AFRICAN FUSION

SAIW

NOVEMBER 2020

Journal of the Southern African Institute of Welding

EXELTOP™

Trust in Performance

Air Liquide
creative oxygen

ENSURE SUPERIOR RESULTS

EXELTOP™ combines the best of our experience and technologies into a advanced built-in regulator for shielding gas cylinders.

Innovation is our focus at Air Liquide, we are driven to ease your work and assure your safety.

Gas flow stability & accuracy for high performance gas operation

- A quick and safe connection every time
- Intuitive design, easy to use
- Built to resist with strengthened guard

Air Liquide
Cnr Old Vereeniging & Andre Marais Streets, Alrode, South Africa, 1451
+27 87 288 1100

CROWN PUBLICATIONS

Published four times a year and mailed out together with MechChem Africa by:

Crown Publications (Pty) Ltd

Crown House
Cnr Theunis and Sovereign Streets
Bedford Gardens 2007
PO Box 140
Bedfordview 2008

Tel: (011) 622 4770
Fax: (011) 615 6108

Editor: Peter Middleton
E-mail: peterm@crown.co.za

Advertising: Helen Couvaras
E-mail: helencou@crown.co.za

Publisher: Karen Grant

Deputy publisher: Wilhelm du Plessis

Production & layout: Darryl James

Circulation: Brenda Grossmann

Printed by: Tandym Print, Cape

Air Liquide's Connected Store is currently being used at the Sappi Saiccor Mill in Umkomaas to service onsite contractors involved with the Vulindlela Project. Mwali Kawawa shares his excitement about the first commercial deployment of this modern and proudly South African delivery and stock management solution for welding contractors.

CESA
Consulting Engineers South Africa

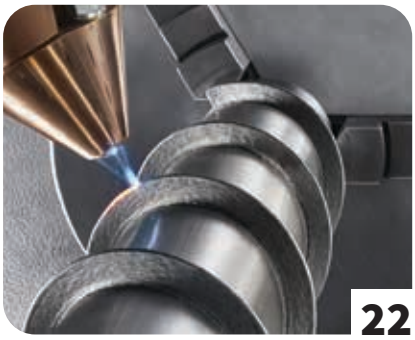
Publisher of the Year 2018
(Trade Publications)

www.africanfusionmagazine.co.za

November 2020

FEATURES

REGULARS



Our member-centred approach delivers value every step of the way

Join the SAIW today and enjoy significant discounts for corporate members on training and certification costs; free access to CPD webinars and discounts on seminars; listing and access to SAIW certified welders database and more. For only R6 400 a year (corporate members) or R820 a year (individual members), you too can benefit from SAIW membership.

JOHANNESBURG (HEAD OFFICE): Tel: +27 (0)11 298 2100 Email: jhb@saiw.co.za
CAPE TOWN: Tel: +27 (0)21 555 2535 Email: cpt@saiw.co.za
DURBAN: Tel: +27 (0)87 351 6568 Email: dbn@saiw.co.za
www.saiw.co.za

SAIW
Southern African Institute of Welding

SAIW and SAIW Certification

SAIW Governing Board

President: Joseph Zinyana – New Age Engineering Solutions
Michel Basson – Sassda
Anthony Boy – CEA
Paul Bruwer – Sasol
Gert Joubert – SAIS
Andy Koursaris – Retired
Muzi Manzi – AFSA
Morris Maroga – Eskom
Dawie Olivier – OSG
Tony Paterson – Retired
Johann Pieterse – AFROX
Willie Ranking – Retired
Carel van Aswegen – Steinmüller
Kevin Xaba – ESAB

SAIW Certification Governing Board

Chairperson: G Joubert – ArcelorMittal
P Pistorius – University of Pretoria
D Olivier – SAQCC CP
R Williamson – WilConsult
N Venter – Aveng Group
G McGarrie – Steinmuller
P Bruwer – SAQCC IPE
J Zinyana – New Age Welding Solutions
G Buitenbos – Steinmüller
H Potgieter – SAIW Certification
J Tarboton – SAIW

SAIW and SAIW Certification representatives

Executive director
J Tarboton
Tel: (011) 298 2101
john.tarboton@saiw.co.za

Training services manager
Shelton Zichawo
Tel: (011) 298 2148
shelton.zichawo@saiw.co.za

SAIW Certification manager
Herman Potgieter
Tel: (011) 298 2149
herman.potgieter@saiw.co.za

NDT training manager
Mark Digby
Tel: (011) 298 2169
mark.digby@saiw.co.za

Southern African Institute of welding
Executive secretary
Dimitra Kreouzi
Tel: (011) 298 2102 (Direct)
Fax: (011) 836 6014
dimitra.kreouzi@saiw.co.za

Finance and administration manager
Michelle Warmback
Tel: (011) 298 2125
michelle.warmback@saiw.co.za

SAIW regional representatives
Cape Town branch manager
Liz Berry
Tel: (021) 555 2535
liz.berry@saiw.co.za

Throughout this year of uncertainty, the SAIW has been on a journey to redefine who we are, what we do and why. We have a new vision to become the preferred provider of welding, NDT and related services. We want industry and its employees to think of us first whenever they encounter a welding-related need or problem. This vision is delivered through our mission, which is to offer cost-effective excellence in training, technical and certification services for companies and personnel.

As a non-profit company, the SAIW does not exist to maximise shareholder value. We have a broader purpose dedicated to the implementation of standards and training in welding fabrication and related technologies and to improve our national welding capability (NWC): so that the welding industry as a whole can ensure the reliability and integrity of welded equipment for the safety of personnel and plant.

This we will strive to do through our members and for our members, whom we empower to improve productivity and quality, whilst reducing costs in all welding related manufacturing activities: through training and qualification; certification of companies and personnel; and technology transfer. This is our member-value proposition.

I have recently been talking to one of our sister associations, the Canadian Welding Bureau (CWB), which has taken the view that its members are its customers, and that their entire service offering should be of direct benefit to its members. Apart from growing its membership and service offering, this approach also enables them to better understand the needs and expectations of industry and to represent the Canadian welding industry when lobbying Government. The approach has had a substantial impact on both corporate and individual CWB membership.

As with any change, we need to identify realistic and achievable objectives. First, we have to continue to reduce our operating deficit – and we are very pleased that COVID has not affected us as badly as expected. We expect to end the financial year with a smaller deficit than 2019 and, by 2021, we hope to be close to breaking even.

Other short term objectives include: growing our membership by a third; improving student satisfaction from 75% to 85%; increasing services provision in Africa from two to four African countries; and to expand SAIW personnel certification services to include inspectors, which adds a career-path role for SAIW-qualified inspection personnel.

We have also developed a comprehensive 2021 recovery plan, which involves two key themes. First, we are striving to raise the SAIW's profile to become more visible to the broader welding and fabrication industries. This work has already been initiated, with Etienne Nell and Constance Lekoane getting out to people and putting SAIW front-of-mind as the preferred welding service provider.

Our second recovery theme is to work with others and build alliances, such as the CWB and the dtic and its TIA Outward Bound Trade Missions to foster African growth through industrialisation. We have also been talking to the Department of Higher Education and Training (DHET) about becoming a private TVET college, which could unlock support funding for our QCTO-accredited welding apprenticeship programme. These types of alliances have become critical for raising our profile and solidifying the integral role we play.

I look forward to sharing the detail of our recovery and other plans in the new year. Until then, have a happy Christmas and New Year.

John Tarboton

President's Report 2020: Time to reimagine the future

At the 72nd Annual General Meeting on August 6, 2020, SAIW president, Morris Maroga, presented the President's Report for the unprecedented COVID-19-affected 2019 to 2020 period. Following this "battle for survival" Maroga urged the Institute to reimagine its future.

"The past year has certainly been difficult, especially with the March 2020 hard lockdown to mitigate the contagion of the COVID-19 pandemic. On one hand, the pandemic is a battle for survival, but on the other, it presents an opportunity to reimagine the future of the SAIW," began Maroga.

After introducing and thanking the SAIW Board – Johan Pieterse, Robin Williamson, Morris Maroga, Joseph Zinyana, Gert Joubert, Dawie Olivier, Ben Beetge, John Tarboton, Louis Breckenridge, Tony Paterson and Tom Rice – he moved swiftly on to the core purpose of his presentation, the SAIW's finances.

The SAIW's Audited Financial Accounts for 2019 continued to reflect an operating loss. "Income was down by around 22.72% compared with 2018, whereas expenses were reduced by 13%. Whilst the Institute is largely self-funding, sponsorship from SAISI amounted to R1.5-million, about 3.9% of total income. "We thank SAISI for its continued support and hope that this will continue in the years to come," he reported.

Addressing the effects of COVID-19, Maroga said the June 2020 income scenario assumed only 10% income after 0% income in May. Compared to 2019, this scenario predicted a 44% drop in income, with an expenditure reduction of 33%, projecting a YTD operating deficit of R4 366 227. Actual YTD income was 8% higher than predicted, whilst the actual YTD expenditure was 5% lower. This meant that the YTD operating deficit was significantly lower than that projected in the scenario plan and current reserve levels now represent 15.6-months of current monthly expenditure.

Willie Williams demonstrates submerged-arc welding in SAIW's Welding Technology Centre.

While the pace and extent of the recovery is not known, a two-year recovery period is included. While the financial performance against the scenario planning is promising, the scenario could be negatively affected if, for example, there were an escalation in the COVID-19 crisis.

"The Board members and the management team will be working hard to turn the ship around and get the Institute back to a healthy situation," assured Maroga.

Growing SAIW membership

For the SAIW to achieve non-profit status from SARS, 80% of Institute income must be derived from member companies. It is, therefore, of utmost importance to grow the SAIW member base. "Every member can help in growing membership, so I encourage all your contacts to come along and join. SAIW is a prestigious and respected Institute and being a member is something to be proud of," he said.

To grow its membership base, a Membership Committee has been established with the intention of embedding SAIW into the minds of its members and industry at large with respect to all things related to welding. "I am pleased to report that a kick-off Membership Committee meeting took place on the 10th of July and the first full meeting took place shortly thereafter on the 24th of July 2020."

While currently difficult due to COVID-19, Maroga believes that SAIW can introduce new services, and communicate and engage far better with stakeholders. "A member acquisition, retention and engagement strategy works on the premise that we can broaden the offerings of the SAIW and increase engagement of members, who will then be far more likely to use the Institute for all their training, company auditing and technical requirements," he said.

And while challenged by a relatively small pool of paying member companies, SAIW Certification has a very loyal ISO 3834 clientele who would certainly benefit from SAIW membership and its associated comprehensive range of incentives, products and services.

Some newly introduced SAIW member benefits now include:

Free first-year membership: Worth R6 400 and a further blanket 10% discount, this incentive applies when a new Corporate Member takes up of one or more of the Institute's training and certification products.

Marketing: Originally focused on face-to-face consultations with potential members to explore the benefits of membership and the full suite of SAIW products and services, COVID-19 has led to a broadening of this approach and a longer-term view towards highlighting and customising SAIW benefits for new members.

SAIW emailers: The latest execution in our new marketing strategy is the distribution of Sales emailers to targeted databases, such as ISO 3834 clients, technical services clients and others, which offer incentives such as free membership and discounted training. Clear 'call to action' buttons are included within each emailer allowing easy access to the offer. This allows us to track exactly how many people have taken up a particular offer, capture their details and follow up with them on a one-on-one basis.

Lapsed member campaign: This campaign was designed to reach out to our lapsed members and bring them back into the fold. Member engagement is only possible if an institute can add value to members' lives. The SAIW management team have thus created an effective value proposition and a great package of offerings that make membership more compelling.

A student practices his pipe welding skills in the Practical Welding School.

SAIW Training School.

The next emailer will be to current members emphasising the value of membership and highlighting upcoming events and plans. The Laboratory emailer will go out after this, followed by an emailer aimed at metals fabricators who are members of other metals associations such as ISF, SAISC, Sassda and AFSA.

Prospectus 2021: A complete campaign will also be designed when the 2021 prospectus is launched. The prospectus will be modernised by being electronic, interactive and cell phone compatible. The development of an App is currently also underway. The savings in printing will be used to develop the App.

Social media platforms: There has been a renewed focus on the strategy and the quality of the content on three key social media platforms: Facebook, Twitter and LinkedIn, with a resultant increase in followers and engagement. The next step will be utilising these platforms for lead and revenue generation.

Ask the experts: The SAIW's technical know-how and industry networks and connections are two of its greatest strengths. The LinkedIn campaign will combine those two strengths into a series called 'Ask the Experts'. SAIW will generate core pieces of content to be used as 'Expert Columns', (website articles and press releases) based on three key topics, one per month plus a webinar for each. Then emailers and additional posts will be used to offer exclusive deals and a virtual tour of the facility. The key targets of these posts are company leaders and decision makers who are able to greenlight investment into SAIW membership, products and services.

Sports Days: As membership numbers and membership engagement start to grow, the SAIW will relaunch SAIW Sports Days. The Institute will also look to sponsor holes at other association's Sports Days to promote SAIW membership and our offerings.

Annual dinner and awards

The 2019 annual dinner was a wonderful celebration of 71 years of the Institute's existence. The function was held at Emperors Palace in October 2019. It was hosted by the Institute's newly appointed executive director, John Tarboton and he was joined by several former SAIW stalwarts and well-known people from industry who have played a part in the history of the Institute. "We celebrate our award winners for their achievements," continued Maroga.

- Sasol Secunda Inspection Authority, winner of the SAIW Gold Medal.
- Quintin Ayres, who won the Phil Santilhano Memorial Award for the best student on the Welding Co-ordination or Welding Inspectors training courses and the SAIW Presidents' Award for the best NDT student.
- Hi-Tech Pressure Engineering, which won the Best IIW Manufacturing Certification Company Award in recognition of its excellent ISO 3834 Certification Manufacturing scheme.

Due to the severe economic downturn, this year's annual dinner to celebrate the 72nd birthday of SAIW will not take place. COVID-19 permitting, a combined annual seminar and gala dinner will introduced in its place.

Augmented, virtual and live welder training technologies can now be effectively used to train and screen welders.

SAIW service area reports

Training: Training figures for 2019 illustrate a dramatic decline in students attending SAIW courses in all categories, due to a range of complex factors, of which, the ones under SAIW control are currently being addressed. We are working on 2021 levels being 10% below 2019, but student numbers are unlikely to recover fully until 2022.

Technical services: The loss of ISO 17025 accreditation for the testing laboratory was damaging, causing a loss of clients and an associated impact on technical services. But SAIW has now regained ISO 17025 accreditation and is in a much better position. We are better communicating SAIW's highly competitive pricing compared to other laboratories and responsibility for growing this important part of the business has been given to Shelton Zichawo and his team.

Non Destructive Testing (NDT): NDT is a critical area in both manufacturing and plant maintenance. NDT, conducted correctly, saves plant owners millions of Rands and countless lives over a plant's operating lifetime. This said, it is imperative that extensive training for this extremely important method of inspection is of the highest calibre.

To ensure that NDT training numbers recover, NDT's short term training goals will include blended learning in the six NDT methods across Level 1, Level 2

NDT is a critical area in both manufacturing and plant maintenance.

The SAIW Testing Laboratory has now regained ISO 17025 accreditation. The Testing Laboratory team consists of, from left: KG Letlole, Nicoline Kgoedi, Confidence Lekoane and Riaan Loots.

and Level 3; on-line Level 3 workshop targeting regional SAIW branched and Cameroon; presenting one NDT Webinars per quarter; one online NDT for Engineers course; on-line theory formative and summative assessments; as well as an on-line theory qualification examinations.

Welding technology: Shelton Zichawo noted that the SAIW Welding and Fabricator Inspector Level 1 course has been upgraded and further improvements are ongoing, with tests being added to the end of each topic. SAIW Welding and Fabricator Inspector Level 2 will also need more time to refine from its current state, though this work was started during the Lockdown period.

The IWP course notes are being overhauled prior to delivering the course in Ethiopia and the International Welder course notes will also be reviewed and revised to give the Liberia project students an enhanced learning experience.

