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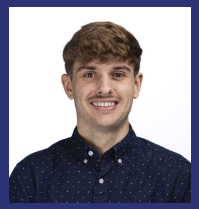
Amy Heilig, PE
Presenter

CEO – USA Office



Alex Bacon, EIT
Moderator

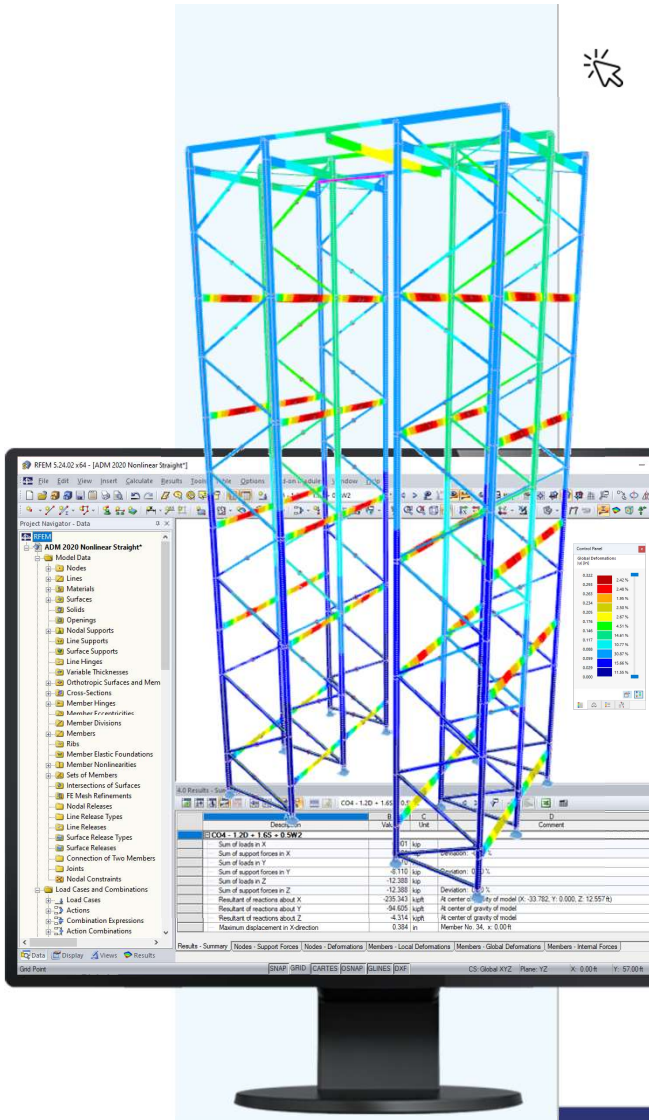
Technical Support Engineer

Cisca Tjoa, PE
Moderator

