Combined Management Report

» in short «

The EBITDA margin rose to

15.7 %

Jenoptik has thus again improved its profitability.

The Remuneration Report as well as the Information and Notes relating to Takeover Law (see Corporate Governance Chapter) are part of the Combined Management Report.

General Group Information

Group Structure

Legal and organizational structure

As the corporate center of the Group, JENOPTIK AG, based in Jena, is responsible for top-level functions including strategic corporate development and innovation management, as well as key tasks in controlling, corporate development (strategy, mergers and acquisitions, innovation), corporate real estate management, finance, internal audit, investor relations and sustainability, communication and marketing, human resources, accounting, legal and IP, compliance and risk management, taxes, and treasury. It further pools the central functions of IT and data security, purchasing, safety, occupational health and safety, and environmental protection.

For more information on the development of the photonics market, see the Macro-economic and Sectoral Developments chapter from page 91 on

Jenoptik's operating business is geared toward the growth market of photonics, which, according to a study conducted by market research company MarketsandMarkets, is expected to see annual average growth of 7.0 percent in the years 2018 through 2023. Since January 1, 2019, the photonics business has been organized within three divisions, Light & Optics (OEM business), Light & Production (industrial customer business), and Light & Safety (business with public sector contractors). The three divisions build on common core competencies in the field of photonics, including expertise in the fields of optics, sensors, imaging, robotics, and data analysis. Work based on mechatronic technologies is managed under the VINCORION brand. VINCORION is operated as an independent investment in the Jenoptik Group. With this new organizational structure, which is based on a common understanding of markets and customers using the same business models, we have further improved our market and customer orientation.

The three photonic divisions and VINCORION also represent the segments as defined in IFRS 8. G10

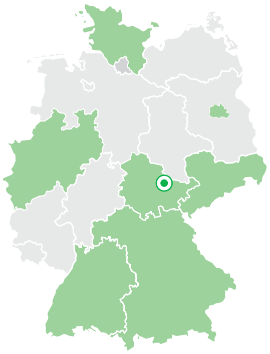
In addition, the legal merger of JENOPTIK SSC GmbH (formerly the Shared Service Center) into JENOPTIK AG was completed in the 2019 fiscal year. In the Light & Optics division, the legal merger of JENOPTIK Laser GmbH (Jena), JENOPTIK Polymer Systems GmbH (sites in Triptis, Berlin, and Mühlhausen), JENOPTIK Diode Lab GmbH (Berlin), and the Sensors business unit of JENOPTIK Advanced Systems GmbH (at the Jena site) within JENOPTIK Optical Systems GmbH was also completed.

In recent years, Jenoptik has continued to expand its international business and the structures associated with it. The US holding company at the Jupiter location in Florida is responsible for steering the overall strategy and coordinating financial activities for the American market. In 2018, Jenoptik approved a new organizational structure for Asia, which will help to simplify complex corporate structures and more clearly define responsibilities. The administrative functions for Asia as a whole where relocated from Singapore, previously the region's Asia headquarters, to the Shanghai site in China. The operating business in Europe is coordinated at the main locations in Germany.

G10 Organizational structure of the Jenoptik Group since January 1, 2019

Photonics			Mechatronics
Light & Optics OEM business	Light & Production B2B business	Light & Safety B2G business	VINCORION
Optical products and key technologies for the markets of the digital world and healthcare	System solutions for more efficiency of products and production processes	Systems and services for safer roads and cities around the world	Mechatronic products and solutions for more security in the civil and military area

G11 Key locations of the Jenoptik Group



Germany
Altenstadt
Berlin
Dresden
Essen
Jena
Monheim am Rhein
Triptis
Villingen-Schwenningen
Wedel

Europe
France
Bayeux

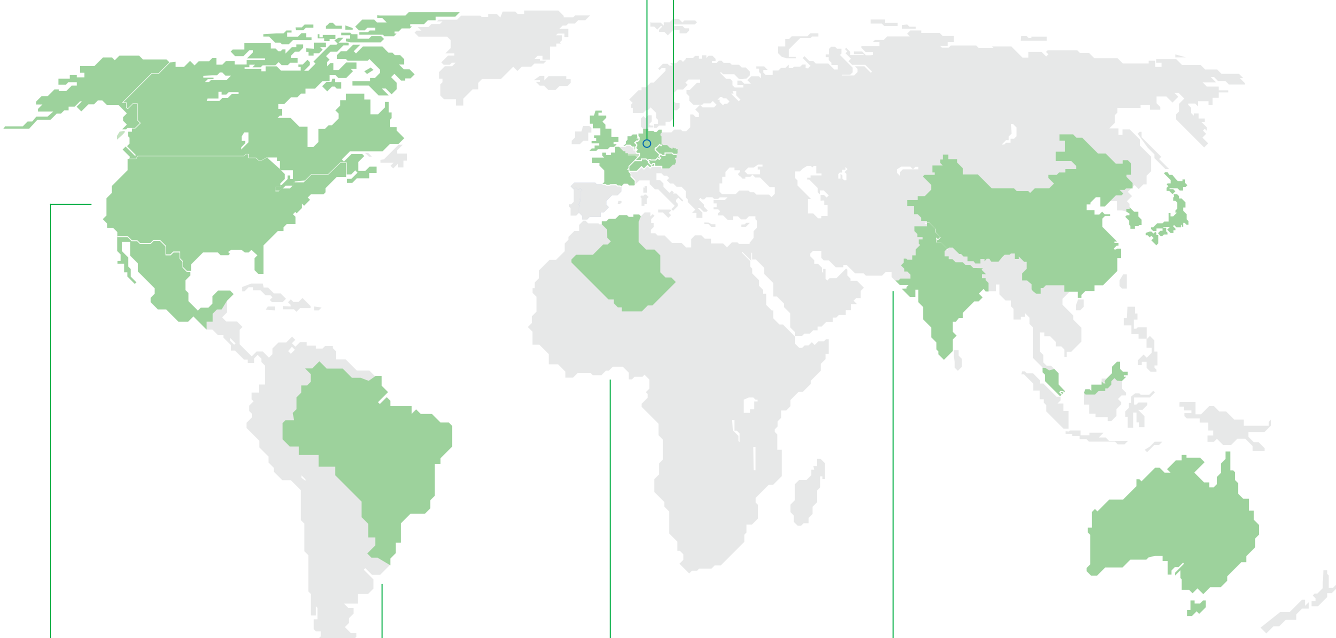
Great Britain
Camberley

Netherlands
Riel

Austria
Vienna

Switzerland
Peseux
Uster

Czech Republic
Teplice



North America
USA
El Paso (TX)
Fremont (CA)
Huntsville (AL)
Jupiter (FL)
Rochester Hills (MI)

Mexico
Saltillo

Canada
Barrie
Toronto

South America
Brazil
São Bernardo do Campo

Africa
Algeria
Algiers

Asia / Pacific
Australia
Sydney

China
Shanghai

India
Bangalore

Japan
Yokohama

Singapore
Singapore

South Korea
Pyeongtaek

Last updated: December 2019

Key locations

Jenoptik is represented in over 80 countries worldwide, with a direct presence in 18 of them, e. g. through its own companies, investments, or affiliated firms. The majority of the Group's products are manufactured in Germany, followed by the US. The Group's Jena headquarters is primarily home to the photonic activities carried out in the Light & Optics and Light & Production divisions. Other major German sites are at Wedel near Hamburg, Essen and Altenstadt in Bavaria (VINCORION), Monheim near Düsseldorf (Light & Safety), Villingen-Schwenningen (Light & Production), Dresden, Berlin, and Triptis (Light & Optics).

Examples of innovative products can be found in the Research and Development chapter from page 84 on

Outside Germany, Jenoptik maintains sites in Canada, China, France, Great Britain, Switzerland and the US. In addition, the Group is represented by subsidiaries and affiliated firms in Algeria, Australia, Brazil, the Czech Republic, India, Japan, Korea, Mexico, the Netherlands, and Singapore. G11

See investment holdings of the Jenoptik Group, pages 209/210

Business Model and Markets

Jenoptik is a globally operating photonics group that provides the majority of its products and services for the photonics market. Photonics covers the basics and areas of use of optical methods and technologies that address the generation, transmission, shaping, and measurement of light. Controllable light sources such as LEDs and lasers, together with suitable optical devices and sensors, make it possible to transmit data, analyze materials, create micro-optical components, and perform non-contact precision measurements. Self-driving cars that have to find their way around independently are practically inconceivable without LiDAR technology.
Pulsed laser technology is also used, allowing satellite constellations, for example, to share data at high speeds. In the process, they use the special physical properties of light quanta (photons) in place of electrons, and also combine optics and electronics. Under the VINCORION brand name, the Group also offers mechatronic solutions.

Our key markets primarily include the semiconductor equipment industry, the medical technology, automotive, machinery engineering, traffic, aviation, and security and defense technology industries. As a supplier of innovative capital goods for these markets, Jenoptik is primarily a partner to industrial companies. Our range of products comprises OEM or standard components, modules and subsystems through to complex systems and production lines for numerous sectors. It further includes total solutions and full-service operator models. Alongside industrial customers, the Light & Safety division and VINCORION primarily serve public sector clients, in part indirectly through system integrators.
Jenoptik's product range competes with a wide range of internationally operating companies not uncommonly specializing in only one or a few of the product areas and markets listed above. Differing product and service ranges are only comparable to a limited extent and thus make it difficult to provide definite market share estimates.

Research and development occupy a key position in Jenoptik's activities. Cooperations arrangements and developments on behalf of customers lead to partnerships and business relationships along the value chain. Our technology-intensive products and systems are often created in close collaboration with customers. This can be seen, for example, in the costs for developments on behalf of customers of 20.4 million euros in 2019. Cooperation arrangements require confidence on both sides as well as knowledge of partner requirements. Such lasting and successful arrangements with key customers are an important factor of our success.

The Jenoptik Divisions

Light & Optics

The Light & Optics division is a global OEM supplier of solutions and products based on photonic technologies. Jenoptik offers a wide range of products and services in the field, combining comprehensive expertise in optics, laser technology, digital imaging, optoelectronics, and software. Our systems, modules, and components help customers to tackle the challenges they face using photonic technologies. Customers include plant and machinery manufacturers, equipment manufacturers, and research institutions. As a high-tech photonics company, Jenoptik can assist its customers as an OEM partner offering an own technology portfolio covering everything from development to volume production.

In the Semiconductor & Advanced Manufacturing business unit, Jenoptik develops and produces optical and micro-optical systems as well as precision components to the highest quality standards. This includes complete systems and modules, all the way to special optical components and custom solutions for wavelengths from the far infrared (FIR) to the deep ultraviolet (DUV) region. The Group develops and manufactures micro-optics, such as for beam shaping applications, which, for example, are used in both lithography and inspection within in the semiconductor equipment industry. With its optical and micro-optical solutions, Jenoptik is also in a position to exploit further potential for growth in the field of digitization, for example in the market for information and communications technology. The company also targets the markets for laser material processing as well as security and defense technology.

In the field of biophotonics, the division focuses on applications for bio-imaging and laser-based therapy. Based on its core expertise in laser and LED-based beam sources, optical components and modules, sensors, digital imaging, and system integration, Light & Optics develops OEM solutions and products for the medical technology/life science industry.

Our diode and solid-state lasers are used in ophthalmology, dermatology, and surgery and are supplied to national and international medical technology companies. The Group also develops and produces optical and optoelectronic components for digital image processing and microscope cameras for applications in the medical field.

A new product concept for the fields of diagnostics and analysis is the JENOPTIK SYIONS technology platform for digital imaging and analysis, which can be configured according to customer requirements. Customers can make use of various imaging technologies and predefined modules to shorten their "time-to-market" processes, e.g. in scientific and clinical laboratories. The flexible miniaturized digital platform can be adapted for various bio-imaging applications.

For the field of industrial solutions, Jenoptik supplies high-power optoelectronic components and modules as well as integrated solutions that combine optics, laser technology, sensors, and digital imaging as required. The company focuses on applications in the fields of industrial automation and automotive and mobility. In addition to complex components for head-up displays, lenses for driver assistance systems, laser optical systems for particle sensors, and polymer optics for machine vision applications, we also produce components for augmented reality applications. In the field of industrial lasers for material processing, Jenoptik covers the entire laser value chain. Sensor products cover infrared camera systems and laser rangefinders, which are used in automation technology, security technology, and military reconnaissance.

Key sales regions in the division are in Europe and North America, and increasingly also in Asia/Pacific. The core markets in which Jenoptik supplies specific market segments are the semiconductor equipment, medical technology/life science, information and communications technology, show and entertainment, automotive, industrial automation, and the defense and security technology industries. Competitors in the Light & Optics division include MKS/Newport, Excelitas/Qioptiq and Berliner Glas.

Light & Production

The Light & Production Division is a global specialist in the optimization of manufacturing processes. With many years of experience and expertise in industrial metrology and optical inspection, laser-based material processing, and highly flexible robot-based automation, the division develops manufacturing solutions for customers in the automotive, aerospace and other manufacturing industries. Jenoptik supports industrial customers in making their production processes more effective and efficient through the use of optical and photonic technologies.

Detailed information on the course of business in the segments can be found in the Segment Report from page 106 on; see the Forecast Report for information on the future development of the divisions from page 133 on

Information on our extensive product range can be found at www.jenoptik.com/products

The company's portfolio includes high-precision contact and non-contact production metrology with a resolution in the nanometer range for pneumatic, tactile, and optical inspection of roughness, contour, shape, and the determination of dimensions at every stage of the production process and in the measurement room. A wide range of services such as in-depth advice, training, service, and long-term maintenance agreements are also all provided. The acquisition of OTTO Vision Technology GmbH and OVITEC GmbH in September 2018 allowed the Jenoptik Group to boost its range of services for innovative metrology solutions, e. g. for 3D inspections, and further expand its market position as a systems supplier for production metrology and industrial imaging applications.

In addition to this, Light & Production develops 3D laser machines that are integrated into customer production lines as part of process optimization and automation. They are used to machine plastics, metals, and leather at high speed and with accurate contours, and are thus both efficient and precise. Jenoptik acquired the Canadian company Prodomax in the summer of 2018. In a similar way to Five Lakes Automation (FLA), which was acquired in 2017, Prodomax plans and designs automated production lines and integrates them in customer production environments. Services and products related to process engineering and implementation include plant layouts, simulation, machine control and software design, robot handling systems, and transport devices. This acquisition has allowed Jenoptik to boost its position as a turnkey supplier of automated production solutions; the company can now offer not only stand-alone laser machines but also complete process solutions from a single source.

The Light & Production division is active around the world and, in addition to Germany, also operates production facilities in the US, Canada, France, China, and recently also in Spain. In addition, there are numerous sales and service offices on three continents. The divisions is present in the centers of the global automotive and automotive supplier industries in Europe, North America, and Asia. Companies such as Marposs, Mahr, and ViciVision compete with Jenoptik's metrology operations, Trumpf, Prima Power, and others with our laser machine business, and firms such as Centerline Automation in Canada and Serra in Spain with our automation business.

Light & Safety

The Light & Safety Division operates in four areas of business: traffic monitoring, civil security, toll payment monitoring systems, and monitoring of environmental parameters. Here, Jenoptik develops, produces, and sells various components, systems, and services used by public sector customers to monitor compliance with applicable road traffic regulations and thus make the world's roads safer. Its product portfolio includes systems covering all aspects of road traffic, such as speed and red light monitoring systems and custom solutions for identifying other traffic violations. Further expertise relates to the measurement of average speeds (section control) and automatic number plate recognition (ANPR), including applications for the police. In order to improve the recognition rate for car license plates using ANPR cameras, the division uses artificial intelligence and computer-based algorithms. Jenoptik thus supplies integrated solutions for public safety and future smart cities.

Jenoptik's traffic monitoring services cover the entire supporting process chain – from system development, construction, and installation of the monitoring infrastructure, to capturing images of traffic violations and their automatic processing.

Jenoptik has contributed to the further technical development of toll monitoring systems in Germany. For these applications, the Group markets innovative toll payment monitoring pillars that combine various digital sensor technologies such as stereo image processing and axle number detection in a single system.

The Light & Safety division's regional areas of focus are also primarily determined by customers. Jenoptik has more than 30,000 devices in use around the world. Competitors here include Redflex, the Sensys Gatso Group, Safran, and Vitronic.

Traffic safety systems in Germany are tested and certified by the Physikalisch-Technische Bundesanstalt (PTB) in Braunschweig, thereby obtaining proof of their measuring accuracy. Foreign deliveries are subject to controls by national institutes, although various countries also partially or fully recognize the German PTB test certificate or licenses from other leading European licensing authorities. As all companies have to go through these procedures, they represent a significant barrier to market entry for potential suppliers.

VINCORION

VINCORION develops, produces, and sells mechatronic products for civil and military markets, in particular for security and defense, aviation, and the rail and transport industries. Its portfolio ranges from individual assemblies for customers to integrate in their systems, through to turnkey solutions and final products. The division specializes in energy systems, drive and stabilization systems, and aviation systems. Qualified customer service ensures product support over what are typically long service lives. Products include diesel-electric generating units, electrical machinery such as generators, electric motors, and converters, power electronics, heating and lift systems, rescue hoists and radomes. They are used in drive, stabilization, and energy systems for military and civilian vehicle, rail, and aircraft equipment.

VINCORION supplies equipment to major systems companies such as Krauss-Maffei Wegmann and Rheinmetall in Germany, Airbus (France/Germany), BAE Systems (Great Britain), and Raytheon (US); it also supplies governments directly. In the area of defense and security technology as well as aviation and rail equipment, VINCORION is a business partner to national and international customers, with end products frequently exported worldwide by the systems companies it supplies. Many of the components and subsystems are developed specially on behalf of clients. In the future, however, new in-house developments such as the heated floor panel for planes and the electric rescue hoist for helicopters will also generate growth. Business is predominantly geared toward the long term and is subject to exacting security, certification, and export control requirements. The platforms on which the systems are deployed, such as the Leopard 2 tank and the Patriot missile defense system, often remain in use for many years and decades, increasing the importance of spare parts business and modernization projects. Competition with other companies is frequently limited to individual product groups. VINCORION's competitors include Moog, UTC Aerospace Systems, and Meggitt.

Targets and Strategies

Strategic orientation of the Group

As described in the chapter titled "Business Model and Markets", the Jenoptik Group offers the majority of its products and services for the photonics market. As so-called enabling technologies, the extremely precise, flexible methods and processes of photonics exert a great economic leverage effect and will thus continue to enjoy an increasing share in industrial value creation. At the same time, our solutions can contribute to increased efficiency and precision of our customers' products as well as to improved environmental compatibility and more sustainability.

The core of our Strategy 2022, introduced in 2018, is to concentrate on the core areas of light and optics. With a greater focus on photonics growth markets we want to develop into a focused and globally positioned photonics company over the coming years. In implementing its strategy, Jenoptik concentrates on internationalization and innovation.

To implement the growth strategy, we are
- focusing on our core competencies in the field of photonics,
- reorganizing and simplifying our corporate structure,
- actively managing our portfolio with a view to additional purchases as well as transformatory acquisitions and selective divestitures,,
- continuing to work on further internationalization in conjunction with greater vertical integration and customer proximity in our priority regions,
- investing more heavily in research and development, expanding our system and application expertise and becoming a solutions provider,
- driving an active cultural change within the company and
- continuing to steadily strengthen our financial resources.

Focus

Our activities in the market for photonic technologies focus on the fields of information processing, intelligent production processes, sensor technology, metrology, and biophotonics. For us, these are markets that are not only characterized by growth, but also by technological differentiation potential. Jenoptik continues to benefit from the global trends in digitization, health, mobility & efficiency, infrastructure as well as security, and is increasingly establishing itself as a strategic systems partner for international customers, with whom it works to design forward-looking solutions.

Further information on the development of the sectors and markets can be found in the Group Management Report.

With the new organizational structure that came into force in the 2019 fiscal year, we have further improved our market and customer orientation. Operations within our former segments were reorganized and the operative business was clustered according to a common understanding of markets and customers based on the same business models. This helps us to bring our products and solutions closer to the customer and opens up improved growth opportunities. Our three photonics divisions, Light & Optics, Light & Production, and Light & Safety, build on our extensive expertise in optics, sensors, imaging, robotics, data analysis, and human-machine interfaces. With our mechatronic activities under the VINCORION brand, we address customers from the aerospace and defense industry independently of the rest of the Group. G12

For us, focusing does not just mean emphasis on our core areas of expertise, but also simplifying structures and making the company more agile. For example, in 2019, the holding company and the Shared Service Center (SSC) were organizationally and legally merged. In addition, all major German legal entities of the Light & Optics division were merged into one company. Decision-making processes and responsibility have thus been further decentralized and, increasingly relocated into the operating areas. This will enable us to prioritize initiatives for future growth more clearly, leading them to success.

Further information on the group structure can be found in the Business Model and Markets chapter from page 74

Innovation

As an innovative high-tech company, identifying customer needs and trends early on and aligning them with our strategic actions and business activities to determine appropriate technology and product developments is of critical importance to Jenoptik. That is why we want to increase our R+D investment, including customer-related projects to a total of approximately 10 percent of revenue by 2022 (2019: 8.0 percent) in order to strengthen our market position in the field of photonics. We will continue to expand our software expertise and our knowledge in the field of artificial intelligence across all business segments in order to offer technological solutions for new requirements with interdisciplinary teams. In addition, we will push ahead with the expansion of our technology platforms in order to better utilize synergies. The planned profitable growth will also be supported through efficiency measures and increasingly also by the further expansion of the service business as well as the realization of economies of scale, for example in the Industrial Solutions, Metrology and Laser Processing areas.

As a system partner, Jenoptik is constantly looking for new solutions together with our customers. Our customers are often already involved in the very early stages of development processes. This enables us to strengthen our relationships and steadily boost value creation.

Further information can be found in the Research and Development chapter from page 84

G12 Strategy of the Jenoptik Group

Group strategy 2022

<table>
<tr><td>Strategic building blocks</td><td>More Focus</td><td>More Innovation</td><td>More International</td></tr>
<tr><td>Strategic targets</td><td colspan="2">Quantitative long-term targets:
Growth | Profitability | R+D ratio
Strengthening financial power</td><td>Qualitative long-term targets:
Cultural change | Employee satisfaction | Headquarters of the divisions | International value creation</td></tr>
</table>

Internationalization

Due to a continuing upswing in domestic industrial production as well as the demographic trend, Jenoptik sees particularly great potential for future growth in the regions of the Americas and Asia / Pacific. In terms of internationalization, we are therefore focusing on these markets. The realignment of our Asian business activities was continued with the reorganization of our structures there. A new leadership team for Asia has been managing the business and structural development of the Group locally since 2019. By establishing a new company Jenoptik can now benefit from the special economic policies that apply in free trade zones in China. In the fiscal year just past, these measures played an important role in our strategic development. In addition, we are aiming to increase value creation by expanding manufacturing and product development in this region. In this way, we will be able to offer local customers products and solutions together with services developed locally to meet their various needs. The plan by 2022 is to establish local R+D teams and own production facilities in all major growth markets – such as China – in order to support our customers in their local markets in achieving their innovation goals.

To further improve our market orientation and customer proximity, we are adapting our structures and developing products and solutions that are consistently geared to the trends and needs of our customers. In the future, Jenoptik will also continue to invest in the implementation and expansion of new and existing sales and service structures. We rely both on our own direct distribution channels and on existing dealer structures. Following the opening of an application center in Fremont, California, further application centers are planned in the years ahead, especially in the Asian region.

Through active portfolio management, we also want to continue to complement our organic growth with acquisitions, and we are continuously examining opportunities. By purchasing companies, we plan to boost our market and customer reach – not only in Europe, but particularly also in the Americas and Asia – or otherwise complement our portfolio through forward integration and additional systems' expertise. Examples of this included the acquisitions of the Canadian Prodomax and the German OTTO Group, successfully completed in 2018, and the recent purchase of INTEROB in Spain. Each acquisition must fit strategically and culturally, offer opportunities for growth and a sound business case, thereby fulfilling the criteria for increasing corporate value as well as integratability. The discontinuation of existing business activities or the sale of shares in companies is also continuously reviewed against the backdrop of the intended focus on photonic core competencies and possible at any time within the scope of active portfolio management. The planned sale of VINCORION was also to be seen in this context. However, in January 2020, the Executive Board decided to stop the sale process, as in its view there was no offer which adequately reflected the potential of this business.

In order to maintain lasting profitable growth, we must attract highly qualified and capable employees and ensure their long-term retention in the company. Structured HR planning is necessary to achieve this in an environment which is becoming increasingly demanding from the demographic aspect. Jenoptik is now positioning itself as an attractive employer by utilizing targeted HR marketing activities. Personnel development measures as well as improved framework conditions and a modern, open corporate culture should help to strengthen employees' loyalty to the company. The new values introduced in 2019 – open, driving and confident – form the basis for our corporate culture and help Jenoptik to grow together across different cultural and legal systems. As part of our personnel work, the anchoring of the values in everyday corporate life is therefore a further focal point in the realization of our strategic objectives.

In the gradual implementation of the Strategy 2022, the Executive Board had set the following priorities for 2019:

- Growth in Asia,
- Operational excellence in our production processes, and
- Speed-up of innovation.