The Training, Technology, Health and Safety Committee has suggested developing refresher sessions for a range of SAIW courses via webinars, which may be offered as an additional membership benefit. Currently, virtual training is being successfully offered and two audio visual systems have now been acquired. Not only does it assist with extending learning from the three SAIW branches, but it also allows the number of lower demand courses to be offered at the Durban and Cape Town branches, live streamed from Johannesburg. This increases class sizes and stimulates interactions between the students and lecturers.

For blended learning, Zichawo has identified Google Education Suite as a possible means by which the SAIW can offer classes online. Virtual classes can be run off this platform where livestreamed lecture sessions can take place. This technology will be tested with a group of learners in West Africa using the International Welder theory coursework and a full project looks set to go ahead, possibly this year, also via online learning, as previously discussed.

Practical Welding School: Etienne Nell holds that the practical welding school is the 'shop window' of the SAIW. Fabrication project work often starts with practical welding, so it is important to revitalise this key department of the SAIW. Augmented, virtual and live welder training technologies can now be effectively used to train and screen welders. Simulation welding equipment saves fabricators money by minimising training time; reducing consumable costs; and ensuring welders are well trained.

The current key focus of the Welding School is on engaging fabricators to use SAIW to train apprentices to the QCTO curriculum.

Client Services: Michelle Warmback reported that at the beginning of June 2020, administration had been restructured to improve the Institute's communication with students. A committed Front of House Student Liaison Officer will carry out all the direct student/client enquiries and queries, thereafter all administration will be completed by the administrator. This ought to improve the handling of student bookings which, in turn, will allow the training managers to make firm decisions on the viability of running scheduled courses.

The student surveys will be used to monitor improvements and the existing Student Management System (SMS) has been redeveloped to incorporate exam rewrites, which will be available online from September 2020.

Qualification and Certification: Whilst ISO 3834 activities fall within the remit of SAIW Certification, it is pleasing to report that the ISO 3834 scheme continues to grow, with 250 companies certified and 50 more companies currently in various stages of the certification process. A total of 863 persons received qualifications in 2019 and the total number of certified persons was 3037, a figure that includes people with multiple certifications.

International affairs and external relationships

IIW: Due to the COVID-19 Pandemic, the 2020 IIW Annual Assembly and International Conference was held online between the 15th and 28th of July. Herman Potgieter attended meetings online as a delegate.

ICNDT: SAIW provides international recognition to certified NDT individuals. The ICNDT Accreditation is still valid and ongoing with regards to the NDT Certification of Personnel.

AFRA/IAEA: AFRA/IAEA has funded a contract between SAIW and Hydrac (Cameroon) for re-establishing an Approved Training, Authorised Qualification and Certification Body. COVID-19 travel restriction has put this project on hold, however.

University relationships: SAIW continues its close relationship with both Wits and Pretoria Universities where each university continues to make good progress on its respective welding engineer and research and development programmes in the field of welding.

Concluding his report, Maroga said: "We need every single member of staff to do his or her utmost to ensure that SAIW is seen to be a competent and professional organisation. People should want to come here knowing they are getting the best training possible and the best support and consultancy services available anywhere in the country and continent.

"I would personally like to thank all SAIW staff members for their hard work and contribution over the past year. The coming year will certainly be the most challenging of years in living memory, but the Institute has faced difficulties in the past and overcome them. I am sure that for the next couple of years, we will all put our shoulders to the wheel and work dynamically towards the recovery of the SAIW," he said, before also thanking the loyal and hardworking board members for their ongoing commitment.

Joseph Zinyana elected SAIW President

***African Fusion* talks to Joseph Zinyana, who was elected to be SAIW's new President at the first meeting of the board of directors on September 22, 2020.**

A renowned welding consultant in South Africa and abroad, Joseph Zinyana hold two MSc Degrees, in Welding and Metallurgy; an Inspector of Pressure Equipment (IPE) certificate and an International Welding Engineer (IWE) qualification, which makes him an ideal choice for taking the SAIW through the turbulence the welding industry is likely to experience over the next few years.

"What you dream of when you are young and what you become are never the same," he tells *African Fusion* when asked about his early career choices. "When I left school I went to university to study maths and science, thinking it would help me to become a pilot. I did my first degree at the University of the North in chemistry and applied mathematics. But in my final year, I met and married my wife, Suzan, and we immediately started a family.

"I completed my degree in 1993, and I had to get a job at the beginning of the freedom year, 1994. It was a tough and uncertain time, so people weren't yet interested in hiring. I heard of a school that required a maths teacher in Soshanguve, though, and after a meeting with the principal, I was appointed on the spot and asked to start on the very next day," he says. "So my career began in a government school as a teacher of maths and science. A year later, I moved to a Catholic school, also as a maths and science teacher, where I taught for a further three and a half years.

Then in 1998, Joseph Zinyana decided to go back to University to study metallurgical engineering. "This led to a post at Mintek, researching the different types of gold, a fascinating period. Shortly after that I joined Iscor Steel in Newcastle, where I worked in the Chemical department, researching steel making processes for basic oxygen furnaces.

"I then joined Sasol as a Metallurgical Engineer, which put me onto the welding career path. I soon became a quality engineer and six months later, after completing my Welding Engineering degree at Wits, I became a Sasol welding engineer with joint responsibility for managing the welding activities on the Secunda site. That was in 2002. And when I go back to Secunda today in my current consultancy role, I still see my name on many of the Sasol welding procedures and quality guidelines," he says.

Having realised that further promotion was unlikely and that, with the onset of retrenchments at Sasol, corporate careers were no longer guaranteed, Joseph and Susan Zinyana decided to establish their own company. "In fact, with her logistics background, Susan was the one who set up New Age Engineering, our company. In 2004, I resigned from Sasol and began to work as a welding consultant with New Age," he informs *African Fusion*.

Being a welding consultant led Zinyana to developing an ever closer relationship with the SAIW. "I joined the SAIW as a personal member because many of the corporate companies I was consulting for regarded SAIW membership as an essential requirement for a specialist in welding. I was also involved in setting up welding business systems, most notably, ISO 3834 welding quality systems under the SAIW's Welding Fabricator Certifications Scheme," he informs *African Fusion*.

Today, New Age offers a comprehensive range of project management services, engineering consultancy, welding/mechanical related services and products, and fabrication solutions for structural and pressure components. In terms of South Africa's transformation and black economic empowerment, Joseph and Susan Zinyana have created one of South Africa's most uplifting success stories.

Describing the importance of the SAIW for helping others to follow in his footsteps, Joseph Zinyana says that South Africa has serious skills shortages and we are unfamiliar with the many modern technologies that can make us successful. "Many youngsters are unaware of careers in welding, boilermaking, pipe and mechanical fitting and other artisan-based skills. They all want to become computer programmers, like I wanted to be a pilot.

"The broader community doesn't understand the importance and value of skills-based careers like welding, weld-inspection and quality control. We need to see many more artisans starting their own businesses, as they all used to, by doing private work in small garages, from where they slowly grow their income streams, their skills levels and capabilities," he suggests.

The SAIW has a vital role in broadening the knowledge and awareness of welding as a valuable career opportunity. "We need to make our youngsters understand the great need we have for skilled people. It is vital for our economic wellbeing.

"SAIW also brings the South African community into touch with the modern technologies that can make us globally competitive. We can bring these technologies and the knowledge and skills to apply them to ordinary South Africans, so they too can have much more successful futures.

"To do this, we need to broaden and grow SAIW memberships so members can take on a bigger role in growing the South African economy," he believes. "When employed in a welding career, it is always easy to find work, and it is easy to grow your career and have pride in what you do.

"Looking back, I think I made excellent career choices. Even though I didn't become a pilot, I now know they don't earn as much I had believed anyway, and our welding, fabrication and quality business has made me very proud, " Zinyana concludes.

Newly elected SAIW board members

Joseph Zinyana – New Age Engineering Solutions
Michel Basson – Sassda
Anthony Boy – CEA
Paul Bruwer – Sasol
Gert Joubert – SAIS
Andy Koursaris – Retired
Muzi Manzi – AFSA
Morris Maroga – Eskom
Dawie Olivier – OSG
Tony Paterson – Retired
Johann Pieterse – AFROX
Willie Ranking – Retired
Carel van Aswegen – Steinmüller
Kevin Xaba – ESAB


ESAB
INTRODUCING A WELDING TRACTOR
DESIGNED WITH YOU IN MIND.
We listened to welders. Then we went to the drawing board and created Versotrac – the most versatile and user-friendly tractor on the market.
VERSOTRAC
See Versotrac in action at esab.com/versotrac.
ESAB / esab.com
SAFETY • QUALITY • ENVIRONMENT • HEALTH
GLOBALLY

Quality welding skills to relaunch SA's economy

Welding is a scarce skill in South Africa with a resultant shortage of suitably qualified welders equipped to meet the required skill level for new and existing projects. The current situation follows decades of non-regulated welder training, resulting in many welders, but very few who are adequately qualified or competent. In fact, in 2017, welding ranked at number two on the South African Government's list of 13 scarce skills, highlighting the critical need for qualified artisans in this field.

The Southern African Institute of Welding (SAIW) executive director, John Tarboton comments: "The current constrained COVID-19 environment, which restricts cross border movement, means that local skills are urgently required to maintain and produce products for key South African sectors. These include power generation, mining, petrochemical, motoring and structural steel manufacturing," he says.

"With skilled welding artisans at hand, South African fabricators have an unprecedented opportunity to thrive, especially within the manufacturing sector where as much as 80% of manufactured products and maintenance requires highly trained welders. However, until there is an adequately trained workforce available, many South African companies and welders won't be able to take advantage of this huge opportunity," Tarboton adds.

Artisan appreciation

As an internationally recognised body for the welding industry in southern Africa, the SAIW believes it can assist the situation by providing the necessary industry facilities and accredited training levels. "Internationally, the role of the apprentice starts at an early age as part of the education curriculum where school leavers already carry artisanal value for future employment. Unfortunately, there is a stigma in South Africa around being an artisan and a real lack of appreciation for the value this role holds as a potential career.

"Ultimately, the demand for work in current times lies in the blue-collar sector and we welcome industry co-operation and alliances for career upliftment, which promotes our student welders to levels where they can add real value. This will provide better employment opportunities and provide skilled local welding services at a lower cost," he argues.

In line with this, the SAIW is looking at the establishment of a national register of trained welders. The plan is to launch an online portal where SAIW members can log in and source the required skilled employee within their industry sector. The strength of this offering is the trust that prospective employers can place in this offering, given its endorsement by the SAIW.

Internationally recognised local proficiency

The SAIW is also seeking to better serve industry by providing a far more flexible, customised approach to the courses that it offers. This will see it developing specific skills programmes tailormade for individual students and specific sectors. "Overall, our training courses will continue to emphasise the role of the welder within an internationally recognised playing field via our association with the International Institute of Welding (IIW). But we are also focused on training students for what is locally required on the ground.

"Ultimately, we aim to provide the required building blocks for a long-term career in welding, in line with international standards and to give our students the ability to work in local manufacturing and fabrication industries within a reasonable period of time."

The SAIW aims to provide the building blocks for long-term careers in welding, in line with international standards and to give students the skills needed to quickly enter careers in the local fabrication sector.

Looking ahead, Tarboton says: "With this new streamlined strategy, we aim to boost welding skills through our internationally accredited training facilities, and firmly believe that the skills we create within the local sector, will be significant contributors to the relaunch of the South African economy."

Jim Guild wins IIW Chris Smallbone Award

At the 2020 IIW virtual assembly and international conference earlier this year, former SAIW executive director, Jim Guild received the IIW Chris Smallbone Award.

This award is made in recognition of contributions made in the key area of IIW regional activities and liaison with developing countries. It recognises an outstanding individual who has made a significant contribution in his or her region or internationally.

Jim Guild has received the IIW Chris Smallbone Award in recognition of the significant contribution he has made in the African region and internationally.

Sponsored by the IIW Members from Bulgaria, Greece, Romania, and Serbia, the Award consists of a commemorative plaque, which would normally be presented by the IIW President during the Opening Ceremony of the IIW Annual Assembly. The Award reads 'For his outstanding contribution to improving global quality of life through optimum use and innovation of welding and joining technologies internationally'.

Current SAIW executive director, John Tarboton says: "This honour is as a result of SAIW welding and NDT work initiated by Jim Guild throughout Africa, and for his IIW input through the Regional Affairs Working Group and the IAB. There are many examples we could quote, including Nigeria, the IAEA NDT projects and many more.

"The SAIW is very grateful for the part Jim has played in these initiatives throughout the continent – past and present. The effort he has put in, along with that of all SAIW employees with the full support of the SAIW board has made SAIW a success story across Africa. We remain determined to continue this legacy by growing our business north of our borders and becoming a significant contributor to the continent's prosperity," Tarboton says.

Connected Store chosen for Project Vulindlela

Air Liquide's Connected Store is currently being used at the Sappi Saiccor Mill in Umkomaas to service onsite contractors involved with the Vulindlela Project. Mwali Kawawa shares his excitement about the first commercial deployment of this modern and proudly South African delivery and stock management solution for welding contractors.

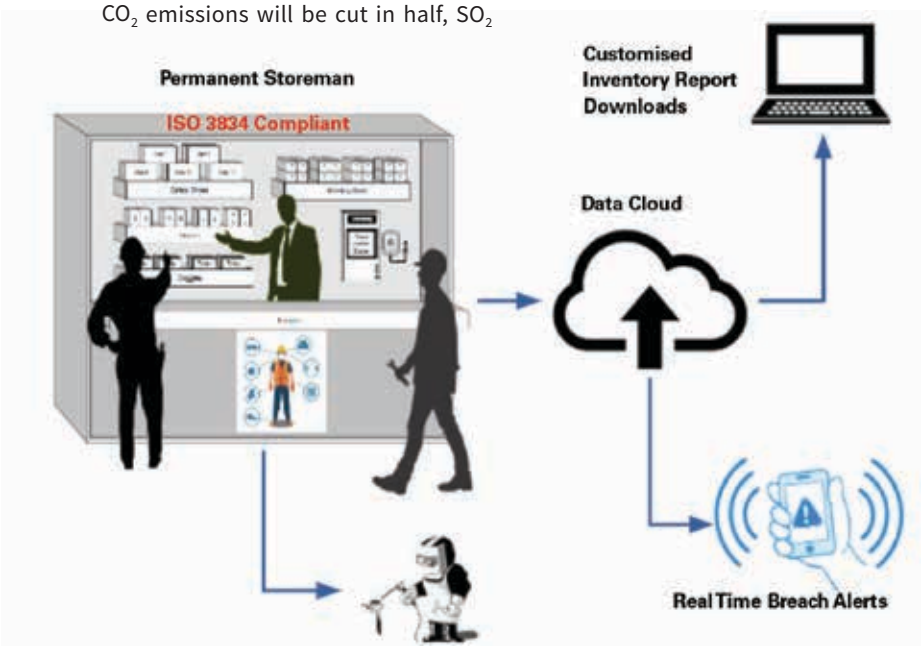
Developed to help welding maintenance and construction contractors to easily access and control the gas, consumables, equipment and supplies they need for their daily welding and cutting work, Air Liquide's Connected Store has been in operation on Sappi's Umkomaas site in KwaZulu-Natal since the start of Project Vulindlela in August 2019.

The Vulindlela Project is Sappi's R2.7-billion capacity expansion project, which is kicking off an investment in the Saiccor plant of R5-billion over five years. Sappi's Saiccor Mill is the world's largest producer of dissolving pulp, which is widely used all over the world to produce viscose staple fibres for the textile industry and microcrystalline cellulose for manufacturing pharmaceuticals as well as beauty and many other household products.

Sappi's investments will secure the mill's future by increasing its global cost competitiveness and significantly reducing its environmental footprint. CO_2 emissions will be cut in half, SO_2 emissions by 35%, waste to landfill will reduce by 48% and water use efficiency will increase by 17% – all while increasing earnings by at least R300-million per year.

