Formation SCIA ESA PT

General

- Environment: Options, Setup, Help

- New Project: Project data

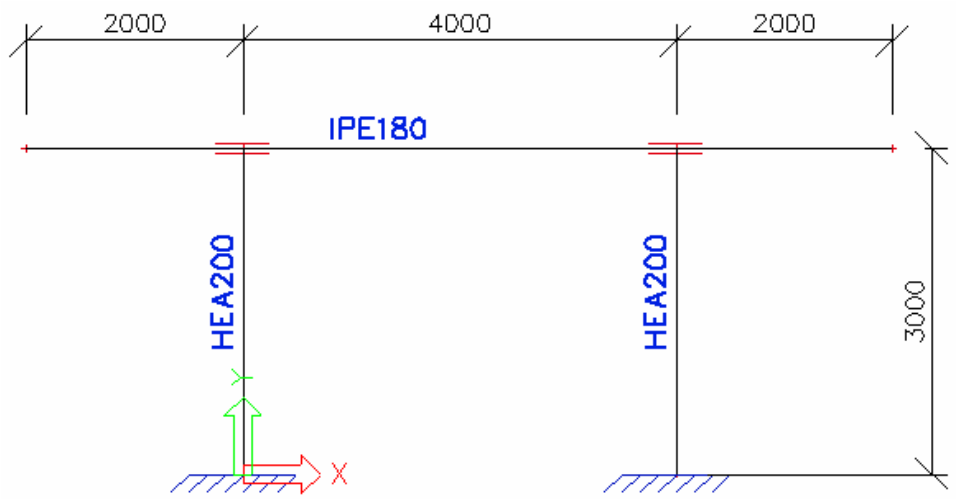
- Windows/toolbars
  : - Workspace, Window with Main tree and window for properties
    - Windows change place / close
    - Hobnail 

- Material Library 

- Always follow tree from the top then downwards!

Part 1: Structure

Example 1: Frame



- Input with - or Absolute coordinates
  - or Relative coordinates @
  - or dot grid
  - or Line grid

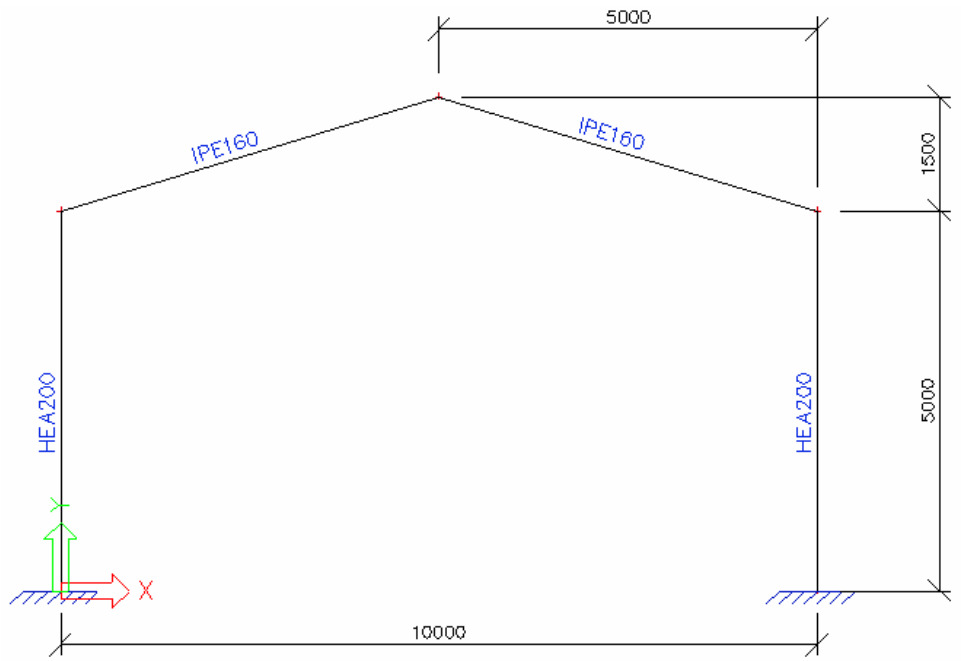
  with snap mode
- Cross section library "manager"
- Property-window
- View with: -
  - Scroll-bars
  - SHIFT + Mouse: move
  - CTRL + Mouse: rotate
  - SHIFT + CTRL + Mouse: Zoom
- Selection with: - Mouse: difference L=>R en R=>L
  - unselect with CTRL
  -
  - Select elements by property
- Change entity by Table edit geometry >>>
- Render

After input structure

- Check Structure data

- Connect nodes/members for whole structure
  1) bars ending in one node
  2) bars end on another bar (t-form)
  3) bars intersect

Example 2: Frame



- Input via: - one by one (change node in middle)
  - or one part and mirror
  - or Catalogue blocks

- Change nodes? - or by select node and move with move mouse
  - or change coordinates in property-window

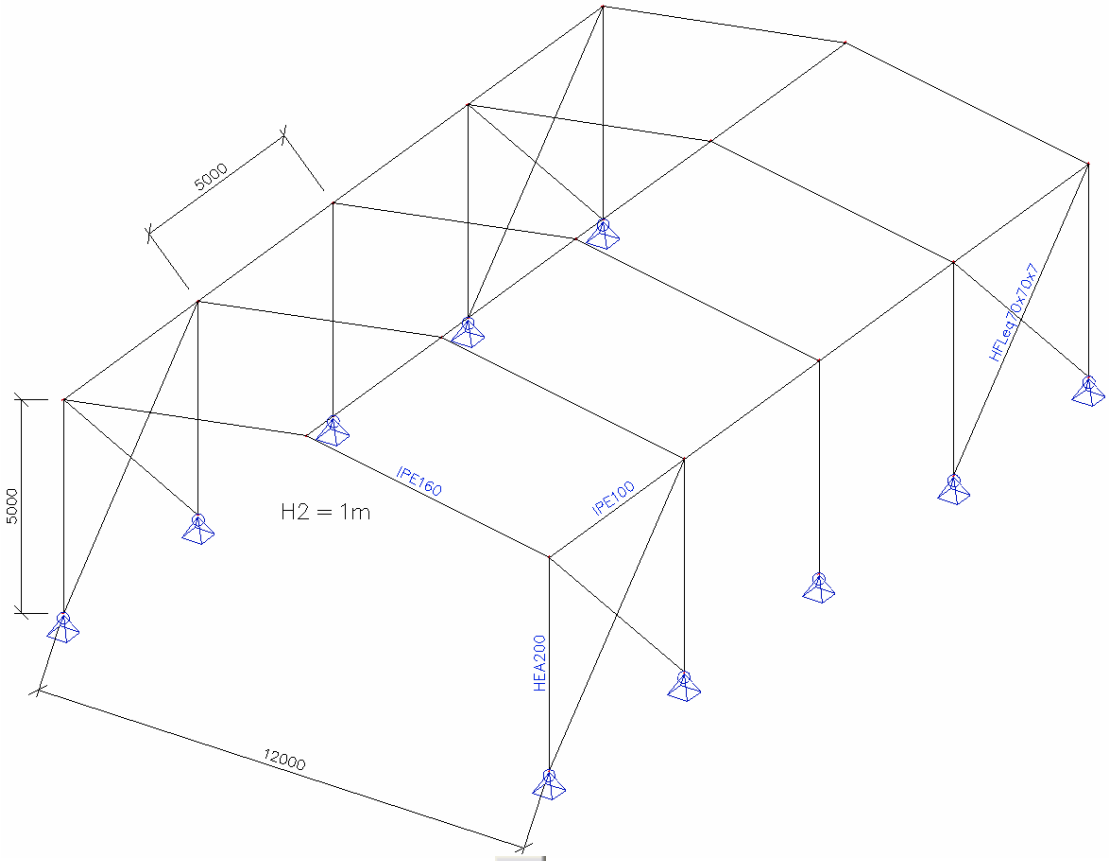
- add bars column in middle, horizontal bar, bracing

