

# Extended service life

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**A**rgoss, located north of Lima in the coastal town of Trujillo, specialises in industrial repair and maintenance projects in the field. "We offer maintenance and repair services at very competitive rates because we bring our own equipment and qualified personnel to work in the plants and factories of our major customers," says Cesar Plasencia, a mechanical engineer and co-owner of Argoss. "This differentiates us from equipment manufacturers and is recognised and appreciated by our customers." Another way Argoss maintains a competitive edge is to regularly evaluate and recommend new material solutions to its customers.

When Mr Plasencia received the job requests for the rotary vane feeder and centrifugal blower fan projects, he recommended a unique solution for both which combined the strategic placement of overlay wear plate in areas of highest wear with an additional iron-based alloy coating that would be thermal sprayed on the entire component surface, including

*As the global recession in the construction industry continues, cement plant operators looking to reduce maintenance costs are turning to new repair solutions that will extend the service life of existing plant equipment and help defer purchases of expensive replacement parts and components. With this strategy in mind, two major cement plants in Peru asked engineers at a local maintenance and repair shop, Argoss HVOF SAC, to recommend material solutions that would extend the life of high wear parts and components inside rotary vane feeder and centrifugal blower fan units, two critical plant processes that require frequent and costly repair.*

the overlay plate. For the overlay and thermal spray coating materials, Mr Plasencia recommended steel alloys from NanoSteel®, from which Argoss had achieved excellent performance results with in a recent evaluation.

According to Mr Plasencia, the NanoSteel material solutions had provided better wear and corrosion resistance and lasted longer than the previous solutions Argoss had been using, including chrome and complex carbide coatings, chrome carbide overlay and quench and temper monolithic wear plate.

"We found the NanoSteel materials to have a unique combination of high hardness and high toughness performance characteristics that other materials do not have that result in better wear and corrosion resistance, especially in high temperature environments," he says.

## Centrifugal blower fan blade - life tripled

Industrial centrifugal blower fans in cement plants provide ventilation of hot gases ( $\leq 500^{\circ}\text{C}$ ) rich with fine particle dust expelled from high temperature environments inside preheater towers, kilns and clinker coolers. Within these units, mounted inside a pair of rotating discs are fan blades fabricated from uncoated steel, which are generally not sufficiently resistant to abrasion, fine particle erosion and corrosion. During service, surface material loss is severe.

At one cement plant in Peru, the fan blades must be replaced every 2-4 months. Management at this plant asked Argoss to provide a material solution that would prolong the life of the rotating discs, which can cost between US\$80,000 and US\$190,000 to import from overseas manufacturers.





Unprotected drum after six months

After six months of service, unprotected rotary vane feeder drum is damaged by wear and corrosion and must be replaced



NanoSteel protected drum at installation

At installation, painted rotary vane feeder drum with NanoSteel wear plate and coating solutions



NanoSteel protected drum after 12 months

After 12 months in service, drum with NanoSteel wear plate and coating solutions show minimal wear and no corrosion damage

Argoss' solution was to weld a 6mm (0.236in) thick NanoSteel overlay wear plate, to resist severe abrasion to those surfaces exposed to the greatest wear. On top of the wear plate and the remaining portions of the fan blades and disc surfaces, Argoss then applied a 1mm (0.039in) thick NanoSteel thermal spray coating, to resist the fine particle erosion and corrosion present in the system.

After 12 months in service, an inspection of fan blades on two discs protected with NanoSteel overlay wear plate and thermal spray coating solutions showed minimal surface wear and no corrosion damage. Argoss' engineers also concluded that the pair of discs could continue in service indefinitely with regular inspections and repeat overlay and coating repairs as needed.

### Rotary vane feeder drum – life doubled

Rotary vane feeder units in cement plants deliver material in process from one station to the next. During service, raw materials enter the rotating drum from the top and fall into vane pockets fabricated from unprotected steel. As the drum rotates, raw materials slide out of the vane pockets at the bottom of the unit and are delivered to the next station. The vane pockets, operating in a high temperature environment, wear quickly from exposure to sliding abrasion, fine particle erosion

and corrosion. The area of highest wear occurs on the top side of each vane where raw materials drop into the centre of the pocket and slide out along the outer edge.

At one cement plant in Peru, this wear and corrosion causes vanes to need replacement every 2-6 months. Management at this plant asked Argoss to provide a material solution that would prolong the life of the rotary vane feeder drum, which cost US\$48,000 to import new from an overseas manufacturer.

Argoss' solution for the rotary vane feeder drum was to weld a 19mm (0.748in) thick NanoSteel overlay wear plate, for resisting wear and moderate impact, in the centre and outer half on the top side of each vane, and then apply a 1mm (0.039in) thick NanoSteel thermal spray coating, for corrosion and wear resistance, to the wear plate surface and remaining vane pocket and drum surfaces.

After 12 months in service, an inspection of the rotary vane feeder drum protected with a NanoSteel overlay wear

plate and thermal spray coating showed minimal surface wear to be 1.5mm (0.059in) and no corrosion damage. This drum remained in service an additional three months before removal for maintenance.

For the customer, Argoss had succeeded in more than doubling the service life of the rotary vane feeder drum and lowering annual operating costs significantly by eliminating one replacement maintenance cycle and reducing replacement drum inventory by one.

### Success leads to additional projects

Because of successful performance results from the rotary vane feeder and centrifugal blower fan projects, Plasencia says Argoss is already underway with additional maintenance projects located elsewhere in each plant that will use NanoSteel overlay and coating solutions to extend the life of key equipment parts and components. |

## NanoSteel – redefining steel

Although The NanoSteel® Company has only recently begun carving a niche in the cement industry as a provider of material solutions for resisting wear and corrosion, since its formation in 2002 the US-based company has been active in other industries such as power generation, mining, oil and gas.

Headquartered in Providence, Rhode Island, NanoSteel offers a patented portfolio of nanotechnology-based alloy solutions for use as thermal spray coatings and weld overlay for wear plate and hardfacing. The solutions can be applied to critical industrial parts and components in-situ or at OEM and repair shop facilities. NanoSteel solutions feature a microstructure refined to a nanoscale level (1-100nm) which results in a revolutionary combination of high hardness/high toughness performance characteristics.

"We've achieved a new level of strength and toughness performance along with high hardness not thought to be achievable with iron based steel alloys," says David Paratore, president and CEO. "NanoSteel alloy solutions are produced in bulk and applied with existing industrial equipment and processes without the burden of high raw material costs. This allows NanoSteel to offer customers an affordable price-performance ratio."

NanoSteel also provides project management services for on-site application work at customer facilities. The company can develop long-term predictive maintenance programmes that can reduce costs and improve production availability.

In addition to its current product portfolio of material solutions for coatings and overlay, new NanoSteel alloy solutions are in development for future use as sheet steel, steel plate and structural steel members within all major industrial markets ranging from automotive and ship building to construction and armour plate.