

GETTING BETTER WITH AGE

HYDRAULICS IS A DYNAMIC, CONTINUOUSLY DEVELOPING, INNOVATIVE TECHNOLOGY, THAT DESPITE ITS LONG HISTORY, DOES NOT DESERVE THE PREJUDICE THAT CONTRASTS IT WITH EMERGING TECHNOLOGIES. IT MAY BE MATURE, BUT STILL HAS MUCH CAPACITY FOR INNOVATION

Technology innovation is sometimes now seen as focused on new emerging disciplines such as nanotechnology and bioengineering, or more recent and still developing ones such as ICT, robotics, and artificial intelligence. More traditional disciplines, such as mechanics and chemistry, are viewed as close to maturity, where the potential for innovation appears to be limited. Hydraulics is sometimes classified among this second class of disciplines and the market perception is sometimes of a more static and mature sector.

There is a certain level of maturity, after centuries of development. After all, industrial hydraulics started back in 1785 when Joseph Bramah designed and built the first piston-type hydraulic press. However, hydraulics today still has a vitality that shows it is still in the prime of its life. It is still unique, providing unparalleled torque, power and bandwidth for the same weight or volume, along with tremendous power densities. The technology can deliver 10 times the power of an electric system of the same size and space, and three times the power of the most powerful racecar engine. It is widely used in many industrial sectors, such as aerospace, agriculture, construction, manufacturing, medical, mining, oil

and gas, and transportation. And the number of applications, and the turnover of the sector, is constantly increasing in the medium term.

Dynamic sector

The dynamics of the sector show a number of developing directions that claim the attention of engineers and researchers and absorb large public and private investments. In particular, the efforts of the technical community aim to improve:

- Efficiency, for a lower and better use of energy;
- Reliability and maintainability;
- Compactness, for lower lifecycle cost (including a trend to multitask machinery designed for larger and integrated functionalities in the same machine);
- Environment and health, to meet the increasing and increasingly mandatory and more stringent requirements on safety, ergonomics, comfort, engine emissions, noise and vibration, and recyclability;
- New international regulations, mainly from Europe and North America, formalizing new targets in each field, further pushing for a deep development of the sector.

The main tools that can help hydraulic engineers to meet these

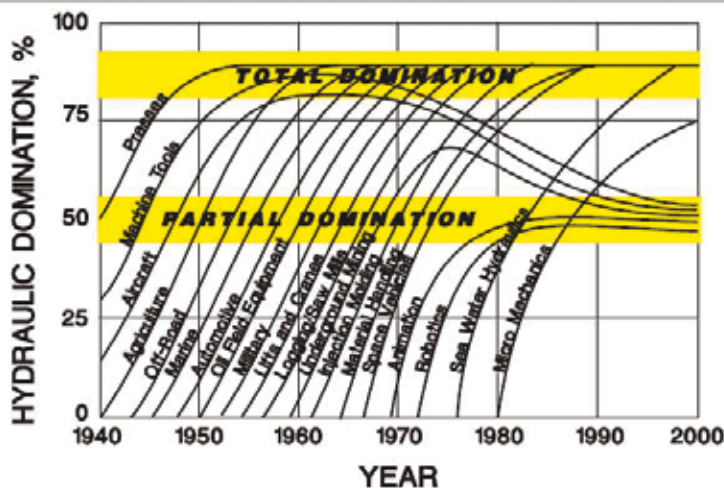
targets appear to include a focus on system integration to enhance the component performance, mainly using electronic control technologies; super components able to withstand higher pressures, progressively reaching the 10,000-20,000psi range, and temperatures with increased in power-to-weight and power-to-volume ratios; development of smart fluid-power components and systems, including self diagnostics and plug-and-play functionality; new materials for components, in particular hydraulic oils and elastomers that can take the higher mechanical and thermal stresses in hydraulic systems; simulation and modeling to visualize the engineering and reduce testing time.

New solutions

Manuli Hydraulics is a leading company in the field of hydraulic connectors and it constantly follows the developments in the field. The constant aim is to have effective and easy-to-use hydraulics through continuous innovation to create new products and solutions.

The company has recently introduced a new proprietary Eco-Tube Plus tube rubber with an innovative NBR-base compound formulation in all of its wire spiral hose ranges. Compared to the erstwhile product, the new Eco-Tube Plus compound has many improvements and advantages including: higher elastic modulus for higher resistance at fitting tail end; higher tensile strength and elongation at break for improved mechanical strength, stability at tighter bend radii; better tear resistance over a wider range of test temperatures up to 120°C; higher stability (more gradual changes) on long-term oil ageing in mineral base (hydraulic, engine and transmission type) oils; reduced swelling and three times better stability, even in the most aggressive synthetic biological oils

GoldenIso/45 is a unique high pressure isobaric hose line where the pressure rating is tuned over the classic 6,000psi and set at 450 bar, to offer the



The changing trends of hydraulics constantly calls for new solutions

PRODUCTS & SERVICES



Dedicated products for refrigeration applications



Safe assembly technology for a perfect connection

necessary margin for absorbing any kind of pressure peak and surge that can occur in hydraulic systems.

This design can increase the service life of the product and has been proven by impulse tests up to two million cycles, justifying the 'long-life' definition given to the hose. The hose line is released with new integrated flanged fittings, X-traflange/45. This has an equivalent more robust design to assure mechanical resistance under any working conditions. This line, and the other isobaric lines in the Manuli catalogue, is compliant with the recent international specifications requiring an isobaric approach (ISO 18751).

