UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

☒ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the fiscal year ended December 31, 2022

or

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the transition period from to

Commission File Number 001-34806

QUAD/GRAPHICS, INC.
(Exact name of registrant as specified in its charter)

Wisconsin	**39-1152983**
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)

N61 W23044 Harry's Way, Sussex, Wisconsin 53089-3995
(Address of principal executive offices) (Zip Code)
(414) 566-6000
(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act:

Title of Class	Trading Symbol	Name of Each Exchange on Which Registered
Class A Common Stock, par value $0.025 per share	QUAD	The New York Stock Exchange

Securities registered pursuant to Section 12(g) of the Act: **None**

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☐ No ☒

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes ☐ No ☒

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, smaller reporting company or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer	☐	Accelerated filer	☒
Non-accelerated filer	☐	Smaller reporting company	☒
		Emerging growth company	☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☒

If securities are registered pursuant to Section 12(b) of the Act, indicate by check mark whether the financial statements of the registrant included in the filing reflect the correction of an error to previously issued financial statements. ☐

Indicate by check mark whether any of those error corrections are restatements that required a recovery analysis of incentive-based compensation received by any of the registrant's executive officers during the relevant recovery period pursuant to §240.10D-1(b). ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes ☐ No ☒

The aggregate market value of the class A common stock (based on the closing price of $2.75 per share on the New York Stock Exchange) on June 30, 2022, the last business day of the registrant's most recently completed second fiscal quarter, held by non-affiliates was $97,681,109. The registrant's class B common stock is not listed on a national securities exchange or traded in an organized over-the-counter market, but each share of the registrant's class B common stock is convertible into one share of the registrant's class A common stock.

Indicate the number of shares outstanding of each of the issuer's classes of common stock as of the latest practicable date.

Class	Outstanding as of January 31, 2023
Class A Common Stock	39,865,322
Class B Common Stock	13,556,858
Class C Common Stock	—

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Proxy Statement for the registrant's 2023 Annual Meeting of Shareholders are incorporated by reference into Part III of this Form 10-K.

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QUAD/GRAPHICS, INC.
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Cautionary Statement Regarding Forward-Looking Statements

To the extent any statements in this Annual Report on Form 10-K contain information that is not historical, these statements are forward-looking statements within the meaning of Section 21E of the Securities Exchange Act of 1934, as amended. These forward-looking statements relate to, among other things, the objectives, goals, strategies, beliefs, intentions, plans, estimates, prospects, projections and outlook of Quad/Graphics, Inc. (the "Company" or "Quad"), and can generally be identified by the use of words such as "may," "will," "expect," "intend," "estimate," "anticipate," "plan," "foresee," "believe" or "continue" or the negatives of these terms, variations on them and other similar expressions. In addition, any statements that refer to expectations, projections or other characterizations of future events or circumstances are forward-looking statements.

These forward-looking statements are not guarantees of future performance and are subject to risks, uncertainties and other factors, some of which are beyond the control of the Company. These risks, uncertainties and other factors could cause actual results to differ materially from those expressed or implied by those forward-looking statements. Among risks, uncertainties and other factors that may impact Quad are those described in Part I, Item 1A, "Risk Factors," of this Annual Report on Form 10-K, as such may be amended or supplemented in Part II, Item 1A, "Risk Factors," of the Company's subsequently filed Quarterly Reports on Form 10-Q, and the following:

- The impact of decreasing demand for printed materials and significant overcapacity in a highly competitive environment creates downward pricing pressures and potential under-utilization of assets;
- The impact of fluctuations in costs (including labor and labor-related costs, energy costs, freight rates and raw materials, including paper and the materials to manufacture ink) and the impact of fluctuations in the availability of raw materials, including paper, parts for equipment and the materials to manufacture ink;
- The impact macroeconomic conditions, including inflation, rising interest rates and recessionary concerns, as well as ongoing supply chain challenges, labor availability and cost pressures, distribution challenges and the COVID-19 pandemic, have had, and may continue to have, on the Company's business, financial condition, cash flows and results of operations (including future uncertain impacts);
- The impact of increased business complexity as a result of the Company's transformation to a marketing experience company;
- The inability of the Company to reduce costs and improve operating efficiency rapidly enough to meet market conditions;
- The impact of changes in postal rates, service levels or regulations, including delivery delays;
- The failure to attract and retain qualified talent across the enterprise;
- The impact of a data-breach of sensitive information, ransomware attack or other cyber incident on the Company;
- The fragility and decline in overall distribution channels;
- The impact of digital media and similar technological changes, including digital substitution by consumers;
- The impact negative publicity could have on our business and brand reputation;
- The failure of clients to perform under contracts or to renew contracts with clients on favorable terms or at all;

- The impact of risks associated with the operations outside of the United States ("U.S."), including trade restrictions, currency fluctuations, the global economy, costs incurred or reputational damage suffered due to improper conduct of its employees, contractors or agents, and geopolitical events like war and terrorism;

- The COVID-19 pandemic continues to negatively affect the Company's business, financial condition, cash flows, results of operations, supply chain and raw materials availability, as well as client demand (including future uncertain impacts);

- The failure to successfully identify, manage, complete and integrate acquisitions, investment opportunities or other significant transactions, as well as the successful identification and execution of strategic divestitures;

- Significant investments may be needed to maintain the Company's platforms, processes, systems, client and product technology, marketing and talent, and to remain technologically and economically competitive;

- The impact of the various restrictive covenants in the Company's debt facilities on the Company's ability to operate its business, as well as the uncertain negative impacts macroeconomic conditions may have on the Company's ability to continue to be in compliance with these restrictive covenants;

- The impact of an other than temporary decline in operating results and enterprise value that could lead to non-cash impairment charges due to the impairment of property, plant and equipment and other intangible assets;

- The impact of regulatory matters and legislative developments or changes in laws, including changes in cyber-security, privacy and environmental laws; and

- The impact on the holders of Quad's class A common stock of a limited active market for such shares and the inability to independently elect directors or control decisions due to the voting power of the class B common stock.

Quad cautions that the foregoing list of risks, uncertainties and other factors is not exhaustive and you should carefully consider the other factors detailed from time to time in Quad's filings with the United States Securities and Exchange Commission ("SEC") and other uncertainties and potential events when reviewing the Company's forward-looking statements.

Because forward-looking statements are subject to assumptions and uncertainties, actual results may differ materially from those expressed or implied by such forward-looking statements. You are cautioned not to place undue reliance on such statements, which speak only as of the date of this Annual Report on Form 10-K. Except to the extent required by the federal securities laws, Quad undertakes no obligation to publicly update or revise any forward-looking statements, whether as a result of new information, future events or otherwise.

PART I

Item 1. Business

Overview

Quad is a global marketing experience company that gives brands a more streamlined, impactful, flexible and frictionless way to go to market and reach consumers. The Company leverages its three key competitive advantages — integrated marketing platform excellence, ongoing innovation, and culture and social purpose — to create a better way for its clients, employees and communities. With a marketing platform intentionally built for integrated marketing execution, Quad helps brands reduce the complexity of working with multiple agency partners and vendors; increase marketing process efficiency; and maximize marketing effectiveness. The Company's holistic, multichannel, through-the-line marketing solutions include strategy and consulting, data and analytics, technology solutions, media services, creative and content solutions, and managed services. With unmatched scale for client-based, on-site services and highly qualified talent with expansive subject matter expertise, the Company has the resources and knowledge to help a wide variety of clients across multiple verticals, including those in industries such as retail, publishing, consumer packaged goods, financial services, healthcare, insurance and direct-to-consumer.

Quad was founded in Pewaukee, Wisconsin, as a Wisconsin corporation, in 1971 by the late Harry V. Quadracci. As of January 31, 2023, the Quadracci family, through the Quad/Graphics, Inc. Amended and Restated Voting Trust Agreement ("Quad Voting Trust"), has voting control of approximately 72%, which the Company believes provides it with continued stability and flexibility as Quad works to achieve its long-term strategic vision. As of December 31, 2022, the Company had approximately 15,300 full-time equivalent employees in North America (including Mexico and the Dominican Republic), South America, Europe and Asia, and served a diverse base of approximately 2,900 clients. Quad locations span 14 countries, including 45 manufacturing and distribution facilities and more than 80 client-based on-site locations, with additional investments in printing operations in India.

During Quad's first 40 years, the Company grew rapidly through greenfield growth, built a premier manufacturing and distribution platform equipped with the latest technology, established its reputation as one of the printing industry's foremost innovators, and created a strong company culture based on enduring values and commitment to social purpose that remains in place today.

Beginning in 2010, Quad strategically expanded its offerings to create enhanced value for its clients. Quad saw an opportunity to participate in industry consolidation in response to economic and industry pressures following the great recession of 2008 and 2009 that severely impacted print volumes and accelerated the impact of media disruption. Through a series of disciplined consolidating acquisitions that included World Color Press, Inc., Vertis Holdings Inc., and Brown Printing Company, the Company added experienced talent, and enhanced and expanded its print-based product and services offerings while removing inefficient and underutilized capacity by transitioning work to more efficient facilities and reducing costs. This period of consolidation established a disciplined cost reduction philosophy while creating the opportunity for additional investments in the highly automated and efficient manufacturing and distribution capabilities the Company operates today.

Beginning in 2018, Quad focused on strategic investments in marketing services, talent and technology to accelerate its eventual transformation as a marketing experience company. During this transformation period, Quad made several growth acquisitions including Ivie & Associates, a premier marketing services provider specializing in customized marketing and business process outsourcing with unmatched scale for client-based, on-site marketing services; Periscope, a top five independent creative agency offering world-class capabilities in strategy, including media buying and analytics, creative and account management, and packaging design and pre-media services; and Rise Interactive, a leading performance marketing agency specializing in digital media, analytics and customer experience. In addition, the Company hired business professionals with client-side marketing experience and consulting expertise to strategically expand its integrated marketing offering, enter new market verticals, and change product-centric conversations with clients to a solutions-based approach. To reflect its transformation, the Company evolved its brand from Quad/Graphics to Quad in 2019.

Today, Quad provides brands and marketers with a more efficient and effective way to go to market and reach consumers. Through its integrated marketing platform, the Company creates greater value for clients by removing friction in the marketing process and speeding the overall marketing journey by enabling more effectively integrated marketing ecosystems. For Quad clients, this:

- Reduces the complexities of working with multiple agency partners and vendors by limiting handoffs that occur in the marketing process.
- Increases marketing process efficiency through workflow re-engineering, process optimization and content production at scale.
- Maximizes marketing effectiveness through their ability to target and reach the right audiences; get into market faster; scale resources more efficiently; achieve better integration of offline and online channels; optimize media performance; drive consistent consumer experiences; and realize meaningful cost savings.

As a good corporate citizen, Quad also creates societal value through a strong commitment to proactively addressing environmental, social and governance (ESG) matters, as described in its ESG report, available for download at QUAD.com. This dedication to driving positive, sustainable change in its business and in the world aligns with Quad’s long-standing commitment to create a better way — a hallmark of the Company’s culture.

In 2022, the Company delivered strong financial results while navigating multiple challenges, including an uncertain economic environment, paper and supply chain disruptions, inflationary cost pressures, rising interest rates and labor shortages. Despite these challenges, Quad worked thoughtfully and diligently to mitigate these impacts on the business and proactively manage client expectations. The Company continued to expand its marketing solutions with new and existing accounts, providing clients with the simplicity, efficiency and effectiveness of an integrated approach. Quad also grew print segment share because of its dependable performance, operational and financial stability, and ongoing investments in manufacturing automation. Further, Quad continued to create a better way to drive positive change in its business and the world through its environmental, social and governance commitments in key areas integral to its business strategy as a marketing experience company. Quad believes it will be able to maintain its leading competitive position through its consistent long-term business strategy driven by dedicated and passionate employees, and by providing stability and innovative solutions for clients into the future.

More information regarding Quad is available on the Company’s website at QUAD.com. Quad is not including the information contained on or available through its website as part of, or incorporating such information by reference into, this Annual Report on Form 10-K. The Company’s Annual Report on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and any amendments to those reports are made available to the public at no charge through a link appearing on the Investor Relations section of the Company’s website. Quad provides access to such materials through its website as soon as reasonably practicable after electronically filing such material with, or furnishing it to, the SEC.

Industry and Competition

Quad competes in both the advertising and marketing services industry, and the commercial printing industry. Additional details about the industry landscape and competitive environment in which Quad operates are described below.

According to an October 2022 Dun & Bradstreet First Research report, the U.S. advertising and marketing services industry is forecast to grow at an annual compounded rate of 3% between 2022 and 2026. Within the commercial printing industry, Quad provides targeted print products that are customized to consumers such as catalogs, direct mail, in-store signage and packaging as well as large-scale print products, such as magazines, retail inserts and directories. The secular decline in the company’s large-scale print segments accelerated due to the COVID-19 pandemic, an uncertain economic environment and the continued migration of advertising dollars from print to digital channels. These industry dynamics support Quad’s transformation as a marketing experience company.

Advertising and Marketing Services

The advertising and marketing services industry is highly fragmented. According to the October 2022 Dun & Bradstreet First Research report, the top 50 companies in the U.S. advertising and marketing services industry generate approximately 40% of industry revenue. Services in this industry include multiple advertising (30%), media planning and/or buying (10%), advertising creative (10%), full public relations services (10%), and leased display advertising media space (10%). Other services include coordinating the manufacturing and delivery of promotional items, direct mail advertising, and distribution of advertising materials. The U.S. advertising and marketing services industry includes about 38,000 establishments (single-location companies and units of multi-location companies), with combined annual revenue of about $110 billion.

Advertising and marketing services providers face pressure to satisfy major clients' needs, as the win or loss of a major client account can impact revenue significantly. Additionally, these providers face challenges related to public concern and general annoyance with advertising methods. For example, data collection of personal information for marketing purposes is an issue under continued scrutiny from federal and state legislators, and marketers are facing growing restrictions on certain types of data they collect. In Europe, the European Union continues to enforce data protection through the General Data Protection Regulations.

As consumer media consumption habits change, advertising and marketing services providers face increased demand to offer end-to-end marketing services, from strategy and creative through execution. As new advertising and marketing channels have emerged, these providers have been required to expand their focus beyond traditional channels, such as television, radio, newspapers and print publications, to digital channels, such as email, paid search, digital display and social, to create effective multichannel marketing campaigns for their clients.

The advertising and marketing services industry is affected by real gross domestic product growth, as economic activity and advertising spending are key drivers of consumer demand. In times of economic prosperity, advertisers may increase spending to build brand awareness and to drive sales. Conversely, in times of global economic uncertainty and budget pressures, advertisers may reduce spending.

Competition in the advertising and marketing services industry is based on access to talent, pricing, adapting quickly to new advertising platforms and technology, creating unique and effective multichannel marketing campaigns, and offering superior customer service.

Commercial Printing

The commercial printing industry is also highly fragmented and highly competitive. According to the July 2022 *Printing in the U.S.* IBISWorld industry report, the United States commercial printing industry, in the aggregate, generates an estimated $80 billion in annual revenue, employs more than 421,000 people and is comprised of over 48,000 companies. The report also states that no printing company accounts for more than 5% of total commercial print industry annual revenue in the United States.

The commercial printing industry has moved toward a demand for shorter print runs, faster product turnaround and increased production efficiency of products with lower page counts and increased complexity. This — combined with increases in postage expenses and marketers' increasing use of online marketing and communication channels (exacerbated by the COVID-19 pandemic, as well as the current macroeconomic conditions) — has led to excess manufacturing capacity in the printing industry. This excess capacity has allowed certain larger competitors like Quad, with economies of scale, strong balance sheets and access to capital markets, the ability to invest in automation and more efficient equipment, take advantage of consolidating acquisition opportunities to remove excess, inefficient and/or underutilized capacity, and reduce overall costs.

Like the advertising and marketing services industry, the printing industry is affected by real gross domestic product growth and in times of economic prosperity, advertisers may increase spending to build brand awareness and to drive sales. Conversely, in times of global economic uncertainty and budget pressures, advertisers may reduce spending or shift their spending to other forms of non-print media. For print specifically, magazine publishers that face diminished advertising pages reduce total page counts and frequency; catalog marketers reduce page counts, circulation or frequency of print campaigns; retailers curb investments in store inventory and cut back on retail insert newspaper circulation and advertising; and other advertisers reduce their direct mail volume. It is possible that these businesses instead decide to move print advertising spend to digital alternatives.

Competition in the commercial printing industry is based on the total price of printing, materials and distribution; availability of materials, including paper, which may be more limited in the future as a number of mills reduce graphic paper production capacity in favor of other product lines, such as packaging; quality; distribution capabilities; customer service; access to a highly skilled workforce; availability of labor; availability to schedule work on appropriate equipment; on-time production and delivery; and state-of-the-art technology to meet a client's business objectives.

Quad believes that business users of print and print-related services are focused on generating and tracking the highest returns on their marketing investment. While digital advertising is essential in today's marketing ecosystem, businesses that focus exclusively on online channels at the expense of offline channels may fail to maximize their return on investment (ROI). For example, research released in 2022 by the Association of National Advertisers showed that direct mail generated an average ROI of 112% — topping email (93%), paid search (88%), social media (81%) and digital display (79%).

Quad believes it is well positioned to help brands and marketers achieve the greatest return on their marketing investment when they start with a strong strategy informed by an audience-first approach to get the right message to the right consumer at the right time using the right combination of channels.

Seasonality

Quad is subject to seasonality in its quarterly results as net sales and operating income are higher in the third and fourth quarters of the calendar year as compared to the first and second quarters. The fourth quarter is typically the highest seasonal quarter for cash flows from operating activities and Free Cash Flow due to the reduction of working capital requirements that reach peak levels during the third quarter. Seasonality is driven by increased retail inserts and catalogs primarily due to back-to-school and holiday-related advertising and promotions. The Company expects seasonality impacts to continue in future years.

Strategic Priorities

Quad delivers its overarching business strategy and singular vision as a marketing experience company by executing the Company's five consistent strategic priorities, as outlined here.

Walk in the Shoes of Clients

Quad encourages all employees, regardless of job title, to walk in the shoes of clients by putting a priority on listening to clients' needs and challenges, and doing what they can to make it easy to work with Quad at every touchpoint. Quad focuses on solving problems, and removing pain points and sources of friction wherever a client experiences it in the marketing process. Quad seeks to become an invaluable strategic marketing partner by helping its clients successfully navigate today's constantly evolving media landscape through innovative, data-driven solutions that are produced and deployed efficiently and at scale, across offline and online media channels. A key component of Quad's client-facing strategy is to strengthen relationships at higher levels within a client's organization so the Company can better understand, anticipate and satisfy the organization's requirements, including their broader environmental, social and governance objectives. The Company also delivers proactive thought leadership about key issues facing its clients — including data-driven marketing, mar-tech and postal reform — to help foster loyalty to the Quad brand.

Grow the Business Profitably

This strategic priority centers on profitably growing Quad as a marketing experience company. Key components of this priority are:

- ***Acquire new and expand existing account relationships*** by introducing clients to the Company's holistic, multichannel, through-the-line marketing solutions — encompassing strategy and consulting, data and analytics, technology solutions, media services, creative and content solutions, and managed services — to help them market more efficiently and effectively across offline and online media channels. To this end, Quad is focused on ensuring it has the right talent in the right positions to facilitate strategic marketing conversations and tailored solutions based on a deeper understanding of its clients' needs.

- ***Expand in key vertical industries*** with growth opportunities, such as consumer packaged goods, financial services, healthcare, insurance and direct-to-consumer, while continuing to capitalize on the Company's established expertise in retail and publishing. Through existing and new products and services, Quad delivers solutions that solve client marketing challenges and drive success for their business.

- ***Make disciplined and compelling investments*** that take many different forms. The Company intends to continue to pursue growth investments that help expand and strengthen its integrated marketing platform. In addition, the Company intends to continue making long-term investments in its talent, such as hiring business professionals with client-side marketing and consulting expertise, to enhance its position as a marketing experience company, as well as investments to attract new employees, and increase existing employee engagement, retention and productivity.

Advance One-of-a-Kind Integrated Marketing Platform

The Company operates what it believes to be a truly differentiated integrated marketing platform, intentionally built to remove friction from the marketing process and maximize marketing effectiveness by reducing complexity and increasing efficiency. Through this unique and scalable platform, the Company offers holistic, multichannel, through-the-line marketing solutions. Quad's solutions include strategy and consulting, data and analytics, technology solutions, media services, creative and content solutions, and managed services, which the Company deploys efficiently across multiple offline and online media channels including digital, direct marketing, in-store, packaging and print. With expertise and resources in planning, creating, deploying, measuring and optimizing marketing efforts, Quad guides brands through every effort intended to drive an action, from consumer awareness and trust, to brand preference and purchase. Quad uses a disciplined return on capital framework to make regular, strategic investments in its marketing platform, resulting in what it believes is the most integrated, automated, efficient, innovative and advanced platform of its kind. The Company believes its long-standing culture of universal Continuous Improvement and commitment to Lean Enterprise methodologies, combined with ongoing, strategic investments in talent, technology, products and services, will continue to accelerate its position as a marketing experience company and drive growth.

To strengthen its solutions offering, the Company continually seeks to enhance its product and services portfolio, especially in the data collection and deployment, direct marketing, in-store and packaging spaces, with innovations that support its clients' ability to stand out in a consumer's mailbox or front doorstep, or on the store shelf. These innovations include proprietary solutions unavailable anywhere else in the advertising and marketing services or printing industries.

Additionally, as Quad accelerated its transformation as a marketing experience company over the last several years, it chose to strategically divest of those businesses that could not be easily leveraged as part of its greater integrated marketing platform. Through these types of optimization efforts, Quad has been able to maintain a superior, unparalleled marketing platform that delivers value to clients and, ultimately, their customers.

Empower Employees

Quad views its corporate culture as a strategic competitive advantage. The Company's priority to empower employees throughout their career journey builds on a foundation of Quad's enduring Values, which are centered on trust, innovation, growth, believing in people and doing the right thing. The Company understands that its employees perform better at work when they can simply be themselves — confident in their abilities; comfortable sharing their ideas, opinions and beliefs; and able to bring their truest and best selves to the workplace — all of which leads to a more inclusive environment and better engagement, decision-making and business outcomes.

The Company embraces forward-thinking workplace practices, such as flexible work models; implements innovative talent acquisition strategies to meet its labor and business needs; and provides training and reward programs to engage, develop and retain its employees. Employees are encouraged to take advantage of the Company's focus on employee growth and development, which not only teaches critical on-the-job and leadership skills, but also helps them respond to rapid change, cultivate effective networks, and create high-quality relationships necessary for personal, professional and Company growth.

The Company believes its approach to continuous growth for every employee distinguishes it from other employers. With the Company's encouragement to do things differently, be something greater and create a better way, employees are more fully engaged in their day-to-day activities, producing better results for clients and advancing the Company's strategic priorities.

Additionally, the Company fosters corporate pride and employee engagement by supporting community activities, initiatives and organizations that improve the quality of life of residents near Quad's operations.

Enhance Financial Strength and Create Shareholder Value

Quad follows a disciplined approach to maintaining and enhancing financial strength to create shareholder value. This strategy is centered on the Company's ability to drive profitable growth, and maximize net earnings, Free Cash Flow and operating margins; maintain consistent financial policies to ensure a strong balance sheet, liquidity level and access to capital; and retain the financial flexibility needed to strategically allocate and deploy capital as circumstances change. The priorities for capital allocation and deployment are balanced according to prevailing circumstances and what the Company thinks is best for shareholder value creation at any particular point in time. Those priorities currently include using its Free Cash Flow to continue reducing debt while investing in scaling the business as a marketing experience company to fuel net sales growth; driving profitability through sales growth; and pursuing opportunities to return capital to shareholders through stock buybacks or dividends over the long term.

To provide ongoing improvement in productivity and, ultimately, maximize operating margins, the Company applies holistic Continuous Improvement and Lean Enterprise methodologies to simplify and streamline processes. These same methodologies are applied to its selling, general and administrative functions to create a truly Lean Enterprise. The Company continually works to lower its cost structure by consolidating its manufacturing operations into its most efficient facilities, as well as realizing purchasing, mailing and logistics synergies by centralizing and consolidating print manufacturing volumes, and eliminating redundancies in its administrative and corporate operations. Quad believes that its focused efforts to be the high-quality, low-cost producer generates increased Free Cash Flow and allows the Company to maintain a strong balance sheet through debt reduction. The Company's disciplined financial approach also allows it to maintain sufficient liquidity and to reduce refinancing risk, with the nearest significant debt maturity of $87.7 million occurring in January 2024, and $229.8 million of debt maturities not due until November 2026. The Company had total liquidity of $425.0 million as of December 31, 2022, which consisted of up to $399.8 million of unused capacity under its revolving credit arrangement, which was net of $32.7 million of issued letters of credit, and cash and cash equivalents of $25.2 million. Quad is proud of its strong and trusted banking relationships, which provide the Company with increased financial flexibility to make strategic investments to accelerate its growth and drive profitability as a marketing experience company.

Competitive Advantages

Quad's strategic priorities are powered by its commitment to three key competitive advantages that the Company believes distinguish it from its competitors: integrated marketing platform excellence, ongoing innovation, and culture and social purpose.

Commitment to Integrated Marketing Platform Excellence

Quad's integrated marketing platform gives brands a more streamlined, flexible and frictionless way to go to market and reach consumers. Its platform encompasses the resources brands need to plan, create, deploy, measure and optimize their marketing efforts across all media channels, both offline and online — a key differentiator for the Company. As such, Quad helps its clients:

- Reduce the complexities of working with multiple agency partners and vendors by limiting handoffs that occur in the marketing process.
- Increase the efficiency of marketing processes by re-engineering workflows, optimizing processes and producing content at scale.
- Maximize the effectiveness of their marketing efforts through the Company's ability to target and reach the right audiences; get into market faster; scale resources more efficiently; achieve better integration of offline and online channels; optimize media performance; drive consistent consumer experiences; and realize meaningful cost savings.

Through its holistic, multichannel, through-the-line marketing solutions, Quad guides brands through every effort intended to drive an action, from consumer awareness and trust, to brand preference and purchase. The Company's solutions comprise of:

- Strategy and Consulting;
- Data and Analytics;
- Technology Solutions;
- Media Services;
- Creative and Content Solutions; and
- Managed Services

A key aspect of Quad's integrated marketing platform is dedicated client on-site and near-site teams, including a network of photography and video production studios. These teams serve as an extension of a client's internal marketing department, fulfilling traditional agency executional roles while also providing production efficiencies at scale for content creation, creative production and marketing deployment. Quad's on-site and near-site teams also offer seamless access to additional integrated services and subject matter experts at the Company, removing handoffs and associated friction in the client's marketing process. Backed by its own global production resources that provide around-the-clock service, Quad believes this model increases process efficiencies and enables clients to focus on what they do best: sell more products, services and/or content. Quad has more than 500 professionals embedded at more than 80 on-site locations including grocery, sporting goods, mass merchandise and publishing clients.

Throughout its more than 50-year heritage, the Company has led the industry in printing and print distribution capabilities — the most capital-intensive part of Quad's integrated marketing platform, but also a key point of differentiation from consulting firms, traditional creative agencies or agency holding companies. Traditional agencies or agency holding companies develop creative and then outsource production, while traditional consulting firms provide strategy and then outsource implementation. Quad, however, prides itself on its "maker" culture, creating all campaign elements and providing seamless execution across all channels, offline and online, using its own internal resources.

In commercial printing, Quad continues to make investments in what it believes is the most advanced and efficient print manufacturing and distribution capabilities in the industry, averaging 2% of its annual net sales for capital expenditures over the past five years. These investments include leading-edge digital press technology to enhance targeted print product features as well as advanced equipment and automation, including automated guided vehicles, robotic palletizers and wide-web presses to maximize labor productivity, increase throughput and reduce labor costs, all of which has enabled Quad to remain a high-quality, low-cost producer. Through these ongoing investments — along with innovative front-end toolsets and data workflows, and industry-leading back-end logistics and postal optimization — the Company provides marketers and publishers a better way to produce and deliver more relevant content faster and more cost-effectively. These ongoing investments also have enabled Quad to better serve the needs of its clients who prize direct access to consumers' home mailboxes. Quad carries over its commitment to print to other forms of media, including digital, broadcast, in-store, packaging and out-of-home.

Another key aspect of the Company's manufacturing capabilities is the operation of very large facilities (greater than one million square feet) that produce multiple product lines under one roof to maximize utilization of equipment and labor resources, while also driving savings in certain product lines (such as publications and catalogs) due to economies of scale. The Company continues to strengthen its manufacturing operations by:

- Removing excess and/or under-utilized capacity, and by consolidating work into facilities where it can achieve the greatest manufacturing and distribution efficiencies; and

- Reconfiguring and re-equipping manufacturing facilities for print growth segments, such as direct mail, in-store and packaging.

Postal rates are a significant component of many clients' cost structures, and Quad believes that postal costs directly influence clients' print and mail quantities. Therefore, the Company has invested significantly in its mailing and distribution platform to mitigate increasing postage costs, and to help clients successfully navigate the ever-changing postal environment. One of Quad's postal optimization programs is co-mailing, which involves the sorting and bundling of multiple printed products for mailing to consumers in order to facilitate better integration with the United States Postal Service ("USPS"). In return, the USPS offers significant work-sharing discounts for this sorting, bundling and drop-shipping. Quad's co-mail program is the largest in the printing industry (based on information published or otherwise made available from competitors). Due to the continuously increasing costs of utilizing the USPS and to help control costs for its clients, Quad continues to expand its alternate delivery service to bring products to consumers' doorsteps.

Commitment to Ongoing Innovation

Quad has been at the forefront of innovation for more than 50 years, and believes its commitment to ongoing innovation drives its purpose to create a better way for all of its stakeholders. The Company continually innovates marketing solutions and vertically integrated capabilities related to commercial printing, as well as initiatives to support employee health and wellness.

Marketing Solutions

When it comes to marketing solutions, Quad takes a disciplined approach to (1) expand its existing product offerings; (2) develop and commercialize new product offerings; and (3) deliver integrated solutions that solve clients' marketing and process challenges.

The Company continues to hire talent with client-side marketing experience and consulting expertise to help advance more solutions-based conversations with clients. Quad's sales team is focused on understanding client pain points, and aims to expand relationships with higher-level executives responsible for corporate strategy, including Chief Executive Officers and Chief Marketing Officers. Through these relationships, the Company is able to gain insights into additional client marketing needs, and then uses a disciplined approach to develop and commercialize solutions that incorporate a broad range of Quad's products and services, ultimately expanding and deepening those C-suite relationships.

Among the ways Quad continuously innovates across its holistic, multichannel, through-the-line marketing solutions are:

Strategy and Consulting: Through its premier marketing, advertising and creative talent, Quad creates campaigns that attract attention and activate audiences, while also taking into consideration timely, cost-effective deployment, measurement and optimization. This a key point of differentiation for the Company. Unlike traditional consulting firms that provide strategy and then outsource production and implementation, Quad harnesses the power of its "maker" culture to not only create the strategy behind high-impact marketing efforts, but also produce all the elements and provide seamless execution across all channels.

Data and Analytics: The Company continues to make investments in its market intelligence services to drive stronger results for its clients while saving both the Company and its clients time and money while keeping emerging data privacy principles, laws and regulations top of mind. These services help clients identify both their optimal target audience based on geographics, demographics, psychographics and behaviors, and the best content and mix of channels to reach and engage that audience at the moment they are most receptive. Quad's data and analytics innovations include:

- *Audience services* including an unparalleled household-first targeting approach made possible by Quad's own proprietary database of households. This exclusive database of information is augmented with existing third-party data, along with type, category and volume of mail based on what consumers actually received, to create a powerful targeting tool. Further, the Company's audience services are seamlessly integrated with activation efforts, which yields improved consistency, stronger response and easier measurement.
- *Virtual creative testing* for use in predicting the combination of offer, messaging and imagery across all channels to drive response and engagement. The solution, called Accelerated Marketing Insights, uses a unique combination of high-level mathematics — along with cultural and emotional factors that affect decision-making — to pinpoint how to best motivate a target audience to take a desired action. Marketers who use the platform have experienced lifts in response rates by as much as 10-20%.
- *Brand packaging performance, consumer attention and shelf impact testing* using the latest in biometric technology, such as mobile eye-tracking, facial coding and brain activation, in a simulated shopping environment. The solution, known as Package InSight, provides consumer product goods, brands and marketers with the proprietary data they need to optimize return on investment for brand creative.
- *Measurement services* that help brands understand where to allocate their budget to achieve their business goals. For example, through Connex, the Company's award-winning media optimization platform, digital marketers can unify marketing data across channels and walled gardens, all in one place. The proprietary technology helps uncover performance trends by audience, creative, product, location and more, eliminating the noise of disparate data sets and identifying the specific value-driving actions they need to take in real time to grow their business.
- *Data capture services*, including approaches that improve the consumer experience. For example, the Company helps brands and marketers plan, create, deploy, measure and optimize campaigns using one-to-one Flowcodes® in creative ways that spark consumer interaction offline to online, delivering first-party user scan data that better identifies audiences and their passions. With this data, clients can create and deploy the most relevant content and offers, driving brand loyalty and sales.

Technology Solutions: Quad has been innovating client-facing technology solutions for more than 20 years. Today, the Company's next-gen mar-tech platform uniquely connects marketing strategy, global content creation, analytics and personalized communications across offline and online channels, including the in-store consumer experience. Through this holistic approach, Quad ensures marketing efforts are relevant, consistent and scalable, and achieve optimal return on ad spend.

Additionally, the Company's platform supports the growing importance of retail media networks — a collection of digital channels offered by retailers that are useful to individual brands for reaching and engaging shoppers. As a result, the Company automates connections between a retailer's advertising infrastructure (e.g., websites and apps) and brand advertising content.

Quad's print division leverages its own Smartools® proprietary enterprise resource planning system to provide seamless, real-time information flow across all facets of print manufacturing and deployment — from print sales and estimating to production planning, scheduling, manufacturing, warehousing, logistics, invoicing, reporting and customer service. Quad also has applied robotic process automation in various administrative functions to streamline data processing and report generation. Where appropriate, Quad also leverages artificial intelligence in areas such as labor management, scheduling and predictive machine maintenance.

Media Services: The Company, which manages hundreds of millions of dollars of media billings annually, works with a variety of industry-leading clients to deliver a fully integrated and innovative approach to media across all offline and online channels. Quad excels in audience-led campaign development with the diligence required for optimum engagement. Its approach provides clients with deep exploration into audience behavior to reach consumers with targeted messages in the moments they are most receptive and likely to engage — ultimately leading to the performance and growth clients expect from their media agency. The Company continues to innovate in this space to create additional value for its clients. For example, its integrated connections planning process drives client business performance through data-driven orchestration of the right brand actions in the right moments for the right audiences. Through this process, clients better understand who their most important audiences are, and how to connect with them across all channels and touchpoints on the terms they prefer while driving desired behaviors. The connections planning process is also part of — and integrated with — Quad's creative solutions, outlined below.

Creative and Content Solutions: Clients credit Quad's creative solutions for providing a more integrated, channel agnostic, content-first approach. Instead of creating content by channels or in silos — wasting resources and time, and creating inconsistencies — the Company's holistic and strategic approach focuses on what content is needed, creating it well and deploying it.

The Company has the talent and extensive resources to execute marketers' and publishers' creative and content needs at scale. These resources include videographers, photographers, copywriters, CGI artists and animation experts, among others, who work from Quad's own network of client on-site, near-site and standalone studios and agency locations around the globe.

For clients with their own creative content operations, the Company offers strategic process design services to identify and address process gaps that slow production, create inconsistent brand assets, and/or lead to time-consuming and costly rework.

Managed Services: Quad leverages its deep expertise and expansive network to help clients manage their operations the way it runs its own — with diligence toward efficiency and cost-savings. Through this innovative approach, Quad removes friction in the process, offering clients its network of in-house experts and capabilities for marketing and production outsourcing; sourcing and procurement of goods and services; and print and paper management. By leveraging Quad's knowledge and purchasing power, clients can focus on other critical aspects of their business.

Vertically Integrated Capabilities

Quad has vertically integrated print and non-print capabilities that provide a distinct competitive advantage. For example, the Company has its own prepress/pre-media services, paper procurement, ink manufacturing (through subsidiary Chemical Research/Technology), and logistics and transportation services (through its in-house Quad Transportation Services division and Duplainville Transport trucking division), which the Company leverages to lower costs and enhance customer service for its clients while providing Quad with substantial control over critical links in the overall print supply chain. Through these services, Quad helps improve the quality, cost and availability of key inputs in the printing and distribution processes.

The Company created a health and wellness subsidiary QuadMed, LLC ("QuadMed") in 1990 to address its own employees' needs for quality, cost-effective health care. Today, QuadMed provides worksite health care solutions nationally for approximately 30 employers of all sizes and across all industries, including private and public sector employers. These solutions include on-site, near-site and virtual health delivery of comprehensive primary and preventive care, condition management, wellness programs and coaching, physical therapy, behavioral health, pharmacy services, occupational health and more. Throughout the COVID-19 pandemic, Quad, its employees and their dependents benefited from guidance and best practices provided by QuadMed, which maintains relationships with leading health care and research organizations across the country.

Commitment to Culture and Social Purpose

Quad believes it can do good in the world while doing well as a business. The Company's long-standing focus on "creating a better way" is a reflection of its "maker" culture where employees not only envision solutions, but actually create and execute them. This approach has been a hallmark of the Company's culture for more than 50 years and has inspired creativity in how it addresses environmental, social and governance (ESG) matters and contributed to good corporate citizenship. The Company details its progress on driving positive, sustainable change annually in its ESG report, which includes advancements on environmental and social commitments, several of which were achieved in 2022. Further, the Company believes that its distinct corporate culture, which evolved from a core set of Values conceived by the Company's late founder Harry V. Quadracci, drives thoughtful decision-making, especially around its disciplined approach to managing operations and innovating solutions for clients, better positioning the Company to succeed and grow in a dynamic marketplace.

In this Annual Report on Form 10-K, the Company reports on its commitment to culture and social purpose through achievements in environmental, social (Human Capital Management) and governance matters as outlined below.

Environmental

Quad seeks to operate in an environmentally responsible manner by challenging itself to create better ways to conduct business that better serve the environment, and reflect the values of its clients and their customers. This approach focuses on conserving raw materials, reducing waste and energy use, recycling and reusing products and materials, and reducing environmental impacts wherever possible across Quad's integrated marketing platform.

Examples of Quad's commitment to environmental responsibility and sustainability include:

- Aligning the Company's initiatives with environmentally focused United Nations Sustainable Development Goals (SDG) such as SDG 12: Responsible Consumption and Production and SDG 15: Life on Land.
- Partnering with federal, state and local regulatory agencies; educational institutions; industry trade groups; and non-profit organizations to share knowledge and information, best-management practices, development of new tools and metrics, and innovative technology that lead to the reduction or elimination of environmental impacts.
- Benchmarking environmental performance to evaluate the effectiveness of current environmental management programs and to identify program areas that need improvement or need to be developed.

- Reclaiming materials and diverting them from the landfill through industrial and office recycling programs.
- Mitigating the dangers associated with hazardous waste through comprehensive chemical and hazardous waste management practices, including safe handling practices in our operations and finding ways to reduce the use of chemicals and solvents.
- Maintaining chain-of-custody certifications for sourcing materials from responsibly managed forests (*Forest Stewardship Council®*, *Sustainable Forest Initiative*, and *Program for the Endorsement of Forest Certification*) and partnering with clients to increase certified paper usage.
- Formulating its own brand of *Envirotech™* inks that contain a high percentage of renewable resource (i.e., vegetable) content.
- Developing a co-mailing program — now believed to be the largest in the printing industry — that helps consolidate loads of mail and, thereby, reduce greenhouse gas emissions impact by putting fewer trucks on the road.
- Becoming a founding partner of the U.S. Department of Energy's Better Plants Program, a voluntary program to save energy and money, and reduce the Company's environmental footprint.
- Being an active participant in the State of Wisconsin's Focus on Energy program, an energy efficiency and renewable resource program through which the Company has implemented multiple energy-saving upgrades to its facilities and operations.
- Becoming ISO 50001 Ready through the U.S. Department of Energy in the Company's Hartford, Sussex and West Allis, Wis., and Saratoga Springs, N. Y. facilities, recognizing that these plants have created sound energy policies, established objectives and built structured improvements to generate deep, sustained energy savings.
- Helping clients meet their sustainability goals through sourcing sustainable materials and reporting how the Company's performance affects their carbon footprint.
- Continually educating clients, employees and communities on environmental sustainability matters. These include providing access to internal experts for consultations; hosting symposiums and other educational events at which the clients, suppliers and employees learn about the latest challenges and trends in sustainability; and advancing community education initiatives through non-profits such as Pine View Wildlife Rehabilitation and Education Center in southeastern Wisconsin which creates awareness of sustainability's importance in daily life.

