Femtet
- Operations Exercise -

202009

Table of Contents

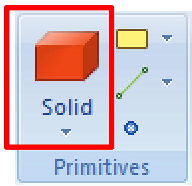
Basic Operations of Modeler

Murata Software

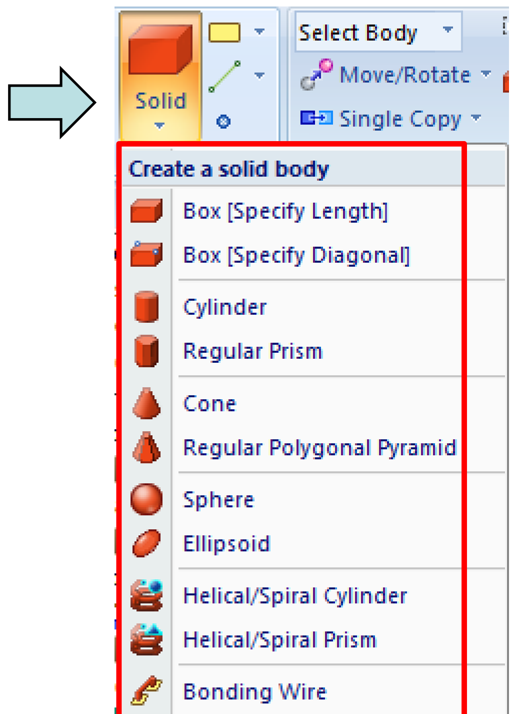
Primitives

From ribbon menu, select primitives.
Pressing ▼ on the right side or below the menu, submenu will appear.

Example: [Model] tab ー[Primitives]ー[Solid]



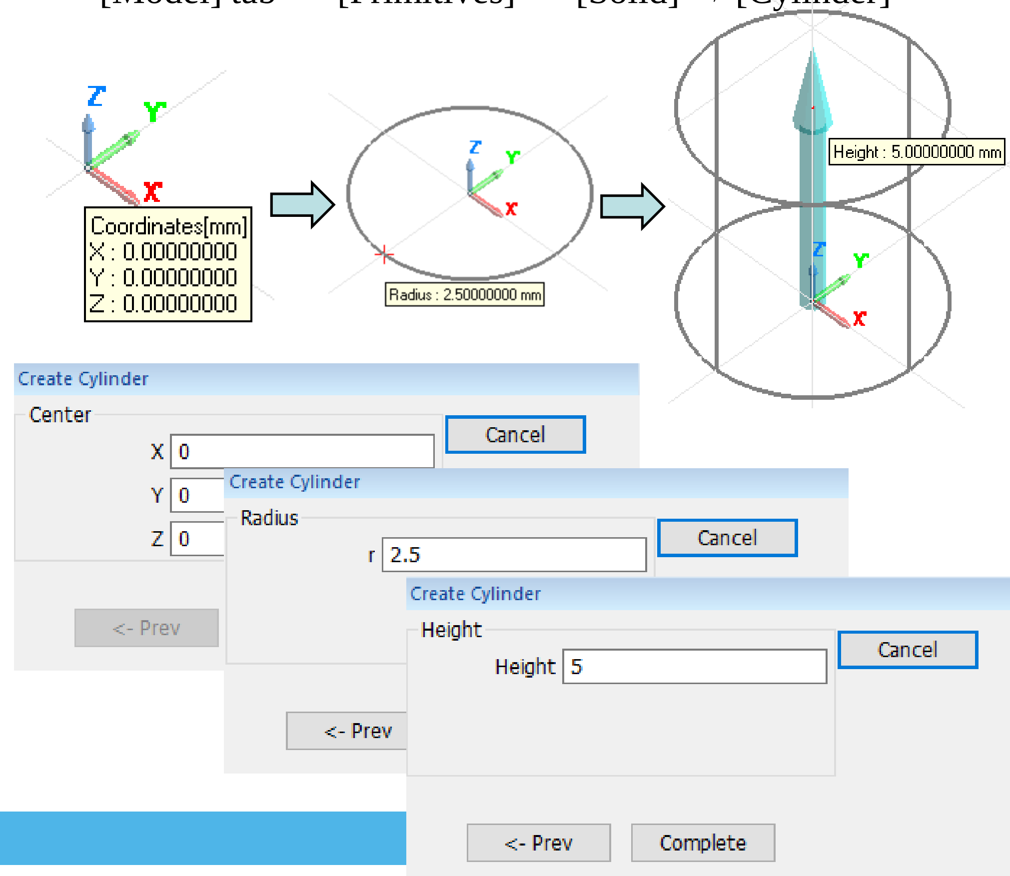
Press Solid



Submenu

Enter parameters of primitives on a Modeling window or in the input fields.

Example
[Model] tab => [Primitives] => [Solid] ⇒ [Cylinder]

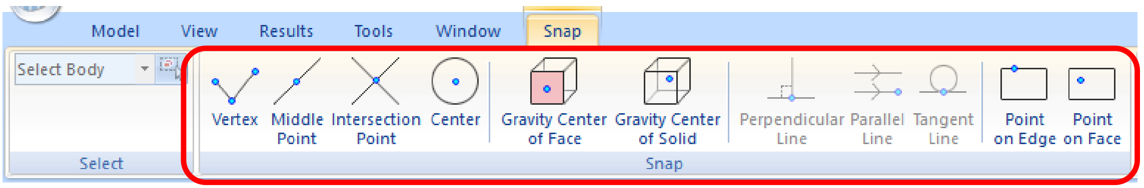


Basic Operations of Modeler

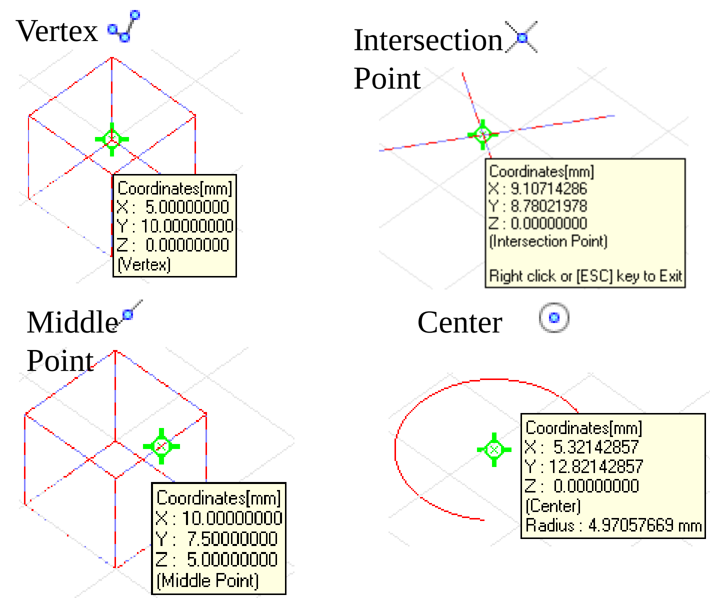
Murata Software

Snap

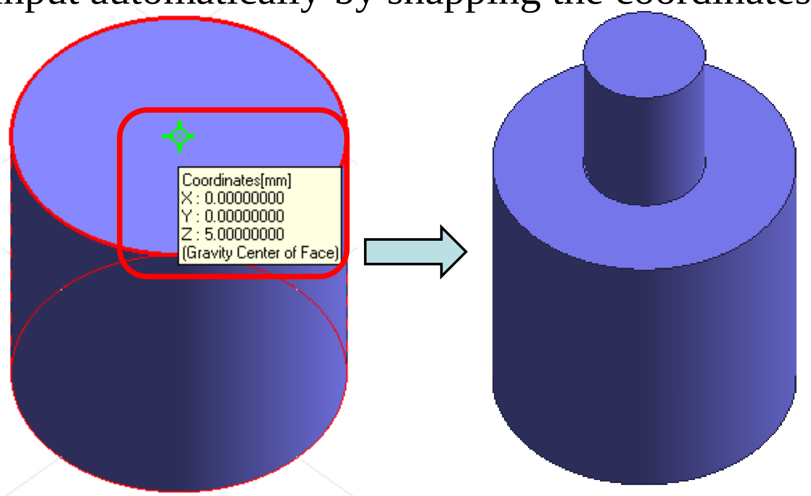
When entering parameters, enable the type of coordinates to snap.

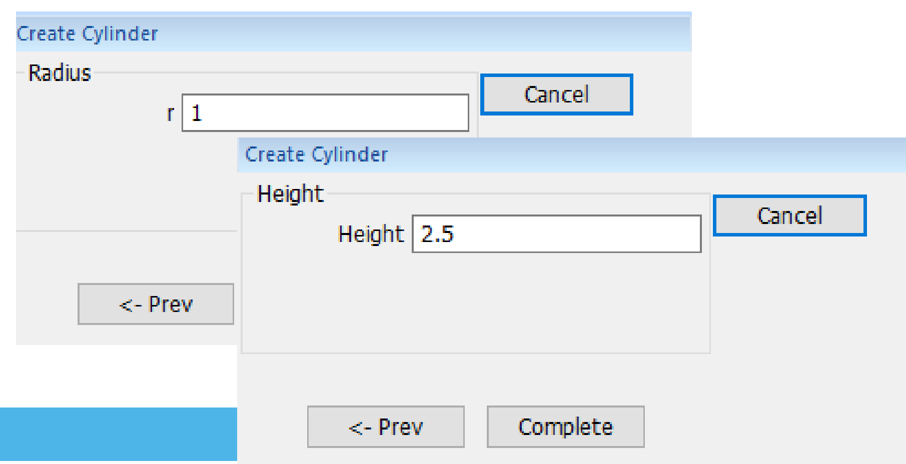


スナップ機能で拾える座標例



Bring mouse near to the enabled coordinates, the parameters are input automatically by snapping the coordinates.



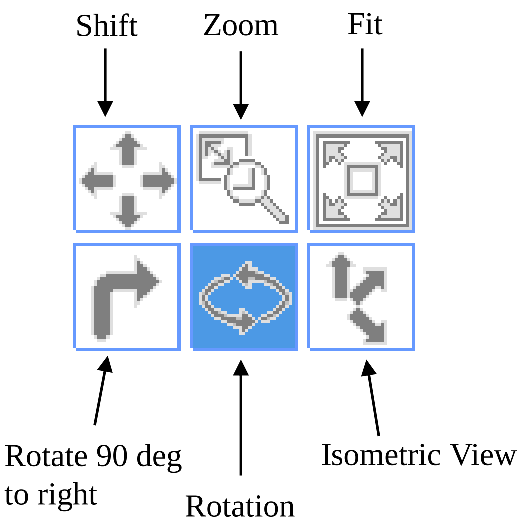


Basic Operations of Modeler

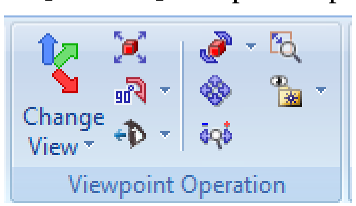
Murata Software

Viewpoint Operation

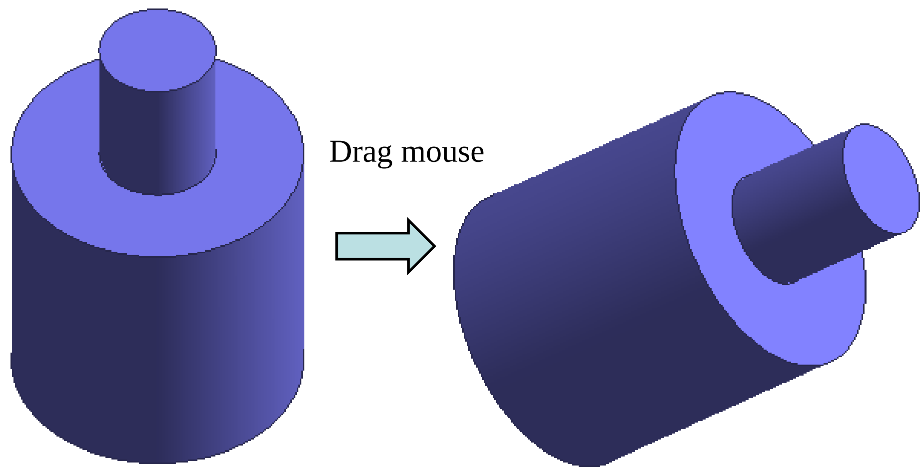
Viewpoint operation is enabled on the tool panel on a Modeling window or [Model] tab => [Viewpoint Operation].



[Model] tab => [Viewpoint Operation]



Drag a model while pressing left button of a mouse to get a viewpoint of your wish.



*Some operations, such as [Fit] and [Isometric View], can be executed simply by selecting the menu.

Basic Operations of Modeler

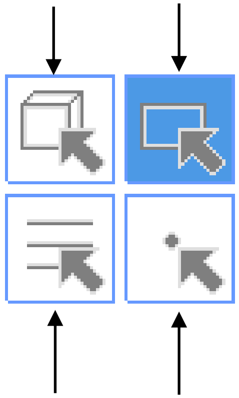
Murata Software

Object Selection

Select a body or topology (vertex, edge, face) from the tool panel on a Modeling window or [Model] tab => [Modification Operation]

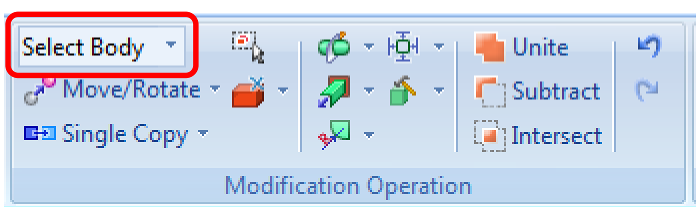
*A body consists of topologies (vertex, edge, face).

Select Body Select Face



Select Edge Select Vertex

[Model] tab ⇒ [Modification Operation]

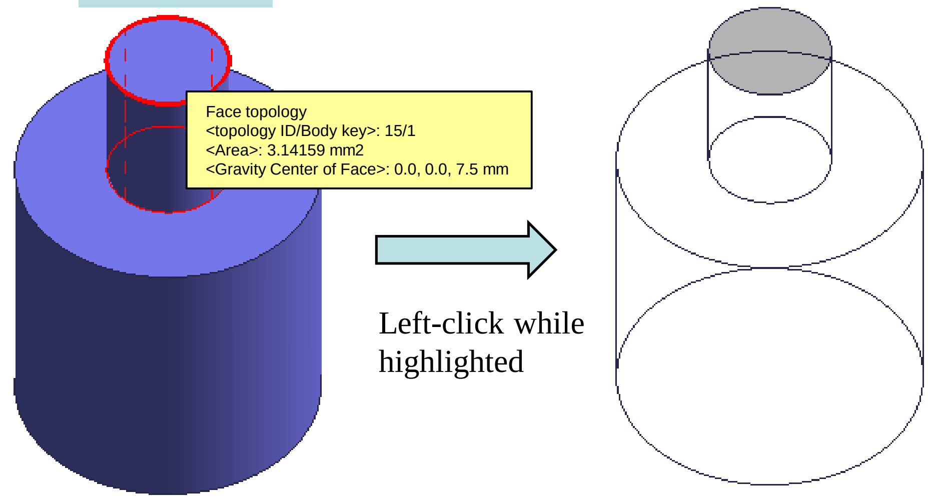


The target object will be highlighted when a mouse is brought to it.

Left-click it to complete the selection.

Highlighted

Selected



*Be aware that left-click is needed to complete the selection.

**Left-click + [Ctrl] key will allow multiple selection.

Basic Operations of Modeler

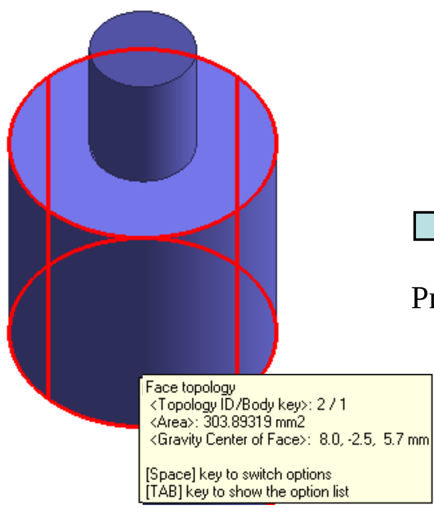
Murata Software

Change Target Object

Bring mouse to the place to select.
Stay there for a second.

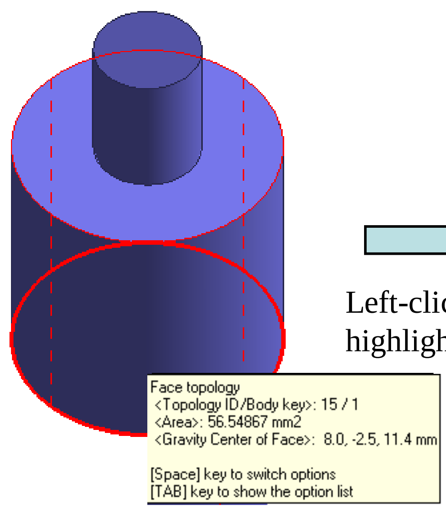
Press a spacebar.
A target object can be switched.

Highlighted



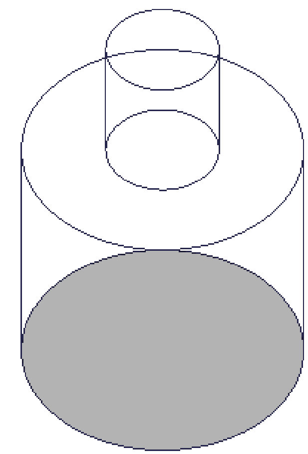
Press a spacebar

Highlighted

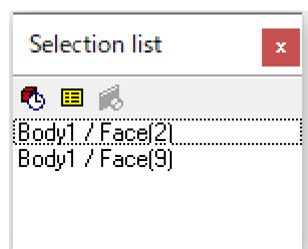


Left-click while highlighted

Selected



The function is useful when you want to select a place where bodies that are overlapping, or hidden faces.



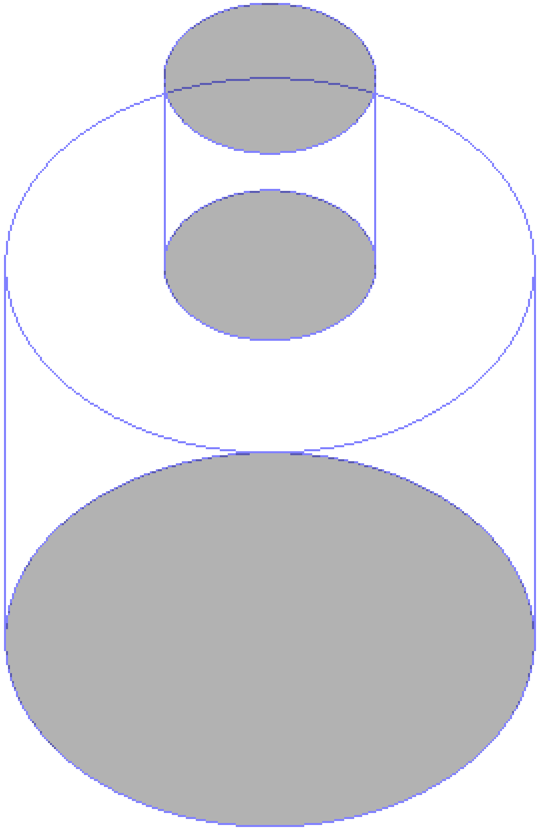
*Press [Tab] key to show Selection list.

Basic Operations of Modeler

Murata Software

Check Your Understanding

You've learnt Object Selection, Change Target Object, and Multiple Selection. Based on what you've learnt, select three faces below.



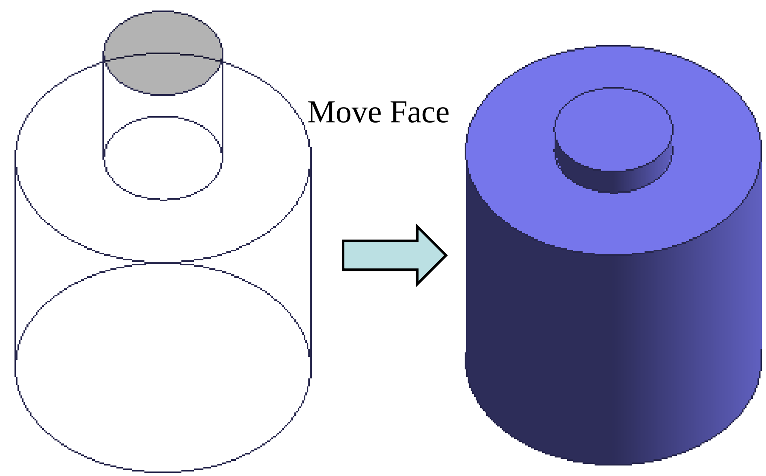
Basic Operations of Modeler

Murata Software

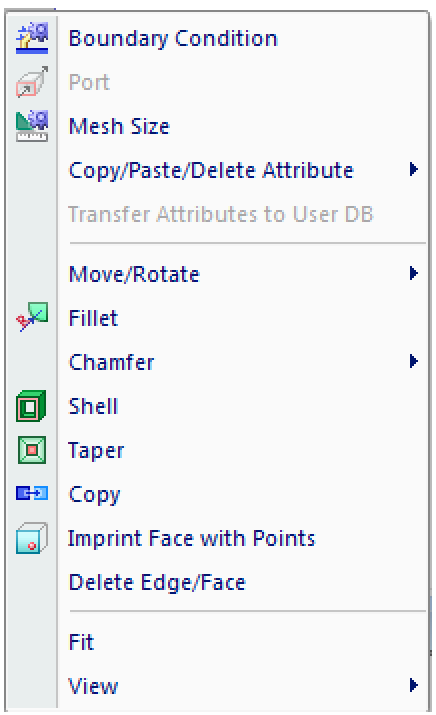
Model Modification

Right-click on a modification target (body or part of body).
Select operation from an appearing menu or
go to[Model] tab => [Modification Operation].

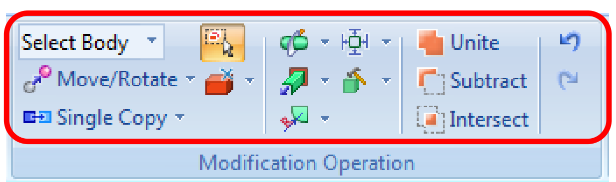
Enter parameters in an input box.

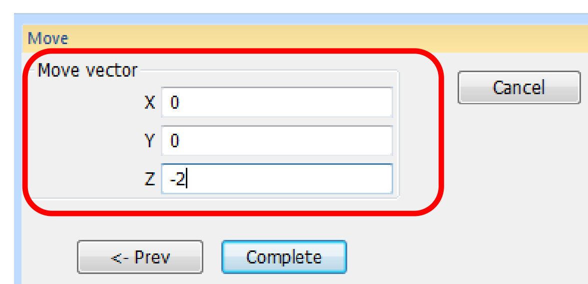


Right-click menu (on a selected face)



[Model] tab => [Modification Operation]



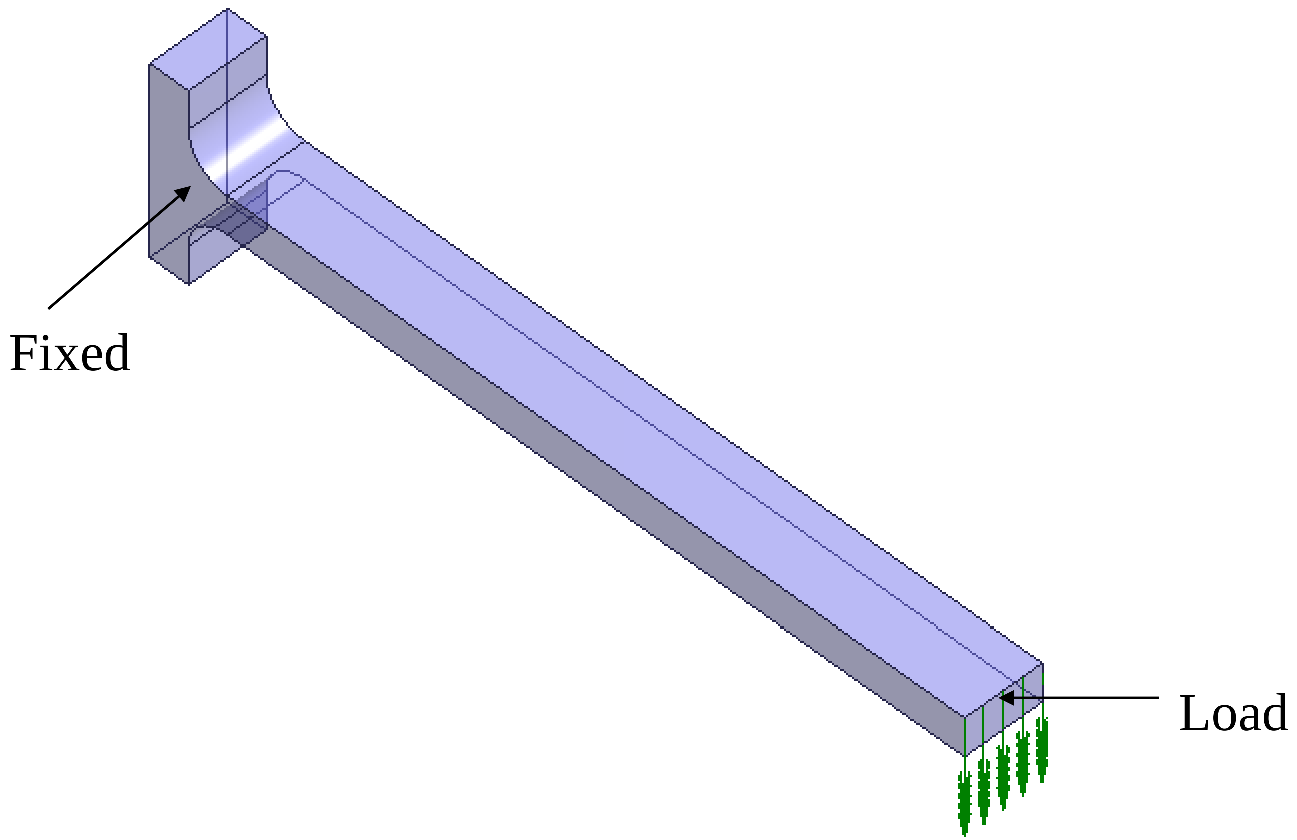


Exercise - Stress Analysis

Murata Software

Analysis Model

Displacement and stress are analyzed when a beam is applied load on its end.

