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THIS MONTH:

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- East London to PE: the C350e experience
- Topology optimisation improves rail component
- Direct hydraulic drives: flexible, simple and reliable

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MechChem Africa: a smart connected hybrid



From January 2017, *Mechanical Technology* will be merging with its chemical sister, *Chemical Technology*, under the new title: *MechChem Africa*. But what's in a name? A lot, I have come to realise. As an editor, one is constantly striving to establish an identity for one's magazine. This is not so easy when the subject matter covers the broad spectrum of topics associated with 'mechanical things', for example. There is no readily identifiable mechanical industry and mechanical engineers find themselves servicing the most diverse range of applications.

When I studied for my MechEng degree, there were four specialisation options: aeronautical; metallurgical; industrial; and general mechanical. Today there are offshoot degrees such as aerospace, automotive; naval architecture; acoustics and vibration; manufacturing/production, along with a host of special interest areas: mechatronics; biomedical; fluid mechanics; emissions and the environment; heat transfer and thermodynamics; energy systems and many others.

I graduated with a mechanical engineering degree with a metallurgical option, a choice I barely remember making. I ended up in the UK working for a welding machine manufacturer, in the days when power electronic technology coupled with digital control was just emerging. My early engineering experience was gained trying to prevent transistors 'popping' every time a welding arc was struck. As soon as we succeeded, the technology moved over to inverters with fast-switching thyristors, which were even more sensitive to the harsh electrical characteristics associated with welding arcs.

I have always, therefore, had a diffuse view of what mechanical technology is about.

At the invitation of Mercedes Benz South Africa this month, I was privileged to learn about and drive the new C350e plug-in-hybrid. Embedded in these vehicles is enough technology to fill every feature of a technology magazine: lithium-ion battery technology; sophisticated inverter drives; highly efficient modern engines; energy recovery systems; smart connected digital control; amazing hybrid transmissions; lightweighting design strategies; a multi-material body; and local manufacture in a state-of-the-art factory in East London.

Fundamental to the theory of evolution is that, for a species to survive, adaptations need to provide advantage. So when seeking to identify an alternative way forward for Crown Publications' *Mechanical Technology* and *Chemical Technology* titles, seeking advantage is the logical starting point.

First among these is that both magazines have broadened in scope over the years and, although always dealt with from the perspective of the different disciplines, several overlapping features have emerged: such as pumping systems, plant maintenance, instrumentation and process control.

We see and write about industrial plant, machines and equipment across the engineering spectrum, from mill circuits to refineries and beverage plants. These include highly integrated technologies that combine aspects of mechanical, electrical and IT control systems, and incorporate expertise, coatings, materials and treatment solutions derived from the chemical industries.

Both publications are positioned to service the technically minded. These key technical strengths will be retained, with the content enriched by deliberately seeking out areas of mechanical and chemical interest. Both chemical and mechanical topics will feature every month and the new features list will ensure content continuity.

The initial print run will be expanded to 5 000 copies per issue. Superficially, this seems counter-intuitive in the light of declining demand for print publications. We remain convinced, however, that the magazine format, as a carefully selected compilation of articles chosen to be interesting to a defined readership, will endure, regardless of the publication format.

Supporting long-term transformation and survival, though, is the opportunity to refocus on a holistic publication offering. We believe in a content-driven approach. We hope to offer readers and advertisers opportunities to connect with and inform each other via rich technical content, smartly disseminated and organised in multiple ways.

Using the magazine content as a springboard, we see multiple opportunities to reuse and reorganise content to suit different sets of digital consumers. Once good technical content is created, the covers of a magazine – print or digital – no longer need confine it. It can be circulated via email, newsletter, Facebook, LinkedIn or Twitter. It can be made findable by attaching some carefully selected key works and, using mechanisms such as hashtags, collections of related articles can be reorganised in a multitude of ways.

We are excited. As our publisher Karen Grant says: "It is important not to remain static. Engineering is exciting and dynamic and since the collection of our magazines covers a wide range of the engineering disciplines, we see increasing service levels for clients, cooperation across magazines and the combination of print and digital media platforms as a sure way of remaining relevant."

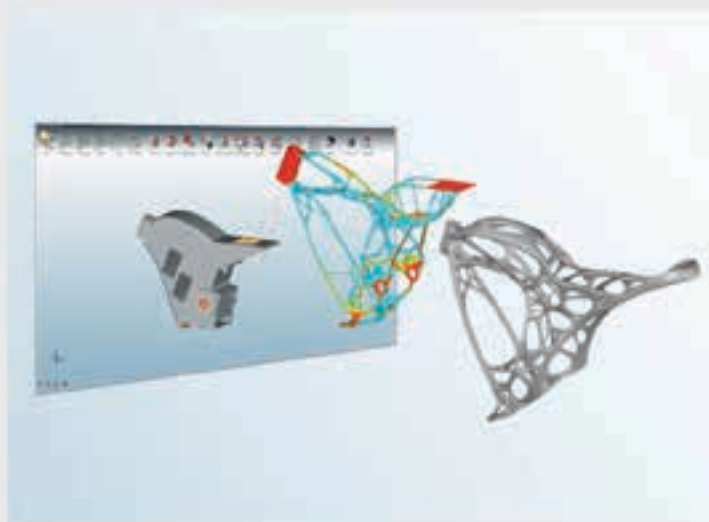
The 'plug-in-hybrid' tagline messages the integrated nature of the C350e. I like to think *MechChem Africa* will be seen in a similar light, as a magazine integrating technologies – chemical, mechanical and others – in a smart connected way.

Peter Middleton

DESIGN THE DIFFERENCE



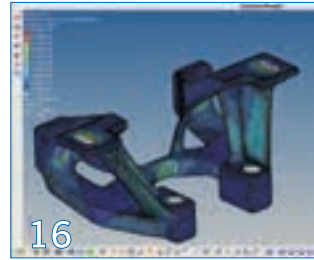
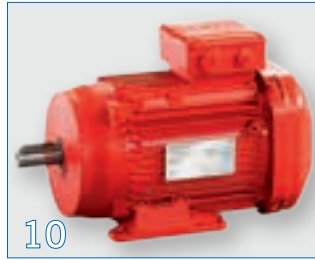
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ON THE COVER



Customer-centric manufacturing: The SMC way

SMC Pneumatics South Africa has invested over R18-million into its local production facilities with some machinery being the first of its kind on African soil. *MechTech* visits the newly opened premises and talks to head of manufacturing, Peter Austin, who brings 20 years of SMC experience from the company's UK facility in Milton Keynes.

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On 19 September in East London, Mercedes-Benz South Africa hosted a media launch for its new plug-in-hybrid range of vehicles, including the new C-Class C350e, which is to be built in the East London factory for local and export markets. *Peter Middleton* attends, drives the car and reports.

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Customer-centric manufacturing: The SMC way

SMC Pneumatics South Africa has invested heavily into the local economy and into its local production facilities, with some machinery being the first of its kind on African soil. *MechTech* visits the newly opened premises and talks to head of manufacturing, Peter Austin (right), who brings 28 years of SMC experience from the company's UK facility in Milton Keynes.



Peter Austin has been involved in the manufacturing of pneumatic components for his entire professional life. To date, he has accumulated 28 years of service at SMC, 20 of which were as manufacturing manager at the UK facility, which recently celebrated winning the Award for Manufacturing at the local (Milton Keynes) Business Achievement Awards, 2016.

"The UK facility is a made-to-order SMC subsidiary that manufactures mostly special products – over 90%. They make standard products for urgent out of stock orders, for example, but prefer to focus on products that need to be customised or those that are not immediately available off the shelf. This policy is driven by the company's guiding philosophy of customer-centric design and ultimately, customer satisfaction," says Austin.

With a significantly bigger market, SMC began in the UK 38 years ago. Today, the facility has 230 internal staff with a nationwide sales team of around 120 technically trained sales engineers.

"There is a strong electronics and semi-conductor industry in the UK, so the trend is to focus on smaller products for lighter applications. Here in South Africa, heavy industries such as mining are stronger, so there is a shift towards the larger ranges," he points out. As well as its widespread use in automatic manufacturing systems such as those used by the automotive industry, pneumatics is widely used in an array of industries including food and packaging, machine tools and many others.

In addition, "both globally and in South Africa, we are the number one supplier to the Japanese automotive

industry and are equipped to deal with all automotive companies," he says. "Generally speaking, we pride ourselves on strong relationships with the Japanese automotive industry."

SMC South Africa's production capabilities

SMC's newest manufacturing facility, is modelled to achieve Japanese quality levels and to mimic long established manufacturing principles. Although smaller compared to the larger mass production sites in SMC's portfolio, the company's production structure ensures lean and efficient manufacturing. "All of our factories operate according to SMC's production guidelines, from raw material storage to machining of components and then on to the assembly and testing of completed units," says Austin.

The actuator production process starts with the cutting of raw materials supplied by SMC's mass production sites around the world.

These materials come into the factory and go directly into bulk storage. Stroke related parts are cut using cutting machines on receipt of a customer order and thereafter the machining is completed with either CNC machinery or special purpose equipment. "Here in South Africa, we can machine material with diameters from 3.0 mm to 320 mm.

Both the cut-to-length and the finishing machines used are designed for precision and repeatability. The operator puts the component in, clamps it down and performs the operation under automatic control. Rapid changeover is then made possible via pre-programming, even if the following component is a different size. "We often need to make many different,



smaller batches in quick succession and quick changeover principles ensure increased productivity and efficiencies," he explains.

Thread rollers are commonly used to generate the tie rod and piston rod threads for the majority of cylinder sizes.

Following cutting and deburring of piston rods there are three CNC turning machines in the facility. "These have highly sophisticated control systems, to such an extent that they are disabled if their position is disturbed. They have built-in GPS sensors that record the position on installation and if any change in that position is detected, the manufacturer is informed and the machine is automatically disabled," Austin tells *MechTech*.

The CNC machines are mostly used for manufacturing piston rods in the different sizes required. For the smallest pistons, those with 3.0 mm to 12 mm rods, a Tsugami precision CNC machine is used: "These are watch-making machines for very small but accurate components.

"Here in South Africa, the smallest size we do is the 3.0 mm rod for our 6.0 mm CJ2 cylinders," he says, adding, "all the CNCs will also cut threads, but for the very small sizes, a three roll Fette thread roller systems is preferred. This is an instant process and, because the threads are formed and not cut, it's clean and debris free."

For the larger piston rods, two preci-





Left above: Materials come into the factory and go directly into bulk storage. Stroke related parts are cut using cutting machines on receipt of a customer order.

Left: Thread rollers are used to generate the tie rod and piston rod threads.

Above right: For the larger piston rods, two precision DMG Mori CNC machines are used.

Right: Assembly starts by attaching pistons to piston rods. For the majority of sizes, SMC uses the roll crimping method.



sion DMG Mori (Morisiki) CNC machines are used, the largest being sized for manufacturing rods for the 300 bore cylinder from 70 mm rod, while the middle DMG machine is dedicated to the 16 to 30 mm rod range for the 32 to 125 mm actuators.

“These are the first machines in the country with this level of CNC control. DMG Mori is, itself, an SMC customer and we provide the pneumatics for its machines. We also supply most of the pneumatics for other Japanese machine tool builders.

“We use the same processes, jigs and machines as those in our big standard-product factories to manufacture customised products. The net result is product with exactly the same machined quality, without sacrificing competitiveness,” says Austin. “All of our processes are audited for quality in Japan and we are required us to send samples for cutting and testing.”

Following machining, the assembly process begins. Pistons, rod covers, head covers, cushion rings and other standard internal components are stored on the production line. Assembly starts by attaching pistons to piston rods. “SMC has several methods of locking

the piston onto a machined rod. For the smallest sizes, we run a thread through the piston and screw it onto the end of the rod. But for the majority of sizes, we use the roll crimping method,” Austin notes. “The aluminium piston is assembled onto the rod and placed into an assembly jig to complete the crimping,” Austin informs *MechTech*.

There are three actuator assembly lines based on fundamentally different methods of assembly. “We also have a fourth assembly line for the assembly of valve manifolds and FRLs (filter, regulator, lubricators) – this is a custom assembly service from standard components. The fifth line is used to add accessories to existing products,” he says.

“We are able to assemble everything from the most basic to the high-tech Industry 4.0 ready components – and SMC can offer systems to almost any protocol to suit its markets in every part of the world.

“As a global company, we strive to produce as much as possible in-house, so we do our own die-casting, moulding and

extruding – and we even make or own circuit boards. While some of our large factories are 100 times bigger than this one in South Africa, we retain the same flow, the same degree of control and we achieve the same product quality.

“Philosophically, SMC is driven by customer demand. That is why this factory is needed in South Africa, so we can offer the same level of customised service available to any SMC customer anywhere in the world, along with the same Japanese approved quality level,” Austin concludes. □

DCD Heavy Engineering completes winder build

Vereeniging-based specialist manufacturer DCD Heavy Engineering – part of the DCD Group’s mining and energy cluster – is nearing completion on a two-year project to produce winder drums for a copper mine in Zambia.

The contract was for two double-drum winders for hoisting rock and two single-drum winders for hoisting personnel, along with related components such as clutches, bearings, brake stands and

assembly services.

“These are substantial items of safety-critical equipment that need to perform optimally for a life of at least 25 to 30 years with no room for error,” says Jaco Muller, project manager at DCD Heavy Engineering. “The project required not just our high levels of engineering expertise and state-of-the-art facilities, but also had to conform to various international safety and quality standards; so leading consultancy Hatch Africa was engaged to ensure strict adherence to these quality requirements.”

The completed man-winder is 6.4 m in diameter and 204 t when assembled, and can transport 141 people at a time to a depth of 1.9 km below surface in just over two minutes.

The rock winder – measuring 7.2 m in diameter and weighing 175 t when assembled – collects rock from a depth of up to 2.0 km. Each load weighs up to 27.5 t and can be delivered in less than two minutes. The winder makes a

complete revolution almost every second and, on average, will deliver more than 550 t of rock in an hour.

“Some 1 700 t of steel went into the project, made up of 125 plates ranging from 60 mm to 215 mm thick. The largest plate was 170 mm thick, weighed 30 t and was 9.0 m long by 2.5 m wide,” Muller says.

Equipped with the largest Hauesler roll plate bending machine in Africa, DCD Heavy Engineering was able to roll the 170 mm thick plate into an almost 180° cylinder through a hot rolling process.

“The manufacturing aspects of the project took 18 months, with a total of about 60 000 hours being invested,” he adds. “Quality was paramount, and machining tolerances were a very fine – 0.1 mm on fit-up.”

The DCD Group is also active in rail, defence and marine segments, offering integrated heavy engineering solutions and expertise, world-class facilities and innovative design capability.

www.dcd.co.za



DCD Heavy Engineering is nearing completion of man and rock winder build for a Zambian mine. The rock winder – measuring 7.2 m in diameter and weighing 175 t when assembled – collects rock from depths of up to 2.0 km.

Atlas Copco gets down to earth

Atlas Copco South Africa employees rolled up their sleeves to plant trees as part of their 67 minutes in honour of Nelson Mandela.

In partnership with Save the Planet, Atlas Copco assisted with the planting of twelve River Bush Willow trees on the sports fields and playgrounds of Isaac Makau Primary School in Benoni.

Save Our Planet – Plant a tree is a

registered non-profit organisation that was founded by Jonathan Richmond in 2012 with the sole objective of greening South Africa. “With 75 000 trees already in the ground, we are half way in realising our mission to plant over 150 000 trees around Gauteng,” says Richmond, adding that Atlas Copco was the perfect partner for this initiative.

“In addition to the fact that we had

already established contact with the company in May this year, Isaac Makau Primary School is ideally located close to the Atlas Copco’s head office in Jet Park.”

