rothoblaas

Solutions for Building Technology

Hybrid Buildings Seminar – Improving best practice

Dr Felix Scheibmair (PhD)- Managing Director

When we hear Hybrid we think of:

Connections and what we need to think about..

- **Durabilty – corrosion protection, moisture, timber types and treatment**
- **Lengths, diameters, drilling capabililties and spacing**
- **Install times + installability**
- **Screws and metal plates**
- **Moisture + Acoustics – a fixings topic in its own right**

.. And after we have all that right, then we can start to think about smarter connections in hybrid structures

HYBRID STRUCTURES

- **Concrete + Timber**
- **Steel + Timber**
- **Timber + Timber**

Prefabricated TCC floor elements

SupraFloor ecoboost, Erne AG

HYBRID STRUCTURES: CONCRETE + TIMBER

MAYR MELNHOF HOLZ

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Innovative, flexible and optimally combined.

XC® marks a smart, ecological combination between wood and concrete for high-quality floors in residential and office buildings.

#mm #mmholz #mayrmelnhofholz #mmk #XC #XCliving #XCoffice #XlamConcrete #holzbetonfertigteil #holzbetonverbund #hybridsolutions #crosslaminatedtimber #BSP #Brettsperrholz # CLT #Holzbau #bauenmitholz #timbertechnology #timberconstruction #whereideascangrow #woideenwachsenkönnen

RHOMBERG
UNITED CLIMATE
ZECH GROUP
CDCL
KIMLY CONSTRUCTION
Walbridge
CREE BUILDINGS
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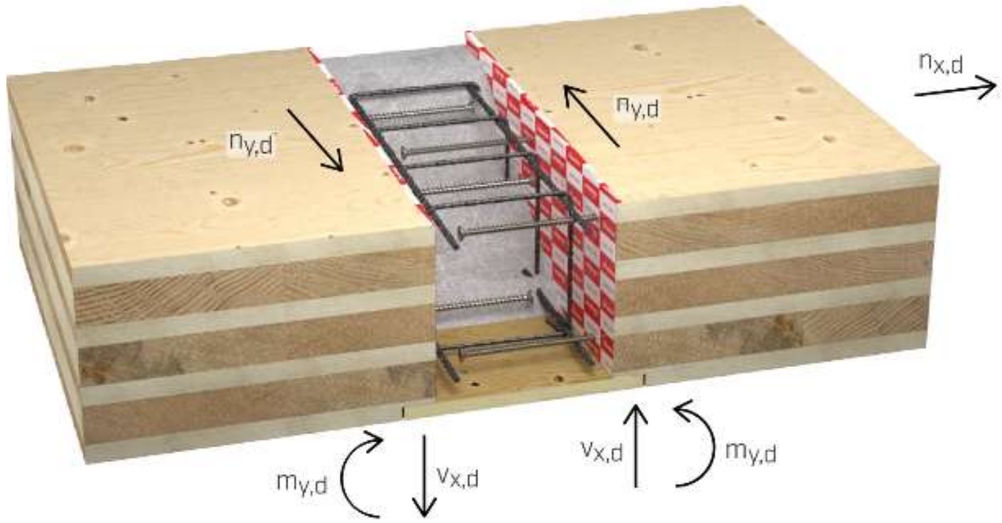
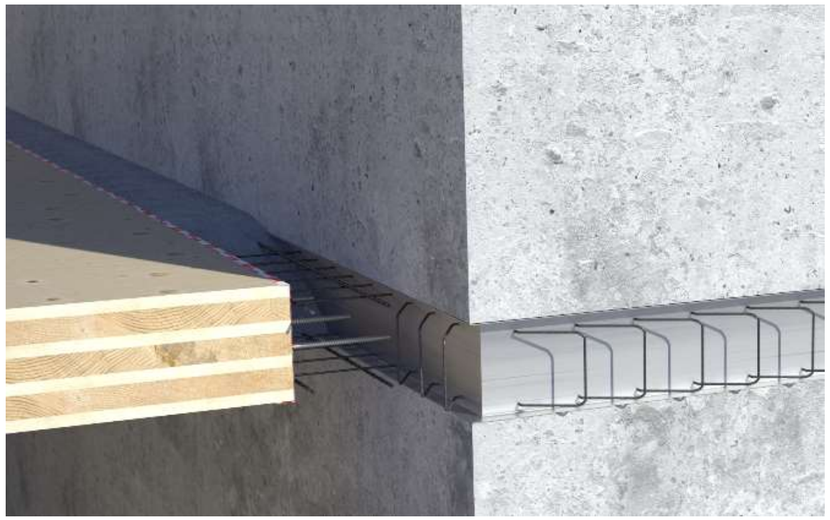
LÖSINGER MARAZZI
JENSEN GRUPPEN
BRÜNINGHOFF
CASAIS
CFE

