POCLAIN MAG

#16

November 2020

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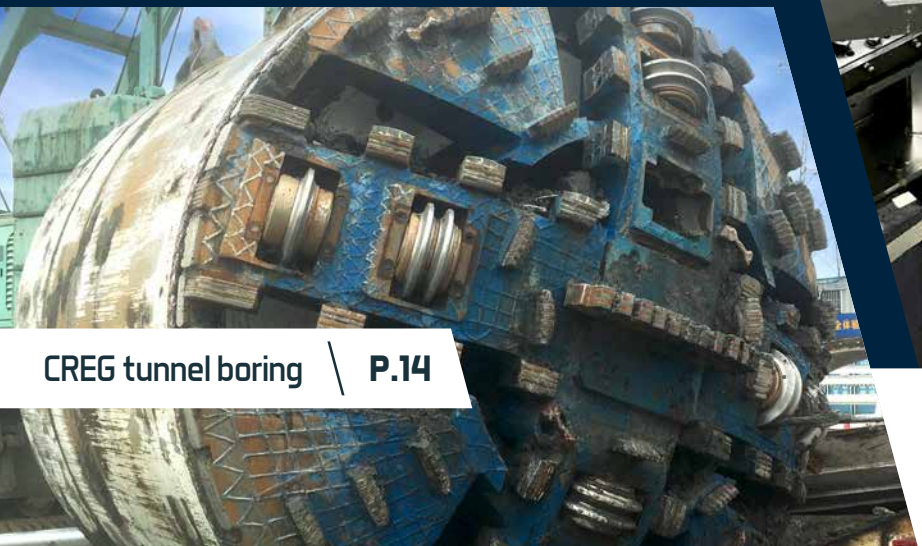

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bauma CHINA
November 24-27, 2020

WE'LL BE THERE ! \ BOOTH N4. 821

POCLAIN MAG

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> For Poclain, the Chinese market and the forthcoming Bauma trade fair in Shanghai provide the perfect opportunity to showcase our advanced solutions.

EDITORIAL

FRÉDÉRIC MICHELLAND
CHIEF EXECUTIVE OFFICER

While Poclain's history has of course been built on success, it has also weathered difficult periods like the one we are experiencing this year. Poclain's innovation, resilience and the values that underpin it have enabled the company to challenge itself and turn the 2020 downturn into an opportunity.

I am proud to announce in this issue of Poclain Mag the rollout of our new global strategy Shift Up - Engage 2025, which will see the Group take a more industrial, technological and entrepreneurial route.

The strategy will enable us to rapidly deploy new high-performing, stand-out products and services, while improving the range and quality of our solutions. The company is also driving the development of major forward-looking projects to meet current and future needs, such as an electro-hydraulic system range, innovative solutions for autonomous and connected applications, and Big Data and IoT-based services.

The range of articles featured in the 16th issue of Poclain Mag shows how we can work as a team to rise to the challenge of providing reliable, high-performing and innovative solutions.

For Poclain, the Chinese market and the forthcoming Bauma Trade Fair in Shanghai provide the perfect opportunity to showcase our advanced solutions. We look forward to welcoming you at our booth (N4.821), where you can browse our MS and MHP motor ranges, our very latest PM range pumps and valves for pavers, compactors and boring machines, and our largest motors for tunnel boring machines and shredders. With our globally renowned mobile transmission systems, we will also be displaying our exclusive AddiDrive truck system, which Europe's leading manufacturers have already incorporated into their offering.

Our strong presence in China revolves around our factory located close to the trade fair center, as well as distributors based throughout the country. Our Chinese contacts work with local OEMs to understand their requirements, meet their tight lead times and deliver the solution that best suits the application.

On behalf of Poclain's teams worldwide, thank you for partnering with us. We are committed to providing service excellence, and working closely with our customers to understand their needs.

ENGAGE 2025 SHIFT-UP

POCLAIN HYDRAULICS E+H VEHICLES ABOUT TO HIT THE ROAD

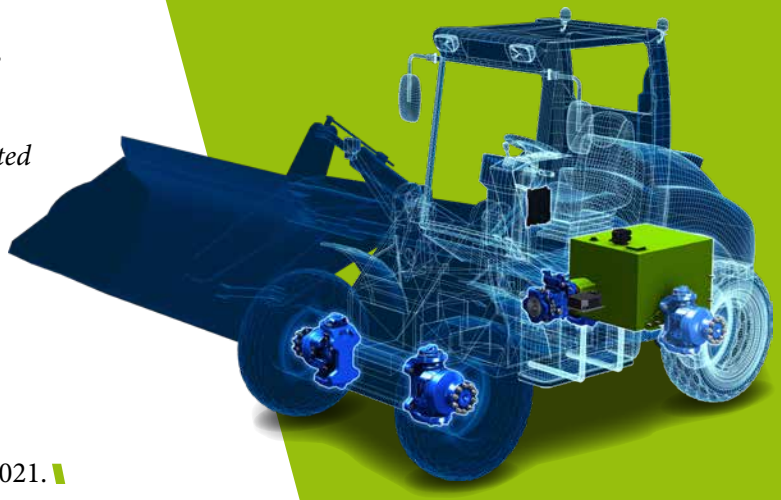
As air quality in urban areas becomes a primary source of concern, authorities are taking strong local or regional initiatives to reduce emissions. On new construction or demolition projects, zero emission vehicles are a prerequisite. As a result, off-road equipment OEMs are focusing their innovation efforts on designing emission-free machines. Poclain Hydraulics has made the strategic decision to support them.

Since 2018, the electromobility team based at Poclain Hydraulics' head office is dedicated to designing high performance battery-powered hydraulic transmissions for the drive and auxiliary systems.

"The challenge is to bring to market zero-emission machines that provide similar continuous performance as their diesel counterparts, with an acceptable range" comments Philippe Reynolds, Director - Electromobility Program. *"We can be proud about the work done during the last two years. Such results can only be achieved by bringing together a broad array of skills covering hydraulic systems, mechatronics, electrical engineering, battery management systems, global vehicle control and functional safety. Thanks to our simulation tools, fixed and mobile benches, we have evaluated and selected the best machine architectures and vehicle controls to improve efficiency, range and functional safety. We have explored new grounds and pushed the envelope of our technology."*

Several zero-emission customer pilot machines using Poclain Hydraulics electro-hydrostatic systems are currently entering their final stage of commissioning, paving the way to new exciting customer projects in 2021.

"We strongly believe that Poclain Hydraulics Electromobility solutions will be part of the answer for a greener world, and we are committed to designing high performance differentiating solutions for our customers", concludes Philippe. *"We are excited about the years to come!"*



POCLAIN HYDRAULICS STEPS UP PROTOTYPING WITH A 3D SCANNER

Whether for an industrial or a mobile application, most new projects call for prototyping. Carried out on-site by a field technician, it often requires craftmanship and time to integrate the components into their environment. Prototyping at Poclain Hydraulics will soon feature a handheld 3D scanner, which instantly captures the geometry of the machine.

The 3D scanner is currently being validated internally, on Poclain Hydraulics test vehicles.
The results have been highly satisfactory, shortening the prototyping phase from months to weeks. It only requires a few hours for a trained technician to scan the application.

Within a week, the scans are converted to CAD files that display the components and their interfaces with the vehicle or machine.

As a result, cardboard models and on-site adjustments are no longer necessary. Thanks to the precise measurements of the camera, the resulting prototype looks and behaves like the series version.

Thierry Thébaud, Systems Designer at Poclain Hydraulics, has been operating the 3D scanner and is very impressed by its performance: "*In the beginning of the year, I used it on a truck prototype in the US. The shaft output angle was particularly tricky to measure, and the camera enabled me to model the motors' integration with 100% accuracy–all it took was a few seconds*".

Starting in 2021, Poclain Hydraulics will give their customers access to the 3D scan service for their prototyping. OEMs will in turn be able to reduce time to market and carry out rapid prototyping in conjunction with a 3D printer.

Prototyping gaining speed and accuracy with 3D scanner

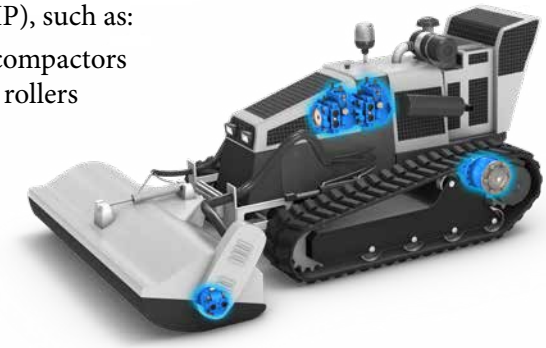
THE PM10 PUMP A CHAMPION ON LIGHT RADIO-CONTROLLED MACHINES

Small radio-controlled vehicles are great when it comes to working on unsafe, soiled or inaccessible terrain. Their drives need to be compact, responsive and powerful and that's exactly what Poclain Hydraulics' electro-proportional control PM10 pump is.