- Quick input for supports/hinges

- Check structure data
- Connect members/nodes to have complete structure

Example 3: Hall

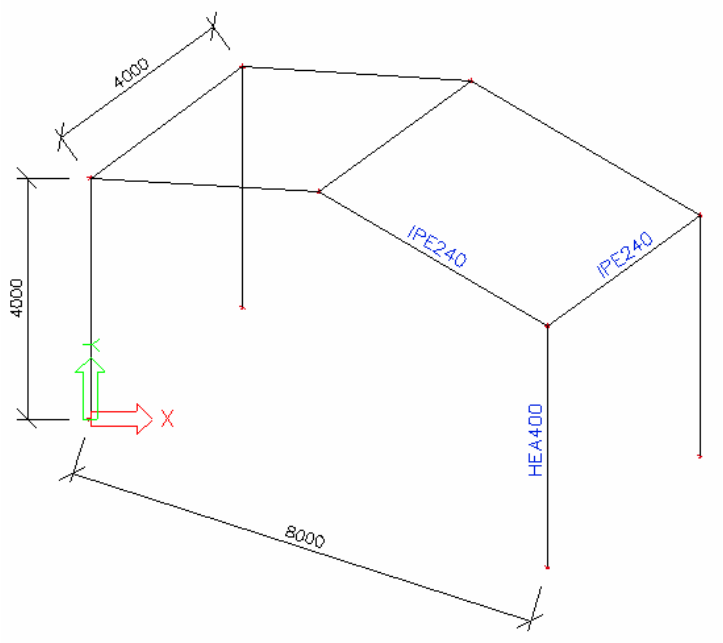
- Input by: - or copy (one by one) + manual connection horizontal bars
  - or Multiple copy and (if wanted) automatically connection of bars



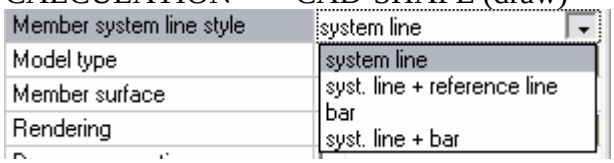
- Select Elements by more properties:
- Make line grid
- Functionality CAD shape
  - Render
  - CAD shape
  - Priority depending on Type beam (80)
- Check structure data
- Connect members/nodes
- View parameters - Set view parameters for all / Set view parameters for selected

- or View flags

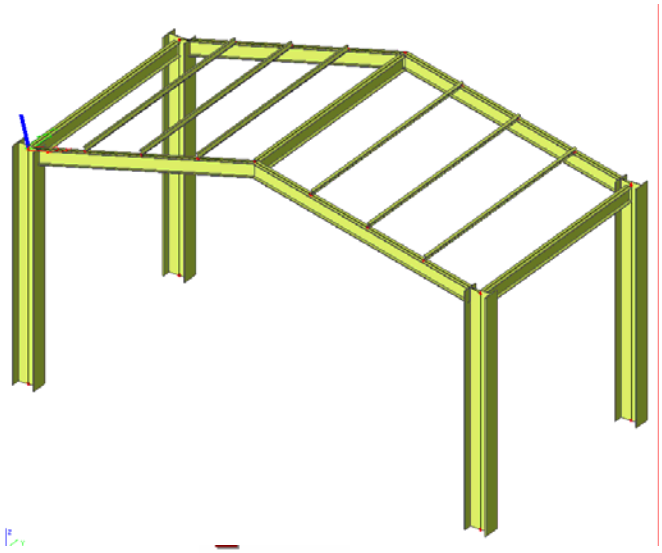
Example 4: Girt

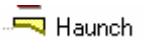


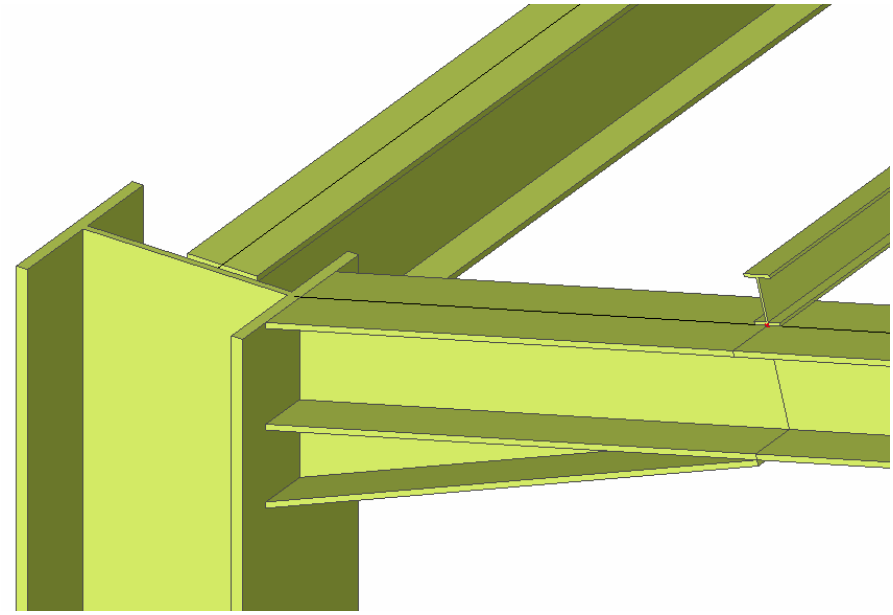
- Eccentricities:
  - or move system line
  - or give values ey, ez
  - CALCULATION <-> CAD-SHAPE (draw)



- Input with:
  - Change UCS to plane (roof)
  - LCS | z by vector
  - 2e half: Copy and rotation or mirror
    (for mirror → choose good plane and mirror plane)

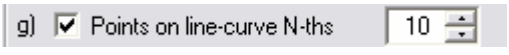


- Input Haunch: 

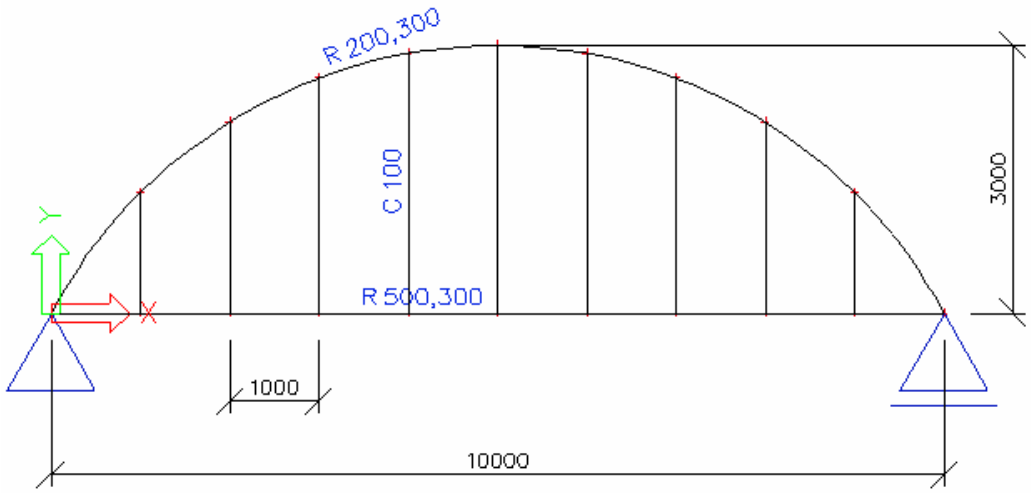


- Check Structure 
- Connect members and nodes 

Example 5: Bridge

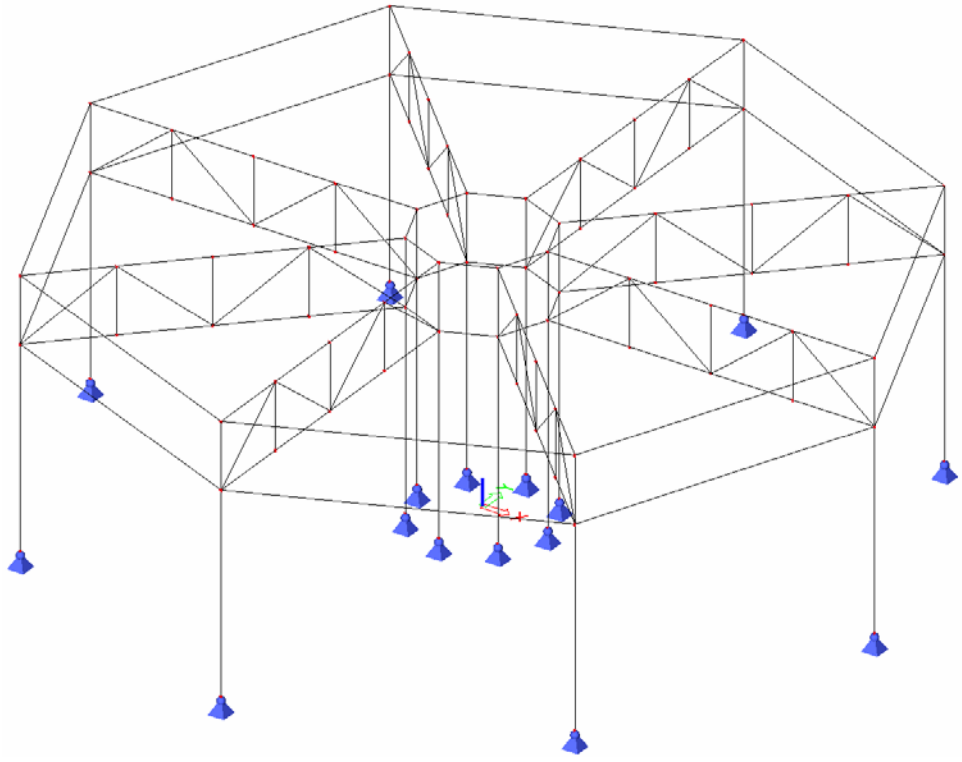
- Input with: - Drawing a member → arc 
  - Snap mode 

