

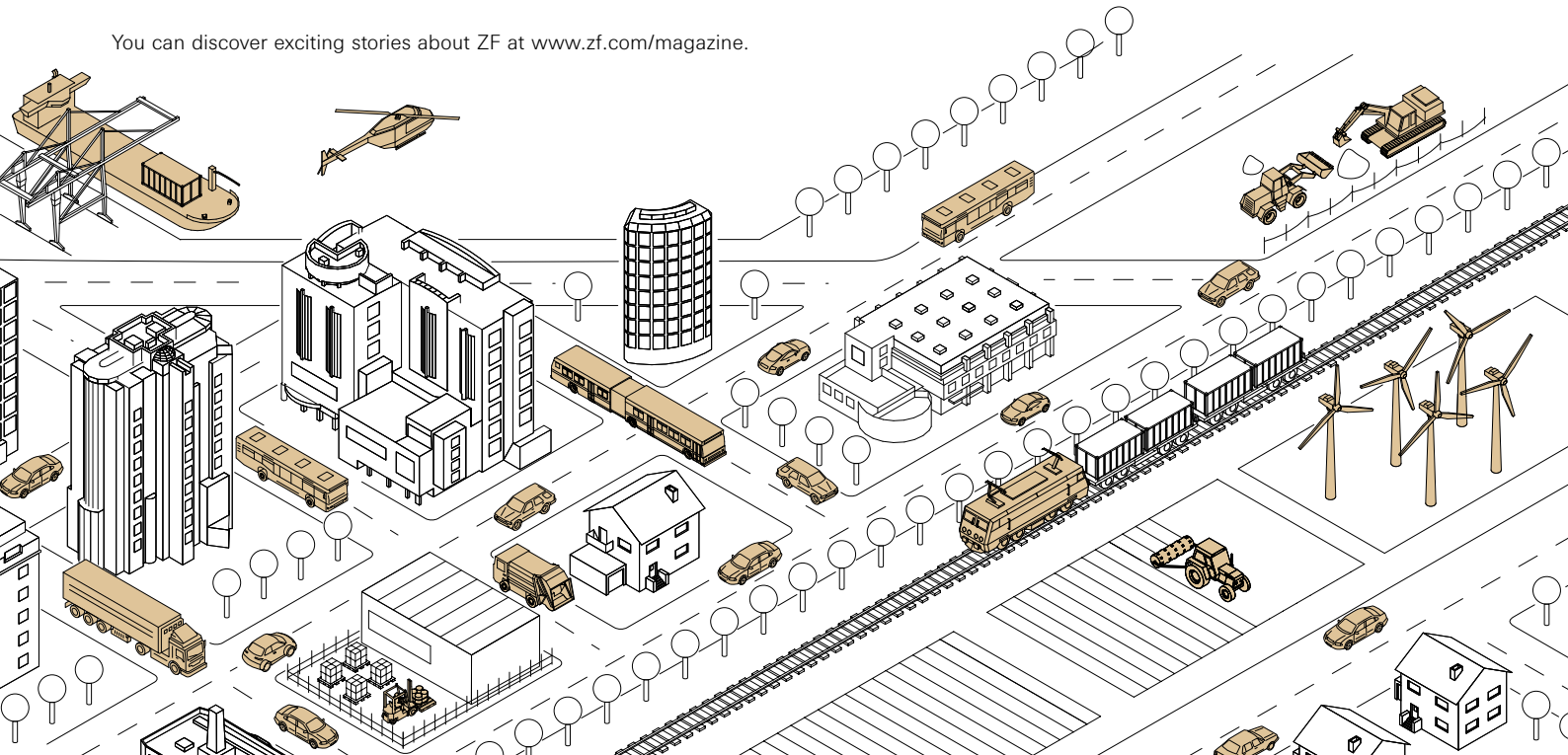
# AT A GLANCE

Edition 2016

ZF FRIEDRICHSHAFEN AG



You can discover exciting stories about ZF at [www.zf.com/magazine](http://www.zf.com/magazine).



