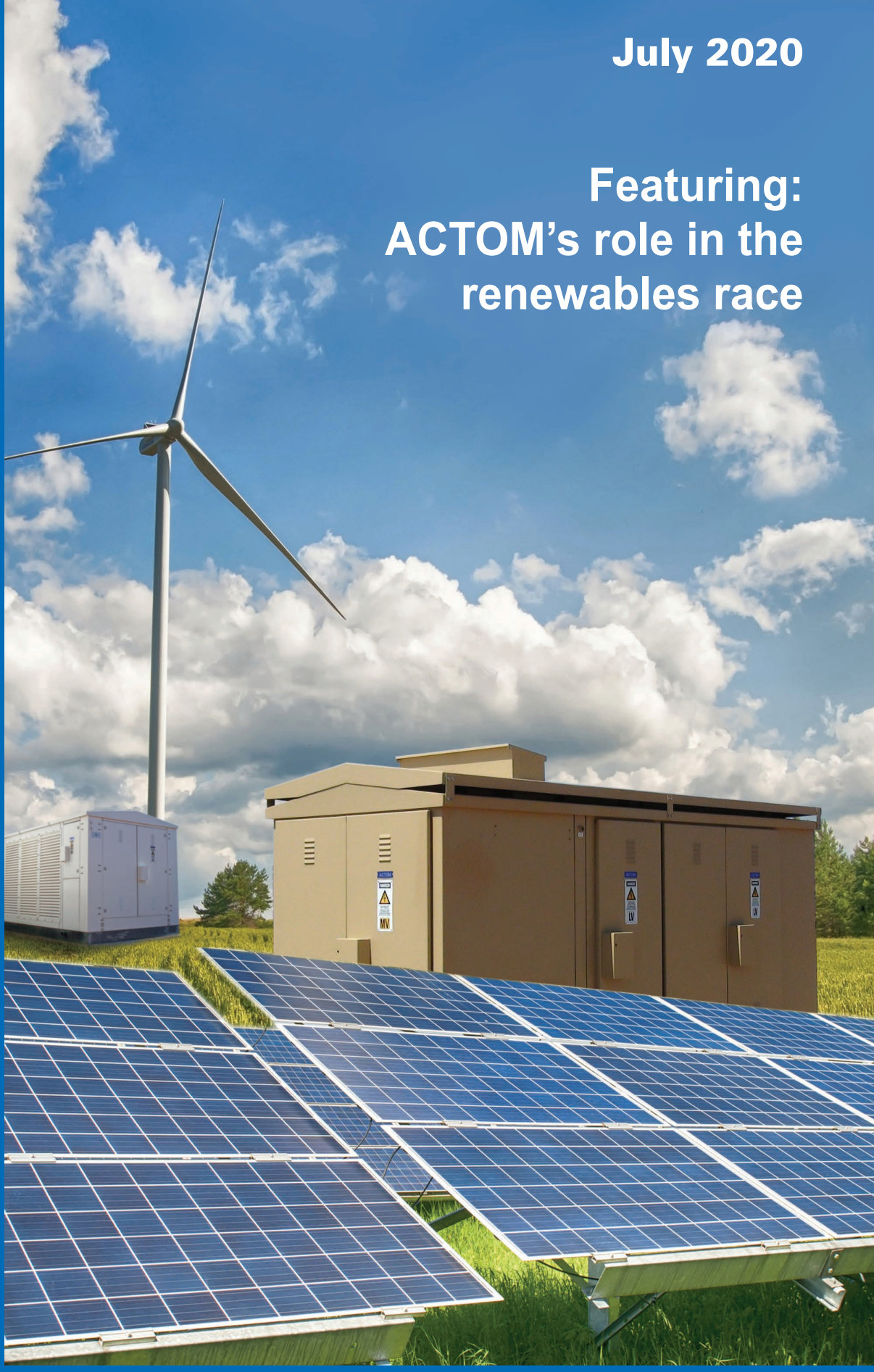
What's Watt

July 2020

Featuring: ACTOM's role in the renewables race



ACTOM

ACTOM introduces measures to sustain business and employees' livelihoods

The past few months have seen a major change in the global macro-economic environment, which has had a significant impact on South Africa and our business environment.

The Covid-19 pandemic has wreaked havoc in all economies globally, resulting in a humanitarian, financial and economic crisis. Together with global tensions between the USA and China, as well as developments in the oil sector, the pandemic has created turmoil in financial markets.

It has led to an extensive and stringent lockdown in South Africa, effectively shutting down our economy and taking us into a recession. Consequently the economy is now projected to shrink by approximately 10% in this year.

ACTOM itself has seen a virtual revenue freeze over the second quarter of 2020. Our customer base has largely been shut down and the situation has led to a demand-side as well as a supply-side shock.

In these circumstances ACTOM's executive team has been forced to take some very difficult decisions in order to ensure the sustainability of the business. We unfortunately had to tightly contain costs and go into a strong cash preservation mode in order to see the business through this tough period. While we are fully supportive of the need for the lockdown and recognise that it was absolutely critical for the health and safety of our people, we are also very mindful of the need to ensure that the livelihoods of people

are sustained.

The company has initiated various health and safety protocols to ensure that our workplaces are kept sterile and clean to protect our employees, which is our utmost priority. Our management team has gone through structured processes as the lockdown migrated through different levels in order to safely return people to work.

It is expected that the months ahead will continue to be challenging. I urge you to stay calm and focussed at all times in managing issues within your control as best you can. The decisions we have taken and those to be taken in the weeks that lie ahead will determine how we will emerge out of this crisis. We should position ourselves to come out of it stronger.

ACTOM has introduced various measures to support its staff during the crisis. We have also taken a decision to support our neighbouring informal settlements. In early-June we donated food parcels to support 1000 families in informal settlements in the vicinity of ACTOM's Knights site.

Sadly during the month of June we had a fatality at our Knights site, where a test bay technician for MV Switchgear, **Ms Sheilar Moloba**, passed away while at work. She leaves behind three young children, which is most tragic. I would like to extend my heartfelt condolences to her family.

South Africa has seen a downgrade in its sovereign rating by the respective ratings agencies. This, together with various other economic factors, has led to a sharp weakening of the rand, which ultimately poses various challenges for the country at large. The current situation is such that the government needs to take decisive steps to stimulate economic growth in the country. It is imperative that infrastructure projects and spending are given priority. ACTOM is well-positioned to benefit from the focus on industrialisation and localisation which would ensue from this.

A decision was recently taken by shareholders to appoint **Mr Andries Mthethwa** as ACTOM group Chairman. I would like to congratulate Andries on his well-deserved appointment after his many years of dedication to the group.

Finally, I would like to thank all staff for their support and understanding as we go through these unprecedented times and would like to appeal to everyone to please bear with us as we take the tough decisions required for long-term sustainability.

Mervyn Naidoo

What's Inside

***Cover**: ACTOM plays a leading role in the production and supply of products for "balance of plant" in the **REIPPPP** programme.*

The Renewables Race

The energy debate in South Africa (SA) is complicated. We are living on a continent where it is estimated that approximately 590 million people have no access to electricity, with about 3 million of those people living in SA. Add to our capacity woes the fact that energy contributes close to 80% of the country's total greenhouse gas emissions, of which 50% is from electricity generation and liquid fuel production alone, and we have a serious challenge on our hands.

The need for SA to diversify its energy mix was realised as far back as 1998 in the White Paper on Energy Policy. This was updated in 2003 in accordance with SA's commitment to the Paris Accord.

In 2010, the Integrated Resource Plan (IRP2010) was developed, detailing various technology targets to be achieved by 2030.

To effectively implement the vision set out in the IRP2010, the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) was launched in 2011. Its purpose was to procure alternative, sustainable energy while contributing to social and economic development in SA. The ultimate target – to produce 17 800MW of electricity from renewable energy sources.

Globally the REIPPPP has received recognition for its transparency, innovation and contribution to local economic development as it sets out to establish private-public partnerships through a competitive tender system that ensures fair energy pricing.

The Energy Blog details 92 Independent Power Producer projects that have been awarded in four bidding rounds as part of the REIPPPP. In rounds 3 and 4, ACTOM played a leading role in the production and supply of products for "balance of plant". The value of these contracts amounted to over R300-million and were awarded to High Voltage Equipment, Power Transformers, Distribution Transformers, MV Switchgear, Static Power, Protection and Control and Electrical Products.

"There is a great deal of opportunity for ACTOM as a supplier to companies awarded projects by the REIPPPP," said **Colin FitzRandolph**, Director – Actis Energy Infrastructure. He went on to explain: "It is a requirement of the programme for a minimum percentage of product to be locally sourced. By partnering with ACTOM – a market leader and local manufacturer – projects are able to meet these commitments and are confident in ACTOM's robust and reliable products."

PV projects have been awarded in all four rounds of the REIPPPP and there are currently 45 projects that range from fully operational to awaiting construction. An additional eight CST projects have also been awarded.

As a direct result of the implementation of these projects, 6 329MW of renewable energy has been procured of which 3 876MW was connected to the grid.

The IRP was always viewed as a working document, to be updated as energy needs changed and technology developed. The latest version was released in October 2019.

Coal will continue to play the largest role in electricity generation due to its abundant availability in SA. The new plan refers to a "business case" for smaller plants of between 300MW and 600MW. Coal is expected to contribute an additional 1.5GW of power, but there will still be a net drop in power produced by coal as a result of the decommissioning of Eskom coal-fired power stations which will reach the end of their commercial and operational lives. Another concern is the closing of plants that do not meet air quality regulations.

Highlighted in the plan is government's intention to fund research into clean coal technologies such as High Efficiency Low Emission (HELE) technology, including supercritical and ultra-critical power plants with Carbon Capture and Utilisation and Storage (CCUS). While CCUS had been developed for power plants, few operate using this technology and it is extremely expensive.

After coal, wind is expected to contribute the next highest percentage to the energy mix.

SA has fair wind potential with 36 recognised renewable wind farms of which 24 are fully operational and the remainder either under construction or awaiting construction.

SA's rivers carry potential for run-off river hydro projects. In round 2 of the REIPPPP two small hydro projects were awarded and both are fully operational. Round 4 saw the awarding of one more small hydro project which is awaiting construction. SA has also entered into a treaty for the development of the Grand Inga Project in the Democratic Republic of Congo (DRC), with some of the power intended for transmission to SA. This project has been under construction for more than 10 years and the IRP2019 notes that the DRC has not yet concluded the work needed for SA to begin receiving electricity by the agreed deadline in 2023.

Renewable solar projects in SA include both photovoltaic (PV) and concentrating solar thermal (CST) which will contribute around 6% to the energy mix.

Most areas in SA average more than 2 500 hours of sunshine per year, and average solar-radiation levels range between 4.5 and 6.5kWh/m² per day. The annual 24-hour global solar radiation average for SA is about 220W/m², compared to 150W/m² for parts of the USA, and about 100W/m² for Europe and the UK making SA's local natural resource one of the highest in the world.

To page 4

From page 3

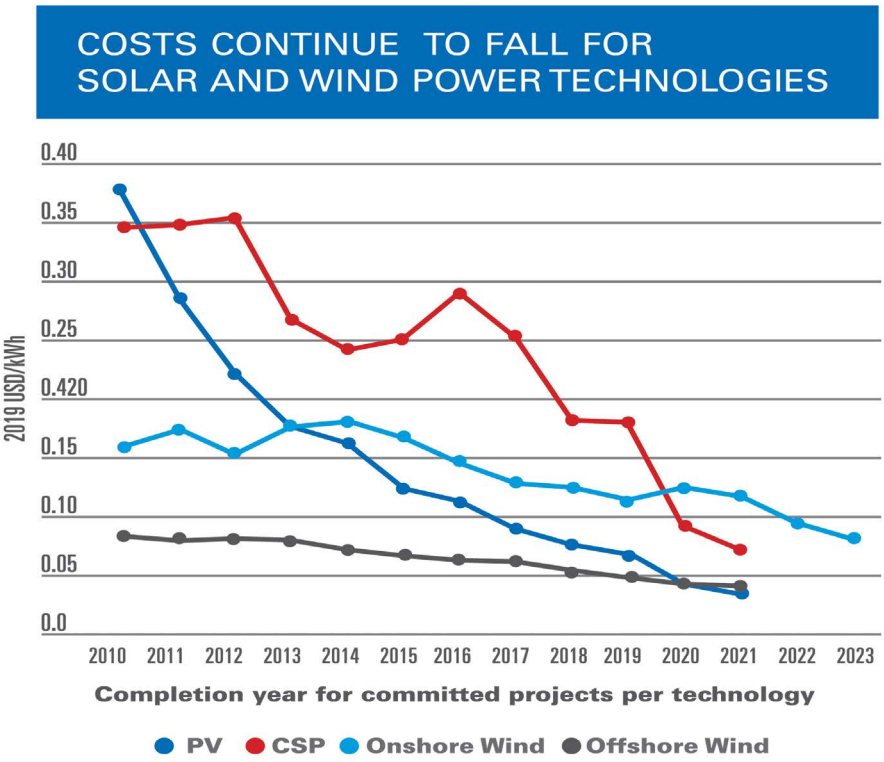
The Eskom-owned nuclear plant, Koeberg, reaches the end of its operating life in 2024, but due to its reliability and the clean nature of the energy produced, an application to extend operations to 2044 is planned. This will require an immediate undertaking to achieve the necessary technical and regulatory requirements for such an extension.

