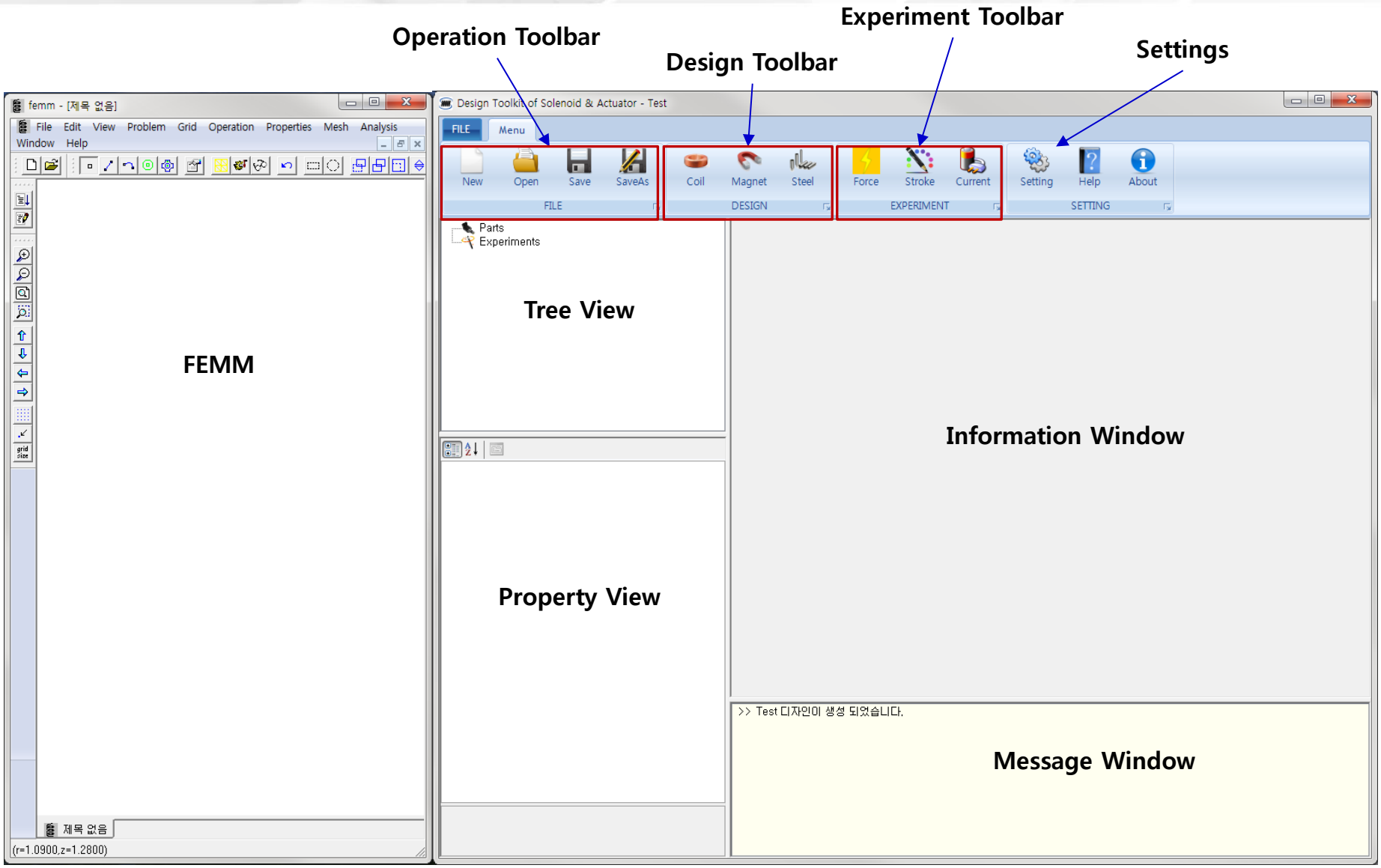
DoSA Use Manual

Linear Vibrator (VCM function) example

2017-11-18

http://OpenActuator.org (zgitae@gmail.com)

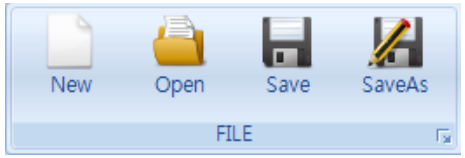
Program Composition



Program Toolbar

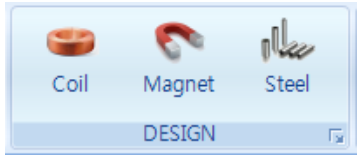
1. Operations

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



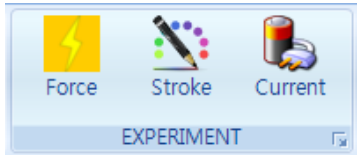
2. Design

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



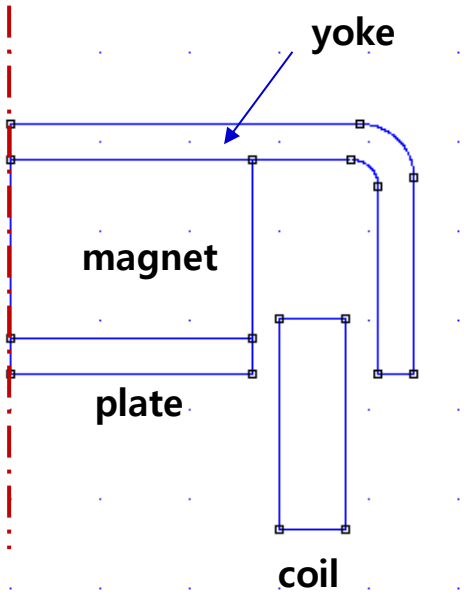
3. Experiment

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



Analysis Model Explanation

1. Shape Model



2. Product Specifications

가. Coil

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

나. Magnet

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

다. Power

- Voltage : 2.5V

(Example File: DoSA Install directory > Samples > LV)

