
Speed!

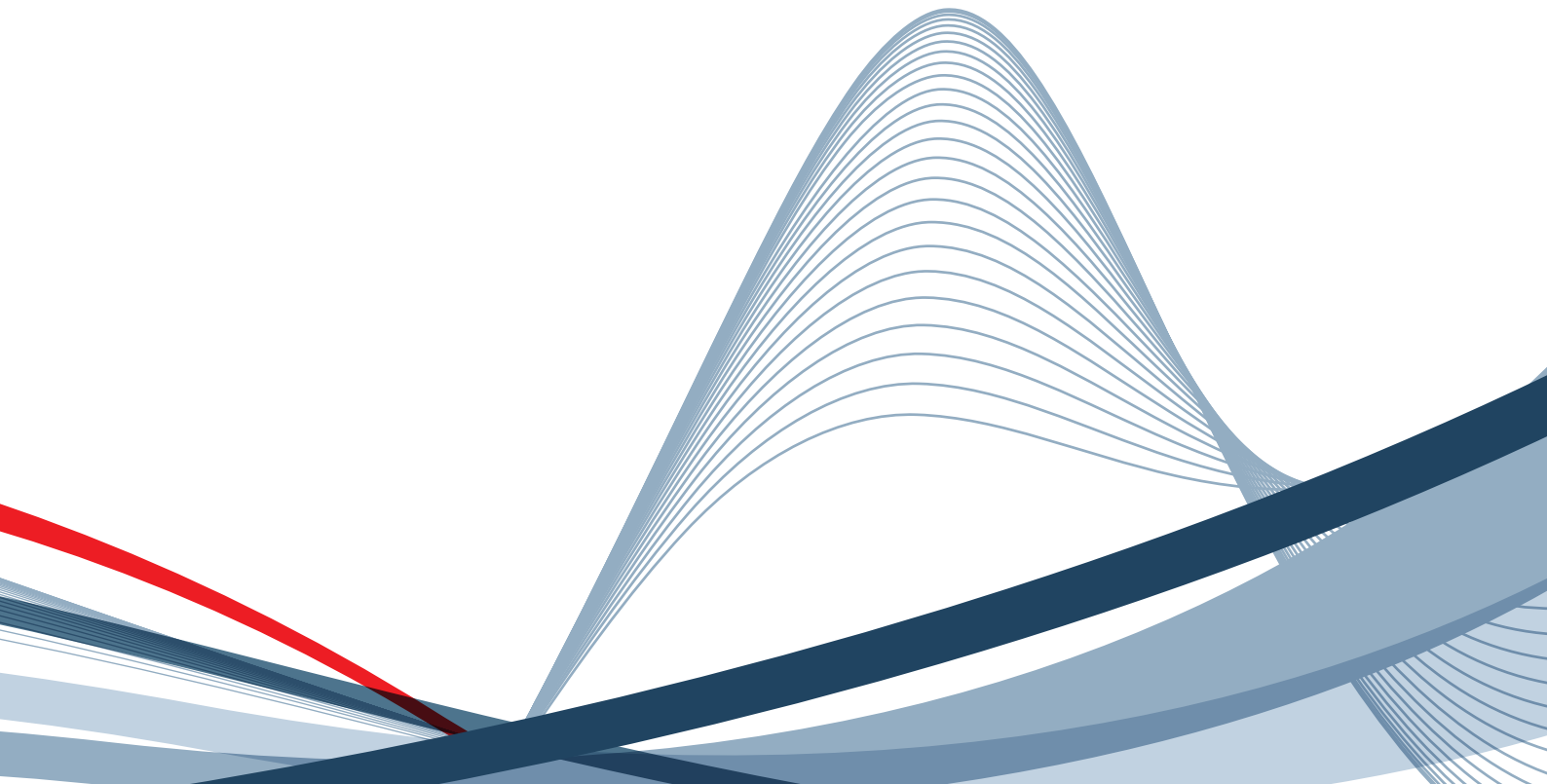
CHoose your Compact Hydraulics Solution

Abstract

Speed has become a major factor for success in most industries. Two key questions may arise for manufacturers in the context of their product development: “How can the process of creating a new product be accelerated?” and “What is the most effective way to design and manufacture a system in order to meet customer demands as closely as possible?”. This paper aims to show the advantages offered by the modular design of Rexroth compact hydraulic systems and the newly developed configuration tool “CHoose”. Aerial Working Platforms are taken as a case study.

