

SyMSpace Development

SyMSpace Days

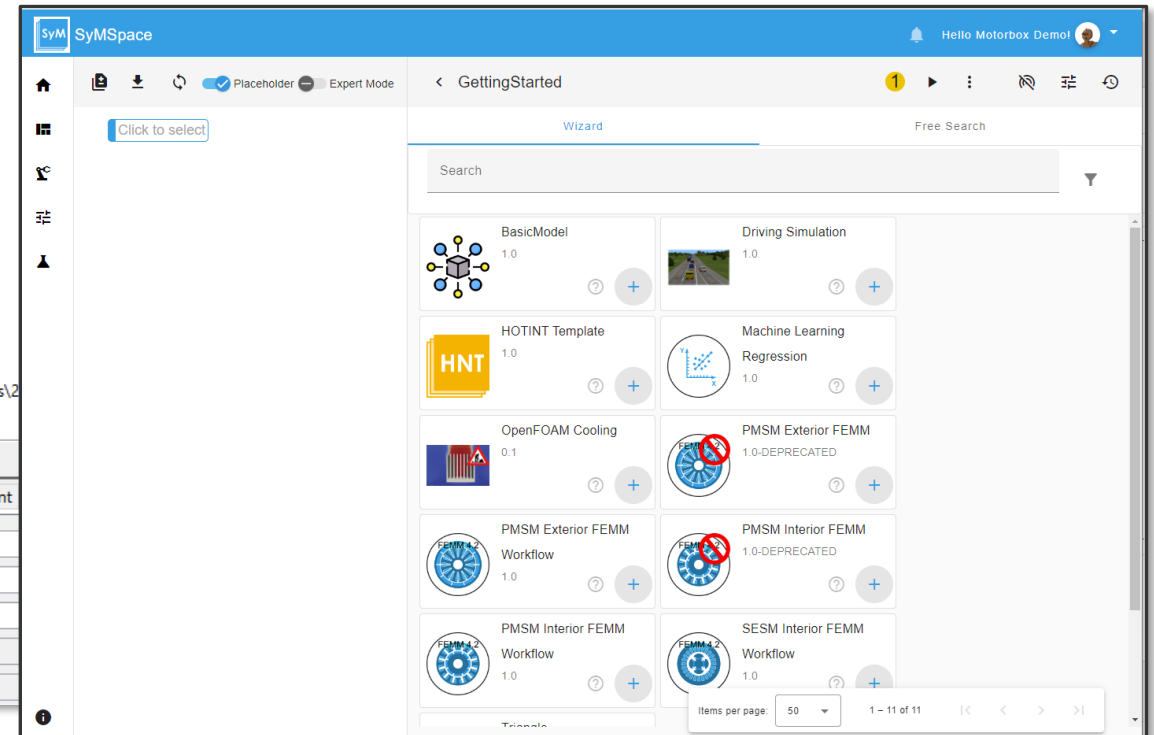
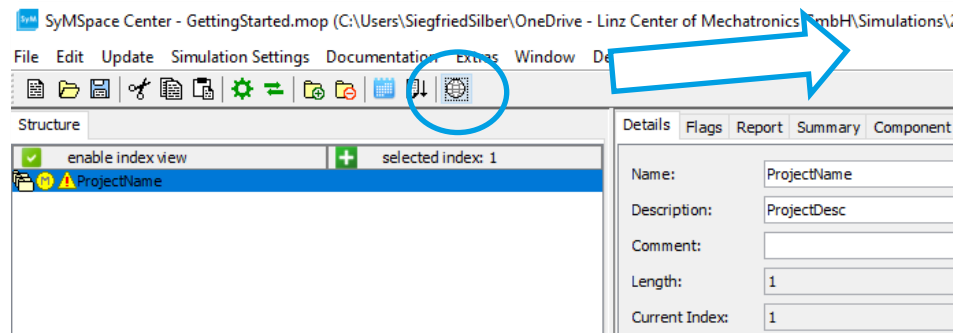
September 18-19, 2024

SyMSpace Web

SyMSpace Web

Getting Started

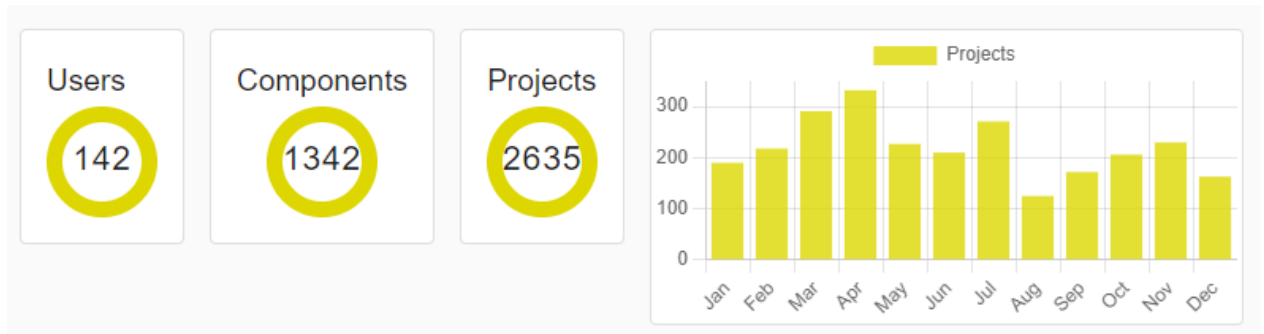
- Launch SyMSpace locally and create a new project.
- Open the Web GUI via *Extras* -> *Open Webgui* or use *CTRL + W*.
- Log in with a user account (case-sensitive username).



