

Voith Turbo

VOITH

**Voith Turbo H + L Hydraulic
Products and Applications**



 **hydraulic**

Voith Turbo H + L Hydraulic

We are the experts in hydraulic systems at Voith Turbo.

Voith Turbo, the specialist for hydrodynamic drive, coupling and braking systems for road, rail and industrial applications, as well as for ship propulsion systems, is a Group Division of Voith GmbH.

Voith is one of the largest family-owned companies in Europe with a workforce of around 39,000, EUR 5.1 billion in sales in the 2008 / 2009 fiscal year and 280 sites worldwide. The company is active in the energy, oil and gas, paper and raw materials as well as transportation and automotive markets around the world.

Hydraulic systems technology satisfying the highest standards

Innovative components and systems for hydraulic drive and control technology – this is the world of Voith Turbo H + L Hydraulic (VTHL).

The intelligent products from VTHL are appreciated in numerous branches of mechanical engineering because of their special characteristics. Our application-oriented and customer-specific hydraulic systems solutions are installed around the world today – in punch presses and other types of presses, plastics processing machinery and machine tools as well as in general machinery construction and for specialty applications.

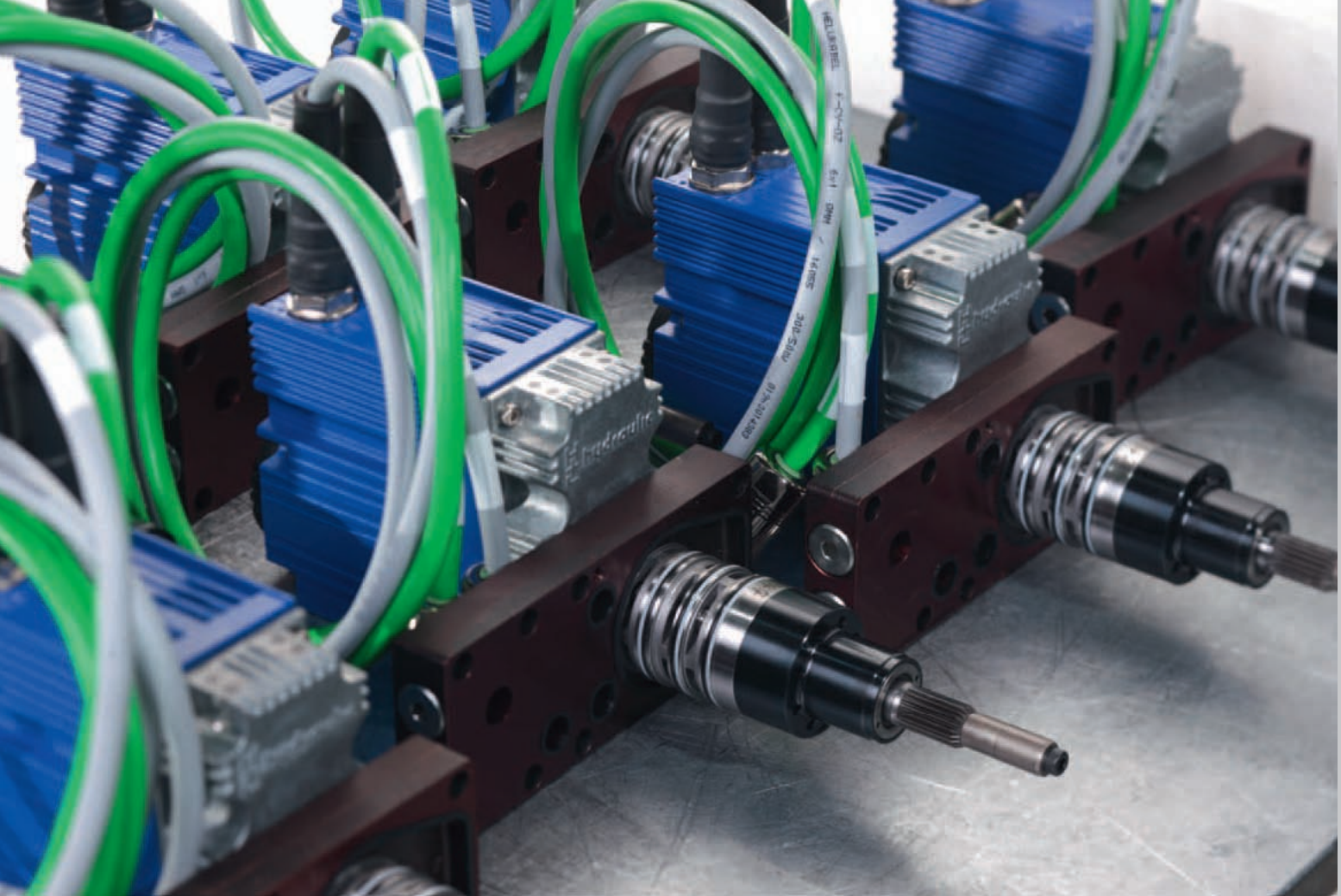


We feel at home with special requirements

For more than 40 years, we have maintained business relationships with our customers as partners. Today, we have an extensive sales network covering all parts of the world – which means that we are close to you. This allows us to clarify the often special requirements through direct contact with our customers. With our high level of consulting expertise, we can work together with you to find the optimal solution for your application.

Milestones in the company's history

- 1965: Company founded by Hans Hartmann and Franz Lämmle
- 2004: Acquisition by Voith Turbo. Formation of the new company Voith Turbo H + L Hydraulic under the umbrella of the Voith Group
