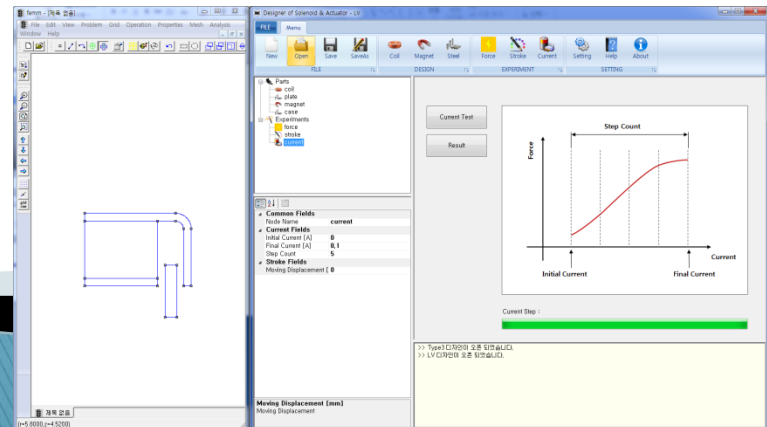


DoSA-2D 사용 메뉴얼

Solenoid Example

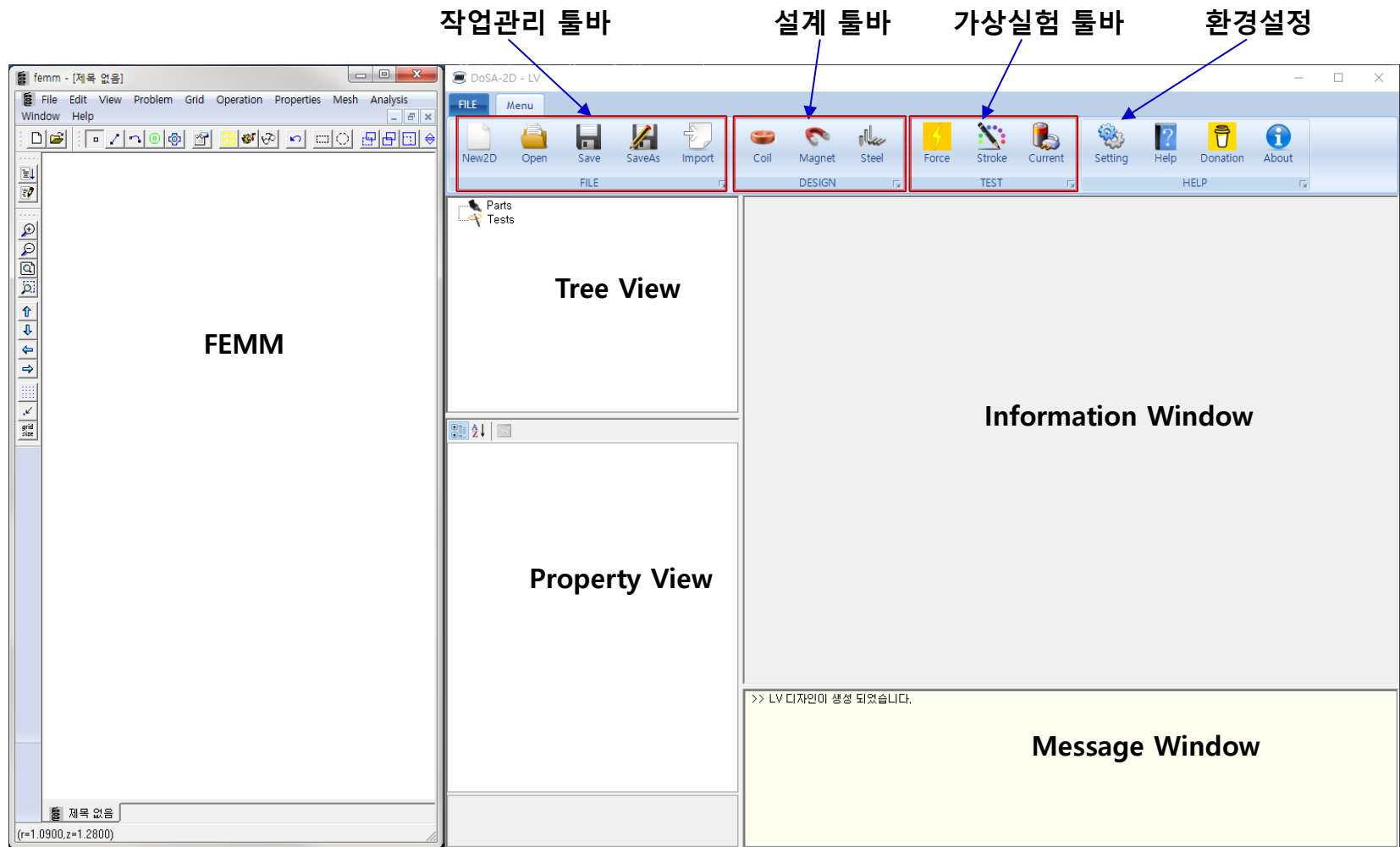
2022-05-06

GiTae Kweon (zgitae@gmail.com)



DoSA 구성

프로그램 구성



Toolbar

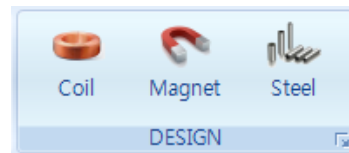
1. 작업관리

- ✓ New : 신규작업 생성
- ✓ Open : 이전작업 열기
- ✓ Save : 작업 저장
- ✓ SaveAs : 다른 이름으로 저장
- ✓ Import : DXF Import



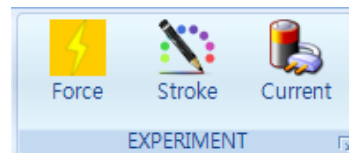
2. 설계

- ✓ Coil : 권선 추가 및 사양 설계
