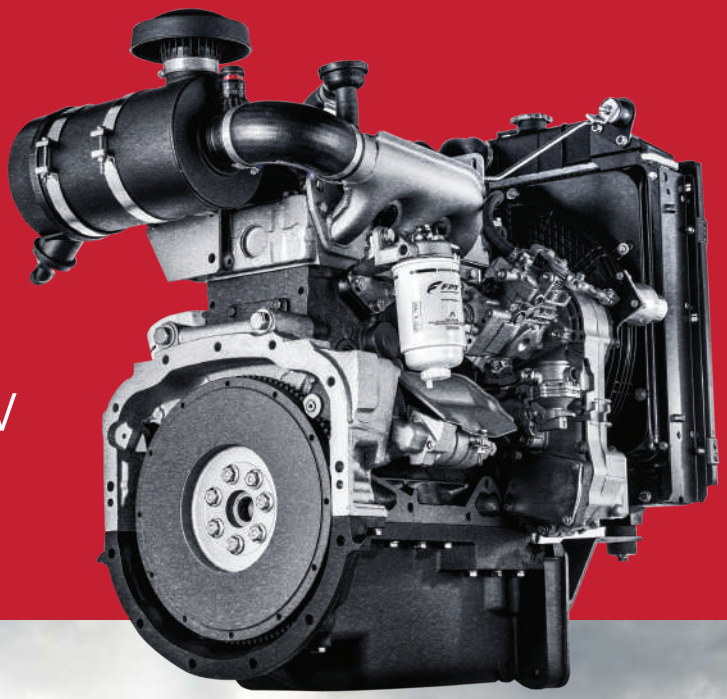
POWERTRAIN TECHNOLOGIES

Tier 4 Final
What you need to know

Compare FPT to the competition.



Genrep FPT engines meet the stringent Tier 4 emissions level requirements without the need for a variable geometry turbocharger (VGT), an Exhaust Gas Recirculation (EGR) system, a higher capacity cooling system, an intake throttle body or a diesel particulate filter (DPF). In addition, the NEF and CURSOR engine series offer proven reliability and lower long-term maintenance costs. Most of the new emission equipment is found in the exhaust or after-treatment system. The key is the selective catalyst reduction (SCR) which converts the harmful components of the exhaust gas stream into water, nitrogen and carbon dioxide. For the operator, other than refilling the diesel exhaust fluid (DEF) tank, no action is required for the SCR system to function.

FPT Engine Solutions through: Genrep

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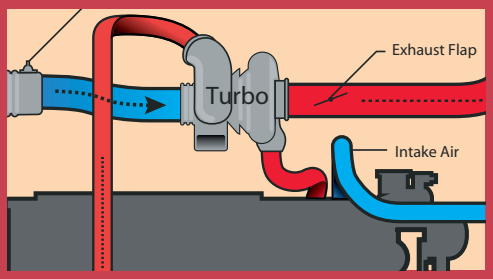
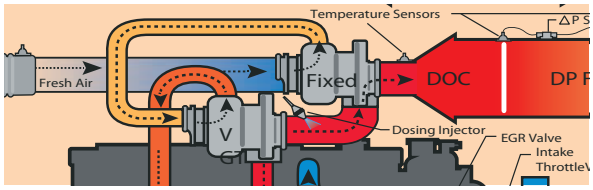
TURBO CHARGER COMPARISON

• One fixed geometry mechanically wastegated turbocharger.
• No complex variable geometry turbocharger.
• Simple and reliable with few moving parts



