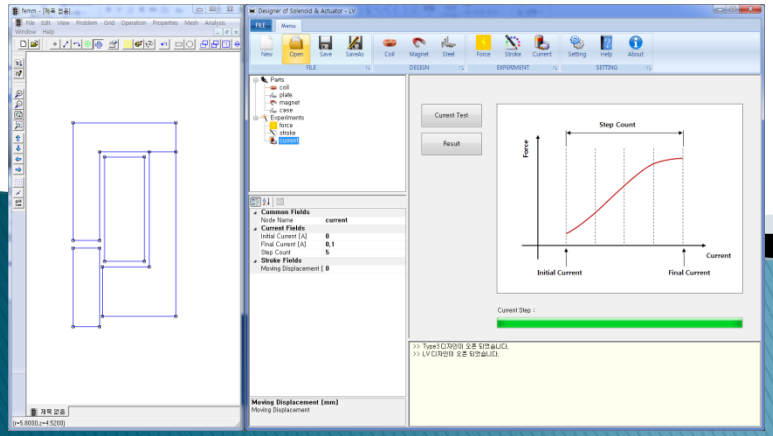
DoSA-2D User Manual

Solenoid Example



2022-05-06
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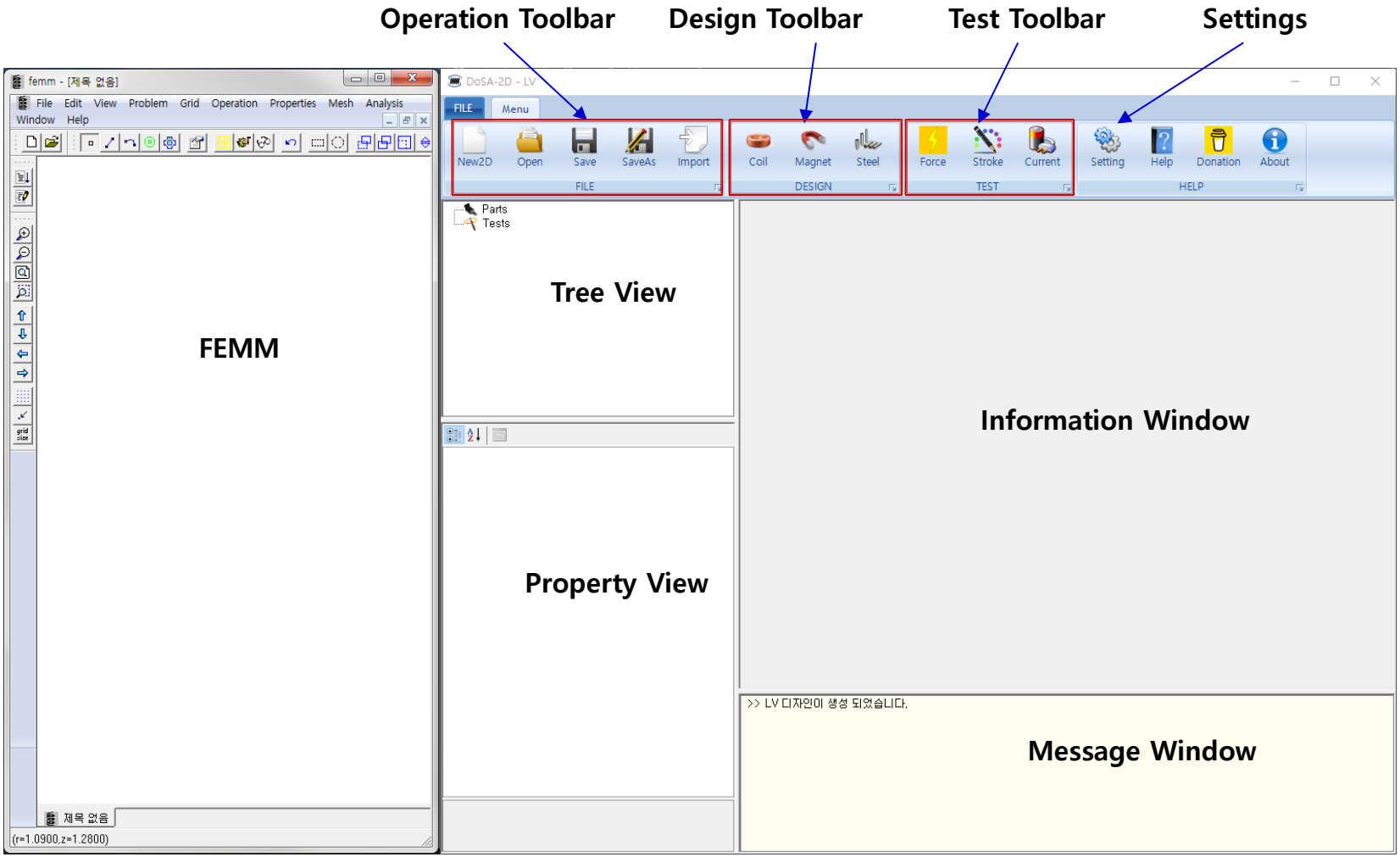
DoSA Structure

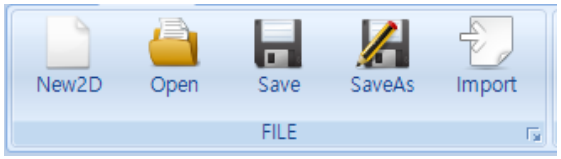
Program Structure



Toolbar

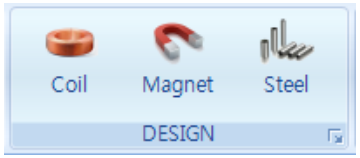
1. Operations

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



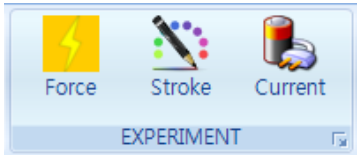
2. Part Design

- ✓ 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



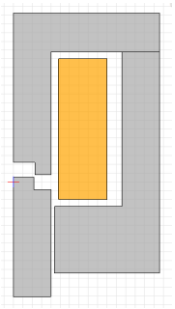
Work process

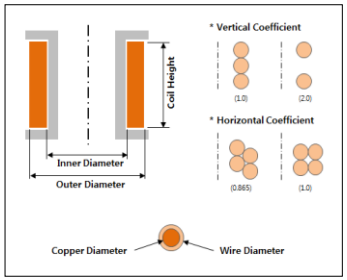
Product Design

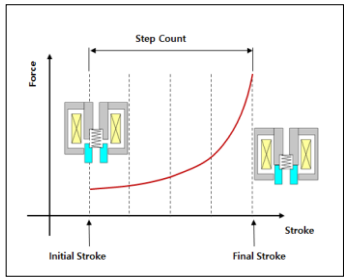
Virtual Test

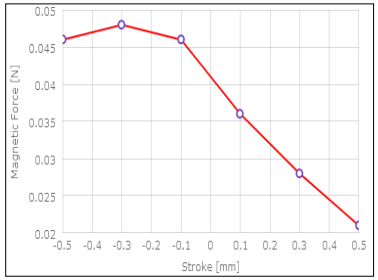
1. Geometry design
2. Part design
3. Test condition
4. Virtual Test (Autorun)
5. Results