SyMSpace Web

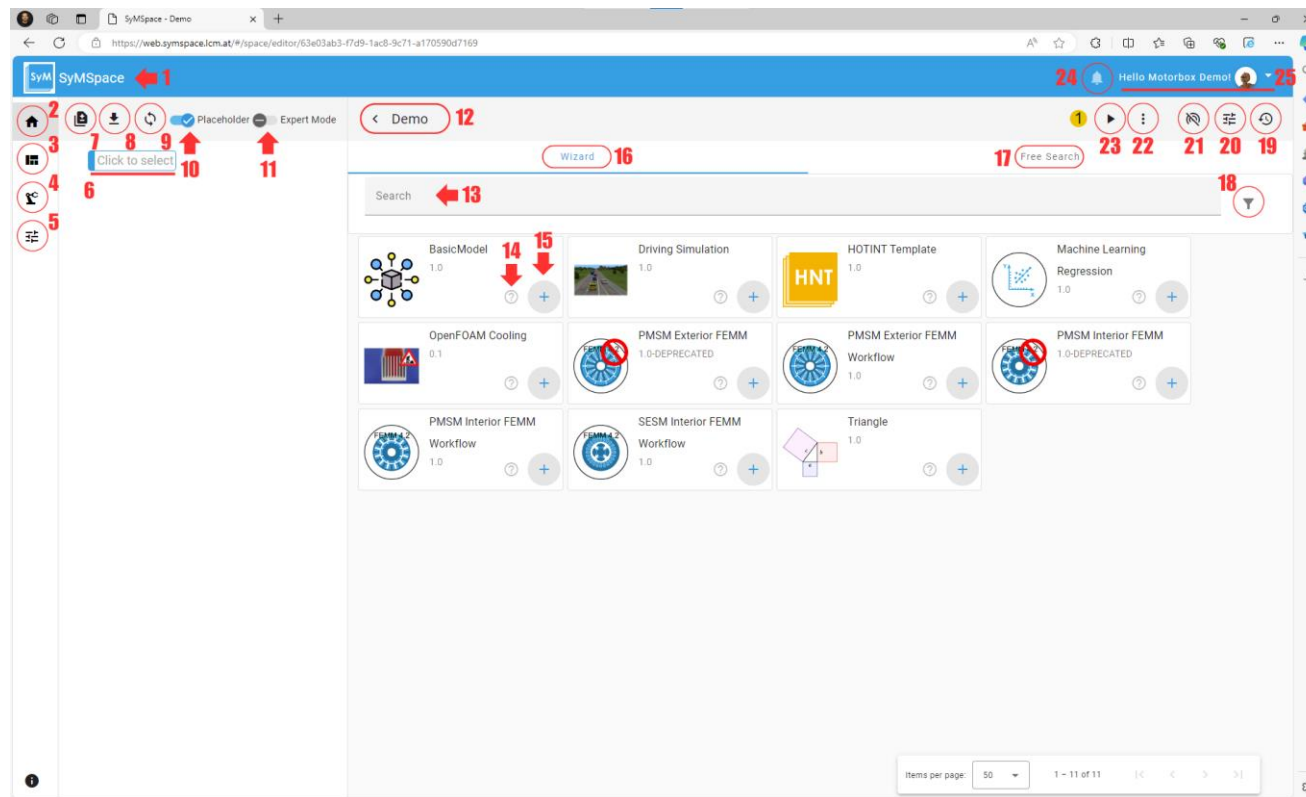
Overview

- SyMSpace Web will gradually replace the SyMSpace desktop application.
- Enhancements in usability are prioritized.
- Installation of Simulation Components is no longer required.
- Components are downloaded from server.
- Simulation workflow is stored and executed locally.
- Data is stored on the local machine.



SyMSpace Web

Project Screen



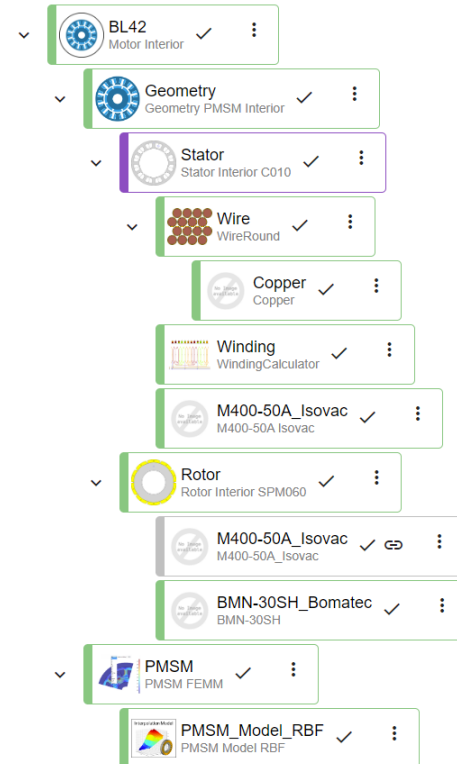
1. SyMSpace Web home screen button -> see the Home Screen.
2. SyMSpace Web home screen button -> see the Home Screen.
3. Components browser -> see the Components Screen.
4. Projects browser -> see the Projects Screen.
5. Parameters control panel -> see the Parameters control panel Screen.
6. Project tree viewer
7. Download Delta button: to download delta.json file
8. Download Evaluation button
9. Synchronize Labels button
10. Placeholder button: controls the view
11. Expert mode: shows advanced options and fields of the project
12. The name of the current project
13. Search bar
14. Component information: opens sub-window with graphs, tables, and preview
15. Select the component button
16. Wizard: the suggested component for the project
17. Search for all components (components browser)
18. Search filter tool
19. Change history
20. Open attribute editor button
21. Disconnect from desktop client button
22. Simulation setting
23. Run simulation button
24. Notification box
25. User profile

