



Tyre management software is used worldwide - here in Indonesia. Mark Fernie from enTIRE is third from right - the company and product remain fiercely independent

productivity/safety platform enabling delivering more production with less equipment. Also, our capabilities to integrate MEMS₄ with truck autonomous systems is a must that we are proud to offer to the market. We are seeing more and more customers integrating MEMS in their Triggered Action Response Plan (TARP) which enables the right person to do the right thing in response to each MEMS alert. We are also seeing more and more customers implementing MEMS as an input to the autonomous vehicle brain. It is proof that our customers understand how MEMS₄ data helps them work toward operational excellence.”

They are alerted in advance of a potential safety situation – a hot tyre event for example; it helps them make informed decisions even when the truck can't be accessed for safety reasons – quarantined caused by hot tyres for example; and be alerted in advance of bad pressure/temperature leading to unscheduled downtime and premature tyre loss – which, in this situation of tense supply is even more critical.

“Some customers also ask us to analyse MEMS data along with other data related to tyres, trucks, or roads. Thanks to our Michelin Mining Consulting & Services offer, we can quickly create a task force gathering tire and data experts to help our customer improve safety, productivity, and cost. Also, MEMS₄ has a high impact on the life of tyres. With a very tight market on tire supply, mines are keen on having a better tire management with adapted rotation policy, better management of pressure and temperature of the tyre so that the tyres last longer. This where our Mining Consulting & Services can help with customised advice to the mine sites to ensure the best management of tyres and see if the mine site has implemented all the levers on tyre management and usage to ensure safety, productivity and cost reduction.”

MAXAM MS₄₁₂ delivers extended tyre life

In 2020, MAXAM Tire introduced the MS₄₁₂ to the open pit mining series that features a unique tread pattern that provides extremely low wear rates. Over the past two years, this tire has been performing and exceeding mine sites expectations due to its many attributes and benefits.

The MS₄₁₂ features a high net-to-gross tread pattern that provides extremely low wear rates that drastically increase tyre life. MAXAM's engineers have also strategically placed stone ejectors to provide maximum protection from

Running hot

Mining tyres remain a high cost consumable for operations, so more efficient designs and better tyre management are to the fore, reports Paul Moore

Before looking at new tyre types and sizes and the latest on tyre management and recycling technology, **IM** spoke with Francois Didion, **Michelin** Global Mining Sales Director on the current state of the global mining tyre market – he had this to say: “Generally, the mining tyre market is in balance between demand and production. The global supply chain constraints have created some challenges for the industry as a whole in terms of raw material supply disruptions and the ability to manage downstream flows with the availability of containers and vessels.”

He also had some interesting comments on how mining tyre supplies respond to the transitions in the mining truck market – specifically towards more autonomous trucks and eventually, autonomous and battery electric trucks. Didion stated: “Current technologies for autonomous haulage systems applied to traditionally designed manually driven trucks do not fundamentally change the tyre dynamics. Future vehicles designed to be autonomous by original design will bring new challenges to tire characteristics and tire manufacturers will need to bring new offers to market. Battery electric vehicles in mining will require cycle changes for charging or swapping, but the real change for tyre design will be the need to support different load capacities, higher speeds, and more torque.”

Looking at its tyre line-up, the newest addition is the Michelin XDR 250+ which it says increases tyre life by up to 8% by improving wear resistance, optimising wear in front and rear axles, and offering increased aggression resistance by utilising an exclusive new mixing process. To date, Didion said that the new XDR

250+ has been very well received in the market. The benchmark tyre incorporates the second generation of two revolutionary compounds, MB₄ and MB, that provide improved wear resistance. An exclusive new mixing process with a superior level of carbon black dispersion creates a much more homogeneous mix that leads to a slower wear rate. Michelin multilayer technology provides optimised wear on front and rear axles.

