

Rockit 402

Breakthrough Fe-based Powder for High-Speed Laser Cladding

Hydraulic rods, also known as hydraulic cylinder rods or piston rods, are widely used in industries such as mining, construction, oil and gas, and marine. These rods are prone to wear and corrosion, which damage the seals, decrease cylinder efficiency, and lead to premature rod failure. Traditionally, the Hard Chrome Plating (HCP) process is applied to most hydraulic rods to achieve a high surface finish, wear resistance, and corrosion protection. However, environmental and safety concerns have led to government restrictions on HCP, increasing process costs and the need for alternative solutions. Industries are now seeking new coating technologies that match or surpass the performance of HCP without the associated environmental and health risks.

Significant strides have been made in replacing HCP with advanced technologies. For instance, Laser Cladding (LC) using Höganäs' Rockit 401 powder for large hydraulic rods in mining galleries has demonstrated better performance than HCP at comparable costs. However, smaller rods are still primarily hard chrome plated due to technical and cost issues with conventional LC. Thankfully, recent developments in High-Speed Laser Cladding (HSLC) have shown great promise as a viable solution for smaller rods. HSLC offers strong metallurgical bonding and dense coatings, enhancing rod longevity with superior wear and corrosion protection. Additionally, the high surface coverage rates and low coating thickness effectively address the cost issues with conventional LC.

Furthermore, the low heat input introduced into the cladded part minimizes distortion, addressing a common technical problem with conventional LC.

Despite these advantages, HSLC faces a challenge: the alloys available on the market for wear and corrosion protection are developed for conventional LC. At the fast solidification rate of the HSLC process, they are prone to forming either hot or cold cracks.

Rockit 402 fills the gap nicely. It's a new sustainable iron-based powder specifically designed for HSLC. The alloy microstructure has been configured using Höganäs' Integrated Computational Materials Engineering (ICME) to provide wear and corrosion resistance, as well as to suppress the formation of hot and cold cracks during solidification.

Main Product Features:

- Good weldability and reproducible coating properties in a wide process window
- Crack-free single- and multi-layer coatings
- Stable hardness of 400–450HV
- Corrosion resistance in Neutral Salt Spray test comparable to conventional martensitic stainless
- Homogeneous microstructure to ensure robust coating performance

Typical Chemical Properties (wt%)

Fe	Cr	Ni	Si	Mo	Others
Bal	23.0	3.0	2.0	0.4	<3.0

Typical Physical Properties

Particle Size	20–53 μm
Hall Flow	22–26 s/50 g
Hall Apparent Density	3–4 g/cm ³

Coating Process

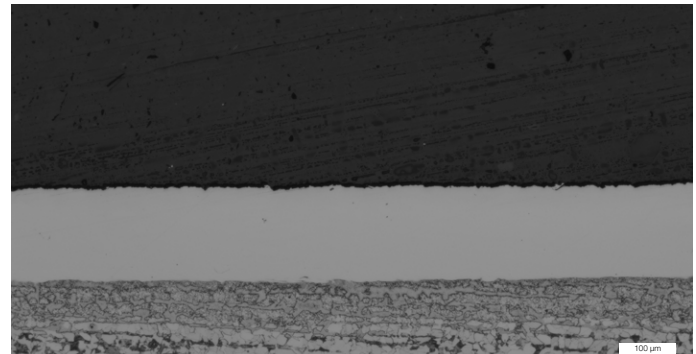
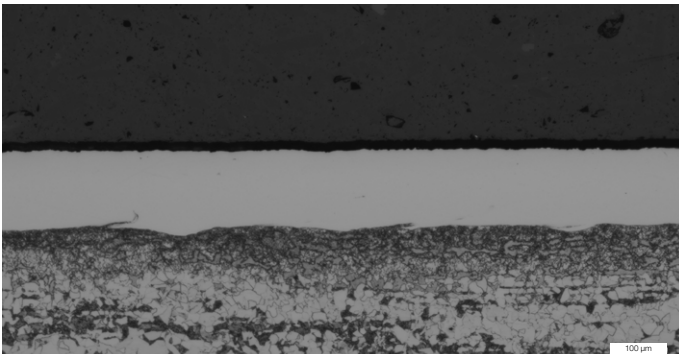
High-Speed Laser Cladding (HSLC)	Recommended clad speed >20 m/min
	Ring-slit or multi-jet nozzles can be used
	Pre-heating normally not required

Coating Properties

Hardness	400–450 HV0.3, for single- and multi-layer coatings
Corrosion properties: Neutral Salt Spray test (ASTM B117)	Rate of protection, Rp, 8 out of 10 for Ra ~0.2 μm (>1000h) Corrosion rating based on ISO 10289

Typical Application

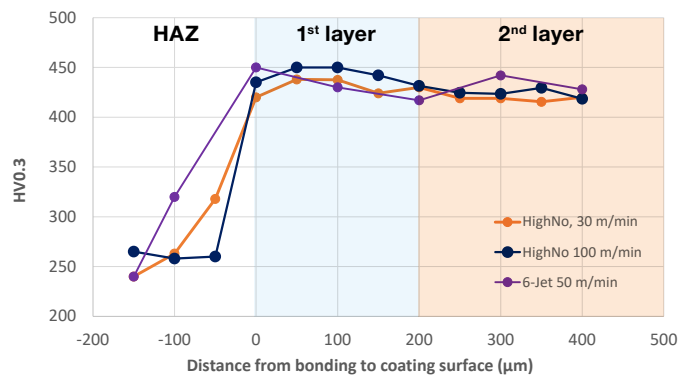
Hydraulic rods and cylindrical parts



Coating overview as unetched, clad speed 30 m/min (left) and 100 m/min (right) ring-slit nozzle, one-layer coating, machined surface



Very fine and homogeneous microstructure consisting of ferrite, martensite and eutectic structure



Hardness profile, for coatings deposited at 30, 50, and 100 m/min with ring-slit and multi-jet nozzles, two-layer coatings

*All tests were conducted on samples that were high-speed laser clad on a low carbon steel substrate.
The thickness of a single-layer coating in as-clad conditions was ~250 μm , with dilution from the substrate being less than <1%.

For more information on Rockit 402 and other Höganäs products, please contact your local sales representative or scan/click the QR code to fill out a contact form.



Höganäs is currently pursuing a patent for Rockit 402.

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