

CR Research & Development



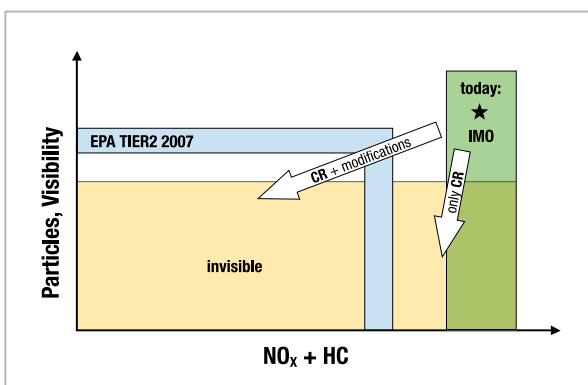
1L32/40 CR research engine

Technology planning

Due to increasingly tighter emission limits the development of low emission combustion systems is gaining more and more importance. During recent years several technologies have been established which have the potential to improve the NO_x-SFOC-PM trade-off without using engine external methods. Basically these modifications are:

- >> Miller-cycle
- >> High compression ratio
- >> Retarded injection
- >> Optimised (not maximised!) injection intensity

These measures belong to the repertoire of all manufacturers of medium speed diesel engines, but they require certain prerequisites, e.g. high compressor pressure ratio combined with high T/C-efficiency and high injection pressures.

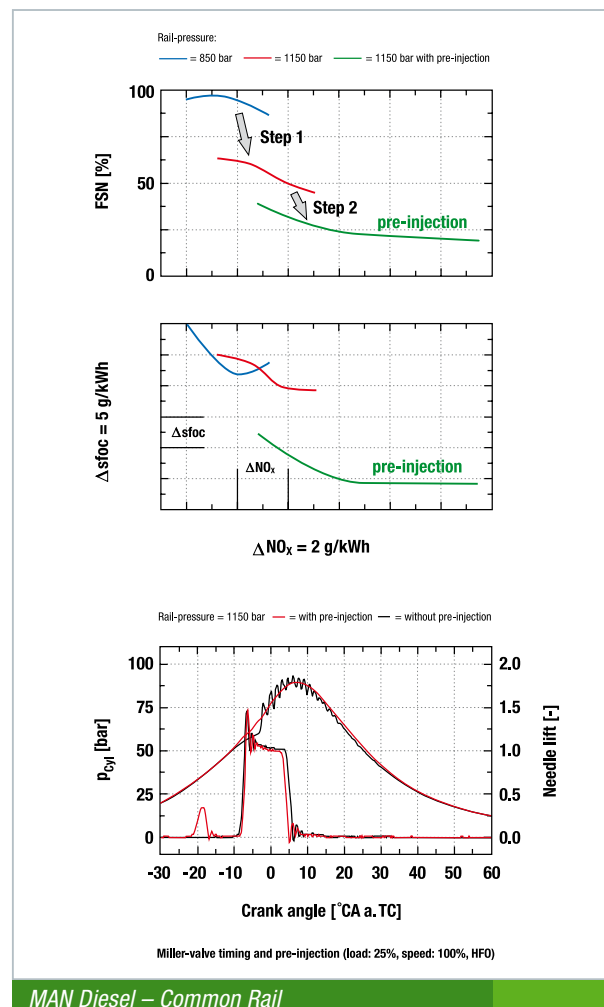


Emmissions limits and technology plan

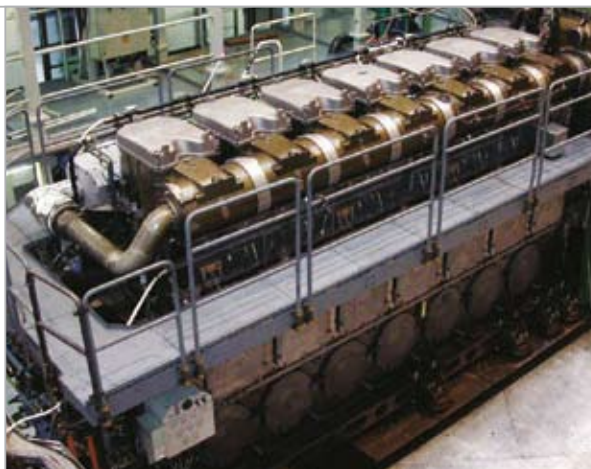
Ready for the future

Research investigations show that for the achievement of a good NO_x-SFOC-trade-off a high compression ratio and Miller-valve timing are effective measures. To optimize the application results in part load, our Common Rail injection system allows improving the NO_x-smoke-SFOC-trade-off due to the possibility to choose the optimum injection pressure for every operation point.

If the system is able to produce multiple injections further substantial improvements are possible. The problems created by Miller-timing and high compression ratio can be solved by a small pre-injection. The graph below shows these results at part load.



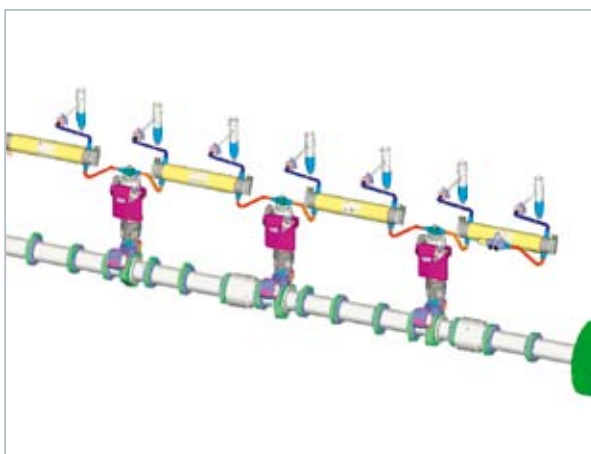
48/60B CR



7L48/60B CR

New member of the CR engine family

The successful development of the 32/40 CR was completed with the new 48/60B CR member. Since 2006, the 7L48/60B CR test engine is operated on the Augsburg test bed, after an intense preliminary technology test on the system test bed.



MAN Diesel - Common Rail

Features and advantages

The proprietary concept and the modular system were consequently continued also for the 48/60B CR. For this reason, development work can directly be based on the experience gained with the 32/40 CR system.

As a matter of principle, MAN Diesel has kept the basic concept of its Common Rail Technology as simple as possible and has integrated technically proven components into the design. For example, in keeping with this philosophy, the design does not use a separate servo circuit for activating the injection valve. Less maintenance is one of the benefits. Also, integrated into the CR technology are well-proven components with long service experience, such as injection valves and nozzles. The injection control valves are on the rail outside the cylinder head, resulting in greater system reliability.

Less consumption. Less soot. Less NO_x.

MAN Diesel Common Rail Technology lowers the emission rate of soot and NO_x at all possible engine operating points.

Due to the flexibility of the injection process, NO_x emission, fuel consumption and exhaust opacity can be improved by varying injection pressure and start of injection. Even in the commonly problematic low load range, exhaust opacity can be brought down below the visibility limit.

Retrofit? Retrofit!

CR technology from MAN Diesel takes advantage of a modular high pressure pump system with multiple lobes on the camshaft. The camshaft drives the high pressure pumps, which are equipped with solenoid operated suction throttle valves for pressure control. This layout, and the modular structure of the units, makes it possible to install MAN Diesel CR technology retrospectively. Thus, many older diesel engines can still benefit from the new technology: simple, fast retrofitting and upgrading – for lower emissions with no loss in output.

MAN Diesel

