

# Core sectors\*

## Automotive

The size of the automotive sector addressed by Oerlikon is estimated at CHF 3.6 billion in 2016. That market grew at a slower pace in 2016, with some recovery in demand in China due to 2016 tax breaks, growth in most European markets, continued strength in the US but declining demand in Russia and Brazil. IHS Markit forecasted that the automotive light vehicle market will grow 2 to 3 % over the next five years. Long-term growth drivers remain relevant include urbanization, a growing global middle class, an ever-greater need for mobility and environmental issues, and create demand for higher fuel efficiency, smaller engines and lower emissions.

All three of Oerlikon's Segments serve the automotive market but mainly by the Surface Solutions and Drive Systems Segments, where automotive market sales represented 24 % and 18 % of the Segment's sales, respectively.

Oerlikon Balzer's BALINIT coatings, used to coat parts and components such as gears, are present today in passenger cars of most leading brands worldwide. Whereas Oerlikon Metco's SUMEBore®, a thermal spray coating, is used to coat cylinder liners, brake discs and turbochargers. With fine dust reduction being part of the future environmental standard to be phased in from 2020 as part of the EU's tightened CO<sub>2</sub> regulation, the demand for coatings is expected to increase. In 2016, the Surface Solutions Segment launched coatings for friction systems used for hybrid technology cars.

**3.6 billion**

Targeted market size in 2016 (in CHF)

**3.8 billion**

Targeted market size in 2017 (in CHF)

**4.2 %**

CAGR 2017–2021

Automotive is a key end market for the Drive Systems Segment, which provides engineered gearing solutions, drive systems and planetary drives used in passenger and premium sports car brands, and in electric and hybrid vehicles. Oerlikon was a major contributor to defining IATF 16949:2016 – the new benchmark for one of the automotive industry's most widely used international quality management standards. In 2016, the Drive Systems Segment also presented several electric and hybrid drive concepts to meet the increasing demand in this market. Technical textiles used in vehicles, such as tire cords, air bags, seat belts, carpets and interior trim, are produced using technologies from the Manmade Fibers Segment.

## Aerospace

The aerospace sector targeted by Oerlikon was CHF 530 million in 2016, with an expected five-year compound annual growth rate (CAGR) of 3 %. Demand in the commercial aircraft market has remained strong, even after several years of robust growth, as Airbus and Boeing continue to work off multi-year backlogs. According to the International Air Transport Association (IATA), airline profitability remained at record levels amid healthy growth trends in global air traffic and low oil prices. Airlines are actively replacing aging aircraft and upgrading to next-generation models with more efficient engines, achieved also through using lighter and more thermally resistant materials. The next-generation engine fleet is estimated to grow by over 25 % through 2020.

The aviation sector is mainly addressed by the Surface Solutions Segment, and aviation-related sales in 2016 represented 13 % of total Segment sales. Oerlikon coatings allow aviation components such as aircraft turbine blades and vanes to withstand harsh conditions, satisfy safety and environmental regulations and improve efficiency. In addition to engine components, the Group's products are used in engine pylons, landing gear, hydraulic systems and related tools. The increasing use of additive manufacturing for airframes and engine parts yields attractive opportunities for Oerlikon for its advanced materials and additive manufacturing services.

Oerlikon Metco delivers engine components used in aircrafts to the

**530 million**

Targeted market size in 2016 (in CHF)

**552 million**

Targeted market size in 2017 (in CHF)

**3.0 %**

CAGR 2017–2021

Leap-X program, and in 2016, it increased the share of its contributions in the program. It also added Safran Helicopter Engines as a customer. To support continued growth, two automated cell concepts were installed in the Oerlikon Metco plant in the Netherlands to serve next generation engine programs: Leap-X and GTF. Oerlikon Metco also continued to develop higher-temperature engine coatings such as coatings for the environmental barrier coatings (EBC) system used to protect ceramic matrix composites (CMCs) at temperatures up to 1300°C (2370 °F). Oerlikon Balzer's BALINIT DIAMOND micro and nano coatings were also upgraded in 2016 to provide extra reliability and longer tool life for machining of materials such as carbon fiber reinforced plastics for aerospace.

