



New radial turbocharger series

The next generation: TCR

Augsburg, 6 August 2004. Following the successful introduction of the TCA axial turbocharger two years ago, MAN B&W Diesel Group are pleased to announce a further expansion of the range to include a completely new radial turbocharger. The TCR turbocharger will replace the current NR series which has been in production for nearly 50 years culminating in the current NR/S design. The new TCR series has a compressor pressure ratio of 4.7 and is capable of up to 5.2 when built as a special version. Aimed specifically at the medium and high-speed diesel and gas markets, six different models are able to cover a wide range of outputs from 400 to almost 6,000 kW.

The introduction of a new turbocharger series always attracts attention in the medium speed long life engine world. Usually the market behaves with caution, preferring to stay with the well proven products. This was however quite different when the axial TCA turbocharger was launched and since delivery of the first unit in May 2002 over 350 have now been ordered. MAN B&W Diesel are quite confident that they will be able to repeat this success with the TCR series.

The TCA and TCR are the first MAN B&W Diesel turbochargers to be completely designed using a 3D-CAD system. This simplifies and reduces development work by integrating innovative software tools during the CFD (flow) and FEA (strength) analysis. These findings allow the optimisation of the material used for the turbocharger so as to combine maximum strength with the lowest possible weight and a compact design.

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The flow and strength analyses resulted in a completely new design of compressor wheel, which permits higher efficiency, quicker response behaviour during acceleration and, therefore, minimal emissions from the complete system. The compressor wheel is screwed onto the shaft via a special retainer, which ensures precise centring. This design permits, among other things, a reduction of the hub and, therefore, an increase in the airflow rate.

With regard to the rotor support, the MAN B&W engineers came up with something special: The axial bearing was located between the two radial bearings which permitted minimisation of the bearing space requirements. The sealing system was also designed to be as compact as possible and without any additional sealing air requirement. The piston ring gasket, combined with a labyrinth seal, was thoroughly tested and proved to provide optimum sealing capacity both in operation and at standstill.

Once again flow calculations played a major part in the development of the new turbine in order to create a shape with high efficiency on the one hand and a wide application range on the other. Consequently the new turbine provides optimum values in part load and full load operation and is equally suitable for constant and pulse pressure turbocharging. Optimisation is not restricted to the turbine rotor but covers the complete system from the gas inlet casing, via the nozzle ring to the turbine outlet casing, which can be obtained in various mounting variants. An optional variable nozzle ring permits turbocharger adaptation to most load conditions.

Development work also concentrated on the noise level by the introduction of a completely new intake silencer, which not only reduces the turbocharger noise but is very easy to

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install. With regard to weight, the one piece casing in aluminium cast design benefits once again from FEA optimisation, while an integrated washing system permits compressor wheel cleaning during operation.

Good design takes the working life of the product into consideration. During TCR turbocharger development, great importance was attached to an extended service life of the wear parts, which is to the operator's benefit with extended service work intervals and the possibility to carry out maintenance work with other services to be done on the engine. Many design details contribute to simplifying and reducing maintenance. For example, an opening in the turbine outlet casing permits inspection of the turbine wheel without having to remove the casing.

In total, MAN B&W Diesel, jointly with their subsidiary PBS Turbo as development partner, succeeded in transferring the experience obtained during five decades of NR series development, construction and operation to the new turbocharger generation and, at the same time, to optimise all turbocharger aspects with the help of state-of-the-art computer technology.

About MAN B&W Diesel

The MAN B&W Diesel Group is leading supplier of large-bore Diesel engines for marine propulsion and power stations with a unit output of up to 97 MW per engine. The two-stroke and four-stroke engines produced by MAN B&W Diesel and their licensees are, with a market share of approx. 50 percent, leaders on the world market with regard to the propulsion of large ocean-going vessels. Moreover, the company is one of the leading suppliers of Diesel power stations and turbochargers. The Group Division, with approx. 6,700 employees and manufacturing plants in Germany, Denmark, England, France, China and the Czech Republic, achieves an annual turnover of approx. 1.4 billion Euro. MAN B&W Diesel is a subsidiary of the MAN Aktiengesellschaft, Munich. The MAN Group is one of the leading European suppliers of capital goods in the fields of commercial vehicles, constructional engineering and engineering contracting with a turnover of approx. 13,5 billion Euro and 64,000 employees.

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