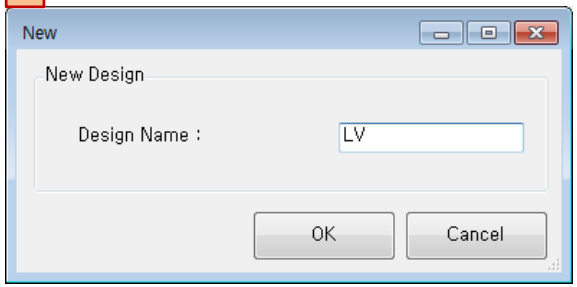
Design Creation

1. Toolbar > Click New button 

2. Design Name : "LV"

3. Click OK

2



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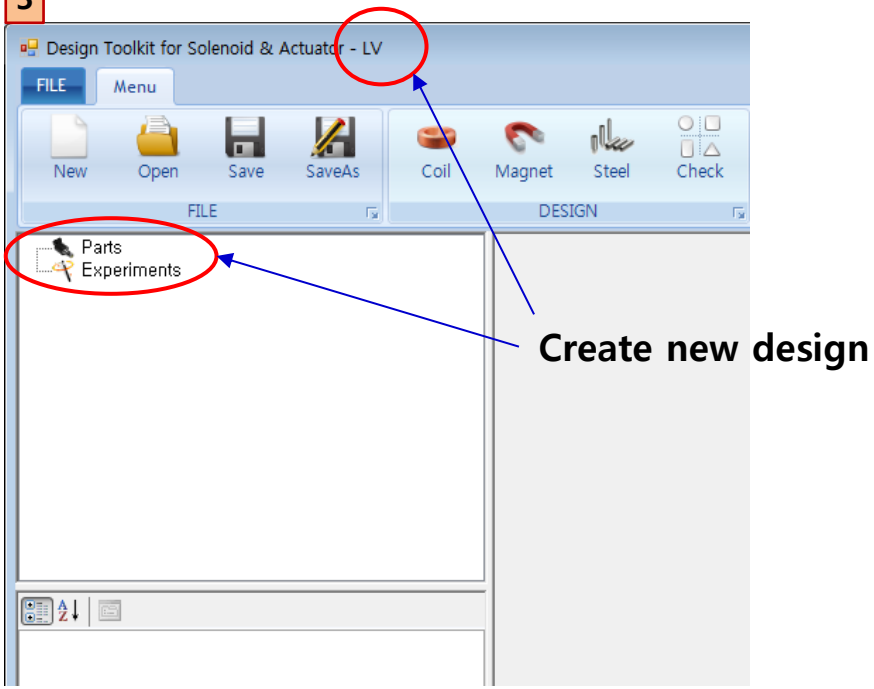
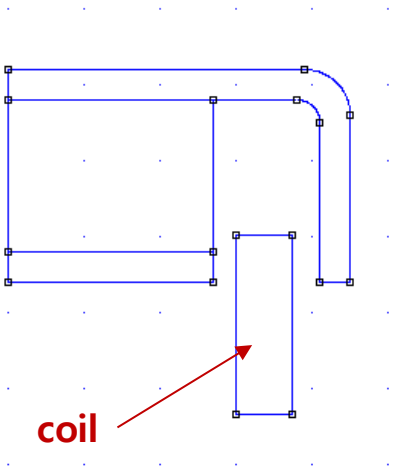


Coil Creation

1. Toolbar > Click Coil button 

2. Coil Name : "coil"
3. Input the coil shape Input
   - ✓ 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)



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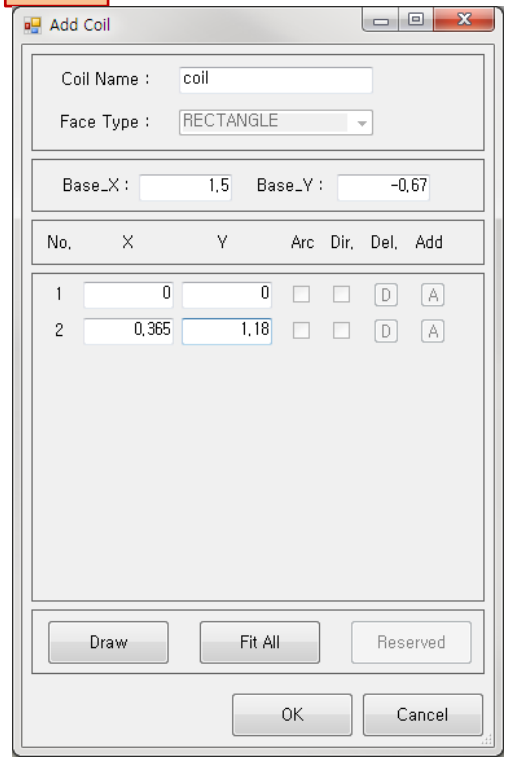