As the owner, lessee or operator of various real properties and facilities, Quad is subject to various federal, state and local environmental laws and regulations, including those relating to air emissions; waste generation, handling, management and disposal; sanitary and storm water discharge; and remediation of contaminated sites. Historically, compliance with these laws and regulations has not had a material adverse effect on the Company's results of operations, financial position or cash flows. Compliance with existing or new environmental laws and regulations may require the Company to make future expenditures.

Human Capital Management

The Company continually invests in and supports its employees. Its people-focused, values-driven culture is a key competitive advantage that the Company believes distinguishes itself from its competitors.

Attracting, Developing and Retaining Highly Qualified Talent

Quad relies on highly qualified, skilled and knowledgeable talent to advance its strategic priorities and maintain its competitive advantage as a marketing experience company. Accordingly, the Company heavily invests in efforts to attract, develop and retain employees, and in tools, technologies, processes, training and education to increase engagement, and drive productivity enhancements and efficiencies across the entire organization.

As of December 31, 2022, the Company had approximately 15,300 full-time equivalent ("FTE") employees in the following geographies:

Geographic Region	Number of FTE Employees
North America (Includes Mexico, Central America and the Caribbean)	12,700
Europe, Middle East and Africa	1,800
South America	700
Asia	100

The ways in which Quad attracts, develops and retains highly qualified talent to accelerate the Company's growth as a marketing experience company include the following:

- Embracing forward-thinking workplace practices, such as flexible work models; implementing innovative talent acquisition strategies to meet labor and business needs; and providing training and reward programs.
- Creating jobs with competitive pay and innovative benefits that support families, strengthen communities and provide long-term career growth opportunities. The Company regularly evaluates its pay practices and structures to ensure that Quad is competitive in the markets where it operates, and equitable based on employees' experience, job responsibilities, performance and business results.
- Offering a Total Rewards package centered on inclusive programs tailored to the unique needs of the whole person and with a continued priority focus on employee total well-being. For additional information, see "Compensation and Benefits" below.
- Offering career development paths for accelerated responsibility and pay, including *Accelerated Career Training*, which provides a fast-track for career advancement in manufacturing positions; *People Leading People*, which focuses on best-in-class manager behaviors; *Corporate Trainee Program*, which develops skills and leadership abilities through a series of agency and corporate rotations; and hands-on, mentor-led manufacturing apprenticeship programs.
- Creating a unique career development program focused on the specific needs of Milwaukee's central city. The program, which includes a recruiting and training hub known as Quad MKE, connects people to family sustaining careers at Quad, and provides the tools and training, and free transportation to set up new employees for success.
- Listening to employees through annual engagement surveys and open forums at department and company-wide meetings to help better understand what employees like about working for the Company, what it can improve, and what could drive greater job satisfaction, and then acting on that employee feedback.
- Fostering pride through employee recognition programs, including an engagement and retention award for manufacturing locations that work to create an engaging workplace; employee and family events; and community outreach activities.
- Providing and maintaining a world-class culture and environment for health and safety. The Company strives for zero workplace injuries and illnesses through its Safety Accountability for All Employees (SAFE) policy which states that no department is considered properly managed — regardless of proficiency in other managerial areas — unless it maintains an acceptable level of safety performance. All employees, from entry-level through senior management, are held accountable for adhering to the Company's safety policies, and are provided with training and other resources.

Compensation and Benefits

The Company invests in its workforce by offering market competitive compensation, regularly conducting total compensation benchmarking as part of its basic operations, as well as offering a comprehensive benefits package as part of its Total Rewards program. Features of this program include:

- Comprehensive medical, prescription, dental and vision coverage to employees, including access to 24/7 telemedicine and virtual care being piloted in certain regions.
- On-site and near-site primary and specialty healthcare, pharmacy, dental, vision and physical therapy services and fitness centers at several large-scale employee locations, operated by the Company's health and wellness subsidiary, QuadMed.
- Robust holistic wellness programming for physical, emotional, financial and social well-being through the company's QLife Wellness program, including a newly launched nationwide behavioral health program in 2022 that provides in-person and virtual counseling through licensed therapists.
- 401(k) retirement savings program with annual discretionary Company match as well as retirement planning and financial wellness resources and webinars.
- Paid vacation time and holidays.
- Short- and long-term disability insurance, and employer-paid life insurance.
- On-site affordable childcare and summer camps for school-aged children at some of the Company's largest manufacturing locations.

Diversity, Equity and Inclusion

Diversity, Equity and Inclusion (DEI) is part of Quad's overall business strategy and a key driver behind specific business outcomes, including attracting and retaining talent, strengthening and protecting its brand reputation, increasing employee productivity, and competing in growth verticals.

Quad's DEI strategy is focused on (1) achieving a workforce that reflects the communities where employees live and work, as well as the clients who trust Quad with their business; (2) ensuring that procedures, processes and distribution of resources create equal opportunities and fair and just outcomes; and (3) creating a safe and open environment where all Quad employees can bring their truest and best selves to work every day, consistent with the Company's long-standing Values.

To achieve its stated DEI goals, the Company has:

- Launched a DEI Task Force that includes representation from all employee levels, Business Resource Groups (BRGs), and many business areas and Company brands, such a QuadMed, Periscope and Rise Interactive. This team helps promote and foster a culture of inclusion, builds and executes a more comprehensive and sustainable strategy, and develops the metrics that will hold the Company accountable for its DEI commitments.
- Strengthened partnerships with nationally recognized DEI experts, consultants, community partners and researchers that include tailored DEI learning and development programs for employees.
- Supported employee-led BRGs through a BRG Advancement Program that includes resource guides, training and annual budgets. Quad's BRGs are designed to cultivate an open company culture for employees who share common interests, providing a way to easily and regularly connect, and encourage each other's growth and development. The Company currently has six BRGs supporting women, military veterans and their families, the LGBTQIA+ community, Black employees, Hispanic / Latinx employees, and working parents.

- Continued to support the education and advancement of talent from untapped communities in the creative industry through scholarships at institutions committed to diversifying the talent pathway, and through talent development programs, such as The BrandLab, a non-profit focused on changing the face and voice of the marketing industry by exposing young people from diverse ethnic and socioeconomic backgrounds to viable creative careers.
- Created and introduced a new DEI performance review competency centered on advancing inclusive behaviors (i.e., behaving in ways that make everyone feel valued, respected and supported). In addition to creating a safe and open environment where all employees can bring their truest and best selves to work every day, the competency directly correlates to improving engagement and retention rates — key business imperatives.
- Continued to engage U.S. employees in DEI-related topics through learning programs and I am. We are., an internal education and communication platform.
- Continued to grow a more inclusive supplier base by developing mutually beneficial relationships with suppliers representing women-, minority-, LGBTQIA+, veteran- and disability-owned businesses.

Building Strong Communities

The Company believes in the power of building strong communities, and understands that its reputation for doing good continues to make Quad the kind of company people choose to work for, do business with, invest in and call a true neighbor. By investing financial resources and providing in-kind services, including volunteerism by employees, the Company:

- Builds economic and social resiliency;
- Helps the underserved and under-resourced;
- Supports community education, arts and service pillars;
- Celebrates with diverse community members; and
- Responds in time of crises.

Communications

The Company believes that timely, transparent communication with all employees is an important engagement tool, and uses a variety of channels to inform and educate employees about business operations and matters of personal importance (e.g., total rewards). These channels include InsideQuad, the employee intranet; executive blogs and video logs (vlogs); executive town halls; department meetings; email; text messaging; in-plant electronic and print signage; and in-home mailings. Quad's CEO hosts regular town halls for all employees, accessible online, and also posts video and written messages.

Corporate Governance

Effective corporate governance has been a part of Quad since its founding and is informed by the Company's Values, especially Do the Right Thing, which strengthens partnerships, reduces risk and creates sustainable value for the long term. Governance starts at the highest level of the Company with oversight by the Board of Directors, which is responsible for minimizing risk while maximizing the effectiveness of Quad's business strategy.

Key aspects of Quad's approach to strong governance practices include:

- Maintaining a high standard for corporate compliance and ethical business practices to keep the business healthy and protect the Company and its stakeholders from risk. The Company's Code of Conduct appears on the employee intranet and corporate website, and explicitly states that Quad is committed to a workplace where every employee, regardless of job title or position, is responsible for doing the right thing.

- Training all employees annually on a suite of ethics and compliance topics, including Code of Conduct, anti-harassment, conflict of interest, C-TPAT, data privacy, HIPAA, information security, physical security, acceptable use policy for technology assets, and anti-bribery and anti-corruption.
- Making it safe and easy for employees to report violations of the Code of Conduct through multiple channels, including a 24/7 Ethics and Compliance Hotline or a web-based reporting tool with guidance in multiple languages.
- Maintaining consistent, stable leadership that is focused on making decisions in the best long-term interest of the Company. The Quadracci family voting control enables the Company to manage its strategy and disciplined financial policy and helps avoid the pitfalls of short-term decision-making that could potentially jeopardize the stability and long-term growth prospects of the Company.
- Retaining an experienced management team with a proven track record that is committed to preserving the Company's Values-based culture. The senior management team's combination of entrepreneurially minded leaders with a long tenure at Quad and strategic new-hires is complemented by managers and employees committed to advancing the Company as a marketing experience company.
- Sustaining a disciplined approach to managing operations and committing to innovating solutions.
- Reducing risk to the business through a formal Enterprise Risk Management program that is managed by an executive risk steering committee that takes a strategic role in risk identification and response planning.
- Continually updating and strengthening the Company's information and data security program to address the fast-changing threat landscape and ensure oversight. The program includes ongoing employee education to ensure physical and digital workspaces remain secure, valuable data remains private, potential phishing and malware threats are spotted, and risky behaviors are avoided.
- Maintaining a Supplier Code of Conduct to ensure suppliers, vendors, contractors, consultants, agents and other providers of goods and services follow the Company's policies related to business integrity, ethical labor and human rights practices, associate health and safety, and environmental management. This Code also includes anti-corruption and anti-bribery policies.

COVID-19

Since March 2020, Quad's response to the COVID-19 pandemic was focused on protecting employees' health and well-being while also protecting the financial health and long-term viability of the Company. The Company's COVID-19 response has been led by an internal Crisis Management Team consisting of leaders from Risk Management, Human Resources, Legal, Manufacturing, Agency Solutions and Communications, as well as medical professionals from QuadMed, the Company's health and wellness subsidiary. The Company's response has been informed by guidance from public health professionals, including the Centers for Disease Control and Prevention (CDC), local health authorities, and direction from federal and state governments, along with best practices and recommendations from QuadMed, which maintains relationships with leading health care organizations and research universities across the country.

During the worst of the pandemic, Quad's Safe at Work program provided for the health and safety of employees while continuing to meet the needs of clients. This program strongly encouraged all employees and family members to get the COVID-19 vaccine and booster; detailed policies and procedures for mask wearing, social distancing, good hygiene, daily disinfecting and more to protect against COVID-19; featured an internal Rapid Response Team of HR and other professionals to assess COVID-19 cases, perform contact tracing, and support and track employees through their return to our work locations; included a branded communication strategy built on transparent, frequent and consistent communication across multiple channels; and equipped any employee able to perform their duties remotely to work from home to prevent the spread of the virus, especially during times of high transmission rates.

In fall 2022, as COVID-19 infection rates and cases continued to drop nationwide, the Company transitioned to a Well at Work program that applied important lessons learned from the COVID-19 pandemic. The Well at Work program encourages employees to make the best choices to protect themselves and those around them against all respiratory viruses, including COVID-19, seasonal flu, Respiratory Syncytial Virus (RSV) and colds. Quad uses its QLife Wellness platform (accessible through the employee intranet) to share important communications and resources, including commonsense measures to protect themselves and others. Through this ongoing program, Quad employees are made aware of how their personal choices impact wellness in all aspects of their lives — physical, emotional, financial and social — while also protecting the health of the business.

Clients

Quad enjoys long-standing relationships with a diverse base of clients, which includes both national and regional corporations in North America, South America, Europe and Asia. The Company's clients include industry-leading blue chip companies that operate in a wide range of industries and serve both businesses and consumers, including retailers, publishers and direct marketers. The Company's relationships with its largest clients average over 19 years in duration.

In 2022, Quad served approximately 2,900 clients, and its ten largest clients accounted for approximately 19% of consolidated sales, with none representing more than 5% individually. The Company believes that its large and diverse client base, broad geographic coverage and extensive range of marketing capabilities are competitive strengths.

Patents, Trademarks and Trade Names

Quad operates research and development facilities that support the development of new equipment, process improvements, raw materials and content management, and distribution technologies to better meet client needs and improve operating efficiencies. The Company continues to innovate within the printing and print-related industry and, as a result, has developed what it believes to be one of the most powerful patent portfolios in the print industry.

Quad currently holds or has rights to commercialize a wide variety of worldwide patents and applications relating to its business. The Company intends to continue to file patent applications that it believes will help ensure the continued strength of the Company and its portfolio. Additionally, the Company markets products, services and capabilities under a number of trademarks and trade names. Quad aggressively defends its intellectual property rights and intends to continue to do so in the future.

Raw Materials

The primary raw materials that Quad uses in its print business are paper, ink and energy. At this time, the Company's supply of raw materials are available from numerous vendors; however, based on market conditions, the current supply is under pressure due to supply chain shortages and higher than expected inflation. The Company generally buys these raw materials based upon market prices that are established with the vendor as part of the procurement process.

Approximately half of the paper used in the printing process is supplied directly by the Company's clients. For those clients that do not directly supply their own paper, the Company makes use of its purchasing efficiencies to supply paper by negotiating with leading paper vendors, uses a wide variety of paper grades, weights and sizes, and does not rely on any one vendor. In addition, the Company generally includes price adjustment clauses in sales contracts for paper and other critical raw materials in the printing process. Although these clauses generally mitigate paper price risk, higher paper prices and tight paper supplies, as well as changes in the United States import or trade regulations, may have an impact on client demand for printed products. The Company's working capital requirements, including the impact of seasonality, are partially mitigated through the direct purchasing of paper by its clients.

The Company produces the majority of ink used in its print manufacturing, allowing it to control the quality, cost and supply of key inputs. Raw materials for the ink manufacturing process are purchased externally from a variety of vendors.

The Company may not be able to fully pass on to clients the impact of higher electric and natural gas energy prices on its manufacturing costs, and increases in energy prices result in higher manufacturing costs for certain of its operations. The Company mitigates its risk through natural gas hedges when appropriate. In its logistic operations, however, the Company is able to pass a substantial portion of any increase in fuel prices directly to its clients.

Information About Our Executive Officers

The following table sets forth the names, ages (as of February 16, 2023) and positions of Quad's executive officers.

Name	Age	Position
J. Joel Quadracci	54	Chairman, President and Chief Executive Officer
Eric N. Ashworth	57	Executive Vice President of Product and Market Strategy, and President of Quad Agency Solutions
Anne M. Bauer	58	Vice President and Chief Accounting Officer
Julie A. Currie	60	Executive Vice President and Chief Revenue Officer
Joshua J. Golden	51	Chief Marketing Officer
Dana B. Gruen	49	General Counsel and Corporate Secretary
David J. Honan	54	Executive Vice President and Chief Operating Officer
Steven D. Jaeger	58	Vice President and Chief Information Officer
Donald M. McKenna	50	Executive Vice President and Chief Administrative Officer
Robert H. Quadracci	55	Chief Human Resources Officer
Anthony C. Staniak	50	Chief Financial Officer
Kelly A. Vanderboom	48	Executive Vice President and Treasurer; Head of Agency Operations and Logistics

Mr. J. Joel Quadracci has been a director of Quad since 2003, its President since January 2005, its President and Chief Executive Officer since July 2006 and its Chairman, President and Chief Executive Officer since January 2010. Mr. Quadracci joined Quad in 1991 and, prior to becoming President and Chief Executive Officer, served in various capacities, including Sales Manager, Regional Sales Strategy Director, Vice President of Print Sales, Senior Vice President of Sales and Administration, and President and Chief Operating Officer. He serves on the board of directors for Plexus Corp., Pixability, Inc., Road America, Inc., Children's Hospital of Wisconsin, the National Association of Manufacturers, and the Metropolitan Milwaukee Association of Commerce. He also serves on the board of trustees for the Milwaukee Art Museum and on the advisory council of the Smithsonian National Postal Museum. Mr. Quadracci received a B.A. in Philosophy from Skidmore College in 1991. Mr. Quadracci is the brother of Kathryn Quadracci Flores, M.D., a director of Quad and President of QuadMed, the brother-in-law of Christopher B. Harned, a director of Quad, and the first cousin of Robert Quadracci, Chief Human Resources Officer. Quad believes that Mr. Quadracci's experience in the printing industry and in leadership positions within Quad qualify him for service as a director of Quad.

Mr. Ashworth has served as Executive Vice President of Product and Market Strategy since joining Quad in 2015 and President of Quad Agency Solutions since April 2016. Prior to joining Quad, Mr. Ashworth was President of SGK, Inc. (formerly Schawk, Inc.) from July 2012 to July 2015; Chief Growth and Strategy Officer of SGK from September 2009 to July 2012; and Global Chief Growth Officer of Anthem Worldwide (a division of SGK) from November 2003 to 2010. Prior thereto, Mr. Ashworth was Co-founder and President of BlueMint Associates from June 2002 through November 2003, after serving in various marketing roles at Fitch San Francisco, Addis Interaction, Levi Strauss & Co., Clorox, Colgate-Palmolive and National Semiconductor. Mr. Ashworth is a board member of Uniting Voices Chicago (formerly Chicago Children's Choir) and The BrandLab, a nonprofit organization that works to increase diversity in the marketing industry.

Ms. Bauer has served as Vice President since January 2022 and Chief Accounting Officer since March 2017. She previously served as Director - Corporate Controller of Quad from May 2016 until March 2017 and then as Executive Director and Chief Accounting Officer until January 2022. She joined Quad in September 2011, serving as Director of Corporate Accounting until May 2016. Prior to joining Quad, Ms. Bauer held various accounting positions at Journal Communications, Inc., during her 18 years there, including Vice President and Controller from June 2000 until September 2011.

Ms. Currie has served as Executive Vice President and Chief Revenue Officer since November 2020. She previously served as Executive Consultant of FCM, LLC from 2019 to 2020. Prior thereto, Ms. Currie served as Senior Vice President of Global Retail Product Leadership from 2016 to 2019; as Senior Vice President, Global Loyalty Commercial Director from 2012 to 2016; as Senior Vice President, Global Business Services North America from 2008 to 2012; as Vice President, National Accounts Group Client Director from 2003 to 2007; and as Vice President, Group Client Director from 2001 to 2003 of The Nielsen Company. Ms. Currie serves on the board of Boys & Girls Club of Lake County, Illinois.

Mr. Golden has served as Chief Marketing Officer since joining Quad in July 2021. Prior to joining Quad, Mr. Golden was the President & Publisher of *Ad Age* from 2016 to 2021. Prior thereto, Mr. Golden served as Vice President, Global Digital Marketing of Xerox from March 2015 to June 2016; as Chief Marketing Officer of Story Worldwide from September 2011 to March 2015; as Chief Digital Officer of Grey Group from September 2010 to September 2011; as Managing Director, Digital of Havas from December 2007 to September 2010; as Group Director of Digital Marketing of NBC Universal from January 2006 to December 2007; and as Head of Digital Division at Young & Rubicam from November 2000 to January 2006.

Ms. Gruen has served as Quad's General Counsel and Corporate Secretary since 2023. Ms. Gruen joined Quad's legal team in 2007 as Employment Counsel, and became Assistant General Counsel in 2014. She became Deputy General Counsel and Chief Compliance Officer in 2015, and was promoted to Vice President in this role in 2016. In 2020, Ms. Gruen became Vice President, Chief Compliance and Risk Officer & Deputy General Counsel, and in 2022 was promoted to Senior Vice President, Chief Risk & Compliance Officer and Deputy General Counsel. Prior to joining Quad, Ms. Gruen was an associate attorney at Foley & Lardner, Sonnenschein Nath & Rosenthal (now part of Dentons), and Seyfarth Shaw.

Mr. Honan has served as Executive Vice President and Chief Operating Officer since January 2022. He previously served as Executive Vice President and Chief Financial Officer from January 2015 to December 2021; Vice President and Chief Financial Officer from March 2014 to January 2015; Vice President and Chief Accounting Officer from July 2010 to March 2014; Vice President and Corporate Controller from December 2009 to July 2010; and Corporate Controller from when he joined Quad in May 2009 until December 2009. Currently, he serves on the advisory board of FM Global. Prior to joining Quad, Mr. Honan served as Vice President, General Manager and Chief Financial Officer of Journal Community Publishing Group, a subsidiary of diversified media company Journal Communications Inc., for five years, and executive-level roles in investor relations and corporate development at Newell Rubbermaid, a global marketer of consumer and commercial products. Prior thereto, Mr. Honan worked at the accounting firm Arthur Andersen LLP for 11 years.

Mr. Jaeger has served as Vice President and Chief Information Officer since November 2015. He previously served as Executive Vice President, President of Direct Marketing and Chief Information Officer from November 2014 to November 2015; as Executive Vice President, President of Direct Marketing and Media Solutions and Chief Information Officer from March 2014 to November 2014; as Corporate Vice President of Information and Technology since 2013; as Vice President of Information Systems and Infrastructure from 2007 to 2012; and as President of Quad/Direct from August 2007 until 2013. Prior thereto, Mr. Jaeger served as Quad's Vice President of Information Systems from 1998 to 2006 and worked in various other capacities since he joined Quad in 1994. Prior to joining Quad, Mr. Jaeger worked for Andersen Consulting for eight years.

Mr. McKenna has served as Executive Vice President and Chief Administrative Officer of Quad since January 2022. He previously served as Senior Vice President of Sales Administration from August 2018 to January 2022; Vice President of Sales Administration from June 2013 to August 2018; and Product Planning Manager from March 2010 to June 2013. Prior to joining Quad, Mr. McKenna worked at J.S. Eliezer Associates, a print consulting firm in Stamford, Conn., beginning in 1998 and was named President of the firm in 2004, the leadership role he maintained until joining Quad in 2010.

Mr. Robert Quadracci has served as Quad's Chief Human Resources Officer since 2023. Previously, he was Vice President of Human Resources - Sales, Marketing & Quad Agency Solutions from January 2022 to February 2023; Executive Director – Human Resources from 2014 to 2022; and Human Resources Director from 1999 to 2014. Prior to joining Quad, Mr. Quadracci worked at Edison International from 1992 to 1999 as a Project Manager, Workforce Management and Corporate Redeployment. Mr. Quadracci is the first cousin of J. Joel Quadracci, Chairman, President and Chief Executive Officer of Quad, and Kathryn Quadracci, M.D., a director of Quad and President of QuadMed.

Mr. Staniak has served as Chief Financial Officer of Quad since January 2022. Previously, he served as Vice President of Finance from March 2017 until January 2022. Joining the company in 2009 as Director of External Reporting, Mr. Staniak was subsequently named Director of Internal Audit in 2011; Executive Director – Financial Controller in 2013; Chief Accounting Officer in 2014; and Vice President and Chief Accounting Officer in 2015. Prior to joining Quad, Mr. Staniak was Chief Financial Officer of data consulting firm Sagence, Inc. He began his career at the accounting firm Arthur Andersen LLP in 1995. Mr. Staniak is a member of the Wisconsin Institute of Certified Public Accountants and the Board of Directors for the Zoological Society of Milwaukee.

Mr. Vanderboom has served as Executive Vice President since 2018, Treasurer and President of Logistics since March 2014 and Head of Agency Operations since February 2023. He previously served as Vice President of the Program Management Office (PMO) from October 2019 until February 2023 (in which he led Quad's EBITDA enhancement initiatives). Since joining Quad in 1993, he has served in various leadership capacities, including Controller of Parcel Direct, a freight expediting subsidiary sold to FedEx in 2004; Controller of Quad's Distribution and Facilities departments from 2004 until 2006; Director of Treasury, Risk & Planning, beginning in 2007; and Vice President, beginning in 2008. Mr. Vanderboom serves on the advisory board at Rise Interactive, a Quad company.

Executive officers of Quad are elected by and serve at the discretion of Quad's Board of Directors. Other than described above, there are no family relationships between any directors or executive officers of Quad.

Item 1A. Risk Factors

You should carefully consider each of the risks described below, together with all of the other information contained in this Annual Report on Form 10-K, before making an investment decision with respect to Quad's securities. If any of the following risks develop into actual events, the Company's business, financial condition or results of operations could be materially and adversely affected, and you may lose all or part of your investment.

Risks Relating to Quad's Business, Operations and Industry

Decreases in demand for printing services caused by factors outside of the Company's control, including the substitution of printed products with digital content, prior and any future recessions, nationwide supply chain disruption, as well as significant downward pricing pressure, may continue to adversely affect the Company.

The Company and the overall printing industry continues to experience a reduction in demand for printed materials and overcapacity due to various factors including the sustained and increasing shift of digital substitution by marketers and advertisers (to both replace and augment campaigns that were historically focused on print), which was exacerbated by the COVID-19 pandemic, as well as the current macroeconomic conditions and prior recessions (which have severely impacted print volumes and further accelerated the impact of media disruption). The impacts of overcapacity, as well as intense competition, have led to the Company experiencing significant downward pricing pressures for printing services in recent years and such pricing may continue to decline from current levels. Any future increases in the supply of printing services or decreases in demand could cause prices to continue to decline, and prolonged periods of low prices, weak demand and/or excess supply could have a material adverse effect on the Company's business growth, results of operations and liquidity.

The media landscape is experiencing rapid change due to the impact of digital media and content on printed products. Improvements in the accessibility and quality of digital media through the online distribution and hosting of media content, mobile technologies, e-reader technologies, digital retailing and the digital distribution of documents and data has resulted and may continue to result in increased consumer substitution. Continued consumer acceptance of such digital media, as an alternative to print materials, is uncertain and difficult to predict and may decrease the demand for the Company's printed products, result in reduced pricing for its printing services and additional excess capacity in the printing industry, and adversely affect the results of the Company's operations.

The Company may be adversely affected by increases in its operating costs, including the cost and availability of paper, ink components and other raw materials, parts for equipment, labor-related costs, fuel and other energy costs and freight rates.

The primary raw materials that the Company uses in its print business are paper, ink and energy. The price of such raw materials has fluctuated over time and has caused fluctuations in the Company's net sales and cost of sales. This volatility may continue and the Company may experience increases in the costs of its raw materials in the future as prices in the overall paper, ink and energy markets are expected to remain beyond its control. The price and availability of paper may also be adversely affected by paper mills' permanent or temporary closures, and mills' access to raw materials, conversion to produce other types of paper, and ability to transport paper produced. The price and availability of ink and ink components may be adversely affected by the availability of component raw materials, labor and transportation.

Approximately half of the paper used by the Company is supplied directly by its clients. For those clients that do not directly supply their own paper, the Company generally includes price adjustment clauses in sales contracts for paper and other critical raw materials in the printing process. Although these clauses generally mitigate paper price risk, higher paper prices and tight paper supplies may have an impact on client demand for printed products. If the Company passes along increases in the cost of paper and the price of the Company's products and services increases as a result, client demand could be adversely affected, and thereby, negatively impact the Company's financial performance. If the Company is unable to continue to pass along increases in the cost of paper to its clients, future increases in paper costs would adversely affect its margins and profits.

Due to the significance of paper in the Company's print business, it is dependent on the availability of paper. In periods of high demand, certain paper grades have been in short supply, including grades used in the Company's business. In addition, during periods of tight supply, many paper producers allocate shipments of paper based upon historical purchase levels of clients. Additionally, the declining number of paper suppliers has resulted in a contraction in the overall paper manufacturing industry. This contraction of suppliers may cause overall supply issues, may cause certain paper grades to be in short supply or unavailable, and may cause paper prices to substantially increase.

Although historically the Company generally has not experienced significant difficulty in obtaining adequate quantities of paper, continued decline in suppliers, changes in United States import or trade regulations, or other developments in the overall paper markets could result in a decrease in the supply of paper and could adversely affect the Company's revenues or profits. In addition, the Company may not be able to resell waste paper and other by-products or the prices received for their sale may decline substantially.

The Company is dependent upon the vendors within the Company's supply chain to maintain a steady supply of inventory, parts for equipment and materials. Many of the Company's products are dependent upon a limited number of vendors, and significant disruptions could adversely affect operations (including labor pressures, distribution challenges, recessionary concerns and other macroeconomic conditions). Under current market conditions, it is possible that one or more of the Company's vendors will be unable to fulfill their operating obligations due to financial hardships, liquidity issues or other reasons.

The Company may not be able to fully pass on to clients the impact of higher electric and natural gas energy prices on its manufacturing costs, and increases in energy prices result in higher manufacturing costs for certain of its operations.

Labor represents a significant component of the cost structure of the Company. Increases in wages, salaries and the cost of medical, dental, pension and other post-retirement benefits may impact the Company’s financial performance. Changes in interest rates, investment returns or the regulatory environment may impact the amounts the Company will be required to contribute to the pension plans that it sponsors and may affect the solvency of these pension plans. The Company may be unable to achieve labor productivity targets, to retain employees or labor may not be adequately available in locations in which the Company operates, which could negatively impact the Company’s financial performance.

Freight rates and fuel costs also represent a significant component of the Company’s cost structure. In general, the Company has been able to pass along increases in the cost of freight and fuel to many of its clients. If the Company is not able to pass along a substantial portion of increases in freight rates or in the price of fuel, future increases in these items would adversely impact the Company’s margin and profits. If the Company passes along increases in the cost of freight and fuel and the price of the Company’s products and services increases as a result, client demand could be adversely affected, and thereby, negatively impact the Company’s financial performance.

Macroeconomic conditions could have a material adverse impact on the Company’s business, financial conditions, cash flows and results of operations.

Macroeconomic conditions, including inflation, rising interest rates and recessionary concerns, as well as ongoing supply chain challenges, labor availability and cost pressures, distribution challenges and the COVID-19 pandemic, have had, and may continue to have, a negative impact on the Company’s business, financial condition, cash flows and results of operations. For instance, the Company was negatively impacted in 2022 by rising interest rates and the increasing cost and availability of raw materials, such as paper, ink, supplies, parts for equipment, distribution and labor. In addition in 2022, the Company experienced certain distribution challenges, including, but not limited to, delivery delays at the USPS and recent volume restrictions at the United Parcel Service, Federal Express and certain local couriers, which negatively impacted the Company.

Demand for the Company’s products and services, in general, is highly related to general economic conditions in the markets the Company’s clients serve. Declines in economic conditions in the United States or in other countries in which the Company operates, including as a result of macroeconomic conditions, recessionary concerns and/or geopolitical events, may adversely impact the Company’s financial results, and these impacts may be material. Economic weakness and constrained advertising spending have resulted, and may in the future result, in decreased revenue, operating margin, earnings and growth rates and difficulty in managing inventory levels and collecting accounts receivable. The Company has experienced, and expects to experience in the future, excess capacity and lower demand due to economic factors affecting consumers’ and businesses’ spending behavior, including as a result of macroeconomic conditions, recessionary concerns and/or geopolitical events.

The Company expects inflationary cost pressures and certain supply chain shortages and distribution challenges to potentially continue through 2023 and the Company may not be able to fully mitigate the impact of the rising inflationary cost pressures through price increases. Continuing or worsening inflation, recessionary concerns and/or supply chain and distribution challenges may have a material adverse impact on the Company’s business, financial condition, cash flows and/or results of operations.

The Company's transformation to a marketing experience company increases the complexity of the Company's business, and if the Company is unable to successfully adapt its marketing offerings and business processes as required by these new markets, the Company will be at a competitive disadvantage and its ability to grow will be adversely affected.

As the Company expands its integrated marketing platform, the overall complexity of the Company's business increases at an accelerated rate and the Company becomes subject to different market dynamics. The new markets into which the Company is expanding, or may expand, may have different characteristics from the markets in which the Company historically competed. These different characteristics may include, among other things, demand volume requirements, demand seasonality, product generation development rates, client concentrations and performance and compatibility requirements. The Company's failure to make the necessary adaptations to its business model to address these different characteristics, complexities and new market dynamics could adversely affect the Company's operating results.

The Company operates in a highly competitive environment.

The advertising and marketing services industries are highly competitive and are expected to remain so. Any failure on the part of the Company to compete effectively in the markets it serves could have a material adverse effect on its results of operations, financial condition or cash flows and could require changes to the way it conducts its business or require it to reassess strategic alternatives involving its operations.

The Company operates primarily in the commercial print portion of the printing industry, which is highly fragmented and competitive in both the United States and internationally. The Company competes for business not only with large and mid-sized printers, but also with smaller regional printers and the growing forms of digital alternatives to print. In certain circumstances, due primarily to factors such as freight rates and client preference for local services, printers with better access to certain regions of a given country may be preferred by clients in such regions.

Some of the industries that the Company services have been subject to consolidation efforts, leading to a smaller number of potential clients. Furthermore, if the smaller clients of the Company are consolidated with larger companies using other printing companies, the Company could lose its clients to competing printing companies.

The Company may not be able to reduce costs and improve its operating efficiency rapidly enough to meet market conditions.

Because the markets in which the Company competes are highly competitive, the Company will need to continue to improve its operating efficiency in order to maintain or improve its profitability. There can be no assurance that the Company's continuing cost reduction efforts will continue to be beneficial to the extent anticipated, or that the estimated productivity, cost savings or cash flow improvements will be realized as anticipated or at all. If the Company's efforts are not successful, it could have an adverse effect on the Company's operations and competitive position. In addition, the need to reduce ongoing operating costs have and, in the future, may continue to result in significant up-front costs to reduce workforce, close or consolidate facilities, or upgrade equipment and technology.

Changes in postal rates, postal regulations and postal services may adversely impact clients' demand for print products and services.

Postal costs are a significant component of the cost structures of many of the Company's clients and potential clients. Postal rate changes and USPS regulations that result in higher overall costs can influence the volume that these clients will be willing to print and ultimately send through the USPS.

Integrated distribution with the USPS is an important component of the Company's business. Any material change in the current service levels provided by the postal service could impact the demand that clients have for print services. The USPS continues to experience financial problems. The passing of the Postal Service Reform Act of 2022, signed in April 2022, gave the USPS considerable financial relief as well as significant relief over the next ten years. While the legislative postal reform helps considerably, without decreased operational cost structures, increased efficiencies or increased volumes and revenues, these losses will potentially continue into the future. As a result of these financial difficulties, the USPS has continued to adjust its postal rates and service levels. Additional price increases may result in clients reducing mail volumes and exploring the use of alternative methods for delivering a larger portion of their products, such as continued diversion to the internet and other alternative media channels, in order to ensure that they stay within their expected postage budgets.

The USPS offers "work-share" discounts that provide incentives to co-mail and place product as far down the mail-stream as possible. Discounts are earned as a result of less handling of the mail, and therefore, lower costs for the USPS. As a result, the Company has made substantial investments in co-mailing technology and equipment to ensure clients benefit from these discounts. As the USPS reacts to its financial difficulties, it often revises design standards for mail entering its system. These design standards often increase costs for clients and, in turn, decrease the value of the cost reductions that the Company's co-mailing services provide. If the incentives to co-mail are decreased by USPS regulations, the overall cost to mail printed products will increase and may result in print volumes declining.

Federal statute requires the Postal Regulatory Commission ("PRC") to conduct reviews of the overall rate-making structure for the USPS to ensure funding stability. As a result of those reviews, the PRC authorized a five year rate-making structure that provides the USPS with additional pricing flexibility over the Consumer Price Index cap, which may result in a substantially altered rate structure for mailers. The revised rate authority that is effective as a result of the rules issued by the PRC includes a higher overall rate cap on the USPS' ability to increase rates from year to year. The USPS is expected to use these additional rate authorities to implement twice a year increases in the future. This has led to price spikes for mailers and may also reduce the incentive for the USPS to continue to take out costs and instead continue to rely on postage to cover the costs of an outdated postal service that does not reflect the industry's ability or willingness to pay. The uncertainty as to how much of the authority the USPS will use on any specific rate increase also creates potential volume declines as rate predictability with respect to cost is no longer known for mailers. The result may be reduced demand for printed products as clients may move more aggressively into other delivery methods, such as the many digital and mobile options now available to consumers.

Failure to attract and retain qualified talent across the enterprise could materially adversely affect the Company's business, competitive position, financial condition and results of operations.

The Company continues to be substantially dependent on its production personnel to print the Company's products in a cost-effective and efficient manner that allows the Company to obtain new clients and to drive sales from the Company's existing clients. The Company believes that there is significant competition for production personnel with the skills and technical knowledge that the Company requires, especially in light of the labor shortages which initially resulted from the COVID-19 pandemic. The Company's ability to continue efficient operations, reduce production costs, and consolidate operations will depend, in large part, on the Company's success in recruiting, training, integrating and retaining sufficient numbers of production personnel to support the Company's production, cost savings and consolidation targets. New hires require extensive training and it may take significant time before they achieve full productivity. In addition, increases in the wages paid by competing employers, including as a result of current macroeconomic conditions, has resulted, and may continue to result, in increases in the wage rates that the Company must pay. As a result, the Company has and may continue to incur additional costs to attract, train and retain employees, including expenditures related to salaries and benefits, and the Company may lose new, as well as existing, employees to competitors or other companies before the Company realizes the benefit of its investment in recruiting and training them. If the Company is unable to hire and train sufficient numbers of personnel, the Company's business would be adversely affected. The nationwide shortage of available production personnel may also put a strain on the Company's ability to accept new work from client requests, including during the Company's seasonally higher third and fourth quarters.

The Company's future success also depends on its continuing ability to identify, hire, develop, and retain its executive management team, including its Chief Executive Officer, and other personnel for all areas of the organization.

Approximately 1,400 of the Company's United States and international employees are covered by an industry wide agreement, a collective bargaining agreement or through a works council or similar arrangement. While the Company believes its employee relations are good and that the Company maintains an employee-centric culture, and there has not been any material disruption in operations resulting from labor disputes, a strike or other forms of labor protest affecting the Company's United States or international plants, distribution centers or other facilities in the future could materially disrupt the Company's operations and result in an adverse impact on its financial condition, results of operations and cash flows, which could force the Company to reassess its strategic alternatives involving certain of its operations.

The Company may suffer a data-breach of sensitive information, ransomware attack or other cyber incident. If the Company's efforts to protect the security of information or systems are unsuccessful, any such failure may result in costly government enforcement actions and/or private litigation, and the Company's business and reputation could suffer.

The Company and its clients are subject to various United States and foreign cyber-security laws, which require the Company to maintain adequate protections for electronically held information. The Company may not be able to anticipate techniques used to gain access to the Company's systems or facilities, the systems of the Company's clients or vendors, or implement adequate prevention measures. Moreover, unauthorized parties may attempt to access the Company's systems or facilities, or the systems of the Company's clients or vendors, through fraud or deception. In the event and to the extent that a data breach, ransomware attack or other cyber incident occurs, such breach could have an adverse effect on the Company's business and results of operations. Complying with these various laws could cause the Company to incur substantial costs or require changes to the Company's business practices in a manner adverse to the Company's business.

The fragility of and decline in overall distribution channels may adversely impact clients' access to cost effective distribution of their advertising materials, and therefore may adversely impact the Company's business.

The distribution channels of print products and services, including the newspaper industry, face significant competition from other sources of news, information and entertainment content delivery. If overall distribution channels, including newspaper distribution channels, continue to decline, the Company's clients may be adversely impacted by the lack of access to cost effective distribution of their advertising materials. In turn, this decline in cost effective distribution channels may force clients to use other avenues of distribution that may be at significantly higher cost, which may decrease demand for the Company's products and services, and thus adversely affect the Company's financial condition, results of operations and cash flows.

Negative publicity could have an adverse impact on the Company's business and brand reputation.

Unfavorable publicity, whether accurate or not, related to the Company or the Company's executive management team, employees, board of directors, operations, business or prospects, or to the Quadracci family shareholders of the Company, could negatively affect the Company's reputation, stock price, ability to attract new clients from growth vertical industries, ability to attract and retain high-quality talent, or the performance of the Company's business.