Finally, MEMS₄ is Michelin's premium mining TPMS on which it has already brought many evolutions since the launch in 2018 (new sensors, GPS upgrades, 4G, automated dashboard). Didion exclusively revealed to **IM** that Michelin will also soon launch MEMS Lite, “combining MEMS proven pressure and temperature sensors with fixed reading stations to deliver daily tire diagnostics remotely for operations that want to start the journey with limited features and limited investment.” For example, a mine equipped with 100 t rigid truck 49 in tyres.

On the wider maturation of the TPMS market, Didion added that since 2015, the mining industry TPMS equipment rate has constantly increased to nearly reach 50% on ultra class trucks. “Mining companies are now considering TPMS not only as a safety tool, but as a



Testing is vital to new tyre development - here for Michelin's recently launched XDR 250+ tyre

stone drilling, which leads to the cause of premature tyre removal and out of service conditions. Engineered with tread grooves that allow for exceptional traction and heat dissipation, the MS412 delivers excellent traction in a variety of haul road conditions. To enable high speed operation with minimum heat build-up, MAXAM has optimised the MS412's base compound to help maximise productivity for mining operations globally.

As an innovative group, with years of expertise in the mining industry, MAXAM's engineering team has designed the MS412 with a high lug-to-void ratio for improved wear and impact defence, providing mine sites with increased protection and wear on haulage tires. Taking the existing MS402 tread pattern, MAXAM's engineers took the two existing straight lines and changed them into a rounded arc. In addition, they also modified six pieces of small lugs into four bigger lugs for enhanced traction. To prevent stones on the road from trapping and resulting in deep cuts and separation, a stone ejector design was added at the area prone to stone trapping.

Some of the other features and benefits that MS412's users have cited include a relatively shallower tread depth and better heat dispersion performance; a relatively low lug-to-void ratio with better traction plus a unique stone ejection design.

Featuring a strong all-steel casing to reduce cuts and punctures, the MS412 is engineered with increased casing durability to dominate severe hauling conditions. Similar to all large mining haulage tires in MAXAM's program, the MS412 has deep tread grooves to provide cooler running tread and longer tire life.

Kal Tire TOMS and Pitcrew.ai

Built on a foundation of modern, industry-leading technology, TOMS, Kal Tire's proprietary Tire and Operations Management System, was launched officially in 2018 and is now in use on more than 130 mine sites across five continents. In 2021 Kal Tire and computer vision specialist Pitcrew.ai, formed an agreement to bring mines autonomous detection of hot tyres, tyre separations and other tyre and mechanical damage any time, anywhere and without the vehicle needing to stop. Any inspection anomalies are automatically transmitted into TOMS. Pitcrew.ai leverages FLIR thermal imaging and AI technology to change the way trucking and mining vehicles are inspected. Using an AI algorithm trained on a library of thermal images, the system can spot problems in their early stages.

Christian Erdelyi, TOMS Systems and Implementation Manager, Kal Tire's Mining Tire Group told *IM*: "TOMS interoperability allows communication with various system and sensors

Monaflex - quick turnaround sidewall repair

Monaflex has built upon 60 years' industry experience to expand its range of specialist bead and sidewall repair systems. The range now covers more tyre sizes than ever before. While the popular Monaflex Custom OTR system cures repairs to sidewall, shoulder and crown in all OTR tyre sizes on the market, the company told *IM* that many customers are choosing to supplement their Monaflex custom system with additional workstations focusing solely on quick turnaround sidewall repairs. These extra stations use dedicated sidewall systems which provide the same inflation technology used in the standard system but incorporated into an extra quick assembly metal housing. Breaking into two parts, the inner frame is simply dropped into the tyre section and positioned with the heat pad over the repair area. Guide bars are pushed into place and locked off with pins and the system is then pressurised and brought up to temperature and the timer set. One technician can assemble the system in seconds. Monaflex now offers four sidewall only systems covering all major truck and OTR sizes. Further, the Monaflex bead repair offering is now wider than ever with a new mid-range OTR bead system supplementing the existing truck and XL OTR bead products. This expanded range is a crucial tool in the quest to improve tyre lifespans and reduce wastage due to minor bead damage.

on mine sites. The integration of sensor information into TOMS, such as thermography from Pitcrew.ai and tire pressure and temperature data from TPMS combined with AI allows Kal Tire to offer real time condition monitoring, planning and prediction. The automated TOMS workflow makes use of predefined business rules to drive certain goals. TOMS needs only under a minute from an autonomous inspection of a truck in the field to creation of a work order and team member notification, if required."