Says Atlas Copco’s Kgothatso Ntsie, corporate communications manager for South and sub-Saharan Africa: “This project aligns with our mandate to involve human resources alongside financial assistance and donations, an approach that enables our employees to get involved in this type of initiative,” she says.

www.atlascopco.co.za

West Coast Painters advocates Rand-Air

Marine shipping is ranked amongst one of the most hazardous industries in the world. The fire and explosion hazards associated with the painting of merchant vessels, passenger ships and ships pose significant risks. The complexity and nature of this work requires the use of sophisticated power and associated equipment.

Inyameko trading 1440cc, trading as West Coast Painters, is an expert in the painting and blasting of marine shipping and believes that for an operation such as theirs to run seamlessly, it is critical to have good relationships with suppliers.

“It is this belief that forms the foundation of our long-standing relationship with Rand-air, market leaders in portable compressed air and power generation rental. We have been using Rand-Air for two years and we have always been extremely happy with the level of

service and the quality of the equipment we receive from them,” says Brian Truter, project manager at West Coast Painters.

The company is renowned for ensuring minimum downtime for vessels undergoing paint spray coating with them. Surface preparation and coating is different for each project and West Coast Painters has a highly trained team consisting of painting engineers and technicians. This highly technical process not only rests on the team, but also demands the use of reliable air compressors.

“As we work in extremely pressured environments and under tight deadlines, reliability and quality of equipment is a non-negotiable with no room for compromise. Not only do we feel that we get excellent quality from Rand-Air, but we always feel assured that they are there for us 24/7,” Truter concludes. www.randair.co.za



Learners from Isaac Makau Primary School in Benoni helping to plant 12 River Bush Willow trees on the school’s sports fields and playgrounds.

iX Engineers – a development success story

An active participant in the transformation of South Africa, project delivery and engineering consultancy WorleyParsons RSA has established iX Engineers, a 53% black-owned consulting engineering company focusing on the public infrastructure sector.

iX Engineers has been established following the incorporation of WorleyParsons' Public Infrastructure (PI) business with Black Jills Engineers, who was among the first participating companies in WorleyParsons' Enterprise Development programme. iX Engineers will provide professional services for the design, development and through-life support of public infrastructure, including roads, dams, water supply, water treatment, wastewater, power transmission and distribution infrastructure.

Current managing director of Black Jills Engineers, Lebo Leshabane, will take up the role of CEO of iX Engineers with 53% equity held by black employees, 35% of these being black women owned. The balance is held by senior management from WorleyParsons' existing PI business who will be moving over to iX Engineers.

Says Denver Dreyer, CEO of Worley-



iX Engineers has been established following the incorporation of WorleyParsons' Public Infrastructure (PI) business with Black Jills Engineers. At the signing are, from left: Ashley September; Lebo Leshabane; Denver Dreyer and Hans Karemaker.

Parsons RSA: "iX Engineers has been created in the spirit of transformation and we are confident that they are set up for success. Our PI business is a going concern, with nearly 300 employees, offices in Cape Town, Port Elizabeth, Durban, Pretoria, Bloemfontein, Kimberley and Upington, and a valued client base.

"WorleyParsons remains firmly committed to South Africa and will continue to focus on power, hydrocarbons, mining, chemicals and resource infrastructure projects. We will maintain a close working relationship with iX Engineers, who will be our partner of choice when we require services in the PI arena. iX Engineers will also work closely with Advisian, WorleyParsons' strategic advisory arm," says Dreyer.

www.worleyparsons.com

ITU names Cisco academy as top skills developer

The Cisco Networking Academy has received an international award for leading skills development worldwide. The international award, which was presented to Cisco during the International Telecommunication Union (ITU) global Capacity Building Symposium in Kenya, recognised Cisco for maintaining the longest and most successful worldwide private sector skills development partnership with ITU. "Through this partnership, we have been able to touch more than one million students in 51 countries. In addition, more than 10 000 students have graduated from the Cisco Certified Network Associate (CCNA) curriculum in Africa," notes Alfie Hamid, regional corporate affairs manager at Cisco.

The partnership goes back to the year 2000 when the Least Developed Countries (LDCs) Initiative was launched

by G8 leaders in an effort to help bridge the digital divide between developed and least-developed countries. The aim was to provide ICT training opportunities specifically for students in LDCs as an extension of the Cisco Networking Academy programme.

The Internet-based learning and educational opportunities have positively transformed communities in Africa by helping the workforce to develop the necessary skills for employment, while using the Internet and connectivity to make a better life for themselves and their families. ITU and Cisco are committed to continuing and strengthening their worldwide partnership to enable the centres of excellence to address the capacity-building demands as we move forward into the era of the Internet of Things.

www.cisco.com

In brief

On 1 December 2016, **Mercedes-Benz South Africa (MBSA)** will welcome Jasper Hafkamp as its new executive director of its Regional Centre Southern Africa (RCSA). He will be responsible for Daimler Trucks & Buses (DT&B) in southern Africa. The current executive director, Kobus van Zyl, is pursuing a new and exciting career as general manager for National Automotive Industries in Saudi Arabia, a joint venture between Mercedes-Benz Trucks and E.A. Juffali & Brothers.

A significant investment in a Sage X3 Enterprise Resource Planning (ERP) system has given **Inclledon**, a member of the **DAWN Group**, greater control over its 15 000 preferred products. The new ERP system first went 'live' at the distributor's Germiston head office at the end of 2015, "following an intensive planning and preparation stage over the past two years," says Inclledon CMO Kelly Wilson.

The latest **Ford Production System** has contributed substantially to making the Ford plants in Silverton and Struandale among the most productive and efficient in South Africa as well as in the Ford world. "An impressive indicator of the way we have improved is that 10 years ago it took 60 hours to build a vehicle, whereas we now make much more complex models in Silverton in only 27 hours per unit on average," says Ockert Berry, the company's vice president for operations.

At the Diggers and Dealers 2016 in Perth Australia, leading provider of intuitive software solutions and services to the international mining sector, **Micromine**, previewed Geobank 2017, the latest versions of the company's data management solution. The 2017 version of Geobank contains 337 items including 50 improvements and new features.

In Heidenheim, Hanover last month, **Voith** provided a glimpse into its next-generation DIWA automatic transmission at IAA Commercial Vehicles 2016. The focus areas of the study are the integration of a central recovery unit, an extra gear and the separation of the torque converter and retarder.

Over the past two years the **Goscor** golf days have raised over R400 000 for beneficiaries such as JB Matabane School, CANSA, children's sanctuary Baby Moses and children's care centre COMPASS. "Corporate social investment (CSI) is not a project or a programme that Goscor feels obliged to do. In the business of creating value for all our stakeholders, we are mindful of the need to help uplift and sustain the communities in which we work," says Goscor Lift Truck MD, Darryl Shafto.

The Global Cleantech Innovation Programme (GCIP) for SMEs in South Africa has announced nine entrepreneurs as finalists for this year's Accelerator Programme. The programme has included business coaching, the pitching process and the wisdom of those that have surrounded participants, from mentors and judges to fellow participants. The 2016 competition winner is to be announced at a gala dinner on 20 October.

First Cut celebrates 60 years

In late September 2016 at its Benrose facility in Johannesburg, First Cut celebrated 60 years of industry experience in South Africa. *MechTech* attends and reports.



An Everising bandsaw machine being demonstrated cutting a batch of 3.0 mm discs off a 120 mm round bar. Automatic clamping between cuts and accurate forward-feed allows for continuous cutting of an exact number of discs.



Ian McCrystal, CEO of First Cut and Andrew Poole, MD in the company's Benrose band-saw blade manufacturing facility.

There are 60 seconds in a minute, 60 minutes in an hour and a lifetime of hours in 60 years. To First Cut, a leading South African manufacturer and distributor of cutting equipment, consumables and precision measuring tools to a broad range of industry sectors, 60 years represents far more than a number of working hours.

Rather, 60 years represents a dynamic journey of courage and endeavour, openness and transparency, innovation and unmatched service. It is these qualities that have seen the company

grow successfully from a small blade-sharpening business for the timber industry in Cape Town, to a market leader providing total cutting solutions to an enviable portfolio of customers, with a nationwide footprint and staff of 240 people.

The company is now led by MD, Andrew Poole and CEO Ian McCrystal. Asked about the success of First Cut, McCrystal responds that the company's remarkable growth is largely due to bold strategic decisions made at certain milestones and inflection points in First Cut's history.

"In 1998, one of these key strategic decisions was the vertical integration of an import operation with a local manufacturing company. In 2002, these two companies merged to form First Cut. Central to this deal was the negotiation of an agreement with Neill Tools UK, to manufacture its products under licence in South Africa. This involved getting two competing suppliers to collaborate in the South African market – a bold move that required vision and open-mindedness from all concerned. This paid off and, today, through First Cut, each of these companies has grown its respective local market share exponentially," he explains.

Since then, the consumables division has pioneered innovation in the business and provided the foundation for

First Cut's ensuing diversification and continued success.

The company then saw that, for customers to get the best out of their blades, they also required top-quality cutting machines. This observation led to the diversification into capital equipment in 2002, with the acquisition of Bandsawing Services. Along with the subsequent conclusion of a deal with the Everising Machine Company, a sound base was formed to begin selling a wide range of cutting machines and solutions to the structural steel, sheet metal, tube and pipe industries.

Poole explains that the capital equipment division, at 14 years old the 'youngest' segment of the business, has grown, and continues to grow vigorously.

He adds: "Our company has a 'triangular' business model, the corners being consumable sales; capital equipment sales; and, very importantly, the provision of service and spares. We will not sell a machine unless we have the factory-trained technicians to support the customer after the sale," he assures.

A further contributing factor to the company's consistent performance is its dedication to quality, testimony to this being their stringent adherence to high standards and ISO 9001 (2008) certification. In addition, First Cut has gone out of its way to foster excellent long-term relationships with its overseas principals and customers. "Again, the strength of these relationships lies in honesty, integrity and openness – qualities we work on developing every day," continues McCrystal.

The strength of the relationships that



An advanced BLM E-Turn32 tube bender on show on the occasion of First Cut's 60th anniversary.

First Cut has with its many consumables and capital equipment suppliers allows the company to offer South African industry the most advanced technology available. An example of this is tube and fibre laser cutting, a technology that is up to twice as fast – and are far more energy-efficient – than conventional cutting systems.

“Apart from speed and efficiency, fibre laser technology offers the customer greatly increased versatility and all these features ensure an excellent return-on-

investment,” asserts Poole.

The majority of First Cut’s employees have many years and, in certain cases, decades of service with the company. To ensure that staff members remain at the cutting edge of expertise, First Cut invests substantially in training and currently has six apprentices in its employment.

“We are working towards our next milestone in 40 years’ time,” explains Poole. “As articulated by our internal tagline and campaign to be ‘one step better’, we have sound plans for further



Band saw blades being flash welded in First Cut’s blade factory in Benrose, Johannesburg.

innovation and diversification,” he concludes. □

Fibre laser cutting: a success story

While flat plate laser cutting has been in existence for a long time, new tube laser cutting technology is revolutionising the tube and pipe industry. This is according to Andrew Poole, managing director at First Cut, sole distributor and representative for BLM in South Africa.

Poole notes that exciting possibilities are opening up for tube processing – resulting in a mind shift within the fabrication sector both locally and globally.

“The high-speed efficiency of BLM’s fibre laser machines for tube cutting is challenging our thinking around what is and what is not possible. Traditional fabrication relies heavily on labour and infrastructure, with many steps in the process. Tube laser processing is changing all that,” says Poole.

First Cut, an established distributor of cutting consumables and capital equipment, has strong ties with some of the leading global brands in steel processing machinery, including BLM. Based in Italy, BLM has, for decades, focused on optimising the tube fabrication process through its range of tube end-forming/bending machinery and tube laser cutting equipment.

For First Cut, it was a priority to build a strong relationship with the ‘best in the business’, to ensure its customers receive the benefits of a world-class service – and the multiple advantages of tube laser technology.

“We have been excited to introduce BLM’s tube laser machines to the South African market. They provide a highly versatile, automated cutting solution that is significantly faster and more accurate than conventional processing,” says Poole.

One of First Cut’s customers, who is an innovative ‘early adopter’ of this technology is TWTLP (TW Tube Laser Processing). Founded in 2014 with TW Profile as its majority shareholder, TWTLP has pioneered its way to fast becoming one of the largest service centres in the laser and profile cutting industry in South Africa.

Having purchased two BLM tube laser processors from First Cut (in 2015

and early 2016), TWTLP and its customers are already seeing significant return-on-investment.

“We were passionate about finding an all-in-one solution for the processing of tubes and sections. It is exciting to note that, through tube laser technology, anything which can be done on plate can now be done on tube and section,” says Tharin Stuart, managing of TWTLP, who has extensive experience in the fabrication sector.

“Thanks to the high-speed output of the BLM tube laser process, production schedules have been drastically reduced, leading to much higher productivity levels for our customers. For example, processing a notch or cope on a beam, channel or pipe development now takes minutes, whereas by hand this could take up to an hour when marking out is included,” Stuart points out.

TWTLP has invested in a BLM L14 3D tube laser, which is a ‘heavy duty’ machine suited to large component manufacturing. With a footprint of about 40 m, the LT 14 can cut diameters up to 355 mm and handle tube and sections 13 m in length and up to 100 kg/metre.

More recently, and also through First Cut, TWTLP commissioned a BLM LT Fibre which is a smaller, high-speed laser machine designed for cutting tube and open sections of between 12 mm and 152 mm.

“The beauty of the LT Fibre is not only the incredible speed of its throughput; but its ability to cut reflective materials such as copper, brass, aluminium, stainless steel and titanium, delivering a smoother cut surface. It also cuts carbon beautifully,” says Stuart.

With the two tube laser processors ‘up and running’, plus an Everising bandsaw machine (also supplied by First Cut), TWTLP is able to service a wide cross-section of industries and varied steel fabrication requirements.

“The applications for tube laser are vast – from office furniture to balustrades, gym equipment, bicycles, stadiums and architectural structures. The automated



Photographed in front of the new BLM LT Fibre laser machine are, from left: TWTLP’s Tharin Stuart, MD, with directors Robbie Carlse and Joost Smuts.

and software-driven process minimises the human error element, creating high levels of accuracy and repeatability of component parts,” Stuart notes.

Automating the tube and section cutting process creates many benefits for the fabricator, including a reduction in labour and infrastructure costs; and for TWTLP’s customers, the benefit of minimising the risks associated with stock-holding.

Because TWTLP takes care of all tube processing as well as stock holding on behalf of its customers, trust is critical to successful customer relationships. This is something that is mirrored in the relationship between TWTLP and First Cut. In fact, a focus on relationship building is an important part of the ethos of both companies.

“It is about both technology and people – and for First Cut the sale of the machine to our valued customer TWTLP is just the start of the relationship,” agrees Poole. “Customers such as TWTLP are experiencing much faster turn-around times on processing and delivery which, in turn, translates into significant cost-savings and benefits for their own customers,” Poole concludes. □

The future starts now



SEW-Eurodrive head of engineering, Andreas Meid.

With several product launches announced at Electra Mining Africa, 2016, SEW-Eurodrive continues to set innovative benchmarks for local industry. New products include the IE3 compliant DRN series of asynchronous motors; the X-series agitator with integrated extended bearing distance (EBD); and the new LTP-B Eco drive, an ideal solution for optimising fan and compressor performance in HVAC applications.



