



The thermal arc spraying process in action on a sprocket assembly.

# High Voltage



This forklift diff housing was brought in to Arc Spray Engineering for repair, showing signs of extreme wear on the bearing surfaces.



A close-up view of the forklift housing after spraying shows the brand new surface – no trace of the severe scoring it was brought in with.



The sprocket assembly before spraying shows clear signs of wear and pitting on the bearing surface.



After thermal arc spraying and machining, the bearing surface is fully restored and the part is fit for service once more.



The complete diff housing with newly machined surfaces and a coat of paint – back to work.

## NATIONAL

THERMAL arc spraying is a process whereby molten metal is blasted under pressure onto a metal substrate in order to reclaim a worn or corroded surface.

The technology is cost effective for repairs and is used widely in the mining industry for the repair of components ranging from wheel hubs to spindles, shafts and bearing surfaces.

This unique process is also known as twin wire arc spray because it uses two spools of wire passing through the same handpiece, like a double MIG welder.

However, unlike MIG, one wire is positive and the other is negative so that when the two touch, they create an arc which melts both wires simultaneously.

The addition of compressed air into the handpiece literally atomises and blasts this molten metal onto the substrate, building up a new layer of metal in the process.

As part of the welding feature this issue, the Australian Mining Review visited Aden from Arc

Spray Engineering in Forrestdale, WA.

Aden has been in the business of thermal spraying and specialised welding for many years and has a great deal of experience when it comes to fine tuning the amperage, voltage and the air pressure within the handpiece, to achieve specific finishes to meet the demands of both oil and gas operations and mining companies.

### Versatile and durable

With an experienced eye, Aden is able to alter the finish and density of the metal finish on the substrate and achieve surfaces that range from rough and textured for anti-slip areas, to smooth and dense for bearing and seal surfaces.

The only areas that are unsuitable for thermal spraying are splines, threads and where there is direct point contact with bearing rollers ie: needle roller bearings.

Adding to the versatility of this repair process is the number of materials that can be used in the process.

"If they make a welding wire in a material, we can spray it," Aden said.

This includes nickel, aluminium, bronze, copper, stainless steel, tungsten carbide and pure zinc.

The marine and offshore oil industries often opt for arc sprayed zinc coating of their components in preference to galvanising, as it offers a thicker and more durable finish.

In most cases, the zinc coating is also covered in a corrosion resistant paint for an extra degree of protection in harsh saline environments.

### Low substrate temperatures, no distortion, tough bond

Despite the fact that molten metal is being blasted onto the surface of the job, the actual parent material remains below 100°C, which, unlike conventional welding, means no distortion and therefore no re-machining.

This relatively low substrate temperature also prevents the material from hardening, which can make subsequent machining more

difficult.

Prior to commencing the thermal arc spraying process, the component is pre-heated to a very moderate 40°C and, once applied, the new material yields a 10,000psi bond strength.

420-grade stainless steel is the most common medium used for thermal arc spraying in the resource industry because it is incredibly durable and also a far more economical option to tungsten carbide.

Stainless steel typically registers at 40-45 HRC on the hardness scale, providing excellent wear resistance.

Depending upon the application and environment, Arc Spray Engineering can recommend the best option in terms of material to extend the life of the component, therefore reducing downtime.

A particular material used has a 50-55HRC hardness rating which makes it very popular for use on seal areas that require an extremely durable and uniform coating, that is a fraction of the price of using tungsten carbide.



This breakaway housing has been zinc metal sprayed. The surface coating offers greater and longer lasting protection than conventional galvanising.



A close-up view of this CAT D10 shaft shows the quality of the finish after thermal arc spraying.

This particular material also shows extreme resistance to acid and caustic solutions, which make it perfect for the protection of the inside of fluid transfer pipes.

When the inside of a pipe is metal sprayed with this material, the life of the pipe is doubled and even tripled in some instances.

When the cost savings of not only replacing the pipe but also the downtime incurred during replacement are considered, the arc spray coating is a very cost-effective solution.

#### Surface and underground applications

This unique technology has its place in both underground and surface mining operations.

It is used to repair spindles, hubs, brake part assemblies, shafts, final drives, transmission components and diff components on various above and below ground earthmoving and drilling equipment.

Arc Spray Engineering also offers hard

chroming and High Velocity Oxy Fuel (HVOF) coatings (which are even more durable than hard chrome as well as incredibly resistant to salt, wear and corrosion).

Arc Spray Engineering has been servicing the resource industries for three years but Aden has more than 11 years' experience in thermal spray coatings and machining.

Aden is a firm believer and advocate of the customer coming first and he has built his reputation by ensuring that a job will not leave the workshop unless it is correct.

He also recognises that downtime is one of the greatest operating costs for any company – especially when production equipment is idle – so, he makes it his responsibility to supply every client with regular progress updates and anticipated return dates to help them manage standby equipment and labour requirements.

Thermal arc spraying technology may rely on high voltage but it delivers low component temperatures, a long service life, fast turnaround times and excellent cost-effectiveness compared to OEM part replacement.

**MORE INFORMATION:** Arc Spray Engineering | 08 9398 3500 | [www.arcsprayengineering.com.au](http://www.arcsprayengineering.com.au)

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