Geometry → Components → Test Condition → Virtual Test → Results





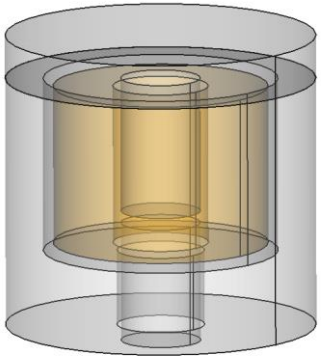


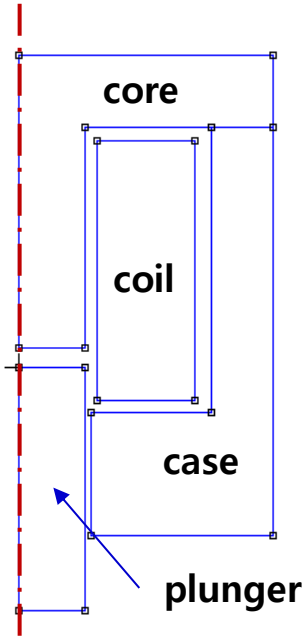


Analysis Model

Analysis Model

1. Model Shape





2. Product Specifications

가. Coil Turns

- Coil Turns : 1040 turns
- Coil Resistance : 15.2 Ohm

나. Power

- Voltage : 14.5V

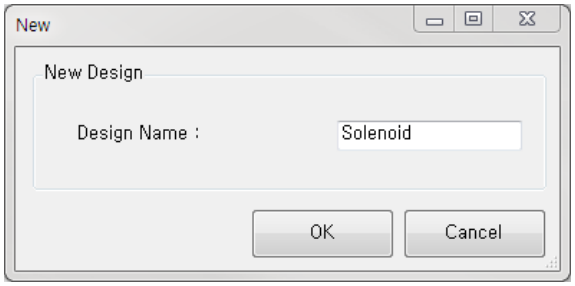
(Work Example Files : DoSA-2D Install Directory > Samples > Solenoid)

New design

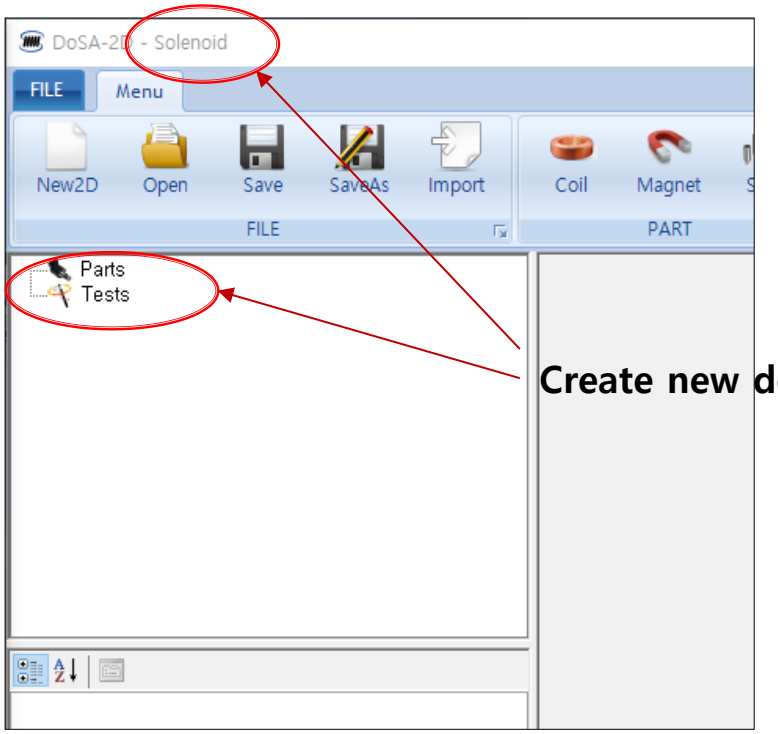
1. Toolbar > Click New Button
2. Design Name : "Solenoid"
3. Click OK

