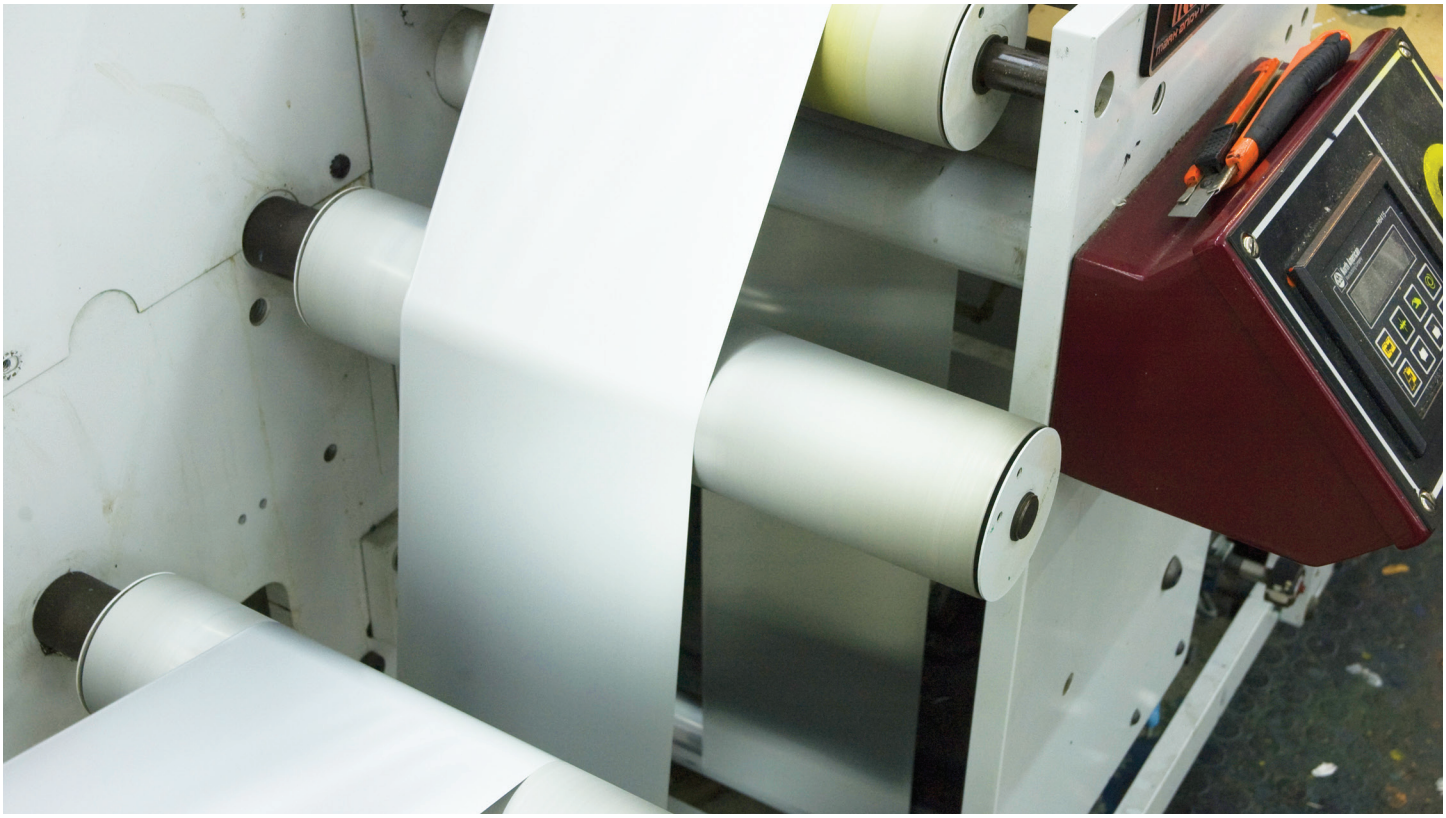
MAGNAPLATE
COATINGS ENGINEERED FOR YOUR SUCCESS

WHITE PAPER

Sustainable Engineered Coatings Greatly Extend Equipment Lifetimes



For plant engineers and maintenance supervisors, minimizing downtime and keeping equipment online is a top priority. High productivity and cost effective manufacturing are the result of well-maintained plant assets, which are the primary focus of those in the maintenance, repair and operations (MRO) community. However, in addition to 24/7 production schedules, plant supervisors must also pay attention to cost considerations and environmental concerns. Balancing these demands means employing multiple strategies including adherence to a strict policy of repairing equipment rather than replacing it, for as long as possible.

