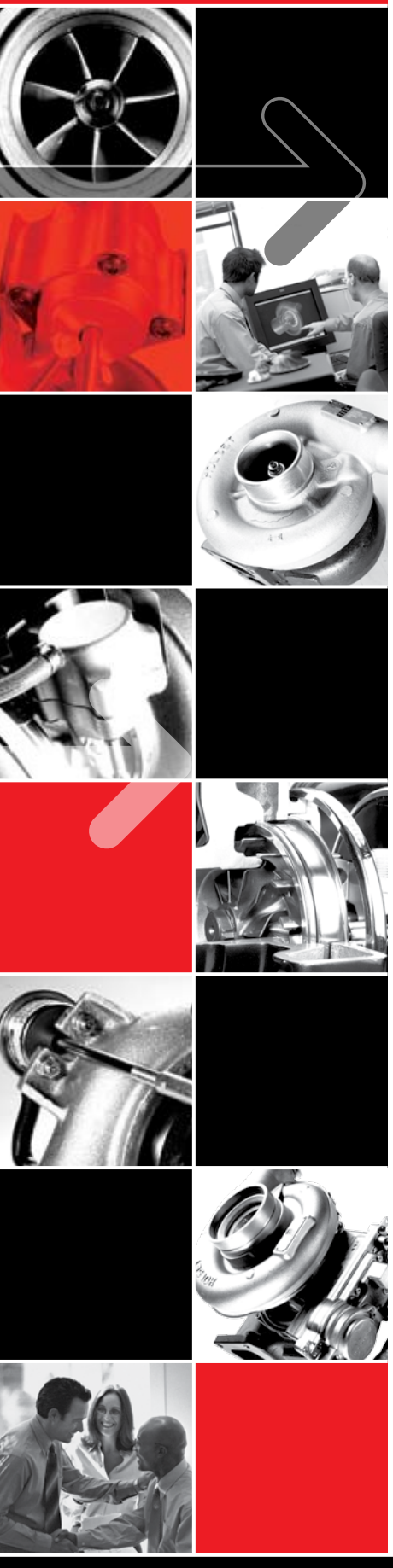
Turbo Technologies

How does a turbocharger work?



The purpose of a turbocharger is to **compress** the air flowing into the diesel engine, this lets the engine squeeze more air into a cylinder and more air means that more fuel can be added. The engine burns air and fuel to create mechanical power, the more air and fuel it can burn the more powerful it is.

In simple terms, a turbocharger comprises a turbine and a compressor connected by a common shaft supported on a bearing system. The turbocharger converts waste energy from an engine's exhaust gases into compressed air, which it pushes into the engine. This allows the engine to burn more fuel producing more power and improve the overall efficiency of the combustion process.

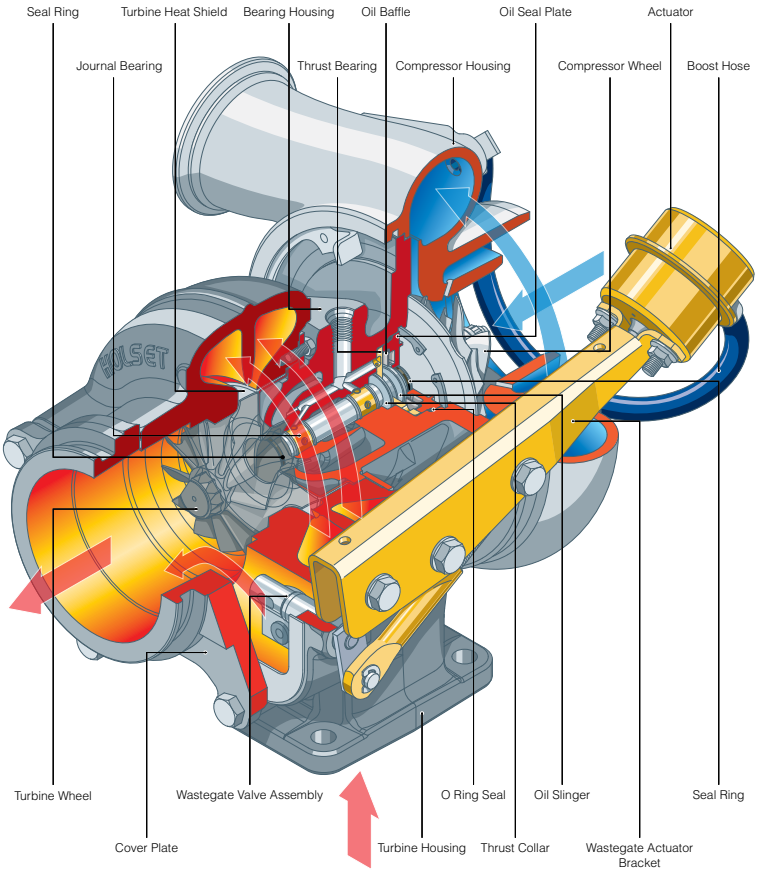
The turbine consists of two components; the **turbine wheel** and the collector, commonly referred to as the **turbine housing**. The **exhaust gas** is guided into the turbine wheel by the housing. The energy in the exhaust gas turns the turbine. Once the gas has passed through the blades of the wheel it leaves the turbine housing via the exhaust outlet area.

Compressors are the opposite of turbines. They consist of two sections; the impeller or **compressor wheel** and the **compressor housing**. The compressor wheel is connected to the turbine by a forged steel shaft. As the compressor wheel spins, air is drawn in and is compressed as the blades spin at a high velocity. The housing is designed to convert the high velocity, low pressure air stream, into a high pressure low velocity air stream, through a process called diffusion.

In order to achieve this boost, the turbocharger uses the exhaust flow from the engine to spin a **turbine**, which in turn spins an **air pump**. The turbine in the turbocharger spins at speeds of up to 150,000 rotations per minute (rpm) that is about 30 times faster than most car engines can go. Since it is connected to the exhaust, the temperatures in the turbine are also very high.

Air enters the compressor at a temperature equivalent to atmosphere however, as compression causes the temperature of the air to rise it leaves the compressor cover at temperatures up to 200°C.

The turbocharger bearing system is lubricated by oil from the engine. The oil is fed under pressure into the **bearing housing**, through to the **journal bearings** and thrust system. The oil also acts as a coolant taking away heat generated by the turbine.



The **journal bearings** are a free floating rotational type. To perform correctly, the journal bearings should float between a film of oil. The bearing clearances are very small, less than the width of a human hair. Dirty oil or blockages in the oil supply holes can cause serious damage to the turbocharger.

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