



# ALTAIR

ONLY FORWARD

Altair<sup>®</sup> FluxMotor<sup>®</sup> 2022.1

## Release Notes

Updated: 07/15/2022

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This chapter covers the following:

- [1.1 Overview](#) (p. 4)
- [1.2 Documents to read](#) (p. 5)

## 1.1 Overview

You're using Altair® FluxMotor® 2022.1

This section gives the major points of the FluxMotor® 2022.1

Please see also the following sections:

- Highlights of FluxMotor 2022.1
- List of warnings
- List of the main issues
- How to report an error

This document gives the major information about Altair® FluxMotor® 2022.1.

### **Here are the highlights of the new version:**

- Frame and shaft – A new thermal network
- A new use case for the winding definition expert mode
- The GUI can be displayed in Chinese and Japanese languages
- A new online user help guide
- Correction of issues

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

For more detailed information, please refer to the user help guides. The list of documents to read is presented below.

## 1.2 Documents to read

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

Below, here is the list of documents which are available.

### 1. General user guides for any type of machine:

- Installation\_guide\_en.pdf (= Installation for both Altair® Flux® and Altair® FluxMotor®)
- Supervisor\_2022.1.pdf
- MotorCatalog\_2022.1.pdf
- PartLibrary\_2022.1.pdf
- PartFactory\_2022.1.pdf
- Materials\_2022.1.pdf
- MotorFactory\_2022.1\_Introduction.pdf
- MotorFactory\_2022.1\_3Phase\_Winding.pdf

### 2. User guides dedicated to Synchronous Machines with Permanent Magnets – Inner and Outer Rotor

- MotorFactory\_2022.1\_SMPM\_IOR\_3PH\_Design.pdf
- MotorFactory\_2022.1\_SMPM\_IOR\_3PH\_Test\_Introduction
- MotorFactory\_2022.1\_SMPM\_IOR\_3PH\_Test\_Characterization.pdf
- MotorFactory\_2022.1\_SMPM\_IOR\_3PH\_Test\_WorkingPoint.pdf
- MotorFactory\_2022.1\_SMPM\_IOR\_3PH\_Test\_PerformanceMapping.pdf
- MotorFactory\_2022.1\_SMPM\_IR\_3PH\_Test\_Mechanics.pdf
- MotorFactory\_2022.1\_SMPM\_IOR\_3PH\_Export.pdf

### 3. User guides dedicated to Reluctance Synchronous Machines – Inner Rotor

- MotorFactory\_2022.1\_SMRSM\_IOR\_3PH\_Design.pdf
- MotorFactory\_2022.1\_SMRSM\_IR\_3PH\_Test\_Introduction.pdf
- MotorFactory\_2022.1\_SMRSM\_IR\_3PH\_Test\_Characterization.pdf
- MotorFactory\_2022.1\_SMRSM\_IR\_3PH\_Test\_WorkingPoint.pdf
- MotorFactory\_2022.1\_SMRSM\_IR\_3PH\_Test\_PerformanceMapping.pdf
- MotorFactory\_2022.1\_SMRSM\_IR\_3PH\_Test\_Mechanics.pdf
- MotorFactory\_2022.1\_SMRSM\_IOR\_3PH\_Export.pdf

#### **4. User guides dedicated to Induction Machines with Squirrel Cage – Inner and Outer Rotor**

- MotorFactory\_2022.1\_IMSQ\_IOR\_3PH\_Design.pdf
- MotorFactory\_2022.1\_IMSQ\_IOR\_3PH\_Test\_Introduction
- MotorFactory\_2022.1\_IMSQ\_IOR\_3PH\_Test\_Characterization.pdf
- MotorFactory\_2022.1\_IMSQ\_IOR\_3PH\_Test\_WorkingPoint.pdf
- MotorFactory\_2022.1\_IMSQ\_IOR\_3PH\_Test\_PerformanceMapping.pdf
- MotorFactory\_2022.1\_IMSQ\_IR\_3PH\_Test\_Mechanics.pdf
- MotorFactory\_2022.1\_IMSQ\_IOR\_3PH\_Export.pdf

#### **Related reference**

[List of new features](#)

#### **Related information**

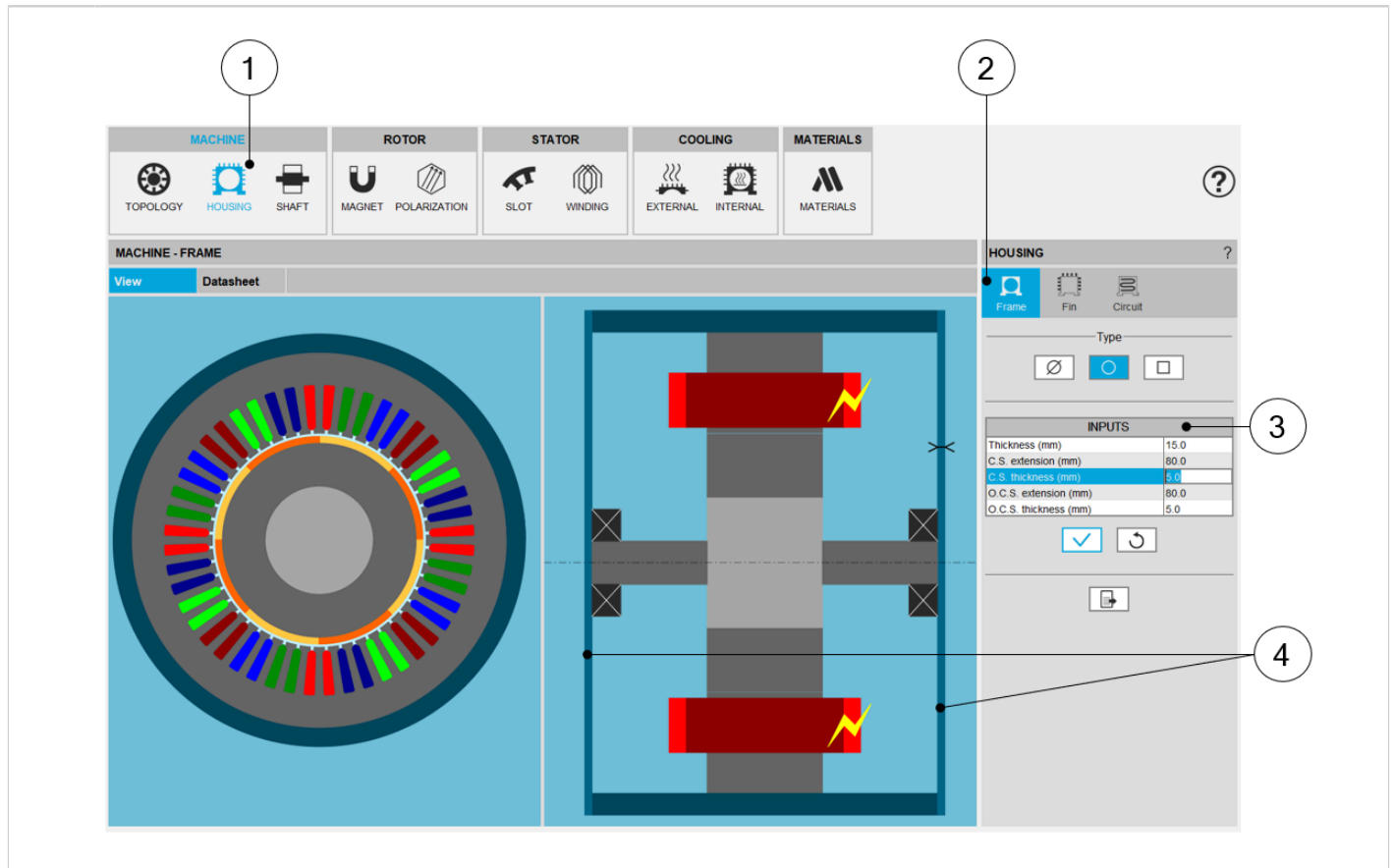
[Documentation](#)

This chapter covers the following:

- [2.1 Frame and shaft – A new thermal network](#) (p. 8)
- [2.2 A new "use case" for the winding definition expert mode](#) (p. 17)
- [2.3 The GUI can be displayed in Chinese and Japanese languages](#) (p. 21)
- [2.4 A new online user help guide area](#) (p. 24)

## 2.1 Frame and shaft – A new thermal network

### 1. Frame and end caps - Design



Frame / Housing design area – End caps and frame

1-2	Selection of the Housing subset: HOUSING panel. Settings of the frame and end caps dimensions
3	User inputs for defining the dimensions of the frame and end caps
4	The two end caps are considered separately from the frame and each of them can have its own dimensions



## 2. Frame and end caps – Materials

MATERIALS design area

1	Selection of the Material subset: MATERIALS panel (Click on the icon MATERIALS)
2	The two end caps are considered separately from the frame and each of them can have its own material

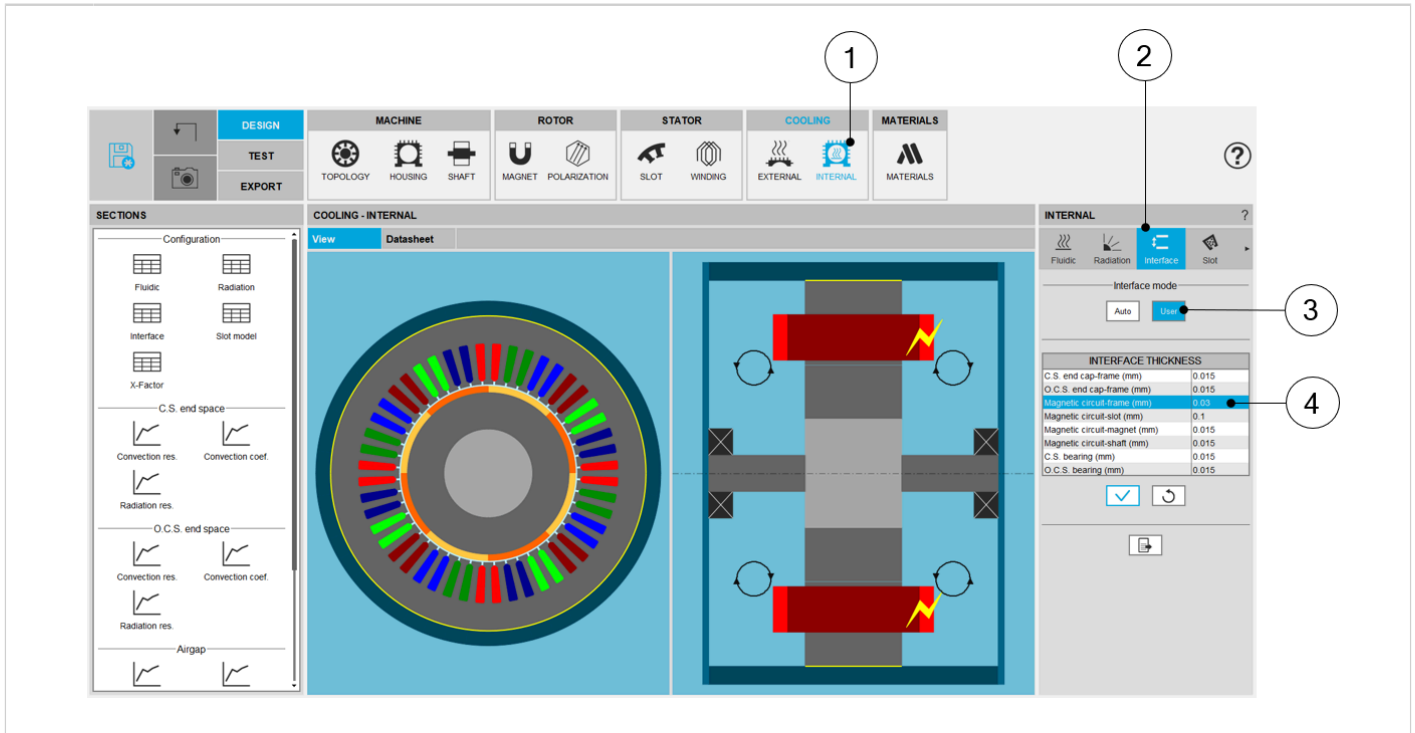
## 3. Internal cooling – New interface gaps

This panel allows describing imperfect contacts between the different components of the machine. The imperfect contacts are here modeled as a parasitic airgap between two parts, through which the heat must be conducted through to go from one part to the other.