Technical Support Engineer

Webinar

AISI S100 / CSA S136 Cold-Formed Steel Design in RFEM 6



Questions During the Presentation

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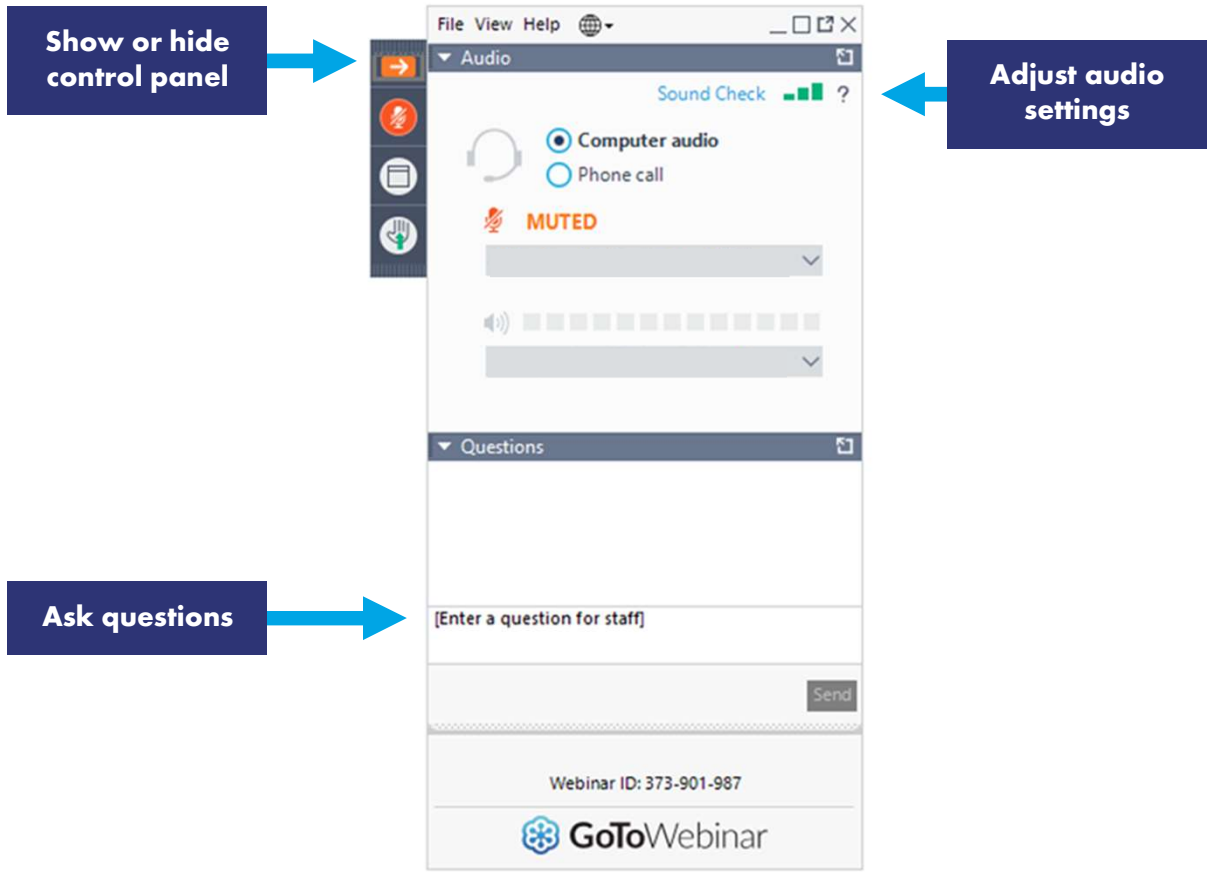
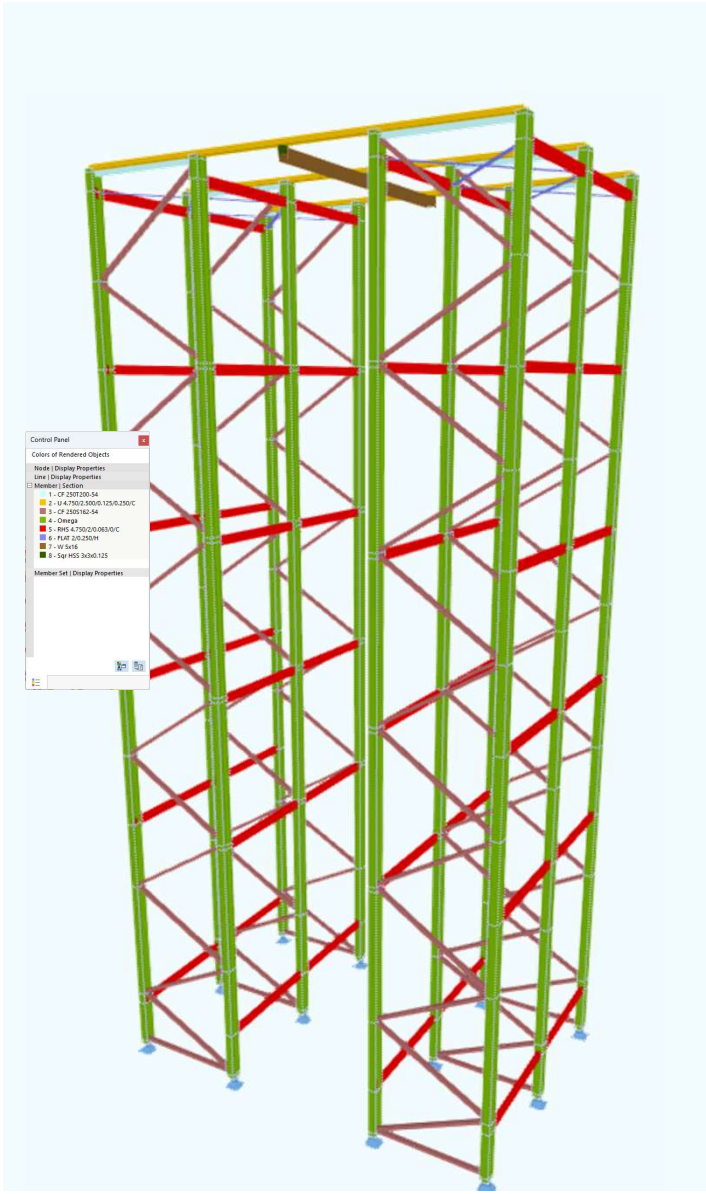


