DoSA User Manual
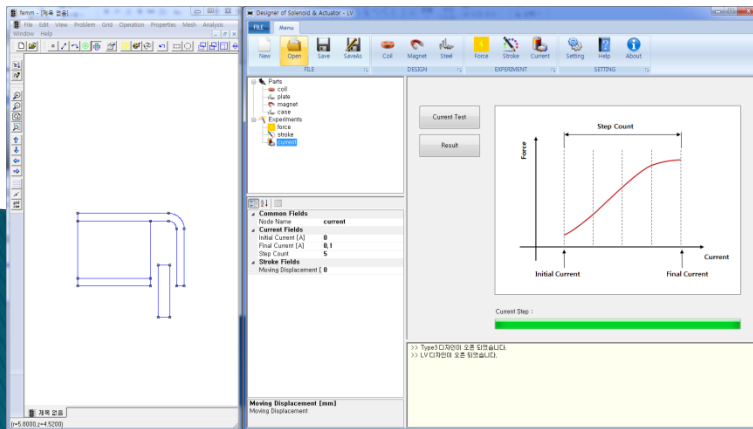
Example of Linear Vibrator
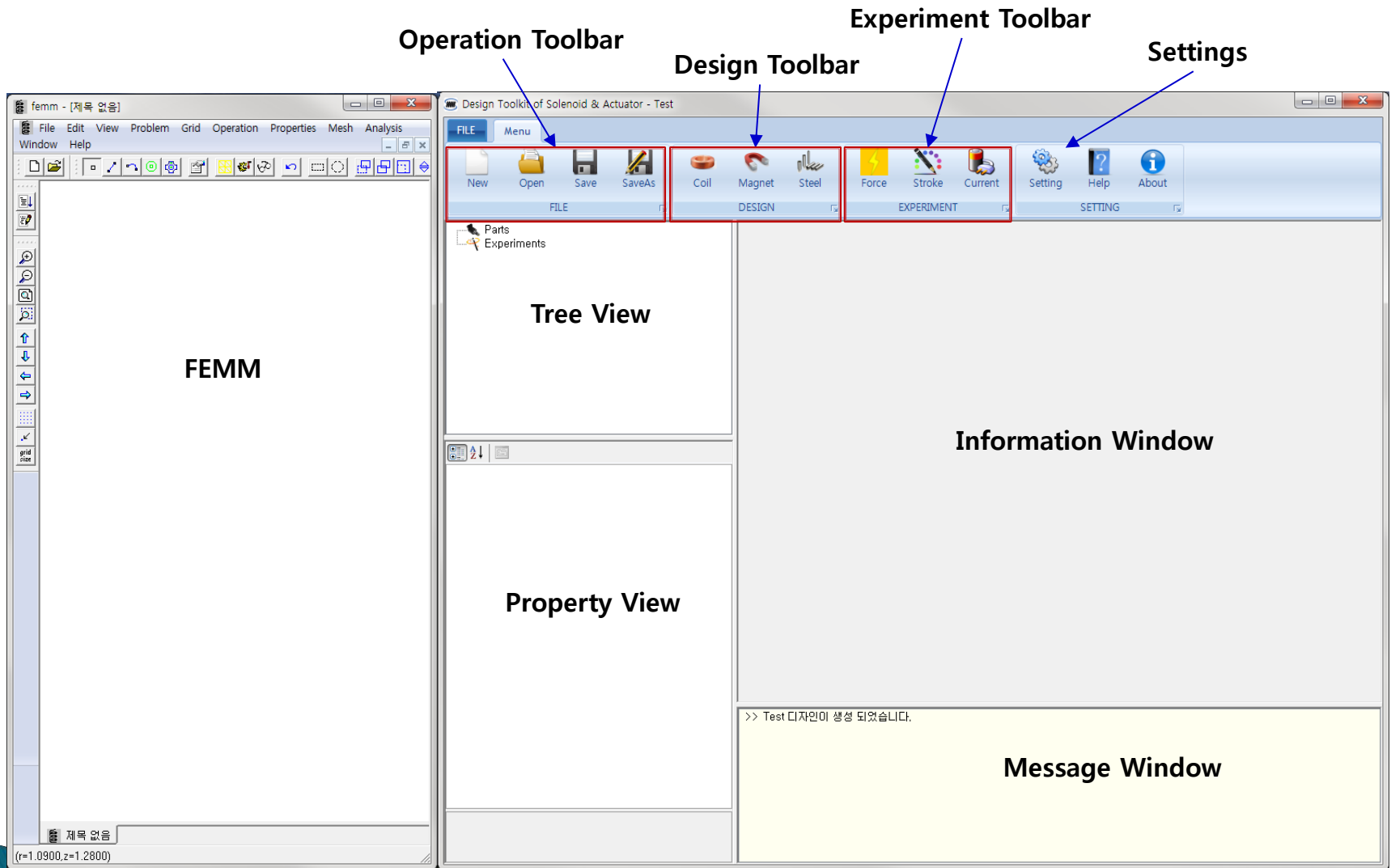

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DoSA Structure

Program Structure

Operation Toolbar

Design Toolbar

Experiment Toolbar

Settings

FEMM

Tree View

Property View

Information Window

Message Window

>> Test 디자인이 생성 되었습니다.