\* Targeted market size is the size of the market addressed by Oerlikon in that specific sector.

### Apparels & industrial textiles equipment

The size of the apparel and industrial textiles equipment market addressed by Oerlikon in 2016 was estimated at CHF 1 646 million. Accounting for 38% of this market is filaments equipment, which experienced an exceedingly difficult year in 2016 due to overcapacities and heightened by China's economic slowdown. However, toward the end of 2016, there were signs of renewed interest in investing in filament equipment, indicating that the bottom of the cycle was reached in 2016.

Over the longer term, the market is being driven by trends toward more eco-friendly and hard-wearing manmade fibers for apparel; technical textile applications for use in construction; and demand for carpet yarn – supported by underlying global trends such as population growth, urbanization and the expansion of the middle class in emerging countries such as China.

In 2016, the Manmade Fibers Segment strengthened its business in the other apparel and textile areas outside of filaments equipment. It acquired Trützschler's staple fibers technology portfolio, making it a leader in the global synthetic staple fibers market. It succeeded to expand its business in this market and its order book is well filled for the next few years. For the drawn textured yarn (DTY) market, the Segment launched a highly productive automatic texturing and compact, eAFK HQ®, which saves space while offering a 50% increase in

**1.65 billion**

Targeted market size in 2016 (in CHF)

**1.61 billion**

Targeted market size in 2017 (in CHF)

**5.9%**

CAGR 2017–2021

productivity. For the polycondensation market, the Segment's joint venture, Oerlikon Barmag Huitong Engineering, signed its first order for a 60 000-tons-per-year polycondensation system in China. Furthermore, new solutions were brought to the market for the production of technical yarns for tire cords (HLMS), seat belts and geotextiles. The Segment also improved its services for customers in this market with new orders to run maintenance workshops at customers' sites in India and China, and plans to launch new digital-based customer services such as the Intelligent Plant Control 4.0 (IPC 4.0).

### Agriculture

In 2016, the agricultural market addressed by Oerlikon was approximately CHF 2.5 billion and is expected to grow at a five-year CAGR of 1.6%. In the near term, the market has been challenged by the global farm recession due to declining commodity prices, the slowdown in China's economy, and low farmer confidence and incomes. Over the long term, agricultural output must expand significantly to support the world's growing population. This will lead to a demand for agricultural products and for equipment that is more productive, energy efficient, durable and cost-effective, driving demand for Oerlikon's solutions.

Agriculture is the largest market for Oerlikon's Drive Systems Segment, and contributed 34% to the Segment's total sales in 2016. The Segment has a significant market share in solutions for gearboxes, drives, brakes and other systems used in tractors, combines, harvesters and feed mixers.

With its sharpened strategic focus, the Drive Systems Segment recorded a slight increase in sales in 2016 in the agriculture market despite ongoing market weakness, by winning market share and new business in countries such as Turkey and India. The principal global manufacturers of premium tractors utilize Oerlikon Graziano's Shifting Solutions in dual-clutch transmissions (DCTs) and have access to a wide portfolio of products, from synchronizers to power shift clutches. Oerlikon Fairfield's Torque-Hub planetary drives are recognized as a leading brand

**2.5 billion**

Targeted market size in 2016 (in CHF)

**2.5 billion**

Targeted market size in 2017 (in CHF)

**1.6%**

CAGR 2017–2021

in North America, and Oerlikon Fairfield now offers the Champion Series of hydrostatic drives, specifically designed for the requirements of modern, self-propelled spray tractors.

The Surface Solutions Segment also provides coating solutions to the agriculture market. For instance, Oerlikon Balzers' BALINIT C is a special coating that improves the wear resistance and efficiency of differential housings and bevel sets used in farming machinery. Oerlikon Metco's surface solutions provide reliable protection against corrosion and wear for the most stressed parts of agricultural machinery like harvester blades and other essential components.

### Industrial solutions

The industrial solutions market served by Oerlikon encompasses tools, equipment, aftersales and precision components – and amounted to a market valued at approximately CHF 1.9 billion in 2016. While the sector has recently been affected by a flattening of industrial production in Europe and the US, long-term prospects are solid. The overall industrial solutions market is estimated to grow at a CAGR of 4% from 2016 to 2021. Key drivers of demand include the continuing industrial growth of countries such as China and India, as well as the requirements of customers for solutions that enhance the performance, durability and cost effectiveness of tools and precision components.

