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Structural Analysis
& Design Software

Amy Heilig, PE
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Technical Support Engineer
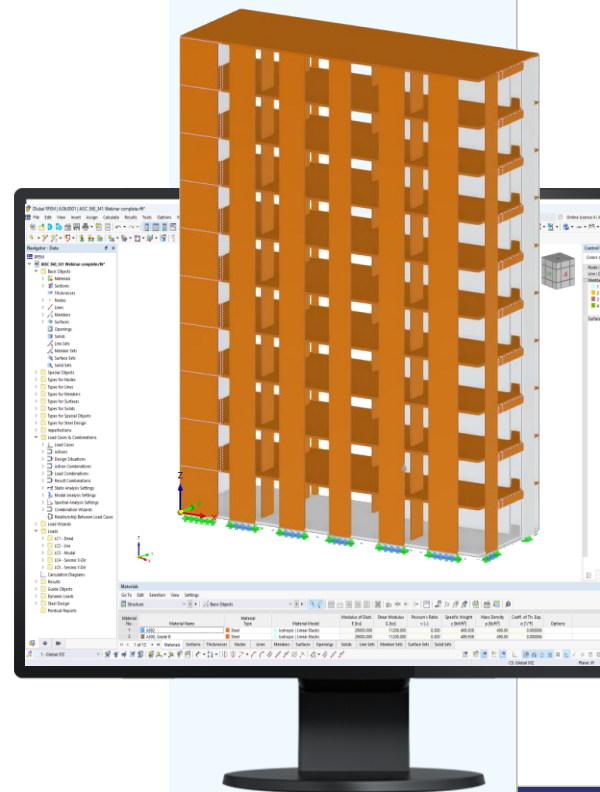
Cisca Tjoa, PE
Moderator

Technical Support Engineer

Webinar

CSA O86:19 CLT Building Design in RFEM 6

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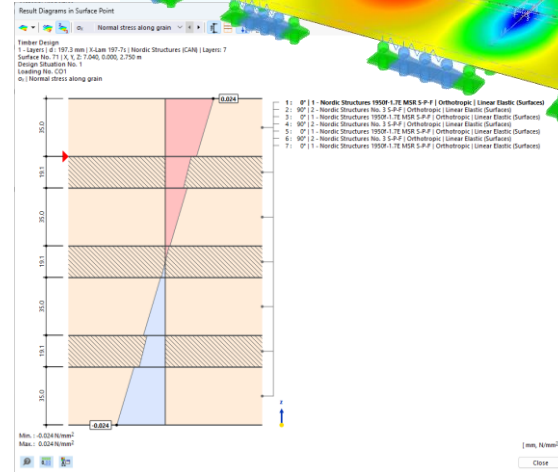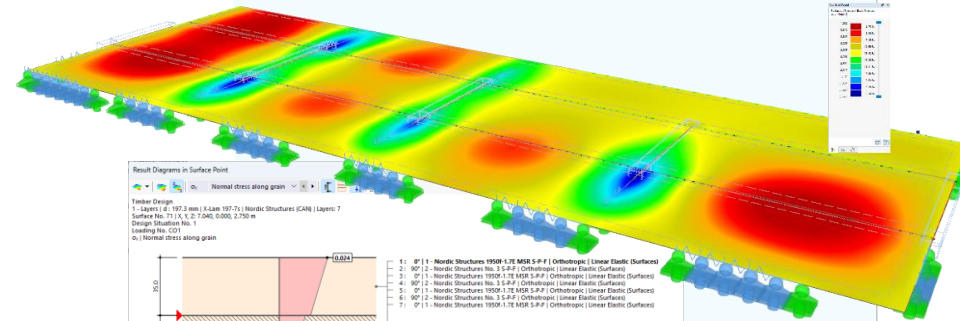
Mass Timber Design in RFEM 6
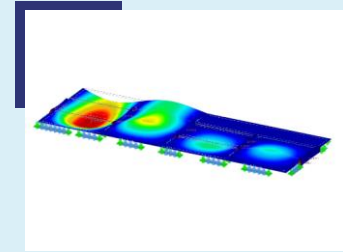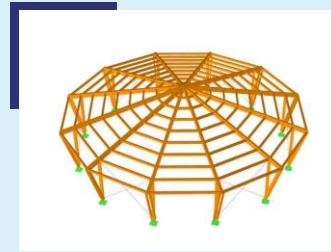
RFEM 6

