Altair® FluxMotor® 2025

Release Notes

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Technical Support

Altair's support resources include engaging learning materials, vibrant community forums, intuitive online help resources, how-to guides, and a user-friendly support portal.

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Contents

Introduction

1

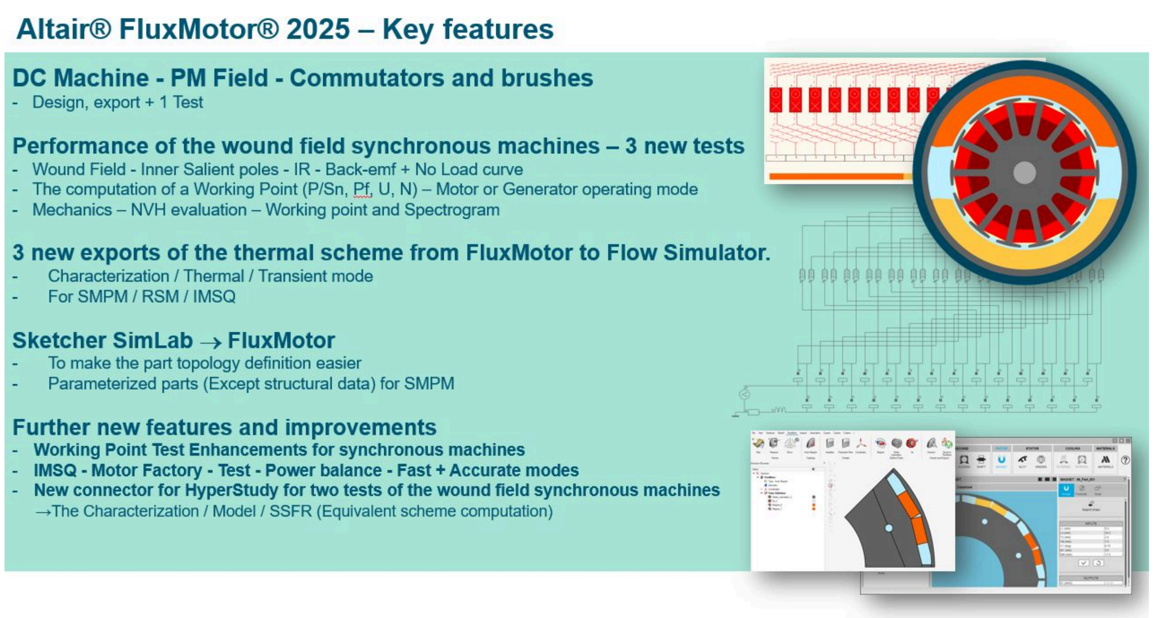
This chapter covers the following:

1.1 What's new in Altair® FluxMotor® 2025

This document gives the major information about Altair® FluxMotor® 2025. The key features of this new version are described below:

- DC Machine - PM Field - Commutators and brushes
    - Design, Export and Test
- Performance of the wound field synchronous machines – 3 new tests
    1. Wound Field - Inner Salient poles - IR - Back-emf + No Load curve
    2. The computation of a Working Point (P/Sn, Pf, U, N) – Motor or Generator operating mode
    3. Mechanics – NVH evaluation – Working point and Spectrogram
- Three news exports of the thermal scheme from FluxMotor to Flow Simulator
    - Characterization / Thermal / Transient mode for SMPM / RSM / IMSQ
- Sketcher SimLab for FluxMotor
    - To make the part topology definition easier
    - Parameterized parts (Except structural data) for SMPM
- Working Point Test Enhancements for synchronous machines
- IMSQ - Motor Factory - Test - Power balance - Fast + Accurate modes - Improvements
- New connector for HyperStudy dedicated to one test of the wound field synchronous machines
    - The Characterization / Model / SSFR (Equivalent scheme computation)
- Correction of issues

All the added new features are briefly described below, followed by an update on issues and bugs.



FluxMotor 2025 – The key features

1.2 Documents to read

It is highly recommended to read the user guides given below before using Altair® FluxMotor®. Each user help document can be downloaded from the online user help.

Below is a list of documents that are available.

Installation Guide

- InstallationGuide_Flux_FluxMotor_2025.pdf

General user guides for any type of machine - Inner and Outer Rotor

- Supervisor_2025.pdf
- MotorCatalog_2025.pdf
- PartLibrary_2025.pdf
- PartFactory_2025.pdf
- Materials_2025.pdf
- ScriptFactory_2025.pdf
- MotorFactory_2025_Introduction.pdf
- MotorFactory_2025_Test_BestPractices.pdf
- MotorFactory_2025_Windings.pdf

Synchronous Machines with Permanent Magnets (SM PM) - Inner and Outer Rotor

- MotorFactory_2025_SMPM_IOR_Design.pdf
- MotorFactory_2025_SMPM_IOR_3PH_Test_Introduction.pdf
- MotorFactory_2025_SMPM_IOR_3PH_Test_Characterization.pdf
- MotorFactory_2025_SMPM_IOR_3PH_Test_WorkingPoint.pdf
- MotorFactory_2025_SMPM_IOR_3PH_Test_PerformanceMapping.pdf
- MotorFactory_2025_SMPM_IR_3PH_Test_Mechanics.pdf
- MotorFactory_2025_SMPM_IOR_Export.pdf

Reluctance Synchronous Machines (SM RSM) - Inner Rotor

- MotorFactory_2025_SMRSM_IR_3PH_Design.pdf
- MotorFactory_2025_SMRSM_IR_3PH_Test_Introduction.pdf
- MotorFactory_2025_SMRSM_IR_3PH_Test_Characterization.pdf
- MotorFactory_2025_SMRSM_IR_3PH_Test_WorkingPoint.pdf
- MotorFactory_2025_SMRSM_IR_3PH_Test_PerformanceMapping.pdf
- MotorFactory_2025_SMRSM_IR_3PH_Test_Mechanics.pdf
- MotorFactory_2025_SMRSM_IR_3PH_Export.pdf

Wound Field Synchronous Machines (SM WF) - Inner Salient Poles - Inner Rotor

- MotorFactory_2025_SMWF_ISP_IR_3PH_Design.pdf
- MotorFactory_2025_SMWF_ISP_IR_3PH_Test_Introduction.pdf
- MotorFactory_2025_SMWF_ISP_IR_3PH_Test_Characterization.pdf
- MotorFactory_2025_SMWF_ISP_IR_3PH_Test_WorkingPoint.pdf
- MotorFactory_2025_SMWF_ISP_IR_3PH_Test_PerformanceMapping.pdf
- MotorFactory_2025_SMWF_ISP_IR_3PH_Export.pdf

Induction Machines with Squirrel Cage (IM SQ) - Inner and Outer Rotor

- MotorFactory_2025_IMSQ_IOR_3PH_Design.pdf
- MotorFactory_2025_IMSQ_IOR_3PH_Test_Introduction.pdf
- MotorFactory_2025_IMSQ_IOR_3PH_Test_Characterization.pdf
- MotorFactory_2025_IMSQ_IOR_3PH_Test_WorkingPoint.pdf
- MotorFactory_2025_IMSQ_IOR_3PH_Test_PerformanceMapping.pdf
- MotorFactory_2025_IMSQ_IR_3PH_Test_Mechanics.pdf
- MotorFactory_2025_IMSQ_IOR_3PH_Export.pdf

User guides dedicated to DC Permanent Magnet machines (DC PM) – Inner Rotor

- MotorFactory_2025_DCPM_IR_Design.pdf
- MotorFactory_2025_DCPM_IR_Test_Introduction.pdf
- MotorFactory_2025_DCPM_IR_Test_WorkingPoint.pdf
- MotorFactory_2025_DCPM_IR_Export.pdf

List of new features

2

This chapter covers the following:

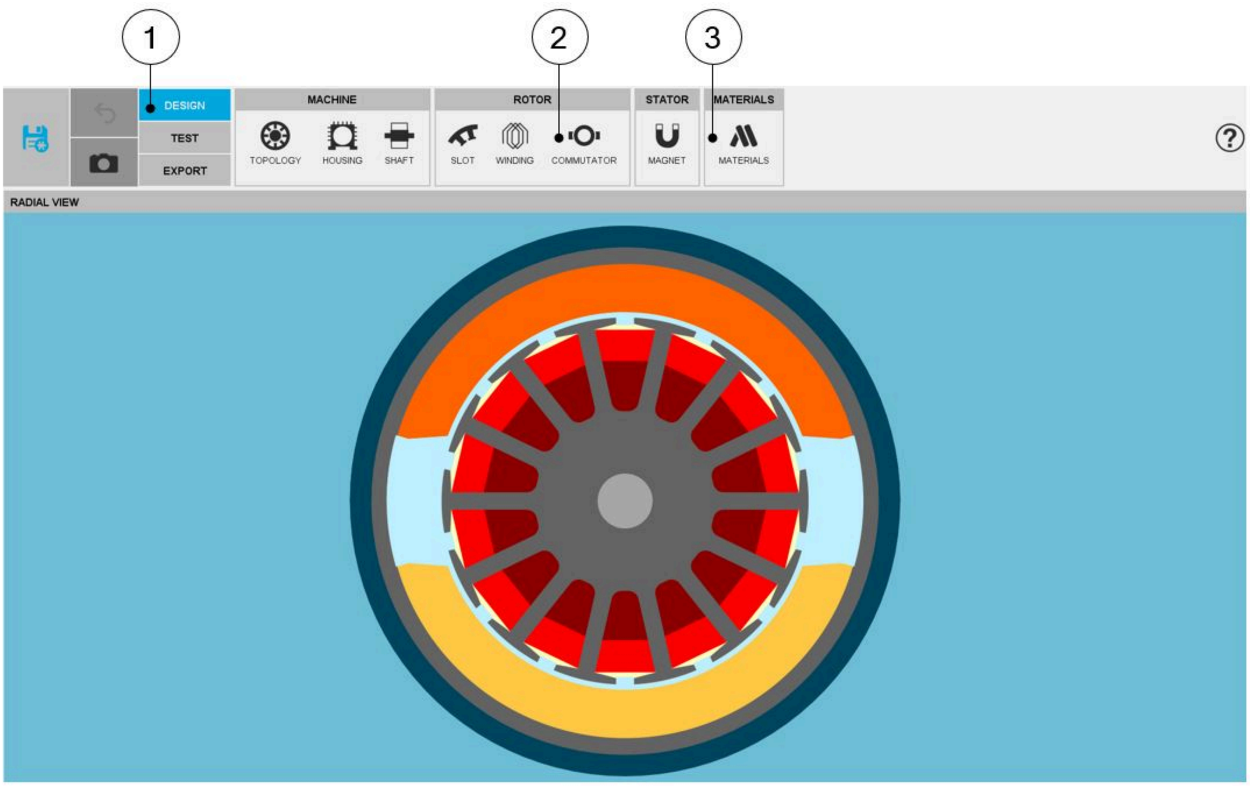
2.1 DC PM Machine - Commutators and brushes

Motor Factory - The design

Introduction

The sections of Motor Factory dedicated to the Permanent Magnet DC machine are quite like the ones available for the Synchronous Machine with Permanent Magnets and Inner Rotor.

New sections allow to define the WINDING and the COMMUTATOR – Commutator segments and brushes.

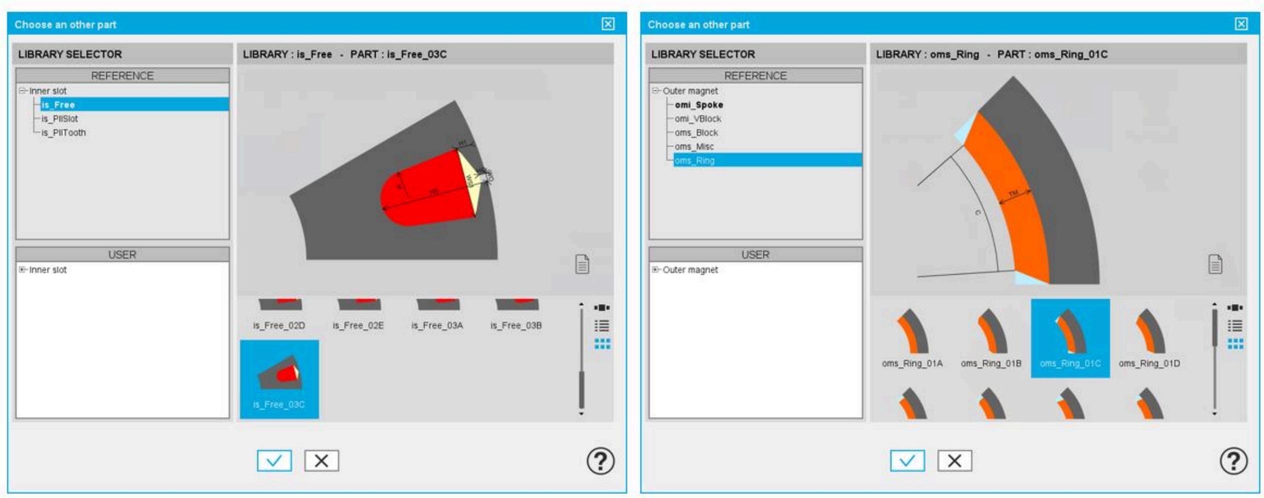


The DC Machine - PM Field - Commutators and brushes – Inner Rotor

The design environment in Motor Factory

1	The design environment
2	In the rotor area, two new sections are available: The WINDING, the COMMUTATOR
3	In the material section, the new active regions of the machine are considered.

> **Note:** The part's topologies - Inner slots and Outer magnets - can be selected in the Part Library.



Inner slots and Outer magnets for designing the Permanent magnet DC machine

The winding

In the section WINDING of Motor Factory, a scrolling selection bar where Scheme, Coil, Insulation, End-winding and X-Factors can be selected.

In the section Scheme the winding architecture and the connections to the commutator segments are designed.

Three definition modes can be chosen.

- Automatic mode where the winding architecture is automatically built based on the number of slots and poles.
- An easy mode to choose a solution among those FluxMotor® proposes.
- Advanced mode, to allow the user to define any specific input parameters.

An illustration of the winding environment is presented below.