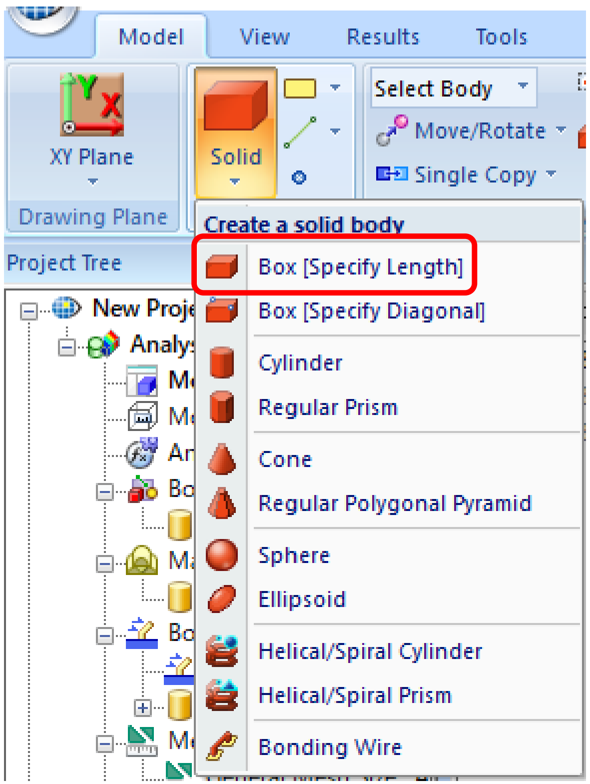


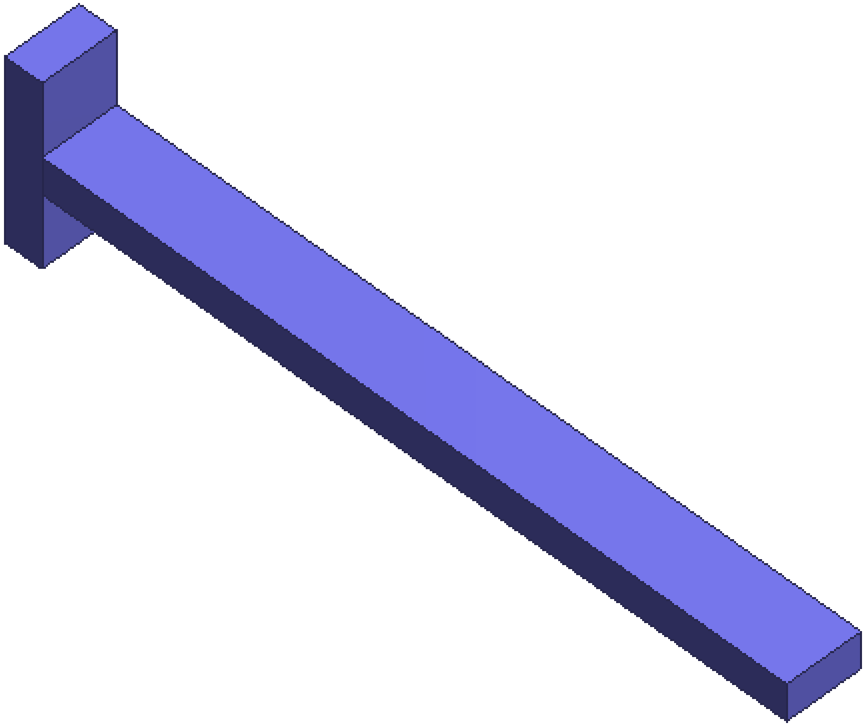
Exercise - Stress Analysis

Murata Software

Modeling

[Model[> [Primitives] > [Box [Specify Length]]
Enter Startpoint [0, 0, 0], Width[20], Depth [2], and Height [1].



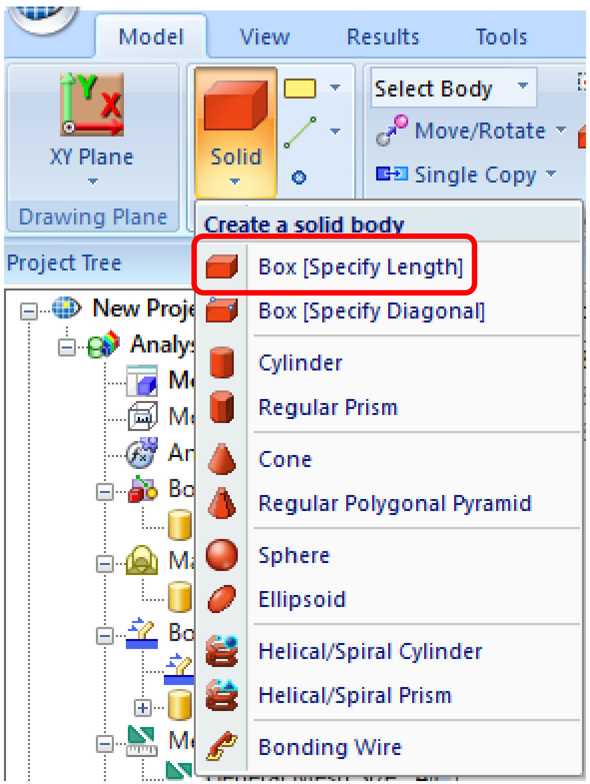


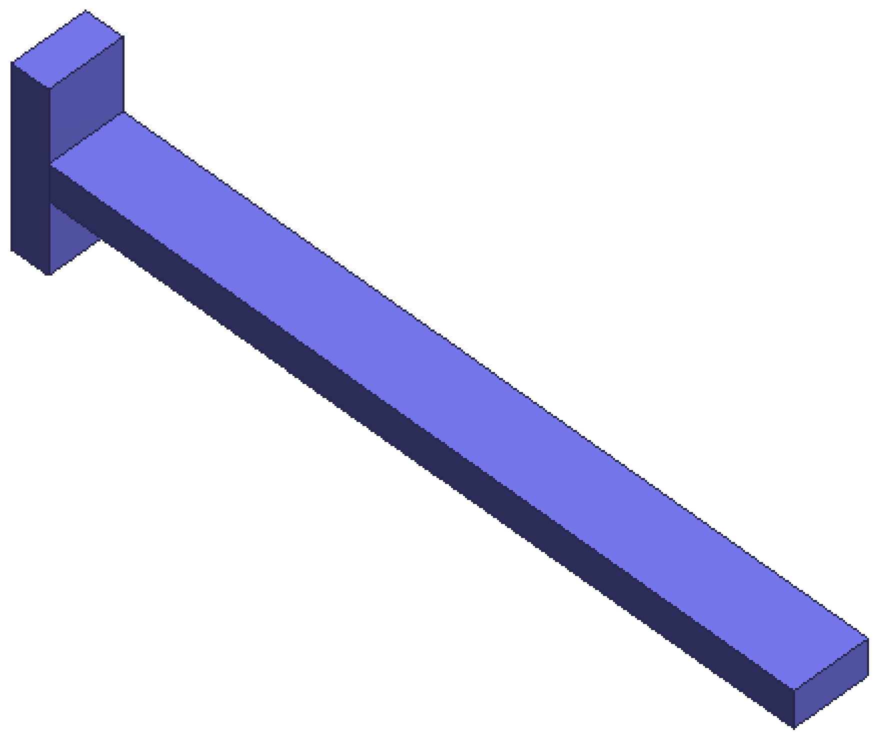
Exercise - Stress Analysis

Murata Software

Modeling

[Model[> [Primitives] > [Box [Specify Length]]
Enter Startpoint [0, 0, -2], Width[-1], Depth [2], and Height [5].



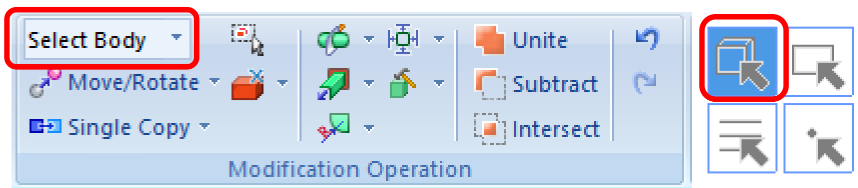


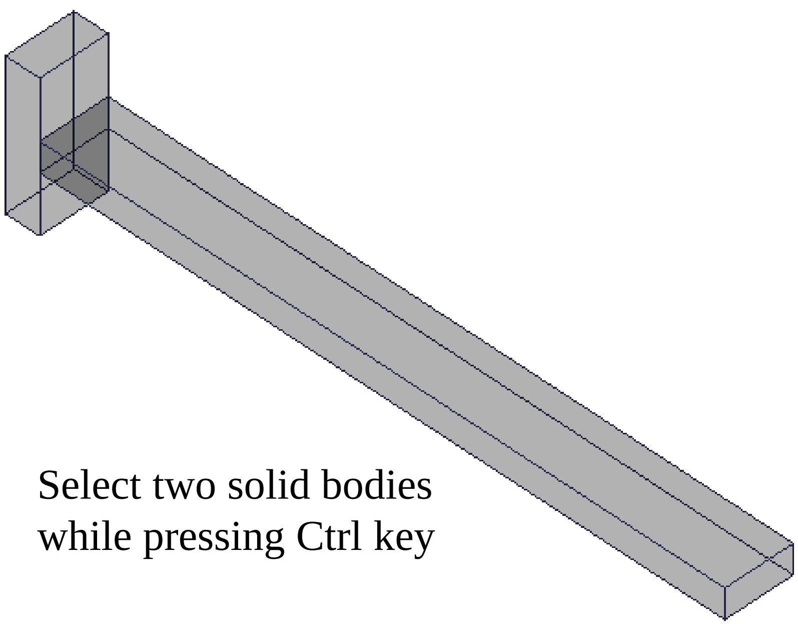
Exercise - Stress Analysis

Murata Software

Modeling

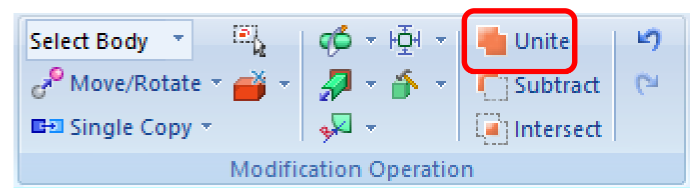
Switch target to Body and select two bodies

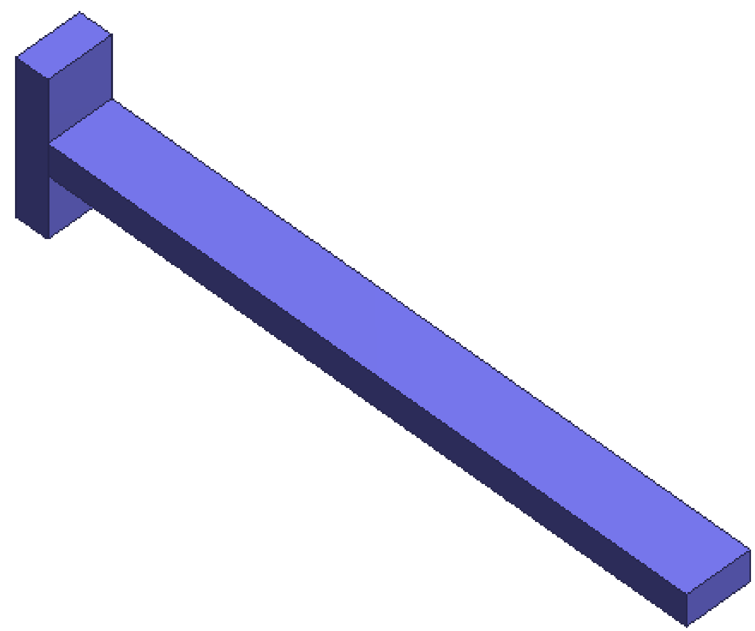




Select two solid bodies
while pressing Ctrl key

[Model] > [Modification Operation] > [Unite]



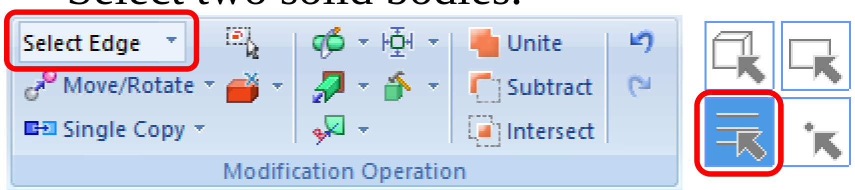


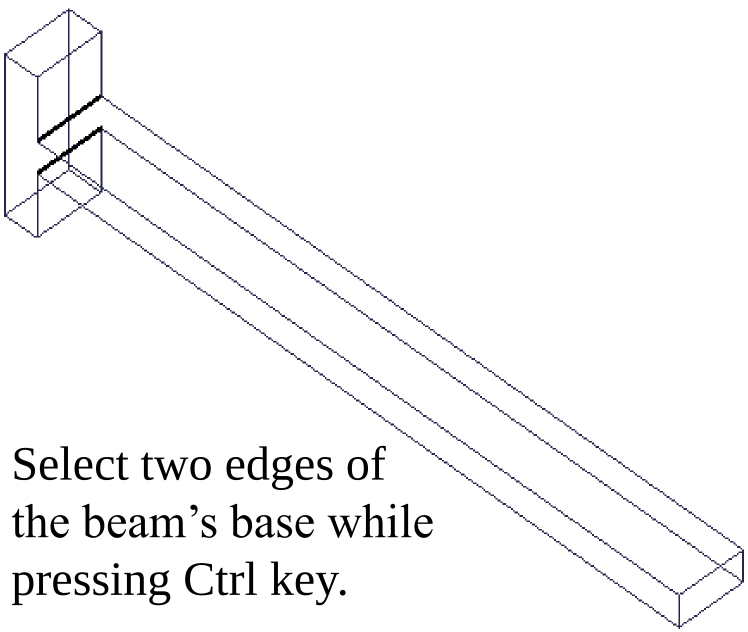
Exercise - Stress Analysis

Murata Software

Modeling

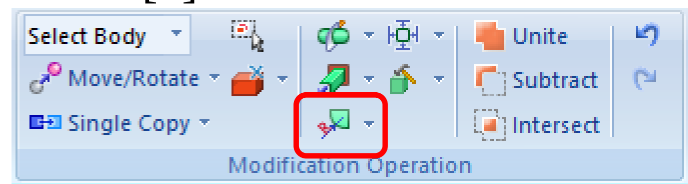
Switch target to Edge.
Select two solid bodies.

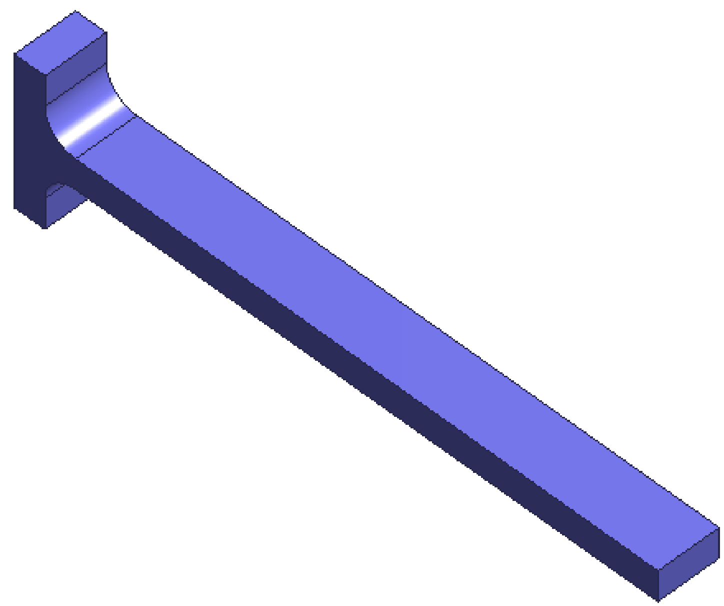




Select two edges of the beam’s base while pressing Ctrl key.

[Model] > [Modification Operation] > [Fillet]
Enter radius [1]

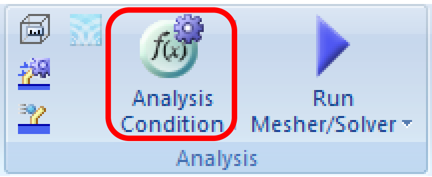


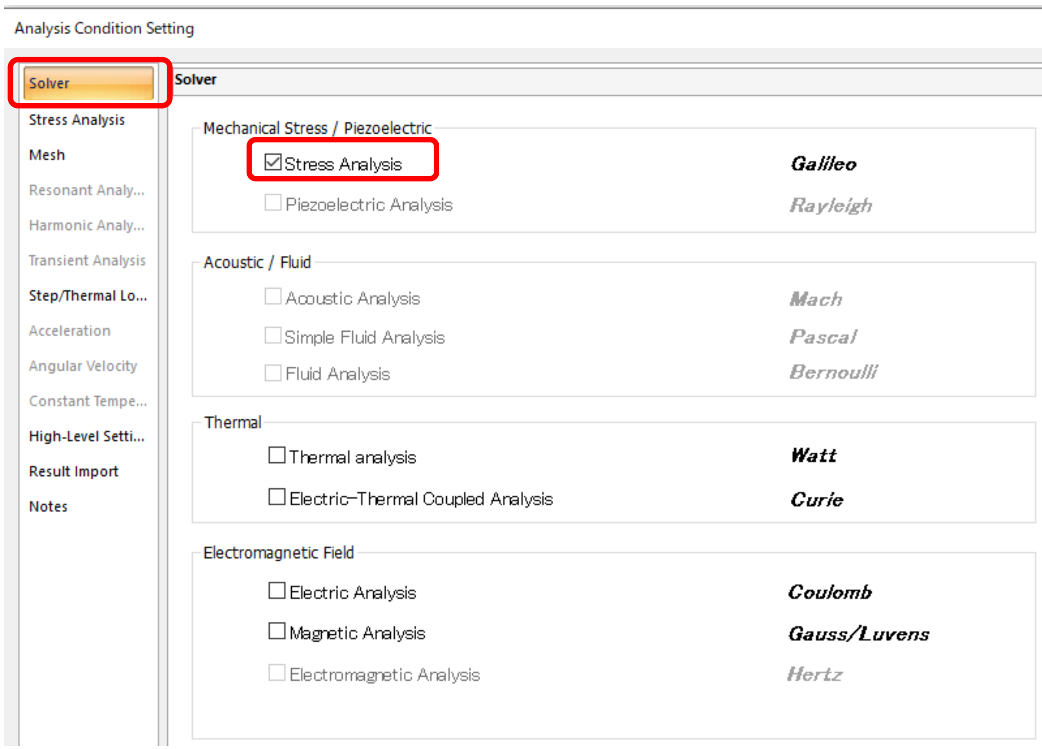


Exercise - Stress Analysis

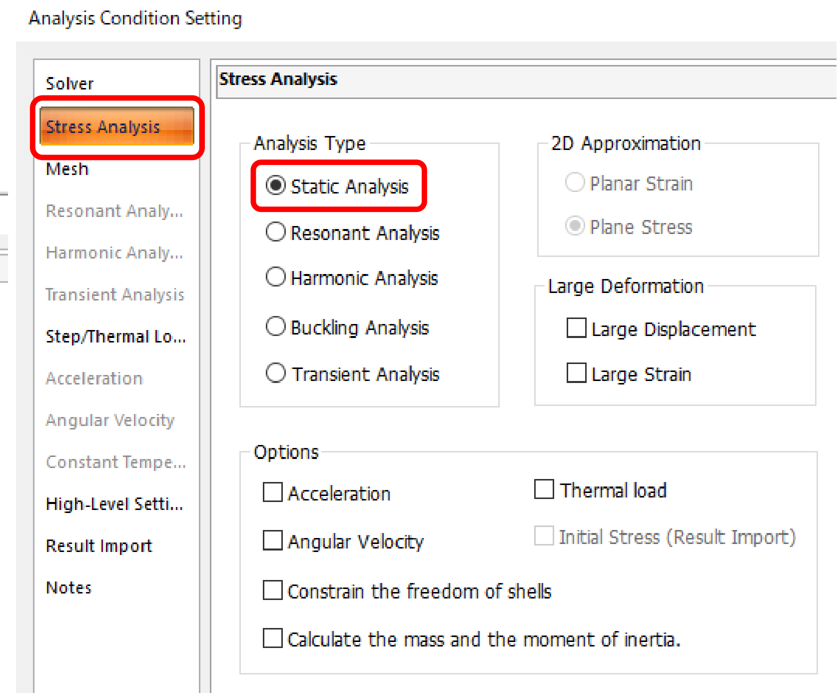
Analysis Condition Setting

[Model] > [Analysis] > [Analysis Condition]
Select [Stress Analysis] on the Solver tab.





Select [Static Analysis] on the [Stress Analysis] tab.

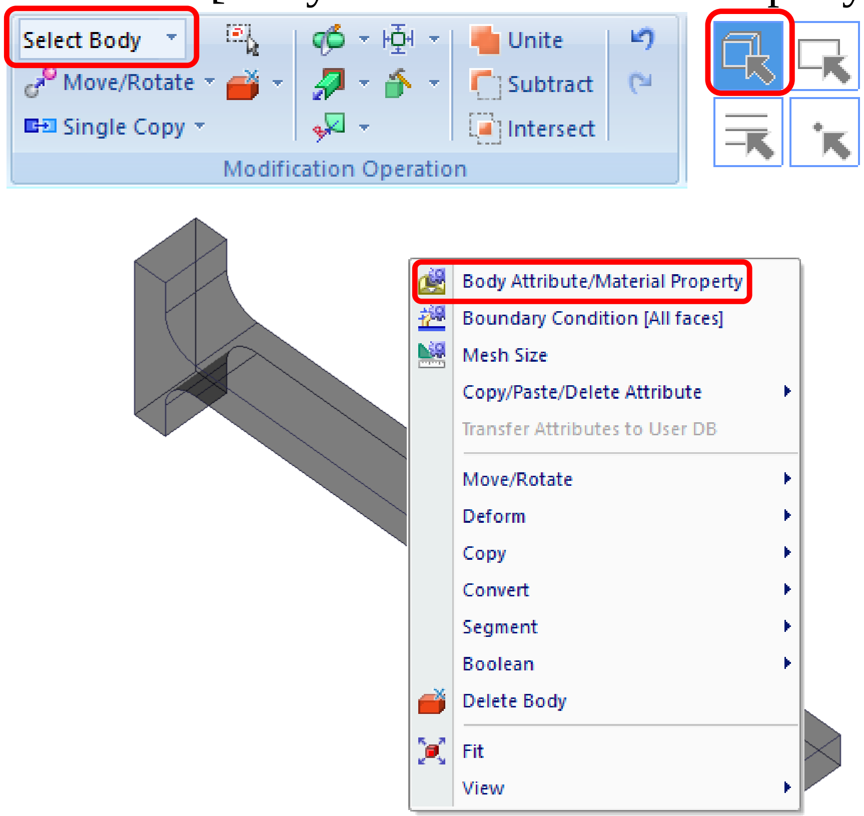


Exercise - Stress Analysis

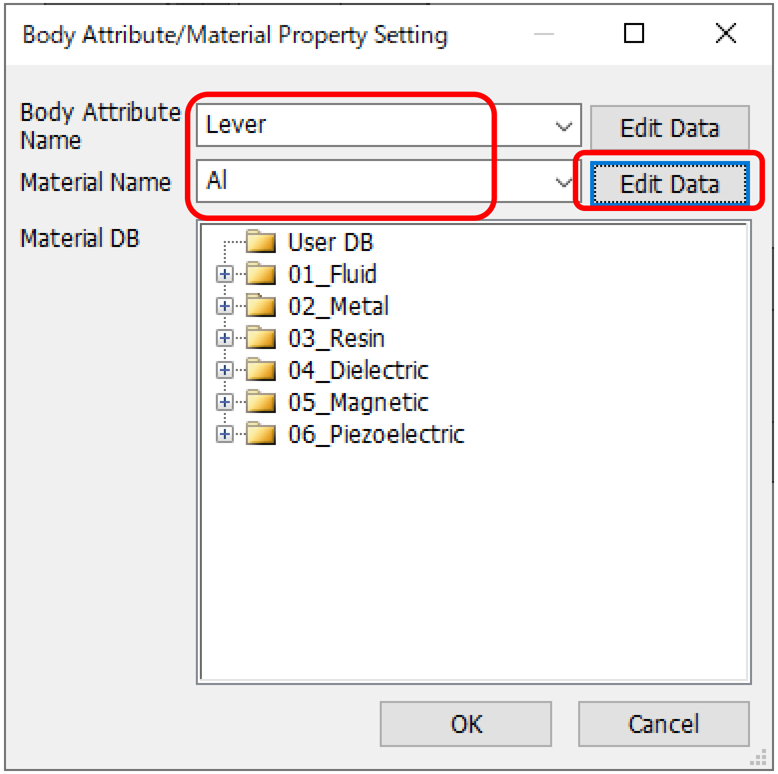
Murata Software

Body Attribute/Material Property Setting

Switch target to Body.
Right-click on the beam body.
Select [Body Attribute/Material Property]



Enter [Lever] as Body Attribute Name.
Enter [Al] as Material name.
Press Edit Data button.

