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Andisha Ross and Thulare Kodisang of Air Liquide talk about high purity customised specialty gases (SG) for complex and niche markets, and the launch of Air Liquide's ALPHAGAZ™ brand, which will be coupled with the innovative SMARTOP™ valve.

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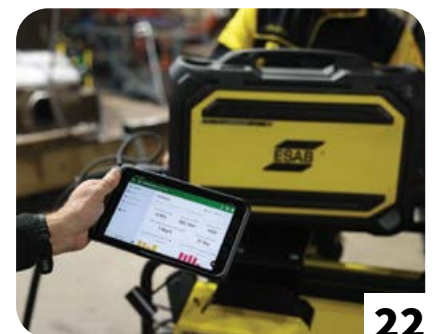
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# When welding is vital to your business.

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**SAIW / IIW ISO 3834  
Certification Is Good  
For Your Business!**



**SAIW**  
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I am relieved to say we have now completed the restructuring of the SAIW to ensure that we can remain sustainable in the long term. Our future is now looking much better. For the first time since 2015, the SAIW should reverse the trend of depleting reserves.

It was critical for us to optimise class sizes on our training courses and to align our lecturing staff numbers with South African industry's real needs for skilled personnel. To do this, we have thoroughly analysed regular and ongoing course attendance and compared our offering to that in other parts of the world. We have also reconstituted the Technology and Training Committee to ensure that our course offerings are fully aligned with the needs of industry. We will continue to offer courses in the regions where there is sufficient demand and ensure that we are able to cost-effectively deliver sufficient numbers of skilled and qualified personnel to meet local industry's annual needs.

To meet additional or unexpected training requirements, for special projects, for example, we have established a network of experienced people we can call upon on a contract basis, many of whom were previously employed here at the SAIW. And I am also pleased to say that we are still attracting long-term interest from our loyal client base for qualified Inspection and NDT personnel.

In spite of many companies having experienced difficulties over the past few years, the number of ISO 3834 certified companies continues to grow. But rather than employing an extra person to do additional auditing, we will also handle this growth by using contractors for the auditing, which has worked well for us in the past.

On a recent visit to an SAIW member that does construction work for the mining industry, the owner of the facility asked about ISO 3834 welding certification. Mining companies haven't yet adopted ISO-3834 in any significant way, but there seems now to be a trend among larger mining houses, which are taking the view that welding is a safety-critical process. This is certainly widely acknowledged by most fabricators.

We also sit on the board of the Constructional Engineering Association of South Africa (CEA) and examples of welding quality standards issues have regularly been raised. Even though unlikely to be made a mandatory requirement, fabrication and construction companies supplying into the mines need properly qualified welders, welding and NDT inspectors and senior supervisory personnel. There is certainly scope for us to use our training and ISO 3834 experience to help these fabricators raise their welding-related quality and safety standards.

Africa is also offering the SAIW opportunities for growth. Shelton Zichawo, David Makoge and Willie Williams recently visited Addis Ababa in Ethiopia, where 89 welders were trained on the International Welding Practitioner course. These IWPs will become the Welding Instructors in Ethiopia's nine TVET colleges. In addition, we recently ran an initial training course for a UNIDO Project in Liberia. Eleven Liberian welders who have been with us for the past six months will be taking their skills back to Liberia to share with local welders.

With our WIN network partners, we have just launched our next eCourse, which will be about Theory of Constraint (ToC) and will be presented on the 16 and 18 August 2022. Any of our ISO 3834 clients can enrol as many of their welding and management teams as they wish for the price of a single delegate. I urge you all to consider signing up.

*John Tarboton*



# SAIW helps advance welder training in Ethiopia

The SAIW has entered into an agreement with the Welding Training and Technology Centre (WTTC) in Ethiopia to help advance the welding skills across all nine provinces of the country. Herman Potgieter reports.

**E**thiopia's Welding Training and Technology Centre (WTTC), which used to be called the Centre of Excellence for Engineering (CEE), was established by the Ministry of Capacity Building (MoCB) in Ethiopia to overcome welding-related productivity, quality and competitiveness problems in the manufacturing sector. It was set up to service the national need for skills in the metalworking, manufacturing and construction fields.

“For the past few years, Ethiopia, with assistance from SAIW, has been conducting welding training and certification through its TVET centres, applying IIW’s welder training guidelines on SMAW, GMAW, GTAW and oxy-fuel welding. The Centre is currently working towards final IIW accreditation as an Approved Training Body (ATB) for the delivery of these courses,” SAIW’s Herman Potgieter tells *African Fusion*.

Appointed by the International Institute of Welding (IIW) as an Authorised Nominated Body (ANB), SAIW Certification is able to approve training organisations to

present IIW courses, conduct examinations and issue IIW diplomas. “We are playing two key roles in helping to advance the training standards of the WTTC. First, we are helping to train the personnel who will run the centre. Second, which was the key reason for my recent visit, we have started the process of approving the WTTC as and ATB in its own right,” he adds.

But these are only first steps. “Our engagement actually began several years ago when five Ethiopians came to the SAIW in South Africa to complete the International Welding Inspector comprehensive course with us. These guys had already been certified as International Welding Engineers through the German Institute of Welding (GSI SLV) and they will be heading up a nationwide Ethiopian training initiative from the WTTC,” he continues.

The demand for skilled fillet, plate and tube welders in Ethiopia, according to the country’s Growth and Transformation Plan (GTP), was estimated to be 4 000 welders by 2021, while 10 000 are thought to be needed

by 2025 (GTP III 2025). “Covid has delayed everything, though, so we are having to catch up. WTTC has preliminary authorisation status from the IIW, which means they can deliver IIW training courses in the country, but can’t yet issue any certificates,” says Potgieter.

Recent progress is significant, though. “Shelton Zichawo, Willie Williams and David Makgoge from our training department have recently been up there to help with a train-the-trainers course based on the IIW International Welding Practitioner (IWP) programmes that the 89 Ethiopians on the



course are going to deliver. These guys came from provinces all over Ethiopia and will be responsible for taking the IWP programmes back to their provinces in an effort to feed growing skills requirements,” Potgieter notes.

Because of the very high unemployment rates in Ethiopia, Potgieter points out, the welding recruits are mostly very highly qualified people, some with Master degrees in engineering. The Government is now determined to drive this unemployment rate down, with welding as the key focus.

“The train-the-trainer course was followed by my visit in June, for a meeting with a high-level delegation, including the Minister of Labour and Skills – who reports directly to the Ethiopian Prime Minister – and the Director General of Education,” Potgieter informs *African Fusion*.

In his presentation to the Ethiopian delegation, he noted that a key mission of the SAIW is to deliver and promote world class training, qualification and certification programmes and to be a leading point of contact for international cooperation; a resource for information transfer; and to promote best-practice welding technology.

“Following the meetings, my task was to audit, accredit and certify the WTTC facility in Addis Ababa as the first Authorised Training Body in Ethiopia,” he continues. “In terms of the agreement with the SAIW, we as the ANB have been invited to overlook the certification process and the certification of students in Ethiopia. Every welding school and every welder will be registered on the SAIW’s national register, which has a unique IIW identification number. Each certified ATB and each successful welding student will get a certificate with the WTTC logo and the SAIW logo printed on it, with the head of the training department of the different ATBs across Ethiopia signing the certificates for their students.



Ethiopia’s Welding Training and Technology Centre (WTTC) in Addis Ababa being refurbished.



“Before we can do this, though, we need to extend the scope of our ANB status to include countries outside of South Africa. And as soon as this has been approved, we will be able to begin the processes of approving personnel and training facilities across Ethiopia.”

The WTTC building which currently being upgraded, he continues, is a remarkable facility: “This Centre in Addis Ababa has

63 multi-process SMAW, GMAW and GTAW welding bays; another 30 bays for SMAW and about 10 bays for other workshop activities such as oxy-fuel cutting/welding and grinding. This makes a great starting point for establishing a strong welding sector in Ethiopia,” Potgieter says.

“We are at the start of a five year programme with the WTTC, with the ultimate goal that the Centre becomes an IIW Ac-

credited Nominating Body in its own right, completely independent of the SAIW. More importantly, though, through training programmes such as these we hope that welding can become a springboard to a rejuvenated African economy with manufacturing as the bedrock and good jobs and low unemployment the ultimate prize,” he concludes.

[www.saiw.co.za](http://www.saiw.co.za)

## NEMS2022 initiative launched at SAIW

On the 24<sup>th</sup> of June 2022, SAIW hosted a delegation of approximately 60 delegates for the launch of this year’s Nuclear Energy Management Schools programme (NEMS2022). The delegation was led by AFRA National Coordinator, Lerato Makgae; along with Ian Gordon-Snr, an IAEA Knowledge Management Specialist and Clive Mokoena, programme manager for Nuclear Education and Training at Necsa.

“The SAIW is the Regional Designated Centre responsible for NDT and has been involved with the International Atomic Energy Agency (IAEA) since 2000 as part of the African Regional Cooperative Agreement for Research, Development and Training related to Nuclear Science and Technology (AFRA),” explains AFRA National Coordinator, Lerato Makgae.

The IAEA has developed the Nuclear Energy Management NEMS programme for professionals working in the nuclear sector. “Managerial and technical competencies are necessary to support national nuclear energy strategies and implementations across the continent. So the IAEA has been organising Nuclear Energy Management and Nuclear Knowledge Management Schools with different partners since 2010, with these being established regionally in cooperation with a local university or nuclear organisation acting as host,” she continues.

To accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world, one of the main functions of the IAEA – in accordance with its Statute (Article II) – is to assist member states with capacity building: sharing knowledge and expertise and assisting with the procurement of equipment. “The IAEA works with its member states to foster the role of nuclear science and technology applications in support of sustainable human development.

“South Africa is a member state and the NEMS programme focuses on the managerial and technical competencies that

are required to support national nuclear energy strategies. It is particularly appropriate for young professionals in member states that intend to develop or are in the process of embarking on a nuclear development programme,” she adds.

The Department of Mineral Resources and Energy (DMRE) is the key stakeholder and nuclear sector champion for the implementation of peaceful uses of Nuclear Science and Technology Applications through the National Liaison Office (NLO) in South Africa. It plays a pivotal role in providing valuable lessons and expertise to the continent.

“The NLO is responsible for implementation of the IAEA’s Technical Cooperation Programmes – including the AFRA Programme – and for promoting the utilisation of nuclear technology by interfacing with regional and inter-regional organisations in the nuclear field: such as the Nuclear Energy Management Schools,” Makgae notes.

The NEMS2022 launch at the SAIW saw participants from 12 countries on the continent, along with IAEA Staff Members from Vienna in Austria. Countries represented included Algeria, Egypt, Ethiopia, Ghana, Kenya, Morocco, Niger, Rwanda, Senegal, Sudan, Uganda and Zambia.

SAIW, as the AFRA Anglophone Regional Designated Centre (RDC) for NDT, has been involved in:

- Direct training of more than 160 NDT Personnel in four methods up to Level 3 from more than 17 English speaking countries in Africa.
- Eleven expert Workshops since Oct 2000.
- Fourteen Scientific Missions by SAIW Personnel.
- Setting up, to date, three Approved Training Bodies (ATBs) in Africa – Cameroon; Kenya and Sudan.

“Based on the interest shown at the NEMS2022 event, there may yet be even closer cooperation between the Institute and other AFRA member states,” Makgae concludes.



At the NEM2022 launch, from left, are: Ian Gordon Senior, Knowledge Management Specialist, IAEA; Clive Mokoena, programme manager, Necsa; Lerato Makgae, AFRA National Coordinator, Joseph Zinyana, SAIW Board President; John Tarboton, SAIW Executive Director.



Approximately 60 delegates attended the seminar of the Nuclear Energy Management School programme (NEMS2022) at the SAIW.



# Steinmüller Africa: the steam generation expert

*African Fusion* talks to Steinmüller Africa Director, Moso Bolofo, about the company’s legacy and its ongoing fabrication and service offering to boiler- and process-steam operators in South Africa and across the African continent.



“We have been in this country since 1962, so we have a 60-year legacy, largely in the power generation sector,” begins Moso Bolofo, the Steinmüller Africa Director. “We started with the now old stations of Grootvlei and Hendrina, then went on to the other baseload stations of Kriel, Duvha, Tutuka and Majuba.

“In recent times, we have been subcontractors to Hitachi for the fabrication of the Medupi and Kusile boilers, which are supercritical boilers that operate at main steam conditions of 240 bar at 560 °C, with reheat temperatures up to 570 °C. This requires Level 1 high-pressure pipework, which is an area of expertise for us,” Bolofo tells *African Fusion*.

Steinmüller Africa, he adds, also operates in other industries that use steam, be it for use in their production processes, as in the pulp and paper and sugar industries, or for the generation or reticulation of that steam, as in the petrochemical plants and the fuel refineries.

From doing all the fabrication and following up with the installation and commissioning of several early boilers, the company has progressed to become a key service provider for ongoing plant maintenance. “So when it came to mothballing and de-mothballing the return-to-service plants – Camden, Grootvlei and Komati Power Stations, for example – we were there, doing whatever was needed to make it happen,” he says, pointing out that Steinmüller’s history proves the claim of being an end-to-end service provider, that “really does look at the whole lifecycle of a plant, from conceptual design, manufacture and installa-

tion and, thereafter, to the maintenance and all the way through the service life until de-commissioning.”

### World-class fabrication capabilities

“In our capacity as an OEM, we did fabrication and construction work for the early power stations, Hendrina, Duvha, Tutuka, Kriel and Majuba and the construction of Matimba power station. Later we were subcontracted for manufacturing of the Medupi and Kusile new-builds and we were a lead contractor for the fabrication of the HP piping,” notes Bolofo.

Consequently, Steinmüller Africa has accumulated local manufacturing capabilities that cover a wide range of high-pressure components for steam boilers. “Our large-scale facilities in Pretoria North have world-class fabrication equipment, such as our Oerlikon Automatic nipple welding system for steam headers; and the Cojafex Induction Bending Machine for

pipe spools, both of which are unique to the African continent,” he says.

The company’s Pretoria facilities have 50 000 m<sup>2</sup> of under-roof fabrication workshops, with a lifting capacity of up to 50 t. “We have bays up to 35 m wide and 700 m long and a pressure component production capacity of 1-million hours per year,” continues Bolofo.

Notable welding equipment for fabricating HP boiler components includes:

- A KLOOS semi-automatic CNC MIG fin welding system for sling tubes, which includes a chuck, a conveyer and two welding heads.
- A PEMA six-head submerge-arc membrane wall welding unit complete with 1.5 m wide by 30 m long conveyers; a turn-around mechanism; storage rack for flat bar and tube; shot blast stations;



*Steinmüller Africa’s header nipple welder with two submerge arc heads and an inner fusion TIG head, with each head able to travel across a 28 m length. Right: A completed header manufactured by Steinmüller Africa in Pretoria North as part of its Medupi and Kusile new-build contract.*



Steinmüller Africa's Piping Division is a one-stop shop for all induction bending requirements.



