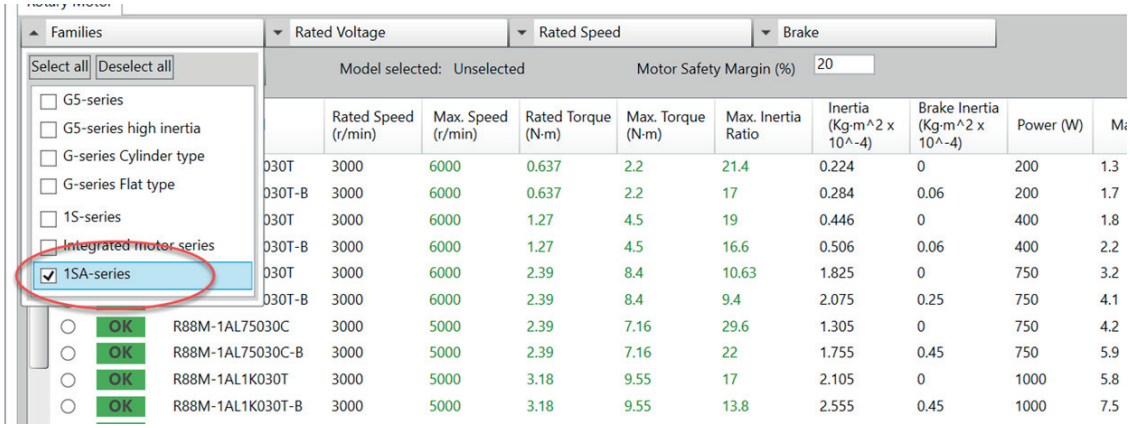
MOTOR SIZING TOOL VERSION 1.4 RELEASE NOTE

New specifications compared to version 1.3

Database has been updated including new servo families

The new servo families have been included:

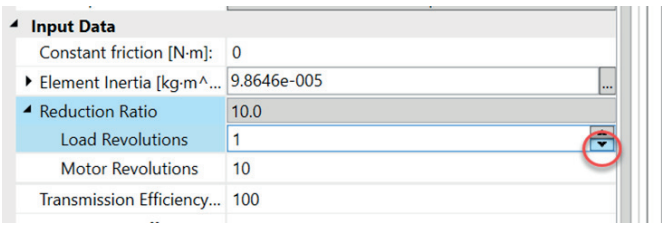
- 1S family has been extended including models up to 15 kW
- New 1S Motion Safety family has been included (200 W to 3 kW)



Gearbox property setting improvement

In version 1.3, clicking the arrow down in the gear ratio it goes 2 --> 1 --> 10, what was incoherent.

In version 1.4, the behavior is 2 --> 1 --> Keeps 1



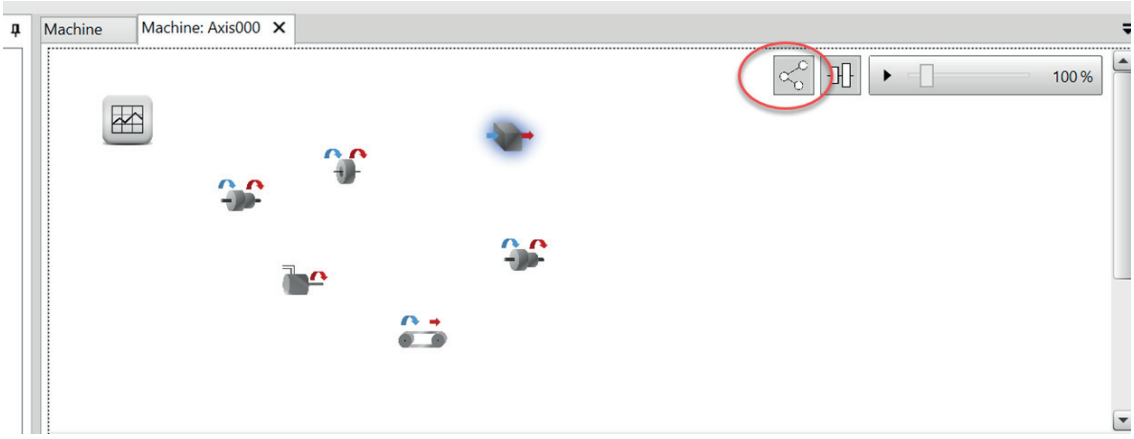
Auto-connect unconnected mechanical elements

In the mechanical chain window there is a new button that links the different unlinked mechanical elements in order to create a valid mechanical chain.

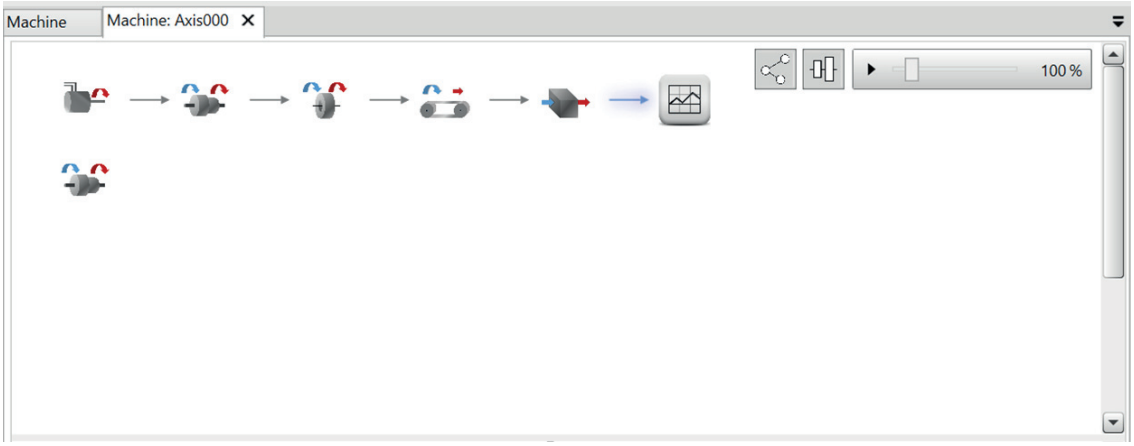
The (simplified) criteria is:

- Only one valid mechanical chain is created
- The first element is a motor and last element is a profile
- The priority of the mechanical elements (if present) is: Rotary_to_rotary --> Rotary_to_linear --> Linear_to_linear
- In case of several elements of the same type, the preference is by distance to the top-left corner
- Only one gearbox will be selected in case there are several
- Remaining elements will keep unconnected

Before connection:



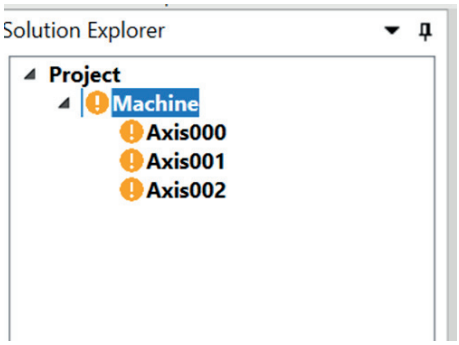
After connection:



Changed Auto-naming of new axes

A new created axis will follow the name Axis000, Axis001 and so on.