- ✓ Magnet : 영구자석 추가 및 사양 설정
- ✓ Steel : 연자성체 추가 및 사양 설정



3. 가상실험

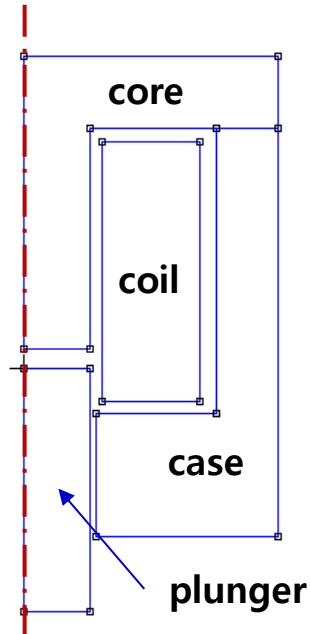
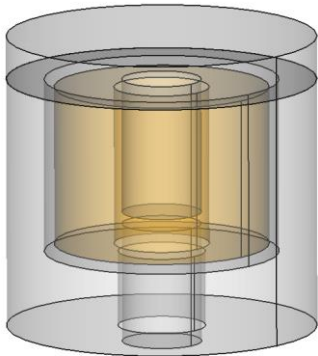
- ✓ Force : 자기력 예측
- ✓ Stroke : 변위별 자기력 예측
- ✓ Current : 전류별 자기력 예측



해석 모델

해석모델 설명

1. 형상 모델



2. 제품 사양

가. 코일권선

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

나. 전원

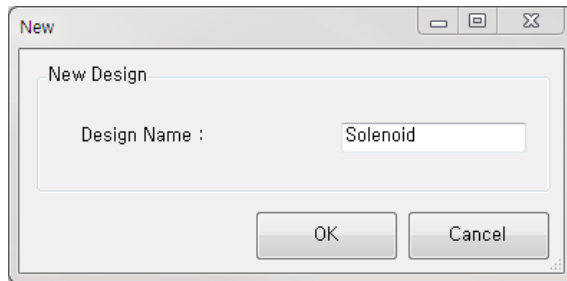
- Voltage : 14.5V

(작업 예제파일 : DoSA-2D 설치 디렉토리 > Samples > Solenoid)

