Mallnow natural gas compressor station

MAN Energy Solutions
Future in the making

Climate-friendly gas supply

Modern pipeline network

The backbone of gas supply

Compressor stations are critically important for transporting natural gas over thousands of kilometers through a network distributing energy to utilities, industrial customers and comfort in our homes. Pressure losses are equalized by compressors sited roughly every 200 km thus maintaining the pipeline pressure between 75 to 100 bar and ensuring a continuous flow of natural gas.

Mallnow – new standards for natural gas compressor stations

The natural gas compressor station at Mallnow near Frankfurt/Oder, close to the border between Germany and Poland, is one of the most important hubs in the supply network of WINGAS TRANSPORT GmbH & Co. KG (WINGAS TRANSPORT, today Gascade). The company is a subsidiary of WINGAS GmbH & Co. KG (WINGAS) and operates a natural gas pipeline network, which extends over 2,000 kilometres (status 2009), running right across Germany.

WINGAS experts developed a novel concept for the Mallnow station where the gas turbine exhaust is put to use in a heat recovery steam generator: a steam turbine drives a gas pipeline compressor thereby increasing the station's transportation capacity by almost a quarter without consuming additional energy.

The central gas supply long-distance pipeline network

The WINGAS TRANSPORT pipeline network has developed into a key supply grid for the transport of natural gas around Europe, thanks to its central position and direct links to the major European transit pipelines coming from Russia and the North Sea. WINGAS TRANSPORT's main long-distance pipelines are:

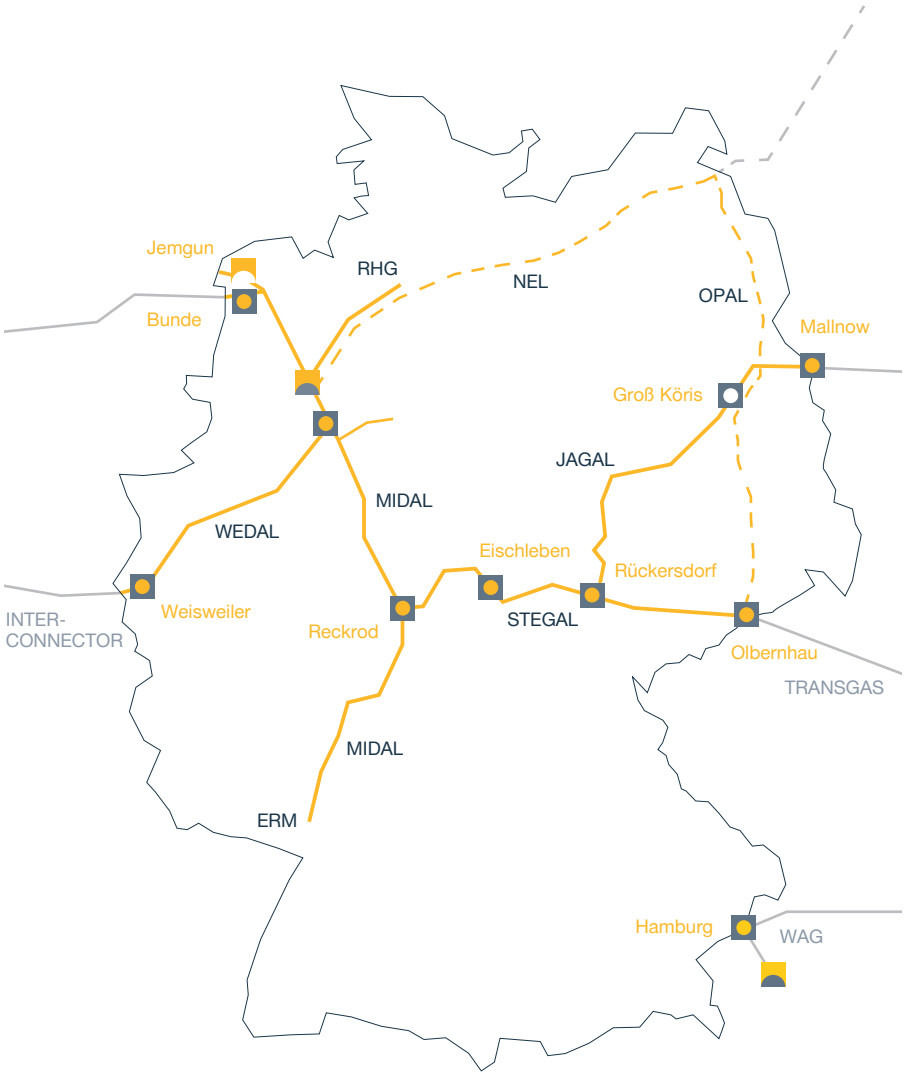
- AGAL (Jamal gas link pipeline) and STEGAL (Saxony Thuringia natural gas pipeline). Both transport Russian natural gas to central Germany.
- MIDAL (Central German link pipeline) crosses Germany from north to south and represents the core of the pipeline system.
- WEDAL (Western Germany link pipeline) supplies Germany with British North Sea gas and also with Russian natural gas through the link with MIDAL.

