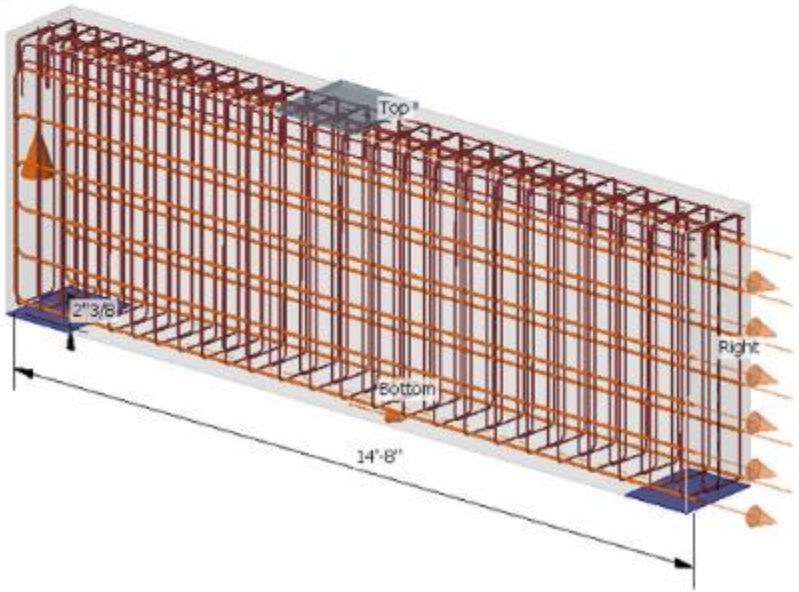
US Webinar

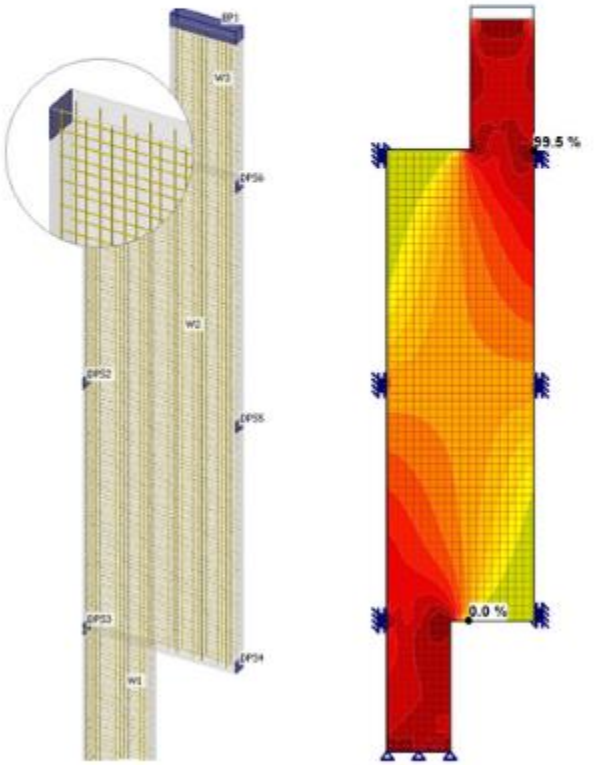
Concrete transfer beams and walking columns: model, analysis and design

September 27, 2023

IDEA StatiCa®

Calculate yesterday's estimates



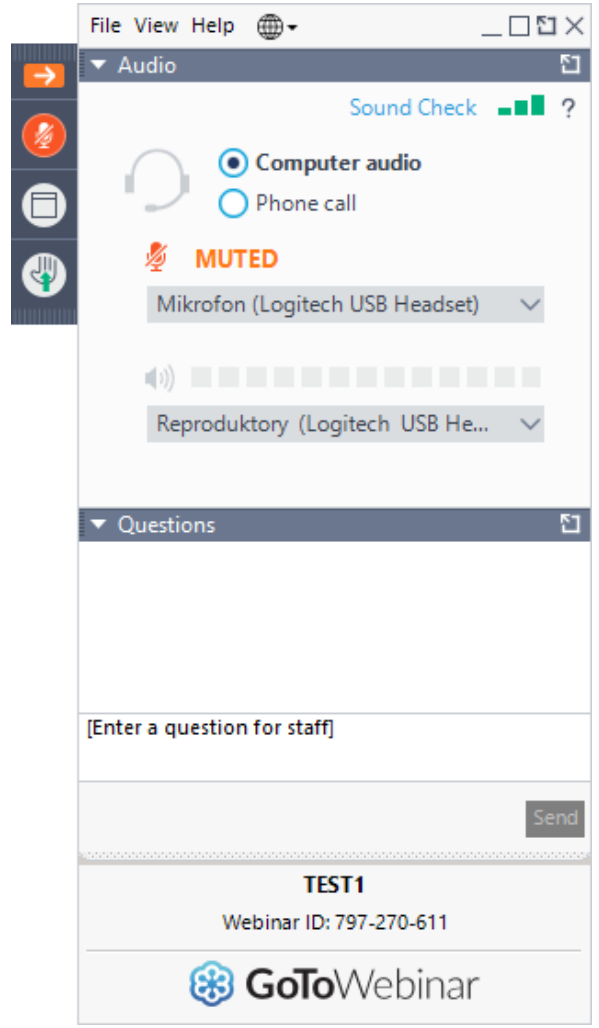


Control Panel

When you first join a session, the Control Panel appears on the right side of your screen. Use the Control Panel to manage your session. To free up space on your desktop, you can collapse the Control Panel and use the Grab Tab to continue to manage your session.

- **Grab Tab**: From the Grab Tab, you can hide the Control Panel, mute yourself (if you have been unmuted by the organizer), view the webinar in full screen and raise your hand.
- **Audio Pane**: Use the Audio pane to switch between Telephone and Mic & Speakers.
- **Questions Pane**: Ask questions for the staff.

QUESTIONS

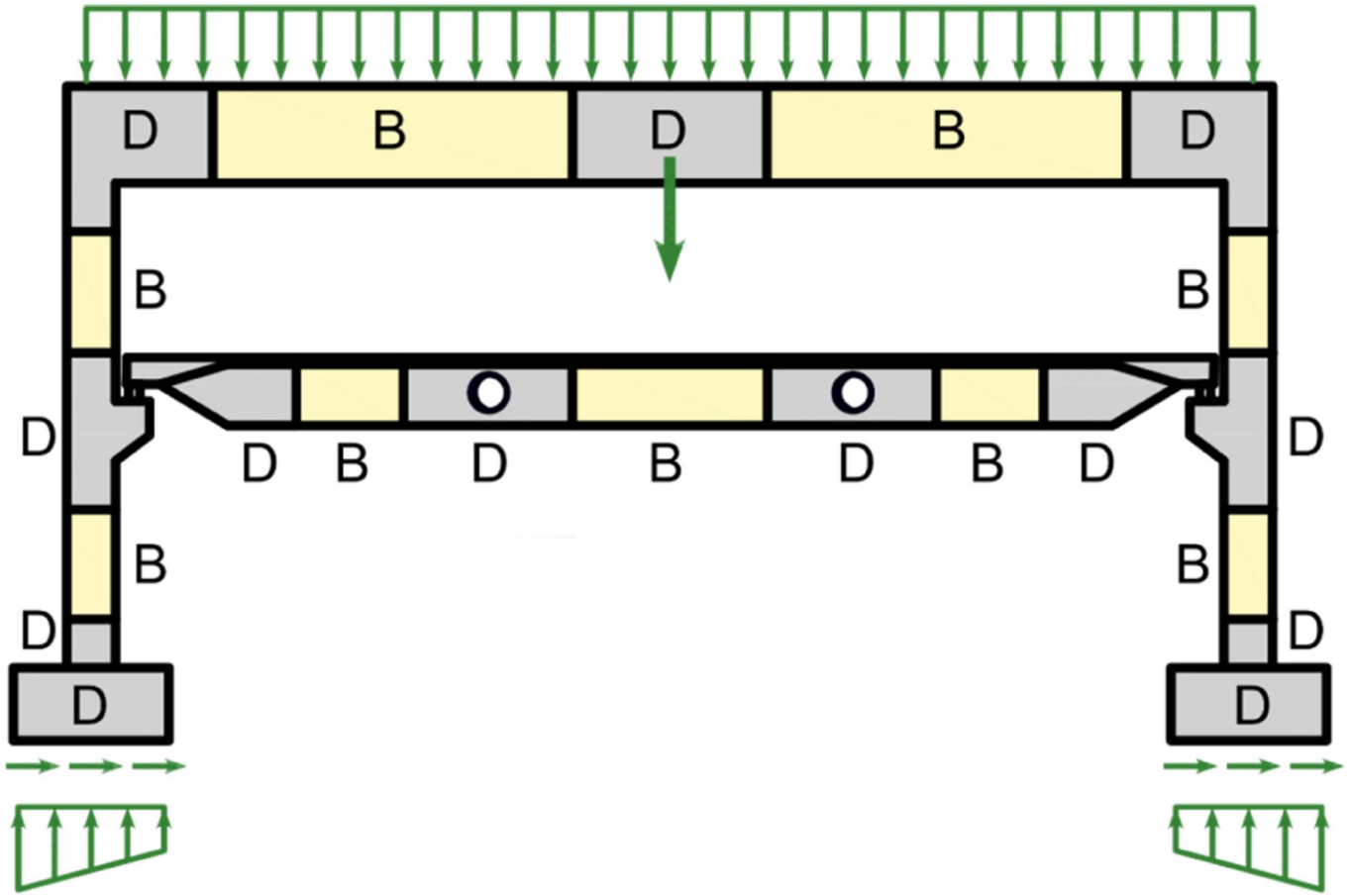


Agenda

- Why Detail?
- Live demo:
  - Transfer beam
  - Walking column
- Where to learn about it?