As part of its 'The future starts now' campaign, SEW Eurodrive unveiled several new products at this year's Electra Mining Africa 2016 trade show. "Innovation, tradition and customer focus are the cornerstones of SEW-Eurodrive South Africa," says managing director, Raymond Obermeyer. "That was the case when the company was founded 85 years ago, and it still holds true today. Thanks to a range of customer-orientated service modules, we offer our customers added value and measurable benefits. This is made possible by powerful drives, high quality standards and customised solutions," he says.

X-series agitator

Responding specifically to customer requirements, the new X-series agitator features an integrated extended bearing distance (EBD). This means it consists of a standard gearbox with a modified output end designed to increase maximum radial and axial force capacities. As well as increasing the distance between the low-speed shaft bearings, bearings with larger dynamic capacities have also been used.

"The integration of the EBD with axial and/or radial bearings into the gearbox is far more cost-efficient for customers than a purely external bearing configuration mounted on the application," explains head of engineering, Andreas Meid. Core applications for the X-series agitators include mixers, agitators and aerators,

"Innovation, tradition and customer focus are the cornerstones of SEW-Eurodrive South Africa," says managing director, Raymond Obermeyer.

where high radial forces, combined with axial forces, act on the low-speed shaft.

"We already have a strong footprint in these sectors with our existing X- and MC-series gearboxes, and it is anticipated that the new X-series agitator will only enhance that. We have looked at all competitive products available on the market and incorporated the strongest features in our unit. This means we have a lot of extra selling points, in addition to unique accessories on offer, such as a condition monitoring system," says Meid.

The main advantage of the new X-series agitator is that it is essentially an off-the-shelf unit that uses existing components. The entire design is fully integrated, which makes for a highly efficient and compact unit that is easily maintainable. "Different lubrication options are available, such as bath lubrication with an expansion tank, or pressure lubrication from a drywell. All the lubrication piping is fully integrated into the unit, which is also thermally optimised – and different filter options are also available," Meid points out.

DRN asynchronous motor series

Stricter international regulations have meant that, as of the beginning of last year, all two-, four- and six-pole asynchronous/induction motors with a power rating of 7.5 kW to 375 kW must meet the requirements of energy-efficiency class IE3 in the European Union (EU). In addition, from the beginning of next year, IE3 applicability will be extended to include all asynchronous motors from 0.75 kW and above.

While South Africa does not face the

The DRN asynchronous motor series sets a new benchmark for IE3 compliance in Africa.

same regulatory pressure as the EU, SEW-Eurodrive has decided to raise the local benchmark by launching its new DRN series as its standard range of electric motors. "We also have to consider customers from across our borders. For example, if we supply an OEM in Africa carrying out a project in the US, the IE3 requirement has to be met. We not only supply the local market, but have to take our export obligations into account as well," says national sales manager, Norman Maleka.

In South Africa, SEW-Eurodrive will offer the DRN series as a complete new range. "It will set the standard. A customer who buys a gearbox or drive from us will automatically have an IE3-compliant motor," Maleka says.

"What is equally important is the fact that the DRN series is downward compatible with our previous motors, regardless of the energy class. It fits right onto our gearboxes, for example, which means no additional modifications or effort are required by customers to make the switch." Another feature is a global stator, which boosts both parts availability and stockholding.

Commenting on the benefit of using energy-efficient motors such as the new DRN series, Maleka points out that the total cost of ownership of the equipment is reduced significantly over the long term. "Not only do we inform our

innovations launched



customers about these benefits, but we also advise on application requirements. Our aim is to offer a total solution, as opposed to simply being a component supplier. Our expertise and experience stands us in good stead in this regard, with SEW-Eurodrive celebrating its 85th anniversary this year," Maleka notes.

Eco HVAC drive

The new LTP-B Eco HVAC drive is also a result of SEW-Eurodrive responding to specific customer requirements. "While we do have general-purpose units for fans, pumps and even conveyors, we have decided to focus on a particular industry and application," continues Maleka.

"Building designers are always the first adopters of new technology such as this. We are quite active in the HVAC sector in Cape Town, for example, and realised that we had to rise to the challenge of meeting the needs of this specific sector."

What distinguishes this purpose-built drive is the fact that different parameters can be set, such as for fan and compres-

Above: X-series agitators with integrated extended bearing distances offers load specific bearing concepts for light, medium and heavy loads and are suitable for extreme conditions such as high ambient temperatures or use under ATEX conditions.

Right: The LTP-B Eco drive enables advanced fan and compressor control in HVAC systems.

sor control. "This allows our customers to realise the full energy-efficiency benefits of different functions," Maleka explains.

In buildings operating 24/7, such as hospitals, traditional drive systems were installed to operate air-handling fans continually at full speed. "With the improved functionality of the LTP-B Eco HVAC drive from SEW-Eurodrive, facilities managers can now control a fan and run it according to the demand. This represents a major advantage in terms of energy-saving, as it allows for total flow control," Maleka explains.

"Our philosophy is predicated on supplying innovative products with easy-to-use energy-efficient features that maximise time and cost savings for



our clients," Obermeyer says. "The new LTP-B Eco HVAC drive is another example of how SEW-Eurodrive is committed to an innovative future for South Africa based on customised, high quality solutions," he concludes. □

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BMG showcases electro-mechanical range

At Electra Mining this year, BMG highlighted the company's electro-mechanical range and its integrated engineering solutions and technical services on offer for optimising productivity and enhancing operating reliability and energy efficiency.

The focal point of BMG's Electra Mining exhibit was a display of the company's extensive electro-mechanical range, with representative examples of its industrial drive systems in use by industry across southern Africa. Exhibits featured products from Nord, Sumitomo and Paramax, with whom BMG holds exclusive distribution agreements," says Mark Barbour, BMG business unit manager for electromechanical drives.

"Since BMG's acquisition in 2015 of Hansen Transmissions South Africa, the company has broadened its mechanical drives range and strengthened its long term partnership with Sumitomo as the sole distributor in sub Saharan Africa of Sumitomo speed reducers," he adds.

Decentralised VLT drives

BMG's Danfoss range includes the decentralised VLT® FCD 302 drive, designed for installations where multiple ac motors are spread around a facility. Typical applications include bottling, food preparation and packaging plants.

"In these applications, where cabling costs are excessive and control room space is limited, it makes sense to get the speed controller closer to the motors," says David Dyce, BMG's electronics manager. "Unlike some decentralised drive systems, the FCD 302 drive – which is a one box concept – can be mounted close to, or directly onto motors. This system is designed to minimise design and installation costs, at the same time ensuring efficiency and total reliability of the drive system. There is no need for field distribution or drop down boxes and

no external 24 V dc supply is required.

"Another advantage is any drive trip can be quickly and accurately isolated to a particular drive unit, which enables simple maintenance and increases up-time of the system."

This new generation, high performance decentralised drive is available in two frame sizes to perfectly match the requirements of different production applications, including: dry areas; wash down installations; and for hygienic environments.

This new system, which has an IP 66 enclosure – for protection against dust ingress and high-pressure water jets from any direction – meets stringent hygienic standards, including the new 'European Hygienic Engineering and Design Group' (EHEDG) regulations.

These new drives are proving to be popular with OEMs – there are fewer boxes to be mounted in fewer positions, with less connections and terminations so that labour costs are significantly reduced. The OEM is able to deliver the whole conveying system ex-factory, pre-wired and pre-tested – this reduces commissioning time after installation.

The advanced vector control of this system enables compatibility with permanent magnet motors and asynchronous motors, without the need for an encoder and the FCD 302's safety features include a standard safe-stop functionality that prevents the drive from starting unintentionally.

R350-million expansion

"Another highlight is the R350-million expansion of BMG's company's distri-

bution and engineering facilities – BMG World. The objective of this development programme, which is nearing completion, is to centralise functional and support operations onto one site to improve supply chain processes across the Group. Through this rationalisation initiative, BMG strives to achieve cost optimisation, improve regionalised branch office support and enhance customer service capability," continues Barbour.

BMG's technical resources centre offers services that positively influence a company's operating efficiencies, by ensuring maximised mechanical reliability of plant and machinery. Services include technical applications consulting, product and system design, on-site process analysis, lab and on-site oil analysis, product quality control and assurance, as well as condition monitoring services.

BMG World will also be home to field services. The company now has 140 mobile technicians with specialist technical skills and equipment to conduct breakdown and routine maintenance on plant. This team carries out trouble-shooting and advises on possible productivity improvements, to ensure the highest level of plant output and reliability.

BMG is committed to providing a 24-hour customer process support for production efficiency and reliability centred maintenance. This is enhanced by advanced technical and design support across all functional disciplines. □

Left: The VLT Automation Drive range is available from BMG in a power range from 0.25 kW to 1.4 MW.

Below: BMG's stand at this year's Electra Mining exhibition highlighted the company's electro-mechanical solutions and technical services.



Reducers, gear units and applications engineering

Bearings International (BI) product manager, Naigel Pera (right) and engineering manager, Josué Pérez-Sánchez talk about the company's Motodrive brand and the associated application engineering services offered for the full range of available technologies and components.



The Motodrive brand, according to BI product manager, Naigel Pera, "is supported in South Africa through Bearings International (BI), offers economically-priced alternatives to traditional competitor products available on the market. "These are high-quality, cost-competitive products supported by the BI network, providing our customers with an attractive value proposition and solution." The range includes SMSR shaft-mount speed reducers, NMR worm gear units and TR in-line gear units.

The SMSR gear unit is a robust, hard-working, simply-constructed gear unit used in conjunction with belts and pulleys to achieve the ratios required. Units are available from Size D to Size J, in ratios from 13:1 and 20:1, as well as in parallel standard size bores with key only.

This shaft-mount speed reducer includes a complete torque arm assembly and is fully interchangeable with other brands. Motor bases, belts and pulleys and holdbacks are not in-

cluded. Production-line manufacturing guarantees tolerances and consistent quality, especially in terms of helical gear components.

"We have made a significant investment in terms of our stockholding of the Motodrive range in anticipation of expected demand," Pera reveals. "BI offers a range of products, from premium to economy, including most ancillary products.

BI focuses on all market segments, from domestic use to heavy industry, mining, steel and other sectors. "We supply products from Mechano set size chain to massive drill rig drive and pulldown chains, and gearboxes suitable for spitbraais to massive furnaces or curing oven drives."

Technical support is offered by BI's



Right: An NMR worm gear unit, part of BI's Motodrive range.

Left: The SMSR gear unit is a robust, hard-working, gear unit available from Size D to Size J in ratios from 13:1 and 20:1.



"Our aim is to facilitate the overall purchase-and-supply process as much as possible. We achieve this by paying attention to the type and quality of supply required for various applications. We also have the flexibility to be able to offer a single supplier option," Pera highlights.

experienced product managers, in conjunction with the company's principal suppliers. "Installation is supported through our engineering department and the various partners we engage with to complete site work when required," Pera adds.

"In terms of aftermarket support, our extensive branch network ensures we have someone in the area to tend to any immediate concerns or issues, in addition to call-on assistance from our 24/7 product support team," he says.

Application engineering as a value-added service

BI's technical information and problem-solving service aims to present sound cases to potential customers to opt for BI products in order to meet a specific business need, explains engineering manager Josué Pérez-Sánchez.

"We follow a process of gathering information about a customer's particular application in order to be able to offer the most informed decision possible when it comes to recommending a BI product," he explains.

"BI is able to give customers peace of mind by providing the correct recommendations with regard to plant improvement and reduced downtime. Each customer project gives us the opportunity



The Link Belt in-line gear unit, a simply constructed and cost competitive gear unit.

to improve our product offering and service implementation," Pérez-Sánchez comments.

The information provided by the potential customer is used to highlight aspects such as seal design improvements, lubrication systems or products, fitment tools and/or procedures, training in terms of bearing installation procedures and any additional power transmission requirements.

"Our capabilities in terms of application engineering not only promote the capabilities of BI as a technical partner, but also open doors to ancillary products in our extensive range," Pérez-Sánchez says.



BI recommends best-brand products for plant improvement and reduced downtime.

BI, part of the Hudaco Group, has consolidated its position as a leading distributor of bearings and power transmission products in Southern Africa by launching a new brand identity at the end of last year.

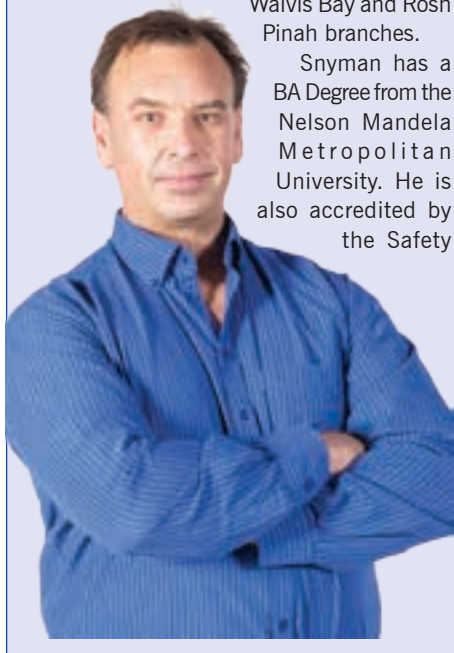
With over 58 years' experience in the bearings industry, BI goes to great lengths to ensure that its product range and service meet the changing needs of its clients, industry and business. Backed by a skilled technical team, BI is

able to ensure immediate product availability through its nationwide network of branches.

"Our aim is to become a proactive company providing excellent service to our customers to ensure we are the preferred supplier. We strongly believe we should rather compete on value, providing advanced, industry-specific solutions and services, and thus safeguard industry sustainability," says CEO, Burtie Roberts. □

BI appoints new regional manager for Namibia

Bearings International (BI) has appointed Bennie Snyman as regional manager of its Namibia division, tasked with overseeing the Windhoek, Walvis Bay and Rosh Pinah branches.



Snyman has a BA Degree from the Nelson Mandela Metropolitan University. He is also accredited by the Safety

and Security Sector Education and Training Authority (SASSETA) as an assessor and moderator, in addition to holding a Grade 'A' certificate from the Private Security Industry Regulatory Authority (PSIRA).

His key skills and competencies include conducting industrial site checks, setting site surveys and recommendations, performing site audits and quality inspections, installing emergency systems, implementing quality policies, conducting performance appraisals and development implementation, guarding monitoring systems, and implementing ISO 9001: 2000 accreditation.

In addition to this, Snyman is skilled in risk and security management, risk analysis, logistics security and cash management, industrial relations, occupational health and safety (OHASA) implementation and quality audits, and organisational management.

Snyman has gained extensive experience in different industries over the past 20 years, culminating in executive management level in operations, security, risk, sales and facilities management. He has received numerous industry and company awards. □



Topology optimisation improves rail component

When Alstom, Spain, wanted to improve the design of an existing cast rail component, the company employed HyperWorks as well as solidThinking Inspire® and Evolve® for design optimisation. The company then turned its attention to exploring additive manufacturing as an alternative manufacturing technique.

While investigating a component used in Alstom's Metropolis train bogies to support the anti-roll system, it was found that the first design of the part seemed much too strong for the occurring workloads, and the finite element (FE) model revealed that the safety factor was high.

As a first step, an analysis with solidThinking Inspire was carried out, providing the same results. To improve the overall design while at the same time optimising material use, the optimisation options were extended by increasing the design volume of the part, followed by a topology optimisation.

As a result of several iterations with Inspire, a customised solution was found; the exterior shape was refined and fixed with solidThinking Evolve.

The final geometry was then again verified with a detailed FE analysis. For the next step, which was already in progress, the team began preparing and analysing the part to be additively

manufactured. For this Alstom collaborated with local 3D printing companies.

Alstom a world leader in integrated railway systems

As a promoter of sustainable mobility, Alstom develops and markets systems, equipment and services for the railway sector. The company manages the widest range of solutions in the market – from high-speed trains to metros and tramways – offering customised services such as maintenance, modernisation, infrastructure and signalling solutions.