The DC Machine - PM Field - Commutators and brushes – Inner Rotor

WINDING design area – Overview

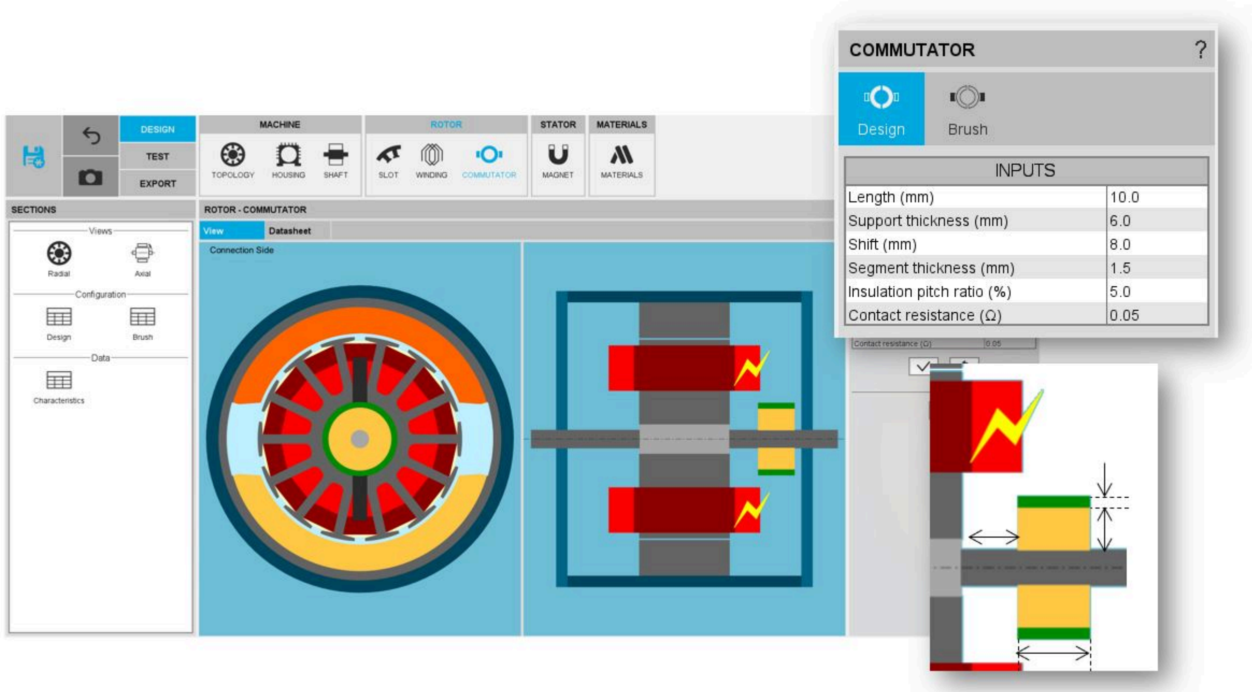
1	Selection of the ROTOR subset: WINDING panel (Click on the icon WINDING)
2	All the required user inputs to define the winding are available in the "WINDING" panel (right part).
3	Once a winding is defined, the corresponding results are automatically displayed in the form of a winding report. Visualization of the winding characteristics (inputs, settings, materials, etc.) are possible. Scrollbars allow browsing the whole document rapidly and give an overview of all the results. Using scrollbars, complete data can be accessed and visualized.
4	A section scrolling bar allows choosing the section in which user inputs are defined. Scrolling selection bar where Winding architecture, Coil, Insulation, End-winding and X-Factor sections can be selected
5	Three modes of winding allow to define and build the winding architecture: • Automatic mode is used as default. • Easy mode is used to choose solution among those FluxMotor® proposes. • Automatic mode is used as default.
6	User input parameter fields to enter the values according to the considered mode.

The Commutator and Brushes

A new environment allows for the design of the Commutator segments and their location and support on the shaft.

Inside the ROTOR subset, the COMMUTATOR panel, the commutator and the brushes are illustrated with the motor axial and radial views.

The commutator design is defined by geometrical and electrical parameters.

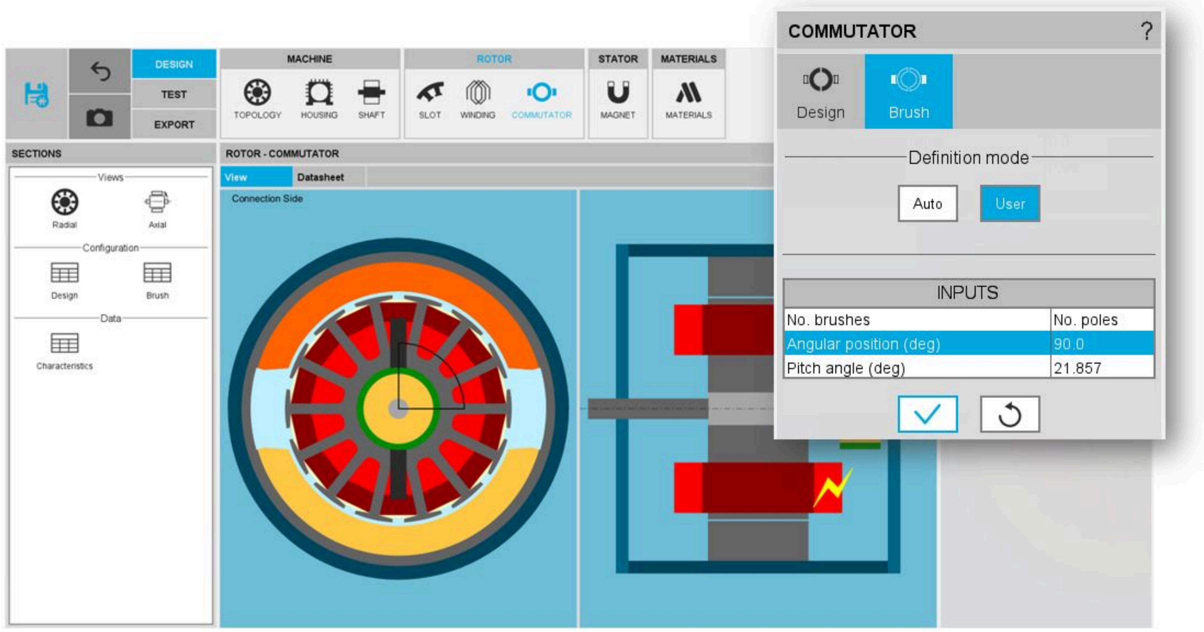


Design of the commutator segments and their support - Geometrical and electrical parameters

There is a brush design tab to introduce brush related parameters.

Choice of the commutator-brush definition mode. Two options are available:

- Auto: Brushes dimensions and angular position are automatically calculated by FluxMotor to get the best fit with the defined winding.
- User: Brushes dimensions and angular position are defined by the user.



Design of the commutator brush – Auto or User mode - Inputs

2.1.1 Motor Factory – Export area

Export Documents

In the EXPORT area of Motor Factory, and like for all the machine types, it is possible to automatically build reports to describe all the work achieved for designing the machine's topology.

At the same level, an export of a python script of a current motor in the application Script Factory can also be automatically generated.

Export projects from FluxMotor® to Flux® 2D

On the other hand, once the design of the machine is achieved, it is possible to export its models in Flux 2D.

The aim of this export is to provide a python file or to get directly into Flux® 2D environment with a full parametrized model ready to be solved and postprocessed.

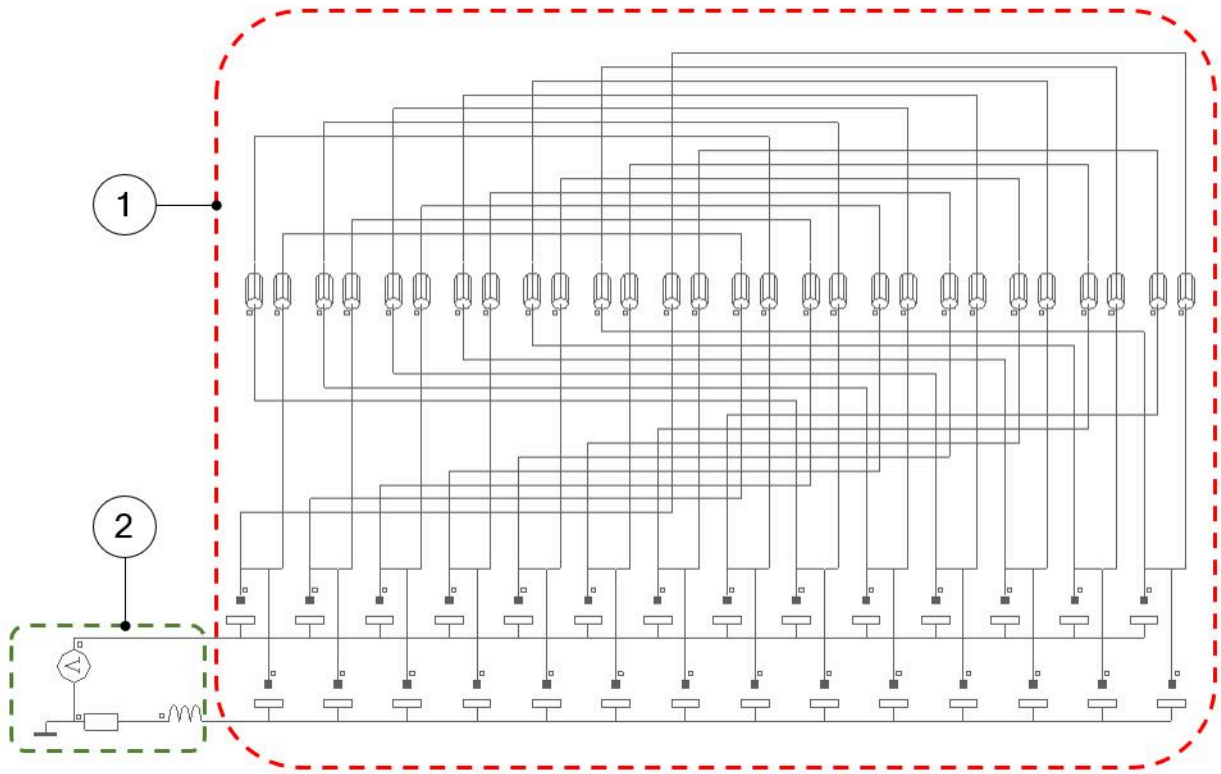
In the current version, this export allows the users to build a model and to perform transient simulations in Flux® 2D.

User inputs, like feed voltage and machine speed, are predefined to get quick access into Flux® 2D environment for performing computations.

The resulting model represents a DC machine rotating at constant speed and fed by a DC source (e.g., battery) through a circuit containing a known impedance, including a resistive and an inductive element.

> **Note:** Please note that, depending on the chosen DC voltage and rotating speed, any working point can be defined, and the DC machine can behave as a motor or as a generator.

The corresponding electrical circuit that represents the winding connections with commutator segments, brushes and their relative positions is automatically defined (see illustration below) saving a huge amount of time in modeling.



Circuit representation in Flux of the DC machine fed by a voltage source	
1	Circuit representation of the DC machine (including brushes – commutator segment contacts)
2	Circuit feeding the DC machine (including a DC voltage source and parasitic impedances)

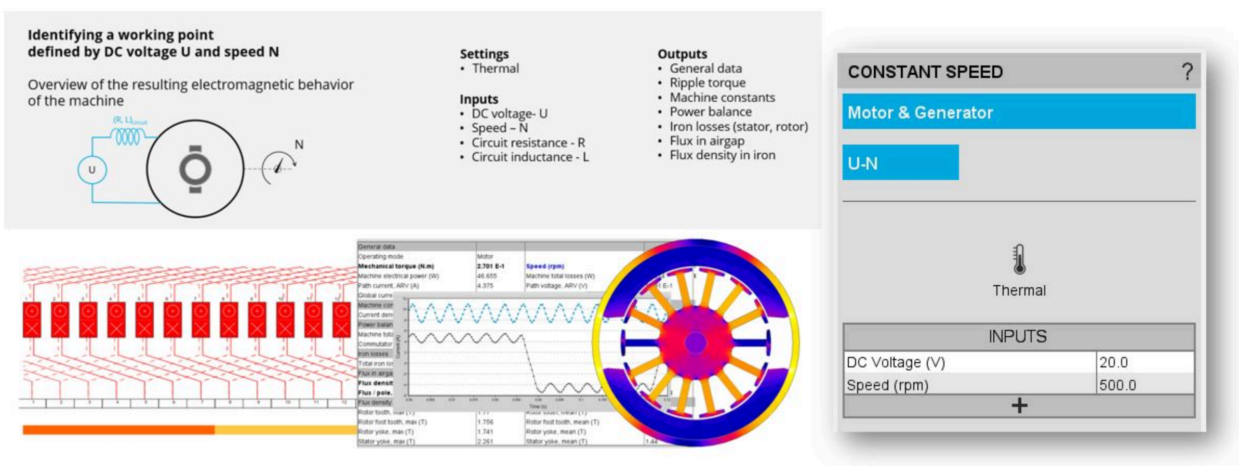
2.1.2 Motor Factory – Test area

Working point – Constant Speed – U-N

Positioning and objective

The aim of the test "Working point – Constant Speed – U-N" is to characterize the behavior of the machine when operating at constant speed connected to an external circuit composed of a DC voltage source and a parasitic impedance.

> **Note:** The working point is mainly imposed by the external source voltage and the machine rotation speed. Since these variables have a great influence on the electric and the mechanical sides, respectively, the working point may correspond to a motor or a generator behavior.



Permanent Magnet DC machine – Test : Working point – Constant Speed - U-N - Overview

All the results are computed from a Finite Element Analysis (Flux) - Transient application. The results of this test give an overview of the electromagnetic behavior of the considered machine at a given working point.

The general data of the machine, such as power balance, machine constant and torque ripple, are computed and displayed.

The magnetic flux density is also computed in every region of the machine magnetic circuit to evaluate the design.

User inputs

The main user input parameters are the voltage of the external DC source and the rotation speed of the machine. In addition, winding temperatures and magnet temperatures must be set.

Main outputs

Test results are illustrated with data, graphs and tables

Tables of results

- Machine performance – working point (General data, Machine constants, Power balance, Iron losses, Flux in airgap, Flux density in iron)
- Ripple mechanical torque at the working point

Curves

- Normalized machine voltage, current and mechanical torque versus time – Working point
- Mechanical torque versus time – Working point
- Voltage of a single path and global voltage of the machine versus time – Working point
- Current flowing through a single path and global current of the machine versus time – Working point
- Losses versus time – Working point
- Power versus time – Working point

2.2 Wound field synchronous machines - New tests

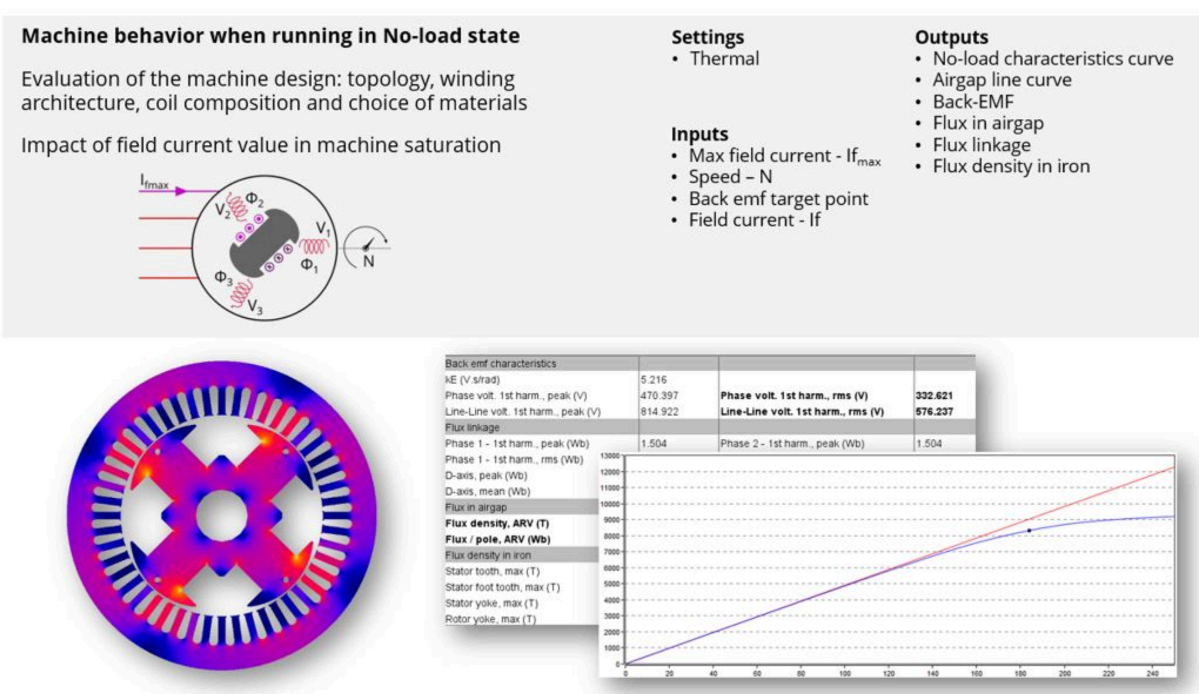
2.2.1 No Load curve + Back-emf

Positioning and objective

The aim of the test "Characterization - Open circuit – Generator – No Load" is to characterize the behavior of the machine when running in a no–load state.

