2021 ANNUAL REPORT

Armstrong®
WORLD INDUSTRIES

A MESSAGE FROM OUR CEO

Dear Shareholders,

Reflecting on 2021, I'm proud of what our company achieved in a uniquely challenging environment. Our teams worked tirelessly together to execute through a period of uncertainty and delivered a year of strong financial and operational performance.

As vaccination rates against COVID-19 accelerated and local economies throughout North America re-opened, we witnessed a rebound in repair demand for our core products. Partially offsetting this, the broader construction market faced significant challenges from labor shortages, supply chain disruptions and rapid inflation on many key inputs. These issues have resulted in delays for many new and major renovation projects and produced an uneven recovery throughout the commercial construction sector.

By remaining focused and agile in this rapidly changing environment in 2021, we succeeded in:

- Delivering $1.1 billion in net sales, an 18% increase from our 2020 results and a 7% increase from our pre-pandemic results of 2019
- Generating strong earnings growth in both Mineral Fiber and Architectural Specialties segments
- Driving a 13% increase in consolidated adjusted EBITDA from 2020 results
- Further integrating and building on our three acquisitions in 2020 to expand our Architectural Specialties portfolio
- Achieving a 3% increase in Mineral Fiber volume, while pricing to stay ahead of inflation

We accomplished this growth thanks to the dedication of all our employees throughout our operations, sales, and support functions. They ensured we operated safely and efficiently, while carefully managing our input costs and availability as supply chains tightened and inflation increased. These were not easy tasks in this challenging environment, but we persevered and continued our strong record of best-in-class customer service to our sales channel partners.

These results are a true testament to the power of focus we have achieved by becoming an Americas' ceilings and specialty walls business. Because of this focus, we have successfully continued executing our growth initiatives despite the ongoing pandemic. We have adapted quickly to changing market conditions and pivoted to emerging opportunities. Through our Americas focus, we have also significantly minimized our exposure to global shocks.

Leading with Digitalization

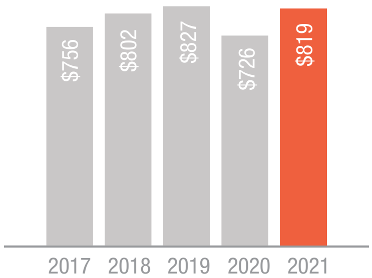
Throughout 2021, we continued to pursue a meaningful set of growth initiatives designed to improve our competitive position in our markets and elevate our growth trajectory. Primary among these has been our investments in digitalization. These digital initiatives have focused both internally, to increase the efficiency and speed to our operations and sales functions, and externally, to bring new customers to AWI and to strengthen our existing customer relationships. Our initiatives target specific frictions with our customers and seek to unlock new sources of demand for our products. We continue to expand our kanopi™ by Armstrong digital marketplace by adding more products and installation services. Kanopi is creating new demand from underserved markets, like small retail, medical and professional offices that are not served by larger contractors or facility service companies, and we are pleased with the traction it gained throughout 2021.

We have also been very encouraged by the increased use of ProjectWorks®. This tool is demonstrating the potential to fundamentally change how we work with customers by automating the design process, leading to significantly faster project design completion,

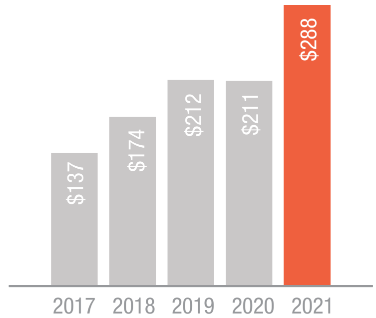
FINANCIAL SCORE CARD

Dollars in millions except per share data

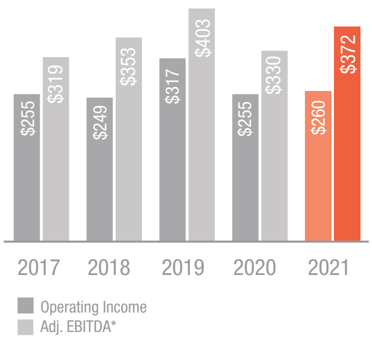
Mineral Fiber Net Sales



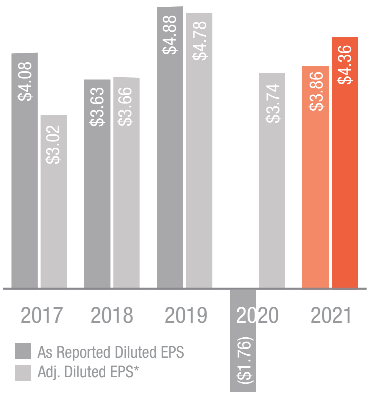
Architectural Specialties Net Sales



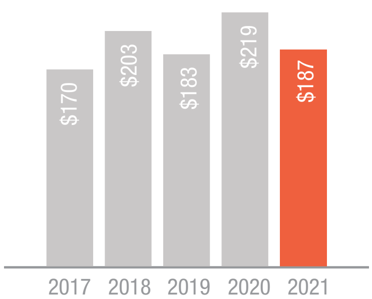
Operating Income & Adjusted EBITDA



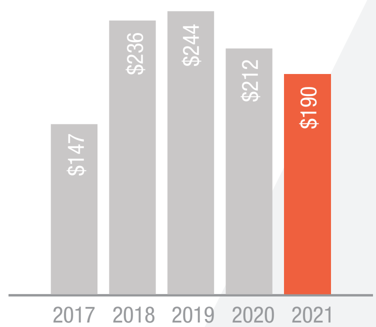
As Reported & Adjusted Diluted EPS



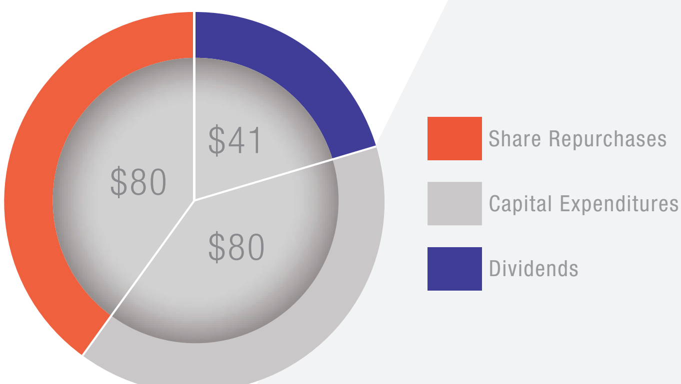
Cash Flow from Operating Activities



Adjusted Free Cash Flow*



2021 Capital Deployment



* Non-GAAP measure. Reconciliations to GAAP measures provided on last page

reducing material waste in the process. Further, in providing this service, we deepen our relationships with architects, designers and contractors, as we bring their designs to life with greater speed and efficiency. This ultimately reinforces our value proposition for our customers and supports our competitive market position.

Increasing Momentum for Healthy Spaces

Another area at the forefront of our strategic investments is the Healthy Spaces initiative. Because of the COVID-19 pandemic, we are all much more cognizant of the healthiness of the air we breathe and overall Indoor Environmental Quality (IEQ). Over the last two years, we've been working on innovations to enhance IEQ and address concerns about airborne pathogens. This has led to new product introductions with more product innovation underway. We have also pursued partnerships to further develop the value proposition of ceilings in this area. This includes the partnership we announced in late 2021 with the scientific advisory firm, 9 Foundations. This organization, founded by Dr. Joseph G. Allen, associate professor at the Harvard T. H. Chan School of Public Health, is at the leading edge of the science and research on human health and the built environment. Together, we are exploring how our products can make a meaningful impact on indoor spaces. Moving forward, we expect to build on our position as a leader in healthy spaces to meet these emerging needs across multiple market verticals, including healthcare, education, and offices.

Heightening Sustainability Focus

We also took another step in our sustainability journey in 2021 by issuing our inaugural sustainability report. This report highlights our long-standing leadership in product recycling and transparency and commits us to continue to innovate to reduce our impact on the environment, and to provide solutions for customers that are healthy and sustainable. We believe that sustainability solutions will be critical to winning in the marketplace, and we are committed to maintaining our leadership position. In addition, we have an enterprise-wide commitment to ambitious, defined, and measurable 2030 goals to reduce the environmental impact of our products and operations and on-going targets focused on increasing the engagement, diversity, inclusion, and safety of our employees.

Looking Ahead to 2022 and Beyond

We have entered 2022 a stronger, more competitive company due to our focus which enables and shapes our investments in our people, our capabilities, and our strategic growth initiatives. We also believe several larger factors are at work that will support future demand for our ceiling and specialty wall solutions including:

- Significant U.S. federal funding for education that has yet to be spent
- Pent-up demand for tenant improvement as people return to offices
- Demand for new spaces to support hybrid working
- Increased awareness of the need for healthy and sustainable indoor spaces

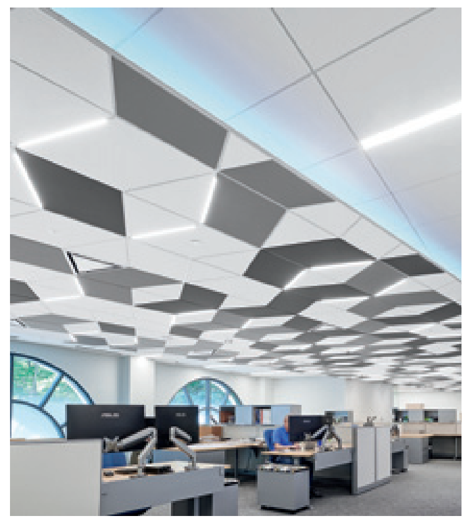
Because of our unique focus, our investments throughout the pandemic, and these broader market factors, we are well-positioned to sustain growth into the future.

In closing, our 2021 results and our strong outlook for the future are made possible by the support of our stakeholders. This includes our employees who have been steadfast in their dedication to our corporate purpose and our vision for growth. This includes our customers, distributors, other sales channel partners, and the many designers, architects, and contractors we work with every day. And it includes our shareholders who have invested in our future. We thank you for your continued support as we work to use our power of focus to deliver strong profitable growth for years to come.

Vic Grizzle

President and Chief Executive Officer

April 20, 2022



Top: AcoustiBuilt® Seamless Acoustical Ceiling System; Calla® Vector® with Prelude® XL® Exposed Tee Grid ▲

Middle: Calla® Shapes for DesignFlex®; Optima® Lay-in and Tegular Ceiling Panels with Suprafine® XM Exposed Tee System for Shapes ▶

Bottom: Custom MetalWorks™ Torsion Spring Ceilings; Custom MetalWorks™ WH1000 Walls ▼

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

FORM 10-K

(Mark One)

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

For the fiscal year ended December 31, 2021

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 1-2116

ARMSTRONG WORLD INDUSTRIES, INC.

(Exact name of registrant as specified in its charter)

Pennsylvania	**23-0366390**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
2500 Columbia Avenue, Lancaster, Pennsylvania	**17603**
(Address of principal executive offices)	**(Zip Code)**

Registrant's telephone number, including area code (717) 397-0611

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

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, $0.01 par value per share	AWI	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, 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 (§232.405 of this chapter) during the preceding 12 months (or for such shorter time 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, a 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. ☒

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 Common Stock of Armstrong World Industries, Inc. held by non-affiliates based on the closing price ($107.26 per share) on the New York Stock Exchange (trading symbol AWI) as of June 30, 2021 was approximately $5.0 billion. As of February 16, 2022, the number of shares outstanding of the registrant's Common Stock was 47,084,127.

Documents Incorporated by Reference

Certain sections of Armstrong World Industries, Inc.'s definitive Proxy Statement for use in connection with its 2022 annual meeting of shareholders, to be filed no later than May 2, 2022 (120 days after the last day of our 2021 fiscal year), are incorporated by reference into Part III of this Form 10-K Report where indicated.

Auditor Name: KPMG LLP   Auditor Location: Philadelphia, PA   Auditor Firm ID: 185

TABLE OF CONTENTS

		PAGE
	Cautionary Note Regarding Forward-Looking Statements	3
	PART I	
Item 1.	Business	5
Item 1A.	Risk Factors	10
Item 1B.	Unresolved Staff Comments	18
Item 2.	Properties	18
Item 3.	Legal Proceedings	18
Item 4.	Mine Safety Disclosures	18
	PART II	
Item 5.	Market for the Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities	19
Item 6.	[Reserved]	19
Item 7.	Management's Discussion and Analysis of Financial Condition and Results of Operations	20
Item 7A.	Quantitative and Qualitative Disclosures About Market Risk	30
Item 8.	Financial Statements and Supplementary Data	32
Item 9.	Changes in and Disagreements with Accountants on Accounting and Financial Disclosure	78
Item 9A.	Controls and Procedures	78
Item 9B.	Other Information	78
Item 9C.	Disclosure Regarding Foreign Jurisdictions that Prevent Inspections	78
	PART III	
Item 10.	Directors, Executive Officers and Corporate Governance	79
Item 11.	Executive Compensation	80
Item 12.	Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters	80
Item 13.	Certain Relationships and Related Transactions, and Director Independence	80
Item 14.	Principal Accountant Fees and Services	80
	PART IV	
Item 15.	Exhibits and Financial Statement Schedules	81
Item 16.	Form 10-K Summary	84
Signatures		85

When we refer to "AWI," the "Company," "we," "our" and "us", we are referring to Armstrong World Industries, Inc. and its subsidiaries.

CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

Certain statements in this Annual Report on Form 10-K and the documents incorporated by reference may constitute forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. Those forward-looking statements are subject to various risks and uncertainties and include all statements that are not historical statements of fact and those regarding our intent, belief or expectations, including, but not limited to, our expectations concerning our residential and commercial markets and their effect on our operating results; the impacts of COVID-19 on our business; our expectations regarding the payment of dividends; and our ability to increase revenues, earnings and earnings before interest, taxes, depreciation and amortization (as discussed below). Words such as "anticipate," "expect," "intend," "plan," "target," "project," "predict," "believe," "may," "will," "would," "could," "should," "seek," "estimate" and similar expressions are intended to identify such forward-looking statements. These statements are based on management's current expectations and beliefs and are subject to a number of factors that could lead to actual results materially different from those described in the forward-looking statements. Although we believe that the assumptions underlying the forward-looking statements are reasonable, we can give no assurance that our expectations will be attained. Factors that could have a material adverse effect on our financial condition, liquidity, results of operations or future prospects or which could cause actual results to differ materially from our expectations include, but are not limited to:

Risks Related to Our Operations

- key customers;
- availability and costs of manufacturing inputs or sourced products;
- Worthington Armstrong Venture ("WAVE"), our joint venture with Worthington Industries, Inc;
- labor;
- costs savings and productivity initiatives;
- sustainability;

Risks Related to Our Strategy

- digitalization initiatives and new technology;
- strategic transactions;

Risks Related to Financial Matters

- negative tax consequences;
- our indebtedness;
- our liquidity;
- covenants in our debt agreements;
- defined benefit plan obligations;
- the tax consequences of the separation of our flooring business from our ceilings business;

Risks Related to Legal and Regulatory Matters

- environmental matters;
- litigation;
- claims;
- intellectual property rights;
- international operations;

Risks Related to General Economic and Other Factors

- economic conditions;
- construction activity;
- competition;
- customer consolidation;
- information technology disruptions and cybersecurity breaches;
- geographic concentration;
- dividend payments;
- public health epidemics or pandemics (like COVID-19); and

- other risks detailed from time to time in our filings with the Securities and Exchange Commission (the “SEC”), press releases and other communications, including those set forth under “Risk Factors” included elsewhere in this Annual Report on Form 10-K.

Such forward-looking statements speak only as of the date they are made. We expressly disclaim any obligation to release publicly any updates or revisions to any forward-looking statements to reflect any change in our expectations with regard thereto or change in events, conditions or circumstances on which any statement is based.

PART I

ITEM 1. BUSINESS

Armstrong World Industries, Inc. (“AWI” or the “Company”) is a Pennsylvania corporation incorporated in 1891. When we refer to “we,” “our” and “us” in this report, we are referring to AWI and its subsidiaries.

AWI is a leading manufacturer and designer of ceiling systems for use in the construction and renovation of commercial and residential buildings in the Americas. Our products primarily include mineral fiber, fiberglass wool, metal, wood, wood fiber, glass-reinforced-gypsum and felt. We also manufacture ceiling suspension system (grid) products through a joint venture with Worthington Industries, Inc. ("Worthington") called Worthington Armstrong Venture ("WAVE").

Reportable Segments

Our operating segments are as follows: Mineral Fiber, Architectural Specialties and Unallocated Corporate.

Mineral Fiber – produces suspended mineral fiber and soft fiber ceiling systems for use in commercial and residential settings. Our mineral fiber products offer various performance attributes such as acoustical control, rated fire protection, aesthetic appeal, and health and sustainability features. Commercial ceiling products are sold to resale distributors and to ceiling systems contractors. Residential ceiling products are sold primarily to wholesalers and retailers (including large home centers). The Mineral Fiber segment also includes the results of WAVE, which manufactures and sells suspension system (grid) products and ceiling component products that are invoiced by both AWI and WAVE. Segment results relating to WAVE consist primarily of equity earnings and reflect our 50% equity interest in the joint venture. Ceiling component products consist of ceiling perimeters and trim, in addition to grid products that support drywall ceiling systems. For some customers, WAVE sells its suspension systems products to AWI for resale to customers. Mineral Fiber segment results reflect those sales transactions.

Architectural Specialties – produces, designs and sources ceilings and walls for use in commercial settings. Products are available in numerous materials, such as metal, felt and wood, in addition to various colors, shapes and designs. Products offer various performance attributes such as acoustical control, rated fire protection and aesthetic appeal. We sell standard, premium and customized products, a portion of which are derived from sourced products. Architectural Specialties products are sold primarily to resale distributors and direct customers, primarily ceiling systems contractors. The majority of this segment's revenues are project driven, which can lead to more volatile sales patterns due to project scheduling uncertainty.

Unallocated Corporate – includes assets, liabilities, income and expenses that have not been allocated to our other business segments and consists of: cash and cash equivalents, the net funded status of our U.S. Retirement Income Plan (“RIP”), the estimated fair value of interest rate swap contracts, outstanding borrowings under our senior credit facility and income tax balances.

Overview

Our business has been built on providing high-quality, innovative products through a highly focused service model as well as by maintaining strong brand awareness and trust. We are committed to delivering profitable topline growth and sustainable shareholder value by strengthening our core Mineral Fiber segment and expanding our Architectural Specialties segment into new, adjacent business categories and sectors. Through this strategy, we have delivered consistent growth in mineral fiber sales dollars per unit sold through product innovation, including our Healthy Spaces products, Total Acoustics® solutions and Sustain® family of products, and we have built the broadest portfolio of architectural specialties products for ceilings and walls in our markets. Our current strategic initiatives focus on further leveraging innovation, digitalization and the movement toward healthier and sustainable indoor environments for additional growth.

Acquisitions

In December 2020, we acquired all the issued and outstanding equity of Arktura LLC (“Arktura”) and certain subsidiaries with operations in the United States and Argentina. Arktura is a designer and fabricator of metal and felt ceilings, walls, partitions and facades with one manufacturing facility based in Los Angeles, California.

In August 2020, we acquired the business and assets of Moz Designs, Inc. (“Moz”), based in Oakland, California. Moz is a designer and fabricator of custom architectural metal ceilings, walls, dividers and column covers for interior and exterior applications with one manufacturing facility.

In July 2020, we acquired all the issued and outstanding capital stock of TURF Design, Inc. (“Turf”), with one manufacturing facility in Elgin, Illinois and a design center in Chicago, Illinois. Turf is a designer and manufacturer of acoustic felt ceilings and wall products.

In November 2019, we acquired the business and assets of MRK Industries, Inc. (“MRK”), based in Libertyville, Illinois. MRK is a manufacturer of specialty metal ceiling, wall and exterior solutions with one manufacturing facility.

In March 2019, we acquired the business and assets of Architectural Components Group, Inc. (“ACGI”), based in Marshfield, Missouri. ACGI is a manufacturer of custom wood ceilings and walls with one manufacturing facility.

The operations, assets and liabilities of these acquisitions are included in our Architectural Specialties segment.

Discontinued Operations

In 2019, we completed the sale of certain subsidiaries comprising our businesses and operations in Europe, the Middle East and Africa (including Russia) (“EMEA”) and the Pacific Rim, including the corresponding businesses and operations conducted by WAVE, our joint venture with Worthington in which AWI holds a 50% interest (collectively, the “Sale”), to Knauf International GmbH (“Knauf”). In January 2021, we finalized post-closing adjustments to the purchase price related to certain pension liabilities assumed by Knauf in the Sale. During the first quarter of 2021, we paid $11.8 million to Knauf related to this purchase price adjustment.

The EMEA and Pacific Rim segment historical financial results through September 30, 2019 have been reflected in AWI’s Consolidated Statements of Operations and Comprehensive Income as discontinued operations.

See Notes 5 and 6 to the Consolidated Financial Statements for additional information related to our acquisitions and discontinued operations.

Markets

We primarily operate in the United States, Canada and Latin America. We are well positioned in the industry sectors and categories in which we operate, often holding a leadership position. Our products compete against mineral fiber and fiberglass products from other manufacturers, as well as drywall and a wide range of specialty ceiling products. We compete directly with other domestic and international suppliers of these products. The major markets in which we compete are:

Commercial Construction. Our revenue opportunities come from new construction as well as renovation of existing buildings. Renovation work (also known as replacement/remodel) is estimated to represent the majority of the commercial market opportunity. Most of our revenue comes from the following sectors of commercial construction – office, education, transportation, healthcare and retail. We monitor U.S. construction starts and project activity. Our revenue from new construction can lag behind construction starts by as much as 24 months. We also monitor office vacancy rates, the Architecture Billings Index, state and local government spending, gross domestic product (“GDP”) and general employment levels, which can indicate movement in renovation and new construction opportunities. We believe that these statistics, taking into account the time-lag effect, provide a reasonable indication of our future revenue opportunity from commercial renovation and new construction. Additionally, we believe that customer preferences for product type, style, color, performance attributes (such as acoustics, sustainability and health attributes), availability, affordability and ease of installation also affect our revenue.

In our Mineral Fiber segment, we estimate that a majority of our commercial construction market sales are used for existing building renovation purposes by end-users of our products. In our Architectural Specialties segment, we estimate that a majority of our commercial market sales are used for new building construction by end-users of our products. The end-use of our products is based on management estimates as such information is not easily determinable.

Residential Construction. We also sell mineral fiber products for use in single and multi-family housing. We estimate that existing home renovation work represents the majority of the residential construction market opportunity. Key U.S. statistics that indicate market opportunity include existing home sales (a key indicator for renovation opportunity), housing starts, housing completions, home prices, interest rates and consumer confidence.

Customers

We use our reputation, capabilities, service, innovation and brand recognition to develop long-standing relationships with our customers. We principally sell commercial products to building materials distributors, who re-sell our products to contractors, subcontractors’ alliances, large architect and design firms, and major facility owners. We have important relationships with national home centers such as Lowe’s Companies, Inc. and The Home Depot, Inc., with wholesalers who re-sell our products to dealers who service builders, contractors and consumers, and also with architects and designers who specify products.

In 2021, approximately 70% of our consolidated net sales were to distributors. Sales to large home centers accounted for slightly less than 10% of our consolidated net sales. Our remaining sales were primarily to direct customers and retailers.

Gross sales to distributors Foundation Building Materials, Inc. and GMS Inc. totaled $495.8 million and individually exceeded 10% of our consolidated gross sales in 2021. These sales were included within our Mineral Fiber and Architectural Specialties segments.

Working Capital

We produce goods for inventory and sell on credit to our customers. Generally, our distributors carry inventory as needed to meet local or rapid delivery requirements. We sell our products to select, pre-approved customers using customary trade terms that allow for payment in the future. These practices are typical within the industry.

Competition

The markets in which our products are sold are highly competitive. Principal attributes of competition include product performance, product styling, service and price. Competition comes from both domestic and international manufacturers. Additionally, some of our products compete with alternative products or finishing solutions, namely, drywall and exposed structure (also known as open plenum). Excess industry capacity exists for certain products, which tends to increase price competition. The following companies are our primary competitors:

CertainTeed Corporation (a subsidiary of Saint-Gobain), Chicago Metallic Corporation (owned by Rockwool International A/S), Georgia-Pacific Corporation, Rockfon A/S (owned by Rockwool International A/S), USG Corporation (owned by Gebr. Knauf KG), Ceilings Plus (owned by USG Corporation), Rulon International, and 9Wood.

Raw Materials

We purchase raw materials from numerous suppliers worldwide in the ordinary course of business. The principal raw materials are fiberglass, perlite, recycled paper and starch. Other raw materials include clays, felt, pigment, wood and wood fiber. We manufacture most of our mineral wool needs at one of our manufacturing facilities. Finally, we use aluminum and steel in the production of metal ceilings by us and by WAVE, our joint venture that manufactures grid products.

We also purchase significant amounts of packaging materials and consume substantial amounts of energy, such as electricity and natural gas, and water.

In general, adequate supplies of raw materials are available to all of our operations. However, availability can change for a number of reasons, including environmental conditions, laws and regulations, shifts in demand by other industries competing for the same materials, transportation disruptions and/or business decisions made by, or events that affect, our suppliers. There is no assurance that these raw materials will remain in adequate supply to us.

Prices for certain high usage raw materials can fluctuate dramatically. Cost increases for these materials can have a significant adverse impact on our manufacturing costs. Given the competitiveness of our markets, we may not be able to recover the increased manufacturing costs through increasing selling prices to our customers.

Sourced Products

Some of the products we sell are sourced from third parties. Our primary sourced products include specialty ceiling products. We purchase some of our sourced products from suppliers that are located outside of the U.S., primarily from Europe and the Pacific Rim. Sales of sourced products represented approximately 9% of our total consolidated revenue in 2021.

In general, we believe we have adequate supplies of sourced products. However, we cannot guarantee that the supply will remain adequate.

Seasonality

Generally, our sales tend to be stronger in the second and third quarters of our fiscal year due to more favorable weather conditions, customer business cycles and the timing of renovation and new construction.

Patent and Intellectual Property Rights

Patent protection is important to our business. Our competitive position has been enhanced by patents on products and processes developed or perfected within AWI or obtained through acquisitions and licenses. In addition, we benefit from our trade secrets for certain products and processes.

Patent protection extends for varying periods according to the date of patent filing or grant and the legal term of a patent in the various countries where patent protection is obtained. The actual protection afforded by a patent, which can vary from country to country, depends upon the type of patent, the scope of its coverage and the availability of legal remedies. Although we consider that, in the aggregate, our patents, licenses and trade secrets constitute a valuable asset of material importance to our business, we do not believe we are materially dependent upon any single patent or trade secret, or any group of related patents or trade secrets.

Certain of our trademarks, including without limitation, , Armstrong®, 24/7 Defend™, ACOUSTIBuilt®, AirAssure™, Airtite®, Arktura®, Calla®, Cirrus®, Cortega®, DESIGNFlex®, Dune™, Feltworks®, Humiguard®, Infusions®, InvisAcoustics™, Kanopi™, Lyra®, MetalWorks™, Moz™, Optima®, Plasterform™, Soundscapes®, Sustain®, Tectum®, Total Acoustics®, Turf®, Ultima®, and WoodWorks®, are important to our business because of their significant brand name recognition. Registrations are generally for fixed, but renewable, terms.

In connection with the separation and distribution of our former flooring business into a separate publicly-traded company, Armstrong Flooring, Inc. ("AFI"), in 2016, we entered into several agreements with AFI that, together with a plan of division, provided for the separation and allocation of assets between AWI and AFI. These agreements include a Trademark License Agreement and a Transition Trademark License Agreement. Pursuant to the Trademark License Agreement, AWI provided AFI with a perpetual, royalty-free license to utilize the "Armstrong" trade name and logo. Pursuant to the Transition Trademark License Agreement, AFI provided us with a royalty-free license to utilize the "Inspiring Great Spaces" tagline, logo and related color scheme, which expires December 31, 2022.

In connection with the closing of the Sale, we entered into a royalty-free intellectual property License Agreement with Knauf for its benefit (and, under sublicense, to the buyers of certain businesses divested by Knauf) under which they license certain patents, trademarks and know-how from us for use in certain licensed territories.

We review the carrying value of indefinite-lived trademarks at least annually for potential impairment. See the "Critical Accounting Estimates" section of Management's Discussion and Analysis of Financial Condition and Results of Operations in Item 7 of this Form 10-K for further information.

Sustainability and Environmental Matters

As a leading building products manufacturer, we are committed to operating sustainably across all areas of our business. This commitment is reflected in our ongoing initiatives to design and develop sustainable ceiling and wall products and solutions for every space. Sustainability in our business reflects our mission to make a difference in the lives of people where they live, work, learn, heal and play. Our approach to sustainability is designed to support our strategic priorities, align with stakeholder interests, and be visible and measurable.

Our sustainability program is organized around three program "pillars": People, Planet and Product.

Under the People pillar, we are broadly focused on increasing our engagement in the communities where we operate, evaluating our benefits and compensation structure for all levels of the organization, promoting and maintaining a diverse, talented and growing workforce, encouraging and protecting human rights, and creating a safe working environment for our employees.

Our Planet pillar broadly focuses on reducing our greenhouse gas footprint, reducing or recapturing water in our operations, and reducing waste in our operations. These efforts include our ceilings recycling program, which diverts reclaimed ceiling tiles from landfills, and our reduction of our environmental operating footprint. Additionally, we are committed to complying with all environmental laws and regulations that are applicable to our operations.

Under the Product pillar, we are broadly focused on ensuring our products are free of chemicals of concern, reducing our products' water and greenhouse gas footprint, and continuing to invest in solutions that meet customer demand for building products that align with their sustainability goals. We expect that there will be increased demand over time for products, systems and services that meet evolving regulatory and customer sustainability standards and preferences and decreased demand for products that produce significant greenhouse gas emissions. We also believe that our ability to continue to provide these products, systems and services to our customers, including through our Sustain® portfolio, will be necessary to maintain our competitive position in the marketplace.

The adoption of environmentally responsible building codes and standards such as the Leadership in Energy and Environmental Design ("LEED") rating system established by the U.S. Green Building Council, has the potential to increase demand for products, systems and services that contribute to building sustainable spaces. Many of our products meet the requirements for the award of LEED credits, and we are continuing to develop new products, systems and services to address market demand for products that enable construction of buildings that require fewer natural resources to build, operate and maintain. Our competitors also have developed and introduced to the market products with an increased focus on sustainability.

In 2021, we published our inaugural Sustainability Report , including our targets for 2030. We expect to update our progress regularly. The report is available in the "Sustainability" section of our website, which is listed below. Information in the Sustainability Report or the Company's website is not incorporated herein by reference.

Human Capital

Workforce Demographics. As of December 31, 2021 and 2020, we had approximately 2,800 and 2,700 full time and part time employees, respectively. During 2021, our total voluntary and involuntary turnover rates were approximately 8% and 2%, respectively, for non-production employees and 12% and 4%, respectively, for production employees.

As of December 31, 2021, approximately 58% of our approximately 1,300 production employees in the U.S. were represented by labor unions. Collective bargaining agreements covering approximately 100 employees at one U.S. plant will expire during 2022. We believe that our relations with our employees are constructive and positive.

Employee Health and Safety. Safety is a core value at AWI and our culture is committed to making safety a personal core value for every employee. Our overall goal is to eliminate workplace injuries. We promote and foster an environment of empowerment and sharing throughout the company at all levels and in all locations. We engage our employees on safety with a focus on risk identification and elimination and through tracking various leading indicators. We track Occupational Safety and Health Administration ("OSHA") recordable injuries and lost time rates by location monthly. We establish safety targets annually, which are tracked and reported to leadership monthly and reviewed with our Board of Directors.

We offer competitive health and wellness benefits to eligible employees and periodically conduct analyses of plan utilization to further tailor our employee benefits to meet their ongoing needs. In response to COVID-19, we continue to follow guidelines from governmental and local health authorities across our facilities and have implemented preventative measures that include remote and hybrid work models, providing personal protective equipment, limiting group meetings, enhancing cleaning and sanitizing procedures, and social distancing. A significant portion of our workforce began working fully remote in mid-March 2020 and continued to do so as of December 31, 2020. In the third quarter of 2021, we instituted a hybrid work model which allowed employees who can meet our customer commitments remotely to continue doing so for a portion of the week. During 2020, we implemented an Emergency Paid Leave policy for all employees which expired on December 31, 2021. This policy granted additional paid time off for any employee impacted by COVID-19.

Diversity and Inclusion. We continue to take steps to expand our role as an employer that champions diversity and inclusion, as we believe it is a key to our future success. This commitment is most recently reflected in the goals of the People Pillar of our Sustainability program, which is being led by our Vice President of Talent Sustainability. We measure gender and racial/ethnic representation and are focusing on our incoming new hires to assist in increasing diversity within the company. In addition, we are committed to engaging in events and outreach that align with our goals to enhance our diversity and inclusion. Our strategy to grow our diversity over time includes (1) providing annual training to employees on diversity and inclusion topics, (2) demonstrating year over year improvement in the diversity of our organization measured by representation of female, minorities and veterans at every level of the organization, and (3) providing employees an opportunity to share their views on topics that matter to them. As of December 31, 2021, our executive leadership team, defined as the chief executive officer and direct reports to the chief executive officer, included 43% gender diversity, compared to 20% as of December 31, 2020.

Product Innovation

Product innovation activities are important and necessary in helping us improve our products' competitiveness. Principal product innovation functions include the development and improvement of products and manufacturing processes.

Legal and Regulatory Proceedings

Regulatory activities of particular importance to our operations include proceedings under the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), and state Superfund and similar type environmental laws governing existing or potential environmental contamination at two domestically owned locations allegedly resulting from past industrial activity. We are one of several potentially responsible parties in these matters and have agreed to jointly fund the required investigation, while preserving our defenses to the liability. We may also have rights of contribution or reimbursement from other parties or coverage under applicable insurance policies.

Most of our facilities are affected by various federal, state and local environmental requirements relating to the discharge of materials or the protection of the environment. We make expenditures necessary for compliance with applicable environmental requirements at each of our operating facilities. We have not experienced a material adverse effect upon our capital expenditures or competitive position as a result of environmental control legislation and regulations.

From time to time, we are involved in various other lawsuits, claims, investigations and other legal matters that arise in the ordinary course of business, including matters involving our products, intellectual property, relationships with suppliers, relationships with distributors, relationships with competitors, employees and other matters. In connection with those matters, we may have rights of contribution or reimbursement from other parties or coverage under applicable insurance policies. When applicable and appropriate, we will pursue coverage and recoveries under those policies, but are unable to predict the outcome of those demands. While complete assurance cannot be given to the outcome of any proceedings relating to these matters, we do not believe that any current claims, individually or in the aggregate, will have a material adverse effect on our financial condition, liquidity or results of operations.

