

TECHNICAL INSIGHT

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Incompatibility of greases

A hot strip steel mill changes over to a new grease that has already won high praise from other mills, but complaints are pouring in. During a production run with high rolling speeds, a critical motor fails even though it had been properly lubricated in line with the maintenance instructions. What happened? A lab technician tests grease from the problem bearing and finds that, although the grease meets all specifications, it is not performing as it should.

In this case, the company had changed from one grease type which met specifications to another type which also met specifications. All were victims of grease incompatibility. Some greases cannot be mixed with others, even when both types meet specifications. Unless incompatibility is understood and accounted for, changing to a different grease can be disastrous.

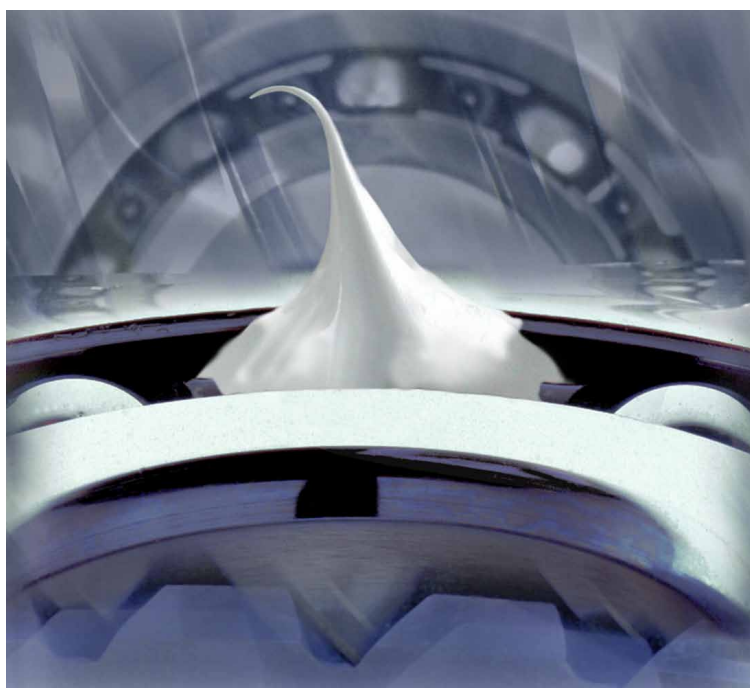
Incompatible greases

Incompatibility occurs when a mixture of two greases shows properties or performance significantly inferior to those of either grease before mixing. When greases are mixed, both the grease bases and the thickeners have to be compatible. Some grease bases are intrinsically incompatible. Different fatty acids and/or additive packages also affect compatibility. To make it even more confusing, sometimes two types of grease can become a mixed base grease during maintenance.

Usually, the problem only becomes obvious once the bearing is in use. By that time, major problems can develop. It is best to know in advance which types of greases can be used together and which should not.

Mixing greases in the field

Why do companies not experience more problems when greases are mixed either deliberately or accidentally? Even a highly fluid mixture of incompatible greases may work for a while when the bearings are still in good condition, if shock loading is not too severe, the seals are adequate, and demands are not extreme. Most instances of incompatibility are brief if the old grease is flushed out of the bearing in time.



Making a change safely

What if changing grease is necessary? There are ways to ensure a safe changeover. Sometimes, incompatible greases do not have to be eliminated completely; if the user is careful, a little intelligent attention can prevent problems:

1. Ask the supplier about compatibility. They should have the information or be willing to run tests.
2. Use up as much of the old grease as possible before using the new grease. It is ideal to completely drain and clean the system before changing over.
3. Once the new grease is added, a larger quantity of grease should temporarily be used for re-lubrication. This will move the interface (the area of grease mixing) through the system and out as quickly as possible. The increased amount of grease flow also ensures good lubrication and proper sealing, while overly soft grease may be in the bearings.
4. When there is doubt, expect incompatibility, watch for problems.

Conclusion

When two greases are mixed, the result may be disappointing. The mixture is frequently softer than the original grease, and this can be disastrous. By being aware and following a sensible procedure when changing greases, a user and supplier can ensure that grease incompatibility will not create serious problems.



The following details provided by Klüber (Munich) can be used as a guide.

For more information, please visit www.nskeurope.com

Key (Table 1 and 2)
 + Compatible
 +- Partially compatible
 - Incompatible

Table 1 – Compatibility of Grease Bases

	Mineral Oil	Synth. Hydrocarbon	Ester Oil	Polyglycol	Silicone Oil	Perfluoroalkylether
Mineral Oil	+	+	+	-	-	-
Synth. Hydrocarbon	+	+	+	-	-	-
Ester Oil	+	+	+	+	-	-
Polyglycol	-	-	+	+	-	-
Silicone Oil	-	-	-	-	+	-
Perfluoroalkylether	-	-	-	-	-	+

Table 2 – Incompatibility of thickener systems

	Simple metal soap greases				Complex metal soap greases					Non-soap greases		
	Al	Ca	Li	Na	Al K	Ba K	Ca K	Li K	Na K	Bentonite	Polyurea	PTFE
Al		+-	+	+-	+	+-	+	+	+-	+	+	+
Ca	+-		+	+	+	+	+	+-	+	+	+	+
Li	+	+		-	+	+	+	+	-	+-	+-	+
Na		+	-		+	+	+-	+-	+	-	+	+
Al K	+-	+	+	+		+	+-	+	+-	+-	+-	+
Ba K	+	+	+	+	+		+-	+-	+	+	+-	+
Ca K	+-	+	+	+-	+-	+-		+	+	+-	+	+
Li K	+	+-	+	+-	+	+-	+		+-	+	+-	+
Na K	+-	+	-	+	+-	+	+	+-		-	+	+
Bentonite	+	+	+-	-	+-	+	+-	+	-		+	+
Polyurea	+	+	+-	+	+-	+-	+	+-	+	+		+
PTFE	+	+	+	+	+	+	+	+	+	+	+	+