Steinmüller Africa looks for talent among the communities around boiler plants, picking up those who don't have higher qualifications and taking them from basic training and onto being A-plus welders.

and a calibrator for flat bar from 26 to 70 mm wide.

- An Oerlikon header nipple welder with two submerge arc heads and an inner fusion TIG head, with each head able to travel across a 28 m length.
- Steinmüller Africa is also the only company in South Africa qualified and approved to perform explosive welding for the power generation sector. This is used to fuse tubes to tube plates or headers in high-pressure heat exchangers and for plugging and sealing leaking tubes.

Describing the induction bending machine, Bolofo says that this unit controls the temperature of the pipe bending zone within a very narrow temperature band, plasticising it by just enough to enable highly complex and accurate pipe bends to be formed – without introducing defects or high internal stress to the pipe material. “And we are able to send completed piping for onsite stress relief in our 12.5 by 4.0 m gas furnace or one of our two 11 m long top hat heat treatment furnaces,” he adds.

Another area of expertise for the company is in the area of milling for the pulverised fuel (PF) needed by steam boiler operators. “We have done quite a lot of contract work managing PF milling plants and resurfacing the mills with new grinding media. We take care of the plant performance and uptime and are paid purely on the PF produce and plant availability, so clients who use our services have one less critical area to worry about,” he informs *African Fusion*.

### ISO 3834 and fabrication quality management

“Welding is our bread and butter, so certifications such as ISO 3834, which deals directly with weld quality issues, are vital, especially since we produce welded pressure vessels and high pressure components.

“Especially when dealing with Level 1 plant, ISO 3834 is a system that gives confidence, both to us during fabrication and to our clients and plant operators, because of the potential consequences of what might happen should a component fail.

“The ISO 3834 welding quality system makes sure that, from the inception of pressure parts, all processes, equipment and everything involved in producing high quality and safe welded constructions is line with the codes and is traceable with repeatable results,” he explains. “Everybody thinks they can weld, but unfortunately materials change all the time and when considering the operating conditions of most plant, if fabricators are not really careful about managing every aspect of weld quality, very serious, dangerous and expensive consequences may arise once a boiler is put into service,” he warns.

“For Steinmüller Africa, this is particularly important, because we continue to be involved on the in-service side for the entire life of boilers. So the ability to track back to find correct information and to know, always, what it is that has been done and how, enables us to respond to issues quickly and appropriately and to best manage longevity,” he adds.

Another other area of strength for the company is welder skills and skills development. “This is a big challenge, not only with respect to artisans, but supervisory skills and engineering backup are also scarce. Fundamental to our business is the retention of skills for the country, and this tricky.

“The boiler construction industry is very cyclical, and even on the in-service side, plants are typically running during winter and being shut down for a period in the summer months for repairs. But we need to develop and retain the skills during the quiet months, so the people we need are

available when we need them,” Bolofo says.

“Then we have to train welders when new and sophisticated alloy materials are introduced, for example. We tend to look for talent among the communities around boiler plants, picking up those that don't have higher qualifications and taking them from basic training and onto being A-plus welders. We have our own Welding Academy for developing these welders, but we also use the EBS Academy, which specialises in training in-service boiler tube welders for maintenance work.

“In the past, we used to be dependent on overseas skills, but that's now at an end. So maintaining the welding skills base to ensure we can keep plants running is more important than ever,” he notes.

“In all that we do, we strive for very high quality standards, and in the stringent high pressure boiler fabrication environment, which generally requires 100% of the welds to be X-rayed, we are achieving repair rates of 3% and less, well below global norms,” concludes Moso Bolofo.

[www.steimmuller.bilfinger.com](http://www.steimmuller.bilfinger.com)

# Air Liquide's Specialty Gas offering

## Tailored to precise needs at dependable quality

*African Fusion* speaks to Andisha Ross and Thulare Kodisang about Air Liquide's capability to manufacture high purity customised specialty gases (SG) for complex and niche markets as well as industrial processes. Air Liquide is also launching the ALPHAGAZ™ brand coupled with its innovative valve called SMARTOP™.

**A**ir Liquide's state-of-the-art SG blending plant, based in Alrode, is set up to deliver exceptionally high purity gases and specialty gas mixtures, begins Andisha Ross Specialty Gas Business Unit Manager at Air Liquide.

In addition, she reveals, the KZN region has been selected to launch the ALPHAGAZ™ brand into South Africa, which will be available with SMARTOP™, an ergonomic gas cylinder valve innovation developed for laboratory and analysis of pure gases that has become very successful in other parts of the world.

"Our specialty gases are used in various sectors such as refineries, power generation, cement plants, universities and laboratories and are used for applications where customers require high purity and very low impurities in the gases they use," continues Ross.

"Our SG plant has the high-precision blending and analytical capability to create exact mixtures to customer specifications. Our facility has the qualified personnel, a variety of high specification raw materials – sourced from both local and international suppliers – and highly sensitive measuring and control equipment to meet these

very niche customised gas needs, which we manufacture to globally benchmarked standards," she tells *African Fusion*.

Air Liquide's SG plant provides the highest safety standards while delivering premium quality gases at much lower operating costs with excellent lead times, Ross adds. The plant is a key tool and innovation to gain market share, enlarge Air Liquide's offer and build a leadership position in emerging and mature countries. In emerging countries, by producing Specialty Gases mixtures locally at competitive costs and shorter lead times, Air Liquide will capture the high growth and demand for these products and markets. The technology within the SG plant is the result of the experience shared by Air Liquide International Group Experts and know-how. Similar blending plants have been deployed in other parts of the world such as the UK, China, Middle East and North Africa.

Air Liquide's SG plants have been designed using a modular approach, with all of the high-tech preparation, filling, admin and laboratory facilities installed inside 20 and 40 ft ISO-containers. This highly flexible and modern approach minimises the infrastructure required and the facility costs – an



Andisha Ross and Thulare Kodisang.

approach ideal for localisation initiatives.

Key innovations of the plant include: Purifiers for producing Alphasgaz 2 inert gases (such as, Ar, He and N<sub>2</sub>) from industrial grade raw materials, Gravimetric equipment for producing mixtures to within 100 ppm without the need for using primary mixture cylinders and automated mixture production equipment. Furthermore, this plant abates all of the highly toxic gases such as SO<sub>2</sub>, H<sub>2</sub>S or NO, thereby providing zero toxic gas emissions.

Air Liquide R&D teams worked with major analytical manufacturers to determine the recommended gas purity for their instrumentation. "Our findings indicated that two basic ranges for gas purity (ALPHAGAZ 1; and ALPHAGAZ 2) ensure optimal performance in most applications.

ALPHAGAZ™ – ALPHAGAZ 1; ALPHAGAZ 2 and ALPHAGAZ Mix – Air Liquide's premium brand of specialty gases for laboratory and analytical applications, will be launched into the South African market starting in KZN in the third quarter of this year. "As a worldwide leader with over 30 years of experience in this field, we have made it our business to understand how our customers use high purity gases and mixtures. This has allowed us to continuously innovate in our field of expertise," says Thulare Kodisang, Specialty Gases Sales and Marketing Manager for Air Liquide in South Africa.

"While we offer undisputable accuracy and traceability, we do it with a complete, yet simple, range of the most commonly requested pure gases and mixtures. Our customer service teams are easy-to-access and totally engaged, ready to support customers, from assessing the right product to eventual utilisation in the laboratory," he adds.

"ALPHAGAZ 1, for the accuracy of analy-



Air Liquide's state-of-the-art SG blending plant, based in Alrode is set up to deliver the high purity ALPHAGAZ™ brand into South Africa.

sis ranging from % to ppm, covers pure gases that meet or exceed the purity recommendations of most laboratory instrument manufacturers, making them the choice for all-around laboratory use,” he says, adding that these are generally 99.999% pure, that is with less than 10 ppm of total contaminants.

“ALPHAGAZ 2, for the high accuracy of analysis, ranging from ppm to low ppb, are pure gases for high accuracy analysis and these have the lowest impurity levels available in the industry, making them the best choice for laboratory, analytical and process control applications where uncompromised ultra-high purity is needed,” Kodisang says adding that these gases are generally 99.9999% pure.

The ALPHAGAZ™ Mix range can be mixed to order, depending on the analytical accuracy and blend tolerance required. “This combination offers ultimate flexibility. ALPHAGAZ™ Mix products feature high purity instrumentation and calibration gas mixtures and are defined as products combining 2 to 40 components with accuracies ranging from % to ppb levels, covering a very wide range of needs, including research and engine testing, as well as environmental and refinery applications,” he tells *African Fusion*. Air Liquide is capable of certifying gas mixtures to ISO 17025 and FSSC 22000 standards, as well as being able to source mixtures that comply with metrological traceability and EPA Protocols.

The release of the ALPHAGAZ™ range in South Africa will also benefit from Air Liquide’s SMARTOP™ valve, which has the following features: easy opening with an ON/OFF lever; a permanent pressure gauge that allows gas content to be easily checked, even when the cylinder is closed; immediate gas cut-off; a residual pressure valve, which prevents back-flow contamination and permanent and ergonomic protection for the valve.

“SMARTOP™ will be available with ALPHAGAZ™ branded specialty gases and it works perfectly with all single and two-stage gas pressure regulators from Air Liquide,” notes Kodisang.

“In addition, the Specialty Gases facility produces welding shielding gases as well as resonator and assist gases for laser cutting. The facility has the capability to produce custom made gases that comply to EN14175 and AWSA5.32 specifications. The one to two percent nitrogen in argon gas, for example, is mixed at the SG plant and used for GTAW of duplex stainless steels,” explains Kodisang.

The demand for laser cutting gases is



*The ALPHAGAZ™ brand in South Africa will be available with SMARTOP™, an ergonomic gas cylinder valve innovation developed for laboratory and analysis pure gases that has become very successful in other parts of the world.*

steadily growing, he continues, and Air Liquide offers the associated lasing/resonator gases and assist gases. “The different OEMs for CO<sub>2</sub> laser processing equipment, such as Trumpf, Amada and Bystronic, recommend different lasing gas mixtures, which are in general three-part mixes of nitrogen (LASAL 1), carbon dioxide (LASAL 2) and helium (LASAL 4) with varying concentration percentages. The resonator gas mixture can be supplied at the point of use either from individual LASAL cylinders of each of the aforementioned high purity gases, or this can be a pre-mixed cylinder blending the three gases that are supplied through our LASAL Mix range,” Kodisang explains.

Laser cutting also requires the use of a process assist gas. “For carbon steel materials, high purity oxygen LASAL 3 is generally used at relatively lower pressures and flow rates, because it combusts the kerf area and makes the dross easy to blow clear. For stainless steel and exotic materials, however, nitrogen LASAL 1 is preferred. It is inert and requires higher pressures and flow rates to flush the dross from the kerf area,” he explains.

“We strive to supply exactly what customers in varying industries need, but we also believe in simplifying the choices and keeping costs down,” Kodisang concludes.

[www.airliquide.com/group/south-africa](http://www.airliquide.com/group/south-africa)



**Key features of Air Liquide’s SMARTOP™ solution.**

- 1: Fixed shock-absorbing cap provides added safety during transport and use, and eliminates lost screw-on type caps.
- 2: Positive ON/OFF lever action of valve stops gas flow quickly in an emergency and provides unmistakable visual indication of valve status.
- 3: Attach pressure regulator.
- 4: Internal Residual Pressure Valve (RPV) prevents back flow contamination during use and storage.
- 5: View pressure of cylinder at a glance without use of a regulator.
- 6: Built-in cylinder flow restrictor prevents sudden gas release to help prevent personal injury.
- 7: Ergonomic design makes it easy to handle and manoeuvre the cylinder.
- 8: Open design minimises insect nesting.
- 9: Valve lever locks safely in closed position.
- 10: Colour-coded cylinders for fast, positive ID of contents.



# MMS: an advanced SA fabricator

Metallurgical and Manufacturing Services is a proudly South African fabrication specialist born out of South Africa’s nuclear facility at Pelindaba. The company is therefore noted for its expertise in the fabrication of critical, high value components from exotic materials. Dion Greyling: a metallurgical engineer and an International Welding Technologist outlines the company’s niche capabilities.

“Our story began in February 1998 following downscaling of the Nuclear Energy Corporation of South Africa (NECSA), which led to the formation of MMS as a specialist welder and fabricator of critical plant components manufactured using special and exotic materials,” says Dion Greyling, the company’s International Welding Specialist.

“Our experience gained at NECSA included manufacturing in special alloys, the development of advanced manufacturing processes, serving as the metallurgical arm of the department responsible for the design, manufacture and maintenance of all rotational equipment, as well as considerable experience from the previously established and operated uranium enrichment plant at NECSA.

The company’s nuclear heritage puts safety and product quality at the heart

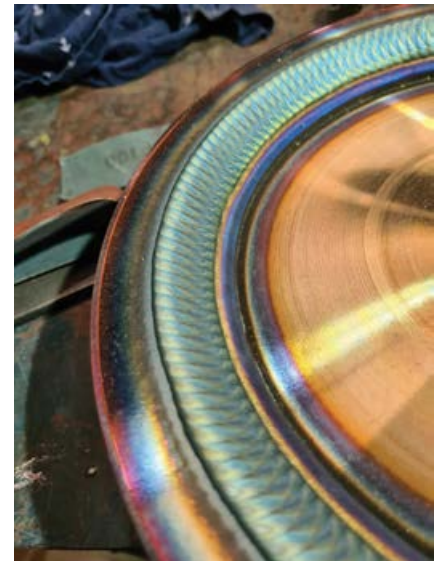
of MMS’s core values, with sustainability and integrity as guiding values for the environmental and business ethics aspects of the company’s offering. “We take pride in the world-class quality we produce. All projects are done to client specifications. If no specifications yet exist and these are required, we will do the qualification (WPQR) according to the requirements of ASME IX or BS EN ISO 15614, and all our welders are qualified to BS EN ISO 9606 to do work according to these codes,” he adds.

MMS specialises in components manufactured in sophisticated engineering alloys. Typical materials that can be accommodated include aluminium; nickel-based and copper-based alloys; titanium and titanium alloys; wear-resistant alloys such as Stellite; as well as cast iron, carbon steels, high-strength low-alloy (HSLA) and high-alloy steels; austenitic, precipitation-hardened, super/duplex, martensitic and ferritic stainless steels; and corrosion-resistant overlay materials such as Monel. “We are also specialists in joining dissimilar alloys such as copper to stainless steel, for example,” Greyling adds.

Welding experience gained in South Africa’s former uranium enrichment programme is now used by MMS to service the power generation, chemical, petrochemical and plastics industries, as well for defence, mining and general manufacturing.