The Executive Board, the members of the Executive Management Committee (EMC) and our employees worked intensely to realize and implement these strategic group initiatives in 2019. For example, sales activities in Asia were aligned even more closely with customers and markets. Jenoptik significantly expanded its own network of partners and carried out a large number of technical training sessions for its own service teams and for dealers. Many new formats for better cooperation as well as various development programs for young talents were also introduced locally.

The Operational Excellence initiative in our largest division, Light & Optics, focused on improving on-time delivery. With the new organizational structure and a number of internal projects further improvements in processes in manufacturing were achieved in 2019. In the year covered by the report, this has already led to a significant improvement in on-time delivery in the Light & Optics division.

Further information on employees and the brand can be found in the Non-financial Report from page 54

In 2019, the initial aim of speeding up innovation was to create optimal framework conditions for an innovation-friendly environment. To this end, the innovation process was simplified and the innovation landscape within the entire Group was made more transparent.

Using the "Vitality Index" from Jenoptik, which was introduced in 2019 and compares the revenue of products less than three years old to total revenue, the successful development of innovation activities can be tracked over time, for example. All innovation topics are viewed in a superordinate and holistic manner with regard to product, platform and technological development. By defining technology and market areas, the Group can further sharpen its focus on current and future technological competitive advantages.

After defining the individual divisional strategies, which follow the objectives of the group strategy, implementation of these strategies also began in the 2019 fiscal year.

Jenoptik has also defined strategic priorities for 2020:

- Development in Asia,
- Global Business Excellence, and
- Cultural change.

Our strategic efforts in Asia have been strongly focused on China over the last two years. In 2020, we will also turn our focus on other countries such as Japan and Singapore in order to achieve sustainable success throughout Asia in the future.

With the Global Business Excellence (GLOBE) program, we want to create the prerequisites for future digital business models and standardized management processes in the Group. The focus of this transformation project in the current fiscal year will be on the introduction of modern collaboration tools as well as the definition of a uniform process landscape and its harmonization across all business segments.

In addition, the cultural change within the Jenoptik Group will be another focus within our strategic initiatives in 2020.

Strategic orientation of the operating business

The Group's photonics divisions, which were established as part of the new business structure, are interconnected in many ways to ensure the transfer of technology or expertise between the divisions. Infrastructures and cross-section functions are also increasingly used jointly, for example for global procurement or in the expansion of the international sales network. Shared locations and the use of infrastructure facilitate market entry, enable the company to achieve critical mass more quickly in key regions around the world, and help to optimize the cost base through the leverage of synergies. Cost benefits are realized and currency risks minimized through global sourcing and production.

In "Light & Optics", we are continuing to focus our OEM business with optical systems on the "Digitization" mega trend. On the basis of our strengths in optical and micro-optical solutions, we aim to access further digital world markets such as advanced manufacturing or industrial solutions in addition to the semiconductor equipment sector. Jenoptik is already positioning itself in the market for optical information and communication technology. Ongoing internationalization, the expansion of the systems business and a focus on key customers will be the basis for sustainable, profitable growth, to which the use of economies of scale and both customer and technology synergies will additionally contribute.

In the market for biophotonics, we are also focusing on the "health" megatrend. Based on beam sources that use lasers and LEDs, optical precision components, digital imaging, and platform technologies, we want to increasingly position ourselves as one of the leading, profitably growing partners for the development of system solutions and products for diagnostics, analysis, screening, and therapy in the healthcare and life science industries. However, we are also participating in the trend for more mobility and efficiency with innovative industrial applications. One business focus is on expanding volume business with optoelectronic and polymer optical high-performance components and modules. In addition, we are continuing to pursue promising growth options for innovative applications using our core areas of expertise, such as driver assistance systems or technologies for autonomous driving (LiDAR). In these fields, too, we want to become an internationally operating supplier.

As a reliable supplier of products, systems, engineering solutions and services for industrial customers (B2B), we are primarily addressing the trend towards more stability, flexibility and efficiency in production processes in the "Light & Production" division. We will use our high-performance Smart Manufacturing applications to support the manufacture of efficient products in various sectors such as the automotive industry. For this purpose, we are increasingly bundling the services of all units of the division into joint projects. Jenoptik's use of optical inspection and production metrology enables it to focus above all on the need to reduce fuel consumption and CO_2 emissions as well as the growing trend towards e-mobility. The aim of this is to expand our position as a leading company in the area of optical 2D and 3D metrology for modern drive systems and in electronic production. A concentration on automated plastic and metal processing will support further growth in the field of laser processing systems. Inline dimensional measurements are increasingly also being carried out for these applications. Our recent acquisitions also contribute to this development. As an integrated supplier, Jenoptik is now able to offer everything for efficient production environments from a single source, from its own products and systems to automated system concepts and complete process solutions. The Light & Production division is therefore developing from a supplier of key technologies to a strategic partner for globally operating customers in our target markets. Regionally, we intend to strengthen our business in Asia, especially in the expanding south-east Asian markets.

In the "Light & Safety" division, we are pursuing two further future trends with a focus on infrastructure and public safety. In the field of traffic monitoring systems, we continue to support our customers – primarily public-sector customers (B2G) – in achieving their targets to improve traffic safety with complete solutions. With the global trends toward increasing mobility, urbanization and security, particularly in emerging countries, Jenoptik is also tapping into new sales regions. In 2019 we began with the development of a new uniform product platform, in particular for these markets. In our existing key markets, there is demand above all for more applications as well as greater information density per monitoring system, which the division is meeting by expanding its growing technology and software expertise. In addition, we see a trend towards major projects in the global traffic safety technology market with a combination of the equipment business and services, known as Traffic Service Provision. That is why Jenoptik is focusing on strengthening this profitable service business. Following the major order for toll monitoring systems concluded in 2018, Jenoptik also intends to further develop this business.

Alongside the traffic safety sector, the market for civil security is also gaining in importance. Based on the existing systems and software applications, the division aims to develop into an integrated solution provider for civil security and future smart cities, while at the same time positioning itself for a future in which autonomous driving is part of everyday life. In this context, the Light & Safety division focused its strategic research work on topics such as powerful database applications, efficient software algorithms and artificial intelligence in 2019. The expansion of our presence in international markets, selected cooperation arrangements as well as the concentration on innovative and competitive products are aimed at securing future growth and boosting our market position.

Jenoptik's Mechatronics business under the VINCORION brand is positioning itself as a partner for systems companies and customers who have a need for individual solutions that meet the stringent requirements of heavily regulated markets such as those of aviation and defense technology. Opportunities for further growth are seen in global trends such as the growing need for security, mobility, and efficiency as well as the increasing electrification in military and civilian sectors. For this reason, the focus will be on such high-growth business areas such as energy systems. Beyond this, the share of systems is to be increased which are used in civilian fields such as aviation. Customer relations with OEMs and end customers will be stepped up around the world. VINCORION is also seeking to expand its service business and international sales and service structures, especially in North America and Asia.

Further information on the segments can be found in the Segment Report on page 106 and the Business Model and Markets chapter on page 74

Strategy development and processes

Jenoptik's Corporate Development department reports directly to the Chairman of the Executive Board and strives to achieve an optimum strategic market alignment of the Group with its segments and foreign locations. The Corporate Strategy team supports the development, implementation, and follow-up of the strategy implementation.

Comprehensive knowledge of the position and competencies of our company in the market environment is indispensable. To underpin the group and individual strategies, on the one hand, there is close cooperation between Corporate Development and the divisions in the area of market intelligence – this concerns information about global target markets, trends and customer requirements, disruptive developments, opportunities and risks, as well as competitors and other framework conditions. On the other hand, it is important to bundle and expand our own technological expertise and unique selling points, including by means of suitable patents, strategic road maps, and structural adaptations. Here the operating business units are also supported in terms of process and content. This helps to secure Jenoptik's targeted market position.

In addition, the central Corporate Development department also supports the operating units in planning and implementing their strategic projects and in designing business models and structures – all with the target of securing sustained profitable growth within the Group. This target can also be supported through company acquisitions.

71 Combined Management Report 136

Control System

The company control system is geared toward the long-term corporate strategy and is therefore consistently aligned with the Group's short to medium-term objectives. The Executive Board is responsible for overall planning and thus for achieving the stated objectives as part of the strategic corporate development.

With the involvement of the Executive Management Committee (EMC), the Executive Board uses a strategy process to steer the development of the business units and monitors the implementation of defined measures. On the basis of global trends, growth paths are defined, opportunities and risks are evaluated, portfolio decisions are made, and the focuses of in-house research and development are determined using so-called technology roadmaps at annual strategy meetings. Strategy and planning meetings provide a planning basis for the following year and in medium-term group planning.

A planning forecast for the coming year and a five-year period is made annually on the basis of the long-term corporate strategy, based on the market-driven strategic planning in the divisions. The "counter flow method" is used for planning (bottom up – top down). In the course of a fiscal year, the planning for that year is updated in several forecast cycles.

Monthly results meetings (business reviews) during the EMC meetings are used for operational control. There the division heads/regional managers report to the Executive Board on the economic situation, the development of customer relationships, the competitive situation, and any exceptional business events. They employ standardized reporting methods largely involving performance indicators, information variables, and qualitative assessments, which are then used to define further operating and strategic measures to achieve the objectives in the event of planning deviations. The internal reports for the monthly Executive Board meetings provide aggregated financial and non-financial information for the divisions and the Corporate Center, which is used as a basis to manage the Group on a global level, allocate resources in a targeted manner, and pass resolutions on the Executive Board.

A business intelligence environment enables and supports continuous improvement in business development analysis, reporting, and planning processes.

The indicator system used in internal reports and to manage the business units in 2019 comprises high-priority performance indicators ("key performance indicators") and other financial and non-financial information parameters. All the indicators chiefly focus on shareholder value, the requirements of the

G13 Performance indicators for corporate management

	Financial indicators		Non-financial indicators	
Key performance indicators	Growth	Revenue, order intake, capital expenditure		
	Liquidity	Free cash flow since 1/1/2020 cash conversion rate		
	Return	EBITDA margin		
Information parameters	Growth	Order backlog, frame contracts	Growth	Number of employees
	Return	ROCE EBIT margin	HR management	Training, fluctuation, sick days
	Liquidity	Net debt, working capital	Process control	Throughput times, reject quotas, and indicators for quality management

capital market, and the corporate strategy. The key indicators are shown in the chart G13. In addition to the key performance indicators at group level, there are also indicators used only within the business units, e. g. order backlog or number of employees. Alongside regular forecasts, a rolling three-month forecast for revenue and order intake is used to manage the company's development. G13

The control system was further developed, and the indicator base was adjusted at the beginning of the 2019 fiscal year in order to better focus on the performance indicators relevant for corporate management. Since the beginning of 2019, the EBIT margin has no longer been used as a key performance indicator, it is now only an information parameter. In addition, the cash conversion rate (ratio of free cash flow to EBITDA) is a new key performance indicator and replaces the free cash flow. In the current fiscal year, too, the Jenoptik Group is committed to the continuous improvement of its processes. One key aspect of this remains the implementation of an SAP business warehouse, which will allow us to better reflect the markets' dynamic growth and thus obtain important control information both faster and more efficiently.

Explanation of the key indicators

EBITDA – earnings before interest, taxes, depreciation and amortization, including impairment losses and reversals of impairment losses. The EBITDA margin is the ratio of EBITDA to revenue.

EBIT – earnings before interest and taxes.

Free cash flow is calculated from the cash flows from operating activities before income taxes less capital expenditure on and income from the sale of property,plant, equipment and intangible assets.

ROCE (return on capital employed) is calculated by dividing EBIT by the average tied operating capital. The total tied operating capital is calculated on the basis of the non-current non-interest-bearing assets (such as intangible assets including goodwill, property, plant and equipment and investment properties) plus the current non-interest-bearing assets (primarily inventories, receivables from the operating business activities and other current receivables) less non-interest-bearing borrowings (such as provisions – excluding pensions and taxes, liabilities from the operating business activities and other current liabilities). The calculation of the average takes into account twelve month-end balances in the period under review, and the opening balance at the start of the year.

For more information on the non-financial information parameters, see the Non-Financial Report from page 54 on

71 Combined Management Report 136

For information on planned development and keys performance indicatrs, see the Forecast Report, from page 133

Research and Development

As a technology group, research and development (R+D) is of key importance to Jenoptik. Our products and services give us competitive advantages which determine our performance and thus our economic success. One of our key strategic aims is therefore to expand our innovative capabilities in the photonics growth markets. In line with market requirements we also develop products and platforms with unique selling points, protecting them where possible by means of industrial property rights. With our products and solutions, we want to improve our customers' performance and profitability, and contribute to greater energy efficiency and the responsible use of resources.

Innovation management is an important tool used by Jenoptik to systematically identify and implement promising ideas. With the networked processes, its primary goal is to generate capital from knowledge by objectively combining market and company viewpoints. Our innovation management has a uniform group-wide process landscape which can be adapted within the divisions to meet the requirements of the respective industry. These framework conditions help to drive developments forward in order to make positive value contributions for the entire Group. Innovation management at Jenoptik lies within the remit of the Chairman of the Executive Board. The innovation managers from the central Corporate Development department evaluate all research and development portfolios and road maps across the Group. They therefore cooperate closely with various areas of the company, such as controlling and investment management, and are intensively involved in the rolling strategy and planning processes.

Innovation process

Innovation is one of the three building blocks of Strategy 2022. As part of the group initiative "Speed up innovation", numerous process improvements were developed and implemented in a series of cross-divisional workshops in 2019. This is expected to accelerate the implementation of innovation projects in the future, which in turn will allow innovative solutions to reach the market sooner. In future, the result of our innovation activities will be measured with the help of a "Vitality Index" which corresponds to the share of revenue with products and platforms developed in the last three years.

Developments directly on behalf of customers continue to play an important role in our innovations. In the future, however, we will focus more on our own developments and spend more resources on pure research activities. The first stage of the Jenoptik innovation process involves a strategic analysis of global trends and the requirements of our customers to identify opportunities for growth. These then become innovation projects based on our core areas of expertise and often in direct cooperation with key customers. Strategic development projects are planned in road maps on the basis of corresponding milestones. This applies to product, technology and process innovations.

In addition to selected photonics markets, the expansion of our applications expertise as well as new digital business models based on our existing technologies and know how are an enormous driver for growth and are at the center of our research and development work.

To further increase our innovative power, we must not only develop technologies and products. In the group-wide Innovation Workshop 2019, for example, the focus was on defining future fields of technology. In a second step, the technology fields were evaluated from the market perspective, and subsequently presented to the Scientific Advisory Council and the Supervisory Board for discussion. In the future, the fields of technology identified in this process will provide orientation for our research activities.

To promote these even more, the Executive Board has approved an "Innovation Budget" for which the development departments can apply. This be used to advance ideas and concepts with high disruptive potential at an early stage of development. The first projects supported by the Innovation Budget started in early 2020.

OTTO Vision in the Light & Production division, which presented the FLEX-3A, an optical 3D measuring system for the fast and ultra-precise measurement of small parts, was the overall winner of the Jenoptik Innovation Awards 2019. The measuring process is fully automatic. No inspection marks are required to obtain a complete 3D model of a part. The system can be used for initial inspections or automated spot checks, but it is also suitable for the generation of so-called digital twins in reverse engineering.

Employees in research and development

The experience and expertise of our employees are essential to the success of our research and development work. Therefore, our demand on their level of qualification is correspondingly high. Their knowledge is used both for specific tasks and across all divisions in development projects. In the fiscal year just past, we hired additional employees in the R+D area. T19

Key cooperation arrangements and memberships in associations

Jenoptik gains access to additional external expertise with the help of targeted cooperation arrangements. Through research cooperations, projects can be realized in a market-driven manner, development times can be reduced and specialist expertize can be successfully built up. Jenoptik works with both universities and non-university research institutions as well as with industrial partners and key customers. The Scientific Advisory Council is a committee of experts which supports the Group in the monitoring and evaluation of long-term technology trends. During the reporting period, the composition of the Scientific Advisory Board was even more consistently with the technologies relevant to Jenoptik in the field of photonics through additional internal and external appointments. The cooperation arrangements named below are just some of those in which Jenoptik was active over the past year.

In the "IDEA" Project (Industrialization of Digital Engineering and Additive Manufacturing), Jenoptik is developing metrological solutions for the process control of 3D printing of metal components. In the so-called "3D printing process", components can be produced from a range of materials by locally melting the powdered starting material, for example, using a laser beam. In this way, the desired component is created, layer by layer, which can possess significant geometric complexity and functions that cannot be realized with conventional production methods, or only at great expense. This type of production has great potential in an customized production, as component-specific tools such as compression or casting molds no longer need to be produced. The objective is to prevent defects and therefore to significantly increase the productivity of the manufacturing process, making it economically attractive for further applications. In addition, the reject rate is reduced, thus protecting the environment. The project is being carried out in a consortium with industrial and research partners (such as Siemens, MTU, EOS, Fraunhofer ILT) and is funded by the German Federal Ministry of Education and Research (BMBF).

The manufacture of diode lasers is a technologically demanding and complex process. From the production of the wafer to the structuring of the laser chips and the final assembly of the laser diode on a heat sink and in a housing, several hundred individual process steps are required, and must be precisely coordinated with each other. But this is precisely what makes it possible to design laser diodes very well for a wide variety of applications and to optimize their parameters. Within the scope of the "HotLas" project, funded by the German Federal Ministry of Education and Research (BMBF), Jenoptik, in cooperation with other partners, has created improved simulation options for predicting and optimizing these parameters as well as extending the operating temperature range of the laser diodes. The latter reduces the demands on the cooling system, thereby improving the cost efficiency of the overall system, especially for ones with high output power. Once the project is completed in 2020, the results will be transferred to series production, thus complementing the Jenoptik product portfolio.

Jenoptik is also active in numerous industry and technology-oriented associations. Examples of this are the Optonet Photonics Network at regional level, SPECTARIS at national level and the European Photonics Industry Consortium (EPIC) at European level. Here, the Group is committed to creating an innovation-friendly environment and promoting the image of photonic technologies. Examples of this are the activities in the Executive Board of Optonet and the Executive Board of the Photonics division within SPECTARIS as well as the gold sponsorship of the Optecnet annual conference, which took place in Jena in 2019.

Development output

The R+D output of the Jenoptik Group, including developments on behalf of customers, was at 68.4 million euros approximately at the level of the prior year (prior year: 69.2 million euros). The R+D expenses fell in comparison with the prior year to 44.1 million euros (prior year: 47.4 million euros). The costs for developments on behalf of customers were 20.4 million euros and were apportioned to the cost of sales (prior year: 20.2 million euros). In 2019, development services including patents were capitalized in the amount of 4.0 million euros (prior year: 1.5 million euros). The increase resulted from necessary

T19 Employees in R+D

	2019	2018
Number of employees in R+D	516	506
Percentage of overall workforce	12.5	12.5

71 – 136 Combined Management Report

Information on the members of the Scientific Advisory Council can be found on page 223

Information on depreciation on internally generated intangible assets can be found in the Notes point 5.1 on page 167

capitalization of internal projects in the Light & Optics division as well as by VINCORION. The capitalization ratio, i.e. capitalized development costs divided by total R+D expenses, was 9.1 percent in 2019 (prior year: 3.2 percent).

As shown in the table, R+D output is distributed among the divisions: T21

R+D output in the Light & Optics division includes expenses arising from developments on behalf of customers in the amount of 13.2 million euros (prior year: 8.3 million euros), among other things due to the development of a laser-optical subsystem for the particle sensor developed by HELLA. R+D expenses in 2019 totaled 19.0 million euros (prior year: 19.2 million euros).

The R+D output of the Light & Production division included developments on behalf of customers of 3.4 million euros (prior year: 4.8 million euros). The R+D expenses came to 7.9 million euros (prior year: 8.2 million euros).

In the Light & Safety division, the R+D output was 12.0 million euros in 2019 (prior year: 13.6 million euros). Of this, 1.0 million euros were developments on behalf of customers (prior year: 4.3 million euros).

VINCORION posted developments directly on behalf of customers amounting to 2.9 million euros in 2019 (prior year 2.7 million euros). VINCORION is also a long-term partner for large systems companies and develops platform technologies in conjunction with its customers. The R+D expenses reduced to 6.1 million euros (prior year: 10.5 million euros), primarily due to capitalization.

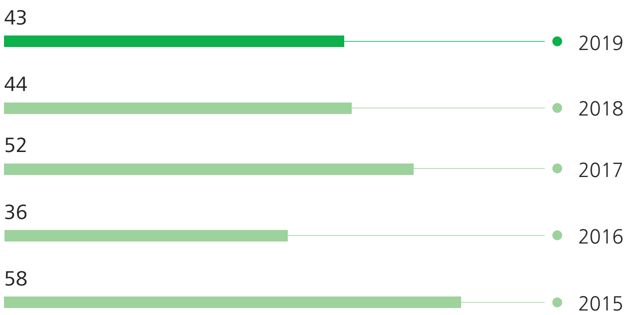
Patents

Our R+D investments are protected via central IP management in close cooperation with the operating areas. We accord particular importance to patent applications in dynamic growth markets such as China, Korea, and the US. In 2019, a total of 43 patents were filed by Jenoptik subsidiary companies (prior year: 44 patents), more than half of which were in the field of

T21 R+D output by division (in million euros)

	2019	2018	Change in %
Group	68.4	69.2	−1.1
Light & Optics	34.6	28.0	23.4
Light & Production	11.3	13.1	−13.6
Light & Safety	12.0	13.6	−12.1
VINCORION	10.5	14.1	−25.4
Other	0.0	0.2	−101.3

G14 Number of patent registrations



T20 R+D output (in million euros)

	2019	2018	2017	2016	2015
R+D expenses	44.1	47.4	43.1	42.3	41.8
Capitalized development costs including patents	4.0	1.5	1.4	0.1	0.4
Developments on behalf of customers	20.4	20.2	22.2	15.0	10.9
R+D output	68.4	69.2	66.6	57.4	53.1
R+D ratio 1 (R+D output / revenue) in %	8.0	8.3	8.9	8.4	7.9
R+D ratio 2 (R+D expenses / revenue) in %	5.2	5.7	5.8	6.2	6.2

optical components and optical modules. The number of patents does not include registered designs, utility models or brand registrations. For competition reasons, Jenoptik does not publish information on the receipt and issue of licenses. G14

Key projects and results

Our aim is to offer our customers the very best solutions. We do this by combining our comprehensive expertise with a broad experience in managing innovation in photonic technologies to the benefit of our customers. The following solutions are some of those developed and launched on the market by Jenoptik in 2019:

In the semiconductor equipment sector, new generations of lithography and inspection machines using light with very short wavelengths are increasingly being used for the production of processor or memory chips. In order to support these new generations of machines, the existing product platform for ultra-precise micro-optical sensors was expanded and its performance further optimized. To this end, manufacturing technologies in the field of micro / nano structuring and assembly as well as the combination and structuring of innovative materials were significantly further developed. In addition, existing platforms for high-performance optics and opto-mechatronic assemblies were adapted to the use of light with shorter wavelengths. One focus here was the development of technology and design approaches for system correction and thus for the realization of complex performance characteristics of these optics. Among other things, the results were also incorporated into the development of the next generation of optical systems for maskless lithography in display manufacturing.

In the field of information and communications technology (ICT), the performance of a novel opto-electronic test card for parallel electrical and optical testing of photonic integrated circuits (PICs) at wafer level was successfully demonstrated using the first prototypes and in close cooperation with pilot customers. These PICs are particularly used in optoelectronic transceivers, which are used today in their millions in data centers for conversion between electrical and optical signals. Significant growth is expected for these in the next few years. In addition, the product and technology platform for high-performance microlenses was further developed to meet the increased requirements of high-speed transceivers.

The catalog range of F-theta lenses and beam expander optics has also been supplemented and further optimized for the laser material processing market. Two key issues were advanced for the further development of product platforms for diffractive beam shaping optics (DOEs). Firstly, prototypes of a modular optical system solution supported by artificial intelligence have been successfully completed and are already being marketed. They are used for intelligent (position) recognition and high-precision laser micromachining of components and assemblies. Customers for this are system integrators, who gain easy access to a modern and very powerful technology through this modular system solution that can be adapted to the corresponding applications. On the other hand, the portfolio of transmission gratings has been extended by gratings for beam combination of high-power laser radiation in the blue wavelength range, which are used e.g. in the processing of copper. These transmission gratings are particularly suitable for applications using high-power lasers, since even small limitations in the grating efficiency can lead to high losses in laser power and thus to thermal problems in the laser system. These products are targeted, for example, at the automotive and mechanical engineering markets as well as medical technology.

In a joint project, colleagues from the Lasers business unit and semiconductor production in Berlin-Adlershof developed a new 275-watt diode laser. With 40 percent more power than its predecessor, optimized thermal management and a long service life, it is one of the few beam sources on the market which, despite its very high output, requires little maintenance and can withstand the extreme demands of high-power laser applications. Customers are attracted by the fact that existing systems can reach new power ranges by coupling the diode lasers. There is particular potential in diode direct applications in laser material processing, such as welding or cutting aluminum sheets for consumer electronics. It is planned to extend the platform to other wavelengths, for example to generate blue light for welding copper electrodes of batteries for electromobility.

