MOTOR SIZING TOOL VERSION 1.80.1.21 RELEASE NOTE

Bugs solved compared to version 1.80.1.16

Correct a bug where the tool crashes when trying to change a motion profile in a Linear motor axis

In version 1.80.1.16 under some circumstances, MST can crash trying to make some modifications, like changing the motion profile in a linear motor axis.
This bug has been solved and now axes with linear motors can be freely operated.

Some accessory description in Japanese language has been improved

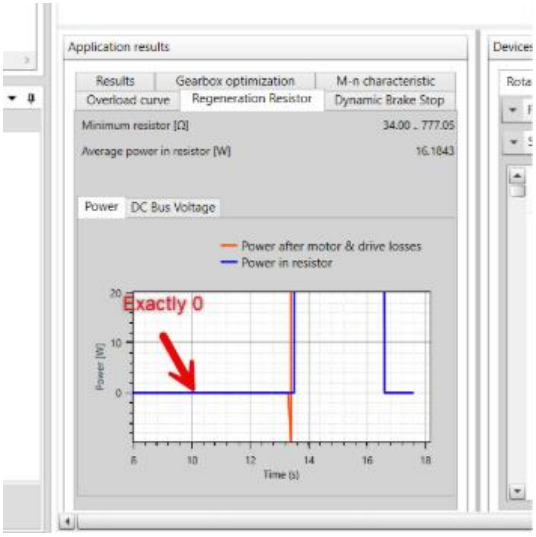
The description of some accessories in Japanese language from the original English was not accurate. The right translation now has been implemented.

Corrected a bug where the regenerated energy was not calculated properly

In MST V1.80.1.16, due to a rounding mistake, when you have next conditions:

- External torque (vertical load or external force/torque pushing the motor).
- Zero velocity.

The regeneration power should be zero because the motor is not moving. But due to rounding errors, in some cases, the velocity used in the calculation was not exactly 0, resulting in an incorrect regeneration when there is a negative torque and a theoretical zero speed.
This bug results in an abnormally big regeneration resistor result when the idle time was long.
This has been resolved and the regeneration power is 0 when the velocity is 0.



Corrections in small motor cable selection for Japan area

In some cases, the selection of the small motor cable was not right. This has been improved and now:

- 50W cables have the right "Reverse and Flexible" cables for Power and brake. For Coherence, the encoder cable is forced to be flexible.
- Resolve the bug that the word "flexible" was duplicated.
- The logic of selecting Flexible or Standard cables has been improved so all the cables (brake, encoder and brake) have to be either standard or flexible.

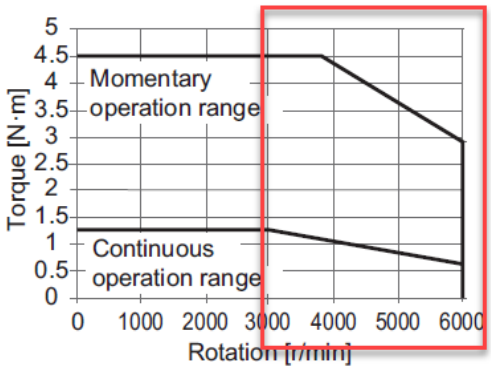
MOTOR SIZING TOOL VERSION 1.8 RELEASE NOTE

New specifications compared to version 1.7

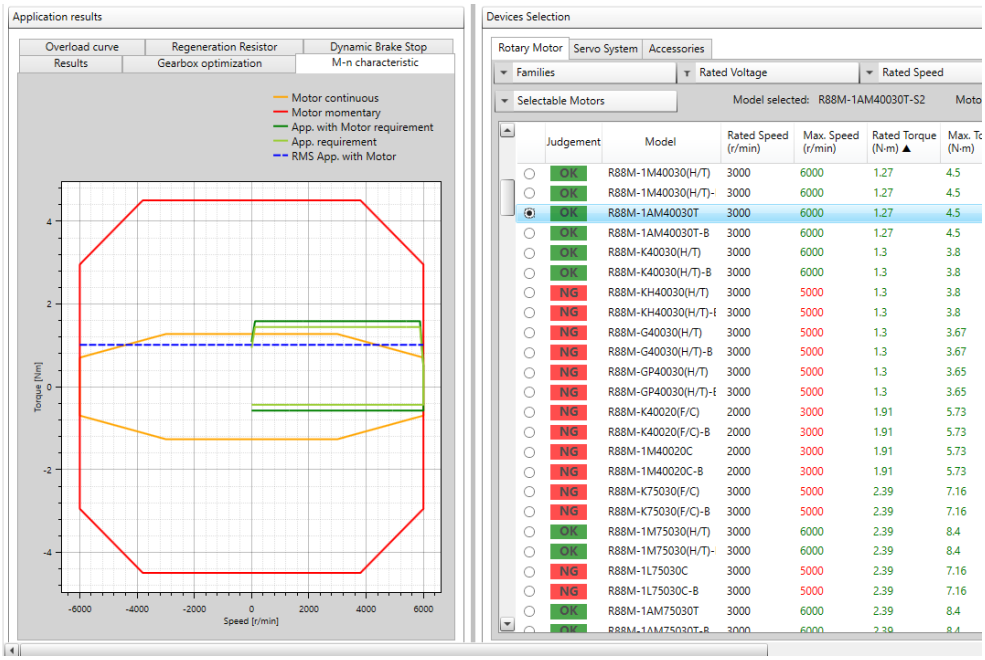
Torque derating above rated speed

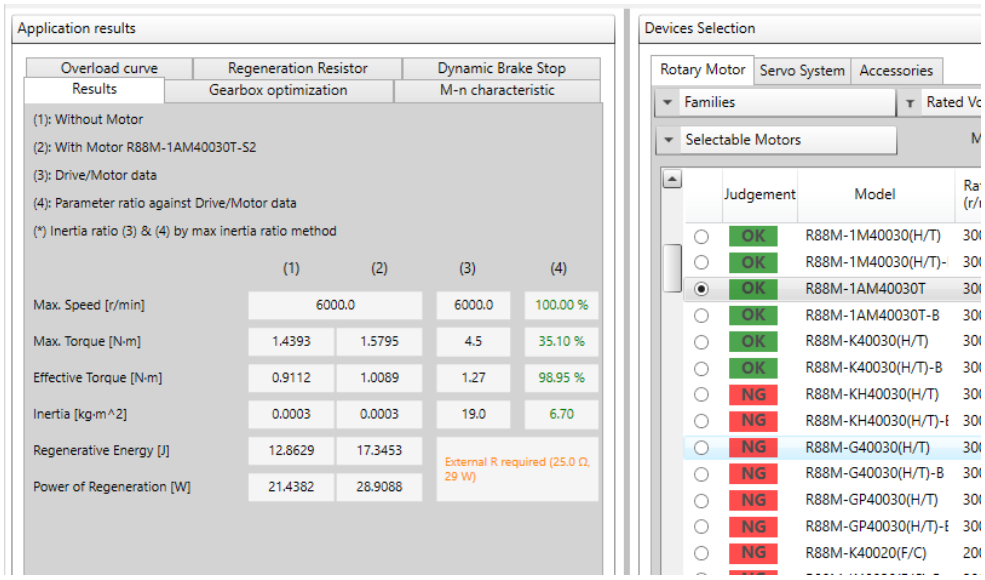
The previous splash screen said "Mechatronics Sizing Tool" and the new one says "Motor Sizing Tool", that corresponds with the name of the tool:
In MST V1.7 and older, the resultant required application Torque rms is compared with the motor rated torque to determine if the motor is valid or not.
This judgement assumes that the motor rated torque is a fixed value, which is not true, as the rated torque decreases above rated speed.

- R88M-1M40030T



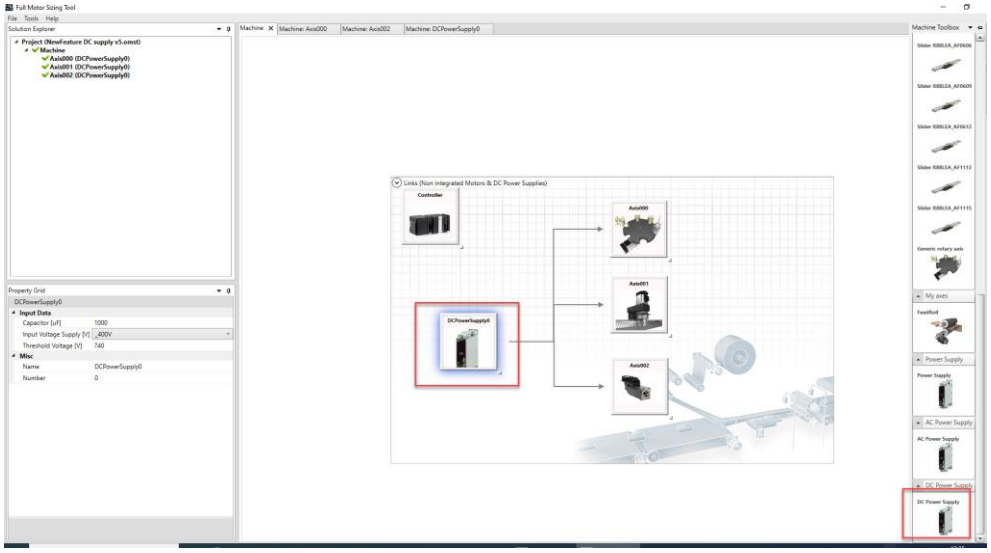
If the application requires that the motor moves in the speed range above rated speed, we have to consider this torque derating at the actual instantaneous speed.
In this example:



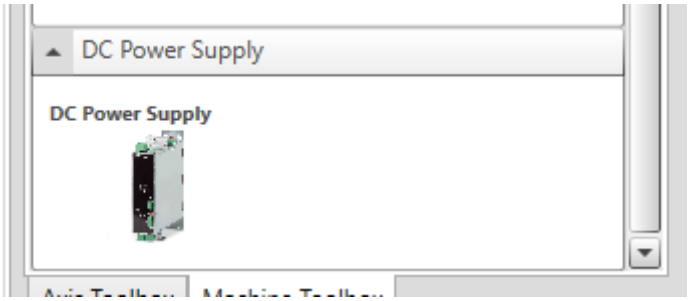


In version 1.7 and older the result of the effective torque in column (4) —That is, percentage of the motor rated torque compared to the required application rms torque, would have been 1.089/1.27*100=85.75% Now we consider that the rated torque of the motor decreases above rated speed, so the result is bigger. In this case 98.95%.

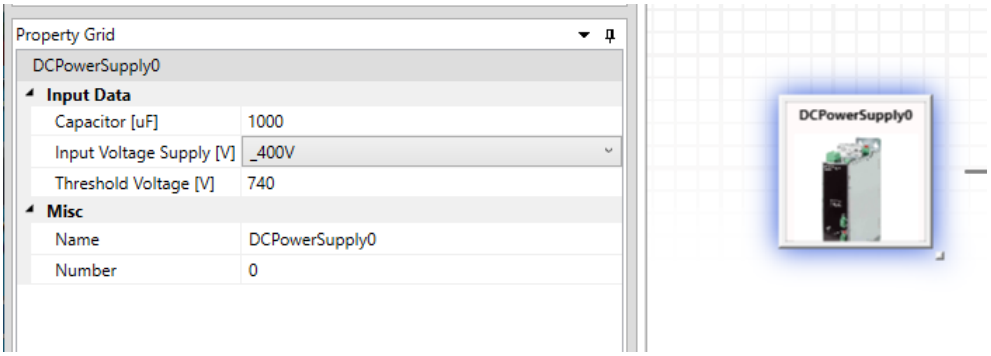
DC Power supply for 1S and 1SA



Supplying the servodrives via DC bus is becoming more and more common because this allows to reduce the use of energy by sharing the DC-bus of several drives. Then, when one servomotor is regenerating energy when decelerating or holding a vertical load, this energy can be used by another motor that is motoring.
For doing this, a new Machine element named DC Power supply has been implemented.



This element can be "drag & dropped" to the machine tab and the properties are next:

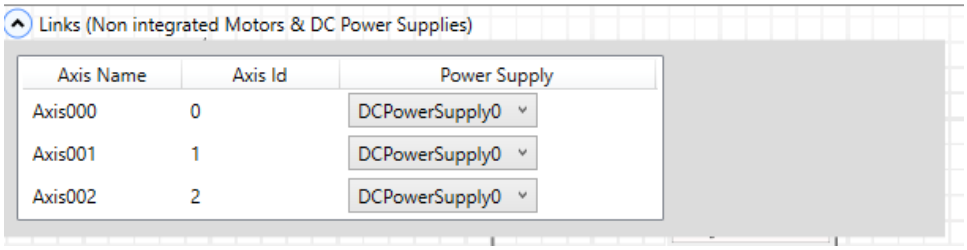


- Input Voltage Supply: You can select between 100V, 200V and 400V range. The exact value used in the calculation is the voltage supply you have in the Settings
- Capacitor: Is the internal capacitor in the power supply. The bigger the value, the more energy can be stored in the power supply and less braking power will be required.
- Threshold voltage. Is the DC voltage where the braking chopper of the power supply will start working.

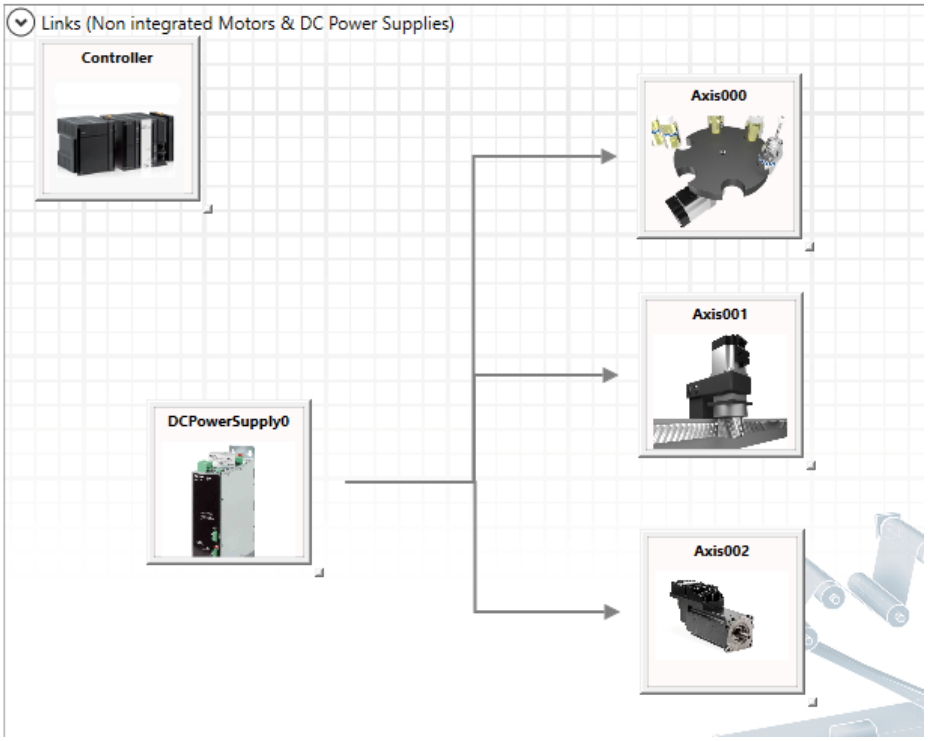
The Servodrives that can be connected to a DC Power supply are:

- 1S drives of the same voltage range than the power supply.
- 1SA drives of the same voltage range than the power supply.
- Integrated motors of the same voltage than the power supply.

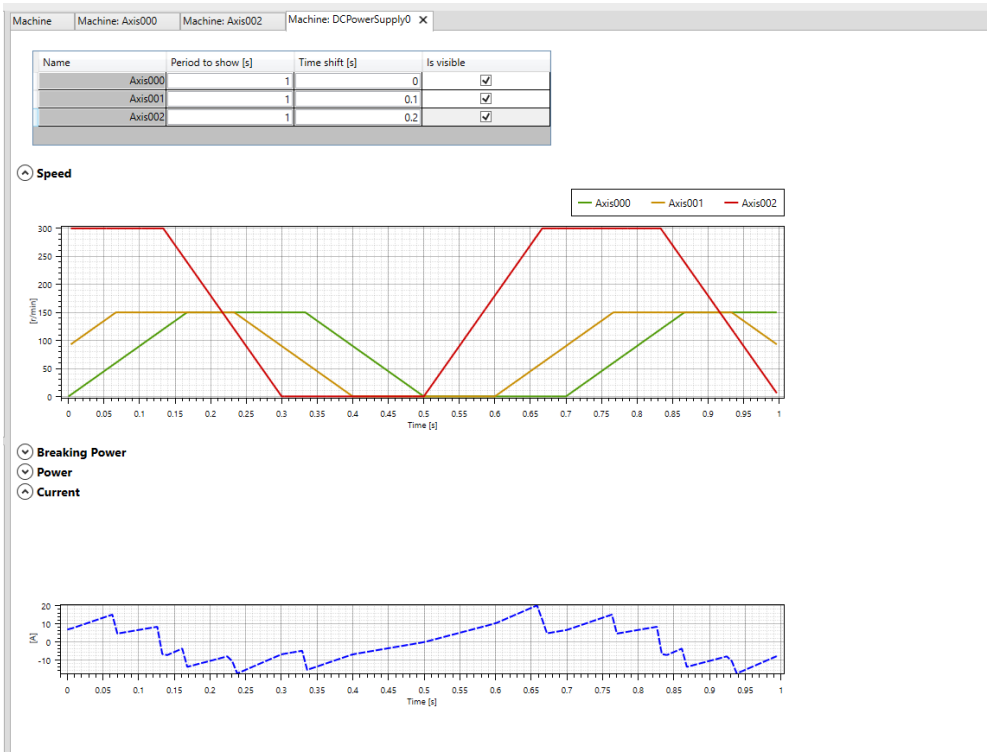
In case of 1S and 1SA, the drive capacitor is summed to the power supply capacitor and it is assumed that the drive regeneration circuit is disabled.
The link between drive and power supply is established via the Drop-down menu in the Machine tab:



And the link is shown by connection arrows:

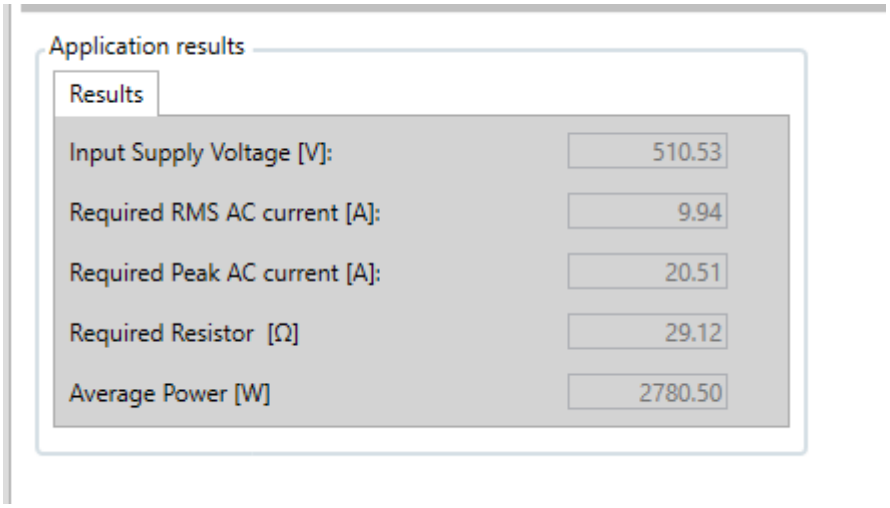


By double clicking on the DC Power supply, the corresponding tab will be opened:



You can add an axis time shift to align the different axis profile to the real machine operation. Those profiles will be summed to obtain the profiles for Braking power, total power and current needed.

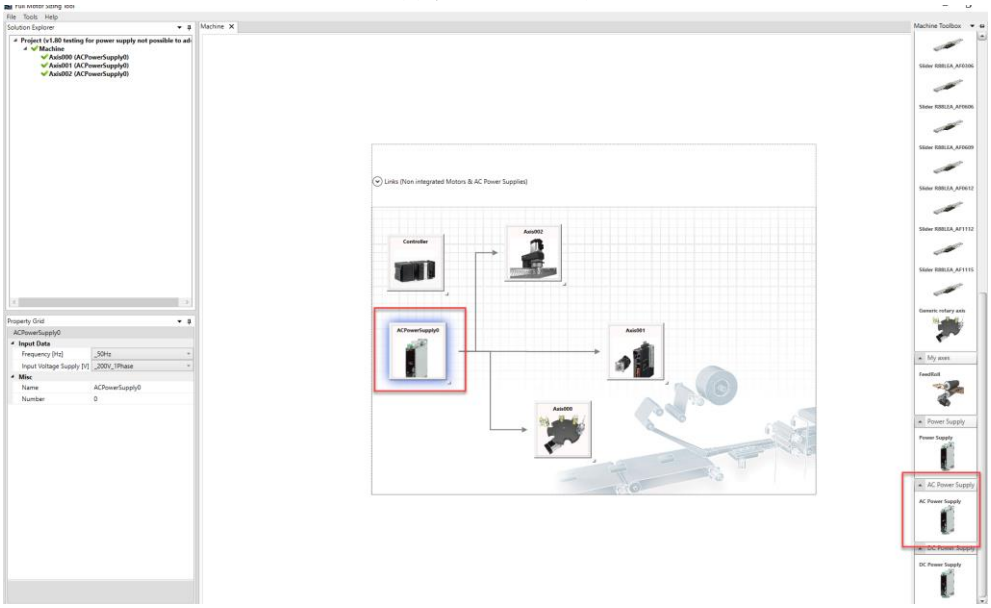
The result is shown below:



So, you have to choose a DC power supply that is able to provide the necessary Vdc Voltage (510Vdc in the example), The required Rated and peak current and has the necessary braking capability (29.12 Orm minimum and 2780W).