### Facilities and capabilities

The company’s 2 200 m<sup>2</sup> of workspace is made up of five integrated business units: the CNC machine shop; the manual machine shop; our welding and heat treatment



*The Plasma Transferred Arc Welding (PTA) process is a versatile powder-based method of depositing high-quality metallurgically fused deposits onto relatively low-cost surfaces.*

facility; the specialised equipment and R&D facility with Electron Beam, Plasma Transferred Arc and Robotic WAAM/3D-printing machines; and a receiving, dispatch, storage and assembly shop,” says Greyling.

In terms of welding capability, MMS has specialist welders for delivering Gas Tungsten Arc Welding (GTAW/TIG); Gas Metal Arc Welding (GMAW/MIG), Submerged Arc Welding (SAW) and Shielded Metal Arc Welding (SMAW/STICK).

In addition, however, the company offers several of the advanced modern processes, including Electron Beam Welding (EBW), Plasma Transferred Arc (PTA), and Cold Metal Transfer (CMT) welding, the latter being used for 3D printing/additive remanufacturing of high-value replacement components and rapid prototyping of products in the development phase.

“We are one of few fabricators in South Africa with an Electron Beam Welding station, which enables us to join ferrous, light and precious metals and alloys to themselves or to each other. EBW is a fusion process that uses a high-velocity electron stream to supply the fusion energy between two parts. The process, which has to be done in a vacuum chamber, does not require any filler material, with the joint being achieved by melting material from each side of the joint as the kinetic energy of the electrons is transformed into heat upon impact,” Greyling explains.

It is a fully automated process that delivers very high depth-to-width ratios, with penetration depths of up to 35 mm in



*A KUKA robot arm is used with Fronius’ Cold Metal Transfer (CMT) welding process for 3D printing/additive remanufacturing of high-value replacement components and rapid prototyping of products in the development phase.*



carbon steel and joint widths as narrow as 3.0 mm. Distortion is minimal and weld strength exceptional. EBW is ideal for thick section welding, particularly of exotic and difficult to weld materials. It is typically used at MMS to weld flanges onto turbine shafts, for example.

Plasma Transferred Arc Welding (PTA) is another advanced process being offered by MMS. “PTA is a versatile powder-based method of depositing high-quality metallurgically fused deposits onto relatively low-cost surfaces. Alloys consisting of various hardnesses or sought-after properties, including carbide composites, can be deposited on a variety of base materials to achieve diverse surface properties, which include: mechanical strength, wear and corrosion resistance and creep resistance,” he explains.

PTA advantages include: a constant and low heat input that delivers minimal dilution of the base materials (<5%) – most other processes for this application have a dilution of more than 20 to 30%; low crack risks; good surface protection properties; and several more, making it an ideal process for surfacing valve seats, for example.

Another MMS speciality is the reverse engineering and/or remanufacture of valve wedges or seats from previously damaged components. “We can generate the engineering drawings, apply hardfacing using an appropriate alloy such as Stellite 6 onto a blank billet, and then remanufacture or refurbish valve seats to original OEM specifications,” notes Greyling, adding that this service can significantly reduce lead times and costs from overseas OEMs, and/or the need to replace an entire high value component because replacement parts are no longer available.

In support of the company’s reverse engineering offering, MMS has also recently set up a Cold Metal Transfer Welding station to enable wire-arc additive manufacturing (WAAM) or 3D printing using the CMT welding process. “We have a CMT welding station with a KUKA robot arm that delivers the very low heat inputs needed for perfect 3D printing.

“This is ideal for wear rings, for example, that need to be manufactured from specialised alloys. These niche components can take months to import, but we can use our CMT-based 3D printer to build and then machine them to the precise size within three days. We can also do the heat treatment, where applicable, and provide all of the procedural qualifications, mechanical testing, material certificates and the NDT – and internationally, the use of this WAAM/3D-printing process is rapidly expanding,” Greyling informs *African Fusion*.



*A fully refurbished Pelton wheel for a water-turbine re-engineered and refurbished in 316 stainless steel from the damaged original (inset).*

In support of the welding side, MMS’ machine shops house horizontal and vertical boring mills; CNC and manual lathes and 4- and 5-axis milling machines; as well as drill presses, wire cutters, spark eroders and more.

“We specialise in weld constructed manufacturing and refurbishment of products such as pumps and pump heads; Pelton wheels in 316 stainless steel for water-turbines; and turbine impellers and blades for all types of rotating equipment. We also have a service centre, where we service equipment such as compressors, expansion turbines and valves, which involves disassembly, diagnostics, re-engineering, servicing and assembly.

“In addition, we offer onsite field services; metallurgical and mechanical engineering; design, CAD modelling and reverse engineering; material sourcing; heat treatment; brazing and much more.

“We at MMS apply our rich experience to deliver exceptional services to our clients through cutting-edge technology and a talented, dedicated team of highly qualified and well-trained employees. We strive to maintain the highest quality standards while adhering to industry requirements via full compliance to ISO 9001 and ISO 3834-2 standards,” concludes Dion Greyling.

[www.mmservices.co.za](http://www.mmservices.co.za)



*A new and complete turbine rotor reversed engineered and manufactured based on the data extracted from a damaged component.*



*A remanufactured pump head.*

# Wind towers: factors leading to fabrication success

Erwin Gering, global key account manager for wind energy, pipe mills and steel construction at voestalpine Böhler Welding, outlines key consideration for those wishing to improve the performance of onshore and offshore wind tower fabrication processes.

**F**or a total solution for the three related global problems of energy security, climate change and affordability, the key lies clearly in generating more power from renewables. To achieve the net-zero emission targets by 2050, wind energy will be a major contributor. But strong growth in wind power capacity will require large-scale manufacturing of wind towers and foundations, where standardisation and automated welding is key.

Most of the welding required for wind towers involves circumferential and lon-

## Erwin Gering: voestalpine Böhler Welding

Working for voestalpine Böhler Welding for 13 years, Erwin Gering's current focus is on the submerged-arc welding (SAW) process, having previously been the global product manager for SAW wire and flux. "My job is focused on understanding the needs of customers in wind energy, especially concerning the use of SAW for the manufacture of wind towers and offshore foundations," says Gering.

gitudinal joining of the large diameter sections for towers and in the components for the offshore foundations, such as monopile jacket foundations and pin piles to anchor the towers to the sea bed. These welding joints are mostly welded using the submerged-arc welding process (SAW).

The welding procedures for these foundation components require high performance welding flux and wire that can deliver consistent product quality. voestalpine Böhler Welding is continuously optimising welding consumables for the different applications in wind energy to fulfil new challenges due to increased dimensions, weights and thicknesses and the growing use of steel grades with higher strength.

## General requirements for welding wind towers

### 1. Minimal welding defects

For serial manufacture of these large components, it is essential to have a constant predictable throughput. Therefore welding defects that need to be repaired before pro-



gressing to the next production step must be kept to the absolute minimum.

Possible weld defects include: slag inclusions; gas inclusions/porosity; lack of fusion; poor bead aspect; pock marks on the weld surface; solidification cracks; and hydrogen-induced cracks.

In general, the majority of weld defects are caused by factors such as incorrect parameter settings; inconsistent manipulation, wire positioning or seam tracking; poor weld preparation with respect to either geometry, or contamination; inappropriate flux properties and quality; and unreliable or inadequate welding equipment.

Often, we tend to look for a single root cause when a problem or weld defect arises. A more holistic approach is recommended, however, due to the interaction of all the above mentioned weld defects and their causes. But let us first focus on the influence of SAW welding flux, which is very important in minimising welding defects.

Selecting a fluoride-basic flux with a high basicity index is often necessary for wind towers to achieve the required high toughness properties in the weld metal. An aluminate-basic flux with lower basicity is often preferred because it gives better welding stability, but this flux may not deliver the required toughness levels. Flux types are purpose-designed as a compromise between conflicting requirements, with their characteristics depending on the exact formulation and selection of the raw materials and the flux manufacturing process.

Relevant flux characteristics to minimise weld defects are: good arc stability; nice wetting and bead aspect; good bead appearance; easy slag release with no residuals; proper grain size distribution of small and large grains; and the required grain shape and strength.



voestalpine BÖHLER Welding's SAW range of cored wire and flux combinations offer the welding performance and quality required for the manufacture of offshore and onshore wind towers.



During welding operation, not all of the flux is melted to form slag and a large percentage of this flux can be re-used. It is important to avoid too much mechanical abrasion on the flux during flux feeding, though, since the flux granules are relatively soft and can easily be reduced to dust. This changes the particle size distribution of the flux, which affects performance characteristics such as wetting, bead appearance and gas shielding. To ensure a constant grain size distribution during recycling it is important to have good grain shape, strength and abrasion resistance to minimise dust formation. A consistent mixing ratio of recycled and fresh flux should also be maintained to prevent welding performance being affected. In addition, the flux must be kept dry to avoid moisture-related issues such as gas inclusions, pock marks and hydrogen cracking.

The lowest possible level of diffusible hydrogen is essential to reduce the risk of hydrogen-induced cracking. Fluxes with a higher level of diffusible hydrogen normally require higher preheat temperature, especially in the case of base metals with higher Carbon-equivalents, such as flanges and components that use higher strength grades (S420/S460). Robust moisture-proof flux packaging, aluminium composite foil, for example, is key to ensuring low hydrogen levels without the need to pre-dry the SAW flux.

### Stable, high level mechanical properties

Mechanical properties of the weld metal depend on: the welding wire and its chemical composition; the chemical activity of the flux; the base metal composition and the dilution rate with the base metal; the welding parameters – current type, inter-pass temperatures and wall thickness; and the weld bead thickness and grain refining under single- or multi-pass conditions.

Clearly, the SAW wire-flux combination has a major influence on the mechanical



*BÖHLER Welding SAW fluxes are designed to deliver good arc stability; nice wetting and bead aspect ratios; good bead appearance; easy slag release; proper grain size distribution; and the required grain shape and strength.*

properties of the weld metal. Table 1 highlights how wire-flux combinations have been optimised for different SAW welding requirements.

For onshore wind towers, mostly mild steel grades are used with a minimum specified yield strength of 355 MPa. Some parts of the wind tower might be constructed with a higher strength steels such as S420. Charpy V-notch toughness requirements vary from 27 to 50 J at test temperatures of between 0 and -50 °C.

In general, there is a preference for using a single flux and wire combination for fabricating all the wind tower sections for onshore projects with different requirements. This is not only for logistical reasons but also to eradicate errors that could result in inadequate weld metal properties. The combination of the Union S 2 Si wire with UV 408 TT flux has been developed specifically for onshore wind towers to cover this wide application range.

For offshore wind towers and foundations, the manufacturing requirements are on a higher level. Base metals vary from S355-S460 and Charpy toughness requirements vary from 27 - 50 J at test temperatures of between -40 and -60 °C. However, the industry normally demands wire-flux combinations that provide Charpy-V toughness levels greater than 100 J at -60° C. For

this toughness level, a fluoride-basic flux with a relatively high basicity index is frequently used, mostly with neutral chemical additions with respect to Mn and Si. To ensure the higher strength level, the matching SAW wire has a higher S 3 Si alloy composition.

Union S 3 Si wire with UV 418 TT flux is the optimised combination for these offshore requirements. For large components with high wall thickness that use these high strength steels with higher CE-equivalents, a very low level of diffusible hydrogen is very important to avoid cold cracking issues. Fluxes with a higher level of diffusible hydrogen will normally require a higher preheat temperature.

The latest improvements of UV 418 TT flux have resulted in a very low level of diffusible hydrogen for DCEP and for AC polarity for both sinus and square wave shapes.

### Minimising welding time

Tact time – the time between starting units – is a critical number because it decides the total output of a production line. Depending on the situation, the SAW welding station could be the bottle-neck that governs this tact time. Every subdivided action/element inside the SAW station should be



SAW wire	Flux	Flux type BI	Min yield (MPa)	Min tensile (MPa)	CVN toughness M-Run (J)	Application Steel grade	Classification EN ISO AWS
Union S 2 Si	UV 408 TT	AB 1,7	420	500	70 @ -50°C	2 run/multi-run Onshore, S355-S420	S 42 5 AB S2Si H5 F7A8-EM12K-H4
Union S 3 Si	UV 418 TT	FB 2,7	460	530	> 100 @ -60°C	Esp. multi-run Offshore, S355-S460	S 46 6 AB S3Si H5 F7A8-EH12K-H4
Diamondspark S 55 HP	UV 418 TT	FB 2,7	460	530	> 100 @ -60°C	Esp. multi-run High dep rate	S 46 6 FB T3 H5 F7A8-EC1
Diamondspark S 56 HP	UV 400	AB 1,9	460	530	> 80 @ -60°C	2 run/multi-run, High dep rate	S 46 6 FB TZ3 H5 F7A8-ECC

Table 1: voestalpine Böhlervelding wire and flux combinations optimised for different SAW welding requirements.

From material extraction to customer satisfaction

**and everything in between.**

The well-managed flow of goods, data, information, and finance — from the procurement of raw materials, ingredients, or parts, to the timeous delivery of a completed product — determines a manufacturer's level of success.

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evaluated to create reliable time-savings. Welding time (arc time) is one of them. Additionally, the increasing dimensions (diameter, length and wall thickness) of the components will have a significant effect on the number of cans/circumferential welds; the number of longitudinal welds, which may have two or three longitudinal welds per can; the weld lengths, particularly for the circumferential seams; the total weld volume and the total arc time.

A very efficient solution is to simultaneously complete several SAW weld seams in parallel. Another possibility is to reduce the weld volume. Attention must be paid to avoiding weld preparations that are too narrow, which increases weld defects rates. A good example of an efficient 'narrow gap' weld preparation for SAW process is a 7 - 8° bevel angle with a radius of 7 - 8 mm. Such a weld preparation can be made by dedicated machining equipment.

An alternative to reduce arc time is to increase the deposition rate. Welding procedures with very large bead cross-sections are more sensitive to inconsistent penetration profiles with less penetration introducing a lack of fusion risk. To avoid large weld beads, it may be necessary to increase the welding speed, but this must not result in poor weld bead appearance/aspect ratios. Increasing the welding speed is dependent on actual process variants, deposition rates and welding speeds; weld preparation geometry and consistency; operational characteristics of the wire and flux combination; the capabilities of the equipment (roller bed/seam tracking) and operator acceptance.

In multi-run applications, the underlying runs are partly refined by the subsequent run(s). With large weld bead cross sections, the share of reheated area decreases and this might have a negative effect on the mechanical properties, which also depend on the exact chemistry of the weld metal and the cooling rate (t8/5)

UV 418 TT flux has been optimised to reduce 'scattering' of Charpy-V toughness properties in welds with large bead cross-sections. Also, the composition of the seamless SAW wire diamondspark S 56 HP has been optimised to ensure very high toughness in large weld beads, including single-pass welds and two-run procedures.

