Altair® FluxMotor® 2025

Direct Current Permanent Magnet Machine - Inner rotor

Motor Factory – Export

General user information

Altairhyperworks.com

Contents

1 MOTOR FACTORY – EXPORT AREA – HOME PAGE VIEW

The area “EXPORT” of Motor Factory groups two main families of functions:

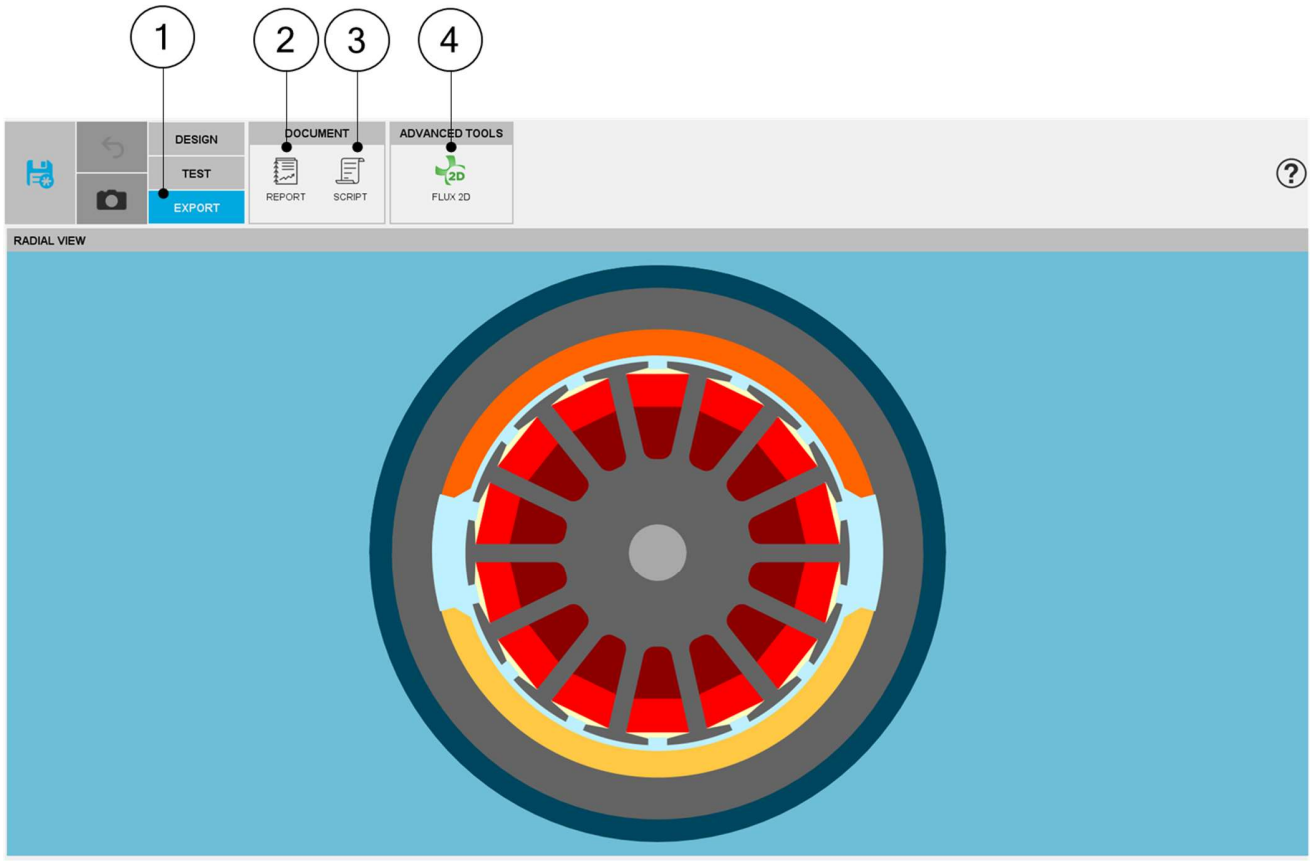
1.1 “DOCUMENT”,

In “DOCUMENT” the function “REPORT” allows building reports automatically to describe all the work achieved for the design as well as for the tests.

Then, the function “SCRIPT” allows to build and export a python script of a current motor in the application Script Factory or in a targeted folder.

1.2 “ADVANCED TOOLS “,

In “ADVANCED TOOLS” the function “FLUX2D” allows to build and export a model in Altair® Flux® (2D environment) for performing advanced studies in transient application.