Open Actuator Project

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
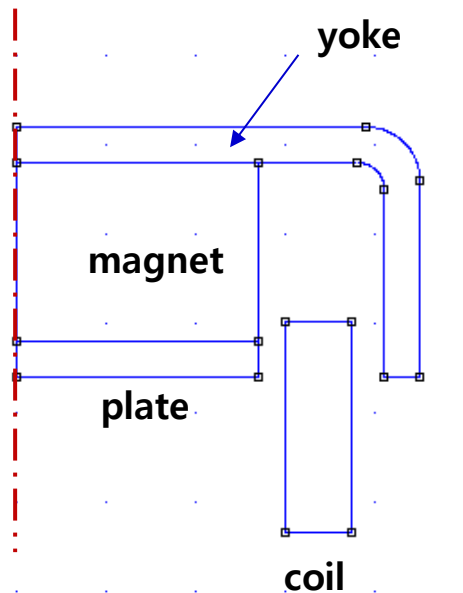
3. Experiment

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

Open Actuator Project
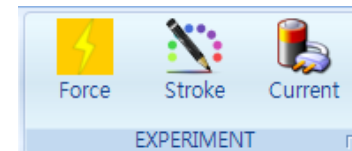
Analysis Model

Analysis Model

1. Shape Model

yoke

magnet

plate

coil

2. Product Specifications

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

나. Magnet
- Material : NdFeB 52
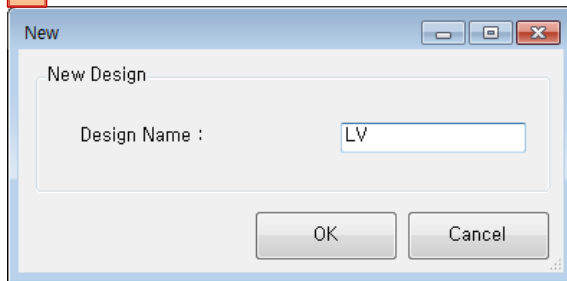- Magnetization Direction : 90 (UP)

다. Power
- Voltage : 2.5V

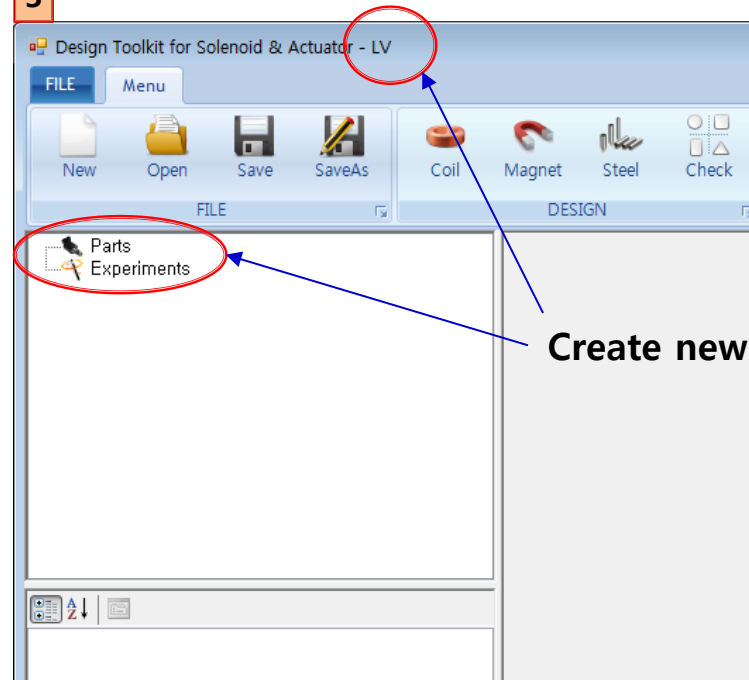(Example Files : DoSA Install directory > Samples > LV)