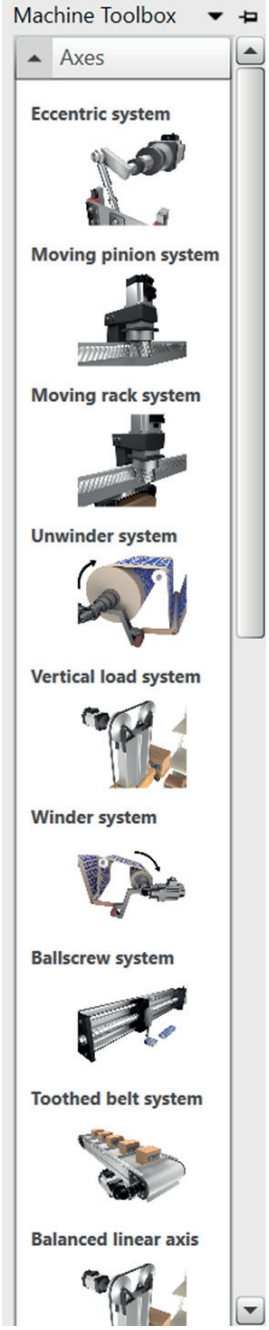
This predefined auto-name can be manually changed afterwards.



In the previous versions there were some exceptions to this rule.

New predefined axes are included

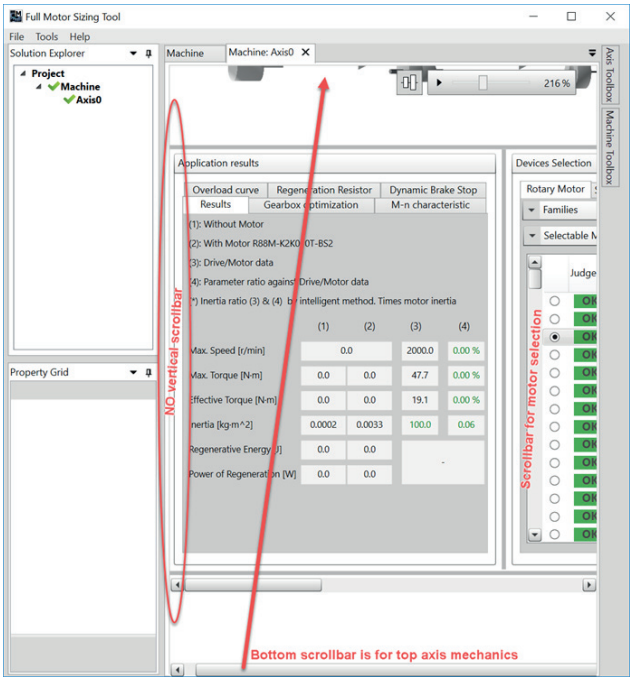
The new axes are: Winder, Unwinder, Moving Rack, Moving Pinion, Eccentric load, Vertical load.



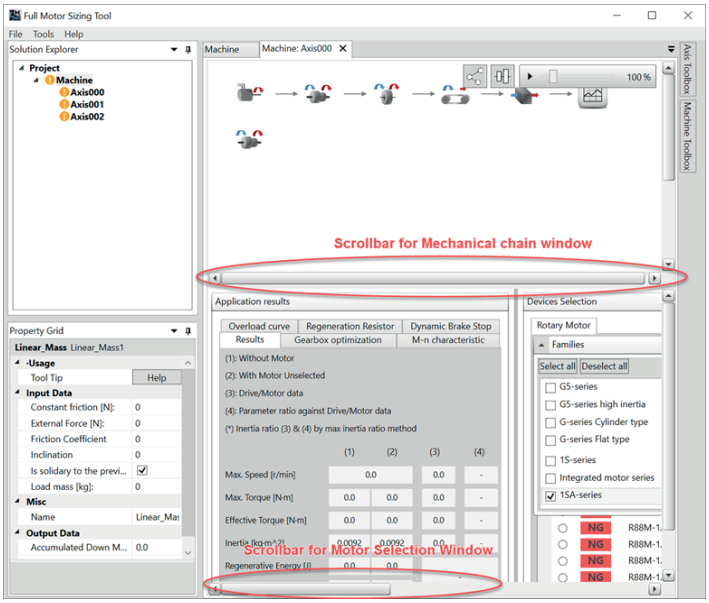
Axis window and Motor selection window are independent

In the previous versions, both windows share the same horizontal axis and have a common scrollbar, which make the visualization difficult in low resolution screens:

Old specifications:



New specifications:



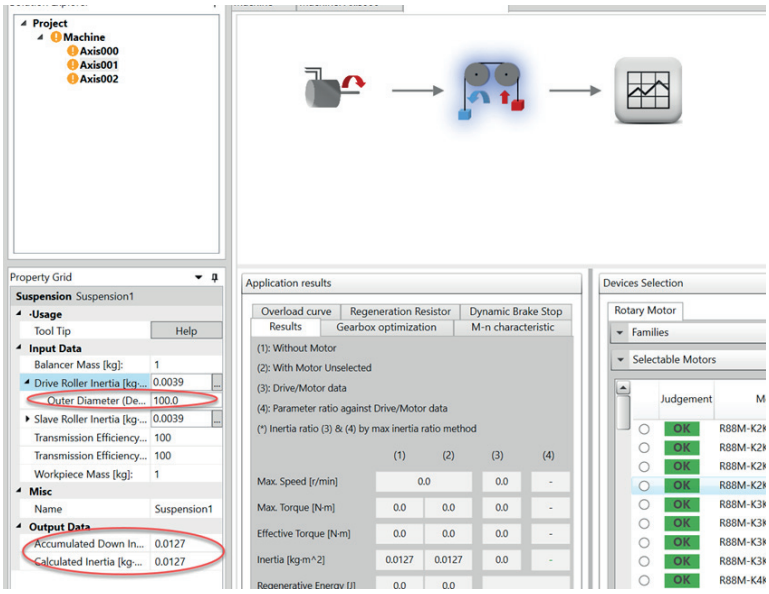
MST can be executed in a computer with non-administration rights

In the previous versions you needed to have administration rights in your computer to execute this tool.

