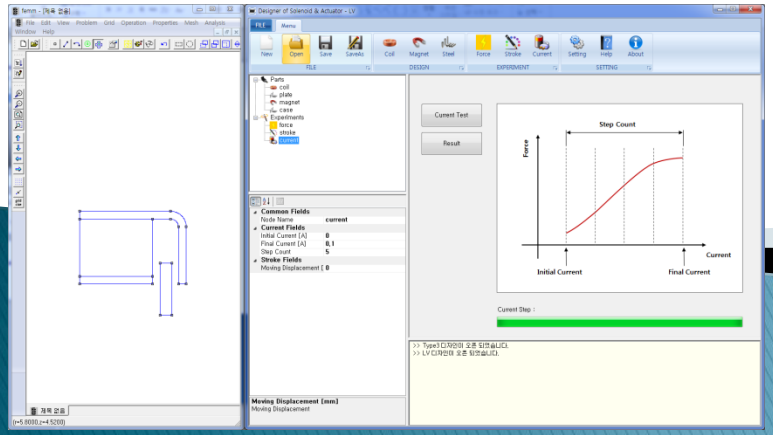
DoSA-2D User Manual

Linear Vibrator Example



2022-03-19

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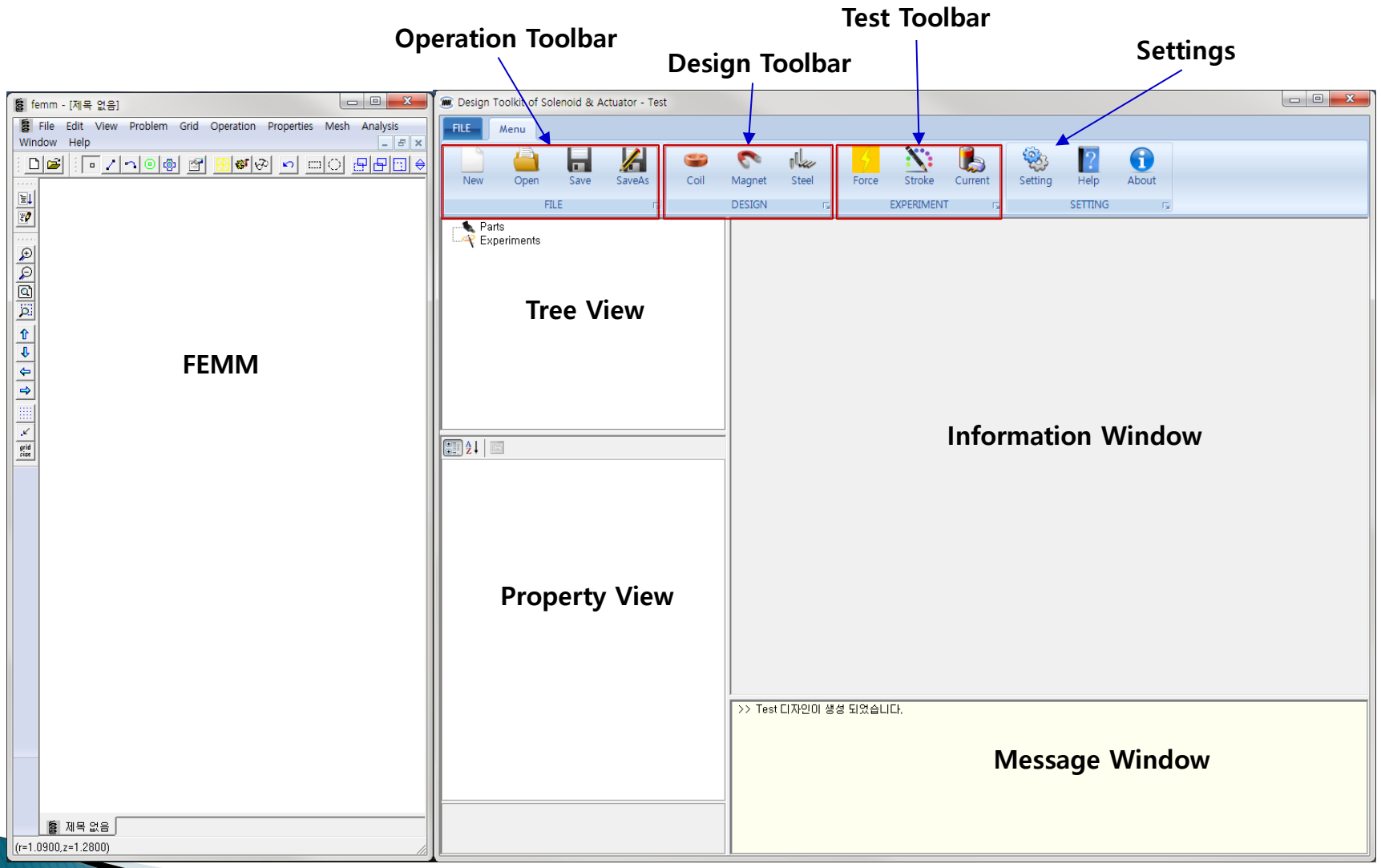
DoSA Structure