The analysis of the machine's no-load characteristics is a first step to evaluate the relevance of the machine design regarding not only parameters such as topology, winding architecture, composition of coils and choice of materials, but also the impact of the applied field current value in the magnetic saturation of the machine.

> **Warning:** When a delta winding connection is considered, the computation doesn't consider circulation currents. That can lead to a different result than what was expected in transient computation.
>
> In such a case, it is recommended to perform a transient computation in Flux® environment. The application "Export to Flux" allows exporting the model with the corresponding scenario ready to be solved.



Characterization - Open circuit – Generator – No Load - Overview

User inputs

The maximum field current value and the rotation speed are the only necessary standard input parameters to run this test. The operating temperature of the field winding and damper bars, if existing, can be defined in the settings “Thermal”.

Additionally, if the user wants to run a complete back-emf test for a single point, specified with a field current value, the two concerned inputs are available as standard inputs as well.

Main outputs

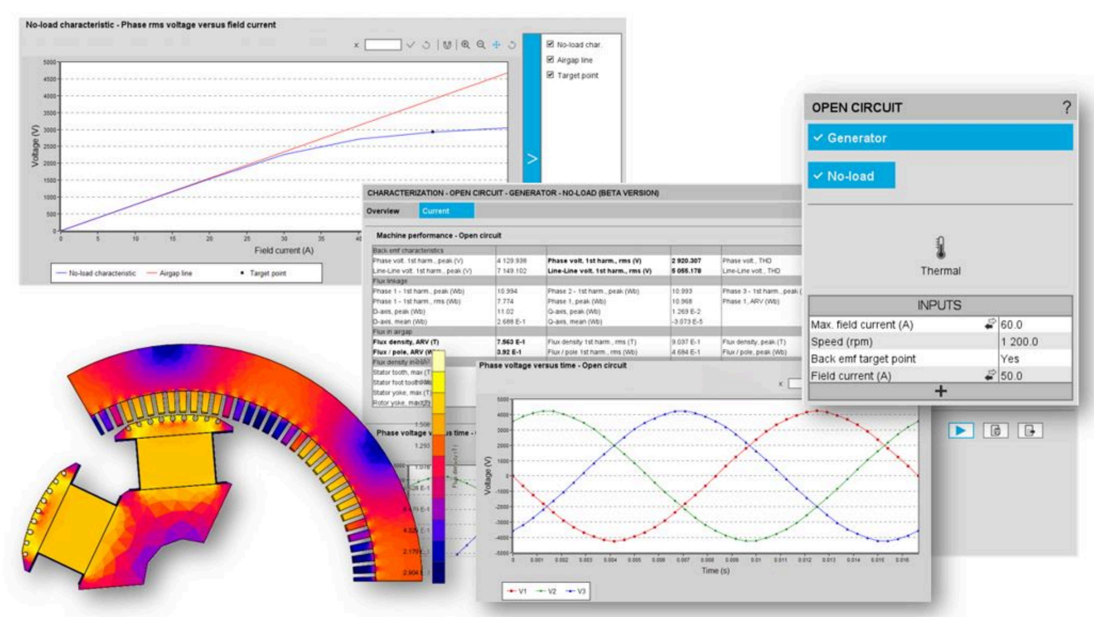
Test results are illustrated with data, graphs and tables.

Main results

- No-load characteristics - Phase voltage rms value versus the field current value – No-load (line graph and table)

Graphs & tables

- Machine performance – Open circuit, Back-EMF characteristics (voltage constant and voltage magnitudes), Flux linkage, Flux in airgap, Flux density in iron
- Phase voltage (Phase voltage versus time – Open circuit, Phase voltage harmonic analysis – Open circuit (bar graph and table))
- Line-line voltage (Line-line voltage versus time – Open circuit, Line-line voltage harmonic analysis – Open circuit (bar graph and table))
- Flux density in airgap (Flux density in the airgap versus angular position – Open circuit, Flux density in the airgap harmonic analysis – Open circuit (bar graph and table))
- Flux linkage (Flux linkage versus angular position – Open circuit)



Characterization - Open circuit – Generator – No Load – The main outputs

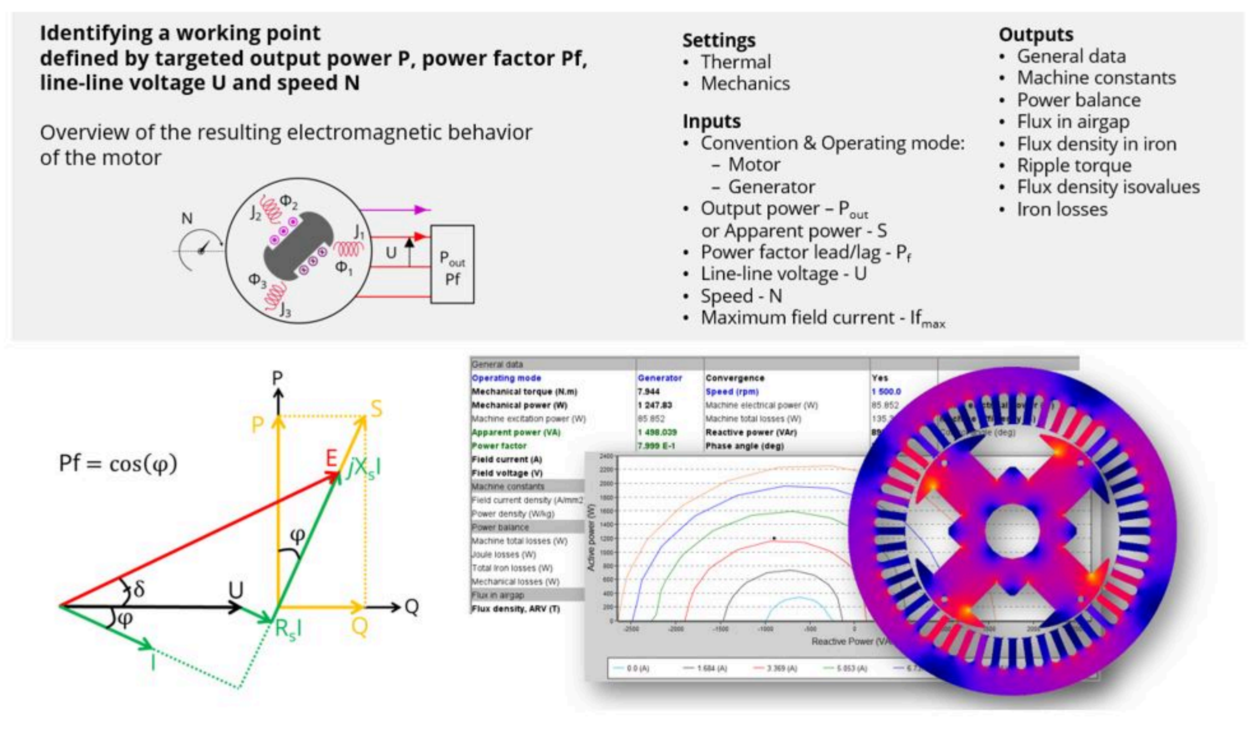
2.2.2 Working Point (P/Sn, Pf, U, N) – Motor or Generator op. mode

Positioning and objective

The aim of the test “Working point – Sine wave – Motor & Generator – P, Pf, U, N” is to characterize the behavior of the machine when operating at the working point that is targeted by the user. This point is defined by:

- The output power, which can be either the electrical power transmitted to the stator winding if the machine is in generator operating mode or the mechanical power exerted on the shaft if the machine is in motor operation. If the generator operation is targeted, the output power can be replaced by the apparent power.
- The power factor,
- The line-line voltage,
- The rotation speed.

Through this test, the user can also verify whether the desired operating point is compatible with the machine. Additionally, the user can identify the appropriate reference values for the field current and the control angle needed to achieve this operating point.



Working point – Sine wave – Motor – P, Pf, U, N” - Overview

The results of this test give an overview of the electromagnetic analysis of the machine, considering its topology.

The general data of the machine, like the machine constant and power balance, are computed and displayed. The user can choose between motor and generator conventions to build the model.

The magnetic flux density is also computed in every region of the machine's magnetic circuit to evaluate the design.

It also gives the capability to make comparisons between the results obtained from the measurements and those obtained with FluxMotor.

User inputs

The main user input parameters are the choice of the convention and the operating mode, then the output power/apparent power, the power factor (lead/lag), the speed and the line-line voltage. In addition, the windings temperatures must be set.

Main outputs

Test results are illustrated with data, graphs, and tables.

Main results

Machine performance at the base speed point (General data, Machine constants, Power balance, Flux in airgap, Flux density in iron)

Ripple mechanical torque at the working point

Curves & graphics

1. Ripple mechanical torque versus rotor angular position and its harmonic analysis
2. Flux density in airgap versus rotor angular position
3. Feasibility diagram
4. Isovalues

Main principles of computation

Introduction

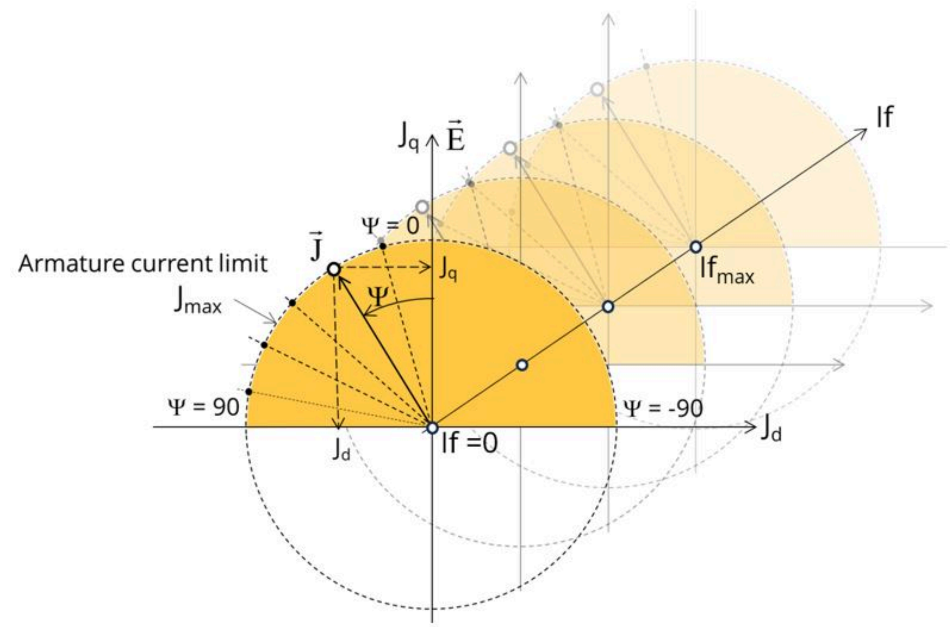
The aim of this test in motor / generator convention is to give a good overview of the electromagnetic potential of the machine by characterizing the working point according to the output power / apparent power, power factor, speed and voltage set by the user.

In addition, ripple torque at the working point is also computed.

To achieve such an objective, in the back end of FluxMotor, an automatic search is performed to identify the line current I, the field current If and control angle ψ providing the performance defined by the user.

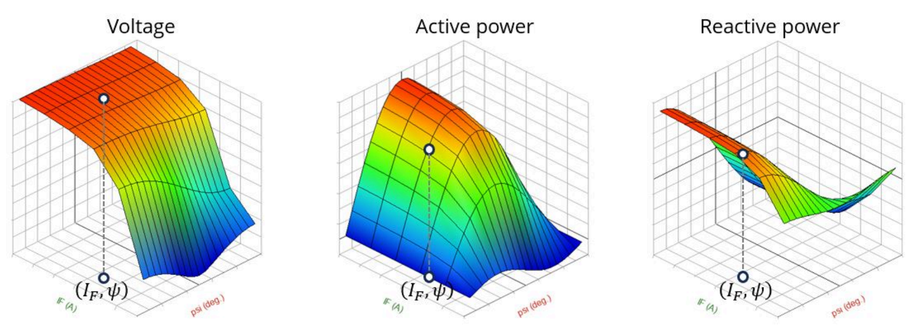
Generator operating mode

In the generator operating mode, the line current can be deduced directly from the user input (output power / apparent power, power factor and line-line voltage). The research zone comprises thus two dimensions: field current and control angle. It is defined by the maximum field current, the number of computations along the field current axis and the control angle axis, all of which can be adjusted by the user in the inputs of the test.



Research zone of the P-Pf-U-N for the generator operating mode defined by maximum field current and number of computations along the field current axis and control angle axis

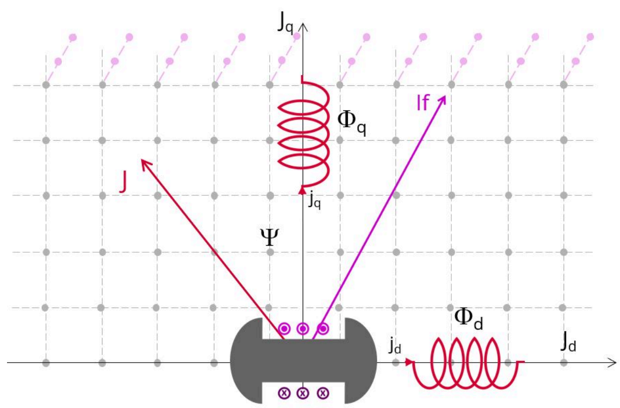
Within the research zone, the If-I-Psi-N test will be executed at all points (If, ψ) to determine the performance response surfaces of the machine. Then an optimizer is used to search for the point (If, ψ) providing the match with the targeted performance.



Performance of the machine in generator operating mode within the research zone in terms of voltage, active power and reactive power and the point (If, ψ) providing the targeted performance

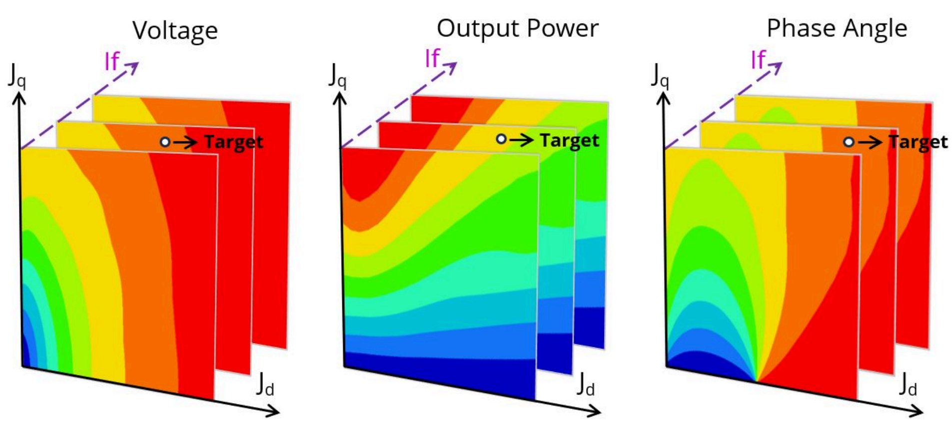
Motor operating mode

In the motor operating mode, the line current cannot be deduced directly from the user input (output power, power factor and line-line voltage) as the output power is related to on-shaft mechanical power without any knowledge of efficiency. The research zone comprises thus three dimensions: field current, armature current and control angle, or field current, d-axis armature current and q-axis armature current. It is defined by the maximum field current, the number of computations along the field current axis and the number of computations along the d-axis and q-axis of the armature current, all of which can be adjusted by the user in the inputs of the test.