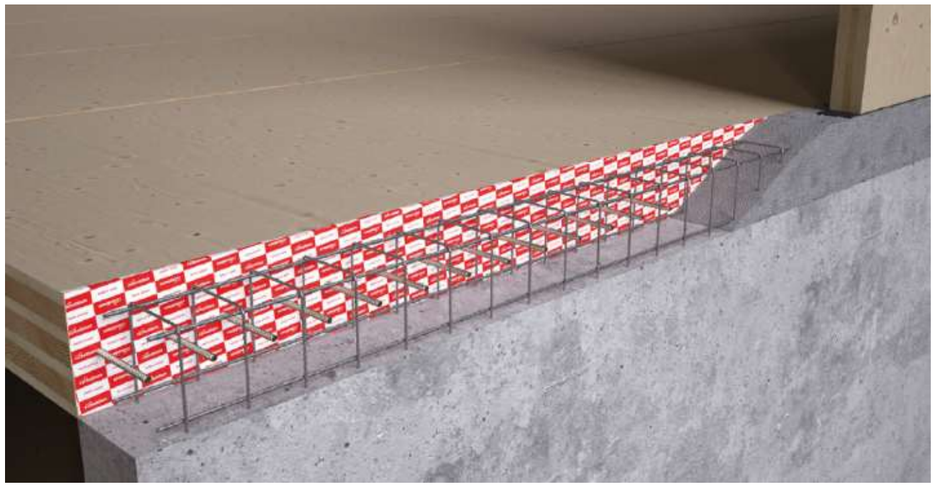
HYBRID STRUCTURES: CONCRETE + TIMBER

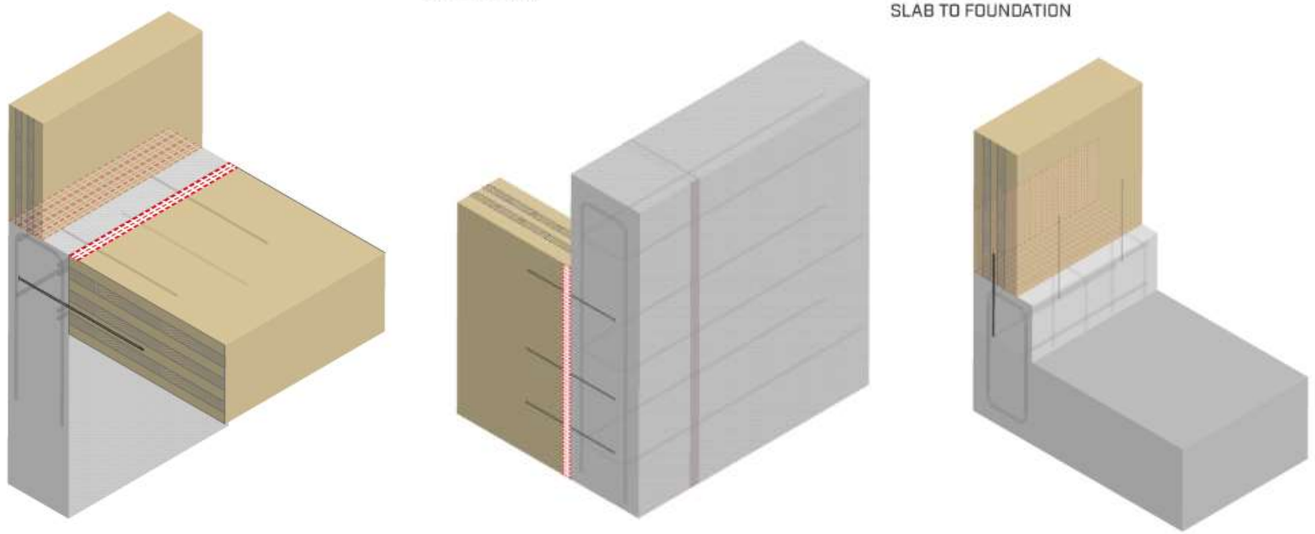




WALL TO WALL

SLAB TO FOUNDATION





HYBRID STRUCTURES: CONCRETE + TIMBER

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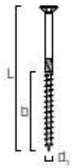
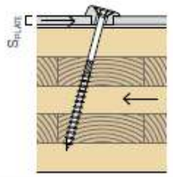
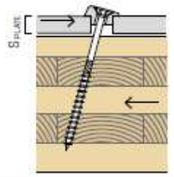
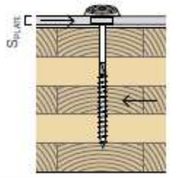
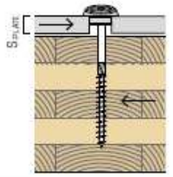
HYBRID STRUCTURES: STEEL + TIMBER

HYBRID STRUCTURES: STEEL + TIMBER

HUS 15°

STRUCTURAL VALUES | CLT

HUS 15°

geometry				SHEAR							
				steel-CLT thin plate		steel-CLT thick plate		steel-CLT thin plate		steel-CLT thick plate	
											
	$d_{1,HBS}$ [mm]	L [mm]	b [mm]	S_{PLATE} [mm]	$R_{V,k}$ [kN]	S_{PLATE} [mm]	$R_{V,k}$ [kN]	S_{PLATE} [mm]	$R_{V,k}$ [kN]	S_{PLATE} [mm]	$R_{V,k}$ [kN]
HUS 15°	8	80	52	4	3,28	8	4,67	4	3,40	8	4,83
		100	52		3,65		4,67		3,77		4,83
		120÷140	60		3,83		4,85		3,96		5,02
		160÷280	80		4,28		5,30		4,43		5,49
		≥ 300	100		4,73		5,75		4,90		5,96

HUS 15° INSTALLATION

1

Drill a D_F = 20 mm diameter hole in the metal plate at the insertion point of the HUS815 washer.

2

We recommend applying HUSBAND adhesive underneath the HUS815 washer to facilitate application.

3

Remove the liner and apply the washer at the hole, paying attention to the insertion direction.

4

Drill a guide hole with a diameter of 5 mm and a minimum length of 20 mm, preferably using the JIGVGU945 template to ensure the correct installation direction.

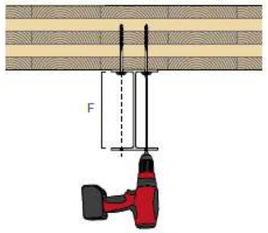
5

Install the HBS screw of the desired length. Do not use pulse screw guns. Pay attention when tightening the connection.