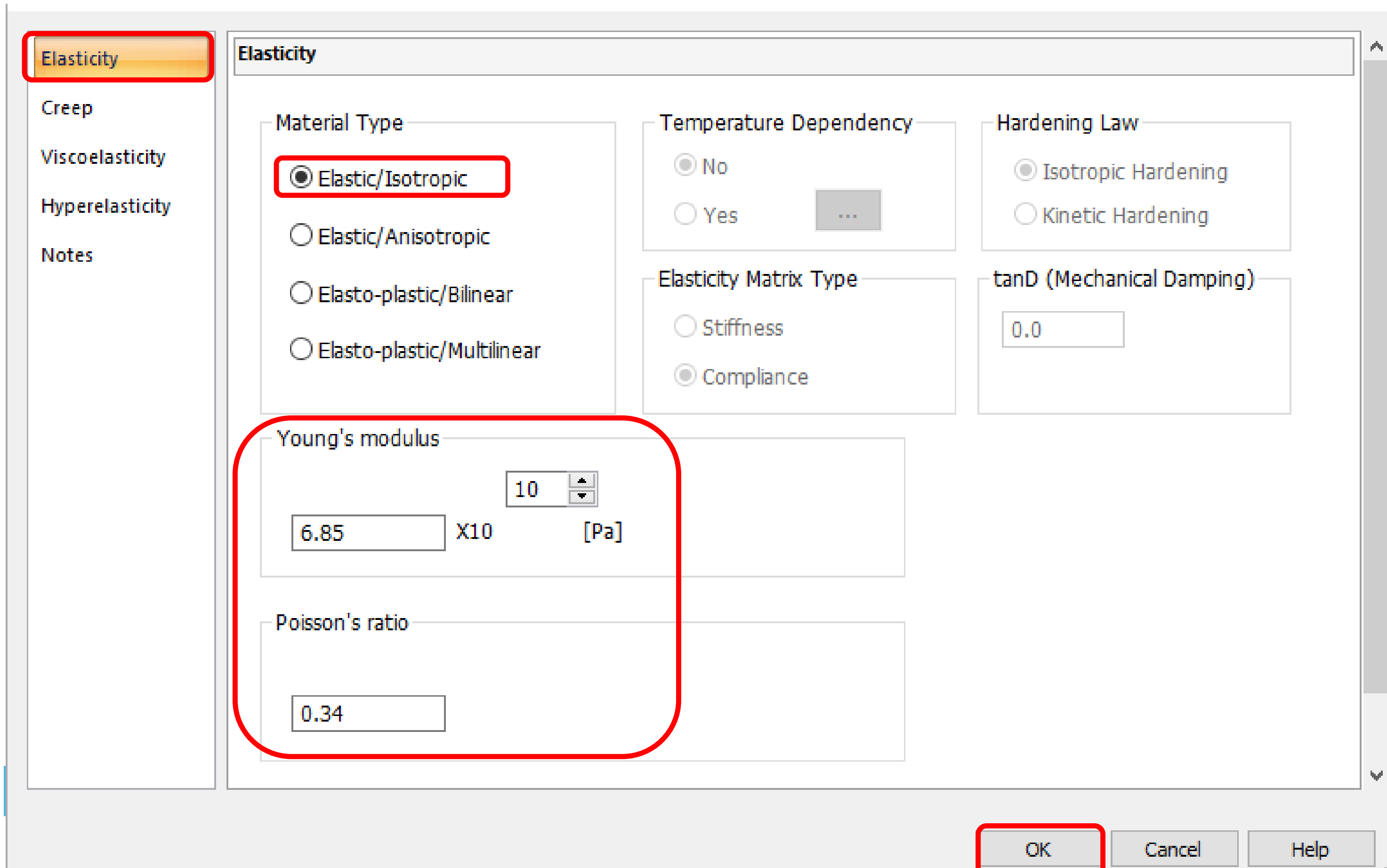


Exercise - Stress Analysis

Murata Software

Body Attribute/Material Property Setting

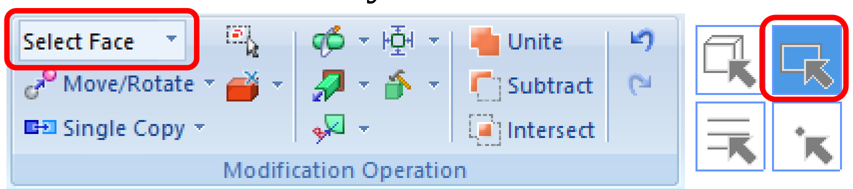
Select [Elastic/Isotropic] on the Elasticity tab.
Type 6.85 in the Young’s modulus and 10 for exponent.
Enter 0.34 in the Poisson’s ratio.

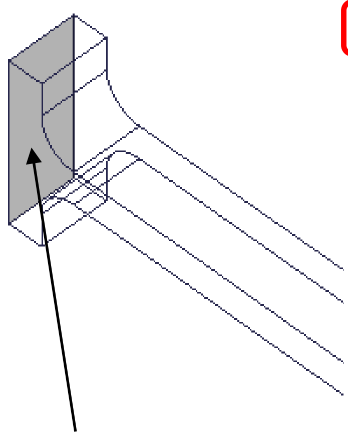


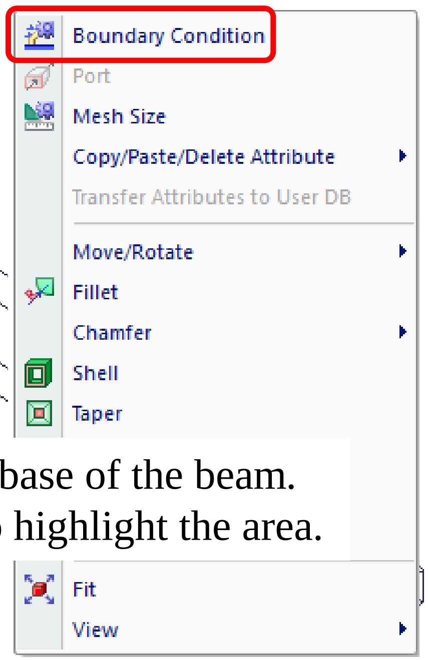
Exercise - Stress Analysis

Boundary Condition Setting

Select the base of the beam and right-click.
Select [Boundary Condition].

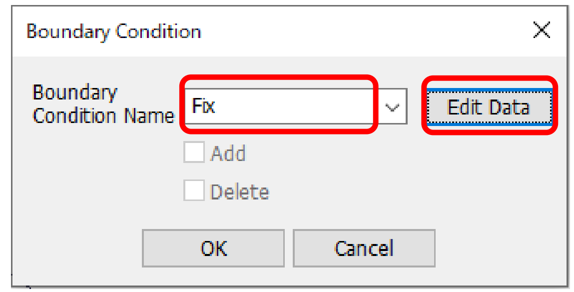


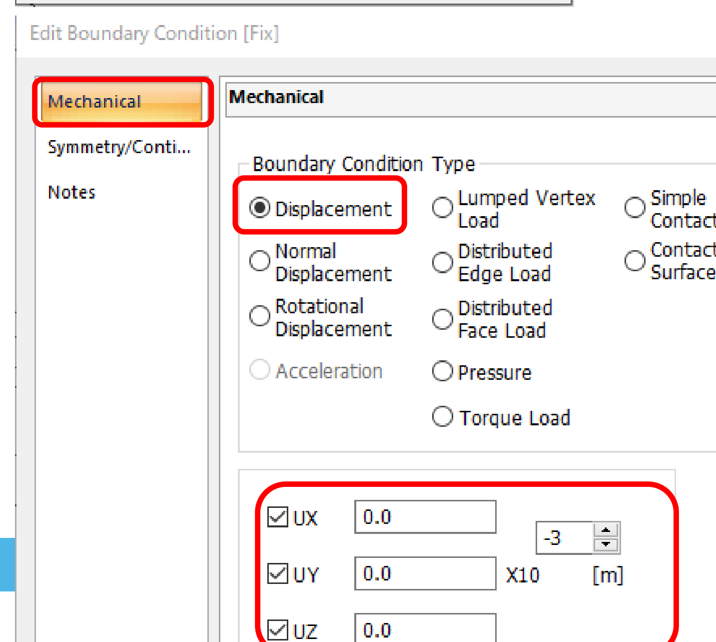




Bring mouse to the base of the beam.
Press a space key to highlight the area.

Type [Fix] as Boundary Condition Name.
Press Edit Data button.
Select [Displacement] on the Mechanical tab.
Type UX=0, UY=0, and UZ=0.



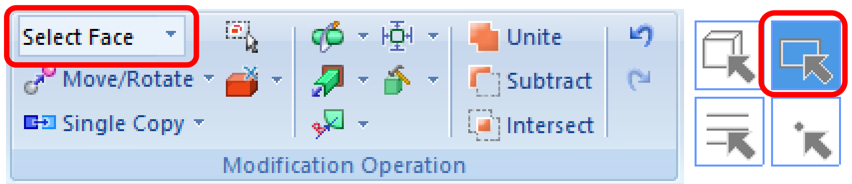


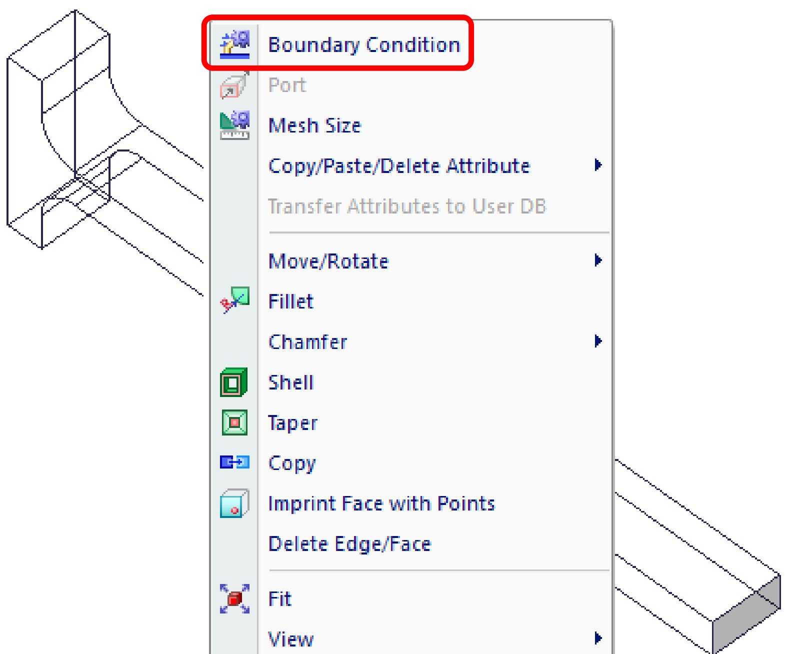
Exercise - Stress Analysis

Murata Software

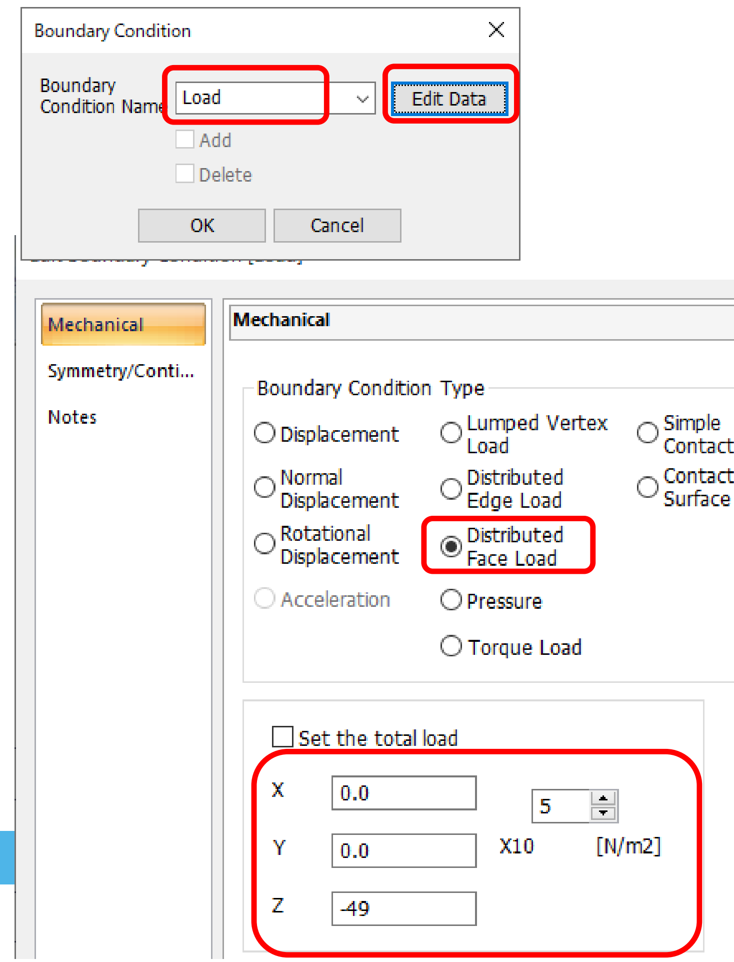
Boundary Condition Setting

Right-click on the front end of the beam.
Select [Boundary Condition].





Type [load] as Boundary Condition Name.
Press Edit Data button.
Select [Distributed Face Load] on the Mechanical tab.
Type X=0, Y=0, Z= -49, and exponent=5.

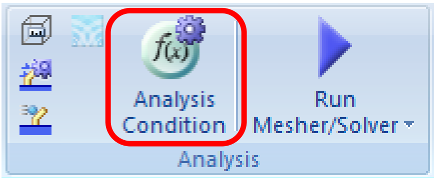


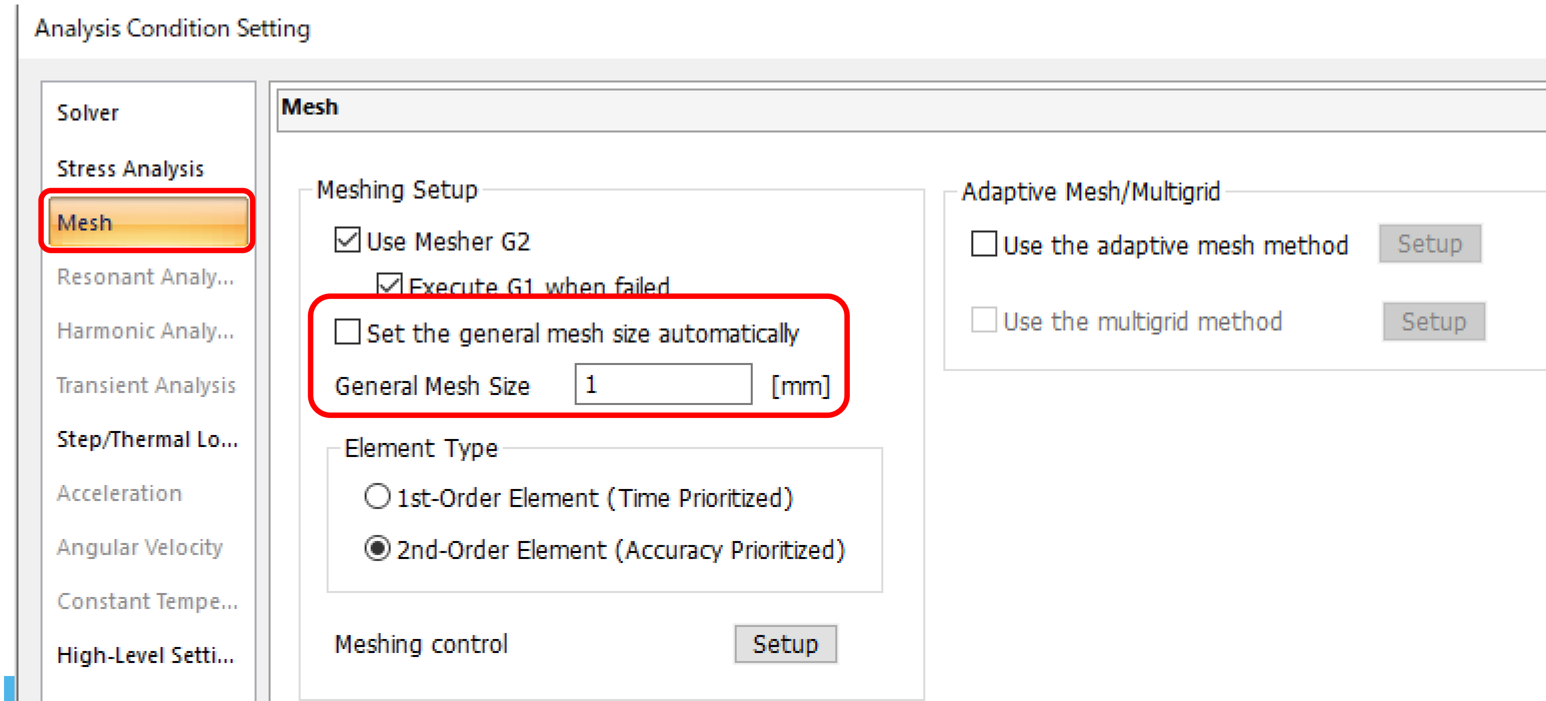
Exercise - Stress Analysis

Murata Software

Mesh Size Setting

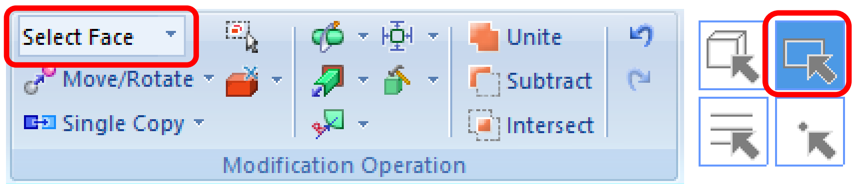
[Model] > [Analysis] > [Analysis Condition]
Deselect [Set the general mesh size automatically] on the Mesh tab.
Enter General Mesh Size =1.

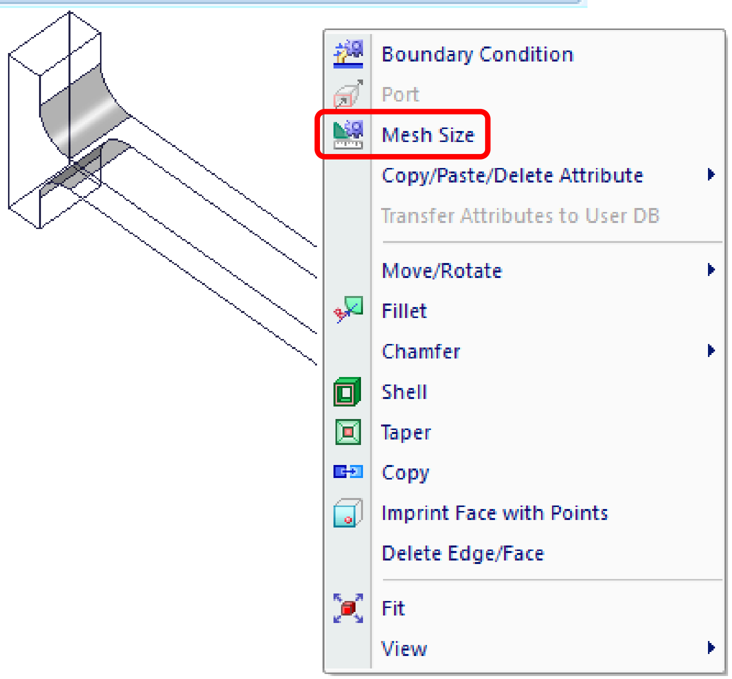




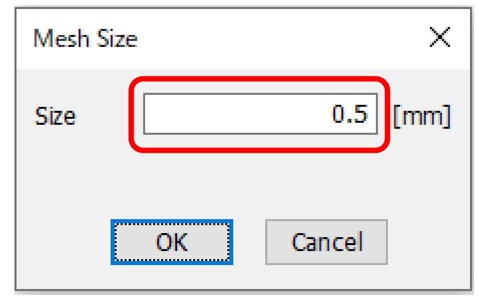
Mesh Size Setting

Select two faces of the beam’s base and right-click.
Select [Mesh Size].





Type 0.5 in the Mesh Size dialog box.

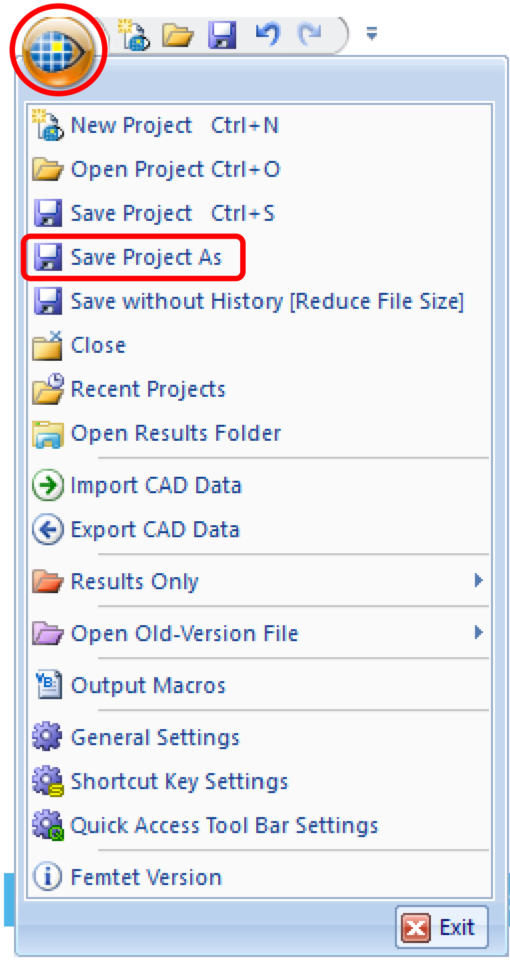


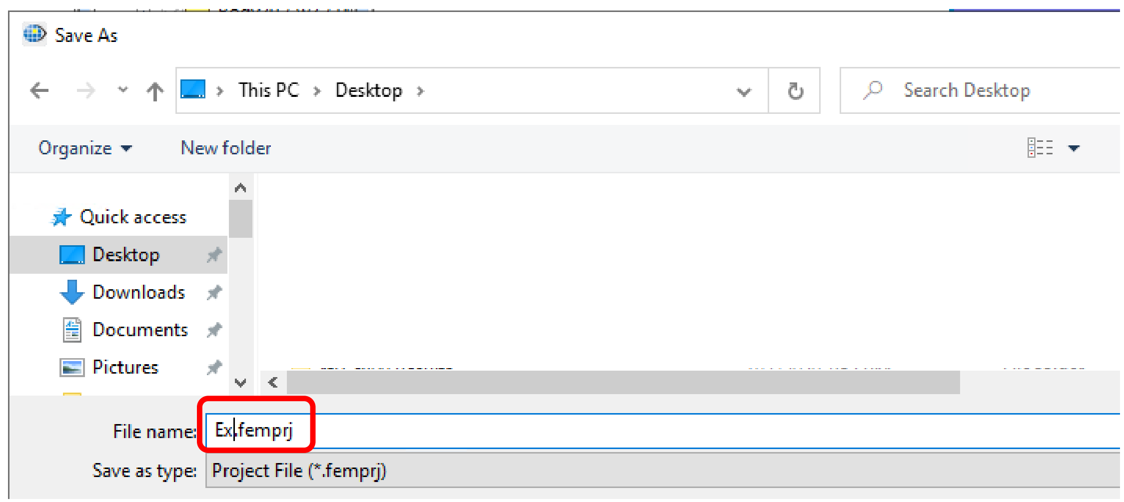
Exercise - Stress Analysis

Murata Software

Save Model

Application button > [Save Project As].
Type file name as you wish.





* You can save file anytime while you work on the project.

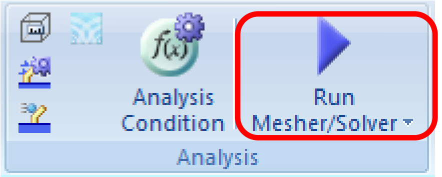
Exercise - Stress Analysis

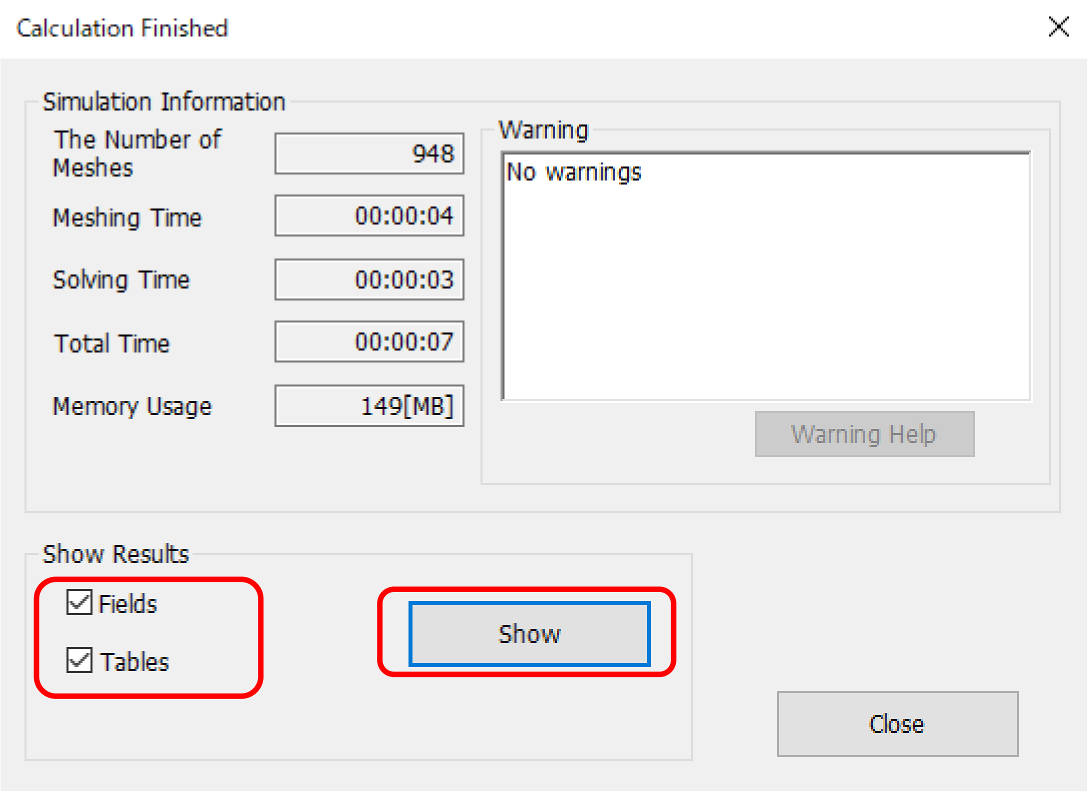
Murata Software

Run Solver

[Model] > [Analysis] > [Run Mesher/Solver].

In the [Calculation Finished] dialog box, select [Fields] and [Tables], and press Show button.