The PM10 pump has axial pistons and a trunnion design that is adapted to medium duty applications. Starting at only 7 cm^3/rev. (0.43 cu.in per rev), it provides the smallest displacement on the market. The PM10 is also available in higher displacements, ranging up to 21 cm^3/rev.

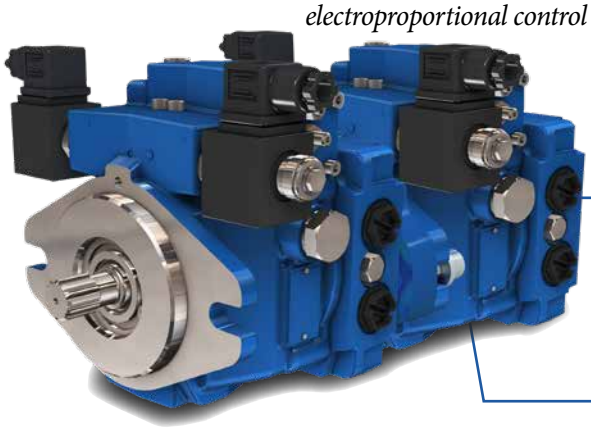
The PM10 with electro-proportional control is fit for radio-controlled applications between 15 and 40 kW (20 to 53 HP), such as:

- Trench compactors
- Tandem rollers
- Mowers
- Sprayers
- Carriers



With its universal solenoid electro-proportional control, the PM10 connects to any type of smart control system. It is available either with feedback (letter Q in the nomenclature) or without (letter P). The feedback provides optimal stability even on rough terrain, a feature that comes in handy on applications such as trench compactors and mowers.

PM10 in tandem with electroproportional control



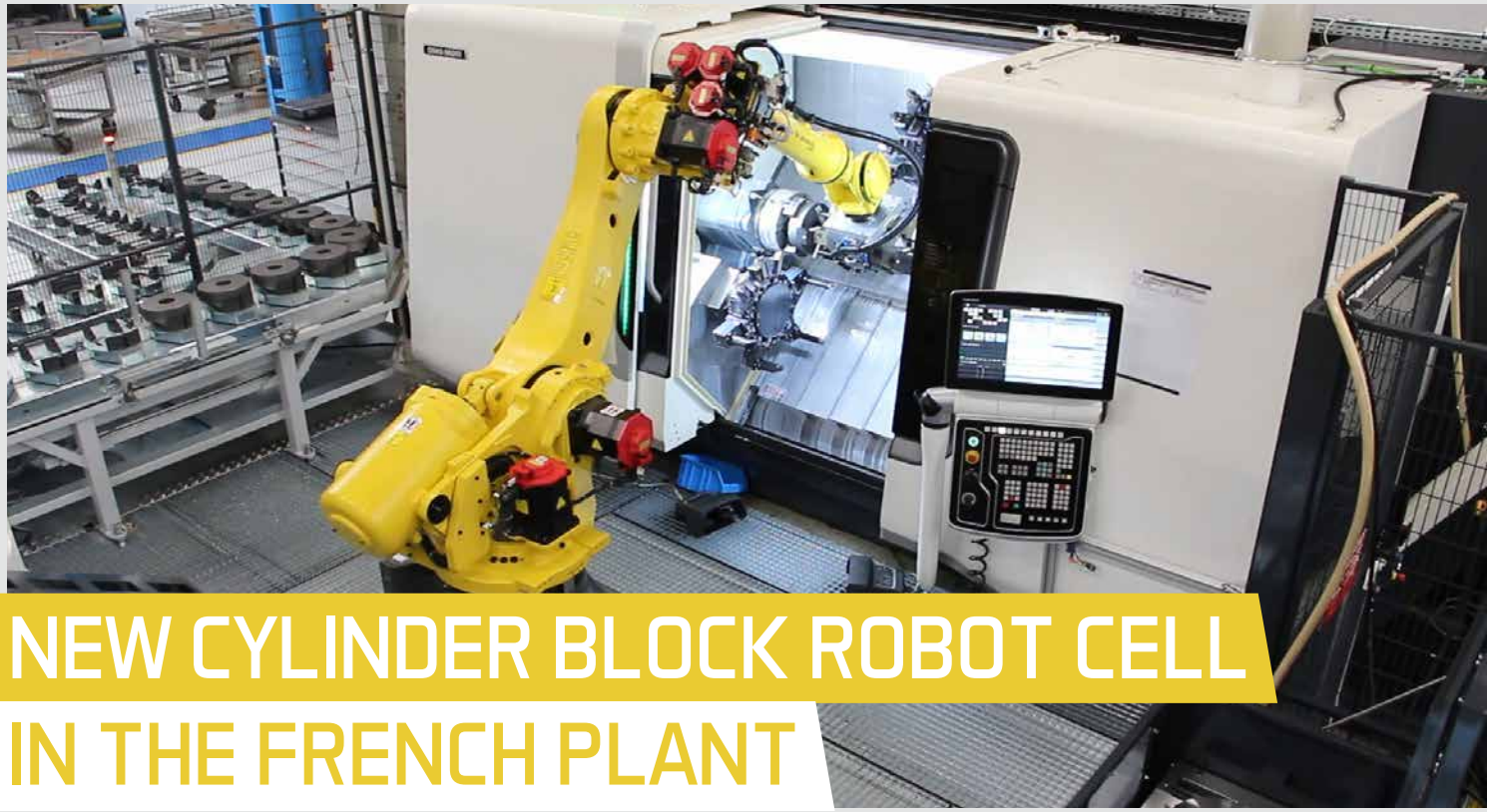
A WIDE ARRAY OF OPTIONS TO CHOOSE FROM

- Charge pump
- Flushing valve
- Anti-stall valve
- Pressure cut-off
- Safety valve
- Neutral position switch
- Filter on the charge pressure line, with and without a clogging indicator
- Mechanical or hydraulic inching
- Roller bearing
- Tandem mount for tracked vehicles and compactors.

PM 10 SPECIFICATIONS

- Closed loop circuit
- 7 to 21 cm^3/rev. (0.23 to 1.24 cu.in per rev)
- 210-350 bar (3,000-5,000 PSI) circuit pressure
- High-pressure relief valves included

For a high-performance system package, the PM10 can be paired with Poclain Hydraulics motors MK04, MS02 or MS05 and a gear pump for the attachment.

