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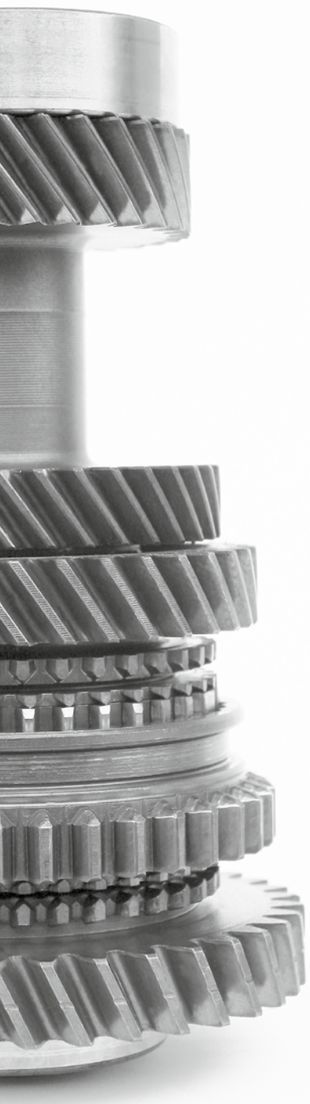
Industrial Gearbox Service Manual

Henkel Excellence is our Passion

Introduction



This guide has been designed to provide quick and easy assistance to the professionals who service industrial gearboxes and look for reliability, longevity and cost reduction. With the help of this guide, you can:

- Easily select the right LOCTITE® products to help you service the wide variety of gearbox assemblies
- Prevent wear proactively
- Pinpoint the most suitable solution for servicing worn parts

LOCTITE® products are used in gearbox manufacturing worldwide to enhance quality and extend end-product life. The same high quality LOCTITE® technologies and products are also available to the people who maintain, repair and service gearboxes. There is a comprehensive range of Loctite® products to:

- Repair and prevent gearbox failures – on-site, to minimize downtime
- Reclaim worn or damaged assemblies to avoid scrap and replacement costs
- Assist in assembly, installation and disassembly
- Ensure reliability and smooth running by restoring performance to "as new" condition

The Industrial Gearbox Service Manual Solves Real Problems

The applications described in the Industrial Gearbox Service Manual are based on a bevel helical gearbox configuration. They apply equally for helical gearboxes, worm gear units and geared motors. The Industrial Gearbox Service Manual is designed as a practical guide to provide information covering key gearbox assembly groups.

Feasibility Confirmed

The recommendations given in this Industrial Gearbox Service Manual are based on collaboration with customers, institutes and universities to establish their validity and confirm that these methods are operable, practical and indeed the best solutions for servicing and repairing gearbox assemblies.

Profit from Reliability

Henkel provides products for cost-efficient, easy and effective gearbox maintenance and repair. When gearboxes and ancillary equipment fails, the greatest concern is getting it running again, but spare parts may not always be readily available. LOCTITE® products not only provide reliable on-site repair capability, but emergency repair and service solutions that last or even extend the lifetime of equipment.

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To speak with someone in our technical service department or to contact your local sales representative call 1-800-LOCTITE (562-8483) or 1-800-263-5043 in Canada.

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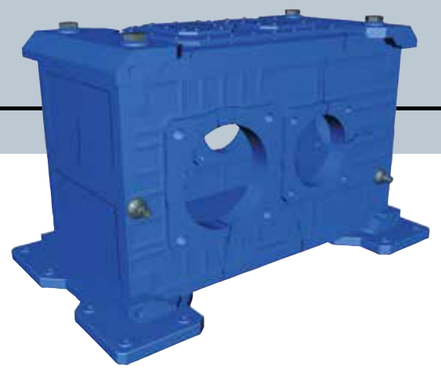
HOUSING



CHALLENGE

- **Repair housing and cover defects**
- **Seal oil leaks due to damaged housing**

CAUSES:

- Gearbox housings may be porous
- Service or repair work may cause damage to gearbox housings and covers

SOLUTION 1

- **Seal porosities (up to 0.05 mm) using LOCTITE® 290™ Threadlocker, medium strength wicking**

STEPS:

1. Thoroughly clean and dry the components with **LOCTITE® ODC-Free Cleaner & Degreaser**, ensuring the porosity is oil free.
2. Brush **LOCTITE® 290™ Threadlocker** into the porosities.
3. Allow to cure, typically for 3 hours.
4. Clean off excess product.

RESULTS

- Quick return to service
- Reduce scrap by salvaging and extending the life of gearbox housing and cover

SOLUTION 2

- **Filling damaged areas with LOCTITE® Fixmaster® Steel Putty, metal-filled epoxy**

STEPS:

1. Thoroughly clean and dry the components with **LOCTITE® ODC-Free Cleaner & Degreaser**, ensuring the repair area is oil free.
2. Mix and apply **LOCTITE® Fixmaster® Steel Putty** onto the area to be repaired.
3. Allow to cure, typically for 12 hours to achieve functional strength.
4. Machine to original size if required.

CHALLENGE

- **Prevent bearing spin, corrosion and housing damage**

CAUSES:

- Bearing outer races are prone to spinning within their housings, resulting in damage to the housing (regardless of whether or not they have been pressed or shrink-fitted in place)
- The air space between a bearing and housing is an area susceptible to rust and fretting corrosion, thus causing damage to the parts

SOLUTION

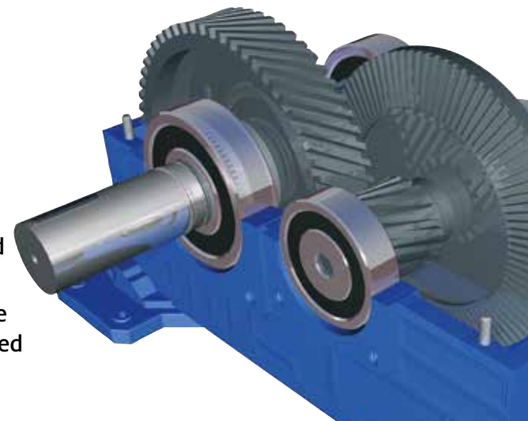
- **LOCTITE® 641™ Retaining Compound is medium strength, allowing for easy disassembly during future overhauls**
- **Alternatively, use LOCTITE® 603™ Retaining Compound for a high strength joint**

STEPS:

1. Clean the mating surfaces with **LOCTITE® ODC-Free Cleaner & Degreaser**. **NOTE: LOCTITE® 603™** is oil tolerant and cleaning is less critical.
2. Apply a film of **LOCTITE® Retaining Compound** to the outside diameter of the bearing.
3. Assemble using normal techniques.
4. Functional cure in 6 hours at room temperature.

