

POCLAIN MAG

#13

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**NEW GENERATION
ROBOTS**
enter the shop floor

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ELECTRO-HYDRAULICS
for optimal e-vehicle
performance

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EDITORIAL



JOERG BOWE
AREA SALES MANAGER CENTRAL EUROPE

**“ At POCLAIN we see
the concurrent
constraints of emission
regulation, power
density, and agility
as a whole.
”**

Dear valued customers, partners and friends,

It is bewildering to see how fast time flies. Especially in the last three years, as the construction equipment industry ventures into new horizons and integrates new technologies, triggering strong movements in strategic domains.

The first one is the drivetrain, not just because of the ongoing demand for lower emissions, but also because OEMs are looking into battery-driven systems and continue to downsize. The drivetrain is directly related to the second topic, techno-enabled comfort and guidance for the end user.

Family-owned, innovative and agile, Poclain Hydraulics is committed to developing, together with our customers, systems for tomorrow's requirements. For example, the new MHP motor series, with its benchmark technology in terms of controllability and efficiency, enables our customers to stay within the emission regulations and provide the same, if not more output power. For smaller machines like yard loaders, we have developed higher efficiency motors to enable our customers to downsize the combustion engine below the 19 kW mark, while delivering the same performance. A double-digit market share gain is a sign that we have listened to the OEMs and provide the best solution on the market. A third example is our new radial-piston motors with high flow covers, which are used on yard loaders, tool carriers, skid steer loaders, rail applications, and milling attachments, thus reducing the internal pressure drop. Our customers can, in turn, reduce the combustion engine rpm, level of emissions and fuel consumption. By combining the high-flow cover motors with our ECU-controlled power regulation, we have reduced emissions by a double-digit percentage on specific applications.

At Poclain Hydraulics we see the concurrent constraints of emission regulation, power density, and agility as a whole. The crucial point is that we move forward while maintaining or even increasing the performance and agility of our hydraulic systems.

The third major transformation is the Internet of Things, which improves the controllability of the complete machine. Because of the benefits that IoT provides to our customers, we have identified this a major development focus and are using the data collected in the field to understand application usage and needs better, as well as deliver value-add to the OEM.

The market is moving fast and we at Poclain Hydraulics focus on providing and supporting your developments from the first idea to full implementation. I look forward to seeing you at BAUMA, catching up with your news and sharing more inspiring ideas.



POCLAIN HYDRAULICS expands in Yorkville and Verberie

For a few months now, over 200 collaborators have been working in [the new Innovation Center at the Verberie Head Office.](#)

Gone are the days of working in silos and experts hiding in their ivory tower. Design, marketing, system engineering and testing engineers now share the same building, the Innovation Center.

Poclain is reinventing its organization to foster collective thinking and cross functional project management. Team members with different insights are able to collaborate and come up with creative ideas, as well as develop new cooperative processes. The new building fosters a more entrepreneurial and agile culture, which will impact the rest of the group.

The new office layout was designed to improve morale and well-being, as well as provide the fabric for collaborative work and design

thinking, making new concepts emerge. The new building also breeds a start-up culture, along with fostering the skills and practices found in this type of culture. In this fertile environment new markets are addressed, projects move faster, and ideas become successful solutions.

Poclain Hydraulics USA expands and optimizes its facilities

The expansion at the Poclain Hydraulics Yorkville, WI USA location has progressed a great deal over the last few months, despite the harsh winter weather that has hit South Eastern Wisconsin this year. Poclain undertook the growth of the plant with the goals of better serving local customers, focusing on expanding capabilities to produce



and service a wider range of products for the region's customers.

The production expansion and modernization is well under way. Last year, Yorkville realized a number of modernizations including the integration of a new robotic line in our current production facility. 2018 also saw the progression of the building framework and roof installation. This year, in January, the concrete floor was poured and interior walls and structures were put into place. February saw the delivery of the first wave of machinery, which is currently being installed.

Poclair Hydraulics' Yorkville facility has undertaken the initiative to redesign their offices alongside the production expansion. Strategically planned, the office redesign kept the needs of the internal teams and

customers in mind when designing the layout and organization to optimize workflows.

Customer facing teams are located together in order to facilitate collaboration and streamline support. Likewise, operations and logistic focused teams are situated with easy access to production to increase agility and response time.

Ergonomics and the human factor also came into play in the planning for the office redesign. Cube walls are lower to allow natural light to flow throughout the building, thus facilitating a more productive and positive workspace. The modern design was also chosen with a similar look and feel to sister locations, promoting a sense of unity and connection with our global sites.



Aerial view of the Verberie Innovation Center



Concrete pouring at PH Inc



NEW GENERATION ROBOTS enter the shop floor

Autonomous driving, e-vehicles, IoT, Industry 4.0 - these concepts are all around us at the Bauma fair and in customer meetings. They're also redefining the shop floor at Poclain Hydraulics, as the group evolves towards intelligently networked value chains. New generation robots are making headway on the shop floor and will enable workflows to be more agile.

Training goes hand-in-hand with new gen robots

From the operator to the plant manager, there are several prerequisites for a person working on a smart shop floor. Besides autonomy and flexibility, the ideal candidate also needs efficient problem solving and leadership skills. These qualities enable the team members to harness the full potential of the machines, as well as adapt their organization on-the-fly. Operators can change workstations or even switch from single-tasking to carrying out several sequential tasks on the line. At Poclain Hydraulics this complex, ever-evolving skill set is acquired on the shop floor. The Group fosters benchmarking between facilities with the support of technical champions, who share best practices and create standards. For

instance, the Brno, Czech Republic team has found ways to improve the cam machining process, and the improvements are being implemented group-wide.

100 robots by 2025

Poclain Hydraulics will more than double the number of robots in operation by 2025. In so doing, the Group's number of robots per 10,000 employees will exceed 300 and be on par with Japanese companies. The introduction of new robots will allow Poclain Hydraulics to advance in a series of domains. Quality improvements come first. As the components on the production line are highly customized, the operator faces the challenge of adjusting his control checkpoints with each part number. Automated controls will facilitate

and complement the manual checks. Second, the robot cameras and sensors will assist in handling the components appropriately and correcting errors on-the-fly. Third, robots will augment stability in production, especially in areas where there is a workforce shortage. Last, mobile robots transferring parts between cells will enable one-piece flow, better stock management and smaller production batches. Overall, introducing new generation robots will make our manufacturing processes leaner and increase our agility.

4.0 robots

The robot technology available at the beginning of the decade made it possible to carry out repetitive tasks for high product quantities. They worked in designated areas and didn't interfere with the operator to avoid injuries. Today's 4.0 generation integrates machine learning and Human-Robot Collaboration. Poclain Hydraulics' new robots will interact with the operators, performing tasks such as pick and place: using cameras the robot adjusts its mechanical fingers to pick a part laid out on a workstation. It inserts it into the machine, while the operator standing

next to it carries out more complex tasks. The Gaggio, Italy plant already uses a pick-and-place robot at a machining station.

With regard to machine learning, the robots will be able to diagnose internal vibrations or overheating and alert the operator to a potential breakdown. It will carry out preventive maintenance and thus avoid shutting down the production line.

Automation is happening group-wide

Robots are already operational in Marnaz, France, which has many automated lines for piston machining. In Yorkville, USA, robots are working on brand-new lines, while in the Žiri, Slovenia plant, automation has been introduced on several units. The Verberie plant will shortly integrate automated guided vehicles to transfer parts from the inventory to the assembly line.