SyMSpace Web

Project Editor vs. Attribute Editor

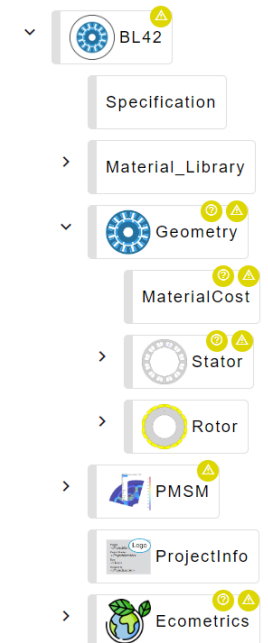
Project Editor

- Component view
- Simplified representation for easier navigation
 - Parameters, previews and documentation files are limited.



Attribute Editor

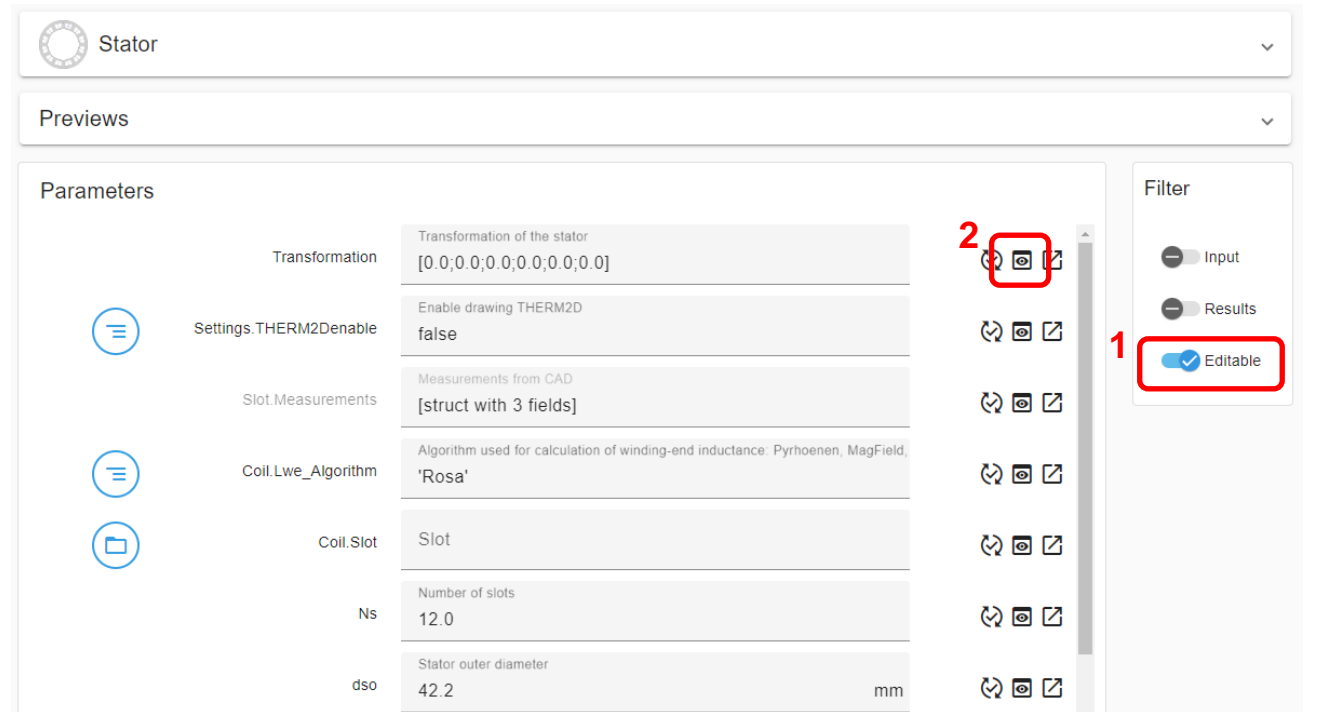
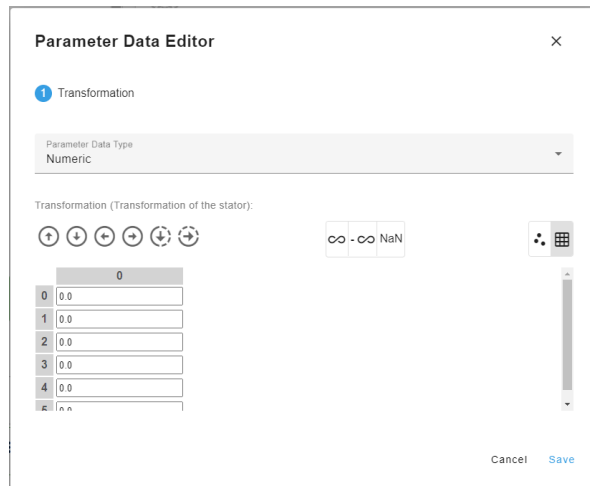
- Tree view as in SyMSpace desktop
- Full representation
 - All parameters, previews and documentation files are displayed.



