

# Drive & Control profile

## Hydraulics and controls retrofit can breathe new life into your extrusion press



If the press frame is sound, a retrofit and upgrade of key press components such as hydraulics and controls can extend the life of the press and raise performance levels.

Extruded parts producers are carefully assessing the performance of their extrusion presses as customers including vehicle component manufacturers, aerospace suppliers, tubing fabricators, window and door (fenestration) suppliers and other high-volume users seek faster turnarounds and smaller order lot sizes. Customers are also requiring more complex profiles and extrusions with lowered costs.

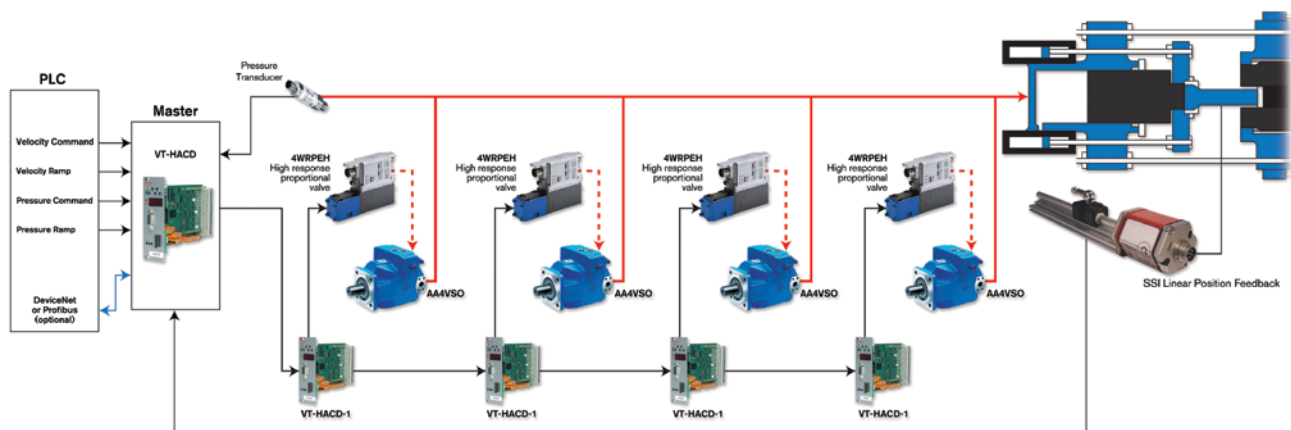
The above industry conditions, along with consolidation among extruded

shapes suppliers, create greater operational demands on presses. When parts makers consolidate, they typically move work onto one press and maximize its use, which can strain the machine, particularly with older presses.

Although some parts producers may feel compelled to completely replace an old extrusion press to keep up with production demands, this major investment may not be necessary. If the press frame is sound, a retrofit and upgrade of key press

### Extrusion Press Retrofits: Five Factors to Consider

- If your press uses limit-switch or analog controls, greater extrusion velocity accuracy and better butt control is possible with newer digital electrohydraulic controls.
- Consider hydraulics efficiency and reliability—if your hydraulics platform has servo valves or inline valves, inexpensive proportional valves and press control manifolds can be used to simplify system design, reduce leak points and improve pump efficiency.
- Energy efficiency can be improved by retrofitting with more efficient hydraulic pumps and motors.
- Consider working conditions—safety conditions, environmental hazards from leaking hydraulics, excess noise. A retrofit of aging or inefficient hydraulics and controls can help pay for itself by significantly reducing these costs.
- Analyze the “dead cycle” when the press isn’t producing parts. Retrofits can often increase press availability and throughput by up to one part per minute—justifying the investment in new hydraulics or controls.



Today's state-of-the-art PLCs and closed-loop pump controllers\* provide much finer accuracy and allow adjustments during the extrusion cycle to keep production moving.

components, such as hydraulics and controls, can extend the life of the press significantly and provide a more flexible, reliable, long-term manufacturing solution that meets the needs of the extruder and raises press performance levels.

