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Paul
Maschinenfabrik GmbH & Co. KG

Edging and Ripping Systems
POWER_RIP

PANEL PROCESSING

SOLID WOOD PROCESSING

OPTIMIZED CROSS-CUTTING

HANDLING SYSTEMS
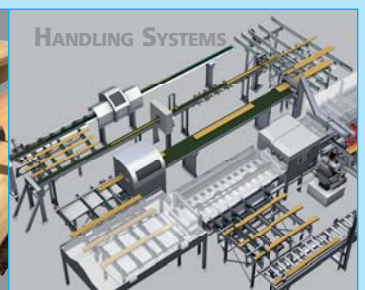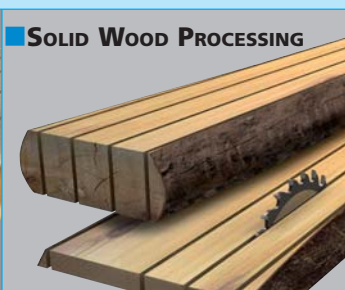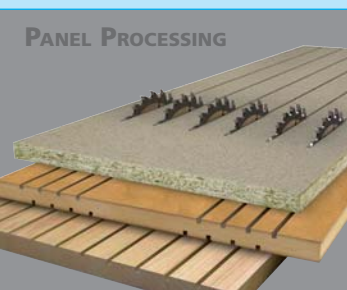
THE CUSTOMIZED EDGING AND RIPPING SYSTEM

Maximum performance and material yield on circular edgers, resaws and multirip saws is achieved through optimum assessment, alignment and grading of the workpieces. PAUL edging and ripping systems assist the operator in performing these tasks, making his work very much easier, more efficient and safer.

The POWER_RIP feeding systems can be combined with different types of rip saws resulting in highly flexible high-efficiency processing lines suiting individual requirements.

The POWER_RIP series ranges from alignment aids to high-efficiency systems for maximum yield optimization. The POWER_RIP feeding system not only centers the individual workpieces, but also skews them longitudinally taking into account their crook and taper – semi or fully automatically depending on the degree of automation provided.

On a semi-automatic system it is the operator who grades and aligns the workpiece whereas the machine control determines the optimum ripping pattern and feeds the workpiece into the machine.

Fig. 1: POWER_RIP system with an AB-MA_EXT for fully and semi-automatic operation, KME3-1012 Edger/Multirip Saw and optional accessories

Fig. 2: POWER_RIP with AB920-XL and SGL-1518 in the sawmill

The fully automatic system measures the workpiece and the machine control calculates its optimum alignment and ripping pattern. Highest edging and ripping accuracy and maximum productivity are ensured.

AUTOMATION IN FOUR STEPS

▶ ## MEASUREMENT

The workpieces pass at high speed in the transverse direction through a measuring system using up to 32 non-contact laser sensors, so-called triangulation measuring heads. A laser beam is transmitted by these triangulation measuring heads and reflected by the surface of the workpiece. Based on the angle of the returning beam, the control software calculates the distance from the transmitter. This allows the shape of the workpiece to be perfectly determined and the incline of the waney edges to be ascertained. In this way the computer gets an almost exact representation of the workpiece. Additional measuring heads to measure the workpieces from the bottom are available as an option which eliminates the need for turning the pieces.
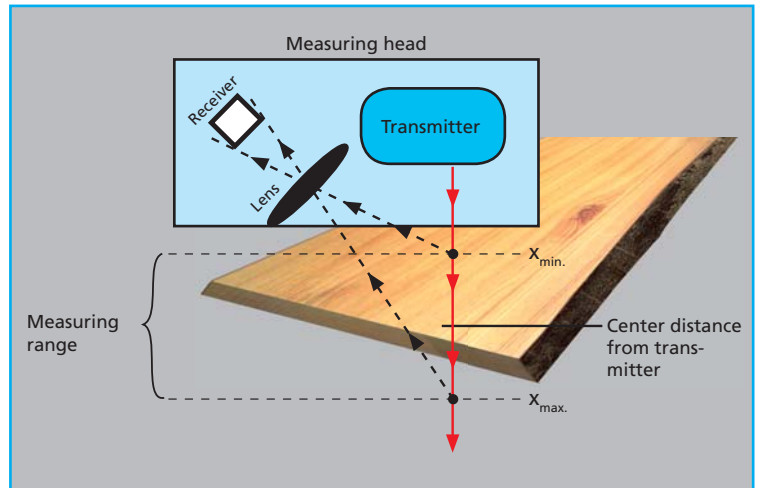
▶ ## OPTIMIZATION

Sophisticated optimization algorithms are used to determine the optimum ripping pattern based on the parameters and ripping lists entered, particularly taking into account the respective values of fixed widths, shorts, wane, etc. The ripping patterns calculated and the maximum yield optimization are exactly recorded in the statistics.

On request, the PAUL team will be pleased to develop customized software solutions.

Fig. 3: Workpiece measurement using triangulation measuring heads

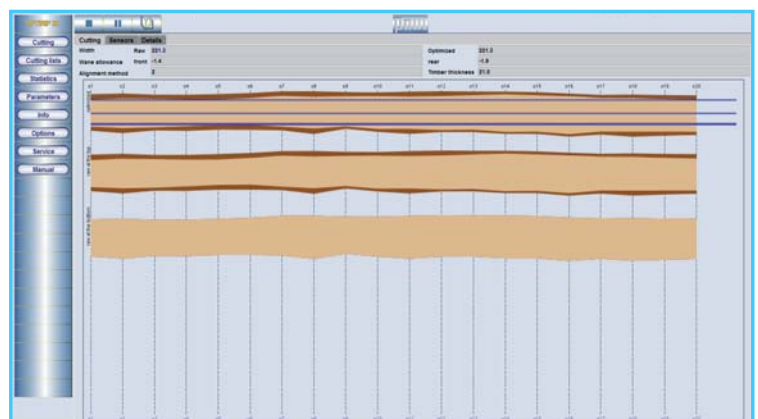*Fig. 4:* The measuring heads of the fully automatic AB920 infeed system

Fig. 5: Screenshot of the ripping pattern

ALIGNMENT

The PAUL feeding systems not only center the workpieces, by skewing them longitudinally they also consider the bend of the board which leads to a higher timber yield.