Open Actuator Project

New design

1. Toolbar > Click New button

2. Design Name : "LV"

3. Click OK

2

New

New Design

Design Name : LV

OK   Cancel

3

Design Toolkit for Solenoid & Actuator - LV

FILE   Menu

New   Open   Save   SaveAs   Coil   Magnet   Steel   Check

FILE   DESIGN

Parts
Experiments

Create new design

Open Actuator Project
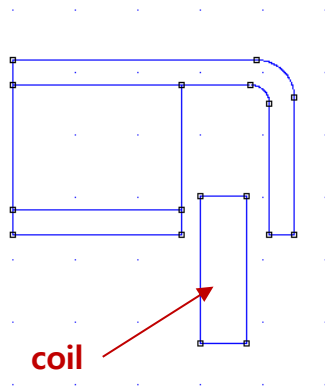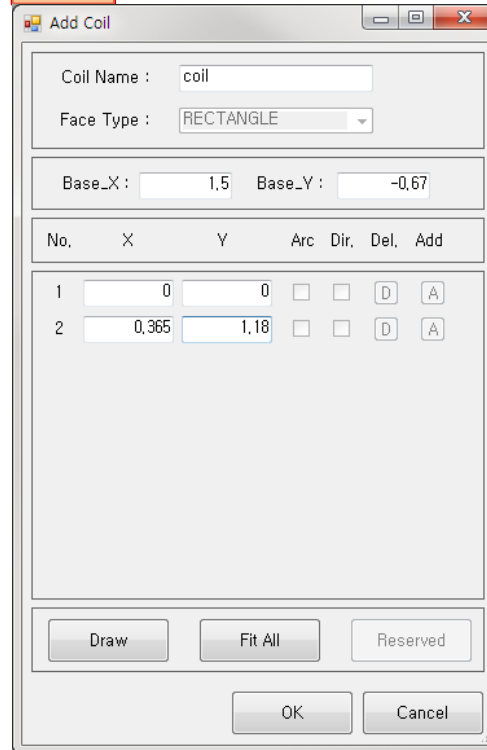
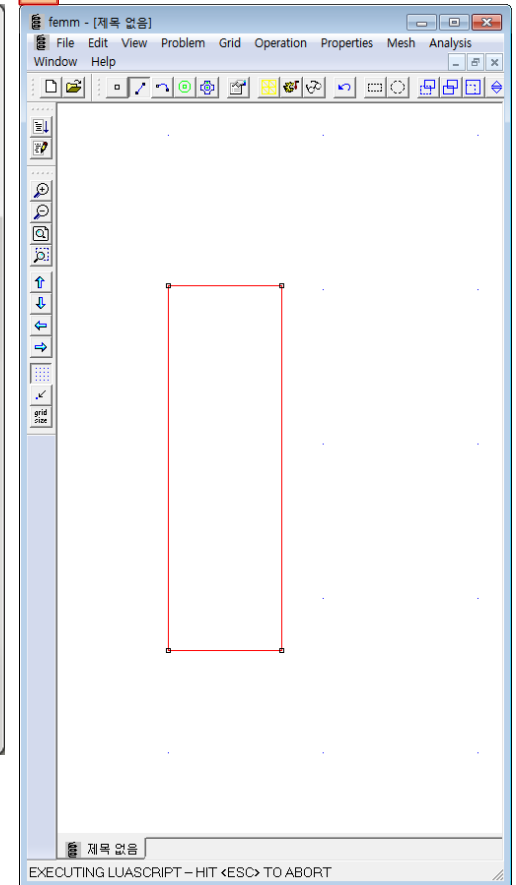# Parts Design

Add 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

Open Actuator Project

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
   ✓ Copper Diameter : 0.045 mm
   ✓ 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