The Mallnow natural gas compressor station

- is one of WINGAS TRANSPORT'S largest compressor hubs
- transports volumes of gas that make up around a third of Germany's natural gas requirements
- uses the gas turbines' waste heat to drive an additional steam turbine driven compressor

The WINGAS TRANSPORT pipeline network and the WINGAS natural gas storage facility

- Existing pipelines
- Pipelines planned and/or under construction
- Transit pipeline
- Transit pipeline planned and/or under construction
- Underground storage facility
- Underground storage facility planned and/or under construction
- Gas compressor stations
- Gas compressor stations planned and/or under construction
- **Bunde** Name of compressor station or storage facility



WINGAS TRANSPORT long-distance pipelines

STEGAL Saxony-Thuringia natural gas pipeline
MIDAL Central Germany link pipeline
WEDAL Western Germany link pipeline
JAGAL Jamas gas link pipeline

MAN turbomachines installed in WINGAS TRANSPORT natural gas compressor stations

Eischleben
1 x gas turbine
1 x pipeline compressor

Haiming
1 x gas turbine
1 x pipeline compressor
1 x compressor

Mallnow
4 x pipeline compressors
1 x steam turbine
3 x gas turbines

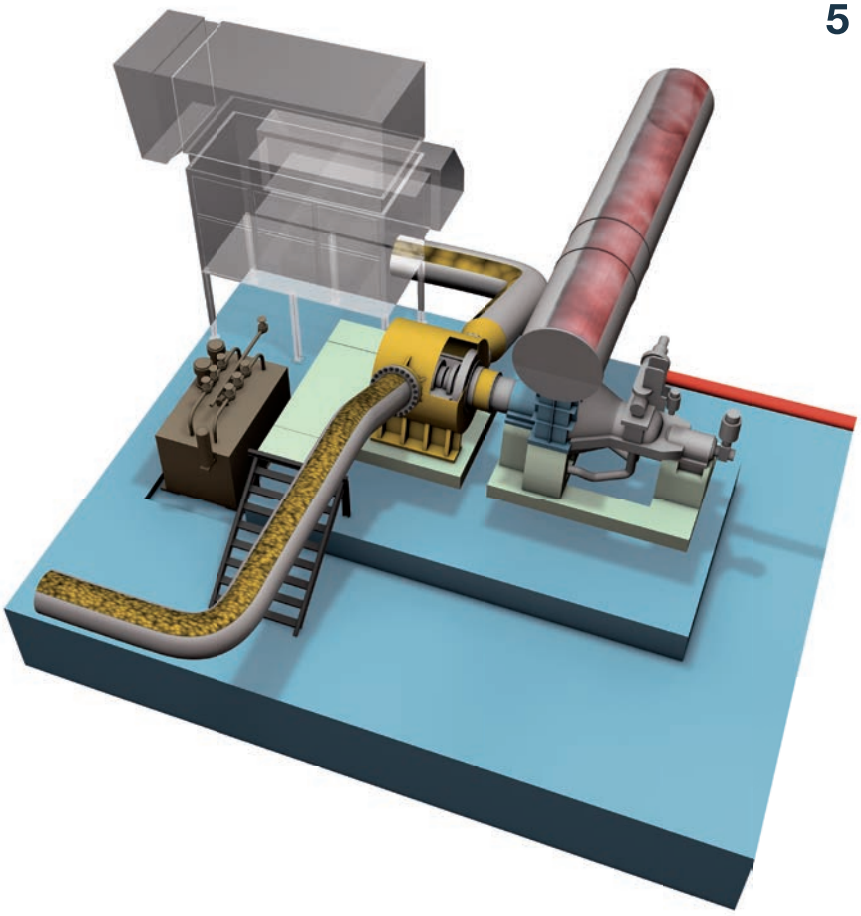
Olbernhau
3 x gas turbines
3 x pipeline compressors

