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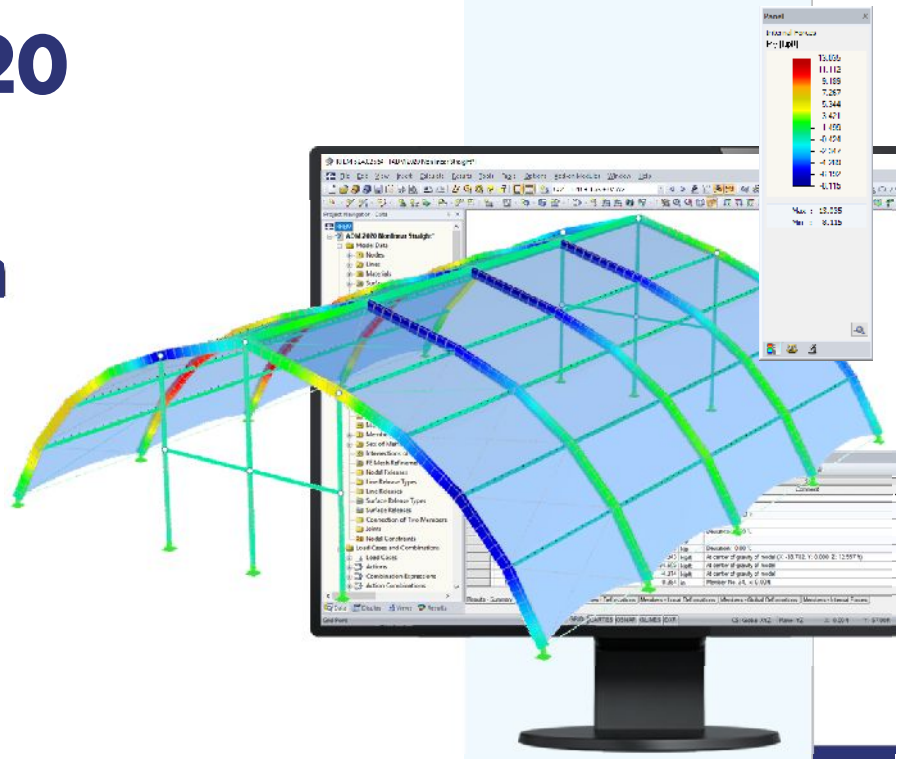
Webinar

