



CASE STUDY



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Worcester Controls Corp. Eliminates Galling and Boosts Ball Valve Life 50% With Mirror-Smooth Coating

By Corey Wesnitzer, General Magnaplate Corp.

“Synergistic” Surface Enhancement Also Extends Effective Temperature Range by More than 200°F.

For more than four decades, Worcester Controls Corporation has been on the leading edge of ball valve and flow control technology. The Marlborough (Mass.) company has always prided itself on making and selling state-of-the-art products of the highest quality. So Worcester was seriously concerned when it discovered galling of the stainless steel balls used with the powdered metal seats of some of their valve models.

“Immediate action was necessary to correct the problem,” says Product Manager Mike Miles. “We took a close look at every component involved in the valves’ manufacture.” Worcester’s investigation soon revealed that microdeposits in the PTFE-impregnated electroless nickel coating used to protect the balls were responsible for the galling. If left uncorrected, the galling would result in premature wear, leaking, and ultimately, total failure of the valve. It was apparent that an improved coating had to be found at once.

“We tested four or five different coating systems,” says Miles, “but they didn’t perform up to our standards. Some actually blistered

in a relatively short time. Others were simply impractical or would have driven our valve prices through the roof.”

Worcester finally found its answer when it turned to General Magnaplate Corporation. This hi-tech, metal surface enhancement company suggested that the company try its MAGNAPLATE HMF® composite coating. “Worcester had to find a totally new coating system,” explains Magnaplate’s Operations Manager Wayne Cromwell, “because the Teflon-impregnated coating it was using simply wasn’t smooth enough. As a result, the stainless steel balls would destroy the powdered metal seats.”

MAGNAPLATE HMF solved that problem. The coating is produced by a proprietary, multi-step process employing specially developed application equipment. A series of nickel base alloys is co-deposited on the scientifically pre-cleaned and prepared surface of the balls. In subsequent hardening and diffusing step, it creates an exceptionally smooth, slippery, amorphous, non-crystalline mirror-like micro-finish. Because the surface is so extremely smooth, wear resistant, and corrosion resistant, it exhibits a much lower coefficient of friction (COF) than other coatings. This eliminated the galling and saved the ball seats.



The benefits of working with General Magnaplate didn't end there for Worcester. It turned out that there was an additional bonus for the company. "In the process of testing," says Miles, "We discovered that MAGNAPLATE HMF is effective over a much broader temperature range than the coating we had been using or even any of the others we had been testing. It's enabled us to increase our operating temperature ranges by more than 200°F."

A Benchmark For Quality-Assured Valves

Founded in the early 1950s, Worcester produces valves, actuators and controls. Its highly automated plants in Mississippi, North Carolina and Ontario, Canada feature the latest in computer controlled machining and assembly facilities. Its products are found in applications as varied as pulp and paper, chemicals and petrochemicals, utilities, pharmaceuticals, biotech, rubber, plastics, food and beverage, and oil production. Many are used in toxic service situations or to control fugitive emissions. Worcester manufactures valves that exceed many standards across all industries. These include



ANSI, ASME, NACE, API, FM, CSA, MSS, USCG, and USDA.

Throughout their history, Worcester valves have served as benchmarks for quality in the industry. A key reason for their continuing leadership has been the company's rigorous program of manufacturing control and quality assurance - an orientation that again served it well in preventing any potentially defective metal-to-metal ball valves from reaching market.

Longer Life, Higher Operating Temperatures Thanks to a "Synergistic" Coating

General Magnaplate pioneered the science of "synergistic" metal surface enhancement when it coated a wide variety of parts on spacecraft and space exploration equipment used in every single NASA space mission since the beginning of that agency. Then it broadened its mission to address earthbound challenges like that of Worcester Controls.

Wherever metal parts are used in manufacturing and processing, design engineers today are seeking ways to achieve, greater resistance to wear, abrasion, corrosion and chemical attack. Often they also seek to provide dry lubrication, mold release, or many other positive performance characteristics. Magnaplate has addressed these needs with what are now known as "synergistic" coatings. They earned that name because the coatings created are superior in performance to the base metals as well as to any of the individual components used in the technology.

Miles enthusiastically points to the excellent



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results which “synergistic” MAGNAPLATE HMF helped him achieve. “The Magnaplate applied MAGNAPLATE HMF surface enhancement coating not only eliminated the galling but actually extended the active and shelf life of our ball valves by 50% while greatly increasing operating temperature ranges.”

Worcester’s metal seat technology allows

high pressure drops plus control of low and high flow. A key to their valves’ efficiency is the enhancement of stainless steel balls in the metal seat to a smooth, slippery, highly-reflective, chrome-looking finish by MAGNAPLATE HMF.

Galling of stainless steel balls in these patented powdered metal seats caused leakage until Worcester coated them with MAGNAPLATE HMF, which eliminated galling, raised operating temperature ranges by over 200°, and extended both their active and shelf life by 50%.