RESULTS

- Bearing movement is eliminated
- Bearing can be easily removed with standard tools
- Corrosion is eliminated because the air space between the bearing and the housing is sealed



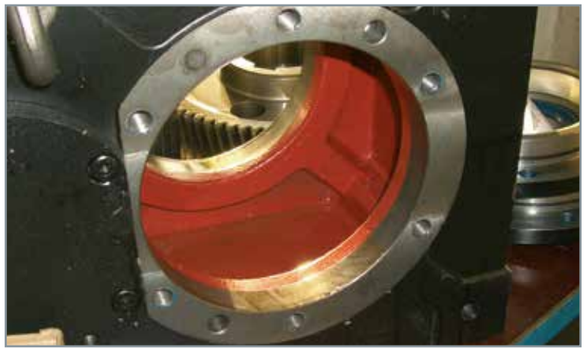
HOUSING

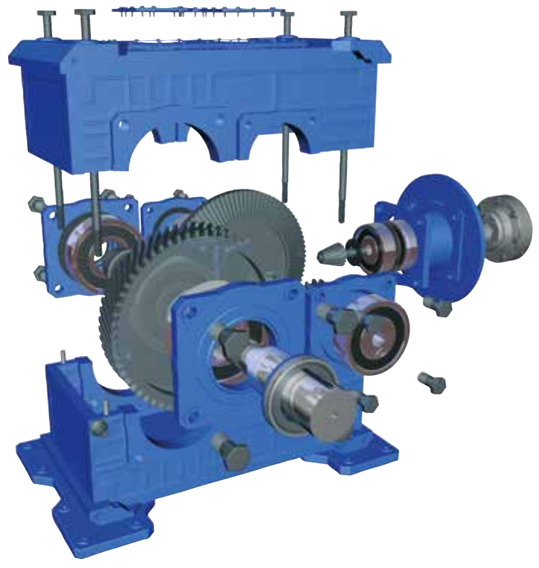
CHALLENGE

- **Repair and rebuild worn bearing housing**

CAUSES:

- Worn components lead to micro movement and additional wear
- Load produces axial forces that are higher than original calculations
- Spun bearing caused by seizure or inappropriate loads





SOLUTION

- **Rebuild worn housing surface with LOCTITE® Fixmaster® Superior Metal**

STEPS:

1. Machine the housing by undercutting in the bore by 1.5 mm in the worn area, leaving the surface rough.
2. Clean parts with **LOCTITE® ODC-Free Cleaner and Degreaser.**
3. Mix and apply a layer of **LOCTITE® Fixmaster® Superior Metal** and force it into the rough surface finish. Build the surface above the final desired level.
4. Allow the adhesive to cure for 12 hours at room temperature.
5. Machine the repair to the required dimensions (typically a press fit) using diamond cutting inserts.
6. Clean the rebuilt surface and the outer bearing ring with **LOCTITE® ODC-Free Cleaner & Degreaser**.
7. Retain the joint between the housing and the outer bearing race with **LOCTITE® 2760™ Threadlocker**.

RESULTS

- Assembly is restored, unitized, and ready for service without a major overhaul
- Easy and fast repair method, compared to alternative repair methods
- Joint between housing and bearing outer race is strengthened by using Loctite® adhesive

HOUSING AND COVER ASSEMBLY

CHALLENGE

- **Prevent gasket failure between the upper and lower housing of a split gearbox**
- **Prevent leaks between the inspection cover / bearing cover / input-output flange and housing**
- **Ensure close tolerance control of the assembly**
- **Sealing of damaged surfaces**

CAUSE:

- The use of cut gaskets is associated with several inherent problems, such as gasket relaxation, shrinkage, extrusion, and breakage that can lead to leaks

SOLUTION 1

- **Use LOCTITE® 518™ Flange Sealant**
- **Use LOCTITE® Instant Gasket for flexible flanges such as inspection covers**

STEPS:

1. Remove old gasketing material and other heavy contaminants with **LOCTITE® Chisel® Paint Stripper**.
2. Clean both flange surfaces with **LOCTITE® ODC-Free Cleaner & Degreaser**.
3. Apply a continuous bead of **LOCTITE® 518™ Flange Sealant** or **LOCTITE® Instant Gasket**. Circle bolt holes with sealant if appropriate.
4. Assemble parts and tighten as required.
5. Allow to cure.

SOLUTION 2

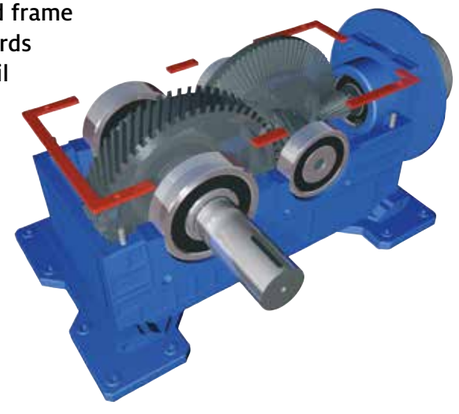
- **When the existing gasket needs to be used as a shim, use LOCTITE® 534™ Hi-Tack Gasket Dressing Stick**

STEPS:

1. Remove old gasket material with **LOCTITE® Chisel® Paint Stripper**.
2. Clean both flanges with **LOCTITE® ODC-Free Cleaner & Degreaser**.
3. Coat flange face on both sides (cover and housing) with **LOCTITE® 534™ Hi-Tack Gasket Dressing Stick**.
4. Position the pre-cut gasket.
5. Assemble and tighten as required.
   Note: Accurate repositioning, component assembly, and tightening should be handled in a continuous workflow without interruptions.