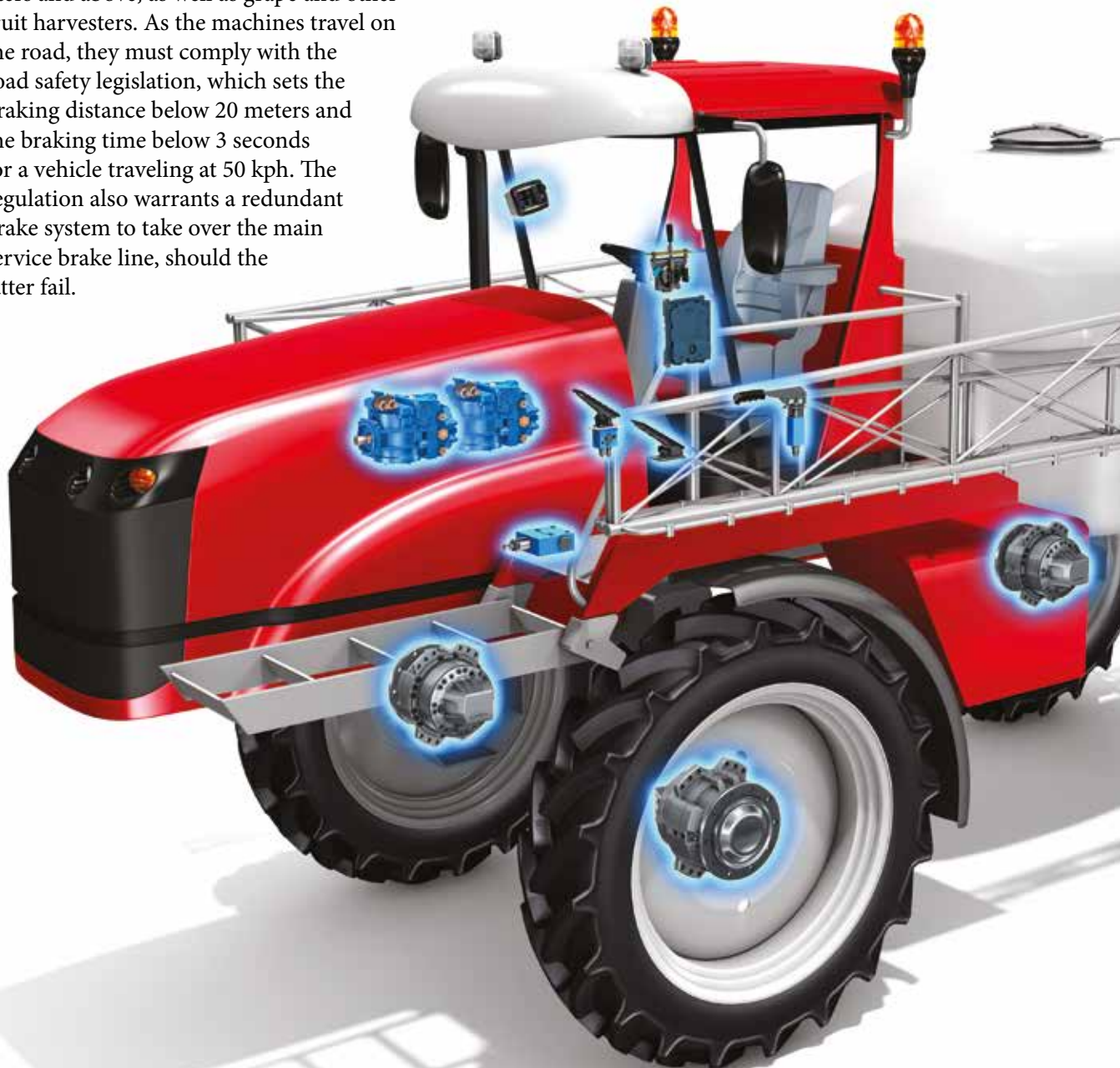
Poclain Hydraulics' investment in new generation robots is an essential element of the Group's intelligently networked value chain. It will give the operator more comfort and control, and help us stay ahead of the fast changes emerging on our markets.



NEW BRAKING SOLUTION for high-speed ag machinery

Today it is common to see off-road machines driving on the road above 40 kph, with some reaching up to 60 kph. Higher speed goes hand in hand with enhanced safety for the driver, in particular regarding braking. Poclair Hydraulics' MHP motors sizes 20 and 27, coupled with the P20 and S20 brake configuration, provide both.

With a maximum displacement of 2425 cc (148 cu.in) and 3525 cc (215 cu.in) respectively, the MHP 20 and 27 are perfectly suited for sprayers with a capacity of 4,000 liters and above, as well as grape and other fruit harvesters. As the machines travel on the road, they must comply with the road safety legislation, which sets the braking distance below 20 meters and the braking time below 3 seconds for a vehicle traveling at 50 kph. The regulation also warrants a redundant brake system to take over the main service brake line, should the latter fail.



In addition to road safety constraints, the operator must be able to access the brakes and check their condition. Last, once the machines are out on the field, they need to provide sufficient clearance under the chassis to preserve the crop, and transmission components must resist the pollution from dirt and spraying solutions.

The S20 P20 braking system is the answer to the new braking regulations

The S20/P20 braking system, available on the MHP 20 and 27 motors, is the answer to the increasingly stringent road regulations. It comprises two P20 parking brakes at the rear and two S20 brakes at the front. The latter fill two distinct functions: service and secondary braking, both combined with the patented dual brake line.

In practice, the higher speeds and harsh braking regulations make it even more critical to enhance the front braking performance, because of the weight transfer to the front – as in a passenger car where the front brakes are designed to handle most of the energy.

The S20 service brake can supply 25,000 Nm (18,440 lb. ft) braking torque and dissipates up to 1.25 million joules energy. As for the P20 parking brake, it withstands up to 1 million applications.

The P20 and S20 brakes are conveniently housed inside the bearing support, instead of at the rear, as in the standard MS motor configuration. As a result, the overall axial length of the motor remains under 50 cm (19.7 in) and enables the driver to spray or harvest without damaging the crop. Housed between the wheel hub and the torque module, the enclosed discs are protected from external pollution.

Safety

The S20 service brakes are designed with two independent hydraulic inlets, the second acting as a safety inlet if the primary one fails. By inserting a stick into a hole located in the bearing support, the driver can rapidly check the brake disc condition.

Proven and competitive design

A staple component of Poclairn Hydraulics' offering, the multidisc technology has a proven track record and delivers more consistent braking than drum brakes.



Service brake



Parking brake

NEW ULTRA-COMPACT medium duty PM20 pump

With an average max pressure between 300 and 420 bar, the PM range spans from 7 to 65 cc, from the PMV0 to the PM65. Poclain Hydraulics is adding the size 20 to address the need for a highly compact 28 cc pump.

The perfect fit for small to medium-sized mobile machinery



The PM20 with hydraulic servo control, the perfect solution for mini wheel / truck loaders

The PM pumps fit the requirements of small to medium-sized mobile equipment, in construction (walk-behind and asphalt rollers, wheel loaders and dumpers), ag (mowers, fruit harvesters, cattle feeders, small sprayers), as well as material handling (truck-mounted forklift trucks, aerial work platforms).

The PM20 offers unrivaled compactness

The latest addition to the PM range, the size 20 borrows its design from the PMV0 and PM10, thus bridging the gap between the PM10 and the PM30. The PM20 features the same displacement as the PM30 in a smaller package; it suits applications such as small wheel loaders, compactors and dumpers that favor compactness and are more price-sensitive. The pump, with its unrivaled axial length of 165 mm – a little under 200 mm with a charge pump - fits under the seat or the short bonnet.

In contrast, the cradle design of the PM30, 50 and 70 pumps tolerates the higher pressures and more demanding duty cycles required by heavier machines. The reinforced envelope also provides higher noise reduction.

