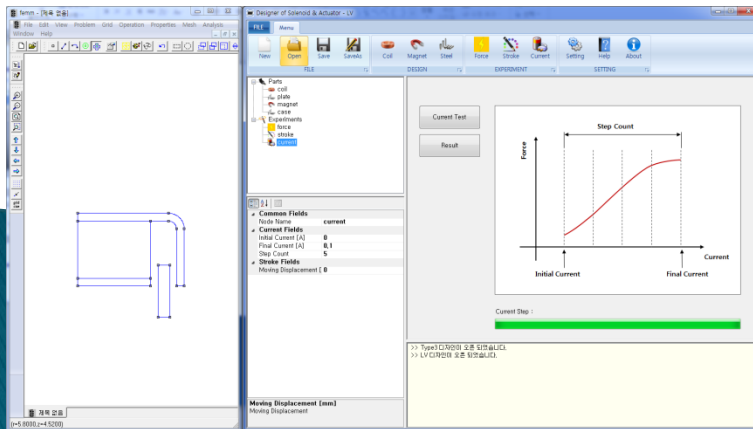


DoSA-2D User Manual

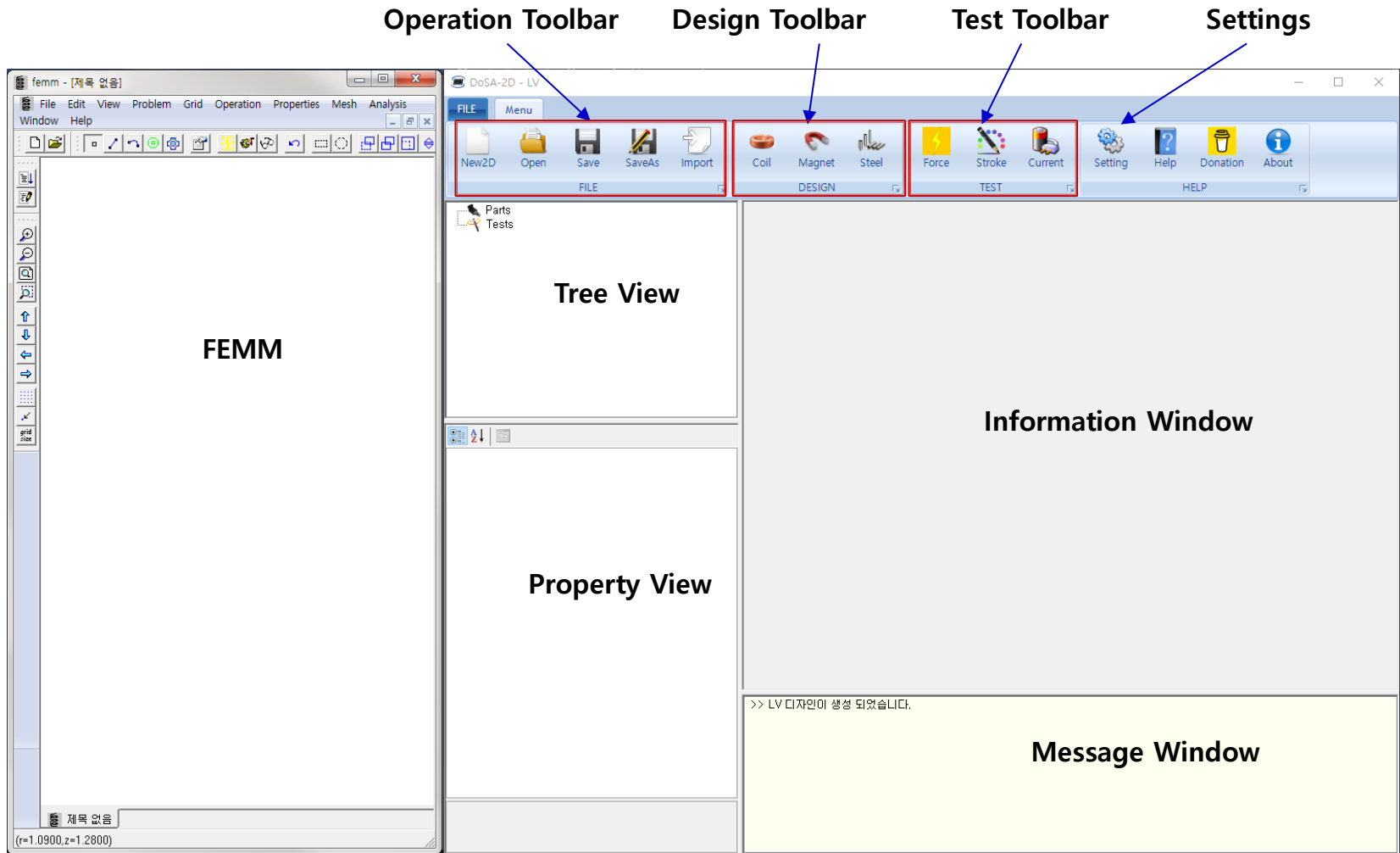
Voice Coil Motor Example
(Speaker, Auto-Focus, Linear Vibrator)