ZF is a global leader in driveline and chassis technology as well as active and passive safety technology.

€ 29.2 billion sales

138,269 employees

230 locations

650 service partners

# WE DRIVE INTELLIGENT MOBILITY

*We are one of the world's leading technology providers for intelligent solutions across the automotive and other industries.*

*As a powerhouse of innovation we have the unique capability to combine excellent expertise in mechanical engineering with the accelerating potential of modern digital technology.*

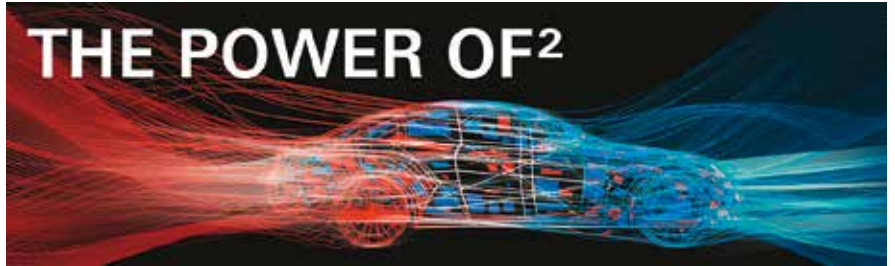
*Therefore we are able to create intelligent and complete system solutions and offer higher added value for the future of our customers, our society and our environment.*

*Based on our long tradition in anticipating and shaping the technological progress we deliver adequate systems and technologies to make the future of mobility safer, cleaner and more efficient.*

Vehicles equipped with beam-based and imaging systems from ZF can recognize what is happening around them. Combined with our central control system and our actuators, the result is smart vehicles that can see, think and act.



# MILESTONES 2015



## DAY ONE

**The go-ahead** *for the integration of the U.S. company TRW into the ZF Group was given in mid-May. “Today marks the day we combine the strengths of ZF and TRW into a worldwide leading systems supplier in the automotive sector,” said Dr. Stefan Sommer, ZF’s Chief Executive Officer. Since then, ZF TRW has been part of ZF Friedrichshafen AG as the Active & Passive Safety Technology Division. “The Power of <sup>2</sup>” is the motto and inspiration behind the integration process. The superscript 2 indicates that the benefits in the extended ZF Group are not simply equal to the sum of the parts but rather multiply each other.*



## *Large industrial drives and gearboxes*

Industrial drives consolidated: In May, ZF took over the industrial drives and wind turbine gearbox segment of Bosch Rexroth AG and incorporated the three locations and a total of 1,200 employees into the Industrial Technology Division. This acquisition provides ZF with access to the large industrial drives and gearboxes business while strengthening its activities in the wind power segment. It also makes the Group less dependent on the cyclical automotive industry.



## VOLUME PRODUCTION ORDER

# IBC

ZF TRW, the Active & Passive Safety Technology Division, has received its first production order for the innovative Integrated Brake Control (IBC): As of 2018, the system will enter volume production in large quantities at a big vehicle manufacturer. The system consists of a single unit which replaces the Electronic Stability Control (ESC) and the vacuum booster with all the associated cables, sensors, switches and control units. It can be deployed in the supermini to the SUV and is suitable for both conventional braking and semi-autonomous driving functions.

## MILESTONES 2015

### 100 YEARS

# MOTION AND MOBILITY

The Group's anniversary year in 2015 drew to a close with a host of activities. The celebrations focused on the company's employees worldwide. Meanwhile, the opening ceremony in Friedrichshafen in September 2015 proved a highlight for customers and stakeholders.



### *Development location in Japan*

A new, additional ZF development location in Japan centers on e-mobility. As of 2016, ZF will develop electric drive solutions specially for the Asian market in the new Tech Center near Yokohama.



