

# Evolved

Our new generation of industrial gas turbines




Engineering the Future – since 1758.

**MAN Diesel & Turbo**



# One Progressive Family...

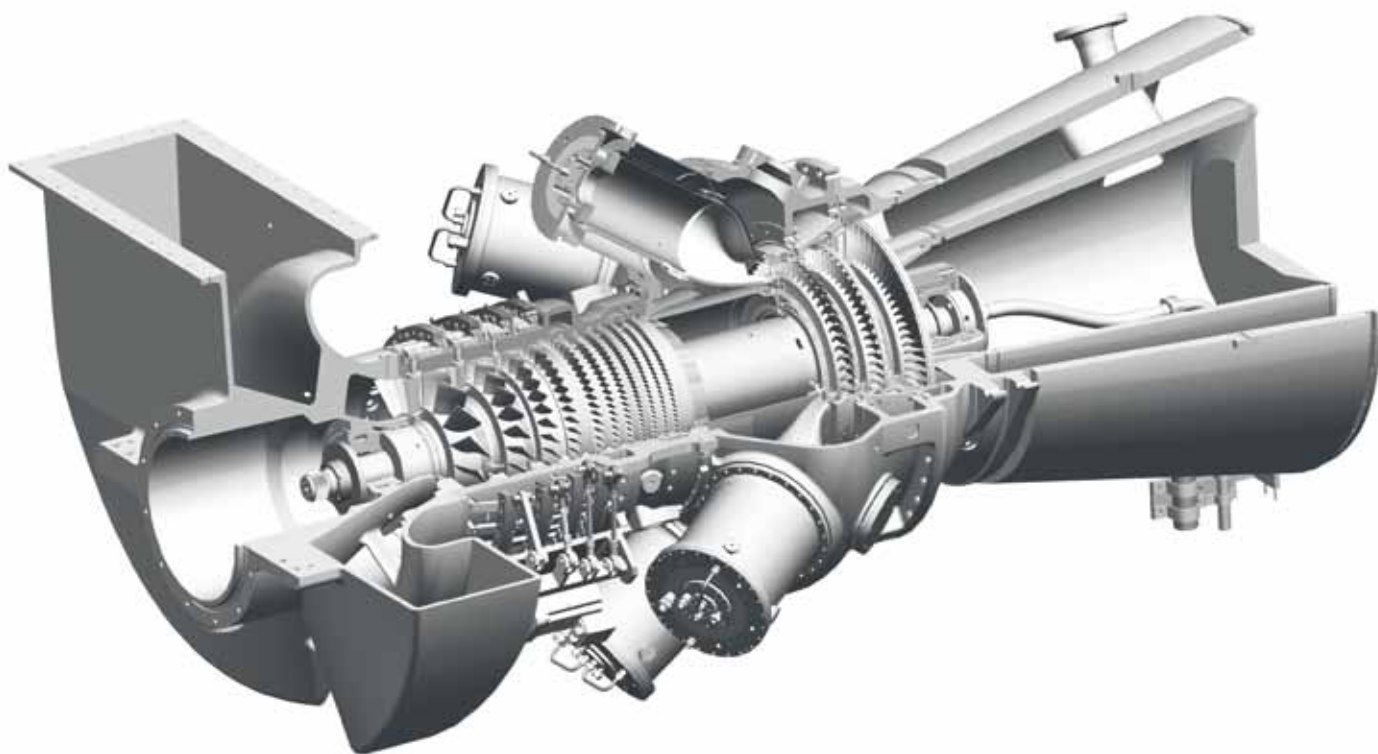
## ...and its newest member



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Evolution means change that is adaptive to its environment. Its result is always something that is better suited to the world it exists in. Generation after generation. It's the principle that powers progress. It is also the principle that created our new industrial gas turbine.

Generating enough clean and reliable power for the world is one of the great challenges of our time. More than ever before, MAN Diesel & Turbo's development focus is on the environmental performance of our engines – from gas turbine to steam turbine applications, from biomass and concentrated solar power to conventional energy. This sets the benchmark for our new gas turbine. It is the result of a decades long evolution towards products that meet the standards of tomorrow for efficient and clean power generation. Our new industrial gas turbine. Designed for progress.



### **A new class of our industrial gas turbines**

More than two decades of industrial gas turbine experience and profound application knowledge have shaped our brand-new product. The industrial gas turbine is designed for mechanical drive applications as well as for power generation. It extends MAN Diesel & Turbo's gas turbine product range in the smaller power classes and establishes a sound technology base for further gas turbine models in the future.

