PRESS RELEASE

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Thermaspray – coating solutions partner for the mining industry

Thermaspray, South Africa's leading coating and surface engineering specialist, offers a quality range of thermal spray coating solutions for the protection of critical components in mining machinery and equipment.

"Enhanced performance and durability along with extended equipment life span as a result of applying these protective coatings ultimately lead to increased uptime and boosted output for the mines," says Thermaspray Managing Director, Dr Jan Lourens. "Furthermore, the use of coatings to refurbish components offers a much faster and more affordable solution compared to replacement with expensive new parts and there are no delays (downtime) as a result of having to wait for parts delivery."

Mining has been the backbone of the South African economy for over 150 years. Producing coal, gold, diamonds, platinum, palladium, chromium, and uranium, the country boasts one of the deepest mines in the world.

The industry has faced tremendous challenges with crippling strike actions particularly in the platinum mines in 2015. This has seen a dramatic decrease in mining production and negative growth and the protracted slump in mining production output continues. Mines are also forced to mine ever deeper in order to find higher quality ore putting even greater stress on mining machines.

But despite all the obstacles, the mining industry continues to make a valuable contribution to the country's economy contributing 18% to GDP mostly through foreign exchange earnings and as an employer (mining and related industries employ over one million people).

However, looking ahead, there is no doubt that the mining industry has to implement serious changes to ensure a sustainable future. Reducing expenditure and operational costs and improved output is the formula for successful growth. "Ensuring the longevity of machinery and equipment is an extremely effective way to keep costs down and productivity up," states Dr Lourens. "This is where thermal spray coatings can play a pivotal role as a positive contributor to a mine's bottom line, irrespective of the ore or mineral being produced."

Surface and underground mining machinery and equipment such as scoop trams, drills loaders, excavators, crushers, mills, haul trucks, etc. are exposed so some of the harshest conditions and most stressful environments having to deal with heat, dust, mud, water, etc.

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JOINT VENTURE:

Dr Lourens elaborates: “Component wear causes physical material removal and corrosion leading to chemical degradation and is the main surface degradation mechanism in the mining industry. The resulting corrosion, abrasion and excavation impact lead to premature component and equipment failure. Unsurprisingly, mining machines often reach their end-of-life prematurely. Alongside spiralling operational costs, unplanned stoppages due to critical failures have a massive negative impact on a mine’s production.”

A practical solution to mitigate the effects of these processes is the deposition of hard-faced thermal-sprayed coatings and steel metal matrix composites. “There is a great demand for thermal spray coatings in the mining industry,” continues Dr. Lourens and explains: “By protecting critical components, protective coatings extend machinery equipment life span and maximise machine up time. In fact, advanced abrasion resistant materials can cut scheduled downtime in half by doubling the life of wear components.”

With the support of a team of engineers and spraying experts, Thermaspray is able to offer the mining industry advanced thermal spray coatings comprising thermal barrier coatings, wear control coatings, corrosion prevention coatings, high temperature environment coatings, oxidation resistant coatings and solid-particle erosion resistant coatings. The company has the necessary expertise and knowledge to restore to OEM standards, a wide range of components including bevel gear housings; bearing carriers; gear spurs; output shafts; speed, spline pulley and hydraulic shafts; crown wheel hubs; flange drives; pumps; etc.

Thermal spraying comprises of various processes such as HVOF (High Velocity Oxy-Fuel) (figure 1), Air Plasma Spraying, Flame- or Wire-Arc. In these processes a fine powder, usually metallic or non-metallic powders such as ceramics, is fed through a chamber by a gaseous carrier, which is then ignited. The powder is melted, and is then deposited onto the surface of the component being coated.

Figure 1: Pump impeller sprayed with the HVOF process

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According to Dr. Lourens, thermal spray coatings are favoured over weld hard-facing because they permit greater flexibility of composition. “Sprayed parts are subjected to lower and more uniform heat input during processing resulting in less distortion and a shallower heat affected zone.”

Tungsten carbide (WC)-based cermet materials are used extensively to fabricate wear resistant coatings which are ideal for mining machinery. Usually deposited by HVOF spraying, the WC hard phase material provides resistance against abrasive and erosive wear and the cobalt (Co) and/or chromium (Cr) metal acts as a ductile matrix to provide support for the WC particles and increase the toughness of the overall coating. In the event of wear as a surface degradation process, in conjunction with corrosion, the use of a HVOF-sprayed WC-Ni-based coating is recommended.

To illustrate the effectiveness of WC, Dr. Lourens sites a case study: “During the refurbishment of an acid reactor, WC was applied to the reactor blade in a nickel matrix. The coating is able to resist extreme conditions of temperatures of over 200°C while in contact with 90% pure sulfuric acid! Consequently, the life of agitator blades was extended from nine to 50 months run time!”

Plasma offers a full range of ceramic coatings including hard wearing, insulation type and chemical attack-preventative coatings which are extensively used as a corrosion barrier with great success.

“We also make use of Plasma Transferred Arc (PTA) (figure 2) welding to produce thick overlay coatings based on tungsten carbide for wear and corrosion resistance,” continues Dr Lourens.

Figure 2: Plasma Transferred Arc (PTA) welding process

He points out that the life-span or longevity of the coatings in service is directly related to the cost of the coatings. “For example, PTA overlays have almost double the life span of HVOF-sprayed coatings but the cost of PTA overlays is approximately twice that of HVOF-sprayed coatings. “Our material engineers will determine the most optimum coating solution for a particular application that will deliver the best results and offer lowest total cost of ownership to the end-user,” concludes Dr Lourens.

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