Air Liquide's Connected Store was initially established to help onsite welding contractors to comply with ISO 3834 quality requirements in terms of the management and traceability of the consumables and equipment used for fusion welding. For portability and easy deployment, the store is housed in a customised container – and 20 ft or 40 ft size options are available depending on the site's needs.

A permanent person is employed to manage each store using a fully online stock management system to issue and control transactions, which are immediately uploaded and accessible in the cloud in real time. This enables easy remote control and management of the consumables used, with batch numbers being recorded against specific jobs and people utilising for traceability.



Air Liquide's Connected Store an ideal addition for ISO 3834-certified fabricators who need to collect records of compliance and traceability.

In addition, the Connected Store incorporates humidity and temperature controls, which are continuously monitored to create the ideal environment for the storage of welding consumables. This ensures sensitive stock is stored correctly, fit for use and overcomes the need for welders to reheat/dehumidify electrodes.

All of these features make the use of the Connected Store an ideal addition for ISO 3834-certified fabricators and welding contractors who need to collect records of compliance and traceability to retain certification and ensure ongoing quality conformity.

"At Saiccor, the Connected Store is routinely utilised by the appointed welding contractors at the construction project, " Kawawa tells *African Fusion*.

While mostly supplying Air Liquide packaged gases – Arcal Prime for the TIG welding, along with oxygen and acetylene or LPG cutting and heating gases – the store also stocks the ESAB TIGROD 2209 for use on the duplex stainless steel fabrication work across the plant. "Also being used are Harris gas equipment, torches and consumables as well as our Premium Arcal™ Prime with Exetlop™ gas solution, which some contractors prefer. In principle, we can include anything that the contractors ask us to, even welding machines," he adds.

As well as the full Air Liquide gas range, ESAB welding electrodes, wires and machines; Gemini welding electrodes; TBi Industries MIG and TIG torches; the Hypertherm Plasma cutting range; Migatronic welding machines; Harris Gas Equipment; Ultra Arc MIG welding wires; and Tyrolit abrasives are core product brands of Connected Store's offering.

The online portal

Kawawa logs onto the Connected Store's online portal via the homepage, www.

Left: Air Liquide's Connected Store is being used to service Vulindlela Project welding contractors at Sappi Saiccor. Right: Fingerprint IDs are used for authentication of the authorised person collecting goods. Purchase information is then immediately uploaded and stored for security and management purposes.

connectedstore.co.za: "Anyone who has access to any Internet connection can log on to the site, via a smartphone, tablet, laptop or computer, for access to purchase and use information for any or all of their requisitions," he says.

In terms of authorisations, there is a hierarchy of logon information that utilises biometric system access control. "The owner is Sappi, who appoints and authorises various contactors, who can then upload their own authorised representatives with access to separate accounts," he explains. "We can set different terms and conditions for each contractor and each one can upload any number of welders, boilermakers or supervisors to access the site and use the store. This ensures sufficient traceability of purchases: which products were issued, the respective quantities, when and for which contract and job.

"For onsite validation, we rely on fingerprint IDs, which then authenticate the authorised person collecting goods. All of this information is then immediately uploaded and stored for security and management purposes so that any authorised manager can monitor how the project budget is being spent," he explains.

Shopping for products and their selection is simplified via the search function at the point of use. A welder or welding supervisor can search for all the items needed for the tasks ahead and add them to the shopping basket. Once ordered and authenticated, the store manager will collect all the items needed, ready for dispatch to the customer.

With regard to receipts, Kawawa says paper receipts are still being issued to the artisan collecting the goods, but these and associated acquisition reports are also uploaded to the system and immediately made available to management and back office staff.

Stock levels in the store are continuously monitored and alerts are sent as soon as any individual stock item falls below pre-established thresholds. "Over time, we can adjust critical stocking levels to best suit usage trends. We can even perform data analytics on the stock flow of a project, for trending and costing, for example. For future projects, this can be a powerful tool in ensuring that our local contractors remain cost effective and competitive," he adds.

It is also possible to filter acquisitions in various ways: for a day, a year or for the contract to date, for example. For the EPC or for Sappi, they can sort expenditure by contractor, by welding process, by employee or directly by an acquisition number, and both detailed and summary reports are immediately available.

"For ISO 3834 traceability, job/project numbers, order numbers, names of employees, employee numbers, item descriptions, batch numbers for consumables, serial numbers of equipment, ISO classifications for gases and all other data required by the quality controller is made available for reporting purposes," Kawawa assures.

"This is a sophisticated database that is available live online as soon as anything is taken from the store. It makes controlling costs and quality requirements incredibly easy," he adds.

"This whole system has been developed in South Africa by us at Air Liquide along with local development partners. It has now been identified by the Air Liquide Group as suitable for global deployment for construction, fabrication, maintenance and refurbishment projects," Kawawa tells *African Fusion*.

"Our Connected Store offers ideal opportunities for organisations to band together to get access to everything they need without having to invest in their own stock, stores and inventory control systems. Together with Air Liquide, we will establish the combined needs, employ a Store Coordinator and then deploy the Connected Store onto the site.

"The digital and IIoT (Industrial Internet of Things) aspect of our Connected Store solution is a big differentiator for us. By combining the supply needs for several contracting companies, significant cost and security benefits accrue for everyone. It is even suitable for OEM-managed projects that offer free-issue materials. Using our Connected Store, we at Air Liquide can take on the responsibility for issuing, controlling and tracking these materials in a modern, transparent, secure and cost effective way," Kawawa concludes.

Comments from Project Vulindlela contractors

Luke Perumal, Project Vulindlela contractor: Air Liquide's Connected Store is a great idea. Having the store on site makes it very easy and convenient to access gas when needed. This saves us time and the well trained and helpful staff are always there to assist us.

Gareth Paul, Project Vulindlela contractor: It is very convenient to have gas and consumables at the construction site, five days a week from 7.30 to 16.00. This means there is no lost time waiting for gas deliveries and the security is very good, as only certain employees can collect the gas, with their fingerprint being used to register their identity. Extra gas is available if we work on the weekend and the store's forklift enables us to load and offload all the gases we need.

Tara Stannard, Project Vulindlela contractor: Using the Connected Store means there are no delays in waiting for product, therefore no disruptions to the job. The system is very easy to use, the staff very helpful and efficient and Air Liquide strives to ensure that it always has stock available, which is the most important thing.

Founder and CEO of New Age Engineering Solutions, Joseph Zinyana and his business partner Suzan Zinyana.

New Age: a transformation success story

Founded back in 2003, New Age Engineering Solutions is one of South Africa's great success stories with respect to the transformation of the mechanical, welding engineering and fabrication sectors. *African Fusion* talks to Joseph Zinyana about the company's rise to prominence and its current trajectory.

New Age Engineering Solutions was first established back in 2003 by Suzan Zinyana while her husband, Joseph, was employed as a welding engineer at Sasol in Secunda. "Suzan and I started the business as partners and we are still both involved, with Suzan heading up business development while I take care of operations," Joseph Zinyana tells *African Fusion*.

"Initially, we were called New Age Welding Solutions with a focus on consultancy work on the welding engineering and quality control side. Having had substantial experience at Sasol and Mittal Steel, I became the welding consultant to several of Sasol's sub-contractors, and this quickly extended to Eskom sub-contractors and to fabrication and construction companies servicing the refinery sector," he continues.

When asked about their first significant success, Zinyana describes work done for JLH engineering, then owned by Saul Nhlabathi, a company doing fabrication work and onsite welded construction at the Tutuka Power Station near Standerton. "In 2005, we received an order for R300 000, which was the order that first set the company on an expansion path," he recalls. "I became JLH's consultant for welding engineering and quality control, supported by two other people at that time."

"Shortly thereafter, we won a short-term contract with Steinmüller. New Age was subsequently awarded a three-year contract with the Engen refinery itself, which ran from 2005 to 2008, helping Engen's Inspection Authority to manage the quality from contracted fabricators and installers on their sites. We dealt with all of the welding engineering related problems, trouble shooting and coming up with solutions. In the same period, New Age also won a contract with D&M Engineering, which was providing services to the Engen refinery

A component for the autothermal reformer (ATR) project that involved welding 38 mm stainless steel in 321 H reformer material.

"This involved a lot of pressure vessels and pressure piping, all constructed to the relevant codes. Engen was the first company at that time to construct its own transfer lines, which involved different code requirements," he says, adding that in 2007, another welding engineering contract with Eskom Nuclear Power Station (the only nuclear plant in Africa) was awarded to New Age. This contract has been repeatedly renewed, with the current contract covering the 2014 to 2020 period.

The move to fabrication

In 2006, New Age Welding Solutions was awarded its first turnkey fabrication and installation contract. "We were asked to install a new valve station and pipeline for the cooling water system for the basic oxygen furnace (BOF) at ArcelorMittal's Newcastle mill, which was still called Iscor at that time. This was our first foray into fabrication and installation work. And it quickly led to other work, for Johnson Controls on its mine ventilation installation systems, for example. In 2006, Thermtron awarded a contract to manufacture a mobile plant for a company in Europe called Gasrec. This was the first time that New Age had to employ the ISO 3834-2 quality management system before it was adopted in South Africa by many other companies.

In 2012, Joseph Zinyana was contracted to return to Sasol, this time on the maintenance side as a fabricator and installer of pressure components and piping. "This was our first maintenance contract, having previously been involved with consultancy, fabrication and installation work. This was another boon for New Age, because maintenance is ongoing and involves long-term sustainable contracts. I was initially awarded a three year contract, which complemented my other consultancy work and enabled us to further expand.

"The contract involved planned day-by-day maintenance, with a New Age presence permanently onsite. At that time, we already had some 20 teams executing site-approved maintenance work on various sites around the country, each consisting of a welder, a pipe fitter and an artisan," he explains.

Then in 2014, New Age had another

significant breakthrough when awarded a maintenance contract for mechanical and welding maintenance at the Koeberg Nuclear Power Station in the Western Cape Province. This was followed by an additional professional welding services contract – and these have been repeatedly renewed, first until 2019 on the mechanical side and, earlier this year, New Age was re-awarded the contract for a further five years.

Also awarded to New Age in 2014 was a safety, health, environment and quality (SHEQ) advisory role with Eskom MegaWatt Park to perform welding, mechanical and civil inspection work for the Medupi and Kusile new-build power stations. "We also performed offshore conformity inspections on equipment and components being manufactured overseas, to ensure they were fit-for-purpose before being shipped," he informs *African Fusion*

Another mechanical and welding contract for the Chevron refinery in Cape Town, now Astron Energy, followed in 2015. This was initially a shut-down contract, but in 2016, we were awarded the full maintenance contact for Astron, which is only due to expire in 2021," Zinyana reveals.

Capabilities and facilities

"We are now a big business: Our head office is in Evander, near Secunda in Mpumalanga and that is where we have our own fabrication facility. This is our flagship facility and is fully equipped with 10-ton cranes, guillotines/croppers, plate rollers and bending brakes. We also have ten welding booths equipped to do our own internal welder training.

"In addition, we have a fabrication facility on Sasol's Secunda site and, having won a maintenance contract in 2018, a permanent Sasol presence in Sasolburg.

"In Cape Town, we are based in Rivergate, where we have another fabrication shop, and we operate three permanently manned satellite offices, one inside the Koeberg precinct, another at Astron Energy and a third in Century City in Cape Town."

In terms of New Age's company structure, Zinyana says that the company remained relatively unchanged until 2017. "Then we partnered with Prommac, a mechanical and turnkey solutions company and realised we complemented one another, because they were short on the welding capability side and we were looking to participate in more MEIP (mechanical, electrical, instrumentation and piping) work. So we did a share swap to formalise our partnership: Prommac now owns a minority stake in New Age and we own a minority share of Prommac –and together, we trade as the CG Tech Group," he tells *African Fusion*.

A cyclone scrubber for a chemical plant being fabricated at New Age Engineering Solutions' Evander fabrication facility.

Some notable recent projects by New Age Engineering Solutions and CG Tech include:

- The safety injection system for the Koeberg Nuclear Power plant piping system, predominantly the emergency cooling systems. The project was accomplished using an automated welding system in collaboration with a company in the USA. This was a one-of-a-kind project that satisfied the Nuclear regulatory requirements.
- The autothermal reformer (ATR) project for reforming methane into hydrogen gas at Sasol. "This involved welding 38 mm stainless steel in 321 H reformer material, which is designed to operate at temperatures of around 650 °C," Joseph Zinyana explains.
- Sasol's steam line replacement, which was done in collaboration with Prommac and delivered four days ahead of schedule. Prefabrication was achieved 30 days and the installation in 15 days - and this also involved a high temperature high chrome material that presents welding challenges. This was one of the 2018 Sasol flagship projects.
- The Astron Energy refineries 2019 refinery turnaround, This was a lifetime biggest project for New Age, given the value of the project and the amount of people employed. "Astron hosts one of the highest quality and safety standards previously derived from Chevron. Working on a plant like Astron is not only a pleasure but a great partnership with regards to quality standards," says Zinyana.

With respect to 3834 Certification, all of New Age's fabrication facilities and onsite operations are certified to ISO 3834 Part 2, in accordance with the SAIW's Welding Fabricator Certification Scheme. "This standard is the specialised standard for all high-integrity welding fabrications. For anyone wanting to deliver quality welded products to suppliers or plants, ISO 3834 is essential. It is the standard that specifies all of the in-process procedures and quality checks needed to ensure that quality is being put in place progressively, while welding fabrication proceeds. If a fabricator follows these requirements, quality issues can either be prevented from arising or immediately eradicated, ensuring that a quality product is delivered at the end of the day," he says.

"ISO 3834 enables fabricators to measure themselves and their work against the standards for the duration of the manufacturing and installation process. I encourage all fabricators – of high integrity pressurised systems or conventional support structures – to adopt this system. It will raise their product quality, which is sure to help their business to grow well beyond expectations," Zinyana advises.

The future outlook? "Having won the Koeberg maintenance contract for the next five years, we are currently looking forward to the Steam Generator Replacement project at Koeberg, which is expected to start in February 2021. We expect to be involved in repairing and replacing piping systems and components such as valves that haven't been opened in 40 years, an exciting first-of-a-kind project for us in Africa.

"New Age is still an expanding organisation and we are looking forward to becoming the MEIP contractor of choice in the coming years. This is our goal. For those interested in delivering a quality service, New Age Engineering Solutions in conjunction with the CG Tech is ready to deliver," Zinyana concludes.

An investigation of cladded buffering on thick duplex plates for laser welding

In this paper presented at last year's IIW conference in Bratislava in Slovakia, Anne Straßea, Gumenyuka and Rethmeiera of the BAM-Federal Institute for Material Research and Testing investigate the use of laser metal deposition using laser welding on the austenite-ferrite ratios of 2205 duplex stainless steel welds.

Because of its excellent corrosion resistance, a high tensile strength together with a high ductility, duplex stainless steel AISI 2205 offers many areas of application in the chemical and the offshore industry, to name just two. Through welding, especially laser beam welding with its high cooling rates, duplex steels tend to produce higher ferrite contents in the weld metal upon cooling down from the melting temperature. This trend leads to a reduction in ductility as well as the corrosion resistance of the weld joint.

To overcome this problem a solution, based on buffering the plate edges using laser metal deposition with a material containing higher nickel (Ni) concentrations prior to the laser welding was suggested. This method offers more benefits in comparison to the conventional use of higher Ni-alloyed filler wire due to the better control over Ni- distribution in the weld seam, resulting in balanced austenite-ferrite ratios everywhere in the weld metal.

In this context different process parameters that enable a smooth surface structure with slightly reduced ferrite contents were investigated. In a second step the possibility of welding those edges defect free with standard parameters while achieving balanced austenite-ferrite ratios was verified with metallographic analysis of the microstructure, Electron Backscatter Diffraction (EBSD) and Charpy impact testing. The improved corrosion resistance of the welds in comparison to unbuffered ones was observed with the ASTM G48 standard test method.