1

2



3

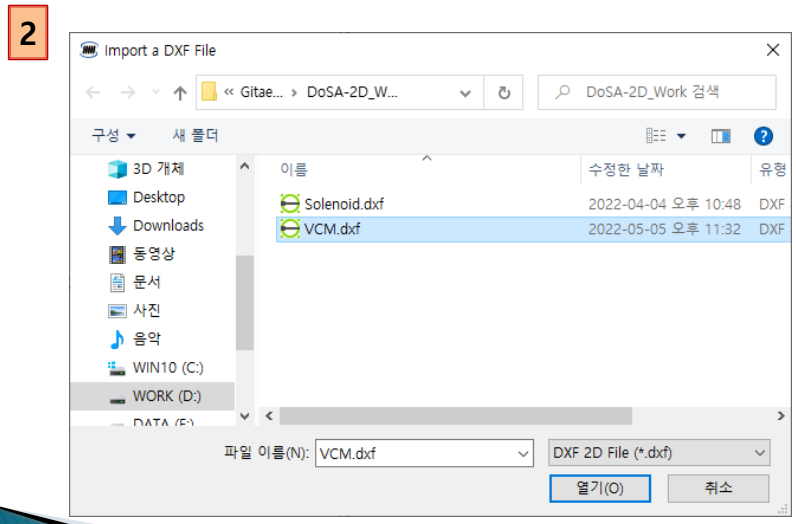


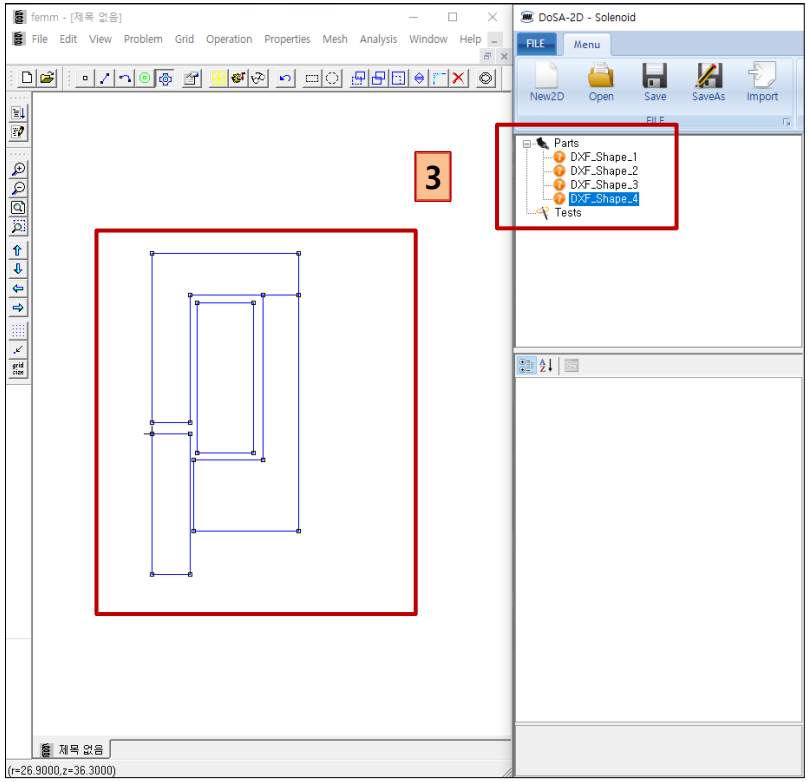
Import shapes

1. Toolbar > Click New button
2. Select "Solenoid.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

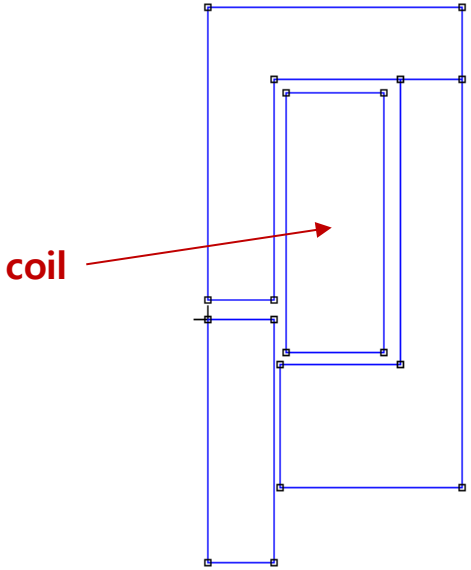


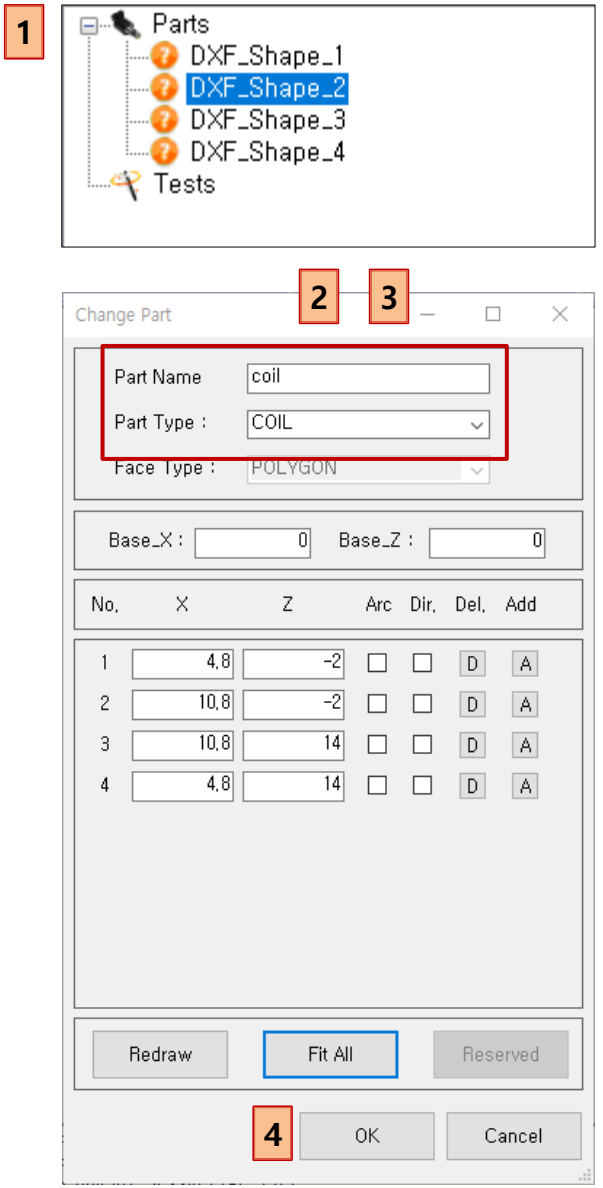


Parts Design

Set as Coil

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





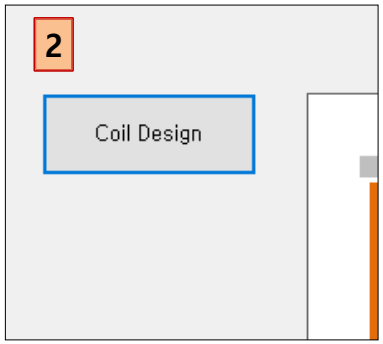
Coil Design

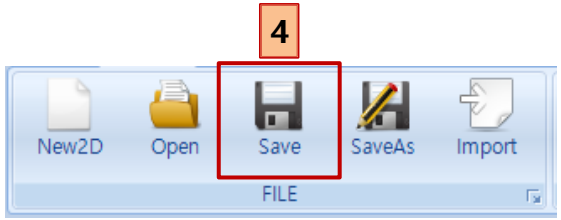
1. Input Coil specifications
   - ✓ Copper Diameter : 0.27

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

3. Check the coil specification

4. Ribbon Bar > Save

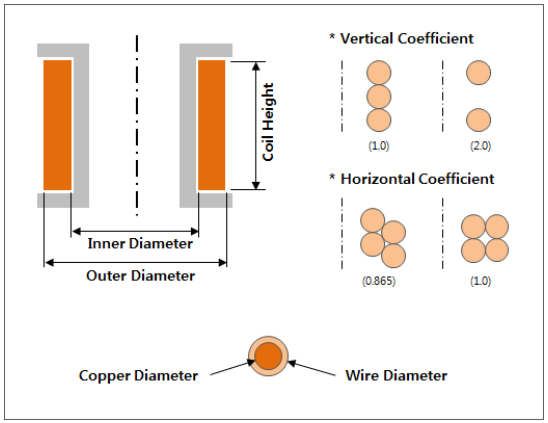




	Common Fields	
	Node Name	**coil**
	Specification Fields	
	Part Material	**Copper**
	Curent Direction	**IN**
	Moving Parts	**FIXED**
	Calculated Fields	
	Coil Turns	**1040**
	Coil Resistance [Ω]	**15.20945**
	Coil Layers	20
	Turns of One Layer	52
	Design Fields (optional)	
	Coil Wire Grade	**Enameled_IEC_Grade_2**
	Inner Diameter [mm]	9.6
	Outer Diameter [mm]	21.6
	Coil Height [mm]	16
	Copper Diameter [mm]	**0.27**
	Wire Diameter [mm]	**0.31872**
	Coil Temperature [℃]	**20**
	Horizontal Coefficient	**0.9**
	Vertical Coefficient	**0.98**
	Resistance Coefficient	**1**

