SKF Technical Info

Commercial Vehicle

Understanding preload and clearance in paired tapered roller bearing (TRB) arrangements

Understanding the correct preload/clearance settings of paired tapered roller bearing arrangements (paired single TRBs as well as unitized wheel end systems, such as THU 1, THU 2, TMU) is vital for maximizing bearing life time.

What are the definitions of preload and clearance?

Preload describes the condition of a paired tapered roller bearing (TRB) arrangement which is not allowing any axial movement (→ fig. 1). The bearings have an axial load due to the clamping force of the axle nut.

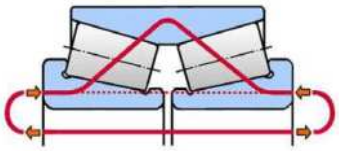

Figure 1: preload

Clearance in a paired TRB arrangement allows axial movement (→ fig. 2). Clearance can easily be measured with a dial indicator.

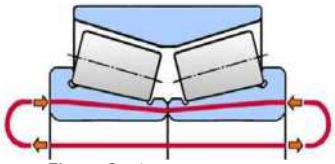

Figure 2: clearance

What is the best setting for a commercial vehicle wheel end, preload or clearance?

Generally speaking a slight preload can be considered to be the best setting as it will distribute the load evenly on all rollers and therefore improve bearing life (→ fig. 3).

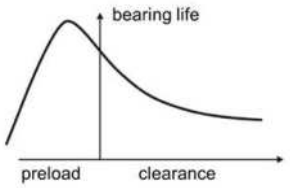

Figure 3: Bearing life clearance vs. preload

What are the risks of a too high preload?

The consequences of a too high preload are serious. The increased load on the rollers can cause high temperature, damage to the lubricant and damage to the side face of the rollers, which in turn can lead to a premature bearing failure and/or even loss of the wheel.

What are the risks of a too high clearance?

A too high clearance can cause skewing of the rollers, over rolling of the cage and eventually an early bearing failure and/or even loss of the wheel.

How can single TRB arrangements be adjusted?

The adjustment of a single TRB wheel end requires high quality products as well as a skilled technician. Bad bearing tolerances can influence your preload settings negatively. The OE manual of your axle will show the right tightening torque for the specific application.

How can unitized wheel end systems (TMU, THU1, THU2) be adjusted?

The preload settings for unitized wheel end systems, like TMU, THU1 and THU2 are pre-adjusted during the bearing manufacturing process. These systems are less fragile to tightening torque variations, due to the touching inner rings. A clamp force of the two inner rings between 80 to 100 kN will preload the bearing system correctly. The axle manufacturer's instruction provides the necessary information for the correct torque value to achieve this clamp force. Due to the various stub axle designs in the market, different axle nut tightening torques are existing.

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