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EDITORIAL



As 2016 was a difficult year for a number of markets, especially in North America, Poclain Hydraulics took this as an opportunity to look inward. We took initiatives to optimize our processes and resources putting the customer in everybody's focus to pave the way for future growth. 2017, however is a new year with new promise of opportunity and potential.

We have made efforts to adapt Poclain Hydraulics expertise to develop products that align to the needs of markets with strong future growth potential such as the industrial and construction markets while working to refine and develop products for struggling markets that help our customers in those segments with developments that will allow them to bring competitive products to the market when positivity returns. We have organized internal teams to better study the market needs and drive new products to market including a new motor option for the CreepDrive™ mechanical-hydraulic hybrid transmission, which will make its debut in our IFPE/ConExpo booth. Another example of this concept is our MI250 motor, developed to withstand the harsh requirements of heavy duty applications such as industrial shredders. To complement our hydrostatic transmission offerings we have further developed our line of valves to include a wider range of products, such as the new FD-H2 flow divider, which offers strong improvements for heavy duty, high-pressure applications. We have also continued to make additions to our pump range of including the newer PW96 and PWe96 which will be displayed at IFPE/ConExpo, showcasing a range of control options.

Many of these products are a result of the platform and product teams we have put in place over the past year. These teams are designed to listen to the market and use that knowledge to understand and address the customer's needs with our product development process. These platform teams take an active approach to aligning product features and benefits to their assigned markets while leveraging their expertise and our internal structure.

Beyond the focus on product development, Poclain Hydraulics has a vested interest in the success of both our network of distributors and OEM customers. Building a strong technical training curriculum for our distributors is key as is continuing to grow our already robust network of local sales offices. Our robust training curriculum ensures our distributors maintain a comprehensive understanding of all Poclain Hydraulics products. This in turn works to guarantee customers receive the high quality support needed for their projects. All of these efforts are made with the goal of utilizing our global network to provide localized service to our customers.

MARKUS RAUCHHAUS
GENERAL MANAGER - NORTH AMERICA

SUBSIDIARY HIGHLIGHT: POCLAIN HYDRAULICS, INC.

Poclain Hydraulics Inc. was first established in North America in Virginia in 1978. The subsidiary opened the first sales office in 1980, which marked the beginning of the group's investment in the region. Shortly thereafter, Poclain Hydraulics partnered with the first distributor and opened a distribution sales and service center in Addison, IL and subsequently in 1992, a manufacturing facility in Racine, WI. With the advent of the manufacturing facility in the US, Poclain Hydraulics embarked on a journey that holds our customer's needs at the heart of our approach to growth in the market. Bringing manufacturing in closer proximity to our customers

spurred more growth, and local production was moved to a larger facility in 2001.

As current market conditions call for short lead times, local and greener operations, Poclain Hydraulics Inc. has taken steps to further incorporate the needs of the customer into our operation through the implementation of a new supply chain methodology as well as plant improvements, allowing us to react quickly and efficiently to shifts in customer needs. This is seen in the implementation of many new process controls as well as our recent shift toward Plan For Every Part methodology (PFEP).

Poclain Hydraulics, Inc. continually strives to implement leading technology

and continuously improve our local manufacturing operation. We have worked to achieve a high level of value-add manufacturing with 20+ machining centers, lathes as well as the grinding and heat treatment technology. These value-add improvements allow us to support all aspects of producing a motor internally to the highest quality levels. One of our most recent technological advances is the implementation of two new five-axis

machining centers, designed to be able to support complex part creation. The implementation of these machines increases productivity and product quality by reducing what was originally a two-step process on

a standard four-axis machining center to a one-step process on these five-axis machines. The new machines are capable of holding tighter tolerances, while removing opportunities for error through reducing movement and performing all machining options with one machine. This is part of our goal to further automate production. Another improvement planned for 2017 is the implementation of automation for cam support production. This improvement will reduce the potential for operator error, increase reproducibility and deliver automated machine adjustments.

We have also continuously improved our process robustness using poka-yokes over the past year. A couple of highlights include implementing acoustic analysis



as part of a last-step check on test stands to assure high stability and durability. In addition to that, we have implemented the use of cameras and automated analytics to assist us in areas of production.

A number of other cleanliness and green initiatives were completed in 2016 to upgrade our facility. The implementation of a new pressurized clean room with testing equipment to evaluate the cleanliness of our parts, and a new CMM room that is humidity and temperature controlled. One 'green' initiative was the recent implementation of settling barrels that distill the used lapping vehicle allowing it to be reused, which in turn reduces the amount of waste released into the environment.



Clean Room

Over \$20 million was invested over the last years in manufacturing technology standards and upgrades to the facility. Currently, several assembly lines are in place at the Yorkville facility. These assembly lines were developed with the changing needs of the market and our customers in mind. Our assembly lines were designed for market and product with the flexibility to handle small to large volumes. They are able to quickly adapt to changes in demand or market shifts. The assembly lines have also incorporated ergonomic improvements such as an added bridge crane system, an ergonomic manipulator, and a chilled water system upgrade. Poclain Hydraulics Inc. handles

all core processes involved in production in-house rather than outsourcing. With end-of-the-line testing and integrated logistics, our assembly lines are able to support a wide range of products currently, with future plans to grow the range of US manufactured products. In addition to the new product lines we will launch over \$5 Million investments for future projects.

The North American operation does not only focus on process improvement to deliver value to customers, but has also gone to lengths to strengthen local expertise and support including the implementation of a robust design engineering team coupled with capable project and product managers. The addition of these teams facilitates partnerships with North American customers and helps to drive new products to market more quickly. It also allows Poclain Hydraulics Inc. to incorporate a stronger understanding of the local market. The team is then able to champion product lines that answer regional specific OEM and operator needs as well as ensure the right product mix is readily available for these applications.

Poclain Hydraulics has taken steps to grow production capabilities by locally producing products that fit the needs of North American customers in North America, such as our MG and ML lines and the CreepDrive™ motor range in order to give our customers the highest level of flexibility and responsiveness.



5 Axis machine

Beyond product development, Poclain Hydraulics Inc. has put into place local engineering support for all product lines and components from motors and pumps to valves and electronics. The most recent addition is a resident engineer to support our full line of pumps, making support and development more accessible to our local customers.

Over the past year, Poclain Hydraulics Inc. has also invested in growing our sales team, which has grown to add more local offices and a higher concentration of sales people across the region. We now have four regions with centralized support providing expertise in products and technology as well as a high level of local customer service. Beyond this, we have invested in our localized team of application engineers. All of this was done with the goal of providing reliable local service that understands the region's

specific needs and agile technical support for all stages of customer's projects. These teams work closely with both OEMs and a full network of highly trained distributors.

As an added level of support, Poclain Hydraulics, Inc. offers a full product line training with a strong curriculum as well as service and technical training. We offer these courses to our distributor sales teams and OEM aftermarket teams to further ensure a high level of service throughout the region. Poclain as a whole values investing in the training and development of its current employees, but also thinks to inspire the future generation. Beyond just internal investment, Poclain Hydraulics Inc. in North America participates in a number of regional industry associations and invests in local talent through partnering with local schools to foster interest and talent growth in the fluid power technology field.





