## Content overview

1. **MAN at a glance**
2. **Company profile**
3. **Locations**
4. **Aftersales MAN PrimeServ – Services around the globe**
5. **History**
Volkswagen Group
12 brands

VOLKSWAGEN FINANCIAL SERVICES AKTIENGESELLSCHAFT
MAN Group
Key Figures 2015

MAN SE

Business areas

Commercial Vehicles

Power Engineering

Divisions

MAN Truck & Bus
Revenu '15: € 8.9 bn

MAN Latin America
Revenue '15: € 1.0 bn

MAN Diesel & Turbo
Revenue '15: € 3.3 bn

Investments

Sinotruk (25.0 % +1 share), Scania (17.4 %*)

The MAN Group in 2015: €13.7 billion revenue, 55,030 employees

* Voting rights

Investments

Sinotruk (25.0 % +1 share), Scania (17.4 %*)
### Key Figures 2015

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<thead>
<tr>
<th></th>
<th>2015</th>
<th>2014</th>
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<tr>
<td><strong>in Mio €</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Order intake</td>
<td>2,949</td>
<td>3,280</td>
</tr>
<tr>
<td>Revenue(^1)</td>
<td>3,305</td>
<td>3,273</td>
</tr>
<tr>
<td>Operating profit</td>
<td>216</td>
<td>206</td>
</tr>
<tr>
<td><strong>in %</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROS</td>
<td>6.5</td>
<td>6.3</td>
</tr>
<tr>
<td><strong>Employees(^2)</strong></td>
<td>14,953</td>
<td>14,947</td>
</tr>
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</table>

1) Including consolidation adjustments between the Engines & Marine Systems, Power Plants and Turbomachinery strategic business units.
2) Headcount (including subcontracted employees) as of December 31, 2014
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MAN Diesel & Turbo
The company’s Executive Board

Dr. Uwe Lauber
Chief Executive Officer, Engineering

Frank Burnautzki
Purchasing

Wayne Jones
Sales

Arnd Löttgen
Production

Dr. Peter Park
Finance

Wilfried von Rath
Human Resources
Organizational structure
Three Strategic Business Units

Executive Board

Group Functions

Strategic Business Units
- Engines & Marine Systems
- Power Plants
- Turbomachinery

Sites

International Group Companies
**Engines & Marine Systems**

- Two-stroke and four-stroke engines for marine applications
- Propellers and complete marine propulsion systems
- Turbochargers

**Power Plants**

- Two-stroke and four-stroke engines for stationary applications
- Diesel and gas power plants

**Turbomachinery**

- Compressors, gas and steam turbines, expanders
- Complex machinery trains
- Chemical reactors

**Service: MAN PrimeServ**

Worldwide network of service hubs: 24/7 OEM service around the globe
MAN Diesel & Turbo

Comprehensive applications in diverse industry areas
**Facts & Figures**

**Higher, faster, further...**

1350°C is the temperature of the hot iron that is casted in MAN Diesel & Turbo’s foundry in Augsburg, the largest German foundry outside the Ruhr region.

The velocities reached by the turning parts of turbomachinery are staggering. Taking a closer look at MAN Diesel & Turbo’s steam turbines reveals that the fastest tip speed of an end stage runs up to...

...which is Mach 1.5, the typical cruising speed of a Eurofighter jet.

1760 kph

257 years

That’s how far back MAN’s roots reach. On October 18, 1758, the first blast furnace was fired up at St.-Antony-Hütte, the oldest iron works in Germany’s industrial Ruhr region.

69,720 kW

is the output of the MAN B&W 12S90ME-C Mark 9.2 type low speed engine. It powers the “CSCL Globe”, one of the world’s largest container ships. This performance corresponds to the output of 78 Bugatti Veyron Super Sports, the fastest street-legal production car.

1.5 million cubic meters per hour

is the amount of air that the largest axial flow compressor from MAN Diesel & Turbo can suck in. At this capacity rate, the entire air volume of the Cologne Cathedral could be exhausted in merely 16 minutes.
From foundry to final assembly
Production
Global megatrends
Drivers of our business

- Worldwide seaborne trade will double until 2030
- Growing demand of energy efficient ships and propulsion solutions

Increase of world trade and international passenger traffic
50% of world trade powered by MAN engines
Two-stroke engine for the CSCL Globe

Powering one of the world’s largest container ships:
The “CSCL Globe” is propelled by a MAN B&W 12S90ME-C two-stroke engine with 69,720 kW
Global megatrends
Drivers of our business

- Worldwide seaborne trade will double until 2030
- Growing demand of energy efficient ships and propulsion solutions

Increase of world trade and international passenger traffic

- Global energy demand will almost double until 2030
- Growing importance of decentralized energy generation