There are a number of ways to increase the weld metal deposition rate, firstly by increasing the welding current. Using a larger diameter SAW wire will only give higher deposition rates when the welding current is also significantly increased. Similarly, using a smaller diameter wire



*As well as being a reliable supplier of high quality and performance welding consumables, voestalpine BÖHLER Welding offers technical support and know-how from specialists in wind tower fabrication.*

with the same current will also result in a higher deposition rate.

Increasing the number of SAW wires in the weld pool using Tandem, Triple or 4-wires each with their own power source will also increase deposition. Here, the lead wire will often be DCEP, with the other wires using AC current to reduce magnetic interference. The advantage of AC is that it produces a 15% higher deposition rate compared to DCEP.

With twin-arc processes, a single power source is connected to a wire feeder mechanism feeding two relatively thin SAW wires via a single contact tip. Two wires with a diameter of 2.4 mm will result in a similar deposition rate curve to a single 3.2 mm wire at the same current. However, due to the double arc in the twin-arc process, it is possible to increase the current further and, in so doing, increase the deposition rate while still achieving stable welding performance. With a single 3.2 mm wire, the weld bead appearance/aspect ratio would become unacceptable at the same (high) current level.

Other high deposition process variants include adding additional cold wire; adding metal powder; increasing the stick-out length; and using an AC welding current waveform. An AC square wave current waveform with increased negative polarity effect will also raise deposition rates.

These high speed welding solutions create a higher ratio of deposited weld metal per kW of power. The disadvantage is that they require investment in special equipment and increased complexity.

An alternative that does not require significant investment in equipment is to use the seamless SAW cored wire diamondspark S 56 HP. At same current, this wire provides an increased deposition rate of between 20% and 35% compared with a solid SAW wire with same diameter. Addi-

tionally, better operational characteristics and better bead aspect ratios enable the welding current and deposition rate to be increased. Depending on the applied welding procedure it is often possible to save 40% in welding arc time.

#### **Minimising product handling and preheating downtime**

Optimal operative characteristics with good wetting and easy slag release will certainly help to enable welding to proceed without unscheduled process interruptions. Packaging formats such bulk packaging of up to 1 000 kg for SAW welding wire results in minimal downtime for exchanging wire spools.

For flux, we can apply our DRY SYSTEM, which means that the flux is protected against moisture pick up during transportation and storage. This is done using sealed aluminium composite foil or aluminium liners. DRY SYSTEM enables the flux to be used for most applications without prior re-baking (350° C × 2-4 hrs). Besides the standard 25 kg bags, we also provide 500 or 1 000 kg DRY SYSTEM big bags.

Properly controlled welding flux is also required to minimise the hydrogen level in the weld metal. An increased level of diffusible hydrogen might require a higher preheat and minimum interpass temperature, especially in the case of base metals with higher C-equivalents, such as flanges in S420 and S460 higher strength grades.

A higher preheat temperature results in higher energy cost and takes more time to bring the large components to temperature.

Reliable supply with high quality and performance levels of welding consumables is key, as well as technical support and know-how from our specialists in wind tower fabrication.

[www.voestalpine.com/welding](http://www.voestalpine.com/welding)

# Integrated gas and welding solutions from Unique Welding

Unique Welding is an importer, supplier and distributor of a wide range of welding equipment and consumables, along with industrial gases to the Southern African region. The customised welding range includes over 3 000 individual products, including welding machines, consumables and accessories for MIG, TIG and MMA welding; plasma and gas cutting machines and equipment, and torches, flowmeters, regulators and spares.

“Established in 1968, we have grown from strength to strength over the past 50 years by taking advantage of world-class supply chain and distribution facilities, to become one of the largest independent gas and welding distributors in South Africa,” says Thomas Taljaard, Head of Sales and Marketing

With its head office in Boksburg and a widespread network of branches spanning across the country, from Roodepoort, Vereeniging, Witbank and Middelburg, to Rustenburg, Polokwane, Ermelo, Evander, Nelspruit, Pinetown, Richard’s Bay, Port Elizabeth and Cape Town, the company’s fleet of more than 70 vehicles and trucks provides reliable delivery to customers all around the country, including major corporations and industries.

“We also have dedicated service centres throughout the country stocking an array of spares, as well as providing machine

service and repairs to all makes and models of welding machines – both in-house and on-site,” he continues.

With a broad customer and distributor network throughout Southern Africa, Unique Welding’s products are easily accessible to customers across multiple industries, from heavy engineering, automotive and construction, to sugar, manufacturing, petrochemicals and mining. “Some of our larger clients include Illovo Sugar, Sasol, Transnet and ArcelorMittal,” he notes.

Unique Welding differentiates itself from others in the market through a strong emphasis on customer and after-sales service. “We excel in service delivery, customer-focused interaction, providing the highest quality technical solutions, and offering sustainable value. We have a team of more than 50 sales executives who travel across the country. They are led by a sales management team with more than 150 years of combined experience under their belts. We also have a team of dedicated internal sales representatives who work at every branch to ensure our customers are always taken care of, no matter where they are,” says Taljaard.

Unique Welding invests a lot of time and money into empowering and upskilling employees and communities through skills development initiatives and social and economic projects. At its training centre at the company’s head office in Boksburg,

Gauteng, the company facilitates regular training interventions for employees. “We also offer product-specific training to help our clients get the most out of their welding consumables and machines. Technical training is offered on-site by our fully competent staff.

Unique Welding conscientiously supports the principles of broad-based black economic empowerment (B-BBEE) to foster greater economic equality within our society,” he continues

At the cutting edge of welding technology, Unique Welding works with some of the world’s best-known manufacturers to develop its in-house welding machines and equipment. Its Thermamax products, for example, are market-leaders. This customised welding range includes machines and consumables for MIG, TIG and MMA welding, as well as Plasma cutting, gas cutting equipment and regulators. The Thermamax brand represents value and quality, while meeting all required industry safety standards.

“Our entrepreneurial spirit helps employees meet the needs of customers for flexibility and reliability. We care about our employees, customers, stakeholders and suppliers, as well as the wider community. For this reason, we don’t run our business through call centres. Here, people talk to people.

[uniqwelding.co.za](http://uniqwelding.co.za)



Technical training is offered on-site by Unique Welding’s fully competent staff.



Unique Welding’s customised welding range includes machines and consumables for MIG, TIG and MMA welding as well as Plasma cutting, gas cutting equipment and regulators.



By taking advantage of world-class supply chain and distribution facilities, Unique Welding has become one of the largest independent gas and welding distributors in South Africa.

# Metal fabrication and SYSPRO ERP

Established in 1978, SYSPRO is an industry-built Enterprise Resource Planning (ERP) solution designed to simplify business complexity for manufacturers, fabricators and distributors worldwide.

**S**YSPRO provides an end-to-end business solution for optimised cost control, streamlined business processes, improved productivity, and real-time data analysis for comprehensive reporting and decision-making.

SYSPRO ERP software is highly scalable and can be deployed either in the cloud, on-premise, or accessed via any mobile device.

The company boasts an unwavering and sustained focus on the manufacturing and distribution sectors. Combined with a practical approach to technology and a passionate commitment to simplifying business processes, SYSPRO dedicates itself to the success of its partners and customers alike.

It targets its resources to the advancement and improvement of the complex and changing needs of its customers. Recognised as a leader in customer service, SYSPRO has one of the highest customer retention rates in the industry.

## SYSPRO Metal Fabrication successes

A depth of software functionality and targeted industry knowledge make SYSPRO an excellent fit for a number of select fabrication, manufacturing and distribution industries, including food and beverage, machinery and equipment, electronics, fabricated metals, automotive, and many more.

Some of the metal fabrication companies that have chosen SYSPRO for its ERP solution include:

- Benchmade Knife Company, a leading designer and manufacturer of world-class sports cutlery and edged tools, which chooses SYSPRO for its high level of integration between modules and to provide the scalability required for the company's growth, and to deliver consistency in its manufacturing process and reliable financial data. "SYSPRO Point of Sale has enhanced Benchmade's retail fulfilment capabilities, so the company can sell effectively from a retail brick-and-mortar environment as well as online.
- Fabrication specialist, Metaltech, which is using Integrated SYSPRO Solution Engineering, chose SYSPRO for its integration capabilities, scalability and

reporting functionality. The company replaced several spreadsheets, which were hindering the generation of substantial reports and the measurement of Key Performance Indicators. Using SYSPRO, Metaltech has produced reports that measure financial performance, job performance, quote accuracy, market performance and sales. The company has saved, on average, some £200 000 a year, along with time savings on administrative duties of up to 40%.

- B&R Enclosures, a metal fabrication specialist with manufacturing facilities in Brisbane, Sydney, Adelaide and Suzhou, China leverages off SYSPRO's flexibility. The company chose SYSPRO to replace legacy ERP software based on the solution's family business culture and full integration capabilities. SYSPRO is a major step in B&R's ongoing strategy to delight its customers through outstanding customer service supported by innovative systems.
- Hall Longmore, a major engineering enterprise that exports to more than

30 countries, uses SYSPRO for more accurate costing models. The company chose SYSPRO as a value-for-money system that provides a simple, user-friendly solution with significantly enhanced access to information. Reports are easier to compile and distribute, and Accounts Receivable can be entered without clicking through multiple screens.

- Zircoa, a specialty ceramics industry leader servicing a global market of end-users needing one of its customisable products across three product categories: extrusion dies, specialty refractories and granular sands and powders. The company, which has seen top-line revenue increase by 21%, chose 'nimble' SYSPRO to provide operational flexibility to support international requirements and changing product or market specifications.

SYSPRO's responsiveness to queries also helps take the guesswork out of ERP and more than 15 000 licensed companies in over 60 countries use its ERP solutions.

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# Babcock to upgrade boiler units to meet emission regulations

Babcock has come full circle at a major power station where it will be upgrading electrostatic precipitators (ESPs) on six boiler units that the company designed and built in the 1980s.

Using technology not available at the time they were first built in the 1980s, Babcock will be bringing some of South Africa's boiler units into the 2020s, enabling the power station to comply with latest emission regulations of below 50 mg of particulate per normal cubic metre (Nm<sup>3</sup>) of flue gas and essentially halving the impurities.

This power station has provided reliable power to the utility for more than four decades, ranking as the best-performing and lowest-cost generating station in the utility's fleet. The boiler was designed to burn coal with a low calorific value and an ash content of above 40%. Producing fly-ash with a low carbon content proved beneficial to the cement industry, which relies on these properties to improve water resistance in cement.

To meet the latest emission regulations, a three-part programme is required to enhance the total precipitator capability in order to achieve levels of below 50 mg:

- Upgrade and refurbish the SO<sub>3</sub> conditioning plant.
- Change the technology on the ESPs' transformers to convert them into high-frequency sets.
- Upgrade and refurbish the ESPs to maximise dust collection efficiency to comply with new legislation.

Babcock has been awarded the third portion of the programme and will refurbish four precipitator cases in each boiler, beginning in 2023.

Dave Brook, Technical Director at Babcock, explains that ESPs use an electric charge to remove impurities from air or gases through a series of collector and discharge electrodes.

"Fly ash is a very fine dust found in hot flue gases from coal combustion. It travels through the heat transfer surfaces of the boiler and the air heater, and eventually emerges through the ducting and

through electrostatic precipitators. After it is removed and deposited in the hoppers below, the fly ash is either removed or sold to the cement industry," Brook says.

"The fine dust in the gas travels a tortuous route in the boiler, resulting in areas where there is more dust, and others with less dust. In order for the ESPs to function optimally, the gas distribution should be as homogenous as possible," adds Brook.

He explains that an ESP is a box with a series of electrodes or plates strung vertically inside of it. The dust particles are charged creating a flow to the collector electrodes upon which the dust is deposited and collected. When these plates get full, they are rapped (struck), and all the dust slides down into the hopper.

Babcock will use computational fluid dynamics modelling, which was not available in the 1980s, to model the gases from the outlet of the boiler into the precipitator cases, to better understand and manage what is happening with the gases under different load conditions and improve dust distribution, thereby improving dust collection and removal.

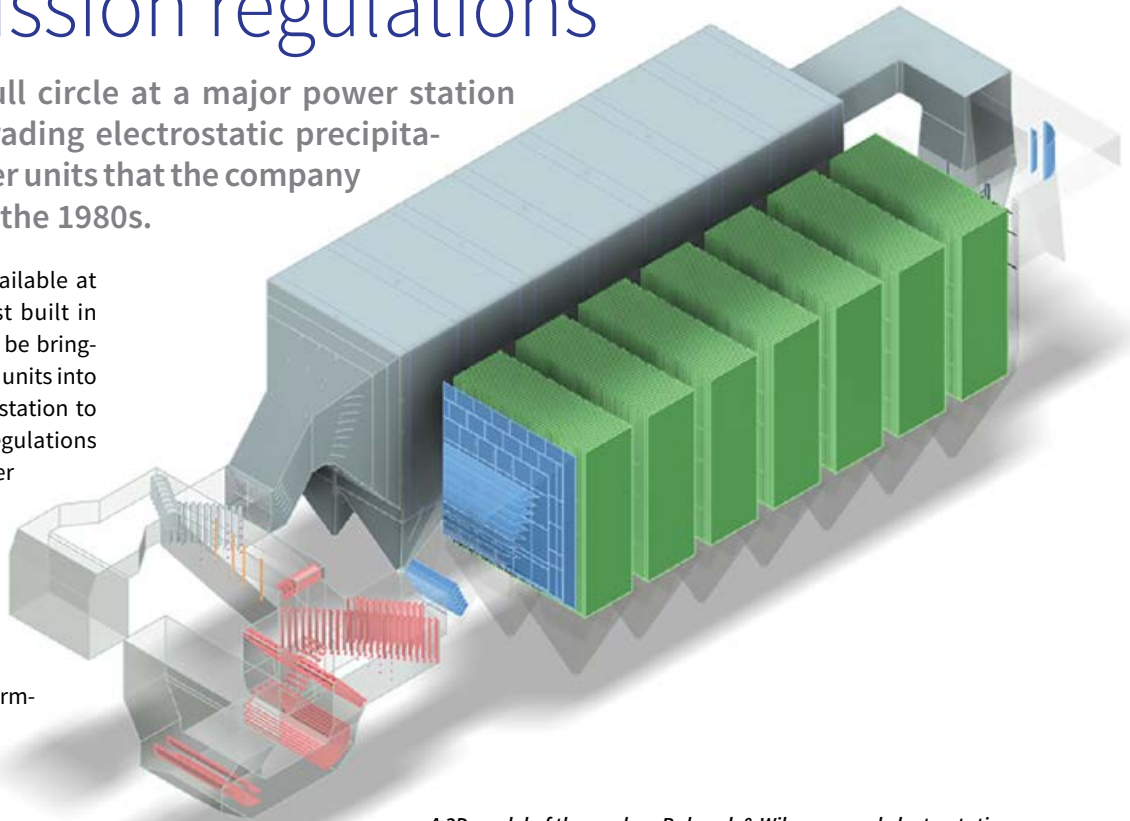
Also included in Babcock's scope of work is the replacement of the current

wire-type discharge electrodes with modern and more reliable rigid discharge electrodes. After time, the 12-metre long weighted discharge electrode wires have started to perish, diminishing the electric or corona field, causing the collector electrodes to lose efficiency and collect less dust. The new rigid discharge electrodes, which will be manufactured in South Africa, cannot break and will create a more stable corona field, thereby maximising efficiency of the ESPs.

