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Stopping at Nothing to Get You Stopped

IMPORTANT NOTE ABOUT AXLE NUT TORQUE ON WHEELS WITH TAPERED ROLLER BEARINGS

MATCO mfg wheels equipped with tapered roller bearings use an integrated grease seals on the bearing cone to ensure the longest possible life. The torqueing procedure for bearings with these type seals is different than for tapered roller bearings without them. A common torqueing technique for bearings without seals is to tighten the axle nut until the wheel stops spinning freely and then back off to the nearest locking feature. THIS TECHNIQUE WILL NOT WORK ON A BEARING WITH AN INTEGRATED SEAL. The reason for a different torqueing technique is that the grease seal produces some drag and makes the wheel feel somewhat stiff when rotated. Reducing the axle nut torque until the wheel spins freely will allow the grease seal and the bearing cone to improperly rotate with the wheel (the cone must not rotate relative to the axle). The higher rolling drag is completely normal for this bearing and allows for longer bearing life since the seal will keep most contaminants out. Manufacturers specification state, for example, that the two 1.25 inch tapered roller bearing used on the WE51 will produce between 18-26 inch pounds of torque (drag) when properly installed. A light coating of grease on the seal will help reduce the drag on initial installation. The drag will also reduce after the bearings have been installed and the seal relaxes in the bore. It is important that the axle nut torque be sufficient to keep the seal from rotating with the wheel.

In the event that reduced bearing drag is desired, the procedure on the MATCO mfg website may be judiciously followed.

A Word About Felt Dust Seals

A true bearing grease seal is used on all MATCO mfg wheels with tapered roller bearings. Like the positive sealing systems used on all commercial and military aircraft wheels, bearings on MATCO mfg wheels use a rubber sealing system for a positive seal to keep the grease in the bearing and moisture and dirt out. This type of sealing system is preferred and superior to dust seal systems that were used on legacy general aviation designs and their copies. A felt dust seal should never be confused with a grease seal. In his forum at Airventure Oshkosh in 2003, Shawn Isham of Cleveland Wheels and Brakes noted the failings of felt seals in that they are required to be kept saturated with oil to prevent moisture invasion while the oil soaked felt attracts dirt like a magnet. He further added that “we are looking to try to go to mostly molded rubber here hopefully down the road”. At the 2005 forum by Vernon Rodgers of the same company, Mr Rodgers noted that without a saturated felt seal, moisture invasion can be severe enough to cause corrosion in the wheel bore to the extent that the wheel may need to be scrapped. He also noted that this had occurred on wheels still on the airframe production floor because the felt seals had not been saturated with oil or grease at installation. A felt dust seal when thoroughly saturated with grease will provide minimal protection against water infiltration while attracting dirt and debris at the bearing. The Duo-face seals used on MATCO mfg tapered roller bearings have two sealing surfaces to keep the dirt and moisture away from the bearing and provide maximum life and performance. In the event reduced bearing drag is desired for an installation, the Duo-face seal may be trimmed using the procedure on the MATCO mfg website. It is always preferable to use the untrimmed profile for maximum protection and durability.

Additionally, there have been some invalid concerns raised about the higher drag of a bearing seal increasing the wheel spin up loads on the landing gear. This notion is entirely false as captured in FAR Part 23, Appendix D which defines spin-up and spring-back loads on a landing gear. In simple terms, Appendix D defines the loads during spin up to be the friction force between the tire and the ground applied at the deflected radius of the tire. THE BEARINGS ARE ASSUMED TO BE RIDGID since the load is reacted by the inertia of the wheel and tire. The limiting factor of these loads is the friction coefficient between the tire and the ground (this is confirmed by the familiar chirp of the tire of a landing aircraft and the skid marks on the landing zone of any runway). Whether the wheel bearing had zero drag or if the wheel were fixed from rotation to the landing gear, the spin-up loads (and therefore the spring back loads) would be the same.