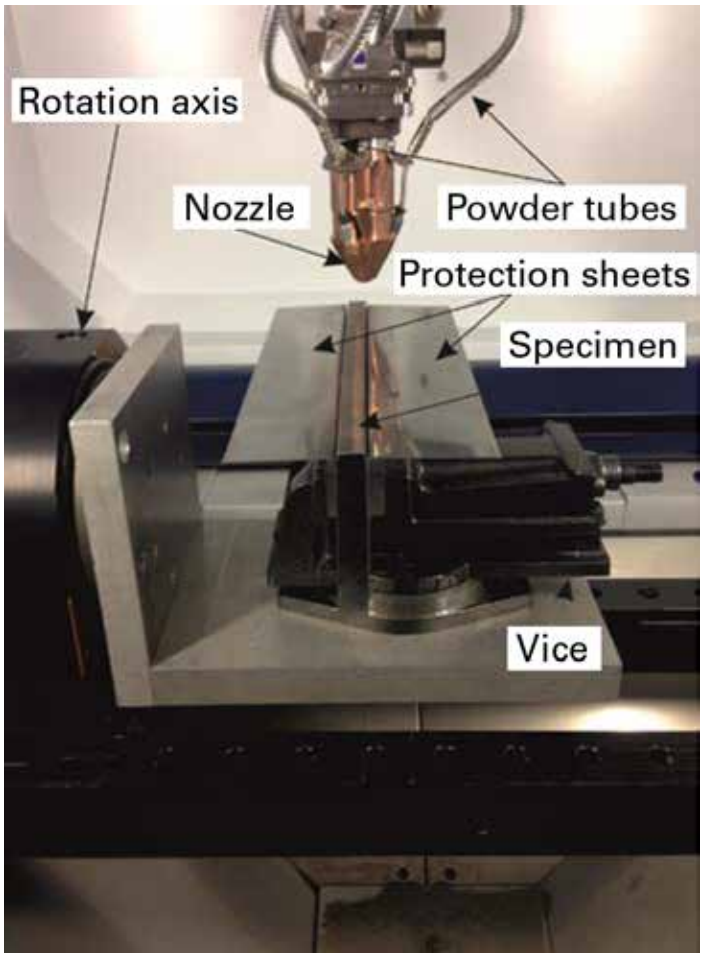


Figure 1: Experimental setup for the coatings.

Material		Fe	Cr	Ni	Mo	Nb	Mn	N	C	Si	P
Duplex (1.4462)	Base Material	Bal.	22.96	5.18	3.00	-	1.82	0.17	0.02	0.29	0.03
Duplex (1.4462)	Powder	Bal.	22.80	5.57	3.16	-	1.09	0.16	0.02	0.68	0.02
Nickel (24.053)	Powder	-	-	Bal.	-	-	-	-	0.05	-	-

Table 1: Chemical composition (wt-%) of the investigated materials.

Introduction

Duplex stainless steels are characterised by a balanced austenitic-ferritic microstructure and thus, by a blend of the properties of these phases. They have the excellent corrosion resistance and ductility of the austenitic steels, while still offering the high tensile strength of the ferritic steels. With this combination of properties, they are serviceable for many applications in the offshore and chemical as well as petrochemical industries [1].

A well-documented problem with welding duplex steels – especially if using laser beam welding – is the formation of ferritic weld seams with up to 90% ferrite [2]. This is due to the relatively short cooling times that are typical of laser beam welding, which does not leave the austenitic phase enough time to transform from ferrite to austenite. This leads to changes in the properties in the weld seam: higher vulnerability to corrosion, especially pitting corrosion; and reduced ductility in comparison to the base material. To overcome this problem, filler materials such as electrodes with higher nickel contents are used. Nickel is known to widen the austenitic field in the phase diagram to higher temperatures, promoting a higher ratio of austenite in the weld seam due to the earlier transformation of ferrite to austenite. Muthupandi et al. [3] studied the influence of such electrodes for laser beam and electron beam welding processes, while Wu et al. [4] used a powder nozzle to distribute nickel powder into the molten pool.

Another approach to realize a balanced duplex microstructure is the use of nitrogen as a shielding gas. Van Nassau et al. [5] recommended the use of nitrogen as a stabiliser of austenite to help increase the ratio of the austenitic phase.

Both approaches work well for thin plates, but Gook et al. [6] showed that the filler material is not transported through weld seams uniformly. Its influence is limited to a maximum thickness of 14 mm. In weld seams that are thicker than 14 mm, the elements of the filler material are not

traceable in the root section. This leads to weld seams with different properties and thus to unforeseeable mechanical behaviour.

To overcome this problem, Westin *et al*. [7] proposed nickel foils to ensure a uniform nickel distribution through the whole weld seam. These foils are placed between both welding partners before the laser welding process, but the handling of foils is complicated and time consuming.

Laser metal deposition (LMD) became increasingly important in the recent years, especially since it was discovered as an effective method for additively manufacturing whole components, but it has previously used for repair welding of worn parts, such as the tips of turbine blades [8]. Another common application is the cladding of parts with wear and corrosion resistant layers to prolong their life in corrosive media or during straining.[9].

In this paper, a two-step process for laser beam welding thick duplex plates is investigated. In the first step, the edges of the weld partners were coated using LMD with a duplex steel and nickel powder mixture; and in the second step, these clad edges were laser beam welded. Using this process, it was thought that a homogenous distribution of the filler material would be ensured.

Experimental setup

The material of the base plates for the welding process were duplex stainless steel AISI 2205 (material number: 1.4462) with the dimensions 300x100x15 mm. The cladding of the edges of the base plates was carried out with a powder mixture containing 2205 duplex powder with a grain size of 53 to 250° µm and nickel with a grain size of 45 to 125° µm. The chemical composition of the base material and the powders is shown in Table 1. The resulting powder mixture contained a 12% total nickel content.

For the cladding, a laser cell with a five-axis system (TruLaser Cell 3000 with a Trumpf laser) and a three-jet nozzle with a working distance of 16 mm was used. Powder distribution was done using a powder feeder (Flowmotion Twin, Medicoat) with helium as carrier gas at a gas flow rate of 4 ℓ/min. The laser cell is coupled with a

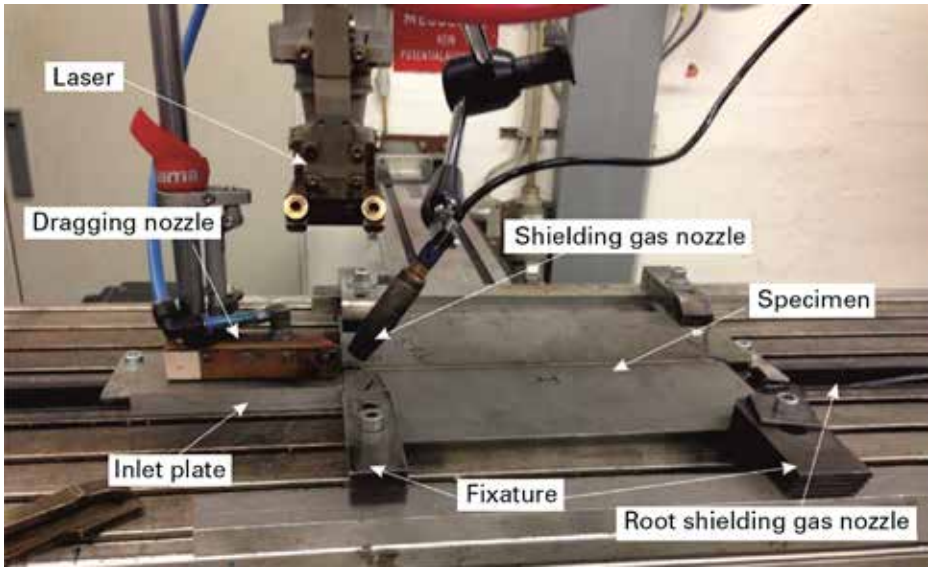


Figure 2: Experimental setup for the laser welds.

16 kW Yb:YAG-disk laser (TruDisk 16002, Trumpf) producing a beam wavelength of 1 030 nm.

The cladding parameters were a constant powder mass flow of 15 g/min, a spot diameter of 1.6 mm, a laser power of 0.8 kW, a welding speed of 0.8 m/min and a stepover of 1.5 mm. This stepover was chosen to meet the requirement for a small gap with even edges between the weld partners for the laser beam welding process to follow.

The cladding was done in one layer with a bidirectional strategy. For all experiments the shielding gas was argon with flow rate of 10 ℓ/min. The experimental setup is shown in Figure 1.

To ensure an extended gas shielding coverage of the edges and thus reduce the oxidation of the layers, protection sheets were used, clamped 1 to 2 mm under the upper side of the base plate. Prior to welding, the plates were initially tacked at three points. Finally, the tacking was done with a cladding track on both sides of the weld seam with the same welding parameters as for the cladded layers.

The buttered edges were laser beam welded with a 20 kW Yb-fibre laser (YLR-20000, IPG) with a wavelength of 1 064 nm, a focus diameter of 0.56 mm and a beam parameter product of 11.2 mm·mrad. For the welding process different shielding gas sources were used to realise good protection of the molten pool. Next to the shielding gas nozzle, a dragging nozzle and a root shielding nozzle were used. The shielding gas was nitrogen. The laser power was 14.3 kW at a speed of 1.5 m/min with defocusing of -5 mm. The experimental setup is shown in Figure 2.

Different destructive and non-destructive tests were executed to ensure the quality of the coatings and the welds. Cross sections as well as electron backscatter diffraction (EBSD), Charpy impact testing and corrosion tests were used to characterise the properties of the welded joint.

Impact testing was done using undersize Charpy-V samples with the dimensions 7.5x10x55 mm. The notch was placed in the middle of the weld seam and the testing performed at a temperature of -20 °C. Specimens welded with and without cladding were compared.

The corrosion testing was done according to the ASTM G48 method for pitting corrosion of stainless steels. For this kind of testing, the specimens are stored at 25 °C in a 6% FeCℓ3 solution for 24 hours [10]. For both impact and corrosion tests, specimens welded with and without buttering were compared.

Results and discussion

For the coating the edges using the above-mentioned parameters, twenty single tracks were necessary to fill the whole edge. A cross section of the cladding is shown in Figure 3. Due to the higher nickel content

Figure 3: Cross section of the coated edge.

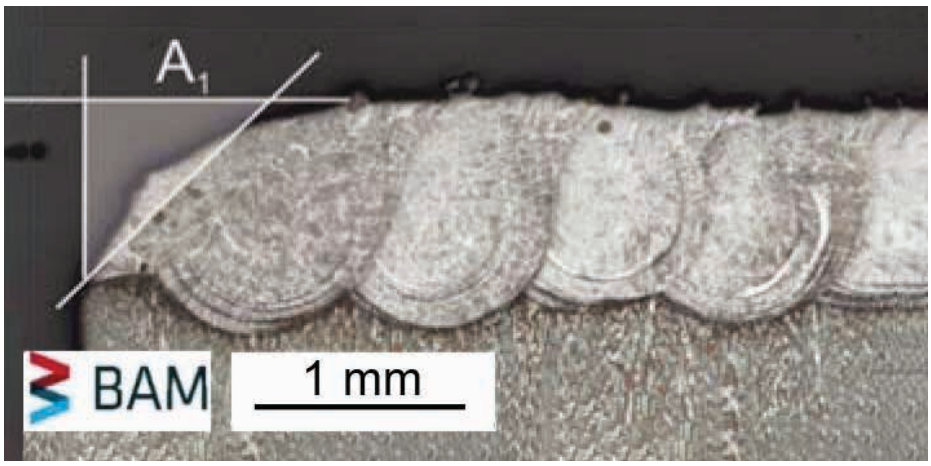


Figure 4: Missing material in Area A1.

Figure 5: Cross section of weld seam with LMD-tacking.

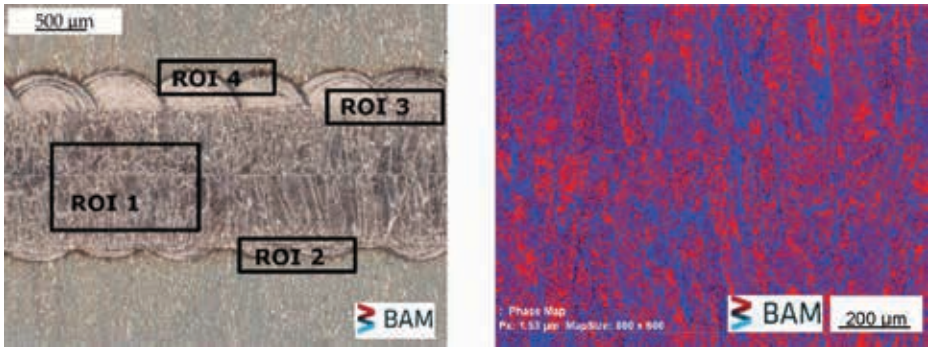


Figure 6: Regions of interest of weld seam (left side); EBSD of ROI 1: blue- austenite, red- ferrite (right side).

of the powder mixture in comparison to the unmixed duplex powder, the optical analysis of the microstructure shows a balanced ratio between austenite and ferrite.

The first layer is more ferritic, most likely because the base material is cold and warms up with an increasing number of layers. The cross section shows strong overlapping of the single LMD-tracks and relative evenness of the coating. Coatings with a normal stepover of 30% of the line width were tested as well, but the results were too wavy for the laser welding process, where a zero gap between the welding partners is preferred, which leads to irregularities in the upper and the lower part of the weld seams. Even with the more even cladding there was an underfill on both sides of the weld seam.

A more detailed examination of the coatings showed that the first and the last line do not form a 90° angle with the base plate, but leave the area A1 (Figure 4) free of material. Since the laser beam welding was done without any additional filler material there is a undercut.

To overcome this problem, LMD-tack lines were used. For this, instead of tacking the plates at three single points the tacking was done with LMD-lines on the upper and the lower part. On the one hand, tacking is necessary to prevent distortion, so the effect of additional LMD-tack lines is relatively low, and on the other hand, these tack tracks provide the extra material to fill the gap ends, thus enhancing the performance of the laser weld.

Figure 5 shows a cross section of the weld seam, with only a slight relapse on the root side visible.

To evaluate the microstructural composition of the different zones, an electron backscatter diffraction (EBSD) analysis was done. The region of interest ROI 1 in Figure 6 shows a balanced microstructure with an average austenite (blue) content of 55%. In comparison, the welds done without any cladding display an austenite content of about 10 %, so the welds were almost completely ferritic. For ROI 2 in Figure 7, a narrow heat affected zone (HAZ) with a predominantly austenitic microstructure was detected.

Where the coating is not completely molten in the HAZ (ROI 3) between the laser beam welding and the coating, is the only area where a notable in a change in microstructure from a balanced austenite-ferrite ratio in the weld seam and the residual coating can be seen. This region transformed to austenite as can also be seen in ROI 4. The HAZ of the coating is visible in ROI 4, were a narrow red ferritic layer is evident.

To characterise the mechanical properties of the welds, Charpy impact testing was executed. The impact toughness and the fractured surfaces are shown in Figure 8. Coated as well as uncoated laser-welded joints were tested. The fractured surface of the welds without any cladding showed

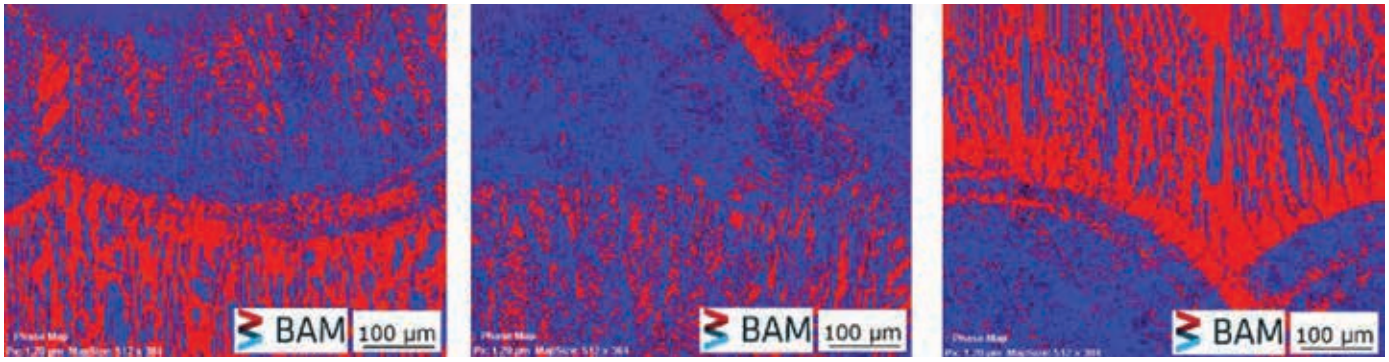


Figure 7: EBSD of ROI 2 (left side); ROI 3 (middle); ROI 4 (right side).