Multilayer Surfaces Add-on

Timber Design Add-on

Optional

Modal Analysis Add-on

Building Model Add-on

Webinar

Shear Failure Modes

Options for CLT

☑ Design for failure of net section and failure in glued contact surface

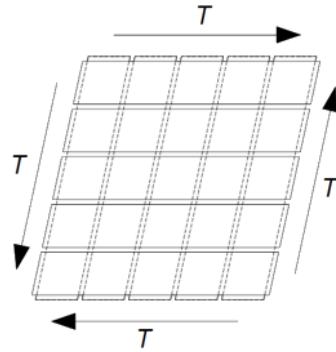Plank width

b_x 100.0 ▲▼ ▶ [mm]

b_y 100.0 ▲▼ ▶ [mm]
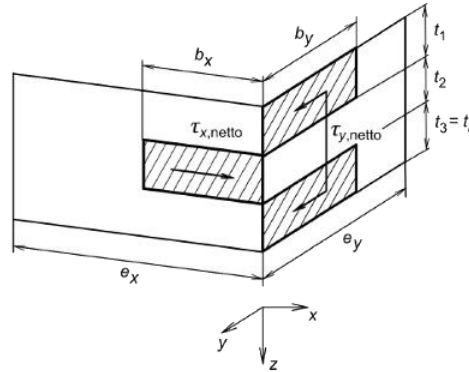
☑ Plank width including gap

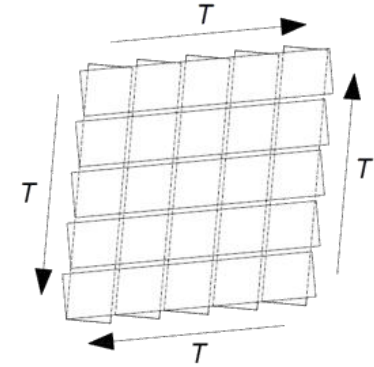e_x 100.0 ▲▼ ▶ [mm]

e_y 100.0 ▲▼ ▶ [mm]

Failure Mechanism 1

Failure parallel to the grain of gross cross-section

Failure Mechanism 2

Failure perpendicular to the grain of net cross-section
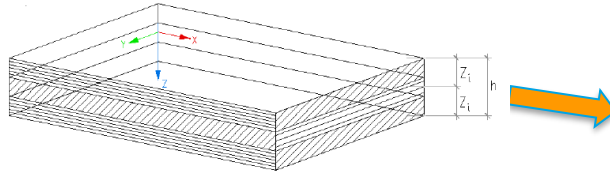
Failure Mechanism 3

Failure of orthogonally crossing boards (torsion)

Multilayer Surfaces Add-on

2. Overall stiffness matrix is created.

3. Export to RFEM.

$$D_{11} = \sum_{i=1}^{n} \frac{z_{i;max}^3 - z_{i;min}^3}{3} d_{i;11}$$

1. Each layer's stiffness is defined.

$$\mathbf{d_i} = \begin{pmatrix} d_{i,11} & d_{i,12} & 0 \\ & d_{i,22} & 0 \\ sym & & d_{i,33} \end{pmatrix} = \begin{pmatrix} \dfrac{E_x}{1-\upsilon_{xy}^2 \frac{E_x}{E_y}} & \dfrac{\upsilon_{xy}E_y}{1-\upsilon_{xy}^2 \frac{E_y}{E_x}} & 0 \\ & \dfrac{E_y}{1-\upsilon_{xy}^2 \frac{E_y}{E_x}} & 0 \\ sym & & G_{i;xy} \end{pmatrix}$$

5. Stresses are distributed to each layer.

$$\boldsymbol{\varepsilon}(z) = \begin{Bmatrix} \varepsilon_x \\ \varepsilon_y \\ \gamma_{xy} \end{Bmatrix} = \begin{Bmatrix} \frac{\partial u}{\partial x} \\ \frac{\partial v}{\partial y} \\ \frac{\partial u}{\partial y}+\frac{\partial v}{\partial x} \end{Bmatrix} + z \begin{Bmatrix} \frac{\partial \varphi_y}{\partial x} \\ -\frac{\partial \varphi_x}{\partial y} \\ \frac{\partial \varphi_y}{\partial y}-\frac{\partial \varphi_x}{\partial x} \end{Bmatrix}$$
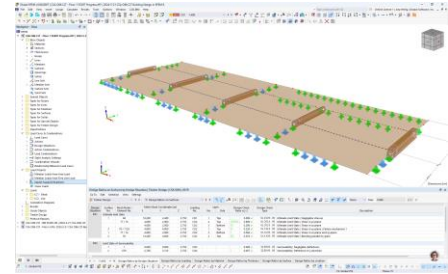
4. Internal forces are anlayzed.