Liabilities of $0.7 million and $1.2 million as of December 31, 2021 and 2020, respectively, were recorded for environmental liabilities that we consider probable and for which a reasonable estimate of the probable liability could be made. See Note 27 to the Consolidated Financial Statements and Risk Factors in Item 1A of this Form 10-K, for information regarding the possible effects that compliance with environmental laws and regulations may have on our businesses and operating results.

Website

We maintain a website at http://www.armstrongceilings.com. Information contained on our website is not incorporated into this document. Annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, all amendments to those reports and other information about us are available free of charge through this website as soon as reasonably practicable after the reports are electronically filed with the SEC. Reference in this Form 10-K to our website and the SEC's website is an inactive text reference only.

ITEM 1A. RISK FACTORS

Risks Related to Our Operations

Sales fluctuations to and changes in our relationships with key customers could have an adverse effect on our financial condition, liquidity or results of operations.

The loss, reduction, or fluctuation of sales to key customers, including independent distributors or national home center customers, or any adverse change in our business relationship with them, whether as a result of changing customer demands and expectations, reduced customer demand, supply chain constraints, competition, industry consolidation or otherwise, could have a material adverse effect on our financial condition, liquidity or results of operations.

If the availability of our manufacturing inputs or sourced products decreases, or the cost of those inputs or sourced products increases, and we are unable to pass along increased costs resulting from supply chain or inflationary pressures, our financial condition, liquidity or results of operations could be adversely affected.

The availability and cost of raw materials, packaging materials, energy and sourced products are critical to our operations and our results of operations. For example, we use substantial quantities of natural gas and some petroleum-based raw materials in our manufacturing operations. The cost of some of these inputs has been volatile in recent years and availability has been limited at times. We source some materials from a limited number of suppliers, which, among other things, increases the risk of unavailability. Limited availability could require us to reformulate products or limit our production. Supply chain disruptions could decrease access to manufacturing inputs or sourced products or significantly increase the cost to purchase these items. A decrease in availability or increases in costs of manufacturing inputs or sourced products, and any inability to pass along such costs through price increases, could have a material adverse effect on our financial condition, liquidity or results of operations.

The performance of our WAVE joint venture is important to our financial results. Changes in the demand for, or quality of, WAVE products, or in the operational or financial performance of the WAVE joint venture, could have an adverse effect on our

financial condition, liquidity or results of operations. Similarly, if there is a change with respect to our joint venture partner that adversely impacts its relationship with us, WAVE's performance could be adversely impacted.

Our equity investment in our WAVE joint venture remains important to our financial results. WAVE's markets are highly competitive and changes in the demand for, or quality of, WAVE products, or in the operational or financial performance of the WAVE joint venture, could have a material adverse effect on its financial condition, liquidity or results of operations. Similarly, the availability and cost of raw materials, packaging materials, energy and sourced products, and the ability to pass along increased costs, are critical to WAVE's operations and its results of operations.

We believe the relationship with our partner, Worthington Industries, Inc., is an important element in the success of this joint venture. If there is a change in ownership, a change of control, a change in management or management philosophy, a change in business strategy or another event with respect to our partner that adversely impacts our relationship, WAVE's performance could be adversely impacted. In addition, our partner may develop economic or business interests or goals that are different from or inconsistent with our interests or goals, which may impact our ability to influence or align WAVE's strategy and operations with our interests or goals.

Increased costs of labor, labor disputes, work stoppages or union organizing activity, and increased labor shortages, could delay or impede production and could have an adverse effect on our financial condition, liquidity or results of operations.

Increased costs of labor, including the costs of employee benefits plans, labor disputes, work stoppages or union organizing activity, and increased labor shortages, could delay or impede production and have a material adverse effect on our financial condition, liquidity or results of operations. As the majority of our manufacturing employees are represented by unions and covered by collective bargaining or similar agreements, we often incur costs attributable to periodic renegotiation of those agreements, which may be difficult to project. We are also subject to the risk that strikes or other conflicts with organized personnel may arise or that we may become the subject of union organizing activity at our facilities that do not currently have union representation. Prolonged negotiations, conflicts or related activities could also lead to costly work stoppages and loss of productivity.

We continuously pursue productivity initiatives and periodically engage in cost-saving initiatives. Our inability to execute these initiatives may result in lower-than-expected savings in our operating cost structure or may not improve our operating results.

We aggressively seek ways to make our operations more efficient and effective. We may reduce, move, modify and expand our plants and operations, as well as our sourcing and supply chain arrangements, and invest in technology, as needed, to control costs and improve productivity. Such actions involve substantial planning, often require capital investments and may result in charges for fixed asset impairments or obsolescence and substantial severance costs. Our ability to achieve cost savings and other benefits within expected time frames is subject to many estimates and assumptions. These estimates and assumptions are subject to significant economic, competitive and other uncertainties, some of which are beyond our control. If these estimates and assumptions are incorrect, if we experience delays resulting from equipment failures or other interruptions in production, or if other unforeseen events occur, our financial condition, liquidity or results of operations could be materially and adversely affected.

Our pursuit of environmental, social and governance ("ESG") and sustainability objectives, including those related to climate change, may not achieve the anticipated benefits we expect or may not align with new regulations or expectations of stakeholders, any of which could have an adverse effect on our business, financial condition or results of operations.

In November 2021, we published our inaugural Sustainability Report, which includes certain ESG and sustainability objectives. In our pursuit of these or other ESG and sustainability objectives, we may not achieve the anticipated benefits we expect or may not align with new regulations or expectations of stakeholders. In addition, we may encounter challenges measuring our progress towards the achievement of those objectives. Finally, increased focus by governmental and non-governmental organizations, customers and investors on ESG and sustainability issues, including those related to climate change, may result in new or increased regulations and stakeholder demands that could cause us to incur additional costs and make significant investments in or changes to our operations to comply with any such regulations and demands. If we are unable to adequately meet our ESG and sustainability objectives or fail to comply with all laws, regulations and policies, or align with stakeholder demands, it could adversely impact our business, financial condition or results of operations.

Risks Related to Our Strategy

We may not experience the anticipated benefits from our strategic initiatives, including investments in digitalization, Healthy Spaces and innovation.

We continue to evaluate and may pursue strategic initiatives involving the development or utilization of new or innovative products, solutions and tools, including those related to Healthy Spaces, as well as the expansion of our digital capabilities. These initiatives are designed to grow revenue, improve profitability and increase shareholder value. Our results of operations and financial position could be materially and adversely affected if we are unable to successfully identify, execute and integrate these initiatives or if we are unable to complete these initiatives in a timely and efficient manner to realize competitive advantages and opportunities.

We may pursue strategic transactions, including mergers, acquisitions, joint ventures, strategic alliances or other investments, which could create risks and present unforeseen integration obstacles or costs, any of which could have an adverse effect on our financial condition, liquidity or results of operations.

We regularly evaluate potential mergers, acquisitions, joint ventures, strategic alliances or other investments that we believe could complement, enhance or expand our current businesses or product lines or that might otherwise offer us growth opportunities. Any such strategic transaction involves a number of risks, including potential disruption of our ongoing business and distraction of management, difficulty with integrating or separating personnel and business operations and infrastructure, and increasing or decreasing the scope, geographic diversity and complexity of our operations. Strategic transactions could involve payment by us of a substantial amount of cash, assumption of liabilities and indemnification obligations, regulatory requirements, incurrence of a substantial amount of debt or issuance of a substantial amount of equity. Certain strategic opportunities may not result in the consummation of a transaction or may fail to realize the intended benefits and synergies. If we fail to identify, consummate and integrate our strategic transactions in a timely and cost-effective manner, our financial condition, liquidity or results of operations could be materially and adversely affected.

Risks Related to Financial Matters

Negative tax consequences can have an unanticipated effect on our financial results.

We are subject to the tax laws of the many jurisdictions in which we operate. The tax laws are complex, and the manner in which they apply to our operations and results is sometimes open to interpretation. Our income tax expense (benefit) and reported net income (loss) may fluctuate significantly, and may be materially different than forecasted or experienced in the past. Our financial condition, liquidity or results of operations could be adversely affected by changes in effective tax rates, changes in our overall profitability, changes in tax legislation, the results of examinations of previously filed tax returns, and ongoing assessments of our tax exposures.

Our financial condition, liquidity or results of operations could also be adversely affected by changes in the valuation of deferred tax assets and liabilities. We have substantial deferred tax assets related to capital loss carryforwards and state net operating losses (“NOLs”), which are available to reduce our U.S. income tax liability and to offset future state taxable income. However, our ability to utilize the current carrying value of these deferred tax assets may be impacted as a result of certain future events, such as changes in tax legislation and insufficient future taxable income prior to expiration of the capital loss carryforwards and NOLs.

Our indebtedness may adversely affect our ability to operate and invest in our business, execute on our strategic initiatives, and return cash to shareholders.

Our level of indebtedness and degree of leverage could:

- limit our flexibility in planning for, or reacting to, changes in our business and the industry in which we operate;
- make us more vulnerable to adverse changes in general economic, industry and competitive conditions and adverse changes in government regulation;
- place us at a competitive disadvantage compared to our competitors that are less leveraged and, therefore, more able to take advantage of opportunities that our leverage prevents us from pursuing;
- limit our ability to refinance existing indebtedness or borrow additional amounts for working capital, capital expenditures, acquisitions, debt service requirements, execution of our business strategy or other purposes;
- restrict our ability to pay dividends on or repurchase our capital stock;
- make it more difficult for us to satisfy our obligations with respect to our indebtedness; and
- adversely affect our credit ratings, if any.

We may also incur additional indebtedness, which could exacerbate the risks described above. In addition, to the extent that our indebtedness bears interest at floating rates, our sensitivity to interest rate fluctuations will increase.

Any of the above listed factors could have a material adverse effect on our financial condition, liquidity or results of operations.

We require a significant amount of liquidity to fund our operations, and borrowing has increased our exposure to materially negative unforeseen events.

Our liquidity needs vary throughout the year. If our business experiences materially negative unforeseen events, we may be unable to generate sufficient cash flow from operations to fund our needs or maintain sufficient liquidity to operate and remain in compliance with our debt covenants, which could result in reduced or delayed planned capital expenditures and other investments and have a material adverse effect on our financial condition or results of operations.

The agreements that govern our indebtedness contain a number of covenants that impose significant operating and financial restrictions, including restrictions on our ability to engage in activities that may be in our best long-term interests.

The agreements that govern our indebtedness include covenants that may restrict our ability to:

- incur additional debt;
- pay dividends on or make other distributions in respect of our capital stock or redeem, repurchase or retire our capital stock or make certain other restricted payments;
- make certain acquisitions;
- sell certain assets;
- consolidate, merge, sell or otherwise dispose of all or substantially all of our assets; and
- create liens on certain assets to secure debt.

Under the terms of our senior secured credit facility, we are required to maintain specified leverage and interest coverage ratios. Our ability to meet these ratios could be affected by events beyond our control, and we cannot assure that we will meet them. A breach of any of the restrictive covenants or ratios would result in a default under the senior secured credit facility. If any such default occurs, the lenders under the senior secured credit facility may be able to elect to declare all outstanding borrowings under our facilities, together with accrued interest and other fees, to be immediately due and payable, or enforce their security interest. The lenders may also have the right in these circumstances to terminate commitments to provide further borrowings.

Significant changes in factors and assumptions used to measure our defined benefit plan obligations, actual investment returns on pension assets and other factors could negatively impact our operating results and cash flows.

We maintain significant pension and postretirement plans in the U.S. The recognition of costs and liabilities associated with these plans for financial reporting purposes is affected by assumptions made by management and used by actuaries engaged by us to calculate the benefit obligations and the expenses recognized for these plans.

The inputs used in developing the required estimates are calculated using multiple assumptions and represent management's best estimate of the future. The assumptions that have the most significant impact on reported results are the discount rate, the estimated long-term return on plan assets for the funded plans, retirement rates, and mortality rates and, for postretirement plans, the estimated inflation in health care costs. These assumptions are generally updated annually.

In the aggregate, our U.S. pension plans were overfunded by $71.6 million as of December 31, 2021. Our unfunded U.S. postretirement plan liabilities were $78.0 million as of December 31, 2021. If our cash flows and capital resources are insufficient to fund our pension and postretirement plans obligations, we could be forced to reduce or delay investments and capital expenditures, seek additional capital, or restructure or refinance our indebtedness.

If the separation and distribution of Armstrong Flooring, Inc. ("AFI") fails to qualify as a tax-free transaction for U.S. federal income tax purposes, then AFI, AWI and AWI's shareholders could be subject to significant tax liability or tax indemnity obligations.

On April 1, 2016, we completed our previously announced separation of AFI by allocating the assets and liabilities related primarily to the Resilient Flooring and Wood Flooring segments to AFI and then distributing the common stock of AFI to our shareholders at a ratio of one share of AFI common stock for every two shares of AWI common stock. In connection with the distribution, we received an opinion from our special tax counsel, on the basis of certain facts, representations, covenants and assumptions set forth in such opinion, substantially to the effect that, for U.S. federal income tax purposes, the separation and distribution should qualify as a transaction that generally is tax-free to us and our shareholders under Sections 355 and 368(a)(1)(D) of the Internal Revenue Code.

Notwithstanding the tax opinion, the Internal Revenue Service ("IRS") could determine on audit that the distribution should be treated as a taxable transaction if it determines that any of the facts, assumptions, representations or covenants set forth in the tax opinion is not correct or has been violated, or that the distribution should be taxable for other reasons, including as a result of a significant change in stock or asset ownership after the distribution, or if the IRS were to disagree with the conclusions of the tax opinion. If the distribution is ultimately determined to be taxable, the distribution could be treated as a taxable dividend to each U.S. holder of our common shares who receives shares of AFI in connection with the spinoff for U.S. federal income tax purposes, and such shareholders could incur significant U.S. federal income tax liabilities. In addition, we and/or AFI could incur significant U.S. federal income tax liabilities or tax indemnification obligations, whether under applicable law or the Tax Matters Agreement that we entered into with AFI, if it is ultimately determined that certain related transactions undertaken in anticipation of the distribution are taxable.

Risks Related to Legal and Regulatory Matters

We may be subject to liability under, and may make substantial future expenditures to comply with, environmental laws and regulations, which could have an adverse effect on our financial condition, liquidity or results of operations.

We are actively involved in environmental investigation and remediation activities relating to two domestically owned locations allegedly resulting from past industrial activity, for which our ultimate liability may exceed the currently estimated and accrued amounts. See Note 27 to the Consolidated Financial Statements for further information related to our current environmental matters and the potential liabilities associated therewith. It is also possible that we could become subject to additional environmental matters and corresponding liabilities in the future.

The building materials industry has been subject to claims relating to raw materials such as silicates, polychlorinated biphenyl ("PCB"), polyvinyl chloride ("PVC"), formaldehyde, fire-retardants and claims relating to other issues such as mold and toxic fumes, as well as claims for incidents of catastrophic loss, such as building fires. We have not received any significant claims involving our raw materials or our product performance; however, product liability insurance coverage may not be available or adequate in all circumstances to cover claims that may arise in the future.

In addition, our operations are subject to various environmental, health, and safety laws and regulations. These laws and regulations not only govern our current operations and products, but also impose potential liability on us for our past operations. Our costs to comply with these laws and regulations may increase as these requirements become more stringent in the future.

Potential regulatory actions, product and service claims, environmental claims and other litigation could be costly and have an adverse effect on our financial condition, liquidity or results of operations. Insurance coverage may not be available or adequate in all circumstances.

In the ordinary course of business, we are subject to various claims and litigation. Any such claims, whether with or without merit, could be time consuming and expensive to defend and could divert management's attention and resources. While we strive to ensure that our products and services comply with applicable government regulatory standards and internal requirements, and that our products and services perform effectively and safely, customers from time to time could claim that our products and services do not meet warranty or contractual requirements, and users could claim to be harmed by use or misuse of our products and services. These claims could give rise to breach of contract, warranty or recall claims, or claims for negligence, product liability, strict liability, personal injury or property damage. They could also result in negative publicity.

In addition, claims and investigations may arise related to patent infringement, distributor relationships, commercial contracts, antitrust or competition law requirements, employment matters, employee benefits issues, and other compliance and regulatory matters, including anti-corruption and anti-bribery matters. While we have processes and policies designed to mitigate these risks and to investigate and address such claims as they arise, we cannot predict or, in some cases, control the costs to defend or resolve such claims.

We currently maintain insurance against some, but not all, of these potential claims. In the future, we may not be able to maintain insurance at commercially acceptable premium levels. In addition, the levels of insurance we maintain may not be adequate to fully cover any and all losses or liabilities. If any significant judgment or claim is not fully insured or indemnified against, it could have a material adverse effect on our financial condition, liquidity or results of operations.

Our intellectual property rights may not provide meaningful commercial protection for our products or brands, which could adversely impact our financial condition, liquidity or results of operations.

We rely on our proprietary intellectual property, including numerous patents and registered trademarks, as well as our licensed intellectual property to market, promote and sell our products. We monitor and protect against activities that might infringe, dilute, or otherwise harm our patents, trademarks and other intellectual property and rely on the patent, trademark and other laws of the U.S. and other countries. However, we may be unable to prevent third parties from using our intellectual property without our authorization. In addition, the laws of some non-U.S. jurisdictions, particularly those of certain emerging markets, provide less protection for our proprietary rights than the laws of the U.S. and present greater risks of counterfeiting and other infringement. To the extent we cannot protect our intellectual property, unauthorized use and misuse of our intellectual property could harm our competitive position and have a material adverse effect on our financial condition, liquidity or results of operations.

We are subject to risks associated with our international operations in Canada and Latin America. Legislative, political, regulatory and economic volatility, as well as vulnerability to infrastructure and labor disruptions, could have an adverse effect on our financial condition, liquidity or results of operations.

A portion of our sales are generated through international trade. These sales are subject to currency exchange fluctuations, trade regulations, import duties, logistics costs, delays and other related risks. Our international operations are also subject to various tax rates, credit risks in emerging markets, political risks, uncertain legal systems, and loss of sales to local competitors following currency devaluations in countries where we import products for sale. In addition, our international growth strategy depends, in part, on our ability to expand our operations in Canada and Latin America. However, some emerging markets have greater political and economic volatility and greater vulnerability to infrastructure and labor disruptions than established markets. Similarly, our efforts to enhance the profitability or accelerate the growth of our operations in certain markets depends largely on the economic and geopolitical conditions in those local or regional markets.

In addition, in many countries outside of the United States, particularly in those with developing economies, it may be common for others to engage in business practices prohibited by laws and regulations applicable to us, such as the Foreign Corrupt Practices Act or similar local anti-corruption or anti-bribery laws. These laws generally prohibit companies and their employees, contractors or agents from making improper payments to government officials for the purpose of obtaining or retaining business. Failure to comply with these laws, as well as U.S. and foreign export and trading laws, could subject us to civil and criminal penalties. As we continue to expand our business, we may have difficulty anticipating and effectively managing these and other risks that our operations may face, which may adversely affect our business outside the United States and our financial condition, liquidity or results of operations.

Risks Related to General Economic and Other Factors

Unstable market and economic conditions could have an adverse impact on our financial condition, liquidity or results of operations.

Our business is influenced by market and economic conditions, including inflation, deflation, interest rates, availability and cost of capital, consumer spending rates, energy availability and the effects of government stimulus. Volatility in financial markets and the continued softness or further deterioration of national and global economic conditions could have a material adverse effect on our financial condition, liquidity or results of operations, including as follows:

- the financial stability of our customers or suppliers may be compromised, which could result in additional bad debts for us or non-performance by suppliers;
- commercial and residential consumers of our products may postpone spending in response to tighter credit, negative financial news and/or stagnation or further declines in income or asset values, which could have a material adverse impact on the demand for our products;
- the value of investments underlying our defined benefit pension plan may decline, which could result in negative plan investment performance and additional charges which may involve significant cash contributions to the plan in order to meet obligations or regulatory requirements; and
- our asset impairment assessments and underlying valuation assumptions may change, which could result from changes to estimates of future sales and cash flows that may lead to substantial impairment charges.

Continued or sustained deterioration of economic conditions would likely exacerbate and prolong these adverse effects.

Our business is dependent on construction activity in North America. Downturns or delays in construction activity could have an adverse effect on our financial condition, liquidity or results of operations.

Our business has greater sales opportunities when construction activity is strong and, conversely, has fewer opportunities when such activity declines. The cyclical nature of commercial and residential construction activity, including construction activity funded by the public sector, tends to be influenced by prevailing economic conditions, including the rate of growth in gross domestic product, prevailing interest rates, government spending patterns, business, investor and consumer confidence, inflation, availability of labor, adequately functioning supply chains and other factors beyond our control. Prolonged downturns or delays in construction activity could have a material adverse effect on our financial condition, liquidity or results of operations.

Our markets are highly competitive. Competition could reduce demand for our products or negatively affect our sales mix or price realization. Failure to compete effectively by meeting consumer preferences, developing and marketing innovative solutions, maintaining strong customer service and distribution relationships, and expanding our solutions capabilities and reach could adversely affect our results.

Our customers consider product performance attributes, product styling, customer service and price when deciding whether to purchase our products. Shifting consumer preference in our highly competitive markets, from acoustical solutions to other ceiling and wall products, for example, whether for performance attributes, such as acoustics and sustainability, and health attributes, or styling preferences or our inability to develop and offer new competitive performance features could have an adverse effect on our sales. Similarly, our ability to identify, protect and market new and innovative solutions is critical to our long-term growth strategy, namely to sell into more spaces and sell more solutions in every space. If our competitors offer discounts on certain products or provide new or alternative offerings that the marketplace perceives as more cost-effective, it could adversely affect our price realization. Any broad-based change to our price realization could materially impact our financial condition, liquidity or results of operations.

Customer consolidation, and competitive, economic and other pressures facing our customers, and our potential failure to attract new customers in our markets, may negatively impact our operating margins and profitability.

A number of our customers, including distributors and contractors, have consolidated in recent years and consolidation could continue. Further consolidation could impact margin growth and profitability as larger customers may realize certain operational and other benefits of scale. The economic and competitive landscape for our customers is constantly changing, and our customers' responses to those changes could impact our business. These factors could have a material adverse impact on our business, financial condition or results of operations.

Our operating and information systems may experience a failure, a compromise of security, or a violation of data privacy laws or regulations, which could interrupt or damage our operations.

In the conduct of our business, we collect, use, transmit and store data on information systems, which are vulnerable to disruption and an increasing threat of continually evolving cybersecurity risks. These information systems may be disrupted or fail as a result of events that are wholly or partially beyond our control, including events such as natural disasters and extreme weather, power loss, software or hardware defects, or hacking, computer viruses, malware, ransomware or other cyber-attacks. All of these risks are also applicable where we rely on outside vendors to provide services, which may operate in a cloud environment. We are dependent on third-party vendors to operate secure and reliable systems which may include data transfers over the internet. Any events which deny us use of vital operating or information systems may seriously disrupt our normal business operations.

We also compete through our use of information technology. We strive to provide customers with timely, accurate, easy-to-access information about product availability, orders and delivery status using state-of-the-art systems. While we have processes for short-term failures and disaster recovery capability, a prolonged disruption of system or other failures in the reliability of our systems may have a material adverse effect on our operating results.

We could also experience a disruption of service or a compromise of our information security due to technical system flaws, clerical, data input or record-keeping errors, migration to new systems, or tampering or manipulation of our systems by employees or unauthorized third parties. Information security risks also exist with respect to the use of portable electronic devices, such as laptops and smartphones, which are particularly vulnerable to loss and theft. Any security breach or compromise of our information systems could significantly damage our reputation, cause the disclosure of confidential customer, employee, supplier or company information, including our intellectual property, and result in significant losses, litigation, fines and costs. The security measures we have implemented to protect against unauthorized access to our information systems and data may not be sufficient to prevent breaches. The regulatory environment related to information security, data collection and privacy is evolving, with new and constantly changing requirements applicable to our business, and compliance with those requirements could result in additional costs.

Additionally, our key partners, distributors or suppliers could experience a compromise of their information security due to technical system flaws, clerical, data input or record-keeping errors, or tampering or manipulation of their respective systems by employees or third parties, which may have an impact on our commercial sales, vendor, partner or other relationships.

The geographic concentration of our business could subject us to risks, including those associated with climate change, that may be greater than our competitors and could have an adverse effect on our financial condition, liquidity or results of operations.

We primarily operate in the United States, Canada and Latin America. Our concentrated operations in the Americas could subject us to a greater degree of risk relative to our global, diversified competitors. We are particularly vulnerable to adverse events (including acts of terrorism, natural disasters, weather conditions, labor market disruptions and government actions) and economic conditions in the United States, Canada and Latin America. Adverse events or conditions in these geographic areas could have a material adverse effect on our financial condition, liquidity or results of operations.

Climate change and related extreme weather events in these geographic areas could result in slow or limited construction activity in the markets in which we operate, decreased availability and increased costs of manufacturing inputs or sourced products and an adverse impact to our operations if one of our manufacturing facilities were impacted by such an event, any of which could have a material adverse effect on our business, financial condition or results of operations.

We cannot provide any guarantees of future cash dividend payments or future repurchases of our common stock pursuant to a share repurchase program.

Since December 2018, our Board of Directors has declared a quarterly dividend on our common stock. The payment of any future cash dividends to our shareholders is not guaranteed and will depend on decisions that will be made by our Board of Directors based upon our financial condition, results of operations, cash flows, business requirements and a determination that the declaration of cash dividends is in the best interest of our shareholders and is in compliance with all laws and agreements applicable to the payment of dividends.

Since July 2016, our Board of Directors has approved share repurchases up to a total of $1,200.0 million. Repurchases under the program may be made through open market, block and privately negotiated transactions, including Rule 10b5-1 plans, at times and in amounts as management deems appropriate, subject to market and business conditions, regulatory requirements and other factors. The program does not obligate the company to repurchase any particular amount of common stock and may be suspended or discontinued at any time without notice. Furthermore, there can be no assurance that we will be able to repurchase our common stock and we may discontinue plans to repurchase common stock at any time.

Public health epidemics or pandemics, such as the COVID-19 pandemic, could have an adverse effect on our financial condition, liquidity or results of operations.

The COVID-19 pandemic has created significant volatility, uncertainty and economic disruption and there is no guarantee that markets will fully recover from the impacts caused by the pandemic. The extent to which COVID-19, or other public health pandemics, impacts our employees, operations, customers, suppliers and financial results will depend on numerous evolving factors that we may not be able to accurately predict, including: the duration and scope of the pandemic (and whether there is a resurgence or multiple resurgences in the future, including the impact of new variants); government actions taken in response to the pandemic, including mandatory shutdowns, vaccine or testing mandates; the availability, acceptance, distribution and continued effectiveness of vaccines; the impact on construction activity; supply chain disruptions; rising inflation; labor shortages; the effect on our customers demand for our ceiling and wall systems; sustained remote or hybrid work models; our ability to manufacture and sell our products; and the ability of our customers to pay for our products. For example, while many of our products support life sustaining activities and essential construction, we, and certain of our customers or suppliers, may be impacted by state actions, orders and policies regarding the COVID-19 pandemic, including temporary closures of non-life sustaining businesses, shelter-in-place orders, and travel, social distancing and quarantine policies, the implementation and enforcement of which vary by individual U.S. states and by individual countries in the Americas. Any of these events could have material adverse effect on our financial condition, liquidity or results of operations.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

We own a 100-acre, multi-building campus in Lancaster, Pennsylvania comprising the site of our corporate headquarters and most of our non-manufacturing operations.

As of December 31, 2021, we operated 16 manufacturing plants in two countries, with 14 plants located within the U.S. and two plants in Canada. We closed our St. Helens, Oregon mineral fiber manufacturing plant in the second quarter of 2018, and the facility was classified as an asset held for sale as of December 31, 2021.

WAVE operates six additional plants in the U.S. to produce suspension system (grid) products, which we use and sell in our ceiling systems.

Eight of our plants are leased and the remaining eight are owned.

Operating Segment	Number of Plants	Location of Principal Facilities
Mineral Fiber	6	U.S. (Florida, Georgia, Ohio, Oregon, Pennsylvania and West Virginia)
Architectural Specialties	10	U.S. (California, Illinois, Missouri and Ohio), Canada (Quebec and Ontario)

Sales and administrative offices are leased and/or owned, and leased facilities are utilized to supplement our owned warehousing facilities.

Production capacity and the extent of utilization of our facilities are difficult to quantify with certainty. In any one facility, utilization of our capacity varies periodically depending upon demand for the product that is being manufactured. We believe our facilities are adequate and suitable to support the business. Additional incremental investments in plant facilities are made as appropriate to balance capacity with anticipated demand, improve quality and service, and reduce costs.

ITEM 3. LEGAL PROCEEDINGS

See the “Specific Material Events” section of the “Environmental Matters” section of Note 27 to the Consolidated Financial Statements, which is incorporated herein by reference, for a description of our significant legal proceedings.

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

AWI's common shares trade on the New York Stock Exchange under the ticker symbol "AWI." As of February 16, 2022, there were approximately 265 holders of record of AWI's common stock.

Dividends are payable when declared by our Board of Directors and in accordance with restrictions set forth in our debt agreements. In general, our debt agreements allow us to make "restricted payments," which include dividends and stock repurchases, subject to certain limitations and other restrictions and provided that we are in compliance with the financial and other covenants of our debt agreements and meet certain liquidity requirements after giving effect to the restricted payment. We declared dividends on a quarterly basis, totaling $0.861 per share in 2021. On February 16, 2022, our Board of Directors declared a dividend of $0.231 per common share outstanding. The dividend will be paid on March 17, 2022, to shareholders of record as of the close of business on March 3, 2022. For further discussion of the debt agreements, see the Financial Condition and Liquidity section of Management's Discussion and Analysis of Financial Condition and Results of Operations in Item 7 and Risk Factors in Item 1A in this Form 10-K.

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	Maximum Approximate Value of Shares that may yet be Purchased under the Plans or Programs
October 1 – 31, 2021	73,635	$ 97.10	72,191	$ 536,779,481
November 1 – 30, 2021	94,229	$ 111.99	94,144	$ 526,235,713
December 1 – 31, 2021	114,071	$ 111.63	111,544	$ 513,779,480
Total	281,935		277,879	

(1) Includes shares reacquired through the withholding of shares to pay employee tax obligations upon the exercise of options or vesting of restricted shares previously granted under our long-term incentive plans. For more information regarding securities authorized for issuance under our equity compensation plans, see Note 22 to the Consolidated Financial Statements included in this Form 10-K.

Since July 29, 2016, our Board of Directors has approved our share repurchase program pursuant to which we are authorized to repurchase up to $1,200.0 million of our outstanding shares of common stock through December 31, 2023 (the "Program").

Repurchases under the Program may be made through open market, block and privately negotiated transactions, including Rule 10b5-1 plans, at such times and in such amounts as management deems appropriate, subject to market and business conditions, regulatory requirements and other factors. The Program does not obligate AWI to repurchase any particular amount of common stock and may be suspended or discontinued at any time without notice.

During 2021, we repurchased 0.8 million shares under the Program for a total cost of $80.0 million, excluding commissions, or an average price of $101.92 per share. Since inception, through December 31, 2021, we have repurchased 10.5 million shares under the Program for a total cost of $686.2 million, excluding commissions, or an average price of $65.31 per share.

ITEM 6. [RESERVED]

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

Armstrong World Industries, Inc. ("AWI") is a Pennsylvania corporation incorporated in 1891.

This discussion should be read in conjunction with the financial statements, the accompanying notes, the cautionary note regarding forward-looking statements and risk factors included in this Form 10-K.

Overview

AWI is a leading manufacturer and designer of ceiling systems for use in the construction and renovation of commercial and residential buildings in the Americas. These products primarily include mineral fiber, fiberglass wool, metal, wood, wood fiber, glass-reinforced-gypsum and felt. We also manufacture ceiling suspension system (grid) products through a joint venture with Worthington Industries, Inc. ("Worthington") called Worthington Armstrong Venture ("WAVE").

COVID-19

The impact of the COVID-19 pandemic on our future consolidated results of operations remains uncertain. In 2020, we experienced a significant decrease in customer demand throughout our business during the second through fourth quarters due to COVID-19. Specifically, we noted delays in construction driven by temporary closures of non-essential businesses, with the most significant impacts in certain major metropolitan areas impacted by COVID-19. In response to COVID-19, we temporarily reduced capital expenditures and discretionary spending including compensation, travel and marketing expenses in 2020. Customer demand continued to improve in 2021 but remained lower than pre-pandemic levels. We continue to monitor and manage the impact of COVID-19 and its potential impacts to our business, most notably global supply chain and labor disruptions, which have contributed to raw material and transportation cost inflation, in addition to construction activity delays.

As of December 31, 2021, all of our manufacturing facilities were operational, excluding the St. Helens, Oregon facility which was idled in the second quarter of 2018. In an effort to operate safely and responsibly, we continue to follow guidelines from governmental health authorities across all our facilities and have implemented preventative measures that include remote and hybrid work models, providing personal protective equipment, limiting group meetings, enhancing cleaning and sanitizing procedures, and social distancing.

We did not record any asset impairments, inventory charges or material bad debt reserves related to COVID-19 during 2021 or 2020, although future events may require such charges. We will continue to evaluate the nature and extent of the COVID-19 pandemic's impact on our financial condition, results of operations and cash flows.

Acquisitions

In December 2020, we acquired all issued and outstanding equity of Arktura LLC ("Arktura") and certain subsidiaries with operations in the United States and Argentina. Arktura is a designer and fabricator of metal and felt ceilings, walls, partitions and facades with one manufacturing facility based in Los Angeles, California.

In August 2020, we acquired the business and assets of Moz Designs, Inc. ("Moz"), based in Oakland, California. Moz is a designer and fabricator of custom architectural metal ceilings, walls, dividers and column covers for interior and exterior applications with one manufacturing facility.

In July 2020, we acquired all issued and outstanding capital stock of TURF Design, Inc. ("Turf"), with one manufacturing facility in Elgin, Illinois and a design center in Chicago, Illinois. Turf is a designer and manufacturer of acoustic felt ceilings and wall products.

In November 2019, we acquired the business and assets of MRK Industries, Inc. ("MRK"), based in Libertyville, Illinois. MRK is a manufacturer of specialty metal ceiling, wall and exterior solutions with one manufacturing facility.

In March 2019, we acquired the business and assets of Architectural Components Group, Inc. ("ACGI"), based in Marshfield, Missouri. ACGI is a manufacturer of custom wood ceilings and walls with one manufacturing facility.

The operations, assets and liabilities of these acquisitions are included in our Architectural Specialties segment.

Discontinued Operations

In 2019, we completed the sale of certain subsidiaries comprising our businesses and operations in Europe, the Middle East and Africa (including Russia) ("EMEA") and the Pacific Rim, including the corresponding businesses and operations conducted by WAVE, our joint venture with Worthington in which AWI holds a 50% interest (collectively, the "Sale"), to Knauf International GmbH ("Knauf").

