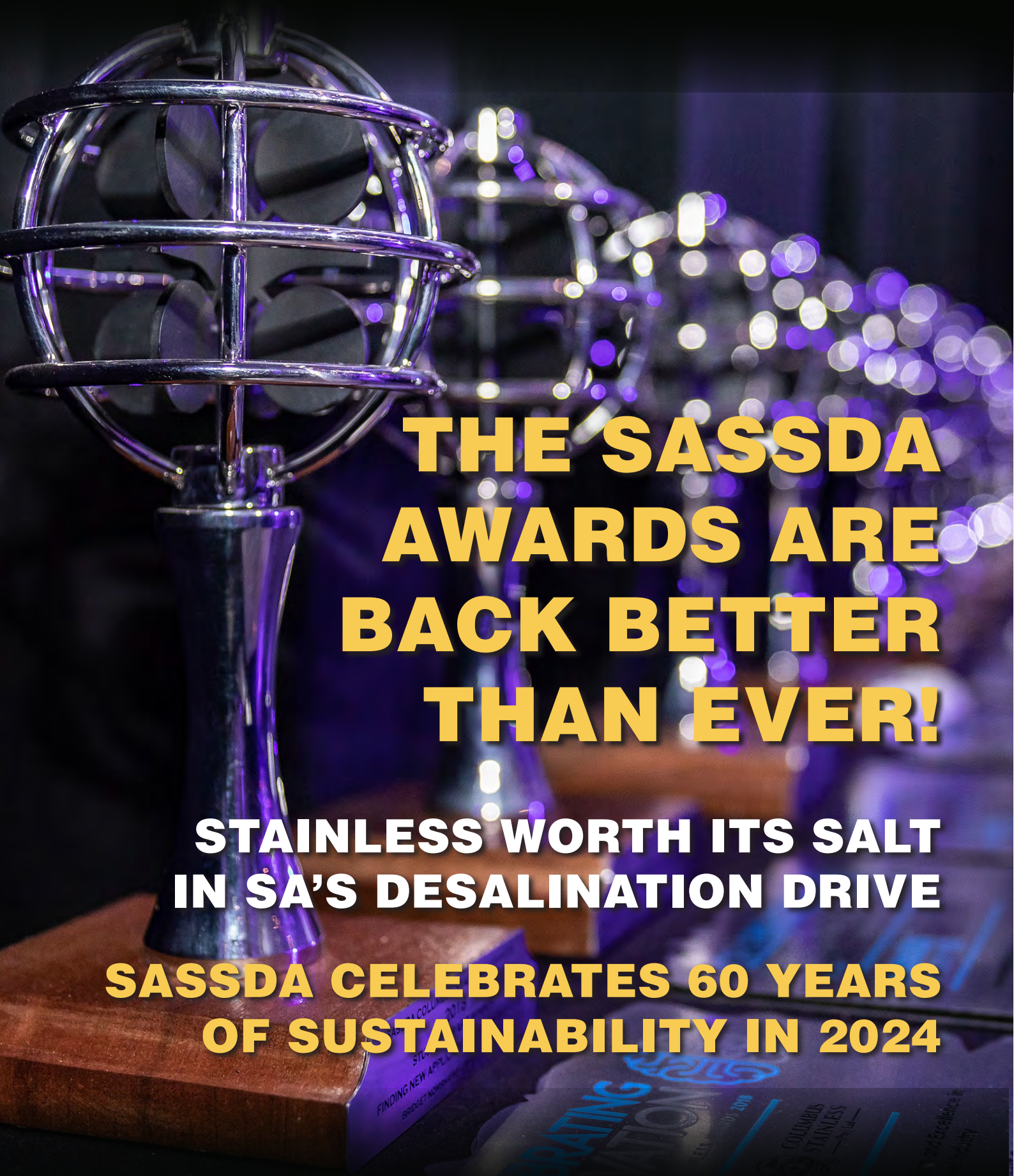


stainless^{steel}

the journal of the southern africa stainless steel development association



ISSUE 1 2024



THE SASSDA AWARDS ARE BACK BETTER THAN EVER!

**STAINLESS WORTH ITS SALT
IN SA'S DESALINATION DRIVE**

**SASSDA CELEBRATES 60 YEARS
OF SUSTAINABILITY IN 2024**



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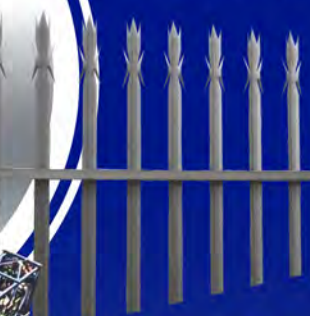
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SASSDA celebrates 60 years of sustainability and growth

This year will be a special one in the history of the South African stainless steel industry. Our industry celebrates the 60th anniversary of its official establishment in July 1964. Since the beginning of the stainless steel industry in Southern Africa, Sassda has been recognised as the official voice of the industry - a role the association still plays.



In 1912, the Krupp company patented the first austenitic stainless steel. This was not publicised broadly and in England, Harry Brearly was trying to improve the durability of gun barrels by adding chrome to alloys. He did not succeed, but his work paid off when he became the first person to produce stainless steel products.

These took the form of cutlery made from martensitic stainless steel. This material was subsequently developed in America and led to the ferritic grades being produced in the 1930s. The last major development was the duplex grades produced in Scandinavia during the 1940s. South Africa and its neighbours have major reserves of the minerals that are instrumental in the production of stainless steel and the first stainless steel was produced in Middelburg in 1966. At that stage, local production capacity was 36 000 tonnes per year.





Columbus Stainless rises

During the early 1980s, there was further investment in strip rolling bringing the local capacity to 150 000 tonnes per year. The Columbus Joint Venture was formed, with the IDC, Samancor, and Highveld Steel as the major stakeholders. During the early 1990s production grew to 500 000 tonnes per year. In 2002, Acerinox acquired a 64% shareholding, and this investment gave birth to Columbus Stainless and increased production to just under 750 000 tonnes per year.

During the last sixty years, Sassda has grown to an association covering the complete stainless steels value chain with just under two hundred members in the southern African region. However, it was not all plain sailing and over the last 60 years the association has had to adapt to a changing market and economy, as well as the dwindling economic growth of the country over the last two decades. Sassda is one of the oldest stainless steel development associations in the world and over the past 60 years, Sassda and the local industry have made their mark on the global arena with quality products and innovation and our "Cross and Ball" logo is world renowned.

Promoting sustainable growth and development

An aspect that has never changed is Sassda's mandate to provide a platform for its members to collectively promote the sustainable growth and development of the industry with the main emphasis on stainless steel converted within the local economy. This is achieved by supplying the industry with world-class training, education, and technical support. There is a strong drive to collaborate with peer organisations to market the local industry and members by lobbying at a high level and creating networking opportunities for members.

The association is simultaneously building on its illustrious past and looking to the future for opportunities to actuate the mandate in new and innovative ways. We are

also celebrating the return of the Stainless Steel Awards in 2024. The brief was that the event should recognise and applaud exceptional achievements within the stainless steel industry during the recent past.

However, it is also aimed at celebrating the resilience of the South African stainless steel industry and its ability to weather a range of storms over the past 60 years. It's now time to celebrate the tenacity, resilience, and teamwork in our industry that is, in effect, a celebration of the sustainability of an industry, the Association and its members. It is an event where the positive side of the past six years will be highlighted as motivation for the future that still is not looking all that bright.

The awards will celebrate the material which builds our industry and society, and which is constantly improving life for all. It is to honour the people that keep the wheels turning in our industry, adding to economic growth, job creation, and a better environment for generations to come. It is the event that will again emphasise the fact that South African stainless steel has been simply brilliant for sixty years and that the intent is to remain brilliant for the sixty to come.

Michel Basson
Sassda Executive Director



The best of the GPS e-newsletter

Each month Sassda rounds up a selection of global and local market intelligence articles that are sent to our members in an easy-to-read package of content. They're designed to highlight pockets of potential growth in demand for stainless steel. Here are some of the best articles from the last few issues...

No charges for environmental crimes - NPA won't prosecute Karpowership case

The Director of Public Prosecutions in Pretoria has declined to bring charges against the environmental consultants who helped Karpowership SA bypass environmental regulations. A case was opened in May 2021 by the Environmental Management Inspectorate (aka Green Scorpions) which investigates environmental crimes. It relates to Karpowership's 2020 attempt to bypass the complex process of obtaining environmental permits. At the time, the country was in the grip of the Covid-19 pandemic and Karpowership's environmental consultants claimed that this "emergency" was a good reason to grant Karpowership an exemption under Section 30A of the National Environmental Management Act (Nema)...

[Read more](#)



Inept African ports miss chance as Red Sea attacks reroute ships

Africa's inefficient and ageing ports are hampering the continent's chances of capitalising on a surge in ship traffic that's avoiding attacks by Houthi rebels through the Red Sea, logistics experts said. The number of vessels sailing around the southern tip of Africa is up 85% from the first half of December 2023, when the Iran-backed, Yemen-based terrorists intensified their attacks on ships, according to Clarksons Research. Some of the biggest beneficiaries are ports in South Africa, Madagascar, Mauritius, and Namibia, all of which have seen volumes rise...

[Read more](#)

Gardens of Stainless Steel

Located outside the Chinese city of Nanjing, the Jiangsu Garden Expo recreates famous classical gardens from across Jiangsu province. The 3.5 km park is an outstanding example of regenerating a degraded environment into a living museum furnished with hotels, restaurants, and entertainment. Stainless steel features prominently throughout the Expo...

[Read more](#)



Transnet's plan to attract rail investment misses the mark

Transnet's draft 'Network Statement', which is intended to ready the logistics provider for private investment, has received a lukewarm reception from the transport sector. Off-the-record discussions are more frosty, in part because Transnet appears intent on retaining its monopolistic control of rail and setting tariffs that could lump miners with a 65% increase in rail transport costs, according to some estimates... [Read more](#)



Canyon Coal to develop new R1.4 billion mine in Mpumalanga

Canyon Coal is constructing a new coal mine in Hendrina, Mpumalanga. Production is expected to start in the second half of 2023, with the first phase of the Gugulethu project on track to be completed in eight to ten months and expected to produce 1.2 million tons a year. Formerly known as De Wittekrans, Gugulethu is a greenfield project located south-east of Hendrina that Canyon bought out of business rescue. Phase 1 of the project holds an economically mineable reserve of 14.3 million tons of run-of-mine (RoM) coal. It comprises three pits, one of which has been specifically designed to gain access to the underground reserve as part of Phase 2... [Read more](#)

Improved infrastructure can help SA escape low growth

Infrastructure challenges in South Africa are mounting in what is turning out to be a perfect storm of power cuts, water shortages and potholes that are all too common.

