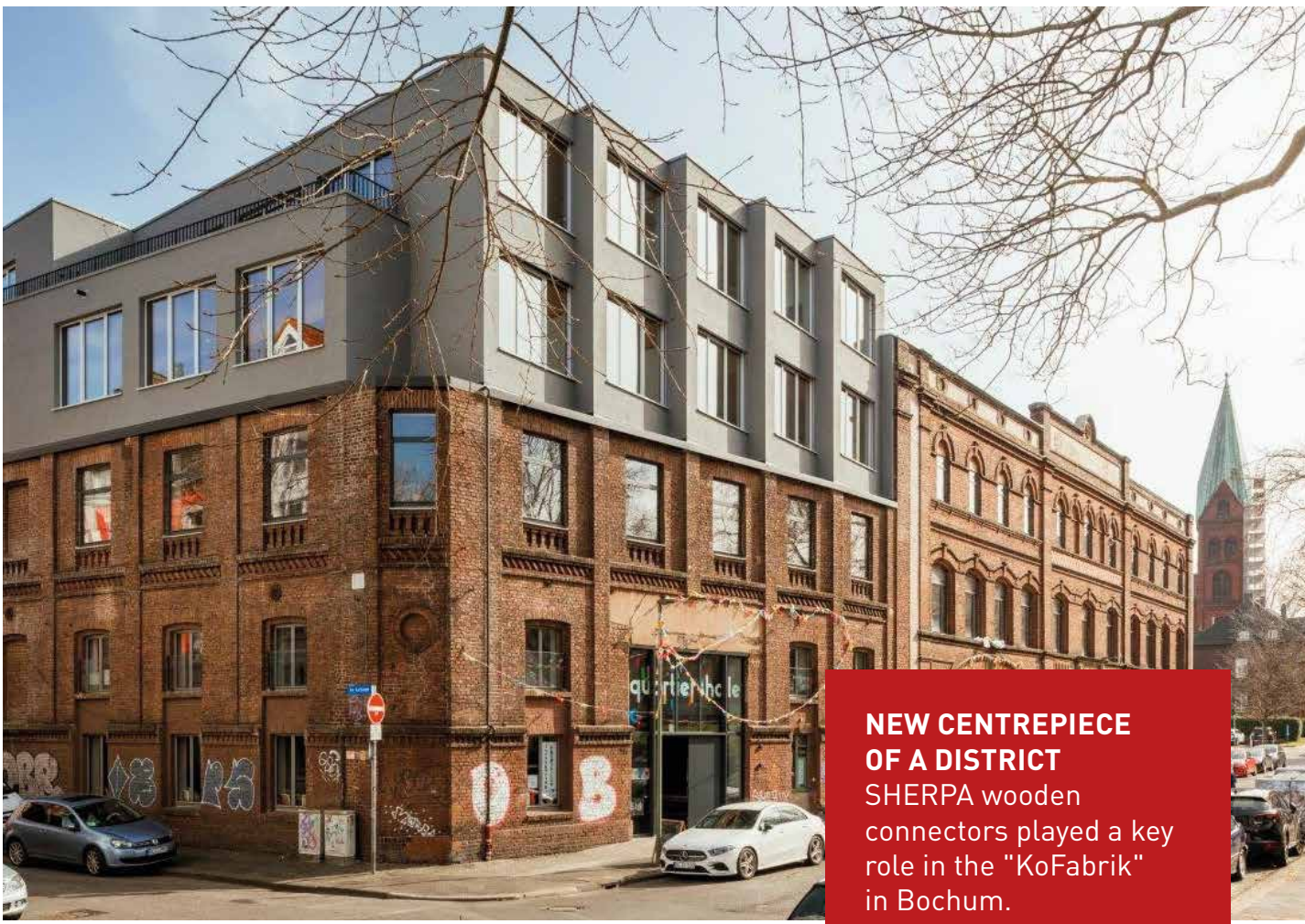
SHERPA news

SIEGWARE
Architectural Innovations

DAS MAGAZIN 05/2023



NEW CENTREPIECE OF A DISTRICT
SHERPA wooden connectors played a key role in the "KoFabrik" in Bochum.

20-YEAR ANNIVERSARY
Standard with system: SHERPA connects the global market.

ENGINEERING WOOD CONSTRUCTION DAYS 2023
Presentations to current timber construction subjects

INTERVIEW
Richard Woschitz about wood as a sustainable building material.

THE SILENT TIMBER CONNECTOR

Sound Insulation **is the name of the game!**

The SHERPA Sonus revolutionises sound insulation in timber joints.