The integrated transfer table turns and positions the measured workpiece to the infeed position into the edger or rip saw. The following alignment methods can be selected:

1. Center alignment
2. Side alignment along the right-hand waney edge
3. Side alignment along the left-hand waney edge

Horizontal bowing or bending of workpieces does not affect the system, as it works without a fence.
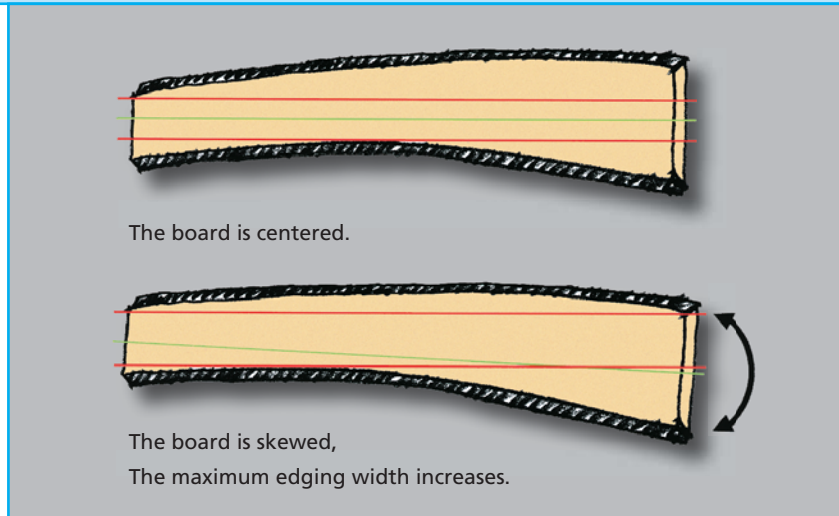

The board is centered.

The board is skewed,
The maximum edging width increases.

Fig. 6: *The workpieces are not just centered, but skewed*

Center alignment

Programmed minimum length for shorts

Cut shorts

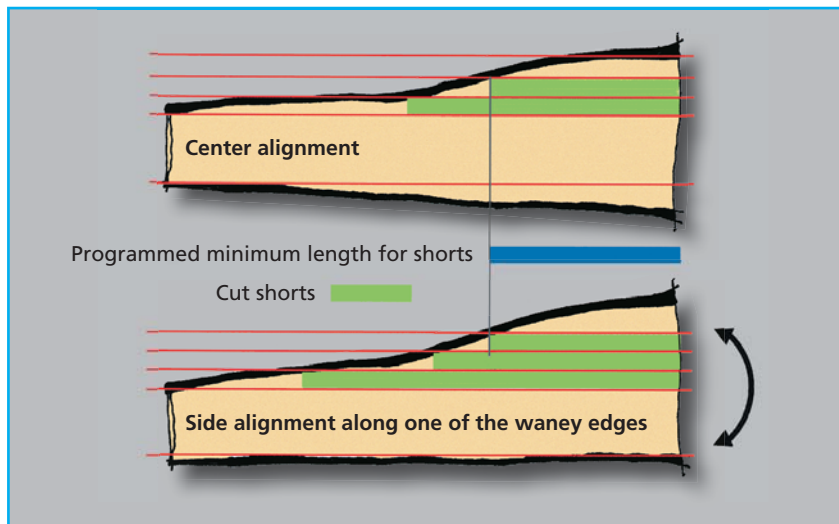Side alignment along one of the waney edges

Fig. 7: *The automatic infeed systems are available with two different alignment methods*

EDGING AND MULTI-RIPPING

The aligned and correctly positioned workpiece is fed into the edger/rip saw by a hydraulically powered overhead infeed chain. PUR-coated bottom rollers and the non-slip chain above grip the board securely and carefully, eliminating the possibility of slippage after completed alignment. The workpiece is accurately transferred to the edger/rip saw. Movable saw bushes are positioned by the control system in accordance with the ripping pattern, implementation of the optimization results is effected with highest precision.

The feed rate of the complete system is automatically adjusted based on the workpiece thickness, saw kerf and the number of saw blades used. This ensures that the maximum possible performance is achieved.
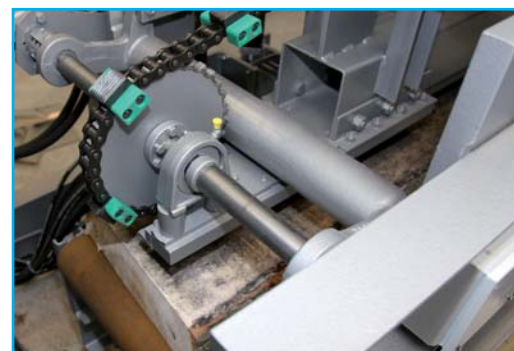

Fig. 8: *Bottom rollers and a powered chain above ensure accurate transport into the rip saw*

