

# Welding and end-of-line handling solutions for African industry

*African Fusion* talks to Jan 't Hart, Yaskawa Southern Africa's national sales manager; and sales engineer, John Mostert, about some notable robotic welding and handling applications that are now being implemented to help raise the accuracy, quality, productivity and competitiveness of manufacturers on the African continent.

**A**frican manufacturers are under increasing pressure to raise their quality and accuracy, on one hand, and productivity and competitiveness on the other. Without adopting more robotics and automation in their production processes, this contrasting combination of imperatives is very difficult to achieve. And while robots have long been a core part of large volume assembly plants, most notably the local automotive industry, Yaskawa is now finding people from diverse industries interested in using robots to help them rise to this challenge.

Yaskawa sales engineer, John Mostert, cites a solution developed for a copper exploration company that drills cores for mapping underground geology and locating seams for mine development. "We have been asked to develop a robotic welding system to overcome problems being experienced with drill pipes, which are used to drill thousands of holes and extract core samples," he explains.

These pipes, he continues, consist of

an inner and an outer section. Each pipe section is about 3.0 m long and, when being used to drill, these are bolted onto one another from the top as drilling proceeds. In the past, the pipes were assembled by hand with the threaded ends being manually welded using stick electrodes. "But the pipes were breaking at the welded joints, which is a huge problem for the drilling process," says Mostert.

Yaskawa has now developed and shipped a dedicated robotic welding cell to produce the sound welds required and, since the trials started, breakages have stopped completely. "This system is therefore a huge benefit in terms of drilling downtime, and it delivers better manufacturing productivity and reduced costs," he adds.

The robot cell has an AR2010 Yaskawa welding robot at its centre, coupled to a Fronius gas metal arc welding (GMAW) welding power source operating in synergic pulsed mode. The cell also has a pipe rotator on either side of the robot itself, so a

new pipe can be loaded on one side while another is being welded on the other.

"These pipes are assembled from CNC machined components with a male thread on one end and a female on the other. There is an inner ring on each end that first has to be welded into place to ensure the inner pipe remains straight during drilling. Then the assembly is hydraulically torqued up to 9 000 Nm prior to welding on the male and female threaded ends," Mostert tells *African Fusion*.

This cell has recently been shipped to Zambia to the customer's dedicated assembly facility and installation and training have now been scheduled.

Jan 't Hart adds another example in the mining industry, this time on the handling side for a manufacturer of underground rock bolts. "We are working with two companies called GRE Industries and Rocbolt, who make and supply fixing systems to stabilise the walls of underground mine tunnels. We have developed a number of different solutions for them, mostly for

end-of-the-line type applications," he notes.

Rocbolt products, he explains, are resin-based bolting solutions that consist of steel bolts up to 3.0 m long that are inserted into the walls and roof of a mine shaft, then bonded into the rock using resin.

The latest novel solution Yaskawa has put together for them is a robot system that uses two TP180 robots to pick up the manufactured bolts and strap them into bundles, before loading the bundles onto pallets. "We are also looking at using a SCARA SG650 robot for handling the washers that go onto the bolts. This robot will use a magnetic gripper to remove each washer from the eccentric forming press and place it on a stacking cell. From there, the washers will be linked with wire in batches of 5, 10 or 15.

"The idea is to change this whole end-of-line handling process into a high speed, error free application that will enable the productivity across the whole line to be increased," notes 't Hart. "Long term, though, the plant will be automated wherever possible. So we are systematically adding robots to further raise production efficiency," adds Mostert.

Also being negotiated is a development for Hydra-Arc in Secunda for a robotic system for refurbishing coal-to-gas gasifier components. "We are currently looking at resurfacing one of the high-wear nozzles for these gasifiers with a molybdenum-based material," 't Hart reveals.

Yaskawa, he says, has been asked to put together a robot-based system to weld a 4.0 mm layer of material onto the inside surface of the nozzle of this gasifier. For this, Fronius low-dilution CMT (cold metal transfer) is being used, because the welding involves precise 5G pipe seams deposited around the inside of a 900 mm pipe. A welding torch with an 800 mm stem is therefore being used to ensure full access into the pipe nozzle without having to move the robot arm deep into the pipe.

"We have already done extensive testing," continues Mostert. "The robot will enter the tube and do two 360° rotations, one in each direction, before coming out to be cleaned. We will continue to advance this process, two rotations at a time – until one full layer has been built up across the internal surface – being careful to systematically stagger the starting points.

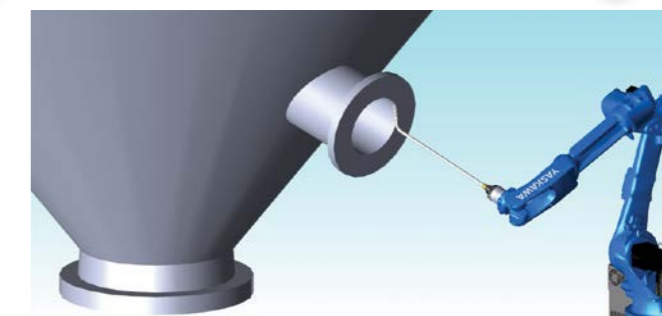
"Testing is currently underway at our Longmeadow facility in Johannesburg, using the correct cladding material on a plain steel tube of the correct diameter. At the end of the day, the robot will be taken into the plant during a shutdown and placed in front of the gasifier nozzle to do the job," Mostert explains, adding that he thinks two layers will typically be needed, depending on how much material has to be machined off prior to welding.