The interface gaps are composed of air at the atmospheric pressure, at 20 °C, equivalent to 293.15K. For more information on material properties, please refer to FluxMotor® material database (“Materials application”).

In the new version, new imperfect contacts have been added in the machine:

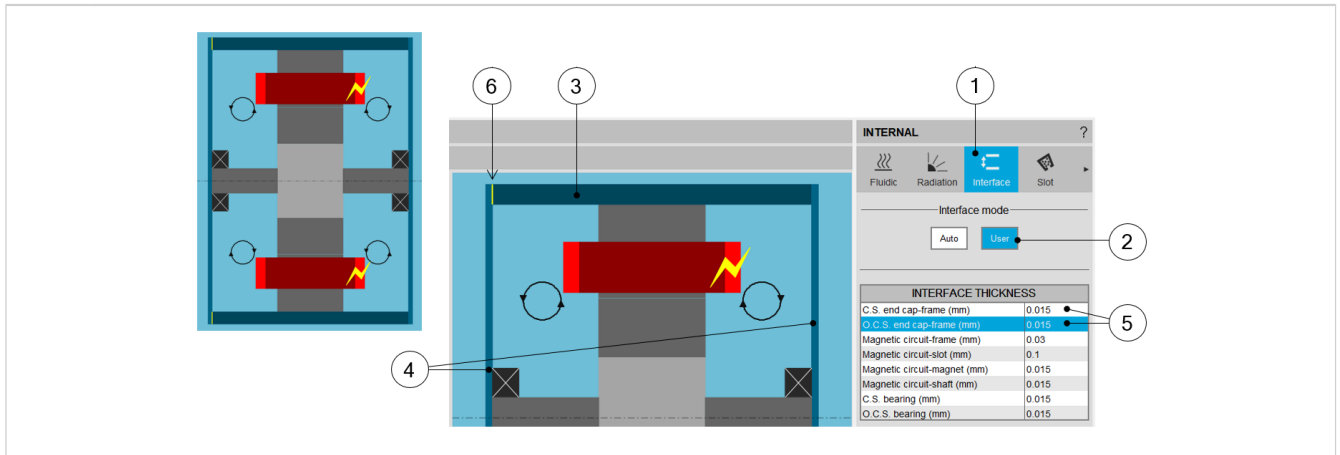
- The interface between the frame and the end cap – Opposite Connection Side
- The interface between the frame and the end cap – Connection Side
- Each bearing has its own interface gap thickness which is used to compute the corresponding thermal resistance of the considered bearing. These two values are used separately in computations.



Internal cooling - Interface design area

<p>1</p>	<p>Display the internal cooling datasheet, showing the thermal parameters defining the internal heat exchanges.</p> <p>Display the axial and radial view of the machine.</p>
<p>2</p>	<p>Selection of the section "Interface" in which all the imperfect contacts between the different components of the machine can be set.</p>
<p>3</p>	<p>The user mode can be selected to define the interface thickness manually.</p>
<p>4</p>	<p>A list of interface thickness (imperfect contacts) is available. In this list new interface gaps have been added.</p> <p>See illustration below.</p>

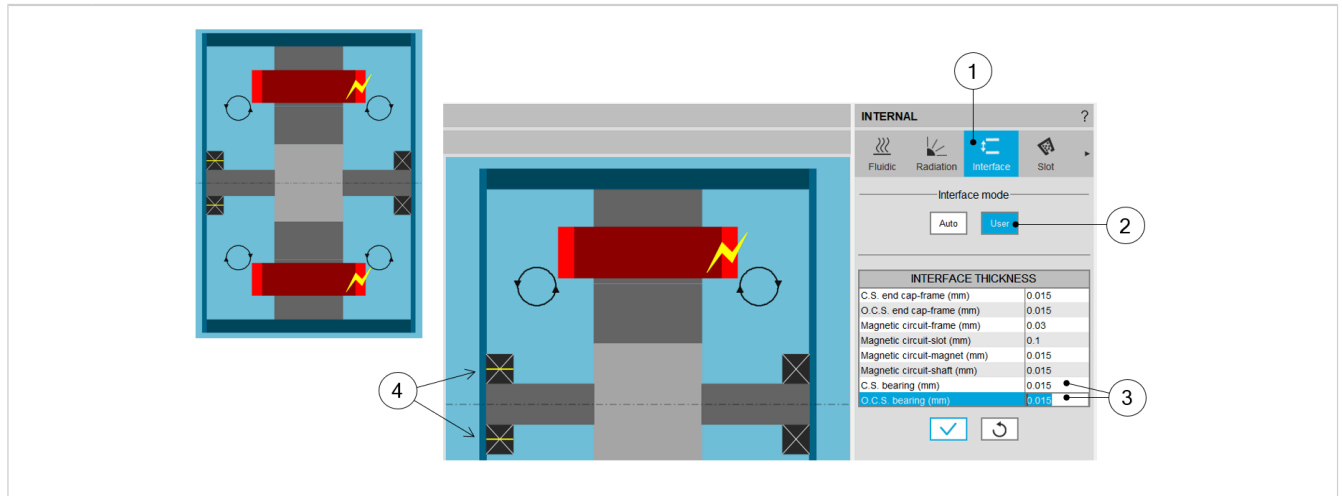
### 1. Interface thickness between frame and end caps



Interface design area – New interface thicknesses between frame and end caps

1	Internal cooling – Definition of the interface parameters
2	User mode to set the interface gaps manually.
3-4	Visualization of the Straight part of the frame and the two different end caps
5	Air gaps between the frame and the end caps can be set separately for both sides of the machine
6	The line which corresponds to the selected air gap to be defined is highlighted

## 2. Interface thickness inside each bearings



Interface design area – Interface thicknesses for bearings

1	Internal cooling – Definition of the interface parameters
2	User mode to set the interface gaps manually.
3	Air gaps to be set for both bearings at the Connection Side and at the Opposite Connection Side
4	The line which corresponds to the selected air gap to be defined is highlighted

## 4. Thermal resistance network – Frame, end caps and the external fluid

The global resistance between the frame, the end caps and the external fluid is illustrated in the thermal resistance network shown below.

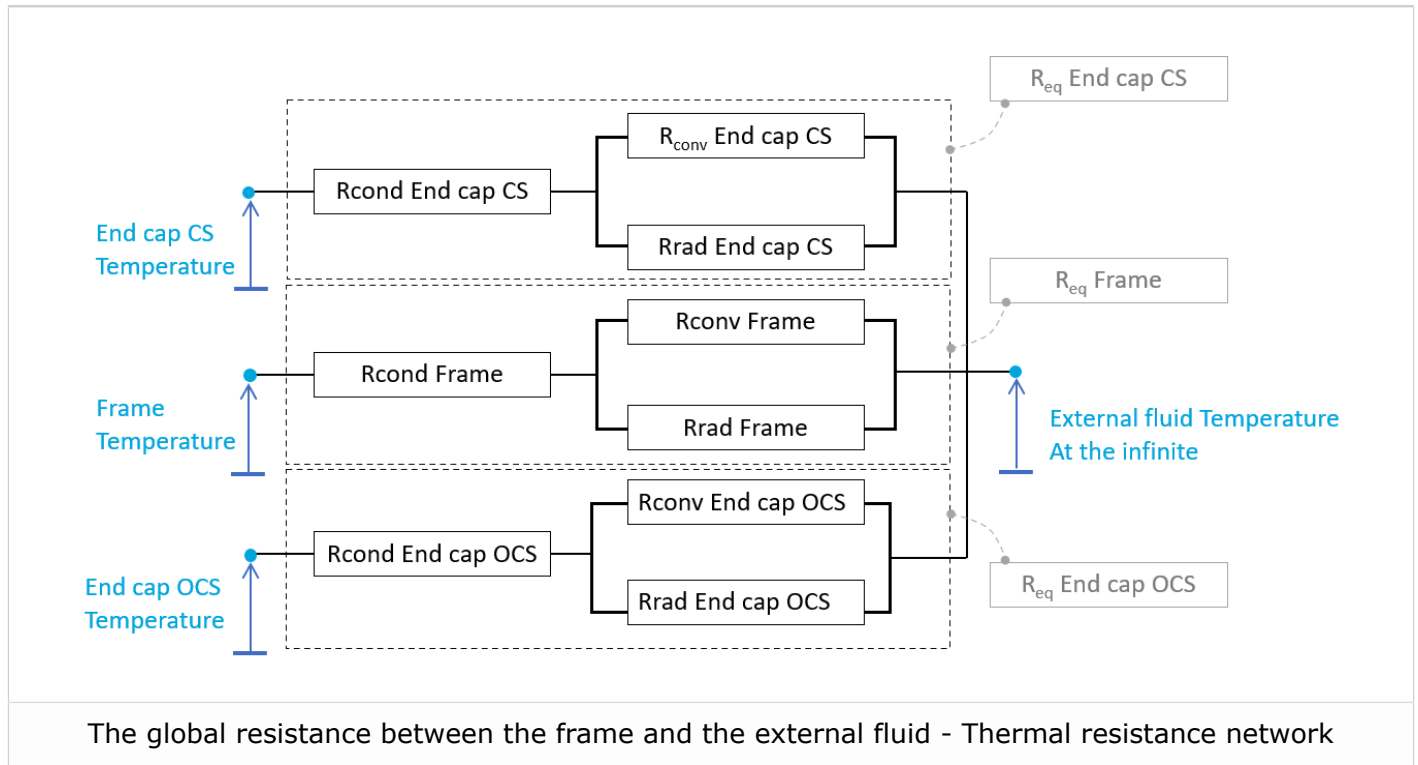
Three main paths extract the heat from the machine to the external fluid, corresponding to three main components: the straight part of the frame and the two end caps.

In the new version, the dimensions of the frame, the Connection Side end cap, the Opposite Connection Side end cap and their physical properties can be defined separately.

