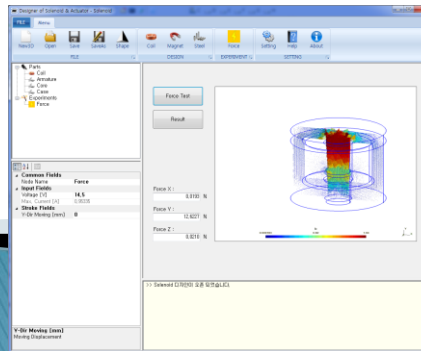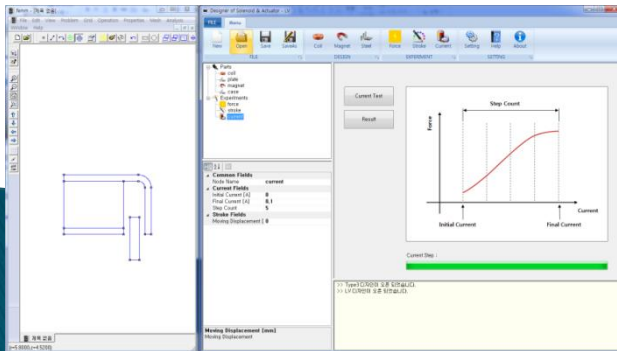# Drawing work guide before simulation

2022-08-05

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Part selection and Shape simplification
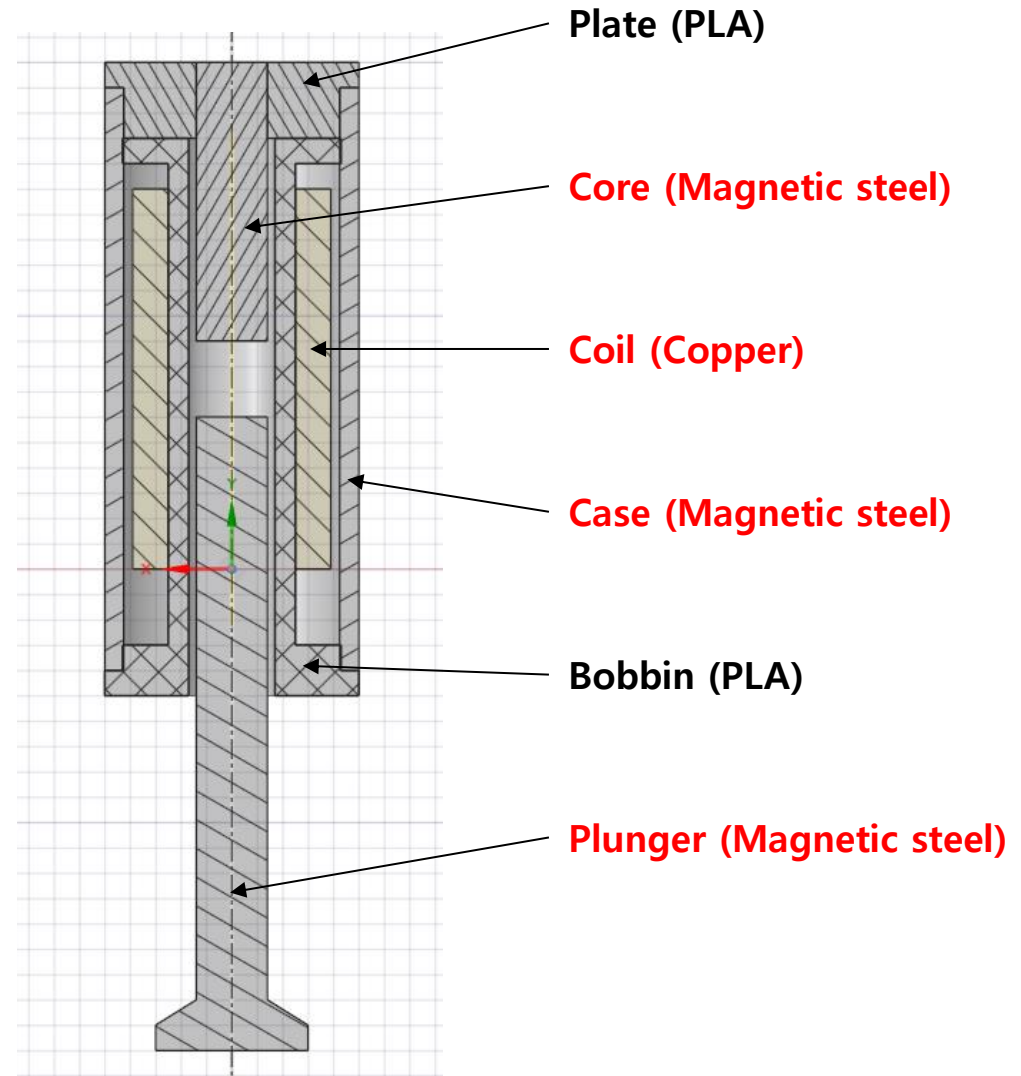
Part selection for magnetic analysis

