



# **Structural Analysis & Design Software**

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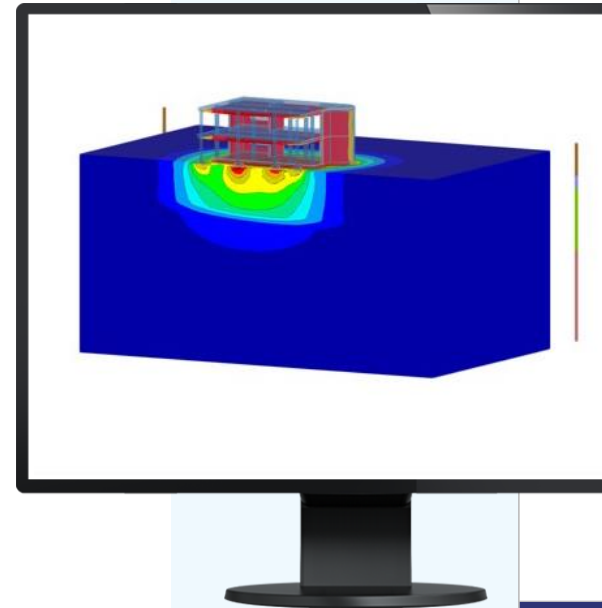


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Webinar

# Geotechnical Analysis with Construction Stages in RFEM 6



# Questions During the Presentation



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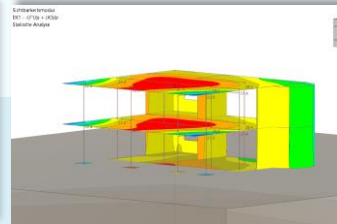
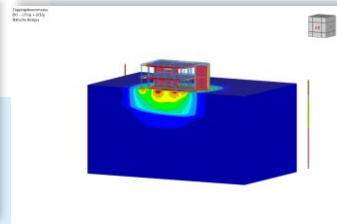
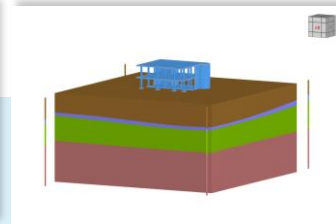
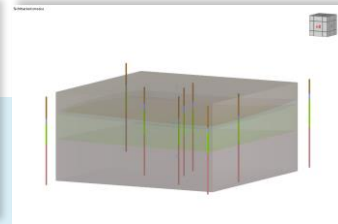
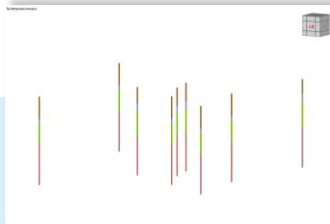
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# Content

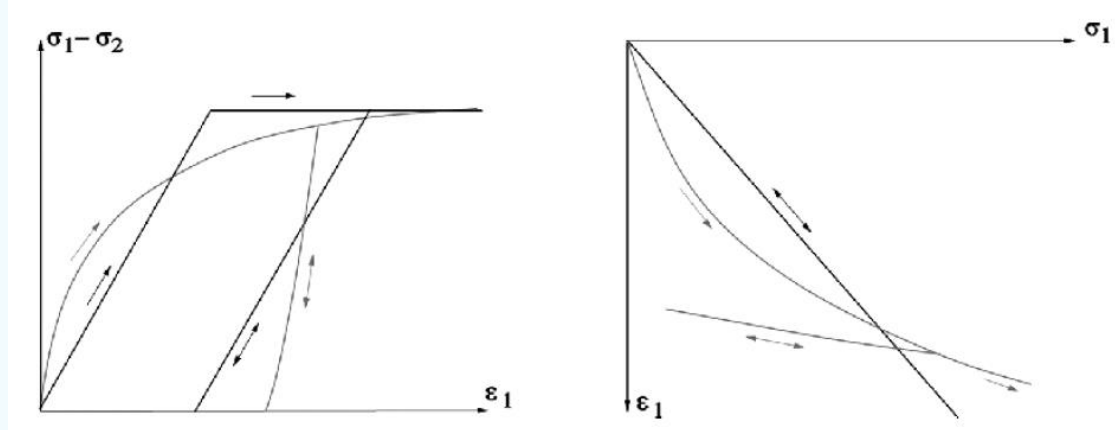
- 01 Theoretical background shortly
- 02 Input for construction stages and geotechnical analysis
- 03 Static analysis and results
- 04 Uneven terrain
- 05 Outlook