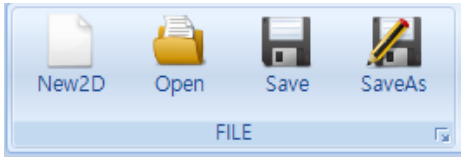
Program Structure



Toolbar

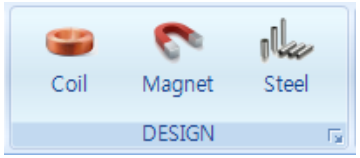
1. Operations

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



2. Part Design

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



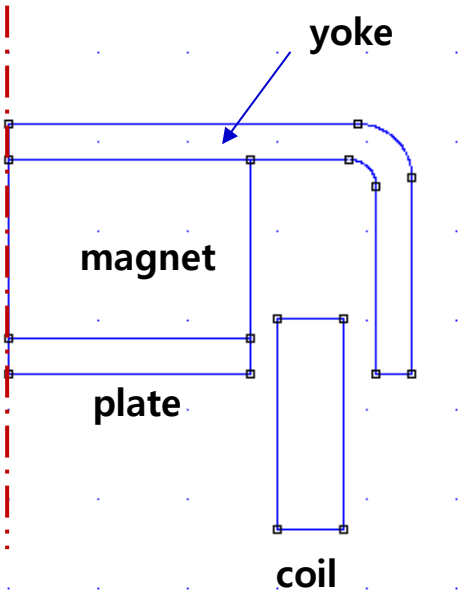
3. Virtual Test

- ✓ 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

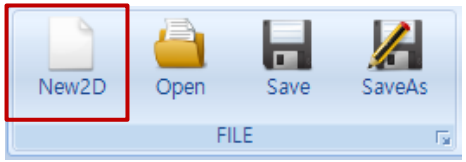
- Voltage : 2.5V

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

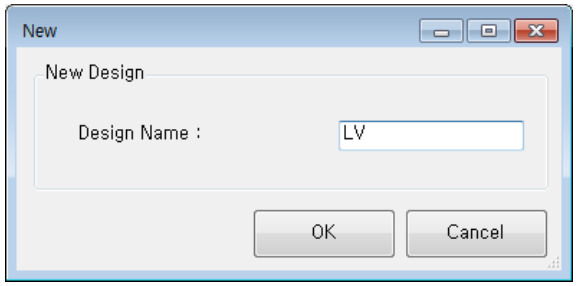
New design

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

1



2



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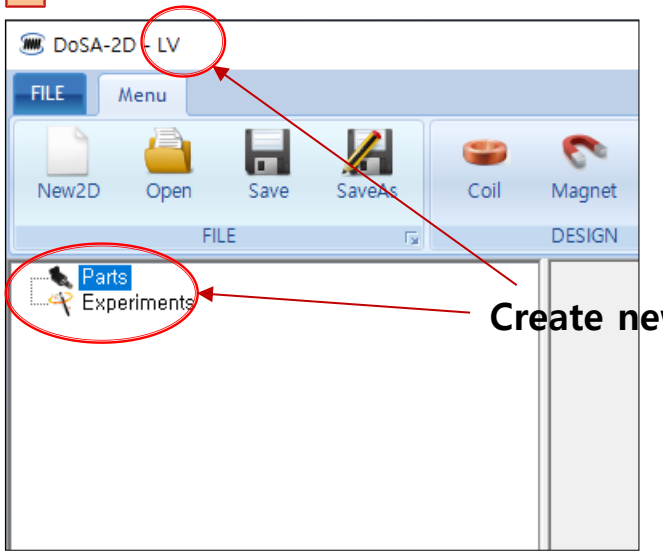
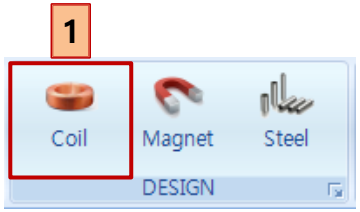
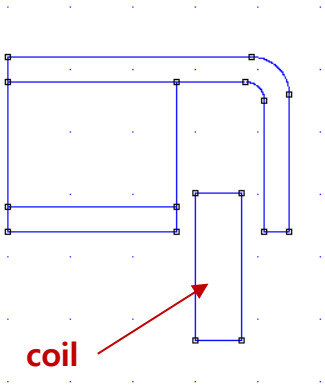


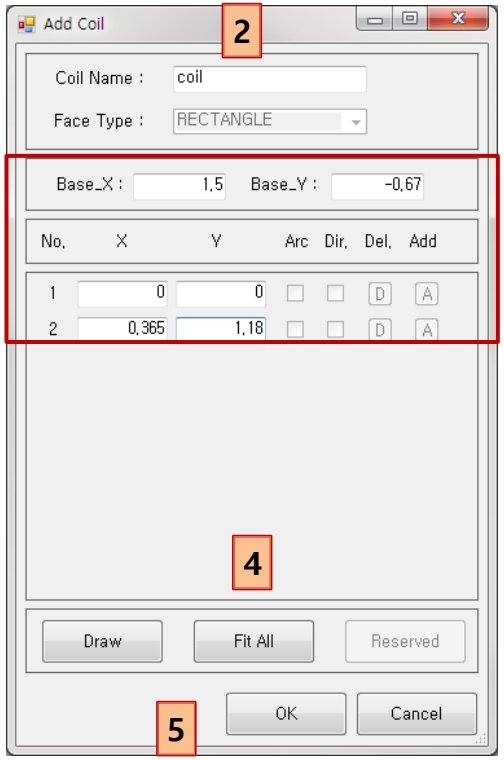
Part Design

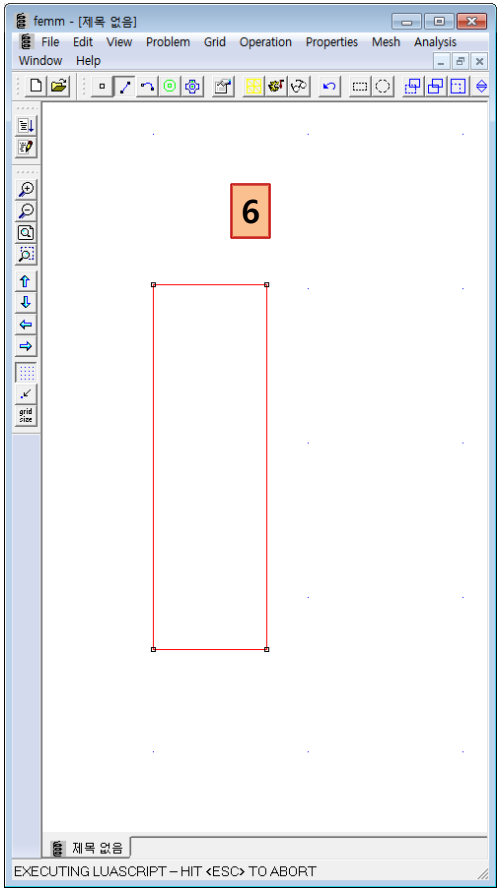
Add a coil

1. Toolbar > Click Coil button
2. Coil Name : "coil"
3. Input the coil shape
   - ✓ Coil Location : Base_X 1.5, Base_Y -0.67
   - ✓ Left-down point : X 0, Y 0
     (Relative coordinates)
   - ✓ Right-Up Point : X 0.365, Y 1.18
     (Relative coordinates)
4. Screen Adjustment : Use Fit All button
5. Click OK button
6. Check shape (FEMM Window)









Coil Design

1. Input the coil instrumental specifications
   - ✓ 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)

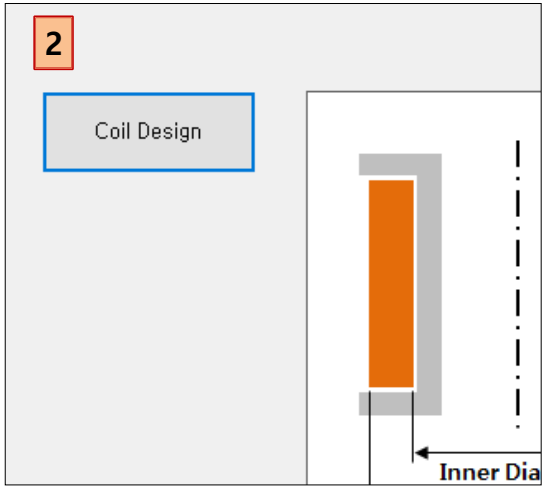
2. Calculate the coil specification
   - ✓ Click the "Coil Design" button