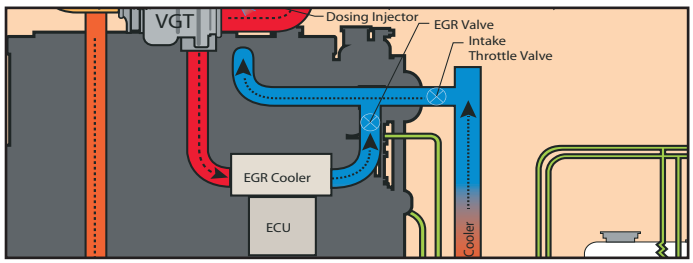
• Two in-series turbochargers, one variable geometry (VGT) and one fixed geometry.
• Besides adding the cost and complexity of a second turbocharger, the VGT is more costly and complex, with more moving parts than a fixed geometry turbocharger.
• The VGT increases the envelope of the engine.
• The VGT requires a control system and additional sensors to control operation of the vanes.
• The VGT is used in part to control the amount of exhaust gas directed to the exhaust gas recirculation (EGR) cooler. The vanes can be clogged with particulate matter (PM) over time, a greater concern in engines that use EGR.



EGR (EXHAUST GAS RECIRCULATION)

• EGR is not required.
• EGR works by cooling and recirculating exhaust gas back to the combustion chamber to reduce oxygen content in the combustion process, lowering in-cylinder combustion temperatures and creating less mono-nitrogen oxides (NOx) but more particulate matter. This increase in PM leads to the need for a diesel particulate filter (DPF).
• The FPT engine is more fuel efficient than an EGR equipped engine.

• EGR is required, leading to higher radiator cooling loads. A larger cooling package and more air flow is required.
• Requires the addition of the EGR cooler and EGR valve. This increases the engine envelope.
• The EGR valve requires ongoing maintenance.
• EGR results in shorter maintenance intervals due to more contamination of the engine oil as exhaust is passed back into the air intake.



FPT TIER 4 SOLTION THROUGH GENREP

COMPETITION - COMPANY A SOLUTION

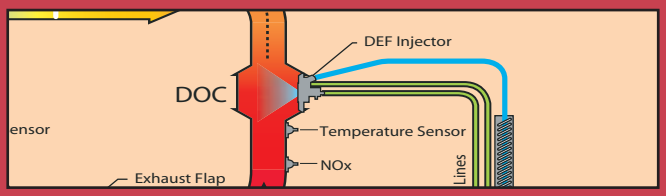
DPF (DIESEL PARTICULATE FILTER)

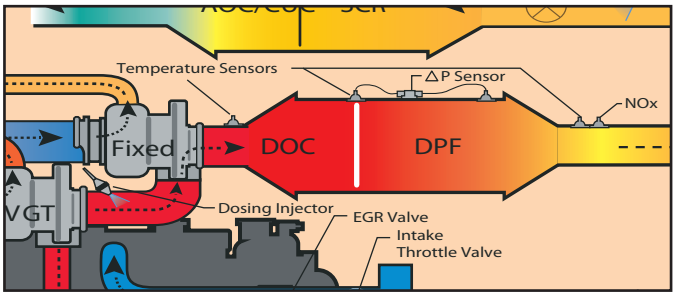
- FPT is able to meet Tier 4 emissions without the DPF, due to the efficiency of the engine and lack of EGR.
- The FPT engine is more fuel efficient than a DPF equipped engine.

- DPF required to control PM created due to EGR. The filters can become clogged with ash.
- The DPF requires continuous regeneration, both active and passive, resulting in decreased fuel economy.
- The DPF requires additional sensors to measure pressure drop across the unit to control regeneration.
- The DPF increases backpressure to the engine, increasing fuel consumption.

DOC (DIESEL OXIDATION CATALYSY)

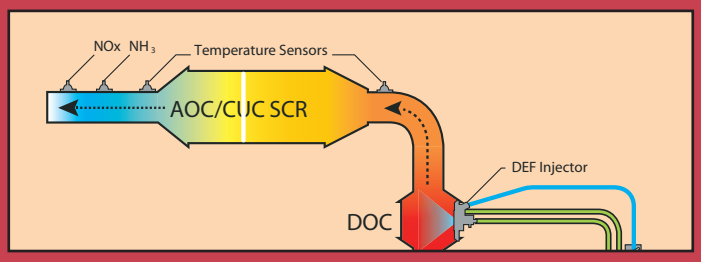
- DOC is a simple technology that passively oxidizes NOx to increase the efficiency of the selective catalytic reduction (SCR).



