

Section 1: 10-K (10-K)

UNITED STATES SECURITIES AND EXCHANGE COMMISSION

WASHINGTON, D.C. 20549

Form 10-K

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

For the Fiscal Year Ended December 31, 2018

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: 1-7665

Lydall, Inc.

(Exact name of registrant as specified in its charter)

Delaware

(State or Other Jurisdiction of Incorporation or Organization)

One Colonial Road, Manchester, Connecticut

(Address of principal executive offices)

06-0865505

(I.R.S. Employer Identification No.)

06042

(Zip code)

Registrant's telephone number, including area code: (860) 646-1233

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

Title of each class

Common Stock, \$.01 par value

Name of each exchange on which registered

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 Exchange Act. Yes No

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

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405 of this chapter) is not contained herein, and will not be contained, to the best of the registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

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 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

Non-accelerated filer

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 is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes No

On June 30, 2018, the aggregate market value of the Registrant's voting stock held by nonaffiliates was \$731,167,924 based on the New York Stock Exchange closing price on that date. For purposes of this calculation, the Registrant has assumed that its directors and executive officers are affiliates.

On February 13, 2019, there were 17,545,802 shares of Common Stock outstanding, exclusive of treasury shares.

DOCUMENTS INCORPORATED BY REFERENCE

Part III incorporates information by reference to the definitive Proxy Statement to be distributed in connection with the Registrant's Annual Meeting of Stockholders to be held on April 26, 2019.

The exhibit index is located on pages 40 – 42.

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The information called for by Items 10, 11, 12, 13 and 14, to the extent not included in this document, is incorporated herein by reference to such information included in the Company's definitive Proxy Statement to be filed with the Securities and Exchange Commission and distributed in connection with Lydall, Inc.'s 2019 Annual Meeting of Stockholders to be held on April 26, 2019.

CAUTIONARY NOTE CONCERNING FORWARD-LOOKING STATEMENTS

Lydall, Inc. and its subsidiaries are hereafter collectively referred to as “Lydall,” the “Company” or the “Registrant.” Lydall and its subsidiaries’ names, abbreviations thereof, logos, and product and service designators are all either the registered or unregistered trademarks or trade names of Lydall and its subsidiaries.

This Annual Report on Form 10-K contains “forward-looking statements” within the meaning of Section 21E of the Securities Exchange Act of 1934, as amended (the “Exchange Act”). Any statements contained in this Annual Report on Form 10-K that are not statements of historical fact may be deemed to be forward-looking statements. All such forward-looking statements are intended to provide management’s current expectations for the future operating and financial performance of the Company based on current assumptions relating to the Company’s business, the economy and future conditions. Forward-looking statements generally can be identified through the use of words such as “believes,” “anticipates,” “may,” “should,” “will,” “plans,” “projects,” “expects,” “expectations,” “estimates,” “forecasts,” “predicts,” “targets,” “prospects,” “strategy,” “signs” and other words of similar meaning in connection with the discussion of future operating or financial performance. Forward-looking statements may include, among other things, statements relating to future sales, earnings, cash flow, results of operations, uses of cash and other measures of financial performance. Because forward-looking statements relate to the future, they are subject to inherent risks, uncertainties and changes in circumstances that are difficult to predict. Accordingly, the Company’s actual results may differ materially from those contemplated by the forward-looking statements. Investors, therefore, are cautioned against relying on any of these forward-looking statements. They are neither statements of historical fact nor guarantees or assurances of future performance. Forward-looking statements in this Annual Report on Form 10-K include, among others, statements relating to:

- Overall economic, business and political conditions and the effects on the Company’s markets;
- Outlook for first quarter and full year 2019;
- Expected vehicle production in the North American, European or Asian markets;
- Growth opportunities in markets served by the Company;
- Ability to integrate the Interface Performance Materials business, which was acquired in the third quarter of 2018;
- Expected future financial and operating performance of Interface Performance Materials;
- Expected costs and future savings associated with restructuring programs;
- Expected gross margin, operating margin and working capital improvements from the application of Lean Six Sigma;
- Future impact of raw material commodity costs;
- Product development and new business opportunities;
- Future strategic transactions, including but not limited to: acquisitions, joint ventures, alliances, licensing agreements and divestitures;
- Pension plan funding and expected impacts of Lydall Pension Plan termination during 2019;
- Future cash flow and uses of cash;
- Future amounts of stock-based compensation expense;
- Future earnings and other measurements of financial performance;
- Ability to meet cash operating requirements;
- Future levels of indebtedness and capital spending;
- Ability to meet financial covenants in the Company’s amended revolving credit facility, which was further revised and under which outstanding borrowings increased in the third quarter of 2018;
- Future impact of the variability of interest rates and foreign currency exchange rates;
- Expected future impact of recently issued accounting pronouncements upon adoption, including the new leasing standard effective January 1, 2019;

- Future effective income tax rates and realization of deferred tax assets;

- Estimates of fair values of reporting units and long-lived assets used in assessing goodwill and long-lived assets for possible impairment; and
- The expected outcomes of legal proceedings and other contingencies, including environmental matters.

All forward-looking statements are inherently subject to a number of risks and uncertainties that could cause the actual results of the Company to differ materially from those reflected in forward-looking statements made in this Annual Report on Form 10-K, as well as in press releases and other statements made from time to time by the Company's authorized officers. Such risks and uncertainties include, among others, worldwide economic cycles and political changes that affect the markets which the Company's businesses serve, which could have an effect on demand for the Company's products and impact the Company's profitability; challenges encountered in the integration of the Interface Performance Materials acquisition; disruptions in the global credit and financial markets, including diminished liquidity and credit availability; changes in international trade agreements and trade policies including tariff regulation and trade restrictions; swings in consumer confidence and spending; unstable economic growth; volatility in foreign currency exchange rates; raw material pricing and supply issues; fluctuations in unemployment rates; retention of key employees; increases in fuel prices; changes in tax laws; and outcomes of legal proceedings, claims and investigations; and cybersecurity attacks or intrusions that could adversely impact the Company's business, as well as other risks and uncertainties identified in Part I, Item 1A — Risk Factors of this Annual Report on Form 10-K. The Company does not assume any obligation to update any forward-looking statements, whether as a result of new information, future events or otherwise.

PART I

Item 1. BUSINESS

Lydall, Inc. has been incorporated in Delaware since 1987 after originally being incorporated in Connecticut in 1969. The principal executive offices are located in Manchester, Connecticut. The Company designs and manufactures specialty engineered nonwoven filtration media, industrial thermal insulating solutions, and thermal and acoustical barriers for filtration/separation and heat abatement and sound dampening applications.

Lydall serves a number of markets. The Company's products are primarily sold directly to customers through an internal sales force and distributed via common carrier. The majority of products are sold to original equipment manufacturers and tier-one suppliers. The Company differentiates itself through high-quality, specialty engineered innovative products, application engineering and exceptional customer service. Lydall has a number of domestic and foreign competitors for its products, most of whom are either privately owned or divisions of larger companies.

The Company's Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and Proxy Statements are made available free of charge through the Investor Relations Section of the Company's Internet website at www.lydall.com after such material is electronically filed with, or furnished to, the Securities and Exchange Commission (the "Commission") and are also available on the Commission's website at www.sec.gov. Information found on these websites is not part of this Form 10-K.

SEGMENTS

During 2018, the Company's reportable segments were Performance Materials, Technical Nonwovens and Thermal Acoustical Solutions. The Performance Materials segment reports the results of the Filtration, and Sealing and Advanced Solutions businesses. The Technical Nonwovens segment reports the results of Industrial Filtration and Advanced Materials products. The Thermal Acoustical Solutions segment reports the results of parts and tooling products. For additional information regarding the Company's reportable segments, refer to Note 13 in the Consolidated Financial Statements included in this Annual Report on Form 10-K.

Effective January 1, 2018, the Thermal/Acoustical Metals and Thermal/Acoustical Fibers operating segments were combined into a single operating segment named Thermal Acoustical Solutions. These automotive segments were combined into one segment to allow the Company to better serve its customers, leverage operating disciplines and drive efficiencies across the global automotive operations.

Prior year segment amounts throughout the Notes to the Condensed Consolidated Financial Statements have been recast to reflect the new segment structure. The recast of historical business segment information had no impact on consolidated financial results.

Performance Materials Segment

The Performance Materials segment includes filtration media solutions primarily for air, fluid power, life science and industrial applications ("Filtration"), and sealing and gasket solutions, thermal insulation, energy storage, and other engineered products ("Sealing and Advanced Solutions").

On August 31, 2018, the Company acquired an engineered sealing materials business operating under Interface Performance Materials ("Interface"), based in Lancaster, Pennsylvania. A globally-recognized leader in the delivery of engineered sealing solutions, the Interface operations manufacture wet-laid gasket and specialty materials primarily serving OEM and Tier I manufacturers in the agriculture, construction, earthmoving, industrial, and automotive segments.

Filtration products include LydAir® MG (Micro-Glass) Air Filtration Media, LydAir® MB (Melt Blown) Air Filtration Media, LydAir® SC (Synthetic Composite) Air Filtration Media, and Arioso® Membrane Composite Media. These products constitute the critical media component of clean-air systems for applications in clean-space, commercial, industrial and residential HVAC, power generation, respiratory protection, and industrial processes. Lydall has leveraged its extensive technical expertise and applications knowledge into a suite of media products covering the vast liquid filtration landscape across the transportation and industrial fields. The LyPore® Liquid Filtration Media series address a variety of application needs in fluid power including hydraulic filters, air-water and air-oil coalescing, industrial fluid processes

and diesel fuel filtration. LyPore® media and Solupor® ultra-high molecular weight polyethylene membranes also serve critical liquid filtration/separation applications such as biopharmaceutical pre-filtration and clarification, lateral flow diagnostic and analytical testing, potable water filtration and high purity process filtration such as those found in food and beverage and medical applications.

Sealing and Advanced Solutions products include nonwoven specialty engineered materials for a multitude of applications. Interface fiber-reinforced gasket materials serve the heavy-duty diesel, automobile, small engine, transmission and compressor markets. These products handle demanding sealing challenges with a diverse range of metallic, non-metallic, rubber-coated and laminate materials that comprise the extensive Sealing materials portfolio. Interface Engineered Components are ready to use soft and hard gasket parts sold directly to OEMs and aftermarket applications. An example is Select-a-Seal® rubber-edged composite (REC) technology that provides robust sealing, compression, adhesion, and shear strength for driveline applications. Advanced Solutions' nonwoven veils, papers and specialty composites for the building products, appliance, energy and industrial markets include Manniglas® Thermal Insulation Papers, and Lytherm® Insulation Media for high temperature technology applications. Lydall's Cryotherm® Super-Insulating Media, CRS-Wrap® Super-Insulating Media and Cryo-Lite® Cryogenic Insulation products are industry standards for state-of-the-art cryogenic insulation designs used by manufacturers of cryogenic equipment for liquid gas storage, piping, and transportation. Additional specialty composite materials include specialty fiber calendar bowl products to service the printing and textile industries and press pad materials for industrial lamination processes.

Technical Nonwovens Segment

The Technical Nonwovens segment primarily produces needle punch nonwoven solutions for a multitude of industries and applications. Products are manufactured and sold globally under the leading brands of Lydall Industrial Filtration, Southern Felt, Gutsche, and Texel. Industrial Filtration products include nonwoven rolled-good felt media and filter bags used primarily in industrial air and liquid filtration applications. Nonwoven filter media is an effective solution to satisfy increasing emission control regulations in a wide range of industries, including power, cement, steel, asphalt, incineration, mining, food, and pharmaceutical. Advanced Materials products include nonwoven rolled-good media used in commercial applications and predominantly serves the geosynthetics, automotive, industrial, medical, and safety apparel markets. Automotive media is provided to Tier I/II suppliers and as well as the Company's Thermal Acoustical Solutions segment.

Technical Nonwovens segment products include air and liquid filtration media sold under the brand names Fiberlox® high performance filtration felts, Checkstatic™ conductive filtration felts, Microfelt® high efficiency filtration felts, Pleatlox® pleatable filtration felts, Ultratech™ PTFE filtration felts, Powertech® and Powerlox® power generation filtration felts, Microcap® high efficiency liquid filtration felts, Duotech membrane composite filtration felts, along with our porotex® family of high temperature filtration felts including microvel® and optivel® products. Technical Nonwovens Advanced Materials products are sold under the brand names Thermofit® thermo-formable products, Ecoduo® recycled content materials, Duotex® floor protection products, and Versaflex® composite molding materials. Technical Nonwovens also offers extensive finishing and coating capabilities which provide custom engineered properties tailored to meet the most demanding applications. The business leverages a wide range of fiber types and extensive technical capabilities to provide products that meet our customers' needs across a variety of applications providing both high performance and durability.

Thermal Acoustical Solutions Segment

The Thermal Acoustical Solutions segment offers a full range of innovative engineered products tailored for the transportation and industrial sectors to thermally shield sensitive components from high heat, improve exhaust gas treatment and lower harmful emissions as well as assist in the reduction of noise, vibration and harshness (NVH). Within the transportation sector, Lydall's products are found in the interior (dash insulators, cabin flooring), underbody (wheel well, aerodynamic belly pan, fuel tank, exhaust, tunnel, spare tire) and under hood (engine compartment, outer dash, powertrain, catalytic converter, turbo charger, manifolds) of cars, trucks, SUVs, heavy duty trucks and recreational vehicles.

Thermal Acoustical Solutions segment products offer thermal and acoustical insulating solutions comprised of organic and inorganic fiber composites that provide weight reduction, superior noise suppression and increased durability over conventional designs, as well as products that efficiently combine multiple layers of metal and thermal - acoustical insulation media to provide an engineered shielding solution for an array of application areas. Lydall's dBCore® is a lightweight acoustical composite that emphasizes absorption principles over heavy-mass type systems. Lydall's

dBLYte® is a high-performance acoustical barrier with sound absorption and blocking properties and can be used throughout a vehicle's interior to minimize intrusive noise from an engine compartment and road. Lydall's ZeroClearance® is an innovative thermal solution that utilizes an adhesive backing for attachment and is used to protect vehicle components from excessive heat. Lydall's flux® product family includes several patented or IP-rich products that address applications which include: Direct Exhaust Mount heat shields, which are assembled to high temperature components like catalytic converters, turbochargers or exhaust manifolds using aluminized and stainless steel and high performance and high temperature heat insulating materials; Powertrain heat shields that absorb noise at the source and do not contribute to the engine's noise budget; and durable, thermally robust solutions for temperature sensitive plastic components such as fuel tanks that are in proximity to high temperature heat sources.

GENERAL BUSINESS INFORMATION

Lydall holds a number of patents, trademarks and licenses. While no single patent, trademark or license is critical to the success of Lydall, together these intangible assets are of considerable value to the Company.

Typically, the Company's business can be slightly stronger in the first half of the calendar year given the timing of customer order patterns and planned customer shutdowns in North America and Europe that typically occur in the third and fourth quarters of each year. Lydall maintains levels of inventory and grants credit terms that are normal within the industries it serves. The Company uses a wide range of raw materials in the manufacturing of its products, including aluminum and other metals to manufacture most of its automotive heat shields and various glass and petroleum derived fibers in its Performance Materials, Technical Nonwovens, and Thermal Acoustical Solutions segments. The majority of raw materials used are generally available from a variety of suppliers.

Sales to Ford Motor Company accounted for 14.8%, 17.3% and 19.6% of Lydall's net sales in the years ended December 31, 2018, 2017 and 2016, respectively. No other customers accounted for more than 10% of Lydall's net sales in such years.

Backlog at January 31, 2019 was \$137.6 million. Lydall's backlog was \$114.4 million at December 31, 2018, \$109.0 million at December 31, 2017, and \$94.9 million at December 31, 2016. The increase in backlog at year-end 2018 compared to year-end 2017 was primarily driven by the Performance Materials segment due to the acquisition of the Interface business on August 31, 2018, offset by a decrease in backlog in the Technical Nonwovens segment due to timing of projects in 2017. Thermal Acoustical Solutions segment backlog, which comprises the majority of total backlog, may be impacted by various assumptions, including future automotive production volume estimates, changes in program launch timing and changes in customer development plans. The Company believes that global automotive orders are typically fulfilled within a two month period and therefore represent a reasonable time frame to be included as Thermal Acoustical Solutions segment backlog.

No material portion of Lydall's business is subject to renegotiation of profits or termination of contracts or subcontracts at the election of any governmental body.

Lydall believes that its plants and equipment are overall, in substantial compliance with applicable federal, state and local provisions that have been enacted or adopted regulating the discharge of materials into the environment, or otherwise relating to the protection of the environment (See Item 3, Legal Proceedings).

As of December 31, 2018, Lydall employed approximately 3,300 people. The Company has approximately 250 employees in the United States under union contracts expiring between February 2019 through July 2022. All employees at the facilities in France and the Netherlands are covered under a National Collective Bargaining Agreement. Certain salaried and all hourly employees in Germany, the United Kingdom, China, Canada and India are also covered under some form of a National Collective Bargaining Agreement. Lydall considers its employee relationships to be satisfactory.

There are no significant anticipated operating risks related to foreign investment law, expropriation, or availability of material, labor or energy. The foreign and domestic operations attempt to limit foreign currency exchange transaction risk by completing transactions in functional currencies whenever practical or through the use of foreign currency forward exchange contracts when deemed appropriate.

Item 1A. RISK FACTORS

The reader should carefully review and consider the risk factors discussed below. Any and all of these risk factors could materially affect the Company's business, financial condition, future results of operations or cash flows and possibly lead to a decline in Lydall's stock price. The risks, uncertainties and other factors described below constitute all material risk factors known to management as of the date of this report.

Global political or economic changes may negatively impact Lydall's business - Ongoing instability or changes in a country's or region's economic or political conditions could adversely affect demand for the Company's products and impact profitability. Among other factors, political conflicts or changes, disruptions in the global credit and financial markets, including diminished liquidity and credit availability, swings in consumer confidence and spending, unstable economic growth and fluctuations in unemployment rates causing economic instability could have a negative impact on the Company's results of operations, financial condition and liquidity. These factors also make it difficult to accurately forecast and plan future business activities.

Further, the implementation of more restrictive trade policies, including the imposition of tariffs, or the renegotiation of existing trade agreements by the U.S. or by countries where the Company sell products or procure materials incorporated into our products, including in connection with the U.K.'s pending withdrawal from the EU, could negatively impact the Company's business, results of operations and financial condition. For example, a government's adoption of "buy national" policies or retaliation by another government against such policies, such as tariffs, could have a negative impact on the Company's results of operations by decreasing the demand for Company products in certain countries and/or increasing the prices on raw materials that are critical to the Company's businesses.

The Company's foreign and export sales were 53.5% of net sales in 2018, 54.2% in 2017, and 46.9% in 2016. If the global economy were to take a significant downturn, depending on the length, duration and severity of such downturn, the Company's business and financial statements could be adversely affected.

The Company's Thermal Acoustical Solutions segment is tied primarily to general economic and automotive industry conditions - Sales to the automotive market accounted for 46.3% of the Company's net sales in 2018, 48.3% in 2017, and 56.2% in 2016. The segment net sales from products manufactured in North America were 69.6%, 72.3%, and 73.1% in 2018, 2017, and 2016, respectively, with the remainder manufactured in Europe and Asia. This segment is closely tied to general economic and automotive industry conditions as demand for vehicles depends largely on the strength of the economy, employment levels, consumer confidence levels, the availability and cost of credit, the cost of fuel, legislative and regulatory oversight and trade agreements. These factors have had, and could continue to have, a substantial impact on the segment. Adverse developments could reduce demand for new vehicles, causing Lydall's customers to reduce their vehicle production in North America, Europe and Asia and, as a result, demand for Company products would be adversely affected.

The Company's quarterly operating results may fluctuate; as a result, the Company may fail to meet or exceed the expectations of research analysts or investors, which could cause Lydall's stock price to decline - The Company's quarterly results are subject to significant fluctuations. Operating results have fluctuated as a result of many factors, including size and timing of orders and shipments, loss of significant customers, product mix, reductions in customer pricing, customer or company shut-downs, technological change, operational efficiencies and inefficiencies, competition, changes in tax laws and deferred tax asset valuation allowances, strategic initiatives, severance and recruiting charges, asset impairment, penalties or fines and general economic conditions. In addition, lower revenues may cause asset utilization to decrease, resulting in the under absorption of the Company's fixed costs, which could negatively impact gross margins. Additionally, the Company's gross margins vary among its product groups and have fluctuated from quarter to quarter as a result of shifts in product mix. Any and all of these factors could affect the Company's business, financial condition, future results of operations or cash flows and possibly lead to a decline in Lydall's stock price.

Implementation of the Company's strategic initiatives may not be successful - As part of Lydall's business strategy, the Company continues to review various strategic and business opportunities to grow the business and to assess the profitability and growth potential for each of its existing businesses. The Company may incur significant professional services expenses associated with the review and potential implementation of strategic business opportunities. The Company cannot predict with certainty whether any recent or future strategic transactions will be beneficial to the Company. Among other things, future performance could be impacted by the Company's ability to:

- Identify and effectively complete strategic transactions;
- Obtain adequate financing to fund strategic initiatives;
- Successfully integrate and manage acquired businesses that involve numerous operational and financial risks, including difficulties in the integration of acquired operations, diversion of management's attention from other business concerns, managing assets in multiple geographic regions and potential loss of key employees and key customers of acquired operations;
- Improve operating margins through its Lean Six Sigma initiatives which are intended to improve processes and work flow, improve customer service, reduce costs and leverage synergies across the Company; and
- Successfully invest and deploy capital investments to support our business and commitments to our customers.

In order to meet its strategic objectives, the Company may also divest assets and/or businesses. Successfully executing such a strategy depends on various factors, including effectively transferring assets, liabilities, contracts, facilities and employees to any purchaser, identifying and separating the intellectual property to be divested from the intellectual property that the Company wishes to retain, reducing or eliminating fixed costs previously associated with the divested assets or business, and collecting the proceeds from any divestitures.

The Company may be unable to realize expected benefits from cost reduction, restructuring and consolidation efforts and profitability may be hurt or business otherwise might be adversely affected - In order to operate more efficiently and control costs, the Company announces from time to time restructuring or consolidation plans, which include workforce reductions as well as facility consolidations and other cost reduction initiatives. These plans are intended to generate operating expense savings through direct cost and indirect overhead expense reductions as well as other savings. The Company may undertake workforce reductions or restructuring actions in the future. These types of cost reduction and restructuring activities are complex. If the Company does not successfully manage current restructuring activities, or any other restructuring activities that it may undertake in the future, expected efficiencies and benefits might be delayed or not realized, and our operations and business could be disrupted. Risks associated with these actions and other workforce management issues include unforeseen delays in implementation of anticipated workforce reductions, additional unexpected costs, adverse effects on employee morale and the failure to meet operational targets due to the loss of employees, any of which may impair our ability to achieve anticipated cost reductions or may otherwise harm the business, which could have a material adverse effect on competitive position, results of operations, cash flows or financial condition.

The Company may not have adequate cash to fund its operating requirements - The principal source of the Company's liquidity is operating cash flows. Other significant factors that affect the overall management of liquidity include capital expenditures, investments in businesses, acquisitions, income tax payments, pension funding, share repurchases, outcomes of contingencies and availability of lines of credit and long-term financing. The Company's liquidity can be impacted by the Company's ability to:

- Manage working capital and the level of future profitability. The consolidated cash balance is impacted by capital equipment and inventory investments that may be made in response to changing market conditions;
- Satisfy covenants and other obligations under its existing credit facility, which could limit or prohibit Lydall's ability to borrow funds. Additionally, these debt covenants and other obligations could limit the Company's ability to make acquisitions, incur additional debt, make investments, or consummate asset sales and obtain additional financing from other sources.

Incurring a substantial amount of indebtedness could have an adverse effect on the Company's financial health and make it more difficult for Lydall to obtain additional financing in the future - The Company incurred a substantial amount of debt to fund the purchase price of the acquisition of the Interface Performance Materials business. Incurring this additional debt may have an adverse effect on the Company's financial condition and may limit Lydall's ability to obtain any necessary financing in the future for working capital, capital expenditures, future acquisitions, debt service requirements or other purposes. Additionally, the Company may not be able to generate sufficient cash flow or otherwise obtain funds necessary to meet the additional debt obligations. Any default under the Amended Credit Facility would likely result in the acceleration of the repayment obligations to our lenders.

The Company is subject to the U.S. Foreign Corrupt Practices Act and similar worldwide anti-bribery laws, which impose restrictions on the Company and violations of which may carry substantial fines and penalties and result in criminal sanctions - The U.S. Foreign Corrupt Practices Act and anti-bribery laws in other jurisdictions, including anti-bribery legislation in the United Kingdom, generally prohibit companies and their intermediaries from making improper payments for the purpose of obtaining or retaining business or other commercial advantage. The Company's policies mandate compliance with these anti-bribery laws, violations of which often carry substantial fines and penalties and could result in criminal sanctions against the Company, Lydall's officers or employees. The Company cannot assure that its internal control policies and procedures always will protect it from reckless or other inappropriate acts committed by the Company's affiliates, employees or agents. Violations of these laws, or allegations of such violations, could have a material adverse effect on Lydall's business, or financial statements and could possibly lead to a decline in Lydall's stock price.

Raw material pricing, supply issues, and disruptions in transportation networks could affect all of the Company's businesses - The Thermal Acoustical Solutions segment uses aluminum and other metals to manufacture most of its automotive heat shields. The Thermal Acoustical Solutions and Technical Nonwovens segments use various petroleum-derivative fibers in manufacturing products, and the Performance Materials segment uses various glass-derivative fibers in manufacturing products. If the prices and duties of these raw materials, or any other raw materials used in the Company's businesses increase, the Company may not have the ability to pass all of the incremental cost increases on to its customers, which was the case in 2018. In addition, an interruption in the ability of the Company to source such materials, including government trade restrictions, could negatively impact operations and sales.

Impairment of the Company's goodwill or other long-lived assets has required, and may in the future require recording significant charges to earnings - The Company reviews its long-lived assets for impairment when events or changes in circumstances indicate the carrying value may not be recoverable. Goodwill is also tested by the Company for impairment during the fourth quarter of each year. Factors that may be considered a change in circumstances, indicating that the carrying value of goodwill or other long-lived assets may not be recoverable, include, but are not limited to, a decline in the Company's stock price and market capitalization, reduced future cash flow estimates, and slower growth rates.

Volatility in the securities markets, interest rates, actuarial assumptions and other factors could substantially increase the Company's costs and funding for its defined benefit pension plans - The Company's defined benefit pension plans are funded with trust assets invested in a diversified portfolio of securities. Changes in interest rates, mortality rates, investment returns, and the market value of plan assets may affect the funded status and cause volatility in the net periodic benefit cost and future funding requirements of such plans. A significant increase in benefit plan liabilities or future funding requirements could have a negative impact on the Company's financial statements.

The Company is involved in certain legal proceedings and may become involved in future legal proceedings all of which could give rise to liability - The Company is involved in legal proceedings that, from time to time, may be material. These proceedings may include, without limitation, commercial or contractual disputes, intellectual property matters, personal injury claims, stockholder claims, and employment matters. No assurances can be given that such proceedings and claims will not have a material adverse impact on the Company's financial statements.

The Company is subject to legal and compliance risks and oversight on a global basis and developments in these risks and related matters could have a material adverse effect on Lydall's consolidated financial position, results of operations or liquidity - The Company is subject to a variety of laws and regulations that govern our business both in the United States and internationally, including antitrust laws. Violations of these laws and regulations can result in significant fines, penalties or other damages being imposed by regulatory authorities. Expenses and fines arising out of or related to these investigations and related claims can also be significant. Despite meaningful measures that we undertake to seek to ensure lawful conduct, which include training and internal control policies, these measures may not always prevent our employees or agents from violating the laws and regulations. As a result, we could be subject to criminal and civil penalties, disgorgement, further changes or enhancements to our procedures, policies and controls, personnel changes or other remedial actions. Violations of laws, or allegations of such violations, could disrupt our operations, involve significant management distraction and result in a material adverse effect on our competitive position, results of operations, cash flows or financial condition.

Changes in Accounting Standards - The Company's accounting and financial reporting policies conform to U.S. generally accepted accounting principles ("U.S. GAAP"), which are periodically revised and/or expanded. The application of accounting principles is also subject to varying interpretations over time. Accordingly, the Company is required to adopt new or revised accounting standards or comply with revised interpretations that are issued from time

to time by various parties, including accounting standard setters and those who interpret the standards, such as the FASB and the SEC. Such new financial accounting standards may change the financial accounting or reporting standards that govern the preparation of the Company's Consolidated Financial Statements. During 2018, the Company adopted Accounting Standards Update ("ASU") 2014-09, Revenue from Contracts with Customers, which provided for comprehensive changes in revenue recognition and superseded nearly all existing U.S. GAAP. In February 2016, the FASB issued ASU 2016-02, Leases, which is a wide-ranging change to lease accounting that is applicable to the Company beginning in 2019. Implementing changes required by new standards, requirements or laws require interpretation of rules and development of new accounting policies and internal controls that if not appropriately applied could result in financial statement errors, deficiencies in internal control as well as significant costs to implement.

Changes in tax rates and exposure to additional income tax liabilities - The Company is subject to risks with respect to changes in tax law and rates, changes in rules related to accounting for income taxes, or adverse outcomes from tax audits that are in process or future tax audits in various jurisdictions in which the Company operates. On December 22, 2017, the U.S. government enacted comprehensive tax legislation commonly referred to as the Tax Cuts and Jobs Act (the "Tax Reform Act"). The changes included in the Tax Reform Act were broad and complex. Future changes in interpretations of the Tax Reform Act, including any legislative action to address questions that arose because of the Tax Reform Act, and any changes in accounting standards for income taxes or related interpretations in response to the Tax Reform Act, may significantly impact the Company's overall effective tax rate and taxes paid. In addition, certain jurisdictions in which the Company operates have statutory rates greater than or less than the United States statutory rate. Changes in the mix and source of earnings between jurisdictions could have a significant impact on the Company's overall effective tax rate.

Realization of deferred tax assets is not assured - The Company maintains valuation allowances against certain deferred tax assets where realization is not reasonably assured. The Company evaluates the likelihood of the realization of all deferred tax assets and reduces the carrying amount to the extent it believes a portion will not be realized. Changes in these assessments can result in an increase or reduction to valuation allowances on deferred tax assets and could have a significant impact on the Company's overall effective tax rate.

The Company's future success depends upon its ability to continue to innovate, improve its existing products, develop and market new products, and identify and enter new markets - Improved performance and growth are partially dependent on improvements to existing products and new product introductions planned for the future. Delays in improving or developing products and long customer qualification cycles may impact the success of new product programs. The degree of success of new product programs could impact the Company's future results. Developments by other companies of new or improved products, processes or technologies may make our products or proposed products obsolete or less competitive and may negatively impact our net sales. Accordingly, our ability to compete is in part dependent on our ability to continually offer enhanced and improved products that meet the changing requirements of our customers. If we fail to develop new products or enhance existing products, it could have a material adverse effect on our business, financial condition or results of operations.

The Company's foreign operations expose it to business, economic, political, legal, regulatory and other risks - The Company believes that in order to be competitive and grow its businesses, it needs to maintain significant foreign operations. Foreign sales were \$363.7 million, \$322.4 million and \$212.5 million for the years ended December 31, 2018, 2017, and 2016, respectively. Foreign operations are subject to inherent risks including political and economic conditions in various countries, unexpected changes in regulatory requirements (including tariff regulations and trade restrictions), longer accounts receivable collection cycles and potentially adverse tax consequences. The Company has little control over most of these risks and may be unable to anticipate changes in international economic and political conditions and, therefore, unable to alter its business practices in time to avoid the adverse effect of any of these possible changes.

Foreign currency exchange rate fluctuations and limitations on repatriation of earnings may affect the Company's results of operations - The Company's financial results are exposed to currency exchange rate fluctuations and an increased proportion of its assets, liabilities and expenses are denominated in non-U.S. dollar currencies. There can be significant volatility in foreign currencies that impact the Company, primarily the British Pound Sterling, Euro, Chinese Yuan, and Canadian Dollar. The Company's foreign and domestic operations seek to limit foreign currency exchange transaction risk by completing transactions in functional currencies whenever practical or through the use of foreign currency forward exchange contracts when deemed appropriate. If the Company does not successfully hedge its currency exposure, changes in the rate of exchange between these currencies and the U.S. dollar may negatively impact the Company. Translation of the results of operations and financial condition of its foreign operations into U.S. dollars may be affected by exchange rate fluctuations. Additionally, limitations on the repatriation of earnings, including

imposition or increase of withholding and other taxes on remittances, may limit or negatively impact the Company's ability to redeploy or distribute cash. The Company receives a material portion of its revenue from foreign operations. Foreign operations generated approximately 46.3%, 46.1% and 37.5% of total net sales in 2018, 2017, and 2016, respectively.

The Company's manufacturing processes are subject to inherent risk - The Company operates a number of manufacturing facilities and relies upon an effective workforce and properly performing machinery and equipment. The workforce may experience a relatively high turnover rate, causing inefficiencies associated with retraining and rehiring. The equipment and systems necessary for such operations may break down, perform poorly or fail, and possibly cause higher manufacturing costs. Manufacturing processes affect the Company's ability to deliver quality products on a timely basis, and delays in delivering products to customers could result in the Company incurring penalties from customers.

Increases in energy pricing can affect all of the Company's businesses - Higher energy costs at the Company's manufacturing plants or higher energy costs passed on from the Company's vendors could impact the Company's profitability.

The Company's resources are limited and may impair its ability to capitalize on changes in technology, competition and pricing - The industries in which the Company sells its products are highly competitive and many of the competitors are affiliated with entities that are substantially larger and that have greater financial, technical and marketing resources. The Company's more limited resources and relatively diverse product mix may limit or impair its ability to capitalize on changes in technology, competition and pricing.

The Company's products may fail to perform as expected, subjecting it to warranty or other claims from its customers - If such failure results in, or is alleged to result in, bodily injury and/or property damage or other losses, the Company may be subject to product liability lawsuits, product recalls and other claims, any of which could have a material adverse impact on results of operations and cash flows.

If the Company does not retain its key employees, the Company's ability to execute its business strategy could be adversely affected - The Company's success, in part, depends on key managerial, engineering, sales and marketing and technical personnel and its ability to continue to attract and retain additional personnel. The loss of certain key personnel could have a material, adverse effect upon the Company's business and results of operations. There is no assurance that the Company can retain its key employees or that it can attract competent and effective new or replacement personnel in the future.

The Company uses a combination of insurance and self-insurance to provide for potential liabilities - For property risk, workers' compensation, automobile and general liability, director and officers' liability and employee health care benefits, the Company uses a combination of insurance and self-insurance. The Company estimates the liabilities associated with the risks retained by Lydall, in part, by considering historical claims experience and other actuarial assumptions which, by their nature, are subject to a high degree of variability.

The Company's current reserve levels may not be adequate to cover potential exposures - Estimates and assumptions may affect the reserves that the Company has established to cover uncollectible accounts receivable, excess or obsolete inventory, income tax valuation and fair market value write downs of certain assets and various liabilities. Actual results could differ from those estimates.

The Company is subject to environmental laws and regulations that could increase its expense and affect operating results - The Company is subject to federal, state, local, and foreign environmental, health and safety laws and regulations that affect operations. New and changing environmental laws and regulations may impact the products manufactured and sold to customers. In order to maintain compliance with such laws and regulations, the Company must devote significant resources and maintain and administer adequate policies, procedures and oversight. Should the Company fail to do these things, it could be negatively impacted by lower net sales, fines, legal costs, and clean-up requirements.

The Company may incur liabilities under various government statutes for the investigation and cleanup of contaminants previously released into the environment. Although there is no certainty, the Company does not anticipate that compliance with current provisions relating to the protection of the environment or that any payments the Company may be required to make for cleanup liabilities will have a material adverse effect upon the Company's cash flows, competitive position, financial condition or results of operations. Current and on-going environmental matters are further

addressed in Item 3, Legal Proceedings, Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations and Note 15 to the Consolidated Financial Statements in our 2018 Annual Report on Form 10-K.