In addition, there has been a substantial increase in the use of social media platforms, including blogs, social media websites, and other forms of internet-based and mobile communications, which allow individuals access to a broad audience of consumers and other interested persons. Many social media platforms immediately publish the content their subscribers' and participants' post, often without filters or checks on accuracy of the content posted. Information or commentary posted on such platforms at any time may be adverse to the Company's interests or may be inaccurate, each of which may harm the Company's reputation, business or prospects. The harm may be immediate without affording the Company an opportunity for redress or correction.

The Company's business depends substantially on client contract renewals and/or client retention. Any contract non-renewals, renewals on different terms and conditions or decline in the Company's client retention or expansion could materially adversely affect the Company's results of operations, financial condition and cash flows.

The Company has historically derived a significant portion of its revenue from long-term contracts with significant clients. If the Company loses significant clients (including as a result of reduced demand for a client's products or services), is unable to renew such contracts on similar terms and conditions, or at all, or is not awarded new long-term contracts with important clients in the future, its results of operations, financial condition and cash flows may be adversely affected.

The Company is exposed to risks of loss in the event of nonperformance by its clients. Some of the Company's clients are highly leveraged or otherwise subject to their own operating and regulatory risks. Even if the Company's credit review and analysis mechanisms work properly, the Company may experience financial losses and loss of future business if its clients become bankrupt, insolvent or otherwise are unable to pay the Company for its work performed. Any increase in the nonpayment or nonperformance by clients could adversely affect the Company's results of operations and financial condition.

Certain industries in which the Company's clients operate are experiencing consolidation. When client consolidation occurs, it is possible that the volume of work performed by the Company for a client after the consolidation will be less than it was before the consolidation or that the client's work will be completely moved to competitors. In addition, new and enhanced technologies, including search, web and infrastructure computing services, digital content, and electronic devices, may affect clients. The internet facilitates competitive entry and comparison shopping, and the reliance on digital retailing may reduce clients' volume. Any such reduction or loss of work could adversely affect the Company's results of operations and financial condition.

There are additional risks associated with the Company's operations outside of the United States, including trade restrictions, currency fluctuations, the global economy, and geopolitical events like war and terrorism.

Net sales from the Company's wholly-owned subsidiaries outside of the United States accounted for approximately 13% and 11% of its consolidated net sales for the years ended December 31, 2022 and 2021, respectively.

As a result, the Company is subject to the risks inherent in conducting business outside of the United States, including, but not limited to: the impact of economic and political instability; fluctuations in currency values, foreign-currency exchange rates, devaluation and conversion restrictions; exchange control regulations and other limits on the Company's ability to import raw materials or finished product; tariffs and other trade barriers; trade restrictions and economic embargoes by the United States or other countries; health concerns regarding infectious diseases (such as COVID-19); adverse weather or natural disasters; social unrest, acts of terrorism, force majeure, war or other armed conflicts; inflation and fluctuations in interest rates; language barriers; difficulties in staffing, training, employee retention and managing international operations; logistical and communications challenges; differing local business practices and cultural consideration; restrictions on the ability to repatriate funds; foreign ownership restrictions and the potential for nationalization or expropriation of property or other resources; longer accounts receivable payment cycles; potential adverse tax consequences and being subject to different legal and regulatory regimes that may preclude or make more costly certain initiatives or the implementation of certain elements of its business strategy.

The COVID-19 pandemic continues to negatively affect the Company's business, financial conditions, cash flows, results of operations, supply chain and raw materials availability, as well as client demand.

Since the first quarter of 2020, there has been a worldwide impact from the COVID-19 pandemic. Quad has significant operations in the United States and printing operations or investments in printing operations in England, France, Germany, Poland, Colombia, Mexico, Peru and India, and each of these countries has been affected by the pandemic and taken measures to try to contain the virus, such as limiting or closing business activities, transportation and person-to-person interactions, resulting in disruptions at some of the Company's printing facilities and support operations, as well as the operations of the Company's clients and suppliers. In some cases, the relaxation of such trends has been followed by actual or contemplated returns to stringent restrictions on commerce or gatherings, including in parts of the United States and the rest of the world.

Global trade conditions and client trends that originated during the pandemic continue to persist and may also have a long-lasting adverse impact on the Company independently of the progress on the pandemic. For example, the COVID-19 pandemic weakened demand for the Company's products and services, disrupted the Company's supply chain and resulted in rising inflationary cost and labor pressures, distribution challenges, recessionary concerns and other evolving macroeconomic conditions. The COVID-19 pandemic has had, and could continue to have, a negative impact on the Company's business, financial condition, cash flows, results of operations, supply chain and raw materials availability, although the full extent is still uncertain and cannot be predicted.

In addition to the COVID-19 pandemic, future natural disasters, epidemics, other public health crises, conflicts, wars, terrorist attacks, fires or other catastrophic events affecting the Company's plants, distribution centers or other facilities, could also materially disrupt the Company's operations and result in an adverse impact on its financial condition, results of operations and cash flows, which could force the Company to reassess its strategic alternatives involving certain of its operations.

If the Company fails to identify, manage, complete and integrate acquisitions, investment opportunities or other significant transactions, as well as identify and execute strategic divestitures, it may adversely affect the Company's future results and ability to implement its business strategy.

The Company may pursue acquisitions of, investment opportunities in, or other significant transactions with, companies that are complementary to the Company's business, as well as divestitures of businesses, product lines or other assets. In order to pursue this strategy successfully, the Company must identify attractive acquisition or investment opportunities, successfully complete the transaction, some of which may be large and complex, and manage post-closing issues such as integration of the acquired company or employees. The Company may not be able to identify or complete appealing acquisition or investment opportunities given the intense competition for these transactions. Even if the Company identifies and completes suitable corporate transactions, the Company may not be able to successfully address inherent risks in a timely manner, or at all. These inherent risks include, among other things: failure to achieve all or any projected synergies, performance targets or other anticipated benefits of the acquisition, investment or divestiture; failure to successfully integrate the purchased operations, technologies, products or services and maintain uniform standard controls, policies and procedures; substantial unanticipated integration costs; loss of key employees, including those of an acquired business; diversion of management's attention from other business concerns; failure to retain the clients of the acquired business; additional debt and/or assumption of known or unknown liabilities; potential dilutive issuances of equity securities; and a write-off of goodwill, client lists, other intangibles and amortization of expenses. If the Company fails to successfully integrate an acquisition, the Company may not realize all or any of the anticipated benefits of the acquisition, and the Company's future results of operations could be adversely affected.

In addition, the acceleration of the Company's transformation to a marketing solutions partner is partially dependent upon the Company's continued ability to identify and execute strategic divestiture opportunities to generate cash and related benefits. There can be no assurance whether the strategic benefits and expected financial impact of any divestitures will be achieved.

Financial Risks

The Company may be required to make investments, including capital expenditures and in the development and implementation of new systems, client technology, product technology, marketing and talent to sustain and grow its platforms and processes, in part to keep pace with industry developments and client expectations, and to remain technologically and economically competitive, which may increase its costs, reduce its profits, disrupt its operations or adversely affect its ability to implement its business strategy.

The printing and advertising and marketing services industries are experiencing rapid change as new digital technologies are developed that offer clients an array of choices for their marketing and publication needs. In order to remain competitive, the Company will need to adapt to future changes, especially with regard to technology and talent, to enhance the Company's existing offerings and introduce new offerings to address the changing demands of clients. In order to remain technologically and economically competitive, the Company may need to make significant capital expenditures and other investments, including in its talent, as it develops and continues to maintain its platforms and processes, and to develop and integrate new technologies. In order to accomplish this effectively, the Company will need to deploy its resources efficiently, maintain effective cost controls and bear potentially significant market and raw material risks. If the Company's revenues decline, it may impact the Company's ability to expend the capital necessary to develop and implement new technology and be economically competitive. Debt or equity financing, or cash generated from operations, may not be available or sufficient for these requirements or for other corporate purposes or, if debt or equity financing is available, it may not be on terms favorable to the Company. In addition, even if capital is available to the Company, there is risk that the Company's vendors will have discontinued the production of parts needed for repairs, replacements or improvements to the Company's existing platforms, leading the Company to expend more capital than expected to perform such repairs, replacements or improvements. The Company's business and operating results may be adversely affected if the Company is unable to keep pace with relevant technological and industry changes or if the technologies or business strategies that the Company adopts or services it promotes do not receive widespread market acceptance.

If the Company is unable to make the capital expenditures and other investments necessary to adapt to industry and technological developments, the Company may experience a decline in demand for its services, be unable to implement its business strategy and its business operating results may be adversely affected. Additionally, if the Company is unable to meet future challenges from competing technologies on a timely basis or at an acceptable cost, the Company could lose clients to competitors. In general, the development of new communication channels inside and outside the printing and media solutions industry requires the Company to anticipate and respond to the varied and continually changing demands of clients. The Company may not be able to accurately predict technological trends or the success of new services in the market.

The Company's debt facilities include various covenants imposing restrictions that may affect the Company's ability to operate its business.

On September 1, 1995, and as last amended on November 24, 2014, the Company entered into a senior secured note agreement (the "Master Note and Security Agreement") pursuant to which the Company has issued over time senior notes in an aggregate principal amount of $1.1 billion in various tranches. As of December 31, 2022, the borrowings outstanding under the Master Note and Security Agreement were $4.4 million. On April 28, 2014, and as last amended on January 24, 2023, the Company entered into a senior secured credit facility (the "Senior Secured Credit Facility,") which includes two different loan facilities: a $825.0 million Term Loan A and a $432.5 million revolving credit facility. As a result of the November 2, 2021 amendment to the Senior Secured Credit Facility, the Term Loan A and revolving credit facility were both broken into two separate maturity dates. Borrowing from lenders who elected to not extend the maturity date will mature on January 31, 2024, whereas borrowing from lenders who elected to extend the maturity date will now mature on November 2, 2026. As of December 31, 2022, the borrowings outstanding under the Senior Secured Credit Facility were $556.7 million. On May 2, 2022, the Company used liquidity available under its revolving credit facility and available cash on hand to fund the repayment on maturity of all $209.1 million aggregate principal amount, outstanding at the time, of its unsecured 7.0% senior notes due May 1, 2022 ("Senior Unsecured Notes").

The Company's various lending arrangements include certain financial covenants. In addition to the financial covenants, the debt facilities also include certain limitations on acquisitions, indebtedness, liens, dividends and repurchases of capital stock. As of December 31, 2022, the Company was in compliance with all financial covenants in its debt agreements. While the Company currently expects to be in compliance in future periods with all of the financial covenants, there can be no assurance that these covenants will continue to be met. The Company's failure to maintain compliance with the covenants could prevent the Company from borrowing additional amounts and could result in a default under any of the debt agreements. Such default could cause the outstanding indebtedness to become immediately due and payable, by virtue of cross-acceleration or cross-default provisions.

The Company may be adversely affected by interest rates, particularly floating interest rates, and foreign exchange rates.

As of December 31, 2022, 75% of the Company's borrowings were subject to variable interest rates. As a result, the Company is exposed to market risks associated with fluctuations in interest rates, and increases in interest rates could adversely affect the Company.

The Company currently holds one active interest rate swap contract. Another previously held interest rate swap, effective on February 28, 2017, terminated on February 28, 2022. The purpose of entering into these contracts was to reduce the variability of cash flows from interest payments related to a portion of the Company's variable-rate debt. The swaps convert the notional value of the Company's variable rate debt based on one-month London Interbank Offered Rate ("LIBOR") to a fixed rate, including a spread on underlying debt, and a monthly reset in the variable interest rate.

The Company has also entered into two interest rate collar contracts, both effective February 1, 2023. The purpose of entering into the contracts is to reduce the variability of cash flows from interest payments related to a portion of the Company's variable-rate debt. The interest rate collars convert the notional value of the Company's variable rate debt based on one-month term Secured Overnight Financing Rate ("SOFR") to a fixed rate if that month's interest rate is outside of the collars' floor and ceiling rates, including a spread on underlying debt, and a monthly reset in the variable interest rate.

Because a portion of the Company's operations are outside of the United States, significant revenues and expenses are denominated in local currencies. Although operating in local currencies may limit the impact of currency rate fluctuations on the results of operations of the Company's non-United States subsidiaries and business units, fluctuations in such rates may affect the translation of these results into the Company's consolidated financial statements. To the extent revenues and expenses are not in the applicable local currency, the Company may enter into foreign exchange forward contracts to hedge the currency risk. There can be no assurance, however, that the Company's efforts at hedging will be successful. There is always a possibility that attempts to hedge currency risks will lead to greater losses than predicted.

The Company's revenue, operating income and cash flows are subject to cyclical and seasonal variations.

The Company's business is seasonal, with the Company recognizing the majority of its operating income in the third and fourth quarters of the financial year, primarily as a result of the increased magazine advertising page counts and retail inserts and catalogs from back-to-school and holiday-related advertising and promotions. The fourth quarter is typically the highest seasonal quarter for cash flows from operating activities and Free Cash Flow due to the reduction of working capital requirements that reach peak levels during the third quarter. If the Company does not successfully manage the increased workflow, necessary increases in paper and ink inventory, production capacity flows and other business elements during these high seasons of activity, this seasonality could adversely affect the Company's cash flows and results of operations.

An other than temporary decline in operating results and enterprise value could lead to non-cash impairment charges due to the impairment of property, plant and equipment, goodwill and other intangible assets.

The Company has a material amount of property, plant, equipment, goodwill and other intangible assets on its balance sheet, due in part to acquisitions. As of December 31, 2022, the Company had the following long-lived assets on its consolidated balance sheet included in Part II, Item 8, "Financial Statements and Supplementary Data," of this Annual Report on Form 10-K: (a) property, plant and equipment of $672.1 million; (b) goodwill of $86.4 million; and (c) other intangible assets, primarily representing the value of customer relationships acquired, of $46.9 million.

As of December 31, 2022, these assets represented approximately 47% of the Company's total assets. The Company assesses impairment of property, plant and equipment, goodwill and other intangible assets based upon the expected future cash flows of the respective assets. These valuations include management's estimates of sales, profitability, cash flow generation, capital structure, cost of debt, interest rates, capital expenditures and other assumptions. A decline in expected profitability, significant negative industry or economic trends, inability to effectively integrate acquired businesses, unexpected significant changes or planned changes in use of the assets or in entity structure, divestitures and discontinued operations may adversely impact the assumptions used in the valuations. As a result, the recoverability of these assets could be called into question, and the Company could be required to write down or write off these assets. Such an occurrence could have a material adverse effect on the Company's results of operations and financial position.

The Company has liabilities with respect to defined benefit pension plans that could cause the Company to incur additional costs.

As a result of the 2010 acquisition of World Color Press, the Company assumed frozen single employer defined benefit pension plans for certain of its employees in the United States. The majority of the plans' assets are held in North American and global equity securities and debt securities. The asset allocation as of December 31, 2022, was approximately 23% equity securities and 77% debt securities.

As of December 31, 2022, the Company had underfunded pension liabilities of $36.3 million for single employer defined benefit plans in the United States. Under current United States pension law, pension funding deficits are generally required to be funded over a seven-year period. These pension deficits may increase or decrease depending on changes in the levels of interest rates, pension plan investment performance, pension legislation and other factors. Declines in global debt and equity markets would increase the Company's potential pension funding obligations. Any significant increase in the Company's required contributions could have a material adverse impact on its business, financial condition, results of operations and cash flows.

In addition to the single employer defined benefit plans described above, the Company has previously participated in multiemployer pension plans ("MEPPs") in the United States, including the Graphic Communications International Union - Employer Retirement Fund ("GCIU") and the Graphic Communications Conference of the International Brotherhood of Teamsters National Pension Fund ("GCC"). Prior to the acquisition of World Color Press by the Company, World Color Press received notice that certain plans in which it participated were in critical status, as defined in Section 432 of the Internal Revenue Code of 1986, as amended (the "Internal Revenue Code"). As a result, the Company could have been subject to increased contribution rates associated with these plans or other MEPPs suffering from declines in their funding levels. Due to the significantly underfunded status of the United States multiemployer plans and the potential increased contribution rates, the Company withdrew from participation in these multiemployer plans and has replaced these pension benefits with a Company-sponsored "pay as you go" defined contribution plan, which is historically the form of retirement benefit provided to the Company's employees. As of December 31, 2022, the Company has recorded in its financial statements a pre-tax withdrawal liability for all United States MEPPs of $28.3 million in the aggregate. The Company is scheduled to make payments to the GCIU and GCC until April 2032 and February 2024, respectively.

The Company may not be able to utilize deferred tax assets to offset future taxable income.

As of December 31, 2022, the Company had deferred tax assets, net of valuation allowances, of $95.1 million. The Company expects to utilize the deferred tax assets to reduce consolidated income tax liabilities in future taxable years. However, the Company may not be able to fully utilize the deferred tax assets if its future taxable income and related income tax liability is insufficient to permit their use. In addition, in the future, the Company may be required to record a valuation allowance against the deferred tax assets if the Company believes it is unable to utilize them, which would have an adverse effect on the Company's results of operations and financial position.

Legal and Regulatory Risks

Unfavorable outcomes in legal proceedings could result in substantial costs and may harm the Company's financial condition.

The Company's financial condition may be affected by the outcome of pending and future litigation, claims, investigations, legal and administrative cases and proceedings, whether civil or criminal, or lawsuits by governmental agencies or private parties. Defending against any such claims, or any legal proceedings to which the Company is subject, can result in substantial costs and divert management time and resources. An adverse judgment could result in monetary damages, which could have a negative impact on the Company's liquidity and financial condition and/or cause significant reputational harm to the Company's business.

The Company may incur costs or suffer reputational damage due to improper conduct of its employees, contractors or agents under anti-corruption or other laws governing business practices, including the United States Foreign Corrupt Practices Act.

The Company could be adversely affected by engaging in business practices that are in violation of United States or foreign anti-corruption laws, including the United States Foreign Corrupt Practices Act. The Company operates in parts of the world with developing economies that have experienced governmental corruption to some degree, and in certain circumstances, strict compliance with anti-corruption laws may conflict with local customs and practices. In certain countries, the Company does substantial business with government entities or instrumentalities, which creates increased risk of a violation of the Foreign Corrupt Practices Act and international laws. There can be no assurance that all of the Company's employees, contractors or agents, including those representing the Company in countries where practices which violate anti-corruption laws may be customary, will not take actions that violate the Company's policies and procedures. The failure to comply with the laws governing international business practices may result in substantial penalties and fines.

Changes in the legal and regulatory environment could limit the Company's business activities, increase its operating costs, reduce demand for its products or result in litigation.

The conduct of the Company's businesses is subject to various laws and regulations administered by federal, state and local government agencies in the United States, as well as to foreign laws and regulations administered by government entities and agencies in markets in which the Company operates. These laws and regulations and interpretations thereof may change, sometimes dramatically, as a result of political, economic or social events, such as the election of the new administration. Such regulatory environment changes may include changes in taxation requirements, accounting and disclosure standards, immigration laws and policy, environmental laws, and requirements of United States and foreign occupational health and safety laws. Changes in laws, regulations or governmental policy and the related interpretations may alter the environment in which the Company does business, and therefore, may impact its results or increase its costs or liabilities.

In addition, the Company and its subsidiaries are party to a variety of legal and environmental remediation obligations arising in the normal course of business, as well as environmental remediation and related indemnification proceedings in connection with certain historical activities, former facilities and contractual obligations of acquired businesses. Permits are required for the operation of certain parts of the Company's business, and these permits are subject to renewal, modification and, in some circumstances, revocation. Due to regulatory complexities, uncertainties inherent in litigation and the risk of unidentified contaminants on current and former properties, the potential exists for remediation, liability and indemnification costs to differ materially from the costs the Company has estimated. The Company cannot assure you that the Company's costs in relation to these matters will not exceed its established liabilities or otherwise have an adverse effect on its results of operations.

Various laws and regulations addressing climate change are being considered at the federal and state levels. Proposals under consideration include limitations on the amount of greenhouse gas that can be emitted (so-called "caps") together with systems of trading allowed emissions capacities. The impacts of such proposals could have a material adverse impact on the Company's financial condition and results of operations.

The Company and its facilities are subject to various consumer protection and privacy laws and regulations, and will become subject to additional laws and regulations in the future. If the Company's efforts to comply with such laws or protect the security of information are unsuccessful, any failure may subject the Company to material liability, require it to incur material costs or otherwise adversely affect its results of operations as a result of compliance with such laws, costly enforcement actions and private litigation.

The nature of the Company's business includes the receipt and storage of information about the Company's clients, vendors and the end-users of the Company's products and services. The Company and its clients are subject to various United States and foreign consumer protection, information security, data privacy and "do not mail" requirements at the federal, states, provincial and local levels. The Company is subject to many legislative and regulatory laws and regulations around the world concerning data protection and privacy. In addition, the interpretation and application of consumer and data protection laws in the United States and elsewhere are often fluid and uncertain. To the extent that the Company or its clients become subject to additional or more stringent requirements or that the Company is not successful in its efforts to comply with existing requirements or protect the security of information, demand for the Company's services may decrease and the Company's reputation may suffer, which could adversely affect the Company's results of operations. In addition, such laws may be interpreted and applied in a manner inconsistent with the Company's internal policies. If so, the Company could suffer costly enforcement actions (including an order requiring changes to the Company's data practices) and private litigation, which could have an adverse effect on the Company's business and results of operations. Complying with these various laws could cause the Company to incur substantial costs or require changes to the Company's business practices in a manner adverse to the Company's business.

If QuadMed, a wholly-owned subsidiary of the Company, fails to comply with applicable healthcare laws and regulations, the Company could face substantial penalties, and its business, reputation, operations, prospects and financial condition of the Company's subsidiary could be adversely affected.

QuadMed provides employer-sponsored healthcare solutions in the United States to employers of all sizes, including the Company and other private and public-sector companies. These solutions include, but are not limited to, on-site and near-site healthcare clinics, occupational health services, telemedicine, and health and wellness programs. The healthcare industry is heavily regulated, constantly evolving and subject to significant change and fluctuation. The United States federal and state healthcare laws and regulations that impact the QuadMed subsidiary business include, among others, those: (a) regarding privacy, security and transmission of individually identifiable health information; (b) prohibiting, among other things, soliciting, receiving or providing remuneration to induce the referral of an individual for an item or service or the purchasing or ordering of an item or service for which payment may be made under healthcare programs; (c) prohibiting, among other things, knowingly presenting or causing to be presented claims for payment from third-party payors that are false or fraudulent; and (d) prohibiting the corporate practice of medicine.

Risks Relating to Quad's Common Stock

Holders of class A common stock are not able to independently elect directors of the Company or control any of the Company's management policies or business decisions because the holders of class A common stock have substantially less voting power than the holders of the Company's class B common stock, all of which is owned by certain members of the Quadracci family or trusts for their benefit, whose interests may be different from the holders of class A common stock.

The Company's outstanding stock is divided into two classes of common stock: class A common stock ("class A stock") and class B common stock ("class B stock"). The class B stock has ten votes per share on all matters and the class A stock is entitled to one vote per share. As of January 31, 2023, the class B stock constitutes approximately 78% of the Company's total voting power. As a result, holders of class B stock are able to exercise a controlling influence over the Company's business, have the power to elect its directors and indirectly control decisions such as whether to issue additional shares, declare and pay dividends or enter into corporate transactions. All of the class B stock is owned by certain members of the Quadracci family or trusts for their benefit, whose interests may differ from the interests of the holders of class A stock.

As of January 31, 2023, approximately 93% of the outstanding class B stock was held of record by the Quad Voting Trust, and that constitutes approximately 72% of the Company's total voting power. The trustees of the Quad Voting Trust have the authority to vote the stock held by the Quad Voting Trust. Accordingly, the trustees of the Quad Voting Trust are able to exercise a controlling influence over the Company's business, have the power to elect its directors and indirectly control decisions such as whether to issue additional shares, declare and pay dividends or enter into corporate transactions.

Furthermore, in response to recent public focus on dual class capital structures, certain stock index providers are implementing limitations on the inclusion of dual class share structures in their indices and certain institutional shareholder advisory firms are updating their voting guidelines to generally withhold support for directors of companies with dual class voting rights. If these restrictions increase or these guidelines are followed, they may impact who buys and holds the Company's stock.

The Company is a controlled company within the meaning of the rules of the New York Stock Exchange ("NYSE") and, as a result, it relies on exemptions from certain corporate governance requirements that provide protection to shareholders of other companies.

Since the Quad Voting Trust owns more than 50% of the total voting power of the Company's stock, the Company is considered a controlled company under the corporate governance listing standards of the NYSE. As a controlled company, an exception under the NYSE listing standards exempts the Company from the obligation to comply with certain of the NYSE's corporate governance requirements, including the requirements that (a) the Company have a corporate governance and nominating committee that is composed entirely of independent directors with a written charter addressing the committee's purpose and responsibilities; and (b) the Company have a compensation committee that is composed entirely of independent directors with a written charter addressing the committee's purpose and responsibilities.

Accordingly, for so long as the Company is a controlled company, holders of class A stock may not have the same protections afforded to shareholders of companies that are subject to all of the corporate governance requirements of the NYSE.

Currently, there is a limited active market for Quad's class A common stock and, as a result, shareholders may be unable to sell their class A common stock without losing a significant portion of their investment.

The Company's class A stock has been traded on the NYSE under the symbol "QUAD" since July 6, 2010. However, there is currently a limited active market for the class A common shares. The Company cannot predict the extent to which investor interest in the Company will lead to the development of a more active trading market for its class A common stock on the NYSE or how liquid that market will become. If a more active trading market does not develop, shareholders may have difficulty selling any class A stock without negatively affecting the stock price, and thereby, losing a significant portion of their investment.

Item 1B. Unresolved Staff Comments

The Company has no unresolved staff comments to report pursuant to this item.

Item 2. Properties

Quad's corporate office is located in Sussex, Wisconsin. The Company owned or leased 104 facilities located in 14 countries including manufacturing operations, warehouses and office space totaling approximately 18,530,000 square feet, of which approximately 13,149,000 is owned space and approximately 5,381,000 is leased space as of December 31, 2022. In addition to these owned and leased facilities, the Company has more than 80 client-based marketing on-site locations, as well as investments in printing operations located in India.

Within the United States Print and Related Services segment, the Company operated 37 owned or leased manufacturing facilities, encompassing approximately 15,241,000 square feet as of December 31, 2022. Within the International segment, the Company operated 8 owned or leased manufacturing facilities, encompassing approximately 1,735,000 square feet as of December 31, 2022. The following table lists the Company's operating locations with manufacturing facilities totaling over 500,000 square feet as of December 31, 2022:

Locations	Square Feet	Property Type	Segment
Lomira, Wisconsin, United States	2,174,000	Owned	United States Print and Related Services
Sussex, Wisconsin, United States	1,971,000	Owned	United States Print and Related Services
Martinsburg, West Virginia, United States	1,740,000	Owned	United States Print and Related Services
Hartford, Wisconsin, United States	1,682,000	Owned	United States Print and Related Services
Saratoga Springs, New York, United States	1,034,000	Owned	United States Print and Related Services
West Allis, Wisconsin, United States	913,000	Leased	United States Print and Related Services
The Rock, Georgia, United States	797,000	Owned	United States Print and Related Services
Wyszkow, Poland	709,000	Owned	International
Effingham, Illinois, United States	564,000	Owned	United States Print and Related Services
Merced, California, United States	539,000	Owned	United States Print and Related Services

Item 3. Legal Proceedings

The Company is subject to various legal actions, administrative proceedings and claims arising out of the ordinary course of business. The Company believes that such unresolved legal actions, proceedings and claims will not materially adversely affect its results of operations, financial condition or cash flows. For additional information, see Note 9, "Commitments and Contingencies — Litigation," to the consolidated financial statements in Part II, Item 8, "Financial Statements and Supplementary Data," of this Annual Report on Form 10-K.

Item 4. Mine Safety Disclosures

Not applicable.

PART II

Item 5. Market for the Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities

Capital Stock and Dividends

Quad's authorized capital stock consists of 105.0 million shares of class A stock, 80.0 million shares of class B stock, 20.0 million shares of class C common stock and 0.5 million shares of preferred stock. The Company's outstanding capital stock as of December 31, 2022, consisted of 39.2 million shares of class A stock, 13.5 million shares of class B stock and no shares of class C common stock or preferred stock. As of January 31, 2023, there were 2,081 record holders of the class A stock and 21 record holders of the class B stock.

The Company's class A stock is listed on the NYSE under the symbol "QUAD". The class A stock is entitled to one vote per share. The Company's class B stock is held by certain members of the Quadracci family or trusts for their benefit (and can only be voluntarily transferred to the Company or to a member of the Quadracci "family group" as defined in the Company's Articles of Incorporation; and any transfer in violation of the Company's Articles of Incorporation results in the automatic conversion of such class B stock into class A stock). The class B stock is entitled to ten votes per share. Each share of class B stock may, at the option of the holder, be converted at any time into one share of class A stock. There is no public trading market for the class B stock.

The Company paid a dividend for each class of common stock then outstanding during the first quarter of 2020. Due to uncertainty in client demand as a result of the COVID-19 pandemic, the Company's Board of Directors proactively suspended the Company's quarterly dividends beginning in the second quarter of 2020. However, the Company remains committed to paying a dividend over the long term and will seek to resume a dividend following the stabilization of its operating environment.

Pursuant to the Company's Articles of Incorporation, each outstanding class of common stock has equal rights with respect to cash dividends. Pursuant to the Company's debt facilities, the Company is subject to limitations on dividends and repurchases of capital stock. If the Company's Total Leverage Ratio is greater than 2.75 to 1.00, as defined in the Company's Senior Secured Credit Facility, last amended on January 24, 2023, (see Note 10. "Debt," for more details on the amendment), the Company is prohibited from making greater than $60.0 million of dividend payments, capital stock repurchases and certain other payments, over the course of the agreement. If the Company's Total Leverage Ratio is above 2.50 to 1.00, but below 2.75 to 1.00, the Company is prohibited from making greater than $100.0 million of dividend payments, capital stock repurchases, and certain other payments, over the course of the agreement. If the Total Leverage Ratio is less than 2.50 to 1.00, there are no such restrictions.

Securities Authorized For Issuance Under Equity Compensation Plans

See Part III, Item 12, "Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters," of this Annual Report on Form 10-K for certain information regarding the Company's equity compensation plans.

Information about the Company's repurchases of its class A common stock during the three months ended December 31, 2022, was as follows:

	Issuer Purchases of Equity Securities			
Period	Total Number of Shares Purchased[(1)]	Average Price Paid Per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs[(1)]	Dollar Value of Shares that May Yet Be Purchased Under the Plans or Programs[(2)]
October 1, 2022 to October 31, 2022	—	—	—	$ 90,061,874
November 1, 2022 to November 30, 2022	—	—	—	90,061,874
December 1, 2022 to December 31, 2022	—	—	—	90,061,874
Total	—		—	

(1) Represents shares of the Company's class A common stock.

(2) On July 30, 2018, the Company's Board of Directors authorized a share repurchase program of up to $100.0 million of the Company's outstanding class A common stock. Under the authorization, share repurchases may be made at the Company's discretion, from time to time, in the open market and/or in privately negotiated transactions as permitted by federal securities laws and other legal requirements. The timing, manner, price and amount of any repurchase will depend on economic and market conditions, share price, trading volume, applicable legal requirements and other factors. The program may be suspended or discontinued at any time. There were 3,093,662 shares of the Company's class A stock repurchased during the year ended December 31, 2022. There were no shares repurchased during the year ended December 31, 2021. As of December 31, 2022, there were $90.1 million of authorized repurchases remaining under the program.

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations

Following discussion of the financial condition and results of operations of Quad should be read together with Quad's audited consolidated financial statements for each of the two years in the period ended December 31, 2022, including the notes thereto, included in Part II, Item 8, "Financial Statements and Supplementary Data," of this Annual Report on Form 10-K. This discussion contains forward-looking statements that reflect the Company's plans, estimates and beliefs. The Company's actual results could differ materially from those discussed in these forward-looking statements. Factors that could cause or contribute to these differences include, but are not limited to, those discussed in "Forward-Looking Statements" and Part I, Item 1A, "Risk Factors," included earlier within this Annual Report on Form 10-K.

Management's discussion and analysis of financial condition and results of operations is provided as a supplement to the Company's consolidated financial statements and accompanying notes to help provide an understanding of the Company's financial condition, the changes in the Company's financial condition and the Company's results of operations. This discussion and analysis is organized as follows:

- *Overview.* This section includes a general description of the Company's business and segments, an overview of key performance metrics the Company's management measures and utilizes to evaluate business performance, and an overview of trends affecting the Company, including management's actions related to the trends.

- *Results of Operations.* This section contains an analysis of the Company's results of operations by comparing the results for the year ended December 31, 2022, to the year ended December 31, 2021. The comparability of the Company's results of operations between periods was impacted by the divestiture of the Company's third-party logistics business on June 30, 2021. The results of operations of the divestiture are included in the Company's consolidated results until the date of disposition. Forward-looking statements providing a general description of recent and projected industry and Company developments that are important to understanding the Company's results of operations are included in this section. This section also provides a discussion of EBITDA and EBITDA margin, financial measures that the Company uses to assess the performance of its business that are not prepared in accordance with accounting principles generally accepted in the United States of America ("GAAP").

- *Liquidity and Capital Resources.* This section provides an analysis of the Company's capitalization, cash flows and a discussion and table of outstanding debt and commitments. Forward-looking statements important to understanding the Company's financial condition are included in this section. This section also provides a discussion of Free Cash Flow and Debt Leverage Ratio, non-GAAP financial measures that the Company uses to assess liquidity and capital allocation and deployment.

- *Critical Accounting Policies and Estimates.* This section contains a discussion of the accounting policies that the Company's management believes are important to the Company's financial condition and results of operations, as well as allowances and reserves that require significant judgment and estimates on the part of the Company's management. In addition, all of the Company's significant accounting policies, including critical accounting policies, are summarized in Note 1, "Basis of Presentation and Summary of Significant Accounting Policies," to the consolidated financial statements in Part II, Item 8, "Financial Statements and Supplementary Data," of this Annual Report on Form 10-K.

Overview

Business Overview

Quad is a global marketing experience company that gives brands a more streamlined, impactful, flexible and frictionless way to go to market and reach consumers. The Company leverages its three key competitive advantages — integrated marketing platform excellence, ongoing innovation, and culture and social purpose — to create a better way for its clients, employees and communities. With a marketing platform intentionally built for integrated marketing execution, Quad helps brands reduce the complexity of working with multiple agency partners and vendors; increase marketing process efficiency; and maximize marketing effectiveness. The Company's holistic, multichannel, through-the-line marketing solutions include strategy and consulting, data and analytics, technology solutions, media services, creative and content solutions, and managed services. With unmatched scale for client-based, on-site services and highly qualified talent with expansive subject matter expertise, the Company has the resources and knowledge to help a wide variety of clients across multiple verticals, including those in industries such as retail, publishing, consumer packaged goods, financial services, healthcare, insurance and direct-to-consumer.

For a full description of the Company's business overview, refer to Part I, Item 1, "Business," of this Annual Report on Form 10-K.

The Company's operating and reportable segments are aligned with how the chief operating decision-maker of the Company currently manages the business. The Company's operating and reportable segments, including its product and service offerings, and a "Corporate" category, are summarized below.

The United States Print and Related Services segment is predominantly comprised of the Company's United States printing operations and is managed as one integrated platform. This includes print execution and logistics for retail inserts, catalogs, long-run publications, special interest publications, journals, direct mail, directories, in-store marketing and promotion, packaging, newspapers, custom print products, as well as other commercial and specialty printed products, along with global paper procurement, and marketing and other complementary services, such as data and analytics, technology solutions, media services, creative and content solutions, managed services and execution in non-print channels (e.g., digital and broadcast). This segment also includes the manufacture of ink. The United States Print and Related Services segment accounted for approximately 87% and 89% of the Company's consolidated net sales during the years ended December 31, 2022 and 2021, respectively.

The International segment consists of the Company's printing operations in Europe and Latin America, including operations in England, France, Germany, Poland, Argentina, Colombia, Mexico and Peru, as well as investments in printing operations in India. This segment provides printed products and marketing and other complementary services consistent with the United States Print and Related Services segment. The International segment accounted for approximately 13% and 11% of the Company's consolidated net sales during the years ended December 31, 2022 and 2021, respectively.

Corporate consists of unallocated general and administrative activities and associated expenses including, in part, executive, legal and finance, as well as certain expenses and income from frozen employee retirement plans, such as pension benefit plans.

Key Performance Metrics Overview

The Company's management believes the ability to generate net sales growth, profit increases and positive cash flow, while maintaining the appropriate level of debt, are key indicators of the successful execution of the Company's business strategy and will increase shareholder value. The Company uses period-over-period net sales growth, EBITDA, EBITDA margin, net cash provided by operating activities, Free Cash Flow and Debt Leverage Ratio as metrics to measure operating performance, financial condition and liquidity. EBITDA, EBITDA margin, Free Cash Flow and Debt Leverage Ratio are non-GAAP financial measures (see the definitions of EBITDA, EBITDA margin and the reconciliation of net earnings to EBITDA in the "Results of Operations" section below, and see the definitions of Free Cash Flow and Debt Leverage Ratio, the reconciliation of net cash provided by operating activities to Free Cash Flow, and the calculation of Debt Leverage Ratio in the "Liquidity and Capital Resources" section below).

Net sales growth. The Company uses period-over-period net sales growth as a key performance metric. The Company's management assesses net sales growth based on the ability to generate increased net sales through increased sales to existing clients, sales to new clients, sales of new or expanded solutions to existing and new clients, and opportunities to expand sales through strategic investments, including acquisitions.

EBITDA and EBITDA margin. The Company uses EBITDA and EBITDA margin as metrics to assess operating performance. The Company's management assesses EBITDA and EBITDA margin based on the ability to increase revenues while controlling variable expense growth.

Net cash provided by operating activities. The Company uses net cash provided by operating activities as a metric to assess liquidity. The Company's management assesses net cash provided by operating activities based on the ability to meet recurring cash obligations while increasing available cash to fund debt service requirements, capital expenditures, cash restructuring requirements related to cost reduction activities, World Color Press single employer pension plan contributions, World Color Press MEPPs withdrawal liabilities, acquisitions and other investments in future growth, shareholder dividends and share repurchases. Net cash provided by operating activities can be significantly impacted by the timing of non-recurring or infrequent receipts or expenditures.

Free Cash Flow. The Company uses Free Cash Flow as a metric to assess liquidity and capital deployment. The Company's management assesses Free Cash Flow as a measure to quantify cash available for strengthening the balance sheet (debt and pension liability reduction), for strategic capital allocation and deployment through investments in the business (acquisitions and strategic investments) and for returning capital to the shareholders (dividends and share repurchases). The Company's priorities for capital allocation and deployment will change as circumstances dictate for the business, and Free Cash Flow can be significantly impacted by the Company's restructuring activities and other unusual items.

Debt Leverage Ratio. The Company uses the Debt Leverage Ratio as a metric to assess liquidity and the flexibility of its balance sheet. Consistent with other liquidity metrics, the Company monitors the Debt Leverage Ratio as a measure to determine the appropriate level of debt the Company believes is optimal to operate its business, and accordingly, to quantify debt capacity available for strengthening the balance sheet (debt and pension liability reduction), for strategic capital allocation and deployment through investments in the business (capital expenditures, acquisitions and strategic investments), and for returning capital to the shareholders (dividends and share repurchases). The Company's priorities for capital allocation and deployment will change as circumstances dictate for the business, and the Debt Leverage Ratio can be significantly impacted by the amount and timing of large expenditures requiring debt financing, as well as changes in profitability.

The Company remains disciplined with its debt leverage. The Company's consolidated debt and finance lease obligations decreased by $234 million during the year ended December 31, 2022, primarily due to the use of cash and cash equivalents and cash provided by operating activities.

Overview of Trends Affecting Quad

As consumer media consumption habits change, advertising and marketing services providers face increased demand to offer end-to-end marketing services, from strategy and creative through execution. As new marketing channels emerge, these providers must expand their services beyond traditional channels, such as for television, newspapers, print publications and radio, to digital channels, such as mobile, internet search, internet display and video, to create effective multichannel campaigns for their clients. This trend greatly influences Quad's ongoing efforts to help brands reduce the complexities of working with multiple agency partners and vendors, increase marketing process efficiency and maximize marketing effectiveness.