Bugs solved

Suspension load recalculates the load inertia properly

In the previous versions, when you use a 'suspension mechanism' the inertia of the load reflected to the motor was properly calculated, but if you change the pulley diameter, this inertia was not updated ending in a wrong calculation. This has been solved and now the load inertia is changed correctly.



Database correction

Some minor mistakes in motor and accessories references have been corrected.

Translations

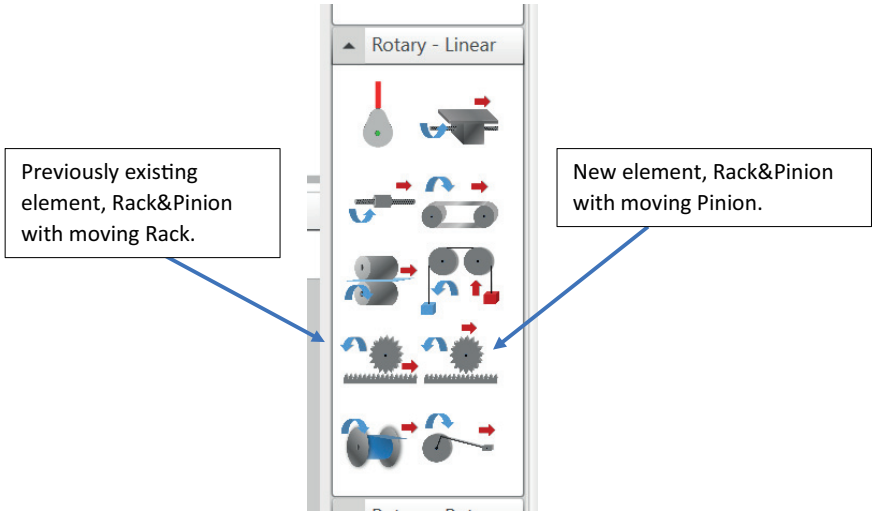
Some fixed texts now are translated to the selected language.

MOTOR SIZING TOOL VERSION 1.3 RELEASE NOTE

New specifications compared to version 1.2

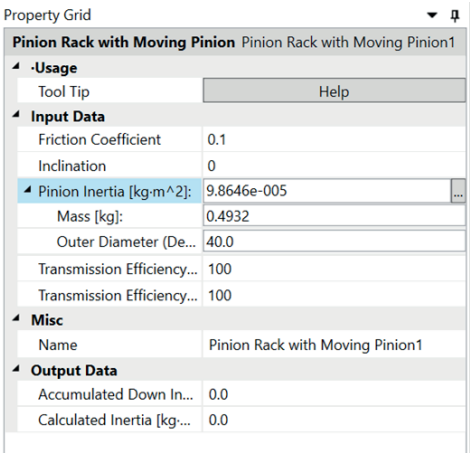
New mechanical element “Rack & Pinion” with moving pinion

A new mechanical element that is the “Rack & Pinion” with moving pinion has been created.



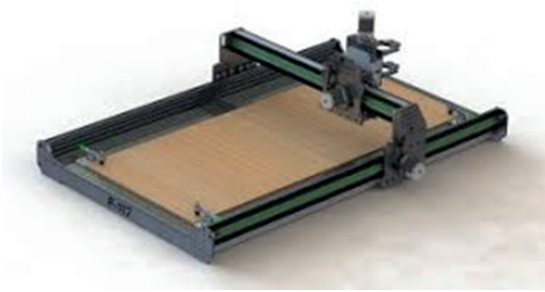
In this element, the motor moves the pinion (directly or via other rotary element) and the pinion and all the elements from pinion to the motor moves linearly.

Element properties:



The mass of the element appears as Property.

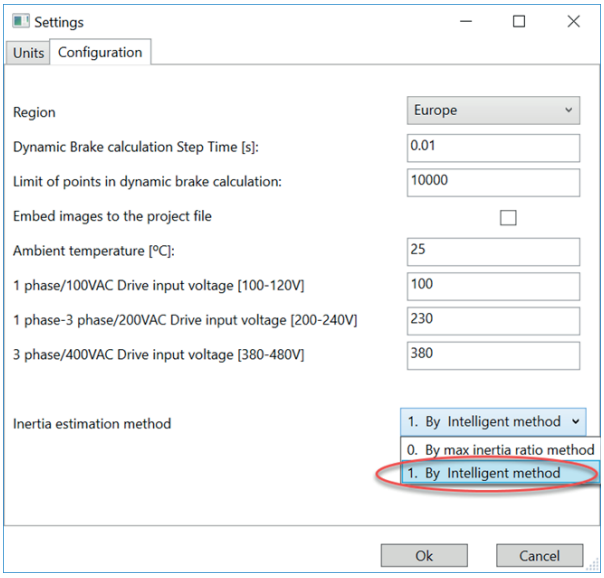
This is a typical example of application:



Intelligent Inertia Ratio Evaluation

The evaluation of the maximum inertia ratio is done just comparing the calculation result with the maximum ratio that appear in the motor catalogue. In some cases this will result in an over-dimensioned servomotor because the catalogue shows the worst case scenario.

In version 1.3 we have implemented a more optimized inertia evaluation.
This new feature is enabled from "Tools\Settings" in main menu:

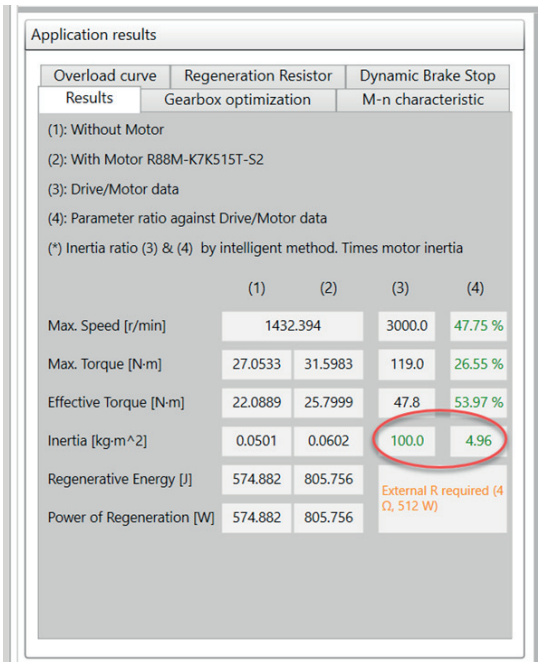


In "Application results" window the inertia is evaluated according to stability criteria.