3. Check the coil specification

Common Fields	
Node Name	**coil**
Specification Fields	
Part Material	**Copper**
Curent Direction	**IN**
Moving Parts	**FIXED**
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]	1.18
Copper Diameter [mm]	**0.045**
Wire Diameter [mm]	**0.04953**
Coil Temperature [℃]	**20**
Horizontal Coefficient	**0.95**
Vertical Coefficient	**1.13**
Resistance Coefficient	**1.1**

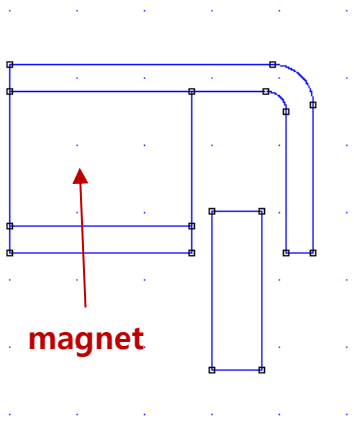
1

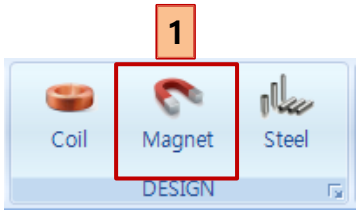
3

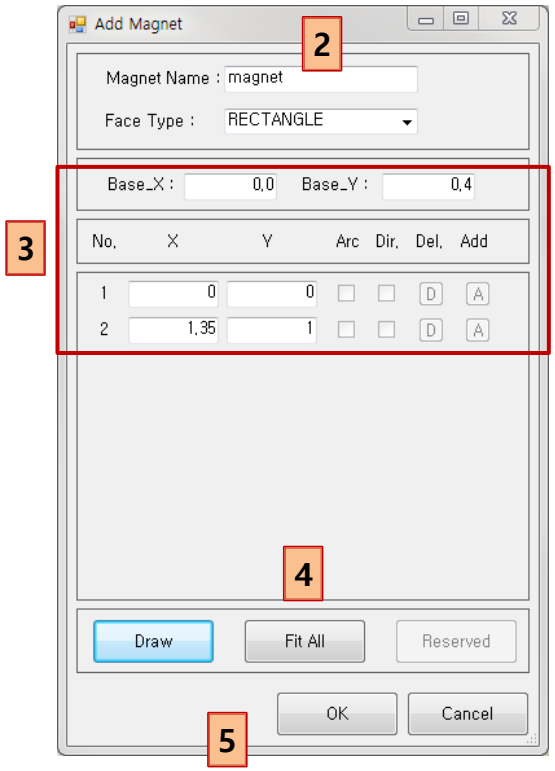


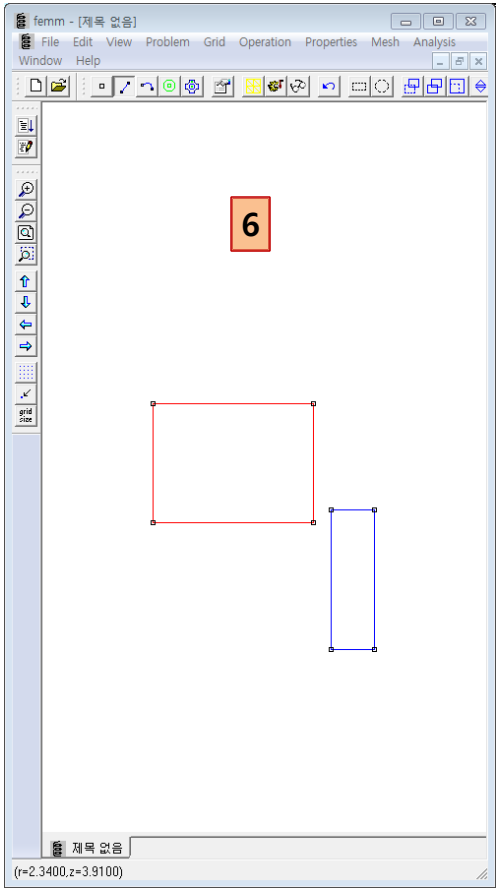
Add a magnet

1. Toolbar > Click Magnet button
2. Magnet Name : “magnet”
3. Magnet Shape
   - ✓ Magnet location : Base_X 0, Base_Y 0.4
   - ✓ Left-down Point : X 0, Y 0
     (Relative Coordinates)
   - ✓ Right-Up point : X 1.35, Y 1.0
     (Relative Coordinates)
4. Screen Adjustment : Use Fit All button
5. Click OK button
6. Confirm Shape (FEMM window)



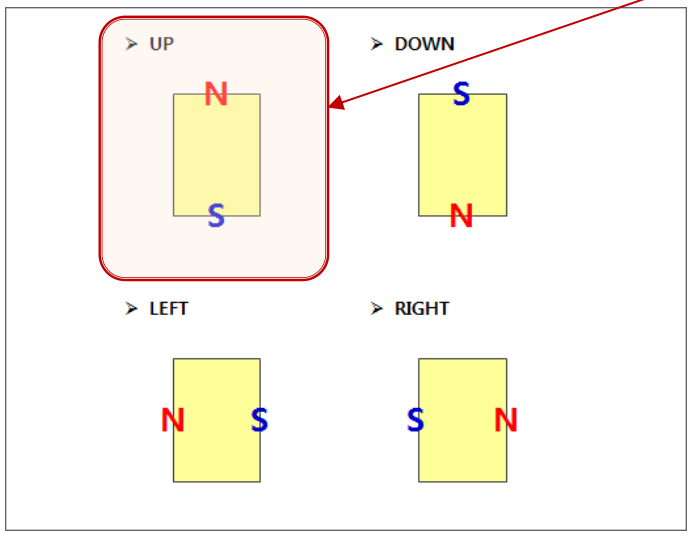


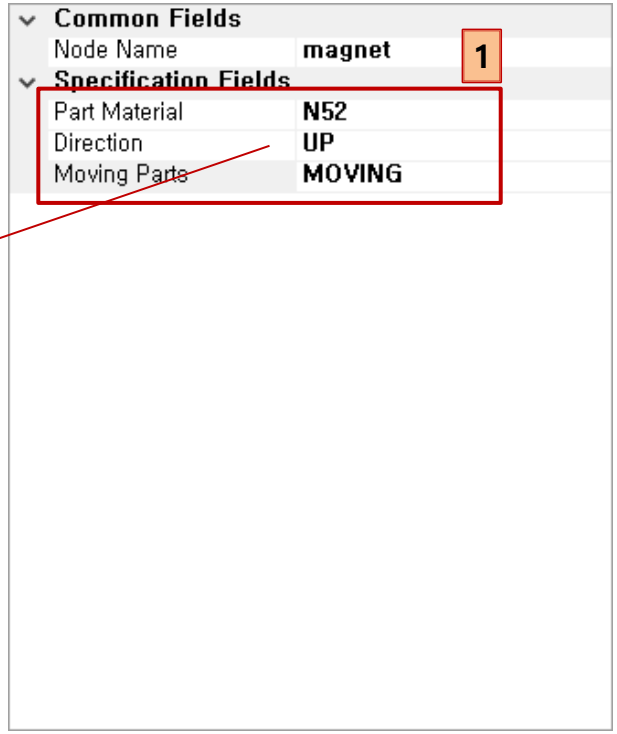




Magnet Settings

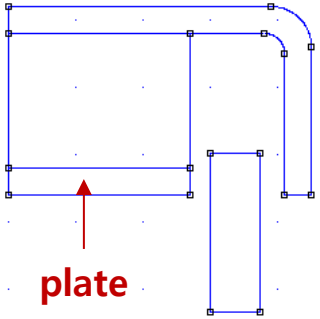
1. Magnet Settings
   - ✓ Part Material : N52
   - ✓ Direction : UP
   - ✓ Moving Parts : **MOVING**

