



Structural Analysis & Design Software

www.dlubal.com



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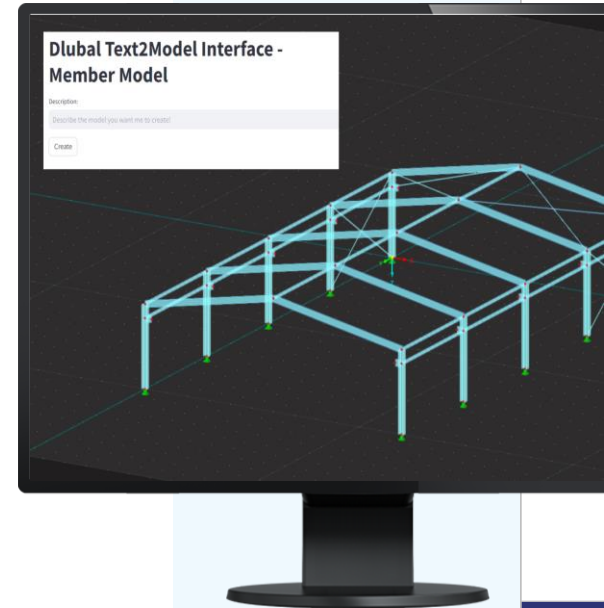


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Webinar

Using AI with RFEM 6



Questions During the Presentation



GoToWebinar Control Panel
Desktop



E-mail: **info@dlubal.com**



Ask questions

2

Questions

No questions yet

Questions from your attendees will appear here.

Submit a question

Enter your question

Your question will be sent to the staff

Send

Adjust audio
settings



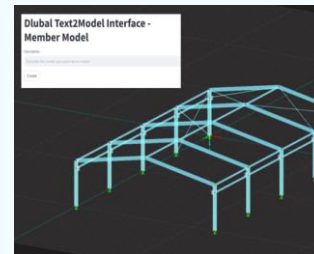
CONTENT

01 **Programming and AI in Structural Engineering**

02 **How to use Dlubal's Support Assistant MIA**

03 **Create models with GPT**

04 **Future vision of Dlubal Software**



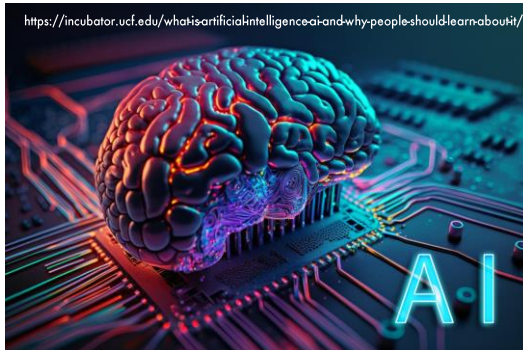


What is Artificial Intelligence?

“Popular Presentation”

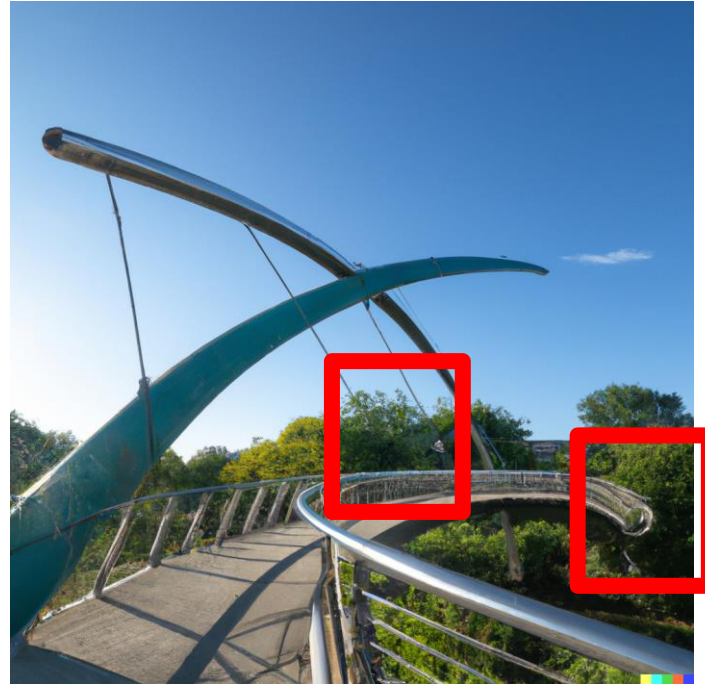
vs.

Reality

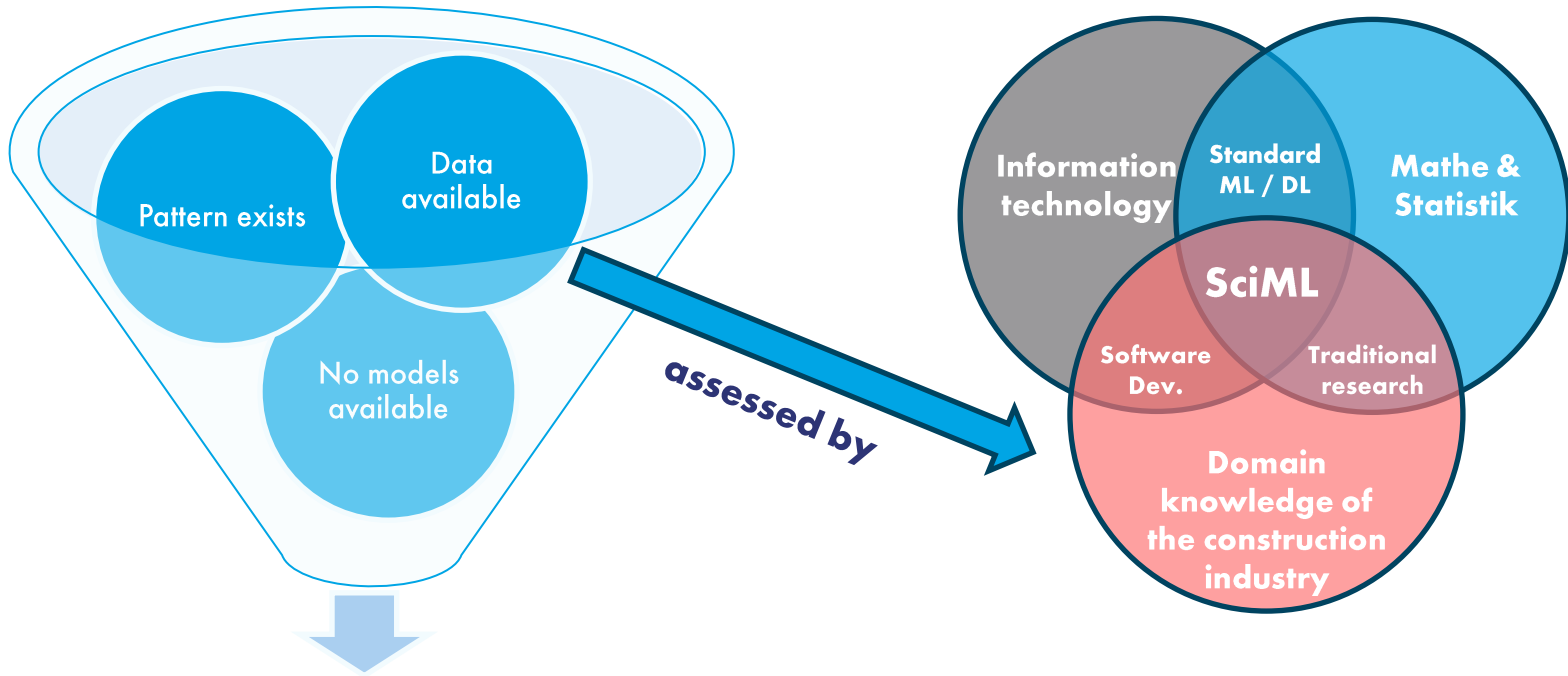


Why we deal with AI at Dlubal...