- 2006: Acquisition of the systems specialist BW Hydraulik



Products with special characteristics

All of our components and systems are characterized by their compact design, so that they can perform their function in stationary as well as portable machinery and equipment while occupying little space. In addition, the components are characterized by small dimensions, making installation easy

Energy efficiency and noise emissions are major topics in industry. Our systems solutions are designed to provide maximum energy efficiency. Starting from the pump, with its high efficiency of up to 95%, continuing through intelligent control components with high-pressure/low-pressure circuits and differential control to optimal energy utilization through use of hydraulic accumulator technology – by employing VTHL products you reduce the energy cost of your machine considerably and make an active contribution to protecting the climate. Reduced noise emissions ensure that you can comply with applicable regulations regarding health and safety in the workplace without difficulty.



Various benefits and applications:

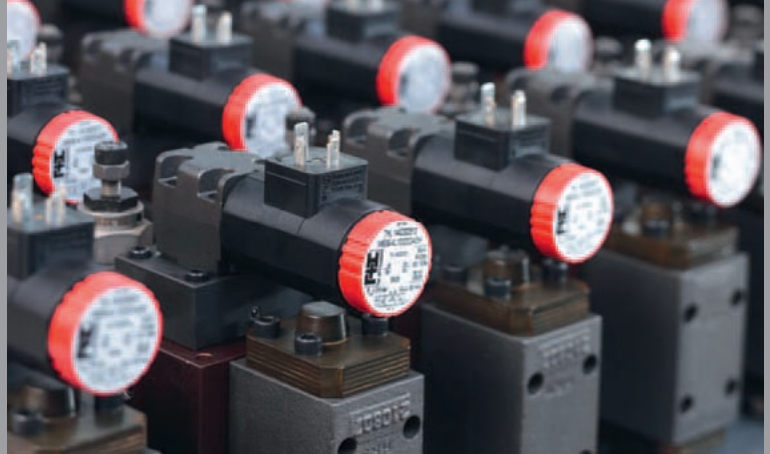
- Highly responsive drives – with fast switching valves and highly dynamic servo valves.
- Energy-saving – through use of highly efficient internal gear pumps, low-and high-pressure circuits with automatic changeover and innovative hydraulic accumulator charging technology.
- Optimized for the application – from individual devices to subsystems providing maximum functionality.
- Proven in actual practice and reliable – in many areas of mechanical engineering.

We divide our extensive line of hydraulic products into 5 major areas:

- Valves
- Internal gear pumps
- Power packs
- Electronics
- Complete system solutions

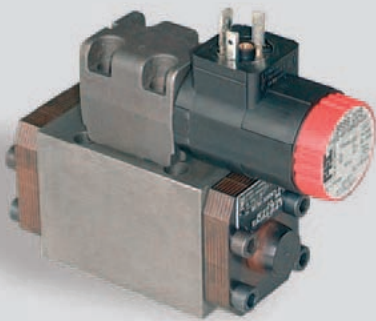
We provide you with the appropriate product for every application.

Valves



Directional control valves, flow control valves, pressure control valves, sandwich valves and servo valves provide the basis for control systems with exceptional dynamics and accuracy.

