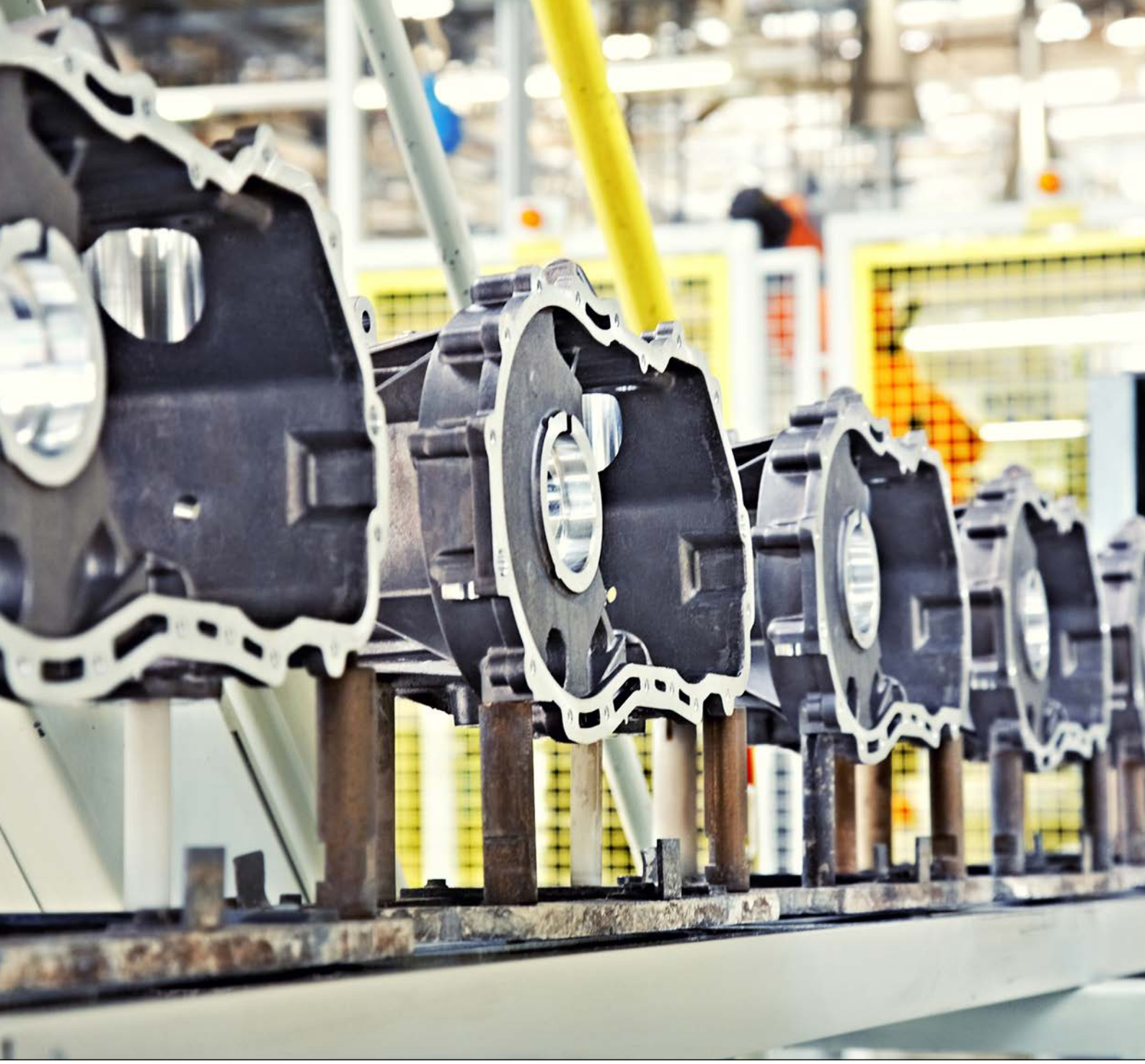


Drive Controlled Pump Efficient Hydraulic Drives with a System

Parker

ENGINEERING YOUR SUCCESS.

Hydraulic System Solutions are th

When it comes to linear movements, the power density of hydraulic drives remains unrivalled. The job now is to further improve the hydraulics in terms of energy and cost efficiency.