The Surface Solutions Segment generated 23% and 33% of its total sales in the general industries and in the tooling market, respectively. The general industries market is served under the Oerlikon Balzers and Oerlikon Metco competence brands. Oerlikon Metco's solutions are applied in industries such as metals processing, heavy machinery, medicine and electronics.

Under the Oerlikon Balzers' brand, a wide range of coatings for industrial solutions are offered by its BALINIT and BALIQ families. Each solution provides the type of hardness, strength, thickness/thinness, wear and friction protection, etc., tailored for the exacting specific industrial applications. In 2016, the Segment served over 30 000 customers in automotive and industrial solutions, and won new customers in China and the USA.

### Additive manufacturing

Additive manufacturing (AM), the process of making 3D objects from digital models by depositing layers upon layers of metal or other material, will change how products will be designed, manufactured and distributed in the future. In 2016, the metal-based AM market is valued at approximately CHF 393 million and is estimated to reach CHF 1 976 million by 2021 – a five-year CAGR of 38%.

AM stands before a breakthrough in industrialization as it delivers many advantages over traditional manufacturing, such as permitting complex designs and yielding components with higher performance and durability. AM also reduces product development time, enables rapid response to changing customer needs, raises manufacturing productivity and reduces waste. Given its significant benefits, Oerlikon expects to see demand for AM in aerospace, due to weight and safety benefits; medical devices, especially implants; power generation, driven by capacity investments; high-end automotive; and in a slowly recovering oil & gas market.

Oerlikon is a market leader with deep expertise in advanced materials, post processing surface solutions and engineering competencies. Combined with its global service network and strong customer relations in the above-mentioned industries, Oerlikon is well positioned to drive the industrialization of AM as an integrated service provider.

**1.92 billion**

Targeted market size in 2016 (in CHF)

**1.99 billion**

Targeted market size in 2017 (in CHF)

**4.0 %**

CAGR 2017–2021

In the tooling industry, the Segment's coating solutions help increase the productivity of tools, resulting in longer lifetimes and reduced maintenance. Despite the weakness of the tooling market, the Segment managed to outperform peers in 2016 and increase its market share in tooling services. To meet increasing demand for reconditioning of tools, it extended the service capacity at its regrinding centers in Argentina, China and India. The Segment also continued to invest in developing new and improved coating equipment such as INNOVENTA MEGA® – coating system for large production capacities, INGENIA S3p® – coating system for precise, small batch sizes and proprietary coatings with S3p (scalable pulsed power plasma) and BALINIT HARD CARBON – coating for machining of non-ferrous metals.

**393 million**

Targeted market size in 2016 (in CHF)

**612 million**

Targeted market size in 2017 (in CHF)

**38.1 %**

CAGR 2017–2021

In 2016, Oerlikon acquired citim to complement its additive production capabilities in Europe and the USA. It is also building a state-of-the-art manufacturing facility in Michigan, USA, to produce advanced materials also for AM applications. In addition, Oerlikon is conducting an R&D project for a US energy company using AM technology in industrial gas turbine applications, and has launched a new thermal spray system platform that enables automated powder-fed AM and coating processes. Oerlikon joined America Makes and partnered with the Shanghai Additive Manufacturing Association to advance this technology and make it part of mainstream manufacturing.

## Construction

Oerlikon addresses a CHF 2.2 billion segment of the construction machinery market, primarily through the Drive Systems Segment. That market is forecasted to grow at a five-year CAGR of 2.6%, in line with world GDP growth. In 2016, the knock-on effects of commodity market volatility and economic slowdown in China impacted the costs and investments in construction. Over the long term, increased mechanization in infrastructure coupled with growing population and urbanization are expected to drive market demand. Emerging trends, such as the increasing requirement for green construction to reduce the carbon footprint, building information systems for efficient building management, and using fiber-reinforced polymer composites for the rehabilitation of aging structures, will also dictate the technologies required in this sector.