This is what DalleE2 understands by a “sustainable concrete bridge over a river”

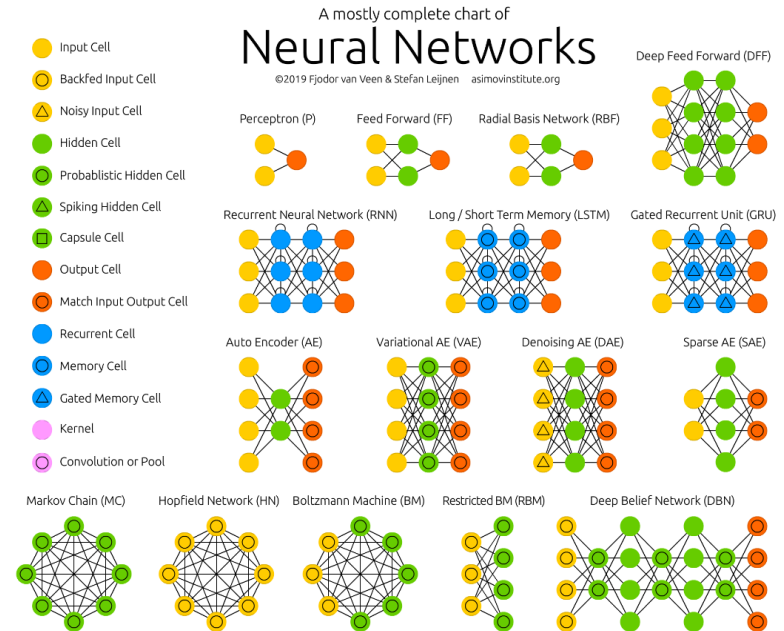
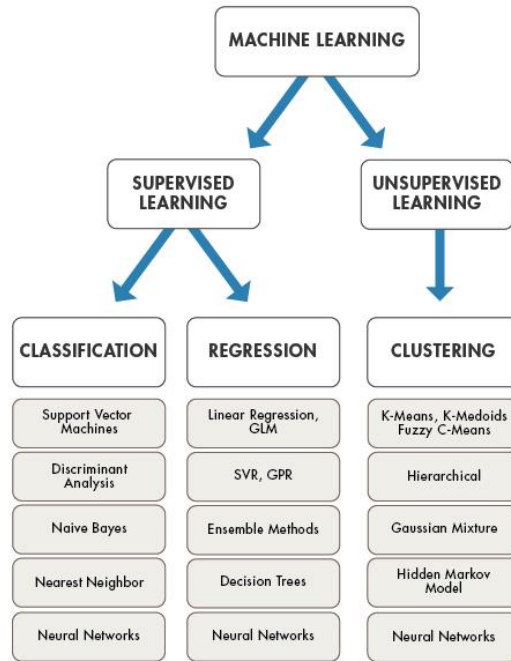


Ingredients of artificial intelligence (AI)

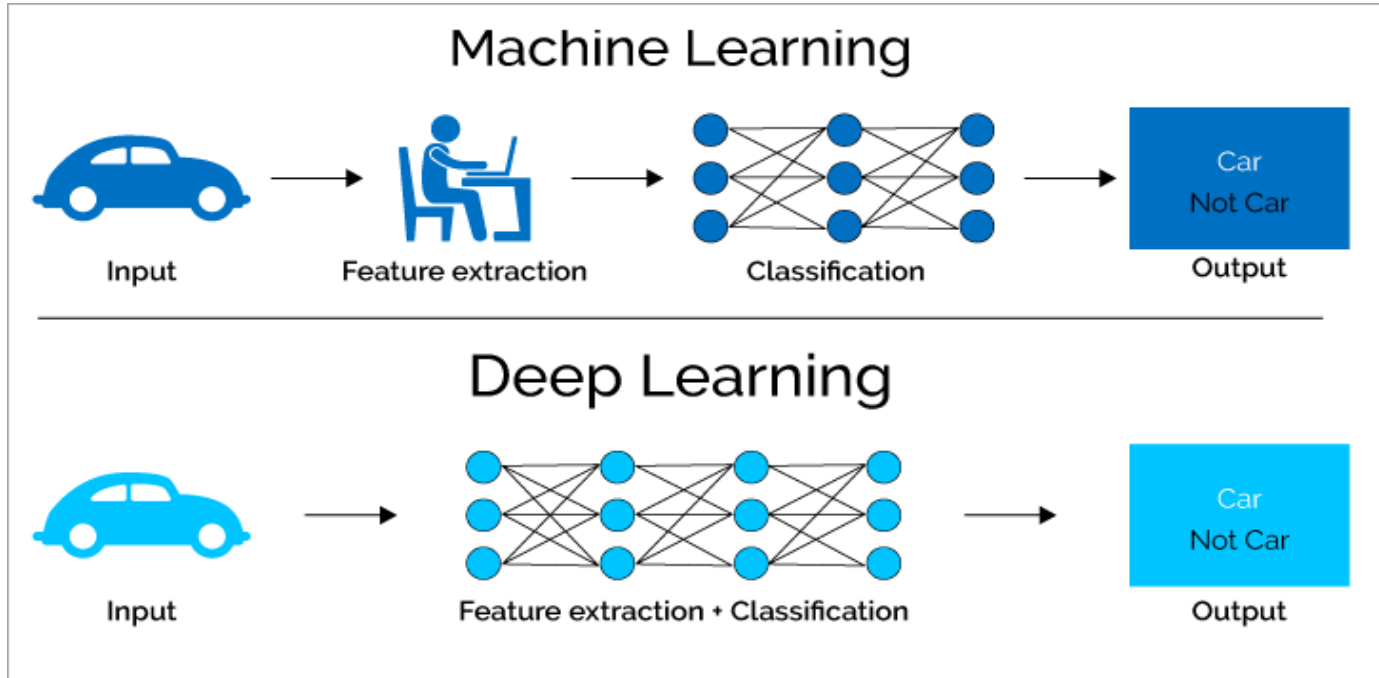


Necessary prerequisites for the
(sensible) use of AI

Machine and deep learning algorithms (ML/DL)



