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# UNPREDICTABLE **DEMAND**

The health of the quarrying industry is an indication of the health of a country's construction industry – particularly infrastructure development because this is the biggest consumer of the products produced by this industry. Despite much lauded plans for infrastructure development during the COVID-19 pandemic, which had the aim of kickstarting the limping local economy, quarrying seems to be under pressure, primarily owing to the lack of road building.

This is not a new problem. The trickle of infrastructure development started about a decade ago and this has in turn led to a systematic reduced demand for aggregates which in turn has led to reduced production in, and sometimes the closure of various quarrying operations.

In 2020, the COVID-19 pandemic exacerbated and accelerated the pressure within the quarrying industry. The problem is highlighted by the lack of road construction projects by especially the state-owned South African National Roads Agency (Sanral). Earlier this year it cancelled adjudicated tenders to the value of R17,47b.

The tenders which the Sanral board says it did not approve are the Mtentu Bridge Wild Coast project, on the N2, valued at R3,4b; the rehabilitation of the R56 Matatiele, in the Eastern Cape, valued at R1b; the N3 Ashburton interchange, in KwaZulu-Natal, valued at R1b; and improvements to the EB Cloete interchange (N2 and N3 connection point in KwaZulu-Natal), valued at R4,3b.

Sanral's significant cancellations dealt yet another blow to an already declining quarrying industry as the building industry, which is fairly buoyant, does not require nearly the same volumes of aggregate as infrastructure projects do.

Even though the quarrying industry is under severe pressure, there are areas in the country where this industry is flourishing. The Western Cape has a constant demand for aggregate with various infrastructural projects underway – particularly the upgrade of the N7 to the Namibian border.

However, aggregate producers find it increasing difficult to predict demand for aggregate as many of the projects planned by the government fail to gain momentum, are subject to significant delays or are, in the case of the Sanral projects, cancelled outright.

This has implicitly forced major producers of construction materials to change the way in which they operate. In many instances producers now follow a demand-driven model. The market-conditions have forced producers to consider the potential of supply around quarrying operations and what future demands here will be. As a result, certain quarries that are located in areas where demand is unlikely to increase any time soon, have been closed while others have been mothballed in the hope that demand will return.

Most quarries now only produce aggregate in line with demand (or what can safely be predicted) while avoiding the production of surplus stock.

Will this change any time soon? Just as demand cannot be predicted, a resurgence in the quarrying industry will only happen once the construction industry significantly improves. For the moment, this is unlikely.

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# TIPS FOR COMBINING SCREEN MEDIA FOR MAXIMUM EFFICIENCY

The difference between using one type of screen media versus the optimal blend of screen media can add up to thousands of dollars in downtime and expense in a year. Improving screening productivity starts with analyzing the operation, consulting with an expert, learning proper installation and maintenance techniques, and trying new solutions.

**With increased infrastructure development, aggregates producers have an opportunity for big business — that is, if they can keep up and maintain maximum outputs. That's why it's important to use the most productive tools for screening and sizing aggregates. Rather than sticking to woven wire or polyurethane media throughout the screen deck, some operation managers find they can reduce wear, lessen screen change-outs, and increase open area by choosing strategic combinations of screen media. By Steve Fair, Tyler engineered media manager, Haver & Boecker Niagara**

### What's the problem?

The first step toward selecting the best combination of screen media involves answering several questions. What material is being processed? Is the screen media reaching a suitable lifespan for the operation? And what sort of challenges are occurring with the current screen media and at what phase of screening?

Start by considering the types of materials going through the vibrating screen. Material size, weight and abrasiveness all come into play during the screen media selection process. For example, screening gravel typically requires media with higher wearability to handle the abrasiveness, while materials with large top sizes may require more durable screens at the feed end because of the constant high impacts.

Next, look at the vibrating screen itself and complete a vibration analysis. Some analysis systems are designed to safely monitor vibrating screen performance in real time and detect irregularities before small problems lead to diminished performance or bigger issues.

The difference between using one type of screen media versus the optimal blend of screen media can add up to thousands of dollars in downtime and expense in a year.

All images courtesy of Haver & Boecker Niagara


Steve Fair is the Tyler engineered media manager at Haver & Boecker Niagara. He works with customers to identify screening challenges, improve their screening applications and increase screening efficiency.

## KEY TAKEAWAYS

- The difference between using one type of screen media versus the optimal blend of screen media can add to downtime and expenses in a year.
- A vibrating screen operator should examine wearability to determine whether media in the three phases is reaching maximum potential.
- A manufacturer should provide ongoing support.
- Some manufacturers offer hybrid screen media options that pair polyurethane's durability with open area similar to woven wire.

Consider the three phases material goes through as it passes over the vibrating screen deck, from layered to basic to sharp. Producers can customise the screen deck by choosing screen media suitable for each phase by accounting for open area and wear life to maximise productivity.

In the layered phase, as material of all sizes hits the screen deck, the media should handle a deep bed depth, high impact and a mix of coarse and fine particles. Heavy-duty options incorporating polyurethane, rubber or metal plate excel in withstanding high top sizes and abrasion.

Material should stratify in the middle of the deck during the basic phase, and near-size and oversize particles should be at the top of the material being screened. For this stage, choose a type of media that combines maximum open area and wear life. Some manufacturers offer hybrid screen media options that

Material size, weight and abrasiveness all come into play during the screen media selection process.

pair polyurethane's durability with open area similar to woven wire.

Virtually all undersize material should have fallen through the screen media by the time it reaches the sharp phase at the discharge end, where near-size and oversize particles should be in direct contact with the media. Woven wire or self-cleaning screen media provides maximum open area here, where any remaining undersized particles should fall through, preventing contamination of the final product.

A vibrating screen operator should also examine wearability to determine whether media in the three phases is reaching maximum potential. If screen media is being changed too often, consider switching to something more durable. It's a good idea for producers to complete an inspection of screen media weekly. Inspect openings carefully; wear becomes apparent if the openings in engineered media begin to round. Also, make sure tensioning remains correct by checking screen tension weekly.

Next, examine discarded screen media for signs of problem areas, such as broken wires, wear areas, pegging or blinding. Many operations experience premature wear on their screen media by not choosing a blend of media that can handle heavy material along with large amounts of abrasive fines. Others use media that isn't suited well for the operation and, as a result, have carryover or contamination because of pegging and blinding. This unwanted material in the screened pile results in the added cost and time of rescreening. Also, broken screens mean costly unscheduled change-outs. It takes about an hour to shut down a vibrating screen and change one screen media section. While an hour may not seem like a long time, the lost production to a mining operation, for example, will result in thousands of dollars off the bottom line.

All of these signs indicate there's likely a better screen media option for at least one phase of screening, if not all three.

**A vibrating screen operator should also examine wearability to determine whether media in the three phases is reaching maximum potential. If screen media is being changed too often, consider switching to something more durable.**

### How to choose?

Manufacturers create screen media out of several different types of materials, including polyurethane, rubber, perforated plate and wire.

**Consider the three phases material goes through as it passes over the vibrating screen deck, from layered to basic to sharp. Producers can customise the screen deck by choosing screen media suitable for each phase by accounting for open area and wear life to maximise productivity.**

Polyurethane leads the list for its lifespan and durability, but not all poly is created equal. Look for a polyurethane screen media manufacturer that blends their own material and pours it open cast rather than producing injection-molded screens. The open cast process typically lasts about 1,5 to 2 times longer than injection-molded products and at a similar price. In addition, open-cast polyurethane permanently hardens when cured to maintain its chemical properties, so it resists wear and tear better than injection-molded screens. Injection-molded screens can soften when the temperature rises during screening, limiting wear life.

Some polyurethane screens achieve maximum durability with thick wire to hold up to deep bed depths, large top sizes and wide bar rail spacing. There are misconceptions that polyurethane is strictly for dry applications, whereas there are others that it is only for wet applications, but it works well in both.

Manufacturers also offer screen media that combines woven wire with engineered composite to achieve an open area closer to wire cloth but with four to seven times longer wear life — all while weighing less than woven wire.

Look for rubber screen media when screening material with a top size larger than 12 inches, or when an application requires an opening bigger than 4 inches. Manufacturers can create rubber screens thicker than polyurethane for improved durability. The screens also dramatically reduce noise, handle high-impact applications, and resist abrasion. In addition, look for a compression-molded rubber versus a punched rubber, as the openings are tapered to alleviate pegging.

Consider perforated plate for heavy-duty operations that require a large amount of open area. Some manufacturers customise each plate's thickness to a customer's application and can create almost any size opening. To resist pegging, choose screens with tapered openings. Many perforated plates come in different abrasion-resistance levels, so be sure to choose a supplier that can match the appropriate perforated plate for the application.

Woven wire is often used to provide maximum open area at the discharge end of the screen deck. Manufacturers offer wire cloth in different thicknesses and weaves.

Self-cleaning screens excel at alleviating blinding and pegging and typically offer the most open area. Because the wires are not woven, but rather bonded to polyurethane strips, they are free to vibrate independently for faster material stratification.

## Think installation

After determining the best combination of materials, open area, and opening size and shape, think about how the screen media will be installed. If a vibrating screen has a cambered deck, switching to a modular system can cost UsD5 000 to UsD15 000. All screen media options are available in tensionable sections, allowing producers to eliminate the deck conversion expenses. This means an operator can blend polyurethane, rubber or metal plate media with woven wire cloth or self-cleaning screens for maximum screening efficiency.

## Manufacturer matters

Calling a screen media expert is a fast way to assess an operation and find the most effective screen media blend for an operation's specific needs. Look for a company that offers certified technicians with years of experience in vibrating screen media selection and maintenance. Some manufacturers not only offer consultations to help an operation find the best combination of screen media but also provide on-site training to make sure the entire team knows how to properly install it to maximise wear life.

Ask the manufacturer to do a vibration analysis before and after installing the engineered screen media to ensure everything runs correctly.

A manufacturer should also provide ongoing support. Find a company that follows up to make sure the screen media works well once in use. Some companies employ service technicians who can be on-site within 24 hours to find, diagnose and fix problems.