In January 2021, we finalized post-closing adjustments to the purchase price related to certain pension liabilities assumed by Knauf in the Sale. During the first quarter of 2021, we paid $11.8 million to Knauf related to this purchase price adjustment.

The EMEA and Pacific Rim segment historical financial results through September 30, 2019 have been reflected in AWI's Consolidated Statements of Operations and Comprehensive Income as discontinued operations for all periods presented.

See Notes 5 and 6 to the Consolidated Financial Statements for additional information related to our acquisitions and discontinued operations.

Manufacturing Plants

As of December 31, 2021, we operated 16 manufacturing plants in two countries, with 14 plants located within the U.S. and two plants in Canada. We closed our St. Helens, Oregon mineral fiber manufacturing plant in the second quarter of 2018, and the facility was classified as an asset held for sale as of December 31, 2021.

WAVE operates six additional plants in the U.S. to produce suspension system (grid) products, which we use and sell in our ceiling systems.

Reportable Segments

Our operating segments are as follows: Mineral Fiber, Architectural Specialties and Unallocated Corporate.

Mineral Fiber – produces suspended mineral fiber and soft fiber ceiling systems for use in commercial and residential settings. Our mineral fiber products offer various performance attributes such as acoustical control, rated fire protection, aesthetic appeal, and health and sustainability features. Commercial ceiling products are sold to resale distributors and to ceiling systems contractors. Residential ceiling products are sold primarily to wholesalers and retailers (including large home centers). The Mineral Fiber segment also includes the results of WAVE, which manufactures and sells suspension system (grid) products and ceiling component products that are invoiced by both AWI and WAVE. Segment results relating to WAVE consist primarily of equity earnings and reflect our 50% equity interest in the joint venture. Ceiling component products consist of ceiling perimeters and trim, in addition to grid products that support drywall ceiling systems. For some customers, WAVE sells its suspension systems products to AWI for resale to customers. Mineral Fiber segment results reflect those sales transactions. The Mineral Fiber segment also includes all assets and liabilities not specifically allocated to our Architectural Specialties or Unallocated Corporate segment, including all property and related depreciation associated with our Lancaster, PA headquarters. Operating results for the Mineral Fiber segment include a significant majority of allocated Corporate administrative expenses that represent a reasonable allocation of general services to support its operations.

Architectural Specialties – produces, designs and sources ceilings and walls for use in commercial settings. Products are available in numerous materials, such as metal, felt and wood, in addition to various colors, shapes and designs. Products offer various performance attributes such as acoustical control, rated fire protection and aesthetic appeal. We sell standard, premium and customized products, a portion of which are derived from sourced products. Architectural Specialties products are sold primarily to resale distributors and direct customers, primarily ceiling systems contractors. The majority of this segment's revenues are project driven, which can lead to more volatile sales patterns due to project scheduling uncertainty. Operating results for the Architectural Specialties segment include a portion of allocated Corporate administrative expenses that represent a reasonable allocation of general services to support its operations.

Unallocated Corporate – includes assets, liabilities, income and expenses that have not been allocated to our other business segments and consists of: cash and cash equivalents, the net funded status of our U.S. Retirement Income Plan ("RIP"), the estimated fair value of interest rate swap contracts, outstanding borrowings under our senior credit facility and income tax balances. Our Unallocated Corporate segment also includes all assets, liabilities, income and expenses formerly reported in our EMEA and Pacific Rim segments that were not included in the Sale.

Factors Affecting Revenues

For information on our segments' 2021 net sales by geography, see Note 3 to the Consolidated Financial Statements included in this Form 10-K. For information on our segments' 2021 net sales disaggregated by major customer groups, see Note 4 to the Consolidated Financial Statements included in this Form 10-K.

Markets. We compete in the commercial and residential construction markets of the Americas. We closely monitor publicly available macroeconomic trends that provide insight into commercial and residential market activity, including GDP, office vacancy rates, the Architecture Billings Index, new commercial construction starts, state and local government spending, corporate profits and retail sales.

We noted several factors and trends within our markets that directly affected our business performance during 2021 compared to 2020, most importantly an increase in demand as the negative financial impacts of the COVID-19 pandemic lessened. The increase in demand was tempered by an uneven market recovery, including shifts in revenue opportunities between new commercial construction and renovation, variability in demand increases across different geographies and project delays. We continue to monitor the pandemic's impact on the demand for ceiling and wall systems, overall construction activity and sustained remote or hybrid work models. During 2021, increased sales volumes contributed $35 million to revenue compared to 2020. In addition, our 2020 acquisitions of Turf, Moz and Arktura (collectively, the "2020 Acquisitions") contributed $82 million and $18 million of revenues in 2021 and 2020, respectively.

Average Unit Value. We periodically modify sales prices of our products due to changes in costs for raw materials and energy, market conditions and the competitive environment. Typically, realized price increases are less than the announced price increases because of project pricing, competitive reactions and changing market conditions. We also offer a wide assortment of products that are differentiated by style, design and performance attributes. Pricing and margins for products within the assortment vary. In addition, changes in the relative quantity of products purchased at different price points can impact year-to-year comparisons of net sales and operating income. Within our Mineral Fiber segment, we focus on improving sales dollars per unit sold, or average unit value ("AUV"), as a measure that accounts for the varying assortment of products and like-for-like pricing impacting our revenues. We estimate that favorable AUV increased our total consolidated net sales for 2021 by approximately $71 million compared to 2020. Our Architectural Specialties segment generates revenues that are primarily earned based on individual contracts that include a mix of products, both manufactured by us and sourced from third parties, that vary by project. As such, we do not track AUV performance for this segment, but rather attribute most changes in sales to volume.

During each quarter of 2021, we implemented price increases on Mineral Fiber ceiling, grid products and certain Architectural Specialties products. In the fourth quarter of 2021, we announced price increases on Mineral Fiber ceiling, grid products and certain Architectural Specialties products which became effective in the first quarter of 2022. We may implement future pricing actions based on numerous factors, including the rate and pace of inflation's impact on our business.

Seasonality. Historically, our sales tend to be stronger in the second and the third quarters of our fiscal year due to more favorable weather conditions, customer business cycles and the timing of renovation and new construction.

Factors Affecting Operating Costs

Operating Expenses. Our operating expenses are comprised of direct production costs (principally raw materials, labor and energy), manufacturing overhead costs, freight, costs to purchase sourced products and selling, general, and administrative ("SG&A") expenses.

Our largest raw material expenditures are primarily for fiberglass, perlite, recycled paper and starch. Other raw materials include aluminum, clays, felt, pigment, steel, wood and wood fiber. We manufacture most of our mineral wool needs at one of our manufacturing facilities. Natural gas and packaging materials are also significant input costs. Fluctuations in the prices of these inputs are generally beyond our control and have a direct impact on our financial results. In 2021, higher costs for raw materials and energy negatively impacted operating income by $14 million compared to 2020.

2020 Acquisition-Related Expenses and (Gains) Losses

In connection with the 2020 Acquisitions, we recorded certain acquisition-related expenses and (gains) losses to operating income in 2021 and 2020, summarized as follows (dollar amounts in millions):

	2021	2020	Affected Line Item in the Consolidated Statement of Operations and Comprehensive Income
Deferred revenue	$ 0.7	$ 0.7	Net sales
(Gain) loss related to change in fair value of contingent consideration	(4.1)	0.1	(Gain) loss related to change in fair value of contingent consideration
Deferred cash and restricted stock expenses	12.8	0.5	SG&A expenses
Inventory	0.3	0.1	Cost of goods sold
Net negative (positive) impact to operating income	$ 9.7	$ 1.4	

The deferred revenue and inventory amounts above reflect the post-acquisition expenses associated with recording these liabilities and assets at fair value as part of purchase accounting. The change in fair value of contingent consideration is related to our Moz and Turf acquisitions and is remeasured quarterly during each acquisition's respective earn-out period. See Note 19 to the Consolidated Financial Statements for further information. Expenses related to the deferred cash and restricted stock awards for Arktura's former owners and employees are recorded over their respective service periods, as such payments are subject to the awardees' continued employment with AWI. Depreciation of fixed assets acquired and amortization of intangible assets acquired have been excluded from the table above. See Note 5 to the Consolidated Financial Statements for further information.

RESULTS OF OPERATIONS

This section of this Form 10-K generally discusses 2021 and 2020 items and year-to-year comparisons between 2021 and 2020. Discussions of year-to-year comparisons between 2020 and 2019 that are not included in this Form 10-K can be found in Management's Discussion and Analysis of Financial Condition and Results of Operations in Item 7 of our Annual Report on Form 10-K for the year ended December 31, 2020.

Please refer to Notes 3 and 6 to the Consolidated Financial Statements for a reconciliation of segment operating income to consolidated earnings from continuing operations before income taxes and additional financial information related to discontinued operations.

2021 COMPARED TO 2020
CONSOLIDATED RESULTS FROM CONTINUING OPERATIONS

(dollar amounts in millions)

	2021	2020	Change is Favorable
Total consolidated net sales	$ 1,106.6	$ 936.9	18.1%
Operating income	$ 260.0	$ 254.8	2.0%

Consolidated net sales increased 18.1% as higher volumes, including the impact of the 2020 Acquisitions, contributed $99 million and favorable AUV contributed $71 million. Mineral Fiber net sales increased $93 million year-over-year and Architectural Specialties net sales increased $77 million. The increase in Mineral Fiber segment net sales was driven by improved AUV and both segments experienced improved sales volumes as market demand continued to recover from COVID-19 impacts. The Architectural Specialties segment net sales also benefited $64 million from the 2020 Acquisitions.

Cost of goods sold was 63.3% of net sales in 2021, compared to 64.4% in 2020. The decrease in cost of goods sold as a percent of net sales was due to favorable AUV performance and improved manufacturing productivity, which was partially offset by higher inflation and normalization of costs that we proactively reduced in 2020 in response to the COVID-19 pandemic.

SG&A expenses in 2021 were $237.4 million, or 21.5% of net sales, compared to $163.2 million, or 17.4% of net sales, in 2020. The increase in SG&A expenses was driven by a $40 million increase in SG&A expenses due to the 2020 Acquisitions, including intangible asset amortization of $13 million, a $15 million increase in incentive and deferred compensation expenses, a $6 million reduction related to higher environmental insurance settlements, net of charges, received in 2020, a $6 million decrease in cost reimbursements, net of related expenses, earned under our Transition Services Agreement with Knauf ("Knauf TSA") in 2020 and a $5 million increase in spending related to digital growth initiatives. Also contributing to the increase in SG&A expenses was the return of discretionary spending, including travel, compensation, and outside services that we proactively reduced in 2020 in response to the COVID-19 pandemic. Offsetting these increased costs was the absence of a $10 million charitable contribution to the Armstrong World Industries Foundation made in 2020.

In 2021 and 2020, we recorded $4.1 million of remeasurement gains and $0.1 million of remeasurement losses, respectively, for changes in the fair value of contingent consideration related to the acquisitions of Turf and Moz. See Note 19 to the Consolidated Financial Statements for further information.

In 2020, we recorded a $21.0 million gain related to the sale of fixed and intangible assets from the sale of our idled Mineral Fiber plant in China, which was reported within our Unallocated Corporate segment. There was no similar activity in 2021.

Equity earnings from our WAVE joint venture were $87.7 million in 2021, compared to $64.0 million in 2020. The increase in WAVE earnings was related to favorable AUV and higher volumes, which was partially offset by increased steel costs and SG&A expenses. See Note 11 to the Consolidated Financial Statements for further information.

Interest expense was $22.9 million in 2021, compared to $24.1 million in 2020, as the benefits from lower effective interest rates year-over-year outweighed slightly higher average debt balances.

Other non-operating income, net, was $5.6 million in 2021, compared to $357.4 million of expense, net, in 2020. The change in other non-operating income, net, for 2021 compared to 2020 was primarily related to a $374.4 million settlement loss and a $2.0 million special termination benefit charge, both related to our RIP, in 2020. This was partially offset by lower credits from non-service cost components of pension and postretirement net period benefit costs. See Note 18 to the Consolidated Financial Statements for further information.

Income tax expense was $57.4 million in 2021, compared to $42.6 million of income tax benefit in 2020, primarily driven by the effects of our first quarter 2020 pension settlement. The effective tax rate for 2021 was 23.7% compared to a rate of 33.6% for 2020. The effective tax rate for 2021 was lower than the statutory rate primarily due to the benefits recognized from current year statute closures. The effective tax rate for 2020 was higher than the statutory rate primarily due to the pre-tax benefits recognized on the sale of our idled Mineral Fiber plant in China.

Total Other Comprehensive Loss ("OCL") was $0.3 million in 2021, compared to Total Other Comprehensive Income ("OCI") of $266.8 million in 2020. The change in OCL was primarily driven by pension and postretirement adjustments, primarily related to the absence of the $278.6 settlement loss, net of taxes, related to our RIP. Pension and postretirement adjustments represent the amortization of actuarial gains and losses related to our defined benefit pension and postretirement plans. Also impacting the change in OCL were derivative gains/losses and foreign currency translation adjustments. Derivative gain/loss represents the adjustments to fair value of our derivative assets and liabilities and the recognition of gains and losses previously deferred in OCI. Foreign currency translation adjustments represent the change in the U.S. dollar value of assets and liabilities denominated in foreign currencies.

REPORTABLE SEGMENT RESULTS

Mineral Fiber

(dollar amounts in millions)

	2021	2020	Change is Favorable
Total segment net sales	$ 818.5	$ 726.0	12.7%
Operating income	$ 261.2	$ 218.7	19.4%

Net sales increased due to $71 million of favorable AUV and $22 million due to higher sales volumes. The improvement in AUV was driven by favorable price and customer channel mix. Increased volumes were driven by comparison against a prior-year period that was negatively impacted by the pandemic.

Operating income increased primarily due to a $53 million benefit from favorable AUV, a $24 million increase in WAVE equity earnings, a $14 million benefit from higher volumes, a $10 million benefit from the absence of the prior year charitable contribution to the Armstrong World Industries Foundation and a $5 million benefit related to a Coronavirus Aid, Relief, and Economic Recovery Act Employee Retention Credit. These benefits were partially offset by a $22 million increase in manufacturing costs, primarily related to raw material and energy inflation, a $15 million increase in incentive and deferred compensation expenses, a $6 million reduction related to higher environmental insurance settlements, net of charges, received in 2020, a $6 million decrease related to reimbursements received under our Knauf TSA in 2021 compared to 2020 and a $5 million increase in spending related to digital growth initiatives. Operating income was also impacted by more normalized discretionary spending that we proactively reduced in 2020 in response to the COVID-19 pandemic.

Architectural Specialties

(dollar amounts in millions)

	2021	2020	Change is Favorable/ (Unfavorable)
Total segment net sales	$ 288.1	$ 210.9	36.6%
Operating income	$ 4.2	$ 22.3	(81.2)%

Net sales increased $77 million, with the 2020 Acquisitions contributing $64 million. Additionally, an improvement in sales volumes, driven by a rebound in economic activity compared to the prior year, contributed to year-over-year net sales growth.

Operating income decreased primarily due to an increase in SG&A expenses related to the 2020 Acquisitions, including a $13 million increase in amortization expense and a $12 million increase in acquisition-related expenses, an increase in manufacturing costs, primarily related to the 2020 Acquisitions, and the negative margin impact of delays from custom project driven revenues which was driven by higher manufacturing input costs. Operating income was also impacted by more normalized discretionary spending that we proactively reduced in 2020 in response to the COVID-19 pandemic and additional investments in selling and design capabilities.

These costs were partially offset by the positive impact of higher sales volumes, including the 2020 Acquisitions, and $4 million of remeasurement gains for changes in the fair value of contingent consideration related to Moz and Turf.

Unallocated Corporate

Unallocated Corporate operating loss was $5 million in 2021 compared to $14 million of operating income in 2020. The change in Unallocated Corporate operating loss was primarily related to the absence of the gain on the sale of our idled Mineral Fiber plant in China. See Note 3 to the Consolidated Financial Statements for further information.

FINANCIAL CONDITION AND LIQUIDITY

Cash Flow

Operating activities for 2021 provided $187.2 million of cash, compared to $218.8 million in 2020. The decrease was primarily due to an increase in income tax payments and lower cash earnings, partially offset by positive working capital changes. Working capital changes compared to 2020 were primarily due to an increase in accounts payable and accrued expenses driven by the timing of payments, partially offset by an increase in accounts receivable.

Net cash used for investing activities was $13.9 million for 2021, compared to $141.1 million in 2020. The favorable change in cash used in 2021 compared to 2020 was primarily due to a decrease in cash paid for acquisitions and the absence of the remittance of Knauf proceeds to WAVE, partially offset by an increase in purchases of property, plant and equipment and a decrease in proceeds from the sale of fixed assets.

Net cash used for financing activities was $212.1 million in 2021, compared to $13.5 million of cash provided in 2020. The change in cash was primarily due to a decrease in proceeds from borrowings and higher repurchases of outstanding common stock.

Liquidity

Our liquidity needs for operations vary throughout the year. We retain lines of credit to facilitate our seasonal cash flow needs, since cash flow is historically lower during the first and fourth quarters of our fiscal year. We have a $1,000.0 million variable rate senior credit facility, which is comprised of a $500.0 million revolving credit facility (with a $150.0 million sublimit for letters of credit) and a $500.0 million Term Loan A. The revolving credit facility and Term Loan A are currently priced at 1.25% over LIBOR. The senior credit facility also has a $25.0 million letter of credit facility, also known as our bi-lateral facility. The revolving credit facility and Term Loan A mature in September 2024. The $1,000.0 million senior credit facility is secured by the capital stock of material U.S. subsidiaries and a pledge of 65% of the stock of our material first-tier foreign subsidiary in Canada. The unpaid balances of the revolving credit facility and Term Loan A may be prepaid without penalty at the maturity of their respective interest reset periods. Any principal amounts paid on the Term Loan A may not be re-borrowed.

As of December 31, 2021, total borrowings outstanding under our senior credit facility were $165.0 million under the revolving credit facility and $468.7 million under Term Loan A.

The senior credit facility includes two financial covenants that require the ratio of consolidated earnings before interest, taxes, depreciation and amortization ("EBITDA") to consolidated cash interest expense minus cash consolidated interest income to be greater than or equal to 3.0 to 1.0 and requires the ratio of consolidated funded indebtedness, minus AWI and domestic subsidiary unrestricted cash and cash equivalents up to $100 million, to EBITDA to be less than or equal to 3.75 to 1.0. As of December 31, 2021, we were in compliance with all covenants of the senior credit facility.

The Term Loan A is currently priced on a variable interest rate basis. The following table summarizes our interest rate swaps (dollar amounts in millions):

Trade Date	Notional Amount		Coverage Period	Risk Coverage
November 28, 2018	$	200.0	November 2018 to November 2023	USD-LIBOR
November 28, 2018	$	100.0	March 2021 to March 2025	USD-LIBOR
March 6, 2020	$	50.0	March 2020 to March 2022	USD-LIBOR
March 10, 2020	$	50.0	March 2021 to March 2024	USD-LIBOR
March 11, 2020	$	50.0	March 2021 to March 2024	USD-LIBOR

Under the terms of our interest rate swaps above, we pay a fixed rate monthly and receive 1-month LIBOR, inclusive of a 0% floor.

These swaps are designated as cash flow hedges against changes in LIBOR for a portion of our variable rate debt.

We utilize lines of credit and other commercial commitments to ensure that adequate funds are available to meet operating requirements. Letters of credit are currently arranged through our revolving credit facility and our bi-lateral facility. Letters of credit may be issued to third party suppliers, insurance and financial institutions and typically can only be drawn upon in the event of AWI's failure to pay its obligations to the beneficiary. The following table presents details related to our letters of credit facilities (dollar amounts in millions):

	December 31, 2021		
Financing Arrangements	**Limit**	**Used**	**Available**
Bi-lateral facility	$ 25.0	$ 8.4	$ 16.6
Revolving credit facility	150.0	-	150.0
Total	$ 175.0	$ 8.4	$ 166.6

The table below reflects future payments of long-term debt, excluding $2.3 million of unamortized debt financing costs, and the related interest payments, which are projected based on market-based interest rate swap curves (dollar amounts in millions):

	2022	2023	2024	2025	Total
Long-term debt	$ 25.0	$ 25.0	$ 583.7	$ -	$ 633.7
Scheduled interest payments	20.7	21.9	15.7	0.3	58.6

As of December 31, 2021, we had $98.1 million of cash and cash equivalents, $87.1 million in the U.S. and $11.0 million in various foreign jurisdictions, primarily Canada. As of December 31, 2021, we also had $335.0 million available under our revolving credit facility. We believe cash on hand and cash generated from operations, together with borrowing capacity under our credit facility, will be adequate to address our near-term liquidity needs based on current expectations of our business operations, capital expenditures and scheduled payment of debt obligations. In 2022, we expect to spend approximately $90 million to $100 million on capital expenditures and approximately $45 million on dividends.

Since July 29, 2016, our Board of Directors has approved our share repurchase program pursuant to which we are authorized to repurchase up to $1,200.0 million of our outstanding shares of common stock through December 31, 2023 (the "Program"). We had $513.8 million remaining under the Board's repurchase authorization as of December 31, 2021.

Repurchases under the Program may be made through open market, block and privately negotiated transactions, including Rule 10b5-1 plans, at such times and in such amounts as management deems appropriate, subject to market and business conditions, regulatory requirements and other factors. The Program does not obligate AWI to repurchase any particular amount of common stock and may be suspended or discontinued at any time without notice.

The impacts of COVID-19 could create volatility in financial markets which may impact the terms under which we access capital. We continue to evaluate our discretionary spending, capital expenditures and other costs in light of the uncertainty related to the COVID-19 pandemic.

CRITICAL ACCOUNTING ESTIMATES

In preparing our consolidated financial statements in accordance with U.S. generally accepted accounting principles ("GAAP"), we are required to make certain estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements, and the reported amounts of revenues and expenses during the reporting period. We evaluate our estimates and assumptions on an on-going basis, using relevant internal and external information. We believe that our estimates and assumptions are reasonable. However, actual results may differ from what was estimated and could have a significant impact on the financial statements.

We have identified the following as our critical accounting estimates. We have discussed these critical accounting estimates with our Audit Committee.

U.S. Pension Credit and Postretirement Benefit Costs – We maintain significant pension and postretirement plans in the U.S. Our defined benefit pension and postretirement benefit costs are developed from actuarial valuations. These valuations are calculated using a number of assumptions, which represent management's best estimate of the future. The assumptions that have the most significant impact on reported results are the discount rate, the estimated long-term return on plan assets and the estimated inflation in health care costs. These assumptions are generally updated annually.

Management utilizes the Aon Hewitt AA only above median yield curve, which is a hypothetical AA yield curve comprised of a series of annualized individual discount rates, as the primary basis for determining discount rates. As of December 31, 2021 and 2020, we assumed discount rates of 2.98% and 2.68%, respectively, for the U.S. defined benefit pension plans. As of December 31, 2021 and 2020, we assumed discount rates of 2.72% and 2.37%, respectively, for the U.S. postretirement plan. The effects of the change in discount rate will be amortized into earnings as described below. Absent any other changes, a one-quarter percentage point increase or decrease in the discount rates for the U.S. pension and postretirement plans would impact 2022 operating or non-operating income by $0.3 million.

We manage two U.S. defined benefit pension plans, our RIP, which is a qualified funded plan, and a nonqualified unfunded plan. For the RIP, the expected long-term return on plan assets represents a long-term view of the future estimated investment return on plan assets. This estimate is determined based on the target allocation of plan assets among asset classes and input from investment professionals on the expected performance of the asset classes over 10 to 30 years. Historical asset returns are monitored and considered when we develop our expected long-term return on plan assets. An incremental component is added for the expected return from active management based on historical information obtained from the plan's investment consultants. These forecasted gross returns are reduced by estimated management fees and expenses. Over the 10-year period ended December 31, 2021, the historical annualized return was approximately 6.84% compared to an average expected return of 6.08%. The actual loss on plan assets incurred for 2021 was 1.12%, net of fees. The difference between the actual and expected rate of return on plan assets will be amortized into earnings as described below.

The expected long-term return on plan assets used in determining our 2021 U.S. pension cost was 3.25%. We have assumed a return on plan assets for 2022 of 3.75%. The 2022 expected return on assets was calculated in a manner consistent with 2021. Absent any other changes, a one-quarter percentage point increase or decrease in this assumption would impact 2022 non-operating income by $1.2 million.

Contributions to the unfunded pension plan were $2.9 million in 2021 and were made on a monthly basis to fund benefit payments. We estimate the 2022 contributions will be approximately $2.9 million. See Note 18 to the Consolidated Financial Statements for more information.

The estimated inflation in health care costs represents a 5-10 year view of the expected inflation in our postretirement health care costs. We separately estimate expected health care cost increases for pre-65 retirees and post-65 retirees due to the influence of Medicare coverage at age 65, as illustrated below:

	Assumptions		Actual	
	Post-65	Pre-65	Post-65	Pre-65
2020	8.2%	7.2%	3.3%	0.7%
2021	7.6%	6.7%	12.8%	(48.1)%
2022	7.1%	6.6%		

The decrease in health care costs for pre-65 related to higher claims in 2020, in addition to population changes in 2021. The difference between the actual and expected health care costs is amortized into earnings as described below. As of December 31, 2021, health care cost increases are estimated to decrease ratably until 2029 for pre-65 retirees and 2027 for post-65 retirees, after which they are estimated to be constant at 4.50%. See Note 18 to the Consolidated Financial Statements for more information.

Actual results that differ from our various pension and postretirement plan estimates are captured as actuarial gains/losses. When certain thresholds are met, the gains and losses are amortized into future earnings over the remaining life expectancy of participants. Changes in assumptions could have significant effects on earnings in future years.

Total net actuarial losses related to our U.S. pension benefit plans as of December 31, 2021 increased by $9.5 million in 2021 primarily due to a less favorable than expected return on assets, partially offset by changes in actuarial assumptions (most significantly a 30-basis point increase in the discount rate). The $9.5 million actuarial loss impacting our U.S. pension plans is reflected as a component of other comprehensive income in our Consolidated Statements of Operations and Comprehensive Income along with actuarial gains and losses from our foreign pension plan and our U.S. postretirement benefit plan.

Income Taxes – Our effective tax rate is primarily determined based on our pre-tax income, statutory income tax rates in the jurisdictions in which we operate, and the tax impacts of items treated differently for tax purposes than for financial reporting purposes. Some of these differences are permanent, such as expenses that are not deductible in our tax returns, and some differences are temporary, reversing over time, such as depreciation expense. These temporary differences create deferred income tax assets and liabilities. Deferred income tax assets are also recorded for state net operating losses ("NOL"), capital loss carryforwards, and foreign tax credit ("FTC") carryforwards.

As of December 31, 2021, we have recorded valuation allowances totaling $60.6 million for various federal and state deferred tax assets. While we have considered future taxable income in assessing the need for the valuation allowances based on our best available projections, if these estimates and assumptions change in the future or if actual results differ from our projections, we may be required to adjust our valuation allowances accordingly. Such adjustments could be material to our Consolidated Financial Statements.

As further described in Note 16 to the Consolidated Financial Statements, our Consolidated Balance Sheet as of December 31, 2021 includes deferred income tax liabilities of $166.9 million, net of $132.3 million of deferred tax assets. We have established valuation allowances in the amount of $60.6 million consisting of $41.2 million for state deferred tax assets, primarily operating loss carryforwards, $18.8 million for federal and state deferred tax assets related to capital loss carryforwards and $0.6 million for federal deferred tax assets related to FTC carryforwards. Inherent in determining our effective tax rate are judgments regarding business plans and expectations about future operations. These judgments include the amount and geographic mix of future taxable income, limitations on usage of NOL carryforwards, the impact of ongoing or potential tax audits, the amount of foreign source income and other future tax consequences.

As of December 31, 2021 and 2020, we had $700.9 million and $806.9 million, respectively, of gross state NOL carryforwards expiring between 2022 and 2041. We estimate we will need to generate future U.S. taxable income of approximately $476.0 million for state income tax purposes during the respective realization periods (ranging from 2022 to 2041) to be able to fully realize the net state NOL deferred income tax assets.

Our ability to utilize deferred tax assets may be impacted by certain future events, such as changes in tax legislation and insufficient future taxable income prior to expiration of certain deferred tax assets.

Impairments of Tangible Assets, Intangible Assets and Goodwill – Our indefinite-lived assets include goodwill and other intangibles, primarily trademarks and brand names. Those trademarks and brand names are integral to our corporate identity and expected to contribute indefinitely to our corporate cash flows. Accordingly, they have been assigned an indefinite life. We conduct our annual impairment tests for these indefinite-lived intangible assets and goodwill during the fourth quarter. These assets undergo more frequent tests if an indication of possible impairment exists. We conduct impairment tests for tangible assets and definite-lived intangible assets when indicators of impairment exist for the asset group, such as operating losses and/or negative cash flows.

The principal assumptions used in our impairment tests for definite-lived intangible assets is operating profit adjusted for depreciation and amortization and, if required to estimate the fair value, the discount rate. The principal assumptions used in our impairment tests for indefinite-lived intangible assets include revenue growth rates, discount rate and royalty rate. The principal assumptions utilized in our impairment tests for goodwill include after-tax cash flows growth rates and discount rate. Revenue growth rates, after-tax cash flows growth rates and operating profit assumptions are derived from those used in our operating plan and strategic planning processes. The discount rate assumption is calculated based upon an estimated weighted average cost of capital which reflects the overall level of inherent risk and the rate of return a market participant would expect to achieve. The royalty rate assumption represents the estimated contribution of the intangible assets to the overall profits of the related businesses. Methodologies used for valuing our intangible assets did not change from prior periods.

In 2021, indefinite-lived intangibles and goodwill were tested for impairment based on the identified asset (for indefinite-lived intangibles) or on our identified reporting units (for goodwill). There were no impairment charges recorded in 2021, 2020 or 2019 related to intangible assets. We did not test tangible assets within our continuing operations for impairment in 2021, 2020 or 2019 as no indicators of impairment existed.

The revenue and cash flow estimates used in applying our impairment tests are based on management’s analysis of information available at the time of the impairment test and represent a market participant view. Actual cash flows lower than the estimate could lead to significant future impairments. If subsequent testing indicates that fair values have declined, the carrying values would be reduced and our future statements of operations would be affected.

We cannot predict the occurrence of certain events that might lead to material impairment charges in the future. Such events may include, but are not limited to, the impact of economic environments, particularly related to the commercial and residential construction industries, material adverse changes in relationships with significant customers, or strategic decisions made in response to economic and competitive conditions. See Notes 3 and 13 to the Consolidated Financial Statements for further information.

Environmental Liabilities – We are actively involved in the investigation, closure and/or remediation of existing or potential environmental contamination under the Comprehensive Environmental Response, Compensation and Liability Act (“CERCLA”), and state Superfund and similar environmental laws at two domestically owned locations allegedly resulting from past industrial activity. In a few cases, we are one of several potentially responsible parties and have agreed to jointly fund the required investigation, while preserving our defenses to the liability. We may also have rights of contribution or reimbursement from other parties or coverage under applicable insurance policies.

We provide for environmental remediation costs and penalties when the responsibility to remediate is probable and the amount of associated costs is reasonably determinable. Accruals are estimates based on the judgment of management related to ongoing proceedings. Estimates of our future liability at the environmental sites are based on evaluations of currently available facts regarding each individual site. In determining the probability of contribution, we consider the solvency of other parties, the site activities of other parties, whether liability is being disputed, the terms of any existing agreements and experience with similar matters, and the effect of our October 2006 Chapter 11 reorganization upon the validity of the claim.

We evaluate the measurement of recorded liabilities each reporting period based on current facts and circumstances specific to each matter. The ultimate losses incurred upon final resolution may materially differ from the estimated liability recorded. Changes in estimates are recorded in earnings in the period in which such changes occur.

We are unable to predict the extent to which any recoveries from other parties or coverage under insurance policies might cover our final share of costs for these sites. Our final share of investigation and remediation costs may exceed any such recoveries, and such amounts net of insurance recoveries may be material. However, we do not expect the total future costs to have a material adverse effect on our liquidity or financial condition as the cash payments may be made over many years.

<u>Business Combinations and Contingent Consideration</u> – Acquired businesses are accounted for using the acquisition method of accounting, which requires that the purchase price be allocated to the assets acquired and liabilities assumed at their respective fair values. Any excess of the purchase price over the estimated fair values of the assets acquired and liabilities assumed is recorded as goodwill. The estimated fair value of contingent consideration is recorded as a liability on the balance sheet at the date of acquisition. The purchase price allocation requires us to make significant estimates and assumptions, especially at the acquisition date, with respect to intangible assets and contingent consideration. Although we believe the assumptions and estimates we have made are reasonable, they are based in part on historical experience and information obtained from the management of the acquired companies. We engage independent, third-party valuation specialists to assist in determining the fair values of acquired intangible assets and contingent consideration.

Both the Moz and Turf acquisitions in 2020 included the potential for contingent earn-out payments based on the financial performance of the acquired companies. We estimated the fair value of these contingent consideration liabilities upon acquisition and are required to measure the liability at fair value each reporting period until the contingency is resolved, with changes in the fair value after the acquisition date affecting earnings in the period of the estimated fair value change. See Notes 5 and 19 to the Consolidated Financial Statements for further information.

The principal assumptions used in valuing certain intangible assets and contingent consideration include future expected cash flows from sales and acquired developed technologies, the acquired company's trade names and customer relationships as well as assumptions about the period of time the acquired trade names and customer relationships will continue to be used in the combined company's portfolio, the probability of meeting the future revenue and EBITDA growth targets and discount rates used to determine the present value of estimated future cash flows.

These estimates are inherently uncertain and unpredictable, and if different estimates were used the total consideration, including the estimated fair value of the contingent consideration, could be allocated to the acquired assets and liabilities differently from the allocation that we have made. In addition, unanticipated events and circumstances may occur, which may affect the accuracy or validity of such estimates, and if such events occur we may be required to record a charge against the value assigned to an acquired asset or an increase in the amounts recorded for assumed liabilities.

ACCOUNTING PRONOUNCEMENTS EFFECTIVE IN FUTURE PERIODS

See Note 2 to the Consolidated Financial Statements for further information.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Market Risk

Our primary exposure to market risk is from changes in interest rates that could impact our results of operations, cash flows and financial condition. We use interest rate derivatives to manage our exposures to interest rates. We utilize derivative financial instruments as risk management tools and not for speculative trading purposes. In addition, derivative financial instruments are entered into with a diversified group of major financial institutions in order to manage our exposure to potential nonperformance on such instruments.