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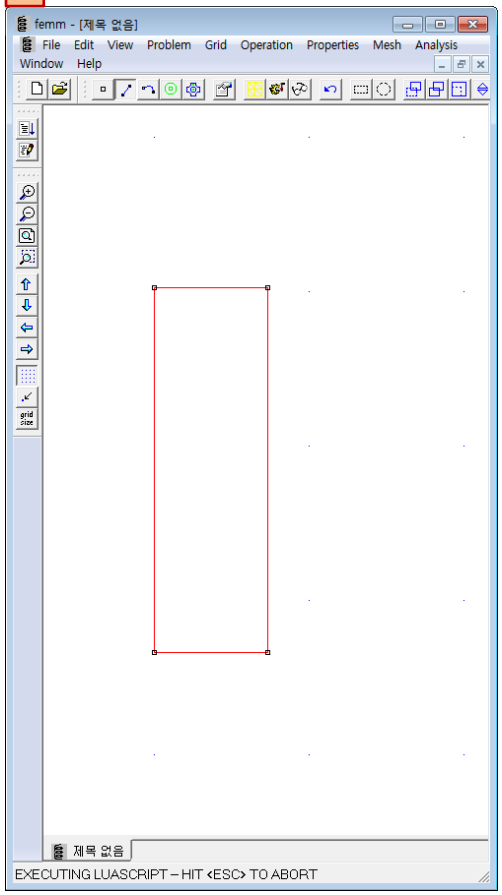


Coil Design

1. Input the coil instrumental specifications
   - ✓ Part Material : Select Copper
   - ✓ Current Direction : Select IN (Inner direction)
   - ✓ Moving Parts : Select FIXED (Fixed Components)
   - ✓ Coil Wire Grade : Bonded_IEC_Grade_1B Selection
   - ✓ Copper Diameter : 0.045 mm selection
   - ✓ Horizontal Coefficient : 0.95 Selection
   - ✓ Vertical Coefficient : 1.13 Selection
   - ✓ Resistance Coefficient : 1.1 Selection

2. Coil specification calculation
   - ✓ Click Design Coil Button

2

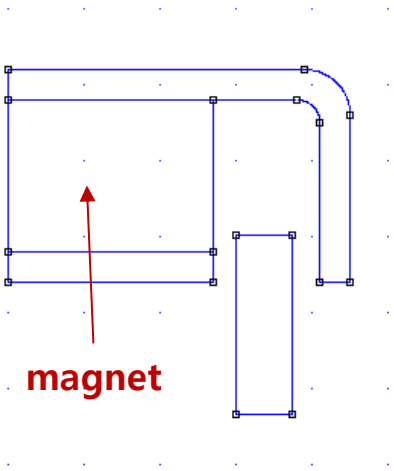
1

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**

Magnet Creation

1. Toolbar > Click Magnet button 

2. Magnet Name : “magnet”
3. Magnet Shape Selection
   - ✓ 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
     (Relative Coordinates)
4. Screen Adjustment : Use Fit All button
5. Click OK button
6. Confirm Shape (FEMM window)



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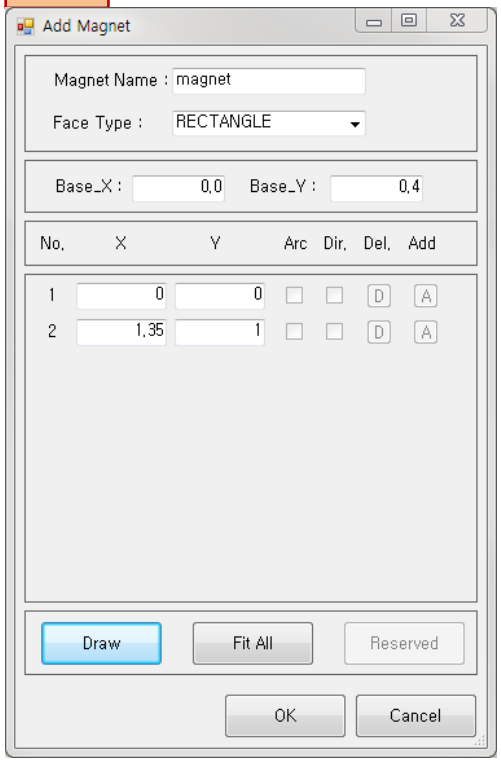

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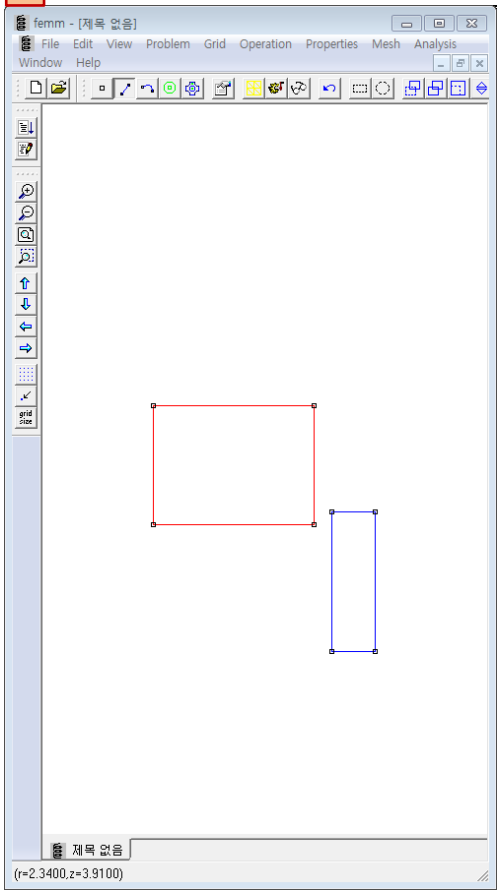
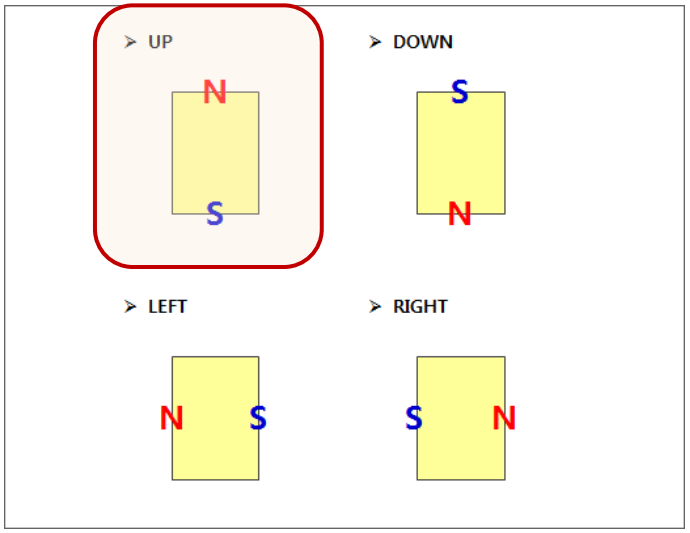