A highly customizable pump

The design of the PM20 makes it highly customizable. A valve block can be flanged onto the pump cover, making the system more responsive. In addition, the valve plate can be modified to produce the desired driving behaviour, from responsive to comfortable. The PM20 is currently available with the following controls and options:

- Servo-mechanical with feedback
- Hydraulic servo-control
- Electric proportional servo with feedback
- Charge pump
- Flushing valve
- Auxiliary mounting pad
- Tandem pump mount

Additional controls, such as automotive or direct mechanical, as well as options, such as safety valve, filters and speed sensors, will be available by the end of 2019.



A compact tandem solution for soil compactors, providing oil to both the travel and vibration functions.

	PMV0	PM10	PM20	PM30	PM50	PM65
	Trunnion design			Cradle design		
DISPLACEMENT [cc/rev]	7-18	11-21	21-28	28-34	40-52	55-65
Max pressure [bar]	300	350	350	420 - 400	400	350

NEW AND IMPROVED SmartDrive™ display

Poclain Hydraulics' SmartDrive™ offering is getting a face-lift with the new generation of SmartDrive™ display, the CR0452.

Poclain Hydraulics' SmartDrive™ Electronic Control Unit (ECU), the SD CT, adds efficiency and driving comfort to the vehicle. It controls actuators on the engine, pump and hydraulic motors to provide horsepower optimization, speed, cruise, and traction control. It monitors vehicle speed, as well as transmission behavior and diagnostics.

In the driver's seat, the CR0452 display relays real-time data provided by up to two distinct ECUs, as well as by the engine using the CAN-J1939 bus:

- Machine speed, transmitted by the hydraulic motor speed sensors,
- Engine speed,
- Engaged hydraulic gear,
- Hydraulic circuit temperature,
- Parking brake status,
- Speed Limit / Cruise Control status & speed,
- Excess pressure or power warning
- Work or road mode
- Wheel slipping and traction control
- Machine work & travel times,
- Battery voltage errors,
- Hydraulic system errors.

Using the CR0452 interface, the driver can also adjust the wheel diameter, switch the cruise control and speed limiter on or off and select the engine driving behavior (fixed or automotive). The display conveniently spares the driver the need to connect the diagnostic case if one of the ECUs fails.

IP67, anti-glare and temperature-resistant, the display can withstand the harsh conditions of a construction site or working in the fields.

Although hydraulics is what first comes to mind in association with the Poclain name, electronics are today one of the group's strategic departments. The twenty strong team strives to add smart features and driving comfort to mobile machinery, with ten developers who work on customizing the SmartDrive™ ECU for each application.





TURNKEY CLOSED-LOOP power units for shredders

Intensive heavy-duty continuous operation is typical of shredders, which cut through tough materials such as tires, plastics and metal. They require reliable and efficient power units to generate the power and rugged motors to convert it into torque.



Starting in 2019, Poclain Hydraulics is offering configurable power drives for shredders consisting of closed-loop pumps, AC motors, valve control blocks, reservoirs, coolers, accumulators etc. The offering is branded Hydraulic Power Drive (HPD).

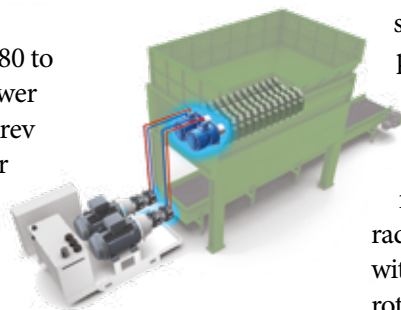
Poclain Hydraulics power units have a proven track record as the Žiri, Slovenian division, has been successfully implementing them in South-East Europe on hydropower plants, industrial presses, off-shore winch drives, wood processing



machines and other applications since the mid-seventies. The business unit currently outputs 600 units per annum.

The power drive is the heart of every industrial hydraulic system and has a decisive influence on its productivity and efficiency. The models in Poclair Hydraulics' catalog offer a wide range of configurations to power one to two shafts with the following requirements:

- 132 to 500 kW (180 to 670 HP) horsepower
- 210 to 560 cc per rev (13 to 35 cu.in per rev) pump displacement
- 450 bar (6,525 PSI) pressure



The power drive features anti-cavitation and over-pressure protection to provide smooth operation and maximize the lifetime of the components. It also comes with the following options: a paneled frame, a water cooler, an

electric cabinet and hoses to connect to the hydraulic drive motors.

The power units are custom designed, manufactured and tested to Poclair Hydraulics' standards and benefit from the group's worldwide support teams for commissioning, maintenance and servicing.

Shredder OEMs can single source a complete system comprised of a Poclair Hydraulics power drive and MS, MHP or MI motors reaching up to 30 liters displacement, to drive the single or dual shafts. The group has implemented motors on the application for 20 years, and the high torque cam lobe radial piston technology has proven that it can withstand the frequent pressure spikes and rotation direction changes of the machines. The Swiss OEM SID, featured in the article on page 29, has around 1,000 Poclair Hydraulics motors running on shredders around the world.

Ales Novak, BU Hydraulic Power Units Manager, standing on the left of a power unit. He manages a team of 17 colleagues in charge of design engineering, assembly and service support.



EXTENSION OF THE ADDIDRIVE™ offering for semitrailers and truck manufacturers

Since 2005, Poclain Hydraulics' AddiDrive™ has been helping truck drivers cover the last mile on rough terrain. The solution was adopted by MAN, Daimler, Renault Trucks, Terberg (Volvo) and Iveco in Europe and by Terra Drive System in North America. Given the benefits of AddiDrive™ on the total cost of ownership (reduced fuel consumption, higher payload, guaranteed uptime, longer tire lifetime) and the environment, it is widely used for construction, earthmoving, forestry, utility, heavy haulage and other activities across Europe and the USA.

The system was initially developed around Poclain Hydraulics' core technology, the closed-loop radial piston motor. A dedicated valve and software completed the package, optimizing performance and integration. For some time now, the system that was initially developed to fit on one specific gearbox, works on any truck that has an available engine power take-off.

New solutions now available

Up until now, the AddiDrive™ system was based on closed loop technology, in which all the components of the hydraulic transmission were

exclusively dedicated to the system. In order to give more flexibility to the truck, special vehicle or trailer manufacturers, AddiDrive™ now also exists in open-loop configurations. It can use existing components such as the pump and the tank, which serve the auxiliary functions for tipping, lifting and pumping. The new offering is ideal for most vocational applications such as truck-mounted cranes, tippers and moving floor semitrailers.



First successes with PAUL Nutzfahrzeuge and SAF Holland

In 2019 the bodybuilder PAUL Nutzfahrzeuge will launch the PXP system for DAF integrating the open-loop AddiDrive™ system. A couple of years earlier, SAF Holland, semitrailer axle manufacturer, acknowledged that after tipping or discharging the earth with the moving floor, the rear axles of the semitrailer were covered with discharged material. In addition, when the semitrailer was empty, there was not enough weight on the rear wheels to generate the required tractive force. In these situations, the driver was frequently stuck, which resulted in truck downtime and additional costs (special maintenance if the truck is frequently pulled and pushed by machines, cost of the retrieval if the truck is stuck in a remote location). Consequently, Poclair Hydraulics and SAF Holland decided to collaborate to develop SAF TRAK, a hydraulic open-loop transmission for semitrailers, which requires only a light truck upgrade. The system was launched mid-2018 and has since received positive feedback from the market. Besides the end users, SAF TRAK is appreciated by the trailer experts and has won the 2017 Trailer Innovation Award in the chassis category.