Babcock is the lead contractor responsible for all project management, integration, delivery and construction for the project, and will be working in partnership with USA-based Babcock & Wilcox (B&W). B&W owns the technology of the original design of the precipitators and will be undertaking the process and detailed engineering.

As one of the most established and experienced steam generator and industrial plant suppliers in Africa, Babcock has delivered solutions to many of the power stations in this country. The company is present at several sites undertaking projects that include high-pressure piping, coal burner overhauls and mill maintenance.

[www.babcock.co.za](http://www.babcock.co.za)



*A 3D model of the modern Babcock & Wilcox-owned electrostatic precipitator (ESP) technology that will be used on six boiler units designed and built by the Babcock in the 1980s.*

# Effective gas purging to avoid porosity

This article from Huntingdon Fusion Techniques (HFT) describes the different purging options for achieving defect-free welds.

The production of defect-free welds is crucial, particularly if high strength is required. The presence of porosity, in particular, can lead to a significant reduction in mechanical properties. This leads to inevitable joint failure, which then results, at best, to costly repair work with production interruptions that can be even more expensive. And in the worst scenario, injury and loss of life is possible.

Gases such as hydrogen, oxygen and nitrogen are soluble in many liquid metals. As the metal cools and eventually solidifies, the solubility decreases and the gas is then released causing porosity. The principal gases that cause porosity vary depending on the material being welded. In carbon steels hydrogen, nitrogen and oxygen are all soluble, while in stainless steel and aluminium alloys, hydrogen is the usual culprit. Hydrogen and nitrogen can both cause porosity in copper-based alloys but most nickel-based materials are only susceptible to nitrogen.

To prevent porosity forming during fusion welding it is essential that hydrogen, oxygen and nitrogen are excluded from the weld environment. This is best achieved by displacing these gases by flushing with an inert gas such as argon, which is far less soluble than most other gases in liquid metal. This process is referred to as purging.

In circumstances where welds have to be designed to withstand stress in service, special consideration needs to be given to their metallurgy and profiles. The mechanical properties of welds, particularly their fatigue properties, can be influenced significantly by their shape and composition. In particular, at the weld root, a positive reinforcement combined with smooth transition from weld to base metal is a

pre-requisite to achieve optimum mechanical strength.

Joints of high quality between cylindrical sections such as tubes and pipes can only be made by ensuring that atmospheric gases are eliminated and positive, smooth weld reinforcement is provided.

The presence of oxygen and to a lesser extent nitrogen around the molten weld can lead to wide-ranging defects. Discoloration is unsightly and, in some instances, might indicate metallurgical imbalance, especially with many stainless steels. Gross oxidation inevitably results in a reduction of mechanical properties and can cause catastrophic loss of corrosion resistance. Nitrogen contamination can result in brittleness, while gas porosity in the weld may give rise to cracking during or after cooling.

It is clear that a reduction in weld section at the root, as evidenced by a concave geometry, will reduce the joint strength. Perhaps not so evident, but in many applications of crucial importance, is the presence of notches or cracks, which tend to appear at the interface between the weld metal and the base material. These can propagate in service and cause failure.

## Basic Principles

Weld root quality when making tubular joints can be ensured by applying appropriate safeguards based on the displacement of air from the fusion zone using an inert gas. This is achieved by gas purging, and the general principles are shown in Figure 1.

## Purging gases and procedures

The most commonly used purging gas in Europe is commercial quality argon; in the US, however, helium has been in more general use.

The materials being joined and the



Figure 2: Soluble weld purge film being applied to a pipe end.

welding process used are two main factors in the selection of the optimum inert gas or gas mixture. Purge gas flow rate and pressure also need to be established and, once selected, they should be included in the formal welding procedure.

Variation in purge gas quality may arise during welding and it may be desirable to apply continuous gas monitoring, especially to control oxygen and moisture content. For this purpose, dedicated Weld Purge Monitors® and Dewpoint Monitors are commercially available.

The first requirement for successful purging is to provide gas entry and exit points. Gas is fed through one end seal with an exit hole at the other end. Argon has a greater density than air and the gas inlet should be at a lower elevation than the exhaust, so that air is expelled effectively from the pipe bore. The converse applies to helium, which is less dense than air.

On small pipes and tubes, where the internal volume is small, the cost of continuous flow purging may not be significant. However, problems can arise due to turbulence inside the tube, making air displacement difficult.

The most effective purging systems are those that locate seals either side of the joint and displace air with an inert gas, while at the same time monitoring potentially damaging residual gases such as oxygen and hydrogen to ensure that they

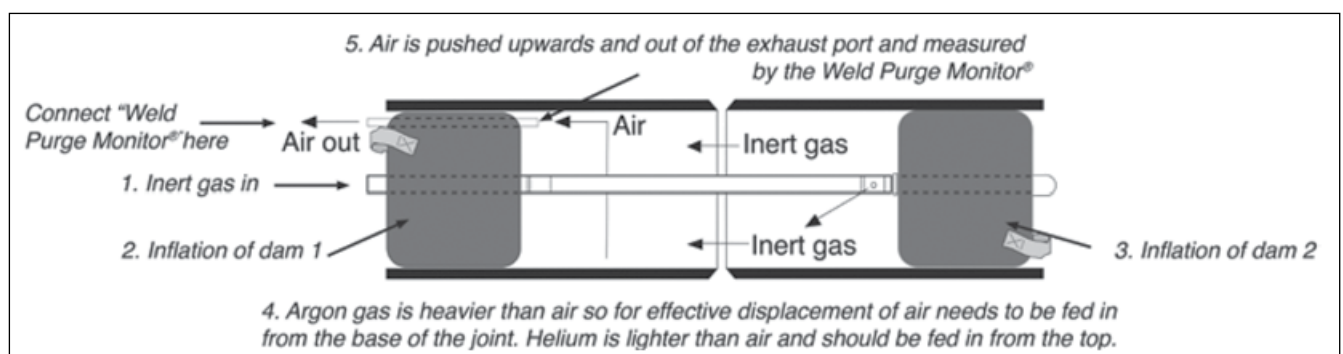


Figure 1: Schematic illustration showing pipe end seals between which air can be displaced and replaced with an inert gas.



meet the requirements in the welding procedure. The presence of oxygen can lead to oxidation and loss of corrosion resistance. Hydrogen is a major cause of porosity in the weld metal.

It is also important that potential leak paths in the seals or delivery pipelines are eliminated.

### Water-soluble purge film

Soluble barriers cut to the pipe size and glued or taped to the internal diameter provide some degree of protection and the discs can be removed by flushing with water after use. The bond to the pipe can be prone to leakage, however, and the time and skill involved in preparation can be considerable.

These are suitable for low volume weld production where time is not of the essence and access to joints is readily available.

Paper and engineering plastic versions are available, but paper versions may not be suitable for site work because of their fragility. Time, dexterity and patience are required during application and the film can only be inserted as far away from the pipe access as an engineer can reach.

Expandable pipe plugs can be very effective and cheap. These are widely used for pipe pressure testing and volume production means that the cost is low.

The sealing area is large and the time involved in preparation is relatively small. Plugs are available covering diameters up to 1 000 mm and whilst the smaller plugs are available with nylon bodies, aluminium and steel are used above 150 mm. The larger and therefore heavier versions may thus be difficult to insert and remove if the joint line is more than 500 mm from the access point.

The only totally reliable purging systems are those based on inflatable seals. Contemporary equipment has been designed to provide fully integrated control of gas flow and purge pressure. Inert gas use is minimal and they are compatible with site use where multiple welds of the same diameter need to be made quickly and efficiently.

Equipment was introduced from 2004 to meet a growing global demand for fully integrated inflatable weld purge systems. Commercially available systems cover the range between 25 and 2 400 mm diameter and are designed for repeat use under site conditions.

Inflatable tandem products exploit the latest engineering developments in abrasion resistant fabrics and low-profile gas control valves. They are compatible

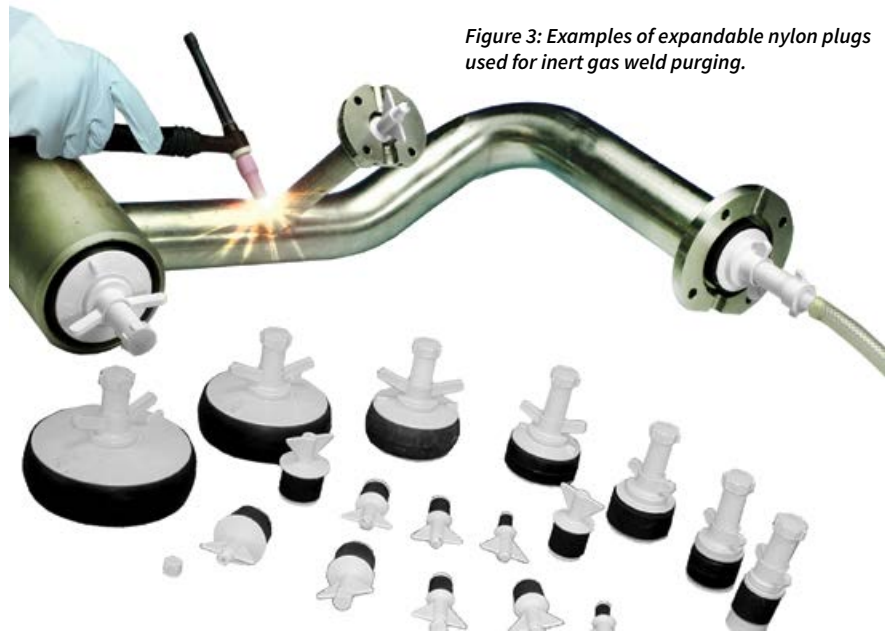


Figure 3: Examples of expandable nylon plugs used for inert gas weld purging.



Figure 4: Systems cover the range between 25 and 2 400 mm diameter.

with standards laid down by the nuclear industry.

More recent developments have led to the introduction of several further advances in equipment production. A control valve can prevent over-inflation even when the operator attempts to increase purge gas pressure. Pre-calibrated gas release valves replace alternative expensive valves that need pre-setting prior to each weld procedure.

Much larger pipe sizes can be purged effectively using inflatable dams. These can be placed either side of the joint or used as single units for welding flanges/fittings and inflated with inert gas or air. Once inflated, inert gas is passed into the space between the dams to flush out air.

In order to ensure compliance with the required oxygen level within the weld purge zone it is desirable to measure the oxygen content continuously during the welding operation. Sensitive instruments have been developed specifically for weld purging applications.

These purge monitors, of which a range to meet differing requirements is available,

Figure 5: Large pipe dams are available for up to 3.0 m in diameter to accommodate large diameter tubes and pipes or large pressure vessels.



Figure 6: A weld purge monitor showing O<sub>2</sub> and H<sub>2</sub>O levels.

are robust devices capable of measuring oxygen levels as low as 10 ppm.

Dew point monitors have also been designed to satisfy the requirement of the weld purge industry. Temperatures in the arc zone during welding are high enough to cause breakdown of water into its constituents. The free hydrogen liberated is known to give rise to porosity in the weld. Detection and removal of water vapour in the purge gas is therefore crucial if hydrogen porosity is to be avoided.

[www.huntingdonfusion.com](http://www.huntingdonfusion.com)

# ESAB to showcase modern new range at EMA

*African Fusion* talks to Chris Eibl, Keith Saunders and Jannie Bronkhorst about ESAB's latest welding and cutting solutions, which will be on show at the 2022 Electra Mining Africa (EMA) exhibition in September.

Having returned from the 2022 Nampo exhibition in Bothaville, which received some 15 000 to 17 000 visitors every day for the five days of the show, Keith Saunders says ESAB was one of the few welding exhibitors at South Africa's leading agricultural Expo this year.

"We showcased our Rebel Multi-Process inverters range, the ESAB Caddy AC/DC TIG welding machines; and the Handy Plasma 45i. We were selling equipment and PPE straight off the stand, including our Sentinel A50 self-darkening helmets and welding gloves, for example, and we are now following up on enquiries for the bigger machines that attracted interest," Saunders tells *African Fusion*. "We were so pleased with the Nampo event that we immediately booked the same spot for next year," he adds.

Attention is now turning to Electra Mining Africa (EMA), though, which is taking place from September 5 at the Nasrec Exhibition Centre in Johannesburg. "As well as key equipment and consumable offerings, a key feature of our ESAB stand at Electra Mining this year will be our state-of-the-art digital and WeldCloud solutions," says MD, Chris Eibl.

The total weld cloud solution is now encapsulated under the ESAB Digital banner, continues Jannie Bronkhorst. "ESAB Digital embraces four different aspects:

recording data with precision and accuracy; monitoring operations, from everywhere; calibrating welding machines according to international standards; and collecting the digital data needed to manage welding documentation," he notes.

Four individual but interconnected solutions are available:

1. Procedure Qualification Records (PQR)
2. Welding Machines Calibration
3. Productivity & Fleet Management
4. Online Documentation

The PQR solution is built into a multi-purpose recording and data capture device called WeldScanner, manufactured by HKS Prozesstechnik in Germany. WeldScanner can be used directly as an oscilloscope to identify the root cause of welding errors; or as a data logger that uses external sensors to record welding parameters such as: voltage, current, arc time, heat input, weld length and gas flow.

An interactive touch screen is used to highlight and display the measured welding parameters, while built-in analysis functions enable curves to be generated for easy interrogation. The data can also be conveniently exported using a USB stick for long term further analysis or storage.

Functional features of WeldScanner include:

- A rugged construction to withstand use in rough welding conditions.

*A key feature of the ESAB stand at Electra Mining this year will be its state-of-the-art digital and WeldCloud solutions.*



- Easy to operate and simple to connect to any welding power source.
- A wide variety of sensors can be selected to suit the application.
- Easy installation, which can be done by any welder within five minutes.

