

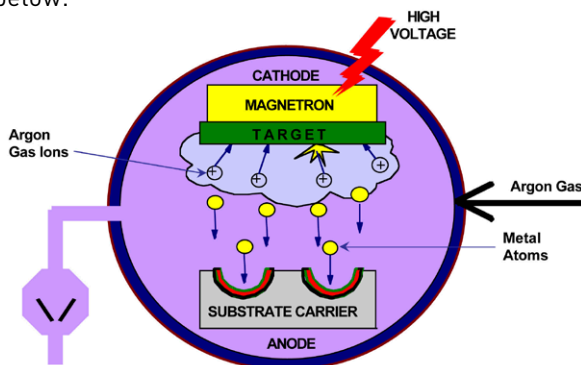
Sputter Bearing Technology

For today's new generation high performance engines, conventional copper base tri-metallic or multi-layer bearings do not achieve the required running performance under peak loads. At loads of around 8700PSI, overlay fatigue occurs after only a short running time. The hardness of the overlay in these traditional bearings at room temperature is in the range 20HV and drops rapidly at higher temperatures. However, the electroplated layer combining the benefits of aluminium, tin & copper resulted in a little better wear resistance and achieved an overlay hardness of around 30HV, but this too had limitations under heavy loading.

In recognition of this and the demands imposed by global vehicle manufacturers for high performance diesel engines, Federal-Mogul Glyco began development in the 1970s of physical vapour deposition (PVD) process used as a technique for overlaying (Sputtering) to exploit the individual advantages of aluminium and copper base layers.

Sputter process

Sputtering refers to a method by which aluminium-tin overlay is applied on the bearing surface. The process takes place in an evacuated chamber where the bearings to be coated are placed beneath a target aluminium-tin alloy. Argon gas is then introduced and electrically heated to plasma-state. Ion bombardment of the argon plasma dislodges aluminium-tin atoms from the target, and accumulates on the substrate as a thin, highly uniform alloy coating, see illustration below:



The result is a heterogeneous alloy of aluminium-tin with extremely fine distribution of tin. The hardness of this layer is approximately 90HV, which is several times higher than the electroplated overlays. The result is a very high load bearing strength, in addition to possessing all the advantages of excellent resistance to corrosion, wear and a very good resistance to fatigue of the thin overlay.

Characteristics of Sputter bearing

- High resistance to overlay wear and fatigue
- Very high Load bearing strength, circa 16000PSI
- Good embedding capabilities
- Excellent corrosion resistance

Today, almost all-new Car, LCV & HCV diesel engines use Sputter bearings. Federal-Mogul has 90% share of the global Sputter bearing market, supplying to VM's such as: VWAG, BMW, GME, Mercedes, Peugeot, DDC, KHD, and MAN. Several Sputter bearings are now featured in the AE Engine Bearing range, and are indicated in the latest catalogue by material code, SP.