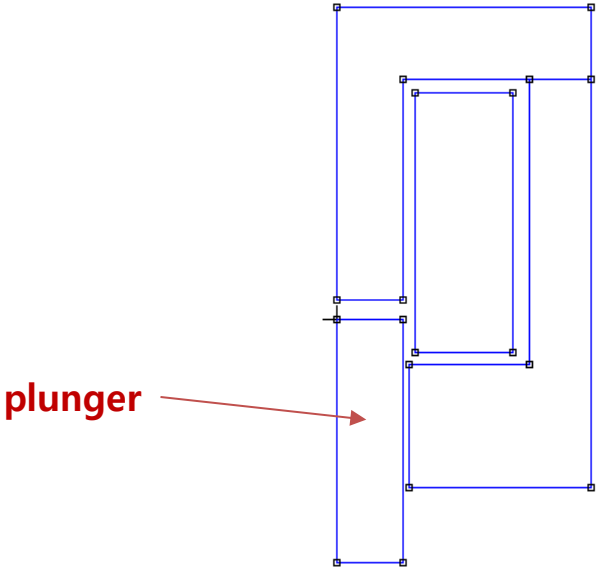
1

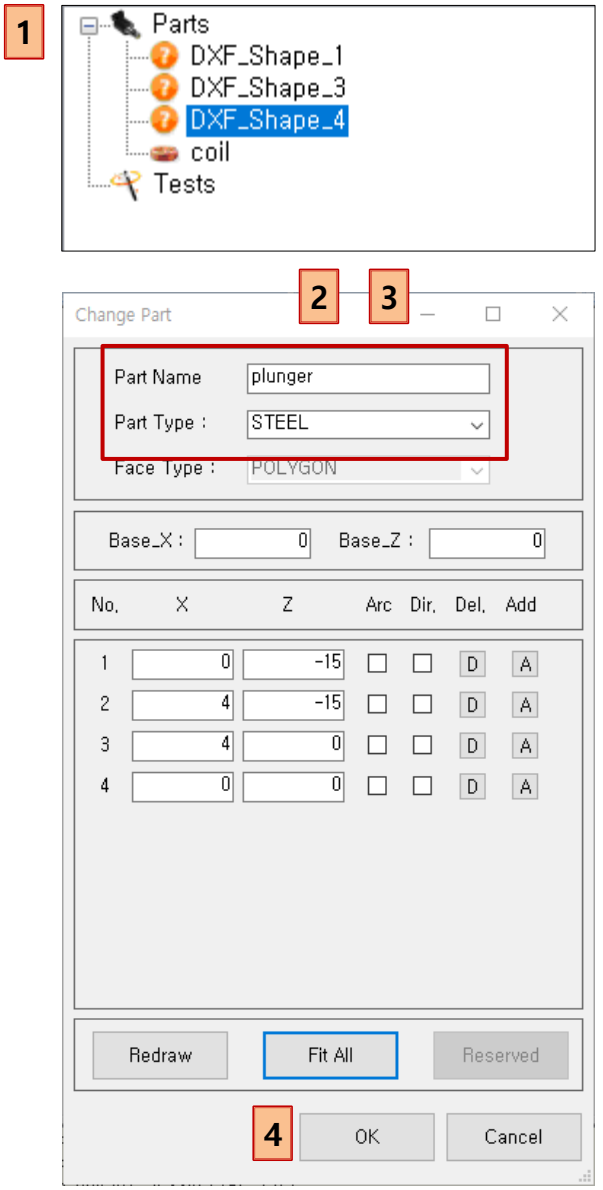
3



Set a plunger

1. Treeview > “DXF_Shape_4” double click
2. Change name : “plunger”
3. Change part type : STEEL
4. Click OK button





Plunger Settings

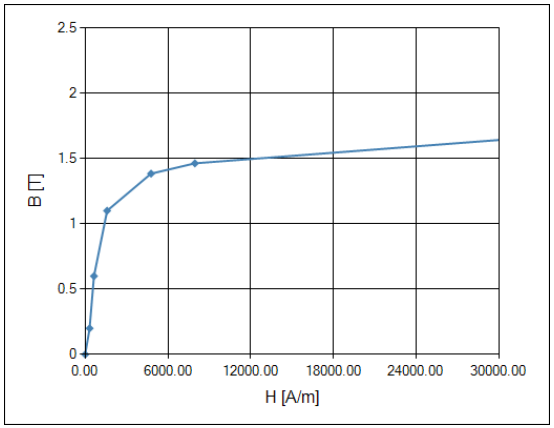
1. Plunger setting
   - ✓ Part Material : 430 Stainless Steel
   - ✓ Moving Parts : **MOVING**

Select the magnetic force calculation part

1

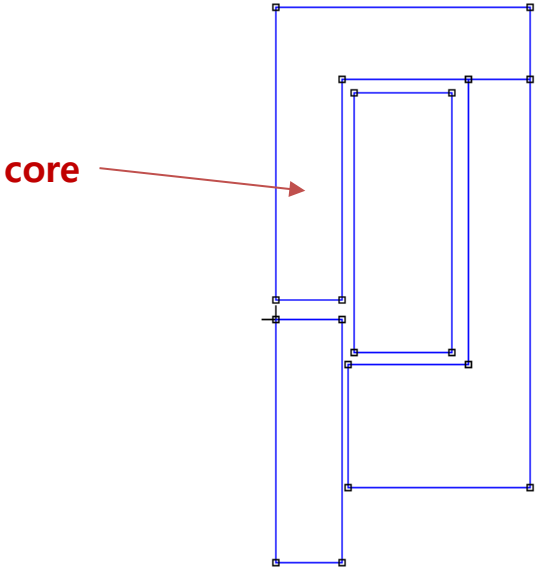
Common Fields	
Node Name	plunger
Specification Fields	
Part Material	430 Stainless Steel
Moving Parts	MOVING