2022-05-30
zgita@gmail.com



DoSA Structure

Program Structure



Toolbar

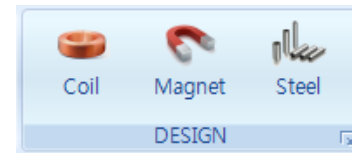
1. Operations

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



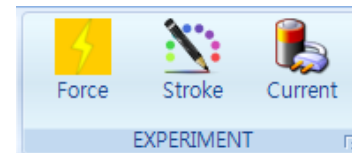
2. Part Design

- ✓ 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

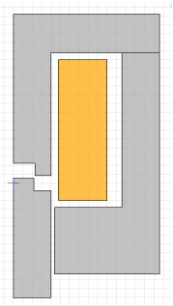


Work process

Product Design

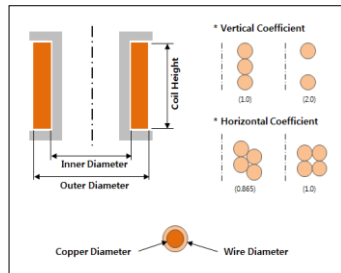
1. Geometry design

Geometry



2. Part design

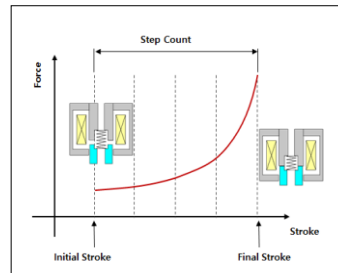
Components



Virtual Test

3. Test condition

Test Condition

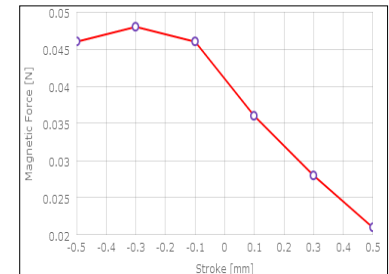


4. Virtual Test (Autorun)

Virtual Test

5. Results

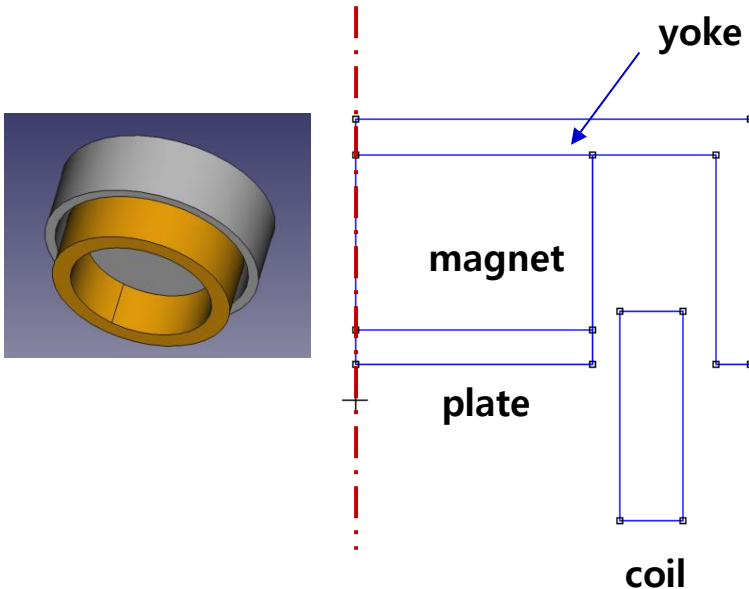
Results



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)

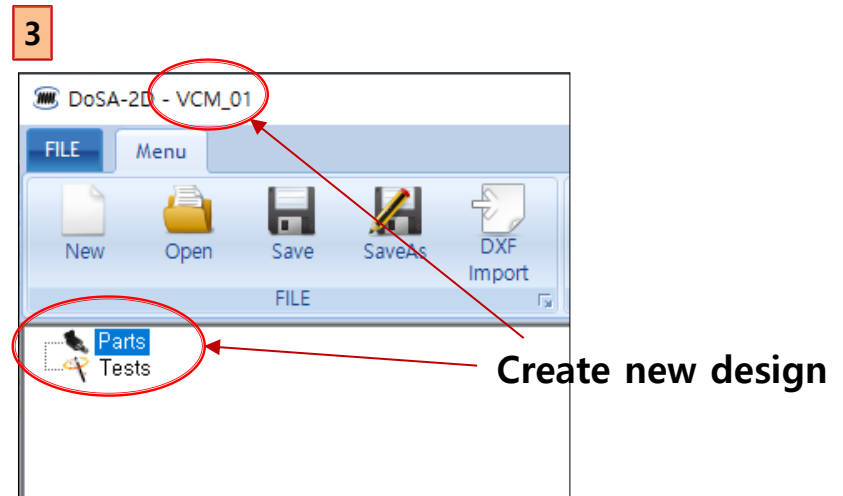
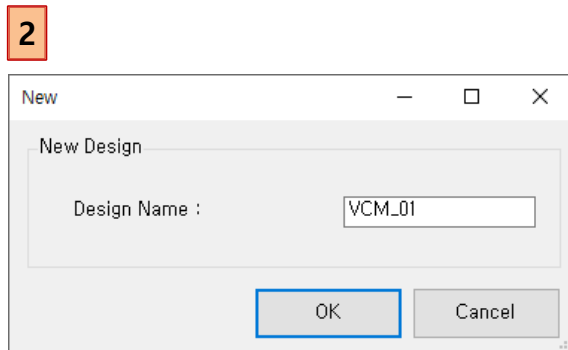
다. Power