Increase of energy demand
Bringing energy even to remote areas
La Réunion power plant meets 25% of the island's energy needs

Highly efficient energy generation for Electricité de France: Twelve MAN 18V48/60 (210 Mwe) secure La Réunion’s energy supply
## Global megatrends

**Drivers of our business**

<table>
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<tr>
<th>TRANSPORT</th>
<th>ENERGY</th>
<th>INDUSTRY</th>
</tr>
</thead>
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<tr>
<td>Increase of world trade and international passenger traffic</td>
<td>Increase of energy demand</td>
<td>Increasing demand of industrial products</td>
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- **TRANSPORT**
  - Worldwide seaborne trade will double until 2030
  - Growing demand of energy efficient ships and propulsion solutions

- **ENERGY**
  - Global energy demand will almost double until 2030
  - Growing importance of decentralized energy generation

- **INDUSTRY**
  - Worldwide consumption will nearly double until 2025 with another 1.8 billion people entering the global consuming class
Improving efficiency of industry processes
Saving energy in paper manufacturing

TURBAIR® vacuum systems can offer substantial water and energy savings. Energy consumption is up to 40 percent lower compared to conventional water ring pumps.
### Global megatrends
Drivers of our business

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
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<tr>
<td>TRANSPORT</td>
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<td>ENERGY</td>
<td>Increase of energy demand, worldwide energy demand will almost double until 2030, growing importance of decentralized energy generation</td>
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<tr>
<td>INDUSTRY</td>
<td>Increasing demand of industrial products, worldwide consumption nearly double by 2025 with another 1.8 billion people entering the global consuming class</td>
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<tr>
<td>CLIMATE</td>
<td>Climate change, introduction of emission standards, growing significance of gas as fuel</td>
</tr>
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World’s most eco-friendly container ships
Dual fuel engines for TOTE container vessels

LNG power for lower emissions: The two 3,100 TEU container ships of US shipping firm TOTE Inc. will be powered by MAN two-stroke dual fuel engines mainly operated on liquid natural gas.
Meeting Tier III limits
Four-stroke engine plus SCR system certified for NOx standards

SCR system for cargo ship Petunia Seaways: MAN Diesel & Turbo has received a certificate from DNV GL for successfully complying with the requirements of IMO Tier III with four-stroke marine engines.
Tapping resources in the deep sea
Subsea compressors for the Åsgard field

MAN has developed the first subsea gas extraction system directly installed on the seabed
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Design and production network
MAN Diesel & Turbo sites in Europe and Asia

Diesel Plants
Turbo Plants
Diesel & Turbo Plant
Worldwide location
Global network of service hubs
International working environment
MAN Diesel & Turbo is a major employer

- 14,900 Employees at more than 120 locations, especially in Germany, Denmark, France, Switzerland, the Czech Republic, India and China
- More than 600 apprentices in more than 20 professions
- Top Employer for Engineers
Design and production sites
Headquarters Augsburg, Germany

Products
- Four-stroke Diesel Engines
- Four-stroke Dual-Fuel & Gas Engines
- Turbochargers
- PrimeServ After Sales Service

Employees (31.12.2015) : 4,171
Design and production sites
Oberhausen, Germany

Employees (31.12.2015) : 1,973

Products
Steam Turbines  Gas Turbines  Axial Compressors  Centrifugal Compressors  Process-Gas Screw Compressors  PrimeServ After Sales Service
Design and production sites
Berlin, Germany

Employees (31.12.2015): 560

Products
- Small / Medium Centrifugal Compressors
- Multi-Shaft Compressors
- PrimeServ After Sales Service
Design and production sites
Hamburg, Germany

Products
Steam Turbines 1-40 MW
Small mech. drive steam turbines

Employees (31.12.2015): 320
Design and production sites
Deggendorf, Germany

Employees (31.12.2015): 483

Products
- Chemical Reactor Technology
- High Pressure Apparatuses
Design and production sites

Copenhagen, Denmark

Products

- Design of two-Stroke Engines
- Two-Stroke Engine Components
- Spare Parts
- PrimeServ After Sales Service

Employees (31.12.2015) : 1,359
Design and Production Sites
Frederikshavn, Denmark

Employees (31.12.2015) : 451

Products
- CP Propellers
- FP Propellers
- Control Systems
- Engine Testing
- PrimeServ After Sales Service
Design and production sites
Holeby, Denmark

Employees (31.12.2015): 206

Products
PrimeServ After Sales Service
Design
Design and production sites
Zurich, Switzerland

Employees (31.12.2015): 936

Products
- Isotherm Compressors
- Large Centrif. Compressors
- Axial Compressors
- MOPICO HOFIM
- Vacuum Blowers
- PrimeServ After Sales Service
Design and production sites
Saint Nazaire, France