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**

2
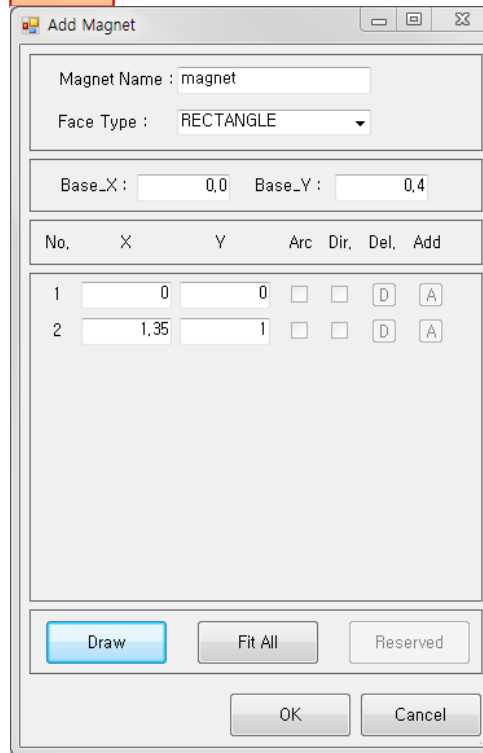
Coil Design

Open Actuator Project
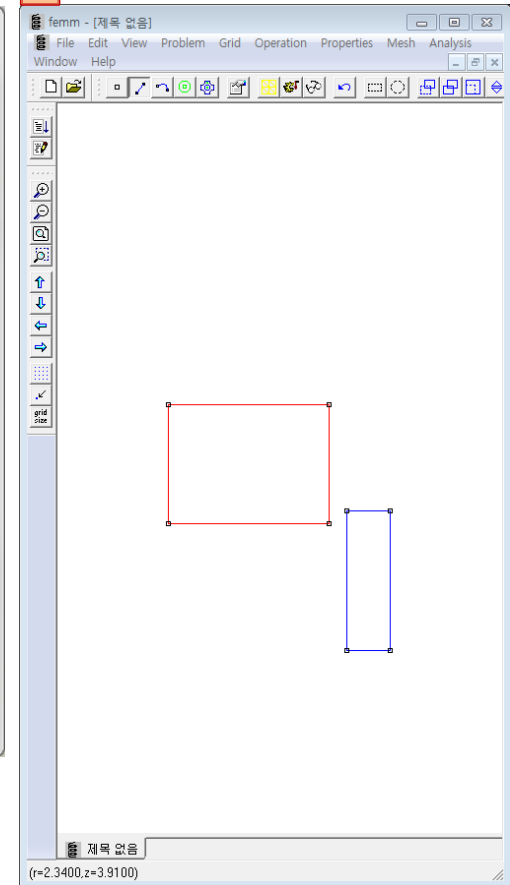
Add magnet

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
                        (Relative Coordinates)
4. Screen Adjustment : Use Fit All button
5. Click OK button
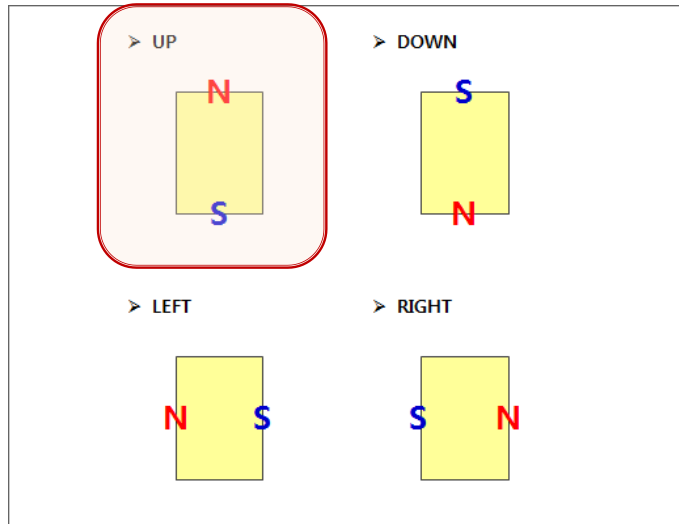6. Confirm Shape (FEMM window)

magnet

Open Actuator Project
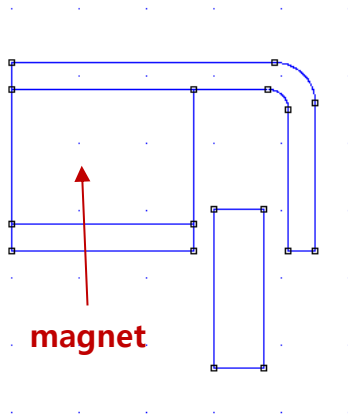
Magnet Settings

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

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

Open Actuator Project

Add plate

1. Toolbar > Click Steel Button

2. Steel Name : "plate"

3. Face Type : RECTANGLE

4. Plate Shape
   - ✓ 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)

plate

Open Actuator Project
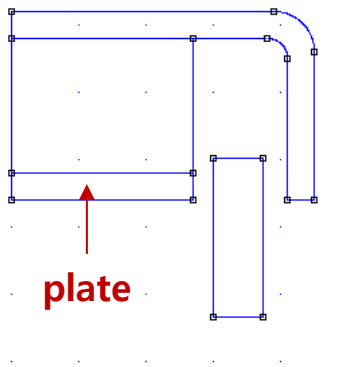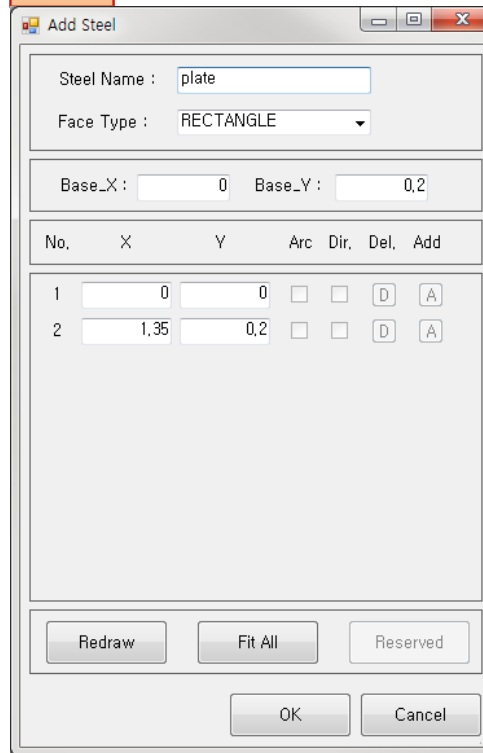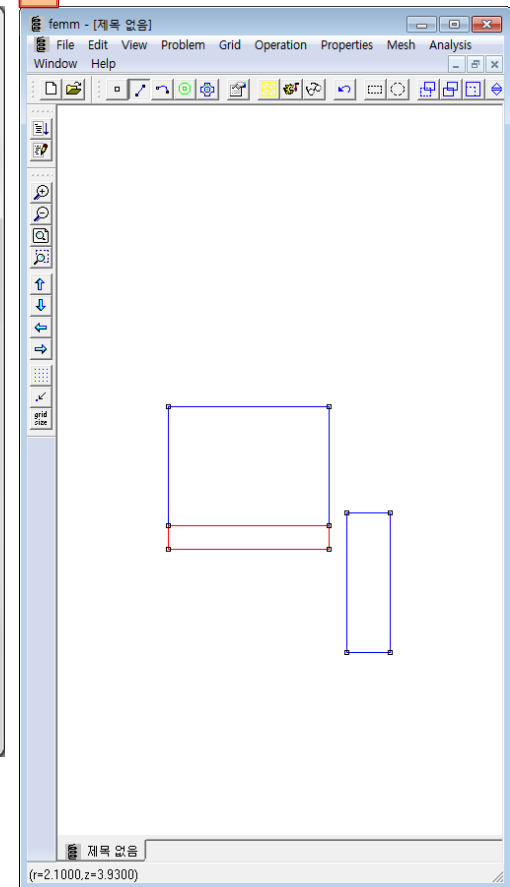
Add yoke