Nuclear power is very expensive to commission and decommission and projects typically only deliver power 20 years after build phase. Some serious media debate ensued in mid-June when the Minister of Mineral Resources and Energy, **Gwede Mantashe**, issued a request for information for a 2 500MW nuclear build programme. This, after the IRP2019 documented that a nuclear build programme would only be considered "at a pace and scale that the country can afford".

Other renewables that form part of SA's energy mix include biomass and landfill gas, but these take place on a much smaller scale with only two biomass projects awarded, one of which was halted/aborted, with only a single landfill gas project currently operating in Gauteng.

However, the generation of electricity and heat through biomass and biogas holds huge potential in SA with this technology being developed by a number of the ACTOM businesses as featured in previous issues of What's Watt.

The future for renewables in SA looks promising and although many agree that the process of implementation could be faster, others argue that getting it right is equally as important.



Source: International Renewable Energy Agency.

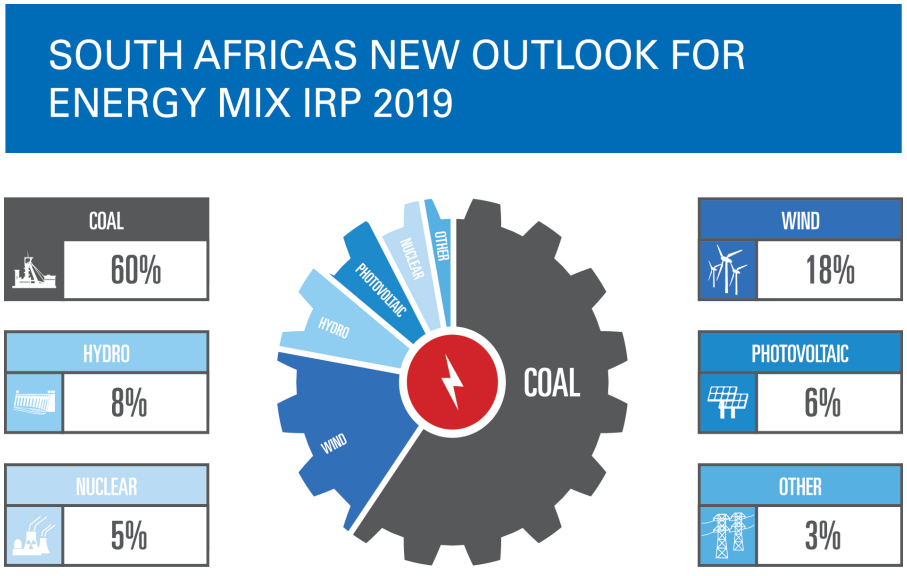
ACTOM is currently building its renewable energy capability through the provision of "balance of plant" supplies. **Mervyn Naidoo**, ACTOM CEO explains how ACTOM intends to further develop this capability, "The renewable energy sector has limitless opportunities for ACTOM, but we are also mindful of the complexity involved in such projects. Initially we have supplied locally manufactured components to various renewable energy projects. However, there is a far greater opportunity for us to be more involved in the new rounds of renewable projects through a more collaborative approach across our businesses. As such we have appointed a renewable energy systems' expert consultant, **Leon Drotsche**, to leverage these opportunities."

Leon explained how, in the past, the whole move towards green technology and renewables was pushed primarily by those with green agendas, but that now, through technology advancement and cost efficiencies, this technology is increasingly sought after in a highly competitive market.

"The advantage that ACTOM has in the renewable space is their specialised expertise and understanding of the various intricate elements of energy generation, transmission and distribution. But possibly, more importantly, the integration capability to pull together existing expertise and the latest technology to provide efficient, end-to-end smart solutions," said Leon.

This, together with their long-standing business partnerships with key industry players, their local footprint and manufacturing capability, as well as innovative solutions suited to local market conditions gives ACTOM a competitive advantage.

In a previous State of the Nation Address, **President Cyril Ramaphosa** committed to "significantly increase generation capacity outside of Eskom".



Source: IRP2019

Some key elements of his address, in his own words, included:

- "A Section 34 Ministerial Determination will be issued shortly to give effect to the Integrated Resource Plan 2019, enabling the development of additional grid capacity from renewable energy, natural gas, hydro power, battery storage and coal.
- The National Energy Regulator will continue to register small scale distributed generation for own use of under 1MW, for which no license is required.
- The National Energy Regulator will ensure that all applications by commercial and industrial users to produce electricity for own use above 1MW are processed within the prescribed 120 days.
- We will open bid window 5 of the renewable energy IPP and work with producers to accelerate the completion of window 4 projects.
- We will negotiate supplementary power purchase agreements to acquire additional capacity from existing wind and solar plants.
- We will also put in place measures to enable municipalities in good financial standing to procure their own power from independent power producers."

These measures highlight further opportunity for ACTOM's involvement in energy storage development and smaller scale EPC projects.

The challenge with energy from solar and wind farms is that they rely on the sun and wind which isn't always available. Storing excess energy for when it is needed is critical, especially as more wind and solar projects come online. Utility scale energy storage is evolving to fill this gap, resulting in more sustainable renewable energy sources, coupled with various capabilities to support the electrical network. ACTOM realises huge potential in Battery Energy Storage Systems (BESS) technology and will include this technology solution in its balance of systems offering. Technologies such as battery systems, compressed air energy storage, flywheel energy storage, hydrogen fuel cells etc. have been highlighted as a priority in the IRP2019.

"ACTOM already actively manufactures battery related systems and is continually researching, developing and testing technology in this field. But we believe our approach to, and development of, management systems that integrate renewables to conventional electricity networks is what will set us apart," commented Leon.

We have largely touched on developments in energy generation and mentioned storage and integration, but would there be any opportunities in energy transmission and distribution for ACTOM?

Eskom has a well-established electricity network and will still hold the key responsibility of transmission and distribution. However, the need for off-grid and micro-grid technology has been acknowledged as a solution for areas so remote that it is not cost effective to extend grid infrastructure. The IRP2019 calls for the necessary acceleration of these options and ACTOM is actively pursuing the commercialisation of micro- and pico-grid technology.

"ACTOM keenly awaits the request for proposals for round 5 of the REIPPPP particularly because of the higher transformation, localisation and community upliftment requirements expected to be included. We are confident of our position as value-add suppliers and also believe we have structured the business in such a way as to take further advantage of the opportunities that present themselves," commented Mervyn Naidoo.

It is ACTOM's strategy to support traditional energy generation but as a parallel process, to actively pursue opportunities in renewables.

Covid-19 screening at ACTOM's busy Knights site operates like a well-oiled machine

With the large number of employees based at ACTOM's main site in Knights, Germiston, which houses the factories and offices of four divisions as well as head office staff and the technical training centre, management recognised the need to provide a very substantial Covid-19 screening facility.

"We realised we'd have to be properly prepared for the rush when the first lockdown period came to an end and people were allowed to return to work," said **Sister Ina Snyman**, the group's Principal Occupational Nurse at Knights, who has been managing the screening facility since it was established from April 20 onwards after the initial extremely stringent "Stage 5" lockdown period ended and the heavy restrictions on movement and attendance at work started being relaxed.

Ina and **Basjan Basson**, Operations Manager for the Knights site, arranged the hire of two converted shipping containers and two tents to set up just inside the main gate of the property in which to do the screening. With the large numbers of people arriving for work in the mornings, Ina and Basjan were quick to recognise additional shelter was needed to protect people against the cold while they waited to be screened, so they hired a further eight tents for this purpose.

Ina also trained the security guards beforehand on how to do the screening. "We have a total of 10 screening

To page 6

Sister Ina Snyman and one of the members of her team, both wearing personal protective equipment, screen factory workers at Knights as they arrive for work.

From page 4

points with three screeners working in each of the two containers and two screeners in each of the two tents. We have nine guards and myself on duty during the day and two guards on duty at night for the night shift," she explained.

Arriving employees and visitors are instructed to maintain safe distances from each other while waiting in a queue to be screened. The screening process includes ensuring that everyone entering the property is equipped with a face-mask and they are sanitised on their hands and have their temperatures taken.

The screeners also carry questionnaires in which the names and contact details of everyone entering the property and the divisions or departments they are employed at or are visiting are recorded. They are also asked if they have crossed a provincial border or arrived recently from outside the country, if they have been in contact with any Covid-19 infected people and if they have taken any medication that could prevent Covid-19 symptoms being detected during the screening process.

"We are kept very busy, especially in the early mornings when employees arrive for work. A very small number of the total number of people employed at this site are able to work from home," Ina said.

"In late-April we had about 200 people coming in every day, but from the beginning of May and into June we have been screening between 800 and 900 people daily. Distribution Transformers is working 100%, including night shift, while High Voltage Equipment and MV Switchgear are operating at 80% capacity at present," she concluded.

ACTOM supplies meals for a month for 1000 needy families affected by Covid-19 lockdown

Shortly after the Covid-19 lockdown was imposed nationwide to reduce and slow down the spread of the disease, managers based at ACTOM's head office in Knights decided something needed to be done to provide relief to poor people living nearby.

"We recognised that people in informal settlements are among the hardest hit when deprived of the opportunity to find work and make money to feed themselves. Many of them get little or no support through government grants or from relief organisations," commented Basjan Basson, Operations Manager for the Knights site.

The Red Cross' Barbara Jensen, accompanied by Mervyn Naidoo and Tembela Caza, Divisional CEO for T&D, pose with some of the food parcels donated by ACTOM.

As a first step an approach was made to the local branch of the Red Cross based in Driehoek, Germiston, who were requested to conduct a survey at the various informal settlements in the vicinity to prepare a list of a thousand families suffering the greatest hardship and most in need of support in the form of food supplies during the lockdown period.

While the door-to-door survey was carried out by 15 Red Cross volunteers during May, ACTOM management arranged to purchase food to provide meals for a full month for the 1000 families selected. All the food, consisting of a total of 10 tonnes of maize meal and a variety of other groceries that were packed into individual parcels, were bought from Pick 'n Pay in Gallo Manor in Northern Johannesburg.

"Not only did the store give us a generous discount, but they also provided a 12 tonne truck and a 24 tonne truck to transport all the food free of charge to the Red Cross premises. In addition, some of the Pick n' Pay staff volunteered to assist us with the job of packing the parcels and helping with loading and offloading," Basjan said.

Red Cross staff-members with some local informal settlement inhabitants who were invited to collect food at the Red Cross branch in Driehoek in early-June.

Mervyn Naidoo, ACTOM's Group CEO, and Tembela Caza, Divisional CEO for T&D, were in attendance at the official handover of the food parcels and bags of maize meal in early-June to **Barbara Jensen**, Manager of the Red Cross branch. During the subsequent week the chosen recipients came to the premises to receive them from Red Cross staff-members.

Basjan also paid tribute to two local security companies, Mantis and Cap, which provided their services free of charge. "They undertook to provide the security personnel required to guard the Red Cross property every night throughout the period of about a week while the food was stored there," he explained.

ACTOM awarded MV switchgear replacement contract at Tutuka power station

Eskom's Tutuka power station.

Eskom has awarded ACTOM a R1.18-bln contract to perform comprehensive switchgear replacement at Tutuka power station near Standerton in Mpumalanga.

The six-year contract, one of the largest-value contracts ever to be won by the group, was signed by Eskom on December 5, 2019, after a prolonged tendering and negotiation process dating back to mid-2016. It involves replacing and upgrading the medium-voltage switchgear and all associated equipment and systems in the power station's six generator units and in its common plant.

Tutuka, one of many of Eskom's coal-fired power plants that have been in operation for more than 30 years, has been selected by the utility for comprehensive refurbishment to extend the life of the station.

Five ACTOM divisions are involved in the project, with MV Switchgear as main contractor and Contracting taking overall responsibility for the project management and coordination of the contract as a whole.