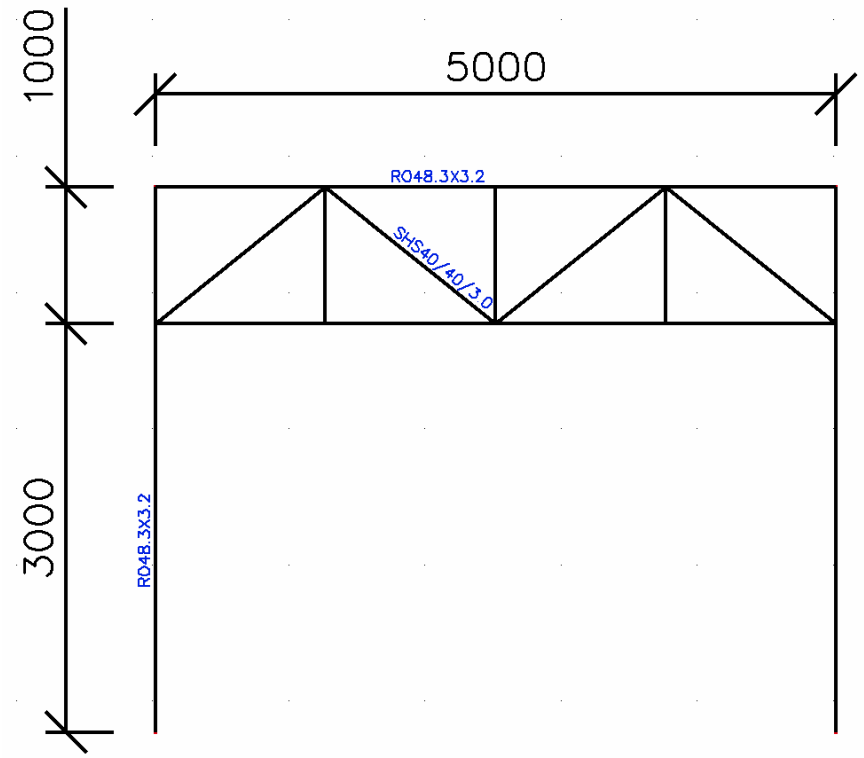
  - Trim  and extend 

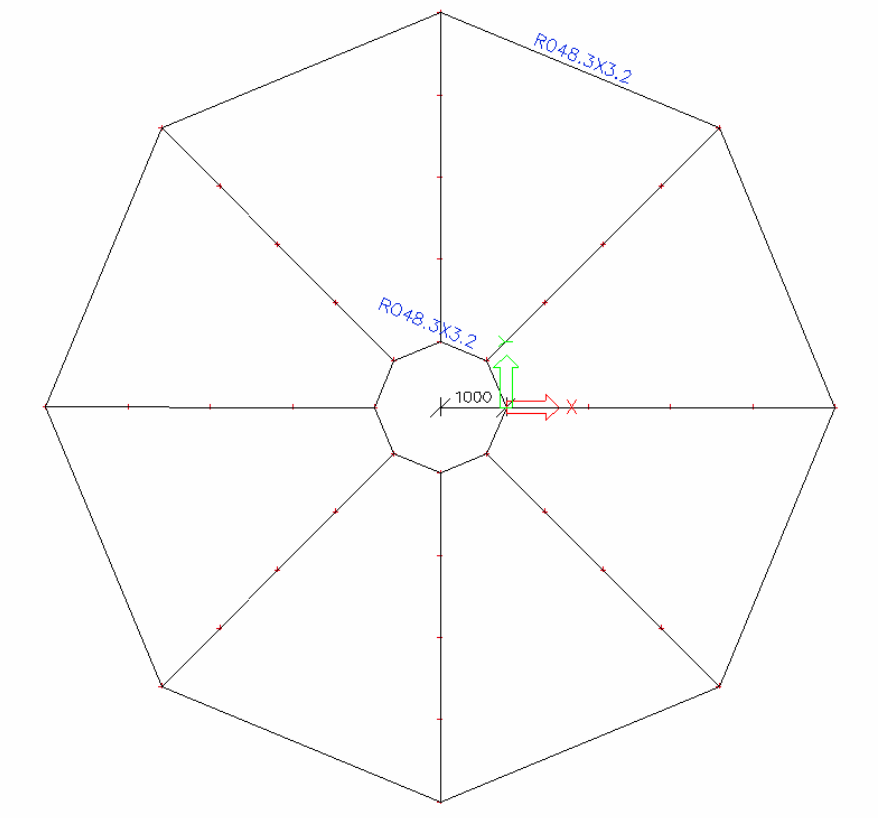


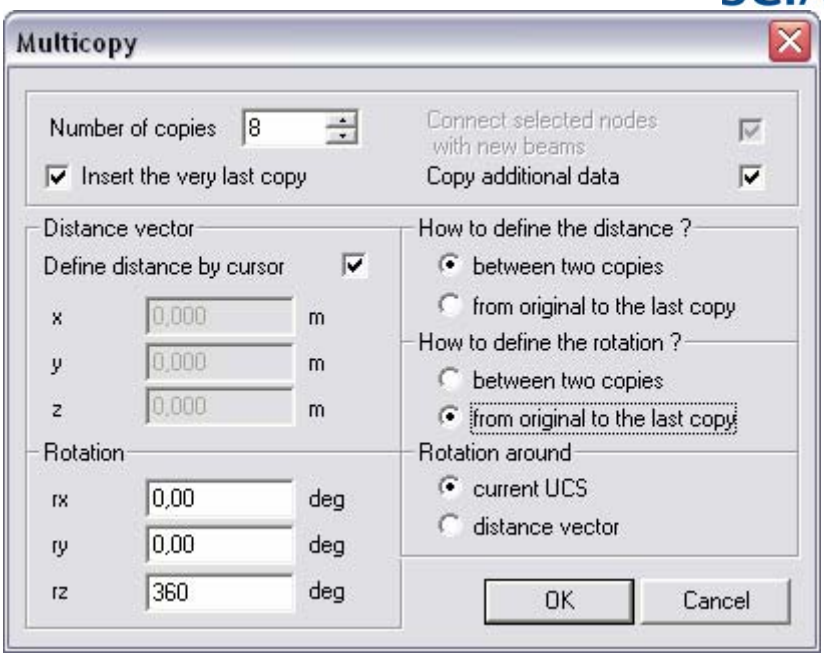
Example 6: Carrousel

- Input with: - Catalogue blocks (attention double bars)
  - Change UCS
  - Multiple copy with rotation




1000
5000
R048.3X3.2
SHS40/40/3.0
3000
R048.3X3.2

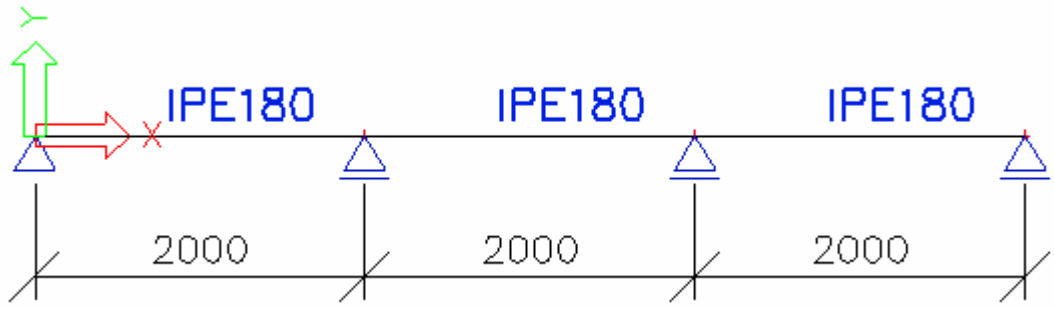

R048.3X3.2
R048.3X3.2
1000
X



- Check structure data 
- Connect members/nodes 

Part 2: Load Calculation,Mesh Results

Example 7: Constructions with 3 spans



- Definition Load cases
  - LC 1: Own Weight
  - LC 2: Permanent load: line force 10 kN/m