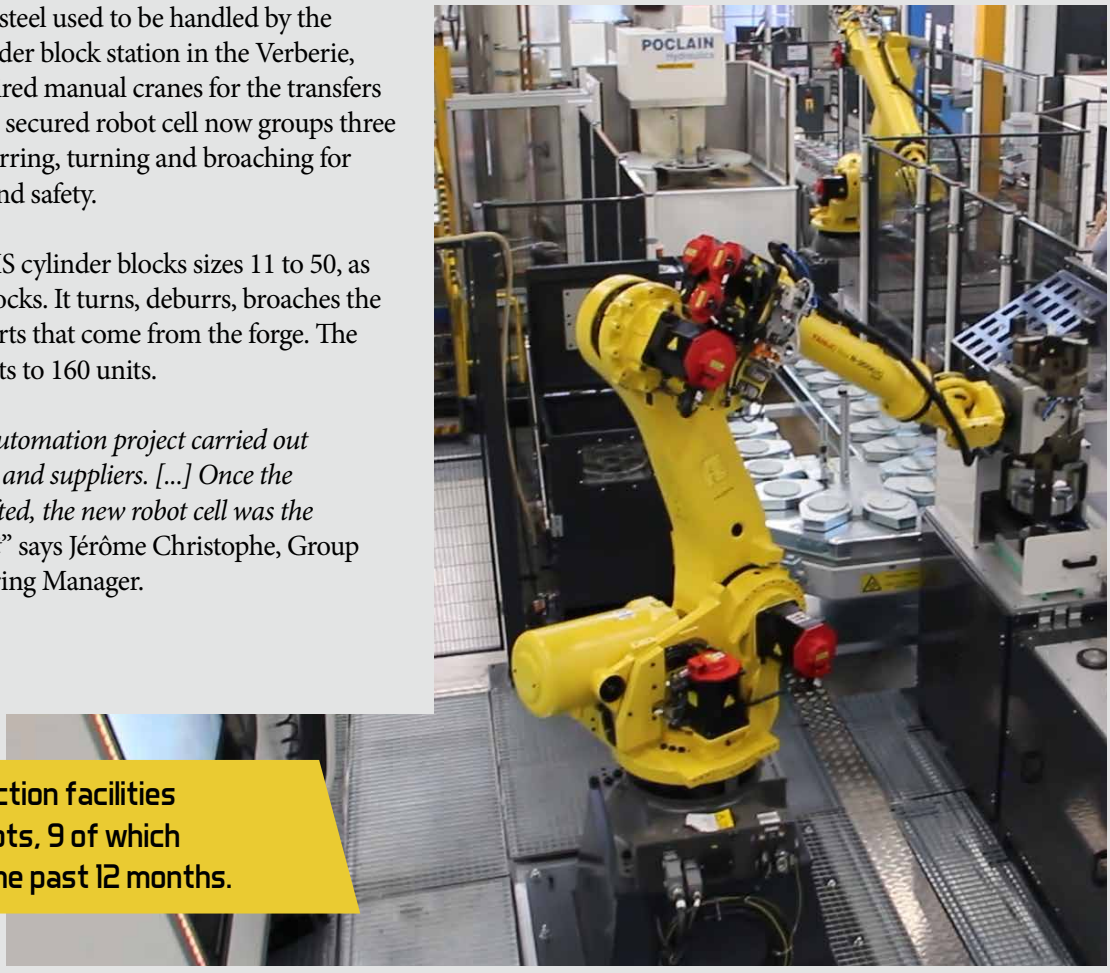


NEW CYLINDER BLOCK ROBOT CELL IN THE FRENCH PLANT

Forty kilos of slippery steel used to be handled by the operators at the cylinder block station in the Verberie, France, plant. They required manual cranes for the transfers between workstations. A secured robot cell now groups three operations, namely deburring, turning and broaching for enhanced productivity and safety.

The robot cell handles MS cylinder blocks sizes 11 to 50, as well as MHP cylinder blocks. It turns, deburrs, broaches the splines and cleans the parts that come from the forge. The daily throughput amounts to 160 units.

"*It is another successful automation project carried out by our engineering teams and suppliers. [...] Once the COVID lockdown was lifted, the new robot cell was the first fully operational unit*" says Jérôme Christophe, Group Manufacturing Engineering Manager.



The Poclain production facilities now group 40 robots, 9 of which were installed in the past 12 months.

ADDIDRIVE OPTIMIZES THE PRODUCTIVITY OF GEIGER'S FLEET

The family-run Geiger group of companies is based in Oberstdorf in the Allgäu region of Germany. Founded in 1923, it has developed into a versatile group with more than a dozen business areas. With 3,000 employees and 50 locations, it supplies, builds, renovates and disposes of waste for customers in the infrastructure, real estate and environmental sectors. The company owns a fleet of 130 trucks, 70 of which have integrated Poclain Hydraulics' AddiDrive. Andreas Weber, Geiger's Logistics Manager, talks to us about how the collaborators use AddiDrive and what they need on tomorrow's trucks.

Rigid 8x6H dump trucks

ADDIDRIVE ENHANCES GEIGER'S PRODUCTIVITY

Geiger adopted AddiDrive back in 2006 on its 4x2 tractors, powering the front axle with hydraulics. The hydraulic drive in the front axle beat the conventional all-wheel drive and the 6x4 tractor with semi-trailer: "*We went for Poclain Hydraulics' solution, branded HydroDrive on MAN and HAD on Mercedes-Benz trucks. Our operators use it 5 to 10% of the time: to enter and exit a construction site and travel on a steep grade. Compared to a mechanical all-wheel drive, each truck gives us an extra payload of around 750 kgs. This increases our productivity, as we make fewer trips to and from the construction site.*" says Andreas Weber, Logistics Manager at Geiger. "*Our operators also appreciate AddiDrive because the truck is easy to manoeuvre and position*". Besides, hydrostatics consume less fuel than a mechanical axle and reduce carbon emissions.

Last, the truck height is the same as a standard truck, given that the hydraulic components are compact and connected using flexible hoses. So driving is more comfortable, and the truck dimensions remain unchanged.

Trucks equipped with AddiDrive are a smart alternative to 4x2 and 4x4 mechanical trucks. AddiDrive provides the traction required to prevent getting stuck when the terrain is rough. This results in optimal productivity. Furthermore AddiDrive prevents slipping, so the tire milage is higher. The impact of AddiDrive on fuel consumption and payload is also minimal compared to a standard truck. Finally, with AddiDrive the total cost of ownership is lower than with both alternatives, standard and mechanical all-wheel drive truck.

ADDIDRIVE ON GEIGER SPECIALTY TRUCKS

Besides the articulated tippers, Geiger has equipped ten specialty trucks with AddiDrive. First, they feature it on rigid 6x4H truck-mounted cranes, which are used to transport equipment, material and containers.

They also use rigid 6x4H trucks paired with an additional two-axle trailer. This configuration enables the truck to transport 24 tons of payload. Two different materials can be transported simultaneously, which is an asset on small construction sites. Highly versatile, the trucks are also low on fuel consumption with an AddiDrive-powered axle at the front and a liftable axle at the rear. Additionally, thanks to the traction on the front axle, mobility is optimal.

Geiger also operates rigid 8x6H tippers in their gravel pits. When the truck goes up a steep grade, its length may cause the front axle to lift from the ground. With AddiDrive on the second axle, the truck has more traction and can climb up the slope effortlessly. Furthermore, the hydraulic axle reduces the turning radius, so the truck is more manoeuvrable.

Articulated tipper – 4x4H tractor and 3 axle semitrailer

Rigid 6x4H truck mounted-crane

ADDIDRIVE PAVES THE WAY TO BOLDER TRUCK DESIGNS

"*We're delighted with AddiDrive and our drivers are asking for it on trucks that don't feature it. We need 6x2 rigid trucks with a lift axle on the rear for a special application. Adding AddiDrive to the lift axle would give us more manoeuvrability and payload*", Andreas explains.

Today AddiDrive equips thousands of vocational trucks across Europe and the US. The OEMs offer AddiDrive on a wide range of truck configurations. Furthermore, as contractors look for new ways to reduce the cost of moving materials, opportunities arise for body builders to design special non-standard AddiDrive trucks that meet their niche requirements.

AddiDrive was launched in 2005 to help vocational truck drivers cover the last mile on rough terrain. Ideal on construction, earthmoving, forestry, utility and heavy haulage trucks, it has been adopted by leading truck OEMs such as MAN, Mercedes-Benz, Renault Trucks, Terberg Techniek for Volvo, Iveco, Paul Nutzfahrzeuge for DAF and TDS for major US OEMs.

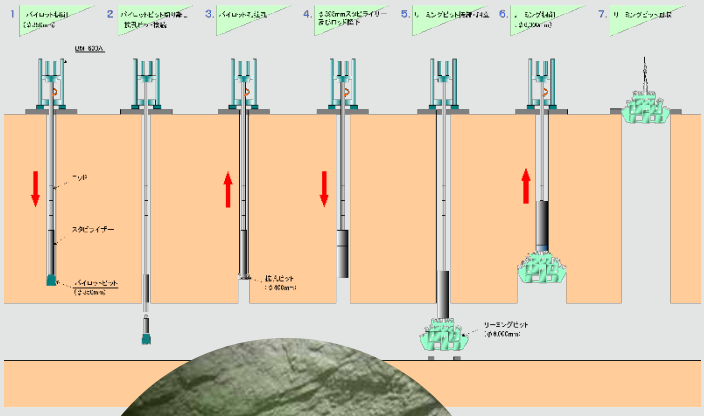
AddiDrive is a hydraulic hybrid transmission that transfers torque to a non-mechanically powered axle when needed. AddiDrive consists in a complete system with two hydraulic motors in the wheels, a pump, a valve and an electronic control unit.

POCLAIN HYDRAULICS' UNDERGROUND WORK IN JAPAN WITH KOKEN

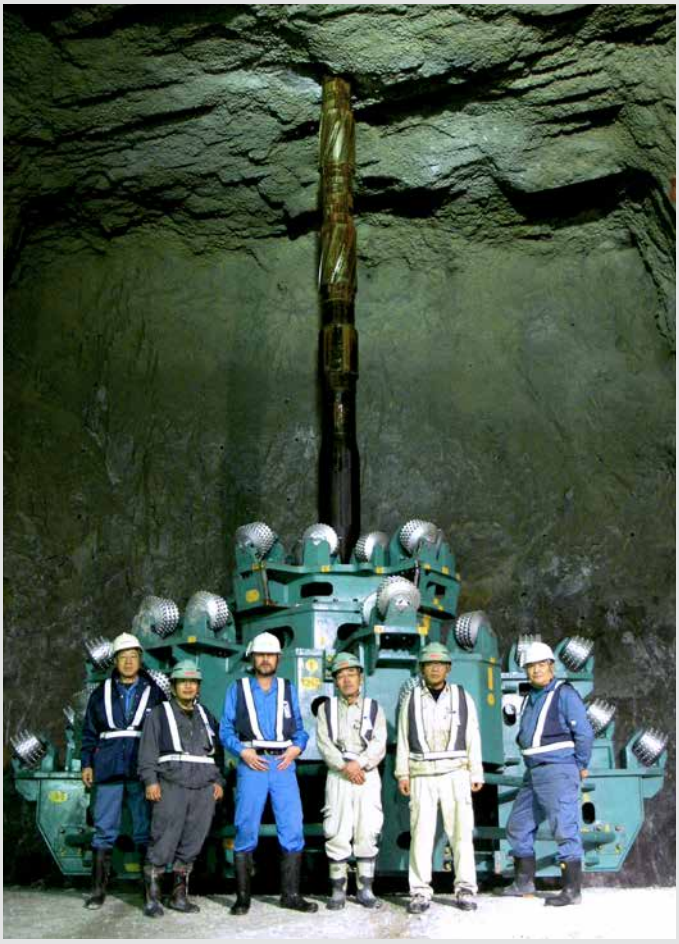
Founded in 1947 in Tokyo (Japan), KOKEN BORING MACHINE Co. Ltd operates in two complementary segments: manufacturing drilling machines and offering drilling services for underground development. Their rotary percussion drills are most popular and rank KOKEN number one in the Japanese market. They are widely used for disaster recovery due to earthquakes and heavy rains. A more niche application, KOKEN's BM raise rock borer series features Poclain Hydraulics motors.