### PLUG-IN HYBRID TRANSMISSIONS

Market premiere for more e-mobility: In September, the first plug-in hybrid transmission with eight gears came off the production line. The ZF product features an electric motor that is powerful enough to drive passenger cars at up to 120 km/h in this all-electric mode. The range in all-electric mode is around 50 kilometers depending on the battery capacity. Compared with a driveline powered solely by a combustion engine, the ZF innovation cuts fuel consumption by up to 70% in the standard cycle.



## *Commercial vehicle transmissions*

ZF has been volume-producing the new TraXon automatic transmission system for commercial vehicles at its Friedrichshafen location since mid-2015. It has been designed to enable the basic transmission to be combined with various starting modules – from the classic dry single-disk clutch to the hybrid module.



**AGILE, CLEVER, URBAN**

# IAA 2015

**At the IAA 2015, ZF demonstrated the indispensable features of the city runabout of the future with its Advanced Urban Vehicle (AUV) concept study. During its development, ZF engineers and engineers in the Active & Passive Safety Technology Division were already working hand in hand – linking intelligence and mechanical systems in the concept vehicle. An extreme steering angle of the AUV's front axle allows for extremely tight turning and parking maneuvers. This is used by the Smart Parking Assist function, which enables fully autonomous parking maneuvers. The microcar uses "PreVision Cloud Assist" to obtain route information from the cloud, making the vehicle safer and more fuel-efficient in the process.**

# STRATEGY

Quality, technology leadership and innovativeness have shaped ZF's identity from the outset. As we look to the future, our ability to make mobility safe, efficient and sustainable with trendsetting technologies continues to motivate and define everything we do.

In order to successfully meet the major challenges of the global markets, we have laid the important groundwork for future corporate development over the past few years with the ZF 2025 Strategy. In this way, we are equipping ourselves for the major changes in the market with which the entire

industry will have to contend. Such changes include long-term growth markets such as China, new market players and the wide-ranging technological changes toward digitization. Electric drives, increasing networking and self-steering cars will fundamentally alter mobility.

ZF intends to shape this change actively and is aligning the Group to these developments, for instance with the integration of the former U.S. company TRW Automotive as the Active & Passive Safety Technology Division or by setting up the E-Mobility Division. Both these

examples demonstrate how we are going to shape mobility with groundbreaking technologies.

## THE MEGATRENDS FOR FUTURE MOBILITY

ZF combines all the relevant technologies for the megatrends of efficiency, safety and automated driving under one roof and hence is optimally equipped for the future. >

## EFFICIENCY



Vehicles with very low fuel consumption and emissions are already on the road today. Increasing electrification will boost efficiency still further. Even more potential can be tapped if the networking between consumption-relevant systems in the vehicle is further improved and vehicles use information on their surroundings, i.e. the course of the road and the route.

## SAFETY



Sensors, high-resolution cameras as well as software algorithms and on-board computing power make it possible: In the future, intelligent systems in the vehicle will be able to identify and interpret hazardous situations independently of the driver, and react rapidly and correctly by performing autonomous braking or evasive maneuvers. This will raise the safety standard in vehicles to a new level.

## AUTOMATED DRIVING



The technology already exists: Sensors precisely record what happens around the vehicle, cameras monitor the lane and even “read” traffic signs, a control unit in the car uses the information to calculate ideal driving maneuvers and autonomously actuates the steering system, brakes and drive. This is the core element of automated driving that will characterize future road traffic.

# THE NEXT LEVEL

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“ADVANCED URBAN VEHICLE” (AUV): This ZF concept vehicle is an extremely agile, locally zero-emission all-electric car. It is equipped with many smart assistance functions. Thanks to the Smart Parking Assist function in the AUV, you simply need to tap your finger on the smartwatch rather than

cranking the steering wheel. Networking with the cloud also makes it more efficient and safer. The Cloud Driving Assist function stores key route information on the cloud, allowing it to be accessed by other vehicles as well. Tomorrow’s ride comfort – by connecting today’s systems.