Motor Factory - EXPORT area

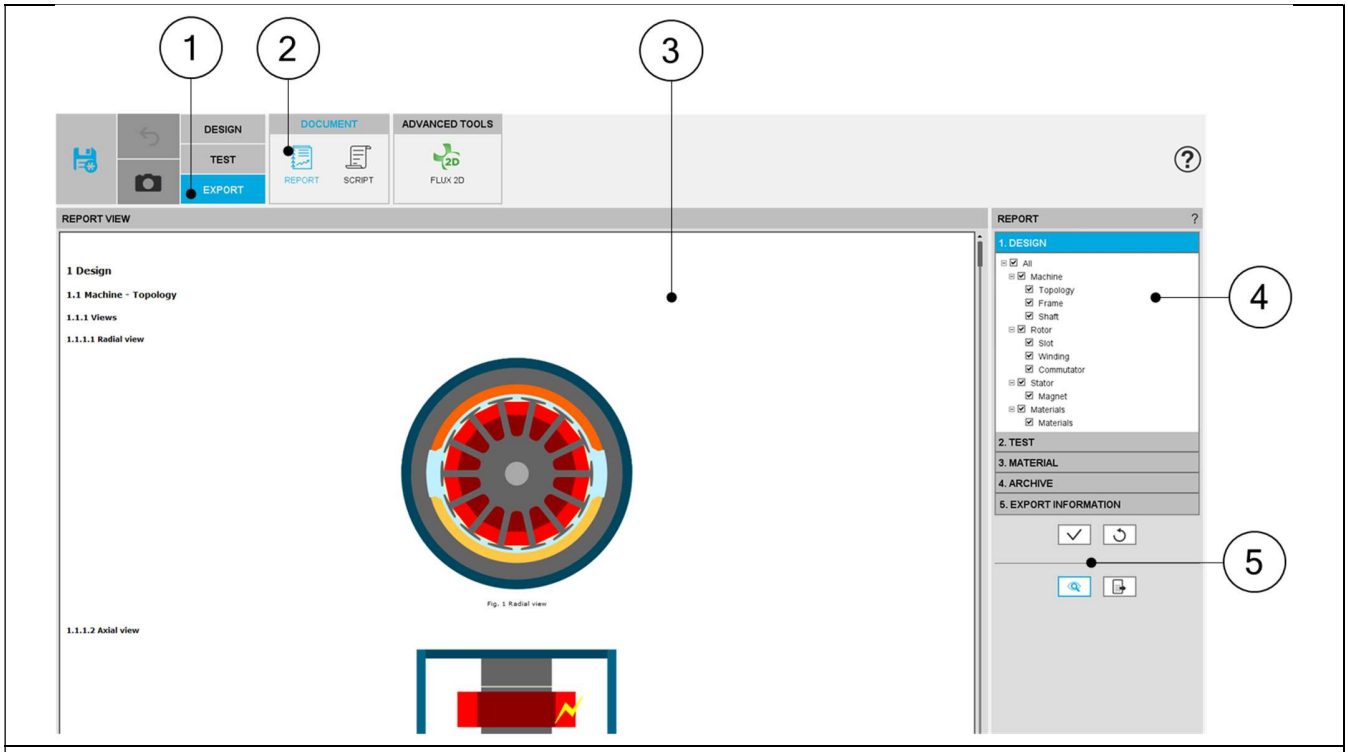
1	Selection of the EXPORT area of Motor Factory.
2	Access the area “REPORT” in which a report can be made
3	Access the area “SCRIPT” for generating a python file in which all the needed command lines are written to rebuild the motor
4	Access the area “FLUX2D” in which a model can be made and sent to Flux® 2D

2 MAKE A REPORT

2.1 Overview

The aim of this export is to build and quickly export a report showing all the work achieved to design and test the machine.
As a result, the report can be exported in a pdf or html file format. It can also be attached to the motor in the "Motor Catalog" or simply displayed in the report area.

2.2 Area to build the report



Motor Factory – EXPORT AREA – Export a report

1	Selection of the EXPORT area of Motor Factory.
2	Access the area in which a report can be made
3	Zone to visualize the report (= preview)
4	4 steps to build the report
5	Buttons to validate inputs, display a preview and export a report