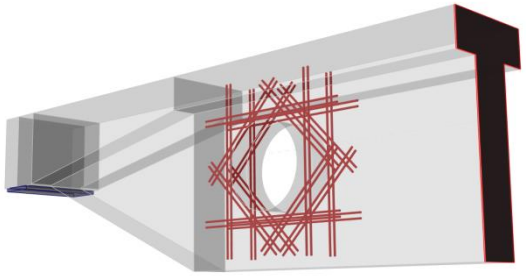
https://www.imegcorp.com/insights/blog/walking-columns-the-structural-solution-for-the-tallest-residential-building-in-philadelphia/

Why Detail?

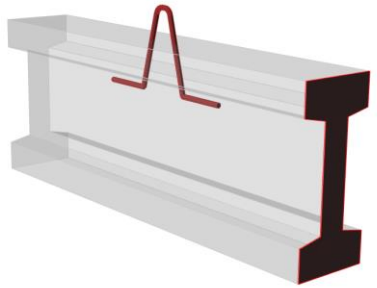


IDEA STATICA DETAIL

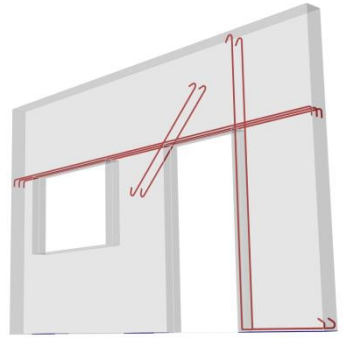
Dapped ends



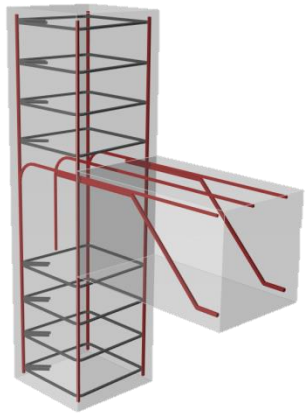
Hangings



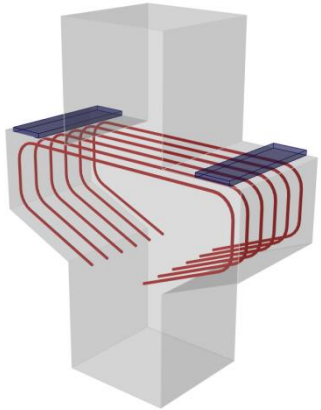
Walls



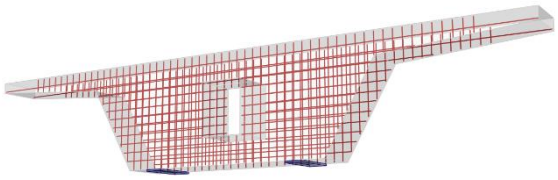
Frame joints



Corbels / Brackets

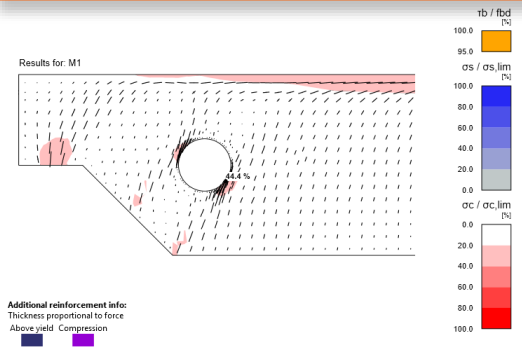


Diaphraghms

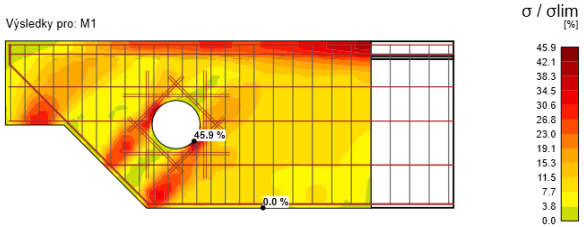