MAXIMUM FLEXIBILITY

▶ ## MODULAR DESIGN

Thanks to the modular design it is possible to combine different feeding systems with different rip saw models. This allows to develop an intelligent system solution for every application. Perfect coordination of the POWER_RIP components via a CNC control ensures maximum yield in the value chain.
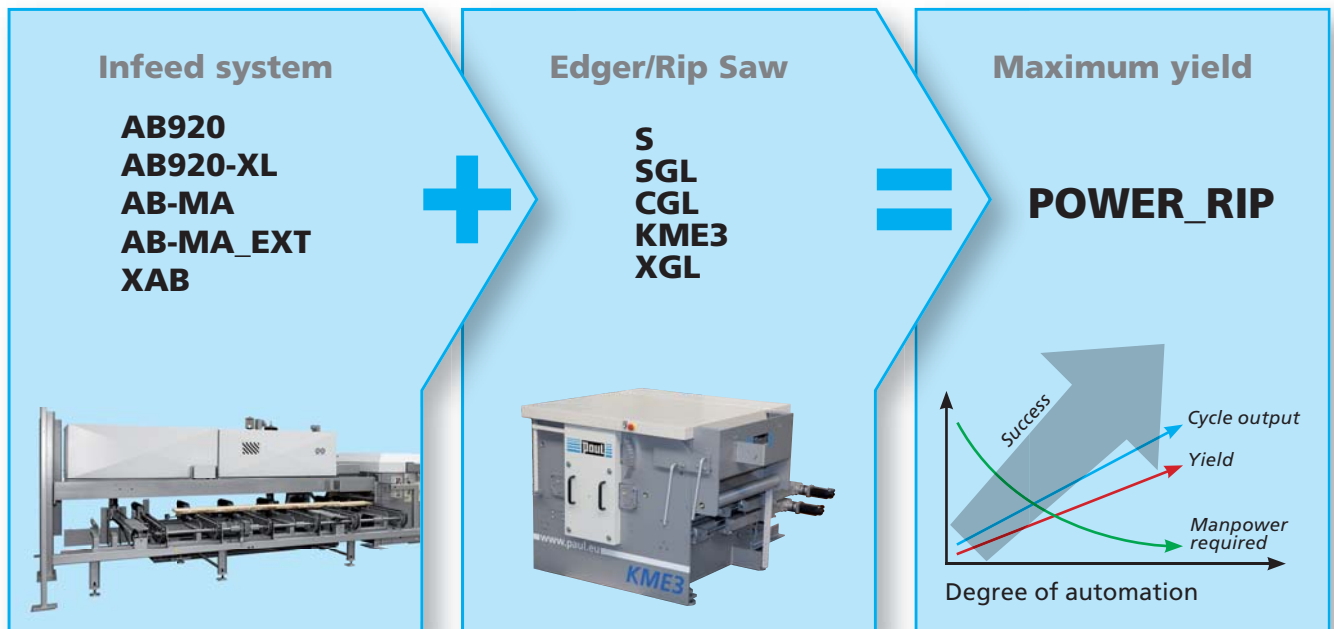
Infeed system	Edger/Rip Saw	Maximum yield
AB920 **AB920-XL** **AB-MA** **AB-MA_EXT** **XAB**	**S** **SGL** **CGL** **KME3** **XGL**	**POWER_RIP**

Fig. 9: Maximum yield optimization on a POWER_RIP from PAUL

▶ ## ALL FROM A SINGLE SOURCE

Complete rip and cross-cut systems are implemented through interlinking of rip saws, cross-cut systems and automated handling equipment. Higher feed rates, interlinked processing steps, accurate workpiece guidance and automatic work flows lead to a significant improvement in productivity. Operator workload is reduced and the safety standard increased appreciably.

We design and develop customized, automatically linked processing lines for easy operation and will advise you from the planning stage through to commissioning. Where components are required that are not included in our product range we work with renowned manufacturers to complete your system. In this way you achieve maximum continuous operation with optimum timber yield.

USEFUL ACCESSORIES FOR INCREASED SUCCESS

From destacking via pre-cross-cutting up to the offcut separator, optional top quality accessories make PAUL edging and ripping systems still more efficient:

▶ WORKPIECE INFEED

- Tilt hoist destackers
- Vacuum destackers
- Buffer stations
- Cross chain conveyors
- Singulators
- Turning devices
- Disposal flaps
- Integrated cross-cut trim saws with waste disposal
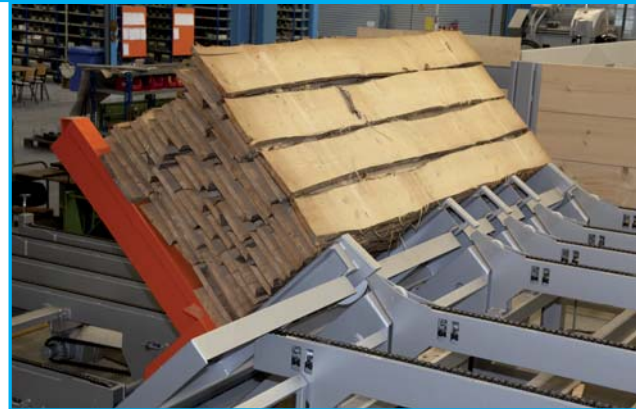- Operator's control center

▶ WORKPIECE OUTFEED

- Slab extractors
- Slab cross-cut saws
- Automatic offcut separators
- Roller conveyors in various designs
- Cross transfer conveyors
- Cross belt conveyors
- Spiral roller conveyors
- Sorting systems

Fig. 10: Tilt hoist destacker

Fig. 11: Integrated cross-cut trim saw
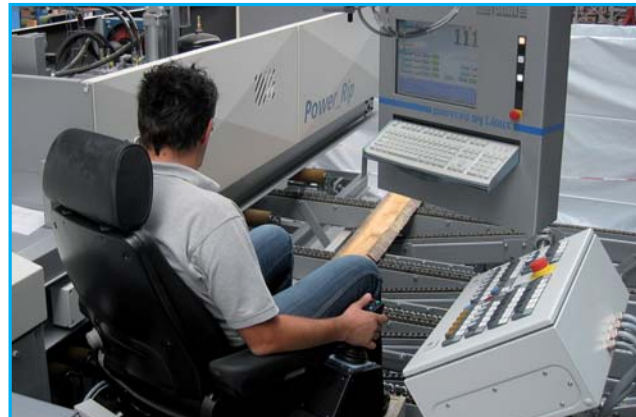
Fig. 12: Operator's control center

Fig. 13: Board turning device

AB920 UND AB920-XL

AB920

Since its launch in the early 80s, the fully automatic AB920 automatic infeed system has been continuously developed and is today a guarantor of efficiency and cost-effectiveness. The automatic measurement and optimum alignment of waney-edged and square-edged workpieces result in a maximum of yield. Servo drives ensure greatest precision. Depending on the application concerned and the rip saw selected, maximum cycle outputs are achieved.

