

# Bearing Life Formula

## ISO Adjusted Bearing Life Formula for Antifriction Bearings

The ISO adjusted bearing life formula is used by bearing manufacturers and equipment design engineers to predict the service life of antifriction bearings.

$$L_{na} = a_{23} (L_{10})$$

$L_{na}$  = actual bearing life (millions of revolutions)

$a_{23}$  = oil film thickness ÷ composite surface roughness  
(composite surface roughness = combined roughness of the bearing and the opposing race;  $a_{23}$  is also called "relative oil film thickness")

$(L_{10})$  = bearing design life (includes all design and installation parameters such as fit, alignment, balance, etc.)

### This formula illustrates:

1. The quality of lubrication is as important as the mechanical factors in determining the bearing life.
2. Oil film thickness must at least equal the combined surface roughness of the bearing and race in order for the bearing to reach its design life in service.
3. Bearing life is increased in direct proportion to:
  - a) the percentage increase in the thickness of the oil film.
  - b) the percentage reduction in the composite surface roughness.Bearing life is greatly increased by a combination of both a & b.

Note: Less than 10 percent of bearings in service ever reach their design life; however, improving relative oil film thickness can increase bearing life up to 4 times its design life.

**Royal Purple's oils with Synerlec® additive technology greatly increases bearing life by both increasing oil film thickness and smoothing bearing surfaces.**

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