1. Toolbar > Click Steel Button

2. Steel Name : "yoke"

3. Add input lines of point : Click 'A' button
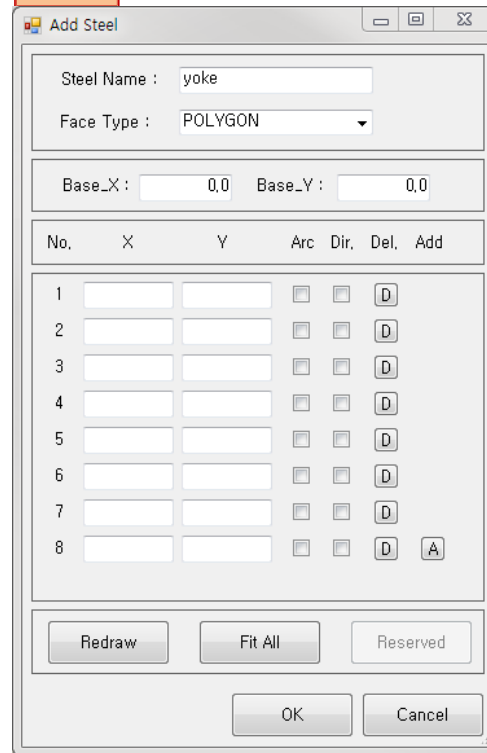
4. Yoke Shape
   - ✓ Yoke location : Base_X 0, Base_Y 0.2
   - ✓ 1 Point : X 0, Y 1.4
   - ✓ 2 Point : X 0, Y 1.2
   - ✓ 3 Point : X 1.9, Y 1.2 (Arc, Dir check)
   - ✓ 4 Point : X 2.05, Y 1.05
   - ✓ 5 Point : X 2.05, Y 0
   - ✓ 6 Point : X 2.25, Y 0
   - ✓ 7 Point : X 2.25, Y 1.05 (Arc check)
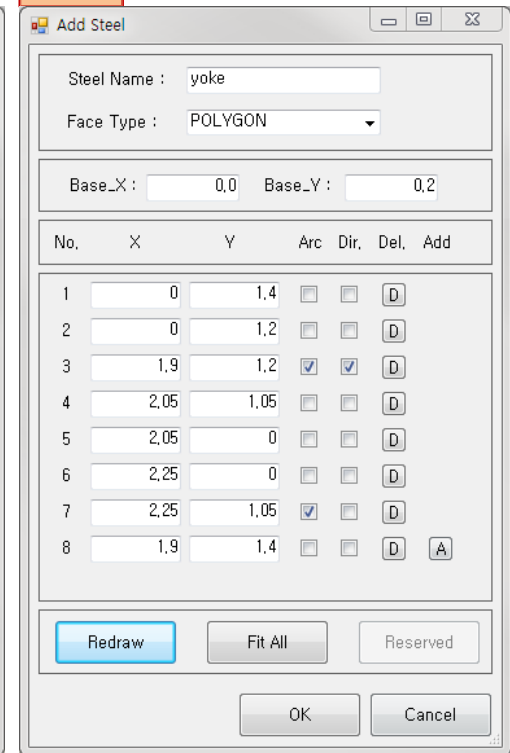   - ✓ 8 Point : X 1.9, Y 1.4