Research zone of the P-Pf-U-N for the motor operating mode

Within the research zone, the If-I-Psi-N test will be executed at all points (If, Id, Iq) to determine the performance response surfaces of the machine. Then an optimizer is used to search for the point (If, Id, Iq) providing the match with the targeted performance.



Performance of the machine in generator operating mode within the research zone in terms of voltage, output power and phase angle and the point (If, Id, Iq) providing the targeted performance

Feasibility diagram and color meaning of outputs in the working point table

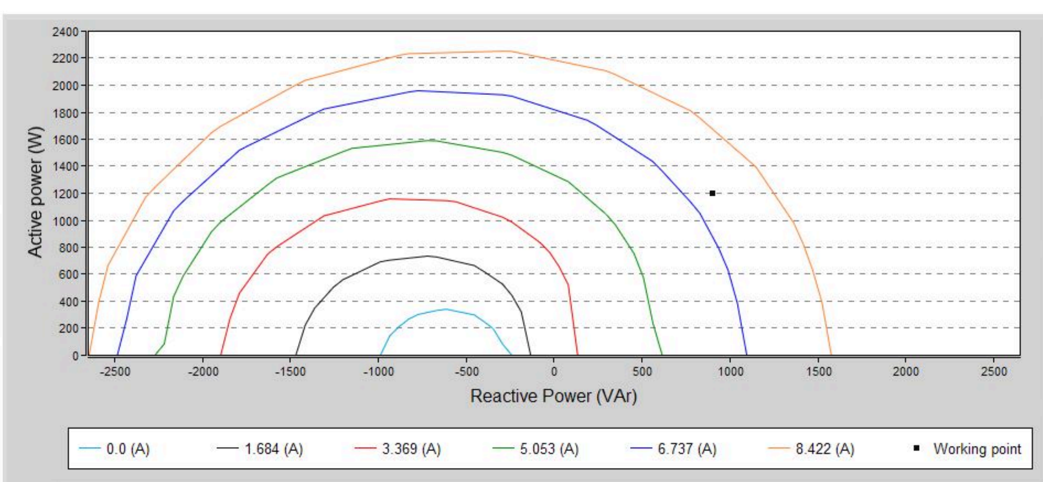
In this test, one can set any combination of power, power factor, voltage, and speed. However, not all the combinations are feasible for a given synchronous machine. To help users detect unfeasible operating points, a powerful tool called the Feasibility Diagram is provided.

The concept is like the P-Q diagram used by generator designers. In the P-Q plane, curves corresponding to different field current (If) values are plotted. Each point on these curves represents a combination of field current, armature current magnitude, and control angle. The curves range from If = 0 to Ifmax, and while the armature current remains constant (determined by the apparent power and voltage targets), each point on a curve corresponds to a different control angle.

The target operating point is also plotted on this diagram.

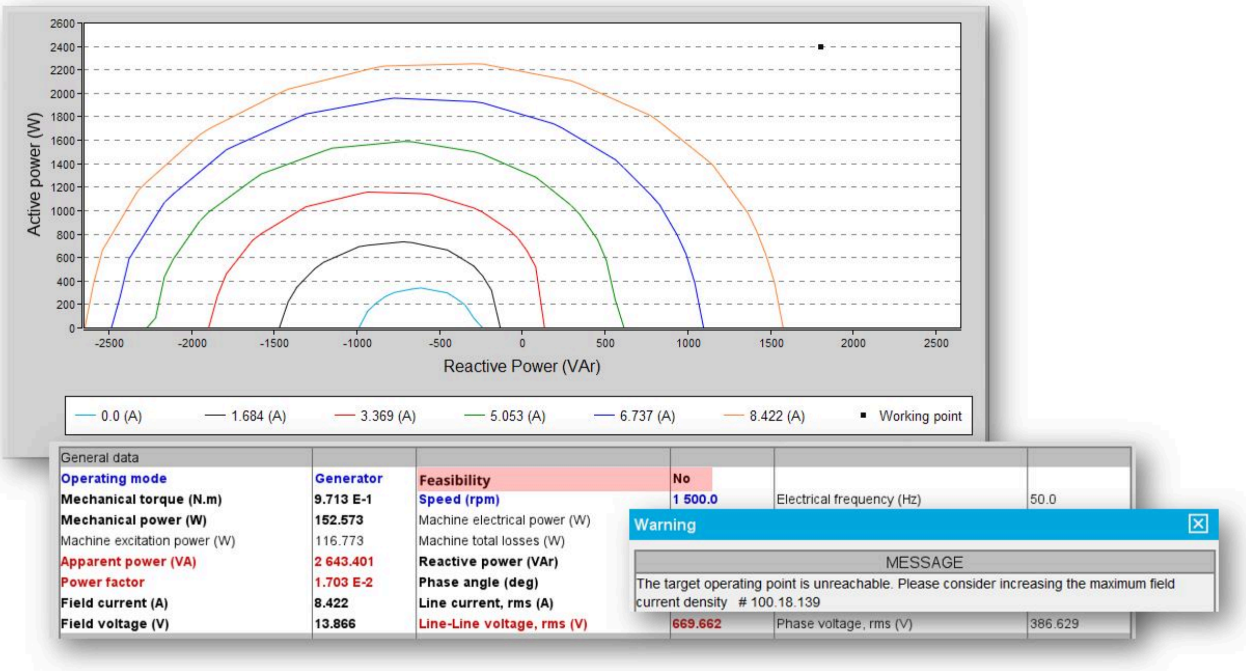
1. Feasible Working Point: If the target point lies within the curve defined by Ifmax, the operating point is feasible. The required field current and control angle are interpolated between the two curves surrounding the target point. The accuracy of these values depends on the number of points plotted on each curve. The more points, the more precise the field current, control angle, and corresponding values of power, power factor, and voltage will be.
2. Unfeasible Working Point: If the target point falls outside the curve defined by Ifmax, it is not achievable with the current settings. Users can try increasing Ifmax to reach the desired point. However, if the target power is too high and the machine is saturated, increasing Ifmax may still not make the point reachable.

The Feasibility output in the working point table will display "Yes" if the target point is feasible or "No" if it is not, based on the position of the working point relative to the feasible area.



General data					
Operating mode	Generator	Feasibility	Yes		
Mechanical torque (N.m)	7.944	Speed (rpm)	1 500.0	Electrical frequency (Hz)	50.0
Mechanical power (W)	1 247.83	Machine electrical power (W)	85.852	Stator electrical power (W)	1 198.342
Machine excitation power (W)	85.852	Machine total losses (W)	135.34	Machine efficiency (%)	89.852
Apparent power (VA)	1 498.039	Reactive power (VAr)	898.943	Control angle (deg)	-43.824
Power factor	7.999 E-1	Phase angle (deg)	36.876		
Field current (A)	7.221	Line current, rms (A)	2.279	Phase current, rms (A)	2.279
Field voltage (V)	11.889	Line-Line voltage, rms (V)	379.503	Phase voltage, rms (V)	219.106

Feasibility diagram, the operating point is accessible



Feasibility diagram, operating point not accessible

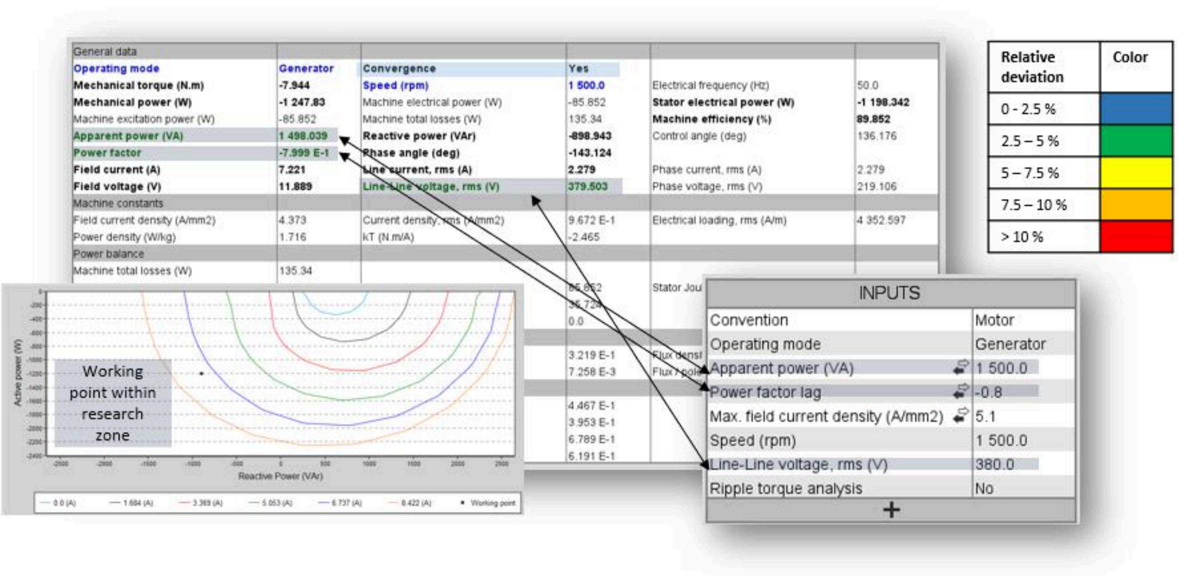
Even if the working point is not feasible, the optimizer in the backend of FluxMotor still provides a combination of field current, armature current, and control angle. This combination allows the machine to operate, but the resulting power, power factor, and voltage might be close to the target values—or far from them. We provide these results regardless, as they might still be helpful to the user.

To visually indicate how close the found working point is to the target, we use a color-coding system in the working point table. This system highlights key quantities:

- **Generator operating mode**: Apparent power, stator electrical power (active power), reactive power, power factor, and voltage.
- **Motor operating mode**: Mechanical power, power factor, and voltage.

Each color corresponds to a specific range of deviation between the found values and the target values:

- Dark green: 0% – 2.5% deviation
- Light green: 2.5% – 5% deviation
- Yellow: 5% – 7.5% deviation
- Orange: 7.5% – 10% deviation
- Red: Greater than 10% deviation



Color-coding system allowing to detect if a working point is accessible and how to achieve it by modifying test inputs

> **Note:**
>
> If **Feasibility** is marked as "No" and the colors are not green, users may choose to increase the maximum field current to bring the working point closer to the target. Additionally, if the system does not compute enough points for field current or control angle, the color might appear yellow, orange, or red as the interpolation works badly with a poorly discretized response surface. In such cases, users can increase the number of computations for **If, Jd, Jq,** or control angle to improve accuracy.

2.2.3 NVH evaluation – Working point and Spectrogram

Positioning and objective

Two tests have been added for performing NVH analysis on the machine when operating at a targeted working point or a set of targeted working points defined with the following input values If, I,Ψ,N (Magnitude of field current, magnitude of current, Control angle, Speed)

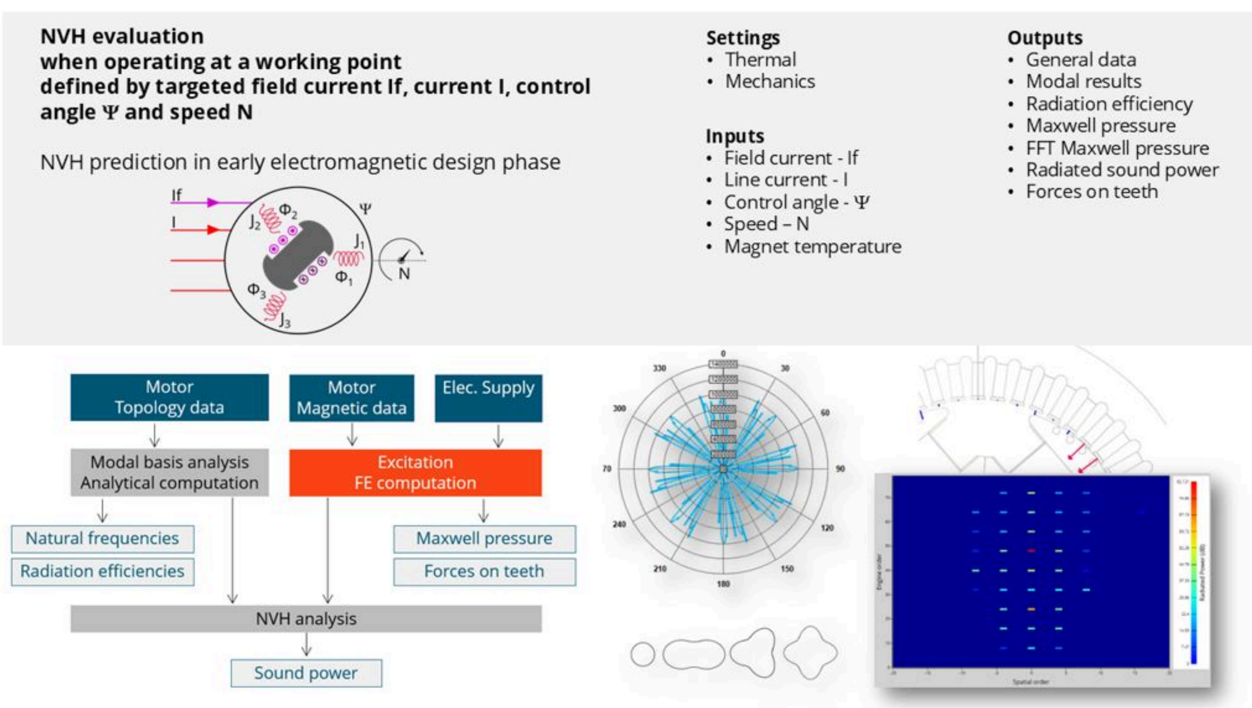
The process and the workflow are the same as what has already been done for other synchronous machines.

These tests give data allowing NVH prediction in the early electromagnetic and design stage.

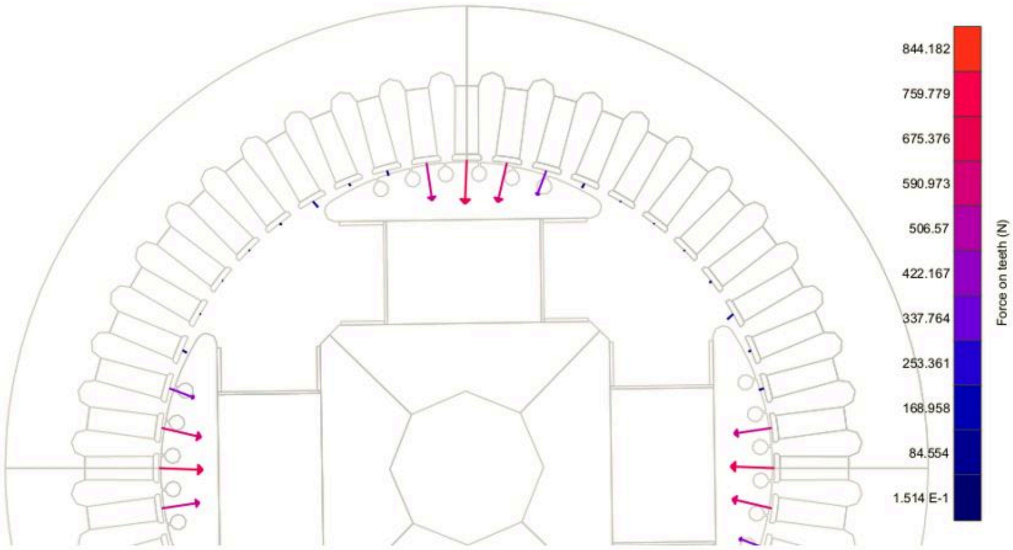
The modal analysis of the stator mechanical structure, the radiated sound power and the magnetic forces applied on teeth are computed and displayed.