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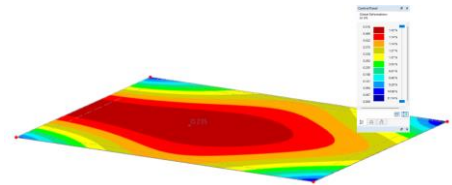
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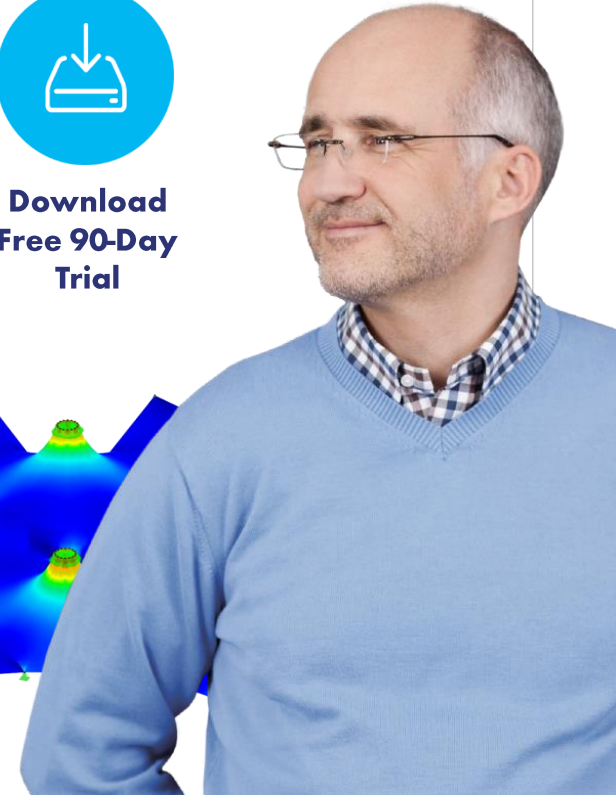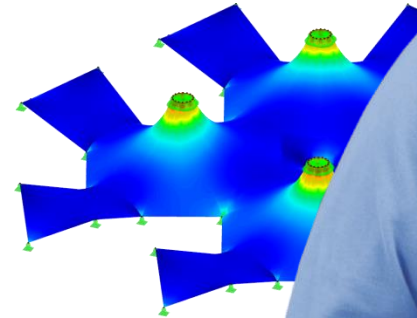
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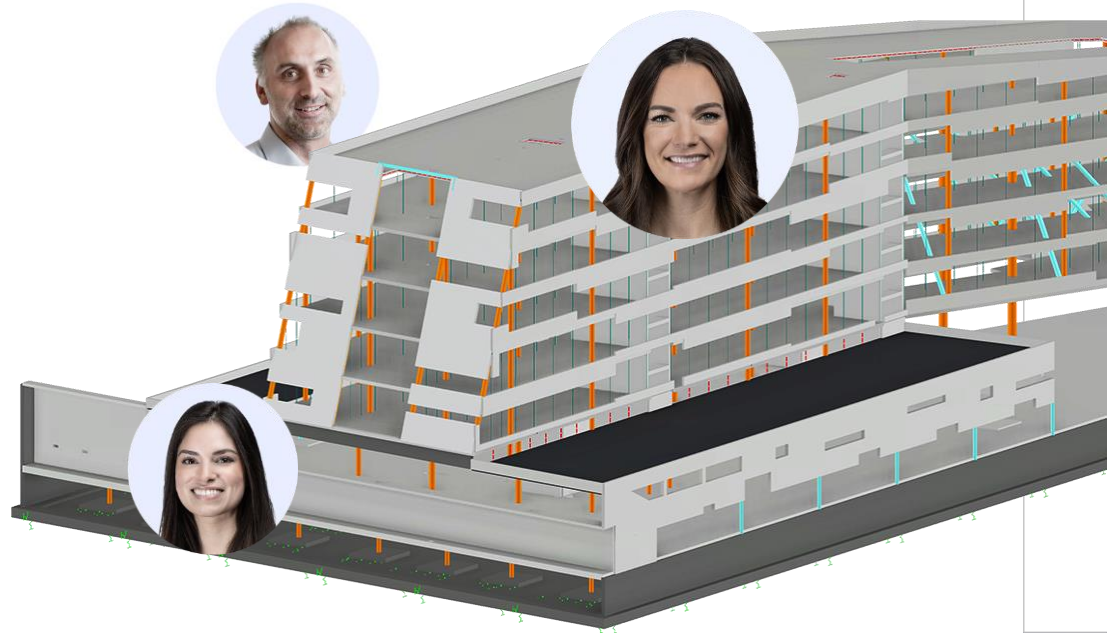30 South15th Street
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