KOKEN'S UNIQUE ROCK BORING MACHINE

KOKEN developed a special raise rock boring range, Big Man, which drills vertical holes through soft and hard rock. Big Man demonstrates outstanding power in all ground conditions and its unique dynamic performances enable it to bore large diameter holes. The machine combines the forces of a large reamer equipped with cutter tools and thrusting cylinders. It bores through the rock in two stages: first, the Big Man rig, which is installed above ground, bores a pilot hole down to the existing horizontal tunnel. Then the large diameter reamer is transferred underground and coupled to the shaft. It works from the bottom up, creating a hole as wide as the reamer.



The reamer is attached and bores upwards through the rock.



KOKEN RAISE ROCK BORERS SPORT MS MOTORS

At the start, KOKEN's raise boring range reached a maximum diameter of 2.5 meters, and powered the rotational force with a combination of a high-speed motor and a reduction gear. In 1995, the company saw an opportunity for extra-large diameters and came up with the 350 HP BM-500A, capable of boring holes five meters wide and 500 meters deep. The application required a power-dense hydraulic drive that was compact, efficient, and delivered high torque. They replaced the high-speed motor and gearbox assemblies by three Poclain Hydraulics direct drive units pairing one MS125 and one MS35 with the free-wheeling function. As the motors are two-speed, the machine provides five working speeds in clockwise rotation, and six anti-clockwise.

The success of the BM-500 A led KOKEN to design an even larger size, the BM-600A. As the MS assembly had proven its outstanding capabilities, they integrated the same solution into the larger machine.

As the Japanese government pursues its construction projects to mitigate natural disasters, KOKEN is building new production facilities to increase output. We look forward to working further together.

MS AND MI250 MOTORS EXCEL AT TUNNEL BORING

While COVID brings down airlines and hotels, the tunnel boring industry continues to thrive. Underground road, railway, pipeline, and water treatment projects are going strong, especially in China and Asia. Despite their relentless activity, tunnel boring machines are rarely visible and seem to belong to Star Wars movies more than to our above-ground landscape. Only a handful of us has ever seen one. Thierry Delage, Poclain Hydraulics Regional Market Business Manager and the company's expert in tunnel boring machines, is among them. Poclain Hydraulics' motors have been driving the machines for decades. We take a trip underground with him to find out how they work.

TBMs ARE TODAY'S PREFERRED BORING METHOD

Tunnel boring machines were invented in the 19th century as an alternative to the ineffective and often destructive drilling, blasting, and hand mining methods. Gaining power and sophistication over time, they have turned into mobile tunnel-making plants. They cause no disturbance to traffic and existing constructions, so they are ideal in urban areas. While the traditional methods may still apply to minor projects, TBMs enable faster work on the longer and more technically challenging tunnels. The holes they bore are smooth and safe, ready to transport resources and people.

A TBM INTEGRATES FOUR PRINCIPAL FUNCTIONS

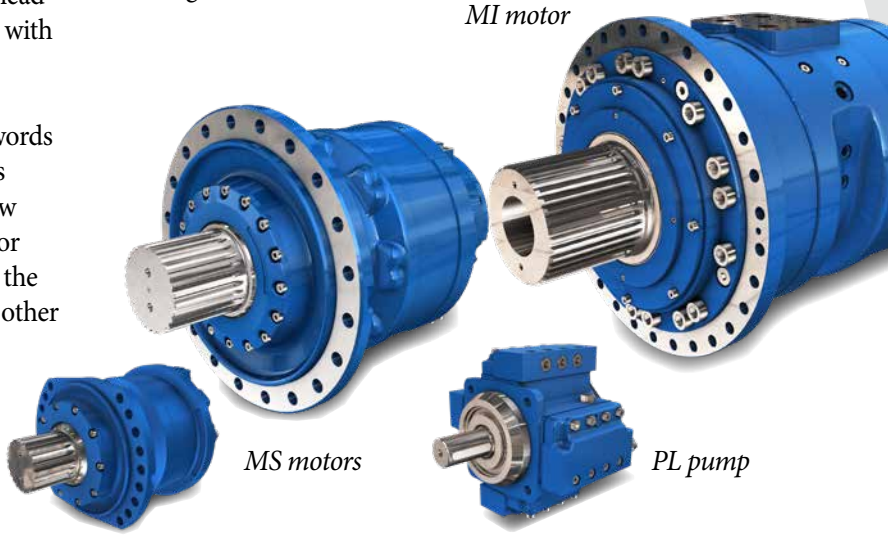
The first function is the rotating cutting wheel or cutterhead at the front of the tunnel boring machine. It is equipped with concentric cutters.

The second function consists in mucking out, in other words discharging the excavated material. There are three ways of mucking out: in a slurry mix (slurry TBM), via a screw conveyor (earth pressure balance TBM), and on conveyor belts in the case of harder rocks. The choice depends on the soil condition, the amount of groundwater present, and other factors.

The third function is the thrusting system that pushes the machine forward. It is carried out either by cylinders that push against the installed tunnel segments, or by jacks that push against the tunnel walls.

The fourth function is tunnel wall consolidation. For hard rock, the zones with friable material are consolidated with wire mesh and shotcrete. For soft ground, concrete segments are erected to cover the entire tunnel surface.

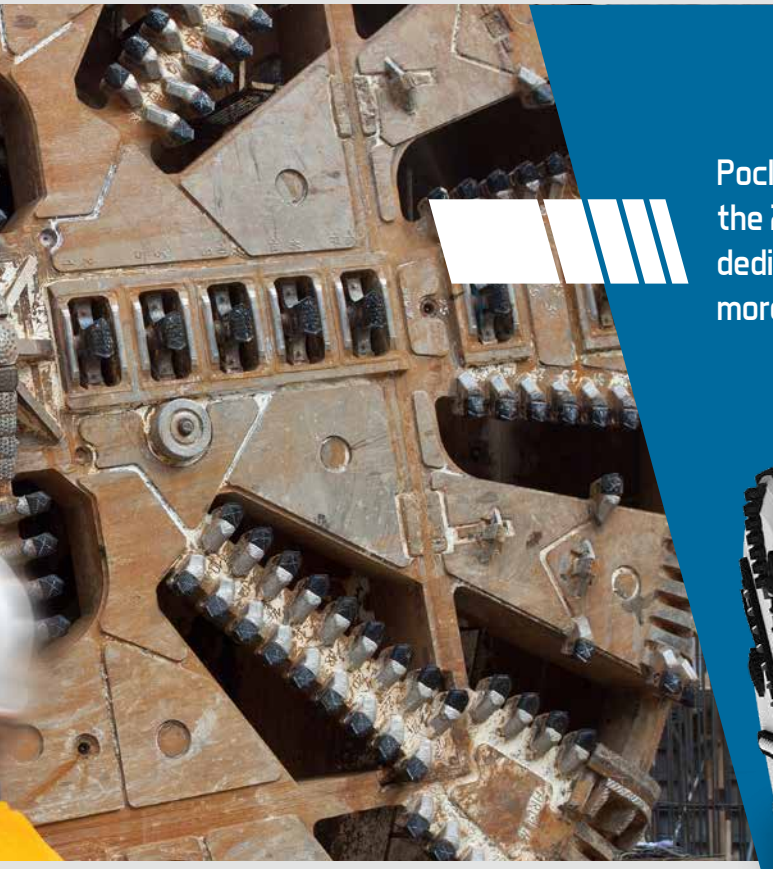
The back-up system at the rear of the TBM removes the material and transfers the precast segments for the tunnel lining. In some instances, a factory is set up above ground to build the concrete segments on-demand and recycle the discharged muck.