5. Screen Adjustment : Use Fit All button

6. Click OK button

Open Actuator Project

Add yoke

7. Shape confirmation (FEMM window)

yoke

Open Actuator Project
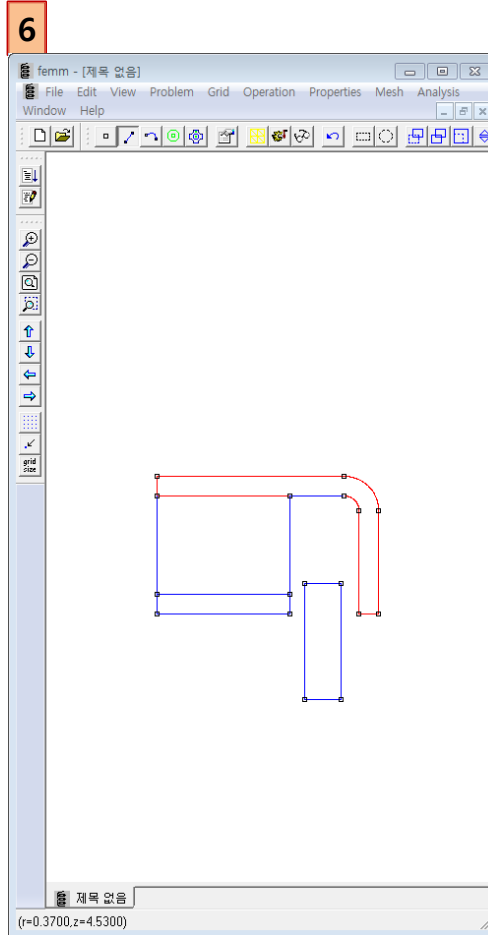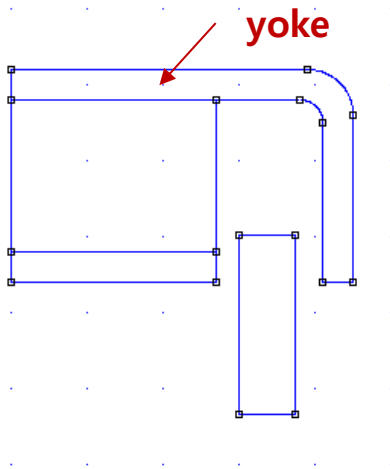
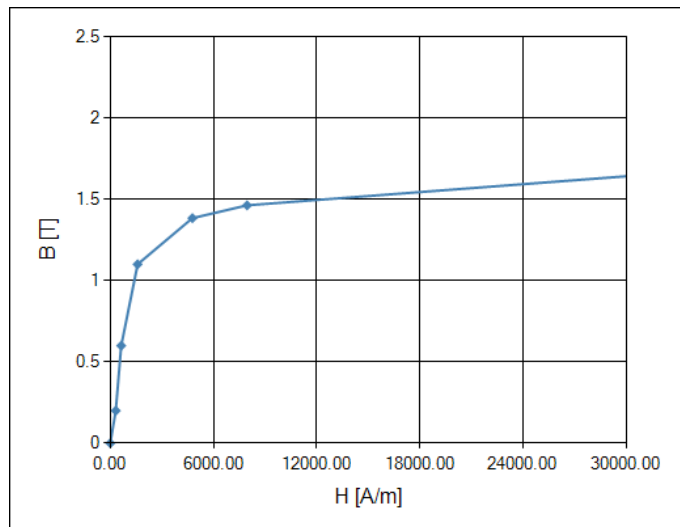# Plate, Yoke settings

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

[BH curve]

1	
◢ **Common Fields**	
Node Name	**plate**
◢ **Specification Fields**	
Part Material	**430 Stainless Steel**
Moving Parts	**MOVING**

Open Actuator Project

Virtual Experiments

Experiment of magnetic force

1. Toolbar > Click Force Button

2. Force Experiment Name : "force"

3. Click OK button

4. Settings of magnetic force experiment
   - ✓ Voltage : 2.5 V

5. Click "Force Test" Button

4
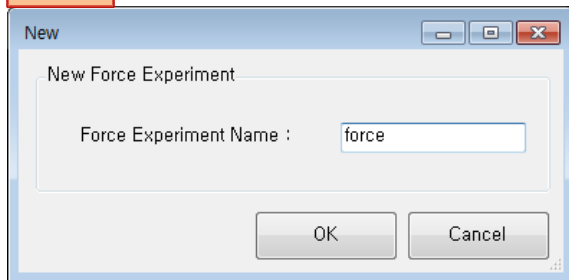
Common Fields	
Node Name	**force**
Input Fields	
Voltage [V]	**2.5**
Max, Current [A]	0.15875
Stroke Fields	
Moving Stroke [mm]	**0**

2~3

New Force Experiment

Force Experiment Name : force

OK   Cancel

5

Force Test

Open Actuator Project

Results of magnetic force

1. Force : -0.05428 N

Open Actuator Project
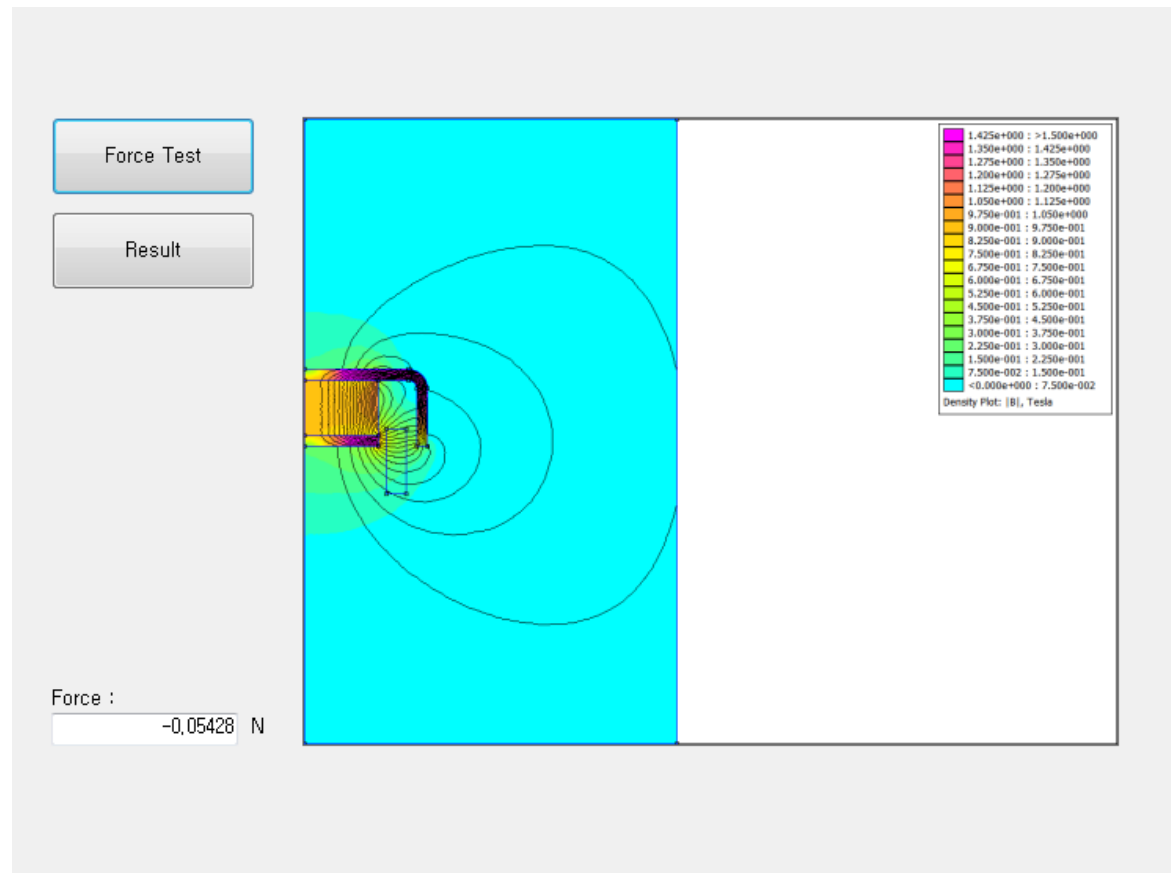
Experiment of displacement-magnetic force