As one approach, protective surface coatings are often used to extend equipment and component lifetimes. By delaying the purchase of new parts and machinery, cost savings are achieved in addition to avoiding premature use of raw materials needed for new equipment. Further, as sustainability efforts and wise environmental stewardship become ever more important at the corporate leadership level, meeting these targets often falls to plant managers and engineers.

Prolonging equipment life starts with protecting parts from forces such as wear, abrasion and corrosion. Engineered coatings can be applied as a first defense against these issues, in addition to providing lubrication and boosting structural integrity. Specifying the right surface treatment not only increases a part's lifespan, it also helps to minimize unplanned downtime and reduce overhead. Coatings are used to protect components in a wide range of industries, everywhere from food processing and medical/pharmaceutical manufacturing to oil and gas exploration and consumer goods production.

Magnaplate Corporation, a pioneer in surface enhancement coatings, has an in-house research and development team continually working on new coating formulas to meet the demands of these diverse industries. For MRO purposes, damaged components may be shipped to one of the company's global facilities, recoated and refurbished to original tolerances, and returned to service. This process can take place many times over, until parts are finally too worn to be repaired. Let's take a look at the basic concepts behind engineered coatings.

NEDOX®

COATINGS WIDELY USED TO REFURBISH EQUIPMENT

Engineered coatings are used on automated equipment, robotic systems and other industrial machinery to solve a host of issues associated with high-speed operations, including troublesome wear, abrasion, corrosion and release problems:

- Mating steel parts on robotic equipment
- Folding plates on wrapping equipment
- Crimping jaws, screw conveyors and tension rolls
- Cylinder heads, extruders and vibratory feeder bowls
- Aluminum and steel wear surfaces of strapping machinery
- Chemical processing machinery
- Textile manufacturing equipment
- Sealing heads of form-fill-seal machines
- Forming rolls on vacuum packaging equipment
- Hoppers and pill chutes in pharmaceutical equipment
- Transfer plates used in laboratory automation
- Air moving equipment
- Surfaces on PET bottle molds
- Bagging chutes of packaging equipment
- Equipment with hygienic or washdown requirements
- Heat sealing and knife bars on sealing equipment
- Guides and seal bars on binding and sealing machines
- Knives, blades, slitters, trimmers, cutting tool surfaces electroless nickel, sulfamate nickel, co-dep electroless nickel, polymer impregnated electroless nickel

How Engineered Coatings Work

The general idea behind engineered coatings is to fortify the surface of metals and other substrates, imparting performance qualities such as hardness, dry lubrication and corrosion resistance. This holds true for both original equipment as well as components that are repaired and returned to service during MRO activities. Surface enhancement coatings from Magnaplate turn plentiful, inexpensive metal parts into super hard, dry lubricated and chemical resistant components that last longer and are more cost effective than components made of expensive and rare metals. For companies with environmental sustainability targets, it makes sense to use coatings to enhance common metals rather than using costly base metals that are difficult to mine and process.

Coatings are applied to substrates in a multi-step procedure that begins with deep cleaning. Next, the substrate's surface is enhanced by applying a base coating using plating conversion, deposition, thermal spray or a combination of these techniques. The procedure continues with a specialized infusion of proprietary polymers or other dry-lubricating particles or metals. For example, on some substrates, a layer of nickel alloy is deposited on the surface. The micro pores are enlarged and polymer particles are infused into the surface layer. A second-step treatment facilitates thorough integration into the top layer, often at elevated curing temperatures.

Compared to paint-on options, the materials in the Magnaplate coatings actually become an integral part of the substrate. Particles are mechanically bonded and the resulting surface layer resists chipping, flaking, peeling or rubbing off. This is especially important in certain applications, such as those in food processing and pharmaceutical manufacturing, not to mention the abrasive wear and tear faced by robotic equipment with metal-on-metal contact of mating parts. In addition, because the newly engineered surfaces either meet or exceed the performance characteristics traditionally provided by metals such as chromium, cobalt, cadmium and manganese, use of these expensive, scarce or environmentally hazardous materials can be reduced. Further, many Magnaplate coatings comply with strict global health and environmental regulations such as FDA and USDA codes.