The advantages of modern industrial hydraulics are the result of decades of evolution to which Parker has made a key contribution. The power density and robustness of the hydraulics, as well as the constructional simplicity when translating linear movements in industrial applications are not achieved any where close to the same way by electromechanics, even today. Constantly increasing demands on the performance and productivity of machines make hydraulic machines indispensable for the future, too.

We think holistically

In addition to performance, energy consumption and cost efficiency are increasingly becoming concerns for the user. In most cases, conventional hydraulic controls are already based on a common hydraulic supply for multiple drives to spread the cost of the conversion from electrical into hydraulic energy. Continuously increasing energy costs and ever greater environmental constraints demand further improvements to hydraulics in this area. In order to raise efficiency potential, in future it is not just the individual product that needs considering, but the hydraulic drive system as a whole.

Optimizing the whole system

With its comprehensive know-how, Parker is best qualified to develop a new generation of hydraulic drives based on this approach. Our plan contains a fundamental modification of proven hydraulic constant

e Future

pressure systems. Their effectiveness and efficiency have thus far been restricted by the unchanging oil flow and the performance adjustment via valve control associated with it. That is why we are now working on the drive. We connect the electromechanical drive with the hydraulics to a speed-controlled, electrohydraulic full-system solution: The **Drive Controlled Pump.**

Precise layout and adjustment
For the composition and layout we opt for an extensive construction kit of high-grade components which will constantly be expanded and thus always stay up to date. All components are matched with one another precisely and tailored individually to the cycle of the respective application using a newly developed piece of software. At the same time, the size of the components used can also be reduced. In turn, this generates further savings potential, as investment and operating costs can be reduced. In so doing, Parker fulfills both current and future demands in terms of energy consumption and CO_2 and noise emissions as well as the wishes of machine manufacturers and users for more efficient system solutions from a single supplier. Ultimately, the objective in everything we do is to improve the competitiveness of our customers.

Challenges at a glance:

- More demanding applications
- Rising energy costs
- Rising staff costs
- Greater environmental requirements

Our Approach: The Drive Controll

With the Drive Controlled Pump, Parker offers a speed-controlled, hydraulic full-system solution that is tailored exactly to a predefined cycle in advance.

Electrical drives have made tremendous advances over the past years – both in terms of speed control and in controlling large torques at small speeds. We are taking advantage of these developments for the optimization of hydraulic pump systems by employing the technology for the speed control of pumps. The Drive Controlled Pump enables the central, controlled hydraulic supply of all drives. By employing an AC drive controller, the speed range is regulated. The exact amount of hydraulic energy can therefore be generated that is required for a particular point in time during a machine's cycle. For cycles with high part load amounts, large savings are therefore possible.

When combining a Drive Controlled Pump, the designs of both the e-motors and the hydraulic pumps are to be considered.

Cost-efficient components

Today there are already attempts on the market to improve the efficiency of hydraulic machines through speed-controlled drives. With the common combination of synchronous motors and internal gear pumps, the efficiency benefits of speed-variable drives are purchased relatively expensively right from the moment of procurement. Parker goes a step further and uses components for the Drive Controlled Pump that offer either an especially attractive price-performance ratio or ad-

ed Pump

vantages in terms of servicing. With respect to the motors, we therefore use cost-efficient standard asynchronous motors which, when combined with a AC drive controller, enable a wide speed range of the controlled pump. We use synchronous servo motors for applications in which especially high dynamics are involved.