Buffering workpieces of random length and thickness ahead of the infeed system allows to achieve minimum cycle times even with varying workpiece dimensions.

With optional extensions, such as a destacking system, integrated cross-cut trim saw or offcut separator, it is possible to respond quickly to changing market requirements. Useful auxiliary equipment will further increase cost-effectiveness and appreciably improve the efficiency of production.

Fig. 14: POWER_RIP with AB920 automatic infeed system and KME3-1012 circular edger/rip saw

AB920-XL

In the XL version the AB920 offers an increased opening height. It has been suited for use with model S and SGL machines for processing large and heavy workpieces. An AB920-XL infeed system combined with a variable circular resaw is suitable for edging and multi-ripping both boards and cants. This may in some cases eliminate the need for an extra board edger.

▶ TECHNICAL DATA

		AB920	AB920-XL
Max. workpiece length*	[mm]	4400/4800/6000/7000	4400/4800/6000/7000
Opening height (option)	[mm]	115/130	180 (225)
Max. feed speed	[m/min.]	180	160
Max. cycle output		depending on workpiece and machine data	
Suitable edger/rip saw		CGL, KME3, S, SGL	S, SGL
Measuring system		Triangulation measurement	Triangulation measurement
Alignment/optimization		automatic/automatic	automatic/automatic

*   Longer workpieces on inquiry

CONTROL ENGINEERING

With the user-friendly OPTIRIP CNC control operating under LINUX ripping lists and system parameters are very easy to program. Based on this data the optimization software calculates the optimum ripping pattern out of fixed and variable widths. It records all production data in statistics giving a perfect overview of timber yield, i.e. product control.

The control is distinguished by the following features:

- Operating terminal with 15" touch screen
- 40+ cutting lists with 1000 fixed widths
- Simple programming of fixed widths on multi-saw bushes with automatic calculation of the spacer rings required
- Database for different saw bush configurations and saw set-ups

- Automatic program changeover based on length, thickness and width measured
- Job system for fast and reliable program changeover
- Automatic recognition of waney and (pre-)edged workpieces
- Thickness measurement for variable ripping options
- Area optimization for maximization of timber yield
- Crayon mark recognition for quality grading, program changeover, etc. (option)
- Scanner connection (option)
- Control of handling components and accessories
- Error messages in plain text and in the user's language
- Automatic self-diagnosis on program start
- Networking / data exchange with the office, other machines or the manufacturer (telemaintenance)
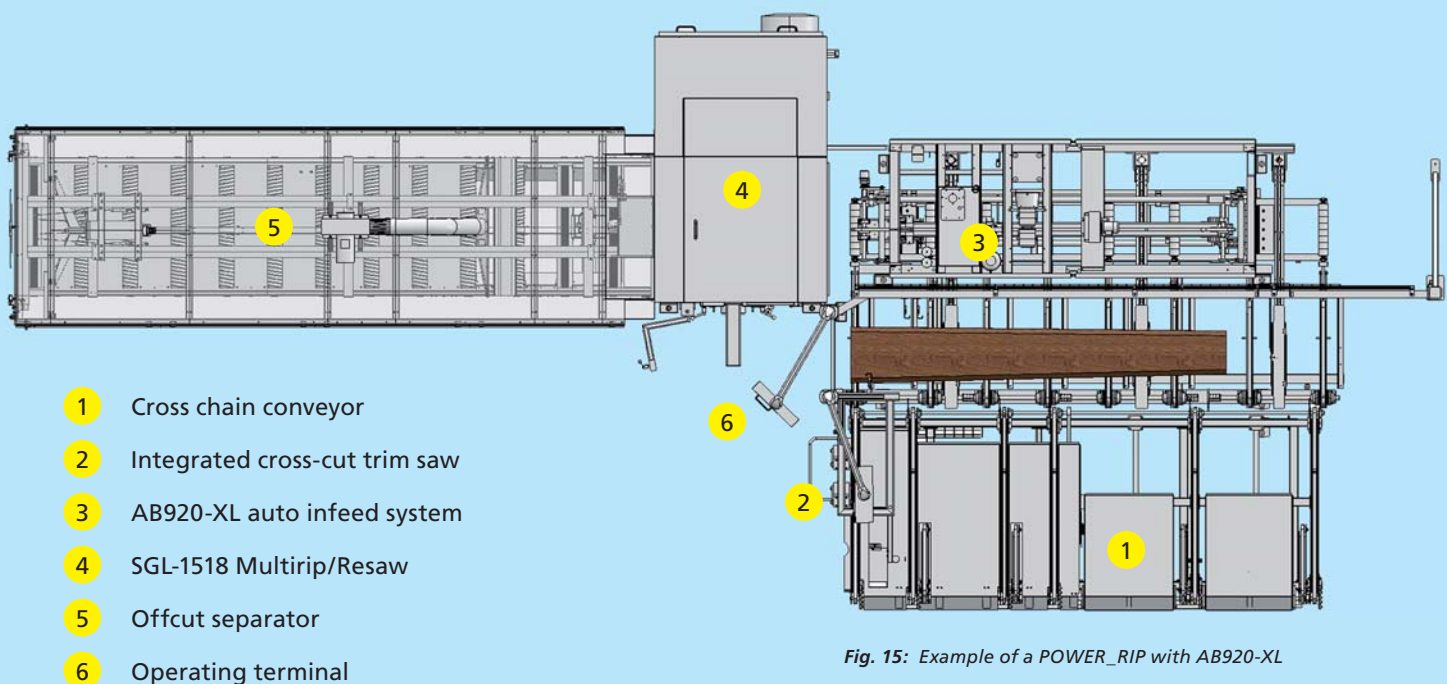
No.	Component
1	Cross chain conveyor
2	Integrated cross-cut trim saw
3	AB920-XL auto infeed system
4	SGL-1518 Multirip/Resaw
5	Offcut separator
6	Operating terminal