Lastly, choose a manufacturer with a long history of customer satisfaction, great service and pride in its work. A partnership with a company with integrity will save time and money while the best combination of screen media will go far in helping improve profits and reduce maintenance headaches.

If unscheduled change-outs or contamination issues eat into profits, it's time to consider a new screen media combination. Choosing a variety of screen types, rather than just one, that's suited to an application can increase productivity, lessen downtime and improve ROI. ●


Traditional self-propelled machines see the majority of their maintenance downtime and costs from engine, transmission and associated parts repairs.

*All images courtesy of Road Widener LLC.

# RECONSTRUCTING ROADBUILDING

**Roads are perhaps the most crucial piece of infrastructure around the world and one of the greatest technological achievements of mankind. Ironically, the glistening asphalt of an open road cues daydreams of escaping technology: windows down, tires humming, freedom. But trying to keep up with the billions of people using one of the world's oldest industrial advancements to escape their modern technology tethers has left road crews in a scramble.**

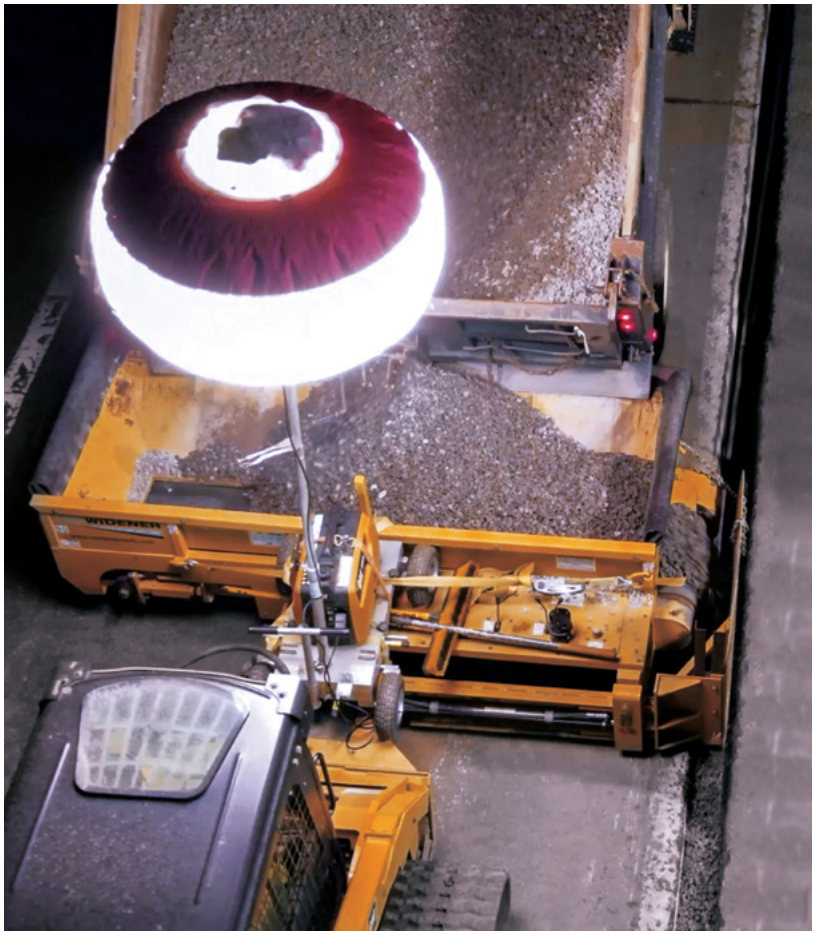
The rising demand placed on roads is steadily exceeding road crews' capacity to maintain, let alone improve, roadways. Between 2008 and 2017, US highways in poor condition rose 25% which has significantly grown the demand to complete road repair projects year after year. According to the American Society of Civil Engineers, vehicles travelled more than 3,2 trillion miles on U.S. roadways in 2019.

Road repair projects are on the rise, but limited budgets require a reevaluation of methods and efficiency to ensure the available funds can stretch far enough. With crews facing a growing backlog of jobs, contractors are looking for ways to improve efficiency and get more done with the same amount of time and workers. However, some entities worry that learning new technology may result in lost time. That's where equipment attachments come into play.

Attachments provide a realistic, effective solution by utilising equipment that contractors are already familiar with. By changing workflow, minimising maintenance, lowering equipment cost, allowing for smarter labour and increasing ROI. These new attachments are changing the foundational methods of road construction that have traditionally left road crews in the dust. Here's how.

## A new method

Road construction tasks like backfilling and aggregate placement have typically been viewed as a four-step process. Roadway materials are piled on the road, scraped into place, compacted and then crews sweep and clean what remains off the road. Although larger machines and added crew members can help complete projects, another perspective to increase efficiency and safety is to minimise the number of steps in the process with the use of mate-



Some material placement attachments can even dispense up to 20 tons of aggregate in under 10 minutes with all machine adjustments made by a single crew member from inside the host machine using a remote control

Road construction is a high-risk job but utilizing attachments that cut out multiple steps in the process takes crew members out of harm's way and allows traffic to flow more freely.

## KEY TAKEAWAYS

**Road construction tasks like backfilling and aggregate placement have typically been viewed as a four-step process. Roadway materials are piled on the road, scraped into place, compacted and then crews sweep and clean what remains off the road.**

**Reducing maintenance reduces downtime, ultimately providing crews with the opportunities to take on more jobs and save money.**

**Traditional self-propelled machines see most of their maintenance downtime and costs from engine, transmission and associated parts repairs.**

**Without an engine or transmission of their own to upkeep, these attachments have the power to reduce maintenance by up to 90% with just a few grease fittings to look after.**

rial placement attachments, which will also cut down on labour.

Material placement attachments take the complex four-step process using expensive equipment and simplify it. With this method, a single operator connects their skid steer, loader or other common host machine to the attachment and loads road material into the hopper at the top. Then, the operator drives alongside the road as material feeds down the hopper onto a conveyor which then carries the material to the edge of the attachment, dispensing it through an adjustable width opening exactly where it's needed. Some attachments can even dispense up to 20 tons of aggregate in under 10 minutes with all machine adjustments made by a single crew member from inside the host machine using a remote control. To further increase the efficiency of material placement attachments, some manufacturers offer dual and single, left or right side, dispensing configurations to take on numerous roadways around the world.

Streamlining the process saves money and makes money. Crews cannot only do more work in a day


**Contractors report up to 50% savings in labour when switching to material placement attachments, which could potentially double a crew's work capacity.**

but do more with their budget by cutting out steps without adding more self-propelled machines or workers. And those savings continue into the future with a drastically lower cost of ownership when compared to self-propelled machines.

## Reducing by attaching

Traditional self-propelled machines see most of their maintenance downtime and costs from engine, transmission and associated parts repairs. However, attachment efficiency truly shines when considering these profits lost to maintenance.

In an effort to reduce maintenance, material placement attachments can connect to the engine and hydraulics of common, proven workhorses, like skid steers and loaders (wheel and tracked). In the case a host machine needs to be serviced, crews can quickly and easily hookup the attachment to another machine. Without an engine or transmission of their own to upkeep, these attachments have the power to reduce maintenance by up to 90% with just a few grease fittings to look after.

When considering this type of equipment, look for manufacturers that offer an optional universal mounting plate and easy hydraulic connections for their attachments and if they can connect to any host machine in a fleet. One advantage of choosing an attachment with a compact design means less parts to keep track of and less transportation requirements and jobsite clutter. Another benefit is the ability to conveniently fit the attachments on the same trailer as the host machine to be transported to and from jobsites.

Reducing maintenance reduces downtime, ultimately providing crews with the opportunities to take on more jobs and save money. Saving money during the process pays back an owner throughout the season, but what about out the door?

## Savings from the get-go

Engines, transmissions and driveshafts. These high maintenance parts are an expensive, but necessary, piece for jobsites. The addition of material placement attachments help combat expenses by connecting low-cost, essentially maintenance-free hydraulic hookups to a host machine which then powers the attachment. Cutting out the unnecessary parts slashes prices by up to 80% and allows contractors to invest in the host machines they know will support their fleet from multiple angles, not the paving machines that see months of off season. And the host machine to power the attachment? These common machines cost pennies on the dollar when compared to dedicated, single function road construction machines. Not to mention, most contractors probably have multiple machines that would excel as a host machine already in their fleet.

Overall, material placement attachments are low-maintenance and cost significantly less than self-propelled machines but also provide savings by repurposing labor.

## Smart labour, not less labour

Remaking road construction by utilising attachments reduces unnecessary steps, lessens the amount of equipment needed and drastically lowers maintenance requirements, but that doesn't mean crew members await a similar fate. Contractors now have the freedom to assign these crew members to different tasks that benefit the jobsite, and in times when labor is scarce, a way to keep getting work done. The freedom that efficiency provides allows contractors to put crews to work in areas they didn't have the capacity to work in before and expand their road construction operations. Contractors report up to 50% savings in labour which could potentially double a crew's work capacity when using road construction attachments. In addition to that, labour savings can benefit crews from a safety perspective, as well.

It's one thing for a machine to go down, but what about a crew member? Road construction is a high-risk job on the best of days, and reflective markings and cones only go so far on narrow roadways. Crowding numerous crew members around a roadside to spread-out materials or to make machine adjustments is an unnecessary risk. However, utilising attachments that cut out multiple steps in the process takes crew members out of harm's way. Additionally, remote-controlled attachments allow the host machine operator to remain in the cab while adjusting the dispensing speed and machine positioning.

## A way forward

The poor conditions of roadways across the world and the limitations of traditional machinery are inspiring equipment innovations. The new road construction methods that material placement attachments offer are proving to be assets not just in times of infrastructure crisis but for creating a system of sustainable roadway management. ●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# HOW MINES **CAN IMPROVE WATER USAGE**

**Mining relies on water. Even though mines consume between 2 and 5% of South Africa's available water, that's substantially less than agriculture (61%), domestic/municipal use (27%) and industry (7%), based on research by the CSIR. Yet while mining has a relatively smaller consumption footprint, it's still often wasteful.**

In an eBook published by Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO), the authors explain this dynamic. Water makes up a small but vital part of a mine's operations. Adding more water helps create substantially more lucrative output than the additional water's cost. As a result, water consumption and planning don't command as much attention as other parts of a mine's complicated operations.

