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Perspective

Advantages and Disadvantages of Superchargers in Automobile Engines

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DESCRIPTION

A supercharger is an air compressor that increases the pressure of air supplied to an internal combustion engine. This contributes to higher power output because the engine receives more oxygen in each of its intake cycles, which helps it burn more fuel. The compressors can be mechanically driven by means of a belt, shaft or chain connected to the motor shaft. There are two types of air compressors that increase the pressure: Positive volumetric compressors and dynamic compressors. A supercharger is another invention in reciprocating internal combustion engines to increase their working efficiency. It is an air compressor that increases the pressure or density of air entering the combustion chamber of an engine for excessive work. Superchargers allow the engine to burn more fuel and do more work because each intake circuit of the engine receives more oxygen. These power components are mechanically driven by a gear, belt, shaft or chain connected to the engine crankshaft.

Here another component has more advantages than a compressor, it is called a turbocharger. Although the part is known as the supercharger, it is referred to as a turbocharger or turbo. It offers performance thanks to a turbine driven by exhaust gases obtained at the end of the combustion stroke. So, one of the differences between supercharger and turbocharger is their power source. A supercharger is powered by the engine's crankshaft, while a turbocharger is powered by the exhaust gas production wasted during the combustion process. Like the other charging device in engines, a compressor's primary function is to increase the air entering the intake manifold. This allows the engine to burn more fuel and does more work, increasing performance.

Types of supercharger

Centrifugal superchargers: A centrifugal supercharger is a particular type of supercharger that uses centrifugal force to boost manifold air pressure, or MAP. Increased MAP allows the engine to burn more fuel, resulting in higher power production. Factory superchargers are used on vee-type engines.

Roots superchargers: It is the most popular type of superchargers. In their setup, there are two counter rotating shafts containing lobes that forces air towards down across the shafts. Generally, air enters the top of the unit and exits through the bottom portion.

Twin-screw superchargers: The two rotors of a twin-screw supercharger are designed to interact with each other and compress the air thrust between them. While they are similar in design, twin-screw superchargers compress the air directly, whereas roots superchargers compress the air through pressure in the manifold.

ADVANTAGES

- Better fuel economy as smaller engines use less fuel to idle, and have less rotational and reciprocating mass, which improves fuel economy, engines with higher efficiency having turbochargers reduce the energy that is typically lost in naturally-aspirated and supercharged engines (exhaust gases).
- The recovery of this energy improves the overall efficiency of the engine; super charged engines have higher power output, better atomization of fuel, mixing of fuel and air, scavenging products, and torque characteristics over whole range, and quick acceleration of vehicle.
- These engines have complete and smooth combustion even fuel with poor ignition, and improved cold starting. It reduces exhaust smoke and specific fuel consumption. Increases mechanical efficiency, smooth operation and reduces the tendency of knocking in diesel engine.

DISADVANTAGES

- Power surge with some turbocharger applications, especially with larger turbos, reaching the boost threshold can provide an almost instantaneous surge in power, which could compromise tyre traction or cause some instability of the car.
- Turbochargers get very hot and often tap into the engine's oil supply. This calls for additional plumbing, and is more demanding on the engine oil. Superchargers typically do not require engine oil lubrication.

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