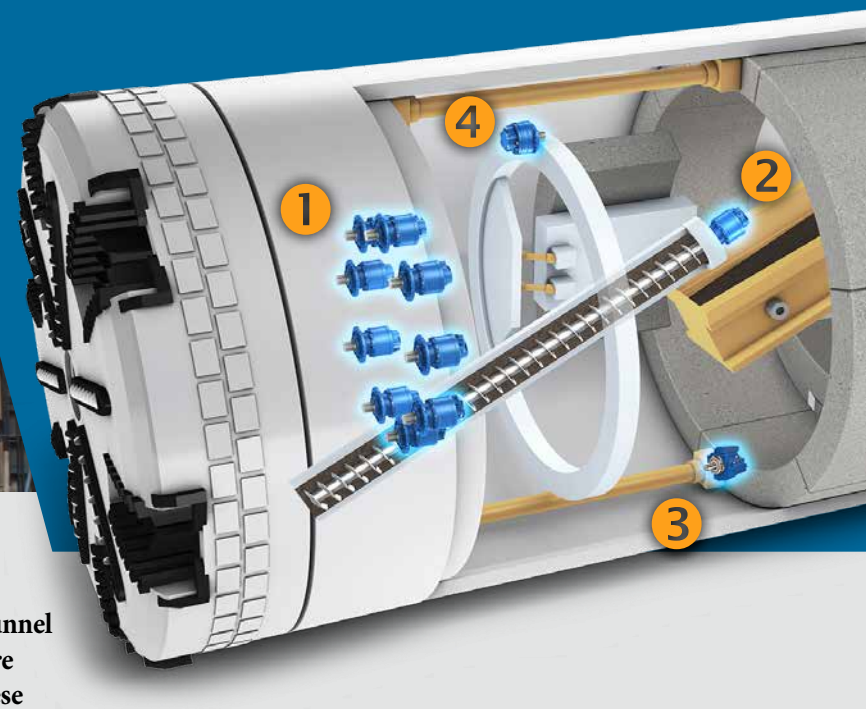
MI motor

MS motors

PL pump



Poclain Hydraulics is showcasing its TBM offering at the 2020 edition of Bauma Shanghai. On the R&D side, dedicated solutions are being developed to address the more advanced requirements of TBM manufacturers.



A POCLAIN HYDRAULICS COMPONENT FOR EACH TBM FUNCTION

Poclain Hydraulics have an extensive track record on tunnel boring machines in Europe, Asia, and the USA. They are the number one hydraulic motor supplier in the Japanese market.

❶ Cutterhead

- MS series, shaft output,
- MI series with hollow shaft,
- Multiple speed available,
- Reinforced bearing and sealing.

Features

Permanent synchronization of rotation and outstanding torque with the direct drive.
The most compact solution on the market. This is particularly relevant for the 0.5 to 5-meter diameter TBM segment.

❷ Screw conveyor/auger

- MS series, shaft output,
- Direct drive, installed at the end of the screw,
- Reinforced bearing and sealing.

Features

Compact envelope that enables screw conveyor set-up optimization.

❸ Thrust-cylinders

- PL pump,
- Heavy duty with radial pistons,
- Fixed displacement with two to six independent outlets providing the same flow.

Features

Optimal thrust cylinder synchronization,
Compact design.

❹ Erector

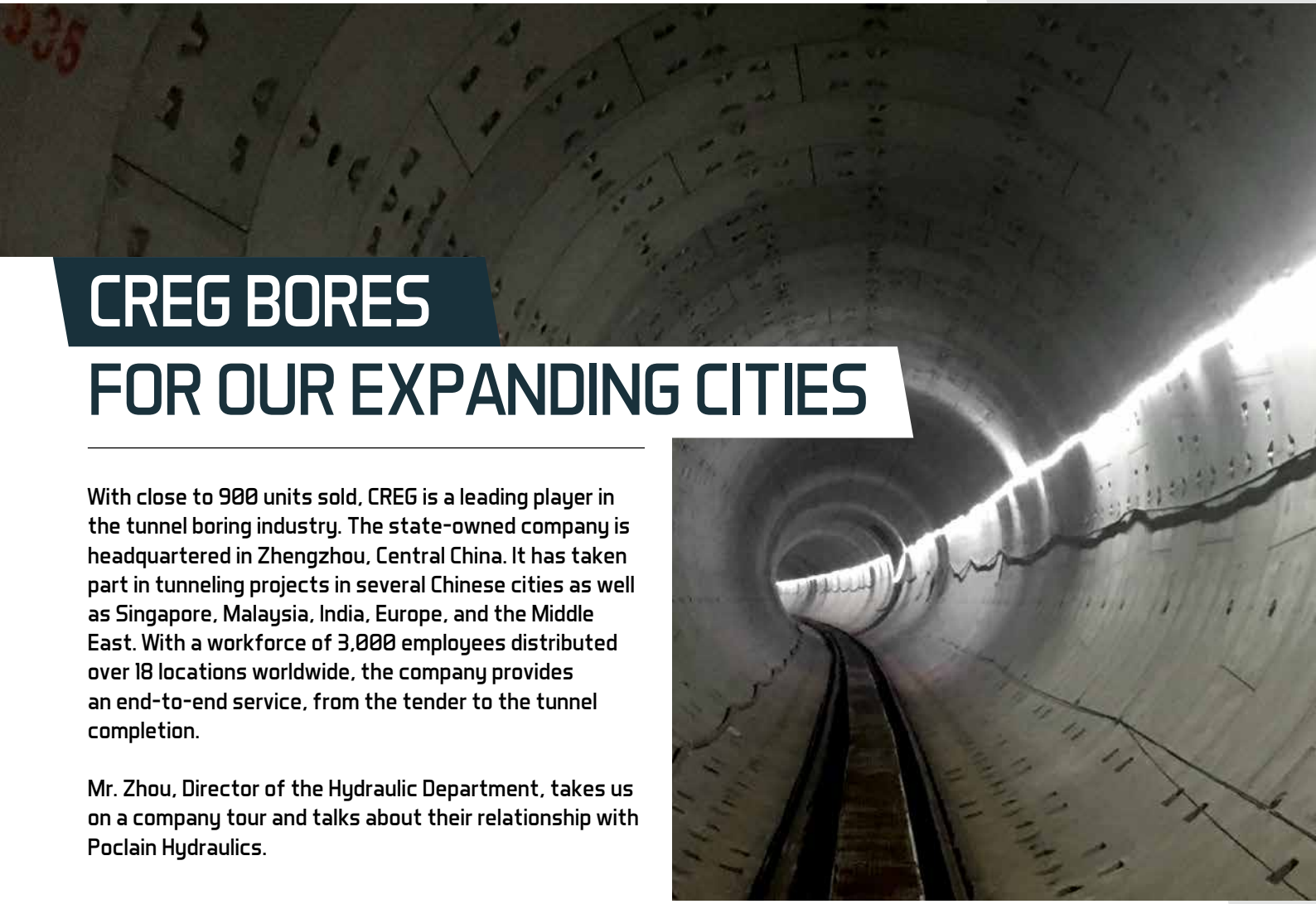
- MS series, shaft output,
- Parking brake and flanged counterbalance valve to secure the positioning of the segment.

Features

Integrated solution,
High starting torque,
High precision.

Auxiliary functions:

Slurry mixer, shotcrete positioner, roof reinforcement.



CREG BORES FOR OUR EXPANDING CITIES

With close to 900 units sold, CREG is a leading player in the tunnel boring industry. The state-owned company is headquartered in Zhengzhou, Central China. It has taken part in tunneling projects in several Chinese cities as well as Singapore, Malaysia, India, Europe, and the Middle East. With a workforce of 3,000 employees distributed over 18 locations worldwide, the company provides an end-to-end service, from the tender to the tunnel completion.

Mr. Zhou, Director of the Hydraulic Department, takes us on a company tour and talks about their relationship with Poclain Hydraulics.

CREG is a leading brand in tunnel boring. What is the key to your success?

Mr. Zhou: CREG's success stems from its strong engineering culture (the company employs 500 engineers) and on-going partnership with its strategic suppliers such as Siemens, Elin, Zollern, and Schneider Electric. These supply chain partnerships help maintain a high product quality level.
As far as servicing is concerned, CREG benefits from its mother company's network, the state-owned China Railway Engineering Corporation (CREC). They provide field service all around the world and a high production capacity that guarantees a quick turnaround time.

From the outside, a tunnel boring project seems hugely complex. How long does it take to come to fruition?

Mr. Zhou: As we have worked on many subway projects, we understand their requirements and have a standard solution. The project can move fast. On the other projects involving larger machines, mixed ground conditions, or severe water inflow, we create a custom design that combines several boring processes. Water management projects are the longest to come to fruition, and our longest took 12 years to come through.
Not only do the projects take time, but they also require specific training. A minority of clients choose to hire our crews, so we train their technicians and deliver a certificate to those who pass the test.

