

A HOUSE AT YOUR FINGERTIPS!



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*Dynamic solutions in
timber house construction*

HAMUEL
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Members of the SCHERDELGroup



Process-oriented thinking

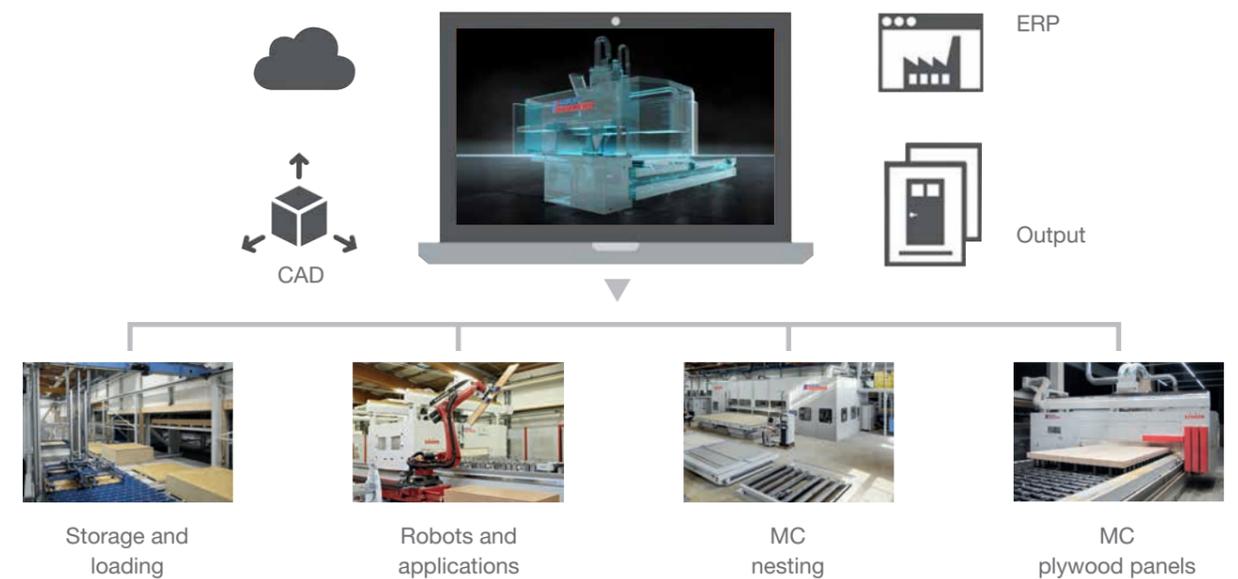
Wood as a building material offers good sound insulation, provides a pleasant indoor climate and, with the right construction method, has a long service life. Moreover, it has excellent ecological properties, as it is renewable, easy to recycle and binds CO₂. Changes in building regulations have resulted in the permission to build houses higher than 80 m from wood now. Construction tolerances are particularly important here, and consequently unwanted deviations in the production process must be minimised.

Timber construction moves away from craftsmanship and towards industrial production – meaning partial or full automation. For this reason, interlinked machine solutions or production lines that permit the automated and precise prefabrication of the timber elements in the factory will increasingly gain in prominence. This means that wood processors can work more efficiently and become less dependent on the market for skilled labour.

Intelligent interlinkage

Usually, planners use CAD programmes for their design work. These programmes require conversion into the software languages of the CAM and/or optimisation systems to make the equipment work optimally. The BTLx data exchange format is a proven format in timber construction. It is non-proprietary and serves as an interface between the different formats. Here, software modules optimise the work processes and ensure that there is little cutting waste.

So-called lot manager programmes even combine completely different projects into a single production lot. The data is stored in a SQL database and continuously synchronised, thus allowing the user to get an overview of all current lot conditions within a very short time.



Automated prefabrication

Most companies already have machines in place. Moreover, in handcraft enterprises the production area is often limited. Batch size 1 is mostly standard and frequently the decisive reason why the company gets the order.

The aim of automation must therefore be to increase productivity on the existing floor space, to further maintain the production of batch size 1, to guarantee flexibility in design, to ensure high quality and exact adherence to deadlines, and to secure a smooth logistics process, especially in the flow of materials.

In their high-end version, intelligent automation solutions do not only imply the interlinkage of production processes but also the self-organisation of manufacturing plants and logistics systems.