Superior traction from 0 to 15 kph

The system is safe, simple, smart and very light, with almost no impact on the payload. The driver manually engages and disengages it using the SAF TRAK switch situated in the cab. The fixed displacement pump, also used for the auxiliaries, provides the flow to the AddiDrive™ selector valve, which stops the auxiliary function. Then the flow goes to the directional valve, which splits the flow between the Poclair Hydraulics motors, both housed inside the SAF axle. Once the SAF TRAK is actuated, the motors provide the maximum torque up to 15 kph. Thanks to its smart electronic control, the system disengages automatically above this speed. SAF TRAK has no impact on the truck and semitrailer behavior when not engaged. SAF TRAK is compatible with all truck brands and can be fitted on a wide range of trailers.



POCLAIN HYDRAULICS STANDS BY DESIGN CHAMPION MECALAC as growth accelerates

Customer-centric design has been at the forefront of Mecalac's strategy from day one. Surveying users, buyers, and dealers recently led them to design the revolutionary wheeled excavator-loader, which can move fast from handling pallets to digging a trench and loading gravel in a truck. Poclair Hydraulics has been alongside Mecalac since the beginning of the 90s, powering the slew drive on the MTX, MCR and MWR excavators, and more recently with brake valves for the wheeled excavators. As Mecalac unveils their TV1200 tandem roller featuring MSE02 motors in the drums at the Bauma, we talk to Jean-Baptiste Rousseau, Technologies Manager for France.



*Jean-Baptiste Rousseau, standing in front
of a Poclair Hydraulics-equipped MWR excavator*

What is Mecalac's position on the construction equipment market?

Jean-Baptiste Rousseau: We have a broad offering of close to 60 machines encompassing excavators, loaders, backhoe loaders, site dumpers, and compaction rollers. While the small equipment, such as the site dumper and the single drum roller, targets the rental market, the large excavators and loaders integrate premium features. Across our range, we design our machines for the men and women operating them, and as a result design, versatility, comfort, and safety are critical. We also involve the operators in the validation stage, before production launch: we hand prototypes over to key users to review their features and performance. Also, if a customer requests a specific feature that facilitates their work on the site, we'll customize the machine for them.

Where are Mecalac's markets worldwide?

Our Headquarters are in France, so our historic market is Western Europe. We're gaining new ground in North Africa, Poland, Russia, North and South America. Our global outreach is facilitated by our production facilities in Germany, the UK and Turkey, nine sales offices and 220 independent dealers throughout the world.

Given your focus on innovation, how do you see the rise of electric construction equipment?

We have launched our own e-machine, the electric version of the 12MTX, branded e12. It is 100% electric and provides a full working day of autonomy on the job site. The technology seems to be mature for mini-excavators (up to 2 tons). Mecalac strongly invested in technology development to reach the 10 ton urban excavator segment with the e12, yet larger excavators above 12 tons still need the power of an internal combustion engine along with the associated hydraulics. Not to mention that electric actuators for cylinders aren't available. The last consideration is cost: when you add up the price of an electric motor, an inverter and a gearbox, the figure is higher than a conventional hydraulic drive. And some markets will not accept to pay the premium, despite the lower cost of operation.

What's your relationship with Poclain Hydraulics?

We have a long history of working together and Poclain Hydraulics is very committed and attentive to our needs. In 2015, when we launched the 12MTX loader-excavator with a Poclain Hydraulics MZE05 for the slew drive, the pre-launch field tests revealed abnormal vibrations that the driver felt on the pedals. So the teams at Poclain Hydraulics worked intensively and explored new avenues to understand and eradicate them. The vibrations actually revealed two issues: the high pressure variations as the pistons traveled up and down the cam ring, along with the unique structure of our excavator-loader. We resolved the problem together within a few months, modifying the motor as well as our machine. Since then we have replicated the motor adaptation to all the Mecalac slew motors.

What are the benefits of the Poclain Hydraulics technology on a slew drive?

The motor integrates all the functions required by the slew function: the shockless and anti-rebound valves, as well as the brake control device. The package is compact, easy to install and competitive. The low speed and high mechanical efficiency provide higher controllability and more precise positioning than a high speed motor and gearbox combination.

The partnership between Mecalac and Poclain Hydraulics is built to last, and the TV1200 tandem roller, which has been nominated for the design innovation award at Bauma 2019 with MSE02 in the drums, is a striking example.



Mecalac's 12MTX excavator-loader featuring a Poclain Hydraulics MZE05 motor in slew drive

KÄRCHER TURNS TO POCLAIN HYDRAULICS for their compact street-sweeper

"Mum, the neighbor wants to borrow our Kärcher." The brand's number 1 product is so widely used that it has become a common noun in several Western countries, alongside escalator, band-aid, and scotch tape. Weighing 2.5 bn € in sales and employing 13,000 people, the family-owned group is specialized in cleaning equipment for private and professional users. The professional section of their offering namely features street-sweepers, including the more recent Poclain Hydraulics driven MIC 42, a compact all-terrain municipal machine.



With the MIC 42, Kärcher offers a multi-purpose municipal machine that blends compact dimensions and powerful drive performance. Only 1.08 meters wide, it can carry a load of up to one ton. It also complies with the Stage V emission standard for use in inner-city zones. As for the implements, it integrates a standard coupling triangle that accepts tractor as well as generic tools. Overall the MIC 42 makes for a superior operator experience, combining high maneuverability, tractive force, and driving comfort.

Starting in 2014, Kärcher and Poclairn Hydraulics worked on designing the hydraulic transmission for the MIC 42. They chose to integrate four MS02 motors – the machine is four-wheel drive – and a PM30 pump. We talked with Matthias Fleig, Product Management Municipal Solutions, to find out how the project came to life.

Poclairn Hydraulics: What prompted Kärcher to develop the MIC 42 municipal machine?

Matthias Fleig: The MIC 42 is an evolution of the MIC 34, which was launched in 2012. It was developed to offer a multipurpose vehicle that complied with the new Stage V emission standard. We also integrated the latest trends and wishes of our customers.

What is the positioning of the MIC 42 on the market and within Kärcher's offering?

Matthias Fleig: With a horsepower of 42 HP and a maximum overall weight of 2.5 tons, the MIC 42 stands between the MIC 34C tool carrier (34 HP and 1.75T max weight) and the MC 130 municipal sweeper (50 HP and 3.5 T max weight). The multifunctional and highly maneuverable tool carrier has been specially designed for inner-city areas, for example sweeping and wet cleaning, snow grooming, green area maintenance, as well as for transportation. Due to its compact dimensions and small turning radius, the machine operates well in tight spaces.

What are the MIC 42's features?

Kärcher is the first manufacturer to have implemented an engine that meets the emissions requirements of the Stage V standard in a municipal sweeper of this class. With a few exceptions, other OEMs have

switched to other fuels or have removed the model from their catalog.

Driver comfort is at the forefront of our product development. With 1.45 m³, the MIC 42 has the largest cab in its class and offers a comfortable workspace. A consistent operator interface concept across the range enables easy control of all the functions. The turbine of the 800 l hopper was designed using Computational Fluid Dynamics to optimize cleaning at low engine speed and thus reduce fuel consumption.

What made you choose Poclairn Hydraulics for the MIC 42?

Poclairn Hydraulics, as a system supplier for the traction drive, convinced us not only because of the degree of customization of their components, but also because of their compact yet efficient and powerful drives. Another deciding factor for Kärcher was the high reliability and long service life of the components.

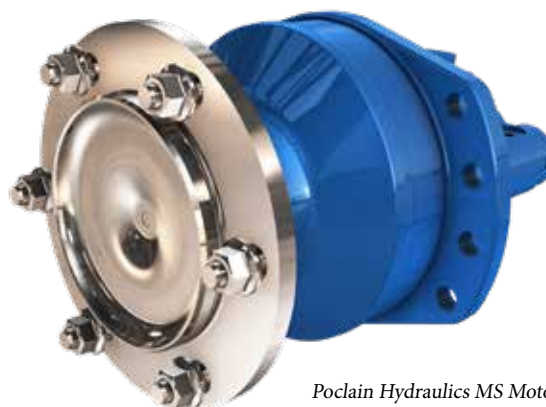
How did Poclairn Hydraulics collaborate with you on the project?