- Optimum sound insulation
- High load capacity
- Tested system
- Easy assembly
- Top sound decoupling

More information on page 16-17.

Available in two connector sizes

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EDITORIAL

Strong partnership for Australia and New Zealand

Siegware is excited to announce the launch of the Sherpa Partner Web Store, in collaboration with Sherpa Connection Systems, for Australia and New Zealand. The partner web store allows for easy communication with Siegware and Sherpa, offering support to our clients in the construction industry. In addition, extensive stock holding in Australia means that your order with Siegware will be ready for dispatch in the shortest time possible.

During 2023, you can visit the Siegware stand at two upcoming conferences in Sydney and Melbourne. The South Pacific PassivHaus Conference (SPPHC) will be running from 5-6 May 2023 at The Roundhouse, Kensington NSW. Timber Offsite Construction Conference & Exhibition (TOC2023) will be running from 11-12 September at Crown Promenade, Melbourne VIC. Samples for viewing and reference material will be available, and the Siegware team will be there to discuss your project needs. During a year filled with exciting developments, you can rely on Siegware for knowledgeable support, technical expertise, and wide stock offering.

We look forward to working with you.

Andrew Ferguson
Operations Manager

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Legal notice: Publisher: SHERPA Connection Systems GmbH, Badl 31, A-8130 Frohnleiten
Design and conception: Raminger & Hirzberger, www.hirzberger.com · Text: Peter Kowal
Print: Druckerei Schwörer · Images: SHERPA, Shutterstock, Urbane Nachbarschaft Imbuschplatz gGmbH, FOTOANDREA, Filip Dujardin, Jan Inge Haga, Jannes Linders, Kurt Hörbst, added · Errors, typesetting and printing errors excepted. All references to individuals apply equally to both genders. Circulation: 15,000 pieces

SUCCESS STORY

“KoFabrik“ for the common good

“KoFabrik” in Bochum is the new core of the Gleisdreieck district. ›

“KoFabrik”, a non-profit project, is a place of encounter in the city. ⌄

In Bochum (Germany), a former ironworks was transformed into the "KoFabrik". SHERPA connectors also played a decisive role in the implementation of the non-profit project, which creates added value for good neighbourliness, social cohesion and equal opportunities.

Offices and studios, small workshops and production facilities, a neighbourhood café and a small but fine neighbourhood hall as a place for neighbourly projects, culture and encounters - the "KoFabrik" in Bochum's city centre (Gleisdreieck district) is the new centrepiece of a neighbourhood surrounded mainly by apartment buildings.

Equitable urban development

The Montag Stiftung Urbane Räume gAG is behind the (listed) "KoFabrik" project on Imbuschplatz, which creates added value for good neighbourliness, social cohesion and equal opportunities. According to the principle of "initial capital for opportunity-oriented urban development", the main building of a former ironworks was transformed on 2,000 square metres into a special place for the development of the neighbourhood around Imbuschplatz. This is where residents and entrepreneurs meet, exchange ideas about the neighbourhood and make plans together on how to shape their own living space and good coexistence.

Former industrial building

"At the end of 2018, we began renovating the building, dismantling suspended ceilings and fixtures, bringing the basic structure of the previous industrial building back to life, creating new infrastructure and organising floor plans in such a way that they enable cooperative working, urban production and neighbourly encounters with predominantly open spaces," reports Henry Beierlorzer, project manager and managing director of Urbane Nachbarschaft Imbuschplatz gGmbH.

Non-visible connection

The "KoFabrik" is now the meeting place in the Gleisdreieck district, in the creation of which SHERPA was also allowed to participate. The two-storey extension of the neighbourhood offices and the construction of the roof terrace on the third floor were carried out in timber construction. In the area of the extension, quality products from SHERPA were used to connect the secondary beams to the main beams of the storey ceiling. The structural engineer had recommended the connectors. "They enable a non-visible connection of the

The structural transformation of the former ironworks was also carried out in timber construction.

components. In this way, the extension met the design requirement of a purely visible timber construction," Beierlorzer refers to one of the many advantages of the SHERPA connectors.

Social and cultural

The Montag Stiftung Urbane Räume gAG is cooperating with the city of Bochum to implement the "KoFabrik" project. The latter provided the land within the framework of a heritable building right, including the waiver of the ground rent in the case of non-profit use. After the initial investment for conversion and expansion, the operation of the "KoFabrik" is now also guaranteed through the renting of the office and work areas in the building by (non-profit) Urbane Nachbarschaft Imbuschplatz gGmbH. All surpluses generated flow into social and cultural projects in the neighbourhood. Furthermore, the tenants of the premises are contractually obliged to perform one hour of voluntary work per square metre rented per year. These concepts not only secure permanent funding, but also the time and know-how of committed people for neighbourhood development.

www.kofabrik.de
www.montag-stiftungen.de/mur

"THE NON-VISIBLE SHERPA CONNECTORS HELP TO LEAVE THE WOOD VISIBLE ON THE INSIDE."

