

Technical Overview

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Optimally Matched: Rexroth Automation Solutions for the Wood Processing Industry

The wood processing industry places particular demands on automation technology, which Rexroth is able to meet at every stage of processing. These include harsh production conditions with a high proportion of dust, vibrations and shocks, and major fluctuations in temperature, particularly in the first stage of processing the wood in sawmills, as well as small batch sizes, especially in the woodworking phase. In addition to this, machine manufacturers and operators also place great emphasis on low-maintenance, sophisticated safety techniques, and ease of use. In short: a low Total Cost of Ownership is top priority in the wood processing industry.

Rexroth solutions cover the whole process sequence, from felling the trees right through to the end wood product. Even in the logging phase mobile machinery is used, fitted out with complete mobile hydraulic systems from Rexroth.

During the wood processing stage, from tree trunk to plank or chipboard, Rexroth offers many innovative automation solutions for diverse technologies, which considerably increases productivity. Working in close co-operation with machine manufacturers for sawing or chopping up tree trunks and veneer peeling, Rexroth has developed optimum solutions especially for harsh conditions.

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Even though, in the past, wood was abundant, today we have had to learn to be more economical with this raw material. Highly automated processes have been introduced into the wood processing industry. Modern types of saws, with automated clamping and sawing of the logs, can achieve a throughput of up to 20 logs per minute, depending on size and type. One key to this is the Rexroth concept of the “Ideal Damping.” This pneumatic system solution accelerates the processing of timber through a combination of refined measurement technology, shortened pneumatic cylinder cycle times of 400ms and an optimized combination of standard components.

20 percent more output with curve saws

Modern curve saws enable the trunk to be sawn in the form of a curve as well as in a straight line, and the parameters can be defined for this. Depending on the shape of the individual trunk, between one and 20 percent more of the wood can be utilized if it is sawn in curved strokes rather than straight. During the drying-out process the curved beams and planks are then straightened. By cutting lengthwise along the annual rings, the reduced degree of across-the-grain cut results in homogenous and thus improved stability characteristics and a higher load-bearing capacity of the end product.

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With curved saws, the trunks are run through a scanner, which records the geometrical measurements, passing the details on to a master computer. From this data, specialized software calculates the position and shape of the best cut in order to achieve optimum material usage. For some of the axes, such as for adjusting the width of the cut, a compact design and as straightforward an integration as possible of the drive in the machine constitute additional challenges. For these drives the new integrated Rexroth IAC-R axis controller is particularly suitable, on the basis of its proven dynamic control valve. This intelligent drive with on-board electronics closes the positioning control circuit of the drive axis directly in the valve and has motion control functionalities right in the drive. After the target value data is received from the machine control via fieldbus, the IAC-R then travels automatically to the required position. Acceleration and speed settings are stored in a profile in the integrated axis controller. The intelligent valve can communicate without restriction with the control system via the fieldbus interface.

Intelligence through experience: Compact axis controller for the wood processing Industry

Rexroth's many years of application experience in the wood processing industry have certainly influenced the development of the IAC-R. The whole pre-tested sub-assembly, which consists of integrated axis controller, position measuring system, and cylinders, is designed for use in the harsh environmental conditions

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of the wood industry. A particularly robust version of the digital closed loop control electronics, the application of a proven control valve in the wood processing industry and the digital position measuring system integrated into the cylinder, all guarantee a long service life. A compact design, considerably less cabling, and die relieving of the super ordinate control are further decisive criteria for choosing this product.

Even with central control concepts Rexroth offers a comprehensive range of hydraulic and pneumatic components and system solutions, which are increasingly being combined with digital closed loop control technology. Right at the first processing stage, it is imperative to use high load-bearing and dirt-insensitive Rexroth roller rail and ball rail guide systems with long maintenance intervals. By using antifriction bearings, drive powers required for the feed process are often noticeably lower.

For a faster cut: Scalable, open control devices

For virtually all wood processing tasks, from cross-cut sawing to separating the boards, from simple milling and drilling applications to complex 5-axis processing, the drive and control specialists provide complete system solutions and drive packages.

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The universally open family of Rexroth IndraMotion control devices offers scalable PLC, motion control, motion logic, and CNC functionalities. With these, depending on the requirement, machine manufacturers can finely scale between drive, controller, or PC-based hardware. All controls use the common open PLC Rexroth IndraLogic in accordance with IEC 61131-3. Starting from the simple 3-axis machines to complex 5-axis processing centers, the IndraMotion MTX is setting new milestones in productivity as one of the world's fastest CNC control devices. When controlling eight axes, the CNC processes up to 2000 NC-records per second. This means that up to 64 axes can be controlled from a single control device in up to 12 CNC-channels working independently of each other. As a result, highly complex special machines for wood processing can be realized using the IndraMotion MTX.

The pneumatic components such as pressure regulators, valve support systems, and cylinders fulfill numerous tasks in a cost-efficient way—for example, the fast and controlled feed of the cross-cut saw or the selection of the edge in the edge magazine that needs gluing. Even the fast outward and return travel of the stops integrated into the cylinders can easily be realized with Rexroth's impact cylinders.

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Everything from a single source reduces automation costs

The Rexroth family of control devices is specifically designed for controlling intelligent drives of all technologies and offers an open development environment, which includes all of the necessary tools. The range incorporates ready-to-install electrohydraulic and electropneumatic drives, along with IndraDrive, the new electronic generation of drives. This unites servo and frequency-converter functionalities in one hardware unit and covers the power range from 1.5 to 120 kW. It also has an integrated motion control device with PLC in accordance with IEC 61131-3. Of particular interest to the wood processing industry are the integrated safety functions, which are certified to EN 954-1, Safety Category 3. This means that the drives operate with a guaranteed precision of milliseconds without having to go via the control device, thus reducing the risk of accidents for the operator.

Low-maintenance-driven: Linear Technology from Rexroth

The comprehensive Linear Technology Program encompasses profile rail and ball rail guides, linear systems and mechanical drives, which are designed specifically to meet the demands of that particular branch of the wood processing industry. In combination with different types of seal, the linear technology components are designed in such a way that they can be used without problem even in conditions containing very fine saw dust. An optimum initial lubrication of the carriage of ball rail guides in combination with a choice of seals will

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considerably prolong, for example, the lubrication intervals—depending on the application they may even be completely maintenance-free. For long and highly dynamic travel distances Rexroth offers ball screw drives with vertical spindle and driven nut. The new drive units with their well-sealed housing are ideal for fast and straightforward installation in processing machines for the wood processing industry.

Rexroth is already a development partner to many machine and system manufacturers as early as the project design phase, working together with the customer to develop tailor-made solutions. In this way, the best in-class components and modules fulfill not only the technical requirements of the wood processing industry, but also, with all automation technologies presented as a single package solution, lower the Total Cost of Ownership by simplifying the business processes together with the customer.

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Photos/Captions:

Photo 1:

Example of an application in wood processing:
Sawmill fitted out with Rexroth hydraulic and pneumatic components



Photo 2:

Example of an application in wood processing: Machine for gluing of edges,
fitted out with drives and controls as well as pneumatics and linear technology
from Rexroth.



Photo 3:

Five-axis milling machine for wood processing with drive and linear technology
from Rexroth.



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