ADM 2020 Member Design in RFEM



Questions During the Presentation

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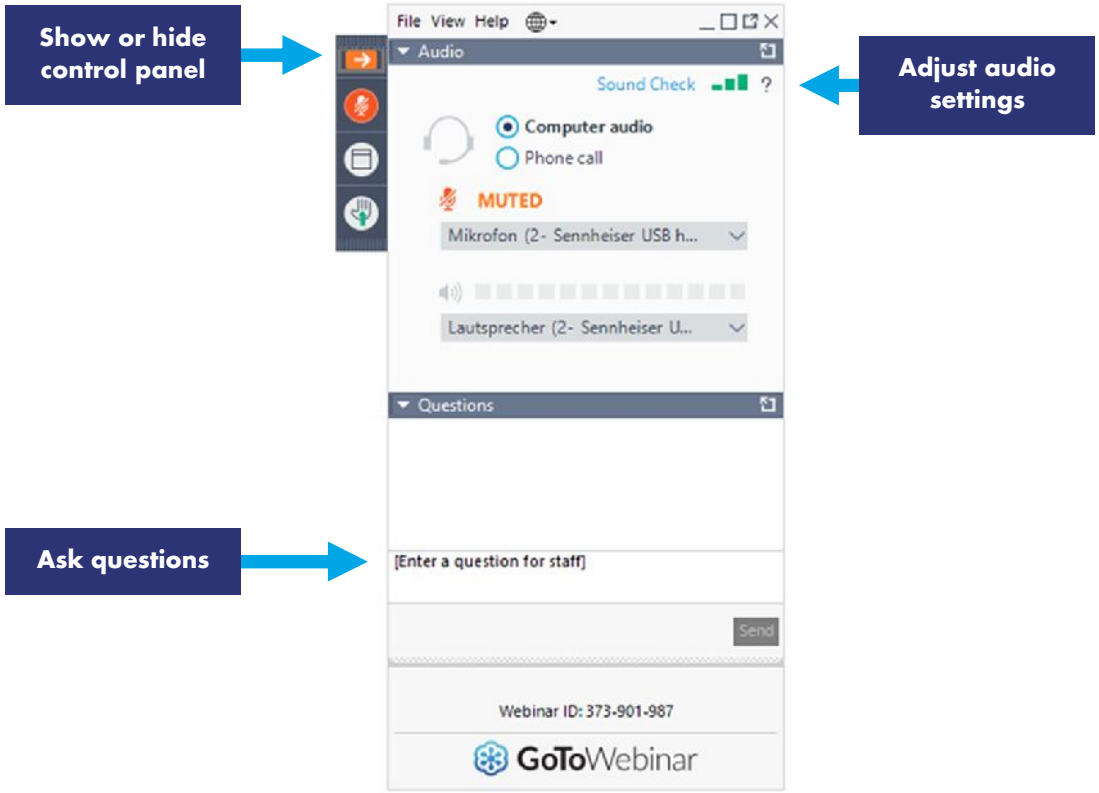
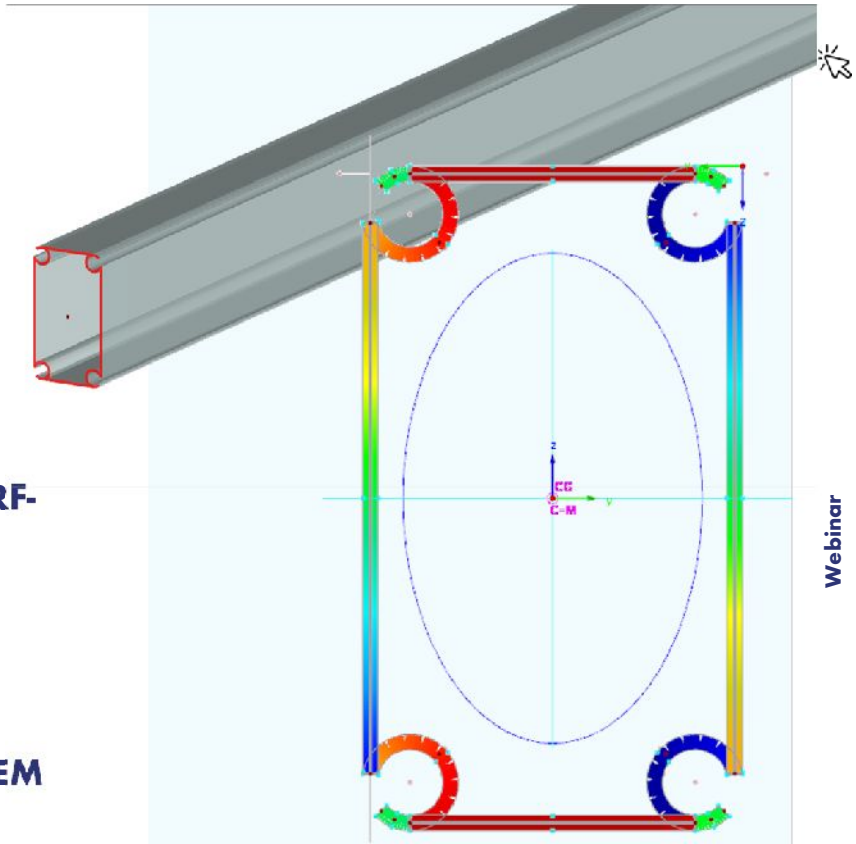