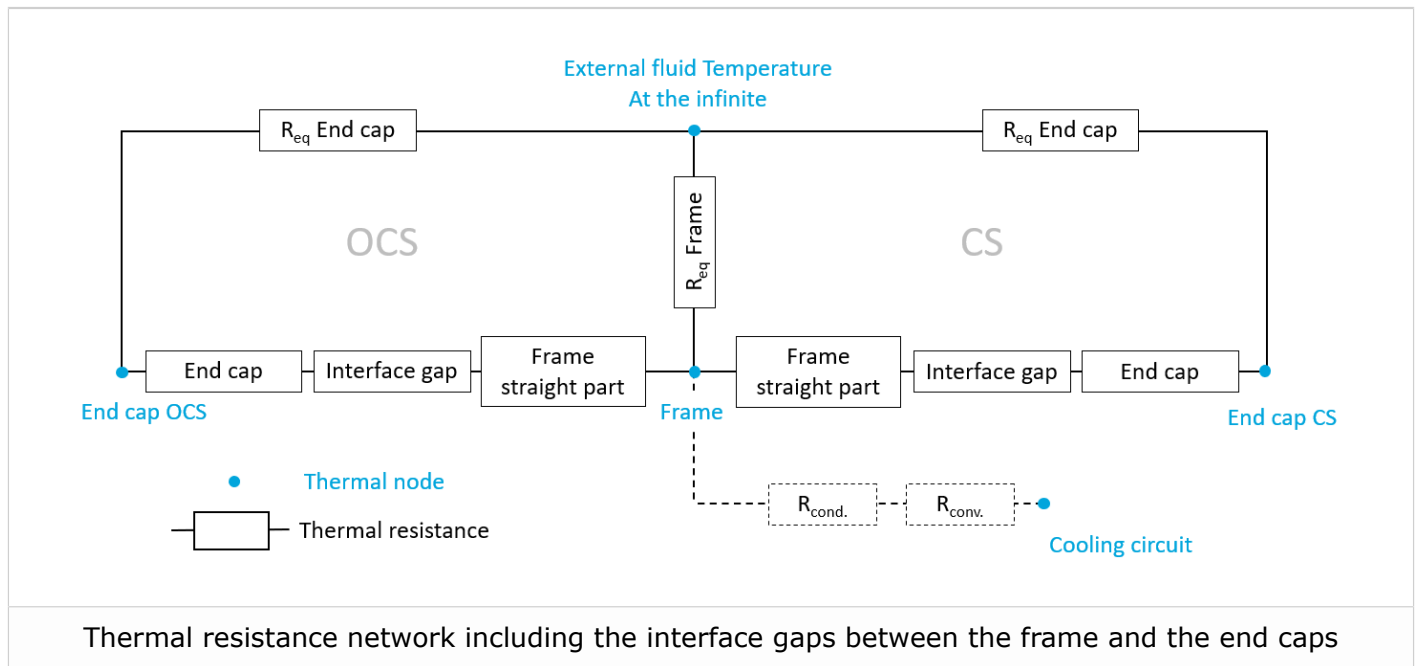
**Note:** Each of these paths extracting heat of the machine is composed of several thermal resistances in series:

- The conduction through the material composing the part
- The convection and radiation occurring from the external surfaces of the frame

In this network, the convection resistances are a mixture of natural and forced components of the convection phenomenon.



The equivalent thermal resistances defined above are integrated in the global thermal network. The part of this network corresponding to the end parts of the machine is described below.



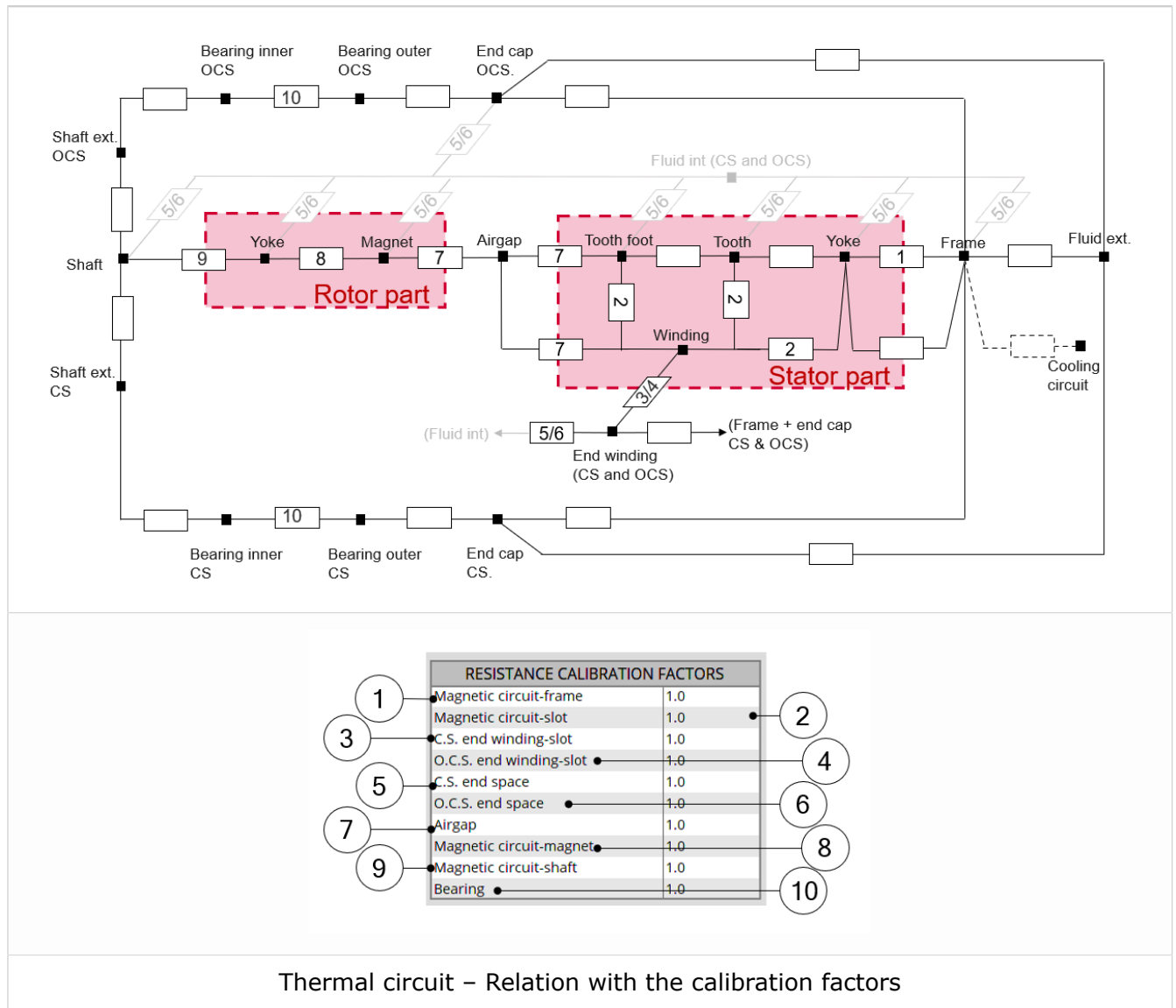
## 5. A new general thermal resistance network

### 1. Synchronous Machines with Permanent Magnets – Inner Rotor

The following picture gives an example of a simple thermal circuit, including the main resistances corresponding to the default synchronous magnet machine, where the frame, the two end caps, the shaft and the bearings have been added.

The numbers on every resistance show what X-factor impacts this resistance value.

To keep the scheme simple, the radiation resistances are not represented there.



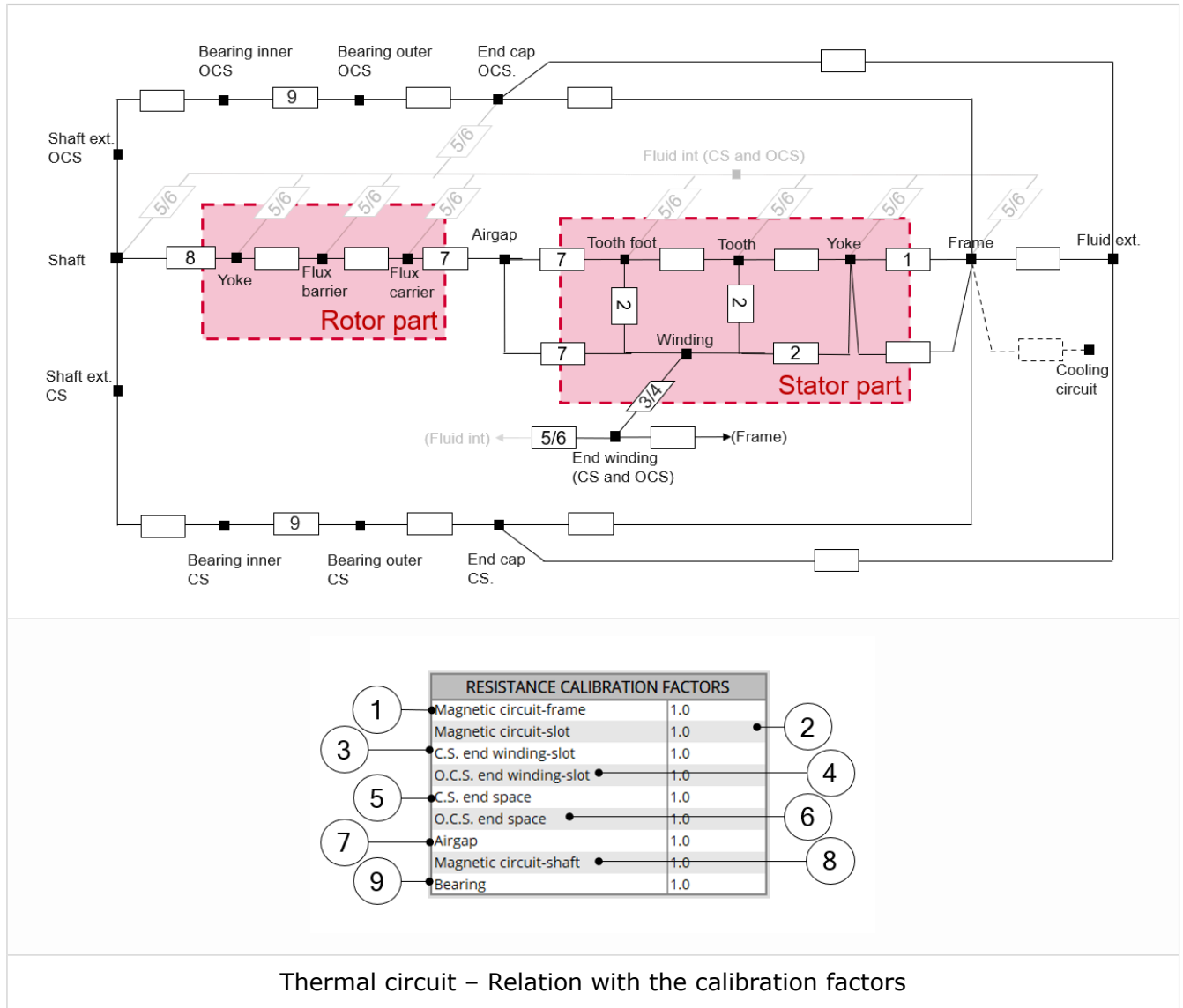
As illustrated the improvements in the new version deal with the following points:

- Additional thermal nodes for the two shaft extensions
- Additional nodes for the two bearing which can be considered separately
- Additional nodes for the two end caps which can be considered separately from each other and from the frame (straight part)

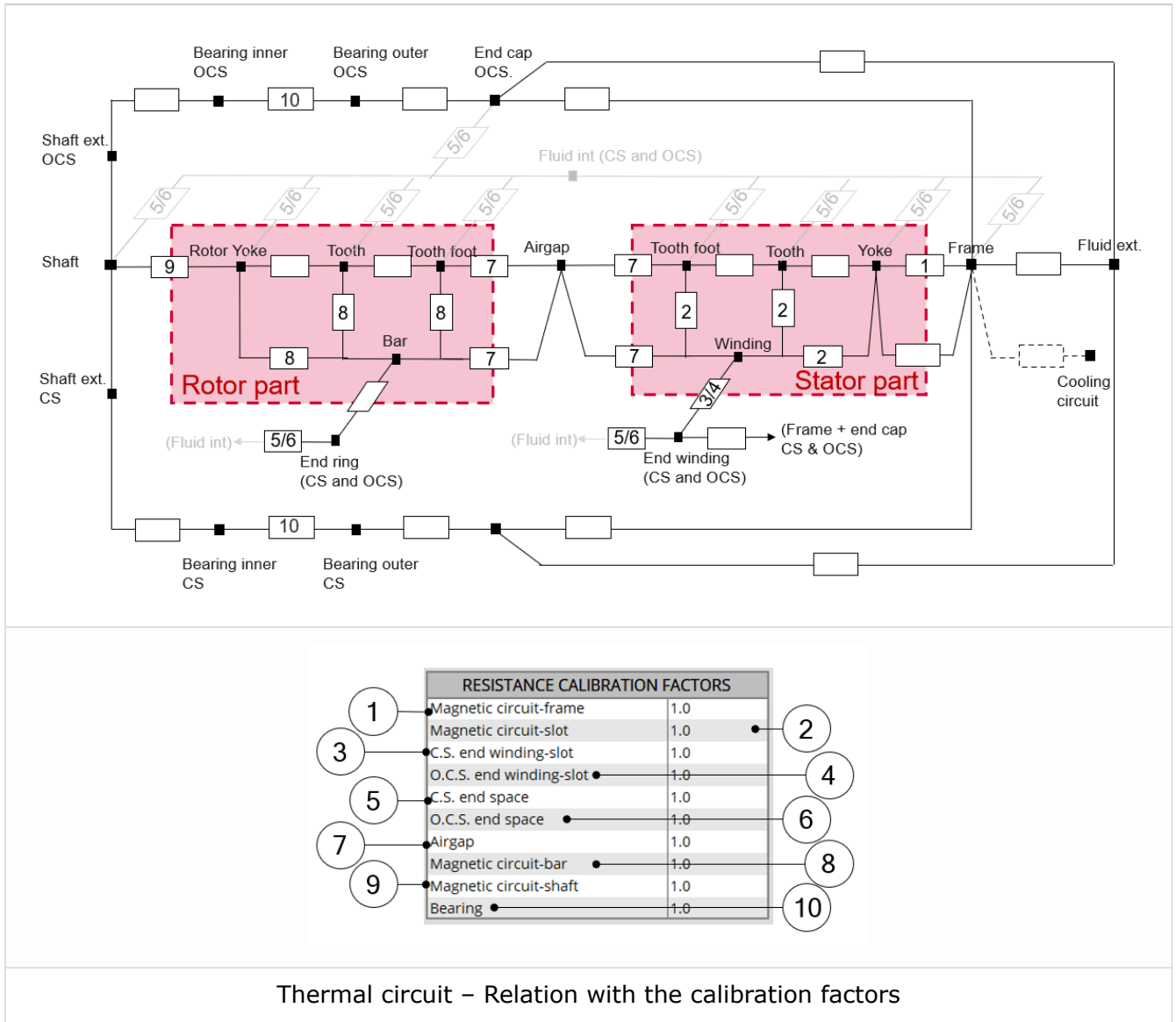
**Note:** The same improvement has been applied for the Reluctance Synchronous Machines – inner rotor and for the Induction Machines with Squirrel Cage – inner rotor as well.

The corresponding general new thermal networks are displayed below.

## 2. Reluctance Synchronous Machines – Inner Rotor – New thermal network



### 3. Induction Machines with Squirrel Cage – Inner Rotor – New thermal network





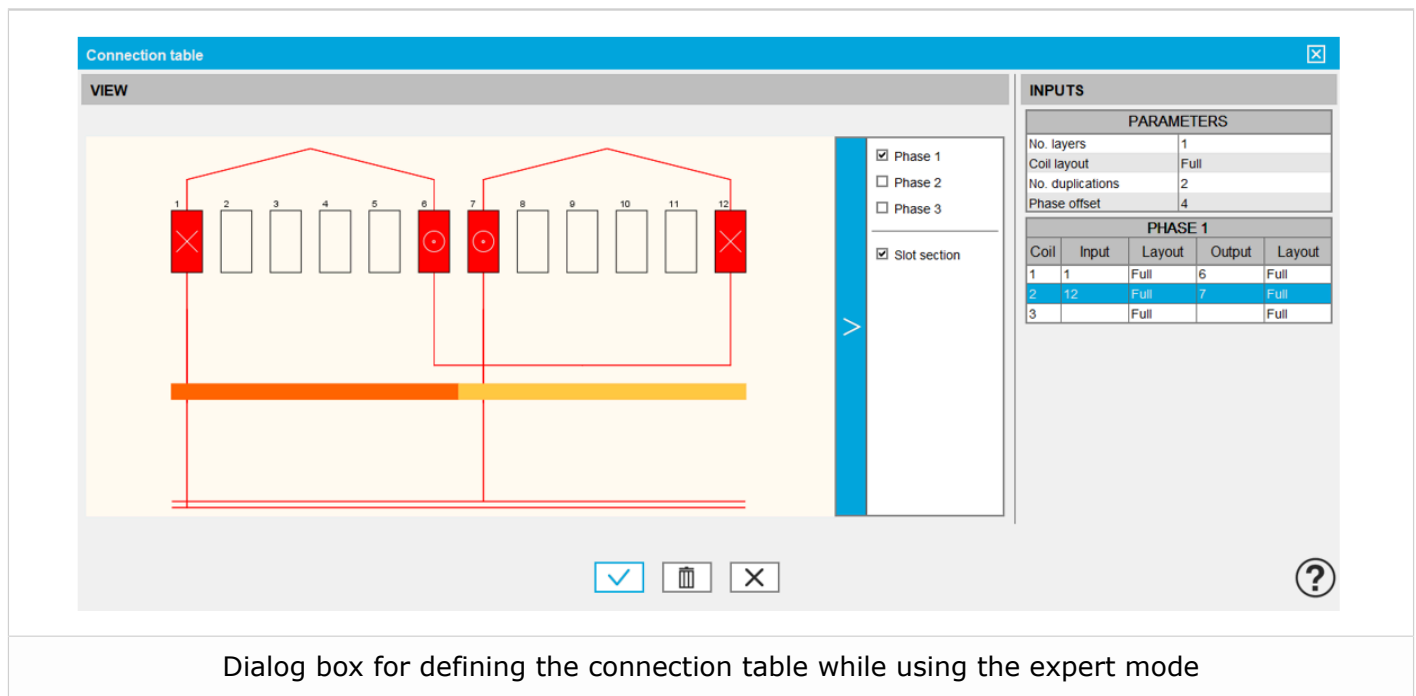
## 2.2 A new "use case" for the winding definition expert mode

### 1. What was the problem with previous version?

In the previous versions, while using the expert mode for designing the winding architecture, the user set the connection table by considering the number of duplications. A drop-down menu gave the possible choices of duplications based on the number of slots and poles.

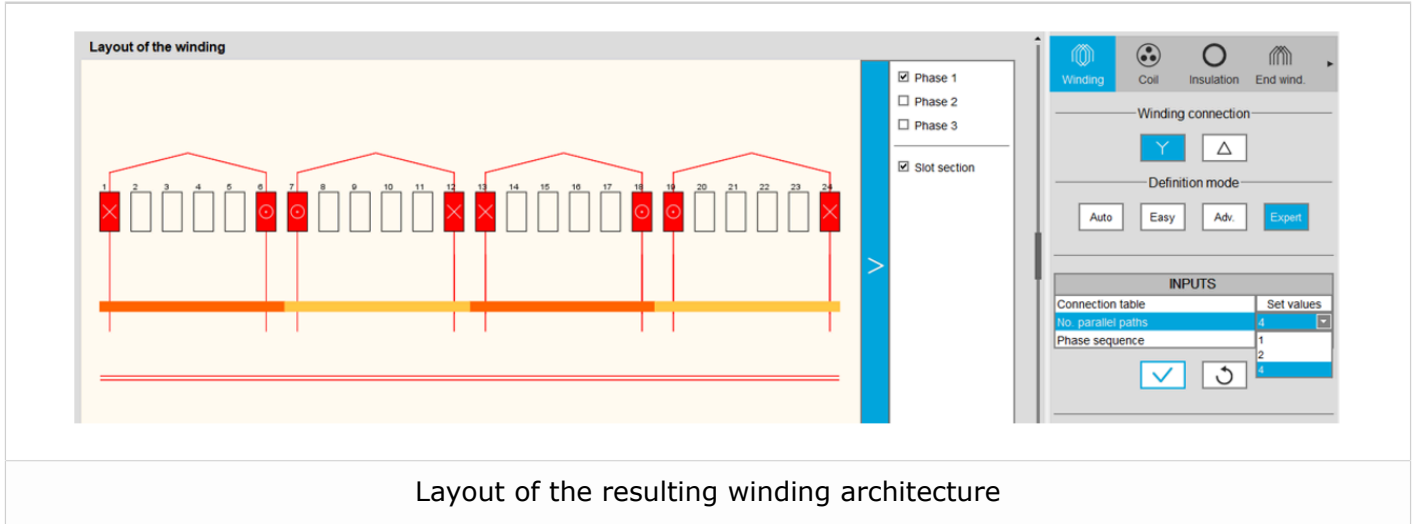
Then, the allowed number of parallel paths could be equal to 2 times the number of duplications. Because it was assumed that two circuits - per elementary duplicated sector - could be represented in the connection table.

However, it was impossible to find how the winding was distributed between these two circuits.



