GO WITH THE FLOW:
COMMON CAUSES OF INDUSTRIAL PUMP FAILURE AND BEST PRACTICE SOLUTIONS

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Industries across the globe rely on pumping systems for their daily operations. They are essential to any application where material needs to be moved, such as water, oil, petroleum, wastewater, sludge, slurry, chemicals or food. Pumps account for about a quarter of the total motor system energy used in manufacturing, making them the second most frequently used mechanical devise.

The continued and rising use of pumps globally is indicative of how vital they are to industry. A recent market analysis revealed a compound annual growth rate of 5.9 per cent in industrial pump use for the period 2018-2025. The Australian Pump Industry Association has estimated that the annual expenditure on pumping equipment is $1 billion annually and is significant to all markets regardless of population or commodity.

Despite being a crucial component of so many industrial applications, pumps are often subject to break down, resulting in production losses and costly repairs. This white paper discusses the three most common causes of pump failure in industrial environment and offers solutions that specifically address these challenges. It also details how efficiency of the pumps can be improved by increasing the Mean Time Between Failures and reducing cost of repairs. Moreover, this paper provides a best practice guideline as to how Industries can improve reliability and safe operation of their pumps through the effective use of the esteemed LOCTITE product range.

**COMMON CAUSES FOR INDUSTRIAL PUMP FAILURE**

Industrial pumps are often exposed to harsh conditions which can lead to erosion/corrosion, abrasion, cavitation and scale deposition. These conditions will reduce the life of pumps and lower their efficiency. The other most frequently observed causes of pump failure are leaks and misalignment which affects the overall efficiency of the pump. Let’s discuss these in more details.

**WEAR: CAUSES AND PREVENTION**

Many major industries like mining, power, steel, oil and gas, food and beverages, water utilities to name a few face severe erosion/corrosion and abrasion in their pumps. It’s because the fluid they carry such as raw water, slurry and chemical eats away the metal surfaces of pump volute and impeller which leads to frequent replacement and decreases the overall efficiency of the pumps.

LOCTITE Wear resistant coatings can protect pump parts from wearing out prematurely and protect valuable pump assets. LOCTITE Protective Coatings like PC 7227 Brushable Ceramic or PC 7255 Sprayable Ceramic along with LOCTITE PC 7222 Wear Resistant Putty have special silicon carbide and ceramic fillers which are extremely resilient to erosion/ corrosion. These coatings are easily applied to surfaces of all sizes and offer the extra benefit of corrosion protection, preventing premature wear. For severe abrasion other LOCTITE products can be suggested.
LEAKS: CAUSES AND PREVENTION

Leaks pose a challenge for most pump operations. They can occur within threaded fittings or flanges. Leaks can be caused by constant pressure changes within the bearing housing, aided by existing air spaces between threads such as in drain plugs and fittings.

LOCTITE Thread Sealants like LOCTITE 577 or LOCTITE 567 provide one hundred percent sealing between thread assemblies, also secure it in place to avoid loosening due to vibration. These sealants create a barrier that cannot be penetrated by oil when pressure in the housing oscillates. The benefit of using LOCTITE Thread Sealants instead of PTFE tape is that the tapes may shred while fitting which can lead to potential leak paths and possible contamination of the pumping system.

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Likewise, LOCTITE Flange Sealants ensure that all air gaps between a flange assembly and casings are filled. These sealants, combined with a thread-locker on the flange bolts, will ensure a pump’s assembly is leak-free, unlike pre-cut gaskets that can create leak paths that affect the integrity of a pump’s seal.
Alignment: Causes and Prevention

Misalignment commonly occurs when the base mounting bolts, casing bolts and other fasteners within the pumping system lose their clamp load. The loosening of the assemblies may arise due to vibration, shock or temperature changes. Conventional methods of using check nuts, spring washers, split pins to name a few do not provide effective locking. Additionally, the gaps between threaded assemblies leads to corrosion and affects reopening the assemblies during periodic overhaul (figure 1).

LOCTITE Threadlockers can provide an effective solution to misalignment. Medium to high strength threadlockers like LOCTITE 243 will fill the air space between the threads. Once cured, the anaerobic adhesive locks the threads and will prevent the premature loosening of fasteners and eliminate the possibility of corrosion and assembly seizure. It also ensures desired clamp load and that proper alignment on a pump is maintained. Additionally, choosing the correct strength LOCTITE Threadlocker can potentially allow for easy disassembly with normal hand tools.

![Figure 1](image_url)
The lower casing of a pump at an Australian mine site was badly damaged due to abrasion from slurry and needed replacement. However, the lead time for a new pump was over 6 months and the replacement cost was estimated to be around half a million dollars. When the LOCTITE application engineer suggested the repair solutions by using wearing compound, it was welcomed by the maintenance manager straightaway. The lower casing was effectively repaired with LOCTITE PC 7218 Wearing Compound and LOCTITE PC 7227 Brushable Ceramic. The job was completed in a few days by the LOCTITE Certified Applicator and saved the customer’s huge replacement cost and lost production time.

A coal power plant in Australia reported erosion of an internal pump surface and subsequent loss of efficiency of a cooling water pump. This was due to a lack of internal wear protection. LOCTITE 7222 Wear-resistant Putty was used to rebuild the eroded surface and this was further coated with LOCTITE Brushable Ceramic. The client benefitted by reclaiming the asset and not having to pay for a cooling water pump replacement, normally valued over $20,000 AUD.
**CONCLUSION**

Maintenance on industrial pumps is critical to their performance and efficiency. While standard maintenance practices such as mechanical refurbishment involving the replacement of parts is still necessary to a pump’s life cycle, this paper has shown that LOCTITE coatings, sealants and threadlockers can prevent premature breakdown and keep pumps running at their BEP. This paper recommends that a maintenance strategy include the use of LOCTITE products to prevent premature pump breakdown and improve a pump’s overall efficiency. LOCTITE products have proven to save costs in general industrial pump maintenance and repair as well as provide significant energy savings.

1. Industrial Pumps Market Analysis By Product (Centrifugal, Reciprocating, Rotary, Diaphragm), By Application (Oil & Gas, Chemicals, Construction, Power, Water & Wastewater Treatment), By Region (North America, Europe), And Segment Forecasts, 2018 – 2025 https://www.grandviewresearch.com/industry-analysis/industrial-pumps-market
3. Pump Repair: Best Practice a webinar by Kalyan Roychowdhury and Bernd Hammer of Henkel Corporation, 16 Aug 2018