

Nitraweld: the concession-free shielding solution transforming laser welding

AF visits the Midrand facility of Nitralife and talks to MD Tom Sowry about his company's new Nitraweld range of nitrogen generators – the first to be developed for laser welding for delivering continuous, on-demand, high-purity nitrogen gas for modern laser welding machines.

A nitrogen generation pioneer back in the 1960s, Sowry's father, Rob Sowry, became one of the first people in the world to commercially fill tyres for off-road mining vehicles with nitrogen. "In those days, this could only be done by renting cylinders of pure nitrogen from one of the large local gas companies, as on-site nitrogen generators were not available back then," says Sowry.

So in the 1980s, Rob Sowry started to package nitrogen generation machines that could make nitrogen on demand. Then, in 1996 – the inception of Nitralife as it is known today – the company launched its first locally manufactured on-site nitrogen generator, which was installed into the commercial transport industry for inflating tyres. "We have since supplied thousands of these systems, not only for mine tyre inflation but also for industrial, medical and food applications, such as spray painting and modified atmospheric packaging (MAP), for example," Tom Sowry tells AF.



Nitraweld nitrogen generators can produce on-demand nitrogen shielding gas to supply one, two or three laser welding machines.

Laser and plasma cutting

By 2014, the technology had improved significantly and Nitralife began to explore other ways in which their nitrogen generators could be used. This led to the introduction of Nitracut, an on-site solution for the booming laser and plasma cutting industries.

"We built our first nitrogen generator for laser cutting back in 2017, for a client fusing plastic. This same client brought in an industrial laser from China, and we built a machine that could supply the nitrogen gas required for a laser cutting machine. This development has completely transformed laser cutting in South Africa – and we have since sold over 250 of these into fabricators and for cutting-related operations in South Africa, USA, Europe and the Middle East," says Sowry.

These on-site nitrogen gas generators are all custom-built to provide a continuous, reliable supply of nitrogen-assist gas for laser or plasma cutting. "Producing nitrogen gas as and when needed can be done at a fraction of the cost of renting and refilling nitrogen cylinder bundles or installing a liquid bulk tank," he points out.

"The nitrogen produced is essentially free, and nitrogen gas, while preferred for stainless steel cutting, can also be used to cut mild steel, often faster than with conventional oxygen and with greater precision and detail. In addition, our Nitracut generators work seamlessly with both CO₂ and fibre laser-cutters of all brands," he notes.

Nitralife also manufactures Nitracut generators for the premium Swiss-made Bystronic fibre laser brand. One of the company's Nitracut systems is running on a Bystronic fibre laser cutter, manufacturing railway components for SBB Rail



Nitralife MD, Tom Sowry.

in Switzerland, cutting the steel needed for their railway network. "These fibre lasers are running 24/7, and our nitrogen generators are uniquely suited to the task of continuously producing on-demand nitrogen to exactly match the cutting need," he explains. This means less downtime, improved safety, and significant long-term cost reductions for customers.

"Our systems are all locally manufactured, with reliable supply and fast delivery – including in original equipment manufacturer (OEM) co-branded formats.

Concession-free laser welding

These days, continues Sowry, fabricators with fibre laser machines often also have laser welding machines, and these need a shielding gas to prevent oxidation. Argon and nitrogen gas are recommended for laser welding, but customers using Nitralife's Nitracut solution saw the sense in using the same gas for laser welding.

"So last year, we built a few prototype Nitraweld nitrogen generators for producing on-demand nitrogen shielding gas to supply one, two or three laser welding machines at any one time," Sowry tells African Fusion.

Nitrogen gas, he says, is not considered suitable for use in TIG or MIG welding, because the gas ionises in the electric arc, allowing nitrogen ions to diffuse into the weld metal, causing porosity when it reforms to N₂ gas. "However, a laser weld uses a light beam as the heat source to melt the steel, so nitrogen retains its gas-shielding properties just as well as argon does, and in

some cases, even better," he explains, adding that there are no material limitations to nitrogen's use for laser welding.

Customers report identical visual and structural weld results to those achieved with argon, but at a fraction of the operating cost.

"We are very excited about this, because with the other applications of nitrogen generators, we have always had to make small concessions – with respect to purity, for example – and we always had to also supply an air compressor with our Nitracut and Nitralife machines.

"Nitraweld machines can be plugged into the plant air that customers already have, so a specific compressor is not required. This already cuts the investment cost of an on-demand shielding gas solution for laser welding in half."

Describing how a Nitraweld nitrogen generator works, Sowry says that the nitrogen is produced on demand through polymer membrane filtration. "We can produce a continuous flow from any compressed air supply. We drop about one bar of pressure across the membrane, but for shielding, all we need is a gas flow of around

25 l/min, with the outlet pressure a little above atmospheric," he explains.

"The machines are remarkably simple, but by understanding the laser welding application, we have been able to put together an ideal solution. A Nitraweld unit goes next to the laser welder and plugs into the client's existing compressed air line. No power is required, and the fabricator never has to order another cylinder again! These machines typically pay for themselves in less than a year," he points out, adding that it also makes the laser welding process much more operationally viable and financially attractive.

"Many of our customers have already switched from using liquid nitrogen on their laser and plasma cutters to using our Nitracut machines. They have seen Nitracut machines successfully supplying their cutting machines for the past six to eight years, and switching to using Nitraweld generators for laser welding offers even better return-on-investment.

"This, therefore, makes it easy for fabricators to enter the laser welding market, with a Nitraweld nitrogen generator pushing up the total package cost by a small



For shielding a laser weld, all that is needed is a gas flow of around 25 l/min, with the outlet pressure a little above atmospheric.

margin. Then customers do not have to buy a regulator; they do not need a gas contract with a supplier; there are no safety issues with carrying and storing cylinders; and no downtime in replacing empty ones.

"All with no concessions and no downside. A Nitraweld generator, custom-built for the laser welding market, offers a seamless switch-over from a cylinder or bulk gas shielding alternative, with immediate and massive savings, safety and productivity advantages," Sowry concludes.

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