

WEDECO
a xylem brand



THIS MONTH:

- Columbus Stainless: A plant tour
- Weight optimisation: an elevator success story
- Towards a sustainable stainless steel industry in SA
- Hybrid automation and efficient pneumatics and hydraulics

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Transparency You Can See

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Trust and sustainability for leaner times

On January 19, the International Monetary Fund cut its global growth forecasts to 3.4% for 2016 and 3.6% for 2017, down 0.2% from its October 2015 estimates. This off the back of Chinese economic growth for 2015 at its slowest in 25 years, along with weak commodity prices and plummeting oil prices.

South African forecasts are bleaker, down to 0.7% in 2016 – from 1.3% predicted in October 2015 – and from 2.1% to 1.8% for 2017. This is a full percentage point lower than the 2016 forecast by our own National Treasury. The reasons? *‘Continued adjustment to lower commodity prices and higher borrowing costs are weighing heavily on some of sub-Saharan Africa’s largest economies’*.

At the time of writing, the World Economic Forum is holding its annual meeting in Davos, Switzerland, under the theme *‘Mastering the Fourth Industrial Revolution’*. Much is being made of the ‘revolution’. *MechTech* prefers to call this technology ‘Industry 4.0’, in line with the idea that it is a ‘latest version’ rather than a social revolution.

In an article entitled *‘Searching for the 21st century dream at Davos’*, published by the WEF (www.weforum.org), Sebastian Buckup, head of programming at the Global Programming Group and a member of the WEF’s executive committee, warns of a new form of ‘technology fetishism’, the “worshipping of tools for their supposed magical powers”. He argues that, “the global threats we face, from climate change to overpopulation, resemble the dangers the Club of Rome highlighted in 1972. Now as then, economic uncertainties abound, as do questions about the willingness and ability of states to address them: trust in the economy is fading; trust in governments is battered by rising inequality and worsening levels of security; and trust in technology is hollowed out by job polarisation and environmental catastrophe.”

Preceding each annual WEF meeting, the Forum’s Global Risks Report is published. In this year’s annual survey, the risk with the greatest potential impact in 2016 was found to be a failure of climate change mitigation and adaptation. This is the first time since the report was published in 2006 that an environmental risk has topped the ranking.

According to the WEF’s director of media relations, Oliver Cann, climate change mitigation was considered to have greater potential damage than weapons of mass destruction (2nd), water crises (3rd), large-scale involuntary migration (4th) and severe energy price shocks (5th).

2015 ended on a euphoric note following COP21. The Paris climate change agreement was described in a *Guardian* headline as ‘the world’s greatest diplomatic success’. Hailed as ‘historic, durable and ambitious’, the agreement requires developed and developing countries to limit their emissions to keep global warming below the 2.0 °C threshold by 2050, with an aspiration of keeping below 1.5 °C. Regular reviews to ensure these commitments are being met have been agreed and finance will be provided to poor nations to help them cut emissions and cope with the effects of extreme weather. Countries affected by climate-related disasters will also be eligible for urgent aid.

As the *Guardian* points out, though: the caps on emissions are too loose, likely to lead to warming of 2.7 to 3.0 °C above pre-industrial levels; poor countries are concerned that the money provided to them will not be nearly enough; and much of the agreement is not legally binding, so future governments could yet renege on their commitments.

How should South Africa be responding?

The country is being sold as a “safe investment” at the WEF Forum and the South African delegation is looking to “quell investor worries” over the country’s recent currency downturn. But safe investments are made by people with a long-term vision, by investors with confidence in the targeted businesses and the technology involved, as well as in the economic and environmental sustainability of the enterprise and the regime in which it operates.

The weakness of the Rand reminds me a little of the effects of economic sanctions. It forces us to produce more locally and to import much less. Unlike economic sanctions, though, we can export, at more competitive prices.

Lean economic times will, inevitably, restrain consumption. While this is not good for commodity prices, it is inherently good for the environment. And power constraints and emission reduction commitments continue to drive the need to use energy efficiently and to switch to less carbon intensive energy generation. This can strengthen the opportunity for us to develop a local renewable energy industry.

From a production point of view, we need to do everything we can to raise productivity and global competitiveness. We need to work harder, develop higher-level skills, adopt modern manufacturing processes such as Industry 4.0 and, above all, cooperate with each other to develop trust.

If we focus on these things instead of the short-term growth numbers, South Africa just might emerge from these times with a stronger and healthier society.

Peter Middleton



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ICON WELDING



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ON THE COVER



The Aquada UV water purification system

The global team for WEDECO, a flagship Xylem brand; has developed the Aquada UV range of residential and commercial water purifiers, which use ultra-violet (UV) light to eliminate bacteria, viruses and protozoa in drinking water. Gerhardt Crous, growth centre manager for treatment at Xylem South Africa, introduces WEDECO and explains how its UV technology works.

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The Aquada UV water purification system

The global team for WEDECO, a flagship Xylem brand; has developed the Aquada UV range of residential and commercial water purifiers, which use ultra-violet (UV) light to eliminate bacteria, viruses and protozoa in drinking water. Gerhardt Crous, growth centre (GC) manager for treatment at Xylem South Africa, introduces WEDECO and explains how its UV technology works.

Xylem's WEDECO was founded in 1975 in Herford, Germany to develop chemical-free and environmentally friendly water treatment technologies, including ultra-violet light and ozone systems. Today, WEDECO is a world market leader in these water treatment technologies that offer safe, efficient, residue-free and eco-friendly technologies such as ultra-violet disinfection and ozone oxidation.

The company offers a comprehensive combination of standardised systems and engineered solutions for the treatment of potable water, industrial process water, cooling water, industrial and municipal wastewater, as well as bleaching processes and other industrial applications.

With more than 200 000 UV- and ozone-based systems installed worldwide, WEDECO has now over 40 years' of technical experience in these technologies. "On the UV side, the company has its own UV lamp

production facility in Essen – with an output capacity of 85 000 lamps per year – and WEDECO is the only major UV system manufacturer with a fully integrated R&D and lamp production facility," says Crous.

UV water treatment

Water delivered to homes and commercial zones is usually treated with chlorine or other processes, but certain microorganisms can survive in water deemed suitable for bathing, washing and drinking. While most of these microorganisms are harmless, there are some that cause severe illness. "And while most of the municipal tap water in South Africa is relatively safe, several municipalities in South Africa are struggling to maintain the standards required," Crous suggests.

"Home water purification systems are generally used to improve the taste and clarity of drinking water, but the most effective way to render microorganisms harmless is to use UV," he adds.

Ultraviolet light is a natural component of sunlight, falling just below the visible light region of the electromagnetic spectrum. "Within the UV spectrum, UV A, with wavelengths just below the visible at between a 315 and 400 nm is a low energy radiation that can cause sun tanning; UV B, with a shorter wavelength

(215 to 315 nm) will cause sunburn; while UV C, at between 200 and 280 nm is the UV that can inactivate the DNA of pathogenic microorganisms," Crous explains.

He goes on to describe how UV disinfection works. "One of the most effective UV wavelengths for disinfection is 254 nm, in the UV C range, which is where the Aquada UV lamp is designed to operate," he says.

UV C light penetrates the cell wall of microorganisms, causing the genetic information embedded in the DNA structure to be changed. Specifically, energy from the photons causes a reaction between the thymine bases, causing them to react with one another to form double-bonded molecules called dimers. These molecular lesions in the cell structure prevent the microorganism from replicating, effectively making them harmless. "A microorganism in this state is said to be inactivated because it is unable to reproduce. Infections are the result of uncontrolled growth/replication of bacteria or viruses, which drain the biological resources from the infected body. So by rendering microorganisms inactive, their growth is permanently blocked, so they become harmless," Crous explains.

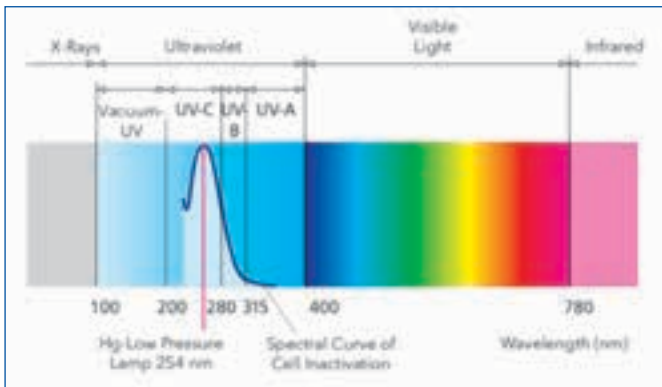
"Unlike chemical disinfectants, which rely on chemical oxidation to disrupt the life functions of microorganisms, UV is simply light energy that 'cripples' the DNA of microorganisms – and because no chemicals are involved, there is no need to drink the unhealthy chemicals or



Presenting at the South African launch of Aquada in Boksburg last year, Gerhardt Crous removes a UV lamp with its watertight quartz surrounding tube from the surrounding vessel. The liquid to be disinfected is passed through a vessel with the UV lamp at its centre. Photo: Grant Difford



Aquada UV systems are available in three distinct models: Altima (economy); Proxima (medium spec); and Maxima (high spec). Each of these is available in five different sizes.



UV radiation is part of the natural light spectrum. Ultra-violet light with high energy levels and a wavelength of 254 nm is most effective for cell inactivation for water disinfection.

their by-products in the treated water,” he adds.

WEDECO’s Aquada UV system

The light necessary for UV disinfection is generated in special UV lamps in watertight quartz tubes surrounding each lamp. The liquid to be disinfected is passed through a vessel with the UV lamp at its centre. The low-pressure gas plasma generated in the lamp emits light with a primary wave length of 253.7 nm, which passes through the surrounding water flowing through the vessel.

The power required to generate the UV is similar to that required by light bulbs. For the Altima series Aquada1 system, for example, the smallest system is powered by a 35 W UV lamp, while the largest, the Aquada10 – capable of disinfecting up to 10.52 m³/h of water with a dose of 300 J/m² of UV – is powered by an 85 W lamp.

When this intensive UV light reaches the microorganisms in the water, it directly impacts their DNA without causing any other changes to occur.

There are several benefits to using the Aquada UV-technology for homes and businesses. Apart from the overall water safety being improved, it is a low cost solution and easy to install. The Aquada system is simply connected to the main water supply line and then provides UV-treated water to all the water outlets on the premises.

There are no harmful by-products and the taste and appearance of the water is not affected by the UV treatment. UV lamps are also easy to replace and only require replacement after a full year of use.

“In spite of the low cost of the investment, the Aquada UV system offers significant benefits: it’s easy to install, eco-friendly and uses no unsafe

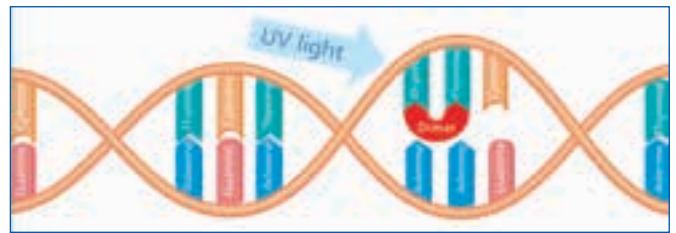
chemicals to eliminate harmful bacteria, viruses and cysts from water. The system is suitable everywhere that drinking water is taken from its own sources, residential treatment plants for water disinfection, as well as in schools, restaurants, campgrounds, hotels, hospitals and more,” Crous says.

Aquada UV systems are available in three distinct models: Altima (economy); Proxima (medium spec); and Maxima (high spec). Each of these is available in five different sizes for homes and businesses; depending on the amount of purified water required. A hotel, for example, would require a high specification Maxima model, whereas an average household might only need the economical Altima model.

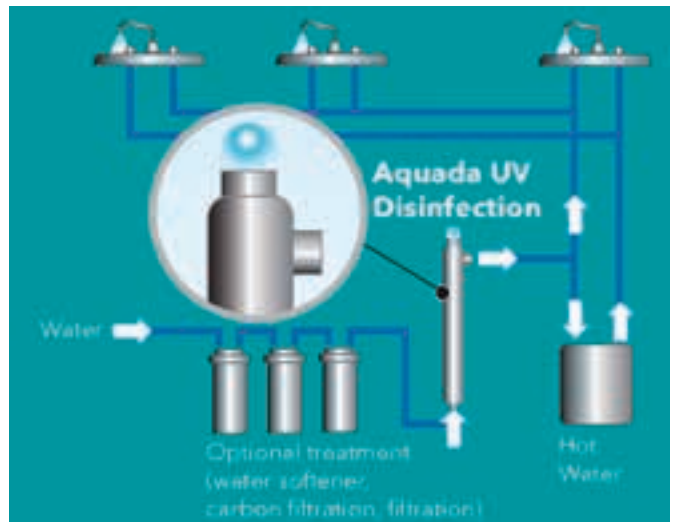
“UV disinfection of drinking water is environmentally friendly and extremely efficient, hence it is no surprise that, globally, this treatment technology is gaining importance year on year. WEDECO has already been providing the municipal drinking water market with its larger UV solutions for more than 12 years,” adds Crous.

“Xylem Water Solutions now offers South African clients the opportunity to obtain affordable Aquada UV systems throughout the country. Technological innovation within the water cycle is forever top of mind for Xylem – both globally and here in South Africa,” he says.

“The new Aquada UV systems underscore Xylem South Africa’s commitment to provide global technology to clients and to ensure that tailor-made solutions are available to clients operating



Photons from the UV light causes a reaction between the thymine bases, causing them to react with one another to form double-bonded molecules called dimers. These molecular lesions in the cell structure prevent the microorganism from replicating, effectively making them harmless.



Aquada UV systems can be integrated into existing water pipeline systems without any great effort.

within every part of the water cycle,” he concludes.

As well as WEDECO, the company boasts a range of pump and water treatment systems and the brands within its stable include Godwin; Flygt; Leopold; Lowara and Sanitaire. □

Xylem: a leading global water technology provider

Xylem (XYL) is a leading global water technology provider, enabling customers to transport, treat, test and efficiently use water in public utility, residential and commercial building services, and industrial and agricultural settings. The company does business in more than 150 countries through a number of market-leading product brands, and its people bring broad applications’ expertise with a strong focus on finding local solutions to the world’s most challenging water and wastewater problems.

Xylem is headquartered in Rye Brook, New York, with 2014 revenues of \$3.9-billion and about 12 500 employees worldwide. Xylem was named in the Dow Jones Sustainability Index for the last four years for advancing sustainable business practices and solutions worldwide and the company has satisfied the requirements to be a constituent of the FTSE4Good Index Series every year since 2013. □

Keeping Vodacom's network more resilient

Master Power Technologies (MPT) has provided Vodacom South Africa with two mobile data centres to ensure the operator can keep its communications network running in the event of an unforeseen catastrophic incident. The mobile units were designed to fit on mobile trailers, which can be deployed to any Vodacom site in South Africa within 48 hours.

Fred Weber, senior specialist, technology projects at Vodacom says MPT was previously tasked with providing data centres and power generation containers last year. These solutions have been placed at sites around the country to provide indefinite, independent backup power to the communications giant. The mobile recovery solutions are built on the same principle, but with the proviso that they fully comply with road ordinances and statutes.

Each mobile data centre is fully self-sufficient and contains power backup capabilities with on-board generators as well as the required networking systems, fire suppression, air conditioning and security technology to ensure the units are safe in almost any eventuality. The mobile units are capable of operating independently of any of the existing site's power infrastructure and utilities.

"The primary benefit of the mobile recovery solutions will be the assurance of continuous network operation, regardless of events and circumstances that may arise," explains Wouter Vermeulen,

Master Power's data centre specialist.

Due to the space restrictions MPT had to work with, Weber says there were a number of innovations in the design. Some of these include the effective fitment of the HVAC condensers in the rear doors, the installation and safe placement of the standby diesel power generator within the mobile facility, the use of Novec 1230 ozone friendly gas suppressant, and the effective fitment of power distribution panels and equipment. This was complemented by the installation of numerous secure network cabinets in this confined space.

HPE Africa's East London open day

High Power Equipment Africa – HPE Africa – hosted an open day at its East London branch recently, to celebrate the opening of new premises in Meisies Halt.

"This function, which generated great interest from the local community, is likely to become an annual event in East London," says HPE Africa's East London branch manager, Jaco van Wyk. "Guests included key players from diverse sectors – quarries, plant hire, construction, contractors and second hand equipment dealers.

"A highlight of the event was a competition where customers were invited to operate the relatively newly launched

The project took eight months to complete the design, construction and testing of the mobile centres at MPT's headquarters in Randburg. Once the systems were fully tested they were handed over to Vodacom and the communications giant conducted a live test at its mobile telephone exchange in Midrand. The test ran smoothly with no reported loss of service.

The mobile recovery solutions are now ready for any emergency. One is located in Pretoria where it will serve the northern parts of the country. The other is in Bloemfontein to serve the southern regions.

www.kva.co.za



From left: Frans Nel of Schrier Plant Hire, winner of the H930S Hyundai backhoe loader competition; Jaco van Wyk, HPE Africa East London branch manager; and Cuan Schrier, owner of Schrier Plant Hire.

H930S Hyundai backhoe loader. The rules were simple – the operator had to pick up three soccer balls and place them into tyres.

"Frans Nel from Schrier Plant Hire, who achieved this in the quickest time, without dropping any balls, won a replica model of the Hyundai backhoe loader."

Also on display were Hyundai R220-9S and R300-9S excavators and HL760-9S front-end loaders. HPE Africa's H930S backhoe loaders, designed for efficient performance, low operating costs and minimal maintenance requirements, are supported by a two year/3 000 hour warranty.

The company's portfolio also includes Soosan hydraulic breaker attachments that withstand harsh operating conditions on mines and quarries, as well as in plant hire and demolition projects.

The East London operation, with a well-equipped workshop, also offers a support service that encompasses an OEM parts, repair and maintenance facility as well as operator familiarisation courses.

www.hpeafrica.com

10 millionth variable speed drive delivered

The ten millionth ABB low voltage drive rolled off the production line at ABB's Beijing factory in November last year. The drive is going to Wuhan Guide Electric in China, a system integrator manufacturing electric control systems for port cranes.