Fig. 15: *Example of a POWER_RIP with AB920-XL*

AB-MA AND AB-MA_EXT

AB-MA

The PAUL AB-MA is a semi-automatic infeed system for waney-edged and square-edged workpieces. Since the triangulation measuring method on the AB920 only detects the workpiece geometry, but no wood characteristics or different grades, the operator's critical eye is required. On the AB-MA alignment and grading of the workpiece are therefore carried out manually.

The workpiece is manually graded with the aid of laser lines and the machine control suggests a ripping pattern which can be changed by the operator. Width-optimized ripping is possible by cutting out wane, bend or other wood characteristics (e.g. heart shake or knotholes). Quality-overlapping width optimization is available as an option.

AB-MA_EXT

Maximum yield optimization is achieved by the extended AB-MA_EXT version. The basic functions of the AB-MA are completed by the measuring system of the AB920. The geometry of the incoming workpiece is first automatically detected by the measuring system, then the workpiece is positioned and aligned by the infeed system. The optimization result calculated based on the workpiece geometry is indicated to the operator by means of laser lines on the workpiece.

Before ripping the operator can check and, if necessary, correct the ripping pattern calculated. Thereafter the infeed chain takes the workpiece into the rip saw.

Fig. 16: *The correctly positioned workpiece as it is presented to the operator*

Depending on the operating mode selected, this system also works fully automatically like an AB920, without operator intervention. This achieves high outputs with minimum waste.

▶ TECHNICAL DATA

		AB-MA	AB-MA_EXT
Max. workpiece length*	[mm]	4400/4800/6000/7000	4400/4800/6000/7000
Opening height	[mm]	115/130	115/130
Max. feed speed	[m/min.]	180	180
Max. cycle output		depending on workpiece and machine data	
Suitable edger/rip saw		CGL, KME3, S, SGL	CGL, KME3, S, SGL
Measuring system		Manual grading with line laser	Triangulation measurement Manual grading with line laser
Alignment/optimization		manual/automatic	manual/automatic automatic/automatic

* *Longer workpieces on inquiry*

CONTROL ENGINEERING

Despite numerous automation possibilities the trained eye of the operator still plays an important part in quality optimization on ripping systems for industrial timber processing. In the AB-MA and AB-MA_EXT systems PAUL combines the operator experience with intelligent software functions and supporting handling components.

The workpieces are presented in the correct position to the critical eyes of the operator sitting in his control center close to the positioning table. Via the operating elements, e.g. joystick or touch panel, his entries are executed quickly and exactly.

The CNC control of the AB-MA and AB-MA_EXT operating under LINUX

calculates the best optimization result based on the ripping lists, system parameters and operator inputs. Thereafter the moving saw blades move at high speed to their target positions. Servomotor-driven saw bushes fitted with one or several saw blades allow production of variable and fixed width strips at one pass.

The CNC control continually records the production progress; statistic data in real time provide a quick and comprehensive survey. Network technology and internet connection not only serve for production control, but also for work preparation in ongoing operation. This reduces programming and set-up times to a minimum.
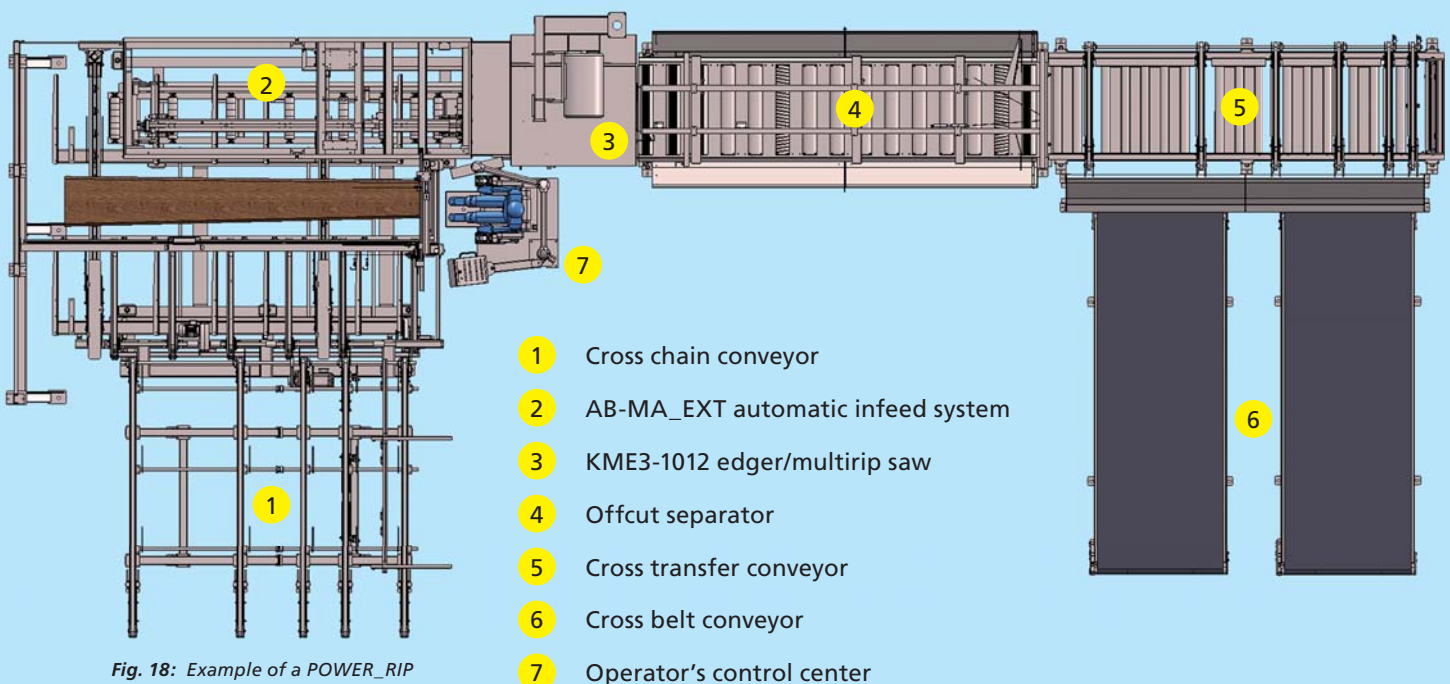