RESULTS

- **Elimination of common cut gasket failures such as compression set, shrinkage, relaxation, and breaks**
- **Constant clamp load is ensured**
- **Elimination of oil leaks between the bearing frame and frame adapter, along with associated cleanup costs and hazards**
- **Reduced oil consumption and risk of running low on oil**
- **Eliminate corrosion on the flange surface**
- **Ensures all potential leak paths are filled and sealed**



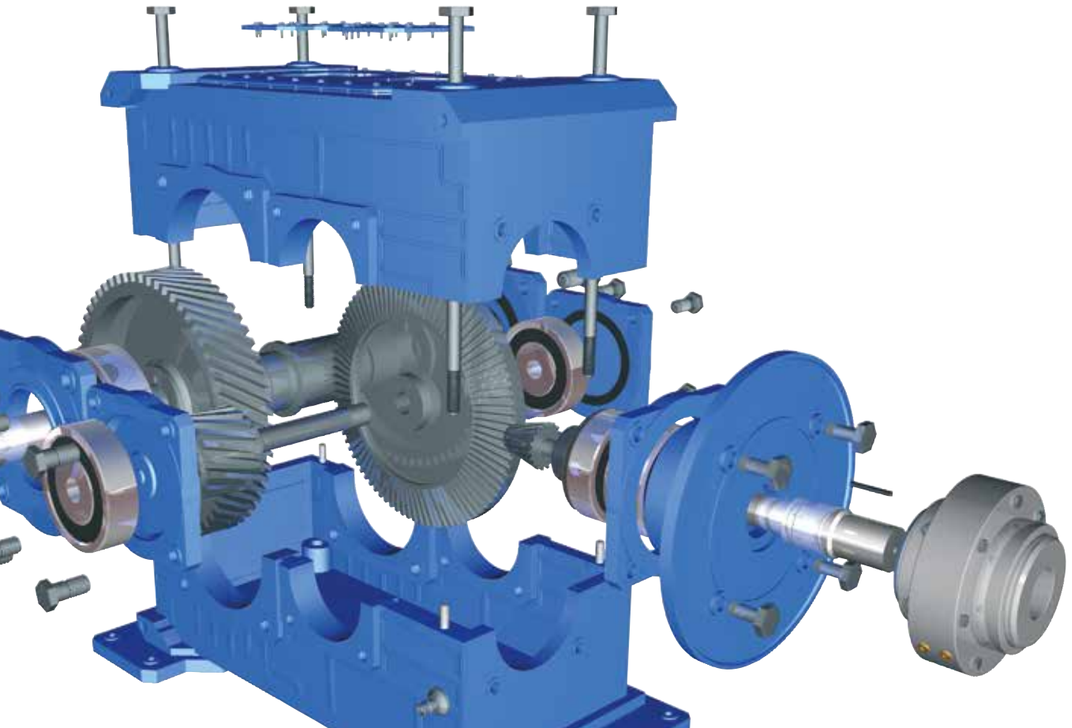
HOUSING AND COVER ASSEMBLY

CHALLENGE

- **Prevent loosening and corrosion of the housing and cover fasteners to ensure gasket reliability**
- **Prevent corrosion and seizure of split gearbox alignment pins**

CAUSES:

- Cover fasteners that are rusted and seized make gearbox maintenance difficult and create additional labor associated with drilling and tapping the fastener hole
- Fasteners can work loose when subjected to torque, vibration, thermal expansion and shock loads
- Once the fasteners become loose, the preload for the gasket will be lost and the gasket will fail
- Dowel pins can rust and seize into component, making disassembly very difficult



SOLUTION

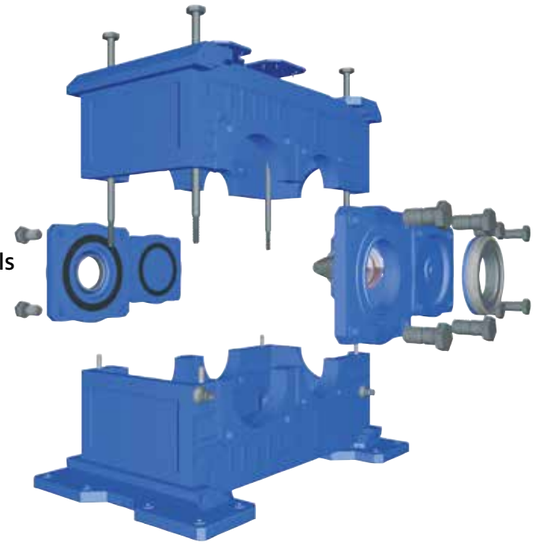
- **Apply LOCTITE® 243™ or 248™ Medium Strength Threadlocker to the housing fasteners**
- **Use LOCTITE® 2760™ Threadlocker for high strength or on stainless steel and plated fasteners**
- **If locking of the fasteners is not required, use LOCTITE® Heavy Duty Anti-Seize**

STEPS:

1. Clean the threads and pins with **LOCTITE® ODC-Free Cleaner and Degreaser**.
2. Apply **LOCTITE® 243™** or **248™ Medium Strength Threadlocker** to the housing fasteners. Apply **LOCTITE® 2760™ High Strength Threadlocker** if stainless steel or plated fasteners are in use.
3. Apply **LOCTITE® Heavy Duty Anti-Seize** onto the dowel pin.
   Note: If a liquid gasket is in use, ensure only a very thin layer of **LOCTITE® Heavy Duty Anti-Seize** is applied.
4. Assemble and tighten.

RESULTS

- Correct clamp load is maintained
- Elimination of rust and seizure
- Easy disassembly with normal hand tools



LUBRICATION AND COOLING SYSTEM

CHALLENGE

- **Prevent leaks from threaded fittings of lubrication and cooling systems**

Lubrication System:

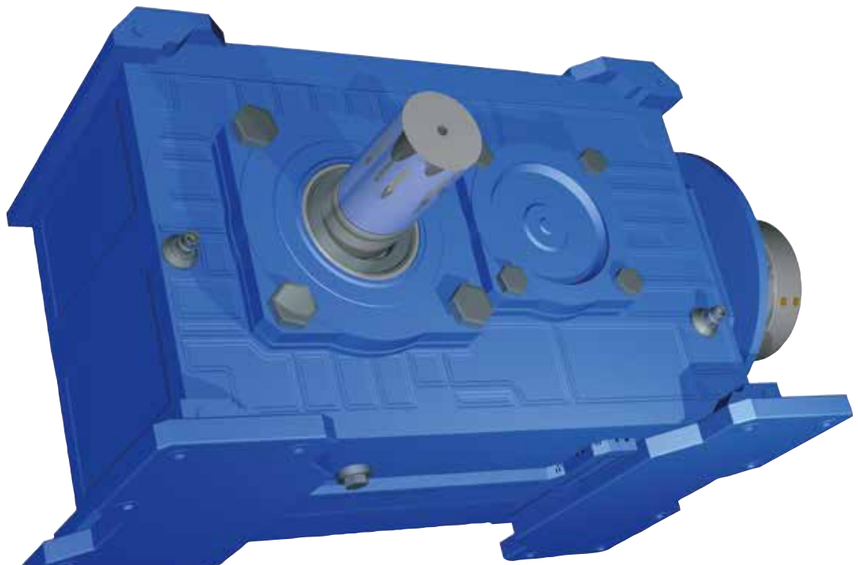
- **Prevent oil leaks on oil drain plug, oil inlet, housing ventilation, oil pump, oil filter and gauge**