The Company leverages its data-driven print expertise as part of an integrated marketing platform that helps its clients not only plan and produce marketing programs, but also deploy, manage and measure them across all media channels. Competition in the commercial printing industry remains highly fragmented and intense, and the Company believes that there are indicators of heightened competitive pressures. The commercial printing industry has moved toward a demand for shorter print runs, faster product turnaround and increased production efficiencies of products with lower page counts and increased complexity. This — combined with increases in postage expenses and marketers' increasing use of online marketing and communication channels (exacerbated by the COVID-19 pandemic, as well as the current macroeconomic conditions) — has led to excess manufacturing capacity.

For a full description of the Company's industry and competition overview, refer to Part I, Item 1, "Business," of this Annual Report on Form 10-K.

The Company believes that a disciplined approach for capital management and a strong balance sheet are critical to be able to invest in profitable growth opportunities and technological advances, thereby providing the highest return for shareholders. Management balances the use of cash between deleveraging the Company's balance sheet (through reduction in debt and pension obligations), compelling investment opportunities (through capital expenditures, acquisitions and strategic investments) and returns to shareholders (through dividends and share repurchases).

The Company continues to make progress on integrating and streamlining all aspects of its business, thereby lowering its cost structure by consolidating its manufacturing platform into its most efficient facilities, as well as realizing purchasing, mailing and logistics efficiencies by centralizing and consolidating print manufacturing volumes and eliminating redundancies in its administrative and corporate operations. The Company has continued to evolve its manufacturing platform, equipping facilities to be product-line agnostic, which enables the Company to maximize equipment utilization. Quad believes that the large plant size of its key printing facilities allows the Company to drive savings in certain product lines (such as publications and catalogs) due to economies of scale and from investments in automation and technology. The Company continues to focus on proactively aligning its cost structure to the realities of the top-line pressures it faces in the printing industry through Lean Manufacturing and sustainable continuous improvement programs.

The Company believes it will continue to drive productivity improvements and sustainable cost reduction initiatives into the future through an engaged workforce and ongoing adoption of the latest manufacturing automation and technology. Through this strategy, the Company believes it can maintain the strongest, most efficient print manufacturing platform to remain a high-quality, low-cost producer.

Integrated distribution with the USPS is an important component of the Company's business. Any material change in the current service levels provided by the postal service could impact the demand that clients have for print services. The USPS continues to experience financial problems. The passing of the Postal Service Reform Act of 2022, signed in April 2022, gave the USPS considerable financial relief as well as significant relief over the next ten years. While the legislative postal reform helps considerably, without decreased operational cost structures, increased efficiencies or increased volumes and revenues, these losses will potentially continue into the future. As a result of these financial difficulties, the USPS has continued to adjust its postal rates and service levels. Additional price increases may result in clients reducing mail volumes and exploring the use of alternative methods for delivering a larger portion of their products, such as continued diversion to the internet and other alternative media channels, in order to ensure that they stay within their expected postage budgets.

Federal statute requires the PRC to conduct reviews of the overall rate-making structure for the USPS to ensure funding stability. As a result of those reviews, the PRC authorized a five year rate-making structure that provides the USPS with additional pricing flexibility over the Consumer Price Index cap, which may result in a substantially altered rate structure for mailers. The revised rate authority that is effective as a result of the rules issued by the PRC includes a higher overall rate cap on the USPS' ability to increase rates from year to year. The USPS is expected to use these additional rate authorities to implement twice a year increases in the future. This has led to price spikes for mailers and may also reduce the incentive for the USPS to continue to take out costs and instead continue to rely on postage to cover the costs of an outdated postal service that does not reflect the industry's ability or willingness to pay. The uncertainty as to how much of the authority the USPS will use on any specific rate increase also creates potential volume declines as rate predictability with respect to cost is no longer known for mailers. The result may be reduced demand for printed products as clients may move more aggressively into other delivery methods, such as the many digital and mobile options now available to consumers.

The Company has invested significantly in its mail preparation and distribution capabilities to mitigate the impact of increases in postage costs, and to help clients successfully navigate the ever-changing postal environment. Through its data analytics, unique software to merge mail streams on a large scale, advanced finishing capabilities and technology, and in-house transportation and logistics operations, the Company manages the mail preparation and distribution of most of its clients' products to maximize efficiency, to enable on-time and consistent delivery and to partially reduce these costs; however, the net impact of increasing postal costs may create a decrease in client demand for print and mail products.

The Company's results of operations have been adversely impacted as a result of the COVID-19 pandemic and the emergence of new variants. Throughout the pandemic, the Company implemented cost reduction and cash conservation initiatives in response to the pandemic's impact on its business. With ongoing advancements against the COVID-19 pandemic, the effects on the Company have lessened from previous periods, particularly from the heavily impacted year of 2020. The COVID-19 pandemic weakened demand for the Company's products and services, disrupted the Company's supply chain and resulted in rising inflationary cost and labor pressures, distribution challenges and recessionary concerns from evolving macroeconomic conditions. The Company continues to evaluate the current economic environment and may implement additional cost reduction measures as necessary.

Additionally, rising interest rates, the increasing cost and availability of raw materials, such as paper, ink, supplies, distribution and labor, have been and are expected to continue to adversely impact the Company's results of operation. The Company is dependent on its production personnel to print the Company's products in a cost-effective and efficient manner that allows the Company to obtain new clients and to drive sales from existing clients. The nationwide shortage of available production personnel may put a strain on the Company's ability to accept new work from client requests, including during the Company's seasonally higher third and fourth quarters.

The Company has also experienced and anticipates it will continue to experience certain distribution challenges, including, but not limited to, delivery delays at the USPS and recent volume restrictions at the United Parcel Service, Federal Express and certain local couriers. As the supply chain and distribution challenges continue to evolve, the Company is unable to predict the duration of the shortages and challenges and the extent of the impact on the Company's business, financial condition, cash flows and results of operations. As a result of the rising inflationary cost pressures within its raw materials, distribution and labor, the Company has and will continue to pass along price increases to its clients. The Company expects inflationary cost pressures and certain supply chain shortages to potentially continue through fiscal year 2023. The Company is unable to predict the future impact of supply chain shortages as well as cost inflation, and the resulting impact on the Company's business, financial condition, cash flows and results of operations.

Results of Operations for the Year Ended December 31, 2022, Compared to the Year Ended December 31, 2021

Summary Results

The Company's operating income, operating margin, net earnings (computed using a 25% normalized tax rate for all items subject to tax) and diluted earnings per share for the year ended December 31, 2022, changed from the year ended December 31, 2021, as follows (dollars in millions, except per share data):

	Operating Income	Operating Margin	Net Earnings	Diluted Earnings Per Share
For the year ended December 31, 2021	$ 92.8	3.1 %	$ 37.8	$ 0.71
Gains from sale and leaseback [1]	(24.5)	(0.8)%	(18.4)	(0.35)
Restructuring, impairment and transaction-related charges [2]	(25.9)	(0.8)%	(19.4)	(0.35)
Other operating income elements [3]	11.1	0.2 %	8.3	0.17
Operating Income	53.5	1.7 %	8.3	0.18
Interest expense [4]	N/A	N/A	8.4	0.15
Net pension income [5]	N/A	N/A	(1.4)	(0.03)
Loss on debt extinguishment [6]	N/A	N/A	0.5	0.01
Income taxes [7]	N/A	N/A	(6.2)	(0.12)
Investments in unconsolidated entity, net of tax [8]	N/A	N/A	(0.3)	(0.01)
For the year ended December 31, 2022	$ 53.5	1.7 %	$ 9.3	$ 0.18

(1) The Company executed sale and leaseback transactions of its Chalfont, Pennsylvania and West Allis, Wisconsin facilities resulting in $24.5 million ($18.4 million, net of tax) in gains during the year ended December 31, 2021.

(2) Restructuring, impairment and transaction-related charges increased $25.9 million ($19.4 million, net of tax), to $44.8 million during the year ended December 31, 2022, and included the following:

a. A $2.6 million decrease in employee termination charges from $9.9 million during the year ended December 31, 2021, to $7.3 million during the year ended December 31, 2022;

b. A $32.7 million decrease in impairment charges from $34.9 million during the year ended December 31, 2021, to $2.2 million during the year ended December 31, 2022;

c. A $1.4 million increase in transaction-related charges from $0.6 million during the year ended December 31, 2021, to $2.0 million during the year ended December 31, 2022;

d. A $0.7 million increase in integration-related charges from zero during the year ended December 31, 2021, to $0.7 million during the year ended December 31, 2022; and

e. A $59.1 million increase in various other restructuring charges from $26.5 million of income during the year ended December 31, 2021, to $32.6 million of expense during the year ended December 31, 2022.

The Company expects to incur additional restructuring and integration costs in future reporting periods in connection with eliminating excess manufacturing capacity and properly aligning its cost structure in conjunction with the Company's acquisitions and strategic investments, and other cost reduction programs.

(3) Other operating income elements increased $11.1 million ($8.3 million, net of tax) primarily due to the following: (1) higher print pricing and volume; (2) a $16.0 million decrease in depreciation and amortization expense; and (3) savings from other cost reduction initiatives. These cost decreases were partially offset by cost increases from supply chain disruptions, cost inflation in materials and freight and labor shortages and a $13.4 million gain from a property insurance claim in 2021 that did not repeat in 2022.

(4) Interest expense decreased $11.2 million ($8.4 million, net of tax) during the year ended December 31, 2022, to $48.4 million. This change was due to a $9.3 million decrease in interest expense related to the interest rate swaps and lower average debt levels, partially offset by a higher weighted average interest rate on borrowings during the year ended December 31, 2022, as compared to the year ended December 31, 2021.

(5) Net pension income decreased $1.9 million ($1.4 million, net of tax) during the year ended December 31, 2022, to $12.6 million. This was due to a $1.9 million decrease from the expected long-term return on pension plan assets and a $0.9 million increase from interest cost on pension plan liabilities, partially offset by a $0.9 million decrease in a non-cash settlement charge in 2021 that did not repeat in 2022.

(6) The $0.7 million ($0.5 million, net of tax) decrease in loss on debt extinguishment relates to a $0.5 million loss on debt extinguishment recorded during the fourth quarter of 2021, primarily related to the repurchase of the Company's unsecured 7.0% senior notes which were due on May 1, 2022 and a $0.2 million loss on debt extinguishment from the fifth amendment to the Company's April 28, 2014 Senior Secured Credit Facility, completed on November 2, 2021. There was no loss on debt extinguishment during the year ended December 31, 2022.

(7) The $6.2 million increase in income tax expense as calculated in the following table is primarily due to a $22.3 million increase from valuation allowance reserves, partially offset by the following: (1) a $6.2 million decrease from impairment charges related to foreign investments in 2021; (2) a $5.1 million decrease from loss on the sale of its Argentina print business in 2022; (3) a $2.6 million decrease from income in foreign branches; and (4) a $1.6 million decrease from equity award activity and executive compensation limitation.

	Year Ended December 31,		
	2022	2021	$ Change
	(dollars in millions)		
Earnings before income taxes and equity in earnings of unconsolidated entity	$ 17.7	$ 47.0	$ (29.3)
Normalized tax rate	25.0 %	25.0 %	
Income tax expense at normalized tax rate	4.4	11.7	(7.3)
Less: Income tax expense from the consolidated statements of operations	8.4	9.5	(1.1)
Impact of income taxes	$ 4.0	$ (2.2)	$ 6.2

(8) The decrease from investments in unconsolidated entity, net of tax, of $0.3 million during the year ended December 31, 2022, was due to the equity in earnings of $0.3 million for the year ended December 31, 2021 at the Company's investment in Plural Industria Gráfica Ltda. ("Plural"), the Company's Brazilian joint venture. In January 2022, the Company sold its investment in Plural.

Operating Results

The following table sets forth certain information from the Company's consolidated statements of operations on an absolute dollar basis and as a relative percentage of total net sales for each noted period, together with the relative percentage change in such information between the periods set forth below:

	Year Ended December 31,					
	2022	**% of Net Sales**	**2021**	**% of Net Sales**	**$ Change**	**% Change**
			(dollars in millions)			
Net sales:						
Products	$ 2,528.3	78.6 %	$ 2,247.1	75.9 %	$ 281.2	12.5 %
Services	688.7	21.4 %	713.3	24.1 %	(24.6)	(3.4)%
Total net sales	3,217.0	100.0 %	2,960.4	100.0 %	256.6	8.7 %
Cost of sales:						
Products	2,156.2	67.0 %	1,861.0	62.9 %	295.2	15.9 %
Services	462.6	14.4 %	528.9	17.9 %	(66.3)	(12.5)%
Total cost of sales	2,618.8	81.4 %	2,389.9	80.8 %	228.9	9.6 %
Selling, general & administrative expenses	358.6	11.1 %	326.0	11.0 %	32.6	10.0 %
Gains from sale and leaseback	—	— %	(24.5)	(0.8)%	24.5	nm
Depreciation and amortization	141.3	4.4 %	157.3	5.3 %	(16.0)	(10.2)%
Restructuring, impairment and transaction-related charges	44.8	1.4 %	18.9	0.6 %	25.9	137.0 %
Total operating expenses	3,163.5	98.3 %	2,867.6	96.9 %	295.9	10.3 %
Operating income	$ 53.5	1.7 %	$ 92.8	3.1 %	$ (39.3)	(42.3)%

Net Sales

Product sales increased $281.2 million, or 12.5%, for the year ended December 31, 2022, compared to the year ended December 31, 2021, primarily due to a $191.2 million increase from paper sales and a $110.1 million increase in sales in the Company's print product lines, primarily due to increased print pricing and volume, partially offset by $20.1 million in unfavorable foreign exchange impacts.

Service sales, which primarily consist of logistics, distribution, marketing services, imaging and medical services, decreased $24.6 million, or 3.4%, for the year ended December 31, 2022, compared to the year ended December 31, 2021, primarily due to a $58.0 million decrease in sales due to the divestiture of the Company's third-party logistics business, partially offset by a $22.4 million increase in logistics sales and an $11.0 million increase in marketing services and medical services.

Cost of Sales

Cost of product sales increased $295.2 million, or 15.9%, for the year ended December 31, 2022, compared to the year ended December 31, 2021, primarily due to the following: (1) an increase in paper costs; (2) the impacts from rising costs of material, labor and other costs of production; and (3) higher print volumes. These increases were partially offset by savings from other cost reduction initiatives.

Cost of service sales decreased $66.3 million, or 12.5%, for the year ended December 31, 2022, compared to the year ended December 31, 2021, primarily due to the impact from the divestiture of the Company's third-party logistics business and savings from other cost reduction initiatives.

Selling, General and Administrative Expenses

Selling, general and administrative expenses increased $32.6 million, or 10.0%, for the year ended December 31, 2022, compared to the year ended December 31, 2021, primarily due to the following: (1) a $14.0 million increase in employee-related costs; (2) a $13.4 million gain from a property insurance claim in 2021 that did not repeat in 2022; and (3) a $2.1 million increase in credit loss expense. Selling, general and administrative expenses as a percentage of net sales increased from 11.0% for the year ended December 31, 2021, to 11.1% for the year ended December 31, 2022.

Gains from sale and leaseback

The Company executed sale and leaseback transactions of its Chalfont, Pennsylvania and West Allis, Wisconsin facilities resulting in $24.5 million ($18.4 million, net of tax) in gains during the year ended December 31, 2021.

Depreciation and Amortization

Depreciation and amortization decreased $16.0 million, or 10.2%, for the year ended December 31, 2022, compared to the year ended December 31, 2021, due to a $15.4 million decrease in depreciation expense, primarily from property, plant and equipment becoming fully depreciated over the past year, a decrease in purchases of property, plant and equipment and a $0.6 million decrease in amortization expense.

Restructuring, Impairment and Transaction-Related Charges

Restructuring, impairment and transaction-related charges increased $25.9 million, or 137.0%, for the year ended December 31, 2022, compared to the year ended December 31, 2021, primarily due to the following:

	Year Ended December 31,		
	2022	2021	$ Change
	(dollars in millions)		
Employee termination charges	$ 7.3	$ 9.9	$ (2.6)
Impairment charges [(a)]	2.2	34.9	(32.7)
Transaction-related charges	2.0	0.6	1.4
Integration costs	0.7	—	0.7
Other restructuring charges (income)			
Vacant facility carrying costs and lease exit charges	5.4	19.8	(14.4)
Equipment and infrastructure removal costs	0.7	1.6	(0.9)
Gains on the sale of facilities [(b)]	—	(24.8)	24.8
Other restructuring activities [(c)]	26.5	(23.1)	49.6
Other restructuring charges (income)	32.6	(26.5)	59.1
Total restructuring, impairment and transaction-related charges	$ 44.8	$ 18.9	$ 25.9

(a) Includes $2.2 million and $2.8 million of impairment charges for machinery and equipment no longer being utilized in production as a result of facility consolidations, as well as other capacity reduction and strategic divestiture activities during the years ended December 31, 2022 and 2021, respectively. Impairment charges related to the Company's decision to sell the investment in Plural of $32.1 million were recorded during the year ended December 31, 2021.

(b) Includes a $13.8 million gain on the sale of the Oklahoma City, Oklahoma facility, a $7.6 million gain on the sale of the Riverside, California facility, a $1.0 million gain on the sale of the Fernley, Nevada facility and a $2.4 million gain on the sale of other facilities during the year ended December 31, 2021.

(c) Includes a $23.1 million loss on the sale of its Argentina print business during the year ended December 31, 2022; and a $20.9 million gain on the sale of a business and a $2.7 million gain from the reclassification of foreign currency translation adjustments during the year ended December 31, 2021. Also includes $1.8 million and $0.6 million in charges from foreign currency losses as a result of the economy in Argentina being classified as highly inflationary during the years ended December 31, 2022 and 2021, respectively. The Company has considered the economy in Argentina to be highly inflationary since June 30, 2018.

EBITDA and EBITDA Margin—Consolidated

EBITDA is defined as net earnings, excluding (1) interest expense, (2) income tax expense and (3) depreciation and amortization. EBITDA margin represents EBITDA as a percentage of net sales. EBITDA and EBITDA margin are presented to provide additional information regarding Quad's performance. Both are important measures by which Quad gauges the profitability and assesses the performance of its business. EBITDA and EBITDA margin are non-GAAP financial measures and should not be considered alternatives to net earnings as a measure of operating performance, or to cash flows provided by operating activities as a measure of liquidity. Quad's calculation of EBITDA and EBITDA margin may be different from the calculations used by other companies, and therefore, comparability may be limited.

EBITDA and EBITDA margin for the year ended December 31, 2022, compared to the year ended December 31, 2021, were as follows:

	Year Ended December 31,			
	2022	% of Net Sales	2021	% of Net Sales
	(dollars in millions)			
EBITDA and EBITDA margin (non-GAAP)	$ 207.4	6.4 %	$ 264.2	8.9 %

EBITDA decreased $56.8 million for the year ended December 31, 2022, compared to the year ended December 31, 2021, primarily due to the following: (1) $25.9 million of increased restructuring, impairment and transaction-related charges; (2) $24.5 million in gains from sale and leaseback transactions in 2021 that did not repeat in 2022; (3) a $13.4 million gain from a property insurance claim in 2021 that did not repeat in 2022; and (4) cost increases from supply chain disruptions, cost inflation in materials and freight and labor shortages. These cost increases were partially offset by an increase in print product pricing and volume and savings from other cost reduction initiatives.

A reconciliation of EBITDA to net earnings for the years ended December 31, 2022 and 2021, was as follows:

	Year Ended December 31,	
	2022	2021
	(dollars in millions)	
Net earnings [(1)]	$ 9.3	$ 37.8
Interest expense	48.4	59.6
Income tax expense	8.4	9.5
Depreciation and amortization	141.3	157.3
EBITDA (non-GAAP)	$ 207.4	$ 264.2

(1) Net earnings included the following:

a. Restructuring, impairment and transaction-related charges of $44.8 million and $18.9 million for the years ended December 31, 2022 and 2021, respectively;

b. Gains from sale and leaseback of $24.5 million for the year ended December 31, 2021;

c. Loss on debt extinguishment of $0.7 million for the year ended December 31, 2021; and

d. Equity in earnings of unconsolidated entity of $0.3 million for the year ended December 31, 2021.

United States Print and Related Services

The following table summarizes net sales, operating income, operating margin and certain items impacting comparability within the United States Print and Related Services segment:

	Year Ended December 31,			
	2022	2021	$ Change	% Change
	(dollars in millions)			
Net sales:				
Products	$ 2,126.6	$ 1,935.8	$ 190.8	9.9 %
Services	668.1	692.8	(24.7)	(3.6)%
Operating income (including restructuring, impairment and transaction-related charges)	108.3	163.1	(54.8)	(33.6)%
Operating margin	3.9 %	6.2 %	N/A	N/A
Restructuring, impairment and transaction-related charges	$ 12.1	$ (14.5)	$ 26.6	nm

Net Sales

Product sales for the United States Print and Related Services segment increased $190.8 million, or 9.9%, for the year ended December 31, 2022, compared to the year ended December 31, 2021, primarily due to a $128.7 million increase from paper sales and a $62.1 million increase in sales in the Company's print product lines, primarily due to increased print pricing and volume.

Service sales for the United States Print and Related Services segment decreased $24.7 million, or 3.6%, for the year ended December 31, 2022, compared to the year ended December 31, 2021, primarily due to a $58.0 million decrease in sales due to the divestiture of the Company's third-party logistics business, partially offset by a $22.6 million increase in logistics sales and a $10.7 million increase in marketing services and medical services.

Operating Income

Operating income for the United States Print and Related Services segment decreased $54.8 million, or 33.6%, for the year ended December 31, 2022, compared to the year ended December 31, 2021, primarily due to the following: (1) a $26.6 million increase in restructuring, impairment and transaction-related charges; (2) $24.5 million in gains from sale and leaseback transactions in 2021 that did not repeat in 2022; (3) a $13.4 million gain from a property insurance claim in 2021 that did not repeat in 2022; and (4) cost increases from supply chain disruptions, cost inflation in materials and freight and labor shortages. These cost increases were partially offset by the following: (1) an increase in print product pricing and volume; (2) a $14.0 million decrease in depreciation and amortization expense; and (3) savings from other cost reduction initiatives.

The operating margin for the United States Print and Related Services segment decreased to 3.9% for the year ended December 31, 2022, from 6.2% for the year ended December 31, 2021, primarily due to the reasons provided above.

Restructuring, Impairment and Transaction-Related Charges

Restructuring, impairment and transaction-related charges for the United States Print and Related Services segment increased $26.6 million for the year ended December 31, 2022, compared to the year ended December 31, 2021, primarily due to the following:

	Year Ended December 31,		
	2022	**2021**	**$ Change**
		(dollars in millions)	
Employee termination charges	$ 4.1	$ 8.2	$ (4.1)
Impairment charges [(a)]	1.1	2.8	(1.7)
Transaction-related charges	—	—	—
Integration costs	—	—	—
Other restructuring charges (income)			
Vacant facility carrying costs and lease exit charges	5.4	19.8	(14.4)
Equipment and infrastructure removal costs	0.7	1.6	(0.9)
Gains on the sale of facilities [(b)]	—	(24.8)	24.8
Other restructuring activities [(c)]	0.8	(22.1)	22.9
Other restructuring charges (income)	6.9	(25.5)	32.4
Total restructuring, impairment and transaction-related charges	$ 12.1	$ (14.5)	$ 26.6

(a) Includes $1.1 million and $2.8 million of impairment charges for machinery and equipment no longer being utilized in production as a result of facility consolidations, as well as other capacity reduction and strategic divestiture activities during the years ended December 31, 2022 and 2021, respectively.

(b) Includes a $13.8 million gain on the sale of the Oklahoma City, Oklahoma facility, a $7.6 million gain on the sale of the Riverside, California facility, a $1.0 million gain on the sale of the Fernley, Nevada facility and a $2.4 million gain on the sale of other facilities during the year ended December 31, 2021.

(c) Includes a $20.9 million gain on the sale of a business during the year ended December 31, 2021.

International

The following table summarizes net sales, operating income, operating margin, certain items impacting comparability and equity in loss of unconsolidated entities within the International segment:

	Year Ended December 31,			
	2022	2021	$ Change	% Change
	(dollars in millions)			
Net sales:				
Products	$ 401.7	$ 311.3	$ 90.4	29.0 %
Services	20.6	20.5	0.1	0.5 %
Operating loss (including restructuring, impairment and transaction-related charges)	(4.5)	(16.1)	11.6	(72.0)%
Operating margin	(1.1)%	(4.9)%	N/A	N/A
Restructuring, impairment and transaction-related charges	$ 30.7	$ 31.3	$ (0.6)	(1.9)%
Equity in earnings	—	(0.3)	0.3	100.0 %

Net Sales

Product sales for the International segment increased $90.4 million, or 29.0%, for the year ended December 31, 2022, compared to the year ended December 31, 2021, primarily due to a $62.5 million increase in paper sales and a $48.0 million increase in print pricing and volume, primarily in Mexico and Colombia, partially offset by $20.1 million in unfavorable foreign exchange impacts, primarily in Europe, Argentina and Colombia.

Service sales for the International segment increased $0.1 million, or 0.5%, for the year ended December 31, 2022, compared to the year ended December 31, 2021, primarily due to an increase in marketing services in Europe.

Operating Loss

Operating loss for the International segment decreased $11.6 million, or 72.0%, for the year ended December 31, 2022, compared to the year ended December 31, 2021, primarily due to an $11.0 million increase in operating income from increased print pricing and volume and a $0.6 million decrease in restructuring, impairment and transaction-related charges.

Restructuring, Impairment and Transaction-Related Charges

Restructuring, impairment and transaction-related charges for the International segment decreased $0.6 million, or 1.9%, for the year ended December 31, 2022, compared to the year ended December 31, 2021, primarily due to the following:

	Year Ended December 31,		
	2022	2021	$ Change
	(dollars in millions)		
Employee termination charges	$ 3.2	$ 1.2	$ 2.0
Impairment charges [(a)]	1.1	32.1	(31.0)
Transaction-related charges	0.1	—	0.1
Integration costs	0.7	—	0.7
Other restructuring charges (income) [(b)]	25.6	(2.0)	27.6
Total restructuring, impairment and transaction-related charges	$ 30.7	$ 31.3	$ (0.6)

(a) Includes $1.1 million of impairment charges for machinery and equipment no longer being utilized in production as a result of facility consolidations, as well as other capacity reduction and strategic divestiture activities during the year ended December 31, 2022 and includes $32.1 million of impairment charges related to the Company's decision to sell the investment in Plural during the year ended December 31, 2021.

(b) Includes a $23.1 million loss on the sale of its Argentina print business during the year ended December 31, 2022. Also includes $1.8 million and $0.6 million in charges from foreign currency losses as result of the economy in Argentina being classified as highly inflationary during the years ended December 31, 2022 and 2021, respectively, and a $2.7 million gain from the reclassification of foreign currency translation adjustments during the year ended December 31, 2021.

Equity in Earnings of Unconsolidated Entities

Investments in entities where Quad has the ability to exert significant influence, but not control, are accounted for using the equity method of accounting. At December 31, 2021, the Company held a 49% ownership interest in Plural, a commercial printer based in São Paulo, Brazil. The equity in earnings of unconsolidated entity in the International segment was $0.3 million for the year ended December 31, 2021. In January 2022, the Company sold its investment in Plural. As a result of the planned sale, the Company recorded a $32.1 million impairment charge during the year ended December 31, 2021.

Corporate

The following table summarizes unallocated operating expenses presented as Corporate:

	Year Ended December 31,			
	2022	2021	$ Change	% Change
	(dollars in millions)			
Operating expenses (including restructuring, impairment and transaction-related charges)	$ 50.3	$ 54.2	$ (3.9)	(7.2)%
Restructuring, impairment and transaction-related charges	2.0	2.1	(0.1)	(4.8)%

Operating Expenses

Corporate operating expenses decreased $3.9 million, or 7.2%, for the year ended December 31, 2022, compared to the year ended December 31, 2021, primarily due to the following: (1) a $2.0 million decrease in employee-related costs; (2) a $1.6 million decrease in professional fees; and (3) a $0.1 million decrease in restructuring, impairment and transaction-related charges.

Restructuring, Impairment and Transaction-Related Charges

Corporate restructuring, impairment and transaction-related charges decreased $0.1 million, or 4.8%, for the year ended December 31, 2022, compared to the year ended December 31, 2021, primarily due to the following:

	Year Ended December 31,		
	2022	**2021**	**$ Change**
		(dollars in millions)	
Employee termination charges	$ —	$ 0.5	$ (0.5)
Transaction-related charges	1.9	0.6	1.3
Other restructuring charges	0.1	1.0	(0.9)
Total restructuring, impairment and transaction-related charges	$ 2.0	$ 2.1	$ (0.1)

Liquidity and Capital Resources

The Company utilizes cash flows from operating activities and borrowings under its credit facilities to satisfy its liquidity and capital requirements. The Company had total liquidity of $425.0 million as of December 31, 2022, which consisted of up to $399.8 million of unused capacity under its revolving credit arrangement, which was net of $32.7 million of issued letters of credit, and cash and cash equivalents of $25.2 million. Total liquidity is reduced to $398.0 million under the Company's most restrictive debt covenants, and consists of $25.2 million in cash and cash equivalents and $372.8 million available under its revolving credit arrangement. There were no borrowings under the $432.5 million revolving credit facility as of December 31, 2022.

The Company believes its expected future cash flows from operating activities and its current liquidity and capital resources, are sufficient to fund ongoing operating requirements and service debt and pension requirements for both the next 12 months and beyond.

Net Cash Provided by Operating Activities

Year Ended December 31, 2022, Compared to Year Ended December 31, 2021

Net cash provided by operating activities was $154.6 million for the year ended December 31, 2022, compared to $136.5 million for the year ended December 31, 2021, resulting in a $18.1 million increase in cash provided by operating activities. The increase was primarily due to a $24.4 million increase in cash from earnings, offset by a $6.3 million decrease in cash flows provided by changes in operating assets and liabilities.

Net Cash (Used in) Provided by Investing Activities

Year Ended December 31, 2022, Compared to Year Ended December 31, 2021

Net cash used in investing activities was $60.5 million for the year ended December 31, 2022, compared to $129.4 million cash provided by investing activities for the year ended December 31, 2021, resulting in a $189.9 million increase in cash used in investing activities. The increase was primarily due to the following: (1) a $121.7 million decrease in proceeds from the sale of property, plant and equipment; (2) a $39.7 million decrease in proceeds from the sale of a business; (3) a $15.0 million decrease in proceeds from a property insurance claim; (4) a $10.3 million increase in purchases of property, plant and equipment; (5) a $2.6 million increase in cash used in the acquisition of a business; and (6) a $1.9 million increase in cost investment in unconsolidated entities. These increases were partially offset by a $1.3 million increase in cash provided by other investing activities.

Net Cash Used in Financing Activities

Year Ended December 31, 2022, Compared to Year Ended December 31, 2021

Net cash used in financing activities was $248.7 million for the year ended December 31, 2022, compared to $140.9 million for the year ended December 31, 2021, resulting in a $107.8 million increase in cash used in financing activities. The increase was primarily due to the following: (1) a $112.2 million increase in net payments of debt and lease obligations in 2022 compared to 2021; (2) a $10.0 million increase in purchases of treasury stock; and (3) a $1.4 million increase in equity awards redeemed to pay employees' tax obligations. These increases were partially offset by (1) an $8.0 million decrease in cash used in other financing activities; (2) a $5.9 million decrease in payments of debt issuance costs and financing fees; and (3) a $1.9 million decrease in cash used in changes in ownership of noncontrolling interests.

Free Cash Flow

Free Cash Flow is defined as net cash provided by operating activities less purchases of property, plant and equipment.

The Company's management assesses Free Cash Flow as a measure to quantify cash available for (1) strengthening the balance sheet (debt reduction), (2) strategic capital allocation and deployment through investments in the business (acquisitions and strategic investments) and (3) returning capital to the shareholders (dividends and share repurchases). The priorities for capital allocation and deployment will change as circumstances dictate for the business, and Free Cash Flow can be significantly impacted by the Company's restructuring activities and other unusual items.

Free Cash Flow is a non-GAAP financial measure and should not be considered an alternative to cash flows provided by operating activities as a measure of liquidity. Quad's calculation of Free Cash Flow may be different from similar calculations used by other companies, and therefore, comparability may be limited.

Free Cash Flow for the years ended December 31, 2022 and 2021, was as follows:

	Year Ended December 31,	
	2022	2021
	(dollars in millions)	
Net cash provided by operating activities	$ 154.6	$ 136.5
Less: purchases of property, plant and equipment	(60.3)	(50.0)
Free Cash Flow (non-GAAP)	$ 94.3	$ 86.5

Free Cash Flow increased $7.8 million for the year ended December 31, 2022, compared to the year ended December 31, 2021, primarily due to an $18.1 million increase in net cash provided by operating activities, partially offset by a $10.3 million increase in capital expenditures. See the "Net Cash Provided by Operating Activities" section above for further explanations of the change in operating cash flows and the "Net Cash (Used in) Provided by Investing Activities" section above for further explanations of the changes in purchases of property, plant and equipment.

Debt Leverage Ratio

The Debt Leverage Ratio is defined as total debt and finance lease obligations less cash and cash equivalents (Net Debt) divided by the trailing twelve months Adjusted EBITDA, comprised of the sum of the following: (1) the last twelve months of EBITDA (see the definition of EBITDA and the reconciliation of net earnings to EBITDA in the "Results of Operations" section above); (2) restructuring, impairment and transaction-related charges; (3) gains from sale and leaseback; (4) loss on debt extinguishment; (5) equity in earnings of unconsolidated entity; and (6) Adjusted EBITDA for unconsolidated equity method investments (calculated in a consistent manner with the calculation for Quad).

The Company uses the Debt Leverage Ratio as a metric to assess liquidity and the flexibility of its balance sheet. Consistent with other liquidity metrics, the Company monitors the Debt Leverage Ratio as a measure to determine the appropriate level of debt the Company believes is optimal to operate its business, and accordingly, to quantify debt capacity available for strengthening the balance sheet through debt and pension liability reduction, for strategic capital allocation and deployment through investments in the business, and for returning capital to the shareholders. The priorities for capital allocation and deployment will change as circumstances dictate for the business, and the Debt Leverage Ratio can be significantly impacted by the amount and timing of large expenditures requiring debt financing, as well as changes in profitability.

The Debt Leverage Ratio is a non-GAAP measure, and should not be considered an alternative to cash flows provided by operating activities as a measure of liquidity. Quad's calculation of the Debt Leverage Ratio may be different from similar calculations used by other companies and, therefore, comparability may be limited.

The Debt Leverage Ratio calculated below differs from the Total Leverage Ratio, the Total Net Leverage Ratio and Senior Secured Leverage Ratio included in the Company's debt covenant calculations (see "Covenants and Compliance" section below for further information on debt covenants). The Total Leverage Ratio included in the Company's debt covenants includes interest rate swap liabilities, letters of credit and surety bonds as debt, and excludes non-cash stock-based compensation expense from EBITDA. The Total Net Leverage Ratio includes and excludes the same adjustments as the Total Leverage Ratio, in addition to netting domestic unrestricted cash with debt. Similarly, the Senior Secured Leverage Ratio includes and excludes the same adjustments as the Total Leverage Ratio, in addition to the exclusion of the outstanding balance of the surety bonds from debt and netting domestic unrestricted cash with debt.

The Debt Leverage Ratio as of December 31, 2022 and 2021, was as follows:

	December 31, 2022	December 31, 2021
	(dollars in millions)	
Total debt and finance lease obligations on the consolidated balance sheets	$ 570.2	$ 803.7
Less: Cash and cash equivalents	25.2	179.9
Net Debt (non-GAAP)	$ 545.0	$ 623.8
Divided by: Adjusted EBITDA for the year ended (non-GAAP)	$ 252.2	$ 260.5
Debt Leverage Ratio (non-GAAP)	2.16 x	2.39 x

The calculation of Adjusted EBITDA for the years ended December 31, 2022 and 2021, was as follows:

	Year Ended December 31,	
	2022	2021
	(dollars in millions)	
Net earnings	$ 9.3	$ 37.8
Interest expense	48.4	59.6
Income tax expense	8.4	9.5
Depreciation and amortization	141.3	157.3
EBITDA (non-GAAP)	$ 207.4	$ 264.2
Restructuring, impairment and transaction-related charges	44.8	18.9
Gains from sale and leaseback	—	(24.5)
Loss on debt extinguishment	—	0.7
Other (1)	—	1.2
Adjusted EBITDA (non-GAAP) (2)	$ 252.2	$ 260.5

(1) Other is comprised of equity in earnings of unconsolidated entity and Adjusted EBITDA for unconsolidated equity method investments.

(2) The Company made a change in its definition of Adjusted EBITDA to include net pension income. This change is reflected in all periods presented.

The Debt Leverage Ratio, at December 31, 2022, decreased 0.23x to 2.16x compared to December 31, 2021, primarily due to a $78.8 million decrease in debt and finance lease obligations, partially offset by an $8.3 million decrease in Adjusted EBITDA. The Debt Leverage Ratio, at December 31, 2022, is within management's desired target Debt Leverage Ratio range of 2.0x to 2.5x; however, the Company will operate at times above the Debt Leverage Ratio target range depending on the timing of compelling strategic investment opportunities, as well as seasonal working capital needs.

Description of Significant Outstanding Debt Obligations as of December 31, 2022

As of December 31, 2022, the Company utilized a combination of debt instruments to fund cash requirements, including the following:

- Senior Secured Credit Facility:
    - $432.5 million revolving credit facility (no outstanding balance as of December 31, 2022); and
    - $825.0 million Term Loan A ($556.7 million outstanding as of December 31, 2022);
- Master Note and Security Agreement ($4.4 million outstanding as of December 31, 2022).

Senior Secured Credit Facility

On April 28, 2014, the Company entered into its Senior Secured Credit Facility, which included a revolving credit facility, Term Loan A and Term Loan B (Term Loan B was retired in July 2019) . The Company completed the fifth amendment to the Senior Secured Credit Facility on November 2, 2021. The Senior Secured Credit Facility was amended to (a) reduce the aggregate amount of the existing revolving credit facility from $500.0 million to $432.5 million, and extend the maturity of a portion of the revolving credit facility such that $90.0 million under the revolving credit facility is due on the existing maturity date of January 31, 2024 (the “Existing Maturity Date”) and $342.5 million under the revolving credit facility is due on November 2, 2026 (the “Extended Maturity Date”); (b) extend the maturity of a portion of the existing term loan facility such that $91.5 million of such term loan facility is due on the Existing Maturity Date and $483.9 million is due on the Extended Maturity Date; (c) make certain adjustments to pricing, including an increase of 0.50% to the interest rate margin applicable to the loans maturing on the Extended Maturity Date; (d) modify certain financial and operational covenants; and (e) modify the interest rate provisions relating to the phase-out of LIBOR as a reference rate.

The Company completed the sixth amendment to the Senior Secured Credit Facility on March 25, 2022, which expanded the number of currencies available for letters of credit. The Company completed the seventh amendment to the Senior Secured Credit Facility on January 24, 2023, which transitioned the Company’s reference rate from LIBOR to SOFR effective February 1, 2023. The transition from LIBOR to SOFR does not have a material impact on the consolidated financial statements.

Borrowings under the revolving credit facility and Term Loan A made under the Senior Secured Credit Facility bear interest at 2.75% in excess of reserve adjusted LIBOR, or 1.75% in excess of an alternate base rate with a LIBOR floor of 0.75% for the extended tranche and bear interest at 2.50% in excess of reserve adjusted LIBOR, or 1.50% in excess of an alternate base rate with a LIBOR floor of 0.75% for the non-extending tranche.

At December 31, 2022, the Company had no outstanding borrowings on the revolving credit facility, and had $32.7 million of issued letters of credit, leaving up to $399.8 million available for future borrowings. The Senior Secured Credit Facility is secured by substantially all of the unencumbered assets of the Company. The Senior Secured Credit Facility also requires the Company to provide additional collateral to the lenders in certain limited circumstances.