HENRY BEIERLORZER, MANAGING DIRECTOR OF URBANEN NACHBARSCHAFT IMBUSCHPLATZ gGMBH

Photos: Urbane Nachbarschaft Imbuschplatz gGmbH

The dovetail joint is a wood joining technique that has been known for centuries. SHERPA Connection Systems GmbH made use of this technology, is constantly developing it further and is the hub of the global market for system connectors.

Managing Director Vinzenz Harrer

Efficient and practical in construction

"Because the market had nothing to offer in this area, 20 years ago we tried to connect components - primarily wall and ceiling parts," reports SHERPA founder Vinzenz Harrer. The result of these efforts was the first generation of the SHERPA family of timber connector systems. "Still less efficient compared to today's generation, but already very practical in terms of construction," Harrer recalls. Today, SHERPA stands for leading technology in standardised connectors.

Passion for wood

Vinzenz Harrer is a trained carpenter who worked for many years as a foreman and site manager. Since he started his own business in 1994, wood has determined his existence as an entrepreneur. Anyone who talks to Harrer hears from his words the passion for wood, for rational and efficient building. His reasoning: "It grows back, has a low weight in relation to its performance, is easy to process and, above all, to transport, and thus also contributes to an optimal carbon footprint."

Conquer new markets

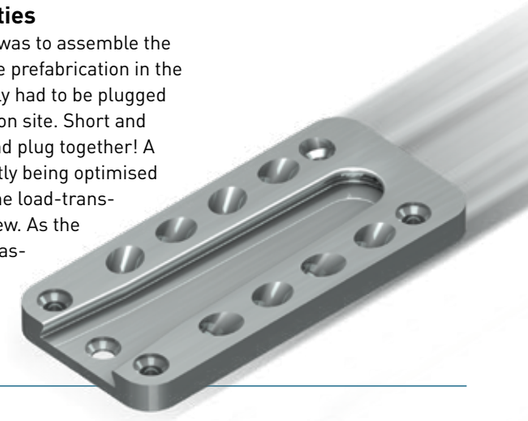
Finally, 20 years ago, Harrer founded SHERPA Connection Systems GmbH, which he established as a hub in the global market for system connectors. The company is one hundred percent export-oriented. The core markets of timber construction extend across Europe and primarily include the DACH region (Germany, Austria and Switzerland) and South Tyrol. "But we are developing wherever classic timber construction is developing," Harrer sums up. SHERPA conquered new markets step by step, also overseas.

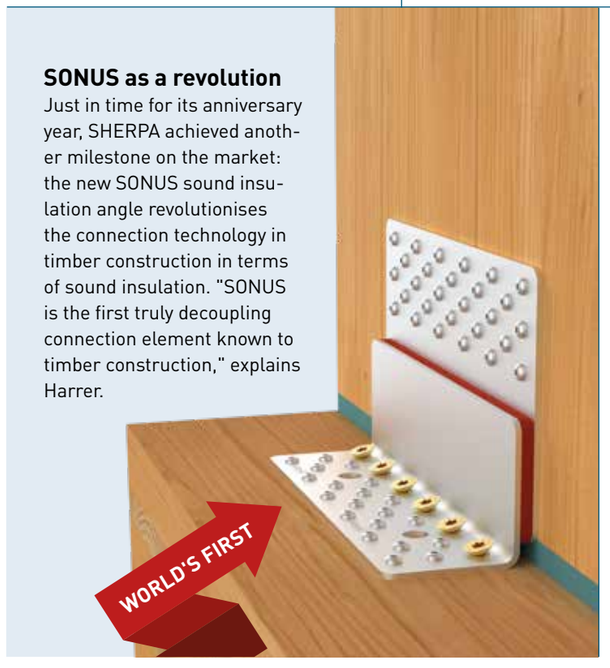
Research and development

New markets also mean new habits of use. "We benefit from the fact that we are not only growing, but also innovating," says Harrer. Every year, around five percent of turnover is invested in research and development in cooperation with renowned universities, technical colleges and institutes. SHERPA researches and develops before specialists manufacture the next generations of SHERPA system connectors.

Always new possibilities

At the beginning, the idea was to assemble the connecting elements in the prefabrication in the cut to size, so that they only had to be plugged together on the construction site. Short and sweet: cut off, screw on and plug together! A technology that is constantly being optimised and further developed. "The load-transmitting element is the screw. As the quality of the screws increases, so do the possibilities for system connectors," explains Harrer.