SyMSpace Web

Parameter Editor

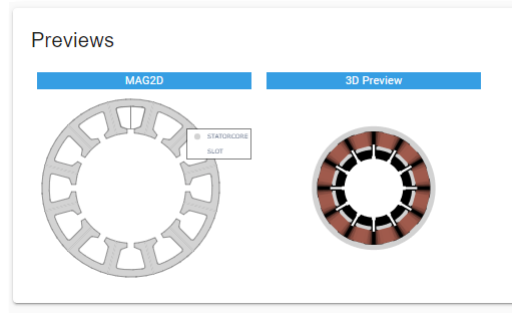
1. Setting the filter to "Editable" shows input parameters only.
2. Complex data types can be modified with the Parameter Data Editor



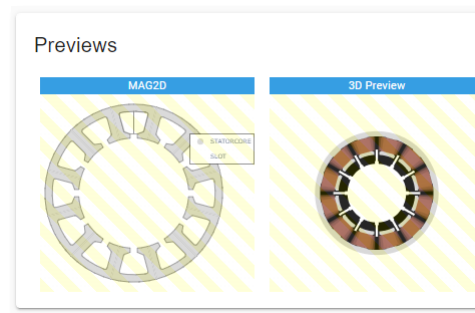
SyMSpace Web

Previews

- Figures can be opened in a separate window.
 - If parameters are modified, the background is shaded in yellow



Parameter values and view are consistent.



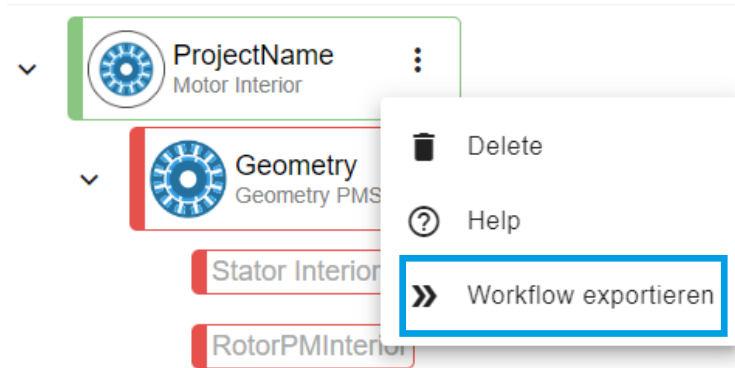
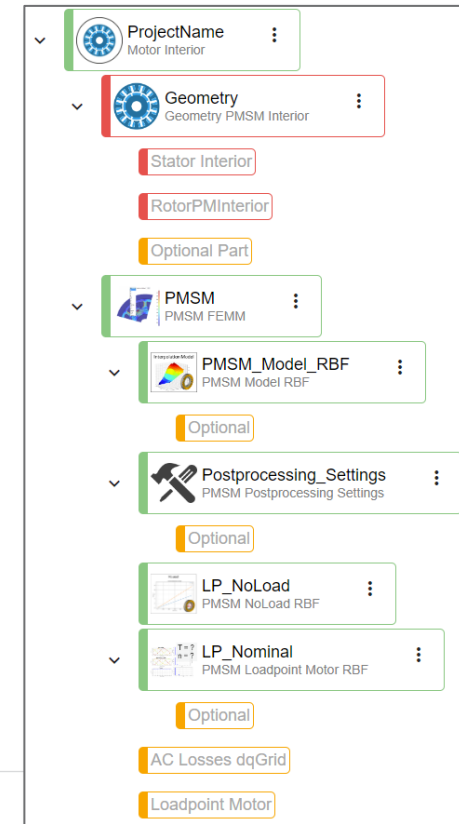
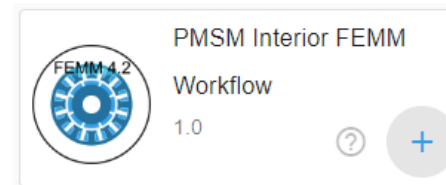
Figures are uncertain.

- Interactive previews using Plotly Dash are now supported.

SyMSpace Web

Workflow Components

- Parts of projects can be defined as workflow
- Download of Workflow definition file is possible



SyMSpace Web

Workflow Components

- Definition of workflow Components with YAML file
- Supports operation with parameters
 - Setting values (setData)
 - Setting of import and export parameter links (setImportAssignments)
 - Lock and unlock fields (setLock)
 - Convert parameters (toLinkedField, toFormula)

```
Filter:
UserGroup: MotorBox
Workflow:
  name: Stator Interior C010
  path: Part.MotorPart.StatorCoreInterior.Stator_Interior_C010
  version: '1.0'
  settings: []
  children:
    - name: WireRound
      path: Material.MaterialFunctions.WireRound
      version: '1.0'
      ruleGuid: 119af45c-1bc3-43d1-a60d-da58954be8ed
      settings: []
      children:
        - name: Copper
          path: Material.Metal.Nonferrous.Copper
          version: '1.0'
          ruleGuid: c29b8346-8cd0-4eb7-ae26-64f7759d6a24
          settings: []
          children: []
        - name: WindingCalculator
          path: KnowledgeEngines.Magnetics.Winding.WindingCalculator
          version: '1.0'
          ruleGuid: 6799ed86-9060-4c6b-a0e6-9cdf7b2eba3c
          settings:
            - '{self}.Ns':
              - toLinkedField:
                - setImportAssignments: { 'link': 'Ns' }
```

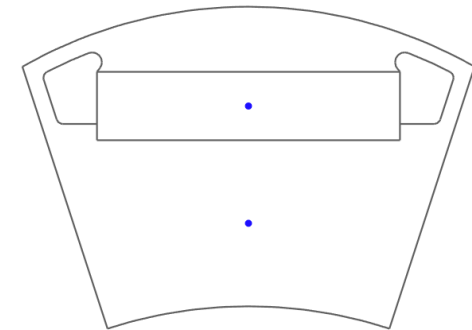
Script Geometry

Geometry

Script Geometry

- Geometry is defined via Python script
 - Definition of slot or magnet pole
 - Code development can be done without SyMSpace
- Interactive dashboard with geometry parameters
 - Quick parametrization of geometry
- Generation of CAD files
 - DXF
 - STEP with Open Cascade
 - OBJ for 3D visualization

