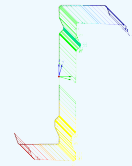




Software für Statik und Dynamik

Questions During the Presentation



The screenshot displays the GoToWebinar control panel. It features a top menu with 'File', 'View', and 'Help'. Below the menu are two main sections: 'Audio' and 'Questions'. The 'Audio' section includes a 'Sound Check' indicator, radio buttons for 'Computer audio' (selected) and 'Phone call', a 'MUTED' status with a red icon, and dropdown menus for 'Mikrofon (2- Sennheiser USB h...)' and 'Lautsprecher (2- Sennheiser U...'. The 'Questions' section is currently empty. At the bottom, there is a text input field with the placeholder 'Enter a question for staff', a 'Send' button, the 'Webinar ID: 373-901-987', and the 'GoToWebinar' logo.

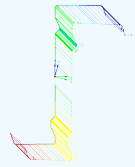
Three orange arrows point to specific features:

- An arrow points to the 'Audio' section with the text: Show or hide control panel
- An arrow points to the 'MUTED' status and microphone dropdown with the text: Adjust audio settings
- An arrow points to the 'Enter a question for staff' input field with the text: Ask questions

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Webinar Content

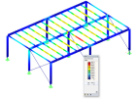
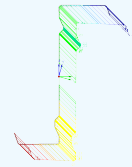


Agenda

- **Basics to determine effective cross-section properties**
- **Modeling general cold-formed sections in SHAPE-THIN 9**
- **Designing cold-formed sections in STEEL Cold-Formed Sections**

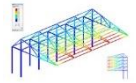


Used Programs/Modules



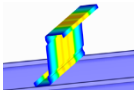
RSTAB 8

3D structural frame analysis program RSTAB for the design of structures consisting of steel, reinforced concrete, timber, aluminum etc.



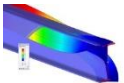
STEEL EC3

Add-on module for the design of steel members according to Eurocode 3



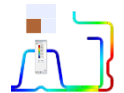
STEEL Cold-Formed Sections

Module extension for STEEL EC3: Design of cold-formed cross-sections according to EN 1993-1-3



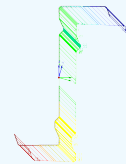
STEEL Warping Torsion

Module extension for STEEL EC3: Warping torsion analysis according to the second-order theory with 7 degrees of freedom



