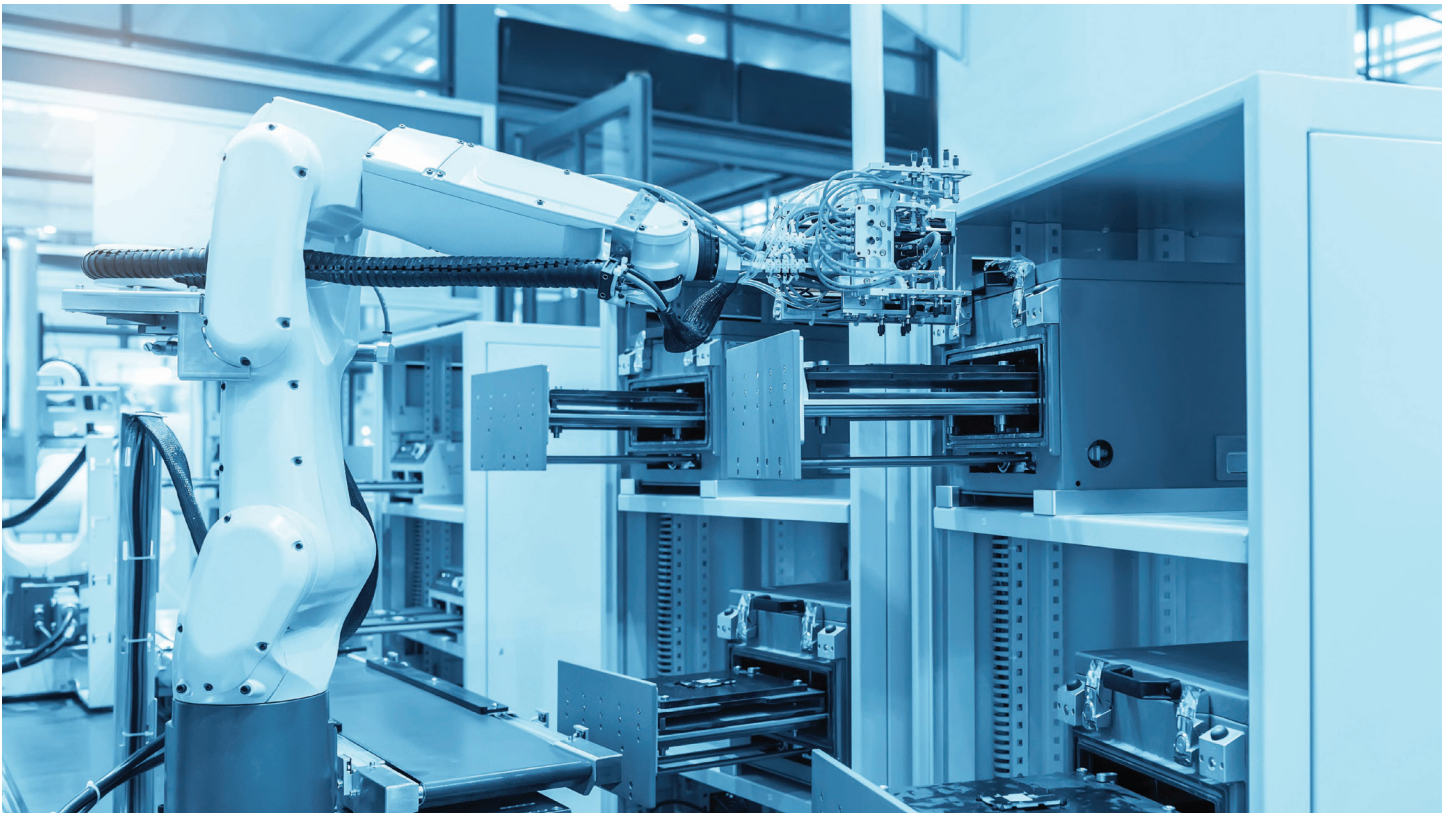


Engineered Coatings Boost Productivity in Automated Systems



Higher throughput, seamless operation, 24/7 plant schedules and cost effective manufacturing are key benefits of automation. In reality, these performance benchmarks can only be achieved by correctly specified and well-maintained equipment. From robotic systems to material handling and packaging machinery, keeping automated equipment up and running is often the most important job for engineers and plant supervisors. Issues involving abrasion, premature wear, galling, corrosion and sticking must be continually identified and mitigated to keep equipment online. To address these challenges, engineered coatings are being used to protect machine components and solve performance problems in high-speed applications found across a wide range of industries that commonly employ automation—including consumer goods, food processing, medical/pharmaceutical and manufacturing, among others.



