Make a Clean Change

The Holset VG Turbocharger

A unique variable geometry system providing better vehicle response with lower fuel consumption and reduced emissions

HOLSET

Performance without compromise

We're all looking for the same things from a modern engine/turbocharger/transmission combination.....

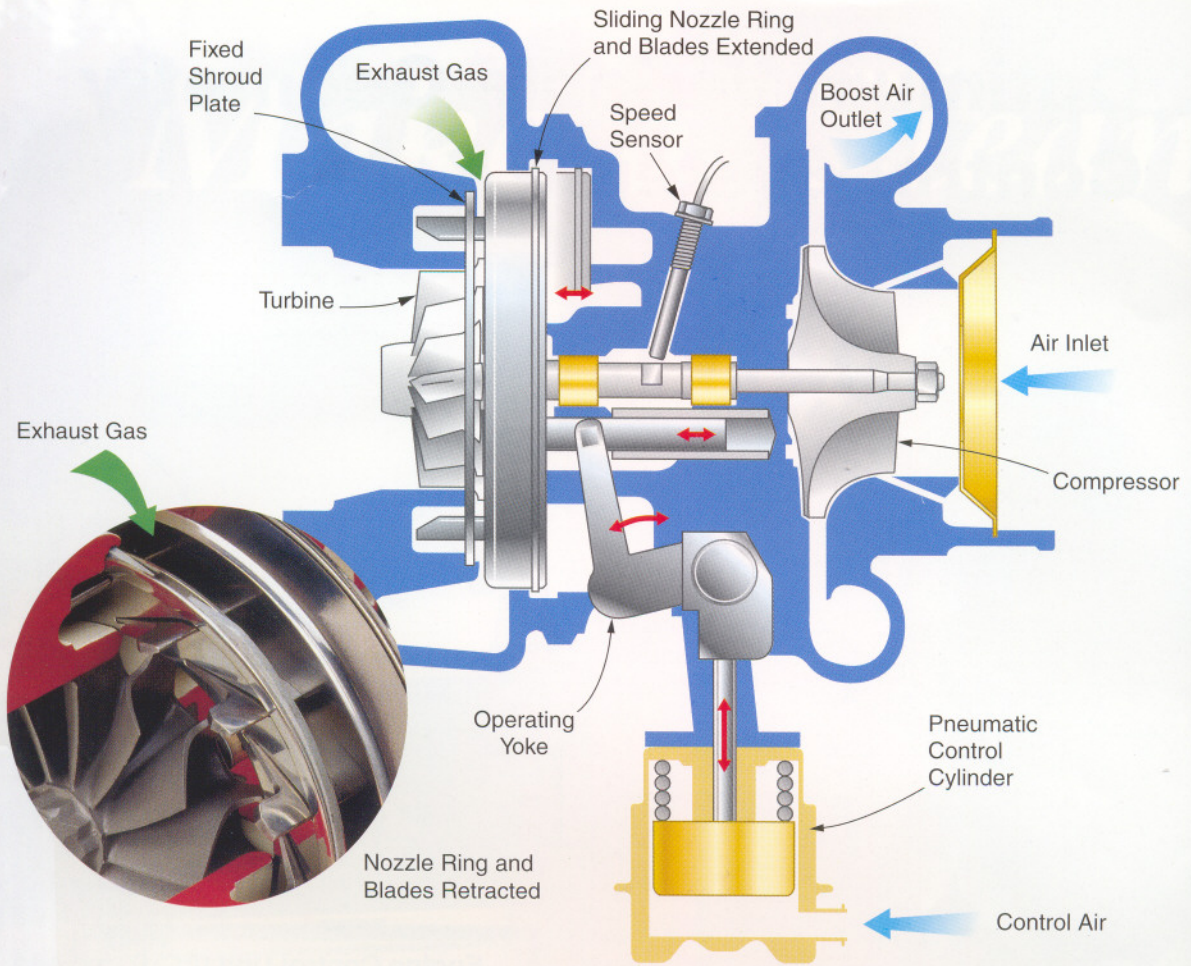
.....better acceleration and full load 'pull-away' torque, particularly in urban situations.....

.....improved transient response over a wider range of speed and load conditions, without the need for constant downshifting.....

.....economy, better fuel economy with lower emission levels.....

.....effective engine braking and improved hill climbing performance.....

A tough challenge, but one which is being met by Holset's unique Variable Geometry (VG) Turbochargers.