Reckrod
4 x gas turbines
4 x pipeline compressors
1 x gas turbine
1 x pipeline compressor

Rückersdorf
3 x gas turbines
3 x pipeline compressors

Weisweiler
2 x pipeline compressors
Drive: variable speed electric motor

All figures for 2009



The steam turbine compressor unit was installed whilst the Mallnow station was in operation. MAN's knowledge in the integration of different types of turbomachinery contributed significantly to the optimization of the Mallnow station.

The order package: embracing a novel solution

Three pipeline compressors driven by industrial gas turbines have been in operation since 1999. Increased gas demand necessitated the expansion of the pipeline network and a capacity increase of the Mallnow compressor station. MAN received the contract to supply, install and commission an additional unit in 2006, consisting of a steam turbine driven pipeline compressor. A combination of gas and steam turbines is uncommon in compressor stations. Therefore, an intensive conceptual phase proceeded the contract, during which MAN's experience of steam turbines made the difference. The entire project execution was demanding in terms of the project partners' technological expertise and their cooperation. It proved possible to expand the station without impairing its ongoing operation, and the station has been running continuously since the end of 2007.

Optimum integration: clever thermal integration avoids energy waste

MAN pipeline compressors are frequently used in conjunction with MAN industrial gas turbines, and have proven their worth for transporting natural gas. The fourth pipeline compressor in Mallnow is driven by an MAN industrial condensing steam turbine. The 460° Celsius gas turbine exhaust is diverted into a common heat recovery steam generator, which continuously supplies up to 85 tonnes of steam per hour at 420° Celsius to the steam turbine thus increasing the station's capacity without additional energy usage.

Optimum integration: clever equipment arrangement to reduce total cost

The integration of the steam turbine compressor unit into the existing station was technically challenging, but cost effective. MAN engineers developed solutions for the ground level foundation of the steam turbine, upwards steam exhaust, condenser piping and drainage. These have since stood up to the demands of practical operation extremely well. As a result, the Mallnow natural gas compressor station is an outstanding example of how proven standard technologies coupled with innovative plant design lead to climate-friendly gas supply. This plant concept is especially suited to large stations such as Mallnow, which can guarantee uninterrupted steam generation during continuous operation.

Turbomachines from a single source

An overview of the Mallnow plant

The compressors and their drive units represent the key elements of every compressor station. MAN Energy Solutions supplied all the turbomachines installed in Mallnow.

Pipeline compressor and steam turbine. Output: 22 MW

Additional technical information

Number of compressors	3 pipeline compressors with gas turbine
Output	3 x 26 MW
Maximum operating pressure	100 bar
Capacity	4 mill. m^3/h (in standard state)

Three pipeline compressors are driven by gas turbines (1). The special feature of the Mallnow station is the fact that the gas turbine flue gases are recovered in a generator (2) for steam production. This steam supplies the steam turbine, which then drives the fourth compressor (3).

Further processes are used specifically for media supply and natural gas processing. These include gas processing (4) with filtration and drying. In addition, the water steam cycle needs a large number of components and systems, such as the air condenser (5).

MAN Energy Solutions
86224 Augsburg, Germany
P + 49 821 322-0
F + 49 821 322-3382
info@man-es.com
www.man-es.com

MAN Energy Solutions
Steinbrinkstr. 1
46145 Oberhausen, Germany
P + 49 208 692-01
F + 49 208 692-021
turbomachinery@man-es.com
www.man-es.com

D02085056EN Printed in Germany 08200.5