Content



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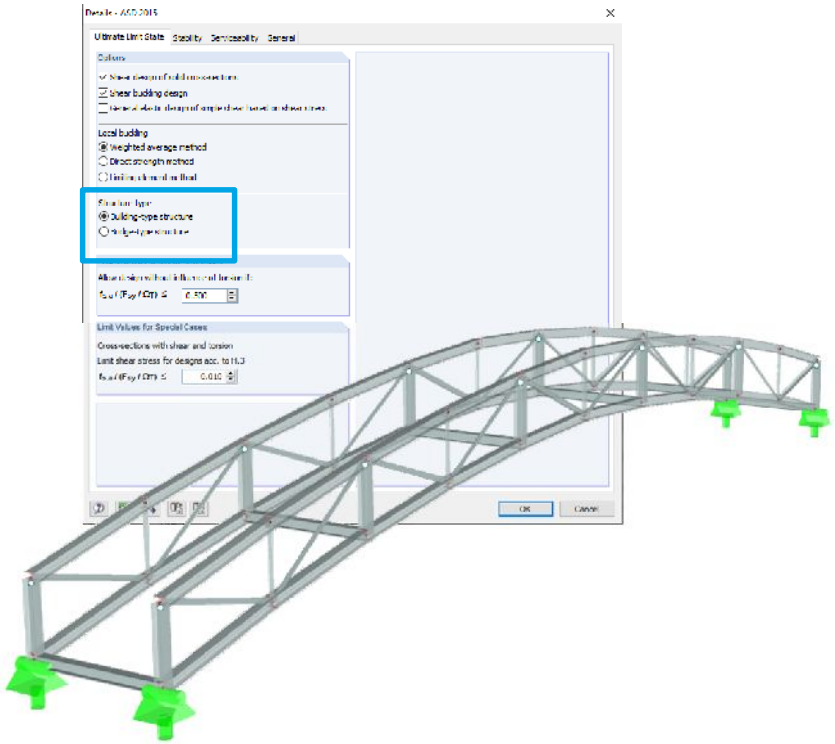
Aluminum Design Manual 2020 Updates

Chapter B – Design Requirements

- **Bridge-Type Structures [ADM 2015 Sect. B.2.2]**
  - Removed this section entirely
  - ADM 1967 addressed both bridges and buildings w/ different safety factors
  - AASHTO published LRFD Specification in 1994 including aluminum bridge design
  - ASD design for bridges remained in ADM even though no longer permitted



Aluminum Design Manual 2020 Updates (cont'd)

Chapter F – Flexural Strength

- **Direct Strength Method [Sect. F.3.2]**
  - 2015 ADM referred to Sect. B.5.5.5
  - Required all elements to be classified under "Uniform Compression" or "Flexural Compression"
  - 2020 ADM lists flexural strength eqns. directly
  - Simplification not requiring further classification

2015

F.3.2 Direct Strength Method

$M_{nlb} = F_b S_{xc}$ (F.3-2)

where F_b is determined in accordance with Section B.5.5.5.

2020

F.3.2 Direct Strength Method

The nominal flexural strength for local buckling M_{nlb} shall be determined as

LIMIT STATE	M_{nlb}	λ_{eq}	Slenderness Limits
yielding	M_{np}	$\lambda_{eq} \le \lambda_1$	$\lambda_1 = \frac{B_p - F_{cy}}{D_p}$
inelastic buckling	$M_{np} - \left(M_{np} - \frac{\pi^2 E S_{xc}}{C_p^2}\right)\frac{(\lambda_{eq} - \lambda_1)}{(C_p - \lambda_1)}$	$\lambda_1 < \lambda_{eq} < \lambda_2$	
post-buckling	$\frac{S_{xc} k_2 \sqrt{B_p E}}{\lambda_{eq}}$	$\lambda_{eq} \ge \lambda_2$	$\lambda_2 = C_p$

where $\lambda_{eq} = \pi\sqrt{\frac{E}{F_e}}$ (F.3-2)

F_e – the elastic local buckling stress of the cross section determined by analysis

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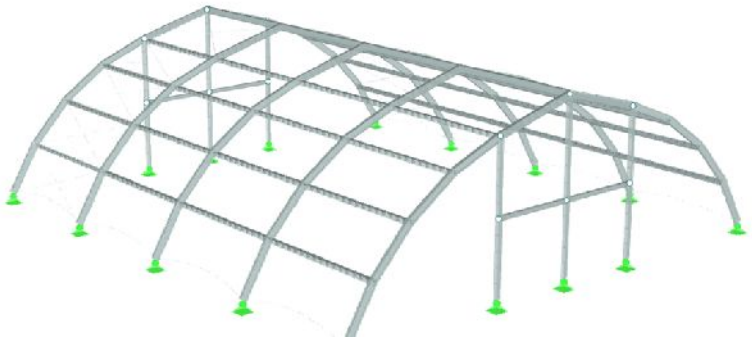
Aluminum Design Manual 2020 Updates (cont'd)