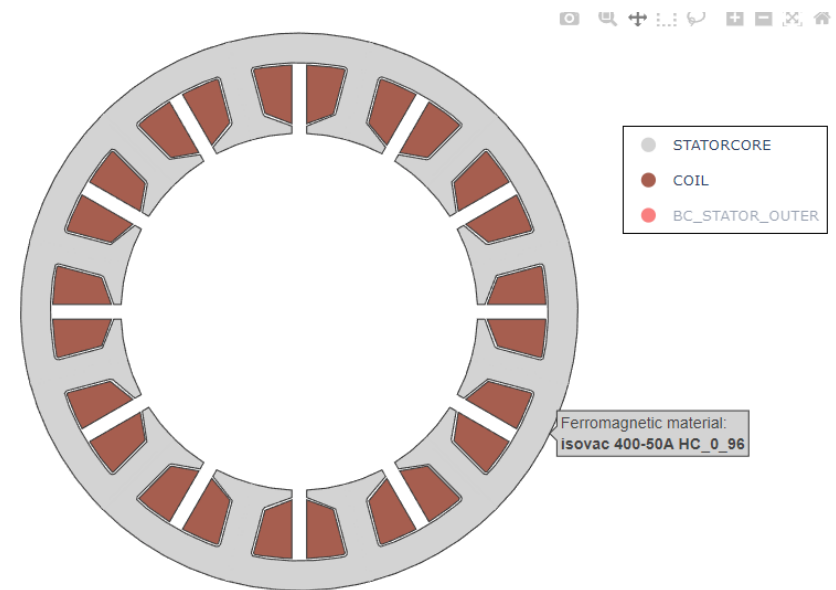
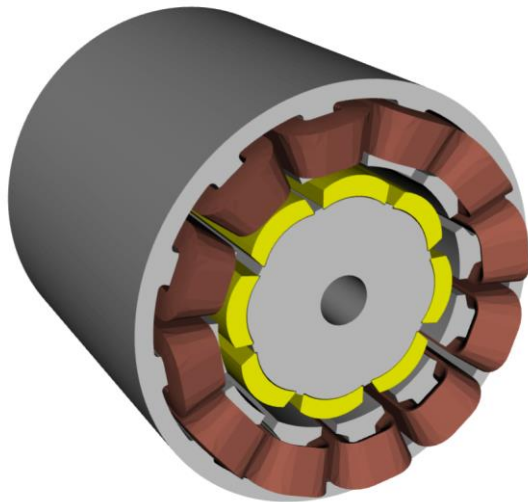
	Number of pole pairs	
pz	5	
	Rotor outer diameter	
dro	46.4	mm
	Rotor inner diameter	
dri	28	mm
	Magnet height	
hm	2	mm
	Gap between magnet and magnet pocke...	
hm_gap	0.1	mm
	Magnet width	
bm	9.2	mm
	Gap between magnet and magnet pocke...	
bm_gap	0.1	mm
	Thickness rotor pole cap	
trpc	2	mm
	Rotor eccentricity	
er	9.2	mm



Geometry

Preview

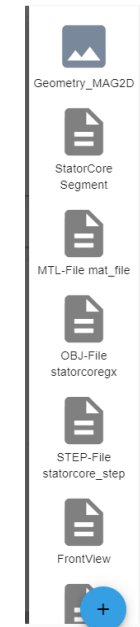
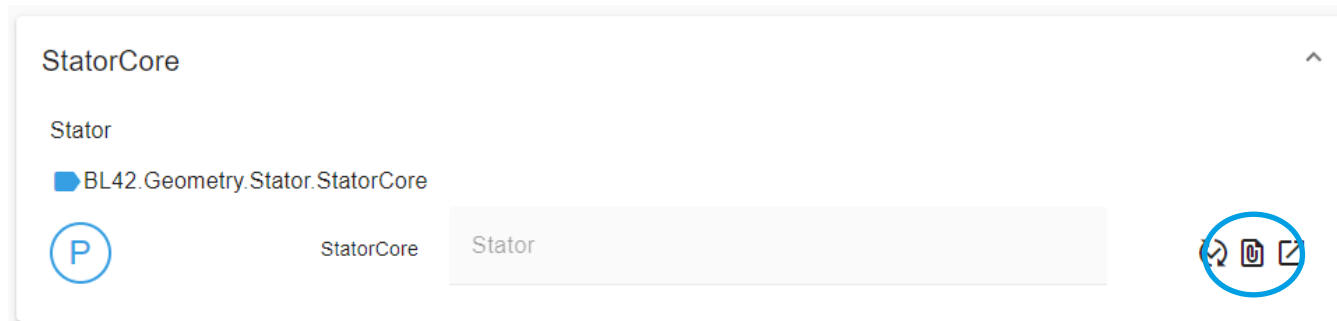
- Interactive preview based on Plotly Dash
- 3D preview of motor