Erdelyi said Kal Tire is running autonomous inspection stations on two mine sites in northern Canada, where it is working on refining the cold weather version. "Both mine sites are supporting the innovative initiative and going out of their way to integrate the autonomous inspection station into the mine plan and traffic management. In Canada, we are also upgrading our mobile weight scale system to integrate a mobile Pitcrew inspection station in order to use this technology on trucks taking part in weight studies. This allows customers that do not have their own autonomous inspection station to get an insight on their fleet during weight study events." In addition, Kal Tire is operating an inspection station on a mine in Chile. Currently it is also mobilising inspection stations to Mozambique, Colombia, and Australia.

Where on the active minesite is the best place to position Pitcrew.ai technology in terms of performance? "The location is driven by the use case. The inspection station can serve to monitor trucks entering fuel and maintenance areas to alert when there are trucks with hot or severe damaged tires to enter those areas. Haul roads leading to fuel farms provide good inspection results. For continuous inspections locations with high traffic and low speeds as ROM pads, crusher and breaker areas are great to position as well if sufficient dust controls are in place. The greater the frequency for a truck to be scanned and

inspected, the better. The business rules in TOMS ensure work orders are only created when the condition of the truck requires it."

And how does the technology application vary by site? "Each mine site has specific goals and targets depending on the operational condition and circumstances, which are defined and agreed upon mobilisation. At one mine site, Kal Tire has to call down trucks for regular inspections, and with the deployment of an autonomous inspection station the goal was set to reduce that downtime by 20% per month, allowing more productive time for trucks, keeping the same level of inspection quality and safety. Another goal that was set was to monitor and track at least 70% of all tyres under condition monitoring. That customer operates different fuel farms and aims now to direct all traffic with trucks that have tyres under condition monitoring to the fuel farm that is equipped with the autonomous inspection station. On all sites Kal Tire is tracking with its Service Delivery Report in Power BI as to how we are performing against those targets."

On comparing Pitcrew.ai with TPMS systems he stated: "TPMS are great go/no go tools enabling the Kal Tire site manager or mine dispatch to interfere when necessary, but TPMS systems cannot give us information on the condition of tires. Pitcrew.ai inspection stations provide eyes – on the outside of tyres, showing us damages where the tyre is exposed such as cuts, cut separation, missing lugs, and others. It also helps us to find sealed or hidden from the eye problems such as hot spots in tread and sidewall. Combining both sensors TPMS and Pitcrew.ai allows a 360 view on our customers tyres."

KLINGE – market leading tyre management software

Al Klinge, Managing Director at **Klinge Holdings Pty Ltd**, aka KLINGE the leading tyre software and consulting company based in

Brisbane, Australia. In 2016 Kal Tire acquired the service business part of Klinge but it retained its IT specialty including its famous Total Tyre Control (TTC) tyre management software business and OTR tyre service training arm – it continued operating and was successfully trading when it was then acquired in 2018 by Michelin.

So how has becoming part of Michelin changed Klinge's journey? Al Klinge told *IM*: "It's meant some changes but not in the ways we operate, develop or support our services and clients. The acquisition established that the brand & culture of KLINGE required both protection and independence to thrive. This pragmatic approach has meant synergies like the TTC/MEMS integration was undertaken like any other software integration between two companies, meaning if it wasn't valuable and practical for our clients we wouldn't do it."