Cooling System:

- **Prevent leakage on the coolant pump, pressure and temperature control unit, and all pipe work**

CAUSES:

- Traditional thread sealants are susceptible to leaks
- Pressure and temperature changes within a gearbox system can aggravate any leak
- Vibration between the gearbox and lubrication / cooling system leads to stress on the pipe work



SOLUTION

- **Seal threaded assemblies with LOCTITE® 567™ or 561™ Thread Sealants**

STEPS:

1. Clean parts with **LOCTITE® ODC-Free Cleaner & Degreaser**.
2. Apply a bead of **LOCTITE® Thread Sealant** to the leading threads of the male fitting.
3. Assemble parts and allow to cure.

RESULTS

- **Less oil consumption, thereby reducing the risk of the gearbox running low on lubricant**
- **When cured, LOCTITE® Thread Sealants are resistant to oil and water/glycol and ensure zero leakage**
- **Thread sealants prevent fittings from loosening, yet allow easy disassembly with normal hand tools**
- **Elimination of the potential hazards and cleanup associated with oil leaks**
- **Elimination of seized fittings because moisture and air have been sealed out**
- **Elimination of rust and corrosion within the thread space**
- **Contaminants prevented from getting into the oil through the gaps in the threads**
- **Reduced coolant consumption**

SHAFT SEALS

CHALLENGE

- **Prevent leaks between the gearbox housing and oil seal**
- **Prevent movement of oil seal in housing**

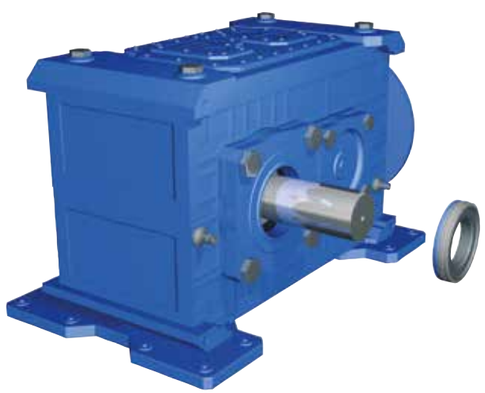
CAUSES:

- As with any press fit, there are small air spaces between the housing and the oil seal; and this air space can create a leak path
- In the case of a split gearbox housing, T-joints are potential leakage points

SOLUTION 1

FOR ELASTOMER OIL SEALS:

- **Fill the air spaces by applying LOCTITE® 435™ Instant Adhesive to the outside diameter of the oil seal**
- **For longer positioning time and oil seal diameter larger than 60 mm, use LOCTITE® 480™ Instant Adhesive**
- **In the case of a cassette seal, also bond the inside diameter to the shaft using LOCTITE® 435™ Instant Adhesive**



SOLUTION 2

FOR METALLIC OIL SEALS:

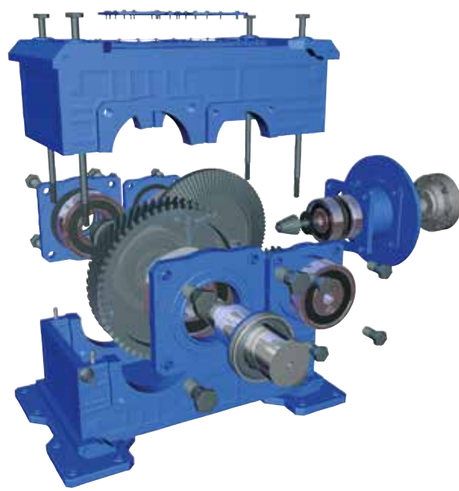
- **Fill the air spaces by applying LOCTITE® 243™ or 248™ Medium Strength Threadlocker to the outside diameter of the oil seal**

STEPS:

1. Clean the bonding surfaces of the oil seal and the gearbox with **LOCTITE® ODC-Free Cleaner & Degreaser**.
2. Apply the adhesive recommended for the different kinds of oil seals to the outside diameter of the oil seal.
   Note: In the case of a cassette seal, apply adhesive onto the cleaned shaft as well.
3. Press the oil seal into position using normal techniques and wipe off any excess.

RESULTS

- A sealed assembly eliminates leaks, contamination and corrosion
- Movement of oil seal during running is eliminated
- The oil seal can still be easily removed with a screwdriver during the next overhaul



SHAFT MOUNTED COMPONENTS: BEARINGS

CHALLENGE

- **Prevent bearing spin**
- **Prevent downtime and scrap costs**

CAUSES:

- Bearings are prone to spinning on their shaft; this results in damage
- Load produces axial forces that are higher than original calculations

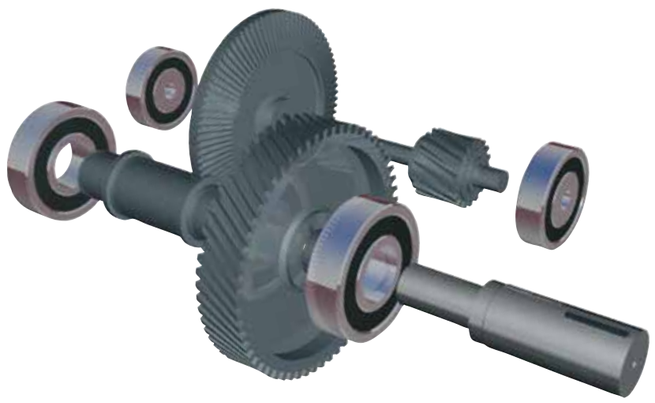
SOLUTION

FOR GAPS UP TO 0.005” (0.1 mm):

- **Retain joint using LOCTITE® 603™ (oil tolerant, high strength) or LOCTITE® 641™ (medium strength, easy to dismantle) Retaining Compound**

STEPS:

1. Clean parts with **LOCTITE® ODC-Free Cleaner & Degreaser**.
2. Apply a bead of **LOCTITE® 603™ or LOCTITE® 641™** to the circumference of the shaft.
3. Mount the bearing onto the shaft using normal techniques.
4. Wipe off excess material.