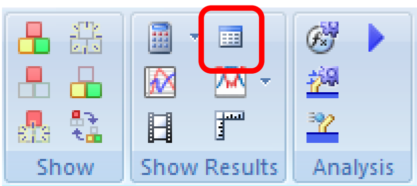




Exercise - Stress Analysis

Table

If [Table] is selected in the Calculation Finished dialog box, the table will show up automatically.
Or, [Results] > [Show Results] > [Table]



Table

External/Reactive Force [N] | Strain energy [J] | Maximum displacement [m] | Maximum stress [Pa] | FEM Info

	X component	Y	Z	Absolute value
Fix	1.713e-11	5.361e-11	9.8	9.8
Load	4.053e-11	2.475e-11	-9.8	9.8

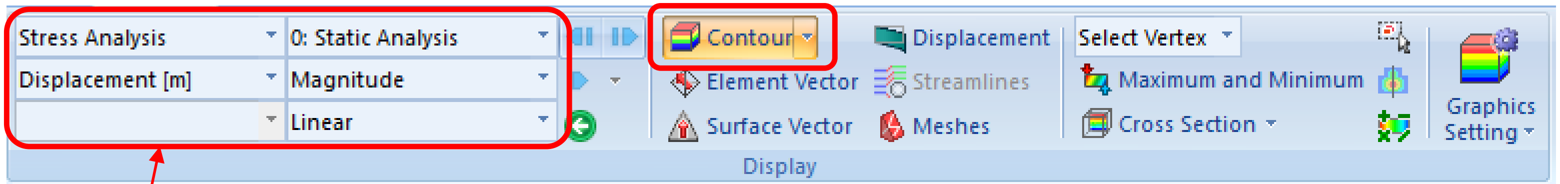
Small values of the X and Y components are output due to a calculation error.

Exercise - Stress Analysis

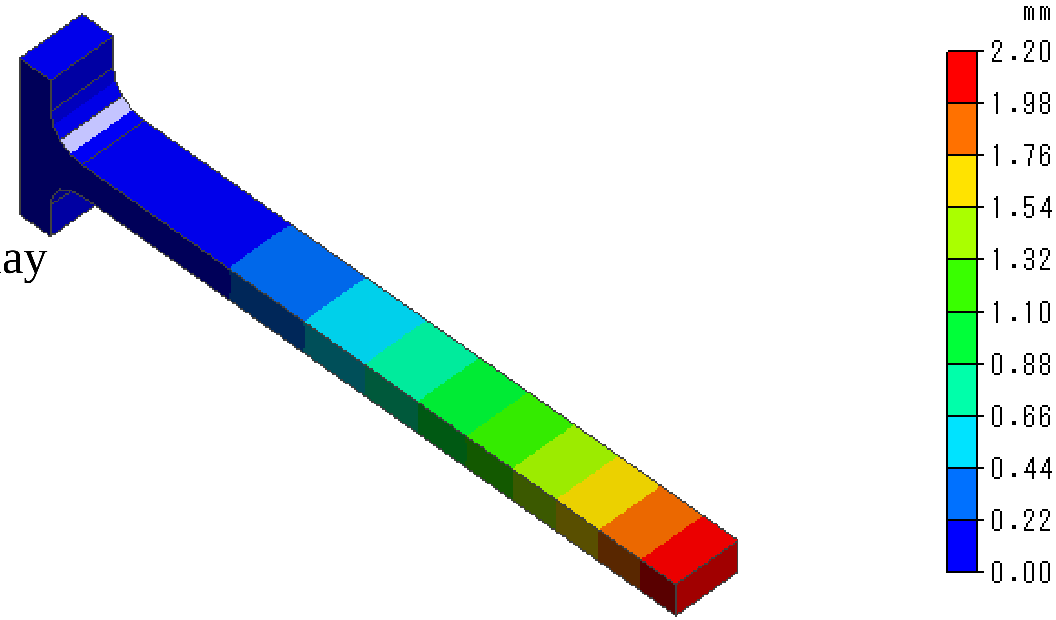
Murata Software

Contour

[Results] > [Display] > [Contour]
The results of specified items are displayed.



Items to display

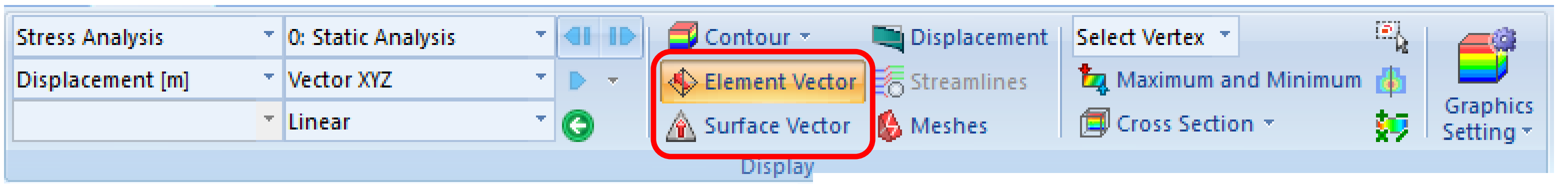


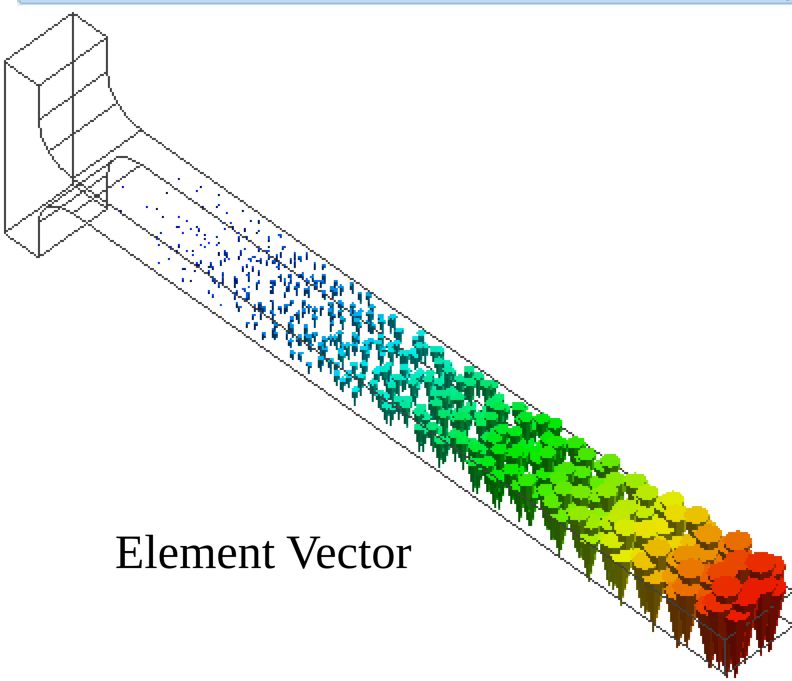
Exercise - Stress Analysis

Vector

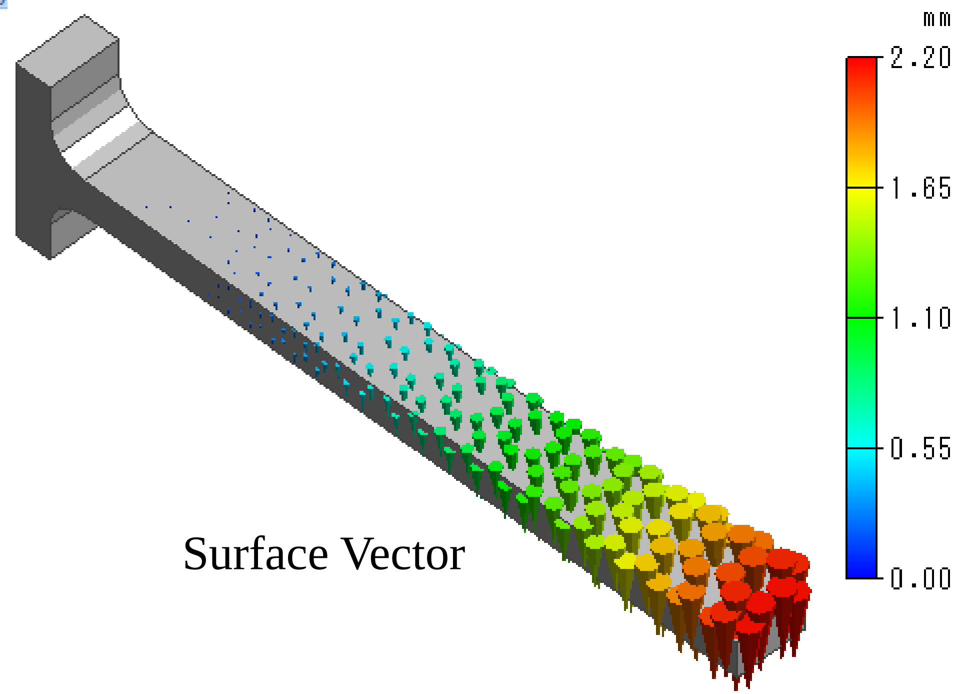
[Results] > [Display] > [Element Vector] or [Surface Vector]

The surface vectors show the results on the surface of the analysis model only.





Element Vector



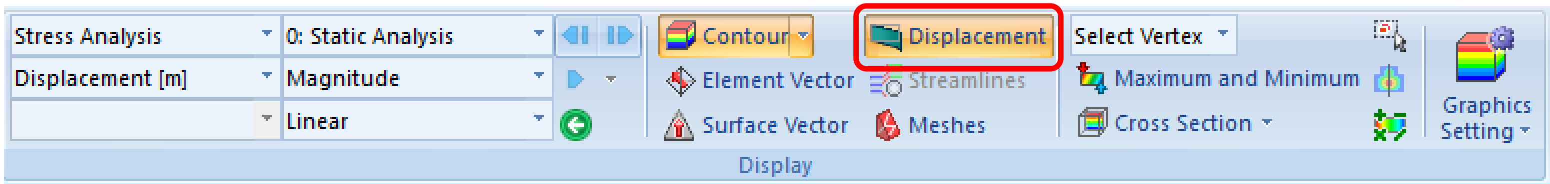
Surface Vector

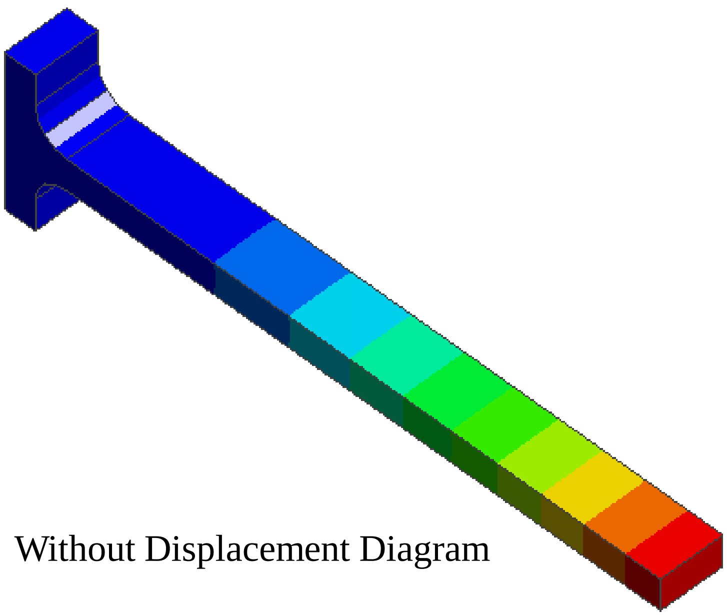
Exercise - Stress Analysis

Murata Software

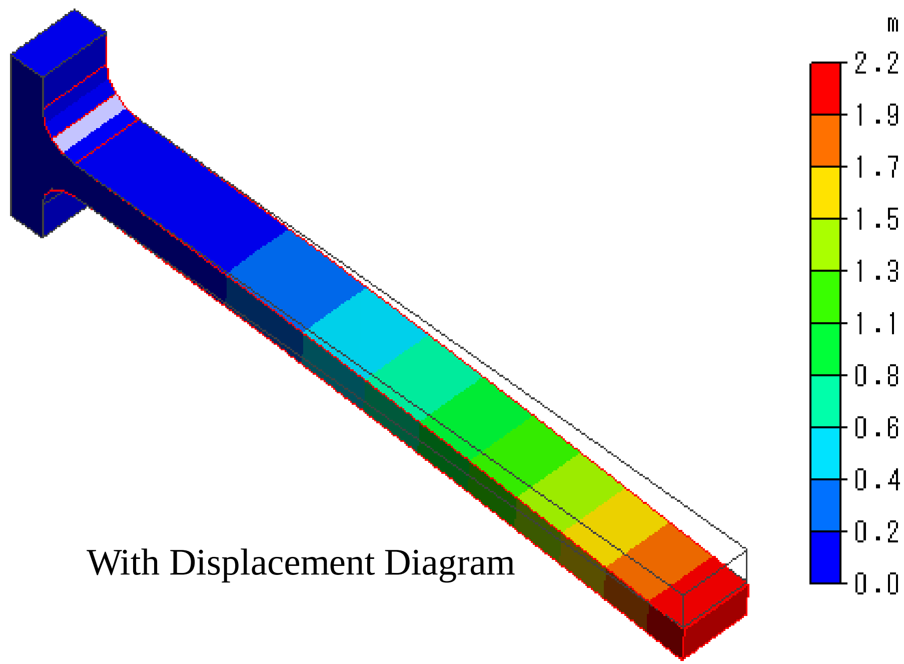
Displacement

[Results] > [Display] > [Displacement]





Without Displacement Diagram



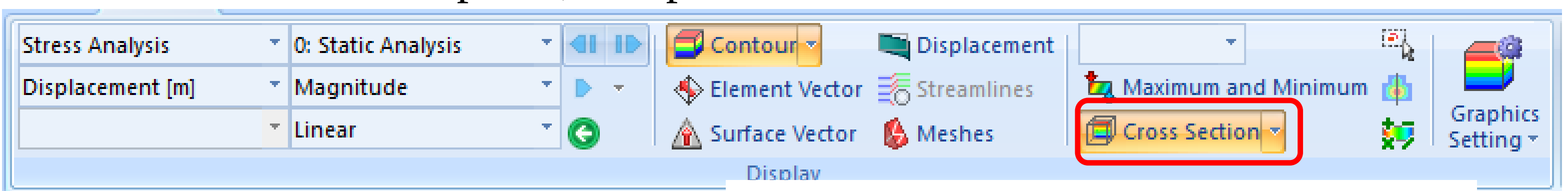
With Displacement Diagram

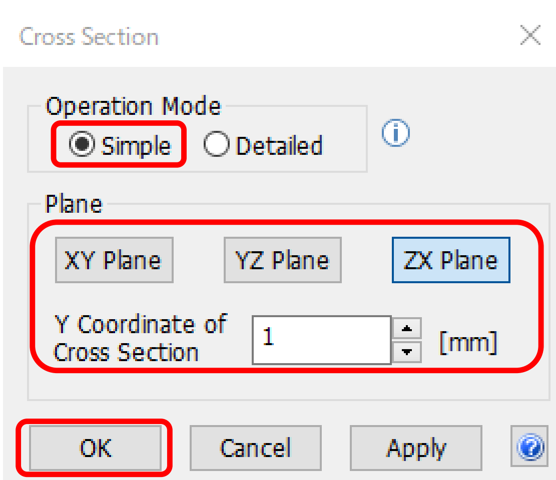
Exercise - Stress Analysis

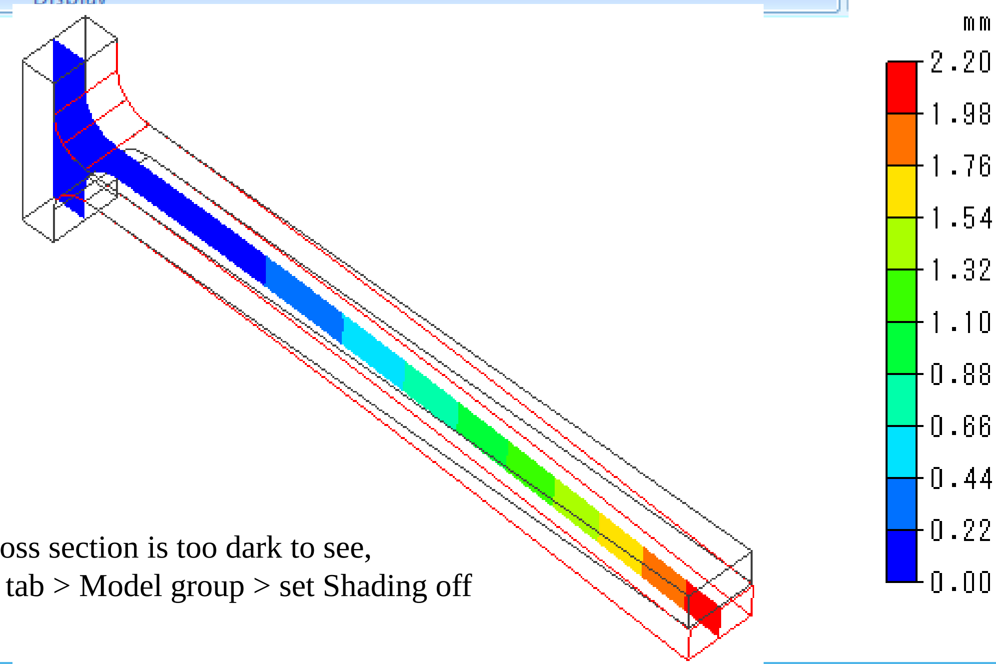
Cross Section (Simple)

[Results] > [Display] > [Cross Section]

In the dialog box, select Simple Operation Mode, specify the cross section and coordinates of the plane, and press OK.







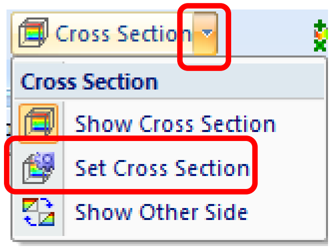
If the cross section is too dark to see,
Display tab > Model group > set Shading off

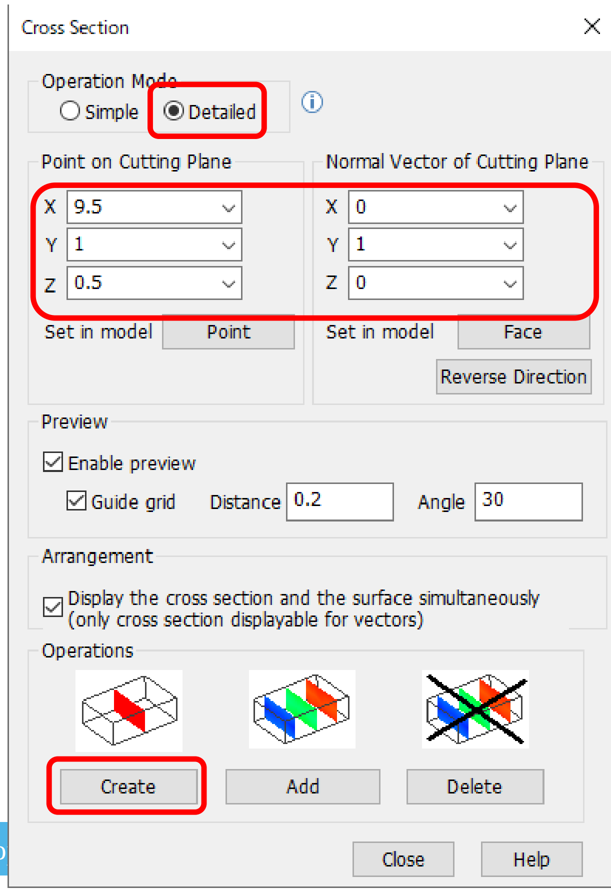
Exercise - Stress Analysis

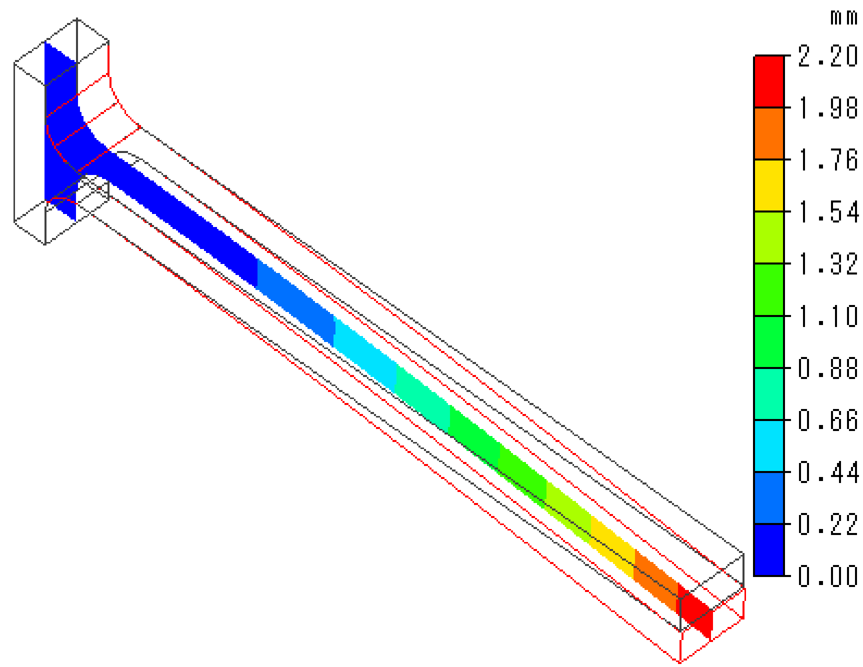
Murata Software

Cross Section (Detailed)

[Results] > [Display] > Submenu of [Cross Section] > Set Cross Section.
In the dialog box of Cross Section, select Detailed Operation Mode, specify the Point on Cutting Plane and Normal Vector of Cutting Plane, and press Create button.





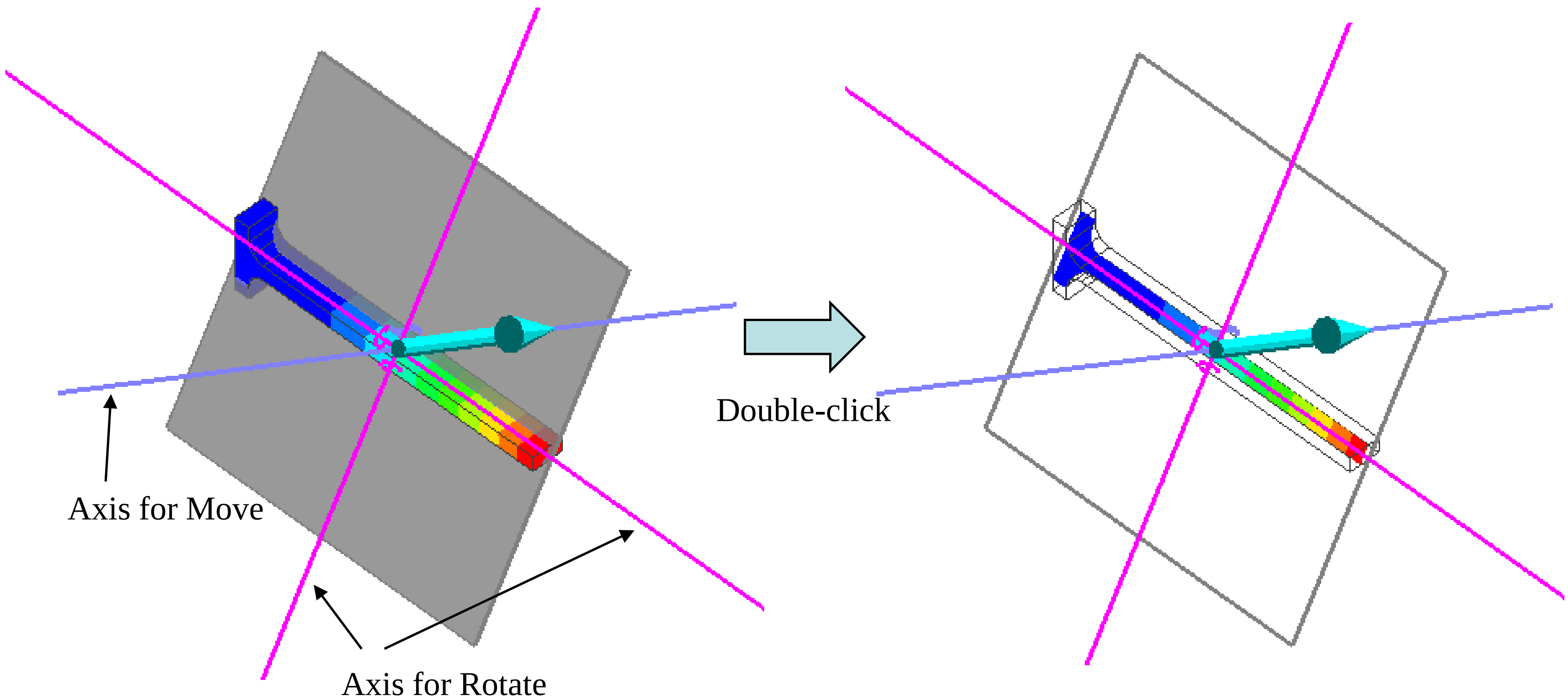


Exercise - Stress Analysis

Murata Software

Cross Section on the Preview Window

Move the cross section on a blue axis and rotate the cross section on a purple axis.
Show the cross section by double-clicking the position of your wish.