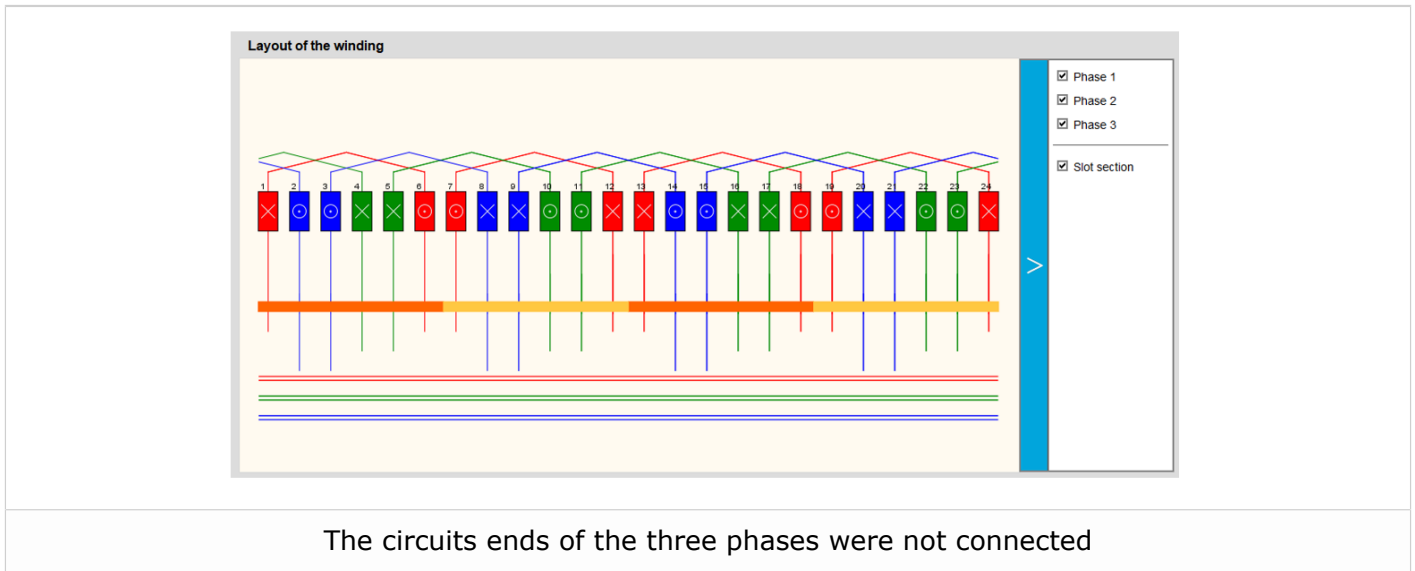
Dialog box for defining the connection table while using the expert mode

Input and output of each coil must be defined. In that case 2 duplications are considered which means that only half of the winding must be defined.



Considering that the allowed number of parallel paths could be equal to 2 times the number of duplications, 4 parallel paths can be built.

However, in such case, one couldn't represent the parallel paths and their connections with the circuit. The circuits' ends were not connected.

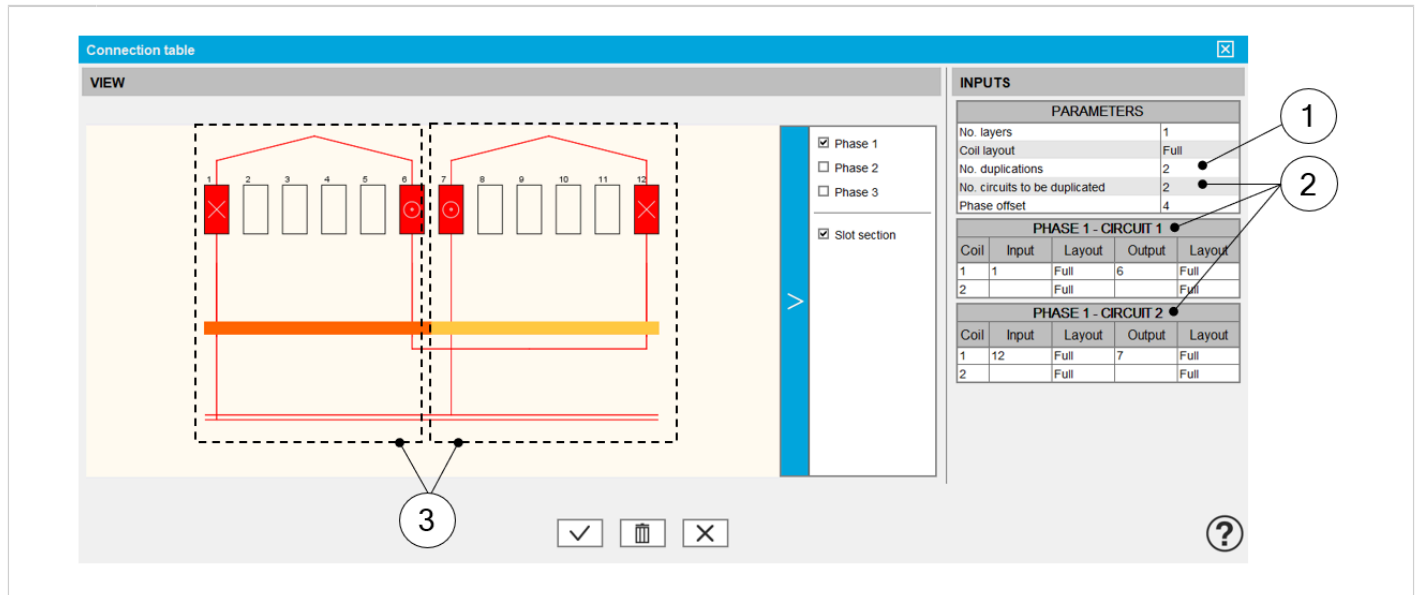


## 2. What is the new use case?

Since the last version (version 2022.0), the real distribution of the parallel paths in the winding is taken into account for performing the tests.

Hence, the previous configuration where it wasn't possible to know how the parallel paths are distributed led to an error (Ref. FXM-14637). This issue has been fixed.

For the correction of this issue, it is required to know how the parallel paths were distributed. From now on, in the expert mode, to define the connection table, the user can define the number of circuits to be duplicated and he must fill in a connection table for each elementary parallel path.

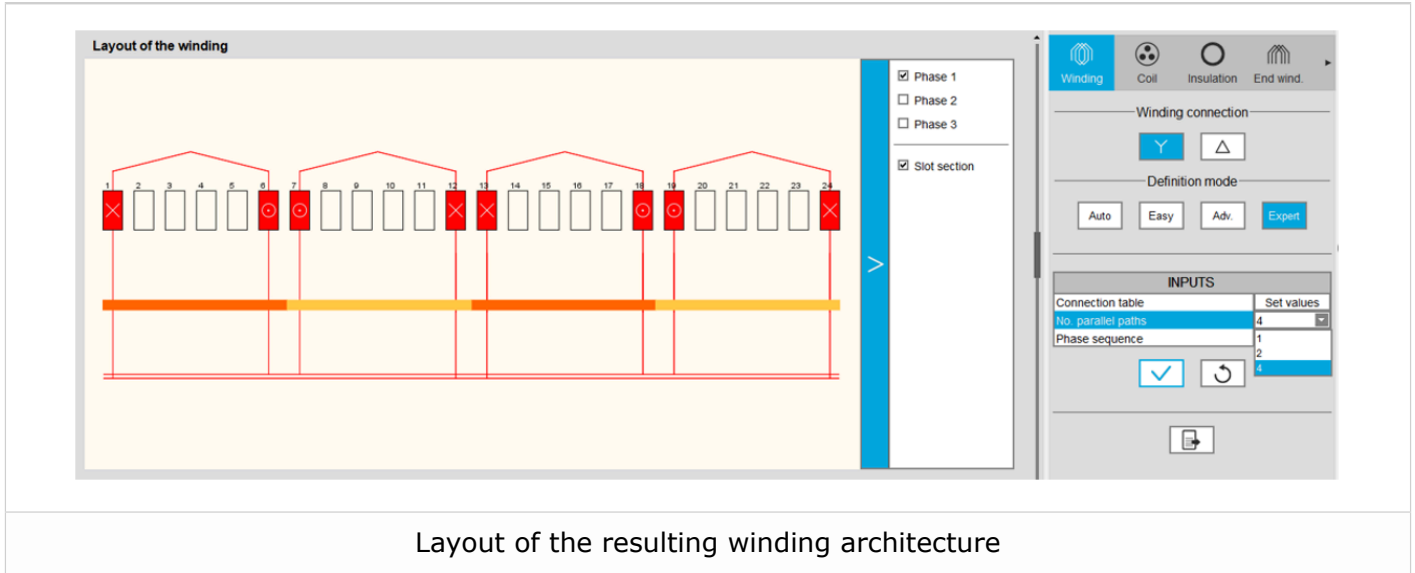


Dialog box for defining the connection table while using the expert mode

1	<p>Definition of the number of duplications.</p> <p>This number is computed and proposed to the user. It depends on the number of slots and the number of poles.</p> <p>When the winding architecture to build is cut into several identical parts, the corresponding possible number of duplications is proposed (a short list).</p> <p>By selecting the number of duplications, the user must define only 1/n of the connection table.</p>
2	<p>Number of circuits to be duplicated represent the number of elementary circuits to be defined inside each sector to be duplicated. In this example 2 circuits are defined in the represented sector.</p> <p>This is why, there are 2 connection tables to be filled in. One for each circuit.</p>
3	<p>Representation of the two circuits inside the considered sector.</p>

Then, the list of possible number of parallel paths « No. parallel paths » adapts itself in function to the number of duplications « No. duplications » and to the number of circuits to be duplicated « No. circuits to be duplicated ».

Here is the resulting layout of the winding architecture below. There are always 4 possible parallel paths. But this time, these circuits can be well connected.



**Warning:** Concerning, the motors built with previous version and for which the winding was initially defined with the expert mode, when these will get opened with the new version (2022.1), the user input « No. circuits to be duplicated » will be set automatically to 1 and only one parallel circuit is considered.

