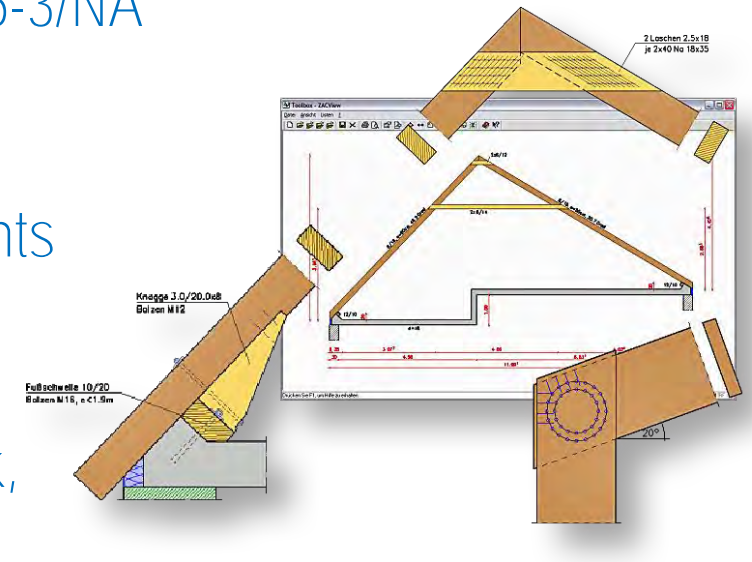


- Reinforced concrete, steel and timber design according to DIN and EN with corresponding national annexes for DE, AT, SK/CZ and UK
- Brickwork analysis according to DIN 1053-100 & DIN EN 1996-3/NA
- Simple handling for efficient and clear operation
- Graphic-interactive working environment with sensitive elements and dimension chains
- Versatile collection of proofs for reinforced concrete, brickwork, steel construction and timber construction
- Integrated software solutions for calculation, design and drawing



Bending and shear design for Rectangle, T-beam and Slab

Graphical interactive input

RIB RTool - Stress amplitudes

Structural member: Beispiel

Cross-section: Rectangle, b = 30.0 cm, h = 50.0 cm, effective width bm = 120.0 cm, slab thickness hf = 20.0 cm. Reinforcement: As-t = 13.20, As-b = 22.16, as-w = 9.33 cm²/m.

Permanent loads: Moment Mg = 100.00 kNm, Normal force Ng = -50.00 kN, Shear force Vg = 20.00 kN.

Live loads: Moment min M = -250.00, max M = 150.00 kNm; Normal force min N = -10.00, max N = 70.00 kN; Shear force min V = -30.00, max V = 100.00 kN.

Fatigue-effective ratio alpha = 0.50

Material: Concrete C16/20, Reinforcement B500M

Safety factor for design (ULS) = 1.40

RIB RTool - Corbel

Structural member: Bsp. 3.4 BK 2007

Graphical input: Corbel dimensions (hc = 65.00 cm, d = 30.00 cm, lc = 45.50 cm, bc = 55.00 cm, c = 55.00 cm, ac = 25.00 cm, au = 35.00 cm, u = 0.00 cm, kz = 0.90).

Loads: direct, Permanent load Fg,d = 400.00 kN, Live load Fq,d = 0.00 kN, Horizontal load HE,d = 80.00 kN.

Material: Concrete C40/50, Reinforcing B500S

Analysis of safety against compressive failure in web: in addition according to Leonhardt (lecture textbook)

Reinforced concrete beam and Corbel design

RIB RTool - Collar beam roof

Structural member Statics Setting Options ?

Purlin, rafter and collar beam roofs

Component / material System dimensions Rafter / collar beam Snow load / Wind load Line load Single load

Structural member: C.1.3. Collar beam roof

Design settings

Wood type...	C24	Fire protection...		Partition of spans into n =	10
Utilization class	UC 1 (indoor, heated)	Deflection	all. w _{inst} = L/	300	
Live load category	A: Living rooms	Deflection	all. w _{fin} = L/	250	

RIB RTool - Timber frame corner

Structural member Statics Setting Options ?