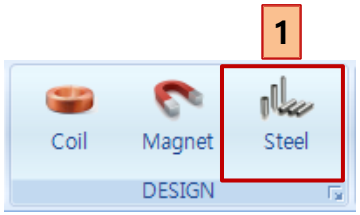


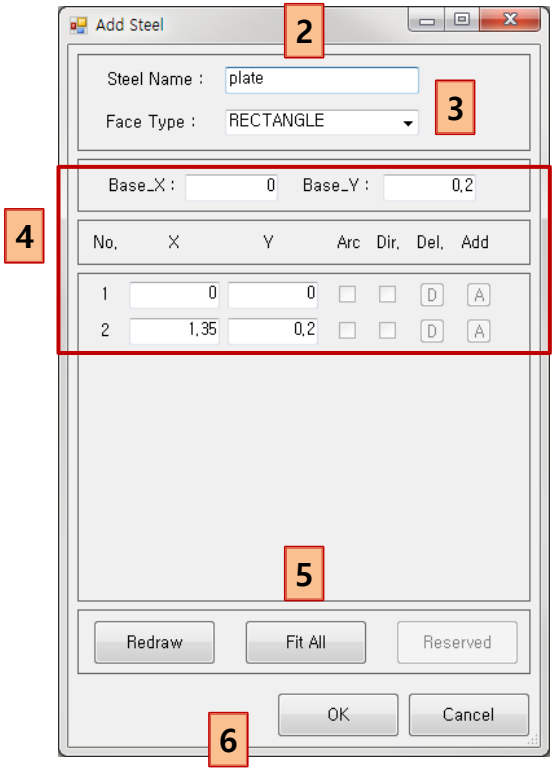


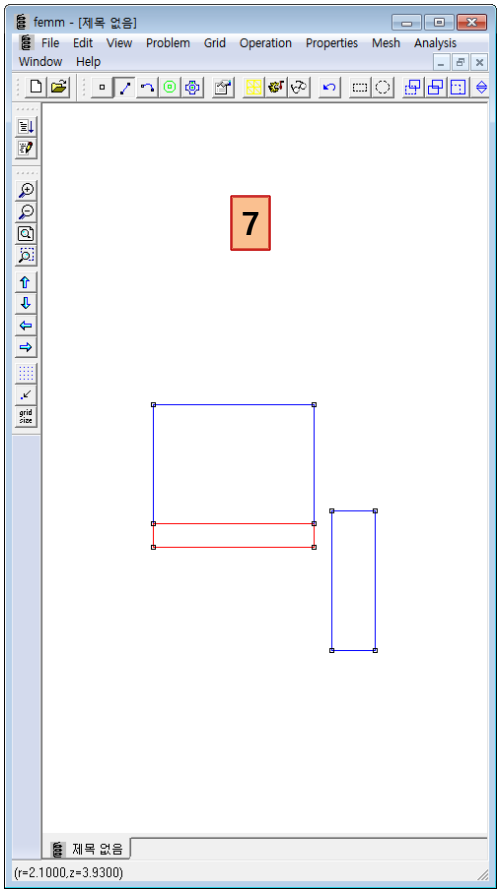
Add a plate

1. Toolbar > Click Steel Button
2. Steel Name : “plate”
3. Face Type : **RECTANGLE**
4. Plate Shape
   - ✓ Plate location : Base_X 0, Base_Y 0.2
   - ✓ Left-down point : X 0, Y 0
     (Relative Coordinates)
   - ✓ Right-Up point : X 1.35, Y 0.2
     (Relative Coordinates)
5. Screen Adjustment : Use Fit All button
6. Click OK button
7. Shape confirm (FEMM window)