Innovative technologies

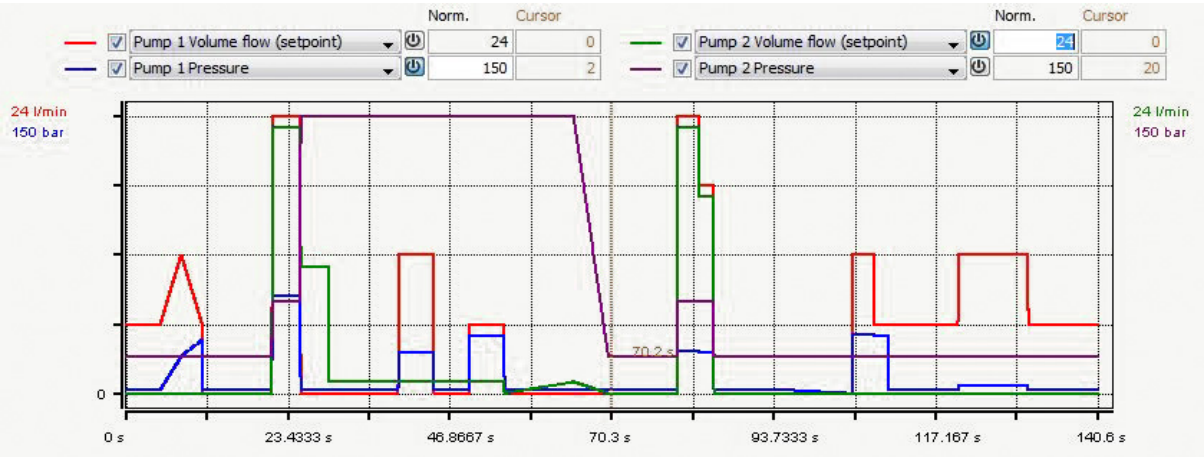
When selecting pumps we do not only consider output, but also minimum and maximum speeds, too. A smaller size generally enables higher speeds and causes lower noise emissions. In contrast, the minimum speed – which is important for the Drive Controlled Pump – depends more on the design than on the size. Taking all of their properties into consideration, two pump technologies have proven the best: The vane pump is the ideal basis for systems with fixed displacement pumps. Its robust double lip design makes it impervious to particle contamination and maintains a high degree of efficiency in the long term. The axial piston pump is employed if high peak pressures are introduced or if high pressures must be maintained for long periods.

The latest software tools

To be able to put together an energy-efficient motor–pump combination, the individual components must be selected in such a way that the sum of all losses in the specified operating points is at a minimum. For their optimum yet simple selection and layout, Parker uses a unique software tool: The Parker DriveCreator (free download at www.parker.com/drivecontrolledpump). All energy-related component data is saved in it. With support from a database, this allows the selection of the best combination of components possible with the highest degree of energy efficiency. Furthermore, a start-up tool simplifies the act of putting the Drive Controlled Pump into operation in the application.

The Drive Controlled Pump at a glance:

- Speed-controlled drive
- Individually adjusted to the machine cycle
- Complete, single-source system solution



The Parker DriveCreator enables the optimum yet simple selection and layout of the components.

Efficient Components from a Singl

Each Drive Controlled Pump consists of proven, high-grade, large series production components that have undergone extensive testing. They become unique by way of their individual arrangement to achieve an efficient system solution.

By choosing a Drive Controlled Pump from Parker, users can rest assured: Each individual component has already demonstrated its reliability in many other applications. Their precise arrangement by the Parker DriveCreator further ensures that the increase in efficiency does not come at the cost of reliability.

Precise regulation

The AC30V series covers the entire spectrum of speed-regulated applications for asynchronous and synchronous servo motors. The motor control system offers high dynamics and can be expanded with numerous communication and control options. A special commissioning software simplifies programming, monitoring and diagnostics.

AC drive controller AC30V

Diverse range of motors

Standard asynchronous motors are characterized by their versatility, robustness, a tremendous power spectrum and high efficiency. Their simple design offers maximum flexibility and minimum cost when installing.

Standard asynchronous motor

The Parker synchronous servo motors combine innovative technology with extremely high performance. As no loss of induction arises with regard to the servo motors when generating the stator field, they can be operated with rotary frequencies on the AC drive controller that deviate widely from the grid frequency. This is why we employ them in areas which involve particularly high dynamics.

Synchronous motor

e Source

New to the Drive Controlled Pump range are the liquid cooled compact synchronous servo motors. They provide higher efficiency than induction motors of the same power range. The liquid cooling system improves the torque curve and enables a low-noise operation.

Compact synchronous servo motor

Powerful pumps

The vane pumps allow very quick changes in pressure with very high flow rate reproducibility. Small pumps can be used in conjunction with a permanent magnet motor for flow and pressure control without the use of other valves. As double and triple combinations in a common housing, they are recommended for simple flow distribution and cut-off for better adaptation to requirements. The pump inserts enable 'drop-in installation' and are particularly service friendly.