Stroke

1. Toolbar > Click Stroke button

2. Stroke Experiment Name : "stroke"

3. Click OK button

4. Settings of the experiment
   - ✓ Voltage : 2.5 V
   - ✓ Initial Stroke : -0.5 mm
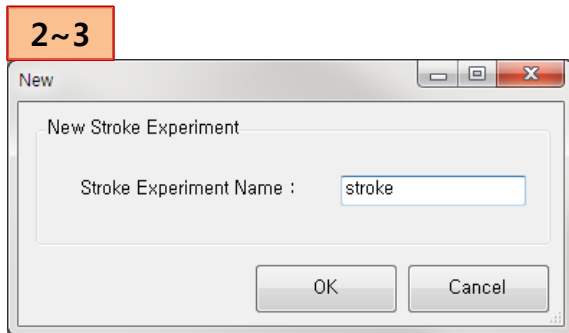   - ✓ Final Stroke : 0.5 mm
   - ✓ Step Count : 5

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**

2~3

New

New Stroke Experiment

Stroke Experiment Name :   stroke

OK   Cancel

Open Actuator Project

Results of displacement-magnetic force

5. Information View > Click "Stroke Test" button

Open Actuator Project
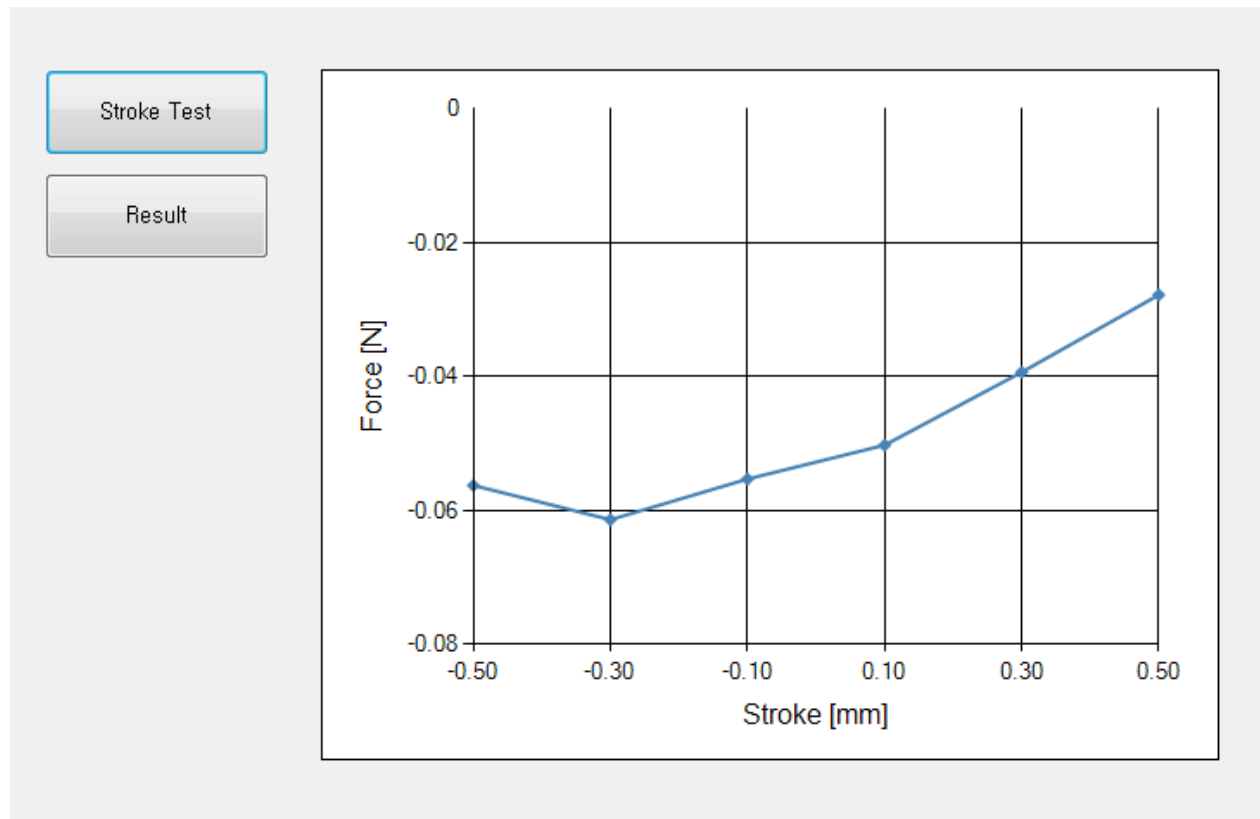
Experiment of current-magnetic force