The problem facing diesel engine designers today can be summarised as:

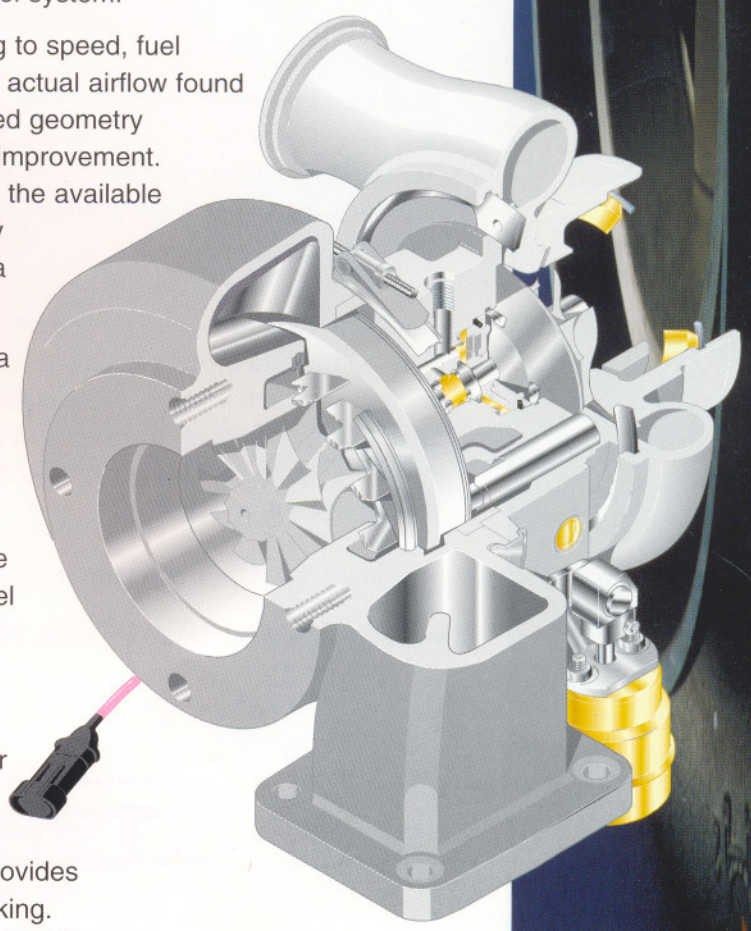
How can the performance of the vehicle be improved to satisfy the truck driver.....

How can vehicle operating costs be reduced to satisfy the truck owner.....

How can the engine be modified to reduce emission levels without affecting the other needs.....

These conflicting objectives can be resolved by the use of the Holset Variable Geometry Turbocharger as part of a totally integrated fuel and air control system.

As the airflow needed by the engine varies directly according to speed, fuel injected, atmospheric pressure and volumetric efficiency, the actual airflow found in existing engines has been limited by the restrictions of fixed geometry turbochargers. Even Wastegate turbos present only a small improvement. Holset engineers have developed a simple way of managing the available exhaust gases, effectively producing a turbo with an infinitely variable sized turbine to meet boost pressure demand over a wide power and speed range.