The construction sector represented 25% of the Drive Systems Segment's total sales in 2016. The Segment serves key market players in this industry such as Caterpillar, one of the world's largest construction machinery companies. Its strengths include long years of experience in developing driveline solutions and its engineering competencies for hydraulic, mechanical and electric drive applications.

In 2016, the Segment partnered with Ashwoods Electric Motors Ltd. to develop a compact, high efficiency electric drive system, which consists of a planetary drive integrated with an electric motor. The current solutions used in off-highway vehicles com-

**2.2 billion**

Targeted market size in 2016 (in CHF)

**2.3 billion**

Targeted market size in 2017 (in CHF)

**2.6%**

CAGR 2017–2021

monly utilize large, heavy and inefficient brushed DC or induction motors coupled to a planetary gearbox – and present a number of challenges to vehicle designers, such as limited vehicle range, limited space around the motor/drivetrain and motor durability. The new, integrated system uses an Oerlikon Torque Hub® planetary drive and Ashwoods' first-to-market Interior Permanent Magnet Motor. These products are integrated and incorporate a brake solution to eliminate redundant components.

## Energy

The energy market served by Oerlikon is approximately CHF 2.5 billion, of which power generation contributes CHF 530 million and oil & gas & mining accounts for CHF 2 billion. Power generation has been stable in the near-term. Over the long term, it has good prospects driven largely by investments in distributed-power installations and the shift to alternative energy. The replacement of aging equipment with more energy efficient, environmentally compliant industrial gas turbine engines, and the gas turbine maintenance, repair and overhaul market, are especially promising factors for power generation. The oil & gas sector has been hurt by depressed energy prices, leading to reduced spending on exploration and production. The oil market saw the beginning of a slow recovery at the end of 2016, which is expected to continue in 2017, while prospects for long-term growth in natural gas as a fossil fuel remain strong. The mining sector was and is expected to stay under pressure.

In 2016, the energy sector contributed 7% of sales in the Surface Solutions Segment, and 6% of sales in the Drive Systems Segment.

Oerlikon's innovative coatings enable turbines, hydroelectric plants and drilling equipment to withstand extreme temperature, pressure and friction. Oerlikon Balzers' BALINIT coatings and heat treatment solutions help prevent wear in steam and wind turbine blades. Oerlikon Metco's surface solutions are essential

**2.5 billion**

Targeted market size in 2016 (in CHF)

**2.6 billion**

Targeted market size in 2017 (in CHF)

**4.7%**

CAGR 2017–2021

in turbine blades, and for valves, riser systems and blowout preventers used in oil and gas exploration. Oerlikon Metco is working closely with original equipment manufacturers in the power generation sector on tailored materials and advanced equipment technology (cascaded plasma) to achieve efficiency gains. The Drive Systems Segment technologies are mainly adopted in the oil & gas and mining sectors, such as gears and drives for mud and fracking pumps, marine winches, hoists and jack-up rigs.

# Key markets by regions

## China

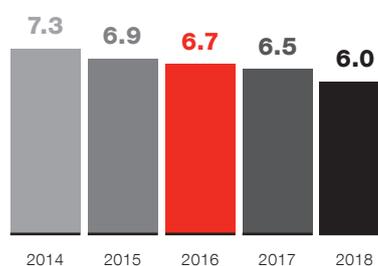
China's GDP grew 6.7% in 2016, down from 6.9% in 2015 and 7.3% in 2014. This deceleration was due in part to muted global economic growth but the abruptness of the slowdown is likely attributed to a cyclical correction, which typically follows a period of overheated economic growth. Facing high debt that was created to drive growth in previous years, China's policymakers have been making efforts to shift its economy away from its reliance on investment and industry toward domestic consumption and services. The renminbi depreciated modestly in 2016, falling by more than 4%, while inflation rose to 2.1%. Once the cycle turns and policy changes take effect, the outlook in China should improve. In 2016, Oerlikon generated 16% of Group sales in China, where it employed more than 1 450 people at 23 sites.

In 2016, the Surface Solutions Segment saw sturdy growth in China's tooling market in the second half of the year and also made good inroads in developing its business in the country's aerospace and power generation sectors. Currently, the Surface Solutions Segment generates 11% of its sales in China. To establish business opportunities for its additive manufacturing business, Oerlikon entered into a partnership with the Shanghai Additive Manufacturing Association.