The Company may be unable to adequately protect its intellectual property, which may limit its ability to compete effectively - The Company owns intellectual property, including patents and trademarks, which play an important role in helping the Company to maintain its competitive position in a number of markets. The Company is subject to risks with respect to (i) changes in the intellectual property landscape of markets in which it competes; (ii) the potential assertion of intellectual property-related claims against the Company; (iii) the failure to maximize or successfully assert its intellectual property rights; and (iv) significant technological developments by others.

Disruptions may occur to the Company's operations relating to information technology - The capacity, reliability and security of the Company's information technology ("IT") hardware and software infrastructure and the ability to expand and update this infrastructure in response to the Company's changing needs are important to the operation of the businesses. Also, any inadequacy, interruption, loss of data, integration failure or security failure of the Company's IT technology could harm its ability to effectively operate its business, which could adversely impact the Company's results of operations and cash flows.

Increased cybersecurity requirements, vulnerabilities, threats and more sophisticated and targeted computer crime could pose a risk to the Company's systems, networks, and data - Increased global cybersecurity vulnerabilities, threats and more sophisticated and targeted cyber-related attacks pose a risk to the security of the Company's systems and networks and the confidentiality, availability and integrity of the Company's data. While the Company attempts to mitigate these risks by employing a number of measures, including employee training, monitoring and testing, and maintenance of protective systems and contingency plans, the Company remains vulnerable to additional known or unknown threats. The Company also may have access to sensitive, confidential or personal data or information in certain of Lydall's businesses that is subject to privacy and security laws, regulations and customer-imposed controls. Despite efforts made by the Company to protect sensitive, confidential or personal data or information, the Company may be vulnerable to security breaches, ransomware, theft, misplaced or lost data, programming errors, employee errors and/or malfeasance that could potentially lead to the compromising or loss of sensitive, confidential or personal data or information and could adversely impact the Company's results of operations and cash flows. Although the Company carries cybersecurity insurance, in the event of a cyber incident, that insurance may not be extensive enough or adequate in scope of coverage or amount to cover damages the Company may incur. In addition, a cyber-related attack could result in other negative consequences, including loss of information, damage to the Company's reputation or competitiveness, remediation or increased protection costs, litigation or regulatory action.

The Company could be subject to work stoppages or other business interruptions as a result of its unionized work force - A portion of the Company's hourly employees are represented by various union locals and covered by collective bargaining agreements. These agreements contain various expiration dates and must be renegotiated upon expiration. If the Company is unable to negotiate any of its collective bargaining agreements on satisfactory terms prior to expiration, the Company could experience disruptions in its operations which could have a material adverse effect on operations.

The Company could be negatively affected as a result of the actions of activist stockholders - Over the last few years, proxy contests and other forms of stockholder activism have been directed against numerous public companies. The Company could become engaged in a solicitation, or proxy contest, or experience other stockholder activism, in the future. Activist stockholders may advocate for certain governance and strategic changes at the Company. In the event of stockholder activism, particularly with respect to matters which our Board of Directors, in exercising their fiduciary duties, disagree with or have determined not to pursue, our business could be adversely affected because responding to actions by activist stockholders can be costly and time-consuming, disrupting our operations and diverting the attention of management, and perceived uncertainties as to our future direction may result in the loss of potential business opportunities and may make it more difficult to attract and retain qualified personnel, business partners and customers.

Item 1B. UNRESOLVED STAFF COMMENTS

None.

Item 2. PROPERTIES

The principal properties of the Company as of December 31, 2018 are situated at the following locations and have the following characteristics:

Location	Primary Business Segment/General Description	Type of Interest
Hamptonville, North Carolina	Thermal Acoustical Solutions – Product Manufacturing	Owned
Yadkinville, North Carolina	Thermal Acoustical Solutions – Product Manufacturing	Leased
Meinerzhagen, Germany	Thermal Acoustical Solutions – Product Manufacturing	Owned
Saint-Nazaire, France	Thermal Acoustical Solutions – Product Manufacturing	Owned
Taicang, China	Thermal Acoustical Solutions – Product Manufacturing	Leased
Green Island, New York	Performance Materials – Specialty Media Manufacturing	Owned
Rochester, New Hampshire	Performance Materials – Specialty Media Manufacturing	Owned
Saint-Rivalain, France	Performance Materials – Specialty Media Manufacturing	Owned
Fulton, New York	Performance Materials – Specialty Media Manufacturing	Owned
Marshalltown, Iowa	Performance Materials – Specialty Media Manufacturing	Owned
Altenkirchen, Germany	Performance Materials – Specialty Media Manufacturing	Owned
St. Elzear, Quebec, Canada	Technical Nonwovens - Filtration Media Manufacturing	Owned
St. Marie, Quebec, Canada	Technical Nonwovens - Filtration Media Manufacturing	Owned
Rossendale, United Kingdom	Technical Nonwovens - Filtration Media Manufacturing	Owned
North Augusta, South Carolina	Technical Nonwovens - Filtration Media Manufacturing	Owned
Wuxi, China	Technical Nonwovens - Filtration Media Manufacturing	Leased
Fulda, Germany	Technical Nonwovens - Filtration Media Manufacturing	Leased
Manchester, Connecticut	Corporate Office	Owned

For additional information regarding lease obligations, see Note 15 to the Consolidated Financial Statements. The Company considers its properties to be in good operating condition and suitable and adequate for its present needs. In addition to the properties listed above, the Company has several leases for sales offices and warehouses in the United States, Europe and Asia, which the Company believes are immaterial individually and in the aggregate.

Item 3. LEGAL PROCEEDINGS

The Company is subject to legal proceedings, claims, investigations and inquiries that arise in the ordinary course of business such as, but not limited to, actions with respect to commercial, intellectual property, employment, personal injury, and environmental matters. The Company believes that it has meritorious defenses against the claims currently asserted against it and intends to defend them vigorously. While the outcome of litigation is inherently uncertain and the Company cannot be sure that it will prevail in any of the cases, subject to the matter referenced below, the Company is not aware of any matters pending that are expected to have a material adverse effect on the Company's business, financial position, results of operations or cash flows.

In the fourth quarter of 2016, as part of a groundwater discharging permitting process, water samples collected from wells and process water basins at the Company's Rochester, New Hampshire manufacturing facility, within the Performance Materials segment, showed concentrations of Perfluorinated Compounds ("PFCs") in excess of state ambient groundwater quality standards. In January 2017, the Company received a notification from the State of New Hampshire Department of Environmental Services ("NHDES") naming Lydall Performance Materials, Inc. a responsible party with respect to the discharge of regulated contaminants and, as such, required the Company to take action to investigate and remediate the impacts in accordance with standards established by the NHDES. The Company conducted a site investigation, the scope of which was reviewed by the NHDES, in order to assess the extent of potential soil and groundwater contamination and develop a remedial action. Based on input received from NHDES in 2017 with regard to the scope of the site investigation, the Company recorded \$0.2 million of expense. In 2018, the Company received a response from the NHDES to the site investigation report outlining proposed remedial actions. The Company recorded an additional \$0.1 million of expense in 2018 associated with the expected costs to remediate the impacts of the discharge of regulated contaminants in accordance with standards established by the NHDES. During 2018, the environmental liability was fully reduced reflecting payments made to vendors, resulting in no balance at December 31, 2018. Additionally, the Company incurred \$0.2 million of capital expenditures in 2018, in relation to the lining of the Company's fresh water waste lagoons. The site investigation is ongoing. The Company cannot be sure that costs will not exceed the current estimates until this matter is closed with the NHDES, nor that any future corrective action at this location would not have a material effect on the Company's financial condition, results of operations or liquidity.

In December 2018, the New York State Department of Environmental Conservation ("NYDEC") informed the Company that the newly acquired Interface site located at Hoosick Falls, NY will be the subject of an investigation in to the possibility of it being an inactive hazardous disposable waste site. The letter specifically references perfluorinated compounds or per- and polyfluoroalkyl substances ("PFAS") that have been detected in a nearby water supply, soil and/or surface water. Notably, the PFAS contamination has been identified in the Hoosick Falls area for some time and other large manufacturers in the area have previously been identified as a source. The Company will conduct a site investigation, the scope of which is in the planning stage with the NYDEC, in order to assess the extent of the potential contamination and develop a remedial action, if necessary. The Company does not know the scope or extent of its future obligations, if any, that may arise from the site investigation and therefore is unable to estimate the cost of any corrective action. Accordingly, the Company cannot assure that the costs of any future corrective at this location would not have a material effect on the Company's financial condition, results of operations or liquidity.

Provisions for such matters are charged to expense when it is probable that a liability has been incurred and reasonable estimates of the liability can be made. Estimates of environmental liabilities are based on a variety of matters, including, but not limited to, the stage of investigation, the stage of the remedial design, evaluation of existing remediation technologies, and presently enacted laws and regulations. In future periods, a number of factors could significantly impact any estimates of environmental remediation costs.

Item 4. MINE SAFETY DISCLOSURES

Not applicable.

EXECUTIVE OFFICERS OF THE REGISTRANT

The executive officers of Lydall, Inc. or its subsidiaries, together with the offices presently held by them, their business experience since January 1, 2014, and their age as of March 1, 2019, the record date of the Company's 2019 Annual Meeting, are as follows:

Name	Age	Position and Date of Appointment	Other Business Experience Since 2014
Dale G. Barnhart	66	President, Chief Executive Officer (August 27, 2007)	Not applicable
Randall B. Gonzales	47	Executive Vice President and Chief Financial Officer (March 12, 2018)	Chief Financial Officer and Treasurer, Progress Rail Services Corporation, a wholly-owned subsidiary of Caterpillar Inc. (2014-2018), a diversified global supplier of railroad and transit system products and services; Chief Financial Officer, Marketing and Sales, Nissan Motor Co., Ltd (2011 - 2014), a Fortune Global 50 automotive manufacturer.
Joseph A. Abbruzzi	60	President, Technical Nonwovens, (February 20, 2014); formerly Sr. Vice President, General Manager, Lydall Thermal/Acoustical Fibers (March 14, 2011)	Not applicable
Scott M. Deakin	52	President, Lydall Thermal Acoustical Solutions (August 30, 2017); formerly Executive Vice President and Chief Financial Officer, (September 8, 2015)	Executive Vice President and Chief Financial Officer, Ensign-Bickford Industries, Inc. (2009 – 2015), a diversified global manufacturer with operating segments that serve the aerospace & defense, life science, specialty chemicals (divested in 2016) and food & flavoring industries.
James V. Laughlan	46	Vice President, Chief Accounting Officer and Treasurer (March 26, 2013); formerly Chief Accounting Officer, Controller and Treasurer (July 27, 2012); formerly Chief Accounting Officer and Controller (March 29, 2010)	Not applicable
Paul A. Marold	57	President, Performance Materials (February 15, 2016)	Chief Operating Officer, Sontara, a division of Jacob Holm & Sons (2014-2016), a global manufacturer of spunlace nonwoven fabrics and finished goods; Senior Vice President, Growth & Innovation, Clarcor, Inc. (2013-2014), a global manufacturer of filtration products.
Chad A. McDaniel	45	Senior Vice President, Chief Administrative Officer and General Counsel (May 13, 2015); formerly Vice President, General Counsel and Secretary (May 10, 2013)	Director, Chase Corporation (2016), NYSE: CCF, a manufacturer of protective materials for high reliability applications.

There is no family relationship among any of the Company's directors or executive officers.

PART II

Item 5. MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

COMMON STOCK

The Company's Common Stock is traded on the New York Stock Exchange ("NYSE") under the symbol LDL. As of December 31, 2018, 8,384 stockholders of record held 17,555,672 shares of Lydall's Common Stock, \$0.01 par value.

ISSUER PURCHASES OF EQUITY SECURITIES

The Company acquired 23,581 shares through withholding during 2018, pursuant to provisions in agreements with recipients of restricted stock granted under the Company's equity compensation plans, which allow the Company to withhold the number of shares having fair value equal to each recipient's tax withholding due. The following table details the activity for the fourth quarter ended December 31, 2018.

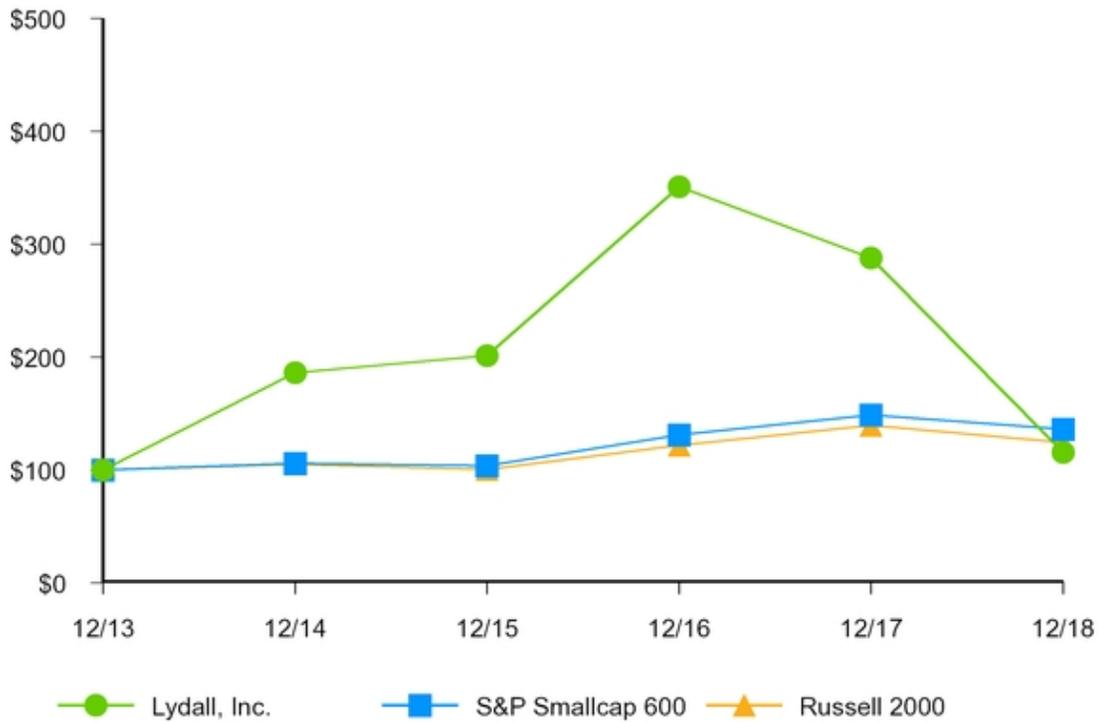
Period	Total Number of Shares Purchased	Average Price Paid per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	Maximum Number of Shares That May Yet Be Purchased Under the Plans or Programs
Activity October 1, 2018 - October 31, 2018	—	\$ —	—	—
Activity November 1, 2018 - November 30, 2018	—	\$ —	—	—
Activity December 1, 2018 - December 31, 2018	2,855	\$ 20.99	—	—
Total	2,855	\$ 20.99	—	—

PERFORMANCE GRAPH

The following performance graph and related information shall not be deemed to be “soliciting material” or “filed” for purposes of Section 18 of the Exchange Act, nor shall such information be incorporated by reference into any filing of Lydall, Inc. under the Exchange Act, except to the extent that the Company specifically incorporates it by reference in such filing.

The following graph compares the cumulative total return on Lydall’s shares over the past five years with the cumulative total return on shares of companies comprising the Standard & Poor’s Smallcap 600 Index and the Russell 2000 Index. Cumulative total return is measured assuming an initial investment of \$100 on December 31, 2013, including reinvestment of dividends, if any. Due to the diversity of niche businesses that the Company participates in, it is difficult to identify a reasonable peer group or one industry or line-of-business index for comparison purposes. Thus, Lydall has chosen to compare its performance to the Standard & Poor’s Smallcap 600 Index and to the Russell 2000 Index, which are comprised of issuers with generally similar market capitalizations to that of the Company.

COMPARISON OF 5 YEAR CUMULATIVE TOTAL RETURN*
Among Lydall, Inc., the S&P Smallcap 600 Index, and the Russell 2000 Index



	12/13	12/14	12/15	12/16	12/17	12/18
Lydall, Inc.	100.00	186.27	201.36	351.02	288.03	115.27
S&P Smallcap 600	100.00	105.76	103.67	131.20	148.56	135.96
Russell 2000	100.00	104.89	100.26	121.63	139.44	124.09

* \$100 invested on 12/31/13 in stock or index, including reinvestment of dividends.
 Fiscal year ending December 31.

Item 6. SELECTED FINANCIAL DATA

FIVE-YEAR SUMMARY

In thousands except per share amounts and ratio data	2018 (1)	2017	2016 (2)	2015 (3)	2014 (4)
Financial results for the year					
Net sales	\$ 785,897	\$ 698,437	\$ 566,852	\$ 524,505	\$ 535,829
Gross margin	19.4%	23.4%	24.5%	23.4%	21.5%
Operating margin	6.3%	9.5%	9.8%	10.1%	6.4%
Net income	\$ 34,944	\$ 49,317	\$ 37,187	\$ 46,259	\$ 21,847
Depreciation and amortization	\$ 32,731	\$ 25,939	\$ 19,401	\$ 17,162	\$ 17,531
Capital expenditures	\$ 29,630	\$ 24,915	\$ 28,159	\$ 21,555	\$ 19,001
Common stock per share data					
Basic net income	\$ 2.03	\$ 2.89	\$ 2.20	\$ 2.76	\$ 1.31
Diluted net income	\$ 2.02	\$ 2.85	\$ 2.16	\$ 2.71	\$ 1.28
Financial position					
Working capital	\$ 195,732	\$ 171,389	\$ 165,162	\$ 158,303	\$ 140,229
Property, plant and equipment, net	\$ 213,369	\$ 170,332	\$ 160,795	\$ 114,433	\$ 115,357
Goodwill	\$ 196,963	\$ 68,969	\$ 63,606	\$ 16,841	\$ 21,943
Other intangible assets, net	\$ 136,604	\$ 40,543	\$ 41,447	\$ 5,399	\$ 7,841
Total assets	\$ 872,686	\$ 560,871	\$ 527,029	\$ 358,260	\$ 361,770
Long-term debt, net of current maturities	\$ 314,641	\$ 76,913	\$ 128,141	\$ 20,156	\$ 40,315
Total stockholders' equity	\$ 369,275	\$ 353,396	\$ 273,456	\$ 245,225	\$ 212,599
Total debt to total capitalization	46.8%	17.9%	32.0%	7.7%	16.1%

Please read Part II, Item 7 (Management's Discussion and Analysis of Financial Condition and Results of Operations) of this Annual Report on Form 10-K and the Notes to the Consolidated Financial Statements for specific changes in the Company and its markets that provide context to the above data for the years 2016 through 2018 including, without limitation, discussions concerning (i) how global economic uncertainties have affected the Company's results; (ii) the impact of the acquisitions and divestitures; (iii) the impact of foreign currency translation; (iv) asset impairment charges; (v) consolidation and restructuring charges; (vi) the German Cartel settlement; (vii) the impact of the adoption of new accounting standards, including ASU 2014-09 "Revenue from Contracts with Customers (Topic 606)" and ASU 2017-07, "Compensation - Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost" and (viii) the Company's effective tax rate.

(1) During 2018, the Company completed the acquisitions of the PCC and Interface businesses. The results of PCC and Interface, from their respective acquisition dates on July 12, 2018 and August 31, 2018, respectively, have been included within the Company's Consolidated Financial Statements as of and for the year ended December 31, 2018 and contributed to the increase in the balance sheet line items above.

(2) During 2016, the Company completed the acquisitions of the Texel and Gutsche businesses. The results of Texel and Gutsche, from their respective acquisition dates on July 7, 2016 and December 31, 2016, were included within the Company's Consolidated Financial Statements as of and for the year ended December 31, 2016 and contributed to the increase in the balance sheet line items above.

(3) On January 30, 2015, the Company sold all of the outstanding shares of common stock of its Life Sciences Vital Fluids business, reported as Other Products and Services. As a result, the Company recognized a gain on the sale of \$18.6 million, reported as non-operating income, and net income of \$11.8 million, or \$0.69 per diluted share, for the year ended December 31, 2015.

(4) During 2014, the Company completed the acquisition of the filtration businesses of Andrews Industries, Limited on February 20, 2014. The results of these businesses were included within the Company's Consolidated Financial Statements as of and for the year ended December 31, 2014.

MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

Item 7.

Overview and Outlook

Lydall, Inc. and its subsidiaries (collectively, the "Company" or "Lydall") designs and manufactures specialty engineered nonwoven filtration media, industrial thermal insulating solutions, and thermal and acoustical barriers for filtration/separation and heat abatement and sound dampening applications. Lydall principally conducts its business through three reportable segments: Performance Materials, Technical Nonwovens, and Thermal Acoustical Solutions, with sales globally.

The Performance Materials segment includes filtration media solutions primarily for air, fluid power, life science and industrial applications ("Filtration"), and sealing and gasket solutions, thermal insulation, energy storage, and other engineered products ("Sealing and Advanced Solutions").

On August 31, 2018, the Company acquired an engineered sealing materials business operating under Interface Performance Materials ("Interface"), based in Lancaster, Pennsylvania for \$268.4 million, net of cash acquired of \$5.2 million, subject to a post-closing purchase price adjustment. A globally-recognized leader in the delivery of engineered sealing solutions, the Interface operations manufacture wet-laid gasket and specialty materials primarily serving OEM and Tier I manufacturers in the agriculture, construction, earthmoving, industrial, and automotive segments. The acquired business has been included in the Company's Performance Materials operating segment since the date of acquisition.

The Technical Nonwovens segment primarily produces needle punch nonwoven rolled-good felt media and filter bags used primarily in industrial air and liquid filtration applications ("Industrial Filtration") to satisfy increasing emission control regulations in a wide range of industries, including power, cement, steel, asphalt, incineration, mining, food, and pharmaceutical. Products also include nonwoven rolled-good media used in commercial applications and predominantly serves the geosynthetics, automotive, industrial, medical, and safety apparel markets. Automotive media is provided to Tier I/II suppliers as well as the Company's Thermal Acoustical Solutions segment ("Advanced Materials").

Effective January 1, 2018, the Company's former Thermal/Acoustical Metals and Thermal/Acoustical Fibers operating segments were combined into a single operating segment named Thermal Acoustical Solutions. The Thermal Acoustical Solutions segment offers a full range of engineered products tailored for the transportation and industrial sectors to thermally shield sensitive components from high heat, improve exhaust gas treatment and lower harmful emissions as well as assist in the reduction of noise, vibration and harshness (NVH). Within the transportation sector, Lydall's products are found in the interior (dash insulators, cabin flooring), underbody (wheel well, aerodynamic belly pan, fuel tank, exhaust, tunnel, spare tire) and under hood (engine compartment, outer dash, powertrain, catalytic converter, turbo charger, manifolds) of cars, trucks, SUVs, heavy duty trucks and recreational vehicles.

Financial Highlights

Below are financial highlights comparing Lydall's 2018 results to its 2017 results:

- Consolidated net sales were \$785.9 million in 2018, compared to \$698.4 million in 2017, an increase of \$87.5 million, or 12.5%, with the increase primarily attributable to the acquisition of Interface on August 31, 2018. The change in consolidated net sales is summarized in the following table:

Components	Change in Net Sales	Percent Change
Acquisitions	\$ 48,918	7.0%
Parts volume and pricing change	15,104	2.2%
Change in tooling sales	12,860	1.8%
Foreign currency translation	10,578	1.5%
Total	\$ 87,460	12.5%

- Gross margin decreased to 19.4% in 2018 compared to 23.4% in 2017, primarily driven by the Thermal Acoustical Solutions segment, and to a lesser extent the Technical Nonwovens segment. The Thermal Acoustical Solutions segment negatively impacted consolidated gross margin by approximately 350 basis points due to higher labor and overhead costs, primarily associated with new product launch activity, commodity inflation and lower customer pricing. The Technical Nonwovens segment negatively impacted consolidated gross margin by approximately 140 basis points, principally driven by commodity inflation and unfavorable product mix, partially offset by increased customer pricing, while the Performance Materials segment favorably impacted consolidated gross margin by approximately 90 basis points from improved segment mix, driven by higher margin sales from the acquired Interface business since August 31, 2018.
- Operating income was \$49.2 million, or 6.3% of net sales in 2018, compared to \$66.2 million, or 9.5% of net sales in 2017; Operating margin declined due to the negative impact of lower gross margin of 400 basis points, partially offset by a 70 basis point reduction in selling, product development and administrative expenses. Operating income in 2018 was favorably impacted by decreased cash incentive and stock compensation expenses of approximately \$4.9 million, or 60 basis points, compared to 2017. The following items are included in operating income for 2018 and 2017 and impact the comparability of each year:

Components (in thousands except per share amounts)	2018		2017	
	Operating income effect	EPS impact	Operating income effect	EPS impact
Strategic initiatives expenses	\$ 3,631	\$ 0.18	\$ 778	\$ 0.03
TNW restructuring expenses	2,296	\$ 0.12	662	\$ 0.03
Inventory step-up purchase accounting adjustments	1,975	\$ 0.09	1,108	\$ 0.04
Intangible assets amortization expenses	9,308	\$ 0.40	4,483	\$ 0.19
Automotive segments consolidation expenses	—	\$ —	1,693	\$ 0.06
Reduction in force severance expenses	—	\$ —	987	\$ 0.04
Impairment charge	—	\$ —	772	\$ 0.03

- Net income was \$34.9 million, or \$2.02 per diluted share in 2018, compared to \$49.3 million, or \$2.85 per diluted share in 2017.

Liquidity

Cash was \$49.2 million at December 31, 2018, compared to \$59.9 million at December 31, 2017. Net cash provided by operations was \$44.7 million in 2018 compared to \$62.9 million in 2017. Lower operating income and working capital expansion drove lower cash generation.

On August 31, 2018, in connection with the Interface acquisition, the Company amended and restated its \$175 million senior secured revolving credit agreement ("Amended Credit Agreement") and increased the available borrowing from \$175 million to \$450 million, added three additional lenders and extended the maturity date from July 7, 2021 to August 31, 2023. Under the terms of the Amended Credit Agreement, the lenders provided a term loan commitment of \$200 million and revolving loans of up to \$250 million. The Amended Credit Agreement may be increased by an aggregate amount not to exceed \$150 million through an accordion feature, subject to specified conditions. As of December 31, 2018, there was approximately \$108 million of availability under the Credit Agreement. The Company's cash from operations and capacity under its Amended Credit Agreement provide for sufficient cash availability to support organic growth programs and fund capital investments.

Outlook

Entering 2019, demand is generally steady and the businesses are experiencing a stabilization of key raw material costs, but the Company continues to monitor the uncertainties around governmental actions impacting global trade regulations. The Company is executing on the integration of Interface and expects consolidated EBITDA growth in the first quarter of 2019 compared to the first quarter of 2018. With focused cost control and margin improvement plans across the businesses, and expected year over year raw material cost reductions, the Company currently expects full year 2019 EBITDA margin expansion.

CONSOLIDATED RESULTS OF OPERATIONS

Net Sales

In thousands of dollars	2018	Percent Change	2017	Percent Change	2016
Net sales	\$ 785,897	12.5%	\$ 698,437	23.2%	\$ 566,852

Net sales in 2018 increased by \$87.5 million, or 12.5%, compared to 2017. Net sales increased in the Performance Materials segment by \$52.5 million, or 7.5% of consolidated net sales, including \$48.9 million from acquisitions in 2018. The Thermal Acoustical Solutions segment reported sales growth of \$23.3 million, or 3.3% of consolidated net sales, including increased tooling sales of \$13.5 million and parts sales of \$9.8 million. The increase in tooling sales within the Thermal Acoustical Solutions segment was primarily due to new platform launches and the Company's adoption of ASC 606 which resulted in the recognition of \$1.6 million of tooling sales as the Company's performance obligations were satisfied over time in 2018 compared to 2017 when tooling sales were recognized when delivered and accepted by the customer. In total, the Company's adoption of ASC 606 contributed additional sales of \$4.3 million in 2018 compared to 2017. The Technical Nonwovens segment reported sales growth of \$8.0 million, or 1.1% of consolidated net sales. Foreign currency translation had a favorable impact on net sales of \$10.6 million, or 1.5% of consolidated net sales, impacting the Thermal Acoustical Solutions, Technical Nonwovens and Performance Materials segments by \$4.9 million, \$3.7 million and \$2.0 million, respectively.

Net sales in 2017 increased \$131.6 million, or 23.2%, compared to 2016. This increase was primarily related to greater net sales in the Technical Nonwovens segment of \$113.6 million, or 20.0% of consolidated net sales, including \$87.3 million of net sales from the Texel and Gutsche acquisitions, which occurred on July 7, 2016 and December 31, 2016, respectively, as well as increased net sales of \$26.3 million from the other Technical Nonwovens operations. Additionally, there were volume increases in all other segments. The Thermal Acoustical Solutions segment reported growth in net sales of \$20.9 million, or 3.7% of consolidated net sales in 2017 compared to 2016. The Performance Materials segment reported growth in net sales of \$5.5 million, or 1.0% of consolidated net sales. Foreign currency translation had a favorable impact on net sales of \$2.8 million, or 0.5% of consolidated net sales, in 2017 compared to 2016.

Cost of Sales

In thousands of dollars	2018	Percent Change	2017	Percent Change	2016
Cost of sales	\$ 633,252	18.3%	\$ 535,078	25.0%	\$ 428,048

Cost of sales in 2018 increased by \$98.2 million, or 18.3%, compared to 2017 primarily due to increased sales volumes of \$76.9 million, primarily from the Interface acquisition which contributed \$45.7 million, increased raw material commodity and tariff costs, increased labor and overhead expenses and foreign currency translation which increased cost of sales by \$9.0 million, or 1.7%. Overall, the Company was negatively impacted in 2018 by higher raw material commodity and tariff costs of approximately \$12.0 million compared to 2017, with approximately \$6.5 million and \$5.0 million impacting the Thermal Acoustical Solutions and Technical Nonwovens segments, respectively. The Thermal Acoustical Solutions segment was also negatively impacted by increased labor and overhead expenses of approximately \$13.0 million, including outsourcing costs, expedited freight expenses for customer deliveries caused by equipment downtime and other inefficiencies. Cost of sales also increased in 2018 compared to 2017 due to unfavorable product mix and higher labor and overhead expenses in the Technical Nonwovens and Performance Materials segments.

Cost of sales in 2017 increased \$107.0 million, or 25.0%, compared to 2016. The increase was primarily due to increased sales in the Technical Nonwovens segment of \$113.6 million, primarily related to the Texel and Gutsche acquisitions which increased cost of sales by \$69.5 million, as well as increases in sales in all other segments aggregating to \$26.5 million, increasing cost of sales by \$26.6 million. Also contributing to the increase in cost of sales in 2017 compared to 2016 were higher raw material commodity costs and higher overhead costs in the Thermal Acoustical Solutions segment, partially offset by improved mix of products. Foreign currency translation increased cost of sales by \$2.5 million, or 0.6%, in 2017 compared to 2016.

Gross Profit

In thousands of dollars	2018	2017	2016
Gross profit	\$ 152,645	\$ 163,359	\$ 138,804
Gross margin	19.4%	23.4%	24.5%

The decrease in gross margin by 400 basis points in 2018 compared to 2017 was primarily attributable to the Thermal Acoustical Solutions segment which negatively impacted consolidated gross margin by approximately 350 basis points, primarily related to increased labor and overhead expenses of approximately 180 basis points, including outsourcing costs, overtime associated with new product launch activity and expedited freight expenses for customer deliveries caused by equipment downtime and other inefficiencies. Increased commodity costs, primarily aluminum and tariffs, were approximately 80 basis points. Finally, lower customer pricing on certain automotive parts reduced gross margin by approximately 40 basis points in 2018 compared to 2017. The Technical Nonwovens segment negatively impacted consolidated gross margin by approximately 140 basis points, primarily related to higher raw material commodity costs, unfavorable product mix and incremental restructuring related expenses of \$1.5 million partially offset by the absence of the negative impact of \$1.1 million of purchase accounting adjustments relating to inventory step up in 2017. The Performance Materials segment favorably impacted consolidated gross margin by approximately 90 basis points, driven by favorable segment mix, primarily related to the Interface acquisition on August 31, 2018, as the Performance Materials segment was a larger proportion of consolidated net sales at greater gross margin than the other two segments in 2018 compared to 2017.

The decrease in gross margin by 110 basis points in 2017 compared to 2016 was primarily attributable to the Thermal Acoustical Solutions which negatively impacted consolidated gross margin by approximately 80 basis points, primarily related to increased overhead expenses including operational inefficiencies, increased raw material commodity costs and reduced customer pricing in 2017 compared to 2016. The Technical Nonwovens segment negatively impacted consolidated gross margin by approximately 20 basis points, primarily related to lower customer pricing, unfavorable mix and restructuring expenses, partially offset by lower raw material commodity costs and decreased purchase accounting adjustments relating to inventory step-up in 2017 compared to 2016. Additionally, the Performance Materials segment negatively impacted consolidated gross margin by approximately 10 basis points primarily related to unfavorable mix on higher margin termination buys in 2016 and lower customer pricing in 2017.

Selling, Product Development and Administrative Expenses

In thousands of dollars	2018	2017	2016
Selling, product development and administrative expenses	\$ 103,457	\$ 97,159	\$ 83,359
Percentage of net sales	13.2%	13.9%	14.7%

Selling, product development and administrative expenses in 2018 increased by \$6.3 million, but decreased 70 basis points as a percentage of net sales, compared to 2017. This increase in expenses was primarily related to the acquisition of Interface on August 31, 2018, which contributed \$10.6 million of expense during 2018, including \$3.4 million of intangible assets amortization expense. This increase was partially offset by decreased legacy selling, product development and administrative expenses of \$4.3 million in 2018 compared to 2017. Included in this decrease was lower cash incentive and stock compensation expense of \$5.2 million, based on the Company's lower achievement of financial targets under its incentive programs, the absence of \$1.6 million of expenses associated with the combination of the Company's former T/A Metals and T/A Fibers segments in 2017, reduced corporate consulting expenses of \$1.1 million and the absence of a 2017 non-cash long-lived asset impairment charge of \$0.8 million in the Performance Materials segment. Partially offsetting those reduced 2018 expenses was greater strategic initiatives expenses of \$2.9 million, primarily related to the acquisition of Interface, higher intangibles amortization expense of \$1.4 million from TNW segment acquisitions and increased salaries and benefits of \$0.7 million in 2018 compared to 2017.

Selling, product development and administrative expenses in 2017 increased by \$13.8 million, or 16.6%, compared to 2016. This increase was primarily related to the Technical Nonwovens segment due to the acquisitions of Texel on July 7, 2016 and Gutsche on December 31, 2016 resulting in an additional \$13.0 million of selling, product development and administrative expenses, which included \$2.9 million of incremental intangible amortization expense from TNW segment acquisitions. All other selling, product development and administrative expenses increased \$0.8 million, or 1.0%, in 2017 compared to 2016. This increase was primarily due to greater salaries and benefits of \$2.6 million, \$1.6 million of expenses associated with the combination of the company's former T/A Metals and T/A Fibers segments, higher corporate consulting expenses primarily in support of organic growth initiatives of \$1.6 million, greater information

technology expenses of \$1.2 million, and a non-cash long-lived asset impairment charge of \$0.8 million in the Company's Performance Materials segment in 2017 compared to 2016. These increases were partially offset by the absence of a \$3.5 million settlement charge in the fourth quarter of 2016 in connection with a German Cartel office investigation, lower strategic initiatives expenses of \$2.8 million and a decrease in other selling, product development and administrative expenses of \$0.7 million in 2017 compared to 2016.

Interest Expense

In thousands of dollars	2018	2017	2016
Interest expense	\$ 6,212	\$ 2,720	\$ 1,068
Weighted average interest rate during the year	3.4%	2.2%	1.4%

The increase in interest expense for 2018 compared to 2017 was due to higher borrowings incurred to finance the Interface acquisition on August 31, 2018 and increased interest rates.

The increase in interest expense in 2017 compared to 2016 was due to higher average borrowings used to finance both the Texel and Gutsche acquisitions on July 7, 2016 and December 31, 2016, respectively, and increased interest rates.

