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Translatory servomotors in repair systems for wood veneers and chipboard

Highly dynamic linear motors for perfect veneers and wood panels

Wood is a natural and renewable raw material, which means it rarely arrives in pristine condition. This is why the Finnish company Raute, which claims to be the global market leader in veneer, plywood, and LVL (laminated veneer lumber) production technology, also offers repair systems that automatically detect and repair defects. A combination of AL8000 linear motors and AX5000 servo drives from Beckhoff ensure the necessary high precision and dynamics.

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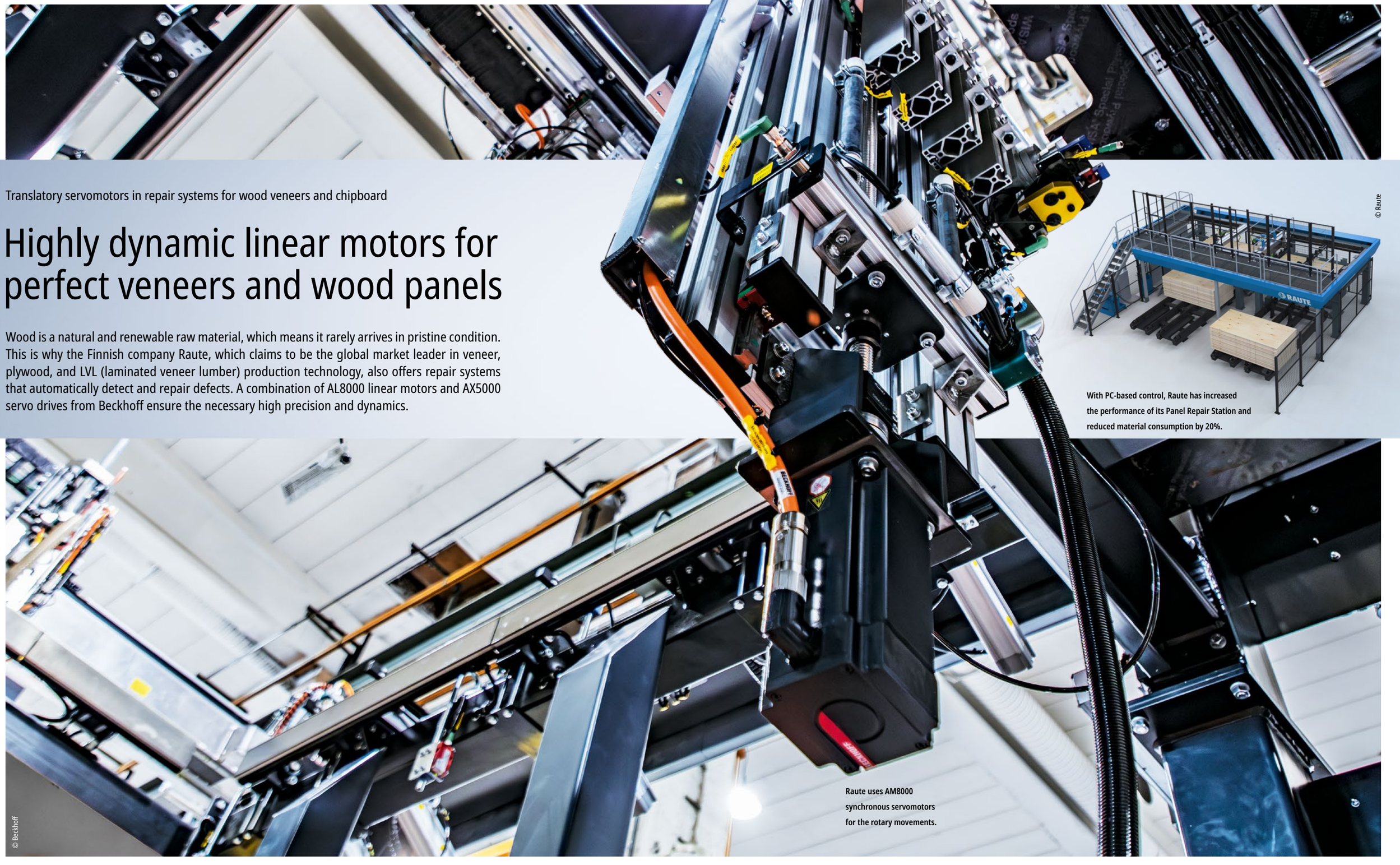
With PC-based control, Raute has increased the performance of its Panel Repair Station and reduced material consumption by 20%.



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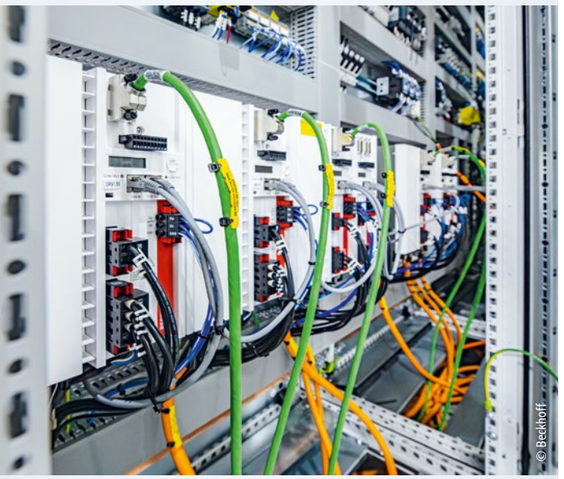
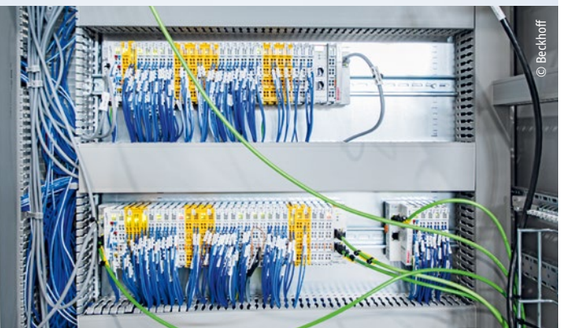
Raute uses AM8000 synchronous servomotors for the rotary movements.