### Retrofits Offer Advantages for Long-Term Value

The cost of a new high-capacity aluminum extrusion press may reach \$2 million or more (plus installation costs), depending on the capacity; whereas the cost for a typical total retrofit may be only half the cost of the press. In retrofits, the hydraulics

and controls components and systems are analyzed to identify opportunities where more efficient, latest-generation technologies can improve performance. This technology includes proven programmable logic controllers (PLCs) and human machine interfaces (HMI)s, closed-loop controllers, and hydraulics systems such as the pumping station, valves (including in-line and manifolds) and the interconnecting piping.

The benefits of a retrofit include:

- Minimal system disruptions and downtime
- A longer operational life of major (i.e. costly) press components such as the press frame
- More throughput, improved troubleshooting and increased parts precision
- Improved operating conditions and easier maintenance

Each press operation is unique, and the life and operational performance of a press can greatly vary. Therefore, when considering hydraulics and controls systems retrofit, evaluate the above factors to determine the ultimate scope and return of a press retrofit project.

\*Customer specific, and or customized firm-ware may have been developed and incorporated to fulfill this application requirement.

Bosch Rexroth has developed a [suite of hydraulics and controls](#) technologies that are easily optimized for use in extrusion press retrofits/upgrades, along with expert engineering support to help you design the most cost-effective, productive solution for your operation.

### Factor One: Current Level of Extrusion Control

Consider your current level of extrusion control: How precise is it? What is the scrap rate? How much time and effort does it take to achieve high-quality, low-defect parts consistently, without added operator intervention? If the output of your press must be scrapped due to unacceptable quality, then the machine may need better electrohydraulic controls.

Many existing extrusion presses utilize limit switches or analog controls to manage hydraulic cycles in the press. These legacy systems could be limiting productivity and adding to waste. Today's state-of-the-art PLCs and closed-loop pump controllers provide much finer accuracy, whether operators are using press velocity



Proportional hydraulic valves offer many benefits over older-generation servo valves.

or part temperature to manage extrusion throughput.

Rexroth's VT-HACD digital controllers are excellent systems for both open- and closed-loop control. They are available in application-specific configurations to provide proven solutions, fast upgrade time changeout, quick hydraulic parameter changeovers, and precise control of the press velocity.

An improved control system architecture provides greatly enhanced precision and automation of the hydraulics circuit, achieving much higher levels of position, velocity and butt length control. Improved controls also allow adjustments during the extrusion cycle to keep production moving. Increased extrusion precision also leads to greater control over butt length, helping reduce waste and increasing the number of shapes produced per hour.

### **Factor Two: Hydraulics Efficiency and Effectiveness**

In addition to precision, assess the efficiency and reliability of your hydraulics and controls systems components. You may be using less efficient, more problematic components that are actually reducing productivity. For example, many older-generation presses have servo valves to control the hydraulic pumps and the speed of the press. The servo valves are typically expensive, and require hydraulic fluid that has a dedicated filtration system with finer particulate removal than that of the existing filtration system; if the filter degrades through use, or the filtration systems are not continually maintained, the servo valves clog easily and can disrupt production.



Newer electrohydraulic controls offer finer control of the hydraulic axis, minimizing stress on the press during the press motion cycle.

By contrast, Rexroth's current generation of proportional hydraulic valves, such as the 4WRPEH High Response Proportional Control Valves, provide the same (and sometimes better) functionality in the hydraulic circuit. They are extremely robust, engineered to be much more tolerant of variations in hydraulic fluid quality, operating for longer periods of time under less stringent fluid conditions.

This does not mean that you can ignore filtration; filtration is one of the most important elements in helping a system to survive for years. In this example, if the pump control valves are not as rugged as they could be, or require persistent maintenance leading to press downtime, a retrofit incorporating proportional valves may reduce operational costs.