Vane pump

The axial piston pumps offer a high degree of efficiency in a full displacement position. Under high pressures a reduced displacement angle causes a reduction to the required drive torque. With a small e-motor, you therefore have the option of achieving a large flow at low pressure or a small flow under high pressure. The low noise level is based on pulsation-weak running and a rigid-optimized housing.

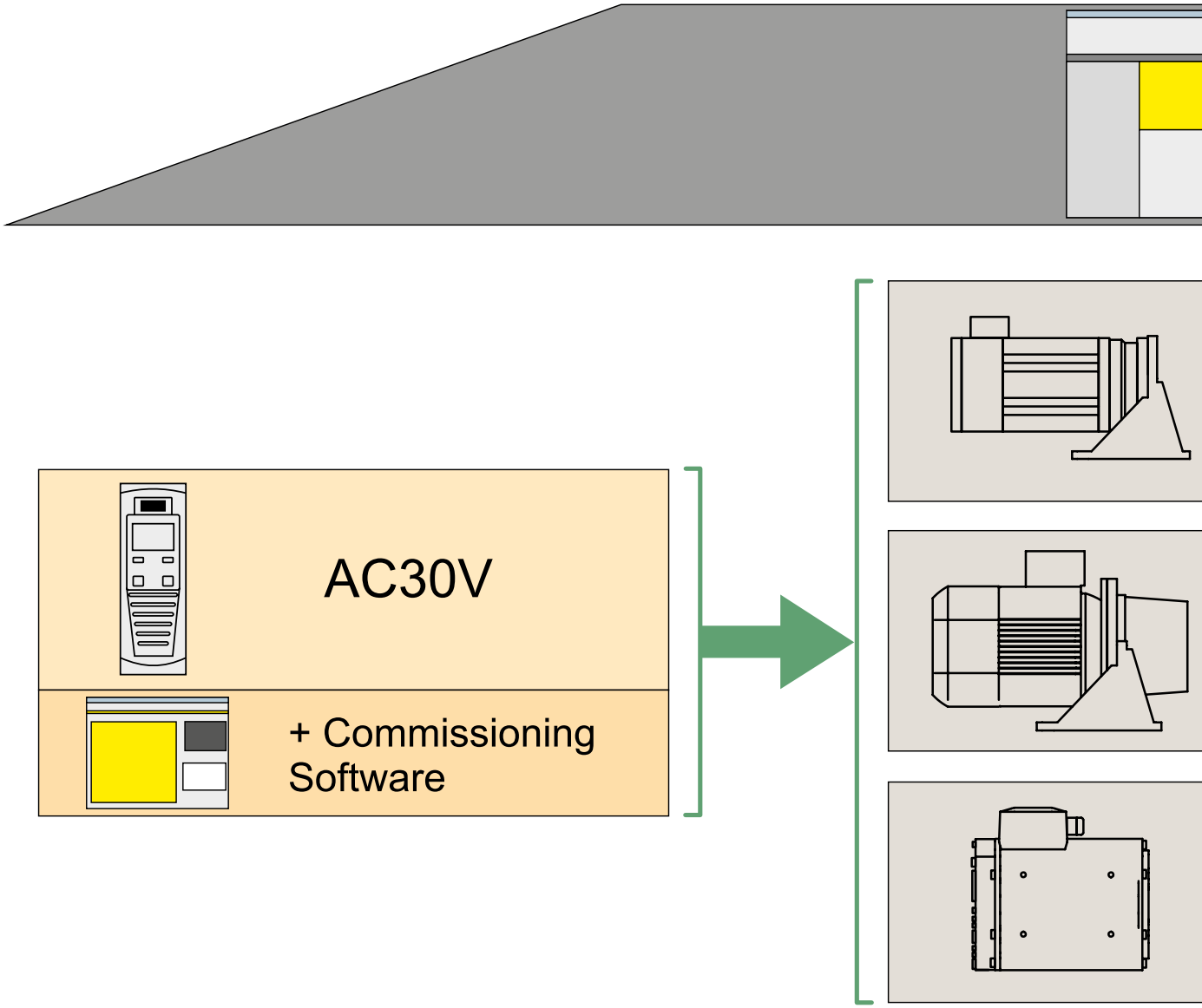
Axial piston pump

Both types of pump can be combined into energy-effective solutions. If, for example, the machine cycle requires a large flow rate for medium pressure while at the same time needing pressure continuity at high pressures, the pumps provide the high flow together. The axial piston pump at low displacement assumes the pressure maintenance, while the fixed displacement pump with low idling capacity is switched to circulation for the tank.