Alstom recorded sales of €6.9-billion and booked €10.6-billion in orders in the 2015/16 fiscal year. Headquartered in France, Alstom is present in over 60 countries and employs 31 000 people.

The component optimisation project described here was carried out by the Bodyshell and Calculation department in Barcelona, which is regularly designing and verifying the different train structures Alstom develops as the consultant to other Alstom departments on technical matters.

Heading the project was Juan Manuel Romero a structures and calculation lead engineer at Alstom, Barcelona.

The challenge

In every industry development engineers strive for the best manufacturing and development processes in order to create the finest possible products. When searching for the perfect structural design solutions, they have to consider technical and economical aspects. Simulation enables them to achieve their goal and supports them in the entire product creation process. At Alstom in Barcelona the engineers usually receive several inputs, (strength, volume constraints, thermal, and others) to study the geometry, the material, and the mountings.

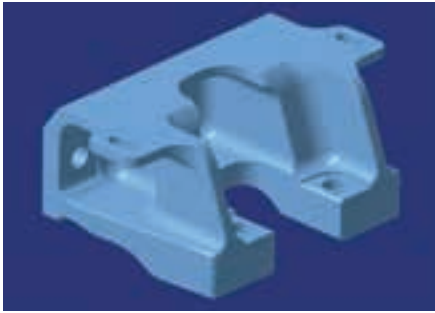
Then they check the solutions they came up with and generate graphical representations. Usually, the Alstom engineers handle several simulations per week, helping them to overcome any development obstacles that might occur. To address these challenges Alstom has to use sophisticated software tools allowing them to handle all related development tasks and to support the product creation process as a whole.

The solution

To handle their simulation tasks, Alstom Barcelona applies HyperWorks for meshing tasks and to perform static FE analyses. For optimisation and design tasks the engineers rely on solidThinking's products, Inspire and Evolve, in particular. These tools allow them to address issues such as material questions, geometries and compatibilities between manufacturing processes and the designs.

Before the engineers started with the re-design of the component to support the anti-roll system, the existing design had been analysed. Since the FEM model showed that the safety factor was a too high, an analysis with solidThinking

“We are very satisfied with the results achieved since we have realised better designs that fulfil all structural requirements in the shorter term. Currently HyperWorks is our main tool for structural studies as well as for the development of the best possible solutions, and we plan on using it for a long time”: Juan Manuel Romero, structures and calculation lead engineer, Alstom, Barcelona.



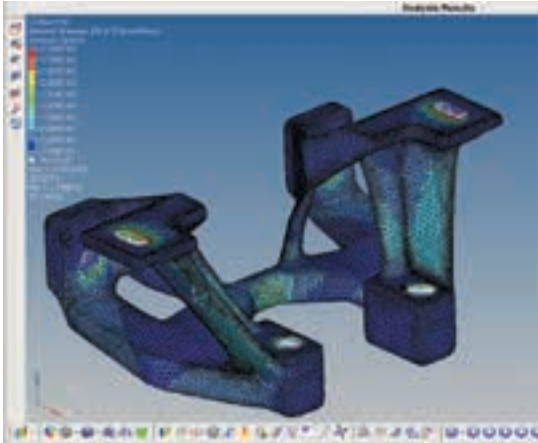
Model of the cast part supporting the anti roll system.



Defining supports and loads prior to the analysis with solidThinking Inspire.



Result of the topology optimisation with solidThinking Inspire.



The final geometry was verified with a detailed FEM analysis using HyperWorks.



Model of the 3D printed version of the anti roll system support.

Inspire was carried out, which returned the same result. With the aim of improving the overall design while optimising material usage, the design volume of the part was increased in order to expand the optimisation options.

For the subsequent topology optimisation the engineers first created a design space, then applied loads and other boundary conditions, and finally ran the optimisation based on this input. Following several iterations with Inspire, in which the design space was changed and the team applied various different load cases and boundary conditions, a customised solution was developed.

Finally the exterior shape was refined and fixed with solidThinking Evolve and the compliance of this final geometry was again verified with a detailed FEM analysis.

With the HyperWorks and solidThinking solutions, Alstom has achieved very good results. The use of Altair's solutions allows the design engineers to complete the process and support structural tests. With their simulation driven design approach, which is enabled and supported by solidThinking Inspire and the HyperWorks products, engineers can drastically change the way products are developed. As a result, better products

are developed in much shorter development cycles. Additionally, the redesign of the part resulted in overall weight savings of about 70%.

Alstom has been working with Altair and solidThinking products for 4-5 years, having established an exclusively Altair product-based development process for structural optimisation and simulation. The engineers at Alstom have a sound expertise in structural design and are now combining simulation, tests and the predicted behaviour in common situations to achieve the best possible results.

Benefits

The use of Altair's solutions in the development processes at Alstom resulted in better, stiffer and lighter products. Depending on the manufacturing method, weight savings of up to 70% have been achieved.

In addition to improving the design of an existing cast part by making it stiffer and lighter, the software also enabled Alstom's engineers to study the benefits of additive manufacturing, offering them new expertise in this area and the ability to implement this manufacturing method as soon as it is approved for series production. □

Altair for synthesis and optimisation

Altair is focused on the development and broad application of simulation technology to synthesise and optimise designs, processes and decisions for improved business performance. Privately held with more than 2 000 employees, Altair is headquartered in Troy, Michigan, USA and operates more than 45 offices throughout 22 countries. Today, Altair serves more than 5 000 corporate clients across broad industry segments.

Alstom optimisation highlights

Industry: Transportation/railway.

Challenge: Optimisation of an existing component design to be manufactured using casting or, alternatively, using additive manufacturing technologies.

Altair solution: Simulation driven design approach with solidThinking Inspire for topology optimisation; Evolve for shape refinements; and HyperWorks for FE analysis.

Benefits

- Reduced development time.
- Improved components with less weight and increased stiffness.
- Detailed insights into new additive manufacturing production options.

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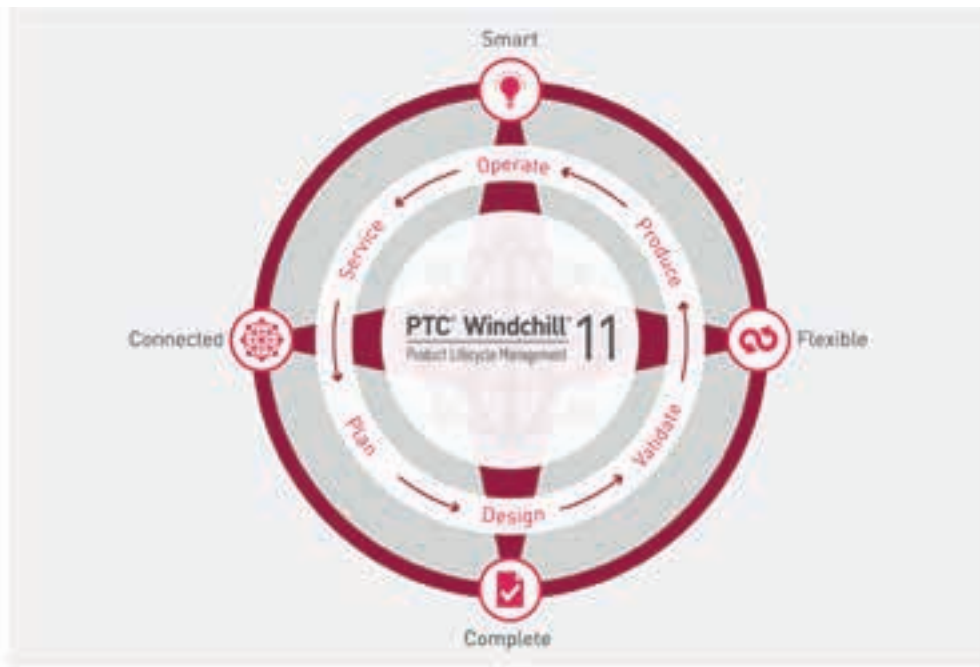
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Implicit modelling for the mining sector

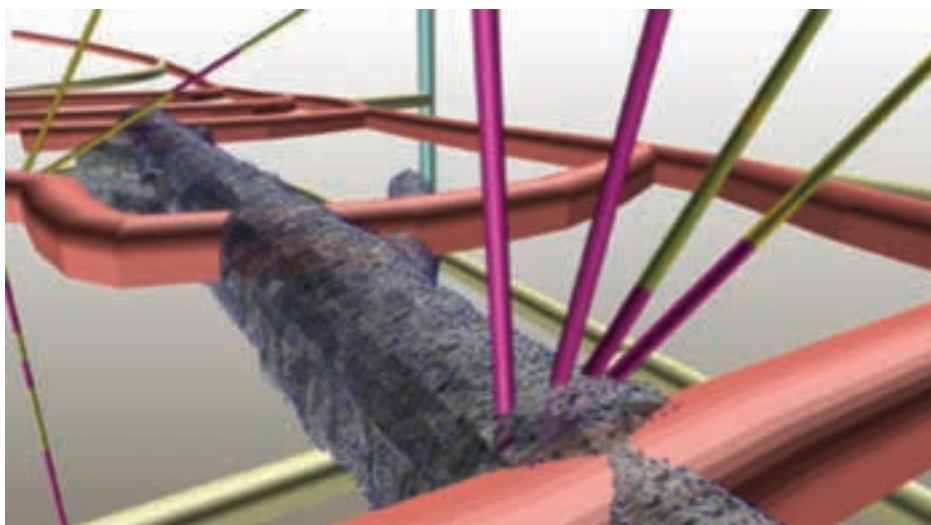
Despite a lack of understanding about what it actually is, implicit modelling has developed a strong following amongst modelling software companies, allowing for the process of data modelling to be sped up, for a more efficient operation.

Implicit modelling uses radial basis functions (RBFs) to model grade shells, lithology boundaries, faults or surfaces. These wireframes are readily displayed in Vizex and are a valuable tool for finalising geological or grade interpretations.

Despite a lack of understanding about what it actually is, implicit modelling has developed a strong following amongst modelling software companies. Its value to mining companies in particular has been enormous as it allows for the process of data modelling to be sped up, thus allowing for a more efficient operation. It has also eliminated the personal perceptions of geologists because of its numerical process, which helps reduce result bias.

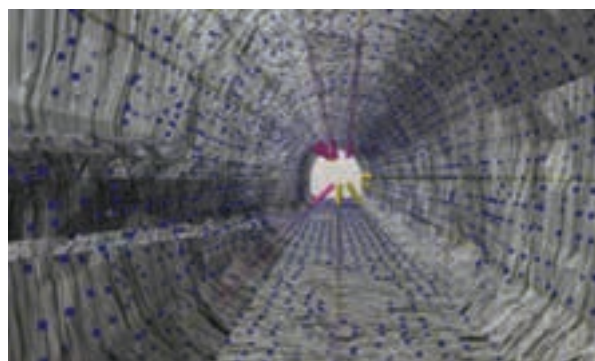
What may be hindering an understanding of implicit modelling is the lack of knowledge around what a true implicit model is. Firstly, a true implicit model is just a big equation that covers the entire volume under investigation. This has infinite resolution, however, and doesn't always produce a visible result. Secondly, a true implicit model can be queried in an infinite number of ways without having to recalculate the equation. Applications that don't support a true implicit modelling framework must recalculate the entire solution each time and the methods used to produce the resulting triangulated model are generally less sophisticated.

It's important to realise that implicit modelling has not replaced traditional modelling or stratigraphic methods as the ideal way to model data, it is an alternative method that is suited to some orebodies and not others. Previously, computers were unable to handle the size of the calculation required to produce the model but as they developed more power, they became equipped to handle the calculations. One of the other



Above: A Micromine model of an as built mine workings defined by a laser point cloud, surrounded by drillholes and proposed future mine workings.

Right: Implicit modelling uses radial basis functions (RBFs) to model grade shells, lithology boundaries, faults or surfaces.



biggest changes over time was the integration of implicit modelling into mainstream mining software and the expansion of modelling applications in mining.

Implicit modelling is becoming mainstream within the minerals industry as seen through the adoption of the software by most general purpose mining applications. It featured prominently in the 2014 edition of AusIMM Monograph 30 (Mineral Resource and Ore Reserve Estimation: The AusIMM Guide to Good Practice). Once again, it is important to remember that this is not meant to replace other methods, but to expand the range of methods available to geologists.

Micromine's first product launched into the mining world back in 1986 and was named after the company itself, Micromine. Supported by a large research and development (R&D) programme, Micromine develops the most intuitive, innovative, commercially advanced and affordable solutions available within the market place.

Micromine's R&D program is managed by experienced specialist people who understand the industry and can therefore anticipate the market's needs. Significant in-house knowledge is complemented by continual input from the

company's global client base, ensuring the solutions remain relevant and continue to meet – and pre-empt – the needs of the global mining and exploration sector.

Micromine 2016 release in May 2016, delivers several enhancements for implicit modelling, which include support for variable structural trends within a model and the ability to save and re-use the implicit model equation, which used to be discarded between runs.

The future of implicit modelling software, while continuing to grow in popularity as an integrated tool in mining applications, is also interesting geologists who believe it will be useful for analysing grade information within orebodies and orebody boundaries.

Frank Bilki, technical product manager at Micromine says: "Although this is actually possible right now, the results can't be used for reporting or production planning because the grade values don't have the necessary supporting data provided by traditional grade estimation methods. But advanced rendering methods such as stereoscopic 3D and immersive reality will increasingly be used for all forms of geological modelling." □

Direct hydraulic drives: flexible, simple

Hägglands Drives South Africa, a Bosch Rexroth company, specialises in direct drive hydraulic motors and control systems that offer variable speed with high torque, which is available across an extended speed and power range. *MechTech* talks to the company's MD, Leif Duwel, and sales manager, Kay Govinder.



Leif Duwel and Kay Govinder.

With Swedish origins dating back to late 1800, Hägglands products became part of Bosch Rexroth's global hydraulics portfolio back in 2008. "Hägglands businesses around the world were then integrated into local Bosch Rexroth entities, In South Africa, however, Bosch Rexroth did not have a presence in its own right, so we remain the only Hägglands Drives entity in the world," explains Duwel.

Govinder continues: "Currently, all Hägglands products are available directly from us or via Hytec company branches and its personnel help to identify opportunities and channel our products."

Debunking the myths

Describing some of the common misconceptions associated with hydraulics, Duwel says that many have come to believe that hydraulic systems are unreliable. "This is not true!" he assures. "As with any system, if one starts by choosing appropriate products that are correctly sized and specified for the drive application, then long and reliable life will result."

"We dimension, design and engineer each particular drive system to meet the functional requirements of the particular application. In so doing, Hägglands has, for over 50 years, been able to deliver hydraulic motors and turnkey drive systems that have been in operation for many years in harsh environments – and we

incorporate preventative maintenance technologies to further enhance and ensure reliability," he informs *MechTech*.

In addition, he says, "Hägglands drive systems are very easy to maintain. All that is really needed is to take care of the oil – keeping the temperature within limits, keeping contamination out and changing the filter elements when required."

With respect to leaks, Duwel says that today's piping systems and connections are of a significantly higher quality than they used to be. "We use non-welded piping systems that are leak free if installed by qualified personnel. We have our own qualified team with all the tools and equipment to install a complete system and piping can be fabricated – cut, formed, cleaned and mounted – directly on site or prefabricated in our workshop for guaranteed leak-free performance," he continues.

A lack of understanding of any technology, be it hydraulic, electric or mechanical, according to Duwel, "can make a system appear very complicated". "It's hard to sell a competing technology when a majority of customers are unaware of its key features and advantages," he argues.

