

SOLID CONSTRUCTION WITH WOOD

by  van roje



XWORKS
 van roje BRETTSPERRHOLZ





Solid, fast, custom-made, and ecological constructions made of renewable materials? It can be done: with our tailored XWORKS [pronounced CROSSWORKS] solid wood elements made of cross-laminated timber. As they offer so many benefits, solid wood constructions are becoming increasingly important in the municipal sectors, industrial sectors and in the construction of residential properties.

WHY XWORKS?	2 3
PROPERTIES	4 5
APPLICATIONS	6 7
FULL SERVICE	8 9
CERTIFICATION	10 11
SUSTAINABILITY	12 13



XWORKS timber construction elements are custom made in our new plant according to plan using our high-quality cross-laminated timber. They are then given the required openings, outlets, holes, and details in our plant's joinery. Once construction is complete, we also take care of the smooth shipment and delivery for on-site assembly.

THIS IS HOW XWORKS WORKS!	14 15
COMPONENTS	16 17
TECHNICAL DATA	18 19
SURFACES	20 21
CROSS-LAMINATED TIMBER PRE-STRUCTURAL DESIGN TABLE	22 23
NESTING	24 25
JOINERY SERVICES	26 - 29
LIFTING SYSTEMS	30 31
SHIPMENT & LOGISTICS	32 33

CROSS-LAMINATED TIMBER – YOUR FULL-SERVICE SUPPLIER

Over the past 100 years, the long-established van Roje company has evolved from a small family-run sawmill into one of the leading wood-processing companies in Germany.

Today the highest-quality cross-laminated timber elements are made here in one of the most cutting-edge plants in Europe.

The timber for the innovative building material comes from local forests and is cut in our Holzwerke van Roje sawmill before being processed in accordance with the highest technical standards on sustainable, future-oriented building components.

WHY XWORKS?

WHY XWORKS?



ECONOMICAL

Solid constructions with XWORKS are highly economical thanks to our quick, highly efficient, and homogeneous planning process, during which the entire building is digitally pre-planned right down to the tiniest detail. Only then is the product made ready for assembly, including all joinery work. Our XWORKS construction elements also offer major design benefits and a maximisation of the living space due to their slimline construction, minimised cross-sections and therefore thinner walls.



FAST

Highly efficient planning and the short assembly time on site reduce actual construction time with our XWORKS timber construction elements compared to conventional solid-wood products. Our high-performance logistics concept ensures punctual delivery on site and in order of assembly. From assembling the first wall right through to the roof, the building shell of a small house can usually be erected in this way within 1-2 days. Premium visual-quality timber also ensures faster completion.



SUSTAINABLE

Our XWORKS timber construction elements conserve resources. Their carbon footprint is also vastly superior to other building materials. The woods used for our cross-laminated timber come from local and national forests across Germany. We separate cut-outs and off-cuts in our state-of-the-art recycling facility so that they can be reused. This way, we are able to use 100% of the raw materials, with no waste.



MODERN

Elegant visual quality, clad walls or a combination of both – customers have so much design freedom with XWORKS. The inner walls can be clad, but this is not necessarily required. We offer a choice of different visual qualities for various needs. The products' straight lines and natural wood surface ensure a modern, warm and cosy ambiance.

XWORKS – LIGHTWEIGHT & STRUCTURED

THE SUPPORTING ROLE OF SOLID WOOD CONSTRUCTIONS

XWORKS timber construction elements combine the benefits of solid building elements and their physical and structural properties with the benefits of the extremely light weight of wood as a material.

As such, even extreme structural challenges can be effortlessly overcome using the large-scale solid-wood elements.

At the same time, the low weight of our XWORKS construction elements compared to other solid building materials offers additional possible applications besides constructing new builds. For example, they are suitable for infill development and urban reconsolidation; adding storeys, annexes, and extensions; and energy renovation when redeveloping existing buildings.

The wall, ceiling, and roof elements pre-fabricated at the plant are easy to transport and simple to dry assemble on the building site in no time at all. The structure of cross-laminated layers and simple connection details and the quick and efficient assembly time also make XWORKS timber construction elements economically attractive, particularly for private, public and commercial building projects.

THE BENEFITS AT A GLANCE

1 AIRTIGHTNESS

When building with cross-laminated timber (CLT), no vapour barrier foil is required because CLT is airtight in itself when made of five or more layers.

2 LOOK

Our XWORKS timber construction elements are available in various surface qualities: unsanded industrial quality (NSi) and our two visual qualities with sanded surfaces – pure industrial visibility quality (ISi) or the elegant residential visual quality (WSi).

3 EASY TO ASSEMBLE

Our XWORKS timber construction elements are pre-fabricated at our plant, including all joinery work, and delivered ready to assemble in the required order, making the process fast and smooth on site.

4 SOUNDPROOFING AND FIRE PROTECTION

The solid cross-laminated timber design offers excellent soundproofing and fire protection properties, while also providing thermal insulation. The latter prevents overheating in summer and guarantees heat protection in winter, thus ensuring the indoor climate is sustainably regulated.

5 PRECISION

CNC-controlled, state-of-the-art joinery facilities are used to produce our XWORKS timber construction elements at our plant accurately to the nearest millimetre. Ducts for electrotechnical and building service installations can also be integrated at the plant upon request.



XWORKS buildings are fully pre-fabricated at the plant for dry assembly on site to ensure they do not transfer any additional moisture into the structure. The design does not include a diffusion barrier, so the walls can absorb the humidity in the room and evenly disperse it for a much nicer indoor climate.



MODERN ARCHITECTURE – THE VARIETY IS ENDLESS

WHY XWORKS?