AC Power Supply

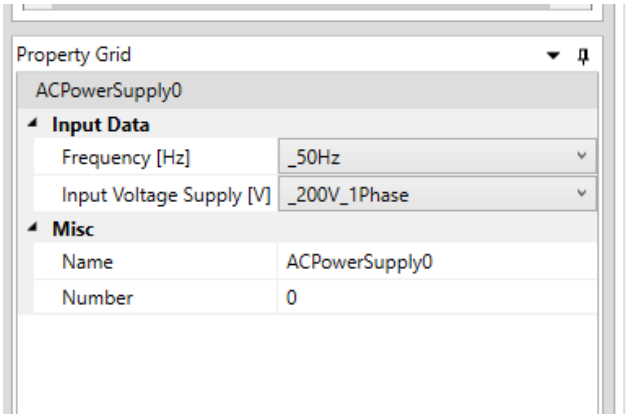
A new Machine element called AC Power Supply has been implemented:



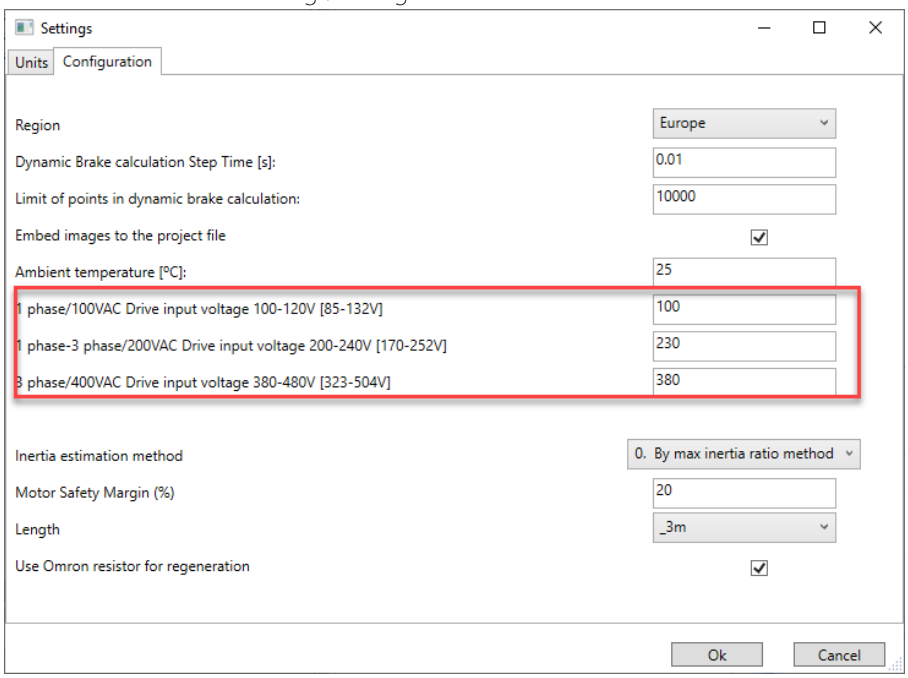
The purpose of this AC power supply is to estimate the power supply requirements for the machine and to estimate the harmonic components.

You can drag & drop to the Machine view the AC Power supply from the Machine Toolbox:

The properties are:

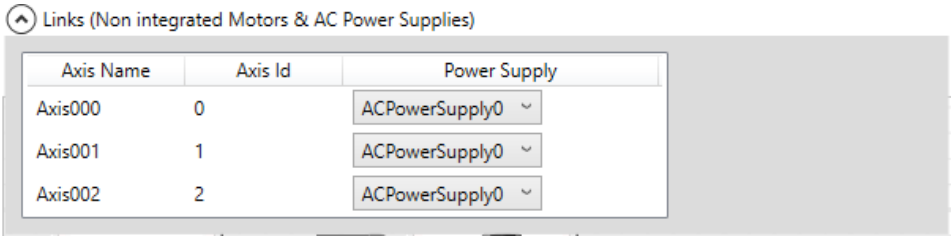


Frequency can be 50Hz or 60Hz
Input Voltage can be selected between 100V, 200V-single phase, 200V-3 phase and 400V. The exact voltage selected is the one set in Settings/Configuration.

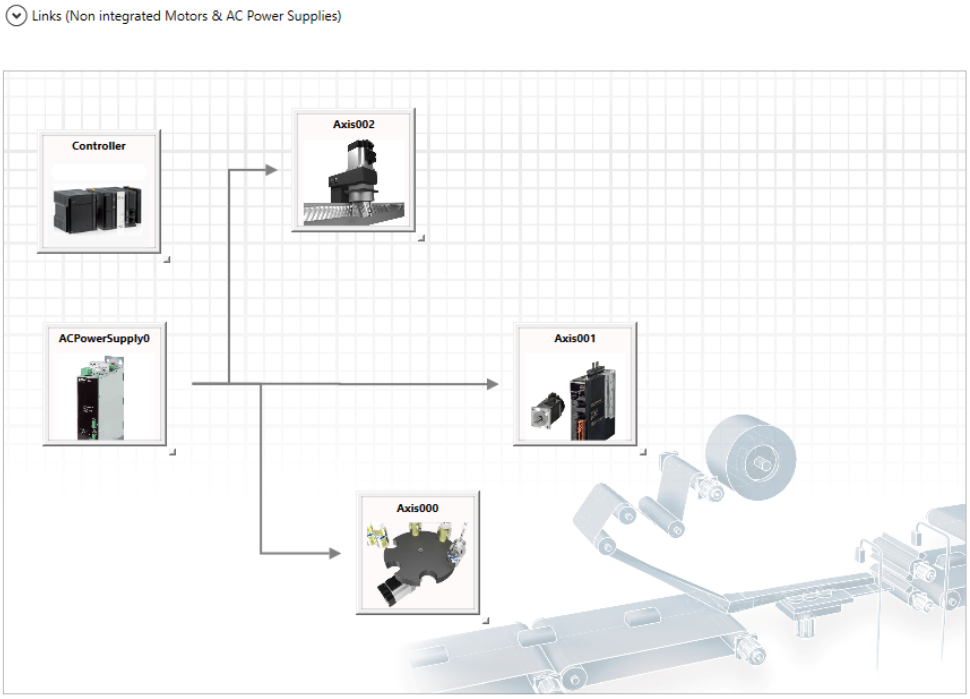


You can link to the AC power supply any drive with the same voltage range.

The link is established via drow-down menu in the Machine tab:



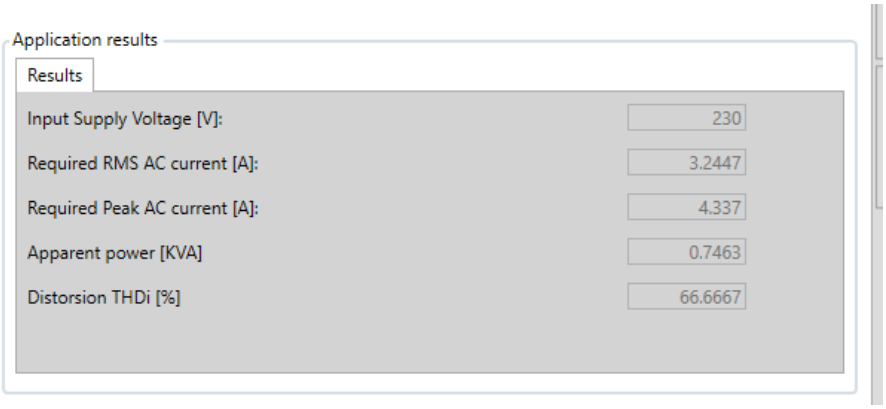
And the link is shown via connecting arrows similar to the DC power supply:



Double-clicking on the AC power supply opens the corresponding tab.
The AC power supply shows the required power and AC current in total and per-axis. It is possible:

- To time offset the profile of every axis according to the machine requirements. The right offset (whenever the application allows it) can minimize the current requirements.
- To select if a DC reactor will be installed in each drive. The installation of a DC reactor will reduce the harmonic component.

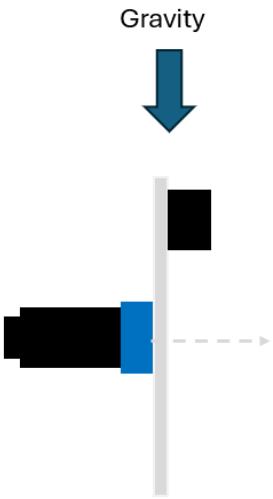
The result is next:



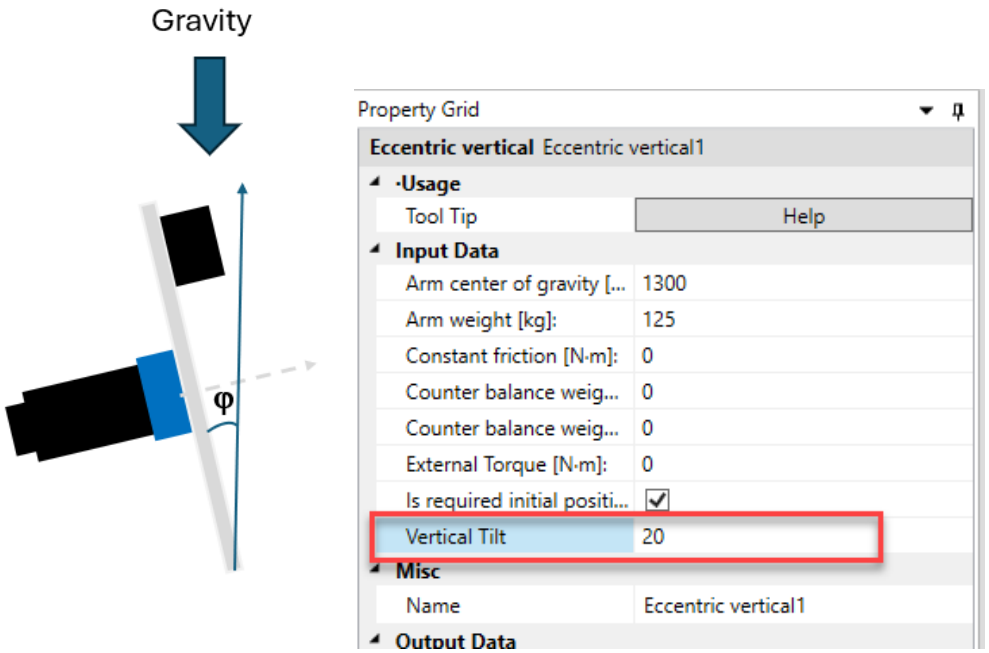
Required rated and peak current that has to be provided to the machine and which is the estimated harmonic distortion and apparent power. Harmonics are just estimated, is not possible to calculate them without complex circuit analysis and the power supply characteristics.

Added "Tilt" to the "Eccentric load with gravity" element

In version 1.7, the Eccentric load with gravity element is always considered with vertical orientation. So the rotation plane is in the same direction than the gravity.



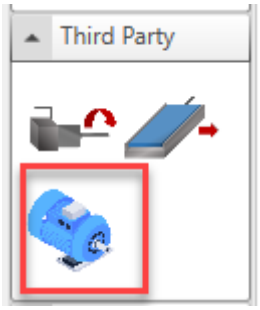
In version 1.8 we have implemented the Tilt, that is the inclination on respect the vertical orientation:



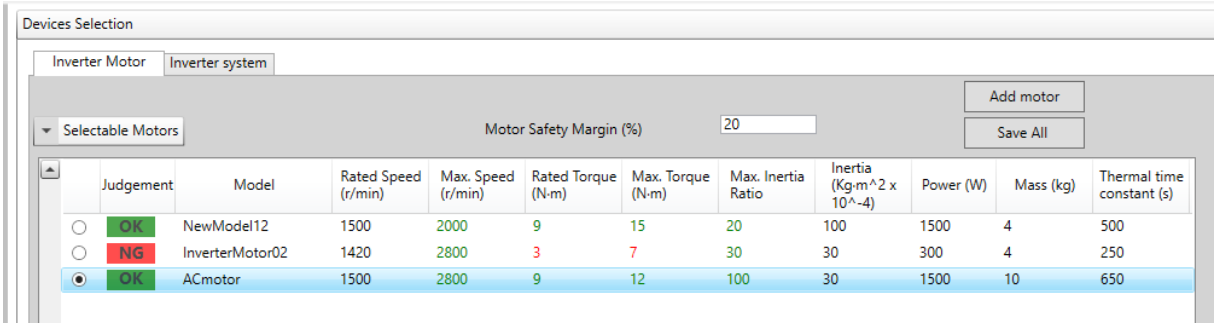
The initial value is 0º so, fully vertical orientation.
The gravity torque becomes multiplied by the COS(tilt) so, a tilt of 90ª means an horizontal movement not affected by the gravity.

Inverter support

A new axis element has been implemented to model an "Inverter motor". This represents a motor to be controlled by an Omron M1 inverter.

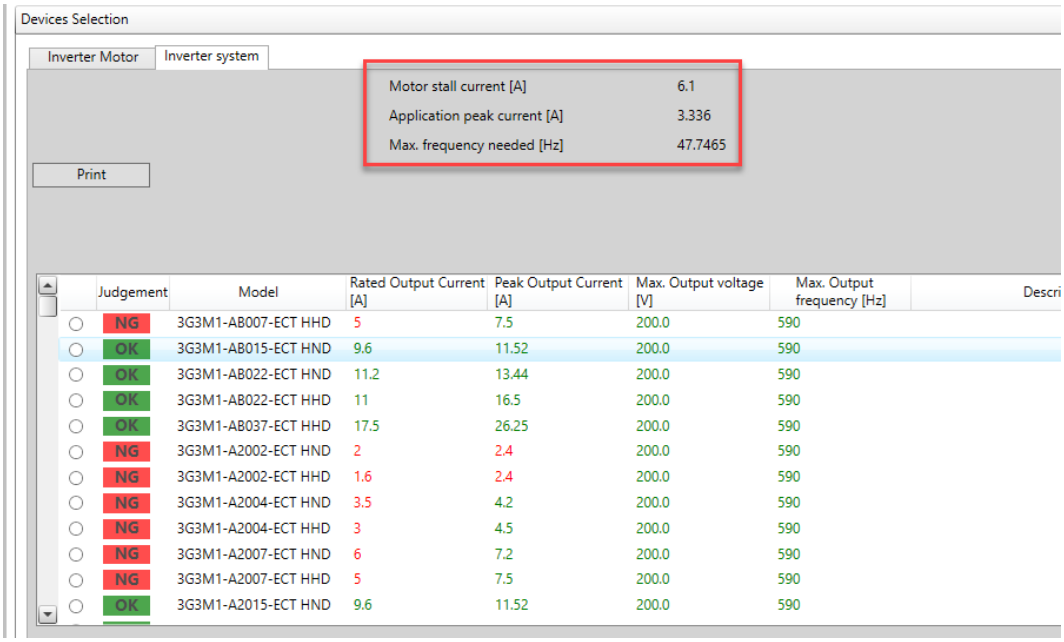


When you drag&drop this element to the axis workspace the "inverter motor" list in the local database is displayed.



Judgement	Model	Rated Speed (r/min)	Max. Speed (r/min)	Rated Torque (N·m)	Max. Torque (N·m)	Max. Inertia Ratio	Inertia (Kg·m^2 x 10^-4)	Power (W)	Mass (kg)	Thermal time constant (s)
OK	NewModel12	1500	2000	9	15	20	100	1500	4	500
NG	InverterMotor02	1420	2800	3	7	30	30	300	4	250
OK	ACmotor	1500	2800	9	12	100	30	1500	10	650

The available motors are Judged following the same rules than the servomotors. Once one motor is selected, the Inverter tab is available.



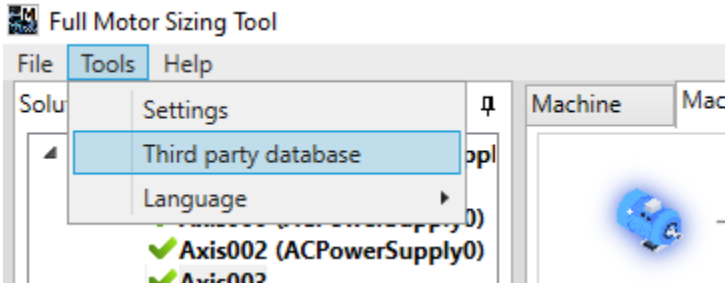
Judgement	Model	Rated Output Current [A]	Peak Output Current [A]	Max. Output voltage [V]	Max. Output frequency [Hz]	Descri
NG	3G3M1-AB007-ECT HHD	5	7.5	200.0	590	
OK	3G3M1-AB015-ECT HND	9.6	11.52	200.0	590	
OK	3G3M1-AB022-ECT HND	11.2	13.44	200.0	590	
OK	3G3M1-AB022-ECT HHD	11	16.5	200.0	590	
OK	3G3M1-AB037-ECT HHD	17.5	26.25	200.0	590	
NG	3G3M1-A2002-ECT HND	2	2.4	200.0	590	
NG	3G3M1-A2002-ECT HHD	1.6	2.4	200.0	590	
NG	3G3M1-A2004-ECT HND	3.5	4.2	200.0	590	
NG	3G3M1-A2004-ECT HHD	3	4.5	200.0	590	
NG	3G3M1-A2007-ECT HND	6	7.2	200.0	590	
NG	3G3M1-A2007-ECT HHD	5	7.5	200.0	590	
OK	3G3M1-A2015-ECT HND	9.6	11.52	200.0	590	

On the top of this tab it appear the motor requirements in terms of stall current, peak current and maximum frequency.
Then you have the list of available M1 inverter with the judgement based on the above requirement. The different duty cycles in the same M1 model are represented as separated drive models.

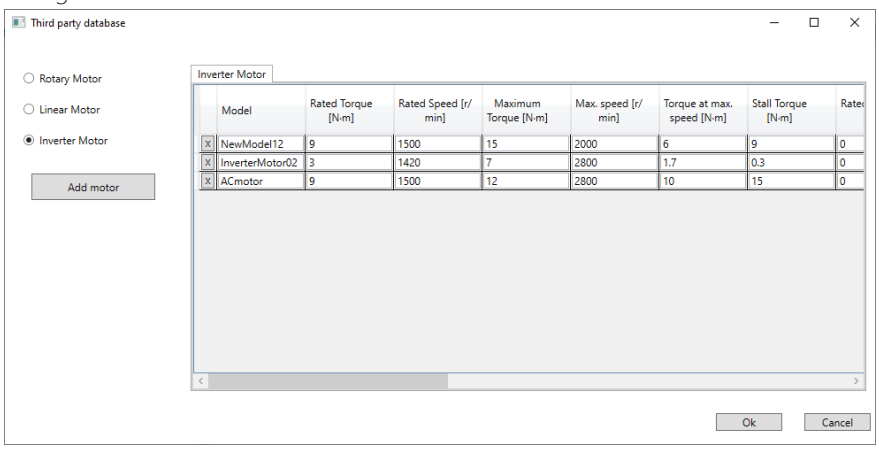
The rest of axis calculations are performed in the same way than the servomotors.

You can enter and edit new Inverter motors in 2 ways:

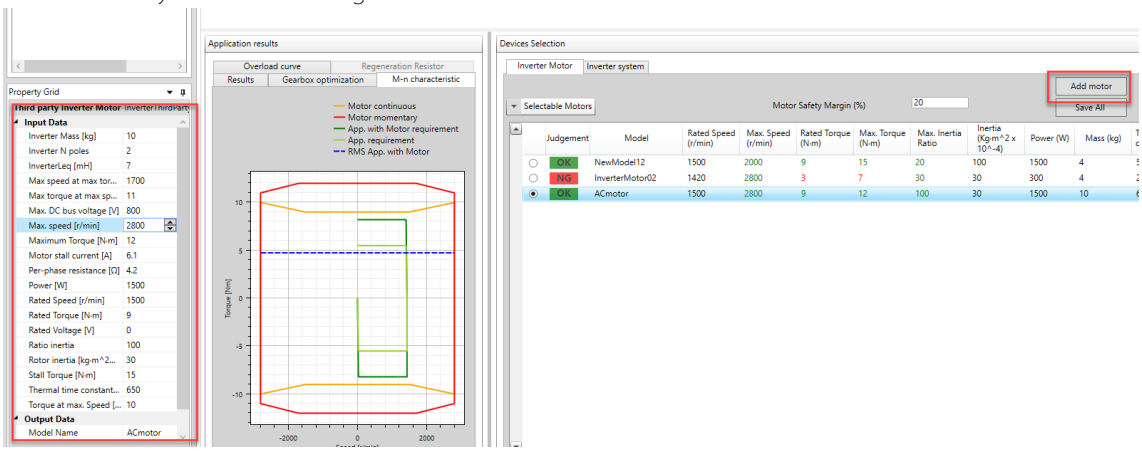
- Via the Third party motor database, very similar to the third party servomotors: From the menu Tools/Third party database.



And selecting "Inverter motor".



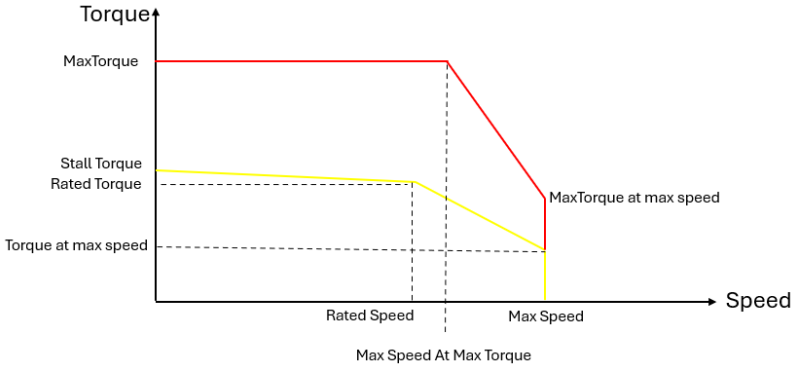
- Via Inverter Motor Axis tab and Add motor and edit the properties (in this case the name cannot be modified if you edit an existing motor.



The data you have to enter for a new inverter motor is next:

- Motor Model Name
- Rated torque (Nm)
- Rated speed (r/min)
- Motor peak Torque (Nm)
- Maximum speed (rpm)
- Torque at max speed (N·m)
- Stall torque (N·m)
- Rated Voltage (V)
- Maximum torque at máximum speed (N·m)
- Maximum speed at máximum torque (r/min)
- Motor stall current (A)
- Rotor inertia (Kg·m2 · 10-4)
- Ratio inertia
- Power (W)
- Per pase resistance (Ω)
- Inverter motor Leq. (mH)
- Thermal time constant (s)
- Inverter motor N poles
- Maximum DC bus voltage (V)
- Inverter motor mass (Kg)

Representing next Motor Torque-Velocity curve:

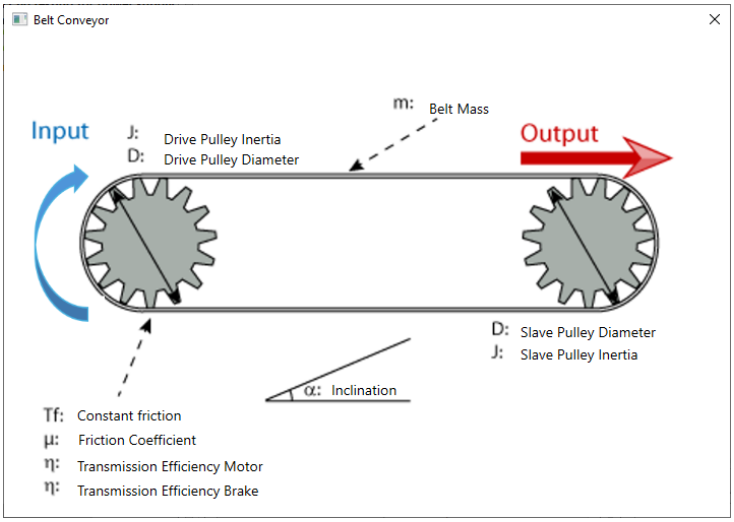


If you open a project (created by another person) that includes a third-party inverter motor that is not in your local database, the third-party motor in the project is included in the local database.