The components at a glance:

- Two different motor control systems
- Two different motor concepts
- Two types of pump that can be combined together

The Drive Controlled Pump Option



At Parker, the term “Drive Controlled Pump” stands for a broad spectrum of AC drive controllers, motors, and pumps that can be combined into tailored solutions for the most diverse applications.

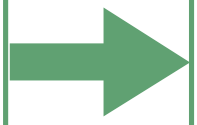
s at a Glance

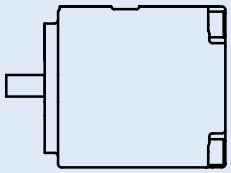
Parker DriveCreator

Synchronous Servo Motor

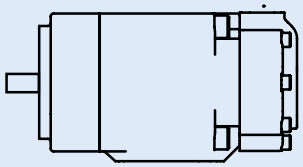
Standard Asynchronous Motor

Compact Synchronous Servo Motor

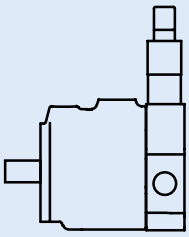




Vane Pump



Double Vane Pump

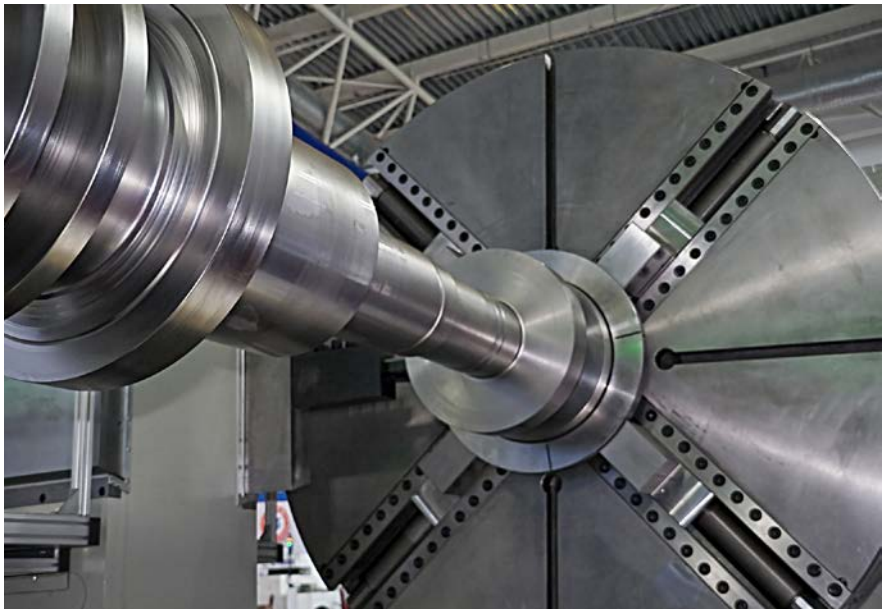


Axial Piston Pump

Drive Controlled Pumps in Industr

Each type of machine places different demands on the hydraulic control. A Drive that are perfectly coordinated with each other.

Machine tools: Stand-by losses minimized



With machine tools, the Drive Controlled Pump can fully demonstrate its advantages. During main movements it reduces energy consumption and noise levels considerably.

With machine tools, the hydraulics are primarily employed for clamping and auxiliary movements. Flow requirements are mostly low. As auxiliary movements frequently occur during main movement cessation, a cycle time that is as short as possible should be striven for without generating high stand-by losses during the machine's peak times.

Reducing running noise

To achieve this, a Drive Controlled Pump with a small vane pump, which is driven by a synchronous servo motor is recommended. The pump is stopped or starts up only briefly during the main movement, for example, to reload the accumulator for the pressure maintenance. This can occur at a medium speed to keep running noises low.

Pumps with maximum efficiency

If the main movement has come to a stop, the pump runs at maximum speed to perform the clamping actions or auxiliary movements in the shortest possible time and to thus reduce the entire cycle time. The disadvantage of increased running noise is more than compensated by the efficiency of the very small, low-loss pump. In all sections of the cycle, it is always the case that only as much flow is supplied and pressure generated as is required by the application – and this is how electrical and hydraulic losses are minimized.