SOLUTION

FOR GAPS UP TO 0.020” (0.5 mm):

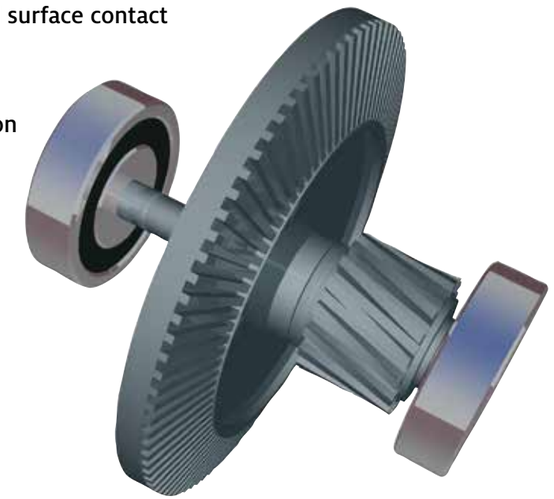
- **Bond using LOCTITE® 660™ Retaining Compound and LOCTITE® 7649™ Primer**

STEPS:

1. Clean parts with **LOCTITE® ODC-Free Cleaner & Degreaser**.
2. Apply **LOCTITE® 7649™ Primer** to the inner bearing race.
3. Apply a bead of **LOCTITE® 660™** to the circumference of the shaft.
4. Assemble the components.
5. Wipe off excess.

RESULTS

- Cylindrical joint is strengthened by using a Loctite® Retaining Compound
- Shaft is repaired to provide full surface contact
- Quick return to service
- Extended shaft life
- Reduce component consumption



SHAFT-MOUNTED COMPONENTS: BEARINGS

CHALLENGE

- **Repair worn cylindrical shafts or gaps exceeding 0.020” (0.5 mm)**

CAUSE:

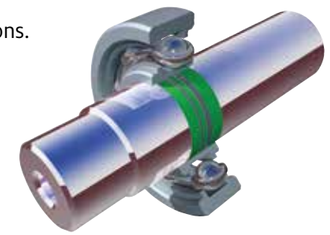
- Spun bearing caused by insufficient interference or inappropriate loads

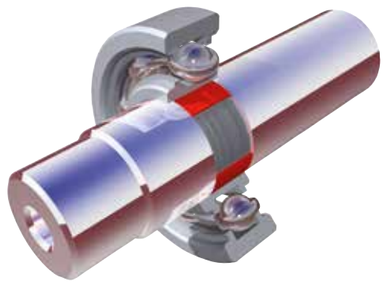
SOLUTION

- **Rebuild with LOCTITE® Fixmaster® Superior Metal to the original diameter and bond the bearing onto the rebuilt shaft with LOCTITE® 603™ Retaining Compound**

STEPS:

1. Using a lathe, undercut the shaft in the worn area 1.5 mm deep.
2. Dovetail the ends of the worn area to lock the application into place and leave a rough surface.
3. Clean parts with **LOCTITE® ODC-Free Cleaner & Degreaser**.
4. Apply a layer of **LOCTITE® Fixmaster® Superior Metal,** and build the surface above the final desired level.
5. Allow the adhesive to cure for 6 hours at room temperature.
6. Machine the repair with a diamond-tipped tool to the required dimensions.
7. Apply **LOCTITE® 7649™ Primer** to the rebuilt area of the shaft.
8. Apply **LOCTITE® 603™** to the inner bearing race.





RESULTS

- Cylindrical joint is strengthened by using a LOCTITE® Retaining Compound
- Shaft is repaired to provide full surface contact
- Quick return to service
- Extended shaft life
- Reduce component consumption

SHAFT-MOUNTED COMPONENTS: GEAR SETS

CHALLENGE

- **Increase reliability and strength of a gear mounted on a shaft**

CAUSES:

- Incorrect reassembly during maintenance, leading to micro movements
- Overload conditions and elevated operating temperatures

SOLUTION

- **Bond gear wheels directly onto the shaft with LOCTITE® 620™ High Strength Retaining Compound**

STEPS:

1. Clean parts with **LOCTITE® ODC-Free Cleaner & Degreaser**.
2. Apply a bead of **LOCTITE® 620™** to the circumference of the shaft.
3. Press the gear onto the shaft using normal techniques.
4. Wipe off excess material.

RESULTS

- Assembly is strengthened by using a Loctite® Retaining Compound

SHAFT-MOUNTED COMPONENTS: GEAR SETS

CHALLENGE

- **Secure the key in the keyway on new equipment**
- **Prevent micro movements that lead to wear**
- **Repair worn keyways**

CAUSES:

- Alternating loads and combined loading result in micro movement wear and loose parts
- Over time, wear can cause keys to loosen – leading to damage of the keyway

SOLUTION 1

NEW COMPONENTS:

- **Proactively apply a LOCTITE® Medium Strength Threadlocker to eliminate any future wear of the key or keyway**

STEPS:

1. Clean the keyway and key stock with **LOCTITE® ODC-Free Cleaner & Degreaser**.
2. Apply several drops of **LOCTITE® 243™ Medium Strength Threadlocker** directly into the keyway.
3. Insert the key stock into the keyway. **Note:** Cover the shaft with a rag to prevent splatter when inserting the key stock.
4. Wipe off any excess threadlocker.

SOLUTION 2

SLIGHTLY WORN KEYWAYS:

- **LOCTITE® 660™ Retaining Compound Compound is a very thick product, allows it to fill large gaps**

STEPS:

1. Clean the keyway and key stock with **LOCTITE® ODC-Free Cleaner & Degreaser**.
2. Apply **LOCTITE® 660™ Retaining Compound** into the keyway.
3. Assemble parts and wipe off excess. **Note:** If keyway wallow is severe, shims can be used on both sides of the keyways in conjunction with the **LOCTITE® 660™ Retaining Compound**.

RESULTS

- Eliminate mirco movement, which leads to fretting
- Prevent keyway wallow
- Prevent corrosion
- A unitized assembly

CHALLENGE

- **Repair badly worn keyways**

CAUSES:

- Alternating loads and combined loading results in micro movement wear and loose parts
- Over time, wear can cause keys to loosen – leading to damage of the keyway

SOLUTION

NEW KEYWAY IN EXISTING SHAFT AND GEAR:

- **If parts are badly worn it may be necessary to cut new keyways; in this case the old keyway should be filled with metal-filled epoxy**

STEPS:

1. Clean parts with **LOCTITE® ODC-Free Cleaner & Degreaser**.
2. Mix and apply **LOCTITE® Fixmaster® Superior Metal** into the keyway of both the shaft and gear.
3. Allow to cure.
4. Machine the cured adhesive to the original dimensions of the shaft and bore of the gear.
5. Machine a new keyway in the shaft and gear, opposite the original keyway.
6. Clean again with **LOCTITE® ODC-Free Cleaner & Degreaser**.
7. Apply several drops of **LOCTITE® 243™ Threadlocker** directly into new keyway and insert key.
8. Wipe off excess.
9. Assemble the components.
10. Allow to cure.