Fig. 17: The convenient workplace of the operator

1. Cross chain conveyor
2. AB-MA_EXT automatic infeed system
3. KME3-1012 edger/multirip saw
4. Offcut separator
5. Cross transfer conveyor
6. Cross belt conveyor
7. Operator's control center

Fig. 18: Example of a POWER_RIP with AB-MA_EXT

POWER_RIP_XAB

The POWER_RIP_XAB has been designed for maximum productivity and equipment up-time. It has been developed as a complete edging and multi-ripping system featuring high-grade state-of-the art components that are perfectly coordinated via a CNC control. Highest edging and ripping accuracy as well as maximum timber recovery are ensured.

On the POWER_RIP_XAB the edging and ripping operations are distributed to two machines. Between the two machines the edged board is separated from the waney edges by an offcut separator without splitting wedges which allows maximum feed speeds.

The automatic infeed system of the POWER_RIP_XAB measures the incoming waney-edged boards in a space-saving manner during transverse throughfeed and ensures their optimum alignment.
The edger features a saw shaft with two independently moving saw bushes for edging the board into the previously measured maximum width. Thereafter it is separated from the waney edges.

The following rip saw is equipped with a saw shaft with four moving telescopic saw bushes offering a multitude of ripping variants and so maximum flexibility.

Fig. 19: POWER_RIP_XAB with fully automatic infeed system and separate edger, offcut separator and rip saw
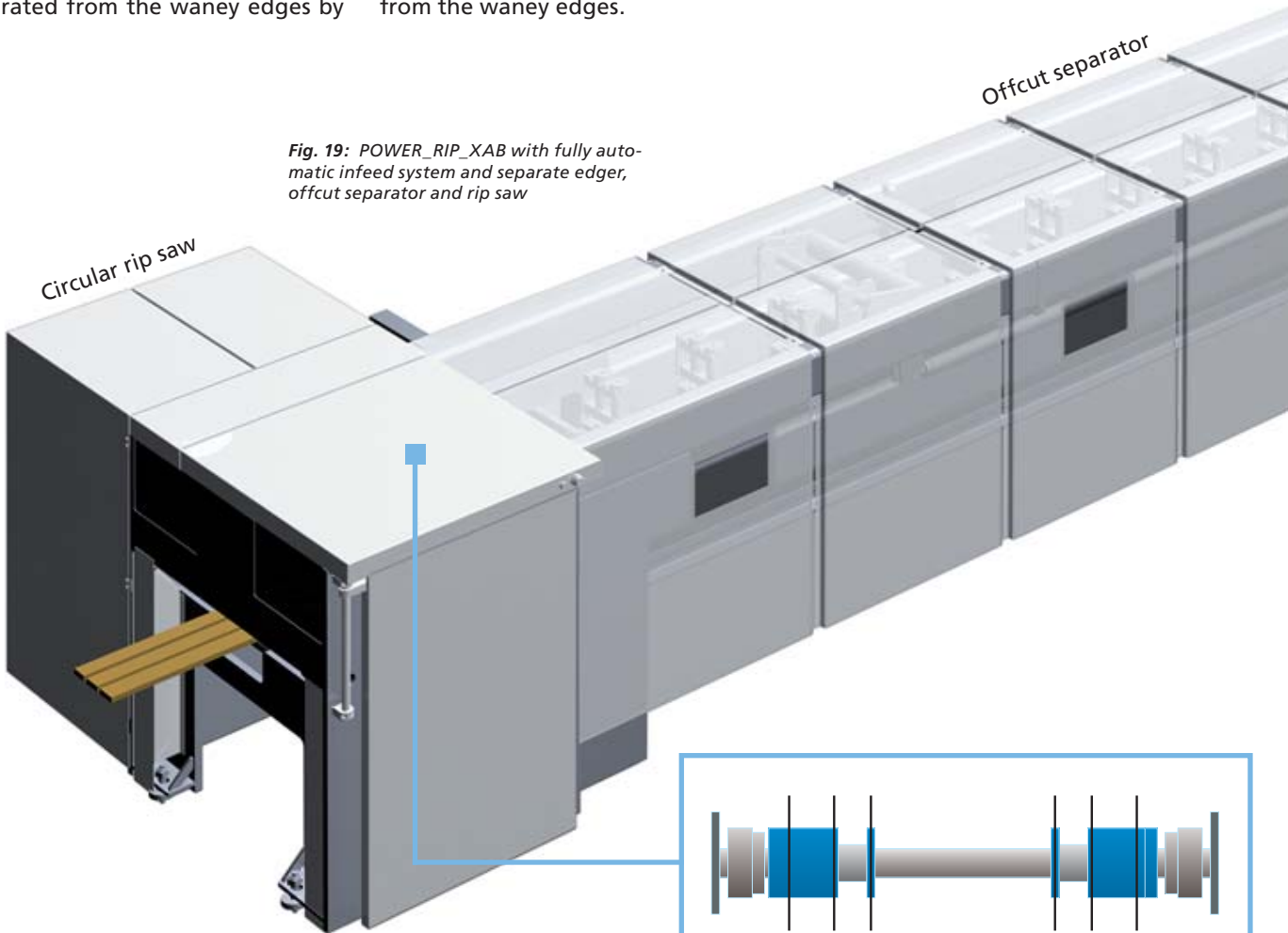
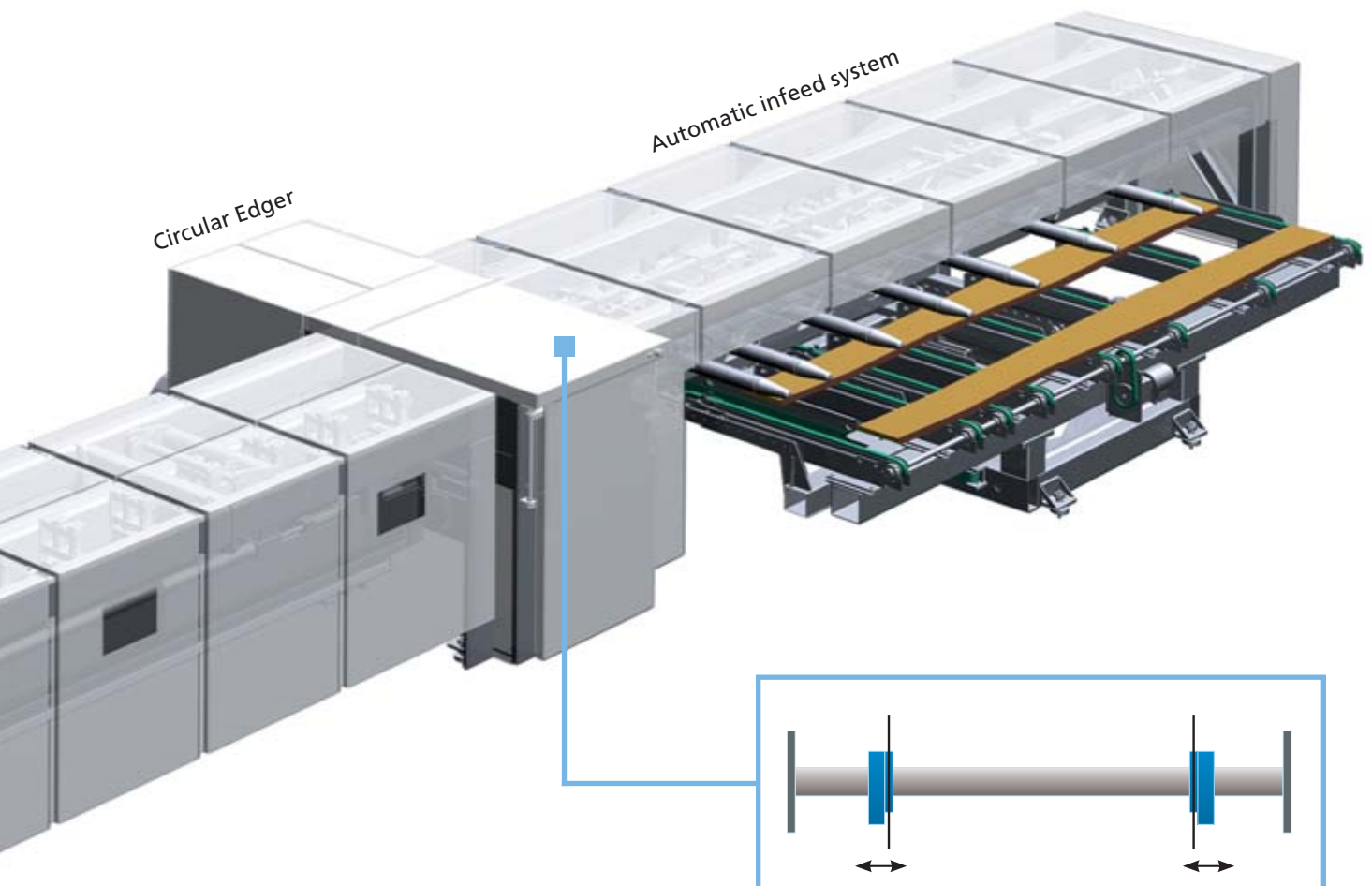*Fig. 20:* Saw shaft with up to four moving telescopic saw bushes

Fig. 21: *Saw shaft with two moving saw bushes*

▶ TECHNICAL DATA

		POWER_RIP_XAB
Workpiece length	[mm]	1 200 - 6 000
Opening width	[mm]	500 / 750 / 1 000
Opening height	[mm]	50 / 100
Max. driving power	[kW]	2 x 200
Cycle output	[m/min.]	250+
Taktleistung	[pcs/min]	30+
Suitable edger		XGL (overall system with XAB)
Measuring system (option)		Triangulation measurement (scanner)
Alignment/optimization		automatic/automatic