Various sizes and connections make it easy to find the correct solution to your requirements.



Directional control valves

Directional control valves are employed in hydraulic engineering to open, block or change the flow path for the working fluid. Depending on the application, small size, fast response, low internal leakage as well as precise and reliable operation can all be important aspects.

When it comes to directional control valves, VTHL offers you a wide range of products that satisfy these demanding requirements without difficulty. In addition to standard directional control valves, the product line includes a multitude of special designs. For example, the NG 4 line offers extremely short response times for dynamic requirements in the millisecond range. Thanks to the compact design with standing magnet (double-solenoid coil in 4/3 valves), these valves can be installed in even the most confined spaces. Pilot-operated directional control valves represent a special group within the VTHL product line. These fast-acting pilot-operated valves provide response times that are up to 50% shorter than the response times of directly operated valves. Response time adjustment, stroke limiter and monitoring are available as options.



Flow control valves

Flow control valves regulate the flow in hydraulic systems in order to achieve a constant volumetric flow rate. Features such as control accuracy and dynamic response are critical factors when selecting the correct valve. Our product line includes flow control valves from a minimum flow rate of 10 cm³/min up to 45 l/min. The maximum operating pressure is 250 bar. The various flow control valves are available with either manual or electrical actuation.

A special feature of VTHL control valves is the reproducibility of the flow rate down to very small values. Pressure regulators compensate for pressure spikes within milliseconds; viscosity changes have only a minimal effect on the flow rate. The control range can be expanded to 1, 2 or 3 turns of the adjustment knob, thereby permitting extremely fine adjustment of the flow set-point.



Pressure control valves

Pressure control valves regulate or limit the pressure in hydraulic applications. A good pressure control valve is characterized by minimal hysteresis, highly dynamic control and insensitivity to vibrations.

VTHL offers a wide selection of pressure control valves fulfilling various functions, e.g. pressure relief valves, pressure reducing valves and accumulator charging valves. All valves are available with a variety of adjustment possibilities. With certain versions, electrically operated adjustment is available. Being designed as directly operated, damped piston valves ensures that the characteristics important for the operator are maintained.

Directly operated VTHL pressure control valves employ either a seat or spool design and are characterized by small, reproducible hysteresis. Almost all applications can be covered. Pressure control valve cartridges can be incorporated directly into control manifolds, saving space.

VTHL accumulator charging valves with a constant hysteresis and soft switching are particularly well-suited for drive systems with a distinctly cyclic oil requirement. By using accumulator charging valves, it is possible to size the installed input power to the average required.



Sandwich valves

By combining stack-mounted devices and sandwich valves, control units with many functions can be designed to fit in a limited space.

VTHL offers a variety of valve types for use in pressure control, check and throttle functions in a variety of sizes: the control channels, and thus the oil column, are kept very short. This ensures the necessary prerequisite for good dynamic response of the hydraulic control system.

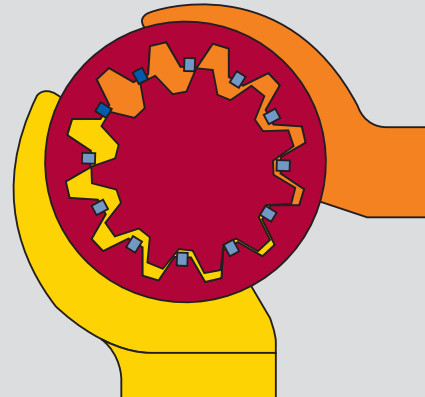


Electro-hydraulic amplifiers

Electro-hydraulic amplifiers from VTHL differ in design and function from known types of servo valves through their setpoint control and mechanical position feedback of the actual value. Setpoint control is provided either by a dynamic stepping motor or AC servo-motor. A follow-up control valve functions as the actuator.

Electro-hydraulic amplifiers are available in different sizes for maximum flow rates up to 1000 l/min. There are versions for rotary and linear motion, and various types of mechanical position feedback such as spindle, gear rack or belt drive, for instance. Combining electric setpoint control with a hydraulic actuator results in a high power density with a low energy input requirement. Maximum dynamic response can be achieved with the drive through use of mechanical position feedback. Thanks to separate control of each control edge and the mechanical adjustability, the valve design is extremely rugged in spite of its high positioning accuracy. Interface modules make interfacing possible to all kinds of machine controls.