Design 생성

1. Toolbar > New 버튼 클릭
2. Design Name : "Solenoid"
3. OK 클릭

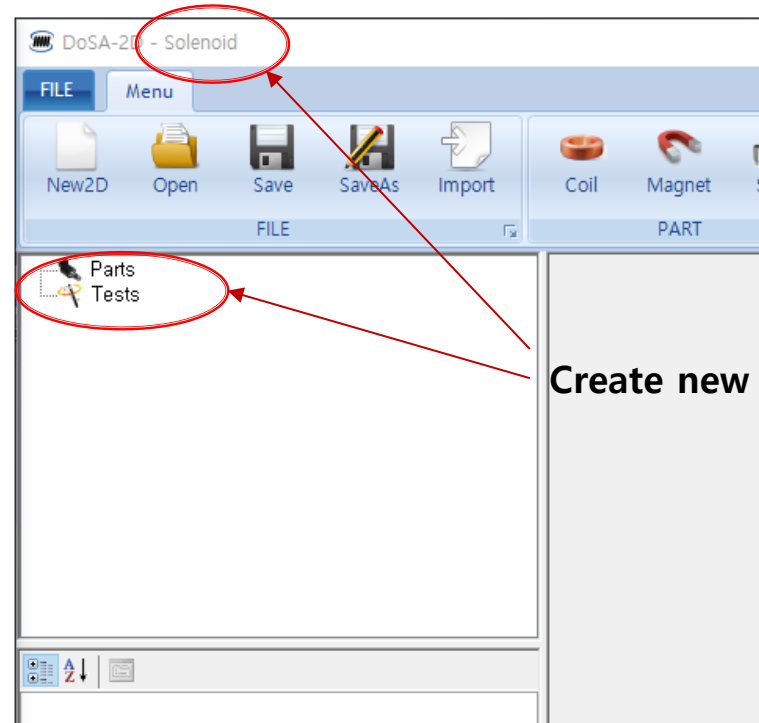
2



1



3



Create new design

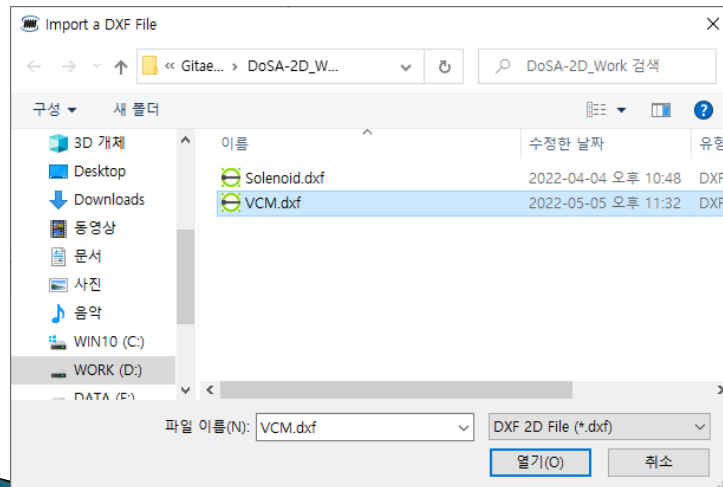
형상 Import

1. Toolbar > Import 버튼 클릭
2. "Solenoid.dxf" 선택 후 열기버튼 클릭
3. 부품 형상 확인

[주의사항]