Geometry

Doc files

- CAD files
 - STEP and DXF files are generated
- Example StatorCore

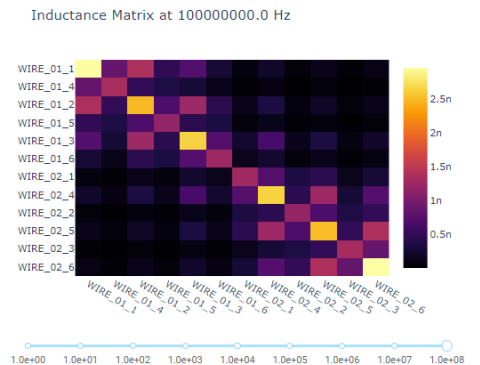
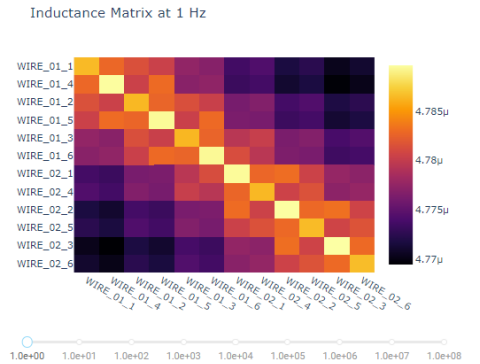
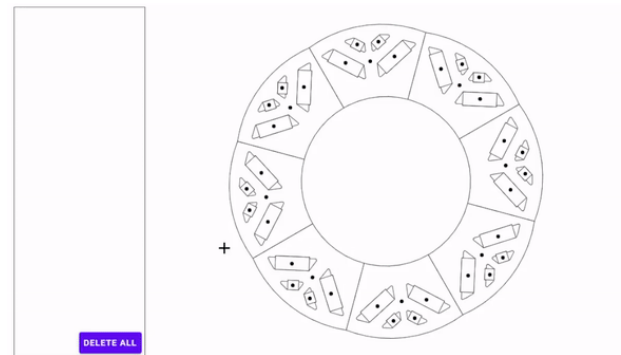
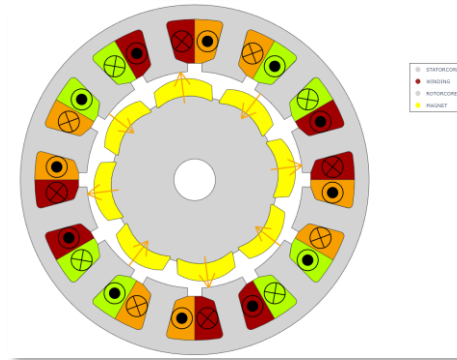


Previews

Interactive Previews

Application Examples with Plotly Dash

- Hiding and showing parts in the geometry.
- Selecting specific areas for modifying the finite element (FE) mesh density.
- Visualization of frequency dependent matrices.



SyMPython

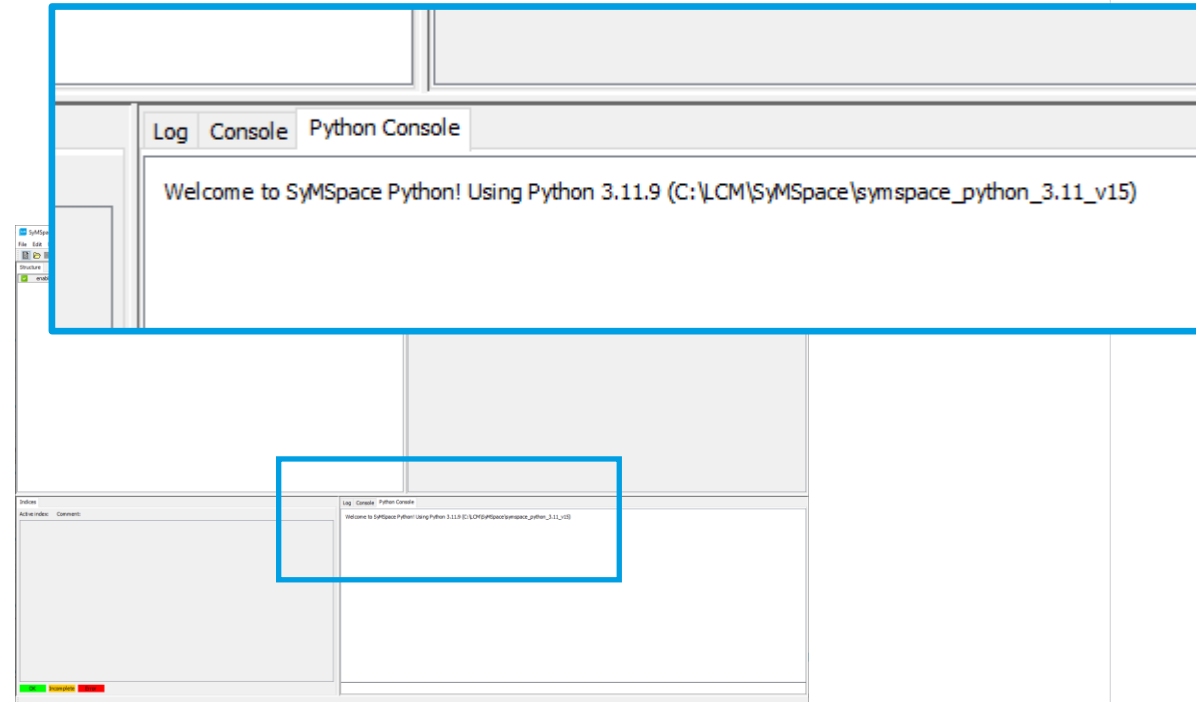
SyMPython

How to install SyMPython for SyMSpace 1.6

- Ensure SyMSpace is installed on your system.
- Unzip the downloaded SyMPython files into your chosen directory.
- Open config.local and set the Python path to your Python installation.

```
# Python 3.11  
PythonPath=C:\\LCM\\SyMSpace\\symspace_python_3.11_v15
```

- Confirm that the correct version of Python is being used.