GET IN THE GAME



**Poclain Hydraulics IFPE/ConExpo
booth #S81640**

POCLAIN'S NORTH AMERICAN PLANT IS AT THE READY WITH A "PLAN FOR EVERY PART"

Over the past year, our North American site has adopted the «Plan for Every Part» (PFEP) methodology as part of our quest to become a world-class production facility for our customers. "Our goal is to anticipate our customers' needs and continue to implement processes that make it possible to meet those needs. These initiatives reduce common issues with waste such as excess inventory and waiting that occurs when parts aren't where they are needed for production. This reduces opportunities for error, which in turn contributes to our end goal of creating an agile, lean facility that is ready to meet demands and exceed the expectations of our customers." *Markus Rauchhaus, General Manager, North America.*

Under the PFEP methodology the entire supply chain, from the supplier to shipment to the customer sourcing and planning to inventory management and shop floor functions are brought under one umbrella. All positions are part of one synchronized team working as a function

of the same database. The plant adopted this methodology to optimize operations to better serve Poclain Hydraulics customers through optimizing material flow, the use of a standard formula for inventory level setting for both components and finished goods, proper minimum order quantity settings, the creation of over 1,700 Kan Ban loops and the reduction of warehouse space required to open space for future production needs.

As a part of this site-wide paradigm shift, Poclain Hydraulics in North America implemented a number of efficiency-creating process improvements that ultimately benefit the customer by increasing on-time delivery of quality products. This is accomplished through a reduction in wasted movement and travel and subsequently opportunities for error. PFEP allows Poclain Hydraulics to implement inventory optimization. This methodology takes into account supplier delivery times, demand variation, and location both geographically and inside



Poclain Hydraulics Team. From left to right: Sean L., Rosendo M., Nathan R., Tim A., James S., Jim V., Neal S., Mike E. and Ryan C.



the facility allowing the organization better inventory control. With multifunctional teams working in sync with one another and a centralized database, Poclain Hydraulics is able to better maintain the right level of inventory.

This methodology also includes the implementation of precise labeling, packaging, and storage of parts to optimize to the flow of goods through the factory. It takes both the internal value stream and customer needs into consideration, reducing excess waste. For example, PFEP links our customer delivery requirements (order quantities and packaging) to the supplier, reducing waste, as well as excess packaging and cost to help sustain a greener supply chain.

One of the improvements put into action at Poclain Hydraulics' North American plant under this methodology was the implementation of a plant tugger system for material delivery. An automotive industry best practice, the tugger increases uptime and operating efficiencies by reducing wasted movement. Effectively eliminating many of the inefficiencies and safety risks associated with excessive

fork lift use, the tugger system promotes a more sustainable plant while allowing for the flexibility needed to quickly adapt for changes in demand.

Another initiative was the implementation of improved material flows. Poclain Hydraulics' North American plant has adjusted the flow of goods to ensure the right parts get to the right hands at the right time. Over the past year, we have created 24 new improved material flows based on packaging dimensions, usage point, and part volume. This in the end, allows the facility to deliver quality products to our customers exactly when they are needed.

These initiatives are part of a greater overall goal of Poclain Hydraulics to create a world class production facility that is closely aligned to automobile standards. In the coming years, Poclain Hydraulics' plans to continue use of PFEP methodology to ensure a leaner and greener manufacturing operation and to align internal PFEP processes with those of our customers by linking our customers' ordering and packaging requirements into our operation flow.

INTRODUCING POCLAIN TECHNICAST

On July 2015, Poclain Hydraulics acquired Grandry Technologies. More recently, the company took on the name of Poclain Technicast and along with a new logo, adopted the visual identity of Poclain.

Poclain Technicast has a rich history of providing quality products, specializing in producing highly cored complex castings.

A multi-year investment plan has been launched aiming to strengthen the company's competitiveness in the international markets and to create a benchmark company for short-and medium-production runs of complex parts. As such, many changes have been made to the production site in order to improve working conditions and enhance the safety of the company's 135 employees. At the same time, major investments have been made in production tooling (CNC grinding, robotic sand blasting, 3D measurement machine, state of the art sand mixing for the preparation of green sand). Other modernization projects will follow in 2017 and 2018.

Poclain Technicast's high quality and reliable castings are now available on a larger scale and the subsidiary continues to grow via Poclain's vast global network. The most recent achievements include

new investments and a local sales support team.

Poclain Technicast has also implemented a sales office in the United States and is now maintaining a business development representation with close proximity to customers in that market. This change allows for easier access to Poclain Technicasts' highly complex small or medium runs of ductile iron parts for manufacturers in the North American market.

Poclain Technicast answers industry needs for highly cored complex castings with unique recipes comprised of core sand that allow for production of cores with a cold box process as opposed to a hot box process. Producing cores through the cold box process, besides cost, reduces problems like porosity since less resin is burned during the pouring process. Poclain Technicast design engineers collaborate constantly with its customers to solve design hurdles by finding new and innovative ways to bring them value—from cost reductions to quality improvements and reducing time to market.

An example of the added value realized when working with Poclain Technicast is best illustrated through an issue one key wind power industry customer was facing with their design. Technically, the





*Poclain Technicast Team.
From left to right: Yann J., Christian D., Eric C., Rahul J.*

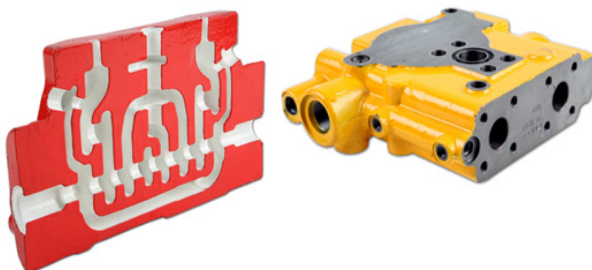
customer faced complications due to the electrical welding process used to complete the design, and needed to reduce weight as well as cost.

The team worked with the customer and using design simulation software, proposed that the part be produced as one piece with the Poclain Technicast casting process. After further evaluation of the project, Poclain Technicast was able to help the customer realize a reduction in weight of over 25% and double the production efficiency by using two cavities per mold as opposed to one. Overall all improvements resulted in 30% cost reduction for the customer.

Another instance where Poclain Technicast added value through their technologically advanced processes was for a construction industry customer who was faced with

needing to reduce a high scrap rate on their complex hydraulics valve bodies. Originally, the customer was producing the hydraulic valve body at another foundry using hot core boxes. Due to high content of resin and complex geometry with multiple inner channels, the rejection rate was up to 65%. This made the part very costly and the process unstable. Poclain Technicast developed a plan to produce the cores in cold boxes. Within one year, the rejection rate was reduced to 10%, and after further capability studies and improvements, the part is now delivered with less than 3% rejection.

With full integration to Poclain group, Poclain Technicast has global sales, design and logistics support to offer one stop solution with local support to its customer for their global complex casting needs at their multiple sites.



Official Website:
www.poclain-technicast.com

STRAIGHT FORWARD DESIGN INTEGRATION FOR COMPACTORS

Customers demand a rugged machine that delivers high efficiency with low ownership costs. “The hydraulic components of the machine are pivotal components of the drive and vibration functions representing around 20% of its overall price. We understand that the OEMs require not only high quality and performance, but simple, straight forward design integration with competitive pricing. Our 30 years of experience in compaction along with our continuous drive to innovate and improve allows us to deliver on those requirements,” stresses Olivier Le Maire, Poclain Hydraulics Platform Business Manager for Road Machinery.