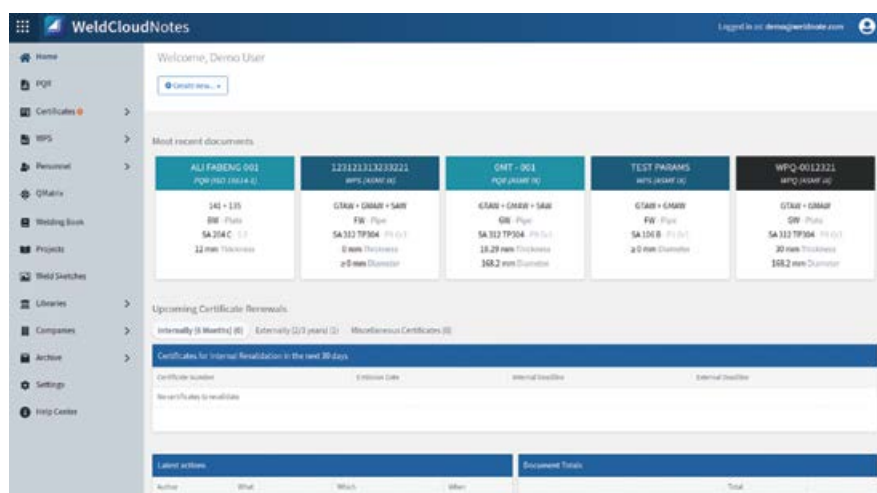
Solution 2, the machine calibration aspect is achieved using an add-on WeldScanner Validator package. In addition to all of the WeldScanner features, this also enables any brand of welding machine to be validated and/or calibrated in accordance with DIN EN IEC 60974-14. Validator generates precise measurements for welding voltage, welding current and other parameters. It can then generate calibration certificates valid for one year for each welding machine tested.

Three different packages are available, a BASIC version for SMAW, GMAW, FCAW and GTAW processes; an SAW version; and a full capability version for machines that use any of these fusion welding processes. WeldScanner Validator packages come with a load resistor along with an optional trolley.

Solutions 3 and 4: Productivity and Fleet Management; and Online Documentation, respectively, are both WeldCloud-based solutions that require a WeldCloud Universal, Mobile or Inbuilt communication module to connect the welding machine to ESAB's web-based WeldCloud platform.

The welding data collected by these modules is uploaded to WeldCloud for processing using custom developed packages tailored for managing welding processes and equipment.

- WeldCloud Productivity, which calculates and presents welding productivity results in terms of metrics such as arc time. These can then be trended, benchmarked and compared across different shifts, welding machines, workshops



Online documentation is achieved using WeldCloud Notes, which uses data collected from each welding machine to automatically generate and record PQRs; WPSs; and WPs.



and fabrication sites.

- WeldCloud Fleet, which enables welding jobs to be managed across the complete welding fleet; service log plans and documents to be recorded; maintenance alerts to be sent; software to be remotely upgraded; and the GPS location of the welding equipment to be routinely recorded so that fabricators always know exactly where every machine is at any time.

Solution 4: Online documentation is achieved using WeldCloud Notes, which uses data collected from each welding machine to automatically generate and record Procedure Qualification Records (PQRs); Welding Procedure Specifications (WPSs); and Welder Performance Qualifications (WPQs).

WPSs written with WeldCloud Notes are

guaranteed to be compliant to customer requirements and construction codes. Notes can also be used to maintain full traceability of every weld performed, which is now a common requirement for fabrication facilities operating according to ISO 3834 quality requirements for fusion welding.

“At Electra Mining, we aim to have HKS WeldScanner and Validator units running, which will enable us to do simulation welds and showcase the whole of ESAB Digital’s solutions’ suite, including WeldCloud Productivity, Fleet and Documentation applications,” notes Bronkhorst.

### The Fabrication journey

Having just released the ESAB Fabricator series into the Middle East and Africa, the air cooled and water cooled Fabrication options for this welding package will also be a key feature of ESAB’s EMA stand this year. ESAB Aristo 500 iX pulsed machines, along with Robust feed wire feeders will be launched, along with ESAB Tweco Spray Master welding torches, which make an ideal welding package for high productivity and high quality welding.

Also new in the ESAB stable is the Pak 200i heavy duty plasma machine for handheld- and off-cutting use. This Victor Thermal Dynamics machine has a 70 mm cut capability on mild steel and, at full power, the unit can deliver cutting speeds of up to 254 mm/min on 50 mm mild steel plate – at a 100% duty cycle.

Dual Gas Capability ensures superior quality and performance on ferrous and non-ferrous materials, while energy ef-

ficient inverter technology reduces the running costs. The Pak 200i also offers a gouging removal rate of 11.3 kg of mild steel per hour and comes with a two-year machine warranty and a one year torch warranty.

On the flatbed cutting side, Eagle CS technology will be highlighted. Offering a cutting area of 1 500 by 3 000 mm, this plasma and oxy-fuel cutting system offers compact, economical and precise CNC cutting at travel speeds of up to 6.0 m/min, while cut thicknesses of between 3.0 and 20.0 mm can be accommodated.

ESAB South Africa will also be promoting the recently acquired GCE-range of gas control equipment at EMA this year. “As well as its industrial range of oxy-fuel cutting equipment, GCE is a global leader in healthcare. We will be holding a morning launch of the GCE oxygen concentrator series, which are lightweight and ergonomically designed to make life simpler for patients that require long term oxygen therapy (LTOT),” continues Saunders. These devices, which enrich and purify the oxygen in the air, typically supply flow rates of up to 5.0 l/min of oxygen at 93% purity. They come with an integrated oxygen sensing device for monitoring oxygen purity levels and a low oxygen purity alarm.

ESAB can be found at Electra Mining Africa in Hall 6 stand B13 from September 5. “I think we have a really good story to tell about our equipment and we look forward to meeting you at our stand,” concludes ESAB SA’s Chris Eibl.

[www.esab.ae](http://www.esab.ae)

*On the flatbed cutting side, Eagle CS technology will be highlighted at Electra Mining, a plasma and oxy-fuel cutting system that offers compact, economical and precise CNC cutting.*



# Safety Unites showcases safety and innovation

An innovative leak-proof oxyfuel gas shut off system was showcased at the joint Safety Unites: Compressed Gas Safety Conference held in Johannesburg during the last week of June. *African Fusion* talks to Ian McCrystal of First Cut, and Peter Rohlssen and Robert Lawrence of Gas Safety International (GSI).

**H**osted by a collaboration between Bolt and Engineering Distributors (B.E.D.) Group; First Cut; Gas Safety International (GSI); and Germany's Messer Cutting Systems, the Safety Unites Gas Safety Conference reminded stakeholders across the compressed gas value chain of the critical need to improve and advance safety procedures and systems.

"The collaboration between our four companies began when First Cut entered into an agreement with Messer Cutting systems approximately three years ago when, for a number of reasons, Messer Cutting decided to exit South Africa," says the CEO of First Cut, Ian McCrystal. "We were looking for an opportunity on the machine side of the oxyfuel cutting space, so we sat around the table with Messer to talk about how we could enter this market," he tells *African Fusion*.

"At First Cut, we are strong in the general industrial markets, but relatively weak in the mining sector, so it made sense for us to team up with Bolt and Engineering Distributors (B.E.D.) as a strategic

partner for the Messer Cutting brand.

"Then we started looking for something that would differentiate Messer Cutting products in this crowded market. Having quickly recognised the role of the safety aspects involved in this technology, we came across Peter Rohlssen and his company, Gas Safety International (GSI), who added genius to the equation in the form of his leak-proof oxyfuel gas shut-off system," McCrystal relates.

"We have since developed a very nice synergy between the four parties, at an IP level and as equipment distributors – and the development of the safety system that Peter invented was very much a joint effort between South Africa and Germany," he adds.

## Safety Advanced Technology (S.A.T.) and leak-proof oxyfuel cutting

Peter Rohlssen, the MD of GSI, describes the innovation: "Our Safety Advanced Technology, which we launched at the conference, is – we believe – the world's first patented leak-proof oxyfuel system specifically



*Peter Rohlssen, GSI's Managing Director and founder presents at the Safety Unites: Compressed Gas Safety Conference.*

developed for the safety-critical industrial and mining sectors. We think this system will revolutionise compressed gas safety," he notes.

S.A.T. involves three newly-patented components, a process change for oxyfuel gas cutting, along with a new shut-off valve on the fuel line and a redesigned cutting torch. This new safety system massively reduces the consequences of hose damage and gas leakage accidents when using oxyfuel equipment.

During a demonstration of how the S.A.T. system works, Rohlssen starts by clamping a conventional oxyfuel torch without the new safety device into a vice. He opens the oxygen and fuel lines and lights the flame. Then he takes a knife and a gas lighter to the fuel line a metre or so back from the torch. As soon as the hose is perforated, flame starts to pour out of the hose, while the torch flame diminishes but remains alight. The fire and explosion risks are clearly highlighted – and these risks are equally likely due to leaky connections or damaged hoses.

Moving on to demonstrate the S.A.T. system, he clamps the newly developed torch and connects the associated safety valve onto the fuel line. He again opens the valves and lights the torch. But when he cuts the hose, as soon as it is perforated and the fuel gas begins to escape, the torch extinguishes and, even though the gas lighter is held over the cut hose, no gas or flame escapes.

He then repeats the experiment using a small section of transparent PVC hose in the fuel line. Instead of cutting this hose,



*Partners in gas safety, from left: Ian McCrystal, CEO of First Cut; Peter Rohlssen, MD of GSI, Mike Giltrow, CEO of the B.E.D. Group; John Emholz, Global CEO and President of Messer Cutting Systems; Martin Zeller, division manager Sales: Oxyfuel Business Unit at Messer Cutting Systems.*



he holds the gas flame underneath the PVC hose to burn it. Again, the torch shuts off the instant the hose burns through.

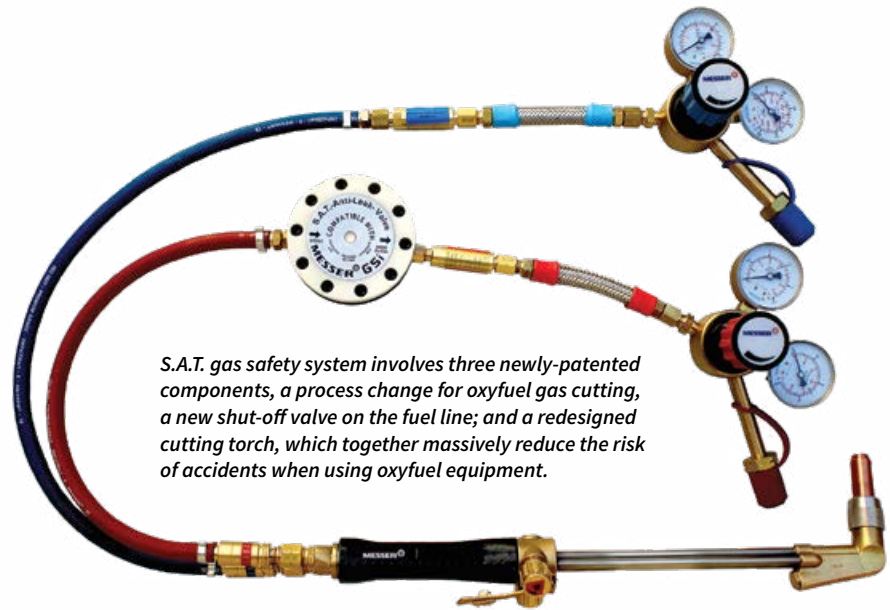
Describing how the new process works, he says the system comprises a demand valve on the fuel side of the torch that shuts off in the event of a leak anywhere between the cylinder regulator and the insides of the torch. Effectively what happens is, instead of these leaks filling the workspace and creating the fire and explosion risks that we all understand, the leak causes the whole system to shut down.

“The valve does not work on its own, though, it works hand in hand with a new process innovation that involves the torch design – and all of these three innovations have been patented,” he reveals.

Describing what happens, he says that the new S.A.T. cutting torch has a special injector built into it that creates suction or negative pressure; using the venturi effect by funnelling or constricting the flow of oxygen. “So when you open the oxygen gas valve and put your finger on the fuel gas nozzle, you can feel suction. This suction is then transferred through the hose to a diaphragm, which opens a fuel-gas valve and allows the fuel gas to flow through the hose to the torch at low pressure,” Rohlssen explains.

“The moment suction is somewhat impaired, owing to, let’s say, a loose connection or a damaged hose or a hose bend, this suction loss causes the valve to close. The operator then has look for the damage before the system can be used, and for the duration of this time, there will be no gas leaking out into the atmosphere,” he informs *African Fusion*.

As well as this innovation, Robert Lawrence says that there is a whole welding and cutting technology side to the GSI, First Cut and B.E.D. partnership that goes well beyond oxyfuel cutting systems. “We’re actually changing the way our own people



*S.A.T. gas safety system involves three newly-patented components, a process change for oxyfuel gas cutting, a new shut-off valve on the fuel line; and a redesigned cutting torch, which together massively reduce the risk of accidents when using oxyfuel equipment.*

think about safety for all of the welding and cutting processes,” he notes. “We go into fabrication workshops and, as well as introducing the S.A.T. system, we do safety audits, looking at how the welding electrodes are being used, how the welding gas cylinders and regulators are being handled and maintained, and a host of other safety related practices,” he says.

“There are really three components to our market offering at GSI. The first is safety training that ranges from one or two day to five day seminars approved by the Engineering Council of South Africa, and that come with CPD points towards professional development requirements. The second is risk audits at a company’s premises; and the third is forensic investigations following an accident or incident. “We are well respected in markets all around the world, particularly with respect to gas safety and safety equipment, whether it’s from Messer Cutting Systems, GSI, First Cut, B.E.D. or anyone else - we are here to teach people about safety,” Lawrence says.

During the con-

ference, Rohlssen cited one of the worst compressed gas safety incidents South Africa has ever seen when, on 16 September 1986, an oxy/acetylene-related incident claimed the lives of 177 people at the Kinross Mine.

“This infamous tragedy highlights the dangerous consequences of not following the prescribed compressed gas safety procedures and protocols and the critical importance of compressed gas safety awareness and training,” he points out. “Together with our colleagues and fellow conference partners – the B.E.D. Group, First Cut and Messer Cutting Systems – GSI is strongly advocating for industry to be more aware and proactive regarding compressed gas safety,” he says.

These four companies have therefore come together to underscore the importance of awareness, knowledge and training across all sectors of the local compressed gas value chain – and, in a global first, to introduce a revolutionary patented oxyfuel system to the market.

[www.firstcut.co.za](http://www.firstcut.co.za): [www.bolteng.co.za](http://www.bolteng.co.za):  
[www.gas-safety.co.za](http://www.gas-safety.co.za): [uk.messer-cutting.com](http://uk.messer-cutting.com)

*The S.A.T. safety system is ideal for incorporation into CNC-controlled oxyfuel cutting tables.*



# BMG's specialised welding services

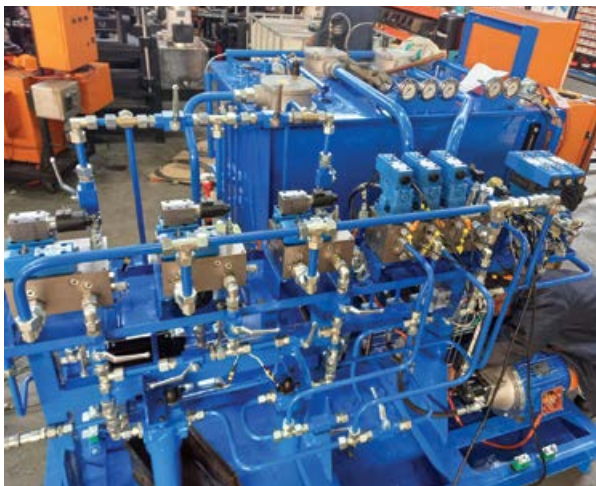
BMG's specialised welding services are critical in the fluid power sector, where hydraulic reservoirs, hydraulic cylinders, and auxiliary components, require the highest standards in welding, says Daniel Feiteira, BMG's Business unit manager for Fluid Technology High Pressure.