Yet this scenario is changing. Strained resources are making it harder for mines to secure more water sources - mines in China and Chile already feel the pinch of reduced local water access. Too much water is also an issue - shifting weather causes more severe water damage at mines. In a 2013 Carbon Development Project (CDP) survey, 64% of mines had negative water-related impacts on business.

But mining's water woes are also an opportunity for quick wins.

"Water is ever present in mines," says Chetan Mistry, Strategy and Marketing Manager at Xylem Africa. "Mines are either removing water or using water to manage the site such as reduce dust, combat fires or move slurry or tailings. Wells and pumps are commonplace on mining sites. So, mines know how to work with water. They can apply new water management principles and technologies more readily than most other sectors and see the benefits more quickly."

### Modern water management options

The benefits of becoming water stewards include greater operational sustainability and efficiency, and better relationships with communities and governments. They become more attractive to investors who link water stewardship with future-minded mining operations.

Mines can improve their water management and conservation through five avenues:

- New technologies: A wide array of sensors and monitoring equipment helps mines track water consumption, environmental impacts, and track down problems such as leaks and membrane failures. Site data combined with artificial intelligence (AI) helps improve a mine's predictive capabilities.
- Efficient processes: Mines can improve water-related processes to reduce usage and costs. For example, energy-efficient pumps save considerably on power consumption, and digitally-managed chemical dosing requires fewer chemicals, resulting in less pollution.
- Reuse: By leveraging AI, mines can reuse water intelligently for specific processes such as minimising water intake, tailing storage, and effluent discharge volumes - thus hugely reducing overall consumption. Improvements in using water to transport waste, extracting water from tailings ponds, and capturing water at seepage spots, also deliver significant savings.
- Recycling: By using modern modular water treatment systems, mines can recycle and reintroduce clean water for various objectives. Recycled water can support on-site personnel, supply local communities, be safely reintroduced into the environment, or stored for later use.
- Alternative water sources: Mines typically operate in rural areas where access to suitable water is not commonplace. In such areas, mining operations benefit from alternative water sources, including desalination, damming and raw seawater.

Many of these interventions are not new. But modern improvements in engineering, materials and technologies provide mines with more choice, says Mistry:

"New enhancements such as data-driven planning, remote control of water infrastructure, smart pumps, and modular treatment systems such as ozone provide mines with a wider range of options on how to manage their water consumption and reuse. These technologies are already making a difference for mines in the most rural and driest parts of the planet, such as the remote areas of Australia and Chile. They help those mines operate efficiently and reduce their impact on surrounding communities and environments. Above all, they help mines become more sustainable and self-sufficient while also reducing operating expenditure."

Overall, this is a terrific time for mines to use water

Chetan Mistry, Strategy and Marketing Manager at Xylem Africa.

stewardship to improve their prospects, "There are many great options for mines that care about water conservation and savings. It's a massive opportunity for the industry to enhance its place in the 21st century." ●

## KEY TAKEAWAYS

- The benefits of becoming water stewards include greater operational sustainability and efficiency, and better relationships with communities and governments.
- Modern improvements in engineering, materials and technologies provide mines with more choice.
- Efficient processes can help mines improve water-related processes to reduce usage and costs.
- Recycled water can support on-site personnel, supply local communities, be safely reintroduced into the environment, or store for later use.

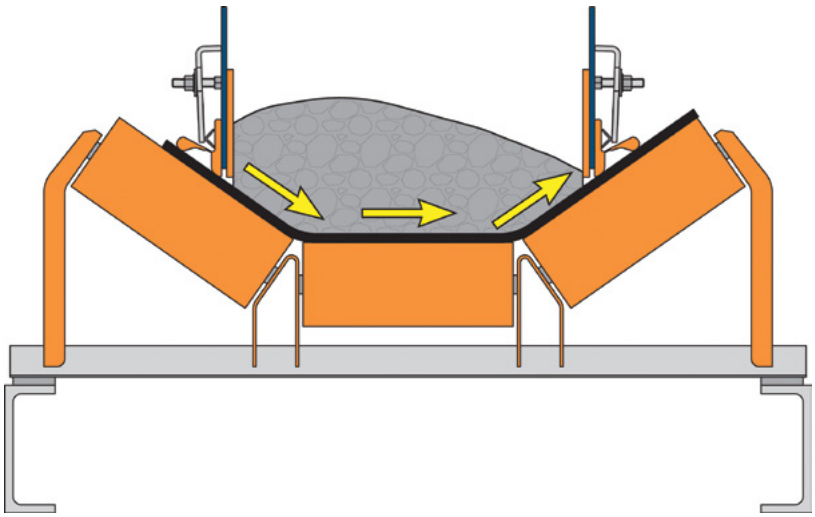
# DESIGNING FOR THE FUTURE **BY INNOVATING THE PRESENT**

**Higher production demands across all bulk handling segments require increased efficiency at the lowest cost of operation, in the safest and most effective manner possible. As conveyor systems become wider, faster and longer, more energy output and more controlled throughput will be needed. Add an increasingly stringent regulatory environment, and cost-conscious plant managers must closely review which new equipment and design options align with their long-term goals for the best return on investment (ROI).**

## Safety at higher belt speeds

Safety is likely to become a new source of cost reduction. The percentage of mines and processing facilities with a robust safety culture are likely to increase over the next 30 years to the point where it is the norm, not the exception. In most cases, with only a marginal adjustment to the belt speed, operators quickly discover unanticipated problems in existing equipment and workplace safety. These problems are commonly indicated by a larger volume of spillage, increased dust emissions, belt misalignment and more frequent equipment wear/failures.

Higher volumes of cargo on the belt can produce more spillage and fugitive material around the system, which can pose a tripping hazard. According to the US Occupational Safety and Health Administration (OSHA), slips, trips and falls account for 15% of all workplace deaths and 25% of all workplace injury claims.



**When a conveyor isn't centre-loaded, the cargo weight pushes the belt toward the more lightly-loaded side.**

The faster the belt, the quicker it can wander off its path and the harder it is for a belt tracker to compensate, leading to spillage along the entire belt path. Caused by uncentered cargo, seized idlers or other reasons, the belt can rapidly come in contact with the mainframe, shredding the edge and potentially causing a friction fire. Beyond the workplace safety consequences, the belt can convey a fire throughout the facility at extremely high speed.

## KEY TAKEAWAYS

Beyond the workplace safety consequences, the belt can convey a fire throughout the facility at extremely high speed.

Automation is the way of the future, but as experienced maintenance personnel retire, younger workers entering the market will face unique challenges, with safety and maintenance skills becoming more sophisticated and essential.

As belts get longer and faster, modern tracking technology becomes mandatory, with the ability to detect slight variations in the belt's trajectory and quickly compensate.

Conveyor monitoring tied to safety and predictive maintenance will become increasingly reliable and widespread, allowing conveyors to autonomously operate and predict maintenance needs.

### Correcting misalignment before it happens

As belts get longer and faster, modern tracking technology becomes mandatory, with the ability to detect slight variations in the belt's trajectory and quickly compensate before the weight, speed and force of the drift can overcome the tracker. Typically mounted on the return and carry sides every 21 to 50 m – prior to the discharge pulley on the carry side and the tail pulley on the return – new upper and lower trackers utilise innovative multiple-pivot, torque-multiplying technology with a sensing arm assembly that detects slight variations in the belt path and immediately adjusts a single flat rubber idler to bring the belt back into alignment.

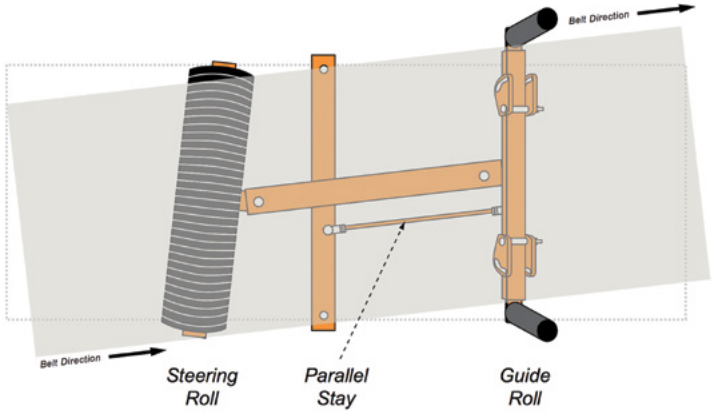
### Modern chute design

To drive down the cost per ton of conveyed material, many industries are moving toward wider and faster conveyors. The traditional troughed design will likely remain a standard. But with the push toward wider and higher-speed belts, bulk handlers will need substantial development in more reliable components, such as idlers, impact beds and chutes.

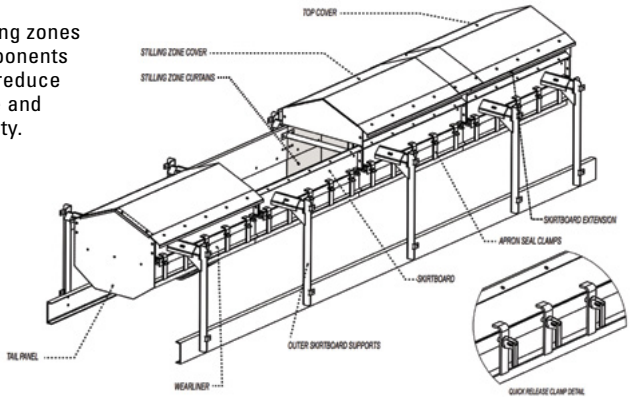
A major issue with most standard chute designs is that they are not engineered to manage escalating production demands. Bulk material unloading from a transfer chute onto a fast-moving belt can shift the flow of material in the chute, resulting in off-centre loading, increasing fugitive material spillage and emitting dust well after leaving the settling zone.