Poclairn Hydraulics' Engineering team was highly competent and responsive. Their system matched our requirements and we were able to integrate it rapidly and introduce the new series on time.

How does the Poclairn Hydraulics technology impact the performance of the MIC 42?

The Poclairn Hydraulics components in the MIC 42 help us meet the more stringent market requirements for this specific vehicle class: higher travel speed (24 kph), payload capacity and service life.

So far, the MIC 42 has received excellent feedback from the market, and sales are on the rise worldwide, in Europe as well as in Asia.



Poclairn Hydraulics MS Motor

POCLAIN HYDRAULICS DRIVES DOT's autonomous platform

Across the globe, Poclain Hydraulics products can be found on many smart platforms. With systems and components designed to facilitate integration into smart machines, Poclain Hydraulics is helping OEMs combine intelligent design with the strength of a hydraulic system.



The Dot A-U1 Power Platform is a smart machine that pushes the envelope.

With efficiency and flexibility paramount, Dot Technology Corp. imagines a more intelligent future for agriculture, mining and construction with its versatile autonomous platform. Located in Emerald Park, Saskatchewan, Canada, Dot is disrupting autonomous technology for off-road machinery.

What is DOT?

The Dot A-U1 Power Platform is a diesel-powered platform that is both similar to a tractor and not. It is able to move various implements like a tractor, but the difference is in the way that it moves. There is no drawbar. The diesel-powered platform “becomes one” with the various implements, allowing the same platform to perform a multitude of different tasks. Unlike many other autonomous off-road vehicles where autonomous functions are adapted to an existing piece of machinery, the A-U1 does not have a cab or seat. It is solely intended for autonomous use. With the Dot platform, the autonomous control integrates with the machine implement, and it becomes one powered unit.

Poclain Hydraulics products were not the first drive system used for the Dot platform. The original system used an axial piston motor and gearbox system. When going into the second design phase, the team at Dot Technology Corp. identified two areas for improvement: efficiency and getting more horsepower to the ground. These are two areas where Poclain Hydraulics’ radial piston technology can deliver results.

For some time now, in partnership with Applied Industrial Technologies in Canada as a distributor, Poclain Hydraulics has been working with both Dot Technology Corp. and its sister company Seedmaster Manufacturing on the development of the drive system for the Dot A-U1 platform. Poclain interviewed the engineers in charge of the Dot project, Greg Vennard and Matt Petruic, for more insight.

Why did you choose to work with Poclain Hydraulics?

Greg Vennard: “We started researching radial piston motors in the second design phase

after seeing performances that were not really satisfying us. We work really closely with Applied Industrial Technologies in Canada. They steered us toward the Poclain Hydraulics solution. We were looking for improved efficiency, smooth operation, and increased carrying capacity. It really checked all the boxes.”

How did you learn about the Poclain Hydraulics Solution?

Greg Vennard: “We compared radial and axial drive motors. When looking at other options, their mounting options and the freewheeling capacity of the motor were their downfall. The Poclain Hydraulics solution proved to be more reliable with the charge pressure keeping the pistons engaged.” **Matt Petruic:** “Poclain Hydraulics’ solution also delivered a better structural design with the added carrying capacity we were looking for. The solution fits better in our envelope.”

Did Poclain Hydraulics’ product or system development support help you to accomplish any milestones or overcome any hurdles in the design or integration process?

Matt Petruic: “Our technical contact with Poclain Hydraulics was very helpful and knowledgeable, working with our software development team on the pump system and traction control. Our sales support team helped when we needed things expedited or were on a time crunch. Applied Industrial Technologies also did a big chunk of the initial design using our required specifications.”

What features of the Poclain system are most important to you, or the end user?

Greg Vennard: “The features that are most important to us and the end user really are the same things: efficiency of the systems combined with the carrying capacity of the wheel. The A-U1 is designed to use the same platform to work with a variety of implements. A high carrying capacity able to support heavy loads, makes it more versatile and able to accommodate integration with any implement. Another thing that is valuable to our end-users is that Poclain delivers proven products. Having a proven product is important to the customer. It lowers service requirements throughout the lifetime of the machine.”

ELECTRO-HYDRAULICS for optimal e-vehicle performance

Internal combustion engines have been mainstream since the beginning of the 20th century. Over 100 years later they are slowly being replaced by electric motors, starting with on-highway vehicles. Off-highway OEMs are starting to launch their own e-machines. The new generation of batteries and electric motors can rely on the power density, compactness and proven performance of Poclain Hydraulics' offering to deliver an enhanced driving experience.

E-powered off-highway applications have been around for a while, in applications that give top priority to clean air and low noise levels. Electric motors can for example be found on mining vehicles, plastic injection machines and industrial forklift trucks. Other machines, such as truck-mounted forklift trucks, cannot integrate heavy batteries into their light structure. High gradeability and torque at low speed, which are paramount on loaders and excavators, are another obstacle. Today's batteries have progressed in performance, size, and cost, thus opening new perspectives on high volume machines.

Recover energy with electro-hydraulic solutions

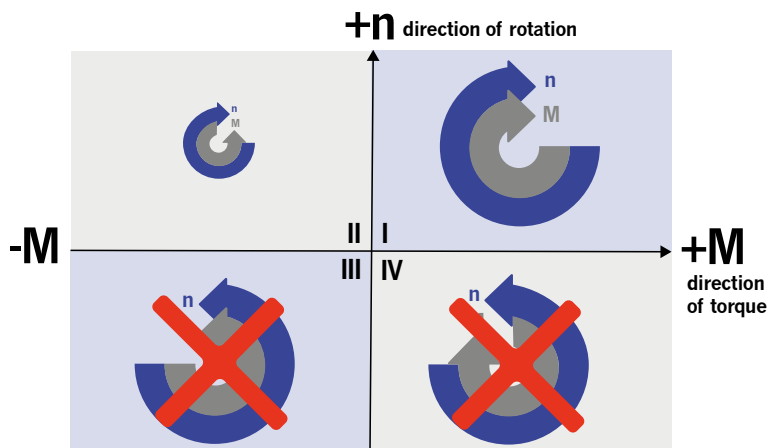
The technology of Poclain Hydraulics motors has been perfected with each upgrade, and today's MHP range, the fifth generation, is the most efficient and power-dense. The radial piston technology delivers high efficiency across the entire motor range, rated at minimum 93%, and offers multiple displacements, smooth changes in the direction of rotation, as well as zero-drag freewheeling.

A closer study of how electric and hydraulic motors perform shows that they work in unison, as both perform as well in

forward and reverse, and can equally accelerate and decelerate the vehicle. When working together, they will enable batteries to work longer hours on the job site:

Forward drive and acceleration (quadrant I in the chart): both the electric and hydraulic motors function at optimal efficiency.

Forward drive and deceleration (quadrant II on the chart): hydraulic and electric motors also perform at optimal efficiency. The driver has high control over the machine, whether on a flat terrain or when going downhill. Electric motor deceleration also enables the brakes to last longer. We can go one step further: as the driver decelerates, the hydraulic motor powering the wheel acts as a pump, the



IC engine

pump as a motor, and the electric motor as a generator, **feeding the battery with the energy it has recovered.**

Reverse drive (quadrants III and IV):

the electric and hydraulic motors offer the same performance levels.