“One of the most important factors in the construction and maintenance of hydraulic and lubrication equipment is the quality of the welding. All welding procedures at BMG are carried out by skilled boiler makers and welders who are certified by the Southern African Institute of Welding,” explains Daniel Feiteira, BMG's Business Unit Manager – Fluid Technology High Pressure division. “BMG conforms to ISO 9001, ISO 14001 and ISO 45001 specifications to ensure quality builds with pristine weld integrity and provides full data packs with a Quality Control Plan in accordance with and subject to specific customer requirements.”

For customer convenience, BMG's field services teams carry out on-site welding during the installation and replacement of piping, plate work, stainless steel and



BMG's range of Jasic welding equipment comprises arc inverters for tungsten inert gas (TIG), metal inert gas (MIG), metal active gas (MAG) welders and plasma cutting machines.



High quality welding is critical for frames and cylinders in the hydraulics and pneumatics sectors.

other components.

An important project for the BMG Fluid Power team was the installation of pipework over a 48-hour shift shut period. The customer had a requirement for fully welded and connected pipework for Schedule 10, 40 and 80 piping. Appropriate assembly, welding, flushing and pressure testing were conducted on site, in accordance with site specifications. This project was commissioned by the respective engineering and field services teams.

BMG's welding services include hydraulic cylinder welding and the use of controlled welding manipulators. Hydraulic cylinders require welding as they are considered pressure vessels, which are designed and machined to specification to move and hold heavy loads. Frames require quality welding and may comprise skids that accommodate and house motor-pump assemblies and/or manifold blocks for bespoke full turnkey hydraulic and lubrication solutions.

“BMG's Fasteners, Tools & Equipment division has partnered with Jasic, a leader in Insulated Gate Bipolar Transistor (IGBT) welding technology and the welding brand of choice of our skilled welders,” says Jeremy Pieters, BMG's Business Unit Manager, Fasteners, Tools & Equipment division.

“We work closely with our customers to ensure a safe and healthy work environment at every plant, by advising on the selection of the correct welding equipment

and appropriate and safe use of each system. We encourage companies to be mindful of the hazards of welding fumes and how important it is to protect the health of workers, through the extraction and control of welding fumes.

“Factors for careful consideration include choosing the correct welding process and equipment, based on the materials to be welded and the material thickness. The most common-

ly welded materials are aluminium, mild steel, stainless steel and alloys, although many plastics can now also be welded. It is also important that only suitably trained operators use welding equipment.

“BMG's welding products and services are tailored to meet specific customer requirements and encompass dependable welding and cutting processes, as well as Personal Protection Equipment (PPE), fume extraction helmets, safety equipment and general accessories.

BMG's range of Jasic welding equipment comprises arc inverters for tungsten inert gas (TIG), metal inert gas (MIG), metal active gas (MAG) welders and plasma cutting.

Available machines include:

- Manual metal arc (MMA) welders from 140 A to 630 A.
- DC TIG inverters from 180 A to 400 A water-cooled pulse units.
- AC/DC TIG units from 200 A to 500 A water-cooled pulse units.
- MIG/MAG inverters from 160 A to 500 A dual pulse water cooled units.
- Plasma cutters ranging from single-phase 45 A hand-held units, to three-phase 160 A inverters capable of cutting through up to 50 mm of steel.
- Plasma cutters with CNC capabilities are also available.

All Jasic components are subjected to rigorous testing, including vibration and drop, waterproof, safety, comprehensive parameter and EMC tests, as well as harmonic wave and flicker testing. BMG supports all Jasic welding products with a comprehensive three-year warranty.

The company's portfolio of safety and PPE also encompasses COBA workplace safety matting and floor safety products, which enhance safety during welding and cutting procedures. COBA Diamond Tread matting, with a flame retardant surface, is suitable for welding bays and industrial applications.

BMG's extensive branch network stocks a wide range of inverter welders, accessories, electrodes, welding wire and PPE, which is designed to enhance safety and optimise productivity in all sectors where metal working is essential.

[www.bmgworld.net](http://www.bmgworld.net)

# Cobot welding for perfect seams

Christian Neuhofer, product manager at Fronius Welding Automation, introduces the Fronius CWC-S Cobot welding cell, a welding automation solution ideal for SMEs.

**H**igh quality requirements, sustainability aspects and safety standards are driving the demands placed on welding technology ever higher. Nowadays, reproducible welding quality and complete welding data documentation are state-of-the-art. But if welding takes place manually, these demands cannot be met. The solution is automation – even for small and medium-sized enterprises (SMEs).

Although automated welding processes achieve significantly more consistent welding results, small and medium-sized businesses frequently still struggle with automation. High acquisition costs for welding robots and professional programming expertise are at odds with small batch sizes. The CWC-S Cobot welding cell from Fronius provides a solution to this mismatch.

Thanks to precise torch movements with a repeatability of  $\pm 40 \mu\text{s}$ , weld reproducibility is guaranteed in the Cobot welding cell every time – even in series production, if necessary. Intelligent Fronius welding technology controls the welding process and records all welding data as required. The WeldCube data management software – optionally available with the welding cell – serves to store and evaluate these data.

“Programming a Fronius CWC-S is intuitive and can quickly be learned by any welding specialist; programming knowledge is not required. Components can even be loaded and welding programs started by trainees,” explains Christian Neuhofer, product manager at Fronius Welding Automation.

“This saves on personnel costs and frees up professional welders for more challenging work – making their job more attractive,” he says, an advantage that should not be underestimated when searching for skilled workers to add to the team.

In order to define the precise welding path, the welding torch is manually guided to the starting points, key position points and end points on the component, with these positions being confirmed by simply pressing a button. The software uses this information to calculate the welding contours and the welding sequence, while the

required welding parameters can also be selected quickly using predefined characteristics.

Motion commands such as ‘pendulum parameters’ or ‘weld job’ can be inserted by means of dragging and dropping pre-programmed commands on the touchscreen of the Cobot control.

Before starting the welding process, the operator can simulate the welding sequence to check path and detect and correct for any possible interference. Once the CWC-S is fully programmed, it welds component after component with consistent quality and at a regular speed.

## Equipment and starter packages

The welding cell’s standard equipment includes a Fanuc Cobot CX10 iA with a reach of 1 249 mm and a payload of 10 kg, and a welding table with a working area of 1 500x1 000x700 mm. Operator safety is ensured by a pneumatic glare shield, sliding side doors with viewing windows and an extraction hood.

Users can choose between the tried-and-tested Fronius Welding Packages Stan-

dard, Pulse, LSC (low spatter control), PMC (pulse multi control), and CMT (cold metal transfer) depending on the intended area of use, while the TPS 320i or TPS 400i welding systems are available for the Cobot, subject to the package selected.

The standard equipment can of course be supplemented with special starter packages or the user-friendly WeldConnect app, for example. Further options include an extraction system, a rotary unit including tailstock, or the option for crane loading.

[www.fronius.com/en](http://www.fronius.com/en)



The compact Fronius CWC-S Cobot welding cell includes a rotary unit and optional tailstock.



No programming knowledge is required for teaching the cell – the programming steps are intuitive and easy to learn, allowing the welding specialist to concentrate on more challenging tasks. Inset: The welding path is established point to point on the component. The software then uses these key points to calculate the welding contours and welding sequence. Photos courtesy of Fronius International.

## Industry skills shortages and the QCTO framework

Roland Innes, Group CEO of Dyna Training and Leoni MacKenzie, QCTO Subject Matter Expert in Qualifications Development talk about the ongoing skills shortages and the important role successful QCTO training programmes play in overcoming these shortages.

In its global risk barometer for 2022, international financial services provider, Allianz, surveyed 2 650 risk experts in 89 countries on the biggest perils facing industries in the coming year. Notably, skills shortages were identified as the eighth biggest risk in South Africa currently.

“Our economic recovery and growth in the aftermath of the Covid-19 pandemic will depend largely on our ability to address skills shortages in the labour market and the workplace. Companies and individuals should make the most of every opportunity to develop skills, and to align these skills with the Quality Council for Trades and Occupations (QCTO),” says Roland Innes of Dyna Training.

“Responsible for oversight, accreditation, implementation, assessment and certification of occupational qualifications, part-qualifications and skills programmes, the QCTO has a major role to play in tackling skills shortages, placing vocational certification by means of learnership and apprenticeship programmes at the centre of South Africa’s skills creation system,” he adds.

There has been an increased demand worldwide for artisans, engineers and technicians along with individuals skilled in sales and marketing. This highlights the fact that practical skills are urgently needed in the labour market and that there should be an increased focus on training artisans. South Africa’s QCTO was established to manage the Occupational Qualifications Sub-Framework (OQSF) by setting and developing standards, while assuring the quality of national occupational qualifications.

The purpose of the OQSF is to facilitate the development and registration of quality-assured occupational and trade-related qualifications, part-qualifications and skills programmes from the National Qualifications Framework (NQF) Levels 1 to 8. This is intended to meet the needs of existing and emerging sectors by ensuring that all learners, professionals, workers, unemployed and those classified as NEET (Not in Employment, Education or Training), are equipped with relevant and transferable competencies to enhance lifelong employability.

Ultimately the QCTO is intended to replace the Sector Education and Training Authority (SETA), while closing the

gap whereby individuals in the labour market have the skills but lack the formal certifications or paperwork necessary to find employment or to maximise earning potential. While higher-level qualifications are essential, it is also necessary to address the immediate gap that stands between an individual coming out of school and becoming eligible to embark on the national qualification process.

To this end the QCTO has implemented skills programmes, effectively a shorter skills syllabus, at the end of which a learner can gain entry into a qualification or a part-time qualification. This also has the immediate benefit of making the individual more employable.

In addition to increasing and keeping their own skills in-house, businesses can contribute to the career development of their people, which provides a greater level of motivation and incentive. Skills development training also assists with reducing absenteeism where workers feel that the training they’re getting is valuable to their personal growth, contributing to a more committed workforce. Where companies offer skills development opportunities, it becomes possible to redirect budgets previously used for recruitment into training, shifting the focus to retention instead of acquisition.

### The QCTO: how does it work?

The QCTO is responsible for the accreditation of Skills Development Providers (SDPs), authorising them to facilitate programmes and qualifications that fall under the OQSF. These include occupational qualifications including ‘old’ trades, N4-N6 Programmes, historically registered qualifications, and the shorter, bridging skills programmes. Any SDP offering training or intending to offer training in any of these must seek accreditation from the QCTO, and must comply with the entity’s minimum criteria.

From June 2023, SETA accreditation will be subject to a teach-out period, after which qualifications and skills programmes will need to be aligned to the QCTO. “This is a valuable opportunity for training providers to align their offerings to the QCTO accreditation standards, as that is the direction in which we are headed. It will be necessary



Roland Innes, Group CEO of Dyna Training.

to work hand-in-hand with industry leaders in developing learning material to ensure that the necessary knowledge is combined with practical experience, hands-on learning opportunities and assessments,” Leoni MacKenzie advises.

Additionally, a major focus of these skills development and training programmes will be ensuring that learners are placed at companies where they can gain experience and skills in the workplace, and ultimately take up employment after assessment and qualification. The output from SDPs will be assessed by Assessment Quality Partners (AQPs), and it is the responsibility of the Assessment Quality Partner to sign off on the provider issuing a Statement of Result to the learner which gives them entry to the Integrated Summative Assessment for certification.

“For companies to maximise this opportunity, both from a tax rebate and Broad-Based Black Economic Empowerment (B-BBEE) scoring perspective, they will need to ensure that they coordinate training initiatives with SDPs that are accredited by the QCTO,” MacKenzie continues. SDPs will need to modernise their curriculum to be more learner-focused, while forming relationships with Assessment Quality Partners.

In order for qualified learners to smoothly enter the workplace, organisations will need to prepare their workplaces so that they are compliant with QCTO requirements, developing the necessary mentoring infrastructure to enable those placements while giving learners the best possible support.

“In shifting the focus from generic skills training to inclusive learner development and facilitation through the QCTO framework, it becomes much easier to address South Africa’s skills shortage effectively and sustainably,” concludes Innes.

[www.workforce.co.za](http://www.workforce.co.za)



## Research paves the way for stronger alloys

Scientists from the University of Birmingham have described how microscopic crystals grow and change shape in molten metals as they cool. This research is breaking new ground in alloy development, paving the way for improving the tensile strength of alloys used in casting and welding.

Their research, published in *Acta Materialia*, used high-speed synchrotron X-ray tomography to ‘photograph’ the changing crystal structures in molten alloys as they cool.

The study shows that as aluminium-copper alloy cools, the solidification process starts with the formation of faceted dendrites, which are formed by a layer-by-layer stacking of basic units that are just micrometres in size. These units start out as L shaped and stack on top of each other like building blocks. But as they cool, they change shape, transforming first into a U shape and then into a hollowed out cube, while some of them stack together to form beautiful dendrites.

The study was led by Biao Cai, from the University of Birmingham’s School of Metallurgy and Materials, whose research has already demonstrated how magnetic fields influence crystal growth. “The findings from this new study provide a real insight into what happens at a micro level when an alloy cools. They show the shape of the basic building blocks of crystals in molten

alloys, and crystal shape determines the strength of the final alloy, so if we can make alloys with finer crystals, we can make stronger alloys,” Cai says.

“The results are in direct contrast with the classical view of dendrite formation in cooling alloys, and opens the door to developing new approaches that can predict and control the formation intermetallic crystals,” he adds.

Cai’s previous research has resulted in a novel technology to improve the quality of recycled aluminium by removing iron from molten alloy in a simple, inexpensive process that uses magnets and a temperature gradient.