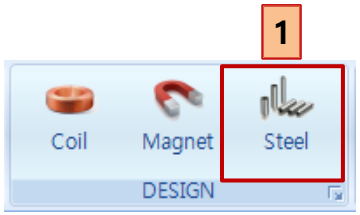


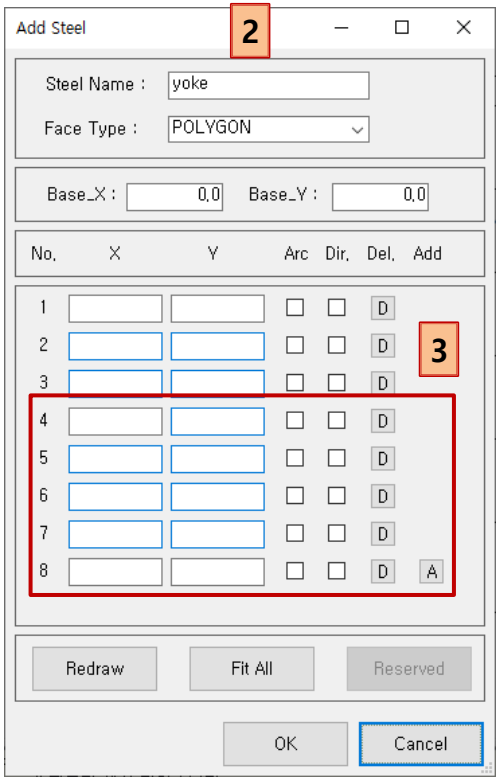


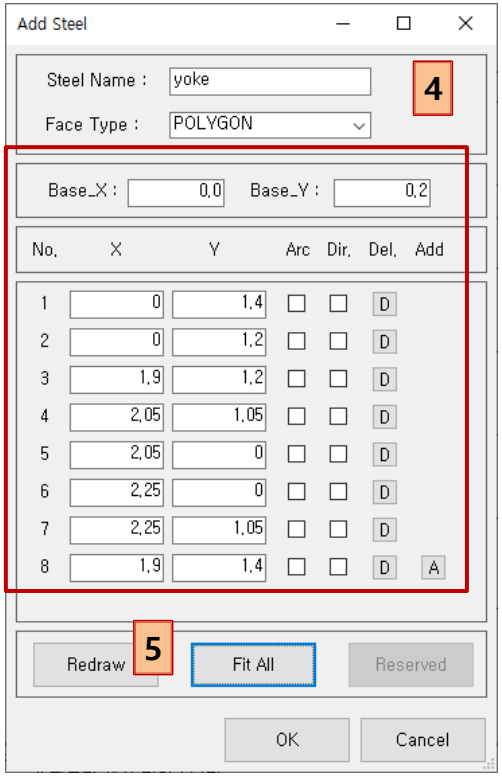


Add a yoke

1. Toolbar > Click Steel Button
2. Steel Name : "yoke"
3. Add input lines of point
   - ✓ Click the 'A' button four times
4. Yoke Shape
   - ✓ Yoke location : Base_X 0, Base_Y 0.2
   - ✓ 1 Point : X 0, Y 1.4
   - ✓ 2 Point : X 0, Y 1.2
   - ✓ 3 Point : X 1.9, Y 1.2
   - ✓ 4 Point : X 2.05, Y 1.05
   - ✓ 5 Point : X 2.05, Y 0
   - ✓ 6 Point : X 2.25, Y 0
   - ✓ 7 Point : X 2.25, Y 1.05
   - ✓ 8 Point : X 1.9, Y 1.4
5. Screen Adjustment : Use Fit All button

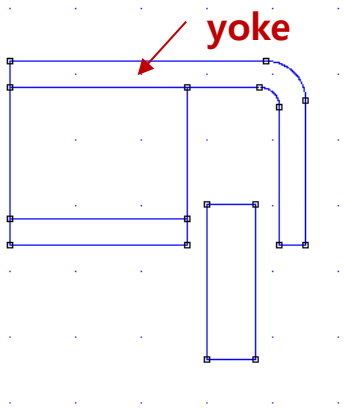


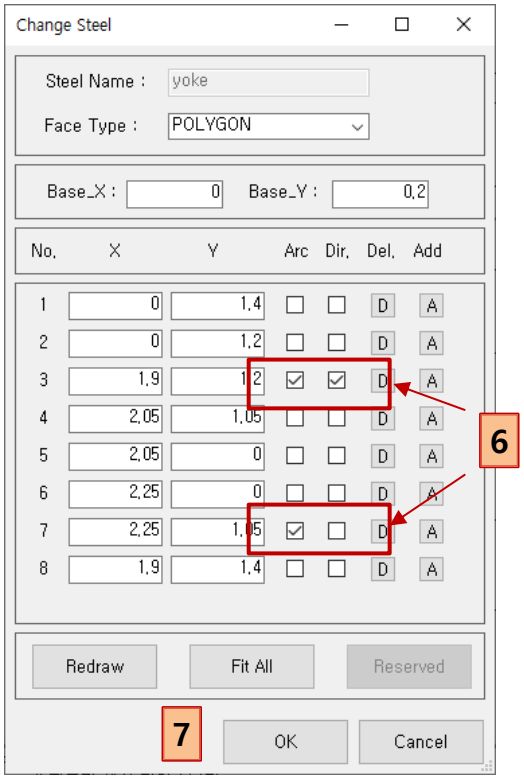


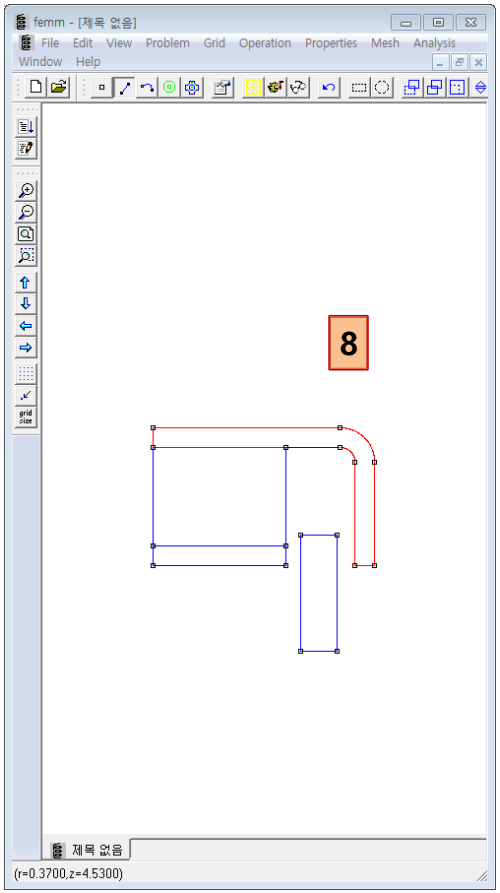


Add a yoke

6. Add the Arc Shape
   - ✓ 3 Point : Arc, Dir check
   - ✓ 7 Point : Arc check
7. Click OK button
8. Shape confirmation (FEMM window)



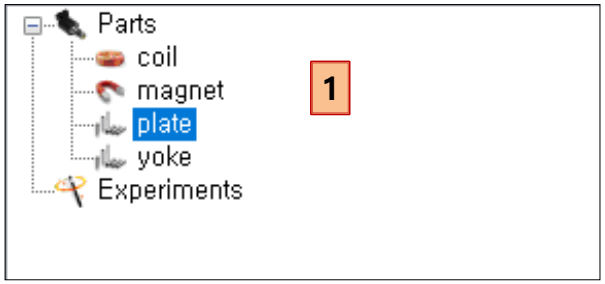




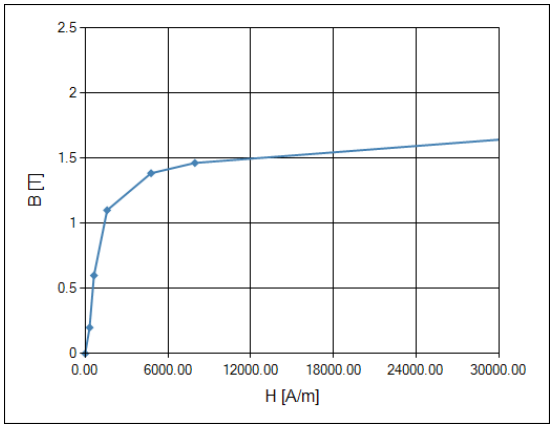
Open Actuator Project

Plate, Yoke settings

1. Click the plate in the treeview
2. Plate settings
   - ✓ Part Material : 430 Stainless Steel
   - ✓ Moving Parts : **MOVING**
3. Click the yoke in the treeview
4. Plate settings
   - ✓ Part Material : 430 Stainless Steel
   - ✓ Moving Parts : **MOVING**



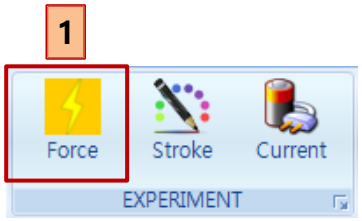
[BH curve]