- 파트는 Polyline 으로 작성되어야 함
- "[해석 전 형상작업 가이드.pdf](#)" 참고 할 것

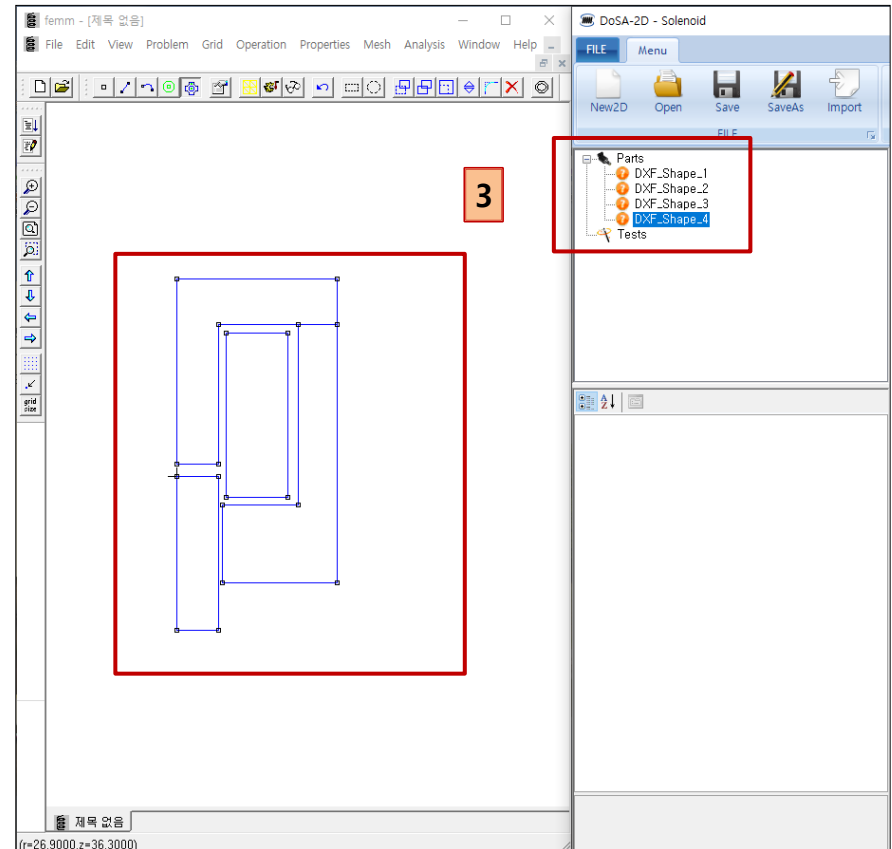
2



1



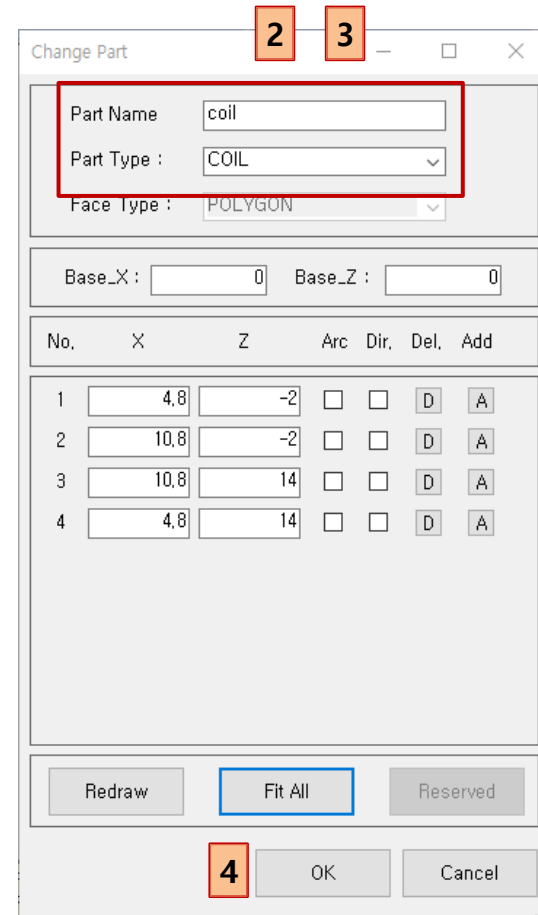
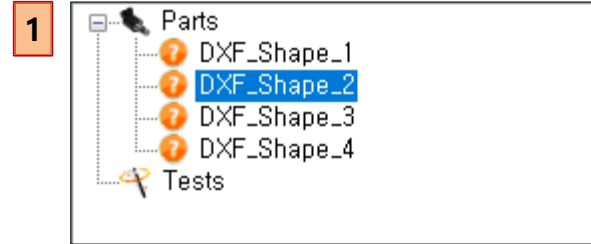
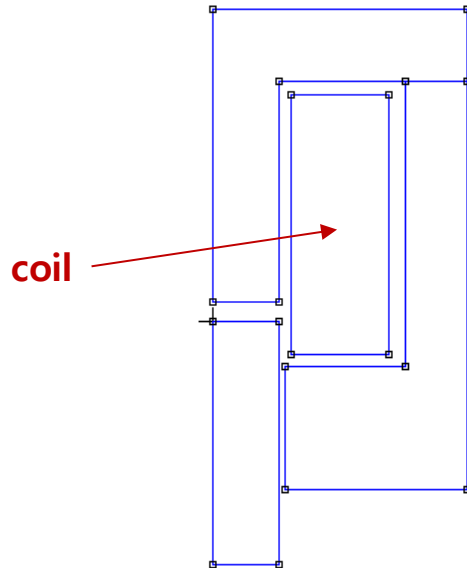
3