The South African Institution of Civil Engineering (SAICE) highlighted these challenges in its 2022 State of Infrastructure report that revealed that South Africa is at risk of becoming a "failed state". The report assessed 32 different infrastructure segments and found only 15 to be "satisfactory" or above (graded C or above), with the remaining segments falling into being at risk of failing' (D) or 'unfit for purpose' (E). South Africa's overall infrastructure rating was a D, indicating that infrastructure is not coping with normal demand and is poorly maintained... [Read more](#)



Koeberg nuclear fuel supplies in trouble after US-South Africa pact ends

South African power utility Eskom is examining how the suspension of a pact that enables it to import nuclear fuel components from the US, will affect its sole atomic plant. The Agreement for Cooperation in Peaceful Uses of Nuclear Energy between the US and South Africa expired on December 4. That resulted in Westinghouse Electric losing its license from the US Nuclear Regulatory Commission to export fuel-assembly components to Eskom's Koeberg plant near Cape Town.

"Eskom is exploring the implications of the withdrawal of the US NRC approval for Westinghouse and what is needed to enable them to continue supplying fuel," the utility said in a reply to questions...[Read more](#)



Looming industrial gas crisis, government called upon to make haste

Against the backdrop of a looming supply crisis, Industrial Gas Users Association of Southern Africa Executive Officer Jaco Human reported that the South African gas sector employs 70 000 people and contributes significantly to the manufacturing sector to the extent of about R500-Billion a year. Speaking during a Moneyweb podcast, he reported there are no feasible or discernible alternatives for energy to run these plants at this particular point in time...

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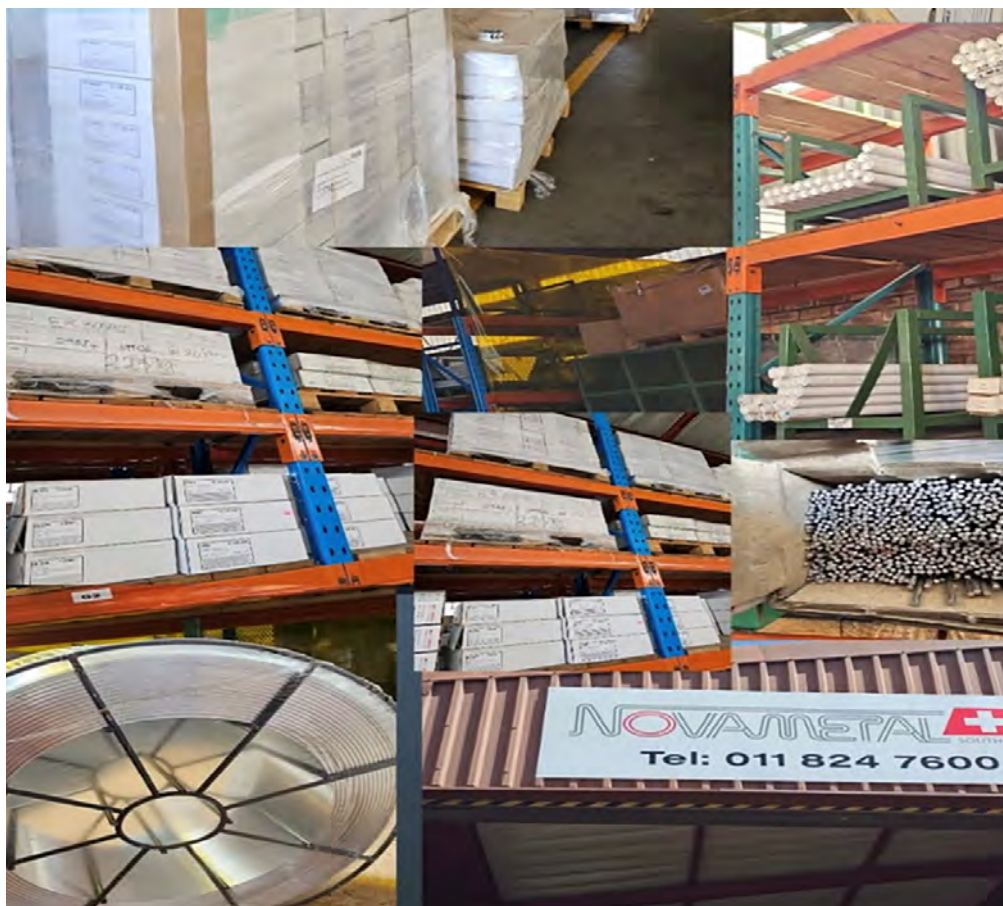
SA steel industry needs level playing field says Amsa's Kobus Verster

Writing in IOL.co.za, ArcelorMittal South Africa CEO Kobus Verster says the South African steel industry needs a level playing field through the establishment of a conducive operating environment and a level ecosystem to allow it not only to survive but to flourish. He stated; "As we enter another election season, there is much discussion about 'saving' the local steel industry. 'Saving it' is, however, a misguided narrative, and one that needs addressing"...[Read more](#)





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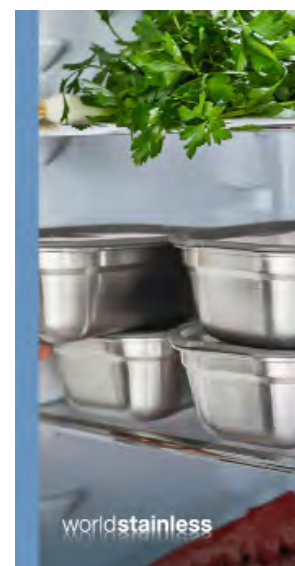
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of different grades for example: 308LSI, 309LSI, 316LSI, 310, 410nimo, nicrmo3, nicrmo4, nicr3, NiTi etc. Sizes available in Mig range from 0.8 to 1.2dia and Tig rods /Sub-arc from 1.6dia to 3.2dia in stainless steel, high nickel alloys and aluminium welding wire.

We also stock general wire in grades 304 and 316 in sizes ranging from 0.9dia up to 8dia in half hard and soft condition.

Other grades can be supplied upon request. Partner up with Novametal S.A. today to benefit and experience the quality, service and competitive pricing available to the local market.



It's time to move away from the global plastic addiction to sustainable stainless

Given that the theme of Sassda's 60th Anniversary is celebrating sustainability this article looks at the excellent work our global associate World Stainless is doing to champion the message that stainless steel is a viable alternative to plastic and should be used to ensure an environmentally eco-friendly product.

Choosing stainless steel for an application ensures that it will be produced responsibly, with an extremely low life-cycle inventory (also known as the life-cycle greenhouse gas emissions profile). Furthermore, stainless steel products have low, or close to zero, maintenance costs during their long life, and stainless steel can be reused indefinitely because they are easy to recycle without any loss of quality or material integrity.

In line with this, worldstainless.org has reiterated its support for the Zero Waste initiative (www.zwia.org) which focuses on; "The conservation of all resources using responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning, and with no discharges to land, water, or air that threaten the environment or human health".

This initiative underscores the urgent need to reevaluate material selection practices, highlighting the superior environmental credentials of stainless steel over traditional options like plastic.

This comes as a response to escalating environmental concerns and the pressing need for industry-wide action.

With mounting evidence of the detrimental impact of plastic pollution on ecosystems worldwide, advocating for the adoption of stainless steel as the preferred choice for various applications, it's clear that this is the most responsible and sustainable to make.

A plastic addiction

Sassda Executive Director Michel Basson comments; "We cannot afford to continue down the path of plastic dependency. The environmental consequences are dire, and it's time for industries to take responsibility for their choices. Stainless steel offers a viable solution - one that prioritises sustainability without compromising on performance."

Indeed, the superior life-cycle strengths of stainless steel make it an ideal candidate for a wide range of applications.

Unlike plastic, which contributes significantly to environmental pollution and resource depletion, stainless steel boasts low to zero maintenance costs throughout its long operational life.



This durability not only translates to cost savings for consumers but also reduces the need for frequent replacements, thereby minimising waste generation and conserving resources.

Stainless steel's inherent recyclability further solidifies its position as a sustainable material choice. Unlike plastic, which often ends up in landfills or oceans, stainless steel can be recycled indefinitely without any loss of quality or material integrity.

This closed-loop approach to material utilisation, not only reduces the environmental burden associated with disposal but also presents economic opportunities by minimising the demand for virgin materials.

Basson emphasises; "Plastic cannot be the default choice anymore. We need to shift towards materials that prioritise sustainability and longevity. Stainless steel offers a viable alternative - one that is not only environmentally responsible but also economically sound."

Currency weaknesses and debt burdens are other factors to consider. These issues can lead to defaults, project cancellations, and payment difficulties for imports. Therefore, businesses must be aware of these factors and utilise Exim facilities wherever possible.

Learn more [here](#) or contact info@worldstainless.org for more information.

Earlier this year The United Nations established Zero Waste Day to draw public attention to the need to address the global waste problem and promote sustainable practices aimed at achieving zero waste.

In line with this, stainless steel microwave-safe food containers can help by reducing food waste and the waste streams of single-use food containers.

Traditionally, metal food containers have been prohibited from being used in microwave ovens due to electrical arcing inside the ovens. Today it is easy to find microwave-safe stainless steel food containers in a variety of selling outlets, including popular online selling platforms.

Most stainless steel food containers are made of 304 grade (18/8 stainless), and new microwave-safe containers have had their corners specially designed,

so they do not cause problems when used in a microwave oven.

The main advantages of stainless steel microwave-safe food containers are:

- Eco-friendly: A resilient, reusable and recyclable product that does not harm our environment or humans.
- Food safe: A completely safe material that meets all global food hygiene standards.
- Versatile: Innovative product that can be used in every appliance in your kitchen including microwave ovens!!
- Convenient: Lightweight, portable and easy to use - just clean and reuse ... over and over again.
- Economical: Damage resistant and extremely long-lasting, meaning no need to re-purchase.



The SASSDA and Columbus Steel Awards are back and they're better than ever!

New look awards offer eight key categories and an enhanced digital entry mechanism

As Sassda proudly celebrates its 60th Anniversary in 2024, it has also announced the highly anticipated return of the Sassda & Columbus Stainless Steel Awards supported by title sponsor Columbus Stainless and category sponsors Euro Steel, Macsteel, NDE, & Novametal South Africa.

Centred around the theme, 'Sustainability: A Legacy of Brilliance' the awards will take place on 19th September 2024 and will honour the enduring strength and durability of stainless steel, while recognising the resilience of the local stainless steel industry in navigating the current challenges it faces.

Sassda Executive Director Michel Basson comments; "We have stated that the intent of the event is to recognise and applaud exceptional achievements within the stainless steel industry during the recent past. However, it is also to celebrate the resilience of the South African stainless steel industry to weather a range of storms over the past 60 years.

He points out that Sassda is one of the oldest stainless steel development associations in the world and over the past 60 years Sassda and the local industry have made

their mark on the global arena with quality products and innovation the world renowned "Cross and Balls" logo.

Explaining the reason for the awards' long hiatus Basson explains; "The last global storm the South African industry had to face came in the form of a pandemic that brought the world to its knees. This also temporarily halted our tradition of the awards as a showcase event every second year.

"The world has undergone countless changes since our founding but through it all, Sassda has remained a pillar of support and innovation for the stainless steel industry, and we are therefore proud to host these sought after awards. They are a vital opportunity to reflect on the resilience of our members and underscore the critical role stainless steel plays in shaping a sustainable future."

Basson adds that this year's awards represent a fresh new take on an old classic given that the number of categories has been streamlined to eight and the digital entry mechanism has been made as user-friendly as possible.