Other Income and Expense

In thousands of dollars	2018	2017	2016
Other (income) expense, net	\$ (289)	\$ 2,161	\$ (562)

Other (income) expense, net, primarily represents the net impact recognized with the revaluation of trade payables and receivables, cash and intercompany loans denominated in currencies other than the functional currencies of the Company's subsidiaries.

During 2018, the Company adopted ASU No. 2017-07, which required certain components of net periodic pension and postretirement costs be presented outside income from operations. During 2018, \$0.3 million of net benefit costs were included in other (income) expense, net. The retrospective adoption of this ASU resulted in the reclassification of net benefit costs of \$0.8 million from operating income in 2017 to other (income) expense, net.

Income Taxes

	2018	2017	2016
Effective income tax rate	19.5%	19.5%	32.4%

In 2018, the effective tax rate of 19.5% was below the federal statutory rate and included valuation allowance activity of \$0.6 million. This was primarily a result of the fourth quarter partial release of valuation allowance on the Netherlands net operating losses offset by a valuation allowance addition in Germany. Compared to 2017, the tax benefit from stock compensation expense had a lesser impact on the 2018 rate because of less windfall benefits recognized. Also, foreign income taxed at lower rates had a lesser impact on the 2018 rate because of new U.S. regulations that were released in the fourth quarter 2018 that limit the amount of the tax benefit recorded compared to 2017.

In 2017, in addition to the Tax Reform Act, which favorably impacted the effective tax rate by a net \$3.7 million, the effective tax rate of 19.5% was impacted by a favorable mix of taxable income generated from foreign income taxed at lower rates, resulting in a tax benefit of \$1.7 million, net of \$0.7 million of expense to correct a foreign tax error in prior years. The Company also recorded a tax benefit of \$1.1 million attributable to the Domestic Production Activities Deduction, a tax benefit of \$2.7 million related to stock based compensation and a tax benefit of \$1.5 million attributable to the release of certain reserves for uncertain tax positions from the settlement of the IRS tax audit that closed in the third quarter of 2017. These favorable adjustments were partially offset by tax expense of \$0.3 million against certain deferred tax assets in China, as future realization of the assets is not reasonably assured.

In 2016, the effective tax rate of 32.4% was positively impacted by a favorable mix of taxable income generated from countries with lower tax rates compared to that of the United States at that time, resulting in a tax benefit of \$1.3 million. The Company also recorded a tax benefit of \$1.5 million attributable to the Domestic Production Activities Deduction and a tax benefit of \$1.1 million related to stock based compensation. These favorable adjustments were partially

offset by tax expense of \$1.2 million related to a nondeductible German Cartel settlement and a net increase in valuation allowance against certain deferred tax assets of \$0.7 million, primarily related to tax valuation allowances of \$0.5 million recorded against certain net deferred tax assets in the Netherlands and China, as future realization of the assets is not reasonably assured.

The Company and its subsidiaries file a consolidated federal income tax return, as well as returns required by various state and foreign jurisdictions. In the normal course of business, the Company is subject to examination by taxing authorities, including such major jurisdictions as the United States, China, France, Germany, Hong Kong, the Netherlands, Canada and the United Kingdom. Within the next fiscal year, the Company expects to conclude certain income tax matters through the year ended December 31, 2015 and it is reasonably expected that net unrecognized benefits of \$0.3 million may be recognized. The total amount of unrecognized tax benefits that would affect the effective tax rate if recognized was \$3.6 million as of December 31, 2018. However, \$1.4 million of the unrecognized tax benefits, if recognized, would be offset in pre-tax income by the reversal of indemnification assets due to the Company. The Company is no longer subject to U.S. federal examinations for years before 2015, state and local examinations for years before 2013, and non-U.S. income tax examinations for years before 2003.

SEGMENT RESULTS

Consolidated Net Sales	For the Years Ended December 31,		
	2018	2017	2016
In thousands			
Performance Materials Segment (1):			
Filtration	\$ 93,089	\$ 87,173	\$ 83,345
Sealing and Advanced Solutions	76,128	29,496	27,783
Performance Materials Segment net sales	169,217	116,669	111,128
Technical Nonwovens Segment (2):			
Industrial Filtration	157,606	147,087	90,415
Advanced Materials (3)	119,465	121,990	65,090
Technical Nonwovens net sales	277,071	269,077	155,505
Thermal Acoustical Solutions Segment:			
Parts	328,057	318,217	298,016
Tooling	37,370	23,888	23,176
Thermal Acoustical Solutions Segment net sales	365,427	342,105	321,192
Eliminations and Other (3)	(25,818)	(29,414)	(20,973)
Consolidated Net Sales	\$ 785,897	\$ 698,437	\$ 566,852

Operating Income	For the Years Ended December 31,		
	2018	2017	2016
In thousands			
Performance Materials Segment (1)	\$ 13,139	\$ 12,321	\$ 12,574
Technical Nonwovens Segment (2)	21,323	26,047	15,584
Thermal Acoustical Solutions Segment	38,085	53,132	53,072
Corporate Office Expenses	(23,359)	(25,300)	(25,785)
Consolidated Operating Income	\$ 49,188	\$ 66,200	\$ 55,445

(1)The Performance Materials segment reports the results of Interface and PCC for the periods following the dates of acquisitions of August 31, 2018 and July 12, 2018, respectively.

(2)The Technical Nonwovens segment reports results of Texel and Gutsche for the periods following the date of acquisitions of July 7, 2016 and December 31, 2016, respectively.

(3)Included in the Technical Nonwovens segment and Eliminations and Other is \$22.2 million, \$26.5 million and \$18.2 million in intercompany sales to the Thermal Acoustical Solutions segment for the years ended December 31, 2018, 2017 and 2016, respectively.

Performance Materials Segment

Segment net sales increased \$52.5 million, or 45.0%, in 2018 compared to 2017. The increase was primarily due to acquisitions in 2018 and contributed \$48.9 million of net sales. Additionally, all other Performance Materials net sales increased \$3.6 million, primarily due to increased net sales of filtration products related to increased demand in the liquid filtration market and to a lesser extent, air filtration in North America. Foreign currency translation positively impacted net sales by \$2.0 million, or 1.7%, in 2018 compared to 2017. The Company's adoption of ASC 606 had a minimal impact on net sales in 2018.

The Performance Materials segment reported operating income of 13.1 million, or 7.8% of net sales, in 2018, compared to operating income of \$12.3 million, or 10.6% of net sales, in 2017. The decrease in operating margin of 280 basis points was driven in part by the acquisition of Interface, which negatively impacted operating margin by 220 basis points, primarily due to \$3.4 million, or 200 basis points, of intangible asset amortization expense and a \$2.0 million, or 110 basis points, purchase accounting adjustment to cost of sales related to inventory step-up. These decreases to operating margin were partially offset by improved product mix from the Interface business by approximately 90 basis points. The remaining decrease in operating margin of 60 basis points from the legacy Performance Materials businesses was due to lower gross margin of 190 basis points, primarily related to increased overhead costs, higher labor costs and unfavorable product mix. This decrease to legacy Performance Materials gross margin was partially offset by a 130 basis point decrease in selling, product development and administrative expenses as a percentage of net sales, primarily due to the absence of a non-cash long-lived asset impairment charge of \$0.8 million recorded in 2017 and lower accrued incentive compensation of \$0.4 million in 2018 compared to 2017.

Segment net sales increased \$5.5 million, or 5.0%, in 2017 compared to 2016. Filtration product net sales increased \$3.8 million, or 4.6% in 2017 compared to 2016. The increase in filtration product net sales was primarily due to higher overall demand and share gains for filtration products, particularly in North America and Europe. Sealing and advanced solutions sales increased \$1.7 million, or 6.2%, primarily due to an increase in thermal insulation product net sales from increased order activity in cryo liquid natural gas and energy related applications, and to a lesser extent, improved market demand in the insulation space in 2017 compared to 2016. Foreign currency translation had a positive impact on segment net sales of \$0.7 million, or 0.6%, in 2017 compared to 2016.

The Performance Materials segment reported operating income of \$12.3 million, or 10.6% of net sales in 2017, compared to operating income of \$12.6 million, or 11.3% of net sales in 2016. The reduction in operating margin was primarily due to a decrease in gross margin of 70 basis points, primarily due to unfavorable mix on higher margin product termination buys in 2016, lower customer pricing and unfavorable absorption of labor and overhead costs in 2017 compared to 2016. Also contributing to the decrease in operating margin was higher selling, product development and administrative expenses of \$1.0 million, or 10 basis points as a percentage of net sales, including \$0.8 million from a non-cash long-lived asset impairment charge recorded in the first quarter of 2017. Other increases included higher salaries and benefits of \$0.4 million, partially offset by a decrease in other selling, product development and administrative expenses of \$0.2 million in 2017 compared to 2016.

Technical Nonwovens Segment

Segment net sales increased \$8.0 million, or 3.0%, in 2018 compared to 2017 primarily due to increased pricing, favorable foreign currency translation and the adoption of ASC 606. Industrial filtration sales increased \$10.5 million, or 7.2%, from increased demand and pricing in Europe and North America. This increase was partially offset by decreased net sales in advanced materials of \$2.5 million, or 2.1%, primarily driven by decreased sales of automotive rolled-good material for use in the Thermal Acoustical Solutions segment manufacturing process. Foreign currency translation had a positive impact on segment net sales of \$3.7 million, or 1.4%, in 2018 compared to 2017. The Company's adoption of ASC 606 contributed \$2.3 million of the sales increase in 2018 compared to 2017.

The Technical Nonwovens segment reported operating income of \$21.3 million, or 7.7%, of net sales in 2018, compared to \$26.0 million, or 9.7%, of net sales in 2017. The decrease in operating margin of 200 basis points was attributable to lower gross margin of 210 basis points. Gross margin was negatively impacted by incremental segment restructuring expenses of \$1.5 million, or 60 basis points, unfavorable product mix and higher raw material costs, partially offset by increased pricing and inventory step-up of \$1.1 million, or 40 basis points, in 2017. Selling, product development and administrative expenses increased \$0.6 million in 2018 compared to 2017, but decreased by approximately 10 basis points as a percentage of net sales. The increase in selling, product development and administrative expenses was primarily related to higher amortization of intangible assets of \$1.4 million and increased salaries and benefits of \$0.9

million, partially offset by lower accrued incentive and stock compensation expenses of \$1.4 million, and a decrease in other administrative expenses of \$0.3 million.

Segment net sales increased by \$113.6 million, or 73.0%, in 2017 compared to 2016 primarily due to net sales of \$87.3 million from the acquisitions of Texel and Gutsche which occurred on July 7, 2016 and December 31, 2016, respectively. The remaining increase in segment net sales of \$26.3 million, or 16.9%, was from advanced materials products which increased \$14.4 million primarily due to increased sales of automotive rolled-good material for use in the Thermal Acoustical Solutions segment manufacturing process, and industrial filtration products, which increased \$11.9 million, primarily due to improved demand globally in power generation markets. Foreign currency translation favorably impacted segment net sales by \$0.5 million, or 0.3%, in 2017 compared to 2016.

The Technical Nonwovens segment reported operating income of \$26.0 million, or 9.7%, of segment net sales in 2017 compared to operating income of \$15.6 million, or 10.0%, of segment net sales in 2016. The increase in segment operating income of \$10.4 million was principally from the acquisitions of Texel and Gutsche, which contributed a combined increase of \$7.5 million of operating income. The remaining increase in segment operating income of \$2.9 million was due to increased sales from the segment's North America and China operations. The decrease in operating margin of 30 basis points was attributable to increased selling, product development and administrative expenses of \$14.1 million, or an increase of 130 basis points as a percentage of net sales, primarily due to increased Texel and Gutsche expenses of \$13.7 million, partially offset by improved gross margin of 90 basis points. Improved gross margin was primarily due to lower raw material costs and decreased expenses for purchase accounting adjustments to cost of sales related to inventory step-up of \$0.8 million, partially offset by reduced customer pricing, unfavorable product mix and restructuring expenses of \$0.4 million. Included in selling, product development and administrative expenses was incremental intangibles amortization expense of \$2.9 million from the acquired Texel and Gutsche businesses in 2017 compared to 2016 and 2017 restructuring expenses of \$0.3 million. Foreign currency favorably impacted operating income by \$0.1 million, or 0.8%, in 2017 compared to 2016.

Thermal Acoustical Solutions Segment

Segment net sales increased \$23.3 million, or 6.8%, in 2018 compared to 2017. Tooling net sales increased \$13.5 million compared to 2017 principally due to new platform launches, and to a lesser extent, the impact of the Company's adoption of ASC 606. The new standard resulted in the recognition of an additional \$1.6 million of segment tooling sales that under prior accounting rules would have been recognized upon delivery and acceptance by the customer in a later period. Parts net sales increased \$9.8 million, or 3.1%, compared to 2017, due to increased demand in Europe and Asia, partially offset by marginally lower net sales in North America due to reduced customer pricing. The Company's adoption of ASC 606 had a minimal impact on parts net sales in 2018. Foreign currency translation had a positive impact on segment net sales of \$4.9 million, or 1.4%, in 2018 compared to 2017.

The Thermal Acoustical Solutions segment reported operating income of \$38.1 million, or 10.4% of net sales, in 2018, compared to operating income of \$53.1 million, or 15.5% of net sales, in 2017. The decrease in operating income of \$15.0 million and operating margin of 510 basis points was due to lower gross margin of 630 basis points primarily due to increased labor and variable overhead expenses of approximately 320 basis points, including outsourcing costs, overtime associated primarily with new product launch activity and expedited freight expenses for customer deliveries caused by equipment downtime and other inefficiencies. Increased raw material commodity costs, primarily aluminum, and tariffs, were approximately 180 basis points. This decrease to gross margin was partially offset by a \$2.7 million decrease in selling product development and administrative expenses, or a 120 basis points decrease as a percentage of net sales, due to the absence of \$1.2 million of expenses associated with the combination of the Company's former T/A Metals and T/A Fibers segments in 2017, lower salaries and sales commissions of \$0.6 million, primarily from savings realized on the segment combination, lower computer maintenance and support expenses of \$0.4 million and decreased other administrative costs of \$0.5 million in 2018 compared to 2017.

Segment net sales increased by \$20.9 million, or 6.5%, in 2017 compared to 2016. Parts net sales increased by \$20.2 million, or 6.8%, in 2017 compared to 2016, primarily due to increased global demand on Lydall's existing and new platforms. Foreign currency translation had a favorable impact on parts net sales of \$1.4 million, or 0.5%, in 2017 compared to 2016. Tooling net sales increased \$0.7 million, or 3.1%, compared to 2016 due to the timing of new product launches. Foreign currency translation had a favorable impact on tooling sales of \$0.3 million, or 1.1%, in 2017 compared to 2016.

The Thermal Acoustical Solutions segment reported 2017 operating income of \$53.1 million, or 15.5%, of segment net sales, compared to \$53.1 million, or 16.5% of net sales in 2016. The decrease in operating margin of 100 basis

points was due to lower gross margin of 180 basis points due to higher raw material commodity costs, reduced customer pricing and increased overhead expenses including operational inefficiencies in 2017 compared to 2016. The decrease in gross margin was partially offset by lower segment selling, product development and administrative expenses of \$1.0 million, or 80 basis points as a percentage of net sales, primarily due to the absence of a \$3.5 million, or 110 basis points, settlement charge in the fourth quarter of 2016 in connection with a German Cartel office investigation. This decrease to selling, product development and administrative expenses was partially offset by increased salaries of \$1.2 million and \$1.2 million of expenses associated with the combination of the Company's former T/A Metals and T/A Fibers segments in 2017 compared to 2016. Overall, 2017 operating income and operating margin were negatively impacted by consolidation expenses of \$1.4 million, or 40 basis points, and severance expenses of \$0.7 million, or 20 basis points. Foreign currency translation had a minimal impact on operating income in 2017 compared to 2016.

Corporate Office Expenses

The decrease in corporate office expenses of \$1.9 million in 2018 compared to 2017 was primarily due to decreased stock and cash incentive compensation expenses of \$3.4 million based on lower achievement of certain financial targets. Also, consulting expenses were lower in 2018 by \$1.2 million, partially offset by increased corporate strategic initiatives expenses of \$2.7 million, primarily related to acquisitions, in 2018 compared to 2017.

The decrease in corporate office expenses of \$0.5 million in 2017 compared to 2016 was primarily due to decreased strategic initiatives expenses of \$2.8 million, partially offset by increased consulting expenses of \$1.3 million, primarily related to organic growth initiatives, higher salaries of \$0.5 million, increased recruiting expenses of \$0.3 million and increases in other administrative expenses of \$0.3 million in 2017 compared to 2016.

LIQUIDITY AND CAPITAL RESOURCES

In thousands except ratio data	For the Year Ended December 31,		
	2018	2017	2016
Cash and cash equivalents	\$ 49,237	\$ 59,875	\$ 71,934
Cash provided by operating activities	\$ 44,739	\$ 62,936	\$ 69,727
Cash used for investing activities	\$ (300,965)	\$ (27,329)	\$ (177,708)
Cash provided by (used for) financing activities	\$ 247,476	\$ (53,209)	\$ 106,375
Depreciation and amortization	\$ 33,162	\$ 26,130	\$ 19,559
Capital expenditures	\$ (31,291)	\$ (27,006)	\$ (25,466)
Total debt	\$ 324,813	\$ 77,190	\$ 128,775
Total capitalization (debt plus equity)	\$ 694,088	\$ 430,586	\$ 402,231
Total debt to total capitalization	46.8%	17.9%	32.0%

The Company assesses its liquidity in terms of its ability to generate cash to fund operating, investing and financing activities. The principal source of liquidity is operating cash flows. In addition to operating cash flows, other significant factors that affect the overall management of liquidity include capital expenditures, investments in businesses, strategic transactions, income tax payments, debt service payments, outcomes of contingencies, foreign currency exchange rates, foreign cash repatriation and pension funding. The Company manages worldwide cash requirements by considering available funds among domestic and foreign subsidiaries. The Company expects to finance its 2019 operating cash and capital spending requirements from existing cash balances, cash provided by operating activities and through borrowings under the Amended Credit Facility, as needed.

At December 31, 2018, the Company held \$49.2 million in cash and cash equivalents, including \$14.0 million in the U.S. with the remaining held by foreign subsidiaries.

Operating Cash Flows

Net cash provided by operating activities in 2018 was \$44.7 million compared with \$62.9 million in 2017. In 2018, net income and non-cash adjustments were \$72.9 million compared to \$78.7 million in 2017. Net operating assets and liabilities in 2018 increased \$28.2 million since December 31, 2017, compared to an increase in net operating assets

and liabilities in 2017 of \$15.8 million since December 31, 2016. The increase in net operating assets and liabilities in 2018 was primarily due to increases of \$7.1 million in accounts receivable and \$6.0 million in inventories and a decrease of \$5.1 million in accounts payable. Also, contributions to the Company's defined benefit pension plans increased by \$3.9 million in 2018 compared to 2017 for total contributions of \$7.5 million in 2018. The increase in accounts receivable was primarily due to higher net sales within the Performance Materials segment as well as timing of customer receipts across segments. The increase in inventory was principally due to higher raw material inventories, primarily associated with strategic purchases within the Technical Nonwovens segment. The decrease in accounts payable was primarily driven by the timing of vendor payments within the Technical Nonwovens and Thermal Acoustical Solutions segments, as well as the timing of payments for capital expenditures in 2018.

Net cash provided by operating activities in 2017 was \$62.9 million compared with \$69.7 million in 2016. In 2017, net income and non-cash adjustments were \$78.7 million compared to \$61.8 million in 2016. Net operating assets and liabilities in 2017 increased \$15.8 million since December 31, 2016, compared to a decrease in net operating assets and liabilities in 2016 of \$7.9 million since December 31, 2015. The increase in net operating assets and liabilities in 2017 was primarily due to increases of \$11.1 million in inventories, \$8.0 million in accounts receivable, \$5.2 million in benefit plan liabilities and \$4.7 million in accrued taxes, partially offset by an increase of \$14.3 million in accounts payable. Increased tooling inventory of \$9.2 million, in preparation of new automotive platform launches in 2018, primarily drove the increase in inventories. The increase in accounts receivable was primarily due to higher net sales in the fourth quarter of 2017 compared to the fourth quarter of 2016 across all segments. The decrease in benefit plan liabilities was mainly due to cash contributions to the Company's domestic pension plan of \$3.6 million in 2017. The decrease in accrued taxes was primarily due to the timing of income tax payments within our foreign operations. The increase in accounts payable was primarily driven by the timing of tooling inventory purchases within the Thermal Acoustical Solutions segment during fourth quarter of 2017.

Investing Cash Flows

Net cash used for investing activities was \$301.0 million in 2018 compared to \$27.3 million in 2017. Investing activities in 2018 consisted of cash outflows of \$268.4 million to fund the Interface acquisition, net of cash acquired of \$5.2 million, and cash outflows of \$1.6 million to fund the PCC acquisition. Investing activities in 2017 consisted of cash outflows of \$0.3 million for a final purchase price adjustment related to the Gutsche acquisition. Cash outflows for capital expenditures in 2018 were \$31.3 million compared to \$27.0 million in 2017.

Net cash used for investing activities was \$27.3 million in 2017 compared to \$177.7 million in 2016. Investing activities in 2017 included a final purchase price adjustment of \$0.3 million related to the Gutsche acquisition. In 2016, investing activities included cash outflows of \$101.1 million to fund the Texel acquisition, net of cash acquired of \$1.6 million, and cash outflows of \$51.1 million to fund the Gutsche acquisition, net of cash acquired of \$9.4 million. Cash outflows for capital expenditures in 2017 were \$27.0 million compared to \$25.5 million in 2016.

Financing Cash Flows

In 2018, net cash provided by financing activities was \$247.5 million compared to net cash used for financing activities of \$53.2 million in 2017. In the third quarter of 2018, the Company borrowed \$338.0 million from its Amended Credit Facility of which the Company repaid \$76.6 million in outstanding borrowings under the previous facility and used the remaining proceeds to fund the purchase of the Interface acquisition. In addition, the Company repaid \$13.0 million in borrowings under the Amended Credit Facility during the fourth quarter of 2018. The Company had debt repayments of \$51.8 million in 2017. The Company acquired \$1.0 million and \$2.8 million in company stock through its equity compensation plans in 2018 and 2017, respectively. The Company received \$0.9 million from the exercise of stock options in 2018, compared to \$1.3 million in 2017.

In 2017, net cash used for financing activities was \$53.2 million compared with net cash provided by financing activities of \$106.4 million in 2016. In 2016, the Company borrowed \$116.6 million against its prior credit facility to fund the purchases of the Texel and Gutsche businesses. Debt repayments were \$51.8 million and \$10.3 million in 2017 and 2016, respectively. The Company acquired \$2.8 million in company stock through its equity compensation plans in 2017 compared to \$1.1 million in 2016. The Company also received \$1.3 million from the exercise of stock options during 2017, compared to \$1.2 million during 2016.

Financing Arrangements

On August 31, 2018, the Company amended and restated its \$175 million senior secured revolving credit agreement ("Amended Credit Agreement") that increased the available borrowing from \$175 million to \$450 million, added three additional lenders and extended the maturity date from July 7, 2021 to August 31, 2023.

Under the terms of the Amended Credit Agreement, the lenders are providing up to a \$450 million credit facility (the "Facility") to the Company, under which the lenders provided a term loan commitment of \$200 million and revolving loans and issue letters of credit to or for the benefit of the Company and its subsidiaries of up to \$250 million. The Facility may be increased by an aggregate amount not to exceed \$150 million through an accordion feature, subject to specified conditions. The Facility is secured by substantially all of the assets of the Company.

Interest is charged on borrowings at the Company's option of either: (i) Base Rate plus the Applicable Rate, or (ii) the Eurodollar Rate plus the Applicable Rate. The Base Rate is a fluctuating rate equal to the highest of (a) the federal funds rate plus 0.50%, (b) the prime rate as set by Bank of America, and (c) the Eurocurrency Rate plus 1.00%. The Eurocurrency Rate means (i) if denominated in LIBOR quoted currency, a fluctuating LIBOR per annum rate equal to the London Interbank Offered Rate; (ii) if denominated in Canadian Dollars, the rate per annum equal to the Canadian Dollar Offered Rate; or (iii) the rate per annum as designated with respect to such alternative currency at the time such alternative currency is approved by the Lenders. The Applicable Rate is determined based on the Company's Consolidated Leverage Ratio (as defined in the Amended Credit Agreement). The Applicable Rate added to the Base Rate Committed Loans ranges from 0.00% to 1.25%, and the Applicable Rate added to Eurocurrency Rate Committed Loans and Letters of Credit ranges from 0.75% to 2.00%. The Company pays a quarterly fee ranging from 0.15% to 0.275% on the unused portion of the revolving commitment.

The Company is permitted to prepay term and revolving borrowings in whole or in part at any time without premium or penalty, subject to certain minimum payment requirements, and the Company is generally permitted to irrevocably cancel unutilized portions of the revolving commitments under the Amended Credit Agreement. The Company is required to repay the term commitment in an amount of \$2.5 million per quarter beginning with the quarter ending December 31, 2018 through the quarter ending June 30, 2023.

The Amended Credit Agreement contains covenants required of the Company and its subsidiaries, including various affirmative and negative financial and operational covenants. The Company is required to meet certain quarterly financial covenants calculated from the four fiscal quarters most recently ended, including: (i) a minimum consolidated fixed charge coverage ratio, which requires that at the end of each fiscal quarter the ratio of (a) consolidated EBITDA to (b) the sum of consolidated interest charges, redemptions, non-financed maintenance capital expenditures, restricted payments and taxes paid, each as defined in the Amended Credit Agreement, may not be lower than 1.25 to 1.0; and (ii) a consolidated net leverage ratio, which requires that at the end of each fiscal quarter the ratio of consolidated funded indebtedness minus consolidated domestic cash to consolidated EBITDA, as defined in the Amended Credit Agreement, may not be greater than 3.5 to 1.0. The Company was in compliance with all covenants at December 31, 2018.

In November 2018, the Company entered into a five year interest rate swap agreement with a bank which converts the interest on a notional \$139.0 million of the Company's one-month LIBOR-based borrowings under its Amended Credit Agreement from a variable rate, plus the borrowing spread, to a fixed rate of 3.09% plus the borrowing spread. The notional amount reduces quarterly by fluctuating amounts through August 2023. In April 2017, the Company entered into a three-year interest rate swap agreement with a bank which converts the interest on a notional \$60.0 million of the Company's one-month LIBOR-based borrowings under its Amended Credit Agreement from a variable rate, plus the borrowing spread, to a fixed rate of 1.58% plus the borrowing spread. The notional amount reduces quarterly by \$5.0 million through March 31, 2020. These interest rate swap agreements were accounted for as cash flow hedges. Effectiveness of these derivative agreements are assessed quarterly by ensuring that the critical terms of the swaps continue to match the critical terms of the hedged debt.

In addition to the amounts outstanding under the Amended Credit Agreement, the Company has various acquired foreign credit facilities totaling approximately \$8.2 million. At December 31, 2018, the Company's foreign subsidiaries had \$2.2 million in standby letters of credit outstanding.

Future Cash Requirements

The Company manages worldwide cash requirements considering available funds among domestic and foreign subsidiaries. The Company expects to fund its operating cash requirements from existing cash balances, cash generated by operations, and through borrowings, as needed, under its existing domestic and foreign credit facilities. The Company continually explores its core markets for suitable acquisitions, joint ventures, alliances and licensing agreements. If completed, such activities would be financed with existing cash balances, cash generated from operations, borrowings under the credit facilities described under "Financing Arrangements" above or other forms of financing, as required.

At December 31, 2018, total indebtedness was \$324.8 million, of which \$138.0 million was a revolver loan and \$186.5 million was a term loan, both governed by the Amended Credit Facility and \$0.3 million was capital leases, totaling 46.8% of the Company's total capital structure. Cash requirements for 2019 are expected to include the funding of ongoing operations, capital expenditures, restructuring programs, payments due on capital and operating leases, pension plan contributions, income tax payments, term loan payments and optional prepayments on the revolver loan. Capital spending for 2019 is expected to be approximately \$40 million to \$45 million.

The funded status of the Company's defined benefit pension plans are dependent upon many factors, including returns on invested assets, levels of market interest rates, mortality rates and levels of contributions to the plan. The Company expects to contribute approximately \$3.5 million to \$5.5 million to its domestic defined benefit pension plans in 2019. See Note 10 to the Consolidated Financial Statements for additional information regarding the Company's pension plans.

Contractual Obligations

The following table summarizes the Company's significant contractual obligations as of December 31, 2018 and the effect of such contractual obligations are expected to have on the Company's liquidity and cash flows in future periods. For recent financing activity please refer to "Financing Arrangements" above.

In thousands	Payments Due by Period						Total
	2019	2020	2021	2022	2023	After 5 years	
Contractual Obligations:							
Operating leases	\$ 6,004	\$ 4,871	\$ 3,877	\$ 3,226	\$ 2,617	\$ 11,111	\$ 31,706
Capital leases*	279	35	—	—	—	—	314
Long-term debt*	24,117	23,837	23,209	22,573	293,017	—	386,753
Total Contractual Obligations	\$ 30,400	\$ 28,743	\$ 27,086	\$ 25,799	\$ 295,634	\$ 11,111	\$ 418,773

* Includes estimated interest payments

The Company has capital lease agreements for machinery and equipment at multiple operations requiring monthly principal and interest payments through 2020. Operating leases are primarily related to buildings, office equipment, vehicles and machinery.

The Company's long-term debt payments in the table above represent the estimated annual term loan fixed principal payments, revolver loan payments due in 2023 and annual interest payments. Actual payments may vary significantly depending on future debt levels, timing of debt repayments and sources of funding utilized. Refer to Note 7 to the Consolidated Financial Statements for additional discussion on long-term debt.

In addition to the above contractual obligations, the Company utilizes letters of credit in the ordinary course of business. Outstanding letters of credit were \$6.1 million and \$6.7 million at December 31, 2018 and 2017, respectively.

The above table does not reflect net tax contingencies of \$3.6 million, the timing of which is uncertain. Refer to Note 14 to the Consolidated Financial Statements for additional discussion on unrecognized tax benefits.

Purchase orders or contracts for normal purchases of raw materials and other goods and services are not included in the table above. The Company is not able to determine the aggregate amount of such purchase orders that represent

contractual obligations, as purchase orders may represent authorizations to purchase rather than binding agreements. For purposes of this table, contractual obligations for purchase of goods or services are defined as agreements that are enforceable and legally binding on the Company and that specify all significant terms, including: fixed or minimum quantities to be purchased; fixed, minimum or variable price provisions; and the approximate timing of the transactions. The Company does not have significant agreements for the purchase of raw materials or other goods specifying minimum quantities or set prices that exceed expected requirements.

CRITICAL ACCOUNTING ESTIMATES

The preparation of the Company's Consolidated Financial Statements in accordance with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities as of the date of the financial statements and the reported amounts of revenues and expenses during the reporting periods. Note 1 in Notes to Consolidated Financial Statements describes the significant accounting policies used in the preparation of the Consolidated Financial Statements. The Company's management is required to make judgments about and estimates of the effect of matters that are inherently uncertain. Actual results could differ from management's estimates. The most significant areas involving management judgments and estimates are described below.

Goodwill

The Company had goodwill of \$197.0 million at December 31, 2018 and \$69.0 million at December 31, 2017. Goodwill is not amortized, but rather is subject to impairment tests annually or more frequently when an event occurs or circumstances change that would more likely than not reduce the fair value of a reporting unit below its carrying value. The identification and measurement of goodwill impairment involves the estimation of the fair value of reporting units, including related goodwill. The Company's reporting units are operating segments for which discrete financial information is available and segment management regularly reviews the operating results of that reporting unit.

During the fourth quarter of 2018, the Company performed its annual impairment analysis of the \$52.3 million of goodwill in the Technical Nonwovens reporting unit and \$144.6 million of goodwill in the Performance Materials reporting unit. Using the qualitative method to analyze the goodwill for the Performance Materials reporting unit, the Company considered the capital markets environment, economic conditions, industry trends, results of operations, and other factors. The Company also considered changes in assumptions used in the Company's most recent quantitative annual testing, including results of operations, the magnitude of excess of fair value over carrying value and other factors. For the Technical Nonwovens reporting unit, to periodically supplement historical qualitative assessments, the Company performed a quantitative assessment of the fair value of the reporting unit utilizing both an income approach, using discounted cash flow projections, and market approach valuations. As a result of this analysis, the Company concluded that the Performance Materials and Technical Nonwovens reporting units' goodwill was not impaired.

In the event that the Company's operating results in the future do not meet current expectations, management, based upon conditions at the time, would consider taking restructuring or other actions as necessary to maximize profitability. Future cash flows can be affected by numerous factors including changes in economic, industry or market conditions, changes in the underlying business or products of the reporting unit, changes in competition and changes in technology. Any changes in key assumptions about the business and its prospects, changes in any of the factors discussed above or other factors could affect the fair value of one or more of the reporting units resulting in an impairment charge.

Impairment of Long-Lived Assets

Long-lived assets are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of such assets may not be recoverable. Determination of recoverability is based on the Company's judgment and estimates of undiscounted future cash flows resulting from the use of the assets and their eventual disposition. Measurement of an impairment loss for long-lived assets that management expects to hold and use is based on the fair value of the assets and measurement of an impairment loss for long-lived assets that are held for sale is based on the fair value of the assets less costs to sell. If the carrying values of the assets are determined to be impaired, then the carrying values are reduced to their estimated fair values, or fair value less costs to sell. The fair values of the impaired assets are determined based on applying a combination of market approaches, including independent appraisals when appropriate, the income approach, which utilizes cash flow projections, and the cost approach.

During the fourth quarter of 2018, as a result of the market changes experienced during 2018 within the automotive sector and the significant decrease in the Company's stock price such that the net book value of the Company exceeded total market capitalization for the Company for a short period of time, an impairment analysis for the long-lived assets within the Thermal Acoustical Solutions segment was performed, which is the segment most impacted by the automotive sector market changes. The Thermal Acoustical Solutions impairment analysis was performed at the asset group level, which is the lowest level of assets for which cash flows could be identified. The Company concluded that undiscounted cash flows were in excess of the total carrying value, and, as a result, the asset groups were not impaired.

During the fourth quarter of 2017, the Company performed an impairment analysis for the long-lived asset group at the Company's St. Nazaire, France operation, included in the Thermal Acoustical Solutions segment. In connection with the Company's on-going efforts to improve performance in its Thermal Acoustical Solutions segment, the Company regularly evaluates both tactical and strategic options. The process of exploring strategic options for the facility during the fourth quarter of 2017 resulted in an indicator of possible impairment. The Company concluded that the St. Nazaire asset group had undiscounted cash flow that was in excess of its carrying value of \$11.6 million and, as a result, the asset group was not impaired at December 31, 2017.

The estimate of undiscounted cash flows of the long-lived asset groups was based on the best information available as of the date of the assessments, which incorporated management's assumptions around cash flows generated from future operations, the estimated economic useful life of the primary assets within the long-lived asset groups, as well as other market information. If cash flows in the future do not meet current expectations a thorough analysis of all the facts and circumstances existing at that time would need to be performed to determine if recording an impairment loss is necessary.

During the first quarter of 2017, the Company tested for impairment a discrete long-lived asset group in the Performance Materials segment with a carrying value of \$1.3 million, as a result of indicators of possible impairment. To determine the recoverability of this asset group, the Company completed an undiscounted cash flow analysis and compared it to the asset group carrying value. This analysis was primarily dependent on the expectations for net sales over the estimated remaining useful life of the underlying asset group. The impairment test concluded that the asset group was not recoverable as the resulting undiscounted cash flows were less than their carrying amount. Accordingly, the Company determined the fair value of the asset group to assess if there was an impairment. Determining fair value is judgmental in nature and requires the use of significant estimates and assumptions considered to be Level 3 inputs. To determine the estimated fair value of the asset group the Company used the market approach. Under the market approach, the determination of fair value considered market conditions including an independent appraisal of the components of the asset group. The estimated fair value of the asset group was \$0.5 million, below its carrying value of \$1.3 million, which resulted in a long-lived asset impairment charge of \$0.8 million included in selling, product development and administrative expenses during the quarter ended March 31, 2017.