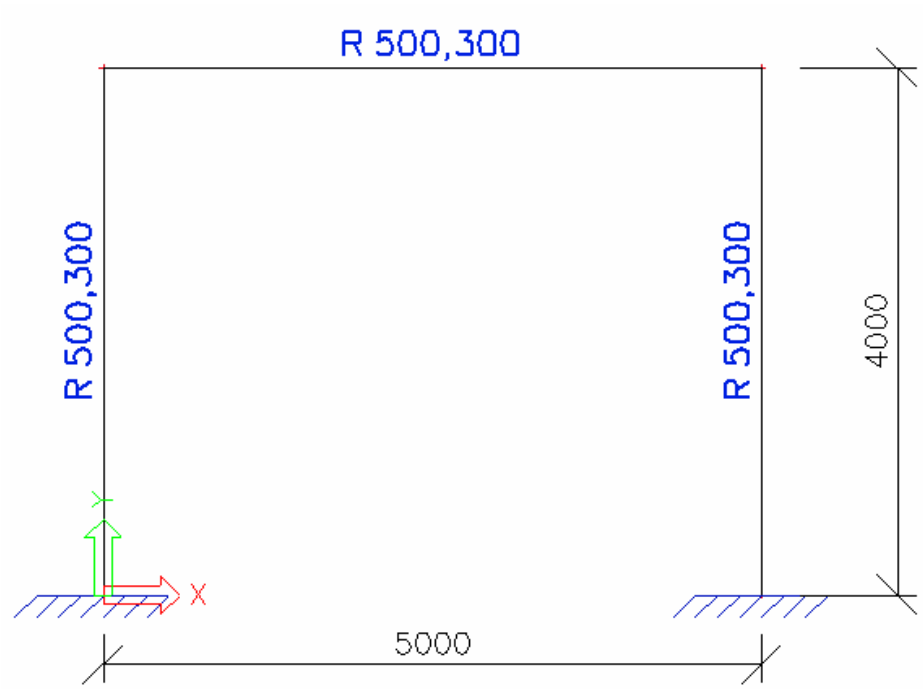
- Input of loads in menu Load

- Calculation / Hidden calculation : no windows

- Message about deformations and max rotation → check this
- Singularity: check structure for supports/hinges

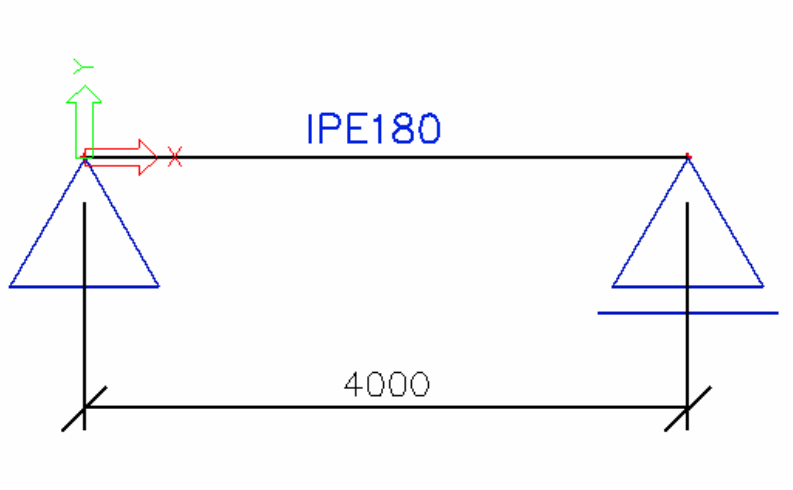
- Results
  - Selection: All / Standard / Selected
  - Global Extreme
  - Drawing setup
  - Refresh (window) – preview (table)
  - Bill of material
  - Calculation protocol

Example 8: Concrete frame

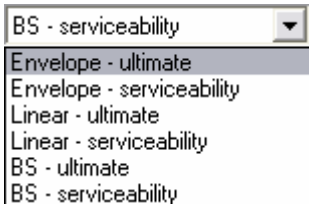


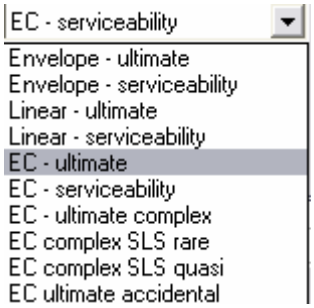
- Load cases:
  - LC 1: Own weight
  - LC 2: Side wind 5 kN/m
- Load groups (for permanent automatically)
-  for easy input and use of property window to change
- Linear Combination: 1,00 LC 1 + 1,00 LC 2
- View 
- Results 
- Scale of results 
- Document 

Example 9: beam on 2 supports



- Load cases:
  - LC 1: Permanent Load 1kN
  - LC 2: Variable Load 1kN
  - LC 3: Variable Load 1kN Exclusive
  - LC 4: Variable Load 1kN Exclusive

- Input Combinations
  - Types: 