A BUILDING MATERIAL WITH A FUTURE FOR ALL

■ **MUNICIPAL:** More and more municipalities are using structures made of cross-laminated timber (CLT) in the construction of public buildings. Its fast and modular design enables a flexible response to urgent needs. Nurseries and schools in particular, but also sports halls, fire equipment buildings, and office buildings are being increasingly planned in CLT, especially as this makes them more sustainable.

■ **COMMERCIAL:** The ecological footprint and sustainability aspects also play an increasingly important role in commercial construction, coupled with the fact that designs made of cross-laminated timber are quick to install. These are vital reasons why retail building projects in particular (such as supermarkets), but also office buildings for industry and commerce, are being made using CLT with increased regularity.

■ **RESIDENTIAL:** From small houses to larger apartment buildings, the major advantage of planning with cross-laminated timber is the predictability of costs. The efficiency and speed of assembly and the pleasant indoor climate are even more reasons behind the constantly growing demand for new builds – but also for renovations and additional storeys – made of cross-laminated timber when constructing residential, commercial and public properties.

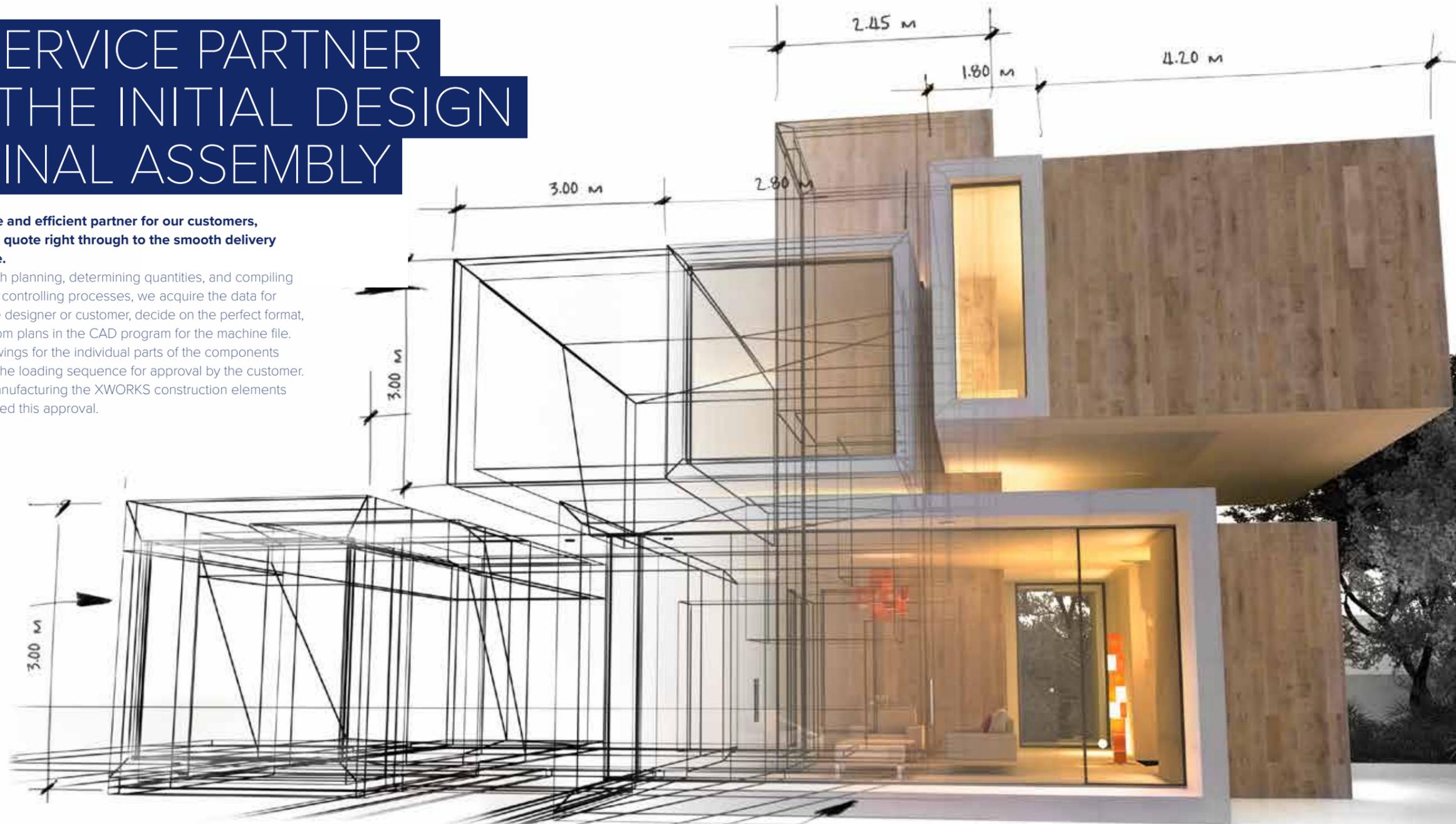
Whether it is a large-scale product in a pure visual quality, whitewashed in the Nordic style, or as warm accents combined with wall cladding, the large-scale space-structuring XWORKS timber construction elements create an excellent feel-good ambiance in interior design. Thanks to their vast design options, XWORKS construction elements can be used in almost any way in modern architecture.



FULL-SERVICE PARTNER FROM THE INITIAL DESIGN TO FINAL ASSEMBLY

We act as a reliable and efficient partner for our customers, from compiling the quote right through to the smooth delivery on the building site.