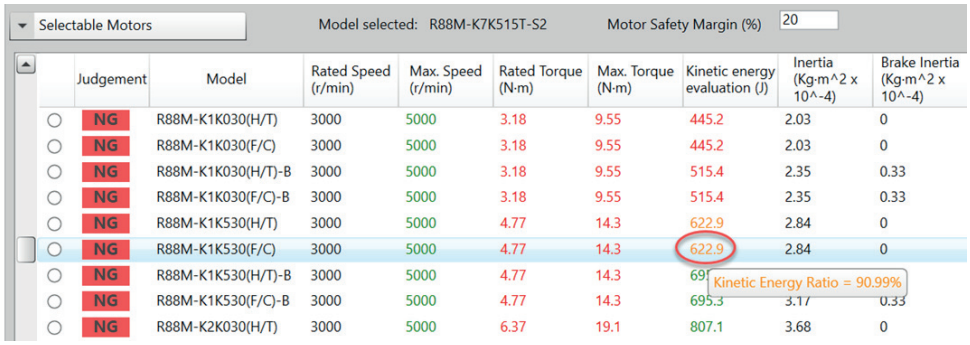
Every mechanical element, according to its typical rigidity has a maximum inertia ratio value that is considered "stable". The application compares the calculated inertia ratio with the value of the element with smaller ratio and show a color code of:

- Green if calculated value is smaller than element ratio
- Orange if calculated value is bigger than element ratio and smaller than double this value
- Red if calculated value is bigger than double this element ratio

In this example, the maximum inertia ratio for stability criteria is 100, and the calculated ratio is 4.95 times so, green.



In addition, the maximum absorbable kinetic energy by the Drive Dynamic brake is calculated giving a second criteria for the maximum inertia. In the motor selection table it appear the maximum absorbable energy and, when you put the cursor on top it appear the calculated value:

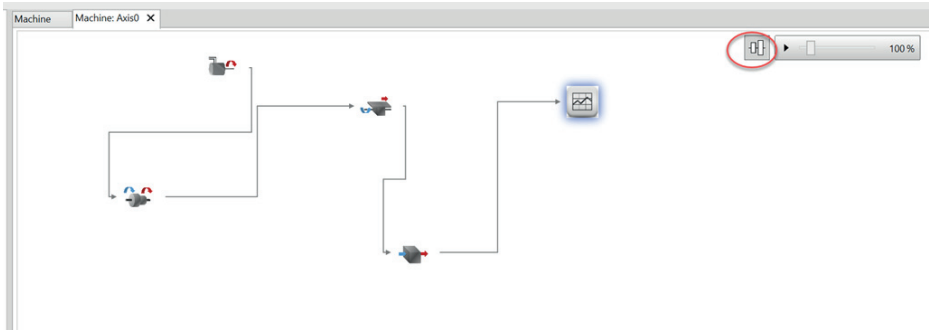


The color criteria is next:

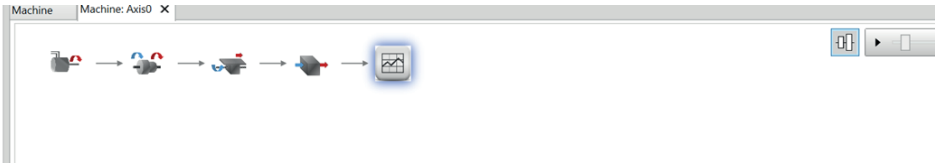
- Green: Ratio below 90%
- Orange: Ratio between 90% and 100%
- Red: Ratio above 100%

Auto-Alignment of Kinematic Chain

The kinematic chain is automatically aligned on clicking a new button.
Before:



After:



Third Party Motor Database Improvement

When using third party motors you have next improvements:

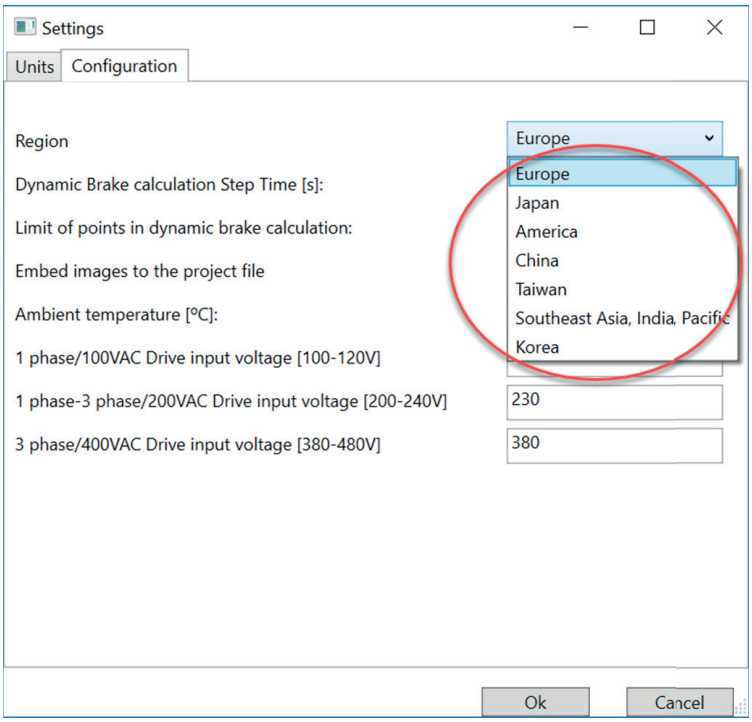
- The third party motor data is embedded in the project file
- On opening a project including a third party motor it is: added to the local database if the motor is not existing or asking which action you want to do if the motor exists.