In an IC and hydraulic motor configuration, the performance levels vary:

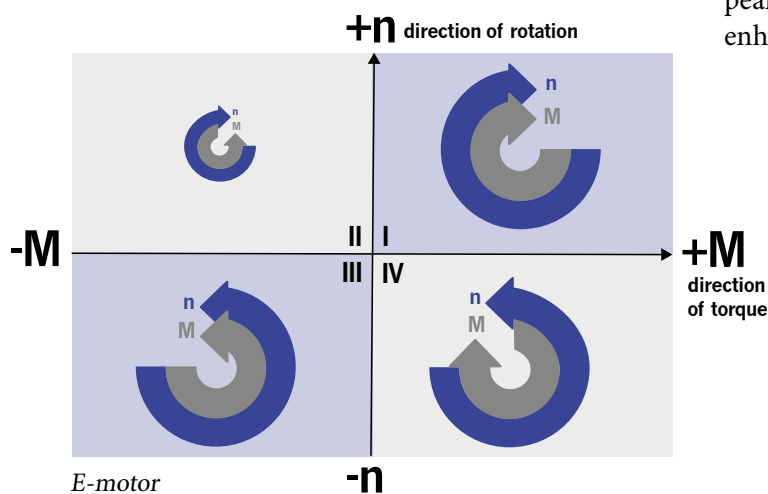
The IC engine, in comparison, cannot operate in the opposite direction when the vehicle drives in reverse (quadrants III and IV); in addition, it has limited deceleration capabilities (quadrant II). The driver has to use the brakes to counteract the vehicle inertia.

ratio on-the-fly. The pump swashplate angle adjusts itself to combine the most efficient levels of electric motor and hydrostatics **at the required flow and pressure.** As a result, the electric motor current decreases, less heat is generated in the motor and battery autonomy increases.

Electro-hydraulics applied to slew drives and grape harvesters

If you take the example of an hybrid or electric excavator, shifting from an open-loop to a closed-loop hydraulic circuit slew drive allows for energy recovery when the turret slows down. The energy can be transferred to other functions in real-time, and/or stored thanks to ultra-capacitors or hydraulic accumulators, both of which can withstand large power peaks. Performance and operating range are enhanced.

Likewise, an off-road vehicle, which mostly operates on a grade, such as a grape harvester, can integrate a hybrid engine with the electric motor taking over in the downhill working mode. The operator has more control over his machine and the energy recovered in the battery can be utilized to boost the engine when extra power is required. The OEM can downsize the IC engine, given that the power requirement with a hybrid solution capable of energy recovery is lower, and the operator will save on fuel.



Electro-hydraulic versus pure electric

An all-electric vehicle comprised of an electric motor coupled to a fixed ratio axle does not offer a variable transmission ratio. This means you cannot choose the torque and speed levels required from the electric components for a given power level. When driving up a 25% grade, the driver does not have the ability to shift into a lower gear.

An electro-hydraulic transmission, which is comprised of an electric motor for propulsion, a variable displacement pump with electronic control and hydraulic motors in the wheels, allows the user to modulate the transmission

SAUER BIBUS CERTIFIED to repair PM pumps in Germany

An expert in the axial piston technology, SAUER BIBUS distributes global brands such as Danfoss, Daikin, Turolla, Comatrol, and Kawasaki. At the end of 2016 Poclain Hydraulics GmbH, the German subsidiary, selected them to be their distributor and provide system expertise and local support to their smaller accounts. Their fruitful partnership prompted Poclain Hydraulics GmbH to certify them for the repair of their medium duty axial piston pumps, the PM range, beginning of 2018.

Redesigned in 2008, the PM pump range starts as low as 7cc displacement and boasts a wide selection of controls and options. Combined with competitive pricing, the PM range has proven to be highly popular on medium-sized mobile machinery such as rice harvesters, tree stump removers, cattle feed mixers, multi-purpose tool carriers, and site dumpers. Given the growing number of PM pumps in the field, Poclain Hydraulics' German subsidiary chose a partner with a solid reputation in axial piston technology for servicing and repair. SAUER BIBUS shares the same values as Poclain Hydraulics, as their General Manager Ralf Schrempp explains: *"We focus on customer needs and world-class service in the fields of engineering, logistics and servicing. We help the OEM associate the PM pump with the appropriate components to get the most out of his transmission and we hold an inventory of PM pumps to deliver parts or complete units just-in-time."*

SAUER BIBUS' capabilities and expertise enable Poclain Hydraulics to provide first-class aftersales service for the PM range:

- Highly qualified hydraulic specialists for fast troubleshooting
- Test bench integrating the latest technologies
- Mobile workshop for field interventions
- Extensive inventory of spare parts

The SAUER BIBUS Certified Repair Center is the perfect match for the German subsidiary's Aftersales, a team of 54 employees and technicians who service or repair approximately 2000 units per annum for all the components besides the PM pumps. Like SAUER BIBUS, Poclain's aftersales place the customer first and focus on rapid troubleshooting, intervention and delivery. From left to right Ralf Schrempp, Philipp Kaas (Deputy Operation Manager), Stefan Anwander (Operation Manager) and Stefan Fendt (Manager Technical Sales).



WORLDWIDE OEM CASTING PARTNER

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Hydraulics / Hydraulique / Hydraulik



Trucks / Camions / Lastkraftwagen



Off-road / Travaux publics / Hoch-und Tiefbau



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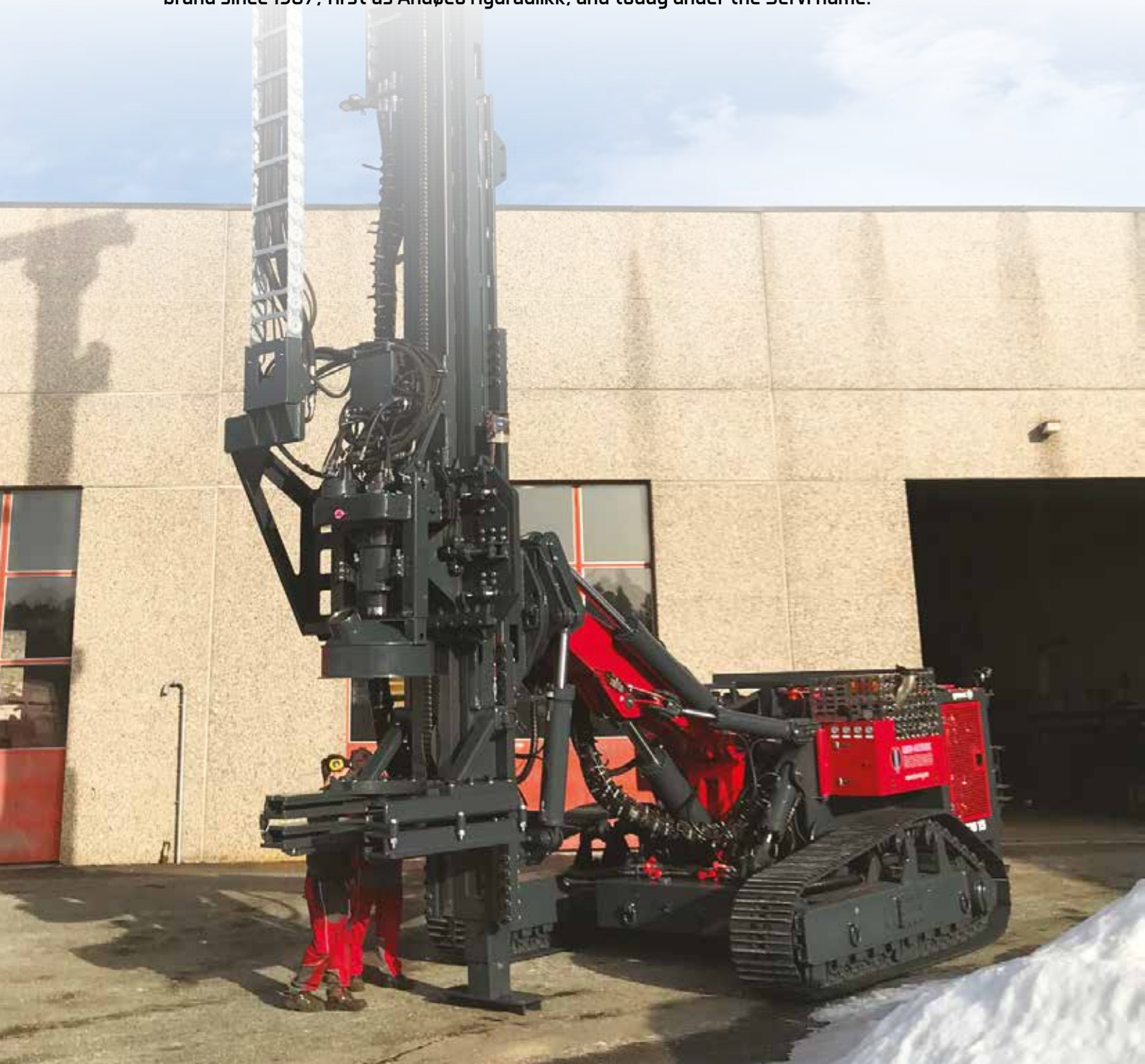
Agriculture / Agricole / Landwirtschaft