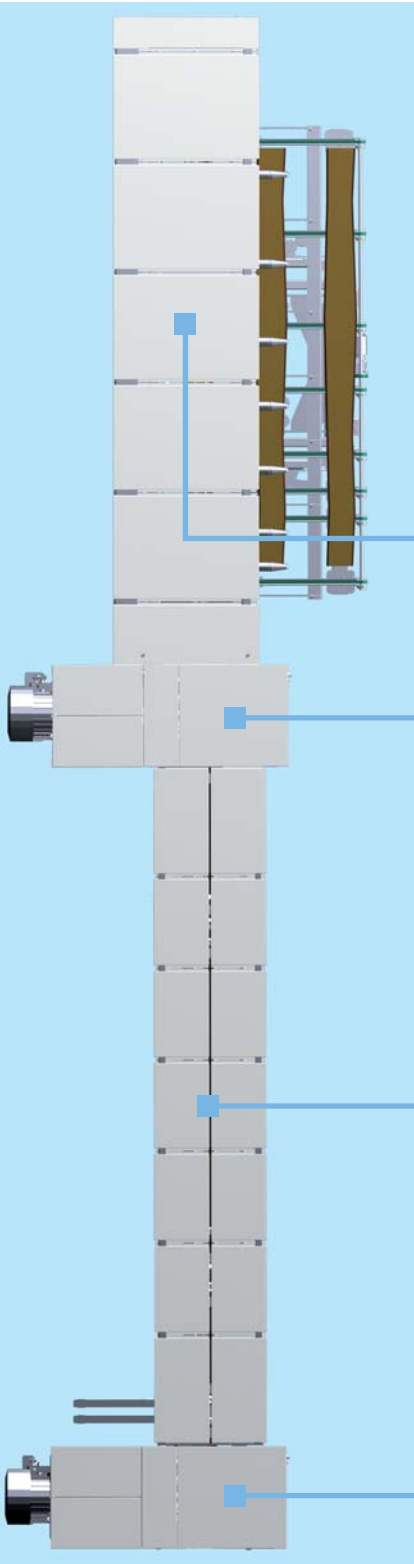## ▶ EDGING AND RIPPING OPERATION ON THE POEWR_RIP_XAB

Fig. 26: Top view of POWER_RIP

Fig. 22: Measurement and alignment of waney-edged boards in the automatic infeed system

Fig. 23: Board edging in the edger

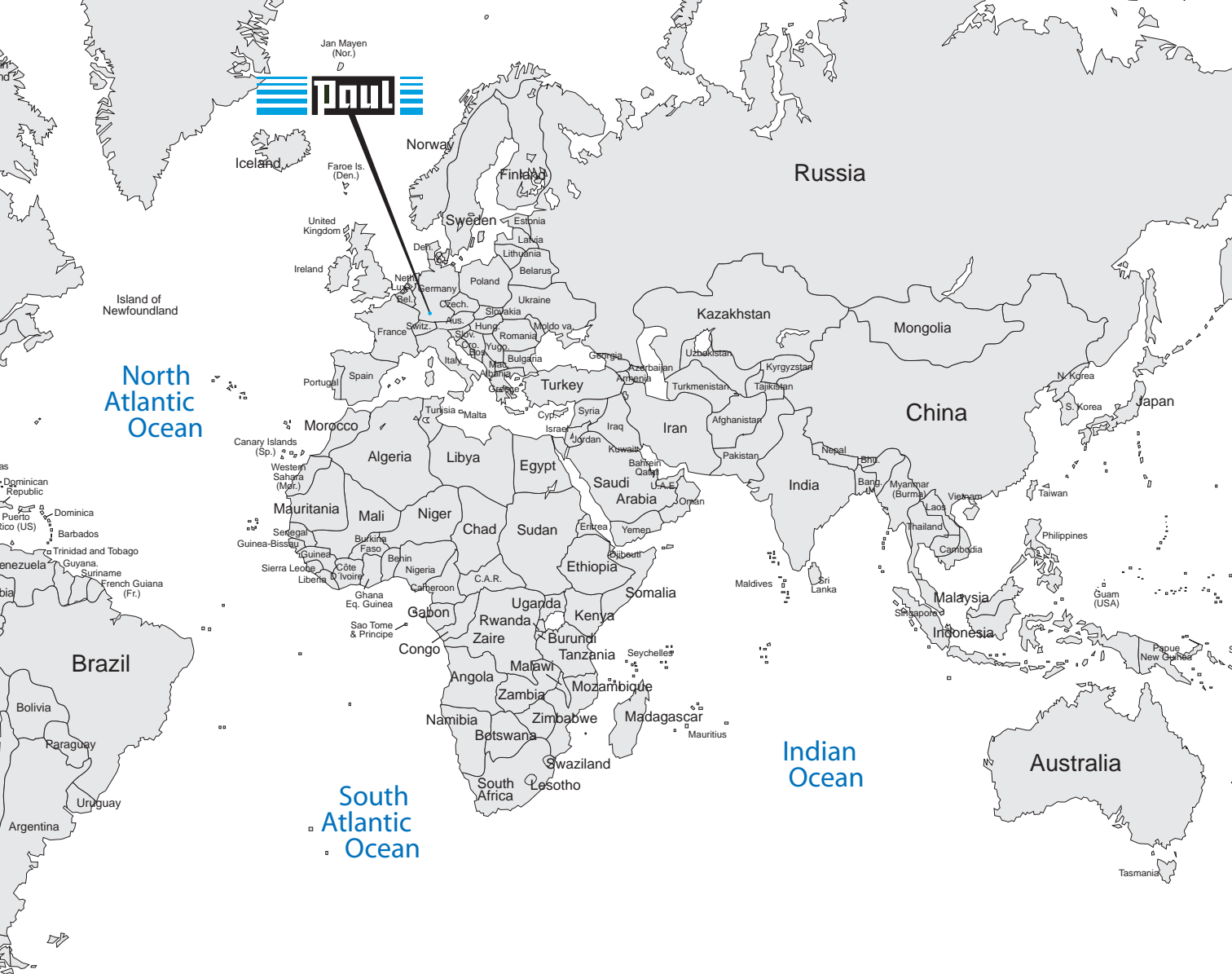*Fig. 24:* Separation of boards and edgings by the offcut separator

Fig. 25: Ripping of square-edged boards in the rip saw

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