Difference between Machine and Deep Learning

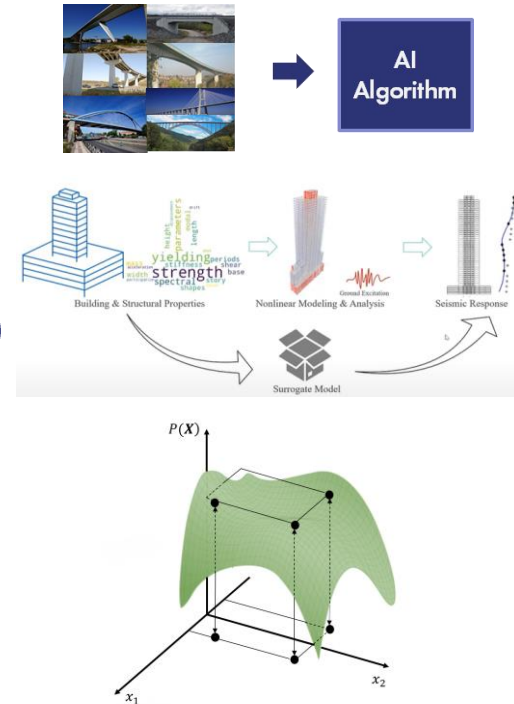


<https://cdn.softwaretestinghelp.com/wp-content/qa/uploads/2019/04/DeepLearning.png>



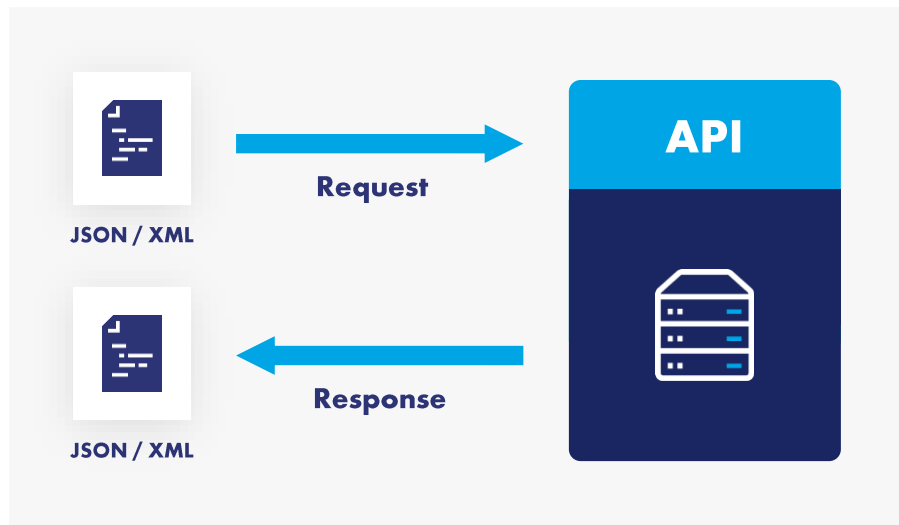
What should AI be used for in the construction industry?

- if empirical models are used anyway
- if the “physics-based” model is “incomplete”
- for mining databases
- to save time (e.g. meta- and surrogate models & optimization)



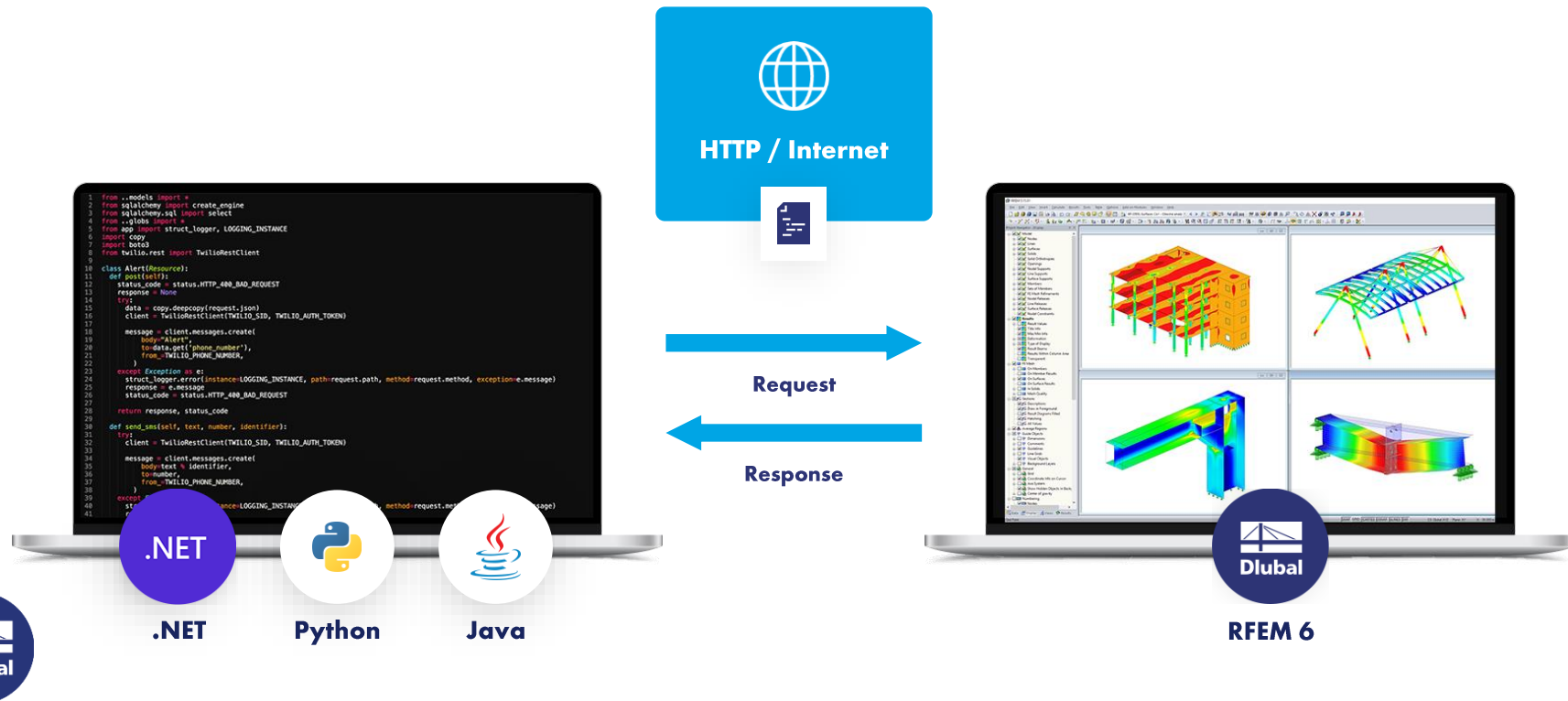


What is an API?





What are Webservices?





— Dlubal Github Repository

<https://github.com/Dlubal-Software>

The screenshot shows the GitHub profile for Dlubal-Software. The header includes the repository name, a search bar, and navigation tabs for Overview, Repositories (24), Discussions, Projects (3), Packages, Teams (3), and People (39). The profile section features the Dlubal logo, the name 'Dlubal Software', the description 'Structural Analysis and Design Software | RFEM | RSTAB', and social links for 61 followers, Prague location, website, and social media handles. A 'Follow' button is present. The main content area displays the README file, which includes the Dlubal logo, social media links, and version tags for RFEM v6.0, RSTAB v9.0, and RSECTION v1.0. A 'Welcome' message follows, stating that the repository contains open-source libraries developed in Python & C# for WebService. The right sidebar shows the repository is public, a section for top discussions, a list of people, and a section for top languages (C++, Python, C#, C, HTML).