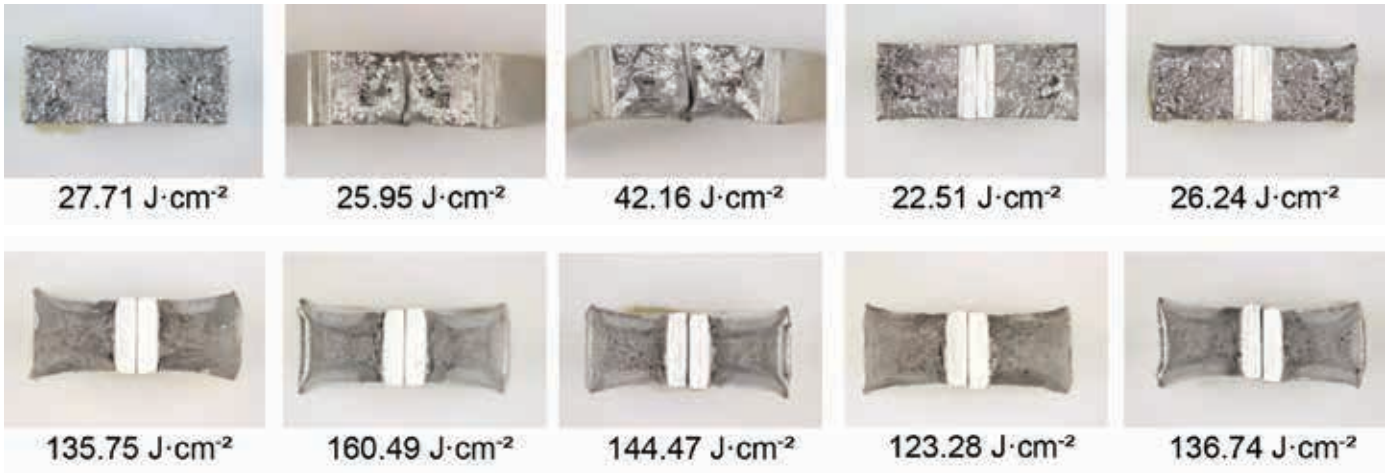


Figure 8: Fracture surfaces and impact toughness of welds without cladding (upper figures), and with cladding (lower figures).

the typical appearance of a brittle fracture, a shiny exterior and almost no deformation. This impression was confirmed by the relative low impact toughness of, on average, 29 J/cm^2. Whereas the clad welds had an average impact toughness of 140 J/cm^2, had a dull surface and were deformed before breaking.

These results verify the first impression of a balanced duplex microstructure with a small HAZ. Even though the specimens do not break with the strength of the base metal, which is produces Charpy values of between 200 and 250 J/cm^2, they had better toughness than those which tested after using laser-GMA hybrid welding [7], which produced values of about 100 J/cm^2.

The lower ductility of the clad weld seams might result from the ferritic HAZ of the residual coating.

Since good corrosion resistance is one of the main advantages of duplex stainless steel, this was tested for the clad and unclad weld seams according to the ASTM G48 method. As expected the ferritic weld seam of uncoated specimens showed pitting corrosion, whereas the base metal was intact. With the coated seams, some showed corrosion at the transition from the weld seam to base material, others showed no defects, neither in the base metal nor in the weld material. Both cases are shown in Figure 9.

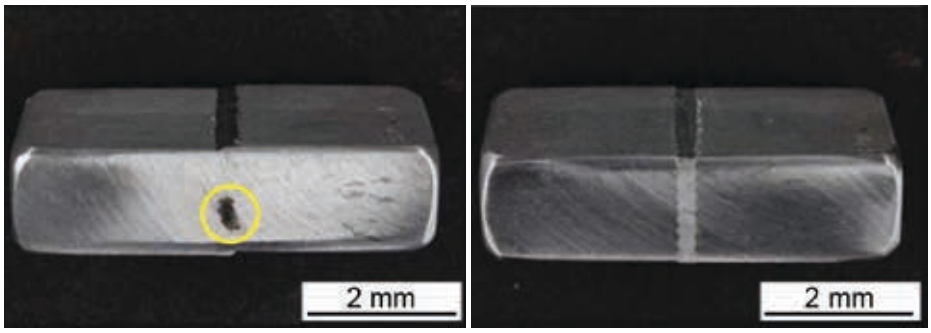


Figure 9: Corrosion specimens: uncoated edges (left side); coated specimen (right).

Conclusions

Laser metal deposition for the cladding of thick duplex plates before laser beam welding is a practicable alternative to realize a balanced austenite-ferrite ratio in the weld seam. A nickel content of 12% in the powder mixture was necessary to realise a balanced microstructure. The EBSD-analysis showed that the HAZ were narrow with austenitic areas in the residual coatings and a ferritic HAZ between coating and base material.

The impact testing at -20°C confirmed a better ductility than the welds without buttering.

Acknowledgements: This work was supported by the Federation of Industrial Research Association (AiF, project number 19.228N) and the German Federal Ministry for Economic Affairs and Energy (BMWi- Bundesministerium für Wirtschaft und Energie) based on a resolution of the Deutscher Bundestag.

The authors want to thank Butting GmbH kindly for providing the base material as well as for performing the corrosion testing.

References

[1] Charles J: Duplex Stainless Steels - a Review after DSS '07 held in Grado; steel research international, vol. 79, no. 6, pp. 455-465, 2008.

[2] Kotecki D J: Ferrite Control in Duplex Stainless Steel Weld Metal; Welding Research Supplement, vol. 10, pp. 273-278, 1986.

[3] Muthupandi V, Bala Srinivasan P, Shankar V, Seshadri SK, and Sundaresan S: Effect of nickel and nitrogen addition on the microstructure and mechanical properties of power beam processed duplex stainless steel (UNS 31803) weld metals; Materials Letters, vol. 59, no. 18, pp. 2305-2309, 2005/08/01/ 2005.

[4] Wu HC, Tsay LW and Chen C: Laser Beam Welding of 2205 Duplex Stainless Steel with Metal Powder Additions; ISIJ International, vol. 44, no. 10, pp. 1720-1726, 2004.

[5] Nassau LV: Welding duplex and super Duplex Stainless Steels - a guide; Welding in the World, 1992.

[6] Gook S, Gumenyuk A, and Rethmeier M: Hybrid laser arc welding of X80 and X120 steel grade; Science and technology of welding and joining, vol. 19, no. 1, pp. 15-24, 2014.

[7] Westin EM, Stelling K, and Gumenyuk A: Single-Pass Laser-GMA Hybrid Welding of 13.5 mm thick duplex stainless steel; Welding in the World, journal article vol. 55, no. 1, pp. 39-49, January 01 2011.

[8] Rottwinkel B, Nölke C, Kaierle S and Wesling V: Crack Repair of Single Crystal Turbine Blades Using Laser Cladding Technology; Procedia CIRP, vol. 22, pp. 263-267, 2014/01/01/ 2014.

[9] Birger EM, Moskvitin GV, Polyakov AN and Arkhipov VE: Industrial laser cladding: current state and future; Welding International, pp. 234-243, 2011.

[10] ASTM G48-11: Standard Test Methods for Pitting and Crevice Corrosion Resistance of Stainless Steels and Related Alloys by Use of Ferric Chloride Solution, 2015.

Afrox's Multi-User Pressure Panel: a customer perspective

Following nearly 12 months of onsite use for general overhauls (GOs) on boilers by Hydra-Arc, Afrox's Multi-User Pressure Panel (MUPP) is now ready for wider industrial deployment. *African Fusion* talks to Matthew Alfonso, Hydra-Arc's onsite manager, about the history and value of this safe, efficient and convenient shielding gas delivery solution.

Hydra-Arc is heavily involved with maintenance on Sasol's Secunda plants and, according to Alfonso, is always on the lookout for safer and better ways of doing things.

"We are responsible for the maintenance on 17 boilers on the Secunda site, nine on the Eastern plant and another eight on the Western plant, doing all of the GOs. For these, the boilers are taken out of service and, once safe, an inspection team moves in to identify areas of damage – where the wall thickness of tubes has become too thin, for example. Our Hydra-Arc teams then go in and start removing compromised parts and replacing them with new components that have to be welded into the existing boiler network," Alfonso informs *African Fusion*.

Hydra-Arc takes responsibility for removing and replacing structural and pressure parts. "This involves a significant amount of TIG welding (GTAW): for the superheater tubes, the convection seal welding and air heaters, for example. So we use tons of gas," he says, adding: "On a GO, we typically do 1 200 to 1 300 1.5-inch butt welds on a boiler's superheater."

Describing the difficulties encountered when TIG welding on a boiler, he first points out that the work has to be carried out at height: "We are working on platforms at levels of 30 to 65 m high. This creates big issues with gas cylinders, particularly lifting them up and near the boiler to enable our welders to access the shielding gas needed for the repair procedures being undertaken," says Alfonso.

The available space between boiler components is very limited, as is the cranage availability for lifting and lowering all of the people, materials and equipment needed on the working platform. Hydra-Arc was finding it "a real mission" to get gas up to these levels and "we were losing up to four hours of productivity every day due to having to transport full gas cylinders up and empty ones down," Alfonso explains.

Gas cylinders on raised platforms also create significant safety risks. Not only did the cylinders need to be moved around at height, from the crane area to where the gas was needed, but excessive numbers of hose connections running along the platforms creating tripping hazards. This expanded the number of the safety inspections required as well as the increasing the chances of hose leaks.

Gas cylinders on raised platforms create significant safety risks because cylinders need to be moved from the crane area to where the gas is needed.

Having identified these problems, Hydra-Arc brought them to the attention of Afrox's development team. "During one of their routine visits, we asked Johann (Pieterse) and Arnold (Meyer) to come up with a way of getting gas to our welders working at heights, without having to use cranes or to move cylinders along raised platforms every time a welder moved to a new area," Alfonso reveals.

"Afrox went off and developed and tested a design for us to try and we were given an excellent solution that is easy to use onsite and very practical," he adds.

Afrox's MUPP solution leaves the gas cylinders on the ground in a safe, secure and convenient fenced off area. Then a single steel hose connects the gas to a pressure-regulated MUPP with eight connection points on each level of the boiler being repaired.

"We are able to locate an MUPP at every level where work is being carried out. Then each welder simply connects his or her gas hose to a point the on MUPP for regulated access to the shielding gas needed. And up to eight welders can connect to the same panel without cross interference. Every welder can pre-set their gas flow and this will be retained, no matter how many other welders are welding using different flow rates at the same time," he points out.

"Our Hydra-Arc welders can now plug-in and weld as easily as they would on the ground, without having to worry about changing empty gas cylinder on raised platforms," says Alfonso.

For most of the past year, Hydra-Arc has been using two MUPPs at levels of intensive work. "The system makes a lot of sense whereever there is a lot of welding to be done in a congested space and where it is inconvenient to store gas cylinders nearby. This Afrox solution enables eight gas cylin-

ders to be replaced by one MUPP. The only question is the amount of welding work and gas required," he adds.

Using an MUPP means that gas cylinder changes can all happen at ground level – and a nine inter-connected bank of cylinders is currently being used at Secunda. "Once delivered, a single steel hose gets shifted from the empty bank of cylinders to the newly delivered bank, enabling welding to proceed within minutes of the changeover. Then all of the welders working off the MUPP are able to proceed for another few days, uninterrupted by gas issues," notes Alfonso.

"At any one point we may have 20 welders and 18 to 20 pipefitters working at height within a GO area – and that does not include labourers. That four or five hours of lost productivity due to moving gas cylinders up and down can pay for an MUPP system in a single day, so the cost of each MUPP system is almost completely irrelevant.

"This solution has made a huge difference to us and we have now incorporated its use wherever it makes sense. We can't say it gives us a huge saving across the total cost of a boiler overhaul, but it is innovations such as these that allow a company like ours to improve on cost competitiveness.

Alfonso says that, in the power industry, things tend to be done the way they have always been done, so it becomes very difficult to be better than anyone else. "It is only through hard work and excellent partnerships with people from companies such as Afrox that effective change becomes possible," he suggests. "We are working in a different and unsafe world at the moment. Onsite work is becoming more and more expensive and we need to find better ways of doing the things we have always done.

"Afrox has always been a good supplier, but now it is also developing a deeper understanding of the difficulties we encounter in using its products. I always say that 10% of my work is welding and 90% is about coordination, getting welders and the resources they need to the places where the welding needs to happen. This is the biggest part of the work and we are very pleased that Afrox is contributing to making this easier for us," he adds.

"Giving welders everything they need while removing all of the things that are in their way is a win for safety, efficiency and productivity. With the MUPP project, Afrox has certainly helped us to achieve this," he concludes.

Afrox's MUPP solution leaves the gas cylinders on the ground in a safe, secure and convenient fenced off area. A single steel hose connects the gas to a pressure-regulated MUPP with eight connection points on each level of the boiler being repaired.

Each welder simply connects his or her gas hose to a point the MUPP for regulated access to the shielding gas needed.

Afrox's Multi-User Pressure Panel (MUPP) uses a single steel hose to connect a manifold of gas cylinders on the ground to a pressure-regulated MUPP on the platform for eight welders, who are each able to set different gas flow rates.

Babcock prevails under pressure

Keagan Naidoo, piping engineering manager at Babcock Ntuthuko Engineering, describes a complex repair project at a power station following a steam pipe rupture.

Following a rupture on the main steam-piping system on one of the units at an older major power station, Babcock's Ntuthuko Engineering division, along with two other major boiler companies, was part of a competitive bidding process to develop a proposal in a very short period of time to repair the piping system as quickly as possible to the strictest of international standards.

Babcock was successful in its tender and was awarded the work to undertake the design, procurement and supply, fabrication, manufacture, and construction of the complete main-steam and high-pressure bypass system for the power unit.

Keagan Naidoo, piping engineering manager at Babcock Ntuthuko Engineering, explains that a complex project of this nature taking into account the engineering scope, manufacturing, logistics and the scope of construction involved, usually takes 18 to 24 months to execute. However, Babcock successfully completed the project in just seven months, working under pressure to restore the additional power capacity.

In order to assess the extent of the damage, Babcock used a combination of visual inspection and 3D scanning technology to scan the piping system and associated structures. Using specialised software, Babcock was able to digitise the real-world architecture by capturing existing plant conditions and complex geometry, resulting in a digital copy, which identified that large sections of pipework and structures had been displaced during the rupture.

Babcock was tasked with designing the replacement system, whilst establishing a safe working environment to enable the safe removal of the damaged sections of pipework; source and supply the replacement components on the piping system; and install them.

As part of removing the existing 'as-damaged' piping system, various techniques using load-bearing scaffolding and ratchet type restraints were employed to remove the residual spring as a result of the rupture and prevent further displacement.

Naidoo explains that even though this was a replacement, the complexity of adhering to the latest standards and the introduction of design smarts, such as cold-pull and additional pipe supports, rendered most of the existing design information irrelevant. He explains that cold-pull is a process whereby the piping system is pre-stressed in its cold state such that it is less stressed in its hot state, which maximises design life.

As part of the design process, Babcock performed pressure containment calculations, performing stress analysis to size the

Babcock undertook the design, procurement and supply, fabrication, manufacture, and construction of the complete main-steam and high-pressure bypass system for the power unit.

Specialty items such as forgings and piping had to be manufactured in Europe and delivered to South Africa within the strict project timelines.

replacement components and then created manufacturing drawings to facilitate machining, fabrication and construction.