www.poclain-technicast.com

POCLAIN HYDRAULICS AND SERVI join forces to serve the unique Norwegian market

With high stakes in the oil and gas industry, Norway's economy slumped in 2015 as oil prices dipped. Companies were hit hard, more so than in 2008. Poclain Hydraulics was on the front line when sales plummeted and turned to a well-established hydraulics expert to bounce back: Servi Hydraulics. All the while, one man has remained in Poclain Hydraulics' Norwegian landscape, Morten Pande-Rolfesen. He has been representing the brand since 1987, first as Andøco Hydraulikk, and today under the Servi name.





Why do Servi and Poclain fit together well?

Morten Pander-Rolfsen: Servi is the largest hydraulics distributor in Norway and is well established in the offshore industry. We have been around for

100 years, with seven sales and service locations and 30 sales engineers throughout the country, so we're in close contact with our customers. We know their business well and can react fast to their needs. In addition, the offshore industry brings in highly demanding projects that require a turnkey systems approach, and Servi has the skills and product portfolio to support them. We provide power units, bespoke manifold blocks, accumulators, cylinders, filters, coolers and measuring equipment.

Servi and Poclain Hydraulics share the same values: superior quality and service, as well as high value-add solutions for small volume projects. We also serve the same industrial markets. So much so that Servi had wanted to have Poclain Hydraulics motors in their portfolio for a long time, and the unfavorable economic conditions of 2015 turned out to be the starting point of their collaboration. Since August 2017 the Poclain Hydraulics motors are featured in Servi's catalog.

You mention highly demanding projects; can you give us some examples?

Servi proposes a tool that fits onto underwater ROVs (remotely operated vehicles) and carries out a wide array of tasks. We are working on a project to equip one of them with an MS50 motor to cut and close down oil pipes that are no longer in use. The power and torque density of the Poclain Hydraulics motor is unique and critical when you operate 300 meters below the sea level.

Here's another unique and high-risk offshore application: the mobile gangways designed by our customer Uptime. They link for instance two boats, or a boat and a rig. The gangway provides fast and safe accessibility for the offshore personnel and is designed to compensate for the action of the waves. Servi's solution integrates an MS05 coupled with a gearbox to provide maximum torque and enable the 30-meter gangway to pivot 360°.

On the mainland, we provide Qmatec with a system to drill foundation holes. The drill is capable of rotating at 30 rpm and supplying 30 kN of torque; it is powered by 4 MS08 High Flow motors coupled to a gearbox. They provide five rotating speeds, the slowest for large diameter holes and the fastest for small diameters. In addition to the motors, Servi provides a custom manifold block and the connections to the drilling rig.

From drills to underwater applications, the Norwegian market demands a combination of cutting-edge hydraulic skills, thorough application knowledge, and local presence. Poclain Hydraulics has found in Servi the perfect partner to make new headway in the market's highly advanced equipment.



MS High Flow motor

WANTED: TORQUE AND RUGGEDNESS for waste shredding

All sorts of waste material are fed into the horizontal shears of a shredder: furniture, household appliances, electronics, wood, used asphalt and tires are a few examples. They exit the machine in smaller pieces, which usually more than halves the waste volume, and makes both incineration and recycling easier. Torque and ruggedness are critical to the process, and Poclair Hydraulics motors have proven that they are fit for the purpose.



Shredding is a severe application

First of all, the materials vary in size and hardness, requiring constant shaft speed and torque adaptation. The machine slows down, stops or reverses the direction of rotation of the shafts if an object gets jammed. The duty cycles are also very demanding, and machines in large Asian waste treatment plants often work 24/7. To give an idea of the sheer volume that transits through the machines, shredding installations in a Chinese megalopolis typically process up to 1 million tons of waste per year.

Poclain Hydraulics' technology

is fit for the purpose

Poclain Hydraulics has over twenty years of experience in equipping waste shredding machines, starting with their large displacement MS motors and more recently with the MI250 and the MHP range. The torque module, which is common throughout Poclain Hydraulics' offering, can withstand the pressure spikes and changes in the direction of rotation that are warranted by the application. The motors also come with features that add value to the machines: the hollow shaft option shortens the time required to replace the shredder shaft, an operation which is carried out monthly on severe applications. Likewise, the flat port option, combined with valve blocs developed in partnership with Poclain customers, can carry out cross-over relief and prevent cavitation, thus further protecting the transmission against the erratic pressure levels and changes in direction.

Poclain Hydraulics and SID

One of Poclain Hydraulics' historical customers in the shredding industry, the Swiss manufacturer SID has grown to become a global player and is among the leaders on the buoyant Chinese market. Their XLC primary shredders are known as the most rugged and reliable machines available, with machines still operating after 20 years of service. While the principle of operation of a shredder is relatively basic, the essence of SID's value-add is in the details, for example the design of the mechanical components, the choice of the materials, and the electronics that control the rotation of the knives and protect the components against premature wear. Beyond

this, SID commissions the machine and helps the end-user fine-tune the shredder to optimize its efficiency.

SID's XLC 7300, 4500 and 3000 models integrate respectively MI250, MS125 and MS83 motors. "We chose Poclain Hydraulics to power our shredders because of their competitive solution, the modular and compact design of the MS, and their superior service" explains Clément Laverrière, Sales & Technical Office Director at SID. To date, about 1,000 Poclain motors have been installed by SID around the world.

Enters Poclain Hydraulics' MHP

Launched in 2015, Poclain Hydraulics' High-Performance MHP motor has sparked the interest of the shredder manufacturers. It is available in five sizes, ranging from 900 to 3520 cc per rev. (55 to 215 cu.in per rev.), boasts an efficiency level of 90% and can withstand a pressure of 500 bar (7200 psi). A shredder manufacturer who needed outstanding power density has chosen the MHP27 for one of his machines. With a displacement under 2000 cc (122 cu.in per rev), the motor can reach 280 kW (375 HP) horsepower. A performance that confirms that Poclain Hydraulics excels in challenging applications.



SID XLC4500 powered by MS125 motors

FROM PFUNGSTADT TO BANGALORE - building Poclain's global culture

By definition, a company is international as soon as it owns locations in more than one country. In reality, that is only the beginning. The challenge of being international is to combine the collaborators' sometimes antagonistic cultures to create a unique global culture. If done the hard way, going international can fail because of cultural barriers that slow down the supply chain and cause tension in meetings and emails. One effective way of breaking those barriers is by encouraging mobility between locations, and Marc Nagel, a salesman who worked in the Pfungstadt, Germany office for eight years, and has moved to Bangalore, India, to be the local Sales Manager for three years, is a living example. Here are a few excerpts from his logbook.