Parts Design

Coil 지정

1. Treeview > "DXF_Shape_2" 더블 클릭
2. Name 변경 : "coil"
3. 파트 속성 변경 : COIL
4. OK 버튼 클릭

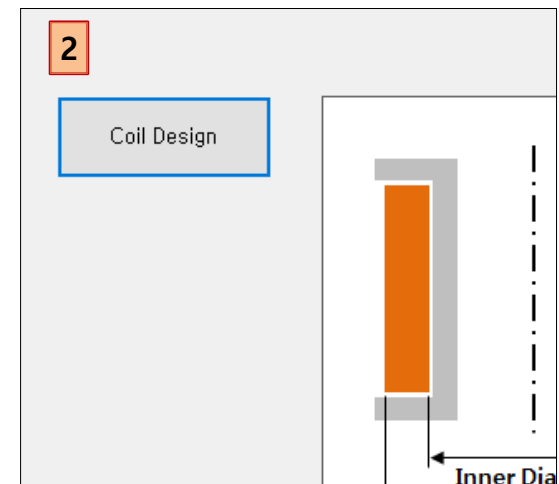


Coil 설계

1. Coil 기구사양 입력
 - ✓ Copper Diameter : 0.27
2. Coil 사양 계산
 - ✓ Design Coil 버튼 클릭
3. Coil 사양 확인
4. 리본 바 > Save

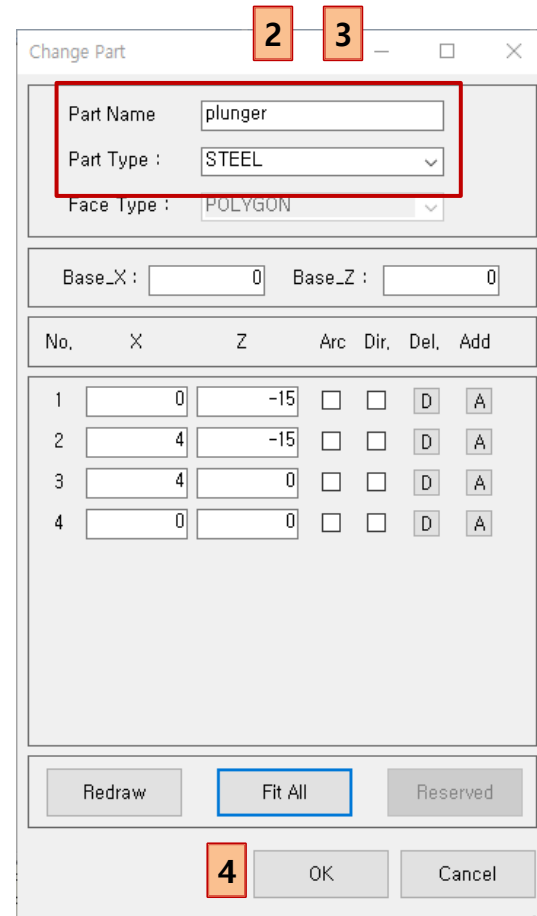
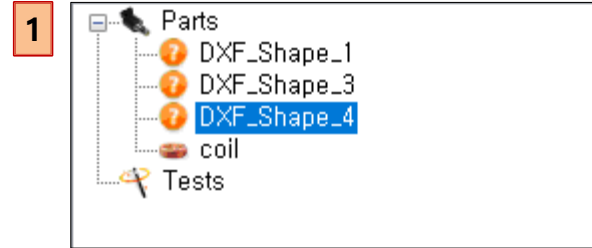
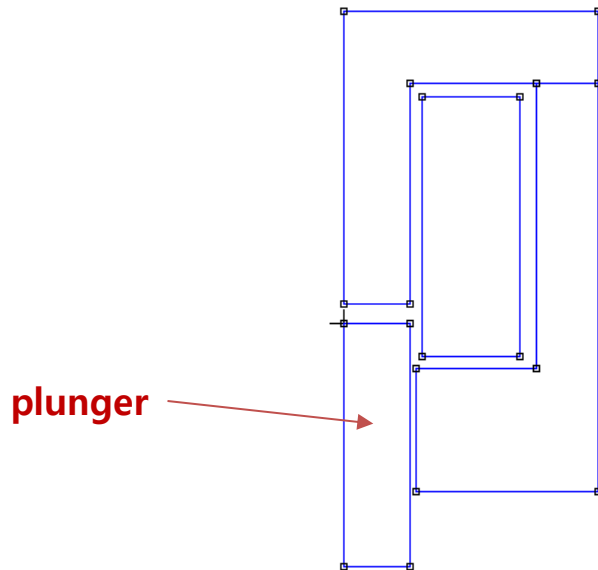