In July 2017, the Financial Conduct Authority (the authority that regulates LIBOR) announced it intends to replace LIBOR rates with the Secured Overnight Financing Rate ("SOFR") effective in late 2023. The Alternative Reference Rates Committee ("ARRC") has proposed that the SOFR rate that represents best practice as the alternative to USD-LIBOR for use in derivatives and other financial contracts that are currently indexed to USD-LIBOR. ARRC has proposed a paced market transition plan to SOFR from USD-LIBOR and organizations are currently working on industry wide and company specific transition plans as it relates to derivatives and cash markets exposed to USD-LIBOR. We continue to monitor the new SOFR rates and regulation related to our debt, interest rate hedging instruments and other contracts that are indexed to USD-LIBOR. In the second quarter of 2020, we adopted Accounting Standards Update 2020-04, *"Facilitation of the Effects of Reference Rate Reform on Financial Reporting,"* issued in March 2020, which provided optional expedients and exceptions for applying U.S. generally accepted accounting principles to contracts, hedging relationships and other transactions affected by the discontinuation of LIBOR. Our adoption of this standard had no impact on our financial condition, results of operations or cash flows.

Counterparty Risk

We only enter into derivative transactions with established financial institution counterparties having an investment-grade credit rating. We monitor counterparty credit ratings on a regular basis. All of our derivative transactions with counterparties are governed by master International Swap and Derivatives Association agreements (“ISDAs”) with netting arrangements. These agreements can limit our exposure in situations where we have gain and loss positions outstanding with a single counterparty. We do not post nor do we receive cash collateral with any counterparty for our derivative transactions. These ISDAs do not have any credit contingent features; however, a default under our bank credit facility would trigger a default under these agreements. Exposure to individual counterparties is controlled and we consider the risk of counterparty default to be negligible.

Interest Rate Sensitivity

We are subject to interest rate variability on our Term Loan A and revolving credit facility. A hypothetical increase of one-quarter percentage point in LIBOR interest rates from December 31, 2021 levels would increase 2022 interest expense by approximately $0.6 million. We have active interest rate swaps outstanding, which fix the interest rates for a portion of our debt. These interest rate swaps are included in this calculation.

As of December 31, 2021, we had interest rate swaps outstanding with notional amounts of $450.0 million. We utilize interest rate swaps to minimize the fluctuations in earnings caused by interest rate volatility. Under the terms of these swaps, we receive 1-month LIBOR and pay a fixed rate over the hedged period. The following table summarizes our interest rate swaps as of December 31, 2021 (dollar amounts in millions):

Trade Date	Notional Amount		Coverage Period	Risk Coverage
November 28, 2018	$	200.0	November 2018 to November 2023	USD-LIBOR
November 28, 2018	$	100.0	March 2021 to March 2025	USD-LIBOR
March 6, 2020	$	50.0	March 2020 to March 2022	USD-LIBOR
March 10, 2020	$	50.0	March 2021 to March 2024	USD-LIBOR
March 11, 2020	$	50.0	March 2021 to March 2024	USD-LIBOR

These swaps are designated as cash flow hedges against changes in LIBOR for a portion of our variable rate debt. The net liability measured at fair value was $14.2 million as of December 31, 2021.

The table below provides information about our long-term debt obligations as of December 31, 2021, including payment requirements and related weighted-average interest rates by scheduled maturity dates. Weighted average variable rates are based on implied forward rates in the yield curve and are exclusive of our interest rate swaps.

Scheduled maturity date (dollar amounts in millions)	2022	2023	2024	2025	2026	After 2026	Total
Variable rate principal payments	$ 25.0	$ 25.0	$ 583.7	$ -	$ -	$ -	$ 633.7
Average interest rate	2.03%	2.94%	3.29%	-	-	-	3.23%

Variable rate principal payments reflected in the preceding table exclude $2.3 million of unamortized debt financing costs as of December 31, 2021.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

SUPPLEMENTARY DATA

Quarterly Financial Information for the Quarter Ended December 31, 2021 (Unaudited)

The following consolidated financial statements are filed as part of this Annual Report on Form 10-K:

Reports of Independent Registered Public Accounting Firm.

Consolidated Statements of Operations and Comprehensive Income for the Years Ended December 31, 2021, 2020 and 2019.

Consolidated Balance Sheets as of December 31, 2021 and 2020.

Consolidated Statements of Shareholders' Equity for the Years Ended December 31, 2021, 2020 and 2019.

Consolidated Statements of Cash Flows for the Years Ended December 31, 2021, 2020 and 2019.

Notes to Consolidated Financial Statements.

Schedule II for the Years Ended December 31, 2021, 2020 and 2019.

Fourth Quarter 2021 Compared With Fourth Quarter 2020 – Continuing Operations

Consolidated net sales of $282.5 million in the fourth quarter of 2021 increased 18.3% with year-over-year favorable AUV contributing $23 million and higher volumes contributing $21 million. The 2020 acquisitions of Turf, Moz and Arktura (collectively, the "2020 Acquisitions") accounted for $14 million of the volume benefit.

Mineral Fiber net sales increased 13.2% due to favorable AUV of $23 million and higher volumes of $1 million. Architectural Specialties net sales increased 35.4% due to the impact of the 2020 Acquisitions and both segments experienced improved sales volumes as market demand continued to recover from COVID-19 impacts.

For the fourth quarter of 2021, cost of goods sold was 63.7% of net sales, compared to 65.3% in the fourth quarter of 2020. The year-over-year decrease in cost of goods sold as a percent of net sales was due to favorable AUV performance and improved manufacturing productivity, which was partially offset by higher inflation and the impact of increased costs that we reduced in 2020 at the height of the COVID-19 pandemic.

SG&A expenses in the fourth quarter of 2021 were $60.9 million, or 21.6% of net sales compared to $54.5 million, or 22.8% of net sales, in the fourth quarter of 2020. The increase in SG&A expenses was driven primarily by a $7 million reduction related to higher environmental insurance settlements, net of charges, received in 2020, a $7 million increase in SG&A expenses due to the impact of the 2020 Acquisitions and the return of discretionary spending that we proactively reduced in 2020 in response to the COVID-19 pandemic. These increases in expenses were offset by the absence of a $10 million charitable contribution expense to the Armstrong World Industries Foundation made in 2020.

In the fourth quarter of 2021 and 2020, we recorded $5.6 million and $0.1 million of remeasurement losses, respectively, for changes in the fair value of contingent consideration related to the acquisitions of Turf and Moz. See Note 19 to the Consolidated Financial Statements for further information.

Equity earnings in the fourth quarter of 2021 were $19.6 million compared to $15.8 million in the fourth quarter of 2020. The increase in WAVE earnings for the fourth quarter of 2021 compared to the same period in 2020 was primarily related to favorable AUV which was partially offset by increased steel costs. See Note 11 to the Consolidated Financial Statements for further information.

Operating income was $55.5 million in the fourth quarter of 2021 compared to $44.1 million in the fourth quarter of 2020.

Interest expense in the fourth quarter of 2021 was $5.5 million compared to $5.4 million in the fourth quarter of 2020. The marginal increase in interest expense was due to higher effective interest rates.

Fourth quarter income tax expense was $9.4 million on pre-tax earnings of $51.3 million in 2021 compared to $8.3 million on pre-tax earnings of $43.1 million in 2020. The effective tax rate for the fourth quarter of 2021 was lower than the same period in 2020 primarily due to an increased benefit from current year statute closures.

Basic and diluted earnings per share were $0.88 in the fourth quarter of 2021, compared to basic and diluted earnings per share of $0.72 in the fourth quarter of 2020.

Management’s Report on Internal Control over Financial Reporting

Our management 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) under the Securities Exchange Act of 1934, as amended. Our internal control over financial reporting was designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of our financial statements for external purposes in accordance with generally accepted accounting principles.

Because of 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.

Our management, with the participation of our Chief Executive Officer and Chief Financial Officer, conducted an evaluation of the effectiveness of our 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 (COSO). Based on this evaluation and the criteria in the COSO framework, our management concluded that our internal control over financial reporting was effective as of December 31, 2021.

KPMG LLP, an independent registered public accounting firm, audited our internal control over financial reporting as of December 31, 2021, as stated in their report included herein.

/s/ Victor D. Grizzle

Victor D. Grizzle
Director, President and Chief Executive Officer

/s/ Brian L. MacNeal

Brian L. MacNeal
Senior Vice President and Chief Financial Officer

/s/ James T. Burge

James T. Burge
Vice President and Corporate Controller

February 22, 2022

Report of Independent Registered Public Accounting Firm

To the Shareholders and Board of Directors
Armstrong World Industries, Inc.:

Opinion on Internal Control Over Financial Reporting

We have audited Armstrong World Industries, Inc. and subsidiaries' (the Company) internal control over financial reporting as of December 31, 2021, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission. In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2021, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of the Company as of December 31, 2021 and 2020, the related consolidated statements of operations and comprehensive income, shareholders' equity, and cash flows for each of the years in the three-year period ended December 31, 2021, and the related notes and financial statement schedule II (collectively, the consolidated financial statements), and our report dated February 22, 2022 expressed an unqualified opinion on those consolidated financial statements.

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 of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audit also included 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/ KPMG LLP

Philadelphia, Pennsylvania
February 22, 2022

Report of Independent Registered Public Accounting Firm

To the Shareholders and Board of Directors
Armstrong World Industries, Inc.:

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated balance sheets of Armstrong World Industries, Inc. and subsidiaries (the Company) as of December 31, 2021 and 2020, the related consolidated statements of operations and comprehensive income, shareholders' equity, and cash flows for each of the years in the three-year period ended December 31, 2021, and the related notes and financial statement schedule II (collectively, the consolidated financial statements). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2021 and 2020, and the results of its operations and its cash flows for each of the years in the three-year period ended December 31, 2021, 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, 2021, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission, and our report dated February 22, 2022 expressed an unqualified opinion on the effectiveness of the Company's internal control over financial reporting.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these consolidated financial statements based on our audits. 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 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 consolidated financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the consolidated 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 consolidated 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 consolidated financial statements. We believe that our audits provide 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 consolidated 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 consolidated financial statements and (2) involved our especially challenging, subjective, or complex judgments. The communication of a 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.

Pension and post retirement benefit obligations

As discussed in Notes 2 and 18 to the consolidated financial statements, the Company's pension projected benefit obligations and the fair value of plan assets for the U.S. plans were $435.1 million and $506.7 million, respectively, as of December 31, 2021, resulting in a funded status of $71.6 million. Additionally, the Company's accumulated postretirement benefit obligation was $77.2 million, which is an unfunded liability.

We identified the evaluation of the Company's measurement of the benefit obligations to be a critical audit matter. Subjective auditor judgment was required to evaluate the discount rates, as minor changes in the rates could have a significant impact on the benefit obligations. Additionally, the assessment of the discount rates required specialized actuarial skills and knowledge.

The following are the primary procedures we performed to address this critical audit matter. We evaluated the design and tested the operating effectiveness of certain internal controls over the Company's benefit obligations process, including controls related to the actuarial determination of the discount rates used in the valuation of the benefit obligations. Additionally, we involved an actuarial professional with specialized skill and knowledge, who assisted in the evaluation of the Company's discount rates by:

- assessing changes in the discount rates from the prior year against changes in published indices;
- assessing the discount rates based on the plan type, plan provisions and pattern of cash flows; and
- evaluating the selected yield curve, the consistency of the yield curve with the prior year, and the spot rates.

/s/ KPMG LLP

We have served as the Company's auditor since 1929.

Philadelphia, Pennsylvania
February 22, 2022

Armstrong World Industries, Inc., and Subsidiaries
Consolidated Statements of Operations and Comprehensive Income
(amounts in millions, except per share data)

	Years Ended December 31,		
	2021	2020	2019
Net sales	$ 1,106.6	$ 936.9	$ 1,038.1
Cost of goods sold	701.0	603.8	643.0
Gross profit	405.6	333.1	395.1
Selling, general and administrative expenses	237.4	163.2	174.3
(Gain) loss related to change in fair value of contingent consideration	(4.1)	0.1	-
(Gain) related to sale of fixed and intangible assets	-	(21.0)	-
Equity (earnings) from joint venture	(87.7)	(64.0)	(96.6)
Operating income	260.0	254.8	317.4
Interest expense	22.9	24.1	38.4
Other non-operating (income) expense, net	(5.6)	357.4	(20.4)
Earnings (loss) from continuing operations before income taxes	242.7	(126.7)	299.4
Income tax expense (benefit)	57.4	(42.6)	57.1
Earnings (loss) from continuing operations	185.3	(84.1)	242.3
Net (loss) from discontinued operations, net of tax expense of $-, $- and $12.0	-	-	(1.8)
(Loss) from disposal of discontinued businesses, net of tax expense (benefit) of $1.7, ($1.4) and ($5.2)	(2.1)	(15.0)	(26.0)
Net (loss) from discontinued operations	(2.1)	(15.0)	(27.8)
Net earnings (loss)	$ 183.2	$ (99.1)	$ 214.5
Other comprehensive (loss) income, net of tax:			
Foreign currency translation adjustments	-	(7.1)	84.1
Derivative gain (loss), net	9.9	(10.5)	(13.9)
Pension and postretirement adjustments	(10.2)	284.4	13.2
Total other comprehensive (loss) income	(0.3)	266.8	83.4
Total comprehensive income	$ 182.9	$ 167.7	$ 297.9
Earnings (loss) per share of common stock, continuing operations:			
Basic	$ 3.88	$ (1.76)	$ 4.97
Diluted	$ 3.86	$ (1.76)	$ 4.88
(Loss) per share of common stock, discontinued operations:			
Basic	$ (0.04)	$ (0.31)	$ (0.57)
Diluted	$ (0.04)	$ (0.31)	$ (0.56)
Net earnings (loss) per share of common stock:			
Basic	$ 3.84	$ (2.07)	$ 4.40
Diluted	$ 3.82	$ (2.07)	$ 4.32
Average number of common shares outstanding:			
Basic	47.6	47.9	48.7
Diluted	47.9	47.9	49.5

See accompanying notes to consolidated financial statements beginning on page 42.

Armstrong World Industries, Inc., and Subsidiaries
Consolidated Balance Sheets
(amounts in millions, except share data)

	December 31, 2021	December 31, 2020
Assets		
Current assets:		
Cash and cash equivalents	$ 98.1	$ 136.9
Accounts and notes receivable, net	109.1	78.3
Inventories, net	90.2	81.5
Income taxes receivable	1.4	2.3
Other current assets	23.1	12.8
Total current assets	321.9	311.8
Property, plant, and equipment, net	542.8	529.9
Operating lease assets	21.0	19.2
Finance lease assets	18.4	20.4
Prepaid pension costs	109.0	119.5
Investment in joint venture	50.0	41.2
Goodwill	167.0	160.7
Intangible assets, net	421.4	457.5
Income taxes receivable	0.6	0.6
Other non-current assets	57.9	57.7
Total assets	$ 1,710.0	$ 1,718.5
Liabilities and Shareholders' Equity		
Current liabilities:		
Current installments of long-term debt	$ 25.0	$ 25.0
Accounts payable and accrued expenses	174.9	136.5
Operating lease liabilities	5.6	4.8
Finance lease liabilities	2.2	2.0
Income taxes payable	1.9	4.0
Total current liabilities	209.6	172.3
Long-term debt, less current installments	606.4	690.5
Operating lease liabilities	15.6	14.6
Finance lease liabilities	16.8	18.8
Postretirement benefit liabilities	71.1	74.9
Pension benefit liabilities	36.9	40.4
Other long-term liabilities	46.7	76.5
Income taxes payable	20.3	21.2
Deferred income taxes	166.9	158.4
Total non-current liabilities	980.7	1,095.3
Shareholders' equity:		
Common stock, $0.01 par value per share, 200 million shares authorized, 62,775,155 shares issued and 47,302,299 shares outstanding as of December 31, 2021 and 62,599,331 shares issued and 47,913,821 shares outstanding as of December 31, 2020	0.6	0.6
Capital in excess of par value	561.3	553.7
Retained earnings	1,011.4	869.8
Treasury stock, at cost, 15,472,856 shares as of December 31, 2021 and 14,685,510 shares as of December 31, 2020	(944.0)	(863.9)
Accumulated other comprehensive (loss)	(109.6)	(109.3)
Total shareholders' equity	519.7	450.9
Total liabilities and shareholders' equity	$ 1,710.0	$ 1,718.5

See accompanying notes to consolidated financial statements beginning on page 42.

Armstrong World Industries, Inc., and Subsidiaries
Consolidated Statements of Shareholders' Equity
(amounts in millions, except share data)

	Common Stock		Additional Paid-In	Retained	Treasury Stock		Accumulated Other Comprehensive	
	Shares	Amount	Capital	Earnings	Shares	Amount	(Loss)	Total
December 31, 2018	48,808,239	$ 0.6	$ 547.4	$ 829.8	12,745,485	$ (692.2)	$ (459.6)	$ 226.0
Cumulative effect impact of ASU 2017-12 adoption	-	-	-	(0.1)	-	-	0.1	-
Stock issuance, net	709,671	-	-	-	-	-	-	-
Cash dividends - $0.725 per common share	-	-	-	(36.0)	-	-	-	(36.0)
Share-based employee compensation	-	-	8.3	-	-	-	-	8.3
Net earnings	-	-	-	214.5	-	-	-	214.5
Other comprehensive income	-	-	-	-	-	-	83.4	83.4
Acquisition of treasury stock	(1,525,562)	-	-	-	1,525,562	(131.3)	-	(131.3)
December 31, 2019	47,992,348	$ 0.6	$ 555.7	$ 1,008.2	14,271,047	$ (823.5)	$ (376.1)	$ 364.9
Stock issuance, net	335,936	-	-	-	-	-	-	-
Cash dividends - $0.810 per common share	-	-	-	(39.3)	-	-	-	(39.3)
Share-based employee compensation	-	-	2.0	-	-	-	-	2.0
Net (loss)	-	-	-	(99.1)	-	-	-	(99.1)
Other comprehensive income	-	-	-	-	-	-	266.8	266.8
Restricted stock issued to employees in connection with acquisition	94,230		(4.0)		(94,230)	4.0		-
Acquisition of treasury stock	(508,693)	-	-	-	508,693	(44.4)	-	(44.4)
December 31, 2020	47,913,821	$ 0.6	$ 553.7	$ 869.8	14,685,510	$ (863.9)	$ (109.3)	$ 450.9
Stock issuance, net	173,379	-	0.1	-	2,445	(0.1)	-	-
Cash dividends - $0.861 per common share	-	-	-	(41.6)	-	-	-	(41.6)
Share-based employee compensation	-	-	7.5	-	-	-	-	7.5
Net earnings	-	-	-	183.2	-	-	-	183.2
Other comprehensive (loss)	-	-	-	-	-	-	(0.3)	(0.3)
Acquisition of treasury stock	(784,901)	-	-	-	784,901	(80.0)	-	(80.0)
December 31, 2021	47,302,299	$ 0.6	$ 561.3	$ 1,011.4	15,472,856	$ (944.0)	$ (109.6)	$ 519.7

See accompanying notes to consolidated financial statements beginning on page 42.

Armstrong World Industries, Inc., and Subsidiaries
Consolidated Statements of Cash Flows
(amounts in millions)

	Years Ended December 31, 2021	2020	2019
Cash flows from operating activities:			
Net earnings (loss)	$ 183.2	$ (99.1)	$ 214.5
Adjustments to reconcile net earnings (loss) to net cash provided by operating activities:			
Depreciation and amortization	96.5	84.0	72.1
Loss on disposal of discontinued operations	0.4	16.4	31.2
Write-off of debt refinancing fees	-	-	2.7
Gain related to sale of fixed and intangible assets	-	(21.0)	-
Deferred income taxes	8.7	(89.3)	14.0
Share-based compensation	11.3	6.8	9.5
Equity earnings from joint venture	(87.7)	(64.0)	(96.6)
U.S. pension cost (credit)	0.1	367.7	(7.5)
Change in fair value of contingent consideration	(4.1)	0.1	-
Other non-cash adjustments, net	0.9	0.9	2.5
Changes in operating assets and liabilities:			
Receivables	(30.9)	12.7	(1.1)
Inventories	(10.6)	(7.7)	(7.2)
Accounts payable and accrued expenses	38.6	(11.9)	(19.9)
Income taxes receivable and payable, net	(2.0)	35.2	(8.4)
Other assets and liabilities	(17.2)	(12.0)	(23.1)
Net cash provided by operating activities	187.2	218.8	182.7
Cash flows from investing activities:			
Purchases of property, plant and equipment	(79.8)	(55.4)	(71.3)
Return of investment from joint venture	78.3	81.5	85.2
Cash paid for acquisitions, net of cash acquired	(0.7)	(164.6)	(56.4)
Proceeds from the sale of assets	0.1	21.7	-
Payments of proceeds from Knauf to investment in joint venture	-	(25.9)	-
Payments to Knauf upon disposal of discontinued operations	(11.8)	(6.4)	(47.9)
Proceeds from company-owned life insurance, net	-	8.0	1.3
Net cash (used for) investing activities	(13.9)	(141.1)	(89.1)
Cash flows from financing activities:			
Proceeds from short-term debt	-	30.0	-
Payments of short-term debt	-	(30.0)	-
Proceeds from revolving credit facility	95.0	290.0	185.0
Payments of revolving credit facility	(155.0)	(180.0)	(70.0)
Proceeds from long-term debt	-	-	500.0
Payments of long-term debt	(25.0)	(6.3)	(825.4)
Financing costs	-	-	(2.9)
Dividends paid	(41.4)	(39.2)	(35.6)
Payments from share-based compensation plans, net of tax	(3.6)	(4.8)	(4.7)
Payments for finance leases	(2.1)	(1.8)	-
Payments for treasury stock acquired	(80.0)	(44.4)	(131.3)
Net cash (used for) provided by financing activities	(212.1)	13.5	(384.9)
Effect of exchange rate changes on cash and cash equivalents	-	0.4	0.9
Net (decrease) increase in cash and cash equivalents	(38.8)	91.6	(290.4)
Cash and cash equivalents at beginning of year of discontinued operations	-	-	10.0
Cash and cash equivalents at beginning of year of continuing operations	136.9	45.3	325.7
Cash and cash equivalents at end of period	$ 98.1	$ 136.9	$ 45.3
Supplemental Cash Flow Disclosures:			
Interest paid	$ 21.5	$ 24.1	$ 33.1
Income tax payments, net	52.5	10.9	58.4
Amounts in accounts payable for capital expenditures	0.3	1.0	1.9

See accompanying notes to consolidated financial statements beginning on page 42.

NOTE 1. BUSINESS

Armstrong World Industries, Inc. ("AWI") is a Pennsylvania corporation incorporated in 1891. When we refer to "AWI," the "Company," "we," "our" and "us" in these notes, we are referring to AWI and its subsidiaries.

Acquisitions

In December 2020, we acquired all of the issued and outstanding equity of Arktura LLC ("Arktura") and certain subsidiaries with operations in the United States and Argentina. Arktura is a designer and fabricator of metal and felt ceilings, walls, partitions and facades with one manufacturing facility based in Los Angeles, California.

In August 2020, we acquired the business and assets of Moz Designs, Inc. ("Moz"), based in Oakland, California. Moz is a designer and fabricator of custom architectural metal ceilings, walls, dividers and column covers for interior and exterior applications with one manufacturing facility.

In July 2020, we acquired all of the issued and outstanding capital stock of TURF Design, Inc. ("Turf"), with one manufacturing facility in Elgin, Illinois and a design center in Chicago, Illinois. Turf is a designer and manufacturer of acoustic felt ceilings and wall products.

In November 2019, we acquired the business and assets of MRK Industries, Inc. ("MRK"), based in Libertyville, Illinois. MRK is a manufacturer of specialty metal ceiling, wall and exterior solutions with one manufacturing facility.

In March 2019, we acquired the business and assets of Architectural Components Group, Inc. ("ACGI"), based in Marshfield, Missouri. ACGI is a manufacturer of custom wood ceilings and walls with one manufacturing facility.

The operations, assets and liabilities of these acquisitions are included in our Architectural Specialties segment. See Note 5 for further information on our acquisitions.

Discontinued Operations

In 2019, we completed the sale of certain subsidiaries comprising our businesses and operations in Europe, the Middle East and Africa (including Russia) ("EMEA") and the Pacific Rim, including the corresponding businesses and operations conducted by Worthington Armstrong Venture ("WAVE"), our joint venture with Worthington Industries, Inc. ("Worthington") in which AWI holds a 50% interest (collectively, the "Sale"), to Knauf International GmbH ("Knauf"). In January 2021, we finalized post-closing adjustments to the purchase price related to certain pension liabilities assumed by Knauf in the Sale. During the first quarter of 2021, we paid $11.8 million to Knauf related to this purchase price adjustment.

The EMEA and Pacific Rim segment historical financial results through September 30, 2019 have been reflected in AWI's Consolidated Statements of Operations and Comprehensive Income as discontinued operations for all periods presented.

COVID-19 Considerations

The COVID-19 pandemic has created significant volatility and economic disruption and the impact on our future consolidated results of operations is uncertain. The extent to which COVID-19 impacts our employees, operations, customers, suppliers and financial results depends on numerous evolving factors that we may not be able to accurately predict, including: the duration and scope of the pandemic (and whether there is a resurgence or multiple resurgences in the future, including the impact of new variants); government actions taken in response to the pandemic, including required shutdowns, vaccine or testing mandates; the availability, acceptance, distribution and continued effectiveness of vaccines; the impact on construction activity; supply chain disruptions; rising inflation; labor shortages; the effect on our customers demand for our ceiling and wall systems; sustained remote or hybrid work models; our ability to manufacture and sell our products; and the ability of our customers to pay for our products. While many of our products support life sustaining activities and essential construction, we, and certain of our customers or suppliers, may be impacted by state actions, orders and policies regarding the COVID-19 pandemic, including temporary closures of non-life sustaining businesses, shelter-in-place orders, and travel, social distancing and quarantine policies, the implementation and enforcement of which vary by individual U.S. states and by individual countries in the Americas. We did not record any asset impairments, inventory charges or material bad debt reserves related to COVID-19 during 2021 or 2020 but future events may require such charges, which could have a material adverse effect on our financial condition, liquidity or results of operations.

NOTE 2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Consolidation Policy. The consolidated financial statements and accompanying data in this report include the accounts of AWI and its majority-owned subsidiaries. All significant intercompany transactions have been eliminated from the consolidated financial statements.

Use of Estimates. We prepare our financial statements in conformity with U.S. Generally Accepted Accounting Principles ("U.S. GAAP"), which requires management to make estimates and assumptions. These estimates and assumptions affect the reported amounts of assets, liabilities, revenues and expenses. When preparing an estimate, management determines the amount based upon the consideration of relevant internal and external information. Actual results may differ from these estimates.

Reclassifications. Certain amounts in the prior year's Consolidated Financial Statements and related notes have been recast to conform to the 2021 presentation.

Revenue Recognition. We recognize revenue upon transfer of control of our products to the customer, which typically occurs upon shipment. Our main performance obligation to our customers is the delivery of products in accordance with purchase orders. Each purchase order confirms the transaction price for the products purchased under the arrangement. Direct sales to building materials distributors, home centers, direct customers and retailers represent the majority of our sales. Our standard sales terms are Free On Board ("FOB") shipping point. We have some sales terms that are FOB destination. At the point of shipment, the customer is required to pay under normal sales terms. In most cases our normal payment terms are 45 days or less and our sales arrangements do not have any material financing components. In addition, our customer arrangements do not produce contract assets or liabilities that are material to our Consolidated Financial Statements. Within our Architectural Specialties segment, the majority of revenues are customer project driven, which includes a minority of revenues derived from the sale of customer specified customized products that have no alternative use to us. The manufacturing cycle for these custom products is typically short.

Incremental costs to fulfill our customer arrangements are expensed as incurred, as the amortization period is less than one year.

Our products are sold with normal and customary return provisions. We provide limited warranties for defects in materials or factory workmanship, sagging and warping, and certain other manufacturing defects. Warranties are not sold separately to customers. Our product warranties place certain requirements on the purchaser, including installation and maintenance in accordance with our written instructions. In addition to our warranty program, under certain limited circumstances, we will occasionally at our sole discretion provide a customer accommodation repair or replacement. Warranty repairs and replacements are most commonly made by professional installers employed by or affiliated with our independent distributors. Reimbursement for costs associated with warranty repairs are provided to our independent distributors through a credit against accounts receivable from the distributor to us. Sales returns and warranty claims have historically not been material and do not constitute separate performance obligations. We often offer incentive programs to our customers, primarily volume rebates and promotions. The majority of our rebates are designated as a percentage of annual customer purchases. We estimate the amount of rebates based on actual sales for the period and accrue for the projected incentive programs' costs. We record the costs of rebate accruals as a reduction to the transaction price. Other sales discounts, including early pay promotions, are deducted immediately from the sales invoice.

See Note 4 to the Consolidated Financial Statements for additional information related to our revenues.

Shipping and Handling Costs. We account for product shipping and handling costs as fulfillment activities and present the associated costs in costs of goods sold in the period in which we sell our product.

Advertising Costs. We recognize advertising expenses as they are incurred.

Research and Development Costs. We expense research and development costs as they are incurred.

Business Combinations. We account for acquisitions under the acquisition method and the results of acquired operations are included in the Consolidated Financial Statements from the acquisition date. Acquisition related costs are expensed as incurred. We allocate total consideration to the assets acquired and liabilities assumed based on their estimated fair values, with the remaining unallocated amount recorded as goodwill. Our definite-lived intangible assets are amortized over the estimated useful life on a straight-line basis and recorded as a component of operating income (expense). The fair value of acquired intangible assets is estimated by applying discounted cash flow models based on significant inputs not observable in the market. Key assumptions are developed based on each acquirees' historical experience, future projections and comparable market data including future cash flows, long-term growth rates, implied royalty rates, attrition rates and discount rates. Acquisition-related contingent consideration that is classified as a liability is measured at fair value at the acquisition date. Changes in the fair value of contingent consideration liabilities in reporting periods after the acquisition date are recorded within our Consolidated Statements of Operations and Comprehensive Income.

Pension and Postretirement Benefits. We have benefit plans that provide for pension, medical and life insurance benefits to certain eligible employees when they retire from active service. See Note 18 to the Consolidated Financial Statements for disclosures on pension and postretirement benefits.

Taxes. The provision for income taxes has been determined using the asset and liability approach of accounting for income taxes to reflect the expected future tax consequences of events recognized in the financial statements. Deferred income tax assets and liabilities are recognized by applying enacted tax rates to temporary differences that exist as of the balance sheet date, which result from differences in the timing of reported taxable income between tax and financial reporting.

We reduce the carrying amounts of deferred tax assets by a valuation allowance if, based on the available evidence, it is more likely than not that such assets will not be realized. The need to establish valuation allowances for deferred tax assets is assessed quarterly. In assessing the requirement for, and amount of, a valuation allowance in accordance with the more likely than not standard, we give appropriate consideration to all positive and negative evidence related to the realization of the deferred tax assets. This assessment considers, among other matters, the nature, frequency and severity of current and cumulative losses, forecasts of future profitability and foreign source income, the duration of statutory carryforward periods, and our experience with operating loss and tax credit carryforward expirations. A history of cumulative losses is a significant piece of negative evidence used in our assessment. If a history of cumulative losses is incurred for a tax jurisdiction, forecasts of future profitability are generally not used as positive evidence related to the realization of the deferred tax assets in the assessment.

We recognize the tax benefits of an uncertain tax position if those benefits are more likely than not to be sustained based on existing tax law. Additionally, we establish a reserve for tax positions that are more likely than not to be sustained based on existing tax law, but uncertain in the ultimate benefit to be sustained upon examination by the relevant taxing authorities. Unrecognized tax benefits are subsequently recognized at the time the more likely than not recognition threshold is met, the tax matter is effectively settled or the statute of limitations for the relevant taxing authority to examine and challenge the tax position has expired, whichever is earliest.

Taxes collected from customers and remitted to governmental authorities are reported on a net basis.

Earnings per Share. Basic earnings per share is computed by dividing the earnings attributable to common shares by the weighted average number of shares of common stock outstanding during the period. Diluted earnings per share reflects the potential dilution of securities that could share in the earnings and is calculated using the treasury stock method.

Cash and Cash Equivalents. Cash and cash equivalents include cash on hand and short-term investments that have maturities of three months or less when purchased.

Concentration of Credit. We principally sell products to customers in building products industries. Revenues from two commercial distributors, included within our Mineral Fiber and Architectural Specialties segments, individually exceeded 10% of our revenues in 2021, 2020 and 2019. Gross sales to these two customers totaled $495.8 million, $370.3 million and $428.7 million in 2021, 2020 and 2019, respectively. We monitor the creditworthiness of our customers and generally do not require collateral.

Receivables. On January 1, 2020, we adopted ASC 326 – Financial Instruments – Credit Losses. This adoption did not have a material impact on our financial condition, results of operations or cash flows.

We sell our products to select, pre-approved customers using customary trade terms that allow for payment in the future. Customer trade receivables, customer notes receivable and miscellaneous receivables (which include supply related rebates and other), net of allowances for doubtful accounts, customer credits and warranties are reported in accounts and notes receivable, net. Cash flows from the collection of receivables are classified as operating cash flows on the Consolidated Statements of Cash Flows.

We establish creditworthiness prior to extending credit. We estimate the recoverability of receivables each period. This estimate is based upon new information in the period, which can include the review of any available financial statements and forecasts, as well as discussions with legal counsel and the management of the debtor company. As events occur, which impact the collectability of the receivable, all or a portion of the receivable is reserved. Account balances are charged off against the allowance when the potential for recovery is considered remote. We do not have any off-balance sheet credit exposure related to our customers.

Inventories. Inventories are valued at the lower of cost and net realizable value. See Note 8 to the Consolidated Financial Statements for further information on our accounting for inventories.

Property Plant and Equipment. Property plant and equipment is recorded at cost reduced by accumulated depreciation and amortization. Depreciation and amortization expense is recognized on a straight-line basis over the assets' estimated useful lives. Machinery and equipment includes manufacturing equipment (depreciated over 2 to 15 years), computer equipment (depreciated over 3 to 5 years) and office furniture and equipment (depreciated over 5 to 7 years). Within manufacturing equipment, assets that are subject to accelerated obsolescence or wear out quickly, such as dryer components, are generally depreciated over shorter periods while heavy production equipment, such as conveyors and production presses, are generally depreciated over longer periods. Buildings are depreciated over 15 to 30 years, depending on factors such as type of construction and use. Computer software is amortized over 3 to 7 years.