**Important:**

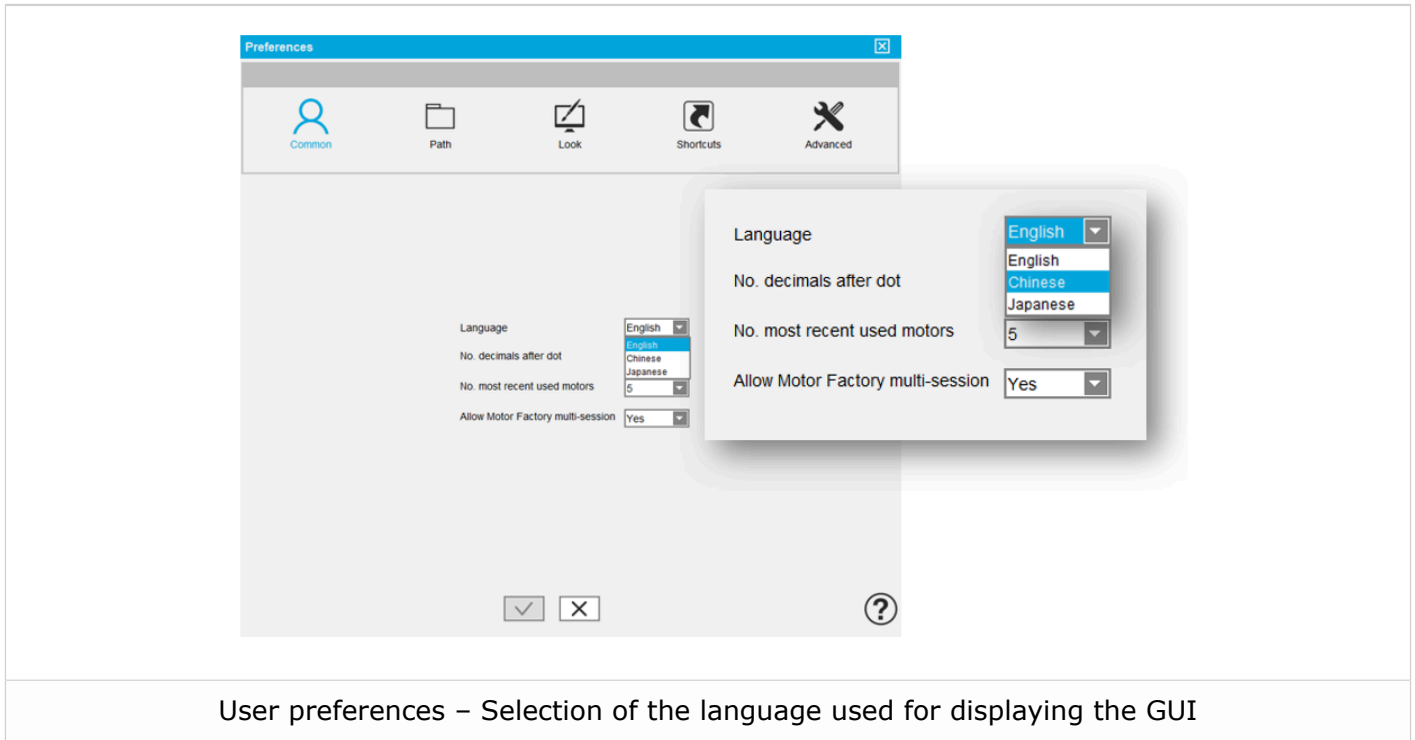
This modification is a problem for motors with a number of parallel paths « No. parallel paths » which is greater to the number of duplications « No. duplications » .

In that case, one must decided and modify the value of the « No. parallel paths » to make it relevant to take the value of the « No. duplications »

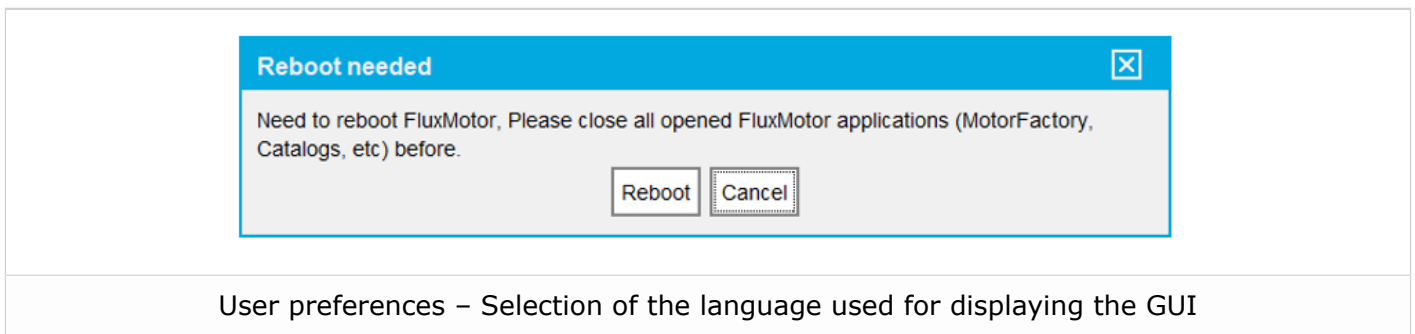
**Important:** This is done without any warning given to the user.


## 2.3 The GUI can be displayed in Chinese and Japanese languages


From the supervisor, while selecting the user preferences, from now on English is not the only language available for displaying the GUI. Chinese and Japanese languages have been added



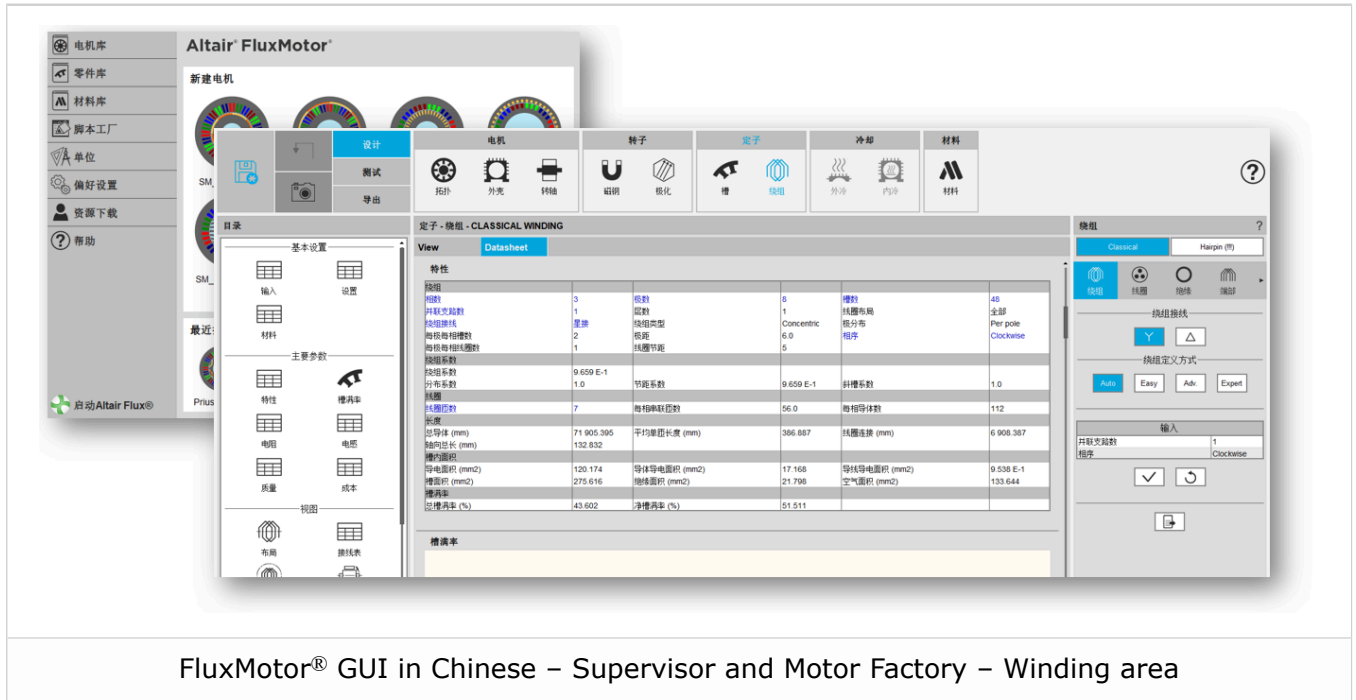
**Note:** When you change the language from the user preferences, a dialog box invites you to reboot FluxMotor®, just to apply the new language to the GUI.



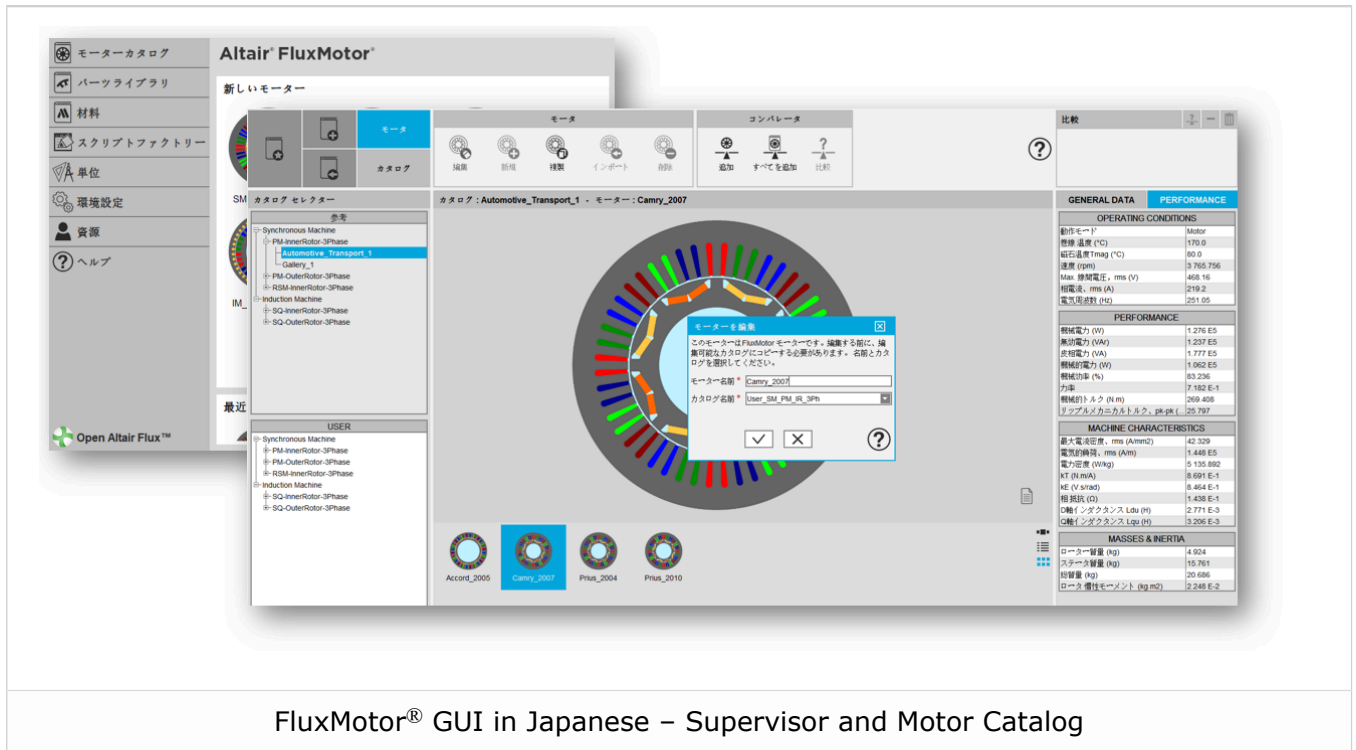
 **Note:** Some labels like those used for defining the catalog names in Motor Catalog or those used for defining the library names in Part Library cannot be translated. Indeed, these are key words used for our internal processes management.