We offer support with planning, determining quantities, and compiling quotes. In our order controlling processes, we acquire the data for 3D planning from the designer or customer, decide on the perfect format, and create the custom plans in the CAD program for the machine file. We then create drawings for the individual parts of the components and then figure out the loading sequence for approval by the customer. We do not begin manufacturing the XWORKS construction elements until we have received this approval.



WHY XWORKS?



1. QUOTE PHASE

- Planning support
- Quote preparation
- Order clarification



2. ORDER PHASE

- Detail planning
- Component drawings
- Material volumes



3. ORDER CONTROLLING AND APPROVAL

- Data preparation
- Individual part drawing
- Approval plans
- Start of production



4. PRODUCTION

- From trunk to CLT
- Goldeneye quality control
- Manufacturing the raw panels
- Joinery: all finishing work, including the details



5. LOADING AND LOGISTICS

- Coding the components
- Delivery in the correct sequence for assembly
- Accurate on-demand control

**ANY QUESTIONS?
WE'RE HERE TO HELP!**

Call us on
+49 26 34 / 95 59 - 0
or write to us at:
crossworks@vanroje.de



CERTIFIED QUALITY WITH HIGH STANDARDS

When we make our products, we place importance on high standards and top quality. Each plank we process is individually scanned and documented in our Microtec Goldeneye Multi-Sensor Quality Scanner for quality control purposes and then examined for possible defects and sorted accordingly so that only the finest and flawless approved woods are made into our master panels.

Our XWORKS timber construction elements do of course have technical approval and CE marking from the EU through ETA certification 22/0652 in cross-laminated timber (CLT) as per Regulation (EU) No. 305/2011 of the European Parliament and Council of the European Union of 9th March 2011 (Construction Products Regulation, CPR).



www.vanroje.de/CE-Zertifikat.pdf





OUR CLIMATE IS OUR FUTURE

As a wood-processing company, it is very important to us that we treat our environment and handle natural resources in a responsible way. The timber, in other words our raw materials, that we process all come from sustainably managed forests. No wood goes to waste in our plants.

To reduce our CO₂ emissions, we prioritise local suppliers and short transport routes and we continuously invest in renewable energies for eco-friendly and resource-efficient production. We currently save a total of more than 130,000 tons of CO₂ per year. We regularly examine all work steps – including the timber harvest, transportation of the raw materials, manufacturing, and delivery – for their energy efficiency and sustainability.

We process sawdust and wood chips created during manufacturing into certified wood pellets at our own on-site pellet plant. These pellets have a high calorific value and are made using 100% renewable energy. In order to guarantee an eco-conscious and self-sufficient energy supply at all our plants, our production site currently has two biomass heating plants, each with an 8-megawatt capacity, and a solar power plant.



Learn more at:
www.vanroje.de/sustainability

As an FSC- and PEFC-certified company, we support sustainable local forestry that meets ecological, social, and economic standards and focuses on the protection and cultivation of the forest ecosystem and its flora and fauna. We have also received Product Carbon Footprint certification from TÜV Rheinland for our excellent product-specific carbon footprint.



XWORKS – ADDED VALUE THROUGH ADDITIONAL USES

The sawn timber used for our XWORKS timber construction elements comes exclusively from our own sawmill and therefore from our sustainable forestry, just like all other van Roje products.

In order to be as resource-efficient as possible in our manufacturing, we make sure we create as little waste as possible and get maximum use out of the precious commodity from the planning and manufacturing stages onwards. After all, cross-laminated timber (CLT) is not just an eco-friendly renewable material – it can also be recycled and reused through deconstruction. We make high-quality wood pellets at our plant using smaller production residues, such as off-cuts or sawdust. Larger cuts of timber can be taken out of our specialised recycling facilities as raw slats and recycled back into production. This is easier on the environment and increases our efficient use of the raw material.





HOW DOES BUILDING WITH XWORKS WORK?

XWORKS ARE SOLID TIMBER CONSTRUCTION ELEMENTS MADE OF HIGH-QUALITY CROSS-LAMINATED TIMBER. THEY ARE CUSTOM-MADE AT OUR PLANT BASED ON TAILORED 3D PLANS IN CLOSE CONSULTATION WITH THE CUSTOMER.

The following part of our guide contains in-depth information on the applications and design options for XWORKS, on nesting the master panels and on the technical data in detail. A comprehensive summary then provides information on joinery service options, the different lifting systems available, and how the loading process is precisely coordinated for optimum logistics during final assembly.

At our XWORKS cross-laminated timber plant, we craft solid timber construction elements that can be customised as required, such as staircases.

ALL FOUR WALLS – FROM CEILING TO ROOF

WALLS

XWORKS timber construction elements are perfect as wall elements.

Our wall elements are fully finished and joined at the plant to meet all structural, physical and fire protection requirements. They are produced with cut-outs for windows, doors, and installations in accordance with custom plans at the plant and delivered directly from our plant to the building site, where they can be assembled in no time at all.



CEILINGS

We manufacture large, dimensionally stable components to create self-supporting dry structures.

Our XWORKS ceiling elements are designed to be used as ceiling and roof structures. They meet all standards relating to structural engineering, fire protection, and sound insulation. XWORKS ceiling elements can be used to create large span widths with thin components. Premium visual-quality surfaces ensure a cosy living atmosphere.



ROOFS

Our XWORKS roof constructions are suitable for all types of roofs – even ones with large span widths.

As our XWORKS roof constructions are largely made of wood, they also have excellent thermal insulation and storage properties for the optimum indoor climate in winter and in summer. In the summer months in particular, the XWORKS roof constructions' large wood mass noticeably protects the attic floors from heat and overheating thanks to a distinctive phase shift.