As engine emission standards become more stringent, compactor OEMs must design machines capable of reaching the same performance levels, while consuming and emitting less. A consequence of the new emissions standards is that engines must be equipped with bulky anti-pollution devices, such as the Diesel Particle Filter. Integrating these devices into the machine is challenging due to space constraints. In order to free space for a larger engine on soil compactors, the experts at Poclain Hydraulics have worked to design an easy-to-integrate, high quality performance, space-saving solution that replaces the rear axle with two MS wheel motors while using Poclain TwinLock circuit for permanent traction control without additional electronic devices. We also offer another economical solution with hydraulic traction control. The traction control between front and rear can be managed by twin pumps, one to drive the front motor and the other to drive the rear motors. A simple

Poclain Hydraulics FD-M2 antiskid valve controls the traction between the left and right motors. The motors and their radial piston technology can operate at maximum 450 bar / 6,525 PSI and cover a broad displacement range, from 172 to 30,000 cc (10.5 to 1,830 cu.in/rev.). Thanks to their high torque low speed technology, these motors drive the wheel directly, without requiring a gearbox. The space freed between the rear wheels allows the OEM to lower the engine and the center of gravity of the machine for a safer and more stable machine on steep grades. This in turn makes transfers between sites easier and gives the operator more rearview visibility. The reduction of machine length also optimizes the machine for export, allowing for a more compact and easy fit into shipping containers.

As for asphalt rollers, priority is given to the quality of compaction and of the asphalt finish, while optimizing the number of passes the operator needs to make. This requirement is easily met when the front and rear vibration frequency are independently managed. Speed management of the fixed displacement motors is possible using two pumps mounted on the transmission pump and coupled to the engine. The three-pump and engine assembly must be integrated under the cab and across the asphalt roller, so compact design of this assembly is key. Consequentially, Poclain Hydraulics has developed the new PM pumps, a range of $\frac{3}{4}$ duty pumps operating at 400 bar / 5,800 PSI maximum pressure. They tolerate a higher pressure than medium duty pumps and are more compact than heavy duty pumps. They deliver the optimum

compromise between compactness and pressure level. Thanks to their compact design, an assembly comprising of three Poclain Hydraulics PM pumps is easily integrated into an asphalt roller for transmission and vibration.

Driving the drum poses another set of constraints: the motor must be compact, robust and capable of withstanding high radial loads due to the vibrations and tough working conditions. The Poclain Hydraulics MS and MK motors meet these requirements handling accelerations up to 20 g. Direct coupling to the drum improves weight distribution, eliminates backlash and provides smoother operation at low speed when compared to high speed motor and gearbox assemblies. For 8-14 ton rollers, the 18 size MS motor and its compact bearing support is robust and long-lasting. With a compact bearing support that is directly mounted to the drum, it is available in displacements ranging from 1 to 2.8 l (61 to 170 cu.in/rev) and provides a braking torque up to 19,000 Nm. Moreover Poclain Hydraulics has recently launched a high-volume, cost-effective production line program exclusively dedicated to our MS18 motors.

As for the walk-behind rollers with independent drive and vibration systems, compact size and cost-effective integration are the primary requirements. Poclain Hydraulics has designed the PMV0, a variable displacement pump (7 to 17 cc, 0.4 to 1.3 cu.in/rev) with a drive-through shaft, which enables assembly in line with the engine, the transmission pump and the vibration clutch.

“North America has recently made a lot of changes to optimize our facility, as well as our customer support and product development teams to deliver a superior customer experience. We have implemented local product line production close to the heart of their respective markets to facilitate more efficient delivery of product to our customers when and where they need. Due to the highly technical nature of our business, our distributors and their customers benefit immensely from dedicated technical support. We have been working to enhance our customer-oriented team with truly local sales engineers and a dedicated team of application engineers for even more technical support for their projects. All of this has been done in the spirit of true partnership with our customers.”
Markus Rauchhaus, General Manager-North America.



SOIL COMPACTOR
1. MS motor for wheel drive
2. MS motor for drum drive
3. PM tandem pumps for drive
4. Traction control valve

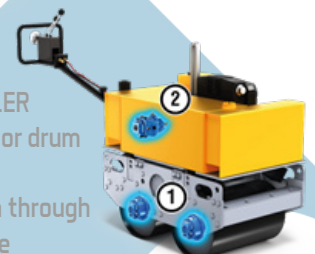


DOUBLE DRUM ROLLER UNDER 4T
1. MS or MK motor for drum drive
2. PM pump for drum drive
3. Traction control valve (option)

DOUBLE DRUM ROLLER OVER 4T
1. MS motor for drum drive
2. M motor for drum vibration
3. PM triple pumps for drive and vibration
4. Traction control valve for split drum



WALK BEHIND ROLLER
1. MS or MK motor for drum drive
2. PMV0 pump with through shaft for drum drive



CREEPDRIVE™ EXPANDS MOTOR OFFERING

Poclain Hydraulics is set to expand its CreepDrive™ offering by developing an additional motor that will address a wider range of applications. This new concept will be presented this year at IFPE/ConExpo and will be available on the market in the beginning of 2018.

CreepDrive™, Poclain Hydraulics' mechanical-hydraulic transmission, allows vehicles to work at low consistent speeds while maintaining the high engine RPM that auxiliary systems require to effectively perform work. When the system is disengaged, vehicles are able to drive at normal speeds on-road with no mechanical transmission efficiency losses. The full Poclain Hydraulics CreepDrive™ system offering includes a range of motors; a PW pump; the SD-CT ECU system management and CAN bus communication; as well as the CreepDrive™ Box, the systems plug & play control box.

The new CreepDrive™ motor will offer both a single and two-speed option with two displacement ranges. Other new features include a reinforced shift cylinder and shaft seals as well as an extremely robust package.

With these new features, the new motor also brings a wider consistent low speed range and a significant gain in torque to the table. This allows for integration onto a wider range of vehicle applications where slow constant speed and accurate positioning are pivotal. Applications include: road maintenance & road marking/stripping, snow cutting, bridge inspection, rail track maintenance, airport

& road sweepers, mulching/chipping, suction dredging, and slinging amongst others. The motor's size and weight features were designed to meet the needs and requirements of modshops, boasting a lighter weight than comparable products while delivering the hybrid mechanical-hydraulic solution that operators of these types of applications are seeking.

The CreepDrive™ systems allows the customer to break the link between high engine speed and ground speed in order to have very precise control yet maintain the higher fixed rpm for the other functions. CreepDrive is designed to include two independent transmission types: a mechanical and a closed loop hydrostatic.

To enable the hydrostatic ground drive, the vehicle brake is applied and the mechanical transmission is set to neutral while the engine power take off is engaged to drive the pump that supplies flow to the system hydrostatic motor. A switch located in the cab engages a pneumatically controlled mechanical clutch which disengages the mechanical transmission and engages the hydrostatic transmission.