1. **Included parts**
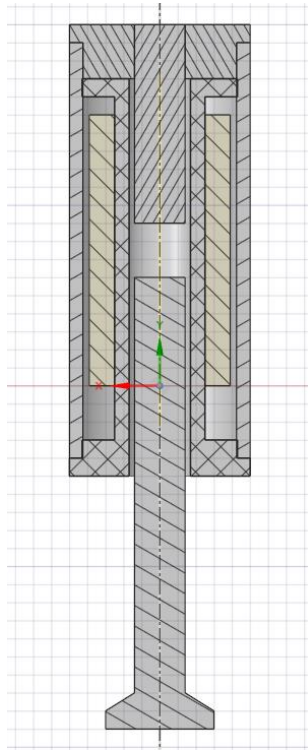   - Coil
   - Magnet
   - Soft magnetic steel

2. **Excluded parts**
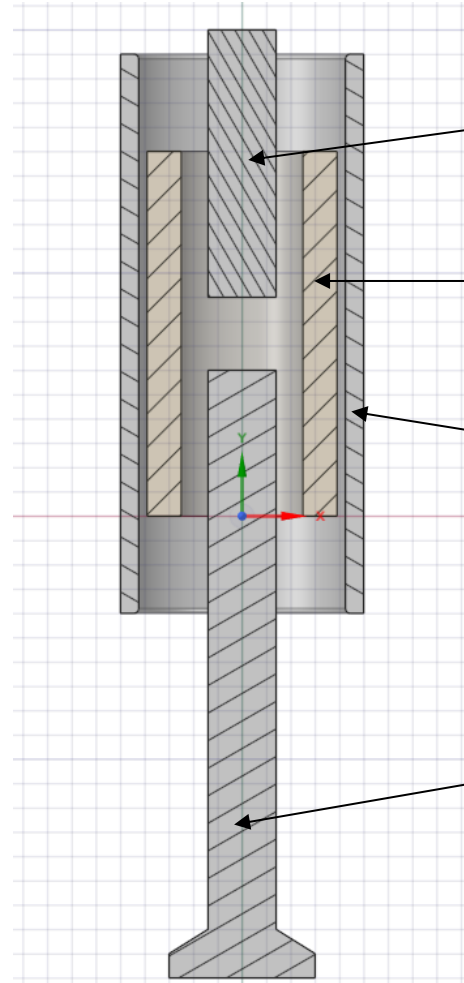   - Plastic, Rubber
   - Non-magnetic metals
     (SUS 300 series, Aluminum, Brass, ...)
   - Other non-magnetic materials

Plate (PLA)

Core (Magnetic steel)

Coil (Copper)

Case (Magnetic steel)

Bobbin (PLA)

Plunger (Magnetic steel)

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Part selection for magnetic analysis

Remove
unnecessary parts

Core (Magnetic steel)
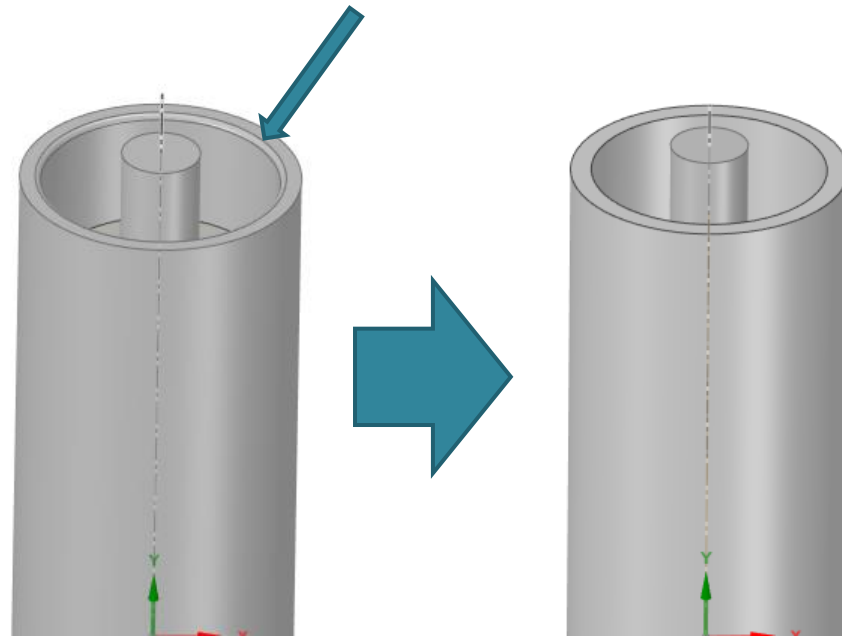
Coil (Copper)