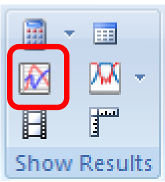


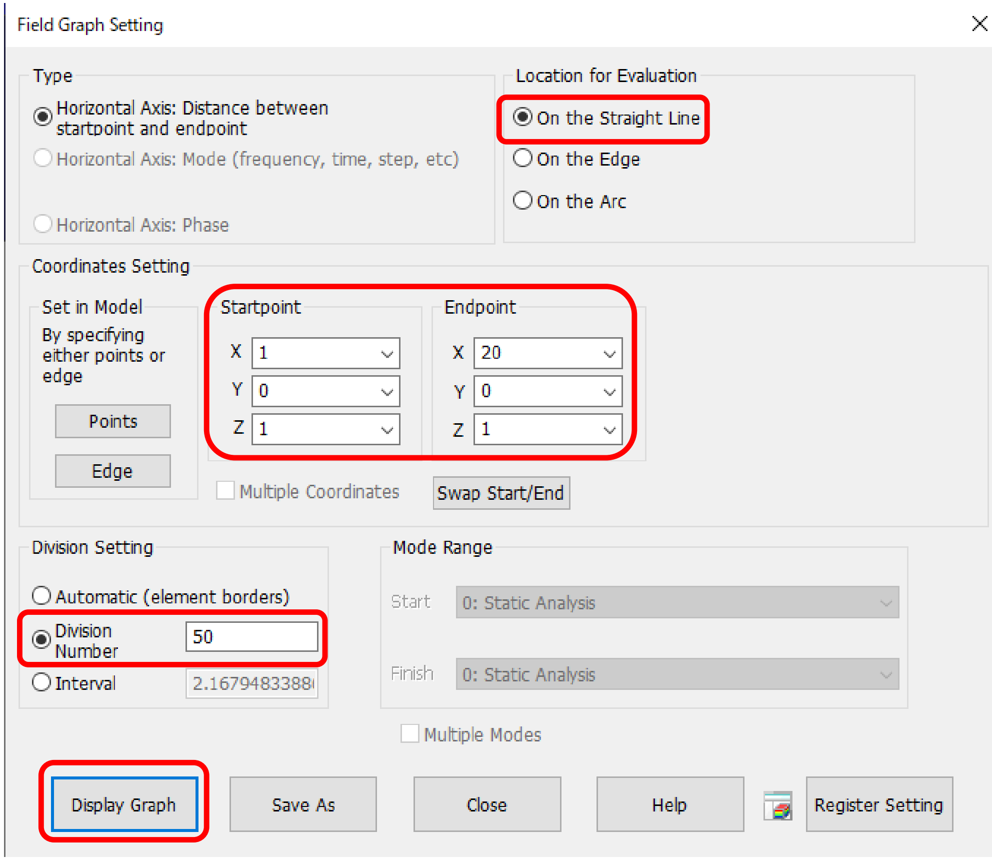
Display Graph on the Straight Line

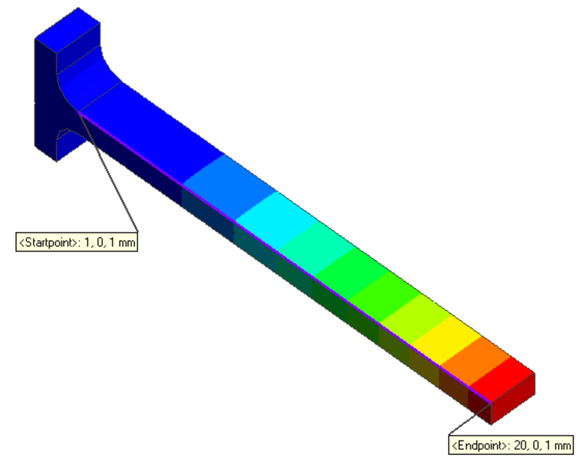
[Results] > [Display] > [Display Graph]

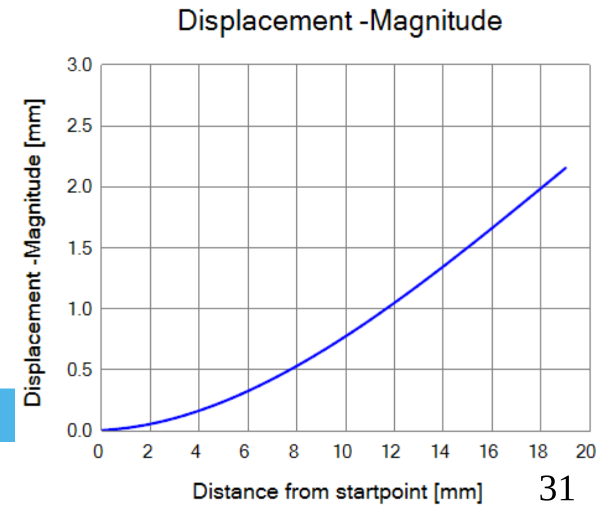
Select [On the Straight Line] for the location for evaluation, and enter Startpoint Endpoint, and Division Number.

Press Display Graph button.









Exercise - Stress Analysis

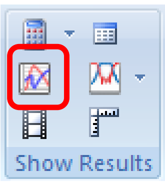
Murata Software

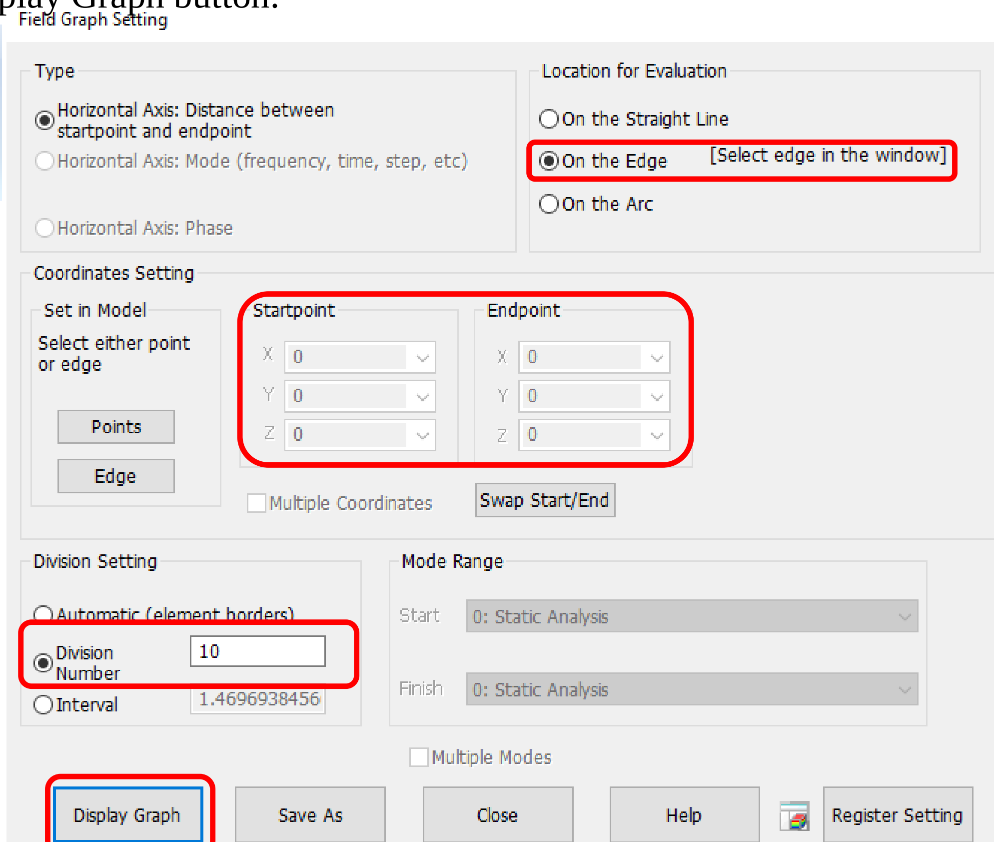
Display Graph on the Edge

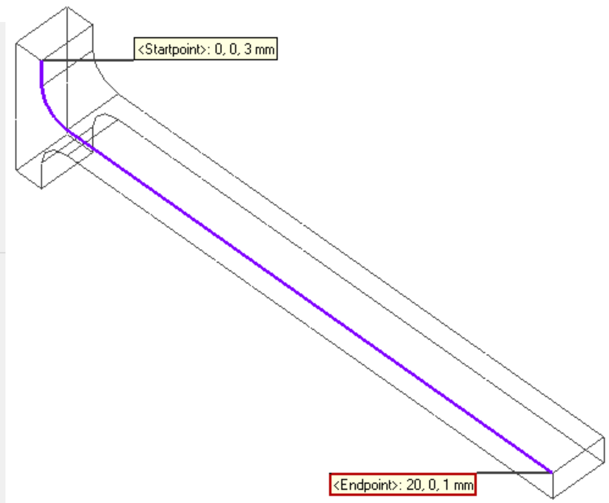
[Results] > [Display] > [Display Graph]

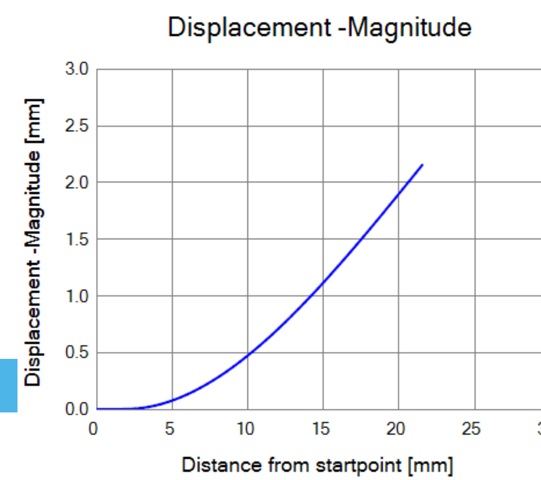
Select [On the Edge] for the location for evaluation and specify the edge(s) and enter Division Number.

Press Display Graph button.







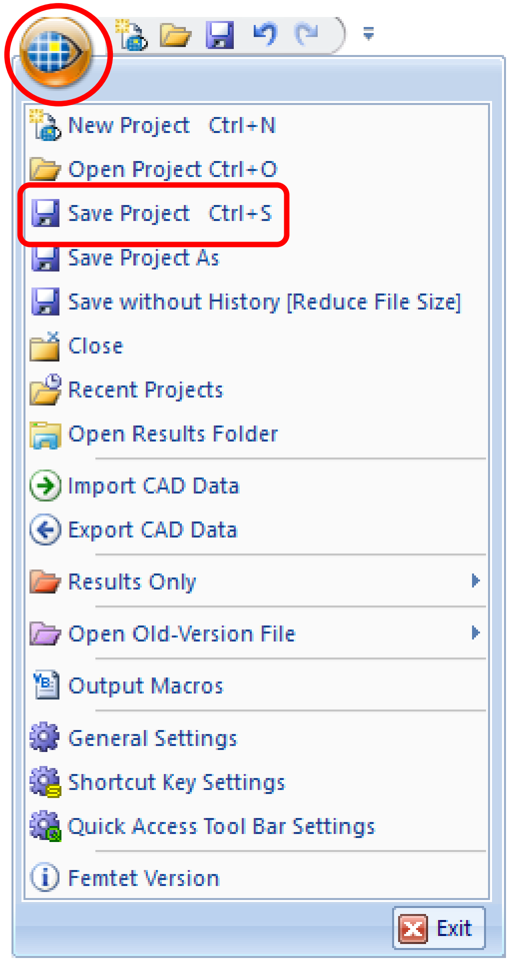


Exercise - Stress Analysis

Murata Software

Save the Results

Application button > [Save Project]
Overwrite the project file that was saved when creating the analysis model.

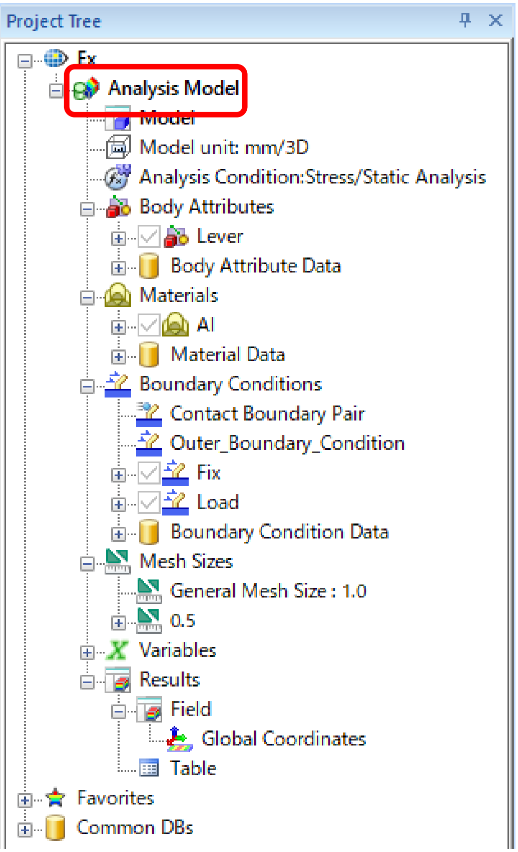


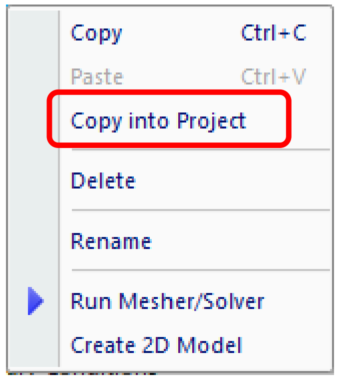
Exercise - Stress Analysis

Murata Software

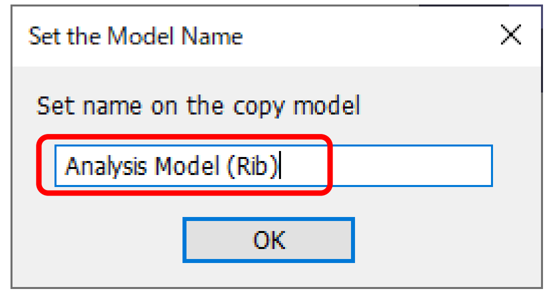
Copy Analysis Model

Right-click on [Analysis Model] in the project tree.
Execute [Copy into Project].





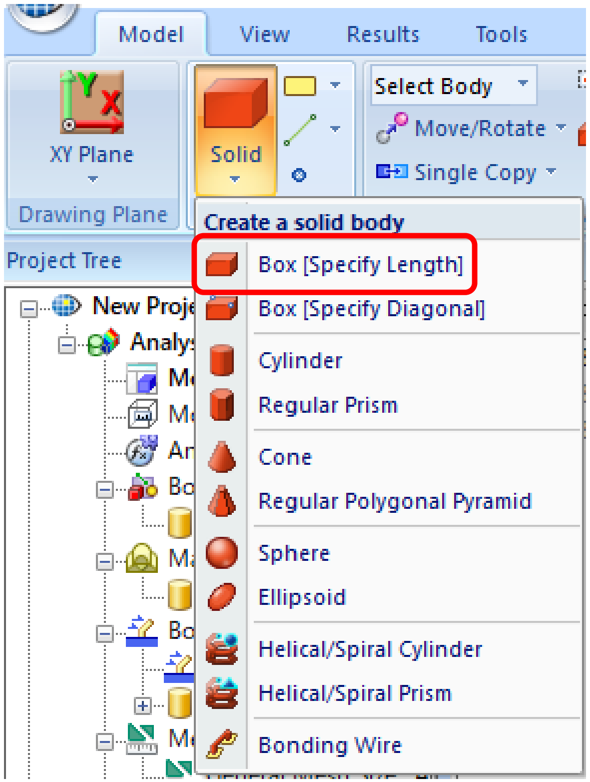
In the dialog box, enter the analysis model name [Analysis Model (Rib)].

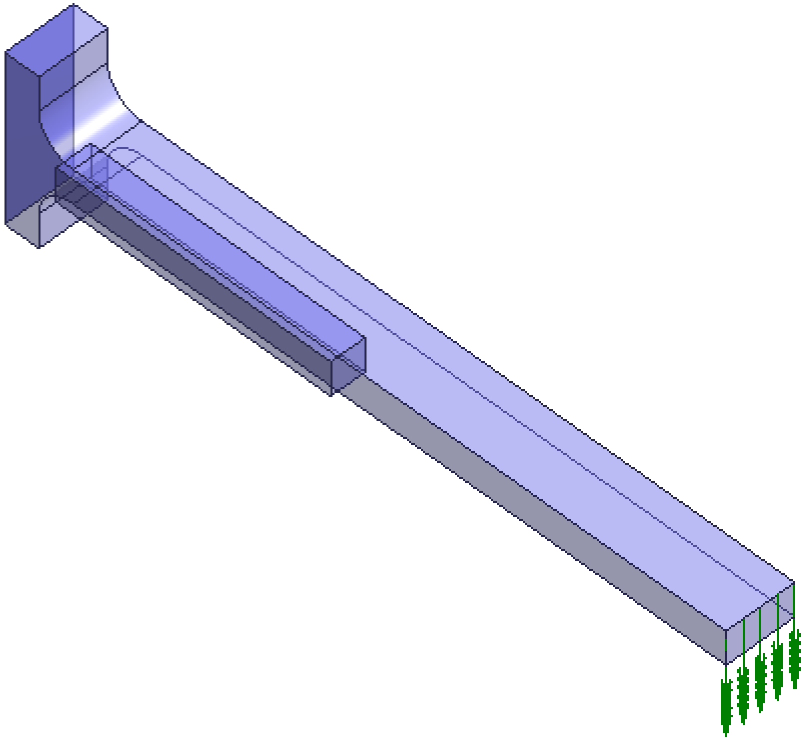


Using the existing analysis model and results, analysis with different conditions can be executed.

Modeling

[Model] > [Primitives] > [Box [Specify Length].
Enter Startpoint [0, 0.5, 0], Width [8], Depth [1], and Height [-1].

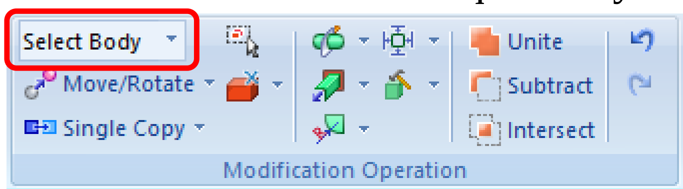


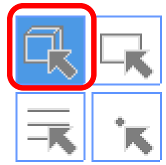


Exercise - Stress Analysis

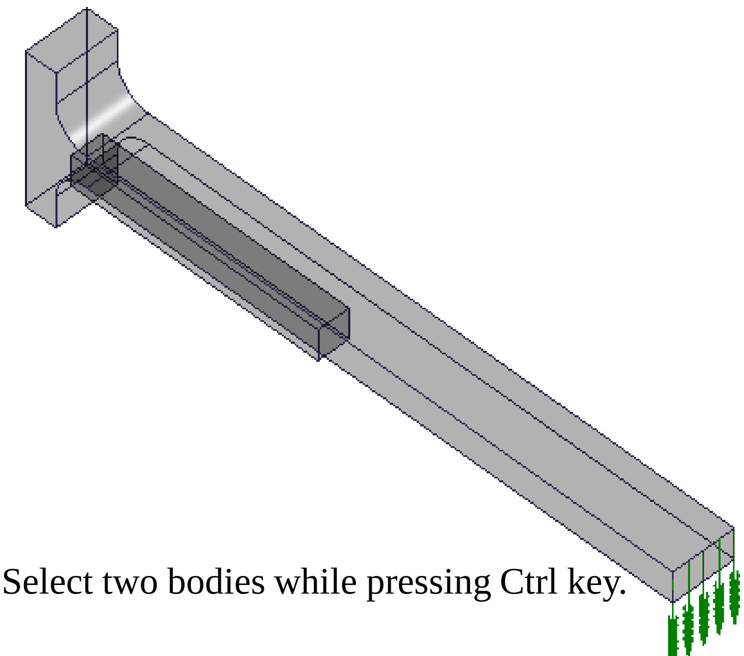
Modeling

Switch to Select Body.
Select rib and beam sequentially.



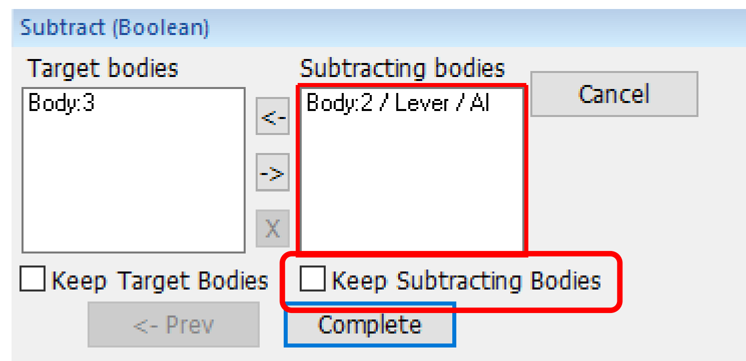


[Model] > [Modification Operation] > [Subtract]



Select two bodies while pressing Ctrl key.

Confirm that the rib is set target body and the beam is set a subtracting body.
Select Keep Subtracting Bodies.

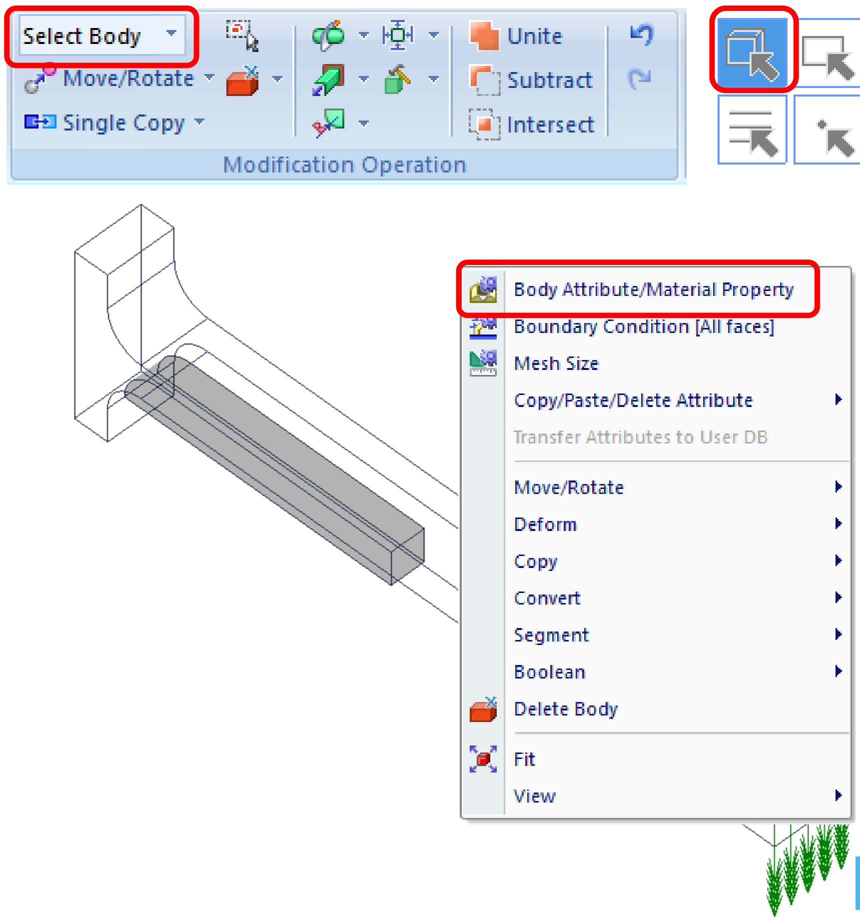


Exercise - Stress Analysis

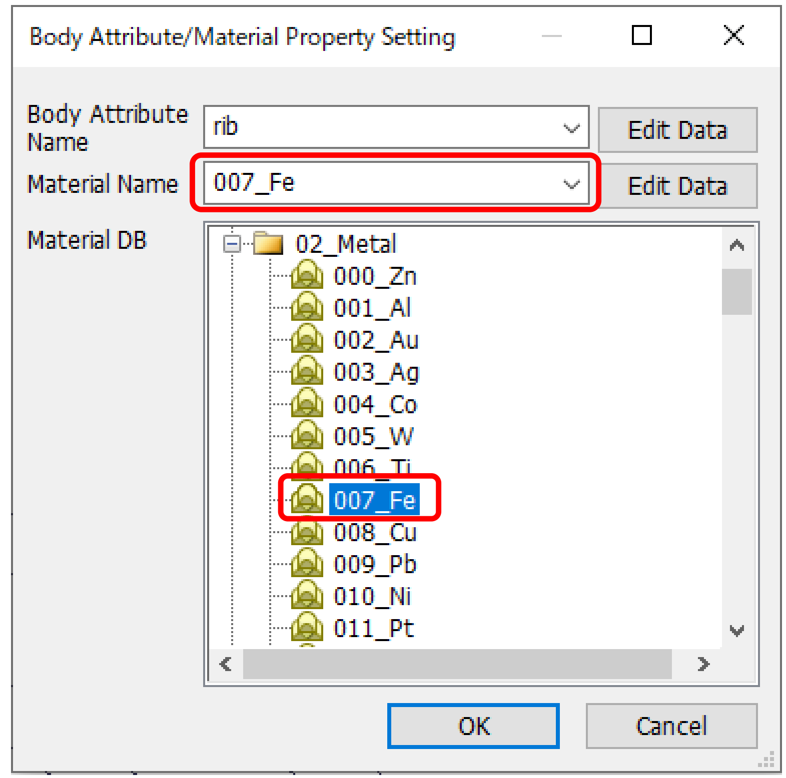
Murata Software

Body Attribute and Material Property Setting

Right-click on the rib body.
Select [Body Attribute/Material Property]



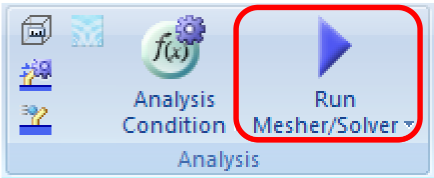
Enter [rib] for the Body Attribute Name.
Material DB > 02_Metal > 007_Fe.