MOTOR SIZING TOOL VERSION 1.2 RELEASE NOTE

New specifications compared to version 1.1

New regions

Now we can select between 7 different regions. Go to "Tool/Settings" and select "Configuration" tab:

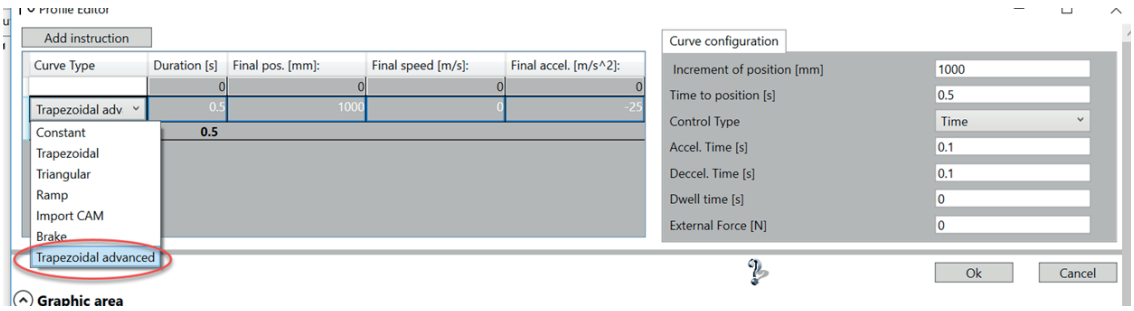


The changes in the different regions are:

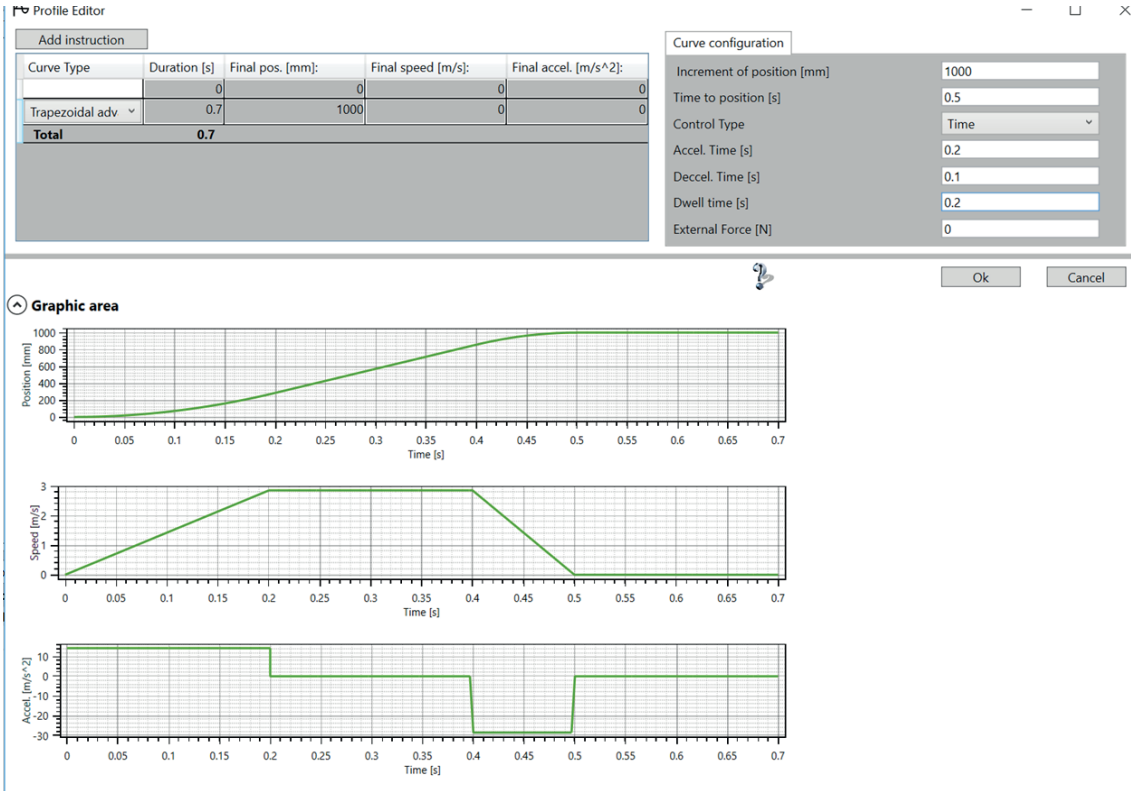
- The available drive and motor models
- The accessories references
- The default value of voltage supply

In European region all drives and motors are visible, even if they are not standard in Europe (eg, the 100 V models).