Case (Magnetic steel)

Plunger (Magnetic steel)

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Shape simplification

1. **shape simplification**

   - Small Fillet → Remove or Chamfer

   - Small Gap (0.05 mm or less) → Remove

   - Small Hole (eyelet) → Remove

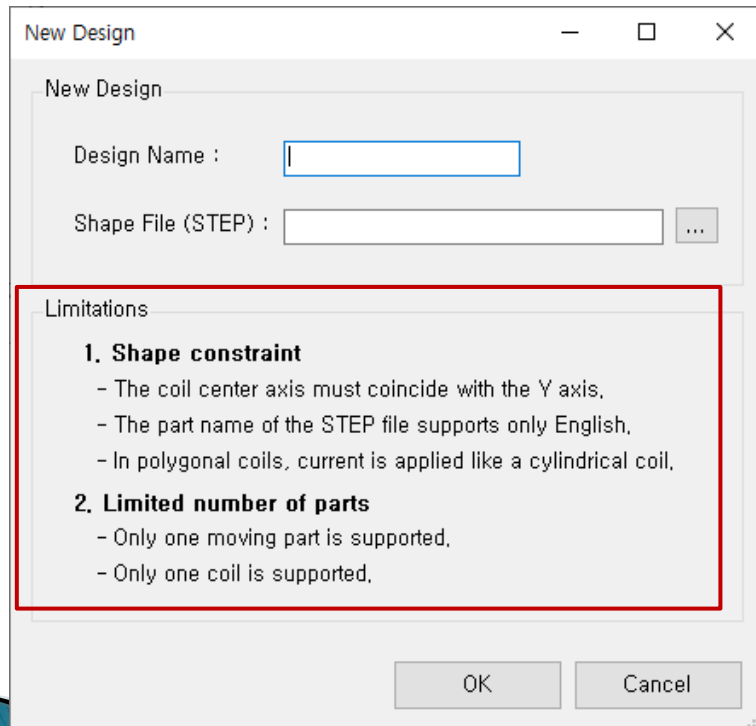   - Unnecessary shape considering flux flow → Remove

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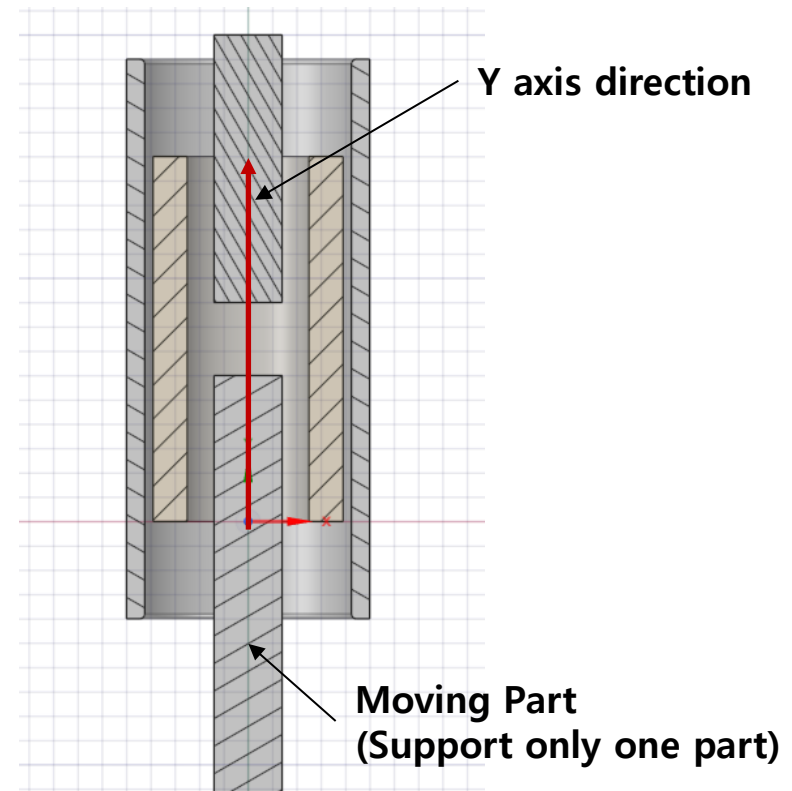# DoSA-3D Shape Caution Item