The award categories are:

Sustainability recognises a sustainable innovative new product or project featuring an impact on either energy use, environmental improvement, recycling, material use or life-cycle costing.

Duplex Stainless Steel The use of this specific grade of stainless steel in an application which demonstrates innovation and life-cycle cost effectiveness. Entries will cover both projects and products.

Ferritic Stainless Steel in a product or project that demonstrates innovation, life-cycle cost effectiveness, substitution, and growth potential.

Austenitic Stainless Steel in a project or product with an application in this grade of material that shows innovation, life-cycle cost effectiveness, substitution, and growth potential.

Export Achievement recognition of significant growth in export sales through innovation, quality and effectiveness (volume, value or both)

Business Excellence will recognise businesses for building a sustainable, long-term, thriving business that has demonstrated innovative use of stainless steel in the design and development of products, to become a leader in the field of excellence.

Lifetime Achievement awards a person or persons that have made an outstanding contribution to Sassda and the stainless steel industry.

Overall Winner the most successful and outstanding winner from all the categories.

In terms of entry criteria, the awards are open to individuals and companies (locally and abroad) that participate in the design, production, conversion, distribution and use or specification of stainless steel. Entrants do not need to be a member of Sassda.

Entries for the awards close on 8th July 2024 and will be adjudicated by an independent panel of judges drawn from recognised professionals, representing all sectors of industry. The winners will be announced at a banquet dinner to be held on the 19th of September 2024 at The Indaba Hotel, Fourways, Johannesburg.

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A critical juncture for local stainless steel



How would you categorise the performance of the South African stainless steel sector in the last three years?

The local decline in production and consumption, which was also experienced globally, was mainly caused by a decline in economic activity due to the pandemic as well as global logistical issues. As the shutdown regulations were eased we expected a spike in stainless steel demand for re-stocking. This took place worldwide, and it was, we believe, the main driver for the growth of more than 20% in local consumption during 2021.

Although this was expected, it was also understood to be short lived as stock levels started to stabilise and the industry returned to normality. The domestic market continued with this growth trend and increased by more than 3% in 2022. This was significant, in light of the impact of the nickel price volatility during the early parts of 2022. It was also encouraging that the rate of growth in local consumption of stainless steel showed an increase of more than 300% compared to the South African GDP growth during the first post-pandemic year.

The 2022 performance is even more impressive seen against the backdrop of a weak economy, floods, unrest, and the lack of electricity experienced by industry during the period. This momentum and the gains made in our work with the Steel Master Plan indicated a solid starting point for continued growth in the years to come.

Overall, since 2018 stainless steel exports from South Africa declined from around 450 000 tons per annum to just under 150 000 tonnes in 2023. This had a similar influence on the local production of stainless steel since local production is mainly driven by the export market. Local production nearly halved over the period bringing production figures to 218 000 tonnes. Bear in mind that the local production capacity is more than three times the current level. The result of this is a decline in the local conversion of stainless steel of around 16% during 2023.

How is Sassda championing the growth of the local stainless steel sector?

Sassda's growth strategy within the framework of the Steel Master Plan is dual faceted. Our mandate speaks about the

promotion of stainless steel use with an emphasis adding local value which will create tonnage and sustainable jobs. Localisation or import replacement of stainless steel products with high labour intensity such as the local production of beer kegs and cooking products would be able to create jobs with an increase of locally used tonnage of around 250 000 tonnes as a target. The strategy of driving higher tonnage in the local manufacture of electrical transmission towers and rural bridge infrastructure in the utility ferritic grades such as 3CR12 for corrosive and other sensitive regions of deployment.

These industry initiatives to create more locally converted tonnage are currently under threat with the Arcelor Mittal South Africa (AMSA) announcement regarding the closure of its long product facilities. The plants earmarked for closure were set to produce many of the profiles and products identified for these projects.

This means that 2024 will once again be a tough year for the local stainless steel industry. Most of our fabricating members work in carbon steel as well and the developments regarding AMSA would take its toll on our current industry activities.

What are some of the key projects flowing from the Steel Master Plan that Sassa is working on?

- **Hollowware:** Sassa and its partners in the demand side structures in the Steel Master Plan have completed an investigation and a report on the local manufacturing capacity for hollowware. This will now be presented to major retailers to gain possible commitment for potential demand.

It has also been noted that the enforcement of SABS standards can be beneficial to local producers by restricting the imports of sub-standard goods. As such, Sassa is currently contemplating a repeat of the investigation done a decade ago regarding the quality of hollowware available from retailers in South Africa.

The study entails the purchase of a range of stainless steel items available in retail stores. This will be followed by tests for material quality, against the SABS Standard 998 which specifies the technical aspects of acceptable hollowware. The results of such a study would potentially highlight serious discrepancies in quality and identify possible dumping practices. It would also have the effect of encouraging the public to purchase local stainless steel products.

- **Structural profiles:** We remain committed to getting 3CR12 included in the national standards for electrical transmission towers and rural bridges. This will open additional markets for structural profiles and possibly exports. Whereas kegs and hollowware can be regarded as job creators, structural use will be tonnage generators.

However, this strategy was largely dependent on the local carbon steel industry's capacity to roll form

the structural profiles to the required standards. The announcement of the closure of the AMSA long products, put a damper on this strategy, since these plants were identified to produce structural profiles.

Sassa therefore participated in industry discussions and supported the work and efforts done by ISF, SAISI and BUSA amongst others to be able to postpone or delay the closure date for 6 months.

What is Sassa's stance on the proposed closure of ArcelorMittal's long steel operations in South Africa?

AMSA is a significant supplier of long steel products to the South African manufacturing industry supplying approximately 450 000 tons a year of product that cannot be supplied by the local mini mills due to capacity, capability, and quality constraints. The resulting steel shortages will lead to the almost immediate closure of industries that are reliant on the supply of long steel from AMSA.

Automotive steel components are typically safety critical. The automotive industry bodies advised that any change in the supply chain requires substantial time for approval



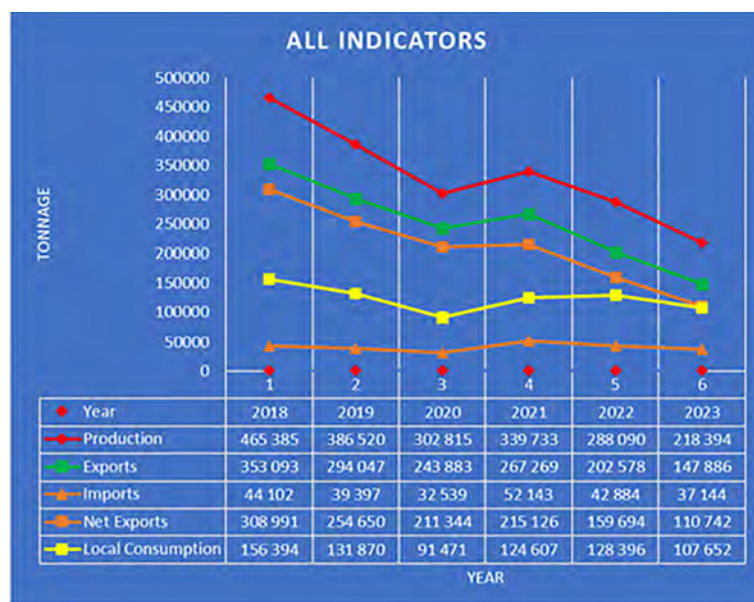
and typically takes more than a year. This could cause a halt in auto production or at least a very uncompetitive scenario. The direct job losses at AMSA are quoted as 3 500, industry experts estimate the immediate indirect job losses at 30 000 which includes service providers to the AMSA plants.

The following quantitative impact analysis was submitted by the auto industry:

- Local steel tonnage loss: +/- 70 000 tons p.a. plus SAAM35 volumes forecast at more than 100 000 tons.
- Cost increases due to importation: 25% to 35%.
- Knock on effect to losses of related sub & full assemblies: More than 7% resulting in an estimated R35-billion p.a.
- Suppliers at risk: Approximately 17 suppliers will be directly affected (Domestic OEM suppliers plus exporters).
- OEM & Supplier Profitability Erosion due to loss of localisation: No longer qualifying content for the Automotive Production Development Program.
- Short-term jobs impacted: +/- 30 000 including suppliers and backward linkages, growing in the medium to longer term.

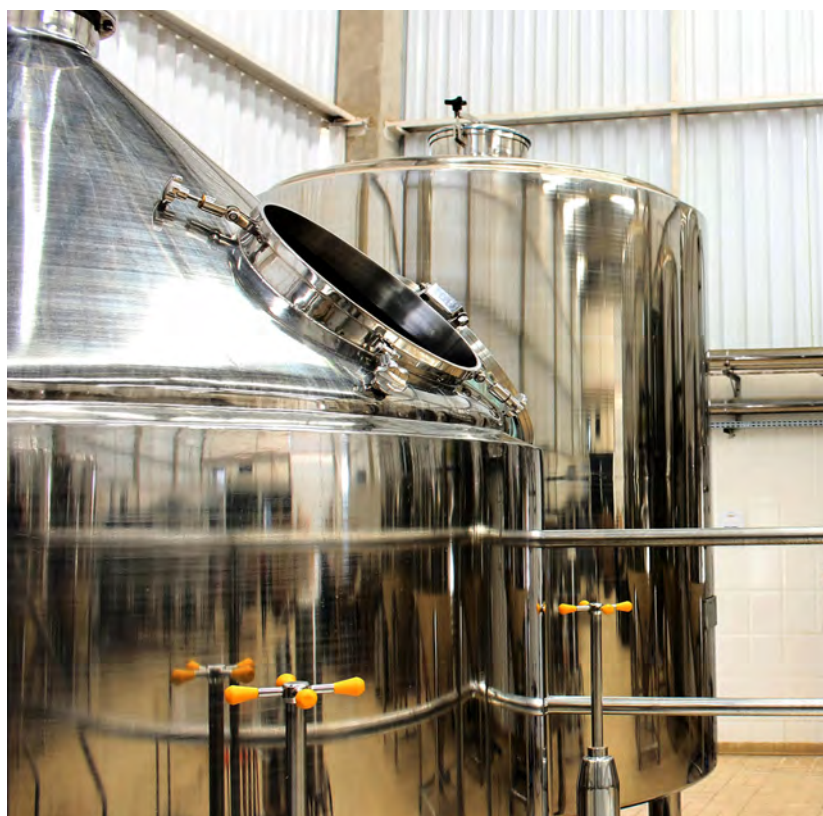
Against this challenging background how does Sassda see 2024 playing out for the local sector?

A key part of Sassda's role is to identify potential avenues for localisation and increases the local tonnage converted. However, the bottom line for the growth of the stainless steel sector in terms of employment figures and tonnage consumed would be the local socio-political environment and improvement of service delivery with a major focus on improving the consistency of electricity supply, rail transport and port efficiency. We are also acutely aware that this is an election year that brings a lot of uncertainty and volatility. The immediate future does not have a positive slant, but we trust that in time our industry will shine again because stainless steel remains simply brilliant.