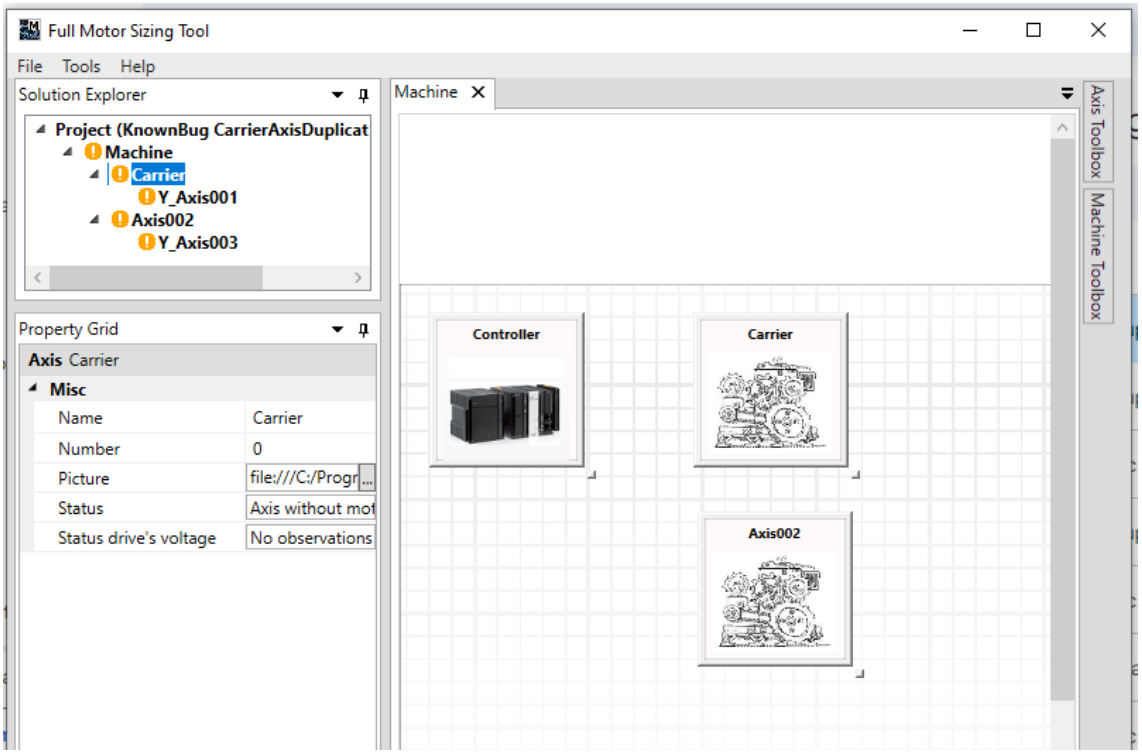
Bug fixes and other minor changes

Next bug fixes and minor changes have been implemented:

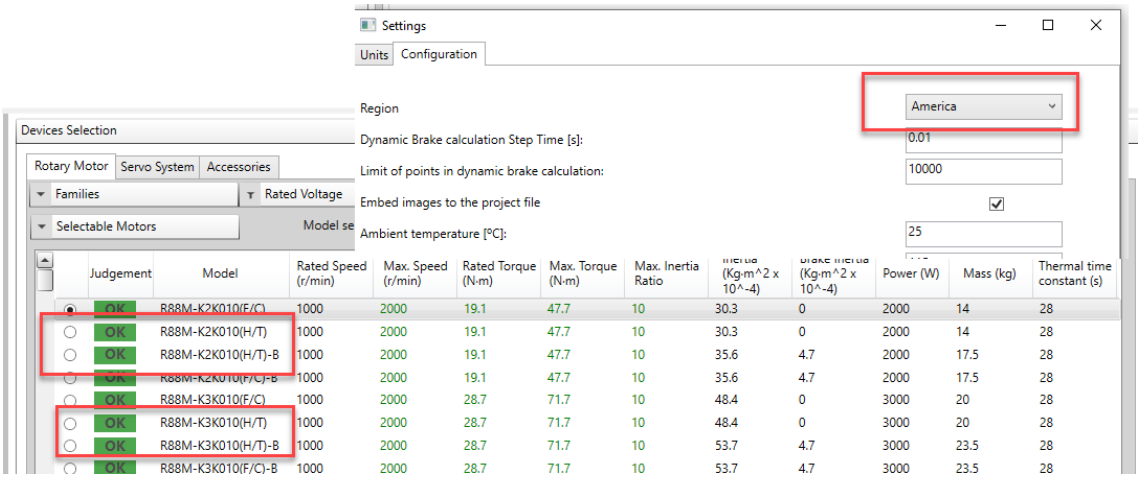
- Working in imperial force units worked as if units were Newtons. This bug has been corrected and the units are displayed and handled with the right magnitude.
- The direction of the arrows in some tooltips elements were not coherent. Now all tooltips are updated, and the Input movement and output movement arrow indication are correct.



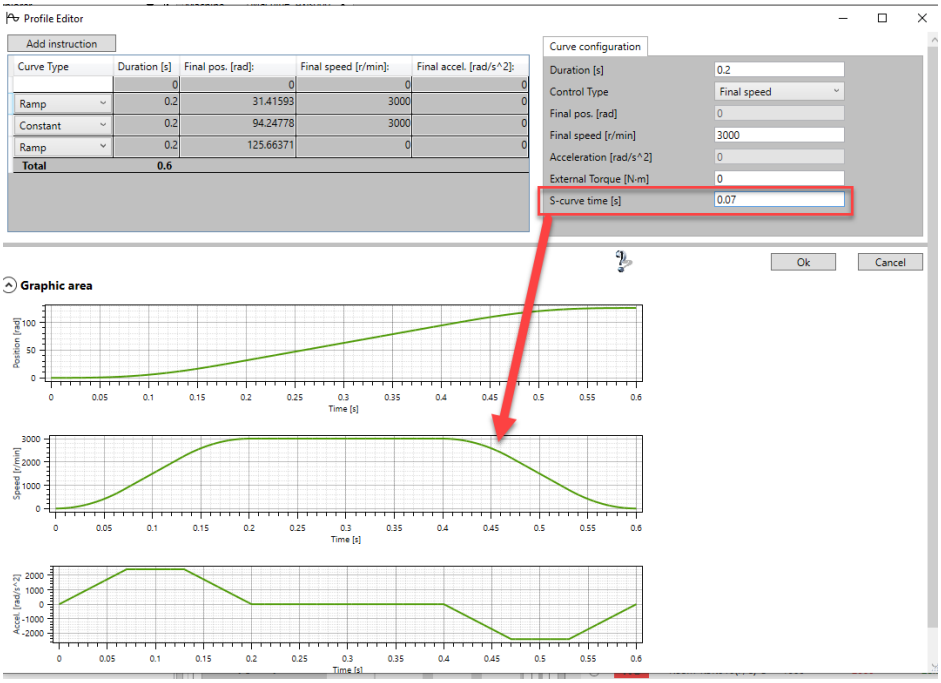
- Copy & Paste of a Carrier axis result in duplicated axis numbers. This has been corrected and now copy&paste carrier axis results in consecutive non duplicated axis numbers.



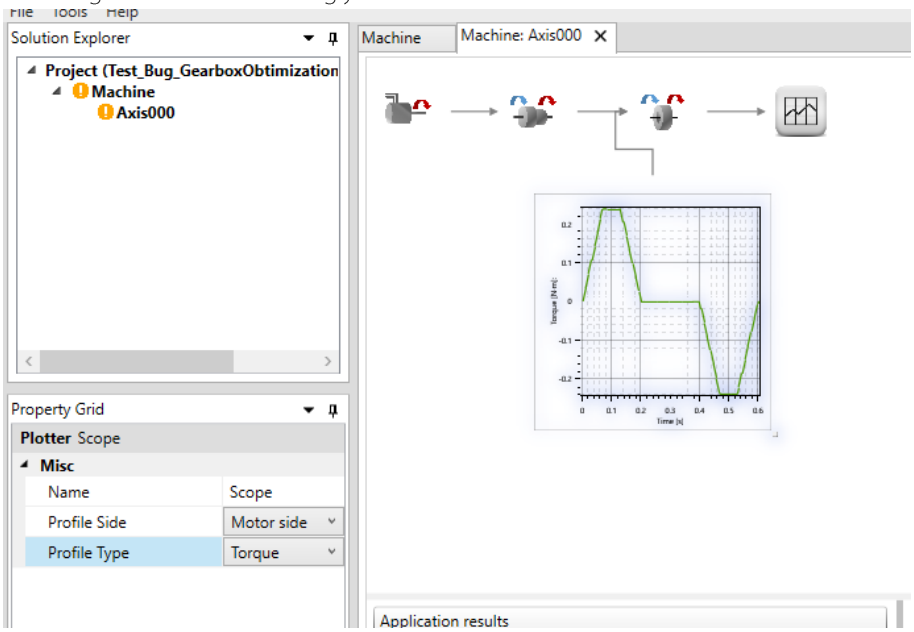
- G5 series motors with 200V and incremental motors do not appear In America region. This bug has been solved and the G5 200V incremental encoder motors appear in America region.



- Third party (servo) motor projects sometimes do not open. In some projects including third party servomotors, the corresponding axis could not be opened or the project could not be opened at all. This has been solved and now the projects including third party servos can be opened properly.
- S.ramps in acceleration segments could result in incorrect results. The problem occurred when the S-curve section was very short compared to the rest of the segment and created a discontinuity. This has been solved and now S-curve is represented properly for all realistic profiles.



- Plots in Ais view does not update the units when changed in settings. In previous versions, if you have a plot in an axis view and you change the units of the magnitude shown in the plot, the change was not reflected. This has been solved and, when changing one unit, the corresponding plot also changes the units accordingly.



- Opening some pre-defined axes shows the message that the project has been created in a different region. This has been corrected and now the predefined axes do not include motor or includes a motor that is valid in all regions. So, the pop-up does not appear.

MOTOR SIZING TOOL VERSION 1.7 RELEASE NOTE

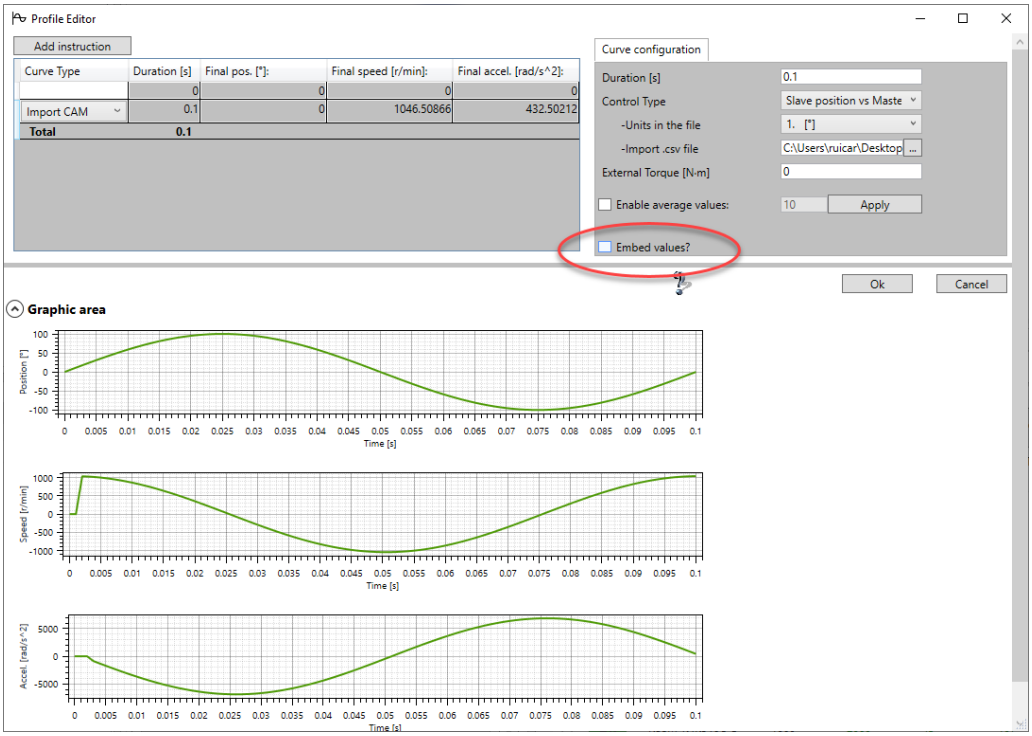
New specifications compared to version 1.6

Correction of the splash screen

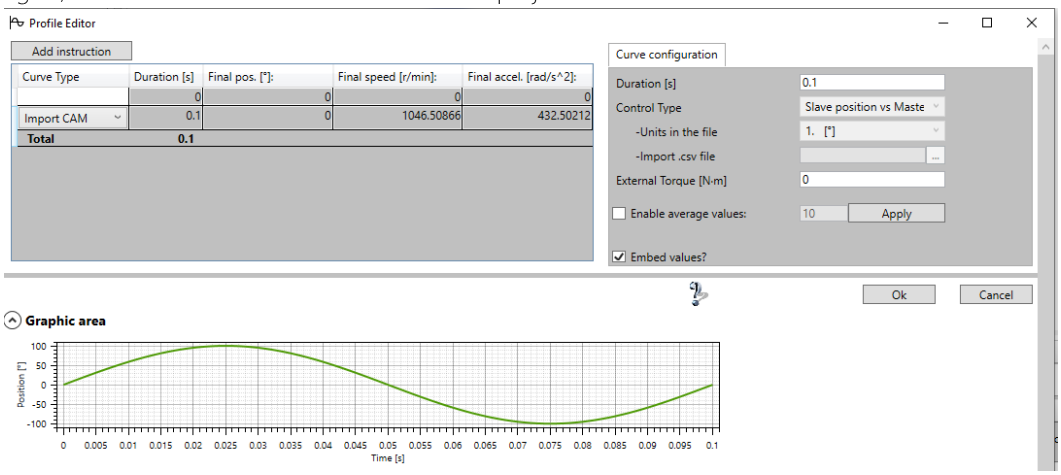
The previous splash screen said "Mechatronics Sizing Tool" and the new one says "Motor Sizing Tool", that corresponds with the name of the tool:

CAM tables can be embedded into the project

In Version 1.6 or older, when the profile editor contains a CAM segment, the .csv file corresponding to this CAM segment needs to be provided as a separated file.
Version 1.7, optionally, provides the possibility to embed the CAM segment in the .omst file so it is not necessary to provide also the .csv file.
For doing this, once the .csv file containing the CAM has been imported, you have to check the "Embed values" checkbox:



Doing so, the CAM values are embedded into the project.



It is still possible to scale in Time the segment.

Modification of the Braking resistor calculation

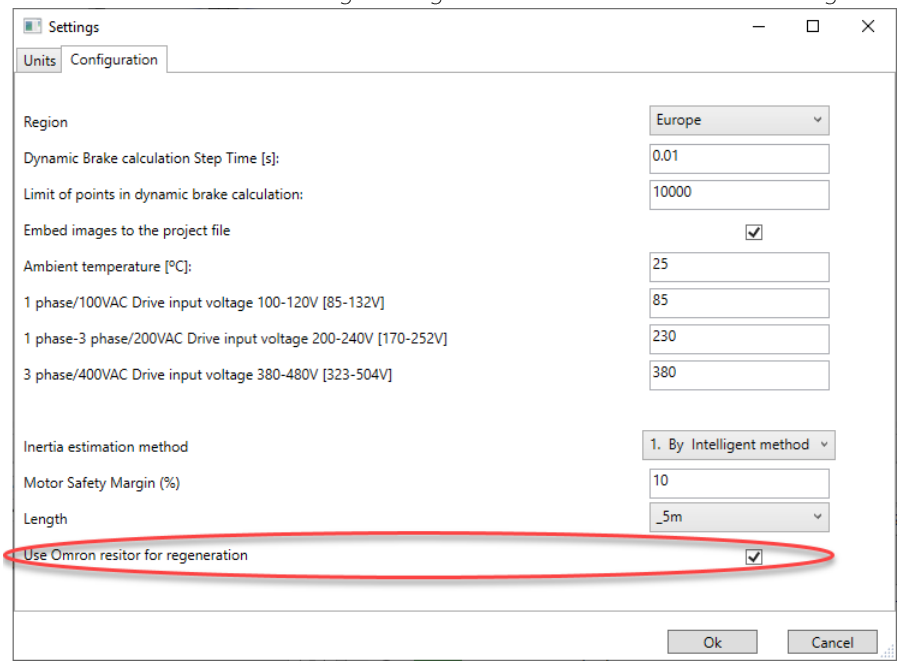
In the calculation of a braking resistor we consider:

- The average power dissipated in the resistor assuming a repetitive cycle. This term is calculated as in the previous MST versions.
- The short-term energy absorbable by the resistor, also called pulse-energy or adiabatic energy and is the energy that the resistor can absorb instantaneously without dissipation. The calculation of this term has changed.

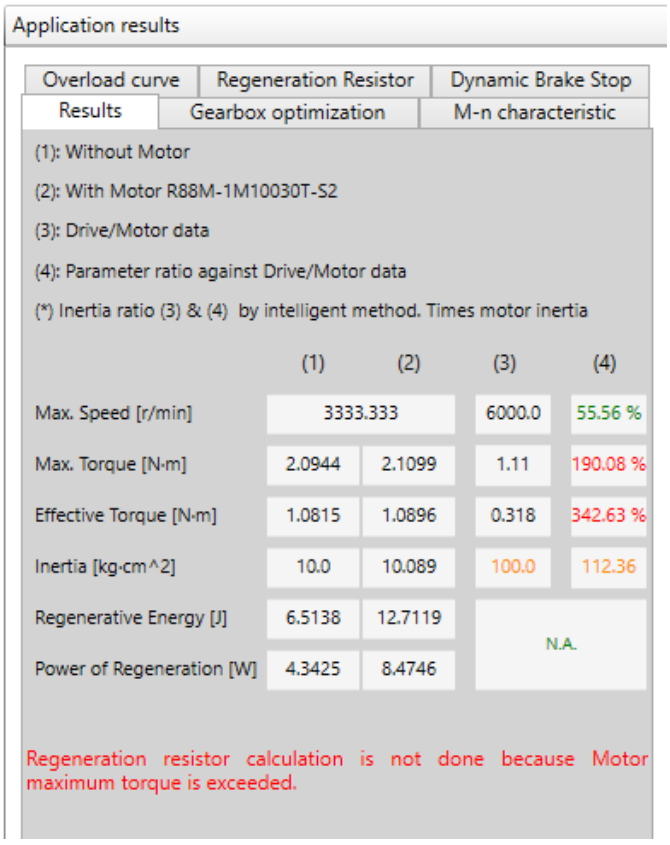
The short-term energy is the dominant term when we have a sudden and very high regeneration followed by a long time without regeneration so, the short term energy is very high but the average power is low. In this case, the calculation is done as:

- Fist we calculate the pulse-energy of the application and compare with the acceptable pulse energy of the embedded drive braking resistor, that is a known value.
- If the internal braking resistor is not enough or is not built-in we calculate which resistor is able to absorb the pulse energy based in some criteria. This criteria is different if we consider Omron resistor (that accepts very high pulse-energy) or third party resistors (as we do not know the pulse energy of third party resistors we use a more conservative criteria)

The used resistor is selected in Tools/Settings/Configuration → Use Omron resistor for regeneration.

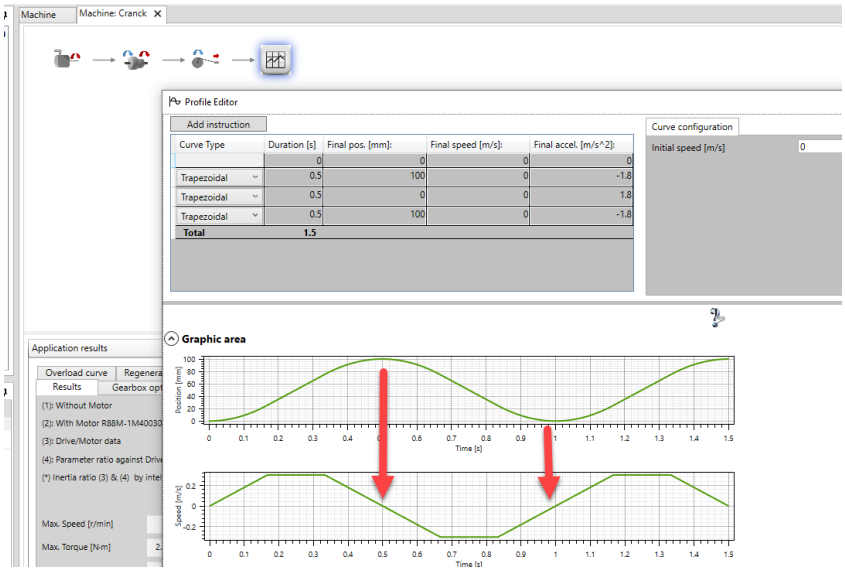


In addition, if the Maximum Torque of the selected motor is exceeded the braking resistor is not calculated because the result is unrealistic.