DoSA-3D Shape Caution Item

1. Coil Restriction

- Coil central axis must coincide with Y axis.
- The part name supports only English. (Space X)
- Current always applied in cylindrical form.
  (Polygon coils cause slight difference)

2. Limited number of parts

- Only one moving part is supported
- Only one coil is supported

Y axis direction

**Moving Part
(Support only one part)**

New Design — □ ×

New Design

Design Name :

Shape File (STEP) : …

Limitations

1. **Shape constraint**
   - The coil center axis must coincide with the Y axis,
   - The part name of the STEP file supports only English,
   - In polygonal coils, current is applied like a cylindrical coil,
2. **Limited number of parts**
   - Only one moving part is supported,
   - Only one coil is supported,

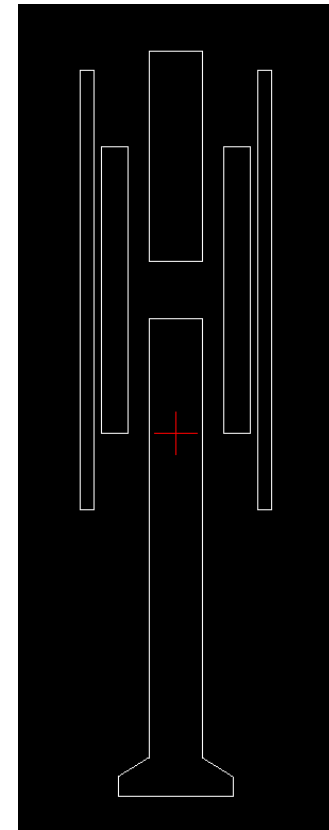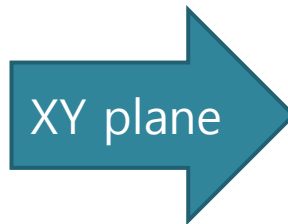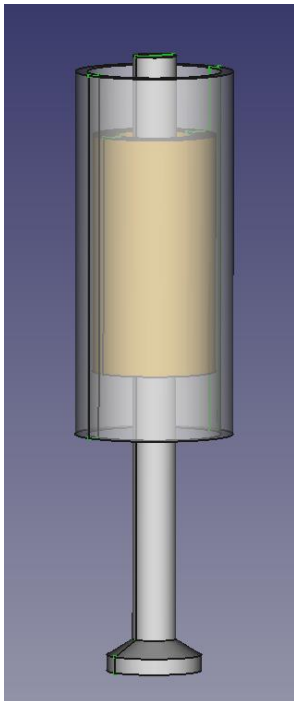OK   Cancel

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DoSA-2D Shape work

Create Section

1. **Caution Items**
   - The central axis of the 3D model coil is positioned to coincide with the Y axis
   - Choose an angle that can represent the axisymmetric shape
   - Rotate the above angle to be the XY plane and proceed to the XY section