For our customers in the medical technology and life science industry, the focus was on the further development of the SYIONS digital micro-imaging platform, for fluorescence microscopy among other things. The first modules including lighting, optics and electronics, sensors and software have been successfully developed, enabling Jenoptik to take a major step forward in cell-based applications. In March 2019, a long-term cooperation agreement was signed with a leading life science company to jointly develop systems for microscopy image processing. With SYIONS, Jenoptik has expanded its comprehensive solution expertise in the field of life science, diagnostics and analytics with a customer-specific, configurable platform for digital imaging and is focusing on the high-growth healthcare & life science market. With the new solution all kinds of image data in in vitro diagnostic devices can be generated quickly and efficiently for scientific and clinical use. Applications or investigations in the areas of cell diagnostics, cell biology and molecular diagnostics, for example, can be realized quickly and inexpensively with the help of the modular system. Thanks to this imaging process, taking samples for analysis is now a thing of the past, thus making the processes of our customers easier.

In the field of ophthalmology, 2019 saw the development of various key components for our customers' ophthalmic surgical systems to support microsurgical procedures for the treatment of pathological changes in the retina or vitreous body. A high-power LED-based white light source, for example, provides optimal illumination of the inner eye and can be adapted to the specific needs of the surgeon. At the beginning of 2020, the first surgical system with integrated Jenoptik technology was commissioned and initial tests carried out. Volume-produced surgical systems should then be on the market from 2021 onwards.

The Group also developed numerous new products for the automotive industry in 2019 and initiated the first strategic projects in the field of electromobility. Specifically for electrical manufacturing, the Jenoptik team in Michigan developed an automation concept for integrating a complete assembly line for a so-called battery pack into our customer's manufacturing process. The battery pack is screwed into the frame of the vehicle and covered by a protective shield to prevent damage to the underside and to protect the vehicle's occupants. The automation line assembled for this in Michigan is then transferred to the electric car manufacturer's production facility and put into operation. This has made Jenoptik an integrator in a promising industry. It is also working on developing and integrating innovative automation concepts for the assembly of battery packs for other automobile manufacturers.

As a supplier of photonic solutions, Jenoptik is active in the future-oriented LiDAR field (Light Detection and Ranging). LiDAR technology complements the existing radar and video sensor technologies and will therefore be integrated into almost all vehicles as a key technology for autonomous and semi-autonomous driving in the near future. Jenoptik has expertise and many years of experience in all the basic technologies required for high-performance LiDAR systems. These include precision optical components, micro-optics and diffractive optical elements (DOE), optoelectronic systems made from glass and polymer, laser diodes as well as laser modules for distance measurement with light. LiDAR offers growth opportunities not only in the automotive market, but also in other industries. Jenoptik is positioning itself as a Tier 2 supplier and supplies customer-specific transmitter and receiver modules as well as selected photonic components to manufacturers of LiDAR systems. Our customers use these products, for example, in the automotive and automation technology sectors.

Our products in the areas of optical surface inspection, optical shaft metrology as well as roughness and contour metrology were also further developed. For example, the Visioline IPS B5 optical surface inspection system entered volume production in 2019 and is now marketed worldwide. It facilitates the inspection of small bores (diameter from 5 mm) and allows for the rapid inspection of entire interior bore surfaces, the inspection and measurement of inner contours as well as the evaluation of defects. The 360° optics of the sensors create an image of the entire bore surface. The fast and robust sensor thus fulfills all requirements for a 100 percent inspection of the product quality in a production line.

The Opticline T3D multi-sensor solution was also launched on the market. This tactile T3D probing solution, exhibited for the first time at the Control trade show, enables comprehensive measurements to be made directly in production and supports our customers in efficient quality control. Prompt test results also save costs, as there is no need to invest in additional production metrology. The combination of optical and tactile metrology means that Opticline devices are multi-talented and ensures, for example, the quality of components in the field of electromobility with only one measuring instrument.

In order to meet the customer requirements for flexible, fast and precise measuring processes, Jenoptik has also further developed the new generation of roughness and contour measurement instruments in the Waveline product range. The measuring stations have a modular design and can be expanded at any time. The W800 model series is particularly suitable for the many different measuring tasks in the measuring room with typically manual or semi-automated measuring processes.

In 2019, Jenoptik invested significantly in expertise in artificial intelligence in the traffic safety market. By introducing and applying so-called deep learning algorithms to automatic license plate recognition, for example, the recognition rate using ANPR cameras has been improved significantly. Our solutions, which enable the classification of vehicle type, model and color, have benefited from the application of so-called “deep learning networks”. Our developers also worked on topics such as the future monitoring of low emission zones, to which only low-emission vehicles may have access. In order to be able to react even better and more flexibly to industry and national requirements in traffic monitoring in the future and to serve various market segments efficiently, we started the development of a modern, modular system platform in 2019.

In the market for security and defense technology, VINCORION's Energy & Drive business unit completed the product portfolio with its new air-cooled SAM 600 A generator, thus focusing on an innovative and modular platform concept. Electric generators from VINCORION generate reliable, efficient and on-demand electricity for the on-board networks of various military vehicles, ensuring mobility and operational readiness. The 28-V generator is characterized by a high proportion of standardized components and is optimized for a small footprint and high degree of efficiency. A battery management system has also been developed that reliably detects the charge status of new and already used vehicle batteries in a cellular network within a short period of time. VINCORION developed P²M² Portable Power Management Modules for the flexible power supply of mobile divisions. These can use all available energy sources and can be supplied with memory modules even independently of energy sources. Units can select the appropriate modular power supply for each mission. This makes the units independent of complex logistics.

In the aviation area, VINCORION developed a floor heating system for the entrance areas of airplanes, modified existing heating elements, and expanded the product portfolio. This heating system is extremely reliable and robust; It can neither overheat nor burn out and provides more comfort and safety in civil aviation. The first innovative heated floor panels were delivered for the A330 in the first quarter of 2019 and in the first quarter of 2020 these will be delivered for the A350. In addition, a further major Airbus program was won. Development began at the start of 2020. The development team also worked on the new “SkyHoist 800” electric helicopter rescue hoist, which, thanks to its innovative product features, exceeds the standard market parameters with an dead weight of less than 50 kg, tensile loads of up to 350 kg, and a lifting speed of up to 2 m per second. Its modular concept also reduces maintenance-related downtime and thus operating costs.

Employees

Development of employee numbers

As of December 31, 2019, with 4,122 employees (incl. trainees), Jenoptik recorded growth in its workforce of 1.9 percent (31/12/2018: 4,043 employees). The number of Jenoptik employees abroad rose by 0.7 percent to 988 (31/12/2018: 981 employees). At 24.0 percent, the proportion of employees abroad is largely unchanged compared to the previous year (31/12/2018: 24.3 percent). T22

Temporary workers were also employed in the past fiscal year to cover production peaks and for major projects. They were employed mainly in the operating areas, and the number fluctuated during the year. On the reporting date of December 31, 2019, 101 temporary workers were employed in the Group (31/12/2018: 107).

At 301.1 million euros, personnel expenses in 2019 (wages, salaries, social security deductions, costs for retirement provision) were up 8.2 percent compared with the prior year’s figure of 278.3 million euros. The growth is attributable both to the increased number of employees in the Group and to wage and salary increases.

Revenue per employee (including temporary employees) measured in full time equivalent fell by 2.3 percent to 216.6 thousand euros in the 2019 fiscal year (prior year: 221.8 thousand euros). G15

T22 Employees by region (incl. trainees and academy students) as of December 31

	2019	2018	Change in %	Absolute change
Germany	3,134	3,062	2.4	72
Germany in %	76.0	75.7	0.4	0.3
Abroad	988	981	0.7	7
Abroad in %	24.0	24.3	−1.2	−0.3
Europe (excl. Germany)	232	220	5.5	12
Americas	565	568	−0.5	−3
Asia/Pacific	191	193	−1.0	−2

The employee age distribution is balanced, as can be seen in the table below. The figures are largely unchanged compared with the prior year. T23

The proportion of women in the Group (in Germany and abroad) was 27.0 percent on December 31, 2019, a slight increase in comparison with the prior year (31/12/2018: 26.3 percent).

At 5.6 percent, the sickness rate among Jenoptik employees in Germany in 2019 remained at almost the level of the prior year (prior year: 5.3 percent). The fluctuation rate in the Group fell to 4.1 percent compared to the prior year (prior year: 4.5 percent). In Germany, the fluctuation rate fell from 3.7 percent in 2018 to 3.1 percent in 2019. It is calculated by dividing the number of employees leaving the company in the fiscal year by the number of employees as of the reporting date of the prior year plus those who joined the company in the fiscal year. Temporary workers are not included in the calculation.

Training & HR development

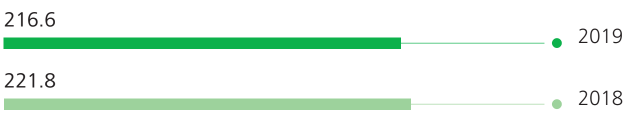
As of December 31, 2019, 156 trainees and students of the Cooperative State Universities were employed by the Group (31/12/2018: 117). Of these, 65 were new employees. At the same time, 28 trainees and students of the Cooperative State Universities successfully completed their training in the year covered by the report, and were taken on.

At the Wedel, Villingen-Schwenningen, Jena, and Triptis sites, the new trainees receive job-specific training for optical, precision engineering, electronic, and commercial occupations in training centers. Jenaer Bildungszentrum gGmbH – Schott, Zeiss, Jenoptik – in which Jenoptik is a partner, has also established itself as a training center for optics and photonics at a national level.

In 2019, Jenoptik invested around 2.6 million euros in the professional development of its employees (prior year: 2.5 million euros). These costs include both the expenses for trainees and students at the Cooperative State Universities and the costs for further training of our employees. The overall development needs in the Group are assessed in regular staff appraisals. Suitable qualification measures are then defined and implemented.

Further information on this can be found in the Non-financial Report from page 54

G15 Revenue per employee (in thousand euros)



Change 2019 −2.3%

T23 Group age distribution (in percent)

	2019	2018
Under 30	14.15	14.75
30–39	26.61	25.87
40–49	22.84	22.78
50–59	25.18	25.29
60–65	9.88	10.26
More than 65	1.34	1.05

Economic Report

Macro-economic and Sectoral Developments

The global economy grew last year by 2.9 percent, significantly slower than economists had expected; the International Monetary Fund (IMF) reduced its forecasts several times during the year due to growing economic uncertainties. Various geopolitical and trade conflicts, such as the trade dispute between the USA and China or Brexit, weakened the global economy, not least because companies were reluctant to invest in machinery and other capital goods. Since October, the US – with the approval of the World Trade Organization (WTO) – has levied tariffs on EU imports worth 7.5 billion euros, primarily for passenger airplanes, food, and consumer goods. An initial preliminary agreement was signed between the US and China at the beginning of 2020, which provides for the reduction of tariffs. Nevertheless, the majority of the special duties in force since 2018 remain in place for the time being. At the end of January 2020, the United Kingdom decided to leave the EU. In the trade dispute between Japan and South Korea, both countries increased their export restrictions on certain materials used in chip production; the impact on global supply chains remained limited.

In the US, the pace of growth stabilized at the end of the year despite the trade disputes. The result was that gross domestic product for 2019 as a whole increased by 2.3 percent compared with the prior year (2.9 percent), according to the first estimate by the Department of Commerce at the end of January. The growth was primarily aided by foreign trade. Due to the trade dispute with China, imports and investments by companies declined sharply. Private consumption grew, but at a much slower pace. The US economy was adversely affected by the crisis experienced by the aircraft manufacturer Boeing, because exports of commercial airplanes fell significantly following the global flight ban on the Boeing 737 Max aircraft. The US concluded a new trade agreement with Japan in October, but this agreement does not concern the automotive market.

T24 Change in gross domestic product (in percent)

	2019	2018
World	2.9	3.6
USA	2.3	2.9
Eurozone	1.2	1.9
Germany	0.5	1.5
China	6.1	6.6
India	4.8	6.8
Emerging countries	3.7	4.5

Source: International Monetary Fund, World Economic Outlook, January 2020

The trade dispute with the US and the associated punitive tariffs severely impacted the Chinese economy, even though the prospect of an initial preliminary agreement with the US eased the economic situation somewhat towards the end of the year. After a figure of 6.6 percent in the prior year, gross domestic product increased by only 6.1 percent in 2019 – as announced by both the IMF and the Chinese Bureau of Statistics. This was the slowest growth rate in 29 years. Exports, in particular, were weaker, with Chinese exports rising by only 0.5 percent compared with 2018, according to the Beijing Municipal Bureau of Statistics. In 2019, imports fell by 2.8 percent. According to economic surveys, China recorded a solid increase in production, order intakes and domestic demand at the end of the year. The coronavirus outbreak affected the Chinese economy at the beginning of 2020: As a result of the government-imposed partition, production was halted, especially in the automotive industry.

In Germany, according to the German Federal Statistical Office, gross domestic product (GDP) rose by 0.6 percent in 2019, and according to the IMF by only 0.5 percent, which is significantly lower than in previous years. The German economy had recovered slightly in the third quarter in comparison with the previous quarter and the same quarter of the previous year, but then stagnated in the final quarter due to weak foreign trade and a slump in industrial production. Despite a strong domestic economy last year, export-oriented industry found itself in recession as investments fell sharply. Indicators include declining order intakes and lower production in the manufacturing sector. Although exports rose to a record level of 1,327.6 billion euros in 2019, the growth of 0.8 percent was significantly lower than in the two previous years, according to the German Federal Statistical Office. Even at the beginning of 2020, the economic weakness had not yet been overcome, according to the Federal Ministry for Economic Affairs and Energy. In January, the Ifo Institute's business climate barometer fell by 0.4 points to 95.9 points, dampening hopes of an economic recovery in the near future. T24

Photonics is regarded as a key technology for future industries and growth markets. The development of the industry is driven by topics such as autonomous driving, digital production, new developments in the medical sector and, increasingly, aspects of climate protection. According to the Spectaris industry association, in the prior year, photonic technologies already contributed to saving 1.1 billion tons of CO_2. According to preliminary calculations by Spectaris, the German industry was to have increased its revenue last year by 6 to 7 percent to around 39.6 billion euros (prior year 37.1 billion euros). Whether or not this goal was achieved was still open to question at the editorial deadline, as the World Market Index for Optical Technologies calculated by Spectaris revealed a weakening in the course of the year compared to the prior year: In the first 9 months, revenue recorded by the 15 international companies included in the index was 2.7 percent down on the prior year's figure.

After a weak start to the year, the semiconductor market has recovered slightly since the third quarter. According to the Semiconductor Industry Association (SIA), global revenue in the semiconductor industry amounted to 412.2 billion US dollars, down 12.1 percent on the prior year's record of 468.8 billion US dollars. In 2019, all regions from North America and Europe to China and Asia / Pacific were in the red. Preliminary figures from IT analyst Gartner also indicated lower industry revenue: Revenue of 418.3 billion US dollars was some 11.9 percent down on 2018. Gartner had already lowered its revenue forecast several times during the year.

The trade dispute between the US and China and the resulting uncertainties affected not only the semiconductor market in 2019, but also the semiconductor suppliers. For example, export licenses to China for large chip manufacturers were withheld. Overall, the industry achieved global revenue of 57.6 billion US dollars in 2019, 10.5 percent less than in the record year before, according to the year-end forecast of the Semiconductor Equipment and Materials International (SEMI) industry association. For the first time, South Korea was not the largest supplier, but Taiwan ahead of China. Last year, merger and acquisition activity in the industry increased again compared to the prior year and consolidation among chip suppliers continued, according to market analysts from IC Insights. More than 30 semiconductor deals with a total volume of 31.7 billion US dollars exceeded the prior year's figure of 25.9 billion US dollars by 22 percent.

In the last year, the German mechanical and plant engineering industry reported a drop in production and order intake. According to initial forecasts, production fell by an average of 2 percent, while the order intake was 9 percent below that of the previous year. According to the VDMA, the reasons for this are international trade conflicts, increasing protectionism, Brexit and a far-reaching structural change in important customer groups such as the automotive industry. Manufacturers of machine tools were also affected by technological change and global export risks, with exports falling by 7.7 percent in 2019.

The weak economic environment from customer industries was also reflected in the robotics industry. According to the Robotic Industries Association (RIA), order intake in North America rose by only 1.6 percent in 2019, compared to 2018. Sales and delivieries in this cyclical industry in North America fell by 1.3 percent, among other things due to a weak final quarter. The International Federation of Robotics (IFR) confirmed the global weakness without growth in the past year.

The economy in the automotive industry was in sharp decline over the past year. An end to years of growth in the industry was reflected in both numerous revenue and profit warnings from car manufacturers and suppliers as well as announcements of plant closures and job cuts. The industry was burdened, among other things, by the diesel scandal and the shift towards electric vehicles, as well as by uncertainty about future environmental regulations, for example a new exhaust gas measurement method. According to the British SMMT industry association, production and foreign investment in the British automotive industry also fell sharply as a result of Brexit. According to the China Passenger Car Association (PCA), in 2019 car sales in China fell by 7.5 percent compared to the prior year. On the German market, around 5 percent more passenger cars were registered than in the prior year, which is equivalent to 3.61 million new vehicles, according to the German Federal Motor Transport Authority. This growth can be attributed to special factors, such as more working days in the past year and a high proportion of commercial registrations. According to analyses by the CAR Institute, however, German car production fell to a 22-year low in 2019.

According to the German Association of the Automotive Industry (VDA), 2019 was a challenging year for the global car markets: Europe and Brazil exceeded the prior year's level, while the US and the Asian markets were down on new car registrations, in some cases significantly. Following the outbreak of the corona virus at the beginning of 2020, in January passenger car sales in China fell by a substantial 20 percent compared with the same month last year, thus adding to the already weakening car market in China.

In the field of traffic safety, the majority of discussions in Germany revolved around the planned car toll system in the past year. Following extensive deliberations, in June the European Court of Justice ruled that the project was in violation of EU law. In early 2019, a Jenoptik section control system was put into operation in Lower Saxony. Following a court order to pause recording, the system in the Lower Saxony pilot project was reactivated in early July. The final ruling of the Higher Administrative Court of Lower Saxony (OVG) in November declared the use of sectional controls to be lawful. Public discussions in 2019 also focused on the introduction of a speed limit on motorways in order to improve environmental protection and safety. While the Netherlands has further reduced its speed limit on motorways from 130 to 100 km/h, the German Bundestag decided against a speed limit on motorways in October. According to the German Federal Statistical Office (Destatis), excessive speed was a contributing factor in almost half of traffic fatalities on German motorways (autobahn) in 2018. In its 2019 collision statistics, the German Federal Highway Research Institute (BASt) determined the lowest level of traffic fatalities since records began, attributing this to the increasing safety of vehicles and the growing use of assistance systems. Destatis also expects a new low in traffic statistics; nevertheless, there are still an average of 8 fatalities and more than 1,000 injuries on German roads every day.

In the aviation industry, uncertainties arose during 2019 as a result of political decisions: in the US, for example, punitive tariffs on aircraft components from the EU entered into force in October. Following two plane crashes, US aircraft manufacturer Boeing is facing commercial difficulties caused by the flight ban on the Boeing 737 Max in force since March 2019 as well as associated cancellations and extra payments. The flight ban, the stop to production and deliveries as well as additional costs for the software revision and claims for compensation burdened the balance sheet of the manufacturer, suppliers and even the US economy. European aircraft manufacturer Airbus was also unable to meet its original delivery target last year. Nevertheless, for the first time since 2011, Airbus delivered more airplanes than Boeing and also received more orders. As a result of fraud and corruption investigations conducted against Airbus, the aircraft manufacturer is paying a fine, which has led to a loss in its annual balance sheet, as was announced in early 2020.

Up to the end of 2019, German export licenses in the security and defense technology industry, saw an increase of 65 percent in comparison with the prior year to almost 8 billion euros, according to the Federal Ministry for Economic Affairs and Energy, thereby achieving a new annual record. The highest level prior to this was 7.95 billion euros in 2015. In September 2019, the German government again extended the arms embargo on Saudi Arabia and other countries involved in the Yemen war for six months, to March 2020. According to a report by the Swedish International Peace Research Institute Sipri in December 2019, arms sales in 2018 rose sharply, especially in the USA: 59 percent of all armaments came from the United States. Germany was responsible for 2 percent. Overall, the 100 leading armaments companies increased their arms sales by 4.6 percent in comparison with the prior year. In August 2019, the US withdrew from the INF Treaty banning intermediate-range missiles and announced a new missile system. At the same time, an arms treaty between Turkey and the US was discussed. After Turkey initially purchased Russian air defense systems, negotiations were held on the purchase of American Patriot missiles.

Legal Framework Conditions

The legal framework conditions governing business operations essentially remained constant in 2019 and therefore had no significant impact on the business development of the Jenoptik Group.

Earnings, Financial and Asset Position

Comparison of actual and forecast course of business

Based on the very good order backlog, the Jenoptik management forecast further growth for the 2019 fiscal year with the release of the preliminary results in February 2019. With the publication of the final figures in March, the statements became more concrete: the management expected an increase in revenue in the mid single-digit percentage range (excluding major portfolio changes) and growth in EBITDA with a margin of between 15.5 and 16.0 percent. The Executive Board expected increasing momentum in the course of the year.

After the guidance was confirmed in May, the original growth forecast was slightly adjusted in August with the publication of the half-year results. Due to the continuing reluctance to invest, particularly in the automotive industry, the Executive Board now expected revenue without major portfolio changes to be between 850 million euros and 860 million euros, and thus still an increase. The EBITDA margin was expected to be around 15.5 percent. These assumptions were once again confirmed in November.

In the year covered by the report, the Jenoptik Group achieved revenue of 855.2 million euros, which was within the now expected range and above the 2018 figure.

At 15.7 percent, the EBITDA margin exceeded the predicted figure. Profitability therefore improved significantly in comparison with the prior year (prior year: 15.3 percent).

Revenue and EBITDA of the divisions and their forecast development are shown in the following table. T25

With respect to the order intake, management had expected a slight increase at the beginning of 2019. Due to the significant deterioration in economic conditions from the middle of the year onwards and a tense market environment, especially in the automotive industry, the development of the Jenoptik Group's order intake was weaker than expected. In November, it was announced that the high level of the prior year could not be achieved. At the end of the year, the order intake was 7.0 percent down on the prior year's figure.

The free cash flow forecast of around 80 million euros issued in the spring was almost achieved with a figure of 77.2 million euros.

Capital expenditure, including additions to rights of use as per IFRS 16, rose to 55.6 million euros, thus showing the expected strong growth.

T25 Actual and forecast course of business (in million euros)

Indicator	Year-end 2018	2019 forecast		Year-end 2019	Change in %
Revenue	834.6	February: March: August:	Further growth Growth in the mid single-digit percentage range (without any major portfolio changes) Between 850 and 860 million euros (without any major portfolio changes)	855.2	2.5
Light & Optics	337.0	March:	Growth in the mid single-digit percentage range	350.0	3.9
Light & Production	210.7	March:	Growth in the lower double-digit percentage range	228.9	8.6
Light & Safety	116.9	March:	Noticeable decline (2018: settlement of a major order)	108.7	−7.1
VINCORION	166.4		Stable	164.8	−1.0
EBITDA / EBITDA margin	127.5 / 15.3%	March: August:	Growth, EBITDA margin between 15.5 and 16.0% Around 15.5%	134.0 / 15.7%	5.0
Light & Optics	74.1	March:	Growth in the mid single-digit percentage range	69.8	−5.8
Light & Production	24.6	March:	Growth slightly stronger than revenue	25.8	4.7
Light & Safety	15.9	March:	Decline in line with revenue	18.8	18.2
VINCORION	20.1	March:	Slight increase, improved margin	24.2	20.0
Order intake	873.7	March: November:	Slight increase Very high prior-year figure will not be achieved	812.6	−7.0
Free cash flow	108.3	March:	Approx. 80 million euros	77.2	−28.7
Capital expenditure [1]	42.5	March:	Strong increase	55.6	30.7

[1] Without capital expenditure on financial assets

Earnings position

The tables in the Management Report, which show a breakdown of the key indicators by segment, include the Corporate Center, real estate and consolidation effects under “Other”.