With the rise of variable speed drives (VSDs) for motors, it is easy for people unfamiliar with hydraulics to think it is less modern and inferior. "This is also not true. Hydraulics is often a more suitable alternative," Duwel asserts. "Some people selling VSDs can claim that they save energy. But any savings depend on the actual operating conditions and on how well the drive is dimensioned to perform across its whole operating range."

Govinder picks up the argument: "Moving material from A to B requires a certain amount of energy, irrespective of the technology being used. Energy efficient drives are those that operate closer to their design parameters."

"To cater for high start up torque in low speed applications, we can dimension for the operating drive shaft requirements, which does not neces-



The use of Hägglands direct drives on bucket wheel stacker/reclaimers enables avalanches to be overcome more easily. This has led to these drives being specified on all of Vale's new and retrofit bucket wheels.

sitate over dimensioning due to start-up requirements.

Our Hägglands direct drive hydraulic systems can, in some cases, operate much closer to the installed power, due to the nature of our drive systems, which produce maximum torque at a reduced speed during start up. The torque requirement then decreases as the speed climbs towards the required operating speed," Govinder adds.

Duwel continues: "At the start, nearly all of the power is used to meet the torque requirement. Then, as the speed slowly climbs, the torque reduces, inherently keeping the system within the installed power capacity. So we don't have to size our systems based on unusual conditions such as start up," he says.

In addition, Hägglands direct hydraulic drives are more tolerant to shock loading and stalling. "Our hydraulic motors can be stalled at maximum torque, indefinitely, without any resulting damage."

"Following an avalanche on a bucket wheel stacker/reclaimer, for example, which regularly occurs, an electric motor is, typically, overloaded, resulting in delays. With a direct hydraulic motor, all the driver need do is slew the wheel back a little. As soon as the load torque

and reliable



reduces to below the maximum capacity, the wheel begins to move again,” Duwel points out.

This operational differentiator led to the specification of Hägglunds direct drive technology for all the bucket wheels at Vale iron ore ports in Brazil. “Being able to deal with avalanches more easily enables average train loading time to be reduced by several minutes. So Hägglunds drives are now specified on all of Vale’s new and retrofit bucket wheels,” he tells *MechTech*.

Several bucket wheels in Mozambique and South Africa are also fitted with the direct hydraulic drives technology. At RBCT in Richards Bay, Hägglunds has retrofitted two existing drives while two new machines are due for installation during 2017.

“In 99.9% of cases, our solution saves space and weight. “Retrofit installations are also very clean and simple. The hydraulic motor is installed directly onto the drive shaft, a torque arm being the only other connection to the structure. No shaft or bearing alignments are necessary and once the existing drive is stripped out, it is a simple matter to mount the motor and connect the hydraulic pipe work to the drive unit,” he says.

Addressing the modern technology misconception of switching to Hägglunds direct drives systems, Duwel says that the company’s control and monitoring system, called Spider, can be run locally



Spider’s use on metal shredders in the recycling industry enables frequent knife jamming to be cleared by automatically and repeatedly reversing the knife blade when a stall is detected.

from the drive unit or from any customer control system via a field bus, hard wiring or Ethernet,” he says.

Built into Spider is a monitoring and protection system allowing warnings and alarms to be easily checked. This enables service engineers to download data to see how the drive has been operated over time. The data can also be accessed remotely via a GPS system if offsite monitoring is preferred.

Citing Spider’s use on a metal shredder in the recycling industry, Duwel says that this application is associated with extremely high and variable torques and frequent knife jamming. “When the control system detects a stall on one of these machine, it automatically stops, then slowly reverses for a cycle. It will then attempt to drive forward again. It will repeat this process several times in an attempt to free the shredder blades. If successful, normal operation will resume without any intervention. Only in the worst cases will the drive have to shut down to protect the machine,” he explains.

“These systems are not expensive. A retrofit Hägglunds system on a bucket



Hägglunds direct drive hydraulic motors have a fixed circumferential cam. Under hydraulic pressure, radial pistons with end rollers push against this cam causing the inner to rotate.

wheel stacker/reclaimer, an apron feeder or a metal shredder can sometimes be sized to use less installed power and to operate much closer to optimum efficiency.

“Our largest motor, the CBM 6000, can produce more than 2 000 000 Nm of torque, weighs only 7.5 t and has a footprint of just 1.5 m in diameter by 1.3 m deep. For low-speed, high-torque applications, there is no better technology,” Duwel concludes. □

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New product selection tool for optimum results

Bosch Rexroth recently launched its integrated LinSelect selection and sizing software tool, enabling design engineers to find optimal linear axes and actuators for their application in just five steps, from around 100 000 possible Bosch Rexroth product variants. The company presented an alpha version of the software at the 2016 Automatica trade fair, held in Munich, Germany, from June 21 - 24, 2016.

LinSelect delivers an integrated digital engineering process, from selection right through to configuration and electronic ordering at the Bosch Rexroth eShop. Here, selecting complete axes and actuators extends beyond the mechanical considerations; it also encompasses suitable Bosch Rexroth motors and drive controllers.

LinSelect doesn't just simplify design and procurement for experienced engineers; even inexperienced users are guided intuitively through the selection process, without the need for laborious training and familiarisation. In just five steps, the software narrows down the number of possible variants based on individual needs.

In addition to a pure calculation of mathematical parameters, the software developers have also integrated algorithms with comprehensive application-specific know-how of linear motion systems. Beyond pure mechanicals, the tool also suggests suitable Bosch Rexroth



In support of integrated digital engineering, the new Bosch Rexroth selection and sizing tool, LinSelect, for linear axis drives and

actuators, enables design engineers to find optimal linear solutions for their application in just five steps, from around 100 000 possible product variants.

motor and drive controllers.

Bosch Rexroth's range of linear technology and electric drives and controls is available exclusively in sub-Saharan Africa through Tectra Automation, a member of the Hytec Group of companies.

LinSelect's special features

- Quick engineering: results in less than 15 minutes.
- LinSelect combines years of application experience with a modern and intuitive user interface.

- Seamless selection, configuration and ordering process.
- Select mechanics, motor and drive combination with a single tool.
- Precise and reliable results.
- Always up-to-date: product data supplied continuously.

Key technical data

- Select from more than 100,000 product combinations.
- Interface to online configuration tool.
- Several languages available.
- Also available offline. □

CR6-free seamless hydraulic tubing now available

Hydronic and Automation Warehouse (HAW), a Hytec Group Company, has added a new range of seamless steel tubing to its already extensive stock – chrome 6-free (CR6-free) hydraulic line tubing from Salzgitter Mannesmann. This tubing is ideal for all high-pressure hydraulic applications.

"The CR 6-free steel tubing complements our existing range of steel tubing as it offers a superior corrosion protection and is environmentally friendly," says Werner Joubert, branch manager, HAW Johannesburg.

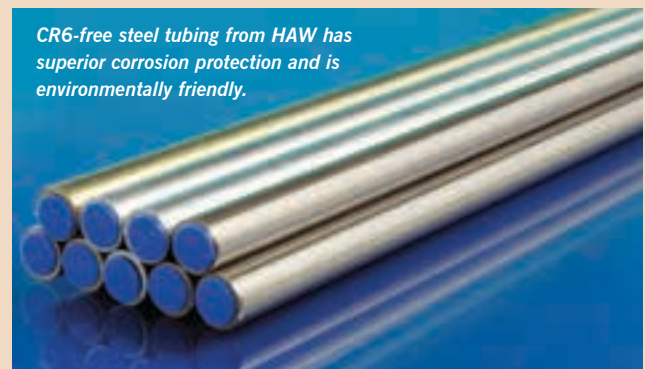
Salzgitter Mannesmann's high-performance passivating process provides CR6-free coating with substantially improved resistance to white rust. No painting of the tubing is required and no changes to assembly procedures are required.

CR6-free hydraulic line tubing can be installed faster as it does not require preheating prior to welding. In addition, the tubing can be bent or shaped without flaking of the plated surface.

The CR6-free range is available in sizes ranging from 6.0 to

42 mm and in lengths of up to six metres.

HAW has distributed various hydraulic components for both the South African and African markets for the last 20 years and has a strategy to continuously expand its product offering to satisfy market demand. □



CR6-free steel tubing from HAW has superior corrosion protection and is environmentally friendly.

Heavy bay foundry geared for growth

Grant Ramsden (right), operations director at Weir Minerals Africa, talks about the company's upgraded Heavy Bay Foundry (HBF). Situated near the new deep-water port of Ngqura that serves the Coega Industrial Development Zone (IDZ), the facility is now successfully operating at higher efficiencies and delivering quality components to both local and export markets.



More recently, Weir HBF commenced producing wear items for the very successful Trio® range of comminution equipment. These parts will serve Weir Minerals Africa's extensive customer base for Trio equipment in Africa and the Middle East.

In addition, the facility is well positioned to produce componentry for equipment used to service the Canadian oil sands industry, a strategic growth area for Weir.

Grant Ramsden, operations director at Weir Minerals Africa, tells *Mechanical Technology* that the intention is to grow Weir HBF's order book significantly by competing for a larger share of the 1.0 to 17 t castings market. "This is a niche market and we believe we are now strategically geared to grow this business," Ramsden says.

These milestones at Weir HBF are as a result of ongoing investments at the foundry that have brought the facility in line with recognised international best practice in castings. Upgrades to the facility commenced in 2013 shortly after Weir acquired the then Xmeco Foundry in a move that added significant value to its

existing casting capability at that time.

Located close to the new deep-water port of Ngqura that serves the Coega Industrial Development Zone (IDZ), Weir HBF is well positioned to complement Weir's strategy of being a best cost sourcing operation.

Both the IDZ and port have been identified by the South African government as critical support infrastructure for South Africa's mining, oil and gas and energy industries, and are therefore set to be the beneficiary of ongoing substantial investments.

Ramsden says the acquisition also brought with it 60 years of experience and skills in producing a broad variety of castings in ferrous metals, as well as an extensive casting infrastructure and capacity housed at the five hectare site with some 16 000 m² under roof.

The extent of Weir's investment into the foundry is reflected by its exacting quality standards that have been firmly entrenched at the facility, which is underpinned by its ISO 9001, OSAS 18001 and ISO 14001 accreditations.

Like Weir's other state-of-the-art foundry in Isando, standard operating procedures comprise about 150 repeti-

tive processes aimed at eliminating inefficiencies, while significantly improving the quality of the end product.

"Repeatability ensures consistency and therefore optimum quality," says Ramsden.

This quality philosophy has been adopted and implemented by the 106 employees throughout the operation including the foundry, heat-treatment and finishing component lines.

The heart of the operation is the pattern shop, and its current upgraded capability follows from a significant cash injection by Weir. Profiling of all castings and patterns is now undertaken using two seven axis, three dimensional scanning probes with accuracies of 1.0 µm (0.001 mm) that have replaced outdated templates. In addition, engineers have been equipped with state-of-the-art software that accurately simulates casting



methods, enabling yields of up to 76% to be achieved during the operation, compared to 45% to 50% at some traditional foundries in the country.

Weir HBF is also capable of designing unique compound polystyrene patterns for once-off and short run castings, otherwise known as rapid prototyping. The solid model design is loaded into a new three-axis CNC milling machine for accurate cutting of polystyrene patterns.

Ramsden says that Weir HBF is considered a leader in the field, having drastically improved the foundry's capability to service this important market.

"A furan sand mixture is compressed around the polystyrene patterns. The hot metal is poured into the polystyrene cavity, vapourising the polystyrene and forming the shape of the part. Where surface finish is imperative, the polystyrene pattern is removed from the sand once it has set and the casting is poured conventionally," Ramsden explains.

The pattern shop has also been fully equipped and staffed to manufacture new patterns in wood and polystyrene, as well as for the repair or modification of wooden patterns of any size. The shop features the latest state-of-the-art beam saws and table saws used to accurately process marine plywood.

One of the major features of Weir HBF is its electric induction melting furnace range, consisting of six furnaces that provide an impressive melting and pouring capacity of up to 18 t at a single pour. Numerous heat treatment ovens allow precise heat treatment and stress relieving capabilities to suit the

specific material option.

However, it is the large investment made into the new enclosed fettling booths, which are all equipped with dust extraction systems at the finishing line, that best demonstrate Weir's commitment to health and safety at the operation.

Fettling operations are also set to receive cutting edge high frequency grinding technology that will improve ergonomics for workers. This new technology is based on an arm and spring system that bears the full weight of the tool, while reducing fettlers' exposure to vibrations by up to 50%.

In order to remain a best-cost producer of castings, Weir endeavours to reduce process waste generated at all its foundries, and Weir HBF is aligned with these lean principles.

The recent commissioning of an advanced secondary sand plant at the foundry will significantly reduce manufacturing costs by enabling the recovery of furan sand. This plant uses magnetic separation technology to extract chromite sand added to furan sand during the moulding process. It also scrubs resins from the furan sand by attrition, allowing the foundry to realise significant savings in chemicals.

Ramsden says this recent investment will also improve the overall quality of castings by mitigating 'sand burn-on' caused by chromite sand build-up in the casting process.

The metallurgical laboratory has also received a major upgrade, which includes a new spectrometer that will be used to



The newly installed sand plant at Weir HBF.

inspect the composition of furnace metal, and a sand particle analyser for assessing the quality of the sand used in moulding.

While investments have predominantly been geared at improving productivity and quality, the on-site canteen and clinic serve as a reminder that Weir has built its success on its employees. Weir HBF intends retaining its skilled artisans as it continues to raise its profile in the international foundry industry. □

1. Profiling of all castings and patterns are done using a seven-axis 3D scanning probe.

2. The investment in the computerised milling machine for cutting polystyrene patterns allows for rapid prototyping.

3. Weir HBF furnaces have a melting and pouring capacity of up to 18 t.



2



3

Quo vadis titanium? The status of the titanium industry in South Africa

In our Materials Engineering in Practice column this month, Leslie Chown of the School of Chemical and Metallurgical Engineering at the University of the Witwatersrand talks about titanium and its alloys and the dti's aim to create a local titanium beneficiation industry.

“Your bullets ricochet ... I'm bulletproof ... I am ti – ta – ni – um...”. The lyrics of this song pop into my head as I write this article. It seems to be my theme song at the moment, as a lot of my work revolves around this amazing metal.

Titanium and its alloys seem to be a panacea for use in aggressive environments. Properties such as a good strength-to-weight ratio, excellent corrosion resistance, higher strength and fracture toughness than steel, high temperature resistance of up to ~590 °C, higher fatigue strength than aluminium or magnesium alloys, low density – half that of steels and superalloys – tick all the right boxes for a wide range of applications.

Typical uses are in aircraft structures, aero-engines, biomedical devices and components in chemical processing equipment. In 2012, 55% of titanium metal in China was used in chemical pro-

cessing, with about 8.0% for structural parts in the aerospace industries and just under 7.0 % in power generation.

Globally, South Africa has the second largest reserves of titanium ore, and is the largest supplier of titania slag, used as pigments in paint, paper and plastics. Pigments account for about 94% of titanium use, leaving 6.0% for metal products. While an ingot of titanium metal can cost \$20 to 80 per kg, and high-end products such as implants 10-1 000 times more, slag sells for a mere \$1 to \$2 per kg.

So how much titanium metal from ore does South Africa currently beneficiate? The answer is staggering: zero tonnes per annum. We are not capitalising on local beneficiation of this resource, because the Kroll process for manufacturing pure titanium is expensive and we cannot be competitive. However, a small but growing, local industry imports semi-finished mill products, converting them to value-added products such as biomedical equipment and large titanium aerospace parts.