or 

  - Black Box <=> User defined

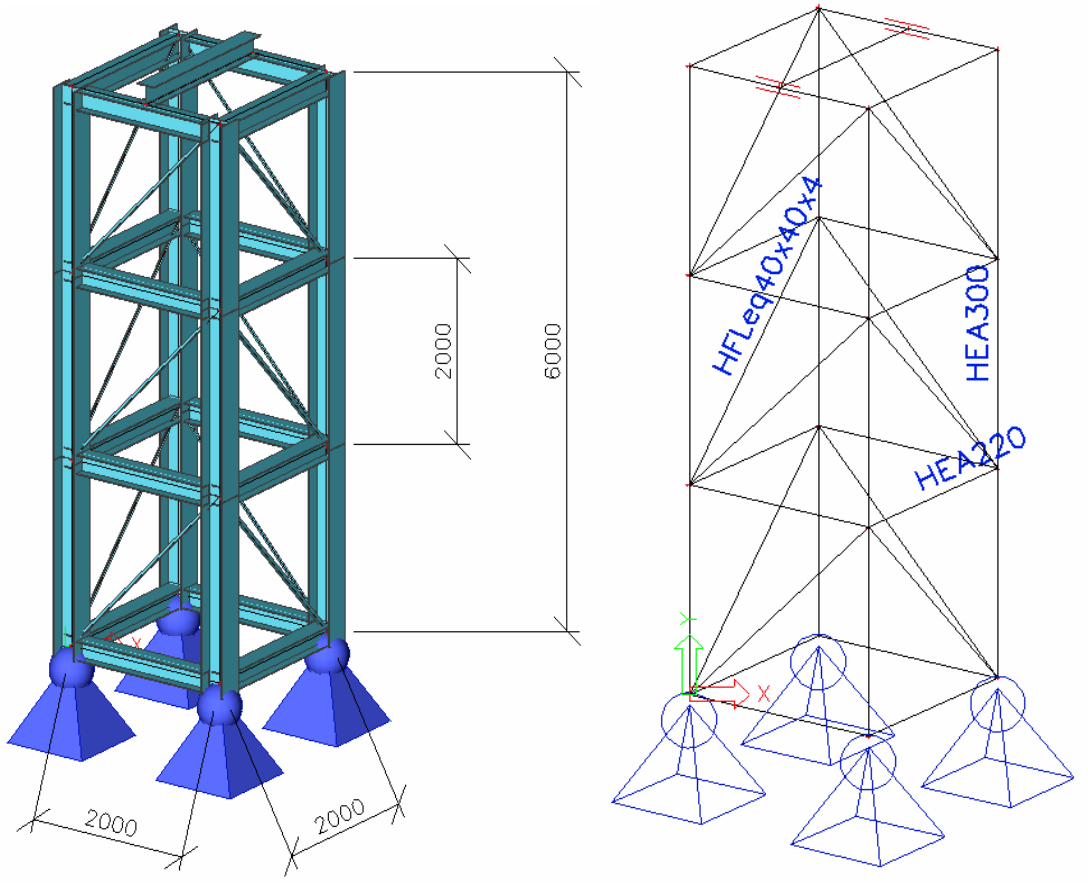
- Result classes

- Results

- Document with table for combination keys

Part 4: Document Picture gallery Paperspace gallery

Exemple 10: Bearing frame

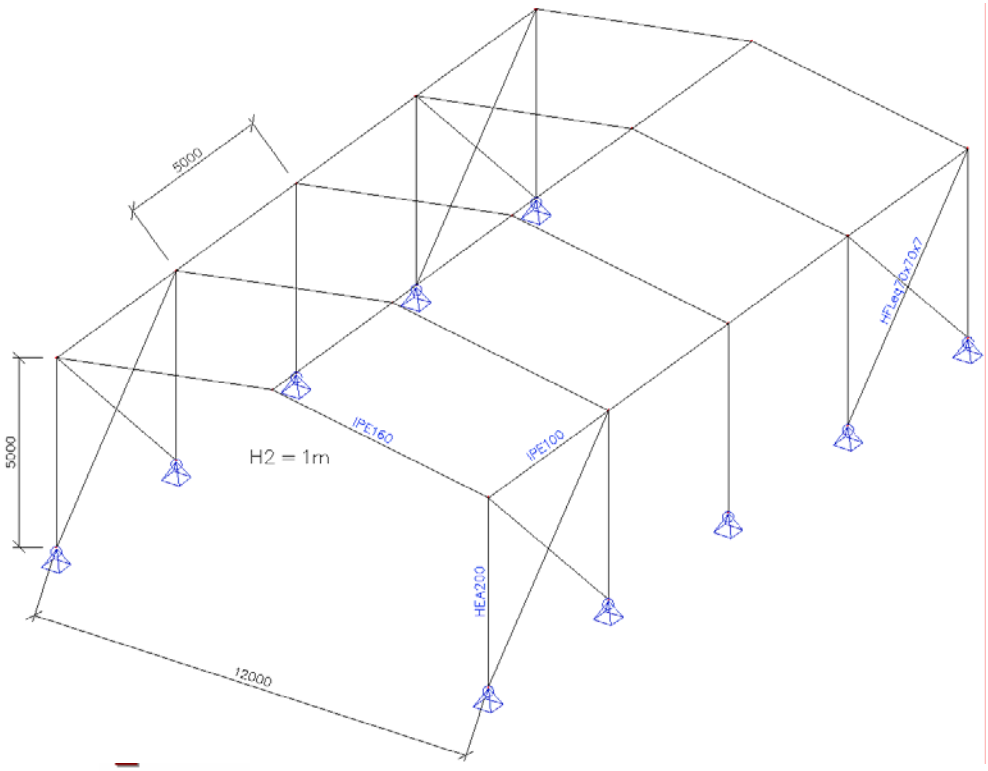


- Load Cases:
  - LC 1: Own Weight
  - LC 2: Vertical load 50 kN
  - LC 3: Horizontal load 20 kN

- Print/send picture
- Print/Send tables/data
- Picture gallery
- Paperspace gallery
- Document : embedded tables

Part5: Introduction to Steel *and* Concrete

Example 11: Steel hall



- Input Haunch

- Load cases
  - LC 1: Own weight
  - LC 2: Roof 5 kN/m
  - LC 3: Horizontal wind load (frontal) 2 kN/m

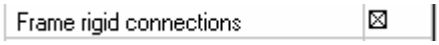
- Combinations:
  - CO1: EC- Ultimate Simple
  - CO2: EC- Service Simple

- Check Buckling and relative le... | Default ... (i.e. columns)

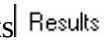
- Steel : Setup : Setup steel settings (general)

- Ultimate: Steel code check: Check with
  Output | Detailed
  - optimize cross-sections with Optimization
  - after optimization: hidden calculation

- Service: Control for Relative deformation

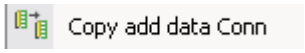
- Steel connection: - Functionality 

- Labels for the connections view parameters  or viewflags

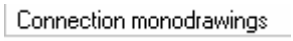
- check structure in his results 

- Calculated stiffness into model as hinge: - 

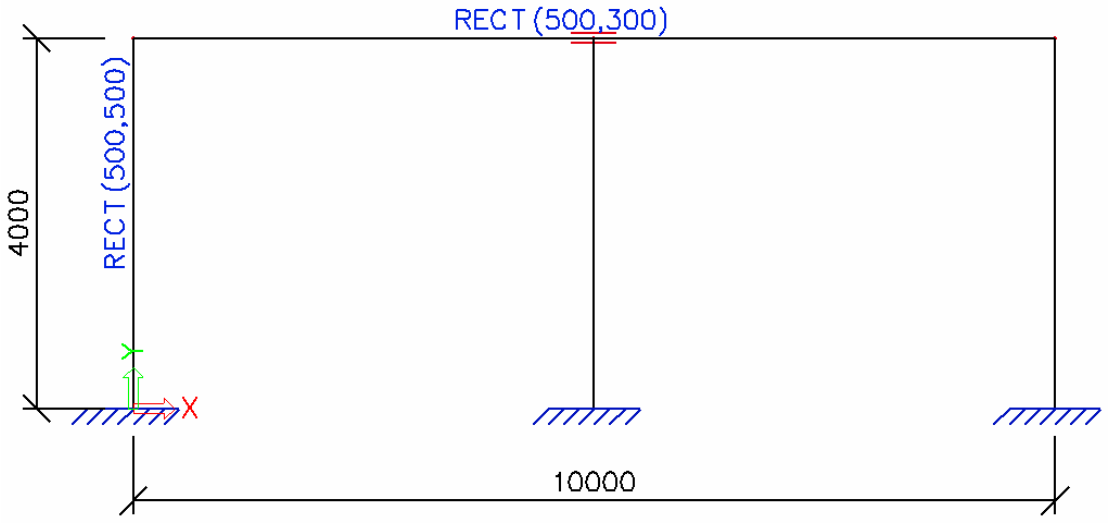
- hidden calculation 

- Copy of connection 

- Overview drawings: - Functionality: 

- Connection drawings: - Functionality: 

Example 12: Concrete Frame



- Load cases:
  - LC 1: Own weight
  - LC 2: Roof weight 10 kN/m

- Combinations:
  - CO1: EC-Ultimate Simple
  - CO2: EC-Service Simple

- Check Buckling and relative le... i.e columns
- Concrete : Setup : General settings: Take diameter 16
- For specific input: Member data
- View intern forces with Member design - Internal forces for the beam

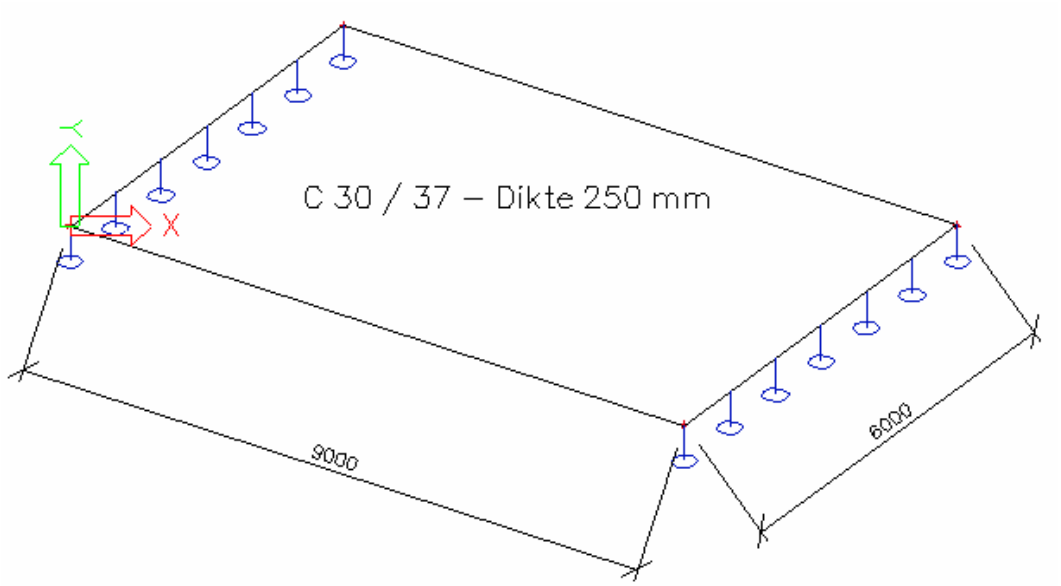
  Recalculate My with My recalc (moment reduction
- Calculation theoretical needed reinforcement: Member design Design