China's development affected Oerlikon's 2016 performance due to China's dominant role in the filaments equipment business. Specifically, eight of the Manmade Fibers Segment's top ten customers are based in China. In 2016, the Manmade Fibers Segment generated over 38% of its sales in China. However, Oerlikon

enjoys continued good standing and trusted relationships with key customers in China, and expects to benefit from this when the market turns around. Indications were noted toward the end of the year implying that the filaments equipment market have reached the bottom of the trough in 2016.

The Drive Systems Segment won business in China's commercial vehicle market with axles for low-floor city bus applications, and signed partnerships with leading automotive manufacturers for hybrids and e-drive systems. The Segment generated 6% of its 2016 sales in China.



**China's GDP development\***  
in %

\* Reported and estimated by the IMF.

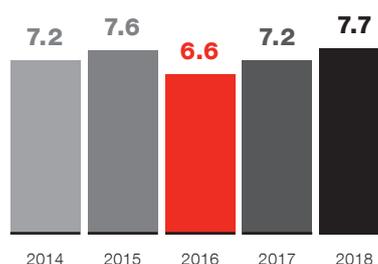
## India

India's economic growth in 2016 was also affected by the sub-par global economic development and the country's GDP grew 6.6%. According to the IMF, India benefited from an improvement in trade due to a decline in commodity prices, stronger external buffers and effective policy actions. However, ongoing efforts to enact structural and economic reforms were overshadowed late in the year by a move to demonetize India's high-value currency, a policy aimed at reducing corruption and strengthening the formal economy. Although demonetization is likely to be beneficial for the economy over the medium term, economic growth is expected to be adversely impacted at least through to the first quarter of 2017. The government is aiming for manufacturing to contribute 25% of GDP by 2025, up from 16% in 2015. In 2016, Oerlikon generated 7% of Group sales in India, where it employed more than 2 800 people at 16 sites.

Oerlikon's operations in India are focused mainly on serving domestic customers. The Surface Solutions Segment, which operates a network of 10 service and production centers, extended its service offering for the automotive industry at its facility in Bangalore. In 2016, the Segment took advantage of the growing economy and further developed its coating business in the automotive, aerospace, power generation, oil & gas and general industrial sectors.

India's burgeoning textile industry continued to grow in importance for the Manmade Fibers Segment, which has been operating in the country for more than 30 years. In 2016, the Segment won additional long-term contracts to install and run maintenance workshops at customers' sites.

The Drive Systems Segment increased sales in the agriculture, construction and transportation sectors in India, fueled by the increase in local demand and for regional exports.



**India's GDP development\***  
in %

\* Reported and estimated by the IMF.

### Europe

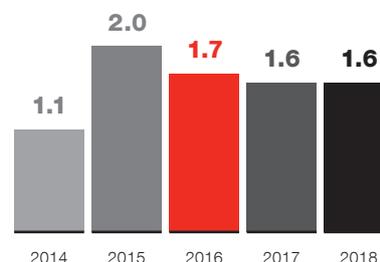
Europe grappled with economic and political uncertainty in 2016, with the UK's unexpected vote to leave the European Union and migrant issues playing dominant roles. These issues, combined with Europe's ongoing structural challenges, dampened economic growth and contributed to a flattening of industrial production, notwithstanding the continued low interest rate policy in the Euro Area. In Germany, Europe's biggest economy, real GDP grew 1.7% and is expected to decline to 1.5% in 2017, according to the IMF. France's GDP grew 1.3% and is forecasted to remain flat in 2017. Overall the Euro Area economic growth for the year was 1.7% and is projected by the IMF to decline to 1.6% in 2017. Europe accounted for 42% of Oerlikon's sales in 2016 and continued to serve as the base for the Group's global headquarters. Oerlikon employs in Europe at 84 sites more than 6800 employees, corresponding to nearly half of its global workforce.

In 2016, Oerlikon made a strategic investment in Germany for its additive manufacturing portfolio by acquiring citim GmbH, which will be a part of the Surface Solutions Segment. As a stamp of approval of its quality in the aviation sector, a Surface Solutions Segment's coating center in the UK received certification from Airbus. The Segment generates 47% of its sales in Europe.