Magnet Settings

1. Magnet Settings
   - ✓ Part Material : NdFeB 52 MGOe Selection
   - ✓ Direction : UP
   - ✓ Moving Parts : Moving Selection (Moving parts)



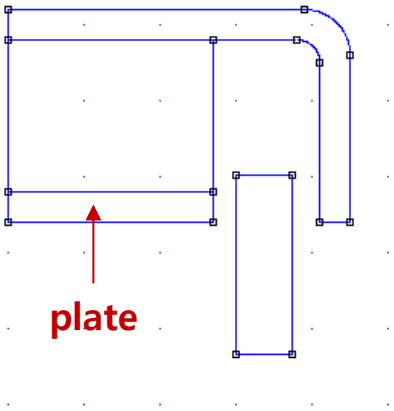
1

Common Fields	
Node Name	magnet
Specification Fields	
Part Material	NdFeB 52 MGOe
Direction	UP
Moving Parts	MOVING

Plate Creation

1. Toolbar > Click Steel Button 

2. Steel Name : “plate”
3. Face Type : RECTANGLE Selection
4. Plate Shape Selection
   - ✓ 자석 위치 : 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)



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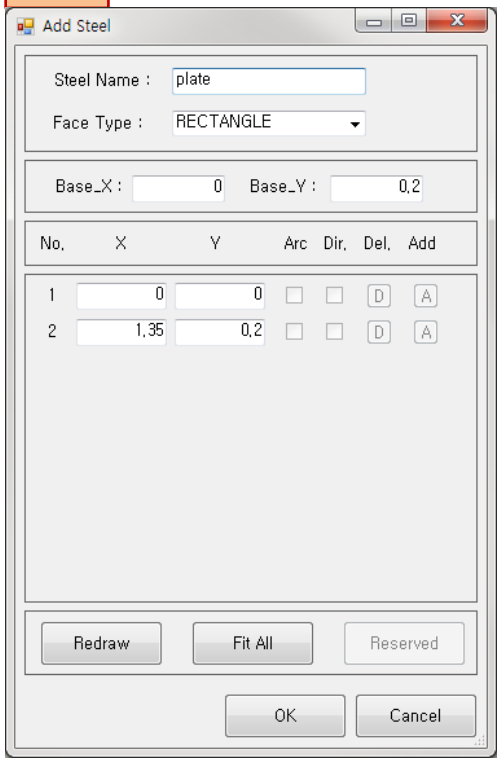

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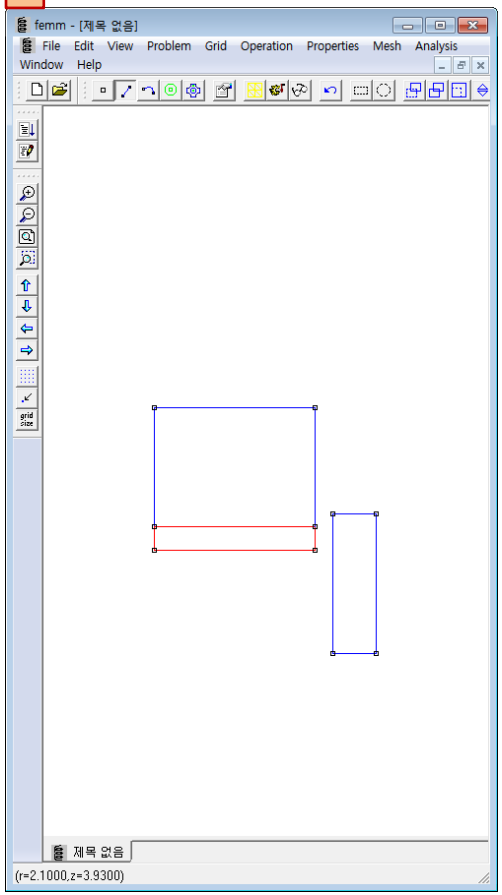
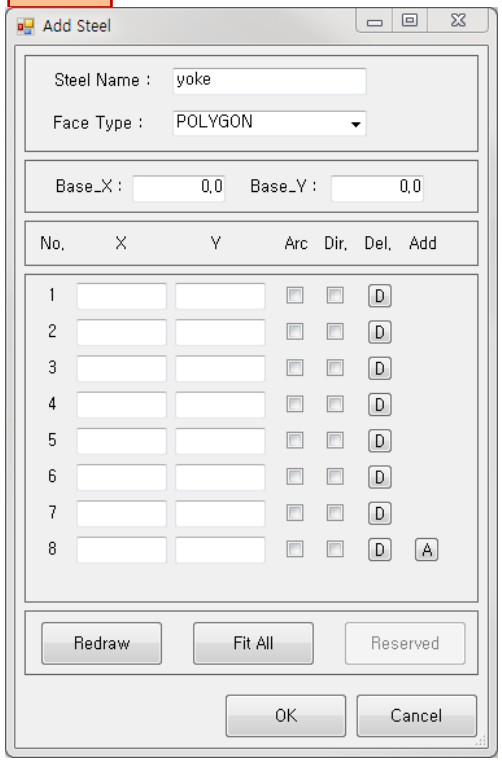