XY plane

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LibreCAD Introduction

1. **2D CAD Program**
    - 2D CAD programming is required for 2D cross-sectional shape work (DXF file)
    - You can use AutoCAD or your own 2D CAD work program.
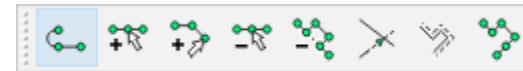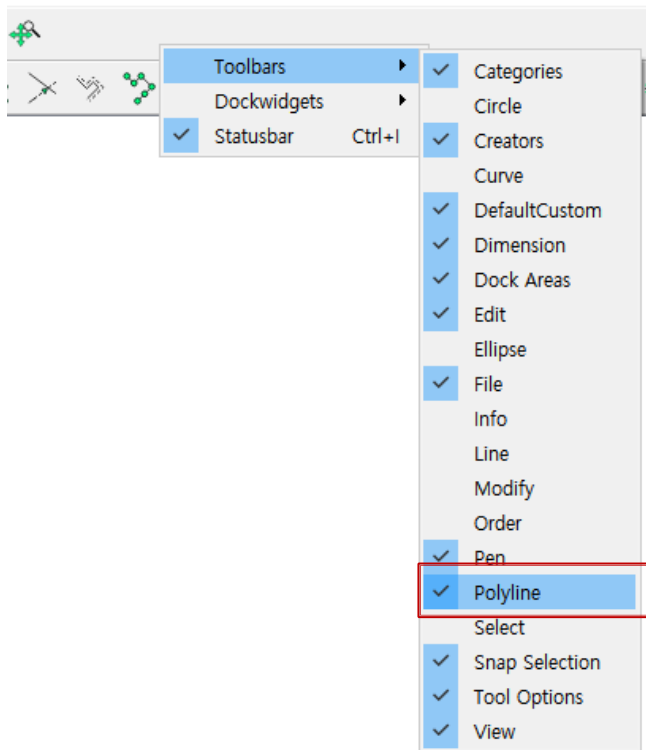
2. **Use a free 2D CAD program**
    - A free 2D CAD program (LiberCAD) is also available.
    - Download Link : http://librecad.org
    - LibreCAD is used for 2D shape work practice in this document.

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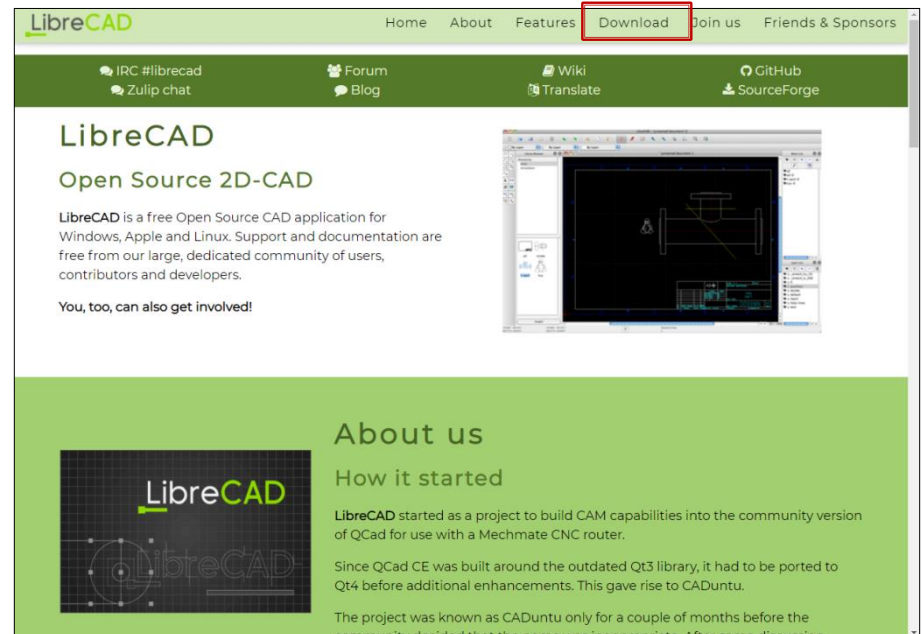
LibreCAD Preferences (1)

1. Add Toolbar

 - Right-click on the toolbar > Toolbars > Polyline (Enable polyline)

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LibreCAD Preferences (2)