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Speed means success. Without a doubt, the most common market requirements start with a need for speed:

Speed in providing a solution in the form of circuit and 3D drawings. They are needed to assure that all products fit the machine properly.

Speed in terms of quoting a competitive price.

Speed and attractive pricing have to be combined with the latest technology in order to guarantee maximum energy savings and the optimal performance of hydraulic circuits, or more specifically the lowest possible drop in pressure. Other targets include reducing the complexity of circuits and, as a result, minimizing the number of parts in machines and the number of suppliers. In most cases, OEMs prefer to work with a global partner.

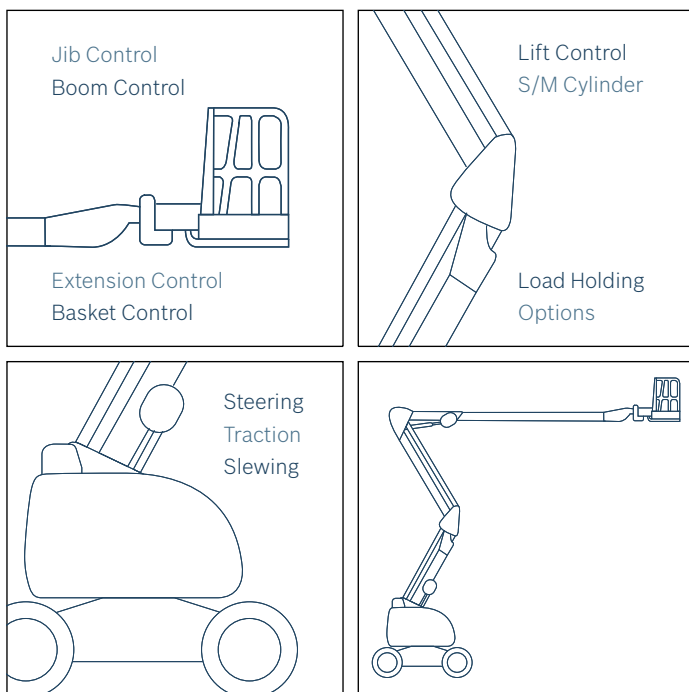


Fig. 1: Compact hydraulics for Aerial Working Platforms (AWP)

In Aerial Working Platform applications, machines are equipped with compact hydraulics to perform a range of functions. Examples include blocks to control cylinder movements, traction drives and load-holding functions (Fig. 1). A customer might ask for two separate blocks to be provided: one dedicated to control the cylinders with simultaneous movements, even in the case of pump flow saturation, and one dedicated to controlling the other cylinders independently.

Thanks to CHoose, the new configuration tool for compact hydraulics, Bosch Rexroth is able to fulfill all these requirements at the same time (Fig. 2).



Fig. 2: Configuration tool „CHoose“

That's a new tool where it's possible to select the most convenient component within a database of Rexroth components; inside the CHoose libraries users may drag and drop in the circuit the cartridges to realize solutions with an HIC, but not only. In CHoose, users may also drag and drop components from a library of slices of our compact directional valve. This is one of the biggest advantages of CHoose compared to other configurations tools already in the market.

CHoose allows solutions by mixing the existing product lines of compact hydraulics: not only solutions with HIC, blocks with cartridges, but as well users may create your compact directional valve or an integration between a block and a compact directional valve.