 [WWW.ZF.COM/AUV](http://WWW.ZF.COM/AUV)

# EFFICIENT, SAFE, CONNECTED: HOW ZF SHAPES THE MOBILITY OF THE FUTURE.

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## *Technological leadership with twice the power*

Such company acquisitions are rare: ZF managed with TRW Automotive to acquire a company which had virtually no overlaps with ZF in its product portfolio. The range of technologies and competencies where the two companies complemented each other almost perfectly proved all the broader, though. For that reason, it made perfect sense to integrate ZF TRW under the motto “The Power of 2” as the Active & Passive Safety Technology Division. The company wasted little time before demonstrating the

innovativeness of the ZF Group: ZF presented the AUV at the IAA (International Motor Show) in 2015. Since then, one thing has been clear: Smart mechanical systems, i.e. the optimum interaction of actuators and controllers on the one hand, and sensors and software on the other, make for a decisive advantage in ZF’s hands. The company aims to leverage this advantage to the full in future in order to implement fuel efficiency, occupant safety, driver assist systems through to autonomous driving.

**Urbanization, demographic change, sustainable resource utilization – many of the global megatrends have been making their presence felt for many years. ZF has already set the course toward the future with its 2025 Strategy. One result of this was the acquisition of the U.S. company TRW. A new Group has crystallized from the two strong companies – with greater clout, diverse market opportunities and with the ability to shape tomorrow’s mobility.**



# EFFICIENT

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Passenger cars with a PLUG-IN HYBRID TRANSMISSION from ZF can drive at up to 120 km/h without any assistance from the combustion engine. The range in all-electric mode is up to 50 kilometers depending on the battery capacity. As such, for many drivers the combustion engine does not start at all during everyday motoring.

 [WWW.ZF.COM/E-MOBILITY](http://WWW.ZF.COM/E-MOBILITY)

## *Lower emissions with higher output*

Greater cost-effectiveness, lower emissions with the same or improved output – this is the objective when it comes to implementing state-of-the-art passenger car drives. Electric drive solutions are particularly in demand today. Such solutions need to keep pace with growing competitive and cost pressures while at the same time meeting ever greater customer expectations; they must be efficient, but not detract from driving pleasure. ZF offers everything that is required to fulfill these expectations. From individual hybrid

modules, plug-in hybrid systems, which are already being used in a host of volume-production applications, through to an all-electric rear-axle drive that is due to enter volume production from 2016. The engineers are not taking their eye off conventional drives though. Take for instance, the second generation of its globally successful 8-speed automatic transmission where ZF has further reduced fuel consumption compared with the transmission's highly energy-efficient predecessor.

# HOW ZF ACHIEVES MORE WITH LESS.

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## *Top quality at lower cost*

Reliable technology – the decisive factor in all product applications. ZF makes a major contribution in this respect with its diversified product portfolio. To ensure this will continue to be the case, customer orientation permeates the entire Group. It is an approach that is reflected in the product strategy, in quality, right through to the availability of spare parts and the global service network.

To ensure the top quality of our products and services at economic costs, ZF is generating new synergies through the integration of ZF TRW: Knowledge sharing and the further development of common standards will improve the quality of our products even further. Materials procurement of the two companies is also being merged – with positive repercussions for the cost structure.

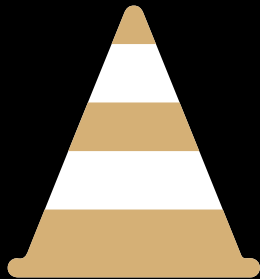


**Quality is a basic prerequisite in the competitive environment. Thanks to efficient COST AND PROCUREMENT MANAGEMENT, ZF customers receive reliable products and services at competitive costs.**

 [WWW.ZF.COM/PROCUREMENT](http://WWW.ZF.COM/PROCUREMENT)

# SAFETY

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ZF CAMERA SYSTEMS make vehicles see. In this field, we already focus on the requirements of tomorrow: Tri-Cam4, for example, supports the most advanced driving functions with its three lenses including a telephoto lens and a fish-eye lens.