TTC has been around in some form since 1981 and in that time has been updated, migrated, expanded and integrated numerous times. The most recent functionality however is the integrated tyre movement features used in the MEMS4 integration. This greatly reduces the data input required for both systems which saves time, increases data quality and streamlines tasks for the teams on the ground.

KLINGE has been exporting its software since the 1990s and has an established footprint outside of Australia with 43 countries and

counting. Its go to market remains direct, plus user support and training is key to clients getting the most value from their investment. "KLINGE software's scalability and features means users bundle or utilise it as part of their own services for their customers, and we have various manufacturers, contract miners, tyre dealers & service providers utilising TTC & TTC Web in this way."

But are mining customers also now more savvy about their tyre operations in terms of achieving maximum life and efficiency? "For now, yes, but there is a growing skills shortage. The miners that have the most mature knowledge and effective programs are finding their key tyre people fast approaching retirement and being replaced by younger reliability engineer types. You'd think this would be great but we don't see many engineers excited to manage tyres, which can lead to strained or incomplete knowledge transfers eventually impacting tyre operations. Anticipating this we developed our Virtual Tyre Advisor service to mentor & support mines as proven experts detached and independent of mine tyre service providers and suppliers. Feedback from our clients has been promising in addressing this growing issue."

Safety remains the KLINGE priority with OTR tyres. "Before optimising productivity ensuring the people who service the tyres and rims are working safely should be the goal. KLINGE

consultants use our proprietary software TyreARM™ to carry out tyre safety audits for mines & tyre services providers, we originally developed this during our time as tyre service providers (as we did with TTC) and today it continues to evolve. ESG is a growing area and I am glad it is, it's obvious that industry are excited to learn and watch as OTR tyre recycling gains momentum and proves itself."

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Finally on centralised tyre monitoring, Klinge added: "As IROCs and similar setups have grown to master various areas, tyres have been patiently waiting for their turn in the spotlight. We have been ready for a long time and are excited to see this beginning to shift, we are ready for the jump when the miners are."

enTIRE – an independent and innovative approach

IM also caught up with Mark Fernie - Managing Director of Vehicle Management Corporation Pty Ltd and the Marketing Director and Founder of

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To get some insight into the Maple Program – *IM* spoke to Darren Flint, VP Europe and West Africa, and Tyre Lifetime Services, Kal Tire's Mining Tyre Group

Q Would you say that customers today are showing much more of an interest in quantifying the environmental benefits of retreading and Ultra Repair since the Maple Program was introduced? If yes, why do think this is?

A Yes customers are now asking for how we can help them reduce their carbon footprint. Since the program's launch in 2019 we've seen a strong increase in interest from customers. The main difference, particularly over the last 12 months is customers actively approaching us about the program and asking questions on how renewing and extending the life of tyres through retread and Ultra Repair, can carry environmental benefits for their business and meet their sustainability goals.

Q What does a customer have to do in terms of data sharing and participation to join the Maple Program?

A The Maple Program is only available to our contracted customers and in most cases we already track the necessary fleet data required to calculate the annual rating, through TOMS, our proprietary Tyre Operations Management System. This includes detail on the fleet, tyre types and sizes in operation, and the total number of retreads and/or Ultra Repairs performed over a calendar year. These are compared against the total retreadable or Ultra-Repairable tyres to calculate the annual rating – this is shown as either the percentage of the fleet or the total tons of rubber that have used our sustainable tyre solutions, depending on the regional preference.

Q Is the Maple Program now available to your customers worldwide?

A It's available to any contracted Kal Tire customer who is using either our retreading or Ultra Repair processes. Thanks to the addition of our Ultra Repair process last year, we were able to open up the program to other major regions as we operate a dozen repair centres internationally, alongside our six retread facilities in North America, Latin America, Europe and Africa.

Q Can tyre recycling also be factored into Maple Program performance?

