



# Structural Analysis & Design Software

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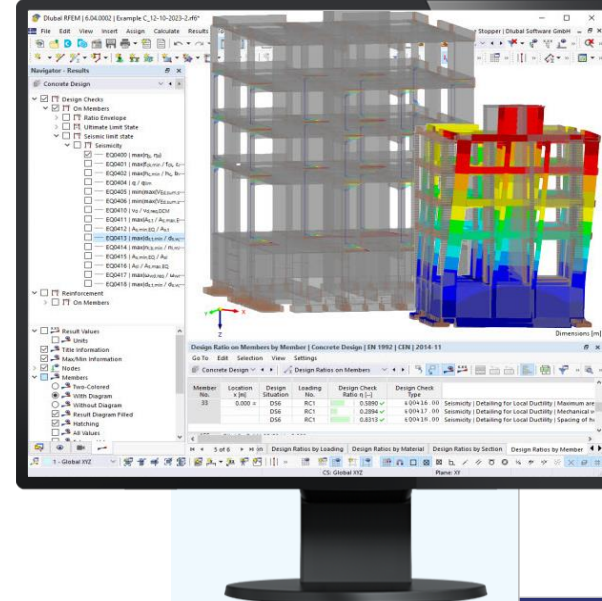


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## Webinar

# Seismic Design of Reinforced Concrete Structures in RFEM 6



# Questions During the Presentation



GoToWebinar Control Panel  
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Show or hide control panel



The screenshot shows the GoToWebinar control panel interface. At the top, there is a menu bar with 'File', 'View', and 'Help'. Below it is the 'Audio' section, which includes a 'Sound Check' indicator with a green bar and a question mark. There are two radio buttons: 'Computer audio' (selected) and 'Phone call'. A red 'MUTED' indicator is visible. Below this, there are dropdown menus for 'Mikrofon (2- Sennheiser USB h...)' and 'Lautsprecher (2- Sennheiser U...'. A volume slider is also present. The 'Questions' section is below the audio settings, featuring a text input field with the placeholder '[Enter a question for staff]' and a 'Send' button. At the bottom, the 'Webinar ID: 373-901-987' and the 'GoToWebinar' logo are displayed.



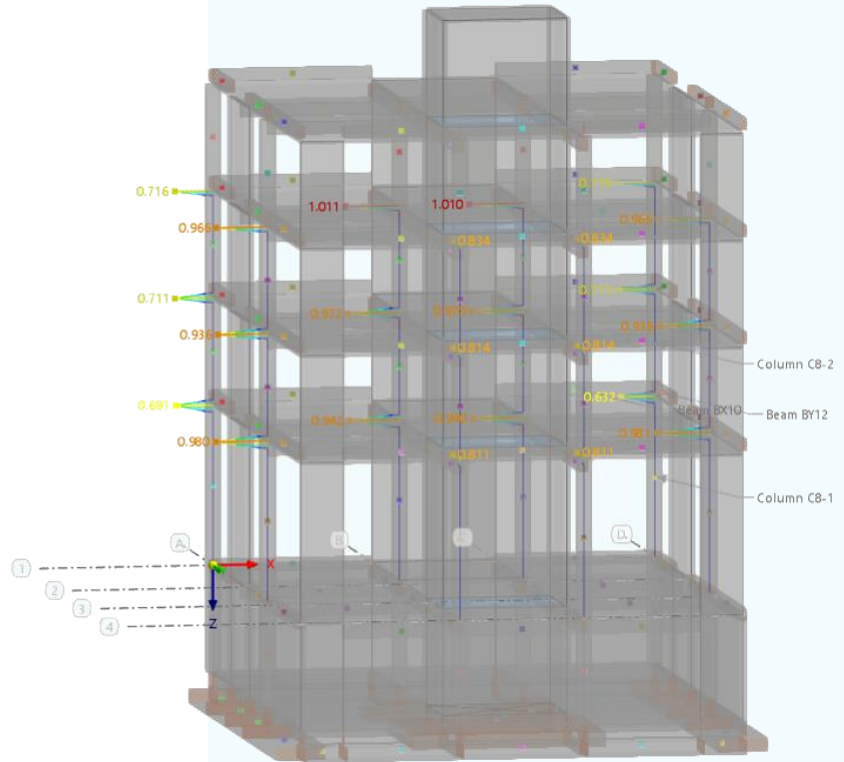
Adjust audio settings

Ask questions



# CONTENT

- 01 Presentation of model and loading
- 02 Modeling of design objects
- 03 Design of reinforced concrete structure according to EC 8
- 04 Prospects