The timespan covered by the graph indicates various sector activities and acts as a snapshot of the COVID-19 and post-pandemic unfolding of events. The negative historic growth rate continued and accelerated during 2020 when the industry experienced severe COVID lockdown conditions.

To some extent, this was mitigated by Sassda's work to get the dtic approval for the stainless steel to run at a 50% capacity compared to the 30% required for other industries.



BE ALL YOU CAN BE. **CHANGE** THE COURSE OF **YOUR FUTURE.**

The Southern Africa Stainless Steel Development Association (Sassda) is committed to the development of the industry and its people. There are six interactive courses offered by the association which target new entrants to the industry as well as warehouse, workshop and sales staff, tradesmen, engineers, specifiers and end users.

INTRODUCTION TO STAINLESS STEEL

The course is a self-paced, convenient and easily accessible e-learning programme offering basic understanding of stainless steel. The target audience is all new-comers and non-technical personnel involved with activities in an organisation that directly or indirectly liaise or interface with customers or are in contact with stainless steel such as: administrators and buyers, procurement, marketing, sales and shop floor employees.

HANDLING AND FABRICATION OF STAINLESS STEEL

Introduces employees to stainless steel best practices in the workshop and warehouse when handling, storing, fabricating, and working with stainless steel. The target audience would include persons exposed and working with stainless steel, such as; warehouse and shop floor staff, artisans, forklift drivers and packers.

HANDLING OF STAINLESS STEEL IN THE WAREHOUSE

Introduces warehouse employees to stainless steel and demonstrates best practices when transporting and storing stainless steel in the warehouse. The target audience would include persons receiving, transporting, dispatching, storing and working with stainless steel in the warehouse such as; forklift drivers, administrators and packers.

FABRICATION OF STAINLESS STEEL

Introduces employees in the workshop to stainless steel and demonstrate best practices when handling and working with stainless steel in the workshop. The target audience would include persons handling and working with stainless steel in the workshop such as; artisans, workshop assistants, welders, etc.

FUNDAMENTALS OF STAINLESS STEEL

This is an intermediate course aimed at people who have acquired a basic understanding of stainless steel through workplace experience and/or from completing the Introduction to Stainless Steel e-learning course. The targeted audience would include newcomers to the industry, as well as persons requiring a more in depth knowledge of stainless steel, such as salespersons, supervisors, managers, specifiers and end users.

The course is approved by ECSA and carries 1 CPD point from SAIMechE

ADVANCED STAINLESS STEEL

This is an intensive course on stainless steel for people who require an advanced understanding of stainless steel and have completed the Fundamentals of Stainless Steel course. The targeted audience is any persons requiring an in-depth knowledge of stainless steel such as; salespersons, sales managers, specifiers, engineers, workshop managers and end users.

The course includes a 1 day mill visit to Columbus Stainless

The course is approved by ECSA and carries 3 CPD point from SAIMechE





Stainless Steel the ‘salt of the earth’ when it comes to desalination

Cape Town’s proposed new desalination plant has the potential to use **900 to 1000 tons of stainless steel** that would be used to construct the desalination unit, connecting pipework, other equipment such as pumps and valves for the unit, and its auxiliary systems and general infrastructure. In this issue’s Focus Feature, we take a deep dive into the concept of desalination and the potential for its use in this vital project...

Desalination has become a popular talking point over the past decade in South Africa. During recent droughts along the Southern and Eastern Coastline desalination played an important part in supplying communities with drinkable water. Unfortunately now that the critical need for alternative water sources has been alleviated, the desalination systems until the next crisis.

However, reality dictates that the water crisis is already upon us and that water sources will remain under escalating pressure with an increase in populations in and around the major coastal cities. Whilst the water crisis is spread over the Southern African region due to climate changes and increased demand for water in industry and rural development, desalination is a potential solution to water supply in the coastal regions only.

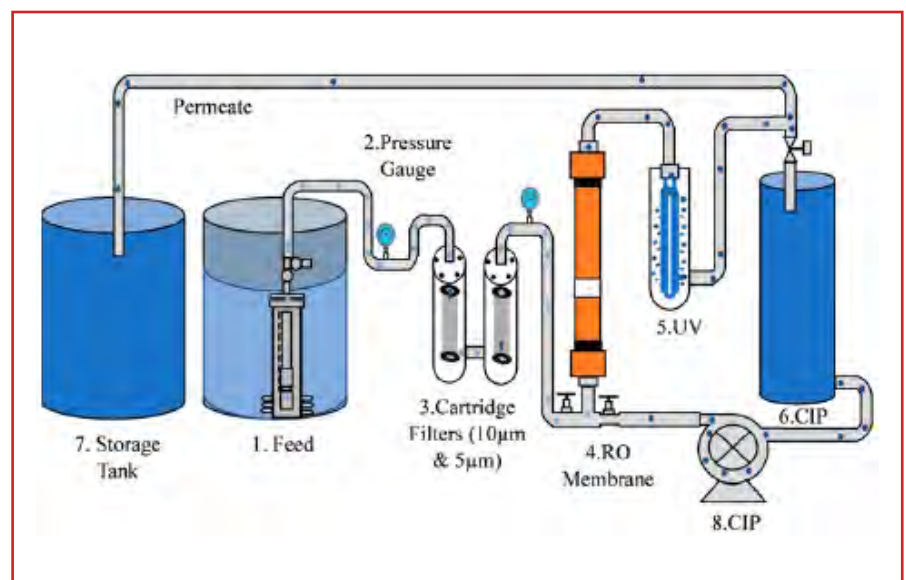
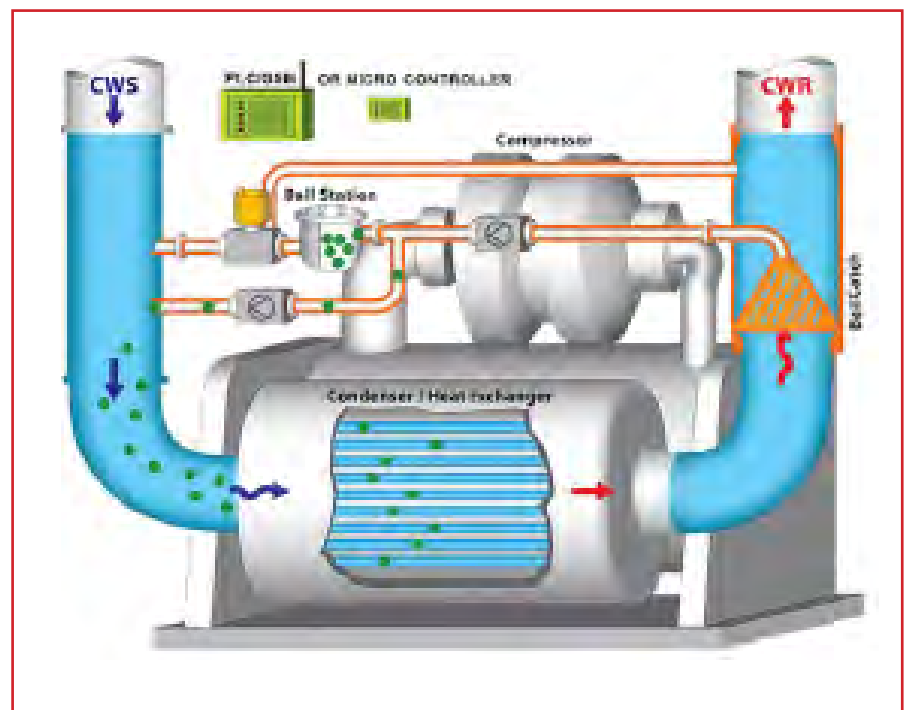


A complex process

Desalination, in any form, is based on simple principles but highly complicated in practice. It is the process of removing salt and other impurities from seawater to make it drinkable. The two most common methods for desalination are thermal and membrane technologies. The thermal technology involves heating saline water (seawater) to produce water vapour, which is then condensed and collected as fresh water. This process is called distillation, which involves boiling seawater in a still, collecting steam, and condensing it to obtain fresh water. Distillation is the most obvious method for removing salt, but it consumes large amounts of energy which can account

for up to half of a plant's production cost. In South Africa, we do not have a constant or consistent energy supply available to see this process as a final solution.

Membrane technology makes use of semi-permeable membranes to separate salts from water. In the Cape Town area, the emergency desalination plants used reverse osmosis, which uses high pressure and a semi-permeable membrane to filter salt and other impurities from water. In reverse osmosis, water from the ocean is forced through thousands of tightly wrapped, semi-permeable membranes under extremely high pressure. The membranes allow the smaller water molecules to pass through, leaving salt and other impurities behind. Desalination processes are still developing and there are a number of other technologies available as alternative solutions. One of them would be so-called multiple effect distillation (MED) which uses heat and electricity to produce



potable water. The water to be treated passes through a set of evaporators in series. The steam from one cell is used to evaporate the water in the following, while the primary energy input is to the first stage. Typically, MED systems have multiple chambers and hot steam from a nuclear power plant is carried into the chamber through pipes, repelling seawater on the pipes.

Another method would be electrodialysis (ED) in which an electric field is used to separate any dissolved salts from water. The process involves the use of ion-selective membranes that allow either positive or negative ions to pass through while retaining the opposite ions. Electrodialysis has many applications, including desalination, table salt production, wine stabilisation, whey demineralisation, and pickling bath recovery.

What does a desalination plant for a city look like?

Spain is the world's fifth largest producer of desalinated water, with 770 large-scale desalination plants, 99% of which are high capacity installations. A good example would be the Valdelentisco Desalination Plant in Murcia, Spain, which uses pumps to move water from the raw water tank to sand filters. The water is then passed through cartridge filters made of rubber-coated carbon steel, which filter the water through polypropylene ore size 5µm.

In Sydney, Australia, seawater is drawn from the Tasman Sea through four intake pipes on the seabed, about 25 m below the water level. At full capacity, the intake pipes

deliver about six hundred million litres of seawater daily to the plant via a 2.5 m diameter concrete tunnel.

Drum screens are used to remove any large materials that may enter through the intake tunnel. The plant's pre-treatment filter system removes any solid material, such as algae and small dirt particles to get the seawater as clean as possible before the reverse osmosis process. The seawater is filtered through layers of filter coal and sand to prepare it for the reverse osmosis process. The clean filtered seawater passes through 36 000 reverse osmosis membranes so any





salt and other minerals can be removed. The water is pushed at high pressure (60bar) through the semi-permeable membranes, which function as a filter for the salt and minerals and only allow fresh water to pass through.

The freshwater produced by the reverse osmosis process requires minerals to be added before it is fluoridated and chlorinated, in line with Australian Drinking Water Guidelines and NSW Health requirements. Two large pumps transfer the water from the drinking water storage tank into a pipeline to the end-users.

Approximately 58% of the water used during the desalination process is returned to the ocean. This water is known as seawater concentrate (effectively saltier seawater) and is transported back to the ocean via an outlet tunnel and specially designed outlet dispersion nozzles. These nozzles make sure the water mixes rapidly and returns to normal seawater salinity and temperature within a short distance of its discharge point so as not to harm the local marine environment.

How much stainless steel is used in desalination?