The contract – divided into six contract packages allocated to MV Switchgear, Protection & Control, Static Power and HVAC Systems – comprises:

- The first contract package – designated Package 3A – covers medium voltage switchgear, which MV Switchgear together with its France-based international technology partner Schneider Electric, will manufacture, supply, assemble and install. It involves the replacement of a total of 615 panels comprising 395 of Schneider Electric's well-proven PIX air-insulated switchgear (AIS) and 220 units of its GHA branded gas-insulated switchgear (GIS), which is also widely in use and well-proven worldwide. Both the PIX and GHA switchgear will be supplied with rated voltages of 17.5kV (for use at 11kV) and 12kV (for use at 3.3kV). The equipment to be provided by MV Switchgear will also be used for provision of power for the planned refurbished and upgraded dust-collection and gas-cleaning filtration plant that is due to replace the existing facility at Tutuka.
- Protection & Control (P&C) is responsible for three contract packages – namely Packages 3B, 3C and 3E – covering the protection, automation and control & instrumentation (C&I) systems respectively. Here again Schneider Electric features as the main international technology partner, as it is responsible for the manufacture and supply of both the protection and automation equipment due to replace the power station's existing systems. These will comprise Schneider's well-known MiCOM protection IEDs and its similarly widely-used C264 and PACiS automation system. The replacement equipment for internal arc protection within the medium-voltage switchgear, however, is to be manufactured by P&C's other international protection systems technology partner, Arcteq of Finland, which is contracted to supply its internal arc protection units. The C&I package for which P&C is responsible involves a partnership arrangement with international companies ABB and Yokogawa, which will produce and supply the required control and instrumentation engineering equipment respectively for Tutuka's units 4, 5 & 6 and the common plant. The manufacture, supply and installation of the C&I equipment for units 1, 2 & 3 are not within the scope of the ACTOM contract.
- Static Power is responsible for Package 3D of the contract, involving the supply and installation of all standby battery chargers for the aforementioned systems. The chargers and battery cabinets are 100% locally designed, engineered and manufactured, with ALCAD Vantex Ultra Low maintenance valve regulated Nickel cadmium battery banks providing four-hour backup time. Static Power's scope also includes the supply of uninterrupted power supply (UPS) systems (one of which is a locally manufactured modular UPS and another an imported Statron UPS) for automation installations.
- HVAC Systems' contribution – Package 3F of the contract – accounts for 25% of the contract value and consists of an extensive upgrade of the existing HVAC plant throughout the power station and the provision of nine new HVAC systems for existing outside plant substations, resulting in a total

To page 8

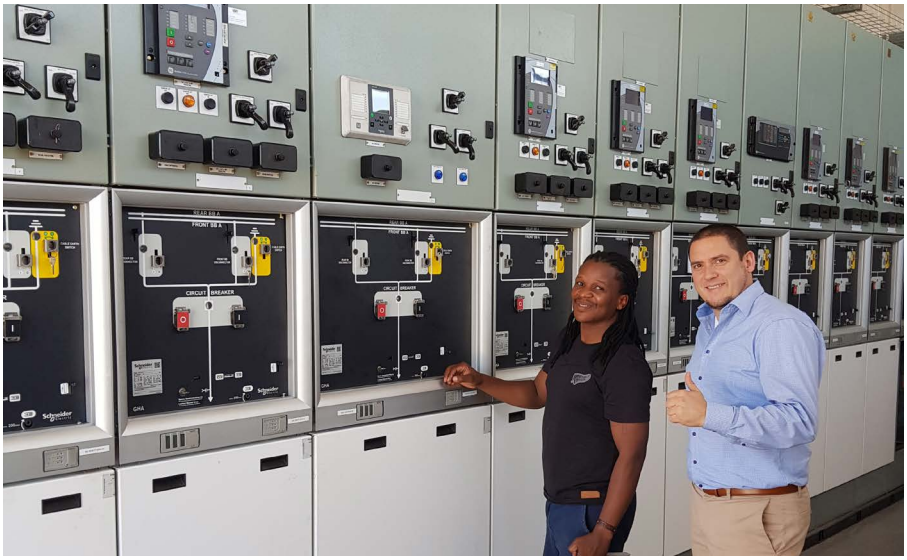
From page 7

installed capacity of just over 9MW of mechanical cooling. Major equipment to be supplied are 14 new water-cooled chillers for run and standby conditions totalling 4203kW cooling capacity and three closed circuit central cooling towers with a total heat rejection of 5550kW. 2.5km of new steel pipework for the chilled water and condenser water systems will be installed throughout the power station. HVAC Systems will design, supply, install and commission 22 low-voltage MCC switchboards to operate and control the HVAC plant equipment. A central building management system will be used to effectively manage and control the new HVAC system. New controls consisting of sensors, PLC's and field equipment will ensure an efficient system of control.

Kevin Saunders, Contracting's Contracts Manager and Principal Project Manager for the total Tutuka refurbishment contract, who the respective contract managers responsible for each of the six contract packages will report to for the duration of the contract, said: "We devised the overall management structure to handle the contract both on and off site. Among the things this covers are the overall coordination of the business units involved and a single point of contact with Eskom. It is also aimed at ensuring that there is no duplication of facilities within the group.

"All the design issue responsibilities rest with the individual business units, including each being responsible for the interface between them and the other units," he added.

ACTOM Contracting's contractual and project management responsibilities include contractual due diligence, scheduling and time management and the commercial and financial aspects of the contract. In addition, it is responsible for human resources and industrial relations functions for the entire contract, as well as attending to all quality, safety, health and environmental requirements. "We also have to conduct the scheduling and timing to align with the outages, which involves fitting in with Eskom's requirement of when outages take place," Kevin commented.



Seen above posing next to Schneider Electric's GHA branded gas-insulated switchgear after its installation in eThekwini Metropolitan Municipality's Umlazi substation in 2018 are Guillermo Camino, Schneider's Senior Manager, Sales Support for Africa; and Itumeleng Nkasi, Site Services Technician for MV Switchgear. Mr Camino is involved in the current Tutuka refurbishment contract to oversee the supply of GHA switchgear from the Schneider factory in Regensburg, Germany.

Two of ACTOM's businesses repositioned for improved effectiveness and growth

Two ACTOM business units, Metalplus in Johannesburg and Namibia Armature Rewinders (NAR) in Swakopmund, Namibia, have been repositioned within the group for the purpose of making them more effective and to provide them with greater opportunities for growth in their respective markets.

With effect from April 1, Metalplus, formerly a business unit in the Reid & Mitchell (R&M) division, is now part of the Marthinusen & Coutts (M&C) division and reports to Divisional CEO **Richard Botton**, and NAR, while continuing to be administered by ACTOM Energy Namibia, as before, has become part of the R&M division and reports to Divisional CEO **Mike Shaw**.

Group CEO **Mervyn Naidoo** said when announcing these changes that with effect from the same date, April 1, Mike Shaw has been appointed Chairman of ACTOM Energy Namibia. "Mike will therefore oversee the future development and expansion of NAR both in his capacity as Divisional CEO of R&M and as Chairman of ACTOM Energy Namibia," he commented.

Explaining the expanded role envisaged for NAR in future, Mike said: "Our aim is to develop NAR's capabilities using R&M's extensive product knowledge and expertise to improve and expand its support to customers in Namibia, Botswana and Angola."

NAR provides electro-mechanical repair services on a variety of rotating equipment, including railway traction equipment and off-highway vehicles.

Explaining the decision to bring Metalplus, a specialist mechanical repair and refurbishment business, under the overall control of the M&C division, Mervyn said: "There is a closer synergy between Metalplus and M&C – also including ACTOM Turbo Machines (ATM), which forms part of this division – than formerly. The move is expected to be of considerable benefit to all three businesses within the division."

Richard Botton said the resources and technical knowledge of the division's three business units will be combined. "Metalplus are leaders in submerged-arc welding technology and have the largest crankshaft grinder in the Southern Hemisphere. M&C have the second-largest lathe in South Africa, a 32 t balancing machine and a large sandblasting facility, while ATM offer vast expertise in turbomachinery, lifetime extensions and repair technologies, including probe track and burnishing knowhow," he said.

"This will make Metalplus capable of providing complete mechanical rotor service solutions. Other advantages will be to grow the laser welding repair

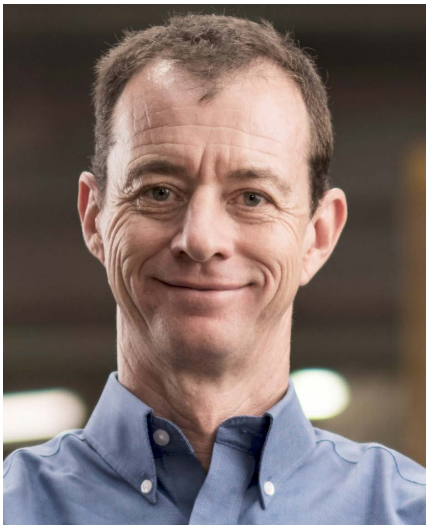
applications and leverage Metalplus' extensive expertise in casing repairs. This greater product offering will be promoted across the broader M&C division market base," he added.

ACTOM Energy now reports to EPC division

A further change announced by Group CEO Mervyn Naidoo is that with effect from June 15 Cape Town based ACTOM Energy, which offers product and service integration to other group divisions and business units, now reports to **Sybrand Nel**, Divisional CEO of the Engineering Projects & Contracts (EPC) division.

"Both divisions operate in the engineering and project management space and the intent of this new structure is to optimise synergies towards driving a more comprehensive systems approach across various industry segments. The pooled resources will enhance the ACTOM offering to the marketplace.

"I look forward to the various growth initiatives which will emanate from this strategy," Mervyn said.



Mike Shaw chairman of ACTOM Energy Namibia and Divisional CEO of R&M

ACTOM joins world power solutions forum CIGRE

ACTOM recently joined CIGRE, the Paris-based international organisation founded 99 years ago with the aim of developing and providing technical solutions in power applications.

Power utilities, OEM's, academic institutions and research centres are among the organisations and businesses that are eligible to join CIGRE, which offers two classes of membership – collective membership for groups like ACTOM and individual membership for suitably qualified technical people.

Casbah Zwane, High Voltage Equipment's Divisional CEO, who together with **Tembela Caza**, Divisional CEO for T&D, initiated the move towards ACTOM's application for membership, said the main benefit from ACTOM's point of view of belonging to the world body is that as the leading global forum on power systems "it offers all the technical info worth knowing that may be used to develop and enhance our products and services and introduce new technologies that promise to further advance our business as a group in a wide range of power system applications".

"There is constant sharing of information about new technology developments and research undertaken by CIGRE's hundreds of member organisations worldwide. ACTOM needs to have access to this on an ongoing basis to ensure it continues to make progress to the best of its ability," Tembela stated.

ACTOM's membership took effect on June 1, 2020. In joining the organisation the group becomes part of CIGRE's Southern Africa Committee, which has study committees, working groups and regional activity groups that hold regular meetings/technical symposiums to enable members to share and discuss the latest developments and innovations in the field of power systems. Member organisations may also attend the world body's international conference every two years, while the local committee holds a biennial conference to which both leading international and local technologists are invited to present papers.

Prince Moyo, Chairman of CIGRE Southern Africa Committee and General Manager, Power Delivery Engineering for Eskom's Transmission Group, congratulated the group on joining CIGRE.

"CIGRE is delighted to have ACTOM on board as a Collective member. Being one of the largest manufacturers and importers of electrical equipment used in our Transmission and Distribution power systems, ACTOM can play a big role in CIGRE growth. Your membership will enable better involvement of South Africa in CIGRE Working Groups (WGs) and Regional Activity Groups (RAGs)," he said.

"I encourage all ACTOM technical personnel to keep safely your collective membership number, so as to set up their individual profiles on www.CIGRE.org and on www.e-CIGRE.org to enable them to maximise the benefit of their membership.

"We look forward to an exciting partnership!" he concluded.

Central University of Technology electrical engineering students visit group's Knights site

A group of 29 students and a lecturer from the Central University of Technology (CUT) in Bloemfontein came to Johannesburg and the East Rand in November last year to visit several factories engaged in manufacturing products and equipment relating to their field of study.

The students, all members of CUT's Student Chapter of the SA Institute of Electrical Engineers (SAIEE), were from the university's Electrical, Electronic and Computer Systems Engineering department.

Included among the various factories they visited was ACTOM's Knights site, where after being given a presentation about the group and the extensive and varied scope of its business by **Tembela Caza**, Divisional CEO for T&D, they were taken on a tour of the plants on the site to be informed more fully about how they operate and the equipment they manufacture and supply.

"The visit and tour proved very worthwhile, as it provided the students with the opportunity to relate the industry to what they are taught at University, as well as enabling them to see some of the actual equipment they will be utilising when they complete their studies and get to the workplace," said **Moeketsi Ramokone**, Chairperson of the SAIEE Student Chapter at the university.

"Some of the students were also able to pick up useful tips from various ACTOM people they spoke to that gave them a clearer understanding of what will be expected of them when they enter the industry," he added.

Students from CUT during their visit to ACTOM's Knights site are shown above with Tembela Caza (front row, right); Andries Mthethwa, ACTOM's Chairman (front row, second from left) and Imraan Mohamed, Protection & Control's Business Development Manager, Network Control & Metering Solutions (second row, left).

Music and design teaching introduced at Balmoral College

Two new subjects – music and design – have been introduced at Balmoral College.

The school, a longstanding beneficiary of ACTOM's social responsibility programme, has once again brought exciting new activities on board to stimulate and educate its learners.

The new subjects were introduced at the beginning of this year, with music being taught in a dedicated classroom in the block of new classrooms established last year for the school's Grade R classes. The grades that are being taught music this year are Grade R to Grade 3, while design is being taught to 10 x Grade 10 learners interested in developing skills in this field with the aim of pursuing a career in one or other aspect of design when they leave school.

Balmoral College intends extending teaching of music and design to higher grades one grade at a time each year. In 2021, for instance, music teaching will be extended to include Grade 4, while design teaching will be extended to include Grade 11.