Hydraulic systems also can be simplified (and thus easier to operate and maintain) by replacing inline valve architectures (in which

multiple circuits are connected "in-line" on a one-to-one basis) with a single [hydraulic manifold](#). Rexroth uses proven design techniques to engineer these components to the unique requirements and operating conditions of your press retrofit. Using a manifold rationalizes the hydraulic design, reduces the leak points and hydraulic maintenance requirements and can also minimize the number of spare parts that must be stocked to keep the press operating.

### **Factor Three: Energy Efficiency**

Another challenge for aluminum extruders is to reduce the energy expended in powering the press hydraulics without sacrificing productivity.

One retrofit opportunity in this area is to evaluate the electric motor driving the hydraulic pumps. In many older systems, motors tended to be oversized to compensate for inefficiencies downstream in the hydraulics system (leaks, pressure drop-offs, and other potentially wasteful inefficiencies). New regulations, such as the Energy Independence and Security Act of 2007 (EISA 2007), call for "right-sizing" manufacturing systems with the use of more energy-efficient motors.

The high efficiency motors can be utilized in conjunction with a systems design concept called "energy on demand," which integrates sophisticated controllers and variable speed pumps with properly sized electric motors to deliver only as much energy as is needed to accomplish the press cycle. [Rexroth's Sytronix variable speed pump drives](#) intelligently combines hydraulics and electronics to achieve energy savings of 30 percent to 80 percent.

Hydraulic pump efficiency is also worth assessing for a retrofit. All hydraulic pumps utilize a portion of the fluid flowing through them for lubrication. As a result, to generate the required force in a hydraulic motion sequence, more energy needs to be drawn from the electric motor powering the pump to compensate for this leakage fluid, since it is not actually contributing force to the press ram. Less efficient, older-generation pumps require more lubrication. They also generate higher levels of waste heat which adds more loads on the cooling systems and can lead to unnecessary energy consumption.

The latest generation of hydraulic pumps is more efficient, requires less lubrication, and places lower loads on the cooling system; which in turn can provide significant energy savings.

Rexroth's latest generation of hydraulic pumps like the [AA4VSO variable displacement pump](#) provides the highest efficiencies in the industry. Competing pumps tend to be larger to deliver the same hydraulic energy that Rexroth pumps offer, without unnecessarily over-sizing and increasing pump costs. In other words, bigger isn't always better: A less efficient pump uses more energy to do the same amount of work.

The pump is the heart of the extrusion press system. If you want to maximize the efficiency and return on investment of any press retrofit, it is crucial that you investigate your pump efficiency and performance; the payback on this investment can be expected to be significant.

In addition, the newer generation pumps from Rexroth feature integrated sensors and diagnostic

ports to check hydraulic system pressure—helping plant personnel pinpoint trouble spots within the hydraulic system much faster.

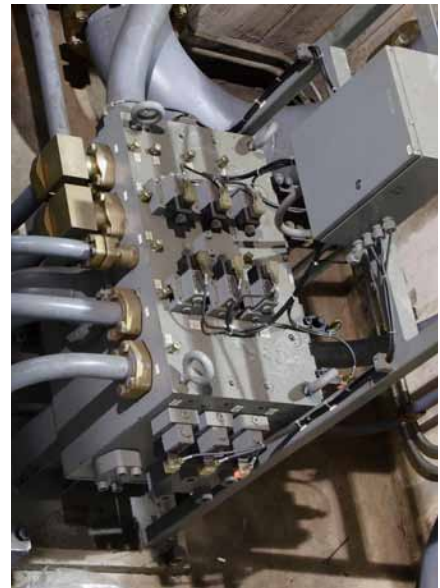
#### **Factor Four: Working Environment**

Safety for the machine operator and protection for the press itself have become more significant in today's manufacturing environment. Older presses may not handle the safety aspects of a press as well as new control systems. For example, new systems can set unique upper limits on pressure for each die in the press to help protect the die (and other press components) from damage. Upgrading to controls with improved capabilities can enhance plant safety and lengthen the life of your equipment.

For more information on this issue, and the Rexroth hydraulics controls solutions offer to environmental and efficiency challenges, download and read [Intelligent Hydraulics in New Dimensions](#) Technical Guide.