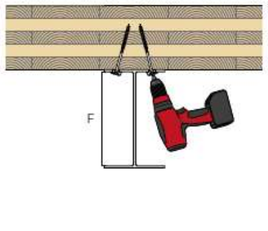
6

Installation completed. The 15° screw angle ensures that the distance to the head of the panel (or beam) is maintained.

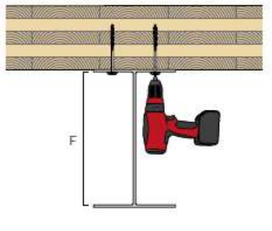
STEEL-TIMBER INSTALLATION FROM BELOW



F < 200 mm



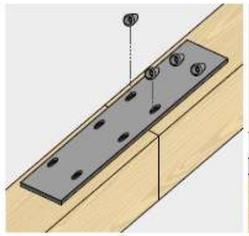
F = 200 ÷ 300 mm



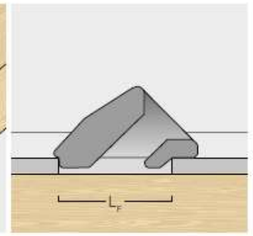
F > 300 mm

HYBRID STRUCTURES: STEEL + TIMBER

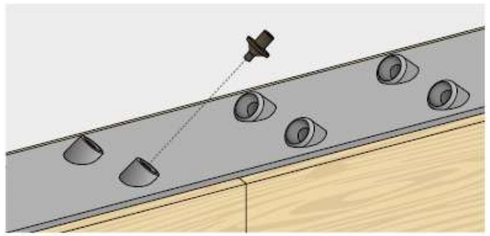
INSTALLATION WITH THE AID OF A PRE-DRILL TEMPLATE



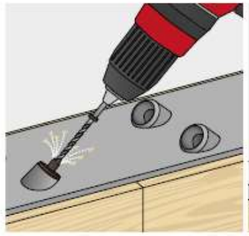
Place the steel plate on the wood and set the VGU washers in the slots provided.

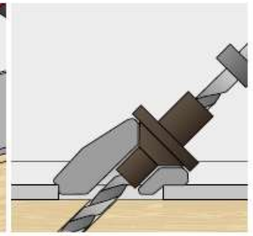


Use the VGU JIG template of the correct diameter by positioning it in the VGU washer

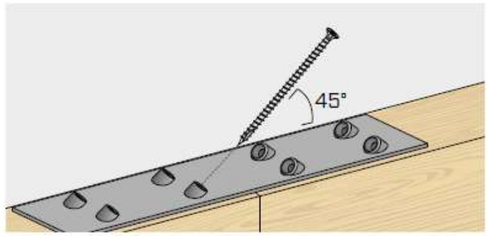


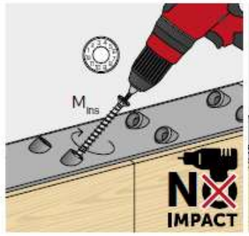
Using the pre-drill template, prepare a pre-drill/guide hole (at least 50 mm length) using an appropriate tip



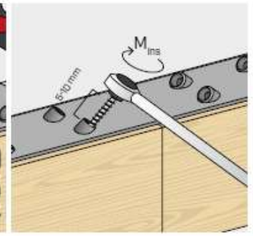


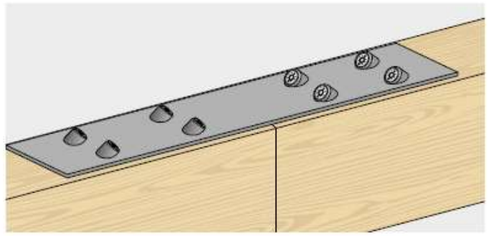
Position the screw and respect the 45° angle of insertion.





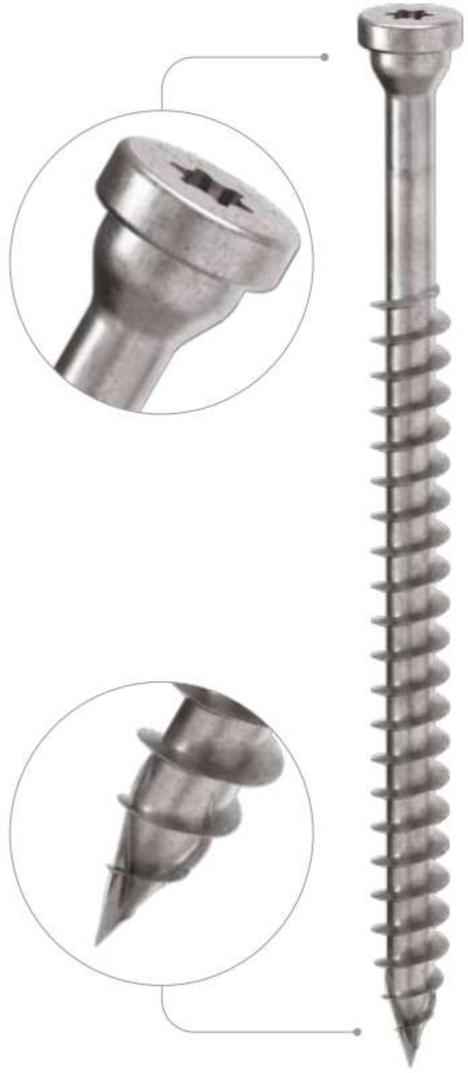
Screw in, ensuring correct tightening.





Perform the operation for all washers.
The assembly must be performed so as to guarantee that the stress is evenly distributed among all the installed VGU washers.