DESIGN AND CODE-CHECK

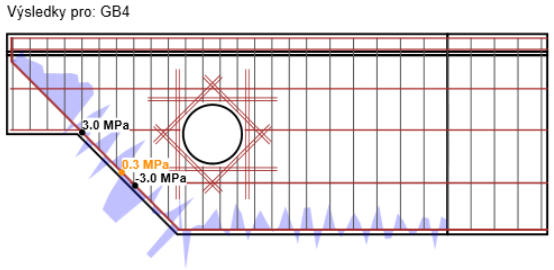
Overall check



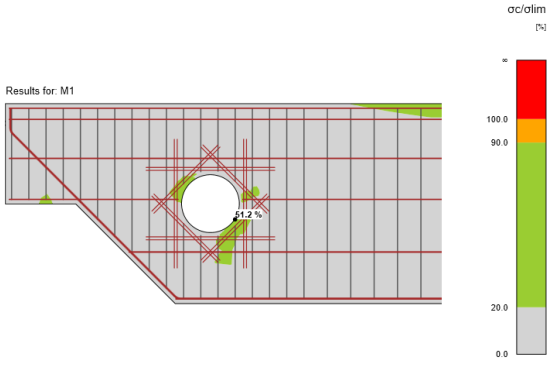
Strength



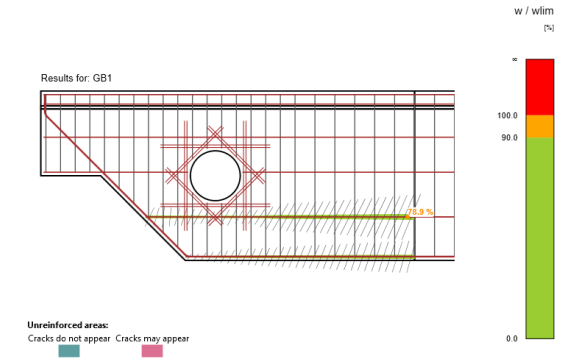
Anchorage



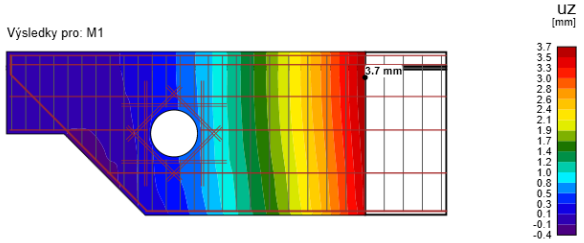
Stress



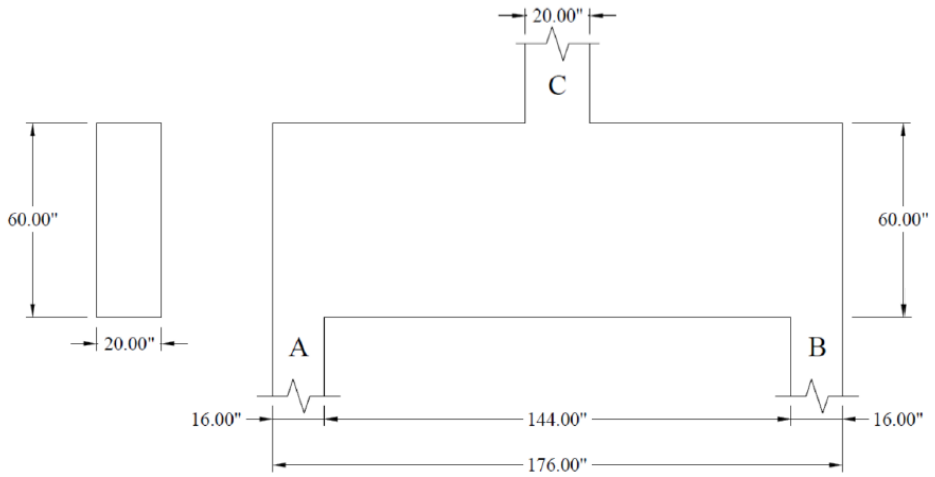
Cracks



Deflection

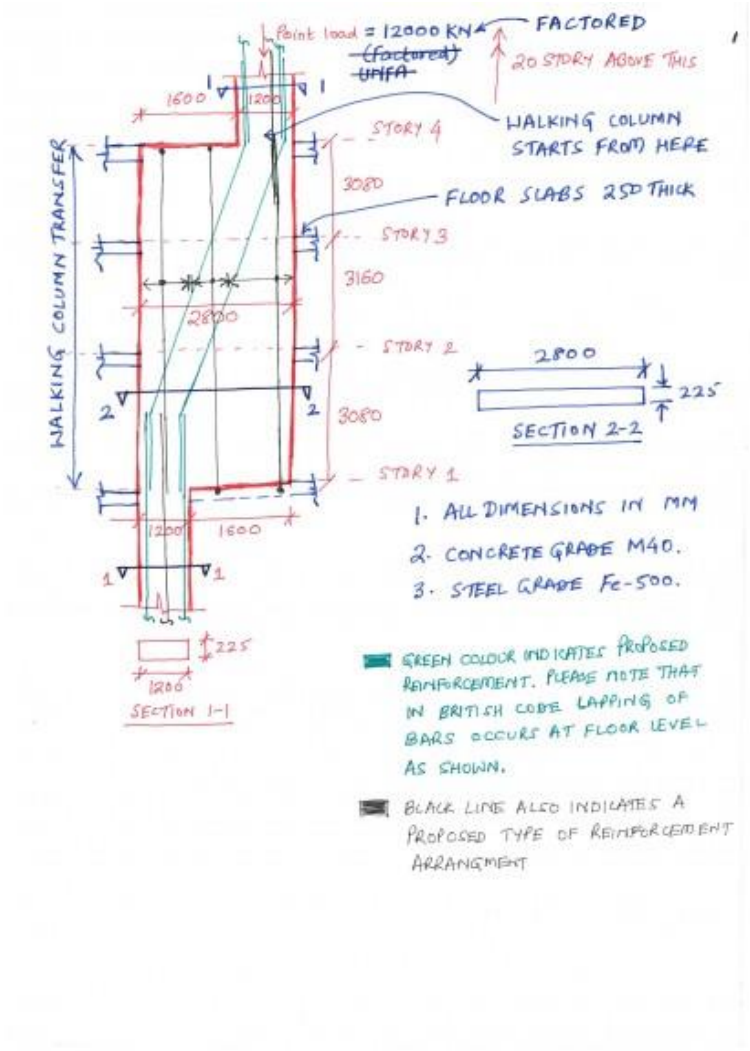


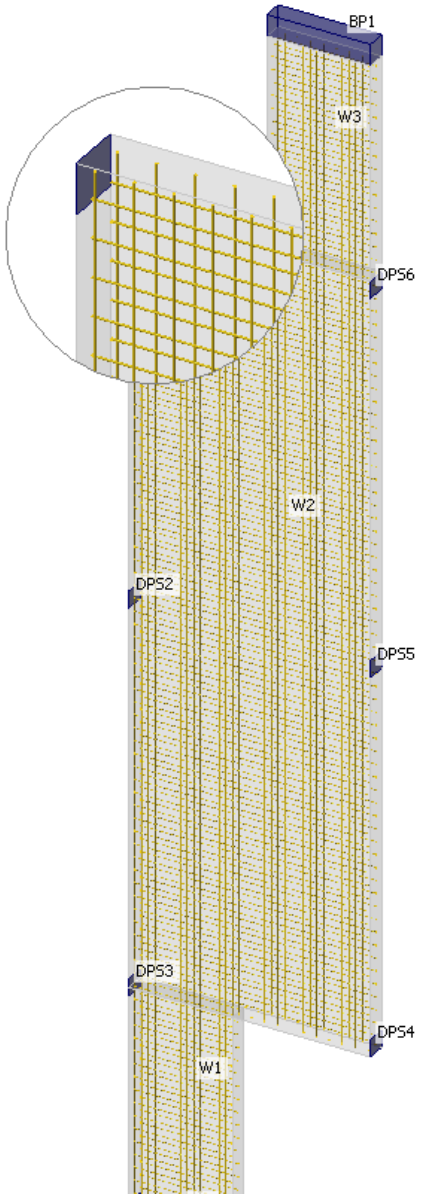
Live demo

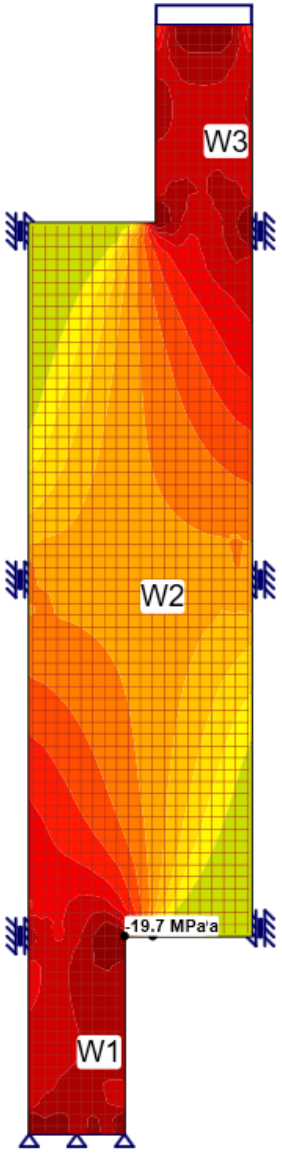


- Design data:
- *fc'* = 4000 psi normal weight concrete
- *fy* = 60000 psi
- The single column at midspan subjects the girder to:
- DL = 180 kips
- LL = 250 kips