This test helps to answer the following question: Could the machine have any risks in connection with NVH? Yes / No.

Here is an illustration that gives an overview of the test NVH – Working point (If, I,Ψ,N):

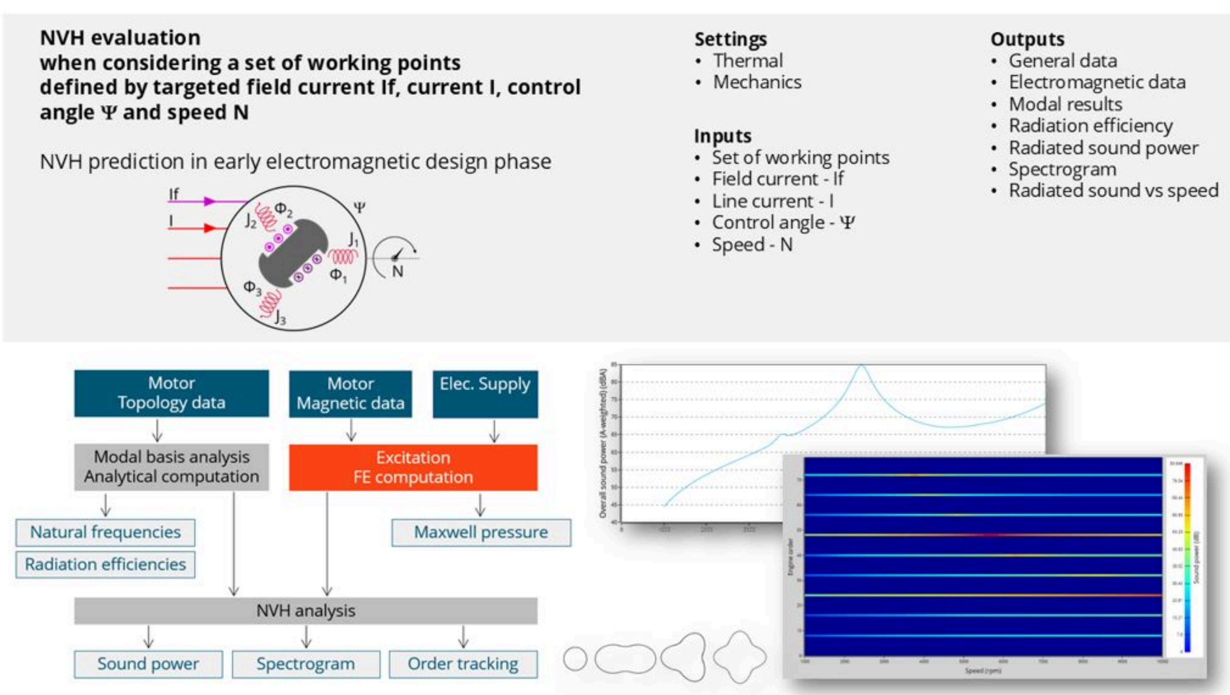


Mechanics – NVH – Working point (If, I, Ψ,N) - Overview

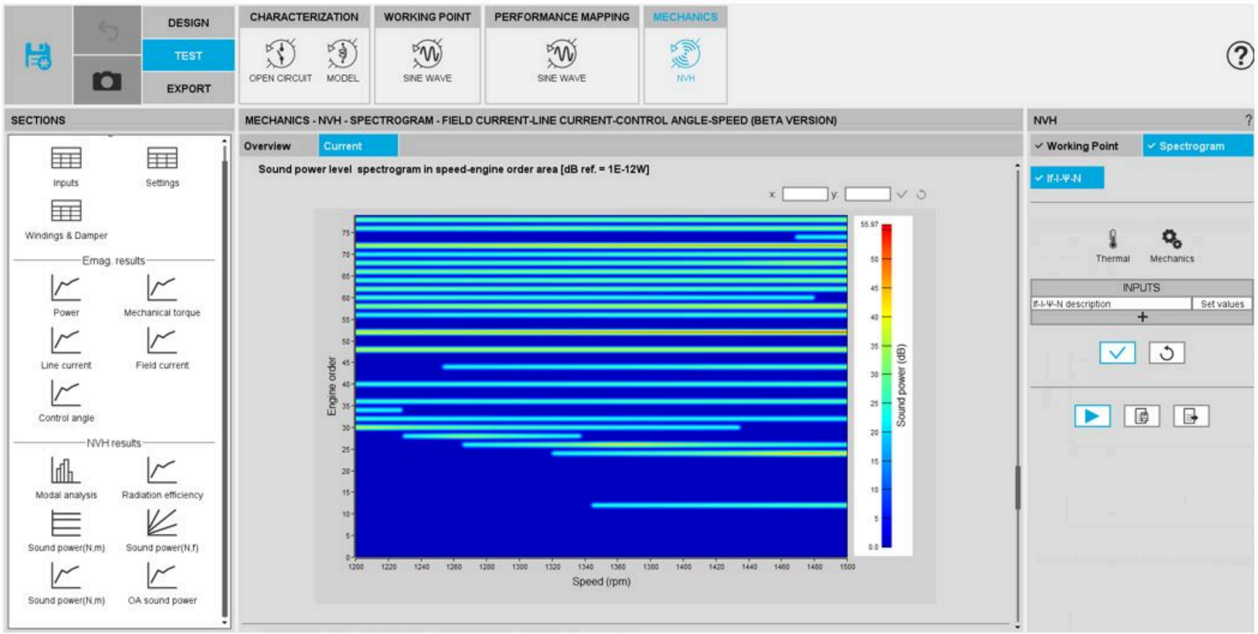


Mechanics – NVH – Working point (If, I, Ψ,N) – Magnetic forces on teeth versus rotor angular position

Here are illustrations which give an overview of the test NVH – Spectrogram (If, I,Ψ,N):



Mechanics – NVH – Spectrogram (If, I, Ψ,N) - Overview



Mechanics – NVH – Spectrogram (If, I, Ψ,N) - Test results

Note: When displaying result maps, the graphical quality of the maps is degraded when the context is modified. This does not prevent analysis of the results. This issue will be corrected in a future version.

2.3 Three new thermal scheme exports for transient thermal analysis

Introduction

With the previous version, it was possible to export the thermal model of a synchronous machine with permanent magnets, a reluctance synchronous machine and an induction machine with squirrel cage from FluxMotor to Flow Simulator ready to perform a thermal steady state analysis.

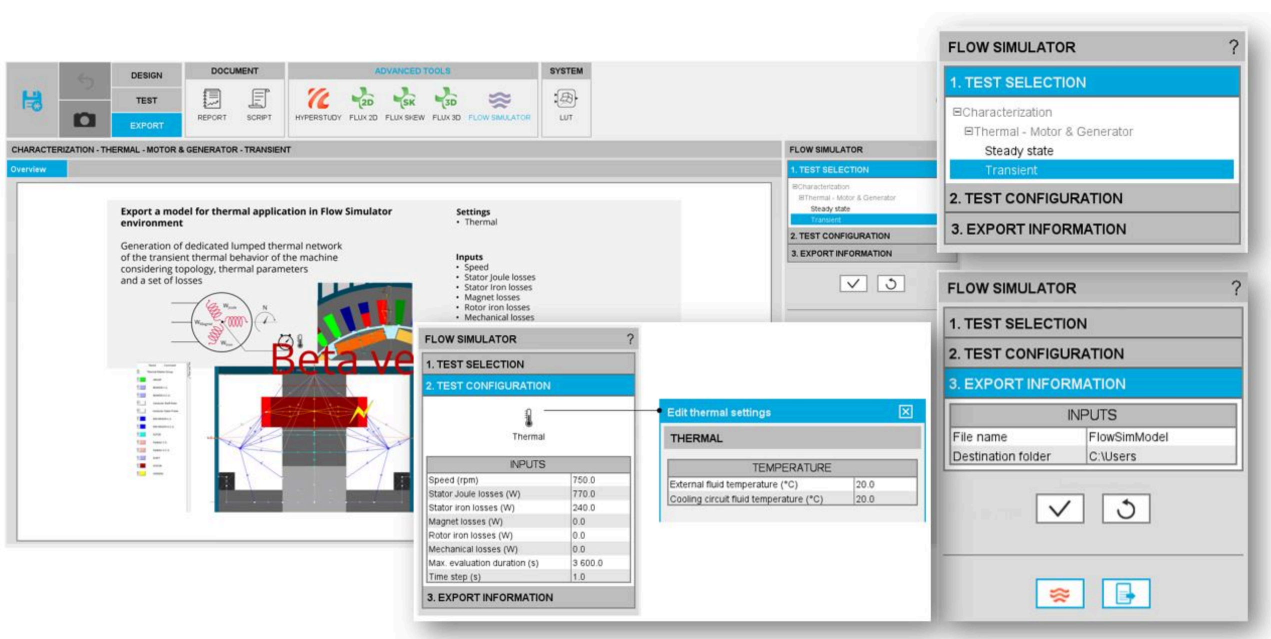
With the new version of FluxMotor, it is now possible to export the thermal model of these machines to perform a transient thermal analysis for the three types of machines.

The aim of the export “Advanced Tools - Flow Simulator – Transient” is to represent the transient thermal behavior of the machine through a customizable lumped thermal parameter model coupled with a flow network when necessary.

The resulting model is a 3D representation of a steady state thermal circuit built in Altair® Flow SimulatorTM; it corresponds to the thermal model used in Flux Motor® to run both thermal and coupled tests.

A thermal working point defined by a speed and a set of losses can be considered to compute the temperature charts and the main thermal parameters.

In addition to that, a maximum evaluation duration and a time step are added as inputs to set the transient mode.



Export of the thermal model from FluxMotor to Flow Simulator
to perform transient thermal analysis in Flow simulator

Reminders

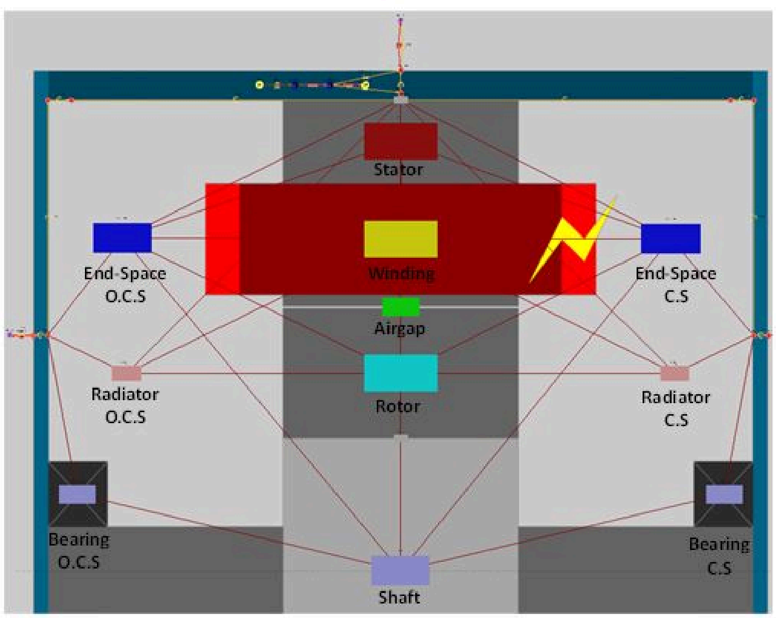
Generalized lumped thermal network.

The proposed thermal network is based on a general schema where the number of thermal resistances is fixed for some well-known regions in which geometrical changes can be modeled through variable parametrization. These regions are the shaft, the bearings, and the housing (end caps included).

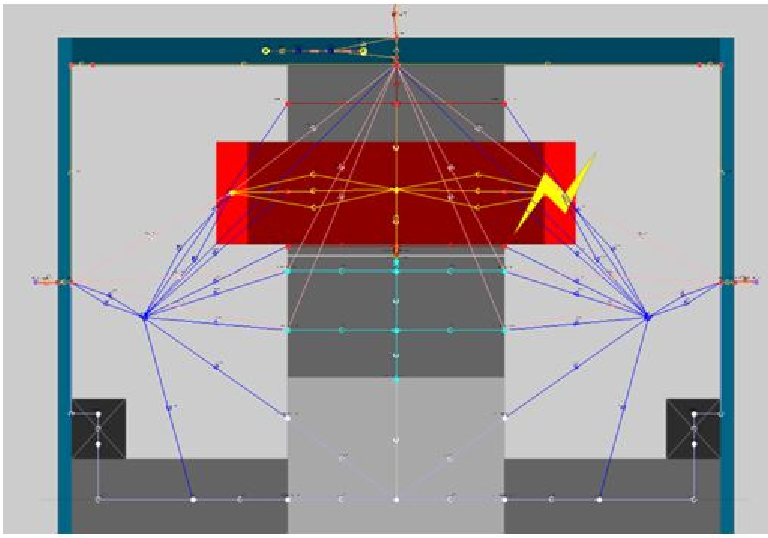
On the contrary, the local grid of some regions is highly dependent on the chosen topology and should be particularized to achieve the essential goals of maximum customization and versatility during the design stage. These regions are mainly the rotor and the stator (including the winding). Due to their high interaction with these areas, the airgap and the end-spaces also require a customized grid.

The global network is displayed in a 3D view in Flow SimulatorTM, and for clarity, the different regions are associated with groups. Resistances can either be hidden inside their groups or expanded, as shown in the images below. This dual view assures, at the same time, the possibility to show a meaningful global view containing the main heat paths or, on the contrary, to have the deepest insight into one or several regions and to study in detail their configuration as explained in the section below ("Customizable stator and rotor grids – The constellation method"). Each group can be expanded or collapsed independently.

Once in Flow SimulatorTM, the thermal circuit can be solved, and any kind of modification in thermal resistance values or grid connections can be added.



Axial projection of the thermal grid exported to Flux Simulator. Global view



Axial projection of the thermal grid exported to Flux Simulator. Expanded view.

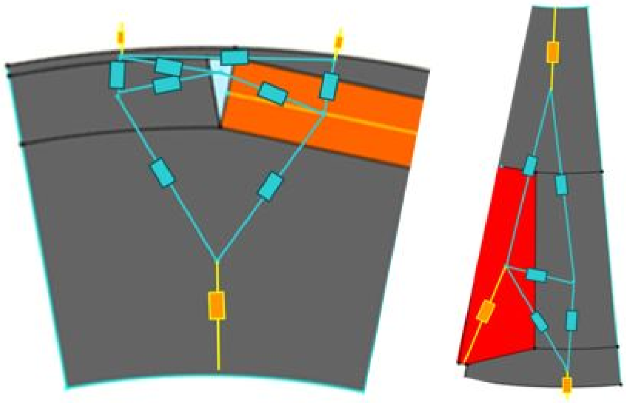
Customizable stator and rotor grids – The constellation method

Stator and rotor geometries, especially the latter, are subject to big changes during predesign, even for a fixed number of slots or poles. Different shapes and number of magnets per pole, the existence of holes in the active parts and of shoes next to the airgap are usual. These modifications, which have an important impact on the machine's performance, are usually difficult to parametrize.

The best solution to this challenge is the use of a customizable grid defined using the constellation method, which can be summarized in the next points:

- Since only radial electric machines are considered, the radial cut of rotor and stator are defined as rotor part and stator part, respectively. These parts are composed of different surfaces, which are represented by their material (generally steel, air, magnets or conductor) and their central point (i.e., their barycenter).
- Barycenters of neighboring surfaces will be connected by a thermal resistance. These resistances will form the part constellation. Thermal resistances between non-neighboring surfaces are supposed to be infinite.
- Surfaces in contact with external frontiers will be connected to them by thermal resistances (i.e., in the radial plane, these frontiers are the airgap and the shaft for the rotor part and the airgap and the frame for the stator part).
- It is considered that every surface in stator and rotor parts is in contact with both end-spaces; therefore, a thermal resistance must link them to these regions. These resistances are the only ones that are not contained in the considered radial plane.