One should distinguish between the desalination processes when trying to determine the quantities of stainless steel used in such applications. The tonnage would also depend on the plant's capacity. The types or grades of stainless steel used in desalination would also be noble or with higher alloying content to protect against harsh conditions in the process.

Since desalination is not common in South Africa, we have no real data on local projects. South Africa is only beginning its feasibility studies on the suitability for such a facility and currently, a study is being finalised for a proposed plant near Cape Town. If this report shows that such a project is feasible, this will be the first permanent installation with this level of capacity in Southern Africa.

Stainless steel in thermal desalination

It would seem that empirical data from the proposed Cape Town project shows that a thermal desalination plant, which produces about 1500 m³/h of distillate, requires **900-1000 tons of stainless steel**. A plant of this capacity will be

regarded as medium sized in global terms. The stainless steel would be used to construct the desalination unit, connecting pipework, other equipment such as pumps and valves for the unit, and its auxiliary systems and general infrastructure.

Stainless steel in reverse osmosis systems

The temporary plants used around Cape Town were of the reverse osmosis types. In reverse osmosis plants, there are much lower pressures and thus a high use of PVC and other plastics. The use of stainless steel is limited to the pumps, valves and tubes working at higher pressures. These plants require far less stainless steel than thermal desalination plants; for example, a plant producing 1500m³/h of permeate requires about 30-40 tons of the aforementioned materials.

Conclusion

Desalination is already widespread in some water-stressed areas, like the Gulf region, where Kuwait gets up to 90% of its drinking water from desalination, where Kuwait gets up to 90% of its drinking water from desalination 42% of the United Arab Emirates' water needs. While desalination is a reliable process used by over three hundred million people worldwide, it has some negative environmental impacts:

- **Fossil fuels** - Desalination is energy-intensive and uses fossil fuels contributing to global warming.
- **Toxic brine** - The brine produced by desalination plants can pollute coastal ecosystems.
- **Waste and chemicals** - Desalination plants produce waste and toxic chemicals that can harm wildlife.
- **Greenhouse gas emissions** - Desalination plants that use diesel produce greenhouse gas emissions.
- **Temperature difference** - The temperature of rejected brines is often 10 to 15 degrees Celsius higher than that of ambient saltwater, which can be harmful to marine ecosystems.
- **Marine life** - Desalination surface water intakes are a huge threat to marine life. For example, the sodium metabisulphite discharged from desalination plants can negatively impact seagrass habitats.

It is clear that desalination is expensive and has significant environmental sideeffects but in an arid country such as South Africa what would be the alternatives?

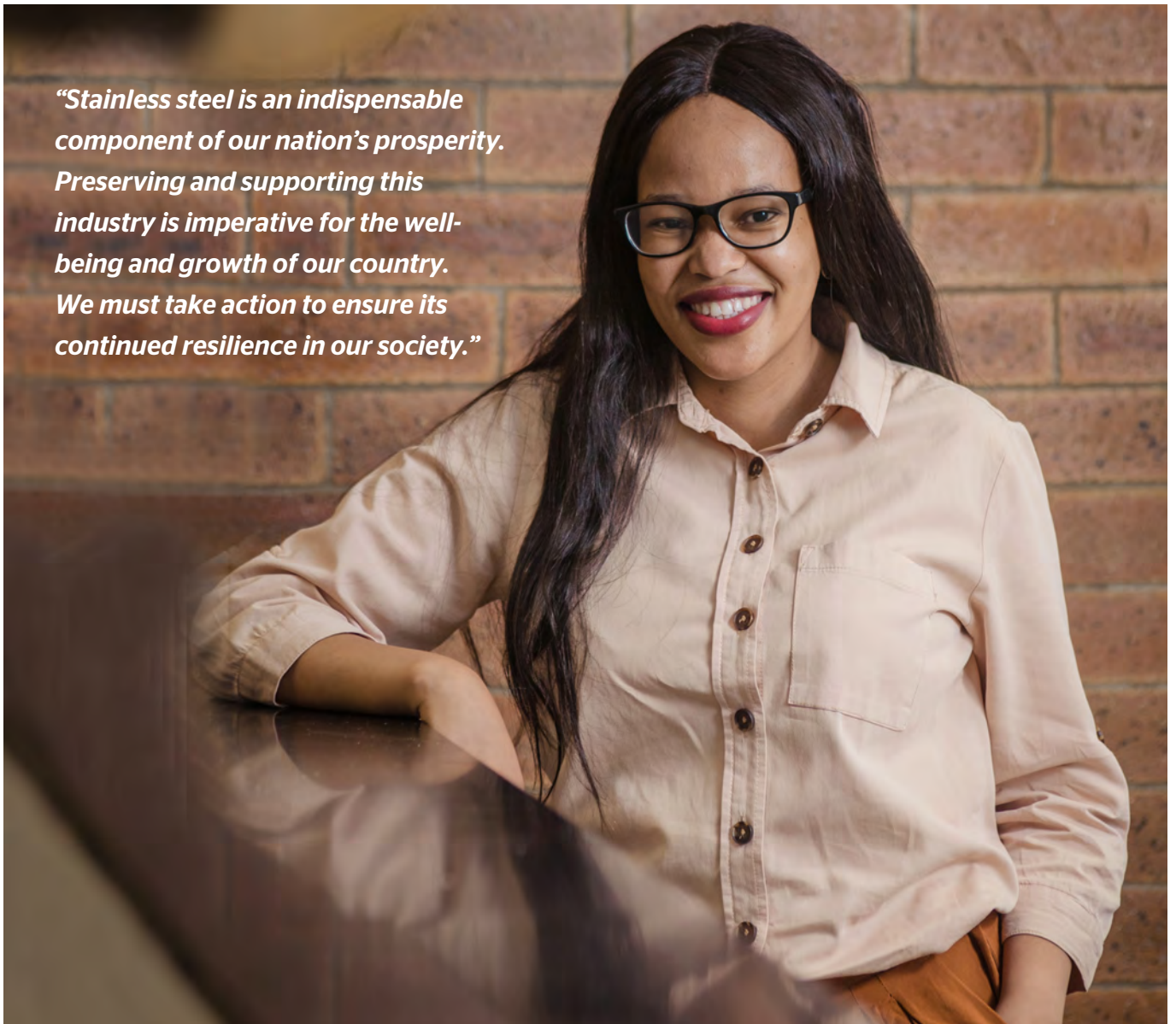
Additional reading

1. https://sassda.co.za/wp-content/uploads/2024/03/ISSF_Desalination_in_Stainless_Steel.pdf
2. www.dailymaverick.co.za/article/2023-12-03-cape-town-set-to-purify-treated-sewage-water-for-drinking-purposes

Nthabiseng Sebelebele: leveraging engineering expertise for innovation

Air Liquide Lead Business Developer Nthabiseng Sebelebele a Chemical Engineering graduate from Wits University, pursued a Masters Degree focusing on energy optimisation. Her passion for engineering, driven by a fascination with science, drives her commitment to large-scale projects in the stainless steel sector. With experience in the explosives and gas industries, she now excels in strategic business development at Air Liquide, leveraging technical expertise for innovation...

“Stainless steel is an indispensable component of our nation’s prosperity. Preserving and supporting this industry is imperative for the well-being and growth of our country. We must take action to ensure its continued resilience in our society.”



Why did you decide to study engineering and what is it about the discipline that attracted you to this field of study?

I completed my undergraduate studies in Chemical Engineering at Wits University. After I graduated, I decided to continue my academic journey by pursuing a Master's Degree, where I directed my focus towards heat integration and the optimal utilisation of energy resources.

My attraction to engineering stems from my exposure to science during my school years. As I progressed into high school, I was captivated by the field of engineering, which amplifies the principles of science from laboratory experiments to large-scale applications. This transition fascinated me; from conducting small experiments to envisioning and designing vast industrial plants capable of mass production. It was the prospect of contributing to significant projects that directly impact our daily lives that truly ignited my passion for engineering.

"It was the prospect of contributing to significant projects that directly impact our daily lives that truly ignited my passion for engineering."

What was the most challenging aspect of it?

University life operates at a significantly faster pace compared to high school. I have always held myself to high standards, so experiencing failure on my first university test was a jolting experience. It's common for these types of setbacks to affect one's self-esteem, potentially leading to self-doubt. In such moments, it becomes imperative to believe in yourself, to rise above the challenges and to persevere with determination.

How did the first years of your career build on what you learnt during your tertiary education but in a more practical setting? What were the key lessons you've learnt during this time?

I was fortunate in the early years of my career to work with individuals who were highly engineering-oriented and were therefore supportive and knowledgeable. It made it easier for them to bridge the gap between my academic background and the practical applications required in our work. Those initial years were when I found myself applying the calculations learned in university.

For example, in my current role within the gas industry, understanding the dynamics of gas flow is crucial, especially in terms of identifying losses within our operations. Gas, being invisible, presents a challenge in pinpointing these losses. However, by leveraging the principles of

thermodynamics - one of the most difficult university courses - we were able to calculate the varying gas consumption rates under different conditions. This included accounting for temperature differentials during hot summer days versus cooler winter months, to estimate potential losses accurately. This exercise was instrumental in implementing cost savings.

What was your first company and your position there?

My first job was with AECL Mining, a company specialising in manufacturing explosives for the mining sector that awarded me a bursary for my tertiary studies. During my time at AECL, I engaged in various efficiency enhancement projects and continuous improvement initiatives within the plant.

In your current position, how would you describe a typical day and what it entails?

I am responsible for business development within our bulk and on-site division. My role involves spearheading the expansion of our business by identifying new opportunities and sectors for growth.

When visiting a client, I assess their needs and requirements. Subsequently, I return to the office to analyse the gathered information. I identify potential solutions from our product and service portfolio that align with a client's needs. Crafting a compelling business case is important because the proposed solution must be financially viable for the client and our company.

Therefore, I present the proposed solution and its benefits. This includes a breakdown of costs, potential savings, and the value it brings to their business. Collaboration ensues, with adjustments made, as necessary.

My role entails extensive interaction across various sectors, with steel remaining a primary focus. Technical expertise, combined with a deep understanding of customer processes and our offerings, is key.

What is your view on the looming industrial gas crisis? How are you working to solve that problem for customers?

We don't handle natural gas; that falls under Sasol's domain. Our focus lies primarily on gases such as nitrogen, oxygen, and argon. While we don't operate in the natural gas sector, we remain open to engaging with customers who utilise it, exploring ways to support their needs. However, it's not within our current scope of work. That being said, Air Liquide is known for its innovation and proactive approach to problem solving. We continuously assess the challenges we encounter and explore potential solutions. However, at present, bridging the gap for natural gas isn't feasible for us.

What is the most exciting project, innovation, or growth strategy that you're working on at present and what lessons has it taught you?

In our line of work, we primarily supply air gases like nitrogen and oxygen to our customers. An innovative focus for us is diversifying how we deliver these gases. Traditionally, we've provided them in cylinders, similar to the gas cylinders used for LPG. We also supply our gases in bulk form (which is the liquified state of oxygen, nitrogen, etc.) using road tankers into storage tanks at customer sites. Additionally, we offer the option of constructing either small to medium plants on, or near, the customer's premises, from which we can supply the gases directly. This approach presents an exciting opportunity, particularly for eligible customers, as it eliminates the need for gas transportation via trucks.

