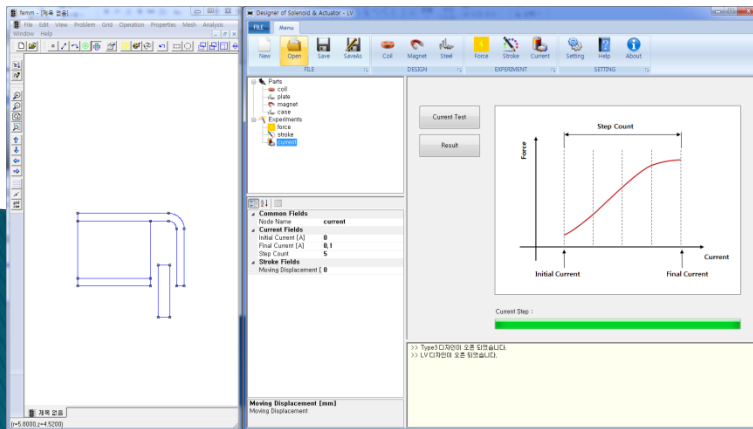


DoSA-2D User Manual

Voice Coil Motor Example
(Speaker, Auto-Focus, Linear Vibrator)

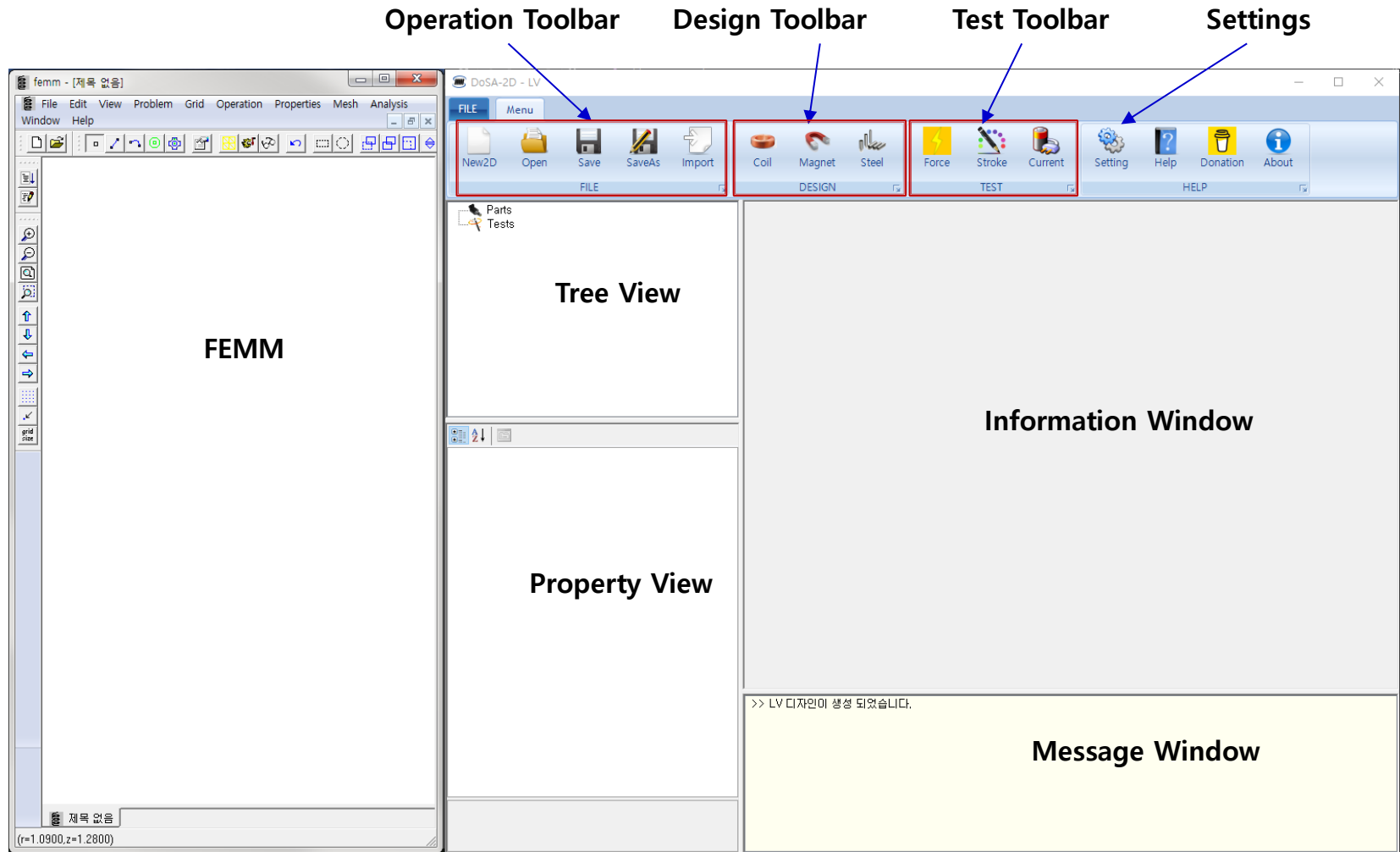


2022-05-06

GiTae Kweon (zgitae@gmail.com)

DoSA Structure

Program Structure



Toolbar

1. Operations

- ✓ New : Create a new design
- ✓ Open : Open previous design
- ✓ Save : Save the design
- ✓ SaveAs : Save in different name
- ✓ Import : DXF Import



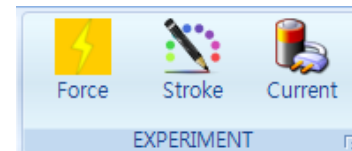
2. Part Design

- ✓ Coil : Add a coil and specification design
- ✓ Magnet : Add a magnet and determine specifications
- ✓ Steel : Add a steel and determine specifications