Internal gear pumps



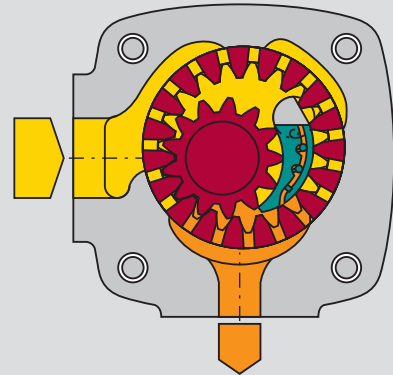
IPM pump with the Superlip system

VTHL internal gear pumps are available for practically all low-, medium- and high-pressure applications. Various pump combinations, motor/pump hybrid systems, motor/pump sets with a frequency converter for simple generation of variable flow rates as well as special pumps to supply cooling lubricant complete the extensive product line.

With their high efficiency, VTHL internal gear pumps can be used wherever low noise levels, compact dimensions and light weight are required. The focus is always on maximum quality and energy savings.

The product range encompasses essentially two different design concepts:

- The fillerless Superlip principle was developed specifically for the low- and medium-pressure ranges. Special characteristics include insensitivity to dirt and compact design.
- The principle employing a two-piece filler and radial compensation is well-suited especially for the medium- and high-pressure ranges. Here, high efficiencies, low noise emissions and compact dimensions are the essential characteristics.



IPV/IPVP pump with two-piece filler

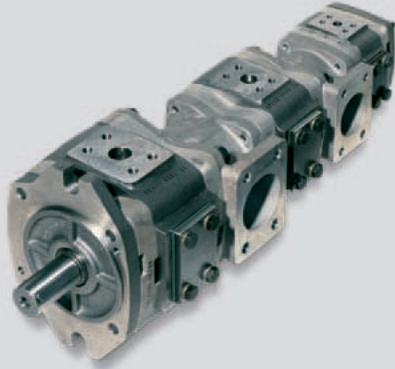
Servo pumps

The servo pump provides variable volume flows with a highly dynamic response and lower energy requirements. The pump comprises an IPVP internal gear pump optimized for the most dynamic requirements and for energy efficiency, an equally versatile servo motor and a servo controller equipped with excellent power reserves.

Servo pump delivery is proportional to speed. During short-time operation, it is possible to achieve high pressures at minimal speeds – the pressure can be maintained at zero conveyor capacity.

Features:

- Lower energy requirements
- Noise reduction
- Lower heat input into the system
- Highly dynamic response
- High overall efficiency
- Excellent precision
- High power density
- Variable volume flow
- Plug & Play



Pump combinations

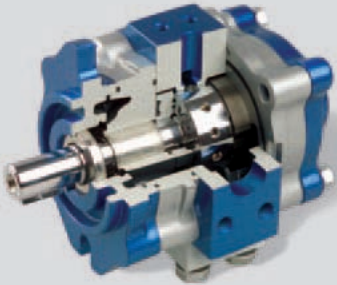
Voith internal gear pumps having the same or different sizes can be combined to create a multiple-flow pump. All sizes are available as two- or three-stage pumps, and as four-stage pumps in some cases. The pumps are arranged in increasing order according to size and delivery. In addition, pumps employing the same as well as different operating principles can be combined together.



Motor/pump hybrid system EPAI

The EPAI system is characterized by an intelligent combination of motor and pump. In this case, an internal gear pump is incorporated into the motor. Oil is forced to flow through the motor, cooling it at the same time.

Extremely compact dimensions as well as exceptionally low noise emissions are typical characteristics of EPAI units. The noise level is as much as 12 dBA lower than that of conventional motor/pump sets. Moreover, the extremely compact size saves up to 50 % of the space required for conventional solutions. The unit protects against leaks by eliminating dynamic sealing elements. The resultant reduction in the number of wearing parts means increased life expectancy as well as less downtime.



Coolant and lubricant delivery IPME

Modern tools for deep-hole drilling require increasingly high pressures to feed the coolant and lubricant. With its high efficiency and long service life, the Superlip principle employed in VTHL internal gear pumps represents the optimal solution. The pump can be operated as a variable-speed EPAF system even in this application.

