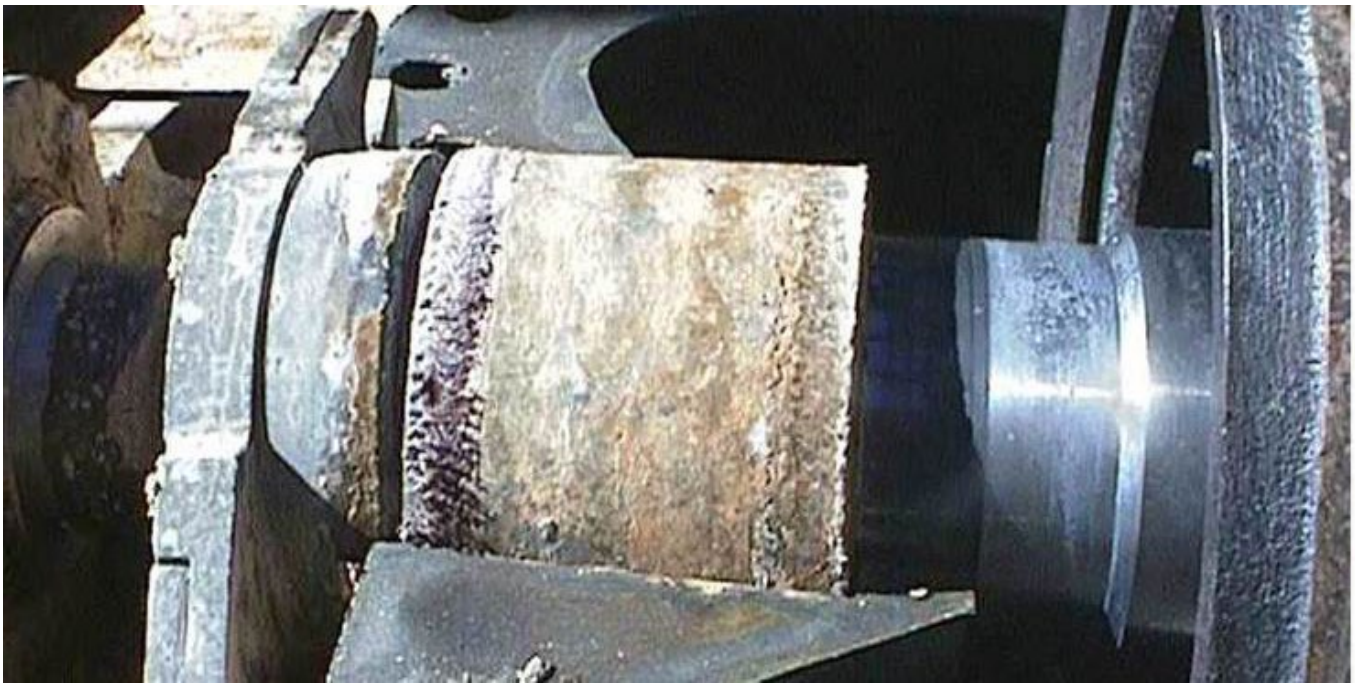

Figure 1: Injectable packing conforms to equipment irregularities.

Injectable packing is an ideal pump packing material when you are looking to seal equipment with worn shafts or fretted sleeves. In this post, you'll learn when to use this flexible packing technology and tips for implementing it.

The Limits of Standard Pump Packing

Braided packing is the oldest pump sealing method used in the process and service industry. Packing has proven to be a reliable and cost-effective sealing choice, especially when pump shaft motion and misalignment issues are not suitable for mechanical seals or when leakage is not a major concern (see our recent post on Packing vs. Mechanical Seals).