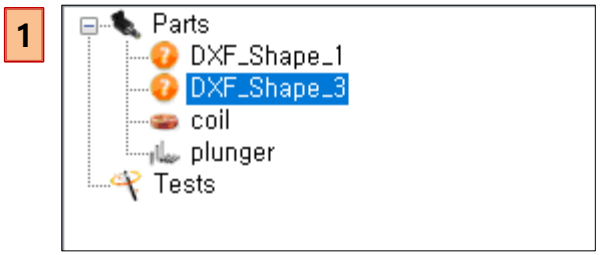
[BH curve]

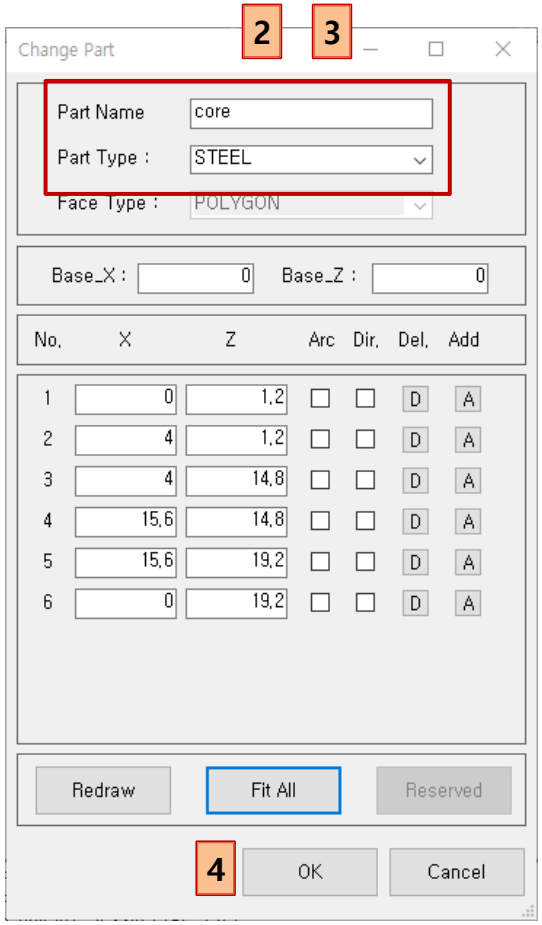


Set as Core

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

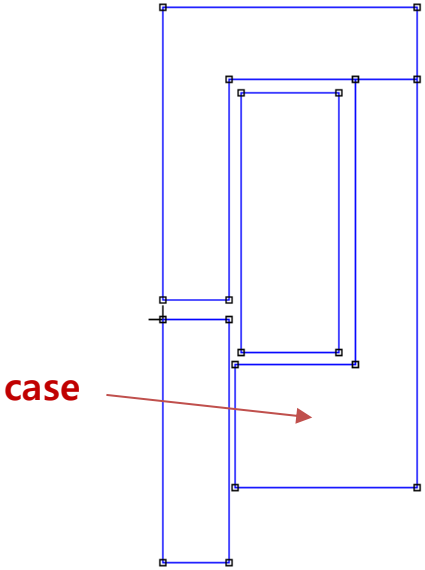


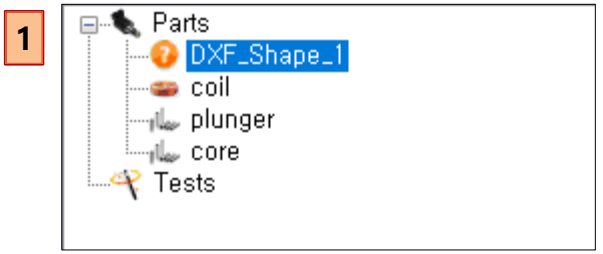


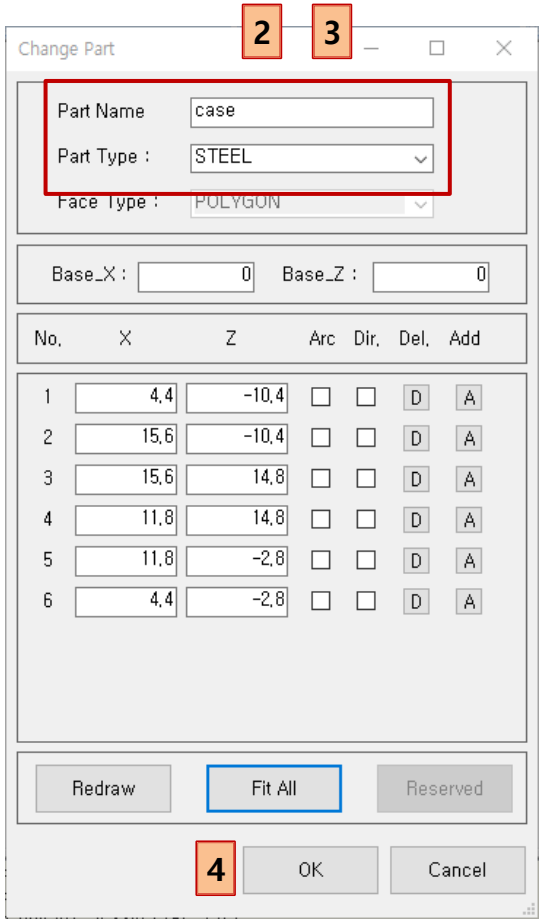


Set as Case

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



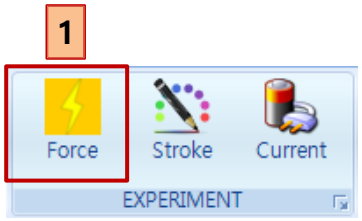


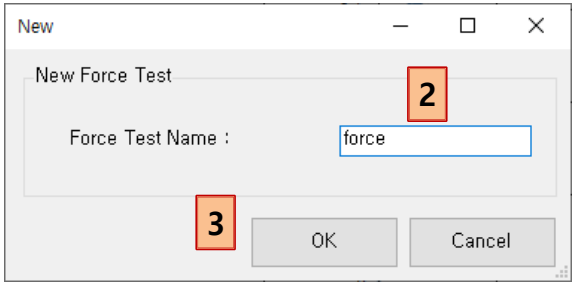


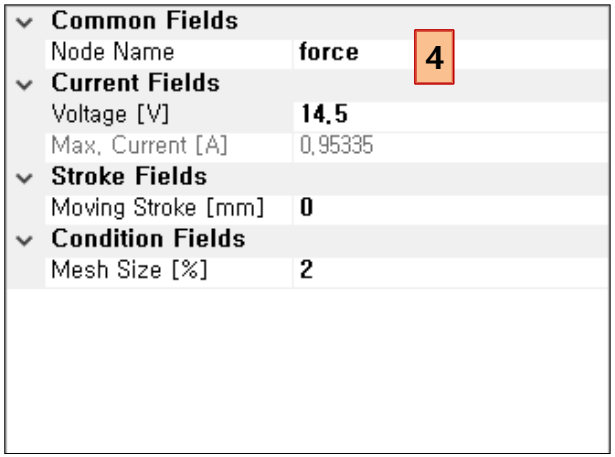
Virtual Test

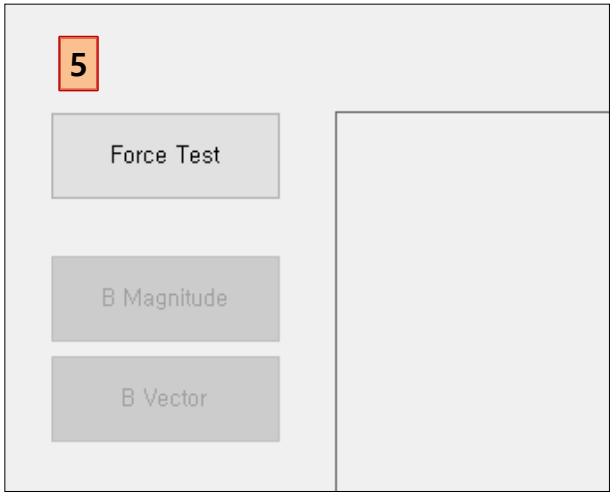
Test of the magnetic force

1. Toolbar > Click Force Button
2. Force Test Name : "force"
3. Click OK Button
4. Test Setting
   - ✓ Voltage : 14.5 V