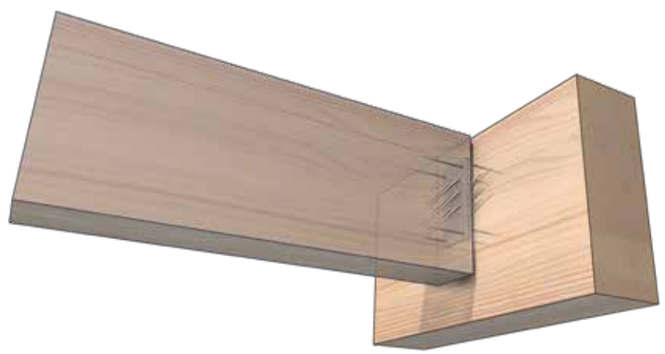
SONUS as a revolution

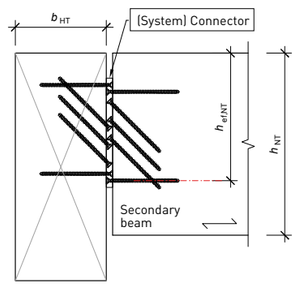
Just in time for its anniversary year, SHERPA achieved another milestone on the market: the new SONUS sound insulation angle revolutionises the connection technology in timber construction in terms of sound insulation. "SONUS is the first truly decoupling connection element known to timber construction," explains Harrer.

Wood material

The sound insulation angle is not to remain the last innovation from SHERPA. "New materials are always being created from wood. Through innovation and further development, we are taking advantage of the new opportunities and making the industry fit for the future," explains Harrer. In everything SHERPA does, the company puts wood in the foreground to show anew that it can be used in even more ways. Harrer emphasises: "We promote wood and make a contribution to keep it competitive in the market."

Photo: Jan Inge Haga





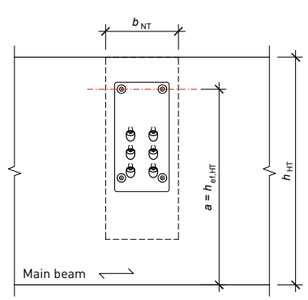


Figure 1: Overview Main girder-sub girder connection >

LOAD CAPACITY

Local Cross-section checks for **shear force connections**

The load-bearing capacity of a node is not necessarily limited by the connections used alone.

When verifying engineering connections in timber construction, not only the load-bearing capacity of the connection itself must be assessed, but also that of the components to be connected in the vicinity of the respective connection.These (net) cross-section verifications take into account, for example, local cross-section weakening caused by fasteners or other parts of the connection and/or other geometric influences such as local eccentricities.

The load-bearing capacity of the entire connection is consequently determined by the minimum load-bearing capacity of the connection and the local cross-section verifications of the components to be connected, whereby the latter often become decisive.

Shear force connections, where large loads are sometimes introduced or transferred transversely to the direction of the grain and which are often realised in practice by high-performance system connectors, are no exception here. On the contrary, these sometimes even require special care when providing evidence, as is explained briefly below

Shear force connection
Figure 1 shows a typical main girder-sub-girder connection with the most essential geometric relationships. The following verifications are to be carried out in the ultimate limit state:

1. Load capacity of the (system) connector
2. (local) Load capacity of the main girder
3. (local) Load capacity of the secondary beam

Load capacity of the connection
The load-bearing capacity of the connection must be checked in accordance with applicable standard regulations or based on technical assessments and/or manufacturer's specifications. Since this part of the design is only of limited importance for the cross-section verifications, it will not be discussed in detail here.

Load capacity of the main girder
Appropriate approaches for assessing the local load-bearing capacity of the main beam are given in ON EN/B 1995-1-1:2019. Specifically, this topic is addressed in section 8.1.4 *Joint mean forces at an angle* to the grain direction. It is important to note that - in addition to taking into account any relevant cross-section reductions - a special transverse tension check must be carried out. The verification concept of the national annexes of Austria and Germany (ON B 1995-1-1 and DIN 1995-1-1, respectively) deviates from the basic

"WHAT IS IMPORTANT IS A CONSCIOUS CHOICE OF CONNECTION TYPE AND ITS POSITION."

GEORG FLATSCHER,
FREIRAUM ZT GMBH

document here (for example, verification can be waived if the ratio of a / h > 0.7 is observed) - the objective, however, remains the same.