He says the project was logistically demanding as specialty items such as forgings and piping had to be manufactured in Europe and delivered to South Africa within the strict project timelines, while complying with the best practices in accordance with the latest international design codes available, and benefiting from the design smarts to minimise calculated stresses.

Once the raw material arrived on site, Babcock was able to commence with machining and welding of piping sub-assemblies, installing of temperature thermocouples and condensate drain outlets, before site construction.

"As the project deadline approached, construction timelines proved to be demanding due to the inclusion of specialty processes such as balanced erection and neutral float, areas in which Babcock is highly experienced," says Naidoo.

He explains that individual pipe spools and sub-assemblies of pipework and fittings were erected and hung into pre-determined locations. Load cells were used at selected locations on these spools and sub-assemblies and cell readings were compared to the calculated balanced loads. Once actual loads were within range of the calculated loads, the spools and sub-assemblies were balanced before the welds could be completed.

Upon completion of piping erection, a neutral float procedure was used to prove the system piping support effort and success of the balanced erection procedure. After neutral float acceptance, terminal point welds were completed.

Approximately 85% cold-pull was installed in the piping system using various control monitoring processes to ensure that the correct moments were introduced and distributed throughout the sub-sections as per cold pull-calculations.

"Quality control measures, which formed key gate keepers leading to cold handover, proved challenging because the majority of this phase was done over the festive season, meaning the availability of resources from sub-contractors was not as abundant as during other periods," says Naidoo.

"With great effort, dedication and teamwork from both Babcock and the client, along with many late nights and weekends away, the unit was successfully and safely synchronised to the power grid on 16 February 2020," he concludes. ***www.babcock.co.za***

Laser cladding versus thermal spray

Which method is best for you?

This article, from HTS Coatings of Illinois in the US and circulated in South Africa by the Thermal Spray Association of South Africa (TSASA), compares the advantages and disadvantages of laser cladding and thermal spray coating processes and makes some simple suggestions for choosing between them.

We live in the information age; one can find the answer to almost any question in minutes. Doing a simple internet search for 'machine part repair' or 'remanufacture' will result in thousands of ways and processes to rebuild parts and get them working again. The hard part is figuring out which advice to take and who to trust. The even harder part comes when there are multiple kinds of repair processes that seem, at first glance, to do the same job.

For those who have ever wondered what the difference is between laser cladding and thermal spray and which one is right for you, you've landed in the right spot.

Same but different

In the broad scheme of things, laser cladding and thermal spray accomplish the same goal. They can be used to add a hardened, new surface to previously damaged or worn industrial components. They can be used for remanufacturing a component and even to better prevent future wear.

Most people look to laser cladding due to its metallurgical bond but there are thermal spray processes that can achieve this as well. So, which one should one choose? Let's break it down and look at the processes individually.

Laser cladding

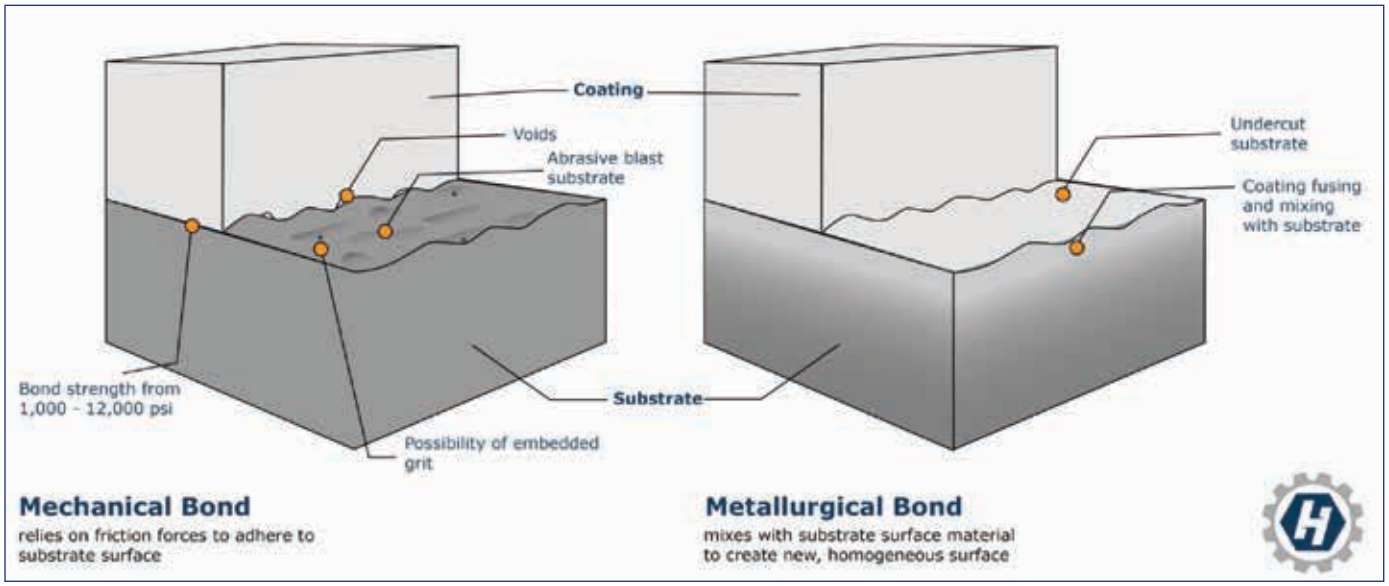
Laser cladding is a hardfacing process that uses laser energy to melt and weld powder material to a surface. The result is similar to hardface welding but operates at a much lower temperature; around 550 °C (1 000 °F) as opposed to over 6 000 °C (11 000 °F) for TIG welding. It forms a metallurgical bond with the substrate material and produces a hard, wear resistant coating.

Laser cladding advantages include:

- **Metallurgical bond:** The biggest advantage to laser cladding is the metallurgical bond achieved at relatively low temperatures. Since laser cladding uses metallurgical bonding, there is little to no porosity in the coatings, resulting in fantastic long-term corrosion resistance.
- **Lower Temperature:** Laser cladding achieves this metallurgical bond at a lower temperature than most procedures. It has a small heat affected zone; meaning the area of the base metal that has had its properties changed due to high temperatures. Laser cladding typically has a heat affected zone of around 0.75 mm thick (0.03″). This is highly beneficial if the part is prone to heat distortion.
- **One-step build-up process:** Laser cladding also allows for thicker build up on a single pass compared to other processes. Overlapping passes meld together to produce a quality surface. This combined with low metal dilution, means there is minimal post-process machining.

Laser cladding also has disadvantages, however:

- **Process limitations:** Laser cladding is usually a robotically controlled process. While this creates greater precision, it is also less versatile. Not only is the system not portable, it can create complication for larger parts.
- **Material limitations:** Laser cladding is typically only applied to a few materials such as nickel- and cobalt-based alloys such as Inconel®, Hastelloy® and Stellite®, along with some stainless steels, such as 300 and 400 series, and carbides, such as tungsten carbide. These are great for wear and corrosion resistance but can fall short if you require other coating properties.
- **Coating thickness issues:** Like most advantages, thick build up also has its downside. Since laser cladding lays



A summary of the differences between mechanical and metallurgically bonded coatings.

down so much in one pass, it can struggle when thin coatings are required. High build rate can also lead to cracking.

Thermal spray

Thermal Spray encompasses a wide variety of processes. Most use a gas or an electric current to create a flame or arc in order to melt the wire or powder materials and apply them to a substrate. Some, such as spray and fuse, produce metallurgical bonding; while most others rely only on mechanical bonding.

Thermal spray advantages include:

- **Wide variety of materials:** Thermal spray can be used to apply a variety of materials, including the materials used in laser cladding. Additional material options can be used to supplement the coating properties. In addition to wear and corrosion resistance, thermal spray coatings can be used to create dielectric, thermal barrier and electrically conductive coatings. One of the thermal spray processes, arc spray, can also feed two different materials to produce an engineered alloy coating.
- **Thin coating capabilities:** Thermal spray processes can lay down coatings as thin as 50 µm (0.002″), thinner in some cases. The ability to spray in thin layers can also aid in producing coatings in situations when precise coating thicknesses are required. Thermal spray can also build up thicker coatings by doing multiple, robotically controlled passes.
- **Process versatility:** Due to its versatility, thermal spray can also be sprayed in the field. Unlike laser cladding, thermal spray guns can be operated independently of robotics and can produce quality coatings when used by skilled operators. The typical robotically controlled thermal spray set up can also handle intricate geometries without thick build up in corners and on edges.

On the other hand thermal spray disadvantages include:

- **It is a multi-step process that requires skilled technicians:** Thermal spray can require more masking to protect against overspray compared to the focused spray area of laser cladding. Since most thermal spray processes use mechanical bonding, machining and grit blasting are usually required before starting the coating application, which can lengthen the process.
- **Higher operating temperature:** Spray and fuse thermal spray can accomplish metallurgical bond but at a higher heat than laser cladding, around 1 000 to 1 120 °C (1 900 to 2 050 °F). High Velocity Air Fuel, or HVAF spray, is the lowest in temperature at around 1 925 °C (3 500 °F) and produces a mechanical bond.
- **Presence of porosity and oxides:** Depending on the process used, there is low to high porosity for thermal spray coatings. This can be a long-term issue with certain coating materials in highly corrosive environments if not sprayed correctly. Porosity helps minimise coating stress and reduces cracking, but it also interferes with surface finish, strength and microhardness. Oxides are introduced during the thermal spray process, which can increase hardness and wear resistance, but they can also cause corrosion, strength and machinability issues.

A comparison between laser cladding and some of the competing thermal spray processes.

A Trumpf laser metal deposition/laser cladding system: the laser creates a weld pool on the component surface. Metal powder is automatically added via the nozzle, propelled to the weld pool and metallurgically bonded to the surface.

Different needs, different processes

Both thermal spray and laser cladding can produce wear and corrosion resistant coatings. There are advantages and disadvantages to both. The best way to choose is to decide what exactly is needed in a surface repair or coating. If a metallurgical bond and temperature are an issue, then laser cladding is the way to go. If a thin coating of material is preferred, then it is best to look to thermal spray.

If the coating needs to do something other than just wear and corrosion resistance, the different coating materials possible with thermal spray may make a better solution possible. Depending on the situation, either one may work, and it may be better to get a quote for each process to see how the costs for a specific part compare.

Reprinted with kind permission of Jason Hunsaker of HTS Coatings: jhunsaker@htscoatings.com

www.htscoatings.com

Air Products' DA facility in Midvaal – a successful sustainability model

Anton Grobbelaar, Air Products' dissolved acetylene (DA) plant manager in Midvaal, talks about the success of the plant's energy efficiency and environmental protection initiatives, which prove that the company has established "a state-of-the-art, sustainably sound acetylene plant."

Air Products unveiled its state-of-the-art Dissolved Acetylene facility in Midvaal in October 2018.

Air Products unveiled a Dissolved Acetylene (DA) Facility in Midvaal two years ago. The design objectives of this project were clear: to centralise the manufacturing of acetylene at a single dedicated high volume production facility, but more importantly, to design it in such a way that it was aligned to the latest global trends in process technology, health, safety and environmental management, ultimately supporting the organisation's sustainability model.

Guided by Air Products' global engineering standards as well as years of management and operational experience, the in-house Air Products project team designed and constructed the facility to incorporate the latest technology for the safe production of high quality acetylene gas in a manner that is not harmful to the environment. Two years later, the success of this facility is evident in the combination of production excellence and, more importantly, sustainable practices.

Powered by solar energy

Air Products formed a relationship with a wholly black-owned and controlled energy company, Jeka Energy, a subsidiary of Jeka Resources. The relationship with Jeka Energy forms part of the company's Enterprise Development Programme and Jeka completed the first solar PV (photovoltaic) roof-mounted power plant at the Kempton Park Facility in 2019.

Jeka Energy CEO, Thembani Jeffrey Marhanele comments: "Since the inception of the relationship with Air Products, we have felt like a valued partner and not only one of many suppliers. The collaboration of technical knowledge between the two parties has truly strengthened and capacitated our team. With the Kempton Park facility installation being roof-mounted, the ground-mounted Midvaal Facility solar PV system highlights our ability to design, install and commission tailor-made solar PV systems."

Air Products' Midvaal Dissolved Acetylene facility has a ground-mounted, automated solar system consisting of 306 panels that can generate approximately 170 000 kWh per year.

Through this solar plant, which generates daytime solar energy, the renewable energy displaces most of the grid energy Air Products would otherwise use. The power is being utilised by both the manufacturing plant and the administration building.

Based on the success and savings achieved at the Kempton Park Facility, a 100 kWp solar panel system was installed by Jeka Energy and commissioned at the Midvaal Facility in June 2019. Due to the availability of space at the facility and the health and safety advantages of maintaining a ground-mounted power plant, it was decided to place the panels on the ground. This approach also allowed the panels to be orientated independently of the buildings for optimal capture of solar radiation.

This system feeds green energy directly into the Midvaal Facility's electrical system. It generates approximately 170 000 kWh per year and consists of 306 solar panels and two inverters. According to Anton Grobbelaar, DA plant manager, the site energy mix and utilisation is optimised according to the system performance and weather patterns. "This supports our focus as an organisation on protecting the environment and using clean energy."

Recycling and water harvesting

The facility was designed in such a way that the process water is a combination of recycled water, harvested rainwater and municipal water.

During the rainy season, rainwater is captured across the site by an extensive drainage network and channelled to an on-site dam. The dam has a capacity of two-million litres and provides water directly to the production process. Through the use of this natural resource there is a significant reduction in the consumption of municipal water, once again highlighting the company's focus on sustainable production methods.

Creating opportunities with by-products

Grobbelaar explains that lime slurry is generated as a by-product in the acetylene production process from the reaction of calcium carbide and water. The lime is separated from the residual process water and recovered for use in other industries and applications, which include: acting as a flocculating agent in water treatment: pH control; cement manufacture; and as a soil stabilising agent in road construction.

Air Products disposes the lime slurry in a responsible manner by ensuring it is supplied to downstream users who can add further value by using it in such applications, thereby avoiding the need for waste disposal.

Solid waste recycling

A comprehensive solid waste recycling project that is run at the facility ensures that solid waste from maintenance and production activities are separated at source. Waste products such as metals, plastics and paper products are collected by certified recyclers on a regular basis. As with all Air Products facilities, employees are committed to recycling in both the production and administration areas.

Grobbelaar concludes by saying: "The main reasons for the centralisation of the acetylene plants were to improve the technology and process efficiency, establish a secure supply and improve customer service. We have achieved this, but we are extremely thankful that this was also an opportunity for Air Products to lead the way in creating a state-of-the-art, sustainably sound, acetylene plant.

"We strive to be the leader, not only for our customers, but also for our own environment and the company's sustainable performance," he says.

www.airproducts.co.za.

Effective, economical and versatile cutting solutions

Eugene van Dyk, ESAB South Africa's regional product manager for cutting and gas equipment, talks about two recently released innovations: the lightweight and portable ESAB Crossbow HD system, and the new Eagle CS, a compact and economical CNC cutting machine.

For plasma cutting, the Crossbow is coupled to ESAB's A120 automated air plasma cutting system and 1Torch plasma torch.

The EAGLE CS delivers performance and long service life for light fabricators that need reliable productivity.

"ESAB continues to advance the state-of-the-art in thermal cutting systems. Along with portable and fixed-bed CNC cutting systems that can accommodate gas and plasma cutting processes, ESAB also offers industry leading safety features that meet or exceed the demanding regulations in local and global machinery directives," begins Van Dyk.

ESAB's latest Crossbow HD system

ESAB's Crossbow mechanised shape cutting solution is compact and lightweight for easy transport to where cutting needs to happen. Automated functions and a user friendly CNC provide powerful and versatile oxy-fuel or plasma processing in a value-minded package. "Crossbow's simple, menu-driven interface makes operation easy to learn and oxy-fuel, plasma or both oxy-fuel and plasma CNC cutting can be accommodated. A fully integrated state-of-the-art CNC system eliminates the need for the user to add a separate controller to the system and the simplicity of the design makes it portable and economical," Van Dyk says.