By reducing reliance on trucking, we not only decrease our CO2 emissions but also enhance supply reliability. This is especially significant in regions like South Africa, where protests and roadblocks are common, leading to delays in gas deliveries. Having a local plant ensures uninterrupted supply, circumventing logistical challenges associated with road disruptions.

It is important to note that this approach isn't suitable for all customers and depends on factors such as usage volume and other considerations. However, for eligible companies, it can significantly transform their operations, offering a reliable and sustainable solution to their gas supply needs.

"We are confronted with numerous challenges, and the most pressing one affecting everyone, whether on a large or small scale, is load shedding. For businesses in industries like steel, ensuring operational continuity amid such uncertain power conditions is key"

What do you feel are the biggest challenges facing South Africa's stainless steel sector at present and how can these be overcome?

As South Africans, we are confronted with numerous challenges, and the most pressing one affecting everyone, whether on a large or small scale, is load shedding. For businesses in industries like steel, ensuring operational continuity amid such uncertain power conditions is key. While government has the ultimate responsibility for ensuring sustainable power, businesses also have a role to play. Even small to medium initiatives, such as exploring solar energy options, can make a difference. At Air Liquide, for instance, we have entered into power purchase agreements in partnership with Sasol and various suppliers who will establish solar plants across the country. This

not only contributes to decarbonisation but also helps alleviate the strain caused by load shedding.

However, the challenges extend beyond power issues. The sustainability of companies in South Africa, particularly in industries like steel, is crucial. ArcelorMittal, for example, cites factors like production costs and load shedding as threats to its sustainability. To remain competitive, the local manufacturing sector must address these challenges and ensure competitiveness against imports.

Why do you feel that stainless steel still has such an important role to play in growing South Africa's economy?

I would like to reiterate the significance of the stainless steel industry, as it is deeply intertwined with various aspects of our society. From construction to medical applications and across all industries, stainless steel plays a vital role. Its collapse would pose a significant challenge for our country. For South Africa to prosper, we rely heavily on steel in our daily lives and economic activities. Moreover, the steel industry is a substantial contributor to our GDP. It sustains livelihoods, enabling people to put food on their tables, access education, and pursue employment opportunities. Stainless steel is an indispensable component of our nation's prosperity. Preserving and supporting this industry is imperative for the well-being and growth of our country. We must take action to ensure its continued resilience and relevance in our society.

What do you consider as the most exciting innovations/product developments happening in stainless steel right now and what sectors hold the greatest potential for the use of stainless steel in the future e.g. aerospace?

Personally, a topic that resonates with me is decarbonisation. As a parent, I'm driven by the desire to leave behind a healthy planet for my daughter. Therefore, I am particularly passionate about companies that prioritise this agenda and seek ways to transition towards greener practices, including the concept of green steel. Ensuring that steel production becomes more environmentally friendly while remaining competitive is essential. By embracing green steel initiatives, we not only enhance competitiveness but also contribute to the larger ecosystem of our world. It's inspiring to witness discussions and actions taking place within the steel industry in South Africa, such as the developments in Saldanha with ArcelorMittal. I'm genuinely excited about the potential impact of these initiatives. They have the power to revolutionise the steel industry and play a significant role in preserving our planet for future generations. I see green steel as not just an industrial advancement but also a crucial step towards environmental sustainability.

A fond farewell

Change is inevitable. Growing and changing as a person can mean maturing, improving, or expanding one's life in some way. It can also help people learn new things, gain new experiences, and develop new skills. Change can also help people adapt to new situations and challenges and become more resilient

Unfortunately, South Africa's lack of land links to West While this is true for individuals, it is also true for organisations and Sassda is an association embracing change to allow it to deliver quality and relevant services to its members and the broader industry for many years to come. Some changes are tougher than others and at the end of April 2024, we will have to change to accommodate the departure of Francis le Roux who has been with us for more than a decade.

Francis started working at Sassda on the 1st of July 2011 as the personal assistant to the Executive Director and given her subsequent excellent professional track record, her position was renamed Administrative Head of the association in 2019. This followed a career earmarked by consistency and dedication.

Francis matriculated from the High School Nababeep in 1976 and started her career in the banking industry by joining Santambank in 1982. From there she moved to ABSA where she worked until 1995. Her entrepreneurial spirit guided her to various endeavours including owning and running a cleaning services company and jewellery stores. From there she joined Sassda and through the years has added true value with her diligence, extraordinary work ethic and positive attitude.

Francis might have reached the age for compulsory retirement in the Sassda structure, but she is married to Japie le Roux and has three children and a handful of grandchildren who will keep her busy in this new phase of her life. What is clear is that her energy levels will not allow her to have a quiet life after her career with Sassda!

Francis has adapted through many phases of Sassda's growth through critical times and she has been an anchor for the business, but also as a confidant and mentor to staff. Her loyalty and strong values helped to navigate the Sassda ship through stormy periods and she will be missed in this regard. Francis will have to adapt to an environment outside of Sassda, but the association will have the difficult task of adapting to an environment without Francis.

The Board and Sassda membership will experience the void left by her departure but wish her the best for the future. As colleagues, we will always remember and treasure the values and stability Francis brought to Sassda and her presence will be with us for a long time to come. We wish her well and trust that her new future will be, like stainless steel, simply brilliant!



West Africa's economic boom sparks global competition

West Africa is experiencing a rapid growth spurt across several key sectors, including mining, oil & gas, urbanisation, agri-industry and infrastructure. As a result, it has become the focal point of established and emerging economic powers globally, creating fierce competition from countries like Morocco, Turkey, the Gulf States, and Egypt.

Unfortunately, South Africa's lack of land links to West Africa's growth areas poses a significant obstacle. However, opportunities for mining still exist in several countries, such as Ghana, Cote d'Ivoire, Guinea, Liberia, and Sahel States, albeit with some security concerns.

As global disruptions continue to occur, regional supply chains and self-reliance are becoming increasingly critical. In some regions, South Africa's distance and time-to-market advantage is key, while the African Continental Free Trade Area (AfCFTA) is expected to provide some level of preference, though it is not a panacea. By the end of 2024, 31 countries will be trading under the AfCFTA, including South Africa, emphasising the need to leverage this agreement's benefits in key markets.

In addition, competition from Asian and MENA countries is expected to intensify, further emphasising the need to capitalise on AfCFTA advantages in significant markets. At present, there are approximately \$18-Billion worth of projects in progress, with approximately half having no declared value yet. This number could potentially increase to \$40-Billion, including infrastructure in some projects

Key countries to consider

The key regional hubs in West Africa remain Ghana and Cote d'Ivoire, with non-SACU/SADC countries accounting for over 62% of Sub-Saharan African projects. At present, South Africa's share of supply is low. However, there are signs of a more coordinated regional approach emerging, particularly with significant mining projects in Guinea and Liberia. However, political instability in Sahel poses a threat to regional development. Regional supply from Abidjan could play a critical role, with Cote d'Ivoire being the primary regional trade hub, with excellent reach across most of the region. Abidjan offers access to all key mining hubs, with Ghana being another hub with good reach, although not

to the same extent as Cote d'Ivoire. Nigeria is not typically a regional hub, with most companies being inwardly focused, though this is changing. Most of the Nigerian export basket to Ghana is oil and gas-related.

A challenging environment

The business climate in West Africa is challenging, given the infrastructure deficits that impede trade and investment. These include power, roads, water, and ports, among other things. However, as countries look to modernise and privatise critical infrastructure, there is a real opportunity. Unfortunately, borders and bureaucracy continue to drive up costs, making matters more complicated.

Instability is another significant challenge, with coups in Niger, Burkina Faso, Mali, and Guinea over the last three years, causing significant disruptions to project activity. Additionally, attacks on mines and mine convoys in Mali, Burkina Faso, and Niger are forcing mines to shut down, with seven mines closing in Burkina since 2022.

Vying for prominence

Despite these challenges, global competition for resources and influence has created an environment of tremendous opportunity, particularly if managed correctly. However, there is still resentment in many countries against the West, with more progressive countries taking a pragmatic stance and reaping rewards. Companies from Asia are offering compelling alternatives, making the project environment highly competitive.

Currency weaknesses and debt burdens are other factors to consider. These issues can lead to defaults, project cancellations, and payment difficulties for imports. Therefore, businesses must be aware of these factors and utilise Exim facilities wherever possible.

Opportunity in West Africa: A focus on Côte d'Ivoire

Côte d'Ivoire, situated on the coast of West African coast, boasts a diverse population of over sixty ethnic groups, with French being the official language. With a population of 29.4 million as of 2021, the country's economy has historically relied on agriculture, providing livelihoods for over half of its labour force. However, there is a vision to elevate the mining sector to become the second pillar of the Ivorian economy.

All that glitters is gold

Côte d'Ivoire possesses significant geological and mining potential, with approximately 35% of West Africa's birimian gold-rich greenstone belts and other commodities, along with 18.6% of the region's archaean-based metal-rich rocks. Recent major discoveries in gold resources include Tanda (4.5 million ounces), Doropo (five million ounces), and Kani (4.87 million ounces).

Strengths in mining

The mining sector in Côte d'Ivoire benefits from various strengths, including favourable socio-economic factors, political stability, nationwide security, modern infrastructure, energy availability, highly qualified human resources, and a welcoming population.

In addition, the sector enjoys exemptions from customs duties and VAT, utility vehicles eligible for temporary admission, and an extended validity period for exploration permits. Measures promoting transparency, such as membership in the Extractive Industries Transparency Initiative (EITI) and the Kimberley Process, further enhance the attractiveness of the Ivorian mining industry to investors.

A dynamic landscape

West Africa's mining landscape is dynamic, with US\$18-Billion of projects declared, potentially costing between US\$35-Billion to US\$40-Billion. Key hubs in the region include Ghana and Côte d'Ivoire, with Nigeria, Guinea, Burkina Faso, Senegal, and other countries contributing to a strong regional mining basket. However, political instability in the Sahel region poses threats to regional development.

Challenges and opportunities

Despite the immense opportunities in West Africa's

mining sector, several challenges persist. Infrastructure deficits, border bureaucracy and instability evidenced by recent coups and attacks on mines hinder trade and investment. Nevertheless, there is a real opportunity for the modernisation and privatisation of critical infrastructure.

Global competition and regional Integration

West Africa's rapid growth in various sectors attracts global attention, leading to increased competition from both traditional and emerging economic powers. While South Africa faces barriers due to its lack of land links to key growth areas, opportunities abound in countries like Ghana, Guinea, Liberia, and the Sahel states, albeit with security concerns.