The generation of the rotor and stator thermal constellations is developed from their associated parts, as defined in Altair® FluxMotor®.



Thermal constellation of a rotor (a) and stator (b) part.
In blue, thermal resistances link internal surfaces.

In yellow, resistances link surfaces with part frontiers.

2.4 Import a parameterized part from SimLab sketcher

Make the topology definition easier

It is now possible to create parameterized parts that are compatible with FluxMotor via SimLab.

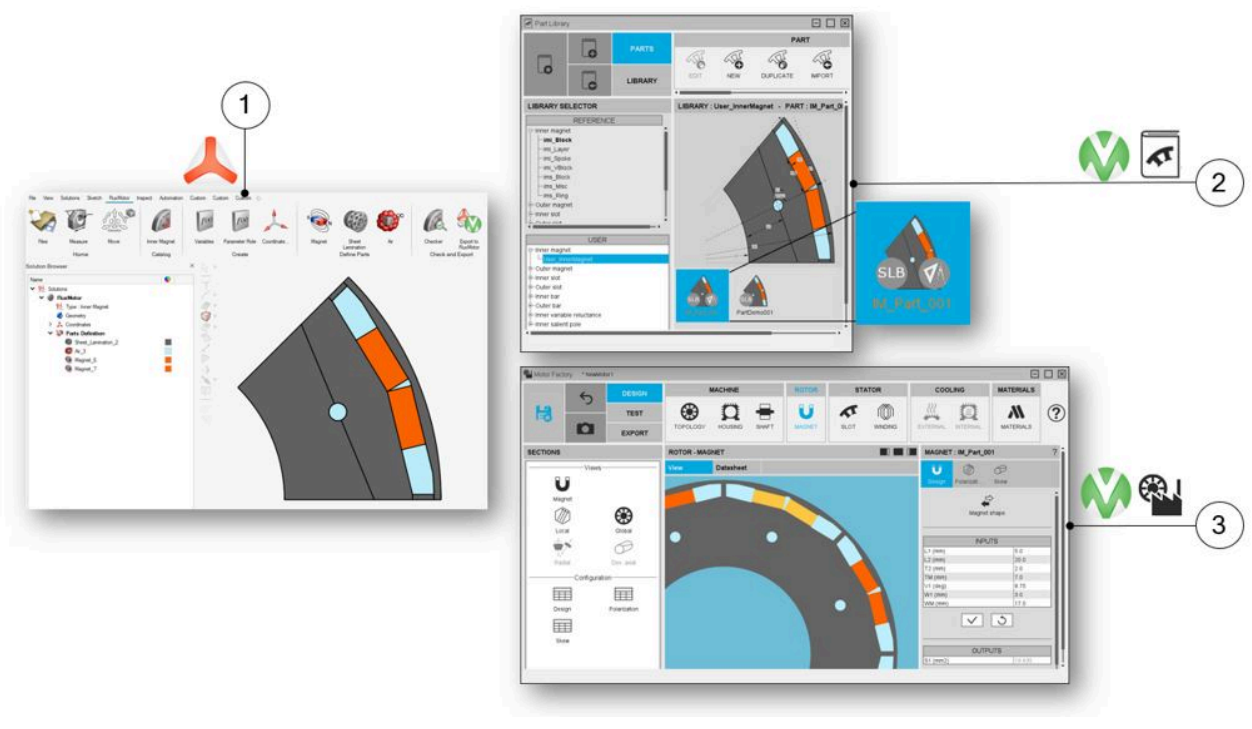
The FluxMotor Solution integrates seamlessly with SimLab tools, including Import (Database, CAD, or Sketch) and the Sketch Environment, to provide a comprehensive workflow for creating and exporting parts compatible with FluxMotor.

Users can perform the following workflows within this solution in SimLab:

Customize catalog parts: Modify existing parts from the catalogs by adjusting design details or adding new features.

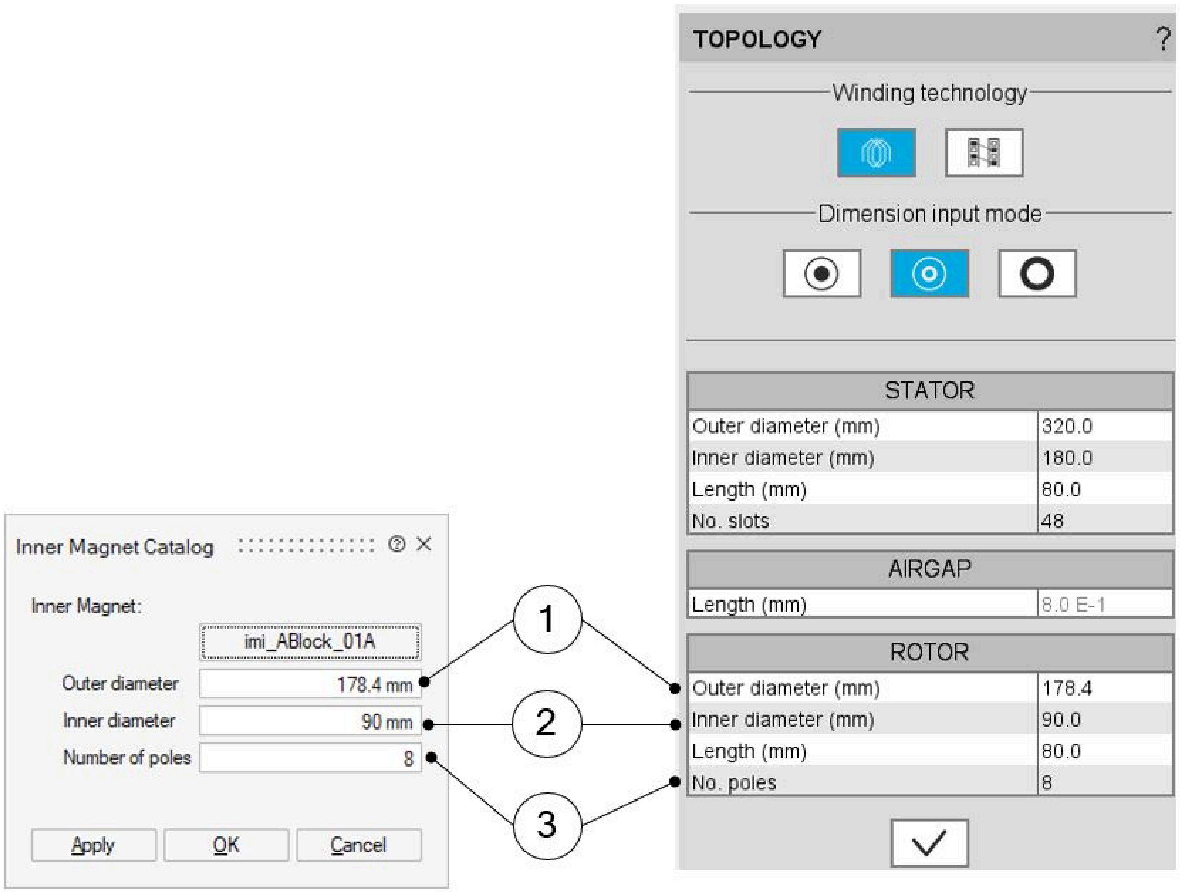
Create a part from scratch: Define a custom FluxMotor part using the basic sector template, specifying the inner diameter, outer diameter, and the number of repetitions within a motor.

Import from CAD: Generate a FluxMotor part by importing a CAD model, either of a specific part or the entire motor assembly.



Workflow between SimLab sketcher, Part Library and Motor Factory

> **Note:** In the version FluxMotor 2025, structural parameters (Rotor outer diameter, Rotor inner diameter, No. poles) are fixed in FluxMotor.
>
> Users cannot modify these parameters within FluxMotor. To ensure compatibility, the motor in FluxMotor must have the same (Rotor outer diameter, Rotor inner diameter, No. poles) as defined in the SimLab part for successful import.
>
> For additional information, please refer to SimLab user help guide.



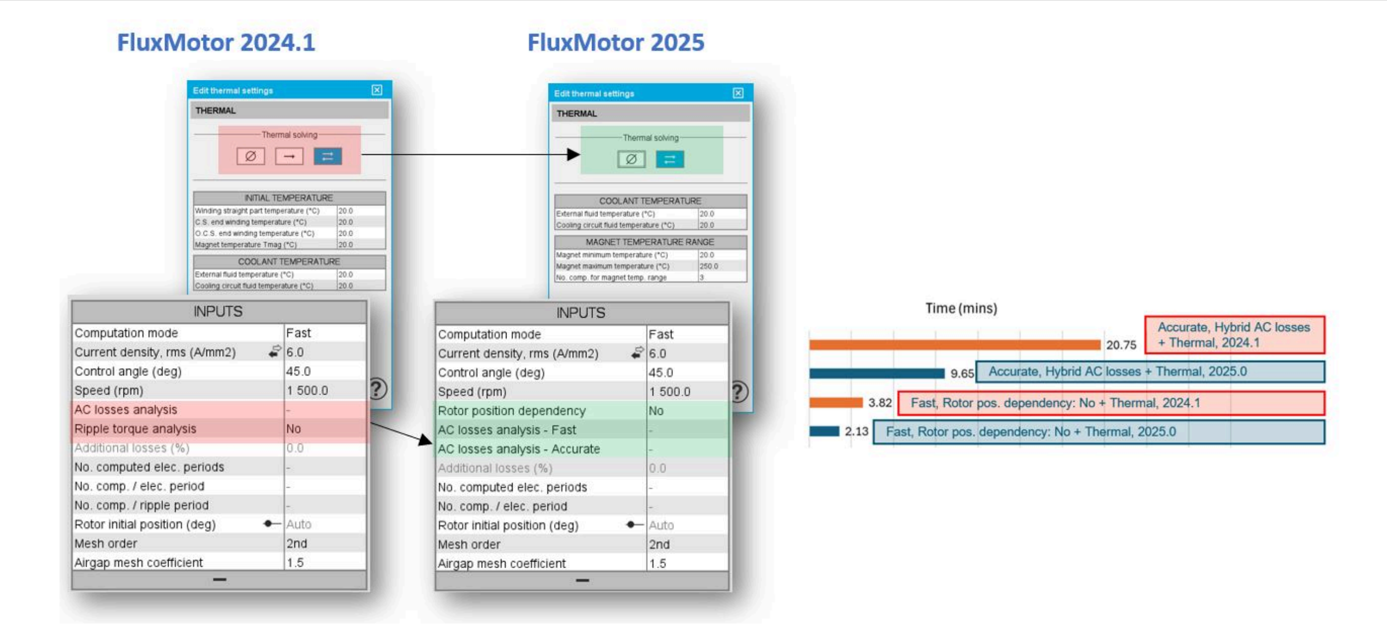
The structural data are not yet parameterized. They must be the same between both environments.

2.5 Working Point Test Enhancements for synchronous machines

Information

The new version, FluxMotor 2025, introduces significant improvements to the working point test for all synchronous machines, enhancing functionality and reducing computation time:

1. New Fast Mode with rotor position dependency
    - Offers faster computation than the accurate mode with comparable accuracy.
    - Computes AC losses using a hybrid method.
2. Optimized Thermal Solving:
    - Incorporates a new backend process that doubles computation speed.
    - Enables highly efficient full emag.-thermal coupling, leading to the removal of the one-way coupling option.
3. Ripple Torque Analysis:
    - The separate ripple torque analysis option is removed.
    - Ripple torque values are now provided only in Fast Mode (with rotor position dependency) and Accurate Mode.



Working Point Test Enhancements for synchronous machines

2.6 IMSQ - Power balance - Improvement of computation

Power balance & iron losses

The method used to include iron losses in the power balance has been improved, whatever the computation mode, “Fast or Accurate”. Iron losses are post-computed, so they must be added to the power balance referring to the following formula:

$P_{elec} = W_{Joule\ stator} + W_{Joule\ rotor} + W_{iron\ stator} + W_{iron\ rotor} + P_{em}$

According to the analysis of the electrical equivalent scheme of the induction machine, the introduction of the iron losses seems to be more impactful in terms of absorbed power than in terms of electromagnetic power.

Indeed, the low value of the magnetizing impedance compared to the iron losses resistance indicates that the torque is not significantly impacted.

Following this observation, it was decided to impact the absorbed power and more precisely, the power factor by adding iron losses to the power balance (current and voltage are unchanged).

$$Pf = \frac{P_{elec.}}{3 \times V_s \times J_s}$$

2.7 New connectors for HyperStudy

New connectors for HyperStudy for two tests of the wound field synchronous machines

One new connector for coupling FluxMotor and HyperStudy has been implemented for the wound field synchronous machine.

The new connector HyperStudy is dedicated to the test: The Characterization / Model / SSFR (Equivalent scheme computation)

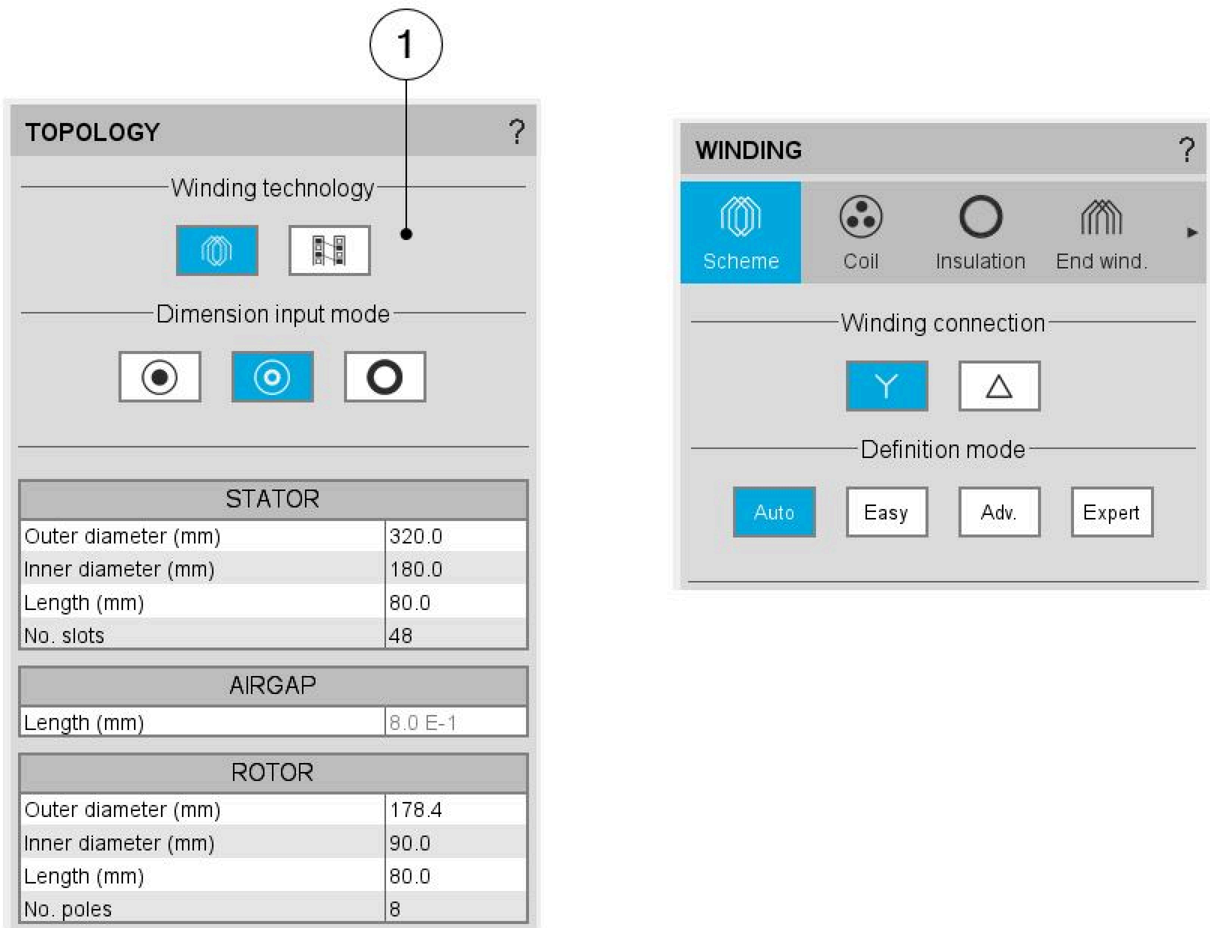
Thus, it is now possible to optimize the design of a wound field synchronous machine with inner salient pole to adapt machine behavior to different scenarios (steady-state or transient), such as short-circuit, load variation, steady-state operating point, etc..

