

Revolutionizing Mining Alloys with AI: Enhancing Efficiency and Sustainability

By Metco Joining & Cladding

In today's rapidly evolving mining industry, materials technological advancements are propelling significant progress, and artificial intelligence (AI) is playing a crucial role in transforming the development of alloys for impact and abrasion resistance. At the forefront of this revolution is Scoperta™ Rapid Alloy Development, an advanced AI platform developed by Metco Joining & Cladding (MJC), which leverages big data to redefine how alloys and carbides are conceptualized, refined, and utilized across industrial applications.

Traditionally, developing new alloys has been a time-consuming process, relying heavily on trial and error through conventional metallurgical methods. However, Scoperta represents a paradigm shift by enabling us to evaluate millions of alloy combinations computationally. This capability is guided by specific criteria tailored to meet the rigorous demands of mining operations, significantly reducing development timelines from years to just months.

Scoperta AI technology has enabled MJC to develop new materials that provide significant improvement in operational performance of ground engaging tools, track grousers, slurry pipe, wear plate for fixed plant and mobile mining, drill bits, hydraulic rods, slurry pump components, and crushing and sizing components. In some cases, newly developed materials have tremendously improved the impact/abrasion resistance of hardfacing overlays, providing three to four times performance improvement. For example, iron-based materials such as Metco 8226 and Metco 1030A (HRC 67-70) combine the performance of carbides with

the impact resistance of manganese steel. New carbides, such as WTiC, are stable in iron-based weld matrices and have half the density of WC. By blending WTiC with the highly impact- and abrasion-resistant iron matrix, we enhance the material's properties. Additionally, new laser cladding high-build WC/Ni overlays are applied to significantly increase the service life of slurry pump components.

These new materials are designed for use with processes such as GMAW, PTA, and laser cladding. MJC manufactures and sells these materials, collaborating with OEM equipment manufacturers worldwide. MJC also provides technical support to help with the adoption of these solutions in critical mining applications.

Since many of the new developments incorporate laser cladding technology, MJC operates a state-of-the-art Laser Cladding Center of Competency in Wohlen, Switzerland, which offers developmental support with cladding services. Additional services are provided by MJC's Laser Cladding Services

in Huntersville, North Carolina, USA, which maintains a leading technology facility handling components for laser cladding (DLD) and hardening up to:

- Max weight of 15,000 pounds (8000 kilograms).
- Length up to 480 inches (12,192 millimeters).
- Diameter up to 96 inches (2,438 millimeters).
- Inner diameter from 2 to 120 inches (50.8 to 3,048 millimeters).
- Minimum wall thickness of 0.25 inch (6.35 millimeters).

MJC's materials, process support, technical expertise, and services are designed to extend the life of new components, restore existing parts, and reduce operating costs by improving the durability and efficiency of mining components and systems. ■■■

About Metco Joining & Cladding

Metco Joining & Cladding is a leading brand for joining and cladding solutions, including welded overlays, brazing, laser cladding and plasma transferred arc. Since 1970, our experience has benefited customers with a customizable and comprehensive solutions portfolio of materials, ranging from powders, wires, rods, electrodes, braze pastes and braze tapes, designed to serve the critical needs of industries, such as aerospace, power generation, mining, oil and gas and agriculture. With a global footprint, Metco Joining and Cladding can offer deep expertise and solutions, also in combination with our broad range of materials, in close proximity to customers. The Metco Joining & Cladding brand is owned by the global Oerlikon Group (SIX: OERL), headquartered in Switzerland.

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