Pensions

Pension cost and the related obligations recognized in the Consolidated Financial Statements are determined on an actuarial basis. The determination of such amounts is made in consultation with the Company's outside actuaries based on information and assumptions provided by the Company.

The Company maintains a domestic defined benefit pension plan ("U.S. Lydall Pension Plan") and acquired two domestic pension plans in the Interface acquisition ("Interface Pension Plans"), (collectively, "domestic defined benefit pension plans").

A substantial portion of the Company's pension amounts relate to its domestic defined benefit pension plans. Pension plans outside the United States were not significant at December 31, 2018. As discussed further below, the significant assumptions that impact pension costs include discounts rates, mortality rates, and expected long-term rates of return on invested pension assets.

The U.S. Lydall Pension Plan, which covers certain domestic Lydall employees is noncontributory and benefits are based on either years of service or eligible compensation paid while a participant is in a plan. During the fourth quarter of 2018, the Company authorized the planned termination of the U.S. Lydall Pension Plan under which approximately 900 participants, including 200 active employees, have accrued benefits. The Company anticipates completing the pension plan termination in 2019. At December 31, 2018, the benefit obligations have been valued at the amount expected to be required to settle the obligations for plan termination, using assumptions regarding the portion of obligations expected to be settled through lump sum payments or annuities and the cost to purchase those annuities. Overall, the Company estimates it will incur pension expense of approximately \$29.0 million to \$33.0 million in 2019

when the plan settlement is completed. Of that settlement amount, the Company expects to make a one-time cash contribution of approximately \$2.0 million to \$4.0 million to purchase annuities for participants and make lump sum payments. The estimated expense is subject to change based on valuations at the actual date of settlement.

The Interface Pension Plans cover Interface's union and non-union employees, the plans are closed to new employees and benefits are no longer accruing for the majority of participants. The Company also acquired Interface's domestic post-retirement benefit plan which includes life insurance and medical benefits for certain domestic employees.

A significant element in determining the Company's pension cost is the expected return on plan assets. Based on a review of market trends, actual returns on plan assets and other factors, including the allocation of the Company's investments between equity and fixed income funds, the Company's weighted expected long-term rate of return on plan assets for the domestic defined benefit pension plans was 4.08% at December 31, 2018, which will be utilized for determining 2019 pension cost. A weighted expected long-term rate of return of 5.79% was used for determining 2018 pension expense and 6.30% in determining 2017 pension expense. In determining the expected return on plan assets, the Company considers the relative weighting of plan assets, the historical performance of marketable debt and equity securities and economic and other indicators of future performance. Investment management objectives include maintaining an adequate level of diversification to balance market risk and to provide sufficient liquidity for near-term payments of benefits accrued under the plan and to pay the expenses of administration. The investment plan assets are stated at fair value, which is based on quoted market prices in an active market. The expected long-term rate of return on assets is applied to the value of plan assets at the beginning of the year and this produces the expected return on plan assets that is included in the determination of pension cost for that year. The difference between this expected return and the actual return on plan assets is deferred. The Company continually evaluates its expected long-term rate of return and will adjust such rate as deemed appropriate.

At the end of each year, the Company determines the discount rate to be used to calculate the present value of plan liabilities, as well as the following year's pension cost. The discount rate is an estimate of the current interest rate at which the pension liabilities could be effectively settled at the end of the year.

The discount rate for the U.S. Lydall Pension Plan at December 31, 2018 was 3.66%, a single discount rate determined that produces an equivalent liability to the liability produced using methodology based on estimated lump sum liabilities and annuity purchase cost. The lump sum rate was based on segment rates for September 2018 and a rate for the estimated annuity purchase costs was based on the actuary Rate:Link 10:90 model. The discount rate for this Plan at December 31, 2017 was 3.71%.

For the Interface Pension Plans, the Company based its discount rate assumption on an analysis which included the selection of a bond portfolio comprised of high quality fixed income investments whose cash flows would provide for the projected benefit payments of the plan. The discount rate is then developed as the single rate that equates the market value of the bond portfolio to the discounted value of the plan's benefit payments. At December 31, 2018, the Company determined this discount rate to be 4.32%.

A one-quarter percentage point change in the assumed long-term rate of return on the Company's domestic defined benefit pension plans as of December 31, 2018 would impact the Company's 2019 pre-tax income by approximately \$0.2 million. A one-quarter percentage point decrease in the discount rate on the Company's domestic defined pension plan as of December 31, 2018 would have a minimal impact on the Company's 2019 pre-tax income. The Company reviews these and other assumptions at least annually.

For the year ended December 31, 2018, the Company recognized pension expense related to its domestic defined benefit pension plans of \$0.3 million.

The Company's weighted average discount rate was 3.99% at December 31, 2018 and will be used for purposes of determining 2019 pension cost. Pension expense for 2019 is expected to be in the range of \$29.9 million to \$33.9 million which includes one-time settlement expenses expected to be \$29.0 million to \$33.0 million. The Company contributed \$7.5 million to its domestic defined benefit pension plan during 2018 and expects to contribute approximately \$3.5 million to \$5.5 million in 2019, which includes the contribution to terminate the U.S. Lydall Pension Plan.

Income Taxes

The Company accounts for income taxes following ASC 740 (Accounting for Income Taxes) recognizing deferred tax assets and liabilities using enacted tax rates for the effect of temporary differences between book and tax basis of

recorded assets and liabilities. Deferred tax assets are reduced by a valuation allowance if it is more likely than not that some or all of a deferred tax asset will not be realized. In assessing the need for a valuation allowance, the Company analyzes historical financial results by jurisdiction and estimates future taxable income, considering the feasibility of ongoing tax planning strategies and the realizable benefit of tax loss carryforwards. Valuation allowances related to deferred tax assets can be impacted by changes in tax law, changes in statutory tax rates and future levels of taxable income. In the event the Company was to determine that it would not be able to realize all or a portion of its deferred tax assets in the future, the Company would reduce such amounts through a charge to income in the period that such determination was made. Conversely, if the Company was to determine that it would be able to realize its deferred tax assets in the future in excess of the net carrying amounts, the Company would decrease the recorded valuation allowance and record an increase to income in the period that such determination was made.

During 2018 the Company changed its assertion and no longer intends to reinvest certain undistributed earnings of its foreign subsidiaries that have been previously taxed in the U.S. and has recorded taxes associated with this position. For the remainder of the undistributed foreign earnings, unless tax effective to repatriate, the Company will continue to permanently reinvest these earnings. As of December 31, 2018, such undistributed earnings were approximately \$1.8 million. The Company estimates that the amount of tax that would be payable on the undistributed earnings if repatriated to the United States could be up to \$0.5 million. This amount may vary in the future due to a variety of factors including future tax law changes, future earnings and statutory taxes paid by foreign subsidiaries, and ongoing tax planning strategies by the Company.

The Company and its subsidiaries file a consolidated federal income tax return, as well as returns required by various state and foreign jurisdictions. In the normal course of business, the Company is subject to examination by taxing authorities, including such major jurisdictions as the United States, China, France, Germany, Hong Kong, the Netherlands, Canada and the United Kingdom. Within the next fiscal year, the Company expects to conclude certain income tax matters through the year ended December 31, 2015 and it is reasonably expected that net unrecognized benefits of \$0.3 million may be recognized. The total amount of unrecognized tax benefits that would affect the effective tax rate if recognized was \$3.6 million as of December 31, 2018. However, \$1.4 million of the unrecognized tax benefits, if recognized, would be offset in pre-tax income by the reversal of indemnification assets due to the Company. The Company is no longer subject to U.S. federal examinations for years before 2015, state and local examinations for years before 2013, and non-U.S. income tax examinations for years before 2003.

Equity Compensation Plans

The Company accounts for awards of equity instruments under the fair value method of accounting and recognizes such amounts in the Consolidated Statements of Operations. The Company recognizes expense on a straight-line basis over the vesting period of the entire award. In accordance with accounting requirements the Company accounts for forfeitures as they occur. Compensation expense for performance based awards is based upon the service period and management's assessment of the probability of achieving the performance goals and adjusted based upon actual achievement. The Company estimates the fair value of option grants based on the Black Scholes option-pricing model. Expected volatility and expected term are based on historical information. The calculation assumes that future volatility and expected term are not likely to materially differ from the Company's historical stock price volatility and historical exercise data, respectively.

The fair value of each option granted is estimated on the date of grant using the Black-Scholes option-pricing model with the following weighted-average assumptions for the years ended December 31:

	2018	2017	2016
Risk-free interest rate	2.7%	2.2%	1.8%
Expected life	5.5 years	5.5 years	5.5 years
Expected volatility	34%	33%	42%
Expected dividend yield	—%	—%	—%

Contingencies and Environmental Obligations

The Company makes judgments and estimates in accordance with applicable accounting rules when it establishes reserves for legal proceedings, claims, investigations, environmental obligations and other contingent matters. Provisions for such matters are charged to expense when it is probable that a liability has been incurred and reasonable estimates of the liability can be made. Estimates of environmental liabilities are based on a variety of matters, including,

but not limited to, the stage of investigation, the stage of the remedial design, evaluation of existing remediation technologies, and presently enacted laws and regulations. The amount and timing of all future expenses related to legal proceedings, claims, investigations, environmental obligations and other contingent matters may vary significantly from the Company's estimates.

RECENTLY ISSUED ACCOUNTING STANDARDS

See Note 18 to the Consolidated Financial Statements for information regarding accounting standards issued by the FASB but not effective until after December 31, 2018.

OTHER KEY FINANCIAL ITEMS

Off Balance Sheet Arrangements — Other than operating leases, the Company does not have any other material off-balance sheet financing arrangements.

Inflation — Inflation generally affects the Company through its costs of labor, equipment, energy and raw materials. The Company attempts to offset increased costs by price increases, operating improvements and other cost-saving initiatives, but overall the Company was negatively impacted by commodity inflation in 2018. The Company also has certain arrangements in which it can pass through inflation on raw material costs to its customers.

Item 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Lydall's limited market risk exposures relate to changes in foreign currency exchange rates and interest rates.

FOREIGN CURRENCY RISK

The Company has operations in Germany, France, the United Kingdom, the Netherlands, China, Canada and India, in addition to the United States. As a result of this, the Company's financial results are affected by factors such as changes in foreign currency exchange rates or economic conditions in the foreign markets where the Company manufactures and distributes its products. The Company's currency exposure is to the US Dollar, the Euro, the Chinese Yuan, the British Pound Sterling, the Canadian Dollar, the Japanese Yen, the Indian Rupee and the Hong Kong Dollar. The Company's foreign and domestic operations attempt to limit foreign currency exchange transaction risk by completing transactions in local functional currencies, whenever practicable. The Company may periodically enter into foreign currency forward exchange contracts to mitigate exposure to foreign currency volatility. In addition, the Company utilizes bank loans and other debt instruments throughout its operations. To mitigate foreign currency risk, such debt is denominated primarily in the functional currency of the operation maintaining the debt.

The Company also has exposure to fluctuations in currency risk on intercompany loans that the Company makes to certain of its subsidiaries. The Company may periodically enter into foreign currency forward contracts which are intended to offset the impact of foreign currency movements on the underlying intercompany loan obligations.

INTEREST RATE RISK

The Company's interest rate exposure is most sensitive to fluctuations in interest rates in the United States and Europe, which impact interest paid on its debt. The Company has borrowings outstanding of \$325.0 million from its Amended Credit Facility at December 31, 2018, with a variable interest rate, based generally on LIBOR. Increases in interest rates could therefore significantly increase the associated interest payments that the Company is required to make on this debt. From time to time, the Company may enter into interest rate swap agreements to manage interest rate risk.

In November 2018, the Company entered into a five year interest rate swap agreement with a bank which converts the interest on a notional \$139.0 million of the Company's one-month LIBOR-based borrowings under its Amended Credit Agreement from a variable rate, plus the borrowing spread, to a fixed rate of 3.09% plus the borrowing spread. The notional amount reduces quarterly by fluctuating amounts through August 2023. In April 2017, the Company entered into a three year interest rate swap agreement with a bank which converts the interest on the first notional \$60.0 million of the Company's one-month LIBOR-based borrowings under its revolver loan from a variable rate, plus the borrowing spread, to a fixed rate of 1.58% plus the borrowing spread. The notional amount reduces quarterly by \$5.0 million through March 2020.

The Company has assessed its exposure to changes in interest rates by analyzing the sensitivity to Lydall's earnings assuming various changes in market interest rates. Assuming a hypothetical increase of one percentage point in interest rates on the variable portion of the \$325.0 million outstanding borrowings as of December 31, 2018, the Company's net income would decrease by an estimated \$1.3 million over a twelve month period.

The weighted average interest rate on long-term debt was 3.4% for the year ended December 31, 2018, compared with 2.2% and 1.4% for the years ended December 31, 2017 and 2016, respectively.

Item 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

The response to this Item is contained under Item 15. "Exhibits, Financial Statement Schedules."

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

None.

Item 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

Under the supervision and with the participation of management, including the Company's President and Chief Executive Officer and its Executive Vice President and Chief Financial Officer, the Company has, pursuant to Rule 13a-15(b) of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), evaluated the effectiveness of the design and operation of its disclosure controls and procedures (as defined under Rule 13a-15(e) of the Exchange Act). Based upon that evaluation, the Company's President and Chief Executive Officer and its Executive Vice President and Chief Financial Officer have concluded that, as of December 31, 2018, the Company's disclosure controls and procedures are effective.

Changes in Internal Control Over Financial Reporting

On August 31, 2018, the Company completed the acquisition of Interface Performance Materials ("Interface"). Management considers this transaction to be material to the Company's consolidated financial statements. The Company is currently in the process of evaluating the existing controls and procedures of the Interface business and integrating the business into our Section 404 compliance program under the Sarbanes-Oxley Act of 2002 (the "Act") and the applicable rules and regulations under the Act. In accordance with such rules, a company is permitted to exclude an acquired business from management's assessment of the effectiveness of internal control over financial reporting for the year in which the acquisition is consummated. The Company will report on its assessment of the effectiveness of internal control over financial reporting of its consolidated operations (including the Interface Business) within the time period provided by the Act and the applicable SEC rules and regulations concerning business combinations.

Subject to the foregoing, there has been no change in the Company's internal control over financial reporting (as defined in Rule 13a-15(f) of the Exchange Act) that occurred during the fiscal quarter ended December 31, 2018 that has materially affected, or is reasonably likely to materially affect, the Company's internal control over financial reporting.

Management's Report on Internal Control Over Financial Reporting

The Company's management is responsible for establishing and maintaining adequate internal control over financial reporting. 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 reporting purposes in accordance with accounting principles generally accepted in the United States of America. Due to its inherent limitations, internal control over financial reporting may not prevent or detect misstatements.

The Company acquired Interface for \$268.4 million, net of cash acquired. The Company excluded Interface from its assessment of the effectiveness of internal control over financial reporting as of December 31, 2018 because it was acquired by the Company in a purchase business combination in 2018. Interface accounted for 10.8% of the Company's total consolidated assets as of December 31, 2018 and 5.8% of the Company's total consolidated revenue for the year then ended.

Management has assessed the effectiveness of the Company's internal control over financial reporting as of December 31, 2018. In making its assessment, management has utilized the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in Internal Control - Integrated Framework (2013 Framework). Management concluded that based on its assessment, the Company's internal control over financial reporting was effective as of December 31, 2018. The effectiveness of the Company's internal control over financial reporting as of December 31, 2018 has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in their report which appears herein.

Item 9B. OTHER INFORMATION

None.

PART III

Item 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

Information required by this Item is incorporated by reference from the sections entitled “Proposal 1 — Election of Directors,” “Corporate Governance” and “Section 16(a) Beneficial Ownership Reporting Compliance” of the definitive Proxy Statement of Lydall to be filed with the Commission within 120 days of the fiscal year ended December 31, 2018 in connection with the Annual Meeting of Stockholders to be held on April 26, 2019 (the “2019 Proxy Statement”). Information regarding the Executive Officers of the Company is contained in this Annual Report on Form 10-K.

The Company’s Code of Ethics and Business Conduct for all employees and its Code of Ethics for the Chief Executive Officer, Senior Financial Officers and all Accounting and Financial Personnel can be obtained free of charge on the Company’s website under the Corporate Governance section or by contacting the Office of the General Counsel, P.O. Box 151, One Colonial Road, Manchester, CT 06045-0151.

The Company intends to post on its website all disclosures that are required by law or New York Stock Exchange listing standards concerning any amendments to, or waivers from, the provisions of these documents.

Item 11. EXECUTIVE COMPENSATION

Information required by this Item is incorporated by reference from the sections entitled “2018 Director Compensation,” “Compensation Discussion and Analysis,” “Executive Compensation Tables,” “Corporate Governance — Compensation Committee Interlocks and Insider Participation” and “Compensation Discussion and Analysis — Compensation Committee Report on Executive Compensation” of the 2019 Proxy Statement.

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

Certain information required by this Item is incorporated by reference from the section entitled “Securities Ownership of Directors, Certain Officers and 5% Beneficial Owners” of the 2019 Proxy Statement.

The following table provides information about the Company’s Common Stock that may be issued upon exercise of options and rights under all of the Company’s existing equity compensation plans at December 31, 2018. The number of securities remaining available for issuance at December 31, 2018 was 168,429 and includes shares that may be issued as restricted stock, performance shares and other stock awards.

Plan Category	Number of securities to be issued upon exercise of outstanding options, warrants and rights (a)	Weighted average exercise price of outstanding options, warrants and rights (b)	Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column (a)) (c)
Equity compensation plans approved by security holders	922,879	\$ 20.34	168,429
Equity compensation plans not approved by security holders	—	—	—
Total	922,879	\$ 20.34	168,429

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

Information required by this Item is incorporated by reference from the sections entitled “Corporate Governance — Independence Determination,” “Related Party Transactions,” and “Compensation Committee Interlocks and Insider Participation” of the 2019 Proxy Statement.

Item 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

Information required by this Item is incorporated by reference from the sections entitled “Proposal 3 — Ratification of Appointment of Independent Auditors,” and “Principal Fees and Services” of the 2019 Proxy Statement.

PART IV

Item 15. EXHIBITS, FINANCIAL STATEMENT SCHEDULES

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(a) 2. Financial Statement Schedule:	
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Other schedules for which provision is made in the applicable accounting regulations of the Securities and Exchange Commission are not required under the related instructions, are inapplicable or are presented in "Notes to Consolidated Financial Statements" and therefore have been omitted.

a) 3. Exhibits Included Herein or Incorporated by Reference:

- 2.1 [Stock Purchase Agreement, dated August 9, 2018, by and among Lydall, Inc., Susquehanna Capital Acquisition Co. and Vulcan Global, LLC, an affiliate of Wind Point Partners, filed as Exhibit 2.1 to the Registrant's Form 8-K dated August 14, 2018 and incorporated herein by reference. The Registrant will supplementally furnish any omitted schedules to the Commission upon request.](#)
- 2.2 [Share Purchase Agreement, dated July 7, 2016, by and among ADS, Inc. and Lydall Canada Acquisition Corp., filed as Exhibit 2.1 to the Registrant's Form 8-K dated July 12, 2016 and incorporated herein by reference. The Registrant will supplementally furnish any omitted schedules to the Commission upon request.](#)
- 2.3 [Sale and Purchase Agreement dated February 20, 2014, by and among the Andrew Industries Limited, Lydall Inc. and Lydall UK Ltd., filed as Exhibit 10.1 to the Registrant's Form 8-K dated February 24, 2014 and incorporated herein by reference. The Registrant will supplementally furnish any omitted schedules to the Commission upon request.](#)
- 3.1 [Restated Certificate of Incorporation of the Registrant, as amended through the date of filing of this Annual Report on Form 10-K, filed as Exhibit 3.1 to the Registrant's Quarterly Report on Form 10-Q dated April 30, 2015 and incorporated herein by this reference.](#)
- 3.2 [Amended and Restated Bylaws of the Registrant, as amended and restated as of December 6, 2018, filed as Exhibit 3.2 to the Registrant's Form 8-K dated December 6, 2018 and incorporated herein by this reference.](#)
- 4.1 Certain long-term debt instruments, each representing indebtedness in an amount equal to or less than 10 percent of the Registrant's total consolidated assets, have not been filed as exhibits to this Annual Report on Form 10-K. The Registrant will file these instruments with the Commission upon request.
- 10.1* [Employment Agreement with Dale G. Barnhart dated July 31, 2007, filed as Exhibit 10.1 to the Registrant's Form 8-K dated August 3, 2007 and incorporated herein by this reference.](#)
- 10.2* [Employment Agreement with Chad A. McDaniel dated May 8, 2013, filed as Exhibit 10.5 to the Registrant's Annual Report on Form 10-K dated March 5, 2014 and incorporated herein by reference.](#)
- 10.3* [Employment Agreement with Joseph A. Abbruzzi dated March 31, 2014, filed as Exhibit 10.6 to the Registrant's Annual Report on Form 10-K dated March 3, 2015 and incorporated herein by reference.](#)
- 10.4* [Employment Agreement with James V. Laughlan dated August 3, 2015, filed as Exhibit 10.1 to the Registrant's Form 8-K dated August 5, 2015 and incorporated herein by reference.](#)
- 10.5* [Employment Agreement with Scott M. Deakin dated August 21, 2015, filed as Exhibit 10.1 to the Registrant's Form 8-K dated August 21, 2015 and incorporated herein by reference.](#)
- 10.6* [Employment Agreement with Paul A. Marold dated February 18, 2016, filed as Exhibit 10.6 to the Registrant's Annual Report on Form 10-K dated February 22, 2017 and incorporated herein by reference.](#)
- 10.7* [Indemnification Agreement with Dale G. Barnhart dated July 31, 2007, filed as Exhibit 10.2 to the Registrant's Form 8-K dated August 3, 2007 and incorporated herein by this reference.](#)
- 10.8* [Lydall, Inc. Annual Incentive Performance Program adopted March 30, 2016 and effective January 1, 2016, filed as Exhibit 99.1 to the Registrant's Form 8-K dated April 1, 2016 and incorporated herein by reference.](#)
- 10.9 [Form of Indemnification Agreement between Lydall, Inc. and non-employee directors, filed as Exhibit 10.1 to the Registrant's Form 8-K dated June 19, 2009 and incorporated herein by this reference.](#)
- 10.10* [Amended and Restated Lydall 2003 Stock Incentive Compensation Plan, filed as Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q dated May 2, 2011 and incorporated herein by this reference.](#)
- 10.11* [Lydall 2012 Stock Incentive Plan, filed as Exhibit A to the Registrant's Definitive Proxy Statement dated March 16, 2012 and incorporated herein by this reference.](#)
- 10.12* [Form of Restricted Share Award Agreement to Non-Employee Directors \(Under the Lydall 2012 Stock Incentive Plan\), filed as Exhibit 10.9 to the Registrant's Form 10-Q dated August 1, 2012 and incorporated herein by this reference.](#)
- 10.13* [Form of Non-Qualified/Incentive Stock Option Agreement \(Under the Lydall 2012 Stock Incentive Plan\) for U.S. employees, filed as Exhibit 10.4 to the Registrant's Form 10-Q dated August 1, 2012 and incorporated herein by this reference.](#)
- 10.14* [Form of Restricted Stock Award Agreement \(Under the Lydall 2012 Stock Incentive Plan\) for U.S. Employees, filed as Exhibit 10.8 to the Registrant's to the Registrant's Form 10-Q dated August 1, 2012 and incorporated herein by this reference.](#)

- 10.15* [Form of Non-Qualified Stock Option Agreement \(Under the Lydall 2012 Stock Incentive Plan\) for Netherland employees, filed as Exhibit 10.10 to the Registrant's Form 10-Q dated August 1, 2012 and incorporated herein by this reference.](#)
- 10.16* [Form of Non-Qualified Stock Option Agreement \(Under the Lydall 2012 Stock Incentive Plan\) for French employees, filed as Exhibit 10.11 to the Registrant's Form 10-Q dated August 1, 2012 and incorporated herein by this reference.](#)
- 10.17* [Form of Non-Qualified Stock Option Agreement \(Under the Lydall 2012 Stock Incentive Plan\) for German employees, filed as Exhibit 10.12 to the Registrant's Form 10-Q dated August 1, 2012 and incorporated herein by this reference.](#)
- 10.18* [Form of Lydall, Inc. Performance Share Award Agreement \(Three-Year Period\) for U.S. employees, filed as Exhibit 10.18 to the Registrant's Annual Report on Form 10-K dated March 3, 2015 and incorporated herein by reference.](#)
- 10.19* [Form of Lydall, Inc. Performance Share Award Agreement \(Three-Year Period\) for French employees, filed as Exhibit 10.6 to the Registrant's Form 10-Q dated August 1, 2012 and incorporated herein by this reference.](#)
- 10.20* [Form of Lydall, Inc. Performance Share Award Agreement \(Three-Year Period\) for German employees, filed as Exhibit 10.7 to the Registrant's Form 10-Q dated August 1, 2012 and incorporated herein by this reference.](#)
- 10.21* [Form of Lydall, Inc. Performance Share Award Agreement \(One-Year Period\), filed as Exhibit 10.3 to the Registrant's Annual Report on Form 10-K dated February 26, 2010 and incorporated herein by this reference.](#)
- 10.22* [Amended and Restated Form of Lydall, Inc. Performance Share Award Agreement \(Three-Year Period\) for U.S. employees, filed as Exhibit 10.18 to the Registrant's Annual Report on Form 10-K dated March 3, 2015, filed herewith.](#)
- 10.23 [Joinder and Second Amendment and Reaffirmation of Guaranty Agreement, dated July 7, 2016, by and among Lydall, Inc., as borrower, and Bank of America, N.A., as Agent for the Lenders, filed as Exhibit 99.2 to the Registrant's Form 8-K dated July 12, 2016 and incorporated herein by reference.](#)
- 10.24 [Amended and Restated Credit Agreement, dated February 18, 2014, by and between Lydall, Inc., as borrower, and Bank of America, N.A., as Agent for the Lenders, filed as Exhibit 10.2 to the Registrant's Form 8-K dated February 24, 2014 and incorporated herein by this reference, as further amended by Amendment No. 1 to the Amended and Restated Credit Agreement, dated May 5, 2015, filed as Exhibit 99.1 to the Registrant's Form 8-K dated May 6, 2015 and incorporated herein by reference.](#)
- 10.25 [Amended and Restated Guaranty Agreement, dated February 18, 2014, by and among Lydall Thermal/Acoustical, Inc., Lydall Filtration/Separation, Inc., Lydall International, Inc., and Bank of America, N.A., filed as Exhibit 10.3 to the Registrant's Form 8-K dated February 24, 2014 and incorporated herein by reference.](#)
- 10.26 [Amendment to the Amended and Restated Security Agreements, the Amended and Restated Domain Name Collateral Assignment and Security Agreement and Partial Release dated January 30, 2015 by and among Lydall, Inc., Lydall Thermal/Acoustical, Inc. and Bank of America, filed as Exhibit 10.34 to the Registrant's Annual Report on Form 10-K dated March 3, 2015 and incorporated herein by reference.](#)
- 10.27* [Amendment No. 1 to the Agreement, dated February 24, 2016, between the Company and Chad A. McDaniel, amending that certain Employment Agreement dated May 8, 2013, filed as Exhibit 10.31 to the Registrant's Annual Report on Form 10-K dated February 24, 2016 and incorporated herein by reference.](#)
- 10.28* [Amendment No. 1 to the Agreement, dated February 24, 2016, between the Company and Joseph A. Abbruzzi, amending that certain Employment Agreement dated March 31, 2014, filed as Exhibit 10.32 to the Registrant's Annual Report on Form 10-K dated February 24, 2016 and incorporated herein by reference.](#)
- 10.29* [Amendment No. 1 to the Agreement, dated February 24, 2016, between the Company and James V. Laughlan, amending that certain Employment Agreement dated August 3, 2015, filed as Exhibit 10.33 to the Registrant's Annual Report on Form 10-K dated February 24, 2016 and incorporated herein by reference.](#)
- 10.30* [Amendment No. 1 to the Agreement, dated February 24, 2016, between the Company and Scott M. Deakin, amending that certain Employment Agreement dated August 21, 2015, filed as Exhibit 10.34 to the Registrant's Annual Report on Form 10-K dated February 24, 2016 and incorporated herein by reference.](#)
- 10.31* [Second Amended and Restated Credit Agreement, dated August 31, 2018, by and among Lydall, Inc., as](#)

[borrower, the Guarantors named therein, and Bank of America, N.A., as Agent for the Lenders, filed as Exhibit 10.2 to the registrant's Form 8-K dated September 7, 2018 and incorporated herein by reference.](#)

- 10.32* [Second Amended and Restated Security Agreement, dated August 31, 2018 by and between Lydall, Inc., and Bank of America, N.A., filed as Exhibit 10.3 to the registrant's Form 8-K dated September 7, 2018 and incorporated herein by reference.](#)
- 10.33* [Second Amended and Restated Security Agreement, dated August 31, 2018 by and between Lydall Thermal/Acoustical, Inc., and Bank of America, N.A., filed as Exhibit 10.4 to the registrant's Form 8-K dated September 7, 2018 and incorporated herein by reference.](#)
- 10.34* [Second Amended and Restated Security Agreement, dated August 31, 2018 by and between Lydall Performance Materials, Inc. \(formerly known as Lydall Filtration/Separation, Inc.\), and Bank of America, N.A., filed as Exhibit 10.5 to the registrant's Form 8-K dated September 7, 2018 and incorporated herein by reference.](#)
- 10.35 [Second Amended and Restated Security Agreement, dated August 31, 2018 by and between Lydall International, Inc., and Bank of America, N.A., filed as Exhibit 10.6 to the registrant's Form 8-K dated September 7, 2018 and incorporated herein by reference.](#)
- 10.36 [Amended and Restated Security Agreement, dated August 31, 2018 by and between Lydall Southern Felt Company, Inc., and Bank of America, N.A., filed as Exhibit 10.7 to the registrant's Form 8-K dated September 7, 2018 and incorporated herein by reference.](#)
- 10.37 [Security Agreement, dated August 31, 2018, by and between Lydall North America LLC, and Bank of America, N.A., filed as Exhibit 10.8 to the registrant's Form 8-K dated September 7, 2018 and incorporated herein by reference.](#)
- 10.38 [Security Agreement, dated August 31, 2018, by and between Susquehanna Capital Acquisition Co., and Bank of America, N.A., filed as Exhibit 10.9 to the registrant's Form 8-K dated September 7, 2018 and incorporated herein by reference.](#)
- 10.39 [Security Agreement, dated August 31, 2018, by and between Interface Performance Materials, Inc., and Bank of America, N.A., filed as Exhibit 10.10 to the registrant's Form 8-K dated September 7, 2018 and incorporated herein by reference.](#)
- 10.40 [Security Agreement, dated August 31, 2018, by and between Interface Sealing Solutions, Inc., and Bank of America, N.A., filed as Exhibit 10.11 to the registrant's Form 8-K dated September 7, 2018 and incorporated herein by reference.](#)
- 10.41* [Employment Agreement with Randall B. Gonzales dated March 12, 2018, filed as Exhibit 10.1 to the Registrant's Form 10-Q dated May 1, 2018 and incorporated herein by this reference.](#)
- 10.42 [Offer letter for Randall B. Gonzales dated January 5, 2018, filed as Exhibit 10.2 to the Registrant's Form 10-Q dated May 1, 2018 and incorporated herein by this reference.](#)
- 14.1 Lydall's Code of Ethics and Business Conduct, as amended, and the supplemental Code of Ethics for the Chief Executive Officer, Senior Financial Officers and All Accounting and Financial Personnel, as amended, each can be accessed on Lydall's website at www.lydall.com under the Corporate Governance section.
- 21.1 [List of subsidiaries of the Registrant, filed herewith.](#)
- 23.1 [Consent of PricewaterhouseCoopers LLP, filed herewith.](#)
- 24.1 [Power of Attorney, dated February 14, 2019 authorizing Randall B. Gonzales to sign this Annual Report on Form 10-K on behalf of each member of the Board of Directors indicated therein, filed herewith.](#)
- 31.1 [Certification Pursuant to Rule 13a-14\(a\) and Rule 15d-14\(a\) under the Securities Exchange Act of 1934 as principal executive officer, filed herewith.](#)
- 31.2 [Certification Pursuant to Rule 13a-14\(a\) and Rule 15d-14\(a\) under the Securities Exchange Act of 1934 as principal executive officer, filed herewith.](#)
- 32.1 [Certifications Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, furnished herewith.](#)
- 101.INS XBRL Instance Document
- 101.SCH XBRL Taxonomy Extension Schema Document
- 101.CAL XBRL Taxonomy Extension Calculation Linkbase Document
- 101.DEF XBRL Taxonomy Extension Definition Linkbase Document
- 101.LAB XBRL Taxonomy Extension Label Linkbase Document
- 101.PRE XBRL Taxonomy Extension Presentation Linkbase Document

* Management contract or compensatory plan.

Item 16. FORM 10-K SUMMARY

Not applicable.

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of Lydall, Inc.:

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Lydall, Inc. and its subsidiaries (the "Company") as of December 31, 2018 and 2017, and the related consolidated statements of operations, of comprehensive income, of changes in stockholders' equity and of cash flows for each of the three years in the period ended December 31, 2018, including the related notes and financial statement schedule listed in the index appearing under Item 15 (a)(2) (collectively referred to as the "consolidated financial statements"). We also have audited the Company's internal control over financial reporting as of December 31, 2018, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the COSO.

Change in Accounting Principles

As discussed in Notes 1 and 2 to the consolidated financial statements, the Company changed the manner in which it accounts for revenue from contracts with customers and the manner in which it accounts for net periodic benefit costs in 2018.

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in Management's Report on Internal Control over Financial Reporting appearing under Item 9A. Our responsibility is to express opinions on the Company's consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements 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. 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 audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

As described in Management's Report on Internal Control over Financial Reporting, management has excluded Interface Performance Materials from its assessment of internal control over financial reporting as of December 31, 2018 because it was acquired by the Company in a purchase business combination during 2018. We have also excluded Interface Performance Materials from our audit of internal control over financial reporting. Interface

Performance Materials is a wholly-owned subsidiary whose total assets and total revenues excluded from management's assessment and our audit of internal control over financial reporting represent 10.8% and 5.8%, respectively, of the related consolidated financial statement amounts as of and for the year ended December 31, 2018.

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 (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) 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 (iii) 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/ PricewaterhouseCoopers LLP

PricewaterhouseCoopers LLP
Hartford, Connecticut
February 26, 2019

We have served as the Company's auditor since 1987.

Lydall, Inc.
CONSOLIDATED STATEMENTS OF OPERATIONS

In thousands except per share data	For the years ended December 31,		
	2018	2017	2016
Net sales	\$ 785,897	\$ 698,437	\$ 566,852
Cost of sales	633,252	535,078	428,048
Gross profit	152,645	163,359	138,804
Selling, product development and administrative expenses	103,457	97,159	83,359
Operating income	49,188	66,200	55,445
Interest expense	6,212	2,720	1,068
Other (income) expense, net	(289)	2,161	(562)
Income before income taxes	43,265	61,319	54,939
Income tax expense	8,453	11,974	17,821
(Income) loss from equity method investment	(132)	28	(69)
Net income	\$ 34,944	\$ 49,317	\$ 37,187
Earnings per common share:			
Basic	\$ 2.03	\$ 2.89	\$ 2.20
Diluted	\$ 2.02	\$ 2.85	\$ 2.16
Weighted average common shares outstanding	17,204	17,045	16,871
Weighted average common shares and equivalents outstanding	17,330	17,317	17,241

The accompanying notes are an integral part of these Consolidated Financial Statements.

Lydall, Inc.
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME

In thousands	For the years ended December 31,		
	2018	2017	2016
Net income	\$ 34,944	\$ 49,317	\$ 37,187
Other comprehensive (loss) income:			
Change in pension plans, net of income taxes of \$1,285, \$409, and \$1,409, respectively	(4,204)	2,016	(2,400)
Foreign currency translation adjustments	(16,237)	25,664	(10,965)
Unrealized (loss) gain on hedging activities, net of tax	(2,096)	122	—
Total other comprehensive (loss) income, net of tax	(22,537)	27,802	(13,365)
Comprehensive income	\$ 12,407	\$ 77,119	\$ 23,822

The accompanying notes are an integral part of these Consolidated Financial Statements.