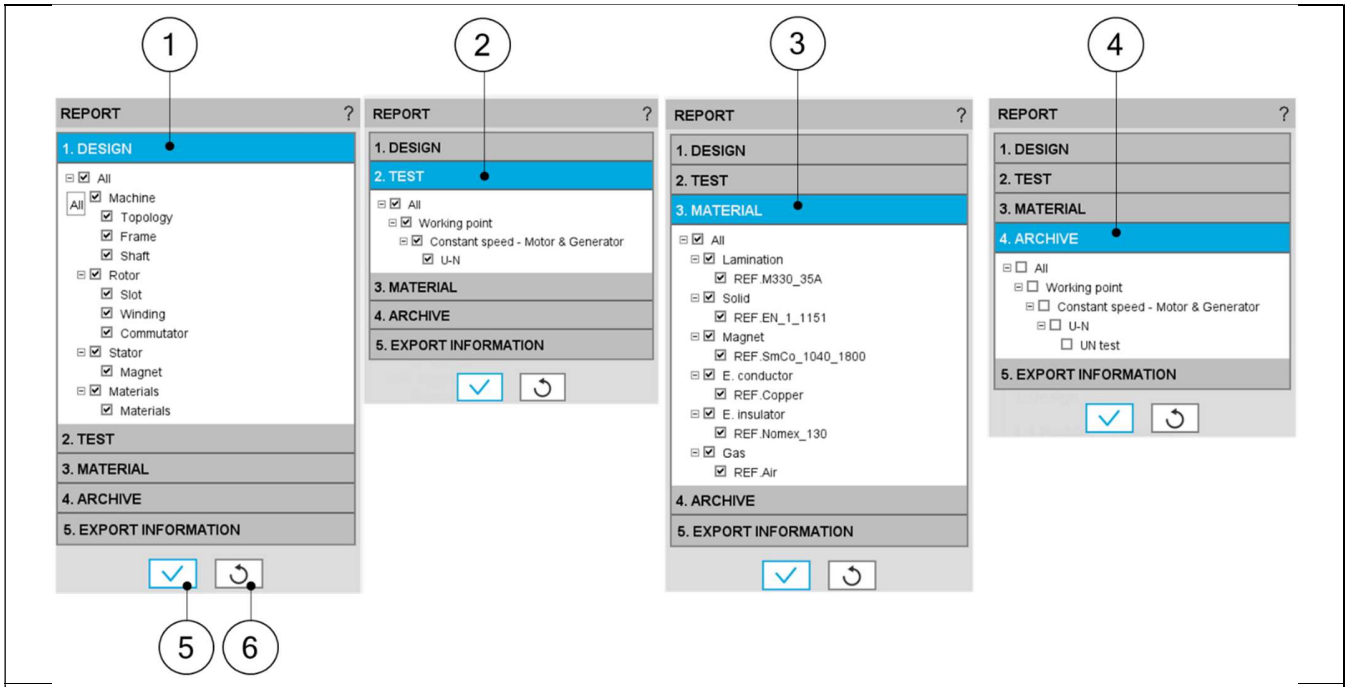
2.3 Steps to build and export a report

Five steps are needed to build and export a report: In EXPORT / DOCUMENT / REPORT area:

1) Select the sections to write dealing with the design
2) Select the sections to write dealing with the tests
3) Select the sections to write dealing with the materials
4) Select the “saved test results” you want to add as archive in the report
5) Define the export information