- Voltage : 2.5V

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

New design

1. Toolbar > Click New button
2. Design Name : "VCM_01"
3. Click OK

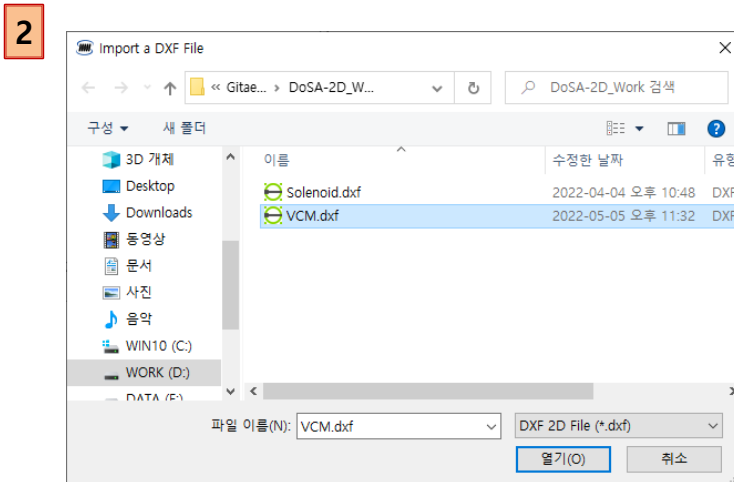
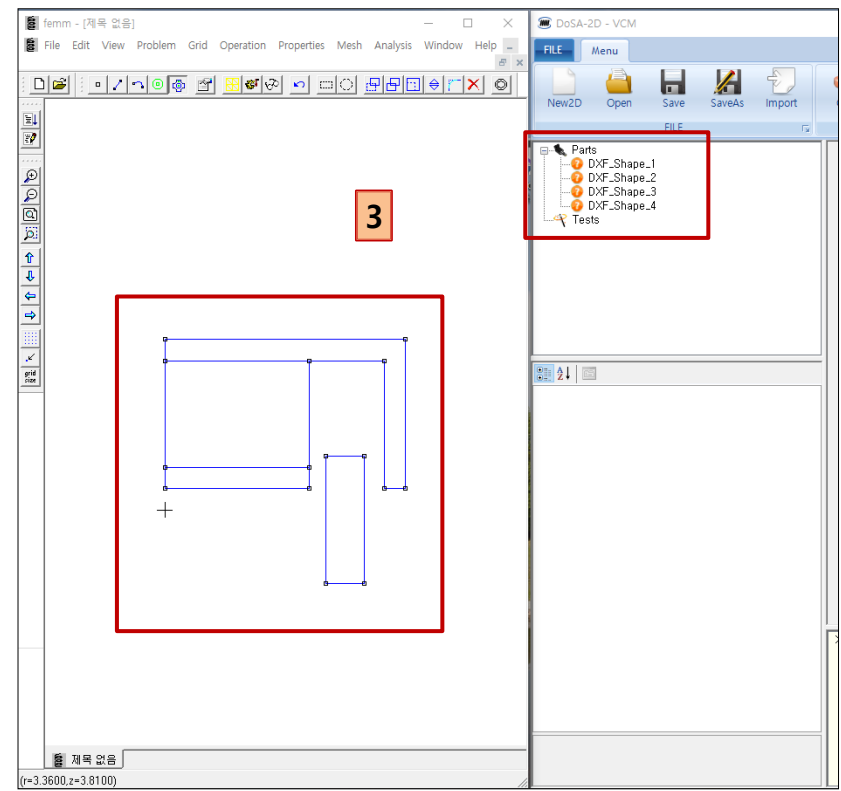


Import shapes

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

[Caution for the Shape Model]

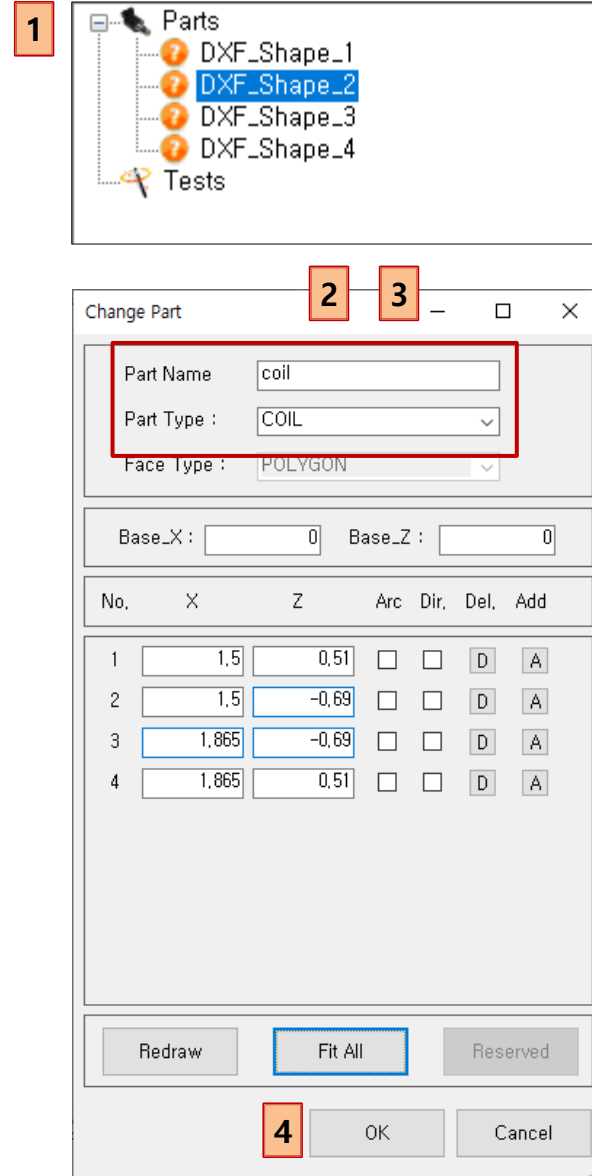
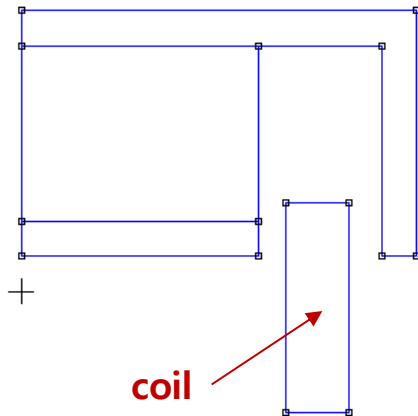
- Part must be written in Polyline
- Please refer to "Drawing Guide"
- https://solenoid.or.kr/data/Drawing_Guide_ENG.pdf



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



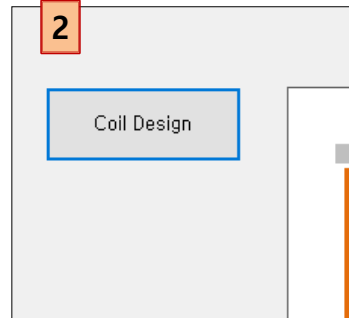
Coil Design

Select the magnetic force calculation part

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)