In the 2019 fiscal year, with revenue of 855.2 million euros, the Jenoptik Group achieved revenue growth of 2.5 percent and exceeded the high level of the prior year despite difficult economic conditions (prior year: 834.6 million euros). In the course of the year, the momentum increased and the quarter with the highest revenue both in the past fiscal year and the prior year was the fourth quarter with 259.5 million euros (prior year: 241.2 million euros). Growth in 2019 came from the Light & Optics and Light & Production divisions. The solid business performance was driven in particular by strong demand from the semiconductor equipment industry and the good business development in the field of automation & integration. At the same time, the companies acquired in 2018 made a significant contribution to revenue totaling 66.4 million euros (prior year: 37.0 million euros). T26

On a regional level, growth momentum came from abroad, in particular from North America. Europe remained the region with the highest revenue, closely followed by the Americas. In Europe, the share of group revenue remained at a high level of 28.8 percent due to the strong demand from the semiconductor equipment industry and the traffic safety technology market (prior year: 29.3 percent). In the Americas, revenue increased significantly by 15.4 percent in comparison with the prior year, due primarily to the full-year contribution made by Prodomax, but also to higher demand for optical systems as well as traffic safety solutions. Revenue in the Asia / Pacific region fell slightly to 97.2 million euros (prior year: 100.8 million), mainly due to the difficult economic conditions. At 621.3 million euros, Jenoptik generated 72.6 percent of revenue abroad in the past fiscal year (prior year: 594.1 million or 71.2 percent) – proof of the successful implementation of our internationalization strategy. Revenue in Germany was 234.0 million euros. The prior year's higher revenue of 240.5 million euros was characterized by the deliveries of the toll payment monitoring systems in the Light & Safety division. T27

More information on the development of revenue in the divisions in the Segment Report from page 106

T26 Revenue by division (in million euros)

	2019	2018	Change in %
Group	855.2	834.6	2.5
Light & Optics	350.0	337.0	3.9
Light & Production	228.9	210.7	8.6
Light & Safety	108.7	116.9	−7.1
VINCORION	164.8	166.4	−1.0
Other	2.8	3.5	−20.6

T27 Revenue by region (in million euros)

	2019	2018	Change in %
Group	855.2	834.6	2.5
Germany	234.0	240.5	−2.7
Europe	246.0	244.7	0.6
Americas	239.7	207.7	15.4
Asia / Pacific	97.2	100.8	−3.6
Middle East / Africa	38.3	40.8	−6.3

Once again, the Group generated its largest revenue share in 2019 with 34.7 percent in the automotive/mechanical engineering target market (prior year: 33.7 percent). The share of revenue in the security and defense technology sector fell slightly to 18.6 percent (prior year: 18.9 percent). Revenue generated with the semiconductor equipment industry increased to 19.7 percent (prior year: 18.0 percent) on the basis of the good industry development. The medical technology market grew to 5.7 percent (prior year: 5.3 percent). In 2019, our top three clients accounted for 17.3 percent of group revenue (prior year: 18.0 percent). T28

Cost of sales rose by 4.1 percent to 563.4 million euros and thus at a slightly stronger rate than revenue (prior year: 541.5 million euros), due primarily to the higher material and personnel costs. The cost of sales also include expenses arising from developments on behalf of customers, of 20.4 million euros (prior year: 20.2 million euros), which were offset by corresponding revenues. T29

The gross profit of 291.8 million euros was at approximately the same level as in the prior year (prior year: 293.1 million euros). At 34.1 percent, the gross margin was below that of the prior year (prior year: 35.1 percent). The cause of this were revenue declines due to an increasingly difficult environment in the automotive industry, a changed product mix, which in part requires a higher use of materials, as is the case with Prodomax, as well as increased personnel costs.

In 2019 the research and development expenses were 44.1 million euros, down on the prior year's figure of 47.4 million euros. The share of R+D expenses as a proportion of revenue thus fell slightly to 5.2 percent (prior year: 5.7 percent). The R+D output including developments on behalf of customers was 68.4 million euros, remaining at approximately the level of the prior year (prior year: 69.2 million euros).

More detailed information on research and development from page 84

In the course of expanding global activities and in connection with the acquisitions, the selling expenses in 2019 rose by 2.6 percent to 89.3 million euros (prior year: 87.0 million euros). At 10.4 percent, the selling expenses ratio remained at the same level as the prior year (prior year: 10.4 percent).

General and administrative expenses increased to 60.5 million euros (prior year: 56.1 million euros), mainly due to the administrative expenses of the companies acquired in 2018, which were not fully included in the prior year, adjustments to pay rates, new recruitment, primarily in the Light & Optics division, and the introduction of an SAP system at the Altenstadt site. The administrative expenses ratio rose to 7.1 percent (prior year: 6.7 percent).

Other operating income, at 18.6 million euros, was down the level of the prior year (prior year: 20.9 million euros), in particular due to lower currency gains totaling 7.0 million euros (prior year: 9.7 million euros).

T29 Key items in the Statement of Comprehensive Income (in million euros)

	2019	2018	Change in %
Cost of sales	563.4	541.5	4.1
R+D expenses	44.1	47.4	−7.1
Selling expenses	89.3	87.0	2.6
Administrative expenses	60.5	56.1	7.9
Other operating income	18.6	20.9	−10.9
Other operating expenses	27.5	28.4	−3.1

T28 Revenue by target market (in million euros and as percent of total revenue)

	2019		2018	
Automotive & mechanical engineering	296.8	34.7%	281.3	33.7%
Semiconductor equipment industry	168.2	19.7%	150.0	18.0%
Security and defense technology	159.3	18.6%	157.7	18.9%
Aviation & traffic	148.7	17.4%	162.5	19.5%
Medical technology	48.4	5.7%	44.6	5.3%
Other	33.7	3.9%	38.7	4.6%
Total	**855.2**	**100%**	**834.6**	**100%**

Other operating expenses came to 27.5 million euros (prior year: 28.4 million euros). They included expenses for group projects such as the introduction of a group-wide ERP system, costs in connection with corporate transactions and impairments on receivables. At 9.1 million euros, the currency losses were slightly higher than those of the prior year (prior year: 8.8 million euros).

Despite increased spending for future growth and the higher functional costs, the earnings before interest, taxes, depreciation, and amortization, incl. impairment losses and reversals (EBITDA) rose by 5.0 percent to 134.0 million euros (prior year: 127.5 million euros). This was mainly the result of contributions made by the acquired companies and positive impacts arising from the use of IFRS 16 of 11.6 million euros. The EBITDA margin accordingly increased to 15.7 percent (prior year: 15.3 percent). EBITDA also increased in the course of the year. After 23.8 million euros in the first quarter of 2019 and 30.2 million euros in the second quarter, the EBITDA rose to 37.4 million euros in the third quarter and to as much as to 42.6 million euros in the fourth quarter. T31

Nevertheless, the lower gross profit combined with higher functional costs led to a weaker operating result. At a total of 88.9 million euros, the operating result (EBIT) was 6.3 percent below that of the prior year (prior year: 94.9 million euros). The group EBIT margin thus fell to 10.4 percent (prior year: 11.4 percent). The Light & Safety division and VINCORION developed positively. Group EBIT includes the operating result of the acquired companies in the amount of 5.8 million euros (prior year: minus 0.5 million euros), including impacts arising from the purchase price allocation of minus 5.3 million euros (prior year: minus 10.5 million euros) and positive effects from the first-time application of IFRS 16 amounting to 1.7 million euros. T32

As a result of the increase in average tied operating capital due to IFRS 16, the assets acquired in the prior year as well as the lower EBIT, the Group's ROCE (Return on Capital Employed) fell to 14.7 percent as of December 31, 2019 (prior year: 20.2 percent). Jenoptik shows this indicator inclusive of goodwill and before taxes. The ROCE is calculated using the method described in the in the chapter Control System on page 82 and shown in the following table. The average tied capital is calculated as the average of the month-end values in the reporting period. T30

The financial result remained at the same level as in the prior year with a total of minus 3.7 million euros (prior year: minus 3.5 million euros). Income from the measurement effects and lower interest expenses to third parties compensated for the higher interest expenses compared to the prior year due to first-time application of IFRS 16 (1.6 million euros). Currency effects totaling 0.5 million euros (prior year: 1.0 million) and interest and similar income of 1.0 million euros had a positive impact on earnings (prior year: 0.3 million euros). Increased interest and similar expenses of minus 5.3 million euros (prior year: minus 4.9 million euros) had a negative impact on earnings.

Detailed information on the composition of the other operating income and expenses on page 160 of the Notes as well as in other comprehensive income

Information on the division EBITDA in the Segment Report from page 106

T30 ROCE (in million euros)

	2019	2018
Long-term non-interest bearing assets	451.1	327.6
Short-term non-interest bearing assets	368.0	332.5
Non-interest bearing borrowings	−213.3	−190.7
Average tied capital	605.8	469.4
EBIT	88.9	94.9
ROCE (in percent)	14.7	20.2

T31 EBITDA (in million euros)

	2019	2018	Change in %
Group	134.0	127.5	5.0
Light & Optics	69.8	74.1	−5.8
Light & Production	25.8	24.6	4.7
Light & Safety	18.8	15.9	18.2
VINCORION	24.2	20.1	20.0
Other	−4.6	−7.3	36.2

T32 EBIT (in million euros)

	2019	2018	Change in %
Group	88.9	94.9	−6.3
Light & Optics	57.9	65.9	−12.1
Light & Production	14.5	16.8	−14.0
Light & Safety	11.7	10.9	7.2
VINCORION	17.4	16.5	5.3
Other	−12.5	−15.2	17.5

The lower EBIT was also reflected in the earnings before tax, which at a total of 85.2 million euros were 6.8 percent down on the prior year (prior year: 91.4 million euros).

See the Notes for detailed information on the subject of taxes

The current income taxes of 11.4 million euros were above the level of the prior year (prior year: 11.0 million euros). Of these, 8.4 million euros (prior year: 11.2 million euros) are attributable to Germany and 3.0 million euros (prior year: minus 0.2 million euros) to other countries. The decline in Germany is due to the reduced domestic income in the reporting period. The rise in foreign taxes is primarily due to the acquisition of Prodomax.

The Jenoptik Group's cash effective tax rate, the ratio between current income taxes and earnings before tax, rose due to the increased foreign share of taxable income to 13.3 percent (prior year: 12.0 percent), but was at a comparatively low level for German companies due to the domestic earnings and the usable losses carried forwards.

Non-cash deferred tax expenses came to 6.2 million euros in the past fiscal year (prior year: income of 7.0 million euros). This is primarily due to the amount of deferred taxes on JENOPTIK AG's tax loss carried forward compared with the same period of the prior year. The group tax rate thus amounted to 20.6 percent (prior year: 4.4 percent), income taxes came to a total of minus 17.6 million euros (prior year: minus 4.0 million euros).

In 2019, due not least to the deferred tax income in the prior year, Jenoptik generated earnings after tax of 67.6 million euros, a reduction of 22.6 percent (prior year: 87.4 million euros). At 67.7 million euros, shareholder earnings were down on the prior year's figure of 87.6 million euros, and earnings per share of 1.18 euros were also significantly lower than the prior year's figure of 1.53 euros per share.

The development of order intakes in the 2019 reporting year was characterized above all by a reluctance to invest in the automotive sector. Overall, the Group received orders worth around 812.6 million euros in 2019 (prior year: 873.7 million euros). The drop of 7.0 percent was also due to a major order in the semiconductor equipment business which was booked at the end of 2018. The order intake was also lower than the revenue generated in the fiscal year. As a result, the book-to-bill ratio also reduced to 0.95 (prior year: 1.05). T33 G16 T36

T33 Order intake (in million euros)

	2019	2018	Change in %
Group	812.6	873.7	−7.0
Light & Optics	324.7	396.1	−18.0
Light & Production	199.3	200.7	−0.7
Light & Safety	107.9	118.4	−8.9
VINCORION	177.9	154.9	14.8
Other	2.8	3.5	−20.6

T34 Order backlog (in million euros)

	2019	2018	Change in %
Group	466.1	521.5	−10.6
Light & Optics	144.9	180.6	−19.7
Light & Production	81.6	112.5	−27.5
Light & Safety	69.9	69.5	0.5
VINCORION	169.7	158.9	6.8

T35 Frame contracts (in million euros)

	2019	2018	Change in %
Group	49.9	62.5	−20.1
Light & Optics	12.4	12.5	−1.3
Light & Production	0	0	0
Light & Safety	12.6	19.2	−34.3
VINCORION	24.9	30.7	−18.9

T36 Book-to-bill ratio

	2019	2018
Group	0.95	1.05
Light & Optics	0.93	1.18
Light & Production	0.87	0.95
Light & Safety	0.99	1.01
VINCORION	1.08	0.93

Nevertheless, major projects, among others, in the defense and traffic safety businesses in the fourth quarter allowed the Group to achieve a sharp rise in order intake compared to the prior quarters of 2019.

The order backlog reduced to 466.1 million euros (31/12/2018: 521.5 million euros) at the end of 2019. Of this order backlog, 68.1 percent (prior year: 79.2 percent) will still be converted to revenue in 2020 and in conjunction with a well-filled order pipeline, this is a solid basis for the forecast growth in the 2020 fiscal year. T34

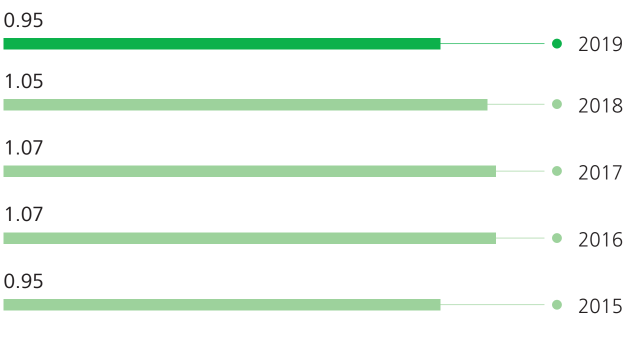
There were also frame contracts worth 49.9 million euros (31/12/2018: 62.5 million euros). Frame contracts are contracts or framework agreements with customers, where the exact extent and time of occurrence cannot yet be specified precisely. The decline in the frame contracts is due to reclassifications in the order intake or adjustments. T35

Financial position

Financial management principles

The central Treasury department plans the requirements and controls the provision of liquid resources within the Group. The Group's financial flexibility and solvency is guaranteed at all times on the basis of multi-year financial planning and monthly rolling liquidity planning. A cash pooling system also ensures the liquidity supply to all the major companies in Europe and North America. Companies not integrated in the cash pooling system are supplied with liquidity through internal group loans or lines of credit from local banks.

G16 Development of the book-to-bill ratio



In 2019, Jenoptik also launched a program to sell trade receivables (factoring) to better adapt to its customers' payment arrangements. This gives the Group a further instrument to manage its liquidity and working capital.

Primarily using currency forward transactions, Jenoptik hedges orders in foreign currencies, thereby reducing the consequences of exchange rate fluctuations on earnings and cash flow. Derivative financial instruments are used exclusively to hedge the operating business and necessary financial transactions, e. g. internal loans or acquisition financing in foreign currencies.

As a result of the above measures, the existing syndicated loan, the granted debenture loans, and a high level of cash and cash equivalents, the liquidity of all the group companies was sufficiently secured at all times in the past fiscal year.

Capital structure and financing analysis

With a still very good equity ratio of 60.5 percent as of December 31, 2019, and net debt of minus 9.1 million euros, the Group has a viable financing structure. This gives Jenoptik the flexibility and financial latitude to finance future organic growth and acquisitions, and thus to implement its international growth strategy.

The debenture loans issued have maturities until April 2020 (21.5 million euros) and April 2022 (69.0 million euros). In addition, the Group has a largely unused credit line worth 230.0 million euros thanks to the syndicated loan agreement. Financial covenants have been agreed for the syndicated loan, and Jenoptik is in compliance with all their conditions.

In addition to cash and cash equivalents of 99.0 million euros and current financial investment of 69.7 million euros, the Group also has unused capacity from global loan agreements totaling 222.2 million euros to fall back on. This means that Jenoptik had around 390 million euros available for corporate development projects, as of the end of 2019.

In 2019, the Group's non-current financial debt increased to 122.6 million euros (31/12/2018: 111.4 million euros). This balance sheet item includes financial liabilities to banks in the amount of 72.2 million euros (31/12/2018: 108.2 million euros) and lease liabilities of 50.4 million euros (31/12/2018: 3.2 million euros) which rose sharply due to the application of IFRS 16. At the end of 2019, non-current financial debt accounted for around 77 percent of Jenoptik's financial debt (12/31/2018: 92 percent).

See the Segment Report from page 106 for detailed information on the order intake in the divisions

See Notes on page 177 for further information on factoring

More information from page 194

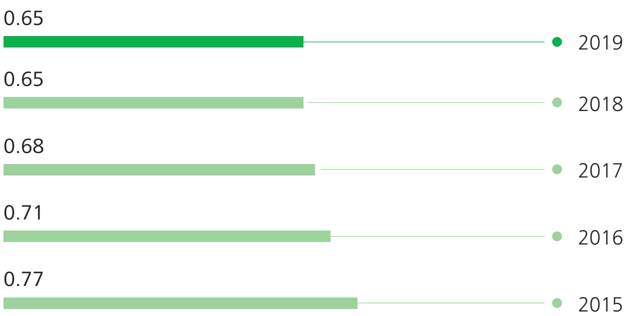
71 Combined Management Report 136

Current financial debt increased to 37.0 million euros (31/12/2018: 10.1 million euros). Contributory causes include the application of IFRS 16 and the reclassification of the tranche of the debenture loans due for repayment in 2020.

The debt-to-equity ratio remained constant at 0.65 (31/12/2018: 0.65), as equity and borrowings increased proportionally at year-end 2019. The debt-to-equity ratio is defined as the ratio between borrowings (427.9 million euros) and equity (655.4 million euros). G17

At the end of 2019, the net cash position, defined as the total cash, cash equivalents, and current financial investments minus current financial debt, amounted to 131.7 million euros (31/12/2018: 138.6 million euros). The value of cash, cash equivalents, and current financial investments increased to 168.7 million euros (31/12/2018: 148.7 million euros). As stated above, current financial debt rose to 37.0 million euros (31/12/2018: 10.1 million euros).

G17 Debt-to-equity ratio



Due to the good cash flows from operating activities Jenoptik was again free of net debt at the end of the fiscal year. Although financial debt rose 56.9 million euros owing to the first-time application of IFRS 16, net debt as of December 31, 2019 came to minus 9.1 million euros (31/12/2018: minus 27.2 million euros). This positive development was achieved despite a higher dividend payout of 20.0 million euros (prior year: 17.2 million euros), and increased capital expenditure. T37

Analysis of capital expenditure

The focus of capital expenditure is derived from the Group strategy and is in line with the planned growth targets and the asset structure of the Group. To ensure this, the individual investments are systematically reviewed with respect to sustainability or their value contribution on the basis of performance and financial indicators, and all risks and opportunities are thoroughly analyzed.

At 55.6 million euros, group investment in intangible assets and property, plant and equipment was significantly up on the prior year in 2019 (prior year: 42.5 million euros). Investments were primarily made to create the conditions for growth and new customer orders, for example by increasing manufacturing capacity at various locations in Germany and abroad, e. g. in Bayeux, Berlin, and Villingen-Schwenningen.

At 43.9 million euros, the largest share of capital expenditure was once again on property, plant, and equipment (prior year: 37.9 million euros). Payments were made primarily for the new build at the Villingen-Schwenningen site, new technical equipment, and an expansion in production capacities. T38

T37 Net and gross debt (in million euros)

	2019	2018	2017	2016	2015
Non-current financial debt	122.6	111.4	108.6	120.5	113.2
Current financial debt	37.0	10.1	19.3	4.1	14.9
Gross debt	**159.6**	**121.5**	**127.9**	**124.6**	**128.1**
minus current financial investments	69.7	59.5	64.6	50.5	0.4
minus cash and cash equivalents	99.0	89.3	132.3	92.0	83.8
Net debt	**−9.1**	**−27.2**	**−69.0**	**−17.9**	**43.9**

Capital expenditure for intangible assets increased to 11.7 million euros, in part due to the launch of an SAP S/4 HANA system (prior year: 4.5 million euros). During the reporting period, development services arising from internal projects and worth 3.8 million euros were capitalized (prior year: 1.3 million euros).

Scheduled depreciation/amortization totaled 43.8 million euros (prior year: 30.6 million euros). This increase was primarily due to impacts of 9.9 million euros arising from the application of IFRS 16, and the purchase price allocation. Impairment losses and reversals came to minus 1.2 million euros (prior year: minus 2.1 million euros).

Depreciation on property, plant, and equipment increased to 33.0 million euros (prior year: 21.6 million euros) and was thus well below capital expenditure on property, plant, and equipment.

Amortization on intangible assets amounted to 10.8 million euros (prior year: 8.9 million euros), and, as in the prior year, primarily included amortization of patents, trademarks, and software, as well as intangible assets identified in the course of company acquisitions. T39

Analysis of cash flows

Cash flows from operating activities fell to 108.9 million euros in the year covered by the report (prior year: 135.5 million euros). The operating cash flow was primarily affected by lower earnings before tax and the negative impacts arising from the changes in provisions and working capital (working capital – see page 103). It also includes a positive impact of 11.6 million euros due to the changed presentation in accordance with IFRS 16. T40

In 2019, cash flows from investing activities amounted to minus 54.4 million euros (prior year: minus 117.5 million euros), While cash flows from investing activities in the prior year were dominated by expenditure of 81.4 million euros for the acquisition of consolidated entities, the period under report was affected by higher capital expenditure for intangible assets and property, plant, and equipment. Expenditure for financial assets within the framework of short-term disposition exceeded proceeds by 9.7 million euros and thus also had a negative impact (prior year: positive impact of 4.1 million euros).

More information on capital expenditure in the divisions can be found in the Segment Report from page 106 on; on future investment projects in the Forecast Report from page 133 on

T38 Capital expenditure and depreciation/amortization (in million euros)

	2019	2018	Change in %
Capital expenditure	55.6	42.5	30.7
Intangible assets	11.7	4.5	156.7
Property, plant, and equipment	43.9	37.9	15.9
Investment properties	0	0.1	– 100.0
Depreciation/amortization/impairment losses and reversals	45.1	32.6	38.1
Intangible assets	11.6	10.1	14.4
Property, plant, and equipment	33.4	22.4	48.9
Investment properties	0.1	0.1	–5.8

T39 Capital expenditure by division – Intangible assets and property, plant and equipment (in million euros)

	2019	2018	Change in %
Group	55.6	42.5	30.7
Light & Optics	18.4	17.2	7.0
Light & Production	13.9	8.9	56.3
Light & Safety	4.1	4.9	– 17.0
VINCORION	8.8	4.9	80.3
Other	10.4	6.6	56.9

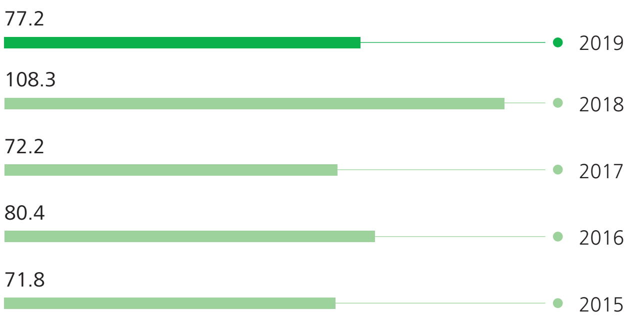
For more information on impact arising from the first-time application of IFRS 16, see the Notes, page 144

As a result of lower cash flows from operating activities before taxes and interest and higher capital expenditure, the free cash flow fell to 77.2 million euros (prior year: 108.3 million euros). The free cash flow is calculated as the cash flows from operating activities before income tax payments in the amount of 121.6 million euros (prior year: 149.3 million euros), less expenditure for operating investment activities, i.e. minus inflows and outflows of funds for intangible assets and property, plant, and equipment, amounting to 44.3 million euros (prior year: 41.1 million euros). G18

The cash flows from financing activities amounted to minus 46.1 million euros (prior year: minus 60.9 million euros) in the 2019 fiscal year, and were dominated by repayments of bonds and loans of 21.3 million euros (prior year: 40.3 million euros) and the higher dividend payment of 20.0 million euros (prior year: 17.2 million euros). Following first-time application of IFRS 16, lease payments also increased in the past fiscal year.

More information on the intangible assets and property, plant, and equipment see Notes points 5.1 and 5.2

G18 Free cash flow (in million euros)



Asset position

Compared to the end of 2018, the Jenoptik Group's total assets grew in value to 1,083.3 million euros as of December 31, 2019 (31/12/2018: 985.9 million euros). The increase of 97.4 million euros is in part due to the introduction of IFRS 16 and the rise in current assets.

Non-current assets rose sharply to 555.2 million euros (31/12/2018: 491.8 million euros). Particularly strong growth was seen in property, plant, and equipment, from 185.9 million euros at the end of 2018 to 251.1 million euros as of December 31, 2019, thanks both to the impact of IFRS 16 and capital expenditure. Both capital expenditure and positive currency effects produced an increase in intangible assets. The "Goodwill" item increased, in particular due to impacts arising from the conversion of transactions in foreign currency, to 165.9 million euros (31/12/2018: 159.8 million euros), and thus remained the largest item in intangible assets. There were only minor changes in the remaining items under non-current assets.

Over the past fiscal year, current assets rose to 528.1 million euros (31/12/2018: 494.1 million euros). Compared with the end of 2018, inventories fell to 153.7 million euros as of December 31, 2019 (31/12/2018: 175.6 million euros). This reduction was mainly due to the recognition of revenue at the end of the year and, in particular, the increasing recognition of revenue over time and thus its classification as a contract asset. As a result, current trade receivables grew to 136.9 million euros (31/12/2018: 131.2 million euros), and contract assets to 54.9 million euros (31/12/2018: 23.4 million euros). Cash and cash equivalent holdings grew to 99.0 million euros (31/12/2018: 89.3 million euros) as a result of the positive cash flow.