A Our low-emission thermal conversion process in Chile safely recycles tyres back to their original components, which carries general environmental benefits vs. stockpiling or disposal/landfill. Another benefit is that the low-emission production of steel, oil and carbon black from recycled tires can emit many times less CO₂ than the new production of these commodities. We're investigating how this could benefit our

customers through the Maple Program in the future.

Q Has the Maple Program been applied to date in both surface and underground mining tyre repair applications?

A The program is continually evolving to appeal to as many of our customers as possible. Currently we are working with surface mining customers but look forward to applying this to our underground customers as well.

Q How does the Maple Program actually quantify environmental performance?

A New tyre production requires large amounts of raw materials, such as natural and synthetic rubber, high-grade steel, oil and carbon black. In larger sizes, this can amount to many tons of material in a single tyre. When added to the energy required to build and cure new tyres, we can clearly see the benefits of our sustainable tyre solutions vs buying a new tyre. By giving carefully managed premium tyres a full second-life through our retread programs, or by restoring injured tyres back to service through our Ultra Repair program, customers can enjoy additional thousands of hours of performance alongside the added environmental value, which has been quantified through our carbon calculator. The calculator takes into account over 20 years of Kal Tire production data for all sizes and compares the reduced raw material and energy demands of retreaded and Ultra-Repaired tyres vs. their new equivalents. The outputs from the calculator are calculated for customers in the form of monthly and annual certificates, which carry third-party accreditation.

Q How has the Maple Program evolved since it was introduced in terms of its accuracy and complexity?

A Our third party accreditation is reviewed annually and the calculator, which is at the heart of the Maple Program, is in constant development to ensure all data is current and relevant. The calculator takes into account emission factors for over 15 countries, which are updated when new data is released. These emission factors take into account the carbon impact of energy created nationally. We also update the calculator with new emission data for all the materials used in new tyre production as they become available and ensure process data across many different types of tyre sizes, patterns and profiles is kept up to date from our repair and retread facilities.



Kal Tire's Maple Program was rolled out in Chile then the UK and then other key mining tyre consumption regions

enTIRE Wheels, its leading tyre and rim management solution. Tyre and rim management software tracks the life, performance and stock movement of tyres. This includes cost/hour, tyre life, tyre fitments, repair history, warranty information, failure reasons and movement between vehicle and sites. Fernie stated: "This information is used by mining operations to reduce their tyre costs by increased tyre life by selecting better performing tyre brands; reducing operational issues that reduce tyre life (eg ensuring haul roads are cleared); and optimising rotation strategies. Increasing tyre life also reduces vehicle downtime. It tracks warranty claims and assists in purchase negotiations with

tyre manufacturers with the understanding of tyre performance of each brand of tyre."

Fernie says with good management a mine can reduce their cost of tyres by around 30%. "This is a considerable saving as some mines are spending more than \$50 million each year on tyres. The different tyre management systems are below in the next point."

But what is the relationship between tyre management systems in mining and the mining tyre suppliers themselves? "Tyre manufacturers and service providers require tyre performance information from their clients to track the performance of their tyres as well as their competitors. They can use this information to

improve their product, assist their client in the use of their product and to become more competitive in supply negotiations. Each company would prefer to control this information as it could give them a commercial advantage knowing the performance and market share of their competitors used at a site. Data is collected from the field and the results transferred to the huge tyre factories for product improvement. It is something the tier one tyre manufacturers do well compared to the Chinese brands. To get this information they must either use their own system or get access to the system the client is using."

Looking at Australian mining as an example,



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Today enTIRE is used throughout the world at over 360 sites tracking over \$1.5 billion of tyres annually

shown to reduce tyre cost by around 30%. “I then worked with Bridgestone to convert the system to track mining tyres. Our first site was a huge mine in Kalimantan, Kaltim Prima Coal. Then Freeport Indonesia, one of the largest copper mines in the world and now our oldest client of 30 years. From this point our team began to grow and new developments began. Our other co-founder Lorenzo Rucchin took control of the enTIRE developments while I focussed on marketing. Since then we kept growing, attracting

mining operations who wanted an independent system. In the past 30 years we have mostly been competing with the Klinge and Otracom software and we gradually built market share. enTIRE is known for its independence from tyre manufacturers and service provider so clients can be assured of the integrity and confidentiality of their tyre performance and stock information.