METAL-to-TIMBER recommended use:



HYBRID STRUCTURES: STEEL + TIMBER

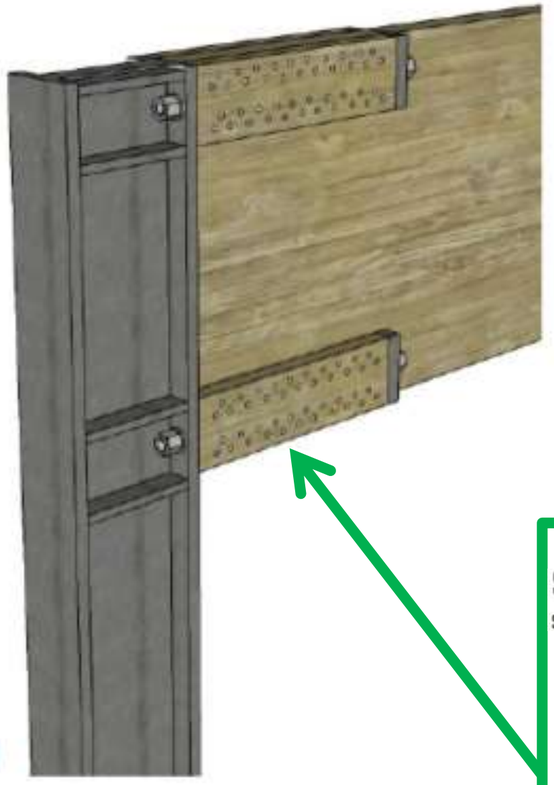
(a)

(b)

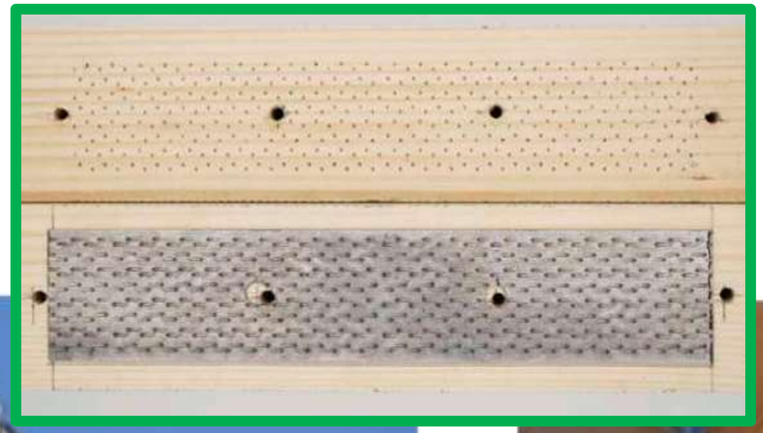
(c)

Modeling Guide for Timber Structures (2022)

HYBRID STRUCTURES: STEEL + TIMBER



(a)



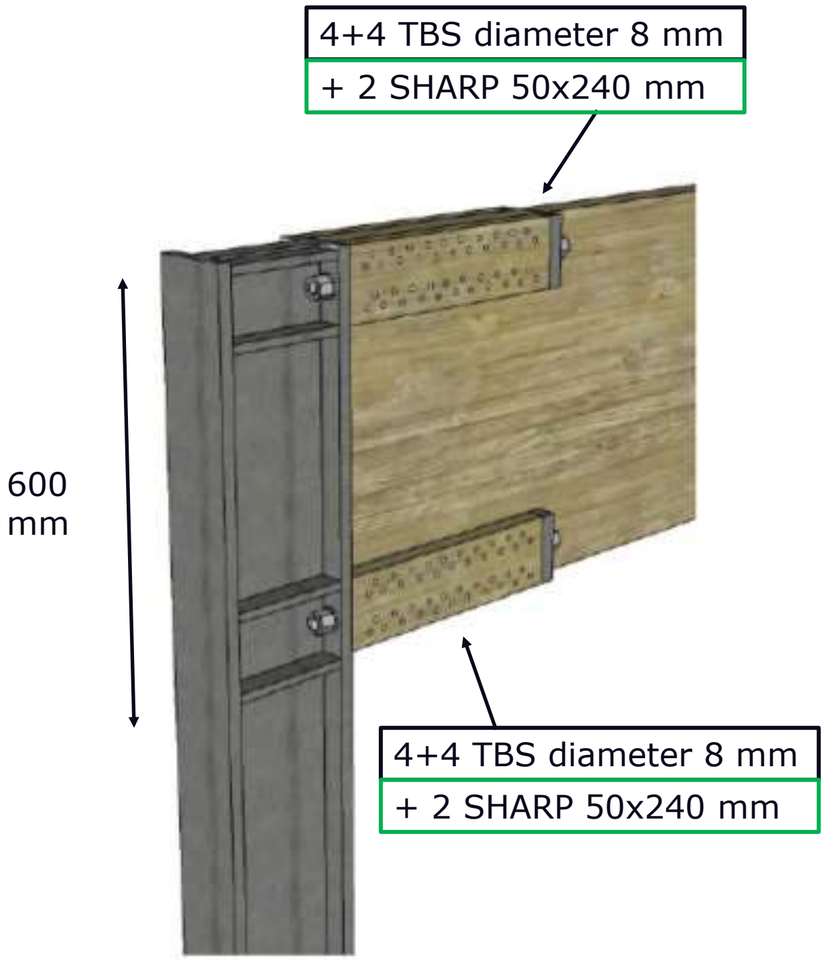
Characteristic strength values of the SHARP METAL connection WITH SCREWS

type	$f_{v,0,k}$ [MPa]	$k_{ser,0,k}$ [N/mm]*[1/mm^2]	$f_{v,90,k}$ [MPa]	$k_{ser,90,k}$ [N/mm]*[1/mm^2]	$f_{v,EG,k}$ [MPa]	$k_{ser,EG,k}$ [N/mm]*[1/mm^2]
LD	2,02	3,13	2,11	0,65	1,92	4,19
HD	2,24	6,47	2,42	0,90	1,92	5,00

The values in the table correspond to the experimental data with TBS 8x160 screws at 10d (80 mm) pitch with under head timber thickness of 60 mm.