TECHNICAL DATA

TYPE OF WOOD: Spruce

PANEL STRUCTURE: 3-, 5-, 7-, or 9-layer structure, depending on structural requirements
Slats 20, 30 or 40 mm thick, C24 as per EN 338.
The slats are finger-jointed longitudinal layers.
Thickness: 60–350 mm, width: max. 3.50 m, length: max. 16.00 m

WOOD MOISTURE: Technically dried with a wood humidity of 12 % +/- 3 %

BONDING: Cross-laminated timber is bonded using a formaldehyde- and solvent-free polyurethane adhesive. The glue is tested in accordance with DIN 68141 and the strict criteria set out by the Materials Testing Institute in Stuttgart and approved for the manufacturing of load-bearing and non-load-bearing timber components in accordance with DIN 1052 and EN 301. The amount of adhesive in the components is around 120 g/m², which is less than 1 % of the product. The high applied pressure of 0.7 N/mm² ensures high-quality bonding.

THERMOCONDUCTIVITY: $\lambda = 0.13 \text{ W/mK}$

STEAM DIFFUSION RESISTANCE: $\mu = 60\text{--}80$, vapour retardant without diffusion barrier

WEIGHT: 5.0 kN/m³ as per EN 1991-1-1:2002 for structural calculations
500 kg/m³ for determining the shipping weight

SHAPE CHANGE: At panel level, approx. 0.02 % per 1 % change in wood moisture, perpendicular to the panel level, approx. 0.24 %

DIMENSIONS: Guidelines as per DIN 1052:2008:12 or DIN EN 1995-1-1:2008-12 (Eurocode 5-1-1) with the relevant national annex DIN EN 1995-1-1/NA as well as the requirements for building inspectorate approval

SERVICE CLASSES: Cross-laminated timber can be used in service classes 1 and 2 as per EN 1995-1-1, meaning for an expected equilibrium moisture content of up to 20 %. This means it can be used inside buildings as well as in covered outdoor areas

FIRE PROTECTION: 0.70 mm/min. calculated burn rate. Depending on the thickness of the panels, the fire resistance class could be between F30 and F90

FIRE PERFORMANCE: Fire classification B2 D-s2, d0. If required, flame-retardant component surfaces can be achieved using the appropriate surface coatings



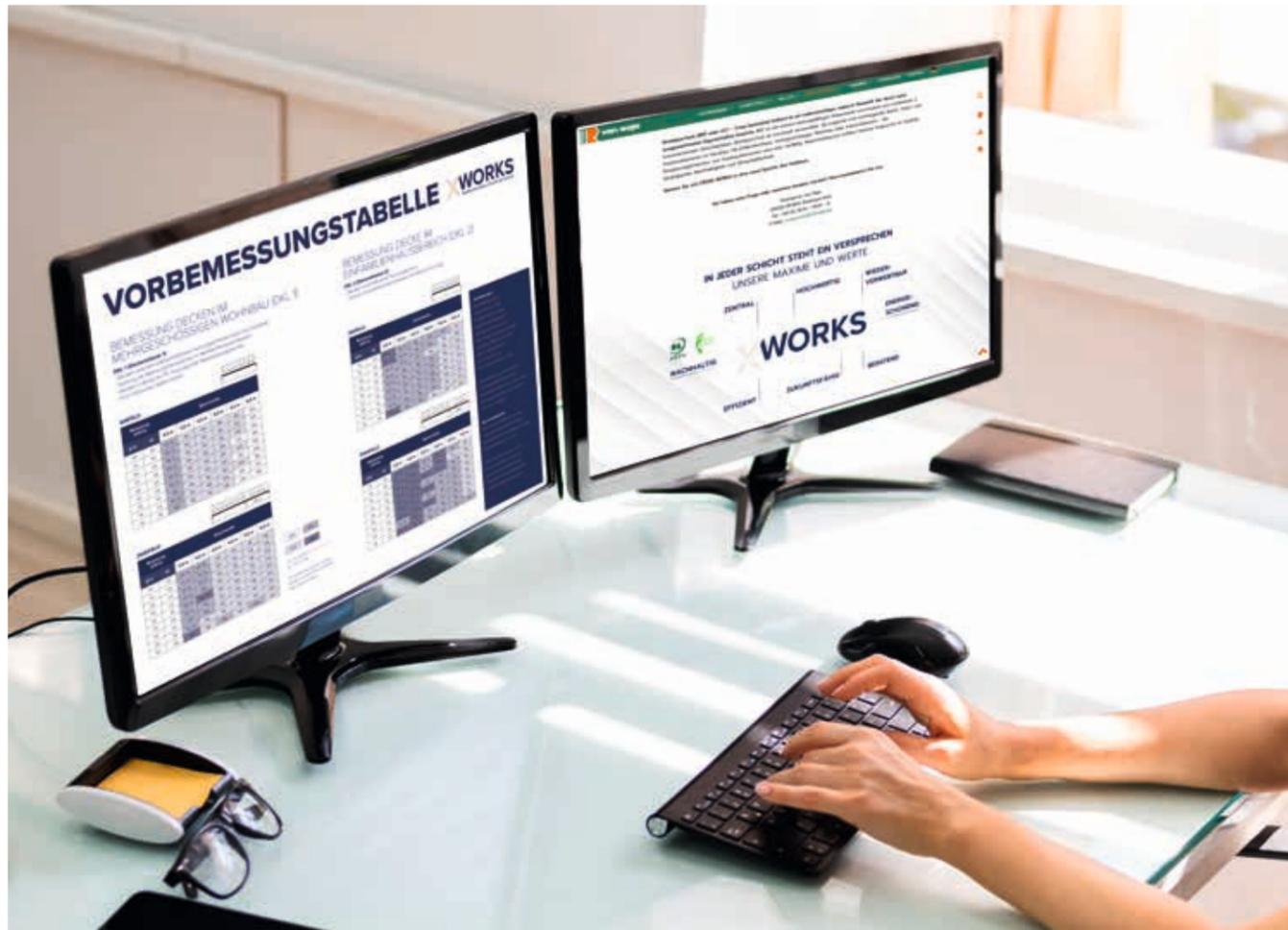
We offer surfaces in different qualities for a range of aesthetic requirements and fields of use as needed.