 **Note:** For both languages, all the labels are not translated yet. There are still some labels displayed in English.

- FluxMotor® GUI in Chinese – Example of displaying



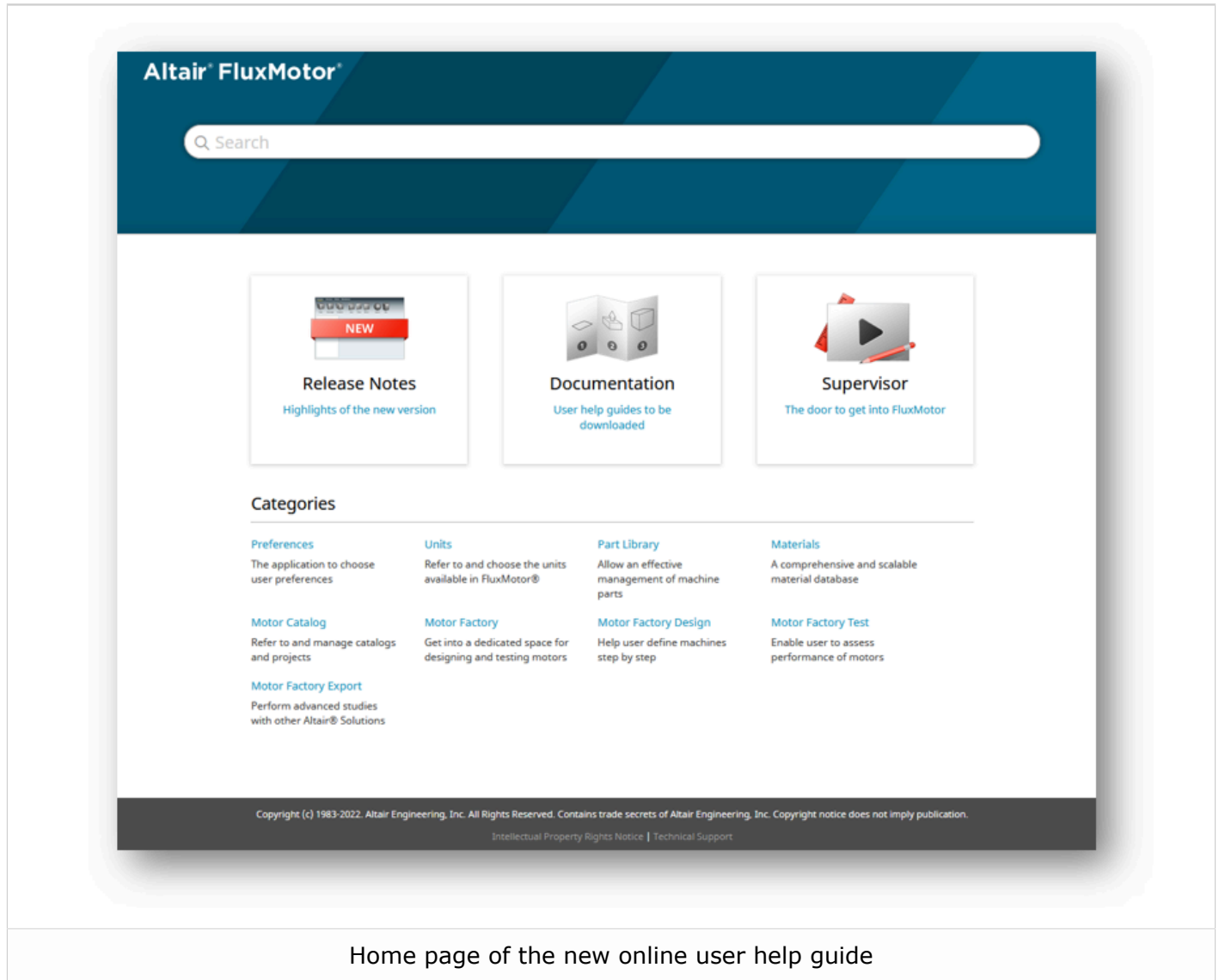
- FluxMotor® GUI in Japanese – Example of displaying



## 2.4 A new online user help guide area

The online user help guide framework of FluxMotor® has been modified to be consistent with what it is done for Altair® Flux® and for the other Altair® solutions.

Here is the new user help guide area



Home page of the new online user help guide

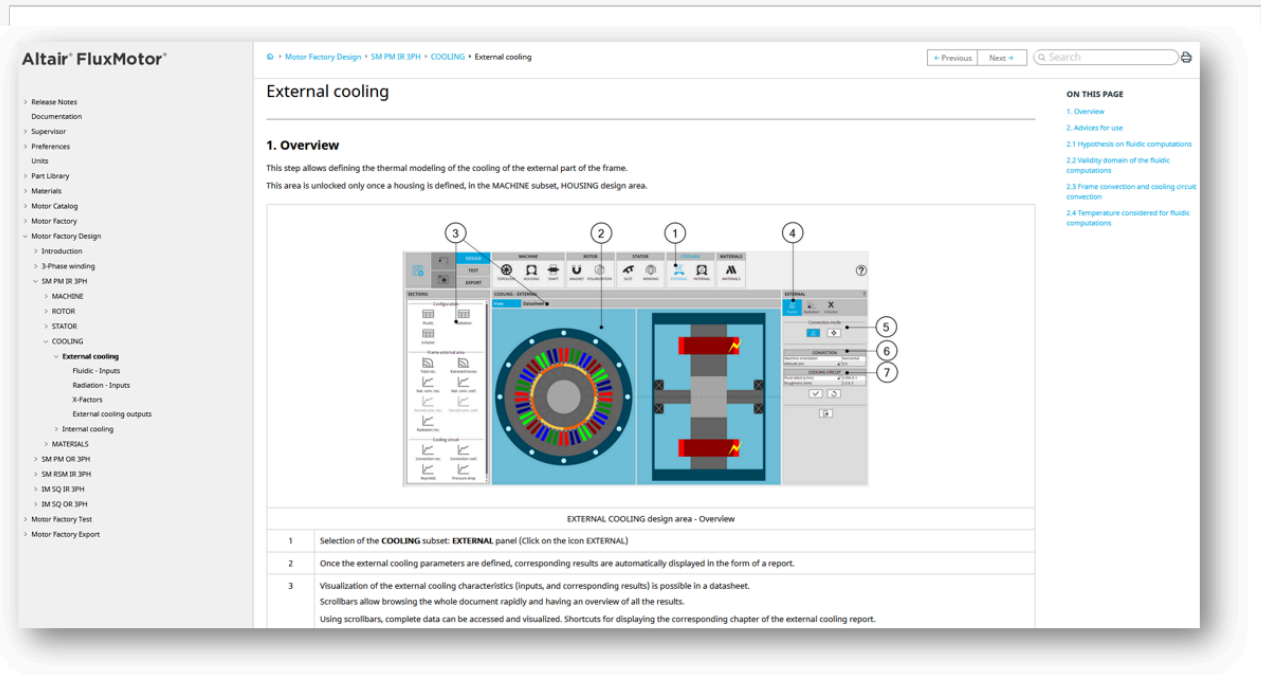




**Important:**

From now on the users need to use their Altair One login and password to open the online user help guide.

Example of the new displaying of documents



Displaying of the online user help content

This chapter covers the following:

- [3.1 All machines](#) (p. 27)
- [3.2 Induction machines – Motor Factory – Test environment](#) (p. 28)
- [3.3 Part Factory](#) (p. 29)

## 3.1 All machines

### 1. Winding environment – Some inputs are not reminded

The inputs 'Inter-wire space" and "Twist" are not displayed in the datasheet view of the winding design context (ref.: FXM-14062).

This issue has been corrected.

### 2. Usage of Motor factory becomes extremely difficult

The usage of Motor Factory becomes extremely difficult when all the tests are performed and all of them are saved twice

This is mainly due to the management of memory. An increase the allocated memory for Motor Factory can solve the problem (ref.: FXM-13359).

This issue has been corrected.

### 3. Air inside empty slots is not well managed in the outer rotor topology

While exporting a topology with empty slots in outer rotor machine, the air inside the slots is attributed to the region "AIR" which is a moving region in outer rotor machine model. Thus, the model computation is not possible.

A workaround must consist of creation of a static air region called "AIR\_STATOR" and to assign the empty slots at this region (ref.: FXM-13771).

This issue has been corrected.

## **3.2 Induction machines – Motor Factory – Test environment**

### **1. Display of flux density**

The display of flux density (isovalues) was wrong for induction machines with squirrel cage (ref.: FXM-14128).

This issue has been corrected.

## 3.3 Part Factory

### 1. Bad displaying of part in Part factory

While building a “part” from a corrupted Excel file, a dialog box without any message gets displayed. The warning indicates the origin of the issue (ref.: FXM-14067).

This issue has been corrected.

This chapter covers the following:

- [4.1 All machines](#) (p. 31)
- [4.2 Synchronous machines – Motor Factory – Test environment](#) (p. 34)
- [4.3 Induction machines – Motor Factory – Design environment](#) (p. 36)
- [4.4 Induction machines – Motor Factory – Test environment](#) (p. 37)

## 4.1 All machines

### 1. Natural convection for end winding

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

### 2. Transient thermal computations - Displaying of iso-temperatures

In the test "Performance mapping – Sine wave – Motor – Efficiency map", when a cycle is considered with a transient thermal solving, the representation of the temperature isovalues inside the machine can be visualized all along the cycle with an animation.

The animation can run for the axial and radial views. However, both the animations are not well synchronized. Therefore, there can be troubles when using both at the same time.

### 3. 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 instantaneously in the applications of Altair FluxMotor® like Motor Factory.

### 4. Preferences – Beta level mode

In the tab "Advanced Preferences", Altair® FluxMotor® "User Level" can be: Standard or Beta. By default, the user level is Standard. In Beta Level, the entire qualified features are not available for evaluation.

The FluxMotor® Beta level mode allows performing NVH computations for induction machines – Inner rotor and gives access to the application "Scripting Factory".

### 5. Export a model into Flux® environment with represented elementary wires

#### 1. 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 Flux® 2D model, the resulting python file can be very long. Therefore, the process for building the corresponding model into Flux® environment can take a long time.

#### 2. Export into Flux® Skew

Export a model with represented elementary wires into Flux® Skew environment is not yet possible.

### 6. Browse function

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

## 7. Export environment – HyperStudy®

### 1. New solver script to be registered

Before starting new studies in Altair® HyperStudy® by using connectors exported from Altair® FluxMotor®, FluxMotor® must be registered as a new solver script in HyperStudy®. This must be defined only while using the coupling for the first time

Label	Varname	Type	Preference	Path
1	RADIOSS	RADIOSS	HyperWorks	C:/Program Files/Altair/2021/hwdesktop/./hwsolvers/scripts/radioss.bat
2	OptiStruct	OptiStruct	HyperWorks	C:/Program Files/Altair/2021/hwdesktop/./hwsolvers/scripts/optistruct.bat
3	MotionSolve	MotionSolve	HyperWorks	C:/Program Files/Altair/2021/hwdesktop/./hwsolvers/scripts/motionsolve.bat
4	Python	Python	HyperWorks	C:/Program Files/Altair/2021/hwdesktop/./common/python/python3.5/win64/pyth
5	Tcl	Other Application	HyperWorks	C:/Program Files/Altair/2021/hwdesktop/hw/tcl/tcl8.5.9/win64/bin/tclsh85.exe
6	Templex	Other Application	HyperWorks	C:/Program Files/Altair/2021/hwdesktop/hw/bin/win64/templex.exe
7	HM Batch	Other Application	HyperWorks	C:/Program Files/Altair/2021/hwdesktop/hm/bin/win64/hmbatch.exe
8	HM BatchMesher	Other Application	HyperWorks	C:/Program Files/Altair/2021/hwdesktop/hm/batchmesh/hw_batchmesh.bat
9	MDL Batch	Other Application	HyperWorks	C:/Program Files/Altair/2021/hwdesktop/io/translators/bin/win64/mdl_batch.bat
10	HyperStudy Batch	Other Application	HyperWorks	C:/Program Files/Altair/2021/hwdesktop/hst/bin/win64/hstbatch.exe
11	HyperWorks	Other Application	HyperWorks	C:/Program Files/Altair/2021/hwdesktop/hw/bin/win64/hw.exe
12	HV Trans	Other Application	HyperWorks	C:/Program Files/Altair/2021/hwdesktop/io/result_readers/bin/win64/hvtrans.exe
13	FLUX	Flux	HyperWorks	C:/Program Files/Altair/2021/hwdesktop/./flux/Flux/Bin/prg/win64/flux.exe
14	None	None	Internal	C:/Program Files/Altair/2021/hwdesktop/hst/bin/win64/hstsolver_none.bat
15	FluxMotor	FluxMotor	HyperStudy	C:/Program Files/Altair/2022.1/flux/FluxMotor/Scripts/win/FluxMotors.exe

C:/Program Files/Altair/2022.1/flux/FluxMotor/Scripts/win/FluxMotors.exe

Connection between Altair® FluxMotor® and Altair® HyperStudy®

- 1 Open the area in HyperStudy® to register FluxMotor® 2022.1 script
- 2 Path where FluxMotors.exe must be selected to be registered as a new solver in HyperStudy®.

