

ENVIRO-SAVE TECHNICAL INFORMATION

The Enviro-Save Metal Treatment process is comprised of a thorough cleaning action & the resin impregnation of all friction surfaces to minimize friction/drag, wear & corrosion. Bearing surfaces such as in engines, differentials, transmissions, wheel-bearing hubs & many other parts of vehicles & equipment seem smooth to the naked eye. However, consider Figures 1, 2 & 3 which are a new crankshaft bearing shell magnified 4,500 times. Figure 1 is a top-down surface view which shows considerable roughness/asperity (peaks & valleys), not the smooth polished surface we feel or see with the naked eye.

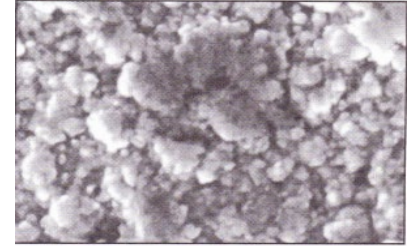


Figure 1: Top View

Figure 2 is a side view illustrating the roughness of the bearing surfaces of the crankshaft bearing shell. The roughness is demonstrated by the peaks & valleys in the area colored in brown which represents the gap (clearance) & oil between two mating bearing surfaces. It is into this gap which the lubricating oil moves. The roughness of the bearing surface asperity induces oil turbulence of the oil between the two surfaces & in the boundary lubrication mode. This turbulence contributes to oil film breakdown, potentially allowing the bearing surfaces to contact each other which in turn contributes to friction. Any increase in friction has 3 primary impacts: (1) increases fuel consumption (2) higher operating temperatures & (3) small metal particles from the bearing surfaces. These particles contribute to (i) more frequent oil changes & (ii) higher metal wear rates requiring more frequent replacement &/or repairs.

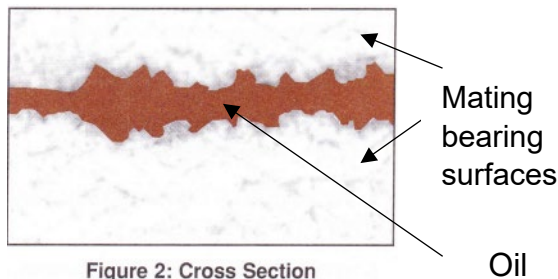


Figure 2: Cross Section

Oil

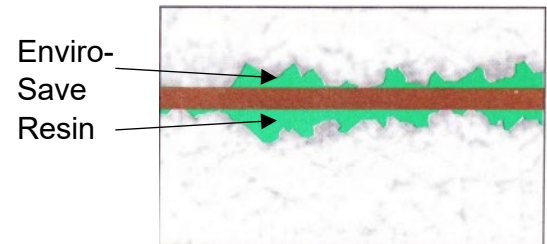


Figure 3: Resin Filled

There are only two ways to reduce friction & metal wear: (1) use a better lubricant; & (2) smooth the mating bearing surfaces, which is what Enviro-Save is all about.

The Enviro-Save treatment is applied via the oil. Figure 3 shows the clearances/gaps between the bearing surfaces, the same gaps as per Figure 2, which are now filled to the height of the peaks but not above the peak with Enviro-Save's resin. The green areas represent Enviro-Save resin while the brown line represents oil. In doing so, Enviro-Save does not leave a film or coating on the peaks which would reduce running clearances, but instead forms an impregnation within the peaks. Subsequent (periodic) monitoring by oil analysis confirms that a single Enviro-Save treatment remains in the bearing surface indefinitely, thus avoiding the need for repeat applications.

With the peaks & valleys changed to a smooth surface, both friction & oil breakdown by asperity-induced turbulence are greatly reduced in the boundary lubrication mode. This in turn decreases fuel consumption, operating temperatures & metal wear rates. In addition, in dry start & extreme adverse modes (loss of oil pressure/lubrication source) where the surfaces touch, damage is minimized when only the peaks of the asperity may touch. The bearing load/pressure is now taken by the Enviro-Save to Enviro-Saved filled surfaces. The impregnated resin, being inert, provides long-term corrosion protection of all bearing surfaces & components in engines, vehicles & equipment.