Profile Editor: Advanced Trapezoidal

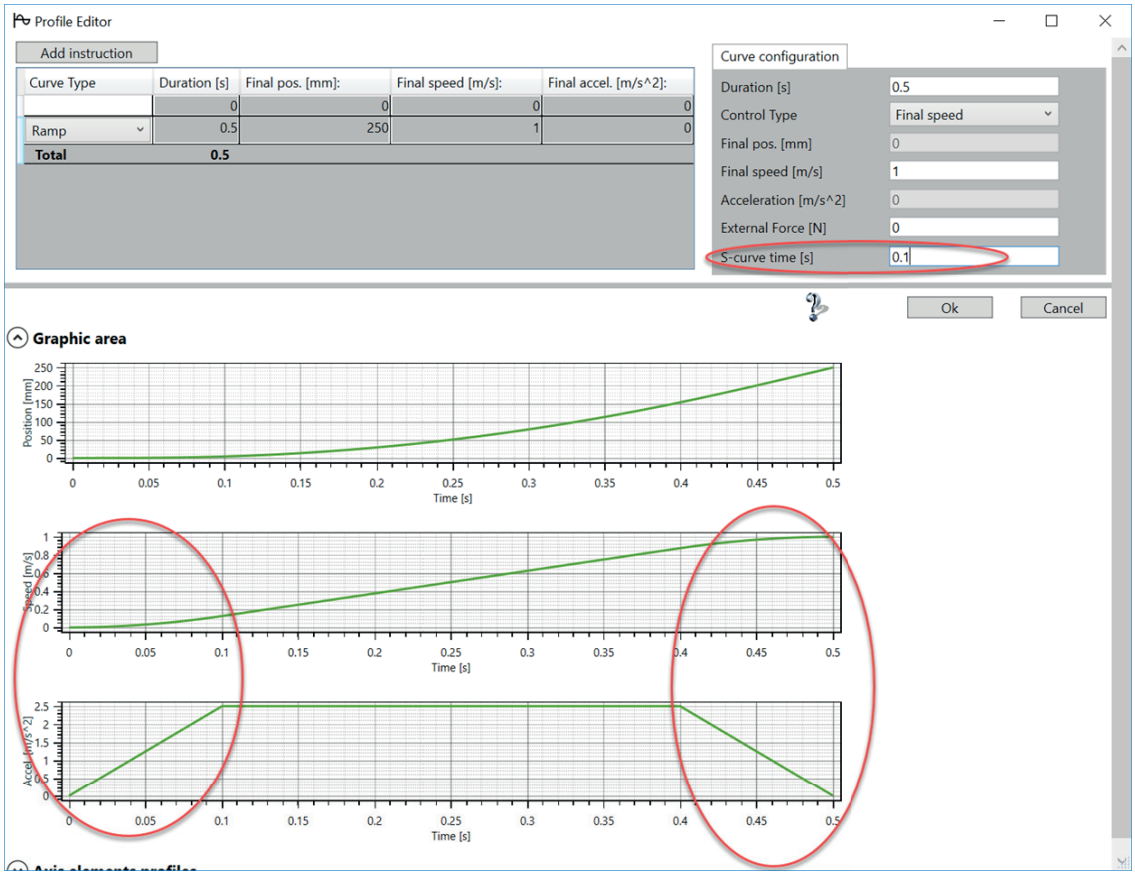


In this new predefined profile you can define the position and time increments and, in addition, control separately acceleration, deceleration and dwell time to obtain something like next:



Profile Editor: S-Curve

In the predefined segment "Ramp" we have included the S-ramp parameter that allows to define Jerk in the movement:

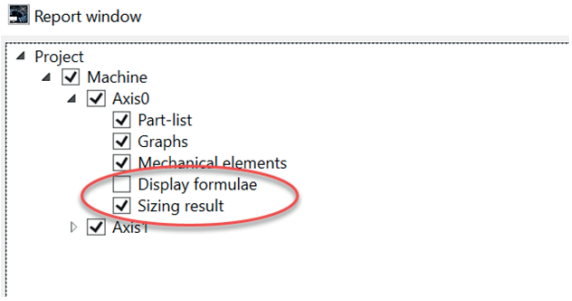


The S-curve time is added at the start and at the end of the Ramp segment.

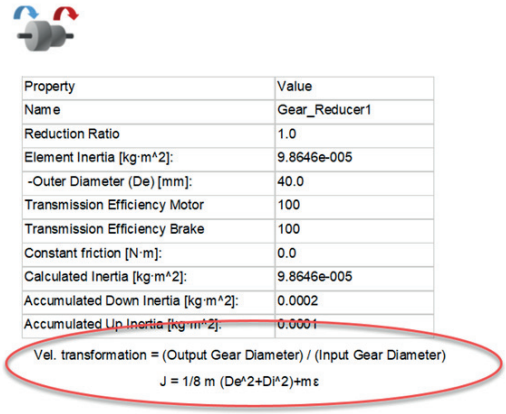
Obviously, the time range is from 0 (default) to "Duration/2" (all ramp segment is S-curve).

Improvements in Print Report

2 new fields have been added (shown with default setting):



Formulae is a simplified list of equations used in the calculations:



Property	Value
Name	Gear_Reducer1
Reduction Ratio	1.0
Element Inertia [kg·m^2]:	9.8646e-005
-Outer Diameter (De) [mm]:	40.0
Transmission Efficiency Motor	100
Transmission Efficiency Brake	100
Constant friction [N·m]:	0.0
Calculated Inertia [kg·m^2]:	9.8646e-005
Accumulated Down Inertia [kg·m^2]:	0.0002
Accumulated Up Inertia [kg·m^2]:	0.0001

Vel. transformation = (Output Gear Diameter) / (Input Gear Diameter)

J = 1/8 m (De^2+Di^2)+mε

Sizing result is same summary that shown in the "Results" in the tool:

Sizing result:

(1) Without Motor

(2) With Motor R88M-K20030H-S2

(3) Drive/Motor data

(4) Parameter ratio against Drive/Motor data

	(1)	(2)	(3)	(4)
Max. Speed [r/min]	3600		6000	60.00 %
Max. Torque [N·m]	0.58	0.61	1.9	32.13 %
Effective Torque [N·m]	0.58	0.61	0.64	77.93 %
Inertia [kg·m^2]	0.00021	0.00023	30	15.24
Regenerative Energy [J]	15.4	19.5		External R required (34 Ω, 7 W)
Power of Regeneration [W]	30.8	39		External R required (34 Ω, 7 W)

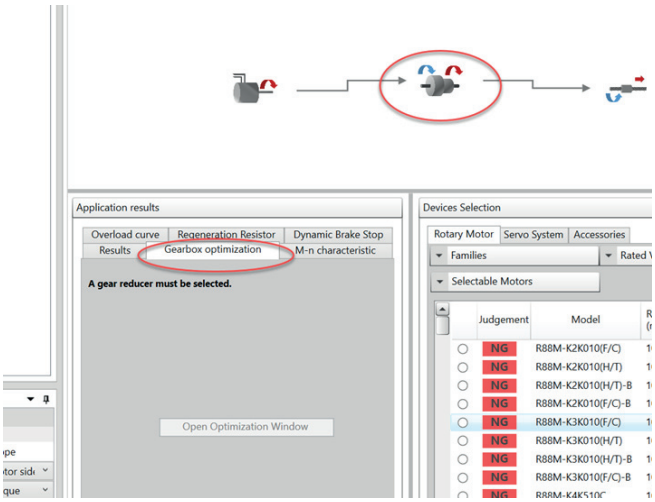
Regeneration Resistor:

Minimum resistor [Ω]	34.00 .. 1589.00
Average power in resistor [W]	6.7

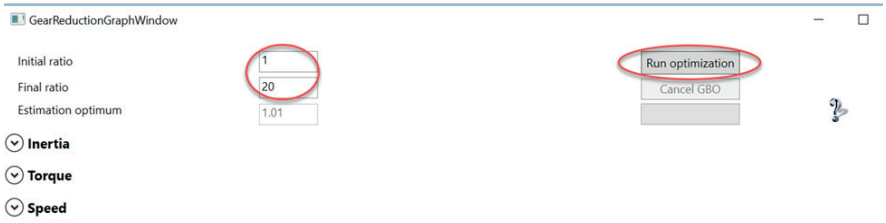
Gearbox optimization

Many times, we have the freedom to choose the best gearbox ratio.