The dti aims to create a local titanium beneficiation industry within the next decade. South African universities and institutes collaborate in the dti Titanium Centre of Competence (TiCoC), hosted by the CSIR. Apart from driving commercialisation of titanium casting, powder production and additive manufacturing

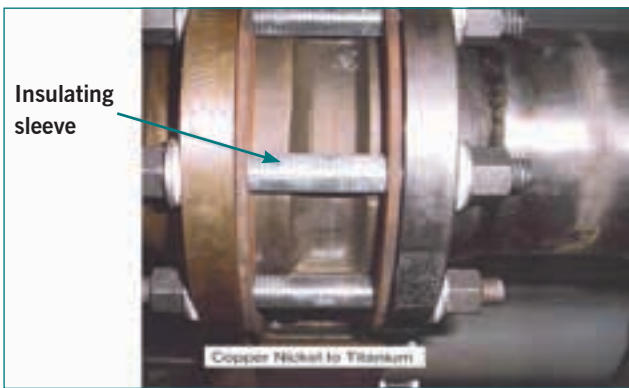
processes, this programme also ensures that we develop human capacity around titanium manufacture.

The ‘workhorse’ of titanium alloys is Ti-6Al-4V. Titanium on its own is expensive, and the aluminium-vanadium master alloy used in the production of Ti-6Al-4V adds to the cost. Researchers are looking at all aspects of manufacture to reduce the cost of titanium alloys. In one of our research projects, the possibility of partially replacing the Al-V master alloy with low cost ferrovandium is being explored. Of course, this alloy would not compete with Ti-6Al-4V, but may offer a cost-effective solution for an application with less stringent requirements.

There is growing concern around life extension, especially in power plants and chemically aggressive industrial environments where corrosion, high temperatures, creep and wear occur. In some cases it would be beneficial to replace steel components entirely with suitable titanium alloys, especially in new plants. The initial higher cost of titanium parts is more than offset by the savings from the metal's 20 to 50 year life, with reduced equipment maintenance and down time. The US Navy chose titanium over copper-nickel for seawater piping systems on LDP-17 ships, expecting titanium to last the ship's lifetime of 40 to 50 years, with half of the weight. Where full replacement of components by titanium is not viable, coating the relevant surface may provide a low-cost, but very effective solution.

As new technologies, such as additive manufacturing using titanium powders and joining titanium, are developed, the alloys become more accessible. In 2012, the US Office of Naval Research used friction stir welding to join plates of titanium for a ship hull – a technology breakthrough.

Coming back to the song – yes, titanium can be bulletproof! Military-grade products are supplied for armouring land-based vehicles. □



An isolated Cu-Ni pipe and flange connected to a bronze butterfly valve and an isolated titanium flange and pipe connection.
Photo reference: Kriedt, FA; Mountford II, JA, Scaturro, MR. (2014), Guidelines for Using Titanium in Seawater Piping, SNAME T&R Bulletin No. 3-52, 16.

References

- David Guetta lyrics from the song “Titanium”.
- Lutjering, G and Williams, JC (2007) Titanium, 2nd Ed. Springer.
- ResearchinChina (2013) Global and China Titanium Industry Report. <http://www.researchinchina.com/htmls/report/2013/6611.html>.
- USGS (2014) Titanium, US Geological Survey, <http://minerals.usgs.gov/minerals/pubs/commodity/titanium>.
- Wild, S. (2015) Innovation: Shaping South Africa through science, GIBS and Macmillan.
- Aerosud (2016): <http://www.aerosud.co.za/tech>.
- Du Preez, W (2014) Beneficiation of South Africa's titanium resource, Presentation to the Portfolio Committee on Trade and Industry. www.thedti.gov.za/parliament/2014/Tiresource.pdf.
- Pickens, JR (2004), Low cost titanium for ships and tanks, Advanced Materials and Processes, May, 37-39.
- ONR (2012): www.onr.navy.mil/Media-Center/Press-Releases/2012/Titanium-Ship-Hull-Navy-ONR.aspx.
- ATI (2016). Armor Materials. www.atimetals.com/products/Pages/armor-materials.aspx.

Green Dot Tiles alert to replacement needs

Mark Jarrett, national sales manager of Multotec Wear Linings, describes the advantages of Multotec's new Green Dot Tiles, developed to better indicate the wear condition of lining systems.

The ability to timeously monitor wear on chute linings can provide processing plants with substantial savings in terms of operational and maintenance costs as well as reducing unplanned downtime. The Multotec Green Dot Tile, which features an integrated wear indicator, was developed specifically to address this pressing need.

Mark Jarrett, national sales manager of Multotec Wear Linings, says Multotec Wear Linings is the only ceramic tile manufacturer in South Africa to offer this feature, a clear indication of the company's commitment to providing customers with products that reduce total cost of ownership by reducing maintenance thereby increasing return on investment.

Jarrett explains that the innovative Green Dot Tile incorporates an integrated wear indicator that facilitates easier visual condition monitoring for customers. "The Green Dot Tile features a two-tone insert in the centre of the tile and as the tile wears down so does this insert," he says.

"As green portion wears down, it reveals a red layer, which indicates that only 25% of the tile thickness remains and the lining is therefore due for replacement. The system is so flexible that the dual



This Multotec quick fit panel incorporates Multotec Green Dot Tiles and also illustrates the location of fasteners and composite ceramic and polyurethane plugs for protecting fasteners.

colour of the insert can be changed to green and blue in, for example, an iron ore application, where red is not sufficiently visible," he elaborates.

A proprietary process is used to form the insert with the combined colours and the fusion within the tile itself to form a cohesive single tile. This process is key to the success of the wear indicator tile, as it provides the necessary integrity and strength consistency as well as enhanced wear properties for the tile to act effectively.

"When doing an inspection on linings, it is often not easy to determine the extent of the wear that has taken place. This visible wear indicator on the Green



Multotec Wear Linings' draughtsman, Leon Arlow; national sales manager, Mark Jarrett; and internal sales manager, Riaan Viljoen, discussing configurations of the Multotec Quick Fit Panel incorporating the Green Dot Tile.



Multotec Wear Linings' senior assembler, Simon Ndlovu assembling Multotec Green Dot Tiles into a Quick Fit Panel.

Dot Tile makes it very simple and allows optimum preventative maintenance to be done," Jarrett concludes.

The Green Dot Tile is designed to complement the company's flagship quick fit panels and facilitates a total maintenance friendly solution. □

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New research data set to stimulate stainless growth

Two years of intensive research by the Southern Africa Stainless Steel Development Association (sassda) in association with the Steel and Engineering Industries Federation of Southern Africa, gives local stainless steel fabricators insight into growth opportunities in new export markets as well as import substitution within the South African market. Sassda executive director, John Tarboton (left) explains.

According to Tarboton, “Previous data available to us only tracked primary product import and export figures, whereas we are now able to drill down into 100% of the total data within the stainless steel industry. This includes looking directly into finished products such as catalytic converters within the automotive industry, which make up 28% of total South African consumption, and into tank containers manufactured for the food and chemical industries, for example.

“This enables more accurate tracking and measurement of true import and

export figures, allowing sassda to assist local fabricators to explore new local and export opportunities.”

Previously, unlike primary stainless steel products, only finished products that were 100% stainless steel were included in the data. This was because the Harmonised System (HS) codes of the World Customs Organisation (WCO) do not specify what the finished product is made from.

“However, we know for example that about 3.0% of the total number of pressure vessels manufactured are stainless steel pressure vessels and that percentage can now be applied to the total quantities of pressure vessels exported

or imported. This means imports of fabricated products, industrial equipment and components into South Africa can now be categorised in a manner that makes it possible to identify the input materials into the final product,” explains Tarboton.

Similarly, South African exports of any finished stainless steel products are not identified in a manner that captures their stainless steel content, offering no identification of the value or volume of these exports leaving the country.

Tarboton says; “It is well known that global trade is sometimes categorised illegally when imported, in order to attract only the lowest rate of duty, which further exacerbates the situation. For example,



Tank containers, such as those manufactured in South Africa by Welfit Oddy, account for significant percentages of South Africa's stainless steel exports.

within the engineering industry there is a large component of 'strategic import plant', which is allowed into the country duty free as 'staged consignments', which do not allow for any measurement of the input materials into the equipment.

"Another area of uncertainty in the statistics, from our point of view, is that a significant portion of trade is measured as 'units' and not as kilograms, which makes the estimate of stainless steel content almost impossible in many cases."

In order to try and get a better understanding of both the import and export trade, sassda embarked on a review of available customs data over the past 10-year period, assigning an estimate of the stainless steel content to each applicable HS code.

While it is clear that there is uncertainty in this estimate, it does give approximate comparisons in this previously unreported area of the industry, and will allow the monitoring of these specific codes to determine where imports and exports are growing or declining.

Leveraging new fabrication markets locally

South Africa already possesses a world-class and globally competitive flat product producer, in Columbus Stainless, which exports approximately three quarters of its production around the globe.

However, there is a significant component of the required local market that is not produced locally: due to the form or finish required; the grades not being produced locally due to the uneconomic quantities required; or purely due to price. This results in continued and significant levels of unfairly priced material being imported into South Africa. Currently primary product imports into the country amount to some 40 000 tpa.

Equally impressive export performance is seen in the downstream fabrication industry in South Africa. Of the stainless steel primary product used in South Africa (approximately 170 000 tpa), almost 40% of this is exported as fabricated, value added products.

The biggest component of this is the catalytic converter and exhaust industry, which converts over 40 000 t annually and exports this to Europe, the USA and the Far East. The tank container industry is equally impressive, exporting more than 20 000 t of high value product into the global shipping market.

"This is the part of the industry that



Finished stainless steel products from industries such as the catalytic converter manufacturing plants in Port Elizabeth make up 28% of total South African stainless steel consumption.

is well known and is able to be quantified through the statistics published by SA Customs. However, we believe there is a significant component of the fabrication industry which 'flies below the radar', as exports and imports and which we intend to quantify and cultivate," Tarboton notes.

Sassda will be implementing a strategic needs analysis to identify potential import replacement opportunities locally. It intends to identify between two to three large volume products of the approximately 74 000 t of finished products currently being imported into South Africa.

"We look to increase the export market by identifying products that are currently being exported, meaning that our local production is competitive. Then we look at countries that are importing that product but not from South Africa to see if those countries are potential new markets for exports. On the other hand, we are looking at substituting imports into South Africa, in finished products that could either be manufactured competitively by our current members or are possible opportunities for new entrants into the market."

Once sassda member capabilities have been identified, opportunities lie in increasing the scale of downstream local fabrication of the 74 000 t of finished product currently being imported.

Export growth initiatives into African markets

A second initiative being undertaken by sassda is looking at International Trade data in order to find potential markets for locally fabricated product. Many less de-

veloped countries have quite simple trade statistics, and identifying specific product imports is often difficult. However, the development of a computer software program, which has now been made available to sassda, allows an analysis of all global trade in any specific HS code to identify potential market opportunities in a defined target market.

"If we have producers of food and beverage equipment looking for opportunities in Africa; it may be impractical and expensive, to visit all targeted countries – especially since the HS code data from these countries may be inaccurate or incomplete, making market identification difficult. However, if we are able to access export data from all countries exporting food and beverage equipment around the world, it is then possible to see which African countries are importing significant volumes, and to target our export drives into those specific areas."

Sassda will be embarking on both of these initiatives in the coming months, and will be working with local fabricators looking to identify import substitution or new export opportunities.

Sassda, the Southern Africa Stainless Steel Development Association, has been in existence for more than 50 years and is made up of members that distribute, market, manufacture and fabricate products and services relevant to stainless steel. With 400 members in sub-Saharan Africa, the association provides a platform to collectively promote the sustainable growth and development of the industry, with the main emphasis on stainless steel converted within the South African economy. □

East London to PE: the C350e

On 19 September in East London, Mercedes-Benz South Africa hosted a media launch for its new plug-in-hybrid range of vehicles, including the new C-Class C350e, which is to be built in the East London factory for local and export markets. *Peter Middleton* attends, drives the car and reports.



The C-Class C350e plug-in-hybrid is now in production at Mercedes-Benz South Africa's East London facility.

I have always been a bit sceptical about the notion that the rules for Formula 1 engines were to allow the technology to 'trickle down' to road vehicles. F1 motor racing is now using new hybrid power units with V6 turbo-charged petrol engines that produce 450-odd kW of power along with

a supplementary electric drive adding a further 120 kW, when needed. The rules are designed to depend on the MGU-K for regenerating energy when braking and the MGU-H for efficiently managing the speed of the turbine shaft and regenerating power from it when the exhaust gas flow is high. If either one of these regeneration systems fails, the car immediately becomes uncompetitive.

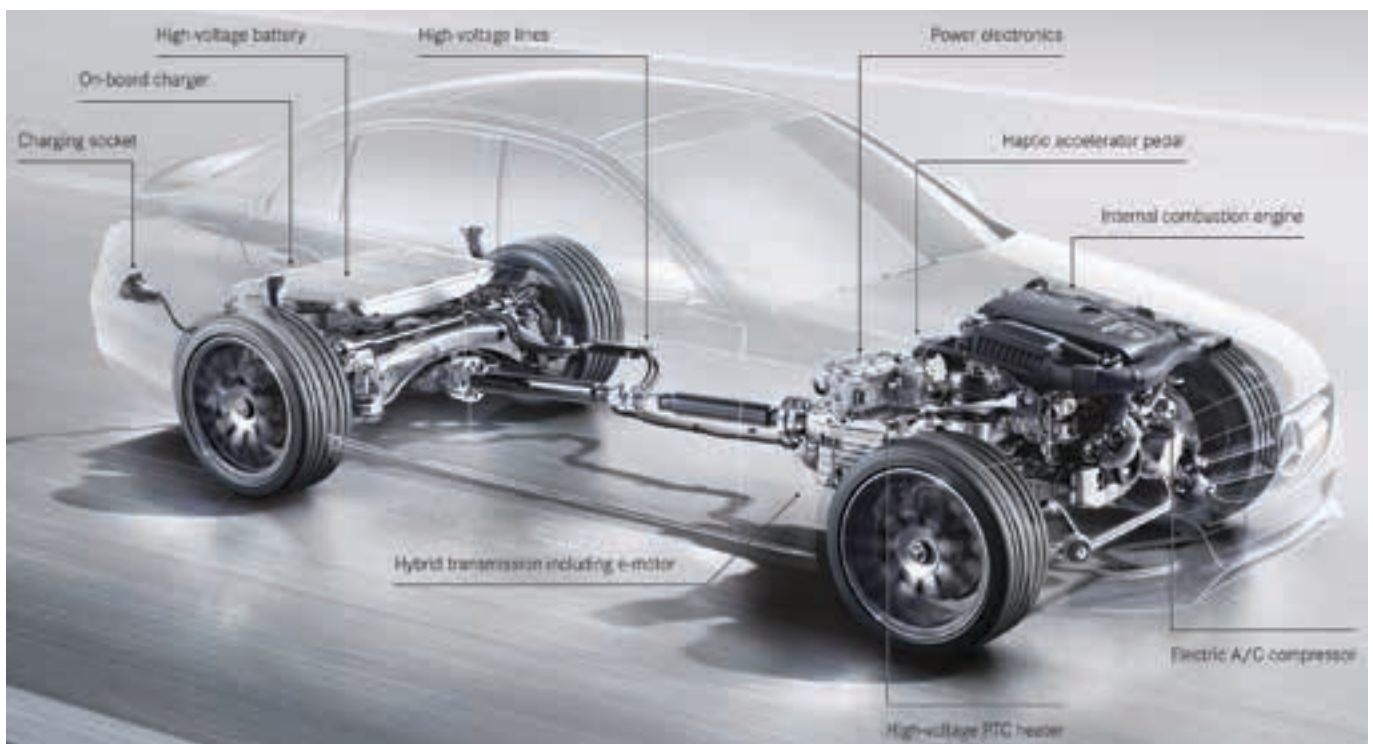
Fuel use and maximum fuel flow are limited to a maximum of 100 kg per race and 100 kg/hour, respectively, making it impossible to sustain full boost – 'hammer-time' – for more than a few laps per race. Overall success, therefore, depends on the car's management system and the driver's ability to balance deployment and harvesting of energy using strategies such as 'lifting off', or 'coasting' before braking into a corner.