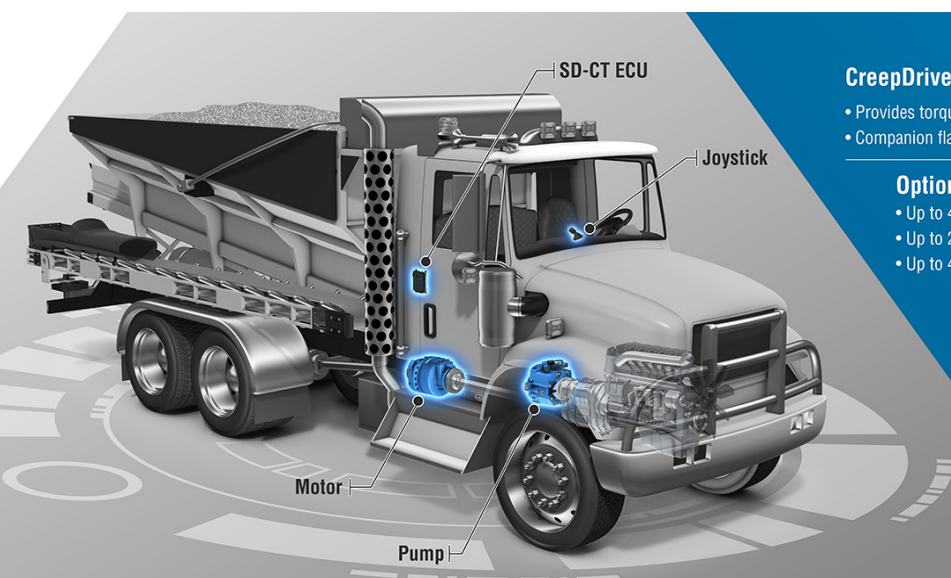
The driver sets the engine speed to the desired working rpm and, after releasing the brake, moves the joystick in the desired direction.

Consistent low working speeds (0-9mph) are achievable in both forward and reverse directions. When traveling at on-road speeds, the clutch is disengaged and the mechanical transmission works at appropriate speeds.



CreepDrive™ eliminates the added stress on braking and clutching seen when working at low speeds as well as the subsequent maintenance required to maintain those systems in working order. Replacing friction braking with hydrostatic braking acting as an integral decelerator

reduces the need to feather the brakes. This allows for more precision and less opportunity for error helping operators to increase safety and productivity. The full CreepDrive system will be on display at the Poclain Hydraulics IFPE/ConExpo booth #S81640.



CreepDrive MOTOR

- Provides torque to the main driveshaft
- Companion flange or end yoke

Option 1

- Up to 40 kW
- Up to 200 rpm
- Up to 4 300 N.m

Option 2 (in development)

- Up to 100 kW
- Up to 350 rpm
- Up to 15 000 N.m

PW PUMP

- 96 cm³/rev.
- Up to 233 kW
- Up to 3 650 rpm
- Up to 450 bar

SD-CT ECU

- System management and CAN bus communication with the truck

CreepDrive BOX

- Simplifies system installation on vehicle
- Electronic control unit
- Joystick and display
- Start, stop and emergency stop buttons
- Plug & Play control box

INTRODUCING YOUR SKID STEER EXPERTS

Over the past year, Poclain Hydraulics has organized a team of experts dedicated to the skid steer and compact track loader markets. The structure of this new organization brings a variety of roles together to focus on the specific needs of

With the Platform organization, Poclain Hydraulics installed the capacity and capabilities needed to further center the customer in our focus. The skid steer loader and compact track loader platform holds over 60 years of technical



the OEMs and end use customers on a global level.

Corey Reynolds is the Platform Manager. He leads his team's long term strategy and brings a level of integrating customer requirements into hydraulic system design. Corey's history with Poclain has been dedicated to ensuring the proper product is delivered to meet market demands.

and industry experience amongst its team members. They are committed to understanding the challenges facing the market and developing a product offering that helps OEMs efficiently deliver more value and a better user experience. The goal of the platform team is to increase Poclain Hydraulics' market and customer understanding which in turn allows



Poclain Hydraulics Team. From left to right: Corey R. - Platform Business Manager, Katie P. - Platform Marketing Manager, Homer H.- Platform System Engineer, Jasraj S. - Platform Project Manager.

the team to better anticipate the future requirements of these machines and deliver solutions to market faster. The team is comprised of a system engineer, with a strong background in application and OEM integration, a project manager with an extensive history of global product development projects, and a product marketing manager who provides voice of customer, market trend analysis, and feature/benefit alignment.

Together the team works to optimize the current Poclain Hydraulics skid steer product offering in terms of product range, features, and price, while balancing performance and cost requirements. The team works to both enhance existing products and to champion research and development of future products for Poclain Hydraulics' skid steer and compact track loader offerings.

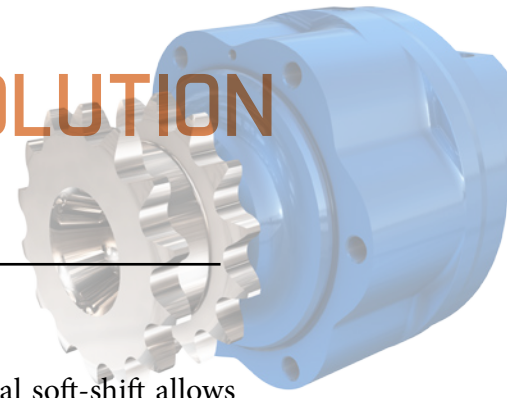
The team, which is located in North America, aligns with Poclain Hydraulics' global network. They have used their knowledge to create a standard offering for

many small to mid-size customers. They are empowered with the tools, expertise, and more-over individualized focus to anticipate the needs of their customers, and to drive internal and external factors to deliver a product offering that best fits the needs of their specific market.

"It is our goal to listen to the voice of the customer and anticipate not only the OEM's needs but also the end user's. We want to deliver innovative products that help OEMs speed up time to market and deliver a more productive and effective machine to their customers. Skid steers are one of the most versatile machines on

a jobsite, though they are small, they complete many different tasks. Their uptime is critical for a smooth and profitable jobsite, we want to ensure our products help make that happen." Katie Pullen, Product Marketing Manager, Skid Steer, Compact Track Loader, and Harvester Platform-Poclain Hydraulics.

SKID STEER SUCCESS EVOLUTION OF POCLAIN HYDRAULICS



Poclain Hydraulics has a long history of developing solutions for the skid steer platform. The successful MSE02 and MS05 range of motors fit the needs of a vast array of machines including skid steers thanks to their modularity. These modular features include a variety of braking options and bearing supports, as well as multiple options for speed sensors, integrated flushing valves amongst other features that an OEM can select to fit the specific needs of their machine. Understanding what modular features that best benefit the skid steer market was a key step in the development of the ML series, the line of Poclain Hydraulics motors dedicated to the skid steer platform. Poclain Hydraulics has taken the well-received attributes of the MS series and applied them to these motors, which were designed with the particular needs of skid steers in mind. This design helps OEMs to realize benefits such as quicker in-factory assembly time and part number reduction.

Poclain offers a robust solution for the skid steer market in its ML06 and MLE06 motors, which were originally introduced in 2007. The motor offers an axial compactness that rivals other motors in the market place. This allows for more internal space for the engine and other components while adding efficiency gains that deliver the increased power to the ground, productivity and tractive effort that operators find so necessary in many applications including construction site heavy lifting transportation efforts. This motor was developed with both the OEM and the end user in mind.

The ML06 motor incorporates a number of features developed to directly benefit

the end customer.

Two speed bi-directional soft-shift allows for a smooth transition from one gear to another. As the rougher sensation felt by the driver on the upshift is generally perceived as added power, the soft shift mechanism is only applied when down shifting thus taking into account the full experience of the end operator and adding to the overall perceived value of the machine. This motor was also designed to take into account the frequent stops/starts common in construction sites. By delivering a greatly increased level of starting torque when alternatively compared to other motors on the market, the ML06 delivers a higher level of productivity for skid steers on the job site.