Property, plant and equipment is tested for impairment by asset group when indicators of impairment are present, such as operating losses and/or negative cash flows for each identified asset group. If an indication of impairment exists, we compare the carrying amount of the asset group to the estimated undiscounted future cash flows expected to be generated by the asset group. If the carrying value exceeds the undiscounted future cash flows, we determine the fair value of the asset group based on discounted future cash flows expected to be generated by the asset group, or based on management's estimated exit price assuming the assets could be sold in an orderly transaction between market participants, or estimated salvage value if no sale is assumed. If the fair value is less than the carrying value of the asset group, we record an impairment charge equal to the difference between the fair value and carrying value of the asset group. Impairments of assets related to our manufacturing operations are recorded in cost of goods sold. We did not test tangible assets within our continuing operations for impairment in 2021, 2020 or 2019 as no indicators of impairment existed.

When assets are disposed of or retired, their costs and related depreciation or amortization are removed from the financial statements, and any resulting gains or losses are normally reflected in cost of goods sold or selling, general and administrative ("SG&A") expenses depending on the nature of the asset.

Leases. We enter into operating and finance leases for certain manufacturing plants, warehouses, equipment and automobiles. Our leases have remaining lease terms of up to 16 years. Several leases include options for us to purchase leased items at fair value or renew for up to 5 years, or multiple 5-year renewal periods. Some of our leases include early termination options. We consider all of these options in determining the lease term used to establish our right-of-use ("ROU") assets and lease liabilities when it is reasonably certain that we will exercise that option. Our lease agreements do not contain any residual value guarantees or material restrictive covenants.

We have lease agreements with lease and nonlease components, which we have elected to combine to determine the ROU assets and lease liabilities. Short-term leases with an initial term of 12 months or less are not recorded on the balance sheet. We recognize lease expense for these leases on a straight-line basis over the lease term.

As most of our leases do not provide an implicit rate, we use our Incremental Borrowing Rate ("IBR") based on information that is available at the lease commencement date to compute the present value of lease payments. Relevant information used in determining the IBR includes the transactional currency of the lease and the lease term.

Asset Retirement Obligations. We recognize the fair value of obligations associated with the retirement of tangible long-lived assets in the period in which they are incurred. Upon initial recognition of a liability, the discounted cost is capitalized as part of the related long-lived asset and depreciated over the corresponding asset's useful life. Over time, accretion of the liability is recognized as an operating expense to reflect the change in the liability's present value.

Goodwill and Intangible Assets. Our definite-lived intangible assets are primarily customer relationships (amortized over 1 to 20 years), developed technology (amortized over 13 to 19 years) and acquired internally-developed software (amortized over 7 years). We review definite-lived intangible assets for impairment by asset group when indicators of impairment are present, such as operating losses and/or negative cash flows for the respective asset group. If an indication of impairment exists, we compare the carrying amount of the asset group to the estimated undiscounted future cash flows expected to be generated by the asset group. If the carrying value exceeds the undiscounted future cash flows, we determine the fair value of the asset group based on discounted future cash flows expected to be generated by the asset group or based on management's estimated exit price assuming the assets could be sold in an orderly transaction between market participants. If the fair value is less than the carrying value of the asset group, we record an impairment charge equal to the difference between the fair value and carrying value of the asset group. We did not test definite-lived intangible assets within our continuing operations for impairment in 2021, 2020 or 2019 as no indicators of impairment existed.

Our indefinite-lived assets include goodwill and other intangibles, primarily trademarks and brand names, with Armstrong representing our primary trademark. Trademarks and brand names are integral to our corporate identity and are expected to contribute indefinitely to our cash flows. Accordingly, they have been assigned an indefinite life. We conduct our annual impairment tests on these indefinite-lived intangible assets and goodwill during the fourth quarter. These assets undergo more frequent tests if an indication of possible impairment exists. When performing an impairment test for indefinite-lived intangible assets and goodwill, we compare the carrying amount of the asset (when testing indefinite-lived intangible assets) and reporting unit (when testing goodwill) to the estimated fair value. For indefinite-lived intangible assets, the estimated fair value is based on discounted future cash flows using the relief from royalty method. For goodwill, the estimated fair value is based on discounted future cash flows expected to be generated by the reporting unit. If the fair value is less than the carrying value of the asset/reporting unit, we record an impairment charge equal to the difference between the fair value and carrying value of the asset/reporting unit. We did not test indefinite-lived intangible assets within our continuing operations for impairment during any interim periods during 2021, as no indicators of impairment existed. We completed our annual impairment test in the fourth quarter of 2021 and no impairment charges were recorded in 2021, 2020 or 2019.

See Note 13 to the Consolidated Financial Statements for disclosure on intangible assets.

Foreign Currency Transactions. Assets and liabilities of our subsidiaries operating outside the United States that are accounted in a functional currency other than U.S. dollars are translated using the period end exchange rate. Revenues and expenses are translated at exchange rates effective during each month. Foreign currency translation gains or losses are included as a component of accumulated other comprehensive (loss) within shareholders' equity. Gains or losses on foreign currency transactions are recognized through earnings.

Financial Instruments and Derivatives. We use derivatives and other financial instruments to offset the effect of interest rate variability. Derivatives are recognized on the balance sheet at fair value. For derivatives that meet the criteria as designated cash flow hedges, the changes in the fair value of the derivative are recognized in other comprehensive (loss) income until the hedged item is recognized in operations. See Notes 19 and 20 to the Consolidated Financial Statements for further discussion.

Share-based Employee Compensation. We generally recognize share-based compensation expense on a straight-line basis over the vesting period for the entire award. Compensation expense for performance-based awards with non-market-based conditions are also recognized over the vesting period for the entire award, however, compensation expense may vary based on the expectations for actual performance relative to defined performance measures. We estimate forfeitures based on actual historical forfeitures. See Note 22 to the Consolidated Financial Statements for additional information on share-based employee compensation.

Treasury Stock. Common shares repurchased by AWI are recorded on the settlement date at cost as treasury shares and result in a reduction of equity. We may reissue these treasury shares. When treasury shares are reissued, we determine the cost using the First-in, first-out cost method (“FIFO”). The difference between the cost of the treasury shares and reissuance price is included in additional paid-in capital or retained earnings.

Recently Adopted Accounting Standards

In December 2019, the Financial Accounting Standards Board (“FASB”) issued Accounting Standards Update (“ASU”) 2019-12, *“Simplifying the Accounting for Income Taxes,”* which removes exceptions to the general principles in ASC Topic 740 – Income Taxes for allocating tax expense between financial statement components, accounting basis differences resulting from an ownership change in foreign investments and interim period income tax accounting for year-to-date losses that exceed projected losses. Effective January 1, 2021, we adopted this standard, which had no material impact on our financial condition or results of operations.

In November 2021, the FASB issued ASU 2021-10, *“Government Assistance (Topic 832): Disclosures by Business Entities about Government Assistance.”* This guidance requires annual disclosures for transactions with a government authority that are accounted for by applying a grant or contribution model. This standard requires entities to provide information about the nature of the transaction and the accounting policy used, terms and conditions associated with the transaction and financial statement line items affected by the transaction. This guidance is effective for fiscal years beginning after December 15, 2021, with early adopted permitted. Effective December 31, 2021, we adopted this standard, which resulted in additional disclosures related to refundable payroll tax credits. See Note 7 to the Consolidated Financial Statements for additional details.

NOTE 3. NATURE OF OPERATIONS

Our operating segments are as follows: Mineral Fiber, Architectural Specialties and Unallocated Corporate.

(dollar amounts in millions, except share data)

Mineral Fiber – produces suspended mineral fiber and soft fiber ceiling systems for use in commercial and residential settings. Our mineral fiber products offer various performance attributes such as acoustical control, rated fire protection, aesthetic appeal, and health and sustainability features. Commercial ceiling products are sold to resale distributors and to ceiling systems contractors. Residential ceiling products are sold primarily to wholesalers and retailers (including large home centers). The Mineral Fiber segment also includes the results of WAVE, which manufactures and sells suspension system (grid) products and ceiling component products that are invoiced by both AWI and WAVE. Segment results relating to WAVE consist primarily of equity earnings and reflect our 50% equity interest in the joint venture. Ceiling component products consist of ceiling perimeters and trim, in addition to grid products that support drywall ceiling systems. For some customers, WAVE sells its suspension systems products to AWI for resale to customers. Mineral Fiber segment results reflect those sales transactions. The Mineral Fiber segment also includes all assets and liabilities not specifically allocated to our Architectural Specialties or Unallocated Corporate segment, including all property and related depreciation associated with our Lancaster, PA headquarters. Operating results for the Mineral Fiber segment include a significant majority of allocated Corporate administrative expenses that represent a reasonable allocation of general services to support its operations.

Architectural Specialties – produces, designs and sources ceilings and walls for use in commercial settings. Products are available in numerous materials, such as metal, felt and wood, in addition to various colors, shapes and designs. Products offer various performance attributes such as acoustical control, rated fire protection and aesthetic appeal. We sell standard, premium and customized products, a portion of which are derived from sourced products. Architectural Specialties products are sold primarily to resale distributors and direct customers, primarily ceiling systems contractors. The majority of this segment's revenues are project driven, which can lead to more volatile sales patterns due to project scheduling uncertainty. Operating results for the Architectural Specialties segment include a portion of allocated Corporate administrative expenses that represent a reasonable allocation of general services to support its operations.

Unallocated Corporate – includes assets, liabilities, income and expenses that have not been allocated to our other business segments and consists of: cash and cash equivalents, the net funded status of our U.S. Retirement Income Plan (“RIP”), the estimated fair value of interest rate swap contracts, outstanding borrowings under our senior credit facility and income tax balances. Our Unallocated Corporate segment also includes all assets, liabilities, income and expenses formerly reported in our EMEA and Pacific Rim segments that were not included in the Sale.

For the year ended 2021	Mineral Fiber	Architectural Specialties	Unallocated Corporate	Total
Net sales to external customers	$ 818.5	$ 288.1	$ -	$ 1,106.6
Equity (earnings) from joint venture	(87.7)	-	-	(87.7)
Segment operating income (loss)	261.2	4.2	(5.4)	260.0
Segment assets	1,133.9	366.3	209.8	1,710.0
Depreciation and amortization	69.9	26.6	-	96.5
Investment in joint venture	50.0	-	-	50.0
Purchases of property, plant and equipment	64.8	15.0	-	79.8

For the year ended 2020	Mineral Fiber	Architectural Specialties	Unallocated Corporate	Total
Net sales to external customers	$ 726.0	$ 210.9	$ -	$ 936.9
Equity (earnings) from joint venture	(64.0)	-	-	(64.0)
Segment operating income	218.7	22.3	13.8	254.8
Segment assets	1,101.1	357.7	259.7	1,718.5
Depreciation and amortization	71.8	12.2	-	84.0
Investment in joint venture	41.2	-	-	41.2
Purchases of property, plant and equipment	45.5	9.9	-	55.4

For the year ended 2019	Mineral Fiber	Architectural Specialties	Unallocated Corporate	Total
Net sales to external customers	$ 826.6	$ 211.5	$ -	$ 1,038.1
Equity (earnings) from joint venture	(96.6)	-	-	(96.6)
Segment operating income (loss)	289.6	35.9	(8.1)	317.4
Segment assets	1,139.9	161.8	191.6	1,493.3
Depreciation and amortization	62.9	8.8	0.4	72.1
Investment in joint venture	58.5	-	-	58.5
Purchases of property, plant and equipment (1)	59.5	8.8	-	68.3

(1) Total differs from our Consolidated Statement of Cash Flows by the amount that was classified as discontinued operations. See Note 6 for additional details.

(dollar amounts in millions, except share data)

Segment operating income (loss) is the measure of segment profit or loss reviewed by the chief operating decision maker. The sum of the segments' operating income (loss) equals the total consolidated operating income as reported on our Consolidated Statements of Operations and Comprehensive Income. The following reconciles our total consolidated operating income to earnings (loss) from continuing operations before income taxes. These items are only measured and managed on a consolidated basis:

	2021	2020	2019
Total consolidated operating income	$ 260.0	$ 254.8	$ 317.4
Interest expense	22.9	24.1	38.4
Other non-operating (income) expense, net	(5.6)	357.4	(20.4)
Earnings (loss) from continuing operations before income taxes	$ 242.7	$ (126.7)	$ 299.4

Accounting policies of the segments are the same as those described in the summary of significant accounting policies.

The sales in the table below are allocated to geographic areas based on the location of our selling entities.

	2021	2020	2019
Geographic Areas			
Net sales			
Mineral Fiber:			
United States	$ 754.2	$ 674.1	$ 769.0
Canada	64.3	51.9	57.6
Total Mineral Fiber	818.5	726.0	826.6
Architectural Specialties:			
United States	$ 268.0	$ 192.8	$ 192.3
Canada	20.1	18.1	19.2
Total Architectural Specialties	288.1	210.9	211.5
Total net sales	$ 1,106.6	$ 936.9	$ 1,038.1

	2021	2020
Property, plant and equipment, net at December 31,		
Mineral Fiber:		
United States	$ 490.6	$ 486.0
Total Mineral Fiber	490.6	486.0
Architectural Specialties:		
United States	$ 46.5	$ 38.2
Canada	5.7	5.7
Total Architectural Specialties	52.2	43.9
Total property, plant and equipment, net	$ 542.8	$ 529.9

During 2020, we recorded a $21.0 million gain related to the sale of our idled mineral fiber plant in China, inclusive of accumulated foreign currency translation gains.

NOTE 4. REVENUE

Disaggregation of Revenues

Our Mineral Fiber and Architectural Specialties operating segments both manufacture and sell ceiling and wall systems (primarily mineral fiber, fiberglass wool, metal, wood, wood fiber, glass-reinforced-gypsum and felt) throughout the Americas. We disaggregate revenue based on our product-based segments and major customer channels, as they represent the most appropriate depiction of how the nature, amount and timing of revenues and cash flows are affected by economic factors. Net sales by major customer channel are as follows:

Distributors – represents net sales to building materials distributors who re-sell our products to contractors, subcontractors' alliances, large architect and design firms, and major facility owners. Geographically, this category includes sales throughout the U.S., Canada, and Latin America.

(dollar amounts in millions, except share data)

Home centers – represents net sales to home centers, such as Lowe's Companies, Inc. and The Home Depot, Inc. This category includes sales primarily to U.S. customers.

Direct customers – represents net sales to contractors, subcontractors, and large architect and design firms. This category includes sales primarily to U.S. customers.

Retailers and other – represents net sales to independent retailers and certain national account customers, including wholesalers who re-sell our products to dealers who service builders, contractors and consumers, online customers, major facility owners, group purchasing organizations and maintenance, repair and operating entities. Geographically, this category includes sales throughout the U.S. and Canada.

The following tables present net sales by major customer group within the Mineral Fiber and Architectural Specialties segments for the years ended December 31, 2021, 2020 and 2019:

Mineral Fiber	2021	2020	2019
Distributors	$ 603.9	$ 525.2	$ 622.9
Home centers	94.4	96.1	85.2
Direct customers	59.2	54.3	61.2
Retailers and other	61.0	50.4	57.3
Total	$ 818.5	$ 726.0	$ 826.6

Architectural Specialties	2021	2020	2019
Distributors	$ 150.5	$ 135.5	$ 138.3
Direct customers	134.6	73.3	68.0
Retailers and other	3.0	2.1	5.2
Total	$ 288.1	$ 210.9	$ 211.5

NOTE 5. ACQUISITIONS

ARKTURA

On December 16, 2020, we acquired all the issued and outstanding equity of Arktura and its subsidiaries with operations in the United States and Argentina for $91.2 million, net of $0.1 million of cash acquired and working capital adjustments. A portion of the cash consideration paid at closing is being held in escrow to secure potential claims for indemnification under the agreement. Under the terms of the agreement, and contingent upon continued employment with AWI, we are obligated to pay the sellers an additional $24.0 million in cash payments over a period of five years and issued an additional $6.0 million of restricted stock which will vest over a period of five years. Contingent upon employment with AWI, we also issued an additional $1.4 million of restricted stock to key Arktura employees which will vest over a period of three years. Compensation expense associated with these cash payments and restricted stock awards are recorded over the required service and vesting periods.

The total fair value of tangible assets acquired, less liabilities assumed, was $0.9 million. The acquisition resulted in $57.4 million of goodwill. The following table summarizes the fair values of identifiable intangible assets acquired, and their estimated useful lives:

	Fair Value at Acquisition Date	Estimated Useful Life
Tradenames	$ 12.1	Indefinite
Software	9.1	7 years
Backlog	5.5	1 year
Customer relationships	3.6	1 year
Non-compete agreements	2.1	5 years
Patents	0.6	13-19 years
Total identifiable intangible assets	$ 33.0	

The weighted average amortization period for acquired intangible assets as of the date of acquisition was 4.3 years. Goodwill from the Arktura acquisition relates to many factors, including the technical competencies and capabilities of the acquired workforce in the fields of architecture, design, materials science, technology and software, and our strategic intent to integrate and leverage those competencies and capabilities to advance and expand our portfolio of solutions and offerings. All of the acquired goodwill is deductible for tax purposes.

In connection with the Arktura acquisition, we formed Arktura Ventures LLC, an incubator entity for the development and commercialization of new products and solutions in the architecture, engineering and construction spaces. As of December 31, 2021, the venture entity had minimal funding and operations.

MOZ

On August 24, 2020, we acquired the business and assets of Moz for $4.2 million of cash paid at closing and the potential for a contingent earn-out payable in 2022 not to exceed $4.7 million. We, with the assistance of an independent, third-party valuation specialist, utilized a Monte Carlo simulation to determine the estimated fair value of the contingent consideration at the acquisition date of $2.7 million, resulting in total acquisition consideration of $6.9 million. The total fair value of liabilities assumed, less tangible assets acquired, was $0.4 million. The total fair value of identifiable intangible assets acquired was $2.7 million, comprised of non-amortizable tradenames of $1.5 million, amortizable customer relationships of $0.6 million and backlog of $0.6 million, resulting in $4.6 million of goodwill. All of the acquired goodwill is deductible for tax purposes.

The contingent consideration was payable upon achievement of certain performance objectives through December 31, 2021. The contingent consideration was classified as a current liability as of December 31, 2021, and was paid in the first quarter of 2022. See Note 19 for details related to the fair value of the contingent consideration.

TURF

On July 27, 2020, we acquired all the issued and outstanding capital stock of Turf for a purchase price of $70.0 million of cash paid at closing and the potential for a contingent earn-out payable in 2022 and 2023 not to exceed $48.0 million. We, with the assistance of an independent, third-party valuation specialist, utilized a Monte Carlo simulation to determine the estimated fair value of the contingent consideration at the acquisition date of $14.1 million, resulting in total acquisition consideration of $84.1 million. The total fair value of tangible assets acquired, less liabilities assumed, was $4.8 million. The total fair value of identifiable intangible assets acquired was $27.9 million, resulting in $51.4 million of goodwill. We identified non-amortizable tradenames of $9.6 million. We also identified amortizable intangible assets comprised of customer relationships of $7.7 million, patents of $5.8 million and a non-compete agreement of $3.3 million that are being amortized on a straight-line basis over their estimated useful lives of 2, 20, and 5 years, respectively. The weighted average amortization period for acquired intangible assets as of the date of acquisition was 8.3 years. Goodwill from the Turf acquisition relates to many factors, including the design talents of the acquired workforce, fabrication capabilities and capacity, broad-based go-to-market channels and relationships, established leadership in a growing product category, and our strategic intent to leverage its position and attributes to grow and expand our portfolio of solutions. All of the acquired goodwill is deductible for tax purposes.

The contingent consideration is payable upon achievement of certain future performance objectives through 2022. The contingent consideration includes up to $24.0 million in additional cash consideration for performance at certain revenue and earnings before interest, taxes, depreciation and amortization (“EBITDA”) growth targets. Full payout for target performance requires compounded annual growth rates in excess of 23% through December 31, 2022. The contingent consideration also includes up to $24.0 million in additional cash consideration for performance over revenue and EBITDA growth targets. Full payout for achievement over target performance requires compounded annual growth rates in excess of 38% through December 31, 2022.

A portion of Turf's contingent consideration was payable upon the achievement of certain performance objectives through December 31, 2021. The contingent consideration payable for the year ended December 31, 2021 was classified as a current liability as of December 31, 2021, and was paid in the first quarter of 2022. See Note 19 for details related to the fair value of the contingent consideration.

(dollar amounts in millions, except share data)

MRK

On November 25, 2019, we acquired the business and assets of MRK. The $13.3 million purchase price was allocated to the assets acquired and the liabilities assumed based on their estimated fair values, with the remaining unallocated amount recorded as goodwill. The total fair value of tangible assets acquired, less liabilities assumed, was $2.9 million, resulting in $10.4 million of goodwill. All of the acquired goodwill is deductible for tax purposes.

ACGI

On March 4, 2019, we acquired the business and assets of ACGI. The $42.9 million purchase price was allocated to the assets acquired and the liabilities assumed based on their estimated fair values, with the remaining unallocated amount recorded as goodwill. The total fair value of tangible assets acquired, less liabilities assumed, was $7.3 million. The total fair value of identifiable intangible assets acquired was $12.0 million, mostly comprised of amortizable customer relationships of $7.4 million and amortizable tradenames of $2.8 million, resulting in $23.6 million of goodwill. All of the acquired goodwill is deductible for tax purposes.

The 2019 acquisitions, both individually and in the aggregate, did not have a material impact on reported net sales or net (loss) earnings for the year ended December 31, 2019.

The following table presents the net sales and net (loss) earnings from continuing operations before income taxes of Arktura, Moz and Turf included in our Consolidated Statements of Operations and Comprehensive Income since the acquisition dates:

	2021	2020
Net sales	$ 82.2	$ 18.2
Net (loss) earnings from continuing operations before income taxes	(9.6)	0.4

PRO FORMA FINANCIAL INFORMATION

The following table summarizes aggregate audited as reported information and aggregate unaudited pro forma information assuming the acquisitions of Arktura, Moz and Turf had occurred on January 1, 2018. The unaudited pro forma results include the depreciation and amortization associated with the acquired assets, compensation expense related to cash payments and equity awards granted to employees of the acquired companies and adjustments to net sales for the purchase accounting effects of recording deferred revenue at fair value. The unaudited pro forma results do not include any expected benefits of the acquisitions, adjustments to as reported changes in the fair value of the contingent consideration or adjustments to the effective tax rate. Accordingly, the unaudited pro forma results are not necessarily indicative of either future results of operations or results that might have been achieved had the acquisitions been consummated as of January 1, 2018.

	2020	2019
Net sales from continuing operations, pro forma (unaudited)	$ 1,009.0	$ 1,099.2
Net sales from continuing operations, as reported	936.9	1,038.1
Net (loss) earnings from continuing operations, pro forma (unaudited)	(69.2)	239.3
Net (loss) earnings from continuing operations, as reported	(84.1)	242.3

NOTE 6. DISCONTINUED OPERATIONS

EMEA AND PACIFIC RIM BUSINESSES

In 2019, we completed the sale of certain subsidiaries comprising our businesses in EMEA and the Pacific Rim to Knauf. We recorded an estimated pre-tax loss on sale of $31.2 million in 2019. In 2020, we recorded a pre-tax loss of $17.2 million, primarily related to an $11.4 million purchase price adjustment related to certain pension liabilities included in the Sale in addition to working capital and other adjustments. In 2021, we recorded a pre-tax loss on sale of $0.4 million for final purchase price adjustments related to certain pension liabilities included in the Sale.

See Note 1 for further discussion of the Sale.

(dollar amounts in millions, except share data)

FLOORING BUSINESSES

Separation and Distribution of AFI

On April 1, 2016, we completed our separation of Armstrong Flooring, Inc. ("AFI") by allocating the assets and liabilities related primarily to our Resilient and Wood Flooring segments to AFI and then distributing the common stock of AFI to our shareholders at a ratio of one share of AFI common stock for every two shares of AWI common stock.

European Resilient Flooring

During 2020, we recorded a gain of $0.8 million related to Accumulated Other Comprehensive Income ("AOCI") adjustments from a previously discontinued foreign flooring entity, which was dissolved in the second quarter of 2020. The AOCI adjustments related to accumulated foreign currency translation amounts.

Summarized Financial Information of Discontinued Operations

The following tables detail the businesses and line items that comprise discontinued operations on the Consolidated Statements of Operations and Comprehensive Income.

	EMEA and Pacific Rim Businesses
2021	
(Loss) from disposal of discontinued businesses, before income tax	$ (0.4)
Income tax expense	1.7
(Loss) from disposal of discontinued businesses, net of tax	$ (2.1)
Net (loss) from discontinued operations	$ (2.1)

	EMEA and Pacific Rim Businesses	Flooring Businesses	Total
2020			
(Loss) gain from disposal of discontinued businesses, before income tax	$ (17.2)	$ 0.8	$ (16.4)
Income tax (benefit)	(1.4)	-	(1.4)
(Loss) gain from disposal of discontinued businesses, net of tax	$ (15.8)	$ 0.8	$ (15.0)
Net (loss) earnings from discontinued operations	$ (15.8)	$ 0.8	$ (15.0)

	EMEA and Pacific Rim Businesses	Flooring Businesses	Total
2019			
Net sales	$ 319.1	$ -	$ 319.1
Cost of goods sold	245.7	-	245.7
Gross profit	73.4	-	73.4
Selling, general and administrative expenses	61.6	-	61.6
Operating income	11.8	-	11.8
Other non-operating expense, net	1.6	-	1.6
Earnings from discontinued operations before income tax	10.2	-	10.2
Income tax expense	12.0	-	12.0
Net (loss) from discontinued operations, net of tax	$ (1.8)	$ -	$ (1.8)
(Loss) from disposal of discontinued businesses, before income tax	$ (31.2)	$ -	$ (31.2)
Income tax (benefit)	-	(5.2)	(5.2)
(Loss) gain from disposal of discontinued businesses, net of tax	$ (31.2)	$ 5.2	$ (26.0)
Net (loss) earnings from discontinued operations	$ (33.0)	$ 5.2	$ (27.8)

(dollar amounts in millions, except share data)

The following is a summary of total gains and losses, capital expenditures and operating lease information related to our former EMEA and Pacific Rim businesses through the date of disposal, and gains on the dissolution of our previously discontinued flooring entity, which are presented as discontinued operations and included as components of operating and investing cash flows on our Consolidated Statements of Cash Flows:

	2021	2020	2019
Loss on sale to Knauf [(1)]	$ 0.4	$ 17.2	$ -
Estimated loss on sale to Knauf [(2)]	-	-	31.2
Gain on dissolution of flooring entity [(3)]	-	(0.8)	-
Purchases of property, plant and equipment	-	-	(3.0)
Operating lease cost [(4)]	-	-	7.4
ROU assets obtained in exchange for lease obligations [(5)]	-	-	24.6

(1) Represents certain pension liabilities, working capital and other adjustments.
(2) Represents comparison of the EMEA and Pacific Rim net assets to the expected final sales proceeds.
(3) Represents AOCI adjustments related to accumulated foreign currency translation amounts.
(4) The amount of cash paid for amounts included in the measurement of lease liabilities was not materially different from the operating lease cost for the nine months ended September 30, 2019.
(5) Represents initial ROU assets recognized upon adoption on January 1, 2019. We did not obtain any new ROU assets in exchange for lease obligations during the nine months ended September 30, 2019.

NOTE 7. ACCOUNTS AND NOTES RECEIVABLE

	December 31, 2021	December 31, 2020
Customer receivables	$ 104.7	$ 77.9
Miscellaneous receivables	7.9	4.0
Less allowance for warranties, discounts and losses	(3.5)	(3.6)
Accounts and notes receivable, net	$ 109.1	$ 78.3

We sell our products to select, pre-approved customers whose businesses are affected by changes in economic and market conditions. We consider these factors and the financial condition of each customer when establishing our allowance for losses from doubtful accounts.

As of December 31, 2021, miscellaneous receivables included a $5.9 million Employee Retention Credit (“ERC”), representing a refundable payroll tax credit for eligible wages paid to our employees in 2020 and 2021 under the Coronavirus Aid, Relief, and Economic Recovery Act ("CARES Act"). See Note 16 to the Consolidated Financial Statements for further information.

Miscellaneous receivables included $3.2 million of proceeds from company-owned life insurance policies as of December 31, 2020.

NOTE 8. INVENTORIES

	December 31, 2021	December 31, 2020
Finished goods	$ 49.9	$ 44.6
Goods in process	6.4	5.5
Raw materials and supplies	48.4	42.3
Less LIFO reserves	(14.5)	(10.9)
Total inventories, net	$ 90.2	$ 81.5

Approximately 66% and 69% of our total inventory in 2021 and 2020, respectively, were valued on a Last-in, first-out (“LIFO”) basis.

(dollar amounts in millions, except share data)

The distinction between the use of different methods of inventory valuation is primarily based on type of inventory, legal entities and/or geographical locations. The following table summarizes the amount of inventory that is not accounted for under the LIFO method.

	December 31, 2021	December 31, 2020
U.S. locations	$ 28.0	$ 22.5
Canada locations	2.7	3.0
Total	$ 30.7	$ 25.5

U.S. locations above generally use the weighted average cost method of inventory valuation and primarily represent certain finished goods sourced from third party suppliers and certain entities within our Architectural Specialties segment, most notably recent acquisitions, that also use the weighted average cost method given the nature of the inventory.

Our Canadian locations use the FIFO method of inventory valuation (or other methods which closely approximate the FIFO method) primarily because the LIFO method is not permitted for local tax reporting purposes. In these situations, a conversion to LIFO would be highly complex and involve excessive cost and effort to achieve under local tax reporting requirements.

NOTE 9. OTHER CURRENT ASSETS

	December 31, 2021	December 31, 2020
Prepaid expenses	$ 17.2	$ 12.0
Assets held for sale	4.6	-
Other	1.3	0.8
Total other current assets	$ 23.1	$ 12.8

As of December 31, 2021, assets held for sale included the property, plant and equipment of our idled Mineral Fiber plant in St. Helens, Oregon.

NOTE 10. PROPERTY, PLANT AND EQUIPMENT

	December 31, 2021	December 31, 2020
Land	$ 31.8	$ 33.3
Buildings	257.2	255.5
Machinery and equipment	643.9	645.7
Computer software	52.6	41.6
Construction in progress	51.3	40.9
Less accumulated depreciation and amortization	(494.0)	(487.1)
Net property, plant and equipment	$ 542.8	$ 529.9

NOTE 11. EQUITY INVESTMENTS

Investment in joint venture as of December 31, 2021 and 2020 reflected the equity interest in our 50% investment in our WAVE joint venture. The WAVE joint venture is reflected within the Mineral Fiber segment in our consolidated financial statements using the equity method of accounting.

We use the cumulative earnings approach to determine the appropriate classification of distributions from WAVE within our cash flow statement. During 2021, 2020 and 2019, WAVE distributed amounts in excess of our capital contributions and proportionate share of retained earnings. Accordingly, the distributions in these years were reflected as a return of investment in cash flows from investing activity in our Consolidated Statement of Cash Flows. Distributions from WAVE in 2021, 2020 and 2019, were $78.3 million, $81.5 million, and $85.2 million, respectively.

In certain markets, we sell WAVE products directly to customers pursuant to specific terms of sale. In those circumstances, we record the sales and associated costs within our consolidated financial statements. The total sales associated with these transactions were $42.3 million, $35.2 million and $33.5 million for the years ended 2021, 2020 and 2019, respectively.

(dollar amounts in millions, except share data)

The European and Pacific Rim businesses of WAVE were included in the Sale to Knauf in 2019. Accordingly, WAVE's European and Pacific Rim historical financial statement results have been reflected in WAVE's consolidated financial statements as a discontinued operation for all periods presented. Our equity earnings in joint venture reflected as a component of earnings from continuing operations included $3.0 million of equity earnings representing WAVE's net earnings from operations of its discontinued European and Pacific Rim businesses in 2019. Condensed financial data for WAVE is summarized below on a continuing operations basis.

	December 31, 2021	December 31, 2020
Current assets	$ 119.7	$ 66.8
Non-current assets	42.1	40.8
Current liabilities	37.1	73.0
Other non-current liabilities	297.4	234.7

	2021	2020	2019
Net sales	$ 430.8	$ 343.3	$ 393.2
Gross profit	244.5	194.7	219.6
Net earnings	184.6	137.8	166.0

In connection with the sale of WAVE's European and Pacific Rim businesses and operations to Knauf in 2019, WAVE recorded a $46.2 million gain on sale during 2019, which included $10.2 million of unfavorable AOCI adjustments. As such, during 2019, we recorded our share of WAVE's gain on sale of discontinued operations of $20.6 million, which was included as a component of Equity earnings from joint venture in our Consolidated Statements of Operations and Comprehensive Income.

Our recorded investment in WAVE was higher than our 50% share of the carrying values reported in WAVE's consolidated financial statements by $136.4 million as of December 31, 2021 and $141.1 million as of December 31, 2020. These differences are due to our adoption of fresh-start reporting upon emergence from Chapter 11 in October 2006, while WAVE's consolidated financial statements do not reflect fresh-start reporting. The differences are composed of the following fair value adjustments to assets:

	December 31, 2021	December 31, 2020
Property, plant and equipment	$ 0.4	$ 0.4
Other intangibles	105.6	110.3
Goodwill	30.4	30.4
Total	$ 136.4	$ 141.1

Other intangibles include customer relationships, trademarks and developed technology. Customer relationships are amortized over 20 years and developed technology is amortized over 15 years. Trademarks have an indefinite life. In 2019, we wrote off $4.4 million of customer relationships and developed technology intangible assets attributed to WAVE's European and Pacific Rim businesses included in the Sale. This write-off was included as a reduction to Equity earnings from joint venture in our Consolidated Statements of Operations and Comprehensive Income.

Management regularly evaluates its investment in WAVE for impairment, including performing an evaluation as a result of the sale of WAVE's European and Pacific Rim businesses to Knauf. Based on those evaluations, management concluded that its investment in WAVE was not impaired in 2021, 2020 or 2019.

See discussion in Note 26 to the Consolidated Financial Statements for additional information on this related party.

(dollar amounts in millions, except share data)

NOTE 12. LEASES

The following table presents our lease costs:

	2021	2020	2019
Operating lease cost	$ 6.4	$ 5.6	$ 6.8
Finance lease cost:			
Amortization of leased assets	$ 2.4	$ 2.0	$ -
Interest on lease liabilities	0.7	0.6	-
Total finance lease cost	$ 3.1	$ 2.6	$ -

Short-term lease expense and variable lease cost were not material for the years ended December 31, 2021, 2020 and 2019. As of December 31, 2021, we did not have any material leases that have not yet commenced.

The following table presents supplemental cash flow information related to our leases:

	2021	2020	2019
Cash paid for amounts included in the measurement of lease liabilities			
Operating cash flows from operating leases	$ 6.3	$ 5.4	$ 6.8
Operating cash flows from finance leases	0.7	0.6	-
Financing cash flows from finance leases	2.1	1.8	-
ROU assets obtained in exchange for lease liabilities			
Operating leases [(1)]	$ 7.3	$ 5.4	$ 41.6
Finance leases	0.3	2.6	-

(1) The years ended December 31, 2021 and 2020 include increases in ROU assets of $3.2 million and $0.4 million, respectively, resulting from modifications that did not involve obtaining a new ROU asset. Modifications resulted from changes in the terms of existing leases. The year ended December 31, 2019 includes initial ROU assets of $29.2 million recognized upon adoption of FASB ASC 842 - Leases on January 1, 2019.