3. Virtual Test

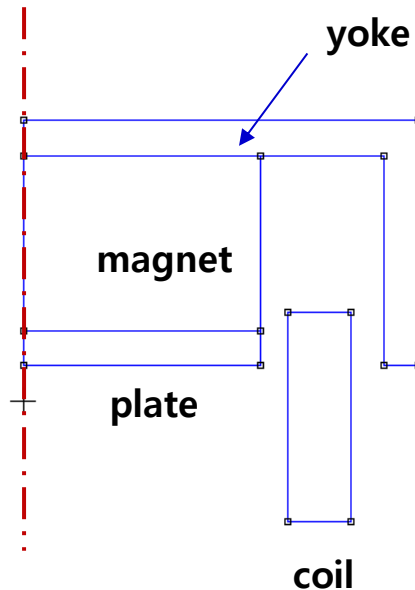
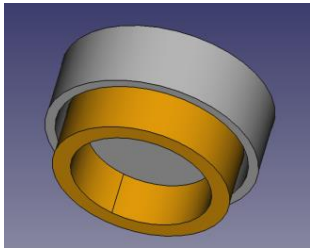
- ✓ Force : Magnetic force estimation
- ✓ Stroke : Magnetic force estimation for each stroke
- ✓ Current : Magnetic force estimation for each current



Analysis Model

Analysis Model

1. Shape Model



2. Product Specifications

가. Coil

- Coil Turns : 126 turns
- Coil Resistance : 15.75 Ohm

나. Magnet

- Material : N52 (NdFeB 52)
- Magnetization Direction : 90 (UP)

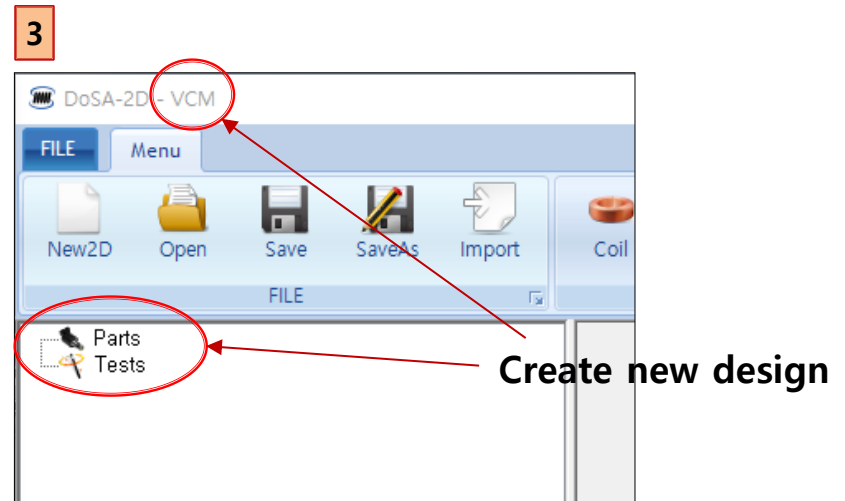
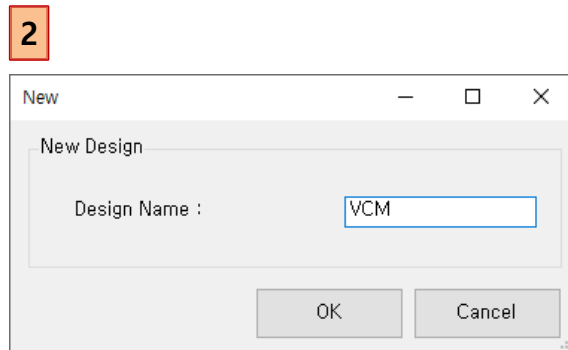
다. Power

- Voltage : 2.5V

(Example Files : DoSA-2D Install directory > Samples > VCM)

New design

1. Toolbar > Click New button
2. Design Name : "VCM"
3. Click OK



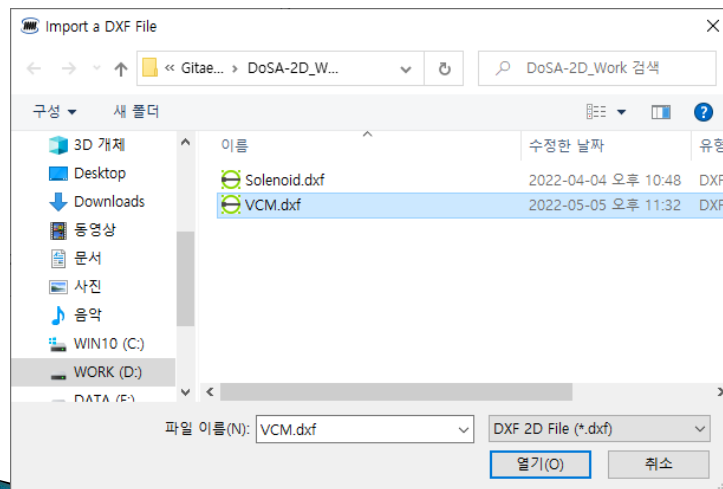
Import shapes

1. Toolbar > Click New button
2. Select "VCM.dxf" and click the Open button
3. Check part shapes

[Caution]

- Part must be written in Polyline
- Please refer to "Shape operation guide before simulation.pdf"