Fig. 3: Hydraulic integrated circuit

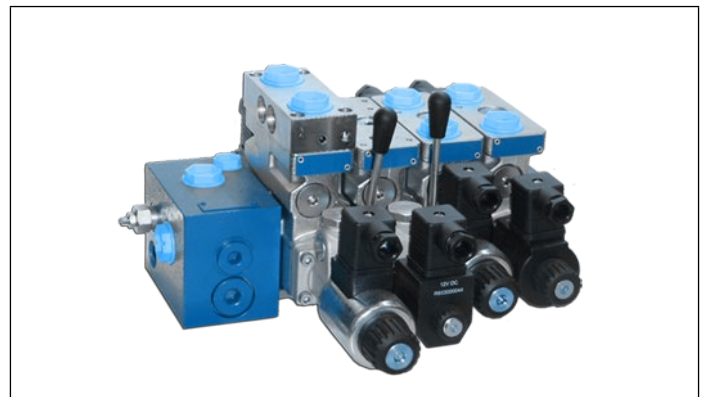


Fig. 4: Compact directional valve

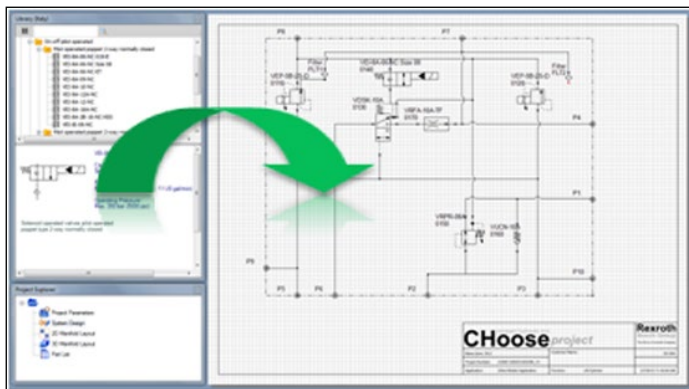


Fig. 5: CHOOSE system interface

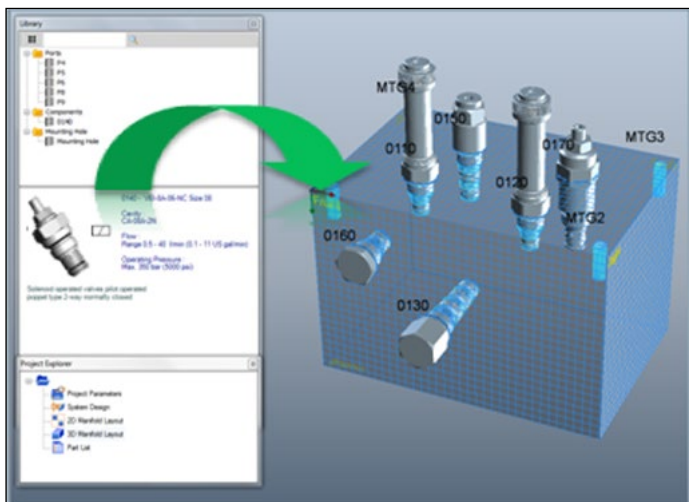


Fig. 6: CHOOSE system interface

Returning to the example of a need for two blocks to control AWP systems, CHOOSE allows to design solutions using Rexroth EDC slices, also called Canossa. Canossa are the new Rexroth compact directional valves with the flow sharing (LUDV) concept – technology that has been developed specifically to satisfy the requirement of

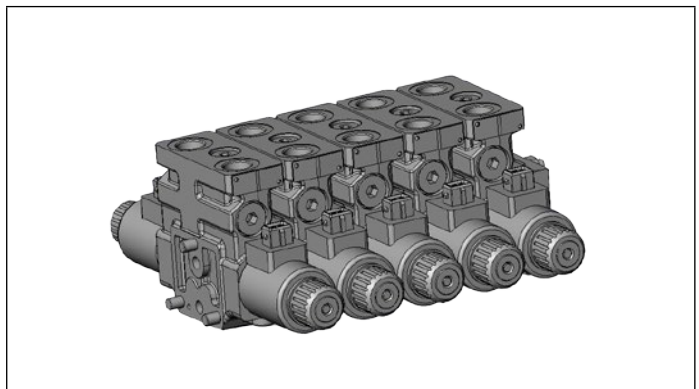


Fig. 7: EDC valve (Canossa)

independent cylinder actuation with a working flow of up to 50 lpm, even under the condition of pump flow saturation (Fig. 7). CHOOSE allows users to connect the desired slices together and, if more flow is required, to select an M4 slice or a high-flow CETOP valve, which, again, can be assembled in a modular design with EDC slices using CHOOSE.