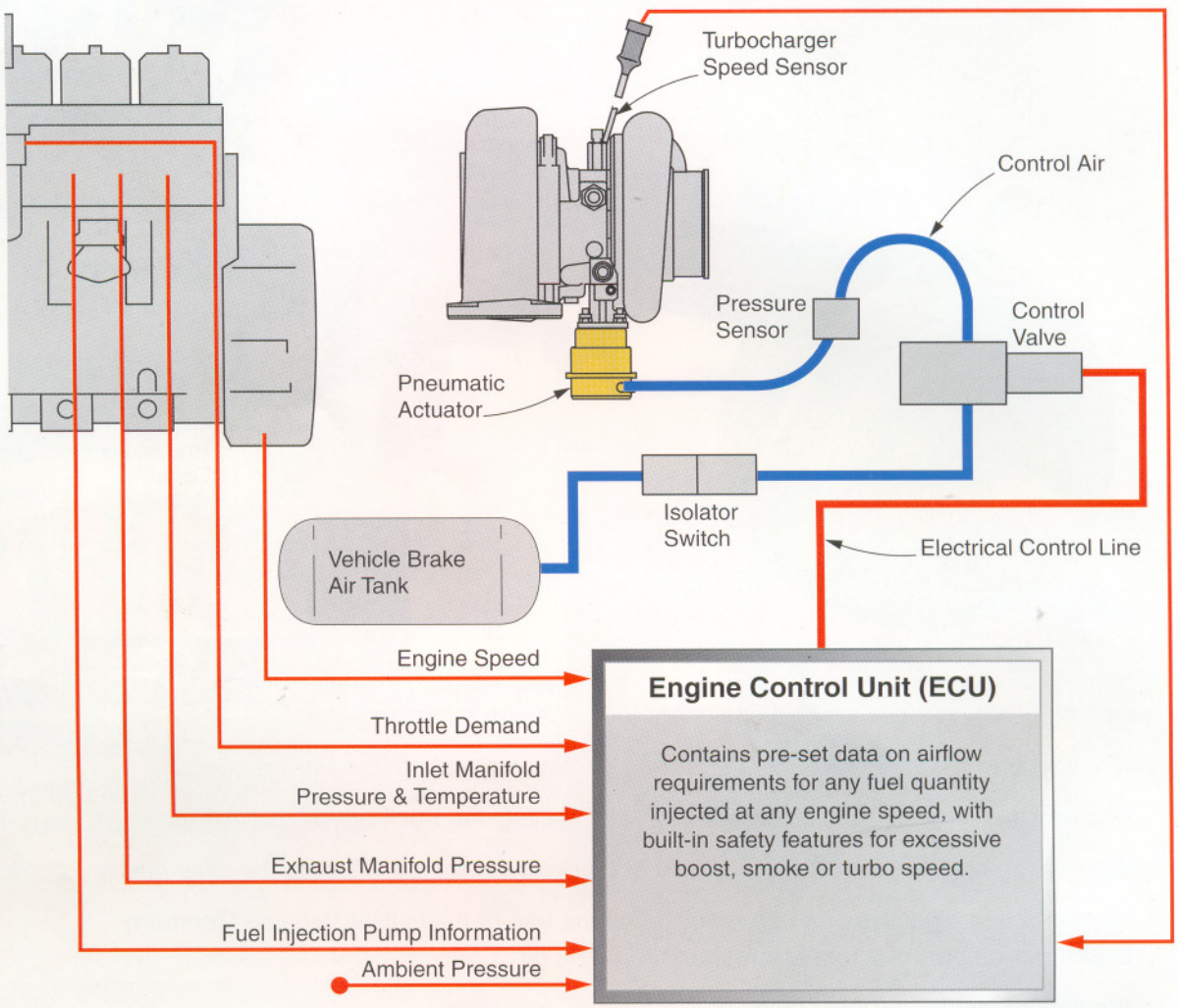


Exhaust gases are directed on to the turbine wheel through a gap between a fixed shroud plate and a sliding nozzle ring and blade assembly, the position of which is controlled by a mechanical yoke and external pneumatic cylinder.

In the insert to the illustration above, the nozzle ring and blades are retracted allowing exhaust gases to act on a large turbine area, just the conditions necessary for high speed fuel economy at low boost pressures.

When more power is needed the nozzle ring and blades are extended, reducing the gap and so the effective size of the turbine. This enables the available gases to turn the compressor faster and produce extra boost pressure without the usual lag. When used in conjunction with today's advanced engine management systems, the Variable Geometry design also provides a means of altitude compensation and enhanced engine braking.

Optimum Variable Geometry Control System



The Holset VG turbo provides such a wide range of airflow that the engine designer must optimise the fuel pump and injector settings carefully, in order to achieve the greatest benefits. Consequently, many months of engine performance development are required to establish the final "data-set" used for production, to obtain better engine transient response and high torque at very low engine speeds.

The Holset VG turbo design has been developed over many years of research and development, to provide a simple operating mechanism that will function in all extremes of engine firing and braking, without the need for periodic servicing. Special materials used in the operating mechanism; coupled with a simple but rugged design, provide levels of reliability and durability demanded by heavy duty truck engine manufacturers. This will also help to control vehicle operating costs.