The overall stiffness of the K_{ser} connection [N/mm] is determined by multiplying the k_{ser} coefficient by the plate surface.

HYBRID STRUCTURES: STEEL + TIMBER



hbeam	**600**	*mm*
hi=hbeam/2	300	*mm*
fi_rad	0,003	*rad*
fi_degree	0,2	°

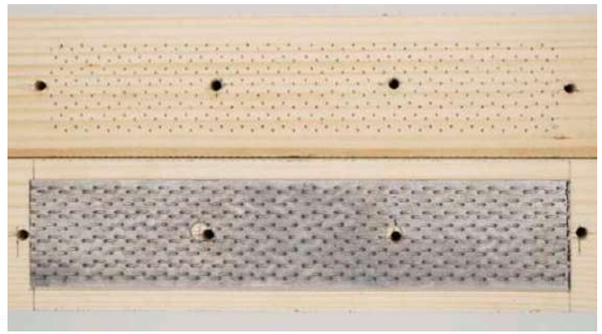
SCREWS ONLY:

Kser,1 screw	**2994**	
Ksertot	**47902**	*N/mm*
Kw,ser,screws	**4311**	***kNm***

SCREWS+SHARP:

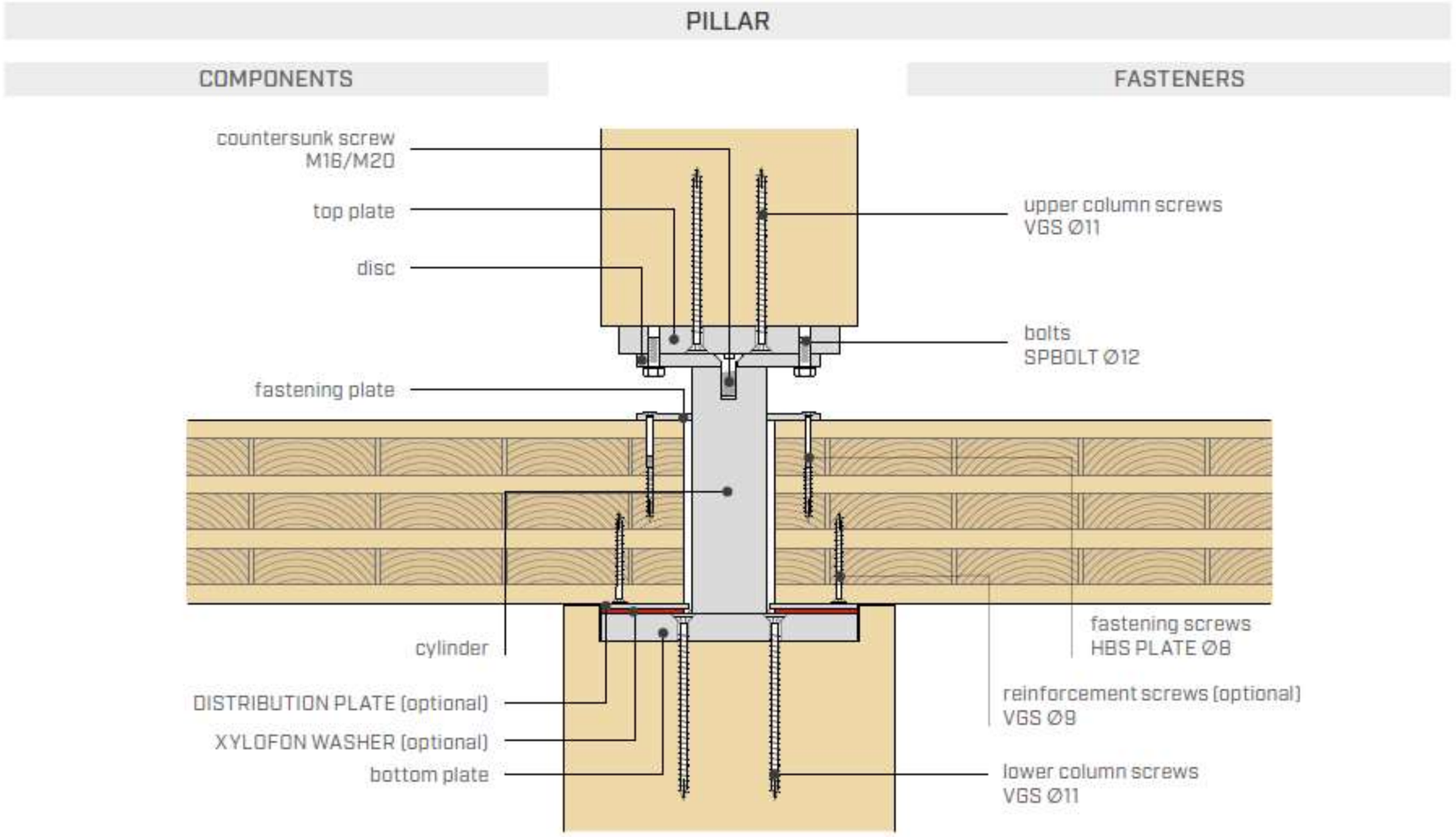
L sharp	**240**	*mm*
Kser SHARP	**37560**	*N/mm*
Kser,tot	150240	*N/mm*
Kw,ser,SHARP	**13522**	***kNm***