Senior Unsecured Notes

The Company issued $300.0 million aggregate principal amount of its Senior Unsecured Notes due May 1, 2022, on April 28, 2014. During the first quarter of 2022, the Company repurchased $2.4 million of its outstanding Senior Unsecured Notes in the open market. During the year ended December 31, 2021, the Company repurchased $27.2 million of its outstanding Senior Unsecured Notes in the open market, resulting in a net loss on debt extinguishment of $0.5 million. All repurchased Senior Unsecured Notes were canceled. The Company used cash flows from operating activities and borrowings under its revolving credit facility to fund the repurchases. These repurchases were completed primarily to reduce interest expense.

On May 2, 2022, the Company used liquidity available under its revolving credit facility and available cash on hand to fund the repayment on maturity of all $209.1 million aggregate principal amount, outstanding at the time, of its Senior Unsecured Notes.

Master Note and Security Agreement

On September 1, 1995, and as last amended on November 24, 2014, the Company entered into its Master Note and Security Agreement pursuant to which the Company issued over time senior notes in an aggregate principal amount of $1.1 billion in various tranches, of which $4.4 million was outstanding as of December 31, 2022. The senior notes under the Master Note and Security Agreement had a weighted average interest rate of 7.92% at December 31, 2022, which is fixed to maturity, with interest payable semiannually. Principal payments commenced September 1997 and extend through 2026 in various tranches. The notes are collateralized by certain United States press equipment under the terms of the Master Note and Security Agreement.

Covenants and Compliance

The Company's various lending arrangements include certain financial covenants (all financial terms, numbers and ratios are as defined in the Company's debt agreements). Among these covenants, the Company was required to maintain the following as of December 31, 2022:

- *Total Leverage Ratio.* On a rolling twelve-month basis, the Total Leverage Ratio, defined as consolidated total indebtedness to consolidated EBITDA, shall not exceed 3.75 to 1.00 (for the twelve months ended December 31, 2022, the Company's Total Leverage Ratio was 2.22 to 1.00).

- Liquidity, defined as unrestricted cash and permitted investments of the Company and its subsidiaries (subject to certain conditions) plus the aggregate amount of the unused revolving credit facility commitments, shall not be less than $181.6 million at any time during the period commencing December 15, 2023 and ending when all obligations owed under the Senior Secured Credit Facility to lenders that are not extending lenders are paid in full.

- If there is any amount outstanding on the Revolving Credit Facility or Term Loan A, or if any lender has any revolving credit exposure or Term Loan A credit exposure, the Company is required to maintain the following:

    - *Senior Secured Leverage Ratio.* On a rolling four-quarter basis, the Senior Secured Leverage Ratio, defined as the ratio of consolidated senior secured net indebtedness to consolidated EBITDA, shall not exceed (a) 3.50 to 1.00 for any fiscal quarter ending prior to December 31, 2023, and (b) 3.25 to 1.00 for any fiscal quarter ending on or after December 31, 2023 (other than, in the case of this clause (b), any fiscal quarter ending September 30 of any year, each of which shall be subject to a maximum Senior Secured Leverage Ratio not to exceed 3.50 to 1.00) (for the twelve months ended December 31, 2022, the Company's Senior Secured Leverage Ratio was 2.13 to 1.00).

    - *Interest Coverage Ratio.* On a rolling twelve-month basis, the Interest Coverage Ratio, defined as consolidated EBITDA to cash consolidated interest expense, shall not be less than 3.00 to 1.00 (for the twelve months ended December 31, 2022, the Company's Interest Coverage Ratio was 6.39 to 1.00).

The Company was in compliance with all financial covenants in its debt agreements as of December 31, 2022. While the Company currently expects to be in compliance in future periods with all of the financial covenants, there can be no assurance that these covenants will continue to be met. The Company's failure to maintain compliance with the covenants could prevent the Company from borrowing additional amounts and could result in a default under any of the debt agreements. Such default could cause the outstanding indebtedness to become immediately due and payable, by virtue of cross-acceleration or cross-default provisions.

In addition to those covenants, the Senior Secured Credit Facility also includes certain limitations on acquisitions, indebtedness, liens, dividends and repurchases of capital stock.

- If the Company's Total Leverage Ratio is greater than 2.75 to 1.00, the Company is prohibited from making greater than $60.0 million of dividend payments, capital stock repurchases and certain other payments, over the course of the agreement. If the Company's Total Leverage Ratio is above 2.50 to 1.00 but below 2.75 to 1.00, the Company is prohibited from making greater than $100.0 million of dividend payments, capital stock repurchases and certain other payments, over the course of the agreement. If the Total Leverage Ratio is less than 2.50 to 1.00, there are no such restrictions. As the Company's Total Leverage Ratio as of December 31, 2022, was 2.22 to 1.00, the limitations described above are not applicable at this time.

- If the Company’s Senior Secured Leverage Ratio is greater than 3.00 to 1.00 or the Company’s Total Net Leverage Ratio which, on a rolling twelve-month basis, is defined as consolidated net indebtedness to consolidated EBITDA, is greater than 3.50 to 1.00, the Company is prohibited from voluntarily prepaying any unsecured or subordinated indebtedness, with certain exceptions (including any mandatory prepayments on the Senior Unsecured Notes or any other unsecured or subordinated debt). If the Senior Secured Leverage Ratio is less than 3.00 to 1.00 and the Total Net Leverage Ratio is less than 3.50 to 1.00, there are no such restrictions. The limitations described above are currently not applicable, as the Company’s Senior Secured Leverage Ratio was 2.13 to 1.00 and Total Net Leverage Ratio was 2.14 to 1.00, as of December 31, 2022.

Net Pension Obligations

The net underfunded pension and MEPPs obligations increased by $13.2 million during the year ended December 31, 2022, from $51.4 million at December 31, 2021, to $64.6 million at December 31, 2022. This increase was primarily due to an overall decrease in pension plan assets due to a negative actual return on pension plan assets of (21.76%) during the year ended December 31, 2022, which was below the expected return on plan assets assumption of 5.25%. This decrease in plan assets was partially offset by a decrease in overall pension obligations, primarily due to a 269 basis point increase in the pension discount rate from 2.77% at December 31, 2021 to 5.46% at December 31, 2022, payments totaling $6.2 million made to the MEPPs and $1.0 million in pension benefit payments during the year ended December 31, 2022.

The Company continues to focus on reducing pension obligations through cash contributions to the plans, lump-sum settlements and plan design changes.

Share Repurchase Program

On July 30, 2018, the Company’s Board of Directors authorized a share repurchase program of up to $100.0 million of the Company’s outstanding class A common stock. Under the authorization, share repurchases may be made at the Company’s discretion, from time to time, in the open market and/or in privately negotiated transactions as permitted by federal securities laws and other legal requirements. The timing, manner, price and amount of any repurchase will depend on economic and market conditions, share price, trading volume, applicable legal requirements and other factors. The program may be suspended or discontinued at any time.

During the year ended December 31, 2022, the Company repurchased 3,093,662 shares of its Class A common stock at a weighted average price of $3.21 per share for a total purchase price of $9.9 million ($10.0 million, including commissions). There were no shares repurchased during the year ended December 31, 2021. As of December 31, 2022, there were $90.1 million of authorized repurchases remaining under the program.

Risk Management

For a discussion of the Company’s exposure to market risks and management of those market risks, see Item 7A, “Quantitative and Qualitative Disclosures About Market Risk,” of this Annual Report on Form 10-K.

Contractual Obligations and Other Commitments

The Company's contractual cash obligations at December 31, 2022, were as follows (in millions):

	Payments Due by Period						
	Total	2023	2024	2025	2026	2027	Thereafter
Debt obligations[1]	$ 677.2	$ 95.0	$ 177.2	$ 94.0	$ 311.0	$ —	$ —
Operating lease obligations[2]	131.3	33.1	25.7	21.4	17.1	13.9	20.1
MEPPs withdrawal obligations[3]	38.9	6.1	4.0	3.9	3.9	3.9	17.1
Pension benefit obligations[4]	35.3	1.5	9.7	8.2	8.4	7.5	—
Finance lease obligations[5]	2.7	0.9	0.6	0.5	0.2	0.2	0.3
Purchase obligations[6]	35.4	35.4	—	—	—	—	—
Total[7][8]	$ 920.8	$ 172.0	$ 217.2	$ 128.0	$ 340.6	$ 25.5	$ 37.5

(1) Debt obligations include $102.5 million for anticipated future interest payments, including $3.9 million of estimated interest payment refunds from the interest rate swaps, and excludes $6.9 million for future amortization of debt issuance costs. During 2021, the Company paid in advance $62.4 million of required amortization payments on its Term Loan A for the year ended December 31, 2023.

(2) Operating lease obligations include $16.4 million for anticipated future interest payments.

(3) MEPPs withdrawal obligations include $10.5 million for anticipated future interest payments. See Note 14, "Employee Retirement Plans," to the consolidated financial statements in Part II, Item 8, "Financial Statements and Supplementary Data," of this Annual Report on Form 10-K for further discussion of the MEPPs withdrawal liability.

(4) For the pension benefit obligations, contributions and benefit payments to be funded from Company assets included in the table have been actuarially estimated over a five year period. While benefit payments under these benefit plans are expected to continue beyond 2027, the Company believes that an estimate beyond this period is unreasonable.

(5) Finance lease obligations include $0.3 million for anticipated future interest payments.

(6) Purchase obligations consist primarily of $32.9 million in firm commitments to purchase press and finishing equipment and $2.5 million of other purchase obligations.

(7) The contractual obligations table above does not include reserves for uncertain tax positions recorded in accordance with the accounting guidance on uncertainties in income taxes. The Company has taken tax positions for which the ultimate amount and the year(s) any necessary payments will be made that pertain to those tax positions is uncertain. The reserve for uncertain tax positions prior to interest and penalties was $11.1 million as of December 31, 2022, of which $6.7 million was included in deferred income taxes and $4.4 million was included in other long-term liabilities.

(8) The contractual obligations table above does not include the share repurchase program as no repurchases are required under the program. See the "Share Repurchase Program" section above for further discussion, including the maximum potential cash payments under the program.

Critical Accounting Policies and Estimates

The Company's consolidated financial statements are prepared in accordance with GAAP. The Company's most critical accounting policies are those that are most important to the portrayal of its financial condition and results of operations, and which require the Company to make its most difficult and subjective estimates. Management is required to make judgments and estimates that affect the reported amounts of assets and liabilities, the disclosure of contingent assets and liabilities at the date of the statements, and the reported amounts of revenues and expenses during the reporting period. The Company bases its estimates on historical experience and on various other assumptions that are believed to be reasonable under the circumstances. The Company's management believes that such judgments and estimates are made with consistent and appropriate methods based on information available at the time, and that any reasonable deviation from those judgments and estimates would not have a material impact on the Company's consolidated financial position or results of operations. Actual results may differ from these estimates under different assumptions or conditions. To the extent that the estimates used differ from actual results, adjustments to the consolidated statements of operations and corresponding consolidated balance sheets would be necessary. These adjustments would be made in future statements.

The Company has identified the following as its critical accounting policies and estimates.

Revenue Recognition

Performance Obligations

At contract inception, the Company assesses the products and services promised in its contracts with customers and identifies performance obligations for each promise to transfer to the customer a product or service that is distinct. To identify the performance obligations, the Company considers the goods or services promised in the contract regardless of whether they are explicitly stated or are implied by customary business practices. The Company determined that the following distinct products and services represent separate performance obligations:

- Pre-Press Services
- Print
- Other Services

For Pre-Press and Other Services, the Company recognizes revenue at point-in-time upon completion of the performed service and acceptance by the customer. The Company considers transfer of control to occur once the service is performed as the Company has right to payment and the customer has legal title and risk and reward of ownership.

The Company recognizes its Print revenues upon transfer of title and the passage of risk of loss, which is point-in-time upon shipment to the customer, and when there is a reasonable assurance as to collectability. Revenues related to the Company's logistics operations, which includes the delivery of printed material, are included in the Print performance obligation and are also recognized at point-in-time as services are completed. Revenues related to the Company's imaging operations, which include digital content management, photography, color services and page production, are recognized in accordance with the terms of the contract, typically upon completion of the performed service and acceptance by the customer. Under agreements with certain customers, products may be stored by the Company for future delivery and revenue is recognized upon shipment to the customer. In these situations, the Company may receive warehouse management fees for the services it provides.

Certain revenues earned by the Company require judgment to determine if revenue should be recorded gross as principal or net of related costs as an agent. Billings for third-party shipping and handling costs, primarily in the Company's logistics operations, and out-of-pocket expenses are recorded gross in net sales and cost of sales in the consolidated statements of operations in Item 8, "Financial Statements and Supplementary Data," of this Annual Report on Form 10-K. Many of the Company's operations process materials, primarily paper, that may be supplied directly by customers or may be purchased by the Company and sold to customers. No revenue is recognized for customer-supplied paper. Revenues for the Company-supplied paper are recognized on a gross basis. In some instances, the Company will deliver print work for a customer and bill the customer for postage. In these cases, the Company is acting as an agent and billings are recorded on a net basis in net sales.

Significant Payment Terms

Payment terms and conditions for contracts with customers vary. The Company typically offers standard terms of net 30 days. It is not the Company's standard business practice to offer extended payment terms longer than one year. The Company may offer cash discounts or prepayment and extended terms depending on certain facts and circumstances. As such, when the timing of the Company's delivery of products and services differs from the timing of payment, the Company will record either a contract asset or a contract liability.

Variable Consideration

When evaluating the transaction price, the Company analyzes on a contract by contract basis all applicable variable considerations and non-cash consideration and also performs a constraint analysis. The nature of the Company's contracts give rise to variable consideration, including, volume rebates, credits, discounts, and other similar items that generally decrease the transaction price. These variable amounts generally are credited to the customer, based on achieving certain levels of sales activity, when contracts are signed, or making payments within specific terms.

Product returns are not significant because the products are customized; however, the Company accrues for the estimated amount of customer allowances at the time of sale based on historical experience and known trends.

When the transaction price requires allocation to multiple performance obligations, the Company uses the estimated stand-alone selling prices using the adjusted market assessment approach.

Impairment of Property, Plant and Equipment and Finite-lived Intangible Assets

The Company performs impairment evaluations of its long-lived assets whenever business conditions, events or circumstances indicate that those assets may be impaired, including whether the estimated useful life of such long-lived assets may warrant revision or whether the remaining balance of an asset may not be recoverable. The Company's most significant long-lived assets are property, plant and equipment and customer relationship intangible assets recorded in conjunction with an acquisition. Assessing the impairment of long-lived assets requires the Company to make important estimates and assumptions, including, but not limited to, the expected future cash flows that the assets will generate, how the assets will be used based on the strategic direction of the Company, their remaining useful life and their residual value, if any. Considerable judgment is also applied in incorporating the potential impact of the current economic climate on customer demand and selling prices, the cost of production and the limited activity on secondary markets for the assets and on the cost of capital. When the estimated future undiscounted cash flows to be generated by the assets are less than the carrying value of the long-lived assets, the assets are written down to fair value and a charge is recorded to current operations. The Company uses internal discounted cash flow estimates, quoted market prices when available and independent appraisals, as appropriate, to determine fair value. This fair value determination was categorized as Level 3 in the fair value hierarchy (see Note 13, "Financial Instruments and Fair Value Measurements," to the consolidated financial statements in Part II, Item 8, "Financial Statements and Supplementary Data," of this Annual Report on Form 10-K for the definition of Level 3 inputs).

The Company classifies long-lived assets to be sold as held for sale in the period in which: (i) there is an approved plan to sell the asset and the Company is committed to that plan, (ii) the asset is available for immediate sale in its present condition, (iii) an active program to locate a buyer and other actions required to sell the asset have been initiated, (iv) the sale of the asset is probable, (v) the asset is being actively marketed for sale at a price that is reasonable in relation to its current fair value, and (vi) it is unlikely that significant changes to the plan will be made or that the plan will be withdrawn. Assets held for sale are initially measured at the lower of the carrying value or the fair value less cost to sell. Losses resulting from this measurement are recognized in the period in which the held for sale criteria are met while gains are not recognized until the date of sale. Once designated as held for sale, the Company stops recording depreciation expense on the property, plant and equipment. The fair value less cost to sell of long-lived assets held for sale is assessed at each reporting period until it no longer meets this classification.

Based on the assessments completed during the years ended December 31, 2022, and 2021, the Company recognized property, plant and equipment impairment charges of $2.2 million and $2.8 million, respectively, primarily related to facility consolidations, as well as other capacity reduction and strategic divestiture activities. There were no finite-lived intangible asset impairment charges recorded during the years ended December 31, 2022 and 2021.

The Company continues to monitor groups of assets to identify any new events or changes in circumstances that could indicate that their carrying values are not recoverable, particularly in light of potential declines in profitability that may result from the highly competitive industry landscape and continued uncertainty in the global economy. In the event that there are significant and unanticipated changes in circumstances, such as significant adverse changes in business climate, adverse actions by regulators, unanticipated competition, loss of key customers and/or changes in technology or markets, or that actual results differ from management's estimates, a provision for impairment could be required in a future period.

Workers' Compensation

The Company is self-insured for a significant portion of its expected workers' compensation program. Insurance is purchased for individual workers' compensation claims that exceed $0.8 million. The Company establishes reserves for unresolved claims and for an estimate of incurred but not reported ("IBNR") claims. These reserves and estimates of IBNR claims are based upon an actuarial study, which is performed annually as of October 31st and is adjusted by the actuarially determined losses and actual claims payments for November and December. The Company also monitors actual claim developments, including incurrence or settlement of individual large claims during the interim periods between actuarial studies as another means of estimating the adequacy of the reserves. As of December 31, 2022, the Company has net reserves for workers' compensation of $29.9 million, of which $6.6 million was recorded in other current liabilities and $34.5 million was recorded in other long-term liabilities in the consolidated balance sheets (see Note 8, "Other Current and Long-Term Liabilities"). These reserves are net of $11.2 million recorded in other long-term assets in the consolidated balance sheets for claims covered by purchased insurance.

New Accounting Pronouncements

See Note 21, "New Accounting Pronouncements," to the consolidated financial statements in Part II, Item 8, "Financial Statements and Supplementary Data," of this Annual Report on Form 10-K.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

The Company is exposed to a variety of market risks which may adversely impact the Company's results of operations and financial condition, including changes in interest and foreign currency exchange rates, changes in the economic environment that would impact credit positions and changes in the prices of certain commodities. The Company's management takes an active role in the risk management process and has developed policies and procedures that require specific administrative and business functions to assist in the identification, assessment and control of various risks. These risk management strategies may not fully insulate the Company from adverse impacts due to market risks.

Interest Rate Risk

The Company is exposed to interest rate risk on variable rate debt obligations and price risk on fixed rate debt and finance leases. The variable rate debt outstanding at December 31, 2022, was primarily comprised of $556.7 million outstanding on the Term Loan A. As of December 31, 2022, there was no outstanding balance on the revolving credit facility. In order to reduce the variability of cash flows from interest payments related to a portion of Quad's variable-rate debt, the Company entered into a $250.0 million interest rate swap in February 2017 (which terminated on February 28, 2022) and a $130.0 million interest rate swap in March 2019, and has classified $130.0 million of the Company's variable rate debt as fixed rate debt. Including the impact of the $130.0 million interest rate swap of variable rate to fixed rate debt, Quad had variable rate debt outstanding of $428.2 million at a current weighted average interest rate of 6.3% and fixed rate debt and finance leases outstanding of $142.0 million at a current weighted average interest rate of 5.1% as of December 31, 2022. A hypothetical 10% increase in the market interest rates impacting the Company's current weighted average interest rate on variable rate debt obligations would not have a material impact on the Company's interest expense. In addition, a hypothetical 10% change in market interest rates would change the fair value of fixed rate debt at December 31, 2022 by approximately $0.1 million.

Foreign Currency Risk and Translation Exposure

The Company is exposed to the impact of foreign currency fluctuations in certain countries in which it operates. The exposure to foreign currency movements is limited in most countries because the operating revenues and expenses of its various subsidiaries and business units are substantially in the local currency of the country in which they operate. To the extent revenues and expenses are not in the applicable local currency, the Company may enter into foreign exchange forward contracts to hedge the currency risk.

Although operating in local currencies may limit the impact of currency rate fluctuations on the results of operations of the Company's non-United States subsidiaries and business units, rate fluctuations may impact the consolidated financial position as the assets and liabilities of its foreign operations are translated into U.S. dollars in preparing the Company's consolidated balance sheets. As of December 31, 2022, the Company's foreign subsidiaries had net current assets (defined as current assets less current liabilities) subject to foreign currency translation risk of $77.5 million. The potential decrease in net current assets as of December 31, 2022, from a hypothetical 10% adverse change in quoted foreign currency exchange rates would be approximately $7.7 million. This sensitivity analysis assumes a parallel shift in all major foreign currency exchange rates versus the U.S. dollar. Exchange rates rarely move in the same direction relative to the U.S. dollar due to positive and negative correlations of the various global currencies. This assumption may overstate or understate the impact of changing exchange rates on individual assets and liabilities denominated in a foreign currency.

The Company's hedging operations have historically not been material, and gains or losses from these operations have not been material to the Company's results of operations, financial position or cash flows. The Company does not use derivative financial instruments for trading or speculative purposes.

These international operations are subject to risks typical of international operations, including, but not limited to, differing economic conditions, changes in political climate, potential restrictions on the movement of funds, differing tax structures, and other regulations and restrictions. Accordingly, future results could be adversely impacted by changes in these or other factors.

The Company has considered the economy in Argentina to be highly inflationary, effective June 30, 2018. In accordance with Accounting Standards Codification ("ASC") 830 - *Foreign Currency Matters*, a highly inflationary economy is one that has experienced cumulative inflation of approximately 100 percent or more over a three-year period. An entity is required to apply the revised accounting guidance in the reporting period following when the economy was deemed to be highly inflationary. As a result of this classification, the functional currency of the Company's Argentina subsidiaries was changed from the local currency to the U.S. Dollar, beginning July 1, 2018, and impacts from the change in the value of the local currency for monetary assets and liabilities is now reflected in the consolidated statements of operations. Due to the Argentina economy classification as highly inflationary, the impact from foreign currency losses was $1.8 million and $0.6 million during the years ended December 31, 2022 and 2021, respectively, and was recorded in restructuring, impairment and transaction-related charges in the consolidated statements of operations. As of December 31, 2022, there were no assets from the operations in Argentina in the total consolidated assets. For the year ended December 31, 2022, there was less than 1.0% of total consolidated net sales from the operations in Argentina.

Credit Risk

Credit risk is the possibility of loss from a client's failure to make payments according to contract terms. Prior to granting credit, each client is evaluated in an underwriting process, taking into consideration the prospective client's financial condition, past payment experience, credit bureau information and other financial and qualitative factors that may affect the client's ability to pay. Specific credit reviews and standard industry credit scoring models are used in performing this evaluation. Clients' financial condition is continuously monitored as part of the normal course of business. Some of the Company's clients are highly leveraged or otherwise subject to their own operating and regulatory risks. Based on those client account reviews and the continued uncertainty of the global economy, the Company has established an allowance for credit losses of $26.4 million as of December 31, 2022.

The Company has a large, diverse client base and does not have a high degree of concentration with any single client account. During the year ended December 31, 2022, the Company's largest client accounted for less than 5% of the Company's net sales. Even if the Company's credit review and analysis mechanisms work properly, the Company may experience financial losses in its dealings with clients and other parties. Any increase in nonpayment or nonperformance by clients could adversely impact the Company's results of operations and financial condition. Economic disruptions could result in significant future charges.

Commodity Risk

The primary raw materials that the Company uses in its print business are paper, ink and energy. At this time, the Company's supply of raw materials are available from numerous vendors; however, based on market conditions, the current supply is under pressure due to supply chain shortages and higher than expected inflation. The Company generally buys these raw materials based upon market prices that are established with the vendor as part of the procurement process. The price of such raw materials has fluctuated over time and has caused fluctuations in the Company's net sales and cost of sales. This volatility may continue and the Company may experience increases in the costs of its raw materials in the future as prices in the overall paper, ink and energy markets are expected to remain beyond its control. The price and availability of paper may also be adversely affected by paper mills' permanent or temporary closures, and mills' access to raw materials, conversion to produce other types of paper, and ability to transport paper produced.

Approximately half of the paper used by the Company is supplied directly by its clients. For those clients that do not directly supply their own paper, the Company makes use of its purchasing efficiencies to supply paper by negotiating with leading paper vendors, uses a wide variety of paper grades, weights and sizes, and does not rely on any one vendor. In addition, the Company generally includes price adjustment clauses in sales contracts for paper and other critical raw materials in the printing process. Although these clauses generally mitigate paper price risk, higher paper prices and tight paper supplies, as well as changes in the United States import or trade regulations may have an impact on client demand for printed products. The Company's working capital requirements, including the impact of seasonality, are partially mitigated through the direct purchasing of paper by its clients.

The Company produces the majority of ink used in its print production, allowing it to control the quality, cost and supply of key inputs. Raw materials for the ink manufacturing process are purchased externally from a variety of vendors. The price and availability of ink and ink components may be adversely affected by the availability of component raw materials, labor and transportation.

The Company may not be able to fully pass on to clients the impact of higher electric and natural gas energy prices on its manufacturing costs, and increases in energy prices result in higher manufacturing costs for certain of its operations. The Company mitigates its risk through natural gas hedges when appropriate. In its logistics operations, however, the Company is able to pass a substantial portion of any increase in fuel prices directly to its clients.

To the extent the cost of other raw materials increase and the Company is not able to increase selling prices of its products, then the Company may experience margin declines.

As a result, management believes a hypothetical 10% change in the price of paper and other raw materials would not have a significant direct impact on the Company's consolidated annual results of operations or cash flows; however, significant increases in commodity pricing or tight supply could influence future client demand for printed products.

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Item 8. Financial Statements and Supplementary Data

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Shareholders and the Board of Directors of Quad/Graphics, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheet of Quad/Graphics, Inc. (the Company) as of December 31, 2022, and the related consolidated statement of operations, comprehensive income, cash flows, and shareholders' equity in the year ended December 31, 2022, and the related notes (collectively referred to as the "financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2022, and the results of its operations and its cash flows for the year ended December 31, 2022, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2022, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework), and our report dated February 24, 2023, expressed an unqualified opinion thereon.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audit included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audit also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audit provides a reasonable basis for our opinion.

Critical Audit Matter

The critical audit matter communicated below is a matter arising from the current period audit of the financial statements that was communicated or required to be communicated to the audit committee and that: (1) relates to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective, or complex judgments. The communication of the critical audit matter does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing a separate opinion on the critical audit matter or on the accounts or disclosures to which it relates.

Measurement of accrued liabilities for workers' compensation claims

Description of the Matter	At December 31, 2022, the Company's consolidated accrued liabilities for workers' compensation claims were $41.1 million and included within other current and long-term liabilities. As discussed in Note 1, the Company establishes accrued liabilities for workers' compensation claims reported plus an estimate for loss development and potential claims that have been incurred but not reported (IBNR) to the Company or its insurance provider. The IBNR calculation utilizes a variety of assumptions, including but not limited to selected loss development factors, loss trend rates, increased limit factors and loss rates. The accrued liabilities for workers' claims are based upon an actuarial analysis performed annually by actuarial specialists as of October 31st and are adjusted by the actuarially determined losses and actual claims payments to update through year end. Auditing management's estimate of the IBNR was especially challenging due to the various assumptions and the complexity of the actuarial analysis.
How We Addressed the Matter in Our Audit	We tested certain of the Company's controls over the measurement of accrued liabilities for workers' compensation claims process, which included, among others, management's review and approval of the actuarial analysis and related year-end update, management's validation of data inputs as well as their review and approval of assumptions used in the analysis. To test the measurement of accrued liabilities for workers' compensation claims, we performed audit procedures that included, among other others, assessing methodologies and testing the significant assumptions discussed above, as well as testing the completeness and accuracy of the underlying data used by the Company in its analysis. We also involved our actuarial professionals with specialized skills and knowledge, who assisted in: (1) assessing the actuarial models and procedures used by the Company by comparing them to generally accepted actuarial methods and procedures to estimate the ultimate losses, (2) evaluating the Company's key assumptions and judgments underlying the Company's estimate by developing an independent range of the IBNR and comparing it against the Company's recorded amount and (3) evaluating the qualifications of the external actuarial specialists.

/s/ Ernst & Young LLP

We have served as the Company's auditor since 2022.

Milwaukee, Wisconsin
February 24, 2023

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the shareholders and the Board of Directors of Quad/Graphics, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Quad/Graphics, Inc. and subsidiaries (the "Company") as of December 31, 2021, the related consolidated statements of operations, comprehensive income, shareholders' equity, and cash flows, for the year ended December 31, 2021, and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2021, and the results of its operations and its cash flows for the year ended December 31, 2021, in conformity with accounting principles generally accepted in the United States of America.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audit included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ Deloitte & Touche LLP

Milwaukee, Wisconsin
February 23, 2022

We began serving as the Company's auditor in 2002. In 2022 we became the predecessor auditor.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Shareholders and the Board of Directors of Quad/Graphics, Inc.

Opinion on Internal Control over Financial Reporting

We have audited Quad/Graphics, Inc.'s internal control over financial reporting as of December 31, 2022, based on criteria established in Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, Quad/Graphics, Inc. (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 31, 2022, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheet of the Company as of December 31, 2022 and the related consolidated statement of operations, comprehensive income, cash flows, and shareholders' equity in the year ended December 31, 2022, and the related notes listed in the accompanying index and our report dated February 24, 2023 expressed an unqualified opinion thereon.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying Management's Report on Internal Control Over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects.

Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ Ernst & Young LLP

Milwaukee, Wisconsin
February 24, 2023

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QUAD/GRAPHICS, INC.
CONSOLIDATED STATEMENTS OF OPERATIONS
(in millions, except per share data)

	Year Ended December 31, 2022	Year Ended December 31, 2021
Net sales		
Products	$ 2,528.3	$ 2,247.1
Services	688.7	713.3
Total net sales	3,217.0	2,960.4
Cost of sales		
Products	2,156.2	1,861.0
Services	462.6	528.9
Total cost of sales	2,618.8	2,389.9
Operating expenses		
Selling, general and administrative expenses	358.6	326.0
Gains from sale and leaseback	—	(24.5)
Depreciation and amortization	141.3	157.3
Restructuring, impairment and transaction-related charges	44.8	18.9
Total operating expenses	3,163.5	2,867.6
Operating income	**53.5**	**92.8**
Interest expense	48.4	59.6
Net pension income	(12.6)	(14.5)
Loss on debt extinguishment	—	0.7
Earnings before income taxes and equity in earnings of unconsolidated entity	17.7	47.0
Income tax expense	8.4	9.5
Earnings before equity in earnings of unconsolidated entity	9.3	37.5
Equity in earnings of unconsolidated entity	—	(0.3)
Net earnings	**$ 9.3**	**$ 37.8**
Earnings per share		
Basic	$ 0.18	$ 0.74
Diluted	$ 0.18	$ 0.71
Weighted average number of common shares outstanding		
Basic	50.7	51.3
Diluted	52.5	53.0

See accompanying Notes to Consolidated Financial Statements.

QUAD/GRAPHICS, INC.
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME
(in millions)

	Year Ended December 31,	
	2022	2021
Net earnings	$ 9.3	$ 37.8
Other comprehensive income		
Translation adjustments		
Foreign currency translation adjustments	(3.2)	(8.2)
Translation of long-term loans to foreign subsidiaries	0.9	(1.1)
Revaluation loss from the dissolution of an equity method investment entity	29.4	—
Total translation adjustments	27.1	(9.3)
Reclassification of foreign currency translation adjustments	27.3	(2.7)
Interest rate swap adjustments	3.4	7.1
Pension benefit plan adjustments		
Net gain (loss) arising during period	(30.7)	20.4
Settlement charge on pension benefit plans included in net earnings	—	0.9
Total pension benefit plan adjustments	(30.7)	21.3
Other comprehensive income, before tax	27.1	16.4
Income tax impact related to items of other comprehensive income	5.8	(6.3)
Other comprehensive income, net of tax	32.9	10.1
Total comprehensive income	$ 42.2	$ 47.9

See accompanying Notes to Consolidated Financial Statements.

QUAD/GRAPHICS, INC.
CONSOLIDATED BALANCE SHEETS
(in millions, except per share data)

	December 31, 2022	December 31, 2021
ASSETS		
Cash and cash equivalents	$ 25.2	$ 179.9
Receivables, less allowances for credit losses of $26.4 million at December 31, 2022, and $28.2 million at December 31, 2021	372.6	362.0
Inventories	260.7	226.2
Prepaid expenses and other current assets	46.0	41.0
Total current assets	704.5	809.1
Property, plant and equipment—net	672.1	727.0
Operating lease right-of-use assets—net	111.1	125.7
Goodwill	86.4	86.4
Other intangible assets—net	46.9	75.3
Other long-term assets	80.8	66.5
Total assets	$ 1,701.8	$ 1,890.0
LIABILITIES AND SHAREHOLDERS' EQUITY		
Accounts payable	$ 456.6	$ 367.3
Other current liabilities	249.1	314.3
Short-term debt and current portion of long-term debt	61.1	245.6
Current portion of finance lease obligations	0.8	1.8
Current portion of operating lease obligations	27.8	28.1
Total current liabilities	795.4	957.1
Long-term debt	506.7	554.9
Finance lease obligations	1.6	1.4
Operating lease obligations	87.1	99.8
Deferred income taxes	9.3	11.9
Other long-term liabilities	128.8	128.1
Total liabilities	1,528.9	1,753.2
Commitments and contingencies (Note 9)		
Shareholders' equity (Note 17)		
Preferred stock, $0.01 par value; Authorized: 0.5 million shares; Issued: None	—	—
Common stock, Class A, $0.025 par value; Authorized: 105.0 million shares; Issued: 42.6 million shares at December 31, 2022, and 41.7 million shares at December 31, 2021	1.0	1.0
Common stock, Class B, $0.025 par value; Authorized: 80.0 million shares; Issued: 13.5 million shares at December 31, 2022 and 2021	0.4	0.4
Common stock, Class C, $0.025 par value; Authorized: 20.0 million shares; Issued: 0.5 million shares at December 31, 2022 and 2021	—	—
Additional paid-in capital	841.8	839.3
Treasury stock, at cost, 3.9 million shares at December 31, 2022, and 1.4 million shares at December 31, 2021	(23.5)	(14.9)
Accumulated deficit	(518.5)	(527.8)
Accumulated other comprehensive loss	(128.3)	(161.2)
Total shareholders' equity	172.9	136.8
Total liabilities and shareholders' equity	$ 1,701.8	$ 1,890.0

See accompanying Notes to Consolidated Financial Statements.

QUAD/GRAPHICS, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
(in millions)

	Year Ended December 31, 2022	Year Ended December 31, 2021
OPERATING ACTIVITIES		
Net earnings	$ 9.3	$ 37.8
Adjustments to reconcile net earnings to net cash provided by operating activities:		
Depreciation and amortization	141.3	157.3
Impairment charges	2.2	34.9
Reclassification of foreign currency translation adjustments	—	(2.7)
Settlement charges on pension plan	—	0.9
Amortization of debt issuance costs and original issue discount	2.2	3.0
Loss on debt extinguishment	—	0.7
Stock-based compensation	6.0	6.2
Gain on the sale or disposal of property, plant and equipment	(2.3)	(49.0)
(Gain) loss on the sale of a business	23.1	(20.9)
Gain from a property insurance claim	—	(13.4)
Deferred income taxes	2.4	5.3
Equity in earnings of unconsolidated entity	—	(0.3)
Changes in operating assets and liabilities—net of acquisitions and divestitures:		
Receivables	(18.6)	12.7
Inventories	(41.1)	(58.3)
Prepaid expenses and other current assets	3.0	8.1
Accounts payable and other current liabilities	63.9	49.0
Other	(36.8)	(34.8)
Net cash provided by operating activities	154.6	136.5
INVESTING ACTIVITIES		
Purchases of property, plant and equipment	(60.3)	(50.0)
Cost investment in unconsolidated entities	(3.3)	(1.4)
Proceeds from the sale of property, plant and equipment	4.6	126.3
Proceeds from the sale of a business	—	39.7
Proceeds from a property insurance claim	—	15.0
Acquisition of a business	(2.6)	—
Other investing activities	1.1	(0.2)
Net cash (used in) provided by investing activities	(60.5)	129.4
FINANCING ACTIVITIES		
Payments of current and long-term debt	(235.9)	(139.5)
Payments of finance lease obligations	(2.1)	(3.0)
Borrowings on revolving credit facilities	995.7	445.1
Payments on revolving credit facilities	(995.0)	(440.5)
Proceeds from issuance of long-term debt	3.1	15.9
Payments of debt issuance costs and financing fees	—	(5.9)
Change in ownership of noncontrolling interests	—	(1.9)
Purchases of treasury stock	(10.0)	—
Equity awards redeemed to pay employees' tax obligations	(2.5)	(1.1)
Payment of cash dividends	(1.4)	(1.4)
Other financing activities	(0.6)	(8.6)
Net cash used in financing activities	(248.7)	(140.9)
Effect of exchange rates on cash and cash equivalents	(0.1)	(0.3)
Net increase (decrease) in cash and cash equivalents	(154.7)	124.7
Cash and cash equivalents at beginning of year	179.9	55.2
Cash and cash equivalents at end of year	$ 25.2	$ 179.9

See accompanying Notes to Consolidated Financial Statements.

QUAD/GRAPHICS, INC.
CONSOLIDATED STATEMENTS OF SHAREHOLDERS' EQUITY
(in millions)

	Common Stock		Additional Paid-in Capital	Treasury Stock		Accumulated Deficit	Accumulated Other Comprehensive Loss	Quad's Shareholders' Equity	Noncontrolling Interests
	Shares	Amount		Shares	Amount				
Balance at January 1, 2021	**54.4**	**$ 1.4**	**$ 833.1**	**(0.8)**	**$ (13.1)**	**$ (566.0)**	**$ (171.3)**	**$ 84.1**	**$ 0.7**
Net earnings	—	—	—	—	—	37.8	—	37.8	—
Change in ownership of noncontrolling interests	—	—	(0.9)	—	—	—	—	(0.9)	(0.7)
Foreign currency translation adjustments	—	—	—	—	—	—	(9.6)	(9.6)	—
Reclassification of foreign currency translation adjustments	—	—	—	—	—	—	(2.7)	(2.7)	—
Pension benefit plan liability adjustments, net of tax	—	—	—	—	—	—	16.8	16.8	—
Interest rate swap adjustments, net of tax	—	—	—	—	—	—	5.6	5.6	—
Accrual reversal for cash dividends declared	—	—	—	—	—	0.4	—	0.4	—
Stock-based compensation	—	—	6.2	—	—	—	—	6.2	—
Issuance of share-based awards, net of other activity	1.3	—	0.9	(0.4)	(0.7)	—	—	0.2	—
Equity awards redeemed to pay employees' tax obligations	—	—	—	(0.2)	(1.1)	—	—	(1.1)	—
Balance at December 31, 2021	**55.7**	**$ 1.4**	**$ 839.3**	**(1.4)**	**$ (14.9)**	**$ (527.8)**	**$ (161.2)**	**$ 136.8**	**$ —**
Net earnings	—	—	—	—	—	9.3	—	9.3	—
Foreign currency translation adjustments	—	—	—	—	—	—	27.2	27.2	—
Reclassification of foreign currency translation adjustments	—	—	—	—	—	—	27.3	27.3	—
Pension benefit plan liability adjustments, net of $6.5 million tax benefit	—	—	—	—	—	—	(24.2)	(24.2)	—
Interest rate swap adjustments, net of tax	—	—	—	—	—	—	2.6	2.6	—
Stock-based compensation	—	—	5.8	—	—	—	—	5.8	—
Purchases of treasury stock	—	—	—	(3.1)	(10.0)	—	—	(10.0)	—
Issuance of share-based awards, net of other activity	0.9	—	(3.3)	1.0	3.9	—	—	0.6	—
Equity awards redeemed to pay employees' tax obligations	—	—	—	(0.4)	(2.5)	—	—	(2.5)	—
Balance at December 31, 2022	**56.6**	**$ 1.4**	**$ 841.8**	**(3.9)**	**$ (23.5)**	**$ (518.5)**	**$ (128.3)**	**$ 172.9**	**$ —**

See accompanying Notes to Consolidated Financial Statements.