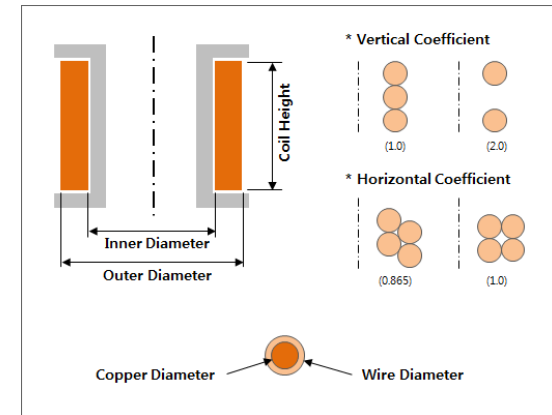
Common Fields	
Node Name	coil
Specification Fields	
Part Material	Copper
Current Direction	IN
Moving Parts	MOVING
Calculated Fields	
Coil Turns	126
Coil Resistance [Ω]	15.74769
Coil Layers	6
Turns of One Layer	21
Design Fields (optional)	
Coil Wire Grade	Bonded_IEC_Grade_1B
Inner Diameter [mm]	3
Outer 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

2. Calculate the coil specification
 - ✓ Click the "Coil Design" button



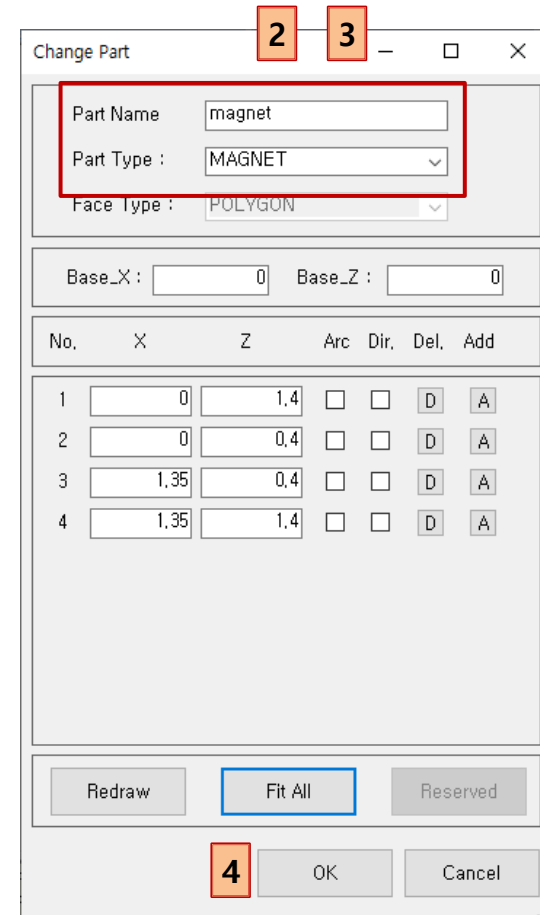
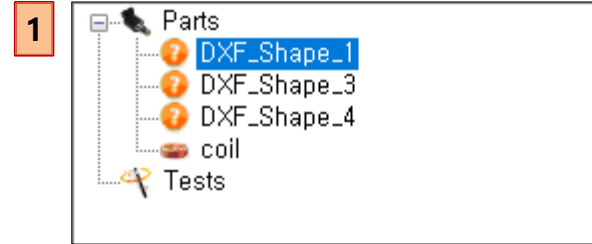
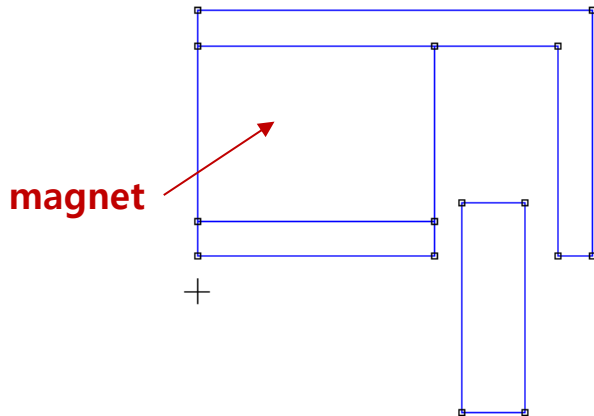
3. Check the coil specification

4. Ribbon Bar > Save



Set as Magnet

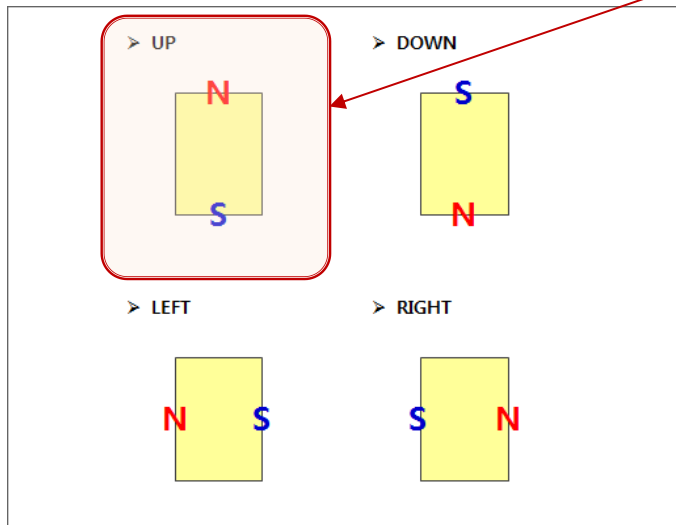
1. Treeview > "DXF_Shape_1" double click
2. Change name : "magnet"
3. Change part type : MAGNET
4. Click OK button