Newer transfer chute designs aid in centering material onto the belt in a well-sealed environment that maximises throughput, limits spillage, reduces fugitive dust and minimises common workplace injury hazards. Rather than material falling with high impact directly onto the belt, the cargo's descent is controlled to promote belt health and extend the life of the impact bed and idlers by limiting the force of the cargo at the loading zone.

Longer and taller than previous




The pivoting ribbed roller design grabs the belt and uses the opposing force to shift it back into alignment.




Modern stilling zones feature components designed to reduce maintenance and improve safety.

designs, modular stilling zones allow cargo time to settle, providing more space and time for air to slow down, so dust settles more completely. Modular designs easily accommodate future capacity modifications. An external wear liner can be changed from outside of the chute, rather than requiring dangerous chute entry as in previous designs.

## Rethinking belt cleaning

Faster belt speeds can also cause higher operating temperatures and increased degradation of cleaner blades. Larger volumes of cargo approaching at a high velocity hit primary blades with greater force, causing some designs to wear quickly and leading to more carryback and increased spillage and dust. In an attempt to compensate for lower equipment life, manufacturers may reduce the cost of belt cleaners, but this is an unsustainable solution that doesn't eliminate the additional downtime associated with cleaner servicing and regular blade changes.

As some blade manufacturers struggle to keep up with changing production demands, industry leaders in conveyor solutions have reinvented the cleaner industry by offering heavy-duty engineered polyurethane blades made to order and cut onsite to ensure the freshest and longest lasting product.

Taking belt cleaner technology into the future, an automated system increases blade life and belt health by removing blade contact with the belt any time the conveyor is running empty. Connected to a compressed air system, pneumatic tensioners are equipped with sensors that detect when the belt no longer has cargo and automatically backs the blade away, minimising unnecessary wear to both the belt and cleaner.

## Power Generation

Systems designed to operate at high speeds over considerable distances are generally powered only at vital locations such as the head pulley, disregarding adequate power for autonomous 'smart systems,' sensors, lights, accessories or other devices along the length of the conveyor. Running auxiliary power can be complicated and costly, requiring transformers, conduits, junction boxes and oversized cables to accommodate the inevitable voltage drop over long runs. Solar and wind can be unreliable in some environments, particularly in mines, so operators require alternative means of reliable power generation.

The design employs a magnetic coupling that attaches a "drive dog" to the end of an existing roller, matching the outside diameter. Rotated by the movement of the belt, the drive dog engages the generator through the outer housing's machined drive tabs. The magnetic attachment ensures that electrical or mechanical overload does not force the roll to stop; instead, the magnets disengage from the roll face.

## Bulk handling, safety and automation in the future

Automation is the way of the future, but as experienced maintenance personnel retire, younger workers entering the market will face unique challenges, with safety and maintenance skills becoming more sophisticated and essential. While still requiring basic mechanical knowledge, new maintenance personnel will also need more advanced technical understanding.

Conveyor monitoring tied to safety and predictive maintenance will become increasingly reliable and widespread, allowing conveyors to autonomously operate and predict maintenance needs. Eventually, specialised autonomous agents (robots, drones, etc.) will take over some of the dangerous tasks, particularly in underground mining as the ROI for safety provides additional justification.

Ultimately, moving large quantities of bulk materials inexpensively and safely will result in the development of many new and higher capacity semi-automated bulk transfer sites. Previously fed by truck, train or barge, long overland conveyors transporting materials from the mine or quarry site to storage or processing facilities may even impact the transportation sector. ●

CLEANER, SAFER, MORE PRODUCTIVE CONVEYING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# BUILDING MATERIALS MINES ARE STRONGER BY ASSOCIATION

**Custodianship of mines that produce sand and aggregates, key components of concrete, is critical to the further development of South Africa's construction industry and secure sufficient supplies for years to come.**

Fortunately, smaller-scale surface mines lacking some of the resources needed to ensure day-to-day compliance with legislation and other statutory conditions are turning towards industry association, ASPASA, to fill the voids.

While ASPASA is strongly focused on the mining industry, its association with other professional bodies, such as The Concrete Institute (TCI) and others in a given industry can add as much value and is the reason why ASPASA is a long-time associate member of the institute.

The association's work in collaboration with all levels of Government, private construction sector and labour over the past 30 years has earned the respect of the industry as well as recognition from all quarters including its overseas peers. It has also led to a stampede of surface mines applying for membership and resulted in a change of its constitution to admit mines other than the sand and aggregate quarries it was founded to represent.

Currently ASPASA's membership includes mines in the salt, dimension stone, diamond, clay and other sectors. The association also provides services aligned with affiliated onsite plants such as readymix and processing plants. When necessary the association protects and lobbies on behalf of the surface mining industry and provides appropriate training and literature to its members through its various committees.

**The association's work in collaboration with all levels of Government, private construction sector and labour over the past 30 years has earned the respect of the industry as well as recognition from all quarters including its overseas peers.**

Some of the key services that contribute to the ever-growing popularity of the association and that assist its members to provide the highest levels of service to the concrete industry include:

**Audits**

Membership of ASPASA requires mines to undergo two compulsory audits in health and safety, as well as environment to ensure compliance with legislation and statutory requirements. These measure the mine's compliance and provides

professional feedback to improve its performance where required. ASPASA also provides additional audits to measure compliance with standards and legal requirements relating to blasting and quality management among others.

## Workshops

Provide an important interface between the association and its members in order to update and upskill the industry to respond to changing market requirements. The workshops also serve to provide explanations of best practices that improve members' business practices and profitability. Legal updates and interpretations are also provided in the form of workshops and are an important tool to ensure compliance. Legal liability training is also provided.

## Technical committees

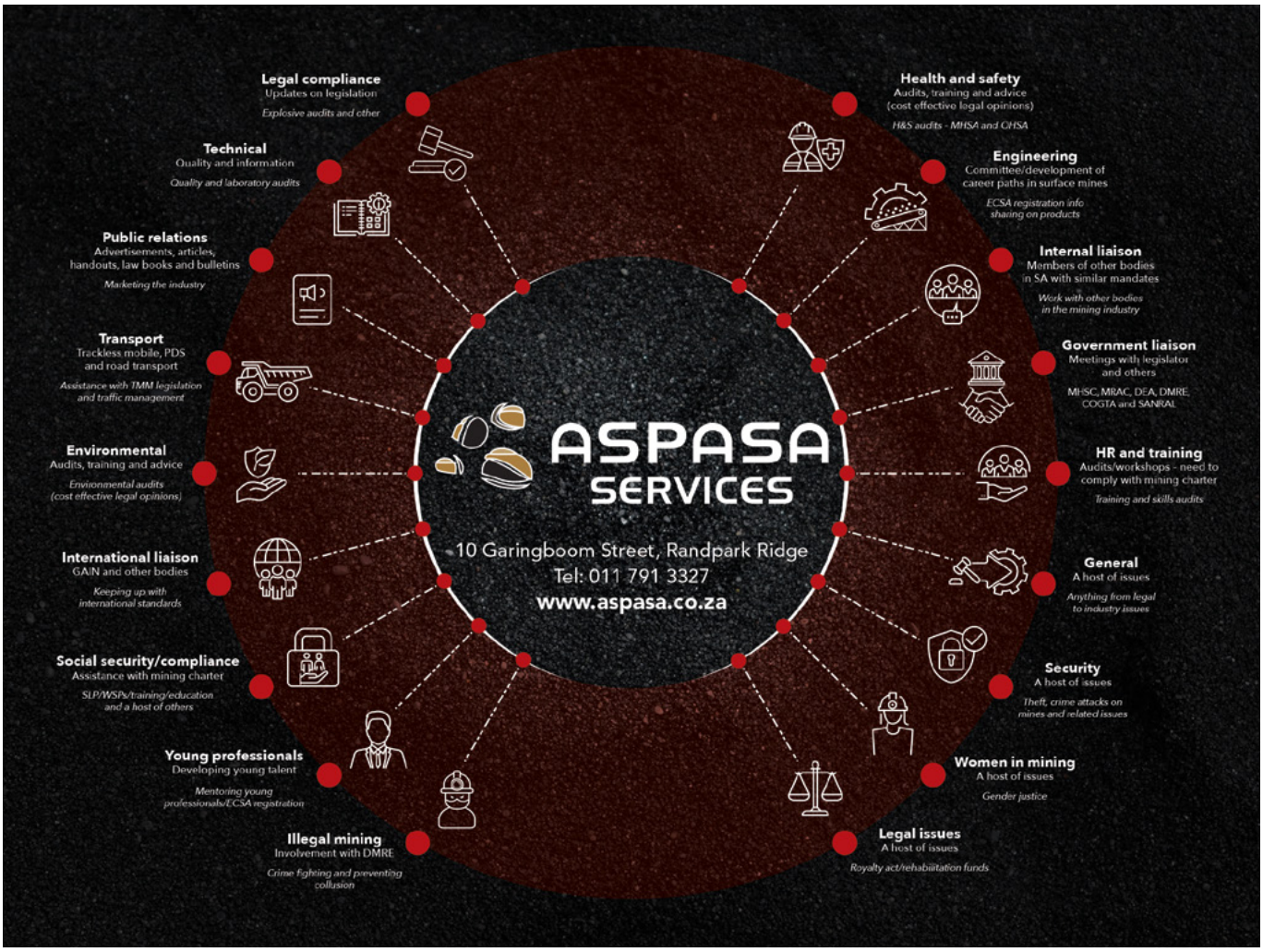
Chaired and attended by specialists in various fields, the committees investigate, debate and interact with stakeholders and the industry to gain knowledge and disseminate information about topics as diverse as explosives risk assessment, trackless mobile machinery legislation, road construction and others.

## GAIN membership

In terms of global competitiveness ASPASA is a long-established member of the Global Aggregates Information Network (GAIN), which represents sharing surface mining industry associations across the globe from China to the USA, Australia and the United Kingdom. It provides a valuable platform for the sharing of information, emerging trends and nest practices.

## Association benefits

These services combine to make membership of ASPASA a necessity to ensure mining operations are compliant with all relevant legislation, operate on a level playing field, while also being able to access and implement best practices from around the world as they become available. ●



The existence of weak and compressible materials within competent rock introduces different stress behaviour into slope stability.