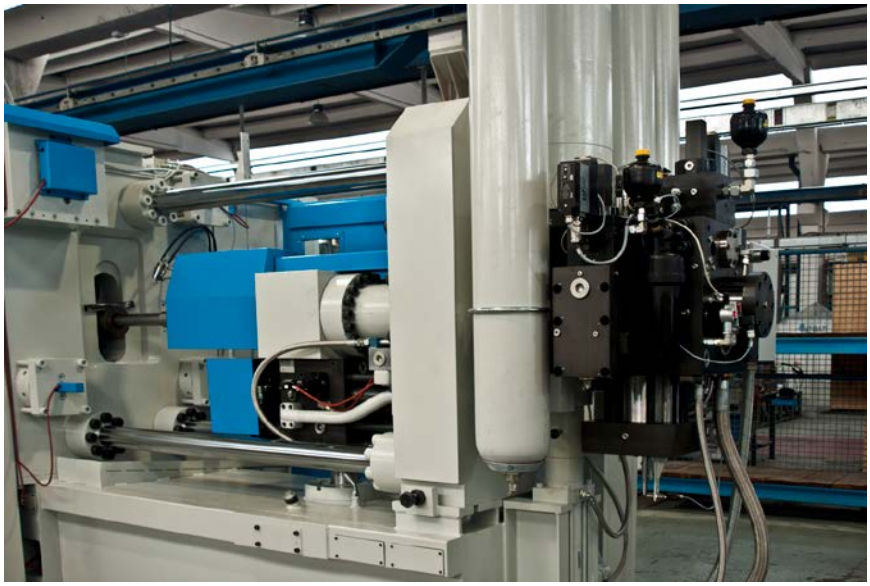
Benefits at a glance

- Low energy requirement during main movement
- Quick clamping actions and auxiliary movements
- Optimized pump sizes

y-Specific Applications

Controlled Pump is always the right answer – with components

Die casting machines: Pumps combined perfectly



Die casting machines have highly varied flow and pressure requirements on the closing and injection sides. With the Drive Controlled Pump, the pumps can be driven highly efficiently.

The injection side saves the energy in large piston accumulators that are pre-loaded with gas cylinders, and which are reloaded throughout the entire cycle at a pressure of around 160 bar. In contrast, the closing sides require large volume flows for movement but only low pressure. Here, high pressures are only required for locking or for auxiliary movements such as for ejectors and core pullers.

Advantages with vanes

The machines are thus equipped with a combination of various pumps. As the most commonly used fluid based on water glycol vaporizes significantly quicker than mineral oil, robust fixed displacement pumps are preferably employed as double pumps. The entry of hydraulic losses into the fluid must be minimized. Vane pumps are best suited in this regard.

Flow on demand

On the other hand, pumps for loading accumulators and supplying auxiliary movements with high pressure should supply the exact flow required. Here, multiple small vane pumps are ideally employed that should be connected based on requirements. Pumps with a large flow rate for the supply of the closing side must be able to circulate to the tank with minimal no-load losses. Pumps are each combined in such a way that as small an e-motor as possible can be selected as a drive for sequential usage.

Benefits at a glance

- Optimum adjustment to various requirements
- Multiple pumps and pump combinations possible
- Smaller motor size

Drive Controlled Pumps in Industr

Presses: Increased power density

When developing presses, the focus is frequently on minimizing cycle times. With the Drive Controlled Pump, the power density of the hydraulic drive can be increased significantly.

The range of press designs is extremely broad. As a result, there are also many options for employing a Drive Controlled Pump. Here is an example: For inserting and removing the workpiece before and after the actual pressing process, presses require a no-load stroke that should run through as quickly as possible. Here, one can raise the grid frequency speed of the motor with the AC drive controller to the pump's permitted limit and therefore supply considerably more flow with the same sized pump. As the no-load stroke is generally driven with small to medium pressure, no increased torque is necessary despite the higher speed: The e-motor can therefore be kept in its original size. The louder running noise is limited to the brief phase of quick outward and return strokes.