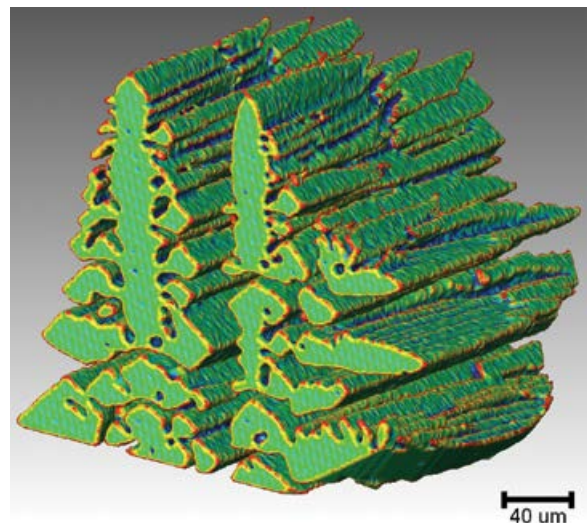
The technology is the subject of a patent application filed by University of Birmingham Enterprise. It has also attracted funding from the Midlands Innovation Commercialisation of Research Accelerator and the EPSRC-Impact Acceleration Account, which has enabled Biao Cai to build a large-scale prototype that runs at up to 1 000 °C, and uses a 1.0 Tesla magnet.

The prototype is currently being tested using ingots provided by the

Tandom Metallurgical Group, which operates an international trading operation from its base in Congleton, Cheshire, where they produce aluminium alloys and master alloys, and recycle aluminium products, scraps and dross.

Cai expects to publish the results of the testing and showcase the demonstrator to industry before the end of the year, with the aim of finding industrial collaborators willing to run tests in foundry settings in combination with existing production lines.

[www.birmingham.ac.uk/schools/metallurgy-materials](http://www.birmingham.ac.uk/schools/metallurgy-materials)



A study led by Biao Cai from the University of Birmingham used X-ray tomography to ‘photograph’ the formation of dendrites during the solidification of molten aluminium-copper alloys.

## DP-Fast for Even Better Weld Seams

SKS Welding Systems is renowned in the automotive industry for flexibility and sustainability. An example of the company’s approach are two special setups that were developed based on the results of customer experiences. Called DP-Basic and DP-Fast, these fast cyclic parameter changes for welding processes offer users improved potential for process optimisation.

Evaluating customer experiences, conducting welding tests and improving results is a core competence of SKS. These findings are collected worldwide by SKS’s customer centres and welding test labs, then evaluated in the headquarters in Kaiserslautern.

In a further step, the findings are translated into practical applications. From this process a special configuration, with the ability to extend parameter adjustments and widen the range and flexibility of welding processes, emerged in two versions: DP-Basic and DP-Fast.

DP stands for Dual Phase. A controlled oscillation of the weld pool is achieved with a periodic change between two wire feed speeds and/or power parameters. The resulting expansion and contraction of the weld pool ensures better gap bridging and improved flow properties.

The controlled switching of the power ranges enables accurate heat control. This can reduce the formation of pores when joining aluminium or coated steel materials. The chevron weld seam appearance achieved, meets the high demands placed on visible weld seams.

DP-Basic can be used for all SKS welding processes. DP-Fast can be combined with the MIG/MAG, I- and KF-pulse processes, thus enabling a wide range of applications. By increasing the frequency to 25 Hz in the case of the DP-Fast, fine seam chevrons and good outflow of the seam edges can be achieved, even at high welding speeds.

The expert mode of the weld process



An aluminium weld completed using DP-Fast, which can reduce porosity when welding aluminium or coated steels and it produces a chevron effect on the weld surface.

controller offers even finer settings, allowing users to come as close as possible to the optimal process.

This new setup is available free of charge for all users of SKS standard systems to improve their welding results.

[www.sks-welding.com](http://www.sks-welding.com)

## ‘Safety first’ with 5.5-million injury-free man hours in sight

Dekra Industrial continues along its successful safety trajectory, leading by example regarding safety in the workplace. In March 2021, the company achieved 5.0-million serious injury-free man hours of operational safety, and is now moving steadily towards its next target.

Carina Kleinhans, Dekra Industrial’s Health, Safety and Environment (HSE) manager, explains: “It was a major achievement for us to reach five million serious injury-free man hours in March last year, thereby achieving a goal that the company has been working towards for many years. We are very pleased with this achieve-

ment, as it shows real commitment from the entire workforce, led by our executive management team.

“We are now working towards 5.5-million serious injury-free man hours, which we hope to attain in early 2023.”

Dekra Industrial managing director, Johan Gerber adds: “Being able to present this excellent result to our clients allows them to see that, across the company, we live and practise our stated objectives when it comes to safety, thereby ensuring the well-being of all our employees and valued clients.

This also shows that when our Dekra

Industrial team members are on-site at our clients’ premises, we are in turn also supporting their safety-related goals, policies and procedures – ‘walking our talk.’”

Dekra Industrial’s commitment to entrenching a culture of safety is further highlighted by its current NOSA (National Occupational Safety Association) ranking results. “The recent NOSA ranking reflects our highest ever, with a score of 97.48,” notes Kleinhans. “These audited NOSA results are very pleasing, as we improve on our score every year. We believe this is testimony to our management commitment, our systems and procedures, our employees’ understanding of what is expected, and our ongoing efforts to provide clear and understandable communications regarding safety.”

“Dekra Industrial has consistently improved its NOSA results since 2013,” adds Gerber, “and I commend all our employees for their ongoing commitment to the critical pursuit of safety in the workplace.

“Combined with our steady progress towards the landmark of achieving 5.5-million injury-free hours, we continue to put safety first,” he concludes.

[dekrarsa.com](http://dekrarsa.com)



## False Bay TVET goes the distance

Owing to increased accessibility to the internet and bandwidth speeds, the trend in distance learning is on the rise. This option is especially attractive to individuals who are employed full time, have demanding family priorities and geographical limitations, says Marian Theron, the Distance Learning Manager at False Bay TVET College.

In South Africa, the White Paper on Further Education and Training highlights distance learning as an additional mode of delivery to increase access to learners. The high demand for higher education also adds pressure on the existing infrastructure, which is insufficient to meet the demand for further education.

As such, False Bay TVET College is tracking market gaps and increasingly expanding its service offerings to meet the growing demand for educational opportunities. Traditional students as well as transitioning adults need new ways to gain knowledge and training to be competitive in the workforce. Findings have demonstrated that typical subject areas of greatest interest for distance learning are business orientated.

False Bay TVET College has, however,

taken it to the next level and is able to offer Electrical Engineering, Fitting & Turning, Plumbing, Welding, Fabrication and Motor Mechanics through distance learning, which empowers individuals already employed in these fields to upskill themselves.

“We want all our learners to be successful and to that end we have developed a list of criteria to be taken into consideration when wanting to apply for distance learning,” says Theron.

Learning material and tests are made available on the College learning management system. However, exams need to be written on the advised campus at a said date. This measure has been put in place to help learners who opt for distance learning to successfully conclude and achieve their study goals. Previous experiences with distance learning opportunities have demonstrated a very high incompleteness rate, hence False Bay TVET College insists on an online introductory meeting to raise the success rate of these courses.

“Distance learning is not for everyone, and to improve the success rate of individuals pursuing this learning mode,



it is vital to build a relationship with the appointed subject matter experts, not only to offer course support, but to keep you motivated to complete,” says Marian Theron.

“False Bay TVET College offers quality, accredited, vocational, occupational and skills programmes in a range of fields. Our courses are designed with Industry to meet the skills shortages of South Africa,” she concludes.

[www.falsebaycollege.co.za](http://www.falsebaycollege.co.za)



## Weldamax/Unique Welding acquired by Air Products

On July 15 2022, Air Products announced that it had acquired the largest company in its distributor network, Weldamax, which trades under the name Unique Welding, with Gaetano Perillo from Air Products appointed as the new CEO.

As an integral player in Air Products' distributor business model, Weldamax distributes Air Products gases and a comprehensive range of welding products through its countrywide network of branches. Air Products' Financial Manager, Gaetano Perillo takes up the role as the new CEO after heading up Air Products' finance department for several years.

Perillo joined Air Products in 1991 as a Management Accountant and worked in various roles within Finance until this move to Weldamax.

According to Rob Richardson, MD of Air Products, the acquisition was a strategic move to maintain and grow Air Products' position in the industrial gas market whilst also diversifying into the welding market. "Air Products and Weldamax are two strong entities on their own, but now that they have joined forces, we have undoubtedly created an industrial gas and welding powerhouse. The acquisition will enable us to further strengthen our market share, leverage resources and knowledge, and to provide a one-stop gases and welding product offering to our customers," says Richardson.

On the appointment of Perillo to the position of CEO, he adds: "Gaetano has been a valued member of Air Products' Finance team for years, and with his leadership skills and experience, he was an obvious choice. He understands the industrial landscape and is meticulous when it comes to business practices and maintaining a high level of integrity."

During his tenure as Financial Manager, Perillo had taken his team to new heights and was the recipient of numerous internal quality awards. He says he is really looking forward to improving and entrenching Weldamax' position as a leading supplier of gases, welding equipment and consumables.

"Considering the current economy globally, as well as in South Africa, I know that I will face challenges in my role as CEO, but I am confident that my years of experience will be of value, helping me to mitigate challenges as I am confronted with them. I believe that sticking to basic business principles and adapting to market demands are crucial in business today. Delivering unsurpassed quality to customers is one way of ensuring that customers remain loyal," says Perillo.



Gaetano Perillo from Air Products has been appointed as the new CEO of Weldamax/Unique Welding.

As the CEO of Weldamax, it will be comforting to know that I have the world class support of Air Products behind us. Although my position has changed, I am not planning to make any drastic changes to my management style. I strive to lead by example and to empower my team members. I have always viewed it as important to ensure that the team also benefits from the successes of the business," he adds.

Richardson concludes: "Not only am I excited about the acquisition and what it will mean to Air Products, but I am also looking forward to seeing how Gaetano and the Weldamax team take this company to the next level of business success."

[www.airproducts.co.za](http://www.airproducts.co.za)

## Steinmüller Africa transforms lives at Vukanini Primary School

Steinmüller Africa recently sponsored the refurbishment of Vukanini Primary School, neighbouring the company's Bethal-based facility. The official handover, attended by one of Steinmüller Africa Directors, Mohamed Khan, took place on 8 of April 2022.

Steinmüller Africa provided project management and financial support for the initiative, extensively sub-contracting local businesses for the much-needed refurbishment of the school's kitchen and 12 classrooms. Renovations included interior painting; the removal and replacement of tiling; upgrading of electrical systems; and putting up shelves. A new water pump station and a 5.5 kVA solar photovoltaic system were also installed and a carport of 12 x35 m was erected in the school's parking area, along with accompanying paving.

"We are proud to have participated in the refurbishment of the school to uplift

and give back to the Mpumalanga province. The school's 850 students are now able to learn in a renovated and safe environment. By investing in schools and their students, we invest in the leaders of tomorrow and the future of South Africa," says Khan.

The opening included the attendance of South Africa's Deputy Minister of Education, Honourable Reginah Mhaule, Provincial and District Officials, the school governing body, and members of the community.

"Steinmüller Africa strives to extend a helping hand in developing the communities in which it operates to ensure a secured future for the children that reside in these communities. One of our company values is 'we care' – about our business, our employees and the wellbeing and development of communities in which we operate," says Khan.

For over 50 years, Steinmüller Africa has offered comprehensive expertise and project management in pipe bending,



Deputy Minister of Education, Reginah Mhaule, attends the reopening of the renovated primary school alongside Mr Arnoux de Bruin and Mr Mkhawu Joshua Mkhonza.

welding, manufacturing and maintenance for high-pressure, high-temperature heat exchange plants and applications across South Africa.

[www.steimmuller.bilfinger.com](http://www.steimmuller.bilfinger.com)

# Lincoln's latest Air Vantage package: the 600X-I

Now available in South Africa through Cosmo Industrial, Lincoln Electric's Air Vantage 600X-I packs in a host of new features, including up to 600 A of multi-process welding power; 20 kW of auxiliary ac power and a compressed air capacity of more than 100 m<sup>3</sup>/h. Petrus Pretorius, General manager of Cosmo Industrial highlights what the new machine offers.

**T**he Air Vantage® 600X-I is a powerful multifunction machine that offers up to 600 A of welding, 20 kW of auxiliary power, and 60 cfm (102 m<sup>3</sup>/h) of compressed air in a single package. Designed for harsh environments and with numerous welding processes, the rugged Air Vantage 600X-I can tackle jobs all around the world from heavy-duty carbon arc gouging to pulse welding.

The machine also features CrossLinc Technology to provide welders with greater control at the arc, which helps to promote a more productive and safer jobsite due



Five process modes are available, including: CC-Stick, Downhill Pipe, DC Touch Start TIG, CV-Wire, and Arc Gouging with carbon rods of up 9.5 mm.

to fewer cables and less walking.

Key features include:

- **High output multi-process welding:** Up to 600 A (IEC rated at 525 A) of welding current is available to tackle numerous welding and carbon arc gouging applications. Five basic process modes are available, including: CC-Stick, Downhill Pipe, DC Touch Start TIG, CV-Wire, and Arc Gouging with carbon rods of up 9.5 mm.
- **Generator Output:** Up to 20 kW of continuous three-phase power to run industrial tools such as plasma cutters, pumps or additional inverter welders.
- **Integrated Air Compressor:** The system has an integrated 60 cfm@100 psi (102 m<sup>3</sup>/h@690 kPa) compressed air unit built into it by Vehicle Mounted Air Compressors (VMAC®), a company that has earned a reputation for extraordinary build quality, durability and reliability.
- **Patented Chopper® Technology:** Experience premium arc performance with minimised spatter for stick or pipe welding as well as enhanced gouging performance that prevents the engine from stalling, resulting in smooth material removal.
- **Expanded Welding Capabilities:** Customised modes for stainless, aluminium and steel as well as advanced SAW and orbital pipe modes have been included. The pulse welding capability is also available for better arc control in out-of-position work and for low heat input for critical welds.
- **CrossLinc® Enabled:** The 600X-I can



*The Air Vantage® 600X-I is a powerful multifunction welding machine that offers up to 600 A of welding power, 20 kW of auxiliary power and 60 cfm (102 cmh) of compressed air.*

communicate through a standard weld cable to enable voltage or current control at the arc to be adjusted without a control cable. This improves safety, quality, and productivity, with less walking between the wire feeder and the power source and reduced site clutter. Also, True Voltage Technology™ (TVT) is built in to compensate for voltage drops due to long welding cables, further improving welding operations and procedure accuracy.

- **Reliable Operations:** As with all Vantage products, the 600X-I is engineered and field proven for ruggedness and durability to meet the most challenging on-site needs and harshest environments.
- **Industrial Diesel Engine:** The new unit is powered by a 65.7 hp (48.4 kW) turbo-charged Deutz® diesel engine, a global benchmark for reliable industrial power. The engine meets EPA Tier 3 compliance and runs exceptionally smoothly and quietly.

"The new Vantage 600X-I is an excellent, all-around welder/generator/compressor that makes almost all of Lincoln Electric's modern welding process technology available to those working on remote sites under harsh conditions," concludes Pretorius.

[cosmogroupsa.co.za](http://cosmogroupsa.co.za)



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