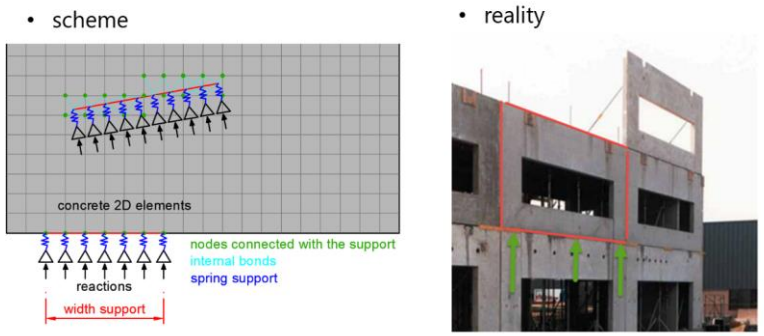
WALKING COLUMN



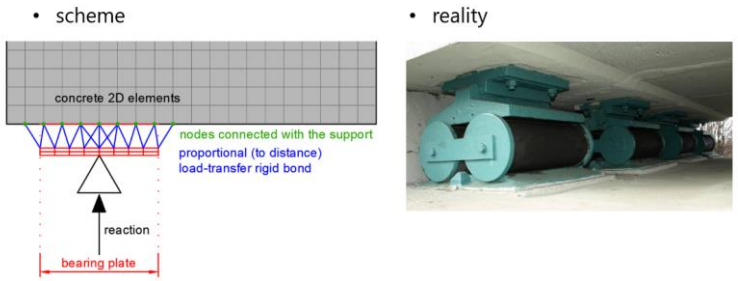




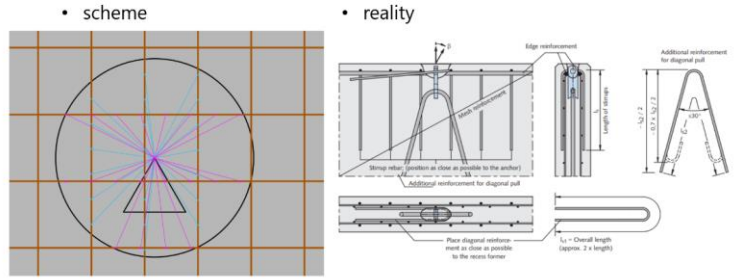
Support type



Line support

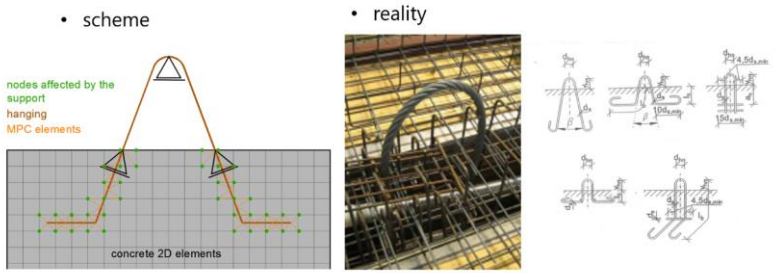


Bearing plate support



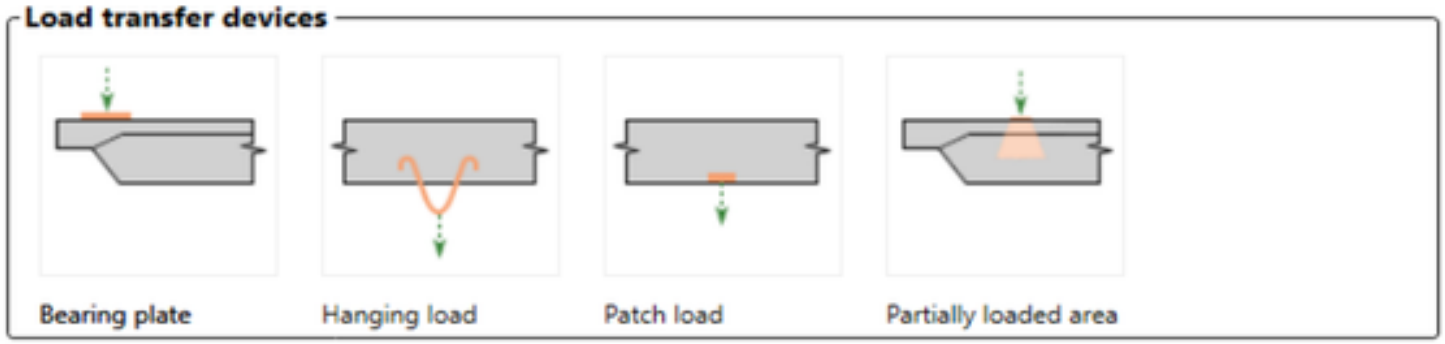
Patch support

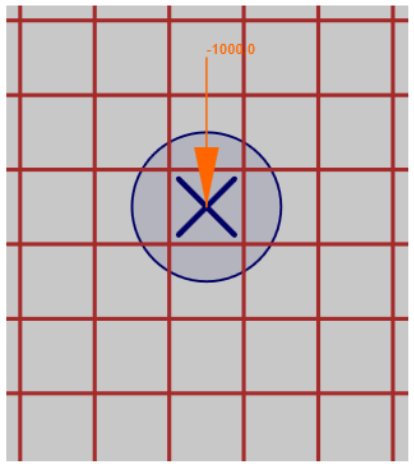
Point distributed support



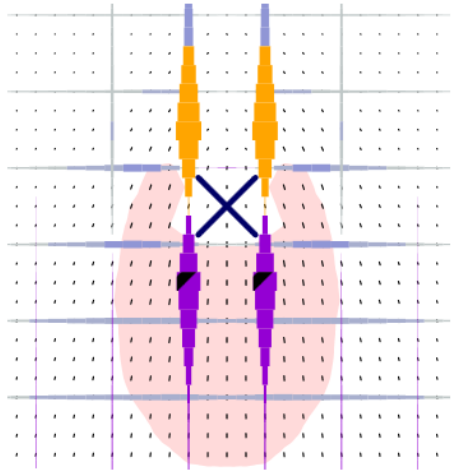
Hanging support

Load transfer devices

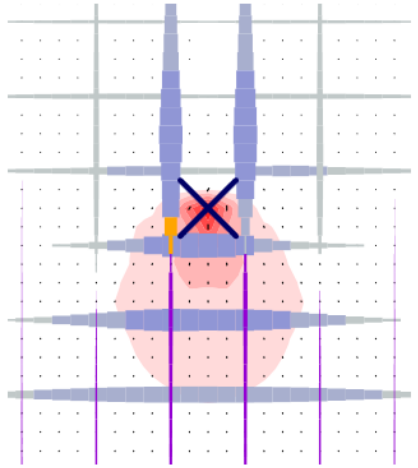




(a)



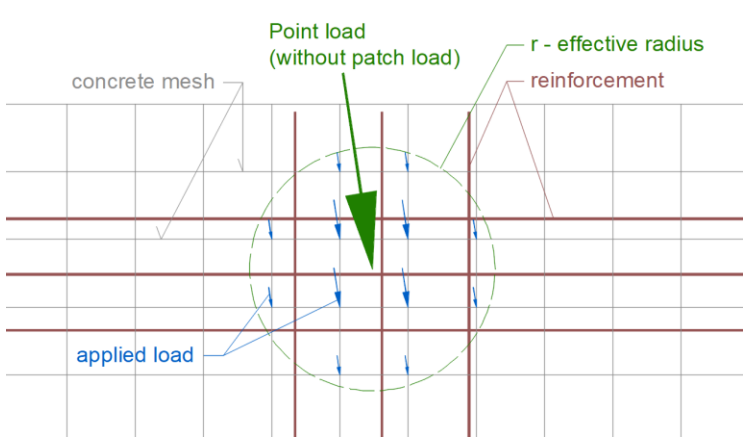
(b)

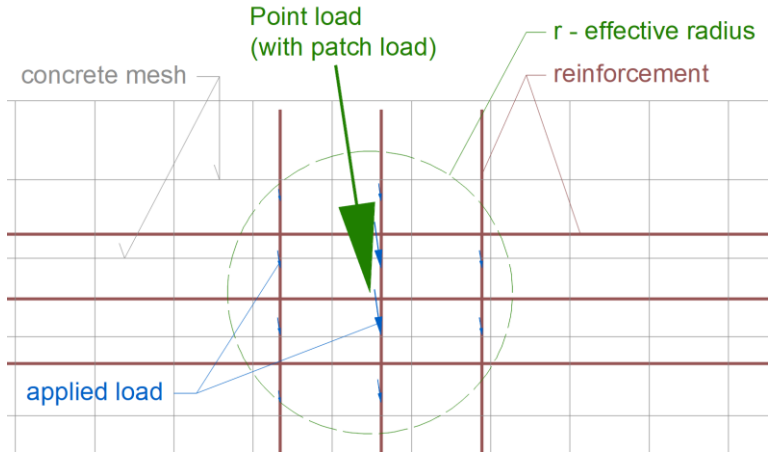


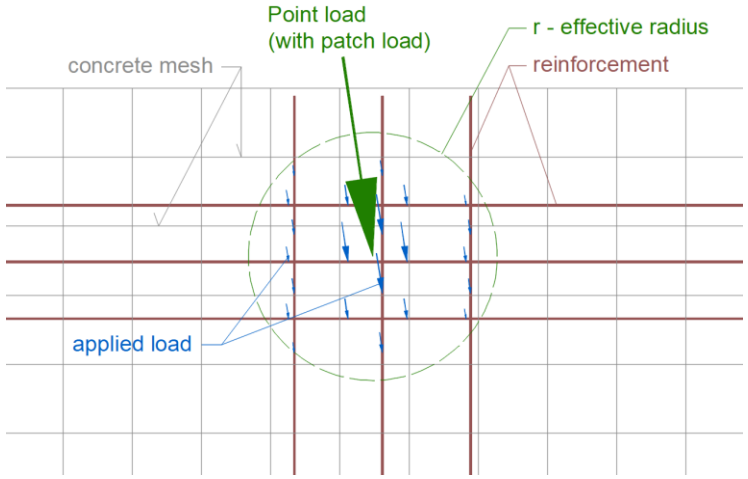
(c)

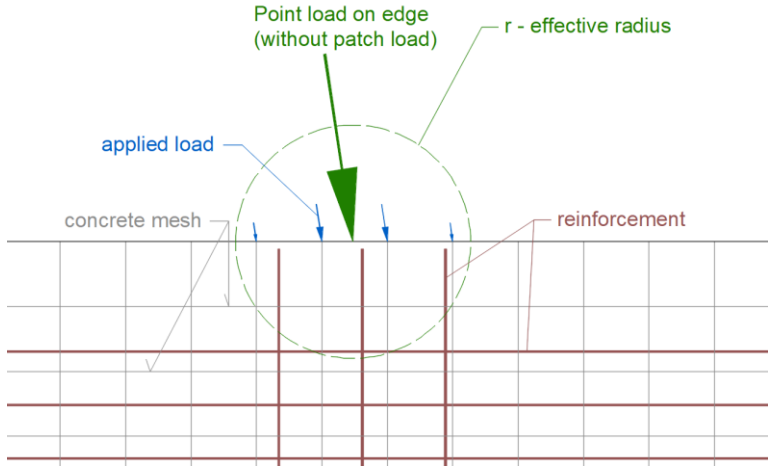
(a) load application; (b) load transferred through rebars, (c) load transferred through concrete