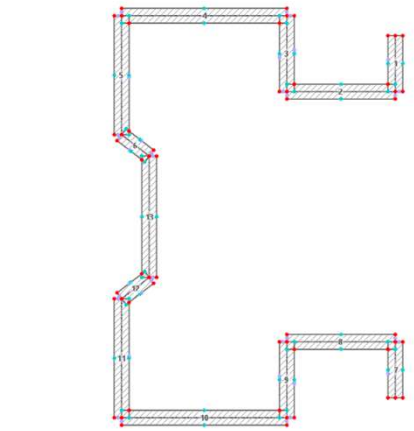
Content

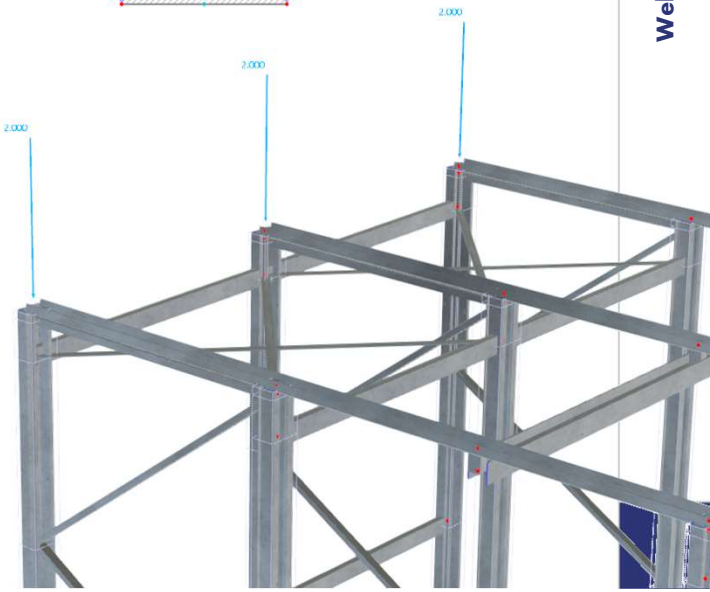


Webinar

Member Buckling Behavior

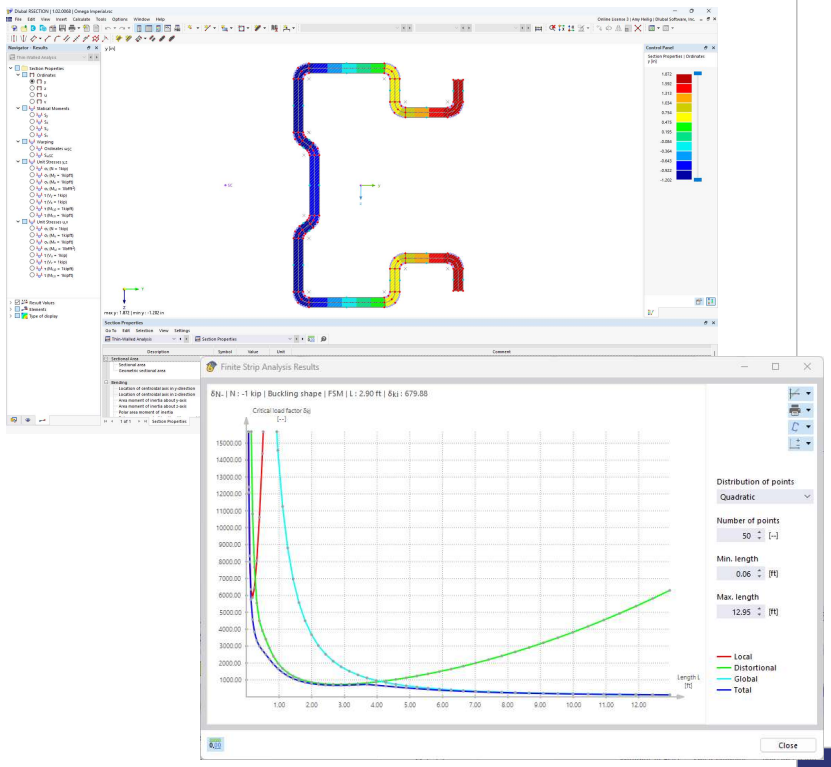
- **Failure buckling modes caused by compressive stress (bending moment or axial force)**
- **Three buckling modes considered for thin-walled sections**
  - Local buckling – Elements bend with no translation at fold lines; short half-wavelength (i.e., the length at which the buckling shape repeats along the member length)