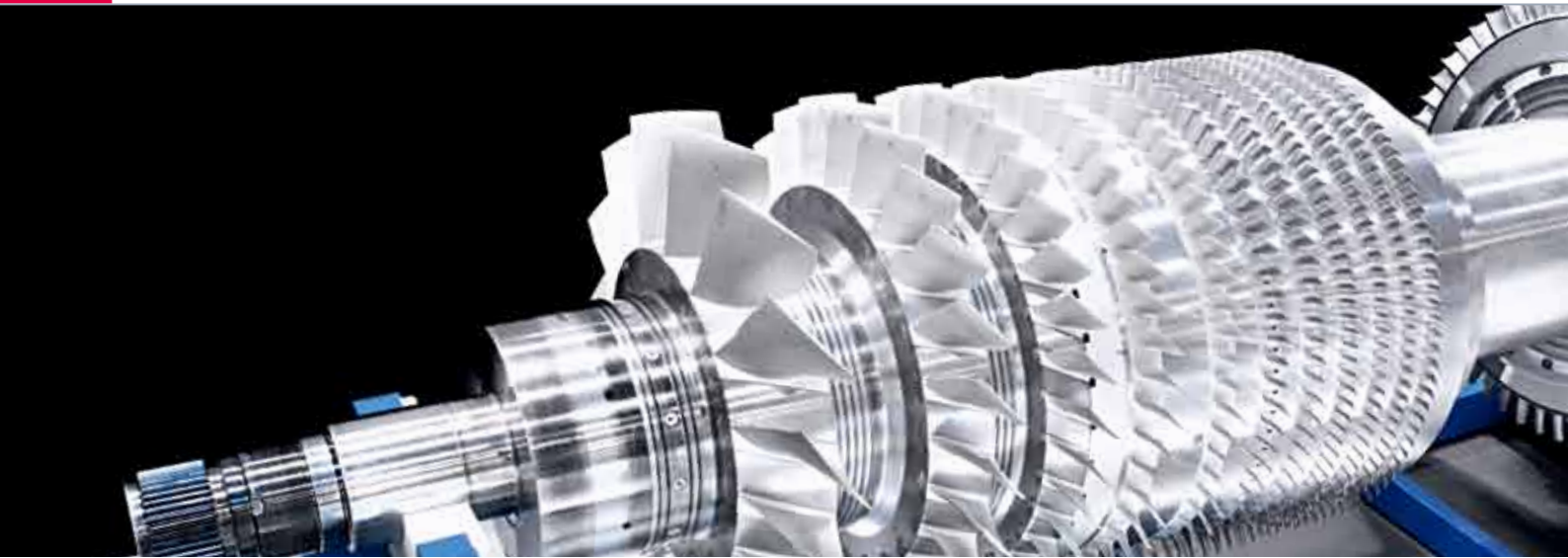
For up- and midstream oil and gas applications a wide range of MAN Diesel & Turbo compressors are available in combination with this new turbine. And in addition to this we offer full train capabilities.

For power generation applications the engine can be combined with a reduction gearbox to drive electrical generators. This machine train can be used effectively for simple cycle power generation as well as combined heat and power plants (CHP).

### **Service without limits**

MAN PrimeServ helps to reach and exceed the expectations our customers have in their gas turbine. Based on the maintenance programme for the new gas turbines our experienced service teams provide the best solutions and services: 24/7, 365 days a year. The MAN PrimeServ global after-sales network reaches every customer at any time anywhere.

# A New Class of Our Gas Turbines



## Main characteristics

The new turbine is a heavy duty industrial gas turbine designed to run successfully even in demanding environments. The engine is of modular design and can be split into sub modules quickly and easily. The casing of the compressor section is horizontally split for easy access to the rotor and simple maintenance. The combustor as well as the turbine sections are designed as rings without split joints to guarantee less degradation and high efficiency. Compressor and turbine airfoils are engineered according to state of the art 3D design rules. All bearings are of sleeve type and use standard ISO 46 grade lube oil.

The engine features a dry low emissions combustion system to comply with ever more stringent regulations worldwide. The high efficiency minimises the CO<sub>2</sub> emissions as well as operating cost. Exhaust temperatures are high enough to produce large amounts of steam for process applications.

## Benefit for our customers

By design, the gas turbine continues MAN's tradition of delivering dependable engines. Long service life as well as easy maintenance ensure reduced operating cost. The continuous improvement of all turbines safeguards the investment of our customers. However the new series of gas turbines is only the beginning. Additional engines with increased power output will follow. This will change the market situation and is our response to our customers' requirements.