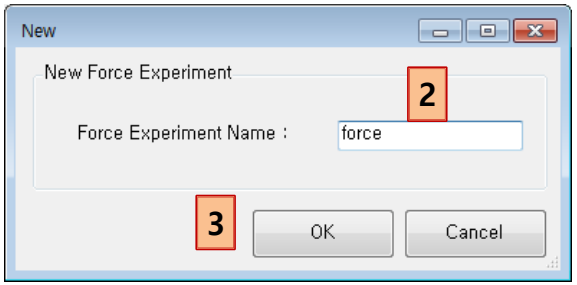


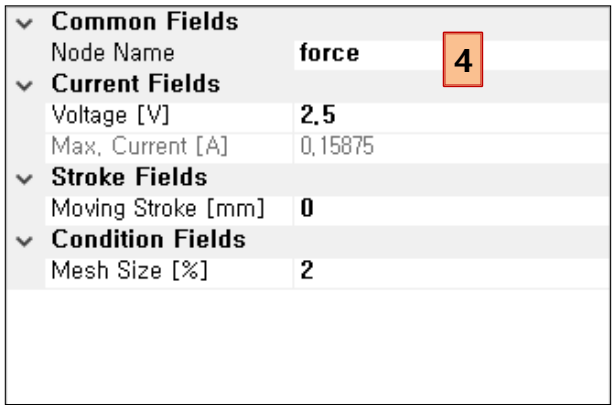
Virtual Test

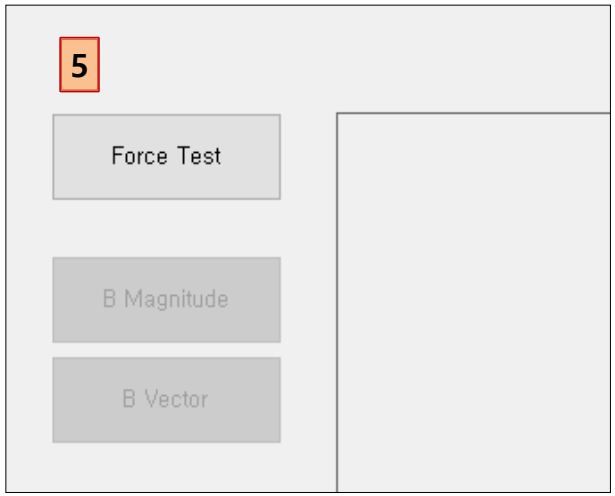
Test of the magnetic force

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



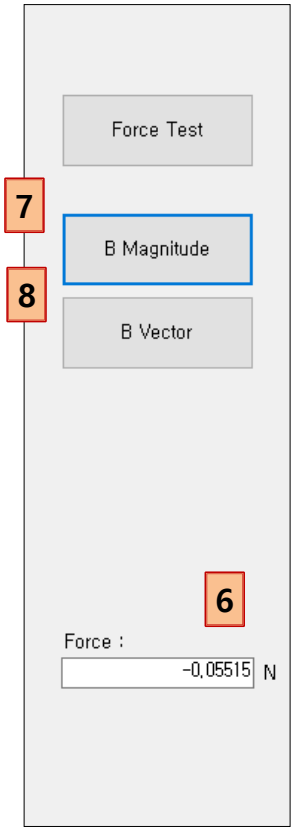


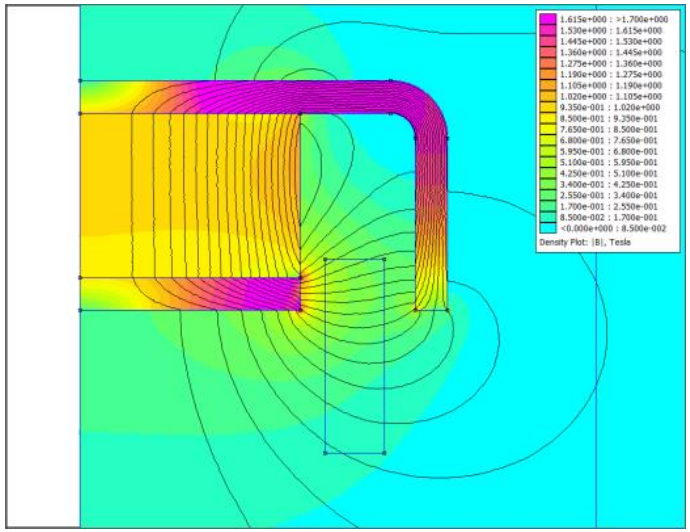


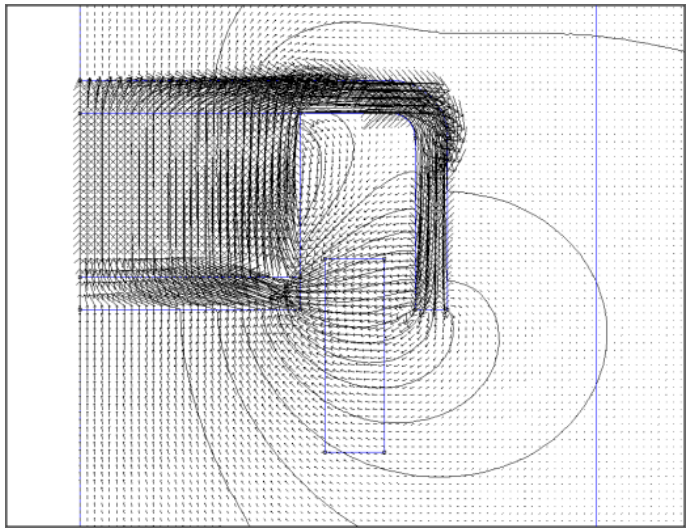


Results of the magnetic force

6. Force : -0.05515 N
7. Magnetic Density
   - ✓ Click the B Magnitude button
8. Vector of Magnetic Density
   - ✓ Click the B Vector button

