



Advanced Turbocharging 2-Stage TC's, Exhaust Gas Recirculation and Waste Heat Recovery

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Over the last decades a continuous growth of compressor pressure ratio in turbo chargers for large diesel engines can be seen. This trend was mainly driven by increasing engine output. In the near future a much faster growth of the needed compressor pressure ratio is expected.

This fast growth is needed to meet the actual trends in engine development. The extra in charge air pressure can be used for emission reduction or to lower the specific fuel oil consumption. According to the experience of ABB it is not reasonable to realize pressure ratios higher than 6 with one stage compressors. Subsequently it is necessary to apply 2-stage compression.

In ABB's product portfolio the new introduced A100 turbo chargers cover the range up to a compressor pressure ratio of 5.7. These TC's are suitable for IMO II compliant engines. For pressure ratios above 6 new 2-stage charging systems are introduced into the market. Benefits of the higher pressure ratio are described. Furthermore some design requirements for high pressure turbochargers are discussed.

One possible strategy to fulfill IMO III requirements is the use of exhaust gas recirculation (EGR) in combination with 2-stage turbo charging. The exhaust gas can be recirculated by means of a high pressure EGR turbocharger. For marine applications both IMO II and IMO III operation modes must be possible. Appropriate configurations and TC specifications must be found. Challenges for the charging system and possible solutions are shown.

For 2-stroke engines waste heat recovery can be a method to reduce fuel oil consumption and exhaust gas emission. A precondition to apply such systems is a efficiency level of the turbochargers that allows to use not all exhaust energy for the charging process. Suitable turbochargers and two frame sizes of power turbines are available from ABB.

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