COATINGS FOR MAINTENANCE AND REPAIR OPERATIONS

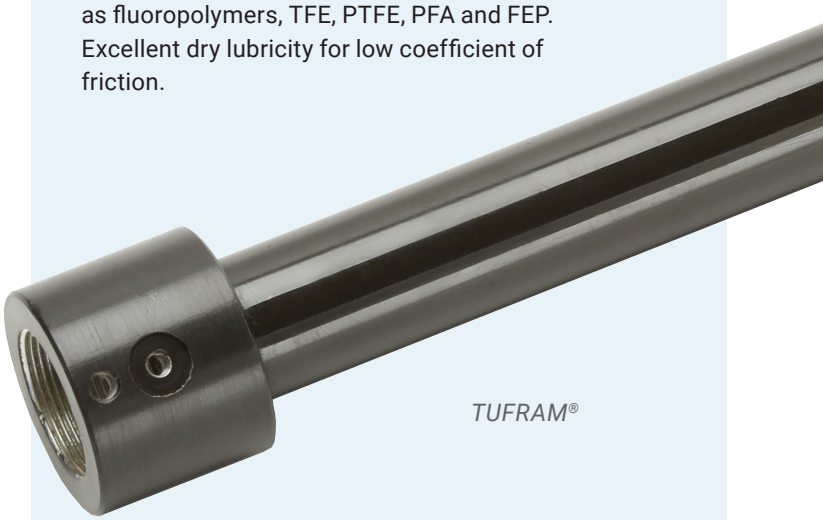
The following coating families from Magnaplate are commonly applied to automated equipment during MRO procedures, repairing components and returning them to service. Several additional formulas are also available to address a wide range of specific applications:

TUFRAM® — Gives aluminum parts a harder-than-steel, permanently dry-lubricated surface that resists corrosion, abrasion and galling. The smooth surface provides superior mold release, eliminating sticking and product hang-up.

NEDOX® — Protects most base metals, including aluminum and titanium, against abrasion, corrosion and static buildup. Outperforms and outwears chrome and stainless steel, and offers excellent mold release and easy cleanup without the need for caustic chemicals or bleach.

PLASMADIZE® — Provides corrosion and wear resistance for all metals; unsurpassed by conventional thermal sprays. More ductile than chrome plate; may be applied to protect or restore all types of parts.

LECTROFLUOR® — This polymer-based coating prevents severe corrosion and chemical attack to metals used in hostile environments. Superior properties compared to common coatings such as fluoropolymers, TFE, PTFE, PFA and FEP. Excellent dry lubricity for low coefficient of friction.



TUFRAM®

Maintaining Equipment with Specialized Surface Treatments

When it comes to maintaining equipment, issues involving abrasion, premature wear, corrosion and sticking must be continually identified and mitigated to keep production processes online. Depending on the application, various coatings may be used alone or combined to achieve several design objectives. Corrosion stemming from high humidity, abrasive wear from metal-to-metal contact and products sticking to molds or dies are just a few of the problems the right coating can prevent.

For example, the NEDOX® family is a nickel alloy-based coating that protects most metals, including aluminum, against wear, corrosion, sticking and galling. Within the NEDOX® group are several options that use various polymers to impart specific properties, such as enhanced hardness, superior mold release or easy release at high temperatures. Another coating family, the TUFRAM® line for aluminum and aluminum alloys, also features a range of formulas suited to a variety of MRO applications. TUFRAM® resists corrosion, reduces friction, improves hardness and replaces more expensive substrates such as steel or stainless steel. Another widely used surface treatment for MRO needs is LECTROFLUOR®, a polymer-based coating that prevents severe corrosion and chemical attack for metals in harsh environments. Finally, PLASMADIZE® is an enhanced thermal spray composite coating that protects and restores metal parts and features increased lubricity and better mold release than conventional spray methods. Many variations of the four above-mentioned coatings and other global standards and are widely used in maintenance and repair operations to extend equipment life and return worn parts to active service. These and other specialized coatings are regularly employed to delay the purchase of new equipment.

Coatings Protect Equipment While Preserving the Environment

Engineered coatings are used for a wide range of purposes across a multitude of industries and in various stages of production, design and packaging. Existing parts may be coated to improve wear and performance, damaged parts may be repaired and returned to service, and newly fabricated parts can be coated to provide optimal performance from the outset. Using surface enhancement coatings to extend equipment and component lifetimes many times over is proven to be both highly cost effective and environmentally conscious. Delaying the purchase of new parts and machinery by repairing existing production assets helps to minimize premature use of raw materials and the associated environmental impact from mining and other activities.