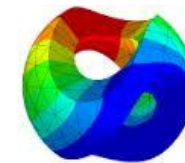


SyMPython Version 3.11.9

Included Packages

- Most important packages

- Numpy
- Pandas
- Plotly, Dash
- Jupyter
- NGSolve
- PyTorch
- Keras
- Scikit-learn
- CadQuery

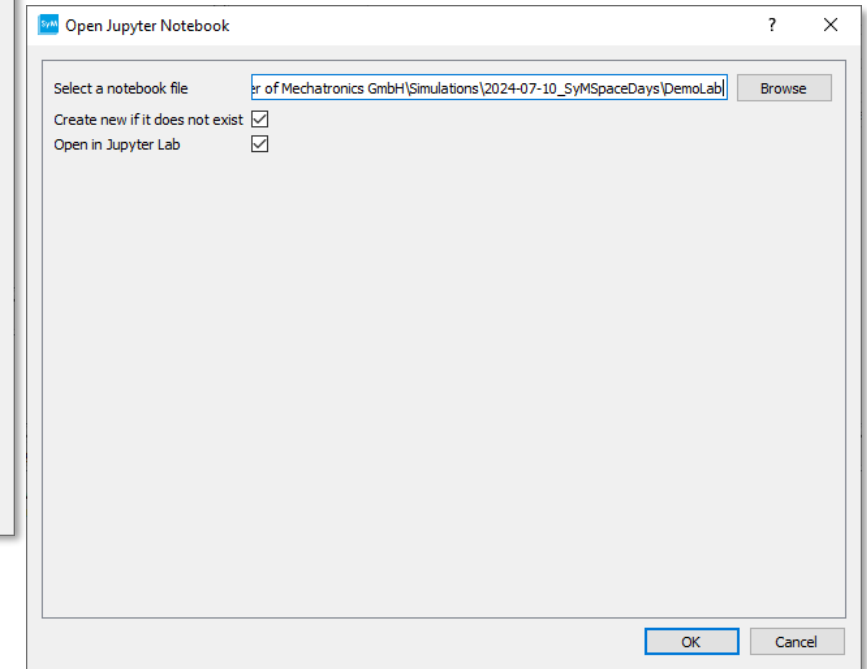
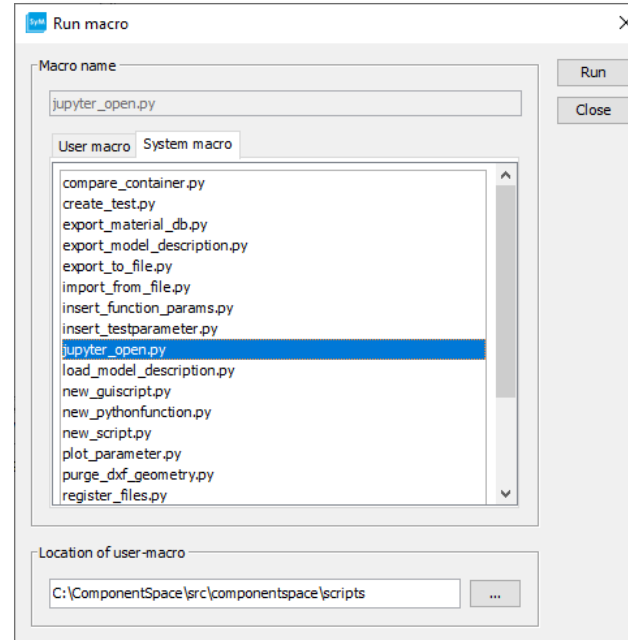
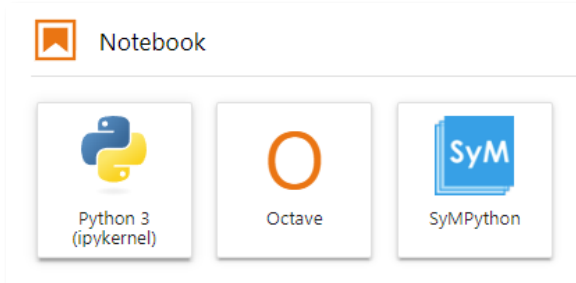


Netgen/NGSolve

Jupyter Lab

Open or create new Jupyter lab file

- Run macro: *jupyter_open*
- Select existing file or create new file
- Jupyter with SymPython kernel is opened
- A SyMPython kernel can also be started without running SyMSpace




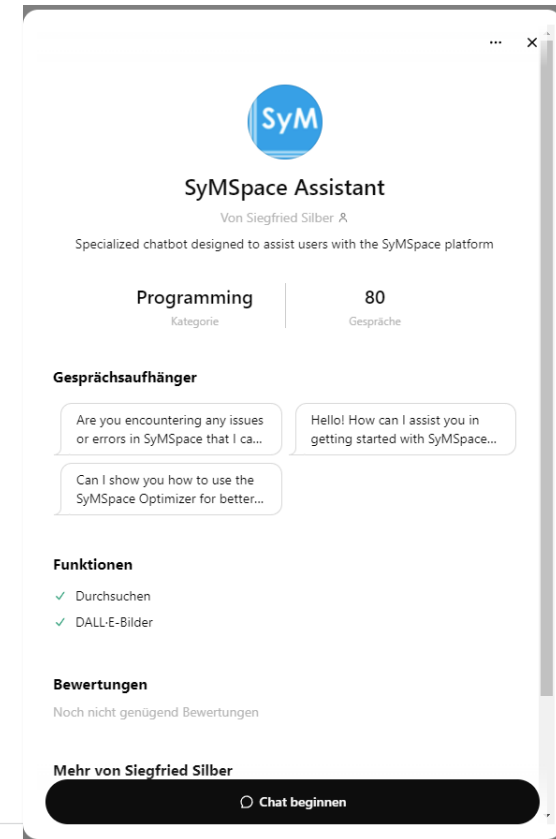
ChatGPT SyMSpace Assistant

ChatGPT

SyMSpace Assistant

- Getting started
 - Search on the ChatGPT platform in the menu for SyMSpace Assistant
 - Start a new chat
- Capabilities von SyMSpace Assistant GPT
 - Supports troubleshooting

 GPTs erkunden



SyMSpace Releases

SyMSpace Release Cycle

- SyMSpace Release
 - Current stable Release: Version 1.6 as of March 1, 2024
 - Biannual Stable Releases in March and October.
- Components Release
 - Weekly updates after successful testing.
 - Component code is stored within the SyMSpace project.
 - Even when Components are updated, already created projects remain unchanged.
 - Component versioning is in development.