Our premium visual qualities add a warm accent to unique interior designs in wood. Using our visual qualities – ISi and WSi – that are either sanded on one or both sides can reduce the building time and costs as no further work is required to the interior wall.

ROUGH OR REFINED? XWORKS SURFACES



	INDUSTRIAL QUALITY NSi	INDUSTRIAL VISIBILITY QUALITY ISi	RESIDENTIAL VISUAL QUALITY WSi
WOOD TYPE FOR CEILING LAYER	Spruce	Spruce	Spruce
SLAT WIDTH	max. 250 mm	max. 140 mm	max. 140 mm
SURFACE	planed	planed and sanded	planed and sanded
OPEN JOINTS	max. 2 mm	max. 2 mm	max. 2 mm
REPAIR	no	yes	yes
TIGHTLY INTERGROWN KNOTS	no limitations	no limitations	no limitations
BLACK KNOTS	no limitations	acceptable < 40 mm	acceptable < 20 mm
DISTINCTIVE KNOTS	no limitations	acceptable < 40 mm	acceptable < 20 mm
PITHS	acceptable	acceptable	acceptable in isolated cases
PITCH POCKETS	acceptable	acceptable	acceptable in isolated cases
BARK POCKETS	acceptable	acceptable	acceptable in isolated cases
COMPRESSION WOOD	acceptable	acceptable	acceptable in isolated cases
WOOD CHECKS	acceptable as per strength grading	acceptable as per strength grading	acceptable in isolated cases
INSECT ATTACK	acceptable	not acceptable	not acceptable
WANE	acceptable	not acceptable	not acceptable
BLUE STAINING	no limitations	up to 5 %	up to 1 %