Currently, four gasifiers are being refurbished per annum, but the intention is to use two Yaskawa systems to refurbish 84 gasifiers over the next 10 years. "Currently, the whole nozzle is being cut out and fully replaced, which takes about 90 days per unit – and the loss of production cost for every gasifier out of service is around R2.5-million/day. In the long term, therefore, this system will deliver a huge cost saving," 't Hart says.

## Bottling rum in Mauritius

Going back to the handling side, 't Hart tells of Yaskawa South

*GRE Industries and Rocbolt are looking at using SCARA SG650 robots to handle the washers that go onto the bolts.*



*A 3D CAD model of Yaskawa Southern Africa's nozzle cladding system being developed for Hydra-Arc.*

Africa's first-ever venture into Mauritius, with a rum making company called Grays. The system Yaskawa is currently developing for them is for rum bottle recycling. Grays has a wash plant that processes about 1 800 recycled rum bottles every hour.

Six operators are currently emptying crates of used bottles from a stack and loading them onto a single-file conveyor. This is slow, repetitive work, and the company is looking for ways of making it more efficient.

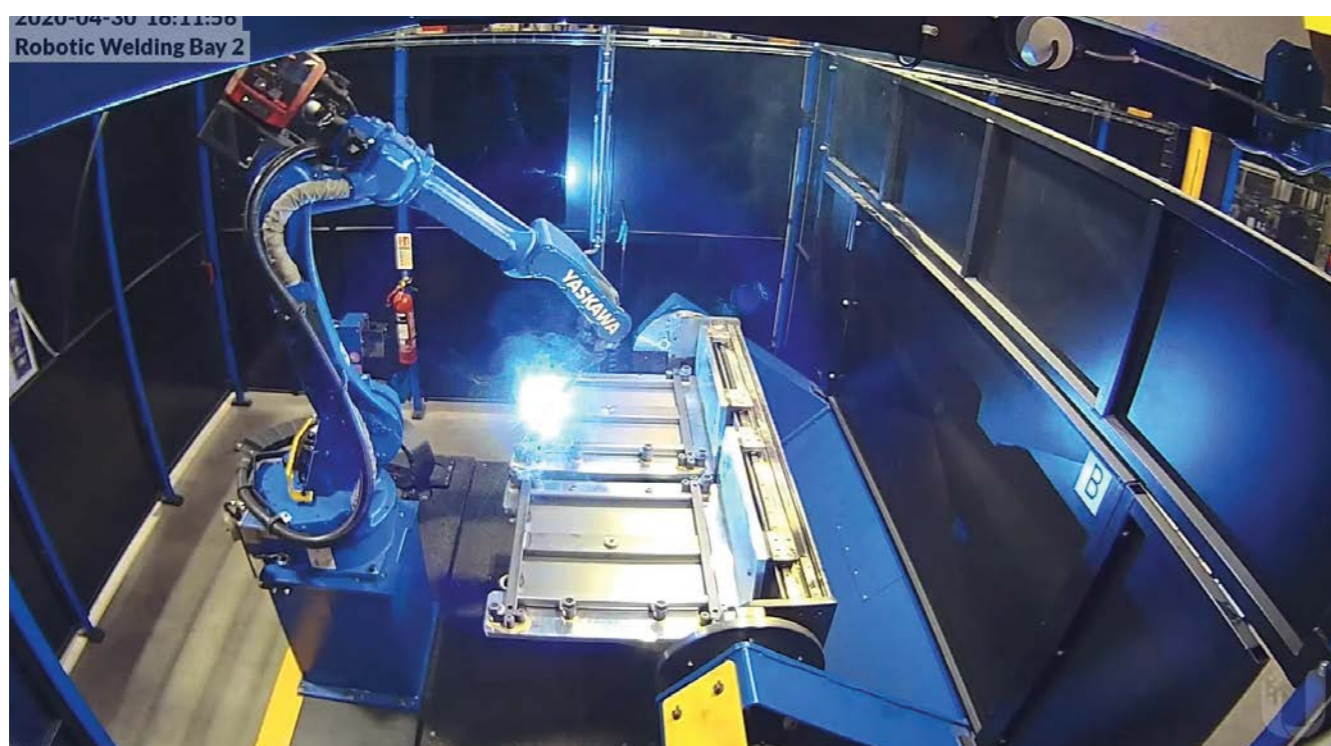
"The robot handling system we have designed picks up a crate containing 12 bottles from the stack. It then deposits the crate onto one conveyor while keeping hold of the individual bottles. The empty crate is carried away, while each row of four bottles is then placed onto a single-file conveyor that takes them into the company's wash plant," he explains, adding that Yaskawa is also looking into modifying the conveyor so that all 12 bottles can be dropped at the same time to further reduce cycle times.

"This is the first robotic automation solution we will put into Mauritius and we are hoping it will open up new potential markets for us at other processing plants," says 't Hart.

Concluding, he says that Yaskawa Southern Africa is seeing a lot more market share going towards palletising; pick-and-place and handling. "In the past, 80% of our business was motor industry and welding related. Today, up to 50% of our current business is for end-of-line applications.

However, for all applications to become globally competitive in terms of quality and productivity, interest in using robots continues to grow.

[www.yaskawa.za.com](http://www.yaskawa.za.com)



*An AR2010 Yaskawa welding robot for gas metal arc welding (GMAW), like the one being used to weld the drill pipes for a copper exploration company.*