2.8 Refactoring and homogenization of the GUI in Motor Factory

Information

The aim of this refactoring is to make all the environments of Motor Factory with the same presentation, and workflow.

For example, the choice of winding technology between Classical and hairpin must be done into the structural data, no longer in the winding environment. Hence, the scrolling selection bar comes first at the top part of the winding environment, like what is done now in all the environments.



Choice of the winding technology (1) must be done into the structural data.

Another example: the polarization of the magnet becomes a sub-section of the magnet. The scrolling selection bar allows to homogenize the design environment of the magnet.

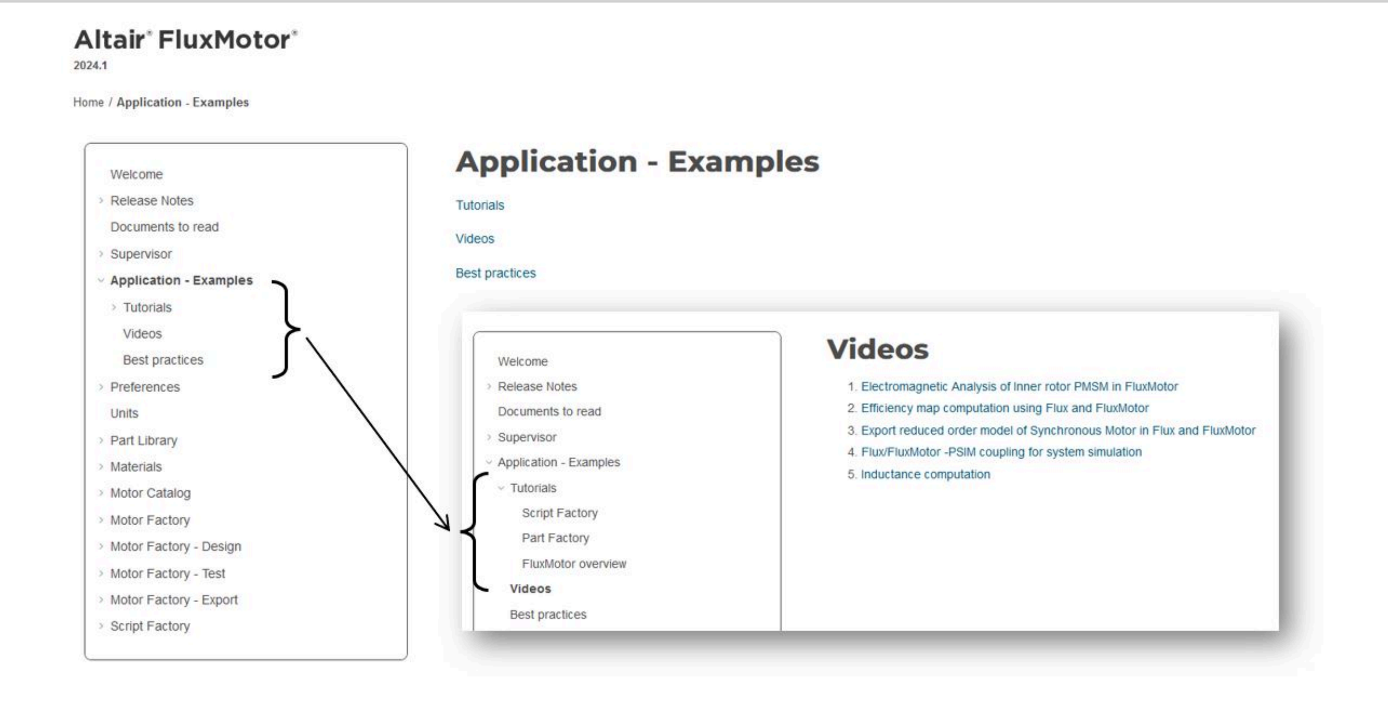
Design, Polarization and Skew are at the same level to characterize the magnet.

2.9 Videos, tutorials and best practices

Reminder

Tutorials, best practices documents and videos are now available on the online user help guide.

Such valuable information allows us to illustrate what is possible to do with FluxMotor and how to exploit the full potential of our solutions.



How to find Tutorials, Videos,and Best pratice documents ?

List of fixed issues and major improvements

3

This chapter covers the following:

3.1 All machines

Thermal computation results can be very different between FluxMotor and Flux2D

Thermal computation with FluxMotor can be very different from the one exported to Flux2D with the same settings.

Indeed, the second-order temperature interpolation does not manage very well high temperature variations on an element.

That's why, sometimes, in Flux2D, the result got for a single thermal node of the mesh can "hide" the real temperature distribution when the temperature map is displayed by default.

As a workaround, we can change the temperature scale manually to make the results become closer to what is expected (ref.: FXM-16393).

This issue has been modified into an improvement task since such a case must be fixed by improving the meshing.

Thermal computations - Problem of convergency

Solving problem during the pre-computation of thermal circuit with negative temperature can occur (ref.: FXM-16948).

This issue has been corrected.

Japanese language and Flux software exports

When we export a Flux project (Flux2D, FluxSkew and Flux3D) some characters are written in Japanese which makes the file crash during the execution. A workaround consists of deleting all the Japanese characters and then execute the python file (ref.: FXM-16590).

This issue has been corrected.

3.2 Synchronous machines – Motor Factory – Test environment

For Reluctance Synchronous Machine, the post processing of the Working Point I-Psi-N does not respect the sign convention.

(ref.: FXM-16945).

This issue has been corrected.

3.3 Induction machines – Motor Factory – Test environment

The computation of power balance for IMSQ in "accurate mode" is not well balanced.

In the test "working point – sine wave – motor – U, f, N", while computing the power balance with the accurate mode (i.e., with the transient application), the results are not well balanced. Indeed, the difference between the electrical power and the power on the shaft is not exactly equal to the total amount of losses.

Depending on the considered slip, the difference can be about a few percent (ref.: FXM-16121 & FXM-16561).

> **Note:** The number of computation points per electrical period and the number of considered electrical periods (user's inputs) have an impact on the accuracy of the results.

> **Note:** The displayed value (in FluxMotor) of the mechanical torque is based on the Finite Element computations and considers the iron losses and the mechanical losses.

> **Note:** The rotor Joule losses (squirrel cage) result from the Finite Element computations.

This issue has been corrected.

Possible negative AC Joule losses

While computing a working point in accurate mode, the AC Joule losses can be negative if they are computed on a half electrical period with a low number of computations per electrical period (ref.: FXM-16919).

This issue has been corrected.

3.4 Wound field synchronous machines – Motor Factory – Export environment

Exporting LUT using FMU format files

For the Wound Field Synchronous Machines, exporting LUT using FMU format files is not possible with the current version.

This issue has been corrected.

3.5 Script Factory

Scripts cannot be executed.

If the path to the batch file or the working directory in Script Factory contains spaces, the script cannot be executed (ref.: FXM-16120).

This issue has been corrected

Name of the Motor Catalog (or Part Library) is not case sensitive

When the name of catalogs (or Libraries) is written with the same letters but with a mismatch in the name due to the usage of uppercase and lowercase discrepancy, this leads to issues like the user cannot access the motor catalogue with name and this prevents us from opening or deleting it (ref.: FXM-16888).

This issue has been corrected.

List of warnings

4

This chapter covers the following:

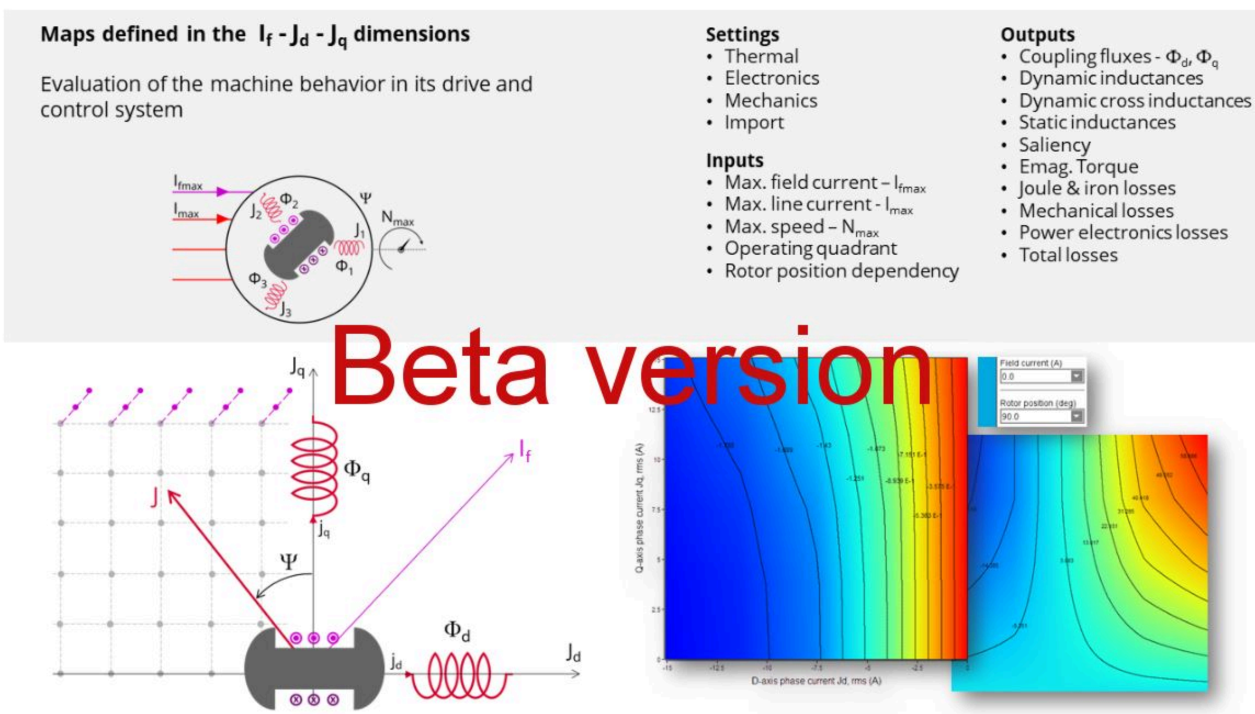
4.1 All machines

Features available in beta mode.

Sometimes, a new test is provided in beta mode, meaning that it is not entirely qualified. However, we make it available for testing, and we invite the users to give us their feedback and comments for improving this feature even more.

To indicate the "Beta mode" status of the test, "**BETA VERSION**" is written in the overview of the considered test as illustrated below.

Here is an overview of the test, as shown below.



Example of a test provided in beta mode

For information here is the list of the features available in beta mode in the current version of FluxMotor:

Synchronous Machines with Permanent Magnets – Inner Rotor:

- The process for importing parameterized part (Magnet) from SimLab sketcher is in beta mode.
- Export – Advanced tools – Flow Simulator – Characterization – Thermal – Motor & Generator – Transient (Inner Rotor only)

Reluctance Synchronous Machines – Inner Rotor:

- Export – Advanced tools – Flow Simulator – Characterization – Thermal – Motor & Generator – Transient

Wound Field Synchronous Machines - Inner Salient Poles – Inner Rotor:

- Test - Characterization – Open circuit – Generator – No load
- Test – Working point – Sine wave – Motor & Generator – P, Pf, U, N
- Test – Mechanics – NVH – Working point If, I, Ψ, N
- Test – Mechanics – NVH – Spectrogram If, I, Ψ, N

Induction Machines with Squirrel Cage – Inner and Outer Rotor:

- Test – Characterization - Model – Motor – Scalar
- Test – Performance mapping – Sine wave – Motor – Ems U-f (Efficiency map)
- Test – Performance mapping – Sine wave – Motor – Ems U-I (Efficiency map)
- Test – Mechanics – NVH – Working point U, f, N
- Test – Mechanics – NVH – Working point I, f, N
- Test – Mechanics – NVH – Spectrogram U, f, N
- Test – Mechanics – NVH – Spectrogram I, f, N
- Export – Advanced tools – Flow Simulator – Characterization – Thermal – Motor & Generator – Transient (Inner Rotor only)

DC Permanent Magnet machines – Inner Rotor:

- Test – Working point – Constant speed – Motor & Generator – U-N
- Export – Flux 2D – Transient – Working point – Voltage source – Motor & Generator – Constant speed

All changes to Motor Factory GUI are not reflected in the user help guide. This will be done in the future versions.

Distribution of computations cannot be used for computing NVH spectrogram

(FXM-15772)

Winding – Expert mode – defining of several circuits per sector.

In Expert mode, several parallel circuits can be defined in a sector, and moreover, several coils can be built in one circuit.

Such circuits can be connected in parallel according to the user's input No. parallel paths.

In that case, it is mandatory to balance all the parallel paths well while building and connecting the coils inside all the circuits.

Indeed, our internal process of computation doesn't manage the unbalance between parallel paths, i.e., in the case of unbalanced parallel paths; the results of computations are wrong.

> **Note:** For example, unbalance between parallel paths can be due to the number of coils per circuit, which can be different from one circuit to another. It can also be induced by the building of coils (differences in conductor lengths...).

Natural convection for end winding

While choosing a model, where the end spaces are cooled with natural convection, the FluxMotor® model uses quite a low rotor tip speed ratio (a value of 5) to describe the fluid velocity far from the rotating components. This may lead to an overestimation of the cooling of the end winding on high-speed machines.

When a tip speed ratio of 5 seems to overestimate the end winding cooling, it is advised to switch to forced convection mode.

This mode allows forcing some higher tip speed ratios for areas far from the rotor but reduces the efficiency of the cooling on the end winding.

This model will be improved for future versions.

Modification of units

To take the change of units into account in a test, the user must reopen Motor Factory. The modification is not considered instantaneous in applications of Altair FluxMotor® like Motor Factory.

Export a model into Flux® environment with represented elementary wires

Building time of the model in Flux®:

When slots are filled out with a lot of elementary wires, and all the phases need to be represented with solid conductors inside the Flux® 2D model, the resulting python file can be very long. Therefore, the process of building the corresponding model in the Flux® environment can take a longer time.

Browse function

Sometimes, opening a folder from FluxMotor® applications via the browser function requires a longer time (several seconds).