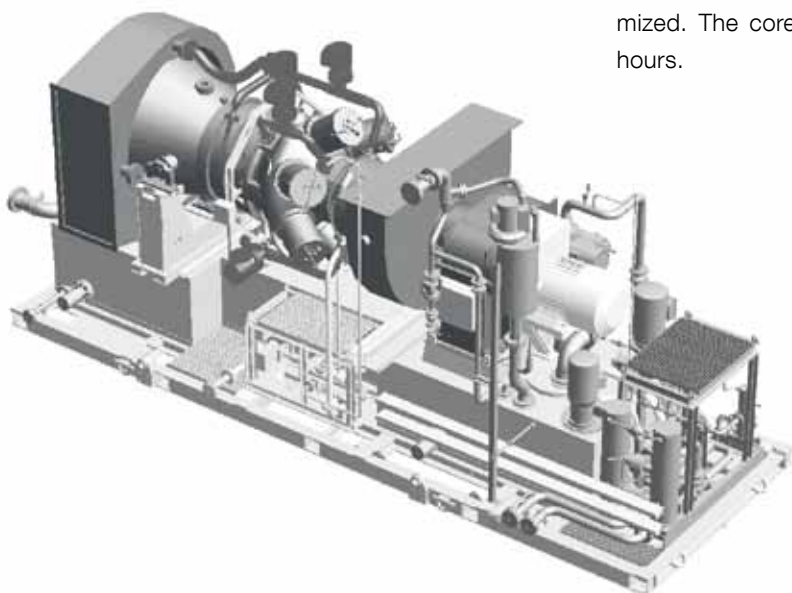


#### Package measures and weight (without air inlet housing and exhaust stack)

|        | Power generation application |              | Mechanical drive application |              |
|--------|------------------------------|--------------|------------------------------|--------------|
| Length | 13 m                         | (42.7 ft)    | 12 m                         | (39.4 ft)    |
| Width  | 2.9 m                        | (9.5 ft)     | 2.9 m                        | (9.5 ft)     |
| Height | 4 m                          | (13.1 ft)    | 4 m                          | (13.1 ft)    |
| Weight | 67 t                         | (147,710 lb) | 57 t                         | (125,663 lb) |

#### The package concept

The gas turbines are delivered by MAN Diesel & Turbo as fully packaged units. The package contains all necessary equipment for safe operation. Special emphasis is on easy and fast maintenance as well as modular and compact design to comply with all customer specifications. The package is preassembled as far as possible, so site erection work is minimized. The core turbine can be removed within 24 hours.





# Technical Data

## Performance

|                                   | Mechanical drive | Generator drive* |
|-----------------------------------|------------------|------------------|
| Power output [MW]                 | 6.90             | 6.63             |
| Efficiency [%]                    | 34.0             | 32.2             |
| Heat rate [kJ/kWh]                | 10,590           | 11,190           |
| Exhaust gas flow [kg/s]           | 28.1             | 26.2             |
| Exhaust gas temperature [°C]      | 460              | 505              |
| Fuel flow [kg/h] (LHV = 48 MJ/kg) | 1,520            | 1,540            |
| Heat input [MJ/s]                 | 20.3             | 20.6             |

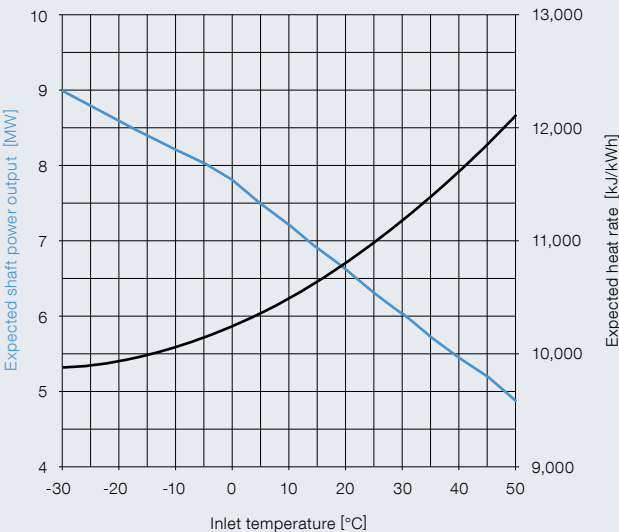
  

|  |                |                |
|--|----------------|----------------|
| Emissions (ref. to 15% O <sub>2</sub> , dry) | 70 – 100% load | 50 – 100% load |
| NO <sub>x</sub> [mg/Nm <sup>3</sup> ]        | 30             | 30             |
| CO [mg/Nm <sup>3</sup> ]                     | <15            | <15            |