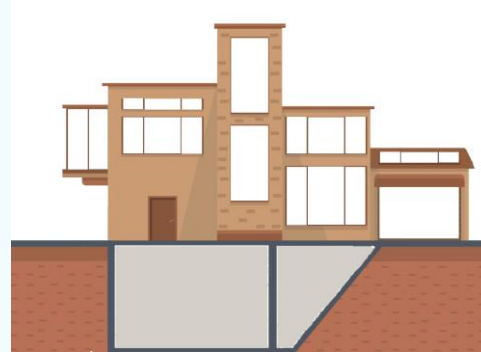
## Overview of mechanical soil material properties

- Stress-level dependency of the stiffness
- Stress-path dependency of the stiffness
- Irreversible displacements



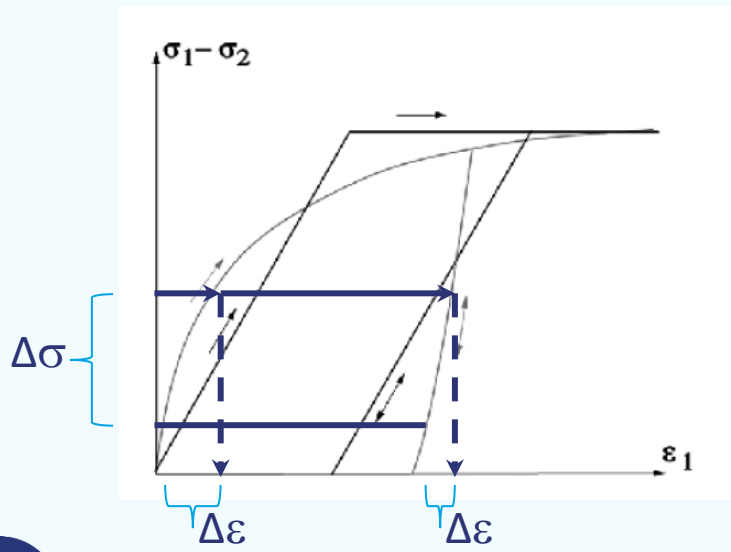
Literature: EANG, German Geotechnical Society DGGT, 2014





# Influence of stress path

- no explicit for a stress state's strain state



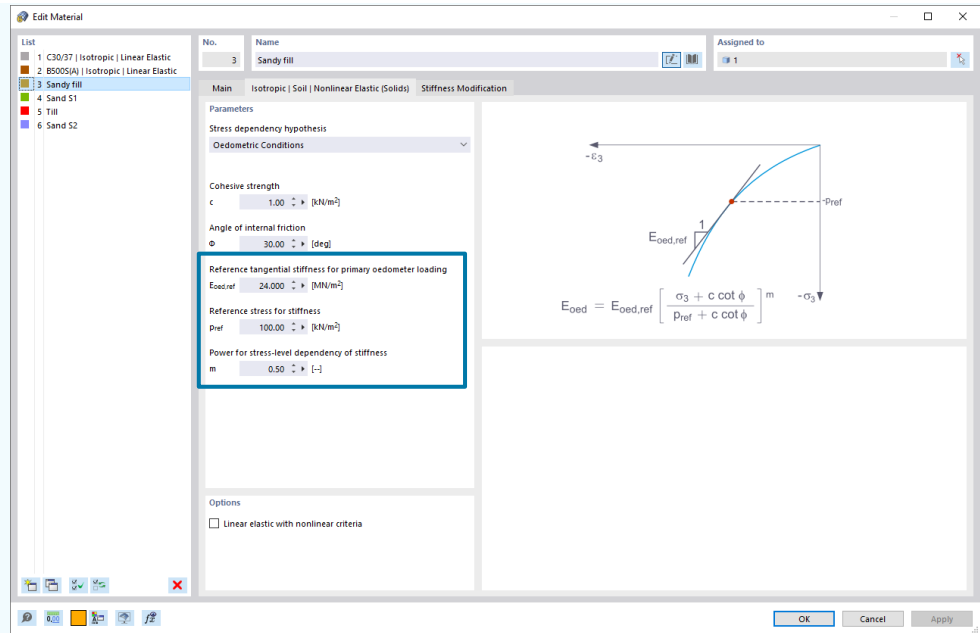
Literature: EANG,  
German Geotechnical  
Society DGGT, 2014

→ In FEM for soil material the construction phases are considered in the analysis for reaching realistic results.