Perfectly matched system solutions

Wood is a living but also delicate material, the processing of which requires not only the necessary precision but also gentle handling of the surfaces. Using the 5-axis technology, the milling head moves around a component in only one clamping operation, thus eliminating changeover times and re-clamping.

Individualised machine concepts, where process stability goes hand in hand with first-class machining performance, will prevail if we understand the process as a holistic approach. High-precision machining centres with sensible chip and storage concepts perfectly matched to accuracy and safety requirements will then decisively increase productivity.

Panel processing centre for the flexible prefabrication of elements in solid wood, wood-based materials, gypsum and cement panels of up to 7,000 x 3,300 mm.

This machine permits the object-related prefabrication of wall, ceiling and roof elements. Door and window cut-outs as well as cable ducts have already been incorporated.

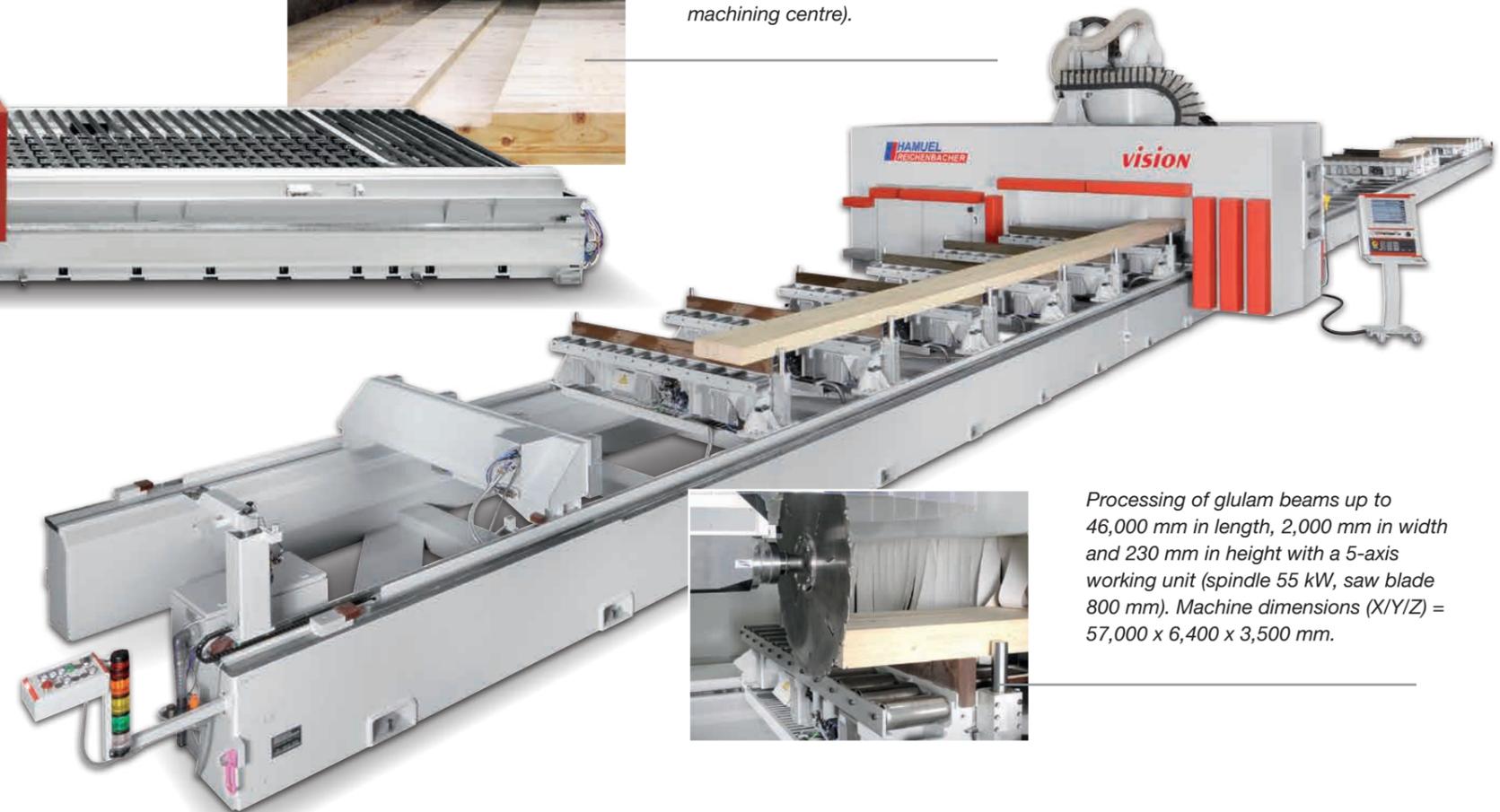


CNC cutting centre for large panels intended for timber construction. Automatic feeding and discharging of panels, handling system with vacuum gripper for bars (integrated in the portal of the machining centre).

5-axis technology increases efficiency

First-class quality and high safety standards – people who have had the opportunity to work with a Reichenbacher CNC-system appreciate the knowhow gained from almost 70 years of experience. The flexibility, precision and reliability of the machines convinces customers who manufacture doors, stairs, windows, construction elements, furniture and many other products from the high-quality natural material wood.

Reichenbacher is a synonym for decades of experience in 5-axis technology as well as for first-class machining quality in the case of high machining forces and great cutting depths. The secure clamping of both large and small or complex components ensures absolute safety for the user.



Processing of glulam beams up to 46,000 mm in length, 2,000 mm in width and 230 mm in height with a 5-axis working unit (spindle 55 kW, saw blade 800 mm). Machine dimensions (X/Y/Z) = 57,000 x 6,400 x 3,500 mm.



Smart factory: Intelligent interlinkage permits parallel panel processing with three machining centres and a common high-rise storage system

- Highly efficient object-related production of elements made from laminated timber
- Sequencing for the entire machining process: three machines of the same type for high reliability
- Planning of the material flow starting at the gluing press: feeding with alignment station, turning station, subsequent processing (for example grinding station)
- Integration of the equipment into the digital company structure
- Very sturdy design for reliability and longevity
- Fully automatic process, linkage to automation, waste wood concept (transportable)