Compared to conventional cooling lubricant feed systems employing screw pumps, the EPA/EPAF unit with an IPNE/IPME internal gear pump achieves considerably higher efficiency. Better energy utilization and lower energy consumption are the results – operating costs are reduced. Less coolant and a lower cooling capacity in the cooling lubricant circuit translate directly into lower costs for consumables.

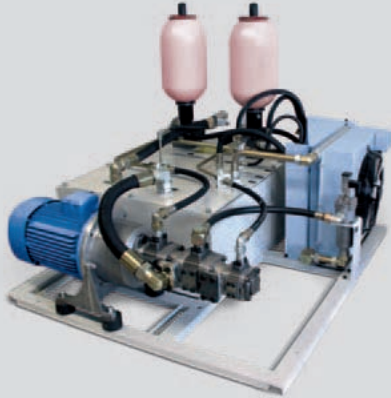


Medium-pressure pump IPA

The IPA medium-pressure pump employs the proven Superlip principle. It is characterized by compact dimensions and is used in applications requiring pressures up to 210 bar. In contrast to our other internal gear pumps, IPA pumps are designed with fewer components.

Housing components are fabricated from aluminum. This makes the pump suitable for mobile applications and stationary applications in the medium-pressure range. Nevertheless, the IPA pump provides all of the benefits of the Voith family of internal gear pumps in terms of efficiency, noise emissions and pressure pulsation.

Power packs



Hydraulic power packs supply hydraulic control units and actuators with pressure and flow. VTHL engineers and manufactures power packs with drive ratings from 1 to 150 kW. VTHL can offer the right solution for every application – whether a standard design or one fabricated to meet customer-specific requirements. Based on the requirements, every design is optimized with regard to energy efficiency, noise emissions and size.

Various VTHL components provide essential elements:

- Low noise emissions are achieved with internal gear pumps. A pump/motor set employing an EPAI system has a noise level of only 58 dBA.
- Optimal energy efficiency is achieved through use of VTHL accumulator charging technology.
- The compact EPAI system is ideal when space is limited.
- Special requirements can be satisfied through use of a flexible, modular system to meet your specifications.

Electronics



VTHL electronic units ensure optimal operation of various hydraulic components and systems. The user thus has the maximum benefits from our products without being forced to use a specific control concept. Our particular know-how regarding hydraulic components and processes is "cast" into the individual components. The user can concentrate on the special aspects of his machine and still rest assured that maximum performance and reliability will be the result. Our electronic units have open interfaces, making connection of various PLCs or CNC controls extremely simple. In most cases, the user can select from various interfaces (analog, digital, field bus). The currently dominant field buses Profibus and CAN-bus are finding increasing support.

System technology



VTHL systems and control units are employed in almost all areas of mechanical engineering. They have been developed for each particular application or are assembled from components in the standard product line.

Our system technology is optimized for the application, highly dynamic, accurate and reliable. It is highly efficient and characterized by low energy consumption. Standard as well as customer-specific solutions can be employed. Based on the requirements, the design is optimized with regard to energy efficiency, noise emissions and size. Various components from VTHL provide essential elements: VTHL systems technology takes the complex processes of every particular application into consideration. Thanks to ongoing research and development activities, we can offer you custom-engineered solutions for your individual application. In this way, you can exploit the full potential of your machine concept. Open and close cooperation with you is essential for successful development of systems. The process know-how of the system developer is what guarantees success. The system technology comprises the hydraulic power pack to provide the system with pressure and flow, the control unit with actuator to control and regulate the machine elements operated and the electronics to drive

the valves in the control unit. The result is an optimized system with defined interfaces and very good process replication.

Examples of optimized system technology:

- Multi-layer technology as an alternative to control manifold technology opens up new possibilities for fluid channel layout and provides greater geometric freedom than conventional control manifold technology.
- Fast-acting valves ensure reliability and dynamic control.
- Special valves with additional functions minimize the number of valves needed.
- Multi-pressure circuits create an energetically efficient control system and minimize the size of the power pack, while their extremely high energy density may first make the application practical at all.
- VTHL servo valves provide high accuracy and highly dynamic response during positioning operations.
- With an intelligent hydraulic control system design and only the necessary functions and valves, the system becomes very user-friendly and rugged without causing any loss in performance.



Versatile applications

Voith Turbo H + L Hydraulic develops products and systems solutions for almost all applications involving mechanical engineering. Our concept for success is based on special application and process know-how. Customers all over the world value our ability to develop custom-engineered and application-specific solutions. Standard products complete the extensive package of services.