1. Open 2D Section
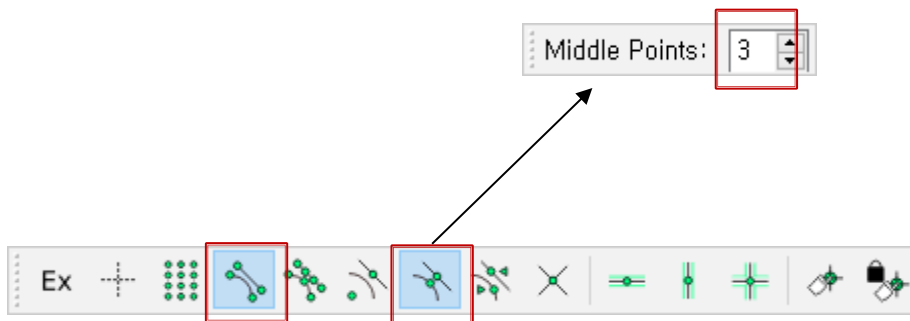   - File > Open > Open *.dxf files

2. Layer 생성
   - Layer List window on the right > Click "+" button
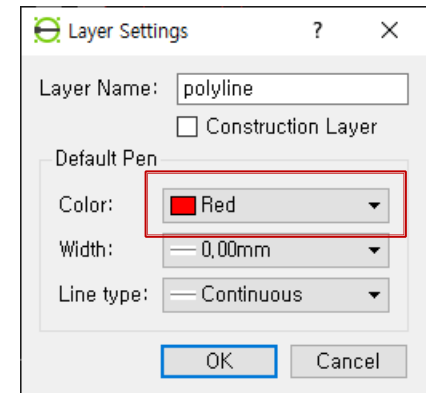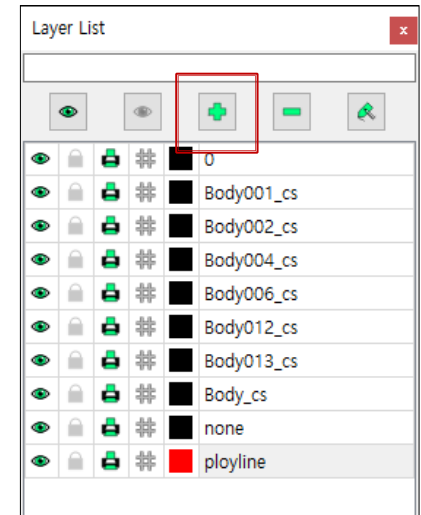   - Layer Name : polyline
   - Color : Red

3. Snap Setting
   - Only turn on Endpoints, Middle
   - Middle Points : 3

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Working with part geometry

1. **To Create Part Geometry**
   - Create part shapes as a ployline on top of the read DXF shape using the Snap function.

2. **Shape work**
   - Start Polyline: Click polyline on the Polyline toolbar
   - Straight section : Select endpoints or midpoints of DXF line geometry
   - Arc section : Select points differently based on size (see next page)
   - Close ployline :
     * Select the first point last and
       Use the Esc key or the Close button on the Middle Points toolbar

3. **Caution**
   - Part geometry uses only the right side (positive X side)
   - The left side (negative X side) must not have a shape
   - The central axis of the actuator must coincide with the Y axis.
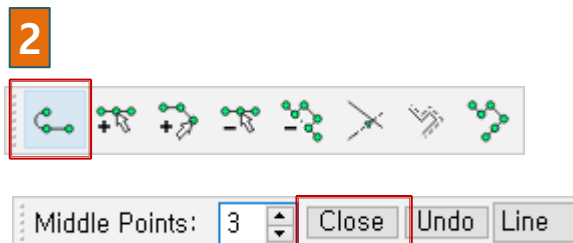
Central axis and Y axis coincide