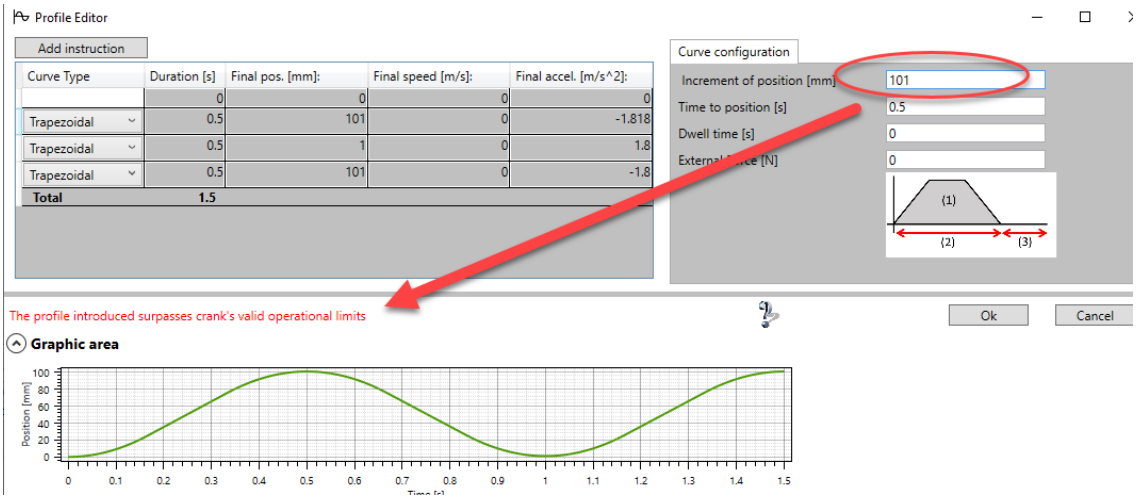


Improvement on singular points in Cranck element

Reaching the "Fully retracted" and "Fully extended" points now considers the motor direction causing less discontinuity.

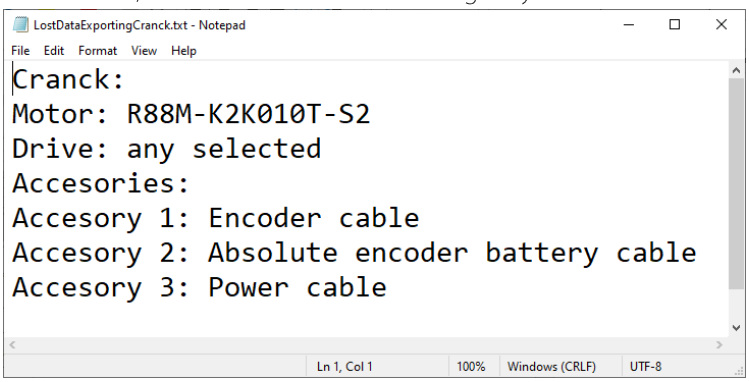


In addition, if the commanded position is out of range it is indicated with a warning.



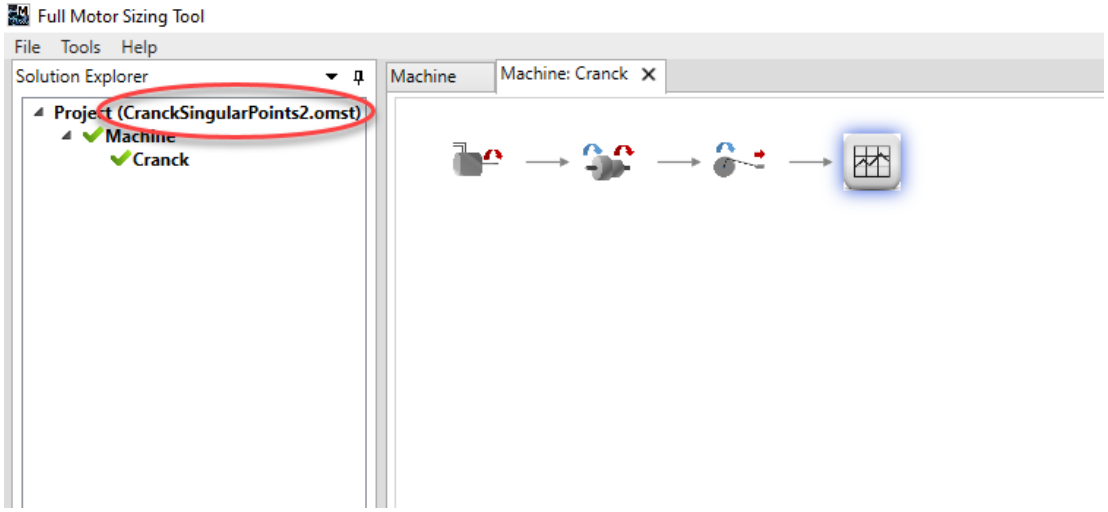
Generate a file with mismatch products when opening in a region one file generated in another region

MST can be installed in one of the 7 different Omron regions. Every region may have different motor, drive and accessory list due to different local motors and accessories.
Then, if you open a file created in a region with MST set for a different region, there is the possibility that some of the selected components in the file do not exist in the MST region so they cannot be selected.
If this happens, a .txt file containing the list of selected components in the original file is created so, it is possible to check which motor, drive and accessories were originally selected.



The name of the project file is added to MST view

Now the name of the project file in use is visible from MST Machine view.

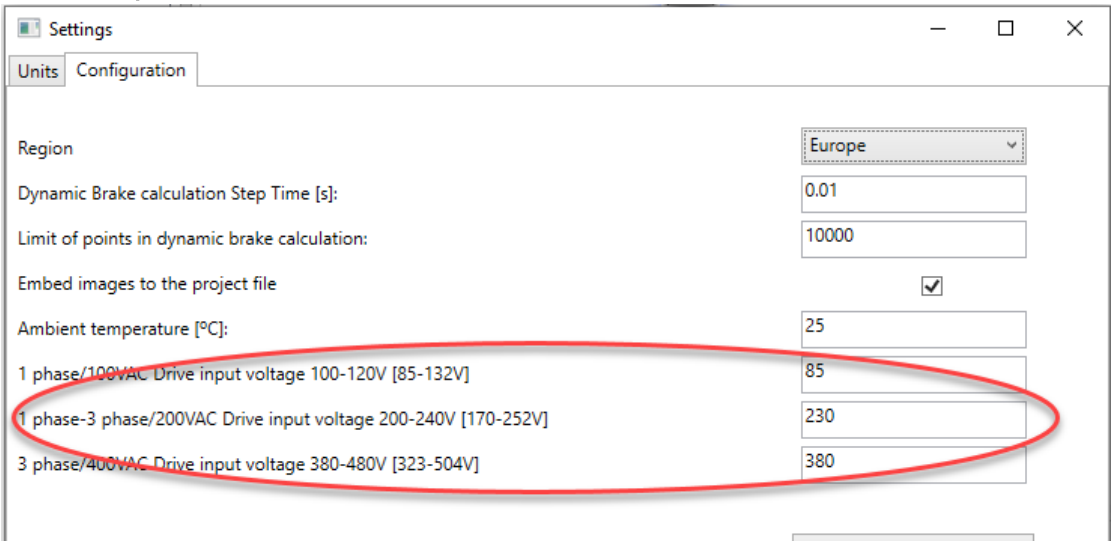


Improvement of the Print report

A new template has been implemented.
The alignment and spacing has been improved.
The mechanical elements are displayed in the order of the connection.

Increase the maximum supply voltage setting range

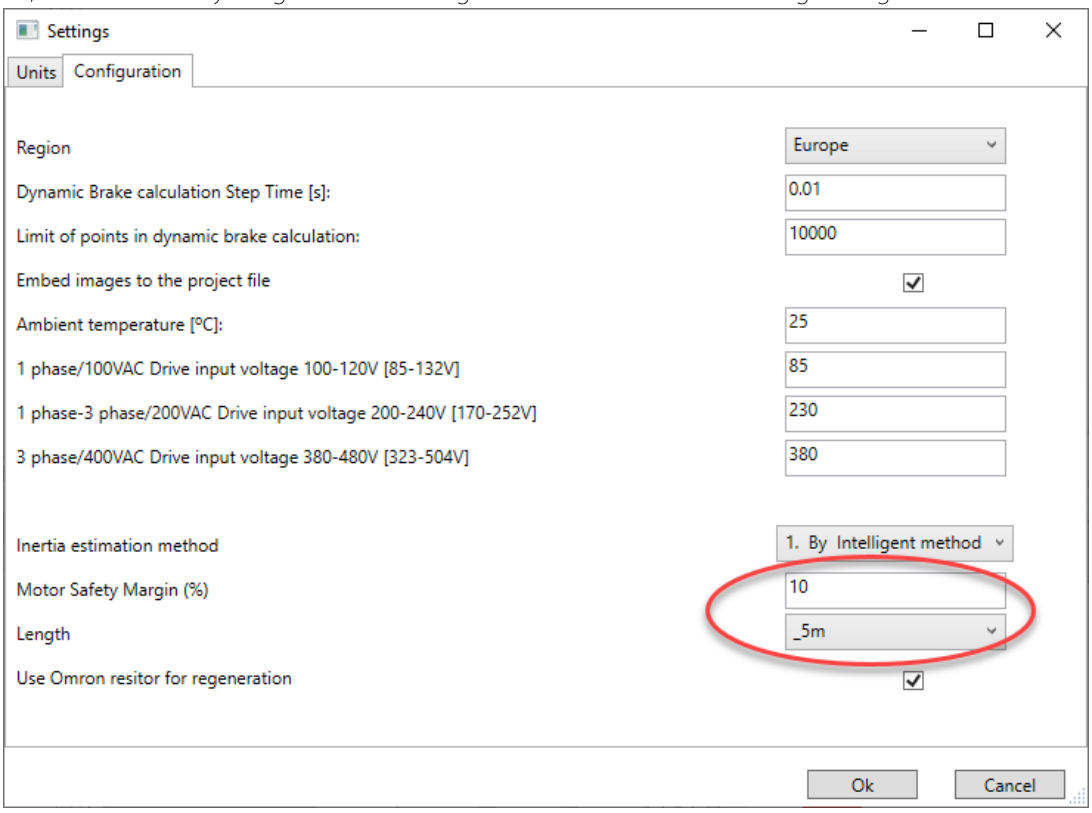
The supply voltage range that can be adjusted in Tools/Setting/Configuration has been increased to the allowable range of the drives.



With this it is possible to make the calculations using the "worst case scenario", mainly in case of increased regeneration when the supply voltage is at the upper limit.

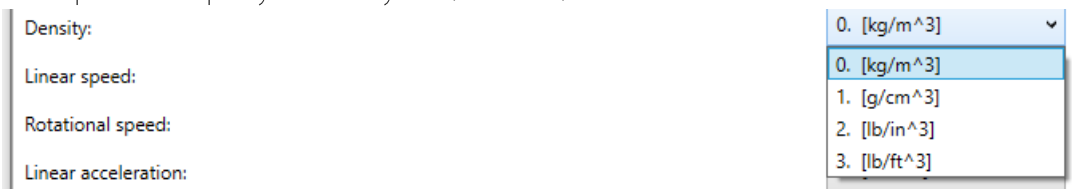
Added 2 new defaults in Settings

The default safety margin for motor calculation in previous version was fixed to 20% and can be changed in the motor selection window.
The motor cable length default value was fixed to 5m.
Now, the default safety margin and cable length can be set from Tools/setting/Configuration.



Added new density imperial units

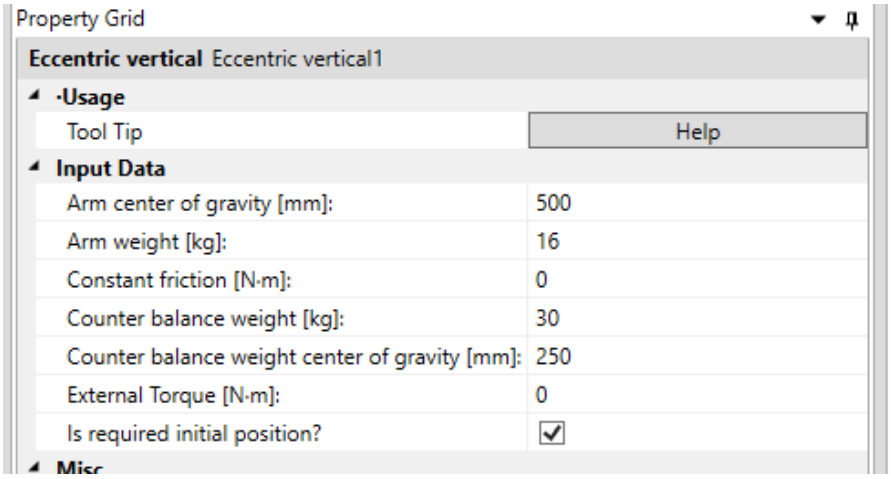
Now it is possible to specify the density in Lb/in^3 and lb/ft^3.



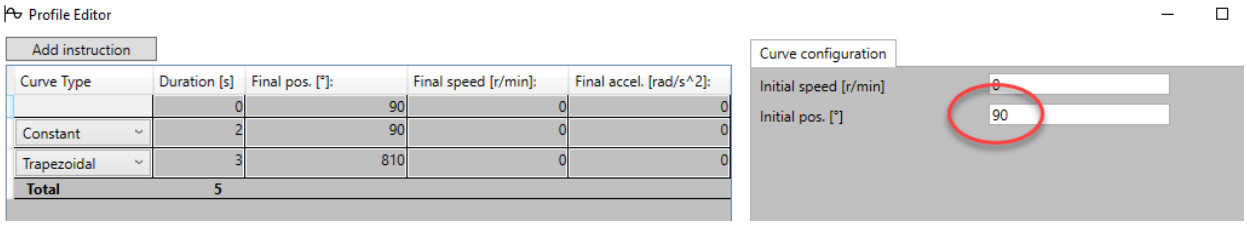
Added new mechanical element: Eccentric load with gravity consideration

This is a new rotary to rotary element that turns an eccentric load vertically so, this load is affected by the gravity force that has an influence depending on the rotational angle.
Icon and typical mechanical configuration.

Properties:



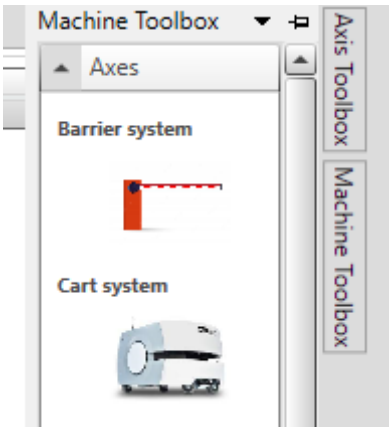
The origin of coordinates is with the load pointing down (effect of the gravity=0) defining a different initial position is possible by checking "Is required initial position". In this case the initial position is defined in the initial of the profile editor.



In this example: 90º represents an initial position parallel to the horizon (maximum gravity effect).

Added new predefined axes for "Cart" and "Eccentric load with gravity"

2 new predefined axes have been added to the Machine Toolbox.
One represents the Cart mechanism and the second one a barrier system using the Eccentric load with gravity mechanism.



Bug fixes and other minor changes

Next bug fixes and minor changes have been implemented:

- Predefined or user-created Lite project/axis update of values after saving and re-opening the same project/axis.
- Warning advise for Dynamic brake detailing stop calculation does not include the external forces.
- Updates on Omron's database.
- Correction of wheel inertia consideration for projects with a Cart item.
- Solved crash and errors after closing or saving an axis containing a winder/unwinder.
- Missing labels on Trapezoidal Advanced instruction on Lite projects.
- Show one decimal value in case of external resistor needed in Application results/results tab.
- Sorting on the print report of the items contained in an axis by connection order from left to write instead of by inserting order.
- New order of graphs in the print report.

MOTOR SIZING TOOL VERSION 1.60.1.15 RELEASE NOTE

Bugs solved compared to version 1.60.1.12

Some text in Japanese language overlaps in the print report

デバイスの機械部品リスト：

デバイス	モデル	数量
モータ	R88M-K4K510C	1
ドライブ	R88D-KN50F-ECT	2
モータ	R88M-K2K010C-B	1
ドライブ	R88D-KN30F-ECT	1
モータ	R88M-K3K010C	1

外部必要 (2) 139029 W)

This has been solved and now the text is showed properly.

Sometimes there are problems re-opening a saved file in a different region

This has been solved.

CAM import fails

Importing CAM profiles in MST 1.60.1.12 results in an error message and an empty CAM. This has been solved.

1S Motor with key selection is lost

In previous versions, when you select a 1S series motor with key shaft in Japan region, when re-opening the project, the key selection is lost and the selected motor is without key. This has been solved and the motor key selection is kept.

Predefined eccentric load cannot be opened

In version 1.60.1.15. the predefined eccentric load axis can be opened normally.

Linear motor database correction

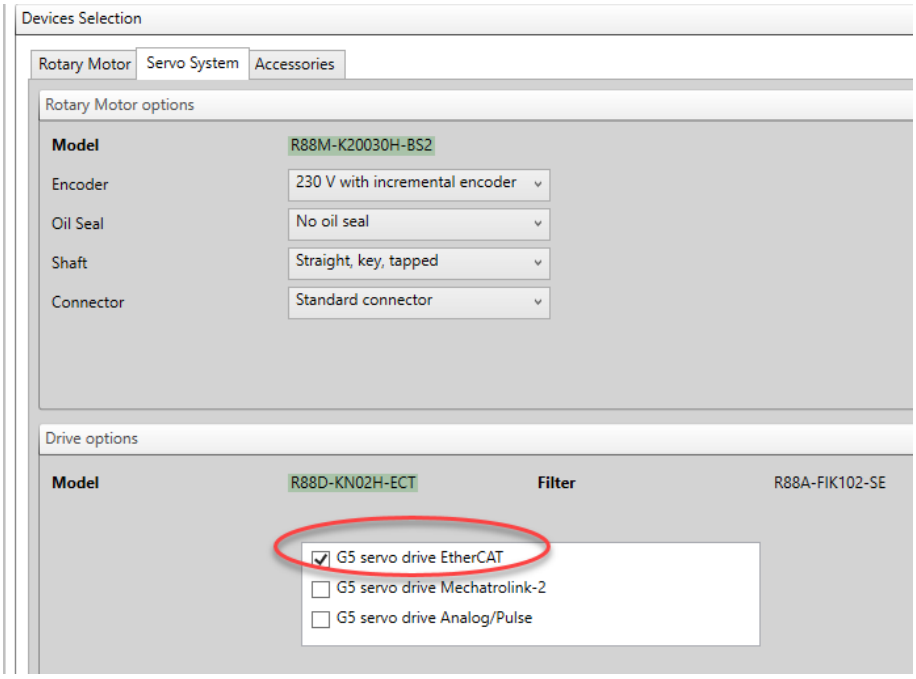
Some data referring to weight of some linear motors has been corrected.

MOTOR SIZING TOOL VERSION 1.60.1.12 RELEASE NOTE

New specifications compared to version 1.5

Pre-selection of drive when there is more than one option

In version 1.5 and older, when the selected controller is "Generic" and the chosen motor has more of one drive option (for example, a G servomotor can be controlled by a G5 drive with Analogue/pulse interface, with EtherCAT interface or with Mechatrolink-II interface), the drive remains unselected and the user must manually choose the right drive. This has the consequence that some of the calculation cannot be performed until the drive is selected (for example, the regeneration calculation).
In version 1.6, when the selected controller is "Generic" and the chosen motor has several drive options, by default, the EtherCAT model will be selected as the first option and the Analogue/pulse model as a second option.



The user can change this pre-selection afterwards.

Correction in Intelligent inertia evaluation

1S and 1SA servodrives have the Dynamic Brake circuit dimensioned based in the servomotor rated velocity, in opposite way than G5 and G series that have it dimensioned based in the servodrive maximum speed.
So, the Maximum absorbable kinetic energy is evaluated as follows:
1S and 1SA motors:

$$E_{Kmax} = \frac{1}{2} \cdot J_{motor}(1 + MaxRatio) \cdot \omega^2_{rated}$$

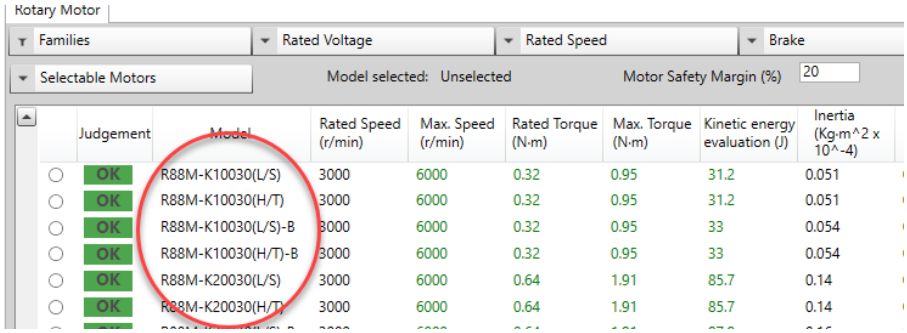
G5 and G motors:

$$E_{Kmax} = \frac{1}{2} \cdot J_{motor}(1 + MaxRatio) \cdot \omega^2_{maximum}$$

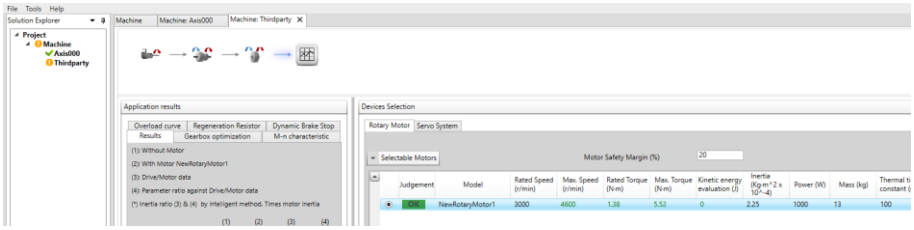
Integrated motors: Not applicable as the corresponding drive does not have Dynamic Brake circuit.

Enhanced features per region

Region Japan: All G5 series incremental motors with incremental encoder appear now in the list.



Region America: Third party motor features are enabled.



Adding new Imperial units to the existing ones

Next units have been added:

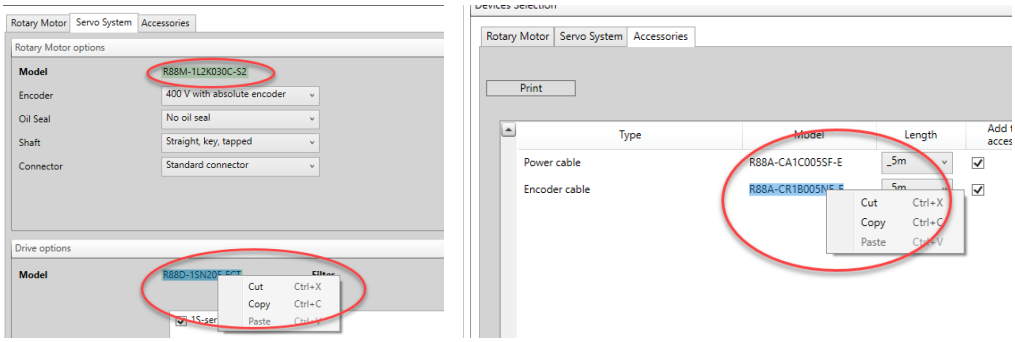
- Linear speed: ft/s, ft/min, in/s, in/min
- Linear acceleration: ft/^s2, in/^s2,
- Force: Kgf, Lbf, Ton-force
- Torque: inlb, ftlb, kgfm

Persistency of the last directory used to open and save projects

Since version 1.6, MST remember the last directory used to open or save a project and next Save or open action this directory will be opened by default.