Support Assistant „Mia“

- “Generative AI” based chat bot
- trained on our data from FAQ, knowledge base and manuals
- can be used both on the website and within the Dlubal programs





Support Assistant "Mia" - in the Dlubal software

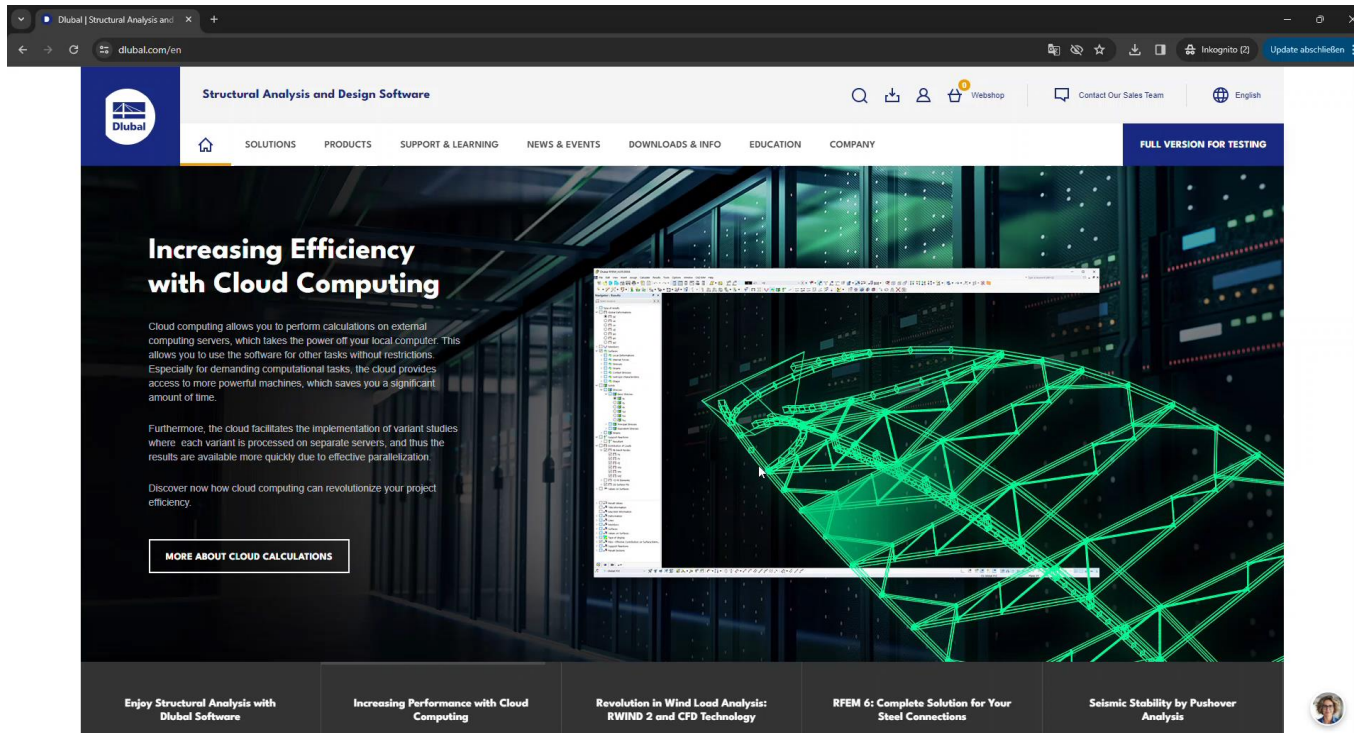
The screenshot displays the Dlubal RFEM software interface. The main window shows a 3D model of a structure. On the right side, there is a chat window titled "Ihre KI-Assistentin Mia". The chat window contains a message from Mia: "Hi, I'm Mia, your AI assistant. Ask anything in your language." Below the message is a text input field and a "SEND" button. The chat window also shows a list of files: "Benutzer-Skripte", "Dlubal-Skripte", "examples", "includes", and "python".

The bottom of the interface shows a table with material properties. The table has columns for Material, Name des Materials, Material-typ, Materialmodell, Elastizitätsmodul E [N/mm²], Schubmodul G [N/mm²], Querdehnzahl ν [-], Spez. Gewicht γ [kN/m³], Dichte ρ [kg/m³], Wärmefähigkeit α [1/°C], Optionen, and Kommentar. The table contains one row of data for material S235JR.

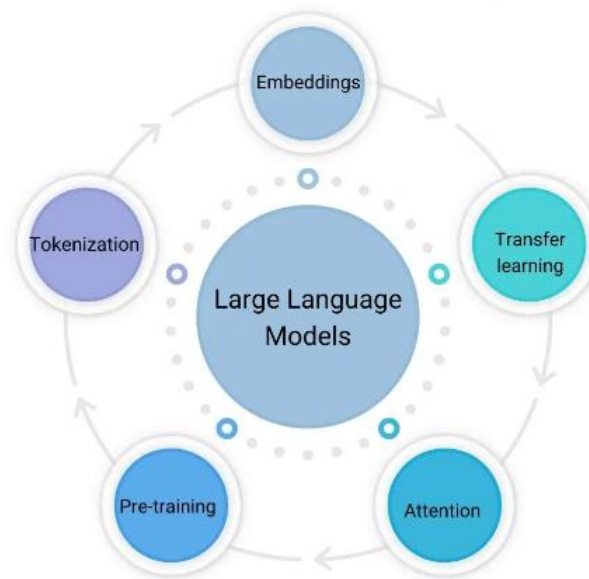
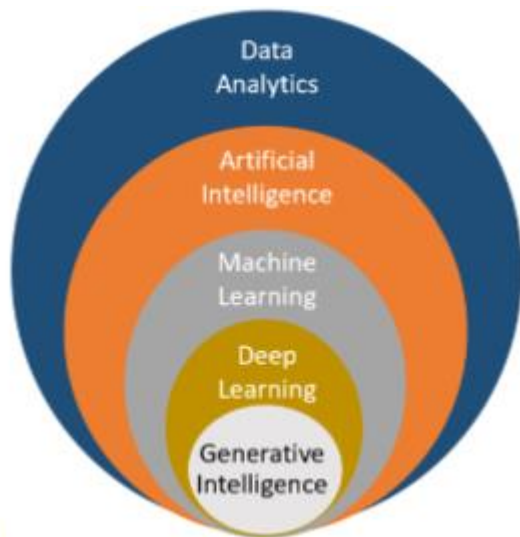
Material	Name des Materials	Material-typ	Materialmodell	Elastizitätsmodul E [N/mm²]	Schubmodul G [N/mm²]	Querdehnzahl ν [-]	Spez. Gewicht γ [kN/m³]	Dichte ρ [kg/m³]	Wärmefähigkeit α [1/°C]	Optionen	Kommentar
3	S235JR	Stahl	Isotrop Linear elastisch	210000.0	80799.2	0.300	7.850	7850.00	6.000012		