  - Global buckling – lateral bending of the entire member including flexural, torsional, flexural-torsional, lateral-torsional; one long half-wavelength dependent on unbraced length
  - Distortional buckling – combination of local/global failure with some translation at fold lines; half-wavelength between local/global
- **Two methods to address buckling**
  - Effective Width Method
  - Direct Strength Method





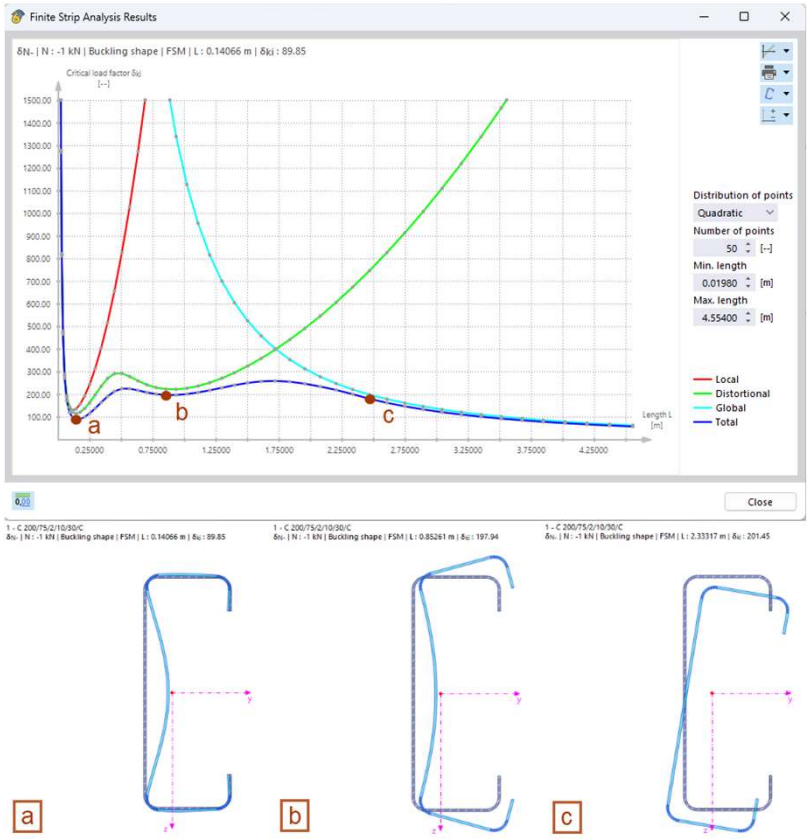
Effective Width Method vs. Direct Strength Method

