

POWER PROFILE

Caterpillar Marine Power Systems



CUSTOMER

Petersen & Alpers

LOCATION

Hamburg, Germany

SEGMENT

Tug & Salvage

VESSEL TYPE

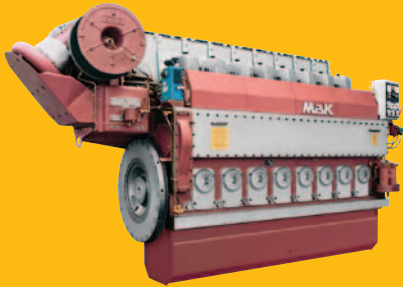
Harbor Tug

POWER SOLUTION

2x MaK 8 M 20 propulsion engines
1520 kW @ 1000 rpm

CAT® DEALER

Zeppelin Power Systems



MaK 8 M 20

A DECADE OF TECHNOLOGICAL PROGRESS

10 years of MaK VRT pressure charging: Variable turbine geometry optimizes torque and reduces emissions

CHALLENGE

The capacity of marine diesel engines has increased steadily over the years. One of the methods chosen to achieve this was to continuously raise mean effective pressures. Unfortunately, the high-efficiency turbochargers used to do this cannot always sufficiently cover the air requirement of the engine in the part load range, which in turn results in torque losses and thermal overload. Torque weakness has a particularly negative effect on towage since tugs are often equipped with fixed-pitch propeller plants running at continually changing speeds.

One of the most powerful tugs in the port of Hamburg has just celebrated its 10th anniversary – along with the innovative MaK VRT technology that has been part of her equipment since she went into service. The harbor tug Michel, owned by Petersen & Alpers, was commissioned in 1998. She owes her capacity to a well-coordinated crew and a twin-engine propulsion plant consisting of two medium-speed MaK 8 M 20 engines adjusted to 1520 kW at 1000 rpm and equipped with a Variable Radial Turbine (VRT). So, not only Michel but also MaK VRT technology has stood the test of time, particularly in tug applications.

SOLUTION

MaK came up with a solution actually adjusting the engine's turbine during operation as early as the 1980s. Called Variable Multi Pulse (VMP) technology, it was used in the MaK M 32 C

engine with axial turbine, particularly on tugs. When the new MaK long-stroke generation was launched from 1992, VMP technology was developed into VRT technology and adjusted to the KBB turbocharger models with radial turbine used for the M 20 and M 25 engine series.

The basic principle of VRT is as simple as it is convincing. The nozzle ring in the turbocharger consists of two parts with different cross sections (full load ring and part load ring). Depending on the engine load, either one or the other ring can be activated. The changeover between the two is fully automatic and effected by means of compressed air depending on engine speed and charging pressure. The nozzle ring simultaneously acts as an air cylinder, which eliminates the need for a complex adjusting mechanism.

SUCCESS

After Michel became the first vessel to be equipped with this technology in 1998, many other tugs were provided with MaK engines types 8 M 20 and 8 M 25 that included the VRT technology. Daily use fully confirmed the expected improvements in torque characteristics and ramp-up behavior. Further advantages are low thermal load on the engine, reduced exhaust emissions and low fuel consumption. The heavy fuel compatibility of VRT technology has also been proven in practice.

POWER PROFILE

Harbor Tug Michel with MaK VRT Technology

It only remains, then, to answer the question why Michel is no longer the toughest conventionally driven tug in Hamburg, despite her optimal MaK engine technology. It's because Michel got a bigger brother, Peter, in September of last year. It goes without saying that this tug is also equipped with engines from Caterpillar Marine Power Systems. Only this time, two high-speed Cat® 3516B engines were installed, each of 2090 kW at 1600 rpm.

Regardless of whether MaK or Cat marine engines are used, ship operators across the world swear by their power, reliability, and longevity. Technical innovation is an integral part of the product philosophy as the market launch of MaK VRT technology confirmed in 1998 – at a time when competition was still looking for viable problem solutions to improve ramp-up behavior, engine emissions, and fuel consumption.

Caterpillar Marine Power Systems

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LEHM0015-01

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