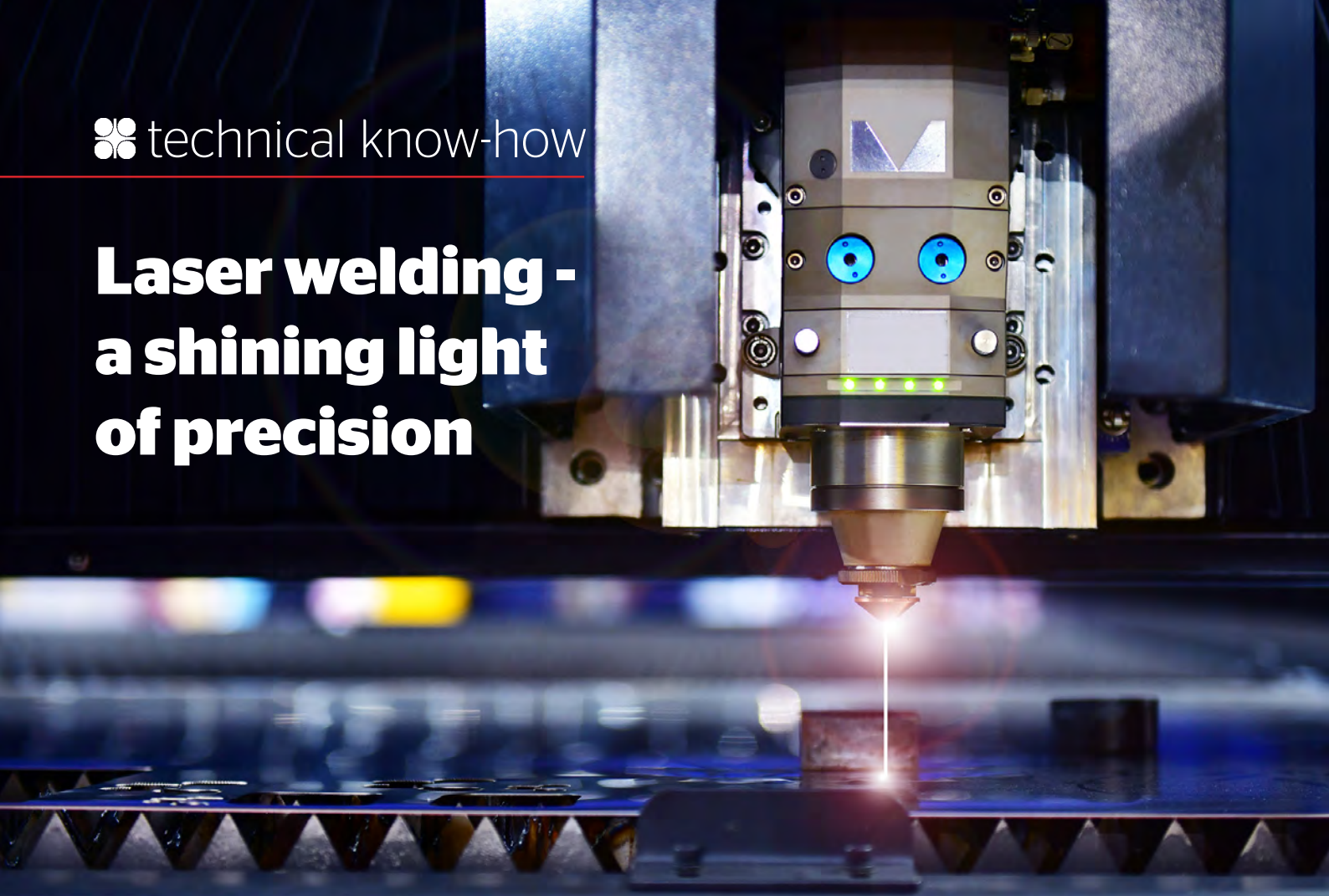
Leveraging Regional Agreements

The African Continental Free Trade Area (AfCFTA) presents opportunities for regional trade, with thirty-one countries expected to be trading under AfCFTA by the end of 2024. However, while AfCFTA provides advantages over higher-cost producers, competition from Asia and MENA countries intensifies, emphasising the need to leverage the benefits of AfCFTA effectively.

A burgeoning opportunity

Côte d'Ivoire stands at the forefront of West Africa's burgeoning mining sector, offering favourable conditions for investment and development. With a strategic vision to elevate mining as a key economic driver, the country presents significant opportunities for investors seeking to capitalise on the region's rich mineral resources. Despite challenges, the West African mining landscape remains dynamic, with concerted efforts towards regional integration and economic growth.

Laser welding - a shining light of precision



Laser welding is a modern method for joining stainless steel and other metals in the automotive, aerospace, and electronics industries. It is effective because it can overcome the challenges of the physical properties of these metals, such as stainless steel's high melting temperature and low thermal conductivity.

Laser welding is a popular production method for stainless steel structural profiles by welding individual components together, such as flat laser cut strips, prefabricated solids, hollows, or other shapes. Despite the advantages in precision, speed and material protection, laser cutting and welding were used in niche applications for a long time. A notable spread of systems for laser cutting and laser beam welding did not take place until the mid-1980s. Before that, these systems were only used in research institutes and specialist companies.

Firing up fusion

Today, laser welding remains a non-standard welding process. In South Africa sheet metal processors are increasingly relying on this high-tech process, which continues to impress with its efficiency, quality, and precision. Laser welding (also known as laser beam welding) is a process that uses a concentrated heat source, in the form of a laser, to melt the materials. They then fuse as they cool down.

It is a versatile process as it can thin materials at rapid welding speeds while running narrow and deep welds for thicker materials. The main advantages of laser welding

are its high precision, since the laser beam focuses on a small area, resulting in minimal distortion and a high-quality weld.

Of importance is the fact that the focused laser beam delivers high energy density to the workpiece, allowing for rapid melting and solidification. The laser beam penetrates deeper into the medium compared to other welding methods and therefore limits the potential for cracking after autogenous welding. The process also features disadvantages such as the high cost of entry-level laser welders. The laser beam also has limited penetration depth and suffers from limited weld joint access. Data is limited, but a reduced weld strength has been reported when using laser welding.

Inert welding gases that are suitable for laser welding include helium, argon, and argon/helium mixtures. Argon is the preferred shield gas for welding certain grades of stainless steel. It's inert, has high thermal conductivity, and offers excellent arc stability. Argon suppresses plasma, which prevents unwanted sparks and ensures a stable welding arc. Argon's density is also larger, which is favourable for sinking above the weld pool and better protecting the weld pool.

A range of options

There are three primary types of laser welders used for the welding process:

- **Gas laser (CO2):** A CO2 laser source is a mixture of gases with CO2 being the main component alongside nitrogen and helium. These lasers can operate in a continuous or pulsed mode at a low current and high voltage to excite the gas molecules. Carbon dioxide lasers are also used in special circumstances, such as in dual-beam laser welding, wherein two beams are produced and arranged either in tandem or side-by-side.
- **Solid-state laser:** These lasers use Diode Pumped Solid State (DPSS) technology to pump ore such as ruby, glass or yttrium, aluminium, and garnet (YAG), with a laser diode to produce laser rays. They are operated in either continuous wave or pulsed beam mode. The pulsed mode produces joints similar to spot welds but with complete penetration. These lasers have their fair share of disadvantages when compared to modern fibre lasers, but still have excellent beam stability and quality along with high efficiency.
- **Fibre laser:** Fibre lasers are the newer type of solid-state lasers that offer more power, better quality, and safer operation. The laser beam is created when the fibre absorbs raw light from the pump laser diodes. To achieve this transformation, the optical fibre is doped with a rare-earth element. By using different elements, laser beams with a wide range of wavelengths can be created. This makes fibre lasers perfect for a variety of applications. It is worth noting that a standard laser cutting head cannot be used for welding and a laser welding head cannot meet the cutting speeds and quality demanded in most industrial applications.

There are two types of laser beam welding, both with unique operating principles to suit specific applications. How the material interacts depends on the laser beam's power density.

- **Heat Conduction Welding** is where a focused laser beam is used to melt the surface of the base materials. When the joint solidifies, a precise and smooth weld seam is produced. Welds created using the head



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conduction method don't need additional finishing. The energy enters the weld zone only by heat conduction. This limits the welding depth and thus the process is therefore ideal for joining thin materials. Heat conduction welding is often used for visible weld seams which need to be aesthetically pleasing.

- **Deep Penetration or Keyhole Welding** uses keyhole welding (deep penetration) mode to create deep, narrow welds with uniform structure. For metals, power densities of about one megawatt per square centimetre are applied. This not only melts the metal but vaporises it, creating a narrow vapour-filled cavity. This keyhole cavity is filled with molten metal as the laser beam advances through the workpiece. Keyhole welding is a high-speed process and thus, the distortion and the formation of a heat-affected zone are kept to a minimum.

Many laser welding applications are conducted without the need for additional filler material. This is called **homogeneous welding**. However, some challenging materials and applications require filler material to produce satisfactory welds. Adding filler material improves the weld profile, reduces solidification cracking, gives the weld better mechanical properties, and allows for more precise joint fit-up.

- **Laser-hybrid welding** combines the concepts of electric arc and laser beam. The two simultaneously act in the same welding zone, complimenting each other and creating a unique welding process. Although laser

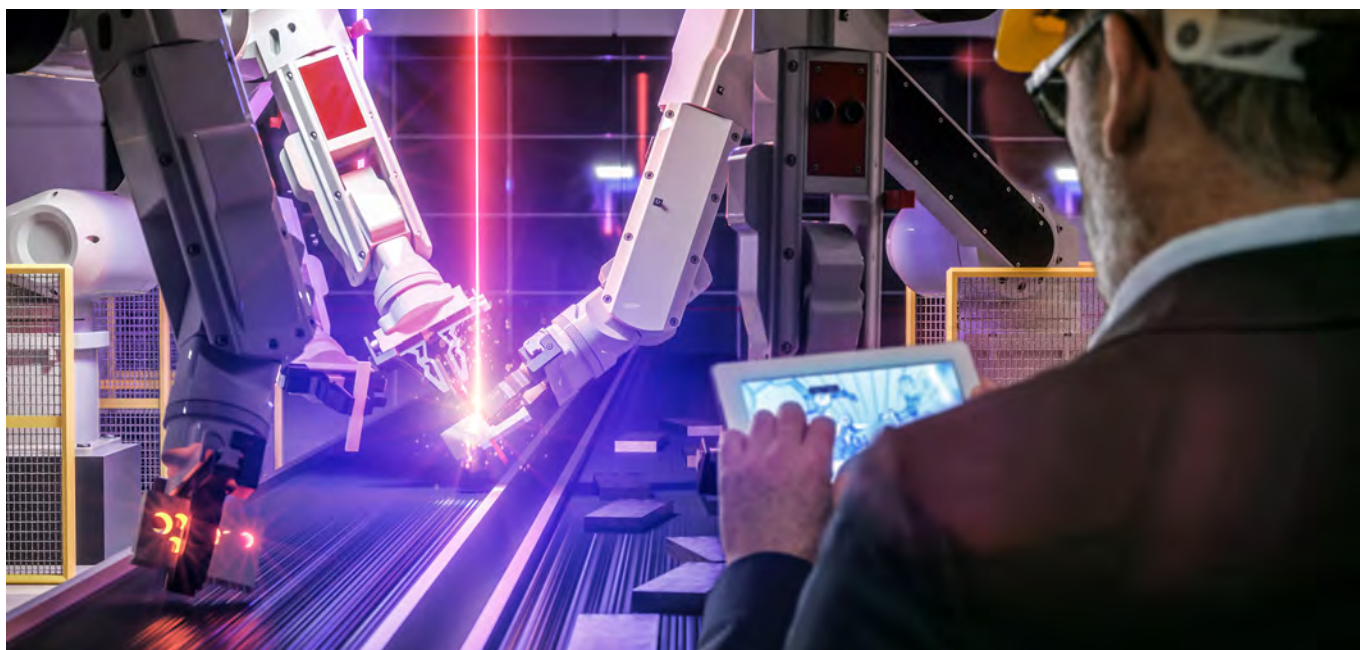
welding can be used in conjunction with any arc welding process, these are used more commonly.