Diamondspir, the traditional high pressure (up to 8,000psi) and large-bore (up to 3in) hose line, has been recently upgraded with two important new features: an extension to size ¾in and a redesign of 2 ½in size, aimed to offer a more compact, light and flexible hose. The hose family is offered with the innovative X-traflange/56, which has a unique patented 3D bending design of flange and counter-flange for outstanding mechanical resistance at these extreme pressures.

The complete wire spiral-hose range has been recently enhanced with the introduction of Interlock Plus, the new



Goldeniso Manuli isobaric hose line



Qsafe quick couplings for a direct to hose integration

high-performance fitting style offering high reliability and easy assembly, to enable more demanding OEM applications and easy replacement in aftermarket.

In more severe working environments (for example mining and forestry), the main stress for a hose is created by external conditions rather than by the internal pressure. Abrasion, and scratching in particular, can be very dangerous for the rubber cover and can tear it up to point where the wire is exposed, accelerating then the failure of the hose through oxidation of the reinforcing structure.

Sharc, the new super high-abrasion resistant cover, is made with a proprietary compound that extends the application limits of rubber. Its abrasion resistance is at least 50 times better than international specification requirements and five times better than the most effective solutions currently available for rubber. However, it still preserves a very high ozone and weathering resistance, as well as having flame resistance and antistatic properties for any mining environment. This new Manuli solution has been already adopted on selected hose families (GolenIso/21 and /28) and can be progressively extended to satisfy

customer demands.

Modern hydraulic machines are often designed for doing multiple and flexible jobs using interchangeable tools, not only in agriculture, but increasingly, in construction as well. The technology of quick release couplings is universally used for connecting and disconnecting tools and implements, keeping the oil, and sometimes the pressure, within the hydraulic system.

The company has developed its QSafe program, which has already shown high reliability in many severe field applications, and for the more demanding OEM applications, Manuli has released a radical innovation: the MQS-DHI Qsafe line. DHI stands for 'direct to hose integration' and it is an innovative solution that integrates quick couplings and hose inserts for highly compact, short, light, cheap, and leak free connections.

Specifically designed for the compactness of long-wall mining connection, the Flush Fit-insert family is an excellent solution for easy operation and fast maintenance in high-pressure mining machinery. It is a new staple lock-fitting system with a snag free profile for easier handling in critical installations, but it still offers a 350-bar pressure rating up to the 2in size. All inserts are compatible with the Manuli Rockmaster hose range for all mining applications and the MIP (Mercia International Products) Staple-lock adaptors range.

Operator comfort is increasingly appreciated, giving added value to hydraulic machines, including cabin air conditioning, which is increasing market share. Manuli Hydraulics offers a dedicated product range, where the new Refrimaster Plus line (up to the new Dn 22) has a very low permeation level and is universally compatible with any Freon and lubricant used in the field of mobile refrigeration. The hose line is integrated with the well-known Frigoclic fitting for attachability in the field, and is now improved with the innovative SP-ring gasket; the same insert can be mounted with a swaged ferrule for OEM applications.

The oil and gas industry is constantly developing in size and its expectations of performance of the applied technologies. Manuli Hydraulics now offers a new program for rotary drilling applications, Goldendrill. This totally new hose family is a compact and flexible solution for easy handling and effective operations, guaranteeing the safety and reliability of the wire spiral-

hose technology. The hose has a high abrasion and environmental resistance to withstand severe working conditions. New field-attachable inserts and ferrules offer an integrated solution, and it is available with a complete API termination-ends range.

Not just products

Following the acquisition of Techmaflex in 2005, Manuli Hydraulics is the only hydraulic-connectors' manufacturer integrated with a machine assembly and manufacture operation. This enables joint product and machine development to improve the overall performance of the system.

In line with the continuous development of the red machines range, the new benchtop swaging machine MB 350 offers unique features: a high crimping-force (350 tons) joint to a large head opening (up to 4in hose) that makes it suited for swaging large-bore and high-reinforced hoses. The machine maintains the innovative ergonomic design adopted in these models and well appreciated by all operators in the sector.

A lot of international regulations are increasing their requirements for health



Goldendrilla hose line for demanding oil and gas applications

and environmental protection. Manuli Hydraulics has a long a successful history in this field, having implemented safe and green solutions as soon as they become industrially available. A large range of halogen-free hoses has been recently announced and many lead-free fittings are available in the range, including the new Interlock Plus family – an effective Cr+6 free zinc-plating technology that is well established. ISO 14001 and ISO 18001

certifications have been achieved by all Manuli Hydraulic Group manufacturing plants.

Excellence in innovation

The most modern technologies, such as Finite Element Analysis (FEA) and experimental simulation techniques, are used to develop the integrated design of the whole Manuli Hydraulics product range.

The company's R&D is based at the Aldo Occari Innovation Center in Bologna, which oversees R&D centers in China, Poland, India, and France. The research centers are equipped with advanced facilities and feature special rooms to enable researchers to simulate the most extreme environmental conditions, such as stress and strain, heat, cold, moisture, and vibration.

Far from entering old age, hydraulics is a developing sector that still experiences continuous innovation. Manuli Hydraulics, recognized as an international center of excellence in the field of hydraulic-hose and connector development, contributes its passion, effort, and results to the overall development of the sector and the success of its customers and partners. **IVT**

Paolo Seghi, CIO at Manuli Rubber Industries, has 30 years' experience in the industry, with a background in rubber, vibration/noise control and high-pressure hydraulics

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