T40 Cash flows (in million euros)

	2019	2018	2017	2016	2015
Cash flows from operating activities	108.9	135.5	96.3	100.1	85.1
Cash flows from investing activities	−54.4	−117.5	−42.2	−71.3	−7.2
Cash flows from financing activities	−46.1	−60.9	−12.9	−20.7	−66.5
Cash-effective change in cash and cash equivalents	8.4	−42.9	41.3	8.0	11.4
Non-cash change in cash and cash equivalents	1.4	−0.1	−0.9	0.1	2.9
Change in cash and cash equivalents	**9.8**	**−43.1**	**40.3**	**8.1**	**14.3**
Cash and cash equivalents at the end of the fiscal year	**99.0**	**89.3**	**132.3**	**92.0**	**83.8**

The rise in contract assets and receivables was largely offset by the decline in inventories and the increase in trade accounts payable. The working capital therefore remained almost unchanged on the prior year, at 217.8 million euros (31/12/2018: 216.8 million euros). The working capital ratio, that of working capital to revenue, reduced to 25.5 percent (31/12/2018: 26.0 percent) as a result of the increase in revenue and the effect of active working capital management. T41

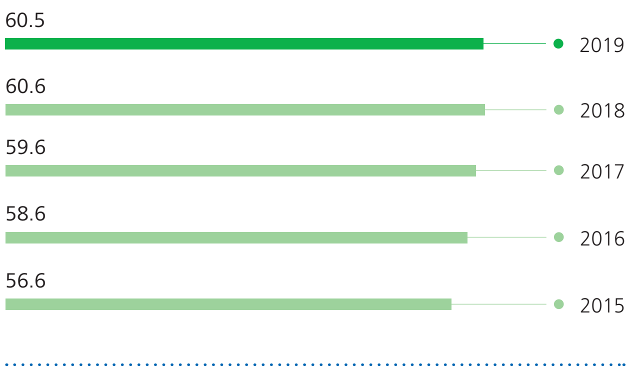
The positive earnings after tax, in particular, but also positive currency effects and actuarial impacts in connection with pension provisions, produced a 57.5-million-euro rise in equity, to 655.4 million euros (31/12/2018: 598.0 million euros). By contrast, equity was reduced by the dividend payment and impacts arising from the first-time application of IFRS 16. The equity ratio, that of equity to total assets, remained virtually unchanged at 60.5 percent (31/12/2018: 60.6 percent). G19

At the end of 2019, the non-current liabilities grew to 176.0 million euros (31/12/2018: 170.3 million euros), primarily due to the increase of 11.2 million euros in non-current financial debt (impacts from the first-time application of IFRS 16), to 122.6 million euros. Pension provisions, however, were reduced, as the negative impacts arising from the fall in interest rates were more than offset by the earnings in plan assets.

A major item of the non-current financial debt are the debenture loans issued in 2015, currently totaling 90.5 million euros. Following early repayment of a tranche of the debenture loans worth 12.5 million euros in April 2019, a further tranche worth 21.5 million euros was reclassified to current liabilities, as it becomes due in April 2020.

The current liabilities rose to 251.9 million euros (31/12/2018: 217.7 million euros). This was largely due to the increase in current financial debt to 37.0 million euros (31/12/2018: 10.1 million euros) following the first-time application of IFRS 16 and the above-mentioned reclassification of a tranche of the debenture loans. As of the reporting date, current trade accounts payable increased to 83.7 million euros (31/12/2018: 60.1 million euros). By contrast, contract liabilities saw a drop to 43.9 million euros (31/12/2018: 53.3 million euros), in part due to lower advance payments. Other current provisions also fell due to reduced personnel and warranty provisions, to 51.9 million euros (31/12/2018: 58.7 million euros).

G19 Equity ratio (in percent)



71 Combined Management Report 136

For more information see the Notes, chapter Provisions for Pensions and Similar Obligations, from page 182 on

T41 Components of working capital (in million euros)

	2019	2018	Change in %
Inventories	153.7	175.6	–12.5
Trade receivables (prior year trade receivables from third parties and from construction contracts)	136.9	131.2	4.3
Contract assets	54.9	23.4	134.7
Less trade payables (prior year trade payables to third parties and from construction contracts)	83.7	60.1	39.3
Less contract liabilities	43.9	53.3	–17.6
Total	**217.8**	**216.8**	**0.5**

Acquisitions and disposals: There were no purchases or sales of companies in the 2019 fiscal year.

In January 2020 Jenoptik acquired the Spanish company INTEROB to boost its position as a turnkey supplier of automated production solutions.

For more information on the INTEROB acquisition, see the Notes, page 151, and the Report on Post-Balance Sheet Events, page 116

Assets and liabilities not included in the statement of financial position

The value of the Jenoptik brand is one of the main assets we do not include on the balance sheet. Jenoptik operates in the highly fragmented photonics market, which is characterized by a multitude of highly-specialized companies. We aim to further boost awareness of our brand, especially on the international stage, in the coming years. Since February 2019, Jenoptik has been on the market with new brand positioning and a new corporate design. With its "Strategy 2022," the Group focuses on the core photonics areas of light and optics under the Jenoptik brand. The independent VINCORION brand for the mechatronics business was launched in 2018 to take better account of specific market requirements.

For more information on the brand, see the Non-Financial Report from page 67

Non-capital tax losses carried forward. Tax losses carried forward arise from losses in the past that have not yet been offset against taxable profits. They represent potential future cash flow benefits, since actual tax payments can be reduced by these losses being offset against taxable profits.

For non-usable losses carried forward, deferred tax assets are not recognized for corporation tax purposes in the amount of 29.3 million euros (prior year: 26.2 million euros) and trade tax purposes in the amount of 129.0 million euros (prior year: 181.7 million euros), as they are unlikely to be used within a determined planning time frame. Equally, no deferred tax assets were recognized for deductible timing differences in the amount of 7.3 million euros (prior year: 8.3 million euros).

Off-balance sheet financing instruments for the financial and asset position. Since the end of 2019 Jenoptik has been using a factoring program, a further instrument for managing its liquidity and working capital, in order to sell trade receivables from selected customers to a factoring company. Although customers' payment terms have in some cases been significantly extended, this has allowed Jenoptik to convert some long-term

T42 Financial debt by due date (in million euros)

	Up to 1 year		1 to 5 years		More than 5 years		Total as of 31/12	
	2019	2018	2019	2018	2019	2018	2019	2018
Liabilities to banks	26.3	9.3	72.2	108.2	0	0	98.5	117.5
Liabilities from leases	10.7	0.8	34.0	3.2	16.4	0	61.1	4.0
Total	**37.0**	**10.1**	**106.2**	**111.4**	**16.4**	**0**	**159.6**	**121.5**

T43 Components of interest-bearing debt (in million euros)

	2019	2018	Change in %
Current	37.0	10.1	265.4
Liabilities to banks	26.3	9.3	182.8
Lease liabilities	10.7	0.8	1,191.4
Non-current	122.6	111.4	10.0
Liabilities to banks	72.2	108.2	−33.3
Lease liabilities	50.4	3.2	1,485.4

receivables into liquidity at short notice. This additional liquidity is then available to the Group for various operational purposes, e.g. investment and acquisitions. Since the economic opportunities and risks associated with the receivables are transferred to the buyer when the receivables are sold, those receivables are no longer recognized in Jenoptik's statement of financial position ("real factoring"). Jenoptik does not use any other off-balance sheet financing instruments.

For information on off-balance-sheet liabilities we refer to the Point "Other financial obligations" in the Notes on page 201.

Information on contingent assets and liabilities can be found in the Notes, from page 196 on.

Clauses in contracts concluded by JENOPTIK AG, which apply in the event of a change of control within the ownership structure of JENOPTIK AG following a takeover bid, exist for financing agreements with a total utilized volume of approximately 104.4 million euros (prior year: 120.0 million euros). More information can be found in the Remuneration Report, from page 45 on, and in the Information on Takeover Law, from page 41 on.

General Statement by the Executive Board on the Development of Business

Despite more difficult economic conditions, Jenoptik was able to continue on its successful path of growth in the 2019 fiscal year. Revenue increased and profitability improved. The Light & Optics and Light & Production divisions contributed to the rise in revenue. A strong demand from the semiconductor equipment industry and the Automation & Integration area supported the positive development. The companies acquired in 2018 thus also contributed to growth. Due to impacts arising from the first-time application of IFRS 16 and the contributions from the acquired companies, EBITDA increased at a faster rate than revenue. The EBITDA margin improved to 15.7 percent.

The order intake was down on the high prior-year, which had been influenced by a major order received in December 2018. In the fourth quarter of 2019, however, the order intake increased significantly, thus providing a good basis for growth in the current fiscal year. The lower order intake also caused a reduction in the order backlog. However, with a book-to-bill ratio of 0.95 we have a solid basis for the Group's further profitable growth.

With improved earnings capacity and good cash flows, we were able to finance not only our operating business but also higher investments. Although the free cash flow remained clearly positive, it was below the very good level of the prior year due to lower cash flows from operating activities before interest and taxes and higher capital expenditure. In late December 2019 the Jenoptik Group was once again free of net debt. The equity ratio remained virtually unchanged. Our total assets came to over 1 billion euros.

Overall, the Executive Board was very satisfied with the company's performance.

Segment Report

The three photonics divisions, Light & Optics, Light & Production, and Light & Safety, together with VINCORION have represented the segments as defined in IFRS 8 since January 1, 2019. Prior-year information in the Segment Report has been adjusted to reflect the new structure of the Jenoptik Group.
The range of services and competitive positioning of the divisions and VINCORION are set out in greater detail in the Group Business Model chapter, from page 74 on.

Light & Optics Division

Information on the various markets can be found in the Sector Report, from page 91 on, and on future developments in the Forecast Report, from page 129 on

As an OEM partner, the division supports its customers with a broad technology portfolio covering everything from development to volume production. Cooperation as a development and production partner with numerous large international companies was again an important part of the business in the 2019 fiscal year. Integrated solutions for semiconductor manufacturing underwent further development, while the product range for the information and communications technology (ICT) market was expanded. The division also focused on the medical technology and life science markets, e. g. with a modular technology platform for analysis and diagnostics solutions in the bio-imaging sector.

The Light & Optics division established its new organizational structure on January 1, 2019, combining the former Optical Systems and Healthcare & Industry divisions with the sensors business that was previously part of the Defense & Civil Systems division. The new division operates in three strategic business areas: Semiconductor & Advanced Manufacturing, Biophotonics, and Industrial Solutions. Sales and production (Operations) were combined globally under one management.

Light & Optics once again increased its revenue in 2019, which rose 3.9 percent to 350.0 million euros (prior year: 337.0 million euros). The fourth quarter was the strongest, with 99.3 million euros in revenue. In 2019, the division particularly benefited from good business with solutions for the semiconductor equipment industry, allowing it to more than offset the decline in the Industrial Solutions unit. Revenue was increasingly recognized over time. In total, around 79 percent of the division's revenue was generated abroad in 2019 (prior year: 78 percent), with Europe still enjoying the greatest share, followed by the Americas. This region saw the strongest increase in 2019, in part due to greater demand for optics to be used in biophotonics, semiconductor equipment, and entertainment applications.

Income from operations before interest, taxes, depreciation and amortization (EBITDA) was down 5.8 percent on the prior year, to 69.8 million euros (prior year: 74.1 million euros). This was due to the declining margin contribution in the Industrial Solutions unit, which could not be offset by the good business with the semiconductor equipment industry and the positive impacts of 1.9 million euros arising from the first-time application of IFRS 16. In terms of EBITDA, the fourth quarter was the most profitable, with 20.4 million euros. At 19.8 percent, the EBITDA margin in 2019 was down on the prior-year figure of 21.8 percent but still remained at a very good level. The divi-

T44 Light & Optics at a glance (in million euros)

	2019	2018	Change in %
Revenue (external)	350.0	337.0	3.9
EBITDA	69.8	74.1	−5.8
EBITDA margin * in %	19.8	21.8	
EBIT	57.9	65.9	−12.1
EBIT margin * in %	16.5	19.4	
Capital expenditure	18.4	17.2	7.0
Free cash flow	57.1	58.6	−2.6
Order intake (external)	324.7	396.1	−18.0
Order backlog (external)	144.9	180.6	−19.7
Frame contracts	12.4	12.5	−1.3
Employees	1,416	1,368	3.5

* Based on total revenue

sion's income from operations (EBIT) came to 57.9 million euros (prior year: 65.9 million euros); the EBIT margin was 16.5 percent (prior year: 19.4 percent).

In line with expectations, the order intake, worth 324.7 million euros, was down on the prior-year figure of 396.1 million euros in 2019. This was partly attributable to the fact that a high-volume order for semiconductor equipment was placed and booked in late 2018 already. Set against revenue, this resulted in a book-to-bill ratio of 0.93 for the reporting period (prior year: 1.18). In the fourth quarter, the division saw a significant increase in its order intake thanks to several major orders from different industries.

In March, the Light & Optics division announced the start of a long-term cooperation arrangement with an international life sciences company. Following successful conclusion of the development phase, the aim is to produce significant numbers of digital imaging systems, based on Jenoptik's own SYIONS imaging platform, which are to be used by this customer in the field of cell diagnostics.

The division reported an order from the automotive industry in November 2019. Light & Optics will supply a laser-optical subsystem for a particle sensor developed by HELLA. This particle sensor will be used to reliably and precisely measure minute concentrations of particulate matter inside vehicles and in their environment. The high measuring accuracy is achieved thanks to Jenoptik's custom precision polymer optics and the high-accuracy adjustment of the optoelectronic system.

Due to the lower order intake, the division's order backlog fell 35.7 million euros in value to 144.9 million euros at the end of the year (31/12/2018: 180.6 million euros). The Light & Optics division also had frame contracts worth 12.4 million euros (31/12/2018: 12.5 million euros).

With higher capital expenditure and positive impacts arising from the first-time application of IFRS 16, and the use of factoring, the division's free cash flow of 57.1 million euros (before interest and income tax) was almost at the prior year's good level (prior year: 58.6 million euros). The working capital, at 77.9 million euros, was also practically unchanged (prior year: 79.2 million euros).

As of December 31, 2019, Light & Optics had a total of 1,416 employees, 48 more than in the prior year. The division had 56 people in trainee positions at the end of 2019.

R+D expenses in the past fiscal year totaled 19.0 million euros (prior year: 19.2 million euros). Including development services on behalf of customers, the division's R+D output came to 34.6 million euros, slightly up on the prior-year figure of 28.0 million euros. The share of total R+D output in division revenue was 9.9 percent (prior year: 8.3 percent).

For more information on the key development topics, see the Research and Development chapter from page 84 on

Capital expenditure on property, plant, and equipment and intangible assets rose to 18.4 million euros (prior year: 17.2 million euros). This was offset by depreciation in the sum of 10.7 million euros (prior year: 8.3 million euros). Key areas of investment in the 2019 fiscal year included the expansion of capacities and the technical development of the manufacturing infrastructure, e.g. for the semiconductor equipment and automotive sectors. Jenoptik is also upgrading and expanding its production facilities for the manufacture of high-performance laser diodes in Berlin, which will enable orders to be executed more quickly. At the Huntsville location in the US, Jenoptik expanded the clean room space and invested in a new photolithographic system for the production of micro-optics. These investments aim to help secure the long-term competitiveness of the Light & Optics division in its core business of photonics.

Production and organization. As part of Jenoptik's "Strategy 2022", the Light & Optics division completed a key initiative to simplify group structures, in line with its stated aim of achieving "More Focus". The division combined its entire photonic technology business for OEM customers, including all major German legal units, in a single company. This significantly streamlined the corporate structure in Germany. The legal merger of the companies was completed in March 2019. Its expertise and longstanding experience in optics and photonics are being combined in one global production, service, and sales network with the aim of being in a position to offer more solutions from a single source in the future.

In addition, the strategic initiative for on-time delivery in the field of optics was launched in the past fiscal year, with the aim of improving on-time delivery. As a result, continuous improvements in processes and the supply chain were achieved across all departments. In 2019, on-time delivery saw a significant improvement compared to the two prior years, especially with regard to our most important customers. These topics will be actively addressed this year, too.

Light & Production Division

With the acquisition of the Spanish company INTEROB in January 2020, the Light & Production division is strengthening its position as a turnkey provider of automated production solutions. With the prior acquisitions of Prodomax and the OTTO Group in 2018, the division already took an important step in its development to become an integrated supplier of high-tech production environments, as well as of production metrology and industrial imaging applications.

At the start of the 2019 fiscal year, the Mobility segment was split up into two new divisions, Light & Production (previously the Automotive division), and Light & Safety (previously Traffic Solutions). The Light & Production division particularly focuses on solutions for the automotive industry in its Metrology, Laser Processing, and Automation & Integration business areas.

Revenue in the Light & Production division grew 8.6 percent to 228.9 million euros in 2019 (prior year: 210.7 million euros), with the Automation & Integration area making a significant contribution to this increase. The companies acquired in 2018 contributed 66.4 million euros (prior year: 37.0 million euros). By contrast, the development of the two areas, Metrology and Laser Processing, was affected by increasingly difficult conditions in the automotive industry, particularly in the second half of 2019.

At around 79 percent, the division again generated most of its revenue abroad in 2019 (prior year: approximately 79 percent). In the Americas, in particular Prodomax contributed to the increase in revenue. Revenue also rose slightly in Germany, primarily due to the contribution of the OTTO Group, which was included for the full fiscal year for the first time. The other regions saw revenue declines.

On the basis of good overall revenue growth and bolstered by positive impacts arising from the first-time application of IFRS 16, worth 2.7 million euros, EBITDA increased 4.7 percent to 25.8 million euros (prior year: 24.6 million euros). The EBITDA margin came to 11.3 percent, compared with 11.7 percent in the prior year. In the prior year, the EBITDA included earnings-reducing impacts of 7.0 million euros arising from the purchase price allocation and acquisition costs of 1.9 million euros.

EBIT in the Light & Production division totaled 14.5 million euros (prior year: 16.8 million euros), to which the companies acquired in 2018 contributed 5.8 million euros (prior year: minus 0.5 million euros). The impacts arising from the purchase price allocation included in EBIT came to minus 5.3 million euros (prior year: minus 10.5 million euros and acquisition costs of 1.9 million euros). The EBIT margin fell to 6.3 percent (prior year: 8.0 percent).

In 2019, the division's order intake was worth 199.3 million euros, practically unchanged on the prior-year figure of 200.7 million euros, with growth seen in the Automation & Integration area. The order intake includes orders from Prodomax and the OTTO Group, worth around 46 million euros (prior year: approximately 24 million euros). The book-to-bill ratio in 2019 reached a figure of 0.87 (prior year: 0.95). Testifying to good demand in the field, the division received larger-volume orders for automation solutions from North American OEMs and automotive suppliers worth a total of over 30 million euros in the early months of the year.

T45 Light & Production at a glance (in million euros)

	2019	2018	Change in %
Revenue (external)	228.9	210.7	8.6
EBITDA	25.8	24.6	4.7
EBITDA margin * in %	11.3	11.7	
EBIT	14.5	16.8	−14.0
EBIT margin * in %	6.3	8.0	
Capital expenditure	13.9	8.9	56.3
Free cash flow	19.5	15.2	28.1
Order intake (external)	199.3	200.7	−0.7
Order backlog (external)	81.6	112.5	−27.5
Frame contracts	0	0	0
Employees	1,093	1,055	3.6

* Based on total revenue

As a result of the increase in revenue, the order backlog decreased by 27.5 percent to 81.6 million euros at year-end 2019 (31/12/2018: 112.5 million euros).

An increase in EBITDA and lower working capital were key reasons for the improvement in the division's free cash flow (before interest and income tax) to 19.5 million euros (prior year: 15.2 million euros). The working capital fell from 59.3 million euros at the end of 2018 to 50.1 million euros. The reduction in inventories and trade receivables was greater than the increase in contract assets; the sum of trade accounts payable and contract liabilities increased.

As of December 31, 2019, the Light & Production division had 1,093 employees, more than in the prior year (31/12/2018: 1,055 employees). 29 people were in trainee positions as of the reporting date (31/12/2018: 19 trainees).

The division's R+D output fell to 11.3 million euros (prior year: 13.1 million euros). This included developments on behalf of customers in the amount of 3.4 million euros (prior year: 4.8 million euros). R+D expenses came to 7.9 million euros (prior year: 8.2 million euros). In 2019, the share of R+D output in total revenue in the Light & Production division was 5.0 percent (prior year: 6.2 percent).

For more information on the key development topics, see the Research and Development chapter from page 84 on

As scheduled, capital expenditure on property, plant, and equipment and intangible assets rose sharply by 56.3 percent to 13.9 million euros (prior year: 8.9 million euros). Modern development, production, and office spaces for industrial metrology are being built at the Villingen-Schwenningen site at a cost of over 13 million euros. Construction work started in March 2019 and business operations at the new site are due to commence in the spring of 2020. The new production building in Bayeux, France opened on schedule to some 60 Jenoptik employees in spring 2019. This capital expenditure has allowed Jenoptik to create a modern production and sales environment for industrial metrology. Well-known automotive and supplier companies are among Jenoptik's customers in France. For its industrial business worldwide, Bayeux is the center of excellence for pneumatic metrology.

In 2019, capital expenditure was offset by depreciation in the sum of 11.3 million euros (prior year: 6.6 million euros).

Acquisitions. There were no purchases or sales of companies in the 2019 fiscal year.

In January 2020, the Light & Production division acquired the Spanish company INTEROB, which specializes in the design, construction, and integration of custom automation solutions and robotics applications.

For more information on the INTEROB acquisition, see the Notes, page 151, and the Report on Post-Balance Sheet Events on page 116

Light & Safety Division

The Light & Safety division is responsible for the Group's business with systems and services related to road traffic, such as speed and red light monitoring systems and custom solutions for identifying other traffic violations, and for the field of civil security.

At the start of the 2019 fiscal year, the former Mobility segment was split up into two new divisions, Light & Production (previously the Automotive division), and Light & Safety (previously Traffic Solutions).

In the 2019 fiscal year, the division generated revenue of 108.7 million euros (prior year: 116.9 million euros). In the prior year, the delivery of toll payment monitoring systems had contributed around 26 million euros to revenue. Light & Safety, however, largely managed to offset the shortfall in revenue arising from this project, a development assisted by a strong fourth quarter in which revenue of 33.6 million euros was generated. At around 73 percent, the share of revenue generated abroad rose significantly in 2019 (prior year: 55 percent), with Light & Safety seeing growth in the Americas and Europe. In Germany, strong revenue arising from the prior-year toll project could not, as expected, be fully compensated. Revenue for the 2019 fiscal here came to 29.6 million euros (prior year: 52.1 million euros).

Despite the fall in revenue, EBITDA climbed sharply to 18.8 million euros (prior year: 15.9 million euros), primarily due to impacts arising from the first-time application of IFRS 16, worth 2.3 million euros, and higher margins in the product mix. A considerable contribution to earnings of 6.9 million euros was generated in the fourth quarter. In 2019, the EBITDA margin improved significantly to 17.3 percent (prior year: 13.6 percent). At 11.7 million euros, EBIT was slightly up on the prior-year figure (prior year: 10.9 million euros); the EBIT margin rose to 10.7 percent (prior year: 9.3 percent).

As expected, the division increased its order intake in the fourth quarter, posting new orders worth some 35.7 million euros, mainly from the US. At 107.9 million euros, the order intake in 2019 was still down on the prior-year figure of 118.4 million euros. As a result of lower revenue, the book-to-bill ratio of 0.99 was only just under the prior-year figure (prior year: 1.01).

As of December 31, 2019, the order backlog of 69.9 million euros was at the same good level as the prior year (31/12/2018: 69.5 million euros). The division also had frame contracts worth 12.6 million euros (31/12/2018: 19.2 million euros).

With a total of 496 employees, the number of people employed in the Light & Safety division at the end of the year saw a slight increase (31/12/2018: 472 employees). At the end of December, the division had a total of 13 people in trainee positions (31/12/2018: 9 trainees).

In 2019, the division's R+D expenses of 11.0 million euros were up on the prior year (prior year: 9.3 million euros). The development costs on behalf of customers fell to 1.0 million euros (prior year: 4.3 million euros). Overall, the division's R+D output fell to 12.0 million euros (prior year: 13.6 million euros).

For information on the key development topics, see the Research and Development chapter from page 84 on

In the year covered by the report, the division invested 4.1 million euros in property, plant, and equipment and intangible assets (prior year: 4.9 million euros). As a result, capital expenditure was 17.0 percent lower than in the prior year. The majority of investment went into preparing and carrying out traffic service provision projects. Capital expenditure was offset by depreciation and impairment losses amounting to 7.2 million euros (prior year: 5.0 million euros).

The free cash flow (before interest and income taxes) fell from 30.3 million euros in the prior year to 11.3 million euros in the 2019 fiscal year, a difference largely attributable to the high payment received for the toll project in the prior year. As of December 31, 2019, the working capital came to 14.8 million euros, down on the prior-year figure of 10.6 million euros. This was mainly due to an increase in inventories and reduced contract liabilities.

Production and organization. In 2019, Light & Safety continued its cross-divisional integration of international operational functions in supply chain, service, and quality assurance to improve order execution. A concomitant aim is to build up international value creation structures. For quality assurance, the focus was on improving processes in hardware and software development, incoming goods inspection, and supplier management.

In early July 2019, the Saarland Constitutional Court issued a ruling on a constitutional complaint in connection with a speeding offense. The court held that the complainant was entitled to receive and review the raw measured data generated, but not saved, by the Jenoptik TraffiStar S350 system. The jugdment did not revoke the system's approval by the Physikalisch-Technische Bundesanstalt (PTB); measuring systems of this type are, however, not being operated in the Saarland at the moment. Jenoptik disagrees with the ruling. Several higher regional courts have also expressly ruled against the Saarland decision (e. g. Bavaria, Oldenburg, Cologne, Düsseldorf, and Stuttgart higher regional courts), thus confirming the unrestricted use of the TraffiStar S350 measuring system. Jenoptik has already applied to the PTB for approval of a software update that will enable the systems in the Saarland to return to operation.