Note 1. Basis of Presentation and Summary of Significant Accounting Policies

Nature of Operations—Quad is a global marketing experience company that gives brands a more streamlined, impactful, flexible and frictionless way to go to market and reach consumers. The Company leverages its three key competitive advantages — integrated marketing platform excellence, ongoing innovation, and culture and social purpose — to create a better way for its clients, employees and communities. With a marketing platform intentionally built for integrated marketing execution, Quad helps brands reduce the complexity of working with multiple agency partners and vendors; increase marketing process efficiency; and maximize marketing effectiveness. The Company's holistic, multichannel, through-the-line marketing solutions include strategy and consulting, data and analytics, technology solutions, media services, creative and content solutions, and managed services. With unmatched scale for client-based, on-site services and highly qualified talent with expansive subject matter expertise, the Company has the resources and knowledge to help a wide variety of clients across multiple verticals, including those in industries such as retail, publishing, consumer packaged goods, financial services, healthcare, insurance and direct-to-consumer.

Principles of Consolidation and Basis of Presentation—The accompanying consolidated financial statements include the accounts of the Company and its wholly-owned and majority-owned controlled subsidiaries and have been prepared in accordance with GAAP. The results of operations and accounts of businesses acquired are included in the consolidated financial statements from the dates of acquisition.

Investments in entities where the Company has both the ability to exert significant influence but not control and an ownership interest of 50% or less but more than 20% are accounted for using the equity method of accounting. Investments in entities where the Company does not exert significant influence or control and has an ownership interest of less than 20% are accounted for using the cost method of accounting. Intercompany transactions and balances have been eliminated in consolidation.

Foreign Operations—Assets and liabilities denominated in foreign currencies are translated into United States dollars at the exchange rate existing at the respective balance sheet dates. Income and expense items are translated at the average rates during the respective periods. Translation adjustments resulting from fluctuations in exchange rates are recorded as a separate component of accumulated other comprehensive income (loss) on the consolidated statements of shareholders' equity, while transaction gains and losses are recorded in selling, general and administrative expenses on the consolidated statements of operations. Foreign exchange transactions resulted in losses of $2.1 million and $2.9 million during the years ended December 31, 2022 and 2021, respectively.

The Company had a 49% interest in Plural, a commercial printer based in São Paulo, Brazil, as of December 31, 2021 and through the date of the Company's sale of the investment in Plural in January 2022. The Company accounted for this entity using the equity method of accounting. The Company's equity in the earnings of Plural's operations was recorded in equity in earnings of unconsolidated entity in the Company's consolidated statements of operations, and was included within the International segment. As a result of the planned sale, the Company recorded a $32.1 million impairment charge during the year ended December 31, 2021. Quad has no unconsolidated entities as of December 31, 2022.

Use of Estimates—The preparation of consolidated financial statements requires the use of management's estimates and assumptions that affect the reported assets and liabilities, disclosure of contingent assets and liabilities at the date of the consolidated financial statements and the reported amounts of revenue and expenses during the reporting periods. Actual results could differ from these estimates. Estimates are used when accounting for items and matters including, but not limited to: allowances for doubtful accounts, inventory obsolescence, asset valuations and useful lives, pension benefits, self-insurance reserves, stock-based compensation, taxes, restructuring and other provisions and contingencies.

Revenue Recognition—The Company recognizes its products and services revenue based on when the transfer of control passes to the customer or when the service is completed and accepted by the customer. Under agreements with certain customers, products may be stored by the Company for future delivery and revenue is recognized upon shipment to the customer. In these situations, the Company may receive warehouse management fees for the services it provides. Product returns are not significant because the products are customized; however, the Company accrues for the estimated amount of customer allowances at the time of sale based on historical experience and known trends.

Revenue from services is recognized as services are performed. Revenues related to the Company's imaging operations, which include digital content management, photography, color services and page production, are recognized in accordance with the terms of the contract, typically upon completion of the performed service and acceptance by the customer. Revenues related to the Company's logistics operations, which includes the delivery of printed material, are recognized upon completion of services.

Certain revenues earned by the Company require judgment to determine if revenue should be recorded gross as a principal or net of related costs as an agent. Billings for third-party shipping and handling costs, primarily in the Company's logistics operations, and out-of-pocket expenses are recorded gross in net sales and cost of sales in the consolidated statements of operations. Many of the Company's operations process materials, primarily paper, that may be supplied directly by customers or may be purchased by the Company and sold to customers. No revenue is recognized for customer-supplied paper. Revenues for Company-supplied paper are recognized on a gross basis.

Financial Instruments—The Company uses derivative financial instruments for the purpose of hedging interest rate, commodity and foreign exchange exposures that exist as part of ongoing business operations, including interest rate swap and collar agreements, natural gas forward purchase contracts and foreign exchange contracts. As a policy, the Company does not engage in speculative or leveraged transactions, nor does the Company hold or issue financial instruments for trading purposes.

Derivative instruments are recorded on the consolidated balance sheets as either assets or liabilities measured at their fair value. If the derivative is designated as a fair value hedge, the changes in the fair value of the derivative and of the hedged item attributable to the hedged risk are recognized in earnings. If the derivative is designated as a cash flow hedge, the effective portion of the changes in the fair value of the derivative are recorded as a component of accumulated other comprehensive income (loss) and recognized in the consolidated statements of operations when the hedged item affects earnings.

The ineffective portions of the changes in the fair value of hedges are recognized in earnings. Cash flows from derivatives that are accounted for as cash flow or fair value hedges are included in the consolidated statements of cash flows in the same category as the item being hedged.

Fair Value Measurement—The Company applies fair value accounting for all assets and liabilities that are recognized or disclosed at fair value in its consolidated financial statements on a recurring basis. Fair value represents the amount that would be received from selling an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. When determining the fair value measurements for assets and liabilities that are required to be recorded at fair value, the Company considers the principal or most advantageous market and the market-based risk measurements or assumptions that market participants would use in pricing the asset or liability. See Note 13, "Financial Instruments and Fair Value Measurements," for further discussion.

Research and Development—Research and development costs related to the development of new products or the adaptation of existing products are expensed as incurred, included in cost of sales and totaled $3.3 million and $3.1 million during the years ended December 31, 2022 and 2021, respectively.

(In millions, except share and per share data and unless otherwise indicated)

Cash and Cash Equivalents and Restricted Cash—The Company considers all highly liquid investments with original maturities of three months or less to be cash equivalents.

Receivables—Receivables are stated net of allowances for credit losses. No single customer comprised more than 5% of the Company's consolidated net sales in 2022 or 2021, or 5% of the Company's consolidated receivables as of December 31, 2022 or 2021. In accordance with ASC 326—*Financial Instruments—Credit Losses* ("ASC 326"), the Company measures expected credit losses for financial instruments, including trade receivables, based on historical experience, current conditions and reasonable forecasts. See Note 5, "Receivables," for further discussion on the transactions affecting the allowances for doubtful accounts.

Inventories—Inventories include material, labor, and plant overhead and are stated at the lower of cost or net realizable value. At December 31, 2022 and 2021, all inventories were valued using the first-in, first-out method. See Note 6, "Inventories," for the components of the Company's inventories.

Leases—Leases are accounted for under the right-of-use model, which requires a lessee to record a right-of-use asset and a lease liability on the balance sheet for all leases with terms longer than twelve months. Leases are classified as either finance or operating, with classification affecting the pattern of expense recognition. See Note 11, "Leases," for additional accounting policies.

Property, Plant and Equipment—Property, plant and equipment are recorded at cost, and are depreciated over the estimated useful lives of the assets using the straight-line method for financial reporting purposes. See Note 7, "Property, Plant and Equipment," for the components of the Company's property, plant and equipment. Major improvements that extend the useful lives of existing assets are capitalized and charged to the asset accounts. Repairs and maintenance, which do not significantly improve or extend the useful lives of the respective assets, are expensed as incurred. Leasehold improvements are depreciated over the shorter of the lease term or the estimated useful life of the respective asset. When an asset is retired or disposed, the associated costs and accumulated depreciation are eliminated, and the resulting gain or loss is recognized in the Company's consolidated statements of operations.

Asset Category	Range of Useful Lives
Buildings	10 to 40 Years
Machinery and equipment	3 to 15 Years
Other	3 to 10 Years

Other Intangible Assets—Identifiable intangible assets are recognized apart from goodwill and are amortized over their estimated useful lives.

Impairment of Long-Lived and Other Intangible Assets—The Company evaluates long-lived assets and other intangible assets (of which the most significant are property, plant and equipment; right-of-use assets and customer relationship intangible assets) whenever events and circumstances have occurred that indicate the carrying value of an asset may not be recoverable. Determining whether impairment has occurred typically requires various estimates and assumptions, including determining which cash flows are directly related to the potentially impaired asset, the useful life over which cash flows will occur, their amount and the asset's residual value, if any. In turn, assessing whether there is an impairment loss requires a determination of recoverability, which is generally estimated by the ability to recover the balance of the assets from expected future operating cash flows on an undiscounted basis. If impairment is determined to exist, any related impairment loss is calculated based on the difference in the fair value and carrying value of the asset.

Goodwill—Goodwill is reviewed annually for impairment as of October 31, or more frequently if events or changes in circumstances indicate that it is more likely than not that the fair value of a reporting unit is below its carrying value. In performing this analysis, the Company compares each reporting unit's fair value to its carrying value. The fair value is estimated based on comparable company market valuations and/or expected future discounted cash flows to be generated by the reporting unit. If the carrying value exceeds the reporting unit's fair value, an impairment loss would be charged to operations in the period identified. See Note 4, "Goodwill and Other Intangible Assets," for further discussion.

Workers' Compensation—The Company is self-insured for a significant portion of its expected workers' compensation program. Insurance is purchased for individual workers' compensation claims that exceed $0.8 million. The Company establishes reserves for unresolved claims and for an estimate of incurred but not reported ("IBNR") claims. These reserves and estimates of IBNR claims are based upon an actuarial study, which is performed annually as of October 31st and is adjusted by the actuarially determined losses and actual claims payments for November and December. The Company also monitors actual claim developments, including incurrence or settlement of individual large claims during the interim periods between actuarial studies as another means of estimating the adequacy of the reserves. As of December 31, 2022, the Company has net reserves for workers' compensation of $29.9 million, of which $6.6 million was recorded in other current liabilities and $34.5 million was recorded in other long-term liabilities in the consolidated balance sheets (see Note 8, "Other Current and Long-Term Liabilities"). These reserves are net of $11.2 million recorded in other long-term assets in the consolidated balance sheets for estimated claims covered by purchased insurance. As of December 31, 2021, the Company had net reserves for workers' compensation of $34.2 million, of which $7.5 million was recorded in other current liabilities and $40.1 million was recorded in other long-term liabilities in the consolidated balance sheets (see Note 8, "Other Current and Long-Term Liabilities"). These reserves were net of $13.4 million recorded in other long-term assets in the consolidated balance sheets for estimated claims covered by purchased insurance.

Income Taxes—The Company accounts for income taxes under the asset and liability method, which requires the recognition of deferred tax assets and liabilities for the expected future tax consequences of items reported in the financial statements. Under this method, deferred tax assets and liabilities are measured based on the differences between the financial statement and tax basis of assets and liabilities using enacted tax rates in effect for the year in which the differences are expected to reverse. The effect of a change in tax rates on deferred tax assets and liabilities is recognized in income in the period that includes the effective date of enactment.

The Company records net deferred tax assets to the extent the Company believes these assets will more likely than not be realized. This determination is based upon all available positive and negative evidence, including future reversals of existing taxable temporary differences, projected future taxable income, tax planning strategies, and recent financial operations. If the Company determines that a deferred income tax asset will not be fully realized in the future, then a valuation allowance is established or increased to reflect the amount at which the asset will more likely than not be realized, which would increase the Company's provision for income taxes. In a period after a valuation allowance has been established, if the Company determines the related deferred income tax assets will be realized in the future in excess of their net recorded amount, then an adjustment to reduce the related valuation allowance will be made, which would reduce the Company's provision for income taxes.

The Company is regularly audited by foreign and domestic tax authorities. These audits occasionally result in proposed assessments where the ultimate resolution might result in the Company owing additional taxes, including in some cases, penalties and interest. The Company recognizes a tax position in its consolidated financial statements when it is more likely than not that the position would be sustained upon examination by tax authorities. This recognized tax position is then measured at the largest amount of benefit that is more likely than not of being recognized upon ultimate settlement. The Company recognizes interest and penalties related to unrecognized tax benefits in income tax expense.

The determination of the Company's worldwide tax provision and related tax assets and liabilities requires the use of significant judgment in estimating the impact of uncertainties in the application of GAAP and the interpretation of complex tax laws. In the ordinary course of business, there are transactions and calculations where the final tax outcome is uncertain. Where fair market value is required to measure a tax asset or liability for GAAP purposes, the Company periodically obtains independent, third party assistance to validate that such value is determined in conformity with Internal Revenue Service fair market value guidelines. While the Company believes it has the appropriate support for the positions taken, certain positions may be successfully challenged by taxing authorities. Resolution of these uncertainties in a manner inconsistent with management's expectations could have a material impact on the Company's financial condition and operating results. The Company applies the provisions of the authoritative guidance on accounting for uncertain tax positions to determine the appropriate amount of tax benefits to be recognized with respect to uncertain tax positions. The determination of the Company's worldwide tax provision includes the impact of any changes to the amount of tax benefits recognized with respect to uncertain tax positions. See Note 12, "Income Taxes," for further discussion.

Pension Plans—The Company assumed certain frozen underfunded defined benefit pension plans as part of the 2010 World Color Press acquisition. Pension plan costs are determined using actuarial methods and are funded through contributions. The Company records amounts relating to its pension plans based on calculations which include various actuarial assumptions including discount rates, assumed rates of return, and mortality. The Company reviews its actuarial assumptions on an annual basis and modifies the assumptions based on current rates and trends when it is appropriate to do so. The effects of modifications are recognized immediately on the consolidated balance sheets, but are generally amortized into operating income over future periods, with the deferred amount recorded in accumulated other comprehensive loss on the consolidated balance sheets. The Company believes that the assumptions utilized in recording its obligations under its plans are reasonable based on its experience, market conditions and input from its actuaries and investment advisors. For the purposes of calculating the expected return on plan assets, those assets are valued at fair value. When an event gives rise to both a curtailment and a settlement, the curtailment is accounted for prior to the settlement. The Company's measurement date to measure the defined benefit plan assets and the projected benefit obligation is December 31.

The Company has previously participated in MEPPs as a result of the acquisition of World Color Press. Due to the significant underfunded status of the MEPPs, the Company has withdrawn from all significant MEPPs and replaced these union sponsored "promise to pay in the future" defined benefit plans with a Company sponsored "pay as you go" defined contribution plan, which is the form of retirement benefit provided to Quad's employees. As a result of the decision to withdraw, the Company recorded a withdrawal liability for the MEPPs based on information received from the MEPPs' trustees. See Note 14, "Employee Retirement Plans," for further discussion.

Stock-Based Compensation—The Company recognizes stock-based compensation expense over the vesting period for all stock-based awards made to employees and directors based on the fair value of the instrument at the time of grant. Equity awards accounted for as liabilities are recorded at fair value on the initial issuance date and are remeasured to fair value at each reporting period, with the change in fair value being recorded in selling, general and administrative expense in the consolidated statements of operations. See Note 16, "Equity Incentive Programs," for further discussion.

Accumulated Other Comprehensive Income (Loss)—Accumulated other comprehensive income (loss) consists primarily of unrecognized actuarial gains and losses and prior service costs for pension plans, foreign currency translation adjustments and interest rate swap adjustments, and is presented in the consolidated statements of shareholders' equity. See Note 18, "Accumulated Other Comprehensive Loss," for further discussion.

(In millions, except share and per share data and unless otherwise indicated)

COVID-19 Pandemic Impacts and Response—Throughout the COVID-19 pandemic, the Company implemented cost reduction and cash conservation initiatives in response to the pandemic's adverse impact on its business, financial condition, cash flows, results of operations, supply chain and raw materials availability. With ongoing advancements against the COVID-19 pandemic, the effects on the Company have lessened from previous periods, particularly from the heavily impacted year of 2020. The COVID-19 pandemic weakened demand for the Company's products and services, disrupted the Company's supply chain and resulted in rising inflationary cost and labor pressures, distribution challenges, recessionary concerns and other evolving macroeconomic conditions. The Company continues to evaluate the current economic environment and may implement additional cost reduction measures as necessary.

Supplemental Cash Flow Information—The following table summarizes certain supplemental cash flow information for the years ended December 31, 2022 and 2021:

	2022	2021
Interest paid, net of amounts capitalized	$ 44.0	$ 41.8
Income taxes paid	6.2	4.3
Non-cash investing and financing activities:		
Non-cash finance lease additions	1.1	1.4
Non-cash operating lease additions	17.6	74.6
Acquisition of a business:		
Fair value of assets acquired	5.0	—
Liabilities assumed	(2.4)	—
Acquisition of a business	$ 2.6	$ —

QUAD/GRAPHICS, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(In millions, except share and per share data and unless otherwise indicated)

Note 2. Revenue Recognition

Revenue Disaggregation

The following table provides information about disaggregated revenue by the Company's operating segments and major products and services offerings for the years ended December 31, 2022 and 2021:

	United States Print and Related Services	International	Total
Year ended December 31, 2022			
Catalog, publications, retail inserts and directories	$ 1,476.3	$ 282.5	$ 1,758.8
Direct mail and other printed products	640.6	118.2	758.8
Other	9.7	1.0	10.7
Total Products	2,126.6	401.7	2,528.3
Logistics services	310.4	19.3	329.7
Marketing services and medical services	357.7	1.3	359.0
Total Services	668.1	20.6	688.7
Total Net Sales	$ 2,794.7	$ 422.3	$ 3,217.0
Year ended December 31, 2021			
Catalog, publications, retail inserts and directories	$ 1,368.6	$ 231.5	$ 1,600.1
Direct mail and other printed products	558.9	78.8	637.7
Other	8.3	1.0	9.3
Total Products	1,935.8	311.3	2,247.1
Logistics services	345.8	19.5	365.3
Marketing services and medical services	347.0	1.0	348.0
Total Services	692.8	20.5	713.3
Total Net Sales	$ 2,628.6	$ 331.8	$ 2,960.4

Nature of Products and Services

The Company recognizes its products and services revenue based on when the transfer of control passes to the client or when the service is completed and accepted by the client.

The products offering is predominantly comprised of the Company's print operations which includes retail inserts, publications, catalogs, special interest publications, journals, direct mail, directories, in-store marketing and promotion, packaging, newspapers, custom print products, other commercial and specialty printed products and global paper procurement.

The Company considers its logistic operations as services, which include the delivery of printed material. The services offering also includes revenues related to the Company's marketing services operations, which include data and analytics, technology solutions, media services, creative and content solutions, managed services and execution in non-print channels (e.g., digital and broadcast), as well as medical services.

Performance Obligations

At contract inception, the Company assesses the products and services promised in its contracts with customers and identifies performance obligations for each promise to transfer to the customer a product or service that is distinct. To identify the performance obligations, the Company considers the goods or services promised in the contract regardless of whether they are explicitly stated or are implied by customary business practices. The Company determined that the following distinct products and services represent separate performance obligations:

- Pre-Press Services
- Print
- Other Services

For Pre-Press and Other Services, the Company recognizes revenue at point-in-time upon completion of the performed service and acceptance by the customer. The Company considers transfer of control to occur once the service is performed as the Company has right to payment and the customer has legal title and risk and reward of ownership.

The Company recognizes its Print revenues upon transfer of title and the passage of risk of loss, which is point-in-time upon shipment to the customer, and when there is a reasonable assurance as to collectability. Revenues related to the Company's logistics operations, which includes the delivery of printed material, are included in the Print performance obligation and are also recognized at point-in-time as services are completed. Revenues related to the Company's imaging operations, which include digital content management, photography, color services and page production, are recognized in accordance with the terms of the contract, typically upon completion of the performed service and acceptance by the customer. Under agreements with certain customers, products may be stored by the Company for future delivery and revenue is recognized upon shipment to the customer. In these situations, the Company may receive warehouse management fees for the services it provides. Revenue from warehouse management fees was immaterial for the years ended December 31, 2022 and 2021.

Certain revenues earned by the Company require judgment to determine if revenue should be recorded gross as principal or net of related costs as an agent. Billings for third-party shipping and handling costs, primarily in the Company's logistics operations, and out-of-pocket expenses are recorded gross in net sales and cost of sales in the consolidated statements of operations. Many of the Company's operations process materials, primarily paper, that may be supplied directly by customers or may be purchased by the Company and sold to customers. No revenue is recognized for customer-supplied paper. Revenues for the Company-supplied paper are recognized on a gross basis. In some cases, the Company will print items that are mailed to consumers and bill the customer for postage. In these cases, the Company is acting as an agent and billings are recorded on a net basis in net sales.

Significant Payment Terms

Payment terms and conditions for contracts with customers vary. The Company typically offers standard terms of net 30 days. It is not the Company's standard business practice to offer extended payment terms longer than one year. The Company may offer cash discounts or prepayment and extended terms depending on certain facts and circumstances. As such, when the timing of the Company's delivery of products and services differs from the timing of payment, the Company will record either a contract asset or a contract liability.

(In millions, except share and per share data and unless otherwise indicated)

Variable Consideration

When evaluating the transaction price, the Company analyzes on a contract by contract basis all applicable variable considerations and non-cash consideration and also performs a constraint analysis. The nature of the Company's contracts give rise to variable consideration, including, volume rebates, credits, discounts, and other similar items that generally decrease the transaction price. These variable amounts generally are credited to the customer, based on achieving certain levels of sales activity, when contracts are signed, or making payments within specific terms.

Product returns are not significant because the products are customized; however, the Company accrues for the estimated amount of customer allowances at the time of sale based on historical experience and known trends.

When the transaction price requires allocation to multiple performance obligations, the Company uses the estimated stand-alone selling prices using the adjusted market assessment approach.

Costs to Obtain Contracts

In accordance with ASC 606 — Revenue from Contracts with Customers ("ASC 606"), the Company capitalizes certain sales incentives of the sales compensation packages for costs that are directly attributed to being awarded a client contract or renewal and would not have been incurred had the contract not been obtained. The Company also defers certain contract acquisition costs paid to the client at contract inception. Costs to obtain contracts with a duration of less than one year are expensed as incurred. For all contract costs with contracts over one year, the Company amortizes the costs to obtain contracts on a straight-line basis over the estimated life of the contract and reviews quarterly for impairment. Activity impacting costs to obtain contracts for the year ended December 31, 2022, was as follows:

	Costs to Obtain Contracts
Balance at January 1, 2022	$ 5.1
Costs to obtain contracts	0.4
Amortization of costs to obtain contracts	(2.2)
Balance at December 31, 2022	$ 3.3

Practical Expedients

The Company has elected to apply the following practical expedients allowed under ASC 606:

- For certain performance obligations related to print contracts, the Company has elected not to disclose the value of unsatisfied performance obligations for the following: (1) contracts that have an original expected length of one year or less; (2) contracts where revenue is recognized as invoiced; or (3) contracts with variable consideration related to unsatisfied performance obligations. The Company had no volume commitments in contracts that extend beyond one year as of December 31, 2022.
- The Company expenses costs to obtain contracts as incurred when the contract duration is less than one year.
- The transaction amount is not adjusted for a significant financing component as the period between transfer of the products or services and payment is less than one year.
- The Company accounts for shipping and handling activities, which includes postage, that occur after control of the related products or services transfers to the customer as fulfillment activities and are therefore recognized at time of shipping.

(In millions, except share and per share data and unless otherwise indicated)

- The Company excludes from its transaction price any amounts collected from customers for sales taxes.

Note 3. Restructuring, Impairment and Transaction-Related Charges

The Company recorded restructuring, impairment and transaction-related charges for the years ended December 31, 2022 and 2021, as follows:

	2022	2021
Employee termination charges	$ 7.3	$ 9.9
Impairment charges	2.2	34.9
Transaction-related charges	2.0	0.6
Integration costs	0.7	—
Other restructuring charges	32.6	(26.5)
Total	$ 44.8	$ 18.9

The costs related to these activities have been recorded on the consolidated statements of operations as restructuring, impairment and transaction-related charges. See Note 19, "Segment Information," for restructuring, impairment and transaction-related charges by segment.

Restructuring Charges

The Company has a restructuring program related to eliminating excess manufacturing capacity and properly aligning its cost structure. The Company classifies the following charges as restructuring:

- *Employee termination charges* are incurred when the Company reduces its workforce through facility consolidations and separation programs.

- *Integration costs* are incurred primarily for the integration of acquired companies.

- *Other restructuring charges* are presented net of the gains or losses on the sale of facilities and businesses. During the year ended December 31, 2021, the Company recognized gains from the sale of the facilities located in Riverside, California, Oklahoma City, Oklahoma, and Fernley, Nevada. The Company also recognized a $20.9 million gain on the sale of a business and a $2.7 million gain from the reclassification of foreign currency translation adjustments during the year ended December 31, 2021, which are included within other restructuring activities below. The components of other restructuring charges consisted of the following during the years ended December 31, 2022 and 2021:

	Year Ended December 31,	
	2022	2021
Vacant facility carrying costs and lease exit charges	$ 5.4	$ 19.8
Equipment and infrastructure removal costs	0.7	1.6
Gains on the sale of facilities	—	(24.8)
Loss on the sale of Argentina print business	23.1	—
Other restructuring activities	3.4	(23.1)
Other restructuring charges	$ 32.6	$ (26.5)

(In millions, except share and per share data and unless otherwise indicated)

The restructuring charges recorded were based on plans that have been committed to by management and were, in part, based upon management's best estimates of future events. Changes to the estimates may require future restructuring charges and adjustments to the restructuring liabilities. The Company expects to incur additional restructuring charges related to these and other initiatives.

Impairment Charges

The Company recognized impairment charges of $2.2 million during the year ended December 31, 2022, primarily for machinery and equipment no longer being utilized in production as a result of facility consolidations, as well as other capacity reduction and strategic divestiture activities.

The Company recognized impairment charges of $34.9 million during the year ended December 31, 2021, which consisted of $2.8 million for machinery and equipment no longer being utilized in production as a result of facility consolidations, as well as other capacity reduction and strategic divestiture activities, including $32.1 million of impairment charges related to the Company's investment in Plural, which was sold in January 2022.

The fair values of the impaired assets were determined by the Company to be Level 3 under the fair value hierarchy (see Note 13, "Financial Instruments and Fair Value Measurements," for the definition of Level 3 inputs) and were estimated based on broker quotes, internal expertise related to current marketplace conditions and estimated future discounted cash flows. These assets were adjusted to their estimated fair values at the time of impairment. If estimated fair values subsequently decline, the carrying values of the assets are adjusted accordingly.

Transaction-Related Charges

The Company incurs transaction-related charges primarily consisting of professional service fees related to business acquisition and divestiture activities. Transaction-related charges of $2.0 million and $0.6 million were recorded during the years ended December 31, 2022 and 2021, respectively.

Restructuring Reserves

Activity impacting the Company's restructuring reserves for the years ended December 31, 2022 and 2021, was as follows:

	Employee Termination Charges	Impairment Charges	Transaction-Related Charges (Income)	Integration Costs	Other Restructuring Charges	Total
Balance at January 1, 2021	$ 14.6	$ —	$ 0.5	$ —	$ 25.8	$ 40.9
Expense (income), net	9.9	34.9	0.6	—	(26.5)	18.9
Cash payments, net	(19.0)	—	(0.7)	—	(13.3)	(33.0)
Non-cash adjustments/ reclassifications	(0.8)	(34.9)	—	—	64.2	28.5
Balance at December 31, 2021	$ 4.7	$ —	$ 0.4	$ —	$ 50.2	$ 55.3
Expense, net	7.3	2.2	2.0	0.7	32.6	44.8
Cash payments, net	(4.1)	—	(0.9)	(0.7)	(15.7)	(21.4)
Non-cash adjustments/ reclassifications	(5.0)	(2.2)	—	—	(61.9)	(69.1)
Balance at December 31, 2022	$ 2.9	$ —	$ 1.5	$ —	$ 5.2	$ 9.6

(In millions, except share and per share data and unless otherwise indicated)

The Company's restructuring reserves at December 31, 2022, included a short-term and a long-term component. The short-term portion included $4.2 million in other current liabilities (see Note 8, "Other Current and Long-Term Liabilities") and $1.1 million in accounts payable in the consolidated balance sheets as the Company expects these reserves to be settled within the next twelve months. The long-term portion of $4.3 million was included in other long-term liabilities (see Note 8, "Other Current and Long-Term Liabilities") in the consolidated balance sheets.

Note 4. Goodwill and Other Intangible Assets

Goodwill

Goodwill represents the excess of the purchase price over the fair value of identifiable net assets acquired in a business combination. Goodwill is assigned to specific reporting units and is tested annually for impairment as of October 31, or more frequently if events or changes in circumstances indicate that it is more likely than not that the fair value of a reporting unit is below its carrying value.

Due to the Company's decision to sell its third-party logistics business on June 30, 2021, goodwill included in the carrying amount of the third-party logistics business sold of $16.6 million was determined based on the relative fair value of the third-party logistics business and the portion of the Core Print and Related Services reporting unit retained. When only a portion of goodwill is allocated to a business to be sold, an interim goodwill impairment test was completed on the remaining $86.4 million of goodwill in the Core Print and Related Services reporting unit. No impairment was recorded as a result of the 2021 interim impairment test.

The Company completed its annual impairment test as of October 31, 2022, and identified no indicators of impairment in any of the Company's reporting units during the year ended December 31, 2022. Fair value was determined using an equal weighting of both the income and market approaches. Under the income approach, the Company determined fair value based on estimated future cash flows discounted by an estimated weighted-average cost of capital, which reflects the overall level of inherent risk and the rate of return an outside investor would expect to earn. Under the market approach, the Company derived the fair value of the reporting units based on market multiples of comparable publicly-traded companies. This fair value determination was categorized as Level 3 in the fair value hierarchy (see Note 13, "Financial Instruments and Fair Value Measurements," for the definition of Level 3 inputs).

No goodwill impairment charges were recorded during the years ended December 31, 2022 or 2021. The accumulated goodwill impairment losses and the carrying value of goodwill at December 31, 2022 and 2021, were as follows:

	United States Print and Related Services	International	Total
Goodwill	$ 864.7	$ 30.0	$ 894.7
Accumulated goodwill impairment loss	(778.3)	(30.0)	(808.3)
Goodwill, net of accumulated goodwill impairment loss	$ 86.4	$ —	$ 86.4

(In millions, except share and per share data and unless otherwise indicated)

There was no activity impacting goodwill for the year ended December 31, 2022. Activity impacting goodwill for the year ended December 31, 2021, was as follows:

	United States Print and Related Services	International	Total
Balance at January 1, 2021	$ 103.0	$ —	$ 103.0
Sale of third-party logistics business	(16.6)	—	(16.6)
Balance at December 31, 2021	$ 86.4	$ —	$ 86.4

Other Intangible Assets

The components of other intangible assets at December 31, 2022 and 2021, were as follows:

		December 31, 2022			December 31, 2021		
	Weighted Average Amortization Period (Years)	Gross Carrying Amount	Accumulated Amortization	Net Book Value	Gross Carrying Amount	Accumulated Amortization	Net Book Value
Finite-lived intangible assets:							
Trademarks, patents, licenses and agreements	6	$ 67.2	$ (57.2)	$ 10.0	$ 68.1	$ (50.7)	$ 17.4
Capitalized software	5	21.5	(17.4)	4.1	19.2	(14.3)	4.9
Acquired technology	5	3.6	(1.9)	1.7	3.6	(1.2)	2.4
Customer relationships	6	559.9	(528.8)	31.1	560.1	(509.5)	50.6
Total finite-lived intangible assets		$ 652.2	$ (605.3)	$ 46.9	$ 651.0	$ (575.7)	$ 75.3

Other intangible assets are evaluated for potential impairment whenever events or circumstances indicate that the carrying value may not be recoverable. There were no impairment charges recorded on finite-lived intangible assets for the years ended December 31, 2022 and 2021.

Amortization expense for other intangible assets was $30.9 million and $31.5 million for the years ended December 31, 2022 and 2021, respectively. The following table outlines the estimated future amortization expense related to other intangible assets as of December 31, 2022:

	Amortization Expense
2023	$ 28.1
2024	15.6
2025	2.4
2026	0.6
2027	0.2
Total	$ 46.9

(In millions, except share and per share data and unless otherwise indicated)

Note 5. Receivables

Prior to granting credit, the Company evaluates each client in an underwriting process, taking into consideration the prospective client's financial condition, past payment experience, credit bureau information and other financial and qualitative factors that may affect the client's ability to pay. Specific credit reviews and standard industry credit scoring models are used in performing this evaluation. Clients' financial condition is continuously monitored as part of the normal course of business. Some of the Company's clients are highly leveraged or otherwise subject to their own operating and regulatory risks.

Specific client provisions are made when a review of significant outstanding amounts, utilizing information about client creditworthiness, as well as current and future economic trends based on reasonable forecasts, indicates that collection is doubtful. The Company also records a general provision based on the overall risk profile of the receivables and through the assessment of reasonable economic forecasts. The risk profile is assessed on a quarterly basis using various methods, including external resources and credit scoring models. Accounts that are deemed uncollectible are written off when all reasonable collection efforts have been exhausted.

The Company has recorded credit loss expense of $3.4 million and $1.3 million during the years ended December 31, 2022 and 2021, respectively, which is included in selling, general and administrative expenses in the consolidated statements of operations.

Activity impacting the allowance for credit losses for the years ended December 31, 2022 and 2021, was as follows:

	2022	2021
Balance at January 1,	$ 28.2	$ 33.8
Provisions	3.4	1.3
Write-offs	(5.2)	(6.9)
Balance at December 31,	$ 26.4	$ 28.2

Note 6. Inventories

The components of inventories at December 31, 2022 and 2021, were as follows:

	2022	2021
Raw materials and manufacturing supplies	$ 173.7	$ 148.6
Work in process	38.3	31.6
Finished goods	48.7	46.0
Total	$ 260.7	$ 226.2

(In millions, except share and per share data and unless otherwise indicated)

Note 7. Property, Plant and Equipment

The components of property, plant and equipment at December 31, 2022 and 2021, were as follows:

	2022	2021
Land	$ 68.2	$ 73.6
Buildings	651.9	658.4
Machinery and equipment	2,854.0	2,883.7
Other[1]	165.0	181.9
Construction in progress	30.5	25.1
Property, plant and equipment—gross	3,769.6	3,822.7
Less: accumulated depreciation	(3,097.5)	(3,095.7)
Property, plant and equipment—net	$ 672.1	$ 727.0

(1) Other consists of computer equipment and software, vehicles, furniture and fixtures, leasehold improvements and communication related equipment.

The Company recorded impairment charges of $2.2 million and $2.8 million during the years ended December 31, 2022 and 2021, respectively, to reduce the carrying amounts of certain property, plant and equipment no longer utilized in production, or due to other capacity reduction and strategic divestiture activities, to fair value (see Note 3, “Restructuring, Impairment and Transaction-Related Charges,” for further discussion on impairment charges).

The Company recognized depreciation expense of $110.4 million and $125.8 million for the years ended December 31, 2022 and 2021, respectively.

Gains from Sale and Leaseback

On June 29, 2021, the Company executed a sale and leaseback of its Chalfont, Pennsylvania facility for net proceeds of $20.0 million, which resulted in a $13.7 million gain. The leaseback is for a term of seven years and was determined to be an operating lease. As of December 31, 2022, the leaseback consisted of an $8.2 million asset included in the operating lease right of use assets - net, current operating lease obligation of $1.3 million and operating lease obligation of $7.1 million in the consolidated balance sheet.

On September 28, 2021, the Company executed a sale and leaseback of its West Allis, Wisconsin facility for net proceeds of $31.9 million, which resulted in a $10.8 million gain. The leaseback is for a term of ten years and was determined to be an operating lease. As of December 31, 2022, the leaseback consisted of a $20.8 million asset included in the operating lease right of use assets - net, current operating lease obligation of $1.8 million and operating lease obligation of $19.3 million in the consolidated balance sheet.

(In millions, except share and per share data and unless otherwise indicated)

Note 8. Other Current and Long-Term Liabilities

The components of other current and long-term liabilities at December 31, 2022 and 2021, were as follows:

	December 31, 2022			December 31, 2021		
	Other Current Liabilities	Other Long-Term Liabilities	Total	Other Current Liabilities	Other Long-Term Liabilities	Total
Employee-related liabilities[1]	$ 117.6	$ 45.3	$ 162.9	$ 128.8	$ 52.8	$ 181.6
Single employer pension plan obligations	1.4	34.9	36.3	1.6	17.6	19.2
Multiemployer pension plans – withdrawal liability	4.1	24.2	28.3	3.8	28.4	32.2
Deferred revenue	53.1	1.2	54.3	66.4	2.1	68.5
Tax-related liabilities	18.9	4.4	23.3	20.0	5.3	25.3
Restructuring liabilities	4.2	4.3	8.5	47.5	6.1	53.6
Interest and rent liabilities	0.4	—	0.4	2.8	—	2.8
Interest rate swap liabilities	—	—	—	0.7	4.4	5.1
Other	49.4	14.5	63.9	42.7	11.4	54.1
Total	$ 249.1	$ 128.8	$ 377.9	$ 314.3	$ 128.1	$ 442.4

(1) Employee-related liabilities consist primarily of payroll, bonus, vacation, health and workers' compensation.

Note 9. Commitments and Contingencies

Commitments

The Company had firm commitments of $32.9 million as of December 31, 2022, to purchase press, finishing and other equipment.

Litigation

The Company is named as a defendant in various lawsuits in which claims are asserted against the Company in the normal course of business. The liabilities, if any, which ultimately result from such lawsuits are not expected by management to have a material impact on the consolidated financial statements of the Company.

Environmental Reserves

The Company is subject to various laws, regulations and government policies relating to health and safety, to the generation, storage, transportation, and disposal of hazardous substances, and to environmental protection in general. The Company provides for expenses associated with environmental remediation obligations when such amounts are probable and can be reasonably estimated. Such reserves are adjusted as new information develops or as circumstances change. The environmental reserves are not discounted. The Company believes it is in compliance with such laws, regulations and government policies in all material respects. Furthermore, the Company does not anticipate that maintaining compliance with such environmental statutes will have a material impact upon the Company's consolidated financial position.

(In millions, except share and per share data and unless otherwise indicated)

Note 10. Debt

The weighted average interest rate for the year ended December 31, 2022 and the components of long-term debt at December 31, 2022 and 2021, were as follows:

	Weighted Average Interest Rate	2022	2021
Master note and security agreement	7.92 %	$ 4.4	$ 7.2
Term loan A	4.54 %	556.7	575.4
Revolving credit facility	4.99 %	—	—
Senior unsecured notes	7.00 %	—	211.5
International term loans	5.39 %	5.2	5.3
International revolving credit facilities	3.00 %	8.4	8.8
Other	— %	—	1.4
Debt issuance costs		(6.9)	(9.1)
Total debt		$ 567.8	$ 800.5
Less: short-term debt and current portion of long-term debt		(61.1)	(245.6)
Long-term debt		$ 506.7	$ 554.9

Description of Debt Obligations

Master Note and Security Agreement

On September 1, 1995, and as last amended on November 24, 2014, the Company entered into its Master Note and Security Agreement. As of December 31, 2022, the borrowings outstanding under the Master Note and Security Agreement were $4.4 million. The senior notes under the Master Note and Security Agreement had a weighted average interest rate of 7.92% at December 31, 2022, which is fixed to maturity, with interest payable semiannually. Principal payments commenced September 1997 and extend through 2026 in various tranches. The notes are collateralized by certain United States press equipment under the terms of the Master Note and Security Agreement.

Senior Secured Credit Facility

On April 28, 2014, the Company entered into its Senior Secured Credit Facility, which included a revolving credit facility, Term Loan A and Term Loan B (Term Loan B was retired in July 2019). The Company completed the fifth amendment to the Senior Secured Credit Facility on November 2, 2021. The Senior Secured Credit Facility was amended to (a) reduce the aggregate amount of the existing revolving credit facility from $500.0 million to $432.5 million, and extend the maturity of a portion of the revolving credit facility such that $90.0 million under the revolving credit facility is due on the existing maturity date of January 31, 2024 (the "Existing Maturity Date") and $342.5 million under the revolving credit facility is due on November 2, 2026 (the "Extended Maturity Date"); (b) extend the maturity of a portion of the existing term loan facility such that $91.5 million of such term loan facility is due on the Existing Maturity Date and $483.9 million is due on the Extended Maturity Date; (c) make certain adjustments to pricing, including an increase of 0.50% to the interest rate margin applicable to the loans maturing on the Extended Maturity Date; (d) modify certain financial and operational covenants; and (e) modify the interest rate provisions relating to the phase-out of LIBOR as a reference rate.