In the first two terms of this year the classes that are being taught music were introduced to the subject by music teacher **Shané Erasmus** with "boomwhackers" being used by the learners to produce simple tunes. Boomwhackers are coloured plastic cylinders of different lengths which make sounds corresponding to musical notes.

Mrs Erasmus instructs the learners by directing them to follow coloured stickers on a board in front of them that match the colours of the boomwhackers, while she plays the music on a piano at the same time to guide them.

The next step is taken in the third term when the learners in the music classes will be provided with recorders, which Mrs Erasmus will teach them to play. She will also then begin teaching them to read musical notation, while continuing to use the colour-coding applied earlier to help them to understand it. Learners from Grade 1 upwards will also receive some theoretical music

Grade R learners play boomwhackers as they are taught simple tunes with the help of musical notes displayed on a board by assistant music teacher Mrs Modiselle.

instruction at this stage. They will be taught more advanced tunes and songs in the fourth term.

The design teacher, **Liron Halgryn**, introduced the subject to the 10 learners in Grade 10 at the beginning of this year by applying a broad-based approach in which he explained several different design disciplines, including environmental, surface, product and communication design. In addition to theoretical instruction he sets practical projects for them to do, involving building models of various kinds.

"This year, in Grade 10, they are given basic instruction in design and how it may be applied in various different fields so that they understand what it's about in broad terms. Next year, in Grade 11, when they will have a clearer idea of what particular branch of design they want to do as a career, the instruction will be much more business related and more specialised in each case than it is now," Halgryn said.

ACTOM's Sy Gourrah elected President of SAIEE

Sy Gourrah, a senior executive in the Transmission & Distribution division, was inaugurated as President of the SA Institute of Electrical Engineers (SAIEE) for 2020 in Johannesburg at the end of March.

The inauguration, originally scheduled to take place at the Institute's AGM, was held via Webinar on March 31, due to the nationwide lockdown to prevent the spread of Covid-19. Sy's inaugural speech, which was also to have formed part of the inauguration, was presented separately via Webinar a week later. The subject of her speech was the Fifth Industrial Revolution.

Sy is the third person from ACTOM and its predecessors GEC, GEC Alsthom and Alstom to be elected President of the Institute. The others were **Alan Meyer** in 1986, Group Consulting Engineer of GEC South Africa at the time, and **Andries Mthethwa** (then Andries Tshabalala) in 2011, who was Group Executive Director, Strategy, at the time and is Chairman of the group today.

Sy is one of three women to have been elected to the post since the Institute's inception 111 years ago in 1909. The previous women incumbents were **Marie Davison**, a senior executive at Eskom, in 1995 and **Bea Lacquet**, a lecturer at Rand Afrikaans University (now the University of Johannesburg) in 2005.

Sy, who is Business Development Executive - Transmission & Distribution, Engineering Projects & Contracts, has long been active as a Fellow and Council Member of the SAIEE and has chaired the Institute's Professional Development and Finance Committees. In 2017 she was elected the SAIEE's Junior Vice-President, in 2018 Senior Vice-President and in 2019 Deputy-President. In 2019 she launched the SAIEE Women in Engineering Chapter, which aims to promote women's interests and empowerment programmes in electrical engineering.

Sy was the first woman President of

Sy Gourrah

the Association of Municipal Electricity Utilities (AMEU), serving it in that capacity from 2008 to 2010. She is also an active volunteer of the Engineering Council of SA (ECSA).

ACTOM's leading ladies

At the end of March 2020, 21% of ACTOM's total number of permanent employees were women. We talked to some of ACTOM's leading ladies about their work experience.

Alleyzandt Verhufen

'At John Thompson we invest in the development of our employees through a number of formal and informal training programs. Facilitating this process and watching people grow and develop is the most exciting and motivating part of my job," said Alley, Divisional HR and Training Manager for John Thompson since 2019.

Alley believes that the caring environment in which she works is what helps develop good working relationships amongst colleagues and promotes a culture of success both personally and as a business.

"We all want to see the business and each other achieve great things!"

Shirley Chauke

"I am motivated by my participation at ACTOM board level and by the opportunity to influence group policy when it comes to the development and training of the youth and women," said Shirley Chauke, Executive Director and ACTOM Board Member.

Shirley is an entrepreneur at heart and has performed differing roles across a broad range of business sectors.

"My involvement across the businesses is very interesting and I enjoy the diverse structure with divisional accountability for profit. But what really excites me is the business potential for end-to-end service provision, achievable through the integration of the various ACTOM businesses," explained Shirley.

Portia Mlangeni

The Marketing and Communications function for John Thompson is coordinated by Portia Mlangeni.

"My role was newly established and provides me with an opportunity to illustrate just how important communication is, both internally and externally. The recent COVID-19 pandemic highlighted the need to communicate effectively and was a great way to illustrate the impact of what I do," said Portia.

Portia intends to be actively involved in fully integrating marketing and communications with the various aspects of the business.

"One element that really motivates me is the opportunity to engage with, and support the communities in which we operate. I see myself as a bridge between the two and look forward to sharing the good work we do," added Portia.

From left to right – Alleyzandt Verhufen, Shirley Chauke and Portia Mlangeni

Noxolo Maphundu

Noxolo is a Business Development Engineer at ACTOM Power Transformers.

"I like being part of the front-line team and engaging directly with our customers. I have a good understanding of both the technical and non-technical challenges our customers face and I enjoy finding solutions that best suit their needs," said Noxolo.

Noxolo believes that her technical capability and her zeal to understand processes is what makes her successful. She gravitates towards developing her design, production and quality assurance skills which she believes contributes positively to the business.

"I think a diverse range of opinion

From left to right - Noxolo Maphundu, Tinyiko Masilana, Vivian Van Rooyen and Wilma Muller.

and perspective helps achieve breakthroughs, particularly when facing technical challenges. Gone are the days of working in silos, we have a great pool of talent and we all bring different solutions to the table."

Tinyiko Masilana

"The work I do is exciting and challenges me which is what I love. I get to work on different projects almost every day and the scope and variety of what I do is what keeps me motivated – I am learning all the time," said Tinyiko Masilana, Senior Project Planner at ACTOM Power transformers.

Tinyiko explained that opportunities to develop are always available and it is how you view them that count. Sometimes opportunities may come in the form of additional or different responsibilities and then you have a choice between learning a new skill and gaining knowledge, or feeling resentful.

"I have always believed in working hard, with dedication and discipline, and I look forward to the road ahead."

Vivian Van Rooyen

Vivian is the Chief Buyer for ACTOM Power Transformers and she manages all procurement activities.

She has extensive experience in the power transformer and power generation fields and has held various procurement, contract management, sourcing and import responsibilities.

"At Power transformers we work together as a team and genuinely care about each other. This kind of support encourages you to expand your responsibilities and develop your skills which in turn makes new challenges exciting and something you actively seek."

Wilma Muller

Wilma heads up sales and marketing for ACTOM Power Transformers. She previously performed a project management role within the division for five years and has a formal engineering qualification. Her detailed understanding of the division and market ideally positions her to promote and implement the division's new sales and marketing initiatives.

"I believe that having a sales team with sound technical knowledge helps us to understand our customer's requirements and to address their enquiries and challenges efficiently."

Wilma is looking forward to launching their new campaigns and helping to establish Power Transformers as a preferred supplier to renewable applications as well as building their scope with existing clients and extending their African footprint.

Annamarie Van Wyngaardt on the left and Angelique Coffee-Heyneke on the right.

Annamarie Van Wyngaardt

"ACTOM has provided me with the opportunity and freedom to grow and learn," said Annamarie.

Annamarie joined ACTOM in August 1998 as Group Company Secretary and was appointed as Group Financial Director in April 2019.

She looks forward to working with ACTOM's incredibly talented and motivated management team, as well as the company's loyal staff, for the foreseeable future.

Lucy Mathipa

Angelique Coffee-Heyneke

In April 2019 Angelique Coffee-Heyneke was appointed as Group Company Secretary.

"I have been blessed with the most amazing mentors during my career with ACTOM and they have all contributed towards my personal growth and development. At times the work can be challenging, but it is always fulfilling, and I get to work with a great team that has vast knowledge across a variety of functions," said Angelique.

Angelique joined ACTOM in 2009 as a receptionist and worked in various HR positions before her appointment as Assistant Company Secretary and then her promotion to her current role.

Lucy Mathipa

Lucy was promoted to SHEQ Manager of MV Switchgear in May 2019 having worked as a SHEQ Officer since April 2014 and then for a further three years as a Senior SHEQ Officer.

"The fact that there is always room to improve yourself and an opportunity for career development is what motivates me. This type of environment encourages me to excel in my daily duties and responsibilities."

Lucy explained that she is currently developing her auditing skills through a skills development opportunity provided by MV Switchgear.

MicroGen power and steam generation for small generation solutions

Introduction

Microgrids could hold the solution for remote rural communities that have very little or no electrical supply network. A microgrid is an electrical network that only serves a relatively small region with power generation plants that can consist of a combination of solar PV, diesel generators and steam turbines receiving steam from boilers burning whatever fuel is abundant in the area, e.g. woody biomass, agricultural waste streams or fossil fuels.

Any industry using steam as a heating medium ought to consider introducing co-generation. Co-generation or a Combined Heat and Power (CHP) installation has a better energy utilisation factor than what can be achieved in even a super-critical utility scale coal-fired power station, with the factory heat demand taking the place of a power station's steam condenser and putting the latent heat to good use.

The electrical demands as described typically fall in the range of 1 to 15 MWe.

Boiler options

John Thompson has developed its MicroGen watertube boiler to cater to the growing demand for a small medium-pressure power boiler particularly suited to renewable fibrous-biomass fuel as well as coal-fired, mini- or micro-grid power islands, or industrial co-generation applications. As the steam pressure is increased, the final steam temperature is also increased to ensure that the steam can do maximum useful work as it expands through a turbine.

The pressure parts exposed to the final steam temperature must be made from materials that can maintain adequate mechanical properties at these elevated temperatures. At metal temperatures exceeding 500°C high-temperature corrosion becomes a very real risk, particularly of the superheater elements with high chromium content. In addition, the water quality needs to be controlled to progressively more stringent requirements as the steam pressure increases.

Modular and standard designs

The MicroGen boiler is supplied with a comprehensive heat recovery tower for optimised thermal efficiency. It is available in two basic frame sizes: MicroGen-V and MicroGen-X, with respective nominal capacities of 25tph and 45tph, each with some flexibility to cover a range of steam capacity, pressure (31 barg to 67 barg) and final steam temperature (saturated steam up to 485°C superheated) and to accommodate various fuel types. It is built using standard modular components.

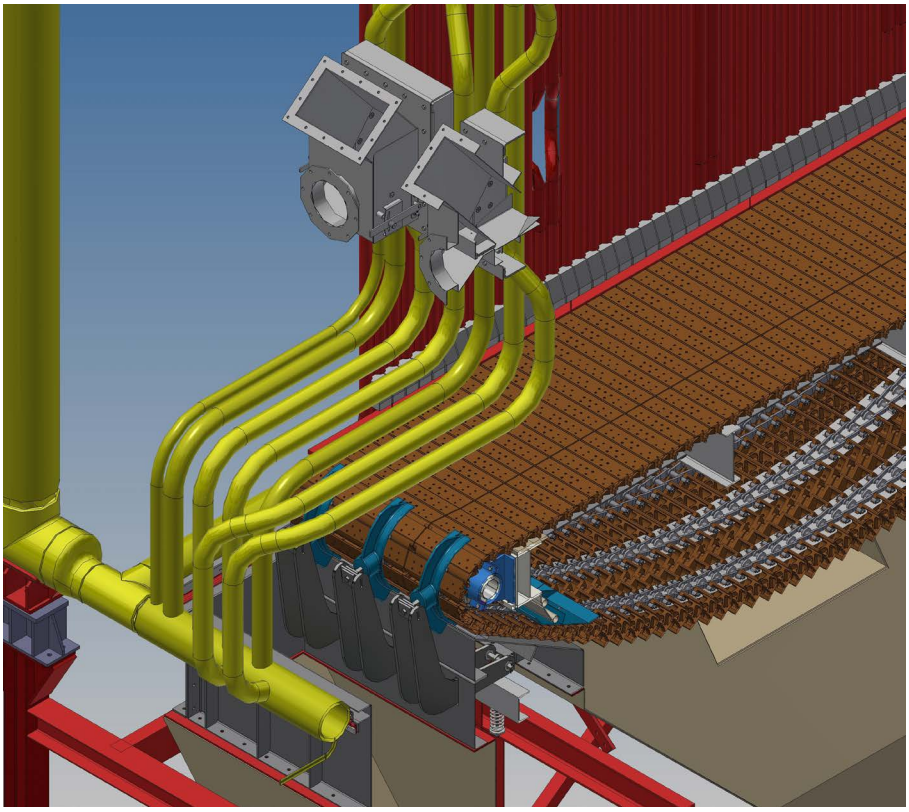
The self-supporting boiler pressure envelope comprises a membrane walled furnace, furnace nose, screen, pendant secondary superheater, a membrane walled dust throw-out chamber, fully screened primary superheater, and a flag-type evaporator bank.