- **Effective Width Method**
  - Effective section calculation required for each element
  - No interaction between elements for overall member behavior
- **Direct Strength Method (RFEM Method)**
  - No effective width calculations required
  - No iterations required
  - Gross cross-sectional properties are used
  - Interaction of all elements for all stability limit states
  - Compatibility and equilibrium maintained at element junctures
  - Applicable to a broad range of sections
  - More accurate strength prediction than effective width method



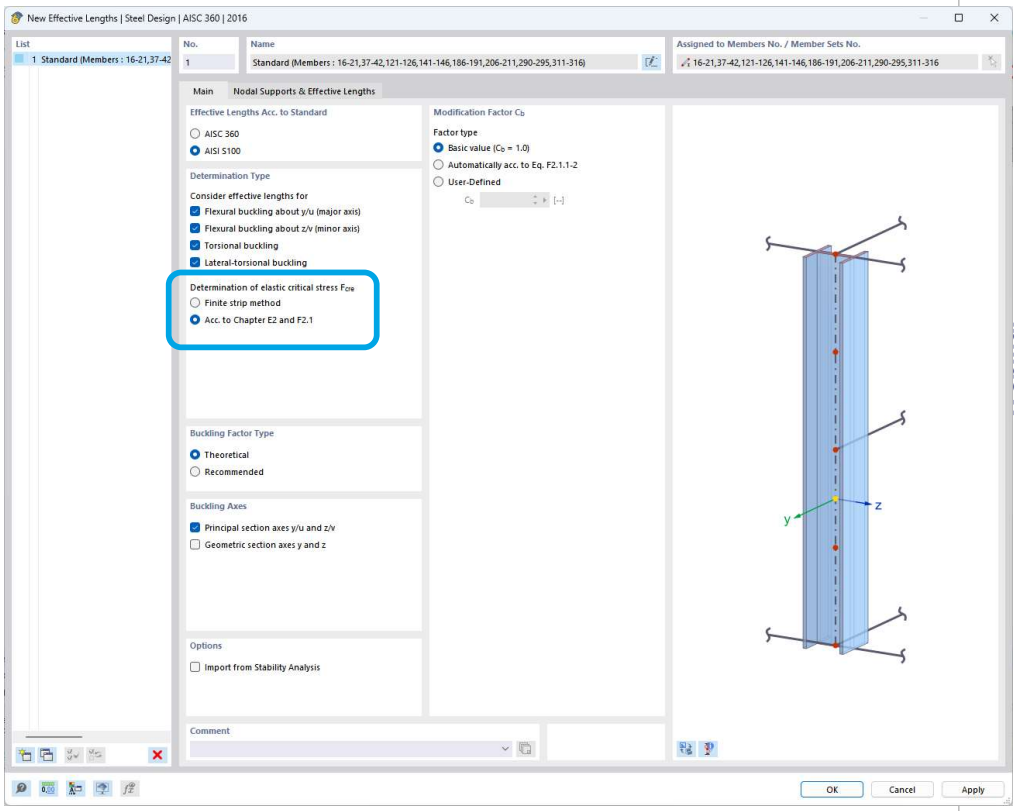
Finite Strip Method (FSM)

- Critical elastic stress/force is required for buckling design
- FSM is an acceptable numerical solution method for Direct Strength Method (AISI S100-16 App. 2.2)
- Simply supported member buckling analyzed with plate bending strips
- Unique buckling mode curve generated for each cross-section (local [a], distortional [b], global [c])
- 7 FSM signature graphs available in RFEM
- "Total" curve combines all modes for quick evaluation based on curve minima
- KB 1809, KB 1841, and KB 1801 on the Dlubal website