Copy and paste

Now it is possible to copy the text for the selected Motor, Drive and Accessories.

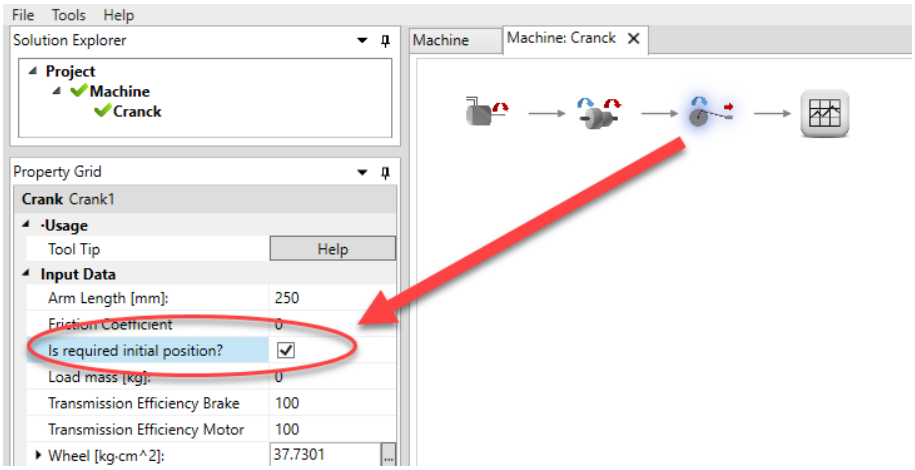


This should simplify the report of the result to customers.

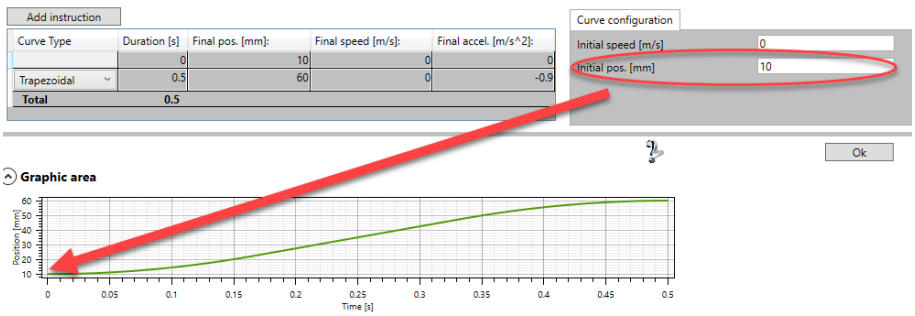
Selectable Initial position for Cranck mechanism

Now it is possible to select an initial position in the profile editor for cranck mechanism. The way to proceed is next:

Check the initial position in the Cranck properties. If unselected, the initial position will be 0.

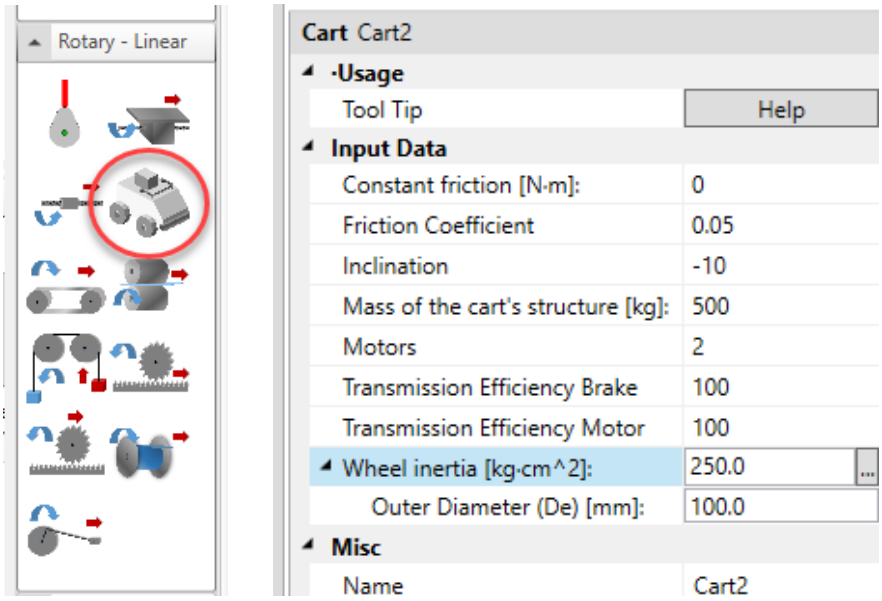


Then, the profile editor will allow to enter an initial position in the first segment:



New Rotary to Linear Mechanism: Cart

Cart mechanism has been added inside the Linear to rotary group:



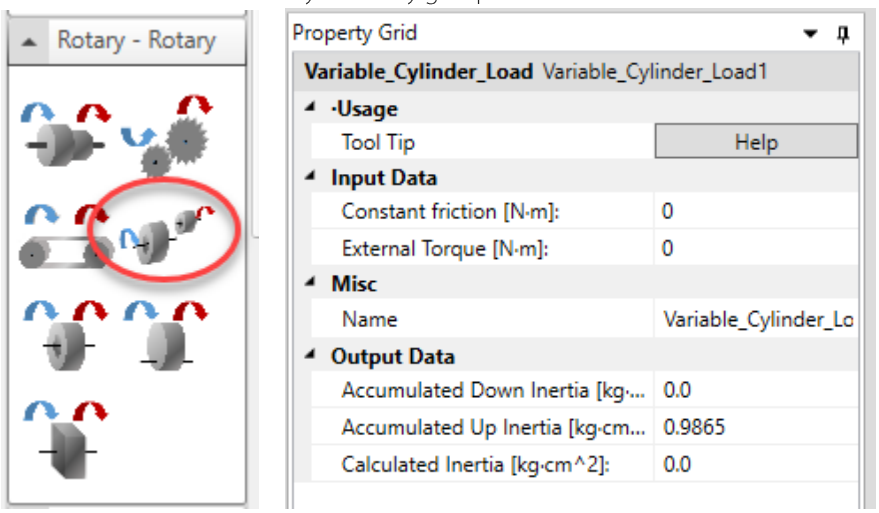
The expected Kinematic chain for this element is:

A couple of remarks:

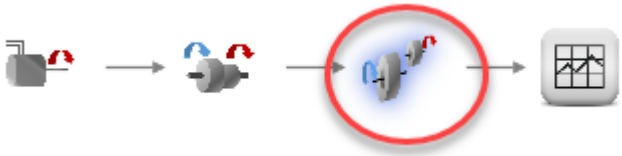
- The cart is expected to have 4 equal wheels. The wheel inertia is per-wheel and the tool multiply this value *4 to consider the 4 wheels.
- The mass of the cart structure should include the mass of the wheels and also the mass of the Gearboxes. The mass of the motor should not be included there as it is internally considered by the tool.
- You can select if the cart is driven by 2 or by 4 motors, the tool will divide the torque requirements accordingly.

New Rotary to Rotary element: Variable Inertia

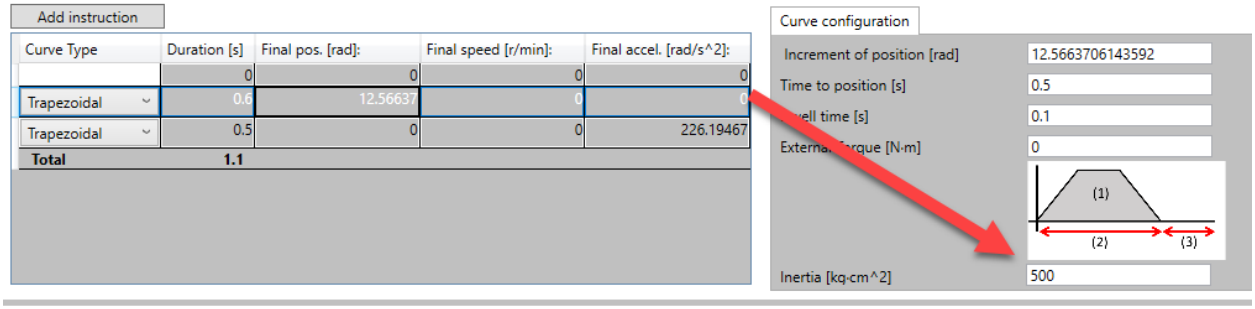
To cover applications where the axis moves different loads in different cycle parts we have created the new Variable Inertia element in the Rotary to Rotary group.

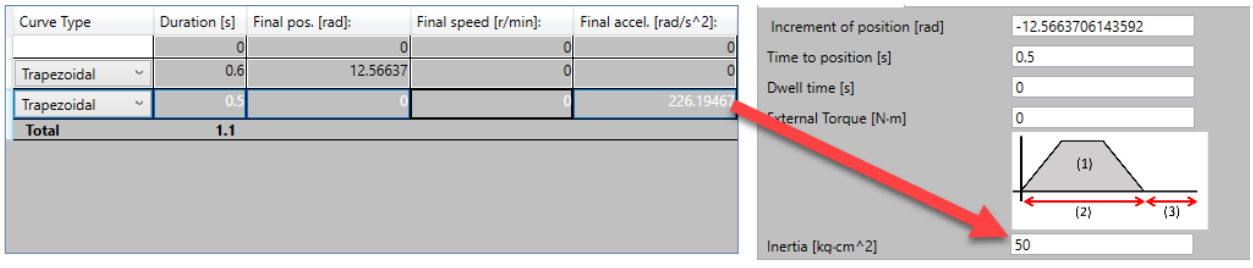


When this element is included in a kinematic chain we impose the restriction that this should be the last mechanical element, just before the profile:



Then, different inertia values are defined in every segment in the motion profile:

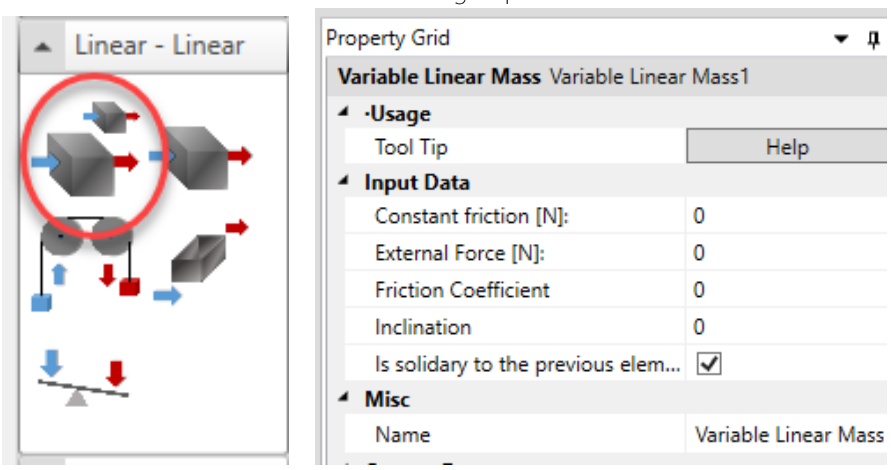




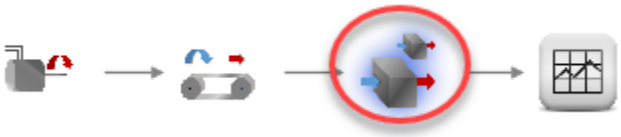
The accumulated inertia value is calculated based in the maximum of the inertia values in the profile editor (worst case).

New Linear to Linear element: Variable Inertia

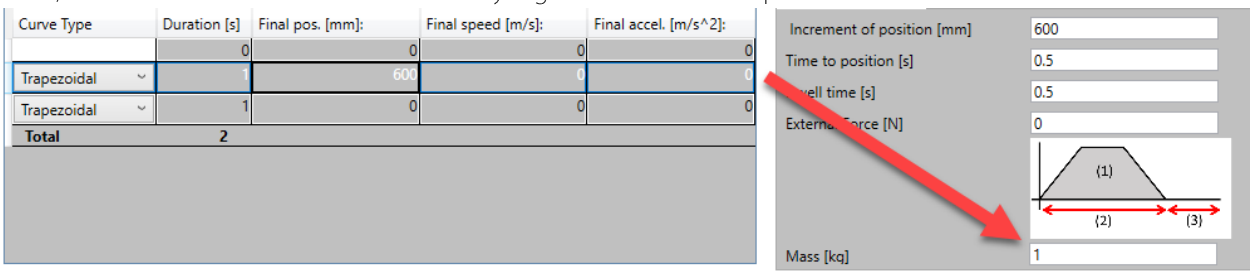
To cover applications where the axis moves different linear loads in different cycle parts we have created the new Variable mass element in the Linear to Linear group.

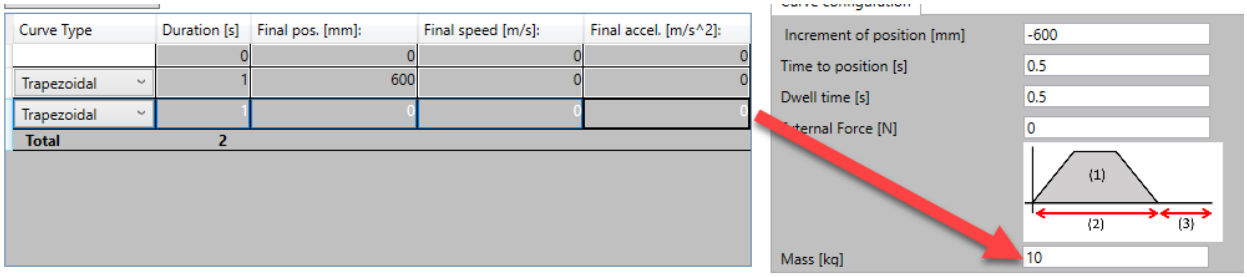


When this element is included in a kinematic chain we impose the restriction that this should be the last mechanical element, just before the profile:



Then, different mass values are defined in every segment in the motion profile:

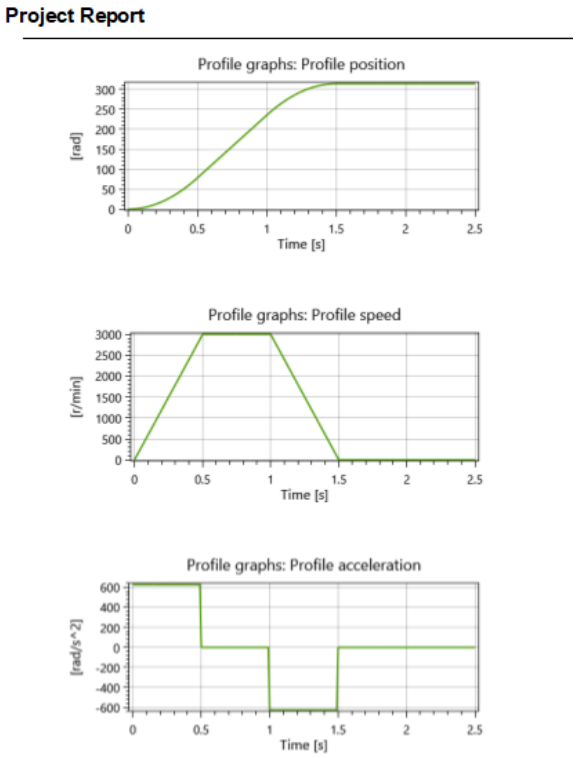




The accumulated mass/inertia value is calculated based in the maximum of the mass values in the profile editor (worst case).

Improvements in the print

Now the print report includes: Motion profile details.



Better description of the regenerative resistor (when needed):

Encoder cable	R88A-CRWA005C-DE	1

External R required (25 Ω, 2 W)

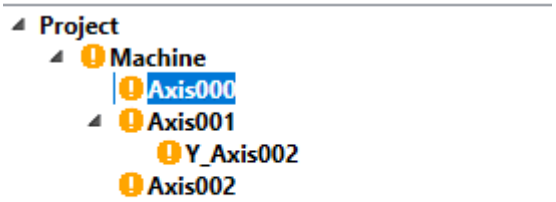
Regeneration Resistor:

Minimum resistor [Ω]	25.00 .. 4426.08
Average power in resistor [W]	1.8

Also the scroll with the central mouse wheel has been improved.

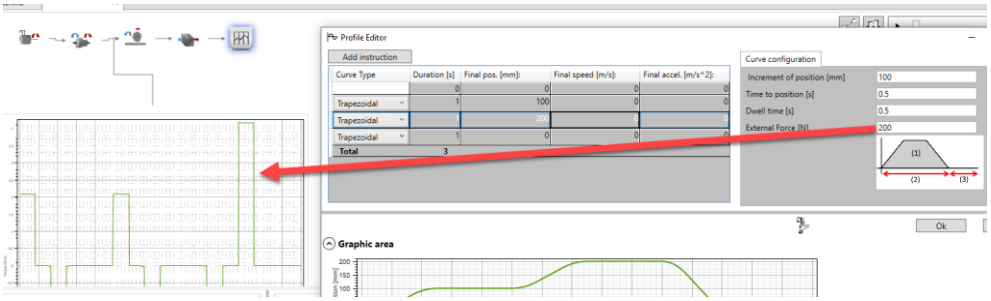
Axis numbering improved when there is a carriage

Now the numbering of carriage axis is consecutive.



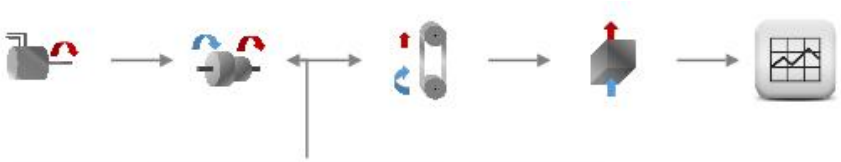
Bugs solved and usability improvements

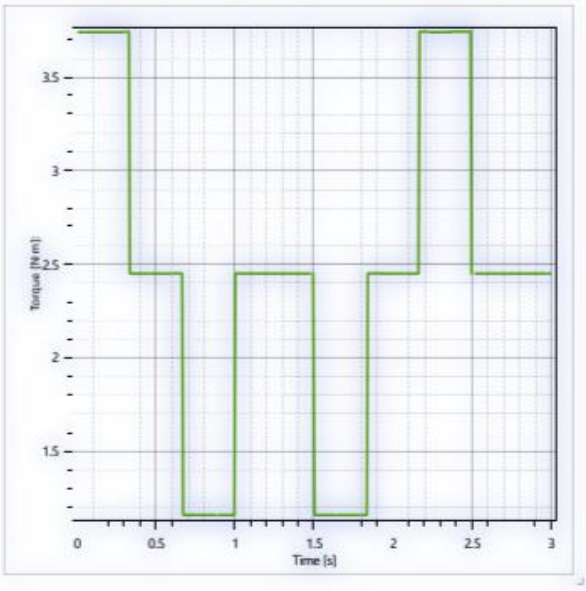
External forces are correctly applied in Rack&Pinion with moving pinion



In previous version the external force make no action.

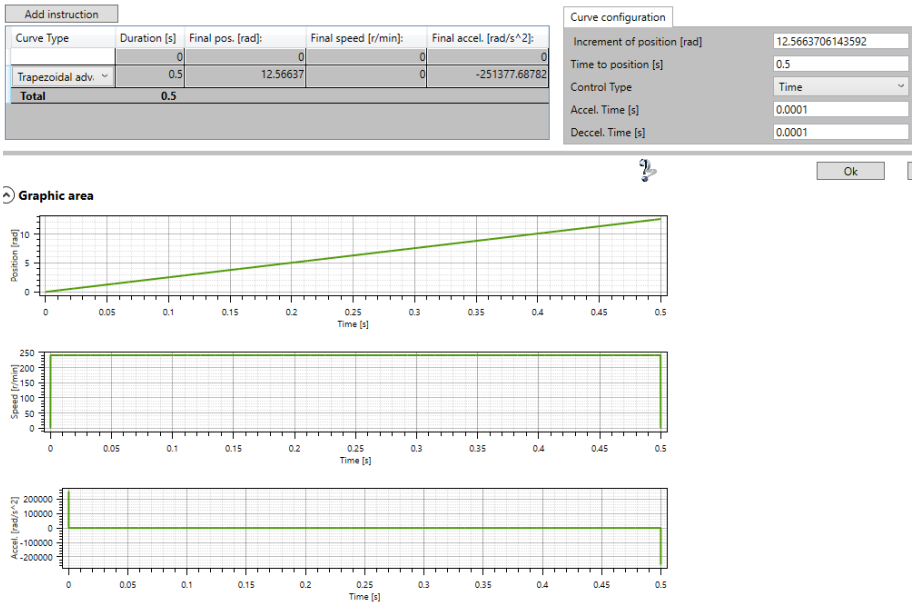
Vertical belt calculation is properly done





In previous version the mass was not applied properly.

Advanced trapezoidal profile with very fast acceleration is represented properly



Previous version may show a discontinuity.

Minor cosmetic changes

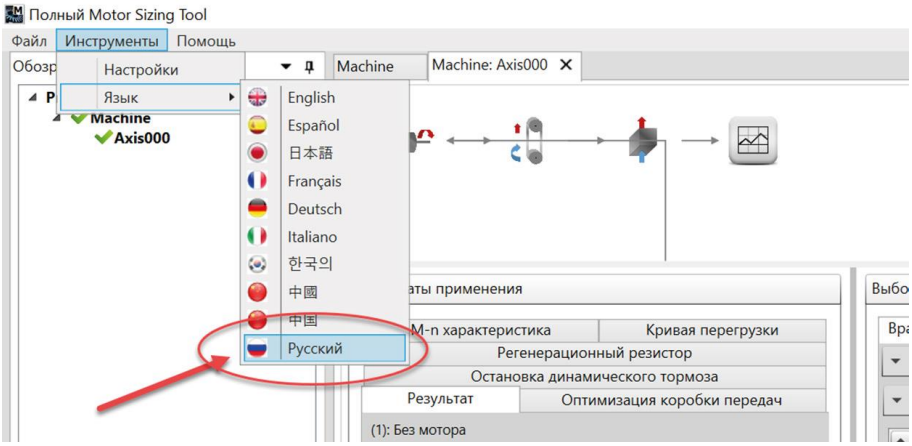
Other minor cosmetic changes like improve descriptions and tooltips have been applied.