Load impulses

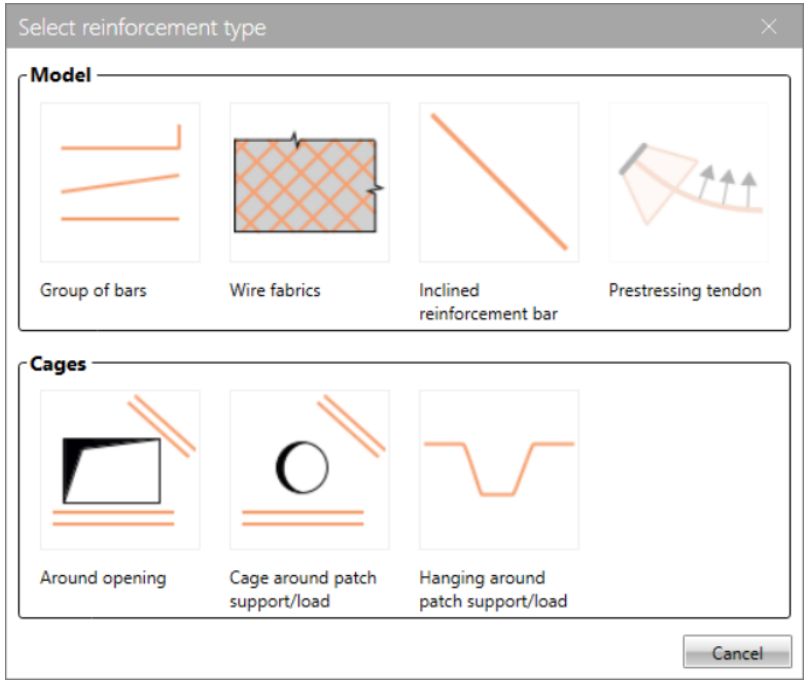


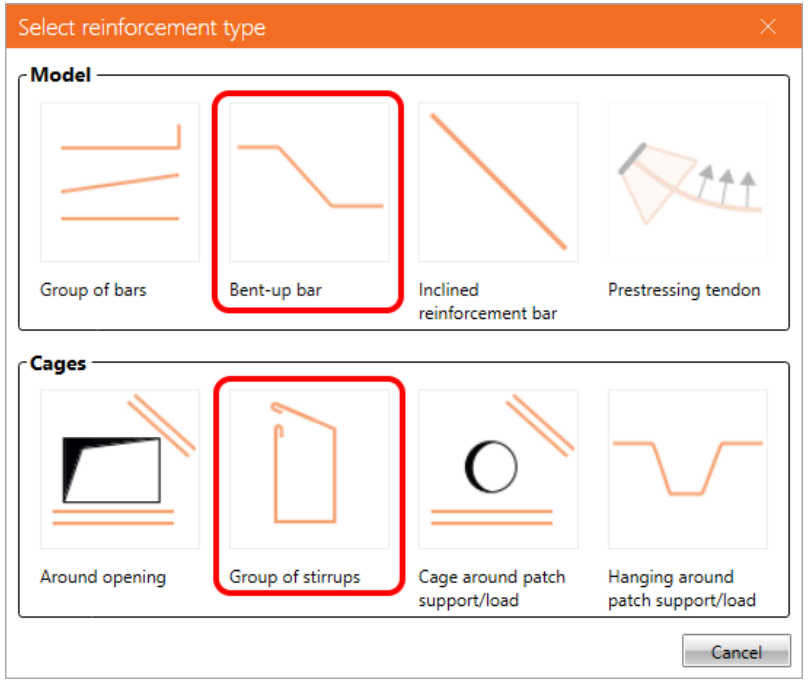


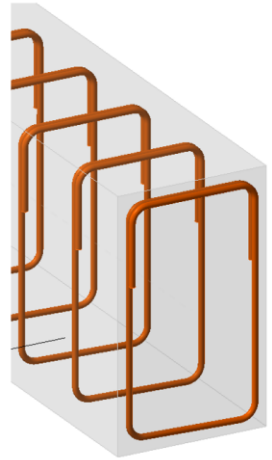




Reinforcement

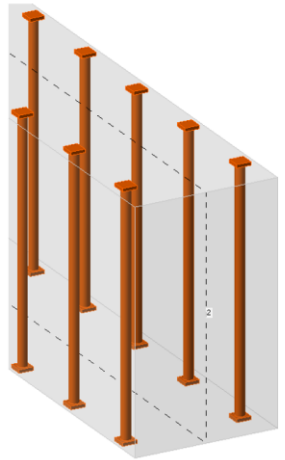






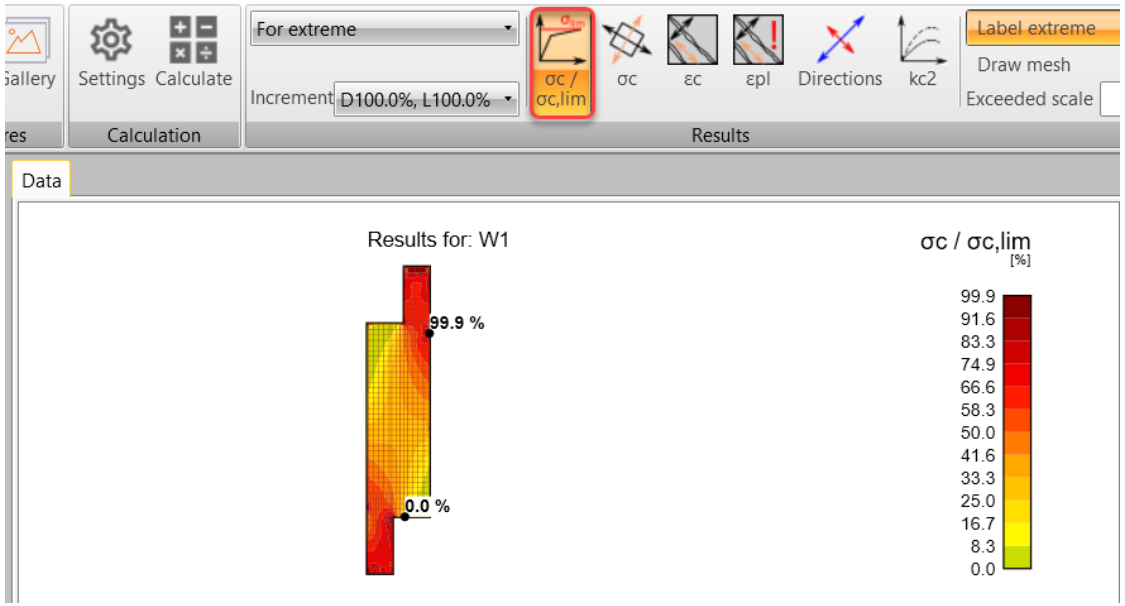
Beam with stirrups

=

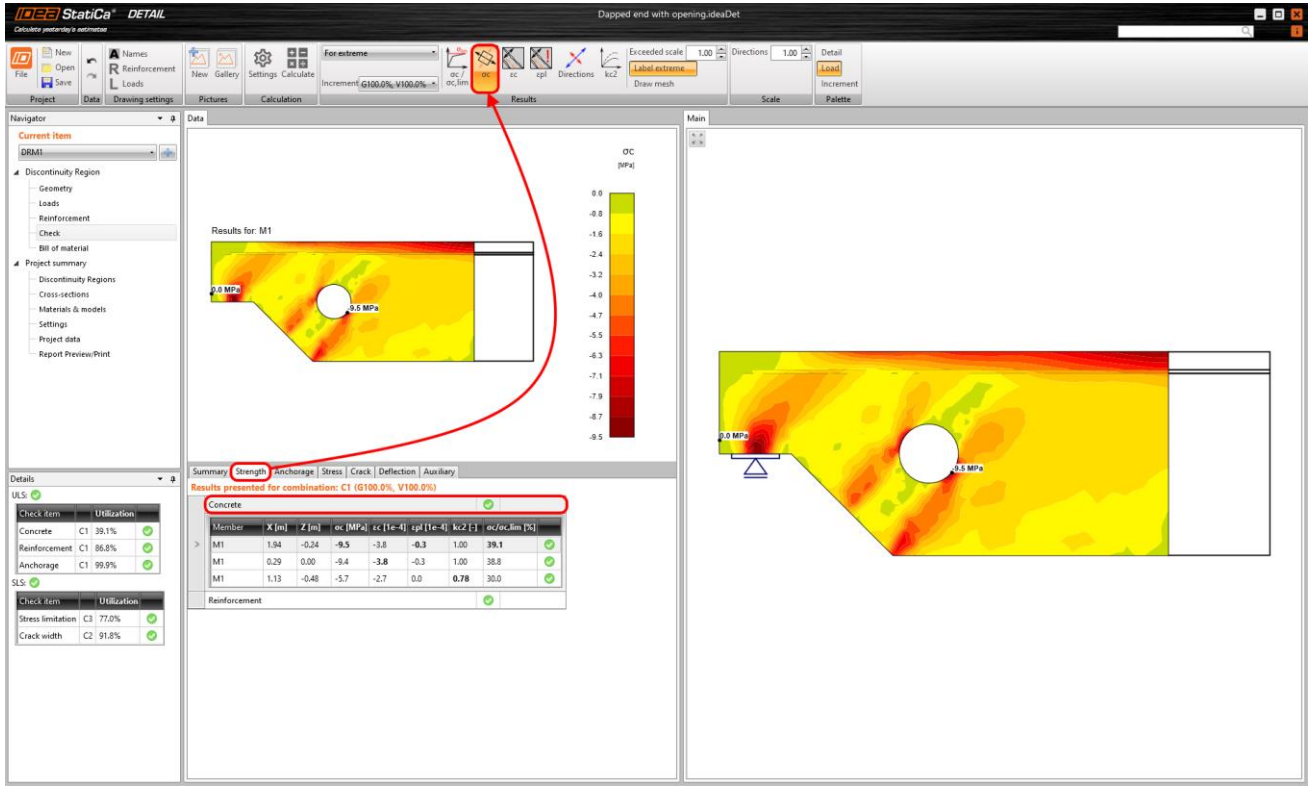


Wall with perfectly bonded bars

Design strength concrete results

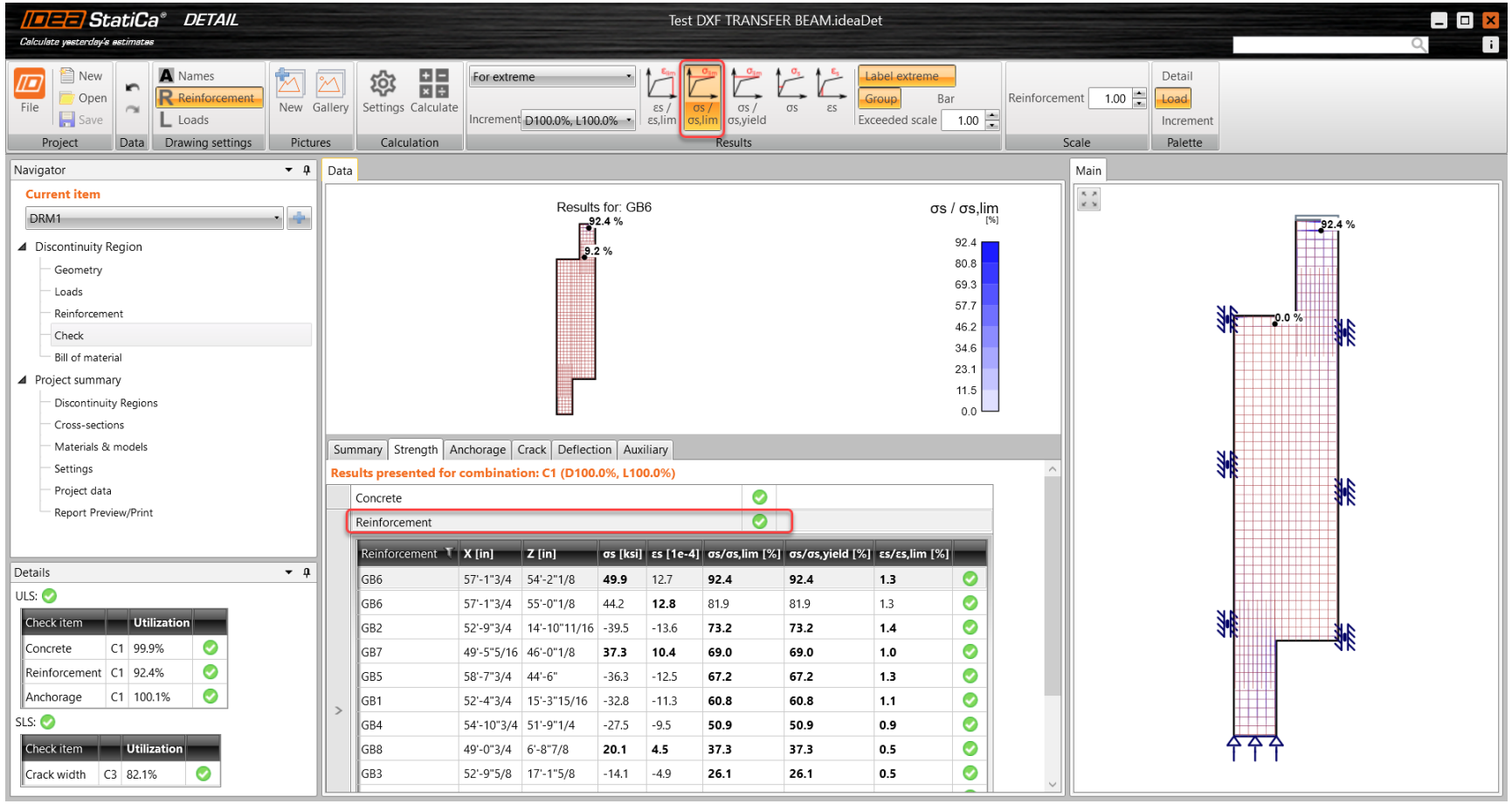


Concrete utilization ratio

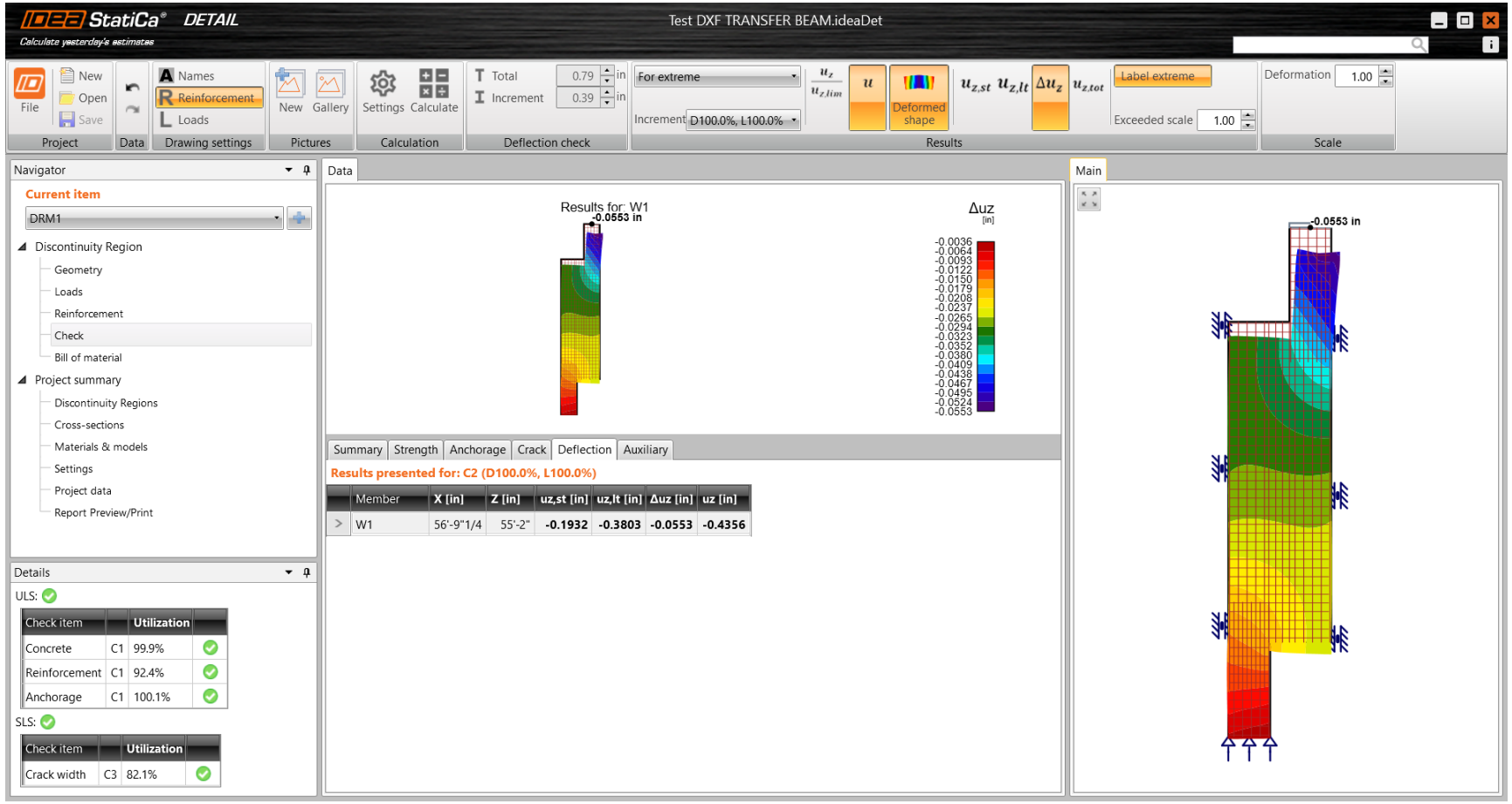


Concrete stress

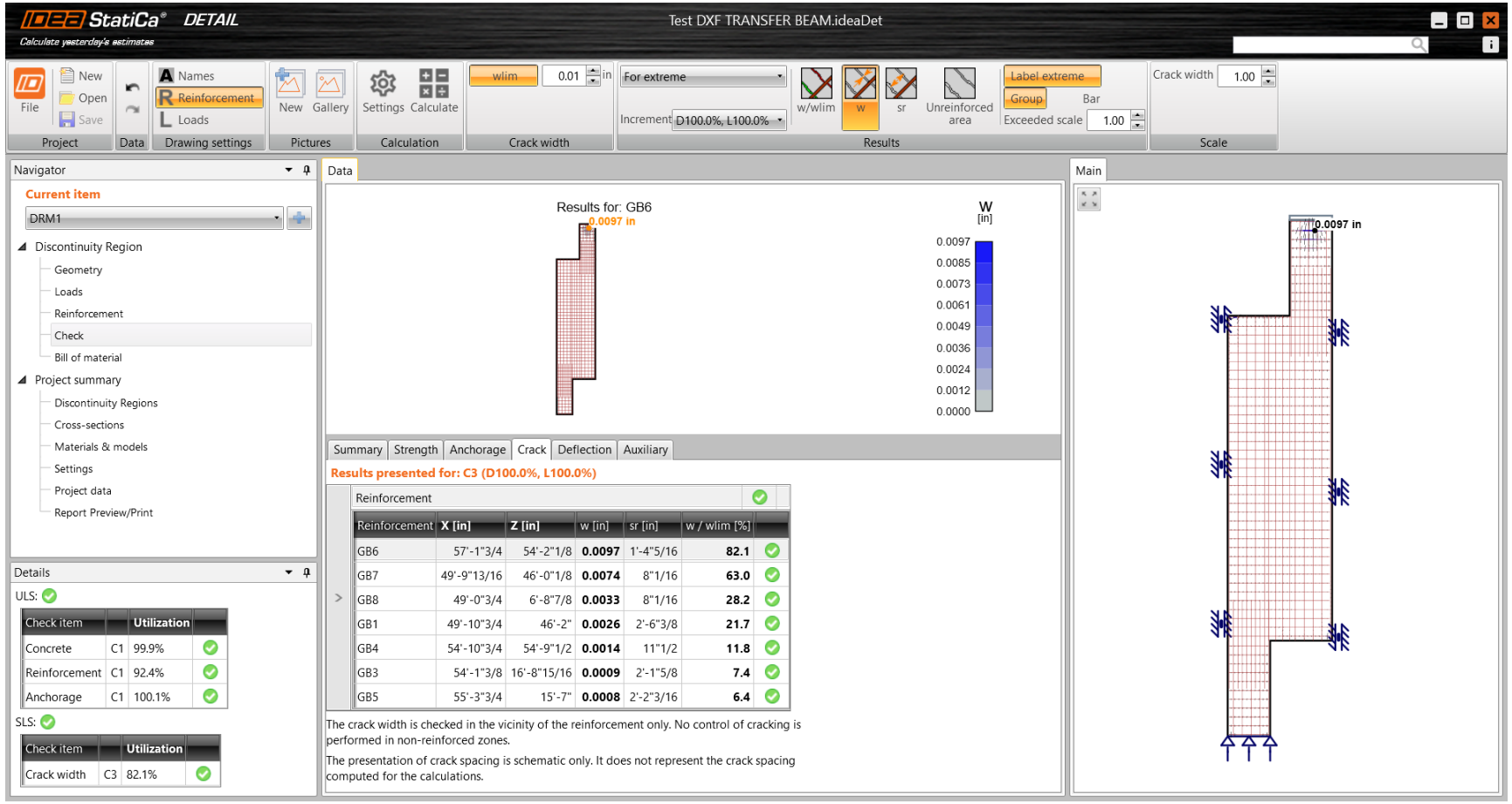
Reinforcement utilization