The following table presents the weighted average assumptions used to compute our ROU assets and lease liabilities:

	December 31, 2021	December 31, 2020
Weighted average remaining lease term (in years)		
Operating leases	5.4	6.5
Finance leases	9.9	10.7
Weighted average discount rate		
Operating leases	3.4%	4.0%
Finance leases	3.6%	3.6%

(dollar amounts in millions, except share data)

Undiscounted future minimum lease payments as of December 31, 2021, by year and in the aggregate, having non-cancelable lease terms in excess of one year are as follows:

	Operating Leases	Finance Leases
Maturity of lease liabilities		
2022	$ 6.2	$ 2.9
2023	5.5	2.8
2024	4.0	2.6
2025	2.0	2.3
2026	1.2	2.5
Thereafter	4.8	10.0
Total lease payments	23.7	23.1
Less interest	(2.5)	(4.1)
Present value of lease liabilities	$ 21.2	$ 19.0

NOTE 13. GOODWILL AND INTANGIBLE ASSETS

We conduct our annual impairment testing of goodwill and non-amortizing intangible assets during the fourth quarter. The 2021, 2020 and 2019 reviews concluded that no impairment charges were necessary. See Note 2 to the Consolidated Financial Statements for a discussion of our accounting policy for goodwill and intangible assets.

The following table details amounts related to our goodwill and intangible assets as of December 31, 2021 and 2020:

		December 31, 2021		December 31, 2020	
	Estimated Useful Life	Gross Carrying Amount	Accumulated Amortization	Gross Carrying Amount	Accumulated Amortization
Amortizing intangible assets					
Customer relationships	1-20 years	$ 196.7	$ 144.8	$ 200.6	$ 128.9
Developed technology	13-19 years	92.9	82.6	92.1	77.9
Software	7 years	9.1	1.3	9.1	-
Trademarks and brand names	5-10 years	4.0	2.0	4.0	1.3
Non-compete agreements	3-5 years	5.6	1.4	6.3	0.4
Other	Various	0.4	0.1	6.9	0.2
Total		$ 308.7	$ 232.2	$ 319.0	$ 208.7
Non-amortizing intangible assets					
Trademarks and brand names	Indefinite	344.9		347.2	
Total intangible assets		$ 653.6		$ 666.2	
Goodwill	Indefinite	$ 167.0		$ 160.7	

The increase in goodwill as of December 31, 2021 resulted primarily from customary adjustments to valuations for Arktura assets acquired and liabilities assumed on December 16, 2020 and foreign exchange movements.

	2021	2020	2019
Amortization expense	$ 33.8	$ 22.1	$ 19.9

The expected annual amortization expense for the years 2022 through 2026 are as follows:

2022	$ 16.2
2023	13.6
2024	13.1
2025	12.5
2026	9.0

(dollar amounts in millions, except share data)

NOTE 14. OTHER NON-CURRENT ASSETS

	December 31, 2021	December 31, 2020
Cash surrender value of company-owned life insurance policies	$ 47.2	$ 47.8
Investment in employee deferred compensation plans	9.7	9.6
Other	1.0	0.3
Total other non-current assets	$ 57.9	$ 57.7

NOTE 15. ACCOUNTS PAYABLE AND ACCRUED EXPENSES

	December 31, 2021	December 31, 2020
Payables, trade and other	$ 105.8	$ 81.3
Employment costs	30.3	17.6
Current portion of pension and postretirement liabilities	9.9	9.5
Payable to Knauf for purchase price adjustments	-	11.4
Acquisition-related contingent consideration	8.6	-
Other	20.3	16.7
Total accounts payable and accrued expenses	$ 174.9	$ 136.5

NOTE 16. INCOME TAXES

The tax effects of principal temporary differences between the carrying amounts of assets and liabilities and their tax basis are summarized below. Management believes it is more likely than not that the results of future operations will generate sufficient taxable income in the appropriate jurisdiction to realize deferred tax assets, net of valuation allowances. In arriving at this conclusion, we considered the profit before tax generated for the years 2019 through 2021, future reversals of existing taxable temporary differences, and projections of future profit before tax.

We reduce the carrying amounts of deferred tax assets by a valuation allowance if, based on the available evidence, it is more likely than not that such assets will not be realized. The need to establish valuation allowances for deferred tax assets is assessed quarterly. In assessing the requirement for, and amount of, a valuation allowance in accordance with the more likely than not standard for all periods, we consider all positive and negative evidence related to the realization of the deferred tax assets. This assessment considers, among other matters, the nature, frequency and severity of current and cumulative losses, forecasts of future profitability, the duration of statutory carryforward periods, and our experience with operating loss and tax credit carryforward expirations. A history of cumulative losses is a significant piece of negative evidence used in our assessment. If a history of cumulative losses is incurred for a tax jurisdiction, forecasts of future profitability are not used as positive evidence related to the realization of the deferred tax assets in the assessment.

As of December 31, 2021 and 2020, we had $700.9 million and $806.9 million, respectively, of gross state net operating loss (“NOL”) carryforwards expiring between 2022 and 2041. As of December 31, 2021, we had capital loss carryforwards of $18.8 million that expire between 2024 and 2036. Capital loss carryforwards as of December 31, 2020 were $19.3 million. As of December 31, 2021, we had foreign tax credits (“FTC”) carryforwards of $0.6 million that expire in 2022. U.S. FTC carryforwards as of December 31, 2020 were $17.7 million. The reduction in FTCs in 2021 was the result of FTC expirations of $17.1 million.

As of December 31, 2021 and 2020, we had valuation allowances of $60.6 million and $79.4 million, respectively. As of December 31, 2021, our valuation allowance consisted of $41.2 million for state deferred tax assets related to operating loss carryforwards, $18.8 million for federal and state deferred tax assets related to capital loss carryforwards and $0.6 million for federal deferred tax assets related to FTC carryforwards.

We estimate we will need to generate future federal taxable foreign source income of $2.9 million to fully realize FTC carryforwards before they expire in 2022. We estimate we will need to generate future taxable income of approximately $476.0 million for state income tax purposes during the respective realization periods (ranging from 2022 to 2041) to be able to fully realize the net deferred income tax assets discussed above. We estimate we will need to generate capital gain income of $66.4 million to fully realize our federal capital loss carryforwards before they expire between 2024 and 2026. We estimate we will need to generate capital gain income of $190.7 million to fully realize our state capital loss carryforwards before they expire between 2024 and 2036. Our ability to utilize deferred tax assets may be impacted by certain future events, such as changes in tax legislation or insufficient future taxable income prior to expiration of certain deferred tax assets.

(dollar amounts in millions, except share data)

	December 31, 2021	December 31, 2020
Deferred income tax assets (liabilities)		
Net operating losses	$ 42.5	$ 48.7
Postretirement benefits	20.7	22.0
Pension benefit liabilities	11.0	12.0
Deferred compensation	7.9	9.0
Foreign tax credit carryforwards	0.6	17.7
State tax credit carryforwards	8.7	8.9
Capital loss carryforwards	18.8	19.3
Lease right-of-use liabilities	9.8	10.0
Other	12.3	16.2
Total deferred income tax assets	132.3	163.8
Valuation allowances	(60.6)	(79.4)
Net deferred income tax assets	71.7	84.4
Intangibles	(87.4)	(93.7)
Partnerships and investments	(26.4)	(28.1)
Accumulated depreciation	(80.4)	(75.5)
Prepaid pension costs	(27.8)	(30.7)
Inventories	(4.9)	(4.4)
Lease right-of-use assets	(10.1)	(10.2)
Other	(1.6)	(0.2)
Total deferred income tax liabilities	(238.6)	(242.8)
Net deferred income tax liabilities	$ (166.9)	$ (158.4)

	2021	2020	2019
Details of taxes			
Earnings (loss) from continuing operations before income taxes			
Domestic	$ 239.3	$ (130.0)	$ 299.7
Foreign	3.4	3.3	(0.3)
Total	$ 242.7	$ (126.7)	$ 299.4
Income tax expense (benefit):			
Current:			
Federal	$ 39.4	$ 40.8	$ 31.4
Foreign	0.6	1.0	0.8
State	8.7	5.6	6.3
Total current	48.7	47.4	38.5
Deferred:			
Federal	3.6	(75.5)	15.1
Foreign	0.6	-	(0.3)
State	4.5	(14.5)	3.8
Total deferred	8.7	(90.0)	18.6
Total income tax expense (benefit)	$ 57.4	$ (42.6)	$ 57.1

(dollar amounts in millions, except share data)

We reviewed our position with regards to foreign unremitted earnings and determined that unremitted earnings will not be permanently reinvested as a result of the Sale. Accordingly, in 2021, we recorded foreign withholding taxes of $0.7 million on approximately $13.0 million of net undistributed earnings of foreign subsidiaries. In 2020, we recorded foreign withholding taxes of $0.9 million on approximately $17.9 million of net undistributed earnings of foreign subsidiaries.

	2021	2020	2019
Reconciliation to U.S. statutory tax rate			
Continuing operations tax expense (benefit) at statutory rate	$ 51.0	$ (26.6)	$ 62.9
(Decrease) increase in valuation allowances on deferred domestic income tax assets	(17.8)	(0.1)	0.1
Expiration of deferred income tax assets	18.3	-	-
State income tax expense (benefit), net of federal impact	11.0	(7.3)	12.4
Capital loss on sale of investment	-	(4.6)	-
Statute closures	(3.8)	(1.3)	(3.8)
State deferred tax adjustments	-	(1.5)	(1.9)
Capital loss utilization on WAVE earnings	-	-	(4.4)
Excess tax benefits on share-based compensation	(0.8)	(0.9)	(3.2)
Tax on foreign and foreign source income	-	-	(1.9)
U.S. permanent differences	(1.3)	(2.2)	(1.8)
Other	0.8	1.9	(1.3)
Tax expense (benefit) at effective rate	$ 57.4	$ (42.6)	$ 57.1

We recognize the tax benefits of an uncertain tax position only if those benefits are more likely than not to be sustained based on existing tax law. Additionally, we establish a reserve for tax positions that are more likely than not to be sustained based on existing tax law, but uncertain in the ultimate benefit to be sustained upon examination by the relevant taxing authorities. Unrecognized tax benefits are subsequently recognized at the time the more likely than not recognition threshold is met, the tax matter is effectively settled or the statute of limitations for the relevant taxing authority to examine and challenge the tax position has expired, whichever is earlier.

We had $35.6 million of Unrecognized Tax Benefits ("UTB") as of December 31, 2021, $17.8 million ($16.8 million, net of federal benefit) of this amount, if recognized in future periods, would impact the reported effective tax rate.

It is reasonably possible that certain UTB's may increase or decrease within the next twelve months due to tax examination changes, settlement activities, expirations of statute of limitations, or the impact on recognition and measurement considerations related to the results of published tax cases or other similar activities. Over the next twelve months we estimate that UTB's may decrease by $1.4 million related to state statutes expiring.

We account for all interest and penalties on uncertain income tax positions as income tax expense. We have $2.5 million of interest and penalties accrued in non-current income tax payable in the Consolidated Balance Sheet as of December 31, 2021.

We had the following activity for UTB's for the years ended December 31, 2021, 2020 and 2019:

	2021	2020	2019
Unrecognized tax benefits balance at January 1,	$ 41.7	$ 34.7	$ 42.6
Gross change for current year positions	1.7	2.3	2.2
Increase for prior period positions	-	8.7	-
Decrease for prior period positions	(3.6)	-	(2.1)
Decrease due to statute expirations	(4.2)	(4.0)	(8.0)
Unrecognized tax benefits balance at December 31,	$ 35.6	$ 41.7	$ 34.7

We file income tax returns in the U.S. and various states and international jurisdictions. In the normal course of business, we are subject to examination by taxing authorities in Canada and the United States. Generally, we have open tax years subject to tax audit on average of between three years and six years. The statute of limitations is no longer open for U.S. federal returns before 2016. With few exceptions, the statute of limitations is no longer open for state or non-U.S. income tax examinations for years before 2018. The 2016 statute of limitations for our U.S. federal return was extended to May 31, 2023 as a result of an ongoing Federal audit. The 2017 statute of limitations for our U.S. federal return expired in October 2021, excluding the 2017 Section 965 Transition Tax, which has a statute period of six years. Under the Tax Cuts and Jobs Act of 2017, the Section 965 Transition Tax related to cumulative earnings and profits of certain foreign subsidiaries that were previously not repatriated and therefore not taxed for U.S. income tax purposes. Except for extending the 2016 statute of limitations, we have not significantly extended any open statutes of limitation for any major jurisdiction and have reviewed and accrued for, where necessary, tax liabilities for open periods.

(dollar amounts in millions, except share data)

	2021	2020	2019
Other taxes			
Payroll taxes	$ 13.4	$ 15.6	$ 16.0
Property, franchise and capital stock taxes	4.4	4.2	3.8

In 2021, we recorded a $5.9 million ERC benefit, representing a refundable payroll tax credit for eligible wages paid to our employees in 2020 and 2021 under the CARES Act. We accounted for the ERC by applying the grant model. Based on our evaluation, we recognized the ERC benefit during 2021, primarily as an offset to payroll tax expenses within cost of goods sold and SG&A expenses in our Consolidated Statements of Operations and Comprehensive Income.

NOTE 17. DEBT

	December 31, 2021	December 31, 2020
Revolving credit facility due 2024	$ 165.0	$ 225.0
Term loan A due 2024	468.7	493.7
Principal debt outstanding	633.7	718.7
Unamortized debt financing costs	(2.3)	(3.2)
Long-term debt	631.4	715.5
Less current portion	25.0	25.0
Total long-term debt, less current portion	$ 606.4	$ 690.5

We have a $1,000.0 million variable rate senior credit facility, which is comprised of a $500.0 million revolving credit facility (with a $150.0 million sublimit for letters of credit) and a $500.0 million Term Loan A. The revolving credit facility and Term Loan A are currently priced at 1.25% over LIBOR. The senior credit facility also has a $25.0 million letter of credit facility, also known as our bi-lateral facility. The revolving credit facility and Term Loan A mature in September 2024.

On September 30, 2019, we refinanced our senior credit facility. In connection with the refinancing, we paid $3.0 million of bank, legal and other fees, of which $2.9 million were capitalized. These fees are reflected as a component of long-term debt and amortized into interest expense over the terms of the underlying debt. Additionally, we wrote off $2.7 million of unamortized debt financing costs, included as a component of interest expense, related to our previous credit facility.

The senior credit facility includes two financial covenants that require the ratio of consolidated EBITDA to consolidated cash interest expense minus cash consolidated interest income to be greater than or equal to 3.0 to 1.0 and requires the ratio of consolidated funded indebtedness, minus AWI and domestic subsidiary unrestricted cash and cash equivalents up to $100 million, to EBITDA to be less than or equal to 3.75 to 1.0. As of December 31, 2021, we were in compliance with all covenants of the senior credit facility.

Our debt agreements include other restrictions, including restrictions pertaining to the incurrence of additional debt, the redemption, repurchase or retirement of our capital stock, payment of dividends, and certain financial transactions as it relates to specified assets. We currently believe that default under these covenants is unlikely.

None of our remaining outstanding debt as of December 31, 2021 was secured with buildings and other assets. The credit lines under our revolving credit facility are subject to immaterial annual commitment fees.

Scheduled payments of long-term debt:

2022	$ 25.0
2023	25.0
2024	583.7

We utilize lines of credit and other commercial commitments in order to ensure that adequate funds are available to meet operating requirements. Letters of credit are currently arranged through our revolving credit facility and our bi-lateral facility. Letters of credit may be issued to third party suppliers, insurance and financial institutions and typically can only be drawn upon in the event of AWI's failure to pay its obligations to the beneficiary. The following table presents details related to our letters of credit facilities:

(dollar amounts in millions, except share data)

	December 31, 2021		
Financing Arrangements	**Limit**	**Used**	**Available**
Bi-lateral facility	$ 25.0	$ 8.4	$ 16.6
Revolving credit facility	150.0	-	150.0
Total	$ 175.0	$ 8.4	$ 166.6

NOTE 18. PENSION AND OTHER BENEFIT PROGRAMS

DEFINED CONTRIBUTION BENEFIT PLANS

We sponsor several defined contribution plans, which cover substantially all U.S. and non-U.S. employees. Eligible employees may defer a portion of their pre-tax covered compensation on an annual basis. We match employee contributions up to pre-defined percentages. Employee contributions are 100% vested. Employer contributions are vested based on pre-defined requirements. Costs for defined contribution benefit plans were $9.1 million in 2021, $8.1 million in 2020 and $7.7 million in 2019.

DEFINED BENEFIT PENSION PLANS

Benefits from defined benefit pension plans are based primarily on an employee's compensation and years of service. We fund our pension plans when appropriate.

Our U.S. defined benefit pension plans include both the qualified, funded RIP and the Retirement Benefit Equity Plan ("RBEP"), which is a nonqualified, unfunded plan designed to provide pension benefits in excess of the limits defined under Sections 415 and 401(a)(17) of the Internal Revenue Code.

In the first quarter of 2020, we entered into agreements with Athene Annuity and Life Company ("AAIA") and Athene Annuity & Life Assurance Company of New York ("AANY") to transfer certain benefit obligations and assets of our RIP to AAIA and AANY. Under the agreements, we effectively settled $1,045.3 million of retiree defined benefit pension obligations related to approximately 10,000 retirees and beneficiaries (the "Transferred Participants"), which were irrevocably transferred to AAIA and AANY and which guarantees the pension benefits of the Transferred Participants. During the third quarter of 2020, these amounts were immaterially adjusted due to customary data reconciliations with AAIA and AANY. The Agreement did not impact our benefit obligations under the RBEP.

As a result of the transaction, we recorded a $374.4 million settlement loss in the first quarter of 2020, which represented the release of amounts previously recorded in AOCI to other non-operating expense. The RIP's assets and liabilities were remeasured as of the settlement date, resulting in a remaining projected benefit obligation of $387.5 million, immediately after remeasurement, which covered approximately 3,000 deferred vested and active participants, and fair value of plan assets of $499.6 million. The discount rate used to determine the projected benefit obligation at the settlement date was 3.07%, compared to 3.16% used as of December 31, 2019. The expected long-term return on plan assets remained at 5.25% and did not change as a result of the settlement.

During the third quarter of 2020, we offered an early retirement incentive benefit to employees at one of our manufacturing plants who met certain age and years of service criteria. The consideration period for eligible employees ended on September 30, 2020. Based on eligible employee elections to participate, we recorded a charge of $2.0 million within other non-operating expense, which increased the projected benefit obligation of the RIP. The enhanced retirement benefits did not result in a curtailment.

We have a defined benefit pension plan in Germany which was not acquired by Knauf in connection with the Sale. This plan uses assumptions which are consistent with, but not identical to, those of the U.S. plans. The accumulated benefit obligation for the non-U.S. defined benefit pension plan was $2.5 million and $2.9 million as of December 31, 2021 and 2020, respectively.

(dollar amounts in millions, except share data)

The following tables summarize the balance sheet impact of our U.S. defined benefit pension plans, as well as the related benefit obligations, assets, funded status and rate assumptions. We use a December 31 measurement date for all our defined benefit pension plans.

	2021	2020
Change in benefit obligations:		
Benefit obligations as of beginning of period	$ 441.7	$ 1,431.4
Service cost	4.8	5.5
Interest cost	9.0	15.5
Settlement payments	-	(1,006.3)
Special termination benefits	-	2.0
Actuarial (gain) loss	(10.9)	31.2
Benefits paid	(9.5)	(37.6)
Benefit obligations as of end of period	$ 435.1	$ 441.7

	2021	2020
Change in plan assets:		
Fair value of plan assets as of beginning of period	$ 520.7	$ 1,478.4
Actual return on plan assets	(7.4)	83.1
Employer contributions	2.9	3.1
Settlement payments	-	(1,006.3)
Benefits paid	(9.5)	(37.6)
Fair value of plan assets as of end of period	$ 506.7	$ 520.7
Funded status	$ 71.6	$ 79.0

	2021	2020
Weighted-average assumptions used to determine benefit obligations at end of period:		
Discount rate	2.98%	2.68%
Rate of compensation increase	3.05%	3.05%
Weighted-average assumptions used to determine net periodic benefit cost for the period:		
Discount rate	2.67%	3.07%
Expected return on plan assets	3.25%	5.25%
Rate of compensation increase	3.05%	3.05%

Basis of Rate-of-Return Assumption

Long-term asset class return assumptions for the RIP are determined based on input from investment professionals on the expected performance of the asset classes over 10 to 30 years. The forecasts were averaged to come up with consensus passive return forecasts for each asset class. Incremental components were added for the expected return from active management and asset class rebalancing based on historical information obtained from investment consultants. These forecasted gross returns were reduced by estimated management fees and expenses, yielding a long-term return forecast of 3.25% and 5.25% for the years ended December 31, 2021 and 2020, respectively.

The accumulated benefit obligation for the U.S. defined benefit pension plans was $433.2 million and $439.6 million as of December 31, 2021 and 2020, respectively. In 2021, the largest contributor to the net actuarial gains affecting the benefit obligations for the defined benefit pension plans was an increase in the discount rates, which was partially offset by other changes in assumptions and changes in census data. In 2020, the largest contributor to the net actuarial losses affecting the benefit obligations for the defined benefit pension plans was a decrease in the discount rates, partially offset by the annuity premium gain in the RIP, an experience gain in the RBEP and other changes in assumptions.

	2021	2020
Pension plans with benefit obligations in excess of assets		
RBEP Projected benefit obligation, December 31	$ 37.4	$ 40.5
RBEP Accumulated benefit obligation, December 31	37.4	40.5

(dollar amounts in millions, except share data)

The components of the pension cost (credit) for the U.S. defined benefit pension plans are as follows:

	2021	2020	2019
Service cost of benefits earned during the period	$ 4.8	$ 5.5	$ 4.8
Interest cost on projected benefit obligation	9.0	15.5	50.3
Expected return on plan assets	(16.5)	(34.5)	(80.1)
Recognized net actuarial loss	3.5	6.3	19.2
Settlement	-	374.4	-
Special termination benefits	-	2.0	-
Net periodic pension cost (credit)	$ 0.8	$ 369.2	$ (5.8)

For 2021, 2020 and 2019, actuarial gains and losses were amortized over the remaining life expectancy of plan participants, which was approximately 27 years for 2021, 28 years for 2020 and 17 years for 2019 for our U.S. defined benefit pension plans.

Investment Policies

U.S. Pension Plans

The RIP's primary investment objective is to maintain the funded status of the plan such that the likelihood we will be required to make significant contributions to the plan is limited. This objective is expected to be achieved by (a) investing a substantial portion of the plan assets in high quality corporate bonds whose duration is at least equal to that of the plan's liabilities, (b) investing in publicly traded equities in order to increase the ratio of plan assets to liabilities over time, (c) limiting investment return volatility by diversifying among additional asset classes with differing expected rates of return and return correlations, and/or (d) using derivatives to either implement investment positions efficiently or to hedge risk but not to create investment leverage.

Each asset class utilized by the RIP has defined asset allocation targets and allowable ranges. The table below shows the asset allocation targets and the December 31, 2021 and 2020 positions for each asset class:

Asset Class	Target Weight at December 31, 2021	Position at December 31, 2021 (1)	Position at December 31, 2020 (1)
Long duration bonds	90.0%	89.0%	89.0%
Equities, real estate and private equity	10.0%	11.0%	11.0%

(1) Investments in collective trust funds as of December 31, 2021 and 2020 have been categorized within the asset classes above based on the underlying investments in those funds.

Pension plan assets are required to be reported and disclosed at fair value. Fair value is defined as 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 on the measurement date. Three levels of inputs may be used to measure fair value:

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

Level 2 - Observable inputs other than quoted prices included in Level 1, such as quoted prices for similar assets and liabilities in active markets; quoted prices for identical or similar assets and liabilities in markets that are not active; or other inputs that are observable or can be corroborated by observable market data.

Level 3 - Unobservable inputs that are supported by little or no market activity and that are significant to the fair value of the assets or liabilities. This includes certain pricing models, discounted cash flow methodologies and similar techniques that use significant unobservable inputs.

The asset's fair value measurement level within the fair value hierarchy is based on the lowest level of any input that is significant to the fair value measurement. Valuation techniques used need to maximize the use of observable inputs and minimize the use of unobservable inputs.

(dollar amounts in millions, except share data)

The following table sets forth by level within the fair value hierarchy a summary of the RIP plan assets measured at fair value on a recurring basis:

Description	Value at December 31, 2021 Level 1	Level 2	Level 3	Total
Collective trust funds - bonds	$ -	$ 451.9	$ -	$ 451.9
Collective trust funds - equities	-	46.8	-	46.8
Cash, other short-term investments and payables, net	(0.3)	1.9	-	1.6
Net assets measured at fair value	$ (0.3)	$ 500.6	$ -	$ 500.3
Investments measured at net asset value as a practical expedient				6.4
Net assets				$ 506.7

Description	Value at December 31, 2020 Level 1	Level 2	Level 3	Total
Collective trust funds - bonds	$ -	$ 460.9	$ -	$ 460.9
Collective trust funds - equities	-	51.4	-	51.4
Cash, other short-term investments and payables, net	(0.3)	0.9	-	0.6
Net assets measured at fair value	$ (0.3)	$ 513.2	$ -	$ 512.9
Investments measured at net asset value as a practical expedient				7.8
Net assets				$ 520.7

The RIP has investments in alternative investment funds as of December 31, 2021 and 2020 which are reported at fair value. These investments that are measured at fair value using the net asset value ("NAV") per share (or its equivalent) practical expedient have not been categorized in the fair value hierarchy. The fair value amounts presented in the tables above are intended to permit reconciliation of the fair value hierarchy to the total fair value of plan assets. We have concluded that the NAV reported by the underlying fund approximates the fair value of the investment. These investments are redeemable at NAV under agreements with the underlying funds. However, it is possible that these redemption rights may be restricted or eliminated by the funds in the future in accordance with the underlying fund agreements. Due to the nature of the investments held by the funds, changes in market conditions and the economic environment may significantly impact the NAV of the funds and, consequently, the fair value of the U.S. defined benefit pension plan asset's interest in the funds. Furthermore, changes to the liquidity provisions of the funds may significantly impact the fair value of the U.S. defined benefit pension plan asset's interest in the funds. As of December 31, 2021, there were no restrictions on redemption of these investments.

The following table sets forth a summary of the RIP's investments measured at NAV:

Description	Value at December 31, 2021 Fair Value	Unfunded Commitments	Redemption Frequency	Redemption Notice Period
Real estate	$ 6.4	$ 2.2	Quarterly	60 days

Description	Value at December 31, 2020 Fair Value	Unfunded Commitments	Redemption Frequency	Redemption Notice Period
Real estate	$ 7.8	$ 2.2	Quarterly	60 days

Following is a description of the valuation methodologies used for assets measured at fair value and at NAV.

Bonds: Consists of registered investment funds and common and collective trust funds investing in fixed income securities tailored to institutional investors. There are no readily available market quotations for registered investment company funds. The fair value of investment funds and common and collective trust funds have been classified as Level 2 assets above as their values were derived based on the underlying securities in the fund's portfolio which is typically the amount which the fund might reasonably expect to receive for the security upon a current sale. Investments in pooled funds traded in a non-active market were valued at bid price and classified as Level 2 assets above.

Collective trust fund: Represents collective trust and funds holding equity investments, fixed income securities, commodity futures contracts, cash and other short-term securities. The fair value of collective trust funds have been classified as Level 2 assets above as their values were derived based on the underlying securities in the fund's portfolio which is typically the amount which the fund might reasonably expect to receive for the security upon a current sale.

(dollar amounts in millions, except share data)

Real estate: Consists of both open-end and closed-end funds. There are no readily available market quotations for these real estate funds. These investments were measured at fair value using the NAV practical expedient.

Cash, other short-term investments and payables: Consists primarily of cash and cash equivalents, and plan receivables/payables. The carrying amounts of cash and cash equivalents and receivables/payables approximate fair value due to the short-term nature of these instruments. Other payables and receivables consist primarily of accrued fees and receivables related to investment positions liquidated for which proceeds had not been received as of December 31.

U.S. DEFINED BENEFIT RETIREE HEALTH AND LIFE INSURANCE PLANS

We fund postretirement benefits on a pay-as-you-go basis, with the retiree paying a portion of the cost for health care benefits by means of deductibles and contributions.

The following tables summarize the balance sheet impact of the U.S. postretirement benefit pension plan, as well as the related benefit obligations, funded status and rate assumptions. We use a December 31 measurement date for all our defined benefit postretirement benefit plans.

	2021	2020
Change in benefit obligations:		
Benefit obligation as of beginning of period	$ 81.4	$ 77.5
Interest cost	1.2	1.9
Plan participants' contributions	1.9	1.9
Actuarial loss	2.0	8.2
Benefits paid	(8.5)	(8.1)
Benefit obligations as of end of period	$ 78.0	$ 81.4

	2021	2020
Change in plan assets:		
Fair value of plan assets as of beginning of period	$ -	$ -
Employer contributions	6.6	6.2
Plan participants' contributions	1.9	1.9
Benefits paid	(8.5)	(8.1)
Fair value of plan assets as of end of period	$ -	$ -
Funded status	$ (78.0)	$ (81.4)

	2021	2020
Weighted-average discount rate used to determine benefit obligations at end of period	2.72%	2.37%
Weighted-average discount rate used to determine net periodic benefit cost for the period	2.35%	3.14%

In 2021, the largest contributor to the actuarial losses affecting the benefit obligations for the postretirement plans was the update to the per capita claims assumption, which was partially offset by an increase in the discount rate. In 2020, the largest contributors to the actuarial losses affecting the benefit obligations for the postretirement plans were the decreases in the discount rates and updates to the per capita claims assumptions.

The components of postretirement benefit (credit) are as follows:

	2021	2020	2019
Service cost of benefits earned during the period	$ -	$ -	$ 0.1
Interest cost on accumulated postretirement benefit obligation	1.2	1.9	2.4
Amortization of prior service (credit)	(0.3)	(0.3)	(0.2)
Amortization of net actuarial gain	(2.2)	(6.6)	(8.5)
Net periodic postretirement benefit (credit)	$ (1.3)	$ (5.0)	$ (6.2)

(dollar amounts in millions, except share data)

For measurement purposes, an average rate of annual increase in the per capita cost of covered health care benefits of 6.6% for pre-65 retirees and 7.1% for post-65 retirees was assumed for 2021, decreasing ratably to an ultimate rate of 4.5% in 2029 and 2027, respectively.

Amounts recognized in assets (liabilities) on the consolidated balance sheets at year end consist of:

	U.S. Pension Plans		Non-U.S. Pension Plan		Retiree Health and Life Insurance Benefits	
	2021	2020	2021	2020	2021	2020
Prepaid pension costs	$ 109.0	$ 119.5	$ -	$ -	$ -	$ -
Accounts payable and accrued expenses	(2.9)	(2.9)	(0.1)	(0.1)	(6.9)	(6.5)
Postretirement benefit liabilities	-	-	-	-	(71.1)	(74.9)
Pension benefit liabilities	(34.5)	(37.6)	(2.4)	(2.8)	-	-
Net amount recognized	$ 71.6	$ 79.0	$ (2.5)	$ (2.9)	$ (78.0)	$ (81.4)

Pre-tax amounts recognized in accumulated other comprehensive (loss) income at year end consist of:

	U.S. Pension Plans		Retiree Health and Life Insurance Benefits	
	2021	2020	2021	2020
Net actuarial (loss) gain	$ (152.1)	$ (142.6)	$ 13.7	$ 17.9
Prior service credit	-	-	1.4	1.7
Accumulated other comprehensive (loss) income	$ (152.1)	$ (142.6)	$ 15.1	$ 19.6

The following benefit payments, which reflect expected future service, as appropriate, are expected to be paid over the next ten years for our U.S. plans:

	U.S. Pension Benefits [1]	Retiree Health and Life Insurance Benefits, Net
2022	$ 15.7	$ 6.9
2023	17.4	6.6
2024	19.6	6.3
2025	20.6	6.0
2026	21.8	5.7
2027 - 2031	118.4	23.7

(1) We were not required and did not make contributions to the RIP during 2021, 2020 or 2019 as, based on guidelines established by the Pension Benefit Guaranty Corporation, the RIP had sufficient assets to fund its distribution obligations. Benefit payments to RIP participants have been made directly from the RIP while benefit payments under the RBEP are made from Company cash.

NOTE 19. FINANCIAL INSTRUMENTS AND CONTINGENT CONSIDERATION

We do not hold or issue financial instruments for trading purposes. The estimated fair values of our financial instruments and contingent consideration are as follows:

	December 31, 2021		December 31, 2020	
	Carrying amount	Estimated fair value	Carrying amount	Estimated fair value
(Liabilities), net:				
Total long-term debt, including current portion	$ (631.4)	$ (626.0)	$ (715.5)	$ (715.5)
Interest rate swap contracts	(14.2)	(14.2)	(28.9)	(28.9)
Acquisition-related contingent consideration	(12.8)	(12.8)	(16.9)	(16.9)

The carrying amounts of cash and cash equivalents, receivables, accounts payable, and accrued expenses approximate fair value because of the short-term maturity of these instruments. The fair value estimates of long-term debt are based on quotes from a major financial institution of recently observed trading levels of our Term Loan A debt. The fair value estimates for interest rate swap contracts are estimated by obtaining quotes from major financial institutions with verification by internal valuation models. We engage independent, third-party valuation specialists to determine the fair value estimates for acquisition-related contingent consideration payable based upon future years' performance, which are measured using a Monte Carlo simulation. The carrying amount of contingent consideration liabilities payable based on historical results are equal to their fair value as milestone achievements are known.

(dollar amounts in millions, except share data)

The fair value measurement of liabilities measured at fair value on a recurring basis and reported on the Consolidated Balance Sheets is summarized below:

	December 31, 2021		December 31, 2020	
	Fair value based on		Fair value based on	
	Other observable inputs Level 2	Other unobservable inputs Level 3	Other observable inputs Level 2	Other unobservable inputs Level 3
(Liabilities), net:				
Interest rate swap contracts	$ (14.2)	$ -	$ (28.9)	$ -
Acquisition-related contingent consideration	-	(4.2)	-	(16.9)

As of December 31, 2021, the acquisition-related contingent consideration liability includes $8.6 million related to the final achievement of certain financial and performance milestones through December 31, 2021 for the Moz and Turf acquisitions, which we expect to pay in the first quarter 2022 and are classified as current liabilities. The remaining acquisition-related contingent consideration liability represents the estimated fair value of additional cash consideration payable related to the Turf acquisition upon the achievement of certain financial and performance milestones through December 31, 2022, and was measured based on a Monte Carlo Simulation and is classified as a non-current liability.