MOTOR SIZING TOOL VERSION 1.50.15 RELEASE NOTE

New specifications compared to version 1.50.14

Include Russian language

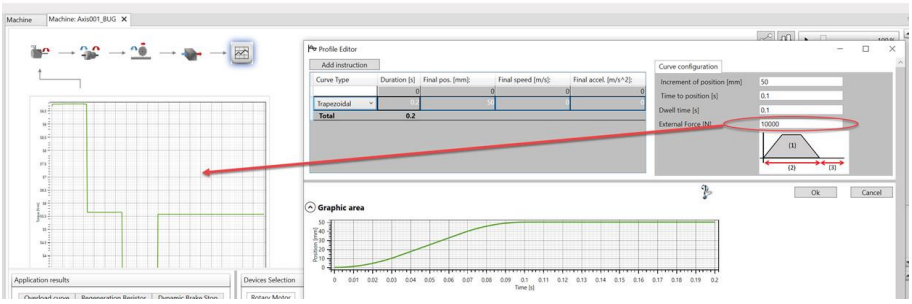
Now Russian language is included.



Bugs solved

Corrected a bug in Rack&Pinion with moving pinion element

In previous version, external forces in Rack&Pinion element with moving pinion were ignored. Now external forces are correctly calculated.

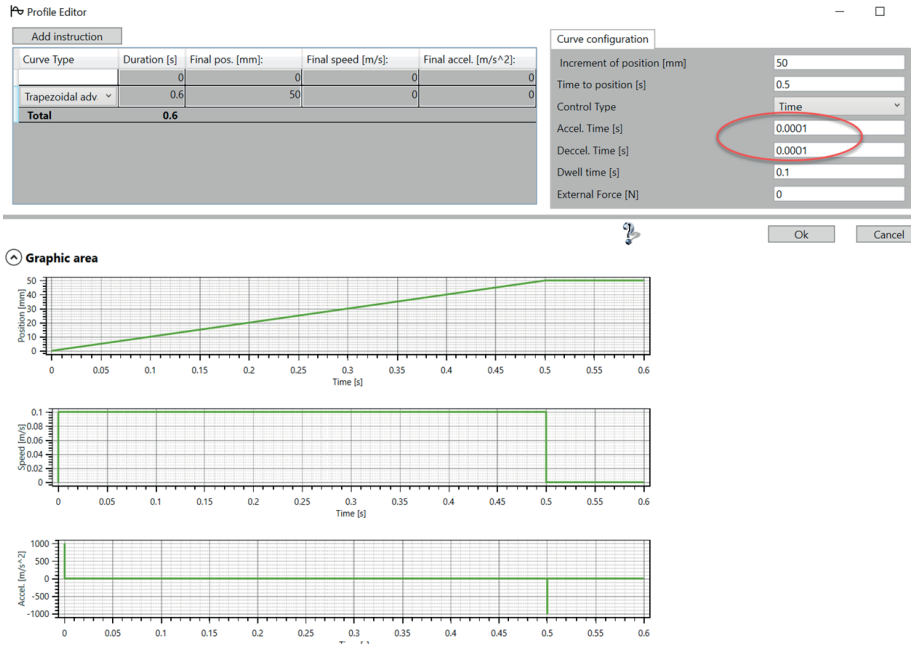


Corrected a bug where the load mass in Vertical Belt conveyor was added twice in the gravity torque

Now gravity force is calculated using the right load mass.

Corrected a bug where the Advanced trapezoidal profile was not calculated properly

In previous version, using advanced trapezoidal profile with very short acceleration and deceleration settings may result in a profile discontinuity. Now this has been corrected.

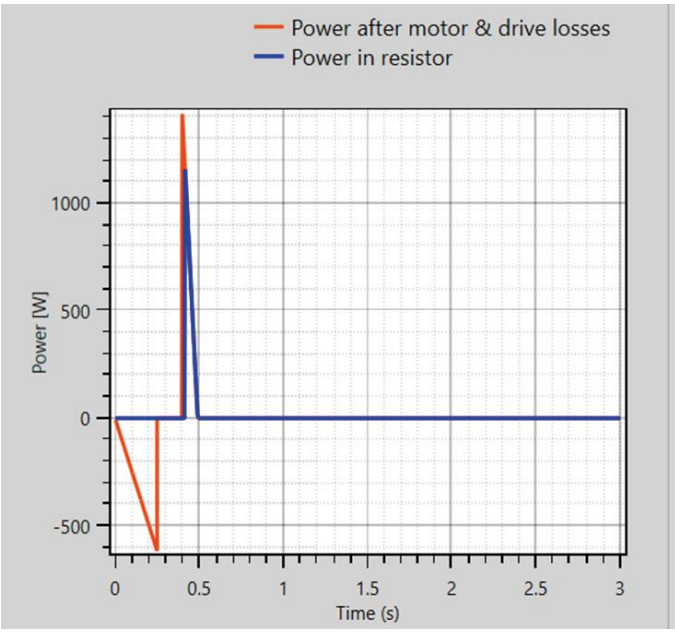


MOTOR SIZING TOOL VERSION 1.5 RELEASE NOTE

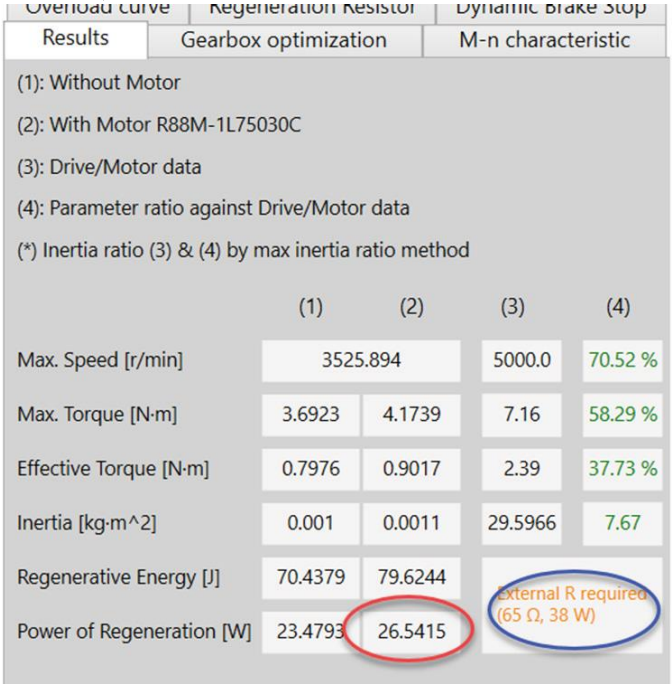
New specifications compared to version 1.4

Improvement of the Regenerative energy calculation and Braking resistor selection

Applications where there is a fast deceleration and a long dwell time, have a big regeneration power during the deceleration but a low average regeneration power in all the cycle:



In previous versions, the Regeneration power was calculated only based in the total-cycle averaged regenerative power. This results in abnormally small power resistors in applications with very long dwell time. In Version 1.5 we have set a limit in the ratio between regeneration power during deceleration and regeneration power in all the cycle.



The average regeneration in all the cycle is 26 W, but the resistor selected is 38 W.
The new criteria is:

- Calculate the average regeneration in all the cycle (old criteria)
- Take the regeneration in the worse 80 ms (starting of deceleration) /15
- Use the bigger of both values

In addition, the regeneration is calculated only in 2nd and 4th quadrants.

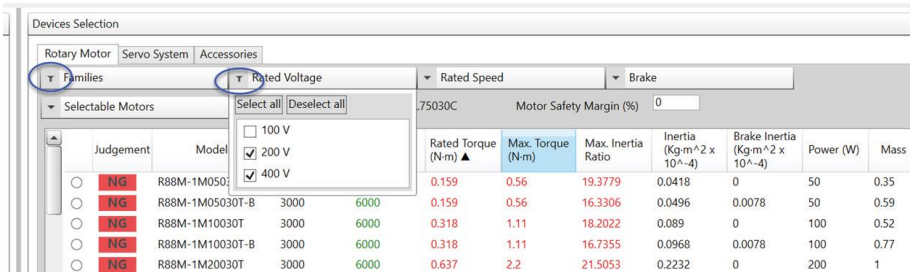
Adding an indication of ordering criteria in Motor selection list

The next indication has been added to indicate the motor ordering criteria:

Triangle pointing up mean ascending ordering.
Clicking again the triangle points down indicating descending order.

Adding an indication of filtering applied in Motor selection list

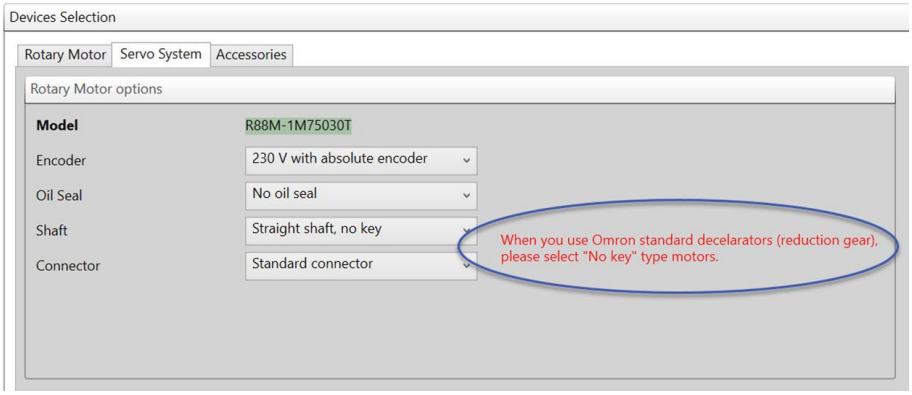
The funnel icon is added in the drop-down list that have one of the options unchecked indicating that there is a filter active:



In the image, the motor families and the rated voltage are filtered.

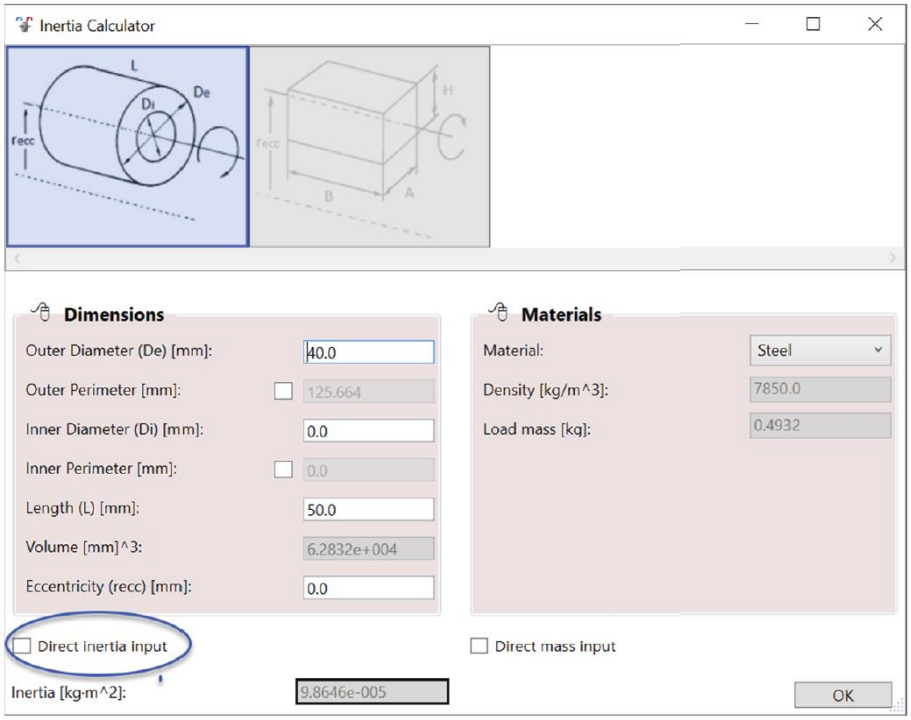
Improving selection of right motor shaft type

The next message has been added in the Motor selection tab for Japan region:



Default setting of Direct Inertia input is now deactivated in all elements except for gearbox

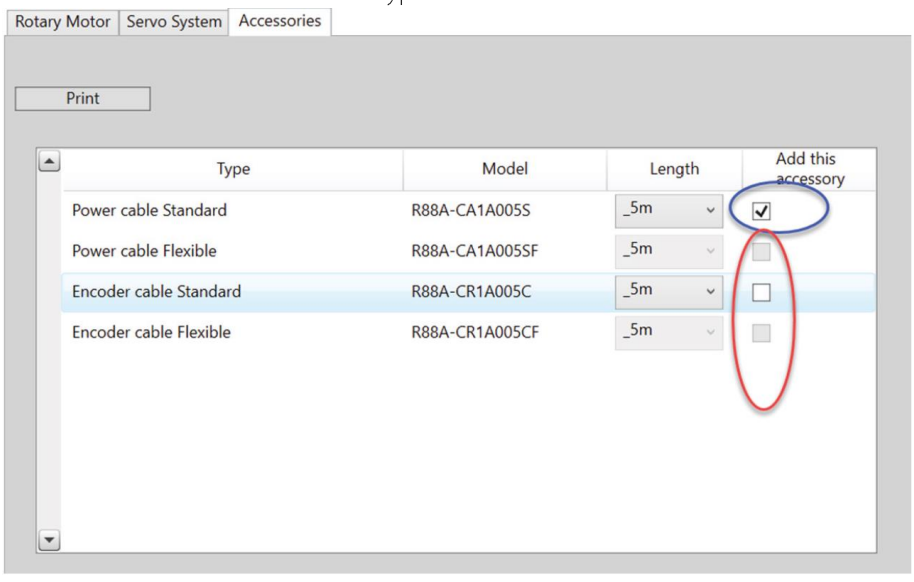
In previous versions, after using the Inertia calculator, the "Direct inertia setting" was set by default. Now is unset unless set by the user.



The gearbox keeps by default Direct inertia Input as Inertia is a data that is normally given by the gearbox maker.

Accessory selection has been improved

In regions where there are standard motor cable and flexible motor cable, it was possible to select a mix of standard and flexible cables. In order to facilitate the selection and avoid mistakes now it is only possible to select power and encoder cables of the same type:



In the screenshot, as example, as Standard power cable has been selected, flexible cable options are blocked.

Accessory selection is now properly saved

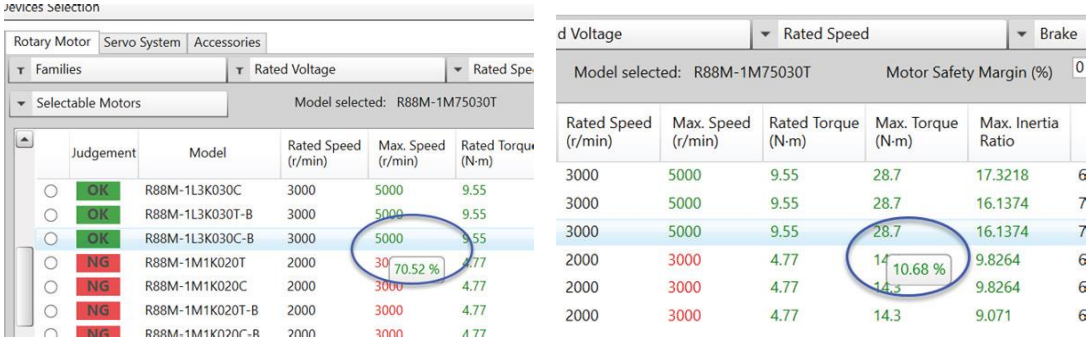
In the case above (regions with standard and flexible cable options) there was a bug where the selected cable length was not properly saved. This bug has been corrected and now the selected cable length is properly saved in the project.

The tool performance has been improved

In previous versions, frequent calculation iterations, specially when plotting complex CAM profiles causes that the memory used by the tool is increasing causing a decrease of the performance and, in extreme cases, even crashing the tool.
Now all the unused memory is freed resulting in an increase of the tool performance. As result of this, the resolution of the profile segments has been increased from 500 points to 5,000 points (this is important in case of CAM profiles).

New tooltips in motor selection window have been added

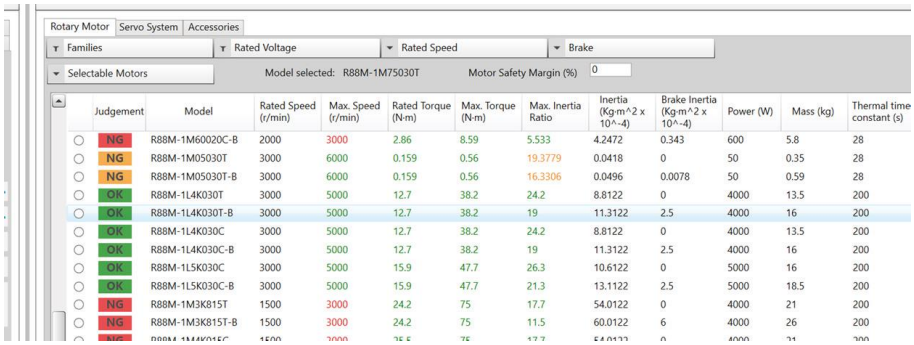
In previous versions we have a tooltip that shows the ratio between motor and application just for the rated torque and inertia ratio. Now we have the tooltip also for the Maximum speed and the Maximum Torque:



Bugs solved

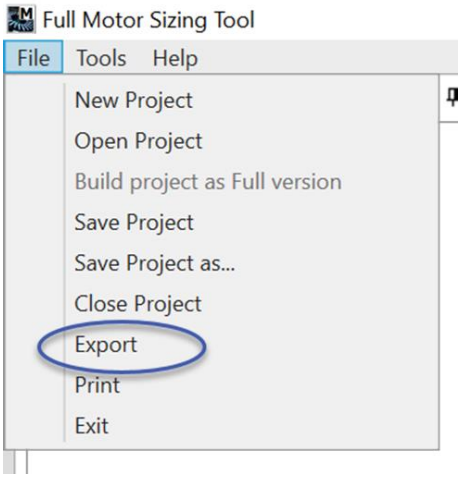
Corrected a bug that showed incorrect motor judgement color

In previous version, under certain circumstances, the color indicating the motor judgement green/orange/red) could be incorrect while the message (OK/NG) was right.
This bug has been corrected and now the color code always correspond with the judgement.



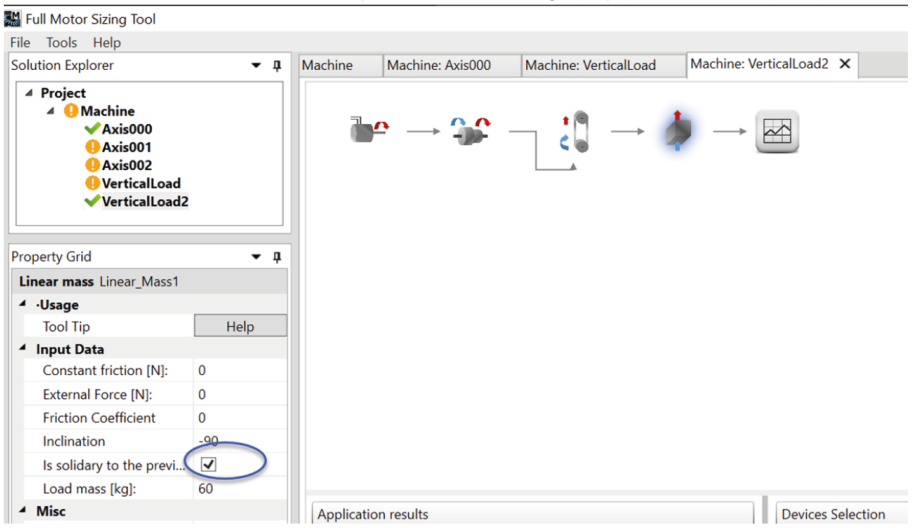
Corrected a bug where sometimes the export option was disabled

Now the export option is always enabled if the controller is Sysmac.



Corrected a bug where Belt mass in Belt conveyor was incorrectly included in the gravity torque

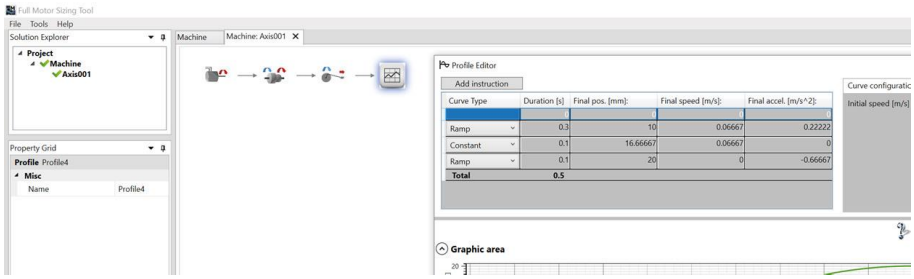
The calculation of the gravity force/torque is independent of the mass of the conveyor belt.
In previous version, if you add a linear mass on top of the conveyor and you select "solidary with previous element", the mass of the belt was incorrectly included in the gravity force calculation.



Now this bug has been solved and only the linear mass is involved in the gravity force calculation.

Corrected a bug where adding some profile segments to a cranck application crashes the tool

Now this bug has been solved and all profile segments can be added (respecting the cranck dimensions) without crashing.



Corrected a bug that gives an error message when trying to print a project

That error was generated when MST V1.5.12.05 was installed in one computer that has a different version of a certain .dll than the one used by this software.
This has been corrected so the right version of the .dll is always used so printing does not generate error.

Corrected a bug that generates the wrong profile

Under certain circumstances, a ramp segment could be incorrectly shown as a trapezoidal profile. This has been solved in version 1.5.13.00 and all segments are properly shown.

Corrected a bug that may generate a wrong SS export file

MST V1.5.12.05 version in the "export" to Sysmac file handles the Axis gear ratio as 64 bit numbers while Sysmac Studio can only import 32 bit numbers, so, in some cases, the .xml file generated cannot be imported into Sysmac Studio.
Version 1.5.13.00 solves this problem and the Axis ratio is always handled as 32 bit number so the import is successful in all cases.