**Note:** FluxMotors.exe with an "s" at the end of FluxMotors.  
This must be defined only when using the coupling for the first time.

### 2. New test and connectors for HyperStudy®

Connectors for coupling FluxMotor® and HyperStudy® are not yet available for the new implemented tests, like those with transient thermal computations.

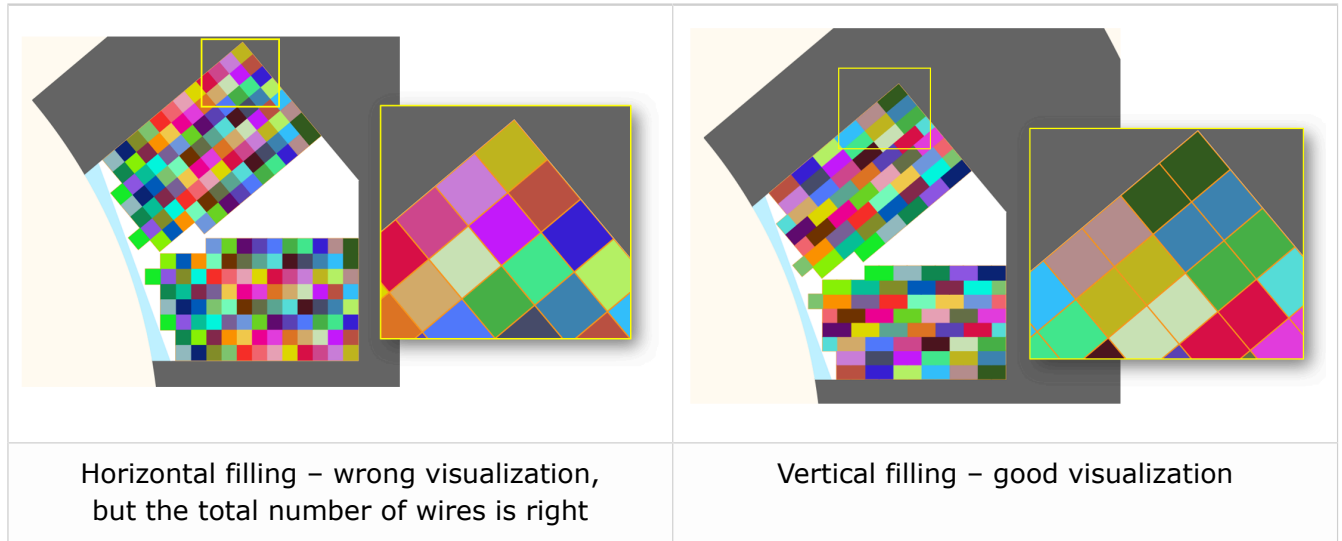


## 8. Problems with slot filling

1. The 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 wrong visualization of conductors. In that case, it is recommended to select the conductor grouping method "vertical".

All works well with circular shape wires

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



## 4.2 Synchronous machines – Motor Factory – Test environment

### 1. 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 a 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 as "saved tests" with reference to the original version (All the previous versions).

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

### 2. Delta winding connection

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

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

### 3. Evaluation of the maximum achievable speed

The aim of this result is to give a rough estimation of the maximum reachable speed, which can be achieved by the machine. This computation is performed by considering a 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.

### 4. 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 as 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 getting faster evaluation of the behavior of machine in connection to NVH. But, in no way this can replace a mechanical finite element modeling and simulation.

Possible reasons for deviations of results can be the following ones:

- The limits of the analytical model are reached or overpassed
- Unusual topology and/or dimensions of the teeth/slots
- Complexity of the stator-frame structure, when it is composed with several components for instance

- The ratio between the total length of the frame  $L_{frame}$  and the stack length of the machine  $L_{stk}$ . In any case, this ratio must be lower than 1.5

$$\frac{L_{Frame}}{L_{stk}} \leq 1.5$$

## 4.3 Induction machines – Motor Factory – Design environment

### 1. Computation of inter bar impedance

For induction machines, inter bar impedance (resistance and inductance) is computed by considering characteristics defined in Motor Factory.

However, while exporting the model into Flux® 2D or into Flux® Skew, inter bar impedance will remain constant, even if a parametric study is performed in Flux® environment. The topology parameters as well as the temperature won't impact the value of the inter bar impedance.

Moreover, when the 'inter bar' computation is done with the user mode, the reference temperatures are not updated while exporting the project in Flux® 2D /Flux® Skew environment.

## 4.4 Induction machines – Motor Factory – Test environment

### 1. 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 increase the computation time.

For the test “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 squirrel cage or slot.

The computation time for computing a working point is generally close to 8 minutes with the skewing of 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 is equal to 8192 MB when the maximum allocated memory for Flux® 2D software is equal to 4096 MB.

In case, the user needs more memory, these values can be increased (user’s preferences - Advanced tab)

Perhaps, it is required to allocate the memory from 10.24 GB to 15.36 GB to run tests without failure.

### 2. Computation of power density for induction machines

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

The result was given in W/m<sup>3</sup> while it is in W/kg for other machines SMPM, 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® 2022.1.

This chapter covers the following:

- [5.1 All machines](#) (p. 39)
- [5.2 Synchronous machines – Motor Factory – Test environment](#) (p. 42)
- [5.3 Induction machines – Motor Factory – Test environment](#) (p. 43)
- [5.4 Induction machines – Motor Factory – Export environment](#) (p. 44)
- [5.5 Part Factory](#) (p. 45)

## 5.1 All machines

### 1. Tests with the solid conductors in slots - Current in parallel paths is wrong

While computing a working point with elementary wires modeled with solid conductors, the computed electrical current in the branches in parallel is wrong if the following conditions are met (ref.: FXM-14728):

- There are parallel paths
- The "Accurate mode" of computation is selected
- The "AC losses analysis" in "One" or "All phases" is selected
- The resulting finite element model doesn't represent the full geometry

### 2. 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 a wrong thermal analysis. It is highly recommended not to use null values for the considered inputs (ref.: FXM-14705).

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

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

### 4. The interwire space is not well defined


The value of the interwire space applied in the resulting finite element model is twice the value set in the user inputs (ref.: FXM-14672).

### 5. Transient thermal computation

Sometimes, there is an issue with nonlinear thermal resolution. The convergence criteria doesn't reach from a certain time iteration leading to non-physical results then making the physical properties interpolations impossible. This can occur for duty cycle inside of which there are a huge number of working points for instance (ref.: FXM-14570).


### 6. Air material properties are wrong for high temperature

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

 **Note:** in case of problem, we can provide you an "Air material" with the right parameters.

## 7. Building and export of a report failed

While adding multiple new tests, and simultaneously executing the previously saved tests (12) along with assigning material in the report and saved test (12) + Materials in the report, the building and the export of the resulting report can fail (ref.: FXM-11574) + (ref.: FXM-14117).

 **Note:** In that case it is recommended to increase the allocated memory for Motor Factory in the user's preferences.

## 8. Inner slots with 2 layers winding and a liner can be infeasible

Rarely, while adding a liner inside an inner slot inside of which there are 2 layers can fail (ref.: FXM-14100).

## 9. Internal optimization processes can crash

Sometimes, when FluxMotor® launches an optimization in the back end with HyperStudy®, and if there is an error in the internal process (evaluation of the objective functions), this makes FluxMotor® crash.

Moreover, without any log file to explain the issue one cannot understand the cause of system crash (ref.: FXM-13949).

## 10. 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).

## 11. 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 "Cooling-Internal" context, and used in all thermal tests is wrong if the slot contains faces "wedge" or "inter-coil insulator" (ref.: FXM-13896).

## 12. Bad management of sequential inputs in HyperStudy® connector

Some configurations of parameterized topologies can be obtained manually in Motor Factory but cannot be created from HyperStudy® for some connectors (ref.: FXM-13612).

## 13. Power electronics and coupling with HyperStudy®

For tests where settings "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 (ref.: FXM-13726).

## 14. Management of multi-parametric settings with HyperStudy® coupling

One must be able to manage the case of sequential input update in HyperStudy® connector, especially for topology definitions (ref.: FXM-13612).



### **15. Issue with report generation**

Sometimes, the report generation freezes

This is mainly due to the management of memory. Increasing the allocated memory for Motor Factory can solve the problem (ref.: FXM-13585 + FXM-11574).

### **16. Save motor doesn't work**

Sometimes, saving a motor doesn't work.

This is mainly due to the management of memory. Increase the allocated memory for Motor Factory can solve the problem (ref.: FXM-13584).

### **17. Script Factory freeze temporarily when running a script**

When running a script, 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).

### **18. 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).

### **19. 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

### 1. Duty cycle with many working points fails

Run a computation of a duty cycle with many working points via scripting crashes (ref.: FXM-14435).

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

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

### 3. FMU LuT data Export: Flux\_D and Flux\_Q are incorrect

The flux linkage related to the end winding inductances on FMU side is not considered as it is done on the test map side (ref.: FXM-14041).

### 4. Wrong data in HyperStudy® export area

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

### 5. 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 a MTPV command mode.

## 5.3 Induction machines – Motor Factory – Test environment

### 1. Power balance of No-load working point

Sometimes, computation of 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).

### 2. 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 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).

## 5.4 Induction machines – Motor Factory – Export environment

### 1. End-ring impedance – Reference temperature is not well applied

While exporting a model from FluxMotor® to Flux® 2D or Flux® Skew environment, if the end-ring impedance has been defined with the “constant computation mode” (= user mode) instead of the automatic one, the reference temperatures set by the user are not used in the resulting Flux® project. Instead, the default values are automatically considered (ref.: FXM-13713)

## 5.5 Part Factory

### 1. Wrong management of part borders

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