Support Assistant “Mia” - on the website



Basic concepts of Large Language Models (LLMs)





Basic concepts of Large Language Models (LLMs)

Tokens
106

Characters
364

```
Write a product launch email for new headphones.

This product is AI-powered and priced at $79.99.

The tone is friendly and exciting.

Output as a JSON object with "subject" and "body" fields.

Example:
{
  "subject": "Introducing Our New AI-Powered Headphones!",
  "body": "We are thrilled to announce the launch of our new AI-powered headphones"
}

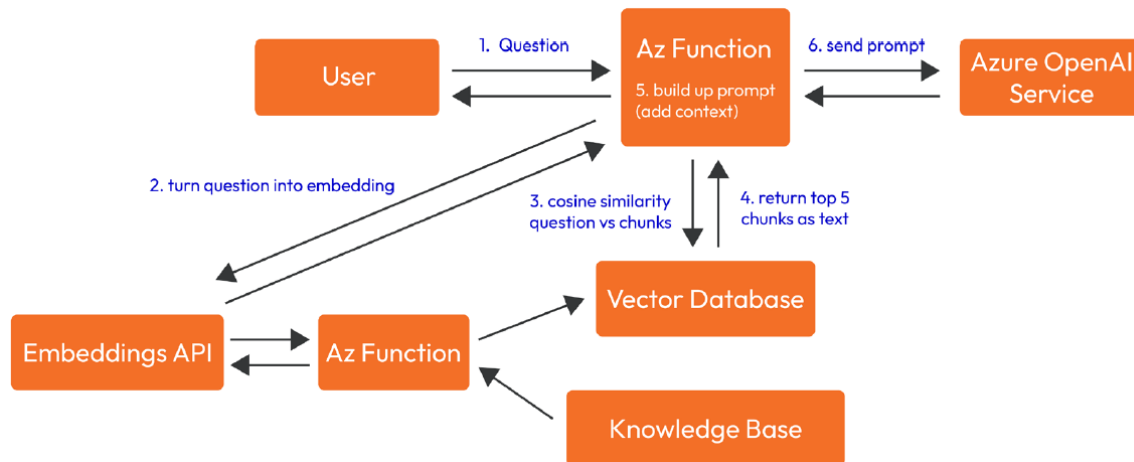
Output:
```

- Use whitespaces carefully
 - Tokens can sometimes be counter-intuitive
- ```
October, 18th 2022
October 18 2022
2022/10/18
10-18-2022
10-18-22
```
- Tabular data is space-efficient

## Grounding LLMs

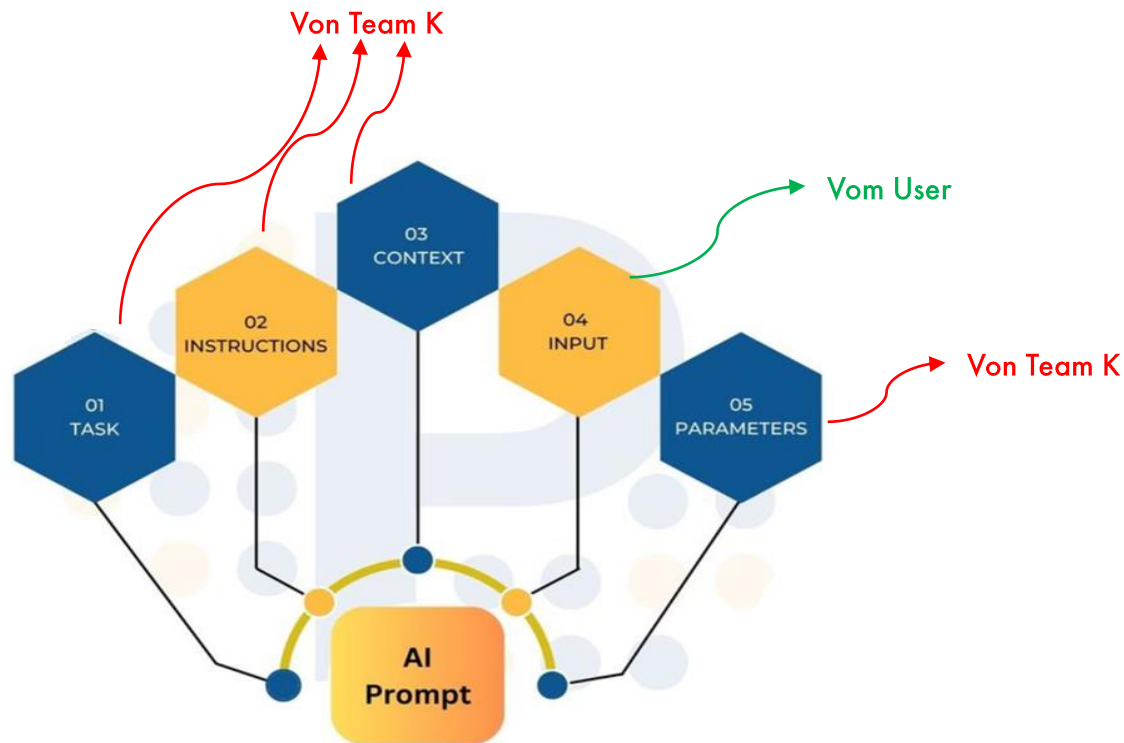
**Grounding:** Providing your own data for the LLM

**Idee:** Reusing the same LLM pipeline but with different data sources for different end users





# Prompt Engineering – Background





## — Prompt Engineering – Example

Task

Instruction

**I am a structural engineer.** I will provide you with details related to statics. You should be familiar with the terminology of structural calculations, formulas, design approaches in solid, steel, timber and composite construction as well as mechanics and mathematics.

My first request is: "I need help with the calculation of a reinforced concrete slab. How can I apply a surface load in RFEM?"

Input



# Prompt Engineering - Instructions in the FAQ

## Instructions for prompting Mia:

<https://www.dlubal.com/de/support-und-schulungen/support/faq/005515>

### Mia Prompting

“ Wie stelle ich meine Frage an Mia, damit sie die optimale Antwort findet?

**Antwort:**

Bei der Interaktion mit Mia – unserer auf generativer Künstlicher Intelligenz basierenden Assistentin – sollten Sie bestimmte Aspekte beachten, damit Sie bestmögliche Antworten erhalten. Hierzu geben wir Ihnen einigen Regeln aus dem sogenannten [Prompt Engineering](#) an die Hand, die das **Prompting** von Mia erleichtern und zu optimalen Antworten führen.

**Hintergrund: Was ist ein Prompt?**

Das Wort "prompt" leitet sich vom englischen Verb "to prompt" ab und bedeutet, eine sofort zu erledigende Aufgabe zu übergeben. Ein Prompt ist im Fall von Mia ein Input von Nutzenden, zu dem Mia eine passende Antwort erzeugt.

