



News service MAN Group

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MAN B&W: Common Rail: A Leap in Technology for Marine Engines AG A New Benchmark in Electronic Fuel Injection

The most up-to-date common rail diesel technology is reliable, clean, economic, durable – and in the MAN Group it is now available for the engine of a small truck up to a large marine diesel. For service on the high seas the electronic injection system has again been decisively improved. “Now this technology is where we wanted to have it,” says Fritz Pape, Member of the Executive Board of MAN B&W Diesel. This in-house development combines conventional components of existing MAN injection systems with up-to-date hydraulic and electronic elements that have been developed further. “It was a strategic decision to develop common rail for our engines ourselves in order to do better than what would have been possible with existing, external systems,” underlines Fritz Pape. The result is the new engine type 32/40 CR that is now being presented to the specialist media in Saalfelden in Austria. With this common rail system that has been optimized with regard to reliability and performance, MAN B&W Diesel has achieved a milestone in marine engine construction with its new medium-speed four-stroke engine 32/40 CR.

Experience

Smother performance, lower emissions, lower consumption, flexible application in the respective area of use: These are the most important advantages of common rail technology. Now this state-of-the-art MAN technology that has become well-established in the truck sector is also available for MAN B&W's successful four-stroke engine range. „In developing our injection systems we have been able to build on many years of experience,” emphasizes the Head of Development Engineering, Dr. Ralf Marquard. Already in 1979 the company had begun to develop common rail engines that went into serial production. Marquard and his team have studied the different systems and have adapted and optimized the technology with regard to the size of the engines and the particular demands of maritime use.

At MAN Nutzfahrzeuge AG, a sister company, common rail technology has been successfully applied for just over two years: approx. 9000 MAN trucks are already on the road with this modern injection system. The new common rail generation in the D20 series sets new standards in engine construction. The specialist publication, “Trucker”, praises the D20 in operation as the “King of Torque” and proclaims: “If there were a title to be won as the quietest truck engine, the MAN six-cylinder engine would bring this title home to Munich.” These engines are successful even under racing conditions: The MAN trucks, equipped with their outstanding engine technology, are always at the front in all the significant races. Their last triumph was at the European Championships and went unchallenged.

Technology

In common rail diesel engines fuel is injected into all the cylinders via a “common rail”. The generation of pressure and injection of fuel are not interconnected in a common rail system. Unlike in conventional systems, the injection pressure is independent of the engine speed. Thus there is always full pressure available. The fuel is first stored in the fuel line and then, when a signal is given by the engine controls to the magnetic valves, it is injected into the cylinders. This creates an extremely fine fuel-air mixture which burns particularly efficiently. For the engineers at MAN B&W Diesel the challenge was to apply this injection system to large marine engines – and to adapt it for operation on heavy fuel oil, which means dealing with a fuel heated to approx. 150° C.



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Reliability

Reliability and durability are an absolute necessity in engines on sea-going vessels. For this reason the new MAN B&W Diesel common rail engine is especially designed for reliability. The whole system, including the electronic controls is fully redundant, i.e. every major function has a back-up. Thus there are at least two high-pressure pumps to every machine, ensuring that the pressure necessary for fuel injection is available, even if one pump fails.

Unlike in most other common rail engines, the MAN injection system is based on conventional pressure-controlled injection. In conventional stroke-controlled systems which function with pilot and post-injection, there is a permanently high pressure of 1600 bar, for example, at the needle seat near the combustion chamber. In the MAN B&W system, the pressure on the valve needle is released by means of the solenoid valve controls which is located away from the cylinder head, at the common rail accumulator. As a result there is not permanently full pressure on the valve needle seat next to the combustion chamber and the electronic components are protected.

Advantages

By means of CR injection it is possible to control combustion precisely and in within the operating range of the engine flexibly. This lowers the fuel consumption. Optimised fuel injection also diminishes combustion noise and the exhaust mission of pollutants. Thus soot emission at part loads is for example reduced to a level below the visibility limit. This is becoming increasingly significant in marine applications as the pollutant emission limits are becoming increasingly stringent worldwide. In particular, start-up soot should be avoided. Common rail technology proves a particular advantage at low speeds and when operating conditions change fast, for example in suction dredgers or in cruise liners travelling very slowly in coastal waters.

Field Trials

Extensive practical testing of the new MAN B&W Diesel common rail technology has commenced since the beginning of the year. One of the five auxiliary engines of the CORNELIA MAERSK, a container vessel (6600 TEU) of the A.P. Moeller Group, is equipped with the new technology. The results so far are excellent: "The engine has been performing with convincing results for more than 1500 operating hours," says Stephan Haas who is assisting in the field trial from the development engineering side. The precise savings in fuel consumption will be known after finishing all field tests. The 32/40 CR series engine will be available from 2005 onwards. Larger as well as smaller types are in the pipeline. Thanks to its modular design, the MAN B&W common rail system can also be retrofitted in almost all MAN B&W marine diesel engines.

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