SHARP/screws	3,1



Smarter Connections

Smarter Connections



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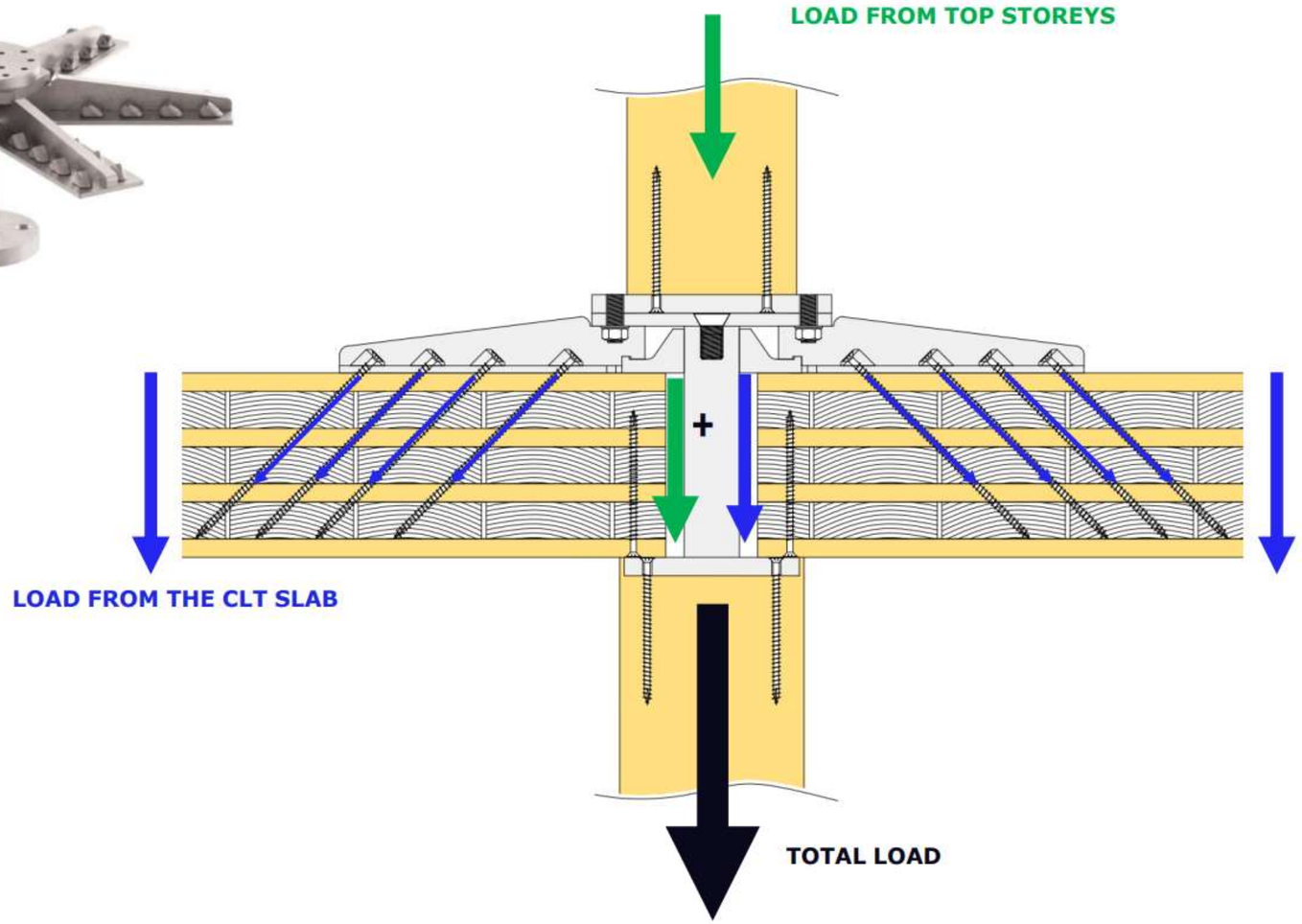