Ideal for use in small fabrication shops, maintenance and repair shops, trade schools, on construction sites, and for plant shutdowns, the Crossbow system can accommodate oxy-fuel cutting and production piercing of 50 mm thick mild steel, with an edge capability of 100 mm.

"When using higher definition plasma cutting equipment, piecing and cutting of 15 mm can be easily accommodated with an edge capability of 20 mm," he notes.

"In terms of the Crossbow CNC manipulator, an effective cutting width of 1 500 mm with length options of either 3.2 m or 6.8 m are available, which makes the system ideal for the varied range of jobbing tasks at busy workshops or construction sites," Van Wyk tells *African Fusion*, adding that maximum traverse speeds of up to 6 000 mm/min can be achieved using the system.

For plasma cutting, the Crossbow is coupled to ESAB's A120 automated air plasma cutting system and 1Torch plasma torch, which are part of ESAB's proven industrial platform and offer the features generally associated with other automated applications. "With all the reliability advantages of 1Torch, the automated A120 Plasma delivers the best-in-class productivity, precision and performance," says Van Dyk.

A120 Plasma features include:

- SL100® SV 1Torch® start technology, which eliminates electronic interference and provides a strong pilot arc for quick and reliable starting.
- The auto-pilot restart function, which enables the A120 to cut expanded metal quickly and easily.
- The SL100 torch with standard ACT Quick Disconnect, which offers toolless quick torch disconnection for easy changeovers between mechanised and manual cutting.

Eagle CS automated cutting machine

The EAGLE CS offers high productivity, exceptional performance, great value with easy operation, delivering performance and long service life for light fabricators that need reliable productivity.

Features include:

- Strength: Robust frame design that offers high performance and long service life.
- Performance: High speed, excellent precision and smooth motion that produces higher quality parts.
- Productivity: Technological innovation and automation of the entire process produces the highest productivity in any application.
- Unitised design: Fast and easy installation, minimum floor space, and easy load/unload thanks to the compact, unitised design.

"The EAGLE plasma cutting system is designed for precision plasma applications. It combines high productivity, exceptional accuracy and sophisticated process integration to deliver the highest cut quality parts at the most economical price," Van Dyk says.

"ESAB can also provide automatic setting of these cutting machine with plasma parameters including gas pressure and type. A full set of cutting parameters is automatically locked in by simply selecting the appropriate thickness on the supplied database," he adds.

"While ESAB is globally renowned for large automation systems, such as those used for wind tower manufacturing, the Crossbow HD and the Eagle CS cutting systems make state-of-the art technology accessible to small workshops and SMEs. They are affordable solutions that offer excellent flexibility without having to make compromises, Van Dyk concludes.

Eagle CS specifications	
Effective cutting width	1 500 mm
Effective cutting length	3 000 mm
Overall space requirement	2 730 x 3 830 mm
Max travel speed	6 000 mm/min
CNC controller	HG616 with 10" colour LCD
Available plasma options	A40i, A60i, A120
Plasma cutting range	3 to 20 mm
Oxy-fuel	Up to 30 mm as optional
HVAC cutting	Plate rider as optional
Height control	Arc voltage height control
Cutting table	Water bed (down draft optional)

Cutting costs in the metal fabrication

SYSPRO has been specialising in the fabrication environment for nearly 40 years, with the result that its ERP solution can be fully integrated into fabricators' processes. This article outlines ten ways to help fabricators optimise their production cycles and cut costs.

The metal fabrication industry is facing serious challenges, from volatile commodity prices to shrinking markets, offshore price cutting and higher expectations in terms of quality and speed of delivery. Increasingly, fabricators are having to reassess the way they operate to remain sustainable, by becoming increasingly innovative, tech-savvy, agile, flexible, responsive and customer-centric.

Today, more than ever, the right ERP (Enterprise Resource Planning) solution could mean the difference between success and failure of an operation. It can help with planning, execution, control and it can radically improves production efficiency in a manufacturing or fabrication environment.

To get the most out of an ERP solution, it should be one that has been designed, implemented and supported by a company that understands the fabrication business, one that has the specialist skills to help individual companies to deliver unfailing continuity and consistency throughout the entire value chain, from the initial quote request to the final product delivery.

SYSPRO has nearly 40 years' experience in providing fully integrated ERP solutions that come with a comprehensive set of tools especially suited to help with planning, executing, controlling, streamlining and expanding production processes in fabrication environments. Listed below are ten of the ways SYSPRO's customised solution for fabricators can help users to get the most value from their ERP experience.

1. Optimising the quotation process:
To improve turnaround times and provide a better service to customers, quotations system should provide a single source of 'the truth' for accuracy and review purposes and to enable easy sharing of updated information.

As more and more services are outsourced to benefit from manufacturing and cost efficiencies, costs of material, labour and outside services continue to be an important part of quoting processes. SYSPRO's Quoting and Estimating capabilities allow fabricators to create professional and comprehensive quotations.

A highly flexible interface provides all the information needed to give customers timely quotes and estimates as well as the ability to incorporate vendor-related service costs that can be marked up as a part of any estimate.

2. Streamlining the planning process:
For more efficient operations, SYSPRO Requirements Planning uses projected demand and supply to assist with planning and to create realistic production, purchasing and supply transfer schedules. It also identifies capacity constraints and maintains optimal stock holdings in a multi-site and multi-warehouse environment.

3. Synchronise supply with demand:
Particularly for component and material suppliers to original equipment manufacturers (OEMs), synchronising supply with customer demand is a key requirement to prevent costly line stoppages in assembly plants. This involves not only automating order processing and other processes in the supply chain, but also executing production plans using LEAN principles.

SYSPRO's Manufacturing Operations Management Solution facilitates the management of the end-to-end manufacturing process. It provides complete manufacturing lifecycle management from planning, scheduling, publishing, collecting, tracking and analysing, to optimise and improve operations.

4. Design and engineering collaboration:
SYSPRO's Product Configurator offers multiple configuration options to customers in a controlled, cost-effective and user-friendly manner to maximise customer service and operational efficiencies.

It enables manufacturers to differentiate their product offerings through the customisation of products to meet customer specifications and it can help reduce configuration errors, while also reducing the involvement of experts in routine transactions.

Import facilities and SYSPRO e.net Solutions facilitate improved electronic collaboration with customers for the creation of customer-specified designs, while the Contact Management System provides a central area for the recording and querying of all communications regarding collaborative activities.

In addition, other product-related data such as technical drawings can be imported and linked to the relevant products in SYSPRO, while photographs, video clips and other multimedia files can be linked and viewed on-demand.

SYSPRO's powerful Engineering Change Control (ECC) features enable the creation of user-defined workflows to control the

SYSPRO ERP metal fabrication software enables users to manage production costs, product quality, and on-time delivery by automating and integrating business processes and improving management information.

product development process and ensure electronic sign-off.

5. Manage inventory:
For improved customer service and profitable management, effective inventory management should be a priority for every manufacturing or distribution business. These businesses need a unified view of inventory, which requires real-time data at each stocking location, whether these are in transit, at the finished goods warehouse, on the factory floor, expected components or raw material from suppliers, and outstanding orders from customers.

SYSPRO provides comprehensive inventory management tools to ensure there is visibility of inventory across the supply chain to meet the demands of the business, helping to eliminate overstocking and tying up of capital.

SYSPRO has specialised in the fabrication environment for nearly 40 years, with the result that its ERP solution can be fully integrated into fabricators' processes.

6. Manage product and part traceability:
To ensure operational efficiencies and to meet the critical compliance requirements of the fabrication industry, SYSPRO provides traceability from material origins through manufacture to final destination.

Lot Traceability and Serial Tracking functionality affords full visibility to the origins, build and sales destination of products, thereby providing the means to easily trace and analyse the source of defects should they occur.

7. Reduce time to market:
Customisable end products, flexibility, speed and accuracy in meeting customer demand are essential to remaining competitive. SYSPRO provides the tools to manage fabrication businesses successfully, ensuring a healthy profit while staying competitive.

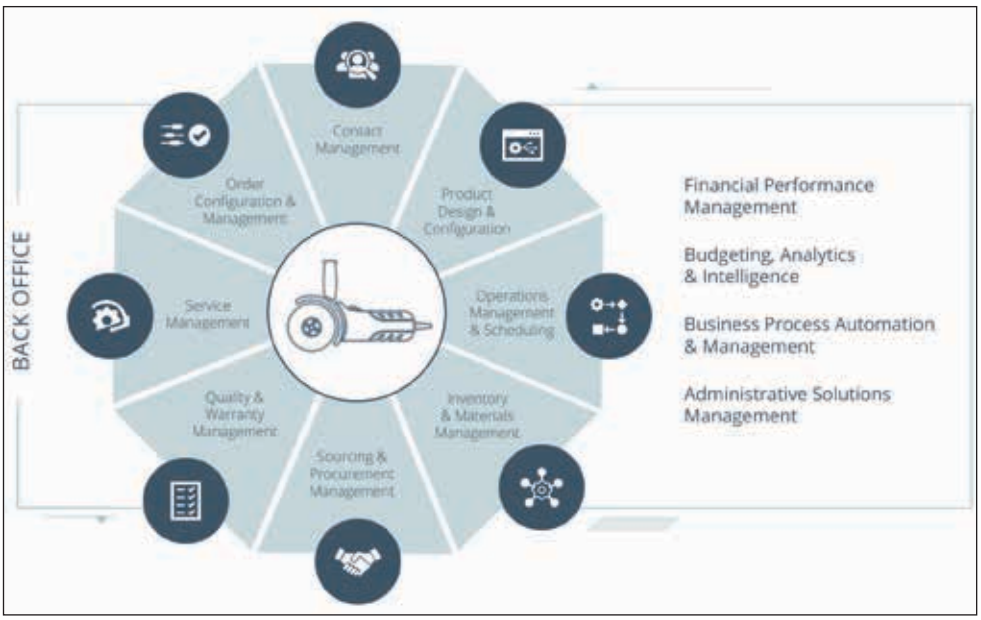
8. Customer relationships and service:
Providing the kind of service that builds solid relationships requires that every client-facing person in the company has immediate access to information that helps them to keep track of customers, conduct analyses, and make informed business decisions quickly and confidently. SYSPRO's Contact Management provides all this and more.

9. Improved electronic collaboration with trading partners:
SYSPRO enhances the ability to harness e-Commerce technologies effectively, giving the potential to transform a business and accelerate commercial success and growth.

10. Linking the supply chain with SYSPRO:
Increasingly, organisations want to connect external devices such as tablets and scanners to their business software. The objectives of integration are to improve information sharing, reduce duplicate data entry and enable data to be stored in one place for consolidated reporting and analysis.

SYSPRO's Integration Framework enables the ERP application to be extended to work with other systems within and beyond the enterprise. It encourages integration with other line-of-business third-party products; information interchange with external devices; access to applications via the web; easier collaboration and information sharing with business partners; and improvements to the user interface.

As evidence of the suitability of this ERP solution, global fabrication companies that have successfully adopted SYSPRO include: Benchmade Knife Company; Metaltech, which reported £200 000 per year in savings after adoption; B&R Enclosures; Hall Longmore. and Zircoa, which reported an increase in top-line revenue of 21% as a direct result of using the solutions.



The operational infrastructure of a fabricated metal business.

High performance welding at Painco relies on TPS 600i

Rafael Severino, operations manager for Painco, a large Brazilian fabricator, describes how his company has improved productivity by 65% through the introduction of Fronius' TPS 600i welding solutions in its automated welding cells.

Headquartered in Rio das Pedras in São Paulo, the Brazilian fabricator, Painco, uses automated welding cells to produce welded components and assemblies from sheet metal for a variety of different sectors, including the yellow goods and commercial transportation industries. Recently, however, the productivity of the robots had to be assessed because Painco was undergoing a period of growth and its existing welding systems could no longer keep up with constantly increasing demand.

The manufacturer found the perfect solution in the Fronius TPS 600i.

All around the world, digitisation and automation are on the rise in the manufacturing industry. Brazil is a major growth market and, as such, is also investing heavily in digital technologies. Painco has also recognised the value of the current trend towards digitisation and automation and has therefore incorporated robot-assisted welding cells into its production area.

The TPS 600i and the PMC welding package in use at Painco on an excavator bucket.

Painco benefits from the intelligent functions of the modern TPSi 600 welding system platform, which delivers a very stable welding process.

As a leading supplier of welded components and assemblies made from carbon steel plates, Painco serves a wide variety of industries, in particular the yellow goods and commercial transportation sectors. The metal thicknesses designed for extreme applications that are used in these sectors pose enormous challenges for the company.

Robot cells had the potential to increase productivity enormously, but the company quickly discovered that using welding systems with just 350 A of power meant that much of this advantage was lost. The seam quality and welding speed left much to be desired. This resulted in large numbers of rejects and production capacity at Painco stagnated.

Rather than adding more robot cells, all that was required to produce the desired volumes was to replace the existing welding systems. The Fronius TPS 600i power source was the preferred system for the job. Its peak power of up to 600 A, combined with the transition to the Pulse Multi Control (PMC) process variant, meant that the desired productivity and seam quality could both be achieved.

When purchasing the welding equipment, the company deliberately chose to upgrade to the Pulse Multi Control (PMC) welding package. In its newly equipped production facility, Painco found that the pulsed arc significantly improved material transfer, allowing welding speeds to be increased. In addition, they noticed two remarkable side effects: "We were able to detect significantly lower heat input and a reduction in weld spatter. This resulted in flawless weld seams with far fewer rejects, which enabled us to increase our productivity even further – all in all by up to 65 percent! This saves us about 120 working hours per month," says operations manager Rafael Severino enthusiastically.

"At the same time, investing in the new devices was much cheaper than purchasing additional robot cells," he adds.

Cosmo Group introduces CNC LINC-CUT® plasma

Petrus Pretorius, general manager at Cosmo Industrial, introduces the LINC-CUT® S 1530w plasma cutting system from Lincoln Electric that uses the FLEXCUT™ 125 CE plasma cutting power source.

The VMD user interface allows you to control the machine and is installed on an easy-to-use 16/9multi-touch screen

"The LINC-CUT S 1530w is a plasma cutting solution that is quick to implement, simple to use and a very affordable investment," begins Pretorius.

The machine frame consists of a steel bed incorporating cutter bars to support the sheets to be cut. The bed contains water mixed with purpose-developed Plasma Green liquid to capture dust and fumes generated during cutting. This liquid enables residual escaping fume gases to be kept below exposure limit values under typical conditions of use, that is, where the machine is installed in a workshop with sufficient dimensions for air renewal and use is limited to two hours of actual cutting per day.

"The touch screen and an intuitive man-machine interface with a library of integrated shapes allows users to begin to do simple cutting immediately. In addition, a software package is provided to enable users to draw, import, vectorise and nest cutting patterns, either manually or automatically, with programs being loaded into the system via USB sticks. There is also a networking option, although this is not included as standard.

"While advanced, the machine is simple to use and maintain and fully guaranteed for two years," Pretorius tells *African Fusion*.

"Also, thanks to Lincoln Electric's FLEXCUT 125 CE technology, the machine produces excellent cut quality with compressed air on carbon steel and stainless steel, with good cost effectiveness, long service life, a reduction of finishing operations, less dross and better angular quality," he continues.

The ACCUMOVE VMD user interface

To simplify controlling the machine, the VMD user interface is installed on an easy-to-use 16:9 multi-touch screen and incorporates all the essential functions for plasma cutting. Notable feature include:

- User-friendly and intuitive human-machine interface (HMI).
- Choice of material, thickness and intensity to automatically adjust the cycle parameters.
- Multi-directional JOGs allow a user to move the machine (linear or incremental).
- A sheet alignment function simplifies set up.

Other features include: a cut function for scraps or skeletons; test mode and cutting mode; a large graphical 'twin' follows the progress of the program in real time; program recovery functions cover the event of an incident; a striking/start number counter enables easier management of consumables; and NC programs can be imported via USB – or a network option if preferred.