Poclain Hydraulics understands that it is critical to spend time around operators and their machines. One goal of product development at Poclain Hydraulics is to solve problems that operators encounter, but it is also necessary to work hand in hand with OEMs to develop a solution that best fits their machine's particular specifications. The success of the ML06 and MLE06 was obtained by working with cross functional teams comprised of engineering, purchasing, product management, and marketing at OEMs and within Poclain. When working with OEMs the design process puts heavy emphasis on providing robustness, longevity, a long service life as well as the validation of the product itself. The ML series is a great example of this. With a dedicated design, the ML06 gives the OEM all the benefits of a motor specifically customized to their skid steer while bringing the added benefit of a proven, tried and true solution.

BREAKER TECHNOLOGY

Breaker Technology (BTI) is the leader in Rock Breaking Technology. Based in Canada, BTI manufactures and distributes a wide range of mine, quarry, construction and demolition equipment. This range includes mobile equipment for underground mining that uses Poclain Hydraulic drive systems. (HWD)

The ScaleBOSS 3D & 3DE, are two innovative underground Scalers from BTI. The ScaleBOSS 3D was exhibited at the 2016 MinExpo in Las Vegas, NV. Both of these models use a complete Poclain drive system with a P90 pump, MS18/MSE18 motors, a SmartDrive Easy ECU for the transmission control, and a SmartDrive CT 200 for the antiskidding system. As this machine has special needs in terms of driving modes and safety norms, the electronic transmission system has been adapted to easily communicate with external devices and controllers that are specific to that application. For example, the SmartDrive system provides a dedicated mode for the rock breaking

tool and has a specific automatic parking brake application function. The system has been developed and adjusted to achieve the high performance required in mining applications in the areas of productivity, comfort, safety and efficiency. The SmartDrive anti-skidding system allows the machine to achieve better gradability and controllability without any intervention from the driver.

The combination of Breaker Technology's expertise in machine design and Poclain Hydraulics expertise in driving control results in a high performance machine on the mining market.

"The feedback to date from our customer in Mexico that purchased the prototype ScaleBOSS 3D unit is that they are very happy with the unit, specifically complimenting the ease of operation with the smooth control in both tram (power) and dynamic braking modes. Both models employ BTI's patent pending ABT Control System™ -Advanced Braking and Tram Control System." Brad Toole, Engineering Manager, BTI Canada



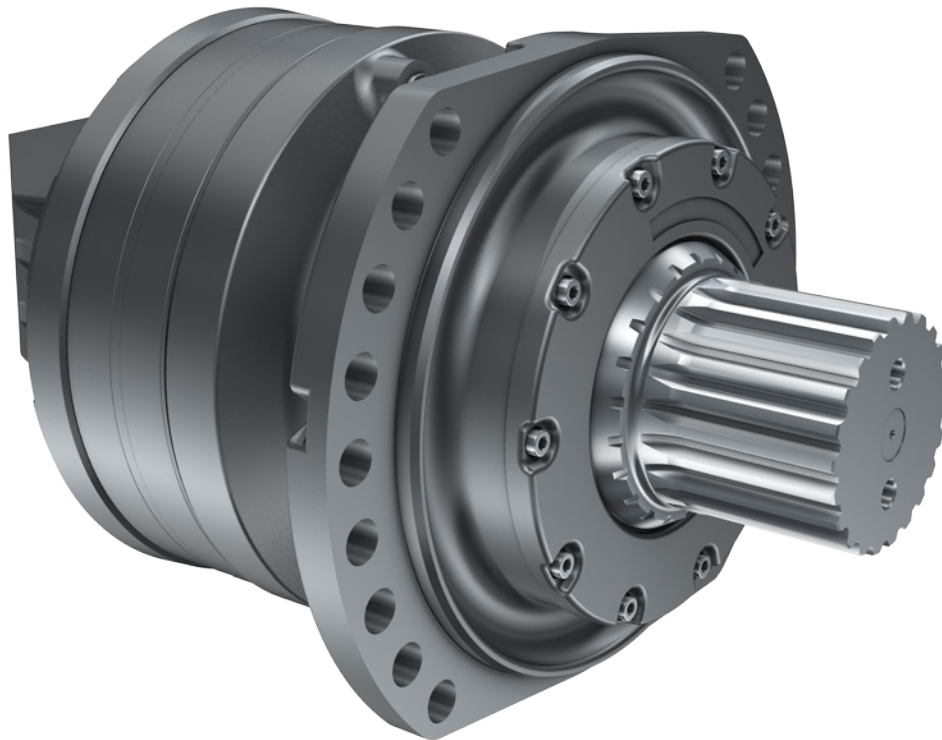
MHP MOTORS

Off-road vehicles are designed, purchased and used with a principal objective: higher productivity, followed by cost reduction at all stages of the vehicle life: manufacturing, purchase and ownership. OEMs take the two factors into account and deliberately select innovative components that perform better, last longer and reduce fuel consumption.

Transmission systems are critical when it comes to optimizing productivity. Poclain

MHP motors are the result of a number of years of research, development, and testing. They set new standards in cam-lobe motor technology regarding performance, reliability, lifetime and efficiency.

They raise the bar on performance limits for rotation speed and power, the principal features that improve the performance and productivity of the applications they equip.



Hydraulics hydrostatic transmissions meet the OEMs' high-performance requirements, and even more so with the MHP range (HIGH PERFORMANCE motors).

In addition, the MHP motors are designed to withstand the extreme working conditions of mobile and industrial applications. The braking function offers

the same ruggedness, with a high level of energy absorption and a braking torque that is directly applied to the wheel.

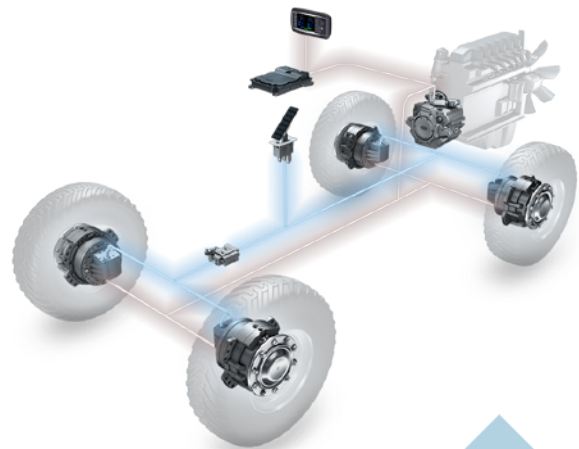
The sales of the MHP20/27 motor picked up rapidly as soon as they were launched on the market. The technology appealed to manufacturers that need the higher productivity and the unparalleled performance of hydrostatic transmissions, as well as manufacturers whose requirements were out of reach for Poclain Hydraulics' standard motor configuration including manufacturers of injection molding machines, hoists for material handling, and horizontal and vertical drills. The MHP motors bring a compromise of not only power and maximum speed, but also longer lifetime to these motors. They are a perfect addition to the modular MS range, as they meet the requirements of new functions and applications.

The customers who have integrated the MHP motors agree it provides high power in a compact design and high-efficiency levels. Off-road machinery OEMs particularly appreciate the displacement ratio, as high as four. This feature enables use of the full displacement and maximum torque of the motor in work mode, while reaching high traveling speed on the road. In addition to the high displacement ratio, the MHP motor provides up to four displacements. The act of shifting speeds is smooth and comfortable on the entire operating range because of the judiciously placed ratios, without hindering efficiency.

Another segment of OEMs, who design high-speed mobile machinery, appreciate the boosted brake. It provides optimal hydrostatic braking for the entire range of displacements. Last but not least, the wide range of bearing supports makes designing and integrating the motor into the transmission simple.