Stäbe | EQ0400 | max max( $\eta_y$ ,  $\eta_z$ ) : 1.011 | min max( $\eta_y$ ,  $\eta_z$ ) : 0.000  
Stäbe | max  $\eta$  : 1.011 | min  $\eta$  : 0.000



# Design process

1. Determination of the design parameters
2. Conceptual design and preliminary member sizing

3. Analysis and design acc. to EC 2

Webinars provided on Dlubal website

4. Seismic analysis acc. to EC 8, clause 4

Webinars provided on Dlubal website

5. Ultimate limit state design

6. Capacity design acc. To EC 8, clause 5

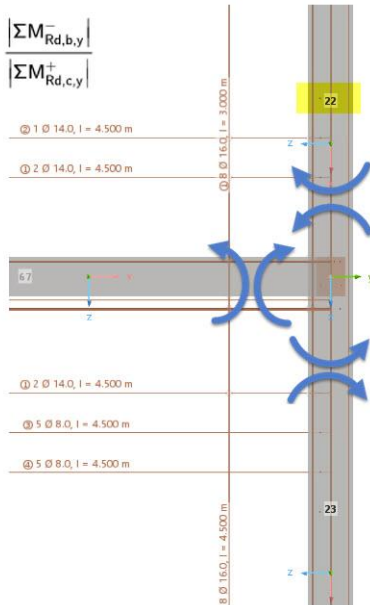
Content of current webinar



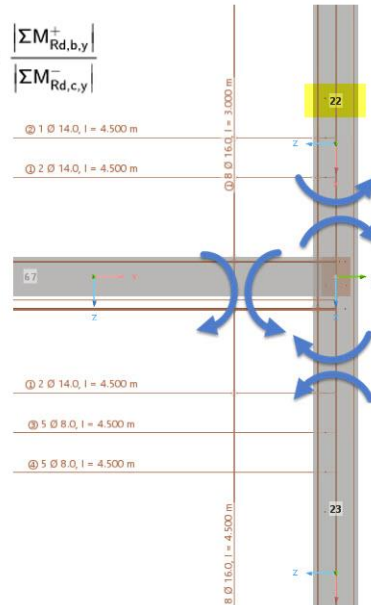
# Capacity design

Ratio between Moment resistances acc. to eq.(4.29) - "Strong column – weak beam"

$$\eta_y^+ = 1.3 \cdot \frac{|\Sigma M_{Rd,b,y}^-|}{|\Sigma M_{Rd,c,y}^+|}$$



$$\eta_y^- = 1.3 \cdot \frac{|\Sigma M_{Rd,b,y}^+|}{|\Sigma M_{Rd,c,y}^-|}$$





# Capacity design

Ratio between Moment resistances acc. to eq.(4.29) - "Strong column – weak beam"

The screenshot displays a software interface for structural design, showing member properties, design check details, and interaction diagrams. The design check details include:

- Member No.: 22
- Member location x [m]: 0.000
- Design check: EQ0400 0.711 ✓ Seismicity | Ca...
- Interaction Diagram:  Interaction Diagrams,  My - Mz,  My - N,  Mz - N,  Mres - N,  Bending moment,  Stress plane,  Secant Stiffness,  Tangent Stiffness,  Diagram Section in 3,  My - Mz,  My - N

The interaction diagrams show:

- Interaction Diagram: A circular interaction diagram with axes M<sub>y</sub> [kNm] and M<sub>z</sub> [kNm]. A point at (121.33, 0.00) is highlighted in yellow.
- Interaction Diagrams | My - N: A triangular interaction diagram with axes M<sub>y</sub> [kNm] and N [kN]. A point at (-117.63, -0.11) is highlighted in blue.