"The outstanding direct torque control (DTC) motor control technology and built-in crane control software of ABB's industrial drives help us to maximise crane performance. For our customers – the ports – ABB industrial drives mean improved safety, high availability, and high total efficiency, resulting in lower energy costs," says Li Xiang, CTO of Wuhan Guide Electric.

Drive number 10 million is an ACS880 industrial drive, part of ABB's all-compatible drives portfolio. Compatible with virtually all types of processes, motors, automation systems and users, they are designed to tackle any motor-driven application in any industry, whatever the power range. The innovation behind all-compatibility is the

new drive architecture, which simplifies operation, optimises energy efficiency and helps maximise process output. The ACS880 series consists of single drives, multi-drives and drive modules.

"We place high demands on our suppliers, especially concerning product quality, reliability and service. ABB drives live up to our requirements, and for ten years now we've had a strategic partnership with ABB," says Li Xiang.

ABB developed its first AC drive in the 1970s and today it offers the most advanced range of variable speed drives in the world. ABB drives cover a wide power and voltage range, including voltages up to 13.8 kV and power up to 100 MW. Using variable speed drives to intelligently control motors increases energy efficiency. The installed base of ABB drives saved 445 terawatt-hours (TWh) in 2014 alone, equivalent to the consumption per year of more than 110 million households in the EU.

www.abb.co.za

Hydraulic distribution in Mpumalanga expands

Hytec has entered into an enterprise development agreement with a Level 1 Broad-Based Black Economic Empowerment (B-BBEE) Company, BNP Industrial Solutions (BNP). BNP was established by managing director Piet Makama and partners, Patrick Mgidi and Vusi Mashele.

This agreement will provide access to the Hytec Group's entire hydraulic and pneumatic range and enable BNP to expand its hydraulics products distribution in Mpumalanga to the power generation and mining sectors.

Hytec will provide BNP Industrial Solutions with the skills, product training and technical support from both its Witbank Branch and Hytec's Technical Department in Spartan, to enable BNP to grow into a significant player in the hydraulics market within the Mpumalanga region.

"We would like to see BNP grow into a substantial and sustainable partner," says Hytec regional manager Ralph Palphramand. "This initiative will create employment within the region, while simultaneously building additional chan-



Pictured at the enterprise development agreement signing are (top row from left): Ralph Palphramand, Hytec regional manager; Mike Harrison, Hytec general manager; Vusi Mashele, BNP financial manager; Frikkie de Klerk, Hytec branch manager, Witbank. (Bottom row from left:) Patrick Mgidi, BNP technical manager; John Wingrove, Hytec CEO; and Piet Makama, BNP managing director.

nels for our products.

"We look forward to working with Hytec as we expand our business offering," says Makama. "With a dedicated business partner and the quality of the Bosch Rexroth product range, we are confident we will become a significant player within the Mpumalanga Region."

www.hytecgroupp.co.za

Sandvik's Zambia support centre growing

Sandvik's new support facilities in Zambia are enabling faster and more efficient turnaround times for the maintenance and repair of mining fleets throughout the central African region.

One year since moving into the new facility and opening its doors in Kitwe, the operation has significantly improved throughput of repairs and rebuilds and has slashed delivery lead times for parts to ensure maximum uptime of Sandvik fleets in the region.

Sandvik invested in state-of-the-art support offices that include administrative offices, workshops, parts distribution and logistics centres. Up-to-date equipment and tooling, along with globally accepted management systems, are also in place to ensure services and support that is comparable to other Sandvik centres across the globe.

Sandvik Mining in Zambia plays a crucial role in assisting mines to develop infrastructure and supply appropriate mining solutions to meet production and revenue targets. It is also one of the most respected mining support firms globally. Its investment in Zambia underpins Sandvik's commitment to both Zambia and the entire central African region.

Steve Chambers, Sandvik technical and workshop manager for central Africa, says burgeoning fleets in the area require equally modern facilities as elsewhere in the world. Mines in the region now have access to the same services that are available globally and can optimise their fleets accordingly, without concerns over technical support.

"Within a year of opening our new facility it is clear to see that the move has paid off and mines operating our machines are starting to make full use of our services," Chambers says.

www.mining.sandvik.com



Technicians rebuilding an LH514 underground loader at Sandvik's new support centre in Zambia.

In brief

According to the latest **PPS Engineers** survey conducted among almost 500 engineering professionals, 56% of the respondents indicated that there are currently not enough job opportunities available for young engineers in the sector. There is a dire need for university and university of technology students to obtain experiential learning but many companies simply do not have the funding to employ or even mentor these young engineers anymore," says Manglin Pillay, CEO of the **South African Institution of Civil Engineering (SAICE)**.

Eaton and Nissan recently announced the signing of a memorandum of understanding to develop energy storage and control systems for the decarbonisation of developed economies through the integration of intermittent renewable energy sources into the grid, whilst maintaining grid stability and helping to develop economic and energy growth without significantly increasing CO₂ emissions.

Wednesday, 13 January 2016 was a proud day for the **Rotary Club of Newlands** in the Western Cape. After two and a half years of negotiations, fundraising and engagement with sponsors and partners, the Rotary Club has donated a fully equipped Isuzu emergency vehicle to Emergency Assistance Volunteer Support (EVS) on the South Peninsula.

ASSA ABLOY has released a new Mul-T-Lock Integrator key system that offers, according to the company's South African vice president, Quintin Boukan: "unparalleled security features including protection from duplication. Mul-T-Lock's advanced key technology is based on the 7x7[®] telescopic pin tumbler mechanism with seven chambers and a horizontal keyway.

DPI Plastics is helping to preserve South Africa's marine heritage by sponsoring the Fishing Line Recovery Programme – a major sustainability initiative that aims to reduce the amount of fishing line entering and remaining in the marine environment. A network of fishing line recycling bins has been placed by the **Overstrand Municipality**, in association with **Dyer Island Conservation Trust (DICT)**, at local beaches and popular fishing spots in Gansbaai.

PMSA, through its well-established affiliation with **BFS GmbH**, is now offering machines for locally manufacturing high-quality prefabricated concrete products for sewage and wastewater systems in South Africa. Based in Blaubeuren, Southern Germany, BFS is a technology leader for concrete pipe and manhole production, as well as for other prefabricated concrete products.

Columbus Stainless: A plant tour

MechTech takes a tour of South Africa's Columbus Stainless plant in Middelburg and talks to Lucien Matthews (right), the company's CEO.

Founded in 1966 in the heart of the chrome- and coal-rich Mpumalanga province of South Africa, Columbus Stainless is Africa's only producer of stainless steel flat products and one of the few inland stainless steel plants in the world not connected to a major waterway. "This site was built in close proximity to chrome resources and low-cost power," begins Matthews. "While this disadvantages us with respect to the logistics of getting finished product out, we have easy access to raw materials and we can run on very low raw material stocks," he says.

Today, global stainless specialist, Acerinox holds a 76% shareholding in Columbus Stainless with the balance (24%) being held by South Africa's Industrial Development Corporation (IDC). "Our plant is a technologically advanced, fully integrated, single-site operation. This gives us flexibility to adjust quickly to changes in the market," Matthews points out.

At the starting point of the stainless steelmaking process is stainless scrap.

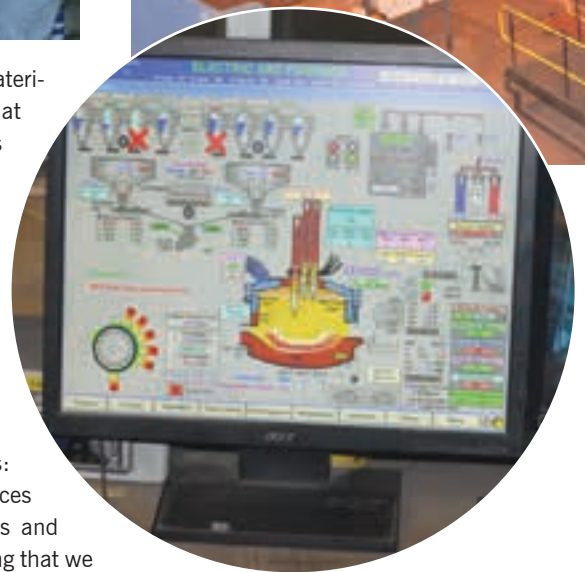


"Stainless is the greenest of materials, with 78% being recycled at the end of a stainless product's life," Matthews says. "In our process, we melt scrap, then add some chrome, nickel and other metals, according to the alloy recipe being made. Eventually, this is converted into sheets and strips that are stamped, pressed and welded to make a host of different products: for hygienic preparation surfaces and storage systems; utensils and containers for almost everything that we eat or drink; stainless steel components in critical areas of motor vehicles, such as exhausts, airbag gas cylinders and catalytic converters; and for decoration, signage, shop fittings, architecture, furniture, appliances and modern technologies such as hydrogen fuel cells.

"Goods manufactured in stainless steel have a life of 15 years or longer.

Then, after this time, the steel comes back into the plant for re-processing into new sheets – and there is no limit to the number of times this can be done," he reveals, adding that this is not just hearsay: the lifecycle of stainless steel has been well documented through studies at Yale University, for example.

Stainless steel scrap is a high value commodity for all stainless



At the heart of the 100 t electric arc furnace (EAF) is a sophisticated in-house-developed control system, which delivers compositional control that is among the best in the Acerinox Group.

manufacturers and, while Columbus uses as much as possible from local sources, significant quantities of stainless steel scrap is imported because there is not enough in South Africa. "We also make stainless steel by melting carbon steel scrap – sourced from within SA – and then blending that with chrome and nickel as required," Matthews adds.

Scrap and ferrochrome

Stainless and carbon steel scrap is accurately sorted into grades in the stockyard, where overhead cranes – connected to the company's in-house order management and material flow software system – weigh and load the required grades into baskets for delivery to the 100 t electric arc furnace (EAF).

At the same time, hot molten ferrochrome (charge chrome) is transferred from Samancor's Middelburg



A basket of raw materials ready to be loaded into the electric arc furnace for melting.



Left: Following reheating to between 1 100 and 1 300°C, depending on the stainless steel grade, the slabs are rolled on a reversing four-high mill to gauges of between 65 and 25 mm. **Above:** Cold rolling of the No. 1 coils takes place on one of four Sendzimer mills (Z-mills), which produce smooth, shiny finished, cold rolled stainless steel. The thickness range of the cold rolled product is between 0.2 mm and 6.0 mm. **Below:** The rolled material is then annealed (softened), pickled and passivated, before it is processed through the skinpass mill, to ensure a smooth surface, known as a 2B finish.

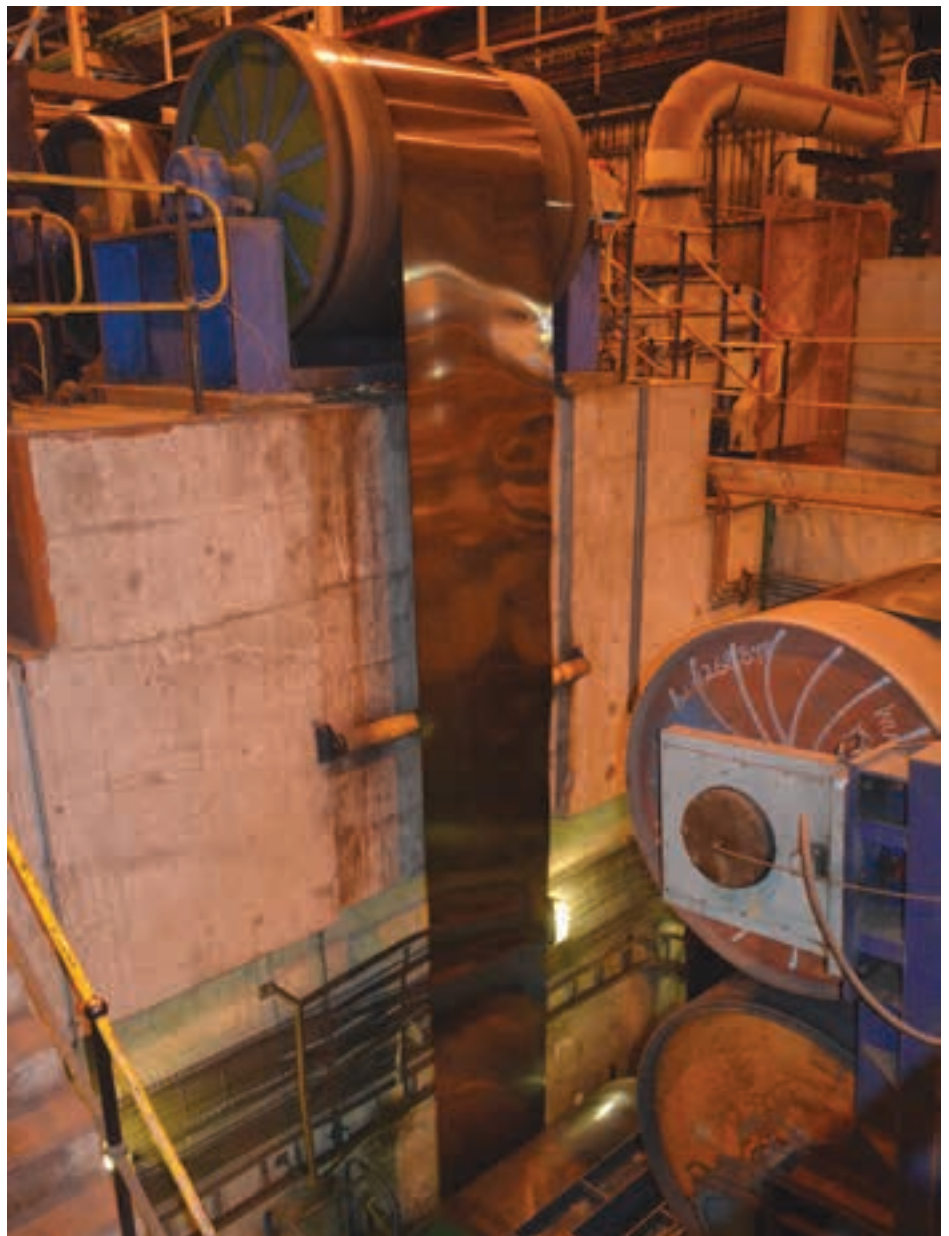
Ferrochrome plant next door, according to the needs of the stainless steel melt being processed. This significantly reduces the logistics costs for both parties and, directly linked to Columbus' EAF furnace control system, improves compositional control. The just-in-time approach also reduces the amount of post-processing required at Samancor – to solidify and crush the Ferrochrome – and the melting energy required per batch of stainless.

Melting

To make ferritic stainless steels, essentially, only iron and chromium are needed, but for austenitic stainless steels, nickel is added to the mix. "Our compositional control is among the best in the Acerinox Group," says Matthews, "and we are also able to switch between different material grades several times per day, giving us a flexibility to respond to urgent or special requirements from anywhere in the world," he adds.

From the EAF, the molten metal is transferred to one of two 100 t Argon-Oxygen Decarburisers (AODs). There, by blowing oxygen, argon and nitrogen into the molten steel, the stainless steel is refined. Oxygen decarburises the steel, but this process is exothermic, which increases the melt's temperature. Argon and/or nitrogen are bubbled through the mix to accurately control the temperature and to optimise the decarburisation process.

Reducing agents, such as silicon and aluminium, are added to recover some of



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A slab in the re-heat furnace being prepared for hot rolling.

the chromium from the slag, and lime is used to desulphurise and to manage the slag fluidity and volume.

“Refinement in an AOD, however takes time, particularly with complicated grades such as duplex stainless steels,” says Matthews – hence the advantage of having two AODs.

Slab casting

Once the melt in the AOD is ready it is tapped into a ladle and transported to Columbus’ continuous casting machine. Molten metal is tapped from the bottom of the ladle into a tundish. From there, it flows through a submerged entry nozzle into the mould, which consists of two water-cooled copper shoes, 200 mm apart and up to 1 600 mm wide. The mould creates a skin on the molten slab as the metal flows vertically into it. On leaving the mould, about 1.5 m below the tundish, a set of rollers guides the solidifying slab along a curve and onto a horizontal table.

“The slabs go through a surface grinding process to remove any possible surface defects and they can be cut to lengths of between 4 and 12 m. This is our first saleable product,” Matthews tells *MechTech*.

Hot rolling

The hot rolling process begins at the reheat furnace where the slabs are heated to between 1 100 and 1 300°C, depending on the stainless steel grade. The slabs are then rolled on a reversing four-high mill to gauges of between 65 and 25 mm. Thinner gauges are rolled down further on the Steckel mill.

Once the predetermined gauge is reached, the material can either be coiled (black coil, also known as hot band)

or cut into plate (black plate). This is Columbus’ second saleable product and it is currently the key supplier of black coil to Bahru Stainless, Acerinox’s new Malaysian rolling mill. The coils have a mass of between 20 and 30 t with thicknesses between 3.0 and 8.0 mm, while black plate of up to 65 mm thick can be supplied.

Annealing, pickling, cold rolling and finishing

The hot rolled products are softened (annealed) and de-scaled (pickled with acids) to produce a No. 1 finish product. This product has a light grey matt surface and is also saleable.

Cold rolling of the No. 1 coils takes place on one of four Sendzimer mills (Z-mills), which produce smooth, shiny finished, cold rolled stainless steel. The thickness range of the cold rolled product is between 0.2 mm and 6.0 mm.

