# What are Plane Bearings?

All **Bearings** provide a sacrificial and disposable product between moving parts that are easier and less expensive to replace than more costly and less disposable components. (This is different than a **bushing** which is a device designed to fill an empty space and has no other particular function.)
**Plane** bearings are devices that have no "rolling" components. They are designed to maintain the centerline position of a shaft or establish a precise location of a structure. The name comes from the geometry "plane" that establishes the point of operation.

Plane bearings are divided into four classes based on the way each kind works.

**Class I**

A lubricated bearing whose source of lubricant must come from the outside. In order to be effective the lubricant must always be present and an absence of the lubricant will result in the journal contacting the bearing wall and failure of the application.
Primary materials – brass, bronze, iron, babbitt, steel, polymer, wood, phenolic (micarta), elastomer, ceramic
Principle of operation – In a perfect design, the fluid film (lubricant) separates the journal from the bearing wall during normal operation and eliminates wear.

**Class II**

A lubricated bearing whose source of lubricant comes from within the bearing wall. In some cases the lubricant is added after the bearing is in its final physical form and in others the lubricant is built into the matrix of the material during the manufacturing process. In either case, when the lubricant contained within the bearing wall has been exhausted, the journal will contact the bearing wall and will fail in the application.
Primary materials – sintered metals (primarily bronze), polymers (oil filled), ceramic, wood
Principle of operation – in a perfect design, the fluid film (lubricant) separates the journal from the bearing wall during normal operation and eliminates wear.

**Class III**

A bearing that requires no separate lubrication and fails when the bearing wall has been exhausted or when the bearing material has broken down. Failure occurs when the journal centerline can no longer be sufficiently maintained for the application or the load can no longer be sustained. The bearing must give up of itself in order to perform.

| Primary Materials | Base Materials | Additives |
|---|---|---|
| • Silicone<br>• Peek<br>• PEI<br>• Polyamide-imide<br>• PES<br>• PBI | • Steel<br>• Resin (solid)<br>• Polyethylene (low molecular weight)<br>• Filament wound resins<br>• UHMW (polyethylene, ultra-high molecular weight)<br>• Composition resins (wood, paper, cotton, canvas)<br>• Ceramic<br>• Polyimide<br>• Urethane<br>• PPS<br>• Wood | • PTFE<br>• Graphite<br>• Carbon<br>• Molybdenum |

Principle of operation – A very thin film of material on the journal that is scraped from the inside of the bearing by the journal provides a suitable working interface between the journal and bearing wall.

**Class IV**

Any other product that qualifies as a plane bearing by virtue of meeting all of the requirements of the plane bearing definition but that do not fall into any of the first three classes by its operation.