

Holset

*turbo*compounding explained...



Although the use of turbocompounding is relatively new for diesel truck applications, the concept actually goes back quite a long way.

The concept was originally used back in the late 1940s and 50s on two notable aircraft engines, The Wright Cyclone and the Napier Nomad, although its promise of low fuel consumption for transport aircraft was soon overtaken by the rapid development of the gas turbine and the turboprop engines. In the case of automotive diesel engines, it means the introduction of a Power Turbine downstream of the turbocharger. The Power Turbine generates more work by re-using the exhaust gases from the conventional turbocharger. The work generated by the Power Turbine is then fed back into the engine crankshaft via a sophisticated transmission. It differs from a standard turbocharger as it does not have a compressor cover or compressor wheel. Instead a gear is fitted



to the power turbine shaft. To assist the Power Turbine, a smaller turbine size is selected for the conventional turbocharger.

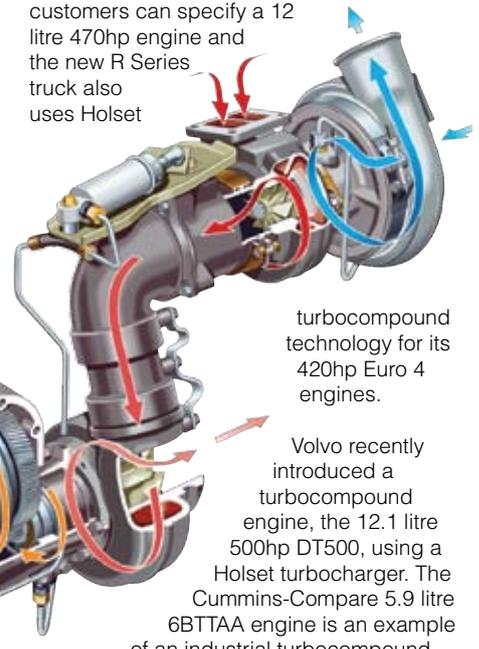
What are its Benefits?

This small turbocharger gives another system advantage to the turbocompound engine, providing better transient response and higher boost pressure for improved low speed torque. The behaviour of the two turbines in series - turbocharger and Power Turbine - is a dynamic one across the engine speed and air flow range, which requires optimum matching of the turbines.

In extracting work from waste energy, the overall thermal efficiency of the engine is increased (46% instead of 42%). In simple terms more energy is extracted from the fuel consumed. This creates a more powerful engine and provides better efficiency.

Which Applications is it used on?

The Scania 11 litre DTC12 engine was, in 1991, the first production example of a mechanically-connected turbocompound engine. Working closely with Scania, Cummins Turbo Technologies developed the Power Turbine and the turbocharger for this engine. Today, Scania customers can specify a 12 litre 470hp engine and the new R Series truck also uses Holset



turbocompound technology for its 420hp Euro 4 engines.

Volvo recently introduced a turbocompound engine, the 12.1 litre 500hp DT500, using a Holset turbocharger. The Cummins-Compare 5.9 litre 6BTTAA engine is an example of an industrial turbocompound

application where the Power Turbine is used to drive the first stage of a two-stage portable air compressor. This greatly reduces the size of the package. Holset turbochargers are also used on this application. Turbocompound progress over the years is a fascinating example of the quest for engine systems giving better efficiency, increased power, torque and lower emissions. This continued development has characterised the engine and turbomachinery markets since the early days.