# SPOTLIGHT ON FOUNDATION FAILURE **IN ROCK SLOPES**

**While slope failures in open pit mines occur mainly due to kinematic instability or shear stresses within the slope exceeding rock mass strength, the concept of foundation failure can prove useful in cases where ground profile anomalies occur.**

This was the message from John Kwofie, principal geotechnical engineer in SRK Consulting's Ghana office, when he delivered a keynote address to the recent Rocscience Africa Conference 2022 in Accra. Kwofie noted that he had encountered three instances over a span of a decade, where the cause of slope failure could not be determined using the usual well-known methods.

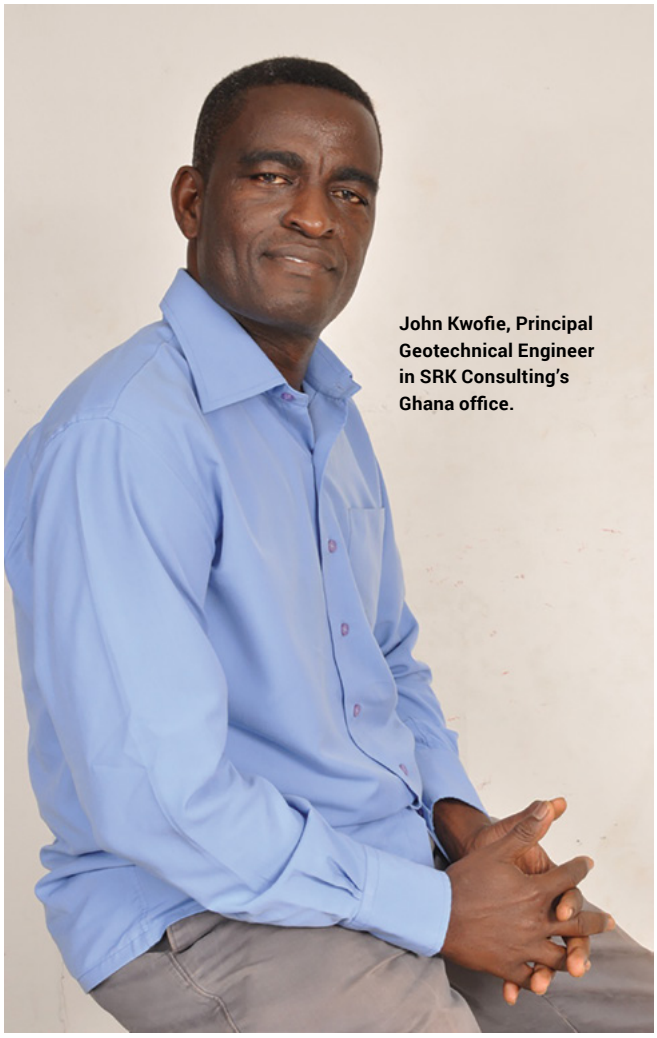
"In these cases, slope stability analyses conducted on the slope design showed that the Factor of Safety (FoS) was above the recommended minimum value," he said. "At the same time, analyses of the orientations of geological structures did not point to any kinematic admissibility."

Nevertheless, he said, the slope had failed – and it was difficult to recommend remedial measures because the cause of failure had not been established. After close observation, though, it appeared that the ground profile was not typical. Instead, it was found that there was weak material embedded within strong layers below the toe elevation of the slope – such as completely weathered layers in otherwise unweathered rock.

"The weak foundation material appeared to be over-stressed, evidenced by the heaving of the ground at the toe of the slope failure, as encountered in general geotechnical shear failure," he said. "Reassessment of the cause of instability – from the perspective of bearing capacity failure – made it easier to see why the slope would fail when conventional methods did not predict such behaviour."

One of the instances was a footwall slope failure at an open pit zinc mine in India, which occurred over a north-south strike length of about 100 metres. The northern end of the collapse was bordered by a fault while the southern border appeared like a broken cantilever support, with shearing through the failed rock mass at that end.

"The failure began with the appearance of cracks on the slope



John Kwofie, Principal Geotechnical Engineer in SRK Consulting's Ghana office.

## KEY TAKEAWAYS

**Differential settlement introduces tensile stresses into the rock mass causing cracking and dilation, which lead to failure that would not have occurred if not for the ground profile anomaly.**

**Slope stability modelling that includes any inherent weakness in the existing slope foundation is more likely to simulate actual field conditions.**

**The existence of weak and compressible materials within competent rock introduces different stress behaviour into slope stability.**

**The solution starts with awareness of the potential impact of foundation instability on slope stability and incorporating this into slope stability analyses where required.**

as mining progressed," said Kwofie. "All efforts to determine the cause of the sudden impending multi-bench failure proved futile – until the 320-310 metre bench was being mined, and a weak zone of weathered Biotite of soft clay consistency about 25 metres wide was found adjacent to the fault in fresh rock."

The mining of the weak zone resulted in acceleration of slope movement. This ended in a tilted, failed rock mass which slumped towards the weathered Biotite zone and truncated at the fault like a broken cantilever. These observations suggested that the failure was likely caused by settlement within the weathered Biotite zone.

"At least three metres of settlement was observed within the weathered Biotite material near the fault, and significant movement occurred adjacent to the fault," he said. "On each berm, the portion adjacent to the fault was depressed more than areas further away."

He explained that the differential settlement caused by this zone of weathered Biotite in a fresh rock material must have caused tensile stresses in the surface of the affected rock mass – resulting in cracks in the slope that led to failure. Significantly, the failure stabilised below the 310 metre elevation once mining exited the weathered Biotite zone.

Kwofie noted that the existence of weak and compressible materials within competent rock introduces different stress behaviour into slope stability. Differential settlement introduces tensile stresses into the rock mass causing cracking and dilation, which lead to failure that would not have occurred if not for the ground profile anomaly.

"The excavation of the pit itself results in a progressive loss of confining pressure in the weak compressible material underlying the slope, making it even weaker," he argued. "Even though the stresses on a weak foundation material are unlikely to increase, the reduction in the strength of the material with mining – due to the loss of confining pressure – is analogous to increasing loading intensity."

The decrease in confining pressure, which occurs as a result of mining, leads to differential settlement in anomalous ground profile and ultimately loss of bearing capacity – causing slope failure. The solution starts with awareness of the potential impact of foundation instability on slope stability, and incorporating this into slope stability analyses where required. Slope stability modelling that includes any inherent weakness in the existing slope foundation is more likely to simulate actual field conditions and provide a more reliable factor of safety than analysis that does not that take foundation conditions into consideration. Adopting this approach would help design more stable slopes.

"Slowing down the excavation rate during mining may help, as this could allow weaker foundation material to adjust to the stress relief associated with the overburden mining," he concluded. ●

# ABB ABILITY™ EMINE DRIVES ENERGY TRANSITION IN THE MINING INDUSTRY

**Mining houses are confronted with the same energy transition as other industries and have an urgent responsibility to transform the way they mine through technological change. It is clear that the energy needs of the modern mine simply cannot be met sustainably with diesel machinery alone. There has to be a transformation and ABB is committed to working with mines to bring about that transformation. By Erik Pretorius, Head of Sales: Africa and Australia, ABB**

We care deeply about the health, safety, and well-being of our planet as much as we do the people who inhabit it. Our vision is for $CO_2$-free and energy-efficient mines to help combat climate change, creating sustainable progress for today and future generations. We work hand in hand with our clients and partners to convert existing mines from fossil fuel energy to all electric. In this way, ABB can assist the mining industry to meet its sustainability goals, while staying competitive and ensuring high productivity.

ABB Ability eMine™ makes the all-electric mine possible, with fully integrated electrification and digital systems from mine to port. The solution includes a portfolio of electrification and digital systems to accelerate decarbonisation in the mining sector. We support the mining industry from the early mine design stage to convey the full benefit posed by electrification, assisting with designing the hauling process to optimise it with electrical solutions that match mine constraints and help meet production targets.

The solution also focuses on supplying power to mining vehicles, with fit-for-purpose electrification to achieve the most optimised electrified process. In addition, the solution integrates with ABB Ability™ applications to plan, monitor, and control processes to optimise operations and energy usage.

A key component of keeping the all-electric mine running is ensuring that the equipment performs when required and that trucks can charge when they need to. We provide charging station solutions to meet the needs of modern mining operations and interface with all vehicles. eMine™ is vehicle type and OEM agnostic in that it supports an interoperable approach based on proven standards to provide any solution needed to charge battery electric vehicles (BEVs).

A new pilot innovation known as ABB Ability™ eMine™ FastCharge is set to become the world's fastest and only fully automated charging system for haul trucks, offering up to 600 kW of power. Designed for the harshest environments, this flexible system can be easily installed anywhere to charge a truck without human intervention, and at the highest power on the market today to minimise downtime.

The solution includes ABB Ability™ eMine Trolley System technology to reduce diesel consumption by up to 90% while haul trucks are on a trolley system, which also reduces energy costs and environmental impact. In addition, electrified trucks run at a higher speed for a better speed-on-grade. Current trolley technology is based on diesel hybrids and can be supported by ABB's Trolley System to assist with the successful transition to an all-electric mine. The system is ideal for heavy-duty vehicles such as those used for inclined hauling, an application that battery-only solutions cannot cater for at present.

We are committed to create sustainable progress for today and future generations by helping our mining clients through their energy transition. ABB Ability™ eMine makes the all-electric mine possible, with fully integrated electrification and digital systems from mine to port. From design to ongoing service, ABB is the partner that can transform today's mine operations while improving the world beyond them. ●

# **PROVIDING** WHEEL LOADERS FOR AFRICA

**A new chapter has unfolded in the earthmoving equipment industry where two giants in the sector are cooperating to supply a thriving wheel loader brand and keep up with demand.**


Due to the keen pricing, low operating costs and extreme reliability of the Lovol range of loaders the company has awarded multi-franchise supplier, ELB Equipment, with dual distributorship rights alongside Dura Equipment's established sales and service outlets.