The load-bearing capacity of the bearing supports is aligned with the new tires that feature high diameter, load bearing capacity and speed. They can also integrate a parking brake, a service brake or a combined brake.

The MHP range is about to expand: the concepts developed for the sizes 20-27 of the MHP will soon be available in additional sizes.



HIGH PERFORMANCE

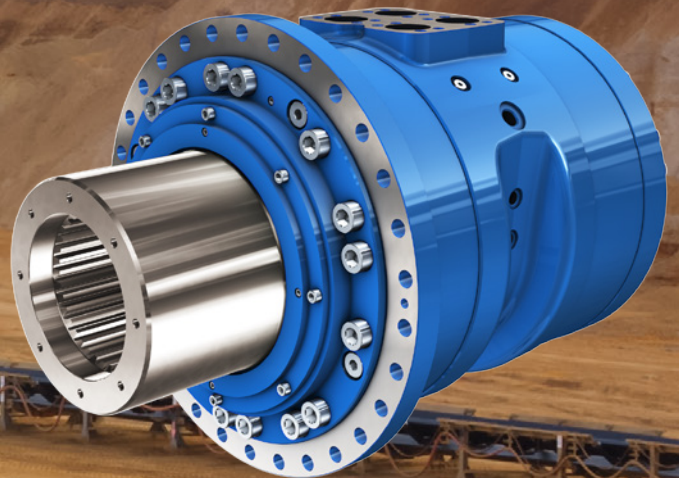


MI250:

THE NEW HIGH-DISPLACEMENT
MOTOR

CHARACTERISTICS

- Weight: <950 kg (2094 lb)
- Overall length: 900 mm (35 in)
- Diameter: 520 mm (20.5 in)
- Displacement: 17,500 cc/rev (1037 cu.in/rev) to 30,000 cc/rev (1830 cu.in/rev)
- Max. speed at 30,000 cc/rev (1830 cu.in/rev): 60 rpm
- Max. pressure: 450 bar (6,527 psi)
- Max. torque: 140,000 Nm (1,240,000 lbf.in)
- Efficiency over 90%
- 2 or 4 DN38 ports with flat port for flanges valves
- 2 drains and 2 pressure gauge ports



VERMEER : ONE OF OUR LONGEST-STANDING CUSTOMERS

Vermeer is a leading manufacturer of high-quality underground construction, surface mining, tree care, environmental and agricultural equipment, and is also one of Poclain Hydraulics, Inc. North America's longest-standing customers. The two companies have a relationship going back over 30 years, starting with the introduction of the Vermeer T655 trencher, which went into production in 1991. Poclain Hydraulics has worked with the mining and pipeline division on a number of successful projects over the years, including the recent integration the MS83HF motor as a drive solution on their T655III rockwheel attachment.

The T655III tractor has been in production for a number of years, but a Vermeer-made rockwheel attachment on this machine hasn't been offered since the early 1990s. Vermeer recently noticed a greater need in the market for a rockwheel attachment, and wanted to deliver a Vermeer-made option suited for use with their machine. The team that worked on this project has decades of history working with Poclain Hydraulics. It consisted of Jeff Flahive, engineering manager; Jason Morgan, senior project engineer; and Tyler Sikora, design engineer for the project. This team worked closely with the team at Poclain Hydraulics led by Mark DeBruine. The goals of this project were to provide a 48" (121.9 cm) depth of cut with a robust and reliable rockwheel attachment that met the specific wheel speed range and price points demanded by the market. The team working on this project had an extensive history developing rockwheel

attachments, and considered early on a drive solution consisting of a headshaft with dedicated bearings and a torque arm mounted motor. This solution, however, was only deliverable at a price point that the market wasn't willing to pay, leaving Vermeer to look for a more cost-efficient drive solution that could meet their goals for efficiency and robustness.

In partnering with Poclain Hydraulics for the drive system on this project, Vermeer was able to put together a solution that met their needs in terms of being able to deliver a competitively priced high-torque, low-speed motor with adequate power rating and internal bearing capacity. This project required the motor to resist the high radial loads of the rockwheel.

"The big advantage [of this motor] is that when you buy the motor, you get the bearings as well—bearings that are capable of living in that condition," said Morgan. Poclain Hydraulics proposed the MS83HF motor, and provided documentation of the efficiency gains.

"During initial testing of the new T655III rockwheel, we noticed right away the decrease in no-load drive pressure of the MS83HF compared to the standard MS83," said Morgan.

The lower pressure drop of the MS83HF not only allowed the system to bring more horsepower to the ground, but can also help to cut costs on cooling systems due to high efficiencies. The MS83HF efficiencies free up more engine power to feed the attachment.

"What that [lower pressure drop] results in is more power to the ditch, which can help improve production. It also takes heat load



out of our cooling circuits when compared to a standard MS83,” said Flahive.

The new MS83HF statically determinate drive system offers a higher efficiency resulting in a more competitive solution.

Another distinctive attribute of the Vermeer T655III rockwheel is the new patent-pending drive mounting system designed by Sikora. At the beginning of the project, when two MS83 HF motors were specified to drive one rockwheel, Vermeer knew they had to develop a mounting system to tolerate misalignment between the sides of the cutterbox structure and the motors/cutter wheel assembly.

The new mounting system made this configuration possible. Unique to the market, this mounting system nearly eliminates motor and cutterbox loading due to misalignment of the cutterbox to the motor/cutterwheel assembly. Poclain Hydraulics provided responsive support for the development of this unique mounting system by running many

iterations of bearing life calculations as well as providing studies on motor drive flange strength.

The T655III is a versatile machine with uses ranging from utility installation to architectural stone cutting. The efficiency gains realized in this project resulted in upgrading MS83 motors to the MS83HF onto other rockwheel applications at Vermeer including the T555 Commander® 3 rockwheel and the CC155 concrete cutter.

“The experience with Poclain Hydraulics was positive and that experience would influence future decisions to use their products,” said Morgan.

The Vermeer mining and pipeline division covers a wide range of machinery and applications including dry utility installation such as fiberoptic networks to telecommunications, and wet utility installation such as water and sewer lines in addition to general pipeline installation and surface mining solutions.

GIKEN LTD.

Giken Ltd. is a Japanese company established in 1967 whose main business is the development of environmentally friendly construction solutions, manufacturing and sales of construction machinery and development of automated underground facilities. In January 2017, Giken Ltd. celebrates its 50th anniversary. Giken Ltd. was founded to reduce construction pollution that was recognized as a major source of environmental contamination at that time.

In 1975, Giken Ltd. released the press-in machine, “Silent Piler”, first in the world. With its light and compact machine, Giken could overcome many common obstacles seen under

construction at the time and reduce construction pollution due to piling work. The press-in machine uses reaction forces derived from fully installed piles which are anchored to the ground and forces a pile into the ground with a static load as the machine works with the earth to generate enormous energy with its compact body. “The press-in method” has accomplished impressive results in more than 30 countries worldwide.

In 2003, Giken Ltd. newly developed rotary press-in machine “Gyro Piler” based on “The Press-in Principles”. The Gyro Piler is equipped with a Poclain Hydraulics motor. It enables tubular piles to penetrate through boulders, existing structures or buried obstructions by attaching cutting bits on the bottom of the piles and rotating them. A rigid structure that can withstand

earthquakes and tsunamis is realized by the piles as their structures and supported by the earth.