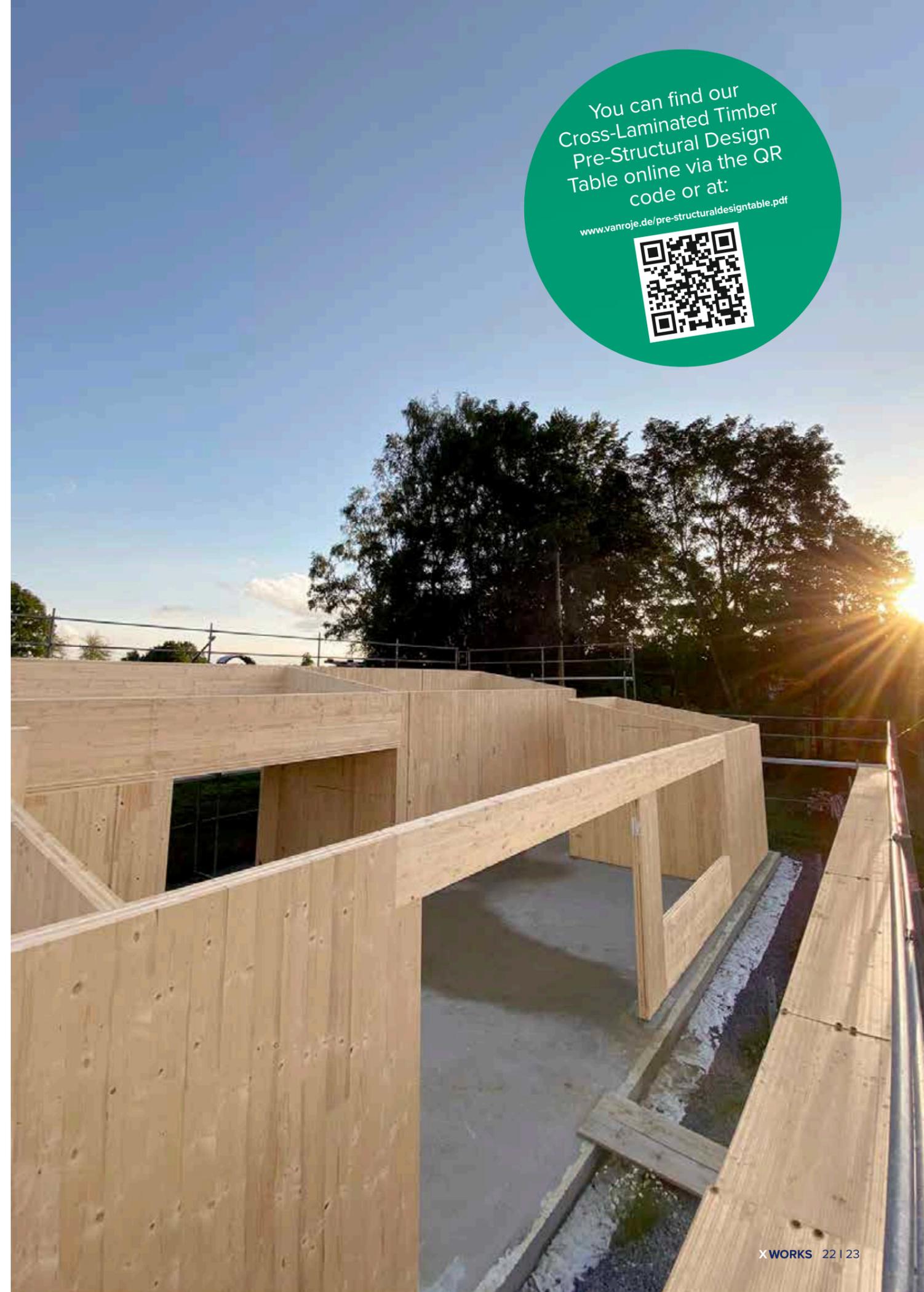
A QUESTION OF DIMENSIONS – XWORKS PRE-STRUCTURAL DESIGN TABLES

Do you want to design a project with XWORKS and need initial indications of what is possible and how?

We have separate in-depth and extensive Cross-Laminated Timber Pre-Structural Design Tables for wall and ceiling elements. In the design phase, they provide an initial constructive assessment of the permanent load and load capacity of the different elements, fire protection, and possible span widths, and help with calculations.

You can find our Cross-Laminated Timber Pre-Structural Design Table online at www.vanroje.de/pre-structuraldesigntable.pdf or via the QR code on the opposite page.

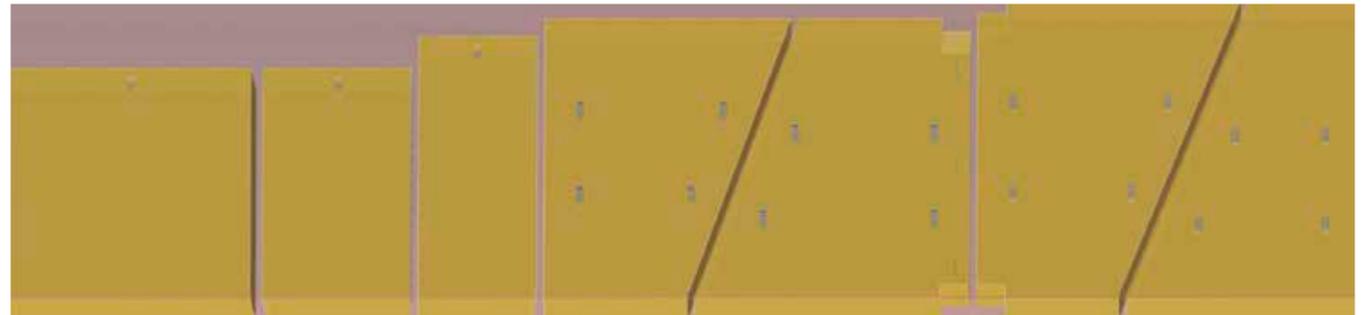
Our Cross-Laminated Timber Pre-Structural Design Tables provide rough indications for initial design planning. They do not, however, replace structural certification, which must be completed separately for each project in accordance with building regulations and standards.



You can find our
Cross-Laminated Timber
Pre-Structural Design
Table online via the QR
code or at:
www.vanroje.de/pre-structuraldesigntable.pdf



PERFECT PLANNING MEANS HIGH EFFICIENCY



NESTING – PLANNING IS EVERYTHING

In wood-working, nesting is a way of creating a cutting pattern with the aim of arranging the individual components so that as little waste as possible is created and usage is maximised of the individual master panels. Our master panels, which we use to create the individual components, are highly economical because they total 16 m x 3.50 m in size. In order to save costs, it is worth thinking holistically and including nesting in the design and planning phase because it plays a very important and complex role throughout the entire production process. During the nesting process, any further joinery work is taken into consideration with regard to its feasibility and efficiency and planned accordingly.

The more meticulous the planning and nesting, the lower the building costs and waste. The smaller the waste, the more sustainable the production, as precious resources are being saved.

During project preparation, we first complete 3D planning in our planning software (hsbCAD, cadwork). We then nest these plans before transferring them to the CNC software CAMBIUM and the joinery machines.

XWORKS – CUSTOM JOINERY

We finish our XWORKS master panels in our high-tech joinery department and tailor them to suit our customers' custom building plans. We also offer specifically tailored custom solutions beyond our standard joinery services.

At our three highly modern joinery facilities we use CNC machines to make the perfect sized solid-wood elements in accordance with the relevant guidelines. In an upstream process, the underfloor system trims and rebates the underside of the elements. Then come the two state-of-the-art PBA-Industry panel processing machines with a 5-axis unit, which can autonomously change their tools, such as cutters, drills, or saw blades, and access a built-in tool cabinet to do so. They fully automatically perform the next work steps and cut the master panel in accordance with the nesting plans.



WALL



CEILINGS



ROOF



XWORKS – JOINERY IN DETAIL

OUTLETS AND OPENINGS



Whether you need recesses for purlins or rafters, outlets for heating / ventilation / sanitation facilities or window or door openings, an end mill can be used to design all kinds of outlets and openings. Corner cut-outs made with an end mill are usually round to begin with, but they can also be given sharp edges or milled diagonally.

LIMITED REBATE



We create a limited rebate using the cylindrical mill cutter or end mill. Round shapes can also be created here depending on the tool used.

REBATE, RECESS, AND GROOVE



Full-length milling on the surface and front side as a rebate can be done with different thicknesses and depths, for example as a groove on the front side for a tongue on a separate piece.

DRILLED HOLES



Holes can be drilled for cable ducting, sockets, as a pilot hole for subsequent screw connections, and other uses. We can use a 32 mm deep-hole drill to create electrical ducts inside visual-quality wood products.