Export environment – HyperStudy®

Compatibility of HyperStudy connectors with respect of FluxMotor solver versions

The process that describes how to update the HyperStudy connector is written in the user help guide "MotorFactory_2025_Introduction.pdf"

New test and connectors for HyperStudy®

Connectors for coupling FluxMotor® and HyperStudy® are not yet available for the newly added tests, like those with transient thermal computations or the tests for induction machine like the "Characterization – Model – Motor – Scalar" and the "Performance mapping – Sine wave – Motor – Efficiency map scalar".

Mandatory synchronization between connector and FluxMotor versions

The connectors used in HyperStudy must be synchronized with the FluxMotor solver version.

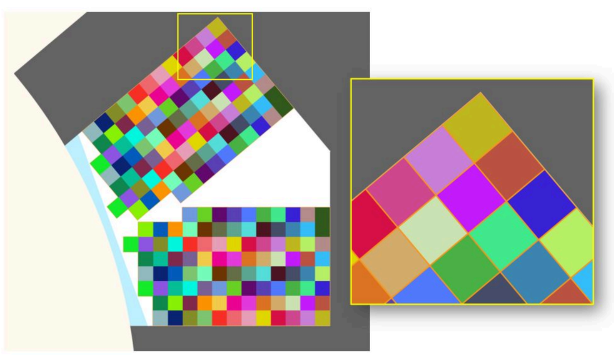
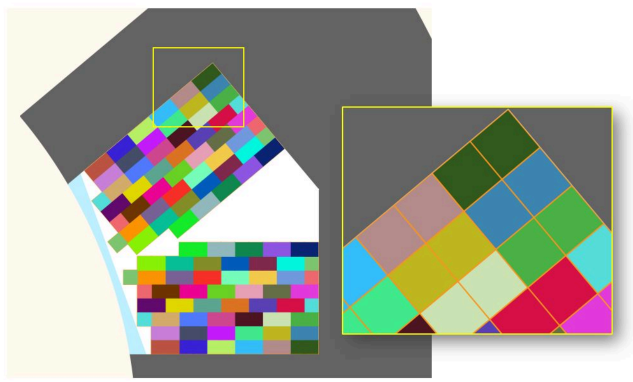
An error message (inside the log files) is generated while performing HyperStudy studies with a connector provided with a former version of the FluxMotor solver.

Problems with slot filling

1. Slot filling is not yet possible with a non-symmetric parallel slot.
2. When a toothed winding design is considered with rectangular shape wires, the conductor grouping method "horizontal" doesn't work properly, leading to the wrong visualization of conductors. In that case, it is recommended to select the conductor grouping method "vertical".

   All work well with circular shaped wires.

Example with a toothed winding design (i.e., the coil pitch = 1) and with 2 wires in hand.

	
Horizontal filling – wrong visualization, but the total number of wires is right	Vertical filling – good visualization

NVH computations - Advice for use

The modal analysis and the radiation efficiency are based on analytical computation, where the stator of the machine is considered a vibrating cylinder.

The considered cylinder behavior is weighted by the additional masses, like the fins or the winding, and the subtractive masses, like the slots and the cooling circuit holes.

This assumption allows for a faster evaluation of the behavior of machine in connection to NVH. But in no way can this replace mechanical finite element modeling and simulation.

Possible reasons for deviations in results can be the following:

- The limits of the analytical model are reached or exceeded.
- Unusual topology and/or dimensions of the teeth/slots
- Complexity of the stator-frame structure when it is composed of several components, for instance.
- The ratio between the total length of the frame Lframe and the stack length of the machine Lstk. In any case, this ratio must be lower than 1.5:

  L_Frame/L_stk ≤1.5

Thermal computation results can be very different between FluxMotor and Flux2D

Thermal computation with FluxMotor can be very different from the one exported to Flux2D with the same settings.

Indeed, the second-order temperature interpolation does not manage very well high temperature variations on an element.

That's why, sometimes, in Flux2D, the result got for a single thermal node of the mesh can "hide" the real temperature distribution when the temperature map is displayed by default.

Such a case must be fixed by improving the meshing.

As a workaround, we can change the temperature scale manually, to make the results become closer to what is expected (ref.: FXM-16393).

4.2 Synchronous machines – Motor Factory – Test environment

Working point – Square wave – Forced I – and delta connection.

When running the test "Working point – Square wave – Motor – Forced I" with a delta winding connection, two electrical periods are considered for reaching the steady state behavior of the motor. However, sometimes two periods are not enough to get a good convergence of the process, and therefore, the displayed results may not correctly represent the steady state.

Motors built and tested with previous versions can be loaded with the current version. The existing "current tests" are removed and transformed into "saved tests" with reference to the original version (all the previous versions).

Sometimes, the results of the current tests are removed. The test must be executed again to get the corresponding results.

Delta winding connection

When a delta winding connection is considered, the computation doesn't consider the circulating currents. This can lead to a different result than expected in transient computation for the test "Characterization - Open-circuit - back-emf".

In such a case, it is recommended to perform a transient computation in the Altair® Flux® environment. The application "Export to Flux®" thereby allows exporting this kind of model to the corresponding scenario ready to be solved.

Evaluation of the maximum achievable speed

The aim of this result is to give a rough estimation of the maximum reachable speed that can be achieved by the machine. This computation is performed by considering the MTPV command mode. However, when the resulting control angle is low (no saliency in the airgap of the machine), the evaluation of the maximum achievable speed may be far away from the maximum speed given by the "Performance mapping – Sine wave – Motor - Efficiency map" test.

Export to FeMT

The export of projects to FEMT is limited to SMPM inner rotor machines.

Furthermore, when there is more than one parallel path, export to FeMT is blocked because the two electric circuit models are not yet compatible in the electric circuit built by FluxMotor. Here, parallel paths are built to represent the corresponding parallel circuits.

4.3 Induction machines – Motor Factory – Design environment

Computation of inter bar impedance.

For induction machines, inter bar impedance (resistance and inductance) is computed by considering characteristics defined in the Motor Factory. However, while exporting the model into Flux® 2D or into Flux® Skew, the inter bar impedance will remain constant, even if a parametric study is performed in the Flux® environment. The topology parameter as well as the temperature variations won't impact the inter bar impedance.

4.4 Induction machines – Motor Factory – Test environment

Computation of tests for induction machines with skewing

When the squirrel cage or the slots are skewed for induction machines, the tests are computed with Altair® Flux® Skew at the back end of the FluxMotor®.

This leads to an increase in computation time.

For the tests "Performance Mapping – Sine wave – Motor – T(Slip)" and the test "Characterization – Model – Motor – Linear", the computation time can be greater than 45 minutes depending on the concerned machine and is generally lower than 5 minutes when it is without skewing of the squirrel cage or slot.

The computation time for computing a working point is generally close to 8 minutes with the skewing of a squirrel cage or slots and lower than 1 minute when it is without skewing.

The required allocated memory is higher when Flux® Skew computations are performed at the back end of the FluxMotor®.

By default, the maximum allocated memory for Flux® Skew software and Flux® 2D software is set to DYNAMIC (user's preferences - Advanced tab).

Computation of power density for induction machines

There was an issue in the process of computing or displaying the power density for induction machines.

The result was given in W/m3 while it is in W/kg for other machines, such as SMPM and RSM.

This issue has been corrected.

However, it won't be possible to use a connector for HyperStudy®, generated with an older version, for driving the FluxMotor® 2022.2.

List of the main issues

5

This chapter covers the following:

5.1 All machines

When a machine with linear ferromagnetic materials is built with version N, it cannot be opened with version N+1.

For example, if such a machine has been built with FluxMotor version 2024.1, it cannot be opened with version 2025.

This problem will be corrected in the next version.

There are two workarounds:

1. Export the project script with version N-1 and run it with version N (solved tests will not be saved).
2. Replace the linear materials with non-linear materials in version N-1, so that it can be opened with version N. The tests must have been saved beforehand (ref.: FXM-17466).

The graphs displayed in the test Mechanics / NVH have bad quality

Immediately after obtaining the results, the quality of the graphics is good. It deteriorates when you change windows and then come back to see the results (ref.: FXM-17258).

Thermal computations - Problem of convergency

When losses are very high, there is a convergence issue with the Thermal computations (ref.: FXM-15900).

Wrong thermal analysis

Zero values are allowed for housing, bearing or shaft dimensions but lead to the wrong thermal analysis (ref.: FXM-14705).

Null values are not well managed while designing the Frame and shaft.

Null values are allowed for designing the housing, bearing, or shaft dimensions, but this leads to the wrong thermal analysis. It is highly recommended not to use null values for the inputs considered (ref.: FXM-14705).

Export to FeMT with too long output path

The Flux script crashes when the output path for FeMT export is too long (ref.: FXM-15471).

Fault in the coupling FluxMotor-HyperStudy

An error in the FluxMotor process doesn't stop the HyperStudy execution (ref.: FXM-15402).

Issue with exported Flux Skew projects

After exporting a Flux Skew project, if the user solves the project, deletes the results, and then solves again, the running of the project fails (ref.: FXM-15075).

The color of wires displayed in the slots is not correct while using Flux Skew export (ref.: FXM-16942).

Error while opening a motor (2020.1) with null shaft extension.

Opening a motor built with version 2020.1 (or older) with a null shaft extension leads to an error. With new versions, a null shaft extension is forbidden (ref.: FXM-14684).

Air material properties are wrong for high temperature.

This issue impacts our internal computation processes during transient thermal solving. Indeed, some iterations involve very high temperature (more than 3000 °K), according to the Newton Raphson non-linear solving method. During the resolution, this can lead to negative conductivity and viscosity, which may make the computation fail (ref.: FXM-14465).

> **Note:** In case of a problem, an "Air material" with the right parameters can be provided.

When an IO cannot be loaded, the test results are not accessible.

When an IO cannot be loaded, the whole process that loads all the test results is stopped. As a result, no test is visible, although the issue may concern one result in a particular test (ref.: FXM-13941).

A wedge and/or inter-coil insulation region leads to a wrong slot equivalent thermal conductivity.

The slot radial thermal conductivity, which is automatically provided by the FluxMotor® in the "Cooling-Internal" context and used in all thermal tests, is wrong if the slot contains faces "wedge" or "inter-coil insulator" (ref.: FXM-13896).

Power electronics and coupling with HyperStudy®

For tests where the setting "Electronics" is available, data like power electronics stage, maximum efficiency, and its rated power can be selected for generating a connector for HyperStudy®, but it should not be.

In the Export-HyperStudy® area, when the selected test is "Working Point, T-N", the settings of "Electronics" - "Max efficiency", and "Rated Power" - are exported even if the associated option is not selected (ref.: FXM-13726).

Winding environment – MMF computation

The counter-clockwise sequence (MMF computation) is not considered in the Altair® Flux® model, which one can export. Only the clockwise phase sequence is considered (ref.: FXM-10280).

Using "phase sequence" set to "Counterclockwise" leads to wrong results in tests (ref.: FXM-13358).

Flux density isovalues

When a skewed topology is considered (synchronous machines or induction machines), the flux density isovalues, the vector potential isolines, and the rotor bars current density isovalues are not displayed (ref.: FXM-12564).

5.2 Synchronous machines – Motor Factory – Test environment

In accurate mode the sign of the reactive power, and the phase angle is not right.

The sign conventions are not respected for defining the reactive power and phase angle (ref.: FXM-16143, FXM-16542).

Working point – Square wave – Forced I – Average computation of quantities.

The computation of average quantities like iron losses, the Joule losses in magnets, and torque is not executed over a full electrical period. That can lead to wrong results (ref.: FXM-14091).

Maximum speed computation

The estimation of the maximum speed is wrong for the tests "Working point - Sine wave – Motor - U-I" and "Working point - Sine wave – Motor - T-N" when the control mode MTPA is selected (ref.: FXM-10916). The computation is always performed by considering the MTPV command mode.

Difference between map and torque-speed envelop

In the efficiency map with thermal coupling and duty cycle, the base speed table + torque speed envelope don't match with the map (ref.: FXM-17188).

The Duty cycle index plot is not displayed; NaN is always displayed instead.

In the test Performance mapping-Efficiency map & Duty cycle with thermal coupling, the duty cycle index plot is not displayed: NaN is always displayed instead (ref.: FXM-17246).

Export - HyperStudy – A wrong setting for the working point (I, Ψ, N).

For SMPM and SMRSM in the export for HyperStudy, when selecting the working point I,PSI,N, while exporting the connector, the Setting "thermal iterative" is available but should not be. Note that the connector can be generated but doesn't work (ref.: FXM-17277).

5.3 Synchronous machines – Motor Factory – Export environment

Export from FluxMotor to FEMT - Issue when exporting the Efficiency map test in case of parallel paths.

This problem occurs when there is more than one circuit in parallel for the periodic portion of the model under consideration (ref.: FXM-17103).

5.4 Induction machines – Motor Factory – Test environment

The computation of the efficiency map (U, I) with mechanical losses can fail.

This issue raises a null-pointer exception (ref.: FXM-16157).

The flux density is not displayed in accurate mode computation.

While computing a working point (U, f, N) for an induction machine with a skewed squirrel cage and outer rotor, the flux density inside the airgap is not displayed. (ref.: FXM-16154).

Error when exporting and solving a project in Flux Skew – Transient application.

This issue occurs when the user input “Represented coil conductors” is set to All phases (ref.: FXM-15877).

Scalar Maps or Efficiency map (U,f) tests fail with hairpin winding technology

Sometimes, the tests Scalar Maps and Efficiency map (U,f) are not correctly solved with a hairpin winding configuration, like for the Motor M1 of the reference catalog (ref.: FXM-15843).

Power balance of No-load working point

Sometimes, computation of the no-load working point (slip = 0.1%) leads to a NaN (Not a Number) result. The computed amount of iron losses is not consistent with the power balance (ref.: FXM-12600).

Issue while computing the of efficiency map (scalar control – U, f or U, I)

This problem occurs when there are 3 poles represented for the periodic portion of the model under consideration (ref.: FXM-17150).

Issue while computing the efficiency map (scalar control – U,f or U,I) – IMSQ

The scalar model gives wrong results when hairpin winding technology is considered compared to results obtained with an equivalent classical winding (ref.: FXM-17183).

Torque slip curve

Test results are not continuously consistent over a torque slip curve. This occurs with the test Performance mapping T(Slip) - induction machines with a skewed squirrel cage. When the user targets a working point as an added value to be computed with the whole Torque-slip curve, sometimes this additional working point doesn't belong to the curve (ref.: FXM-12599).

5.5 Part Factory

Wrong management of part borders

An inner part with an air region on the bottom border is not allowed (ref.: FXM-13445).

5.6 Materials

Material library issue for BH property after clicking linear mode button.

While clicking the linear button for choosing the linear B(H) curve, this removes the value defined in nonlinear mode and it is not possible to return to the previously specified inputs (ref.: FXM-17090).

5.7 Script Factory

Script Factory does not stop correctly.

Script Factory does not stop correctly if FluxMotor has been killed. This occurs if the FluxMotor process has been killed externally. Then, Script Factory is not able to get back to a valid state, neither automatically nor after a kill of the process (ref.: FXM-15140).

Script Factory freezes temporarily when running a script.

When running a script, the Script Factory gives the impression of freezing (while still running in the background). The editing window of the script becomes unresponsive until the script is done executing (ref.: FXM-13138).

Testing and exporting projects should be prohibited for certain use cases.

For example, testing and exporting of projects with scripts should be prohibited when slot filling is bad, or when the End-windings X-Factor leads to negative end-windings resistance (ref.: FXM-16455).

The new files are not visible in the tree if the folder is empty.

When we open an empty directory, the workspace tree is empty. Using the 'New file' button does not make visible the created files. (ref.: FXM-16901).

5.8 Supervisor – Preferences

Reboot after changing language fails

While changing the language in Chinese, then in Japanese the automatic reboot of FluxMotor fails (ref.: FXM-15088).