T46 Light & Safety at a glance (in million euros)

	2019	2018	Change in %
Revenue (external)	108.7	116.9	−7.1
EBITDA	18.8	15.9	18.2
EBITDA margin* in %	17.3	13.6	
EBIT	11.7	10.9	7.2
EBIT margin* in %	10.7	9.3	
Capital expenditure	4.1	4.9	−17.0
Free cash flow	11.3	30.3	−62.7
Order intake (external)	107.9	118.4	−8.9
Order backlog (external)	69.9	69.5	0.5
Frame contracts	12.6	19.2	−34.3
Employees	496	472	5.1

* Based on total revenue

VINCORION

VINCORION is responsible for the Jenoptik Group's range of mechatronics services for the aviation, security and defense technology, and rail markets. In the 2019 fiscal year, VINCORION continued to position itself as a partner for systems companies and customers with a need for individual solutions, and also launched a wide range of new products. International sales and service structures were expanded and the technology and knowledge transfer to civilian fields was continued.

At 164.8 million euros, revenue, as expected, remained practically unchanged on the prior year (prior year: 166.4 million euros). Buoyed by the export license issued in early October 2019 by the German Federal Ministry for Economic Affairs and Energy to export power supply units for the "Patriot" missile defense system to the United Arab Emirates (UAE), VINCORION generated sales of 68.0 million euros in the fourth quarter, which was significantly up on the prior quarters of the year. At around 51 percent, the share of revenue generated abroad, remained below the prior-year figure of 58.5 percent, due to project-related reasons. VINCORION posted a significant rise to 81.0 million euros in Germany (prior year: 69.0 million euros), where revenue in the aviation business, for example, saw growth. The majority of products are still sold to German buyers, whose end customers, however, are largely active on the international sales market. By contrast, revenue in the Americas fell due to project-related reasons.

VINCORION's EBITDA saw a sharp rise to 24.2 million euros (prior year: 20.1 million euros), primarily due to positive impacts of 3.7 million euros arising from the first-time application of IFRS 16. A significant contribution to earnings of 13.6 million euros was generated in the fourth quarter on the back of this rise in revenue. The EBITDA margin improved to 14.7 percent (prior year: 12.1 percent). At 17.4 million euros, EBIT was also up on the prior-year figure (prior year: 16.5 million euros); the EBIT margin came to 10.5 percent (prior year: 9.9 percent).

In line with expectations, VINCORION increased its order intake in the fourth quarter, posting new orders worth some 69.9 million euros. At 177.9 million euros for the full year, the order intake was down on the prior-year figure of 154.9 million euros. VINCORION, amongst others, received orders for systems for the Leopard 2 tank, the Patriot missile defense system, and in the aviation business. The book-to-bill ratio increased to 1.08 (prior year: 0.93).

The increase in the order intake also produced a rise in the order backlog to 169.7 million euros as of December 31, 2019 (31/12/2018: 158.9 million euros). The division also had frame contracts worth 24.9 million euros (31/12/2018: 30.7 million euros).

With a total of 795 employees, the number of people employed in VINCORION at the end of the year was practically unchanged (31/12/2018: 790 employees). At the end of December, the division had a total of 51 people in trainee positions (31/12/2018: 49 trainees).

T47 VINCORION at a glance (in million euros)

	2019	2018	Change in %
Revenue (external)	164.8	166.4	−1.0
EBITDA	24.2	20.1	20.0
EBITDA margin* in %	14.7	12.1	
EBIT	17.4	16.5	5.3
EBIT margin* in %	10.5	9.9	
Capital expenditure	8.8	4.9	80.3
Free cash flow	1.0	19.6	−94.7
Order intake (external)	177.9	154.9	14.8
Order backlog (external)	169.7	158.9	6.8
Frame contracts	24.9	30.7	−18.9
Employees	795	790	0.6

* Based on total revenue

R+D expenses fell to 6.1 million euros in 2019 (prior year: 10.5 million euros). Higher expenditure in the prior year was particularly due to projects to develop new products in the aviation business. The development costs on behalf of customers amounted to 2.9 million euros (prior year: 2.7 million euros), and are primarily due to joint development projects with systems companies. Overall, VINCORION's R+D output fell to a value of 10.5 million euros (prior year: 14.1 million euros).

For information on the key development topics, see the Research and Development chapter from page 84 on

VINCORION invested 8.8 million euros in property, plant, and equipment and intangible assets (prior year: 4.9 million euros). As a result, the level of capital expenditure was 80.3 percent higher than in the prior year due to capitalized development costs and lease contracts. Capital expenditure was offset by depreciation and impairment losses amounting to 6.8 million euros (prior year: 3.6 million euros).

The free cash flow (before interest and income taxes) fell from 19.6 million euros in the prior year to 1.0 million euros in the 2019 fiscal year, despite positive impacts arising from IFRS 16. This was primarily attributable to a sharp rise in trade receivables, which led to a higher level of working capital. As of December 31, 2019, the working capital came to 84.1 million euros, up on the prior-year figure of 71.8 million euros.

Production and organization.

On January 17, 2020, the Executive Board of JENOPTIK AG decided to stop the process of selling the mechatronics business operated under the VINCORION brand. The Board had come to the conclusion that there was no offer that corresponded to the business potential of VINCORION as confirmed in the 2019 fiscal year. VINCORION will continue to be operated as an independent investment in the Jenoptik Group.

General Statement by the Executive Board on the Development of the Segments

Depending on their target markets, the Jenoptik Group's three photonics divisions and VINCORION developed differently in 2019. The Light & Optics division benefited from good revenue with the semiconductor equipment industry. Earnings, however, were down on the prior year due to a decline in the Industrial Solutions area. Despite a more difficult economic environment in some areas of the automotive industry, particularly in the second half of the year, the Light & Production division succeeded in increasing revenue and earnings, with Prodomax and the OTTO Group, both acquired in 2018, making major contributions. As expected, the Light & Safety division reported a fall in revenue without the toll project from the prior year, but still managed to increase its earnings. In line with forecasts, VINCORION generated revenue at the prior-year level, and significantly improved its profitability.

The reportable segments also developed disparately in terms of free cash flow. While the Light & Optics division generated a free cash flow comparable to the prior year, Light & Production posted an improvement. Light & Safety reported a fall in the cash flow on the prior year; in 2018 the cash flow was strongly impacted by high payments received for the toll project. Due to higher working capital, VINCORION's free cash flow fell. The introduction of IFRS 16 had a significant positive impact on EBITDA and the free cash flow in all segments.

Over the course of the past fiscal year, Jenoptik boosted its capital expenditure on expanding international sales structures, in efficient processes, and the development of new products.

In 2019, we also managed to establish a broader range of systems and secure both international projects and new customers. Demand varied by market and was clearly influenced by economic developments. Order intakes in all three photonics divisions were below prior-year figures. The Light & Optics division's 2018 order intake, however, included a major order for semiconductor equipment, which was booked ahead of schedule at the end of 2018. VINCORION posted more orders in the past fiscal year than in the prior year. Its business is geared toward the long term and characterized by major projects.

Management Report of JENOPTIK AG

(Abridged version according to HGB)

Supplementary to the reports on the Jenoptik Group, the development of JENOPTIK AG is set out below.

JENOPTIK AG is the parent company of the Jenoptik Group and based in Jena. Its asset, financial, and earnings position is fundamentally defined by its capacity as the holding company of the Jenoptik Group. The operating activities of JENOPTIK AG primarily cover the provision of services for subsidiary companies and the subleasing of commercial premises.

The Annual Financial Statements of JENOPTIK AG are prepared in accordance with German commercial law (HGB) and the supplementary regulations of the German Stock Corporation Act (AktG). The Consolidated Financial Statements are prepared in accordance with the International Financial Reporting Standards (IFRS) valid on the reporting date and the interpretations of the International Financial Reporting Interpretations Committee (IFRIC) whose application is mandatory within the European Union. This gives rise to differences in the accounting and valuation methods, chiefly concerning fixed assets, derivatives, provisions, and deferred taxes.

The Group's strategic policy focuses on our core competencies, and thus also on the simplification of structures. In this context, the legal merger of JENOPTIK SSC GmbH (formerly the Shared Service Center, hereafter referred to as SSC GmbH) with JENOPTIK AG took place with economic effect from January 1, 2019. A comparison of the current reporting period with the prior year is therefore only of limited relevance.

T48 Abbreviated Income Statement of JENOPTIK AG (in thousand euros)

	1/1 to 31/12/2019	1/1 to 31/12/2018
Revenue	36,221	22,533
Cost of sales	32,640	18,468
Gross profit	3,580	4,065
Selling expenses	1,634	1,850
General administrative expenses	12,448	15,850
Research and development expenses	266	253
Other operating result	−2,422	−356
Income and expenses from profit and loss transfer agreements and income from investments	73,277	104,093
Financial result	3,742	−6
Income taxes	8,210	10,876
Earnings after tax	55,621	78,964
Net profit	55,621	78,963
Retained profits from prior year	30,000	40,000
Accumulated profit	85,621	118,963

Asset, Financial, and Earnings Position

Earnings position

Revenue was up 13.7 million euros on the prior year, at 36.2 million euros. The increase primarily resulted from the central services for group companies that were transferred to JENOPTIK AG following the merger of SSC GmbH.

Administrative expenses were 3.4 million euros down on the prior year. Lower general administrative expenses are mainly due to the increased charging of administrative services to group companies, lower expenses for variable remuneration and lower legal fees.

JENOPTIK AG posted research and development expenses of 0.3 million euros (prior year: 0.3 million euros), primarily covering expenditure for innovation management and the coordination of R+D work in the Jenoptik Group.

Selling expenses of 1.6 million euros (prior year: 1.8 million euros) concerned expenses for strategic marketing projects, communication, advertising, and sponsorship.

The other operating result included other operating income of 10.7 million euros (prior year: 7.7 million euros), which was offset by 13.1 million euros of other operating expenses (prior year: 8.0 million euros).

Other operating income primarily included currency gains worth 3.6 million euros (prior year: 4.3 million euros), intra-group cost allocations of 4.0 million euros (prior year: 1.8 million euros), and income arising from the reversal of provisions in the sum of 1.2 million euros (prior year: 1.1 million euros).

Key items in the other operating expenses were currency losses of 3.8 million euros (prior year: 3.1 million euros), expenses for intra-group cost allocations of 4.0 million euros (prior year: 1.6 million euros), 3.0 million euros for an internal group project to analyze and optimize business processes and introduce an SAP S/4 system, and 2.1 million euros for consulting services relating to the planned sale of the VINCORION division and a review of potential company acquisitions.

The financial result of 3.7 million euros (prior year: 0) included earnings from securities and loans, depreciation on loans, and the interest result. Interest income of 2.1 million euros for internal group loans of 100.7 million euros, which were granted in connection with the acquisition of Prodomax in 2018, contributed to the improvement of 3.7 million euros. Interest expenses fell by 0.5 million euros, in part due to the early repayment of a tranche of the debenture loans worth 12.5 million euros in April 2019.

Income taxes were 2.7 million euros below the figure for the prior year due to lower taxable income of the companies consolidated for tax purposes in the fiscal year.

JENOPTIK AG's annual net profit fell by 23.3 million euros, or 29.6 percent, to 55.6 million euros (prior year: 79.0 million euros). The company's earnings position was mainly influenced by the subsidiaries' earnings, which are transferred to JENOPTIK AG on the basis of existing control and profit and loss transfer agreements. The net earnings contribution of the subsidiaries fell compared to the prior year, by 30.6 million euros to 73.0 million euros. Due to the more difficult framework conditions in the automotive industry, earnings contributions by the Metrology and Laser Processing areas (both Light & Production) as well as Industrial Solutions (Light & Optics) reduced. In addition, as the export permission was granted very late in the year, this resulted in lower revenue in the high-margin spare part business and thus to lower earnings contributions by the Power Systems business unit (VINCORION). In the prior year, the toll project had a positive impact on profit and loss transfer.

Asset and financial position

At 781.8 million euros, JENOPTIK AG's total assets were 1.9 percent up on the figure for the prior year (prior year: 767.6 million euros).

The assets side of the statement of financial position reflects JENOPTIK AG's status as a holding company. Alongside intensity of investments of 72.4 percent, of which 63.7 percent was attributable to financial investments and 8.7 percent to property, plant, and equipment (in particular real estate), total assets are also characterized by a high level of cash and cash equivalents (16.6 percent) and loans to associates (10.2 percent).

Of the 29.3-million-euro fall in financial investments, 22.5 million euros arose from the conversion of a loan granted to subsidiary Prodomax into a short-term loan and the associated reclassification of the item in current assets.

Receivables from associates, worth 86.3 million euros (prior year: 78.6 million euros), were mainly due to the issue or settlement of cash and cash equivalent to and from group companies, and chiefly affected the settlement accounts for cash pool holdings and the short-term loan to Prodomax, of which 13.7 million euros had not yet been drawn as of the reporting date.

T49 JENOPTIK AG Statement of Financial Position (in thousand euros)

	31/12/2019	31/12/2018
Assets		
Intangible assets, property, plant, and equipment	76,605	66,642
Financial investments	459,471	488,773
Non-current assets	**536,077**	**555,415**
Inventories, trade receivables, and other assets	87,233	81,978
Cash and cash equivalents	154,903	127,479
Current assets	**242,136**	**209,457**
Accurals und deferrals	3,589	2,706
	781,801	**767,578**
Equity and liabilities		
Share capital	148,819	148,819
(Conditional capital 28,600 thousand euros)		
Capital reserves	180,756	180,756
Revenue reserves	216,070	147,140
Accumulated profit	85,621	118,963
Equity	**631,266**	**595,678**
Provisions	**20,166**	**21,040**
Liabilities to banks	90,500	103,000
Trade accounts payable	7,806	1,703
Other liabilities	32,060	46,156
Liabilities	**130,369**	**150,860**
	781,801	**767,578**

The increase in cash and cash equivalents by 27.45 million euros, from 127.4 million euros to 154.9 million euros, was the result of positive cash flows of the subsidiaries.

Accruals and deferrals essentially comprised accrued costs for IT service and maintenance contracts, as well as incidental rental costs not yet settled.

The liabilities side reflects in particular JENOPTIK AG's financing function as the holding company for the Jenoptik Group. Equity came to 631.3 million euros, liabilities to banks 90.5 million euros (11.6 percent of total assets).

Thanks to the positive annual result in the sum of 55.6 million euros, equity improved by 35.6 million euros. This was countered by the payment of dividends of 20.0 million euros for the 2018 fiscal year. The equity ratio rose from 77.6 percent to 80.7 percent.

Tax provisions at the companies consolidated for tax purposes fell due to a payment for tax arrears of 3.9 million euros for the years 2017 and 2018.

Other liabilities comprised 30.6 million euros of cash pool holdings.

Over the reporting year, JENOPTIK AG's debt-to-equity ratio improved due to the increase in equity and the repayment of financial debt, from 28.86 percent to 23.85 percent.

As of December 31, 2019, JENOPTIK AG had 258 employees, of which 18 were temporary workers and 7 were trainees (prior year: 135 employees, of which 10 temporary workers).

Risks and Opportunities

Due to its function as a holding company, JENOPTIK AG's development of business is subject to the same risks and opportunities as the Jenoptik Group. It generally participated in the risks of equity holdings and subsidiaries in line with their equity interests and financial investments. The risks and opportunities of the Group and the segments are set out in the Risk and Opportunity Report from page 117 on.

Forecast report

The net profit of JENOPTIK AG is largely dependent on the development of contributions to earnings by the subsidiaries.

Based on the development set out in the Group Forecast Report, JENOPTIK AG is anticipating revenue from holding company services at the prior-year level in the 2020 fiscal year. Due to higher rental revenue, JENOPTIK AG is expecting in total a higher revenue. The profit of JENOPTIK AG – before transfer of profit and losses of the subsidiaries – will remain stable compared with the prior year.

For detailed information on the expected future development of the Jenoptik Group and its segments we refer to the Forecast Report from page 133 on.

Events after the Balance Sheet Date

The JENOPTIK AG Executive Board approved the submission of the present Consolidated Financial Statements to the Supervisory Board on March 10, 2020. The Supervisory Board is responsible for reviewing and approving the Consolidated Financial Statements at its March 24, 2020 meeting.

Dividends. According to the Stock Corporation Act, the amount available for a dividend payment to the shareholders is based on the accumulated profit of the parent company JENOPTIK AG, as determined by the regulations of the HGB. For the 2019 fiscal year, JENOPTIK AG's accumulated profit totaled 85,620,600.56 euros, comprising net profit for 2019 in the amount of 55,620,600.56 euros plus retained profits of 30,000,000.00 euros.

The Executive Board recommends to the Supervisory Board that for the 2019 fiscal year a dividend of 0.35 euros per qualifying no-par value share be proposed to the 2020 Annual General Meeting (prior year: 0.35 euros). This would mean that a sum of 20,033,340.25 euros from JENOPTIK AG's accumulated profit in the 2019 fiscal year would be distributed. Of JENOPTIK AG's remaining accumulated profit, a sum of 35,587,260.31 euros will be allocated to revenue reserves, and a sum of 30,000,000.00 euros will be carried forward.

With this recommendation the Executive Board maintains a continuous dividend policy, in spite of the lower earnings per share of 1.18 euros (prior year 1.53 euros). Prior-year earnings included, in particular, a non-cash deferred tax income which contributed to the increase in earnings per share. The payout ratio is 29.7 percent (prior year 22.9 percent).

Acquisition of INTEROB. With the signing of the agreement on January 25, 2020 and on the closing date of February 4, 2020, Jenoptik acquired the INTEROB Group, consisting of INTEROB, S.L. and INTEROB RESEARCH AND SUPPLY, S.L. INTEROB specializes in projects relating to the plant planning, design, manufacture, and integration of automation solutions, as well as robotics applications with a focus on the automotive industry. The acquisition allows the Jenoptik Group to boost its position as a turnkey provider of automated production solutions. In the 2019 fiscal year, INTEROB posted some 22 million euros of revenue; its profitability was above the average in the Jenoptik Group. Jenoptik will consolidate 2020 revenue and earnings, including the impacts arising from the purchase price allocation on a pro rata temporis basis. The purchase price is slightly less than twice the revenue generated in 2019. INTEROB is based in Valladolid, Spain, and was founded in 2001.

On January 17, 2020 the Executive Board of JENOPTIK AG decided to stop the process of selling the mechatronic business operating under the VINCORION brand. The Board had come to the conclusion that there was no offer that corresponded to the business potential which VINCORION demonstrated in the 2019 fiscal year. Going forward, VINCORION will be operated as an independent investment of Jenoptik.

No further events of significance occurred after December 31, 2019.

Opportunity and Risk Report

Principles of Opportunity and Risk Management at Jenoptik

For Jenoptik, the responsible evaluation of risks and opportunities within the corporate environment is one of the principles of responsible corporate governance. To ensure implementation of our strategy, it is necessary to identify risks and opportunities at an early stage, to evaluate them appropriately, and control them efficiently. This is done by promoting an open risk culture and regularly examining the established risk management system. Jenoptik's risk and opportunity management system is annually reviewed for appropriateness and effectiveness at an internal risk workshop. Reporting processes employ centrally available software.

Risks are defined as potential developments and events that may result in a negative divergence from objectives and forecasts in the company and involve uncertainty regarding the occurrence of an event. Correspondingly, opportunities are events that may result in a positive divergence from our expected targets.

Jenoptik's risks and opportunities are assessed with the help of the probability of occurrence and extent of damage factors using a key matrix. (see paragraph Structure and process of the opportunity and risk management system). The risks and opportunities described here are the result of the aggregation of locally identified risks and opportunities that were each allocated to defined categories. G20

For further information see structure and processes of the risk and opportunity management system

Organizational integration of the risk and opportunity management

The Executive Board is responsible for the risk and opportunity management system in the Jenoptik Group. The group-wide approach is set out in a risk manual.

Central Compliance & Risk Management organizes and manages the system, working closely with the other central departments and the risk officers in the divisions, who in turn are responsible for implementing the risk and opportunity management system in the risk reporting units. The risk reporting units are defined reporting units that are employed to accurately identify and allocate risks and opportunities, and can be both business units and individual subsidiaries.

71 Combined Management Report 136

G20 Risk assessment

Metrics	Probability of occurence	Consequences / extent of damage: Qualitative		Quantitative EBIT deviation
5 = High	up to 50%	The goal of the Group or the risk reporting unit is jeopardized	or	> 20%
4 = Medium-high	up to 40%	The goal of the Group or the risk reporting unit has to be adapted immediately	or	> 15 to 20%
3 = Medium	up to 30%	The goal of the Group or the risk reporting unit has to be adapted in the medium term	or	> 10 to 15%
2 = Low	up to 20%	Further measures are necessary in order to achieve the goals of the Group or the risk reporting unit	or	> 5 to 10%
1 = Very low	up to 10%	Minor consequences	or	> 0 to 5%

Internal Audit monitors the effectiveness of the risk management system, while the Audit Committee of the Supervisory Board takes up the external monitoring function for or in conjunction with the Supervisory Board.

On the Risk Committee, all aggregated reporting results are consolidated to form a top-level evaluation of the Group's risk position. The Risk Committee consists of the members of the Executive Board and the head of central Compliance & Risk Management. G21

The consolidated companies exposed to risk correspond to those included in the consolidated balance sheet.

Structure and processes of the risk and opportunity management system

The Jenoptik risk and opportunity management system is based on the ISO 31000 standard.

The definition and ongoing development of the system takes place with the close cooperation of central Compliance & Risk Management, the Executive Board, and the Audit Committee of the Supervisory Board. The Executive Board is responsible for the system and approves it. Central Compliance & Risk Management communicates the requirements of the risk management system, advises on their practical implementation, and monitors the measures and results of the risk management processes.

A core process of risk management are the various risk assessments, which are carried out using a combination of top-down and bottom-up elements. In order to ensure the most in-depth risk identification and comparability possible within the company, a risk register was developed to support management in the evaluation of risks. It comprises several specified categories to which potential risks and opportunities are allocated by the risk reporting units. This is to ensure that each risk reporting unit deals with the entire risk landscape and that, simultaneously, an aggregation of the results is guaranteed across the specified categories. While operational and financial targets are analyzed over a time frame of up to two years, strategic topics are considered for periods of up to four years. Under the current system, sustainability risks are not determined in a separate risk category. They are, however, in part covered by the existing risk categories.

Within the scope of the risk analysis, the risk reporting units determine the risks and opportunities in order to be able to undertake a valid risk assessment in the next stage regarding

G21 Process of risk reporting

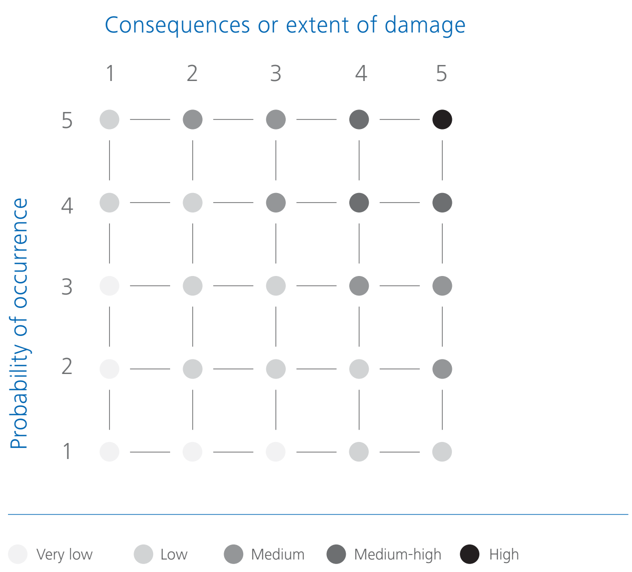
Risk Officers in the divisions and central departments	Assessment of single risks
Central Functions	Review of aggregated risks
Corporate Compliance & Risk Management department	Review and analysis of group risks
Risk Committee	Analysis of group risks
Executive Board	Final assessment of group risks
Audit Committee Supervisory Board	Evaluation of group risks

the assessment methods (qualitative or quantitative) and the measures already taken or still required. This takes place in accordance with the net method, i. e. mitigating measures are already included in the assessment so that only the assessed residual risk is reported and aggregated. The assessment of a risk is the product of the probability of occurrence and the quantitative amount of loss or the qualitative extent of damage. The opportunities are evaluated in the same way. G22

There is a scale of 1 to 5 for both assessment factors mentioned, probability of occurrence and extent of loss, with 1 being the smallest and 25 the greatest possible risk indicator. G23

Every six months, the results of the risk assessments are requested by central Compliance & Risk Management at the risk reporting units and aggregated to the Group Risk and Opportunity Report. The findings are then validated by the central departments of the Corporate Center before being discussed in the Risk Committee. The Executive Board makes a general assessment and, as necessary, approves further action. Then the Group Risk and Opportunity Report is presented to and discussed by the Audit Committee of the Supervisory Board and the Supervisory Board.

G23 Calculation of risk scores



G22 Risk and opportunity categories

Operational Risks / Opportunities	Strategic Risks / Opportunities
Supply Chain Management / Safety and Environmental Protection / Production (incl. Quality Management) / Marketing & Sales / Patents & IP rights / Human Resources Management / IT / Compliance / Legal Affairs / Real Estate	Market Development / Product Development (incl. R+D) / Corporate Development (Portfolio and Structure) / Organizational Setup (Processes and Resources)
Financial Management Risks / Opportunities	
Accounting / Finance Management (Treasury) / Controlling / Taxes	

1st year 2nd year 3rd year 4th year

In addition, any risks identified during the year which have a high probability of occurrence and significant potential for damage, are communicated without delay to the Chief Compliance & Risk Officer and the Executive Board. Following joint analysis with the technical departments, they decide on further measures to be taken and, if necessary, the required communication.