Also, the entire process of press-in work including transportation, pile setting, and press-in work can be completed on top of the installed piles. It realizes rapid construction work under tight conditions, such as narrow spaces over water or sloping ground because no temporary

work is required. “The Gyro Piler”, which can swiftly press-in piles to establish rigid structure while saving



Retaining Wall Construction Work with Gyro Piler

workspace, has been widely adopted for construction work, such as reinforcement of earthquake-proof and tsunami-resistant levees and aging retaining walls, construction of railroad embankments, reinforcement of bridge piers, protection of tanks and quay walls from erosion, and prevention of landslides in mountain areas.

In the early phase of development of the “Gyro Piler”, the rotating part consisted of a hydraulic motor and reduction gear due to placing more emphasis on rotation torque than on rotation speed. However, it was found that work efficiency could be improved with smaller rotation torque and quicker rotation speed depending on ground conditions by analyzing the work data.



Tubular Pile with cutting bits

Therefore, Giken Ltd. adopted a hydraulic motor (MS50) produced by Poclain Hydraulics for the newly developed Gyro Piler in 2004 that does not require reduction gear. It then realized improvement of pile rotation speed and a reduction in size and weight of the machine compared to conventional models.

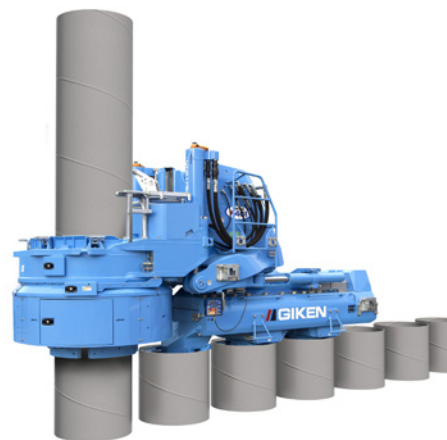


Levee Reinforcement Work with Gyro Piler

As a result, the maximum rotation speed realized was three times as quick as that of conventional models. It can generate high rotation torque (the maximum hydraulic output is 45MPa). Furthermore, the size and weight of the machine and noise generation were reduced with the Poclain motor. Due to abundant variations of

hydraulic motors produced by Poclain Hydraulics, its products have been adopted into the latest models of the Silent Piler regardless of their size.

The chuck driving part must be able to rotate continuously with high output and durability so that the Gyro Piler can repeat press-in and extraction constantly. Rotation speed must be adjusted depending on the



*The Latest Gyro Piler
F401-G1200*

ground conditions and it must maintain stability and efficiency even at low speed. Moreover, the hydraulic system requires high drain pressure resistance in case the press-in machine and power unit are set away from each other.

As a basic philosophy of development, Giken Ltd. has defined the ideal state of the construction industry as the “Five Construction Principles”, consisting of Environmental Protection, Safety, Speed, Economy, and Aesthetics. By developing machines and construction solutions which satisfy the Five Construction Principles with a well-balanced pentagon, Giken Ltd. has promoted the “Construction Revolution” which realizes a “Re-born Construction Industry” based on science.

IN FOCUS: POCLAIN HYDRAULICS DISTRIBUTORS



2017 marks a year of renewed focus on our distribution network in North America. Distributors strive to bring value to their customers by delivering a hydraulic system that will meet their OEMs' machine specifications and desired outcome. Through their close relationships and understanding of the machine architecture of the many OEMs in North America, they are in the best position to define the solution that carries the most value for their customers. Poclain Hydraulics wants to do everything in our power to foster and augment the value that our distributors deliver through our solutions and expertise. Scott Betzen, Global Director of Distribution and North American Business Development, weighs in on what this means for Poclain

Hydraulics distributors in 2017.

What does your new role bring to the table for Poclain Hydraulics' distributors?

My newly defined role will bring a renewed focus to working with our distributors to ensure they have the tools, training, and necessary resources in place to best facilitate their success in bringing a valuable solution to their clients. Another part of my role is to listen to the distributors, to better understand how they work with their customers and to identify areas of difficulty and then develop and champion initiatives that address them.

What have you identified so far, in other words, what can distributors expect to see in 2017?

First and foremost, our distributors can expect more communication from their sales and support team here at Poclain. We will be working with our distributors to better align our mutual sales goals/targets and develop an agreed upon action plan that help to measure results and create a more positive sales experience and relationship with our distributors.

Our distributors can also expect to benefit from a stronger format for product training with opportunities for our distributors to attend trainings both formally here in our Yorkville facility, as well as on-site at the distributor. We have a strong technical curriculum for our distributors that attend our on-site trainings, which are planned throughout the year. This program is something we plan to continue to build

on, as it is very highly reviewed by our attendees. Our attendees benefit from hands-on training, as well as an in-depth exposure to our full product line. Attendees are able to gain a better understanding of potential applications for our full product lines - from motors and pumps to valves and electronics, as well as a stronger grasp of the modularity and flexibility of our products. In 2016 we completed three on-site trainings in our Yorkville facility. We also offer product specific trainings for our distributors who are looking to grow their understanding and expertise in a specific product line, like our valves for example.

Why has Poclain Hydraulics decided to take this path of renewed focus on distributors?
We recognize the importance of the

distributor in the North American market, not only the value they provide to the OEMs, but the relationships and trust they hold with their customers. Our distributors understand their customers best and we want to support them in developing solutions that fit the needs of the many OEMs in North America.

We are dedicated to the success of our distributors and their customers. We want to ensure that when our distributors are working with their customers they have the knowledge and resources necessary to identify when a Poclain product could help them in their quest to deliver a robust solution to their clients, because when our distributors succeed, we succeed.



DISTRIBUTOR SPOTLIGHT: FLINT HYDRAULICS

Flint Hydraulics is a long-standing distributor for Poclain Hydraulics, located in Memphis, TN, USA. Beyond the typical project-based collaborations, Poclain Hydraulics' partnership-like relationship with Flint Hydraulics is rather unique in that Flint Hydraulics helps to make Poclain Hydraulics motors more readily available to operators that require quick repairs when they most need it. Flint Hydraulics prides themselves on the ability to modify, reconfigure, and repair hydraulic components for quick-turn or even next-day shipment for aftermarket use in heavy equipment. They also offer engineering and design services for machinery in a wide range of industries and applications including: construction, agriculture, timber harvesting, marine, dredging and

sludge pumps, plastic injection & blow molding, as well as mining.

Flint Hydraulics also specializes in servicing large fleets and contractors as a service center. They work with these types of customers in North America as well as abroad. This unique set-up has in part been facilitated by Flint Hydraulics' expert understanding of Poclain Hydraulics model codes and motor codification.

Andy Malmo, Flint Hydraulics noted, Flint Hydraulics, Inc. has evolved from a single product line repair and service facility into a multi-line distributor of hydraulic, electronic, and power transmission equipment. With its main focus of providing components, parts, and complete assemblies for same or next day shipment, the traditional distribution



From left to right: Steve L., Chief Operating Officer, Flint Hydraulics - Bob F., Regional Sales Manager, Poclain Hydraulics - Alan S., District Sales Manager, Poclain Hydraulics.



model doesn't hold true. As a result, Flint Hydraulics, Inc. stocks a wide array of parts, assemblies, and complete motors, ready and available for modular assembly and immediate shipment.

With the attributes of superior quality, long service life, modular design, competitive pricing, and excellent customer service, our relationship with Poclain is indeed a partnership that is tailored to our specific needs."