The highly dynamic AL8000 linear motors ensure dynamics and precision.



All drive axes are controlled via AX5000 digital compact servo drives.

Control cabinet with C6030 ultra-compact Industrial PC, CU8110 uninterruptible power supply, and various EtherCAT I/O and TwinSAFE Terminals



Erkki Kauranen, Business Line Manager at Raute:

> “We chose the AL8000 linear motors and AX5000 servo drive from Beckhoff because of their high precision and dynamics.”

Raute, headquartered in Nastola, Finland, has built up a comprehensive stock of expertise in all sub-processes of veneer, plywood, solid wood panels and LVL processing since the company was founded in 1908. Its technology spectrum ranges from log handling, turning, and drying to veneer handling, stacking and pressing of veneers, panel handling, sorting, and repair. “Today, more than half of the LVL produced worldwide is manufactured on Raute machines,” states Erkki Kauranen, Business Line Manager for Veneer Repair, Panel Repair, and Panel Processing.

High-quality solid wood panels

The Panel Repair Station R5 is Raute’s latest innovation. Automated with PC-based control, the system eliminates the need to manually repair solid wood panels and requires only one operator to monitor the process. This allows companies to deploy their qualified personnel elsewhere in production and, at the same time, increase the quality and efficiency of repairs. When dealing with an average of seven defects per side, the system can repair up to 250 panel surfaces per hour. Designed for processing solid wood panels, the system can also repair panels made from all other types of wood.

All process steps are automated with PC-based control. “We chose the AL8000 linear motors and AX5000 servo drive from Beckhoff because of their high precision and dynamics,” says Erkki Kauranen. The system is controlled via TwinCAT and a C6030 ultra-compact Industrial PC. The customer-specific control panel communicates with the Beckhoff Industrial PC via CP-Link 4. Raute uses AM8000 synchronous servomotors with planetary gearboxes for the rotary movements. Due to the considerable system size of 8 x 10 m, the sensor signals are collected in a decentralized manner using EtherCAT EP box modules with an IP67 protection rating. TwinSAFE components are used for the safety technology.

A hundred parameters define a knothole

In addition to the highly dynamic and fully automatic processes, detecting and eliminating defects are essential to keeping the systems productive – that is, maintaining the rate at which high-quality wood panels are produced. Raute has therefore combined the technologies for identifying and categorizing defects in veneers and plywood panels in its own dedicated systems known as analyzers, which are based on image processing and AI. Raute has taught the technology to recognize the patterns and shapes of around a thousand knotholes categorized as “healthy”. “We detect and document around 100 features in a knothole, such as its shape and color changes,” says Erkki Kauranen, explaining the work involved. This means that powerful hardware is required to record the grain and detect the defects in order to keep the repair system performing well. “That’s why we carry out camera- and AI-based detection and evaluation of the defects on another Beckhoff control cabinet Industrial PC – a C6650,” adds Janne Suhonen, Key Account Manager at Beckhoff Finland.

As a rule, between five and twenty defects are detected per panel. Smaller defects may remain untreated, depending on the desired quality level, the product in question, and the intended use. This advanced analysis of the wood panels allows the company to use exactly the right amount of repair materials. “We’ve managed to halve our consumption and reduce waste to a minimum,” says Erkki Kauranen. Proof of this is provided by a comprehensive reporting system, which is an important part of the repair systems.

Erkki Kauranen, Business Line Manager for Veneer Repair, Panel Repair, and Panel Processing at Raute, and Janne Suhonen, Key Account Manager at Beckhoff Finland, in front of the Panel Repair Station R5 (from right to left)

Motion control ensures dynamics

The repair station requires the automation technology to deliver excellent performance. The coordinates of each defect must be associated with the relevant wood panel and transferred to the control system. The AL8000 linear drives are responsible for the dynamic and precise positioning of the tools. To keep system throughput high, several tools process one veneer simultaneously. However, there is also integrated collision detection to prevent damage to the tools. “The complete solution from Beckhoff, consisting of an engineering environment, control, safety, high-performance motion control, and highly dynamic linear drives, has brought us clear advantages in practice – especially during commissioning,” says Erkki Kauranen. PC-based control has also solved the interface problems that repeatedly arose in the past.

The company began working with Beckhoff about ten years ago, when it acquired its first drives for lathes and a few I/O terminals, which it used for tasks such as acquiring signals from SSI encoders. It gradually began using motion controllers and industrial PCs more and more. Teppo Lepistö, Automation Product Specialist at Beckhoff Finland, supported the implementation of the PC-based solution from the very beginning. “That has been a very important factor in introducing new products and control systems, and has accelerated development considerably,” says Erkki Kauranen.

Today, Raute uses Beckhoff’s complete automation portfolio – motors (rotary and linear), drives, and control elements – for its repair systems. The outdated control system for the lathe is currently being replaced by a powerful control system from Beckhoff. The Panel Repair Station R5 has been in operation for some time now and represents a standard-bearer for technology at Raute, providing a basis for future developments.

More information:
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