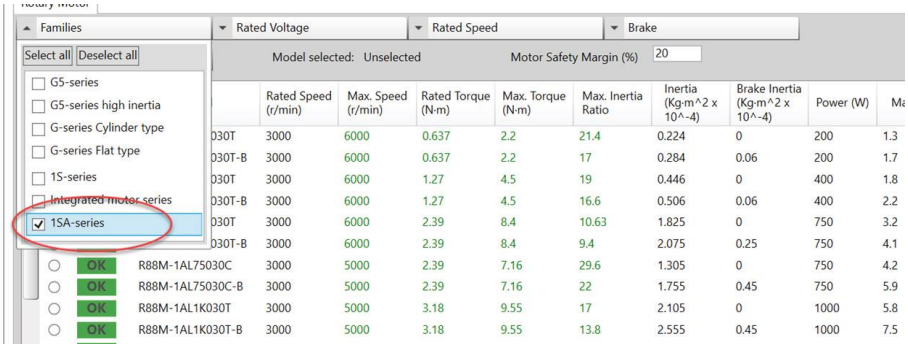
MOTOR SIZING TOOL VERSION 1.4 RELEASE NOTE

New specifications compared to version 1.3

Database has been updated including new servo families

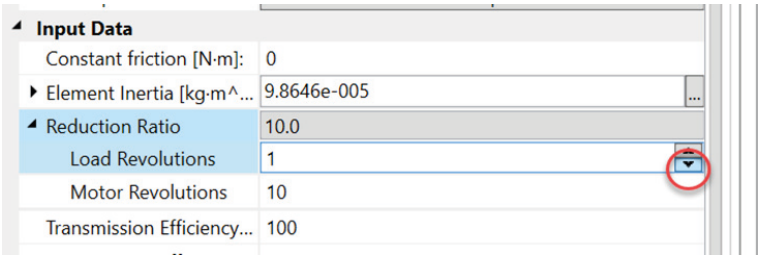
The new servo families have been included:

- 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

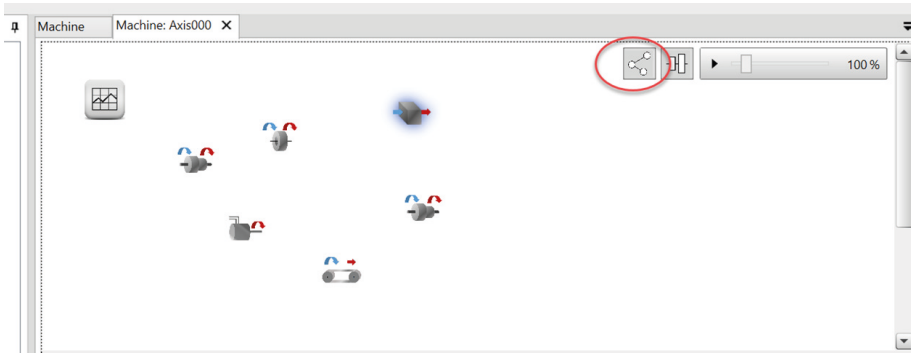


Auto-connect unconnected mechanical elements

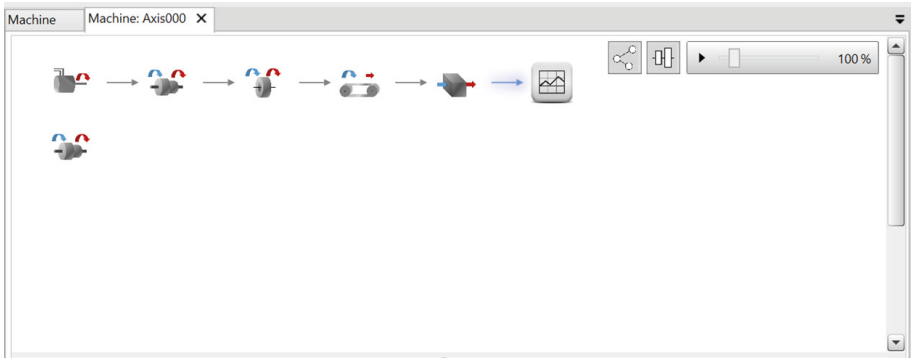
In the mechanical chain window there is a new button that links the different unlinked mechanical elements in order to create a valid mechanical chain.
The (simplified) criteria is:

- 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:

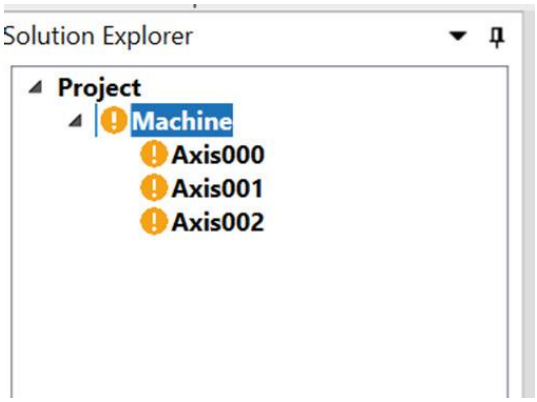


After connection:



Changed Auto-naming of new axes

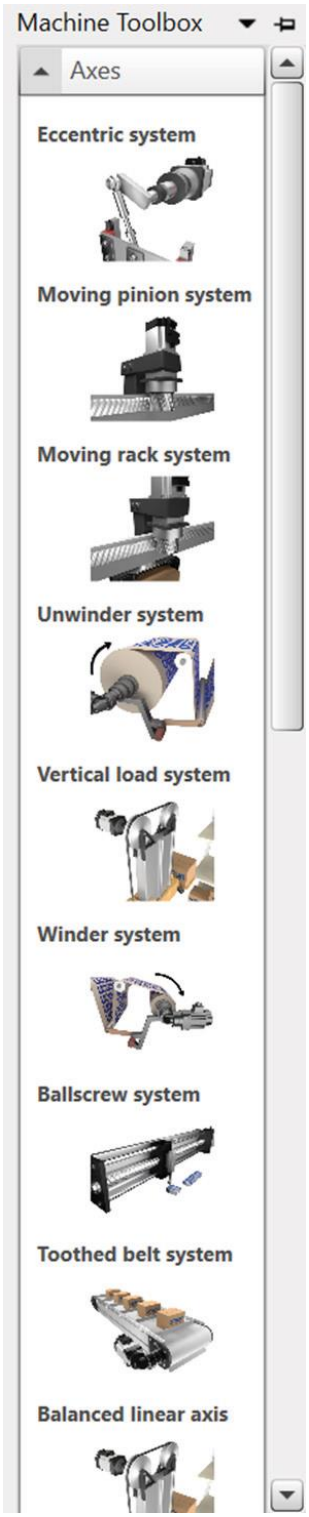
A new created axis will follow the name Axis000, Axis001 and so on.
This predefined auto-name can be manually changed afterwards.



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

New predefined axes are included

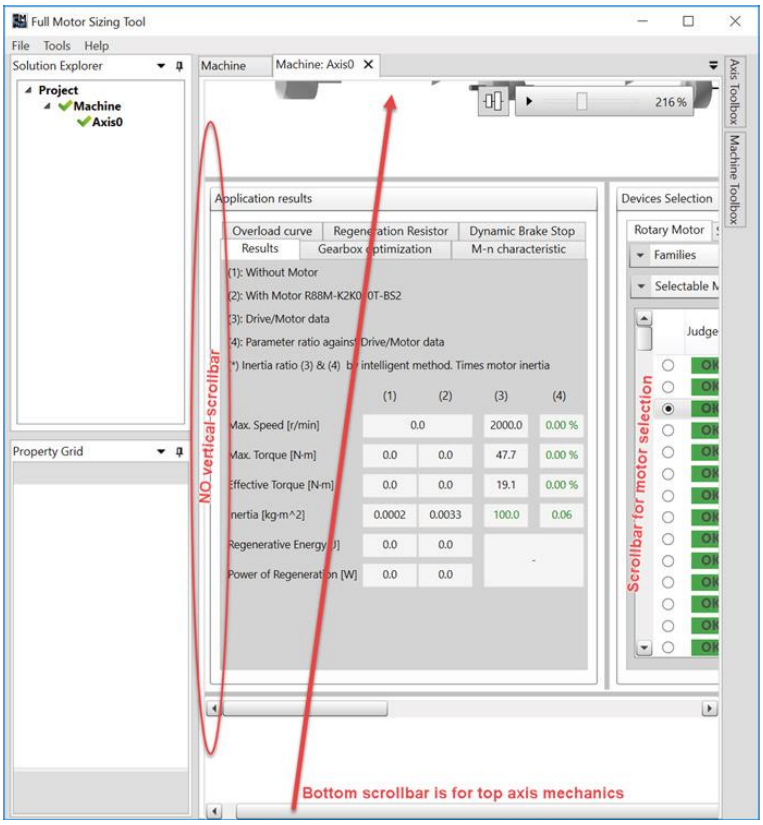
The new axes are: Winder, Unwinder, Moving Rack, Moving Pinion, Eccentric load, Vertical load.



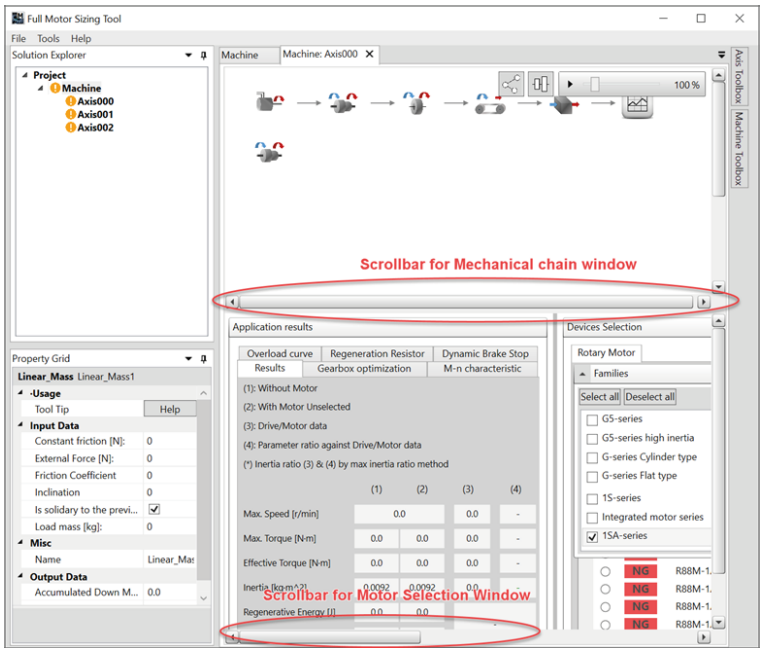
Axis window and Motor selection window are independent

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:



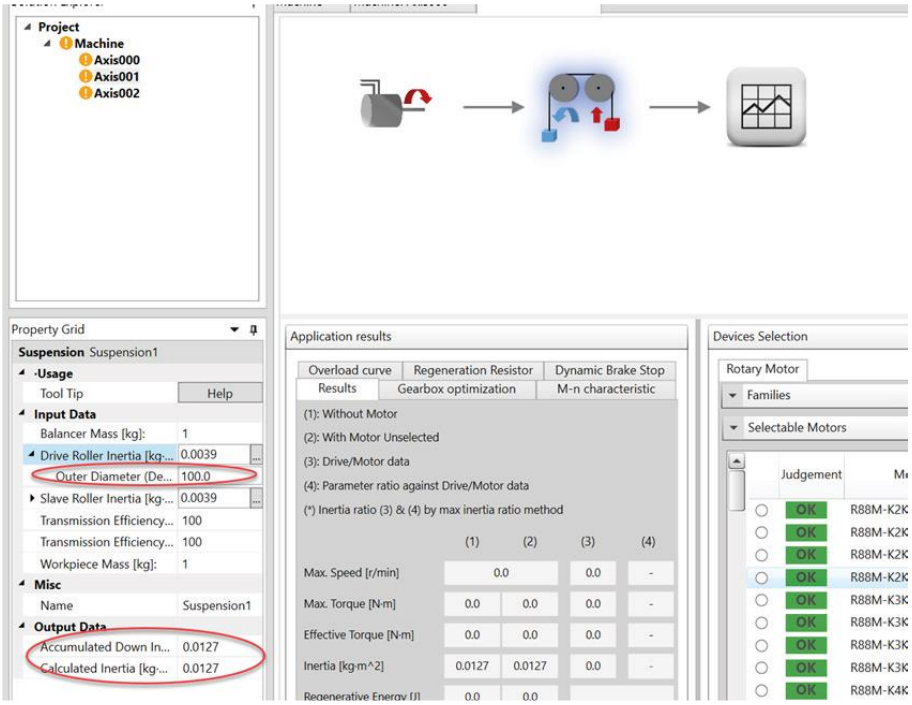
MST can be executed in a computer with non-administration rights

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

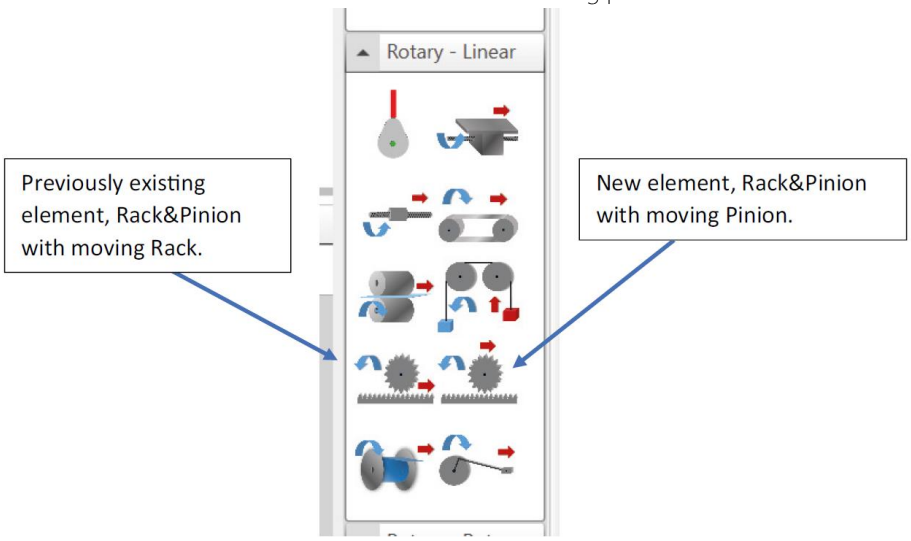
Some fixed texts now are translated to the selected language.

MOTOR SIZING TOOL VERSION 1.3 RELEASE NOTE

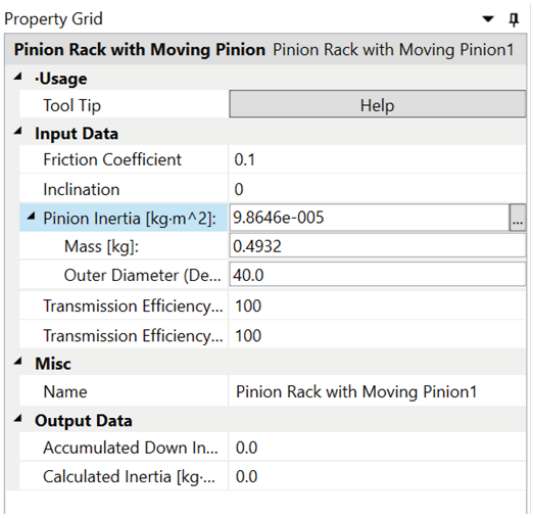
New specifications compared to version 1.2

New mechanical element "Rack & Pinion" with moving pinion

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

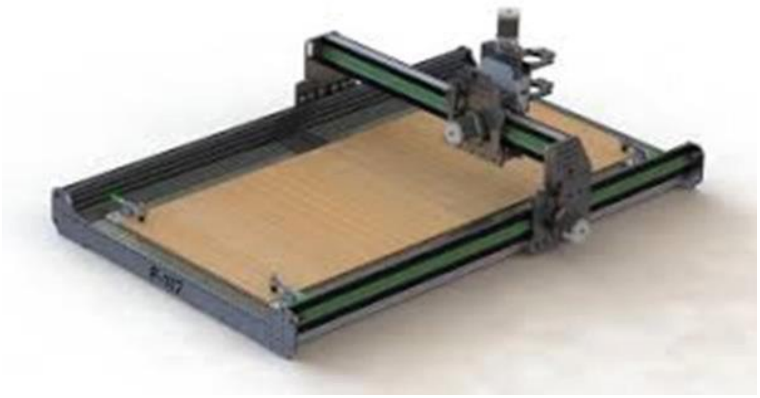


In this element, the motor moves the pinion (directly or via other rotary element) and the pinion and all the elements from pinion to the motor moves linearly.
Element properties:



The mass of the element appears as Property.

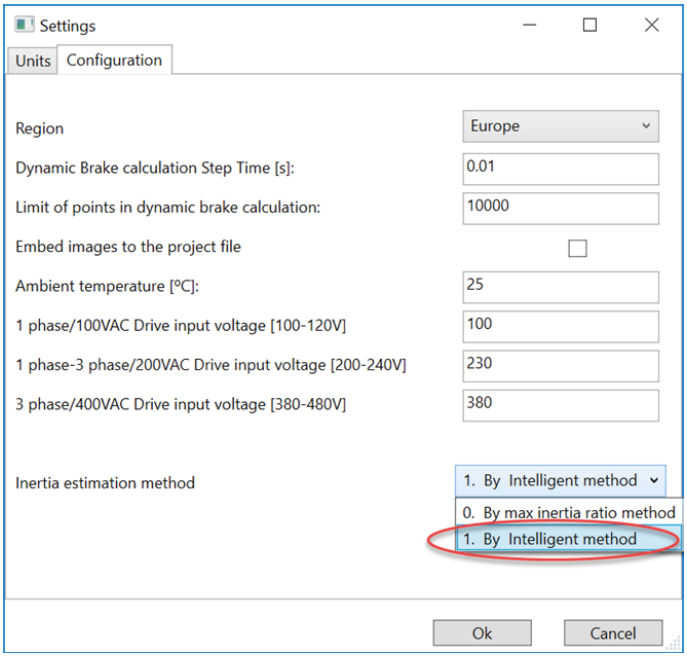
This is a typical example of application:



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.

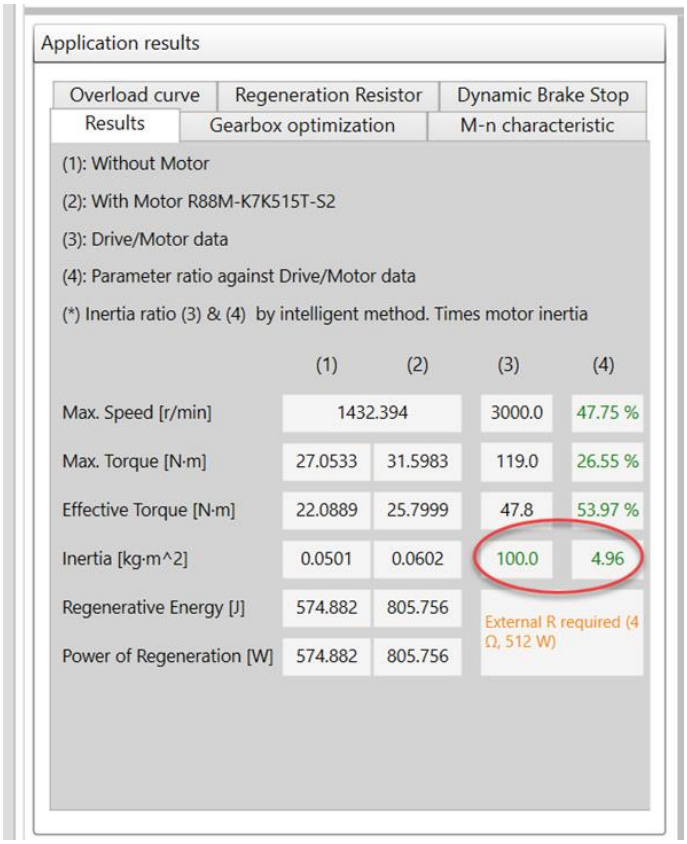
In version 1.3 we have implemented a more optimized inertia evaluation.
This new feature is enabled from "Tools\Settings" in main menu:



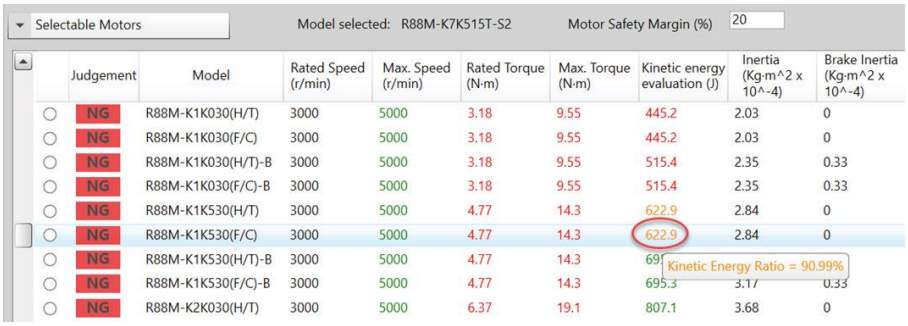
In "Application results" window the inertia is evaluated according to stability criteria.
Every mechanical element, according to its typical rigidity has a maximum inertia ratio value that is considered "stable". The application compares the calculated inertia ratio with the value of the element with 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:



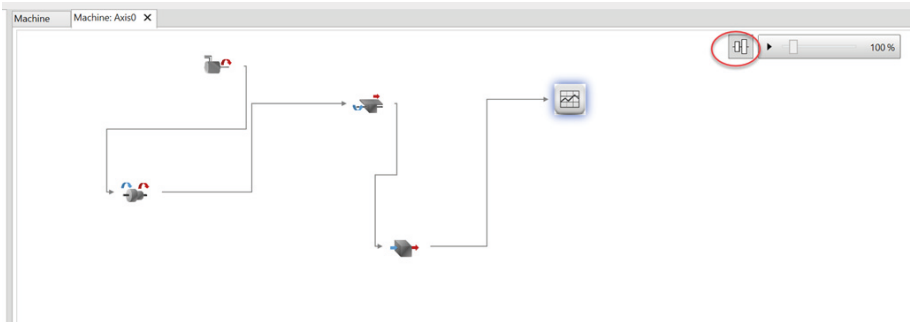
The color criteria is next:

- 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:

o The third party motor data is embedded in the project file

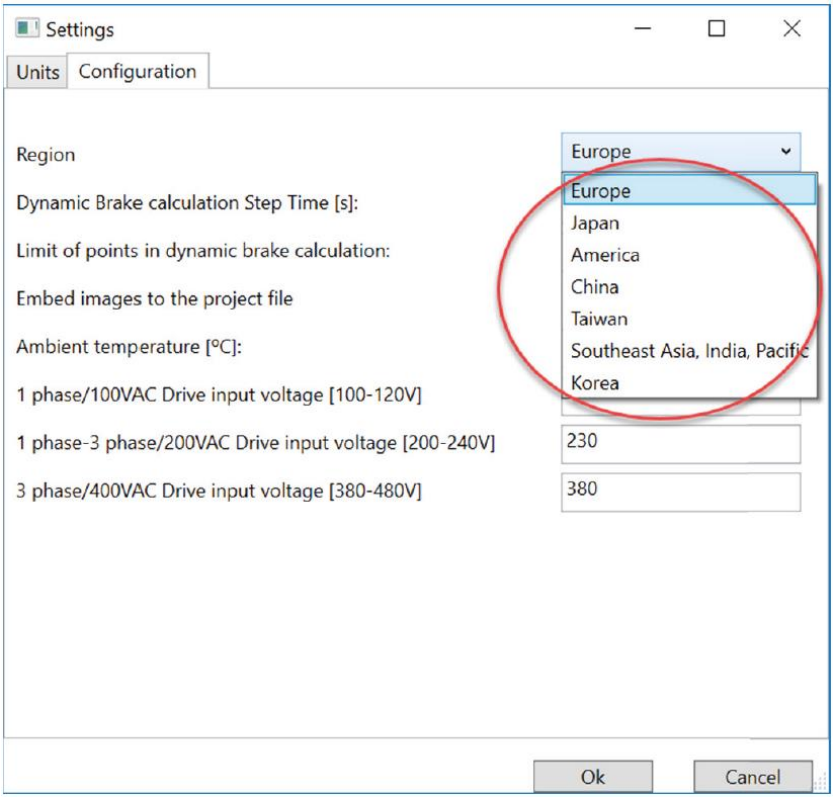
o On opening a project including a third party motor it is: added to the local database if the motor is not existing or asking which action you want to do if the motor exists.