Local load capacity of the secondary beam

A special situation arises for the shear force introduction at the end grain of the secondary beam. Particularly in the case of densely packed groups of fasteners, the load transmission takes place in a concentrated manner in their immediate vicinity. As a result, the timber areas underneath the lanyard group can only participate in the load transfer to a limited extent and a "notching out" situation arises as shown in Figure 2.

The current basic document of Eurocode 5 does not contain a concrete calculation approach for this situation. However, clause 6.5 of ON B1995-1-1:2019 states that (...) *shear force connections of bending beams by means of connection means groups [which] have a distance (h-h_{ef}) from the lower edge of the beam should be designed like notches with height h_{ef} (...).*

Note: This approach will in all likelihood also be included in the new edition of Eurocode 5.

The influencing factors of this approach and the respective effects on the cross-section verification are briefly explained below.

The secondary beam connection as notching

Figure 2 shows the approach from ON B1995-1-1:2019 and the most essential geometric relationships. Equations [1] and [2] describe the verification to be carried out and the factor k_v required for this.

It can be seen here that this is a local shear check, whereby the cross-sectional area used to determine the shear

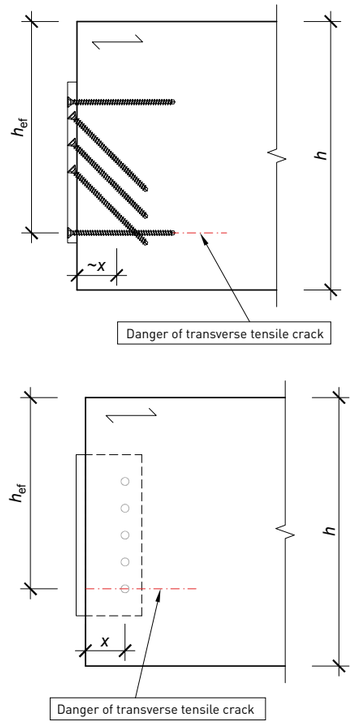


Figure 2: Consideration of the secondary beam connection as a notch

The secondary beam connection as notching

$$\eta_N = \frac{1.5 \cdot V_d}{b_{(ef)} \cdot h_{ef} \cdot f_{v,d} \cdot k_v} \leq 1.0 \quad (1)$$

$$k_v = \min \left\{ 1.0;\ \frac{k_n \left(1 + \frac{1.1 \cdot i^{1.5}}{\sqrt{h}}\right)}{\sqrt{h} \cdot \left(\sqrt{\alpha \cdot (1-\alpha)} + 0{,}8 \cdot \frac{x}{h} \cdot \sqrt{\frac{1}{\alpha} - \alpha^2}\right)} \right\} \quad (2)$$

V_d ..... Force to be applied or transmitted (Rated value)
$b_{(ef)}$ ..... Component width or effective width for shear verification
h ..... Component height
h_{ef} ..... effective cross-section height (can be used for shear verification)
$f_{v,d}$ ..... Shear strength (design value)
k_v ..... Reduction coefficient to account for stress concentrations
i ..... "Inclination of the notch"
x ..... Distance between the line of action of the acting force and the "notching corner".
α ..... h_{ef}/h

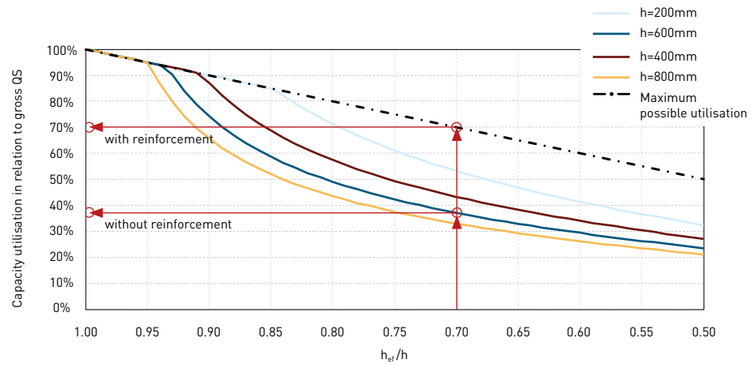


Figure 3: Achievable load factors in notching situations (x = 50 mm) with reading example

stress is now only determined with the effective height. If one recalls the concentrated load application in the area of the lanyard group, this is also quite understandable.

The load-bearing capacity of the net cross-section is further reduced by the factor k_v, which is based on a fracture mechanics approach and takes into account the stress concentration in the lower connection area or the risk of cracking.

