Anti-wear and corrosion solutions boost boiler life

Gary Heath looks at solutions for prolonging the service life of power generation equipment.

Boilers are large and expensive installations which can suffer enormously from wear caused by corrosion and erosion, aggravated by very high temperatures.

The exact type of wear experienced varies from one part of a boiler to another and is influenced by the overall design of the boiler and the type of combustible fuel.

Castolin Eutectic protective coatings extend the service life of worn boiler components, making them last longer than uncoated new parts.

These protective coatings are a more cost-effective solution than replacement of the worn parts with new ones and offer direct savings in boiler efficiency and valuable reductions in downtime.

Preventative maintenance

Preventive maintenance on boilers can extend the lifetime by as much as two to three times. Such maintenance operations are undertaken each and every day by Castolin Eutectic technician specialists, with 80 per cent of them being on-site repairs the rest being repairs in the company's workshops.

Repairs are carried out on parts such as super heater tubes, economiser tubes, waterwall panel, exhaust fan, nozzle, conveyor chain, vertical roller mill. From pulverised fuel fired boilers to fluidised bed boilers and incinerators, Castolin Eutectic also supplies boiler manufacturers with new OEM parts which are produced on a regular basis with the Castolin Eutectic protective coatings.

Fig. 1. Area coated by Arc Spray Technique (rear and roof membrane walls and suspension tubes).

Fig. 2. Castolin Eutectic's Arc Spray equipment EAS 4.

Corrosion resistance

The company has developed special products which providing wear and corrosion resistance. Its NanoAlloys, as well as a range of patented powders and wires, have been developed for boiler coating.

- NanoAlloys: The world's first NanoAlloy formulation was developed to provide abrasion and erosion resistance. This was achieved by using a lower cost ferrous alloy with bulk hardness values reaching 71HRC.
- Industry proven spray and fuse alloys: Castolin Eutectic was among one of the first companies to recognise and offer nickel-based self-fluxing alloys as a wear and corrosion resistant coating for boiler tubes in the 1980s and have developed a considerable reputation and experience of these alloys.

A novel high Molybdenum, high silicon alloy was developed and patented for severe corrosive environments.

This solution combined the inherent properties of such fused coatings (such as diffusion bonding, zero through porosity) with improved performance over even welded 625 alloys.

The increasing demands of waste incineration

Fig. 3. CastoLab Services Arc Spraying Team.

environments are leading to new developments.

- EuTronic Arc Wires: Through development in the early 1990s with power companies and high temperature wear institutes a family of iron-based high temperature boiler coating alloys was developed for arc wire spraying. Today, these solid industrial references are being used for new alloy development, spurned by improvements in application equipment and increasing performance demands.
- HVOF: The quality and properties of HVOF are useful to boiler coating. The experience gained in arc wire and powder alloy developments is being modified to bring a new generation of Fe and Ni alloy powders for HVOF spraying.

Circulating fluidised bed

Here, a protected example of a recent boiler coating repair service is described. A special boiler repair was done in Zonguldak (Turkey) on a circulating fluidised bed (CFB) boiler used in a power plant for electric generation with the capacity of 160MW.

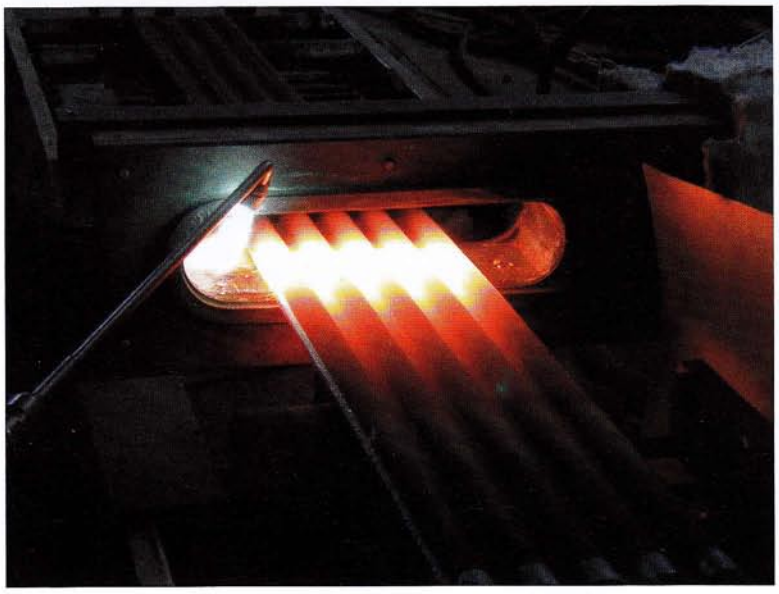

Fig. 4. Spray and fuse patented alloys for corrosion protection.

The owner of the power plant was EREN ENERGY and the constructor of the boiler a European boiler company.

The construction company had identified a potential leakage problem at the critical surface areas which are subjected to flue gas erosion due to the fly ash particles. For this reason a preventive boiler tube coating of the CFB boiler was required.

The boiler was under construction and the coating was applied just after the leakage test of the membrane walls and the tubes.

The area coated using the Arc Wire Spray process was the roof and membrane walls with an area of 30sqm as well as the suspended tubes with 8.6 sqm. By comparison the total size of the membrane walls was 88.9 x 10 mm and 31.8 x 5, 6mm of the suspended tubes.

The material of the membrane walls was 16Mo3 and the suspended tubes consisted of 10Cr Mo 9-10. The temperature of the pipe wall was 500°C and 950°C of the flue gas.

A special iron-based Arc wire was used, 595, which has a unique combination of high temperature and corrosion resistance, high hardness and bond strength. Typical coating thickness are 0.7 mm. The application lasted 11 days and was done by the team of CastoLab Services Turkey.

Conclusions

The very thin 595 coating is prolonging the service life of the boiler seriously and is very easy to apply on the tube surface.

Castolin Eutectic's boiler repair service package includes:

- A wide range of innovative products to solve the wear problems.
- On-site and workshop refurbishment possibilities.
- Increased service life over conventional weld alloys
- Fast and effective return to service;
- Alloy development and manufacturing in-house.

Castolin Eutectic is a leader of application solutions in maintenance, repair and wear protection, with more than 100 years of experience in welding, brazing and thermal spraying technologies stand for professional and innovative solutions. When boiler components are too large to be moved for example, Castolin's CastoLab Services maintenance experts will visit a customer's premises to solve the problem on-site.

Castolin Eutectic – part of the MEC Group – employs nearly 2000 people worldwide in more than 100 countries.

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