Lydall, Inc.
CONSOLIDATED BALANCE SHEETS

In thousands of dollars and shares	December 31,	
	2018	2017
Assets		
Current assets:		
Cash and cash equivalents	\$ 49,237	\$ 59,875
Accounts receivable, (net of allowance for doubtful receivables of \$1,440 and \$1,507, respectively)	144,938	116,712
Contract assets	23,040	—
Inventories	84,465	80,339
Taxes receivable	2,912	5,525
Prepaid expenses and other current assets	12,486	11,044
Total current assets	317,078	273,495
Property, plant and equipment, net	213,369	170,332
Goodwill	196,963	68,969
Other intangible assets, net	136,604	40,543
Deferred tax assets	2,055	1,146
Other assets, net	6,617	6,386
Total assets	\$ 872,686	\$ 560,871
Liabilities and Stockholders' Equity		
Current liabilities:		
Current portion of long-term debt	\$ 10,172	\$ 277
Accounts payable	73,265	71,931
Accrued payroll and other compensation	16,621	15,978
Accrued taxes	3,095	2,230
Deferred revenue	6,990	3,412
Other accrued liabilities	11,203	8,278
Total current liabilities	121,346	102,106
Long-term debt	314,641	76,913
Deferred tax liabilities	39,265	14,714
Benefit plan liabilities	22,795	9,743
Other long-term liabilities	5,364	3,999
Commitments and Contingencies (Note 15)		
Stockholders' equity:		
Preferred stock (par value \$0.01 per share; authorized 500 shares; none issued or outstanding) (Note 9)	—	—
Common stock (par value \$0.01 per share; authorized 30,000 shares; issued 25,254 and 25,018 shares, respectively) (Note 9)	253	250
Capital in excess of par value	90,851	88,006
Retained earnings	411,325	374,783
Accumulated other comprehensive loss	(42,685)	(20,148)
Treasury stock, 7,698 and 7,675 shares of common stock, respectively, at cost	(90,469)	(89,495)
Total stockholders' equity	369,275	353,396
Total liabilities and stockholders' equity	\$ 872,686	\$ 560,871

The accompanying notes are an integral part of these Consolidated Financial Statements.

Lydall, Inc.
CONSOLIDATED STATEMENTS OF CASH FLOWS

In thousands	For the years ended December 31,		
	2018	2017	2016
Cash flows from operating activities:			
Net income	\$ 34,944	\$ 49,317	\$ 37,187
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	33,162	26,130	19,559
Inventory step-up amortization	1,975	1,108	1,954
Long-lived asset impairment charge	—	772	—
Deferred income taxes	636	(2,933)	(1,172)
Stock-based compensation	2,081	4,269	4,359
(Income) loss from equity method investment	(132)	28	(69)
Loss on disposition of property, plant and equipment	230	—	—
Changes in operating assets and liabilities:			
Accounts receivable	(7,127)	(8,046)	379
Contract assets	(3,828)	—	—
Inventories	(6,001)	(11,116)	500
Taxes receivable	3,151	(1,216)	1,169
Prepaid expenses and other assets	(542)	(784)	(3,355)
Accounts payable	(5,055)	14,315	3,505
Accrued taxes	535	(4,708)	1,244
Accrued payroll and other compensation	(2,352)	1,103	1,770
Deferred revenue	3,801	934	1,072
Benefit plan liabilities	(7,658)	(5,245)	487
Other, net	(3,081)	(992)	1,138
Net cash provided by operating activities	44,739	62,936	69,727
Cash flows from investing activities:			
Business acquisitions, net of cash acquired	(269,972)	(323)	(152,242)
Capital expenditures	(31,291)	(27,006)	(25,466)
Proceeds from the sale of property, plant and equipment	298	—	—
Net cash used for investing activities	(300,965)	(27,329)	(177,708)
Cash flows from financing activities:			
Proceeds from borrowings	338,000	—	116,600
Debt repayments	(89,862)	(51,762)	(10,328)
Debt issuance costs payments	(538)	—	—
Common stock issued	850	1,323	1,194
Common stock repurchased	(974)	(2,770)	(1,091)
Net cash provided by (used for) financing activities	247,476	(53,209)	106,375
Effect of exchange rate changes on cash	(1,888)	5,543	(2,369)
Decrease in cash and cash equivalents	(10,638)	(12,059)	(3,975)
Cash and cash equivalents at beginning of period	59,875	71,934	75,909
Cash and cash equivalents at end of period	\$ 49,237	\$ 59,875	\$ 71,934
Supplemental Schedule for Cash Flow Information			
Cash paid during the year for:			
Interest	\$ 5,960	\$ 2,747	\$ 787
Income taxes, net	\$ 4,606	\$ 16,158	\$ 15,739

Non-cash capital expenditures of \$4.9 million, \$6.5 million and \$8.6 million were included in accounts payable at December 31, 2018, 2017 and 2016 respectively.

The accompanying notes are an integral part of these Consolidated Financial Statements.

Lydall, Inc.

CONSOLIDATED STATEMENTS OF CHANGES IN STOCKHOLDERS' EQUITY

In thousands of dollars and shares	Common Stock Shares	Common Stock Amount	Capital in Excess of Par Value	Retained Earnings	Accumulated Other Comprehensive Loss	Treasury Stock	Total Stockholders' Equity
Balance at December 31, 2015	24,732	\$ 247	\$ 76,746	\$ 288,358	\$ (34,585)	\$ (85,541)	\$ 245,225
Net income				37,187			37,187
Other comprehensive loss, net of tax					(13,365)		(13,365)
Stock repurchased						(1,155)	(1,155)
Stock issued under employee plans	119	2	1,156				1,158
Stock-based compensation expense			4,009				4,009
Stock issued to directors	7		350				350
Recently adopted accounting standards			126	(79)			47
Balance at December 31, 2016	24,858	249	82,387	325,466	(47,950)	(86,696)	273,456
Net income				49,317			49,317
Other comprehensive income, net of tax					27,802		27,802
Stock repurchased						(2,799)	(2,799)
Stock issued under employee plans	152	1	1,350				1,351
Stock-based compensation expense			3,868				3,868
Stock issued to directors	8		401				401
Balance at December 31, 2017	25,018	250	88,006	374,783	(20,148)	(89,495)	353,396
Net Income				34,944			34,944
Other comprehensive loss, net of tax					(22,537)		(22,537)
Stock repurchased						(974)	(974)
Stock issued under employee plans	225	3	852				855
Stock-based compensation expense			1,619				1,619
Stock issued to directors	11		374				374
Adoption of ASC 606				1,598			1,598
Balance at December 31, 2018	25,254	\$ 253	\$ 90,851	\$ 411,325	\$ (42,685)	\$ (90,469)	\$ 369,275

The accompanying notes are an integral part of these Consolidated Financial Statements.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. Significant Accounting Policies

Business — Lydall, Inc. and its subsidiaries (the “Company” or “Lydall”) design and manufacture specialty engineered nonwoven filtration media, industrial thermal insulating solutions, and thermal and acoustical barriers for filtration/separation and heat abatement and sound dampening applications.

On August 31, 2018, the Company acquired an engineered sealing materials business operating under Interface Performance Materials (“Interface”), based in Lancaster, Pennsylvania. A globally-recognized leader in the delivery of engineered sealing solutions, the Interface operations manufacture wet-laid gasket and specialty materials primarily serving OEM and Tier I manufacturers in the agriculture, construction, earthmoving, industrial, and automotive segments. The acquired business is included in the Company's Performance Materials operating segment.

On July 12, 2018, the Company acquired certain assets and assumed certain liabilities of the Precision Filtration division of Precision Custom Coatings (“PCC”) based in Totowa, NJ. Precision Filtration is a producer of high-quality, air filtration media principally serving the commercial and residential HVAC markets with products in the efficiency range of MERV 7-11. The acquired business is included in the Company's Performance Materials operating segment.

On December 31, 2016, the Company completed an acquisition of the nonwoven needle punch materials businesses, operating under the Gutsche (“Gutsche”) brand, a German based corporation. The Gutsche operations manufacture nonwoven needle punch materials and predominantly serve the industrial filtration and high performance nonwoven markets. The acquired businesses are included in the Company's Technical Nonwovens reporting segment.

On July 7, 2016, the Company completed an acquisition of the nonwoven and coating materials businesses primarily operating under the Texel brand (“Texel”) from ADS, Inc. (“ADS”), a Canadian based corporation. The Texel operations manufacture nonwoven needle punch materials and predominantly serve the geosynthetic, liquid filtration, and other industrial markets. The acquired businesses are included in the Company's Technical Nonwovens reporting segment.

Principles of consolidation — The Consolidated Financial Statements include the accounts of Lydall, Inc. and its wholly owned subsidiaries. All intercompany accounts and transactions have been eliminated.

Estimates and assumptions — The preparation of the Company's Consolidated Financial Statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the financial statement dates and the reported amounts of revenues and expenses during the reporting periods. Actual results could differ from those estimates.

Risks and uncertainties — Worldwide economic cycles and political changes affect the markets that the Company's businesses serve and affect demand for Lydall's products and impact profitability. Among other factors, disruptions in the global credit and financial markets, including diminished liquidity and credit availability, changes in international trade agreements, swings in consumer confidence and spending, unstable economic growth and fluctuations in unemployment rates has caused economic instability and can have a negative impact on the Company's results of operations, financial condition and liquidity.

Cash and cash equivalents — Cash and cash equivalents include cash on hand and highly liquid investments with original maturities of three months or less at the date of purchase.

Concentrations of credit risk — Financial instruments that potentially subject the Company to concentrations of credit risk consist principally of cash and cash equivalents and trade accounts receivable. The Company places its cash and cash equivalents in high-quality financial institutions. Concentrations of credit risk with respect to trade accounts receivable are limited by the large number of customers comprising the Company's customer base and their dispersion across many different industries and geographies. At December 31, 2018, no customer accounted for more than 10.0% of total accounts receivable. At December 31, 2017, Ford Motor Company (“Ford”) represented 12.0% of total accounts receivable. No other customers accounted for more than 10.0% of total accounts receivable at December 31, 2017. Foreign and export sales were 53.5% of the Company's net sales in 2018, 54.2% in 2017, and 46.9% in 2016. Export sales primarily to Canada, Mexico, Asia and Europe were \$56.8 million, \$55.9 million, and

\$53.2 million in 2018, 2017, and 2016, respectively. The Company performs ongoing credit evaluations of its customers' financial condition and generally does not require collateral. Sales to the automotive market, included in the Thermal Acoustical Solutions segment, were 46.3% of the Company's net sales in 2018, 48.3% in 2017, and 56.2% in 2016. Sales to Ford were 14.8%, 17.3%, and 19.6% of Lydall's 2018, 2017, and 2016 net sales, respectively. No other customers accounted for more than 10% of total net sales in 2018, 2017, and 2016.

Inventories — Inventories are valued at lower of cost or net realizable value, cost being determined using the first-in, first-out (FIFO) cost method. Inventories in excess of requirements for current or anticipated orders have been written down to net realizable value.

Pre-production design and development costs — The Company enters into contractual agreements with certain customers to design and develop molds, dies and tools (collectively, "tooling"). All such tooling contracts relate to parts that the Company will supply to customers under long-term supply agreements. Tooling costs are accumulated in work-in process inventory and are charged to operations as the related revenue from the tooling is recognized. With the adoption of ASC 606, Revenue from Contracts with Customers on January 1, 2018, the Company's revenue recognition policies require the Company to make significant judgments and estimates regarding timing of recognition based on timing of the transfer of control to the customer. The Company analyzes several factors, including but not limited to, the nature of the products being sold and contractual terms and conditions in contracts with customers to help the Company make such judgments about revenue recognition. For tooling revenue recognized over time, the Company's significant judgments include, but are not limited to, estimated costs to completion, costs incurred to date, and assessments of risks related to changes in estimates of revenues and costs. The Company's management must make assumptions regarding the work required to fulfill the performance obligations, which is dependent upon the execution by the Company's subcontractors, among other variables and contract requirements.

Periodically, the Company enters into contractually guaranteed reimbursement arrangements as a mechanism to collect amounts due from customers from tooling sales. Under these arrangements, amounts due from tooling sales are collected as parts are delivered over the part supply arrangement, in accordance with the specific terms of the arrangement. The amounts due from the customer in such transactions are recorded in "Prepaid expenses and other current assets" or "Other assets, net" based upon the expected term of the reimbursement arrangement.

The following tooling related assets were included in the Consolidated Balance Sheets as of December 31, 2018 and 2017:

In thousands	December, 31	
	2018	2017
Inventories, net of progress billings and reserves	\$ 4,262	\$ 18,540
Prepaid expenses and other current assets	469	281
Other assets, net	987	476
Total tooling related assets	\$ 5,718	\$ 19,297

Amounts included in "Prepaid expenses and other current assets" include the short-term portion of receivables due under contractually guaranteed reimbursement arrangements. Included in the inventory balance was an offset for progress billings of \$1.7 million at December 31, 2017. Effective January 1, 2018, the Company adopted ASC 606, Revenue from Contracts from Customers, under the modified retrospective transition method. The adoption of ASC 606 resulted in the reclassification of progress billings to contract liabilities. See Note 2, Revenue from Contracts with Customers, for further discussion of contract liabilities. Company owned tooling is recorded in "Property, plant and equipment, net" at December 31, 2018 and December 31, 2017.

Property, plant and equipment — Property, plant, and equipment are stated at cost. Assets held under capital leases are recorded at the lower of the net present value of the minimum lease payments or the fair value of the leased asset at the inception of the lease. Property, plant and equipment, including property, plant and equipment under capital leases, are depreciated over their estimated useful lives using the straight-line method. Leasehold improvements are depreciated on a straight-line basis over the term of the lease or the life of the asset, whichever is shorter. The cost and accumulated depreciation amounts applicable to assets sold or otherwise disposed of are removed from the asset and accumulated depreciation accounts and any net gain or loss is included in the Consolidated Statements of Operations. Expenses for maintenance and repairs are charged to expense as incurred.

Goodwill and other intangible assets — Goodwill represents costs in excess of fair values assigned to the underlying net assets of acquired companies. Goodwill and other intangible assets with indefinite lives are not amortized but are subject to annual impairment tests. All other intangible assets are amortized over their estimated useful lives, which range from 3 to 17 years. In performing impairment tests, the Company considers discounted cash flows and other market factors as best evidence of fair value. There are inherent uncertainties and management judgment required in these analyses.

Valuation of long-lived assets — The Company evaluates the recoverability of long-lived assets, or asset groups, whenever events or changes in circumstances indicate that carrying amounts may not be recoverable. Should such evaluations indicate that the related future undiscounted cash flows are not sufficient to recover the carrying values of the assets, such carrying values would be reduced to fair value and this adjusted carrying value would become the assets' new cost basis. For long-lived assets held for sale, assets are written down to fair value, less costs to sell.

Fair value is determined primarily using future anticipated cash flows that are directly associated with, and that are expected to arise as a direct result of the use and eventual disposition of the asset, or asset group, as well as market conditions and other factors. There are inherent uncertainties and management judgment required in these analyses.

Contingencies and environmental obligations — The Company makes judgments and estimates in accordance with applicable accounting rules when it establishes reserves for legal proceedings, claims, investigations, environmental obligations and other contingent matters. Provisions for such matters are charged to expense when it is probable that a liability has been incurred and reasonable estimates of the liability can be made. Estimates of environmental liabilities are based on a variety of matters, including, but not limited to, the stage of investigation, the stage of the remedial design, evaluation of existing remediation technologies, and presently enacted laws and regulations. The amount and timing of all future expenses related to legal proceedings, claims, investigations, environmental obligations and other contingent matters may vary significantly from estimates.

Employer sponsored benefit plans — The Company recognizes the funded status of its defined benefit pension plans and post-retirement plans. Net benefit obligations are calculated based on actuarial valuations using key assumptions related to discount rates, mortality rates and expected return on plan assets.

Derivative instruments — Derivative instruments are measured at fair value and recognized as either assets or liabilities on the Consolidated Balance Sheet in either current or non-current other assets or other accrued liabilities or other long-term liabilities depending upon maturity and commitment. For derivative instruments that are designated and qualify as a fair value hedge, the gain or loss on the derivative as well as the offsetting loss or gain on the hedged item attributable to the hedged risk are recognized in the Consolidated Statement of Operations. For derivative instruments that are designated and qualify as a cash flow hedge, the effective portion of the gain or loss on the derivative is reported as a component of other comprehensive income and reclassified into earnings in the same period or periods in which the hedge transaction affects earnings. The Company selectively uses financial instruments to manage market risk associated with exposure to fluctuations in interest rates and foreign currency rates. These financial exposures are monitored and managed by the Company as an integral part of its risk management program. The Company does not engage in derivative instruments for speculative or trading purposes. Lydall has historically not been a party to a significant number of derivative instruments.

Revenue recognition — As of January 1, 2018, the Company accounts for revenue in accordance with ASC 606, Revenue from Contracts from Customers. The Company's revenues are generated from the design and manufacture of specialty engineered filtration media, industrial thermal insulating solutions, automotive thermal and acoustical barriers for filtration/separation and thermal/acoustical applications. The Company's revenue recognition policies require the Company to make judgments and estimates. The Company analyzes several factors, including but not limited to, the nature of the products being sold and contractual terms and conditions in contracts with customers to help the Company make such judgments about revenue recognition. In applying the Company's revenue recognition policy, determinations must be made as to when control of products passes to the Company's customers which can be either at a point in time or over time depending on when control of the Company's products transfers to its customers. Revenue is generally recognized at a point in time when control passes to customers upon shipment of the Company's products and revenue is generally recognized over time when control of the Company's products transfers to customers during the manufacturing process. If sales are recognized at a point in time, the Company's standard sales and shipping terms are FOB shipping point, therefore, substantially all point in time revenue is recognized upon shipment. However, the Company conducts business with certain customers on FOB destination terms and in these instances point in time revenue is recognized upon receipt by the customer. In circumstances when control transfers over time, revenue is recognized based on the extent of progress towards completion of the performance obligation.

Due to the nature of the work required to be performed on many of the Company's performance obligations, the estimation of total revenue and cost at completion is complex, subject to many variables and requires significant judgment. (See Note 2. "Revenue from Contracts with Customers")

Sales returns and allowances are recorded as identified or communicated by the customer and internally approved. The Company does not provide customers with general rights of return for products sold; however, in limited circumstances, the Company will allow sales returns and allowances from customers if the products sold do not conform to specifications.

The Company made an accounting policy election to record shipping and handling activities occurring after control has passed to the customer to be treated as a fulfillment cost rather than as a distinct performance obligation. Shipping and handling expenses consist primarily of costs incurred to deliver products to customers and internal costs related to preparing products for shipment and are recorded as a cost of sales. Amounts billed to customers as shipping and handling are classified as revenue when services are performed.

Research and development — Research and development costs are charged to expense as incurred and amounted to \$10.6 million in 2018, \$10.8 million in 2017, and \$9.0 million in 2016. Research and development costs were primarily comprised of development personnel salaries, prototype material costs and testing and trials of new products.

Earnings per share — Basic earnings per common share are equal to net income divided by the weighted average number of common shares outstanding during the period. Diluted earnings per common share are equal to net income divided by the weighted average number of common shares outstanding during the period, including the effect of stock options and stock awards, if such effect is dilutive.

Income taxes — The provision for income taxes is based upon income reported in the accompanying Consolidated Financial Statements. Deferred income taxes reflect the impact of temporary differences between the amounts of income and expense recognized for financial reporting purposes and such amounts recognized for tax purposes. In the event the Company was to determine that it would not be able to realize all or a portion of its deferred tax assets in the future, the Company would record a valuation allowance through a charge to income in the period that such determination was made. Conversely, if the Company was to determine that it would be able to realize its deferred tax assets in the future in excess of the net carrying amounts, the Company would decrease the recorded valuation allowance and record an increase to income in the period that such determination was made.

Translation of foreign currencies — Assets and liabilities of foreign subsidiaries are translated at exchange rates prevailing on the balance sheet date. Revenues and expenses are translated at average exchange rates prevailing during the period. Any resulting translation gains or losses are reported in other comprehensive income (loss).

Stock options and share grants — The Company accounts for awards of equity instruments under the fair value method of accounting and recognizes such amounts in the Consolidated Statements of Operations. The Company recognizes expense on a straight-line basis over the vesting period of the entire award and records forfeitures as they occur. The Company estimates the fair value of option grants based on the Black Scholes option-pricing model. Expected volatility and expected term are based on historical information. The calculation assumes that future volatility and expected term are not likely to materially differ from the Company's historical stock price volatility and historical exercise data, respectively. Compensation expense for all restricted stock awards is recorded based on the market value of the stock on the grant date and recognized as expense over the vesting period of the award. Compensation expense for performance-based restricted stock is also impacted by the probability of achieving the performance targets.

Recently Adopted Accounting Standards

Effective January 1, 2018, the Company adopted the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update ("ASU") No. 2014-09, "Revenue from Contracts with Customers (Topic 606)". The amended guidance establishes a single comprehensive model for companies to use in accounting for revenue arising from contracts with customers and will supersede most of the existing revenue recognition guidance, including industry-specific guidance.

The amended guidance clarifies that an entity recognizes revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. In applying the amended guidance, an entity will (1) identify the contract(s) with a customer;

(2) identify the performance obligations in the contract; (3) determine the transaction price; (4) allocate the transaction price to the contract's performance obligations; and (5) recognize revenue when (or as) the entity satisfies a performance obligation.

The Company adopted the amended guidance and all related amendments using the modified retrospective approach on January 1, 2018, at which time it became effective for the Company. The Company recognized the cumulative effect of initially applying the new revenue standard to all contracts that were not completed on the date of adoption as an adjustment to the opening balance of retained earnings. (See Note 2. "Revenue from Contracts with Customers"). At the adoption date, the cumulative impact of revenue that would have been recognized over time, was \$19.6 million. The impact was primarily driven by tooling net sales of \$16.3 million from customer contracts within the Thermal Acoustical Solutions ("TAS") segment. The related adoption impact to retained earnings was \$1.6 million, net of tax. Refer to Note 2.

Effective January 1, 2018, the Company adopted the FASB issued ASU No. 2016-01, "Financial Instruments - Overall" (Subtopic 825-10): Recognition and Measurement of Financial Assets and Financial Liabilities". This ASU revises an entity's accounting related to (1) the classification and measurement of investments in equity securities and (2) the presentation of certain fair value changes for financial liabilities measured at fair value. It also amends certain disclosure requirements associated with the fair value of financial instruments. In February 2018, the FASB issued ASU 2018-03, "Technical Corrections and Improvements to Financial Instruments - Overall (Subtopic 825-10): Recognition and Measurement of Financial Assets and Financial Liabilities", which clarifies various aspects of the guidance issued in ASU 2016-01. The Company adopted both ASUs effective January 1, 2018. The adoption of these ASUs did not have any impact on the Company's consolidated financial statements and disclosures.

Effective January 1, 2018, the Company adopted the FASB issued ASU No. 2016-15, "Statement of Cash Flows (Topic 230): Classification of Certain Cash Receipts and Cash Payments", which provides guidance on eight specific cash flow classification issues. Prior to this ASU, GAAP did not include specific guidance on these eight cash flow classification issues. The adoption of this ASU did not have a material impact on the Company's consolidated financial statements and disclosures.

Effective January 1, 2018, the Company adopted the FASB issued ASU 2016-16, "Income Taxes (Topic 740): Intra-Entity Transfers of Assets Other Than Inventory" as part of the Board's initiative to reduce complexity in accounting standards. This ASU eliminates an exception in ASC 740, which prohibits the immediate recognition of income tax consequences of intra-entity asset transfers other than inventory. This ASU requires entities to recognize the immediate current and deferred income tax effects of intra-entity asset transfers. The adoption of this ASU did not have a material impact on the Company's consolidated financial statements and disclosures.

Effective January 1, 2018, the Company adopted the FASB issued ASU No. 2016-18, "Statement of Cash Flows (Topic 230): Restricted Cash", which clarifies guidance and presentation related to restricted cash in the statement of cash flows, including stating that restricted cash should be included within cash and cash equivalents on the statement of cash flows. The adoption of this ASU did not have a material impact on the Company's consolidated financial statements and disclosures.

Effective January 1, 2018, the Company adopted the FASB issued ASU No. 2017-01, "Business Combinations (Topic 805): Clarifying the Definition of a Business", which adds guidance to assist entities with evaluating whether transactions should be accounted for as acquisitions (or disposals) of assets or businesses. The definition of a business affects many areas of accounting including acquisitions, disposals, goodwill, and consolidation. The amendments of this ASU provide a screen to determine when an integrated set of assets and activities is not a business. The Company evaluated this ASU in connection with its 2018 acquisitions and determined that they met the definition of a business.

Effective January 1, 2018, the Company adopted the FASB issued ASU No. 2017-07, "Compensation - Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost". This ASU requires an entity to report the service cost component of net benefit costs in the same line item(s) as other compensation costs arising from services rendered by the pertinent employees during the period. This ASU also requires the other components of net benefit cost, which includes interest costs and actual return on plan assets to be presented in the income statement separately from the service cost component and outside a subtotal of income from operations. As required for retrospective adoption, the Company reclassified net benefit costs of \$0.3 million from cost of sales and \$0.4 million from the selling, product development and administrative expenses to other expense, net, in the Consolidated Statement of Operations for the year ended December 31, 2016. The Company reclassified net benefit costs of \$0.3 million from cost of sales and \$0.5 million from the selling, product development and

administrative expenses to other expense, net, in the Consolidated Statement of Operations for the year ended December 31, 2017. The adoption of this ASU had minimal impact on the Company's consolidated financial statements and disclosures for the year ended December 31, 2018.

Effective January 1, 2018, the Company adopted the FASB issued ASU No. 2017-09, "Compensation - Stock Compensation (Topic 718): Scope of Modification Accounting". This ASU requires an entity to apply modification accounting in Topic 718 when there are changes to the terms or conditions of a share-based payment award, unless the fair value, vesting conditions, and classification of the modified award are the same as the original award immediately before the original award is modified. The adoption of this ASU did not have any impact on the Company's consolidated financial statements and disclosures.

2. Revenue from Contracts with Customers

The Company accounts for revenue in accordance with ASC 606, Revenue from Contracts from Customers. These revenues are generated from the design and manufacture of specialty engineered filtration media, industrial thermal insulating solutions, automotive thermal and acoustical barriers for filtration/separation and thermal/acoustical applications. The Company's revenue recognition policies require the Company to make significant judgments and estimates. In applying the Company's revenue recognition policy, determinations must be made as to when control of products passes to the Company's customers which can be either at a point in time or over time. Revenue is generally recognized at a point in time when control passes to customers upon shipment of the Company's products and revenue is generally recognized over time when control of the Company's products transfers to customers during the manufacturing process (see description below). The Company analyzes several factors, including but not limited to, the nature of the products being sold and contractual terms and conditions in contracts with customers to help the Company make such judgments about revenue recognition.

The Company accounts for revenue from contracts with customers when there is approval and commitment from both parties, the rights of the parties are identified, payment terms are identified, the contract has commercial substance and collectability of consideration is probable. Revenue is primarily derived from customer purchase orders, master sales agreements, and negotiated contracts, all of which represent contracts with customers.

The Company next identifies the performance obligations in the contract. A performance obligation is a promise to provide distinct goods or services. Performance obligations are the unit of account for purposes of applying the revenue standard and therefore determines when and how revenue is recognized. The Company determines the performance obligations at contract inception based on the goods that are promised in a contract with a customer. Typical performance obligations include automotive parts, automotive tooling, rolled good media and filter bags.

The transaction price in the contract is determined based on the consideration to which the Company will be entitled in exchange for transferring products to the customer, excluding amounts collected on behalf of third parties (for example, sales taxes). The transaction price is typically stated on the purchase order or in a negotiated agreement. Certain contracts may include variable consideration in the transaction price, such as rebates, pricing discounts, price concessions, sales incentives, index pricing or other provisions that can decrease the transaction price. Estimates of variable consideration and determination of whether to include estimated amounts in the transaction price are based on reasonably available information (customer historical, current and forecasted data). In certain circumstances where a particular outcome is probable, the Company utilizes the most likely amount to which the Company expects to be entitled. The Company accounts for consideration payable to a customer as a reduction of the transaction price thereby reducing the amount of revenue recognized. Consideration payable to a customer includes cash amounts that the Company pays, or expects to pay, to a customer based on certain contract requirements.

The Company recognizes revenue as performance obligations are satisfied, which can be either over time or at a point in time, depending on when control of the Company's products transfers to its customers.

In circumstances when control transfers over time, revenue is recognized based on the extent of progress towards completion of the performance obligation. Due to the nature of the work required to be performed on many of the Company's performance obligations, the estimation of total revenue and cost at completion is complex, subject to many variables and requires judgment.

The selection of the method to measure progress towards completion requires judgment and is based on the nature of the products to be provided. The Company generally uses the cost-to-cost measure of progress for contracts because it best depicts the transfer of control to the customer which occurs as costs are incurred on contracts. Under the cost-

to-cost measure of progress, the extent of progress towards completion is measured based on the ratio of costs incurred to date to the total estimated costs at completion of the performance obligation. Revenues are recorded proportionally as costs are incurred.

For tooling revenue recognized over time, the Company makes judgments which includes, but not limited to, estimated costs to completion, costs incurred to date, and assesses risks related to changes in estimates of revenues and costs. In doing so, management must make assumptions regarding the work required to fulfill the performance obligations, which is dependent upon the execution by the Company's subcontractors, among other variables and contract requirements.

Changes in estimates for revenue recognized over time are recorded by the Company in the period they become known. Changes are recognized on a cumulative catch-up basis in net sales, costs of sales, and operating income. The cumulative catch up adjustment recognizes in the current period the cumulative effect of changes in estimates on current and prior periods.

Performance Obligations

The following is a description of products and performance obligations, separated by reportable segments, from which the Company generates its revenue. For more detailed information about reportable segments, see Note 13 "Segment Information."

Segment	Performance Materials
Products	Products for this segment include filtration media solutions primarily for air, fluid power, life science and industrial applications, gasket and sealing solutions, thermal insulation, energy storage, and other engineered products.
Performance Obligations	<p>These contracts typically have distinct performance obligations, which is the promise to transfer the media solutions to the Company's customers.</p> <p>The Company recognizes revenue at a point in time or over time, based upon when control transfers to the customer. If revenue is recognized at a point in time, the performance obligation is typically satisfied upon shipment and in accordance with shipping terms. In circumstances when control transfers over time, revenue is recognized based on the extent of progress towards completion of the performance obligation.</p> <p>Customer payment terms are negotiated on a contract-by-contract basis and typically range from 30 to 90 days.</p>

Segment	Technical Nonwovens
Products	This segment produces needle punch nonwoven solutions including industrial filtration and advanced materials products. Industrial Filtration products include nonwoven rolled-good felt media and filter bags used primarily in industrial air and liquid filtration applications. Advanced materials products include nonwoven rolled good media used in commercial applications and predominantly serves the geosynthetic, automotive, industrial, medical, and safety apparel markets. The automotive media is provided to tier-one suppliers as well as the Company's Thermal Acoustical Solutions segment.

Performance Obligations	<p>These contracts typically have distinct performance obligations, which is the promise to transfer the industrial filtration or advanced materials products to the Company's customers.</p> <p>The Company recognizes revenue at a point in time or over time, based upon when control transfers to the customer. If revenue is recognized at a point in time, the performance obligation is typically satisfied upon shipment and in accordance with shipping terms. In circumstances when control transfers over time, revenue is recognized based on the extent of progress towards completion of the performance obligation.</p> <p>Customer payment terms are negotiated on a contract-by-contract basis and typically range from 30 to 90 days.</p> <p>For filter bag sales, the Company may enter into warranty agreements that are implied or sold with the product to provide assurance that a product will function as expected and in accordance with certain specifications. Therefore, this type of warranty is not a separate performance obligation.</p>
Segment	Thermal Acoustical Solutions
Products	<p>Parts - The segment produces a full range of innovative engineered products tailored for the transportation sector to thermally shield sensitive components from high heat, improve exhaust gas treatment and lower harmful emissions as well as assist in the reduction of noise vibration and harshness. The majority of products are sold to original equipment manufacturers and tier-one suppliers.</p> <p>Tooling - The Company enters into contractual agreements with certain customers within the automotive industry, to design and develop molds, dies and tools (collectively, "tooling").</p>
Performance Obligations	<p>Parts - Customer contracts typically have distinct performance obligations, which is the promise to transfer manufactured parts to these customers. The Company recognizes parts revenue at a point in time or over time, based upon when control transfers to the customer. If revenue is recognized at a point in time, the performance obligation is typically satisfied upon shipment and in accordance with shipping terms. In circumstances when control transfers over time, revenue is recognized based on the extent of progress towards completion of the performance obligation.</p> <p>Customer payment terms are negotiated on a contract-by-contract basis and typically range from 30 to 90 days.</p> <p>Tooling - Customer contracts typically have distinct performance obligations and are generally completed within one year. The Company periodically enters into multiple contracts with a customer at or near the same time which may be combined for purposes of determining the appropriate transaction price. The Company allocates the transaction price to each performance obligation in the contract based on a relative stand-alone selling price using costs incurred plus expected margin. The corresponding revenues are recognized over time as the related performance obligations are satisfied.</p> <p>Tooling customer payment terms typically range from 30 to 90 days after title transfers to the customer. Occasionally customers make progress payments as the tool is constructed.</p>

Practical Expedients and Exemptions

The Company has elected to adopt the contract cost practical expedient. This expedient allows the Company to recognize its incremental costs of obtaining contracts, such as sales commissions, as an expense when incurred if the related contract revenue is expected to be recognized in one year or less. These costs are included in selling, product development and administrative expenses.

The Company has made an accounting policy election to record shipping and handling activities occurring after control has passed to the customer to be treated as a fulfillment cost rather than as a distinct performance obligation. Shipping and handling expenses consist primarily of costs incurred to deliver products to customers and internal costs related to preparing products for shipment and are recorded as a cost of sales. Amounts billed to customers as shipping and handling are classified as revenue when services are performed.

ASC 606 requires the disclosure of unsatisfied performance obligations related to contracts from customers at the end of each reporting period. The Company has elected the practical expedient because the Company's contracts generally have a duration of one year or less, therefore no disclosure is required.

The Company has elected to adopt the practical expedient to disregard the need to adjust the promised amount of consideration for the effects of a significant financing component as the Company expects that the period of time between when the products are transferred to the customer and when the Company is paid for those products will be one year or less.

Contract Assets and Liabilities

The Company's contract assets primarily include unbilled amounts typically resulting from sales under contracts when the over time method of revenue recognition is utilized and revenue recognized exceeds the amount billed to the customer. These unbilled accounts receivable in contract assets are transferred to accounts receivable upon invoicing, typically when the right to payment becomes unconditional in which case payment is due based only upon the passage of time.

The Company's contract liabilities primarily relate to advance payments received from customers, and deferred revenue. These contract liabilities represent the Company's obligation to transfer its products to its customers for which the Company has received, or is owed consideration from its customers. Contract liabilities are included in deferred revenue on the Company's Condensed Consolidated Balance Sheets.

Contract assets and liabilities consisted of the following:

In thousands	December 31, 2018		January 1, 2018		Dollar Change
Contract assets	\$	23,040	\$	19,125	\$ 3,915
Contract liabilities	\$	4,537	\$	2,820	\$ 1,717

The \$3.9 million increase in contract assets from January 1, 2018 to December 31, 2018 was primarily due to timing of billings to customers and contract assets increased \$0.3 million relating to the acquisition of Interface. See Note 3 "Acquisitions."

The \$1.7 million increase in contract liabilities from January 1, 2018 to December 31, 2018 was primarily due to an increase in customer deposits partially offset by revenue recognized of \$2.6 million in 2018 related to contract liabilities at January 1, 2018.