Figure 3 shows the order of magnitude of the reductions to be taken into account and the influence of h_{ef}/h ratio in particular. Shown here is the achievable utilisation of the net cross-section in relation to the gross cross-section. The black dotted line shows the maximum achievable load capacity as the shear capacity of the net cross-section (b*h_{ef}). The coloured lines show the additional influence of k_v, which can obviously result in considerable reductions in load-bearing capacity. In many cases, however, this can be compensated for by relatively inexpensive reinforcement measures (e.g. fully threaded screws). Corresponding approaches (for notches) can again be found in ON B 1995-1-1 or DIN 1995-1-1, or also in various technical assessments by bolt manufacturers.

Summary

Particularly in the case of high-performance system connectors, it is sometimes not the connection itself that is relevant to the design, but the local (net) cross-section verification of the components to be connected. The latter is strongly influenced by the position of the connection in the case of shear force connections - if the connection is too high, the check at the secondary beam is unfavourable, if it is too low, the transverse tensile stress at the main beam becomes relevant for the design. It is, thus, important to consciously choose the type of connection and its position relative to both timber components. If necessary, reinforcement measures can be used - within certain limits - to ensure the load-bearing capacity of the connection under consideration despite the notch situation on the secondary beam and/or transverse tensile stress on the main beam.

INTERVIEW

Reuse, Reduce, Recycle

In times of climate change, wooden buildings are a sign of sustainability.

"Wood is the solution for sustainable building materials," says Richard Woschitz (Woschitz Group). What role do SHERPA system connectors play in this? The timber construction pioneer in an interview about wood as a material, man's highest good and the demands of the future in the timber construction industry.

You are considered a timber construction pioneer: What significance does the raw material wood have for you personally?
Wood is one of the oldest building materials and, above all, now meets the zeitgeist of sustainability because it is a renewable raw material. We don't have to think about whether we need industrial plants and industrial processes to get the material. Wood is the solution for sustainable building materials.

What must happen so that we can hope for more and more timber buildings in the coming years in times of climate change and in the spirit of sustainability?
Consciousness-raising in an honest sustainability debate begins with humanity's highest asset, our own home. In order for us to be able to hope for more use of wood as a renewable building material, we clearly need to continue to raise awareness of this most valuable asset - whether it is a flat, a terraced house or a home of one's own. The day has 24 hours and Central Europeans need eight hours of sleep: it's about spending around 50 per cent of your time in a healthy environment and enjoying your sleep in a healthy atmosphere. We need to continue to raise awareness.

Why do you rely on SHERPA products for your projects?
Because they are tested and certified products that are examples of how to use system connectors. I am intensively involved with the three big "R "s: Reuse, Reduce and Recycle. For sustainable planning and construction, we are required to find solutions that can also be solved after the life cycle. It is important to use fasteners that are applicable in terms of after-use, change of use and re-use. The SHERPA system connector is a very good product that shows the solution approach to meet these future requirements.

What requirements do fasteners have to fulfil in your projects?
The guiding principle of the Woschitz Group is: think, design and build more efficiently. I always proclaim an annual theme in my group. Last year, the theme was "Simply Build". In timber construction, when we join two elements together, there is a weakening of the component. The first requirement is that we find fasteners that work without significantly weakening the component. The second requirement: We also want to make timber construction visible, tangible and perceptible. That's where we get into the issue of fire safety requirements. The SHERPA product is a metallic part that connects two wooden construction elements. This metallic component can also be used according to the requirements of R60 - without additional measures. That's what I mean by "just build".

Another look at the labour market: How can we succeed in getting more graduates and engineers interested in timber construction?
We can inspire and motivate young people by creating wow effects. When it comes to these wow effects, graduates and engineers like to orient themselves towards offices that are working on pilot projects. Attention to large projects is also attracted via "social media" channels. We must always be one step ahead with innovative projects, also enter new territory for timber construction, for example in the high-rise segment, and convey that timber construction is exciting. When graduates and engineers see the constructions, they should feel: "Wow, I want to be there too!"

WORTH KNOWING

The Woschitz Group, based in Vienna, has its origins in a one-man business founded by Richard Woschitz in 1996. The group of companies, which now comprises eight companies, is active in construction support and construction management and handles all matters from the start to the completion of the respective project - from project management and local construction supervision to safety management on the construction site.

