Power to perfection

From this month onwards, every issue of Trucks and Heavy Equipment will feature a topic relating to the owning and operating of trucks, covering areas that operators will find relevant to their transport businesses. Sponsored by Freightliner, the topics will be of a general nature and not specific to a particular brand or manufacturer. The first topic, on engine selection, is a vital element in the purchasing of a truck.

Today's truck engine manufacturing industry has virtually two classes of diesel engines: the heavy duty and mid-range series. A heavy-duty engine has a minimum displacement of 10 litres with a power output of between 300 and 600 horsepower. The mid-range engines have a capacity of up to 9 litres and a horsepower range of between 180 and 300 hp.

Engine and transmission components have changed in recent years. Gone are the Detroit Diesel Series 53 and 71 two-stroke engines that were popular for many years in trucks and construction machinery. Because of world-wide emission regulations, all diesel engines today are four-cycle designs. With the withdrawal of Caterpillar recently from the automotive engine business, there remains only Cummins and Detroit Diesel as the major North American suppliers, especially in the heavy-duty range.

When evaluating engines today, it is wise to remember how they have changed over the last twenty years. Previously a mid-range engine was rated at around 175 hp, while the heavy-duty version peaked at between 250 and 350 hp. Today, however, the larger mid-range engines have the horsepower and peak torque, and even the service life expectancy of a generation ago.

An important point, sometimes not often considered when selecting an engine, is the application for which it was designed. It is not sufficient to look merely at horsepower but to be aware of the peak torque rating as well. This is a power indicator, particularly in terms of engine performance on gradients.

Heavy-duty engines are primarily designed to haul a 56-ton multi-axle highway truck and trailer rig up to 80 km/h across the country for hours. This involves high GVW, high speeds and sometimes high wind resistance. In addition, these engines are designed to provide over 800 000 km service life for a highway truck application.

To achieve maximum engine service life and fuel mileage, highway truck engines are governed at as low as 1 800 rpm. However, with the introduction of automated transmission options in trucks today, engine manufacturers have stepped up the torque characteristics to peak at around 1 200 rpm, thus widening the operating range available to automated transmissions and improving performance. This provides smoother control over heavier loads when starting from rest and this crucially allows the vehicle to be driven with higher loads at low engine speeds.

One further item is the emission control system in the latest diesel engines. The electronically controlled injector provides the control for fuel distribution through precision-machined nozzles and plungers controlled by solenoid actuators. Apart from the advantages in emission control the electronically controlled fuel injection concept has contributed greatly to the overall reduction in fuel consumption of the modern diesel engine.

The next generation of diesels using electronically controlled common-rail delivery is expected to use variable injection geometry, which allows the amount of fuel injected to be varied over a wider range and variable timing, similar to that of a petrol engine. This concept is designed to cope with the further tougher emission control regulations about to be introduced.

By identifying and evaluating the correct balance between application and engine requirement, the operator is well on the way to maximising his business potential in the face of rising costs and regulation boundaries. **THE**