▼ Common Fields	
Node Name	coil
▼ Specification Fields	
Part Material	Copper
Current Direction	IN
Moving Parts	FIXED
▼ Calculated Fields	
Coil Turns	1040
Coil Resistance [Ω]	15.20945
Coil Layers	20
Turns of One Layer	52
▼ Design Fields (optional)	
Coil Wire Grade	Enameled_IEC_Grade_2
Inner Diameter [mm]	9,6
Outer Diameter [mm]	21,6
Coil Height [mm]	16
Copper Diameter [mm]	0.27
Wire Diameter [mm]	0.31072
Coil Temperature [$^{\circ}\text{C}$]	20
Horizontal Coefficient	0.9
Vertical Coefficient	0.98
Resistance Coefficient	1



Plunger 지정

1. Treeview > "DXF_Shape_4" 더블 클릭
2. Name 변경 : "plunger"
3. 파트 속성 변경 : STEEL
4. OK 버튼 클릭

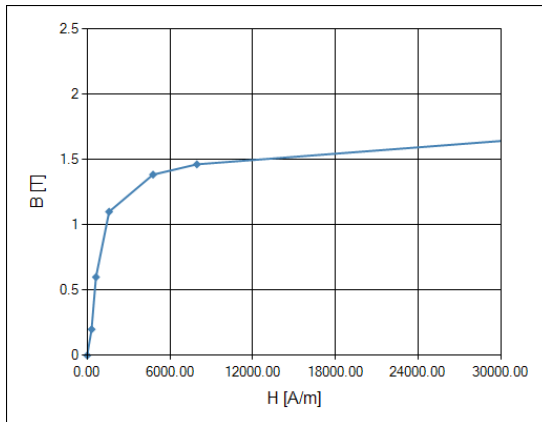


Plunger 설정

1. Plunger 속성 설정

- ✓ Part Material : 430 Stainless Steel 선택
- ✓ Moving Parts : **MOVING**

[BH curve]

