

Analyzing Thread Treatment Options

Proactive use of thread treatment products can improve both efficiency and cost effectiveness while reducing industrial equipment failure, avoiding millions in losses resulting from unscheduled downtime annually. Related losses include more than a billion in leaked fluids wasted each year, which impacts toxicity, emissions, safety and contamination.

Threaded fasteners are used to set and hold tolerances on a wide range of assemblies, with a range of thread treatment options to lubricate, protect, seal and increase reliability. These treatments can be categorized as threadlockers, thread sealants and anti-seize materials.

Threadlockers

Differential stress such as vibration, shock, thermal expansion and micro-movement is continually placed on threaded fasteners and can eventually lead to machine failure. While devices such as spring washers, wire retainers or locking bolts are used to control fastener loosening, these methods add significant cost and cannot reliably prevent self-loosening or seal corrosion.

Alternatively, a liquid threadlocker is a reliable and cost-effective method to ensure a threaded assembly remains leak-free. Liquid anaerobic products can be applied by the drop to fill grooves and cure to hard thermoset plastic when exposed to active metal ions in the absence of air. By locking the threads together, unwanted movement and loosening is avoided while preventing leakage and corrosion.

Recent advancements in anaerobic technology offer unique properties that limit cleaning and surface preparation requirements. Designed to cure on inactive metal surfaces and tolerate oily surfaces, primers are necessary only when using conventional products for challenging applications. Available in different strengths for a variety of applications, threadlockers allow threaded fasteners to maintain clamp load and prevent misalignment, with a high temperature tolerance of up to 450°F.

In considering the right threadlocking adhesive, several factors must be weighed. Threadlockers are available in low-strength formulas for easy removal, with medium-strength grades that can be removed using common tools and high-strength formulas for the most permanent holding capacity. Even the highest strength threadlocker can be removed with several minutes of heat exposure at 450-500°F.

Thread Sealants

Leak potential exists for gas, vapor and liquid fluid systems, and the degree to which the leaks are tolerated vary with every application. While a few drops of water may seem insignificant, this can have devastating effects on an electrical application.

Most leaks are traced to pipe joints, of which threaded joints are a necessary component. Threaded joints allow the pipes to be dismantled without the removal of massive pipe links. Despite best efforts, tapered pipe threads are imprecise and over the course of use can become damaged and prone to leaks. Mechanical thread sealants are used in an attempt to block this leak, and are available in the form of sealing tapes, pastes, O-rings and cone fittings.

Once an anaerobic thread sealant is cured, it will eliminate leak paths while acting as a lubricant during assembly to promote tightening and ensure assembly torque. After cure, many formulations are rated to seal to pressures of 10,000 psi with exceptional fluid compatibility without shrinkage for a long-term seal.

Anti-Seize

Engineered to protect threaded and slip-fitted metal from rust, corrosion, galling and seizing at high temperatures, anti-seize materials reduce friction, wear and breakage of critical components while ensuring that fasteners are easy to assemble and disassemble. A range of anti-seize formulas cater to temperature extremes in excess of 1000°F with certain formulas tolerating up to 24000°F. Usually brush-applied, anti-seize materials require use of a reservoir and separate applicator.

New Technology

Advancements in threadlocking and thread sealing materials have led to the development of semi-solid stick formulations which can be used alongside their liquid counterparts. Semi-solid alternatives work well for applications in which liquid could potentially migrate to areas where a cured adhesive could be damaging. Useful when assembly is time sensitive or needs to be staged, this unique threadlocking material can be applied in advance.

Based on an original publication by Andy Bardon, Henkel Corporation.