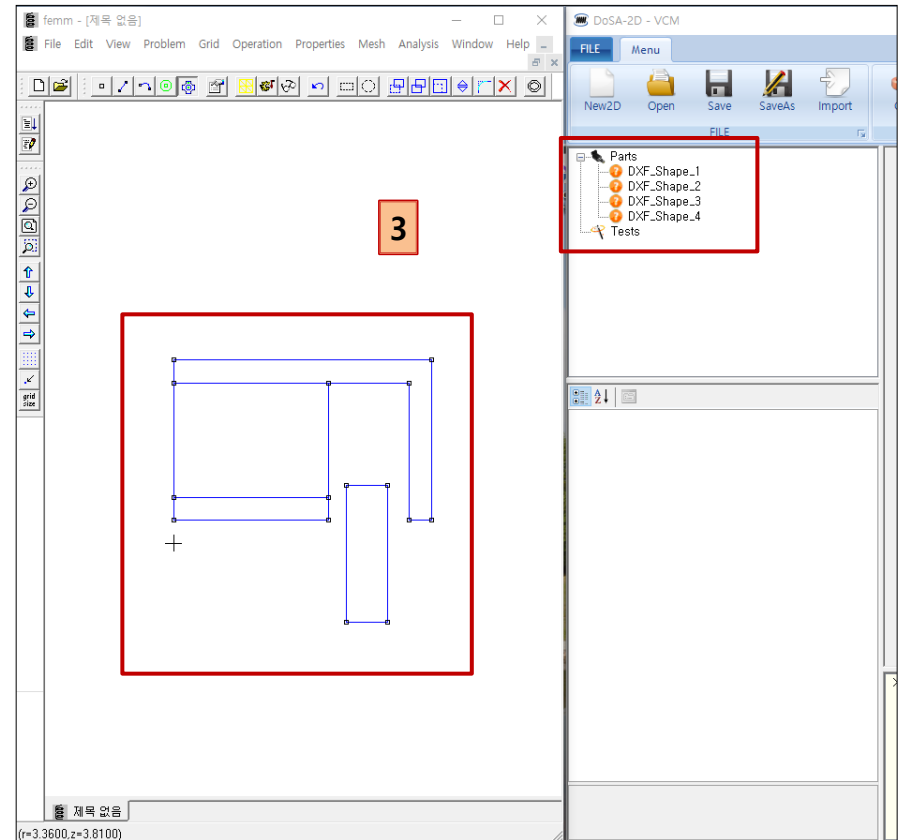
2



1



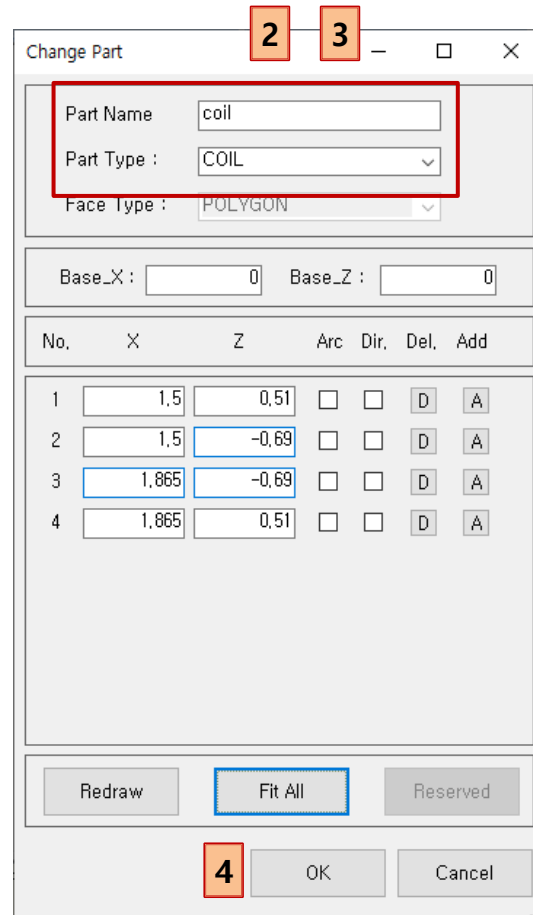
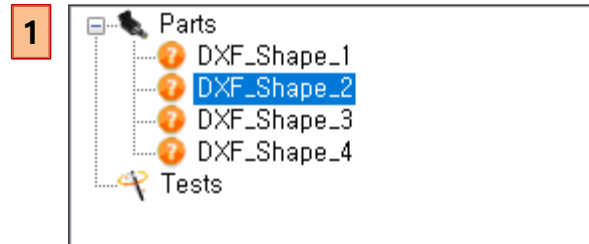
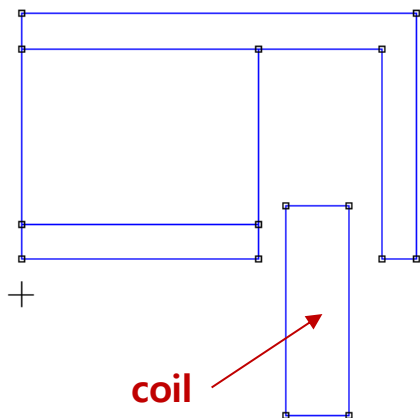
3



Part Design

Set as Coil

1. Treeview > "DXF_Shape_2" double click
2. Change name : "coil"
3. Change part type : COIL
4. Click OK button



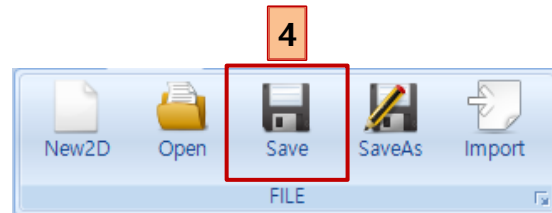
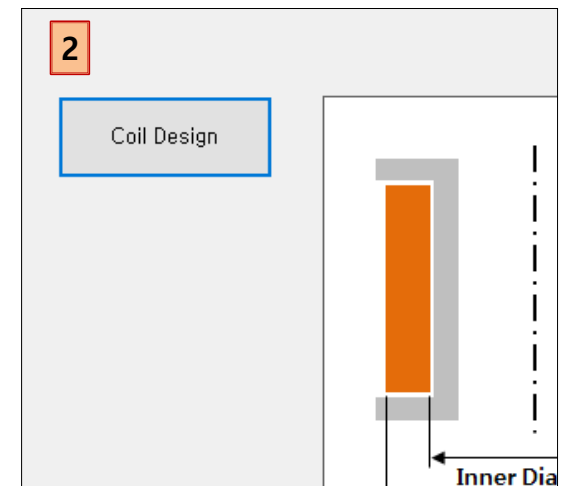
Coil Design

1. Input the coil instrumental specifications
 - ✓ Moving Parts : MOVING
 - ✓ Coil Wire Grade : Bonded_IEC_Grade_1B
 - ✓ Copper Diameter : 0.045
 - ✓ Horizontal Coefficient : 0.95 (Bonded Type)
 - ✓ Vertical Coefficient : 1.13 (Bonded Type)
 - ✓ Resistance Coefficient : 1.1 (Bonded Type)
2. Calculate the coil specification
 - ✓ Click the "Coil Design" button
3. Check the coil specification
4. Ribbon Bar > Save