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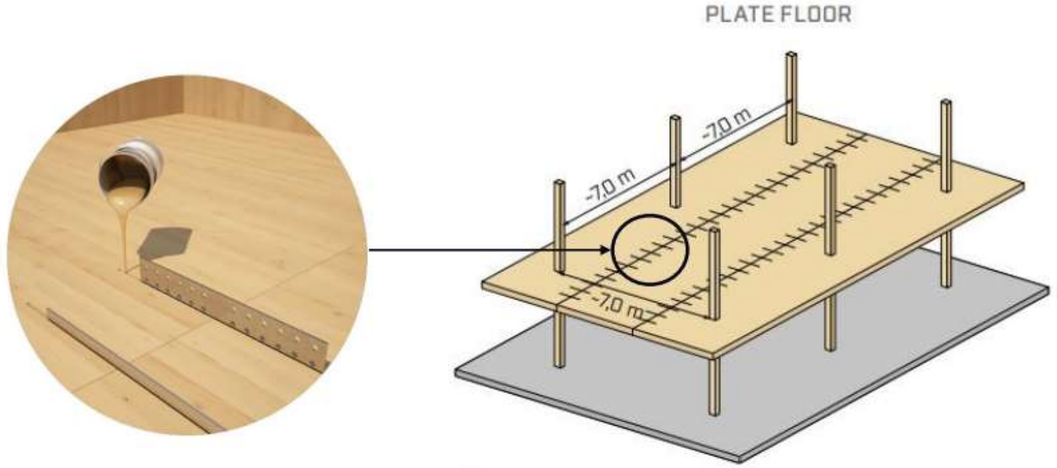
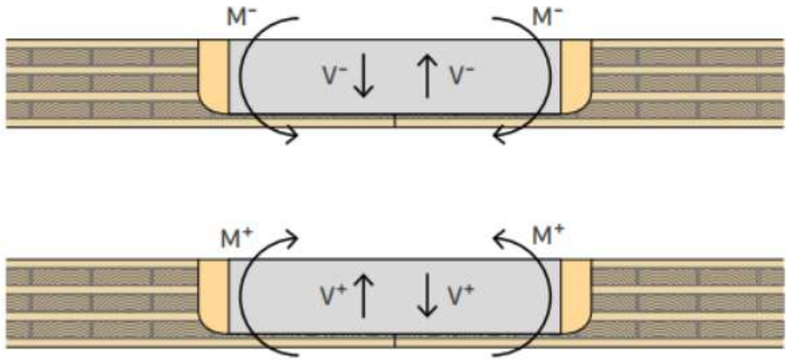
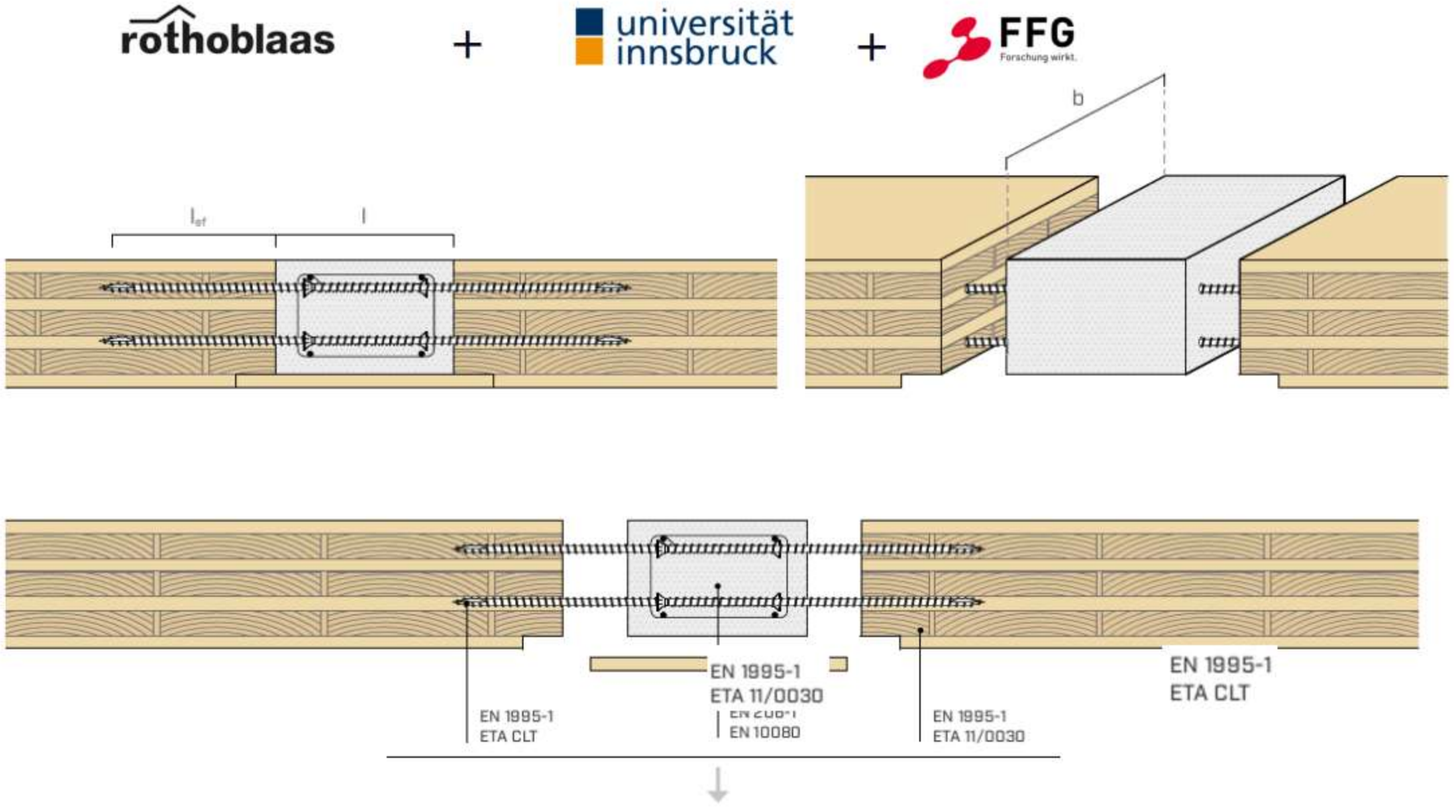


- maximum spacing between the columns
- it exploits the two-dimensional behaviour of the panel