Our team have been involved in very large TMS projects in the USA, China, France, Indonesia and the UK and we have worked with all of the tier one tyre manufacturers and a large number of service providers.”

Today enTIRE is used throughout the world at over 360 sites tracking over \$1.5 billion of tyres annually. “Our team has grown from the two

founders sitting in a room with an idea about designing a tyre management system to a group of nine people throughout Australia, Asia and Africa supporting and developing the system with around 150 combined years of enTIRE experience. “I think our growth can be put down to the fact it was initially developed with a large amount of input from tyre manufacturers and end users. Therefore the system suits both these groups needs. The system is very user friendly, robust and relevant. Our independence from tyre manufacturers and service providers is also important, along with affordability and a very strong, long term and loyal support team in Australia, Asia and Africa.

Other long term clients include Thiess, Glencore, NRW, Bis Industries, Pamapersada Indonesia (PAMA), De Beers, PT Bukit Makmur Mandiri Utama Indonesia, South32, CPB Contractors, Petrosea Indonesia and Mineral Resources plus other service providers and tyre manufacturers which are kept confidential.

So what can we expect to see from enTire going forward? “Particularly with mining operations realising “data is king” and utilising powerful business analysis tools to improve efficiency and competitiveness, they want access and ownership of data. enTIRE has been fortunate to have maintained our independence over the past 30 years and acquired such a large user base. This has been partly due to good

there have been a number of systems used including Treadstat (Bridgestone), EMTRACK (Goodyear), Total Tyre Control (Klinge, now owned by Michelin), Otracom – (now owned by Bridgestone), TOMS (Kal Tire) and finally enTIRE Wheels. “However, there have been any failed systems in the past 30 years and I have seen tens of millions of dollars and years of work spent on projects that never took off. All the major tyre manufactures have used or are using enTIRE in their business.”

enTIRE was founded in 1990 when Fernie first developed the system for a bus company. It was

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Yokohama on larger loader tyres

Large mining wheel loaders represent a specific and challenging tyre application, and *IM* spoke to Bruce Besancon Vice President, Marketing at **Yokohama Off-Highway Tires America, Inc.** about this part of the market. “Tyres on large wheel loaders – above 33 in rim sizes – are an incredibly important contributor to efficient and profitable operation. Selecting the right large loader tyre starts with the loader itself – vehicle weight, load capacity, lift height, torque, speed – as well as a ‘site severity survey’ that includes an analysis of the material the loader will be handling, the underfoot material, the load, and the distance of travel. The choice between a lug tread pattern and a traction pattern will be dictated by what’s underfoot. Hard surfaces and broken rock will point you towards a lug tread for its massive rubber surface, while loaders operating in gravel, sand or standing water can benefit from the extra grip of a traction pattern. Compound options range from cut-and-chip resistance in tyres that are not moving far – like loaders doing face work, where debris and tight turns are the hazards – to more heat-resistance compound demands for tires in load-and-carry applications. Tread depth also plays a role: extra depth can protect tires from cuts, chips and abrasion, but for longer cycles, shallower tread can help reduce heat buildup in your tyres.” He adds: “When it comes to structure, radials tend to be excellent for heat resistance and ride comfort on long cycles, but the sturdier sidewalls of bias-ply tyres can be an excellent choice where heavy loads, high lifts and massive torque demand extra stiffness. The bottom line is this: large wheel loaders are the centre of a mining/quarry operation, so downtime is extremely costly. Tyre choice is a decision you want to take very seriously, and the best approach is to work as a team with the tire manufacturer and a professional a tire dealer who understands large loader tires and knows your operation. That can pay off again and again.”

developed a TPMS system called enTIRE PressureNET which is currently operating in Australia, Asia, Mexico, New Caledonia and Africa. We see our market share increasing in this space due to our independence and the ability to supply multiple sensor brands. enTIRE Mobile has been developed years ago and the team is upgrading this technology in line with market trends. We expect our growth to continue and accelerate both in the TMS and TPMS markets.”