1

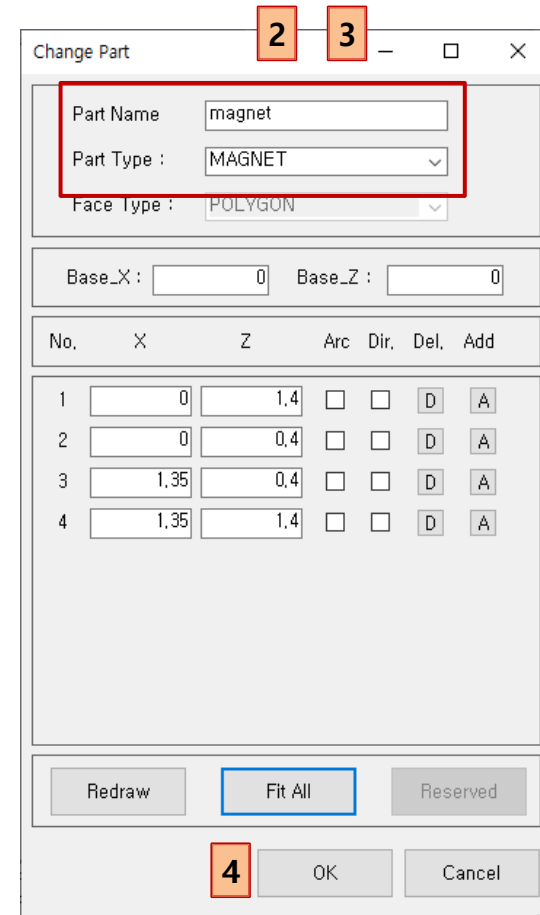
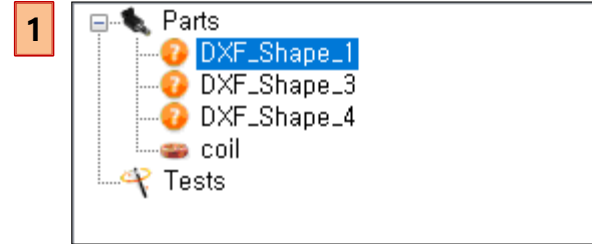
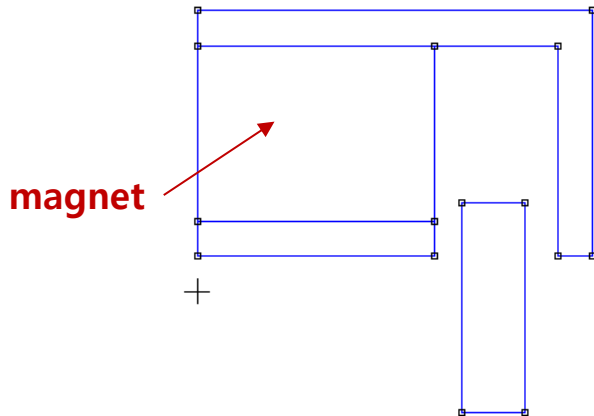
Common Fields	
Node Name	coil
Specification Fields	
Part Material	Copper
Current Direction	IN
Moving Parts	MOVING
Calculated Fields	
Coil Turns	126
Coil Resistance [Ω]	15.74769
Coil Layers	6
Turns of One Layer	21
Design Fields (optional)	
Coil Wire Grade	Bonded_IEC_Grade_1B
Inner Diameter [mm]	3
Outer Diameter [mm]	3.73
Coil Height [mm]	1.2
Copper Diameter [mm]	0.045
Wire Diameter [mm]	0.04953
Coil Temperature [°C]	20
Horizontal Coefficient	0.95
Vertical Coefficient	1.13
Resistance Coefficient	1.1

3



Set as Magnet

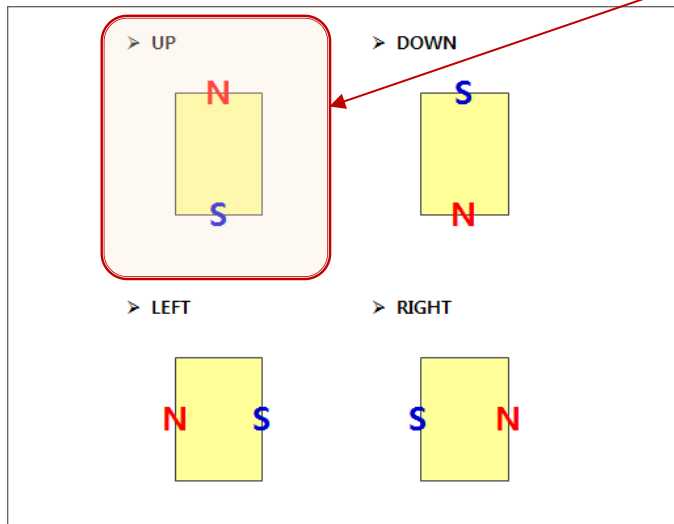
1. Treeview > "DXF_Shape_1" double click
2. Change name : "magnet"
3. Change part type : MAGNET
4. Click OK button



