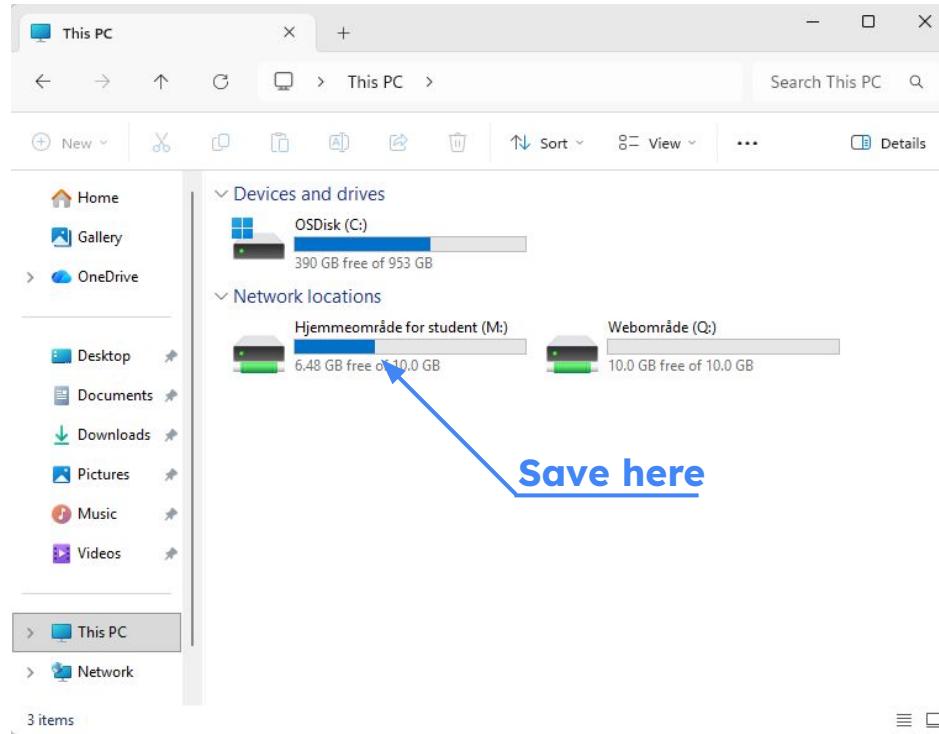


SAP2000®

# Introduction

# Save file



Or:



Google Drive



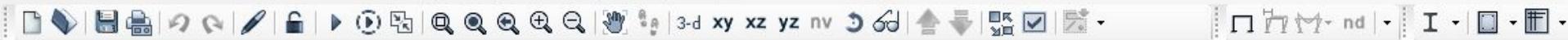
OneDrive

# Structure/Geometry

---

## Workflow

1. Grid
2. Materials
3. Frame Sections
4. Frame objects
5. Connections



S

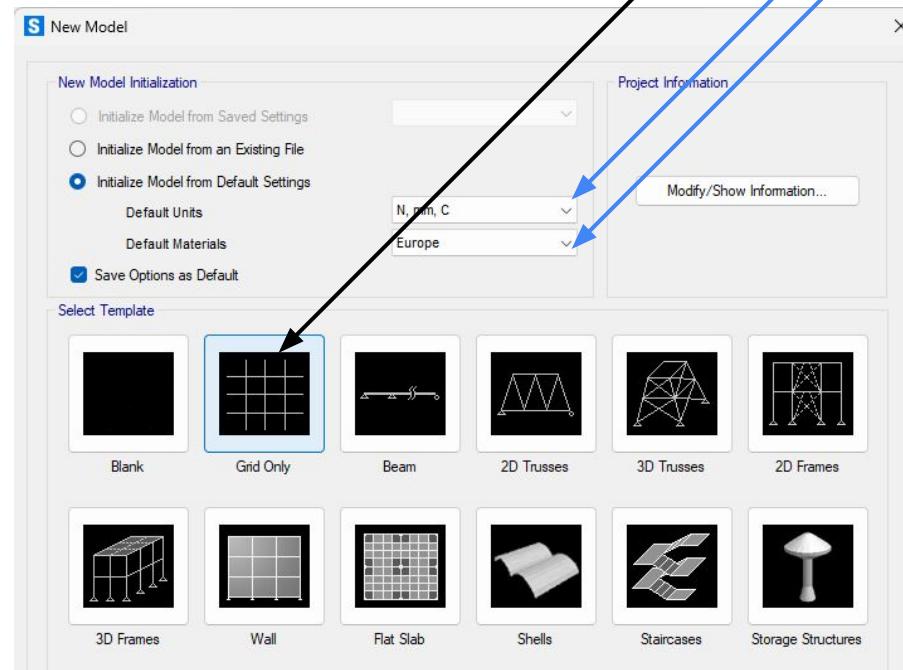
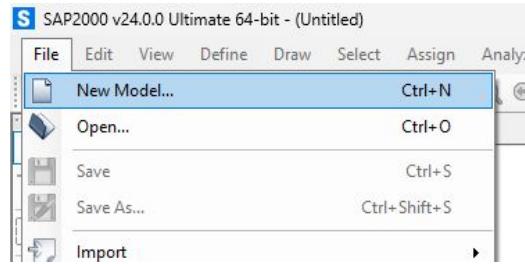
Fi