- Cardanic working head (5-sided machining, cut-outs with sharp angles)
- Superior performance: feed rate up to 60 m/min
- High-performance milling spindle: with 66 kW in S6 operation
- Deep-hole drilling unit up to 1,800 mm in depth; saw blade with a diameter of 800 mm



Planking components at your fingertips



A panel star for the future

Small panels for small areas, large panels for large areas: the principle is a simple one, but large panels confront a production plant with enormous challenges. The core of the machine park, a panel processing centre type ECO, closes a major gap.

Wood-based panels or solid wood panels, coated or cement-bonded panels, soft-fibre, gypsum, plastic or solid core panels, Corian or hard foam panels – they are all processed fully automated in a single operation, even in the case of unconventional panel sizes.

After the fully automatic feeding of the material, processing takes place simultaneously from above and below eliminating the need to turn the panels. The 40-fold drilling unit permits complex special and series drilling, and, using a double gripper module, the tool magazine with up to 80 tools precisely supplies the working unit with the preselected tools.



High cutting performance for large panels

The VISION cutting and machining centre has set standards in the machining of large panels. At 19 m in length, 8.5 m in width and almost 5 m in height, the dimensions of the plant are impressive, and the associated logistics allow the sawing, drilling, milling, chamfering and grinding of panels up to a length of 13,500 mm and a width of 3,500 mm from a wide variety of wood-based materials.

This starts with the aligning of the panels on the through-feed table, their fixing, sectioning and cutting. Milling of the workpieces required from the raw panels and their machining on five sides at high travel speeds will be possible without the need for repositioning. Mechanisation by means of conveyor systems placed upstream and downstream from the machining centre guarantees fast handling of the large panels up to a thickness of 400 mm.



A staircase at your fingertips

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Passion for unique staircases

The secret of staircases realised way beyond conventional standards is the combination of craftsmanship with ultra-modern 5-axis CNC technology. Thanks to its extraordinary precision and flexibility, the latter has gained a significant place in the production plant of a staircase manufacturer. After all, the VISION can process anything made from solid wood, aluminium, composite or solid surface material.

Here, the programming is essential for the entire process. Sophisticated software turns initial ideas into precise planning and production steps. All relevant factors, such as the optimum pitch ratio, are calculated and shown in 3D simulation, followed by the creation of the data required for machining and their transfer to the CNC.