Magnet Settings

1. Magnet Settings

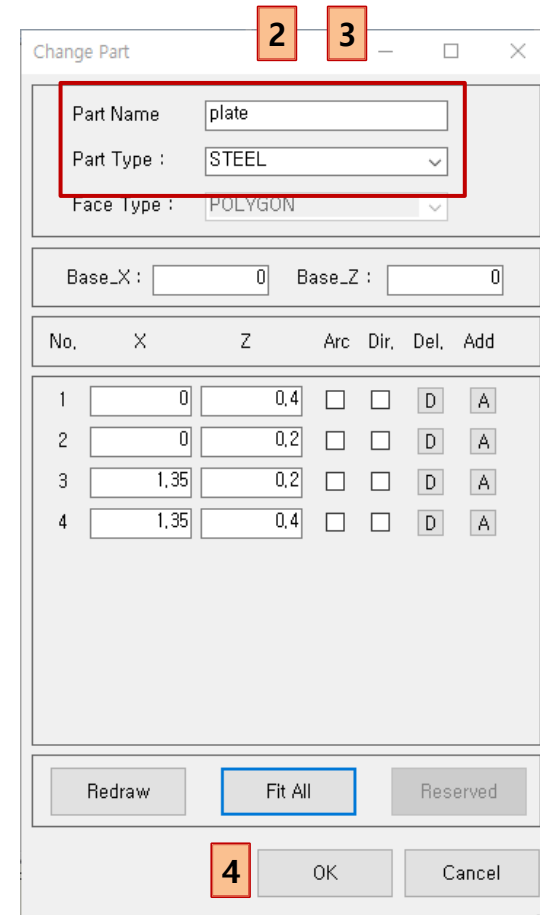
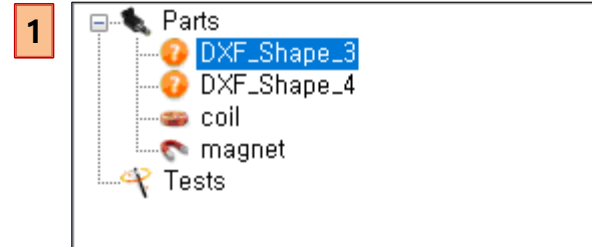
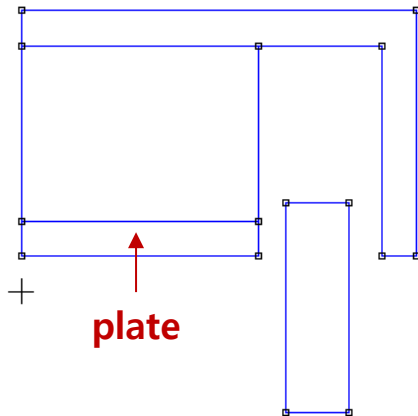
- ✓ Part Material : N52
- ✓ Direction : UP



▼ Common Fields	
Node Name	magnet
▼ Specification Fields	
Part Material	N52
Direction	UP
Moving Parts	FIXED

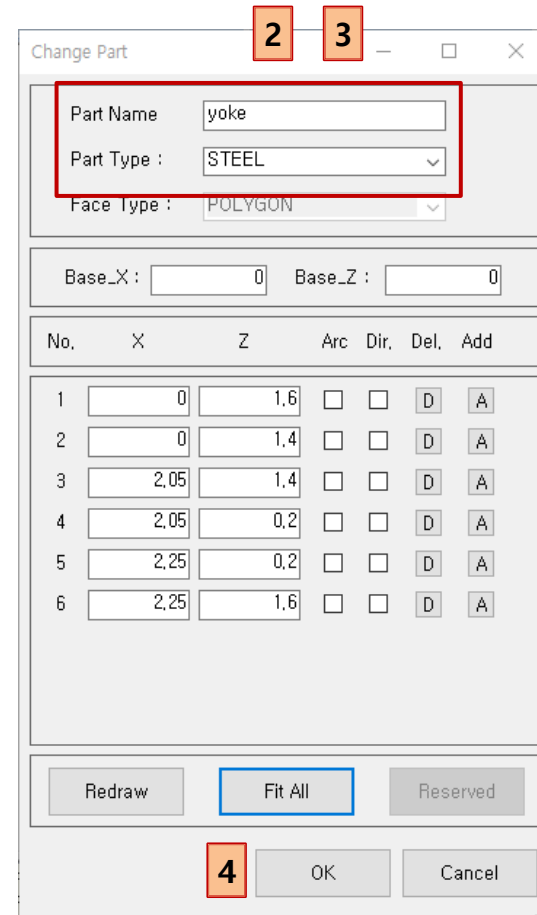
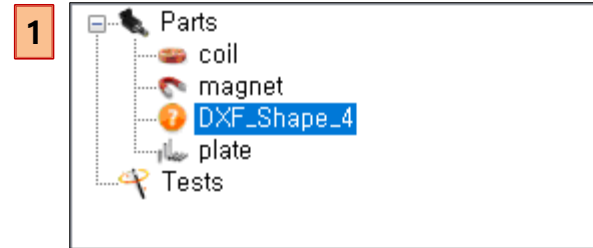
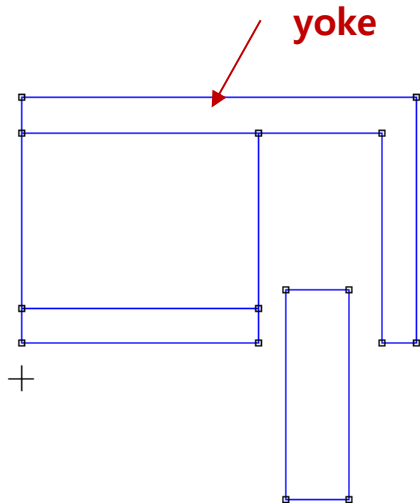
Set as Plate

1. Treeview > "DXF_Shape_3" double click
2. Change name : "plate"
3. Change part type : STEEL
4. Click OK button



Set as Yoke

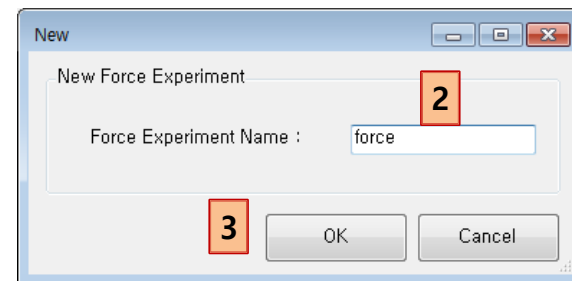
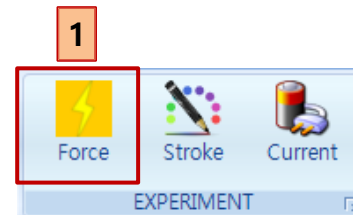
1. Treeview > "DXF_Shape_4" double click
2. Change name : "yoke"
3. Change part type : STEEL
4. Click OK button