3

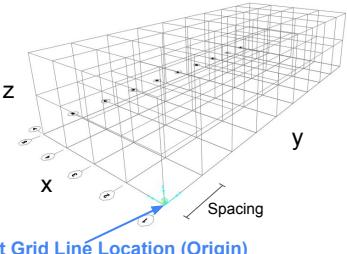
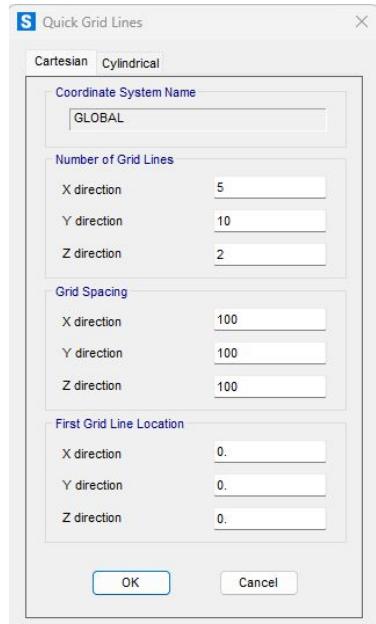
**Click Grid Last**

# New model



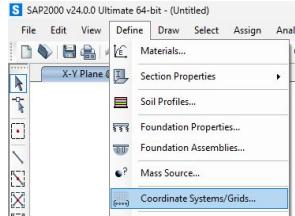
N/kN  
Europe

# Grid Setup

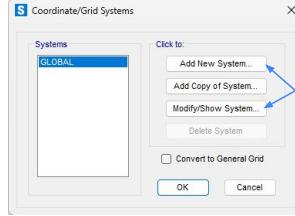


## Modify grid later:

1.



2.



3.

System Name					
GLOBAL					
X Grid Data					
Grid ID	Ordinate (mm)	Line Type	Visible	Bubble Loc	Grid Color
A	0	Primary	Yes	End	Dark Gray
B	100	Primary	Yes	End	Dark Gray
C	200	Primary	Yes	End	Dark Gray
D	300	Primary	Yes	End	Dark Gray
E	400	Primary	Yes	End	Dark Gray
F	500	Primary	Yes	End	Dark Gray
G	600	Primary	Yes	End	Dark Gray

Y Grid Data					
Grid ID	Ordinate (mm)	Line Type	Visible	Bubble Loc	Grid Color
1	0	Primary	Yes	Start	Dark Gray
2	100	Primary	Yes	Start	Dark Gray
3	200	Primary	Yes	Start	Dark Gray
4	300	Primary	Yes	Start	Dark Gray
5	400	Primary	Yes	Start	Dark Gray
6	500	Primary	Yes	End	Dark Gray

Z Grid Data					
Grid ID	Ordinate (mm)	Line Type	Visible	Bubble Loc	
Z1	0	Primary	Yes	End	
Z2	100	Secondary	Yes	End	
Z3	200	Primary	Yes	End	

Last: OK

Add Line (same spacing)

Switch Coordinates/Spacing

Bubble

Primary (w/ Bubble)

Secondary (No Bubble)