- MIG augmented welding (often synonymous with laser-hybrid welding)
- TIG augmented welding
- Plasma-arc augmented welding

Cleaning up

Lasers can also be used to clean material. Laser cleaning is a non-contact method that removes welding scale, corrosion, stains, metal black, and non-ferrous lubricants from stainless steel. Laser cleaning can be used before and after welding to improve the quality of the weld. Pre-weld laser cleaning can prevent contamination that could interfere with the weld. Post-weld lasers can remove discolouration due to oxidation, which improves the corrosion resistance of stainless steel welds. At this stage, it is not clear if laser cleaning can restore the passivity of laser welded surfaces and it is advised that standard methods of passivation are used on welded areas. Laser cleaning can reach cleaning speeds of 1 to 1.5 meters per minute, which matches common welding speeds.

However, laser cleaning can provide a smooth, high quality weld and remove void-free soldering and brazing. Since it does not involve chemicals, it can improve the health and safety of operators. Since the need for wet chemical washing processes is removed, laser cleaning offers lower production space requirements, lower running costs and is still environmentally friendly.





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Boosting the potential of SA's stainless steel sector one added value service at a time...

Sassda is deeply ingrained in the fabric of our members' operations and is acutely aware of the daily challenges they face. We therefore strive to add constant value with a range of 'free' services and outreach efforts that form part of Sassda memberships. To help members unlock the true value of their Sassda membership here is an easy Reference Guide to the top services we offer with e-mail links for easy enquiries.

1. Training Courses in 2024

In 2023 Sassda offered its members an incredible R226 000 in free training to its current members which shows its commitment to investing in the long-term growth and sustainability of the local stainless steel sector.

Sassda's training courses are renowned for their comprehensive content and in-depth insight and information and as such, Sassda has been verified and recognised as an ECSA CPD Service Provider. The 2024 schedule of courses is as follows:

- **Introduction to Stainless Steel Course**
(online/permanently accessible)
- **Fundamental Course**
 - 7, 14 & 21 May
 - 2, 11 & 16 July
 - 3, 10 & 17 September
- **Selling of Stainless Steel Course**
 - 22 April
 - 26 November
- **Handling of Stainless Steel in the Warehouse Course**
(on demand)
- **Advanced Stainless Steel Course** - Sassda will expand this offering in 2024 by incorporating hybrid access to the Advanced Course, i.e. the class will be presented at a physical venue and then also broadcast to remote attendees. The next Advanced Course will take place on the 8, 15 October (online course) and a tour to Columbus Stainless on 22 October.
- **Beyond Stainless Steel** will be presented during June/ July with the current CPD accreditation.

For more information on Sassda's education and training offerings e-mail: mankabe@sassda.co.za

2. Technical Advisory Service

The combined expertise of Sassda's staff is reflected in its very popular free technical advisory service enabling the correct specification and usage of the various grades of stainless steel.

The technical team reports that Sassda has had a number of technical enquiries related to the mining industry during 2023. To add to the depth of technical expertise offered Sassda has worked closely with Columbus Stainless to provide the most in-depth feedback to these enquiries with Columbus undertaking additional research to boost this line of service.

Other research stemming from the technical desks related to Preliminary tests on the cleaning of welds with laser welding equipment shows that this method is most likely not efficient in restoring the passive layer on stainless steel. Research is continuing on this important line of research.

For more information on our technical advisory service email: michel@sassda.co.za

3. Lobbying

Assistance with product designation, tariff codes and lobbying – Sassda produces quarterly reports with assistance from the dtic on exemption statistics. Sassda was asked to facilitate the use of 56% locally produced welding wire from the only producer of this specific product in the country to ensure the material was eligible for a Transnet contract. Efforts continue in this regard.

Renewable Energy - The rules and regulations regarding local content for the renewable industry are being developed as certain service providers make use of loopholes in existing regulations to bring in material and components, thereby skipping the correct duties. Sassda has also identified that an opportunity exists for 3CR12 to be used as replacement material in electrification pylons. Sassda is engaging with the SABS to get the local content and materials stipulated in the National Standards. This will compel Eskom and other SOEs to use materials such as 3CR12 in certain conditions.

For more information e-mail Tebogo@sassda.co.za

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Decades of dedication - the hallmark of a sector leader

In this issue, we speak to Fabrinox MD **Wessel van Zyl** about what it takes to be a leader in South Africa's stainless steel fabrication sector and the significance of its three decades of experience in the South African economy...



How would you describe the role that Fabrinox plays in the South African stainless steel fabrication sector?

Fabrinox marked its 30th anniversary milestone in 2023, solidifying its role in the South African stainless steel fabrication sector. Our commitment to ethical business practices has cultivated enduring partnerships with suppliers and customers, spanning decades. This has earned Fabrinox the esteemed reputation of being a trusted ally within the industry.

Embedded within Fabrinox's DNA is a steadfast resolve to enhance value in every facet of our involvement. Consequently, we firmly believe in our multifaceted contributions to the sector, including:

- **Technology and Innovation:** By introducing advanced fabrication technologies and techniques that enhance the efficiency and quality of stainless steel products.
- **Skills development:** By offering training programmes, learnerships and apprenticeships, we are not only developing a skilled workforce, but we are also contributing to the broader economic development by increasing employment opportunities
- **Local Sourcing and Supply Chain Development:** By supporting local suppliers of raw materials, equipment, and services we contribute to strengthening the entire stainless steel fabrication supply chain in South Africa.
- **We have implemented environmentally friendly practices** such as energy efficiency, therefore minimising the environmental impact of stainless steel fabrication operations.
- **We engage with local communities** and support initiatives that address social and economic challenges
- **We are actively promoting South African stainless steel materials and products** in international projects to help expand the reach of the sector and increase export revenues.

What sets Fabrinnox apart from its competitors in terms of product quality, innovation, and customer service?

Central to our mission is our dedication to being client-centric. We understand our clients' situations, perceptions, and expectations. With this understanding as our guide, our experts can bring any metal-related concept to life. Our service offering covers a broad spectrum of needs within the manufacturing realm; from professional drawing services to the production of high-quality sheet metal and tube components, from the seamless integration of critical assemblies to under-license manufacturing, management of projects, as well as international installations. Our expertise is supported by a dedicated Procurement Division, as well as an independent Quality Control team.

What are the biggest challenges you currently face as a company and how are these being overcome?

In the dynamic landscape characterised by volatility, uncertainty, complexity, and ambiguity (VUCA), both we and our stakeholders - suppliers and customers alike - operate in a fast-paced environment that demands swift adaptation to constant changes.

Our dynamic management team and employees have the agility and resilience needed to navigate these challenges effectively. Demonstrating unwavering resilience, adaptability, and forward-thinking, we tackle obstacles head-on while maintaining a steadfast commitment to



excellence and innovation. This proactive approach ensures that we not only withstand the unpredictability of the VUCA world but also thrive amidst it, positioning us as leaders in our field.

Could you discuss any recent technological advancements or innovations that Fabrinnox has implemented to enhance its manufacturing processes or product offerings?

Over the past 12 months, we've made a significant investment in state-of-the-art fabrication technology. Our latest addition, the Trumpf 8kW laser coupled with cutting-edge automation, represents a pioneering advancement in the Western Cape region. We're thrilled to introduce this exciting development to our operations.

Please could you outline a significant/interesting key client project that Fabrinnox has worked on during the last 12-24 months and what was achieved and learnt during its involvement?

Fabrinnox has forged a longstanding partnership with Eco Clarity, a leading waste-to-energy service provider, to pioneer the development of a patented modular and scalable technology aimed at the efficient and cost-effective disposal of Grease Trap Waste (GTW). Over the years, this collaborative effort has yielded significant advancements, culminating in the recent installation of the latest generation plant in north-eastern England in early 2024.

Integral to our success is our recognition of the importance of comprehending our clients' expectations. Through this partnership, we've learned that ongoing communication and a deep understanding of our clients' needs are paramount. By continuously refining our approach based on client feedback, we ensure that our solutions remain not only technologically advanced but also perfectly aligned with market demands. This commitment to learning and adaptation ensures that we consistently deliver value and maintain our position at the forefront of the industry.

What are the key growth areas that Fabrinnox intends to focus on in 2024 and do these include expansion into African markets?

At Fabrinnox, we maintain an unwavering commitment to leveraging our strengths. Our primary goal is to empower our customers throughout their journey, facilitating their growth and helping them realise their fullest potential while achieving their business objectives. Exciting opportunities await those who partner with us, including localisation initiatives, export prospects, and installation services worldwide.

Eastern Cape Golf Day is a clear winner

Sassda was once again proud to host its Eastern Cape Golf Day at the pristine Port Elizabeth Golf Club (The Hill) on the 8th of February 2024., despite being close to the start of the work year this highly anticipated annual event attracted a stellar field of 52 players with 73 people attending the evening awards function.

There was also great interaction at the five watering holes dotted throughout the course and players and visitors could also view the legendary and sleek stainless steel DeLorean sports car which was on display at the start of the course.

All in all, a fantastic opportunity for our East Coast members and associates to come together and build the bonds that make the South African stainless steel sector so great.

We'd like to thank our sponsors for their excellent support namely: Columbus Stainless; Welfit Oddy; Grinding Techniques; Macsteel VRN; NDE and TÜV Rheinland.



Look out for Sassda's other regional Golf Days in 2024:

- **Western Cape** (Kuils River Golf Course) - 11 April 2024
- **KZN** (Royal Durban Golf Course) - 13 June 2024
- **Gauteng** (Bryanston Country Club) – 23 October 2024

To find out more or book your four ball and/or sponsorship email: kstevens@sassda.co.za



A day of learning and immersion into the origins of stainless steel



Sassda hosted its first visit of the year to the Columbus Stainless mill in Middelburg, Mpumalanga on the 5th March 2024, which was once again an enormous success as 35 attendees witnessed the world-class manufacture of South African stainless steel. The two hour walking tour of the massive facility was followed by a networking opportunity over lunch.

Sassda's Tebogo Nkwe who hosted the mill visit comments; "Sassda's visit to Columbus Stainless was a fascinating immersion for our guests into the makings of stainless steel. On-site visits like these are also important as they help create industry connections, innovation, and growth."

Sassda would like to extend its sincere thanks to the companies that attended the visit: Cronimet, EMV Africa, Macsteel VRN, GC Top Technologies, Plasma Cut, Redd Pill Consulting, Stonehenge Steel, Swiss Steel South Africa and Valbruna Stainless.

For more information on our next visit to Columbus Stainless please email info@sassda.co.za