2.4 Section selection

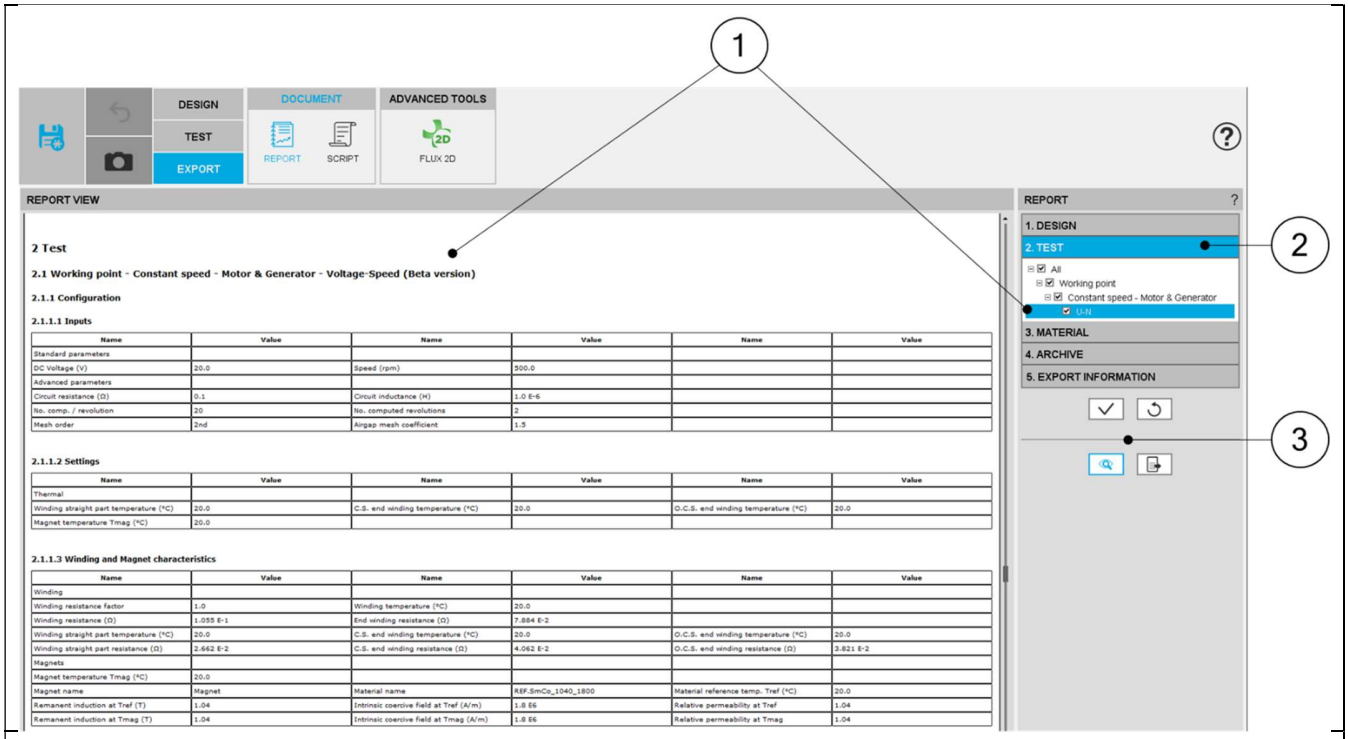
2.4.1 List of sections available to build the report



Motor Factory - EXPORT AREA – Export a report – Chapters to be selected

1	Chapters to describe the DESIGN. Machine, Rotor and Stator characteristics.
2	Chapters to describe the TEST results. All the test results are available as soon as the corresponding computations are performed.
3	List of materials used to build the machine can be added to the report with all their physical properties.
4	Archive groups all the tests which have been saved during the process. These can be added to the report. Note: A maximum of five results per test can be added to the report.
5	Button to apply the selection of the user input selections (selection of chapters)
6	Button to restore default values.

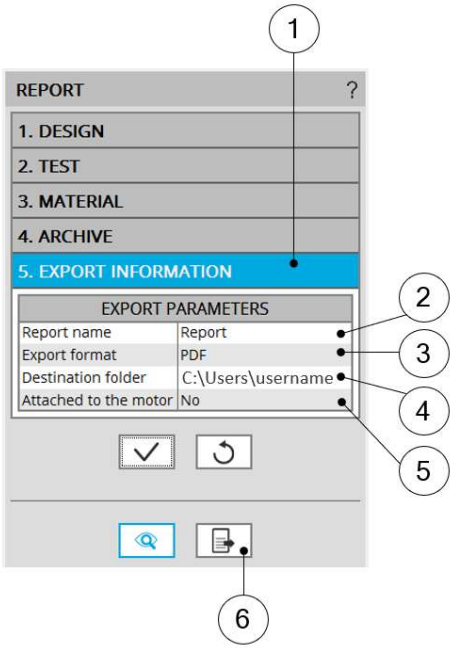
2.4.2 Selection of sections



Motor Factory - EXPORT AREA – Export a report – Chapters to be selected

1	Section names are shortcuts for displaying the corresponding section of the report
2	Check the section to add chapters to the report
3	Button “Preview” considers the selected chapters and displays the report