Tyre recycling getting traction

Chile continues to lead the way in the tyre recycling market – the regulatory timeline starts from 2023 through 2026, when 25% of mining tyres must be recycled, this increases to 75% as of 2027, and to 100% as of 2030. Crucially, Peru, with its own huge mining industry and mines like Cerro Verde and Antamina, has just passed mining tyre recycling legislation, and it is widely thought that Australia will be next.

Back to Chile and you have a number of initiatives. First off the pioneering plant from Kal Tire in Antofagasta. Scott Farnham, Director of Recycling Services, Kal Tire’s Mining Tire Group, said that for the most part it has already been achieving the original proposed 20,000 kg/day recycling rate and on some occasions has achieved even higher. He adds: “We continue to run various tests, changing one parameter at a time, in order to balance the energy input and

planning but also luck. We are the last of the independent software providers in the tyre management space and this leaves us in a strong position. The development cost (and time) for any new system to be introduced to the industry would prove prohibitive. Even if another system appeared, achieving enough market share to run

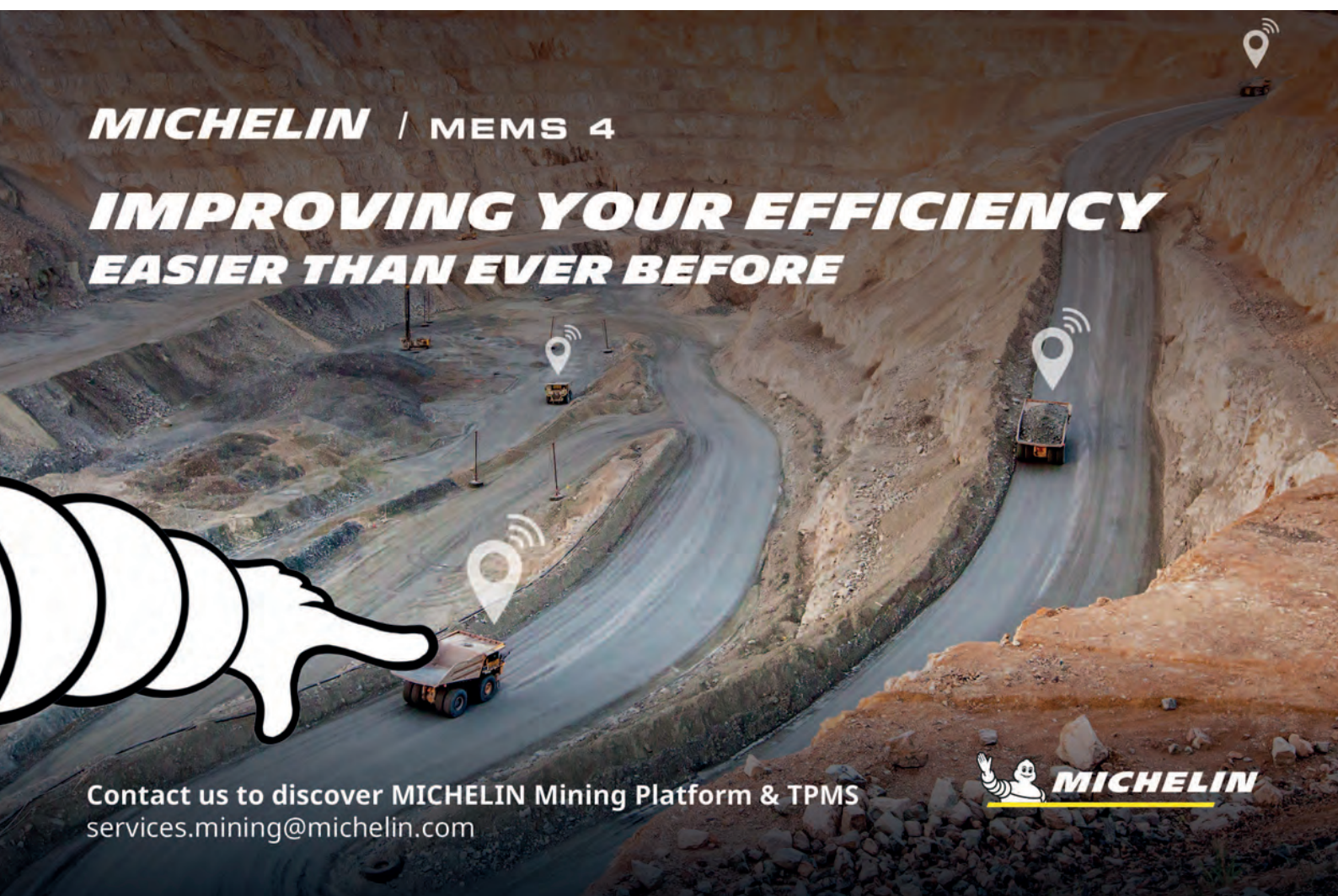
at a profit would take more than a decade, if at all. Our market share is increasing now from clients moving away from the tyre manufacturer controlled systems and we see this continuing. We also see a rise in smart tools and hand held data collection devices and we believe there will be strong growth in these areas. We have already