John Thompson's boiler design engineers use state-of-the-art CFD modelling and verification techniques to design the combustion equipment, including the positioning and control of the primary and secondary combustion air for optimal combustion effectivity for every fuel considered. The fuel is fed into chutes that discharge into pneumatic fuel-spreaders that introduce it into the furnace using a high-pressure secondary air, over a robust Continuous Ash Disposal (CAD) stoker with hot undergrate, primary combustion air to facilitate optimal combustion efficiency.

The heat transfer surfaces in the combustion chamber, superheater, evaporator bank and heat recovery equipment are sized to take optimal advantage of the available log, mean temperature difference in each section, resulting in the highest possible utilisation of the available heat in the flue gas.

The back-end heat recovery equipment consists of an upper tubular flue gas airheater, followed by two banks of extended surface economiser and then another lower single-pass airheater.

3-D model of the MicroGen-V concept vs a picture of a unit during final stages of construction.



Cross-sectional view through the combustion chamber of a MicroGen-V boiler.

Behind the heat recovery equipment is the flue gas clean-up equipment and followed by the ID fan and the chimney stack.

Co-generation

Co-generation entails the use of a back-pressure turbine where the exhaust steam leaves the turbine at a pressure required by a particular industrial process, usually slightly superheated to allow for heat losses in the steam line from the turbine to the actual application. The process then utilises the latent heat in the steam and the condensate is returned to the boiler via a pre-boiler plant. Even a small co-generation plant could have a utilisation factor of 65 to 68%.

At a factory with a fleet of boilers producing saturated steam, the ideal option would be to add a small power boiler e.g. a MicroGen-V or MicroGen-X unit, matched with a back pressure turbo-alternator, sized so that the electrical output from the alternator meets the base load demand of the factory, while supplying a corresponding fraction of the steam requirement. This solution can reduce the factory's electrical costs by a significant margin and improve the plant overall energy efficiency significantly. A limitation with this solution is that it is not practically possible to meet both the electrical power and process steam demand across all load cases. This solution either meets the process steam demand, with a power deficit that needs to be imported from the national grid or alternately generating sufficient power, but requiring additional steam from a standby process steam boiler.

In many cases a hybrid co-generation solution may be an attractive option, using an extraction condensing turbo-alternator. Here the multi-stage turbine is designed with an extraction port on the housing, to achieve controlled extraction of steam at the pressure required by the industrial process, slightly superheated by a few degrees. The rest of the steam continues through the latter stages of the turbine before it exhausts to either an air- or water-cooled condenser.

This solution can meet the plants heat and power demand over a wide range of load scenarios, without back-up from process steam boilers and power imported from the grid. This turbine can run in fully condensing mode, making it possible to generate power when there is zero process steam demand. However, this type of turbine always requires a minimum steam flow through the latter stages of the turbine.

Although it is typically more capital intensive, another hybrid co-generation option is to install a back-pressure turbine that is 100% controlled based on process steam demand, generating whatever is associated with the varying steam flow, while a separate fully condensing turbine makes up the power deficit. This solution often provides more flexibility, especially when dealing with a more complex process where either the electrical or power demand may lag behind the other.

Steam turbo-alternator options

Steam turbines convert a part of the energy in steam into mechanical power that can drive an alternator or mechanical device.

Steam is introduced into the turbine expanded via a set of nozzles to create a high velocity jet that impinges on a curved vane that is free to move. The steam undergoes a change in momentum and the resultant force acts on the vane and in turn rotates the shaft. The rate of change in momentum of the steam impinging on the vane provides the motive force for the turbine.

A typical stage in a steam turbine consists of a stationary stator row that is a nozzle or guide vane ring. The stator expands the high pressure, high temperature steam to form steam jets. The shape of the stator guide vanes ensures that the steam jet enters the rotor blades at the optimum angle. The number and types of stages in the turbine determines the efficiency and the flexibility of the particular machine to meet the requirements of a specific application.

John Thompson has established relationships with several turbo-alternator suppliers, making it possible to select the most suitable turbine technology to meet the technical and commercial requirements for every power island application. John Thompson as the turnkey supplier can package the complete power island to suit every need and application, using one or other model MicroGen boiler matched with the most suitable turbo-alternator combination.

Environmental considerations

Environmental legislation applicable to manufacturing and processing plants in all industries is becoming more stringent. When considering a new power island or co-generation plant,

To page 16

From page 15

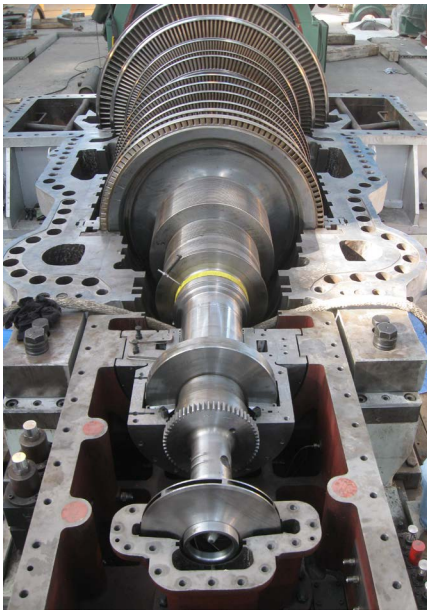
obligatory environmental requirements must be considered, in particular with regards to plant effluent, gaseous and particulate emissions. This affects the selection of ash removal systems, flue gas cleaning as well as the type of cooling implemented in the steam condenser behind the turbine.

Conclusion

There is no one solution to fit all the co-generation or small-scale electrical generation challenges that are encountered. Hence it is good to have a conceptual understanding of which arrangement will suit a particular application best. Each combination of plant will also have different levels of capital and operational costs that will in turn play a role in the decision-making when selecting the right solution.

Whatever the combination of plant required, the different models of MicroGen boilers provide a flexible starting point regarding fuel selection, capacity, steam pressure and temperature to be used as building blocks for a modular power generation or co-generation solution for any industrial plant or stand-alone power island.

By Etienne de Villiers
Divisional Technical Manager
John Thompson



A turbine with a combination of impulse and reaction blades.

ACTOM Signalling installs tried-and-tested yard control system at Ermelo station

After encountering repeated failures and faults in a semi-automated yard control system that had been supplied and installed by a local railway signalling company at Ermelo station in Mpumalanga seven years ago, Transnet Freight Rail (TFR) decided the system had to be replaced by a more reliable one.

TFR accordingly invited tenders for the replacement contract, which Signalling won in October 2018 and completed at the end of July this year.

Signalling's semi-automated yard control system is already well-proven as reliable and efficient. The business unit developed it in 2012/13 and was commissioned by TFR in two sets of contracts amounting to over R400-million to produce and install it at various TFR depots across the country. The contracts involved upgrading all the stations from longstanding manually-operated yard control systems to semi-automated systems. Signalling was awarded the first set of contracts in mid-2012 and completed them at the end of 2014, while the second, awarded in August 2015 was completed in April 2019.

"TFR has subsequently confirmed that the system functions and operates very well at all the stations concerned and represents a big advance over the cumbersome manual system it replaced," commented **Leonard de Villiers**, Signalling's Contracting Manager.

Ermelo, situated in the heart of the Mpumalanga coalfields, which supply coal via the Coal Line to Richards Bay in northern KwaZulu-Natal for export, is the largest railway junction in South Africa.

Signalling's contract for the Ermelo station yard involved removing the existing semi-automated system and replacing it in three of the yard's total 10 local control points, while it also encompassed installing a new central control room in the Yard Master's office.

In Signalling's semi-automated control system yard operators are provided with two levels of control, as they may control the points sets remotely or directly as they choose.

Remote control is provided via a local control panel situated in each local control point, while for direct control a trackside push-button is provided on the side of each points indicator.

During the development phase, as part of meeting TFR's design requirements for the system, Signalling had to design and develop a new points machine, points indicator and axle-counter with features specifically applicable to yard control.

Members of Signalling's installation team on the yard control system contract for Ermelo station are seen above installing a points machine.

Signalling completes contract for new coal loading facility at Rietkuil station

Signalling recently completed a contract for Exxaro Coal in Mpumalanga consisting of the installation of a signalling system to control train movements for a new rail siding and coal loading facility adjacent to Transnet Freight Rail's (TFR) Rietkuil station on the Wonderfontein-Geluksplaas section of the Coal Line from the Mpumalanga coalfields to Richards Bay, South Africa's coal export port in northern KwaZulu-Natal.

Rietkuil station, situated close to Eskom's Arnot and Hendrina power stations, already serves a coal loading hub. Three rail sidings and coal loading facilities are present in the immediate vicinity of Rietkuil station. The new Exxaro Pioneer siding shares a take-off set of points from the TFR main line with Mafube mine, a joint coal mining venture between Exxaro and Anglo American Coal.

The signalling contract, awarded in November 2018, was completed on time and within budget in November last year. The project comprised:

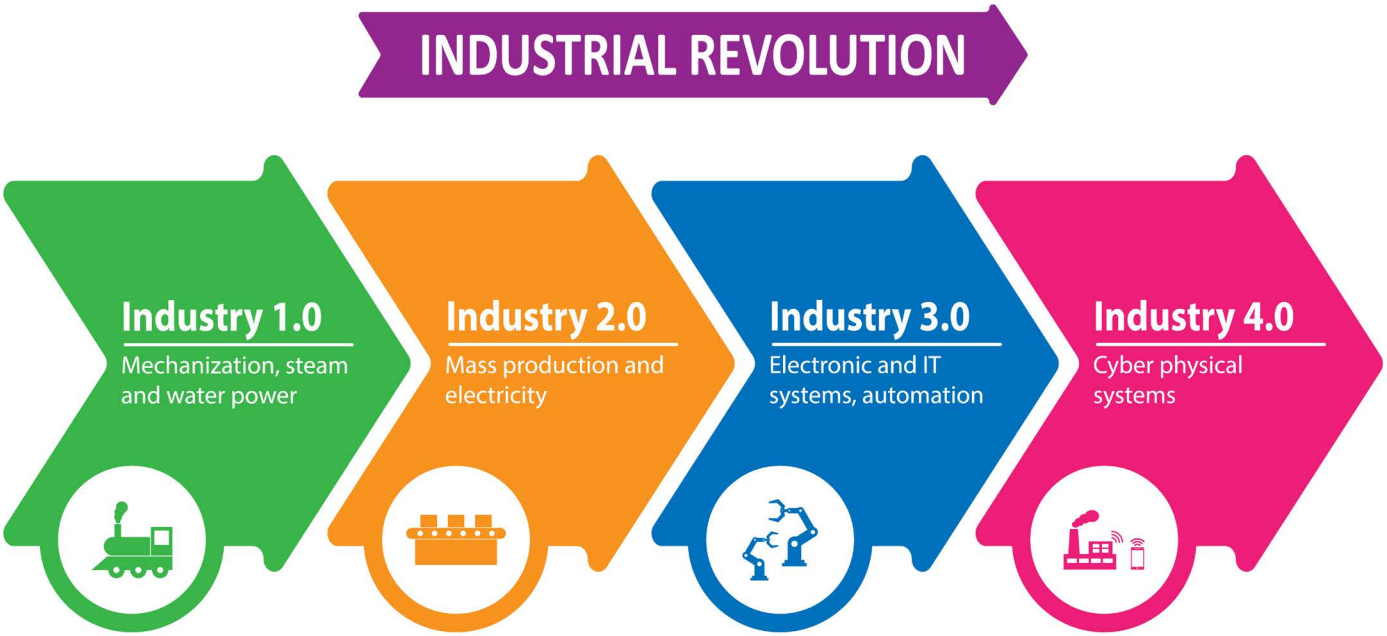
- The design, manufacture, supply, installation and commissioning of Spoorplan Mark 1b interlocking units for control of the take-off, which also included modifying the existing interlocking system to integrate the new track elements.
- Supply and installation of eight new signals and eight Thales axle-counter sections to serve the four sets of points at the junction between the take-off line and the loop line.
- Upgrade of the existing Train Control Officer (TCO) video display unit (VDU) in TFR's Centralised Traffic Control (CTC) in Ermelo to incorporate changes to the existing signalling system.

Contracting Manager **Leonard de Villiers** said Signalling's team faced two main challenges when executing the contract.

"The first was having to organise space for the take-off interlocking system in the existing TFR relay room, where space was extremely tight.

"The second challenge was the tougher of the two, as it involved having to search for and find obsolete relays and other components we needed to make the new equipment compatible with the existing legacy Spoornet Mark 1b system. These proved very difficult to source, but we found them eventually," he said.

What the 4th industrial revolution means for ACTOM



Never before in the history of mankind have technological breakthroughs been as rapid or as disruptive as they are today.

This period, dubbed the 4th industrial revolution, is closely linked to the 3rd industrial revolution, where electronics and information technology were used to automate production.

To understand this revolution perhaps we need to look back on what we call the 1st industrial revolution, where production was mechanised during the 19th century using water and steam-powered machines and mechanisms. This initial industrial revolution was a leap forward from a mostly agrarian society and the 2nd industrial revolution with the introduction of electricity was more of the same. New methods of transmitting and distributing this energy brought about expansion of industries and greater mass production.