5. Click "Force Test" Button



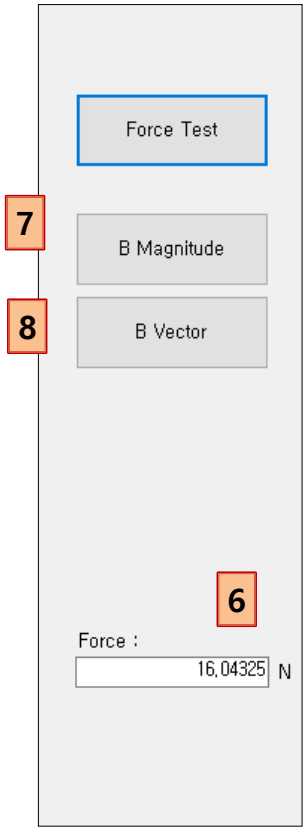


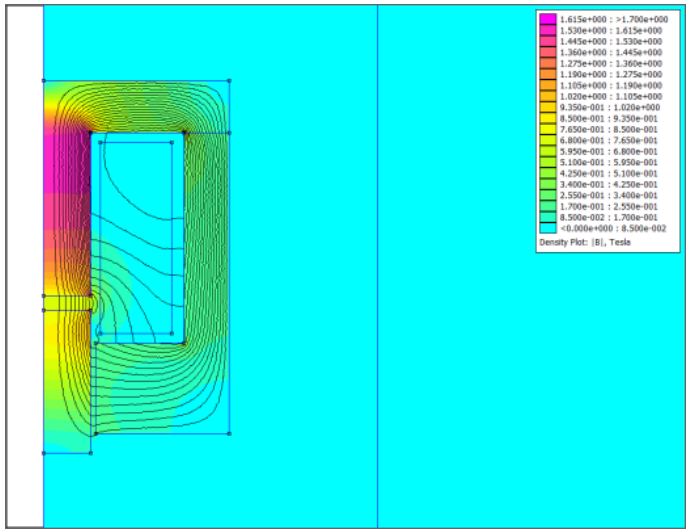


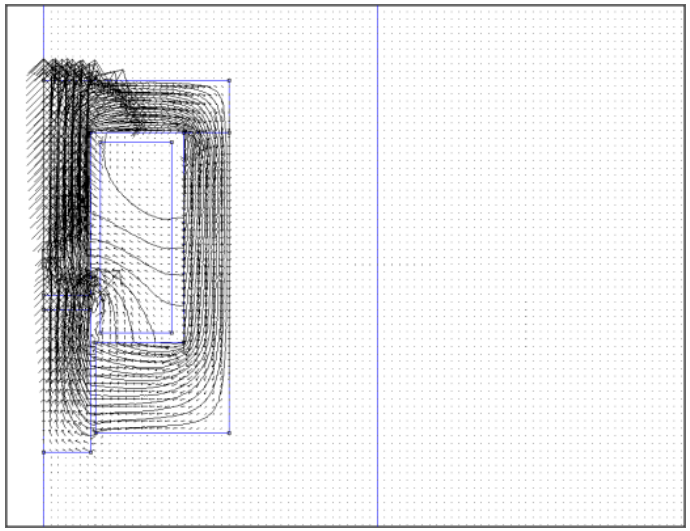


Results of the magnetic force

6. Force : 16.04 N
7. Magnetic Density
   - ✓ Click the B Magnitude button
8. Vector of Magnetic Density
   - ✓ Click the B Vector button

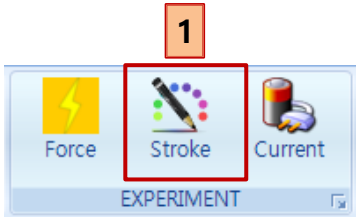


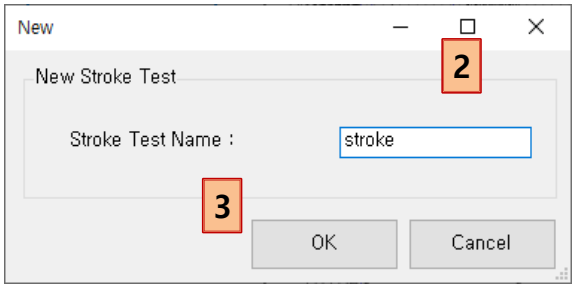


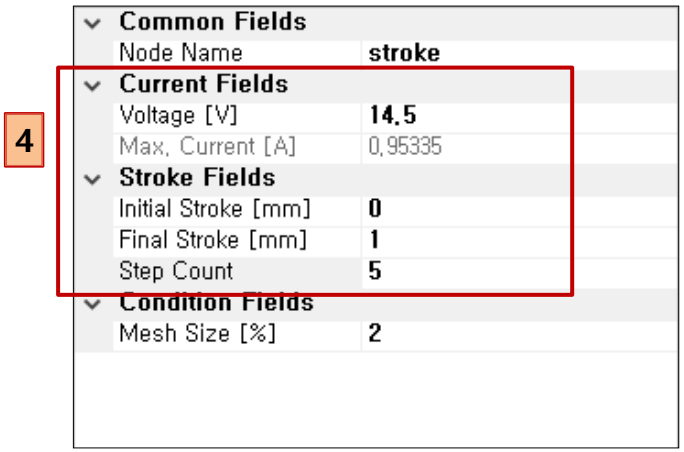


Test of the stroke-magnetic force

1. Toolbar > Click Stroke Button
2. Stroke Test Name : "stroke"
3. Click OK Button
4. Test Settings
   - ✓ Voltage : 14.5
   - ✓ Initial Stroke : 0.0
   - ✓ Final Stroke : 1.0
   - ✓ Step Count : 5

