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Diesel Engine Oil Consumption

Excluding such obvious causes as incorrect machining, assembly or bad driving, investigations into oil consumption in diesel engines shows that lack of 'bedding in', cylinder bore glazing and cylinder bore polishing are the major reasons for oil consumption.

'Bedding In'

It is authoritatively estimated that some 90% of oil consumption problems, following rebuild of diesel engines, occur as a result of incorrect running-in procedures. Engine manufacturers have specific 'bedding in' procedures for their new engines, and in the majority of instances these extend to rebuilt engines, both for bench or 'in-frame' rebuilds. Without exception, engine manufacturers are emphatic that engines should be progressively put under load at an early stage. Prolonged periods of idling (i.e. longer than 5 minutes) are detrimental to subsequent engine performance, blow-by and oil consumption. Most diesel engines should be run-in initially to full load on schedules of up to 2 1/2 hours duration maximum. Rebuilders should make themselves aware of the particular engine manufacturer's recommendations for running-in procedures and advise the operator accordingly. In many instances, incorrect running-in procedures will not only delay the running-in process, but may lead to irreversible conditions where major corrective action is necessary, including a strip-down. Glazing of the cylinder bores is one likely result of incorrect running in procedures.

Cylinder Bore Glazing

Cylinder bore glazing is one result of an incorrect running-in process, or of prolonged light load running. This leads to the formation of a surface coating or skin derived from chemicals present in the oil and fuel. If one examines the cylinder bores, it is not unusual to see the hone cross hatch markings beneath a super smooth, highly polished, 'varnish-like' layer which results from a combination of the factors mentioned above. The lubricant additive choice, or perhaps the flashpoint of various fuel fractions could well be one of the determining factors. Excessive piston crown and top land deposits arise as a result of extensive periods of idling or light running, which should be avoided at all costs during the running-in period. During engine idling periods the fuelling tends to be badly matched to the air flow, resulting in idle smoke and more importantly, the formation of excess soot. With the necessary top ring land clearance called for by diesel engines (needed for full power operation), the soot particles find their way into the top land crevice and glazing tends to follow soon afterwards.

Cylinder Bore Polishing

Cylinder bore polishing is of a different nature and usually occurs much later in the operating life of the engine. However, the results may still give rise to oil consumption and in severe cases, a breakdown of the oil film leading to scuffing and seizure. Turbocharged engines operating at high ratings may also give rise to a bore polishing condition. Inlet air temperatures are high and tests have shown that surface temperatures are a major factor in the polish formation. Prolonged operation on a well known turbo engine tested at 355 HP resulted in 5% of the bore area exhibiting a polish; raising the power to 360 HP increased the polish area to 14% of the area in the same time period. The small increase in thermal load above critical level appears to have been the determining factor. It has been determined that bore polishing in excess of 20% will lead to increased oil consumption.

Cylinder bore polishing arises from the excessive deposits of hard carbon on the piston top land. Bore polishing tends to be self evident. It is characterised by a bright, smooth 'mirror-like' surface with elimination of the cross hatch honing pattern. This also occurs naturally and progressively over the life of the engine as opposed to the premature polishing being discussed here.