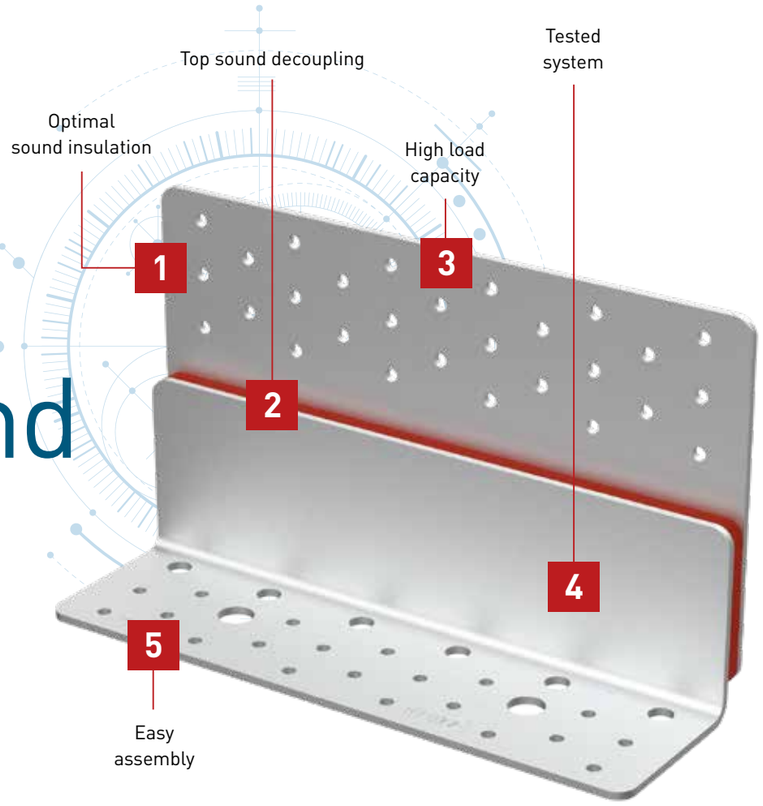
The Woschitz Group offers services in the following areas: Construction supervision, findings and expert opinions, structural design, building physics, project development, energy design, infrastructure construction, research and innovation, real estate valuation and real estate consulting, real estate brokerage and client consulting.

Photos: Jannes Linders, Kurt Hörbst

THE NEW SOUNDPROOFING ANGLE

Simple, strong and **silent**

A great deal of research and development has gone into the Sonus soundproofing bracket, a world first from SHERPA. All the advantages at a glance.



The Sonus revolutionises the connection technology in timber construction in terms of sound insulation by means of a glued-in rubber layer for sound decoupling of the two connector plates or timber components. This allows for easy mounting of the Sonus, as with conventional angle connectors. Two connector sizes are available for you to choose from. The bracket can be mounted with fitting screws (5 x 50 mm) or comb nails (4 x 60 mm). Optimally, SHERPA special screws (8 x 120 mm), placed close to the edge in the horizontal connector plate, further increase the load-bearing capacity.

Tested sound insulation quality
The sound decoupling effect of the Sonus was tested at the Higher Federal Technical Teaching and Research Institute of the Technological Trade Museum (tgm) in Vienna on an L-joint of a BSP wall (100 mm) and BSP ceiling (140 mm) with sound insulation bearings on a scale of 1: 1, see Figure 4. On the basis of representative loads for different numbers of storeys, the excitation frequency range from 50 to 5000 Hz was tested and the sound reduction index K_{ij} in the range between 200 and 1250 Hz (according to ÖNORM EN ISO 10848) was evaluated. The sound insulation effect of the sound insulation bearings in the ceiling-wall joint is almost maintained with the Sonus compared to a joint with a standard angle connector, i.e. the use of the Sonus only influences the flank transmission insignificantly. As an example of the outstanding sound-insulating effectiveness of Sonus, the performance comparison at a superimposed load of 0.18 N/mm² (18 kN/lfm wall as a quasi-resistant service load) is shown in Figure 1.

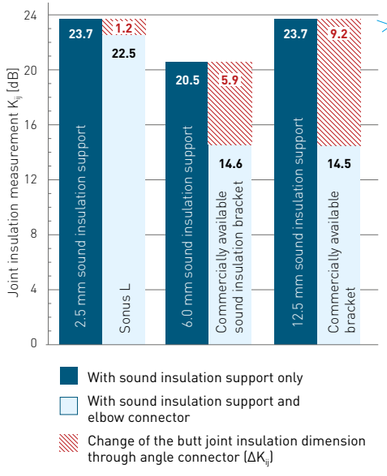


Figure 1: Comparison of the tested sound insulation effect of the Sonus and standard (sound insulation) angles

Figure 2: Testing the Sonus at the ceiling-wall joint with stress in direction 2/3

Figure 3: Typical, predominantly ductile failure of the Sonus sound insulation angle