2.5 Export information



Motor Factory - EXPORT AREA – Export a report – Export information

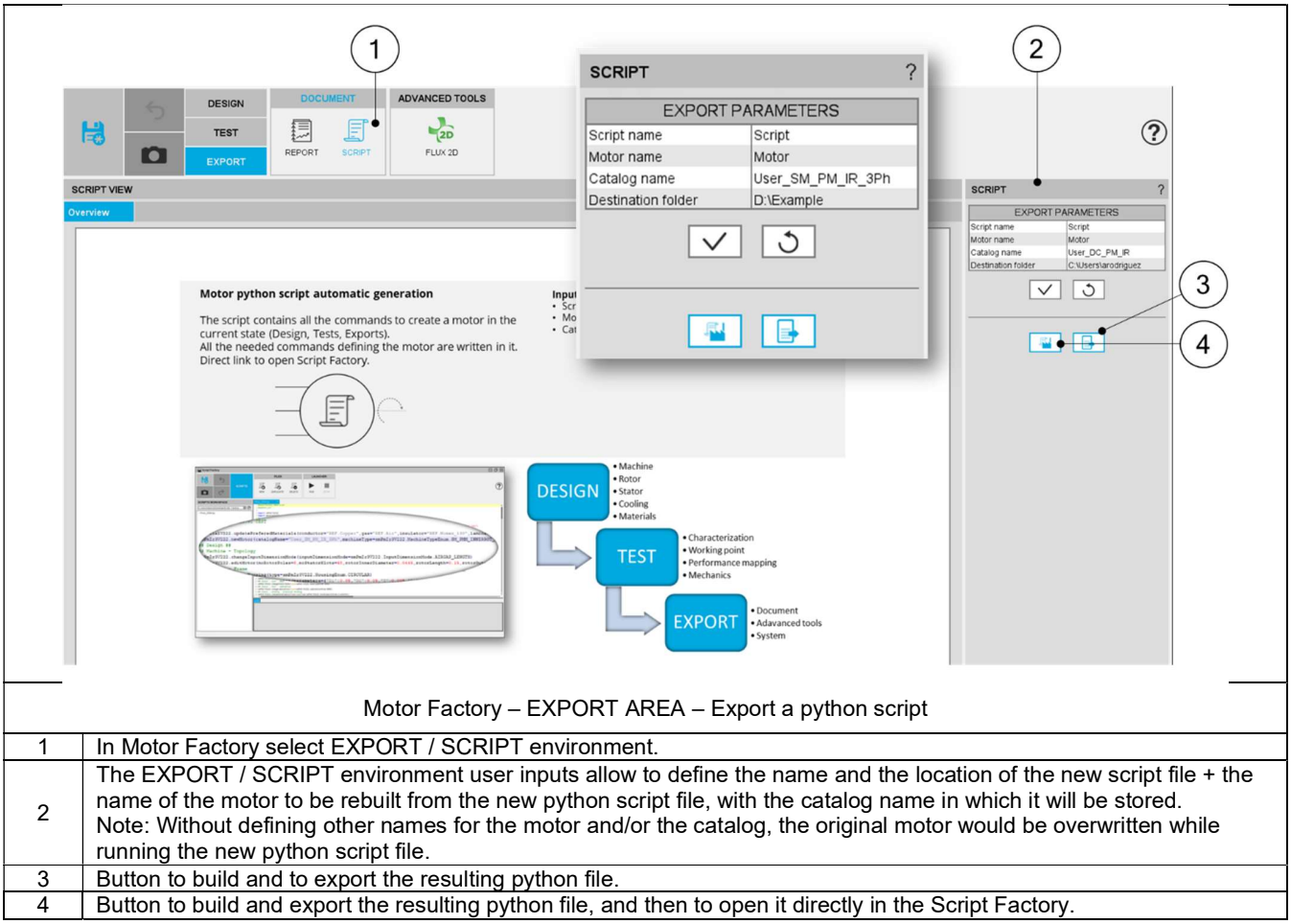
1	Access to the area in which export parameters can be defined
2	A file name must be written (Default name = “Report”)
3	The file format must be chosen (pdf or html) to build the report
4	A folder in which storing the report must be selected via the browser
5	It is possible to attach the report (HTML or PDF file) to the motor in the “Motor Catalog”
6	Button to export the report by considering all the previous defined parameters

3 EXPORT A SCRIPT

3.1 Overview

Next to the function “Report”, the function “Script” gives the capability to build and export a python script file, in which all the needed command lines are written to rebuild the considered motor. The script is generated with all the needed sections and sub-sections in Motor Factory, dedicated to the design, the test, and the exports.
Then Script Factory can be used to automate some study such running serial tests or serial design configurations.

3.2 Area to build the script export



Motor Factory – EXPORT AREA – Export a python script	
1	In Motor Factory select EXPORT / SCRIPT environment.
2	The EXPORT / SCRIPT environment user inputs allow to define the name and the location of the new script file + the name of the motor to be rebuilt from the new python script file, with the catalog name in which it will be stored. Note: Without defining other names for the motor and/or the catalog, the original motor would be overwritten while running the new python script file.
3	Button to build and to export the resulting python file.
4	Button to build and export the resulting python file, and then to open it directly in the Script Factory.

