

SA company builds 600 t bullet

Starweld Automation, a proudly South African welding equipment and automation OEM, has completed the design and manufacture of two 600 t rotators for fabricating five LPG storage bullets required for the new R1.3-billion Sunrise Terminal, currently under construction in Saldanha Bay. *African Fusion* talks to Starweld's Steve Hutchinson and Robert Case.



The Saldanha LPG Import Terminal, being developed by investment group Sunrise Energy, includes the construction of a multi-buoy mooring (MBM) system in Big Bay, Saldanha; a subsea and overland pipeline to the onshore terminal; rail and road distribution gantries, cylinder filling facilities and pipeline options for bulk users; and – for Phase 1 – 5 500 t of storage via five LPG storage tanks, which are going to be built in South Africa by a local fabricator.

The terminal will be able to handle pressurised marine design vessels with DTW (dead weight tonnage) of between 3 000 and 20 000 t, including semi-refrigerated and refrigerated vessels with overall lengths (LoA) of between 97 and 174 m and drafts of 6.0 to 10.4 m.

Long term, a modular expansion strategy has been adopted to allow for growth in LPG demand. On completion by the end of 2016, the initial handling capacity will be 17 500 t/month from the first five-vessel, 5 500 t bullet battery. For Phase 2, planned for completion by

2019, additional road loading gantries and a second bullet battery is planned, and if predicted demand is realised, Phase 3 will be implemented thereafter to take the terminal throughput capacity of 52 500 t/month.

At the terminal, imported commercial propane and butane in accordance with SANS 1774: 2007, will be blended and odourised before being transported via bulk road tankers, direct cylinder filling or via pipeline to downstream customers or storage facilities.

The bullet vessels for storing the imported LPG are at the heart of the terminal. Phase 1 vessels, comprising five mounded storage bullets, over 65 m long with a diameter of 7.0 m, will be installed during 2016 to meet currently predicted demand. In line with Sunrise Energy's objectives of maximising local content and optimising the use of local resources, fabrication of the bullets will

be completed by a local fabricator at a facility adjacent to the Sunrise Energy site.

Starweld automation

Launched in 2010, Arc Quip is a locally based manufacturer of welding machines and related manipulation equipment and one of the few inverter-based welding machine manufacturer in South Africa. At the beginning of June



For the driven rolls, Bonfiglioli 7.5 kW induction motors connected to 311 planetary drives on a torque arm were chosen in a simple in-line design.



The 'wheels' are 1.0 m in diameter and have a 520 mm width, with a number of 40 and 50 mm stiffening ribs to ensure load carrying capacity, while the control system has variable speed drives (VSDs), switchgear and a remote control.



rotators

2012, Arc Quip began manufacturing and marketing Starweld welding inverters, a comprehensive range that covers MMA, MIG, TIG and submerged arc power sources and, according to Starweld's design engineer Robert Case, are "the first locally manufactured machines to be fully digitally controlled. Starweld machines are fitted with 32 bit micro-processors, typically the same as those found in current generation Smart Phones," he adds.

"This innovation, means that intelligent communication possibilities, within the machines, and between external devices, are now unlimited. Starweld uses CAN Bus technology, a two-way coded communication system first developed in the motorcar industry. This enables communication between the power source, interfaces, wire feeding systems and manipulation equipment to simplify the task of integrating welding machines into automation systems," he says, adding that this lead naturally to the company expanding its offering

to include turnkey welding automation solutions.

Citing a typical example, he says that Starweld is about to introduce a Plasma TIG welding system. "This state-of-the-art technology is ideally suited to the stainless steel industry, where plates of up to 8.0 mm can be welded in a single pass, without the need for a bevelled weld preparation."

Starweld's 600 t rollers

The LPG bullets being manufactured for Sunrise's LPG Terminal have mounded (semi-spherical) ends with 3.5 m radii (internal), joined to eight cylindrical sections with a total length of 60 m. Including the ends, therefore, the length of each storage vessel is just over 67 m. The design pressure requirements are -0.7 bar to 16 bar in the temperature range from -40 °C to +40 °C.

The vessels are fabricated by rotating the weldment underneath submerged arc welding equipment, adding a cylindrical section at a time – one of 8.84 m, six of 7.5 m and one of 6.16 m, respectively. Hence the need for two sets of 600 t rotators, a contract awarded to Starweld earlier this year.

This rotator consists of two interconnected drive rollers; a control system with variable speed drives (VSDs), switchgear and a remote control; and a set of two separate idler rollers to support the growing end.

"Each individual roller for this system, and we have fabricated eight of these for the two systems we are manufacturing, has a material thickness of 50 mm for its 'tyre', which is first

rolled, then submerged arc welded to close the seam and rolled again. The 'wheels' are 1.0 m in diameter and have a 520 mm width, with a number of 40 and 50 mm stiffening ribs to ensure load carrying capacity. Each wheel weighs approximately 1.2 t, the total weight of the driver set is 10 t and the two idlers on their bases weigh over 4.0 t each.

"The only company that could supply a suitable gearbox for driving the system was Bonfiglioli," Case tells *African Fusion*. A reduction ratio of 4 760 was required to enable the VSDs to accurately control linear welding speeds between 100 and 1 000 mm per min. Bonfiglioli 7.5 kW induction motors connected to 311 planetary drives on a torque arm were chosen in a simple in-line design. Custom designed and in-house manufactured tapered bushes were also machined to lock the shaft and rollers to the drive system.

The first 600 t rotator set was completed and ready for dispatch in mid August from Starweld's East Rand facility, with the second set due to be completed two weeks later. "This is a 100% South African design, purpose built to customer specifications in less than two months Case says.

"We do not compete in the low-cost equipment market. But through this project and through the increasing success of our robust and fully digital welding machines, we believe we can compete – on performance, quality and price – with premium-brand manipulator and welding equipment manufacturers from anywhere in the world," he concludes. ■



Arc Quip began manufacturing and marketing Starweld welding inverters in its Boksburg premises in 2012. These are "the first locally manufactured machines to be fully digitally controlled," says design engineer, Robert Case.