If a block is needed to control other actuators with no flow-sharing functionality, users need only to search within our cartridge library. Here the solutions include a 4/3 proportional cartridge valve, possibly with a dedicated port for the LS signal if required (Fig. 8).

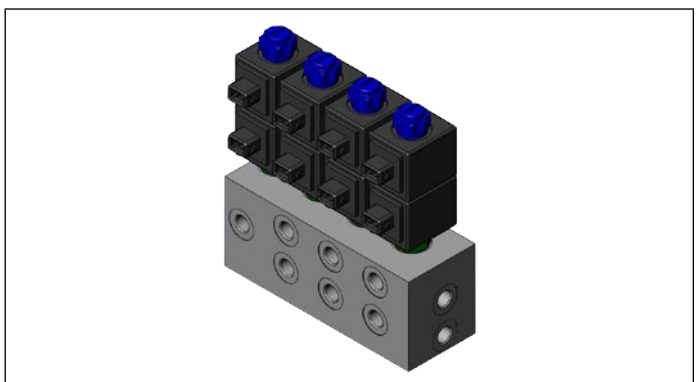


Fig. 8: 4/3 proportional cartridge valve



Fig. 9: Cartridge valves automated production lines



A large variety of cartridge valves are included in the CHoose library, starting with solenoid cartridge valves, which Bosch Rexroth currently manufactures in million pieces per year. Most of these components are assembled and tested on a highly automated production line that ensures high quality in addition to competitive prices and very short lead time (Fig. 9).

Alternatively, relief, counterbalance, directional and flow control mechanical cartridge valves may also be selected on CHoose to model and realize all possible functions. At Bosch Rexroth plants, millions of cartridge valves are manufactured every year. Most of their parts originate from the former TARP plant in Italy, which turns and grinds a high number of parts annually. This scale of production ensures an unprecedented level of quality in the market and complete control of internal manufacturing processes.

Once all the components have been selected, CHoose allows the user to set certain parameters such as pressure settings, coil voltages and connection types. A block layout can then be realized with cartridges and ports set in whatever position the customer prefers. All of these design steps can be completed in the shortest of times.

At this point, one of most relevant advantages of CHoose comes to bear: the option to combine integrated circuit manifolds and compact directional valves in a single compact hydraulic solution!

The two solutions – with and without flow-sharing (LUDV) technology – can be consolidated in a single solution that perfectly fits machine layout requirements, making the circuit simpler and cleaner with fewer fittings and less pipework (Fig.10).

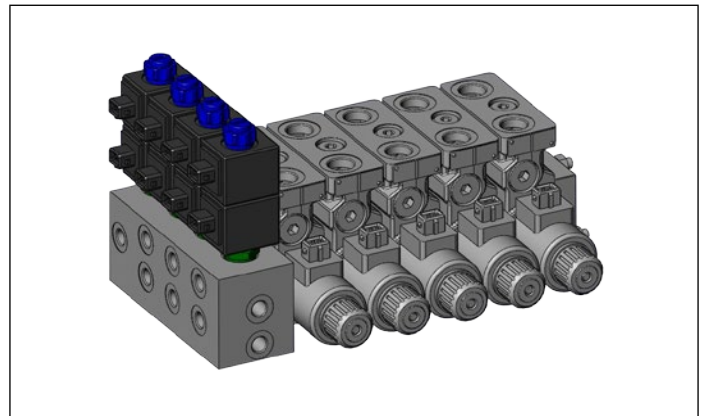


Fig. 10: Compact hydraulic – combination of integrated circuit manifolds and compact directional valves