3

2

Middle Points: 3   Close Undo Line

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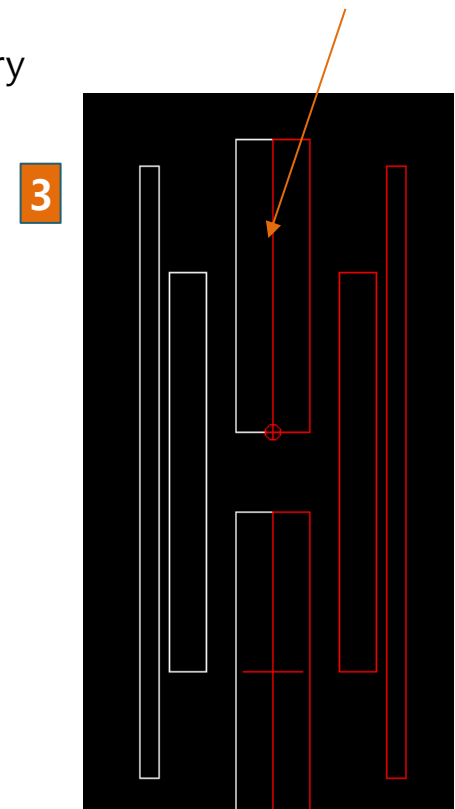
Arc processing while working
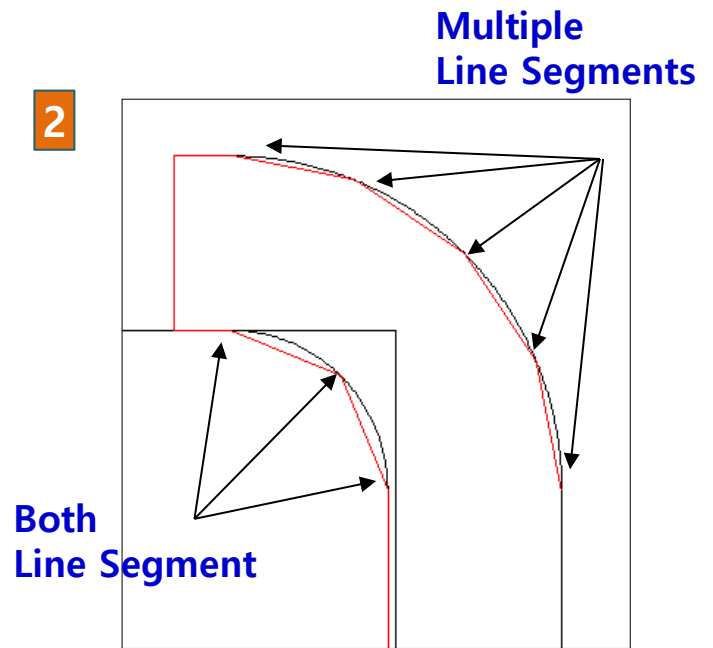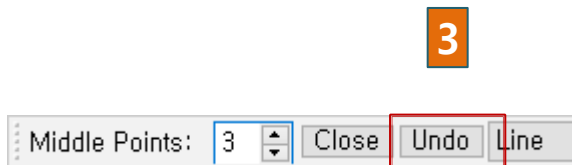
1. **Simplify Arc Geometry**
   - Arc geometry needs simplification because unnecessary meshes are added.

2. **Arc work**
   - Small Arc : Select both endpoints (Chamfer)
   - Middle Arc : Select both endpoints + 1 middle point
   - Big Arc : Select both endpoints + 3 middle point

3. **Cancel selection point**
   - Using the Undo button on the Middle Points toolbar

Multiple Line Segments

2

Both Line Segment

3

Middle Points: 3 ⇕ Close Undo Line

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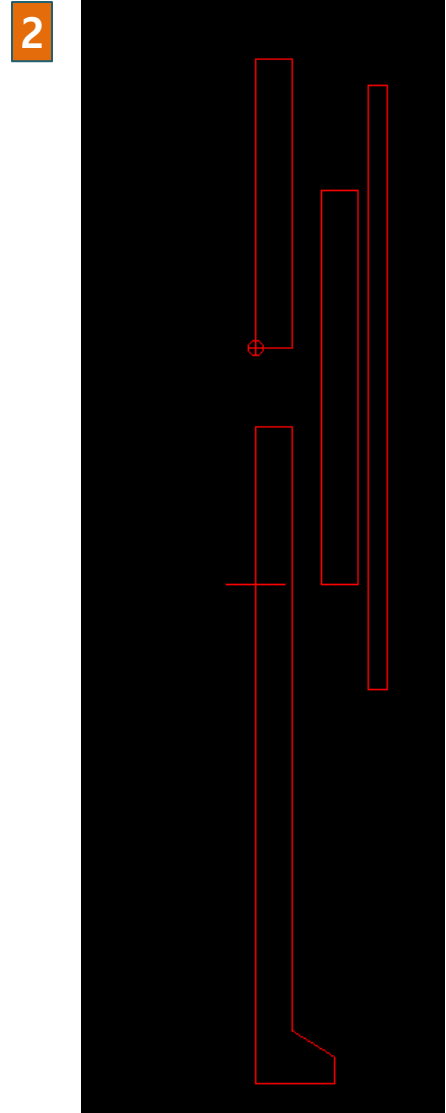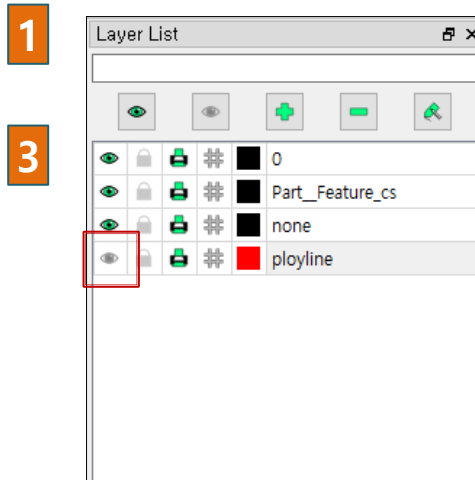
Save part