# Parameters



$$E_{oed} = E_{oed,ref} \left[ \frac{\sigma_3 + c \cot \phi}{p_{ref} + c \cot \phi} \right]^m$$

$E_{oed}$  Oedometric modulus

$E_{oed,ref}$  Reference value  $E_{oed}(p_{ref})$

$p_{ref}$  Reference stress

$m$  Power for stresslevel dependency

$m = 0,5$  (sand) ...  $1,0$  (clay)





## Parameters

### From Geotechnical report

Bodenschichten	Wichten		Kohäsion	Reibungs- winkel	Steifemodul Erstbelastung
	feucht $\gamma$ kN/m <sup>3</sup>	Auftrieb $\gamma'$ kN/m <sup>3</sup>			
	$\gamma$ kN/m <sup>3</sup>	$\gamma'$ kN/m <sup>3</sup>	$c'$ kN/m <sup>2</sup>	$\phi'$ °	$E_s$ MN/m <sup>2</sup>
Auffüllungen A	17	10	0	30	-
Sande, mitteldicht gelagert (S1- Sande)	18	10	0	32,5	$15 \cdot \sqrt{z}$
Geschiebemergel	21	11	15	27,5	$10 \cdot \sqrt{z}$
Sande, mitteldicht bis dicht gelagert (S2-Sande)	18,5	10,5	0	35,0	$20 \cdot \sqrt{z}$

z ... Abstand zu Geländeoberkante in m

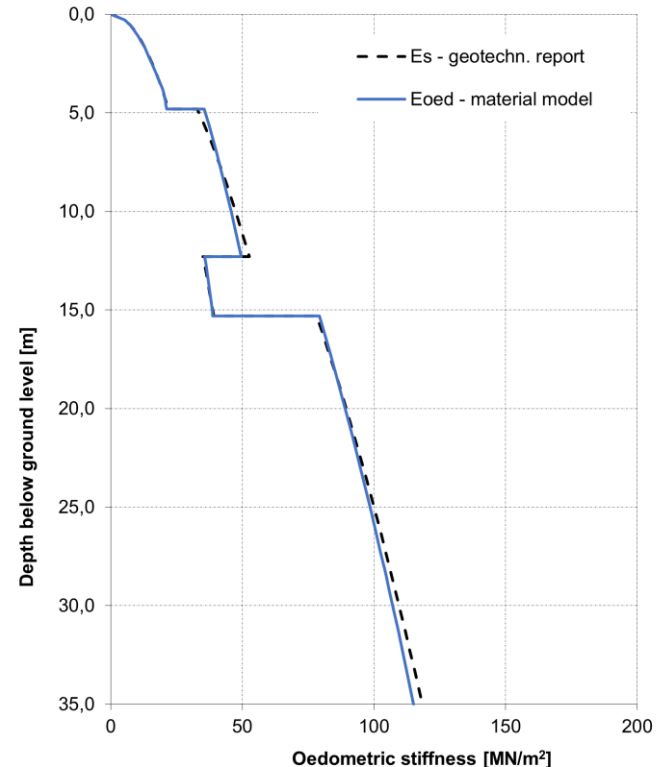
### Adjusted reference values with $p_{ref} = 100 \text{ kN/m}^2$

$$E_{oed,ref,A} = 24 \text{ MN/m}^2$$

$$E_{oed,ref,S1} = 40 \text{ MN/m}^2$$

$$E_{oed,ref,MG} = 30 \text{ MN/m}^2$$

$$E_{oed,ref,S2} = 58 \text{ MN/m}^2$$







## Links

- **Webinar Construction Stages Analysis**

<https://www.dlubal.com/en/support-and-learning/learning/webinars/002683>

<https://www.dlubal.com/en/support-and-learning/learning/webinars/002713>

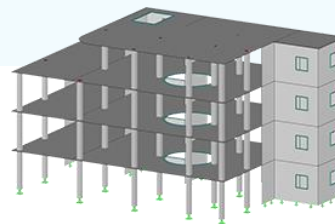
- **Online Manuals**

<https://www.dlubal.com/en/downloads-and-information/documents/online-manuals/geotechnical-analysis>

<https://www.dlubal.com/en/downloads-and-information/documents/online-manuals/csa>