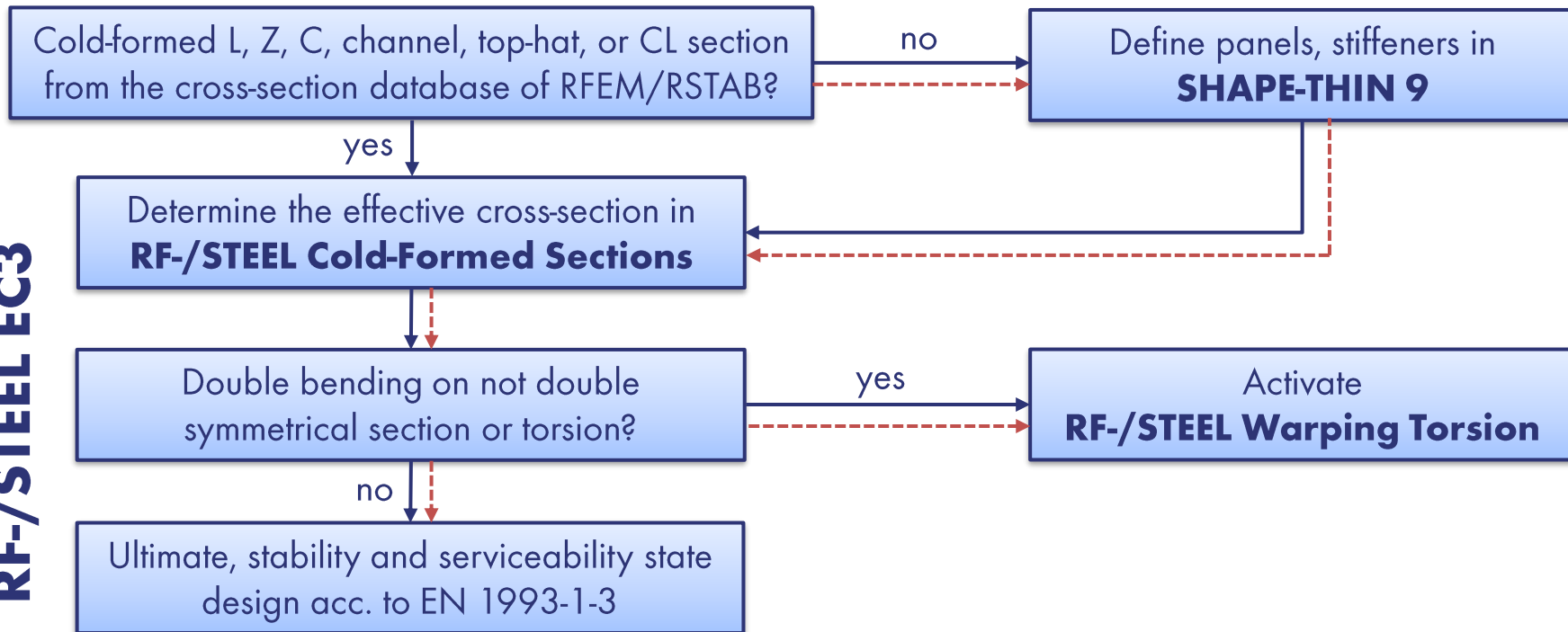
SHAPE THIN 9

Stand-alone program for properties and stresses of thin-walled and cold-formed cross-sections

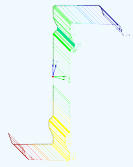


Workflow Design of Cold-Formed Sections

RF-/STEEL EC3

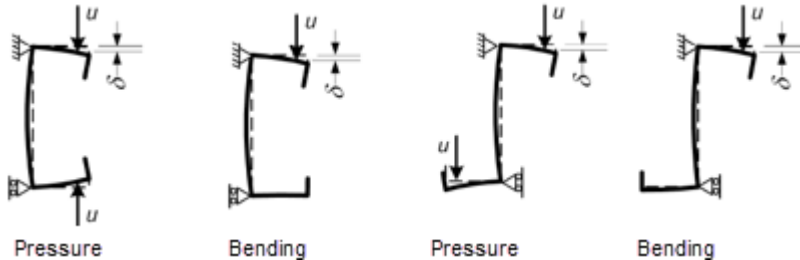


Effective Cross-Section Properties

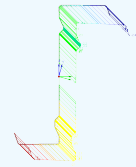


- 1 Checking the geometric conditions according to EN 1993-1-3, Section 5.2
- 2 Considering local plate buckling by determining the effective cross-section with $K = \infty$ according to the method of effective widths
- 3 Considering flexural buckling of the stiffener (distortional buckling)

3.1 Displaying the stiffener as member with elastic foundation with spring stiffness K
 $K = u / \delta$

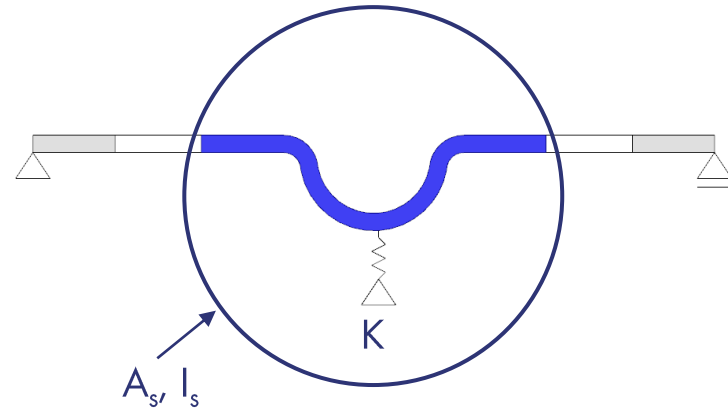
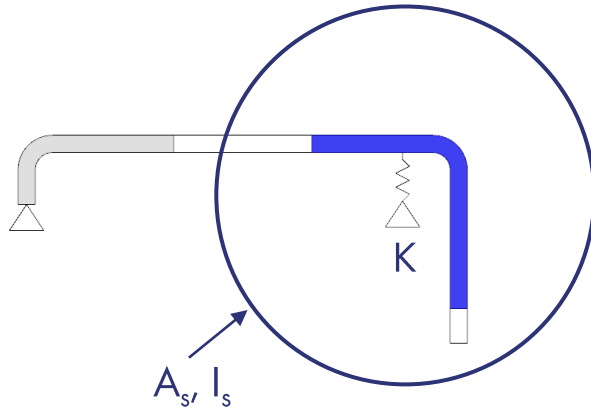