The above-mentioned reporting instruments also form the basis for the risk early warning system. This is reviewed by the auditor during the audit. The auditor confirms that it is designed in such a way that any developments that could jeopardize the continued existence of the Group can be identified in good time.

Risk prevention and ensuring compliance

Prevention is a key element of the risk management system, and an integral part of regular business operations and committee work.

It essentially comprises risk monitoring as part of a range of assessments and special approval procedures. Consequently, risks and opportunities, as well as their impact on the company, are discussed during the monthly meetings of the Executive Board and at EMC and strategy meetings. At the same time, potential risks to achieving the strategic goals can be considered directly in the strategy development process and minimized by taking suitable measures.

Compliance with national and international compliance requirements is an integral part of risk prevention and of the processes of Jenoptik's risk management system. In order to improve employee awareness and achieve company-wide uniform understanding of our compliance standards, regular training is provided on subjects relevant to compliance, such as anti-corruption or anti-trust law, as well as data protection issues or insider trading. Online training on key compliance issues is obligatory for all employees. A help desk is available on the intranet to assist employees on any risk or compliance issues they may have. Following the introduction of the new Group Guidelines system in 2020, the corporate guidelines implemented within the Group with regard to important company processes are annually reviewed and, as necessary, expanded, and updated. They are published on the intranet. Together with our Code of Conduct, they help to prevent risks.

For further information, see Corporate Governance Report from page 36 on

In accordance with international standards, a supplier code of conduct requires Jenoptik's suppliers to comply with a number of different compliance requirements. Central business partner screening (third-party due diligence) is used to check whether cooperation with a high-risk business partner is viable from a compliance perspective.

Jenoptik therefore has a system of regulations, processes and controls that enable it to identify any possible deficits in the company and to minimize them using appropriate measures at an early stage.

Alongside the risk and compliance management systems, the Internal Control System (ICS) is a key element of corporate governance. It covers technical and organizational regulations and control steps to ensure compliance with guidelines and prevent damage, as well as ensuring clear divisions of responsibility and function, in adherence to the principle of double-checking. In particular, its intention is to ensure the security and efficiency of transactions as well as the reliability of financial reporting, and it is regularly reviewed by Internal Audit. The established ICS self-assessments, to be completed by the management of all subsidiaries and JENOPTIK AG in the form of questionnaires, were also carried out in the past fiscal year. Monitoring and evaluation of the completed questionnaires is carried out by central Accounting, Controlling, and Internal Audit. Reported deficits are analyzed and appropriate countermeasures are defined to ensure they are lastingly eliminated.

Internal Audit is permanently incorporated into the ongoing further development of the internal monitoring and risk management system through process-independent audits. As a staff department, it reports to the Chief Financial Officer and acts on his behalf. Employees in Internal Audit are not subject to any instructions in their work. This includes the choice of audit items, the setting of priorities and the procedures used, the frequency and scheduling of audits, and reporting. The organizational units of the Jenoptik Group are analyzed and audited on the basis of a risk-oriented audit plan. The compliance with and proper implementation of the applicable guidelines form integral parts of the audit. This not only identifies errors, infringements, or process weaknesses and the most expedient remedial action, but also potential process improvements in the sense of a "best practice approach". The recommendations are prioritized, categorized, and reported directly to the persons responsible for the audited units, the respective central departments, and to the Executive Board. The audited unit then submits a report to the Executive Board, indicating the measures and deadlines for implementation of the stated recommendations. This is followed by follow-up audits that review the implementation of the recommendations, with information on the results being sent to the respective management levels and central departments as well as the Executive Board. Internal Audit submits a report containing its key findings since the last report to the Audit Committee of the Supervisory Board at least once a year. In 2019, six audits, three follow-up audits, and five special audits were conducted. Nine units received support for implementation of the measures identified in the course of auditing.

Jenoptik has a centralized financial management system. The central Treasury department coordinates the financing needs of the Group, ensures liquidity and monitors the currency, interest rate, and liquidity risks on the basis of group-wide rules and relevant process descriptions. These regulations include provisions for the clear separation of transaction and corporate oversight functions as well as trading within predetermined limits.

The purpose of financial risk management is to limit financial risks arising from changes in market rates, for example interest and exchange rates. Financial instruments are used exclusively for the purpose of securing underlying transactions and not for speculative purposes. They are only concluded with banks with investment grade rating (at least BBB-Standard & Poor's rating scale).

Key features of the Internal Control and Risk Management System with regard to the consolidated accounting process of the Group and JENOPTIK AG (§ 289 (4) and § 315 (4) of the German Commercial Code [HGB])

The accounting-related internal control system is part of the overall ICS of the Jenoptik Group. Its purpose, in part, is to ensure a due and proper process in preparing the Consolidated Financial Statements, guaranteeing compliance with statutory regulations, accounting rules, and internal guidelines for uniform accounting and valuation principles, which are binding for all companies included in the Consolidated Financial Statements. New regulations and changes to existing rules are analyzed promptly and implemented. All employees involved in the accounting process receive regular training.

Access restrictions in the respective IT systems protect the financial systems against abuse. Centralized control and regular backup of the IT systems reduce the risk of data loss.

In order to prepare the Consolidated Financial Statements, data from the companies is recorded directly by them in the LucaNet consolidation tool. The transferred data from the statements and financial statements of consolidated companies is verified by manual and technical system inspections. All the consolidation processes required for the preparation of the Consolidated Financial Statements are documented. These processes, systems, and controls enable Jenoptik to ensure a group accounting process that complies with both the IFRS and statutory requirements. The group auditor audits JENOPTIK AG's Financial Statements and Consolidated Financial Statements in accordance with the IFRS regulations in compliance with § 317 of the German Commercial Code (HGB) and the EU Audit Regulation (537/2014), giving consideration to the generally accepted German audit principles defined by the Institute of Public Auditors in Germany (IDW).

The Corporate Governance Report can be found on pages 36 ff of the Annual Report. The Corporate Governance Statement in accordance with §§ 289 f, 315 d of the German Commercial Code (HGB) can be found on our website at www.jenoptik.com, in the "Investors/Corporate Governance" section. In accordance with § 317 (2) (6) of the German Commercial Code, the information required under §§ 289 f, 315 d is not considered by the auditor.

71 Combined Management Report 136

The Group's Risk and Opportunity Profile

The Group's risk profile for 2019 and subsequent years was determined with the aid of the various risk and opportunity assessments from the segments. Part of the risk assessment of the segments is a review by the central functions of the Corporate Center, whose identified risks are then included in the segment reporting and in the final group assessment. Our risk and opportunity management allows to directly compare the individual risk subcategories and the associated risk symptoms. The risk assessment of subcategories is set out in greater detail in the table below.

Overall, the risks to which the Group is exposed are at the lower end of the medium risk range. No significant changes on the prior year were identified.

Once again, strategic risks and opportunities were on average assessed as the most important for the overall Group, compared to operational and financial management risks, in 2019. Following the strategic realignment initiated in 2018 to focus on photonics market segments, their development is both a risk and an opportunity for the Group.

Continuing uncertainties arising from trade and geopolitical conflicts may have a decisive influence on overall economic development in Jenoptik's growth markets, for example in China. The uncertainties existing at the time that this report was prepared also harbor potential risks for the current and future business of the Group. On the one hand, we are constantly assessing the potential impacts of a wider outbreak of coronavirus and the action being taken. The risks arising from this to the supply chain or sales cannot yet be quantified at the time of reporting. On the other hand, potential risks to the Group's current and future business continue to arise with regard to the final form of future relations between the EU and Great Britain and the

T50 Risk profile of the Jenoptik Group 2019

	Group risk assessment	
	2019	2018
Strategic risks		
Market development	Medium	Medium
Product development (incl. R+D)	Medium	Medium
Corporate development (portfolio and structure)	Medium	Medium
Organizational setup (processes and resources)	Medium	Medium
Operational risks		
Supply chain management	Medium	Medium
Safety and environmental protection	Low	Low
Production (incl. quality management)	Medium	Medium
Marketing and sales	Medium	Medium
Patents and IP rights	Low	Low
Human resources management	Medium	Medium
IT	Medium	Medium
Compliance	Medium	Medium
Legal affairs	Low	Low
Real estate	Low	Low
Financial management risks		
Accounting	Low	Low
Finance management	Low	Low
Controlling	Low	Medium
Taxes	Low	Low
Total risk	Medium	Medium

associated legal consequences of Great Britain's withdrawal from the European Union after the end of the transition period. We are therefore continuously assessing the direct impacts of Brexit on Jenoptik's business. We have, for example, conducted an analysis of our supply chains and supplier management. Suitable measures have already been initiated to avoid bottlenecks; alternative suppliers have been evaluated and adjustments made to working capital management, for example. At the same time, we also analyze the impacts of potential financial management factors such as tariff or export restrictions or exchange rate fluctuations, which we counter with appropriate hedging mechanisms.

Continuing high levels of public debt in parts of Europe and associated budgetary consolidation are also hampering investment by both public sector clients and consumers. In the course of active risk management, we also develop suitable measures to counter political uncertainties within our business processes wherever possible.

Jenoptik is exposed to intense competition throughout its business. The company counters the risk of being squeezed out by competitors with, for example, innovative USPs, specific and flexible adjustments to its product range, or customization options for existing products and solutions. In addition, mergers and acquisitions on the markets we target may further exacerbate the competitive environment. Potentially improved cost structures at competitor companies, and the resulting increasing pricing pressure, may have negative effects on group earnings. We counter this risk by continuously analyzing our portfolio, i.e. by determining whether and how specific acquisitions may usefully complement our product range and generate lasting profitable growth. M&A activities and the integration of acquisitions pose a fundamental risk to the Group. We actively counter this risk with extensive due diligence and a structured integration process individually tailored to the acquired company.

Operational risks and opportunities were assessed with low to medium risk indicators for the whole Group.

The increasing number of complex international projects, particularly those of a technically challenging nature, place enormous operational demands on all parts of the business. Supplier management and production are predominantly responsible for assuring the quality of our products. The use of isolated single-source suppliers may increase the risk of dependency, but ongoing refinement of our purchasing and production organization aims to ensure that our customers continue to receive high-quality, tailored solutions in good time.

Global IT systems and processes are of great significance to Jenoptik in all its divisions. The security and availability of these systems have top priority. Data is stored on redundant storage media and secured against data loss by means of a partially tiered archive and backup system enabling rapid data recovery in the event of a crisis situation. The world is seeing a rise in the number of IT threats, e.g. in the form of phishing attacks, in which sensitive corporate information is obtained by third parties by means of deception. Jenoptik actively takes both preventive and corrective action to reduce the risk of cyber attacks: as examples, all IT security issues are coordinated by the Chief Information Security Officer, existing processes are continuously scrutinized and adjusted, technical measures are implemented, and employees in positions of responsibility are provided with internal training. Jenoptik took out cyber risk insurance in 2018 to cover the residual risk of data loss or restricted use of the IT infrastructure and limit any resulting financial impacts on the Group.

Our employees make the most important contribution to the company's success. As an international technology company, we need dedicated and highly qualified colleagues – now and in the future. Due to the difficulties in attracting qualified employees, particularly in Germany, Jenoptik is also exposed to the risk of not being able to fill vacant positions as they arise. We counter this risk with a large range of targeted measures, including the establishment of a succession planning process for management positions, leadership and professional career programs, an employer branding campaign, and both attractive and personalized incentive and loyalty schemes.

In view of Jenoptik's international business operations, one general risk is non-compliance with legal, ethical, and contractual requirements. As a result of adjustments in the compliance organization as well as better established structures and processes in the divisions, the risk was reduced compared with the prior year and is now in the low risk range. As a company with customers and business partners in numerous countries, clients in the public sector and involvement in the US defense market, Jenoptik must grapple with many, partly evolving, compliance requirements in different markets. Although the necessary organizational structures and measures to minimize potential compliance violations have been implemented with a group-wide export control and data protection organization, the central Compliance and Risk Management department, and corresponding processes, such violations cannot be entirely ruled out. Strict adherence to the compliance program and the continuous development of the compliance management system aim to close up any process gaps and ensure that processes comply with laws and regulations.

Financial management risks were assessed on average as low throughout the Group in 2019. The issues cited below also include the segment-specific risks. One key task of the central Treasury department is to safeguard and coordinate the financing of all group companies over the long term. Jenoptik has good internal financing and access to alternative, external financing options. Currency-related risks arise from the Group's international activities. These risks are identified by the central Treasury department in collaboration with the group companies and are controlled with appropriate measures such as the conclusion of currency forward transactions.

The risk of changing interest rates is in part reduced by the conclusion of fixed interest loans. In addition, interest rate swaps are used to reduce the risk of changing interest rates for loans with variable interest. A variable interest rate was consciously agreed for a part of the loans in order to profit from the current low interest rate environment.

Group-wide liquidity planning aims to identify liquidity risks at an early stage and systematically minimize them. Regular Treasury reports and a monthly rolling liquidity forecast have been established for liquidity control and monitoring.

With regard to the use of financial instruments, we refer to the Notes, section 3.8, from page 155 on

In the Controlling and Accounting departments, opportunities predominantly arise from the continuing expansion and optimization of the standardized ERP system, and from the centralization of accounting activities for continuous quality improvement. Thanks to the establishment of new controlling instruments based on modern IT solutions, we counter the risk of lacking business-critical information in internal reporting.

Risk and Opportunity Profiles of the Segments

The risk and opportunity profile of the Jenoptik Group was derived from the various risk profiles of the photonics divisions and VINCORION. Financial management risks are aggregated in the group risk and opportunity profile. As a result of the changes to the group structure carried out in early 2019 (see the Group Structure chapter, page 72), we have also adjusted our risk and opportunity reporting. The Light & Production and Light & Safety divisions are now reported separately rather than being aggregated in a single segment. As a result, the prior-year figures for the two divisions represent the risk values for the former Automotive and Traffic Solutions divisions. T51

Light & Optics

Strategic risks and opportunities primarily arise on the basis of demand in the semiconductor equipment industry, which is subject to cyclical developments. They may have a significant positive or negative effect on results. Beyond this, the focus on larger customers is generally associated with the risk that poor business performance or the loss of customers may impact severely on revenue and earnings. On the other hand, the loyalty of such customers enables profitable revenue growth due to economies of scale. Although there is always an inherent threat posed by the growing number of mainly Asian competitors and the trend among suppliers and customers toward forward and/or backward integration, growth may still be achieved through the continuous expansion of existing competitive advantages and internationalization. In addition, the Light & Optics division addresses this risk by continuously reviewing vertical integration with the aim of supplying more system and service solutions to its customers.

The growing importance of digitization and the related demand for applications and devices, both from private households and companies, provides Light & Optics with major opportunities for the coming years. Demographic developments in industrialized nations and the relentless progress being made in medical technologies, particularly in our core markets of Asia and the Americas, are also boosting demand for product solutions. Due to ongoing development of the product portfolio and Jenoptik's greater market orientation we can better meet our customers' requirements. Increasing financial problems in healthcare systems, however, are resulting in growing price pressure among suppliers. The trend toward increasing complexity in the market environment makes clear and reliable forecasts more difficult, especially in innovative areas of application.

Customers' specific requirements result in particular operational risks and opportunities in supplier management and production processes. For many components of the division, there is only a very limited number of qualified suppliers that are able to meet the necessary specifications in a timely manner. When such a supplier is lost or the customer changes specifications, this can result in corresponding problems in the development or production process. Partners are subject to ongoing qualification with the help of strategic purchasing to develop a stable base of suitable suppliers in the medium and long term. Specific customer requirements, especially regarding the quality and growing number of complex high-end products, also lead to increased demands on production technologies, which are met through targeted expansion or replacement investment. If necessary investments are delayed, there is a risk that quality and performance requirements may not be met to the agreed schedule, or at all, resulting in either delivery delays or non-acceptance by the customer.

T51 Risk profiles of the segments 2019

	Risk assessment							
	Light & Optics division		Light & Production division		Light & Safety division		VINCORION	
	2019	2018	2019	2018	2019	2018	2019	2018
Strategic risks								
Market development	Medium	Medium	Medium high	Medium high	Medium	Medium	Medium	Medium
Product development (incl. R+D)	Medium	Medium	Medium	Medium	Medium high	High	Medium	Medium
Corporate development (portfolio and structure)	Medium	Medium	Low	Medium	Low	Medium	Medium	Medium
Organizational setup (processes and resources)	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Operational risks								
Supply chain management	Medium	Medium	Medium	Medium	Medium	Medium high	Medium	Medium
Safety and environmental protection	Low	Low	Low	Low	Low	Low	Low	Low
Production (incl. quality management)	Medium	Medium	Low	Low	Medium	Medium	Low	Low
Marketing and sales	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Patents and IP rights	Low	Low	Low	Medium	Medium	Medium	Low	Low
Human resources management	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
IT	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Low
Compliance	Low	Low	Medium	Medium	Medium	Medium high	Medium	Medium
Legal affairs	Low	Low	Very Low	Low	Medium	Medium	Low	Medium
Real estate	Low	Low	Very Low	Low	Low	Low	Low	Low
Financial management risks								
Accounting	Low	Low	Low	Low	Low	Medium	Low	Low
Finance management	Low	Low	Low	Low	Low	Low	Low	Low
Controlling	Low	Low	Low	Low	Medium	Medium	Low	Low
Taxes	Low	Low	Medium	Medium	Medium	Medium	Low	Low
Total risk	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium

Light & Production

The strategic risks and opportunities in the Light & Production division are strongly influenced by the development of the automotive industry and its investment schedule. Current challenges the industry is facing are based on technological shifts and sales trends and may pose risks to our success as a supplier to this industry, which we are proactively countering with the aid of the division's new strategic focus and a corresponding adjustment to its product range, in addition to selectively strengthening our positions as a turnkey supplier of automated production solutions and a systems supplier for production metrology and industrial imaging applications.

In terms of operational risks and opportunities, the increasing internationalization of projects and parts of the value chain is reflected in increased demands on supplier management, manufacturing, marketing, sales, and HR management. The systematic expansion of efficient service and sales structures is of crucial importance to achieving growth targets, particularly abroad.

By building up a broad sales partner organization, we are consistently increasing our access to new customers and markets in Asia. The resulting opportunities are offset by stricter compliance requirements. We are actively countering the risks by adopting suitable measures such as business partner audits and training, as well as ensuring close coordination between those responsible in the region, the division, and the central Compliance department.

Innovations and process adjustments in implemented ERP systems may presently still cause isolated delays within the organization. However, the consolidation of the system landscape means that the opportunities outweigh the risks in terms of efficiency and improved control options.

Light & Safety

Uncertain economic and political developments around the world currently represent the main strategic risks and opportunities for the Light & Safety division. As a supplier to international public-sector customers in particular, Jenoptik is exposed to both the political and economic development of the respective countries. Particularly in the event of unrest, changes in government, or in connection with Brexit, this may result in projects being delayed or even stopped entirely. By contrast, improvements in the political situation in certain sales markets and the economic prosperity of the countries are opening up opportunities to better serve the evolving demand for traffic safety technology. Conflicting legal decisions made by German courts regarding traffic monitoring systems, including our TraffiStar S350, may adversely affect both revenue and earnings. To minimize this risk, the division has submitted revised operating software to the Physikalisch-Technische Bundesanstalt (PTB) for review.

At the same time, the growing demand for safety technologies, intelligent traffic flow solutions ("smart cities"), the levying of congestion charges for the use of inner-city traffic infrastructure, and compliance with emission values for air pollutants, especially in metropolitan areas, present good opportunities for the division. We want to improve our strategic competitive position by continuously optimizing our product range and developing a standardized platform to cover the above-mentioned future issues.

The operational risks and opportunities are currently dominated by the ongoing possibility of a disorderly Brexit. Great Britain's withdrawal from the European Union could particularly impact on the Light & Safety division, which maintains a production and development site in the country. As stated above, we continue to analyze the potential consequences and have already prepared a range of measures. At the time the Risk and Opportunity Report was prepared, however, the potential risks were still not quantifiable in full. We therefore cannot rule out the risk that unscheduled measures and delays in our business processes could result in higher future costs, which would negatively impact on the division's earnings.

The division's supply chain is exposed to a range of risks: both the risks surrounding Brexit and the fact that the division has a very limited number of qualified suppliers. If one of these suppliers is lost or products are discontinued, problems may arise due to the need for new approvals, modified production processes, or delivery bottlenecks. Strategic Purchasing helps the division to qualify partners and to ensure a stable base of suitable suppliers in the medium and long term.

In addition, the Light & Safety division is compelled to meet strict compliance requirements, whether imposed by customers or legislation. They entail the risk of delays in our business processes or of additional costs that could adversely affect the business's earnings. In the field of traffic safety technology, the requirements of the General Data Protection Regulation are of particular significance. They can now be better met thanks to the establishment of a standardized group-wide data protection organization.

VINCORION

Strategic risks and opportunities. The defense market is strongly influenced by political decision-making, in particular by governments' budgetary positions, and by the export license policies of the German government. This also applied to the restrictions in force in the 2019 fiscal year, particularly regarding the Middle East, which pose risks to our ability to deliver to customers at short notice. Associated with this is the risk that our customers will lose confidence in our reliability. By contrast, the requirement that NATO member states spend two percent of their gross domestic product on defense and the consideration by the European Union's member states to establishing a common armaments policy are both likely to stimulate the market environment. The planned increase in the defense budget and the associated growth in investment by the German government may result in higher order intakes for VINCORION. In terms of corporate development, the potential risk of a dependency on political decisions and government budgets will continue to be countered by the targeted expansion of the product portfolio for civilian and, in particular, international markets. The processes and resources required for this must be gradually adapted within the course of strategic organizational development. Marketing and sales activities are also being stepped up to fully exploit the relevant growth options. The new VINCORION brand is helping us to better target our customers.

Since a large proportion of revenue generated by VINCORION is the result of project business, product developments and launches represent both a huge risk and a huge opportunity. Long-term development projects present great potential to generate future revenues. However, there are also inherent technological and organizational risks that may jeopardize the timely success of the development.

Based on current information, the decision taken by Airbus to discontinue production of the A380 in 2021 will not have any material impact on VINCORION's business in 2020 and 2021, especially as the spare parts business and repair and maintenance work on the A380, which will remain in service, will continue to contribute to our earnings. Due to the business model being focused on long-term customer relationships and long product life cycles, supplier performance is an important success factor. As a result, good cooperation to date also presents opportunities to establish VINCORION as a supplier for further Airbus aircraft.

Operational risks and opportunities arise primarily from a strong dependency on single sources in a number of cases, which may endanger future business opportunities. We counter these risks through active supplier management.

The consolidation of VINCORION's ERP systems and an independent IT strategy that better takes into account the specific IT requirements in the defense sector offer opportunities in terms of efficiency, improved control options, and compliance with other information security standards (e. g. NIST).

General Statement by the Executive Board on the Group's Risk and Opportunity Situation

Overall, in terms of strategic, operational, and financial management risks, the Jenoptik Group's exposure to risk is largely unchanged on the prior year, and currently remains at the lower end of the medium risk range.

The strategic risks that were assessed as "medium" are offset by adequate opportunities or are countered by measures that enable lastingly beneficial strategic positioning. This is particularly the case for the risks in the "product development" and "organizational setup" subcategories. The risks in the "market development" category are attributable to external sources of risk that are also countered by appropriate strategic measures. The risks in the "corporate development" subcategory remained stable compared to the prior year, also due to the acquisitions of Prodomax, the OTTO Group, and INTEROB, as well as other structural measures which strengthen our portfolio.

In the area of operational risks, the successful development and expansion of the sales structures is of crucial importance. The same applies to supplier management and production, which demand special attention due to the high technological requirements in an international market environment and, in some cases, associated single source procurement.

The Group's financial management risks remain at a low level on average. By improving the tools and processes provided, the risk assessment for the "controlling" subcategory was also downgraded from "medium" to "low".

Overall, it can be said that the realignment of the Group's strategic market segments (with the help of "Strategy 2022") may gradually help to reduce the existing strategic risks. The growing importance of the photonics industry and the strong related demand for applications and devices, both from private households and companies, continues to offer Jenoptik with the potential for good further growth.

Overall, there is an satisfying relationship between risks and opportunities in the Jenoptik Group. No risks were identified that may jeopardize the continued existence of the Group.

Forecast Report

Framework Conditions: Future Development of the Economy as a Whole and the Jenoptik Sectors

For the current year, the International Monetary Fund (IMF) forecasts global economic growth of 3.3 percent in its World Economic Outlook as of January 2020, 0.1 percentage points down on its forecast in fall 2019 but better than in the prior year. Hopes that growth may pick up a little faster are based on the initial agreement in the trade conflict between China and the US, a loose monetary policy around the world, and diminishing concerns about Great Britain's withdrawal from the EU. Despite this, however, trade uncertainties and international tensions remain. Due to problems in emerging countries such as India, the IMF adjusted its 2021 forecast from 3.6 to 3.4 percent. Economic growth in the US is expected to weaken in 2020, but will pick up somewhat in the euro zone, according to the IMF.

Tariff sanctions could also interrupt global supply chains in the technology sector. Other risks identified by the IMF include tensions between the US and Iran, which could adversely affect global oil supplies, and growing social unrest in many countries.

