



Boiler servicing contracts to global best practice

ACTOM John Thompson's (AJT) Boiler and Environmental Solutions business unit has recently extended its ISO 3834 Part 2 certification to include its Isando fabrication facility along with three of its onsite boiler-serve power station operations. *African Fusion* visits the Isando facility and talks to Tobias Jansen, the general manager of the business unit and Arnold Webb, engineering manager.



ACTOM John Thompson's Tobias Jansen and Arnold Webb.

John Thompson is the power division of ACTOM (Pty) Ltd, its principle focus being to provide boiler and environmental solutions to the power generation and industrial markets, both locally and internationally. "John Thompson has been in existence for some 80 years in South Africa and a division of ACTOM since its formation in 2007. It is one of 43 operating divisions within the ACTOM group, which employs some 7 500 people in South Africa," explains Jansen.

The John Thompson division comprises three business units: Package boilers, which designs and manufactures small steam boilers generating up to 20 t/h of steam; the Durban-based Industrial Water Tube business unit, which offers industrial solutions and services to the refineries, sugar and paper industries, specialising in multi-fuel boilers of up to 130 t/h of steam; and Boiler and

Environmental Solutions, which offers a range of services for utility-scale boilers.

"We specialise in refurbishing and maintaining the boilers at some of South Africa's older power stations," says Jansen: "such as Komati, Tutuka and Matimba, where we have permanent presences through our boiler-serve contracts, and at Grootvlei, where we take care of the environmental side," he reveals.

AJT's utility boiler services are backed up by a highly skilled locally based engineering team with in-house CFD, FEA, circulation and solid modelling capabilities. "The team performs process and mechanical engineering designs of boiler processes, components and large and small bore high-pressure piping systems," Jansen tells *African Fusion*. "We also have an impressive fabrication workshop in the Western Cape, which services all three John Thompson boiler business units. This facility was the first to be ISO 3834 certified, over two years ago," he adds.

Boiler-serve contracts

Boiler-serve is a key offering for AJT's Boiler and Environmental Solutions business unit. "Basically, these contracts are about boiler refurbishments and repair for South Africa's grid-connected power stations, and these sites are now ISO 3834 accredited. A boiler refurbishment under our boiler-serve offering involves cutting and re-welding thousands of boiler tubes – a typical shut-down can last two to three months and we would do 4 000 to 8 000 butt welds

on tubes with diameters of between 20 and 40 mm. These tubes can be buried in bundles and usually involve joining new to ageing materials, which makes welding challenging," says Webb.

"The station owner will determine the scope and then we perform the repairs and follow up with 100% NDE examination on completed work," adds Jansen. "In some cases, entire headers, membrane walls or tube bundles would have to be replaced, and we would get these fabricated in our Cape Town facility, which has equipment such as four-head panel welder and 3D pipe bending machines for making tube bundles," he continues.

"We are active at some of the older return-to-service (RTS) power stations, such as Komati, where normal carbon steel was used for the original piping, as opposed to CrMo," explains Jansen. "Komati, which was built in the 1950s has nine boilers, of which five produce 100 MW and four 125 MW. We did the full RTS at this station," Jansen adds.

"The nature of refurbishments require that we develop and qualify welding procedures for joining old to new materials," says Webb. "We have to qualify a large number of these procedures to specifically suit the transition required." Increasingly, AJT is finding novel ways to successfully welds these joints without having to use transition pieces, saving time and money and reducing the repair rate risks.

"Our welders are awesome!" Webb exclaims. "We have one of the lowest



The superheater outlet manifold for the Komati power station under construction at AJT's Cape Town fabrication facility.



weld repair rates in the industry, below the global best practice figure of 3%," he notes. Most of the on-site boiler tube welding is done using the manual TIG welding process, apart from ducting and plate, which is associated with less onerous quality requirements. "To TIG weld a tube in a boiler, welders need hands as steady as a surgeon," Webb suggests.