Structural member: Dowel-connection Frame Corner (B.4.2.3)

Geometry

Strut	<input checked="" type="radio"/> twice	Beam	<input type="radio"/> twice
Width =	12.00 cm	Width =	20.00 cm
Height =	110.00 cm	Height =	110.00 cm
Overlap =	7.00 cm	Overlap =	7.00 cm
		Slope =	14.00

Connection type

Dowel pin

Special structure dowel

Wedge dovetail

Connection method

2 Dowel circles

Dowel diameter: Stabdübel 20 mm

Loading

Md =	-275.00 kNm	Radius 1	47.00	Radius 2:	37.00 cm
Nd =	-138.00 kN	Number 1:	24	Number 2:	19 pcs
Vd =	-94.50 kN	<input type="checkbox"/> maximum utilization		<input type="checkbox"/> requ. number of dowels	

Design settings

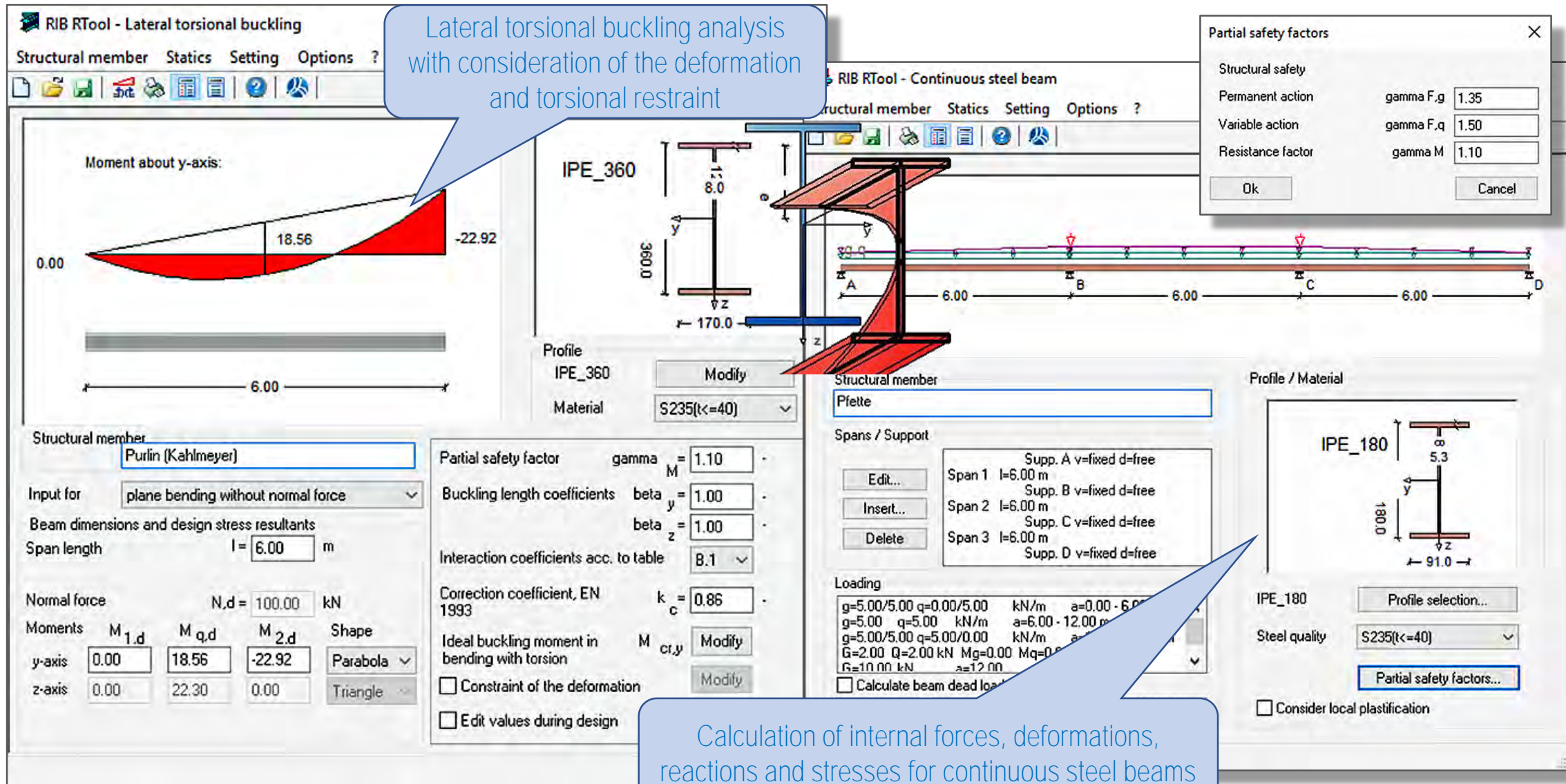
Wood type... GL24h

Utilization class UC 1 (indoor, heated)