  - Additional inform: Calculation info

  - Detailed with Single check
- overview with table: Preview

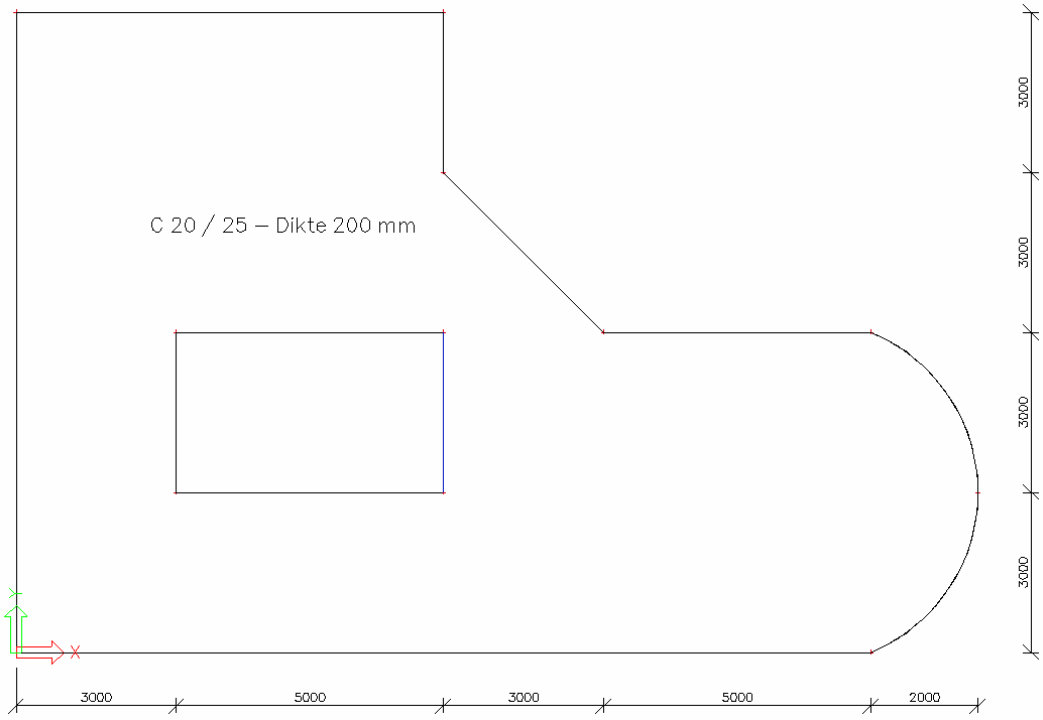
Part 6: Vlak 2D element Schijf Schaal element

Example 13: Rectangular plate



- Project data - Structure type: Plate XY
  - Project level advanced
- Input, with: - Plane 2D member
  - Shape 2D element
- Adapt entity with Table edit geometry
- Supports line on 2D member edge
- Load cases:
  - LC 1: Own weight
  - LC 2: Permanent Load: walls on free edges: Line loads 10 kN/m
  - LC 3: Variable Load: service load 2 kN/m²
- Mesh generation , Set view parameters for all
- Check structure data and input: Calculation Test of input data - . 2D data viewer
- Results: - Intensity on edge
  -
    - 2D Members
      - Deformation of nodes
      - Member 2D - Internal Forces
      - Member 2D- Stresses

Example 14: Slab on subsoil



- Functionality Subsoil
- Input with: - Plane 2D member
  - Shape 2D element
- Opening
- Supports surface (el.foundation)

- Load cases:
  - LC 1: Own weight
  - LC 2: Permanent Load: Walls on external edges: line load 10 kN/m
  - LC 3: Permanent Load: Free walls as free line load 6,5 kN/m
  - LC 4: Variable Load: Service load 2 kN/m²
  - LC 5: Variable Load: Service load on part: Free surface load 1,5 kN/m²

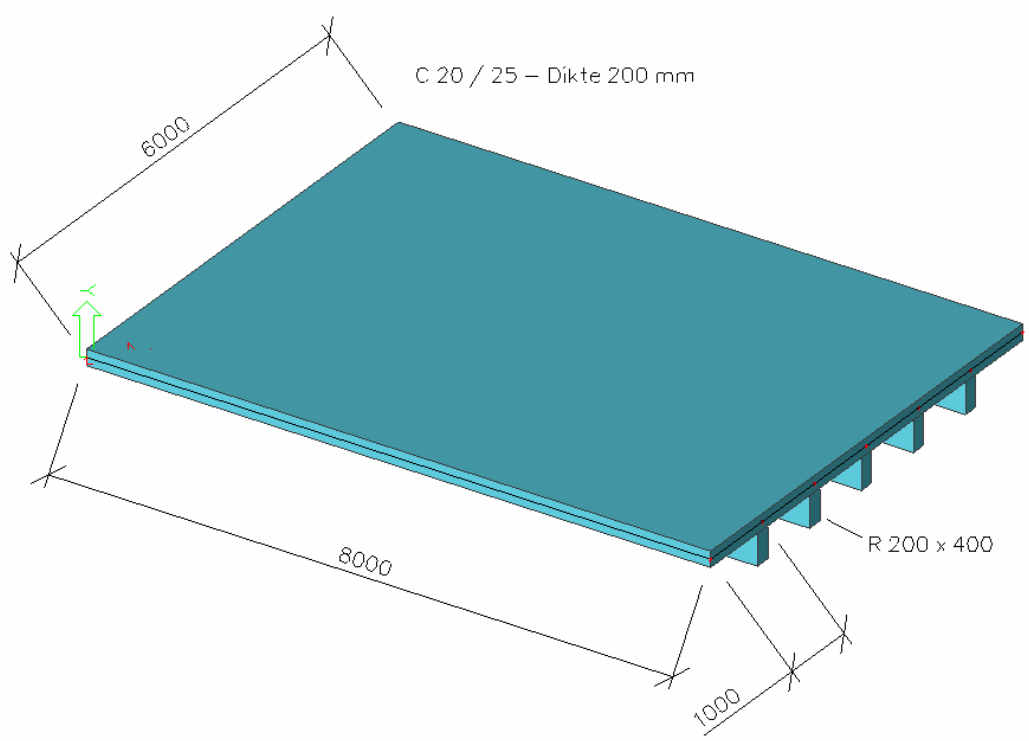
- Mesh generation , Set view parameters for all
- Mesh refinement with general: Mesh setup

- Check input data: Calculation - 2D data viewer

- Results: Subsoil: 2D element - Contactspanningen

- Results: Snede op 2D element

Example 15: Slab with ribs



- Project data: Structure type: General XYZ
- Input with: - Plane 2D member
  - Shape 2D element
- Supports line on 2D member edge : (free)
- Plate rib :
  - Effective width: default / number of thickness / width
  - See also Setup Solver setup

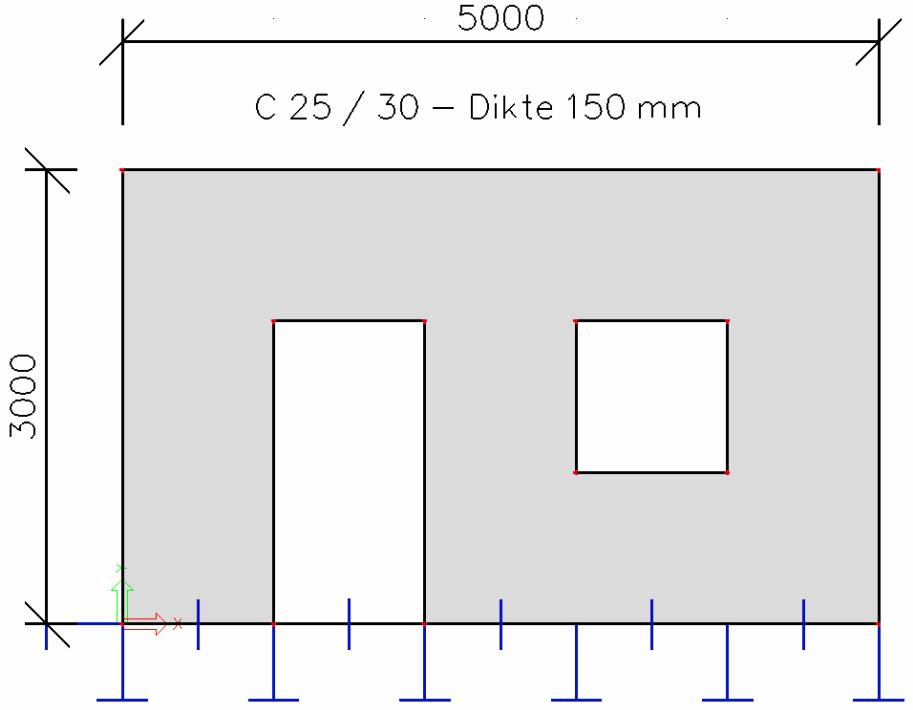
Load cases:

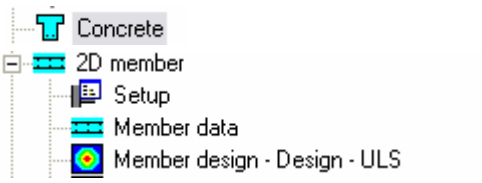
- LC 1: Own Weight
- LC 2: Permanent Load: surface load 5 kN/m²

- Results:
  - Internal forces on beam: Rib
  - Member 2D - Internal Forces: Rib

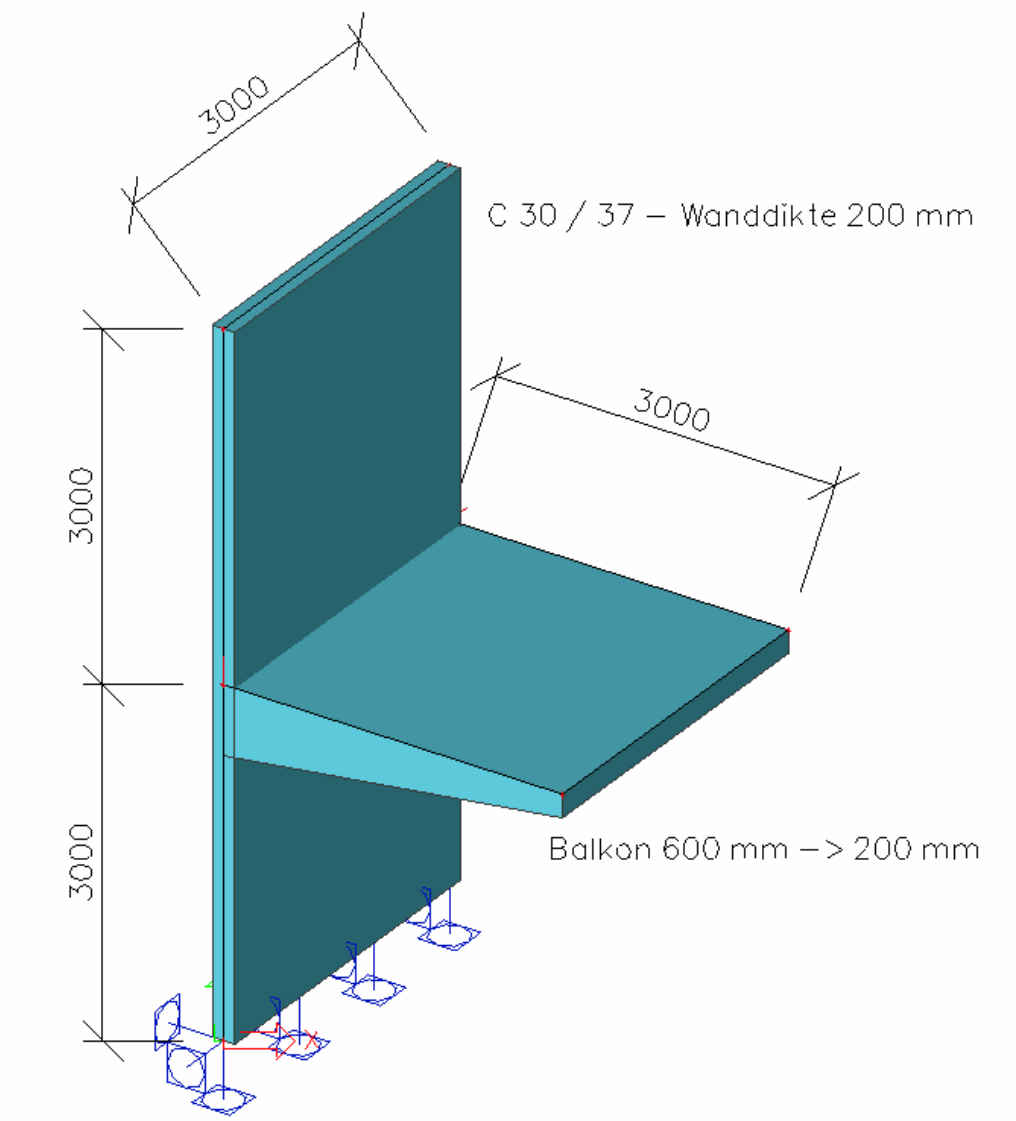
- De effective width is a approach out of the standard, where the beam and plate are replaced by a t-formed section for the design of reinforcement. By selecting the option rib the forces in the beam are higher. This higher forces come from the total T-section.

Example 16: Prefab Wall



- Project data - Structure type: Wall XY
  - Project level advanced
- Input with: - Plane 2D member
  - Shape 2D element 
- Openings with Opening
- Supports line on 2D member edge
- Load cases:
  - LC 1: Own weight
  - LC 2: Permanent Last: (plates): 13,2 kN/m
- Mesh generation , Set view parameters for all
- Local mesh refinements: Specific: Local mesh refinement
- Direction membrane forces: Local axes
- Basic 

Example 17: Balcony

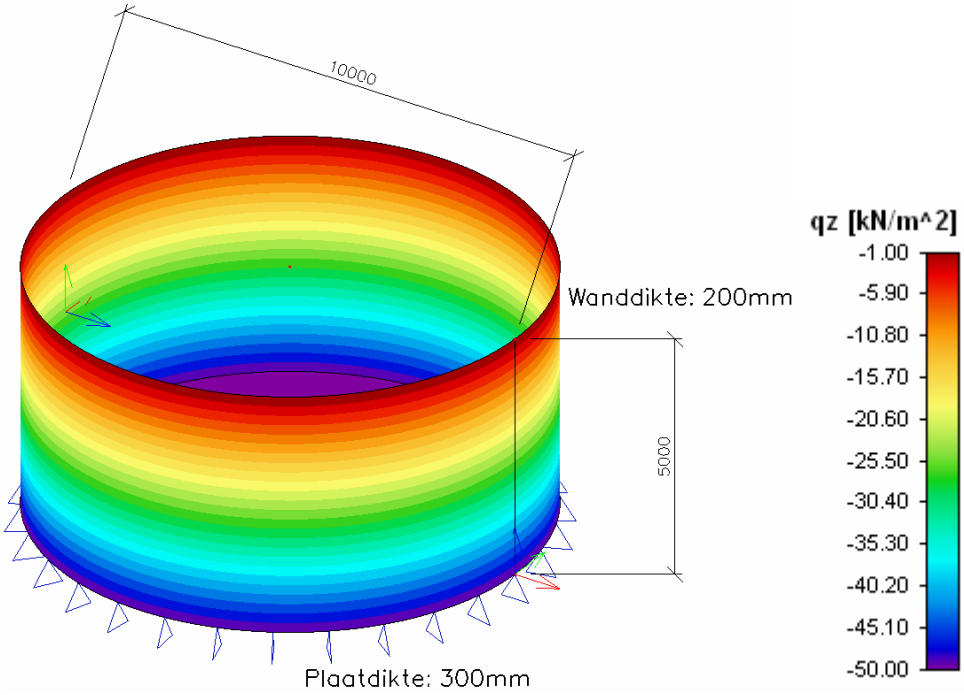


- Project data
  - Structure type: general XYZ
  - Project level: advanced
- Input with:
  - Wall
  - Plane 2D member
- Connect members: Connect members/nodes
- Balcony:

Thickness/Mater.	variable
Member system-plane at	top

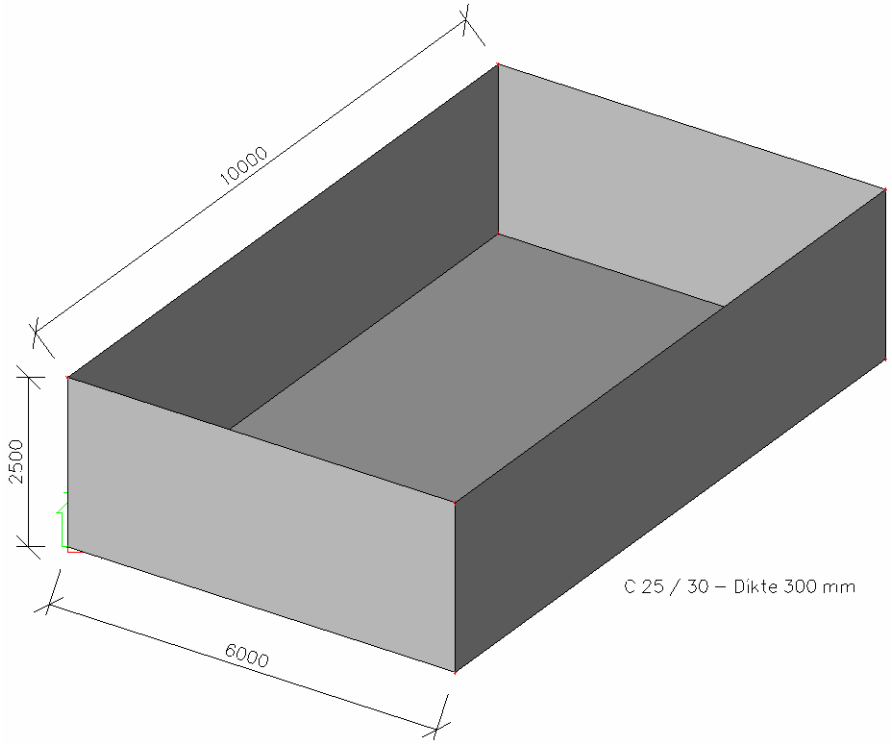
- Load cases: LC 1: Line load on edge
- Check via Deformation of nodes | Values | Deformed mesh