On climbing into a Mercedes-Benz C350e plug-in-hybrid however, the 'trickle down' effect from F1 becomes obvious.



Following the presentations and a lightning tour of Mercedes-Benz's state-of-the-art C-Class factory in East London, pairs of media representatives were allocated a car, told that the GPS was programmed and that we were to meet up again at a restaurant 160 km outside of East London – 'for a car and mode change'.

The initial impression on getting into this C-class plug-in hybrid is its modern



The C350e hybrid combines an electric drive, with an efficient four-cylinder petrol engine, the two being interconnected via the automatic transmission. The electric motor, powered from a 6.2 kWh lithium-ion battery mounted in a new well under the boot space.

experience



and luxurious feel. The first thing you notice is the tablet-like touch screen display in the centre of the console. Then, as you try to work out how to adjust the seats, where the hand brake is, what it might look like and how to start the vehicle, you sense an amazing level of sophistication.

"Driving the new C350e is just as easy as any other automatic vehicle from Mercedes-Benz," the company claims. But having never driven an automatic Mercedes before, it took a while to locate the electronic brake release and park/drive selections.

Once moving, however, driving is not only easy, it is an absolute pleasure.

We managed to leave the East London manufacturing plant silently on electric power. We knew this, because the rev counter read zero for the first two traffic lights. At the third we were at the front of the queue and decided to try to get the engine to kick. We succeeded. The acceleration and responsiveness was amazing.

After a gentle drive out of East London, along with one or two 'hammertime' overtaking manoeuvres', we started to play with the controls.

A switch between the seats changes the display on the touch screen from GPS mode to operating mode: This is mooted to "to influence the regulation between electric mode and the use of the combustion engine".

In the Eco and Comfort transmission modes, the following operating modes are available:



Above: To facilitate manufacture of the C350e in East London, a new Lifter and High Station has been installed in the in the Assembly area.

Left: The console is dominated by a tablet-like touch screen display in its centre.

Right: The new high-voltage electrical testing station has required certification and training to ensure that the highest international safety standards are being met.

- **Hybrid:** All hybrid functions – electric, boost and recuperation – are automatically applied according to the driving situation and the route in the most fuel-efficient manner.
- **E-mode:** For all-electric driving.
- **E-save:** the charge status of the battery is maintained to allow all-electric driving at a later, more urban stage in the journey. Electric driving and boost are limited.
- **Charge:** Allows the battery to be recharged while driving using the combustion engine.

In modes S+ and S, which we took to represent super sport and sport settings, hybrid operation is also active – with less priority placed on fuel efficiency, we assumed. In addition, there is an 'Individual mode' which makes available a comprehensive set of drive system settings – ideal for the Lewis' and Nicos, perhaps?

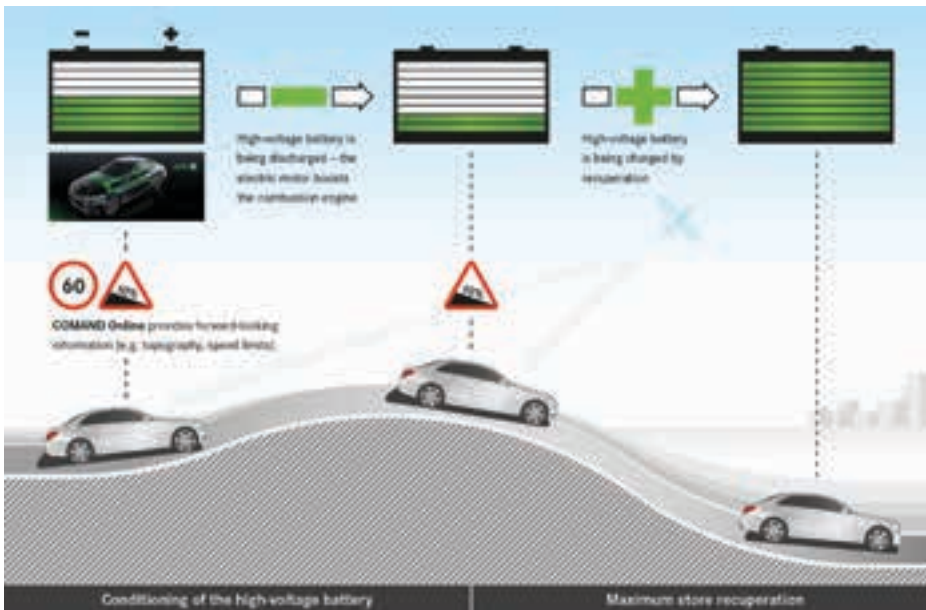
It is very difficult to feel any change at all when switching between these settings, which is hardly surprising, on reflection, as they mostly optimise energy use rather than limit performance.

We also tried to experience a feature called 'the haptic accelerator pedal', mooted to help drivers reduce fuel con-

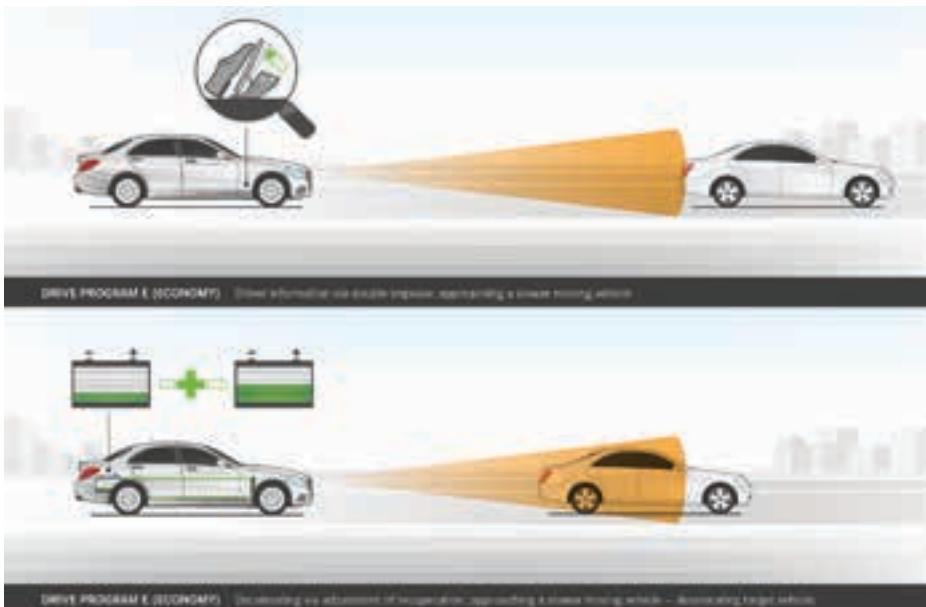


Fast facts: Mercedes-Benz C350e plug-in-hybrid

- 31 km range in purely electric mode.
- 60 kW electric motor produces a maximum torque of 340 Nm.
- 2.0 l four-cylinder petrol engine, produces 155 kW and maximum torque of 350 Nm
- 205 kW and torque of 600 Nm available from both drives combined.
- Certified consumption figures of 2.1 l/100 km on the standard test.
- CO₂ emissions of 65 g/km on the standard test.
- Equipped with Airmatic air suspension and a pre-entry climate control system that can be controlled via the Internet.



The Intelligent Hybrid operating strategy ensures that lithium-ion battery can take maximum advantage of recuperation opportunities provided by the route.



Radar based recuperation adjusts battery regeneration based on traffic conditions, coasting in free flowing traffic and immediately decelerating when it detects decreasing following distances.

sumption by providing feedback via pedal resistance. Neither of us could feel this resistance, but we later determined that we were in the wrong mode, it is only active in electric mode or in economy mode, when the Eco Assist function is active.

How does it work? When driving in electric mode, the driver's foot meets a point of resistance on the accelerator pedal when maximum all-electric performance is reached. Pushing through that resistance is like clicking 'Yes' to the question: "Do you want the combustion engine to kick in?" We were in Sports mode, so we were not asked this question. It would have been annoying.

A double impulse signal is also incorporated, which tells the driver to lift off

the accelerator pedal to switch off and decouple the combustion engine from the drive train. This allows the C350e's engine management system to automatically decelerate using data from the car's radar systems. We did notice some of this when our following distance decreased coming into a queue.

In support of anticipatory driving, the best strategy for efficiency, Mercedes has also enabled the navigation system to be connected to the engine management system. When an exact destination and route is entered into the navigation system, charge and discharge of the C350e's high-voltage battery is controlled to ensure the optimal use of energy over the whole route – taking into account

both stop-start portions of the journey as well as road elevation data.

Needless to say, the infotainment, comfort and safety levels are faultless. The vehicle has Airmatic air suspension as standard with electronically regulated continuously variable damper adjustment; Attention Assist, which can warn of inattentiveness and fatigue; and Collision Prevention Assist Plus, which protects against collision at speeds of over 7.0 km/h and, if the danger remains and the driver fails to react, undertakes autonomous braking at speeds of up to 200 km/h.

The price? R804 900 – but the C350e is exempt from CO₂ emission tax and comes with a six-year/100 000 km PremiumDrive maintenance plan.

Proudly manufactured in South Africa

"With a total investment of around R100-million in our Mercedes-Benz East London plant, the Hybrid project comprised of more than 500 new purchase parts, of which 200 were local, including significant changes to the bumpers and wiring harnesses," says Florian Seidler, Co-CEO of Mercedes-Benz South Africa and executive director of Mercedes-Benz Cars.

"This investment further demonstrates the company's commitment to the advancement of technology and skills development in the country," he adds.

Following the celebration in May 2015 of the millionth vehicle produced, the successful manufacture of the first C350e sedan at the award-winning Mercedes-Benz East London plant is another milestone in the company's illustrious 68-year history.

Logistics division's project management specialist, Liebrecht Otto, confirmed that all employees and contractors involved with the manufacture of these hybrid units were specifically trained to safely work with high voltage components.

"Instructors from TÜV SÜD, an international service corporation focusing on consulting, testing, certification and training, were brought in to the plant to ensure that we met the highest international safety standards. We have now set the benchmark in South Africa for safety, as we do for quality. From a facility perspective, to accommodate some of the additional work content, we installed a new Lifter and High Station in the Assembly area. Additionally, we

installed a manipulator on the trim line to aid the operator in securing the new battery into the vehicle,” says Otto.

Thanks to the combination of its combustion engine and electric drive, the hybrid drive system delivers impressively low consumption, but with high performance. The electric motor is able to replace or support the combustion engine in situations where the combustion engine does not perform quite so well, and makes practical use of energy generated while braking by converting it into electric energy and storing it.

The C350e uses the most advanced form of hybrid technology. Its electrical energy storage unit is a high-voltage lithium-ion battery with a total capacity of 6.2 kWh, which can be charged from an external power source and so makes an effective contribution to the low consumption and emission figures. The battery is water-cooled, weighs around 100 kg and is mounted in a sheet-steel housing underneath the rear axle in order to maximise crash safety, driving dynamics and boot space.

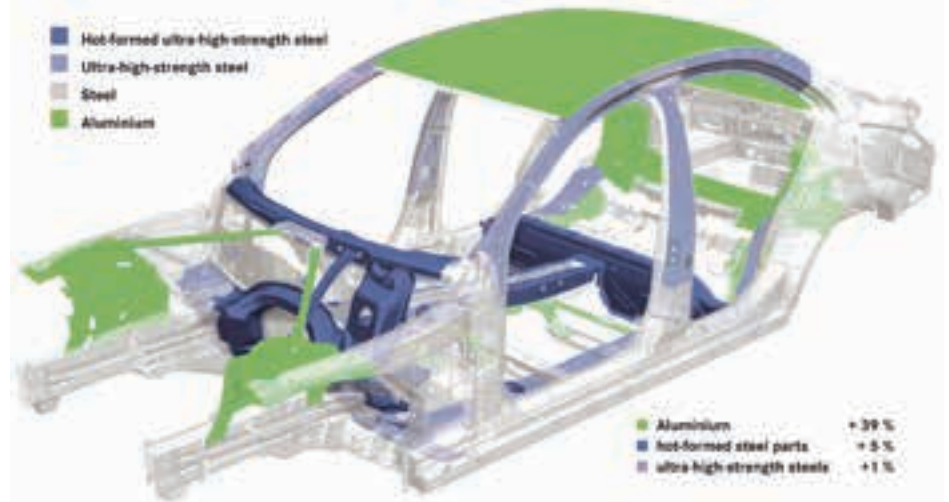
Thanks to an intelligent on-board charging system, the battery can be recharged in around 90 minutes at a wall-box (230 V, 16 A, 3.7 kW single-phase). Alternatively, charging via a standard domestic socket is also possible. Depending on the connection, a charge time of around two hours is achievable from a 230 V, 13 A (3.0 kW) domestic supply.

Despite the space taken up by the battery, the C350e still has a boot capacity of 335 l.

An overview of the power train

A four-cylinder petrol engine and a 60 kW electric motor: The C350e hybrid combines an electric drive, with an efficient four-cylinder petrol engine, the two being interconnected via the automatic transmission.

From a displacement of just under two litres (1971), the engine produces 155 kW and maximum torque of 350 Nm. Its direct injection system with spray-guided combustion uses precise electronically controlled multiple injection and fast multi-spark ignition to deliver outstanding performance coupled with high efficiency and low emissions. The electric motor, powered from a 6.2 kWh lithium-ion battery mounted in a new well under the boot space, has an output of up to 60 kW and can



Innovative lightweight construction through the use of aluminium, hot-formed steel and ultra-high-strength steels has reduced weight of the hybrid body by about 70 kg.

deliver 340 Nm of torque.

When both engine and motor are engaged simultaneously, therefore, a total system output of 205 kW, and 600 Nm of torque is available.

7G -Tronic Plus transmission: The hybrid module of Mercedes’ standard seven-speed Tronic Plus automatic transmission incorporates the electric motor and an additional clutch between the combustion engine and the electric motor. When driving in all-electric mode, this decouples the combustion engine from the drive train. It also, however, offers the possibility of moving off using the combustion engine but with the performance of a wet start-up clutch, the clutch being a substitute for the torque converter.

Engine management: Along with the engine management system, the transmission and its two clutches are at the heart of managing the combined power options. In electric mode, when starting and driving sedately in traffic, the C350e starts virtually silently since the combustion engine is inactive – and the rev counter on the dash reads zero when in electric-only mode.

When a boost of acceleration is required, both clutches are engaged to give the total combined output of the engine with the addition 60 kW from the electric motor. This is called boost mode.

When decelerating, braking or coasting down a hill, energy recuperation mode kicks in. The electric motor remains engaged, but is driven by the momentum the vehicle, so acts as an alternator. This allows electrical energy recovery, that is, some of the energy is recovered and stored in the battery. This energy can then be used at a later stage

for electric driving or in boost mode.

Maximising energy recovery during coasting and braking offers the greatest potential for lowering overall energy consumption. When the brake pedal is initially depressed, the electric motor takes on the job of decelerating the vehicle. If firmer braking is required, however, the disk brakes will then intervene mechanically to provide additional grip. This overlap between conventional mechanical braking and the electric braking performance of the electric motor in alternator mode increases both braking effectiveness and energy efficiency.

But to the driver, the difference remains imperceptible. During accelerating, cruising, coasting or braking, the intelligent engine management system of the C350e works in the background to select the ideal combination between combustion engine and electric motor.