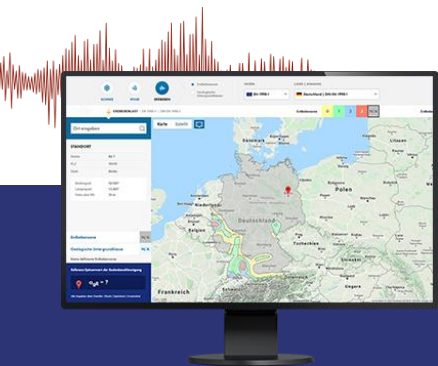


# Free Online Services



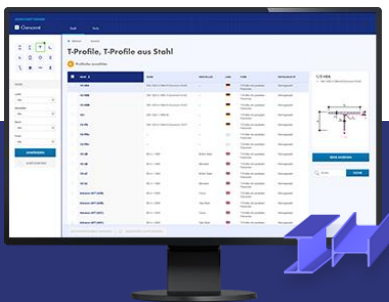
## Geo-Zone Tool

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



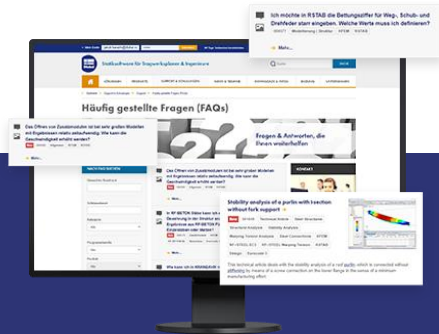
## Cross-Section Properties

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.



## FAQs & Knowledge Base

Access frequently asked questions commonly submitted to our customer support team and view helpful tips and tricks articles to improve your work.



## Models to Download

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





# Free Online Services

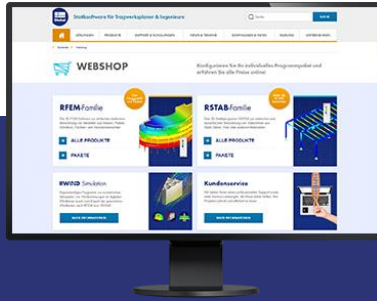
## Youtube Channel - Webinars, Videos

Videos and webinars about the structural engineering software.



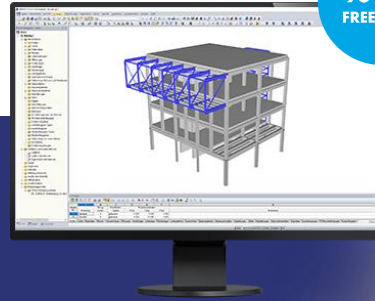
## Webshop with Prices

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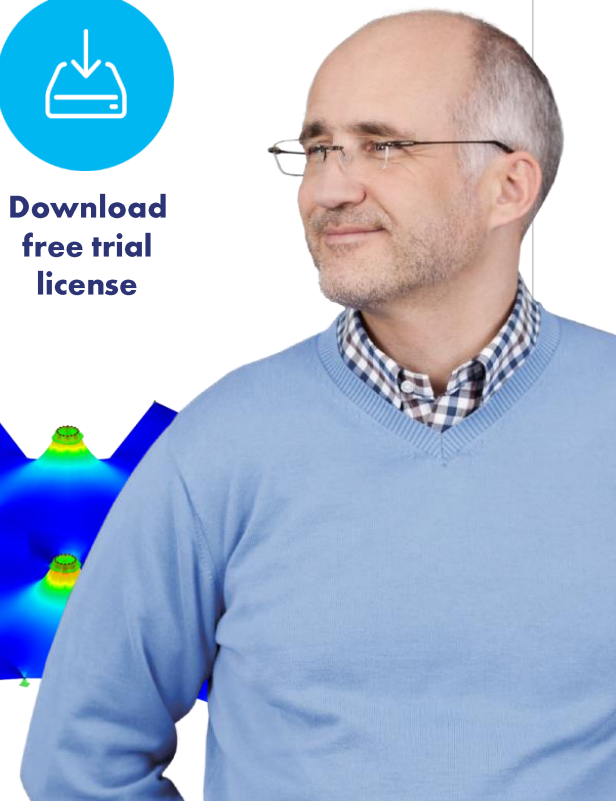
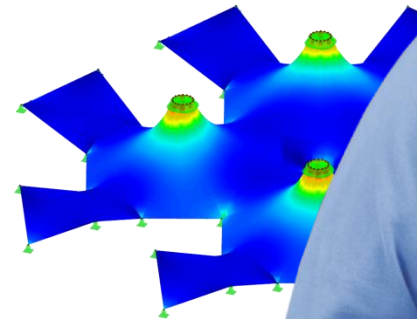
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