The move will be mutually beneficial and provides the importer with the opportunity to tap into new markets through ELB's vast distribution network, among the largest of its type in southern Africa. It at once provides ELB customers access to a value based loaders that easily go toe-to-toe with the premium brands in terms of durability, reliability, productivity and cost-of-ownership.

### Sensible partnership

ELB Equipment CEO, Desmond van Heerden, says the distribution agreement is a match made in heaven. The companies have a nearly half-century long relationship and share similar outlooks with the emphasis on customer service and building lasting relationships. Staff cultures and ethics are aligned and as an added bonus the companies' headquarters are less than ten kilometres apart.

Mature supply chains exist for the distribution of machinery and spare parts which are easily integrated to provide customers of either company with the same equipment, parts and service at a guideline for pricing. The biggest advantage for customers is of course having a Lovol wheel loader outlet nearby for sales, services, spares and support wherever they are in the sub-region.

The machines have become somewhat of a sensation in the earthmoving community due to their performance in the field in mines, construction, industrial, quarrying and agricultural operations. Evidence of this can be found among company owners who report consistent cost-of-ownership savings of about 40% over comparable brand machines including fuel, parts and servicing. Added to this the capital cost of the Lovol machines is up to 30% lower than premium competitors.

### Proven record

Dura Equipment CEO, Ben du Randt, says the Lovol wheel loaders are well proven in the field with more than 500 in operation, many of which are in back-breaking applications such as chrome and iron ore with specific gravities well over the three ton per cubic meter mark. Despite this the company has not had a single frame loss nor have any cracks been recorded on the Lovol machines.

This is a superb reflection on the quality of the machines considering that many of the early machines already have clocked close to 33 000 hours which ELB is used to with the best of breed philosophy they adopt. Thanks to the low cost of ownership and exceptional performance of the machines it is unsurprising that the Lovol's also have among the highest resale values and are in demand wherever and whenever they become available.

Due to the outstanding performance of the Lovol machines in southern Africa Dura Equipment has become an integral part of Lovol's manufacturer due to the tight specifications it demands and the level of feedback and initial customisation required for the equipment in South Africa. As a result, the South African specification machines have become the standard for countries with tough operating conditions such as the USA and Australia.

### Factory representation

"We have full time onsite representation from Lovol to provide technical backup and to relay information from local operators to constantly improve and develop machinery to suit local requirements. This kind of cooperation underpins the commitment of Lovol to our customers and shows that from Lovol's side they are prepared to change and modify their plans to suit the South African market.

"Post-Covid markets demand value for money and this is evident in our orderbook going forward. There is equal excitement among ELB Equipment's sales staff and we expect that the numbers of Lovol wheel loaders brought into the country will have to be radically adjusted in order to keep up with skyrocketing demand.

"Our agreement with ELB Equipment places Lovol equipment on a different level and means that we can safely send our machines to far-flung places and remain confident in the knowledge that they will be supported quickly and efficiently no matter where they are. We will also be able to offer ELB Equipment's telematics systems with all loaders sold," says Du Randt. ●

Metcat has been carrying out maintenance work on the Metso mobile equipment for Gem Diamonds' Letseng Mine in Lesotho with whom it enjoys a good working relationship.

*All images courtesy of Road Widener LLC.

# A NEW **APPROACH**

**Despite recent difficulties following the COVID-19 pandemic and a costly project in Ghana, Metcat Services and Projects' unique structuring enables it to tap into the expertise of OEMs to provide solutions to customers' needs in the sphere of purchasing new and second-hand machines, maintenance, servicing, inspection, component rebuilds and project management in the crushing and screening industry. Modern Quarrying spoke to Raymond Cohen, the company's Managing Director.**

Metcat Services and Projects (Metcat) was established in 2015. "It started as a small company with a different approach to business," says Managing Director, Raymond Cohen. "The norm is to employ people permanently. Metcat employs individuals on contract only when it itself wins a contract. "My company, from when I started it, was structured in such a manner as to assist individuals doing similar work by giving them work. This protected what saved the company during the COVID-19 pandemic," says Cohen. "The downside is obviously that if the company does not have work, others also do not have work. But if Metcat has an abundance of work, I help others look after their companies and in the process, we look after each other."

The company focuses on the repair and maintenance of mobile crushers (Metso, Sandvik, ELB, Osmond, Telesmith etc.). "Metcat had a group of companies that supported it from the beginning and it was able to meet the needs of these companies. We have grown over the past six years which we have been in business. Our core focus is maintenance and repairs of screening and crushing machines and part supply to new and second-hand machines. We are deeply involved with most of the OEMs in the industry and we assist them to sell new and second-hand machines in and outside the country.

"In addition," says Cohen, "the company services machines and does inspections." The company also focuses on rebuilds as well as spare parts sales on all brands of mobile and stationary equipment. "Our explicit aim is to satisfy the customers' needs – this is includes minimising downtime - while we always have an eye on price."

In addition Metcat provides project management and crushing and screening site consultation by advising customers what the right equipment for their unique needs will be, while it does electronic repairs to screens and I/O modules.

"It is our aim to meet the customers' needs by keeping the operating costs of our customers as low as it can possibly be. In so

**Metcat's project for WBHO in Mozambique.**

doing we want to become a sought-after solution provider," says Cohen.

For a small company, Metcat's footprint is surprisingly large. In addition to working in all the provinces of South Africa, it has customers in Lesotho, Zambia, Congo, Ghana, Mozambique while Cohen indicates that it wants to extend its involvement in Zimbabwe. "Our prime goal is to support customers in these regions with part sales, new machines, maintenance and repairs as well as site management and site consultation.

"We have recently moved our head office to Heidelberg as its strategic location enables us to service customers more easily in the Free State, Mpumalanga and KwaZulu-Natal.

Cohen says it is the company's business philosophy to bring back what most major companies have lost. "I understand that everyone has an eye on the bottom line and that is something I do too, but my aim is to re-attain a philosophy where a handshake and a man's word is his bond. In an era of Zoom-meetings, this is not easily achievable. At Metcat we believe in trust, loyalty and the old way of doing business where there is a commitment towards the customer."

"The company's structure means that it has over 40 years of combined experience in earthmoving and 16 years of combined experience in crushing and screening. We can tap into a wider range of experience for crushing and screening and project management. We work hand in hand with companies that work in the industry and who have their own experience.

"I can tap into resources to help my customers meet their needs in the manner that they want them to be met. We do not give them solutions that we think would suit them, we give them solutions to what they want," says Cohen.

Metcat has worked with and collaborated on various projects throughout Southern Africa, and the wider Africa. "We worked on a large crushing project for the Total Gas project for WBHO in northern Mozambique, while we have assisted various mining companies in the Northern Cape." Other companies that Metcat often works with include African Mining and Crushing, Maluti Plant & Crushing, Storm Mountain Diamond Mine and the Letseng Diamond Mine. ●


The TK feeder upgrade has the ability to maximised productivity, increased throughput and reduced costs per ton.

# UPGRADES BRING NEW LIFE TO CRUSHERS

**In today's market customers have to maximise their return on investment to stay competitive, and companies like Pilot Crushtec partner closely with customers to ensure equipment will continue to produce at the lowest cost per ton.**

This is according to company Sales Manager Charl Marais who says Pilot Crushtec, together with Metso Outotec, recently delivered and installed a world first upgrade to older Metso Outotec mobile crushing equipment.

"In doing this we created an opportunity to breathe new life into older machines in a way never done before in the industry," he enthuses. "In this particular case the upgrade, which was done on site, was to a Lokotrack® LT300HP™ cone crusher with a belt feeder, which has now been upgraded to include a vibrating grizzly feeder.

This upgrade significantly increases production capacity and decreases wear on the cone crusher."

Migrating to the TK feeder option on Metso Outotec Lokotrack® LT300HP™ cone crushers assists in maximising productivity, increasing throughput and reducing costs per tonne for several of Pilot Crushtec's mining and aggregate producing customers.

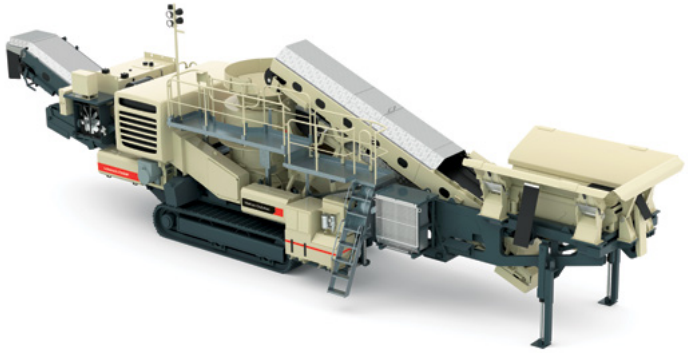
Marais says these upgrades are particularly exciting for Pilot Crushtec as it is the first time this type of upgrade has been conducted within the international Metso Outotec community.

"The majority of Lokotrack® LT300HP™ cone crushers we have in the field use a belt feeder," he explains. "However, applications changes due to market demands and customer expectations resulted in our working with customers to take their equipment to the next level."

The Lokotrack® LT300HP™ – an efficient and flexible mobile cone crusher for secondary and tertiary stage crushing – has always been available with either of the two feeder options. The TK feeder includes the advantage of a vibrating pan feeder with a grizzly. Local customers have historically opted for the belt feeder, largely due to the lower upfront capital cost of this option.

A belt fed cone crusher comes with a feed hopper at the back of the machine. Material from an excavator feed is received and directed onto the belt conveyor, which then carries the material to the cone

The TK feeder includes the advantage of a vibrating pan feeder with a grizzly.



A new Lokotrack® LT300HP™ mobile cone crusher complete with TK feeder.

## KEY TAKEAWAYS

**Migrating to the TK feeder option on Metso Outotec Lokotrack® LT300HP™ cone crushers assists in maximising productivity, increasing throughput and reducing costs per tonne for several of Pilot Crushtec's mining and aggregate producing customers.**

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**Pilot Crushtec has been able to assist several customers to upgrade their existing Lokotrack® LT300HP™ cone crushers with TK feeders.**

crushing chamber.