The high overall system output and intelligent engine management give the car the dynamic performance of a nimble sports car, capable of sprinting from zero to 100 km/h in 5.9 seconds and reaching a top (regulated) speed of 250 km/h.

But this is combined with the ride comfort of a premium sedan, along with fuel consumption and environmental compatibility at a level that, until not all that long ago, would not even have been expected of many small cars – with certified fuel consumption of 2.1 l/100 km and corresponding CO₂ emissions of 65 g/km.

While the C350e only offers up to 31 km in all-electric mode, this is particularly good for city travel in traffic. During stop-start driving, an idling engine consumes fuel while stationary for high percentages of the travel time. □

Sealing solutions though quality brands

"BMG's commitment to providing high quality sealing products is evident in the extreme care taken in brand selection, in terms of standardisation, reliability, flexibility and consistent quality controls," says Marc Gravett, business unit manager seals, BMG. "The company has secured the exclusive supply, service and distribution agreements with leading global seals manufacturers, which means quality branded components are readily available.

"An extensive range of sealing products is available through BMG, as well as from the company's exclusive seals outlets, trading as BMG Sealco. BMG Sealco branches specialise largely in hydraulic cylinder sealing for earthmoving, mining,

agriculture and industrial applications."

BMG's sealing products include rotary shaft, torric, hydraulic and pneumatic seals, as well as allied products such as O-rings, waved washers, circlips, mechanical seals, gland packing and adhesives. Recent additions to the range are Mekrolek rotary couplings and the Spanjaard range of lubricants and allied chemical products.

Mekrolek rotary couplings or rotary joints, are designed to provide a reliable, leak-free seal for water, steam, oil, and air, between a stationary supply and a rotating workpiece.

These robust rotary couplings – which are available in mono and dual flow configurations, in threaded, flanged or quick release options – can be manufactured in various materials, including stainless steel, brass and aluminium. Important features include hydraulically balanced

mechanical seal faces, which reduce rotor torque and stainless steel rotors that prevent scale build-up. There are no springs in the media, which results in optimal flow rates. Units with high wear resistant faces are designed for operation in harsh conditions.

Applications for these rotating couplings include ball mills, pulp and paper mills, hydraulic coiling and uncoiling, brakes and clutches and flexible packaging. These units are also designed for use in rubber mixers, guillotines and eccentric presses.

BMG also offers a manufacturing facility for custom-designed sealing products, fabricated to exact specifications. This service also includes a full refurbishment facility for most brands of couplings. Every unit is inspected and pressure tested for optimum performance, according to stringent quality standards.

www.bmgworld.net



Seal Maker machines offer faster turnaround times, double the number of seal profile options and a wider range of materials, than previously available on the older generation seal jet machines.

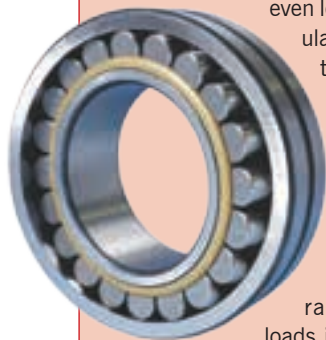
Upgraded Explorer spherical roller bearings

All SKF Explorer spherical roller bearings have now been upgraded to a new level of performance, featuring high-quality steel produced using an improved heat treatment process. These upgraded spherical roller bearings now provide

even longer service life, particularly in applications where there are high levels of contamination or poor lubrication conditions.

Originally introduced by SKF in 1919, SKF spherical roller bearings can accommodate very heavy radial and heavy axial loads in applications prone to misalignment or shaft deflections. The range has been continuously improved to increase reliability and decrease friction and all SKF spherical roller bearings are now available as upgraded SKF Explorer bearings, including open bearings, sealed bearings and bearings for vibratory applications.

www.skf.com



Chilled mirror hygrometer for reliable sintering

Michell Instruments, represented locally by Instrotech, has a new S8000RS chilled-mirror hygrometer that offers an accuracy of $\pm 0.1^\circ\text{C}$ over a dew-point measurement range from -80 to $+20^\circ\text{C}$, making it the ideal choice for moisture control in a range of metallurgical processes, including sintering.

Sintering is a process where powdered metals are bonded together to form light and strong products, from filters to machine parts. Because the powdered metal is not fully melted, the temperatures involved are relatively low – around 600°C – but careful control of moisture is essential to ensure the finished quality. Because the raw material is powdered metal, moisture present in the furnace could cause clumping or, as the moisture evaporates in the heat, large holes being created in the finished product. To avoid this, accurate control and measurement of moisture is vital.

For sintering carried out 600°C , maintaining a constant dew point of -60°C in the furnace is necessary and the gas is sampled at several points in the process. A fast-responding moisture analyser is necessary so that action may be taken quickly if moisture

levels rise above acceptable limits.

Michell's S8000RS uses the fundamental chilled mirror technique to measure moisture, which ensures long-term accuracy to $\pm 0.1^\circ\text{C}$ dew point as well as reliability and a fast response. The measurement range of -80 to 20°C dp is ideal to ensure consistent monitoring at -60°C with confidence in the accuracy.

The S8000RS is the smallest hygrometer on the market that can reliably measure dew points at -80°C . This small size is possible because it does not require any external cooling, which makes it well-suited to metallurgical applications where it is easy to install in an air conditioned instrumentation cabinet.

www.instrotech.co.za



For sintering carried out 600°C , maintaining a constant dew point of -60°C in the furnace is necessary and the gas is sampled at several points in the process. The S8000RS is the smallest hygrometer on the market that can reliably measure dew points down to -80°C .

Mid-sized forward and reversible plate compactor

Chicago Pneumatic has expanded its range of light compaction equipment with the introduction of a new tough and fast mid-sized forward and reversible plate compactor. The MV 504 is very easy to operate and maintain and intended for deep and medium deep compaction of granular soils.

“With its smooth operation, the MV 504 represents a great alternative to rollers when compacting soil in small areas,” says Andrzej Mroziński, spokesperson for light compaction equipment at Chicago Pneumatic. “In addition, it provides efficient performance and excellent traction, even on wet soil, helping operators to achieve the right compaction level.”

The MV 504 has a bottom plate made of Hardox 400 grade steel that is extremely durable and resistant to wear and tear. The compactor is equipped with a heavy-duty frame to protect internal components, with the hydraulic pump mounted on the engine to reduce the risk of impact damage.

The machine is designed to prevent rocks becoming stuck between the plate



The MV 504, a tough and fast mid-sized forward and reversible plate compactor from Chicago Pneumatics.

and the frame and the user-friendly design provides operators with easy access to the fuel tank, drive belt and eccentric box.

Alongside durability and low maintenance, the MV 504 has great ergonomic qualities. It comes equipped with a vibration-reducing handle and is easy to handle even on rough surfaces.

The MV 504 is available through Chicago Pneumatic’s local distributor network, which offers sales, aftermarket parts and maintenance services.

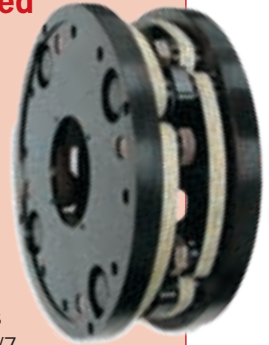
www.cp.com

Couplings for reduced machine footprint

The quest for smaller machine footprints continues as designers seek new ways to reduce machine size while increasing output. The Zero-Max CD® coupling provides precise and reliable shaft connections in less space than other couplings. It operates without fatigue for reliable 24/7 operation required in the latest machine designs.

Key to this coupling design is the composite flex element. It provides high torsional stiffness, yet allows for misalignment in high stress applications. In addition, these zero-backlash CD couplings provide smooth operation at high speeds. The coupling’s high performance material is configured in a compact design, surpassing the performance of much longer couplings to enable designers to reduce their machine footprint.

Designed around Zero-Max’s unique composite-centre disc, Compact CD couplings perform at peak torques in the most hostile operating environments – from extreme cold to hot weather conditions -70° to 250 °F (-57° to 121 °C). Time-proven applications include drive trains, gearboxes and generators providing trouble-free operation in sea water and abrasive desert sand conditions.



www.zero-max.com

Energy saving Pneumatic solutions for factory environments

As part of SMC’s constant pursuit of customer satisfaction, SMC has modified the three-port three-position VEX3 power valve used to control actuators. The modifications allow for improved cost savings and versatility by offering greater energy efficiency and added handling flexibility thanks to the addition of new manual override options, which have been added to the existing non-locking push type.

Compared to its predecessor, the VEX3 is not only smaller in size, but when added to the existing benefit of fewer components required per circuit, it delivers space and cost savings.

Achieving a flow rate of up to 3 300 ℓ/min, the VEX3, with its three positions, makes it possible to perform intermediate stops when actuating cylinders with bore sizes of up to 125 mm and can also change the speed of cylinders with up to 200 mm bore sizes. What’s more, two valves can be connected to a double acting cylinder, controlling speeds, slow stopping, acceleration and deceleration with nine different valve position combinations.

Product manager for SMC Pneumatics, Brian Abbott says: “While the func-

tions of the VEX3 can be performed by an electric actuator, this new power valve offers greater force and flexibility while being more cost efficient to purchase and operate. It is another great example of the SMC team working closely with its customers to deliver a product that improves productivity and reduces



The new version of SMC Pneumatics’ VEX3 power valve series ensures greater energy efficiencies and increased flexibility.

overall production costs,” he concludes.

www.smc Pneumatics.co.za

Less charging time gets more work done

Bosch’s L-Boxx is a 2.0 Ah battery that can be 100% charged in 45 minutes, allowing trades people to work without interruption.

“The L-Boxx even allows for wireless charging,” says out senior brand manager for Bosch Professional Power Tools, Campbell Mhodi. It comes with a wireless charging holster that can charge 18 V cordless drill drivers, cordless combis and cordless impact drivers.

“The wireless charging L-Boxx bay offers professional trades people the advantage of charging a cordless tool

while still in the L-Boxx. Inductive energy transfer enables both the battery in the tool and the spare battery in the L-Boxx to be charged at the same time,” Mhodi explains. Bosch also offers different versions of the wireless charging system. A stationary solution is designed for use in workshops and for semi-industrial production such as furniture and vehicle construction. The wireless charging holster is especially suitable for professionals who work directly from their cars, such as repair service technicians.

www.bosch.co.za

Fast-track MCCs for fast-track projects

The fast-track nature of many large industrial and mining projects on the African continent has seen an increase in the demand for containerised housing for motor-control centres (MCCs). These stations are quicker to establish on site than their brick-and-mortar counterparts and they are assembled off-site in factory-controlled conditions.

There is no limit to the size of the MCC stations, with containers connected side by side or stacked on top of each other to provide the necessary space. Being a modular solution, individual containers are easily transported to the project site and then erected.

Shaw Controls' chief commercial officer, Johan van Niekerk notes that the company has supplied these solutions to many project sites including Eskom's Medupi Power Station project and the associated Exxaro Grootegeluk expansion programme.

And, while this is a growing trend, Shaw Controls, a division of Zest WEG Manufacturing, is leading in their supply. The company's firm grip on this growing market can be attributed to its intense focus on quality at its 12 000 m² manufacturing hub in Robertsham, Gauteng.

Van Niekerk says the containers are constructed to customers' specifications at the Shaw Controls facility. "All our containerised housings are built from scratch. We install all the necessary fittings and claddings, based on individual

customer requirements," he says.

This approach is in line with Shaw Controls' strategy of keeping manufacture in-house to reduce costs and maintain close control over quality. The strategy is working, considering that Shaw Controls' order book for all its solutions – including its leading range of MCCs – is five times the size it was a year ago.

A sizeable share of this comprises orders from blue-chip mining houses and international engineering companies involved in brownfields and greenfields mining projects in Africa. Van Niekerk says the company's close affiliation to the mining industry means that it has to comply with the highest standards in design and manufacture of MCCs and panels.

This includes all quality and safety standards adhered to by Australian engineering firms, who are dominant players in the African mining industry. These are more stringent than those followed in South Africa, and this compliance has given Shaw Controls a competitive edge when tendering for projects across the country's borders.

This is complemented by Shaw Controls' IEC 61439 certification, which proves the integrity of its panels. As van Niekerk points out, these stringent tests require a high capital outlay and, for this reason, only a few South African companies have been certified. "We have subjected our products to all these tests, and re-verified the outcome of the tests in 2014. This is one of the reasons why we are so busy," he says.

The Shaw Controls' facility mirrors its international holding company and is testament to the WEG Group's commitment to South Africa. It boasts state-of-the-art computer numerical controlled punching and bending machines to work the sheet plating used to make the casings. The durability and longevity of the units are enhanced by extensive surface preparation of the various components, including the seven stage surface preparation process and powder coating they undergo before assembly.



A fixed pattern MCC manufactured by Shaw Controls for an E-house destined for a mine tailings project. "There is no other manufacturer in the country that is able to manufacture everything in-house," says Van Niekerk.

The facility even has its own gasket-manufacturing machine and makes its own steel hinges. "There is no other manufacturer in the country that is able to manufacture everything in-house," says Van Niekerk.

It is not only the mining industry that is demanding quality. Van Niekerk says Shaw Controls has been diversifying into an array of other markets, ranging from large industries through to small manufacturers.

"The future continues to be bright for a company that has proved the integrity of its products, and there is no customer too big or too small for us," Van Niekerk concludes. □

RAPDASA 2016 at VUT

VUT's Science and Technology Park is gearing up to host the 17th Annual International Rapid Product and Development Association of South Africa (RAPDASA) conference at its Sebokeng campus from November 2 to 4.

Under the theme 'Building on the Foundations – Consolidating impact into products to enhance quality of life for all South Africans', the 17th conference aims to summarise the achievements made in the field of 3D printing/Additive Manufacturing (AM).

An exciting national 3D Print Design Competition, forms part of the RAPDASA 2016 conference. The competition is aimed at encouraging designers, engineers and artists to use AM technology.

For further information, contact Anne Naidu: annen@vut.ac.za.

Industry diary

November 2016

ASME B31.3 Process Piping: Glynn Woods

7-10 November, 2016
Cedarwoods, Johannesburg
2KG Training
Phindi Mbedzi
phindi@2kg.co.za

11th Southern African Energy Efficiency Convention

8-9 November, 2016
Emperors Palace, Gauteng
Nikki Nel or Erika Kruger
+27 11 038 4300
info@sae.org.za
www.sae.org.za

Piping Systems: John Tonkin

14-17 November, 2016
Cedarwoods, Johannesburg
2KG Training
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phindi@2kg.co.za

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- Improvements in steel composition, heat treatment, geometries, surface finishes, lubrication and seals
- Extended bearing life in the most demanding industrial applications - can last up to twice as long as previous bearings under contaminated or poor lubrication conditions.



Find out more at www.skf.co.za



Bonsai – the Japanese art of growing trees in containers, requires a delicate balance of respect, effort and ingenuity

This balance plays an essential role in bonsai aesthetics. The isosceles triangle, with its unequal sides, provides asymmetry and is used in overall design to achieve *sabi*, or deliberate imperfection. Interpreted as a more natural sense of balance, *sabi* is highly valued in Japanese culture because it provides movement within the composition, symbolising a continuation of life.

At SMC Pneumatics, we manifest this balance. Our superior quality products, unmatched support, local manufacturing and extensive global supply chain synchronise to attain an exquisite balance between pliancy and stability, which helps our customers' business to thrive.

With 400 sales offices expertly balanced across 83 countries on five continents and a local staff complement nationwide, SMC is always close to our customers. Through the art of listening and truly understanding, SMC responds by designing custom products that match unique needs.

Contact us for a free consultation or a tour of our state-of-the-art facilities on +27 11 100 5866 or sales@smcpneumatics.co.za

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