RESULTS

- The assembly is restored and ready for service without a major overhaul
- The key is secured into the keyway

SHAFT-MOUNTED COMPONENTS: GEAR SETS

CHALLENGE

- **Repair worn shafts**

CAUSES:

- Incorrect reassembly during maintenance leading to micro movements
- Overload conditions and elevated operating temperatures

SOLUTION 1

- **Bonding a sleeve on the worn shaft with LOCTITE® 620™ Retaining Compound**

STEPS:

1. Determine an appropriate size of sleeve and machine the shaft to match.
2. Clean parts with **LOCTITE® ODC-Free Cleaner & Degreaser**.
3. Apply a bead of **LOCTITE® 620™** to the circumference of the shaft.
4. Assemble sleeve onto the shaft.
5. Wipe off excess.
6. Apply the same product between the sleeve and the gear wheel.

SOLUTION 2

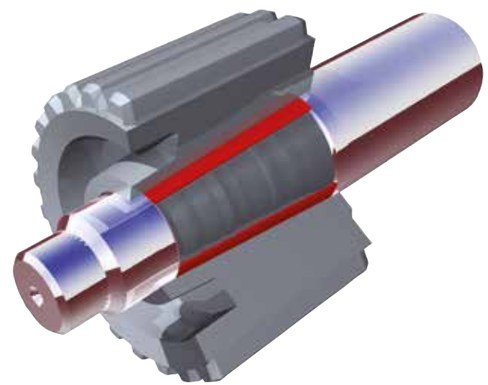
- **Rebuilding the worn shaft with LOCTITE® Fixmaster® Superior Metal and bonding the gear wheel onto the shaft with LOCTITE® 603™ Retaining Compound**

STEPS:

1. Using a lathe, undercut the shaft in the worn area 1.5 mm deep and leave a rough surface over the entire machined surface.
2. Dovetail the ends of the worn area to lock the application into place.
3. Clean parts with **LOCTITE® ODC-Free Cleaner & Degreaser**.
4. Apply a layer of **LOCTITE® Fixmaster® Superior Metal**, building the surface above the final desired level.
5. Allow the adhesive to cure for 12 hours at room temperature.
6. Machine the repair with a diamond-tipped tool to the original dimensions.
7. Apply **LOCTITE® 603™ Retaining Compound** to the components.
8. Assemble using normal procedures.

RESULTS

- **Assembly is strengthened by using a Loctite® Retaining Compound**
- **Assembly is restored and ready for service without a major overhaul**



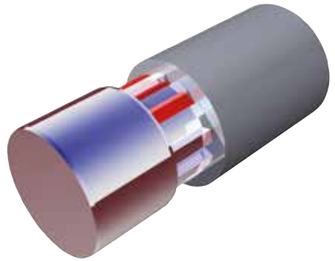
COUPLINGS

CHALLENGE

- **Protecting the spline assembly to prevent unnecessary fretting**

CAUSE:

- Wear will occur where there is friction and movement in the spline



SOLUTION

- **Use LOCTITE® Moly Paste proactively to reduce friction and wear**

STEPS:

1. Clean mating surface with **LOCTITE® ODC-Free Cleaner & Degreaser**.
2. Coat mating surface with **LOCTITE® Moly Paste**.
3. Assemble parts.

RESULTS

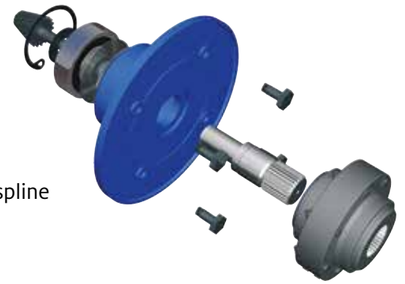
- Prevention of wear caused by friction
- Prevention of corrosion
- LOCTITE® Moly Paste provides very high lubricity and heavy load capacity

CHALLENGE

- **Protecting the spline assembly to prevent unnecessary fretting**

CAUSE:

- Wear will occur where there is friction and movement in the spline



SOLUTION

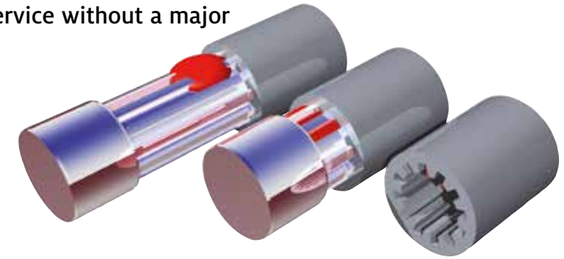
- **For repair of a non-sliding spline with backlash**

STEPS:

1. If possible, abrasive blast the surface of the spline shaft and socket.
2. Clean parts with **LOCTITE® ODC-Free Cleaner & Degreaser.**
3. Check the spline area for uniformity.
4. Apply **LOCTITE® Fixmaster® Superior Metal** to the spline shaft and disperse the product uniformly over the spline circumference.
   Note: For wear between socket and shaft below 0.25 mm, use **LOCTITE® 660™ Retaining Compound** in combination with **LOCTITE® 7649™ Primer**.
5. Immediately push the spline shaft into the socket and remove excess adhesive.
6. Allow the adhesive to cure before putting the equipment back into service.