With a belt feeder, the cone crusher is fed with a high proportion of fine material. This adds to the load in the crushing chamber but does not contribute to the high value output that the crusher produces. In contrast, the vibrating feeder and grizzly bars in the TK feeder allow the fine material in the feed to bypass the crusher and go straight to the stockpile or further in the process.

"Bypassing the fines and only crushing material that needs to be crushed increases your throughput," says Marais. "A cone crusher is a volumetric machine by nature, and by taking out fines, you create more crushing volume in the chamber. For instance, if you bypass 20% of fines in your feed material, your production rate will increase by 20%."

Pilot Crushtec has been able to assist several customers to upgrade their existing Lokotrack® LT300HP™ cone crushers with TK feeders. A mid-tier miner has already gone the TK feeder route for two of its units operating at two different sites. A further unit has just been commissioned for another customer running a Lokotrack® LT300HP™ cone crusher in an aggregate operation.

Marais highlights other benefits of the TK feeder, including reduced wear. Limiting the amount of fine material that reports to the crushing chamber increases the life of wear items, particularly crusher liners. This also reduces the machine's power draw as the cone crusher's closed side settings are maintained, translating into lower cost per tonne of material produced.

"As customers seek increased efficiencies and ways to reduce their bottom-line costs, we believe the trend towards upgrading machines as opposed to replacements will gain traction in the next few years," concludes Marais. "Pilot Crushtec is committed to working closely with customers to find the best possible solution for their operations." ●

The TK feeder upgrade has the ability to maximised productivity, increased throughput and reduced costs per ton.

# A WORLD PREMIERE AND SUSTAINABLE SOLUTIONS FOR THE QUARRY AND RECYCLING

**At this year's Bauma, Kleemann presented innovations from its comprehensive product portfolio with a total of nine mobile crushing and screening plants and its operating concept SPECTIVE. A world premiere was celebrated by the new impact crusher MOBIREX MR 130(i) PRO.**

### All-electric drive concept

With the impact crusher MOBIREX MR 130(i) PRO, Kleemann presents a new family member from the PRO line. The plant is used as a primary and secondary crusher and combines output, precision and sustainability.

Thanks to its all-electric drive concept with the option of an external power supply and thus $CO_2$-free operation, the plant guarantees low energy consumption per ton of final product. The optional large double-deck secondary screening unit permits the production of two classified final grain sizes. The MR 130(i) PRO covers a very wide application range in natural stone and recycling. With its heavy rotor and powerful electric 250 kW drive, the crushing unit guarantees a very high and stable throughput. A continuous crusher load is guaranteed by the Continuous Feed System (CFS).

### Operating concept SPECTIVE with new functions

The innovative operating concept SPECTIVE includes various components that are ideally tuned to one another and accompany the machine operator during the entire working day. Apart from the intuitive touch panel and different radio remote controls, the digital application SPECTIVE CONNECT, above all, supports the work site digitalisation. All relevant process information and reporting are now displayed on your smartphone without having to leave the feeding device. SPECTIVE CONNECT has new features, which will be presented at Bauma and which make work for the operator even easier. A new configuration tool, for example, supports the operator in the selection of the correct machine settings.

### Kleemann screening program extended

The new MOBISCREEN MSS 802(i) EVO has been designed as a powerful mobile screen for coarse elements for changing challenges in different applications. With its clever plant design and flexible conversion options, it guarantees an optimum material flow in natural stone and recycling applications. The large range of screen surfaces and simple setting of screen parameters make it possible to adapt the MSS 802(i) EVO easily to new application conditions. If a fine final product is to be screened from particularly coarse feed material, the plant can be quickly converted from three to two final grain sizes. Further advantages of the plant include its simple operability thanks to its intuitive control system, easy access to all relevant machine components and its drive concept with the option of an external power supply for emission-free and thus environmentally sound work.

### EVO2 line for flexible application possibilities

The plants in the EVO2 generation demonstrate that output, efficiency and flexibility belong together. The latest members of the product line – the jaw crusher MOBICAT MC 110(i) EVO2 and the cone crusher MOBICONE MCO 90(i) EVO2 – will be presented together to the public at Bauma with line coupling. Both plants have an efficient drive concept and intelligent overload systems. Operation is simple thanks to SPECTIVE and SPECTIVE CONNECT.

The EVO2 line also includes the mobile impact crushers MOBIREX MR EVO2. The plants excel in both natural stone and recycling. The SPECTIVE operating concept ensures simple, intuitive control. The new feature here is that SPECTIVE CONNECT is now also available. ●

# Top performing excavators

**HPE Africa's line-up of earthmoving equipment now includes the Hyundai HX220HD crawler excavators. These machines, which are manufactured in India, as part of Hyundai's global expansion programme, offer the same quality and performance as the Korean manufactured HX220S series. These units also run on the same engine, pump, MCV and motor as their Korean manufactured counterpart.**

HPE Africa's customers who have invested in Hyundai HX220HD crawler excavators have great praise for these robust machines.

"The local market has a wide choice of earthmoving equipment to select from and we know how critical it is to use the right machine for each specific task," says Ross Collard, Managing Director, HPE Africa. "An important feature of the Hyundai range is the flexibility of every machine. The versatile and robust design means a Hyundai excavator, backhoe loader, skid steer loader or motor grader excels in various environments and applications, including challenging terrain.

"When it comes to the new Hyundai HX220HD crawler excavator series, our customers note favourable features that include high performance, comfortable operation and easy serviceability and maintenance. Fuel efficiency, operator safety and after-sales support, are also important.

"Customers are impressed with the performance of the 5,68 m heavy-duty boom and 2,40 m heavy duty arm of these machines, as well as the new variable power control for precise operation and swing control. Other new design features for superior performance include the reinforced bucket and bucket linkage, the strong and stable lower frame and a single layer cooling system. The reinforced idler covers increases durability, while the new design of the cab mounting system reduces shock and vibration."

Operator comfort and safety are important factors for Hyundai's design experts. New features include a wide cab with reduced noise, excellent visibility, an improved intelligent display, easy-to-reach control panels and a highly sensitive joystick. Other features include an accessible entrance, smooth travel pedals and foot rests and a new front side air-conditioning system.


Hyundai's Hi-mate remote management system enables users to track and monitor a machine's performance and daily operation history. This system utilises mobile based technology to access accurate diagnostic information, evaluate equipment reliability and to verify a machine's location.

These robust excavators have a travel speed of 5,7 km/h are fitted with an efficient diesel engine 148 hp and have an operating weight of 21,4 t, a bucket capacity between 0,9 m³ and 1,2 m³ and a digging depth of 6 730 mm.

Easy-to-maintain engine components ensure quick and effortless serviceability and maintenance. Design features include a centralised electric control box and an easy change air cleaner assembly.

HX220HD crawler excavators are designed for high productivity in many applications, including construction, digging trenches, holes or foundations, road works, materials handling and laying pipes, as well as moving earth, demolition, or dredging.

HPE Africa's range includes Hyundai wheel loaders, tracked and wheeled excavators, backhoe loaders, skid steer loaders and motor graders. The company also supplies and supports Soosan hydraulic breakers and quick couplers, which are complimentary attachments to Hyundai construction equipment.

All machines are supported by HPE Africa's technical and after-sales teams throughout Southern Africa. ●

# Industry vehicles can achieve fuel savings of up to 3,75%

**Shell Commercial Fuels has launched a new formulation of Shell FuelSave Diesel with advanced cleaning properties, which helps customers in the road transport/construction/mining/agriculture/ manufacturing sectors improve fuel economy and recover power.**

With the number of trucks, buses and equipment still powered by diesel engines, innovation in diesel fuels still has an important role to play and Shell is committed to developing technology to help customers get more from their vehicles. Shell FuelSave Diesel now features a unique triple-action formula which otters a deeper clean'.

After just one tank, the new formulation helps to clean up fuel injector nozzle deposits and Internal Diesel Injector Deposits {IDIDs}. It is also designed to help protect Exhaust GasRecirculation (EGR} systems from deposit build-up', thus boosting vehicle reliability.

By providing a fuel injector clean-up and keep-clean effect, the new formulation helps businesses avoid unplanned breakdowns and replacements. When taken to account that six or eight cylinder engines may require replacing a whole set of injectors, the costs accumulate to the point of having an impact on the bottom line. "The last few years have been turbulent for our customers, to say the least," said Kong Hua Ong, Technology Advisor, Shell Commercial Fuels. "They have faced various challengesincluding increasing costs, new ways of working, and tightening environmental targets. On top of this, engine technologies continue to advance, meaning operators' fuel choices become increasingly important when dealing with current market demands.

"Our new formulation of Shell FuelSave Diesel is designed to ease these stressors by ensuring equipment is less likely to fall foul of engine deposits. It


combines key ingredients including deposit control additive to target and remove injector deposits with a combustion improver which helps keep the EGR system clean. This helps to promote better engine performance, reduce downtime and drive down maintenance costs, allowing businesses to maintain a competitive edge." ●

# Pumping during the rainy season

Southern Africa's summer rainfall regions, where much of the mining industry is located, face a seasonal risk from heavy rains – and must be ready to rapidly dewater sites.

Now is therefore a good time to conduct a full check on all pump installations, according to Justin Bawden, internal sales at Integrated Pump Technology. As the southern African distributor of Grindex submersible dewatering pumps, the company is dedicated to helping customers prevent flooding and disruption.

"Weather patterns have become less predictable, with some regions experiencing drought conditions for extended periods," says Bawden. "Parts of the country may experience heavy rainfall consistently that creates great demand for pumps, while other regions may see more arid conditions in which case pumps go unutilised for some time."

He stresses the importance of pumps being checked for performance and reliability, as they must often be put into service at short notice. Grindex pumps are well known for their applications in dewatering as well as sludge and slurry pumping. One of his concerns is that some pumps are left unused in applications where solid particles can clog up components through sedimentation.

"In a muddy application, for instance, particles should not be allowed to thicken around a pump over a period of months," he says. "If a pump is restarted under these conditions, it could lead to the impeller shaft snapping."

He urges pump owners to take stock of which pumps they have available at the various dewatering 'hot-spots' around their sites. By re-assessing the demands that the rainy season will soon place on each of these points, they could check that the pump capacities are well aligned.