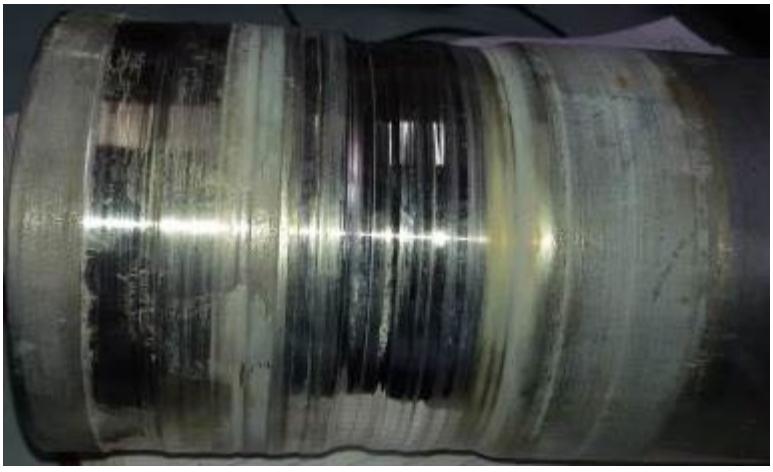

Figure 2: Standard packing can be an issue when shafts are worn.

However, the reliability of conventional braided packing is highly dependent upon the sleeve and flush conditions:

- Sleeve roughness and high spots can cause rapid wear of the packing.
- Flush solids embedded between the packing and the shaft can increase pump sleeve damage, causing unplanned equipment downtime and additional expense.

Maintenance and repair costs of a worn sleeve, as well as flush treatment, can be challenging and sometimes unfeasible. Unscheduled pump shutdowns and downtime can severely increase the cost of production. In addition, a clean flush is often unavailable or too expensive to maintain and remove from the diluted process product, making the packing failure unavoidable.

Flexible Packing Alternatives

New pump packing material technology provides alternatives to conventional braided packing that can better adapt to worn sleeves and contaminated flush.

Injectable packing is one of these technologies that has proven to be highly effective for worn equipment. Unlike braided or die formed packing, injectable packing is a hybrid between a solid and a liquid composed of chopped reinforced fiber mixed with lubricants. Injectable packing works, as the name implies, by injecting the packing through the lantern ring flush port into the stuffing box as shown in Figure 3.