Impacts on Financial Statements

The cumulative effect of the changes made to the Company's Condensed Consolidated January 1, 2018 Balance Sheet for the adoption of ASC 606 was as follows:

In thousands	December 31, 2017		Adjustments for Adoption of ASC606		January 1, 2018
Assets:					
Contract assets	\$	—	\$	19,125	\$ 19,125
Inventories	\$	80,339	\$	(15,184)	\$ 65,155
Liabilities:					
Accounts payable	\$	71,931	\$	663	\$ 72,594
Deferred revenue	\$	3,412	\$	1,209	\$ 4,621
Deferred tax liabilities	\$	14,714	\$	471	\$ 15,185
Stockholders' equity:					
Retained earnings	\$	374,783	\$	1,598	\$ 376,381

The cumulative effect of the changes made to the Company's Condensed Consolidated Balance Sheet for the adoption of ASC 606 was as follows:

In thousands	December 31, 2018		
	Balances Without Adoption of ASC 606	ASC 606 Adjustments	As Reported
Assets:			
Contract assets	\$	—	\$ 23,040
Inventories	\$	103,767	\$ 84,465
Liabilities:			
Accounts payable	\$	71,937	\$ 73,265
Deferred revenue	\$	7,952	\$ 6,990
Deferred tax liabilities	\$	38,422	\$ 39,265
Stockholders' equity:			
Retained earnings	\$	408,846	\$ 411,325
Accumulated other comprehensive loss	\$	(42,735)	\$ (42,685)

The cumulative effect of the changes made to the Company's Condensed Consolidated Statement of Operations for the adoption of ASC 606 for the year ended December 31, 2018 was as follows:

In thousands	December 31, 2018		
	Results Without Adoption of ASC 606	Effect of Change Higher (Lower)	As Reported
Net sales	\$ 781,612	\$ 4,285	\$ 785,897
Cost of sales	630,220	3,032	633,252
Gross profit	151,392	1,253	152,645
Selling, product development and administrative expenses	103,457	—	103,457
Operating income	47,935	1,253	49,188
Interest expense	6,212	—	6,212
Other income, net	(289)	—	(289)
Income before income taxes	42,012	1,253	43,265
Income tax expense	8,081	372	8,453
Income from equity method investment	(132)	—	(132)
Net income	\$ 34,063	\$ 881	\$ 34,944
Earnings per share:			
Basic	\$ 1.98	\$ 0.05	\$ 2.03
Diluted	\$ 1.97	\$ 0.05	\$ 2.02
Weighted average number of common shares outstanding:			
Basic	17,204	—	17,204
Diluted	17,330	—	17,330

Disaggregated Revenue

The Company disaggregates revenue from customers by geographic region, as it believes this disclosure best depicts how the nature, amount, timing and uncertainty of the Company's revenue and cash flows are affected by economic factors. Disaggregated revenue by geographical region for the year ended December 31, 2018 was as follows:

In thousands	December 31, 2018				
	Performance Materials	Technical Nonwovens	Thermal Acoustical Solutions	Eliminations and Other	Consolidated Net Sales
North America	\$ 117,313	\$ 167,519	\$ 250,133	\$ (25,121)	\$ 509,844
Europe	49,055	73,912	99,529	(697)	221,799
Asia	2,849	35,640	15,765	—	54,254
Total Net Sales	\$ 169,217	\$ 277,071	\$ 365,427	\$ (25,818)	\$ 785,897

3. Acquisitions

On August 31, 2018, the Company completed the acquisition of Interface Performance Materials ("Interface"), based in Lancaster, Pennsylvania. A globally-recognized leader in the delivery of engineered sealing solutions, the Interface operations manufacture wet-laid gasket and specialty materials primarily serving OEM and Tier I manufacturers in the agriculture, construction, earthmoving, industrial, and automotive segments. The transaction strengthens the Company's position as an industry-leading global provider of filtration materials and expands the Company's end

markets into attractive adjacencies. The Company acquired one hundred percent of Interface for \$268.4 million, net of cash acquired of \$5.2 million, subject to a post-closing working capital adjustment within the one year window under ASC 805. The purchase price was financed with a combination of cash on hand and \$261.4 million of borrowings from the Company's amended \$450 million credit facility. The operating results of the Interface businesses have been included in the Consolidated Statements of Operations since August 31, 2018, the date of acquisition, and are reported within the Performance Materials reporting segment.

During the year ended December 31, 2018, the Company incurred \$3.4 million of transaction costs, related to the acquisition of Interface. These transaction costs include legal fees and other professional services fees to complete the transaction. These expenses have been recognized in the Company's Condensed Consolidated Statements of Operations as selling, product development and administrative expenses.

From the date of the acquisition through December 31, 2018, Interface reported net sales and operating income of \$45.7 million and \$0.8 million, respectively. Operating income from the date of the acquisition to the year ended December 31, 2018 included \$2.0 million of purchase accounting inventory fair value step-up adjustments in cost of sales upon the sale of inventory and \$3.4 million of intangible assets amortization expense in selling, product development and administrative expenses.

The following table presents the preliminary determination of the fair value of identifiable assets acquired and liabilities assumed from the Company's acquisition of Interface. The final determination of the fair value of certain assets and liabilities will be completed within the one year measurement period as required by the FASB ASC Topic 805, "Business Combinations." As the Company finalizes the fair value of assets acquired and liabilities assumed, additional purchase price adjustments may be recorded during the measurement period in the first eight months of 2019, including a post-close working capital adjustment. Fair value estimates are based on judgments about future events and uncertainties and rely heavily on estimates and assumptions. The judgments used to determine the estimated fair value assigned to each class of assets acquired and liabilities assumed, as well as asset lives, can materially impact the Company's results of operations. The finalization of the purchase accounting assessment may result in a change in the valuation of assets acquired and liabilities assumed and may have a material impact on the Company's results of operations and financial position.

The following is a preliminary estimate of the assets acquired and the liabilities assumed by the Company at the date of the acquisition:

In thousands		
Accounts receivable	\$	25,182
Inventories		17,313
Prepaid expenses and other current assets		2,382
Property, plant and equipment		40,902
Goodwill (Note 6)		130,991
Other intangible assets (Note 6)		106,900
Other assets		308
Total assets acquired, net of cash acquired	\$	323,978
Current liabilities		(11,319)
Deferred tax liabilities (Note 14)		(24,904)
Benefit plan liabilities (Note 10)		(18,352)
Other long-term liabilities		(1,031)
Total liabilities assumed		(55,606)
Total purchase price, net of cash acquired	\$	268,372

The following table reflects the unaudited pro forma operating results of the Company for the year ended December 31, 2018 and 2017, which gives effect to the acquisition of Interface as if it had occurred on January 1, 2017. The pro forma information includes the historical financial results of the Company and Interface. The pro forma results are not necessarily indicative of the operating results that would have occurred had the acquisition been effective January 1, 2017, nor are they intended to be indicative of results that may occur in the future. The pro forma information does not include the effects of any synergies related to the acquisition.

In thousands	For The Years Ended December 31,	
	(Unaudited Pro Forma)	(Unaudited Pro Forma)
	2018	2017
Net Sales	\$ 888,355	\$ 840,040
Net Income	\$ 34,896	\$ 36,619
Earnings per share:		
Basic	\$ 2.03	\$ 2.15
Diluted	\$ 2.01	\$ 2.11

Pro forma adjustments to the historical financial statements during the year ended December 31, 2018 resulted in an additional \$4.5 million of net income. Earnings were adjusted to exclude items such as acquisition related expenses for both Lydall and Interface, purchase accounting adjustments for inventory step-up and tax valuation allowance expenses. Earnings for the year ended December 31, 2018 were adjusted to include items such as additional intangibles amortization expense and additional interest expense associated with borrowings under the Company's Amended Credit Facility.

Pro forma adjustments during the year ended December 31, 2017 reduced net income by \$14.0 million. Earnings for the year ended December 31, 2017 were adjusted to include items such as acquisition related expenses for both Lydall and Interface, additional intangibles amortization expense, purchase accounting adjustments for inventory step-up and additional interest expense associated with borrowings under the Company's Amended Credit Facility. Earnings were adjusted to exclude items such as Interface management fee expenses and tax valuation allowance expenses.

On July 12, 2018, the Company acquired certain assets and assumed certain liabilities of the Precision Filtration division of Precision Custom Coatings ("PCC") based in Totowa, NJ. Precision Filtration is a producer of high-quality, air filtration media principally serving the commercial and residential HVAC markets with a range of low efficiency through high-performing air filtration media. The Company acquired the assets and liabilities of PCC for \$1.6 million in cash with additional cash payments of up to \$2.0 million to be made based on the achievement of certain future financial targets through 2022. PCC had a minimal impact on the Company's sales and operating income from the date of the acquisition and the year ended December 31, 2018.

On December 31, 2016, the Company completed an acquisition of the nonwoven needle punch materials businesses, which include MGF Gutsche & Co GmbH KG, FRG and Gutsche Environmental Technology (Yixing) Co. Ltd., China, operating under Gutsche ("Gutsche"), a German based corporation. The Gutsche operations manufacture nonwoven needle punch materials and predominantly serve the industrial filtration and high performance nonwoven markets. The Company acquired one hundred percent of Gutsche for \$57.6 million, net of a receivable of \$3.0 million related to an estimated post-closing purchase price adjustment. In the second quarter of 2017, the Company finalized the post closing adjustment resulting in an increase in the purchase price of \$0.4 million resulting in a final purchase price of \$58.0 million.

On July 7, 2016, the Company completed an acquisition of the nonwoven and coating materials businesses primarily operating under Texel from ADS, a Canadian based corporation. The Texel operations manufacture nonwoven needle punch materials and predominantly serve the geosynthetic, liquid filtration, and other industrial markets. The Company acquired one hundred percent of Texel for \$102.7 million in cash, including a post-closing working capital adjustment. As part of the acquisition, the Company acquired a fifty percent interest in a joint venture, Afitex Texel Geosynthetiques, Inc., with a fair value of \$0.6 million. The joint venture is accounted for under the equity method of accounting.

4. Inventories

Inventories as of December 31, 2018 and 2017 were as follows:

In thousands	December 31,	
	2018	2017
Raw materials	\$ 37,731	\$ 28,672
Work in process	18,296	29,427
Finished goods	28,438	23,901
	84,465	82,000
Less: Progress billings	—	(1,661)
Total inventories	\$ 84,465	\$ 80,339

Included in work in process is gross tooling inventory of \$4.3 million and \$20.2 million at December 31, 2018 and 2017, respectively. Tooling inventory, net of progress billings, was \$18.5 million at December 31, 2017. Effective January 1, 2018 the Company adopted ASC 606, Revenue from Contracts from Customers, under the modified retrospective transition method. The adoption of ASC 606 resulted in the reclassification of progress billings to contract liabilities. See Note 2, Revenue from Contracts with Customers, for further discussion of contract liabilities.

5. Property, Plant and Equipment, Net

Property, plant and equipment as of December 31, 2018 and 2017 were as follows:

In thousands	Estimated Useful Lives	December 31,	
		2018	2017
Land	—	\$ 6,280	\$ 4,289
Buildings and improvements	10-35 years	104,036	84,337
Machinery and equipment	5-25 years	289,059	254,881
Office equipment	2-8 years	36,110	33,880
Vehicles	3-6 years	1,640	1,706
Assets under capital leases:			
Land	—	228	241
Buildings and improvements	10-35 years	229	221
Machinery and equipment	5-25 years	1,005	1,051
Office equipment	2-8 years	32	34
		438,619	380,640
Accumulated depreciation		(244,098)	(226,581)
Accumulated depreciation of capital leases		(608)	(239)
		193,913	153,820
Construction in progress		19,456	16,512
Total property, plant and equipment, net		\$ 213,369	\$ 170,332

Depreciation expense was \$23.4 million in 2018, \$21.4 million in 2017, and \$17.8 million in 2016.

6. Goodwill and Long-Lived Assets

Gross and net carrying amounts of goodwill at December 31, 2018 and 2017 were as follows:

In thousands	Performance Materials	Technical Nonwovens	Thermal Acoustical Solutions	Totals
Goodwill	\$ 13,307	\$ 55,662	\$ 12,160	\$ 81,129
Accumulated amortization/impairment	—	—	(12,160)	(12,160)
Balance at December 31, 2017	13,307	55,662	—	68,969
Goodwill	144,626	52,337	12,160	209,123
Accumulated amortization/impairment	—	—	(12,160)	(12,160)
Balance at December 31, 2018	\$ 144,626	\$ 52,337	\$ —	\$ 196,963

The changes in the carrying amounts of goodwill in 2018 and 2017 were as follows:

In thousands	Performance Materials	Technical Nonwovens	Totals
Balance at January 1, 2017	\$ 12,777	\$ 50,829	\$ 63,606
Goodwill addition	—	323	323
Currency translation adjustment	530	4,510	5,040
Balance at December 31, 2017	13,307	55,662	68,969
Goodwill addition	131,509	—	131,509
Currency translation adjustment	(190)	(3,325)	(3,515)
Balance at December 31, 2018	\$ 144,626	\$ 52,337	\$ 196,963

Goodwill Associated with Acquisitions and Divestitures

The additional goodwill of \$131.5 million in 2018 within the Performance Materials segment results from the two acquisitions completed in the third quarter of 2018. The Interface acquisition accounted for \$131.0 million of the \$131.5 million increase. The amount allocated to goodwill is reflective of the benefits the Company expects to realize from the expansion of the Company's engineered materials offering, new product development and Interface's assembled workforce. None of the goodwill associated with the Interface acquisition is expected to be deductible for income tax purposes.

The additional goodwill of \$0.3 million in 2017 within the Technical Nonwovens segment is the result of the final post-closing adjustments related to the acquisition of Gutsche on December 31, 2016.

Goodwill Impairment Testing

During the fourth quarter of 2018, the Company performed its annual impairment analysis of the \$144.6 million of goodwill in the Performance Materials reporting unit (PM reporting unit) and \$52.3 million in the Technical Nonwovens reporting unit (TNW reporting unit). The Company used the qualitative method to analyze the goodwill for the PM reporting unit by considering capital markets environment, economic conditions, industry trends, results of operations, and other factors. The Company also considered changes in assumptions used in the Company's most recent quantitative annual testing, including results of operations, the magnitude of excess of fair value over carrying value and other factors. As a result of this qualitative analysis, the Company concluded that the PM reporting unit's fair value more likely than not exceeds its carrying value and as a result, the two-step impairment assessment is not required to be completed.

To periodically supplement historical qualitative assessments, the Company also performed the two-step impairment test for the TNW reporting unit. In performing step one of the impairment analysis, a quantitative valuation of the fair value of the reporting unit was completed utilizing both an income approach and a market approach. The income approach involved determining the present value of future cash flows from the TNW reporting unit's projected financial results for 2019-2021 and the projected cash flows beyond that three year period computed as the terminal value.

The Company believes the income approach was appropriate because it provided a fair value estimate based upon the reporting unit's expected long-term operations and cash flow performance.

In applying the market approach, valuation multiples were derived from historic operating data of selected guideline companies, which were evaluated and adjusted, if necessary. The valuation multiples were then applied to the appropriate operating data of the TNW reporting unit to arrive at an indication of fair value. The Company believes the market approach was appropriate because it provided a fair value using multiples from companies with operations and economic characteristics similar to the TNW reporting unit.

As a result of the step-one quantitative assessment, the Company concluded that the TNW reporting unit had a fair value in excess of its carrying value and as a result, step two of the impairment test was not required.

Other Intangible Assets

The table below presents the gross carrying amount and, as applicable, the accumulated amortization of the Company's acquired intangible assets other than goodwill included in "Other intangible assets, net" in the Consolidated Balance Sheets as of December 31, 2018 and 2017:

In thousands	December 31, 2018		December 31, 2017	
	Gross Carrying Amount	Accumulated Amortization	Gross Carrying Amount	Accumulated Amortization
Amortized intangible assets				
Customer relationships	\$ 141,455	\$ (11,453)	\$ 39,474	\$ (4,460)
Patents	4,333	(3,816)	4,504	(3,821)
Technology	2,500	(810)	2,500	(644)
Trade names	7,235	(2,840)	4,288	(1,461)
License agreements	619	(619)	640	(640)
Other	561	(561)	586	(423)
Total amortized intangible assets	\$ 156,703	\$ (20,099)	\$ 51,992	\$ (11,449)

In connection with the acquisition of Interface on August 31, 2018, the Company recorded intangible assets of \$106.9 million, which included \$103.7 million of customer relationships and \$3.2 million of trade names. As of December 31, 2018, the weighted average useful lives of Interface's intangible assets was 12 years.

Amortization of all intangible assets for the years ended December 31, 2018, 2017, and 2016 was \$9.3 million, \$4.5 million, and \$1.5 million, respectively. Estimated amortization expense for intangible assets is expected to be \$21.4 million, \$20.8 million, \$16.4 million, \$14.4 million and \$12.7 million for each of the years ending December 31, 2019 through 2023 and thereafter, respectively. As of December 31, 2018, the weighted average useful life of intangible assets was approximately 11 years.

Impairment of Long-Lived Assets

During the first quarter of 2017, the Company tested for impairment a discrete long-lived asset group in the Performance Materials segment with a carrying value of \$1.3 million, as a result of indicators of possible impairment. To determine the recoverability of this asset group, the Company completed an undiscounted cash flow analysis and compared it to the asset group carrying value. This analysis was primarily dependent on the expectations for net sales over the estimated remaining useful life of the underlying asset group. The impairment test concluded that the asset group was not recoverable as the resulting undiscounted cash flows were less than their carrying amount. Accordingly, the Company determined the fair value of the asset group to assess if there was an impairment. Determining fair value is judgmental in nature and requires the use of significant estimates and assumptions considered to be Level 3 inputs. To determine the estimated fair value of the asset group the Company used the market approach. Under the market approach, the determination of fair value considered market conditions including an independent appraisal of the components of the asset group. The estimated fair value of the asset group was \$0.5 million, below its carrying value of \$1.3 million, which resulted in a long-lived asset impairment charge of \$0.8 million included in selling, product development and administrative expenses during 2017.

7. Long-term Debt and Financing Arrangements

On August 31, 2018, the Company amended and restated its \$175 million senior secured revolving credit agreement ("Amended Credit Agreement") that increased the available borrowing from \$175 million to \$450 million, added three additional lenders and extended the maturity date from July 7, 2021 to August 31, 2023.

Under the terms of the Amended Credit Agreement, the lenders are providing up to a \$450 million credit facility (the "Facility") to the Company, under which the lenders provided a term loan commitment of \$200 million and revolving loans and issue letters of credit to or for the benefit of the Company and its subsidiaries of up to \$250 million. The Facility may be increased by an aggregate amount not to exceed \$150 million through an accordion feature, subject to specified conditions. The Facility is secured by substantially all of the assets of the Company.

Interest is charged on borrowings at the Company's option of either: (i) Base Rate plus the Applicable Rate, or (ii) the Eurodollar Rate plus the Applicable Rate. The Base Rate is a fluctuating rate equal to the highest of (a) the federal funds rate plus 0.50%, (b) the prime rate as set by Bank of America, and (c) the Eurocurrency Rate plus 1.00%. The Eurocurrency Rate means (i) if denominated in LIBOR quoted currency, a fluctuating LIBOR per annum rate equal to the London Interbank Offered Rate; (ii) if denominated in Canadian Dollars, the rate per annum equal to the Canadian Dollar Offered Rate; or (iii) the rate per annum as designated with respect to such alternative currency at the time such alternative currency is approved by the Lenders. The Applicable Rate is determined based on the Company's Consolidated Leverage Ratio (as defined in the Amended Credit Agreement). The Applicable Rate added to the Base Rate Committed Loans ranges from 0.00% to 1.25%, and the Applicable Rate added to Eurocurrency Rate Committed Loans and Letters of Credit ranges from 0.75% to 2.00%. The Company pays a quarterly fee ranging from 0.15% to 0.275% on the unused portion of the revolving commitment. The Company has entered into multiple interest rate swaps to convert a portion of the Company's one-month LIBOR-based borrowings from a variable rate to a fixed rate. See Note 8.

The Company is permitted to prepay term and revolving borrowings in whole or in part at any time without premium or penalty, subject to certain minimum payment requirements, and the Company is generally permitted to irrevocably cancel unutilized portions of the revolving commitments under the Amended Credit Agreement. The Company is required to repay the term commitment in an amount of \$2.5 million per quarter beginning with the quarter ending December 31, 2018 through the quarter ending June 30, 2023.

The Amended Credit Agreement contains covenants required of the Company and its subsidiaries, including various affirmative and negative financial and operational covenants. The Company is required to meet certain quarterly financial covenants calculated from the four fiscal quarters most recently ended, including: (i) a minimum consolidated fixed charge coverage ratio, which requires that at the end of each fiscal quarter the ratio of (a) consolidated EBITDA to (b) the sum of consolidated interest charges, redemptions, non-financed maintenance capital expenditures, restricted payments and taxes paid, each as defined in the Amended Credit Agreement, may not be lower than 1.25 to 1.0; and (ii) a consolidated net leverage ratio, which requires that at the end of each fiscal quarter the ratio of consolidated funded indebtedness minus consolidated domestic cash to consolidated EBITDA, as defined in the Amended Credit Agreement, may not be greater than 3.5 to 1.0. The Company was in compliance with all covenants at December 31, 2018.

At December 31, 2018, the Company had borrowing availability of \$108.1 million under the Amended Credit Facility net of \$138.0 million of revolving loan borrowings outstanding and standby letters of credit outstanding of \$3.9 million.

In addition to the amounts outstanding under the Amended Credit Facility, the Company has various acquired foreign credit facilities totaling approximately \$8.2 million. At December 31, 2018, the Company's foreign subsidiaries had \$2.2 million in standby letters of credit outstanding.

The Company also has capital lease agreements for machinery and equipment at multiple operations requiring monthly principal and interest payments through 2020.

Total outstanding debt consists of:

In thousands	Effective Rate	Maturity	December 31,	
			2018	2017
Revolver Loan	4.15%	8/31/2023	\$ 138,000	\$ 76,600
Term Loan, net of debt issuance costs	4.15%	8/31/2023	186,498	—
Capital Leases	1.65% - 2.09%	2019 - 2020	315	590
			324,813	77,190
Less portion due within one year			(10,172)	(277)
Total long-term debt			\$ 314,641	\$ 76,913

As of December 31, 2018, total debt maturing in 2019, 2020, 2021, 2022, and 2023 is \$10.2 million, \$9.9 million, \$9.9 million, \$9.9 million, and \$284.9 million, respectively.

The weighted average interest rate on long-term debt was 3.4% for the year ended December 31, 2018, compared with 2.2% and 1.4% for the years ended December 31, 2017 and 2016, respectively.

The carrying value of the Company's \$450 million Facility approximates fair value given the variable rate nature of the debt. The fair values of the Company's long-term debt are determined using discounted cash flows based upon the Company's estimated current interest cost for similar type borrowings or current market value, which falls under Level 2 of the fair value hierarchy.

8. Derivatives

The Company selectively uses financial instruments to manage market risk associated with exposure to fluctuations in interest rates and foreign currency rates. These financial exposures are monitored and managed by the Company as an integral part of its risk management program. The Company's interest rate exposure is most sensitive to fluctuations in interest rates in the United States and Europe, which impact interest paid on its debt. The Company has debt with variable rates of interest based generally on LIBOR. From time to time, the Company may enter into interest rate swap agreements to manage interest rate risk. These instruments are designated as cash flow hedges and are recorded at fair value using Level 2 observable market inputs.

Derivative instruments are recognized as either assets or liabilities on the balance sheet in either current or non-current other assets or other accrued liabilities or other long-term liabilities depending upon maturity and commitment. For derivative instruments that are designated and qualify as a cash flow hedge, the effective portion of the gain or loss on the derivative is reported as a component of other comprehensive income and reclassified into earnings in the same period or periods in which the hedge transaction affects earnings. Any ineffective portion, or amounts related to contracts that are not designated as hedges, are recorded directly to earnings. The Company's policy for classifying cash flows from derivatives is to report the cash flows consistent with the underlying hedged item. The Company does not use derivatives for speculative or trading purposes.

In November 2018, the Company entered into a five year interest rate swap agreement with a bank which converts the interest on a notional \$139.0 million of the Company's one-month LIBOR-based borrowings under its Amended Credit Agreement from a variable rate, plus the borrowing spread, to a fixed rate of 3.09% plus the borrowing spread. The notional amount reduces quarterly by fluctuating amounts through August 2023. In April 2017, the Company entered into a three-year interest rate swap agreement with a bank which converts the interest on a notional \$60.0 million of the Company's one-month LIBOR-based borrowings under its Amended Credit Agreement from a variable rate, plus the borrowing spread, to a fixed rate of 1.58% plus the borrowing spread. The notional amount reduces quarterly by \$5.0 million through March 31, 2020. These interest rate swap agreements were accounted for as cash flow hedges. Effectiveness of these derivative agreements are assessed quarterly by ensuring that the critical terms of the swaps continue to match the critical terms of the hedged debt.

The following table sets forth the fair value amounts of derivative instruments held by the Company:

In thousands	December 31, 2018		December 31, 2017	
	Asset Derivatives	Liability Derivatives	Asset Derivatives	Liability Derivatives
Derivatives designated as hedging instruments:				
Interest rate contracts	\$ 179	\$ 2,738	\$ 157	\$ —
Total derivatives	\$ 179	\$ 2,738	\$ 157	\$ —

The following table sets forth the income, recorded in accumulated other comprehensive income, net of tax, for the quarters and years ended December 31, 2018 and 2017 for derivatives held by the Company and designated as hedging instruments:

	Quarters Ended December 31,		Years Ended December 31,	
	2018	2017	2018	2017
Cash flow hedges:				
Interest rate contracts	\$ (2,185)	\$ 129	\$ (2,096)	\$ 122
	\$ (2,185)	\$ 129	\$ (2,096)	\$ 122

9. Capital Stock

Preferred Stock — The Company has authorized Preferred Stock with a par value of \$0.01. None of the 500,000 authorized shares have been issued.

Common Stock — As of December 31, 2018, 8,384 Lydall stockholders of record held 17,555,672 shares of Common Stock.

Dividend policy — The Company does not pay a cash dividend on its common stock. The Company's Amended Credit Facility does not place any restrictions on cash dividend payments, so long as the payments do not place the Company in default.

10. Employer Sponsored Benefit Plans

The Company maintains a domestic defined benefit pension plan ("U.S. Lydall Pension Plan") and acquired two domestic pension plans in the Interface acquisition ("Interface Pension Plans"), (collectively, "domestic defined benefit pension plans").

The U.S. Lydall Pension Plan covers certain domestic Lydall employees, is noncontributory and benefits are based on either years of service or eligible compensation paid while a participant is in a plan. The plan has been closed to new employees for several years and benefits under the pension plan are no longer accruing. During the fourth quarter of 2018, the Company authorized the termination of the U.S. Lydall Pension Plan under which approximately 900 participants, including 200 active employees, have accrued benefits. The Company anticipates completing the termination of this plan in 2019. At December 31, 2018, the benefit obligations have been valued at the amount expected to be required to settle the obligations, using assumptions regarding the portion of obligations expected to be settled through participant acceptance of lump sum payments or annuities and the cost to purchase those annuities. Overall, the Company estimates it will incur pension expense of approximately \$29.0 million to \$33.0 million in 2019 when the plan settlement is completed. Of that settlement amount, the Company is expected to make a one-time cash contribution of approximately \$2.0 million to \$4.0 million to purchase annuities for participants and make lump sum payments. The estimated expense is subject to change based on valuations at the actual date of settlement.

The Interface Pension Plans cover Interface's union and non-union employees, the plans are closed to new employees and benefits are no longer accruing for the majority of participants. Certain union employees of Interface business participate in a multi-employer pension plan. Contributions to this multi-employer plan are required to be made monthly based upon the total monthly hours worked by the covered employees multiplied by the employer contribution rate published by the fund. Total contributions related to the multi-employer plan from the date of acquisition through

December 31, 2018 were immaterial. As of the acquisition date, the Company remeasured the fair value of plan liabilities and funded status of the Interface Pension Plans. An underfunded liability of \$11.2 million was included in benefit plan liabilities within the Company's Condensed Consolidated Balance Sheets.

The Company also acquired Interface's domestic post-retirement benefit plan and recorded a liability of \$4.1 million and German pension plans and recorded a liability of \$2.9 million included in benefit plan liabilities within the Company's Condensed Consolidated Balance Sheets. The Interface post-retirement benefits include life insurance and medical benefits for certain domestic employees and these plans are closed to new employees. The German noncontributory plan is closed to new employees.

The Company's funding policy for all of its domestic defined benefit pension plans (US Lydall Pension plan and Interface Pension Plans) is to fund not less than the ERISA minimum funding standard and not more than the maximum amount that can be deducted for federal income tax purposes.

Plan assets and benefit obligations of the domestic defined benefit pension plans were as follows:

In thousands	December 31,	
	2018	2017
Change in benefit obligation:		
Net benefit obligation at beginning of year	\$ 51,882	\$ 50,086
Benefit obligation assumed through acquisition	52,392	—
Service Cost	46	—
Interest cost	2,595	2,058
Actuarial (gain)/loss	(876)	2,126
Gross benefits paid	(3,360)	(2,388)
Net benefit obligation at end of year	\$ 102,679	\$ 51,882
Change in plan assets:		
Fair value of plan assets at beginning of year	\$ 44,174	\$ 37,038
Fair value of plan assets through acquisition	43,230	—
Actual (loss)/return on plan assets	(4,092)	5,924
Contributions	7,500	3,600
Gross benefits paid	(3,360)	(2,388)
Fair value of plan assets at end of year	\$ 87,452	\$ 44,174
Net benefit obligation in excess of plan assets	\$ (15,227)	\$ (7,708)
Balance sheet amounts:		
Current liabilities	\$ (3,078)	\$ —
Noncurrent liabilities	\$ (12,149)	\$ (7,708)
Total liabilities	\$ (15,227)	\$ (7,708)
Amounts recognized in accumulated other comprehensive income, net of tax consist of:		
Net actuarial loss	\$ 21,850	\$ 17,632
Net amount recognized	\$ 21,850	\$ 17,632

At December 31, 2018, in addition to the accrued benefit liability of \$15.2 million recognized for the Company's domestic defined benefit pension plans, the Company also had foreign pension plans with an accrued benefit liability of \$4.7 million and accumulated other comprehensive loss, net of tax, of \$0.4 million. At December 31, 2017, in addition to the accrued benefit liability of \$7.7 million recognized for the Company's domestic defined benefit pension plan, the Company also had foreign regulatory labor agreements with an accrued benefit liability of \$1.9 million and accumulated other comprehensive loss, net of tax, of \$0.4 million.

In addition to the domestic pension plans included in the table above, the Interface post-retirement benefits include life insurance and medical benefits for certain domestic employees with an accrued benefit liability of \$4.1 million at

December 31, 2018. From the August 31, 2018 acquisition to December 31, 2018, benefit expense of \$0.1 million was recognized and benefit payments of \$0.1 million were made from Company assets.

The U.S. Lydall Pension Plan liability, net of tax, included in other comprehensive income increased by \$1.8 million for the year ended December 31, 2018. The Interface Pension Plans liability, net of tax, included in other comprehensive income increased by \$1.8 million at December 31, 2018. The U.S. Lydall Pension Plan liability, net of tax, included in other comprehensive income increased by \$2.1 million for the year ended December 31, 2017. These changes are mainly due to changes in pension assumptions, primarily the discount rates.

Aggregated information for the domestic defined benefit pension plans with an accumulated benefit obligation in excess of plan assets is provided in the tables below:

In thousands	December 31,	
	2018	2017
Projected benefit obligation	\$ 102,679	\$ 51,882
Accumulated benefit obligation	\$ 104,188	\$ 51,882
Fair value of plan assets	\$ 87,452	\$ 44,174

Components of net periodic benefit cost for the domestic defined benefit pension plan:

In thousands	December 31,		
	2018	2017	2016
Service cost	\$ 46	\$ —	\$ —
Interest cost	2,595	2,058	2,139
Expected return on plan assets	(3,339)	(2,376)	(2,419)
Amortization of actuarial net loss	1,024	1,092	933
Total net periodic benefit cost	\$ 326	\$ 774	\$ 653

It is estimated that \$0.5 million of actuarial net loss will be amortized from accumulated other comprehensive loss into net periodic benefit costs for the domestic defined benefit pension plans in 2019. For the U.S. Lydall Pension Plan settlement loss of approximately \$29.0 million to \$33.0 million will also be expensed when the U.S. plan terminates in 2019.

The major assumptions used in determining the year-end benefit obligation and annual net cost for the domestic defined benefit pension plans are presented in the following table:

For the years ended December 31,	Benefit Obligation		Net Cost		
	2018	2017	2018	2017	2016
Discount rate	3.99%	3.71%	3.75%	4.21%	4.56%
Expected return on plan assets	4.08%	5.80%	5.79%	6.30%	7.00%

Plan Assets

The domestic defined benefit pension plans are administered by the Lydall Retirement Committee (the "Committee"), which is appointed by the Board of Directors. The Committee's responsibilities are to establish a funding policy for the domestic pension plans and to appoint and oversee the investment advisor responsible for the plan investments. The Committee is a named fiduciary under the plan, and the Committee has granted discretion to the investment advisor with respect to management of the investments. The assets of the U.S. Lydall Pension Plan are invested with the purpose to fund the plan termination which the Company anticipates completing in 2019. The Interface Pension Plans are invested for the purpose of investment diversification. In determining the expected return on plan assets, the Committee considers the relative weighting of plan assets, the historical performance of marketable debt and equity securities and economic and other indicators of future performance.

Investment management objective for the U.S. Lydall Pension Plan is a liability driven strategy to lessen the risk prior to plan termination with liquidity of assets to match the expected plan termination lump sum and annuity payments in 2019.

Investment management objectives for the Interface Pension Plans include maintaining an adequate level of diversification to balance market risk and to provide sufficient liquidity for near-term payments of benefits accrued under the Plan and to pay the expenses of administration. Investment decisions are based on the returns and risk relative to the Plan's liabilities, an approach commonly referred to as liability-driven investing. The long-term investment objective of the Interface Pension Plan is to achieve a total return equal to or greater than the assumed weighted rate of return, currently 4.08%. Though it is the intent of the Committee to achieve income and growth, that intent does not include taking extraordinary risks or engaging in investment activities not commonly considered prudent under the standards imposed by ERISA. The allowable investments include: securities, mutual funds, sub-advisers, independent investment managers and/or programs, and cash or cash equivalents. Prohibited investments include: single strategy hedge funds, investment in individual securities, direct investment in venture capital, CMO derivatives and commodities.

The following table presents the target allocation of the domestic defined benefit pension plan assets for 2019 and the actual allocation of plan assets as of December 31, 2018 and 2017 by major asset category:

Asset Category	Target Allocation	Actual Allocation of Plan Assets December 31,	
	2019	2018	2017
Domestic equities	11% - 32%	16%	26%
International equities	5% - 24%	11%	26%
Fixed income	30% - 69%	44%	40%
U.S. government securities	2% - 13%	3%	—%
Corporate and foreign bonds	2% - 13%	2%	—%
Inflation hedge mutual funds	2% - 13%	3%	—%
Hedge fund of funds	2% - 9%	5%	7%
Cash and cash equivalents	0% - 32%	16%	1%

Domestic and international equities consist primarily of mutual funds valued at the closing price reported in the active market in which individual securities are traded.

Fixed income consists of mutual funds and a long duration fixed income held in proprietary funds pooled with other investor accounts which use the net asset value (NAV) per share practical expedient to measure fair value. The fixed income mutual funds are valued using quoted market prices.

Inflation hedge mutual funds invest primarily in a portfolio of inflation-protected debt securities, real-estate related securities and commodity/natural resource-related securities. The mutual fund is designed to protect against the long-term effects of inflation on an investment portfolio with the long-term objective of preservation of capital with current income.

U.S. government securities include U.S. Treasury Notes and Bonds which represent middle range and long term fixed income investments.

Corporate and foreign bonds primarily include a diversified portfolio of U.S. corporate debt obligations.

Hedge funds are mutual funds and pooled funds that employ a range of investment strategies for diversification including equity and fixed income, credit driven, macro and multi oriented strategies. Certain hedge funds were measured at fair value using the NAV practical expedient and are not classified in the fair value hierarchy.

