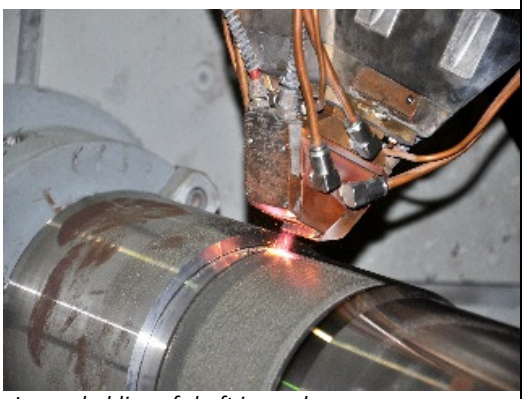
Surface Technologies
Surface Engineering Solutions – Valve Systems

Thermal Spray

Thermal Spray in general terms is a process utilized to improve the surface properties of a component by applying metallic and non-metallic coatings to its surface. There are many Thermal Spray processes available, each exhibiting unique operating characteristics that produce distinct operating conditions and a versatile range of subsequent coating properties. These processes include, but aren't limited to, Twin Wire Arc Spray, Combustion Spray, Air and Vacuum Plasma Spray and High Velocity Oxygen Fuel (HVOF). Coatings properties such as hardness, density, adhesion strength etc. can be manipulated and applied to resist corrosion, oxidation and many different tribological wear mechanisms. One of the main advantages of thermal spray as a solution over alternate surface engineering processes is the minimization of heat input into the component substrates. This ensures the mechanical and chemical properties are appropriately maintained.

Laser Cladding

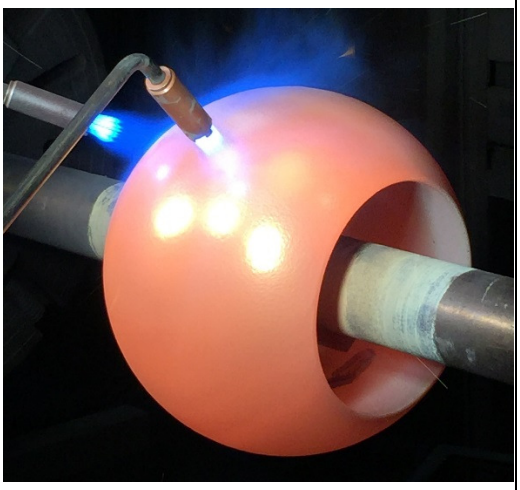
An alternate option to Thermal Spray when high adhesion and thick deposits are required is Laser Cladding. Essentially a welding process, the laser generates a focused beam of light to generate heat to deposit metallic and inter-metallic materials to a substrate. With considerably lower heat input to the substrate, when compared to traditional welding processes, it results in a minimal Heat Affected Zone to the base material while still achieving a metallurgical bond with the substrate.



Laser cladding of shaft journal.

Severe Service Valve Coatings

As technology advancements in next generation valves develop to operate in increasingly aggressive service conditions, engineered surfaces are becoming ever more important in the operation and function of the valve components. Thermal Spray and weld solutions are designed into valve components to extend service life and improve efficiency and safety of the valve systems.



Spherical ball being sprayed and fused.

For decades, Curtiss-Wright has been the industry vanguard for cultivating new coating technologies across a broad range of ball valve types, sizes and substrates. Considering the harshness of some of these operating environments, we work collaboratively with our customers to achieve unique coating properties that include corrosive, abrasive and erosive wear resistance, as well as thermal protection.

Our technological development also includes advances in finishing and sealing technologies. We have engineered innovative solutions to achieve the finishes required to seal these components at extreme temperatures and pressures.

Finishing

The development of our spherical CNC machining capabilities has produced unique methods for machining coatings exhibiting macro-hardness in excess of 60HRC. Our spherical grinding expertise is consistently capable of producing near perfect spheres on ball components with carbide and ceramic coatings that exhibit micro-hardness values in excess of $1400HV_{300}$.

Achieving the seals required for elevated temperature and high pressure applications requires advanced lapping techniques. Our latest evolution in lapping technology incorporates substantial improvements over traditional equipment design. Depending on the valve design, this equipment is capable of lapping two seats simultaneously to ensure 100% complete sealing on any surface of the ball circumference.

This not only reduces overall lapping time but also removes much of technique dependency exhibited by previously used lapping techniques.

Ball and seat valve coated, finish grounded and lapped.

The technology is capable of consistently meeting or exceeding any customer requirement.

Surface Technologies Division of Curtiss-Wright is here to provide solutions for any surface engineering challenges. Our group delivers innovative solutions for surface engineering needs, providing services to the commercial, industrial, military and energy markets. Building on the heritage of Glenn Curtiss and the Wright brothers, Curtiss-Wright has a long tradition of providing reliable solutions through trusted customer relationships.

Coating Code	Nominal chemistry	Description	Micro-hardness (HV_{300})	Best finish (μin Ra)	Bond strength (Psi)	Max. temp (ºF)
216 / 819	Cr Mo Si B Fe Cu C Ni-Base	Nickel based hard surfacing alloy for corrosion and oxidation resistance	800	4	>40,000	1,200
238 / 838	Cr W Si Fe B C Ni- Base	Nickel based hard surfacing alloy for high abrasion, heat and fretting corrosion	750	4	>40,000	1,400
217 / 850	Cr Ni W B Si Fe C Co-Base	Cobalt base alloy with good metal- to-metal wear resistance for corrosive and high temperature	750	4	>40,000	1,800
221 / 855	W Cr Ni B C Fe Co-Base	Cobalt base alloy with high metal- to-metal wear resistance for corrosive and high temperature	690	4	>40,000	1,800
262	Ta	Tantalum for severe corrosion protection	600	N/A	7,500	375
831 / 931	Cr_2C_3/NiCr	Hard carbide for hot wear and erosion	800	4	>10,000	1,500
801 / 901	WC Co	Good sliding wear, abrasion and fretting resistance	900	2	>10,000	1.000
817 / 917	WC Co	Wear , abrasion resistance with High toughness, ductility and high fretting resistance	900	2	>10,000	1.000
815 / 915	WC Co Cr	Tungsten carbide for severe wear resistance	1050	3	>10,000	1000
825 / 925	WC Ni	Tungsten Carbide with nickel matrix for exceptional wear service	1,000	1-2	>10,000	1,000
827 / 927	WC Hastelloy	Tungsten carbide alloy with hastelloy for wear and severe corrosive resistance	1,000	2	>10,000	1,000
205NS / 205SFP	Al_2O_3	Pure alumina as dielectric or to resist corrosive wear	1,100	4	4,500	3,000
202	TiO_2	Titanium dioxide for sliding wear resistance and resistance against many corrosive media	900	2	10,000	1,000
600 / 206 / 208	Cr_2O_3	Chromium oxide is hard, wear resistant and chemically inert. Resists acids, alkalis and alcohols.	1,100	4	10,000	1,000
202F	Cr_2O_3 – TiO_2 (Proprietary)	Chromia-Titania is for Corrosion and abrasion resistance, can resist HPAL Environments. High fracture toughness.	950	2	>10,000	1,000

Curtiss-Wright Surface Technologies (CWST) is a provider of value added surface treatment technologies, including engineered coatings, shot peening, laser peening and materials testing, for demanding industrial applications. With a network of over 75 facilities located in North America, Europe and Asia, Curtiss-Wright Surface Technologies is a Division of the **Curtiss-Wright Corporation** (NYSE:CW), a diversified global provider of highly engineered products and services.

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