

28. They Get in There (Foreign object avoidance in oil systems)

Time and again you read in trade journals that engines were damaged by hard foreign objects entering into the oil system and damaging parts there, especially bearings. When a bearing fails, it will quickly wreak havoc in the engine.

The way I see the problem:

Let's first see what sort of foreign particles we've got here, and where they come from. Normally, the fine oil filters separate foreign particles from the oil before the circulating oil again splashes onto bearings and gears. Normally, also, contamination is not likely to enter the oil system during oil changes. If it still gets in there, it's for one of two reasons:

One is contamination due to manufacturing and repair processes. This is mostly material left behind after abrasive cleaning or compaction peening (aluminum oxide blasting, glass bead or steel shot peening). It may also be core residues that are dislodged in service.

The second is contamination due to chipped spray coatings used for hardfacing bearing chamber seal fins and to debris from abradable coatings in these seals. To prevent contamination in either case, therefore, cleanliness is a top priority when working on the oil system; just like surgeons working on a person's blood circulation. Also, we see how important it is to achieve proper bonding of these hardfacings.

Contamination deposit on bearing races or gear teeth, they make imprints that have a notch effect. These notches cause material fatigue as the bearing balls roll over them or pitting as the gears mesh. Pitting in turn produces foreign particles that again accelerate the damage.

Things to remember:

- When checking filters during test or acceptance runs, watch for abnormally large amounts of foreign particles. It may be advisable to repeat the run and then recheck the filters. Submit your findings to the proper departments. The findings should also be recorded in the engine logs in case a problem arises at a later date.
- When you process on castings (e.g. gearbox cases), watch for particles trickling out of them that may have been loosened by vibrations or cleaning. If that condition exists, route the parts to inspection. The inspectors may want to x-ray them, since foreign particle accumulations like core residues can often be found that way if they're large enough.
- Don't make compromises when cleaning components after blasting or shot peening.

- When you note bearing or gear damage, watch for foreign particles on the running surfaces that might have caused the damage.

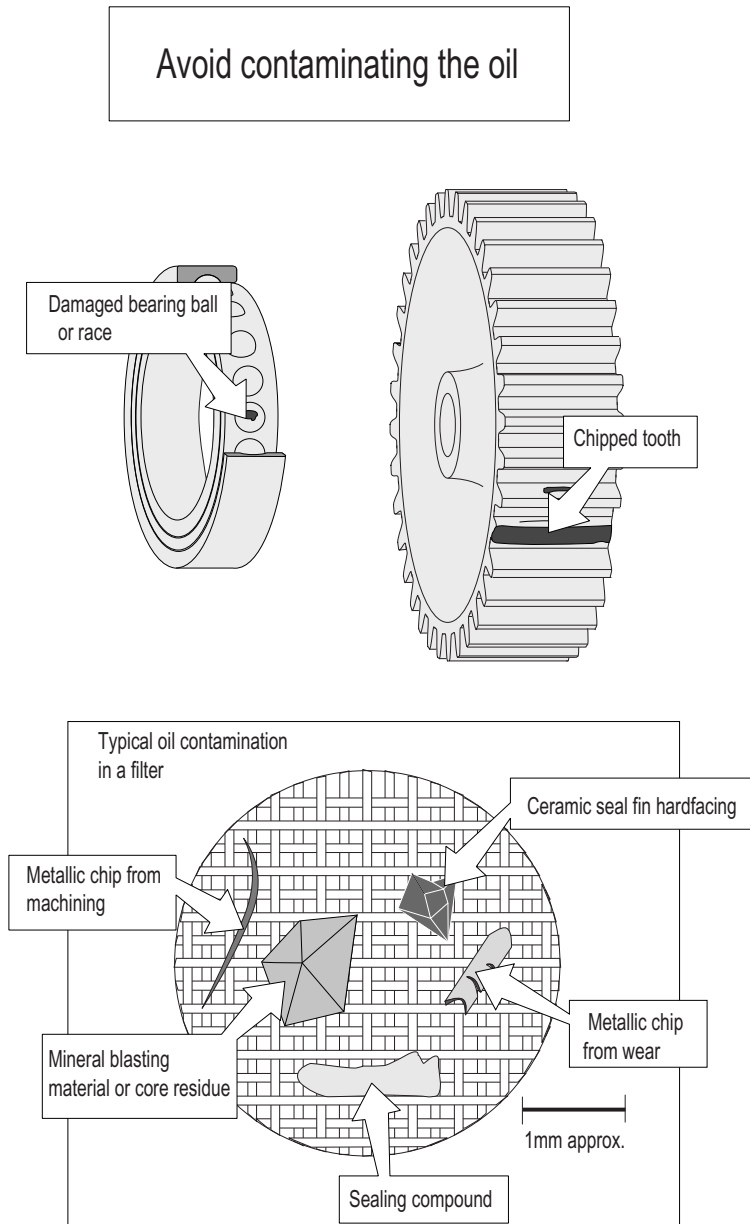


Fig. 28

Various foreign materials in an engine's oil system, if not trapped in filters, may damage sensitive items, such as antifriction bearings and gears. An expert inspector will know the origin of the particles by their shape, surface appearance and composition when viewing them under a microscope. This will help much in the

initial assessment of potential engine damage and give clues to suitable action, such as exposing the engine for inspection in the proper places. Knowing the origin of the foreign matter also helps in taking precautions, to prevent the entrance of foreign particles into the oil system during the manufacturing cycle.