Chapter F – Flexural Strength

- **Bending Coefficient, C_b [Sect. F.4.1]**
  - Guide to Stability Design Criteria for Metal Structures, 6th Edition (Wiley, 2010)
  - Combined 2015 ADM doubly and singly symmetric shapes w/ R_m variable



2015

$$C_b = \frac{12.5M_{max}}{2.5M_{max} + 3M_A + 4M_B + 3M_C} \quad \text{(F.4-2)}$$

2020

$$C_b = \frac{4M_{max}}{\sqrt{M^2_{max} + 4M^2_A + 7M^2_B + 4M^2_C}} \quad R_m \le 3.0 \quad \text{(F.4-2)}$$

R_m = 1.0 except for unbraced lengths of singly-symmetric members subjected to double-curvature bending from transverse loading,

$$R_m = 0.5 + 2\left(\frac{I_{yf}}{I_y}\right)^2$$

Aluminum Design Manual 2020 Updates (cont'd)

Chapter F – Flexural Strength

- **Single Angles [Sect. F.5]**
  - Consistent with AISC 360-16 changes
  - Lateral torsional buckling strength, M_e, Sect. F.5.1 and F.5.2 revised
  - Bending about geometric axes [Sect. F.5.1]
  - Bending about the principal axes [Sect. F.5.2]
  - Simplifications in Sect. F.5.2 major axis bending for equal and unequal leg angles

2015

(3) If the leg tip is in compression, lateral-torsional buckling strength determined by Sectior F.5c with

$$M_e = \frac{0.82Eb^4tC_b}{L_b^2}\left[\sqrt{1+0.78(L_bt/b^2)^2}-1\right] \quad \text{(F.5-4)}$$

If the leg tip is in tension, lateral-torsional buckling strength determined by Section F.3c with

$$M_e = \frac{0.82Eb^4tC_b}{L_b^2}\left[\sqrt{1+0.78(L_bt/b^2)^2}+1\right] \quad \text{(F.5-5)}$$

2020

(3) If the leg tip is in compression, lateral-torsional buckling strength determined by Section F.5c with

$$M_e = \frac{0.73Eb^4tC_b}{L_b^2}\left[\sqrt{1+0.88(L_bt/b^2)^2}-1\right] \quad \text{(F.5-4)}$$

If the leg tip is in tension, lateral-torsional buckling strength determined by Section F.5c with

$$M_e = \frac{0.73Eb^4tC_b}{L_b^2}\left[\sqrt{1+0.88(L_bt/b^2)^2}+1\right] \quad \text{(F.5-5)}$$

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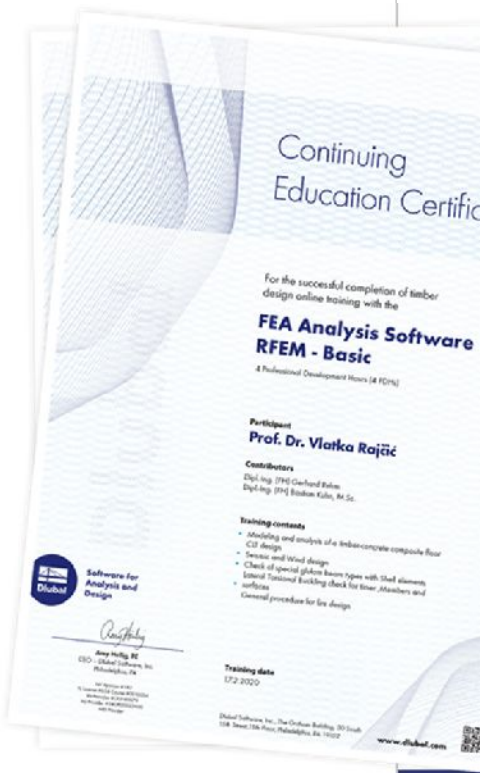

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