What is minimum life of bearing?

The life of a bearing is a function of many factors, including the application, load conditions, lubrication, and material. In general, ball bearings have a longer life than roller bearings because they are less sensitive to overloads and speed variations.

The minimum life can be expressed as a number of revolutions or cycles that the bearing can withstand before failure occurs. The life will vary depending on the type of load on the bearing. For example, if you apply a radial load to a bearing, it will have more cycles available than if you apply an axial load. Also consider that one application might require heavier loads than another application, therefore fewer cycles may be required before failure occurs.

The minimum life of a bearing refers to the time from the beginning of use to the failure of the bearing.

It is an important indicator for the selection and design of bearings. The factors affecting the minimum life include material, geometry and lubrication conditions.

The minimum life can be calculated based on different methods: statistical method, accelerated test method and reliability theory method. The main difference between these methods is that they all use different assumptions to calculate the expected lifetime.

Bearing life is affected by rotational speed.

The life of a bearing is affected by the rotational speed of the shaft it supports. The higher the speed, the greater the contact stress between bearing and shaft. The higher the contact stress, the shorter the bearing life.

In general, as speeds increase, so does wear on all mechanical components. However, some bearings are more sensitive to speed than others. For example, ball bearings have higher fatigue limits than roller bearings because of their relatively low contact stress and high lubrication level. In contrast, linear motion bearings have much lower fatigue limits than ball or roller bearings because they have higher contact stresses and no lubrication.

The maximum allowable operating speed for any particular bearing type depends upon its structural design and material characteristics. Maximum allowable speeds are based on standard tests that are conducted under controlled conditions with new bearings in good condition. For example, a standard test for ball bearings might be 30 horsepower at 10 revolutions per minute (rpm) for 60 minutes (6 hours) without failure.

Bearing life is affected by temperature.

High temperatures can cause the lubrication to break down and reduce the load-carrying

capacity of the bearing. Low temperatures cause brinelling or surface damage, which also reduces its load-carrying capacity.

Temperature is one of the most important factors that affect bearing life. The general rule of thumb is that for every 10°C increase in temperature above ambient, the life of a bearing will be cut in half.

As you can see, there are two main reasons why temperature affects bearings:

The viscosity of grease and oil increases with temperature (or decreases with decreasing temperatures). This means that there will be less grease or oil to fill up microscopic voids between moving parts inside a bearing assembly or around its outer race. The result is reduced lubrication which leads to premature wear and failure.

At high temperatures, plain carbon steel races will begin to oxidise and this layer of corrosion increases frictional forces during operation - again leading to premature wear and failure.

The life of the bearing is affected by the load.

The load on a bearing is a function of the size (diameter and width) of the shaft, and the speed at which it turns. If the shaft is large and turns slowly, there will be little or no load. If it is small but turns quickly, there will be significant pressure on the bearing.

The load on a bearing can also be changed by changing its position in relation to other parts in a machine or engine. For example, if one end of a shaft rotates faster than another end, there will be greater pressure on that end of the shaft where rotation is faster because there will be more centrifugal force acting on that part of the shaft due to its increased speed.

Bearing life is affected by lubrication.

The lubricating oil or grease, which is used to protect the bearing from wear, also affects bearing life. In fact, it is even more important than the type of bearing. The wrong choice of lubricant can reduce the life of a bearing by as much as 50 percent.

The most common cause of premature failure is lack of lubrication — especially in applications with high loads and temperatures.

As soon as the temperature reaches 160°F (71°C), the oil film breaks down and starts to evaporate. At 230°F (110°C), it's gone completely — which means there's nothing left to keep out dirt and contaminants that can damage the bearings and lead to premature failure.

Regular maintenance is necessary.

The bearings should be cleaned and relubricated at regular intervals, depending on their type

and operating conditions.

The frequency of routine maintenance depends on the severity of your application, but it is usually recommended to clean and relubricate your bearings every six months or once per year. This is especially important if you run your equipment in a dusty environment or if you operate at high speeds.

In addition to cleaning and relubricating, it is also recommended that you inspect your bearings periodically to ensure that they are in good condition. If a bearing appears to have worn excessively or has other visible damage, it must be replaced immediately before it fails completely and causes damage to other components in your equipment.

When a bearing is installed it will have a specified minimum and maximum life, however to get the longest life possible from a bearing you must understand how to correctly install it, how to maintain and how to correctly remove when necessary. If a bearing is not properly maintained, removed or if the lubrication system is not functioning properly then premature failure could result within the recommended operating limits.