Load action short

Corner protection reduce allow.Nst Nailing

Frame corner connected by dowel pins, special dowel designs or wedge dovetails



Lateral torsional buckling analysis with consideration of the deformation and torsional restraint

Calculation of internal forces, deformations, reactions and stresses for continuous steel beams

Partial safety factors

Structural safety		
Permanent action	gamma F,g	1.35
Variable action	gamma F,q	1.50
Resistance factor	gamma M	1.10

Moment about y-axis:

0.00	18.56	-22.92
------	-------	--------

Structural member: Purlin (Kahlmeyer)

Input for: plane bending without normal force

Beam dimensions and design stress resultants: Span length $l = 6.00$ m

Normal force: $N, d = 100.00$ kN

Moments:

	$M_{1,d}$	$M_{q,d}$	$M_{2,d}$	Shape
y-axis	0.00	18.56	-22.92	Parabola
z-axis	0.00	22.30	0.00	Triangle

Profile / Material: IPE_180, Steel quality S235(t<=40)

Spans / Support: Span 1 $l=6.00$ m, Span 2 $l=6.00$ m, Span 3 $l=6.00$ m

Partial safety factor: $\gamma_M = 1.10$

Buckling length coefficients: $\beta_y = 1.00$, $\beta_z = 1.00$

Interaction coefficients acc. to table: 8.1

Correction coefficient, EN 1993: $k_c = 0.86$

Ideal buckling moment in bending with torsion: $M_{cr,y}$

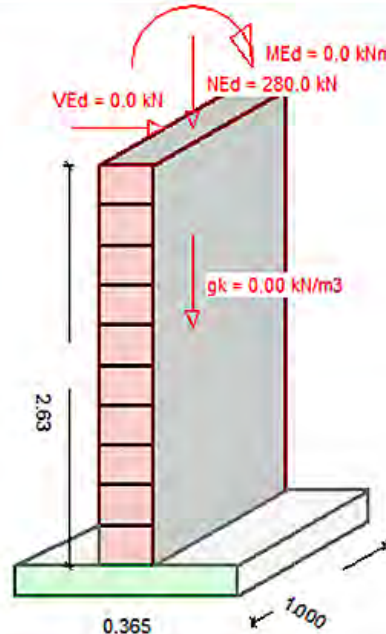
Constraint of the deformation:

Edit values during design:

RIB RTool - Masonry

Structural member Statics Setting Options ?

Structural member
Exterior Wall HLz t=36,5



Wall
Wall thickness in buckling direction $t = 0.365$ m
Wall width $b = 1.000$ m
clear floor-to-floor height $h = 2.625$ m
Buckling length factor $\rho_{0.2} = 1.00$
Ceiling end support
 Roof slab Span width of slab $l_f = 5.500$ m
Support depth $a = 0.245$ m

Loading
 $\gamma_{Gg} = 1.40$ $\gamma_{Gq} = 1.40$
Vertical load NGk 60.0 NQk 140.0 kN
Moment MQk 0.0 MQk 0.0 kNm
Shear force VGk 0.0 VQk 0.0 kN
Dead load of wall $g_k = 0.00$ kN/m³
Eccentricity $e-N = 0.000$ m

Result
max NEd + Gd 280.00 NRd 414.34 kN
min NEd 60.00 kN
VEd 0.00 VRd 24.65 kN
Slenderness ratio 7.19
Length of gaping joint 0.000 adm.: 0.183 m
Edge deformation 0.000 adm.: 0.100 o/oo

Material
Brick strength 12 Mortar group $NM II$
Brick type $VCBA, VCB, BB T1$ Butt joints grouted

Max/min compression and shear stresses as well as the slenderness of the wall

Material
Brick strength 6 Mortar group $NM II$
Brick type $VCBA, VCB, BB T1$ Butt joints grouted