4 BUILD AND EXPORT A MODEL IN FLUX® 2D ENVIRONMENT

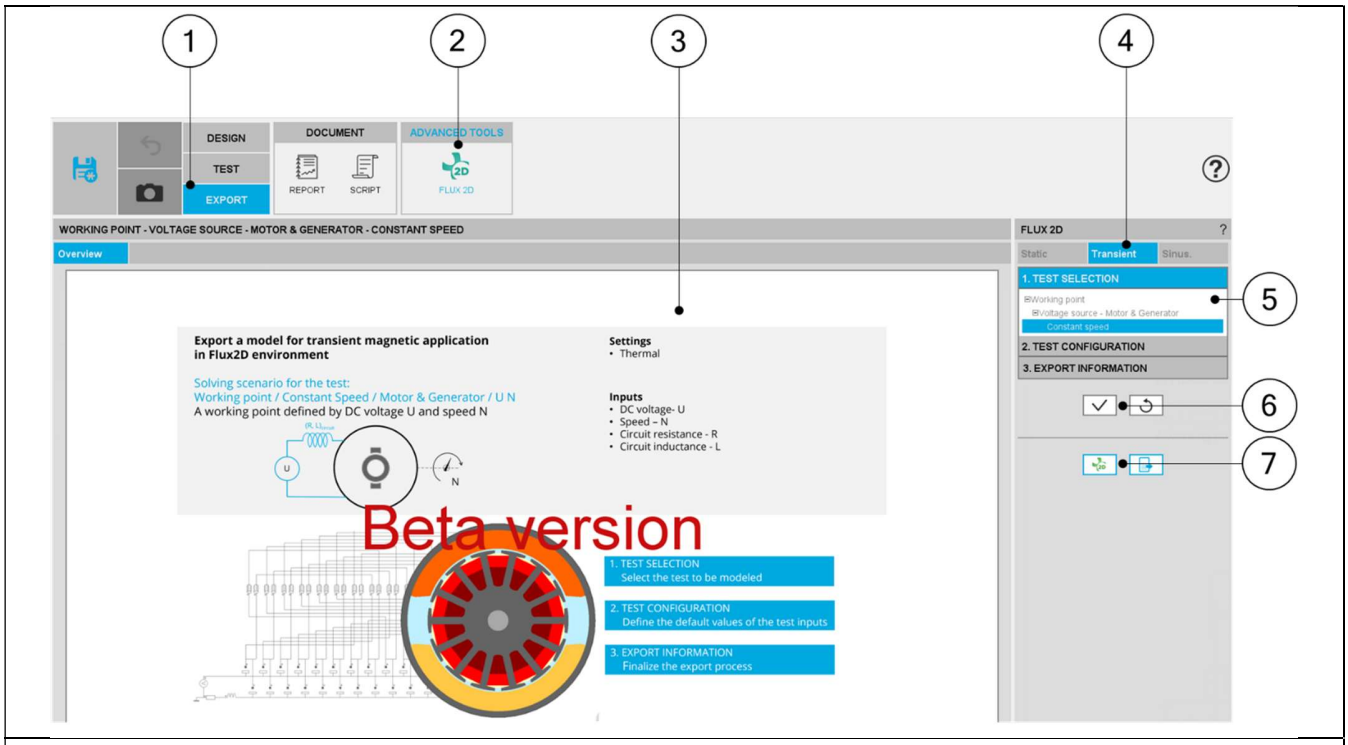
4.1 Overview

The aim of this export is to provide a python file which allows to get a full parametrized model ready to be used in Flux® 2D environment. In the current version, models can be exported for static application or transient application in Flux® 2D environment.

In the current version just one model can be export to Flux® 2D environment:

Application	Model family	Package	Convention	Model / Test
TRANSIENT	Working point	Constant speed	Motor & Generator	U-N

4.2 Area to build and to export a model to Flux® 2D environment



	Motor Factory – EXPORT AREA – Export model for Flux® 2D environment
1	Selection of the EXPORT area of Motor Factory.
2	Access the area in which a model for Flux® 2D environment can be made
3	Zone to visualize the overview of the selected model to be exported
4	Click on the tab to select the application (in this version only transient is available)
5	3 steps to build the model to be exported for Flux® 2D environment
6	Button to validate inputs before building the model in Flux® 2D environment.
7	Exports the python file for building the model in Flux® 2D environment or launch the project directly in Flux® 2D.

4.3 Steps to build and export a model to Flux® 2D environment

In EXPORT / ADVANCED TOOLS / FLUX2D area, one must indicate that on which application of Flux® 2D environment, the models must be built. In the current version one transient application is available.

Then, the 3 next steps are:

1) Define the type of scenario one wants to get in Flux® 2D environment (Test selection).
   This means the simulation, that one wants to perform in Flux® 2D environment for evaluating the electromagnetic behavior of the considered machine.