Engineered coatings are used to permanently enhance the surface of metals and other substrates used in automated machinery to solve corrosion, wear, lubrication and release problems. For example, sticking is a common problem plaguing equipment used to heat seal packages. As polyethylene film strips melt together to seal a package, sticking can arise from two sources—the melted material itself and adhesive glues—both of which can stick to seal bars. In robotic systems, metal-on-metal contact of steel parts operating at punishing speeds creates tremendous friction forces, leading to premature wear. Magnaplate Corporation, a pioneer in engineered coatings, develops custom coating processes to solve problems such as these, which frequently arise during high-speed operations.

Depending on the application, various coating families may be used alone or combined to achieve several design objectives. For example, GOLDENEDGE® is used to keep cutting surfaces sharp and extend their life by as much as 20 times. This coating formula may be combined with—or used alongside—other coating families such as NEDOX®, TUFRAM® and PLASMADIZE® to address specific application requirements. Corrosion stemming from high humidity and sanitation, 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.

How Engineered Coatings Work

The goal of engineered coatings is to enhance the surfaces of metals and other substrates, imparting performance attributes such as corrosion resistance, hardness and dry lubrication. Surface-enhancing coatings from Magnaplate are now used to transform inexpensive metal parts into chemical resistant, super hard, dry-lubricated components that last longer and perform better than parts made of expensive and rare metals. Engineered to withstand the harshest of environments, these coatings have even proven their ability to perform in space applications.

Coatings are applied to substrates using an orderly process that begins with a thorough cleaning. Next, applying a synergistic layer using conversion, deposition, thermal spray or a mix of these techniques enhances the substrate's surface. The process continues with a controlled infusion of engineered polymers or other dry-lubricating particles or metals. For example, on some metals, a hard layer of

WHERE ARE COATINGS USED ON AUTOMATED EQUIPMENT?

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

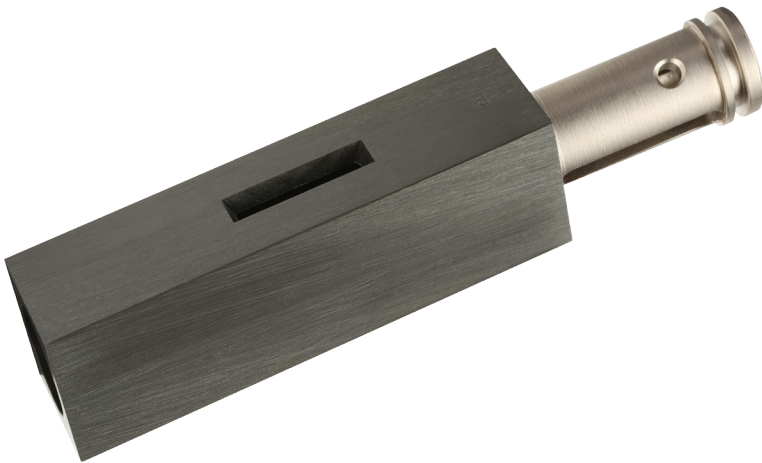
- Mating steel parts on robotic equipment
- Folding plates on wrapping equipment
- Aluminum and steel wear surfaces of strapping machinery
- Sealing heads of form-fill-seal machines
- Forming rolls on vacuum packaging equipment
- Hoppers and pill chutes in pharmaceutical equipment
- Transfer plates used in laboratory automation
- Surfaces on PET bottle molds
- Bagging chutes of packaging equipment
- Heat sealing and knife bars on sealing equipment
- Guides and seal bars on binding and sealing machines
- Knives, blades, slitters, trimmers, cutting tool surfaces



nickel alloy is deposited on the surface. The micro pores are enlarged and polymer particles are infused into the surface layer. A second-stage treatment ensures thorough integration into the top layer.

The biggest advantage of Magnaplate coatings compared to other options, such as paint-on varieties or black oxide, is that the particles in the Magnaplate coatings become part of the substrate. Particles are mechanically bonded and the resulting surface layer cannot chip, flake, peel or rub off. A variety of Magnaplate coating systems are available, each designed and tested to protect a certain metal or solve a common problem.

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 applications. The ability to customize product families by adding different polymers extends across all Magnaplate coating families.



Depending on the application, coating families can be used alone or combined. On this component, for example, NEDOX® was applied to the insert and TUFRAM® was applied to the outer casing.

COATING FAMILIES AT A GLANCE

The following Magnaplate coating families are commonly applied to automated equipment, although additional formulas are available to address a wide range of 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; protects or restores all types of parts.

MAGNAPLATE HMF®—Imparts optimum wear performance to aluminum, steel, stainless steel, copper and other alloys; creates an ultra-hard surface with a mirror-smooth microfinish similar to chrome plate.

PLASMADIZE®—Coatings solve “sticky substance” problems often encountered while using adhesives. Designed to act as a release system for all types of metal parts that come in contact with adhesives.