Ein textbasierter Prompt an Mia kann Wörter, Buchstaben, Sonderzeichen, Zahlen und Links enthalten. Weiterhin kann der Prompt als Frage, Aufforderung oder kurze Themenbeschreibung gestaltet sein. Mit Mia kann ein ganzer Dialog erfolgen, indem wechselseitig eine Prompt-Eingabe an Mia erfolgt und Mia ihre Antworten generiert.

Das Hauptziel von "Prompt Engineering" ist es, eine präzise, möglichst eindeutige, umfassende und effektive Eingabe zu schaffen, die qualitativ hochwertige Antworten gewährleistet. Hierzu finden Sie nachfolgend einige Hinweise und Anleitungen.

**Empfehlungen zum Prompting für Mia**

- Verwenden Sie vollständige, kurze und klare Sätze und nennen Sie das Implizite.

Mia ist keine Stichwortsuche, sondern die KI-Assistentin benötigt einen vollständigen Prompt. Mit Stichworten erhalten Sie zwar eine Antwort; diese kann jedoch sehr vom erwarteten Ergebnis abweichen. Um sicherzustellen, dass die Antwort mit der eigenen Erwartungshaltung übereinstimmt, sollten Sie daher **vollständige, kurze und klare Sätze** verwenden, die Mia versteht. Ebenfalls hilft es Mia sehr, wenn Sie Implikationen in den Prompts verdeutlichen und möglichst genaue Anweisungen geben oder Erwartungen klar benennen.





# Prompt Engineering - Instructions in the FAQ

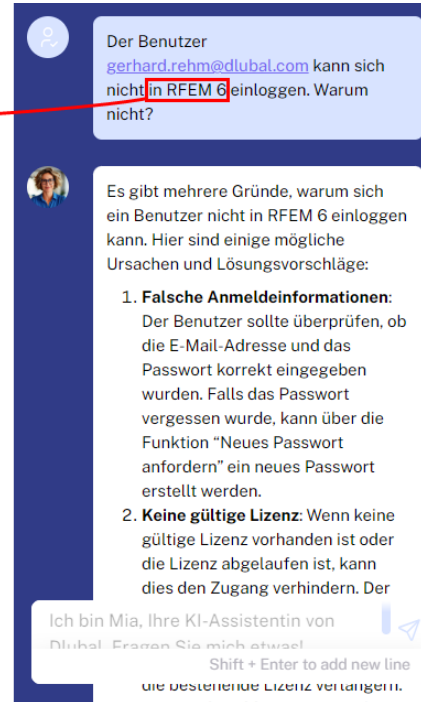
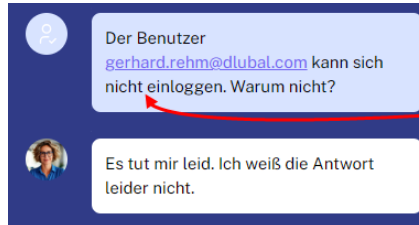
## Goal

create a precise, clear, comprehensive and effective input that ensures high-quality answers.

## Prompting recommendations for Mia

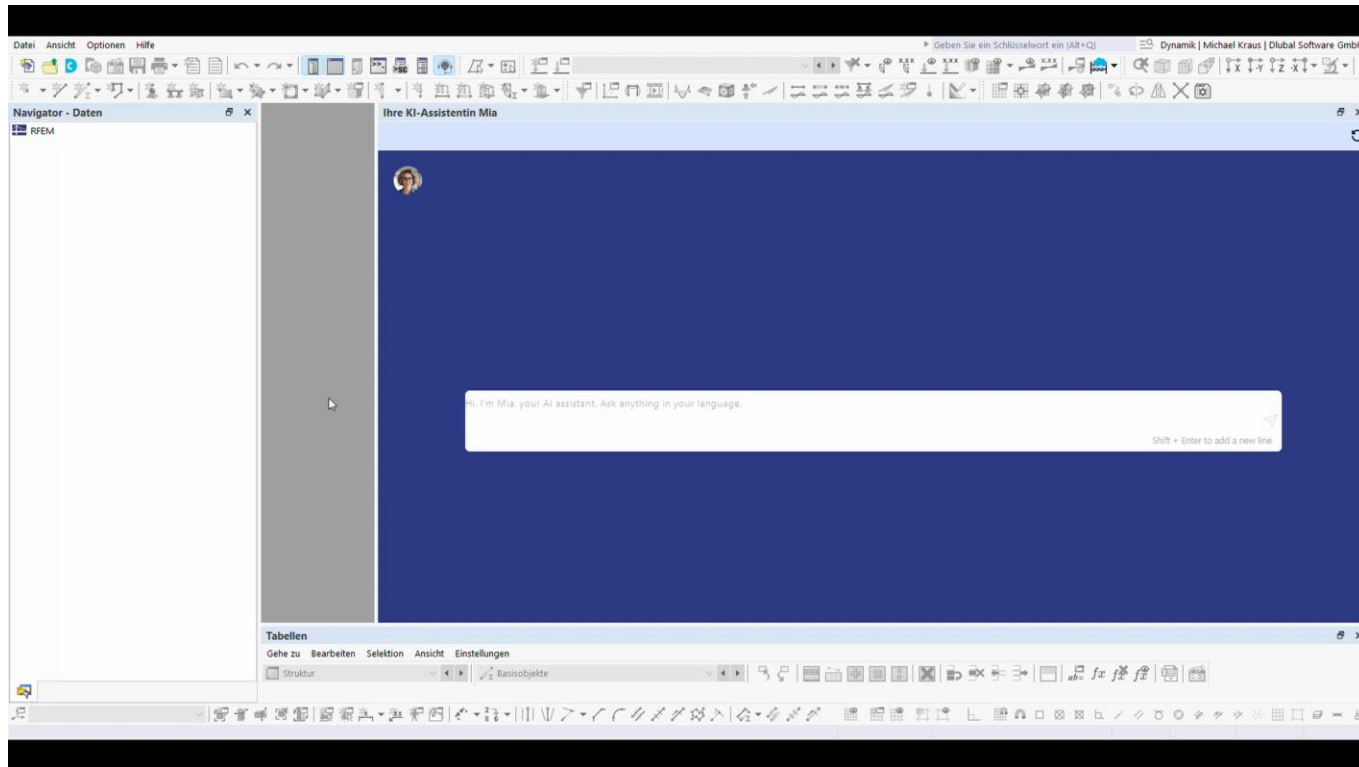
- Use complete, short and clear sentences and state what is implicit.
- Present all the necessary details as vividly as possible: The more precise, the better.
- Break the task down into small, manageable steps. If necessary, ask several questions in one chat.
- Be specific about what is expected. Ask your question as precisely as possible and with context.
- State the most important thing at the beginning or at the end.

