

# *Effects of Dirt & Abrasive Materials*

Dirt or abrasive materials that are introduced into an engine can lead to premature failure of the engine components. Listed below are several ways that dirt can enter an engine.

- ↳ The air intake system could have leaks or cracks, the air filters could be worn out or damaged. We have seen the air filters blown out with an air compressor, which does remove the dirt, but it also removes the filter material, which is supposed to restrict the dirt from entering the intake system.
- ↳ The fuel system could have rust or scale in the fuel tank, which eventually winds up in the engine cylinder.
- ↳ Remnants of a grinding, machining or honing operation which were not completely removed from the engine prior to assembly.
- ↳ Accumulations of wear particles due to extended oil change intervals.
- ↳ High engine operating temperatures can diminish viscosity of the engine oil, which can accelerate engine component wear.
- ↳ Components that were sand or bead blasted and not properly cleaned.

Once the particles are in the cylinders, if the particles are relatively large, they can cut deep scratches into the cylinder walls, thus creating channels for the engine oil to get into the combustion chamber where it is burned.

Smaller particles mix with the engine oil to form a lapping compound. The operation of this gritty substance can cause removal of the cross-hatch hone pattern. The main purpose of the cross-hatch pattern is to retain lubricating oil on the cylinder wall.

This lapping compound can also accelerate the wear on the piston ring face. The compression rings typically possess a barrel profile or a tapered profile. If the profile is worn from the piston rings, the line of contact will be lost, which causes oil consumption and possible blow-by problems.

Particles which become trapped between the ring side faces and the piston ring grooves greatly reduce the ring seal. The compression rings require combustion pressure to seat properly against the cylinder wall and its ring groove. Without the necessary pressure the cylinder seal will be sacrificed and an oil control problem may appear.

Once engine oil travels past the piston rings, a carbon deposit will appear. The carbon build-up impedes the flow of the required combustion pressure to get to the compression rings. The carbon build-up can also polish sections of the cross-hatch pattern from the cylinder walls. This polishing of the cross-hatch will continue to allow growth of the carbon build-up.

The rod and main bearing surface will also exhibit premature wear. The particles can cut grooves into the surface of the bearings and also become embedded into the surface. Once embedded, the particles can cause increased wear to the journal of the crankshaft.

On turbocharged engines, particles may cause premature failure of the turbocharger. Since the turbocharger is lubricated by the engine oil and is rotating many thousands of rpm's, the particles can cause the turbine shaft and bearings on the shaft to prematurely wear out. To make matters worse, the abrasive materials grow exponentially within the engine. As the particles tear material from the operating surfaces of the various engine components, additional media is circulated in the engine.

Therefore ensure cleanliness at all stages of the manufacture and assembly processes!