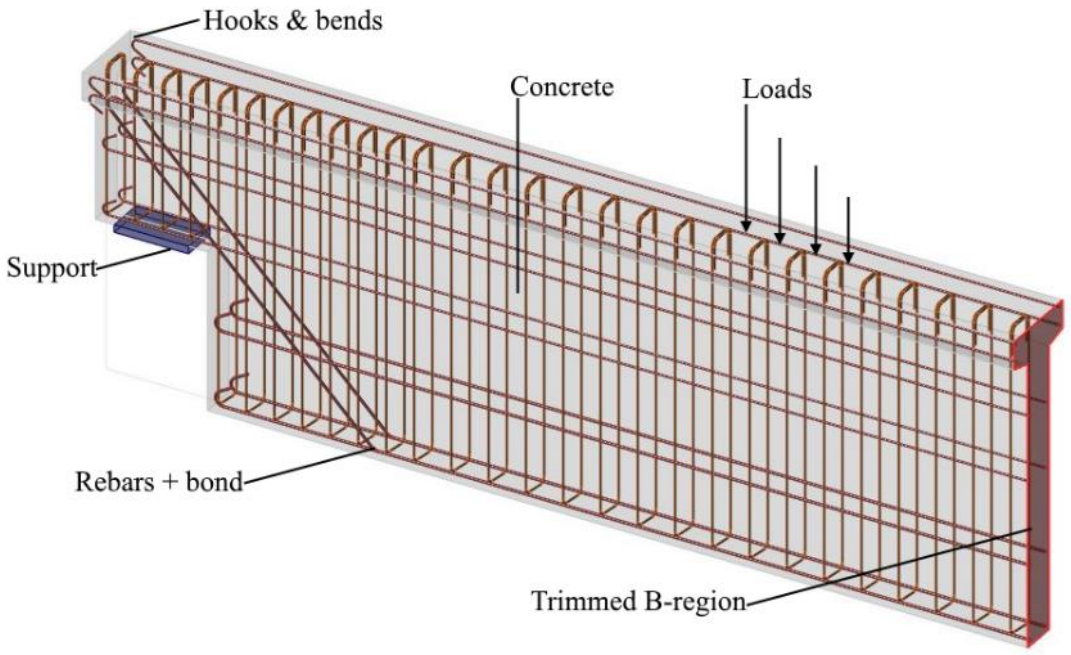
Deflection


StatiCa® DETAIL
Calculate yesterday's estimates
Test DXF TRANSFER BEAM.ideaDet
File
New
Open
Save
Project
Data
Names
Reinforcement
Loads
Drawing settings
New
Gallery
Pictures
Settings
Calculate
Calculation
Total
Increment
0.79
0.39
in
Deflection check
For extreme
Increment
D100.0%, L100.0%
Deformed shape
Results
Label extreme
Exceeded scale
1.00
Deformation
1.00
Scale
Navigator
Current item
DRM1
Discontinuity Region
Geometry
Loads
Reinforcement
Check
Bill of material
Project summary
Discontinuity Regions
Cross-sections
Materials & models
Settings
Project data
Report Preview/Print
Details
ULS:
Check item
Utilization
Concrete C1 99.9%
Reinforcement C1 92.4%
Anchorage C1 100.1%
SLS:
Check item
Utilization
Crack width C3 82.1%
Data
Results for: W1
-0.0553 in
Δuz
[in]
-0.0036
-0.0064
-0.0093
-0.0122
-0.0150
-0.0179
-0.0208
-0.0237
-0.0265
-0.0294
-0.0323
-0.0352
-0.0380
-0.0409
-0.0438
-0.0467
-0.0495
-0.0524
-0.0553
Summary
Strength
Anchorage
Crack
Deflection
Auxiliary
Results presented for: C2 (D100.0%, L100.0%)
Member
X [in]
Z [in]
uz,st [in]
uz,lt [in]
Δuz [in]
uz [in]
W1
56'-9"1/4
55'-2"
-0.1932
-0.3803
-0.0553
-0.4356
Main
-0.0553 in