In the middle of the 20th century we entered the 3rd industrial revolution, often called the digital revolution, where automation became the order of the day and computers were developed to assist in all areas of our lives beyond just the factory floor.

In an article in January 2016, **Klaus Schwab**, the founder and executive chairman of the World Economic Forum, remarked that there are three reasons why today's transformations

To page 18

From page 15

represent not merely a prolongation of the 3rd industrial revolution, but rather the arrival of a distinct 4th one: velocity, scope and systems impact. The speed of current breakthroughs has no historical precedent.

The revolution we are in now uses the computers from the digital revolution to blur the lines between our physical world, the digital space and biological spheres. In the connected world we live in now, vast amounts of data can be used to unlock value if chosen well and analysed using algorithms which have been proven by research and good engineering principles.

One of the areas where ACTOM features today is the hugely advantageous area of asset performance by means of analytics. This is an area that promises greater opportunities for advancement of the group in the future.

Like the motor car industry that many years ago developed sensors to advise drivers when their vehicles require service, using decades of analytic data around performance of lubricants, lifetimes of spark plugs, oil and fuel filters and wear and tear of sub-systems, ACTOM as a manufacturer of electrical and mechanical infrastructure systems and products knows these products' characteristics, maintenance cycles, operating parameters and modes of failure.

The raw environmental data available in the field can be leveraged to offer end-users peace of mind in terms of the longevity and reliability of their assets. Algorithms that are unique to the plant equipment – specific transformers or switchgear, for example – may be used to offer end-users maintenance based on loading conditions, as opposed to time-based maintenance cycles that were previously the norm.

Surprisingly though, the key to unlocking the value is not in the technology itself. There are many platforms and communication options available to engineers today. Never before have small industrial computers been as prevalent or as simple to configure and use as today. Previously one had to be a programmable logic controller (PLC) expert to be able to digitise, automate or monitor systems, whereas today a Raspberry Pi single-board computer can be bought for under R500 and put to use within minutes as a hub for various sensors, including discrete digital inputs and outputs as well as analogue sensing parameters such as temperature.

The internet of things (IoT) infrastructure that enables communication from field devices to back-end systems are ubiquitous now, yet not so long ago they lived in the realm of hobbyists and tinkerers. Today all the major network operators offer them as simple available options on their tick sheets.

If these technologies are so available and prolific, what is the key to unlocking their value? What it comes down to is actually understanding the fundamental principles of the primary plant, equipment and infrastructure that have been in the domain of experts and engineers in established companies like ACTOM for many years.

Translating this knowledge and experience into algorithms and methods, living and calculating inside an edge-based computer can become a revolutionary tool for change and advancement.

By Faisal Hoosen
Divisional CEO
Medium Voltage & Protection

WPI performs speedy installation of replacement switchgear at Secunda's Albany substation

WPI Power Solutions brought together all management and technical personnel from three of its branches to form a single large team to perform an unusually rapid installation of new switchgear panels at Secunda's Albany substation early this year.

Albany, the main supplier of power to Secunda residents and businesses, including the town of Trichardt, had to have all its aging medium voltage switchgear replaced by new switchgear, comprising a total of 32 panels – 14 for its Main Sub 1 and 18 for its Main Sub 2.

Sasol, as the town's largest employer, arranged by agreement with the town council to foot the bill and two years ago commissioned ACTOM MV Switchgear to manufacture and supply the 11kV replacement panels comprising its SBV4E switchgear, while WPI, ACTOM's business unit specialising in repair, maintenance and installation of electrical networks, was contracted to remove the old panels and install the new ones.

WPI technicians conduct final checks on one of the new sets of switchgear panels in Albany substation.

The installation part of the contract was however put on hold until early this year, when Sasol and Govan Mbeki Municipality gave WPI the go-ahead to proceed with it, but stipulated an extremely tight time-frame in which to carry it out.

"Under normal circumstances each

set of installations – for Main Sub 1 and Main Sub 2 – would take five to seven days each, but we were allowed only two days for each separate shutdown to limit the inconvenience to the community and businesses. This necessitated deploying a much larger installation crew than normal, working round the clock and requiring very careful planning and coordination to ensure the work was completed as required," said **Marius Lombard**, Regional Manager for WPI's eMalahleni (Witbank) and Secunda branches.

A total of 39 managers and technical staff – comprising 16 from WPI's eMalahleni branch, 12 from its Secunda branch and 11 from its Carletonville branch – were assigned to the project. The old switchgear panels in Main Sub 1 were removed and the 14 new panels installed and commissioned within a shutdown lasting 43 hours between February 18 and 20. The same procedure was achieved during a 40-hour shutdown to install the 18 new panels in Main Sub 2 from March 17 to 19.

"Taking into account the limited time allowed for all the work that was involved, which also included replacing three 33kV outdoor circuit breakers and repairing an earthing system, this contract can be rated as one of WPI's largest projects," Marius commented.

Sasol expressed its appreciation to the WPI team by issuing special Certificates of Recognition to all team-members. "These very competent WPI teams really showed dedication and commitment, which ensured the success for this large project," said **Ryno Oosthuizen**, Area Manager: Electrical Contractor Management, Secunda Synfuels Operations.

LH Marthinusen gears up for repair and testing of auxiliary mine ventilation fans

LH Marthinusen (LHM) is gearing up to enter a new market sector following a recent decision by management to acquire a specialised state-of-the-art fan testing facility for its Denver, Johannesburg plant.

The new facility, currently being installed and due to commence operation in August this year, is dedicated to testing auxiliary ventilation fan assemblies deployed in underground mines.

"This facility will enable us to provide a full-on reliable auxiliary fan repair-and-refurbishment service to the mining industry. It is a niche market for which dedicated testing equipment is needed to meet the mining industry's specific requirements for these fans," said **Craig Johnston**, General Manager of LHM's Fan Service division.

"The new facility will however, in addition to having the capability of proving performance efficiency after repair by ensuring that the fans meet the set performance criteria in terms of volume, pressure and power as laid down in the international ISO 5801 code applicable to them, as required by the mining industry in South Africa, will also be equipped to prove other important parameters we know the industry needs and wants," he pointed out.

The enhanced testing services LHM's new testing facility will offer are:

- Testing the sound levels of the fans with the aim of reducing the high noise levels most auxiliary fans produce. "The mines have a huge problem with noise pollution, with auxiliary fans being a big contributor to this problem, which causes hearing loss among many mine workers," Johnston commented.

Fan Fitter Assistant Patrick Sishuba puts finishing touches to one of two newly-installed test columns in the auxiliary fan testing facility.

- Testing their efficiency from an energy-saving point of view. "Auxiliary fans are known to be substantial consumers of energy, so anything that helps to reduce their energy consumption and the attendant costs will be welcomed by the industry," he said.

The advanced monitoring and testing system that is being installed in the test area which has been set aside for it in LHM's premises is fully automated and includes an observation room in which customers may witness on a screen the test data and results as each test procedure is carried out. The facility includes two test columns in which underground working conditions are simulated while the various performance parameters of newly-repaired auxiliary fans undergo testing.

Repairs and refurbishments of auxiliary fans will be undertaken in tandem by LHM's Fan Service and Rotating Machines divisions. "The motor driving a fan is its single most important component, so the auxiliary fan service facility has been incorporated into the existing Rotating Machines division," said **Pieter van der Walt**, the division's General Manager.

"This gives us the opportunity to maximise the resource, using our well-entrenched LV motor repair systems and infrastructure, thus enhancing this facility's loading and cost-effectiveness," he explained.

Auxiliary ventilation fans are in the 4kW to 132kW power range, typically using 525V motors, with fan impellers from 400mm to 1600mm in diameter.

The two divisions between them are equipped to perform repairs and rebuilds of the full range of equipment in their respective fields, from very large through to small. The LHM Fan Service division deals with large power generation and mining fans as well as a wide range of industrial fans deployed in process plants. The LHM Rotating Machines division refurbishes and repairs all types of motors from small to multi-megawatt units, including traction motors.

LH Marthinusen overhauls 17 drilling rig duty motors against tight deadline

LH Marthinusen (LHM) recently completed a general overhaul on 17 drilling rig duty AC variable speed induction motors.

The overhauls of the motors were performed in batches, as the contract had to be completed in nine weeks instead of 14 weeks, which is the normal period required for a task of this magnitude.

The vessel on which the drilling motors were situated was on a Class Renewal stopover in an international harbour.

After disassembling, cleaning and mechanically and electrically assessing the motors, LHM balanced the rotors and replaced the bearings. The shaft journals, which had undergone excessive wear, were rebuilt and brought back into specification, while the stator windings were treated for moisture suppression.

In accordance with contractual requirements, the international client's mechanical OEM witnessed the fitment of the shaft hubs. The assembled motors also had to be inspected and issued with Certifications of Compliance by an appropriate standards authority, due to the fact that they operate in a potentially explosive environment.

"In order to meet the strict timelines, the specialised bearings to replace the existing ones had to be purchased beforehand, as they were long lead import items. Replacement components were issued with certificates of material conformity, required for the Class Renewal overhaul," said **Boris Breganski**, LHM's Electrical Engineer.

LHM performed all the overhauls in only five weeks – well within the nine-weeks' limit stipulated in the contract. "The client was satisfied with our workmanship and promptly commissioned us to overhaul a further four drilling rig duty motors," Boris said.

Repair order follows R&M's detection of fault in wheel motors of Namibian mine's dump trucks

In November last year, while conducting routine inspections and services on the wheel motors of some of the large 183t capacity Komatsu 730E electro-mechanical off-road dump trucks operating at an opencast mine in Namibia, Reid & Mitchell (R&M) detected an irregularity it hadn't previously encountered in these motors.

"Applying in-depth mechanical dimensional measurements, we identified in several of the motors a movement of the commutator away from the armature core and concluded that if this was allowed to continue unchecked it would cause the motors to fail," said **Rene Rajzman**, R&M's Operations Executive.

After bringing the fault to the attention of its customer Komatsu, an arrangement was made for Rene and a senior engineer from Komatsu to visit the mine in January this year to examine the wheel motors of the mine's entire fleet of dump trucks.

"During this examination the same irregularity was found to exist in virtually all the wheel motors, but it was more marked in some than in others. We drew up a list of all the faulty motors, ranging from the most serious to the least serious so that the more serious ones could be attended to first," Rene commented, adding that excessive heat resulting from use of the trucks over long working cycles was the likely cause of the problem.

To address the problem R&M proposed that a regular change-out programme be embarked upon involving rewinding of the armatures and installing a new commutator in each case.

Lucky Thipane, R&M's Assessing Metrologist, uses a portable coordinate measuring machine for easy verification of product quality by performing a 3D inspection and dimensional analysis of a wheel motor armature.

In accordance with this suggested programme, Komatsu gave R&M the go-ahead in early-June this year to repair three of the wheel motors, using a special type of copper imported from Europe for the rewinding of the armatures.

"We expect similar orders to follow in coming months for the rest of the faulty wheel motors to be repaired in batches in the same way," Rene concluded.

R&M assembles grid blowers for locomotives in latest contract for leading international OEM

The local subsidiary of leading international diesel electric locomotive manufacturers and suppliers Wabtec (formerly GE Transportation), which has partnered Reid & Mitchell (R&M) since 2015 to perform a variety of repairs on the traction motors and other components of its various models of locomotives deployed in South Africa and elsewhere in Africa, has commissioned the division to assemble grid blowers for Transnet-owned locos in its latest contract.

The contract, awarded in early-June this year by Wabtec South Africa Technologies (formerly GE South Africa Technologies), involved the assembly of seven grid blowers from late-June until the end of July. The function of grid blowers is to cool the braking grid resistors in the company's locomotives.

The assembly of the grid blowers comprised four stages:

- Wound armature assembly
- Coil assembly into field frame
- Vacuum pressure impregnation of field frame
- Unit assembly

The contract also included dismantling, assessing and rebuilding grid blowers that had failed.

"Wabtec SA Technologies applies strictly defined procedures to all its repair and assembly work. Therefore a Wabtec SA Technologies engineer formed part of our assembly team at the start of the process to ensure that the correct assembly procedures for the grid blowers were followed in accordance with the approved documentation," said **Willie Liebenberg**, R&M's Technical Executive.

Team expertise key to successful mill drive maintenance of motors

Meticulous planning underpinned the successful completion by Marthinusen & Coutts (M&C) of the servicing and pole changes on two of the largest mill motors operating in Africa, at a South African platinum mine. These are ABB gearless mill drives (GMDs) with 17.5MW 60 pole synchronous motors.

According to **Owen Kilian**, M&C's National Technical Sales & Service Manager, the business' experience ensured the work was done efficiently while planning for any eventuality. The GMDs require regular inspection and maintenance, and the mine gave Owen's team just 120 hours – the five days of the quarterly shutdown period – to complete the work.

"As the preferred service partner in Africa, we deployed 16 people on this contract, allowing us to keep working through the day and night shift," he said. "Time was of the essence, as we couldn't delay the resumption of plant operations at the end of the shutdown."