Example 18: Tank



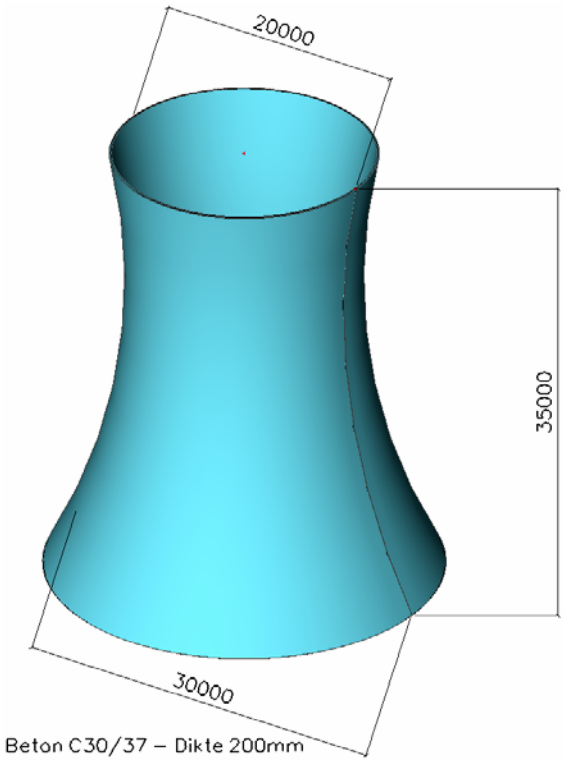
- Project data
  - Structure type: General XYZ
  - Project level advanced
- Input with:
  - Plane: Plane 2D member
  - Wand: Wall
- Functionality: Subsoil
- Supports: surface (el.foundation)
  - Load cases:
    - LC 1: Load cases
    - LC 2: Internal pressure: 0 kN/m² => 50 kN/m²
- Input distributed load with Surface load – free
  - First set UCS:
  - Direction: according to local z-axes
  - Distribution: Y-direction (according UCS)
  - Then input rectangle
- Mesh refinement with Average size of 2D element/curved element [m] 0,500 put it on 0,2m
- Check Calculation Test of input data – 2D data viewer

Example 19: swimming pool



- Project data - Structure type: General XYZ
  - Project level: advanced
- Functionality Subsoil
- Input with: - Plane: Plane 2D member
  - Wand: Wall
- Supports - surface (el.foundation) : plate (and walls)
  - line on 2D member edge : edge of plate
- Load cases:
  - LC 1: own weight
  - LC 2: Variable Load: Water: 25 kN/m²
- Iput water load with: Surface load - free
- Check load - . 2D data viewer
- Basis Concrete : Plate- Ontwerp - Ontwerp - UGT

Example 20: cooling tower



- Project data
  - Structure type: general XYZ
  - Project level advanced
  - Material: Concrete

- Input via Shell member
  - Underside: radius 15m
  - Height: - Active plane XZ workplane
    - with intermediary point (9;20) and endpoint (10;35)
  - Upside: radius 10m: - Active plane XY workplane
    - Middle point 0;0;35

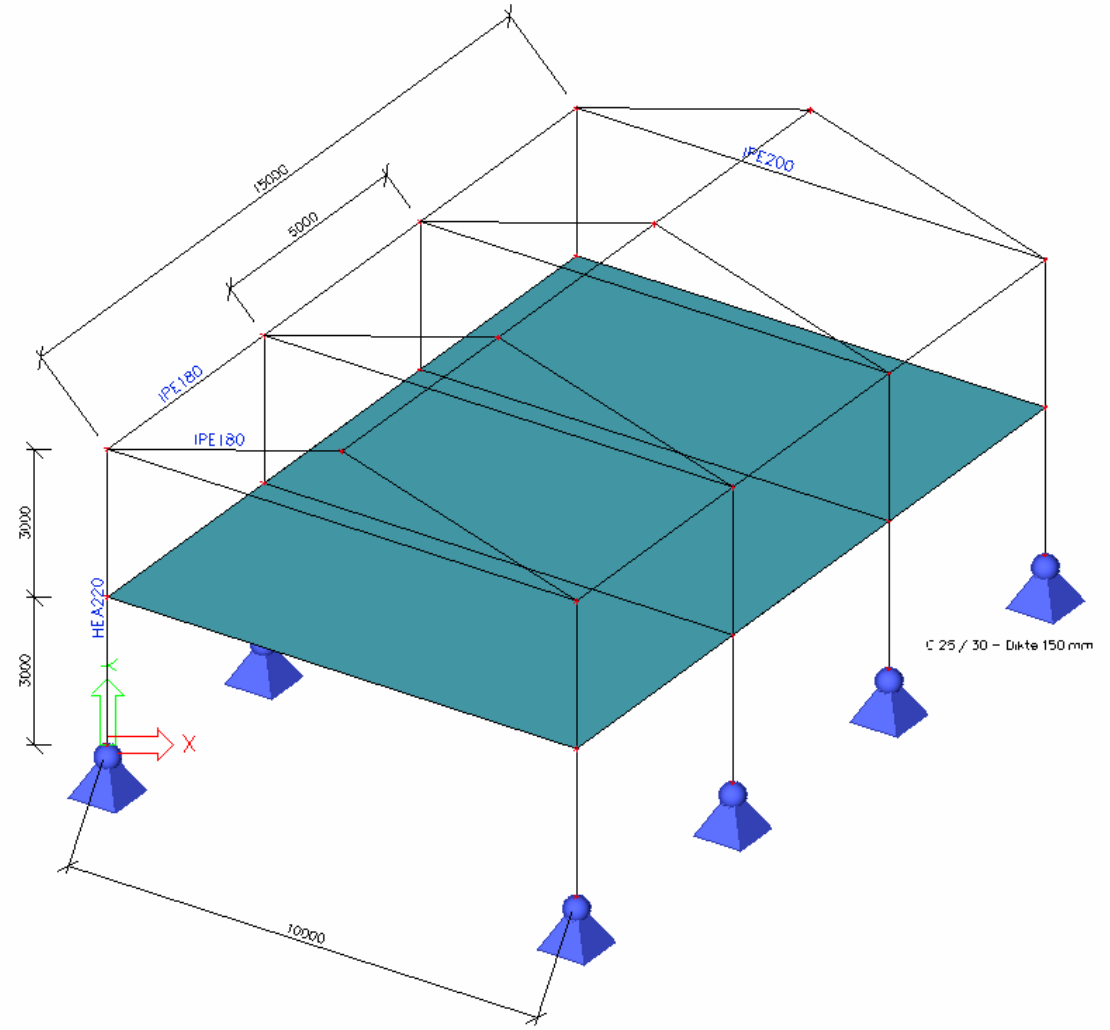
- Input line on 2D member edge

- Load cases:
  - LC 1: Own weight
  - LC 2: Temperature: delta 40K
  - LC 3: Wind load 0 kN/m² => 1,4 kN/m²

- Temperature load: Thermisch - op 2D element

- Wind load: Surface load - free : plane away from structure
- Check data - 2D data viewer

Example 21: Hall – concrete plate



- Project data
  - Structure type: general XYZ
  - Project level: advanced
  - Material: concrete and steel

- Input with:
  - Catalogue blocks
  - Change
  - Plane 2D member

- Connect members (plate and beam): Internal edge

- Connect members/nodes: Connect members/nodes

- Check deformation :
  - Deformations on beam
  - Deformation of nodes

  in section