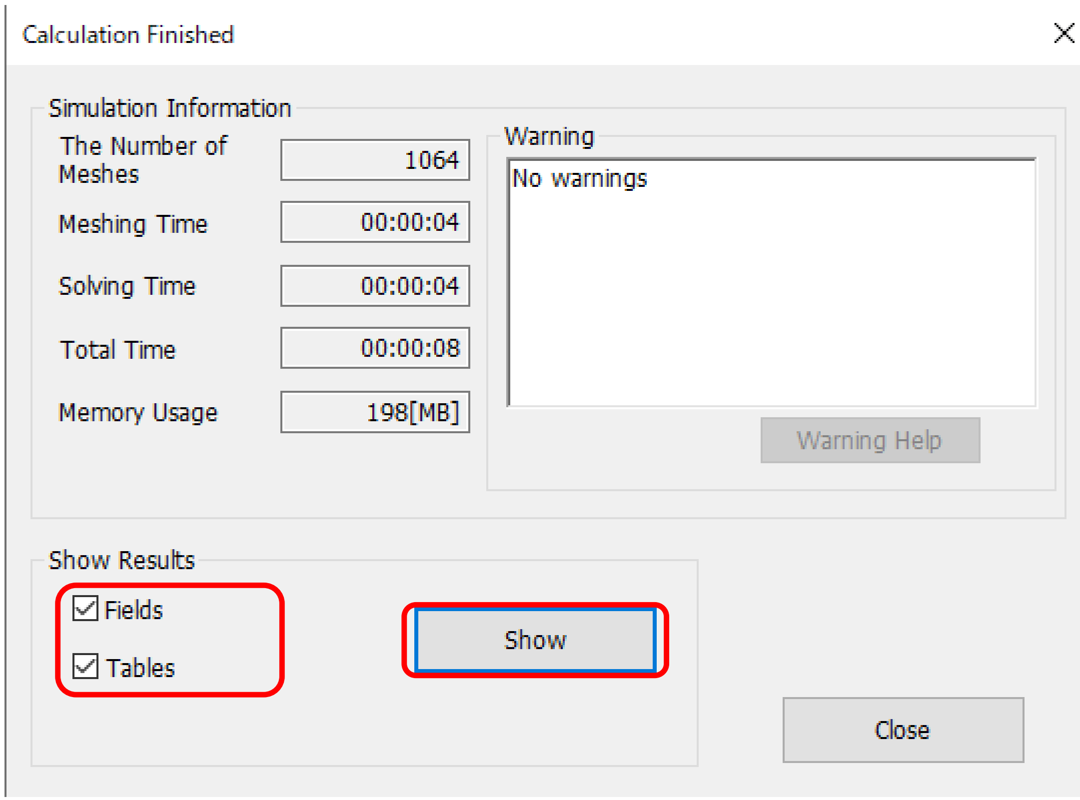


Exercise - Stress Analysis

Execute Analysis

[Model] > [Analysis] > [Run Mesher/Solver]
When the calculation is finished, select Fields and Tables in the dialog box, and press Show button.



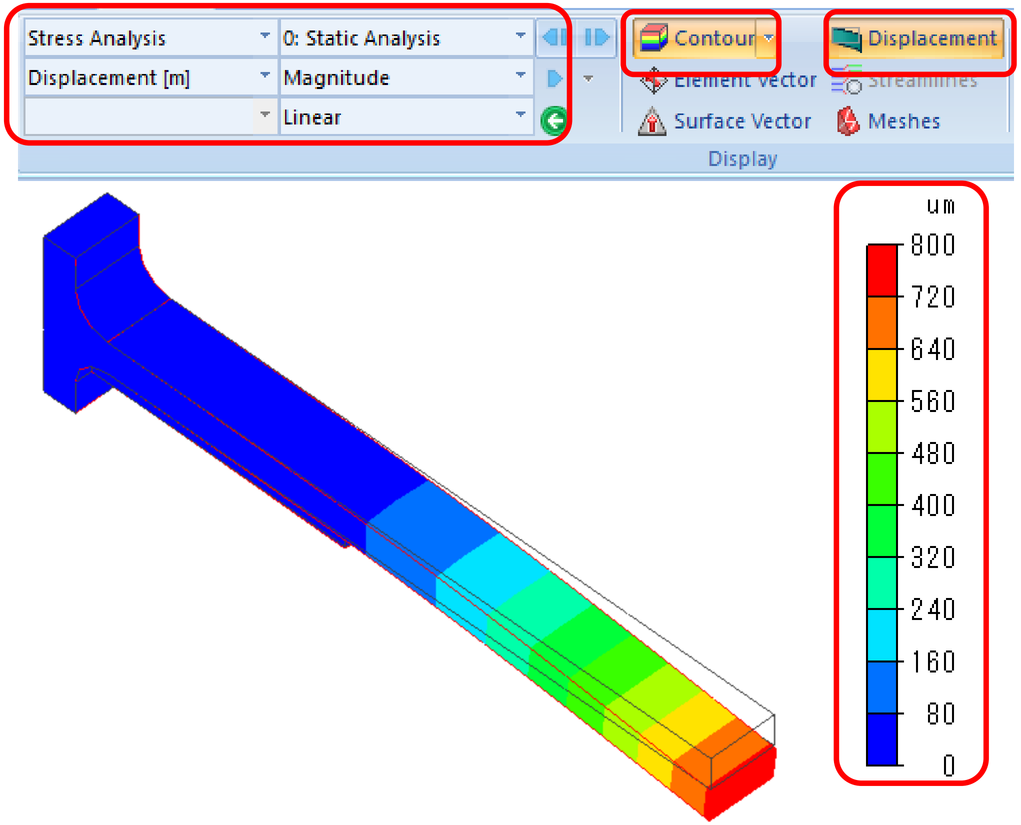


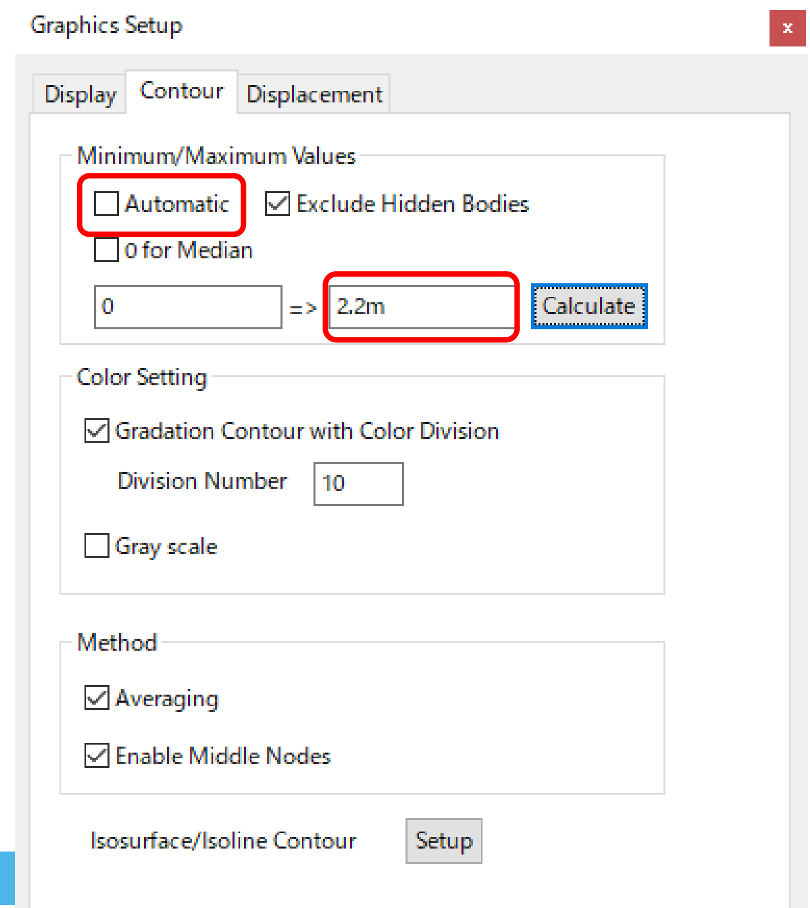
Exercise - Stress Analysis

Murata Software

Displacement (Compare the Results with and without Rib)

[Results] > [Display] > Select Contour and Displacement, and double-click the color scale.
Deselect [Automatic] of Minimum/Maximum Values, enter [2.2mm] for the maximum value.
Press Calculate button.

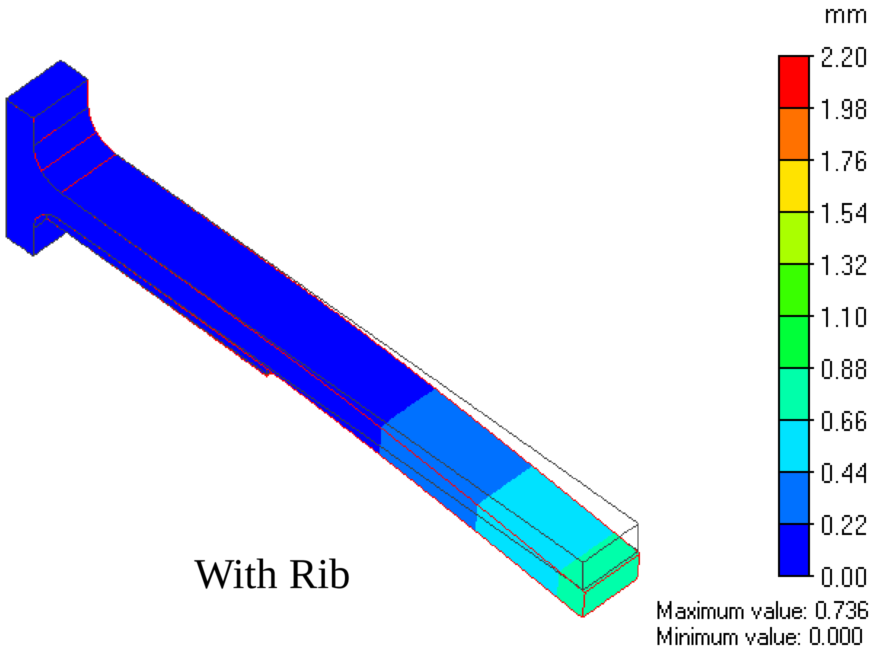




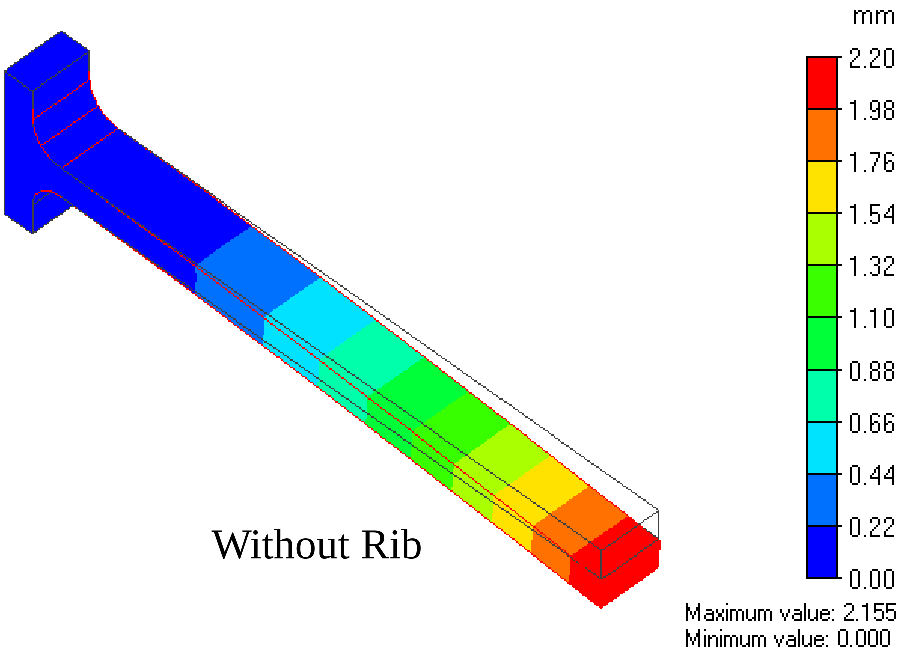
Exercise - Stress Analysis

Displacement (Compare the Results with and without Rib)

The maximum and minimum values of the color scale is changed as specified on the previous page. Scale adjustment can be done on the displacement tab by double-clicking on the color scale.



With Rib



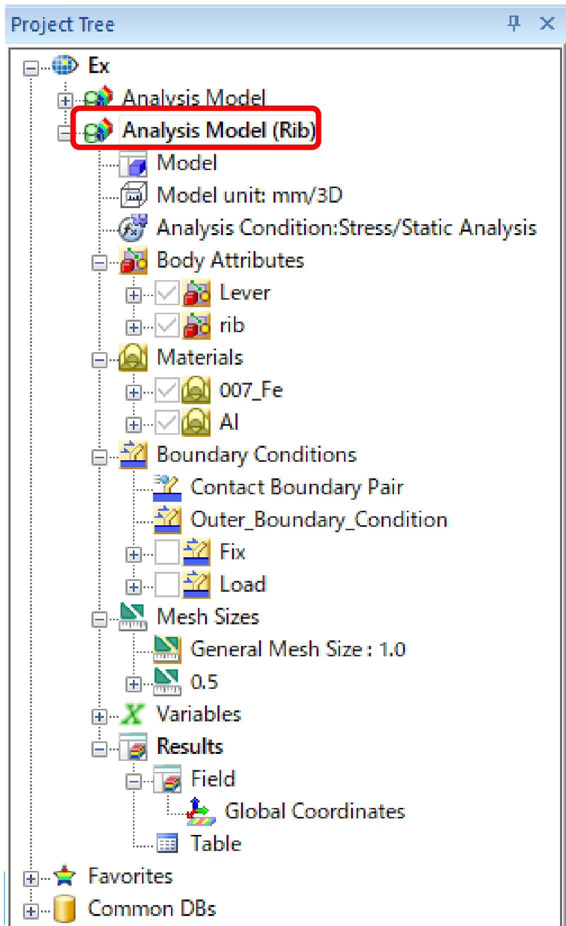
Without Rib

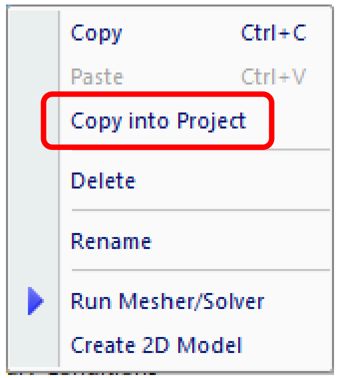
Exercise - Parametric Analysis

Murata Software

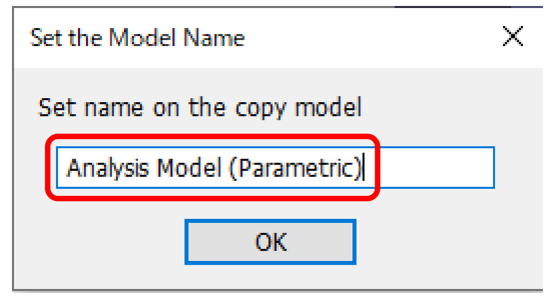
Copy Analysis Model

Right-click on [Analysis Model (Rib)] in the project tree. Execute [Copy into Project].





In the dialog box, enter the analysis model name [Analysis Model (Parametric)].

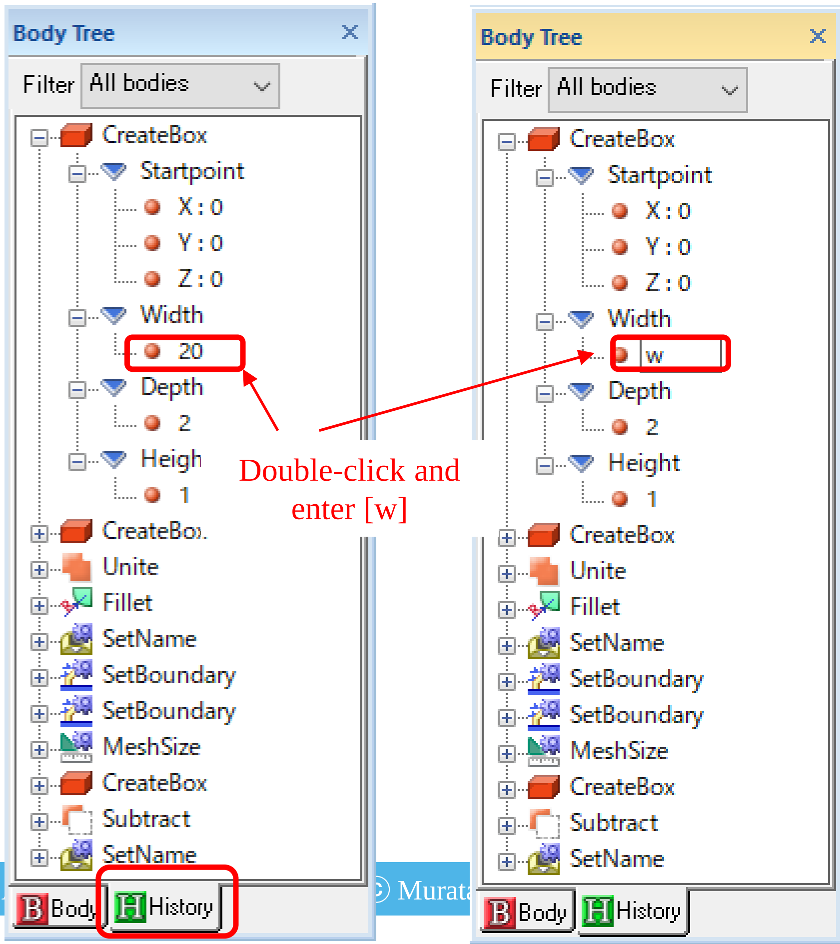


Exercise - Parametric Analysis

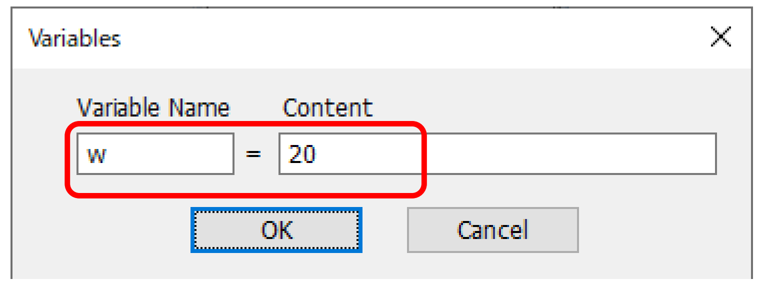
Murata Software

Parameter Setting

Go to the History tab in the Body Tree.
Modify the value of the width in the 1st Create Box to [w].



In the dialog box, enter 20



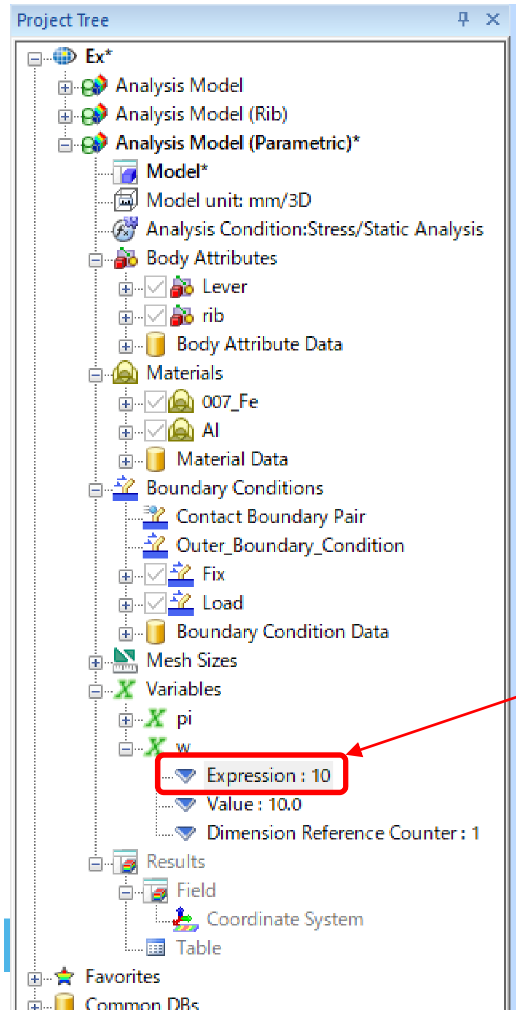
By entering numerical value instead of text, the analysis model is re-created.
In this way, editing the History allows you to re-create the analysis model.

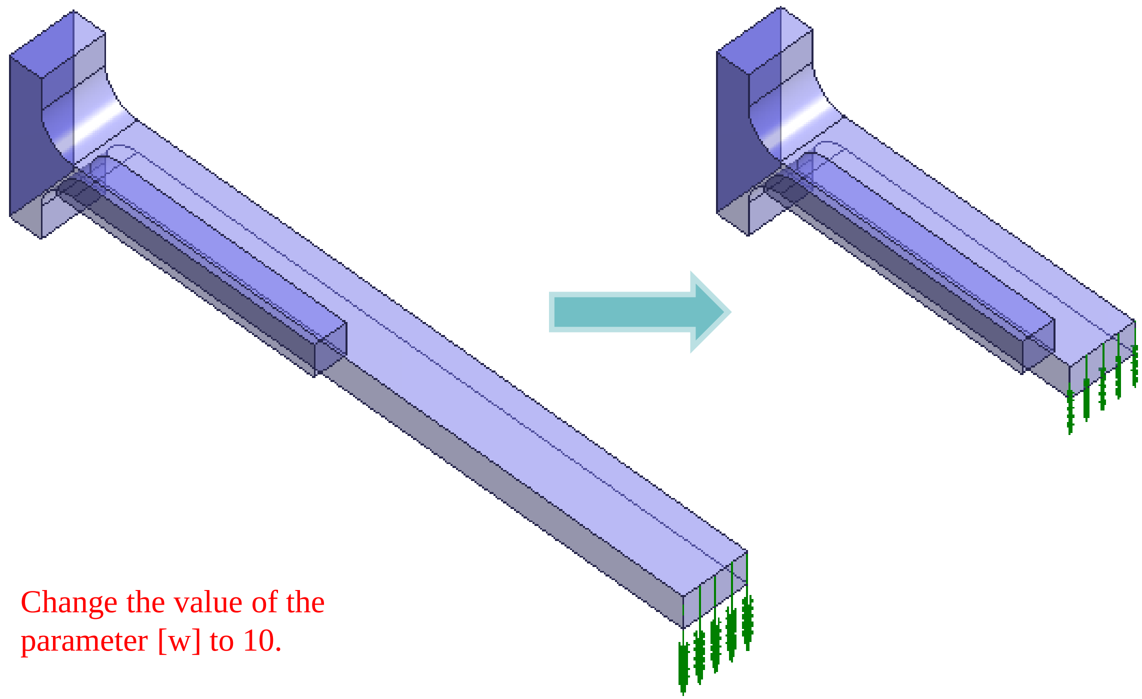
Exercise - Parametric Analysis

Murata Software

Change Value of Parameter

Confirm the form of the analysis model is changed by modifying the value of the parameter [w].



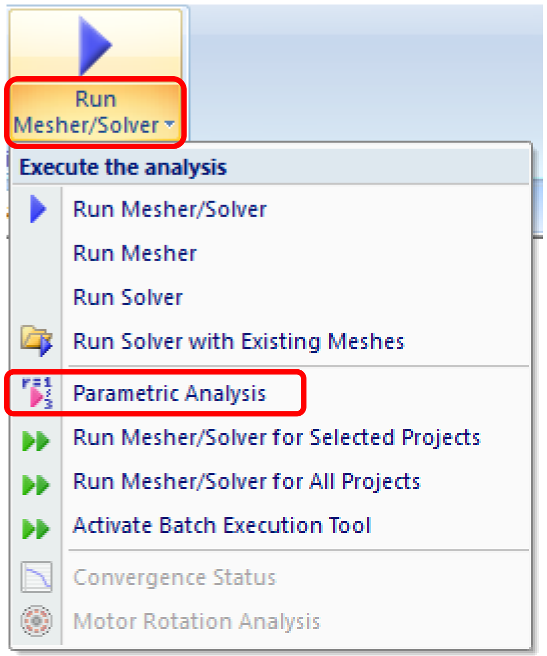


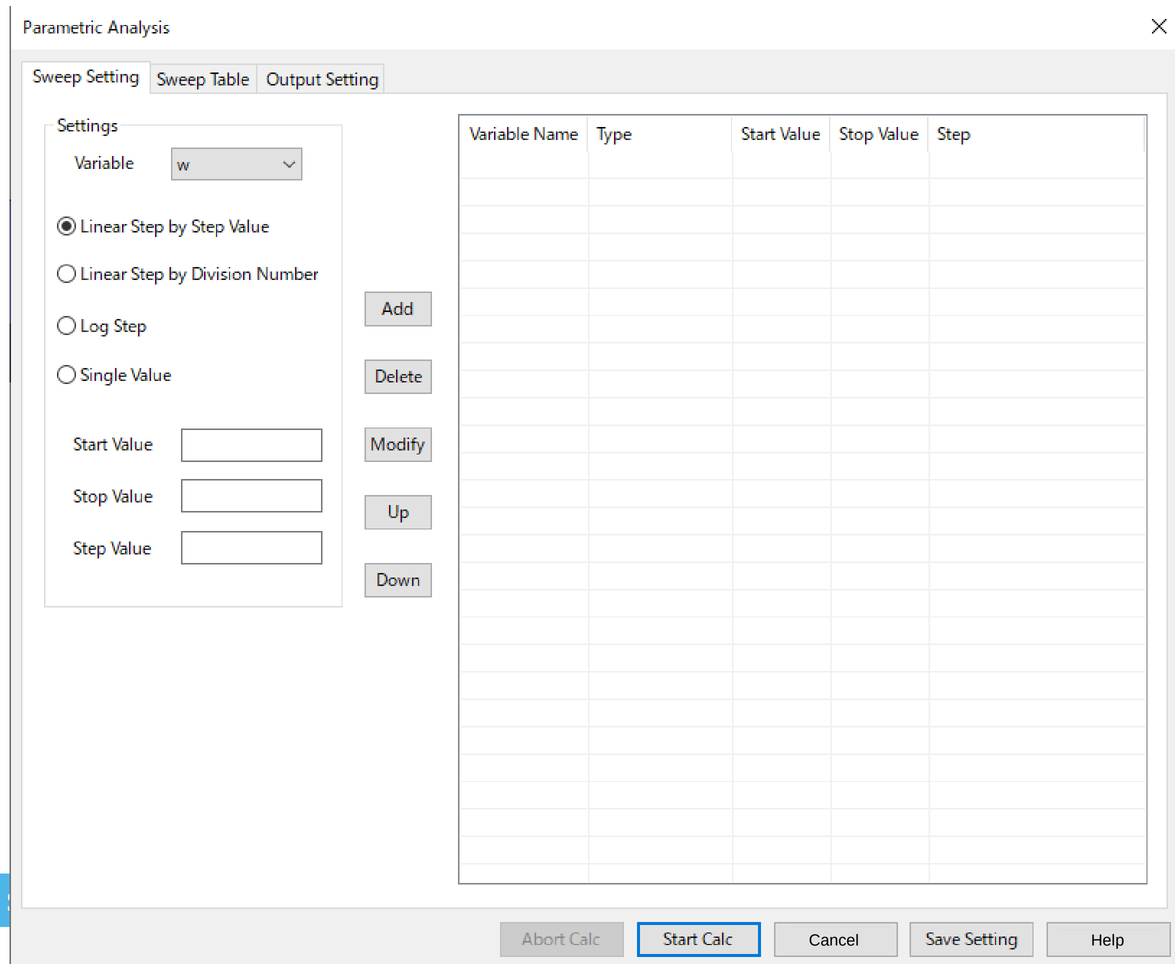
Change the value of the parameter [w] to 10.