RESULTS

- Assembly is restored and ready for service without a major overhaul



COUPLINGS

CHALLENGE

- **Prevent couplings from moving due to loose setscrews**
- **Ensure optimum assembly life in on-site conditions**

CAUSES:

- Couplings are commonly held in place by a key and a setscrew
- Coupling assemblies are subjected to vibration and high loads, which can cause threaded fasteners to loosen
- Typically, couplings are assembled on site; for this reason it is difficult to ensure that tightening specifications are followed

SOLUTION

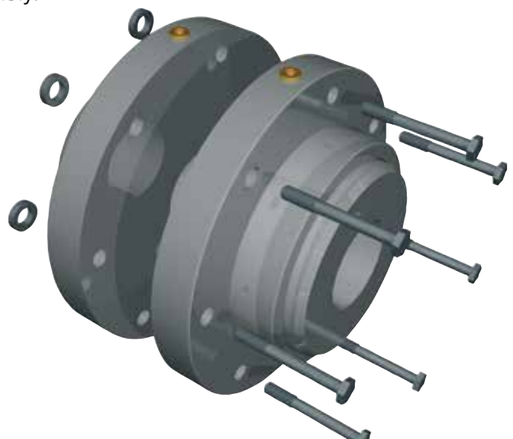
- **Secure all threaded fasteners on couplings using LOCTITE® 243™ or 248™ Medium Strength Threadlocker**

STEPS:

1. Clean the components with **LOCTITE® ODC-Free Cleaner & Degreaser**.
2. Apply **LOCTITE® 243™ or 248™ Medium Strength Threadlocker** to all threaded fasteners.
3. Align the coupling and assemble.
4. Tighten each fastener within 5 minutes of assembly.

RESULTS

- All fasteners are secured in place
- Prevention of misalignment and coupling failure



CHALLENGE

- **Upgrade the load capacity of existing flange drive couplings**
- **Reuse worn flange couplings**

CAUSES:

- The transmittable torque of a flange drive coupling is limited by the friction of the surfaces
- Overloading causes slippage and wear of the coupling surface

SOLUTION

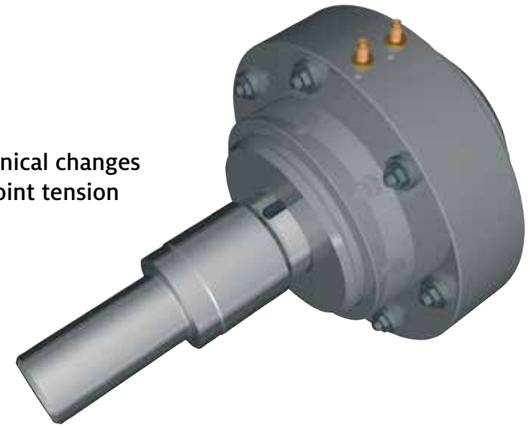
- **Use LOCTITE® 680™ High Strength Retaining Compound on the flange face to increase the torque capacity**
- **Increase torque capacity without any mechanical changes**

STEPS:

1. Clean the surfaces with **LOCTITE® ODC-Free Cleaner & Degreaser.**
2. Apply a thin film of **LOCTITE® 680™ High Strength Retaining Compound** on the entire surface of the coupling flange.
3. Once you start to assemble, torque bolts within 10 minutes.
4. Allow to cure before applying full load.

RESULTS

- Improved torque capacity without mechanical changes
- Eliminates micro movement and loss of joint tension
- Eliminates corrosion



MOUNTING GEARBOX TO MOTOR

CHALLENGE

- **Secure motor and gearbox to the bedplate system**
- **Prevent misalignment caused by loosening under high loads and vibration**

CAUSES:

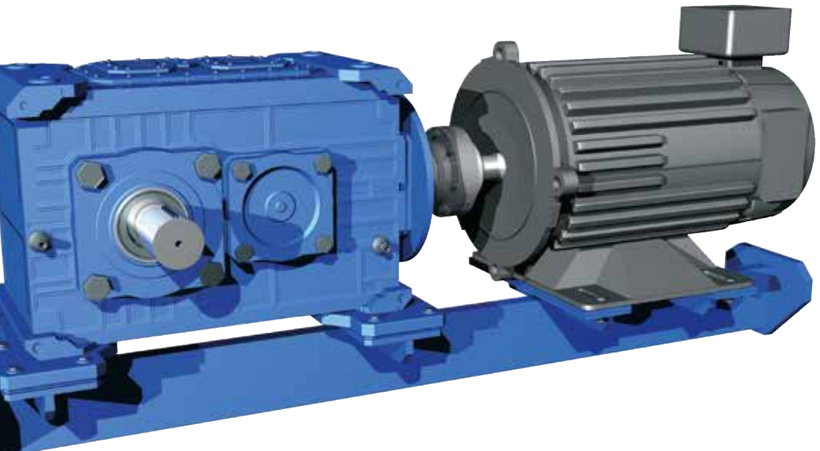
- Vibration and shock load can loosen fasteners and mounting bolts
- Loose bolts result in movement which, in turn, causes misalignment

SOLUTION 1

- **Apply LOCTITE® 2760™ High Strength Threadlocker to the mounting bolts**

STEPS:

1. Clean threads with **LOCTITE® ODC-Free Cleaner & Degreaser**.
2. Apply several drops of **LOCTITE® 2760™ High Strength Threadlocker** to the mounting bolts.
3. Assemble and tighten as usual.



SOLUTION 2

- **Apply LOCTITE® 290™ Wicking Grade Threadlocker to the mounting bolts after the gearbox has been leveled and aligned**

STEPS:

1. Clean the parts with **LOCTITE® ODC-Free Cleaner & Degreaser**.
2. Align the gearbox.
3. Tighten the nuts on the mounting studs.
4. Apply several drops of **LOCTITE® 290™ Wicking Grade Threadlocker** to the mounting bolts.

RESULTS

- **Mounting bolts and fasteners are secured in place**
- **Eliminate vibration loosening**
- **Eliminate bolt corrosion**
- **Prevent misalignment**