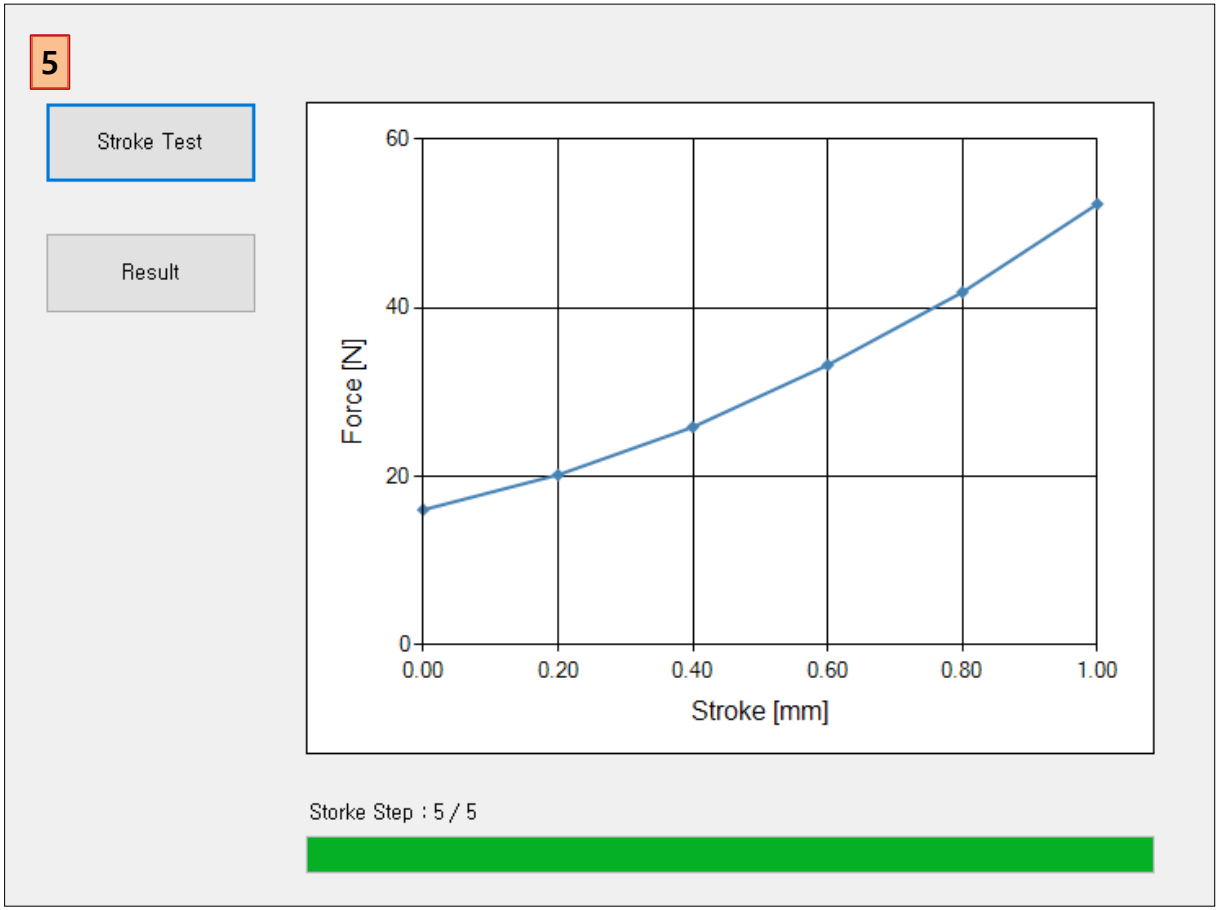






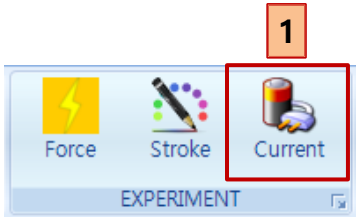
Results of the stroke-magnetic force

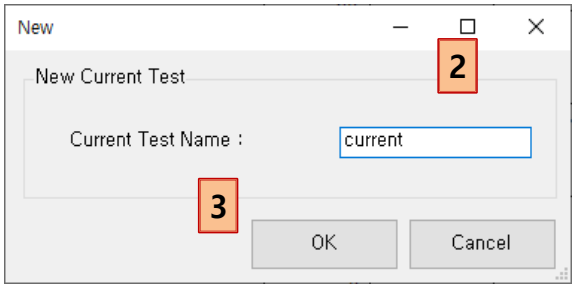
5. Click "Stroke Test" button

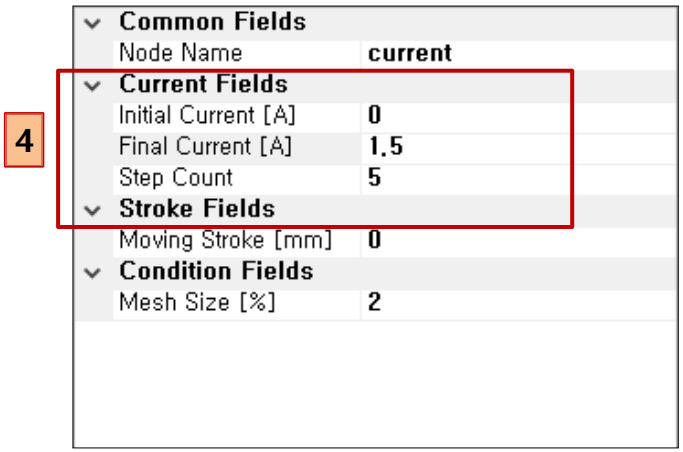


Test of the current-magnetic force

1. Toolbar > Click Current Button
2. Current Test Name : "current"
3. Click OK Button
4. Test Settings
   - ✓ Initial Current : 0.0
   - ✓ Final Current : 1.5
   - ✓ Step Count : 5