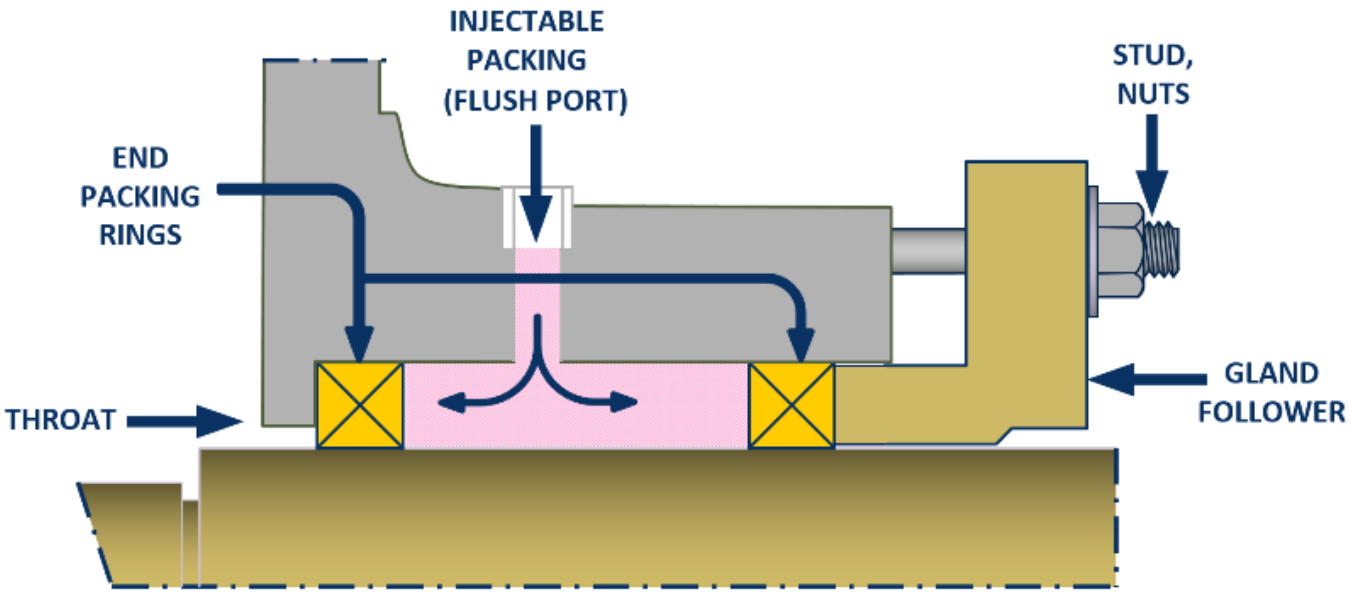

Figure 3: The packing mixture is injected through the lantern ring flush port into the stuffing box.

Advantages

Injectable packing can be used in many applications. It is perfect for high up-time demand pumps. The packing can be re-energized (using the injection system provided by the manufacturer) from a safe distance while the pump is still rotating.

In addition to conforming to worn shafts or fretted sleeves, it's advantages include:

- Eliminating gland adjustments
- Removing requirements for flush or process fluid to cool or lubricate the packing
- Simplifying conventional packing inventory to fit various pump sizes

Once injected, the mixture creates an endless composite ring that fills most irregularities inside the stuffing box bore, shaft or sleeve. The injected material absorbs the friction due to laminar shear during shaft rotation (see Figure 4 & 5 below).

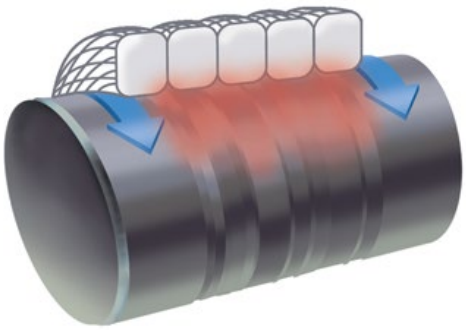

Figure 4: Standard packing – friction impacts both the packing and the shaft.

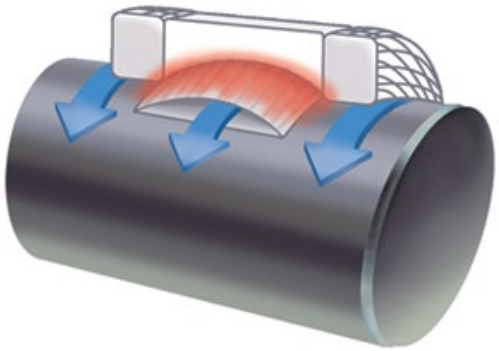

Figure 5: Injectable packing – the material absorbs the friction

Injectable Packing — Best Practice Installation Tips

For best results using injectable packing, the following precautions are recommended:

- Because injectable packing does not have any strength, two end rings are necessary to enclose the material to avoid extrusion through the gland follower and pump throat.
- For ease of installation, a cage could also be used to hold the mixture and prevent shifting of

Figure 6: A cage is used to hold the

the end rings (see Figure 6)

- Keep in mind the location of your lantern ring flush port. If the pump flush port is angled, chances are that injectable packing could fall on top of the bottom end packing ring blocking the access to the stuffing box (see Figure 7).

pliable material in place.