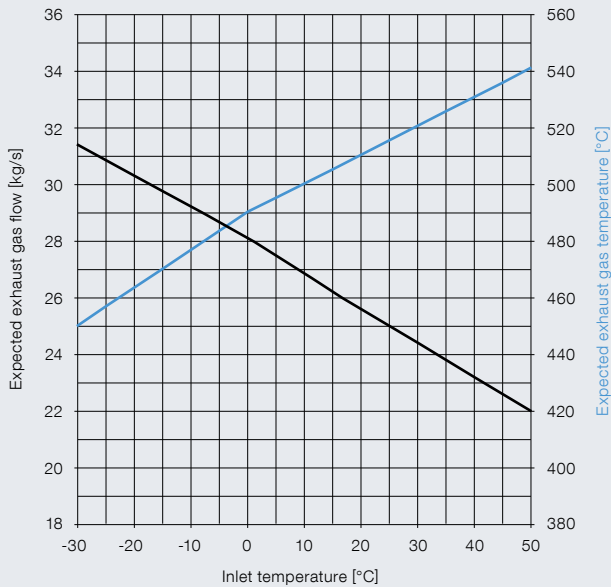
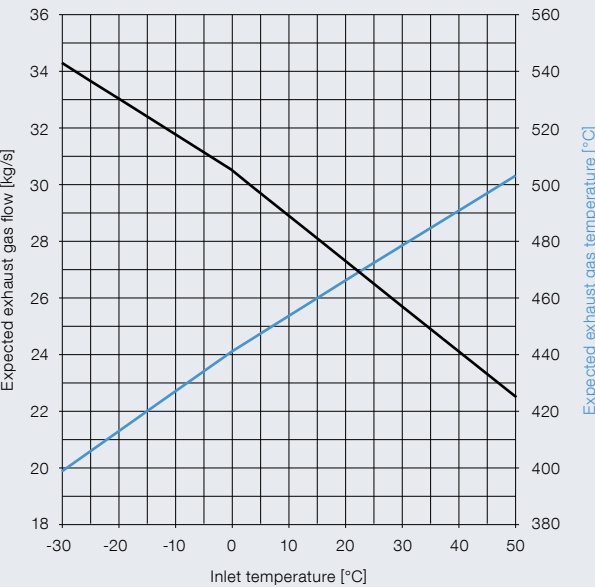
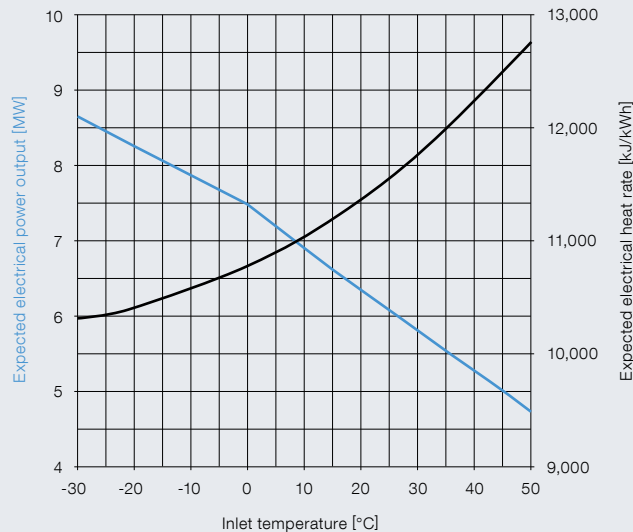
All Data at 15°C (59°F), Sea Level (101.3 kPa), Rel. Humidity 60%, Zero Inlet and Exhaust Pressure Losses.

\*At generator terminals including gearbox and generator losses.

### Mechanical drive



### Generator drive





### Testing

The prototype engine was tested thoroughly in the Oberhausen gas turbine testbed. The vigorous testing programme took several months and covered all areas including performance, mechanical integrity, emissions and maintenance processes etc. Test was flawless and data confirmed that all design criteria were met. Based on these exhaustive tests and on the upcoming field trial period at selected customer

sites for different applications, the new gas turbine will be available for our customers in the market. MAN Diesel & Turbo's customers recognised In Service Development program will take care of the engines while in operation and incorporates modifications whenever necessary and as fast as possible.

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