Tables of design data are provided:

No.	M <sub>y</sub> [kNm]	M <sub>z</sub> [kNm]	N [kN]
12	120.90	-90.44	
14	90.49	-75.94	
15	101.58	-58.66	
16	111.17	-40.47	
17	118.46	-20.89	
18	121.33	0.00	
19	118.46	20.89	
20	111.17	40.47	
21	101.58	58.66	
22	90.49	75.94	
23	75.90	90.44	
24	58.56	101.41	
25	40.34	110.82	
26	20.79	117.89	
27	0.00	120.61	
28	-20.79	117.89	
29	-40.34	110.82	
30	-58.56	101.41	
31	-75.90	90.44	
32	-90.49	75.94	
33	-101.58	58.66	
34	-111.17	40.47	
35	-118.46	20.89	
36	-121.33	0.00	
37	-118.46	-20.89	

No.	M <sub>y</sub> [kNm]	N [kN]
1	-117.63	-0.11
2	-132.91	-107.89
3	-151.54	-249.61
4	-166.36	-421.52
5	-175.68	-616.66
6	-184.06	-851.54
7	-181.93	-1076.70
8	-170.63	-1285.88

Calculation formulas for moment resistance ratio:

$$\Sigma M_{Rd,b,y} = |M_{Rd,b,y}| = 112.20 \text{ kNm}$$

$$\Sigma M_{Rd,c,y}^+ = |M_{Rd,c,y,22}^+| + |M_{Rd,c,y,23}^+| = |121.31 \text{ kNm}| + |121.87 \text{ kNm}| = 243.18 \text{ kNm}$$

$$\eta_{y,+} = 1.3 \cdot \frac{|\Sigma M_{Rd,b,y}|}{|\Sigma M_{Rd,c,y}^+|} = 1.3 \cdot \frac{112.20 \text{ kNm}}{243.18 \text{ kNm}} = 0.600$$

$$\eta_{y,-} = \max(\eta_{y,+}, \eta_{y,-}^+) = \max(0.583, 0.600) = 0.600$$

Design check results:

- Nachweis EQ0400 | EN 1992 | CEN | 2014-11
- Seismizität: Kapazitätsregel für Biegung | Kapazitätsbemessung der Stützen unter
- Seismizität
- Kapazitätsregel für Biegung | Kapazitätsbemessung der Stützen unter
- $\Sigma M_{Rd,b,y}^+ = |M_{Rd,b,y}^+| = 109.02 \text{ kNm}$
- $\Sigma M_{Rd,c,y}^- = |M_{Rd,c,y,22}^-| + |M_{Rd,c,y,23}^-| = |-121.31 \text{ kNm}| + |-121.87 \text{ kNm}| = 243.18 \text{ kNm}$
- $\eta_{y,-} = 1.3 \cdot \frac{|\Sigma M_{Rd,b,y}^+|}{|\Sigma M_{Rd,c,y}^-|} = 1.3 \cdot \frac{109.02 \text{ kNm}}{243.18 \text{ kNm}} = 0.583$



# Capacity design

## Capacity design shear

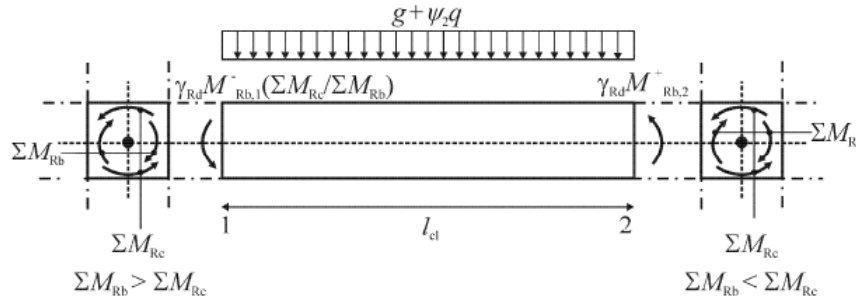


Figure 5.1: Capacity design values of shear forces on beams [DIN EN 1998-1:2010-12]