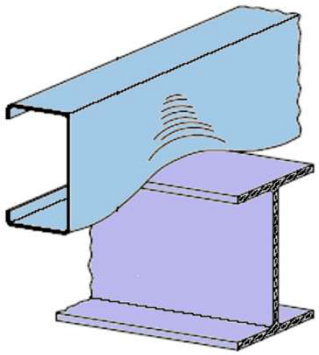
RFEM and Stability Design

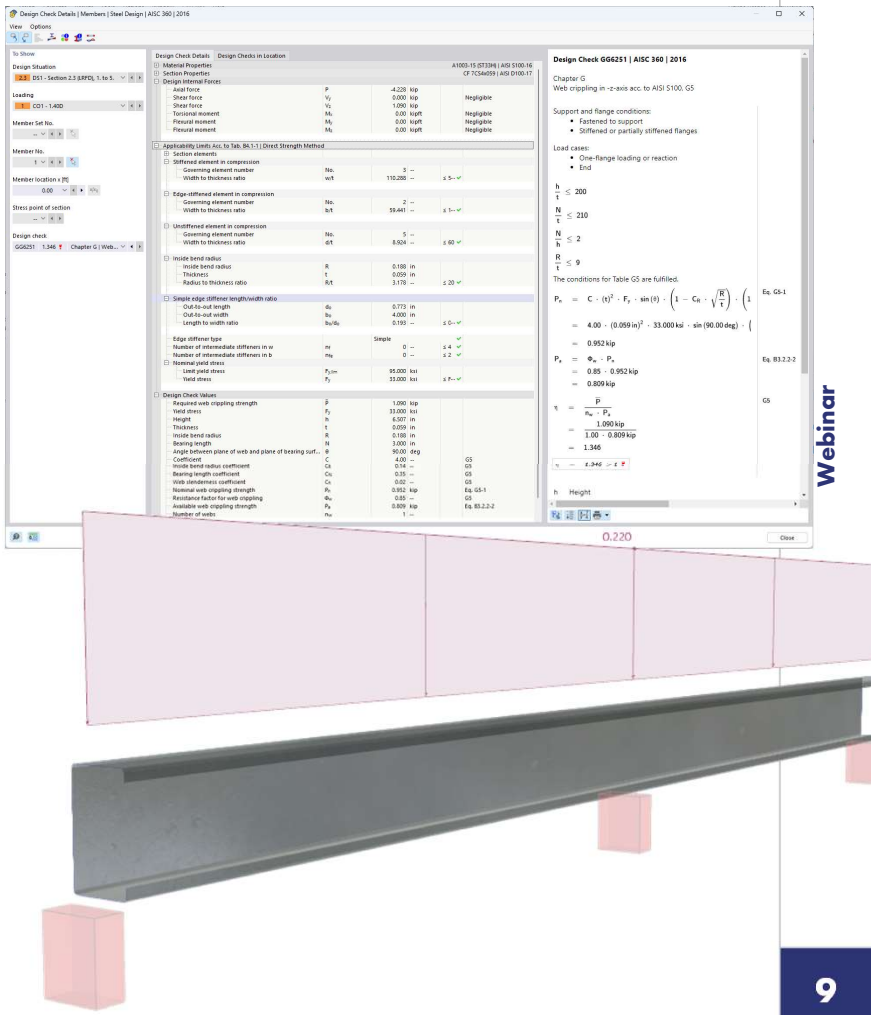
- **Finite Strip Method (Numerical Method)**
  - Applicable for local, distortional, and global elastic buckling failures
  - Flexural and torsional stability failure modes grouped together for global buckling regardless if option is unchecked (limitation with FSM graphs)
  - Longest effective length (KL) for flexural and torsional considered together for global buckling regardless if smaller effective length is defined
- **Acc. to Chapter E2 and F2.1 (Analytical Method)**
  - Only applicable for global buckling (FSM still used for local and distortional buckling)
  - Can consider varying effective lengths independently for flexural and torsional failure modes and global buckling



Web Crippling Design

- AISI S100-16 Sect. G5 Web Crippling w/o Holes
- AISI S100-16 Sect. H3 Combined Bending and Web Crippling
- Applicable for sections acc. to Table G5-1 – G5-4 (built-up I-beams, single web channels, C-sections, single web Z-sections, hat sections)
- Member must have 0° rotation set
- "Steel" Design Supports applied to member for reference to G5 tables





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