Magnet Settings

1. Magnet Settings

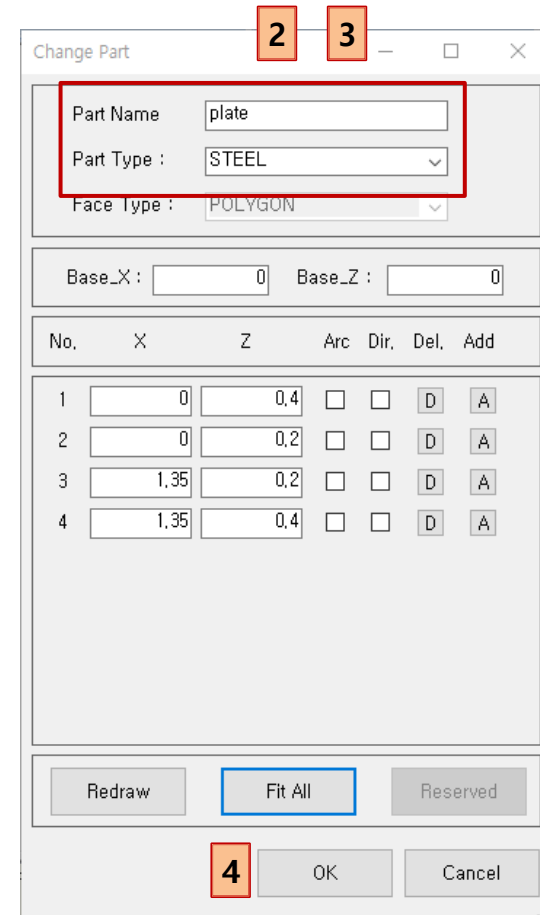
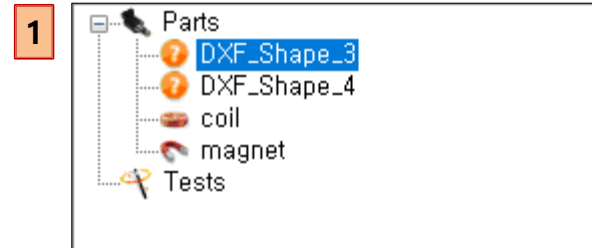
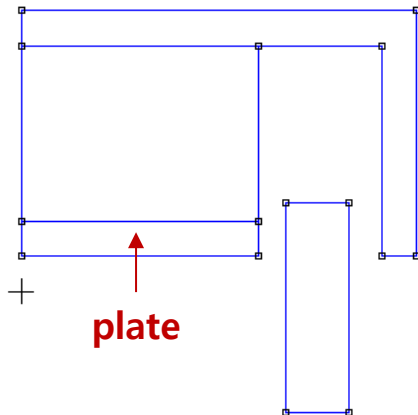
- ✓ Part Material : N52
- ✓ Direction : UP



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

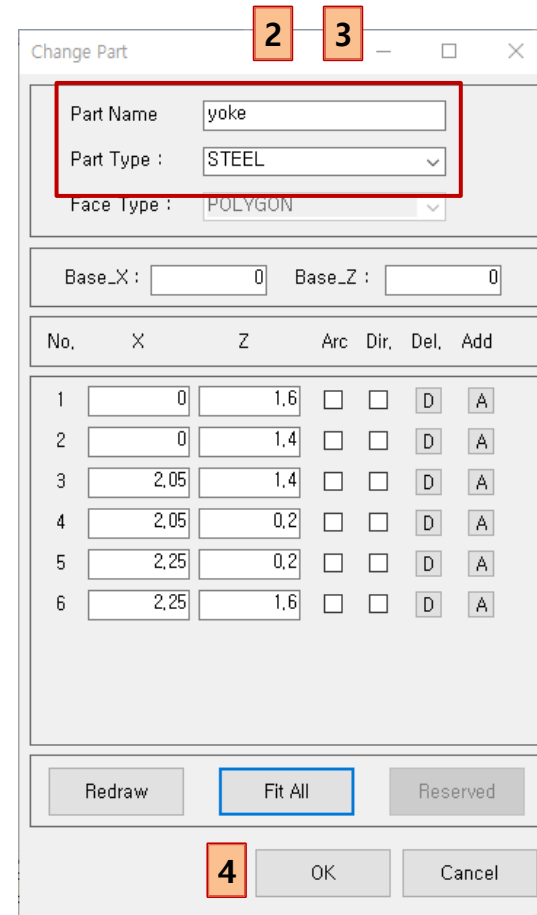
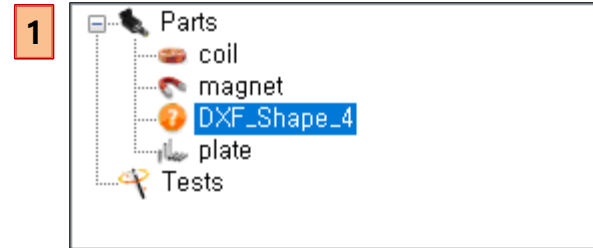
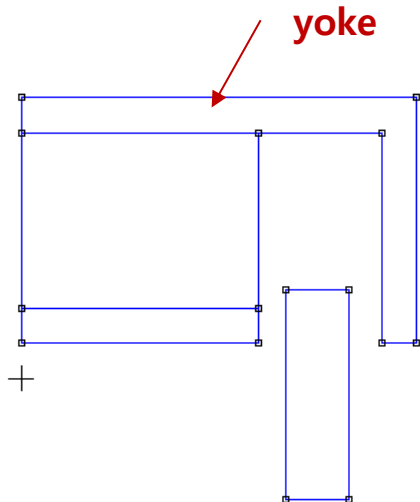
Set as Plate

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



Set as Yoke

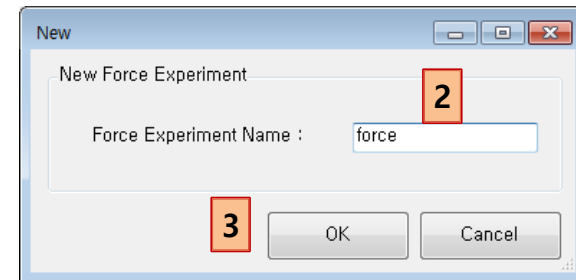
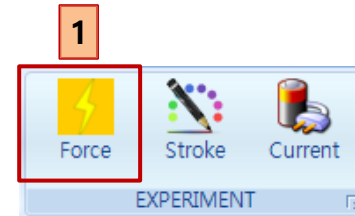
1. Treeview > "DXF_Shape_4" double click
2. Change name : "yoke"
3. Change part type : STEEL
4. Click OK button