What is the lifetime of a tunnel boring machine? Which parts need replacing?

Mr. Zhou: The lifetime of a tunnel boring machine (TBM) is usually 10 km or 10,000 hours. At the end of a project, we remanufacture the TBM so that it is fit to go back underground. The cutter tools are the parts that wear the most, especially with hard rock. Sometimes they need to be replaced every hour. A TBM machine is worth several million dollars, but sometimes replacing the cutter tools can cost more than the machine price.

3.5 meter diameter TBM head with 4 x MS125

How are CREG TBMs integrating IoT?

Mr. Zhou: Our TBMs integrate sensors that enable our remote support centers to monitor the ground conditions, the progress of our TBMs, and the state of their components in real-time. We notify the technicians on-site as soon as a part needs replacing.

As cities grow denser with no room left to expand, tunnels and underground structures enable them to ease traffic, transport the residents, and create space for parking. Tunnel boring machines play a strategic role in our expanding underground world, and Poclain Hydraulics commits to pursuing their R&D work to offer system solutions that meet the extreme conditions of the application.

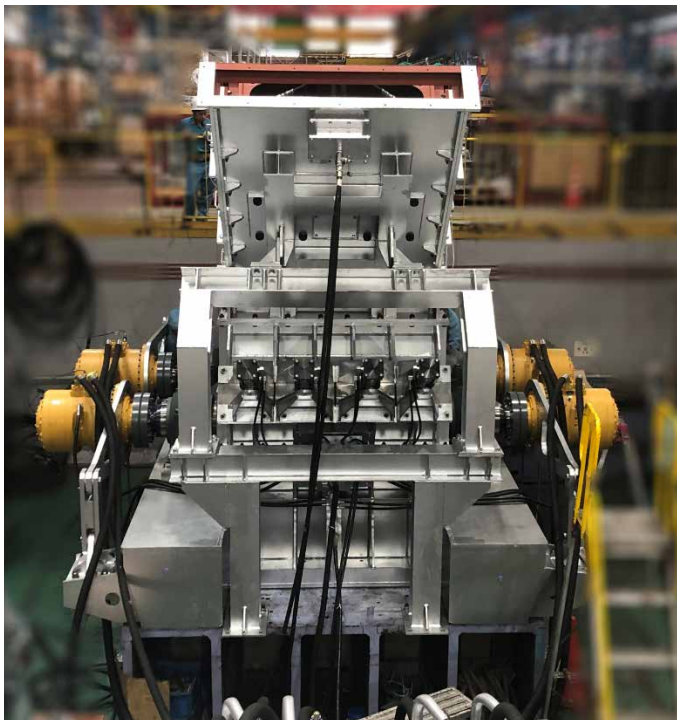
Some of your machines integrate Poclain Hydraulics' motors. What brought you to choose our technology?

Mr. Zhou: We use your MS motors on a wide range of TBM functions: sizes 02 to 35 power our conveyors, shotcrete arms, augers, and concrete segment erectors. We also use MS50s on our slurry mixers and MS125s on our cutter heads. There are MS50 motors powering the mixer on an award-winning slurry TBM that we delivered two years ago. With its 15.8 meter diameter, it's one of the largest models ever made in China.
We appreciate the compact envelope of the Poclain Hydraulics motors; it's a requirement on the small TBM models. And we value the Chinese team's outstanding responsiveness, anytime we need their assistance on the field.

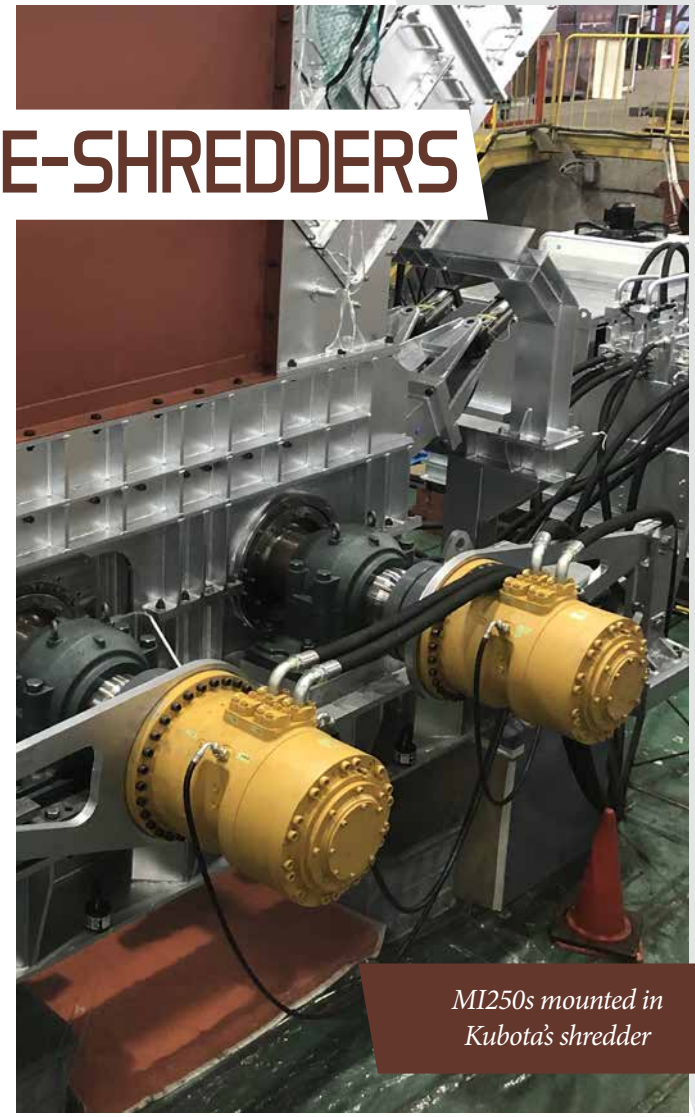
XXL MI250s POWER KUBOTA'S PRE-SHREDDERS

Established in 1976, Kubota Environmental Services Co. Ltd addresses the market for waste recycling and water treatment. They can provide an end-to-end offering encompassing plant construction and maintenance. Headquartered in Tokyo, they have a factory in Yao, Osaka, and operate more than 20 locations throughout Japan. They employ more than 1,800 people, and their sales turnover exceeds 657 million USD.

Horizontal and vertical shredders are Kubota Environment's primary business. The vertical models shred small, mainly metal components at high speed. Their horizontal single and twin shaft models are used for more pliable non-metal material. On the top of their range are the extra-large pre-shredders and shredders that process cars, fridges, and large metal structures at low speed. A total of 30 units are manufactured every year, combining electric and hydraulic drives. Kubota Environmental's success stems from their attachment to outstanding after-sales service, which has triggered repeat business from several customers.



Kubota started working with Poclain Hydraulics in 2019 on a 2 x twin-shaft hydraulic pre-shredder dedicated to nuclear accident waste. Poclain Hydraulics' solution consisted of six 30-liter MI250 motors. It outperformed the competition in terms of quality, pricing, and lead-times. The compact size



MI250s mounted in Kubota's shredder

of the MI250 enabled Kubota to mount two motors on the same side of the machine and simplify assembly, as the hoses were bundled together. In terms of behavior, the MI250 accelerates smoothly and can withstand the pressure peaks generated by the material's varying degrees of hardness. Responsive aftersales services are also critical in the waste shredding industry, as the machines often work 24/7, and repairs must be swift. For the first delivery, Kubota needed Poclain Hydraulics to overhaul two MI250 in a short timeframe. The motors were sent to the Yokohama certified repair center and serviced within the required deadline.

Kubota is delighted with the performance and the services of Poclain Hydraulics and is currently producing its third shredder powered by MI250 and MS125 motors.

The collaboration between Kubota and Poclain Hydraulics is likely to grow. They expect their supplier to help them access new markets, with more powerful shredders powered by larger motors than the existing MI250.

VERVAET SPARES TOP SOIL AND CROPS WITH POCLAIN HYDRAULICS TRANSMISSION

Vervaet, like Poclain Hydraulics, is a family business with deep roots in agriculture - starting with beet harvesters and moving to design their flagship machine, the Hydro Trike in 1989. The machine conception came about as governments pushed farming toward slurry injection as a way to reduce environmental issues related to ammonia emissions. Poclain Hydraulics recently worked with Vervaet to supply wheel motors on the unique five-wheeled self-propelled liquid slurry processor.

The Hydro Trike is a self-propelled slurry applicator with 530 HP and a 16 to 20m^3 slurry tank. Vervaet is a market leader in the Netherlands, France, Italy, as well as many other countries. They are best known for the simplicity of their machines, high reliability and ability to maintain their value.