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:

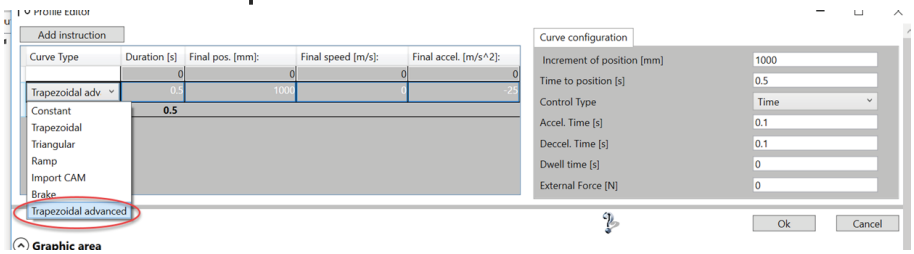


The changes in the different regions are:

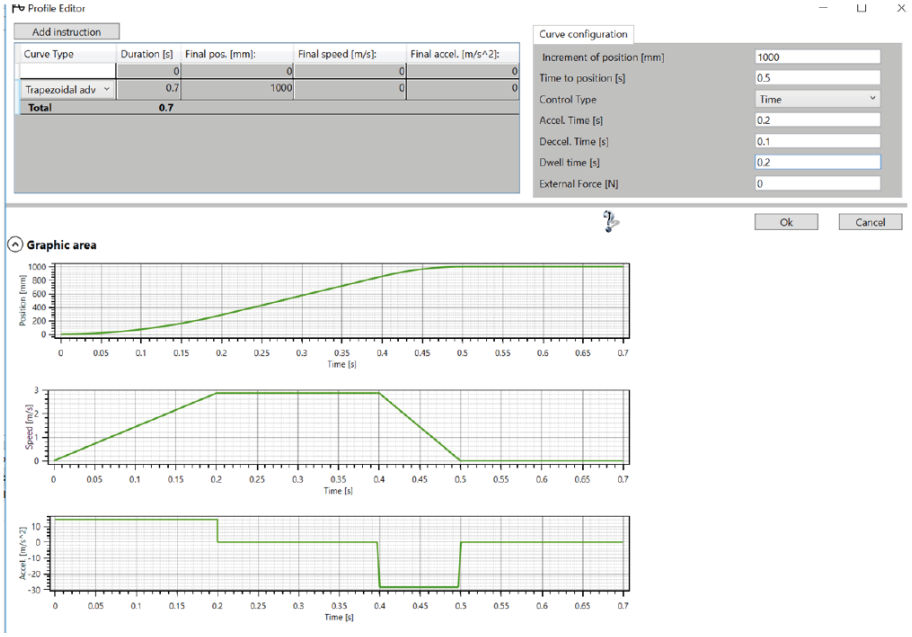
- The available drive and motor models
- The accessories references
- The default value of voltage supply

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

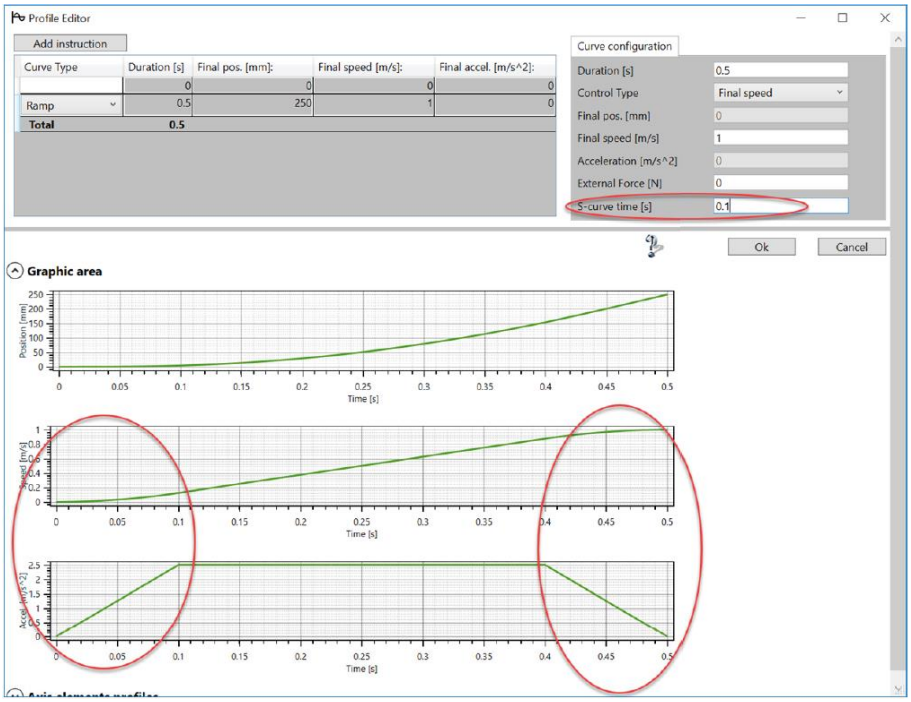


In this new predefined profile you can define the position and time increments and, in addition, control separately acceleration, deceleration and dwell time to obtain something like next:



Profile Editor: S-Curve

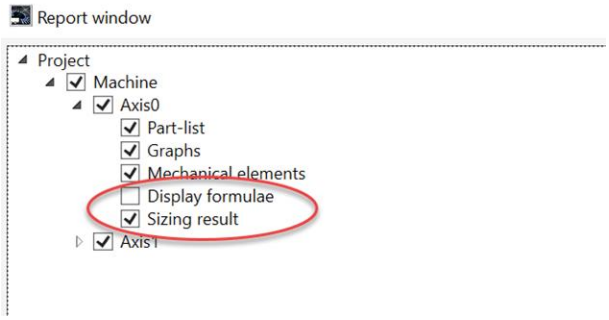
In the predefined segment "Ramp" we have included the S-ramp parameter that allows to define Jerk in the movement:



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

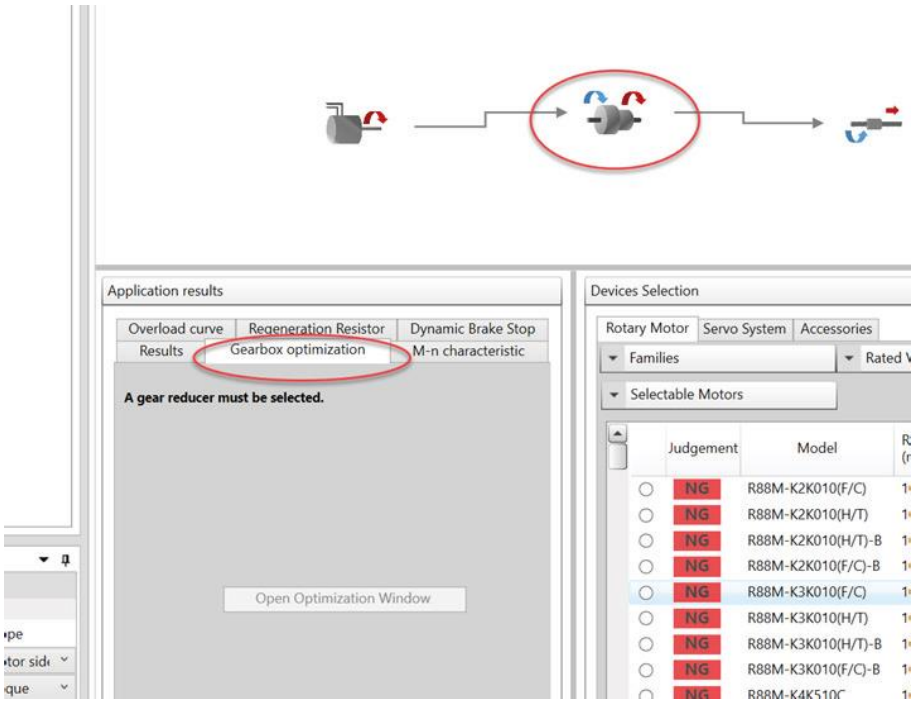
	(1)	(2)	(3)	(4)
Max. Speed [r/min]	3600		6000	60.00 %
Max. Torque [N·m]	0.58	0.61	1.9	32.13 %
Effective Torque [N·m]	0.58	0.61	0.64	77.93 %
Inertia [kg·m^2]	0.00021	0.00023	30	15.24
Regenerative Energy [J]	15.4	19.5		External R required (34 Ω, 7 W)
Power of Regeneration [W]	30.8	39		External R required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

Regeneration Resistor:

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

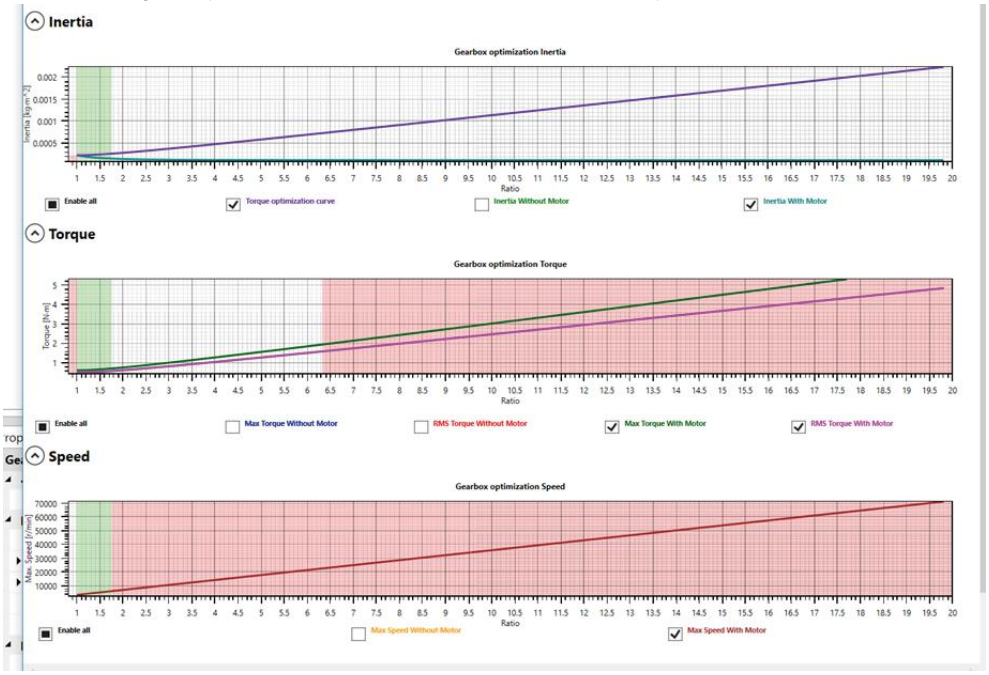
Gearbox optimization

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:



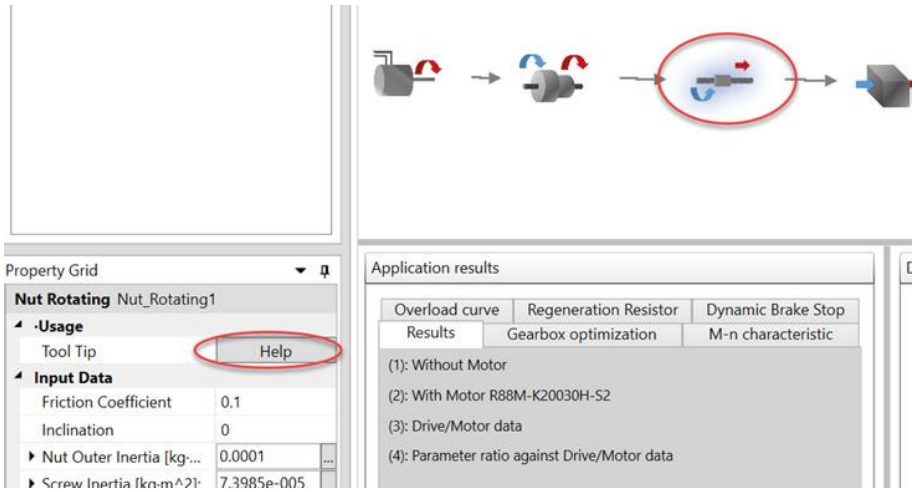
It open a new window where you can select the range of gearboxes to check:

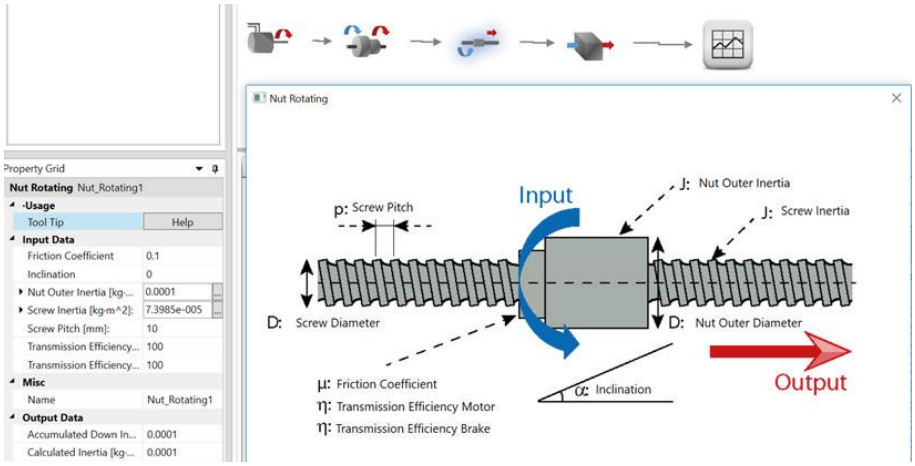
Then, it result in traces of inertia, torque and speed from motor side so you can see quickly which is the optimum gearbox ratio in this application. If your range of ratios is large, the calculation may take several seconds. In red and green you see the available areas for the currently selected motor:



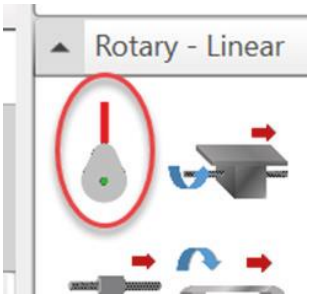
Help for setting mechanical properties

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:

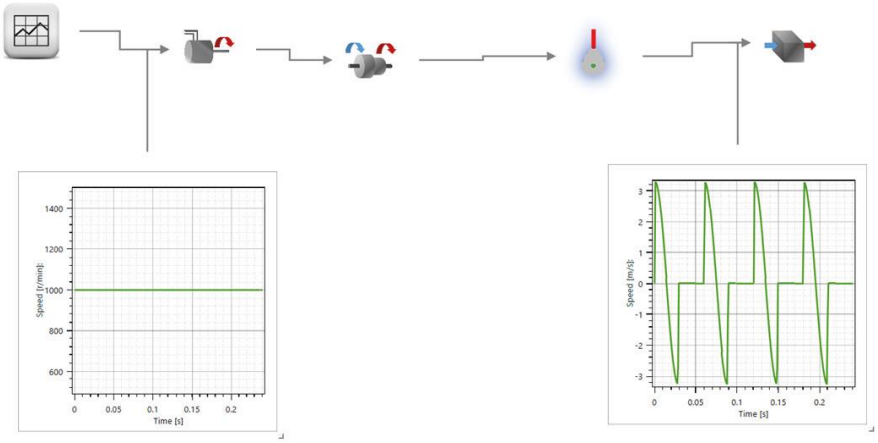




New mechanical element: Mechanical lift CAM



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.



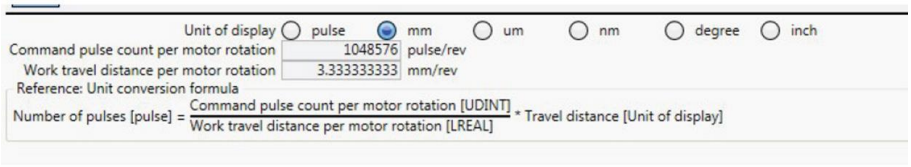
Intelligent scaling export to Sysmac Studio

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

o Numerator: Motor encoder resolution

o Denominator: Conversion factor from encoder counts to degree (for rotary motors) or mm (for linear motors)

This may result in infinite decimal conversion:

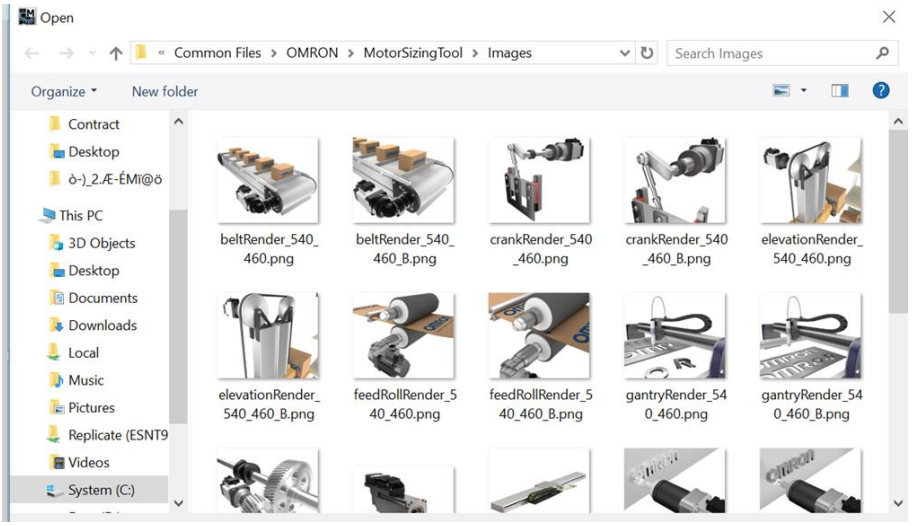


The new scaling changes numerator and denominator to use only integer values and avoid potential rounding errors.

New icons

Predefined axes icons correspond to 1S servo system:

Some new preinstalled images have been defined:



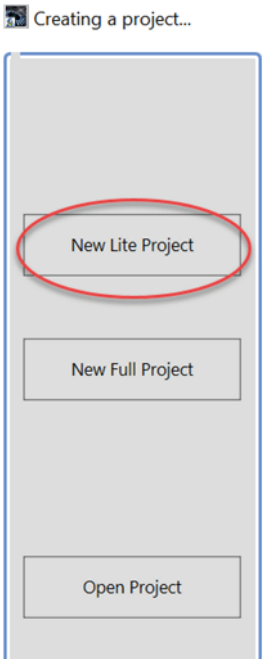
Lite Project version

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

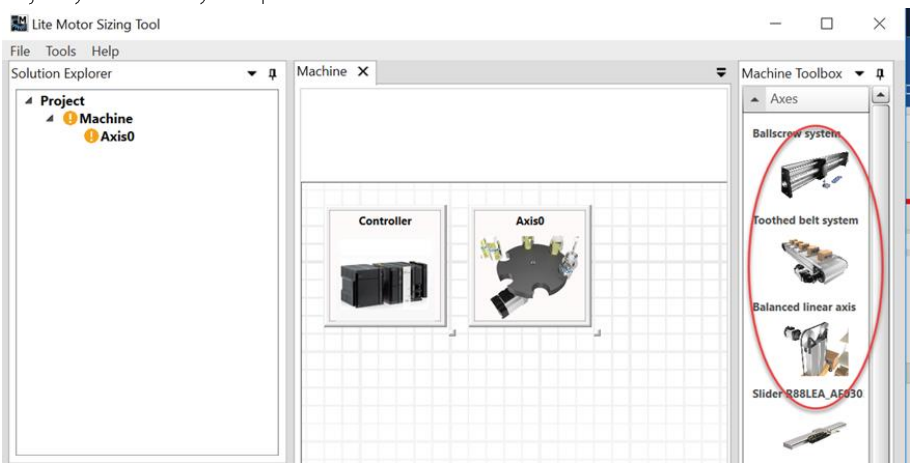
The target of this "Lite" version is:

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

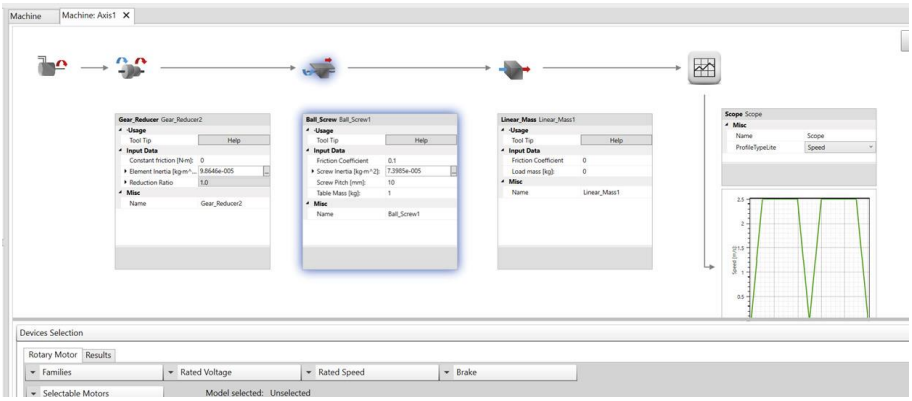
On opening MST you are asked which kind of project you want to create:



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.