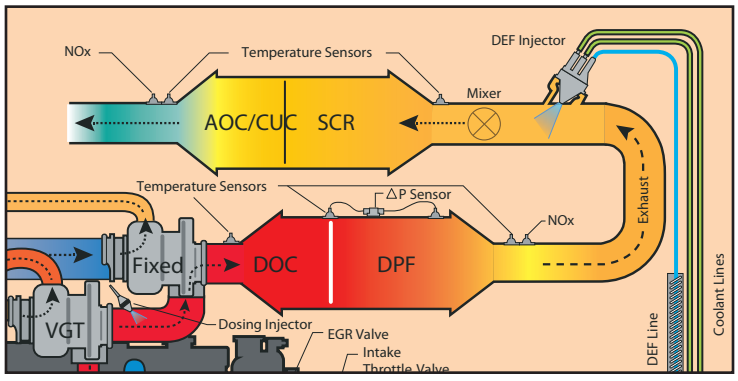


SCR (SELECTIVE CATALYST REDUCTION

- SCR technology, coupled with the high efficiency engine, meets Tier 4 requirements.
- The SCR unit houses both the catalyst and clean up catalyst (CUC). Exhaust gas mixes with diesel exhaust fluid (DEF) as it enters the SCR. The DEF breaks down into ammonia which reacts with the NOx to form nitrogen and water vapor. The unit requires no maintenance or regeneration.
- The CUC is used to neutralize excess ammonia from DEF injection.



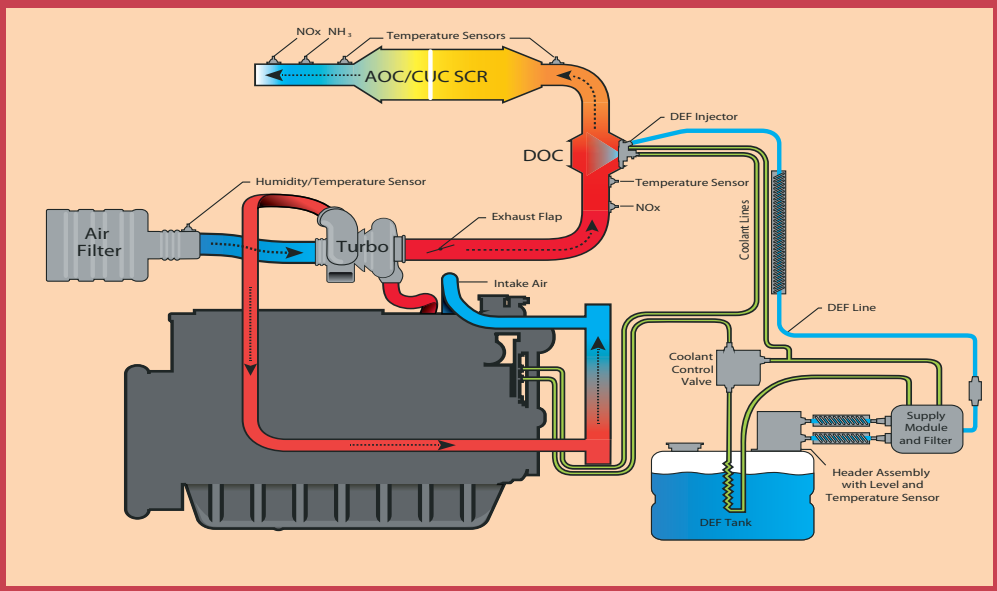
- Competitive powertrains are using SCR technology and will be required to carry DPF.



AMMONIA OXIDATION CATALYST/CLEAN UP CATALYST (AOC/CUC)

- The AOC/CUC is used to neutralize excess ammonia from DEF injection.

FPT TIER 4 SOLTION THROUGH GENREP



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