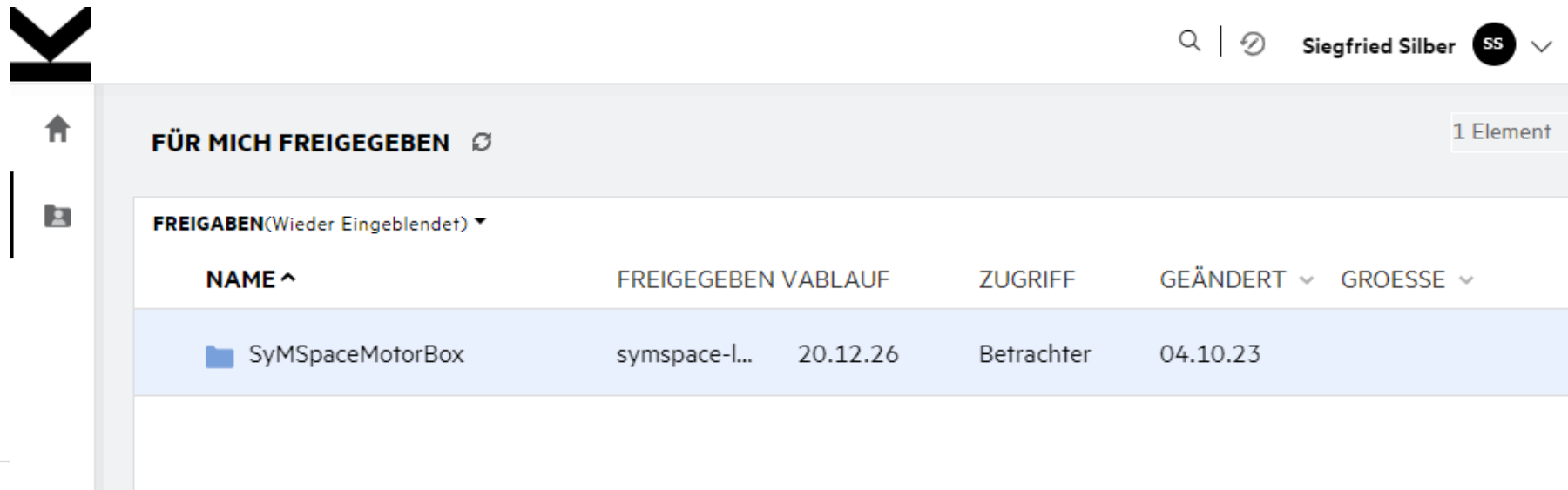
Download SyMSpace

MotorBox and ComponentSpace

Login at <https://drive.jku.at/>

Choose [SyMSpaceMotorBox](#) for updating SyMSpace

Choose [Company folder](#) for updating ComponentSpace



The screenshot shows a cloud storage interface. At the top right, there is a search icon, a refresh icon, and the user name 'Siegfried Silber' with a profile picture and a dropdown arrow. Below this, the main content area is titled 'FÜR MICH FREIGEgeben' with a refresh icon and a '1 Element' indicator. A dropdown menu is open, showing 'FREIGABEN(Wieder Eingebildet)'. Below the dropdown is a table with the following columns: NAME ^, FREIGEgeben VABLAUF, ZUGRIFF, GEÄNDERT ^, and GROESSE ^. The table contains one row for the folder 'SyMSpaceMotorBox' with the following details: 'symspace-l...', '20.12.26', 'Betrachter', and '04.10.23'.

NAME ^	FREIGEgeben VABLAUF	ZUGRIFF	GEÄNDERT ^	GROESSE ^
📁 SyMSpaceMotorBox	symspace-l...	20.12.26	Betrachter	04.10.23

Download SyMSpace

Stable Release

The screenshot shows a file management interface with a sidebar on the left and a main content area on the right. The sidebar shows a tree view with the following items: Documentation, Examples, nightly, and stable. The 'stable' item is circled in red. The main content area shows a table of files with columns: NAME, STATUS, MITGLIED, GEÄNDERT, and GROESSE. The table contains the following rows:

NAME ^	STATUS	MITGLIED	GEÄNDERT v	GROESSE v
FreeCADUtils-stable-2024-03-01...	--	Nur ich	Vor 25 Tagen	2 MB
SyMSpace-Help-stable-1.6.1305...	--	Nur ich	Vor 25 Tagen	24.56 MB
SyMSpace-MotorBox-Cloud-stabl...	--	Nur ich	Vor 25 Tagen	1.03 GB
SyMSpace-MotorBox-stable-1.6.1...	--	Nur ich	Vor 25 Tagen	1.22 GB
SyMSpace-Motorbox-stable-1.6.1...	--	Nur ich	Vor 25 Tagen	836.61 MB
ThirdParty.Ink	--	Nur ich	22.05.23	2 KB

The row for 'SyMSpace-MotorBox-stable-1.6.1...' is circled in red. The interface also shows a search bar, a user profile 'Siegfried Silber', and a breadcrumb path 'FÜR MICH FREIGEgeben > 1.6.13052'.