VTHL products are found in the following primary applications:

Sheet metal processing machinery

- Punch presses
- Nibbling machines
- Corner notchers
- Shears
- Sheet metal processing machinery in general

Presses

- Hydraulic presses
- Peripheral mechanical presses
- Feed systems for presses
- Press safety
- Press brakes

Plastics processing machinery

- Injection molding machines
- Blow molding machines

Metal-cutting machine tools

- Machining centers
- Lathes
- Honing machines
- Grinding machines

General industrial machinery

- Wire processing machines
- Shoe machines
- Woodworking machinery
- Packaging machinery
- Recycling machinery

Supply of coolant lubricant

- Metal-cutting machine tools

Sheet metal processing machinery



Dynamics, reliability, stability and energy efficiency are especially important in all types of sheet metal processing machines. VTHL concentrates on these characteristics in particular when developing appropriate solutions. In this way, the criteria specified are satisfied in their entirety, allowing the user to optimize the application.

Fast-acting valve technology and intelligent control system design ensure maximum dynamic response in punching and nibbling machines. The necessary reliability is also achieved with fast-acting valve technology and monitoring of the entire process by the electronic control module that is part of the system.

Simple and rugged valve technology translates into high stability without any loss in flexibility or dynamics. The application requires very high but alternating power density in conjunction with high dynamics. We offer appropriate solutions with multiple-pressure circuits and accumulator charging systems, which allows us to achieve exceptional results regarding energy efficiency in this field.

Customer-specific solutions are complemented by a variety of standard solutions for different sheet-metal processing operations such as punching, shearing, bending and cutting to length.

Our products cover:

- Cylinder forces from 2 to 200 tons.
- Simple on/off functions to fully programmable electro-hydraulic axes.
- Traversing speeds up to 1000 mm/s.
- Up to 60% lower installed power than comparable conventional systems.

Presses

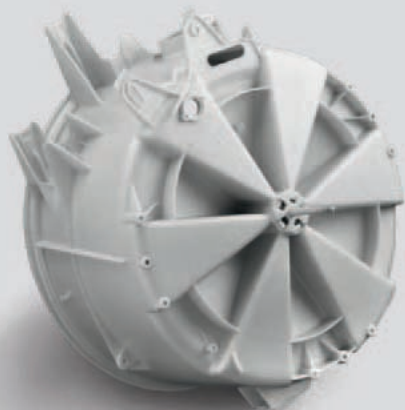


The product range in the area of press technology extends from complete main drives and motor/pump sets or pumps for hydraulic presses and hydraulic lifting units for feed systems to auxiliary hydraulic devices such as press safety valves for brake-coupling combinations, relief valves and bed cushion control systems.

VTHL main drive solutions for hydraulic presses are being used successfully for press forces of up to 1000 tons. They are characterized by their dynamics and reproducible positioning accuracy. The subject of energy efficiency plays an especially important role when it comes to such high power densities in press applications. All items in our product line take this essential requirement into account, thereby contributing to an environmentally compatible approach to the entire process.

The requirement for low noise emission levels to comply with regulations regarding health and safety in the workplace is equally important. The low noise emissions requirements for the pump supplying the hydraulic system in press brakes are easily satisfied. The VTHL internal gear pump ensures high stability and exceptionally high efficiency.

Plastics processing- and die casting machinery



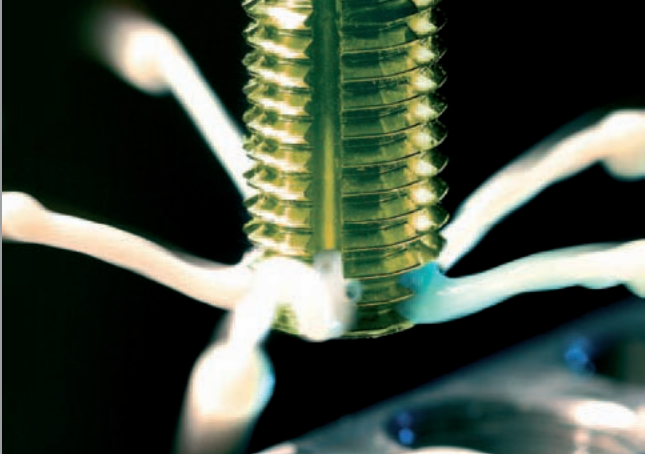
Efficiency and low noise emissions are essential criteria for plastics processing machinery. The Voith internal gear pump satisfies this particular requirement especially well and is thus ideally suited to serve as the feed pump for the accumulator charging circuit in injection molding machines.