Reduce energy consumption

Another option for presses is a Drive Controlled Pump with a combination of a large vane pump and a small variable axial piston pump. With this version, the large flow rate for the no-load stroke is generated by both pumps with the high press pressure generated exclusively by the piston pump. During pressing, the vane pump feeds with low idling capacity to the tank, either directly or via the cooler. The axial piston pump lowers displacement during the pressing process based on requirements for pressure maintenance and thus reduces energy consumption.

Benefits at a glance

- Numerous application possibilities
- More efficient use of the available drive
- Use of pump combinations possible

y-Specific Applications

Plastics machinery: Investment costs reduced

In addition to operating costs, component cost is a crucial factor when equipping plastics machinery. Here, the Drive Controlled Pump scores points with simple, cost-effective solutions.

Essentially, the employment of a Drive Controlled Pump is possible in all kinds of plastic injection molding machinery. Even in small machines, the attraction of hydraulic drives wins out when compared to competing electrical direct drives – both in terms of energy consumption and in terms of investment costs.

Optimum performance with the smallest size

With plastics machinery, there are many auxiliary movements in addition to opening and closing the molds, plasticizing and injecting. They take place partly sequentially but also in parallel and must be supplied centrally with the required flow and pressure. The frequently very brief cycle times of these machines also demands supply with the highest dynamics. A vane pump driven by permanent magnet motor in a closed speed and pressure control circuit is recommended in this regard. With the high maximum speed of the small pump, a very high volume flow can be achieved with the smallest size. This significantly reduces investment costs.

Control functions through the motor

Furthermore, the dynamic of the pressure control circuit with the synchronous servo motor renders a pressure relief valve superfluous. When switching from injection pressure to holding pressure, the pump reverses the motor for less revolutions for decompressing the fluid in the injection cylinder. The fluid flows back to the tank against the normal flow direction. In this way, the hydraulic control functions are completely shifted onto the controls for the motor – a simple solution with minimum component cost.

Benefits at a glance

- The highest dynamics
- Size-optimized components
- Lower component cost

Retrofitting: Optimization in all Areas

When retrofitting hydraulic drives the objective is to achieve extensive cost reductions or increases in performance as quickly as possible. With a Drive Controlled Pump you can attain both.

Re-using as many parts as possible, amortizing the investment quickly through energy savings, reducing cycle times and increasing the machine's productivity: There are many reasons for retrofitting a hydraulic drive with a Drive Controlled Pump.

Custom speeds

For example, nearly all standard asynchronous motors can be made speed-variable with an AC drive controller. Energy can be saved with a reduction in speed if less flow is required than before when this was determined by the grid frequency speed. The volume flow can even be increased to the maximum permitted pump speed using the AC drive controller to operate the machine quicker and to reduce cycle times.

Advanced simulation of the cooling capacity

The same thing applies for influencing noise emissions: Reducing the speed means a reduction in operational noise. The cooling of the e-motor must be taken into consideration when retrofitting, as a reduction in speed reduces the cooling capacity of the fan that runs simultaneously. Using the Parker DriveCreator, one can check in advance to see whether the e-motor temperature remains within the permitted range or if a conversion to an e-motor with separate cooling is required.

Benefits at a glance

- Lower investment requirement
- Quick amortization
- Calculation using Parker DriveCreator

You Take the First Step
We'll do all the Rest for you

Regardless of whatever your requirements or challenges are, we develop tailored-solutions from the Drive Controlled Pump program for you based on your specifications.

The layout of a hydraulic system gains in complexity with a speed-controlled drive. Yet at the same time, this also opens whole new opportunities for the efficient design of the machine cycle. To do this, we offer you our professional support right from the beginning. Together with you we will develop a solution with components that are perfectly coordinated with each other.

Our services are comprehensive

All that we require from you are the processes of all drives of the machine over the time axis. From this we deduce the volume flow and pressure requirements of each individual drive, as well as the additional requirement of all drives that the Drive Controlled Pump must be able to deliver. Together with you, we select a suitable pump or pump combination, an energy-efficient e-motor, and a matching AC drive controller for your application using the Parker DriveCreator. The software tool also shows you how much energy the suggested solution will save when compared to the current solution or an alternative one.

We configure the selected combination for you from our model key. The order is then processed by our sales department. We build the complete Drive Controlled Pump for you, test it and deliver it to you ready for operation – the whole job from a single source.

Want to learn more?

We would be happy to help you.

Please simply refer to your nearest Parker representative

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