Effective Cross-Section Properties

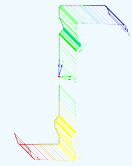


3.2 Calculating the critical buckling stress

$$\sigma_{cr,s} = \frac{2 \cdot \sqrt{K \cdot E \cdot I_s}}{A_s}$$



Effective Cross-Section Properties

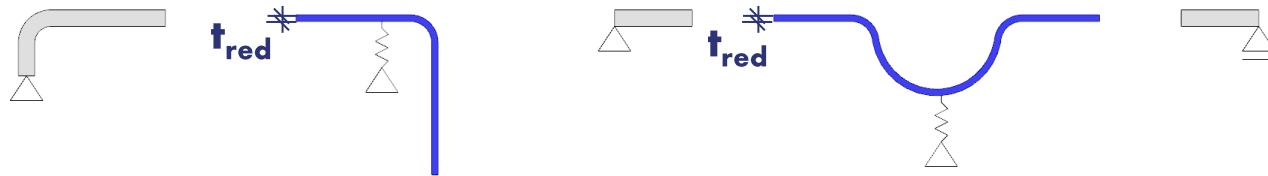


3.3 Calculating the reduced ultimate limit state

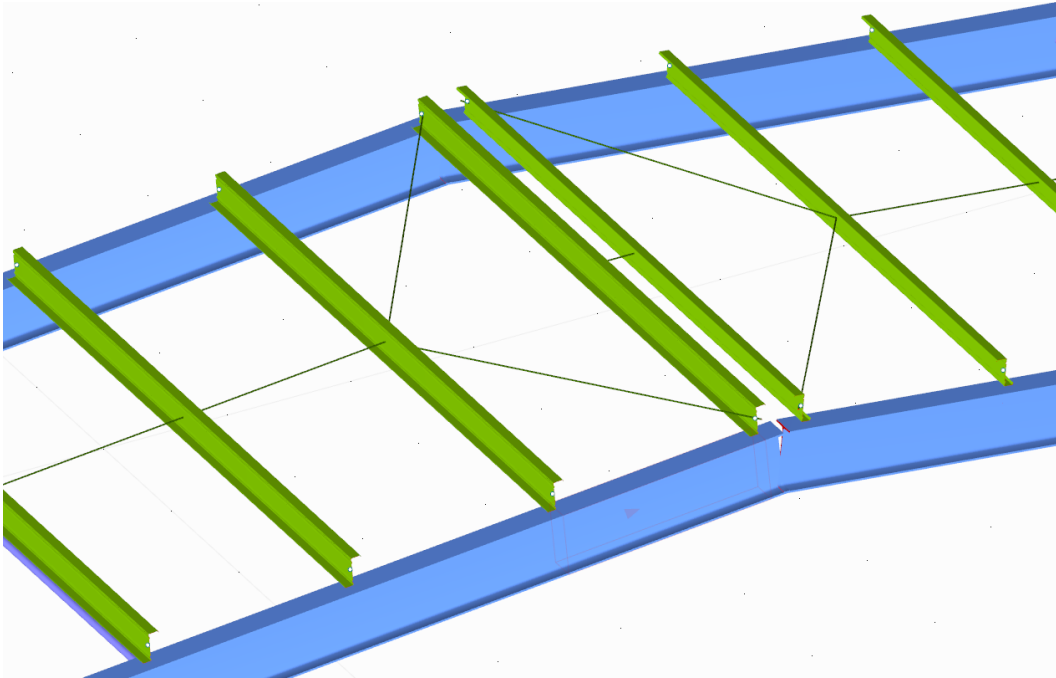
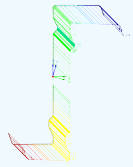
$$\chi_d = \begin{cases} 1.0 & \text{for } \bar{\lambda}_d \leq 0.65 \\ 1.47 - 0.723 \cdot \bar{\lambda}_d & \text{for } 0,65 < \bar{\lambda}_d < 1,38 \\ 0.66 / \bar{\lambda}_d & \text{for } \bar{\lambda}_d \geq 1.38 \end{cases}$$

3.4 Calculating the reduced stiffener thickness

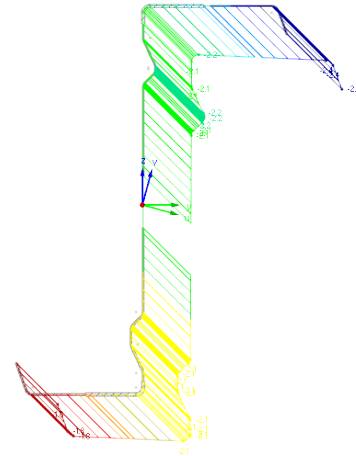
$$t_{red} = \chi_d \cdot t \cdot f_{yb} / (\sigma_{com,Ed} \cdot \gamma_{M0})$$



Purlin Suspension



**Thank you for your
attention!**





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