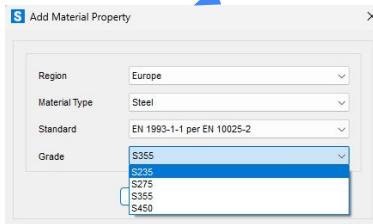
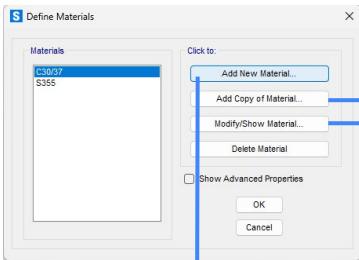
5

# Materials

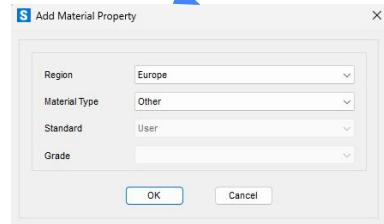
1.



2.

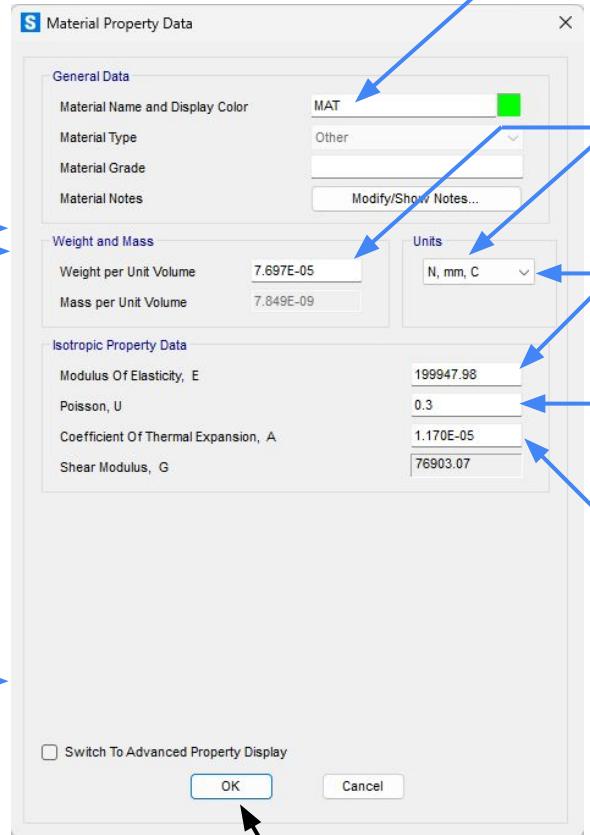


Eurocode Materials



Timber and other materials

3.



Material Name:  
GL24h, C24 etc

Density  
(NEWTONS)

Watch units

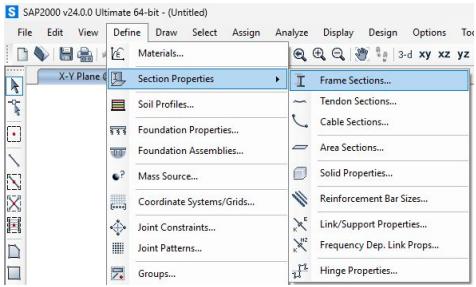
$$\nu = \frac{\varepsilon_{\perp}}{\varepsilon_{\parallel}}$$

$$\alpha \cdot \Delta T = \varepsilon$$

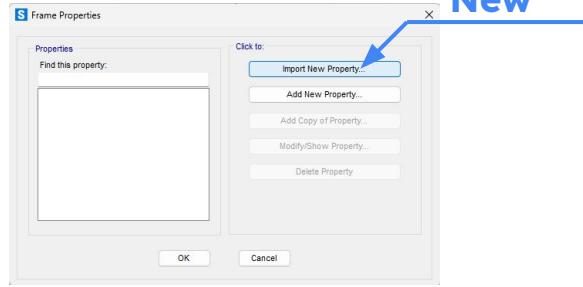
# Frame sections (Cross section/tverrsnitt)

## Complex sections (I, H, C)

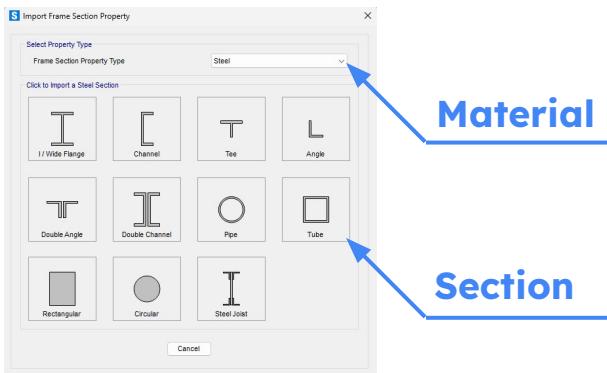
1.