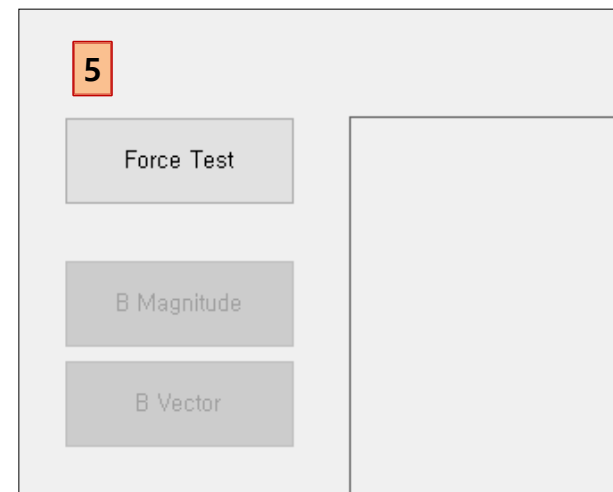
Virtual Test

Test of the magnetic force

1. Toolbar > Click Force Button
2. Force Test Name : "force"
3. Click OK button
4. Settings of magnetic force test
 - ✓ Voltage : 2.5
5. Click "Force Test" Button

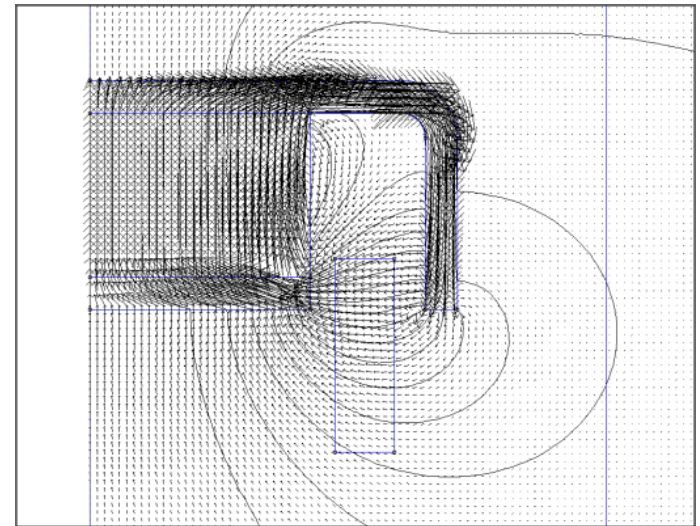
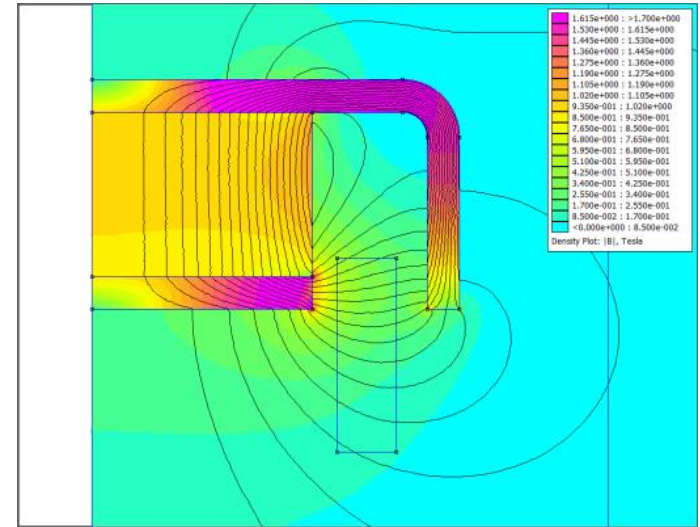
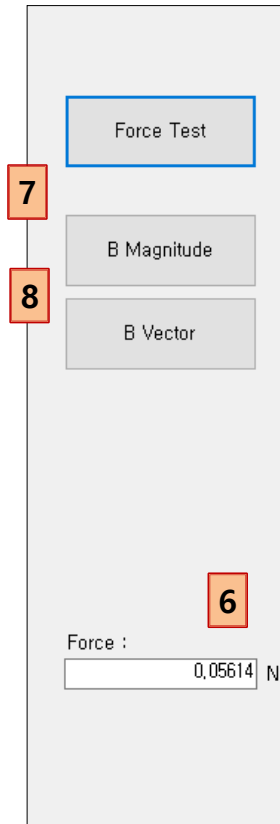


▼ Common Fields	
Node Name	force
▼ Current Fields	
Voltage [V]	2,5
Max. Current [A]	0,16669
▼ Stroke Fields	
Moving Stroke [mm]	0
▼ Condition Fields	
Mesh Size [%]	2



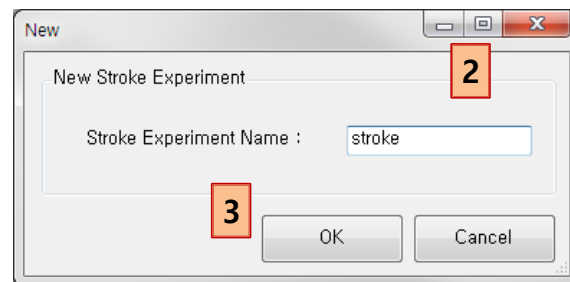
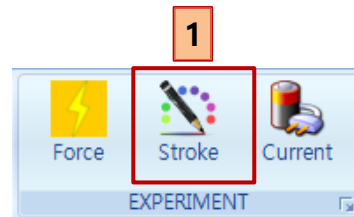
Results of the magnetic force

6. Force : 0.05614 N
7. Magnetic Density
 - ✓ Click the B Magnitude button
8. Vector of Magnetic Density
 - ✓ Click the B Vector button



Test of the stroke-magnetic force

1. Toolbar > Click Stroke button
2. Stroke Test Name : "stroke"
3. Click OK button
4. Settings of the test
 - ✓ Voltage : 2.5
 - ✓ Initial Stroke : -0.5
 - ✓ Final Stroke : 0.5
 - ✓ Step Count : 5