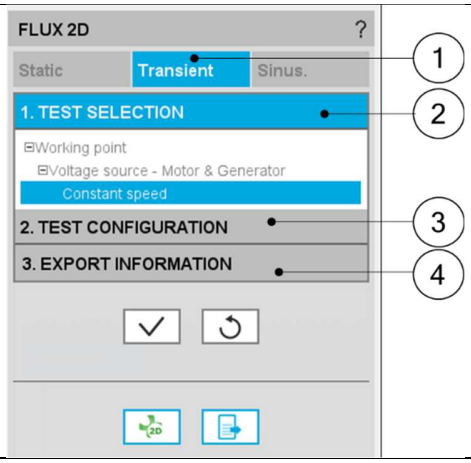
2) Define the test configuration. This is to give an initial value for the user inputs, which will be set in the scenario of the simulation available in the Flux® 2D model.

3) Define the export information.

The resulting models are fully parameterized, and these are built in Flux® 2D environment.

4.4 Test selection

After selecting an application type the corresponding test inputs (settings and user inputs) must be defined. This allows to define the initial conditions for testing.



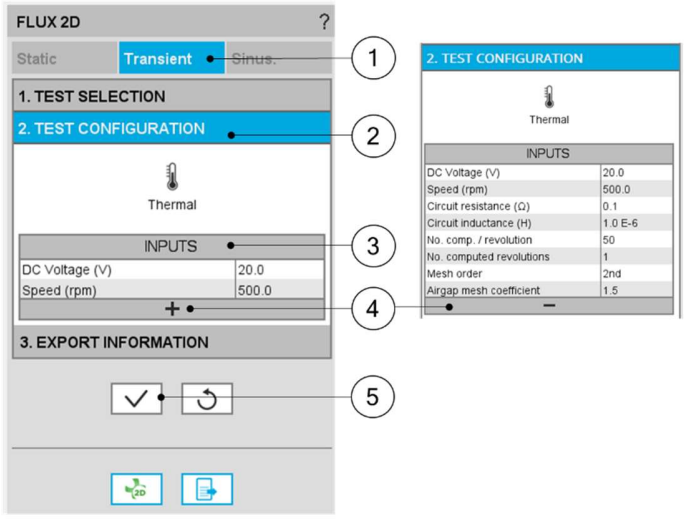
Motor Factory – EXPORT AREA – Export a model for Flux® 2D – Test selection

1	Automatic selection of transient application for Flux® 2D
2	Tab to choose one scenario (or test) to be provided
3	Define the initial conditions for the simulation process in Flux® 2D environment
4	Button to validate the previous choices

Note: The user help information about the test parameters is defined in the user help guide of the corresponding test. Please refer to the corresponding section.

4.5 Test configuration

Next step is to define the initial conditions for the simulation process in Flux® 2D environment.



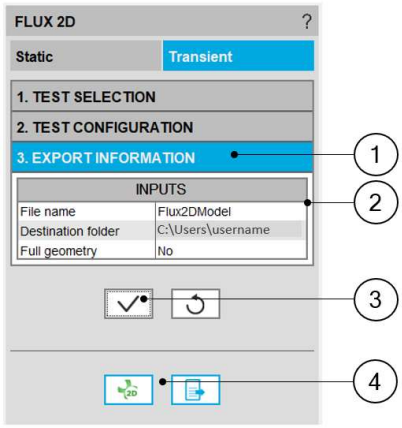
Motor Factory – EXPORT AREA – Export a model for Flux® 2D -

1	Tab to define the initial conditions for the simulation process in Flux® 2D environment
2	Settings like thermal conditions can be defined
3	User inputs dealing with the considered test can be defined
4	The tab corresponding to advanced parameters can be expanded. Advanced parameters can also be defined if needed.
5	Button to validate the previous choices

4.6 Export information

The last step for building a model for Flux® 2D is to define the export information.
There are three data to be defined:

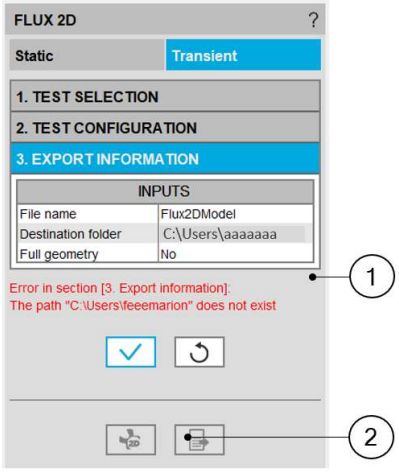
- The name of the python file which will build the model in Flux® 2D environment.
- The folder in which the provided file must be stored.
- The last answer “Full geometry “ allows the user to get a full geometry in the provided model, even if it is possible to work with a reduced model considering the number of poles and the number of slots.