Staircases connect (living) spaces

If you want to keep up with the visionary design concepts of architects, you have to be technically versatile. Two different CNC systems always enable the process planner to assign the immense range of components, which consists of different short or long stringers, steps, handrails, posts or special components, to the machine that, due to its technical equipment, optimally implements the machining modes.

Apart from the VISION with automatic beam table, a chain tool changer with space for 60 tools and a multi-spindle drilling gear, a system with grooved HPL table and a pick-up place for large saw blades completes the machine park. Thus, for high components, the system with a Z-axis of 735 mm proves its advantages, while for elements requiring many drilling and milling operations, the system with a large number of tools is predestined for economic process optimisation.



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Challenging special and fire protection doors

Customers often design products with complex demands on construction, dimensioning and materials. The CNC simultaneous technology with radius correction is the perfect way to meet these requirements – for the production of sound insulation elements or perforated parts, for example.

The ECO is equipped with two separately movable machining tables. The machining of high-density materials and composites is just as effortless as that of lightweight construction materials, wood materials and plastics. Special probing cycles ensure dimensionally accurate machining in all axes. Two high-performance 5-axis units, two tool magazines with 40 places, each, and special places for circular saw blades, provide a high degree of flexibility. Powerful blast nozzles guarantee the optimum cleaning of the components and thus high quality and a long service life of the tools.



Realising brilliant door concepts

Unlike almost any other component, doors are subject to daily wear and tear. The modern VISION high-performance system has been perfectly adapted to the requirements of a door manufacturer to achieve a significant reduction in processing times in their special doors programme. The heart of the 4-column portal machine are two 5-axis units with vibration monitoring system, two PIN tables and a chain tool magazine with 60 places.

The advantage of two units is obvious: while one is drilling the hole for a door peephole, the other is already set up for the next work step, for example the milling of light cut-outs. Downtimes have thus become a matter of the past. The machine bed is equipped with two additional unit slides, which move via separate NC axes. Each slide possesses milling-drilling motors with fixed tooling, one lock case and one fitting groove cutter, which are positionable with respect to each other.



Formwork at your fingertips

Spectacular geometries

The complexity of geometrically demanding structures in combination with fair-faced concrete is a remarkable challenge. For a tower made from fair-faced concrete dyed red, which tapers more and more towards the top, 100 m² of filigree special formwork including battens and joints was required, which consists of individual small-scale boxes. The VISION machining centre with a grooved HPL table surface can set new standards, both in terms of accuracy and speed but also of flexibility.

The 5-axis machining centre with nesting operation, which has been conceived for maximum panel sizes of 2.50 m x 5.50 m, is equipped with a lifting table and a printer unit on the loading side and a table with a brushing and push-off station on the unloading side.

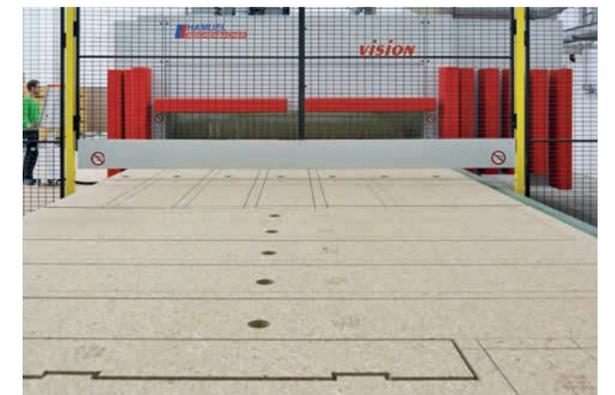
Impressive pagoda in the entrance area of the new rhino compound at Zoo Berlin.



Formwork determines the shape

Milling of all the components for the formwork is from coated or raw chipboard and birch multiplex panels. For example, Vario elements with pre-drilled holes or cut-outs for windows or doors come from the 2.50 m x 5.50 m 3-layer panels, and round covers with a diameter of 70 mm from small raw panels. The 5-axis unit carries out milling, sawing and grinding work, while an additional multi-spindle drilling unit exists for drilling rows of holes and construction holes. The high degree of prefabrication results in enormous efficiency on site. Since all components delivered are marked with a numerical code, you know immediately where which component goes.