# Prompt Engineering – Hands-on



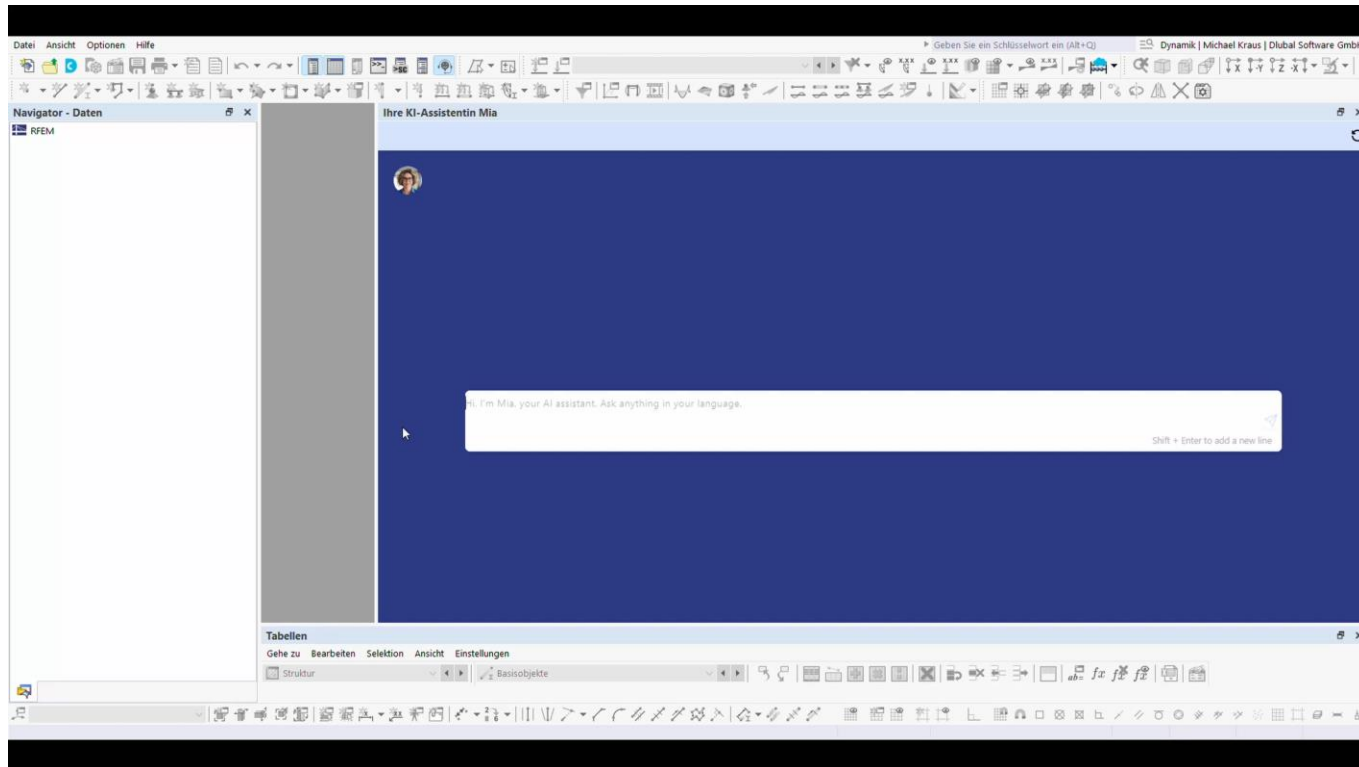


# Prompt Engineering – Hands-on: Instability



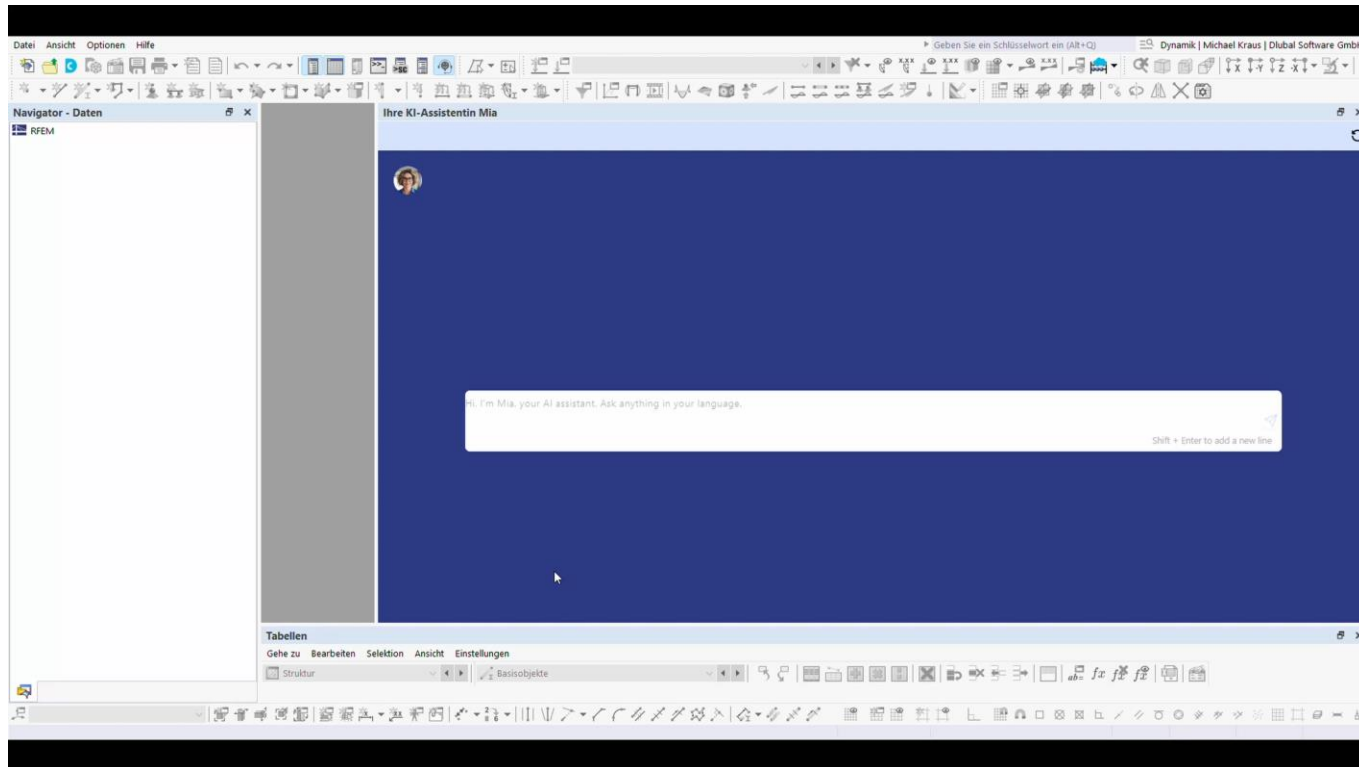


# Prompt Engineering – Hands-on: Instability





# Prompt Engineering – Hands-on: Formulas



# Support Assistant „Mia“ – Feedback and Links

Ihre KI-Assistentin Mia

$$V_{\max} = \frac{5 \text{ kN/m} \cdot 10 \text{ m}}{2} = 25 \text{ kN}$$

### Maximales Moment

Das maximale Biegemoment  $M_{\max}$  tritt in der Mitte des Trägers auf und wird berechnet mit:

$$M_{\max} = \frac{q \cdot L^2}{8}$$

Setzen wir die gegebenen Werte ein:

$$M_{\max} = \frac{5 \text{ kN/m} \cdot (10 \text{ m})^2}{8} = 62,5 \text{ kNm}$$

### Zusammenfassung

- Maximale Querkraft: 25 kN
- Maximales Moment: 62,5 kNm

Diese Werte sind entscheidend für die Bemessung und Analyse des Trägers unter der gegebenen Last.