Cash and cash equivalents include investments readily converted to cash valued in the active market in which the funds were traded and are classified within Level 1 of the fair value hierarchy. Non-government money market funds are classified as Level 2.

The investments of the domestic defined benefit plans are stated at fair value. Fair value is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the

measurement date. 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. The framework for measuring fair value provides a fair value hierarchy that prioritizes the inputs to valuation techniques used to measure fair value. The hierarchy gives the highest priority to unadjusted quoted prices in active markets for identical assets or liabilities (Level 1 measurements) and the lowest priority to unobservable inputs (Level 3 measurements). The fixed income long duration fund and certain hedge funds were measured at fair value using the NAV practical expedient and are included as a reconciling item to the fair value table.

The following tables set forth the fair value of the assets by major asset category as of December 31, 2018 and December 31, 2017:

December 31, 2018						
In thousands	Level 1	Level 2	Level 3	Measured at NAV	Total	
Domestic equity	\$ 13,941	\$ —	\$ —	\$ —	\$ 13,941	
International equity	9,547	—	—	—	9,547	
Fixed income	10,977	—	—	27,727	38,704	
U.S. government securities	—	2,466	—	—	2,466	
Corporate and foreign bonds	—	1,448	—	—	1,448	
Inflation hedge mutual funds	2,808	—	—	—	2,808	
Hedge fund of funds	4,129	—	—	312	4,441	
Cash and cash equivalents	12,027	2,070	—	—	14,097	
Total Assets at Fair Value	\$ 53,429	\$ 5,984	\$ —	\$ 28,039	\$ 87,452	

December 31, 2017						
In thousands	Level 1	Level 2	Level 3	Measured at NAV	Total	
Domestic equity	\$ 11,577	\$ —	\$ —	\$ —	\$ 11,577	
International equity	11,626	—	—	—	11,626	
Fixed income	—	—	—	17,360	17,360	
Hedge fund of funds	—	—	—	3,054	3,054	
Cash and cash equivalents	557	—	—	—	557	
Total Assets at Fair Value	\$ 23,760	\$ —	\$ —	\$ 20,414	\$ 44,174	

Estimated Future Contributions and Benefit Payments

The Company expects to contribute approximately \$3.5 million to \$5.5 million in cash to its domestic defined benefit pension plans in 2019.

The U.S. Lydall pension plan is estimated to pay a partial year of benefits in 2019 as the U.S. plan is expected to terminate in 2019. The benefit payments for 2020 and thereafter only include benefit payments for the Interface Pension Plans. Estimated future benefit payments for the next 10 years for the domestic defined benefit pension plans are as follows:

In thousands	2019	2020	2021	2022	2023	2024-2028
Benefit payments	\$ 4,023	\$ 3,099	\$ 3,186	\$ 3,241	\$ 3,264	\$ 16,995

Employee Savings Plan

The Company also sponsors a 401(k) Plan. Employer contributions to this plan amounted to \$2.9 million in 2018, \$2.6 million in 2017, and \$2.5 million in 2016. Matching contributions by the Company are made on employee pretax contributions up to five percent of compensation, with the first three percent matched at 100% and the next two percent matched at 50%.

11. Equity Compensation Plans

As of December 31, 2018, the Company's equity compensation plans consisted of the 2003 Stock Incentive Compensation Plan (the "2003 Plan") and the 2012 Stock Incentive Plan (the "2012 Plan" and together with the 2003 Plan, the "Plans") under which incentive and non-qualified stock options and time and performance based restricted shares have been granted to employees and directors from authorized but unissued shares of common stock or treasury shares. The 2003 Plan is not active, but continues to govern all outstanding awards granted under the plan until the awards themselves are exercised or terminate in accordance with their terms. The 2012 Plan, approved by stockholders on April 27, 2012, authorized 1,750,000 shares of common stock for awards. The 2012 Plan also authorizes an additional 1,200,000 shares of common stock to the extent awards granted under prior stock plans that were outstanding as of April 27, 2012 are forfeited. The 2012 Plan provides for the following type of awards: options, restricted stock, restricted stock units and other stock-based awards.

The Company accounts for the expense of all share-based compensation by measuring the awards at fair value on the date of grant. The Company recognizes expense on a straight-line basis over the vesting period of the entire award. Options issued by the Company under its stock option plans have a term of ten years and generally vest ratably over a period of three to four years. Time-based restricted stock grants are expensed over the vesting period of the award, which is typically two to four years. The number of performance based restricted shares that vest or forfeit depend upon achievement of certain targets during the performance period. Prior to January 1, 2016, stock-based compensation expense included estimated effects of forfeitures. Upon adoption of ASU 2016-09, Improvements to Employee Share-Based Payment Accounting, in 2016, an accounting policy election was made to account for forfeitures as they occur. Compensation expense for performance based awards is recorded based upon the service period and management's assessment of the probability of achieving the performance goals and will be adjusted based upon actual achievement. Stock options issued under the current plan must have an exercise price that may not be less than the fair market value of the Company's Common Stock on the date of grant. The Plans provide for automatic acceleration of vesting in the event of a change in control of the Company. Upon the exercise of a stock option under the Plans, shares are issued from authorized shares or treasury shares held by the Company.

The Company incurred compensation expense of \$2.1 million, \$4.3 million, and \$4.4 million for the years ended December 31, 2018, 2017, and 2016, respectively, for all stock-based compensation plans, including restricted stock awards. No compensation costs were capitalized as part of inventory. The associated tax benefit realized was \$1.3 million, \$4.0 million, and \$1.9 million for the years ended December 31, 2018, 2017, and 2016, respectively.

Stock Options

The fair value of each option granted was estimated on the date of grant using the Black-Scholes option-pricing model with the following weighted-average assumptions for the years ended December 31:

	2018	2017	2016
Risk-free interest rate	2.7%	2.2%	1.8%
Expected life	5.5 years	5.5 years	5.5 years
Expected volatility	34%	33%	42%
Expected dividend yield	—%	—%	—%

The following is a summary of the option activity as of December 31, 2018 and changes during the year then ended:

In thousands except per share amounts and years

	Shares	Weighted-Average Exercise Price	Weighted- Average Remaining Contractual Term (years)	Aggregate Intrinsic Value
Outstanding at December 31, 2017	433	\$ 33.37		
Granted	246	\$ 21.49		
Exercised	(54)	\$ 16.48		
Forfeited/Cancelled	(2)	\$ 36.08		
Outstanding at December 31, 2018	623	\$ 30.14	7.7	\$ 734
Options exercisable at December 31, 2018	254	\$ 29.36	5.8	\$ 699
Unvested at December 31, 2018	369	\$ 30.68	3.1	\$ 35

The Company granted 245,830, 99,840, and 56,580 stock options during 2018, 2017, and 2016, respectively. The weighted-average grant-date fair value of options granted during the years 2018, 2017, and 2016 was \$21.49, \$17.91, and \$21.11, respectively. There were 54,316 options exercised in 2018, 90,897 options exercised in 2017, and 76,333 options exercised in 2016. The intrinsic value for options exercised during 2018 was \$1.4 million and the associated tax benefit realized from stock options exercised was \$0.3 million. The total intrinsic value for options exercised during 2017 was \$3.6 million and the associated tax benefit realized from stock options exercised was \$1.1 million. The total intrinsic value for options exercised during 2016 was \$2.4 million and the associated tax benefit realized from stock options exercised was \$0.7 million. The amount of cash received from the exercise of stock options was \$0.9 million in 2018, \$1.3 million in 2017, and \$1.2 million in 2016. At December 31, 2018, the total unrecognized compensation cost related to non-vested stock option awards was approximately \$4.0 million, with a weighted average expected amortization period of 3.1 years.

Restricted Stock

The following is a summary of the Company's unvested restricted shares for the year ended and as of December 31, 2018:

In thousands except per share amounts

Outstanding Restricted Shares	Shares	Weighted-Average Grant-Date Fair Value
Nonvested at December 31, 2017	219	\$ 44.77
Granted	172	\$ 25.19
Vested	(79)	\$ 31.26
Forfeited/Cancelled	(8)	\$ 50.56
Nonvested December 31, 2018	304	\$ 37.02

Restricted stock includes both performance-based and time-based awards. Compensation for restricted stock is recorded based on the fair market value of the stock on the grant date and amortized to expense over the vesting period of the award. The Company granted 99,560, 52,595, and 44,423 shares of performance-based restricted stock during 2018, 2017, and 2016, respectively. The Company granted 71,516 shares of time-based restricted stock in 2018, 22,700 shares in 2017, and 31,455 in 2016. The Company granted 1,245, 485, and 8,570 of time-based restricted stock units in 2018, 2017, and 2016, respectively. The weighted average fair value per share of restricted stock granted was \$25.19, \$45.18, and \$49.70 during 2018, 2017, and 2016, respectively. During 2018, 2017, and 2016, respectively, there were 8,440, 14,045 and 33,800 shares of restricted stock forfeited. The fair value of awards for which restrictions lapsed during the years ended December 31, 2018, 2017, and 2016 was \$3.2 million, \$8.0 million, and \$3.4 million, respectively. At December 31, 2018, the total unrecognized compensation cost related to non-vested restricted stock awards was approximately \$6.5 million, with a weighted average expected amortization period of 2.4 years.

Stock Repurchases

During the year ended December 31, 2018, the Company acquired 23,581 shares of common stock valued at \$1.0 million, through withholding, pursuant to provisions in agreements with recipients of restricted stock granted under the Company's equity compensation plans, which allow the Company to withhold the number of shares having fair value equal to each recipient's tax withholding due.

12. Restructuring

In April 2017, the Company commenced a restructuring plan in the Technical Nonwovens segment which includes plant consolidations and transfer of equipment to other facilities within the segment's Europe and China operations. The consolidation of certain plants, which is expected to conclude in 2019, is expected to reduce operating costs, increase efficiency and enhance the Company's flexibility by better aligning its manufacturing footprint with the segment's customer base. Accordingly, the Company expects to record pre-tax expenses of approximately \$4.2 million, in connection with this restructuring plan, of which approximately \$3.7 million is expected to result in cash expenditures over the period of consolidation. The Company also expects to incur cash expenditures of approximately \$3.8 million for capital expenditures associated with this plan.

During the year ended December 31, 2018, the Company recorded pre-tax restructuring expenses of \$2.3 million as part of this restructuring plan. Restructuring expenses of \$1.9 million were recorded in cost of sales and \$0.4 million were recorded in selling, product development and administrative expenses. During the year ended December 31, 2017, the Company recorded pre-tax restructuring expenses of \$0.7 million as part of this restructuring plan. Restructuring expenses of \$0.4 million were recorded in cost of sales and \$0.3 million were recorded in selling, product development and administrative expenses. The Company expects to record approximately \$1.2 million of restructuring expenses as part of the restructuring plan in 2019.

Actual pre-tax expenses incurred and total estimated pre-tax expenses for the restructuring program by type are as follows:

In thousands	Severance and Related Expenses	Contract Termination Expenses	Facility Exit, Move and Set-up Expenses	Total
Total estimated expenses	\$ 1,250	\$ 450	\$ 2,500	\$ 4,200
Expenses incurred during year ended:				
December 31, 2017	181	154	327	662
December 31, 2018	606	136	1,555	2,297
Estimated remaining expense at December 31, 2018	\$ 463	\$ 160	\$ 618	\$ 1,241

There were cash outflows of \$2.2 million and \$0.2 million for the restructuring program for the years ended December 31, 2018 and 2017, respectively.

Accrued restructuring costs were as follows at December 31, 2018:

In thousands	Total
Pre-tax restructuring expenses, excluding depreciation	\$ 510
Cash paid	(177)
Balance as of December 31, 2017	\$ 333
Pre-tax restructuring expenses, excluding depreciation	\$ 2,012
Cash paid	(2,198)
Balance as of December 31, 2018	\$ 147

13. Segment Information

The Company's reportable segments as of December 31, 2018 were Performance Materials, Technical Nonwovens, Thermal Acoustical Solutions.

On August 31, 2018, the Company acquired an engineered sealing materials business operating under Interface Performance Materials ("Interface"), based in Lancaster, Pennsylvania. A globally-recognized leader in the delivery of engineered sealing solutions, the Interface operations manufacture wet-laid gasket and specialty materials primarily serving OEM and Tier I manufacturers in the agriculture, construction, earthmoving, industrial, and automotive segments. The acquired business is included in the Company's Performance Materials operating segment.

Effective September 30, 2018, as a result of the Interface acquisition, the Performance Materials segment changed the disaggregation of revenue at the product level to be categorized as "Filtration" and "Sealing and Advanced Solutions".

Effective January 1, 2018, the Thermal/Acoustical Metals and Thermal/Acoustical Fibers operating segments were combined into a single operating segment named Thermal Acoustical Solutions. These automotive segments were combined into one segment to allow the Company to better serve its customers, leverage operating disciplines and drive efficiencies across the global automotive operations.

Prior period segment amounts throughout the Notes to the Condensed Consolidated Financial Statements have been recast to reflect the new segment structures. The recast of historical business segment information had no impact on the consolidated financial results.

Performance Materials Segment

The Performance Materials segment includes filtration media solutions primarily for air, fluid power, life science and industrial applications ("Filtration"), and sealing and gasket solutions, thermal insulation, energy storage, and other engineered products ("Sealing and Advanced Solutions").

Filtration products include LydAir® MG (Micro-Glass) Air Filtration Media, LydAir® MB (Melt Blown) Air Filtration Media, LydAir® SC (Synthetic Composite) Air Filtration Media, and Arioso® Membrane Composite Media. These products constitute the critical media component of clean-air systems for applications in clean-space, commercial, industrial and residential HVAC, power generation, respiratory protection, and industrial processes. Lydall has leveraged its extensive technical expertise and applications knowledge into a suite of media products covering the vast liquid filtration landscape across the transportation and industrial fields. The LyPore® Liquid Filtration Media series address a variety of application needs in fluid power including hydraulic filters, air-water and air-oil coalescing, industrial fluid processes and diesel fuel filtration. LyPore® media and Solupor® ultra-high molecular weight polyethylene membranes also serve critical liquid filtration/separation applications such as biopharmaceutical pre-filtration and clarification, lateral flow diagnostic and analytical testing, potable water filtration and high purity process filtration such as those found in food and beverage and medical applications.

Sealing and Advanced Solutions products include nonwoven specialty engineered materials for a multitude of applications. Interface fiber-reinforced gasket materials serve the heavy-duty diesel, automobile, small engine, transmission and compressor markets. These products handle demanding sealing challenges with a diverse range of metallic, non-metallic, rubber-coated and laminate materials that comprise the extensive Sealing materials portfolio. Interface Engineered Components are ready to use soft and hard gasket parts sold directly to OEMs and aftermarket applications. An example is Select-a-Seal® rubber-edged composite (REC) technology that provides robust sealing, compression, adhesion, and shear strength for driveline applications. Advanced Solutions' nonwoven veils, papers and specialty composites for the building products, appliance, energy and industrial markets include Manniglas® Thermal Insulation Papers, and Lytherm® Insulation Media for high temperature technology applications. Lydall's Cryotherm® Super-Insulating Media, CRS-Wrap® Super-Insulating Media and Cryo-Lite® Cryogenic Insulation products are industry standards for state-of-the-art cryogenic insulation designs used by manufacturers of cryogenic equipment for liquid gas storage, piping, and transportation. Additional specialty composite materials include specialty fiber calendar bowl products to service the printing and textile industries and press pad materials for industrial lamination processes.

Technical Nonwovens Segment

The Technical Nonwovens segment primarily produces needle punch nonwoven solutions for a multitude of industries and applications. Products are manufactured and sold globally under the leading brands of Lydall Industrial Filtration, Southern Felt, Gutsche, and Texel. Industrial Filtration products include nonwoven rolled-good felt media and filter bags used primarily in industrial air and liquid filtration applications. Nonwoven filter media is an effective solution to satisfy increasing emission control regulations in a wide range of industries, including power, cement, steel, asphalt, incineration, mining, food, and pharmaceutical. Advanced Materials products include nonwoven rolled-good media used in commercial applications and predominantly serves the geosynthetics, automotive, industrial, medical, and safety apparel markets. Automotive media is provided to Tier I/II suppliers as well as the Company's Thermal Acoustical Solutions segment.

Technical Nonwovens segment products include air and liquid filtration media sold under the brand names Fiberlox® high performance filtration felts, Checkstatic™ conductive filtration felts, Microfelt® high efficiency filtration felts, Pleatlox® pleatable filtration felts, Ultratech™ PTFE filtration felts, Powertech® and Powerlox® power generation filtration felts, Microcap® high efficiency liquid filtration felts, Duotech membrane composite filtration felts, along with our porotex® family of high temperature filtration felts including microvel® and optivel® products. Technical Nonwovens Advanced Materials products are sold under the brand names Thermofit® thermo-formable products, Ecoduo® recycled content materials, Duotex® floor protection products, and Versaflex® composite molding materials. Technical Nonwovens also offers extensive finishing and coating capabilities which provide custom engineered properties tailored to meet the most demanding applications. The business leverages a wide range of fiber types and extensive technical capabilities to provide products that meet our customers' needs across a variety of applications providing both high performance and durability.

Thermal Acoustical Solutions Segment

The Thermal Acoustical Solutions segment offers a full range of innovative engineered products tailored for the transportation and industrial sectors to thermally shield sensitive components from high heat, improve exhaust gas treatment and lower harmful emissions as well as assist in the reduction of noise, vibration and harshness (NVH). Within the transportation sector, Lydall's products are found in the interior (dash insulators, cabin flooring), underbody (wheel well, aerodynamic belly pan, fuel tank, exhaust, tunnel, spare tire) and under hood (engine compartment, outer dash, powertrain, catalytic converter, turbo charger, manifolds) of cars, trucks, SUVs, heavy duty trucks and recreational vehicles.

Thermal Acoustical Solutions segment products offer thermal and acoustical insulating solutions comprised of organic and inorganic fiber composites that provide weight reduction, superior noise suppression and increased durability over conventional designs, as well as products that efficiently combine multiple layers of metal and thermal - acoustical insulation media to provide an engineered shielding solution for an array of application areas. Lydall's dBCore® is a lightweight acoustical composite that emphasizes absorption principles over heavy-mass type systems. Lydall's dBLyte® is a high-performance acoustical barrier with sound absorption and blocking properties and can be used throughout a vehicle's interior to minimize intrusive noise from an engine compartment and road. Lydall's ZeroClearance® is an innovative thermal solution that utilizes an adhesive backing for attachment and is used to protect vehicle components from excessive heat. Lydall's flux® product family includes several patented or IP-rich products that address applications which include: Direct Exhaust Mount heat shields, which are assembled to high temperature components like catalytic converters, turbochargers or exhaust manifolds using aluminized and stainless steel and high performance and high temperature heat insulating materials; Powertrain heat shields that absorb noise at the source and do not contribute to the engine's noise budget; and durable, thermally robust solutions for temperature sensitive plastic components such as fuel tanks that are in proximity to high temperature heat sources.

Net sales by segment, as well as reconciling items, to equal consolidated net sales for the years ended December 31, 2018, 2017, and 2016 were as follows:

Consolidated Net Sales	For the Years Ended December 31,		
	2018	2017	2016
In thousands			
Performance Materials Segment (1):			
Filtration	\$ 93,089	\$ 87,173	\$ 83,345
Sealing and Advanced Solutions	76,128	29,496	27,783
Performance Materials Segment net sales	169,217	116,669	111,128
Technical Nonwovens Segment (2),(3):			
Industrial Filtration	157,606	147,087	90,415
Advanced Materials (4)	119,465	121,990	65,090
Technical Nonwovens net sales	277,071	269,077	155,505
Thermal Acoustical Solutions Segment:			
Parts	328,057	318,217	298,016
Tooling	37,370	23,888	23,176
Thermal Acoustical Solutions Segment net sales	365,427	342,105	321,192
Eliminations and Other (4)	(25,818)	(29,414)	(20,973)
Consolidated Net Sales	\$ 785,897	\$ 698,437	\$ 566,852

Operating income by segment and Corporate Office Expenses for the years ended December 31, 2018, 2017, and 2016 were as follows:

Operating Income	For the Years Ended December 31,		
	2018	2017 (5)	2016 (5)
In thousands			
Performance Materials Segment (1)	\$ 13,139	\$ 12,321	\$ 12,574
Technical Nonwovens Segment (2),(3)	21,323	26,047	15,584
Thermal Acoustical Solutions Segment	38,085	53,132	53,072
Corporate Office Expenses	(23,359)	(25,300)	(25,785)
Consolidated Operating Income	\$ 49,188	\$ 66,200	\$ 55,445

Operating results in 2018 were negatively impacted by \$3.6 million of corporate strategic initiatives expenses predominantly within Corporate Office Expenses, \$2.3 million of restructuring expenses in the Technical Nonwovens segment, and a \$2.0 million purchase accounting adjustment related to inventory step-up in the Performance Materials segment. Operating results in 2017 were negatively impacted by \$1.7 million of expenses associated with the combination of the Company's former T/A Metals and T/A Fibers segments, a \$1.1 million purchase accounting adjustment related to inventory step-up in the Technical Nonwovens segment, \$0.7 million and \$0.3 million related to severance expenses for a reduction in force in the Thermal Acoustical Solutions and Technical Nonwovens segments, respectively, \$0.8 million of corporate strategic initiatives expenses predominantly within Corporate Office Expenses, a \$0.8 million non-cash long-lived asset impairment in the Performance Materials segments and \$0.7 million of restructuring expenses in the Technical Nonwovens segment. Operating results in 2016 were negatively impacted by \$3.7 million of acquisition related expenses within Corporate Office Expenses, \$3.5 million related to a settlement with the German Cartel Office in the Thermal Acoustical Solutions segment and a \$2.0 million purchase accounting adjustment related to inventory step-up in the Technical Nonwovens segment.

Total assets by segment and the Corporate Office were as follows at December 31, 2018, 2017, and 2016:

Total Assets	December 31,		
	2018	2017	2016
In thousands			
Performance Materials Segment (1)	\$ 414,211	\$ 72,837	\$ 66,965
Technical Nonwovens Segment (2),(3)	242,007	271,713	268,104
Thermal Acoustical Solutions Segment	201,509	189,301	166,591
Corporate Office	14,959	27,020	25,369
Total Assets	\$ 872,686	\$ 560,871	\$ 527,029

Total capital expenditures and depreciation and amortization by segment and the Corporate Office for the years ended December 31, 2018, 2017, and 2016 were as follows:

In thousands	Capital Expenditures			Depreciation and Amortization		
	2018	2017	2016	2018	2017	2016
Performance Materials Segment (1)	\$ 11,288	\$ 3,610	\$ 4,098	\$ 9,006	\$ 3,996	\$ 4,028
Technical Nonwovens Segment (2),(3)	5,864	2,903	1,248	13,877	12,625	6,791
Thermal Acoustical Solutions Segment	11,934	17,462	22,324	9,190	8,619	7,605
Corporate Office	544	940	489	658	699	977
Total	\$ 29,630	\$ 24,915	\$ 28,159	\$ 32,731	\$ 25,939	\$ 19,401

Net sales by geographic area for the years ended December 31, 2018, 2017 and 2016 and long-lived asset information by geographic area as of December 31, 2018, 2017, and 2016 were as follows:

In thousands	Net Sales			Long-Lived Assets		
	2018	2017	2016	2018	2017	2016
United States (1)	\$ 422,222	\$ 376,086	\$ 354,371	\$ 136,448	\$ 93,583	\$ 88,918
France (1)	66,579	56,214	52,042	13,219	14,268	12,692
Germany (1),(3)	125,796	105,828	63,301	25,873	20,872	15,649
United Kingdom	27,156	24,921	23,871	4,844	4,916	4,903
Canada (2)	87,622	84,701	40,871	25,614	30,739	30,911
China (1),(3)	54,198	47,856	30,361	11,958	11,896	11,996
Other (1)	2,324	2,831	2,035	4,085	1,590	1,301
Total	\$ 785,897	\$ 698,437	\$ 566,852	\$ 222,041	\$ 177,864	\$ 166,370

(1)The Performance Materials segment includes the results of Interface and PCC for the periods following the dates of acquisitions of August 31, 2018 and July 12, 2018, respectively.

(2)Technical Nonwovens segment includes results of Texel for the period following the date of acquisition of July 7, 2016.

(3)Technical Nonwovens segment includes results of Gutsche as of the acquisition date of December 31, 2016.

(4)Included in the Technical Nonwovens segment and Eliminations and Other is \$22.2 million, \$26.5 million and \$18.2 million of intercompany sales to the Thermal Acoustical Solutions segment for the years ended December 31, 2018, 2017 and 2016, respectively.

(5)For the years ended December 31, 2017 and 2016 \$0.8 million and \$0.7 million, respectively, have been reclassified from operating income to other expense (income), net, to give effect to the adoption of ASU No. 2017-07, "Compensation - Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost".

Foreign sales are based on the country in which the sales originated (i.e., where the Company's legal entity is domiciled). Sales to Ford Motor Company in 2018, 2017, and 2016 were \$116.1 million, \$120.7 million, and \$110.9 million, respectively, and accounted for 14.8%, 17.3%, and 19.6% of Lydall's net sales in the years ended December 31, 2018,

2017, and 2016, respectively. These sales were reported in the Thermal Acoustical Solutions segment. No other customers accounted for more than 10.0% of total net sales in 2018, 2017, and 2016.

14. Income Taxes

On December 22, 2017, the United States enacted significant changes to U.S. tax law following the passage and signing of the Tax Cuts and Jobs Act (the "Tax Reform Act"). During the year ended December 31, 2017, the Company followed guidance in Staff Accounting Bulletin No.118 ("SAB 118"), which provided a measurement period, not to exceed one year from the enactment of the Tax Reform Act, and recorded a provisional benefit of \$3.7 million related to the revaluation of deferred tax assets and liabilities, the one-time mandatory repatriation of foreign earnings, and legislative changes to 162(m). During the year ended December 31, 2018, the Company evaluated interpretations and additional regulatory guidance and adjusted the provisional tax reform benefit by recording tax expense of \$0.7 million. As of December 31, 2018, the Company has completed its accounting for the Tax Reform Act as described in SAB 118. In 2019, the Company will continue to review and incorporate updates related to forthcoming U.S. Treasury Regulations and other interpretive guidance and determine any impacts to the Company.

The provision for income taxes consists of the following:

In thousands	For the years ended December 31,		
	2018	2017	2016
Current:			
Federal	\$ 3,739	\$ 11,526	\$ 15,376
State	498	956	1,513
Foreign	3,788	2,425	2,104
Total Current	\$ 8,025	\$ 14,907	\$ 18,993
Deferred:			
Federal	\$ 2,646	\$ (2,472)	\$ (594)
State	380	256	601
Foreign	(2,598)	(717)	(1,179)
Total Deferred	428	(2,933)	(1,172)
Provision for income taxes	\$ 8,453	\$ 11,974	\$ 17,821

The following is a reconciliation of the difference between the actual provision for income taxes and the provision computed by applying the federal statutory tax rate on earnings:

	For the years ended December 31,		
	2018	2017	2016
Statutory federal income tax rate	21.0 %	35.0 %	35.0 %
State income taxes	1.6	1.6	2.1
Valuation allowances for deferred tax assets, including state	(1.3)	0.1	1.3
Research and development credits	(1.3)	(1.0)	(1.2)
Capitalized transaction costs	0.6	—	0.7
Domestic production activities deduction	—	(1.8)	(2.7)
Stock based compensation	(0.7)	(4.4)	(2.1)
German Cartel settlement	—	—	2.2
Foreign income taxed at lower rates	(1.6)	(2.8)	(3.5)
Reserves for uncertain tax positions	—	(1.7)	(0.1)
Repatriation of foreign undistributed earnings	1.6	1.3	—
Revaluation of deferred tax liabilities due to federal rate change	—	(7.3)	—
Other	(0.4)	0.5	0.7
Effective income tax rate	19.5 %	19.5 %	32.4 %

In 2018, the effective tax rate of 19.5% was below the federal statutory rate and included valuation allowance activity of \$0.6 million. This was primarily a result of the fourth quarter partial release of valuation allowance on the Netherlands net operating losses offset by a valuation allowance addition in Germany. Compared to 2017, the tax benefit from stock compensation expense had a lesser impact on the 2018 rate because of less windfall benefits recognized. Also, foreign income taxed at lower rates had a lesser impact on the 2018 rate because of new U.S. regulations that were released in the fourth quarter 2018 that limit the amount of the tax benefit recorded compared to 2017.

In 2017, in addition to the Tax Reform Act, which favorably impacted the effective tax rate by a net \$3.7 million, the effective tax rate of 19.5% was impacted by a favorable mix of taxable income generated from foreign income taxed at lower rates, resulting in a tax benefit of \$1.7 million, net of \$0.7 million of expense to correct a foreign tax error in prior years. The Company also recorded a tax benefit of \$1.1 million attributable to the Domestic Production Activities Deduction, a tax benefit of \$2.7 million related to stock based compensation and a tax benefit of \$1.5 million attributable to the release of certain reserves for uncertain tax positions from the settlement of the IRS tax audit that closed in the third quarter of 2017. These favorable adjustments were partially offset by tax expense of \$0.3 million against certain deferred tax assets in China, as future realization of the assets is not reasonably assured.

In 2016, the effective tax rate of 32.4% was positively impacted by a favorable mix of taxable income generated from countries with lower tax rates compared to that of the United States at that time, resulting in a tax benefit of \$1.3 million. The Company also recorded a tax benefit of \$1.5 million attributable to the Domestic Production Activities Deduction and a tax benefit of \$1.1 million related to stock based compensation. These favorable adjustments were partially offset by tax expense of \$1.2 million related to a nondeductible German Cartel settlement and a net increase in valuation allowance against certain deferred tax assets of \$0.7 million, primarily related to tax valuation allowances of \$0.5 million recorded against certain net deferred tax assets in the Netherlands and China, as future realization of the assets is not reasonably assured.

The Company maintains valuation allowances against certain deferred tax assets where realization is not reasonably assured. The Company evaluates the likelihood of the realization of deferred tax assets and reduces the carrying amount to the extent it believes a portion will not be realized. The Company's effective tax rates in future periods could be affected by increases or decreases in anticipated earnings in countries where tax rates differ from the United States federal rate, the relative impact of permanent tax adjustments on higher or lower earnings from domestic operations, changes in net deferred tax asset valuation allowances, completion of acquisitions or divestitures, changes in tax rates or tax laws, and the outcome of tax audits.

The following schedule presents net current and net long-term deferred tax assets and liabilities by tax jurisdiction as of December 31, 2018 and 2017:

In thousands	2018		2017	
	Deferred Tax Assets		Deferred Tax Assets	
	Current	Long-term	Current	Long-term
Federal	\$ —	\$ —	\$ —	\$ —
State	—	—	—	—
Foreign	—	2,055	—	1,146
Totals	\$ —	\$ 2,055	\$ —	\$ 1,146

In thousands	2018		2017	
	Deferred Tax Liabilities		Deferred Tax Liabilities	
	Current	Long-term	Current	Long-term
Federal	\$ —	\$ 30,193	\$ —	\$ 7,288
State	—	3,728	—	424
Foreign	—	5,344	—	7,002
Totals	\$ —	\$ 39,265	\$ —	\$ 14,714

Net deferred tax assets (liabilities) consisted of the following as of December 31, 2018 and 2017:

In thousands	December 31,	
	2018	2017
Deferred tax assets:		
Accounts receivable	\$ 172	\$ 132
Inventories	520	164
Net operating loss carryforwards	6,095	5,339
Other accrued liabilities	3,426	1,053
Pension	5,181	1,482
Tax Credits	1,846	1,735
Total deferred tax assets	17,240	9,905
Deferred tax liabilities:		
Intangible assets	25,133	2,073
Property, plant and equipment	23,353	15,691
Total deferred tax liabilities	48,486	17,764
Valuation allowance	5,964	5,709
Net deferred tax liabilities	\$ (37,210)	\$ (13,568)

For the years ended December 31, 2018, 2017 and 2016, income before income taxes was derived from the following sources:

In thousands	For the years ended December 31,		
	2018	2017	2016
United States	\$ 33,928	\$ 54,212	\$ 53,356
Foreign	9,337	7,107	1,583
Total income before income taxes	\$ 43,265	\$ 61,319	\$ 54,939

At December 31, 2018, the Company had approximately \$4.1 million of state net operating loss carryforward which will expire between 2027 and 2036. The Company has not recorded a deferred tax asset for \$4.0 million of this carryforward as the Company anticipates paying a non-income based franchise tax for the foreseeable future in the applicable jurisdiction. In addition, at December 31, 2018, the Company had \$1.8 million of state tax credit carryforwards that expire between 2019 and 2033. As of December 31, 2018, the Company has recorded a valuation allowance against the full amount of its state tax credit carryforwards. The Company also has \$6.8 million of foreign net operating loss carryforwards in China, \$10.5 million of net operating loss carryforwards in Germany, and \$5.1 million of net operating loss carryforwards in the Netherlands. The Netherlands' net operating losses expire between the years 2019 and 2025 and the China net operating losses expire between the years 2019 and 2023. A partial valuation allowance is recorded against the net operating losses in all three jurisdictions for the portion of its net operating losses that future realization is not reasonably assured. The Company evaluates and weighs the positive and negative evidence present at each period. The Company will continue to monitor the realization criteria based on future operating results.

During 2018 the Company changed its assertion and no longer intends to reinvest certain undistributed earnings of its foreign subsidiaries that have been previously taxed in the U.S. and has recorded taxes associated with this position. For the remainder of the undistributed foreign earnings, unless tax effective to repatriate, the Company will continue to permanently reinvest these earnings. As of December 31, 2018, such undistributed earnings were approximately \$1.8 million. The Company estimates that the amount of tax that would be payable on the undistributed earnings if repatriated to the United States could be up to \$0.5 million. This amount may vary in the future due to a variety of factors including future tax law changes, future earnings and statutory taxes paid by foreign subsidiaries, and ongoing tax planning strategies by the Company.

The Company and its subsidiaries file a consolidated federal income tax return, as well as returns required by various state and foreign jurisdictions. In the normal course of business, the Company is subject to examination by taxing authorities, including such major jurisdictions as the United States, China, France, Germany, Hong Kong, the

Netherlands, Canada and the United Kingdom. Within the next fiscal year, the Company expects to conclude certain income tax matters through the year ended December 31, 2015 and it is reasonably expected that net unrecognized benefits of \$0.3 million may be recognized. The total amount of unrecognized tax benefits that would affect the effective tax rate if recognized was \$3.6 million as of December 31, 2018. However, \$1.4 million of the unrecognized tax benefits, if recognized, would be offset in pre-tax income by the reversal of indemnification assets due to the Company. The Company is no longer subject to U.S. federal examinations for years before 2015, state and local examinations for years before 2013, and non-U.S. income tax examinations for years before 2003.

A reconciliation of the beginning and ending amount of unrecognized tax benefits is as follows:

In thousands	2018	2017
Unrecognized tax benefits at beginning of year	\$ 2,526	\$ 3,219
Decreases relating to positions taken in prior periods	(298)	—
Increases relating to positions taken in prior periods	—	221
Increases relating to current period	1,584	475
Decreases due to settlements with tax authorities	(233)	(1,372)
Decreases due to lapse of statute of limitations	(16)	(17)
Unrecognized tax benefits at end of year	\$ 3,563	\$ 2,526

The Company recognizes the interest accrued and the penalties related to unrecognized tax benefits as a component of tax expense.

15. Commitments and Contingencies

Leases

The Company has operating leases that resulted in expense of \$6.8 million in 2018, \$5.8 million in 2017, and \$5.4 million in 2016. These contracts include building, office equipment, vehicle and machinery leases that require payment of property taxes, insurance, repairs and other operating costs.

Approximate future minimum lease payments under noncancelable leases are:

In thousands	Payments due by period		
	Operating Lease Payments	Capital Lease Payments	Total
2019	\$ 6,004	\$ 279	\$ 6,283
2020	4,871	35	4,906
2021	3,877	—	3,877
2022	3,226	—	3,226
2023	2,617	—	2,617
Thereafter	11,111	—	11,111
Total	31,706	314	32,020
Interest on capital leases	—	(2)	(2)
Total	\$ 31,706	\$ 312	\$ 32,018

Commitments and Contingencies

The Company is subject to legal proceedings, claims, investigations and inquiries that arise in the ordinary course of business such as, but not limited to, actions with respect to commercial, intellectual property, employment, personal injury and environmental matters. While the outcome of any matter is inherently uncertain and the Company cannot be sure that it will prevail in any of the cases, subject to the matter referenced below, the Company is not aware of any matters pending that are expected to be material with respect to the Company's business, financial position, results of operations or cash flows.