The planning, prefabrication and assembly of the 3D formwork to give the concrete its shape is computer-assisted. The more geometrically complex the formwork is, the more capable of flowing and at the same time more pressure-resistant the concretes used have to be. In this context, one often chooses special high-performance concretes for statically relevant components.





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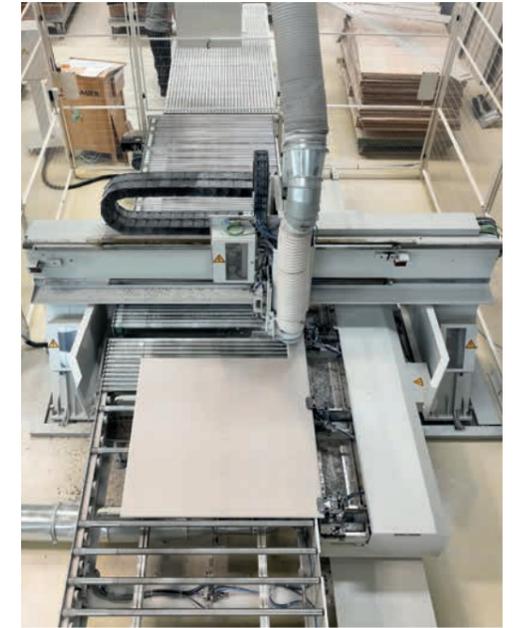


Ceilings and walls at your fingertips

High degree of prefabrication using a through-feed system

The highly efficient through-feed system is a central component in the overall process. An area storage system with 14 places precedes it, where the arrangement of the panel stacks is in line with the quantities required. A flexible gripper system moves raw panels with maximum dimensions of 3,500 x 1,280 x 25 mm and transports them into the CNC unit via a motor-driven roller conveyor. Then five positionable grippers aligned along the table on a slide hold the panel in place. The sectioning and cutting to size of the panel are the next steps.

Those who rely on a high degree of prefabrication want to deliver almost completely closed façade components to the construction sites, i.e. including façade formwork, plaster and with windows and doors in place. For this purpose, the CNC carries out all formatting, such as socket, door and window cut-outs, anchoring angles, fixing holes, bevel cuts for gables and other technically necessary notches. A central CAD planning system provides the complete data sets with the correct project reference for all workstations. This saves time and ensures optimum fitting accuracy and high quality. Thus, the intelligent interlinkage of all components in the sense of a smart factory makes a significant contribution to an increase in efficiency.



Extra strong panelling

What is so special about energy-efficient buildings, which stand out due to their high-quality workmanship and first-class materials, is continuous innovation. Particularly noteworthy are walls with wood fibre insulation and extra strong panelling made of gypsum, a natural building material, as they ensure a healthy indoor climate thanks to their perfect temperature and moisture balance.

At the core of the wall production is a panel machining CNC centre ECO implemented within an existing production sequence to improve the process flows. Production 4.0 means digitising even more profoundly, making workplaces more ergonomic and optimising processes in such a way that the right panels are always available at all production stations at the right time for each specific construction project.





Construction in harmony with the environment and nature

In the future, construction will be a decisive factor when it comes to coping with the climate change.

Hardly anyone knows that 110 million m³ of wood grow in German forests every year and only 70 million m³ of it are used. Building with wood creates a healthy indoor climate and meets high functional and aesthetic demands.

- According to a UN report dated 2020, the construction industry is currently responsible for 38 % of energy-related global CO₂ emissions. This makes this industry alone the third largest emitter in the world.
- When buildings are demolished, the building materials used for their construction end up as waste. At about 63 % of the total waste produced in Germany alone, construction and demolition waste represents a great potential for more sustainable action.
- If you compare the CO₂ balance of wood with that of concrete, which is currently the most widely used building material, you can see that wood is much more environmentally friendly because it binds carbon dioxide, whereas the production of concrete releases the harmful greenhouse gas.
- Wood is a renewable resource that permits the so-called cascade use, meaning it can be used not only once in its solid form but also as recycled material and, finally, to generate bioenergy.
- Thanks to new ways and approaches in the planning and implementation of buildings, bonded elements made of glulam and cross laminated timber can be taken back at the end of a defined building service life and serve as a raw material for new products – a consistent circular economy in the sense of sustainability.

CNC-technology at its best