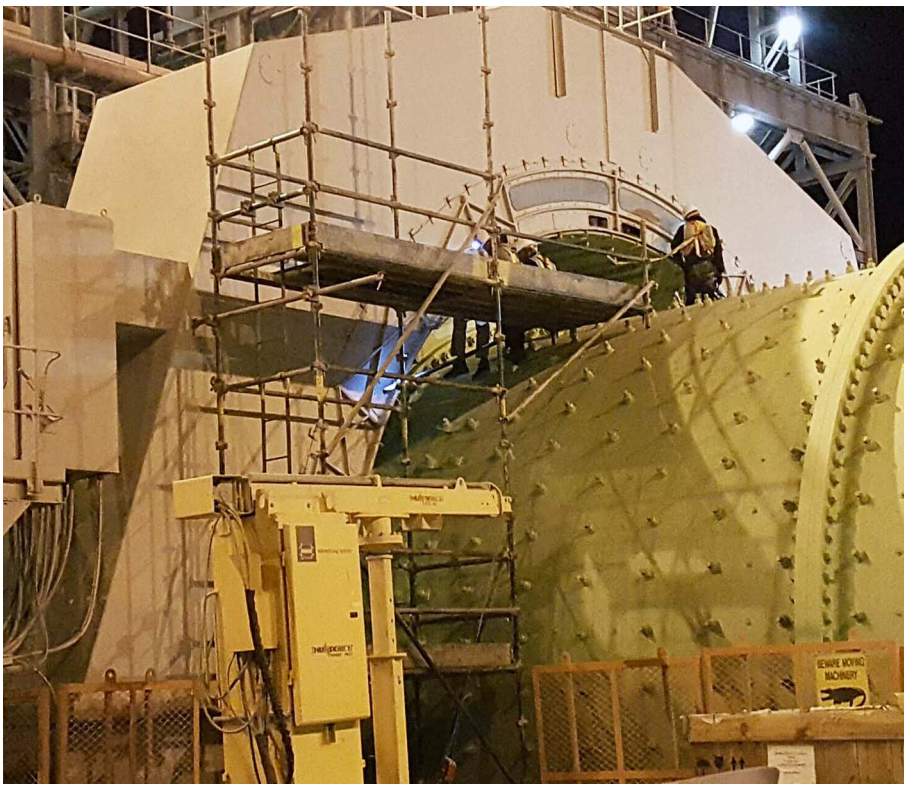
The seasoned team for this work included two site managers and two supervisors – one for each shift – as well as mechanical fitters and armature winders with their assistants. Preparation began well before the team arrived on site, with various medical fitness tests and inductions being required to comply with the mine's strict health, safety and other requirements.

"Before the shutdown, we also conducted an inspection and risk assessment. By doing this, we identified any aspect of the job that might take more time than normal, and planned for that by stocking all relevant tools, equipment and spares," he said. "We even took back-up tools and testing equipment to keep all functions running smoothly, and to make the best use of the available time."

The work itself followed a strict and optimal sequence, noted Owen, from the lifting of connection plates and stator covers to the removal and replacement of the damaged rotor poles. This sequence kept the process efficient and allowed the team to work in close collaboration with the mine's riggers, who conducted the heavy lifting duties.

"While we were changing the rotor poles, we were also able to clean the motor inside – removing dust and wiping the walls with an electrical solvent," he said. "For efficient operation, these motors need to be kept as clean as possible."

He emphasised that confidence in his team's expertise was the key to successful project completion, with each member trained and prepared for their tasks. "This experience is what makes us leaders in the repair of both rotating electrical and mechanical machines," said Owen.



M&C technicians removing the gearless mill drives motor covers.

M&C replaces ball mill motor in Kyrgyzstan

With its world-class expertise in rotating electrical and mechanical machines, Marthinusen & Coutts (M&C) recently changed out a large ball mill motor at a gold mine in Kyrgyzstan.

The planning and work to replace the 36t synchronous motor with a brushless exciter was conducted in just 16 days over the December 2019 shutdown. According to **Andries de Lange**, Field Service Technician at M&C, this was done to reduce any impact on production.

"The ball mill is at the heart of the mine's plant, and the customer chose to use M&C as they could rely on our quality workmanship and our ability to meet the agreed deadlines," said Andries. "The contract followed extensive engagement with the mine on various project options and included our taking responsibility for sub-contracting certain aspects of the work."

Fitment of new ball mill motor on the new base.

M&C was required to conduct the motor replacement as well as ancillary work related to the mill and infrastructure, including a new base frame. This meant that among the project team that headed to Kyrgyzstan in December 2019 were eight specialised subcontractors from South Africa.

"After a period of pre-shutdown preparation, we were able to move the 40t overhead crane into position, removing covers and other components in readiness for moving the motor," Andries said. "After the motor was lifted out, the existing base frame could be removed and a new one installed in line with stringent OEM procedures and specifications."

The new motor was retrieved from storage and thoroughly inspected before installation on a new base frame. Following this, the full range of checks and adjustments were made. Electrical fitment and alignment then followed, with the inspection and testing of the stator, rotor, exciter rotor, exciter stator and all components.

"Our running checks included testing for vibrations on the drive-end and non-drive-end bearings, and bearing temperature measurements," he said.

"With our combined experience in both motors and mills, we were able to leave the customer well-assured that the new equipment would run productively and reliably."

Bloemfontein wins Electrical Products' Branch of the Year Award for 2020

Electrical Products' Bloemfontein branch was named winner of its Branch of the Year Award for 2020.

Unlike in all previous years, the business unit's annual conference and awards presentation function on June 30 was staged remotely by Zoom on account of the Covid-19 lockdown restrictions on travelling and the holding of meetings.

Bloemfontein branch, which previously won "Branch of the Year" in 2016, was way ahead of its closest rivals East London and Nelspruit in the latest competition, which in addition to a trophy award also includes special bonus pay-outs to all staff members of the winning branch.

East London, competing with Nelspruit in a neck-and-neck race to the finishing post for Runner-Up, won it by a narrow margin.

Rod Penaluna, Electrical Products' Divisional CEO, said Bloemfontein's victory was achieved on the back of their success in the renewable energy sector as an integral part of the dominant role ACTOM played in supplying equipment for solar and wind projects in the latest round of the national Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). "The branch's excellent performance this year is also due to their success in increasing their market share in Lesotho and the Northern Cape,' he pointed out.

East London, winners of "Most Improved Branch" as well as Runner-Up in the main contest, are Electrical Products' newest branch. "They've made great strides in taking market share in the Eastern Cape, particularly with sales of transformers, while Nelspruit had all-round success in the markets they serve, namely the local market in the Lowveld, Eswatini and Mozambique," Rod said.

Other award winners in the competition were:

- Best Sales: Mechanical Equipment
- Best Credit Control: Welkom
- Best Stores: Pretoria

Eskom Senior Planning Engineer Monde Soni named SAIEE's 'Engineer of the Year' for 2019

At the Annual Awards dinner for 2019 of the SA Institute of Electrical Engineers (SAIEE) on November 28, 2019, at the Sandton Convention Centre in Johannesburg, Monde Soni, a Senior Planning Engineer at Eskom, was named the Institute's "Engineer of the Year".

Casbah Zwane, Divisional CEO of High Voltage Equipment, presented him with the award on behalf of ACTOM, which sponsors it every year.

The picture on the right shows Casbah (centre) with **Monde Soni** and SAIEE President **George Debbo** displaying the award certificate. The award recognises an engineer who energetically works towards promoting electrical science for the benefit of the Southern African community.

Amongst Soni's major achievements have been his facilitation of the SAIEE Load Research Chapter and his presentation at the Cigre SA Conference in 2019 of a paper on bulk energy storage integration studies on the Eskom network, in which he developed the first methodology in South Africa for bulk energy storage modelling and simulation.

Key appointments

Andries Mthethwa has been appointed Chairman of ACTOM with effect from June 1, 2020.

Sy Gourrah, has been appointed to the new position of Business Development Executive –Transmission & Distribution, Engineering Projects & Contracts with effect from June 1, 2020.

Faisal Hoosen, has been appointed Divisional CEO of the Medium Voltage & Protection division with effect from August 1, 2020.

Gladstone Mbili has been appointed General Manager of John Thompson's Utility Boilers & Environmental Solutions business unit with effect from April 1, 2020.

Andrea James has been appointed Financial Manager of Electrical Products with effect from August 1, 2020.

Danie Hanekom has been appointed Manager: Vacuum Interrupters at MV Switchgear with effect from April 1, 2020.


Andries Mthethwa


Sy Gourrah


Faisal Hoosen


Gladstone Mbili


Andrea James


Danie Hanekom

John Thompson sponsors Stellenbosch University's M&M Engineering prizes

For many years John Thompson has sponsored Stellenbosch University's Mechanical and Mechatronic (M&M) Engineering department's graduation ceremony and some of the prizes presented at the event.

At the M&M graduation and prize-giving ceremony for 2019, held in December, **Etienne de Villiers**, John Thompson's Divisional Technical Manager, presented two prizes for exceptional achievement, one being the Mechanical Engineering prize, won by final year student **Murray Louw** and the other to **Danial Waters**, the winner of the Best Final Year Project in the Field of Thermal Energy Systems.

The picture on the right shows Etienne presenting Danial with his prize.

Top achievers in tutoring programme applauded

The top 10 learners in Maths and Science out of a group of Katlehong Technical Secondary School Grade 9 learners who last year became part of the Ekurhuleni School Tutoring Programme were treated to a delicious lunch by ACTOM in early-March this year.

The 10 best learners out of the total group of 25 learners taking part in the ACTOM-sponsored programme were presented with certificates, while the top three learners also received special trophies as a further mark of recognition.

"Arranging to combine the presentations with a lunch at an up-market restaurant made it a unique experience for the learners, many of whom are from severely disadvantaged backgrounds. The lunch was part of their reward for what they'd achieved," commented **Sylvester Makamu**, Group HR Executive.

Hosting the lunch with Sylvester was **Mervyn Naidoo**, ACTOM's Group CEO, while Katlehong Tech's Principal **Jaco Opperman** and Maths teacher **Mr Malindi** also attended.

Seen in the above picture with Mervyn, Mr Opperman and Sylvester are the three top Maths and Science achievers proudly displaying the certificates and special trophies they were presented with at the lunch. They are, with their positions and average percentages in brackets (from left): **Maria Manjate** (Third, 69%), **Sithembile Magqabini** (First, 91%) and **Skhombiso Mdluli** (Second, 71%).

As an illustration of the difficulties many of the learners at the school face, Sylvester said one of the learners attending the lunch told him that until recently he was having to walk to and from school every day, which took him 1-1/2 hours each way, because he couldn't afford the taxi-fare. He lives with his mother, but she is unable to assist him as she is unemployed.

However this changed when he started up his own little business at school selling lollipops to fellow-learners, which earns him just enough money to pay the taxi-fare both ways.

"He is just one of many children who are forced by circumstance to fend for themselves. Yet despite being faced with such enormous difficulties, he has still made it as one of the top 10 learners in this group, which is really admirable!" Sylvester remarked.

2019 awards presentations at four ACTOM divisions

Among group divisions and business units which held long-service award presentations for staff towards the end of 2019 were Signalling, Distribution Transformers, Marthinusen & Coutts and Electrical Products.

At Signalling's awards presentation function in November, **Peter Colborne**, the business unit's General Manager, and **Peter Nel**, Technical Adviser, were presented with long-service awards for attaining 35 years' service with the group in 2019.

In addition to long service awards, two merit awards were presented at the event, the Factory Performer of the Year Award, which was won by **Lerato Namane**, Stores Clerk, while **Yollanda Janse van Rensburg**, Engineering Clerk, was selected winner of the Office Performer of the Year Award.

The other Signalling employees who received long-service awards were:

30 years: Anton Reinhardt.

Signalling's award recipients (from left): George Taylor, Loretta Kuun, Bongani Yende, Aaaron Gamede, Sello Chabalala, George Fritz, Andre Wienekus, Yollanda Janse van Rensburg, Juan Bruyns, Cameron Martin, Peter Colborne, Peter Nel and Anton Reinhardt.

25 years: Thelma January, Andre Wienekus, Loretta Kuun and Aaron Gamede.

20 years: Sello Chabalala.

15 years: Cameron Martin, Saul Nkosi, Rodger Marakalala, Anna-cletta Barends, Lerato Namane and Shawnel Gameson.

10 years: George Fritz and Bongani Yende.

5 years: Robert Mdingi, Lukha Ndlovu, John Sekgobela, George Taylor and Juan Bruyns.

At Distribution Transformers' long-service awards presentation function in late-November – unlike recent previous

Distribution Transformers recipients of long-service awards for 2019: In the back row with Alan Buchhotz (second from right) and Shop Stewards M Tshotini (left) and G Motlou (right) are the employees who received 10 years long-service awards (from left) S Mhlongo, S Zulu, N Molapo, S Esaack, R Mathebula, J Moshia, L Dwasha and S Vilakazi. In the front row are the 15 years award recipients (from left) V Ntando, A Molefe, B Nkabinde and C Legoba.

years when there was a large number of recipients on each occasion – only 12 employees received awards in 2019 for 15 and 10 years' service.

Distribution Transformers' Divisional CEO **Alan Buchholz** also presented a special award to **Frank Mkwanazi** of Final Assembly upon his retirement after 11 years' service.