Two other complaints associated with extrusion press hydraulics are fluid leaks and noise. Hydraulic leaks create hazards such as slippery floors, dirt and even risk for fire. Plus, persistent leaks require more frequent and costly refilling of the hydraulic fluid reservoir. Much of the noise typically associated with hydraulic presses comes from the high-power electric motors that are driving pumps, as well as the pumps themselves.

It's often assumed that leak and noise issues are inherent to the power and force dynamics that only hydraulics can deliver—even if it means increased maintenance and an unsuitable operating environment.



Hydraulic systems can be simplified and thus easier to operate and maintain by replacing inline valve systems with a single hydraulic manifold.

Many environmental issues arise from outdated or poorly designed and/or maintained hydraulics systems—and can be easily resolved through a retrofit. For example: presses that utilize older inline valves have far more seals and points where leaks can occur than systems retrofitted with hydraulic manifolds. Because inline designs are typically older, the seals have been stressed longer and are more prone to leaks.

In addition, limited control system design, or older controllers, may be introducing high levels of hydraulic “shock” through the press motion cycle, overstressing piping, valves and seals. Newer electrohydraulic controls offer much finer control of the hydraulic axis, minimizing stress on the system. To reduce noise, simply enclosing pumps and motors, or reorienting motor-pump assemblies to redirect noise, can resolve excess noise issues with minimal cost as part



of an intelligently designed and cost effective retrofit.

Rexroth has developed a comprehensive press controls design capability that draws on our unique, in-depth understanding of the complex interplay of hydraulics and controls technologies; our experts can design a complete controls system for your press as part of a press upgrade or retrofit project.

#### **Factor Five: Overall Operating Costs**

Many press operators incrementally expend time and resources on repeated repairs and maintenance efforts. This includes overseeing spare parts inventories, repair and service contracts with outside hydraulics and controls service providers, and more frequent maintenance cycles—all of which can also reduce press availability.

The costs are not just related to time and materials, but to opportunity costs, as well. There is more risk of losing potential business with less efficient or problem-prone extrusion operations. A new press would alleviate the risk issues, but could be inexpensively solved through a retrofit.

For many press operators, a key goal is also to reduce the extrusion press “dead cycle,” or the time when the press is not extruding parts. A hydraulics and controls retrofit has the potential to directly reduce the

extrusion press dead cycle, which enables the press to push more material per hour.

One other element you can “upgrade” as part of a press retrofit project is your operator’s skill sets: Training for press operators can help make them aware of best practices to reduce waste, improve throughput and conduct preventive maintenance and interventions to help keep small problems from becoming big issues that cost time and money to resolve.

Bosch Rexroth offers a comprehensive array of [Hydraulics Training Programs](#) designed to upgrade the skills of machine operators, plant engineers and system designers—available at our location or in your plant, tailored to your machines.

#### **New Life for Your extrusion Press**

Preserving and extending the value of existing manufacturing equipment makes fundamental sense; the challenge is to determine which solution offers the most reliable and measurable return on investment. The age and performance of your existing systems need to be analyzed. Although no single factor—higher energy efficiency, improved control, reduced hydraulics leaks—can solely justify a significant retrofit, it makes sense to consider all aspects of the systems that drive, control and affect extrusion press performance, uptime and part quality.

Bosch Rexroth offers a comprehensive array of extrusion press retrofit resources and services to help you breathe new life into your system—world-class products, applications support, expert engineering personnel and system design and installation support.

From conducting an initial press “health check” and creating an extrusion press retrofit plan that specifies which systems need improvement and the potential return they offer, to complete engineering and implementation support including designing and installing wiring and piping upgrades, you can choose the support level you need to ensure project success.

It makes sense to consult with experts who have in-depth experience designing high-efficiency hydraulics and controls solutions for both new extrusion presses and retrofit/upgrade projects.

Together, we can help you discover issues or inefficiencies in your production platform that can be addressed simply through a cost-efficient retrofit. The end result: with the right investment, your press can continue to deliver the highest quality products and keep your operations competitive and profitable for years to come.

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