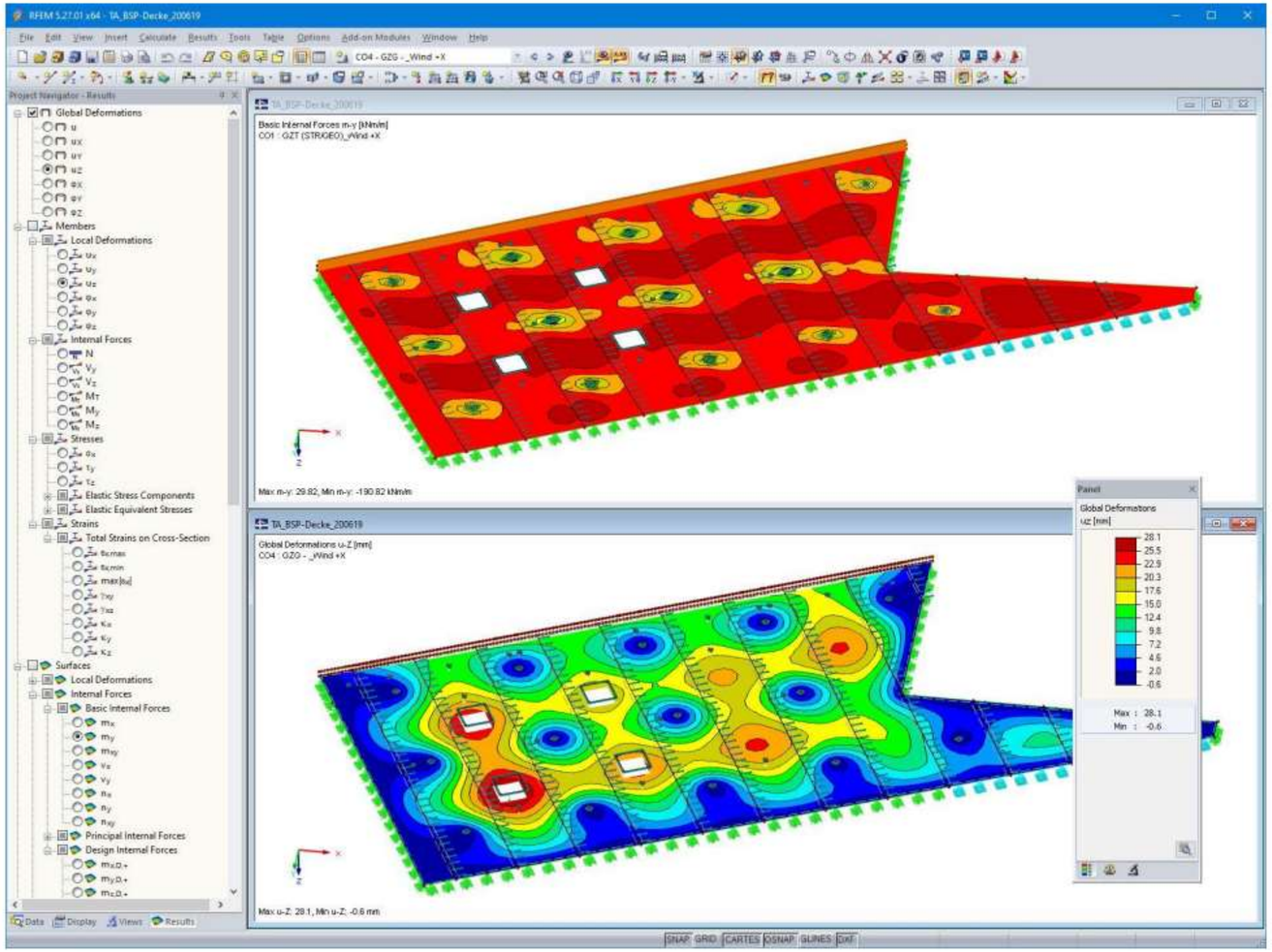


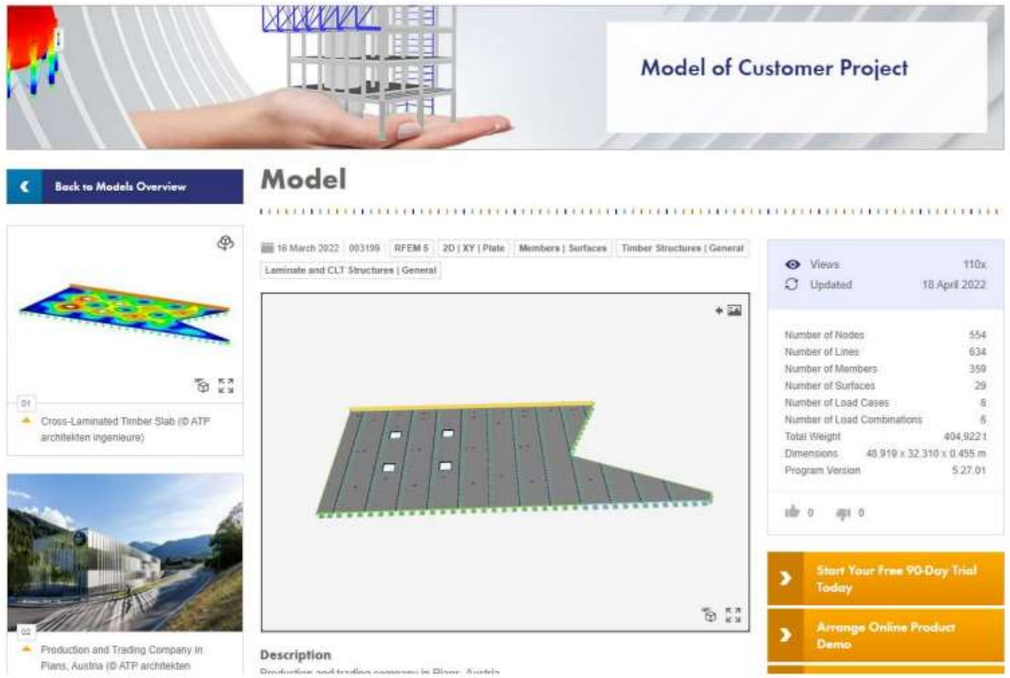
Smarter Connections



New ETA Rothoblaas for timber - concrete connection

SPIDER CONNECTION: REAL CASE "HANDL" IN INNSBRUCK, AUSTRIA





https://www.dlubal.com/en/downloads-and-information/references/customer-projects/001231

Smarter Connections

HP

HV

JV

JS

Thanks for your attention

rothoblaas

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