## Links

- **Webinar reinforced concrete design in RFEM 6 und RSTAB 9**

<https://www.dlubal.com/en/support-and-learning/learning/webinars/002636>

<https://www.dlubal.com/en/support-and-learning/learning/webinars/002783>

- **Seismic Design According to Eurocode 8 in RFEM 6 and RSTAB 9**

<https://www.dlubal.com/en/support-and-learning/learning/webinars/002705>

- **Seismic Load Maps**

<https://www.dlubal.com/en/solutions/online-services/snow-load-wind-speed-and-seismic-load-maps>

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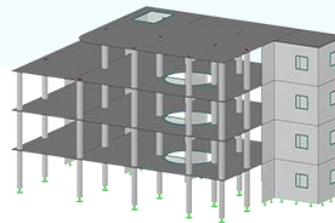
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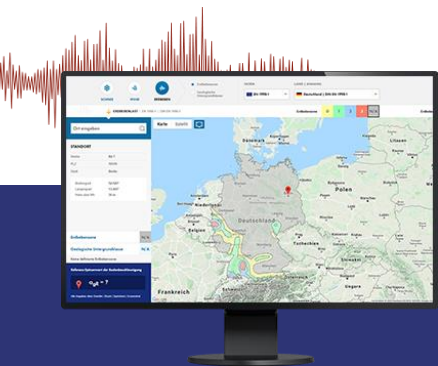


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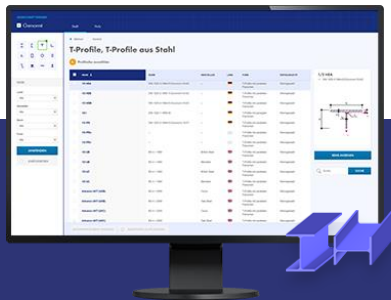
## Geo-Zone Tool

Dlubal Software provides an online tool with snow, wind and seismic zone maps.



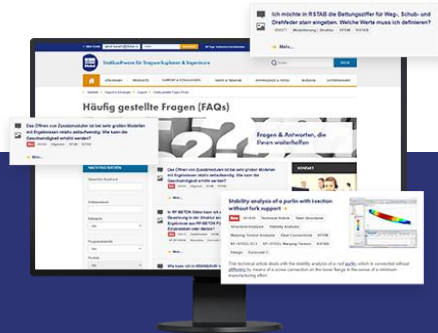
## Cross-Section Properties

With this free online tool, you can select standardized sections from an extensive section library, define parametrized cross-sections and calculate its cross-section properties.



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## Models to Download

Download numerous example files here that will help you to get started and become familiar with the Dlubal programs.

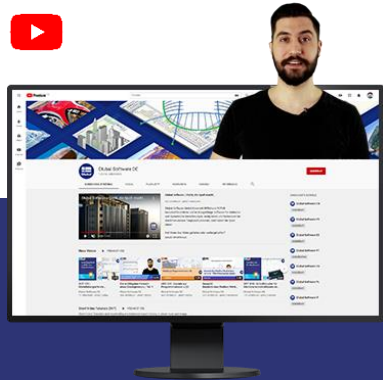




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Videos and webinars about the structural engineering software.



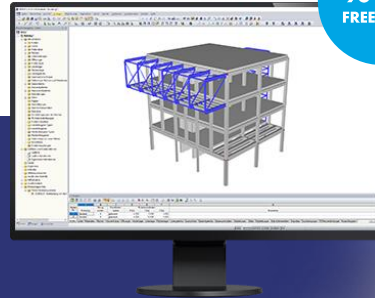
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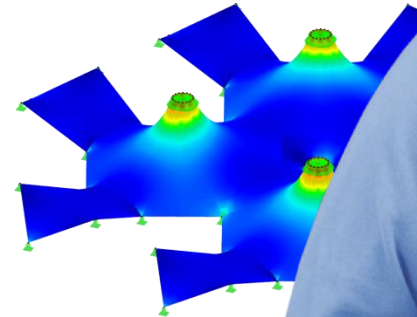
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