Employees (31.12.2015): 663

Products
- Four-stroke Diesel Engines
- Emergency Genset
- PrimeServ After Sales Service
Design and production sites
PBS Turbo s.r.o., Velká Bíteš, Czech Republic

Employees (31.12.2015): 208

Products
Turbochargers
Design and production sites
Aurangabad, India

Employees (31.12.2015): 378

Products
- Four-stroke Engines
- GenSets
Design and production sites
Bangalore, India

Employees (31.12.2015): 149

Products
Steam turbines
Design and production sites
Changzhou, China

Employees (31.12.2015): 484

Products
- Steam turbines
- Isotherm compressors
- PrimeServ After Sales Service
- Turbocharger
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Aftersales MAN PrimeServ
24/7 service around the globe
Aftersales MAN PrimeServ
24/7 service around the globe

- Individual consulting, service agreements and contracts
- Maintenance, spare parts supply and repairs
- Retrofits, upgrades
- Online monitoring and diagnosis
- Customer training in MAN PrimeServ academies
- Worldwide network of service hubs: 24/7 OEM service around the globe
Aftersales MAN PrimeServ
Retrofits and Upgrades

Fuel & Lube Oil Savings

Life-Cycle Extension

Emission Control

Online Service

Major Fuel Conversion

Monitoring- / Controlling
Aftersales MAN PrimeServ
Academies for training employees and customers

13 Academies worldwide
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The history of MAN Diesel & Turbo

MAN has twin roots

1758: St. Antony Eisenwerke, Oberhausen

1873: Börsengang der Gutehoffnungshütte (GHH)

1840: Sandersche Masch.fabrik Augsburg

1841: Eisengießerei u. Masch. fabrik Klett & Comp., Nürnberg

1908: M.A.N. Masch.fabrik Augsburg-Nürnberg

1921: GHH acquires majority share of M.A.N.

1986: M.A.N. merges with GHH, renamed MAN AG

2007: Volkswagen AG becomes main shareholder of MAN AG

2010: Merger of MAN Diesel SE and MAN Turbo AG to MAN Diesel & Turbo SE

2011: MAN becomes part of the Volkswagen Group
The history of MAN Diesel & Turbo
Continuous development of brands and business areas
Visionary engineers influencing MAN
Pioneers shaping the company’s history

Franz Ferdinand von Wenge (1707-1788)

Hans Caspar Escher (1775-1859) & Salomon von Wyss (1769-1827)

Johann Jacob Sulzer (1782-1853)

Johann Friedrich August Borsig (1804-1845)

Ludwig Sander (1790-1877)

Johann Friedrich Klett (1778-1847)

Carl Christian Burmeister (1821-1898) & William Wain (1819-1882)

Heinrich von Buz (1833-1918)

Rudolf Diesel (1858-1913)
Rudolf Diesel (1858 – 1913)
Developing the diesel engine together with MAN engineers
First ocean-going motor vessel in 1912
MV Selandia with 2 x 1 050 HP B&W engines
World’s first diesel power plant in 1904
2,400 HP for energy generation in Kiev
The Evolution of the thermal engine
From steam engines to Diesel Combined Cycle

η mech. 1,0 (100 %)

- 3 % steam engine (J. Watt 1782) (1)
- 26,2 % First diesel engine (R. Diesel 1892) (2)
- 30 % First turbocharged diesel engine (MAN & Masch. Fab. Winterthur 1925) (3)
- 47,4 % Current medium speed diesel engine (1-stage turbocharging) (4)
- 49,1 % Current medium speed diesel engine – 2-stage turbocharging (5)
- 52 % “Diesel Combined Cycle“ (6)

Optimierungs-Maßnahmen am Motor: Erhöhung Zünddruck, Mitteldruck, Kolbengeschwindigkeit

(1) Ben Marsden: Watt’s Perfect Engine: Steam and the Age of Invention. Columbia University Press, 2004
(2) http://www.deutsches-museum.de/sammlungen/maschinen/kraftmaschinen/verbrennung/dieselmotoren/der-erste-dieselmotor-1897/
(3) http://www.lkv.uni-rostock.de/uploads/media/Prenninger_Skriptum_2011_1-12.pdf - S.9
(4) 18V48/60B – WB2007/2008. 5 % Toleranz MDT „Power Plants Programme 2012“
(6) Nutzung der Abgaswärme zum Antrieb einer Dampfturbine.
First Piston Type Steam Engine in 1898
Delivered to China
First GHH steam turbine in 1904
Entering the market for steam turbines
All data provided in this document is non-binding. This data serves informational purposes only and is especially not guaranteed in any way. Depending on the subsequent specific individual projects, the relevant data may be subject to changes and will be assessed and determined individually for each project. This will depend on the particular characteristics of each individual project, especially specific site and operational conditions.