 [WWW.ZF.COM/SAFETY](http://WWW.ZF.COM/SAFETY)

## *Minimize risks predictively*

A computer does not panic and freeze. For this reason, intelligent systems on board a car can not only detect hazardous situations more effectively, they can also interpret them thanks to sensors, high-resolution cameras and software algorithms as well as suitable computing power. They can respond quickly and appropriately, with virtually no delay,

with independent braking and evasive maneuvers. The technology in passive safety solutions we now all take for granted – air-bags and pretensioners triggered to the exact millisecond – will help take the standard of safety in vehicles to a new level in the form of active driver assist systems.



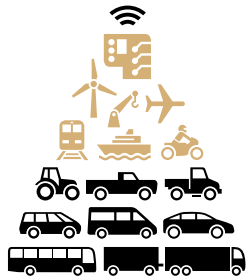
## HOW ZF ENSURES SAFETY.

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### *Broader base ensures stable growth*

E-mobility illustrates the kinds of opportunities a diversified product and service portfolio brings for ZF: The company benefits from this megatrend not just as a supplier of drive solutions that make locally zero-emission mobility a reality. ZF also plays a major role when it comes to generating power from renewable energy sources by supplying gearboxes for

wind turbines, for instance. A broad product portfolio not only makes ZF less dependent on economic cycles. Technologies and process know-how from the automotive industry can also be transferred to neighboring sectors with lower quantities and a higher level of individualization, such as the agricultural and construction machinery industries.



Eggs in more than one basket with **A BROAD PRODUCT PORTFOLIO**: ZF's diversified range of expertise delivers greater added value and minimizes risks.

 [WWW.ZF.COM/PORTFOLIO](http://WWW.ZF.COM/PORTFOLIO)

# CONNECTED

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Steer, brake and accelerate automatically with the HIGHWAY DRIVING ASSIST: The combination of Adaptive Cruise Control and Lane Centering Assist helps to maintain a defined safe distance to the car ahead.

 [WWW.ZF.COM/HDA](http://WWW.ZF.COM/HDA)

## *Automated driving functions for all vehicle categories*

Sit back and read the news on your way to work, while the vehicle sets the indicator at 130 km/h to overtake smoothly, and then autonomously changes lane: Scenarios like these become reality with automated assistance systems which will relieve the driver in future of the need to steer the vehicle. Powerful sensors, complex electronic control units and mechatronic systems, which ensure

the safety of the driver, occupants and other road users at all times, enable vehicles to see, think and act. To ensure that such systems are not reserved exclusively for full-size high-end luxury cars, ZF is already working continuously on "democratizing" the autonomous driving functions across all vehicle categories.

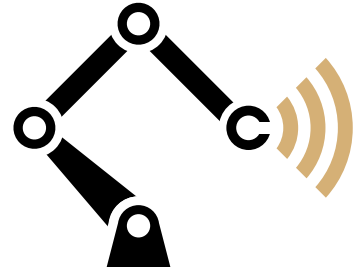
# HOW ZF DRIVES AUTOMATION.

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## *Effectively utilizing automation internally*

Networking and digitization play an important role for ZF not just in terms of product development. A look in the production halls reveals that here too the digital transformation has long since been underway, for instance as part of the needs-based maintenance and repair of machinery or the optimization of the operating process. Milk run systems which transfer transport orders for the final assembly

line to the driver in real time using mobile scanners are already part of ZF's everyday operations. ZF also calls on digital support when it comes to identifying individual parts across the entire production process: IT-based traceability systems document the production cycle and soon also the lifecycle of individual workpieces – and provide even greater reliability thanks to automated workflows.



Digitization is revolutionizing production, ushering in the era of **INDUSTRY 4.0**. With the aid of smart machines that communicate with each other and cooperate with people, ZF aims to become even more efficient across the entire value chain.