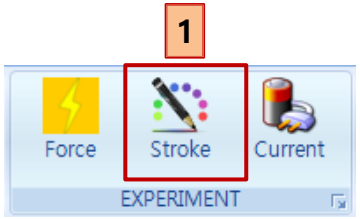


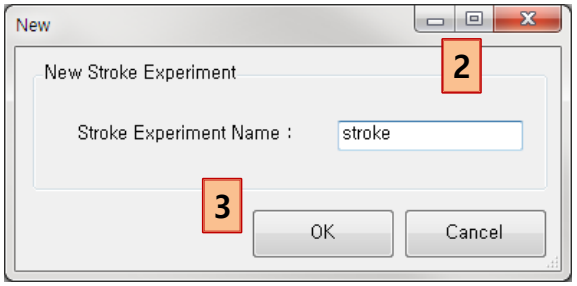


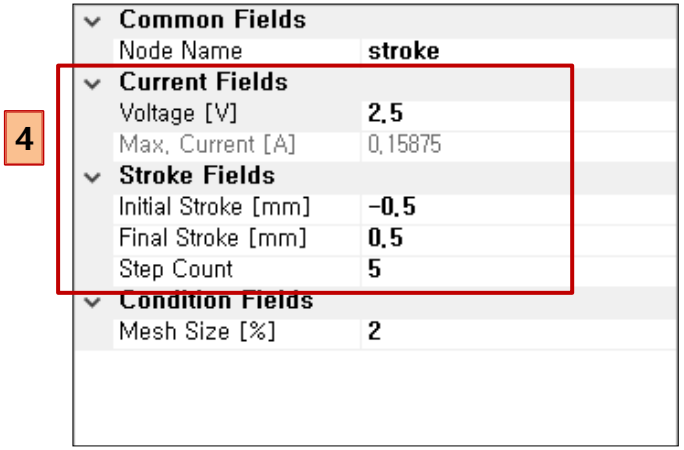


Test of the stroke-magnetic force

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

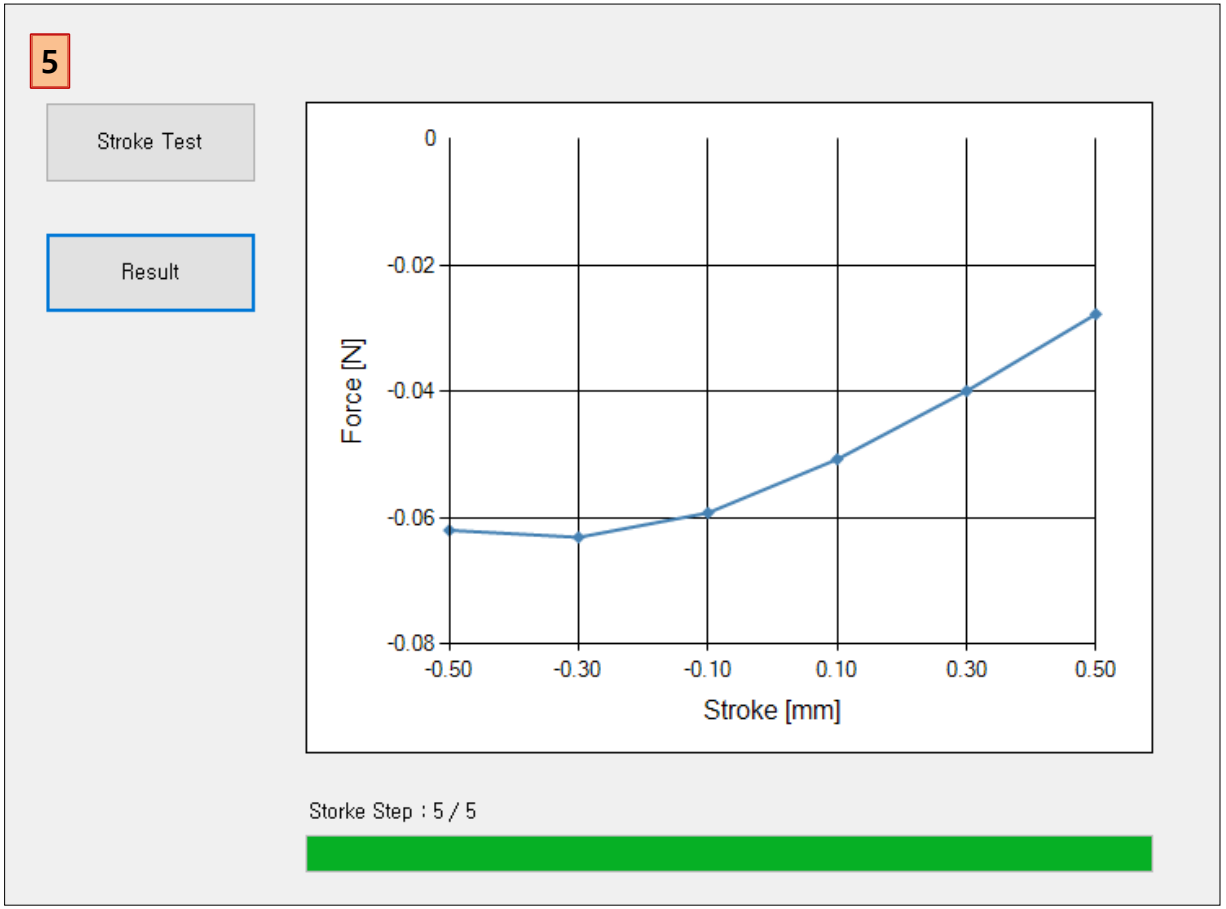






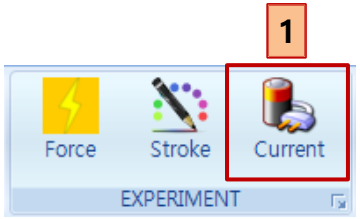
Results of the stroke-magnetic force

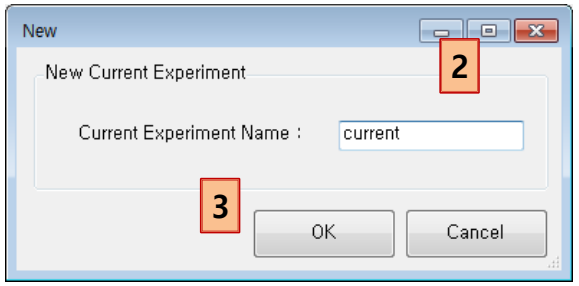
5. Click "Stroke Test" button

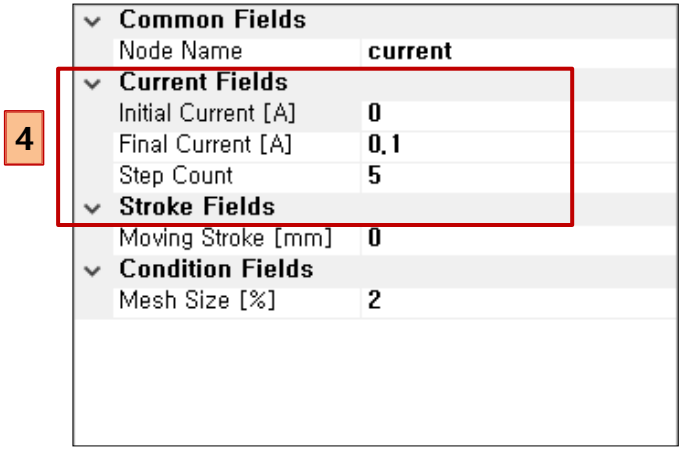