- VCBA, VCB, BB T1
- KS Hollow block
- VCBw, BB(T2-T4), HCB
- Solid brick
- KS Full, KS Block
- Lightweight concrete Hb
- Lightweight concrete V
- Lightweight concrete Vn
- Lightweight concrete Vb
- Aerated concrete
- Planar elements KS XL
- Planar elements KS XL-N
- Planar bricks KS P
- Planar bricks KS L-P

Different types of bricks

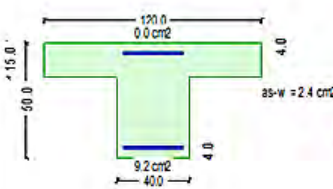
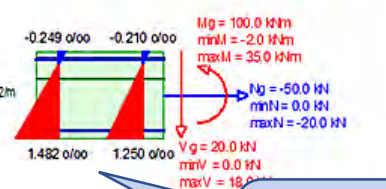
RTconfig

File Export Depiction ?

Example

RIB RTool - Stress amplitudes © 2018 RIB Software SE

Example

$Mg = 100.0 \text{ kNm}$
 $\text{min}M = -2.0 \text{ kNm}$
 $\text{max}M = 35.0 \text{ kNm}$
 $Ng = -50.0 \text{ kN}$
 $\text{min}N = 0.0 \text{ kN}$
 $\text{max}N = -20.0 \text{ kN}$
 $Vg = 20.0 \text{ kN}$
 $\text{min}V = 0.0 \text{ kN}$
 $\text{max}V = 18.0 \text{ kN}$

Stress range verification acc. to DIN EN 1992-1-1

Concrete : C16/20
Reinforc. : B500M

Cross-section: I-beam
Strain assessment at operating load

Fatigue-effective ratio $\alpha = 0.50$

Result

Edge deformation min. $\text{eps-h} / \text{eps-d} = -0.21 / 1.25 \text{ o/oo}$
 max. $\text{eps-u} / \text{eps-l} = -0.25 / 1.48 \text{ o/oo}$

Bending top layer : $As-t = 0.00 \text{ cm}^2$

Bending bottom layer: $As-b = 9.21 \text{ cm}^2$
 Upper stress = 268.69 MN/m²
 Lower stress = 226.59 MN/m²
 Amplitude = 42.10 MN/m²

Shear stirrups: $as-w = 2.43 \text{ cm}^2/\text{m}$
 Upper stress = 0.00 MN/m²
 Lower stress = 0.00 MN/m²
 Amplitude = 0.00 MN/m²

Tabular and graphical results display

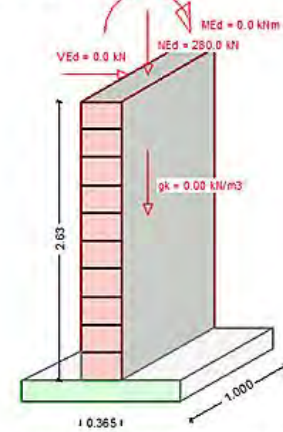
RTconfig

File Export Depiction ?

Exterior Wall HLz t=36,5

System
Masonry analysis according to DIN EN 1996-3
Result

Exterior Wall HLz t=36,5



Masonry analysis according to DIN EN 1996-3

Masonry strength class: 6
Mortar type: NM II
Masonry type: VCBA, VCBB, BB T1
Butt joints not grouted

Buckling length $sk = 2.625 \text{ m}$

Vertical load $NEd = 280.000 \text{ kN}$ $e = 0.000 \text{ m}$
 Slab end support $lf = 5.500 \text{ m}$ $a = 0.245 \text{ m}$
 Moment $MEd = 0.000 \text{ kNm}$
 Shear force $VEd = 0.000 \text{ kN}$

Result

Slenderness ratio $\lambda = 7.192$
 Compressive strength $f_d = 1.530 \text{ N/mm}^2$ $f_k = 2.700 \text{ N/mm}^2$
 Shear strength $f_{vd} = 0.079 \text{ N/mm}^2$ $f_{vk} = 0.119 \text{ N/mm}^2$
 Coefficients $\phi_1/\phi_{11}/\phi_{12} = 0.514/0.604/0.514$

Normal force $NEd+Gd = 280.000 \text{ kN}$ \leftrightarrow $NRd = 286.850 \text{ kN}$
 $\text{min } NEd = 60.000 \text{ kN}$