May 21st, 2018

I get off the plane with a mixture of excitement and foreboding. The first move should be smooth, I have a cab waiting for me outside the airport; he's holding a sign with my name on it. As I step onto the curb, I get a vibrant picture of the life that's awaiting me: there is a sea of over 100 signs staring at me. I am entering a country with vast and noisy crowds, quite the opposite of Mannheim, my hometown in Germany.

May 28th

I have a lot to learn about the subsidiary's sales activity. I'm analyzing their indicators, the situation of each account, and which opportunities we need to go after. With a GDP growth of 7%, business is flourishing here: our global accounts are transferring production capacities and design centers to India; Indian companies are extending their product portfolio and looking to export to new markets. The subsidiary grew a staggering 29% in 2018. Indian OEMs appreciate the Poclain brand for its superior design and reliability, and they always like to add that they want "German technology at Chinese prices."

July 1st

I have found my apartment, in a complex consisting of five towers. My neighbors are a mixture of Indians and expats. With a climate and living standards that are the closest to Europe, Bangalore is the Indian Silicon Valley. Its population has quadrupled in the last 25 years. The pollution is relatively high, as the city struggles to treat the waste generated by the inhabitants and factories. I can see it in my apartment, where dust collects every day.

July 12th

If I had to choose a word to summarize the Indians, I would say open-minded. My German nationality doesn't stand in the way when it comes to meeting and exchanging. Indians have a positive attitude, they want to help, to understand. We share a lot of technical information with customers, both on the application and our technology – more so than in Germany, where confidentiality is the norm.

July 14th

I have received my debit card! It took 60 days to arrive. Time stretches here and deadlines, like appointments, are rough estimations. There's an Indian proverb that rings very true here: "You (Westerners) have the watches, but we have the time." On the other extreme, I pay my electricity and household goods using an app on my mobile phone. India combines cutting-edge technology and ancient ways.

November 2nd

Besides developing Poclain's footprint in India, hiring and moving into larger, more modern facilities are my 2019 objectives. Right now, we have three sales engineers - Venkatesh, Raj and Sharavana - Sumeeth our applications engineer, and Laxmi, our logistics agent. As several projects are moving into production, we need to hire at least one additional applications engineer. To relieve my new collaborators, I will manage some accounts myself, as well as share with the team what I have learned and practiced in the German subsidiary. We will explore all the possibilities of Poclain's offering and attempt to address more challenging applications.

I have slightly adapted my management style, as Indians respect and expect more from their hierarchy than the Germans. Emails are longer, revealing every detail, and copied to a lot more addressees. As a result, decisions are more collective and out-of-the-box.

Both Marc and Poclain Hydraulics will likely grow from his transfer from Pfungstadt to Bangalore. Marc will develop his intercultural skills, something he feels strongly about: "*If you want to be successful in an international environment, business or private, you need to evaluate tasks and situations through the eyes of your counterparts.*" The Indian sales team will get more exposure to Poclain expertise and best practices; communication will also flow more smoothly between the Head Office and the Indian subsidiary, facilitating logistics and problem solving. And on a higher level, Poclain Hydraulics will strengthen its unique corporate culture.

POCLAIN SPEAKER AT Les Echos Big Data and IoT event

France's leading daily financial newspaper, Les Echos invited the Poclain group to share their insight at their event dedicated to "data applied to customer experience and business" on Wednesday, February 6th 2019.

François Delys, Big Data & IoT Practice Manager at Poclain, spoke during a round table of the specifics in manufacturing, alongside two other global players. The goal of the round table was to grasp the purpose and benefits of data analytics, to identify meaningful data (AKA smart data), to obtain results that can be deployed and to share them.

François Delys presented Poclain's practices in terms of field data originating from the customers, the manufacturing plants and the internet.

Business-centric data

In B2B a salesperson knows his customer well, and as the interactions spread within the organization, each contact must have the same level of knowledge. Data allows us to be **customer** rather than product-**centric**, in order to maximize satisfaction for both customers and their stakeholders in the long run.

Beyond a company's information systems, such as its ERP (Enterprise Resource Planning), PLM (Product Lifecycle Management) and EDI (Electronic Data Interchange), the seamless flow of data must contribute to knowing the customer and responding to the needs of the end user. A good place to start is **understanding the uses** of the customer or the customer's customer and what their pain points are. The next step is to map out and collect the meaningful data and use artificial intelligence to create predictive algorithms and better understand what goes on in the field.

Data will thus enable Poclain to create a "Smart" product and service offering, generating value for both the customers and the group.

Data governance

With the integration of their IT systems in 2010 (ERP, PLM, SIRH for Human Resources, CRM for Customer Relations), Poclain started breaking down the departmental silos, thus anticipating today's industrial transformation. IoT (Internet of Things) is a critical component of data management in manufacturing, as the sensors gather information in the field and enable us to better understand usage and needs. **Sharing the data** using embedded intelligence allows each and every stakeholder to grow. Sharing data between Poclain departments will generate more value, more business and introduce new work methods.

The **quality of the data** supplied to the customer is a real value-add that creates differentiation, while building a long-lasting customer relationship. This also applies to distributors. "Data allows us to move faster and with more precision, it also gives us additional responsiveness to gain market share" concludes François Delys.



A STEP BACK IN TIME

with the FC30 excavator

As usual during the INTERMAT 2018 exhibition close to Paris, the association "Generation Deux" organized a very nice booth showing Poclain Excavator Models from the 1960s.

**One of the attractions
was a very well preserved FC30**



It was interesting to see some applications with radial piston motors that go back more than 50 years.

The turret full 360° swing drive motor is a radial piston motor TYPE G0, 850cc with 5 pistons.



The two track motors are also cam-lobe radial piston type motors, driving the sprockets of the crawlers through an offset reduction given by a set of gears. Motor type : 600cc (G1) single speed.



The FC30 was a 9T, 33 HP excavator equipped with a 200L bucket ; it was the smallest in the Poclain range. It was launched in 1965 and built until 1975. It may not have been as famous as one of its bigger brothers, the wheel-driven three wheeled chassis mounted TY45, but could be considered as a remote ancestor of the current mini excavators. 1800 FC30 and wheeled version FY30 were built between 1963 and 1976. The compactness of F models was much appreciated in urban construction sites and in agriculture.

In 2019, Poclain Hydraulics is well engaged in the mini excavator business providing close to 10,000 swing drive radial piston MZ motors per year to leading OEMs such as Volvo, Mecalac or Yanmar.

**The current
MZ Motor**





POCLAIN HYDRAULICS' TEAM of Experts continues to thrive

In the previous issue, we had presented the Group's Expertise Path program, which aims at capitalizing, sharing and reusing the knowledge acquired through experience and projects. A formal field of expertise combines three elements: specific competitive advantages, the number of people impacted by it, and the difficulty in acquiring knowledge. Once a field of expertise is identified, an expert is nominated to further the knowledge, share it internally and build a wider network that will sustain it.

Beginning in February five new experts were nominated, bringing the total number to 21. Each new nominee excels in a specific field: material and failure analysis, axial simulation, machining process metrology and valve architecture. Expertise is also decentralized to ensure each location is involved. Two of the nominees are based in Brno, Czech Republic, one in Žiri, Slovenia, another in Gaggio, Italy, and the last one in the French head office.

Meet us at BOOTH 536, HALL 3 of the Bauma show

We're excited to be part of the international construction machinery gathering that opens in Munich on April the 8th. We look forward to seeing you there!





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