Yoke Creation

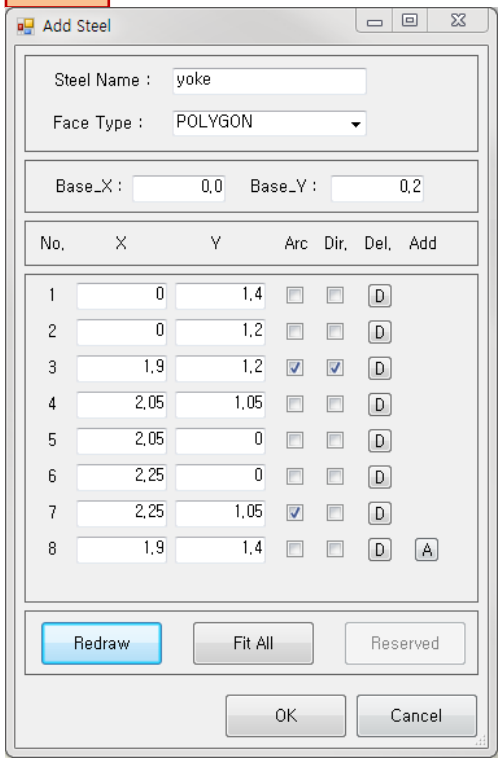
1. Toolbar > Click Steel Button 

2. Steel Name : "yoke"
3. Coordinate addition (total 8) :Click 'A'
4. Yoke Shape Selection
   - ✓ 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 (Arc, Dir check)
   - ✓ 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 (Arc check)
   - ✓ 8 Point : X 1.9, Y 1.4
5. Screen Adjustment : Use Fit All button
6. Click OK button

2~3

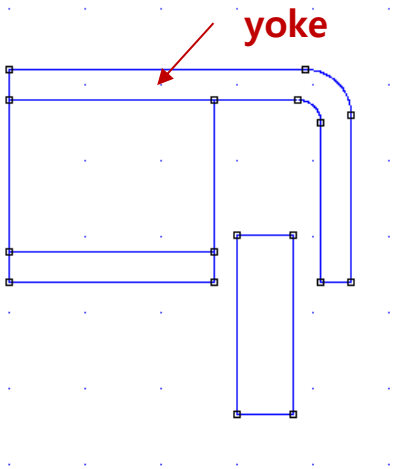


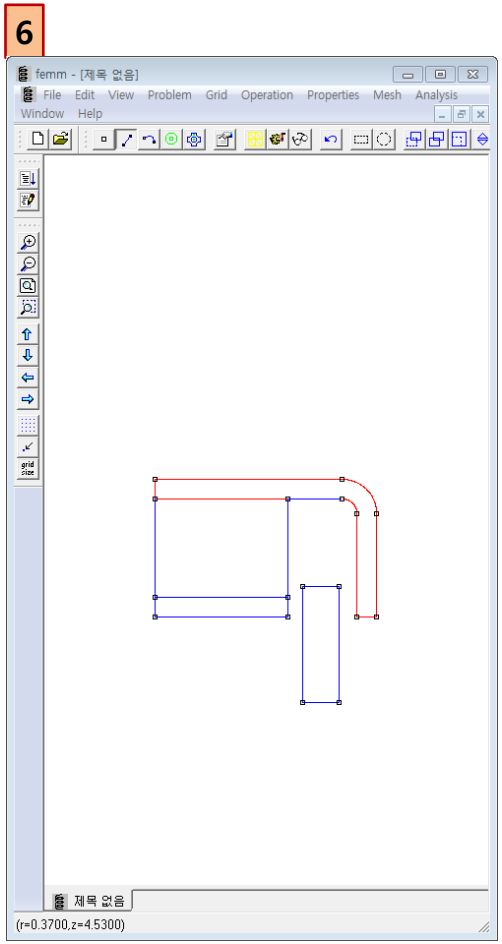
4~5



Creating Yoke

7. Shape confirmation (FEMM window)

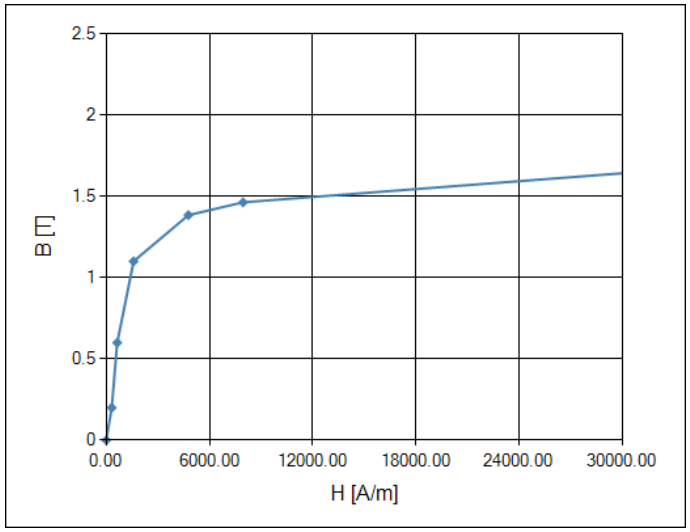




Plate, Yoke settings

1. Plate, Yoke settings
   - ✓ Part Material : 430 Stainless Steel Selection
   - ✓ Moving Parts : Moving Selection (Moving Parts)