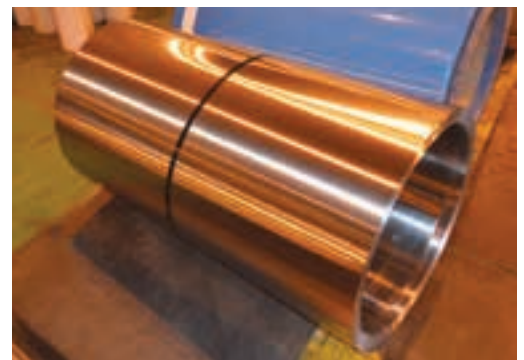
The rolled material is then annealed (softened), pickled and passivated, before it is processed through the skin-pass mill, to ensure a smooth surface, known as a 2B finish. “Alternatively, the cold rolled material can be processed to a bright annealed (BA) finish. This is achieved by annealing in a vertical furnace with an inert atmosphere, to retain the bright surface imparted by the cold rolling process – and we are particularly good at producing this bright stainless finish,” says Matthews.

Before being packed and shipped to customers, cold rolled stainless steel coils can then be cut into smaller coils or sheets, slit to narrower widths and/or given a uniform scratch finish by polishing with abrasive belts.

“We have created a modern, efficient stainless steel production facility that



The VBA vertical furnace where a bright annealed (BA) finish is produced.



Bright annealed coil on the shop floor. With a wide range of products in austenitic, ferritic, utility and duplex grades produced in the plant, Columbus Stainless is able to offer stainless grades for most applications.

meets the changing demands of users in the domestic market and around the world. With a wide range of products in austenitic, ferritic, utility and duplex grades produced in this plant, we are able to offer stainless grades for most applications. Backed by sound technical support, we are also able to make recommendations on correct material selection as part of our customer support process,” Matthews says.

“Because of the boundless potential for stainless steel as a metal of the future, we at Columbus remain dedicated to becoming one of the leading suppliers of stainless steel in our domestic market and the global arena,” he concludes. □

New mill drive system for improved efficiencies

Metso's latest innovation, the Metso QdX4 Mill Drive system is mooted to help customers achieve high efficiencies in mining operations.

Over the past three years, Metso has worked in close collaboration with CMD and Ferry Capitain to develop a new high-powered mill drive solution for large SAG and ball mills in the mining industry. After exhaustive design research that concluded with build, installation and continuous full-scale testing operations, Metso has now introduced its QdX4 Mill Drive.

This system was tested for over three million cycles at 28 MW (2×14 MW) with an input speed of 320 rpm, proving the torque splitting system arrangement. In the past, grinding mills operating between 18 and 28 MW required a large electrical wrap-around motor, known as a gearless mill drive (GMD). The Metso QdX4 Mill Drive system is an alternative option to the GMD. Until now, the gear-driven solution for large SAG and ball mills was limited to 18 MW.

Responding to the needs of industry

"Traditionally, the mining industry has been somewhat reluctant to change, but change has occurred nonetheless and the industry is now encouraging innovations to operate in a more efficient way. Our goal

was to design a robust, reliable, cost-effective, high-powered mechanical solution without compromising the high design standards we are all used to seeing in our customers' specifications," says Frank Tozlu, product manager of large grinding mills at Metso Minerals' grinding headquarters, in York, Pennsylvania.

"SAG and ball mill specifications have been developed over many decades and we are still developing them today. We must continue to look at advancing innovative ideas through our standards and practices when expanding upon transmittable mechanical power," he adds.

Taking architecture to the next level

The Metso QdX4 Mill Drive system provides the next step in the evolution of mechanical mill drive architecture. The progression from a single- to a dual-pinion arrangement has been a way to transmit twice as much power in the past. "We have simply rearranged the dual system into



Metso's QdX4 Mill Drive system rearranges the dual pinion arrangement into a quad system that equally divides input power from two load-sharing motors into four pinions.

a quad system that equally divides input power from two load-sharing motors into four pinions," Tozlu explains. With this architecture, the Metso QdX4 is capable of delivering up to 32 MW to horizontal mill comminution systems.

Driving time and cost efficiencies

The QdX4 Mill Drive has many features that help customers achieve both time and cost efficiencies from an equipment point of view and in terms of the overall costs of a large-scale operation. For example, two installed QdX4 drive units weigh less than one GMD quarter section. This significantly reduces transportation cost, delivery time, equipment handling and site preparation. The system also reduces the need for massive reinforced foundation volumes and the requirement for customers to install large crane capacities. Similarly, there is no need for ex-

Metso's new mill drive uses traditional engineering load distribution calculations for sizing standard base-plates and hold-down anchor bolts, very similar to that seen with dual-pinion drive arrangements.

tensive, costly, time-consuming dynamic system analysis studies that, in the end, essentially verify the integrity of the GMD stator.

Allowing for easier and faster set up

Metso's new mill drive uses traditional engineering load distribution calculations for sizing standard base-

plates and hold-down anchor bolts, very similar to that seen with dual-pinion drive arrangements. The Qdx4 is estimated to take less than one-third of the time to install when compared to a GMD system and can be mounted and aligned by trained on-site personnel. There is no requirement for large brakes and foundation brake piers or the need for extended feed and discharge mill flanges, allowing a better-optimised design of the rotating structure.

With the installation of two high-powered single motors equipped with load-sharing variable speed drives, frozen charge protection, inching and creep capabilities and standard cooling, the Metso QdX4 is clearly an alternative option for operating large SAG and ball mills of greater than 18 MW.

Simplifying mining operations while helping to increase profitability

The system also saves the user time and money when it comes to reliability and maintenance in terms of gear/pinion lubrication. Two dedicated lubrication units are provided, one for the

internal transmission gearing and one for the closed loop mill gear and pinion interface. "The days of purchasing and disposing of spent gear grease are over," Tozlu suggests.

"Minimising the complexities related to mill installation, operation, and maintenance activities maximises mill availability and increases overall profitability for customers. The Metso QdX4 Mill Drive system is the first alternative to a GMD and makes mining operations simpler to save time and money," he argues.

"Metso is the world's leading industrial company in the mining and aggregates industries and in the flow control business. Our knowledge, people and solutions help drive sustainable improvements in performance and profitability in our customers' businesses.

"We have an uncompromising attitude towards safety. Our products range from mining and construction equipment and systems to industrial valves and controls. Our solutions are delivered and supported by decades of process knowledge and a broad scope of services backed by a global footprint of over 90 service centres, thousands of service employees, and an extensive logistics network," Tozlu concludes. □

Frequency converters enabling leaner automation

Demand-oriented motor control is enabling users to reduce their electricity consumption by up to 80% compared to fixed-displacement drives. Bosch Rexroth has recently added two new models to its range of frequency converters, the EFC 3610 and EFC 5610, to provide intelligent speed and torque control for motors from 400 W up to 18.5 kW.

Bosch Rexroth's EFC-class frequency converters are open-source, scalable and expandable drive controls that are easily integrated into many different kinds of machines and automation environments, including pumps, compressors, fans, conveyors, presses and packaging machines.

The EFC 3610 is a universal, low-cost converter for control and demand-oriented energy supply for almost all industry segments. The EFC 5610 is a high-torque solution with efficient, high-performance vector control for specialised requirements and an expanded power range (up to 18.5 kW). Both are available in heavy-duty and

normal-duty configurations.

The communications interface of the EFC converters has expanded to include support for Modbus, Profibus and CAN bus protocols. Pluggable I/O connection terminals and fieldbus modules enable a high degree of expandability and flexibility in the way drive architectures can be configured. Integrated brake choppers and mains filters (EN61800-3 C3) reduce the need for external componentry, enhancing the plug-and-

play functionality of these products. Process control is improved through integrated PID controllers alongside an eight-step sequence control system.

Other innovative features, such as the detachable control interface that allows parameters to be dumped into additional drives using the panel's memory and copy function, enhance the overall usability of the EFCs. Additional braking resistors are available for applications where the controlled motor is required to stop instantly, dissipating the electromotive voltage.

The Bosch Rexroth frequency converter range will soon be expanded to support motors up to 22 kW, and will also include the Ethernet range of communications.

Apart from lowering the electricity bill through reduced and more efficient consumption, frequency converters lower capex by reducing the requirements of the associated switchgear, while also limiting component stress for a longer motor life. Bosch Rexroth frequency converters are distributed in sub-Saharan Africa by Tectra Automation, a Hytec Group Company. □



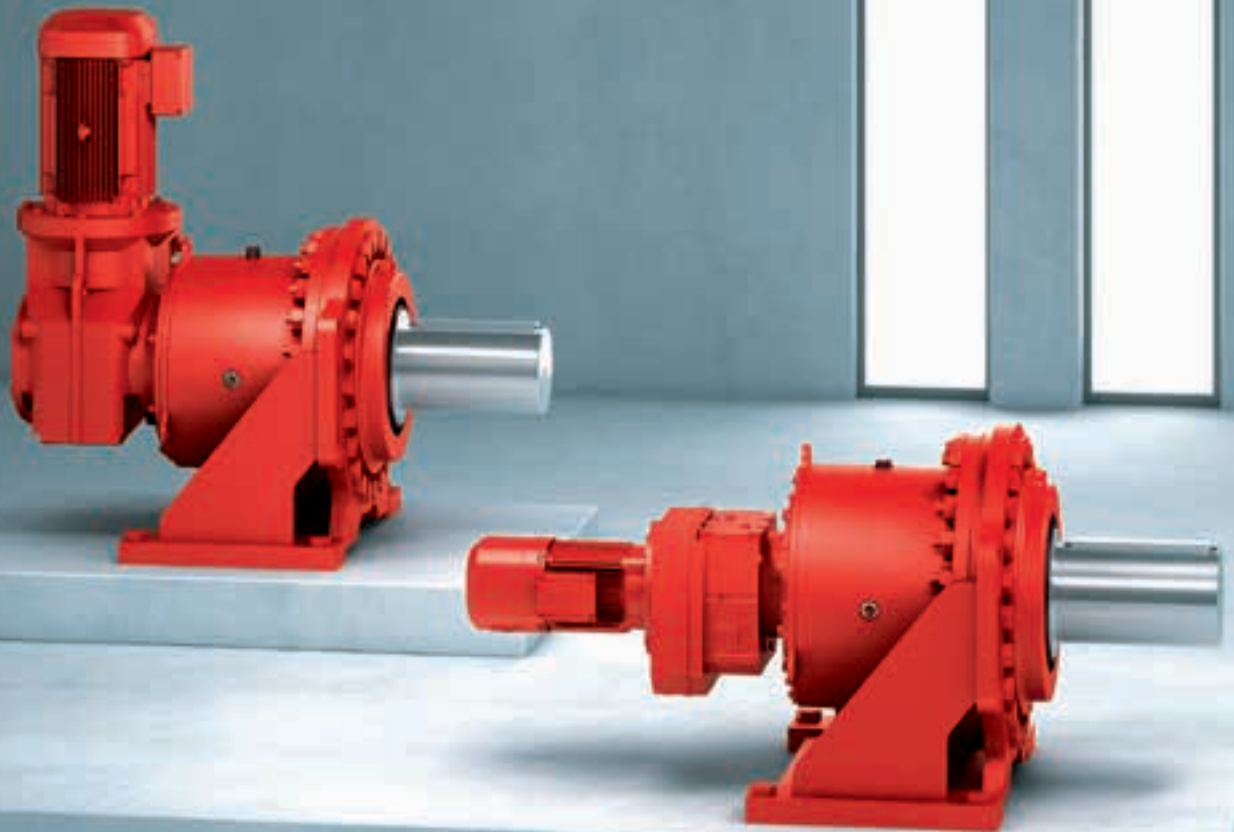
The EFC 5610 is a high-torque motor control solution with high-performance vector control for specialised requirements.

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The P-Series has been successfully used in bucket wheel, apron feeder and milling applications. The SEW-EURODRIVE modular concept results in a cost-effective performance relationship with shorter delivery times.

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New brand identity centres on customer service

Bearings International (BI), part of the Hudaco Group, is consolidating its position as a leading distributor of bearings and power transmission products in Southern Africa by launching a new brand identity that focuses on customer service as its key differentiator.



timisation and increasing operational efficiency. There also remain a number of opportunities to leverage our partnerships in adjacent industries and explore value-accretive activities. We are very excited and positive about the future," Roberts concludes.

Bearings International, incorporating Roller Chain-Opti and Arrow Bearings & Transmission, is a leading Southern African distributor of bearings and power transmission products. A complete range of leading brand imported products is offered through 50 wholly owned branch outlets, three on-site operations at customer facilities, plus four independently-owned franchised outlets. □



The ribbon-cutting at the official BI rebrand launch.

Bearings International CEO Burtie Roberts (right) says that the company had undergone a complete re-engineering process, with the unveiling of a new logo, staff uniforms and brand livery. The new look will be rolled out to its extensive branch network in a phased approach.

With a proud track record in the industry of 57 years, Roberts adds: "This is the start of a new company. In order to be the preferred supplier, we have to do something different. We have to give our customers a 'wow' experience, and we will continuously engage in that process.

"Our aim is to provide a cost-effective, quality service to internal and external customers. The initial process was to catch up with market demands and competitors, and secondly to become a proactive company providing an excellent service to our customers to ensure we are the preferred supplier," Roberts says.

"This involved relooking at our logo, changing our branch network and even introducing changes at our head office in terms of support services, but most importantly it involves redefining our



The-modernised Bearings International (BI) logo.

customer service," says the company's marketing manager Gugulethu Nkutha.

Bearing's International's main industry focus is the automotive, OEM and aftermarket sectors in South Africa, Namibia, Botswana and other countries within sub-Saharan Africa. "With our extensive network of more than 47 branches, we support clients in most major cities. However, where the Hudaco Group expands through acquisitions, we will be willing to look into those areas of opportunity.

"We are focused on transforming our organisation through cost op-



Proud staff celebrate the rebrand launch at the BI head office in Boksburg.

Innovative solutions for powering the future

Following Hannover 2015 and the publication of SKF's 'Power the Future' report, this article presents a selection of SKF's leading products and smart innovations to boost mobility and connectivity.

SKF has been developing advanced solutions to customers operating across industry since 1907. The company utilises its vast experience and industry insight to continuously produce new technologies, which deliver competitive advantages to customers, such as improved productivity and sustainability.

This experience and expertise has established SKF as an industry leader in product design and development. "We attribute this to a forward thinking culture and a commitment to delivering cutting-edge solutions that meet the needs of customers, including bearings and units, seals, mechatronics, services and lubrication systems. We call this

SKF Knowledge Engineering and it is this approach that will power the future of industry," says Bernd Stephan, senior vice president of group technology development at SKF.

Innovative new bearing rating life model

SKF has launched the SKF Generalised Bearing Life Model, a pioneering new rating life model for bearings that is specifically designed to help engineers to calculate a more realistic bearing life by considering more influencing factors than before. The new model is a major step forward for the industry and will play a vital role in enabling OEMs and end users to match bearings and application conditions with even greater certainty, resulting in improved machine life and reduced operating costs.

Developed as part of the SKF EnCompass Field Performance Programme, the new bearing rating life model will enable original equipment designers and end users to more closely match bearings to actual application conditions, therefore further optimising bearing performance.

The current bearing life model calculation is primarily based on damage below the bearing's surface. However, SKF's experience over a number of decades has confirmed that today's high quality bearings rarely fail because of sub-surface damage from inadequate load capacity. They generally fail as a result of surface damage caused by such factors as contamination, inadequate lubrication, surface distress and wear. The new model takes all of these factors into account.

Power the future and SKF's new report

In partnership with industrial technology experts and academics from all over the world, SKF has released a new thought leadership report focusing on the future of manufacturing and engineering. The document, entitled 'Power the Future',



Bernd Stephan, senior vice president of group technology development at SKF.

features contributions by specialists from within SKF and leading external authorities. It focuses on current and emerging trends in engineering technology and processes and outlines how the factory, machinery and the workforce will evolve in the near future.

'Power the Future' will enable engineers and students to develop a greater knowledge of the main areas of interest that are predicted to become increasingly prevalent to future technology developments in a variety of key global industrial segments.

SKF smart innovations boost mobility and connectivity

At last year's Hannover Fair, SKF launched a variety of new product innovations to boost mobility and connectivity in industrial applications. These include SKF Enlight, TKSA 51 and SKF Insight.

SKF Enlight is a package that combines a powerful new mobile app with a special Bluetooth-enabled sensor. It allows non-expert staff to gather expert data such as vibration and temperature information, using standard mobile devices on demand.

The package features three main elements: a mobile app entitled Data Collect, which turns a standard mobile device such as a smartphone or tablet into a data collection device; the SKF Wireless Machine Condition Detector (WMCD), which is a special sensor that measures vibration and temperature data and relays it to Data Collect via Bluetooth; and, if appropriate, ruggedised Atex Zone 1-compliant tablets and smartphones to enable users to collect data in hazardous industries such



SKF's Generalised Bearing Life Model takes into account the fact that modern bearings generally fail as a result of surface damage caused by such factors as contamination, inadequate lubrication, surface distress and wear.



SKF Enlight is a package that combines a powerful new mobile app with special Bluetooth-enabled sensors.

as oil and gas, refining, chemicals and pharmaceuticals.

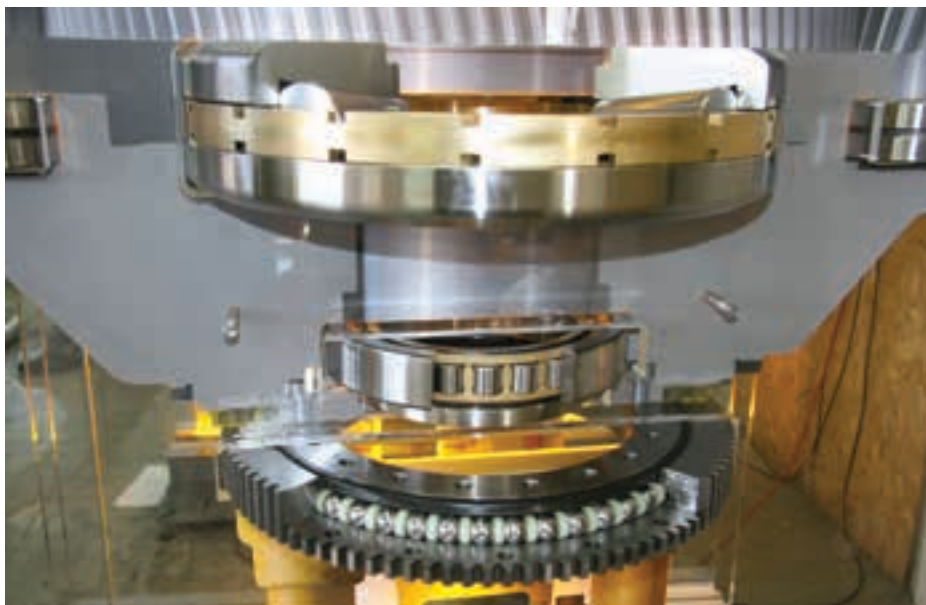
The TKSA 51 is a new SKF shaft alignment tool, which prevents shaft misalignment. Easy to use, the TKSA 51 is the first instrument designed for intuitive shaft alignment using tablets and smart-phones. The app makes it quick and easy to set up motors, drives, fans, gearboxes, pulleys and couplings, even by first time users. It comprises two compact and lightweight laser measuring units, designed to suit almost any application.