For its Manmade Fibers Segment, Oerlikon acquired the staple fibers technology portfolio of the German company Trützschler Nonwovens & Man-Made Fibers GmbH, in order to expand its offering, gain access to customers and solidify the Segment's position as a leader in synthetic staple fibers. In 2016, positive

demand for staple fibers was noted in Europe, and positive uptakes for bulked continuous filaments systems and services in Turkey. Europe accounted for 21% of the Manmade Fibers Segment's sales in 2016.

Italy remains the main hub for the Drive Systems Segment, where innovative solutions are developed for passenger, hybrid and electric vehicles as well as for customers in the agricultural, oil & gas, and construction sectors. Although all of its key sectors experienced lingering weakness in 2016, the Segment won new customers and incremental projects with existing customers in the European construction sector and increased sales revenues in its agriculture business in Europe. In total, the Segment generates 47% of its sales in Europe.



Europe's GDP development\* in %

\* Reported and estimated by the IMF (Euro Area).

### North America

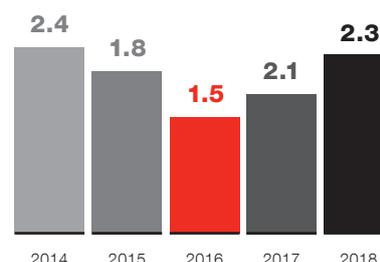
The US economy lost momentum in the early part of the year, with weakness in business fixed investment driven by a decrease in capital spending in the energy sector and financial market volatility. The UK's vote to leave the European Union drove up demand for an already strong US dollar, which climbed further following the November US presidential election, creating headwinds for export-oriented industries and the manufacturing sector. Full-year US GDP growth was 1.6% according to the IMF. Canada was also affected and its GDP grew 1.3% for the year. In 2016, Oerlikon generated 21% of its sales and employed more than 1750 people at 30 sites across North America.

Looking ahead, the IMF expects US GDP growth to rebound to 2.3% in 2017 and GDP growth in Canada is projected to increase to 1.9%.

The Surface Solutions Segment operates a network of 33 service and production centers in the Americas and is a major supplier to the US automotive, aerospace, energy and food sectors. The Segment is building a state-of-the-art manufacturing facility in Michigan, dedicated to producing advanced materials for additive manufacturing and high-end surface coatings. In June 2016, Oerlikon joined America Makes, the US National Additive Manufacturing (AM) Innovation Institute, to partner with other leading organizations in AM. The Surface Solutions Segment generates 19% of its sales in North America.

The Manmade Fibers Segment, based in North Carolina and Georgia, mainly supplies manufacturers of bulked continuous filaments (BCF) used in carpet production, and benefited from renewed BCF market demand. North America accounted for 12% of the Segment's sales in 2016.

The Drive Systems Segment, based in Indiana, develops and manufactures drives and transmissions for the agriculture, construction, oil & gas and mining sectors, and expects to benefit from the recovery in US end markets. In 2016, the Drive Systems Segment generated 33% of its sales in North America.



North America's GDP development\* in %

\* Reported and estimated by the IMF (Canada & USA).

# Serving our customers locally



Oerlikon has a strong global footprint with over 180 sites in 37 countries. The Group is strongly committed to research and development, which is reflected by its 55 production and R&D sites worldwide. Together with its sales and services network of more than 175 sites, Oerlikon operates in close proximity to its customers, improving customer interaction, response times and satisfaction.



**Surface Solutions Segment**  
New sales office in Seoul (KR)

**Surface Solutions Segment**  
New coating center in Gwangju (KR)

**Surface Solutions Segment**  
extension of plant in Bengaluru, Karnataka (IN)

**182 sites globally**

- 38 in the Americas
- 60 in Asia
- 84 in Europe

**177 sales and services sites**

- 150 Surface Solutions Segment
- 12 Manmade Fibers Segment
- 15 Drive Systems Segment

**55 production and R&D sites**

- 38 Surface Solutions Segment
- 5 Manmade Fibers Segment
- 12 Drive Systems Segment

- Production and R&D sites
- New sites in 2016 (incl. production)
- Other Oerlikon sites (incl. production)
- Partners (distributors, representatives)