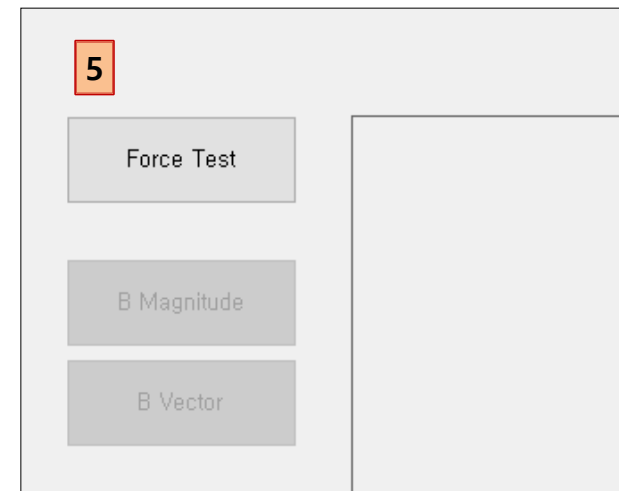
Virtual Test

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

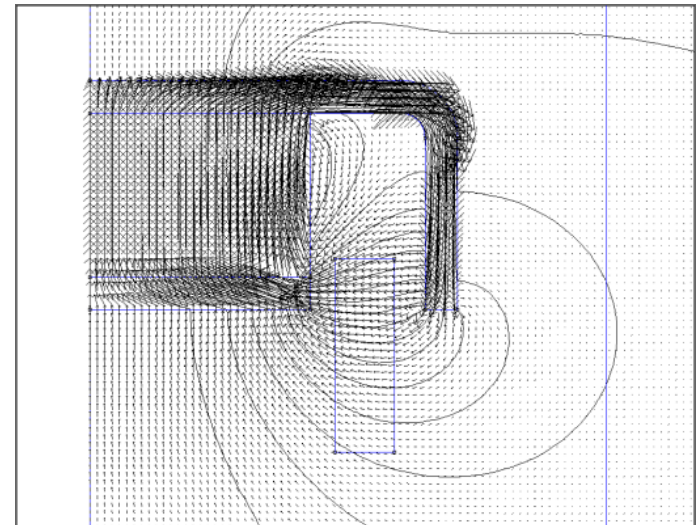
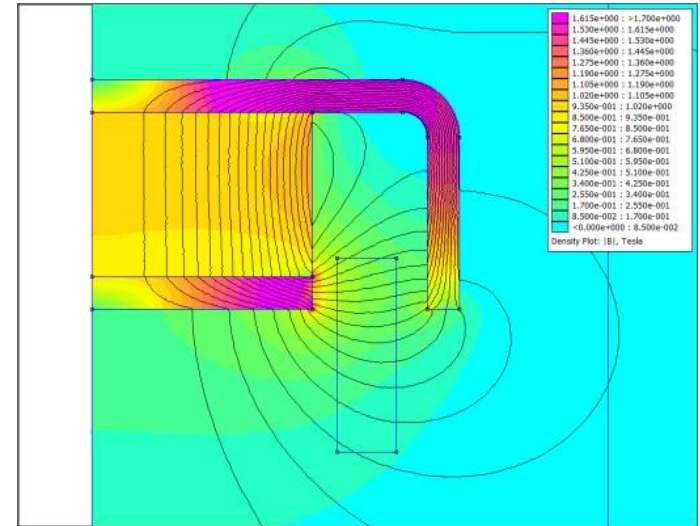
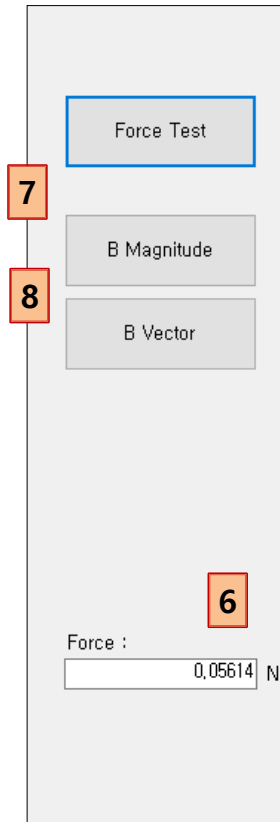


▼ Common Fields	
Node Name	force
▼ Current Fields	
Voltage [V]	2,5
Max. Current [A]	0,16669
▼ Stroke Fields	
Moving Stroke [mm]	0
▼ Condition Fields	
Mesh Size [%]	2




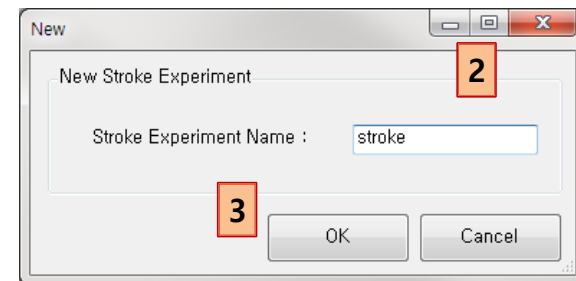
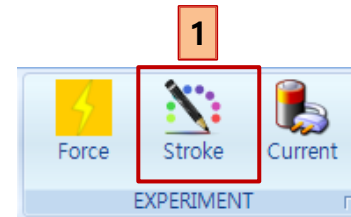
Results of the magnetic force