[BH curve]



1

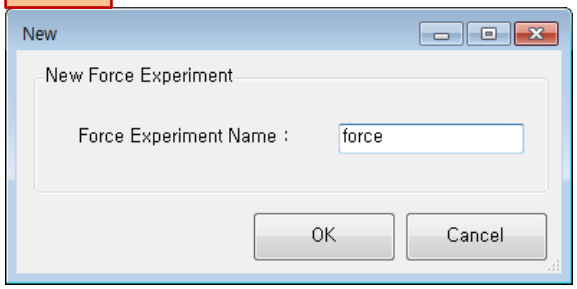
Common Fields	
Node Name	plate
Specification Fields	
Part Material	430 Stainless Steel
Moving Parts	MOVING

Magnetic force Experiment

1. Toolbar > Click Force Button 

2. Force Experiment Name : "force"
3. Click OK button
4. Magnetic force experiment settings
   ✓ Voltage : 2.5 V
5. Run Magnetic force experiment

2~3



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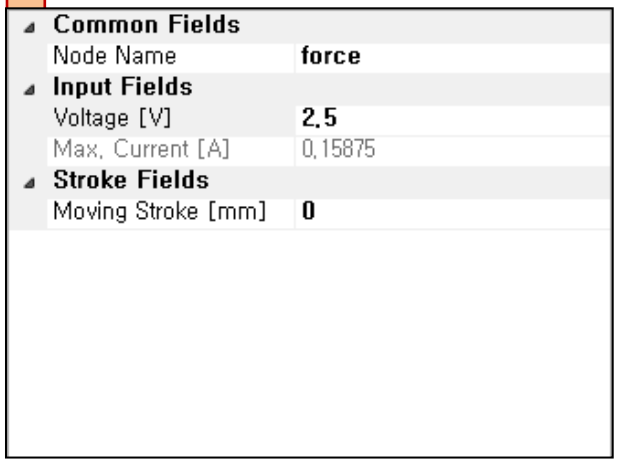
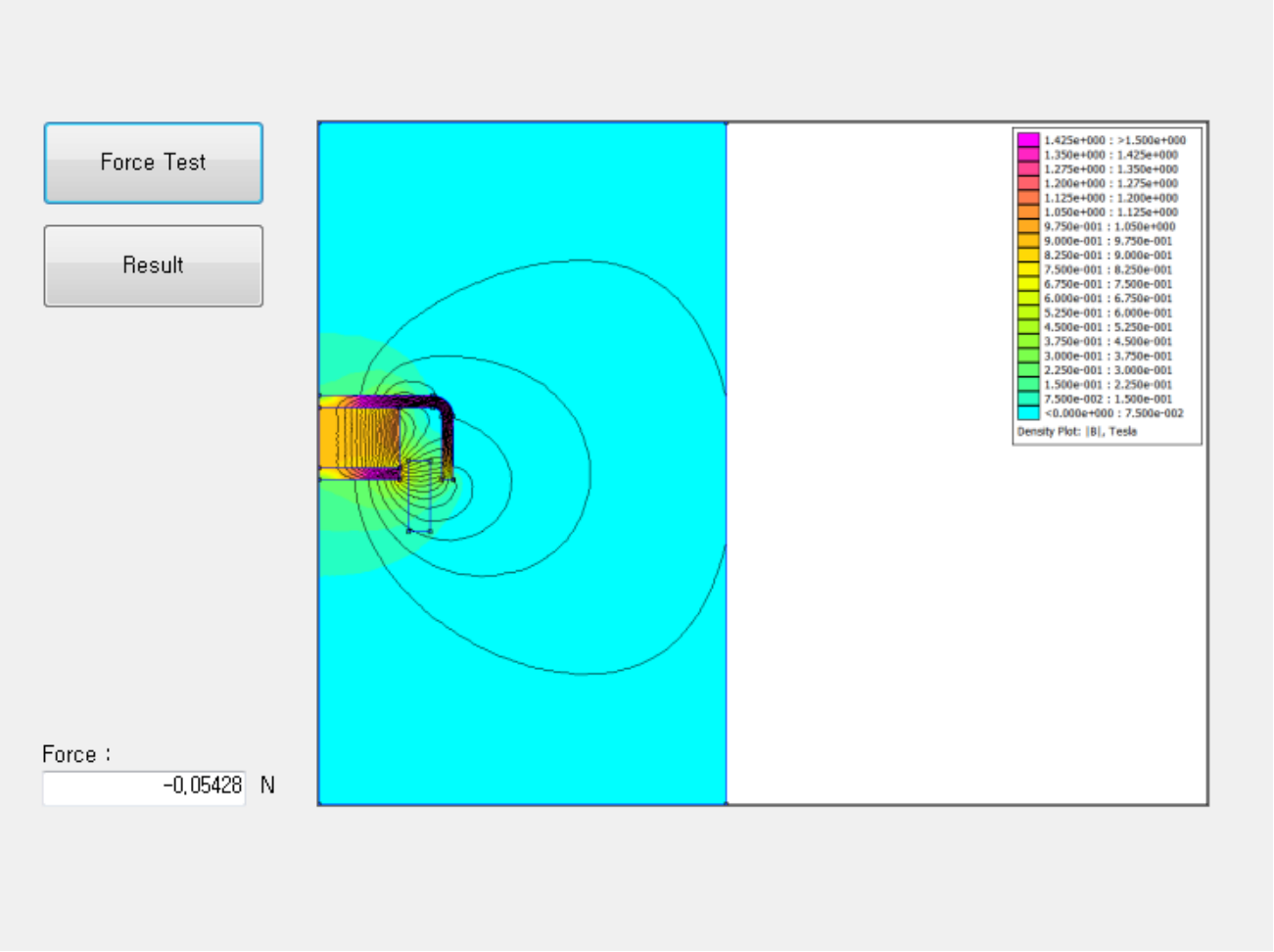