Borrowings under the revolving credit facility and Term Loan A made under the Senior Secured Credit Facility bear interest at 2.75% in excess of reserve adjusted LIBOR, or 1.75% in excess of an alternate base rate with a LIBOR floor of 0.75% for the extended tranche and bear interest at 2.50% in excess of reserve adjusted LIBOR, or 1.50% in excess of an alternate base rate with a LIBOR floor of 0.75% for the non-extending tranche.

At December 31, 2022, the Company had no outstanding borrowings on the revolving credit facility, and had $32.7 million of issued letters of credit, leaving up to $399.8 million available for future borrowings. The Senior Secured Credit Facility is secured by substantially all of the unencumbered assets of the Company. The Senior Secured Credit Facility also requires the Company to provide additional collateral to the lenders in certain limited circumstances.

The Company completed the sixth amendment to the Senior Secured Credit Facility on March 25, 2022, which expanded the number of currencies available for letters of credit. The Company completed the seventh amendment to the Senior Secured Credit Facility on January 24, 2023, which transitioned the Company's reference rate from LIBOR to SOFR effective February 1, 2023. The transition from LIBOR to SOFR does not have a material impact on the consolidated financial statements.

Senior Unsecured Notes

The Company issued $300.0 million aggregate principal amount of its Senior Unsecured Notes due May 1, 2022, on April 28, 2014. During the first quarter of 2022, the Company repurchased $2.4 million of its outstanding Senior Unsecured Notes in the open market. During the year ended December 31, 2021, the Company repurchased $27.2 million of its outstanding Senior Unsecured Notes in the open market, resulting in a net loss on debt extinguishment of $0.5 million. All repurchased Senior Unsecured Notes were canceled. The Company used cash flows from operating activities and borrowings under its revolving credit facility to fund the repurchases. These repurchases were completed primarily to reduce interest expense.

On May 2, 2022, the Company used liquidity available under its revolving credit facility and available cash on hand to fund the repayment on maturity of all $209.1 million aggregate principal amount, outstanding at the time, of its Senior Unsecured Notes.

International Debt Obligations

The Company has two fixed rate, Euro denominated, international term loans for purposes of financing certain capital expenditures and general business needs. The first international term loan in the amount of $21.7 million was entered into on December 28, 2015, was fully funded during 2016 with a term of six years, and matured on December 28, 2021. The second international term loan in the amount of $12.8 million was entered into on December 21, 2018, bears interest at 1.96% and has a term of five years, maturing on December 31, 2023. As of December 31, 2022, $2.5 million remained outstanding on the second international term loan. In addition, there are $2.7 million of term loans in Colombia and Peru.

(In millions, except share and per share data and unless otherwise indicated)

The Company has two multicurrency international revolving credit facilities that are used for financing working capital and general business needs. The Company had $8.4 million of borrowings outstanding at a weighted average interest rate of 3.00% on the international revolving credit facilities as of December 31, 2022, leaving $7.7 million available for future borrowing. The terms of the international revolving credit facilities includes certain financial covenants, a guarantee of the international revolving credit facilities by the Company and a security agreement that includes collateralizing substantially all of the Quad Europe Sp. z.o.o. assets. The first multicurrency international revolving credit facility expires on October 29, 2023, and bears interest at the aggregate of the Warsaw Interbank Offered Rate ("WIBOR") plus 1.40% for any Polish Zloty denominated borrowings, the aggregate of Euro Interbank Offered Rate ("EURIBOR") plus 1.45% for any Euro denominated borrowings or the aggregate of British pound sterling LIBOR plus 1.45% for any British pound sterling denominate borrowings. The second multicurrency international revolving credit facility expires on December 15, 2023, and bears interest at the aggregate of WIBOR plus 1.00% for any Polish Zloty denominated borrowings or the aggregate of EURIBOR plus 1.00% for any Euro denominated borrowings.

Fair Value of Debt

Based upon the interest rates available to the Company for borrowings with similar terms and maturities, the fair value of the Company's total debt was approximately $0.6 billion and $0.8 billion at December 31, 2022 and 2021, respectively. The fair value determination of the Company's total debt was categorized as Level 2 in the fair value hierarchy (see Note 13, "Financial Instruments and Fair Value Measurements," for the definition of Level 2 inputs). As of December 31, 2022, approximately $1.3 billion of the Company's assets were pledged as security under various loans and other agreements.

Debt Issuance Costs

The debt issuance costs are amortized on a straight-line basis over the lives of the related debt instruments. Activity impacting the Company's capitalized debt issuance costs for the years ended December 31, 2022 and 2021, was as follows:

	Capitalized Debt Issuance Costs
Balance at January 1, 2021	$ 6.9
Debt issuance costs from November 2, 2021 debt financing arrangement	5.2
Write off of debt issuance costs from Term Loan A pre-payments	(0.4)
Amortization expense	(2.6)
Balance at December 31, 2021	9.1
Amortization expense	(2.2)
Balance at December 31, 2022	$ 6.9

(In millions, except share and per share data and unless otherwise indicated)

Loss on Debt Extinguishment

2021 Loss on Debt Extinguishment

The loss on debt extinguishment recorded during the year ended December 31, 2021, was comprised of the following:

	2021 Loss on Debt Extinguishment
Debt issuance costs from November 2, 2021 debt financing arrangement	0.2
Loss on debt extinguishment from Senior Unsecured Note Repurchases	0.5
Total	$ 0.7

Covenants and Compliance

The Company's various lending arrangements include certain financial covenants (all financial terms, numbers and ratios are as defined in the Company's debt agreements). Among these covenants, the Company was required to maintain the following as of December 31, 2022:

- *Total Leverage Ratio.* On a rolling twelve-month basis, the Total Leverage Ratio, defined as consolidated total indebtedness to consolidated EBITDA, shall not exceed 3.75 to 1.00 (for the twelve months ended December 31, 2022, the Company's Total Leverage Ratio was 2.22 to 1.00).

- Liquidity, defined as unrestricted cash and permitted investments of the Company and its subsidiaries (subject to certain conditions) plus the aggregate amount of the unused revolving credit facility commitments, shall not be less than $181.6 million at any time during the period commencing December 15, 2023 and ending when all obligations owed under the Senior Secured Credit Facility to lenders that are not extending lenders are paid in full.

- If there is any amount outstanding on the Revolving Credit Facility or Term Loan A, or if any lender has any revolving credit exposure or Term Loan A credit exposure, the Company is required to maintain the following:

    - *Senior Secured Leverage Ratio.* On a rolling four-quarter basis, the Senior Secured Leverage Ratio, defined as the ratio of consolidated senior secured net indebtedness to consolidated EBITDA, shall not exceed (a) 3.50 to 1.00 for any fiscal quarter ending prior to December 31, 2023, and (b) 3.25 to 1.00 for any fiscal quarter ending on or after December 31, 2023 (other than, in the case of this clause (b), any fiscal quarter ending September 30 of any year, each of which shall be subject to a maximum Senior Secured Leverage Ratio not to exceed 3.50 to 1.00) (for the twelve months ended December 31, 2022, the Company's Senior Secured Leverage Ratio was 2.13 to 1.00).

    - *Interest Coverage Ratio.* On a rolling twelve-month basis, the Interest Coverage Ratio, defined as consolidated EBITDA to cash consolidated interest expense, shall not be less than 3.00 to 1.00 (for the twelve months ended December 31, 2022, the Company's Interest Coverage Ratio was 6.39 to 1.00).

(In millions, except share and per share data and unless otherwise indicated)

In addition to those covenants, the Senior Secured Credit Facility also includes certain limitations on acquisitions, indebtedness, liens, dividends and repurchases of capital stock.

- If the Company's Total Leverage Ratio is greater than 2.75 to 1.00, the Company is prohibited from making greater than $60.0 million of dividend payments, capital stock repurchases and certain other payments, over the course of the agreement. If the Company's Total Leverage Ratio is above 2.50 to 1.00 but below 2.75 to 1.00, the Company is prohibited from making greater than $100.0 million of dividend payments, capital stock repurchases and certain other payments, over the course of the agreement. If the Total Leverage Ratio is less than 2.50 to 1.00, there are no such restrictions. As the Company's Total Leverage Ratio as of December 31, 2022, was 2.22 to 1.00, the limitations described above are not applicable at this time.

- If the Company's Senior Secured Leverage Ratio is greater than 3.00 to 1.00 or the Company's Total Net Leverage Ratio which, on a rolling twelve-month basis, is defined as consolidated net indebtedness to consolidated EBITDA, is greater than 3.50 to 1.00, the Company is prohibited from voluntarily prepaying any unsecured or subordinated indebtedness, with certain exceptions (including any mandatory prepayments on the Senior Unsecured Notes or any other unsecured or subordinated debt). If the Senior Secured Leverage Ratio is less than 3.00 to 1.00 and the Total Net Leverage Ratio is less than 3.50 to 1.00, there are no such restrictions. The limitations described above are currently not applicable, as the Company's Senior Secured Leverage Ratio was 2.13 to 1.00 and Total Net Leverage Ratio was 2.14 to 1.00, as of December 31, 2022.

Estimated Principal Payments

The approximate annual principal amounts due on long-term debt, excluding $6.9 million for future amortization of debt issuance costs, at December 31, 2022, were as follows:

	Principal Payments
2023	$ 55.5
2024	149.2
2025	72.8
2026	297.2
Total	$ 574.7

Note 11. Leases

The Company determines if an arrangement is or contains a lease at contract inception. The Company recognizes a right-of-use ("ROU") asset and a lease liability at the lease commencement date.

For operating and finance leases, the lease liability is initially measured at the present value of the unpaid lease payments at the lease commencement date, and is subsequently measured at amortized cost using the effective interest method.

Key estimates and judgments include how the Company determines the discount rate, lease term and lease payments.

- ASC 842 requires a lessee to discount its unpaid lease payments using the interest rate implicit in the lease or, if that rate cannot be readily determined, its incremental borrowing rate. Generally, the Company cannot determine the implicit interest rate as it does not have access to the lessor's estimated residual value or the amount of the lessor's deferred initial direct costs. Therefore, the Company generally uses its incremental borrowing rate as the discount rate for the lease. The Company's incremental borrowing rate for a lease is the rate of interest it would have to pay on a collateralized basis to borrow an amount equal to the lease payments under similar terms based on the published United States Treasury rates as well as the Company's credit rating at implementation or at the lease inception date.

- The lease term for all of the Company's leases includes the non-cancelable period of the lease, plus or minus any additional periods covered by an option to extend or terminate the lease that the Company is reasonably certain to exercise.

- Lease payments included in the lease liability are comprised of fixed payments as well as any exercise price of a Company option to purchase the underlying asset if the Company is reasonably certain to exercise. The Company's leases do not contain variable lease payments.

ROU assets are initially measured at cost, which comprises the initial amount of the lease liability adjusted for lease payments made at or before the lease commencement date, plus any initial direct costs incurred less any lease incentives received. For operating leases, the ROU asset is subsequently amortized by the straight-line lease expense adjusted by the lease liability accretion over the lease term.

For finance leases, the ROU asset is subsequently amortized on a straight-line basis from the lease commencement date to the earlier of the end of its useful life or the end of the lease term. Amortization of the ROU asset is recognized and presented separately from interest expense on the lease liability.

The Company's ROU assets for both operating and finance leases are reviewed for impairment losses on a quarterly basis in line with ASC 360-10 — *Property, Plant, and Equipment — Overall.* The Company has not recognized any impairment losses to date.

The Company also monitors its leases for events or changes in circumstances that require a reassessment of the lease. When a reassessment results in the remeasurement of a lease liability, a corresponding adjustment is made to the carrying amount of the ROU asset.

Operating leases are included in operating lease right-of-use assets—net, current portion of operating lease obligations, and operating lease obligations in the consolidated balance sheets. Finance leases are included in property and equipment—net, current portion of finance lease obligations, and finance lease obligations in the consolidated balance sheets.

The Company has elected not to recognize ROU assets and lease liabilities for short-term leases that have an original lease term of twelve months or less. Therefore, the Company recognizes the lease payments associated with these short-term leases as an expense over the lease term in the consolidated statement of operations.

Practical Expedients

The Company has elected to apply the following practical expedients allowed under Accounting Standards Update 842:

- The Company elected the practical expedient package and therefore did not reassess for any existing leases:
    - whether contracts are or contain leases;
    - the lease classification for any existing leases; and
    - any initial direct costs.
- The Company elected the practical expedient related to land easements, allowing to carry forward the accounting treatment for land easements on existing agreements.
- The Company used "hindsight" judgments that impact the lease term.
- The Company elected to combine lease and non-lease components into one lease component for select underlying lease asset categories. Real estate leases are accounted for separately while all other leases, primarily equipment leases, with separate lease and non-lease components are accounted for as a single lease component.

Leases Financial Information

The Company enters into various lease agreements for real estate, such as office space and manufacturing facilities, as well as equipment leases, including press, finishing and transportation equipment. Many of these leases provide the Company with options to renew, terminate, or in the case of equipment leases, purchase the related equipment at the termination value, as defined, and at various early buyout dates during the term of the lease. In general, the Company has determined these options were not reasonably certain to be exercised, and therefore are not included in the determination of the lease term.

(In millions, except share and per share data and unless otherwise indicated)

The following summarizes certain lease information for the years ended December 31, 2022 and 2021:

	Year Ended December 31, 2022	Year Ended December 31, 2021
Lease cost		
Finance lease cost:		
Amortization of right-of-use assets	$ 1.8	$ 2.9
Interest on lease liabilities	0.1	0.2
Operating lease cost	29.7	28.4
Short-term lease cost	0.2	—
Sublease income	(1.9)	(2.0)
Total lease cost	$ 29.9	$ 29.5
Other information		
Cash paid for amounts included in the measurement of lease liabilities		
Operating cash flows from finance leases	$ —	$ —
Operating cash flows from operating leases	28.1	27.9
Financing cash flows from finance leases	2.1	3.0
Right-of-use assets obtained in exchange for new finance lease liabilities	1.1	1.4
Right-of-use assets obtained in exchange for new operating lease liabilities	17.6	74.6
Weighted-average remaining lease term — finance leases	4.2 years	2.3 years
Weighted-average remaining lease term — operating leases	5.2 years	5.7 years
Weighted-average discount rate — finance leases	5.2 %	4.5 %
Weighted-average discount rate — operating leases	5.4 %	5.4 %

The components of finance lease assets at December 31, 2022 and 2021, were as follows:

	2022	2021
Leased equipment—gross	$ 24.3	$ 23.8
Less: accumulated depreciation	(21.9)	(20.7)
Leased equipment—net	$ 2.4	$ 3.1

(In millions, except share and per share data and unless otherwise indicated)

Future maturities of lease liabilities at December 31, 2022, were as follows:

	Future Maturities of Operating Leases	Future Maturities of Finance Leases
2023	$ 33.1	$ 0.9
2024	25.7	0.6
2025	21.4	0.5
2026	17.1	0.2
2027	13.9	0.2
2028 and thereafter	20.1	0.3
Total minimum payments	131.3	2.7
Less: present value discount	(16.4)	(0.3)
Present value of minimum payments	114.9	2.4
Less: current portion	(27.8)	(0.8)
Long-term lease liability	$ 87.1	$ 1.6

Note 12. Income Taxes

Income taxes have been based on the following components of earnings before income taxes and equity in earnings of unconsolidated entity for the years ended December 31, 2022 and 2021:

	2022	2021
United States	$ (13.9)	$ 52.4
Foreign	31.6	(5.4)
Total	$ 17.7	$ 47.0

The components of income tax expense for the years ended December 31, 2022, and 2021, were as follows:

	2022	2021
Federal:		
Current	$ 0.4	$ 0.9
Deferred	3.3	3.2
State:		
Current	1.4	—
Deferred	(0.3)	—
Foreign:		
Current	4.2	3.3
Deferred	(0.6)	2.1
Total income tax expense	$ 8.4	$ 9.5

(In millions, except share and per share data and unless otherwise indicated)

The following table outlines the reconciliation of differences between the Federal statutory tax rate and the Company's income tax expense for the years ended December 31, 2022 and 2021:

	2022	2021
Federal statutory rate	$ 3.7	$ 9.9
Loss on the sale of Argentina print business	(5.1)	—
Adjustment to valuation allowances	3.1	(17.1)
Executive compensation limitation	2.9	—
Impact from foreign branches	1.9	4.5
Adjustment of deferred tax liabilities	1.5	3.5
Credits	(1.5)	—
State taxes, net of federal benefit	1.1	(0.1)
Adjustment of uncertain tax positions	(0.3)	0.2
Impairment on investment in Plural	—	6.2
Foreign rate differential	—	(1.9)
Other	1.1	4.3
Income tax expense	$ 8.4	$ 9.5

The $3.1 million adjustment to valuation allowance in 2022 primarily relates to increasing reserves related to deferred tax assets for credits and interest limitation that are not expected to be realized in the future for federal income tax purposes. The $17.1 million adjustment to valuation allowance in 2021 primarily relates to releasing reserves related to deferred tax assets for net operating losses and interest limitation. The $1.1 million effective rate reconciling item for State taxes, net of federal benefit, in 2022 includes a $2.8 million adjustment for partial release of valuation allowance reserves. The $0.1 million effective rate reconciling item for State taxes, net of federal benefit, in 2021 includes a $4.8 million adjustment for partial release of valuation allowance reserves.

(In millions, except share and per share data and unless otherwise indicated)

Deferred Income Taxes

The significant deferred tax assets and liabilities as of December 31, 2022 and 2021, were as follows:

	2022	2021
Deferred tax assets:		
Net operating loss and other tax carryforwards	$ 108.8	$ 125.2
Goodwill and intangible assets	24.0	24.4
Pension and workers compensation benefits	23.9	21.9
Interest limitation	12.8	11.5
Accrued liabilities	9.4	12.9
Research or experimental expenditures	8.0	—
Accrued compensation	7.6	8.1
Allowance for doubtful accounts	5.9	6.5
Other	8.6	10.8
Total deferred tax assets	209.0	221.3
Valuation allowance	(113.9)	(116.3)
Net deferred tax assets	$ 95.1	$ 105.0
Deferred tax liabilities:		
Property, plant and equipment	$ (86.0)	$ (99.2)
Other	(6.9)	(5.9)
Total deferred tax liabilities	(92.9)	(105.1)
Net deferred tax assets (liabilities)	$ 2.2	$ (0.1)

The Company has recorded deferred income tax liabilities of $9.3 million and $11.9 million as of December 31, 2022 and 2021, respectively, which were included in deferred income taxes in the consolidated balance sheets. The Company has also recorded deferred income tax assets of $11.5 million and $11.8 million as of December 31, 2022 and 2021, respectively, which were included in other long-term assets in the consolidated balance sheets.

At December 31, 2022, the Company had the following gross amounts of tax-related carryforwards:

- Net operating loss carryforwards of $3.8 million, $32.6 million and $567.9 million for federal, foreign and state, respectively. The federal net operating loss carryforward was generated in 2020 and is available without expiration. Of the foreign net operating loss carryforwards, $8.6 million is available without expiration, while the remainder expires through 2042. Of the state net operating loss carryforwards, $79.7 million is available without expiration, while the remainders expire through 2042.

- Various credit carryforwards of $9.7 million, $24.3 million and $36.2 million for federal, foreign and state, respectively. The federal carryforward expires through 2041, the foreign credit carryforward expires in 2026, and the state credit carryforwards include $25.5 million that is available without expiration, while the remainder expires through 2036.

(In millions, except share and per share data and unless otherwise indicated)

As of December 31, 2022, the Company has recorded a valuation allowance of $113.9 million on its consolidated balance sheet primarily related to the tax-affected amounts of the above carryforwards. The valuation allowance includes $13.2 million, $31.3 million and $69.4 million of federal, foreign and state deferred tax assets, respectively, that are not expected to be realized.

Uncertain Tax Positions

The following table summarizes the activity of the Company's liability for unrecognized tax benefits at December 31, 2022 and 2021:

	2022	2021
Balance at January 1,	$ 11.7	$ 11.6
Additions for tax positions of prior years	0.2	0.5
Reductions for tax positions of prior years	(0.3)	(0.3)
Lapses of applicable statutes of limitations	(0.5)	(0.1)
Balance at December 31,	$ 11.1	$ 11.7

As of December 31, 2022, $8.0 million of unrecognized tax benefits would impact the Company's effective tax rate, if recognized. Of that amount, it is reasonably possible that $4.4 million of the total amount of unrecognized tax benefits will decrease within the next twelve months due to resolution of income tax audits or statute expirations.

The Company classified interest income and any related refunds related to income tax uncertainties as a component of income tax expense. The following table summarizes the Company's interest income related to tax uncertainties and refunds recognized during the years ended December 31, 2022 and 2021:

	2022	2021
Interest income	$ (0.1)	$ (0.5)
Refunds	—	(0.1)

Accrued interest and penalties related to income tax uncertainties are reported as components of other current liabilities and other long-term liabilities in the consolidated balance sheets. The following table summarizes the Company's liabilities for accrued interest and penalties related to income tax uncertainties at December 31, 2022 and 2021:

	December 31, 2022		December 31, 2021	
	Accrued interest	Accrued penalties	Accrued interest	Accrued penalties
Other current liabilities	$ —	$ —	$ —	$ —
Other long-term liabilities	0.1	—	0.2	—
Total liabilities	$ 0.1	$ —	$ 0.2	$ —

The Company has tax years from 2013 through 2022 that remain open and subject to examination by the Internal Revenue Service. Tax years from 2013 through 2022 remain open and subject to examination in the Company's various major state jurisdictions within the United States.

(In millions, except share and per share data and unless otherwise indicated)

The Company's practice and intention is to reinvest certain earnings of its non-U.S. subsidiaries in those operations. The Company has analyzed its global working capital and cash requirements and the potential tax liabilities attributable to repatriation of earnings, and has determined not to change its permanent reinvestment assertion. The Company does not have significant prior year untaxed, undistributed earnings from its foreign operations at December 31, 2022, and the Company does not provide for, nor expect to incur, any significant, additional taxes which could become payable upon repatriation of such amounts.

Note 13. Financial Instruments and Fair Value Measurements

Certain assets and liabilities are required to be recorded at fair value on a recurring basis, while other assets and liabilities are recorded at fair value on a nonrecurring basis, generally as a result of acquisitions or impairment charges. Fair value is determined based on the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants. GAAP also classifies the inputs used to measure fair value into the following hierarchy:

Level 1: Quoted prices in active markets for identical assets or liabilities.

Level 2: Quoted prices in active markets for similar assets or liabilities, quoted prices for identical or similar assets or liabilities in markets that are not active, or inputs other than quoted prices that are observable for the asset or liability.

Level 3: Unobservable inputs for the asset or liability. There were no Level 3 recurring measurements of assets or liabilities as of December 31, 2022.

Interest Rate Swaps

The Company currently holds one active interest rate swap contract. Another previously held interest rate swap, effective on February 28, 2017, terminated on February 28, 2022. The purpose of entering into the contracts was to reduce the variability of cash flows from interest payments related to a portion of Quad's variable-rate debt. The interest rate swaps were previously designated as cash flow hedges as they effectively converted the notional value of the Company's variable rate debt based on one-month LIBOR to a fixed rate, including a spread on underlying debt, and a monthly reset in the variable interest rate. However, the Company amended its Senior Secured Credit Facility during the second quarter of 2020, which added a 0.75% LIBOR floor to the Company's variable rate debt, changing the critical terms of the hedged instrument. Due to this change in critical terms, the Company has elected to de-designate the swaps as cash flow hedges, resulting in future changes in fair value being recognized in interest expense. The balance of the accumulated other comprehensive loss attributable to the interest rate swaps as of June 30, 2020 was then amortized to interest expense on a straight-line basis over the remaining lives of the swap contracts. The Company expects to reclassify $2.7 million of this balance to interest expense over the next twelve months.

	March 19, 2019 Interest Rate Swap
Effective date	March 29, 2019
Termination date	March 28, 2024
Term	5 years
Notional amount	$130.0
Fixed swap rate	2.43%

(In millions, except share and per share data and unless otherwise indicated)

The Company classifies interest rate swaps as Level 2 because the inputs into the valuation model are observable or can be derived or corroborated utilizing observable market data at commonly quoted intervals. The fair value of the interest rate swaps classified as Level 2 as of December 31, 2022 and 2021, were as follows:

	Balance Sheet Location	December 31, 2022	December 31, 2021
Interest rate swap assets	Prepaid expenses and other current assets	$ 3.8	$ —
Interest rate swap liabilities	Other current liabilities	—	(0.7)
Interest rate swap liabilities	Other long-term liabilities	—	(4.4)

Prior to the Company's de-designation of the interest rate swaps as a cash flow hedge, the interest rate swaps were considered highly effective, with no amount of ineffectiveness recorded into earnings. The change in the fair value of the interest rate swaps are recorded as an adjustment to interest expense in the consolidated statements of operations. The cash flows associated with the interest rate swaps have been recognized as an adjustment to interest expense in the consolidated statements of operations:

	Year Ended December 31,	
	2022	2021
Cash Flow Impacts		
Net interest paid	$ 1.7	$ 7.6
Impacts with Swaps as Nonhedging Instruments		
Income recognized in interest expense excluded from hedge effectiveness assessments	$ (9.0)	$ (9.3)
Amounts reclassified out of accumulated other comprehensive loss to interest expense	3.4	7.1
Net interest expense	1.7	7.6
Total impact of swaps to interest expense	$ (3.9)	$ 5.4

Interest Rate Collars

The Company has entered into two interest rate collar contracts, both effective February 1, 2023. The purpose of entering into the contracts is to reduce the variability of cash flows from interest payments related to a portion of Quad's variable-rate debt. The interest rate collars will be designated as cash flow hedges as they effectively convert the notional value of the Company's variable rate debt based on one-month term SOFR to a fixed rate if that month's interest rate is outside of the collars' floor and ceiling rates, including a spread on underlying debt, and a monthly reset in the variable interest rate. The key terms of the interest rate collars are as follows:

	December 12, 2022 Interest Rate Collar	December 14, 2022 Interest Rate Collar
Effective date	February 1, 2023	February 1, 2023
Termination date	October 30, 2026	October 31, 2025
Term	45 Months	33 Months
Notional amount	$75.0	$75.0
Floor Rate	2.09%	2.25%
Ceiling Rate	5.00%	5.00%

Foreign Exchange Contracts

The Company has operations in countries that have transactions outside their functional currencies and periodically enters into foreign exchange contracts. These contracts are used to hedge the net exposures of changes in foreign currency exchange rates and are designated as either cash flow hedges or fair value hedges. Gains or losses on net foreign currency hedges are intended to offset losses or gains on the underlying net exposures in an effort to reduce the earnings volatility resulting from fluctuating foreign currency exchange rates. As of December 31, 2022, there were six open foreign currency exchange contracts designated as cash flow hedges, with a total notional value of $7.7 million.

Natural Gas Forward Contracts

The Company periodically enters into natural gas forward purchase contracts to hedge against increases in commodity costs. The Company's commodity contracts qualified for the exception related to normal purchases and sales during the years ended December 31, 2022 and 2021, as the Company takes delivery in the normal course of business.

Debt

The Company measures fair value on its debt instruments using interest rates available to the Company for borrowings with similar terms and maturities and is categorized as Level 2. See Note 10, "Debt," for the fair value of the Company's debt as of December 31, 2022 and 2021.

Nonrecurring Fair Value Measurements

In addition to assets and liabilities that are recorded at fair value on a recurring basis, the Company is required to record certain assets and liabilities at fair value on a nonrecurring basis, generally as a result of acquisitions or the remeasurement of assets resulting in impairment charges, which are categorized as Level 3. See Note 3, "Restructuring, Impairment and Transaction-Related Charges"; Note 4, "Goodwill and Other Intangible Assets"; and Note 7, "Property, Plant and Equipment" for further discussion on impairment charges recorded as a result of the remeasurement of certain long-lived assets.

Other Estimated Fair Value Measurements

The Company records the fair value of its forward contracts and pension plan assets on a recurring basis. The fair value of cash and cash equivalents, receivables, inventories, accounts payable and other current liabilities approximate their carrying values as of December 31, 2022 and 2021. See Note 14, "Employee Retirement Plans," for the details of Level 1 and Level 2 inputs related to employee retirement plans.

(In millions, except share and per share data and unless otherwise indicated)

Note 14. Employee Retirement Plans

Defined Contribution Plans

The Quad/Graphics, Inc. Diversified Plan is comprised of participant-directed 401(k) contributions, Company match and profit sharing contributions, with total participant assets of $1.9 billion as of December 31, 2022. Company 401(k) matching contributions were $16.8 million and $13.2 million for the years ended December 31, 2022 and 2021, respectively. The Company's ESOP holds profit sharing contributions of Company stock, which are made at the discretion of the Company's Board of Directors. There were no profit sharing contributions for the years ended December 31, 2022 and 2021.

Defined Benefit Plans

The Company assumed various funded and unfunded frozen pension plans for a portion of its full-time employees in the United States as part of the acquisition of World Color Press in 2010. Benefits are generally based upon years of service and compensation. These plans are funded in conformity with the applicable government regulations. The Company funds at least the minimum amount required for all qualified plans using actuarial cost methods and assumptions acceptable under government regulations.

The components of net pension income for the years ended December 31, 2022 and 2021, were as follows:

	Pension Benefits	
	2022	2021
Interest cost	$ (9.7)	$ (8.8)
Expected return on plan assets	22.3	24.2
Net periodic pension income	12.6	15.4
Settlement charge	—	(0.9)
Net pension income	$ 12.6	$ 14.5

The Company made $1.0 million in benefit payments to its non-qualified defined benefit pension plans and made no contributions to its qualified defined benefit pension plans during the year ended December 31, 2022.

The Company incurred non-cash settlement charges of $0.9 million during the year ended December 31, 2021 due to the significance of lump sum payments made in 2021. The non-cash settlement charges result in accelerated recognition of actuarial losses on the consolidated statement of operations.

(In millions, except share and per share data and unless otherwise indicated)

The underfunded pension obligations are calculated using generally accepted actuarial methods and are measured annually as of December 31. The following table provides a reconciliation of the projected benefit obligation, fair value of plan assets and the funded status of the pension plans as of December 31, 2022 and 2021:

	Pension Benefits	
	2022	**2021**
Changes in benefit obligation		
Projected benefit obligation, beginning of year	$ (462.7)	$ (525.6)
Interest cost	(9.7)	(8.8)
Actuarial gain	86.1	23.1
Benefits paid	37.0	47.5
Liability benefit from settlement	—	1.1
Projected benefit obligation, end of year	(349.3)	(462.7)
Changes in plan assets		
Fair value of plan assets, beginning of year	443.5	469.0
Actual return on plan assets	(94.5)	20.4
Employer contributions	1.0	1.6
Benefits paid	(37.0)	(47.5)
Fair value of plan assets, end of year	313.0	443.5
Funded status	$ (36.3)	$ (19.2)

The net underfunded defined benefit plan obligations increased by $17.1 million during the year ended December 31, 2022. This increase was primarily due to an overall decrease in pension plan assets due to a negative actual return on pension plan assets of (21.76)% during the year ended December 31, 2022, which was below the expected return on plan assets assumption of 5.25%. This decrease in plan assets was partially offset by a decrease in overall pension obligations due to a 269 basis point increase in the pension discount rate from 2.77% at December 31, 2021, to 5.46% at December 31, 2022 and $1.0 million of benefit payments.

Amounts recognized on the consolidated balance sheets as of December 31, 2022 and 2021, were as follows:

	Pension Benefits	
	2022	**2021**
Current liabilities	$ (1.4)	$ (1.6)
Noncurrent liabilities	(34.9)	(17.6)
Total amount recognized	$ (36.3)	$ (19.2)

(In millions, except share and per share data and unless otherwise indicated)

The following table provides a reconciliation of the Company's accumulated other comprehensive loss prior to any deferred tax effects at December 31, 2022 and 2021:

	Actuarial Gain / (Loss), net
Balance at January 1, 2021	$ (38.1)
Amount arising during the period	20.3
Impact of pension plan settlement charge included in net loss	0.9
Balance at December 31, 2021	(16.9)
Amount arising during the period	(30.7)
Balance at December 31, 2022	$ (47.6)

Actuarial gains and losses in excess of 10% of the greater of the projected benefit obligation or the market-related value of plan assets are recognized as a component of net periodic benefit costs over the average remaining service period of a plan's active employees. Unrecognized prior service costs or credits are also recognized as a component of net periodic benefit cost over the average remaining service period of a plan's active employees.

The weighted average assumptions used to determine net periodic benefit costs for the years ended December 31, 2022 and 2021, were as follows:

	Pension Benefits	
	2022	2021
Discount rate	2.77 %	2.37 %
Expected long-term return on plan assets	5.25 %	5.50 %

The weighted average assumptions used to determine pension benefit obligations at December 31, 2022 and 2021, were as follows:

	Pension Benefits	
	2022	2021
Discount rate (end of year rate)	5.46 %	2.77 %

The Company determines its assumed discount rate based on an index of high-quality corporate bond yields and matched-funding yield curve analysis as of the measurement date.

Estimated Company Contributions and Benefit Payments

In 2023, the Company does not expect to make any cash contributions to its qualified defined benefit pension plans and expects to make estimated benefit payments of $1.5 million to its non-qualified defined benefit pension plans. The actual pension contributions may differ based on the funding calculations, and the Company may choose to make additional discretionary contributions. The estimated benefit payments may differ based on actual experience.

(In millions, except share and per share data and unless otherwise indicated)

Estimated Future Benefit Payments by the Plans to or on Behalf of Plan Participants

An estimate of the Plans' present value of future benefit payments to be made from funded qualified plans and unfunded non-qualified plans to plan participants at December 31, 2022, were as follows:

	Future Pension Benefit Payments
2023	$ 35.4
2024	33.7
2025	33.0
2026	31.7
2027	30.8
2028 - 2032	134.7
Thereafter	50.0
Total	$ 349.3

Plan Assets and Investment Strategy

The Company follows a disciplined investment strategy, which provides diversification of investments by asset class, foreign currency, sector and company. The Pension Committee has an approved investment policy for the pension plan that establishes long-term asset mix targets based on several factors including the following: the funded status, historical returns achieved by worldwide investment markets, the time horizon of the pension plan's obligations, and the investment risk. An allocation range by asset class is developed whereby a mix of equity securities and debt securities are used to provide an appropriate risk-adjusted long-term return on plan assets. Third-party investment managers are employed to invest assets in both passively-indexed and actively-managed strategies and investment returns and risks are monitored on an ongoing basis. Derivatives are used at certain times to hedge foreign currency exposure. Gains or losses on the derivatives are offset by a corresponding change in the value of the hedged assets. Derivatives are strictly used for hedging purposes and not speculative purposes.

The current target allocations for plan assets on a weighted average basis are 25% equity securities and 75% debt securities, including cash and cash equivalents. The actual asset allocation as of December 31, 2022, was approximately 23% equity securities and 77% debt securities, and as of December 31, 2021, was approximately 26% equity securities and 74% debt securities. Equity investments are diversified by country, issuer and industry sector. Debt securities primarily consist of government bonds and corporate bonds from diversified industries.

The expected long-term rate of return on assets assumption is selected by first identifying the expected range of long-term rates of return for each major asset class. Expected long-term rates of return are developed based on long-term historical averages, current expectations of future returns, anticipated inflation rates and active investment management of the portfolio. The expected long-term rate of return on plan assets is then calculated by weighting each asset class.

(In millions, except share and per share data and unless otherwise indicated)

The fair values of the Company's pension plan assets at December 31, 2022 and 2021, by asset category were as follows:

	December 31, 2022				December 31, 2021			
Asset Category	**Total**	**Level 1**	**Level 2**	**Level 3**	**Total**	**Level 1**	**Level 2**	**Level 3**
Cash and cash equivalents	$ 0.6	$ 0.6	$ —	$ —	$ 3.2	$ 3.2	$ —	$ —
Debt securities	76.2	—	76.2	—	120.6	—	120.6	—
Equity securities	13.4	—	13.4	—	22.2	—	22.2	—
Total pension plan assets, excluding those measured at net asset value ("NAV")	90.2	$ 0.6	$ 89.6	$ —	146.0	$ 3.2	$ 142.8	$ —
Investments measured at NAV [(1)]	222.8				297.5			
Total pension plan assets	$ 313.0				$ 443.5			

(1) These investments consist of privately placed funds that are valued based on NAV. NAV of the funds is based on the fair value of each fund's underlying investments. In accordance with ASC Subtopic 820-10, certain investments that are measured at fair value using the NAV per share (or its equivalent) practical expedient have not been classified in the fair value hierarchy.

There were no Level 3 assets as of December 31, 2022 and 2021. See Note 13, " Financial Instruments and Fair Value Measurements," for definitions of fair value levels.

The Company segregated its plan assets by the following major categories and levels for determining their fair value as of December 31, 2022:

Cash and cash equivalents. Carrying value approximates fair value and these assets are classified as Level 1.

Debt Securities. This category consists of bonds, short-term fixed income securities and fixed income pooled funds fair valued based on a compilation of primarily observable market information or broker quotes in over-the-counter markets and are classified as Level 2.

Equity Securities. This category consists of equity pooled funds that are classified as Level 2 in the fair value hierarchy. Level 2 assets are valued using quoted prices in markets that are not active, broker dealer quotations, and other methods by which all significant input was observable at the measurement date.

The valuation methodologies described above may generate a fair value calculation that may not be indicative of net realizable value or future fair values. While the Company believes the valuation methodologies used are appropriate, the use of different methodologies or assumptions in calculating fair value could result in different amounts. The Company invests in various assets in which valuation is determined by NAV. The Company believes that NAV is representative of fair value at the reporting date, as there are no significant restrictions on redemption on these investments or other reasons to indicate that the investment would be redeemed at an amount different than NAV.

(In millions, except share and per share data and unless otherwise indicated)

The fair value measurements in common/collective trusts, calculated using a NAV and their redemption restrictions, for the years ended December 31, 2022 and 2021, are as follows:

	Fair Value		Redemption Frequency (If Currently Eligible)	Redemption Notice Period
	2022	2021		
JP Morgan Chase Bank Strategic Property Fund	$ 11.7	$ 12.8	Quarterly	30 days
Pyramis Long Corporate A or Better	24.0	55.4	Daily	15 days
Pyramis Long Duration	12.4	46.9	Daily	15 days
Pyramis 810 Corporate	124.7	101.3	Daily	15 days
Russell 3000 Index NL	46.0	81.1	Daily	1 day
NT Collective Short Term Investment Fund	4.0	—	Daily	1 day
Total value of investments measured at NAV	$ 222.8	$ 297.5		

Risk Management

For all directly invested funds, the concentration risk is monitored through specific guidelines in the investment manager mandates. The investment manager mandates were developed by the Company's external investment advisor, and specify diversification standards such as the maximum exposure per issuer, and concentration limits per type of security, industry and country when applicable.

For the investments made through pooled funds, the investment mandates of the funds were again reviewed by the Company's external investment advisor, to determine that the investment objectives and guidelines were consistent with the Company's overall pension plan risk management objectives. In managing the plan assets, management reviews and manages risk associated with funded status risk, interest rate risk, market risk, counterparty risk, liquidity risk and operational risk. Liability management and asset class diversification are central to the Company's risk management approach and are integral to the overall investment strategy.

Given the process in place to ensure a proper diversification of the portfolio, management believes that the Company pension plan assets are not exposed to significant concentration risk.

Multiemployer Pension Plans

The Company has previously participated in a number of MEPPs under terms of collective bargaining agreements that cover a number of its employees. The risks of participating in these MEPPs are different from single employer plans in the following aspects:

- Assets contributed to the MEPPs by one company may be used to provide benefits to employees of other participating companies.
- If a participating company stops contributing to the plan, the unfunded obligations of the plan may be borne by the remaining participating companies.
- If the Company stops participating in some or all of its MEPPs, and continues in business, the Company would be required to pay an amount, referred to as a withdrawal liability, based on the unfunded status of the plan.

The Company has withdrawn from all significant MEPPs and replaced these union sponsored "promise to pay in the future" defined benefit plans with a Company sponsored "pay as you go" defined contribution plan. The two MEPPs, the GCIU and GCC, are significantly underfunded, and will require the Company to pay a withdrawal liability to fund its pro rata share of the underfunding as of the plan year the full withdrawal was completed. As a result of the decision to withdraw, the Company accrued the estimated withdrawal liability based on information provided by each plan's trustee.