VMD advanced cutting cycle functions include: height regulation by arc voltage; cycle initiation by electrical detection of the sheet; automatic compensation for consumable wear; intelligent sheet detection management; speed management via F-code to optimise quality on small internal profiles; and resume cut functions

In addition, VMD also controls a laser pointer as a positioning and sheet alignment aid, and a multidirectional torch shock detector to protect the plasma cutting tool.

The machine is also supplied with the LINC-CUT CADCAM software suite for installation on a PC. The CADCAM offers:

- Drawing according to plans with a complete and efficient industrial drawing module.
- Creating text using a multitude of pre-installed fonts.
- An extensive library of parametric shapes to assist with designing.
- Importing most standard drawing formats, including .dxf, .dwg, .pdf vector

The software can also vectorise images, nest parts, create the toolpath and generate the machine program required for a cutting. "LINC-CUT CADCAM manages up to four cutting qualities that adapt to the geometry of the part being cut, making quick contour cuts with little or no dross, cuts for bolt passages and quality lettering.

The Lincoln Electric FLEXCUT 125 CE

The 125 A that is generally shipped with the LINC-CUT CNC cutting table is a plasma cutter with a 100% duty cycle at 125 A. "The FLEXCUT 125 ensures up to six times longer consumable life than competitors and maintains faster cut speeds. The completed cut is virtually dross-free, which means less secondary processing.

"Whether being used for piercing a 25 mm mild steel in a mechanised cutting application or cutting expanded metal, users can count on less edge bevel and superior edge quality compared to competing cutting systems," Pretorius assures, adding that the system can be operational in a very short time and controls are simple, enabling a consistent and reliable arc plasma cutting arc to be produced without the need for high frequency arc ignition.

"We at Cosmo are able to offer fast delivery, installation and set-up of these units, along with training on the easy to learn software. The LINC-CUT plasma system with its FLEXCUT 125 power unit is ideal for sheet metalwork, locksmithing, artists and hobbyists, prototyping, education, the motor racing industry and repair shops. It offers improved cycle times with industry leading technical support at minimal investment costs," Pretorius concludes.

VacuFil: a torch-integrated extraction solution

The new VacuFil series of extraction units from KEMPER is a torch-based extraction system that combines easy handling with needs-based extraction capacity. With 125i, 150i and 250i digital variants, VacuFil automatically and continuously adjusts the required air volume flows according to the individual torch characteristics. W3 approval now certifies that the digital VacuFil versions embody the highest level of protective welding equipment. Also, international machine manufacturers are already successfully using this new high-vacuum technology.

An earthmoving equipment manufacturer ordered the first 90 125i units shortly after the product launch. This single VacuFil system enables them to meet safety requirements using different welding torches from multiple manufacturers.

To ensure that the shielding gas stream is not disturbed, the correct extraction capacity is important for torch extraction. All extraction torches require an individual volume flow for this. The new EN ISO 21094 DIN standard now defines exactly how this is to be determined. “With VacuFil, we are creating a hitherto unique solution for torch extraction in accordance with these specifications.” says Björn Kemper, CEO of KEMPER GmbH. “Our new high-vacuum units are convincing not only due to their simple operation. Thanks to the automatic speed control, welders do not have to laboriously determine the extraction capacity manually. They act in accordance with the standards at all times, while ensuring the welding gas shield is maintained.”

VacuFil can be combined with any conventional welding torch. When welders couple their torch technology with the digital extraction units of the series, they intuitively select the torch of their choice on a touch display. The units then automatically adjust their output to the torch parameters stored in the unit’s software. The integrated extraction volume control ensures that the extraction systems continuously to adjust the welding process. This means that the highest possible air volume flow is always used for extraction.

Depending on the danger intensity of the welding process used, the VacuFil 125i, 150i and 250i versions are available with different maximum extraction capacities. The W3 certification from the Institute for Occupational Safety and Health certifies that the systems meet the best possible protective welding equipment standards. Even the extraction of welding fumes during the processing of chrome-nickel steels is possible. VacuFil is eminently suitable for detecting high levels of smoke and dust during industrial welding. The automatic filter cleaning system enables uninterrupted continuous operation.

VacuFil digital extraction units enable welders to intuitively select their chosen welding torch on a touch display. The unit then automatically adjusts the extraction parameters to those stored for the matching torch.

During the development of the VacuFil series, KEMPER has built up extensive torch know-how regarding the necessary extraction capacity. If torch manufacturers change their designs, KEMPER adjusts the extraction parameters in its master data to the ideal extraction capacity. The units are then simple to update over the Internet using KEMPER Cloud.

All units are also available as analogue VacuFil 125, 150 and 250 versions. Here, welders set the required extraction capacity manually.

All new VacuFil variants are suitable as mobile extraction units for use at changing workplaces or when working with large work pieces.

Shortly after the market launch, one of the world’s largest manufacturers of earthmoving machinery ordered the first 90 VacuFil 125i units and is using them successfully in a production facility in the UK.

www.kemper.eu

voestalpine Böhler Welding and Afrox JV for local welding consumables

Voestalpine Böhler Welding and Afrox have strengthened their presence in the South and sub-Saharan Africa by forming a joint venture company (JV) to manufacture welding consumables.

Afrox’s current welding consumables factory, located in Brits in the North West province of South Africa, has been transformed into a new company by selling 51% to voestalpine Böhler Welding to form the new joint venture company, voestalpine Bohler Welding Africa Pty Ltd, which will be managed by voestalpine Böhler Welding.

The new JV will manufacture Afrox and voestalpine Böhler Welding products for the South African, sub-Saharan African, as well as other export markets.

“This development will support the current Brits factory with voestalpine Böhler Welding‘s manufacturing know-how and technology, raw material sources, welding application know-how and high product quality standards. Furthermore, the partnership will invest in manufacturing of advanced welding consumables when required by our customers in the African markets, now and in the future,” says Herbert Abbott, managing director for voestalpine Böhler Welding in the Middle East and Africa region.

“voestalpine Böhler Welding and Afrox are proud to enter into this exciting new joint venture and look forward to providing our customers with world leading quality products, while ensuring continued success for both the shareholders and employees of the new JV consumables factory,” he says.

www.afrox.co.za
www.voestalpine.com/welding

X5 FastMig for extraordinary productivity

Kemppi has announced the launch of a brand new industrial multi-process welding system for steel welding: the X5 FastMig. Built using energy-efficient inverter technology and developed in collaboration with professional welders, the Finland-made X5 FastMig welding machine is available for manual and synergic 400 A and 500 A welding to offer increased arc-on time by improving the ergonomics, weld quality and user experience.

The X5 FastMig overcomes the challenges of steel welding, to save time and money in post-weld treatment. Precise arc ignition using latest Touch Sense Ignition technology is featured as standard in all available models. This minimises spatter and reduces the need for cleaning up after welding. In addition, challenging welding consumables can be easily accommodated with Kemppi's Wise special processes.

Ease-of-use is at the core of the X5 FastMig. The graphical and impact-resistant 5.7″ TFT display wins over both experienced welding professionals and new talents and the operating basics are easy to grasp in just 10 minutes.

"The excellent usability results in an increase in valuable arc-on time, especially for companies that employ an outsourced workforce and have a welding fleet with shared usage," explains Kemppi product manager, John Frost.

The ergonomically designed, top-loading wire feeder saves space and improves occupational safety when changing wire spools and adjustable hanging, even in dual setup, enables easy accessibility.

Flexlite GX welding guns that are used with the X5 feature flexible cable sets and ball-jointed cable protection for reduced wrist loading. The neck structure adds to welder comfort with more efficient cooling, while the on-torch GXR10 remote control allows parameter adjustment while welding the joint. The torch is also designed to extend the lifetime of the torch consumables.

The modular system with excellent accessories provides the optimal solution for every production line and cell, enabling higher arc-on times. The X5 FastMig's wide range of accessories includes transport units, interconnection cables of various lengths and wired remote controls.

With the help of X5 Selector, an online configurator tool, the users can easily choose the equipment setup to best suit their needs.

Kemmpi's new X5 FastMig offers increased arc-on time by improving the ergonomics, weld quality and user experience.

www.kemppi.com

In tough times, Apex safety screens suggests no compromise

Poor economic conditions – exacerbated by the COVID-19 lockdown – have tempted many manufacturers to cut back unwisely on health and safety facilities, risking the sustainability of their enterprises. According to Wim Dessing, sales executive of Apex Strip Curtains & Doors, South Africa already has disproportionally high rates of injuries at work – despite having advanced occupational health and safety (OHS) laws.

"The difficult trading environment certainly makes for tough financial decisions, but safety should always be a priority," says Dessing. "Employees are the backbone of any business's capacity to produce and meet deadlines, so they need constant protection – not to mention the regular compliance inspections by the Department of Labour."

In factories where grinding and welding are carried out, for instance, some manufacturers may resort to makeshift protective structures where solid wall barriers are not feasible to counter UV radiation and weld spatter. These structures might comprise wooden or metal partitions, or even opaque canvas sheeting. They do not comply with the OHS Act, he emphasises, and provide well below-par protection for workers.

"Rather, the responsible route is to install Apex Welding & Safety Screens – which effectively protect workers from weld spatter and fumes, as well as from harmful ultra-violet radiation," he says. "The screens are manufactured from a specially formulated PVC material, proven by SABS tests to be superior to conventional materials."

The screens are available in various configurations, the most popular being a freestanding frame for easy handling and portability. They absorb, scatter and filter light for a safer working environment, both for the welder and for others in the vicinity. SABS tests show that the screens are more effective than conventional materials for UV transmittance, protecting workers against long-term skin exposure and impact on eyesight.

Apex Welding and Safety Screens are most often used to cordon off welding and grinding bays.

Dessing notes that the feet of the screens are angled to allow the best use of floor space, and they can be positioned perpendicular to each other.

www.apexstrip.co.za

Reducing business downtime with robots

Colin Brings, Total Customer Support Director at Yaskawa Southern Africa, talks about the uptime advantages of adopting modern robot technology.

According to Asen Bozhikov, assistant professor of Business Informatics at the D. A. Academy of Economics in Svishtov, Bulgaria, businesses suffer approximately 14 hours of technology-related downtime per year. Effectively, that's two days of operations lost.

In a world that is always connected and moving at a blistering speed, businesses cannot afford to have extensive periods of downtime. After all, the cost of downtime is the minutes of downtime multiplied by the cost of operations per minute, so it's easy to see how this could spiral out of control and negatively impact productivity.

As efficiency becomes a primary driver of business, industries are investigating new and innovative ways to reduce downtime. And this includes the implementation of automation and robotics.

Erik Hupjé, founder of Road to Reliability, believes that world-class organisations ensure that less than 2% of their total maintenance should be emergency maintenance. While each industry and business varies, there are some organisations striving to push this number even lower.

"One of our clients aims for a 1% downtime for its overall uptime," says Colin Brings, Total Customer Support Director at Yaskawa Southern Africa. "So far, it's been an achievable and realistic target for them, partially due to robots being highly reliable. In fact, it's usually the peripheral equipment, such as tooling and jigging, that causes downtime rather than the robots."

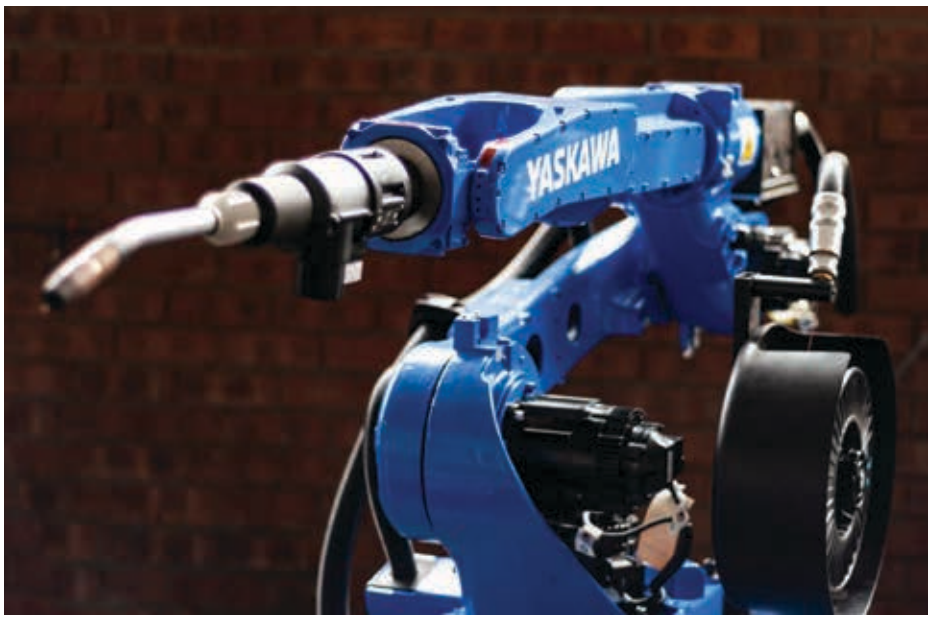
Modern robotic solutions feature predictive technology that warns operators of possible failures or parts that'll need to be replaced. Instead of nervously anticipating a breakdown, businesses are now in control of their operations as they can better prepare for maintenance and plan ahead.

"All of our latest robots have maintenance algorithms built into them where they can predict the life expectancy of speed reducers, such as gearboxes, and servo amplifiers like the drives for the motors," Brings says. "If you implement and adhere to these checks, you can schedule your maintenance accordingly and eliminate any unnecessary downtime."

While the automotive industry is one of the largest and most obvious to benefit from the use of automation, the implementation of robotics has reduced downtime and improved operations for other unexpected industries.

"Even before the start of the pandemic, we noticed an increase in demand for end-of-line packaging and food handling robots," Brings explains. "As an example, we embarked on an automation project with a number of bakeries recently. One of these bakeries produces 8 000 loaves of bread per hour, with five to eight people running the factory. As a result, it is highly dependent on the robots' output and uptime, as any downtime could result in a shortage of bread in the area."

Brings adds that the sanitary ware industry has also experienced an uptake in automation, in an effort to manage uptime and curb unpredictability. Robots are now being used to sand and polish quartz resin baths, while others are being used to inspect and check the quality of the baths before exports.



Compact robot designs from Yaskawa are optimised for a multitude of specific applications such as welding, while high-density installation helps to save space on production lines.

"In a fast-moving and highly competitive world, late deliveries or production issues, due to downtime, cannot be overlooked," Brings says. "It's up to businesses to ensure these moments are rare and that they don't impact their clients and customers at the end of the day."

No organisation can afford the luxury of shutting down its operations for two days (or more) a year due to downtime. Productivity, process and consistency translate into profit, and the only way to ensure it continues is to embrace technology and how it can help solve some of the biggest business challenges.

www.yaskawa.za.com

In a constantly changing world, success depends on creating the perfect balance.

The impact of global events have highlighted the need for manufacturers and distributors to transform traditional procurement models, specifically in order to mitigate the risks of supply chain disruption, create a competitive advantage and drive growth.

Using real time data, actionable insights and digital technologies, SYSPRO ERP has built-in capabilities to provide you with end-to-end visibility across your entire supply chain - and the tools and intelligence you need to create the perfect balance between supply and demand.

SYSPRO ERP. Agile procurement for whatever comes next.

97.5%

Order Fulfillment

The SYSPRO solution eliminated the need to manually order stock, reducing overheads in the stock and procurement side of the business dramatically.

Hazel Barton
Fiddes Payne, Financial Controller

SYSPRO
Simplifying your Success

SYSPRO AFRICA @SYSPRO_Africa za.syspro.com

721811 0921

ESAB®

INNOVATION

YOUR COMPLETE WELDING AND CUTTING SOLUTIONS PARTNER

salesjhb@esab.co.za | salesdbn@esab.co.za | salespe@esab.co.za | salescpt@esab.co.za

TURBOTORCH · ewac AN ESAB BRAND · AMI · TWECO · ARCAIR · STOODY · TBi Industries · THERMAL DYNAMICS · VICTOR