RIB Engineering GmbH Vaihingerstraße 151 D-70567 Stuttgart
 Software for Structural Engineers - Member Design, CAD, FEM for Building & Bridges
 statik-hotline@rib-software.com www.rib-software.com
 Telefon: +49(0)711 7873-41 Telefax: +49(0)711 7873-8841

RIB Continuous steel beam design © 2018 RIB Software SE

Purlin

Design standard: DIN EN 1993-1-1
 Steel: S235 (s=40) (E/G = 210000/81000 N/mm²) Profile: IPE_180

Partial safety factors Structural safety Serviceability
 Permanent effects gamma-F_g 1.35 1.00
 Variable effects gamma-F_q 1.80 1.00
 Module of member resistance gamma-M 1.10

Load (characteristic)

Permanent load g₁ = 5.00 / 5.00 kN/m (x = 0.00 to 6.00 m)
 Permanent load g₂ = 5.00 / 5.00 kN/m (x = 6.00 to 12.00 m)
 Permanent load g₃ = 5.00 / 5.00 kN/m (x = 12.00 to 18.00 m)
 Permanent load G₁ = 2.00 kN (x = 6.00 m)
 Permanent load G₂ = 10.00 kN (x = 12.00 m)
 Live load q₁ = 0.00 / 5.00 kN/m (x = 0.00 to 6.00 m) span-by-span
 Live load q₂ = 5.00 / 5.00 kN/m (x = 6.00 to 12.00 m) span-by-span
 Live load q₃ = 5.00 / 0.00 kN/m (x = 12.00 to 18.00 m) span-by-span
 Live load Q₁ = 2.00 kN (x = 6.00 m)

Stress resultants (gamma-F Structural safety)

Span	x [m]	max Md [kNm]	x [m]	min Md [kNm]	Md-1e [kNm]	Md-z1 [kNm]	Vd-1e [kN]	Vd-z1 [kN]
1	2.70	32.05	6.00	-47.37	0.00	-47.37	22.80	-42.14
2	3.00	26.34	0.00	-47.37	-47.37	-47.37	44.74	-44.74
3	3.20	32.05	0.00	-47.37	-47.37	0.00	42.14	-22.80

Seite: 1

Clear and comprehensible output of results

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 statik-hotline@rib-software.com www.rib-software.com
 Telefon: +49(0)711 7873-41 Telefax: +49(0)711 7873-8841

RIB Continuous steel beam design © 2018 RIB Software SE

Structural member: Purlin

Result graphics

Seite: 3

Different diagrams to display the results

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 Software for Structural Engineers - Member Design, CAD, FEM for Building & Bridges
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RIB Timber frame edge design © 2018 RIB Software SE

Dowel-connection Frame Corner (B.4.2.3)

Design standard : DIN 1052:2008
 Wood quality : GL24h
 Utilization class : 1
 Duration of loading: short
 Emean / Gmean = 11600 / 720 N/mm²
 f_{m,k} / E_{v,k} / E_{v,k} = 24.0 / 24.0

Stress resultants:

Beam: N_{s,d}: -125.08 kN
 Column: N_{s,d}: -138.00 kN
 M_d: -275.00 kNm

Member geometry:

Beam: 1-teilig h/b: 110.0 cm / 20.0 cm Outstand ü: 7.0 cm
 Inclination alpha: 14.00°
 Strut: 2-teilig h/b: 110.0 cm / 12.0 cm Outstand ü: 7.0 cm

Dimensions of dowel circle:

Circle 1: r₁ = 47.0 cm n₁ = 24 Dowel (Stabdübel 20 mm) S235
 Circle 2: r₂ = 37.0 cm n₂ = 19 Dowel (Stabdübel 20 mm) S235

Dowel spacing:

- * Dowel to edge of end grain wood of beam: 15.0 cm >= 14.0 cm ok
- * Dowel to loaded edge of beam: 5.0 cm >= 6.0 cm ok
- * Dowel to edge of end grain wood of strut: 15.0 cm >= 14.0 cm ok
- * Dowel to loaded edge of strut: 5.0 cm >= 6.0 cm ok
- * Dowel one below the other:
 - Secant distance Circle 1: 12.3 cm >= 10.0 cm ok
 - Secant distance Circle 2: 12.2 cm >= 10.0 cm ok

Seite: 1

Illustration of the frame corner with dowels