The GCIU Plan is a defined benefit plan that provides retirement benefits, total and permanent disability benefits, and pre-retirement death benefits for the participating union employees of the Company. The funded status of the GCIU Plan is classified as critical and declining based on the GCIU Plan's 2022 certification to the United States Department of Labor, as the plan is projected to become insolvent within 20 years. As of January 1, 2022, the plan was projected to be insolvent in 2033. As a result, the GCIU Plan implemented a rehabilitation plan to improve the plan's funded status. In 2019, the Company and the GCIU reached a settlement agreement for all claims, with scheduled payments until April 2032.

The GCC Plan is a defined benefit plan that provides retirement benefits, disability benefits, and early retirement benefits for the participating union employees of the Company. The funded status of the GCC Plan is classified as critical based on the GCC Plan's 2022 certification to the United States Department of Labor, improved from critical and declining status because it received Special Financial Assistance from the Pension Benefit Guaranty Corporation in 2022. The plan is still projected to become insolvent in 2037. As a result, the GCC Plan implemented a rehabilitation plan to improve the plan's funded status. In 2016, the Company and the GCC reached a settlement agreement for all claims, with scheduled payments until February 2024.

The Company made payments totaling $6.2 million for the years ended December 31, 2022 and 2021. The Company has reserved $28.3 million as the total MEPPs withdrawal liability as of December 31, 2022, of which $24.2 million was recorded in other long-term liabilities and $4.1 million was recorded in other current liabilities in the consolidated balance sheets.

Note 15. Earnings Per Share

Basic earnings per share is computed as net earnings divided by the basic weighted average common shares outstanding. The calculation of diluted earnings per share includes the effect of any dilutive equity incentive instruments. The Company uses the treasury stock method to calculate the effect of outstanding dilutive equity incentive instruments, which requires the Company to compute total proceeds as the sum of the amount the employee must pay upon exercise of the award and the amount of unearned stock-based compensation costs attributable to future services.

Equity incentive instruments for which the total employee proceeds from exercise exceed the average fair value of the same equity incentive instrument over the period have an anti-dilutive effect on earnings per share during periods with net earnings, and accordingly, the Company excludes them from the calculation. Anti-dilutive equity instruments excluded from the computation of diluted net earnings per shares were 0.2 million and 0.4 million class A common shares for the year ended December 31, 2022 and 2021, respectively.

(In millions, except share and per share data and unless otherwise indicated)

Reconciliations of the numerator and the denominator of the basic and diluted per share computations for the Company's common stock for the years ended December 31, 2022 and 2021, are summarized as follows:

	2022	2021
Numerator:		
Net earnings	$ 9.3	$ 37.8
Denominator:		
Basic weighted average number of common shares outstanding for all classes of common stock	50.7	51.3
Plus: effect of dilutive equity incentive instruments	1.8	1.7
Diluted weighted average number of common shares outstanding for all classes of common shares	52.5	53.0
Earnings per share:		
Basic	$ 0.18	$ 0.74
Diluted	$ 0.18	$ 0.71

Note 16. Equity Incentive Programs

The shareholders of the Company approved the Quad/Graphics, Inc. 2020 Omnibus Incentive Plan (the "2020 Plan") at the Company's annual meeting of shareholders held on May 18, 2020, for two complementary purposes: (1) to attract and retain outstanding individuals to serve as directors, officers and employees; and (2) to increase shareholder value. The Company's previous plan, the Quad/Graphics, Inc. 2010 Omnibus Plan (the "2010 Plan"), was terminated on the date of approval of the 2020 Plan, and no new awards will be granted under the 2010 Plan. All awards that were granted under the 2010 Plan that were outstanding as of May 18, 2020, will remain outstanding and will continue to be governed by the 2010 Plan.

The 2020 Plan provides for an aggregate 3,000,000 shares of class A common stock reserved for issuance, plus shares still available for issuance or re-credited under the 2010 Plan. Awards under the 2020 Plan may consist of incentive awards, stock options, stock appreciation rights, performance shares, performance share units, shares of class A common stock, restricted stock ("RS"), restricted stock units ("RSU"), deferred stock units ("DSU") or other stock-based awards as determined by the Company's Board of Directors. Each stock option granted has an exercise price of no less than 100% of the fair market value of the class A common stock on the date of grant. There were 1,173,520 shares of class A common stock reserved for issuance under the 2020 Plan as of December 31, 2022. Authorized unissued shares or treasury shares may be used for issuance under the Company's equity incentive programs. The Company plans to either use treasury shares of its class A common stock or issue shares of class A common stock to meet the stock requirements of its awards in the future.

The Company recognizes compensation expense based on estimated grant date fair values for all share-based awards issued to employees and non-employee directors, including stock options, performance shares, performance share units, restricted stock, restricted stock units and deferred stock units. The Company recognizes these compensation costs for only those awards expected to vest, on a straight-line basis over the requisite approximate three year service period of the awards, except DSU awards, which are fully vested and expensed on the grant date. The Company estimated the number of awards expected to vest based, in part, on historical forfeiture rates and also based on management's expectations of employee turnover within the specific employee groups receiving each type of award. Forfeitures are estimated at the time of grant and revised, if necessary, in subsequent periods, if actual forfeitures differ from those estimates.

(In millions, except share and per share data and unless otherwise indicated)

Equity Incentive Compensation Expense

Equity incentive compensation expense was recorded primarily in selling, general and administrative expenses in the consolidated statements of operations and includes expense recognized for liability awards that are remeasured on a quarterly basis. The total compensation expense recognized related to all equity incentive programs for the years ended December 31, 2022 and 2021, was as follows:

	Year ended December 31, 2022	Year ended December 31, 2021
RS and RSU equity awards expense	$ 5.1	$ 5.4
RSU liability awards expense	0.2	—
DSU awards expense	0.7	0.8
Total equity incentive compensation expense	$ 6.0	$ 6.2

Total future compensation expense related to all equity incentive programs granted as of December 31, 2022, was estimated to be $6.0 million, which consists entirely of expense for RS and RSU awards. Estimated future compensation expense is $3.5 million for 2023, $2.2 million for 2024 and $0.3 million for 2025.

Stock Options

Options vested over four years, with no vesting in the first year and one-third vesting upon the second, third and fourth anniversary dates. Options expire no later than the tenth anniversary of the grant date and are not credited with dividend declarations. Stock options were only to be granted to employees.

There were no stock options granted, and no compensation expense was recognized related to stock options during the years ended December 31, 2022 and 2021. There is no future compensation expense for stock options granted as of December 31, 2022. The following table is a summary of the stock option activity for the year ended December 31, 2022:

	Shares Under Option	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term (years)	Aggregate Intrinsic Value (millions)
Outstanding and exercisable at December 31, 2021	56,034	$ 14.14	0.0	$ —
Granted	—	—		
Exercised	—	—		
Canceled/forfeited/expired	(56,034)	14.14		
Outstanding and exercisable at December 31, 2022	—	$ —	0.0	$ —

The intrinsic value of options outstanding and exercisable as of December 31, 2021 was based on the fair value of the stock price. There were no stock options exercised for the years ended December 31, 2022 and 2021.

(In millions, except share and per share data and unless otherwise indicated)

Restricted Stock and Restricted Stock Units

Restricted stock and restricted stock unit awards consist of shares or the rights to shares of the Company's class A stock which are awarded to employees of the Company. The awards are restricted such that they are subject to substantial risk of forfeiture and to restrictions on their sale or other transfer by the employee. RSU awards are typically granted to eligible employees outside of the United States. As defined in the individual grant agreements, acceleration of vesting may occur under a change in control, death, disability or normal retirement of the grantee. Grantees receiving RS grants are able to exercise full voting rights and receive full credit for dividends during the vesting period. All such dividends will be paid to the RS grantee within 45 days of full vesting. Grantees receiving RSUs are not entitled to vote but do earn dividends. Upon vesting, RSUs will be settled either through cash payment equal to the fair market value of the RSUs on the vesting date or through issuance of Company class A stock. In general, RS and RSU awards will vest on the third anniversary of the grant date, provided the holder of the share is continuously employed by the Company until the vesting date.

The following table is a summary of RS and RSU award activity for the year ended December 31, 2022:

	Restricted Stock			Restricted Stock Units		
	Shares	**Weighted-Average Grant Date Fair Value Per Share**	**Weighted-Average Remaining Contractual Term (Years)**	**Units**	**Weighted-Average Grant Date Fair Value Per Share**	**Weighted-Average Remaining Contractual Term (Years)**
Nonvested at December 31, 2021	3,053,019	$ 6.99	1.2	222,093	$ 10.41	0.5
Granted	1,693,743	3.97		54,014	4.00	
Vested	(1,039,567)	12.31		(169,489)	12.33	
Forfeited	(100,900)	4.22		(5,675)	4.68	
Nonvested at December 31, 2022	3,606,295	$ 4.11	1.4	100,943	$ 4.08	1.5

In the first quarter of 2019, the Company issued RSU awards in connection with the acquisition of Periscope, Inc. that were accounted for as liability awards and vested on March 1, 2022. The awards were recorded at fair value on the initial issuance date and were remeasured to fair value at each reporting period, with the change in fair value being recorded in selling, general and administrative expense in the consolidated statements of operations. The change in fair value of the awards classified as liabilities resulted in $0.2 million of expense for the year ended December 31, 2022. The fair value of the RSU awards classified as liabilities was $0.5 million as of the year ended December 31, 2021.

In general, RS and RSU awards will vest on the third anniversary of the grant date, provided the holder of the share is continuously employed by the Company until the vesting date. Compensation expense recognized for RS and RSUs classified as equity was $5.1 million and $5.4 million for the years ended December 31, 2022 and 2021, respectively.

Deferred Stock Units

Deferred stock units are awards of rights to shares of the Company's class A stock and are awarded to non-employee directors of the Company. The following table is a summary of DSU award activity for the year ended December 31, 2022:

	Deferred Stock Units	
	Units	**Weighted Average Grant Date Fair Value Per Share**
Outstanding at December 31, 2021	687,391	$ 8.26
Granted	187,632	3.89
Settled	(101,829)	7.90
Outstanding at December 31, 2022	773,194	$ 7.25

Each DSU award entitles the grantee to receive one share of class A stock upon the earlier of the separation date of the grantee or the second anniversary of the grant date, but could be subject to acceleration for a change in control, death or disability as defined in the individual DSU grant agreement. Grantees of DSU awards may not exercise voting rights, but are credited with dividend equivalents and those dividend equivalents will be converted into additional DSU awards based on the closing price of the class A stock. Compensation expense recognized for DSUs was $0.7 million and $0.8 million for the years ended December 31, 2022 and 2021, respectively. As DSU awards are fully vested on the grant date, all compensation expense was recognized at the date of grant.

Note 17. Shareholders' Equity

The Company has three classes of common stock as follows (share data in millions):

		Issued Common Stock		
	Authorized Shares	**Outstanding**	**Treasury**	**Total Issued Shares**
Class A stock ($0.025 par value)				
December 31, 2022	105.0	39.2	3.4	42.6
December 31, 2021	105.0	40.8	0.9	41.7
Class B stock ($0.025 par value)				
December 31, 2022	80.0	13.5	—	13.5
December 31, 2021	80.0	13.5	—	13.5
Class C stock ($0.025 par value)				
December 31, 2022	20.0	—	0.5	0.5
December 31, 2021	20.0	—	0.5	0.5

In accordance with the Articles of Incorporation, each class A common share has one vote per share and each class B and class C common share has ten votes per share on all matters voted upon by the Company's shareholders. Liquidation rights are the same for all three classes of stock.

The Company also has 0.5 million shares of $0.01 par value preferred stock authorized, of which none were issued at December 31, 2022 and 2021. The Company has no present plans to issue any preferred stock.

(In millions, except share and per share data and unless otherwise indicated)

On July 30, 2018, the Company's Board of Directors authorized a share repurchase program of up to $100.0 million of the Company's outstanding class A common stock. Under the authorization, share repurchases may be made at the Company's discretion, from time to time, in the open market and/or in privately negotiated transactions as permitted by federal securities laws and other legal requirements. The timing, manner, price and amount of any repurchase will depend on economic and market conditions, share price, trading volume, applicable legal requirements and other factors. The program may be suspended or discontinued at any time. During the year ended December 31, 2022, the Company repurchased 3,093,662 shares of its Class A common stock at a weighted average price of $3.21 per share for a total purchase price of $9.9 million ($10.0 million, including commissions). There were no shares repurchased during the year ended December 31, 2021. As of December 31, 2022, there were $90.1 million of authorized repurchases remaining under the program.

In accordance with the Articles of Incorporation, dividends are paid equally for all three classes of common shares. Due to uncertainty in client demand as a result of the COVID-19 pandemic, the Company's Board of Directors proactively suspended the Company's quarterly dividends beginning in the second quarter of 2020.

Note 18. Accumulated Other Comprehensive Loss

The changes in accumulated other comprehensive loss by component, net of tax, for the years ended December 31, 2022 and 2021, were as follows:

	Translation Adjustments	Interest Rate Swap Adjustments	Pension Benefit Plan Adjustments	Total
Balance at January 1, 2021	$ (130.8)	$ (12.3)	$ (28.2)	$ (171.3)
Other comprehensive income (loss) before reclassifications	(9.6)	—	16.1	6.5
Amounts reclassified from accumulated other comprehensive loss to net earnings	(2.7)	5.6	0.7	3.6
Net other comprehensive income (loss)	(12.3)	5.6	16.8	10.1
Balance at December 31, 2021	(143.1)	(6.7)	(11.4)	(161.2)
Other comprehensive income (loss) before reclassifications	27.2	—	(24.2)	3.0
Amounts reclassified from accumulated other comprehensive loss to net earnings	27.3	2.6	—	29.9
Net other comprehensive income (loss)	54.5	2.6	(24.2)	32.9
Balance at December 31, 2022	$ (88.6)	$ (4.1)	$ (35.6)	$ (128.3)

(In millions, except share and per share data and unless otherwise indicated)

The details about the reclassifications from accumulated other comprehensive loss to net earnings for the years ended December 31, 2022 and 2021, were as follows:

Details about Accumulated Other Comprehensive Loss Components	Year Ended December 31, 2022	Year Ended December 31, 2021	Consolidated Statements of Operations Presentation
Amortization of amounts accumulated for interest rate swaps de-designated as cash flow hedges	$ 3.4	$ 7.1	Interest expense
Impact of income taxes	(0.8)	(1.5)	Income tax expense
Amortization of amounts accumulated for interest rate swaps de-designated as cash flow hedges, net of tax	2.6	5.6	
Reclassification of foreign currency translation adjustments	27.3	(2.7)	Restructuring, impairment and transaction-related charges
Impact of income taxes	—	—	Income tax expense
Reclassification of foreign currency translation adjustments, net of tax	27.3	(2.7)	
Plan settlements on pension benefit plans	—	0.9	Pension income
Impact of income taxes	—	(0.2)	Income tax expense
Plan settlements on pension benefit plans, net of tax	—	0.7	
Total reclassifications for the period, net of tax	$ 29.9	$ 3.6	

Note 19. Segment Information

Quad is a global marketing experience company that gives brands a more streamlined, impactful, flexible and frictionless way to go to market and reach consumers. The Company leverages its three key competitive advantages — integrated marketing platform excellence, ongoing innovation, and culture and social purpose — to create a better way for its clients, employees and communities. The Company's operating and reportable segments are aligned with how the chief operating decision maker of the Company currently manages the business. The Company's operating and reportable segments, including their product and service offerings, and a "Corporate" category are as follows:

- ***United States Print and Related Services***
- ***International***
- ***Corporate***

United States Print and Related Services

The United States Print and Related Services segment is predominantly comprised of the Company's United States printing operations and is managed as one integrated platform. This includes print execution and logistics for retail inserts, catalogs, long-run publications, special interest publications, journals, direct mail, directories, in-store marketing and promotion, packaging, newspapers, custom print products, as well as other commercial and specialty printed products, along with global paper procurement, and marketing and other complementary services, such as data and analytics, technology solutions, media services, creative and content solutions, managed services and execution in non-print channels (e.g., digital and broadcast). This segment also includes the manufacture of ink.

(In millions, except share and per share data and unless otherwise indicated)

International

The International segment consists of the Company's printing operations in Europe and Latin America, including operations in England, France, Germany, Poland, Argentina, Colombia, Mexico and Peru, as well as investments in printing operations in India. This segment provides printed products and marketing and other complementary services consistent with the United States Print and Related Services segment.

Corporate

Corporate consists of unallocated general and administrative activities and associated expenses including, in part, executive, legal and finance, as well as certain expenses and income from frozen employee retirement plans, such as pension benefit plans.

The following is a summary of segment information for the years ended December 31, 2022 and 2021:

	Net Sales		Operating Income (Loss)	Depreciation and Amortization	Capital Expenditures	Restructuring, Impairment and Transaction-Related Charges
	Products	Services				
Year ended December 31, 2022						
United States Print and Related Services	$ 2,126.6	$ 668.1	$ 108.3	$ 124.7	$ 46.4	$ 12.1
International	401.7	20.6	(4.5)	16.1	13.9	30.7
Total operating segments	2,528.3	688.7	103.8	140.8	60.3	42.8
Corporate	—	—	(50.3)	0.5	—	2.0
Total	$ 2,528.3	$ 688.7	$ 53.5	$ 141.3	$ 60.3	$ 44.8
Year ended December 31, 2021						
United States Print and Related Services	$ 1,935.8	$ 692.8	$ 163.1	$ 138.7	$ 46.4	$ (14.5)
International	311.3	20.5	(16.1)	17.5	3.6	31.3
Total operating segments	2,247.1	713.3	147.0	156.2	50.0	16.8
Corporate	—	—	(54.2)	1.1	—	2.1
Total	$ 2,247.1	$ 713.3	$ 92.8	$ 157.3	$ 50.0	$ 18.9

Restructuring, impairment and transaction-related charges for the years ended December 31, 2022 and 2021, are further described in Note 3, "Restructuring, Impairment and Transaction-Related Charges," and are included in the operating income (loss) results by segment above.

A reconciliation of operating income to earnings before income taxes and equity in earnings of unconsolidated entity as reported in the consolidated statements of operations for the years ended December 31, 2022 and 2021, was as follows:

	2022	2021
Operating income	$ 53.5	$ 92.8
Less: interest expense	48.4	59.6
Less: net pension income	(12.6)	(14.5)
Less: loss on debt extinguishment	—	0.7
Earnings before income taxes and equity in earnings of unconsolidated entity	$ 17.7	$ 47.0

(In millions, except share and per share data and unless otherwise indicated)

Total assets by segment at December 31, 2022 and 2021, are shown in the following table.

	2022	2021
United States Print and Related Services	$ 1,390.2	$ 1,459.7
International	289.5	252.7
Total operating segments	1,679.7	1,712.4
Corporate	22.1	177.6
Total	$ 1,701.8	$ 1,890.0

Note 20. Geographic Area Information

The table below presents the Company's net sales and long-lived assets as of and for the years ended December 31, 2022 and 2021, by geographic region. The amounts in this table differ from the segment data presented in Note 19, "Segment Information," because each operating segment includes operations in multiple geographic regions, based on the Company's management reporting structure.

	United States	Europe	Latin America	Other	Combined
2022					
Net sales					
Products	$ 2,076.9	$ 181.3	$ 259.6	$ 10.5	$ 2,528.3
Services	668.1	20.6	—	—	688.7
Property, plant and equipment—net	563.6	51.6	46.9	10.0	672.1
Operating lease right-of-use assets—net	102.6	2.3	3.8	2.4	111.1
Other intangible assets—net	45.2	0.3	1.4	—	46.9
Other long-term assets	67.8	7.4	5.1	0.5	80.8
2021					
Net sales					
Products	$ 1,892.0	$ 161.3	$ 183.0	$ 10.8	$ 2,247.1
Services	692.8	20.5	—	—	713.3
Property, plant and equipment—net	616.8	60.4	41.6	8.2	727.0
Operating lease right-of-use assets—net	118.9	3.3	0.7	2.8	125.7
Other intangible assets—net	71.9	1.4	2.0	—	75.3
Other long-term assets	53.1	6.0	6.9	0.5	66.5

Note 21. New Accounting Pronouncements

In March 2020, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update 2020-04 "Reference Rate Reform (Topic 848): Facilitation of the Effects of Reference Rate Reform on Financial Reporting" ("ASU 2020-04"), which provides optional guidance for a limited period of time to ease the potential burden in accounting for reference rate reform. Additionally, ASU 2020-04 permits entities to apply certain expedients and exceptions for contracts, hedging relationships, and other transactions impacted by the anticipated transition away from the use of LIBOR or other interbank offered rates to alternative reference rates. ASU 2020-04 was further updated by Accounting Standards Update 2021-01 "Reference Rate Reform (Topic 848)" ("ASU 2021-01") which further clarified the scope of Topic 848. As amended in ASU 2022-06, this optional guidance is effective as of March 12, 2020, through December 31, 2024. The Company expects to elect the practical expedient outlined in ASU 2020-04 and ASU 2021-01 which allows the Company to prospectively adjust the effective interest rate after a reference rate change. Reference rate reform is not expected to have a material impact on the consolidated financial statements upon the transition from LIBOR to SOFR as the Company's reference rate, effective February 1, 2023.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

Not applicable.

Item 9A. Controls and Procedures

Disclosure Controls and Procedures

The Company's management, with the participation of the Company's principal executive officer and principal financial officer, has evaluated the effectiveness of the design and operation of the Company's disclosure controls and procedures (as such term is defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934) as of the end of the period covered by this report and has concluded that, as of the end of such period, the Company's disclosure controls and procedures were effective.

Changes in Internal Control Over Financial Reporting

There were no changes in the Company's internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Securities Exchange Act of 1934) that occurred during the fiscal quarter ended December 31, 2022, that have materially affected, or are reasonably likely to materially affect, the Company's internal control over financial reporting.

Management's Report on Internal Control Over Financial Reporting

The Company's management, including the Company's Chairman, President and Chief Executive Officer and Chief Financial Officer, is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Rules 13a-15(f) and 15d-15(f) of the Securities Exchange Act of 1934. The Company's internal control over financial reporting is designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of published financial statements in accordance with generally accepted accounting principles.

The Company's management, including the Company's Chairman, President and Chief Executive Officer and Chief Financial Officer, has assessed the effectiveness of the Company's internal control over financial reporting based on the framework in *Internal Control—Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on this assessment, the Company's management has concluded that, as of December 31, 2022, the Company's internal control over financial reporting was effective based on that framework.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of the effectiveness to future periods are subject to the risk that the controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Ernst & Young LLP (PCAOB ID No. 42) the Company's independent registered public accounting firm, issued an audit report on the effectiveness of the Company's internal control over financial reporting as of December 31, 2022, which is included herein.

Audit Report of Independent Registered Public Accounting Firm

The audit report required under this Item 9A, "Controls and Procedures," is contained in Item 8, "Financial Statements and Supplementary Data," of Part II of this Annual Report on Form 10-K under the heading "Report of Independent Registered Public Accounting Firm."

Item 9B. **Other Information**

The Company has no other information to report pursuant to this item.

Item 9C. **Disclosure Regarding Foreign Jurisdictions that Prevent Inspections**

Not applicable.

PART III

Item 10. Directors, Executive Officers and Corporate Governance

The information required by this Item is included under the captions “Election of Directors”, “Corporate Governance—Board Committees—Audit Committee” and “Miscellaneous—Delinquent Section 16(a) Reports” in the Company’s definitive Proxy Statement for its 2023 Annual Meeting of Shareholders (“Proxy Statement”) and is hereby incorporated herein by reference. Information with respect to the executive officers of the Company appears in Part I, Item 1, “Business,” of this Annual Report on Form 10-K.

The Company has adopted a Code of Business Conduct that applies to all of the Company’s employees, including the Company’s Chief Executive Officer, Chief Financial Officer, Controller and other persons performing similar functions. The Company has posted a copy of the Code of Business Conduct on its website at www.QUAD.com, and such Code of Business Conduct is available in print, without charge, to any shareholder who requests it from the Company’s Secretary. The Company intends to satisfy the disclosure requirements under Item 5.05 of Form 8-K regarding amendments to, or waivers from, the Code of Business Conduct by posting such information on its website at www.QUAD.com. The Company is not including the information contained on its website as part of, or incorporating it by reference into, this Annual Report on Form 10-K.

Item 11. Executive Compensation

The information required by this Item is included under the captions “Compensation of Executive Officers,” “2022 Summary Compensation Table,” “Grants of Plan Based Awards in 2022,” “Outstanding Equity Awards at December 31, 2022,” “Option Exercises and Stock Vested in 2022,” “2022 Pension Benefits,” “2022 Nonqualified Deferred Compensation,” “Director Compensation,” “Compensation Committee Report,” “Corporate Governance—Board Committees—Compensation Committee Interlocks and Insider Participation,” “Pay Versus Performance,” and “Miscellaneous—Assessment of Compensation-Related Risk,” in the Proxy Statement and is hereby incorporated herein by reference.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

The information required by this Item with respect to security ownership of certain beneficial owners and management is included under the caption “Stock Ownership of Management and Others” in the Proxy Statement and is hereby incorporated by reference.

Equity Compensation Plan Information

The following table sets forth information with respect to compensation plans under which equity securities of the Company are authorized for issuance as of December 31, 2022. The table does not include employee benefit plans intended to meet the qualification requirements of Section 401(a) of the Internal Revenue Code. All equity compensation plans are described more fully in Note 16, "Equity Incentive Programs," to the consolidated financial statements in Part II, Item 8, "Financial Statements and Supplementary Data," of this Annual Report on Form 10-K.

Plan Category	Number of securities to be issued upon the exercise of outstanding options, warrants and rights	Weighted average exercise price of outstanding options, warrants and rights[2]	Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in the first column)
Equity compensation plans approved by security holders[1]	4,480,432	$ —	1,173,520
Equity compensation plans not approved by security holders	—	—	—
Total	4,480,432	$ —	1,173,520

(1) Consists of the Company's 2010 Omnibus Incentive Plan and 2020 Omnibus Incentive Plan. Awards under the Omnibus Plans (no new awards can be made under the 2010 plan) may consist of incentive awards, stock options, stock appreciation rights, performance shares, performance share units, shares of class A stock, restricted stock, restricted stock units, deferred stock units or other stock-based awards as determined by the Company's Board of Directors.

(2) The weighted average exercise price of outstanding options, warrants and rights only includes stock options.

Item 13. Certain Relationships and Related Transactions, and Director Independence

The information required by this Item is included under the caption "Corporate Governance" in the Proxy Statement and is hereby incorporated by reference.

Item 14. Principal Accountant Fees and Services

The information required by this Item is included under the caption "Miscellaneous—Independent Registered Public Accounting Firm" in the Proxy Statement and is hereby incorporated by reference.

PART IV

Item 15. Exhibit Index and Financial Statement Schedules

1. Consolidated financial statements—The consolidated financial statements listed in the accompanying index to consolidated financial statements are filed as part of this Annual Report on Form 10-K.

2. Financial statement schedule—All financial statement schedules are omitted since the required information is not present or is not present in amounts sufficient to require submission of the schedules, or because the information required is included in the consolidated financial statements and notes thereto.

3. Exhibits—The exhibits listed in the accompanying “Exhibit Index” are filed as part of this Annual Report on Form 10-K.

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

EXHIBIT INDEX

The exhibits listed in the exhibit index below are filed as part of this Annual Report on Form 10-K.

Exhibit Number	Exhibit Description
(3.1)	Amended and Restated Articles of Incorporation of Quad/Graphics, Inc., as amended through May 23, 2019 (incorporated by reference to Exhibit 3 to the Company’s Current Report on Form 8-K, dated May 20, 2019, and filed on May 24, 2019.
(3.2)	Amended Bylaws of Quad/Graphics, Inc., as amended through January 31, 2023 (incorporated by reference to Exhibit 3.2 to the Company's Current Report on Form 8-K dated January 31, 2023, and filed on February 2, 2023).
(4.1)	Note Agreement, dated September 1, 1995, among Quad/Graphics, Inc., certain subsidiaries of Quad/Graphics, Inc. and the purchasers named therein (incorporated by reference to Exhibit 4.4 to the Company’s Registration Statement on Form S-4 (Reg. No. 333-165259)).
(4.2)	First Amendment and Consent, dated June 1, 1996, to the Note Agreement, dated September 1, 1995, among Quad/Graphics, Inc., certain subsidiaries of Quad/Graphics, Inc. and the purchasers named therein (incorporated by reference to Exhibit 4.5 to the Company's Registration Statement on Form S-4 (Reg. No. 333-165259)).
(4.3)	Second Amendment, dated as of March 24, 1998, to the Note Agreement, dated September 1, 1995, among Quad/Graphics, Inc., certain subsidiaries of Quad/Graphics, Inc. and the purchasers named therein (incorporated by reference to Exhibit 4.6 to the Company's Registration Statement on Form S-4 (Reg. No. 333-165259)).
(4.4)	Third Amendment, dated as of January 26, 2006, to the Note Agreement, dated September 1, 1995, among Quad/Graphics, Inc., certain subsidiaries of Quad/Graphics, Inc. and the purchasers named therein (incorporated by reference to Exhibit 4.7 to the Company's Registration Statement on Form S-4 (Reg. No. 333-165259)).
(4.5)	Fourth Amendment, dated as of November 24, 2014, to the Note Agreement, dated September 1, 1995, among Quad/Graphics, Inc., certain subsidiaries of Quad/Graphics, Inc. and the purchasers named therein (incorporated by reference to Exhibit 4.1 to the Company's Current Report on Form 8-K dated November 24, 2014 and filed on November 26, 2014).
(4.6)	Amendment No. 5, dated as of November 2, 2021, to Second Amended and Restated Credit Agreement, dated as of April 28, 2014, by and among Quad/Graphics, Inc., as the Borrower, the Lenders party thereto, and JPMorgan Chase Bank, N.A., as Administrative Agent (incorporated by reference to Exhibit 4 to the Company’s Current Report on Form 8-K dated November 2, 2021 and filed on November 3, 2021).
(4.7)	Indenture, dated as of April 28, 2014, among Quad/Graphics, Inc., the subsidiary guarantors of Quad/Graphics, Inc. set forth therein and U.S. Bank National Association, as trustee (incorporated by reference to Exhibit 4.2 to the Company's Current Report on Form 8-K dated April 28, 2014 and filed on May 2, 2014).

Exhibit Number	Exhibit Description
(4.8)	Quad/Graphics, Inc.’s Description of Securities (incorporated by reference to Exhibit 4 to the Company’s Annual Report on Form 10-K for the year ended December 31, 2020 and filed on February 24, 2021).
	Certain other instruments, which would otherwise be required to be listed above, have not been so listed as such instruments do not authorize long-term debt securities in an amount that exceeds 10% of the total assets of Quad/Graphics, Inc. and its subsidiaries on a consolidated basis. Quad/Graphics, Inc. agrees to furnish a copy of any such instrument to the Securities and Exchange Commission upon request.
(9)	Amended and Restated Voting Trust Agreement, dated as of June 25, 2010, by Betty E. Quadracci, J. Joel Quadracci, Elizabeth M. Quadracci-Harned and David A. Blais, as trustees as of the date of the agreement's execution (incorporated by reference to Exhibit 9.1 to the Company's Current Report on Form 8-K dated July 2, 2010 and filed on July 9, 2010).
(10.1)++	Dividend/Discount Deferred Compensation Plan (incorporated by reference to Exhibit 10.7 to the Company's Registration Statement on Form S-4 (Reg. No. 333-165259)).
(10.2)++	Employment Agreement, effective as of January 1, 2004, by and between Quad/Graphics, Inc. and James Joel Quadracci, as amended (incorporated by reference to Exhibit 10.9 to the Company's Registration Statement on Form S-4 (Reg. No. 333-165259)).
(10.3)++	Form of Amendment, effective as of September 15, 2016, to the Employment Agreements by and between Quad/Graphics, Inc. and J. Joel Quadracci (incorporated by reference to Exhibit 10.2 to the Company’s Quarterly Report on Form 10-Q for the quarter ended September 30, 2016 and filed on November 2, 2016).
(10.4)++	Form of Executive Salary Continuation Plan for James Joel Quadracci (incorporated by reference to Exhibit 10.15 to the Company’s Registration Statement on Form S-4 (Reg. No. 333-165259)).
(10.5)++	Executive Supplemental Retirement Plan (incorporated by reference to Exhibit 10.16 to the Company's Registration Statement on Form S-4 (Reg. No. 333-165259)).
(10.6)++	Quad/Graphics, Inc. 2010 Omnibus Incentive Plan, as amended through May 20, 2019 (incorporated by reference to Appendix A to the Company’s Definitive Proxy Statement on Schedule 14A filed on April 10, 2019).
(10.7)++	Form of Stock Option Award Agreement under the Quad/Graphics, Inc. 2010 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K dated December 16, 2010 and filed on December 17, 2010).
(10.8)++	Form of Stock Option and Dividend Equivalent Award Agreement under the Quad/Graphics, Inc. 2010 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the quarter ended March 31, 2012 and filed on May 10, 2012).
(10.9)++	Form of Deferred Stock Unit Award Agreement under the Quad/Graphics, Inc. 2010 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.4 to the Company's Current Report on Form 8-K dated December 16, 2010 and filed on December 17, 2010).

Exhibit Number	Exhibit Description
(10.10)++	Form of Restricted Stock Award Agreement under the Quad/Graphics, Inc. 2010 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the quarter ended March 31, 2014 and filed on May 7, 2014).
(10.11)++	Form of Restricted Stock Unit Award Agreement under the Quad/Graphics, Inc. 2010 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q for the quarter ended March 31, 2014 and filed on May 7, 2014).
(10.12)++	Form of Performance Share Award Agreement under the Quad/Graphics, Inc. 2010 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the quarter ended June 30, 2014 and filed on August 7, 2014).
(10.13)++	Form of Performance Unit Award Agreement under the Quad/Graphics, Inc. 2010 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q for the quarter ended June 30, 2014 and filed on August 7, 2014).
(10.14)++	Form of Restricted Stock Unit Award Agreement, with full retirement vesting, under the Quad/Graphics, Inc. 2010 Omnibus Incentive Plan (incorporated by reference to Exhibit 10 to the Company's Quarterly Report on Form 10-Q for the quarter ended June 30, 2015 and filed on August 5, 2015).
(10.15)++	Quad/Graphics, Inc. Executive Severance Plan, effective as of September 15, 2016 [participants are David Honan, Jennifer Kent, Eric Ashworth, Kelly Vanderboom, Julie Currie, Anthony Staniak, Donald McKenna, Dana Gruen and Robert Quadracci] (incorporated by reference to Exhibit 10.1 to the Company’s Quarterly Report on Form 10-Q for the quarter ended September 30, 2016 and filed on November 2, 2016).
(10.16)++	Form of 2020 Cash Long-Term Incentive Plan Net Leverage Ratio Award Agreement under the Quad/Graphics, Inc. 2010 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.17 to the Company’s Annual Report on Form 10-K for the year ended December 31, 2020 and filed on February 24, 2021).
(10.17)++	Form of 2020 Cash Long-Term Incentive Plan Net Sales Wins Award Agreement under the Quad/Graphics, Inc. 2010 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.18 to the Company’s Annual Report on Form 10-K for the year ended December 31, 2020 and filed on February 24, 2021).
(10.18)++	Quad/Graphics, Inc. 2020 Omnibus Incentive Plan (incorporated by reference to Appendix A to the Company’s Definitive Proxy Statement on Schedule 14A filed on April 8, 2020).
(10.19)++	Form of Deferred Stock Unit Award Agreement under the Quad/Graphics, Inc. 2020 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.20 to the Company’s Annual Report on Form 10-K for the year ended December 31, 2020 and filed on February 24, 2021).
(10.20)++	Form of Restricted Stock Award Agreement under the Quad/Graphics, Inc. 2020 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.21 to the Company’s Annual Report on Form 10-K for the year ended December 31, 2020 and filed on February 24, 2021).
(10.21)++	Form of Restricted Stock Unit Award Agreement under the Quad/Graphics, Inc. 2020 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.22 to the Company’s Annual Report on Form 10-K for the year ended December 31, 2020 and filed on February 24, 2021).

Exhibit Number	Exhibit Description
(10.22)++	Form of 2021 Cash Long-Term Incentive Plan Net Leverage Ratio Award Agreement under the Quad/Graphics, Inc. 2020 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.23 to the Company’s Annual Report on Form 10-K for the year ended December 31, 2020 and filed on February 24, 2021).
(10.23)++	Form of 2021 Cash Long-Term Incentive Plan Net Sales Wins Award Agreement under the Quad/Graphics, Inc. 2020 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.24 to the Company’s Annual Report on Form 10-K for the year ended December 31, 2020 and filed on February 24, 2021).
(10.24)++	Alternative Form of 2021 Cash Long-Term Incentive Plan Net Leverage Ratio Award Agreement under the Quad/Graphics, Inc. 2020 Omnibus Incentive Plan (incorporated by reference to Exhibit 10 to the Company’s Quarterly Report on Form 10-Q for the quarter ended March 31, 2021 and filed on May 5, 2021).
(21)	Subsidiaries of Quad/Graphics, Inc.
(23.1)	Consent of Ernst & Young, LLP.
(23.2)	Consent of Deloitte & Touche, LLP. (PCAOB ID No. 34)
(31.1)	Certification of the Chief Executive Officer pursuant to Rule 13a-14(a) or 15d-14(a) under the Securities Exchange Act of 1934.
(31.2)	Certification of the Chief Financial Officer pursuant to Rule 13a-14(a) or 15d-14(a) under the Securities Exchange Act of 1934.
(32)	Written Statement of the Chief Executive Officer and Chief Financial Officer pursuant to 18 U.S.C. Section 1350.
(99)	Proxy Statement for the 2023 Annual Meeting of Shareholders. [To be filed with the Securities and Exchange Commission under Regulation 14A within 120 days after December 31, 2022; except to the extent specifically incorporated by reference, the Proxy Statement for the 2023 Annual Meeting of Shareholders shall not be deemed to be filed with the Securities and Exchange Commission as part of this Annual Report on Form 10-K.]
(101)	Financial statements from the Annual Report on Form 10-K of Quad/Graphics, Inc. for the year ended December 31, 2022 formatted in Inline eXtensible Business Reporting Language (iXBRL): (i) the Consolidated Statements of Operations, (ii) the Consolidated Statements of Comprehensive Income, (iii) the Consolidated Balance Sheets, (iv) the Consolidated Statements of Cash Flows, (v) the Consolidated Statements of Shareholders’ Equity, (vi) the Notes to Consolidated Financial Statements, and (vii) document and entity information.
(104)	Cover Page Interactive Data File (formatted in iXBRL and contained in Exhibit 101).

++ A management contract or compensatory plan or arrangement.

Item 16. Form 10-K Summary

None.

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SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized, on this 24th day of February 2023.

QUAD/GRAPHICS, INC.

By: /s/ J. Joel Quadracci
J. Joel Quadracci
Chairman, President and Chief Executive Officer

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the Registrant and in the capacities and on the dates indicated.

Signature	Title	Date
/s/ J. Joel Quadracci J. Joel Quadracci	Chairman, President and Chief Executive Officer (Principal Executive Officer)	February 24, 2023
/s/ Anthony C. Staniak Anthony C. Staniak	Chief Financial Officer (Principal Financial Officer)	February 24, 2023
/s/ Anne M. Bauer Anne M. Bauer	Vice President and Chief Accounting Officer (Principal Accounting Officer)	February 24, 2023
/s/ Mark A. Angelson Mark A. Angelson	Director	February 24, 2023
/s/ Douglas P. Buth Douglas P. Buth	Director	February 24, 2023
/s/ Beth-Ann Eason Beth-Ann Eason	Director	February 24, 2023
/s/ Kathryn Quadracci Flores Kathryn Quadracci Flores	Director	February 24, 2023
/s/ John C. Fowler John C. Fowler	Director	February 24, 2023
/s/ Stephen M. Fuller Stephen M. Fuller	Director	February 24, 2023
/s/ Christopher B. Harned Christopher B. Harned	Director	February 24, 2023
/s/ Jay O. Rothman Jay O. Rothman	Director	February 24, 2023
/s/ John S. Shiely John S. Shiely	Director	February 24, 2023

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