GEARBOX APPLICATION PRODUCT TABLE

APPLICATION	LOCTITE SOLUTION	BENEFITS	PACKAGE SIZE	PART NO.	PAGE
Housing					
Defects and porosities	Loctite® Fixmaster® Steel Putty	Steel-filled repair epoxy	1 lb. kit	99913	4
	Loctite® 290™ Threadlocker	Wicking for post-assembly	50 ml	29031	4
Prevent bearing spin	Loctite® 603™ Retaining Compound	High strength, oil tolerant	50 ml	21441	5
	Loctite® 640™ Retaining Compound	High strength	50 ml	64031	5
	Loctite® 641™ Retaining Compound	Medium strength	50 ml	21458	5
Repair and rebuild worn bearing housing	Loctite® Fixmaster® Superior Metal	Ferro-silicone-based epoxy, with outstanding compressive strength	1 lb. kit	97473	6
	Loctite® 2760™ Threadlocker	High strength, primerless	50 ml	32525	6
Housing and Cover Assembly					
Prevent gasket failure between upper and lower housing (split gearbox), prevent leaks	Loctite® 518™ Flange Sealant	General purpose, up to 0.25 mm gap fill	300 ml kit	22424	8
	Loctite® 534™ Hi-Tack Gasket Dressing Stick	Increase the reliability of cut gasket seals	19 g stick	39156	8
Removal of cured chemical gasket	Loctite® Chisel® Paint Stripper	Aggressive gasket remover	18 oz.	79040	9
Housing and cover fasteners, alignment pins	Loctite® 243™ Threadlocker	Medium strength, oil tolerant	50 ml	1329467	10
	Loctite® 248™ Medium Strength Threadlocker Stick	Semisolid stick, medium strength	19 g stick	37087	10
	Loctite® 2760™ Threadlocker	High strength	50 ml	32525	10
	Loctite® Heavy Duty Anti-Seize	Metal-free, high lubricity	1.2 lb.	51606	10
Lubrication and Cooling System					
Threaded fittings for lubrication and cooling system	Loctite® 567™ Thread Sealant	General purpose	50 ml	56747	12
	Loctite® 561™ Thread Sealant Stick	Semisolid stick, controlled strength	19 g stick	37127	12
Shaft Seals					
Prevent leaks between oil seal and housing	Loctite® 248™ Medium Strength Threadlocker Stick	Semisolid stick, medium strength	19 g stick	37087	14
	Loctite® 435™ Instant Adhesive	Transparent, toughened, fast cure	20 g	40994	14
	Loctite® 480™ Instant Adhesive	Black, toughened	20 g	48040	14
	Loctite® 243™ Medium Strength Threadlocker	Medium strength, oil tolerant	50 ml	1329467	14

APPLICATION	LOCTITE SOLUTION	BENEFITS	PACKAGE SIZE	PART NO.	PAGE
Shaft-Mounted Component: Bearings					
Prevent bearing spin	Loctite® 641™ Retaining Compound	Medium strength	50 ml	21458	16
	Loctite® 603™ Retaining Compound	High strength, oil tolerant	50 ml	21441	16
	Loctite® 660™ Retaining Compound	High strength, gap filling up to 0.020"	50 ml	66040	16
Repair worn shafts	Loctite® Fixmaster® Superior Metal	Ferro-silicone-based epoxy, with outstanding compressive strength	1 lb. kit	97473	18
	Loctite® 603™ Retaining Compound	High strength, oil tolerant	50 ml	21441	18
Shaft-Mounted Component: Gear Sets					
Gear mounted on a shaft	Loctite® 620™ Retaining Compound	High temperature, high strength	50 ml	62040	19
Secure keys and repair slightly worn keyways	Loctite® 243™ Threadlocker	Medium strength, primerless	50 ml	1329467	20
	Loctite® 660™ Retaining Compound	High strength, gap filling up to 0.020"	50 ml	66040	20
Repair badly worn keyways	Loctite® Fixmaster® Superior Metal	Ferro-silicone-based epoxy, with outstanding compressive strength	1 lb. kit	97473	21
	Loctite® 243™ Threadlocker	Medium strength, oil tolerant	50 ml	1329467	21
Repair worn shafts	Loctite® 620™ Retaining Compound	High temperature, high strength	50 ml	62040	22
	Loctite® Fixmaster® Superior Metal	Ferro-silicone-based epoxy, with outstanding compressive strength	1 lb. kit	97473	22
	Loctite® 603™ Retaining Compound	High strength, oil tolerant	50 ml	21441	22
Couplings					
Protecting the spline assembly	Loctite® Moly Paste	High lubricity, heavy load capacity moly paste, brush top	1 lb.	51049	24
Repair spline	Loctite® 660™ Retaining Compound	High strength, gap filling up to 0.020"	50 ml	66040	25
	Loctite® Fixmaster® Superior Metal	Ferro-silicone-based epoxy, with outstanding compressive strength	1 lb. kit	97473	25
Prevent coupling movement: Setscrews	Loctite® 243™ Threadlocker	Medium strength, oil tolerant	50 ml	1329467	26
	Loctite® 248™ Medium Strength Threadlocker Stick	Semisolid stick, medium strength	19 g stick	37087	26
Upgrade load capacity, reuse worn flange couplings	Loctite® 680™ Retaining Compound	High strength	50 ml	1835201	27
Mounting Gearbox to Motor					
Mounting fasteners	Loctite® 290™ Threadlocker	Wicking for post-assembly	50 ml	29031	28
	Loctite® 2760™ Threadlocker	High strength, primerless	50 ml	32525	28

GEARBOX APPLICATION PRODUCT TABLE

APPLICATION	LOCTITE SOLUTION	BENEFITS	PACKAGE SIZE	PART NO.
Maintenance – Lubrication				
To free rusted, corroded and seized parts during dismantling	Loctite® Freeze & Release	Freezing action plus penetrating oil	13.52 fl. oz aerosol	996456
Assembly aid for all assembly works	Loctite® ViperLube® High Performance Synthetic Grease	High performance grease	14 oz. cartridge	36782
	Loctite® Moly Paste	High lubricity, heavy load capacity moly paste, brush top	1 lb.	51049
Protection for fasteners and alignment pins	Loctite® C5-A® Copper Anti-Seize	Copper-based, general purpose use up to 1800ºF	20 g stick	37229
			1 lb.	51007
	Loctite® Silver Grade Anti-Seize	General purpose for use up to 1600ºF	20 g stick	37230
			1 lb.	76764
	Loctite® Heavy Duty Anti-Seize	Metal-free anti-seize for use up to 2400ºF	20 g stick	41205
			1.2 lbs.	51606
Maintenance – Cleaners				
General cleaning of external surfaces	Loctite® Natural Blue® Biodegradable Cleaner & Degreaser	Large parts cleaner, water-based	24 fl. oz.	82249
Cleaning and degreasing of machined parts	Loctite® Pro Strength Degreaser	Solvent cleaner	15 oz. aerosol	1578099
Cleaning and degreasing of surfaces prior to bonding	Loctite® ODC-Free Cleaner & Degreaser	General parts cleaner prior to bonding, solvent-based	15 oz. aerosol	22355
			16 fl. oz. pump spray	20162
			1 gallon	20260
Surface Protection				
Rust treatment	Loctite® Extend® Rust Treatment	Rust treatment coating	10.25 oz. aerosol	30539
Corrosion protection	Loctite® Maxi-Coat™	Long-term corrosion protection	12 oz. aerosol	51211

NOTES