

MRO Adhesive Options

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Potentially the most underutilized and misunderstood tool in industrial maintenance today, adhesives have the capacity to improve equipment reliability, lower operating costs and save large amounts of time and money if used correctly. The "when, where and how" of adhesive use is essential; but perhaps even more important, with all of today's choices, is first answering the question: "which?" Within the substantial variety of modern adhesives, MRO options can be divided into the following six groups.

Acrylic adhesives

Acrylic adhesives were developed for bonding applications that require tensile, shear and peel strength combined with maximum impact, stress and shock resistance. On contact with an activator (typically in the form of a spray), these no-mix materials cure rapidly at room temperature to a weather-resistant bond. Acrylic adhesives offer superior ultraviolet light and oxidation resistance; a wide temperature performance range; excellent moisture resistance; and, when properly cured, excellent solvent and chemical resistance.

Best uses: Acrylic adhesives are the best choice for bonding two dissimilar materials, such as bonding plastic to metal. Most formulations will also work on glass, wood, concrete, ceramic and rubber.

Instant adhesives

Cyanoacrylates, or instant adhesives, are among the most popular with consumers due to their extremely rapid cure rate. Regardless of brand name, these adhesives are commonly called "Super Glue."

Although they appear to air dry, cyanoacrylates actually cure when the acid stabilizer molecules within them react with the relative humidity in the air to create a chemical reaction that quickly hardens the material. Industrial users also like the fast-curing ability of these adhesives. However, since repairs in industrial environments are more demanding, maintenance personnel commonly use formulations that have enhanced viscosities, cure speeds, gap-filling ability and substrate compatibility. High-performance versions of cyanoacrylate adhesives come in toughened, low odor, low blooming and thermally resistant formulations.

Best uses: Although cyanoacrylates are a versatile adhesive that can be used to bond many dissimilar materials, they are more suitable for bonding lightweight materials, such as rubbers and plastics, to metal in industrial environments.

Epoxies

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Epoxies are adhesive systems made synthetically by reaction of two or more chemicals. Adding another chemical called a hardener, or catalyst can then cure the resultant resin. The basic epoxy resin systems are further modified to change their physical properties by the addition of materials. These materials include elastic substances to increase impact resistance and flexibility; dilutents or solvents to reduce the viscosity; or fillers like glass fiber, alumina, silica sand, clay, metal powders and flakes to change properties such as heat and electrical resistance, fire retardance, strength and adhesion to certain substrates or materials.

Best uses: Epoxies are used to repair, rebuild and restore damaged parts fast so equipment can be returned to service as quickly as possible. They are one of the most effective choices for filling large gaps. Most epoxies can be drilled, tapped and machined just like metal when they are fully cured. Epoxies are available in a wide range of performance characteristics for specific applications and are capable of bonding to metal, ceramic, wood, glass and some plastics.

Urethanes

Urethanes are two-component repair materials that can be troweled, cast or brush-applied to rebuild or protect critical operating equipment. Tough, rubber-like properties provide protection from impact, abrasion and corrosion. Like epoxies, these adhesives cure by the combination of a resin and a hardener.

Best uses: Their primary use is to repair conveyor belts and other damaged rubber equipment quickly and easily.

RTV silicones

RTV Silicone adhesives are a rubber-like polymer made from a process that turns elemental silicon metal made from sand (silica) into a rubbery polymer. RTV stands for room temperature vulcanizing because it is a rubber that cures at room temperature. When cured, silicone rubber adhesives/sealants have excellent resistance to heat (up to 600°F) and moisture, which makes them exceptionally suited for outdoor weathering applications, such as sealant and caulking compounds in the construction industry. In maintenance applications, however, silicones are primarily used to seal ducts, flanges and gaskets.

Best uses: Silicone sealants are best suited for filling large gaps. Due to their high-temperature resistance, RTV silicones are also appropriate as a replacement for cut gaskets or as a gasket dressing. These adhesives should be considered in outdoor repairs for their resistance to the elements. However, they should be excluded for repairs of equipment exposed to solvents.

Anaerobic adhesives

In the early 1950's, professor Vernon Kriable, founder of American Sealants Co., now Loctite Corp., developed an adhesive that would remain a liquid as long as it was exposed to air (oxygen), but would solidify in the absence of air and the presence of most metals.

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Because they act differently than traditional bonding agents, anaerobics are probably the most underutilized and misunderstood of all adhesives. One of the most notable attributes of anaerobic adhesives - strength - has also suppressed its popularity among maintenance technicians. Some maintenance departments mistakenly view anaerobics as a "permanent" adhesive only to be used to lock metal pieces together forever. Some have even restricted or banned the use of anaerobic adhesives altogether in fear of accidental bondings.

In fact, there are a variety of formulations, including penetrating, fast-cure, high-temperature, low-, medium- and high-strength. While high-strength anaerobic adhesives have a strong bonding ability, the reality is that parts assembled with them can be removed by applying heat for a specified time. Lower-strength grades can usually be removed with a wrench and a little torque.

The fear of accidental bonding is unfounded as well. Anaerobics only cure upon contact with metal in the absence of air. This allows the adhesive to flow and evenly settle in gaps before curing. Should any of the adhesive spill or overflow during application, it will remain liquid and won't cure unless it becomes pressed between two metal surfaces.

Best uses: Anaerobic adhesives are versatile and are used in a wide variety of applications. Today, anaerobic adhesives are used as threadlockers to lock all types of threaded fasteners; as thread sealants to seal pipe and connection fittings; as retaining compounds to retain bearings, pulleys and gears to shafts; as flange sealants to seal flanged surfaces and as gasket makers to dress or replace cut gaskets. Anaerobic adhesives should be considered for use anywhere fasteners, gaskets or bearings are used, or on any mechanical device that needs to be secured or sealed.

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