Using the versatile shaft brackets, the instrument can be mounted on small machines with limited space, whilst extension chains, rods and magnetic holders are supplied for mounting the tool on large machines.

The company has begun to apply SKF Insight – its revolutionary bearing health management technology – in several new industry projects. The technology, which uses a self-powered, intelligent wireless sensor in the bearing to provide instant condition monitoring data via the Internet, is undergoing trials in challenging projects in the wind turbine and rail industries.

In cooperation with SJ, the Swedish national rail operator, SKF started to run Insight on a railway vehicle. This trial will demonstrate the technical and commercial advantages, including the ability to improve the in-service availability of passenger rail vehicles, while gradually reducing maintenance costs.

SKF Insight monitors dynamic parameters such as vibration, temperature, lubrication condition and load, and informs the user when conditions are abnormal and at risk of causing bearing damage. When



SKF top drive bearing solutions are designed to address challenges inherent in the drilling industry: mud and lubricant contamination; excessive loads and vibration; electrical discharges and hydraulic blockages.

it was first launched, at Hannover 2013, SKF Insight was a technology concept – a way in which maintenance engineers might improve condition monitoring by keeping tabs on bearing health. Two years on, it is a fully functioning solution running in customer pilots, capable of supplying data directly to diagnostic centres for better condition monitoring via the SKF Cloud: SKF @ptitude

Oil and gas, automotive and other innovations

The Top Drive exhibit showcased a range of advanced solutions that are helping to improve the operational reliability of critical top drive systems in the oil and gas sector. This includes bearings, seals, lubrication and condition monitoring products.

The latest top drive equipment, used to rotate the drill string during the drilling process, offers a number of important benefits. It can, however, be subject to costly failures due to mud and lubricant contamination, excessive loads and vibration, or electrical discharges and hydraulic blockages. SKF top drive bearing solutions are designed to address these challenges. For example, the main tapered roller thrust bearing has been specifically designed for the drilling industry using the latest SKF modelling software, which is capable of simulating a variety of relevant operating conditions.

The Sliding Door Damper (SDD) incorporates two gas springs and an oil damper, ensuring that doors of up to 400 kg in weight can quickly be brought to a soft, safe final position, regardless of

how hard they are closed. As well as acting as a brake, the SDD also positions the door in its closed position and is ideal for use in a range of sliding door structures, such as barn doors, room partitions and French windows.

The design, which is available in four different sizes, each with a different casing length, is a vast improvement on existing systems, which tend to use a single air-gas oil spring and are limited to doors of up to 100 kg. At the same time, they are often bulky, expensive and require an electrical or hydraulic connection. The new product combines three separate functions: regressive braking; cushioned docking; and gentle closing. It decelerates the linear motion of doors, windows and even heavy drawers until they reach a defined end position.

Tyre pressure monitoring: Meeting the need for safer driving and increased efficiency, the SKF Tyre Pressure Monitoring system delivers reliable and wireless continuous tyre monitoring in trucks and trailers to prevent unplanned vehicle downtime.

Designed to reduce the risk of tyre blowouts, improve fuel economy and to cut CO₂ emissions, the Tyre Pressure Monitoring system features robust modules that are mounted externally on each wheel. The temperature and pressure data collected is highly reliable due to using advanced algorithms for calculations and a high signal strength of 2.4 GHz for accurate data transfer.

The 'Power the Future' report can be downloaded free from the SKF website: www.skf.com. □

SKF and Lincoln Lubrication SA

In February 2015 SKF successfully acquired South African-based Lincoln Lubrication SA (Pty) Ltd and the company now forms part of SKF's Lubrication Systems core technology.

Lincoln Lubrication SA specialises in Asset Protection Management with Full Circle Reliability. Our understanding of assets includes not only machines, and equipment, but also staff and their safety.

Lincoln Lubrication specialises in automated lubrication systems that can be fitted to any application, machine or piece of equipment. In addition to lubrication systems and equipment, Lincoln Lubrication also offers other asset protection management technology including hose reels, liquid Fast Fill, and fire suppression systems.

As a complementary product, GreenLinc offers environmentally accredited spill kits.

For more information about the acquisition and Lincoln/SKF Products and Services, please contact your nearest SKF/Lincoln Lubrication Distributor or Branch.

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Planetary final drives for industrial equipment

Fairfield is part of Oerlikon AG, a global technology company with over 16 000 employees in 36 countries. Together with Turin-based manufacturing sister company, Graziano Trasmissioni, Fairfield is a key Oerlikon Drive Systems brand. The combined drive technologies from Oerlikon Drive Systems provide fully integrated drive systems from transmissions to final drives for both on- and off-highway vehicles as well as for industrial machinery.

Fairfield Torque-Hub® final drives are a planetary range of reducers designed to be compatible with hydraulic motors and mountings. Standard input configurations and a choice of shaft, spindle or wheel drive output options combine to meet the needs of many power transmission applications and standard SAE hydraulic motor-mounting provisions can accommodate nearly any hydraulic motor.

The application flexibility provided by these drives and the broad range of torque outputs and gear ratios available have helped to make Fairfield

Torque-Hubs the preferred final drives of equipment manufacturers throughout the world. Customers include the world's leading OEMs of agricultural and construction equipment, conveyors, augers, mixers, wire drawing machines, capstan winches, metal roll bending machinery, garbage shredders, aerators and many other types of specialised products.

Ideal for propelling off-highway equipment, Fairfield Torque-Hub wheel drives are also used to power winches and many marine applications. Wheel drives allow the design engineer greater flexibility to economically deliver power where it is needed. Fairfield Torque-Hub wheel drives are available for delivering torques of between 2 260 Nm and 395 450 Nm (20 000 to 3.5-million lbs-in).

Shaft outputs facilitate the delivery of power to remote in-plant machinery such as conveyors, mixers and augers. They also meet remote power requirements such as swing drives on mobile man-lifts, cranes, excavators and logging equipment. They can deliver up to 141 000 Nm of

torque (1.25-million lbs-in).

Spindle outputs are used to power the drive wheels of vehicles with small-diameter wheels, such as small lift trucks and mowers. They also meet many other requirements where a flange mount is more desirable and are available across the same torque range as the Torque-Hub wheel drives.

Fairfield Torque-Hub drives are available in single planetary, double planetary, triple planetary and differential planetary gearing configurations to meet torque and operating speed requirements.

Fairfield also manufactures a full line of special drives and complimentary products to enhance Torque-Hub performance in demanding applications, including: two-speed drives; right angled drives; compact drives; and input adapters.

The range is available in South Africa through Axiom Hydraulics. □



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BEE 3

Weight optimisation: an elevator success story

In the architecture industry, buildings are being built taller and ever more elaborately. The current world's tallest skyscraper, the Burj Khalifa in Dubai, UAE, stands at 828 m tall. This impressive height brings with it a unique set of challenges, one of which is how to efficiently transport people from the ground floor to the top.

Most elevator systems in operation today pull the elevator up and lower it down via cable systems located in the top floor of the building. However, these systems generally offer a maximum ride height of up to 400 m,

just half the distance of the world's tallest building. Relying on this traditional system, passengers would need to ride two or more elevators to reach the very top level.

ThyssenKrupp Elevator, part of the Germany-based ThyssenKrupp

Corporation, is one of the world's leading elevator companies. With sales of €6.4-billion and more than 50 000 employees at 900 locations, the company's products are installed in buildings throughout the world.

ThyssenKrupp Elevator's design and engineering teams have developed an elevator that makes use of electro-magnetic drives attached to the frame of each cabin. The system does not require any roof mounted cables and can travel the full 800 m distance with ease. In addition, it allows the elevators to move horizontally as well as vertically.

The new concept brought its own challenges, chief among these being the fact that the system would not be able to carry as much weight as a traditional elevator.

ThyssenKrupp Elevator wanted to explore ways to ensure that the new design was as lightweight as possible in order to maximise the loading capacity of the cabins. Altair ProductDesign, due to its experience in removing mass from products in the automotive and aerospace sectors, was selected to explore methods and materials that could help to minimise the weight of the elevator cabin.

ThyssenKrupp Elevator had developed two concept designs related to how the electro-magnetic drives would lift the cabin. The first was the 'BackPack' concept, which placed an electro-magnetic drive on the rear of the cabin, lifting it through a support structure from underneath.

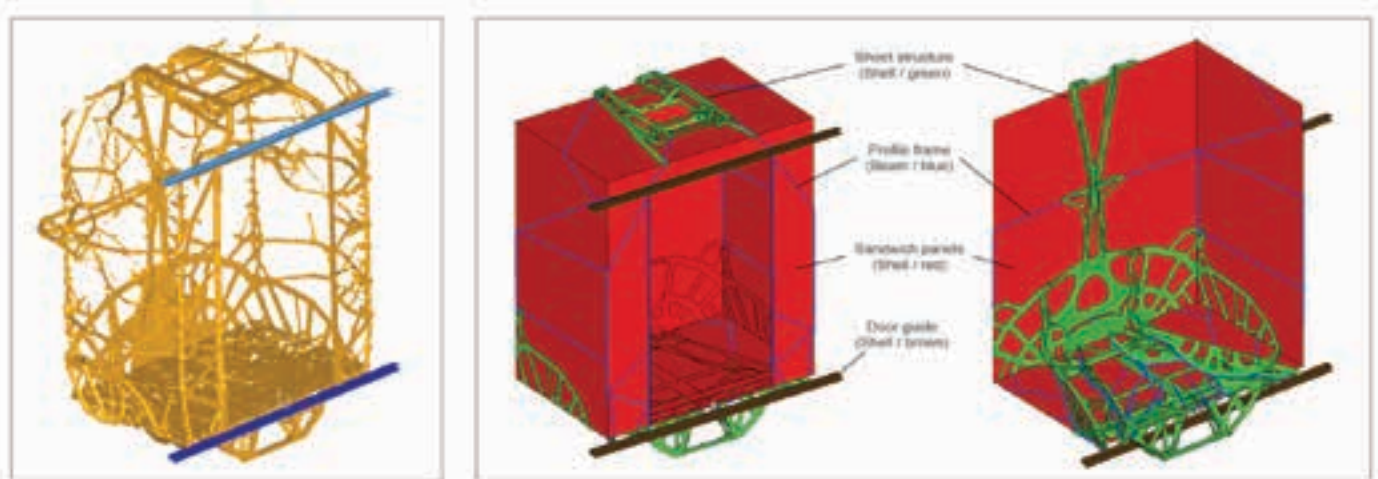
The second was the 'SideGuide' concept, which used a frame built around the cabin with drives on the left and right to provide the lift. ThyssenKrupp Elevator's weight targets for both the BackPack and SideGuide designs were extremely low compared to traditional cabin designs.

Using optimisation technology to minimise weight

To achieve these targets, Altair ProductDesign developed a three-stage approach. In the first stage, the team performed a topology optimisation study on the BackPack concept using OptiStruct™, the design optimisation solution within Altair's HyperWorks suite of simulation tools. With the freedom to create a totally new design, the team specified the cabin's 'design space'; the areas of



Burj Khalifa in Dubai, UAE, stands at 828 m tall, which results in a unique set of challenges for cable-based elevator systems, which generally offer a maximum ride height of up to 400 m.



Above: The results of the topology optimisation study on the Backpack concept using OptiStruct™ (left) and the interpretation of those results (right).

Right: Exploring the ply shapes and orientation of the carbon fibre sandwich panels.

the structure where the software was free to remove material; and where it had to remain in place, such as the door guides.

Loading information such as acceleration forces on the floor, occupants leaning on one of the walls, or a person standing on top of the cabin was gathered from ThyssenKrupp Elevator and entered into the software. OptiStruct was then able to suggest the most efficient placement of material for the cabin's structure while meeting design requirements.

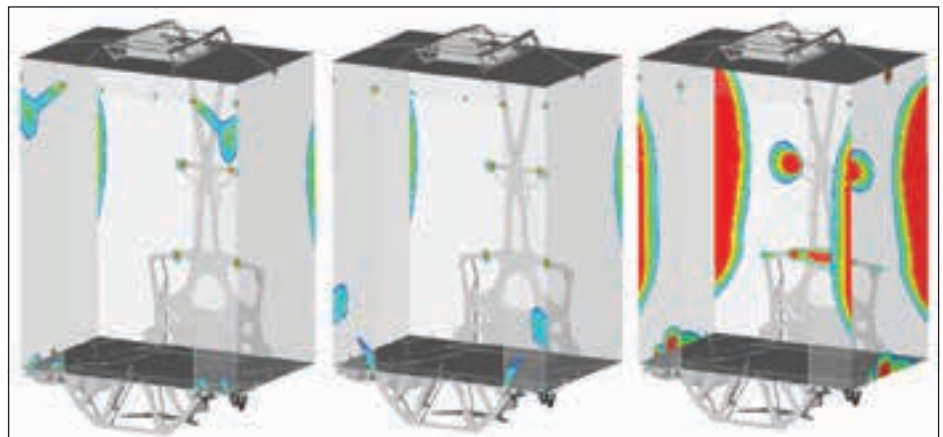
The results of the topology optimisation study were then interpreted by Altair ProductDesign into a material layout that could be manufactured.

Exploring new material configurations

With the basic structure of the cabin defined, Altair ProductDesign was able to move to the second stage where the thicknesses of the materials could be investigated. Altair's team wanted to investigate the potential to further minimise weight through the use of different material configurations.

The walls of elevator cabins are usually made from metallic sheet panels, however Altair and ThyssenKrupp Elevator wanted to explore the lightweight potential of sandwich panel structures where aluminium or plastic facing sheets are used with a foam core.

Again using OptiStruct, the team was able to perform a sizing optimisation process where the technology would explore the thicknesses of the wall-facing sheets and the foam core. Profile sections and sheet thicknesses were optimised at the same time in order to find the ideal layout

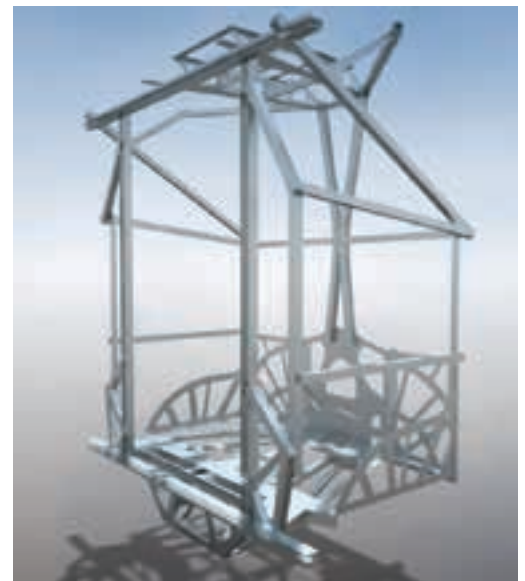


for the different material combinations.

The third stage of the project involved exploring new materials. Altair ProductDesign has considerable experience in working with carbon fibre in the automotive and aerospace markets, where the material is gaining traction as a lighter alternative to metals. The team wanted to explore its potential for the walls of the new cabin and set about developing an optimisation study that would find, not only the ideal thickness of material, but also the ideal fibre-ply shapes and lay-up orientation of each layer. The same process was also applied to the SideGuide concept with the aim of providing detailed results to ThyssenKrupp Elevator to inform its decision on the best system to adopt for further development.

Weight and performance targets

The weight reduction project produced some impressive results. The concept optimisation process on the Backpack structure, in combination with the sizing optimisation of the sandwich panel walls, managed to produce a cabin that was 42% less than the target weight. If the walls were constructed from carbon fibre, it would be possible to go down even further, to 56% below target.

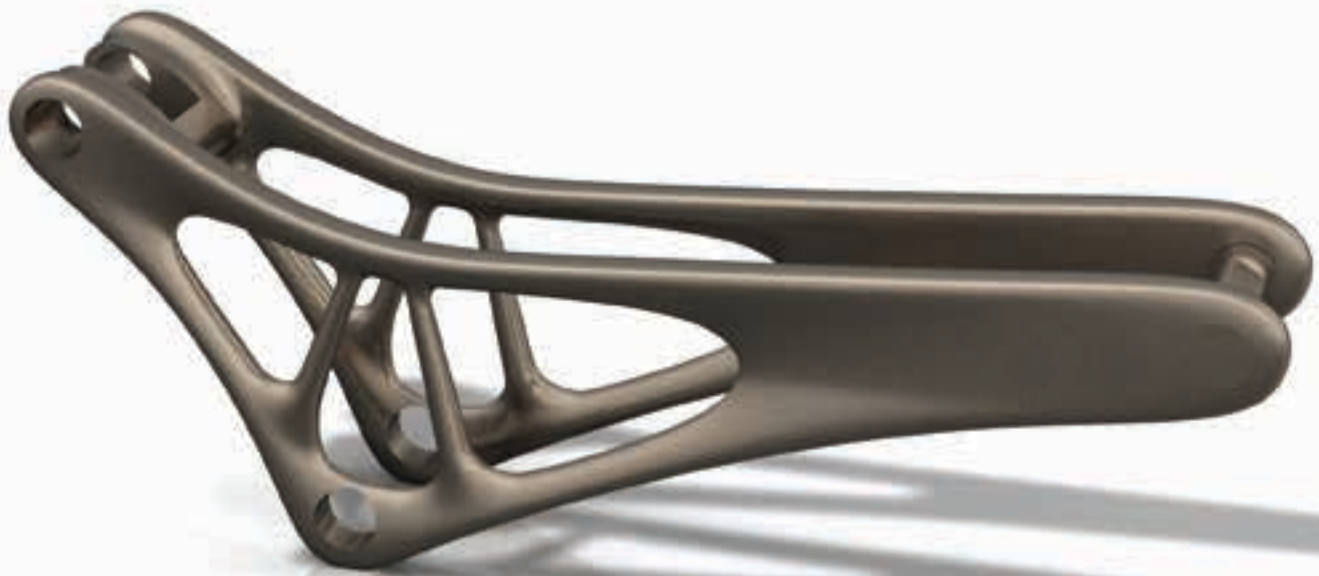


A render of the final Backpack design.