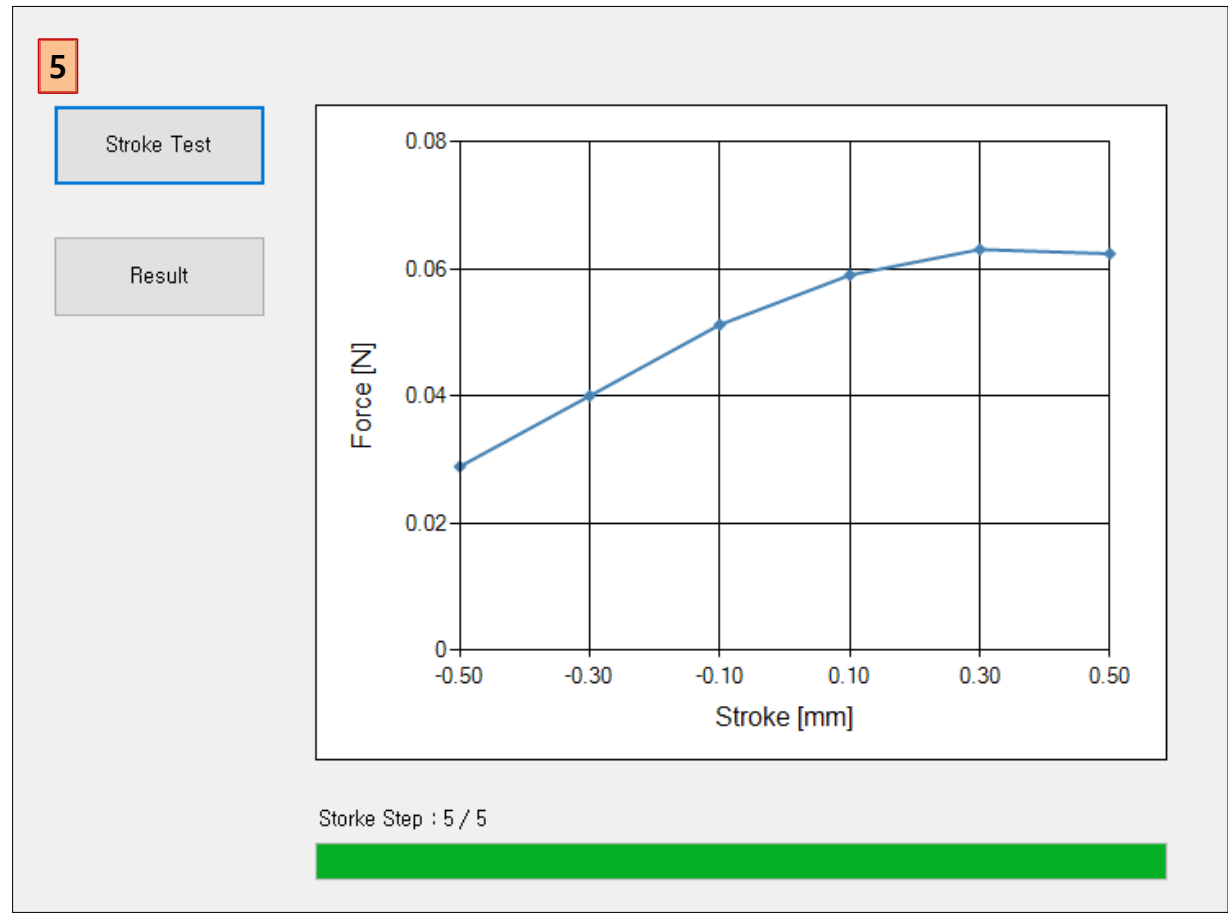


The image shows a table of experiment settings. A red rectangular box highlights the 'Stroke Fields' section, and a red square with the number '4' is to its left.

▼ Common Fields	
Node Name	stroke
▼ Current Fields	
Voltage [V]	2.5
Max. Current [A]	0.15875
▼ Stroke Fields	
Initial Stroke [mm]	-0.5
Final Stroke [mm]	0.5
Step Count	5
▼ Condition Fields	
Mesh Size [%]	2

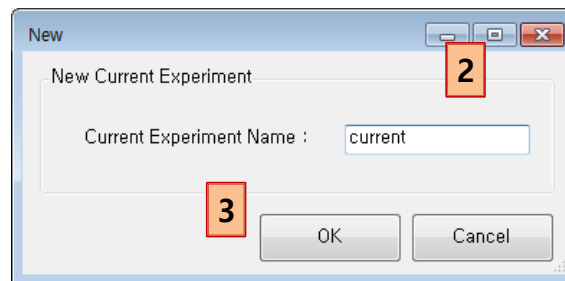
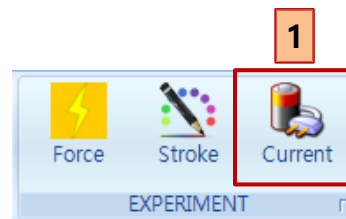
Results of the stroke-magnetic force

5. Click "Stroke Test" button



Test of the current-magnetic force

1. Toolbar > Click Current button
2. Current Test Name : "current"
3. Click OK button
4. Test settings
 - ✓ Initial Current : 0.0
 - ✓ Final Current : 0.1
 - ✓ Step Count : 5