SLOTS AND NICHES



We use an end mill or cylindrical mill cutter to create slots – recesses with a limited depth – for example to inlay steps in a staircase or to mount steel brackets and connectors. These elements can also be rounded depending on the tool used.

CHAMFERS



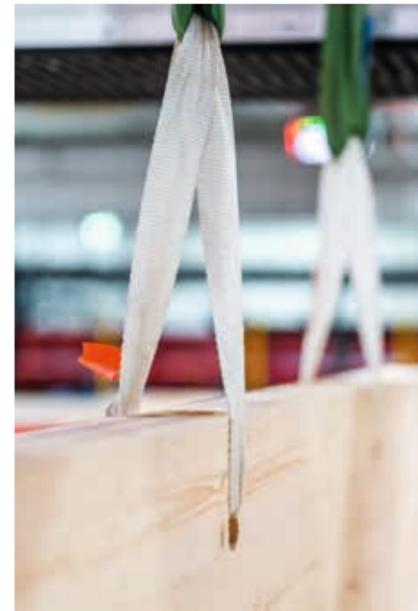
Our XWORKS visual-quality (ISI & WSi) ceiling elements are chamfered along the entire length of the panel as standard.



LIFTING SYSTEMS – SAFE & CONVENIENT

To ensure the safe and speedy unloading of our solid elements upon arrival at the building side, we discuss which lifting system is required with our customers in advance. Which system is best will depend on the individual payload and the structural conditions. There is a choice of various multi-use systems, which are mainly recommended for unloading and lifting visual-quality woods, as well as a loading option using single-use lifting loops – perfect for industrial-quality woods (NSi).

SINGLE-USE



LIFTING LOOPS for wall elements, drill hole required

To use single-use lifting loops, two holes will be drilled, and a loop pulled through the hole at the plant. We only recommend this lifting system for industrial-quality timber (NSi). For visual-quality woods, the drill holes will need to be repaired or sealed up afterwards.

MULTI-USE



EXPANSION ANCHOR Pitzl PowerClamp / SIHGA® Pick

When using expansion anchors from Pitzl or SIHGA, for example, an appropriate hole will be drilled at the plant for the lifting clamp. The lifting clamp is usually provided by the timber construction specialist.



SPHERICAL HEAD ANCHORS for lifting screws WÜRTH ASSY® 3.0 combi Ø 12 mm

The lifting screws for walls and ceilings can be pre-assembled in the elements at the plant if required. The screws can only be used once, but the spherical head anchors can be used multiple times.



LOADING AND LOGISTICS

ACCURATE DELIVERY FOR A SMOOTH PROCESS

Time is money. We know every minute counts on the building site. So we ensure to coordinate everything and place the individual building elements in the correct order for loading and efficient logistics. To make on-site assembly as effortless and swift as possible, we clarify the specific details of the delivery, such as the maximum height and maximum width of the transport type as well as accessibility, before production even begins.

This is because not every building site can be accessed by every type of articulated lorry at all times. The loading sequence, which needs to be approved by the customer, makes it easier to assemble the product faster and helps to avoid unnecessary downtime.