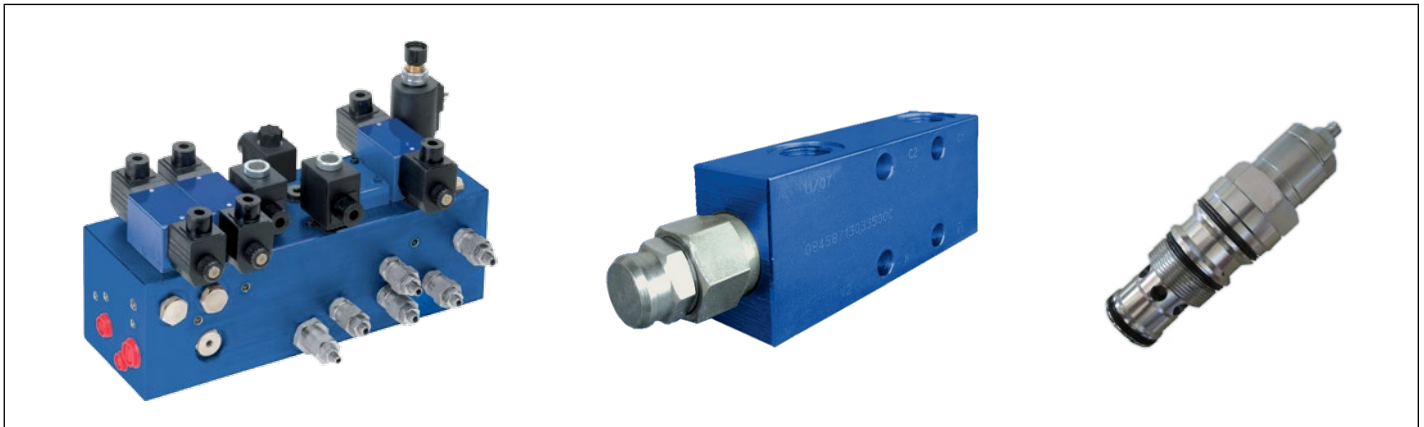


Fig. 11: Control block, counterbalance valve and cartridge valve

The draft design mentioned above is possible with CHoose, but that is not all: by changing port locations, moving cartridges around the block and evaluating various component selections, a range of possible price indications can be calculated in order to identify the best solution.

The output formats of CHoose are extremely diverse thanks to 3D drawings that customers can open on their computers. These files are saved in formats that can be opened by one of the most popular hydraulics simulation software applications on the market.

Naturally, other solutions and functions could also be configured with CHoose, such as the control block dedicated to the traction of the Aerial Working Platform (AWP) machine used as an example (Fig. 11).

Counterbalance valves are also included in the CHoose library: Bosch Rexroth is the European market leader for counterbalance and boom lock valves and is increasing its market share in America and Asia. Our product portfolio in this segment includes our highly competitive range of parts-in-body valves, which feature the latest technology. Thanks to the parts-in-body concept, Bosch Rexroth is able to create customized solutions that are tailored to

provide a perfect fit for individual machine and application requirements and achieve the highest possible level of efficiency. To support customers, the CHoose library facilitates the selection of any of our counterbalance cartridge valves, all of which slot into the most common cavities.

With CHoose, all machine functions are easy to configure, and Bosch Rexroth is also able to offer customers the commissioning of compact hydraulics products. Customers greatly value our commissioning service for compact hydraulic products, which results in excellent circuit performance despite highly fluctuating external factors such as ambient temperature, oil viscosity and cleanliness, and supply voltage. Additionally, something as simple as a different layout of fittings and piping can have the effect of an accumulator in the machine.

Commissioning is also a valuable service because it provides an opportunity to verify that all the selected components work properly in their various configurations. This is especially beneficial for the stability of critical functions in cases with a complex machine circuit, for example when several components are required to be in action simultaneously – as may often occur in AWP applications that require more than one actuator to work at the same time.