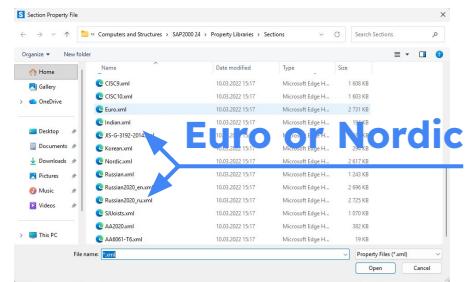
2.



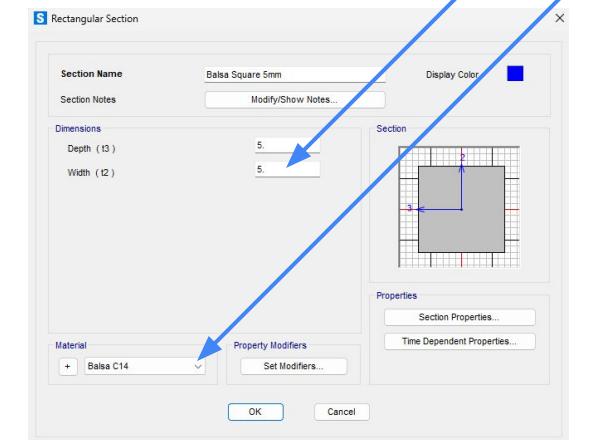
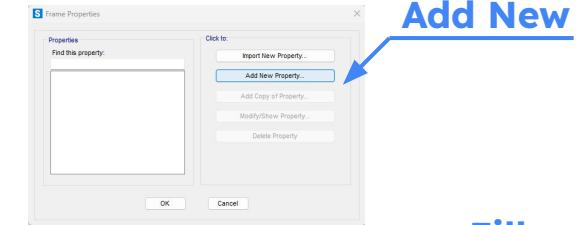
3.



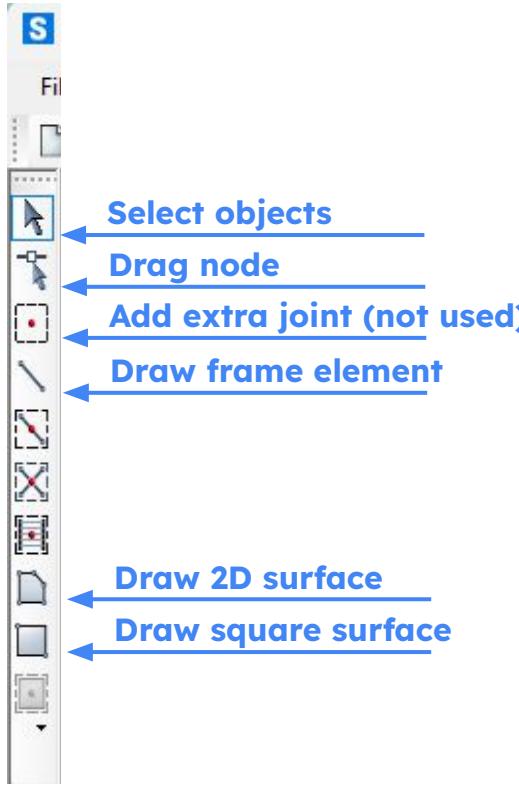
4.



## Simple Sections (or non standard)



# Frame objects



## Select object

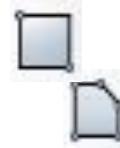
Select frame or node to edit

## Element drawing options



### Draw frame element

Draw a frame or brace element (Ramme-element/stav).



### Draw 2D surface or square

Use to draw walls/shear walls

## Node snapping options: Choose after element selected



### Snap to Grid (intersections)

Snaps to defined grid



### Snap to perpendicular

Snaps to a point perpendicular to the frame element of the first point



### Snap to ends and midpoints

Useful for Bracing/fagverk



### Snap to closest (Dont use)

Snaps to closest element/mode. Only use for ideas or tests.