Exercise - Parametric Analysis

Parametric Analysis Setting

[Model] > [Analysis] > Open submenu of [Run Mesher/Solver].
Select Parametric Analysis.

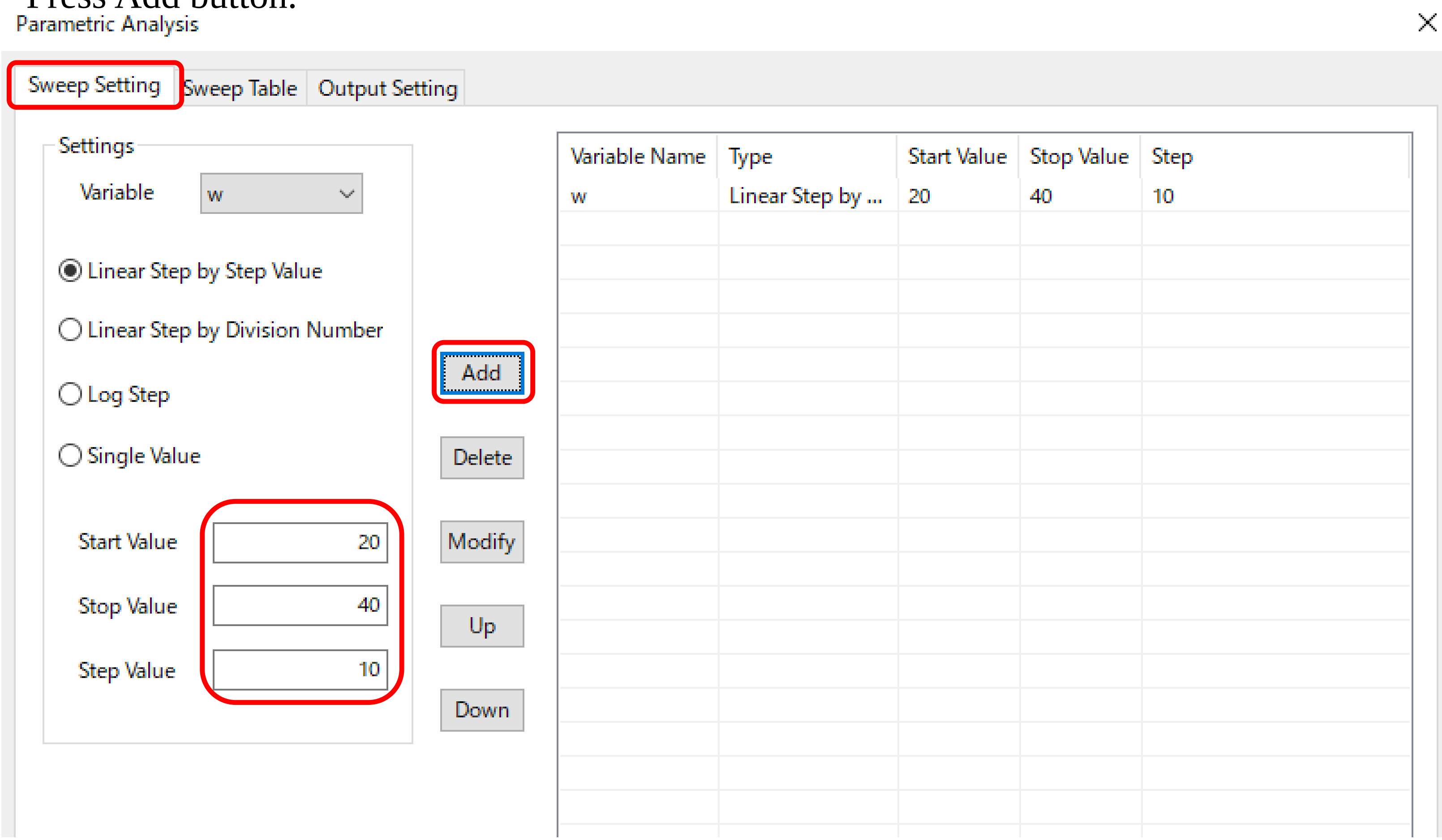




Exercise - Parametric Analysis

Parametric Analysis Setting

On the Sweep Setting tab, switch to [w] for the Variable setting.
Select [Linear Step by Step Value], enter Start Value [20], Stop Value [40], and Step Value [10].
Press Add button.

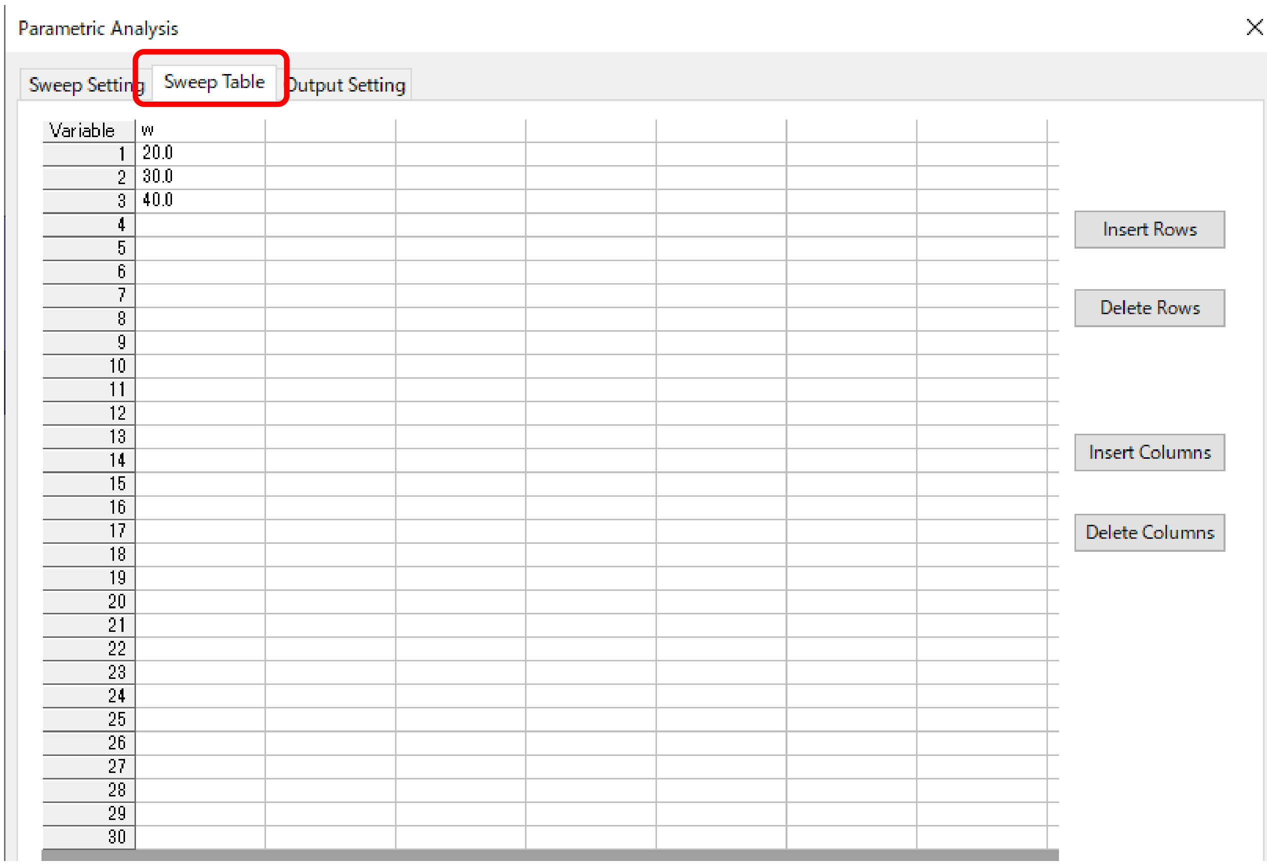


Exercise - Parametric Analysis

Murata Software

Parametric Analysis Setting

Check the combination of variable values on the Sweep Table tab.
Direct edit on the table is available as well.

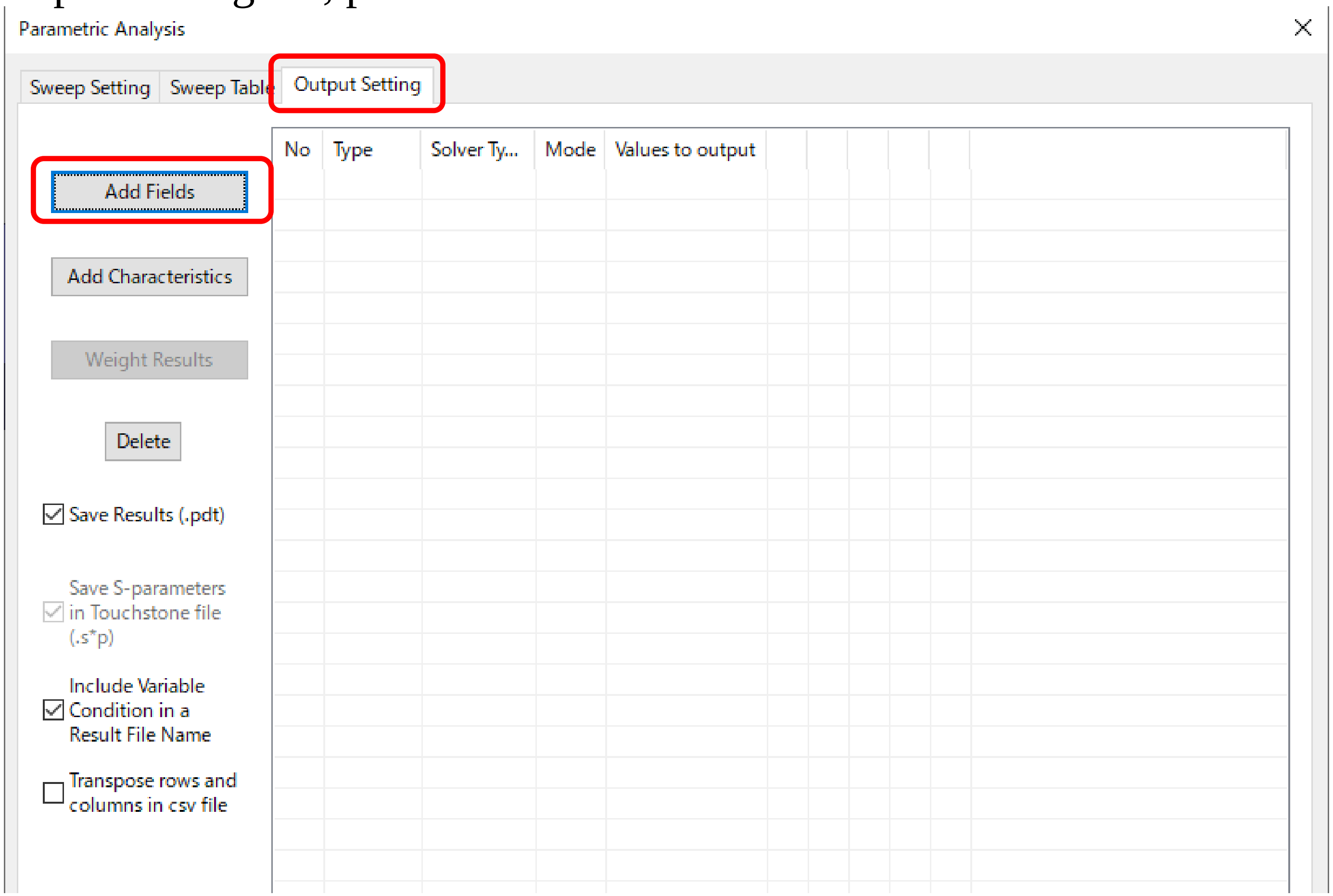


Exercise - Parametric Analysis

Murata Software

Parametric Analysis Setting

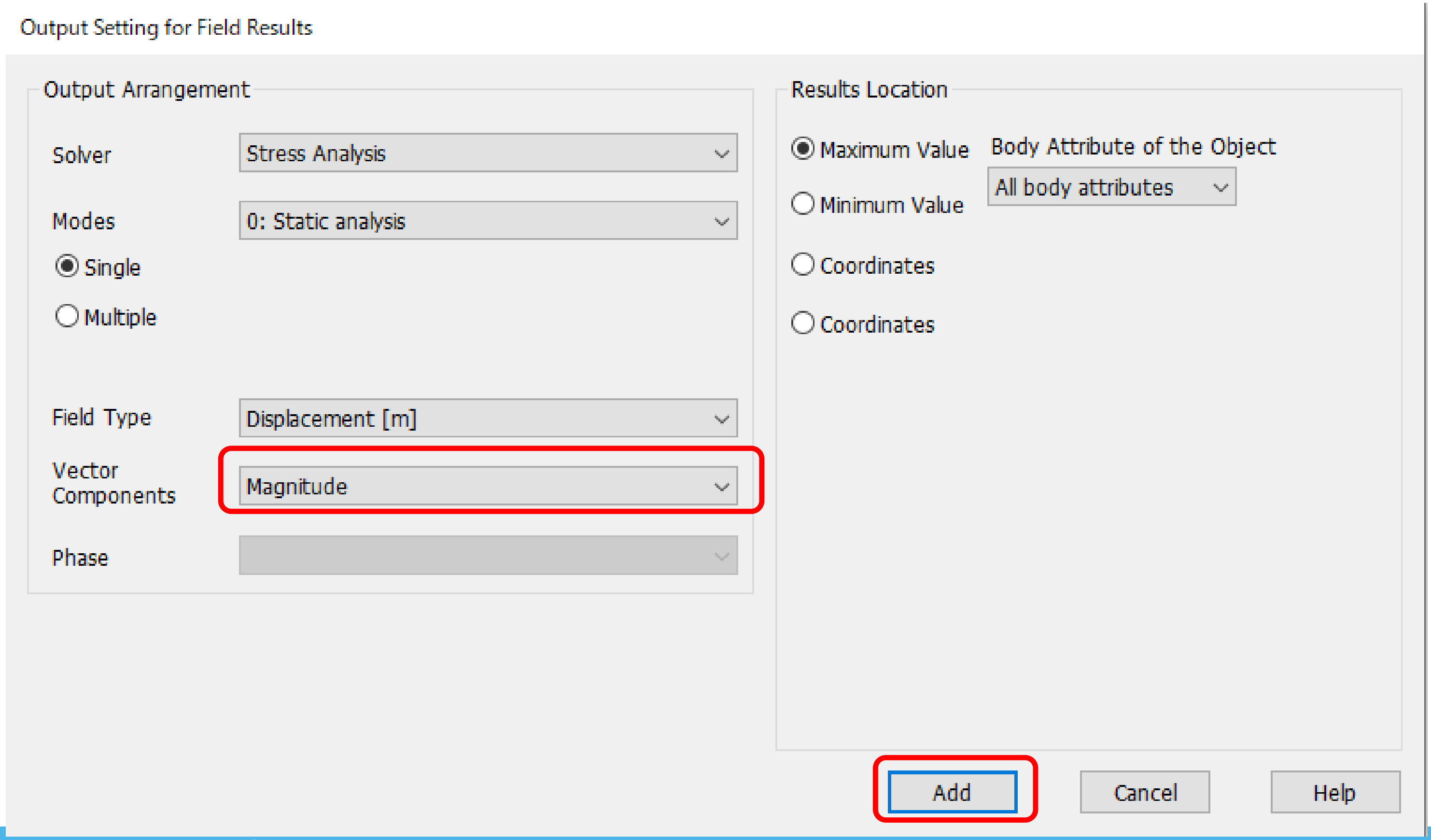
On the Output Setting tab, press Add Fields button.



Exercise - Parametric Analysis

Parametric Analysis Setting

On the Output Setting for Field Results tab, switch Vector Components to [Magnitude].
Press Add button.

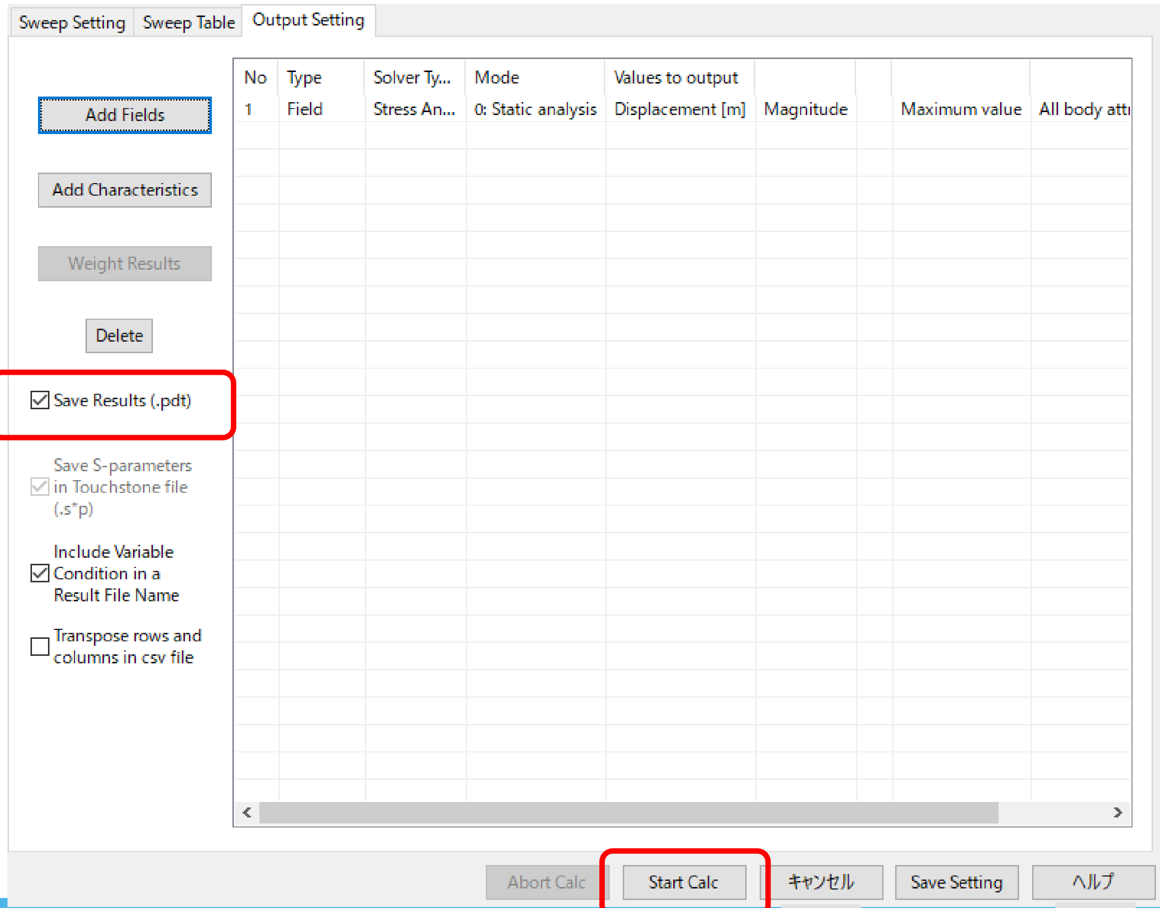


Exercise - Parametric Analysis

Murata Software

Parametric Analysis Setting

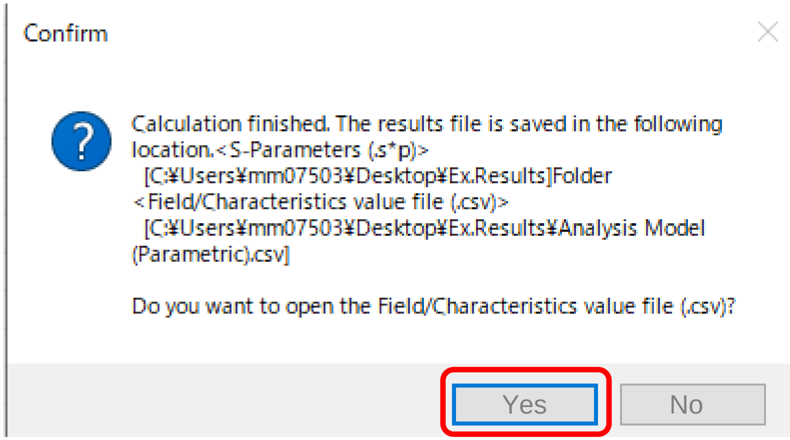
Select [Save Results] and press [Start Calc] button.



Cancel Help

Results Confirmation of Parametric Analysis

When the message shows up informing the calculation is completed, press [Yes] to see the results on Excel sheet.



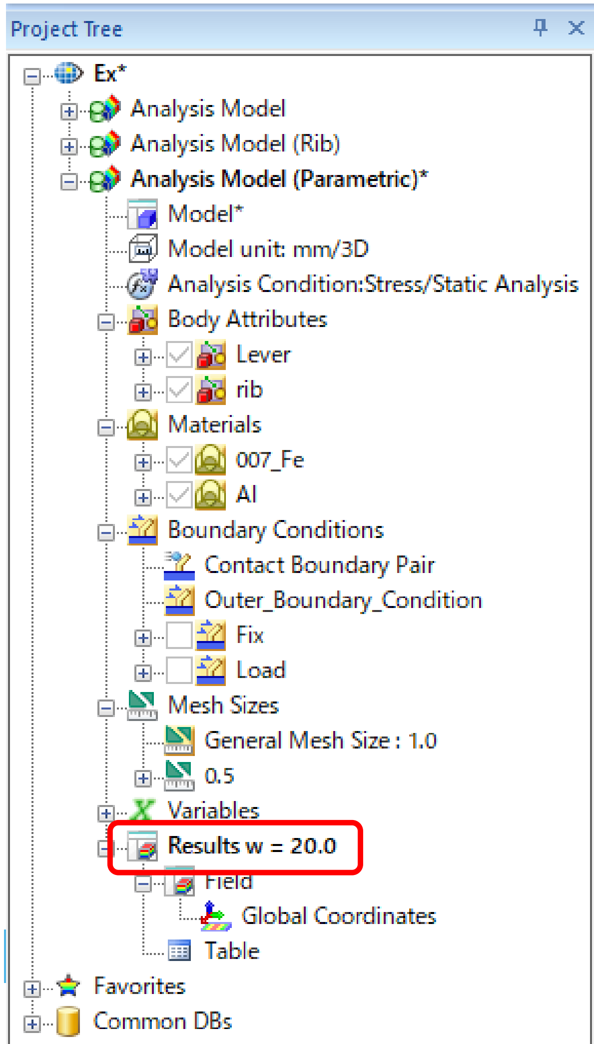
	A	B	C	D	E	F
1			Solver Type/Mode/Field Type/Component/Phase/Place/Target Body Attribute			
2		Acquired v	Stress Analysis/0: Static analysis/Displacement [m]/Magnitude/ /Maximum value/All body attributes			
3		Acquired X coordinate				
4		Acquired Y coordinate				
5		Acquired Z coordinate				
6						
7	No	w	Value	X coordina	Y coordina	Z coordinate
8	1	20	7.36E-04	2.00E+01	1.00E+00	1.00E+00
9	2	30	3.69E-03	3.00E+01	5.00E-01	1.00E+00
10	3	40	1.06E-02	4.00E+01	1.00E+00	1.00E+00
11						

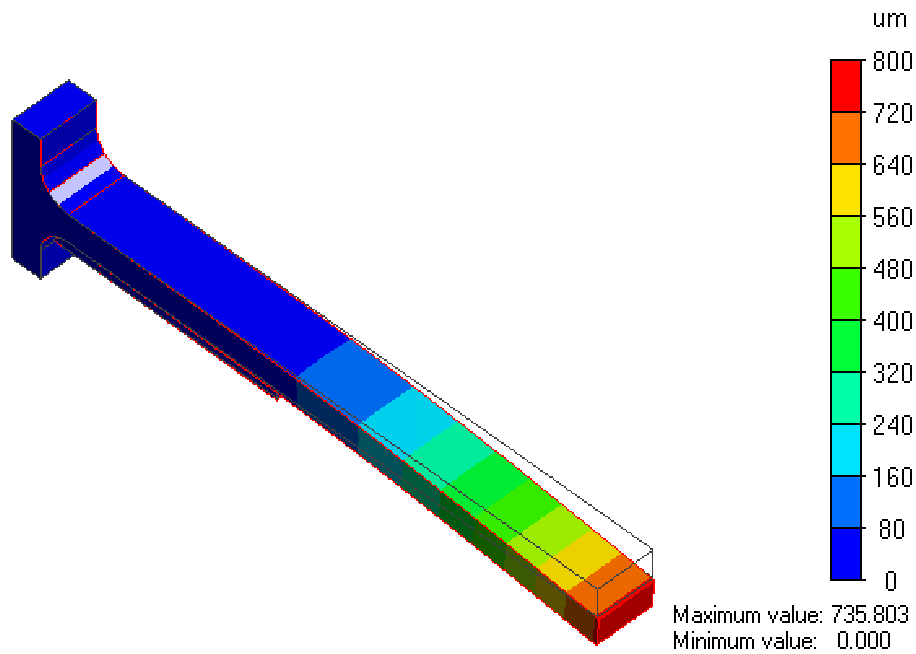
Exercise - Parametric Analysis

Murata Software

Results Confirmation of Parametric Analysis

Double-click on [Results] in the project tree and see the results.