The SideGuide concept also saw weight savings, 16% lighter than target using traditional materials with the potential to go to 33% under target by using carbon fibre.

The weight savings gave ThyssenKrupp Elevator additional confidence in the electro-magnetic concept as a practical alternative to the cable system. Motivated by the positive results from this project, ThyssenKrupp Elevator is continuing to develop the Backpack concept. □

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Winners of the 2015 antenna design competition

Ting-Yen Shih, a PhD student from the University of Wisconsin-Madison, was announced the 2015 winner of the FEKO Student Competition. The contest, now in its 11th year, supports engineering education and academic excellence and is aimed at students interested in antennas, microwave devices, bio-electromagnetics, electromagnetic compatibility, and other electromagnetic related fields. FEKO is a software tool for optimising antenna design and placement using characteristic mode analysis (CMA).

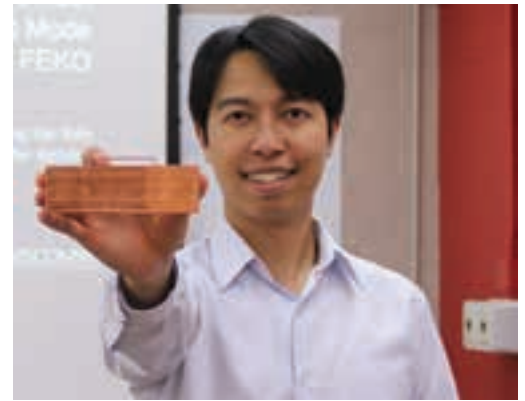
Shih's winning entry, entitled '*Design of Platform-Mounted HF Antennas with Enhanced Bandwidth Using the Characteristic Mode Configuration in FEKO*', successfully developed a method using the characteristic mode configuration in FEKO to systematically and efficiently approach the bandwidth limitation of a platform mode. This resulted in Shih achieving the bandwidths that stand-alone antennas were not able to achieve.

"Many antennas working at the high frequency (HF) band tend to have significantly smaller dimensions than the

wavelength at which they operate, and, therefore, suffer from narrow bandwidths. Since HF antennas are often mounted on metallic platforms that are physically larger than the antennas themselves, if the platform can be used as part of the antenna, the maximum linear dimension of the antenna can be increased, resulting in an enhanced bandwidth. Our goal was to design platform-mounted HF antennas with enhanced bandwidth using the characteristic mode configuration in FEKO," explained Shih.

"We were so impressed with the quality of entries that we decided to give out three honourable mentions in addition to the winning project," said Matthias Goelke, senior director – business development academic markets. These were: Mahrukh Khan, PhD student from the University of Missouri, USA, Marno van Rooyen, a Masters student from the University of Pretoria, South Africa and Stanley Kuja, a Master student from Stellenbosch University, also in South Africa.

Details on the 2016 FEKO Student Competition will be announced in March 2016. □



Ting-Yen Shih (top), a PhD student from the University of Wisconsin-Madison, was announced the 2015 winner of the FEKO Student Competition. South Africans, Stanley Kuja, photographed above right with his University of Pretoria advisor Gideon Wiid (Centre), and Marno van Rooyen (right) from Stellenbosch University were awarded honourable mentions.

Big data analytics for improved energy efficiency

By Syed Mansoor Ahmad, EcoEnergy, Wipro

Sophisticated sensor technology has given rise to the Internet of Things (IoT) and Machine-to-Machine (M2M) communication, embedding intelligence, integrating more data sources than ever and providing the potential for informed decision-making based on comprehensive insight.

However, as a greater proportion of our world is driven by electricity, and populations continue to increase, we are seeing a year-on-year increase in the demand for energy. Harnessing the power of big data analytics, organisations can become empowered not only to reduce energy consumption, but to leverage wider supply-side optimisation, including demand management, energy procurement, and tariff-based savings. This not only helps to improve energy efficiency, it also reduces energy costs, and helps organisations to meet carbon emission reduction targets.

Another challenge facing organisations

around the world is to achieve sustainability targets. Many enterprises are tasked with achieving this in a massively distributed infrastructure environment, which may include large office buildings, warehouses, and even water treatment plants. Achieving energy efficiency in such scenarios is exceptionally challenging.

The IoT, M2M communication and the availability of big data and analytics can help to generate greater awareness of operations, and the analysis of this data can assist in delivering actionable insight for improvement and optimisation.

Energy management also ensures that assets are run as and when they are needed, reducing the running time of equipment, which results in reduced wear and tear, ultimately extending the lifespan of assets. In addition, by running assets at the optimum set points, organisations can optimise the performance of various assets.

Energy management requirements are

often unique to a customer. Practices, therefore, must be tailored to each individual organisation. In order to achieve this, it is essential to have sufficient data available to aid in the decision-making process around how operations, services, locations and energy consumption can be optimised.

Not only will the availability and analysis of big data around energy usage assist organisations to optimise their consumption, it can also provide significant insight to utility providers. Utilities can use the data to drive programmes and incentives that encourage users to adopt more energy efficient devices, which in turn will reduce overall demand. By reducing the overall demand, the utilities will be better able to provide adequate supply. This will help bridge the growing demand-supply gap.

The effectiveness of this approach is well proven. There are credible industry case studies in which Wipro clients have saved up to 20% on energy costs, maintenance and operational expenses across their portfolios, simply by leveraging big data and analytics. □

Gas pipeline operators rely on Voith coupling

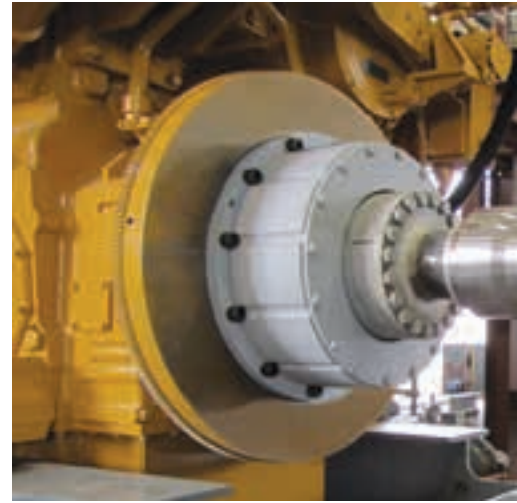
Voith Turbo's Derain Pillay, vice president of power, oil & gas, talks about some of the company's coupling solutions for dual drive gas compression equipment used in the oil and gas industry.

Paving the way for an even more economical operation of installed systems is one of Voith's main goals in the oil and gas industry, according to Pillay of Voith. The company demonstrated this once again when it equipped in excess of 35 compressor systems throughout the USA. Here, highly flexible K couplings and HyGrip connection couplings ensure that the process gas equipment that generates gas pipeline pressure for transportation or underground storage continues to remain operational throughout the year, in spite of varying power availability.

"Gas compression equipment maintains pipeline pressure in the most cost-effective way possible, ensuring maximum revenue returns," Pillay explains. Dual-drive gas compression sets have proven themselves in the market to be a cost-effective means of ensuring this, even when power conditions onsite are not favourable to maintain process operations.

While single-drive systems customary in the USA use either a diesel engine or an electric motor drive, dual-drive compressors combine both alternatives. This allows the package to run on more cost-efficient electricity by default. However, should the motor become unavailable, or the grid demand rises and thus increases the price of electricity, the prime mover can be switched over to the diesel engine on the fly due to the incorporation of a SSS clutch between the engine and electric motor.

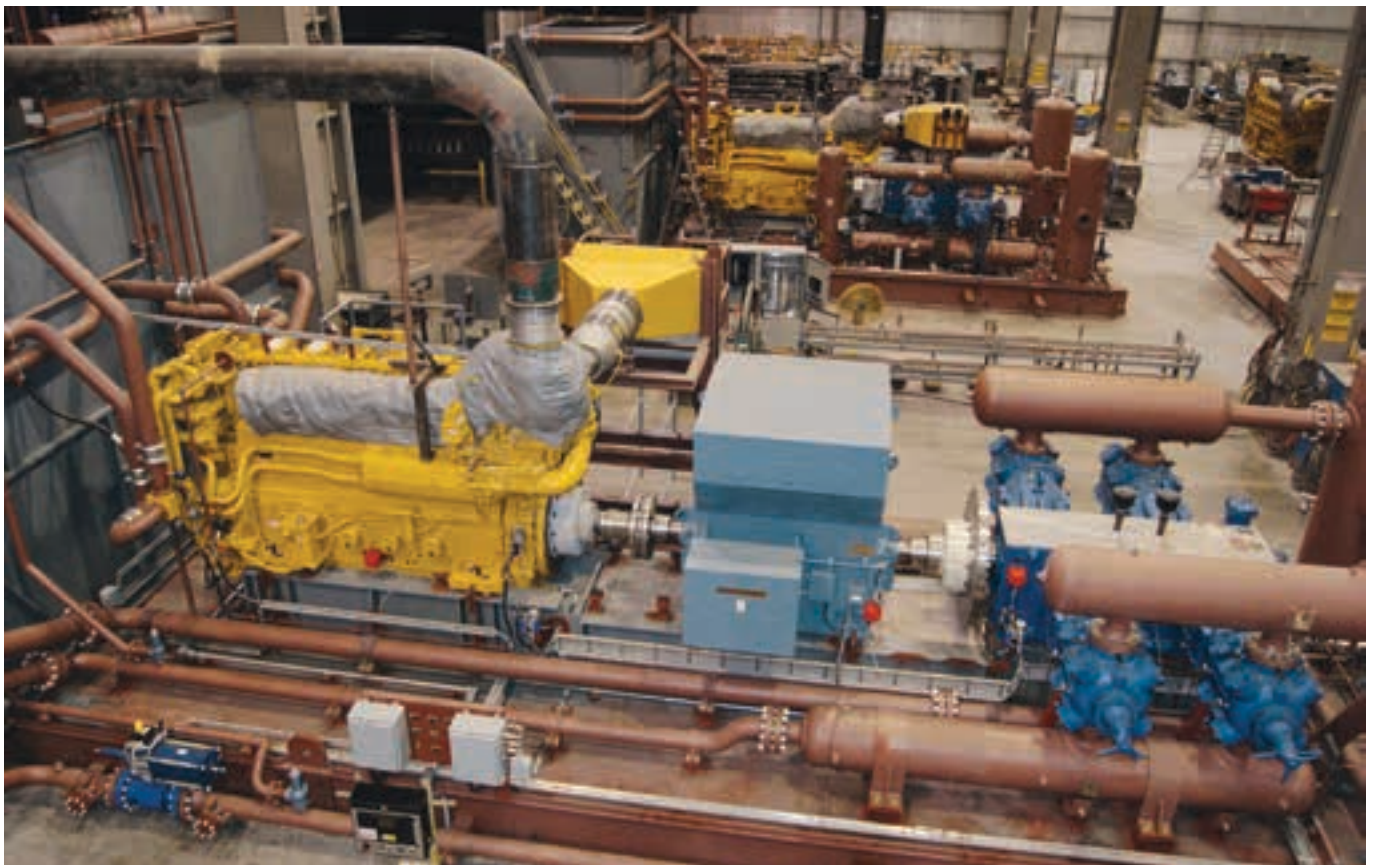
A dual-drive package from the Standard Equipment Company (SEC) in Houston, Texas makes this technically feasible. In this package, a highly flexible type K Voith coupling is installed between the diesel engine and the electric motor, thus protecting the driveline from the damaging torsional vibrations emanating from the reciprocating motion of the engine when in operation. Another Voith coupling is installed between the



A Voith K coupling in the driveline of a gas compressing system.

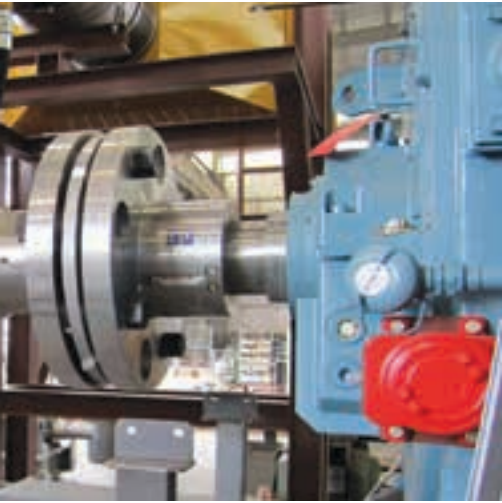
electric motor and the compressor. This isolates the electrical motor from the damaging torsional vibrations emitted by the reciprocating compressor when being driven by the electrical motor. The HyGrip connection couplings are installed on either side of the electrical motor to aid removal and refit.

SEC has ordered in excess of 35 packages to date from Voith for its BR 210 and



A gas compression system equipped with a flexible Voith K coupling and a HyGrip connection coupling from Voith.

technologies



BR 260 series K couplings with a rated torque of 82 kNm (size 90), as well as another ten K couplings of the same series with a rated torque of 28 kNm (size 75) for the compressor sets. The most important advantage of these highly flexible couplings for the operating company is that they dampen critical torsional vibrations and shift resonance frequencies to below the idle speed. This extends the lifespan of all the connected drive components.

On new sites in the US, it can take up to 18 months to receive approval for the installation of three-phase power. Another major advantage in that particular situation is that the dual-drive package allows the site to operate solely on the diesel engine during this period. After three-phase power is linked, the package can simply be switched over to the more cost-effective electric motor-driven prime mover.

"Machine uptime is critical in the gas compression market," Pillay notes. When driving packages with either engines or electric motors, the whole package becomes inoperative as soon as the prime mover has to be overhauled or repaired. With a dual-drive package from SEC, this issue becomes a thing of the past, because there is always an alternate prime mover that can be switched in.

If it is the engine that is out of service, the engine is simply disconnected from the driveline to allow work to proceed. If the electric motor requires servicing, the installed HyGrip couplings can simply be removed from the motor shaft and reinstalled onto a dummy motor shaft. The dummy is temporarily installed in the driveline and replicates the mass inertia of the motor once it is removed. "The



A highly flexible Voith K coupling is ideal for damping torsional vibration peaks.

whole process takes only a few hours of downtime, ensuring the package has the maximum uptime for gas compression," Pillay concludes.

Voith Turbo, a Group Division of Voith GmbH, is a specialist in intelligent drive solutions and systems and customers from highly diverse industries such as oil and gas, energy, mining and metal processing, mechanical engineering, ship technology, rail and commercial vehicles rely on the company's advanced technologies. □

Latest innovations in servo valves

The new DECV servo valve (direct electronic copy valve) from Voith Turbo represents the latest development of this product, which has already proven itself in countless hydraulic control systems. "It combines excellent operating characteristics and robustness with innovative valves and associated electronic control," says Voith's Derain Pillay.

Impulse response and accuracy means that the Voith Turbo DECV is responsive to demanding drive tasks. A step response of only seven milliseconds places the DECV firmly in the class of highly dynamic valves. A hysteresis of less than one percent is achieved thanks to direct actuation.

Pillay explains that the development of the Voith Turbo DECV is focused on applications with high mechanical loads. "The DECV's extraordinary parameters are also confirmed outside laboratory conditions in its daily work environment. For example, this servo valve has already proven itself in punching/nibbling machines that clock up a g-force in the hundreds, that is, acceleration of greater than 2 000 m/s²," he says.

The Voith Turbo DECV is unaffected by oil impurities, and can be used with

oil of cleanliness class 19/17/14 as per ISO 4406. This oil-quality level can be achieved by means of a common bypass filter system. Comparable servo valves often require higher purity levels, which means using expensive pressure filters. The Voith Turbo DECV, on the other hand, plays a major role in helping to reduce operating costs.

The programmable control electronics of the Voith Turbo DECV offers all common interfaces, which simplifies integration into existing systems. The HS4-SV2 controller used contains a configurable PLC/CNC, in addition to the control amplifier. Frequently-occurring user cycles are already integrated, and can be customised easily via field buses for specific requirements.

Diagnostic data can be retrieved via Ethernet from anywhere in the world using the PunchMaster software tool accompanying the HS4 controller. This ensures the identification of faulty cycles and quality assurance during production. An integrated sensor measures the



The directly controlled Voith Turbo DECV servo valve.

pressure directly at the process connection, ensuring extremely accurate and dynamic process monitoring and control. This avoids downtime, which in turn limits the need for costly repairs and service calls. □

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Majuba compressors and service agreements

Ingersoll Rand compressors have now been used at Eskom's Majuba power plant for over seven years. The company's dedicated Eskom service sales engineer and key accounts manager, Neo Kuhn, talks about the service agreements and contractual obligations that have made this possible.

Through its largest contract to date in terms of the number of compressors supplied and serviced – and the years under service – Ingersoll Rand is playing a pivotal role in ensuring that Eskom's Majuba plant in Mpumalanga has sufficient compressed air for continuous operation. Majuba is the power utility's second largest plant with an installed capacity of 4 110 MW. The plant is supported by 21 Ingersoll Rand Centac® centrifugal compressors installed onsite.