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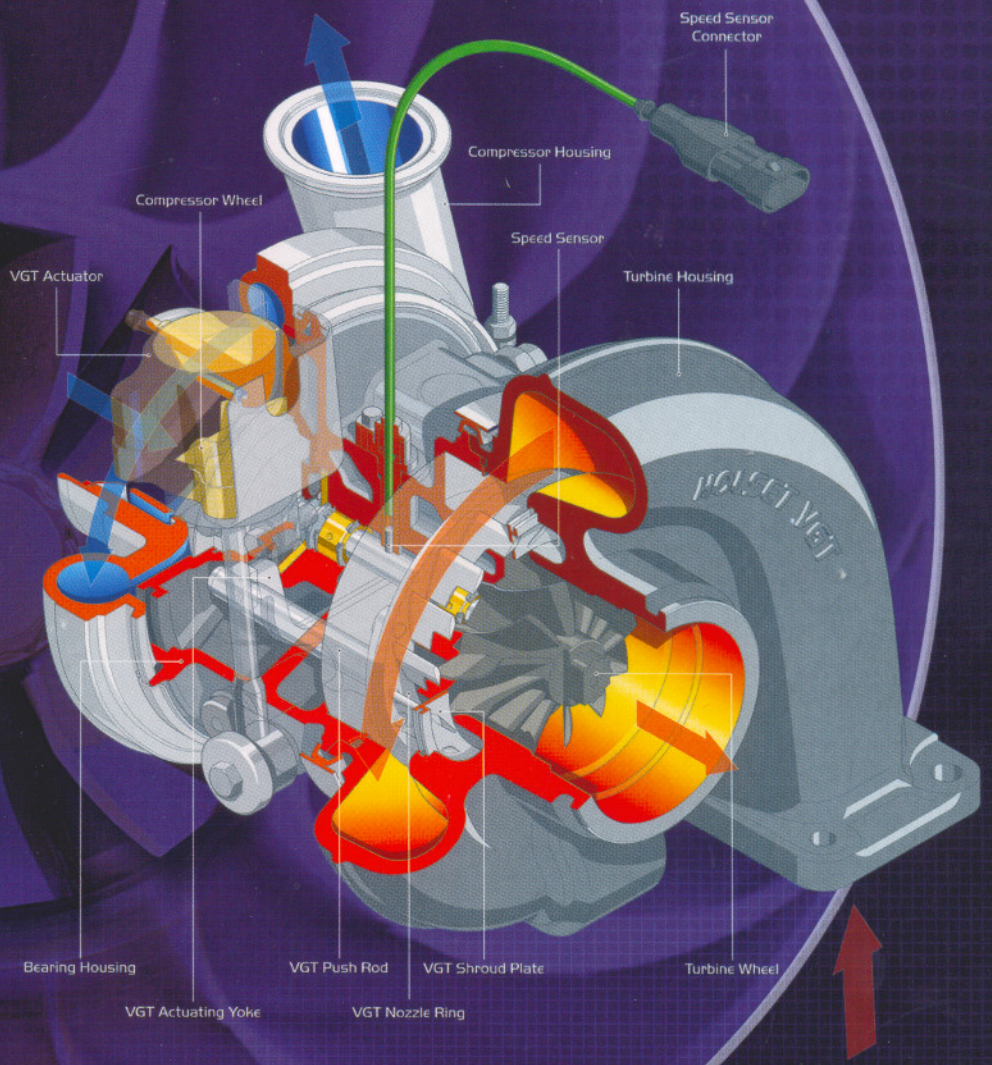
Variable Geometry *turbocharging* explained...



The key to turbocharging is to maximise and control the boost pressure over as wide a field of engine operation as possible. Holset's patented VGT™ technology gives infinite control of boost pressure.

The VGT uses a turbine stage where the swallowing capacity is automatically varied while the engine is running. This permits turbine power to be set, providing sufficient energy to drive the compressor at the desired boost level wherever the engine is operating. This is achieved by varying the area of a nozzle; a set of guide vanes that control the flow through the turbine.

Conventional designs pivot the vanes to achieve different nozzle areas. The Holset VGT is extraordinary in that the vanes do not pivot but slide axially; this design ensures a high level of durability and reliability, essential for today's commercial diesel applications.

The sliding nozzle ring alters the aperture through which the exhaust gases flow onto the turbine wheel. This alteration in the geometry of the turbocharger increases the boost as the nozzle is closed down. Reducing the aperture increases exhaust manifold pressure and increases the turbo speed. As the nozzle ring opens up, the exhaust pressure reduces and the turbocharger boost decreases. In effect it creates an infinite number of fixed geometry turbochargers

Benefits of Holset's VGT

Holset's VGT technology yields several benefits:

- Good transient response
- Improved fuel economy
- Increased useful engine operating speed range
- Enhanced compression brake capability
- Proven durable design
- Reduced engine swept volume and package size for a given rating
- Helps control EGR to meet emissions regulations

It is these benefits which have led Holset's VGT turbochargers to become a key solution for engine makers in meeting the ever-increasing stringent emissions legislation worldwide.

Pneumatic or Electric Actuation

The VGT is part of a totally integrated fuel and air control system controlled by the engine electronics. Either electric or pneumatic actuation can be used to regulate the turbocharger's nozzle geometry. Pneumatic actuation harnesses air pressure from the vehicle braking system, alternatively a water-cooled and automatically calibrated electric motor actuator makes for a simplified installation whilst fully maintaining VGT responsiveness and overall turbocharger performance.

HOLSET
TURBOCHARGERS

Part No: 3766227 Ref RB/SEG Rev 00

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