The clever overall design of the Hydro Trike sets it apart from competitors. The machine's maneuverability and high capacity allow it to spread nutrients evenly and efficiently. Another differentiator for Vervaet is their strong focus on service, as productivity is paramount to agricultural contractors who have no time to lose when it comes to maintenance or repairs.

Most recently, Vervaet integrated Poclain Hydraulics MSE05 motors onto the left and right middle axle of the five-wheel driven Hydro Trike. Trends toward precision farming push farmers toward more efficient solutions that cause less damage to soil. Vervaet identified that it would be possible to increase traction, maintain more even ground pressure, and minimize ground friction by adding drive motors to the middle axle. This helps to minimize ground damage on loose soil, growing crops or grassland.

"*In the past the middle axle was not driven, and to tow the middle axle was very hard, now it is self-driven, and that works very nice!*" says Daan Van de Velde, Marketing Manager at Vervaet.

Vervaet chose the MSE05 for its compact, high-power design as its dimensions fit perfectly into the Hydro Trike's envelope. Currently, the first MSE05s are being inspected after 1,200 hours and have proven to be perfect hydraulically. With better control on hilly terrain, the five-wheel drive version will be available in 2021.

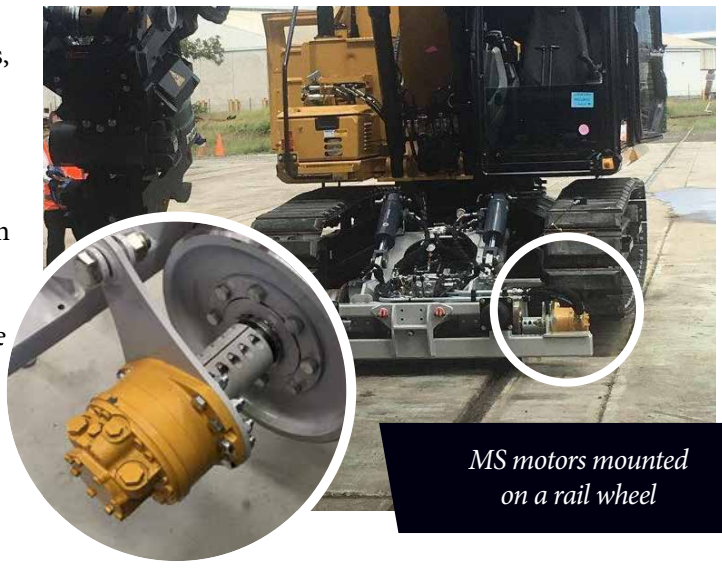
STRONG TIES WITH DISTRIBUTORS DRIVE SALES DOWNUNDER

A land of plenty, Australia ranks number one in resources for gold, lead, uranium, zinc, nickel, lead, and zircon. Second behind Switzerland in terms of median wealth per adult, it boasts a healthy GDP growth. It is also a land of vast expanses that challenges the most determined salesperson, as OEMs are dispersed and small to mid-sized. To address the mining, fishing, and agricultural OEMs, Poclain Hydraulics chose to rely on distributors rather than open a subsidiary. We speak to the company's distributors, AT Hydraulics, Pacific Hydraulics and Hyspecs, who carry the brand.

A.T. HYDRAULICS

With branches in Sydney, Perth, and South of Brisbane, A.T. Hydraulics are a fluid power specialist that sells and services components, as well as complete systems. Their competitive edge stems from their collaborators who have been in the organization for most of their careers. Their depth of knowledge enables them to assess new applications and challenges in the field rapidly. They are well-known for supplying hydraulics to mining OEMs, waste management companies, on-rail machinery OEMs, theme parks, and film studios.

A.T. Hydraulics is Poclain Hydraulics' oldest distributor in Australia, as well as their certified repair center. They have an in-depth knowledge of their technology, so they commission the transmissions themselves, enabling them to secure the project in terms of time-to-market. Robert Mack, Sales Manager A.T. Hydraulics - Brisbane, has been working with the Poclain Hydraulics products since 1996. "*A.T. Hydraulics have found the Poclain hydraulics' products are very reliable and competitive. Poclain Hydraulics' recent additions of the high-flow valving feature and dynamic brakes for the MS series motors are a real game-changer, no one can compete in the closed loop radial piston motor market.*" As for the application team, "*earlier this year, Poclain Hydraulics with A.T. Hydraulics presented a proposal to a new OEM prospect. The customer acknowledged that his company had never received this level of technical assistance from our competitors and is confident to go forward with the Poclain Hydraulics' product*".



MS motors mounted on a rail wheel

PACIFIC HYDRAULICS

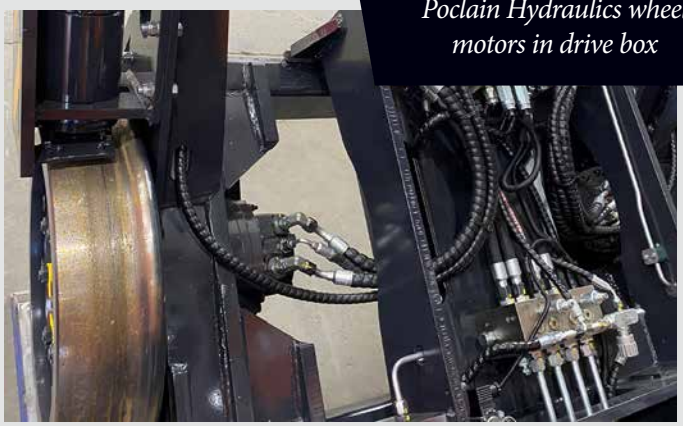
Pacific Hydraulics is a recent addition to Poclain Hydraulics' distributor network. With five branches across Australia, they excel in hydraulic transmissions for mobile machinery: transit mixers, garbage compactors, cranes, vacuum trucks, and forestry equipment.

Poclain Hydraulics' unique motor features, such as their high radial load and freewheeling capabilities, enable them to access new markets. As they are only starting to investigate new accounts, most of their activity is in aftersales. "*Winch, dredge, and wheel loader drives are applications that we can target with the Poclain Hydraulics range. We're excited about the potential, and we know it's an excellent product, so we are working at building the business up. We're looking forward to becoming an important partner for Poclain Hydraulics*." says Andrew Parkin, CEO of Pacific Hydraulics.

Poclain Hydraulics' Australian distributors have significant first mount opportunities with one major challenge: quantities are diluted across a vast territory. They can rely on Poclain Hydraulics' sales and applications support to provide the technical solution and the dedication that will convert future accounts.

HYSPECS

When Hyspecs, a historical distributor of Poclain Hydraulics' in New Zealand, opened a branch in Melbourne in 2010, they asked to represent the brand. "*We have been using their products for forty-odd years; we have always used them and always will – they are one of our key products. Our customers in mobile applications like that they can get a high-power solution in a relatively small package*", says Cam Riddle, Branch Manager in Melbourne. Hyspecs has sold the motors on on-rail excavators, high-powered winches, and forestry equipment. They also carry other hydraulic brands and electronic controls and offer training, design, and servicing.



Poclain Hydraulics wheel motors in drive box

ABOUT TEMPERATURE AND THE EXCHANGE VALVE

Just like blood in a human body, hydraulic fluid is the indicator of a healthy hydraulic circuit. Healthy oil ensures that the moving parts are well lubricated and protected against excessive friction. Let the circuit overheat, and the oil becomes too thin, the metal parts start rubbing and generating shavings. The entire system rapidly breaks down. So oil temperature is critical in a Poclain Hydraulics transmission. Yvan le Bougeant, Poclain Hydraulics' training center Manager and his team share their knowledge on circuit temperature and the exchange or hot oil shuttle valve, which guarantees a healthy circuit temperature.

HEAT BUILD-UP IS A NATURAL BY-PRODUCT OF A CLOSED-LOOP CIRCUIT

Closed-loop circuits are ideal for mobile transmissions. They allow for smaller components, a pre-requisite to fit inside a vehicle. A small amount of oil – 10 liters at the most - circulates within the circuit. So heat build-up is a natural by-product of a closed-loop circuit, and it averages 25 to 30% of the engine horsepower.
On a Poclain Hydraulics closed-loop circuit, the recommended oil temperature is 50 to 80°C (120 to 175°F).

SEVERAL FACTORS IMPACT OIL TEMPERATURE

The closed-loop configuration implies that every part in and around the system impacts the oil temperature.

1. The size of the hoses
Undersized hoses make oil travel faster and generate heat.

2. The size of the components
The size of the transmission components impacts the oil temperature. Undersized motors and pumps are subject to a higher pressure and generate more heat.

3. The auxiliary circuit(s)
If the vehicle integrates auxiliary functions that feed off the same tank, they will also impact the oil temperature.

4. The climate
The climate impacts the oil temperature. Poclain Hydraulics transmissions are designed to operate in any climate: the components on a tree harvester are the same, whether they operate in a forest in Sweden or Brazil. However, the oil type will change. In a mild climate, HV46 is recommended, HV32 for cold temperatures and HV68 or HV100 for hot temperatures.