Supporting these claims, Jansen says: "We recently completed a three-month 8 000 weld shut down at Tutuka with weld repair rates of 1,4%."

Welder training is all carried out in-house following talent assessments and selection processes. "We operate using permanent core crews and a floating crew that travels between refurbishments, but we regularly need to expand the total crew for each shut-down. But nobody, no matter how much welding experience they have, goes into any boiler without being retested and re-approved for the welding procedure they will be using," Webb assures *African Fusion*.

All AJT's boiler-serve contracts are under the direct supervision the company's qualified welding engineer, Promise Chandigere, who audits the site operations and ensures that the welding procedure specifications (WPSs) are implemented correctly. "We have an extensive library of welding procedures that we use in our Isando fabrication facility and all of our accredited ISO 3834 sites. This library has been built up by our International Welding Technologist (IWT), Michael von Dresselt, who continues to grow the library to meet changing requirements. Qualified procedures based on ASME, EN, WES (Japanese welding codes), DVS Merkblätter and other international standards are used, depending on the origin or preference of the OEM and/or the customer," says Webb.

As well as the boiler refurbishment work, AJT's Boiler and Environmental Solutions also has an external piping capability: "We also support and install large bore piping lines, such as those carrying high pressure, high temperature steam from the boilers to the turbines. We are capable and qualified to do design, fabrication and on site welding work on all types of pressure piping for the power industry," adds Jansen.

Environmental protection

The company further specialise in the design, manufacture, installation, retrofitting and maintenance of emission control plant for coal fired boilers,

including fabric filter plant, electrostatic precipitators, flue gas conditioning and flue gas desulphurisation plants. "We retrofitted the electrostatic precipitators at Grootvlei and Komati, for example and we continue to maintain these plants. The upgraded precipitators have a sulphur trioxide (SO₃) injection system to boost the dust collection efficiency, by reducing its resistivity," Webb explains.

"We have also successfully retrofitted fabric filter plants on utility boilers ranging from 200 to 600 MW and the first operational flue-gas desulphurisation plant in South Africa was constructed by John Thompson," he adds.

"The originally specified design life of the boilers in South Africa is 25 years and even Kendal has already passed its initial design life. Today, though, 25 years is being called 'mid-life', and is seen as the time to do a full evaluation to determine the safe remaining life. This is the economically responsible thing to do, because these boilers were built with significant safety margins," says Webb.

"Due to the emergence of environmental concerns in recent times, though, it is becoming increasingly important to upgrade the filtration and emission control systems as part of life extension programmes," Jansen points out.

ISO 3834 and welding

The recent accreditation to ISO 3834 Part 2 for AJT Utility Boiler and Environmental Solutions' Isando fabrication facility and the three permanent power station operations at Komati, Tutuka and Matimba follows the 2012 certification of the company's head office and fabrication facility in Bellville, Cape Town. The audit for this international standard was conducted by the South African Institute of Welding (SAIW) on behalf of the International Institute of Welding (IIW).

"ISO 3834 is 'a must' for the quality of work that we do, but it also helps to give our welding operation high levels of structure. We have long been operating at high quality levels, though, so our processes were already in place before the audit. Getting the accreditation wasn't that onerous," reveals Webb.

"ISO 3834 is very well matched to industry requirements," adds Jansen. "Its adoption establishes a sensible and complete approach to welding fabrication and provides a platform from which to assess welding performance. This is exactly what is needed to ensure that



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quality is routinely achieved," he argues.

Webb further suggests that it gives AJT a competitive advantage: "It proves that our welding processes are under stricter control than companies who have chosen to operate without certification," he says.

"ISO standards, if taken seriously, deliver quality and integrity, which, for utility power plants adds up to the longest and safest possible life. We strive for excellence," concludes Jansen, "and ISO 3834 certification, along with our repair rate records, prove that our services are on a par or better than international best practices," he concludes.