 [WWW.ZF.COM/PRODUCTION](http://WWW.ZF.COM/PRODUCTION)

# DIVISIONS AND BUSINESS UNITS

## CAR POWERTRAIN TECHNOLOGY

*Sales 2015: € 7,785 Mio.*

*Employees: 24,389*

**Automatic Transmissions, Manual Transmissions / Dual Clutch Transmissions, Axle Drives, Powertrain Modules**

## CAR CHASSIS TECHNOLOGY

*Sales 2015: € 6,550 Mio.*

*Employees: 15,953*

**Chassis Systems, Chassis Components, Suspension Technology**

## COMMERCIAL VEHICLE TECHNOLOGY

*Sales 2015: € 2,983 Mio.*

*Employees: 12,246*

**Truck & Van Driveline Technology, Axle & Transmission Systems for Buses & Coaches, CV Chassis Modules, CV Damper Technology, CV Powertrain Modules**

## INDUSTRIAL TECHNOLOGY

*Sales 2015: € 2,187 Mio.*

*Employees: 10,202*

**Off-Highway Systems, Industrial Drives, Marine Propulsion Systems, Test Systems, Aviation Technology, Wind Power Technology, Special Driveline Technology**

## E-MOBILITY

Newly established in January 2016

*Employees: 5.300*

**Electronic Systems, Electric Traction Drive, System House**

## ACTIVE & PASSIVE SAFETY TECHNOLOGY

*Sales 2015 (proportionate):*

*€ 8,941 Mio.*

*Employees: 64,108*

**Braking Systems, Steering Systems, Commercial Steering Systems, Occupant Safety Systems, Electronics, Body Control Systems, Parts & Service**

## ZF SERVICES

Sales 2015: € 1,847 Mio.

Employees: 4,171

**ZF Services combines the Sachs, Lemförder, Boge and ZF Parts product brands and pools the worldwide product range of the ZF Group in the fields of services, trade and customer service.**

### Sales development by divisions and business units, consolidated ZF Group

in € million

	2015	2015/2014
Car Powertrain Technology	7,785	+ 15 %
Car Chassis Technology	6,550	+ 11 %
Commercial Vehicle Technology	2,983	- 2 %
Industrial Technology	2,187	+ 7 %
Active & Passive Safety Technology	8,941	
Electronic Systems	717	+ 12 %
ZF Services	1,847	+ 13 %
Corporate R&D, Corporate Headquarters and Service Companies	284	+ 87 %
- Internal Sales	- 2,140	+ 24 %
<b>Consolidated ZF Group</b>	<b>29,154</b>	<b>+ 58 %</b>

# EMPLOYEES

ZF has 138,269 employees worldwide. Their work is characterized by a high degree of autonomy, by collegiality, mutual respect, a management style based on cooperation, and equal opportunities. The perfect environment for good work which produces globally leading products. A global employee survey helps maintain this solid foundation by providing insights into the working atmosphere at regular intervals. In this way, the managers can specifically further develop their sphere of responsibility together with the employees.

Incidentally, 85% of our employees would recommend ZF as a good employer to their friends and relatives. Just one of the findings of our 2015 internal employee survey.



# RESEARCH AND DEVELOPMENT



Research and development is the best investment in the future. It is the key to delivering innovation and outstanding technical performance for machines with high user benefits. ZF is an innovation-driven company that develops volume production-ready products based on its own research and development efforts and thus invests in the future in a targeted way.

13,600 employees work in research and development worldwide, of which around 1,450 are employed in the Group's Corporate Research and Development. ZF employees work at more than 100 development locations worldwide, including 17 main development locations.

€ **1,390** million

This is the amount ZF invested in research and development in 2015, and successfully so, because innovative products from ZF set the standards for state-of-the-art technology – again and again.