These compressors, which vary from 16 m³/min capacity to 125 m³/min, are used to service Majuba's compressed air requirements, primarily process and dust conveying air. To ensure optimum running of the centrifugal compressors, Ingersoll Rand has employed a dedicated Eskom service sales engineer (SSE). Now a dedicated team of six Ingersoll Rand staff members – a senior technician, who also performs the role of onsite supervisor; an instrumentation technician; a dryer technician; and three assistants – are seconded to the utility's site on a full time basis. The team is responsible for all maintenance, service and repairs and performs all operations pertaining thereto.

In addition to the Ingersoll Rand

Centac compressors, the company inherited an additional 84 non-Ingersoll Rand products onsite, including 63 dryers, and also takes responsibility for the continuous optimum operation of these products.

To facilitate smooth running of the service agreement, the contractual obligations are split into two measurable service agreements – a maintenance contract and a spare parts contract, which run in conjunction with one another for five-year periods. The current service agreement is the second five-year contract and it is currently into its second year.

The original product commissioning took place as far back as September 1995, while the two service agreements came into place only seven years ago when Eskom realised the need for dedicated onsite professionals to ensure uptime continuity. "Although the average compressor lifetime is approximately five years," says Neo Kuhn, service sales engineer and key accounts manager, Ingersoll Rand, "with correct upkeep and proper service intervals, it is possible to increase compressor longevity."

Ingersoll Rand removes and overhauls each compressor every three years for smaller compressors and every five years



Ingersoll Rand's CVO, 16 m³/min compressor (the smallest), used extensively at the Majuba power station.

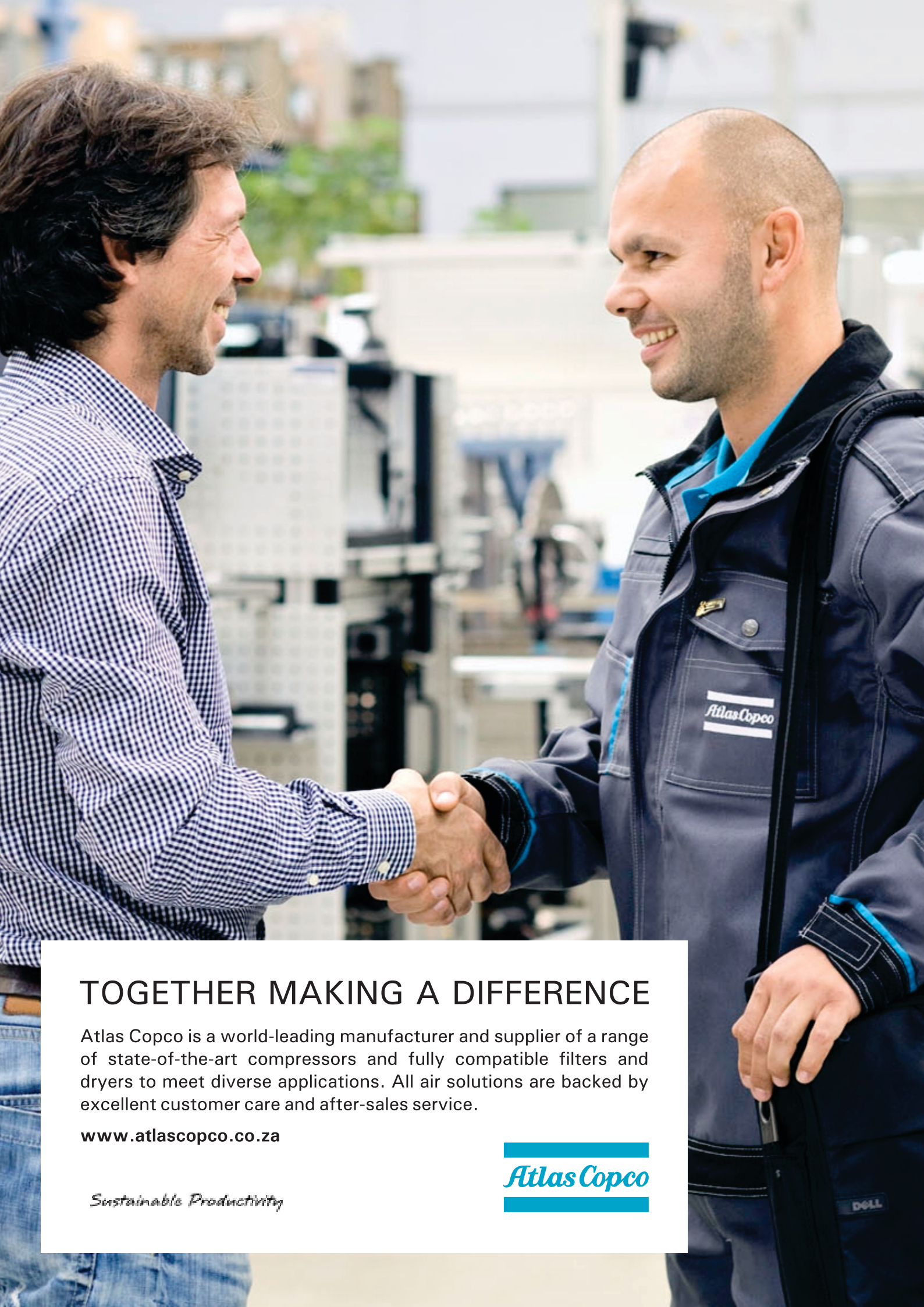
for the larger. "Although, due to the way we maintain our compressors, we have a number of smaller units that achieve five years or more before an overhaul, and larger units that have now reached the seven-year milestone," Kuhn points out.

He believes that these particular Centac compressors provide Eskom with several advantages that others don't, such as the ability to provide constant flow, quick demand compression and the high energy efficiency for the required volumes of compressed air produced.

"Ingersoll Rand South Africa is certainly putting its money where its mouth is and living up to one of the statements made by its American parent company: 'We stand behind our air compressors and beside our customers during planning, installation and maintenance'," Kuhn concludes. □



The C125MX3, 125 m³/min centrifugal compressors (the largest) are regularly maintained and serviced, along with 19 other Ingersoll Rand Centac® centrifugal compressors and 84 non-Ingersoll Rand products. Ingersoll Rand's six-man team is onsite 24/7.



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Sustainable Productivity

Atlas Copco

VSD compressor technology for forward-thinking industries

Charl Ackerman, Atlas Copco Compressor Technique's industrial air business line manager argues for the use of VSD technology to improve energy efficiency and productivity of compressed air systems.

Compressed air is one of the most important utilities in industry but it is also one of the largest consumers of energy. According to Ackerman, energy consumption typically represents over 70% of a compressor's lifecycle cost. "In addition to South Africa's protracted energy crisis, which is debilitating mining and industry through interrupted production, escalating energy costs are inevitable. Alternative energy sources like solar and wind power are very expensive and not always practical."

Forward-thinking industries that are already committed to finding effective and sustainable ways to conserve energy will reap cost saving benefits over the short and medium terms, which will increase exponentially over the long term.

Ackerman says: "Through analysing, optimising and monitoring a compressed air network, we are able to minimise losses and maximise operational efficiency for the end-user."

He argues that, while there are a number of areas in a compressed air installation where wastage can occur, optimum air flow is one area in particular that can deliver significant energy savings. "This is where our VSD technology comes into its own. With energy savings of up to 35%, a GA VSD compressor is an investment in sustainable plant operation."

Pioneered by Atlas Copco in 1994, the VSD compressor perfectly matches air supply to air demand in processes where air demand profiles fluctuate. By varying the drive speed of the electric motor, the compressor follows fluctuations in production demand. As air demand declines or is reduced, the GA VSD lowers the delivered flow and consequently the power consumption.

Motor speed regulation is the most efficient compressor control method where air demand varies because the inefficient transition period between full and no load is eliminated, which avoids excessive off-load power consumption. Maintaining the net pressure band within

0.10 bar (15 psi) greatly reduces the overall average working pressure and energy costs. In addition to end-user benefits, VSD technology also conserves natural resources. The extensive Atlas Copco's oil-injected rotary screw GA VSD compressor range – available from 5.5 kW up to 160 kW – ensures there is a unit perfectly suited to meet any compressed air requirement.

Other elements fundamental to maximising a compressor network's efficiency, such as eliminating leakages in the air delivery system and optimising oil injection, temperature and air quality, highlight the importance of regular expert service and maintenance. Atlas Copco Compressor Technique's service



With energy savings of up to 35%, a GA VSD compressor delivers significant savings and sustainable productivity, making it is an ideal investment for sustainable plant operation.

division is dedicated to the delivery of total customer care at all levels of service interaction, from remote monitoring and optimisation to standardised genuine OE parts and tailor-made service plans. "We establish long-term relationships and develop complete air technology solutions that deliver the benefits of lowest total equipment and operational costs to our customers," Ackerman concludes. □

SA's No. 1 Chicago Pneumatic construction dealer

Chicago Pneumatic Construction Equipment has appointed BO's Hire & Sales as its construction dealer for South Africa.

Jacques van der Westhuizen, Chicago Pneumatic Construction Equipment South Africa's business development manager, explains that the company's route to South and southern African markets is exclusively through dealer networks. "BO's success in growing market share is a true testament to their commitment to the brand. In only six months, BO's has become our overall number one Chicago Pneumatic Construction Equipment dealer, with record sales in the new light compaction range. This unprecedented growth over the past 12 months becomes even more impressive when considered in the context of a virtually stagnant economic climate."

BO's is a leading equipment solutions provider headquartered in Durban and supported by twelve outlets strategically located throughout South Africa. The Level 4 B-BBBEE certified company is perfectly positioned to offer one of the largest and most diverse hire equipment ranges, from small to

large plant, throughout southern Africa, ably supported by excellent service delivery.

BO's MD, Craig Cook is extremely upbeat about the recent dealership appointment. "The partnership makes perfect mutual business sense as we share a number of synergies with Chicago Pneumatic Construction Equipment in terms of equipment, customers and market sectors. Furthermore, the highly reputable Chicago Pneumatic brand augments our quality equipment solutions, enabling BO's to broaden our product profile to existing and potential customers," he says. □



Chicago Pneumatic Construction Equipment has appointed BO's Hire & Sales as its construction dealer in South Africa.

Towards a sustainable stainless steel industry in SA

MechTech talks to sassda executive director, John Tarboton (right), about the current state of the stainless steel industry in South Africa and the association's outlook.



The Southern Africa Stainless Steel Development Association (sassda), one of the most active stainless steel industry associations in the world, provides a platform for members to collectively promote the sustainable growth and development of the industry. "We exist to promote the local manufacture of finished products in stainless steel, to grow the conversion of primary product in South Africa and to grow market awareness and demand for finished stainless steel products," begins Tarboton.

The industry has experienced "pain" in recent years, "but during 2014, we managed to breach pre-financial crisis (2008) peak consumption in stainless steel and for 2015, while we have been sliding due to the prevailing commodity prices, consumption remains relatively stable," he reports.

The recovery in South Africa, however, is more sluggish than that of the world. "Prior to 2008, we were achieving long-term growth of 6.5 %, higher than the world average of 5.7 %. If we were following the current world recovery, we should be converting about 70 000 t more stainless steel in South Africa than we achieved during 2015, and the

question is, if we could do it before the financial crisis why can't we do it now?" Tarboton asks.

Dominating the world stainless production and conversion market is the emergence of China as a world producer and exporter of stainless steel products. Current data reveals that substantial growth since 2001 has led to China producing, in 2014, over 50% (21.7-million tons) of the stainless steel consumed in the world.

"Sassda has never pursued anti-dumping duties on primary products, because we feel this could affect our converting members. What we did do was to commission a study on the industry in China by George Gerringer, formerly of Price Waterhouse Coopers," says Tarboton.

Gerringer found that the stainless steel industry is well favoured and supported by the Chinese. "What they are basically trying to do is to make their stainless steel as cheap as possible so that Chinese converters can manufacture finished products cheaper than anyone else in the world," Tarboton explains. "It's all about adding value. The Chinese steel mills are given free land, pay no rates and taxes and are given interest free loans that

get written off and reissued every five years. In addition, their electricity costs are subsidised by up to 80% and both primary producers and converters benefit from export subsidies.

"This is the approach to stainless steel and aluminium production and conversion across China, an approach that makes it very difficult for South African companies to compete on price alone," he adds.

On the primary side of the South African market, Columbus Stainless remains the dominant producer with 80 to 90% of the flat-product market. "In principle, we see imports as healthy for the industry. Plate wider than Columbus' 1.5 m, for example, must be imported and using a 2.0 wide plate for a big tank can reduce the amount of welding, reducing fabrication costs and improving quality," Tarboton explains.

Seven features of successful organisations

Sassda's transformation began when Tarboton attended an association summit and enrolled for an association leadership course that was based on the book *'What Remarkable Associations Do That Others Don't'*. This book was the result of research by The American Society of Association Executives (ASAE) which had completed a survey of over 500 associations. "What they had done in the USA was interesting: four years of research looking at nine matched pairs of associations – one remarkable and the other good, but not great – to determine the differences," he explains.

Seven areas of difference associated with remarkable associations were identified:

- 1 Treating members as customers and avoiding complacency and arrogance that can become entrenched in long-standing institutions.
- 2 The alignment of products and services with the association's mission. "Associations often derive services



South African growth in stainless steel (t). "If we were following the current world recovery, we should be converting about 70 000 t more stainless steel in South Africa than we actually achieved during 2015, and the question is, if we could do it before the financial crisis why can't we do it now?" Tarboton asks.

they think customers want instead of finding out what members actually need. In sassda's case, we need to involve all of our members in how to grow the market."

- 3 Data-driven strategies: "The gathering of information, analysing data and giving proper feedback to members allows remarkable organisations to be adaptable and to quickly realign their strategies to changing circumstances."
- 4 Dialogue and engagement: "We are now routinely going out to our members to talk about opportunities and successes. The research found that 90% of emails are deleted before they are read. Face to face contact with members is essential to stay properly informed about the state of the industry."
- 5 The leader as a broker of ideas: "The management style of an association is inherently different from that of a business. Association leaders need to be less dictatorial and more creative and innovative. Their role is to generate enthusiasm for industry's mission, to break down silos and to create a family atmosphere."
- 6 Organisational adaptability: Great organisations were found to be able to reposition to adapt to the changing environment.
- 7 Alliance building: "Instead of concentrating exclusively on our own markets and challenges, we are now looking to see how we can work with the likes of the of Manufacturing Circle, dti, AFSA, the Corrosion Institute; SAIW, SAISC and the export councils so that, collectively, we can find innovative ways to advance all of our industries," Tarboton tells *MechTech*.

Springing from this new approach, sassda is currently focused on promoting stainless steel in architecture and in the mining industry. "For architects, we go and give presentations about the use and advantages of stainless steel use in buildings. We also present to all fourth year architecture students and we sponsor prizes for the best use of stainless steel in an architectural project," he says, adding, "all over the world, we see architecture as the biggest area of stainless steel growth."

In addition, presentations have been developed for the mining project houses. "Mine and process design engineers have mining, chemical, mechanical and electrical competences, but they don't

really know much about the stainless steel range of materials. Some seem to think that stainless steel can't be welded, for example, which is completely untrue.

"So, based on what the engineers have requested, we have initiated a programme of afternoon engagements with project houses to introduce the different grades of the material and their advantages. We focus on the austenitic, ferritic and duplex grades of stainless steel, the differences between them in terms of corrosion and mechanical properties, and their potential uses."

Also under development are follow-on seminars on corrosion and lifecycle costing of stainless steel as compared to its alternatives.

"This is a big challenge area for us, to shift a mine specifier's mindset to consider using stainless steel for tanks, mining equipment and structures. By using longer lasting stainless steels instead of carbon steels, which has to be separately protected to extend its life, the replacement, operating and maintenance costs can be substantially reduced in the long term.

"It's not only about longevity. The initial costs plus the protection, maintenance and equipment downtime costs also need to be factored in. If a carbon steel tanks needs to be taken offline for three days for relining, for example, that is a real cost that can be avoided if a stainless steel tank is used instead," Tarboton points out.

Promoting exports

While projects across Africa are on hold right now, "this will not last forever". "At some point the commodity cycle will turn around and prices and sales will improve," Tarboton assures.

By analysing imports and exports of finished products through the international Harmonised System codes (HSCs) and applying typical factors to determine the amount of stainless steel associated with these products, sassda is looking for export 'hot-spots' of potential opportunities for its members. "We have 1 600 products that members make and we have fitted all of these to the HSCs to enable us to track growth areas."

In collaboration with the dti, stainless steel is being represented in South African pavilions at export showcases across Africa. "This is a cost effective way for our members to get exposure in African and overseas markets. We



Tiger Brands' new Crosse & Blackwell mayonnaise plant in Belville, Cape Town, was installed by Stainless Steel specialist, Gerhard Unger Process Technology.

are going to Chile this year, looking for opportunities to export into the copper mines, for example," he notes.

Future opportunities? "Should the nuclear new-build come to fruition, we are looking to establish a nuclear cluster to localise ancillary plant equipment and components such as walkways, pipe and cable racks, piping and valves. We need to work with the dti and help develop black-owned companies and get together as consortiums to manufacture high percentages of the balance-of-plant equipment," Tarboton suggests.

As well as architectural uses for facias on public building such as hotels and supermarkets, the steel construction industry is expected to increasingly adopt stainless steel going forward "The US is now specifying 100-year life for its new buildings, and stainless steel rebar is going to be required to achieve this. The US is looking at duplex grades for this, but the Japanese prefer the 12% chromium ferritic grade (410) and we have done extensive research in South Africa on 3CR12, which is ideal for this application," he says.

South African strengths include tank containers, in which the likes of Welfit Oddy already excel; and the catalytic convertor industry, which is hoping for growth based in the new APDP programme. Automotive applications account for 28% of local consumption. Future potential is offered by food and agro-processing applications, hydrogen fuel cells and the increased use of stainless steel for roofing.

