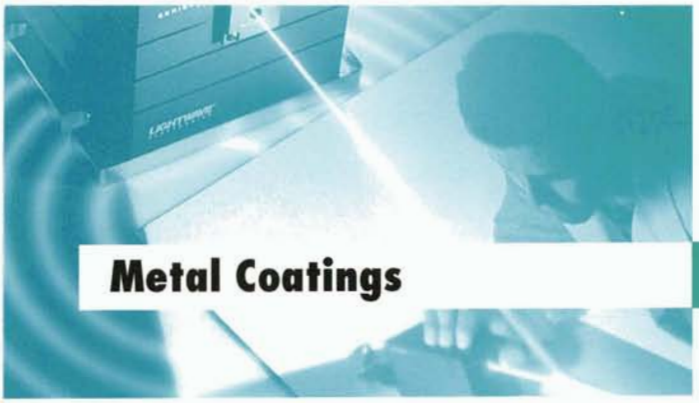


Metal Coatings

Industrial Productivity and Manufacturing Technology

In the early days of the space program, General Magnaplate Corporation, Linden, New Jersey conducted a study for NASA of Apollo spacecraft hardware requirements that included development of a quality control program and a handbook. During this work, the company reported that conventional lubrication processes would not be adequate for some of the new, lightweight metals being used in Apollo components — titanium and magnesium, for instance — because the lubricants would "outgas" or boil away in the vacuum of space and leave hardware surfaces unprotected.

Under NASA contract, General Magnaplate developed several process techniques for bonding dry lubricant coatings to space metals; not susceptible to outgassing, the Magnaplate-applied coatings offered enhanced surface hardness and superior resistance to corrosion and wear.

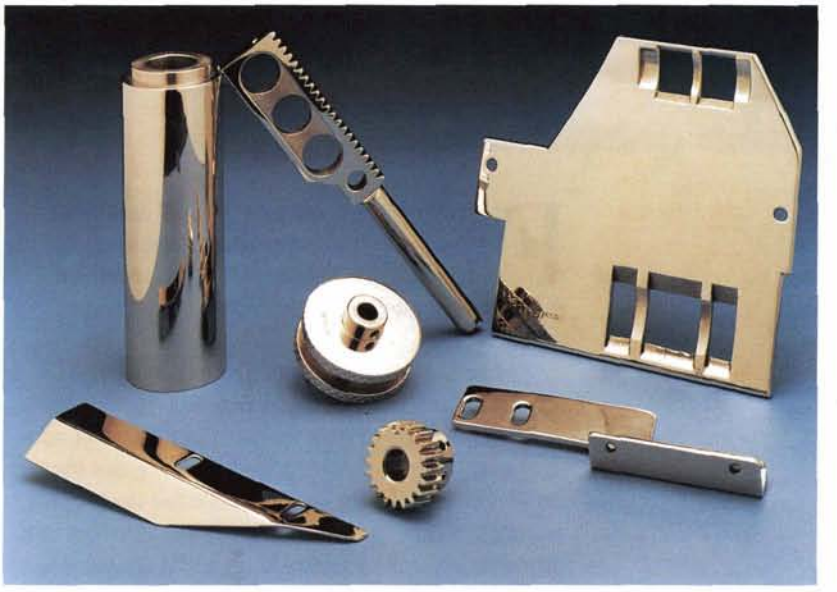
That work sparked a large scale expansion of the company's business and led to its establishment as a leader in development of high performance metallurgical surface enhancement coatings — "synergistic" coatings, they are termed, because the coated surface is superior in performance to the base metal or to the individual components of the coating.

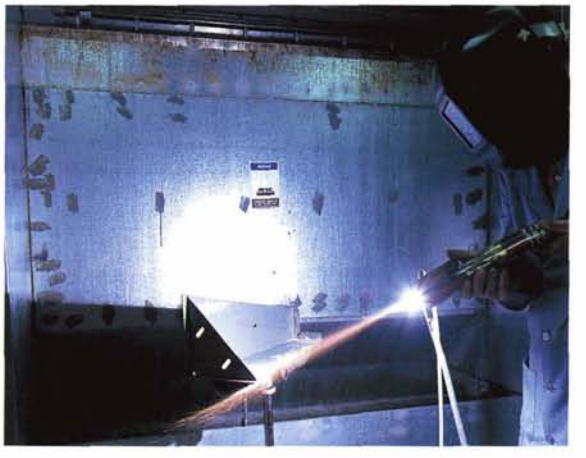
Initially applied to components of the Apollo spacecraft, the Magnaplate coatings have since been applied to virtually every NASA spacecraft. But the technology proved to have even broader utility in industrial operations and today Magnaplate-applied synergistic coatings are used in a wide spectrum of applications ranging from pizza making to laser manufacture, including machinery used in production of hundreds of household products, food processing machinery, pharmaceutical production machinery, equipment for printing and papermaking, cosmetic and cigarette manufacture, computers, turbines, pumps, valves and a great variety of other equipment.

Magnaplate enhanced composite coatings are created in a multistep process. After the base metal is cleaned, it is thermally sprayed with engineered layers of ceramic particles. Then the layered ceramic matrix is infused with engineered polymers or other dry-lubricating particles/metals to create a dense, structurally integrated nonporous surface. This technique, says Magnaplate, surpasses conventional spray coating and provides a harder-than-steel, permanently dry-lubricated surface with superior corrosion resistance, wear resistance and easier mold release.

Magnaplate offers a variety of surface enhancement coatings, each designed to protect a specific metal or group of metals or to solve problems encountered under operating conditions. **Above,** General Magnaplate chairman and chief executive officer Charles P. Covino (right) and vice president/corporate director of operations Edward V. Aversenti, Jr. are shown at the Linden facility, one of five Magnaplate Materials Technology Centers, where the NEDOX® coating is being applied to air inlet vanes for a line of air moving equipment.

At left is a selection of parts coated with Magnaplate's new MAGNAGLOW™; originally designed for undersea and color-coding applications, MAGNAGLOW creates a hard, high-visibility fluorescent metal surface





that withstands up to 1,500 hours of salt spray testing. **Above** are a number of extruded and molded parts coated with TUFRAM®, a coating that offers unusually high levels of resistance to wear and corrosion. Metal parts treated with MAGNAPLATE HMF™ **(top right)** have a mirror-smooth ultrahard chromelike surface that, the company says, outwears chrome without the problems inherent in chrome plating.

In the **middle photo** is an example of a specific application: a synergistic coating on the steel piston and aluminum cylinder that make up Stone Bennett Corporation's remote shift device for trucks. In the **bottom photo** a technician is applying PLASMADIZE®, one of Magnaplate's newer coatings.

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