Internal gear pumps have the best prerequisites for use in variable-speed pump systems employing a servo-motor or AC motor, since high efficiency in conjunction with low delivery and pressure pulsation are extremely important here.

We offer a very compact solution as a beside-the-press hydraulic pump/motor set for electric injection molding machines with hydraulic core pulls. Upon request, it can be installed in the machine frame. Without additional noise damping measures, the entire unit achieves a surprisingly low noise emission value below 60 dBA and thus distinguishes itself from conventional solutions significantly.

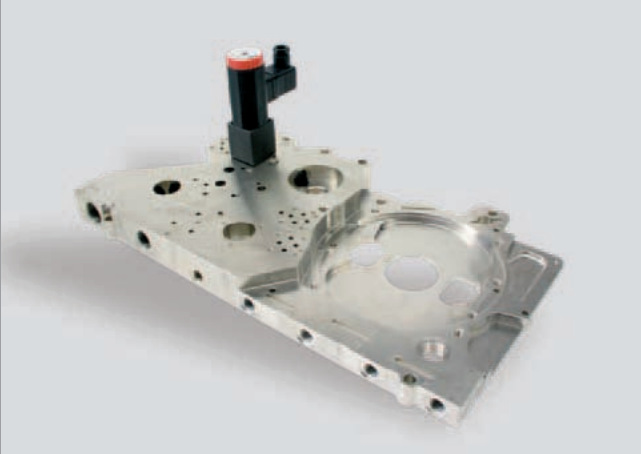
In blow molding machines, short-stroke electro-hydraulic servo-valves provide highly precise wall thickness control, while servo-valves with a highly dynamic drive system operate the blow pin and control mold motion.

Supply of cooling lubricant



As machine tools are becoming more powerful, the requirements placed upon the cooling lubricant circuits in the machines are also becoming more demanding. With the use of emulsions as the pressure fluid for internal gear pumps, directional control valves and pressure control valves, VTHL has opened up a new field: Feeding the cooling lubricant during machining operations – for instance in deep-hole drilling machines, machining centers and transfer lines. Valves and pumps for this application are characterized by enormous stability. The high efficiency of the pump, which can also be employed as a variable-speed drive, is responsible for the good energy efficiency of the system. The valve technology has been designed for modular use.

Metal-cutting machine tools



Use of hydraulic control concepts in metal-cutting machine tools has changed in recent years. Some hydraulically controlled motions have been replaced by purely electro-mechanical solutions. In addition, processes have been made more efficient through use of new technologies. Voith Turbo H+L Hydraulic, with its expertise in this application, offers a variety of approaches for various areas in these machines:

One example is the fluid cabinet, which concentrates the entire fluid supply system with motor/pump set, central lubrication and pneumatics in a single machine module. The machine module can be easily attached to the machine.

Additional developments include the hydraulic, fast-acting brake in combination with weight balancing as a safety element for vertical axes or optimization of mechanical functions performed by certain components with the aid of multi-layer technology. Here, the metal layer with pre-machined channels is built up and brazed. The result is a freely configured channel layout and freedom when producing mechanical parts. The channels can withstand dynamic loads of up to 300 bar.

Classical functions are covered by standard products and systems such as hydraulic supply units and valves for clamping functions. Special solutions tailored to your machine are worked out together with you.

General industrial machinery



The extensive line of standard valves and products as well as the variety of already developed products provide the basis for developing solutions that are custom-engineered for a particular application. We have a special interest in providing solutions for new applications. In this regard, open and reliable cooperation with you is absolutely essential. Together with you, we can develop solutions for components as well as complete systems.

Other applications



Cranes, forklifts, boring machines and industrial robots:

Mobile applications demand a compact size paired with high efficiency. VTHL products offer these characteristics and are designed for a long lifetime in mobile industrial applications.

Lifting platforms:

With our hydraulic solutions, you can position your lifting platform exactly and save energy at the same time. With system solutions consisting of motor, high-pressure pump and frequency converter from a single source, you control flow rates and recover energy when lowering.

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