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

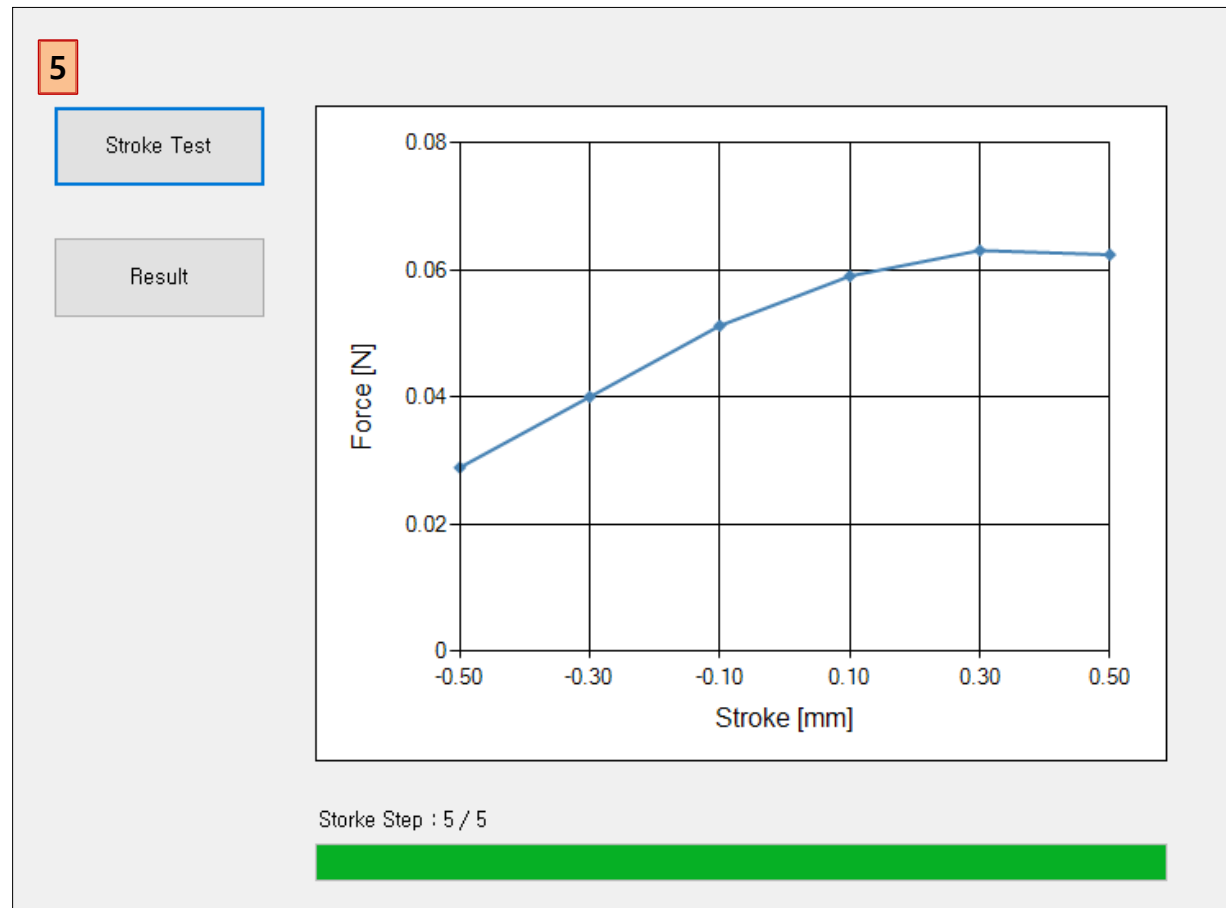
1. Toolbar > Click Stroke button
2. Stroke Test Name : "stroke"
3. Click OK button
4. Settings of the test
 - ✓ Voltage : 2.5
 - ✓ Initial Stroke : -0.5
 - ✓ Final Stroke : 0.5
 - ✓ Step Count : 5



▼ 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

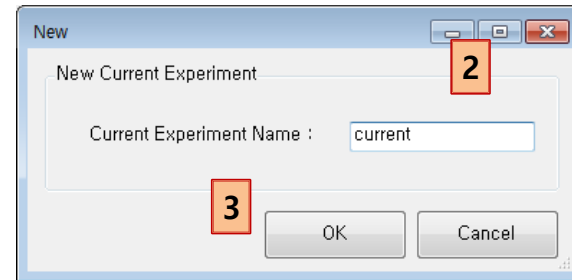
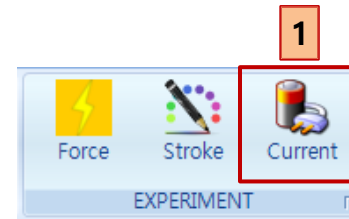
Results of the stroke-magnetic force