Environmental Obligations

The Company elected to remediate environmental contamination discovered prior to the closing of the Texel acquisition in 2016 at a certain property in the province of Quebec, Canada (“the Property”) that was acquired by Lydall. The Company records accruals for environmental costs when such losses are probable and reasonably estimable. In 2016, the Company, through the engagement of a third-party environmental service firm, determined the final scope and timing of the remediation project and estimated the cost of the remediation project to range between \$0.9 million and \$1.5 million, which was further refined in July of 2017 to the top end of this range at \$1.5 million. During 2017, the environmental liability was reduced by \$0.7 million, reflecting payments made to vendors, resulting in a balance of \$0.8 million at December 31, 2017. During 2018, the environmental liability was reduced by \$0.8 million resulting in no balance at December 31, 2018.

Pursuant to the Share Purchase Agreement, ADS has agreed to indemnify the Company from all costs and liabilities associated with the contamination and remediation work, including the costs of preparation and approval of the remediation plan and other reports in relation therewith. This indemnity was secured by an environmental escrow account, which was established in the amount of \$3.0 million Canadian Dollars (approximately \$2.2 million U.S. Dollars as of December 31, 2018). Should the costs and liabilities exceed the environmental escrow amount, the Company also has access to the general indemnity escrow account, which was originally established in the amount of \$14.0 million Canadian Dollars (approximately \$10.3 million U.S. Dollars as of December 31, 2018), and based on the Share Purchase Agreement was reduced to approximately \$7.0 million Canadian Dollars (approximately \$5.1 million U.S. Dollars as of December 31, 2018). Based on the foregoing, an indemnification asset of \$0.9 million was also recorded in other assets at December 31, 2016, and subsequently increased to \$1.5 million in July of 2017, as the Company believed, and still believes collection from ADS is probable. The indemnification asset was decreased by \$0.7 million, reflecting indemnification from ADS for payments made by the Company to its vendors during 2017. During 2018, the indemnification asset was further reduced by \$0.8 million, reflecting indemnification from ADS for payments made by the Company to its vendors, resulting in no balance at December 31, 2018. In the fourth quarter of 2018 the Company and ADS reached an agreement to release the remaining \$1.2 million Canadian Dollars (approximately \$0.9 million U.S. Dollars as of December 31, 2018) from the environmental escrow account as the remediation was substantially complete. A portion of the escrow was released directly to the Company to pre-fund three years of monitoring for which the Company will assume the incremental monitoring costs.

In the fourth quarter of 2016, as part of a groundwater discharging permitting process, water samples collected from wells and process water basins at the Company’s Rochester New Hampshire manufacturing facility, within the Performance Materials segment, showed concentrations of Perfluorinated Compounds (“PFCs”) in excess of state ambient groundwater quality standards. In January 2017, the Company received a notification from the State of New Hampshire Department of Environmental Services (“NHDES”) naming Lydall Performance Materials, Inc. a responsible party with respect to the discharge of regulated contaminants and, as such, is required to take action to investigate and remediate the impacts in accordance with standards established by the NHDES. The Company conducted a site investigation, the scope of which was reviewed by the NHDES, in order to assess the extent of potential soil and groundwater contamination and develop a remedial action. Based on input received from NHDES in March 2017 with regard to the scope of the site investigation, the Company recorded \$0.2 million of expense. In 2018, the Company received a response from the NHDES to the site investigation report outlining proposed remedial actions. The Company recorded an additional \$0.1 million of expense in 2018 associated with the expected costs to remediate the impacts of the discharge of regulated contaminants in accordance with standards established by the NHDES. During 2018 the environmental liability was fully reduced reflecting payments made to vendors, resulting in no balance at December 31, 2018. Additionally, the Company incurred \$0.2 million of capital expenditures in 2018, in relation to the lining of the Company’s fresh water waste lagoons. The site investigation is ongoing. The Company cannot be sure that costs will not exceed the current estimates until this matter is closed with the NHDES, nor that any future corrective action at this location would not have a material effect on the Company’s financial condition, results of operations or liquidity.

Provisions for such matters are charged to expense when it is probable that a liability has been incurred and reasonable estimates of the liability can be made. Estimates of environmental liabilities are based on a variety of matters, including, but not limited to, the stage of investigation, the stage of the remedial design, evaluation of existing remediation technologies, and presently enacted laws and regulations. In future periods, a number of factors could significantly impact any estimates of environmental remediation costs.

16. Earnings Per Share

The following table provides a reconciliation of weighted-average shares used to determine basic and diluted earnings per share.

In thousands	For the years ended December 31,		
	2018	2017	2016
Basic average common shares outstanding	17,204	17,045	16,871
Effect of dilutive options and restricted stock awards	126	272	370
Diluted average common shares outstanding	17,330	17,317	17,241

For the years ended December 31, 2018, 2017 and 2016, stock options for 455,515, 44,837, and 94,796 shares of Common Stock, respectively, were not considered in computing diluted earnings per common share as the stock options were considered anti-dilutive.

17. Quarterly Financial Information (Unaudited)

The following table summarizes quarterly financial results for 2018 and 2017. In management's opinion, all material adjustments necessary for a fair statement of the information for such quarters have been reflected.

In thousands except per share data	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
	2018	2017	2018	2017	2018	2017	2018	2017
Net sales	\$ 191,660	\$ 165,487	\$ 186,413	\$ 174,879	\$ 197,886	\$ 180,041	\$ 209,938	\$ 178,030
Gross profit	\$ 39,507	\$ 40,498	\$ 36,127	\$ 43,327	\$ 35,139	\$ 40,054	\$ 41,872	\$ 39,480
Net income	\$ 11,054	\$ 11,669	\$ 10,450	\$ 13,125	\$ 6,256	\$ 10,675	\$ 7,184	\$ 13,848
Earnings per common share:								
Basic	\$ 0.64	\$ 0.69	\$ 0.61	\$ 0.77	\$ 0.36	\$ 0.63	\$ 0.42	\$ 0.81
Diluted	\$ 0.64	\$ 0.68	\$ 0.60	\$ 0.76	\$ 0.36	\$ 0.62	\$ 0.42	\$ 0.80

The table above includes the quarterly results of Interface since the acquisition date of August 31, 2018.

The following components are included gross profit and net income for 2018 and 2017 and impact the comparability of each year:

In thousands except per share data	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
	2018	2017	2018	2017	2018	2017	2018	2017
Gross profit impact:								
Inventory step-up purchase accounting adjustments	\$ —	\$ 481	\$ —	\$ 543	\$ 1,390	\$ 83	\$ 585	\$ —
Restructuring, severance and segment consolidation expenses	449	441	876	92	400	287	169	155
Net income impact:								
Inventory step-up purchase accounting adjustments	\$ —	\$ 350	\$ —	\$ 394	\$ 1,077	\$ 59	\$ 438	\$ —
Restructuring, severance and segment consolidation expenses	494	702	711	216	409	910	527	488
Long-lived asset impairment charge	—	490	—	—	—	—	—	—
Strategic initiatives expenses	87	125	923	—	1,730	219	493	205
Discrete tax items	—	—	—	—	—	(1,380)	320	(2,867)

During the quarter ended December 31, 2017, the Company recorded an out of period adjustment reducing net income by \$0.8 million to correct a foreign tax error in prior periods. This error resulted in the overstatement of net income by less than \$0.1 million in each of the first, second, and third quarters of 2017. This error also impacted each quarter in 2016, 2015 and 2014 by less than \$0.1 million. The Company evaluated the impact of these errors and determined them to be immaterial to all quarters and years.

18. Recently Issued Accounting Standards

In February 2016, the FASB issued ASU No. 2016-02, "Leases (Topic 842)". This ASU requires entities that lease assets with lease terms of more than 12 months to recognize right-of-use assets and lease liabilities created by those leases on their balance sheets. This ASU will also require new qualitative and quantitative disclosures to help investors and other financial statement users better understand the amount, timing, and uncertainty of cash flows arising from leases. In July 2018, the FASB amended the leasing guidance to add a transition option. The Company plans to elect the transition option to continue to apply the legacy guidance ASC 840, Leases, including disclosure requirements, in the comparative periods presented in the year of adoption. Based on the effective date, the Company will adopt the new standard effective January 1, 2019 on a modified retrospective basis and will not restate comparative periods.

The Company anticipates the ASU will have a material impact on its assets and liabilities due to the addition of right-of-use assets and lease liabilities to the balance sheet; however, it does not expect the ASU to have a material impact on the Company's consolidated cash flows or results of operations. Based on the portfolio of leases as of December 31, 2018, the Company expects to recognize approximately \$28.0 million to \$34.0 million of operating lease right-of-use assets and lease liabilities on its consolidated balance sheets upon adoption.

While substantially complete, the Company is still in the process of finalizing its evaluation of the effect of ASU 842 on the Company's financial statements, disclosures and impact to its internal control over financial reporting. The Company will finalize its accounting assessment and quantitative impact of the adoption during the first quarter of 2019 and the actual impact may differ from the estimate. As the Company completes its evaluation of this new standard, new information may arise that could change the Company's current understanding of the impact to leases. Additionally, the Company continues to monitor industry activities and any additional guidance provided by regulators, standards setters, or the accounting profession, and adjust the Company's assessment and implementation plans accordingly.

In June 2018, the FASB issued ASU No. 2018-07, Compensation - Stock Compensation (Topic 718) ("ASU 2018-07"). ASU 2018-07 was issued in order to expand the guidance for stock-based compensation, to include share-based payment transactions for acquiring goods and services from nonemployees. The pronouncement is effective for fiscal years, and for interim periods within those fiscal years, beginning after December 15, 2018, with early adoption permitted. The Company does not expect the adoption of the new accounting standard to have a material impact on its consolidated financial statements.

In August 2018, the FASB issued ASU 2018-13, Fair Value Measurement (Topic 820): Disclosure Framework-Changes to the Disclosure Requirements for Fair Value Measurement ("ASU 2018-13"), which adds, amends and removes certain disclosure requirements related to fair value measurements. Among other changes, this standard requires certain additional disclosure surrounding Level 3 assets, including changes in unrealized gains or losses in other comprehensive income and certain inputs in those measurements. ASU 2018-13 is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2019. Certain amended or eliminated disclosures in this standard may be adopted early, while certain additional disclosure requirements in this standard can be adopted on its effective date. In addition, certain changes in the standard require retrospective adoption, while other changes must be adopted prospectively. The Company is currently evaluating the impact of this update on its consolidated financial statements and related disclosures.

In August 2018, the FASB issued ASU No. 2018-14, "Compensation - Retirement Benefits - Defined Benefit Plans - General (Subtopic 715-20): Disclosure Framework - Changes to the Disclosure Requirements for Defined Benefit Plans." This ASU requires entities to disclose the weighted-average interest crediting rates for cash balance plans and other plans with promised interest crediting rates. This ASU also requires entities to disclose an explanation for significant gains and losses related to changes in the benefit obligation for the period. This ASU is effective for fiscal years beginning after December 15, 2020 with early adoption permitted. The Company is currently evaluating the method and impact the adoption of ASU 2018-14 will have on the Company's consolidated financial statements and disclosures.

In August 2018, the FASB issued ASU 2018-15, Intangibles - Goodwill and Other - Internal-Use Software (Subtopic 350-40); Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That Is a Service Contract. The amendments in this update require implementation costs incurred by customers in cloud computing arrangements (i.e., hosting arrangements) to be capitalized under the same premises of authoritative guidance for internal-use software, and deferred over the noncancellable term of the cloud computing arrangement plus any option renewal periods that are reasonably certain to be exercised by the customer or for which the exercise is controlled by the service provider. The Company is required to adopt this new guidance in the first quarter of 2020. Early adoption is permitted. The Company is currently evaluating the impact of this update on its consolidated financial statements and related disclosures.

19. Changes in Accumulated Other Comprehensive Income (Loss)

The following table discloses the changes by classification within accumulated other comprehensive income (loss) for the period ended December 31, 2018, 2017 and 2016:

In thousands	Foreign Currency Translation Adjustment	Defined Benefit Pension Adjustment	Gains and Losses on Cash Flow Hedges	Total Accumulated Other Comprehensive (Loss) Income
Balance at December 31, 2015	\$ (16,920)	\$ (17,665)	\$ —	\$ (34,585)
Other Comprehensive loss	(10,965)	(2,969) ^(a)	—	(13,934)
Amounts reclassified from accumulated other comprehensive loss		569 ^(b)	—	569
Balance at December 31, 2016	\$ (27,885)	\$ (20,065)	\$ —	\$ (47,950)
Other Comprehensive income	25,664	1,299 ^(a)	122 ^(c)	27,085
Amounts reclassified from accumulated other comprehensive loss		717 ^(b)	—	717
Balance at December 31, 2017	\$ (2,221)	\$ (18,049)	\$ 122	\$ (20,148)
Other Comprehensive loss	(16,237)	(4,998) ^(a)	(2,096) ^(c)	(23,331)
Amounts reclassified from accumulated other comprehensive loss	—	794 ^(b)	—	794
Balance at December 31, 2018	\$ (18,458)	\$ (22,253)	\$ (1,974)	\$ (42,685)

(a) Amount represents actuarial (losses) gains arising from the Company's postretirement benefit obligation. This amount was \$(5.0) million, net of \$1.5 million tax benefit, for 2018, \$1.3 million, net of a \$0.1 million tax expense, for 2017 and \$(3.0) million, net of \$1.6 million tax benefit in 2016. (See Note 10)

(b) Amount represents the amortization of actuarial losses to pension expense arising from the Company's postretirement benefit obligation. This amount was \$0.8 million, net of \$0.2 million tax benefit in 2018, \$0.7 million, net of \$0.4 million tax benefit in 2017, and \$0.6 million, net of \$0.4 million tax benefit in 2016. (See Note 10)

(c) Amount represents unrealized gains (losses) on the fair value of hedging activities, net of taxes, for the years ended December 31, 2018 and 2017.

Schedule II

LYDALL, INC.
VALUATION AND QUALIFYING ACCOUNTS
FOR THE YEARS ENDED December 31, 2018, 2017 AND 2016

In thousands	Balance at January 1,	Charges to Costs and Expenses	Charges (Deductions) to Other Accounts	Deductions	Balance at December 31,
2018					
Allowance for doubtful receivables	\$ 1,507	\$ 785	\$ (58) ²	\$ (794) ¹	\$ 1,440
Tax valuation allowances	5,709	3,859	(192) ²	(3,412) ³	5,964
2017					
Allowance for doubtful receivables	\$ 1,429	\$ 541	\$ 103 ²	\$ (566) ¹	\$ 1,507
Tax valuation allowances	4,903	886	394 ²	(474) ³	5,709
2016					
Allowance for doubtful receivables	\$ 1,251	\$ 941	\$ (123) ²	\$ (640) ¹	\$ 1,429
Tax valuation allowances	4,307	762	(140) ²	(26) ³	4,903

1. Uncollected receivables written off and recoveries.
2. Foreign currency translation and other adjustments.
3. Reduction to income tax expense.

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Section 2: EX-10.22 (EXHIBIT 10.22)

Exhibit 10.22

FORM (FOR U.S. EMPLOYEES) OF
LYDALL, INC.
PERFORMANCE SHARE AWARD AGREEMENT
(Three-Year Period)

THIS PERFORMANCE SHARE AWARD AGREEMENT (this "Agreement") is made between Lydall, Inc., a Delaware corporation ("Lydall"), and the recipient (the "Recipient") with respect to an Award under Lydall's 2012 Stock Incentive Plan (the "Plan") pursuant to the award letter (the "Award Letter"), dated [_____], from Lydall to the Recipient. All capitalized terms used but not defined in this Agreement shall have the same meanings that have been ascribed to them in the Plan, unless the context clearly requires otherwise.

1. Grant of Performance Shares. On the Date of Grant (as defined in the Award Letter), the Recipient has been granted the number of shares of Restricted Stock as set forth in the Award Letter (the "Performance Shares"). The Performance Shares are subject to the terms and conditions set forth in the Award Letter, this Agreement and the Plan. By accepting this Agreement, Recipient understands that the Performance Shares shall vest (a) solely to the extent the Committee certifies the achievement of the Performance Objectives (as defined below) and (b) provided that the Recipient remains in employment by the Company through the date of the Certification (as defined below). Performance Shares that do not vest will be forfeited.

2. Acceptance of Award. The Recipient shall have no rights with respect to the Performance Shares unless the Recipient accepts this Agreement no later than the close of business on the date that is sixty (60) days after the Date of Grant. Such acceptance shall be effected by accessing the website of Lydall's administrative agent (the "Administrative Agent"), referenced in the Award Letter and completing the required on-line grant acknowledgment process.

3. Ownership of Performance Shares; No Rights to Dividends on Performance Shares That Do Not Vest. As soon as

practicable after the acceptance of the Award by the Recipient, Lydall will cause the Performance Shares to be issued in book entry form in the name of the Recipient, whereupon they will be held for the benefit of the Recipient by the Administrative Agent until the Performance Shares vest or are forfeited in accordance with the terms and conditions of the Plan and this Agreement. Upon such issuance, the Recipient shall be the holder of record of the Performance Shares granted hereunder and will have, subject to the terms and conditions of the Plan and this Agreement, voting rights of a stockholder with respect to such Shares. Lydall shall retain custody of all Unvested Dividends made or declared with respect to the Performance Shares, subject to the same restrictions, terms and conditions as are applicable to the Performance Shares, until such time, if ever, as the Performance Shares shall vest.

4. Performance Condition.

(a) Period. The Performance Period for the Performance Shares is defined in the Award Letter.

(b) Performance Objectives. The actual number of Shares eligible for vesting will depend upon Lydall's Relative TSR Percentile Rank for the Performance Period as determined by the Committee in accordance with this Section 4. The number of Shares that shall vest shall be the total number of Performance Shares granted multiplied by the Vesting Percentage as set forth in the following table:

<u>Relative TSR Percentile Rank</u>	<u>"Vesting Percentage" of Performance Shares</u>
75 th or higher	150%
50 th	100%
25 th	50%
Lower than 25 th	0%

To determine the Relative TSR Percentile Rank for the Performance Period, the Committee will rank the TSR of the companies in the Peer Group including Lydall from highest to lowest, with the highest being ranked number 1, and apply the following formula, where N is the total number of companies in the Peer Group including Lydall and R is the ranking of Lydall's TSR within the Peer Group:

$$\frac{N - R}{N - 1}$$

The result will be rounded to the nearest whole percentile, rounding up for any value of 0.50 or higher. If the Relative TSR Percentile Rank for the Performance Period falls between the 25th percentile rank and the 75th percentile rank, the Vesting Percentage shall be determined using straight line linear interpolation.

(c) Certain Definitions.

i) "Beginning Stock Price" with respect to Lydall or any other company in the Peer Group, means the average of the closing sales prices for a share of common stock of the applicable company on the U.S. national securities exchange on which such stock principally trades for the month immediately preceding the beginning of the Performance Period, as reported in the *Wall Street Journal* or such other source as the Committee deems reliable. If a member of the Peer Group has been publicly traded for less than the full month immediately preceding the beginning of the Performance Period, such company's Beginning Stock Price shall equal the average of the closing sales prices for a share of common stock of the applicable company on the U.S. national securities exchange on which such stock principally trades over the period during which the company's common stock has been publicly traded.

ii) "Ending Stock Price" with respect to Lydall or any other company in the Peer Group means the average of the closing sales prices for a share of common stock of the applicable company on the U.S. national securities exchange on which such stock principally trades for the last month of the Performance Period, as reported in the *Wall Street Journal* or such other source as the Committee deems reliable.

iii) "Peer Group" means those companies that are included in the S&P 600 Industrials index on both (i) the first day of the Performance Period and (ii) the last day of the Performance Period.

iv) "Relative TSR Percentile Rank" means the percentile rank of Lydall's TSR for the Performance Period relative to the TSR of the companies in the Peer Group.

v) "Total Shareholder Return" or "TSR" means with respect to Lydall and each of the companies in the Peer Group, the difference of (A) the quotient of (i)(1) the applicable Ending Stock Price plus (2) dividends paid with respect to a record date occurring during the period over which the Beginning Stock Price is calculated and during the remainder of the Performance Period (assuming dividend reinvestment on the ex-dividend date), divided by (ii)(1) the applicable Beginning Stock Price plus (2) dividends paid with respect to a record date occurring during the period over which the Beginning Stock Price is calculated (assuming dividend reinvestment on the ex-dividend date); minus (B) 1.00. For purposes of this definition, any dividend paid in cash will be valued at its cash amount and any dividend paid in securities with a readily ascertainable fair market value shall be valued at the market value of the securities as of the dividend record date.

(d) Determination of Level of Performance Objectives Achieved. As soon as practicable (and no later than the 15th day of the third month) following the completion of the Performance Period, the Committee shall (a) determine the satisfaction of the Performance Objectives and (b) certify in writing, the extent to which the Performance Objectives have been achieved, if at all, and the Vesting Percentage as defined in 4(b) resulting therefrom (such certification being hereinafter referred to as the "Certification").

(e) Delivery of Vested Shares. Following the Certification, the Recipient shall be entitled to receive that number of Shares calculated by multiplying the number of Performance Shares set forth in the Award Letter by the Vesting Percentage set forth in the Certification, together with any Unvested Dividends relating thereto, provided the Recipient has settled all applicable tax withholding obligations arising from the vesting of the Award, as set forth in Section 6 below. All such vested Shares to which the Recipient is entitled, together with any Unvested Dividends, if any, relating thereto and any additional Performance Shares, if any, to which the Recipient is entitled by virtue of the Vesting Percentage being in excess of 100%, shall be released or delivered, as applicable, to the Recipient as soon as reasonably practical after the date of the Certification. Delivery of Shares will be made electronically via book entry to an account in the name of the Recipient maintained with Lydall's transfer agent or Administrative Agent. In connection therewith, the Recipient agrees to execute any documents reasonably requested by Lydall or the Administrative Agent.

5. Forfeiture; Transfer Restrictions.

(a) All Performance Shares that do not vest pursuant to Section 4, as well as any Unvested Dividends relating to the Performance Shares that do not vest, shall be forfeited, effective as of the date of the Certification.

(b) If the Recipient's employment with the Company terminates for any reason whatsoever prior to the date on which the Certification is made, then, effective upon the date of such termination, all of the Performance Shares, as well as any Unvested Dividends relating thereto, shall be forfeited.

(c) Neither the Performance Shares, nor the Recipient's interest in any of the Performance Shares or Unvested Dividends, may be encumbered, sold, assigned, transferred, pledged or otherwise disposed of at any time prior to the date of the Certification. In the event any such action is taken, all of the Performance Shares evidenced

by this Agreement, as well as any Unvested Dividends relating thereto, shall thereupon automatically be forfeited, effective as of the date of such event.

(d) All forfeited Performance Shares shall be delivered promptly to Lydall by the Administrative Agent, and Lydall shall direct the transfer agent and registrar of the Common Stock to make appropriate entries upon its or their records.

(e) The Plan Administrator shall make all determinations as to whether an event has occurred resulting in the forfeiture of Performance Shares and any related Unvested Dividends, and all such determinations of the Plan Administrator shall be final and conclusive.

(f) The Performance Shares shall be subject to the forfeiture and recoupment provisions of Section 10(a) of the Plan.

6. Taxation.

(a) The Recipient recognizes and agrees that there may be certain tax issues that affect the Recipient arising from the grant and/or vesting of the Performance Shares and that the Recipient is solely responsible for payment of all federal, state and local taxes resulting therefrom. The Company expressly provides no tax advice to the Recipient and recommends that the Recipient seek personal tax advice. In general, the Recipient will have taxable income in any year during which Performance Shares vest, in an amount equal to the number of Shares that vest multiplied by the fair market value of the Common Stock on the vesting date. This amount will be included in Recipient's taxable income reported on Form W-2 for that year.

(b) Any applicable income and employment tax withholding obligations associated with the vesting of the Performance Shares must be satisfied in accordance with the Plan and sub-section (c) below, prior to the delivery of vested Shares to the Recipient.

(c) Unless otherwise determined by the Plan Administrator, Recipient's tax withholding liability will be satisfied through "net withholding" whereby the number of vested Shares actually delivered to the Recipient is reduced by a number of Shares with a fair market value of the Common Stock on the vesting date equal to the Company's minimum statutory withholding tax liability outlined in (b) above.

(d) Section 83(b) of the Code permits the Recipient to recognize income in the year in which the Performance Shares are granted, rather than in the subsequent year in which they vest. This election must be filed with the Internal Revenue Service within 30 days of the Date of Grant. The Recipient is encouraged to discuss this alternative with his or her own tax advisor. In the event that the Recipient desires to make an election under Section 83(b) of the Code, the Recipient first shall make appropriate arrangements with the Company for the payment of all applicable withholding taxes associated with such election.

7. No Employment Rights. Nothing in this Agreement shall be deemed to: (a) confer or be deemed to confer upon the Recipient any right to continue in the employ of the Company or in any way affect the right of the Company to dismiss or otherwise terminate the Recipient's employment at any time for any reason with or without cause, (b) impose upon the Company any liability for any forfeiture of Performance Shares which may result if the Recipient's employment is terminated, or (c) affect the Company's right to terminate or modify any contractual relationship with a Recipient who is not an employee of the Company.

8. Changes in Capitalization. Neither this Agreement nor the grant of the Performance Shares shall affect in any way the right or power of Lydall or its stockholders to make or authorize any or all adjustments, recapitalizations, reorganizations or other changes in Lydall's capital structure or its business, or any merger or consolidation of Lydall or any Lydall Affiliate, or any issue of bonds, debentures, preferred or prior preference stocks ahead of or affecting the Common Stock or the rights thereof, or the dissolution or liquidation of Lydall or any Lydall Affiliate, or any sale or transfer of all or any part of Lydall's assets or business, or any other corporate act or proceedings, whether of a similar character or otherwise.

9. Change in Control. Upon a Change in Control Event or other Reorganization Event, the Performance Shares shall be subject to the terms of the Plan. Notwithstanding anything to the contrary herein, as a result of a Change in Control Event, the Performance Objectives no longer apply to the Performance Shares following the Change in Control Event, shall deem the Vesting Percentage to be 100%.

10. Plan Terms and Plan Administrator Authority. This Agreement and the rights of the Recipient hereunder are subject to all of the terms and conditions of the Plan, as it may be amended from time to time, as well as to such rules and regulations as the Plan Administrator may adopt for the administration of the Plan. It is expressly understood that the Plan Administrator is authorized to administer, construe and make, in its sole and absolute discretion, all determinations necessary or appropriate for the administration of the Plan and this Agreement, all of which shall be binding upon the Recipient. This Agreement shall be interpreted and applied in a manner consistent with the provisions of the Plan, and in the event of any inconsistency between this Agreement and the Plan, the terms of the Plan shall control.

11. Miscellaneous

(a) Amendment; Modification; Waiver. No provision of this Agreement may be amended, modified or waived unless authorized by the Plan Administrator, and no amendment or modification of this Agreement may be made without Recipient's consent except as permitted by Section 9(e) of the Plan.

(b) Notices. Except as otherwise provided herein, every notice or other communication relating to this Agreement shall be in writing, and shall be mailed or delivered to the party for whom it is intended at such address as may from time to time be designated by such party in a notice mailed or delivered to the other party as herein provided; provided, that, unless and until some other address be so designated, all notices or communications to the Company shall be mailed to or delivered to Lydall's Vice President, General Counsel and Secretary, with a copy to its Vice President of Human Resources, both at Lydall, Inc., One Colonial Road, P. O. Box 151, Manchester, Connecticut, 06045-0151, and all notices by the Company to the Recipient may be given to the Recipient personally or may be mailed to him or her at the last address designated for the Recipient on the employment records of the Company. For purposes of this section, the term "mailed" includes electronic delivery methods.

(c) Appointment of Agent. By accepting the Performance Shares evidenced by this Agreement, the Recipient hereby irrevocably nominates, constitutes and appoints each of Lydall's Vice President of Human Resources and the Administrative Agent as his or her agent and attorney-in-fact to take any and all actions and to execute any and all documents, in the name and on behalf of the Recipient, for any purpose necessary or convenient for the administration of the Plan and this Agreement. This power is intended as a power coupled with an interest and shall survive the Recipient's death. In addition, it is intended as a durable power and shall survive the Recipient's incapacity. Lydall has the right to change the appointed transfer agent or Administrative Agent from time to time.

(d) Governing Law; Jurisdiction. This Agreement shall be governed by and interpreted in accordance with the laws of the State of Delaware, excluding choice-of-law principles of the law of such state that would require the application of the laws of a jurisdiction other than the State of Delaware, and the Recipient agrees to the exclusive jurisdiction of Connecticut courts.

(e) Compliance with Laws. The issuance or delivery of Shares pursuant to this Agreement shall be subject to, and shall comply with, any applicable requirements of any federal and state securities laws, rules and regulations (including, without limitation, the provisions of the Securities Act and the Exchange Act, and any rules and regulations promulgated thereunder) and any other law or regulation applicable thereto. Lydall shall not be obligated to issue or deliver to Recipient any Shares pursuant to this Agreement if such issuance or delivery would violate any such requirements.

(f) Severability. The invalidity or unenforceability of any provision of this Agreement shall not affect the validity, legality or enforceability of the remainder of this Agreement, it being intended that all rights and obligations of the Company and the Recipient shall be enforceable to the fullest extent permitted by law.

12. Statute of Limitations. The Recipient hereby agrees that there shall be a one-year statute of limitations for the filing of any claim relating to this Agreement or the terms or conditions of the Performance Shares. If such a claim is filed more than one year subsequent to the earlier of the date on which the vesting of the Performance Shares is scheduled to occur or termination of the Recipient's employment, it shall be precluded by this provision, whether or not the claim has accrued at that time.

IN WITNESS WHEREOF, the undersigned officer of Lydall has executed this Agreement.

LYDALL, INC.

By: /s/ Dale G. Barnhart
Name: Dale G. Barnhart
Title: President and Chief Executive Officer

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Section 3: EX-21.1 (EXHIBIT 21.1)

Exhibit 21.1

Lydall, Inc. Subsidiary List as of December 31, 2018

I. Parent Company

Lydall, Inc.

II. First tier

Lydall Thermal/Acoustical, Inc.

Lydall Performance Materials, Inc.
Lydall International, Inc.
LDL C.V.
Southern Felt Company, Inc.
Lydall North America, LLC
Susquehanna Capital Acquisition Co.

III. Second tier

Lydall Netherlands B.V.
Texel Technical Materials Inc.
Lydall Performance Materials (US), Inc.
Lydall Sealing Solutions, Inc.
Interface Sealing Solutions Hong Kong LTD

IV. Third tier

Afitex Texel Geosynthetics Inc.
Lydall Thermal/Acoustical (Taicang) Company Limited
Lydall Performance Materials B.V.
Lydall France S.A.S.
Lydall Holdings GmbH
Lydall UK Ltd.
Lydall Gerhardi GmbH & Co. KG
Texel Geosol Inc.
Interface Sealing Solutions, Europe SARL
Lydall Performance Materials Altenkirchen GmbH
Interface Performance Materials India, LLP
Interface Sealing Solutions (Shanghai) Co., LTD

V. Fourth tier

Lydall Performance Materials S.A.S.
Lydall Thermique/Acoustique S.A.S.
Lydall Industrial Filtration (EMEA) Limited
Lydall Industrial Filtration Textile Manufacturing (EMEA) Limited
Andrew Industries (Hong Kong) Limited
Lydall Gutsche GmbH & Co. KG

VI. Fifth tier

Lydall Industrial Textile Manufacturing Company (Shanghai) Limited
Lydall Industrial Textile Manufacturing Company (Wuxi) Limited
Lydall Industrial Textile Trading Company (Shanghai) Limited
Gutsche Holding GmbH

VII. Sixth tier

Leaseford Enterprises Limited

VIII. Seventh tier

Gutsche Environmental Technology (Yixing) Co. Ltd.

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Section 4: EX-23.1 (EXHIBIT 23.1)

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statements on Form S-8 (Nos. 333-08886, 333-109500, 333-160511, and 333-181139) of Lydall Inc. of our report dated February 26, 2019 relating to the financial statements, financial statement schedule and the effectiveness of internal control over financial reporting, which appears in this Form 10-K.

/s/ PricewaterhouseCoopers LLP

PricewaterhouseCoopers LLP

Hartford, Connecticut

February 26, 2019

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Section 5: EX-24.1 (EXHIBIT 24.1)

Exhibit 24.1

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, that each of the undersigned directors and officers of Lydall, Inc. (the "Corporation"), does hereby constitute and appoint Dale G. Barnhart and Randall B. Gonzales, and each of them singly, as his agent and attorney-in-fact to do any and all things and acts in his/her name and in the capacities indicated below and to execute any and all instruments for him/her and in his/her name in the capacities indicated below which said Dale G. Barnhart and Randall B. Gonzales, or either of them, may deem necessary or advisable to enable the Corporation to comply with the Securities Exchange Act of 1934, as amended, and any rules, regulations and requirements of the Securities and Exchange Commission, in connection with the preparation and filing of the Corporation's Annual Report on Form 10-K (the "Annual Report") respecting the fiscal year ended December 31, 2018, including specifically, but not limited to, power and authority to sign for him/her in his/her name in the capacities indicated below the Annual Report and any and all amendments thereto, and each of the undersigned does hereby ratify and confirm all that said Dale G. Barnhart and Randall B. Gonzales, or either of them, shall do or cause to be done by virtue hereof.

IN WITNESS WHEREOF, each of the undersigned has executed this Power of Attorney as of the date indicated opposite his or her name.

/s/Marc T. Giles Chairman of the Board February 14, 2019
Marc T. Giles and Director

/s/Dale G. Barnhart President, Chief February 14, 2019
Dale G. Barnhart Executive Officer
and Director

/s/Kathleen Burdett Director February 14, 2019
Kathleen Burdett

/s/James Cannon Director February 14, 2019
James Cannon

/s/Matthew T. Farrell Director February 14, 2019
Matthew T. Farrell

/s/William D. Gurley Director February 14, 2019
William D. Gurley

/s/Suzanne Hammett Director February 14, 2019
Suzanne Hammett

/s/S. Carl Soderstrom, Jr. Director February 14, 2019
S. Carl Soderstrom, Jr.

/s/S. David G. Bills Director February 14, 2019
David G. Bills

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Section 6: EX-31.1 (EXHIBIT 31.1)

Exhibit 31.1

CERTIFICATION

I, Dale G. Barnhart, certify that:

1. I have reviewed this annual report on Form 10-K of Lydall, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact

necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, 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;
 - (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

February 26, 2019

/s/ Dale G. Barnhart

Dale G. Barnhart
President and Chief Executive Officer

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Section 7: EX-31.2 (EXHIBIT 31.2)

Exhibit 31.2

CERTIFICATION

I, Randall B. Gonzales, certify that:

1. I have reviewed this annual report on Form 10-K of Lydall, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods

presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, 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;
 - (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

February 26, 2019

/s/ Randall B. Gonzales

Randall B. Gonzales
Executive Vice President and Chief Financial Officer

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Section 8: EX-32.1 (EXHIBIT 32.1)

Exhibit 32.1

**CERTIFICATIONS PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the Annual Report of Lydall, Inc. (the "Company") on Form 10-K for the period ended December 31, 2018 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), each of the undersigned officers of the Company certifies, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to his knowledge:

1. The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
2. The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

The foregoing certifications are accompanying the Form 10-K solely pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 (subsections (a) and (b) of Section 1350, chapter 63 of title 18, United States Code) and are not being filed as a part of this Form 10-K or as a separate disclosure document.

February 26, 2019

/s/ Dale G. Barnhart

Dale G. Barnhart
President and Chief Executive Officer

February 26, 2019

/s/ Randall B. Gonzales

Randall B. Gonzales
Executive Vice President and Chief Financial Officer

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