# COMPANY DEVELOPMENT



**1915**

Publication of the entry in the trade register of the municipal court of Tettwang on September 9

**1915**

Foundation of Zahnradfabrik GmbH in Friedrichshafen by Luftschiffbau Zeppelin GmbH

**1921**

Transition to Zahnradfabrik Friedrichshafen Aktiengesellschaft

**1937**

Foundation of the Schwäbisch Gmünd (Germany) plant (since 1999 ZF Lenksysteme GmbH\*)

**1946**

Reconstruction of the destroyed plant in Friedrichshafen, foundation of Zahnradfabrik Passau GmbH, Passau (Germany)

\* until January 2015 joint venture of ZF Friedrichshafen AG and Robert Bosch GmbH

**1958**

Foundation of ZF do Brasil S.A., São Caetano do Sul (Brazil)

**1961**

Venturing into motor racing: Jim Clark (Lotus) competed in Formula One with a ZF transmission

**1972**

Foundation of ZF Getriebe GmbH, Saarbrücken (Germany)

**1978**

Investment in the Fábrica Argentina de Engranajes, Buenos Aires

**1979**

Foundation of ZF of North America Inc. in Chicago, Illinois, as the first location in the USA



**1980**

Foundation of ZF Japan

**1984**

Majority shareholding gained in Lemförder Metallwaren AG, Lemförde near Osnabrück (Germany)

**1986**

ZF opened its first two production locations in the United States

**1995**

Acquisition of the Hurth Group's units: Rail Drives, Lift Trucks and Marine

**2001**

Acquisition of Mannesmann Sachs AG

**2003**

Increase in shares to 100% of ZF Lemförder Metallwaren AG, Lemförde (Germany)

**2008**

Acquisition of Cherry Corporation

**2011**

Merger of major German ZF companies into ZF Friedrichshafen AG

**2011**

Acquisition of Hansen Transmissions International N.V.

**2013**

Inauguration of the plant in Gray Court, South Carolina (USA) (image right) to produce 8HP and 9HP automatic passenger car transmissions

**2015**

Acquisition of the U.S. company TRW. ZF Friedrichshafen AG almost doubled in size.

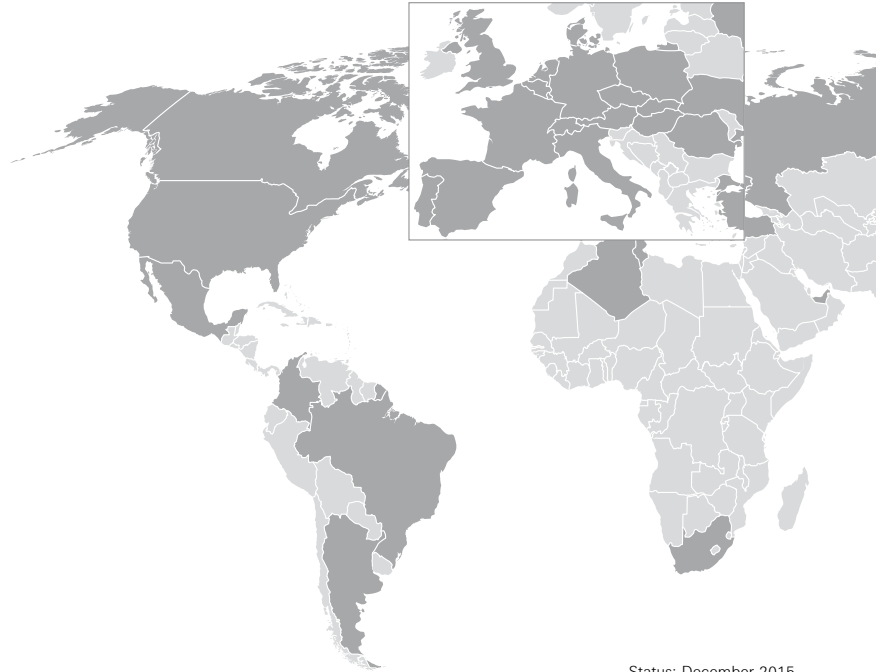
**2015**

ZF is celebrating its 100th anniversary.



# ZF WORLDWIDE

ZF has at about 230 locations in some 40 countries. In addition, we have 77 own service companies and more than 650 service partners. This enables ZF to provide a tight network of highly qualified contacts close to international customers at all levels and in all regions.





Further information at [www.zf.com](http://www.zf.com).

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