



Case study

Changing shielding gases and machinery deliver greater efficiencies and output for A&G Engineering

A&G Engineering has been at the forefront of stainless steel tank and vessel manufacturing and design for over 50 years in Australia, providing storage and fermentation solutions for their clients in a number of industries, including the wine, brewery, agriculture, mining and dairy industries. In 2001 they won the WTIA Company of the Year gold medal award.

The firm believes strongly in quality and design, and is constantly investing in research and development to ensure it continues to be a leading vessel and tank manufacturer. As part of this, they enlisted the external expertise of BOC to examine their workshops to address inefficiencies in their welding practices. BOC provided solutions that helped A&G Engineering deliver faster and better quality welds that have in some business areas increased output substantially.

The challenges

Move to automated welding

A&G Engineering was welding dimple stainless steel sheets to regular stainless steel sheets by hand for their pressurised tankers at an operating speed of 220 mm per minute. This at times created some visible inconsistencies in the welding process.

Given the nature of this welding, with the main external sheet being only 2 mm thick and the dimple plate being only 0.9 mm, there was a need for a process that provided superior speed and a greatly reduced heat input in order to minimise distortion and increase production.

Due to the length of the tanks produced, welders were also required to stop and start on a single weld as the length was beyond their physical reach.

These factors had the potential to cause some inconsistencies with the overall quality of their welds, appearance and the potential for a lack of fusion.

The process needed to be re-evaluated and updated to ensure the best quality weld every time. This would need to be done with superior speed and a greatly reduced

heat input to guarantee a quality weld, only achievable by an automated process.

Need for migration to newer shielding gas mixtures

A&G's welders were using pure argon as their shielding gas, which caused the arc produced during the welds to be unstable, and thus contributing to fusion issues. Such issues would require re-examination of welds, and therefore potential requirement of costly reworks.

Need for greater welder safety

Safety of workers and compliance with safety codes are paramount to A&G Engineering's business. As vulnerability of workers increases over time spent on completing long linear welds, they identified that it was important to upgrade their portable welding equipment to reduce safety risk.

Need to increase keyhole plasma welding integrity

The A&G Engineering team were using keyhole plasma welding to achieve higher precision seam welds on their tanks and vessels. For the past year, the majority of keyhole plasma welds had been performed by their automated tank building equipment, with a focus on consistency and integrity of weld. The automated machinery builds tanks end-to-end; rolling, cutting, welding and forming tanks.

Solutions

BOC's expert Application Sales Engineers were invited to inspect A&G Engineering's current welding processes and proposed a number of solutions.



Move to automated welding

A&G Engineering purchased Australia's first BOC mechanised welding solution consisting of the EWM Alpha Q machine with the EWM miniDrive portable wire feeder that ran along an automatic welding carriage. This automated welding package immediately improved the quality of A&G's welds. Although the Alpha Q machine gave the team a choice of six different welding processes, it was the coldArc process that had an immediate impact.

EWM's coldArc technology performs better during the relighting phase of a weld, producing a high quality weld with short arc process. This process gave A&G the flexibility to weld finer metal sheets (0.3 mm with coldArc), and allowed seams to be produced at different thicknesses. This is ideal for pressurised vessels and tanks for the food and beverage industries that require superior finishes. 'The machine has produced higher quality welds more efficiently and quicker than ever before. Shifting to Alpha Q has allowed us to substantially increase the output when fusing dimple stainless steel sheets to stainless steel sheets', said Tom Gallagher, A&G Engineering General Manager.

Need for migration to newer shielding gases

After testing a couple of suggested argon mixtures, A&G realised that migrating to BOC's unique STAINSHIELD® 66 (argon 96.2%, hydrogen 1%, CO₂ 2.8%) allowed the arc produced during welds to be more stable resulting in stronger, faster welds, greater fusion and more aesthetically pleasing results.

Aesthetics are very important for A&G Engineering and their customers, and their tanks and vessels need to satisfy regulatory standards as well as close customer scrutiny.

Need for greater welder safety

To help mitigate the safety risks associated with confined spaces and long linear welds, A&G Engineering chose to upgrade to a light-weight portable welding solution, BOC/EWM miniDrive. The new portable welding machine enabled welders to deliver better quality welds over a 15m length.

The miniDrive has also allowed welders to operate welds at distances up to 50 m from a power source,

reducing downtime inefficiencies with less need to start stop on welds.

Need to increase keyhole plasma welding integrity

A few months after the integration of the automated machinery into the A&G Engineering supply line, BOC technicians were invited to look at the set-up and suggested trialling one of their PERFORMANCE LINE® gases, ARGOPLAS® 5 (95% argon, 5% hydrogen) instead of pure argon.

The automated welding solution improved output of fused dimple to regular stainless steel sheets by 300% (improving 220 mm per minute to 660 mm)

During their trialling, A&G personnel noticed they were able to weld thicker material and obtain faster travel speeds without increasing the parameters of the welding unit. They also found that welds were far better in quality and aesthetically superior than before.

Business benefits

'Since working with BOC and implementing our automated machinery, we have found that we have significantly increased our productivity levels, allowing us to take on 10-15% more work than we would have been able to previously', said Gallagher.

The solutions delivered some noticeable benefits to the A&G Engineering business including:

- Greater overall consistency of welds produced
- Automated welding solution improved output of fused dimple to regular stainless steel sheets by 300% (improving 220 mm per minute to 660 mm)
- Distortion of the plate was greatly reduced with the decreased heat inputs. This set-up was able to provide the greatest value to A&G as it greatly reduced the time it took to straighten the plate for fabrication into a tank
- Changing from argon to STAINSHIELD® 66 allowed for a faster welding process, delivering stronger fusion and an aesthetically better end result
- The portable welding machine has improved safety of welders and reduced downtime when working on larger vessels and tanks
- The weld appearance and consistency was greatly improved and aesthetics and bio-film resistance of A&G Engineering's products has given them a competitive advantage
- The results of these implemented efficiencies provided a significant reduction in gas and power consumption, as well as greater time efficiency in the welding process.

For further information, please visit www.boc.com.au or www.boc.co.nz

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