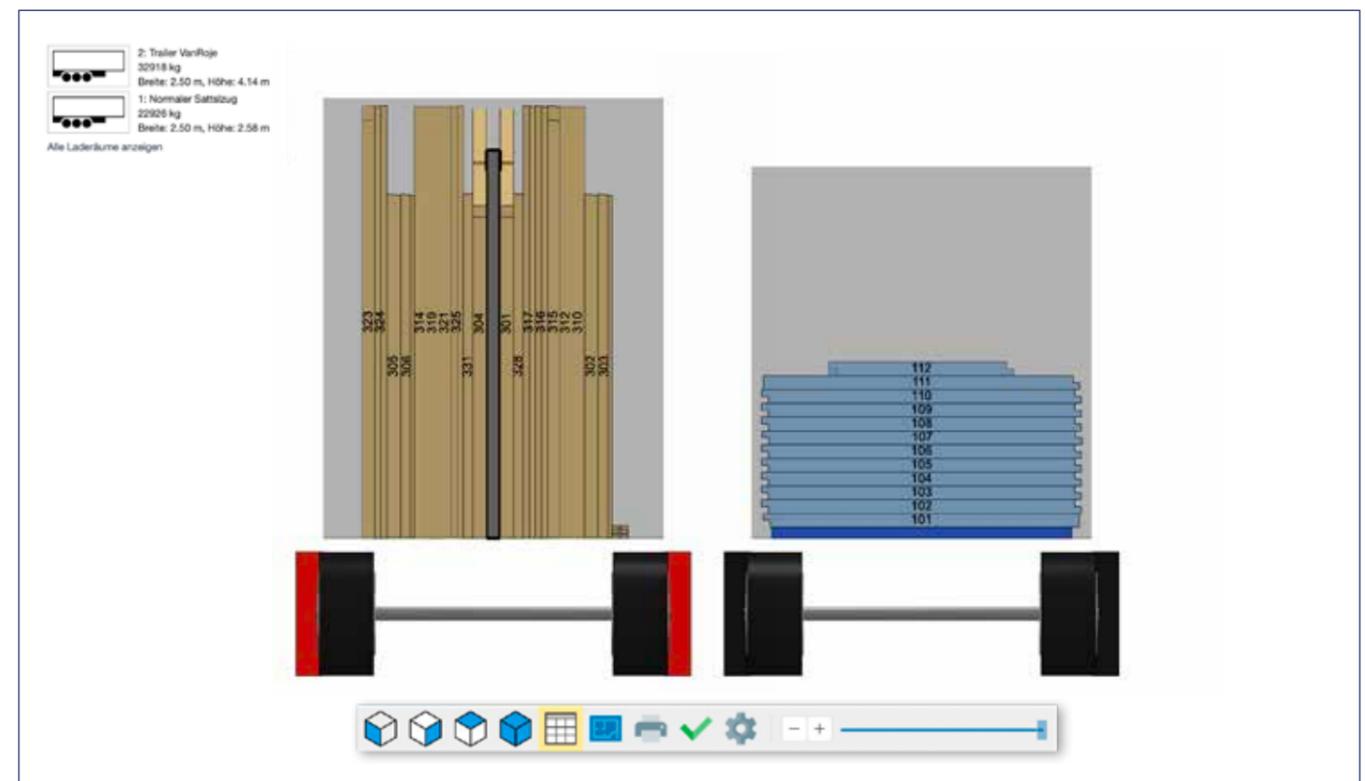
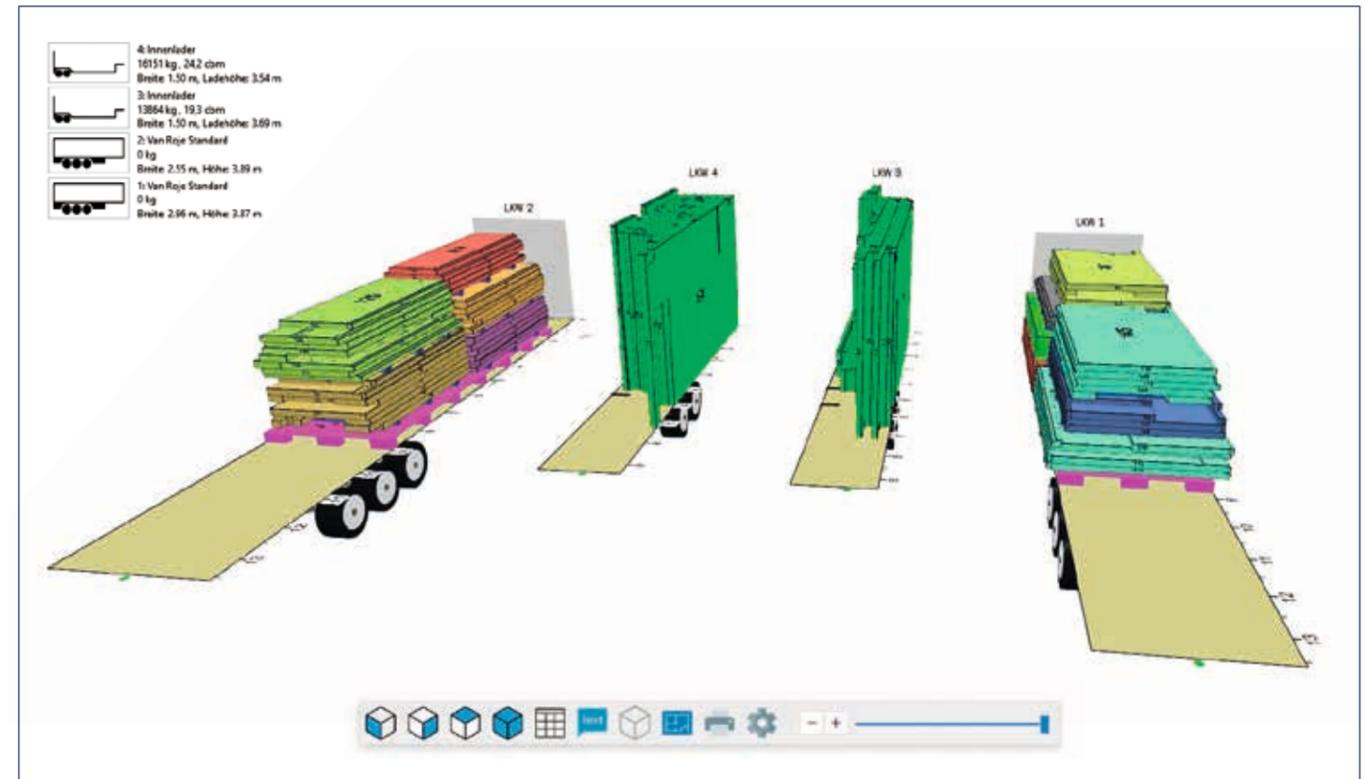
DIMENSIONS AND LOAD WEIGHTS

Our XWORKS solid construction elements are usually loaded and transported flat. Upon request, elements can also be delivered upright. The maximum payload is 25.0 t; our maximum panel length 16 m.

STANDARD
up to max. 2.99 m
panel width

SPECIAL TRANSPORTS
min. 3.00 m
panel width

INLOADER
up to max. 3.50 m
panel width



LOADING SOFTWARE FOR INTELLIGENT TRANSPORTATION

We work with specialised loading software to ensure the products are in the correct sequence during the loading process. Before we put the individual timber construction elements into production, we send our customers a link to approve the loading process. Via this link, our customers can virtually unload the load from the lorry in question to check whether everything will actually be delivered the way they want it. This way, the sequence can of course be changed before final approval.



XWORKS
van roje BRETTSPERRHOLZ

[pronounced CROSSWORKS]

Holzwerke van Roje SAS GmbH
Ignatz-van-Roje-Platz 1 · 56587 Oberhonnefeld-Gierend · Germany
Tel.: +49 26 34 / 95 59 - 0 · Fax: +49 26 34 / 95 59 - 59
crossworks@vanroje.de · www.vanroje.de