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syngas output, in order to find ways to optimise the process and further reduce emissions.” On plans for further expansion Farnham said there is always the possibility of this as it continues to have discussions with a number of interested customers. There are numerous ongoing discussions with interested customers and we anticipate the interest in our recycling facility ramping up significantly as we get closer to the deadline. Minera Los Pelambres have been very supportive and have initially provided more than 2,300 t of scrap tyres.

On success in actually selling the products of the pyrolysis products like steel, fuel oil and carbon black, he adds: “We have had some success. For all the products there is a lengthy qualification phase to pass. Each customer has their own quality and performance tests that need to be completed. This is taking an extended amount of time and has involved first sending small samples out, then larger quantities, then truckload quantities. It is encouraging to see a good level of interest from some global companies looking for these recovered and more sustainable material options. An overarching theme from customers is to lower their carbon footprint by using recovered materials.”

Trentino, Italy-based Salvadori is to supply its OTR tyre downsizing technology for Michelin’s new mining tyre recycling plant in Chile. Michelin’s new-generation 30,000 t/y recycling




plant built in Chile is in the final stage of construction with production set to begin in 2023. The plant is in collaboration with Enviro, a Swedish company that has developed a patented technology to recover carbon black, oil, steel and gas from end-of life tyres. The plant is in Chile’s Antofagasta region. Salvadori’s technology will be used specifically to reduce the large mining tyres of up to 63 in into pieces of predetermined dimensions which will then be further processed in the factory.

The Chilean mining majors are also stepping up. Codelco’s Andina mine already ran a pilot project that saw the removal of 58 mining truck tyres. Codelco says it is preparing to definitively incorporate this innovation that contributes to an increasingly sustainable mining industry. Mine

Kal Tire’s Mining Tire Group established one of the industry’s first dedicated mining tyre thermal conversion recycling facilities near Antofagasta, Chile, which has been reaching and exceeding its capacity

manager at Codelco Andina, Raúl Molina said in November 2021 that the mine completed the pilot test and is already including in its budget continuation of the initiative to reduce its tyre waste pile. The pilot plan saw the tyres pretreated to reduce their size for feeding into reactors for pyrolysis ie thermal conversion processes.

Elsewhere, Anglo American back in 2017 did its first mining tyre recycling test, in a plant that no longer exists in Concepción. Collahuasi also has an active tyre recycling project. 

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