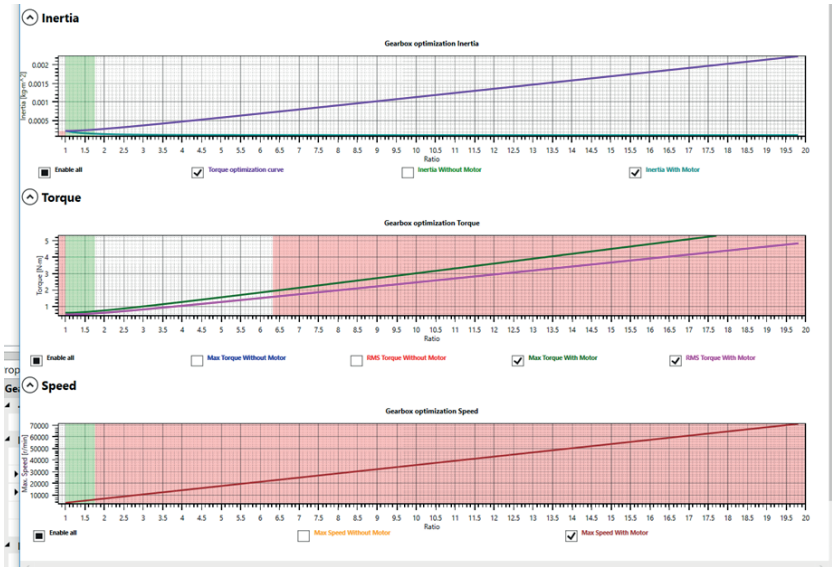
In order to simplify this operation, we have added a new tab in the "Application results" if a gearbox is used in the mechanical chain:



It open a new window where you can select the range of gearboxes to check:

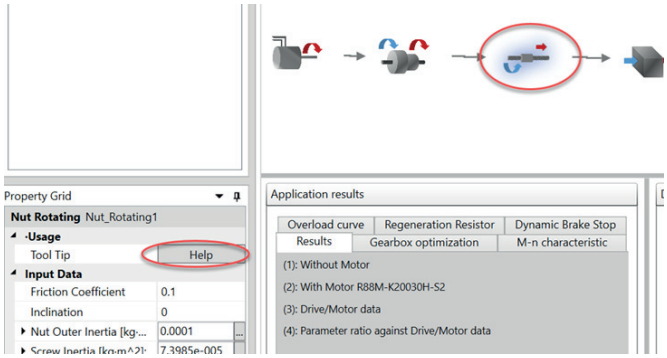


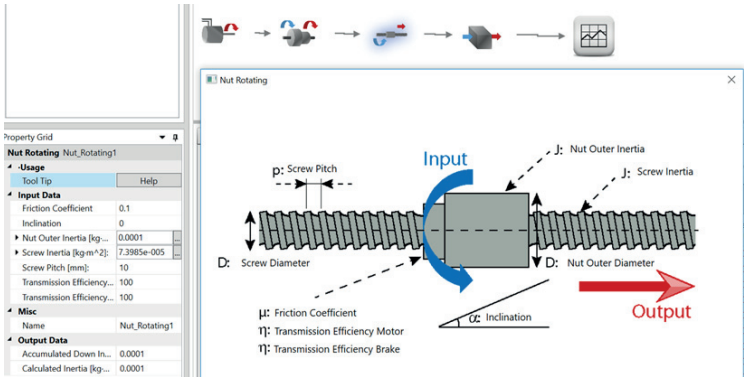
Then, it result in traces of inertia, torque and speed from motor side so you can see quickly which is the optimum gearbox ratio in this application. If your range of ratios is large, the calculation may take several seconds. In red and green you see the available areas for the currently selected motor:



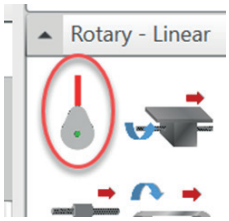
Help for setting mechanical properties

Sometimes it is not clear the meaning of some properties in the mechanical elements. A “Help” button that open a descriptive window has been created:

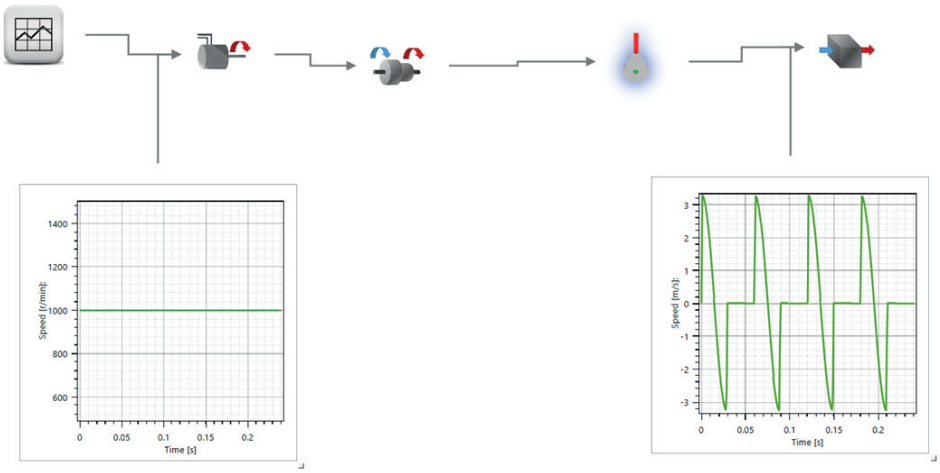




New mechanical element: Mechanical lift CAM



This kind of mechanical elements are designed to run the motor at constant speed and the CAM lifts up & down some kind of mass. For this reason, the motion profile should be in motor side.