"Our Grindex agents are strategically located around the country, and across border with many undertaking regular site visits," he says. "This helps customers to ensure the right pumps are in place, and to identify any problem areas that might need more attention."

It is vital to understand the key aspects of each pumping application – from the required flow rate and vertical head to the pipeline and the nature of the material being pumped. This makes for cost effective choices that provide the necessary duty when heavy rains arrive, he says.

The Grindex submersible pump range includes smaller units up to 10 kW that can be easily carried by a single person. For many of the larger units from 18 kW and up, Integrated Pump Technology can also offer trolleys that make mobility of the units easier for those on site tasked with installation of these units. ●

# Why on-site generation provides a future-proofed, sustainable and reliable alternative

**Like its counterparts across the world, the South African mining industry is an electricity super user. Unsurprisingly, it was one of the first industries that had to comply with South Africa's Carbon Tax Act, which is driving mining houses to use alternatives to reduce OPEX while meeting its regulatory obligations.** By Vladimir Milovanovic, Vice President, Power Systems, Anglophone Africa Cluster at Schneider Electric

That said, it is not only the Carbon Tax Act that is moving the industry towards change; our unreliable grid is seeing mining houses move towards more sophisticated process and control equipment which in turn requires high power quality to ensure these systems run optimally and won't fail prematurely or frequently, causing downtime.

Additionally, mines require reliable electricity to remote locations where new operations are designed and constructed. Combined with electricity tariff hikes one can understand why mining houses are scrambling to find feasible alternatives.

To counter grid instability, as well as availability, many mining operations are relying on internal power sources such as diesel generators to run operations. Also, mines are bringing renewable energy sources, like solar and wind, into the mix to establish a hybrid energy model of sorts.

Whilst the above does provide some form of renewable energy posture, it unfortunately still relies too heavily on fossil fuels, be it generators and grid supply, to meet daily operational demand.

### The microgrid – self-containment optimised

To truly make the most of our country's abundance of natural energy resources, in a sustainable manner, whilst reaping the benefits of reliable and quality energy, mining houses should incorporate the concept of microgrids into their operations.

Microgrids offer mines the following important benefits:

- It harnesses modern renewable generation – wind and solar are widely available, becoming more and more cost-effective, and generally safer to operate than traditional sources.
- Energy storage – comprising battery energy storage systems (BESS) and/or thermal and mechanical methods, storage abilities support a clean energy transition by firming up availability of intermittent power sources and increasing grid flexibility to drive positive outcomes. Moreover, battery storage is becoming increasingly affordable and attainable.
- Advanced control technologies – such as cloud computing, data analysis and IoT to optimise, autonomously schedule and control energy production and consumption.
- Microgrids allow for self-contained, on-site energy generation from greener sources that can improve a network's sustainability, reliability, and resilience.
- Facilitating compliance and ESG.
- Transparency of consumption – energy's visibility is the starting point for decarbonisation, obtaining insights from across the corporate value chain is vital to measuring and controlling what power resources are used.
- Analytics and AI can automate the conversion of data-driven insights into real-time decision making.
- Digital twin technologies enable modelling the characteristics of the mine (demand/load) in order to facilitate predictive shifting of flexible operations to when renewable generation is at peak
- Ecosystem collaboration that leverages the skills and know-how of end-users, technology partners, and integrators.

In order to forge a future that offers reliable, quality, and sustainable energy, mines should include on-site generation such as microgrids into their energy mix, which is realised by a partnership of energy transition and digital transformation. Ultimately, using on-site energy more efficiently, improves mining processes' productivity, reliability, safety, and the expansion of operations.

# Tailings Management

**Tailings storage facilities (TSFs) represent one of the most critical liabilities associated with the mining industry. With the spotlight focused on ESG, investors and communities perceive the risk posed by TSFs as less tolerable than ever before. There has been a shift in how these facilities are managed, with a focus on sustainability and proactive tailings management strategies.** By Pepe Moreno

The response from industry, and community in general, was a deep concern that mining houses did not have a good grasp of the risks related to TSFs, and a general sentiment that closer scrutiny of the quality of the design, operations and closure of TSFs was required. This is how the Global Industry Standard on Tailings Management (GISTM) was presented to the community – as a vehicle to restore confidence that our mining industry can operate in a more sustainable manner.

The process of implementing the GISTM at the Olympic Dam operations has been very positive in improving transparency and ensuring there is accountability for systems and structures. A few years before the launch of the GISTM, BHP appointed SRK as the Engineer of Record (EOR) for its Olympic Dam (BHPOD) operations. Pepe Moreno assumed the EOR role, with Joe Rola as a deputy EOR. Since then, SRK has provided support to BHPOD on a wide range of services, working in partnership with BHPOD's responsible dam engineer and dam team.

Olympic Dam has six upstream tailings dams and six evaporation ponds, with some of these being dormant. Since appointment to the EOR role in 2017, SRK has introduced many initiatives and designs to reduce the risk profile of all facilities.

**Olympic Dam has six upstream tailings dams and six evaporation ponds, with some of these being dormant. Since appointment to the EOR role in 2017, SRK has introduced many initiatives and designs to reduce the risk profile of all facilities.**

BHPOD and SRK have invested significant resources to evaluate the fundamental behaviour of the Olympic Dam tailings, including advanced in situ and laboratory testwork employing critical state soil mechanics theory. The staged approach used in this investigation has assisted BHPOD to gain more confidence in the evaluation of TSF stability in the short and long term, and now also in worst-case liquefaction conditions. The investigation findings have been used to design appropriate mitigation measures and targeted monitoring programes.

In 2019, ANCOLD published an addendum to its original Guidelines on Tailings Dams (ANCOLD, 2012), which recommended additional governance requirements and introduced a more defined set of loading conditions related to undrained shearing such as static liquefaction – when materials can develop contractive brittle behaviour during shearing. This was reinforced in 2020 with the GISTM requiring brittle failure modes to be assessed and addressed. The substantial body of work completed by SRK has enabled BHPOD to address these elements of the standards and allowed SRK to complete a quantitative risk assessment within reasonable accuracy. ●

**Pepe Moreno is a Corporate Consultant (Tailings Engineering) with SRK Consulting Australasia**

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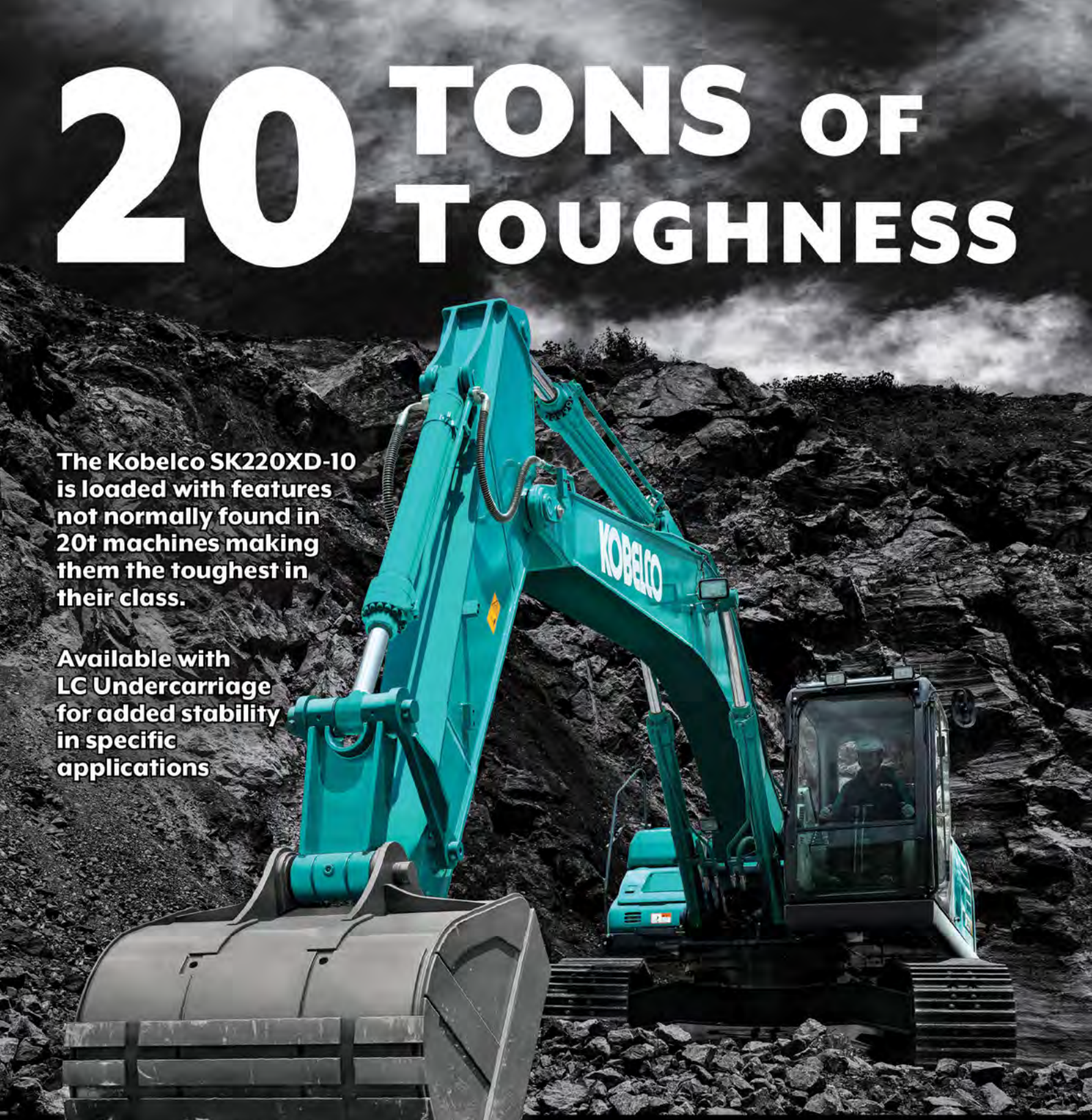


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