5

Magnetic Force Experiment Results

1. Force : -0.05428 N

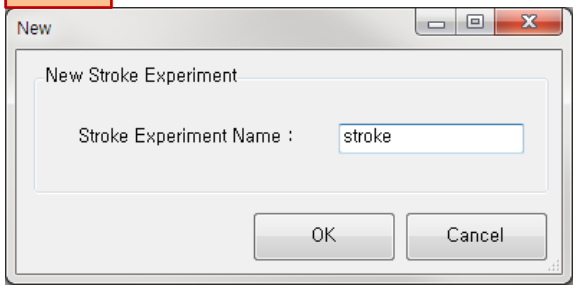


Displacement-Magnetic Force Experiment

1. Toolbar > Click Stroke button 

2. Stroke Experiment Name : "stroke"
3. Click OK button
4. Magnetic force-Current experiment settings
   - ✓ Voltage : 2.5 V
   - ✓ Initial Stroke : -0.5 mm
   - ✓ Final Stroke : 0.5 mm
   - ✓ Step Count : 5

2~3

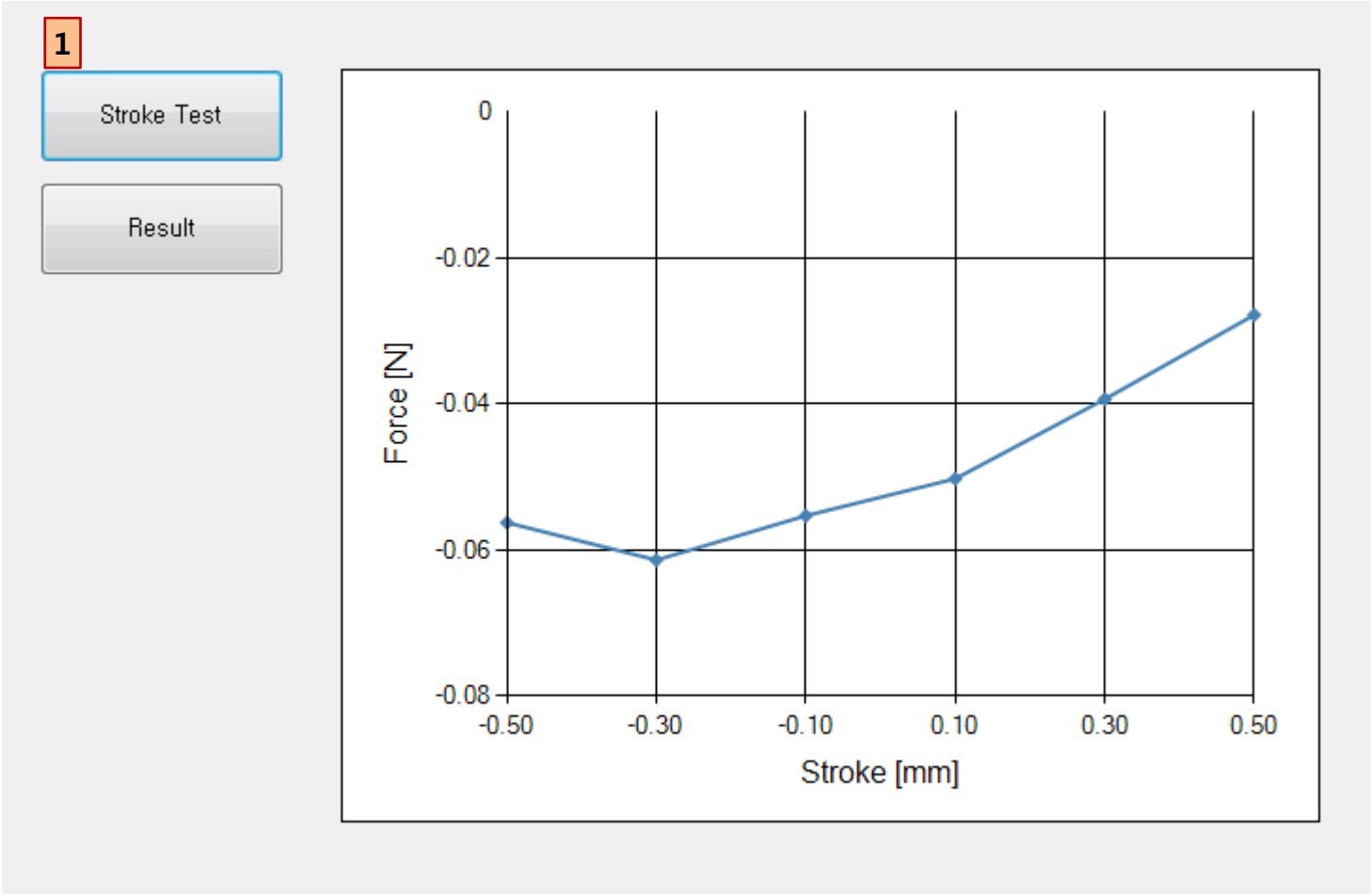


4

Common Fields	
Node Name	**stroke**
Input 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**