Fig. 12: Multi-function modular block for municipal vehicles

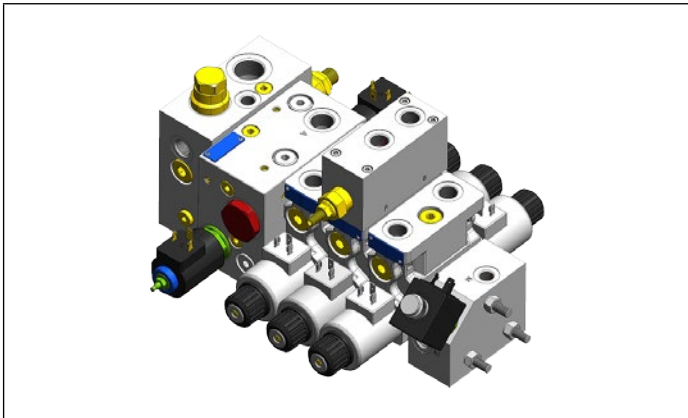


Fig. 13: Multi-function modular block for forklift trucks

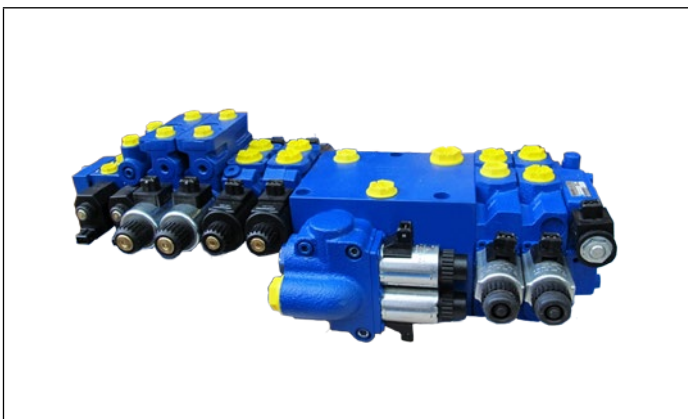


Fig. 14: Multi-function modular block for agricultural machines

In short, our innovative and versatile product lines allow customers to simplify their machines and achieve optimal energy savings. Thanks to CChoose, it is possible to arrive at the best layout in a very short time and to select components that fulfill all the necessary functions while remaining within budget. In this sense, customers are able to benefit from the competitive production processes in place at Bosch Rexroth compact hydraulics plants.

These achievements can be realized in very little time thanks to CChoose, which deliver for each project a circuit, bill of material, datasheet of selected components, 2D and 3D drawings and a price indication (Fig. 15).

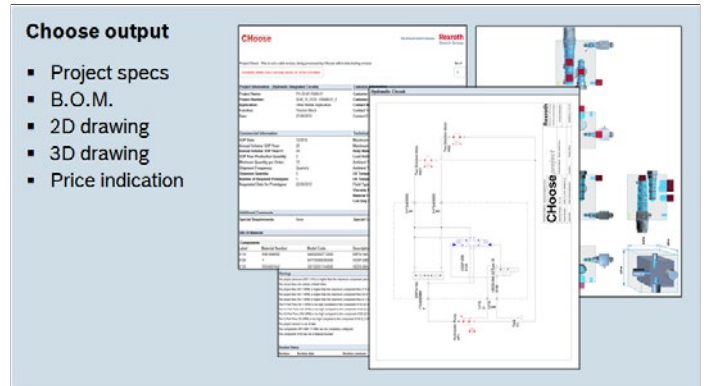


Fig. 15: Multi-function modular block for agricultural machines and road rollers

CChoose is as global as compact hydraulics itself: the company currently operates manufacturing plants in the USA and Asia-Pacific. Furthermore, CChoose is available in several national releases, meaning that language and local market requirements are taken into account when selecting the right software for a specific plant.

The examples presented so far are typical for AWP, but Bosch Rexroth is able to realize a broad range of different blocks and functions with the support of CChoose, for instance multi-function modular blocks for forklift trucks, municipal vehicles, agricultural machines and road rollers (Fig. 12, 13 and 14).

When it comes to compact hydraulics, Bosch Rexroth is the partner of choice for all mobile applications thanks to a high level of technical expertise and over 40 years of experience in the field with a wide range of customers.

Whatever the application, Bosch Rexroth helps its customers to consolidate functions in a single, compact and competitive solution; and CHoose, which Bosch Rexroth is pleased to make available to the market, can accelerate the process of getting to the right solution. **Speed means success. CHoose makes success.**

Summary

Looking ahead, Bosch Rexroth expects that electronics and digital hydraulics will become increasingly popular in mobile applications as a means to further enhance system efficiency.

And the compact hydraulics team at Bosch Rexroth is a strong partner in the future. Indeed, we are already involved in the pre-development of a concept that requires solenoid cartridges with improved performance in terms of flow and switching time.