Acquisition-related contingent consideration of $4.2 million and $16.9 million as of December 31, 2021 and 2020, respectively, was measured with the use of significant unobservable inputs, which included financial projections over the earn-out period, the volatility of the underlying financial metrics and estimated discount rates. All changes in the contingent consideration liability subsequent to the initial acquisition-date measurements were recorded as a component of operating income on our Consolidated Statements of Operations and Comprehensive Income.

The following table summarizes the weighted-average of the significant unobservable inputs as of December 31, 2021:

	Turf
Unobservable input	
Volatility	22.2%
Discount rates	2.7%

Unobservable inputs were weighted based on the relative fair value of the components of contingent consideration. See Note 5 for further information.

The changes in fair value of the acquisition-related contingent consideration liability for the year ended December 31, 2021 and 2020 were as follows:

	Fair Value of Contingent Consideration
Balance as of January 1, 2020	$ -
Acquisition date fair value of Moz contingent consideration	2.7
Acquisition date fair value of Turf contingent consideration	14.1
Loss related to change in fair value of contingent consideration	0.1
Balance as of December 31, 2020	$ 16.9
(Gain) related to change in fair value of contingent consideration	(4.1)
Balance as of December 31, 2021	$ 12.8

(dollar amounts in millions, except share data)

During 2021, we recorded remeasurement gains of $4.1 million for the changes in fair value of acquisition-related contingent consideration. These changes in fair value were primarily due to changes in the Turf and Moz actual results or financial projections over each entity's respective earn-out period.

NOTE 20. DERIVATIVE FINANCIAL INSTRUMENTS

We are exposed to market risk from changes in foreign exchange rates, interest rates and commodity prices that could impact our results of operations, cash flows and financial condition. We use interest rate derivatives to manage our exposures to interest rates. At inception, interest rate swap derivatives that we designate as hedging instruments are formally documented as a hedge of a forecasted transaction or cash flow hedge. We also formally assess, both at inception and at least quarterly thereafter, whether the derivatives that are used in hedging transactions are highly effective in offsetting changes in the cash flows of the hedged item. If it is determined that a derivative ceases to be a highly effective hedge, or if the anticipated transaction is no longer probable of occurring, we discontinue hedge accounting and any future mark-to-market adjustments are recognized in earnings. We use derivative financial instruments as risk management tools and not for speculative trading purposes.

Counterparty Risk

We only enter into derivative transactions with established financial institution counterparties having an investment-grade credit rating. We monitor counterparty credit ratings on a regular basis. All of our derivative transactions with counterparties are governed by master International Swap and Derivatives Association agreements ("ISDAs") with netting arrangements. These agreements can limit our exposure in situations where we have gain and loss positions outstanding with a single counterparty. We do not post nor do we receive cash collateral with any counterparty for our derivative transactions. These ISDAs do not have any credit contingent features; however, a default under our bank credit facility would trigger a default under these agreements. Exposure to individual counterparties is controlled and we consider the risk of counterparty default to be negligible.

Interest Rate Risk

We utilize interest rate swaps to minimize the fluctuations in earnings caused by interest rate volatility. These swaps are designated as cash flow hedges against changes in the London Interbank Offered Rate ("LIBOR") for a portion of our variable rate debt. The following table summarizes our interest rate swaps as of December 31, 2021:

Trade Date	Notional Amount		Coverage Period	Risk Coverage
November 28, 2018	$	200.0	November 2018 to November 2023	USD-LIBOR
November 28, 2018	$	100.0	March 2021 to March 2025	USD-LIBOR
March 6, 2020	$	50.0	March 2020 to March 2022	USD-LIBOR
March 10, 2020	$	50.0	March 2021 to March 2024	USD-LIBOR
March 11, 2020	$	50.0	March 2021 to March 2024	USD-LIBOR

Under the terms of our interest rate swaps above, we pay a fixed rate monthly and receive 1-month LIBOR, inclusive of a 0% floor.

Financial Statement Impacts

The following tables detail amounts related to our derivatives as of December 31, 2021 and 2020. We did not have any derivative assets or liabilities not designated as hedging instruments as of December 31, 2021 or 2020. The derivative asset and liability amounts below are shown gross and have not been netted.

	Derivative Assets						**Derivative Liabilities**				
		Fair Value						**Fair Value**			
	Balance Sheet Location	**December 31, 2021**		**December 31, 2020**		**Balance Sheet Location**		**December 31, 2021**		**December 31, 2020**	
Interest rate swap contracts	Other current assets	$	-	$	-	Accounts payable and accrued expenses		$	0.1	$	0.5
Interest rate swap contracts	Other non-current assets		0.4		-	Other long-term liabilities			14.5		28.4

(dollar amounts in millions, except share data)

	Amount of Gain (Loss) Recognized in AOCI			Location of Gain (Loss) Reclassified from AOCI into Net Earnings (Loss)	Gain (Loss) Reclassified from AOCI into Net Earnings (Loss)		
	2021	2020	2019		2021	2020	2019
Derivatives in cash flow hedging relationships							
Interest rate swap contracts	21.9	(8.6)	(20.0)	Interest expense	8.5	5.6	(1.4)

As of December 31, 2021, the amount of existing losses in AOCI expected to be recognized in earnings over the next twelve months was $7.0 million.

NOTE 21. OTHER LONG-TERM LIABILITIES

	December 31, 2021	December 31, 2020
Long-term deferred compensation arrangements	$ 17.6	$ 14.8
Fair value of derivative liabilities	14.5	28.4
Environmental insurance recoveries received in excess of cumulative expenses incurred	4.8	5.0
Acquisition-related contingent consideration	4.2	16.9
Other	5.6	11.4
Total other long-term liabilities	$ 46.7	$ 76.5

NOTE 22. SHARE-BASED COMPENSATION PLANS

The 2016 Long-Term Incentive Plan ("2016 LTIP") authorizes us to issue stock options, stock appreciation rights, restricted stock awards, stock units, performance-based awards and cash awards to officers and key employees and expires on July 8, 2026, after which time no further awards may be made. The 2016 LTIP authorizes us to issue up to 2,803,242 shares of common stock, which includes all shares that have been issued under the 2016 LTIP. As of December 31, 2021, 1,040,066 shares were available for future grants under the 2016 LTIP, which includes anticipated future adjustments to shares for performance-based awards that have been previously granted.

The 2016 Directors Stock Unit Plan ("2016 Director's Plan") authorizes us to issue stock units to non-employee directors until July 2026. The 2016 Director's Plan authorizes us to issue up to 250,000 shares of common stock, which includes all shares that have been issued under the 2016 Director's Plan. As of December 31, 2021, 158,904 shares were available for future grants under the 2016 Director's Plan.

The 2020 Inducement Award Plan ("2020 Inducement Plan") authorizes us to issue stock options, stock appreciation rights, restricted stock awards and stock units to key employees and expires on December 14, 2030, after which time no further awards may be made. The 2020 Inducement Plan authorizes us to issue up to 19,000 shares of common stock. As of December 31, 2021, 3,452 shares were available for future grants under the 2020 Inducement Plan.

The following table presents stock option activity for the year ended December 31, 2021:

	Number of shares (thousands)	Weighted-average exercise price	Weighted-average remaining contractual term (years)	Aggregate intrinsic value (millions)
Option shares outstanding, December 31, 2020	139.6	$ 42.41		
Option shares exercised	(66.1)	$ 38.37		
Option shares outstanding, December 31, 2021	73.5	$ 46.05	1.4	$ 5.2
Option shares exercisable, vested and expected to vest, December 31, 2021	73.5	$ 46.05	1.4	$ 5.2

We have reserved sufficient authorized shares to allow us to issue new shares upon exercise of all outstanding options. Options generally become exercisable in three years and expire 10 years from the date of grant. When options are exercised, we may issue new shares, use treasury shares (if available), acquire shares held by investors, or a combination of these alternatives in order to satisfy the option exercises.

(dollar amounts in millions, except share data)

The following table presents information related to stock option exercises:

	2021	2020	2019
Total intrinsic value of stock options exercised	$ 4.1	$ 5.6	$ 15.9
Cash proceeds received from stock options exercised	2.5	4.7	14.5
Tax deduction realized from stock options exercised	0.4	1.2	3.3

The fair value of option grants was estimated on the date of grant using the Black-Scholes option pricing model. There have been no option grants since 2014.

We also grant non-vested stock awards in the form of Restricted Stock Units (“RSUs”), Performance Stock Units (“PSUs”) and Restricted Stock Awards ("RSAs"). A summary of the 2021 activity related to the RSUs, PSUs and RSAs is as follows:

	Non-Vested Stock Awards					
	RSUs		PSUs		RSAs	
	Number of shares (thousands)	Weighted-average fair value at grant date	Number of shares (thousands)	Weighted-average fair value at grant date	Number of shares (thousands)	Weighted-average fair value at grant date
December 31, 2020	66.8	$ 83.14	330.3	$ 75.49	94.2	$ 77.96
Granted	23.6	92.30	113.8	102.46	-	-
Performance adjustments	-	-	23.1	52.56	-	-
Vested	(22.1)	(78.32)	(148.4)	(55.63)	(21.1)	(77.88)
Forfeited	(3.3)	(86.23)	(17.0)	(93.03)	(0.5)	(77.22)
December 31, 2021	65.0	$ 87.94	301.8	$ 92.74	72.6	$ 77.99

RSUs entitle the recipient to a specified number of shares of AWI’s common stock provided the prescribed service period is fulfilled. PSUs entitle the recipient to a specified number of shares of AWI’s common stock provided the defined financial targets are achieved at the end of the performance period. Upon vesting, final adjustments based upon financial achievements are reflected as performance adjustments in the table above. RSUs and PSUs generally have vesting periods of three years at the grant date. RSUs and PSUs earn dividends during the vesting period that are subject to forfeiture if the awards do not vest.

In connection with the acquisition of Arktura in 2020, we issued RSAs to the sellers as of the acquisition date. These awards to sellers were not issued under the 2020 Inducement Plan and have a vesting period of five years from the grant date and earn dividends during the vesting period, which are subject to forfeiture if the awards do not vest. We also issued RSAs under the 2020 Inducement Plan to key employees as of the acquisition date, which have a vesting period of three years from the grant date and earn dividends during the vesting period, which are subject to forfeiture if the awards do not vest. Upon forfeiture, the key employee awards transfer to the Arktura sellers.

RSUs, PSUs and RSAs with non-market based performance conditions are measured at fair value based on the closing price of our stock on the date of grant. In 2021 and 2020, we granted 54,231 and 42,698 PSUs, respectively, with market-based performance conditions that are valued through the use of a Monte Carlo simulation. The weighted average assumptions for PSUs measured at fair value through the use of a Monte Carlo simulation are presented in the table below.

	2021	2020
Weighted-average grant date fair value of market-based PSUs granted (dollars per award)	$ 117.85	$ 97.75
Assumptions		
Risk-free rate of return	0.3%	1.2%
Expected volatility	37.0%	23.8%
Expected term (in years)	3.1	3.1
Expected dividend yield	0.0%	0.0%

The risk-free rate of return was determined based on the implied yield available on zero coupon U.S. Treasury bills at the time of grant with a remaining term equal to the expected term of the PSUs. The expected volatility was based on historical volatility of our stock price commensurate with the expected term of the PSUs. The expected term represented the performance period on the underlying award. The expected dividend yield was assumed to be zero under the assumption that dividends distributed during the performance period are reinvested in AWI’s common stock.

(dollar amounts in millions, except share data)

In addition to the equity awards described above, we distributed 11,773 fully-vested phantom shares issued under the 2006 Phantom Stock Unit Plan. These awards are settled in cash and had vesting periods of one to three years. The total liability recorded for these shares as of December 31, 2020 was $1.2 million, which included non-forfeitable dividends. This liability was settled on January 5, 2021 and there are no shares outstanding under the plan as of December 31, 2021. The 2006 Phantom Stock Unit Plan is still in place, however, no additional shares will be granted under the plan.

As of December 31, 2021 and 2020, there were 130,393 and 126,474 RSUs, respectively, outstanding under the 2016 Directors Stock Unit Plan not reflected in the non-vested stock awards table above. In 2021 and 2020, we granted 8,314 and 12,278 restricted stock units, respectively, to non-employee directors. These awards generally have a vesting period of one year, and as of December 31, 2021 and 2020, 122,079 and 114,196 shares, respectively, were vested but not yet delivered. The awards are generally payable upon vesting or the director's deferral election. These awards earn dividends during the vesting period that are subject to forfeiture if the underlying award does not vest.

We recognize share-based compensation expense on a straight-line basis over the vesting period. Share-based compensation cost was $11.3 million ($8.5 million net of tax benefit) in 2021, $6.9 million ($5.1 million net of tax benefit) in 2020, and $8.4 million ($6.3 million net of tax benefit) in 2019.

As of December 31, 2021, there was $19.3 million of total unrecognized compensation cost related to non-vested share-based compensation arrangements which is expected to be recognized over a weighted-average period of 2.4 years.

NOTE 23. EMPLOYEE COSTS

	2021	2020	2019
Wages, salaries and incentive compensation	$ 259.9	$ 207.6	$ 201.8
Payroll taxes	13.4	15.6	16.0
Defined contribution and defined benefit pension plan expense, net	10.0	1.0	2.0
Insurance and other benefit costs	28.2	25.1	21.9
Share-based compensation	11.3	6.9	8.4
Total	$ 322.8	$ 256.2	$ 250.1

NOTE 24. SHAREHOLDERS' EQUITY

Common Stock Repurchase Plan

Since July 29, 2016, our Board of Directors has approved our share repurchase program pursuant to which we are authorized to repurchase up to $1,200.0 million of our outstanding shares of common stock through December 31, 2023 (the "Program"). We had $513.8 million remaining under the Board's repurchase authorization as of December 31, 2021.

Repurchases under the Program may be made through open market, block and privately negotiated transactions, including Rule 10b5-1 plans, at such times and in such amounts as management deems appropriate, subject to market and business conditions, regulatory requirements and other factors. The Program does not obligate AWI to repurchase any particular amount of common stock and may be suspended or discontinued at any time without notice.

During 2021, we repurchased 0.8 million shares under the Program for a total cost of $80.0 million, excluding commissions, or an average price of $101.92 per share. Since inception, we have repurchased 10.5 million shares under the Program for a total cost of $686.2 million, excluding commissions, or an average price of $65.31 per share.

Dividends

In February, April and July 2021, our Board of Directors declared $0.21 per share quarterly dividends, which were paid to shareholders in March, May and August 2021. In October 2021, our Board of Directors declared a $0.231 per share quarterly dividend, which was paid to shareholders in November 2021. On February 16, 2022, our Board of Directors declared a $0.231 per share quarterly dividend to be paid in March 2022.

(dollar amounts in millions, except share data)

Accumulated Other Comprehensive (Loss)

The balance of each component of accumulated other comprehensive (loss), net of tax is presented in the table below.

	December 31, 2021	December 31, 2020
Foreign currency translation adjustments	$ 2.3	$ 2.3
Derivative (loss), net	(9.1)	(19.0)
Pension and postretirement adjustments	(102.8)	(92.6)
Accumulated other comprehensive (loss)	$ (109.6)	$ (109.3)

The amounts and related tax effects allocated to each component of other comprehensive income (loss) for 2021, 2020, and 2019 are presented in the tables below.

	Pre-tax Amount	Tax (Expense) Benefit	After-tax Amount
2021			
Derivative gain, net	$ 13.4	$ (3.5)	$ 9.9
Pension and postretirement adjustments	(13.4)	3.2	(10.2)
Total other comprehensive (loss)	$ -	$ (0.3)	$ (0.3)

	Pre-tax Amount	Tax Benefit (Expense)	After-tax Amount
2020			
Foreign currency translation adjustments	$ (7.1)	$ -	$ (7.1)
Derivative (loss), net	(14.2)	3.7	(10.5)
Pension and postretirement adjustments	382.9	(98.5)	284.4
Total other comprehensive income (loss)	$ 361.6	$ (94.8)	$ 266.8

	Pre-tax Amount	Tax Benefit (Expense)	After-tax Amount
2019			
Foreign currency translation adjustments	$ 84.1	$ -	$ 84.1
Derivative (loss), net	(18.8)	4.9	(13.9)
Pension and postretirement adjustments	16.8	(3.6)	13.2
Total other comprehensive income	$ 82.1	$ 1.3	$ 83.4

The following table summarizes the activity, by component, related to the change in AOCI for December 31, 2021 and 2020:

	Foreign Currency Translation Adjustments	Derivative Gain (Loss) (1)	Pension and Postretirement Adjustments (1)	Total Accumulated Other Comprehensive (Loss) (1)
Balance, December 31, 2019	$ 9.4	$ (8.5)	$ (377.0)	$ (376.1)
Other comprehensive (loss) income before reclassifications, net of tax benefit (expense) of $ -, $2.5, ($3.0) and ($0.5)	(0.2)	(6.1)	6.1	(0.2)
Amounts reclassified from accumulated other comprehensive (loss)	(6.9)	(4.4)	278.3	267.0
Net current period other comprehensive (loss) income	(7.1)	(10.5)	284.4	266.8
Balance, December 31, 2020	2.3	(19.0)	(92.6)	(109.3)
Other comprehensive income (loss) before reclassifications, net of tax (expense) benefit of $-, ($5.4), $3.5 and ($1.9)	-	16.5	(11.0)	5.5
Amounts reclassified from accumulated other comprehensive (loss)	-	(6.6)	0.8	(5.8)
Net current period other comprehensive income (loss)	-	9.9	(10.2)	(0.3)
Balance, December 31, 2021	$ 2.3	$ (9.1)	$ (102.8)	$ (109.6)

(1) Amounts are net of tax

(dollar amounts in millions, except share data)

The amounts reclassified from AOCI and the affected line item of the Consolidated Statement of Operations and Comprehensive Income are presented in the table below.

	Amounts Reclassified from Accumulated Other Comprehensive (Loss) 2021	Amounts Reclassified from Accumulated Other Comprehensive (Loss) 2020	Affected Line Item in the Consolidated Statement of Operations and Comprehensive Income
Derivative Adjustments:			
Interest rate swap contracts, before tax	$ (8.5)	$ (5.6)	Interest expense
Tax impact	1.9	1.2	Income tax expense
Total (income), net of tax	(6.6)	(4.4)	
Pension and Postretirement Adjustments:			
Prior service credit amortization	(0.3)	(0.3)	Other non-operating (income) expense, net
Amortization of net actuarial loss (gain)	1.4	(0.3)	Other non-operating (income) expense, net
Settlement	-	374.4	Other non-operating (income) expense, net
Total loss, before tax	1.1	373.8	
Tax impact	(0.3)	(95.5)	Income tax expense
Total loss, net of tax	0.8	278.3	
Foreign Currency Translation Adjustments:			
Sale of idled plant in China	-	(6.9)	
Total (income), net of tax	-	(6.9)	
Total reclassifications for the period	$ (5.8)	$ 267.0	

NOTE 25. SUPPLEMENTAL FINANCIAL INFORMATION

	2021	2020	2019
Selected operating expense			
Maintenance and repair costs	$ 41.9	$ 38.1	$ 41.4
Product innovation costs	14.6	14.7	14.8
Advertising costs	8.0	6.8	7.0
Other non-operating (income) expense, net			
Interest income	$ (0.1)	$ (0.3)	$ (3.2)
Pension and postretirement (credits) cost	(5.3)	358.7	(16.9)
Other	(0.2)	(1.0)	(0.3)
Total	$ (5.6)	$ 357.4	$ (20.4)

NOTE 26. RELATED PARTIES

For some customers, we purchase grid products from WAVE, our 50%-owned joint venture with Worthington, for resale to customers. The total amount of these purchases was $27.9 million in 2021, $21.5 million in 2020 and $22.5 million in 2019. We also provide certain selling, promotional and administrative processing services to WAVE for which we receive reimbursement. Those services amounted to $21.6 million in 2021, $20.7 million in 2020, and $15.7 million in 2019. The net amount due to WAVE from us for all of our relationships was $4.3 million as of December 31, 2021 and $4.9 million as of December 31, 2020. See Note 11 to the Consolidated Financial Statements for additional information.

NOTE 27. LITIGATION AND RELATED MATTERS

ENVIRONMENTAL MATTERS

Environmental Compliance

Our manufacturing and research facilities are affected by various federal, state and local requirements relating to the discharge of materials and the protection of the environment. We make expenditures necessary for compliance with applicable environmental requirements at each of our operating facilities. While these expenditures are not typically material, the applicable regulatory requirements continually change and, as a result, we cannot predict with certainty the amount, nature or timing of future expenditures associated with environmental compliance.

Environmental Sites

Summary

We are actively involved in the investigation and remediation of existing or potential environmental contamination under the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA") and state Superfund and similar environmental laws at two domestically owned locations allegedly resulting from past industrial activity.

In each location, we are one of multiple potentially responsible parties and have agreed to jointly fund the required investigation and remediation, while preserving our defenses to the liability. We may also have rights of contribution or reimbursement from other parties or coverage under applicable insurance policies. We are currently pursuing coverage and recoveries under those policies with respect to certain of the sites, including the Macon, GA site and the Elizabeth City, NC site, each of which is summarized below. These efforts have included two active and independent litigation matters against legacy primary and excess policy insurance carriers for recovery of fees and costs incurred by us in connection with our investigation and remediation activities for such sites. Other than disclosed below, we are unable to predict the outcome of these matters or the timing of any recoveries, whether through settlement or otherwise. We are also unable to predict the extent to which any recoveries might cover our final share of investigation and remediation costs for these sites. Our final share of investigation and remediation costs may exceed any such recoveries, and such amounts net of insurance recoveries may be material.

Between 2017 and 2020, we entered settlement agreements totaling $52.5 million with certain legacy insurance carriers to resolve ongoing litigation and recover fees and costs previously incurred by us in connection with certain environmental sites. These settlements were recorded as a $9.2 million reduction to cost of goods sold and a $38.3 million reduction to SG&A expenses reflecting the same income statement categories where environmental expenditures were historically recorded. In 2020, cumulative insurance recoveries exceeded cumulative expenses to date related to the respective environmental sites and the excess $5.0 million was recorded within our long-term liabilities as of December 31, 2020. The excess recoveries will be released to offset any future expenses incurred on the respective environmental sites. In 2021, we entered into a new settlement agreement totaling $0.5 million and the balance of insurance recoveries in excess of cumulative expenses as of December 31, 2021 was $4.8 million. We anticipate that we may enter into additional settlement agreements in the future, which may or may not be material, with other legacy insurers to obtain reimbursement or contribution for environmental site expenses.

Estimates of our future liability at the environmental sites are based on evaluations of currently available facts regarding each individual site. We consider factors such as our activities associated with the site, existing technology, presently enacted laws and regulations and prior company experience in remediating contaminated sites. Although current law imposes joint and several liability on all parties at Superfund sites, our contribution to the remediation of these sites is expected to be limited by the number of other companies potentially liable for site remediation. As a result, our estimated liability reflects only our expected share. In determining the probability of contribution, we consider the solvency of other parties, the site activities of other parties, whether liability is being disputed, the terms of any existing agreements and experience with similar matters, and the effect of our October 2006 Chapter 11 reorganization upon the validity of the claim, if any.

Specific Material Events

Macon, GA

The U.S. Environmental Protection Agency (the "EPA") has listed two landfills located on a portion of our facility in Macon, GA, along with the former Macon Naval Ordnance Plant landfill adjacent to our property, portions of Rocky Creek, and certain tributaries leading to Rocky Creek (collectively, the "Macon Site") as a Superfund site on the National Priorities List due to the presence of contaminants, most notably polychlorinated biphenyls (“PCBs”).

In September 2010, we entered into an Administrative Order on Consent for a Removal Action (the “Removal Action”) with the EPA to investigate PCB contamination in one of the landfills on our property, the Wastewater Treatment Plant Landfill (the “WWTP Landfill,” also known as “Operable Unit 1”). After completing an investigation of the WWTP Landfill and submitting our final Engineering Evaluation/Cost Analysis, the EPA issued an Action Memorandum in July 2013 selecting our recommended remedy for the Removal Action. The Operable Unit 1 response action for the WWTP Landfill is complete and the final report was submitted to the EPA on October 11, 2016. The EPA approved the final report on November 28, 2016, and a Post-Removal Control Plan (the “Plan”) was submitted to the EPA on March 28, 2017. That Plan required us to monitor the effectiveness of the WWTP Landfill response action over a five-year period.

It is probable that we will incur field investigation, engineering and oversight costs associated with a Remedial Investigation and Feasibility Study (“RI/FS”) with respect to the remainder of the Superfund site, which includes the other landfill on our property, as well as areas on and adjacent to our property and Rocky Creek (the “Remaining Site,” also known as “Operable Unit 2”). On September 25, 2015, AWI and other Potential Responsible Parties (“PRPs”) received a Special Notice Letter from the EPA under CERCLA inviting AWI and the PRPs to enter into the negotiation of an agreement to conduct an RI/FS of Operable Unit 2. We and the other PRPs entered into a settlement agreement with the EPA effective September 18, 2018, in response to the Special Notice Letter to conduct the RI/FS. The PRPs submitted a complete RI/FS work plan, which was approved by the EPA on September 11, 2019. Investigative work on this portion of the site commenced in December 2019. In June 2021, the PRPs submitted the Site Characterization Summary Report (SCSR) for Operable Unit 2 to the EPA. The purpose of the SCSR is to demonstrate that the available data for Operable Unit 2 is adequate for the risk assessment and for the development of remedial action objectives. Additional investigative work for Operable Unit 2 continues in preparation of a Baseline Ecological Risk Assessment to be submitted to the EPA in 2022. We may ultimately incur costs in remediating any contamination discovered during the RI/FS. The current estimate of future liability at this site includes only our estimated share of the costs of the investigative work that the EPA is requiring the PRPs to perform at this time. We are unable to reasonably estimate our final share of the total costs associated with the investigation work or any resulting remediation therefrom, although such amounts may be material to any one quarter's or year's results of operations in the future. We do not expect the total future costs to have a material adverse effect on our liquidity or financial condition as the cash payments may be made over many years.

<u>*Elizabeth City, NC*</u>

This site is a former cabinet manufacturing facility that was operated by Triangle Pacific Corporation, now known as Armstrong Wood Products, Inc. (“Triangle Pacific” or “AWP”), from 1977 until 1996. The site was formerly owned by the U.S. Navy (“Navy”) and Westinghouse, now CBS Corporation (“CBS”). We assumed ownership of the site when we acquired the stock of Triangle Pacific in 1998. Prior to our acquisition, the North Carolina Department of Environment and Natural Resources listed the site as a hazardous waste site. In 1997, Triangle Pacific entered into a cost sharing agreement with Westinghouse whereby the parties agreed to share equally in costs associated with investigation and potential remediation. In 2000, Triangle Pacific and CBS entered into an Administrative Order on Consent to conduct an RI/FS with the EPA for the site. In 2007, we and CBS entered into an agreement with the Navy whereby the Navy agreed to pay one third of defined past and future investigative costs up to a certain amount, which has now been exhausted. The EPA approved the RI/FS work plan in August 2011. In January 2014, we submitted the draft Remedial Investigation and Risk Assessment reports and conducted supplemental investigative work based upon agency comments to those reports. In connection with the separation of Armstrong Flooring, Inc. in 2016, we agreed to retain any legacy environmental liabilities associated with the AWP site. The EPA published an Interim Action Proposed Plan for the site in April 2018 seeking public comment through June 7, 2018. The EPA evaluated comments, including ours, and has published its Interim Record Of Decision selecting an interim cleanup approach. On September 25, 2018, AWI and CBS received a Special Notice Letter from the EPA under CERCLA inviting AWI and CBS to enter into the negotiation of a settlement agreement to conduct or finance the response action at the site. During the third quarter of 2018, we increased our reserve for the cost of the interim cleanup, which we expect to be shared with CBS and the Navy. In response to the September 2018 Special Notice Letter, we and CBS submitted a good faith offer to the EPA on May 28, 2019. In June 2021, we entered into a negotiated Partial Consent Decree and Site Participation Agreement with the EPA and the PRPs for the remedial design and remedial action to be completed by the parties at the site. The Partial Consent Decree for Remedial Design and Remedial Action was entered by the U.S. District Court for the Eastern District of North Carolina in January 2022. The current estimate of future liability at this site includes only our estimated share of the costs of the interim remedial action that, at this time, we anticipate the EPA will require the PRPs to perform. We are unable to reasonably estimate our final share of the total costs associated with the final remediation or any resulting remediation therefrom, although such amounts may be material to any one quarter’s or year’s results of operations in the future. We do not expect the total future costs to have a material adverse effect on our liquidity or financial condition as the cash payments may be made over many years.

Summary of Financial Position

Total liabilities of $0.7 million and $1.2 million as of December 31, 2021 and 2020, respectively, were recorded for environmental liabilities that we consider probable and for which a reasonable estimate of the probable liability could be made. As of December 31, 2021 and 2020, $0.2 million and $0.3 million, respectively, were reflected within accounts payable and accrued expenses. During 2021, we recorded $0.2 million of additional reserves for potential environmental liabilities. As noted above, the expense associated with the additional reserves recorded in 2021 was offset through the release of a portion of the balance of insurance recoveries in excess of cumulative expenses. During 2020, we did not record any additional reserves for potential environmental liabilities. Where existing data is sufficient to estimate the liability, that estimate has been used; where only a range of probable liabilities is available and no amount within that range is more likely than any other, the lower end of the range has been used. As assessments and remediation activities progress at each site, these liabilities are reviewed to reflect new information as it becomes available and adjusted to reflect amounts actually incurred and paid. These liabilities are undiscounted.

The estimated environmental liabilities above do not take into account any claims for additional recoveries from insurance or third parties. It is our policy to record insurance recoveries as assets in the Consolidated Balance Sheets when realizable. We incur costs to pursue environmental insurance recoveries, which are expensed as incurred.

Actual costs to be incurred at identified sites may vary from our estimates. Based on our knowledge of the identified sites, it is not possible to reasonably estimate future costs in excess of amounts already recognized.

OTHER CLAIMS

From time to time, we are involved in other various lawsuits, claims, investigations and other legal matters that arise in the ordinary course of business, including matters involving our products, intellectual property, relationships with suppliers, relationships with distributors, relationships with competitors, employees and other matters. In connection with those matters, we may have rights of contribution or reimbursement from other parties or coverage under applicable insurance policies. When applicable and appropriate, we will pursue coverage and recoveries under those policies, but are unable to predict the outcome of those demands. While complete assurance cannot be given to the outcome of any proceedings relating to these matters, we do not believe that any current claims, individually or in the aggregate, will have a material adverse effect on our financial condition, liquidity or results of operations.

NOTE 28. EARNINGS PER SHARE

The following table is a reconciliation of earnings (loss) to earnings (loss) attributable to common shares used in our basic and diluted Earnings (Loss) Per Share ("EPS") calculations for the years ended December 31, 2021, 2020 and 2019. EPS components may not add due to rounding.

	2021	2020	2019
Earnings (loss) from continuing operations	$ 185.3	$ (84.1)	$ 242.3
(Earnings) allocated to participating vested share awards	(0.3)	(0.1)	(0.5)
Earnings (loss) from continuing operations attributable to common shares	$ 185.0	$ (84.2)	$ 241.8

The following table is a reconciliation of basic shares outstanding to diluted shares outstanding for the years ended December 31, 2021, 2020 and 2019 (shares in millions):

	2021	2020	2019
Basic shares outstanding	47.6	47.9	48.7
Dilutive effect of common stock equivalents	0.3	-	0.8
Diluted shares outstanding	47.9	47.9	49.5

Anti-dilutive stock awards excluded from the computation of dilutive EPS for 2021, 2020 and 2019 were 8,548, 313,003 and 7,580, respectively. Due to the net loss for the year ended December 31, 2020, all common stock equivalents were considered anti-dilutive.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

Not applicable.

ITEM 9A. CONTROLS AND PROCEDURES

Our management, with the participation of our chief executive officer and our chief financial officer, performed an evaluation of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) of the Securities Exchange Act of 1934 ("Exchange Act")) as of December 31, 2021. Our chief executive officer and our chief financial officer have concluded that our disclosure controls and procedures were effective insofar as they are designed to provide reasonable assurance that information required to be disclosed by us in the reports we file or submit under the Exchange Act is (i) recorded, processed, summarized and reported, within the time periods specified in the Commission's rules and forms, and (ii) accumulated and communicated to our management, including our principal executive and principal financial officers, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure. We believe that a controls system, no matter how well designed and operated, cannot provide absolute assurance that the objectives of the controls system are met, and no evaluation of controls can provide absolute assurance that all control issues and instances of fraud, if any, within a company have been detected.

There have been no changes in our internal control over financial reporting that occurred during the quarter ended December 31, 2021 that have materially affected or are reasonably likely to materially affect our internal control over financial reporting.

Management's Report on Internal Control over Financial Reporting and the Report of Independent Registered Public Accounting Firm are incorporated by reference to Item 8 to this Annual Report on Form 10-K.

ITEM 9B. OTHER INFORMATION

Not applicable.

ITEM 9C. DISCLOSURE REGARDING FOREIGN JURISDICTIONS THAT PREVENT INSPECTIONS

Not applicable.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

Information about our Executive Officers (as of February 22, 2022):

Name	Age	Present Position and Business Experience During the Last Five Years*
Victor D. Grizzle	60	Armstrong World Industries, Inc. President & CEO, Director since April 2016 Executive Vice President & CEO, Armstrong Building Products (January 2011 to April 2016)
Charles M. Chiappone*	59	Armstrong World Industries, Inc. Senior Vice President, Ceiling and Wall Solutions since April 2018 Senior Vice President, Ceiling Solutions (April 2016 to April 2018) Vice President of Global Marketing & Commercial Excellence, Armstrong Building Products (January 2012 to April 2016)
Mark A. Hershey	52	Armstrong World Industries, Inc. Senior Vice President, Americas since January 2022 Senior Vice President, General Counsel and Business Development (January 2020 to January 2022) Senior Vice President, General Counsel (July 2011 to January 2022) Chief Compliance Officer (February 2012 to January 2022) Secretary (April 2016 to February 2022)
Austin So	48	Armstrong World Industries, Inc. Senior Vice President, General Counsel and Chief Compliance Officer since February 2022 StoneMor Inc. Senior Vice President, Chief Legal Officer & Secretary (July 2016 to January 2022)
Brian L. MacNeal*	55	Armstrong World Industries, Inc. Senior Vice President, Chief Financial Officer since April 2016 Vice President, Global Finance and CFO, Armstrong Building Products (June 2014 to April 2016)
James T. Burge	46	Armstrong World Industries, Inc. Vice President, Controller since April 2021 Americas Controller (December 2017 to April 2021) External Reporting and Consolidations Manager (March 2017 to December 2017) External Reporting Manager (May 2015 to March 2017)
Ellen R. Romano	60	Armstrong World Industries, Inc. Senior Vice President, Human Resources since July 2013

* *As previously announced, these executive officers will be retiring in 2022.*

All executive officers are elected by the Board of Directors to serve in their respective capacities until their successors are elected and qualified or until their earlier resignation or removal.