Displacement-Magnetic Force Experiment Results

1. Information View / Click Stroke Test button

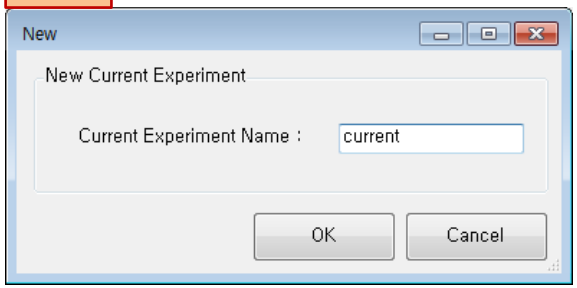


Current-Magnetic force experiment

1. Toolbar > Click Current button 

2. Current Experiment Name : "current"
3. Click OK button
4. Magnetic force-Current experiment settings
   - ✓ Initial Current : 0.0 A
   - ✓ Final Current : 0.1 A
   - ✓ Step Count : 5

2~3

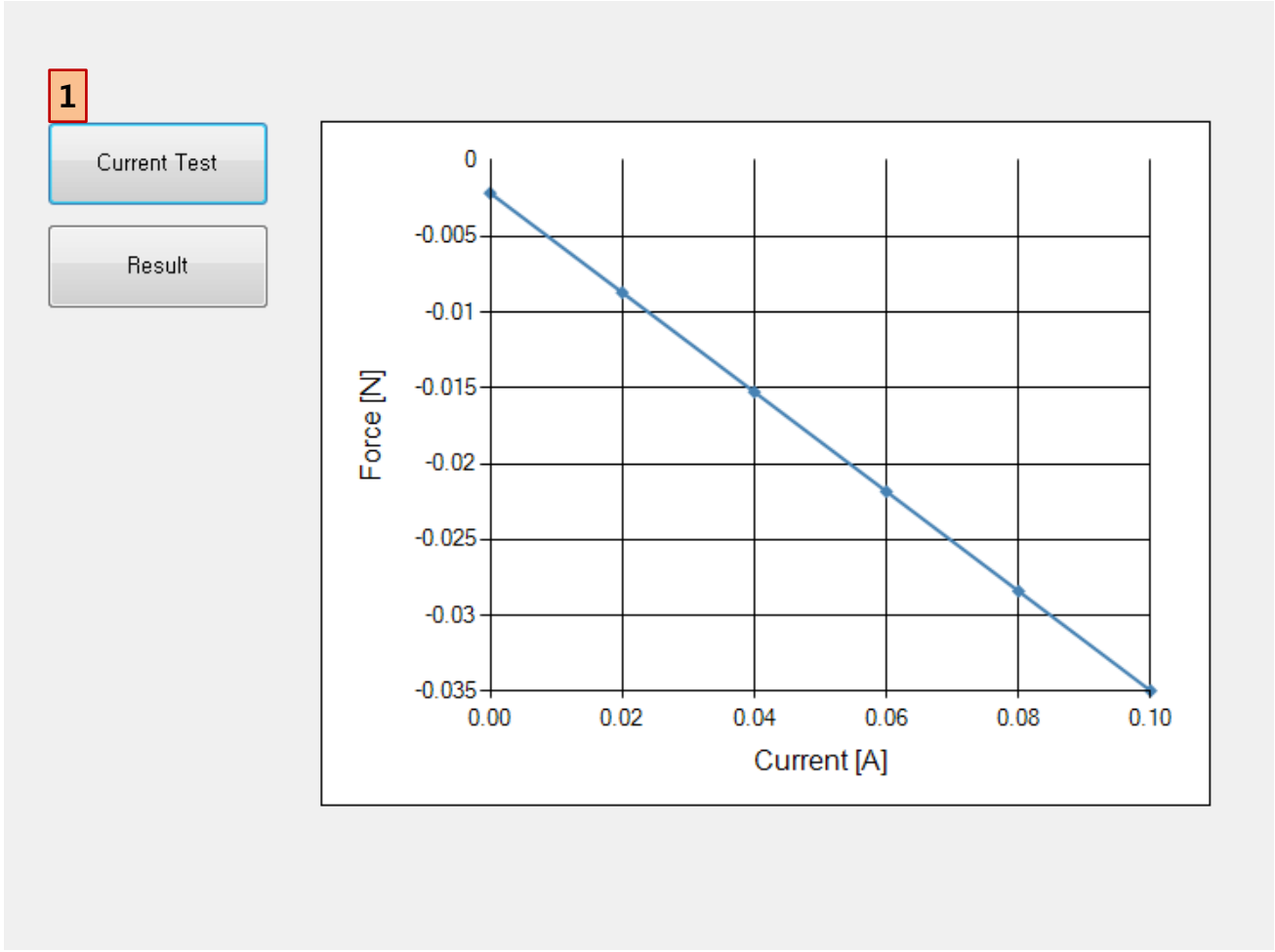


4

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**

Current-Magnetic Force experiment results

1. Information View / Click Current Test button



– Thank You –