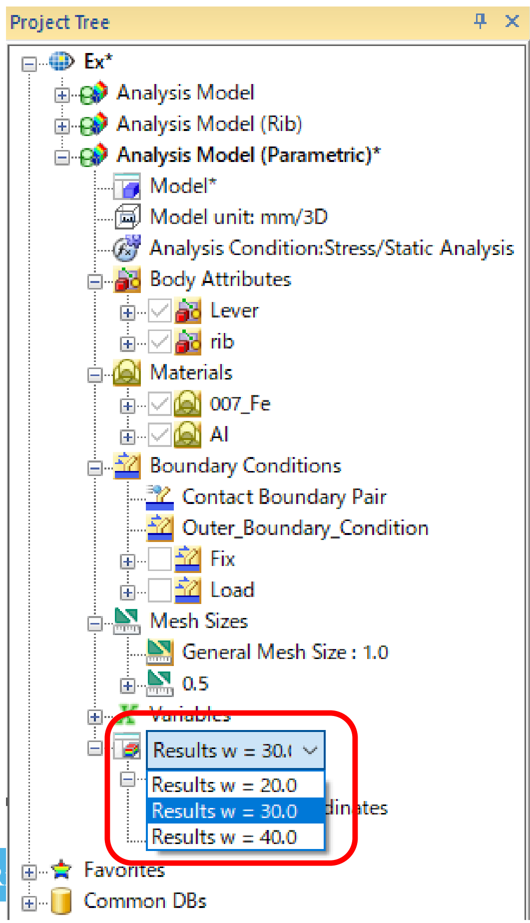


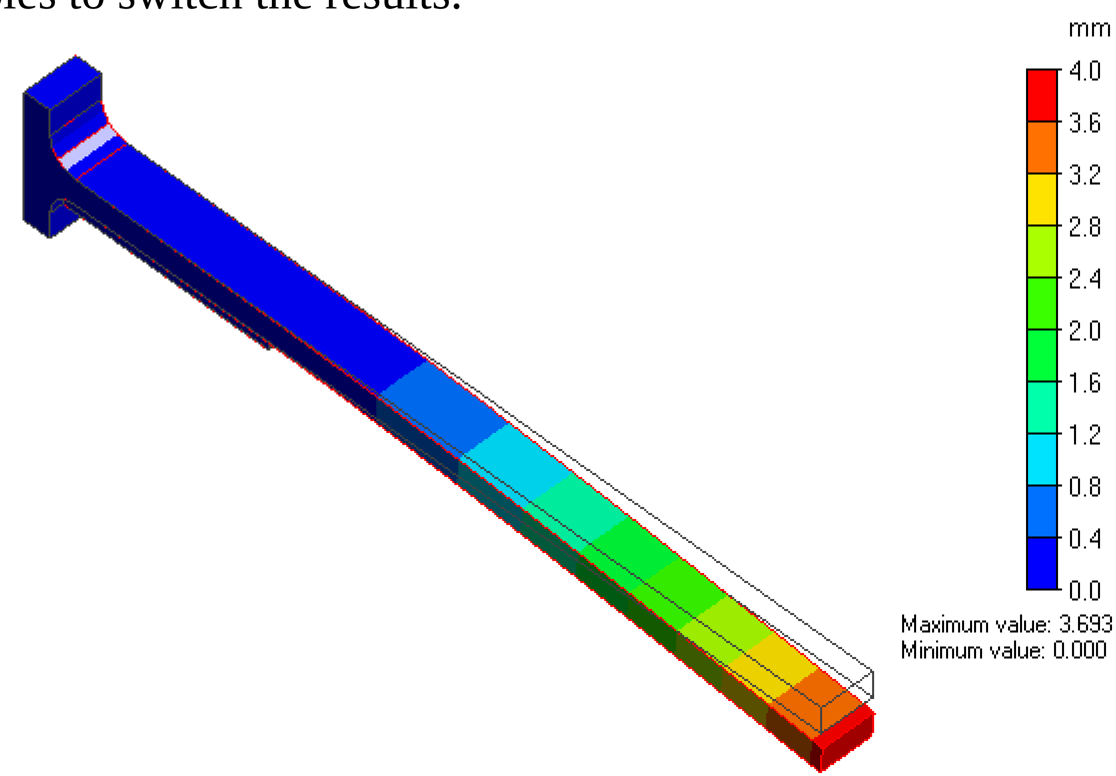


Murata Software

Results Confirmation of Parametric Analysis

Single-click on [Results] to show the list of combinations of variables.
Select the combination of variables to switch the results.

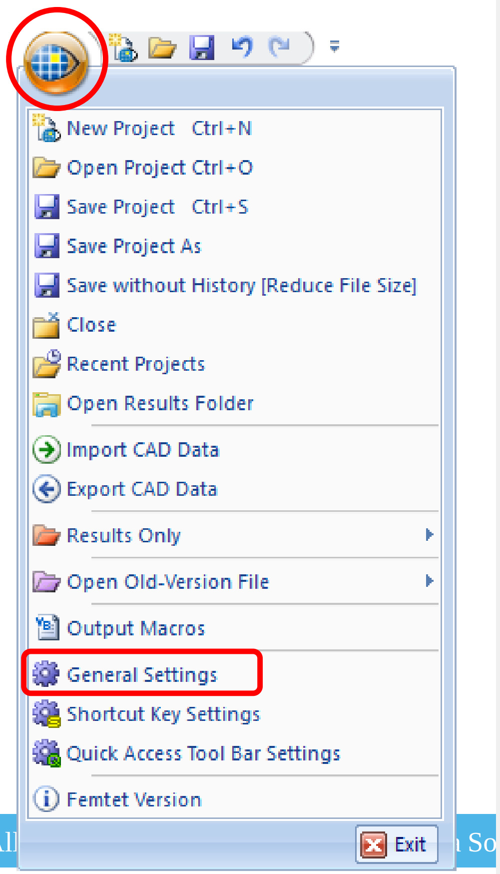


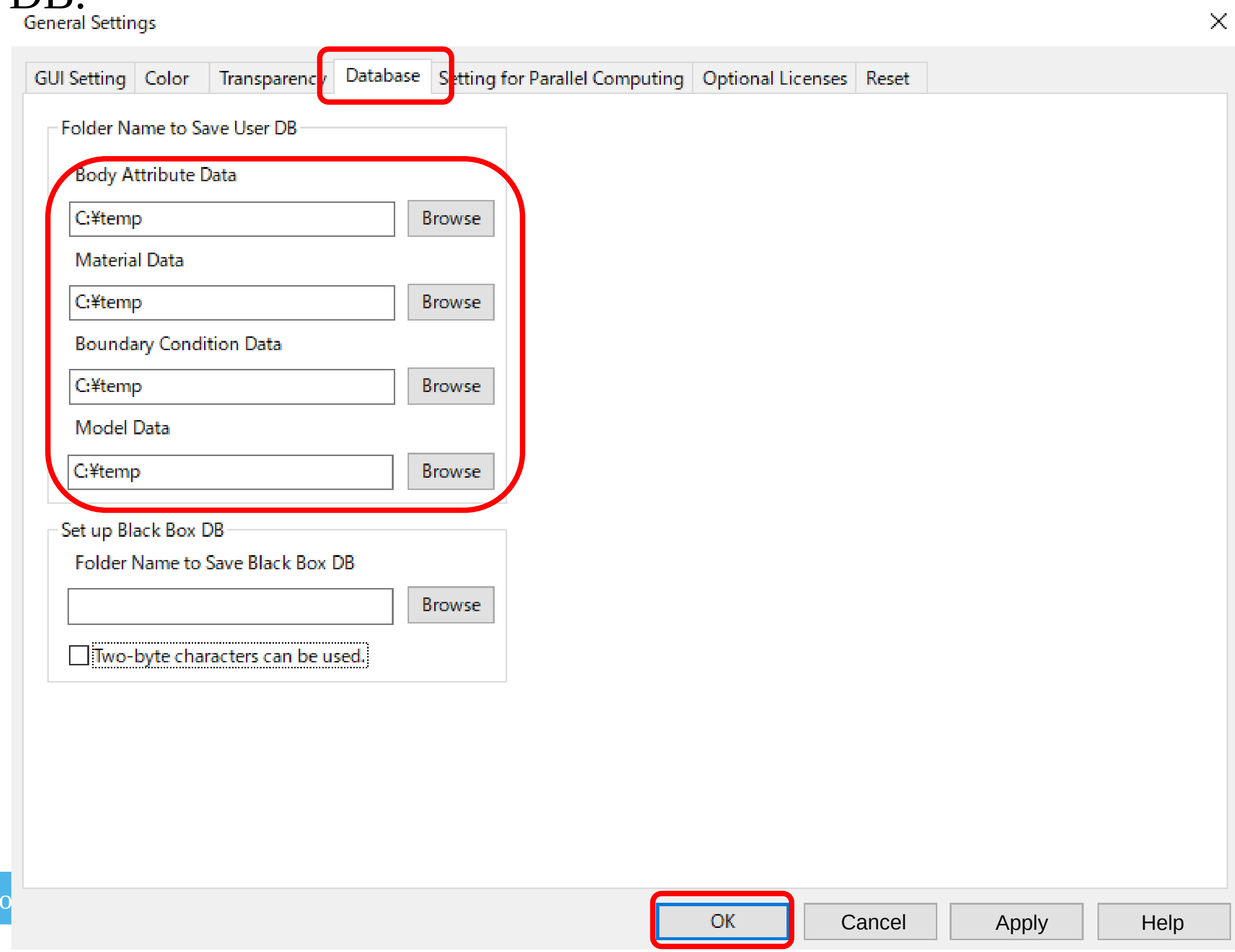


Exercise - User Database

Specify the Location for Saving User DB

Application button > [General Settings].
Specify folder to save user DB.



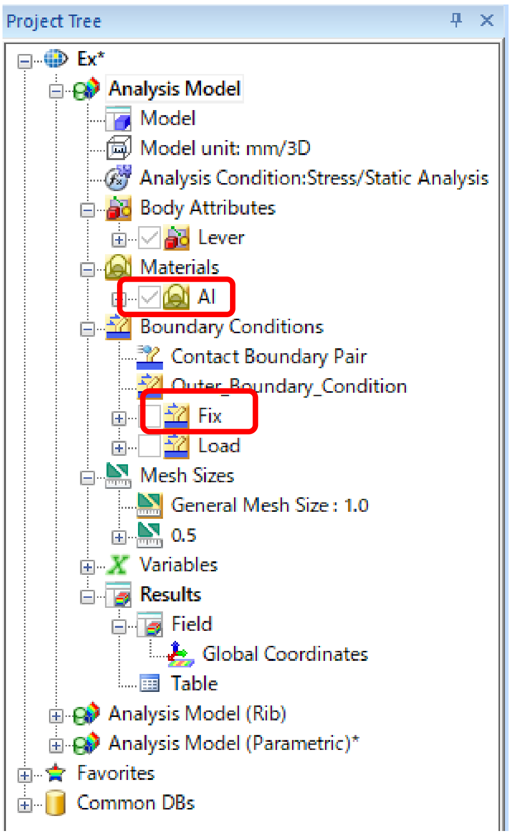


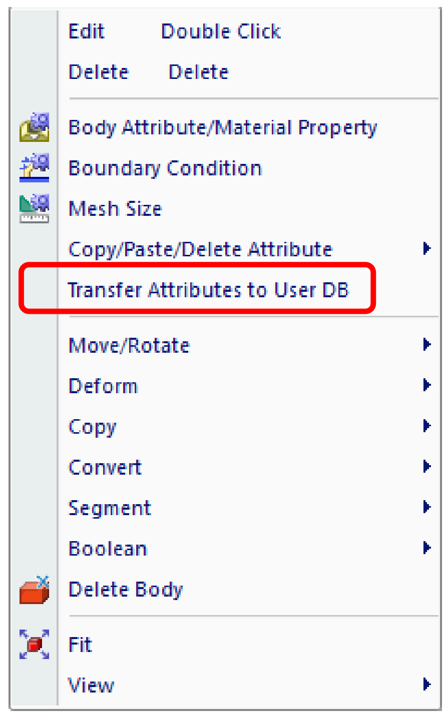
Exercise - User Database

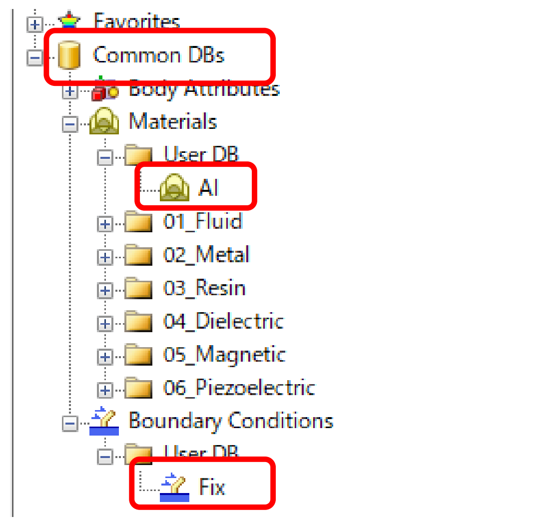
Murata Software

Register Data in the Database

Open the project and right-click on [Al] in the project tree while showing the model window. Select [Transfer Attributes to User DB]. Transfer [Fix] also in the same way.





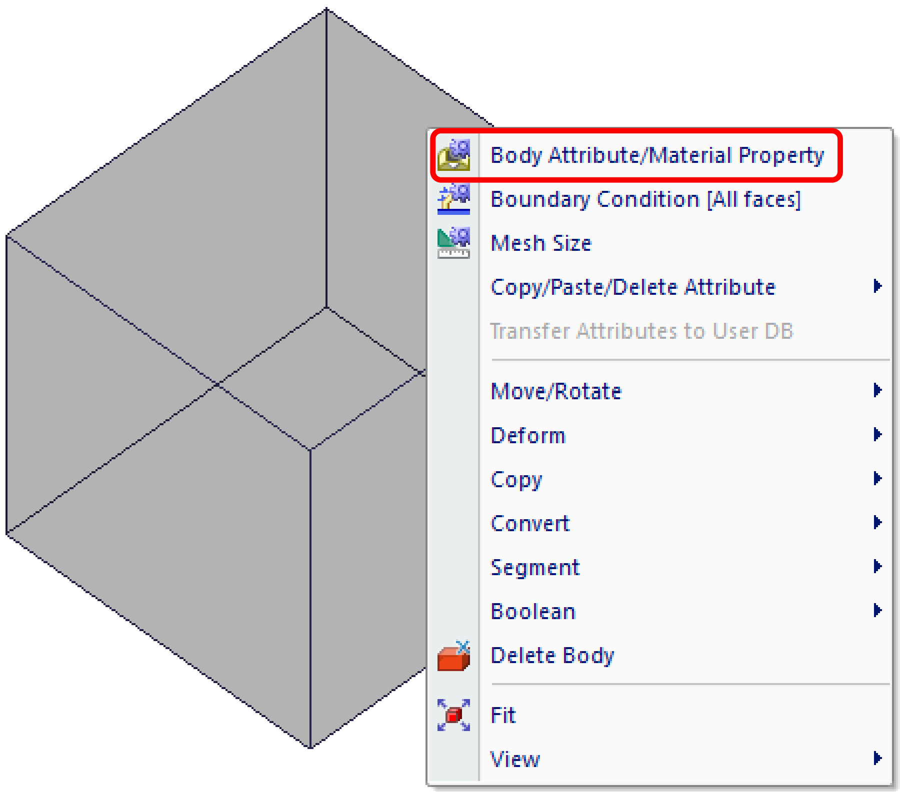


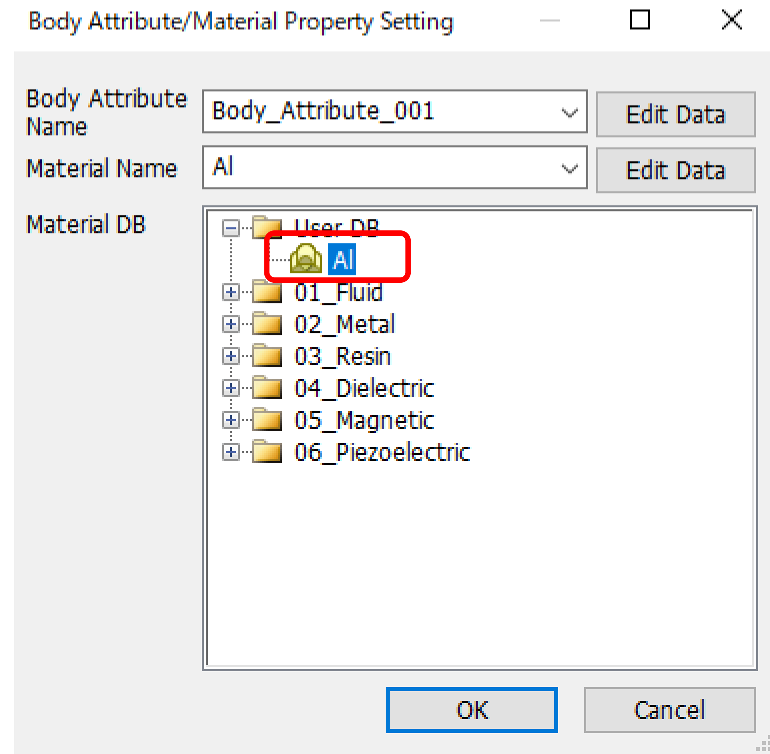
Open [Common DBs] to check the transferred data is registered.

Exercise - User Database

Use Registered Data for Material Property

Create a body in the new project.
Right-click on the body and select [Body Attribute/Material Property]
Select the registered material from the material DB.

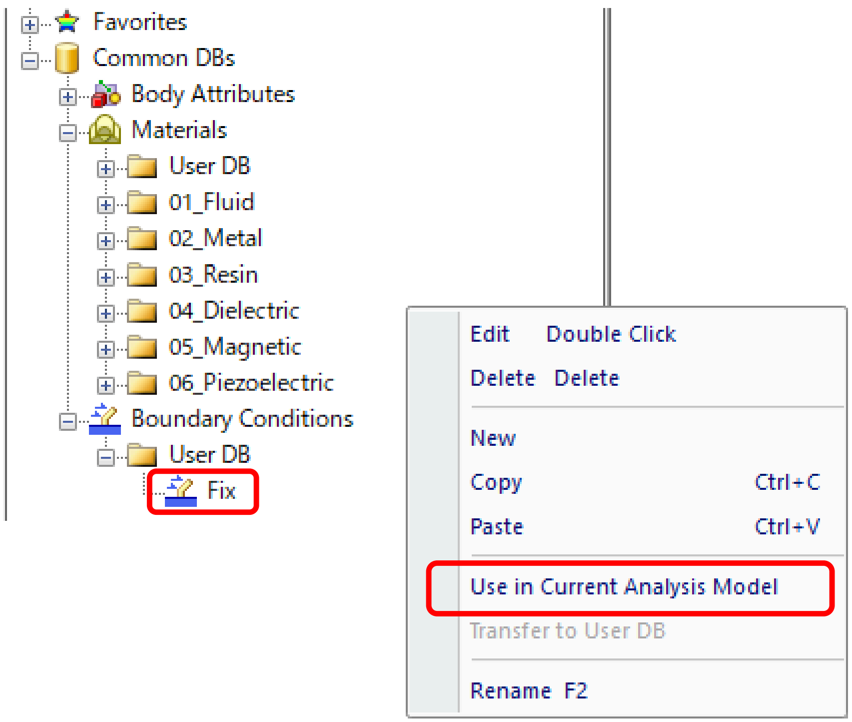




Exercise - User Database

Use Registered Data for Body Attribute and Boundary Condition

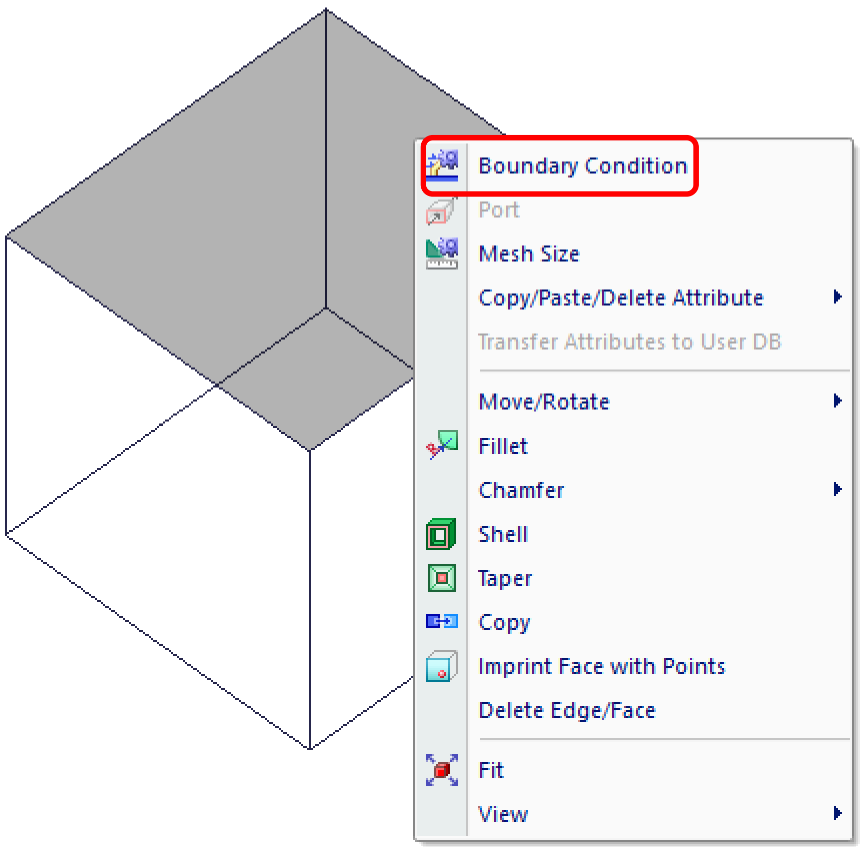
In the project tree, select the data to use from the Common DBs.
On the right-click menu, select [Use in Current Analysis Model].

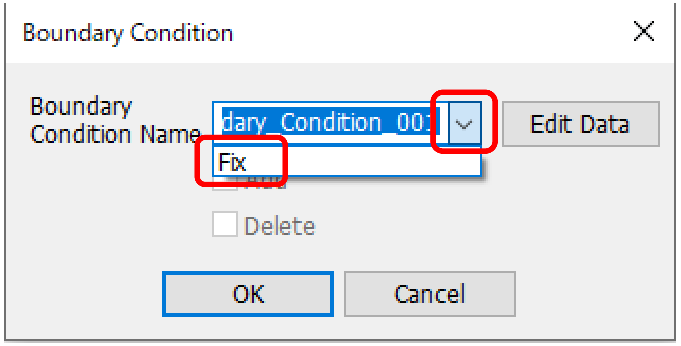


Exercise - User Database

Use Registered Data for Body Attribute and Boundary Condition

Select a face topology of the body. Select [Boundary Condition] on the right-click menu. Click ▼ at the right side of the Boundary Condition Name and select the registered data.



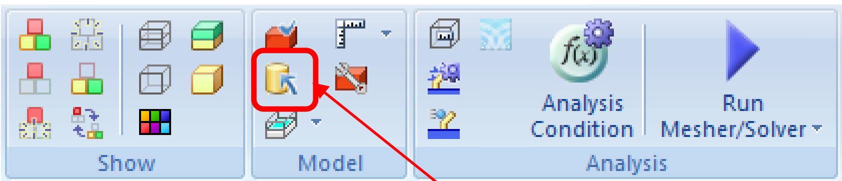


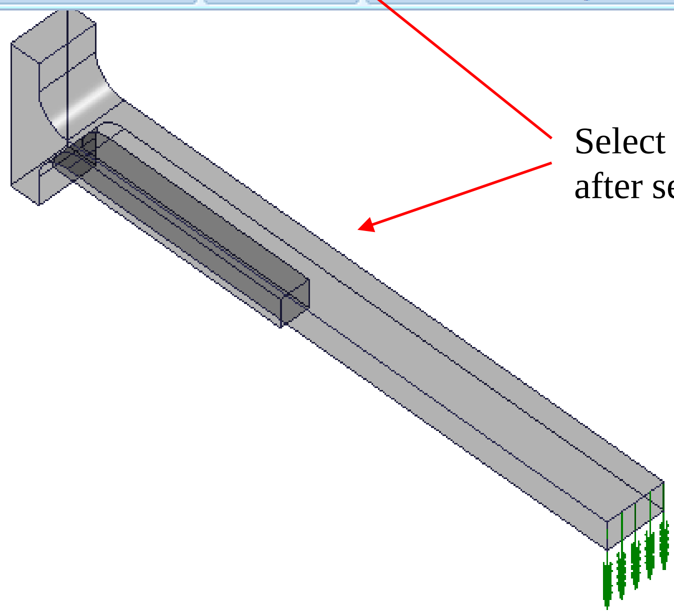
Exercise - User Database

Murata Software

Data Registration of Analysis Model in the Database

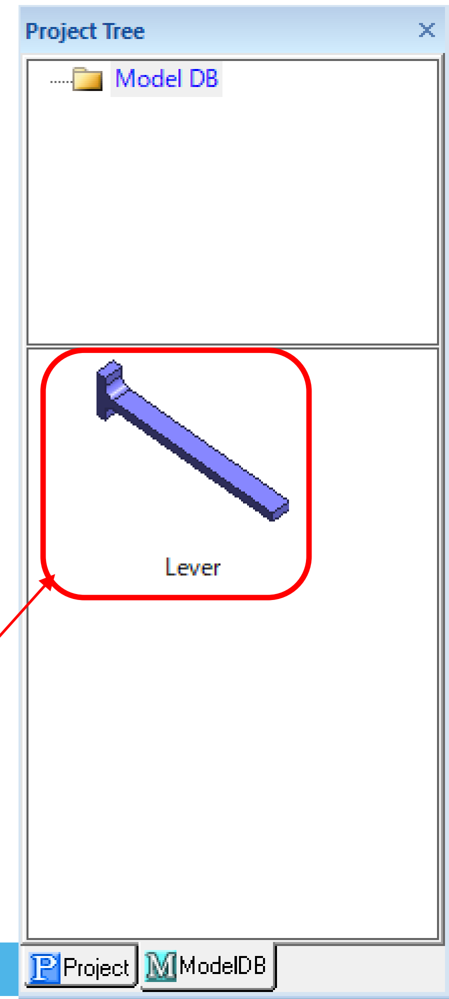
Open the project and select all bodies.
[Model] tab > [Model] group > [Register in Model Database]
The data is registered in the [ModelDB] tab.





Select [Register in Model Database] after selecting all bodies

Registered



Exercise - User Database

Murata Software

Use Registered Analysis Model Data

Create a new project. Switch the project tree to [ModelDB] tab.
Select an image of data and drag it to the modeling window.