Test of the current-magnetic force

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

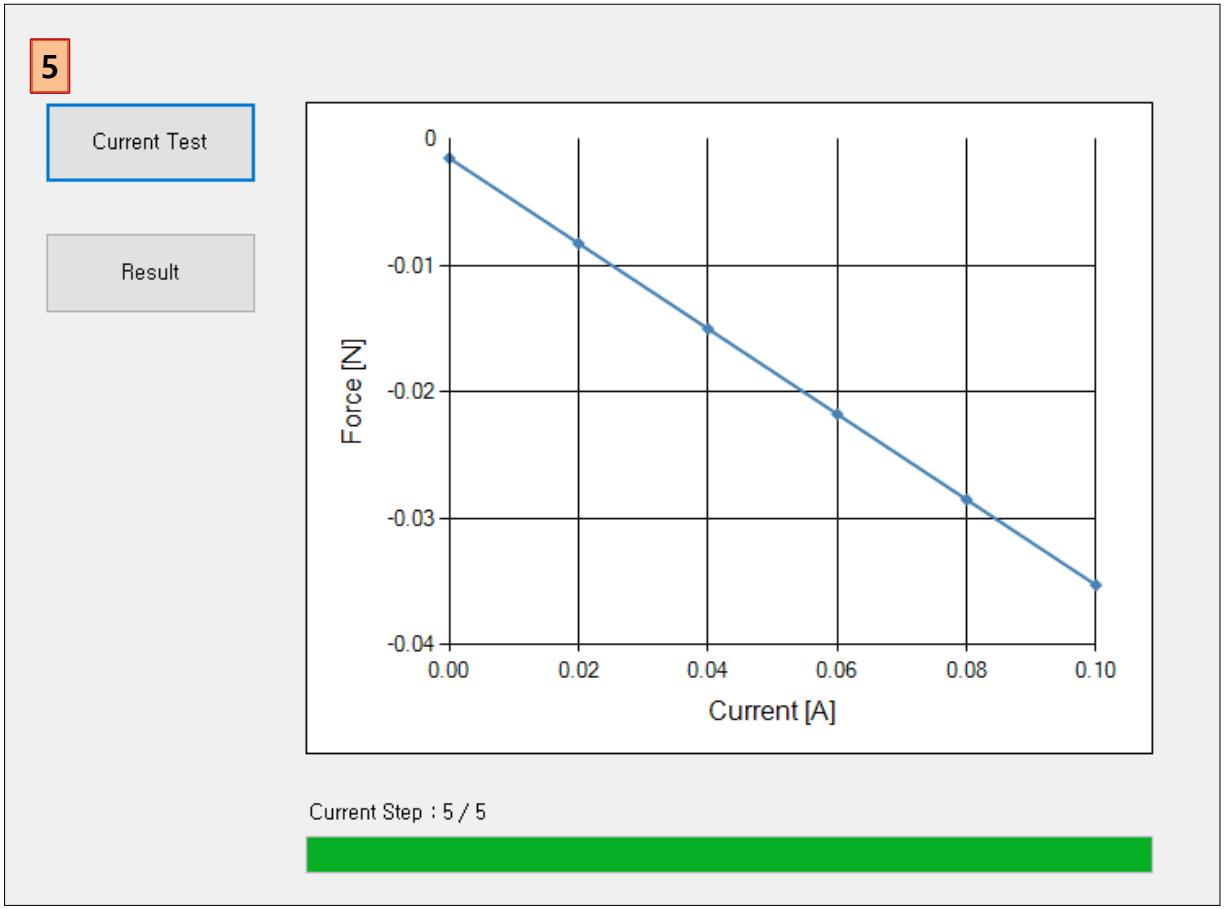






Results of the current-magnetic force

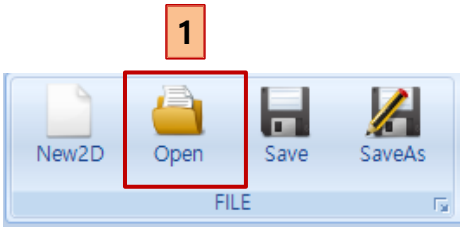
5. Click "Current Test" button

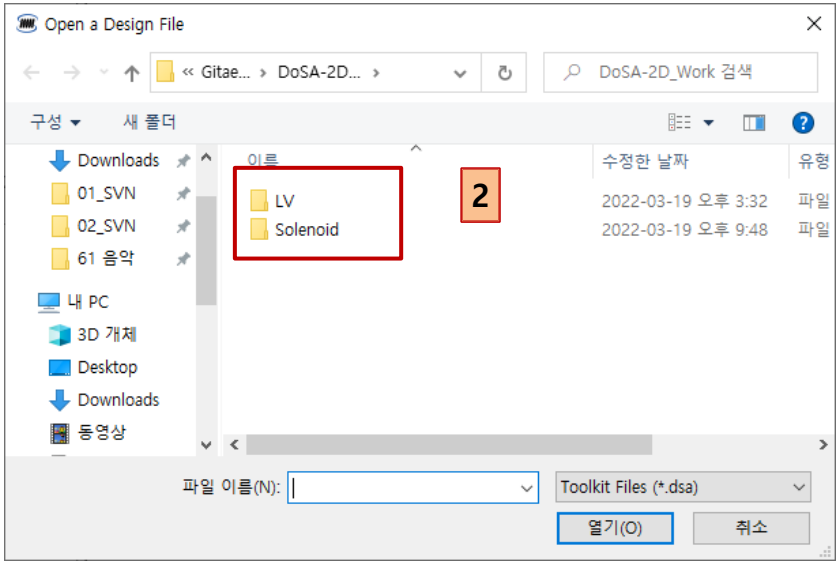


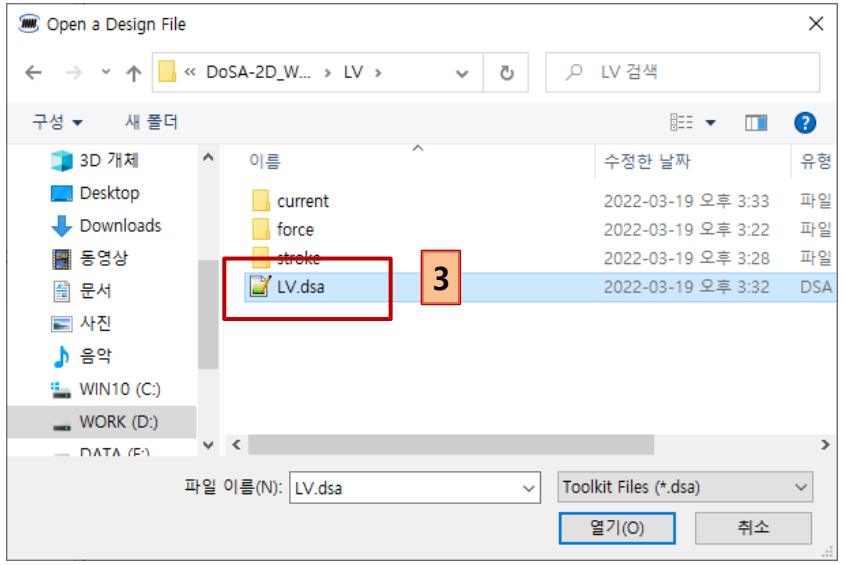
Tips

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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