There are many types of bearings, each used for different purposes. These include ball bearings, roller bearings, ball thrust bearings, roller thrust bearings, tapered roller thrust bearings and linear bearings.

**What loads or movements will the bearing need to support or allow?**

- Ball bearings are very common in applications from the simplest to the most complex and are used in a wide variety of applications where they are subject to radial or thrust loads. They are not as robust as roller bearings or needle bearings. For example, the design of a ball bearing consists of a race and balls. The race is made of hardened steel and this allows the bearing to handle loads, while the balls are much more flexible and have lower friction than bearings with more rigid components.

- Roller bearings, such as the one illustrated below, are used primarily where something needs to be moved along a straight line with low friction. They are effective in eliminating rolling resistance in assemblies where the contact area holding that load, so if the load is not very much, they can deform or squish, ruining the bearing. The roller is a cylinder, so the contact between the inner and load is not a point but a line. This means that there is not very much friction, which helps it spin very smoothly. But it also means that the load is not designed to handle much radial loading.

- Linear bearings are used in applications like conveyer belts, where they must hold heavy loads, and they are used in optical test fixturing and calibration. They provide a smooth and accurate linear movement that is easy to control and maintain. The linear bearings are designed to slide on a linear track, which helps to reduce friction and wear. They are also used in robotic pick-and-place applications, where they are used to accurately move objects from one location to another.

- Shielded and Seal Types

- **Z TYPE SHIELD**
  - This shield is non-removable, and it provides protection to the bearing against outside contamination. However, the high pressure of the lip seal itself results in greatly increased torque and friction losses that can cause heat build-up in the bearing. These types of bearings are best suited for the bore size of 1/4 inch or larger. They are used in applications where the bearing is subject to continuous or intermittent loading.

- **ZS TYPE SHIELD**
  - This shield is identical to the fixed Z type shield, except that it is removable. It is used in applications where the user needs to remove the shield after manufacture of the bearing.

- **D TYPE SEAL**
  - This seal consists of a molded Buna-N rubber lip seal and an external snap wire to the bearing outer ring, but also lightly retained by an external snap wire to the bearing outer ring. It is available for bearings with a shaft size of 1 inch or larger. It is used in applications where the bearing is subject to intermittent or continuous loading.

- **Single Seal - Code D**
  - This seal is used for bearings with a shaft size of 1 inch or larger. It is used in applications where the bearing is subject to intermittent or continuous loading.

- **Double Seal - Code DD**
  - This seal consists of a molded Buna-N rubber lip seal and an external snap wire to the bearing outer ring. It is available for bearings with a shaft size of 1 inch or larger. It is used in applications where the bearing is subject to intermittent or continuous loading.

- **Double Shield - Code ZZ**
  - This shield is used for bearings with a shaft size of 1 inch or larger. It is used in applications where the bearing is subject to continuous or intermittent loading.

- **Double Shield - Code ZZS**
  - This shield is used for bearings with a shaft size of 1 inch or larger. It is used in applications where the bearing is subject to continuous or intermittent loading.

**Fit Tolerances**

- **General PV Guidelines**
  - PV values are calculated by multiplying the product of the linear speed of the bearing and the pressure between the mating surfaces. This product is divided by the surface roughness. The result is the PV value, which represents the maximum safe operating pressure for the bearing.

- **Typical Lubricants**
  - The selection of the lubricant depends on the application, the speed of the bearing, and the environmental conditions. The most common lubricants for rolling element bearings are mineral-based oils and grease.

**Useful References**

- Bearing Selection Guide (Found in Mnd Works) - www.3Dcontentcentral.com
- Quality Bearing and Components Catalog B605 - www.howstuffworks.com
- www.skf.com
- www.dynaroll.com/bearing-selection
- www.3Dcontentcentral.com
- Mechanical Engineering Design 5th Edition, Shipley and Maschine
- www.howstuffworks.com
- www.skf.com
- www.dynaroll.com/bearing-selection

- If you are going to incorporate bearings into your solid modeling, this website provides free SolidWorks Downloads of different bearings. They can be found under the CAD Data icon: http://www.tec.nskl.com/

**General Selection Table**

- **Life Factors**
  - There are many factors to consider when selecting a bearing, including the type of application, the load conditions, and the environment. The table below provides a summary of the most important factors to consider.

**Shields and Seal Types**

- **TS TYPE SEAL**
  - This seal consists of a molded Buna-N rubber lip seal and an external snap wire to the bearing outer ring. It is available for bearings with a shaft size of 1 inch or larger. It is used in applications where the bearing is subject to continuous or intermittent loading.

- **TS TYPE SEAL**
  - This seal consists of a molded Buna-N rubber lip seal and an external snap wire to the bearing outer ring. It is available for bearings with a shaft size of 1 inch or larger. It is used in applications where the bearing is subject to continuous or intermittent loading.

- **TS TYPE SEAL**
  - This seal consists of a molded Buna-N rubber lip seal and an external snap wire to the bearing outer ring. It is available for bearings with a shaft size of 1 inch or larger. It is used in applications where the bearing is subject to continuous or intermittent loading.

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