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

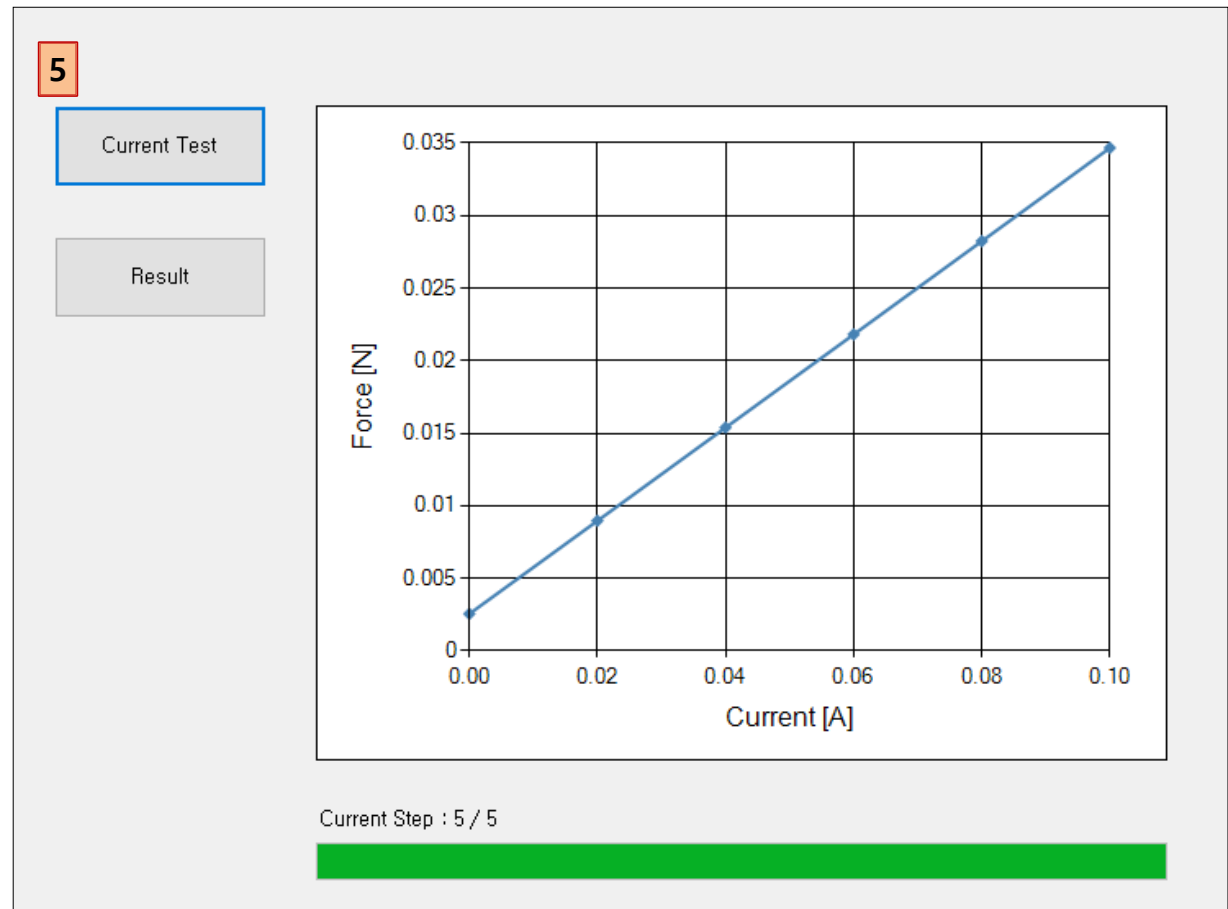


A screenshot of a software interface showing a list of fields. A red rectangular box highlights the 'Current Fields' section, which includes 'Initial Current [A]', 'Final Current [A]', and 'Step Count'. A red square with the number '4' is to the left of this box.

▼ 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

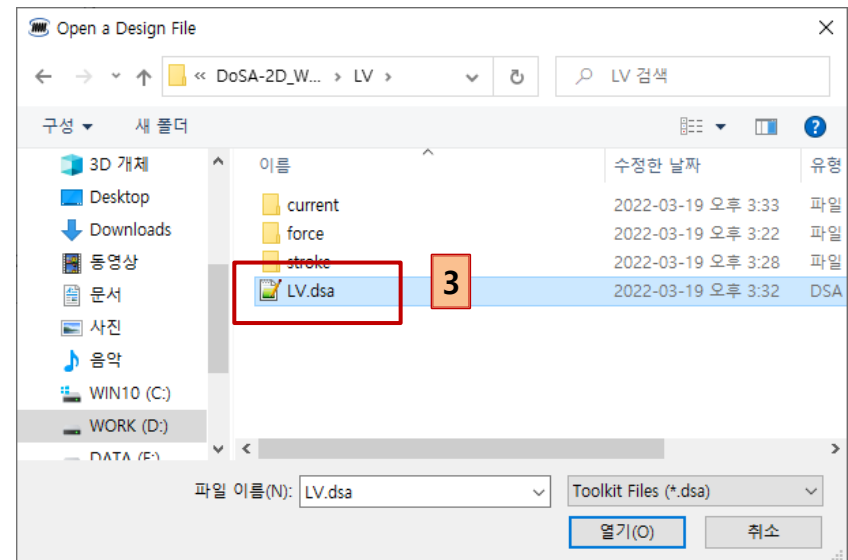
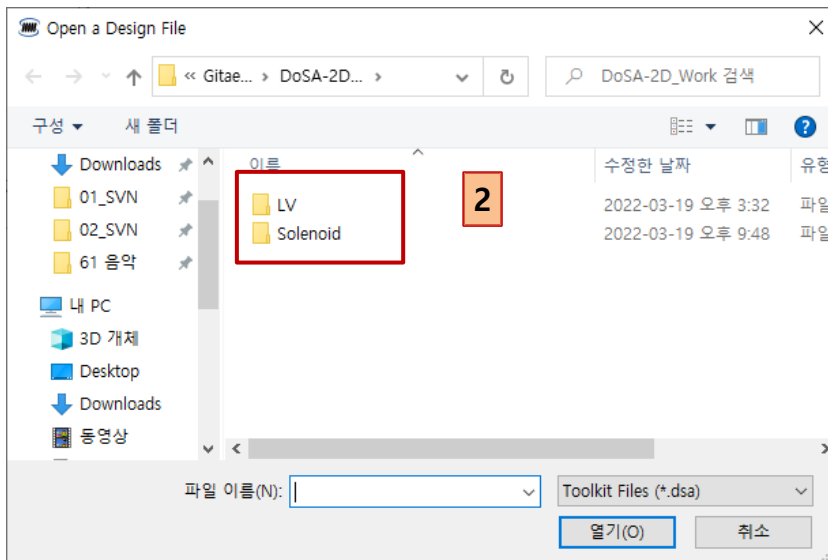
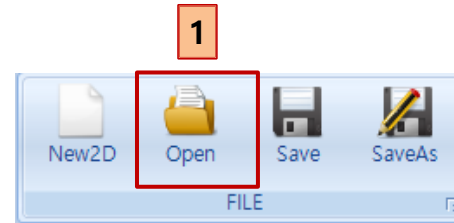
5. Click "Current Test" button



Tips

Open design

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



Thank You

Email : zgitae@gmail.com

Homepage : <http://openactuator.org>