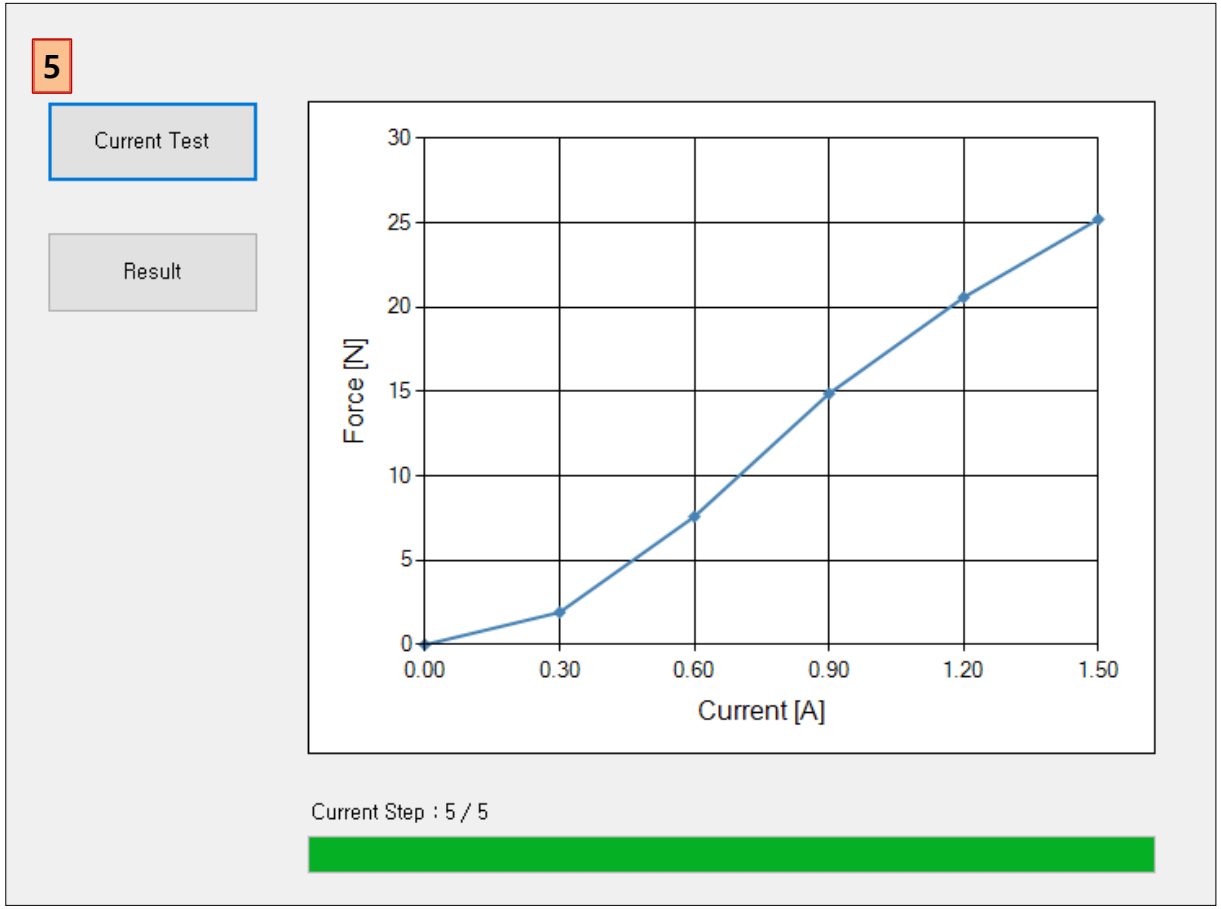






Results of the current-magnetic force

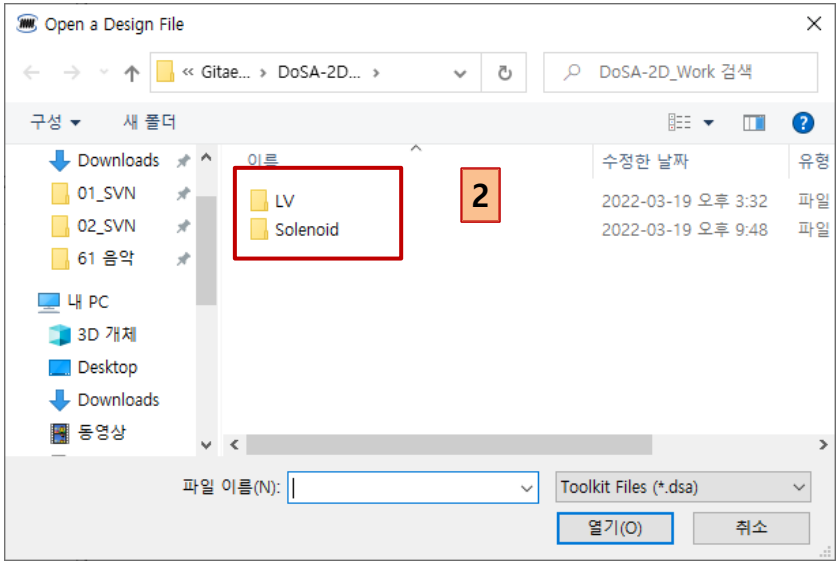
5. Click "Current Test" button

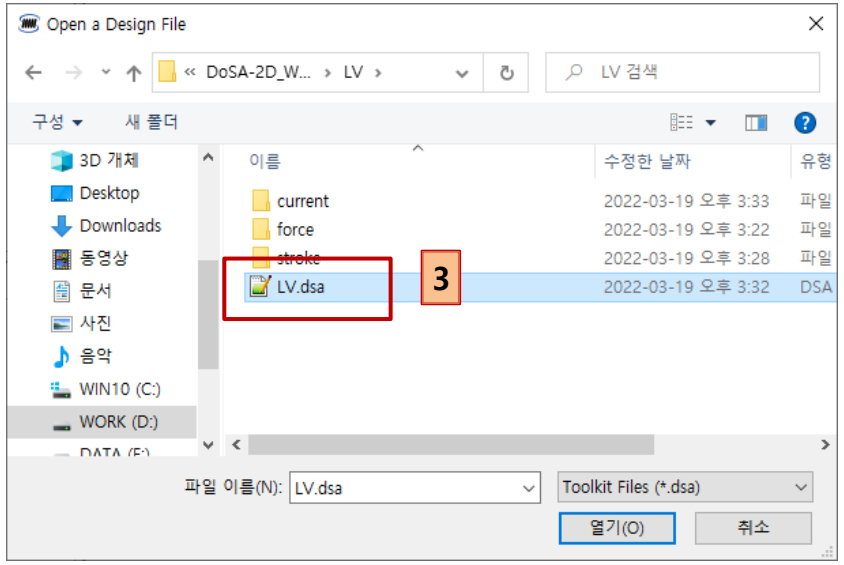


Tips

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