Code of Ethics

We have adopted a Code of Business Conduct that applies to all employees, executives and directors, specifically including our Chief Executive Officer, our Chief Financial Officer and our Controller. We have also adopted a Code of Ethics for Financial Professionals (together with the Code of Business Conduct, the “Codes of Ethics”) that applies to all professionals in our finance and accounting functions worldwide, including our Chief Financial Officer and our Controller.

The Codes of Ethics are intended to deter wrongdoing and to promote:

- honest and ethical conduct, including the ethical handling of actual or apparent conflicts of interest between personal and professional relationships;
- full, fair, accurate, timely and understandable public disclosures;

- compliance with applicable governmental laws, rules and regulations;
- the prompt internal reporting of violations of the Codes of Ethics; and
- accountability for compliance with the Codes of Ethics.

The Codes of Ethics are available at http://www.armstrongceilings.com/corporate/codes-policies.html and in print free of charge. Any waiver of the Company’s Code of Business Conduct, particularly its conflicts-of-interest provisions, which may be proposed to apply to any director or executive officer, must be reviewed in advance by the Nominating, Governance and Social Responsibility Committee of the Board of Directors, which would be responsible for making a recommendation to the Board of Directors for approval or disapproval. The Board of Directors’ decision on any such matter would be disclosed publicly in compliance with applicable legal standards and the rules of the New York Stock Exchange. We intend to satisfy these requirements by making disclosures concerning such matters available on the “For Investors” page of our website. There were no waivers or exemptions from the Code of Business Conduct in 2021 applicable to any director or executive officer.

Other information required by Item 10 is incorporated by reference to the sections entitled “Election of Directors,” “Corporate Governance,” and “Security Ownership of Certain Beneficial Owners, Management and Directors” in the Company’s proxy statement for its 2022 annual meeting of shareholders to be filed no later than May 2, 2022.

ITEM 11. EXECUTIVE COMPENSATION

The information required by Item 11 is incorporated by reference to the sections entitled “Compensation Discussion and Analysis,” “Compensation Committee Report,” “Summary Compensation Table,” “Grants of Plan-Based Awards,” “Outstanding Equity Awards at Fiscal Year-End,” “Options Exercised and Stock Vested,” “Pension Benefits,” “Nonqualified Deferred Compensation,” “Potential Payments Upon Termination or Change in Control,” “Board’s Role in Risk Management Oversight,” “Compensation Committee Interlocks and Insider Participation” and “Compensation of Directors” in the Company’s proxy statement for its 2022 annual meeting of shareholders to be filed no later than May 2, 2022.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

The information required by Item 12 is incorporated by reference to the sections entitled “Security Ownership of Certain Beneficial Owners, Management and Directors" and “Securities Authorized for Issuance Under Equity Compensation Plans” in the Company’s proxy statement for its 2022 annual meeting of shareholders to be filed no later than May 2, 2022.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The information required by Item 13 is incorporated by reference to the sections entitled “Review of Related Person Transactions” and “Director Independence” in the Company’s proxy statement for its 2022 annual meeting of shareholders to be filed no later than May 2, 2022.

ITEM 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES

The information required by Item 14 is incorporated by reference to the sections entitled “Audit Committee Report” and “Fees Paid to Independent Registered Public Accounting Firm” in the Company’s proxy statement for its 2022 annual meeting of shareholders to be filed no later than May 2, 2022.

PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

(a) Listing of Documents

1. The financial statements and schedule of Armstrong World Industries, Inc. filed as a part of this 2021 Annual Report on Form 10-K is listed in the "Index to Financial Statements and Schedules" on Page 32.

2. The financial statements required to be filed pursuant to Item 15 of Form 10-K are:

   Worthington Armstrong Venture consolidated financial statements for the years ended December 31, 2021, 2020, and 2019 (filed herewith as Exhibit 99.1).

3. The following exhibits are filed as part of this 2021 Annual Report on Form 10-K:

Exhibit No.	Description
2.1	Armstrong World Industries, Inc.'s Fourth Amended Plan of Reorganization dated May 23, 2003 (as modified by modifications filed with the Bankruptcy Court on October 17, 2003, November 10, 2003, December 3, 2004 and February 21, 2006) is incorporated by reference from the Annual Report on Form 10-K, filed on February 24, 2006, wherein it appeared as Exhibit 2.3.
2.2	Separation and Distribution Agreement, dated March 11, 2016, by and between Armstrong World Industries, Inc. and Armstrong Flooring, Inc. is incorporated by reference from the Current Report on Form 8-K filed on March 15, 2016, wherein it appeared as Exhibit 2.1.
2.3	Plan of Division, adopted by Armstrong World Industries, Inc. on March 11, 2016 is incorporated by reference from the Current Report on Form 8-K filed on March 15, 2016, wherein it appeared as Exhibit 2.2.
3.1	Amended and Restated Articles of Incorporation of Armstrong World Industries, Inc. is incorporated by reference from the Current Report on Form 10-Q filed on May 1, 2017, wherein it appeared as Exhibit 3.1.
3.2	Amended and Restated Bylaws of Armstrong World Industries, Inc., are incorporated by reference from the Current Report on Form 8-K filed on April 17, 2020, wherein it appeared as Exhibit 3.1.
4.1	Description of Securities Registered under Section 12 of the Securities Exchange Act of 1934.†
10.1	Amended and Restated Credit Agreement, dated April 1, 2016, by and among Armstrong World Industries, Inc., as Borrower, certain subsidiaries of Armstrong World Industries, Inc. identified therein, as the Guarantors, Bank of America, N.A., as Administrative Agent and Collateral Agent, the other lenders party thereto, JPMorgan Chase Bank, N.A. and Citibank, N.A., as Co-Syndication Agents, Manufacturers and Traders Trust, The Bank of Nova Scotia, Fifth Third Bank, Citizens Bank of Pennsylvania, TD Bank National Association and Bank of Montreal, as Co-Documentation Agents, and Merrill Lynch, Pierce, Fenner & Smith Incorporated, JPMorgan Chase Bank, N.A. and Citibank, N.A., as joint lead arrangers and joint lead managers is incorporated by reference from the Current Report on Form 8-K filed on April 4, 2016, wherein it appeared as Exhibit 10.8.
10.2	Amended and Restated Security Agreement, dated April 1, 2016, by and among Armstrong World Industries, Inc., the grantors named therein and Bank of America, N.A. is incorporated by reference from the Annual Report on Form 10-K, filed on February 26, 2018, wherein it appeared as Exhibit 10.2.
10.3	Amended and Restated Pledge Agreement dated, April 1, 2016, by and among Armstrong World Industries, Inc., the pledgors named therein and Bank of America, N.A. is incorporated by reference from the Annual Report on Form 10-K, filed on February 26, 2018, wherein it appeared as Exhibit 10.3.
10.4	Amended and Restated Canadian Pledge Agreement dated, April 1, 2016, by and among Armstrong World Industries, Inc. and Bank of America, N.A. is incorporated by reference from the Annual Report on Form 10-K, filed on February 26, 2018, wherein it appeared as Exhibit 10.4.

10.5	Second Amendment to Credit Agreement, Amendment to Security Agreement, Amendment to Domestic Pledge Agreement and Amendment to Canadian Pledge Agreement by and among the Company, the guarantors named therein, JPMorgan Chase Bank, N.A., Citizens Bank, N.A., Fifth Third Bank and PNC Bank, National Association, as co-syndication agents, Branch Banking and Trust Company, TD Bank, N.A., Manufacturers and Traders Trust Company, The Bank of Nova Scotia, Capital One, National Association, Keybank National Association, U.S. Bank National Association and Wells Fargo Bank, National Association, as co-documentation agents, and other lenders and L/C issuers party hereto and BofA Securities, Inc., JPMorgan Chase Bank, N.A., Citizens Bank, N.A., Fifth Third Bank and PNC Capital Markets, LLC, as joint lead arrangers and bookrunners, in incorporated by reference from the Current Report on Form 8-K, filed on October 1, 2019, wherein it appeared as Exhibit 10.1.
10.6	Amended and Restated Joint Venture Agreement, dated February 22, 2016 between Armstrong Ventures, Inc. and Worthington Ventures, Inc., is incorporated by reference from the Annual Report on Form 10-K filed on February 22, 2016, wherein it appeared as Exhibit 10.12.
10.7	Tax Matters Agreement, dated as of April 1, 2016, by and between Armstrong World Industries, Inc. and Armstrong Flooring, Inc. is incorporated by reference from the Current Report on Form 8-K filed on April 4, 2016, wherein it appeared as Exhibit 10.2.
10.8	Trademark License Agreement, dated as of April 1, 2016, by and between Armstrong World Industries, Inc., AWI Licensing LLC and Armstrong Flooring, Inc. is incorporated by reference from the Current Report on Form 8-K filed on April 4, 2016, wherein it appeared as Exhibit 10.4.
10.9	Transition Trademark License Agreement, dated as of April 1, 2016, by and between Armstrong World Industries, Inc., AFI Licensing LLC and Armstrong Flooring, Inc. is incorporated by reference from the Current Report on Form 8-K filed on April 4, 2016, wherein it appeared as Exhibit 10.5.
10.10	Share Purchase Agreement, dated November 17, 2017, by and between Armstrong World Industries, Inc. and Knauf International GmbH is incorporated by reference from the Current Report on Form 8-K filed on November 20, 2017, wherein it appeared as Exhibit 2.1.
10.11	Deed of Amendment to the Share Purchase Agreement dated as of July 18, 2018, by and between Armstrong World Industries, Inc. and Knauf International GmbH is incorporated by reference from the Current Report on Form 8-K filed on July 19, 2018, wherein it appeared as Exhibit 2.1.
10.12	2011 Long-Term Incentive Plan, effective as of June 24, 2011, is incorporated by reference to Armstrong World Industries, Inc.'s Definitive Proxy Statement on Schedule 14A for the Armstrong World Industries, Inc. 2011 Annual Meeting of Shareholders held on June 24, 2011 filed on April 28, 2011, wherein it appeared as Exhibit A.*
10.13	Form of 2011 Long-Term Incentive Plan Terms and Conditions, as amended for 2013 (Grant of Nonqualified Stock Options – U.S. (Executive Officer)), is incorporated by reference from the Quarterly Report on Form 10-Q filed on April 29, 2013, wherein it appeared as Exhibit 10.2.*
10.14	Form of 2011 Long-Term Incentive Plan Terms and Conditions, as amended for 2013 (Grant of Nonqualified Stock Options – U.S.), is incorporated by reference from the Quarterly Report on Form 10-Q filed on April 29, 2013, wherein it appeared as Exhibit 10.3.*
10.15	Form of 2011 Long-Term Incentive Plan Terms and Conditions, as amended for 2014 (Grant of Nonqualified Stock Options – U.S.), is incorporated by reference from the Quarterly Report on Form 10-Q filed on April 28, 2014, wherein it appeared as Exhibit 10.1.*
10.16	Armstrong World Industries, Inc. 2016 Long-Term Incentive Plan, effective as of July 8, 2016 and amended and restated effective February 20, 2019, is incorporated by reference from the Annual Report on Form 10-K filed on February 25, 2019, wherein it appeared as Exhibit 10.42.*
10.17	Form of Long-Term Performance-Based Restricted Stock Unit Grant for 2019 and later years under the 2016 Long-Term Incentive Plan is incorporated by reference from the Annual Report on Form 10-K, filed on February 23, 2021, wherein it appeared as Exhibit 10.25.*‡
10.18	Form of Long-Term Time-Based Restricted Stock Unit Grant for 2022 under the 2016 Long-Term Incentive Plan.*†
10.19	Armstrong World Industries, Inc. 2020 Inducement Award Plan, is incorporated by reference from the Registration Statement on Form S-8 filed on December 15, 2020, wherein it appeared as Exhibit 4.4.*
10.20	Nonqualified Deferred Compensation Plan effective January 2005, as amended July 23, 2010, is incorporated by reference from the Annual Report on Form 10-K, filed on February 28, 2011, wherein it appeared as Exhibit 10.4.*

10.21	Retirement Benefit Equity Plan, effective January 1, 2005, as amended October 29, 2007 and December 8, 2008, is incorporated by reference from the Annual Report on Form 10-K, filed on February 26, 2009, wherein it appeared as Exhibit 10.2.*
10.22	2008 Directors Stock Unit Plan, as amended December 8, 2008, November 30, 2010 and June 24, 2011 is incorporated by reference to the Current Report on Form 8-K filed on June 13, 2011, wherein it appeared as Exhibit 99.2.*
10.23	Form of 2009 and 2010 Award under the 2008 Directors Stock Unit Plan, as amended, is incorporated by reference from the Quarterly Report on Form 10-Q for the quarter ended September 30, 2009, filed on October 28, 2009, wherein it appeared as Exhibit 10.27.*
10.24	Form of 2011, 2012, 2013, 2014 and 2015 Award under the 2008 Directors Stock Unit Plan, as amended, is incorporated by reference from the Annual Report on Form 10-K filed on February 27, 2012, wherein it appeared as Exhibit 10.40.*
10.25	Armstrong World Industries, Inc. 2016 Directors Stock Unit Plan, is incorporated by reference from the Current Report on Form 8-K filed on July 11, 2016, wherein it appeared as Exhibit 10.1.*
10.26	Form of Stock Unit Grant Agreement under the Armstrong World Industries, Inc. 2016 Directors Stock Unit Plan, is incorporated by reference from the Current Report on Form 8-K filed on July 11, 2016, wherein it appeared as Exhibit 10.3.*
10.27	Offer Letter to Victor D. Grizzle dated January 4, 2011, is incorporated by reference from the Current Report on Form 8-K filed on January 10, 2011, wherein it appeared as Exhibit 99.2.*
10.28	Offer Letter to Mark A. Hershey dated November 14, 2021.*†
10.29	Offer Letter to Austin So dated January 6, 2022.*†
10.30	Form of Indemnification Agreement for Officers and Directors of Armstrong World Industries, Inc. is incorporated by reference from the Report on Form 8-K filed on July 27, 2021, wherein it appeared as Exhibit 10.1.*
10.31	Form of Amended and Restated Severance Agreement with Certain Officers, approved for use on October 26, 2016 is incorporated by reference from the Report on Form 8-K filed on October 31, 2016, wherein it appeared as Exhibit 10.1.*
14	The Armstrong Code of Business Conduct, revised as of July 29, 2011, is incorporated by reference from the Current Report on Form 8-K filed on August 1, 2011, wherein it appeared as Exhibit 14.1.
21	Armstrong World Industries, Inc.'s Subsidiaries.†
23.1	Consent of Independent Registered Public Accounting Firm.†
23.2	Consent of Independent Auditors.†
31.1	Certification of Chief Executive Officer required by Rule 13a-15(e) or 15d-15(e) of the Securities Exchange Act.†
31.2	Certification of Chief Financial Officer required by Rule 13a-15(e) or 15d-15(e) of the Securities Exchange Act.†
32.1	Certification of Chief Executive Officer required by Rule 13a and 18 U.S.C. Section 1350.††
32.2	Certification of Chief Financial Officer required by Rule 13a and 18 U.S.C. Section 1350.††
99.1	Worthington Armstrong Venture consolidated financial statements as of December 31, 2021 and 2020 and for the years ended December 31, 2021, 2020 and 2019.†
101	Inline Interactive Data Files**
104	The cover page from the Company's Annual Report on Form 10-K for the year ended December 31, 2021 has been formatted in Inline XBRL.

* Management Contract or Compensatory Plan.

† Filed herewith.

†† Furnished herewith.

‡ Portions of this exhibit have been omitted as permitted by applicable regulations.

** XBRL – Information is furnished and not filed or a part of a registration statement or prospectus for purposes of Sections 11 or 12 of the Securities Act of 1933, as amended, is deemed not filed for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, and otherwise is not subject to liability under these sections.

ITEM 16. FORM 10-K SUMMARY

None.

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.

ARMSTRONG WORLD INDUSTRIES, INC.
(Registrant)

By: /s/ Victor D. Grizzle
Director, President and Chief Executive Officer

Date: February 22, 2022

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, 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/ Victor D. Grizzle Victor D. Grizzle	Director, President and Chief Executive Officer (Principal Executive Officer)	February 22, 2022
/s/ Brian L. MacNeal Brian L. MacNeal	Senior Vice President and Chief Financial Officer (Principal Financial Officer)	February 22, 2022
/s/ James T. Burge James T. Burge	Vice President and Controller (Principal Accounting Officer)	February 22, 2022
/s/ Stanley A. Askren Stanley A. Askren	Director	February 22, 2022
/s/ Tao Huang Tao Huang	Director	February 22, 2022
/s/ Barbara L. Loughran Barbara L. Loughran	Director	February 22, 2022
/s/ Larry S. McWilliams Larry S. McWilliams	Director	February 22, 2022
/s/ James C. Melville James C. Melville	Director	February 22, 2022
/s/ Wayne R. Shurts Wayne R. Shurts	Director	February 22, 2022
/s/ Roy W. Templin Roy W. Templin	Director	February 22, 2022
/s/ Cherryl T. Thomas Cherryl T. Thomas	Director	February 22, 2022

SCHEDULE II

Armstrong World Industries, Inc., and Subsidiaries
Valuation and Qualifying Reserves
(amounts in millions)

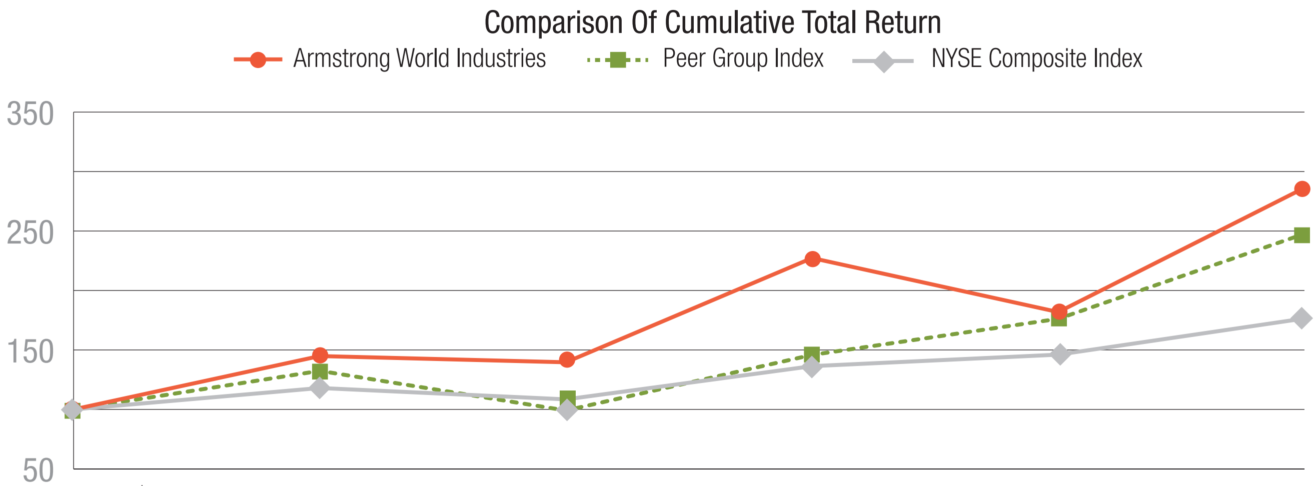
	Balance at beginning of year	Additions charged to earnings	Deductions	Balance at end of year
2019				
Provision for bad debts	$ 0.3	$ 0.7	$ (0.3)	$ 0.7
Provision for discounts	1.3	21.0	(20.9)	1.4
Provision for warranties	0.4	3.0	(3.2)	0.2
Provision for inventory obsolescence	-	0.6	(0.1)	0.5
2020				
Provision for bad debts	$ 0.7	$ 0.9	$ (0.2)	$ 1.4
Provision for discounts	1.4	19.4	(19.5)	1.3
Provision for warranties	0.2	5.5	(4.8)	0.9
Provision for inventory obsolescence	0.5	0.1	(0.6)	-
2021				
Provision for bad debts	$ 1.4	$ 0.4	$ (0.8)	$ 1.0
Provision for discounts	1.3	21.7	(21.3)	1.7
Provision for warranties	0.9	3.9	(4.0)	0.8
Provision for inventory obsolescence	-	0.3	(0.1)	0.2

[THIS PAGE INTENTIONALLY LEFT BLANK]

[THIS PAGE INTENTIONALLY LEFT BLANK]

CUMULATIVE TOTAL STOCK RETURN PERFORMANCE

The following graph shows the cumulative total shareholder return for Armstrong World Industries, Inc. Common Shares (NYSE: AWI) during the period from December 31, 2016 to December 31, 2021. The graph also shows the cumulative returns of the NYSE Composite Index and a building materials peer group composed of the companies listed below the chart. The performance shown in the chart assumes $100 invested on December 31, 2016, with dividends reinvested and it should not be considered indicative of future performance.



Assumes $100 invested on Dec 31, 2016. Assumes Dividends Reinvested

Period Ending

Company/Market/Peer Group	12/31/2016	12/31/2017	12/31/2018	12/31/2019	12/31/2020	12/31/2021
Armstrong World Industries, Inc.	$100.00	$144.86	$139.62	$227.28	$181.86	$286.31
NYSE Composite Index	$100.00	$118.90	$108.45	$136.38	$146.05	$176.45
Peer Group Index	$100.00	$132.42	$99.10	$145.85	$176.17	$247.68

The client-selected peer group is composed of the following companies:
(Market Cap is the base year)

	% of Total Market Cap
Allegion PLC	5%
A.O. Smith Corporation	8%
Apogee Enterprises, Inc.	1%
Acuity Brands, Inc.	11%
Masonite International Corp.	2%
Fortune Brands Home & Security, Inc.	7%
James Hardie Industries	6%
Lennox International Inc.	6%

	% of Total Market Cap
Masco Corporation	9%
Mohawk Industries, Inc.	13%
Cornerstone Building Brands Inc.	1%
Owens Corning	5%
Sherwin-Williams Company	23%
Simpsons Manufacturing Co., Inc.	2%
Interface, Inc.	1%
	100%

CORPORATE INFORMATION

Transfer Agent and Registrar

American Stock Transfer & Trust Company
6201 15th Avenue
Brooklyn, NY 11219
www.astfinancial.com

NOTE: References to our website are textual references only, and niether the website nor any information contained on it are included in this report, or incorporated by reference.

Annual Meeting of Shareholders

The 2022 Annual meeting of Shareholders of Armstrong World Industries, Inc. will be held virtually on June 16, 2022, at 8:00 a.m. Eastern Time.

Certifications

The certifications of our Chief Executive Officer and Chief Financial Officer, as required by Section 302 of the Sarbanes-Oxley Act of 2002, have been filed with the Securities and Exchange Commission as exhibits to our Annual Report on Form 10-K. In addition, in 2021 our Chief Executive Officer provided the required annual certification to the New York Stock Exchange.

FORWARD-LOOKING STATEMENTS

Certain information in this report and in our other public documents and comments contain forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. Those statements provide our future expectations or forecasts and can be identified by our use of words such as "anticipate," "estimate," "expect," "project," "intend," "plan," "believe," "outlook," and other words or phrases of similar meaning in connection with any discussion of future operating or financial performance. Forward-looking statements, by their nature, address matters that are uncertain and involve risks because they relate to events and depend on circumstances that may or may not occur in the future. A more detailed discussion of the risks and uncertainties that could cause our actual results to differ materially from those projected, anticipated or implied is included in the "Risk Factors" and "Management's Discussion and Analysis" sections of our recent reports on Forms 10-K and 10-Q filed with the U.S. Securities and Exchange Commission. As a result, our actual results may differ materially from our expected results and from those expressed in our forward-looking statements. Forward-looking statements speak only as of the date they are made. We undertake no obligation to update any forward-looking statements beyond what is required under applicable securities law.

In addition, we will be referring to non-GAAP financial measures within the meaning of SEC Regulation G. A reconciliation of the differences between these measures with the most directly comparable financial measures calculated in accordance with Generally Accepted Accounting Principles ("GAAP") are included below and are available on the Investor Relations page of our website at www.armstrongworldindustries.com.

ADJUSTED DILUTED EPS RECONCILIATION

	For the Year Ending				
	2017	2018	2019	2020	2021
Earnings (Loss) from continuing operations, as reported	**$221**	**$190**	**$242**	**($84)**	**$185**
Add/(Less): Income tax expense (benefit), as reported	2	53	57	(43)	57
Earnings (Loss) from continuing operations before income taxes, as reported	**$222**	**$243**	**$299**	**($127)**	**$243**
(Less)/Add: RIP (credit) expense [1]	(5)	(26)	(8)	368	-
Add: Non-Cash Hedge expense	-	5	-	-	-
Add: WAVE pension settlement [2]	-	-	1	-	-
Add: Litigation expense	-	7	20	-	-
Add: Cost Reduction Initiatives	7	22	-	-	-
Add: Net proforma international allocations, other	8	6	-	-	-
(Less)/Add: AWI Portion of WAVE's loss/(gain) on sale of international	-	-	(21)	-	-
Add: WAVE FSA [3]	-	-	4	-	-
Add: Acquisition-related impacts [4]	-	-	-	3	10
Add: Acquisition-related amortization [5]	-	-	-	7	21
(Less): Net environmental (recoveries) expense	(15)	(1)	1	(6)	-
Add: Foreign exchange movements	1	-	-	-	-
(Less): Gain on sale of idled China plant facility	-	-	-	(21)	-
Add: Accelerated depreciation from closed facility	-	-	-	3	-
Add: Charitable contribution – AWI Foundation [6]	-	-	-	10	-
Adjusted earnings from continuing operations before income taxes	**$217**	**$255**	**$297**	**$236**	**$274**
(Less): Adjusted income tax expense [7]	(54)	(64)	(61)	(56)	(65)
Adjusted net income from continuing operations	**$163**	**$191**	**$237**	**$180**	**$209**
Diluted Shares Outstanding [8]	54.0	52.1	49.5	48.2	47.9
Adjusted Tax Rate [9]	25%	25%	20%	24%	24%

Per Diluted Share	2017	2018	2019	2020	2021
As Reported	**$4.08**	**$3.63**	**$4.88**	**($1.76)**	**$3.86**
Adjusted	**$3.02**	**$3.66**	**$4.78**	**$3.74**	**$4.36**

1 The U.S. pension plan (the "RIP") (credit) expense represents the entire actuarial net periodic pension expense (credit) recorded as a component of earnings from continuing operations. For all periods presented, we were not required to and did not make cash contributions to our RIP.

2 Worthington Armstrong Joint Venture ("WAVE") settled a portion of their pension plan that resulted in a non-cash accounting change.

3 WAVE fresh start accounting asset impairment charge due to sale of international.

4 Represents the impact of acquisition-related adjustments for the fair value of acquired inventory and deferred revenue, changes in fair value of contingent consideration and deferred compensation & restricted stock expenses.

5 Represents the intangible amortization related to acquired entities, including customer relationships, developed technology, software, trademarks and brand names, non-compete agreements and other intangibles.

6 Donation to the AWI Foundation.

7 Adjusted income tax expense is calculated using the adjusted tax rate multiplied by the adjusted earnings from continuing operations before income taxes.

8 Dilutive shares are as-reported. 2020 dilutive shares outstanding include anti-dilutive common stock equivalents which are excluded from U.S. GAAP.

9 The tax rate for 2020 excludes the impact of our first quarter pension annuitization and the gain on the sale of our idled China facility.

ADJUSTED FCF RECONCILIATION

	For the Year Ending				
Consolidated	2017	2018	2019	2020	2021
As Reported net cash provided by operating activities	$170	$203	$183	$219	$187
Net cash (used for) provided by investing activities	($54)	$310	($89)	($141)	($14)
Net cash provided by (used for) operating and investing activities	$116	$513	$94	$78	$173
Add: Acquisitions, net	31	22	56	165	1
(Less)/Add: Payments (proceeds) related to sale of international, net [1]	-	(272)	66	(20)	12
(Less)/Add: Net environmental (recoveries) payments	-	(27)	5	(12)	(1)
Add: Litigation, net	-	-	23	-	-
Add: Net Payments to WAVE for portion of proceeds from sale of international business	-	-	-	13	-
(Less): Proceeds from sale of idled China plant facility	-	-	-	(22)	-
Add: Charitable contribution - AWI Foundation [2]	-	-	-	10	-
Add: Arktura deferred compensation [3]	-	-	-	-	5
Adjusted Free Cash Flow	**$147**	**$236**	**$244**	**$212**	**$190**

1 Includes related income tax payments for 2020.

2 Donation to the AWI Foundation.

3 Contingent compensation payments related to the acquisition.

ADJUSTED EBITDA RECONCILIATION

	For the Year Ending				
Consolidated	2017	2018	2019	2020	2021
Earnings (Loss) from continuing operations, as reported	$221	$190	$242	($84)	$185
Add/(Less) Income tax expense (benefit), as reported	$2	$53	$57	($43)	$57
Earnings (Loss) from continuing operations before income taxes, as reported	$222	$243	$299	($127)	$243
Add: Interest/Other income and expense, net	$22	$7	$18	$382	$17
Operating Income, as reported	$244	$249	$317	$255	$260
Add: RIP expense [1]	8	6	5	6	5
Add: Cost Reduction Initiatives	7	8	-	-	-
Add: Unallocated Corporate costs, pre-Armstrong Flooring, Inc. and net Proforma International Allocations, other	8	6	-	-	-
(Less)/Add: Environmental (recoveries) expenses	(15)	(1)	1	(6)	-
Add: Litigation expense	-	7	20	-	-
Add: WAVE Pension Settlement [2]	-	-	1	-	-
Add: WAVE FSA [3]	-	-	4	-	-
(Less): AWI Portion of WAVE's (gain) loss on AWI's sale of its non-Americas international businesses	-	-	(21)	-	-
Add: Acquisition-related impacts [4]	-	-	-	3	10
(Less): Gain on sale of idled China plant facility	-	-	-	(21)	-
Add: Charitable contribution – AWI Foundation [5]	-	-	-	10	-
Operating Income, adjusted	**$252**	**$275**	**$328**	**$246**	**$275**
Add: Depreciation & Amortization	67	78	75	85	97
Adjusted EBITDA from continuing operations	**$319**	**$353**	**$403**	**$330**	**$372**

1 RIP expense represents only the plan service cost that is recorded within Operating Income. For all periods presented, we were not required to and did not make cash contributions to our RIP.

2 WAVE settled a portion of their pension plan that resulted in a non-cash accounting charge.

3 WAVE Fresh Start Accounting asset impairment charge due to sale of our non-Americas International Businesses.

4 Represents the impact of acquisition-related adjustments for the fair value of acquired inventory and deferred revenue, changes in fair value of contingent consideration and deferred compensation & restricted stock expenses.

5 Donation to the AWI Foundation.

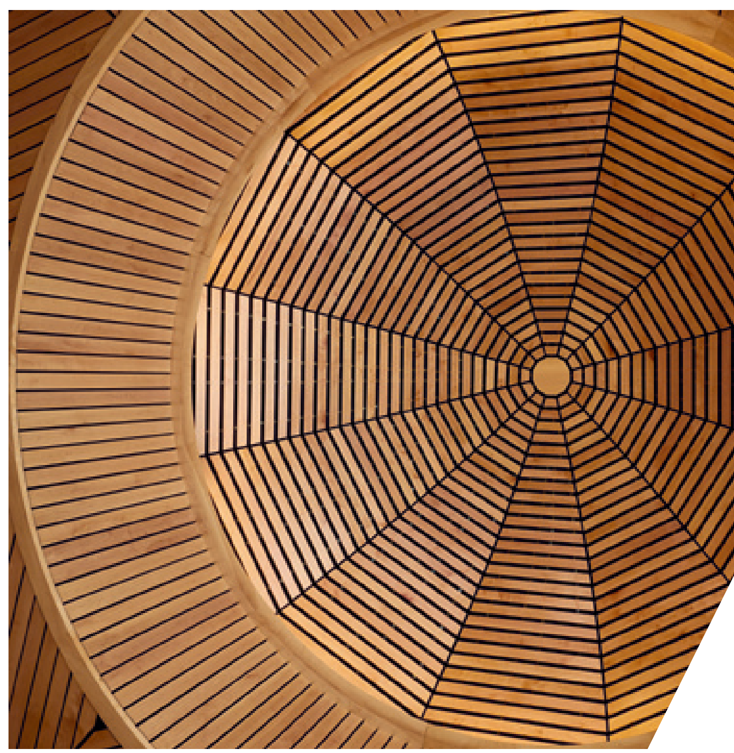
Calla® Shapes for DesignFlex® Panels, Suprafine® XM Exposed Tee System for Shapes, VidaShield UV24™ Air Purification System, AcoustiBuilt® Seamless Acoustical Ceiling System

OUR PRODUCTS

We are a leading producer of ceilings and specialty wall solutions for use in the construction and renovation of commercial buildings. **Mineral Fiber** ceiling tiles are our core product offering. We manufacture these tiles at four plants in the United States. In addition to recycled fibers including recycled ceiling tiles and paper, we use mineral wool that we manufacture from converted slag, a biproduct of steel production, as well as perlite, fiberglass, starch, and various coatings in our ceiling tile products. Through our constant focus on innovation and product development, we have continued to enhance and expand our core products.

Through our **Architectural Specialties** segment, we manufacture and source a broad portfolio of specialty ceiling, wall, and column products that complement our core offerings to provide integrated solutions. These products use a variety of materials including wood, metal, and felt, as well as special coatings and manufacturing techniques to bring the visions of architects and designers to life. We provide both highly customized solutions as well as standard products with short lead times to meet the needs of a broad range of construction projects.

Through our joint venture with Worthington Industries called WAVE, we manufacture ceiling suspension systems that are sold through our sales and distribution channels.



WoodWorks® Grille Ceiling and Wall Panels

Tectum® Create!™ Custom Direct-Attach Wall Panels

WoodWorks® Grille, SoundScapes® Blades, Ultima® Lay-in and Tegular on Prelude® Plus XL® Aluminum 15/16" Exposed Tee Grid

Armstrong World Industries, Inc.
2500 Columbia Avenue
Lancaster, PA 17603

Additional information about Armstrong is available without charge to shareholders by directing a request to Investor Relations:

Theresa L. Womble: tlwomble@armstrongceilings.com

Corporate Website: www.armstrongworldindustries.com

For Investors: 717.396.6354

For News Media: 866.321.6677

Mailing Address:

Armstrong World Industries, Inc.
P.O. Box 3001
Lancaster, PA 17604-3001

Armstrong® WORLD INDUSTRIES