Where did this answer come from?

Ergebniskombinationen | 1. Grundlagen

Ergebniskombinationen | 1. Grundlagen

<https://www.dlubal.com/de/support-und-schulungen/support/knowledge-base/0014...>

Hi, I'm Mia, your AI assistant. Ask anything in your language.

Shift + Enter to add a new line

Your feedback on Mia's answers is important!

Ctrl + C calls up the hyperlink



# — Creating models with GPT

Schritt 1: Erstellen eines openAI Kontos und finden des Keys

Step 2: Download the files for the RFEM bot in the "ChatGPT\_Tank" folder

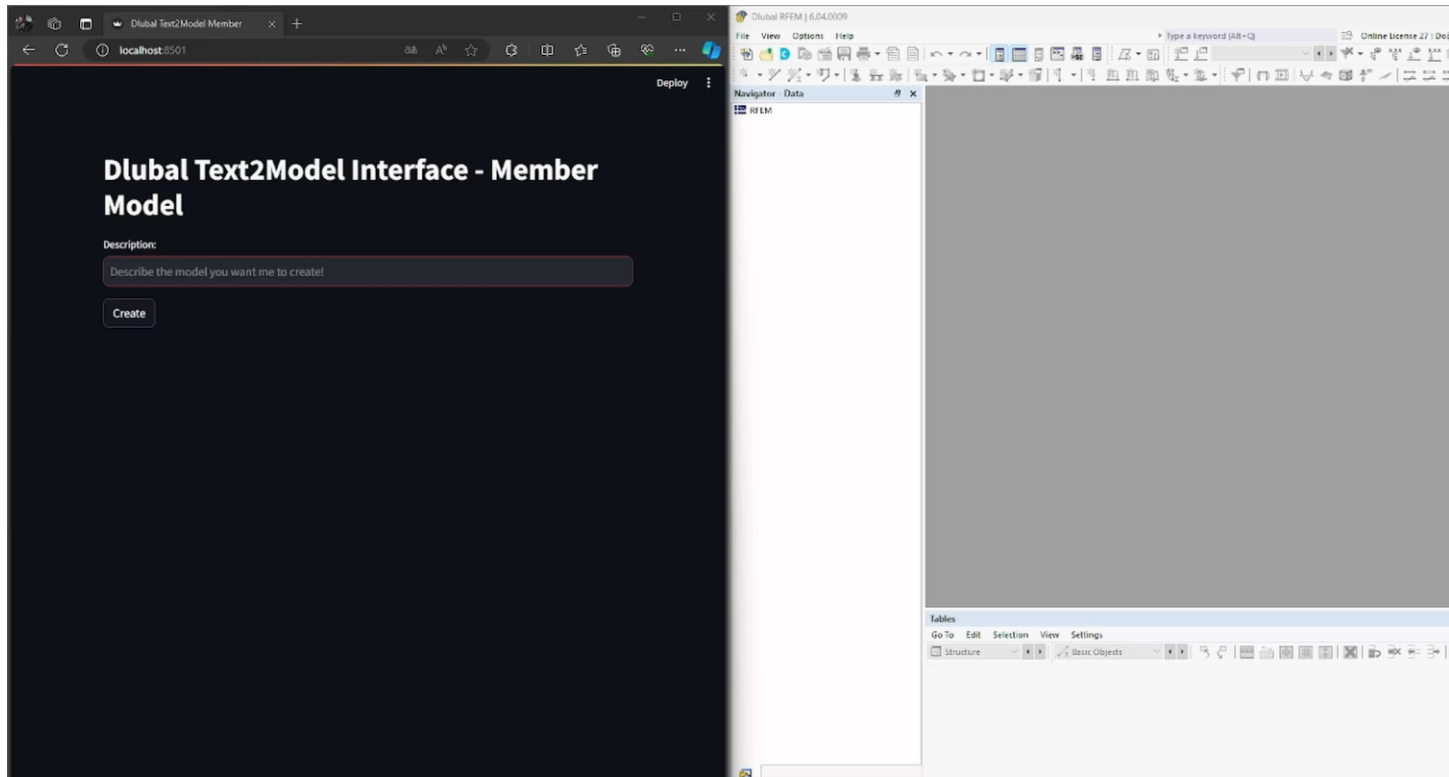
[https://github.com/Dlupal-Software/RFEM\\_Python\\_Client/tree/main/Examples](https://github.com/Dlupal-Software/RFEM_Python_Client/tree/main/Examples)

Step 3: Open the file "ChatGPT\_Tank\_E.ipynb "





# Erstellen von Modellen mit GPT





## Timeline of our future developments



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Get valuable insights from one of our experts



**Dipl.-Ing. (FH) Dipl.-  
Wirtschaftsing. (FH)  
Christian Stautner**

Head of Sales



**Bastian Ackermann, M.Sc.**

Sales



**Daniel Dlubal, M.Sc.**

COO of Dlubal Software GmbH



➔ **Contact Our Sales Team**

# Free Online Services

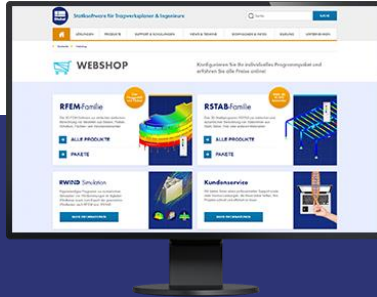
## Youtube Channel - Webinars, Videos

Videos and webinars about the structural engineering software.



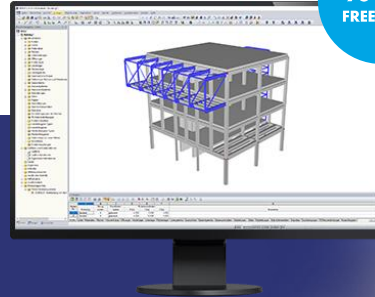
## Webshop with Prices

Configure your individual program package and get all prices online!



## Trial Licenses

The best way how to learn using our programs is to simply test them for yourself. Download a 90-day free trial version of our structural analysis & design software.



We offer free support via email and chat



90-DAY  
FREE TRIAL

# — Get Further Details About Dlubal



Visit website  
[www.dlubal.com](http://www.dlubal.com)

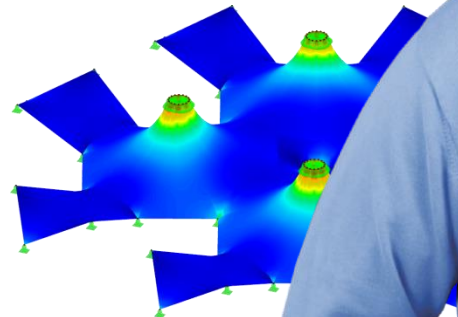
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