Motor Factory – EXPORT AREA – Export model for Flux® 2D – Export information

1	Tab to be expanded to define export information for Flux® 2D
2	Area in which the export parameters to be defined are listed
3	Button to validate the previous choices
4	Button to finalize the export of the model. When one clicks on this button, the folder gets opened where the python file to build the model is stored.

Note 1: When data is missing in the third table; “Export information” for instance, an error message is displayed in the red colored font which indicates what data is missing. If all the needed information is missing, exporting a model is not allowed.



Motor Factory – EXPORT AREA – Export model for Flux® 2D – Error message

1	Error message display in red colored font.
2	The button to export the model is not active if all the needed data are missing

Note: Exporting a model to Flux® 2D (i.e. provide the python file to build the model) can take a few seconds.

4.7 Available models to be exported and user inputs.

4.7.1 Overview

All the models to be exported are first classified by considering the type of application, for which they are built (STATIC or TRANSIENT). Then, for the tests in Motor Factory Test environment, the models are associated with a convention of operating (Motor or Generator) and grouped into packages itself to get classified into model families.

In the current version of FluxMotor® one model can be exported to Flux® 2D environment:

Application	Model family	Package	Convention	Model / Test
TRANSIENT	Working point	Constant speed	Motor & Generator	U-N

The following section give a short description of the model available for exportation to Flux® 2D environment.

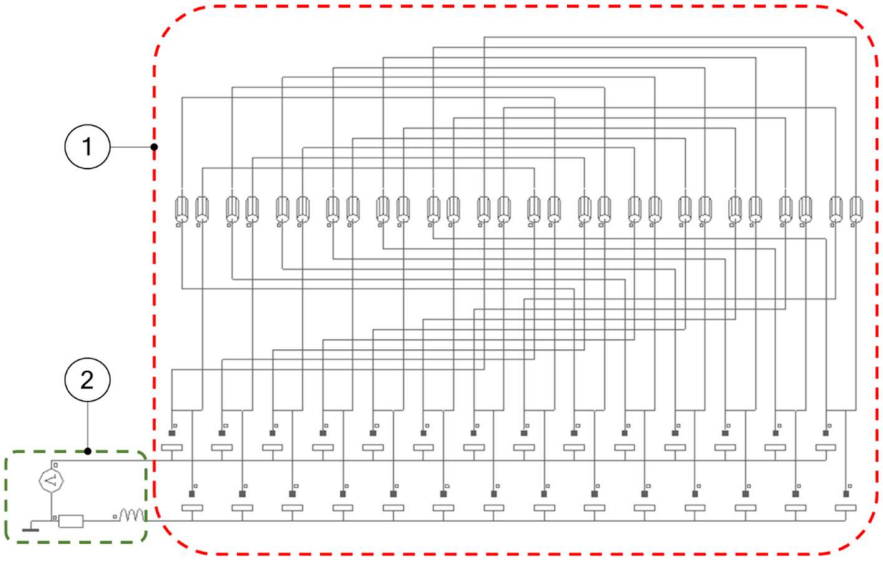
4.7.2 Without scenario – Constant speed – Motor and generator – U-N

4.7.2.1 Positioning and objective

This export allows the users to build a model in Flux® 2D to perform transient simulations.
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 rotation speed, any working point can be defined and the DC machine can behave as a motor or as a generator.



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)

The following section describes all the user inputs to initialize the exported model.

4.7.2.2 Settings

One button gives access to the following setting definition:

- Winding temperatures (including inset and end-winding parts).
- Magnet temperature.

4.7.2.3 Standard inputs

1) DC voltage

The voltage of the source feeding the DC machine.

2) Speed

The rotating speed of the DC machine.

4.7.2.4 Advanced inputs

The list of advanced inputs dedicated to this export are listed below.

1) Circuit resistance

Parasitic resistance of the circuit connecting the DC voltage source with the DC machine.

2) Circuit inductance

Parasitic inductance of the circuit connecting the DC voltage source with the DC machine.

3) Number of computations per revolution

The number of computations per revolution "**No. comp. /revolution**" (*Number of computations per revolution*) influences the accuracy of results and the computation time.
The default value is 50. The minimum allowed value is 13. This default value provides a good balance between the accuracy of results and computation time.

4) Number of computed revolutions

The default value is 1. The minimum allowed value is 1 and the maximum value is equal to 4.

5) Mesh order

The default level is second order mesh.

6) Airgap mesh coefficient

Airgap mesh coefficient is set to 1.5 by default.