"Our fabricators are successful because they offer something extra: high quality, customised solutions or specific technology that is locally developed and owned. They also have close relationships with their markets, such as those in the mining industry. We are not only selling on price, and we will continue to be successful if we adopt these attitudes," Tarboton concludes. □

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Thermoplastic oil tank for dry sumps

The world's first thermoplastic oil tank for dry sump engines has been developed by Hummel-Formen, a brand by ElringKlinger AG at Lenningen, Germany. The reservoir, which weighs around 2.6 kg, is made from Ultramid® A3WG7, a BASF polyamide 66 with 35% glass fibre reinforcement, which is resistant to oil and thermal aging.

The tank is 59% lighter than previous steel or aluminium welded constructions and has an improved, multi-functional oil separation system integrated into the tank. The complex component is used in the new Mercedes-AMG GT, which has been available since spring 2015.

The oil reservoir is noted for its ingenious geometry. It comprises ten different, injection-moulded polyamide parts, which are joined together with 13 further elements such as sensors, sieves, covers and screws to form a single component – manufactured using vibration welding and various snap-in mechanisms.

By optimally using the space available, a lot of different functions could be integrated. The component deals with the ventilation of the crankcase – including oil separation – makes possible the filling and changing of the oil as well as controlling the oil level and its quality. It also slows down and roughly filters the incoming oil.

“With the new oil tank made from BASF plastic, we are not simply re-modelling previous aluminium welding designs,” says Thomas Wolf, head of technical sales at Hummel-Formen. “We have optimised the structure of the component in such a way that it is now lighter, quieter and more compact. The refined internal structure, with various elements and functions for integrated oil separation, would not have been possible if metal had been used,” he adds.

The development work, from the 3D model through to the first functional samples made with silicone moulds, took 12 weeks, while the production of the first parts made with serial moulds took about a year.

The success of this engineering effort provides, among other things, better driving dynamics for the Mercedes-AMG GT: the vehicle has a lower centre of gravity, therefore sits better on the road and reaches higher speeds around bends.

In contrast to pressure lubrication, which is normally used in car engines and works with an oil pan, dry sump lubrication originates from motor racing: where the oil pan is replaced by a separate tank with a tall and narrow design. The oil tank is configured so that the pressure oil pump is always able to reliably suck in the oil even in extreme driving situations, such as driving around bends at high speed or heavy braking. □



A dry sump tank with improved integrated oil separation has been developed and manufactured by Hummel-Formen for the new Mercedes-AMG GT.

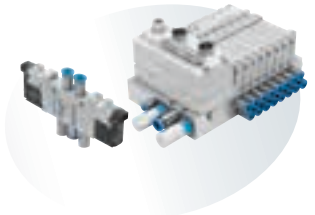
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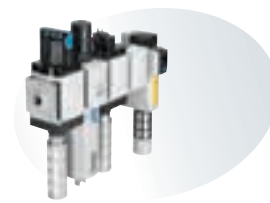
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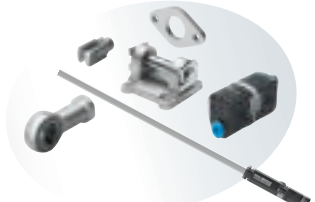
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Materials engineering in practice: the product-centred approach

In this month's column from Wits' School of Chemical and Metallurgical Engineering *Tony Paterson* discusses the advantages of moving from a sequential approach to fabrication to a product-centred approach, based on reciprocal interdependence between the parties involved at every stage, from design, though material processing and manufacture.

The Chrysler plant in Kokomo, Indiana produces gearboxes. This includes design, casting, machining and assembly. Chrysler's philosophy of placing its best and brightest on the factory floor is probably not unique and similar practices support Japanese manufacture, but in South Africa, the factory floor is not as highly regarded.

The rationale is that, as monies are made or lost on the factory floor based on the performance of the end product in the market, looking for nascent problems before they emerge and for opportunities for improvement make commercial sense. The administrative offices in these facilities are sparsely occupied, with all the necessary performance communication reduced to dashboards.

Locally we seem to prefer a top-down approach, with substantial administra-

tive offices and/or contract-based relationships. This represents a sequential interdependence between discrete work centres, where coordination is achieved through planning and control, often through rigid procedures. This, illustrated in Figure 1, results in contractual relationships with independent work centres linked via contracts. It works reasonably well in an industrial production environment.

Sequential interdependence, however, rarely results in effective communication. This is required for effective performance in project engineering passing through workshops and jobbing shops where products vary. Figure 2 shows an alternative product-centred approach. The end product is the focus of success for all technical decisions. The corresponding communication structure is shown interacting with the product and with

all other work centres. The key issue is the need to achieve mutual cooperation and adjustment between all the centres of expertise.

Why do we not follow this route? Whilst engineering is taught as a science, it is in fact an applied science. The simplified models taught may be simple or complex to analyse but usually fall into the known-known box of Figure 3. These models form a valuable reference base from which to work. However, applied science represents the art of engineering. The key skills required are judgement and compromise. Judgement considers both theory and applied knowledge, while compromise is necessary where required outcomes clash. Judgement is almost always required when unforeseen operational circumstances arise.

In the context of materials, for example, operational circumstances define the load and load effects to which a structure will be exposed during its working life. In essence, anything that results in a stress in the material may be regarded as the material response to a load. However, in practice it would appear that, particularly with the advent of systems, computer assists and specifications, the applied science that is engineering is being regarded as a pure science. For instance the Chemical Manufacturers' Association defines mechanical integrity as "the establishment and implementa-



Figure 1: Sequential interdependence between independent work centres. Coordination is achieved through planning and control via contracts.

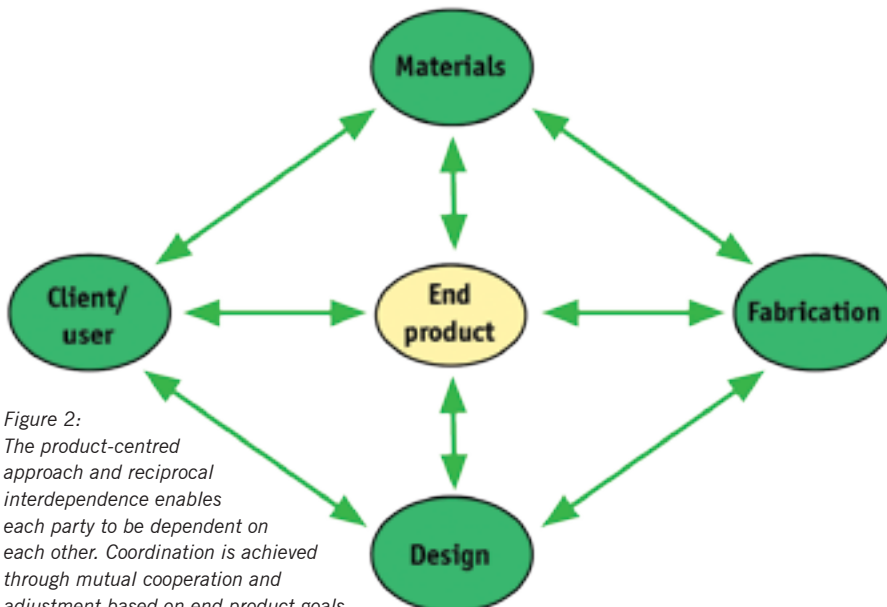


Figure 2: The product-centred approach and reciprocal interdependence enables each party to be dependent on each other. Coordination is achieved through mutual cooperation and adjustment based on end product goals.

tion of written procedures to maintain the on-going integrity of the process equipment." [www.twi-global.com/technical-knowledge]. This supports the sequential interdependence concept shown in Figure 1.

Whilst system thinking, computer models and appropriate input or output specifications are valuable tools which should be embraced, they do not replace the need for expert input, this coming from a range of disciplines as we seek to develop lighter structures. Metaphorically tossing a problem over a contractual wall may only serve to shift blame rather than to gain from the opportunities of collaboration using expertise from various sources. What makes engineering continually interesting is that it is an applied

science, which demands that matters are always re-assessed in terms of new understanding.

Take a commonly used material as an example, structural steel. In years gone by it was easily weldable and highly user friendly. The chemistry was relatively simple as was the manufacturing process.

But the development of higher performing steels and more predictable manufacturing processes over the past two decades has led to far lighter structures. These steels often have a more complex chemistry and require manufacturing processes involving heat soaking and controlled cooling.

As a result of the lighter structures that are possible, problems that were previously masked by scale, notably deflection and distortion, have started to emerge. With thinner sections, manufacturing and fabrication tolerances can play a significant role. Welds are far more highly stressed and tighter welding process control is required. The higher performing weldable steels may require pre-weld heat treatment and complicated post-weld heat treatment,

	<i>Optimal decision capability</i> ↘	Objective: to maximise achievable self-benefit.	
		Known	Unknown
The effect of a possible decision choice.	Known	Calculation	Mutual adjustment
	Unknown	Judgement	Intuition

Figure 3: The effect of uncertainty on optimal decision-making capability.

including quenching. Unfortunately the user friendliness of more modern steels has declined significantly. Practically, some are unaware of the new possibilities and challenges offered and imposed by modern steels.

How can the product-centred approach be modified to match the current reality? One method is to adopt a target cost approach, which does not change the normal tender procedure but recognises that all the expertise required for an effective solution does not necessarily lie with the client or designer. The essence of a target cost contract is that it allows for all parties to offer alternative solutions that meet the operational circumstances defined on the basis that cost savings that accrue are shared.

The target cost approach – with reciprocal interdependence – was used for the 2012 UK Olympic games to provide

a mechanism through which negotiations could quickly move to win-win scenarios as participants concentrate on the individual value potential available through the project.

Providing an opportunity for more effective communication, sequential interdependence driven by processes is better replaced by a reciprocal interdependence structure, which recognises that each party is dependent on the others and where coordination is achieved through cooperation and adjustment.

Administration in South Africa has grown towards control at the expense of facilitation. Whilst this strives towards controlling the performance of less able staff using procedures and reports, the question arises as to whether performance is actually enhanced and whether the reciprocal interdependence between parties is sufficiently embraced. □



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Hybrid automation and efficient pneumatics and hydraulics

In this article, Kevin Lombard (right), general manager of Tectra Automation, a Hytec Group company, talks about the integration and hybridisation of pneumatic, hydraulic, and electric motion systems, driven by IT connectivity and Industry 4.0 technology innovations.



In the current technological environment where there are increasing demands on higher energy efficiency and, in apparent contrast, lower costs, most manufacturers do not rely only on machinery and automation to decrease cycle times. Instead, they now pursue solutions that are easy to set up, provide a simple operator interface and reduced downtime. Using electric, hydraulic or pneumatic motion systems is a choice that has the potential to affect costs, performance, flexibility, reliability, ease of use and maintenance. It is therefore important that customers get appropriate advice before selecting a solution.

One modern option is to opt for a hybrid automation solution, a technology that has made rapid in-roads in our technologically advanced environment. This is especially relevant in the automation sector, which has already entered the new reality of Industry 4.0 – the fourth industrial revolution. Among other aspects, Industry 4.0 centres on the increasing integration of all areas of industry, which has been made possible by information technology.

In the history of change in the industry, never before has IT brought such potential for increased collaboration, through quickened communication and real-time data exchange. For those with the foresight and expertise to quickly integrate Industry 4.0's offerings, exciting opportunities are on the cards. There are six design principles in Industry 4.0 that support companies in identifying and implementing Industry 4.0 scenarios: interoperability, virtualisation, decentralisation, real-time capability, service orientation and modularity.

Engineering companies that embrace combination electric, hydraulic and pneumatic motion technologies are in a better position to give the most suitable advice. They can help customers achieve the best solution for performance and price. They

should have strong product portfolios in all three disciplines, and significant expertise in integrating electric, hydraulic and pneumatic technologies into an overall solution.

Hydraulics

Hydraulics is the choice for heavy loads when immediate motion is required. Hydraulics allows full velocity to be achieved quickly. Forces are by far the highest of the three technologies – upwards of 100 tons. Hydraulic systems have become smart – they are inherently powerful and combine hydraulic actuators with integrated digital control electronics. This combination allows functions to shift to the software. The hydraulic standard functions are pre-defined in Bosch Rexroth control, drive and power units – all the user needs to do is define the parameters.

The software and intelligent control algorithms, developed specifically for hydraulic requirements, automatically equalise the non-linearities inherent in fluid technology. For example, in the Bosch Rexroth Sytronix series, the software combines the best from both electrical and hydraulic systems. Essentially, operations that used to be performed by valve controls made of steel and iron are now handled by decentralised intelligence in the electronically controlled device.

Bosch Rexroth has integrated all of its electro-hydraulics expertise into the IndraMotion MLC control solution software. This allows for the special characteristics inherent in fluid technology and can, in most instances, replace elaborate programming with parameterisation. This reduces engineering expenditure for machinery manufacturers and, depending on performance requirements, can execute both electrical and hydraulic movements without major changes in the machine control.



Expertise in integrating electric, hydraulic and pneumatic technologies into an overall solution can help customers to optimise solutions for performance, efficiency and price.

Pneumatics

Commonly powered by compressed air or compressed inert gases, pneumatics finds wide application in machining applications by offering fine performance and simple application. Most pneumatic systems operate at pressures of about 6.9 bar (100 psi) or less. Because pneumatic pressures are lower, components can be made of thinner and lighter weight materials. Factory automation is the largest sector for pneumatic technology, which is widely used for manipulating products in manufacturing, processing and packaging operations.

Pneumatics is used when speed and force need to be easily and continuously controllable over a wide range. This technology is also functionally reliable under adverse operating conditions and is insensitive to external influences such as high and low temperatures, dirt, mechanical vibration, moisture, and electrical noise. In addition, pneumatics is fundamentally safe.

Aventics has integrated electronics into its current pneumatic range, such as the ED series electro-pneumatic pressure regulators or AES modular electronics for the AV Advanced Valve generation. This product range provides the functions required for machine networking and the Internet of Things, making Aventics' pneumatic components 'Industry 4.0 ready'.

Aventics AV valves are a valve technology innovation that is pushing the boundaries of electric/pneumatic hybrid products in terms of space and energy efficiency. With their diagonal arrangement of the valve spool, the valve size is reduced by half. This means these valves



can be placed on machines close to the action, which can reduce compressed air consumption by up to 20%.

Electric control

Electric control excels when absolute accuracy of movement is required or when continuous motion is needed. Electric servo control is useful in such diverse applications as CNC spindle controls in machining centres and in lift-and-locate applications for assembly operations.

Electronic servo control offers the highest levels of precision, particularly in closed-loop applications where feedback allows the system to adjust to conditions. For example, Bosch Rexroth offers the System 300 advanced DC tightening system, which allows for multi-stage programming and multiple synchronisation of the spindle motors.

Since hydraulic and pneumatic applications use cylinders, they achieve linear motion simply and easily. Electric control is based on rotating motion and requires a transition, such as a ball screw or linear motor.

As energy efficient technologies should be used more often, and processes improved, electro mechanical actuation should be considered as it can offer many industrial areas a better economic and energy use solution. An experimental analysis conducted by the University of Kassel in Germany incorporating hydraulic, pneumatic and electric actuators, proved that the latter are the most energy efficient across the three disciplines.

In conducting the experiment, a specific duty cycle was chosen and parameters set for real application simulation. All actuators were mounted inline to have the same required duty cycle, the specifications for the choice of cylinders were similar, and the set up ensured that differ-



Aventics AV valves are a valve technology innovation that is pushing the boundaries of electric/pneumatic hybrid products in terms of space and energy efficiency.

ent loads could be chosen. A maximum load of 100 kg was used and standard hydraulic and pneumatic components used, with the electro mechanical actuator being an integrated actuator.

The measured energy consumption was multiplied by the number of operating hours and extrapolated to the real need during one year – with 6 000 hours per year taken as a basis. An air cylinder's energy requirements worked out to 8 980 kWh per year, hydraulic at 3 602 kWh for the same period and the electro mechanical alternative only 816 kWh. CO₂ consumption for the pneumatic system worked out to 5.3 tons a year, with 2.3 tons from the hydraulic system and only 525 kg resulted from the electro mechanical equivalent. Thus, a saving of 90% was achieved compared to the pneumatics-only system and 77% compared to the hydraulic cylinders.

An energy consumption-based comparison shows that hydraulic actuators needs 4.4 times more energy for the same duty cycle and a pneumatic cylinder needs 10 times more energy compared to electro mechanical actuators.

The electronics in Aventics AV valves (mentioned under pneumatics above) in these applications support all standard fieldbus and Ethernet protocols, which realise control and communication tasks. The sensors also feature IO-link interfaces, allowing them to exchange data with the control for diagnostic functions or parameterisation. For example, the Bosch Rexroth EMC electromechanical cylinder has an optional force sensor, which allows decentralised process controls without a higher-level control system.

The EMC-HD is a powerful alternative to pneumatic and hydraulic cylinders and provides benefits in terms of energy efficiency. It provides an advanced control technology advantage, even at



All of Bosch Rexroth's electro-hydraulics expertise is integrated into the IndraMotion MLC control solution software, which can replace elaborate programming with parameterisation.

The EMC-HD electromechanical cylinder is a powerful alternative to pneumatic and hydraulic cylinders that provides energy efficiency benefits.



high forces – force, position and speed can be freely parameterised – and its flexibility means it can be adapted to new tasks via the drive system. It is an electromechanical heavy-duty cylinder that transmits motor movement via ball or planetary screw drives, depending on the dynamics and force requirements.

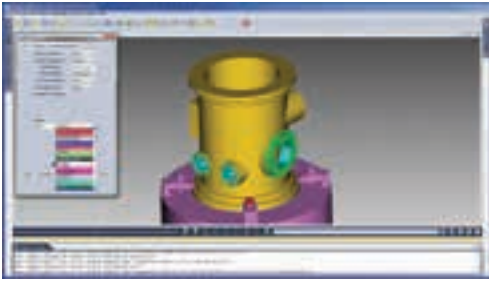
Hybrid solutions

There are a number of factors to consider when selecting technology for a specific system: accuracy and repeatability, application complexity, speed flexibility, reliability, maintainability and lifecycle costs.