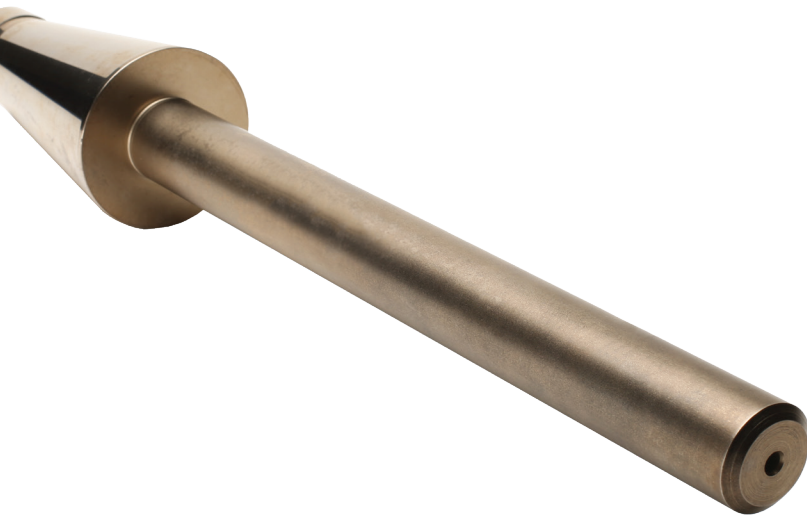
GOLDENEDGE®—When applied to blades, knives and other cutting tools, thickness is controlled within micro-inches to prevent dulling. Creates a dense, ultra-hard surface that keeps edges as sharp as when they were first honed, extending blade life by up to 20 times.



Coatings Protect Automated Equipment Across Multiple Industries

Engineered coatings are used for a wide range of purposes across a multitude of industries and in various stages of production, design and packaging. For example, existing parts may be coated to improve wear and performance, damaged parts can be repaired and returned to service, and newly fabricated parts can be coated to provide optimal performance from the outset. Virtually any piece of automated equipment can benefit from a carefully specified coating applied to machine areas where problems are known to occur. The following examples illustrate how different coatings can be used to solve specific issues in automated machinery:

- **Sticky products/Food processing** – Cereal manufacturers require efficient product flow to increase throughput of cereal boxes. A fruity sugar coating was sticking to a chute, causing cereal grains to back-up onto conveyors during transfer to packaging lines and requiring a lengthy sanitation process. NEDOX® was applied to the chute, easing product flow and minimizing cleanup.



This part is an example of how we can combine multiple coatings on a single part. Magnaplate HMF® was applied to the main body and Nedox® was applied to the shaft.

- **Abrasion/Battery manufacturing** – Facilities that refine lithium and other metals into powders used to make batteries can experience abrasion on stainless steel tubing during the refining process. Any contamination can cause a battery to short. NEDOX® was used to coat the tubing because it stands up to abrasive wear from the powders and eliminates contamination.
- **Sticking when sealing/Packaging** – At the end of a manufacturing line, the packaging operation needed to increase sealing speeds with its hot-melt adhesives. The adhesives were sticking to guides on a binding machine, slowing the packaging phase. Guides and seal bars were coated with PLASMADIZE®, preventing adhesive buildup, eliminating sticking on heat seal bars and increasing abrasion resistance.
- **Abrasion/Consumer goods** – Facial tissue manufacturers use high-speed wrapping and folding machines to produce attractive polyethylene overwraps on finished packages. For one tissue producer, unsightly bubbles and misplaced labels were occurring due to abrasive attack on machine surfaces, caused by microscopic dust particles carried along by polyethylene sheets. The machine's aluminum bottom plates and side-folding plates were major problem areas. MAGNAPLATE HCR® was applied to all wear surfaces, fortifying aluminum parts with an ultra-hard, corrosion resistant and nonstick surface, and leading to attractive tissue packages.
- **Abrasive wear/Packaging** – A diaper manufacturer needed to increase packaging speeds that were bogged down by worn product chutes. As the arm scraped against the chute's sides and bottom, material was deposited onto the equipment—causing friction and slowing packaging operations. PLASMADIZE® was applied to the chute's bottom and sides, resolving wear and friction issues and restoring packaging output.



- **Mold release/Pharmaceutical** – A contract packaging company in the pharmaceutical industry prepares thermoformed plastic sheets with multiple cavities for individual tablets and capsules. After cavities are filled and sealed, sheets are cut into strips and packaged for use. Films were sticking to the aluminum tooling after thermoforming. NEDOX® was applied to impart dry lubrication and solve the problem by creating a dense, nonporous surface, which also helps to eliminate growth of mold and bacteria.

Engineered coatings easily mitigate these issues and many others commonly experienced with automated equipment. To learn how engineered coatings can solve problems in your next application, contact the technical experts at Magnaplate Corporation.



MAGNAPLATE HCR®