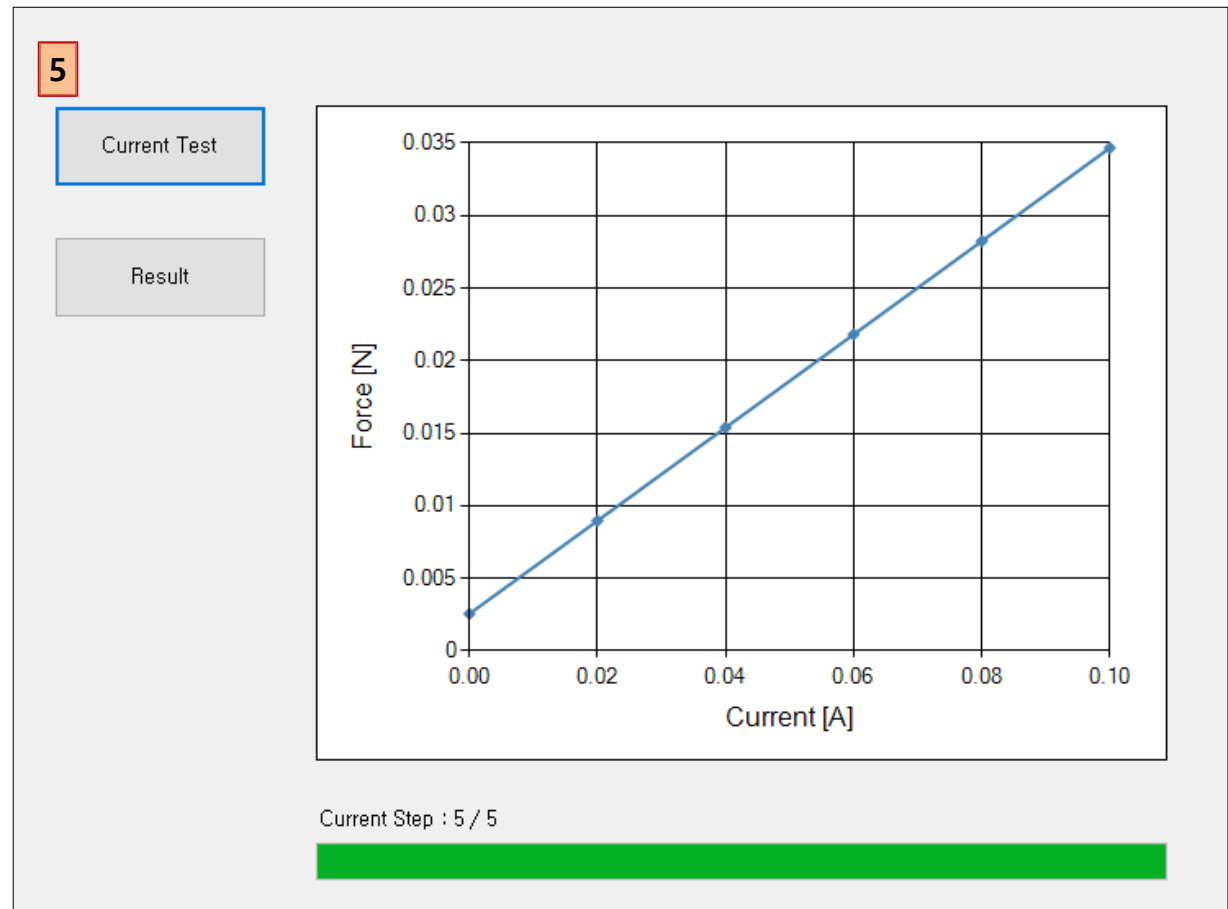


A screenshot of a software interface showing a list of fields. A red rectangular box highlights the 'Current Fields' section, which includes 'Initial Current [A]', 'Final Current [A]', and 'Step Count'. A red square with the number '4' is to the left of the box.

▼ Common Fields	
Node Name	current
▼ Current Fields	
Initial Current [A]	0
Final Current [A]	0.1
Step Count	5
▼ Stroke Fields	
Moving Stroke [mm]	0
▼ Condition Fields	
Mesh Size [%]	2

Results of the current-magnetic force

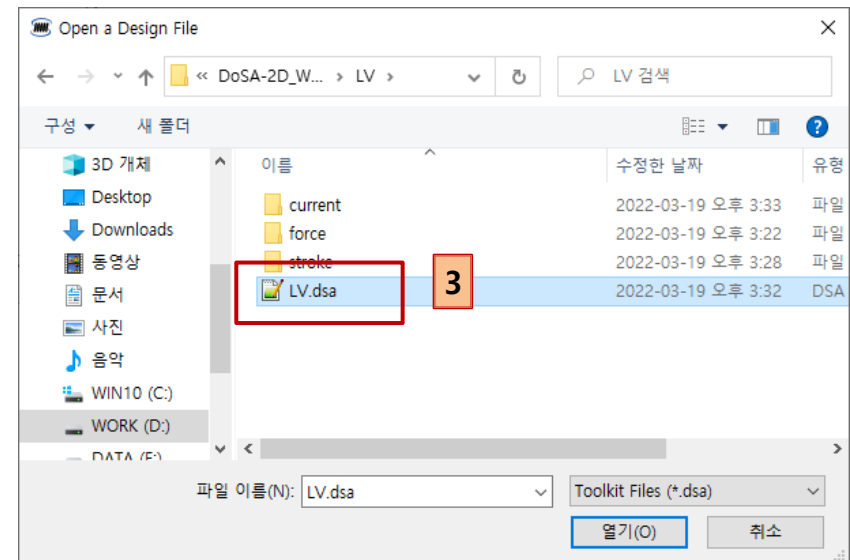
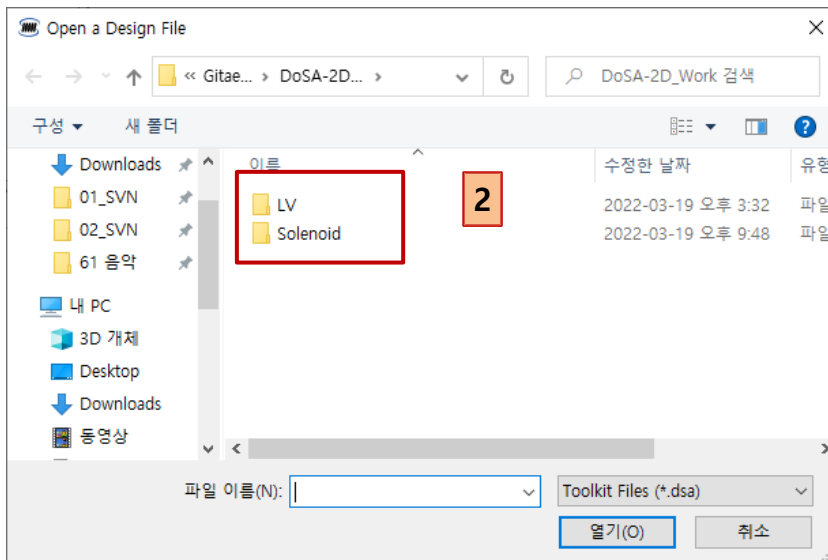
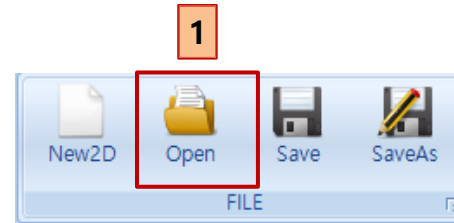
5. Click "Current Test" button



Tips

Open design

1. Toolbar > Click Open Button
2. Double click the design directory.
3. Double click the design file.



Thank You

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Homepage : <http://openactuator.org>