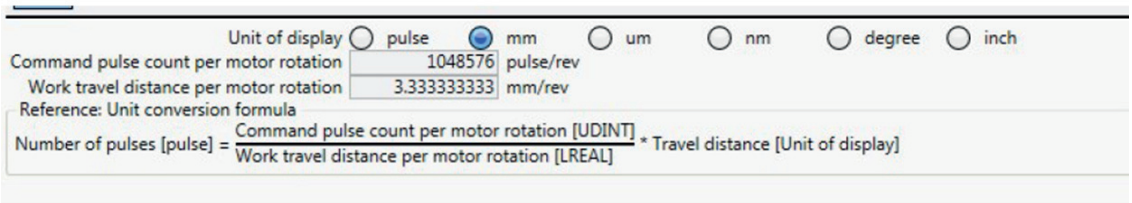


Intelligent scaling export to Sysmac Studio

In version 1.1, when you export one axis, the scaling follows the simple rule of:

- Numerator: Motor encoder resolution
- Denominator: Conversion factor from encoder counts to degree (for rotary motors) or mm (for linear motors)

This may result in infinite decimal conversion:

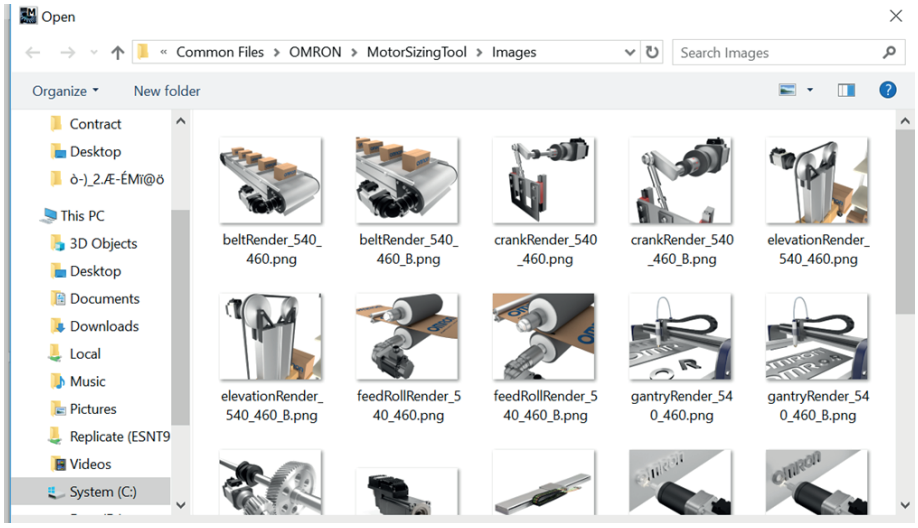


The new scaling changes numerator and denominator to use only integer values and avoid potential rounding errors.

New icons

Predefined axes icons correspond to 1S servo system:

Some new preinstalled images have been defined:



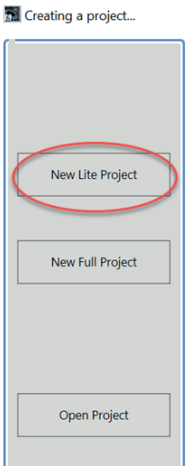
Lite Project version

We have created a simplified version of MST project addressed to people that is not very familiar with servo sizing.

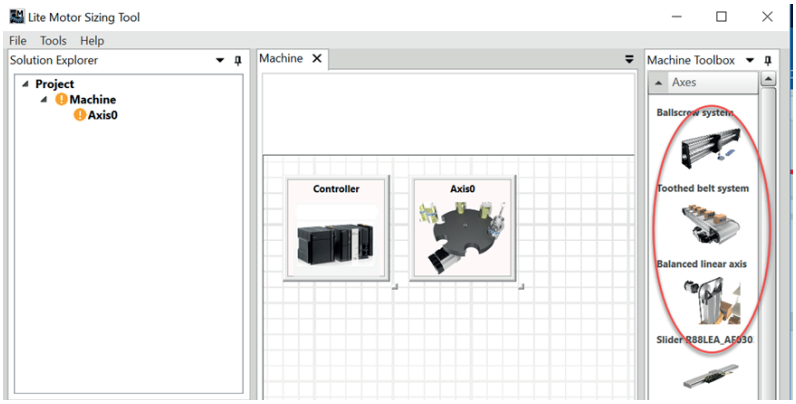
The target of this "Lite" version is:

- To make the calculations simple
- To have everything needed in the calculation in one view

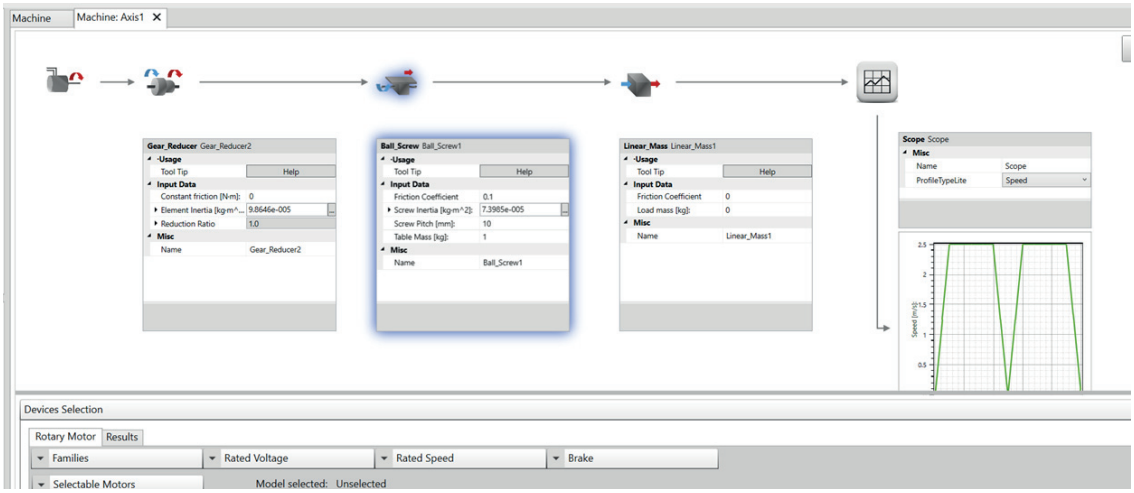
On opening MST you are asked which kind of project you want to create:



In a "Lite" project you can only use predefined mechanical axes:



Everything is in same view. The property window is a simplified list and is just below the corresponding mechanical element:



In the profile you can only select triangular, trapezoidal and advanced trapezoidal segments.

Bugs solved and usability improvements

Asking to save when tool is closed

In version 1.1 this was asked always. In version 1.2 this only asked if project has been changed since last save operation.

Lost focus

In version 1.1, after closing the profile editor, the focus was lost. This has been solved in version 1.2.

Linear Motor temperature calculation

Under certain circumstances, in version 1.1 the linear motor temperature was calculated abnormally high, specially if speed was below 2 m/s. The temperature calculation has been improved in version 1.2.

Winder/Unwinder maximum speed calculation

In version 1.1, the maximum motor velocity (when coil is empty) was not accurately calculated. This has been solved in version 1.2.