The convergence of production IT and business IT, the synchronisation of processes as well as decisions taken autonomously by machines in real-time, have enabled the Hytec Group, through its relationships with Bosch Rexroth and Aventics, to provide accurate, efficient, customer-specific manufacturing products and solutions.

Industry 4.0 and the resultant hybrid automation solutions represent better resource allocation, higher efficiency, individuality and profitability. The Hytec Group is Industry 4.0 ready, with a number of safety-compliant hybrid solutions that integrate electric/pneumatics, electric/hydraulics and now even pneumatic/hydraulic/electric solutions. □

CNC machining: verify, simulate, optimise



VERICUT Auto-Diff reduces the time it takes to prepare an NC tool path. Programmers check for gouges or excess material while working on the program.

VERICUT software is used to simulate CNC machining in order to detect errors, potential collisions, or areas of inefficiency. VERICUT enables NC programmers to correct errors before the program is ever loaded on the CNC machine, thereby eliminating manual prove-outs. VERICUT also optimises NC program cutting speeds for more efficient machining. And Version 7.4.1 is now available!

Also featured is the AUTO-DIFF module, which enables users to compare the simulated model to the design model. From the time a part is designed to when it is ready to be machined, the design has passed through a number of different people, departments, companies, and CAD/CAM systems. In the end, it is difficult to tell if the tool path accurately reflects the original design intent. Without AUTO-DIFF, the only way to be sure is to cut the part and do a first component inspection.

By using AUTO-DIFF to compare the simulated model to the design model,

a manufacturer can be assured that the tool path accurately represents the original design concept. This reduces the time it takes to cut the first production-worthy part.

AUTO-DIFF also reduces the time it takes to prepare an NC tool path. Programmers check for gouges or excess material while working on the program. Problems are then identified and corrected before machining.

Solid or surface models from most popular CAD/CAM systems can be used. AUTO-DIFF also enables one to compare the cut model with another VERICUT simulated model. This function is useful for comparing different operations such as roughing cuts and finishing cuts.

Open-ended floor grating

Elaine van Rooyen, marketing manager at Andrew Mentis says that the company's open-ended system (OES) on its RS40 Rectagrid floor grating panels offers customers some unbeatable advantages: "The OES is more cost competitive compared to banded panels and lead times are also much shorter, especially for customers who usually cut and fit standard panels on site.

"The half pitch on all sides of the panels, because of the manufacturing process, results in an almost seamless walkway. Aesthetically pleasing pattern matching is made possible by the accurate pitching, so that one is presented

A surface, a set of surfaces or the skin of a solid model can be compared with the simulated part. The surface is overlaid on top of the simulated part, and gouges and excess material are displayed. Large amounts of data from very complex tool paths can be quickly compared. The design model does not need to be watertight, nor does the entire part need to be included.

AUTO-DIFF generates a comprehensive error report including information such as type of error, tolerance value, all tool path records out of tolerance, error location, and a summary of the AUTO-DIFF results.

VERICUT is supported in South Africa by TDM Solutions.

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with a non-jointed appearance when the open-ended panels are joined," Van Rooyen explains. "The banding of panels is eliminated by using the OES and, because there is no welding, corrosion is significantly reduced. Customers therefore benefit from both cost effectiveness and simplicity of design and installation."

Mentis Rectagrid is the result of the unique Andrew Mentis process of compressive locking of bearer bars and transversals, which ensures permanent locking and accurate bearer pitching, producing the industry's safest available grating. Rectagrid is manufactured in compliance with the international ISO 9001 quality management system.

www.mentis.co.za

Large-format printing for AEC professionals reinvented

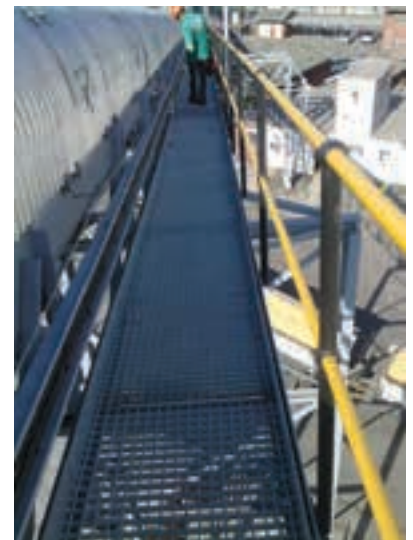
HP has recently unveiled five new HP DesignJet technical printers, including the flagship HP DesignJet T830 Multifunction Printer (MFP) and the HP DesignJet T730 Printer, reinventing how architecture, engineering and construction (AEC) professionals print, scan and copy. Engineered to withstand tough environments, these new devices make large-format printing faster and easier from the office to construction sites.

"Even as AEC and design professionals become increasingly mobile, they prefer making edits and reviewing plans on the printed page," says Xavier Garcia, vice president and general manager, large format printing, HP. "HP's innovative new large-format printers and MFPs simplify collaboration with next-level features and mobile printing capabilities to meet this blended reality and print whatever and wherever AEC professionals need."

The HP DesignJet T830 MFP is the

industry's most affordable, compact and transportable integrated large-format MFP. Half the size of competitive large-format MFPs, with the same footprint as the HP DesignJet T730 Printer, the MFP offers a damage-resistant design able to withstand challenging job sites, a built-in scanner and a front panel that can be extended and operated from a tablet.

"Architectural drawings are at the heart of what we do as contractors, and getting them to the site quickly is key. However, outsourcing our large-format printing was causing delays and costing money," says Neil Geraghty, surveyor, Duke Construction. "With the HP DesignJet T830 MFP, we are able to quickly and affordably produce high-quality, large-format prints in-house, while HP mobile printing makes choosing, editing and printing files easy to do from any location." www.hp.com



Andrew Mentis offers the advantage of an open-ended system (OES) on its RS40 Rectagrid floor grating panels. Rectagrid is formed using compressive locking of bearer bars and transversals.

Powerful new angle grinder for the industrial market

Chicago Pneumatic has launched a new angle grinder for industrial maintenance, repair and operations (MRO) – the CP75XX series – which is one of the most powerful angle grinders for its class, enabling users to achieve a high material removal rate. Ideal for surface preparation and weld seam removal, the CP75XX series is a major evolution from the existing series and is expected to set a new benchmark for grinders, enabling users to increase their productivity and ultimately, profitability.

The CP75XX series boasts a powerful 840 W governed motor, providing a high material removal rate, therefore enabling users to reduce the time taken to complete their tasks. The new series is available with 4-in, 4.5-in and 5-in grinding wheels, cutting wheels or flap wheels, providing users with added versatility to best suit their application.

The high durability expected of Chicago Pneumatic's tools comes in the high quality bevel gears and durable design, which result in 1 000 hours between maintenance intervals. The long service life enables users to reduce maintenance costs and improve uptime, so they can do their jobs more quickly and easily.

As a composite tool, the CP75XX series is compact and lightweight, weighing 1.6 kg and measuring 270 mm long, providing users with easier manoeuvrability



The CP75XX series angle grinder from Chicago Pneumatics boasts a powerful 840 W governed motor or a high material removal rate.

and handling. The head is manufactured from aluminium, providing the tool's robustness, while the body is made of steel and aluminium with a composite over-moulded grip, which insulates the operator's hand from the cold.

The grinder features a robust steel wheel guard that can be adjusted to protect the operator and to facilitate access to the application. It also features a streamlined safety lever for additional ease of use. Equipped with a 360° swivel air inlet, the CP75XX provides users with exceptional manoeuvrability, avoiding potentially dangerous air hose entanglements.

"The composite grinder has been designed to provide users with high power but also high comfort and better safety," says Luis Clement, vice-president, Chicago Pneumatic Tools.

www.cp.com

The world's most durable infrared window

Infrared windows designed to withstand the rigours of the industrial environment and maintain accuracy are the products for which IRISS is already renowned. With its latest introduction, however, the company has set the bar even higher in terms of product durability. The new IRISS CAP-ENV is unequivocally the toughest and most reliable infrared window available and suitable for thermal inspection of energised equipment in the visual, UV and all three infrared wavelengths.

What sets this product apart from others in the IRISS range is a stainless steel housing complete with a reinforced, lockable door, which is environmentally sealed to IP67/NEMA 6. This means that accurate quantitative and qualitative measurements can now be taken from live electrical systems in the most hostile of conditions. IRISS CAP-ENV is therefore ideal for use in offshore, onshore or marine applications, exposed



The new IRISS CAP-ENV infrared window.

industrial environments and in climates characterised by temperature extremes.

An exclusive pharmaceutical grade reinforced Poly-View System™ polymeric material creates the large and clear, rectangular IR window of the CAP-ENV. It provides an unparalleled field of view when compared to traditional round windows and a choice of standard sizes is available to suit the application. These range up to CAP-ENV 24 that measure 61×21.8 cm, while custom sizes, materials, locking devices, labelling and colour are also available.

Compact, rugged and reliable festoon solutions

Powermite, part of the Hudaco Group, is a leading supplier of superior quality high-performance cable festoon systems for the efficient feeding of power, data, air, or fluids to keep mobile bulk materials handling and mining machinery moving.

Powermite's materials handling division has been distributing Conductix products including cable reeling drums (CRDs), slip-ring housings and festoon systems to the Southern African mining and industry for over 40 years.

Open cast and underground mining operations, stockyards, ports and other bulk materials handling facilities rely on powerful electric machines to do the heavy work. Maximum uptime, fundamental to high production levels, relies on reliable, easy to maintain materials handling machines. "It is therefore essential to install high quality specialised festoon systems to ensure uninterrupted and reliable feeding of energy and data. to these machines even in extremely harsh and arduous environments," says Powermite marketing director, Donovan Marks.

The cable carriers used on the festoon systems are custom made, compact, rugged and reliable in order to protect and manage flat and round power/data cables for electrical energy and data transfer to machinery. These low-maintenance feeding systems contribute to maximised uptime and productivity due to easy installation and uncomplicated operation.

www.powermite.co.za



Cable festoon systems from Powermite are critical for materials handling machines that require efficient distribution of power, data, air or fluids.

The benefits of the IRISS IR transmissive polymers for industrial applications include: the materials are unaffected by mechanical stress and are shatterproof; and they maintain a fixed and stable transmission rate even when exposed to humidity, moisture, seawater and a broad spectrum of acids and alkalis.

The addition of an environmentally sealed door on the CAP-ENV system allows IRISS to complement these qualities with another layer of application security, creating a supremely reliable data collection port for tough applications.

In common with all IRISS products, the CAP-ENV is also protected by the IRISS unconditional lifetime warranty.

www.iriss.com

Certified IR windows assure safety at sea

Manufactured in 2013, the Maersk Intrepid is a drilling rig that has been designed to operate in the extremely harsh environment of the North Sea. Up to 150 people stay on the rig at any one time, so safety and fire prevention are paramount. To minimise the risk, Maersk operates a rigorous preventative maintenance programme for all electrical equipment on board, in line with NFPA 70E and SOLAS regulations.

Thermal imaging is an essential element of this regime and Maersk has recently taken further steps to underpin the safe use of this method. It has chosen to install IRISS IR windows, the only products of their type to carry Lloyds, ABS (American Bureau of Shipping) and DNV accreditation.

Removing panels to gain access to

switchgear for thermal inspection is a very risky business. The danger of arc flash – a short circuit through the air that creates a fireball explosion – is huge. Simply dropping hand tools or a cover panel, making accidental contact with energised parts or changing the state of equipment are common triggers – and the results can be fatal. These hazards are bad enough on land but at sea, they are even more acute.

Safe, live inspection

The use of IRISS IR windows effectively allows the switchgear to remain in an enclosed and guarded condition, so the IR scan becomes a non-invasive task. Infrared passes through the window's transmissive polymer lens without compromising the IP65/NEMA 4X seal on the enclosure panel.

This not only keeps personnel safe but it also allows the system to be thermally inspected under normal load conditions. As a result, quantitative and qualitative data can be acquired on the status of the electrical system. Furthermore, applications previously considered to be too hazardous for thermal imaging can be brought into the regular inspection schedule.

Maersk chose IRISS windows because they are the most tested windows on the market and comply with all safety standards required by the offshore industry. The products were recommended and supplied by TCAM AS of Norway, a local partner of IRISS that specialises in preventative maintenance solutions. The lion's share of the thirty IRISS windows ordered by Maersk were custom rectangular CAP-CT 24 and CAP-CT 12 made from a transparent polymer with grill reinforcement. They allow assets to be monitored in the visual, ultraviolet and all infrared spectrums.

The IRISS polymer window provides many advantages over a crystal alternative. Firstly it is designed for harsh engineering use. Unlike crystal, it withstands vibration and won't shatter. Nor will it lose its transmission qualities in the presence of UV or salt water so for maritime and offshore use IRISS is a clear front-runner.

Another advantage is that an IRISS window can be virtually any size and shape. The optimum size of a crystal window is just 4.0" in diameter and can only

be round, the shape in which it is grown in the laboratory. IRISS CAP-CT Series windows are available in a wide variety of standard sizes from 10 to 60 cm in width but can also be supplied in custom sizes and to fit curved surfaces. Indeed Maersk took advantage of this design freedom by including a bespoke window in its order.

"We supplied the IRISS windows for Maersk Intrepid in September 2015 and they are now allowing rig engineers to undertake fast thermal inspection of critical components," confirms Tormod Selbekk of TCAM AS. "Electrical inspection in heavy seas is extremely hazardous and this is why the IRISS products are particularly helpful in the maritime and offshore industries. They ensure compliance with industry standards, reliability of assets and most importantly personnel safety." □



The Maersk Intrepid is a drilling rig that has been designed to operate in the extremely harsh environment of the North Sea.

Ultrasound inspection course

Martec will be hosting a Level 1 Airborne and Structure Borne Ultrasound Inspector's course in Johannesburg from 17 to 19 February, 2016. Designed in accordance with the guidelines of ASNT recommended practice SNT-TC-1A, the Level 1 Airborne and Structure Borne Ultrasound Inspector's course is a 3-day comprehensive mix of theory and practical experience and provides maximum transfer of knowledge, skills, and abilities.

The course will be presented by ultrasound inspection specialist Tom Murphy and candidates will be exposed to introductory sound theory and how it is applied to the inspection disciplines demanded by an effective airborne ultrasound programme.

Contact Matthew van der Ploeg: +27 11 326 2708; matthew@martec.co.za

Industry diary

February 2016

Africa Energy Indaba 2016

15-17 February
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Sandton
Debbie Mankowitz
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+27 82 604 5826
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API Fitness for Service: Alex Fereidooni

22-26 February, Johannesburg
2KG Training
Phindi Mbedzi
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Pump Efficiency and Reliability: Harry Rosen

22-24 February, Johannesburg
30 June-01 July, Durban
2KG Training
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"This book is a perfect learning aid for students who have not been familiar with engineering drawing. The additional standards, conventions and explanations for manufacturing drawings in particular are an important addition for reference to anyone who needs a refresher when producing drawings. The additional link between manual drawing, and CAD makes the use of this manual possible with any teaching method."

Kirsty Veale MscEng. BScEng. (Mechanical) – Lecturer, University of KwaZulu-Natal. Managing Coordinator of Engineering Drawing in the School of Engineering, UKZN (2015 – present).

"The 'ENGINEERING DRAWING GUIDE' is supplied to all our first year Drawing Students as back-up notes for their National Diploma (Mechanical Engineering). They are encouraged to use the book throughout their diploma studies at all levels as a reference for Mechanical Engineering Drawing and Machine Design, including the capstone project for their Bachelor of Technology Degree. The exercises and notes help develop a good understanding of both the 2D and 3D aspects of drawing, and the "Miscellaneous Information" has proved to be very useful in their design courses."

Drewan Bennett: Engineering Drawing and CAD lecturer, Department of Mechanical Engineering, Durban University of Technology (DUT).

"The Engineering Drawing Guide is prescribed for students undertaking the capstone project for the Bachelor Degree in Mechanical Engineering Technology at the Durban University of Technology. The outcomes of the course require that students use best practice to produce engineering outputs that conform to established standards. As such the Engineering Drawing Guide provides very useful guidance in aiding students to produce professional engineering drawings according to the latest ISO code of practice. Besides providing information related to drawing outputs, the guide also contains other engineering data that will ensure that the book serves as a valuable reference in professional practice."

Dr David Jonson: PhD, Associate Professor, Department of Mechanical Engineering, Durban University of Technology.

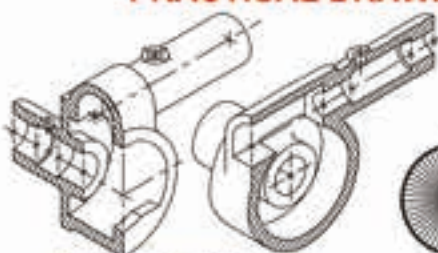
"This book is the culmination of many years of teaching of, and first-hand experience with, the engineering drawing course which the author lectured at UKZN for 21 years. It provides a state-of-the-art textbook on the subject, including CADD, with several examples, exercises and explanations. It is recommended to all students who are studying the subject and to professional engineers who use drawing in their work."

Dr Sarp Adali: Sugar Millers Professor of Engineering Design; Fellow of University of KwaZulu-Natal; Fellow of the South African Royal Society; Fellow of American Society of Mechanical Engineers.

"The Engineering Drawing Guide authored by Mr Joelson has formed the basis for the first year drawing module at UKZN for many years. It is laid out in a logical and structured format. It is easy to read, understand and flows in a format that builds understanding in engineering drawing. This 'Guide' is highly recommended for tertiary education students that want a complete guide to modern day engineering drawing methods, principles and practices."

Prof Glen Bright: James Fulton Professor in Mechanical Engineering; Academic Leader Discipline of Mechanical Engineering (UKZN); PhD, MSc, BSc, MBA.

PRACTICAL DRAWING APPLICATIONS FOR REAL DESIGN SITUATIONS



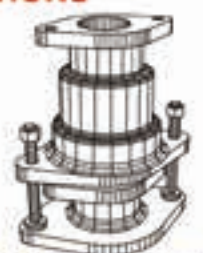
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