Over the years, Poclain Hydraulics has worked closely with Flint Hydraulics, developing a good partnership. This partnership has helped cultivate Flint Hydraulics' expertise and knowledge of Poclain Hydraulics' products and to allow them to develop the right mix of on-hand stock needed to best anticipate the needs of their customers.

Poclain Hydraulics sales engineers work as a team with the experts at Flint Hydraulics to specify motors in multiple pre-determined configurations that will allow Flint Hydraulics the stock needed

for the widest possible product range. With Poclain's modular design of motors, Flint can easily configure a motor to the customer's specific needs for same or next day shipment. This service allows their customers to get machines back in service and maintain profitability, while making Flint Hydraulics an invaluable resource for a wide range of customer's world-wide.

"Flint Hydraulics works with a number of Poclain Hydraulics motor ranges from MS02 to MS35 in various configurations and quantities. The modularity of these motors allows them to easily rebuild them into the specific configuration their customers require. This and the commitment that they have made to stock Poclain Hydraulics products positions them with a unique advantage in their market place, and delivers a much needed service to the end-customer."

Bob Fair, Poclain Hydraulics South East Regional Sales Manager.

CROSS COMPANY CREEPDRIVE™ SUCCESS

Cross Company's Mobile Hydraulic & Control Systems Group and Poclain Hydraulics have a strong history of collaborative work. As Cross Company's experience spans a range of machines, they have a strong understanding of the needs of a number of different applications. Cross Company has become a champion of the market-driven CreepDrive™ system, helping to adapt the system to fit the needs

include two independent transmission types, mechanical and closed loop hydrostatic, making it a strong solution for vehicles that have low work speeds but also high engine RPM. From gravel spreaders, bridge & tunnel inspection trucks, and rail service trucks, to livestock mixers or feeder trucks, remote control concrete mixer trucks or aircraft de-icers and others, CreepDrive™ helps operators



of an even wider range of applications. In conjunction with Poclain Hydraulics and Kar-Tech, Cross Company has become a distributor that is now able to offer their customers a remote control application option for the Poclain Hydraulic CreepDrive™ system. The addition of a remote control solution for the CreepDrive system allows for more efficiency and precise positioning on a wider range of equipment. CreepDrive™ is a system designed to

to improve productivity and job quality. CreepDrive™ helps to reduce brake and clutch use and subsequently service and fuel consumption. Cross Company's partnership with Kar-Tech widens the use of the system for work that requires the operator be on the ground next to the work being done.

Other systems share the "hydraulic hybrid" status, but they are entirely different in application. CreepDrive™ employs two drive systems on the same vehicle. That



represented a few different challenges to design. For the mechanical transmission to function, the drive shaft must still transmit motion to the drive axle in an unencumbered way. A normal in-line hydraulic motor cannot be used because it would have to spin at high *rpm* with no oil flow while the mechanical transmission is functioning.

For the hydraulic drive system to function, the hydraulic motor must not be allowed to transmit motion back into the mechanical transmission, but must transmit motion to the same set of wheels. This essentially requires that each system be mutually exclusive. Each system needs a fool proof, on demand “towing” mode.

Poclain Hydraulics engineered an inline motor that incorporates a “clutch” for on-demand engagement. The truck drive shaft is cut and coupled with the input and output of the CreepDrive™ motor. Its internal design is such that when the motor is disengaged, it is little more than a shaft riding in a bearing carrier. When the motor is engaged, the rotating group is connected to the shaft that was previously free spinning. To provide flow to the circuit, a variable displacement, closed loop piston pump is run from the PTO of

the mechanical transmission.

The brain for logic functions is Poclain’s SmartDrive ECU. Its programming prevents overlap in the use of the mechanical and hydraulic drive systems.

Poclain Hydraulics’ CreepDrive™ box is a packaged control box with a basic array of controls. This box is best suited for in cab or on-chassis operation. When the application requires remote control, a solution is easily integrated. Cross Company partnered with Kar-Tech to make this possible. Kar-Tech specializes in providing pre-programmed receivers and transmitters in countless configurations. This solution makes it easy to find a receiver to fit any application to map inputs and outputs to match the SmartDrive controller.

“Cross Company and Poclain Hydraulics’ partnership made it possible to deliver a solution that offers full mechanical drive performance on the road with on-demand hydraulic drive and remote control capabilities. This partnership is a prime example of Poclain Hydraulics continued efforts to deliver solutions that benefit the end user and make their jobs easier.”
Bob Fair, Southeastern US Regional Sales Manager, Poclain Hydraulics.

FD-H2 : THE NEW HEAVY DUTY FLOW DIVIDER

After introducing the new medium duty flow-divider (FD-M), Poclain Hydraulics continued the development of its flow divider range by launching a new heavy duty flow-divider, FD-H2. The FD-H2 is built for applications working with pressures up to 500 BAR and will be available in two versions :

FD-H2-1 :
Controlled flow : up to 150 l/min
By-pass flow : up to 200 l/min

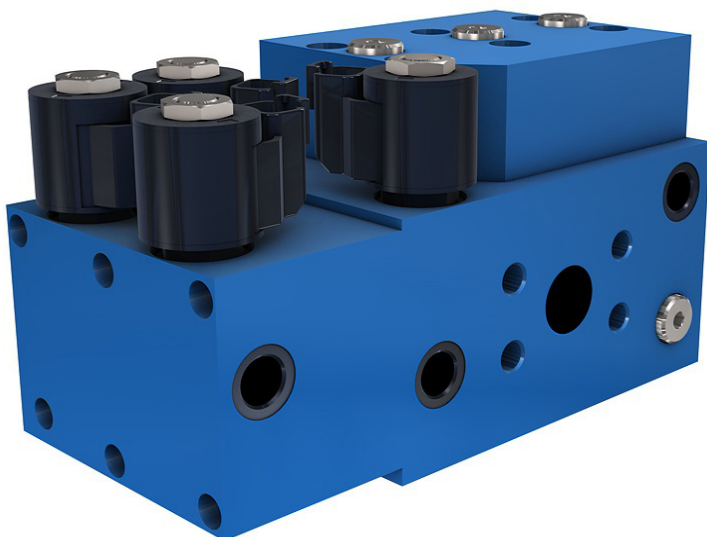
FD-H2-2 :
Controlled flow : up to 200 l/min
By-pass flow : up to 300 l/min

Following Poclain Hydraulics legacy, the FD-H2 is a compact and modular two-way flow divider/combiner that can be flanged or piped. This heavy duty flow divider is available with different dividing flow ratios and flow control. The by-pass can be controlled electrically or hydraulically.

More options like a pilot for auxiliary functions (up to three), a high pressure valve and a check valve can be added. If needed other functions presented in our catalogue offering (like freewheeling) can be added on the FD-H2 to offer a compact multifunctional valve.

FD-H2 represents a great improvement compared to our existing offering for heavy duty application in terms of performance. Our customers now have access to a valve that is able to reach high level of pressure (500 Bar) with low pressure drops in by-pass mode (2,4 bar at 250 l/min). These optimal performances are available on a wider range of working flows thanks to the FD-H2's innovative design, which provides great stability even at a lower flow (accuracy: +/- 12% at 20% of nominal flow).

Poclain Hydraulics, as a global leader for hydraulic power transmission, supports their customers through innovative solutions that continuously reach new standards of performance .



NEVER GET STUCK

PIONEERING AWD SOLUTION





GET IN THE GAME

Visit Us at IFPE/ConExpo booth #581640