1. **Hide work layer**
   - Layer List window on the right > turn off polyline layer

2. **Delete the read existing shape**
   - Select All : Ctrl-A
   - Delete : Del

3. **Save As**
   - Layer List window on the right > turn on polyline layer
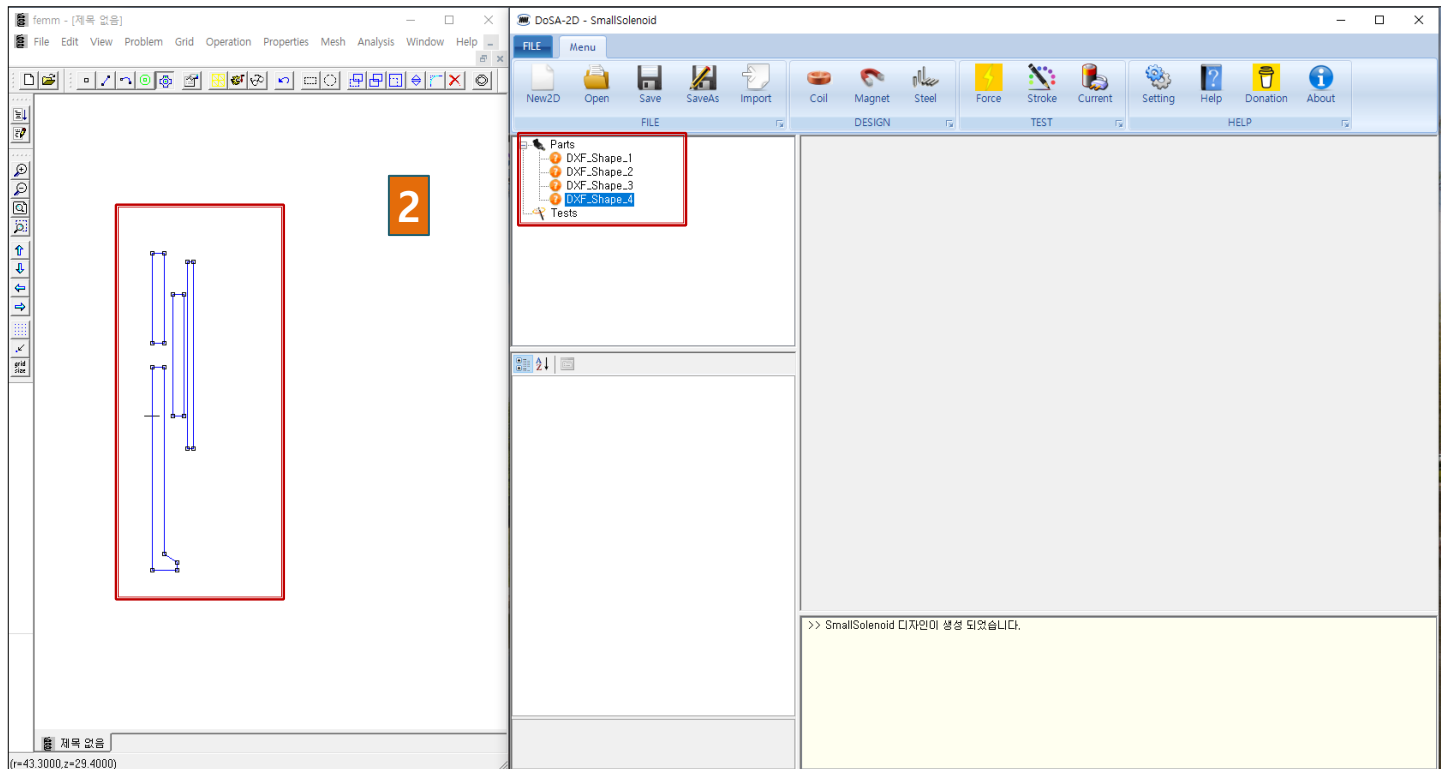   - File > Save As ...

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Reading the shape of DoSA-2D

1

1. **Read DXF file**
   - Ribbon Bar FILE > Import

2. **Check the cross-sectional shape**

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Thank You

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