1. Toolbar > Click Current button

Current

2. Experiment Name : "current"

3. Click OK button

4. Experiment settings
   - ✓ Initial Current : 0.0 A
   - ✓ Final Current : 0.1 A
   - ✓ Step Count : 5

4

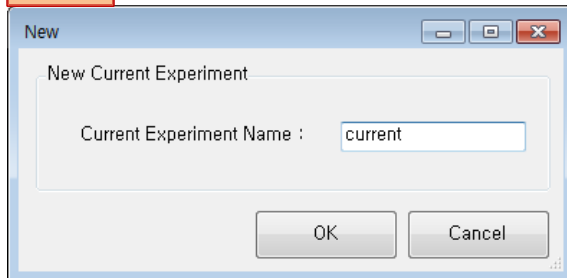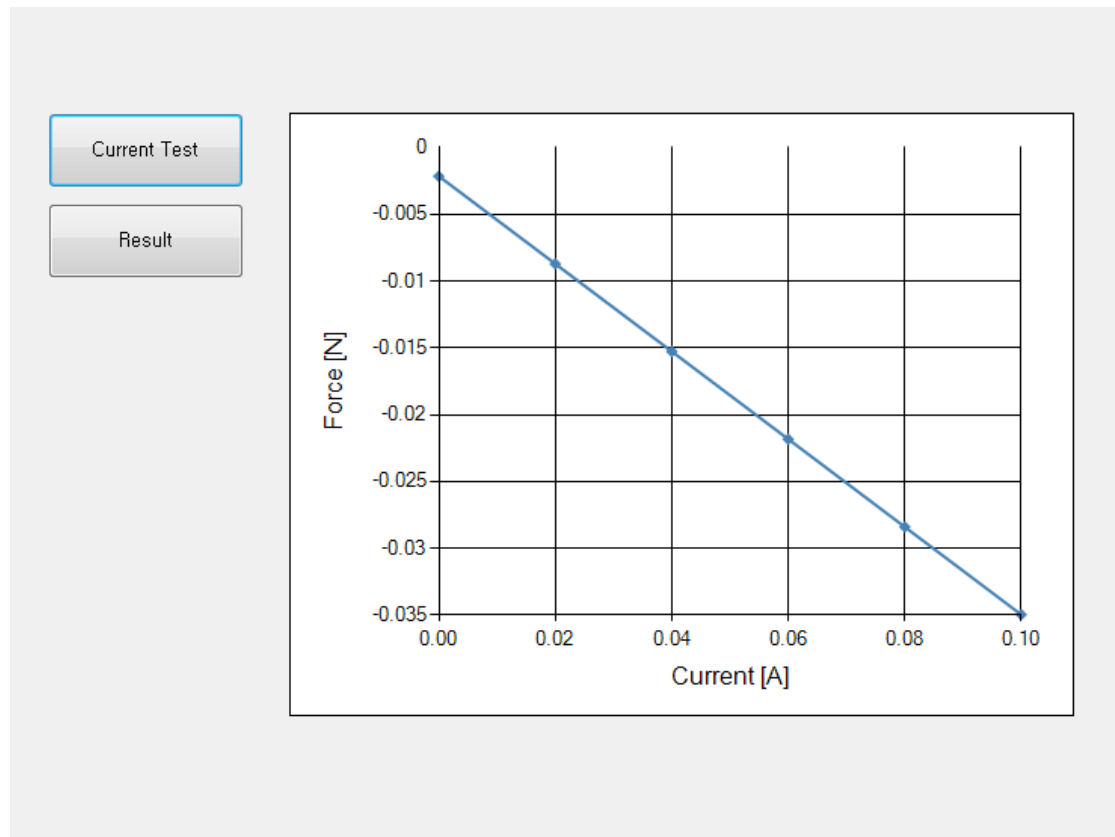| Common Fields	
Node Name	**current**
Current Fields	
Initial Current [A]	**0**
Final Current [A]	**0.1**
Step Count	**5**
Stroke Fields	
Moving Stroke [mm]	**0**

2~3

New

New Current Experiment

Current Experiment Name : current

OK   Cancel

Open Actuator Project

Results of current-magnetic force

5. Information View > Click "Current Test" button

Open Actuator Project

Thank You