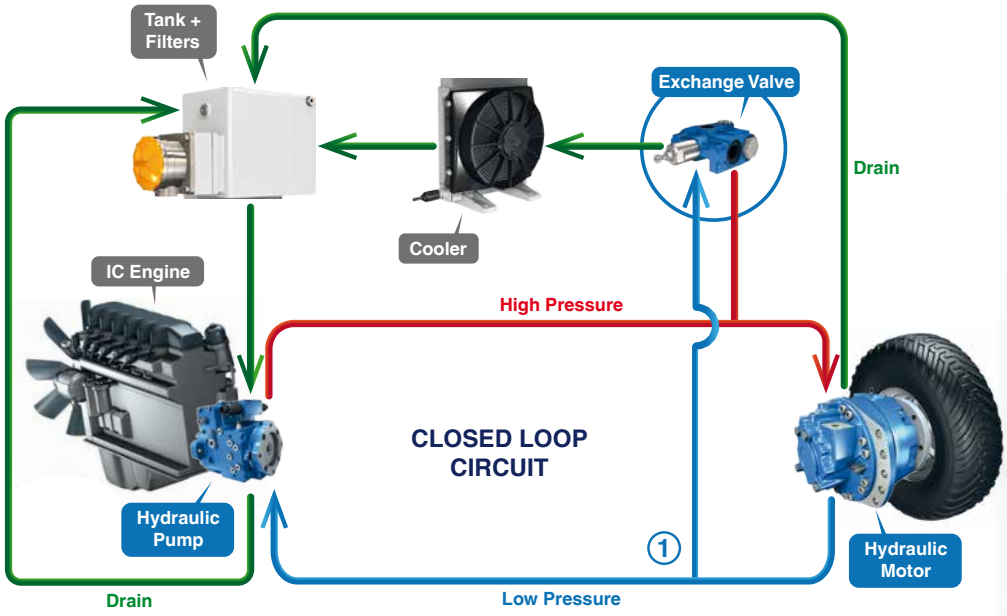
HOW THE EXCHANGE (HOT OIL SHUTTLE) VALVE WORKS

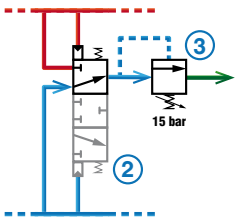
The impact of the exchange valve was measured on a Poclain Hydraulics prototype vineyard tractor. The oil temperature reached 140°C (285°F) without the exchange, and peaked at 80°C (175°F) with the exchange.
The exchange valve's role is to bleed hot oil from the low pressure side ① for cooling, filtering or to provide oil for pump or motor case flushing.

The Poclain Hydraulics guidelines set the ratio of diverted oil at 10 to 15% of the main pump displacement.
An exchange valve consists of a low-pressure selector ② that automatically connects the valve to the low-pressure line. The oil goes through the selector and into the exchange relief valve ③. It then exits the valve and goes to the cooler and the tank.
Once the extracted oil reaches the tank, it is sent to the charge pump that reinjects the oil into the closed loop.

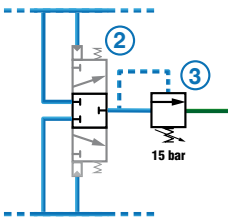
The exchange valve functions both in forward and reverse: in reverse, the high and low-pressure lines switch over. The selector valve shifts up, this time letting in the oil from the upper line. When the circuit is idle, no oil enters the exchange valve.

To secure the flow transiting through the exchange valve at 10 to 15%, the pressure settings of the exchange and the charge relief valves are adjusted. The wider the gap between the two pressure settings, the higher the flow transiting through the exchange valve. If both valves are set at 20 bar, no oil goes through the exchange valve.

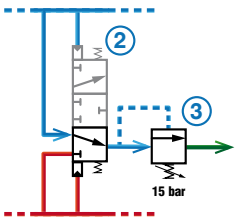




Forward position



Neutral position



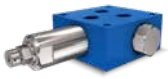
Reverse position

VE10

- 10 l/min
- 450 bar

VE30

- 30 l/min
- 500 bar



VE60 HP

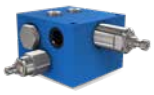
- 60 l/min
- 500 bar

Pipeded version

Flanged version

VES60

- 60 l/min
- 450 bar



With pressure relief valve

THE BEST PLACE FOR THE EXCHANGE VALVE

The goal is to limit the pressure drop between the exchange valve and the charge relief valve housed in the pump. So the ideal location is close to or inside the pump. On compact machines such as skid steers, the pump and motor are close, and the exchange valve can also be housed inside the motor.

As the closed-loop diagram shows, there are three hoses connecting to the exchange valve. Integrating it to the pump or motor, depending on the circuit layout, is preferred to having it standalone to simplify hosing and coupling.

NOT ALL APPLICATIONS NEED AN EXCHANGE VALVE

A few applications, such as walk-behind compactors, work at low speed and generate little heat. To determine the need for an exchange valve, a Poclain Hydraulics field technician carries out a circuit temperature assessment during the application commissioning.

THE EXCHANGE FUNCTION IS AVAILABLE IN SEVERAL SIZES

The higher the main pump displacement, the higher the volume of oil that must transit through the exchange valve. Poclain Hydraulics offers three sizes: the VE10, 30 and 60, respectively enabling a flow of 10, 30 and 60 liters per minute.

If you want to learn out more about the exchange valve and hydrostatic transmissions in general, send a training request to Yvan's team: yvan.lebougeant@poclain.com.

A ROMANIAN IN PONDICHERRY

When Marian Denitiu left Romania for France, he was 23, had an engineering degree and a few French words in his bags. He continued his studies and began his career at the Atomic Energy Commission, perfecting his French along the way. He joined Poclain Hydraulics in 2011 and was mentored by his manager, learning the skills of serial product management. In 2018 he was made a once-in-a-lifetime offer: put his training into practice with the creation of the design office in the Indian plant, located at Pondicherry, on the East coast. The experience was challenging for more than one reason: Marian had to adapt to the Indian culture, hone his management skills, and leave his wife in France.

BRINGING PONDICHERRY TO DESIGN AUTONOMY

Pondicherry is a strategic plant for Poclain Hydraulics: it manufactures around 100,000 sizes 02, 03, 05 and 08 MS motors, as well as MG02 motors. They are shipped worldwide to power high volume applications, such as forklift trucks, small rollers, and lawnmowers. Marian's objective in setting up a local design team was to help increase the autonomy of the Indian facility. Its activity generates requests and issues that need to be addressed on-the-fly: the purchasing department needs technical support; the shop floor needs codes to build new motors; OEMs need interface drawings and 3D models; quality issues need to be solved. All these requests are sent to the French head office, and the teams can't always respond fast enough.

In September of 2018, Marian set off to Pondicherry and worked on building the design department from the ground up. Starting with two engineers, he grew the team to five people and trained them to become an autonomous design team. The two Indian engineers who were already on site were sent to France for complimentary training for a year.

WORKING WITH INDIANS

As Marian manages his team, he adapts to the context of every day work with his collaborators. He also advises on how to communicate with their western counterparts.

Time is also a whole different concept: although the Indians aren't sticklers for punctuality, they insist on getting what they want right away. Regarding training, the engineers expected Marian to jump straight to the advanced level of motor design, skimming through the fundamentals. Marian had to pace their learning curve and progress step-by-step to ensure their new skills were firmly rooted.

The upside of the Indian spontaneity is their out-of-the-box approach. They are less hampered by rules than the old European continent, and they find creative solutions to their problems. The challenge is to find a middle ground, which respects the corporate guidelines while leaving room for light local adaptation.

Marian also learnt a universal truth about management: human beats professional. Before he left for Pondicherry, he was warned that turnover averaged 30% in India.
So he strived to praise the achievements of his team and create a stable working environment. In return, his engineers developed a deep trust in him and are still here today,

The Poclain Hydraulics plant in Pondicherry

working long hours when there is an emergency. They can currently support other design offices for small R&D projects, while he supervises remotely now that he is back in his French office.

Marian brings home vivid memories of the stifling heat, the pungent spices and the bustling traffic. He is also fully trained to take on his next challenge, becoming serial motor manager. His move to Pondicherry was a success, as the team has gained the expertise and maturity which will allow them to work independently in the future. It has also enabled Marian to see Poclain Hydraulics' processes through a subsidiary's eyes and build a strong bond with one of the most dynamic facilities in the group.

GLOBAL COMPANY LOCAL SUPPORT

POCLAIN HYDRAULICS IN THE WORLD:

- 8 PLANTS ON 3 CONTINENTS
- 24 SALES SUBSIDIAIRIES
- 200 DISTRIBUTORS
- 47 CERTIFIED REPAIR CENTERS

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