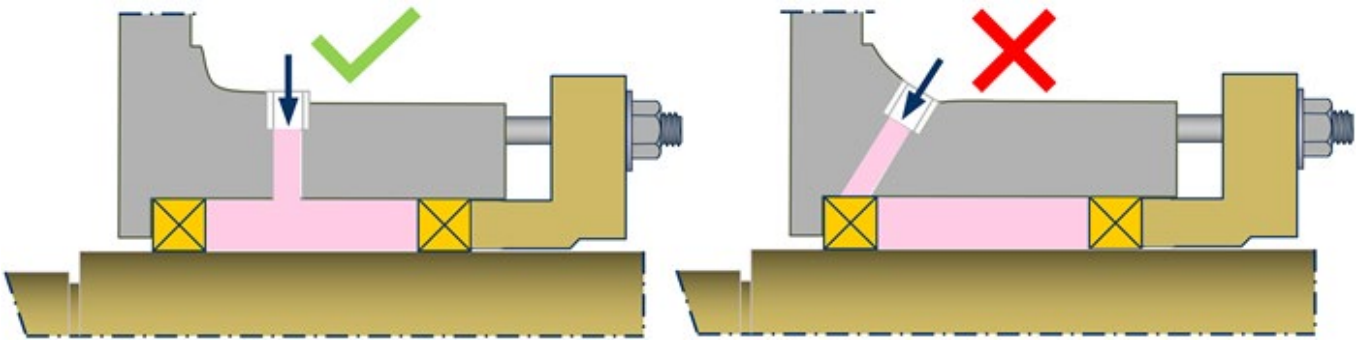

Figure 7: Injectable packing is not advised if the pump flush port is angled.

Important: *Always follow the installation instructions and recommendations provided by the packing manufacturer to ensure compatibility with the application and performance of the product*.

Industries & Applications

Injectable pump packing can be used in all industries where a high amount of cooling water must be circulated such as refineries, power generation, petrochemical, steel manufacturing, chemical processing, paper mills, and food processing and handling.

Injectable pump packing can work effectively on a variety of pumps (including stock, whitewater, river water, condensate, water treatment, cooling tower, wastewater, lift, and seawater) as well as grinders and other rotating equipment.

Chesterton offers two formulations of injectable packing: white and non-staining food grade. For more information, read about successful uses of injectable packing below or contact your local Chesterton sales office.

Success Stories

Case Study #1

Problem: A petrochemical plant in Qatar needed to constantly shut down a pump for the sleeve and bearing replacement. The worn braided packing (PTFE and Graphite with Kevlar® corners) was damaging the sleeve. Oil contamination from the uncontrollable leakage of the stuffing box caused bearing failure. Seawater leakage also caused corrosion to the equipment's concrete base and pump body.

Solution: The old PTFE/Graphite with Kevlar® corners packing was removed and replace with injectable packing. The installation was directly done on the worn sleeve.

Results: The pump operated leak free for 14 months with no packing replacements. The sleeve no longer needed replacement. The bearing's lifetime increased to 26 months. Maintenance and housekeeping cost was reduced. Amp consumption of the motor dropped by almost 7%. In addition, the high cost of the "clean water flush" system was eliminated. After detailed calculations were made, it was determined that the total net savings per year for this plant were $28,200 US.

Case Study #2:

Problem: A large capacity "sea water intake" vertical cooling pump was having problems with their braided PTFE/Graphite packing. The packing rings needed to be replaced every four weeks. The pump sleeve was continuously replaced due to damage from the packing rings. Grease was used in large amounts to lubricate the packing. All these factors increased production downtime and overall maintenance cost.

Solution: The old packing rings were removed. The same worn sleeve was left in

place. The grease line lubricating the old packing was disconnected and the stuffing box was cleaned. Injectable packing was hand shaped and installed in the stuffing box with the corresponding packing end rings.

Results: Injectable packing worked leak free for more than 15 months with no adjustments to the gland and no make-up. Packing costs were reduced from $1,200 to $430. Since the grease lubricant was no longer needed, savings on grease cost alone were $3,650/year. The net savings were $4,420, not including savings from maintenance staff, power consumption, sleeve repair, and housekeeping.

Case Study #3:

Problem: A beverage plant in Kentucky had three pumps in extremely poor condition. Shaft sleeves had excess wear due to braided packing wear. The shaft misalignment was easily noticeable from looking at the cross-section of the old packing removed. The leakage was so bad that a submersible floor pump was installed, but it couldn't control the volume of leaked water.

Solution: The old worn out packing was removed and replaced with injectable packing. The existing worn sleeve was left in place. The packing was injected until a drip rate of 10-15 drops per minute was achieved.

Results: After a week of installation, the pump was inspected for leakage, and the drip rate was below 10-15 drops per minute without pump adjustments. The customer was extremely pleased with the increased up-time.