Cracks width



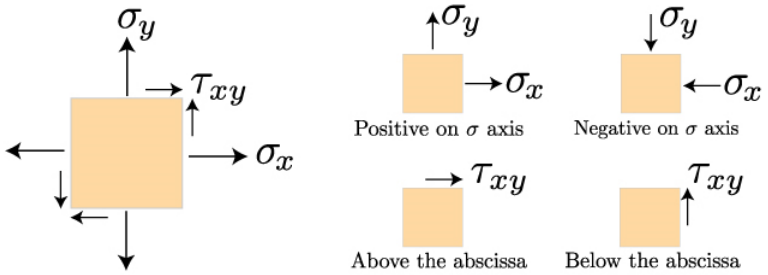
CSFM

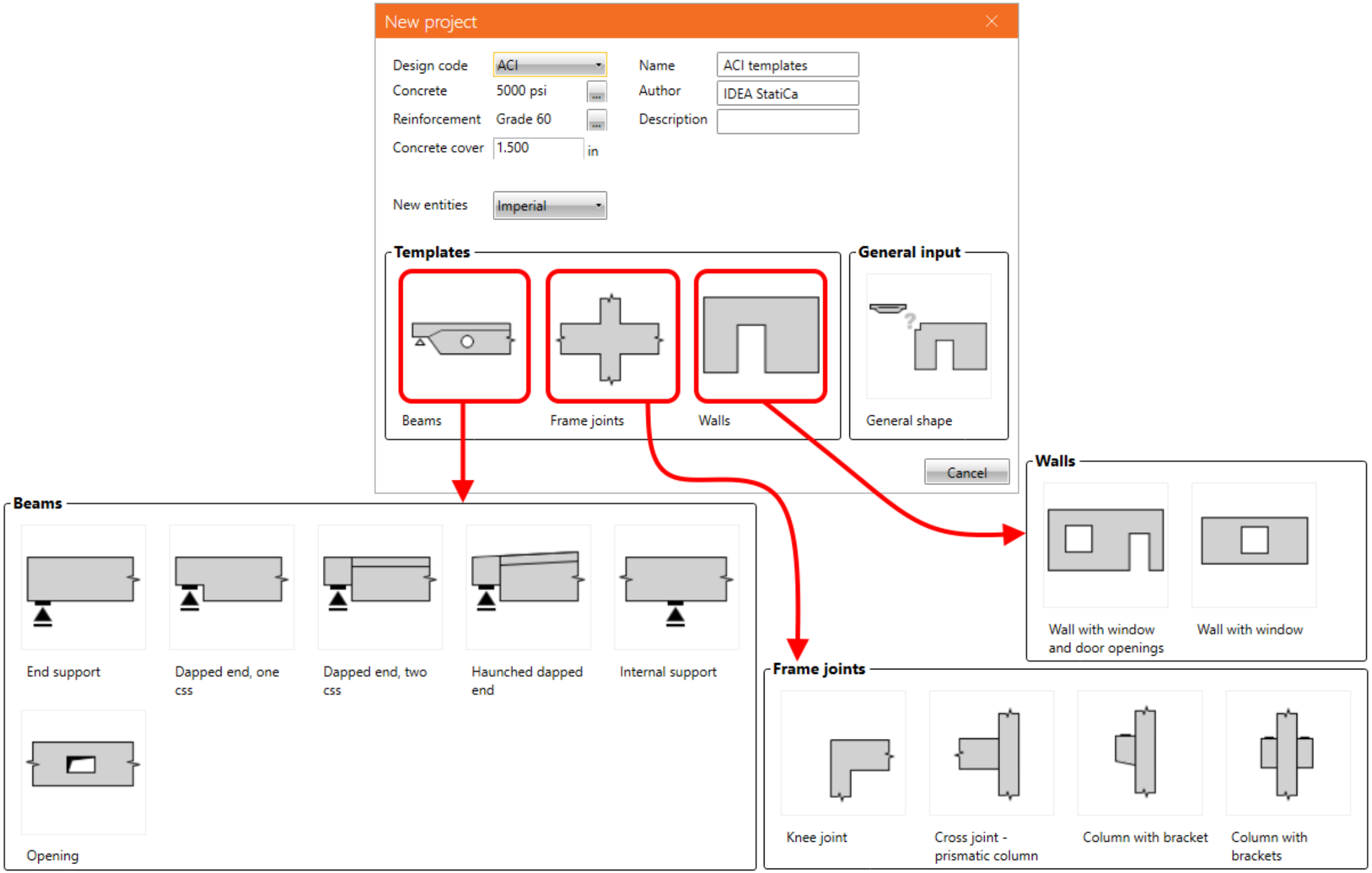


- Plane stress shell elements

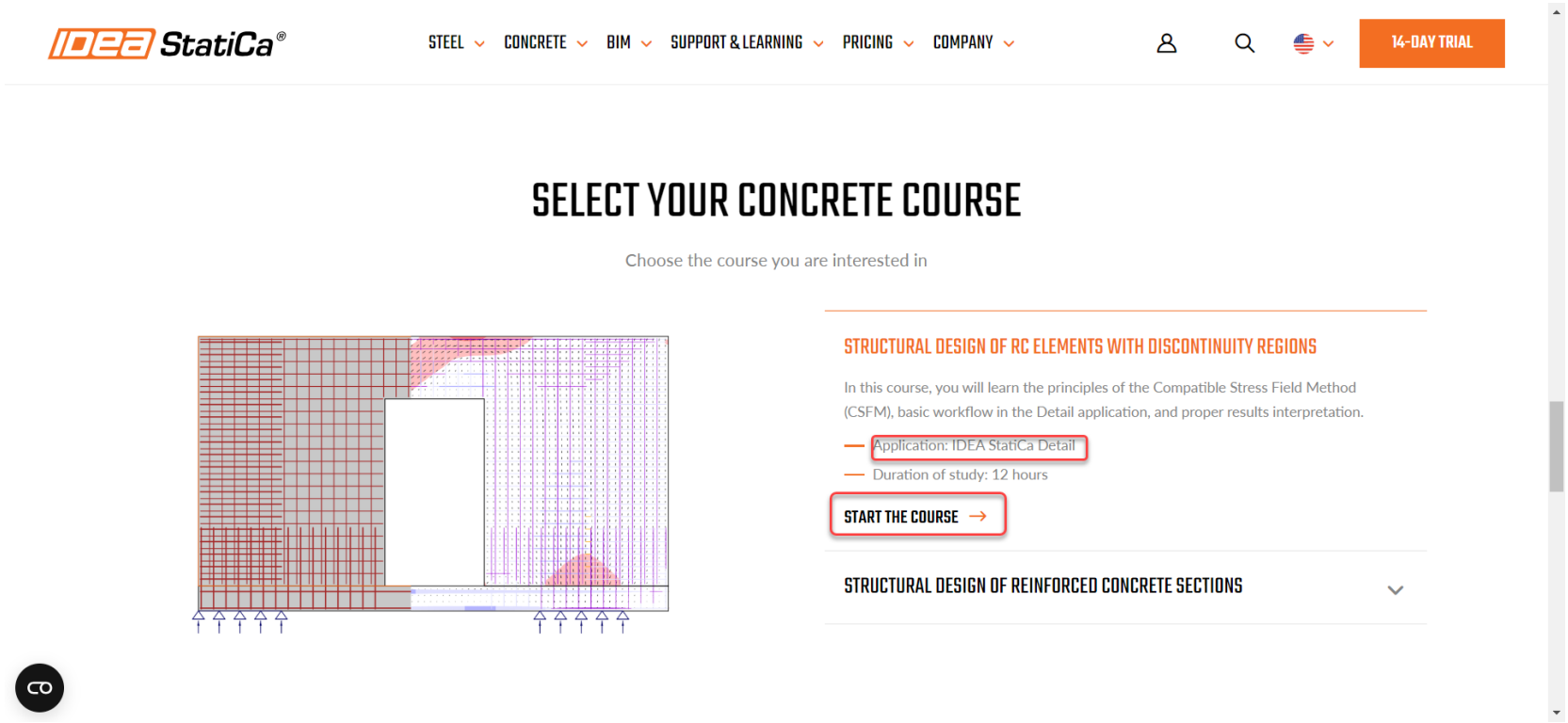
(2D FEA)

- ‘Rod’ elements representing the reinforcement (1D finite elements)




New project
Design code
ACI
Concrete
5000 psi
Reinforcement
Grade 60
Concrete cover
1.500
in
New entities
Imperial
Name
ACI templates
Author
IDEA StatiCa
Description
Templates
Beams
Frame joints
Walls
General input
General shape
Cancel
Beams
End support
Dapped end, one css
Dapped end, two css
Haunched dapped end
Internal support
Opening
Walls
Wall with window and door openings
Wall with window
Frame joints
Knee joint
Cross joint - prismatic column
Column with bracket
Column with brackets

IDEA StatiCa Campus



https://www.ideastatica.com/campus-course/structural-design-of-rc-elements-with-discontinuity-regions

Q&A

What's next?

Next webinar

Complex modeling in Connection

- Wed., Nov. 1st at noon ET

Live events

• SEA of Texas	9/28-29
• SDS2 User Summit	10/11-12
• Trimble Dimensions	11/6-8
• NCSEA Summit	11/8-10