### Snap to element intersections

Intersections between frame elements



### Snap to increment

Snaps to every 0.1cm etc.

# **Connections**

# Static Analysis

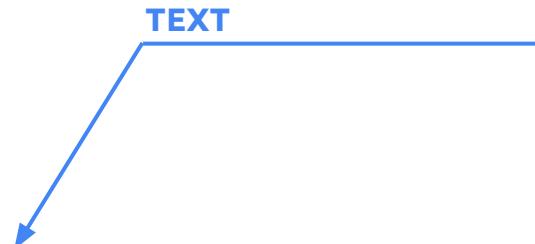
---

## Workflow

1. Loads
2. Load Combinations
- 3.

# Load Combinations

1.



# Assign loads

1.

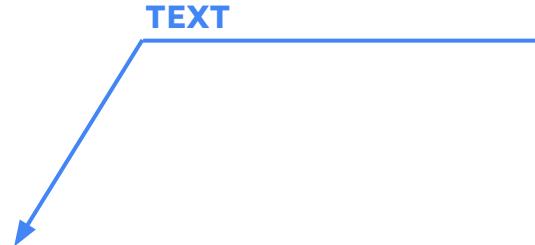
TEXT

The screenshot displays the SAP2000 v24.0.0 Ultimate 64-bit software interface across three windows. The top window shows the main menu bar with 'Assign' selected. The middle window shows a zoomed-in view of the 'Assign' menu, specifically highlighting the 'Area Loads' option under the 'Assign' tab. The bottom window shows the 'Assign' menu again, with the 'Area Loads' option also highlighted. Overlaid on these windows are several dialog boxes:

- Assign Joint Forces**: A dialog box for assigning joint forces. It includes fields for 'Load Pattern' (set to 'DEAD'), 'Coordinate System' (set to 'GLOBAL'), and force values for Global X, Y, and Z axes, as well as moment values about each axis. Options for 'Add to Existing Loads', 'Replace Existing Loads', and 'Delete Existing Loads' are available.
- Assign Area Uniform Loads**: A dialog box for assigning area uniform loads. It includes fields for 'Load Pattern' (set to 'DEAD'), 'Coordinate System' (set to 'GLOBAL'), 'Load Direction' (set to 'Gravity'), and a 'Uniform Load' value of 10 N/mm. Options for 'Add to Existing Loads', 'Replace Existing Loads', and 'Delete Existing Loads' are available.
- Trapezoidal Loads**: A sub-dialog for defining trapezoidal loads. It shows four segments with relative distances of 0, 0.25, 0.75, and 1, and loads of 0, 0, 0, and 0 respectively. It includes options for 'Relative Distance from End-1' and 'Absolute Distance from End-1'.
- Assign Area Uniform Loads** (another instance): This is a duplicate of the second dialog box, showing identical settings for a uniform load of 10 N/mm.

# Analysis

1.



# View

1.



# Dynamic Analysis

---

## Workflow RHA

1. Mass
2. Time history
3. Load Case

Video on Response Time History (RHA) analysis

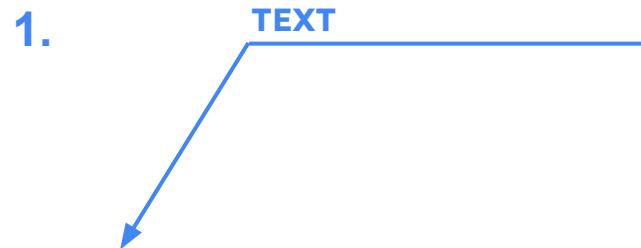
[https://www.youtube.com/watch?v=VjkqA4\\_hIMk](https://www.youtube.com/watch?v=VjkqA4_hIMk)

# Define Mass Source

1.



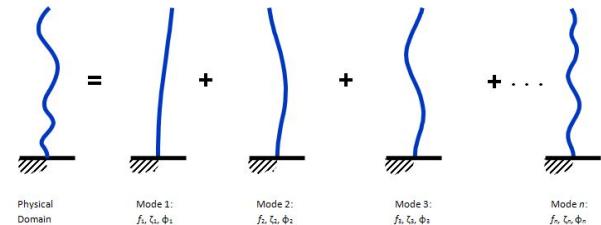
# Time History



# Modal Load Case

1. **TEXT**

**Recall:**



Modes refer to the structures oscillating behaviour.