At Marthinusen & Coutts' long-service awards presentations event held in December, the longest -serving employee among the five recipients was **Klompie Motsoe**, Coil Taper, with 30 years' service.

The others were **Tanya Carnell**, Power Generation Office Manager, and **Ruben Lentswe**, Assembler, both having completed 25 years of service, and **Marrian Bernardes**, Coil Taper, and **Theo Pienaar,** General Manager Rustenburg, both with 20 years' service. Theo has subsequently retired.

At Electrical Products **Martin Liebenberg**, Sales Representative, Ventilation & Heating, was presented with a long-service award certificate for 25 years' service at the business unit's head office in Driehoek, Germiston, by Divisional CEO **Rod Penaluna** in January this year, as shown in the picture on the right.

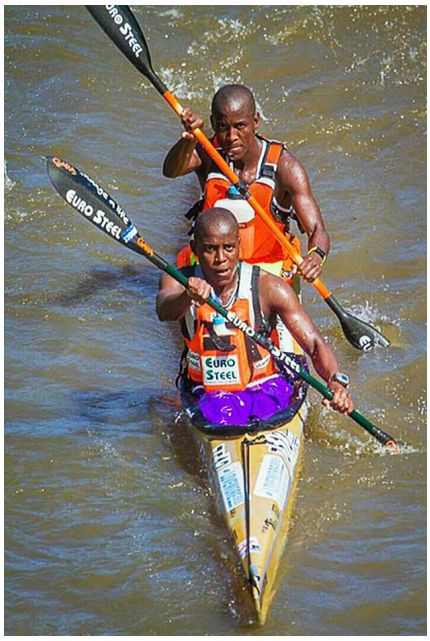
ACTOM's star canoeists Loveday and Zonele do well in Dusi 2020

ACTOM's top two canoeists, Loveday Zondi of Electrical Products and Zonele Nzuza of Genlux Lighting, each accompanied by a partner from outside the group, did well in this year's three-day Dusi canoe marathon at the end of February.

Loveday, 35, and his brother **Mpilo**, 22, who accompanied him for the first time in this gruelling 124 km race through the Valley of a Thousand Hills between Pietermaritzburg and Durban, finished in 14th position overall, while Zonele, 30, accompanied by **Trenton Lamble**, 36, finished 16th overall – all winning silver medals in the doubles (K2's) contest.

Loveday, Product Coordinator at Electrical Products, has completed 17 Dusi races and Zonele, SHE Assistant at Genlux, has done 14 Dusis to date.

This year's weather and water conditions were the best in years, with good rains leading up to the event, resulting in high water levels, cleaner water, cool conditions, easier portages and less sickness. Only about 4% of all participants suffered from "Dusi guts", as the illness caused by contact with contaminated water is called, compared with around 28% last year.



Loveday (back) and his brother Mpilo doing Dusi.

Stalwarts **Craig Johnston**, General Manager of LH Marthinusen's Fan Service division, and **Mike Merry**, Divisional Financial Executive for the Power Conversion division, paired up again this year as they did last year, but were unfortunate in having two incidents that set them back. Craig cut his eyebrow when their boat overturned during Day 2, resulting in him having to get the wound stitched at the end of that day, while on Day 3 they got stuck in a rapid where another boat coming down punched a hole in their boat.

"We patched up the hole as best we could, but still had to stop regularly to bail out water the rest of the way. The main thing is that we finished the race despite the setbacks," Mike commented. They finished in 291st position overall.

Craig was presented with a special prize at the finish on completing his 10th Dusi race.

ACTOM divisions and business units

POWER

John Thompson, Bellville: (021) 959-8400
John Thompson, Isando: (011) 392-0900
www.johnthompson.co.za
John Thompson designs, manufactures, installs and maintains industrial boilers and environmental equipment for local and international process steam and power generation applications. It also retrofits, services and maintains utility boilers and environmental equipment in the power generation market, as well as designing, supplying and installing dust control, product recovery and gas-cleaning equipment for the mining, mineral processing, cement, chemical, petrochemical and food industries.

POWER CONVERSION

Electrical Machines: (011) 899-1111
Electrical Machines supplies medium and low voltage motors, starters, gearboxes and speed reducers to the mining, industrial, processing and utilities markets.

Large Motors: (011) 899-1111
Large Motors designs and manufactures medium voltage motors that include its reputable customised large UNIBOX series and its high specification MS4 totally enclosed fan-cooled (TEFC) cast-iron motors.

Laminations & Tooling: (011) 899-1111
Laminations & Tooling manufactures laminated components and tooling for the electric motor manufacturing and repair industries.

HVAC Systems, Durban: (031) 700-3286
HVAC Systems, Cape Town: (021) 981-0111
www.actom-hvac.co.za
HVAC Systems designs, supplies and installs industrial ventilation, heating and air-conditioning systems for the petrochemical, paper, pharmaceutical, mining, food, textile and various other industries.

Static Power: (011) 397-5316
Static Power Specialize in the design and manufacture of AC and DC standby equipment,including thyristor type battery chargers (Micro Process Controlled option), industrial batteries, power supplies, rectifiers, DC/DC converters, DC/AC inverters, furnace control panels, capacitor trip units, battery trip units, power distribution boards. All systems are designed and engineered to suit their purpose.

Alkaline Batteries: (011) 397-5326
Alkaline Batteries, is the South African Distributor for ALCAD and SAFT industrial nickel cadmium and Lithium Ion batteries for the industrial, telecoms, rail and renewable energy markets. Services offered; Installation, Commissioning, Battery Sizing, Testing, Training, Maintenance and Repairs.

COM 10: (011) 552-8368
COM10 is a local assembler and integrator of Alpha switchmode rectifiers, DC/DC Converters with sophisticated supervisory controllers, Haze Batteries, stands, battery cubicles and power enclosures.

ENGINEERING PROJECTS & CONTRACTS

Industry: (011) 430-8700
ACTOM Industry, the group's Mine winder experts with modern power electronic drive, control and switchgear technology, providing turnkey solutions worldwide for specialised industrial rotating drive and power applications in mining, metals, paper and process industries. We manage projects from design to commission; inspect & maintain; provide emergency support; do repairs and we perform magnetic rope testing.

Contracting: (011) 430-8700
Contracting is the electrical and instrumentation business unit which provides turnkey solutions for electrical power and instrument & control systems in the mining and manufacturing industries as well as the public sectors.

Power Systems: (011) 430-8700
ACTOM Power Systems, the group's substation construction contractor, is ACTOM's systems integrator, responsible for turnkey projects for the electrical power, mining and manufacturing industries, as well as for public sector infrastructure. It specialises in Renewable balance of plant installations.

Transport: (011) 871-6600
Transport has three trading units:

ACTOM Signalling; design, manufacture, install and maintain railway signalling equipment and turnkey systems.

ACTOM Transport Equipment and Projects (TEP); a contractor and supplier of rolling stock equipment, parts, maintenance and specialised depot machinery and test equipment.

ARNOT Vibration Solutions (AVS); suppliers of anti-vibration products and engineered solutions to a wide range of industries, including rolling stock.

HIGH VOLTAGE EQUIPMENT

High Voltage Equipment: (011) 820-5111
High Voltage Equipment, is a designer, manufacturer, supplier and installer of high voltage equipment to power utilities, electricity generation, transmission and distribution industry, mining sector and contracting companies. It manufactures, Isolators, instrument transformers, outdoor circuit breakers, isolated phase busbars. It also supplies generator circuit breakers, high voltage gas insulated switchgear, compact hybrid switchgear, surge arresters, substation and overhead line insulators. It also specializes on the repairs and maintenance of high voltage equipment.

MEDIUM VOLTAGE & PROTECTION

MV Switchgear: (011) 820-5111
Leading manufacturer and supplier of air-insulated (AIS) and gas-insulated (GIS) switchgear for use up to 36kV. The product range consists of indoor switchgear, containerized switchgear solutions, compact substations for renewable energy applications, minisubs, free-standing outdoor kiosk ring main units and bulk metering units. The division also specializes in the repair and maintenance of electrical networks.

Protection & Control: (011) 820-5111
Protection & Control is a market leader in the supply of protection and metering solutions to the electrical industry. The offering includes a comprehensive range of automation systems, protection relays, credit, smart and prepayment metering systems and hosted services as well as LV panels, components and accessories.

Current Electric: (011) 822-2300
Current Electric designs, manufactures and supplies medium voltage current and voltage transformers to switchgear manufacturers and repairers, electrical distributors and a diverse range of end-users locally and internationally.

POWER TRANSFORMERS

Power Transformers: (011) 824-2810
Power Transformers designs, manufactures and supplies a wide range of power transformers to power utilities, electrical contractors, the mining sector, local authorities and industry locally and internationally.

DISTRIBUTION TRANSFORMERS

Distribution Transformers: (011) 820-5111
Distribution Transformers designs, manufactures and supplies distribution transformers to power utilities, the mining sector, local authorities and industry locally and internationally.

LH MARTHINUSEN

LH Marthinusen: (011) 615-6722

www.lhm.co.za

LH Marthinusen repairs and refurbishes transformers, electric motors, alternators and industrial fans. Manufacture of electric motor components, insulation components and specialised transformers and motors. It also provides engineering services for its products to the mining, industrial and petrochemical sectors and local authorities, as well as for the export market.

REID & MITCHELL

Reid & Mitchell: (011) 914-9600

www.reidmitchell.co.za

Reid & Mitchell is a repairer and manufacturer of electrical equipment for open cast mining, steel, rail transportation and marine industries. Motors and generators for excavators, off-highway vehicles, locomotives, drilling and pumping applications. The division is also a specialist repairer of DC motors and generators, including rebuilds, rewinds and commutator manufacture.

MARTHINUSEN & COUTTS

Marthinusen & Coutts: (011) 607-1700

www.mandc.co.za

M&C maintains, services, and carries out specialised manufacture of HV, MV and LV, flameproof, DC and traction motors, transformers, generators, alternators and ancillary power generation equipment up to 373 MVA. M&C also provides a full range of 24/7engineering on-site services and unique motor and generator management and maintenance solutions and programmes.

ACTOM Turbo Machines: (016) 971-1550

www.actomturbo.co.za

ACTOM Turbo Machines is a mechanical turbo-machinery and high-speed rotating equipment service provider, for manufacturing, maintenance, overhauls, repairs, installations and commissioning of all types of steam and gas turbines, compressors, blowers, pumps, fans, gearboxes, centrifuges, as well as general fabrication and machining.

Metalplus: (011) 433-1880

www.metalplus.co.za

Metalplus is an expert mechanical facility. It has pioneered Submerged Arc Micro welding in South Africa. It's core competencies are machining of new shafts and repair, grinding and micro welding of all types of rotating equipment and other mechanical components, as well as the mechanical repairs of a wide range of electrical components (traction motor casings, electric motor casings, end/bearing caps, etc.).

ELECTRICAL EQUIPMENT

Electrical Products: (011) 878-3050

www.actomep.co.za

Electrical Products is ACTOM's trading and representation arm, with a national network of strategically located branches. The business unit supplies products produced by ACTOM divisions and other manufacturers, including cable, cable accessories, lighting equipment, heating and ventilation equipment, circuit breakers, distribution transformers, minisubs, protection and control equipment, electric motors, meters, fusegear and overhead line materials.

Satchwell: (021) 863-2035

Satchwell manufactures and supplies domestic and industrial heating elements, temperature controls, refrigeration components, solar water heating components and appliance spares to the domestic appliance manufacturing industry and the chemical, mining and construction industries, among others.

Genlux Lighting: (011) 825-3144

www.genluxlighting.co.za

Genlux Lighting is a leading designer and manufacturer of luminaires for roadway lighting, floodlighting, outdoor commercial lighting and industrial applications. It produces a wide range of high quality products and employs a team of expert designers, with further technological support available from a leading international designer and manufacturer of luminaires.

ACTOM ENERGY

ACTOM Energy: (021) 510-2550

ACTOM Energy in collaboration with divisions within the ACTOM group, provides electrical, automation, hydraulic and pneumatic system integration services and turnkey solutions across all sectors.

What's Watt is published by ACTOM (Pty) Ltd to inform staff, customers and other stakeholders of developments within the group.

Editorial contact: Julian Kraft, J Kraft Public Relations
Tel: (011) 472-6686, mwkraftj@mweb.co.za
Feature story and Development editorial contact, Wendy Hardy
Tel: 083 230 0643, wendy@trendingideas.co.za

Produced by: Jeroen Luyk, In Africa
(011) 768-7050 or 082 951 5049, inafrica@saol.com

ACTOM contact:
Andries Mthethwa, Tel: (011) 820-5111
andries.mthethwa@actom.co.za

ACTOM, caring for it's people!

ACTOM have implemented stringent protocol and safety measures which include:

* Temperature screening
* Hand Sanitizers
* Disinfection
* PPE equipment
* Social distancing
* Education & training

ACTOM

ACTOM (Pty) Ltd: 2 Magnet Road, Knights, 1413 | PO Box 13024, Knights, 1413
Tel: +27 (0) 11 820-5111 | Fax: +27 (0) 11 820-5044 | www.actom.co.za