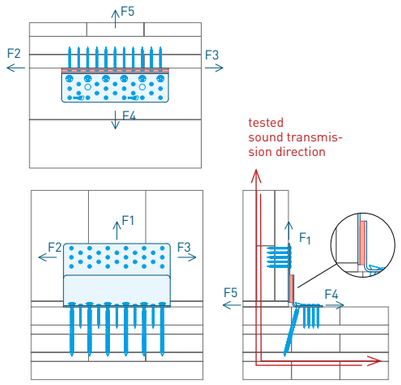
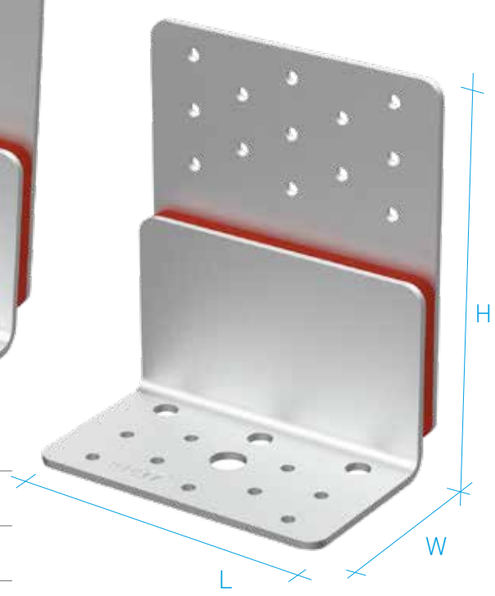


Figure 4: Stress directions of an angle connector and tested sound transmission direction



Tested load-bearing capacity
The load-bearing capacity of the sound insulation angle connector was tested at the Lignum Test Center (LTC) of the Graz University of Technology in cooperation with the Kompetenzzentrum holz.bau forschungs GmbH in Graz. Both connector sizes Sonus M and Sonus L, see Figure 2 and 3, were tested with different combinations of fasteners and in all four loading directions and their load-bearing resistance and connection stiffness were determined, see Table 1. The decisive factor for the load-bearing capacity was the (predominantly ductile) behaviour of the fastener groups or the achievement of a limit displacement of 15 mm before the onset of failure.

	SONUS M 115 x 75 x 140 (L x W x H)					SONUS L 235 x 75 x 140 (L x W x H)				
Connecting devices	Quantity [pcs.]	$R_{1,k}$	$R_{2/3,k}$	$R_{4,k}$	$R_{5,k}$	Quantity [pcs.]	$R_{1,k}$	$R_{2/3,k}$	$R_{4,k}$	$R_{5,k}$
Comb nail	22	5.40	7.36	10.50	1.25	48	11.80	27.30	20.60	2.84
Comb nail & Special screw	22 3	17.80	10.60	14.80	2.34	48 6	34.90	32.40	29.70	4.70
Fittings screws	22	7.73	7.36	10.50	2.33	48	16.70	27.80	20.60	5.32
Fittings screw & Special screws	22 3	17.90	10.60	14.80	4.38	48 6	36.60	33.90	29.70	8.79

Table 1: Lanyard combinations and load-bearing capacity of the Sonus sound insulation brackets

PROJECT PARTNER

tgm
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www.holzbauforschung.at
Management: Univ.-Prof. DI Dr. techn. Gerhard Schickhofer

freiraum ZT GmbH
8230 Hartberg
www.freiraum.engineering
Management: DI Dr. techn. Andreas Ringhofer

SONUS data sheet available for you as a download!

INVITATION

Engineering wood construction days 2023

COLOGNE
Tuesday, June 6th
Leonardo Hotel Köln Airport
51147 Cologne

BERLIN
Wednesday, June 7
Holiday Inn Berlin Airport – Conference Centre
12529 Berlin

LEIPZIG
Thursday, June 8
Leipzig Marriott Hotel
Am Hallischen Tor 1
04109 Leipzig

STUTTGART
Tuesday, June 13
Parkhotel Stuttgart
70771 Leinfelden-Echterdingen

MUNICH
Wednesday, June 14
Leonardo Hotel Arabellapark
81925 Munich

The LIVE lecture series goes into the second round. Experience exciting lectures from the field of timber construction.
Register now for free!

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For a simple measure of all SHERPA products

NOW NEW

All data, numbers and facts

All important facts and figures are summarised compactly in the new design guide, which supports the simple design of all SHERPA products and enables rapid and economical planning.

Now available for you in the download area.

NEW ETA 12/0067 WITH FIRE PROTECTION EXTENSION

Fire resistance up to R120 for visible wooden constructions

The fire protection solutions of the SHERPA system connectors enable verifications up to R120 for demanding constructions.

Fire test at IBS in Linz for 90 minutes fire resistance

Connection joints up to 5 mm without additional fire protection measures

ETA-12/0067

SHERPA®

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