Economists believe that the economic impacts of the outbreak of coronavirus and the extent to which it will spread cannot yet be fully quantified. Measures such as isolation of entire regions, production stops and international supply disruptions could effect in particular export-oriented countries, especially in the automotive industry and the chemical, textile and electronics sectors. At the beginning of March 2020, the IMF lowered its economic forecast for the global economy and China due to the spread of the virus. Global economic growth in 2020 is expected to be 0.1 percentage points lower than forecast still in January. Global economic growth in 2020 is expected to be lower than in the previous year (2.9 percent). An exact forecast is currently difficult to make. In January, the IMF had still predicted growth of 3.3 percent.

T52 Gross domestic product forecast (in percent)

	2020*	2021*
World	3.3	3.4
US	2.0	1.7
Eurozone	1.3	1.4
Germany	1.1	1.4
China	6.0	5.8
India	5.8	6.5
Emerging countries	4.4	4.6

Source: International Monetary Fund, World Economic Outlook, January 2020
* Forecast

The downside risk is also clearly reflected in China: in February, the IMF reduced its forecast for Chinese economic growth to just 5.6 percent for the current year instead of the 6.0 percent predicted in January. The prerequisite is that the virus weakens and the Chinese economy returns to normality in the second quarter of 2020.

In recent months, the export trade in the US did not make enough contributions to growth. According to the US Treasury Department, the crisis at Boeing, in particular, is likely to have a negative impact on gross domestic product (GDP) this year due to the worldwide grounding of the 737 Max aircraft, and growth could slow down by 0.5 percentage points. It is therefore expecting growth to come in at 2.5 percent for 2020 (prior year: 2.3 percent); the IMF forecasts 2.0 percent. According to the US Federal Reserve (Fed), business worries are likely to last until a second trade agreement has been signed by the US and China. The tariffs that have been imposed will then be reduced or removed. Experts, however, are not expecting a further agreement to be signed prior to the US presidential election in November 2020.

In the first partial trade deal with the US, China committed to importing at least 200 billion dollars more of US goods for two years. In view of the restrictions imposed by the coronavirus, the timing and extent of this commitment is questionable.

For Germany, the IMF forecasts year-on-year GDP growth of 1.1 percent in 2020 – 0.1 percentage points more than in its prior forecast – and 1.4 percent in 2021. This would be more than double the 0.6 percent achieved in 2019, the weakest growth in six years. German industry, which is export-oriented, is likely to benefit from the stabilization of the global economy. In January, the German government raised its GDP forecast for 2020 to 1.1 percent. Institutes and a number of economic experts, however, are expecting less than 1 percent growth in the stabilizing German economy. In the current fiscal year, a "calendar effect" caused by a high number of work days, could provide an artificial boost of 0.4 percentage points. In view of Germany's dependence on exports and global trade, economic experts expect the coronavirus to delay the economic upswing in Germany; some observers, such as Deutsche

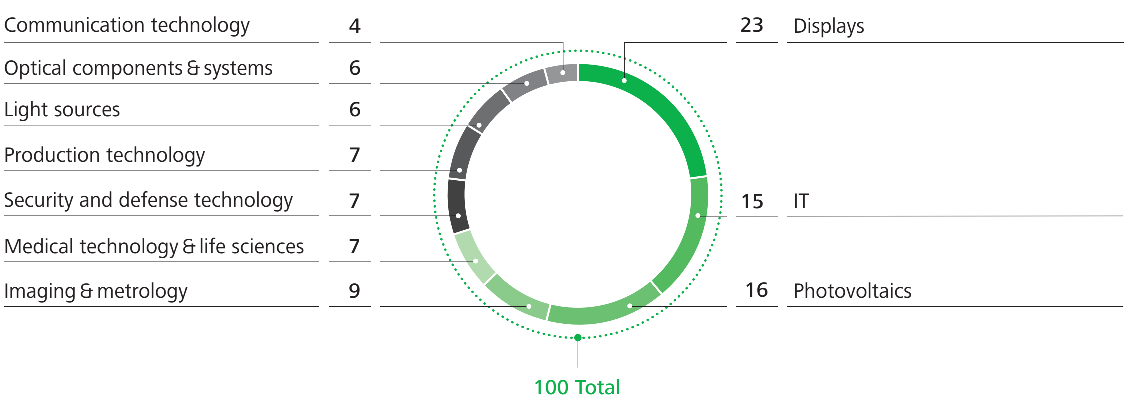
Bank, forecast a decline of 0.2 percent in the first quarter compared to the previous quarter making a technical recession, i. e. two quarterly declines in a row, probable – others see a renewed stagnation as last seen at the end of 2019. T52

Thanks to digitization, the photonics industry remains part of a growing environment, according to the Spectaris industry association. On the 60th anniversary of the laser, the use of lighting technologies is making an essential contribution to global market growth and has become indispensable for many innovations, e. g. as a basic technology for autonomous driving, for industry 4.0 and big data applications, and for the smart laboratory in analytical and biotechnology. Quantum technology may provide photonics with its next source of growth momentum. Further growth is expected in the photonics industry, according to Spectaris, in the pursuit of climate protection and sustainability. Light-based technologies deployed in the service of "green photonics" are key here. The use of photonic solutions will save 3 billion tons of CO_2 emissions by 2030, according to Spectaris. The market research company MarketsandMarkets expects the global photonics market to grow from 556.4 billion US dollars in 2018 to 780.4 billion US dollars by 2023, with an average annual growth rate of 7.0 percent.

The Photonics21 technology platform published a position paper on the promotion of optical technologies in June 2019. The paper details commitments by the European photonics industry to invest up to 100 billion euros in research and development throughout the next phase of the "Horizon Europe" research initiative (2021 to 2027) when the European Commission launches a new photonics PPP (public-private partnership). This PPP will double the Commission's annual commitment to 200 million euros, equating to 1.4 billion euros in seven years. This investment is required to ensure competitiveness in comparison with China, South Korea, and the US. Europe is in a good position to accelerate initiatives such as artificial intelligence, high-performance computing, smart cities, quantum communication, and quantum computing, all of which depend on photonics as the key enabling technology.

The potential opened up by digitization is set to boost the medical technology industry, according to Spectaris: the use of digital components alone is expected to generate revenue of 15 billion euros by 2028; the figure for 2018 was 3.3 billion euros. This would equate to an annual increase of 16 percent in this segment.

G24 Global photonics market in 2020 (in percent)



Source: VDMA, ZVEI, Spectaris: Photonics Industry Report 2013

Following a weak 2019 for the semiconductor industry, with global revenues amounting to 412.1 billion US dollars, the SIA industry association is again expecting moderate growth in the next two years. The market is set to recover in 2020 and grow 5.9 percent, followed by 6.3 percent in 2021. In the future, the automotive industry will be one of the industry's key sales markets. The semiconductor equipment market will also recover in 2020, according to the SEMI industry association. Fueled by new projects in China, by the demand for advanced logic and foundry, and, to a lesser extent, memory chips, revenue is expected to grow by 5.5 percent to 60.8 billion US dollars, followed by a record year with 68.8 billion US dollars. SEMI expects all industry sectors to recover. T53

The German Mechanical Engineering Industry Association (VDMA) is forecasting a drop of 2 percent in production in the machinery and plant engineering industry for 2020. Reasons for this include continuing global economic weakness, trade conflicts and protectionism, and structural changes in key customer groups. According to the VDMA's assumptions, machines with a total value of 218 billion euros will be produced in the current year. The industry still needs to be prepared to deal with ongoing pressure, as no upswing is presently in sight.

The trend toward increasing automation shows no sign of abating: Within the robotics industry, the International Federation of Robotics (IFR) is optimistic about the years through 2022. Thanks to continuing trend towards automation, the IFR forecasts average annual global growth of 12 percent from 2020 on.

The automotive industry is still facing problems. The German VDA industry association is expecting the loss of 79,000 to 88,000 jobs in Germany. A weak economy and a drop in demand at car manufacturers also affects the outlook for suppliers:

T53 Semiconductor equipment: Global revenue forecast

Year	in billion USD	Change on prior year in %
2021**	66.8	9.8
2020**	60.8	5.5
2019*	57.6	– 10.5
2018	64.4	14

Source: Semiconductor Equipment and Materials International (SEMI)
* provisional calculation
** forecast

major German automotive suppliers do not expect global production of passenger cars and light commercial vehicles to pick up significantly in the next five years. From 2020, industry experts are expecting several mergers in the car industry and further consolidation, especially in the low-margin volume segment. Over the long term, mobility in general, the optimization of combustion engines, the switch to electromobility, and driver assistance systems will remain global drivers of growth. For the time being, the EU Trade Commission has stated that the announced 25 percent punitive tariffs on car imports to the US are currently on hold. The European Union's regulation on exhaust emissions will come into force in 2020, with 95 percent of all new registrations having to comply with a limit value for carbon dioxide. According to industry experts, a short-term slump in production and sales due to coronavirus can be offset in China's car market in the current year. However, if demand and supply chains are affected for a longer period of time, car sales in China could reach a low point in 2020 and global production could continue to drop to 76.9 million passenger cars (prior year 80.1 million passenger cars), according to VDA.

In the field of traffic safety, a motion aiming to introduce a speed limit of 130 kilometers per hour on German autobahns was rejected by the Bundestag and the Bundesrat. Nevertheless, a number of parties and the Federation of German Consumer Associations expect that in future, as in other European countries, there will be a speed limit on autobahns (motorways) in Germany, not only to better protect the climate and reduce accidents and fatalities, but also to enable automated driving on the autobahn. According to the German Federal Government, however, there are no plans for a general speed limit on German autobahns. In its "Road Safety Market by Solution, Service, Region" report, US market research company MarketsandMarkets believes that the global traffic safety market will grow from 3.0 billion US dollars in 2019 to 4.7 billion dollars in 2024, an average annual increase of 9.3 percent. Key drivers include the increase in numbers of people living in cities, growing mobility and motorization, a rising number of traffic accidents and deaths, and more government initiatives to promote road safety. On a regional level, the market is growing most strongly in Asia / Pacific as demand for traffic safety solutions in countries such as China, Japan, and Australia increases. Automatic number plate recognition (ANPR) is becoming more important as a means of traffic monitoring and prevention: The technology could also be used to monitor rights to enter or restricted zones, such as those in which diesel vehicles are prohibited in Germany. Before this can be done, the necessary (regulatory) political conditions first need to be created.

The future development of the aviation industry will in part be adversely affected by the general downturn in the global economy and the political environment. The Boeing 737 Max aircraft is not expected to fly again before the summer of 2020 at the earliest. According to its own statements, European aircraft manufacturer Airbus will not benefit from the crisis at Boeing in the short term, as the company's A320neo jets are already sold out through 2025. Aircraft manufacturer Airbus is forecasting demand for 39,210 new planes over the next 20 years, a doubling of the world's present fleet to more than 48,000 jets. Its long-term forecast for average annual growth, updated annually, fell just minimally, from 4.4 to 4.3 percent. In its "Market Outlook" Boeing is expecting that global demand will rise to around 44,000 new commercial aircraft in the next 20 years, mainly due to the steadily increasing demand for air travel in industrialized and emerging countries and the necessary replacement of old aircraft with new, low-fuel jets. In addition, there may be new rules for the certification of aircraft, which would no longer involve only the country of production approving the aircraft, but would also require other national authorities to be involved in this process or issue separate approvals. This would significantly delay the market launch of new aircraft. Aircraft manufacturer Bombardier is withdrawing from the construction of commercial aircraft and selling its shares in the Airbus A220 program to the majority shareholder Airbus and the Canadian province of Quebec. Bombardier wants to retain the Learjet business aircraft.

Bombardier is also facing major changes in the rail industry: In February 2020, it was announced that a merger of Bombardier's train division with the French company Alstom was imminent. This would create a new railway technology group with revenue of around 15 billion euros. Following the failed merger of Alstom and Siemens Mobility in 2019, this would be a new attempt to consolidate the industry in its efforts to counter competition from Chinese companies.

The planning of longer-term projects in the security and defense industry in Germany will be affected by current export restrictions until at least the spring of 2020, as the government has again extended its export ban on Saudi Arabia and other nations involved in the Yemen war to March 2020. Following the military offensive in Syria, the German Federal Government does not intend to issue any new export licenses for armaments that could be used in Syria by Turkey. Together with France, the German Federal Government agreed in October 2019 on common guidelines for future arms exports based on the "de minimis" rule with a threshold of 20 percent. This means that Germany will not block the export of armaments arising from joint Franco-German projects if less than 20 percent of the components in these goods are made by German companies. Since 2017, armaments projects at European level have been managed within the framework of PESCO (Permanent Structured Cooperation): in late 2019, EU defense ministers agreed on 13 new projects, including one on European multi-purpose missile defense.

The US defense budget for 2020 was raised again: at 738 billion dollars, it is 20 billion dollars higher than in 2018. For 2021, 740.5 billion US dollars have currently been earmarked for defense.

Defense spending in Germany is expected to come to around 50.3 billion euros in the current year. Germany will decide on a successor to the Tornado fighter jet in 2020. The choice is between the American F-18 or the European Eurofighter, which Airbus says is needed as a technological bridge to the long-term European development project for the FCAS fighter jet. In their joint armaments cooperation arrangement to build a new battle tank, Krauss-Maffei Wegmann and Nexter, already affiliated in a holding company, agreed with Rheinmetall to work together – with no merger – in a consortium. The tank will replace the Leopard 2 and is due to go into service in 2038. Prior to this, the German government plans to acquire 80 new Leopard 2 tanks worth around 1 billion euros, as provided for in a resolution passed at the end of 2019.

Expected Development of the Business Situation

Planning assumptions for the Group and the divisions

The forecast for the future business development was based on the Group planning undertaken in the fall of 2019 and the forecast revised in early 2020.

Jenoptik has been operating in the following reportable segments since January 1, 2019: the three photonics divisions Light & Optics, Light & Production, and Light & Safety, and VINCORION.

Separate plans from the divisions, VINCORION, and the operational business units are the starting point, these are reconciled and integrated in the group planning. Potential acquisitions, divestitures, and exchange rate fluctuations are not included in the planning. On the other hand, the fact was taken into account that a joint operation (HILLOS GmbH) is no longer proportionately consolidated as of the 2020 fiscal year due to its changed accounting as joint venture. As a result, its contributions to revenue and earnings are no longer included in the individual items of the income statement, but are instead reported in the result from other investment. The forecast also includes the impacts arising from the acquisition of INTEROB in early 2020. Revenue and earnings, including the impacts arising from the purchase price allocation, will be consolidated on a pro rata basis in 2020.

The system of key performance indicators includes the revenue, EBITDA margin, order intake, cash conversion rate, and capital expenditure. Other indicators will also be regularly compiled in the future and are used by top management for informational purposes.

In 2020, we will continue to pursue our "Strategy 2022" – which focuses on photonic technologies – and implement measures to realize its objectives. In the process, we are concentrating on three building blocks – focusing, innovation, and internationalization.

Overall, the Jenoptik Group anticipates consistently good business performance in the Light & Optics division in 2020. We will enable this by stepping up our activities as a global OEM supplier of solutions and products based on photonic technologies, by focusing on key sales markets, by growing our global reach, and with innovative products and a larger range of integrated system solutions. Market observers and key customers expect demand in the semiconductor equipment market to increase in the current year. In this regard, the division will benefit from its range of optical and micro-optical system solutions for semiconductor production. In the field of biophotonics (medical technology and life science), existing cooperation arrangements with key international customers will be expanded in the current fiscal year. Following a decline in 2019, the division will make various efforts to optimize business in its Industrial Solutions area in the current year. In order to support good overall development in the Light & Optics division and broaden our presence in our core markets, the range of optical solutions for information and communication technologies is also growing in significance. In the current fiscal year, the division will also continue to invest in its operational performance and sales to support future growth and continue the process of internationalization.

Business performance in the Light & Production division, especially in the second half-year, showed a mixed picture. The Automation & Integration area saw very positive growth, which is due to continue in the current year. The Metrology and Laser Material Processing areas were affected by a challenging market environment with an order intake that was weaker than expected. Despite signs of a slight improvement in the area of laser material processing at the end of the year, business is expected to be rather subdued in the first half of 2020 due to the longer lead times for these projects. Growth may then be achieved in the second half-year 2020.

In the metrology sector, we assume that the trend toward integrated production-related metrology will continue. This plays a particularly important role when precision parts are manufactured, such as those required by the automotive industry for efficient and environmentally-friendly drive systems. We also continue to develop from selling stand-alone machines to supplying modular systems and solutions for customer manufacturing in the B2B segment, thereby contributing to boost our customers' productivity. In the laser machines business, the division primarily focuses on 3D material processing of a wide variety of metal and plastic components, including natural materials, in addition to the established systems for plastics processing in the automotive industry. In January 2020, Light & Production acquired the Spanish company INTEROB, like Prodomax and FLA a specialist in the design, construction, and integration of custom automation solutions and robotics applications, thereby taking a further step on the road to becoming an integrated supplier of high-tech production environments. The acquisition also gives the division both regional and technological potential for growth. It will also help it to expand its international reach.

See the "Control System" chapter for more information on the key performance indicators

71 Combined Management Report 136

See the "Business Model and Markets" and the "Targets and Strategy" chapters for more information on the strategy and the new division structure

See the Framework Conditions chapter for more information on the future development of the Jenoptik sectors

The Light & Safety division is expecting good growth in the 2020 fiscal year. Orders secured in the US will help to bolster this growth, and further projects are in the pipeline. New products, investment in customer relationships, e. g. by expanding the sales team, and improvements in the partner network will support the business performance. In addition, local project management and service structures will be strengthened to further improve direct customer support.

The traffic service provision business model will be expanded. The civil security business is another area that is growing in significance. We will expand our product range in 2020, particularly in the area of traffic monitoring, and broaden our range of software solutions. Additional new functions are also being integrated in existing systems to reflect the required interdependence of applications such as law enforcement, facial recognition, or automatic number plate recognition (ANPR). There are plans, for example, to push on with development of a modern, modular system platform. Solutions were delivered to the first key customers back in 2019, with full roll-out scheduled to start in 2020. Deep learning technology is due to be used to a greater extent in safety and civil security applications. On a regional level, Jenoptik is primarily expecting growth momentum benefiting the Light & Safety division to come from the Americas, Europe, and the Arabian region.

Following a stable development of revenue and a marked margin improvement in the fiscal year just past, VINCORION is expected to generate improvements in both figures on the basis of a good 2019 order intake and the current project pipeline.

Its business is predominantly project-based and geared toward the long term. European defense spending is picking up again. Various major new procurement projects are also planned in Germany, key criteria being networkability, automation, and energy efficiency. At the same time, a potentially more restrictive export policy under the present Federal Government in Germany could impact on or delay projects. In the medium term, a significant increase in investment for the German armed forces has political support, but we do not expect this to have any effect on our business in the short term, as political decision-making processes are generally highly protracted. In the years ahead, it may contribute to higher revenues. Beyond this, VINCORION is looking to further increase the share of its systems used in civilian fields. These include system solutions for civil aviation. We assume that new in-house developments, such as the heated floor panel for passenger aircraft and the electric rescue hoist for helicopters, will also contribute to growth. Internationalization also remains a key topic in 2020; foreign business is due to expand steadily, particularly in North America and Asia / Pacific.

Earnings position forecast 2020

Based on good order intake growth in the fourth quarter of 2019 and the continued good performance of the semiconductor equipment business and the Automation & Integration area, the Executive Board expects further growth in 2020. Due to increasing uncertainties, however, it has become more difficult to make reliable statements regarding future developments. Our scheduled growth presupposes that political and economic conditions do not worsen. In particular, these include economic trends, the potential impacts of Brexit, regulations at European level, export restrictions, and further policy developments in our sales markets. At present, it is also not possible to assess to what extent the spread of coronavirus will negatively affect business of Jenoptik in the current year. The forecast below was made on the assumption that potential negative impacts on the economy, supply chains, and sales markets in connection with the coronavirus will not worsen.

Major portfolio changes were not included in the forecast, which does, however, account for the pro rata consolidation of INTEROB, acquired in early 2020. By contrast, the contributions to revenue and earnings from HILLOS GmbH (2019 revenue: almost 20 million euros) are no longer included.

For 2020, Jenoptik is expecting revenue growth to be in the low single-digit percentage range (prior year: 855.2 million euros).

At present, the Group is expecting EBITDA (earnings before interest, taxes and depreciation / amortization, incl. impairment losses and reversals) to grow in the current fiscal year (2019: 134.0 million euros). The integration costs associated with the acquisition of INTEROB and the impacts arising from the purchase price allocation have already been taken into account. The EBITDA margin is expected to be around 16 percent.

The order intake for a period is in part affected by major orders, particularly in VINCORION and in the Light & Safety division, and increasingly also in the Light & Production division. In the past fiscal year, Jenoptik received new orders worth 812.6 million euros and had thus built up a good order base at year-end 2019, particularly following a strong fourth quarter. For the current fiscal year, Jenoptik expects the order intake to be significantly higher than in the prior year.

Also worthy of note is that Jenoptik had frame contracts worth 49.9 million euros at the end of 2019, which are not included in the order intake or backlog. 68.1 percent of the order backlog as of December 31, 2019 is due to be converted to revenue in 2020 (31/12/2018: 79.2 percent).

In 2020, the Light & Optics division will compensate for the loss of HILLOS GmbH's revenue contribution of some 20 million euros, and is therefore expecting stable development. EBITDA is expected to rise significantly.

The Light & Production division expects revenue growth in the low double-digit percentage range, to which INTEROB, acquired in early 2020, will also contribute. EBITDA is due to grow more strongly than revenue, which will help to improve profitability. In this division, too, the accuracy of forecasts is influenced by the rising share of international projects, which are increasingly subject to revenue recognition over time as specified in IFRS 15.

The Light & Safety division also expects growth in 2020, with a revenue increase in the mid single-digit percentage range. EBITDA is expected to see slight growth. This lower growth rate compared to revenue is in part due to the development of a standardized product platform and the expenditure associated with this.

Based on significant order intake growth, especially in the fourth quarter of 2019, and the current project pipeline, VINCORION is expecting revenue to increase in the mid single-digit percentage range in the 2020 fiscal year. EBITDA is due to grow in line with revenue.

T54 Targets for Group and divisions (in million euros)

	Actual 2019 (incl. Hillos)	Forecast 2020 (without major portfolio changes; incl. INTEROB; excl. Hillos)
Revenue	855.2	Growth in the low single-digit percentage range
Light & Optics	350.0	Stable development
Light & Production	228.9	Growth in the low double-digit percentage range
Light & Safety	108.7	Growth in the mid single-digit percentage range
VINCORION	164.8	Growth in the mid single-digit percentage range
EBITDA / EBITDA margin	134.0 / 15.7%	Growth / margin approx. 16%
Light & Optics	69.8	Significant rise
Light & Production	25.8	Growth stronger than revenue
Light & Safety	18.8	Slight rise
VINCORION	24.2	Growth in line with revenue
Order intake	812.6	Significantly above prior year
Cash conversion rate	57.6%	Slightly over 50%
Capital expenditure [1]	55.6	At prior-year level

[1] Without capital expenditure on financial investments

Group asset and financial position forecast

Jenoptik expects that capital expenditure will be at the prior-year level (prior year: 55.6 million euros) in the 2020 fiscal year. Capital expenditure on property, plant, and equipment will focus on the growth areas within the divisions or take place within the scope of new customer projects. It aims to expand capacities, thereby ensuring future growth.

Based on our advance spending / services for future growth, we expect the cash conversion rate (ratio of free cash flow to EBITDA) to come in at slightly over 50 percent in 2020 (31/12/2019: 57.6 percent).

In addition to financing the continued growth of the company, the future aim of the Executive Board remains to ensure a dividend policy in line with corporate success. In the view of the Executive Board, a stable provision of equity for sustainable organic growth to increase the company value as well as the exploitation of opportunities for acquisitions are also of crucial importance to the interests of the shareholders.

See the Report on Post-Balance Sheet Events for more information on the dividend

Important note. The actual results may differ significantly from the forecasts of anticipated development made above and summarized below. This may be the case, in particular, if one of the uncertainties mentioned in this report were to materialize or worsen, or if the assumptions upon which the statements are based prove to be inaccurate in relation to the economic development.

General statement by the Executive Board on future development

In the current 2020 fiscal year, the Jenoptik Group will continue implementing its "Strategy 2022", concentrating on photonic technologies. In terms of economic development, our key focus remains on profitable growth. We believe that revenue growth, resulting economies of scale, and more efficient and faster processes result in higher, sustainable earnings.

Jenoptik wants to see further growth in 2020. We intend to build on the good order intake growth seen in the fourth quarter of 2019 and continued good performance in the semiconductor equipment business and the Automation & Integration area. The solid asset position and a viable financing structure also give us sufficient room for maneuver to finance further growth and further acquisitions. For 2020, the Executive Board forecasts revenue growth, without major portfolio changes, in the low single-digit percentage range (excl. Hillos and incl. INTEROB) and an EBITDA margin of around 16 percent. Achieving these targets is dependent on the development of the economic and political environment. At the time this report was prepared, it was not possible to state to what extent the spread of coronavirus will impact on business development in the current year.

In 2020, we will again invest a significant portion of our funds in the expansion of the international sales network and the development of innovative products. As part of our active portfolio management, potential acquisitions are closely scrutinized; divestitures have not been ruled out.

Based on the information available at the time this report was prepared, the Executive Board expects the Jenoptik Group to show a solid business development in 2020.

Jena, March 10, 2020

JENOPTIK AG
the Executive Board