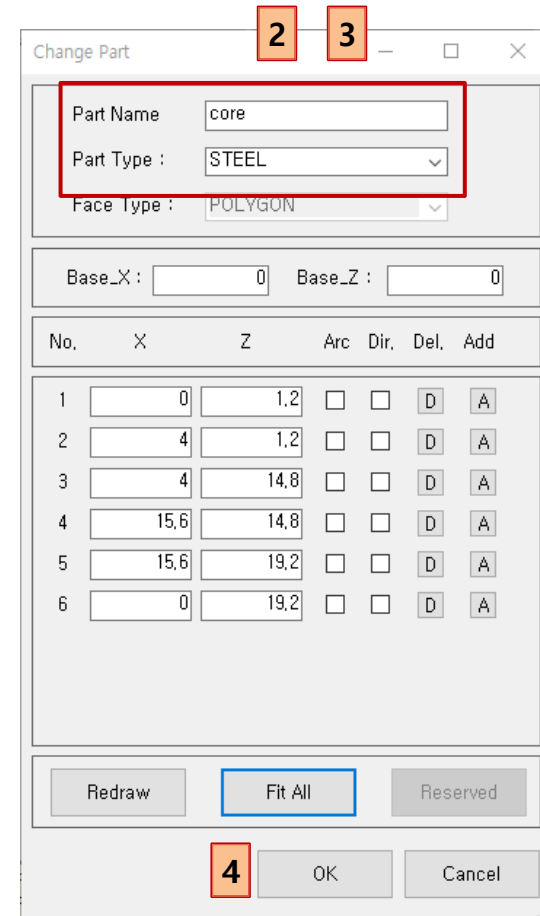
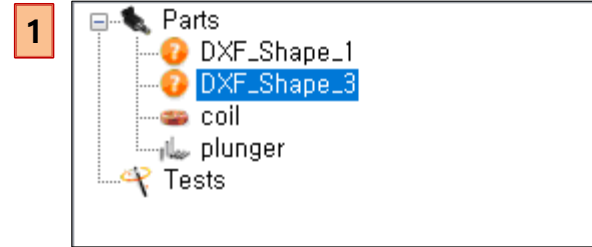
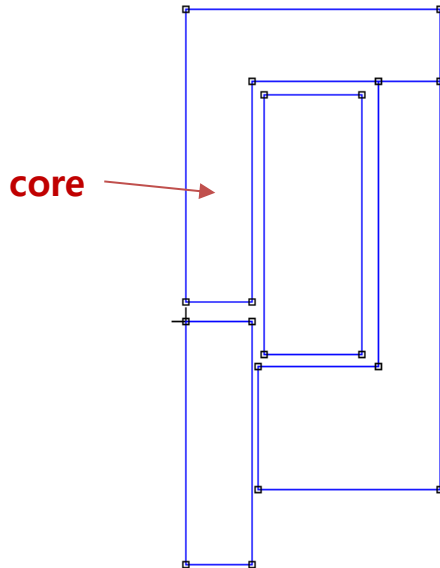


1

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

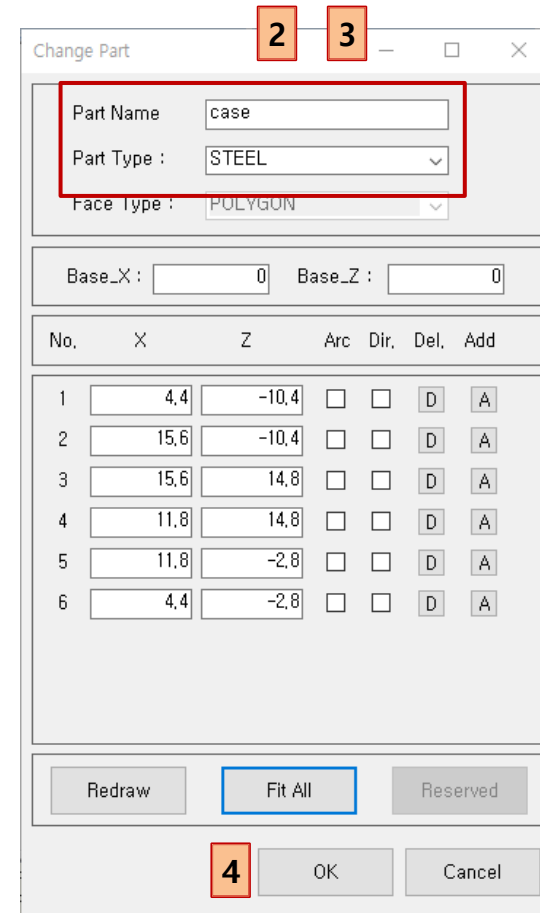
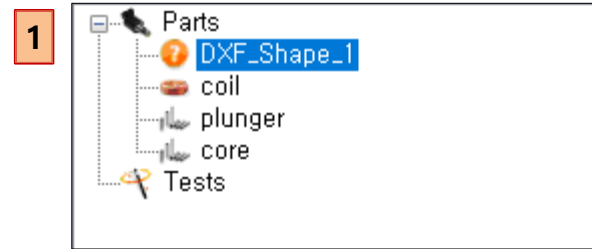
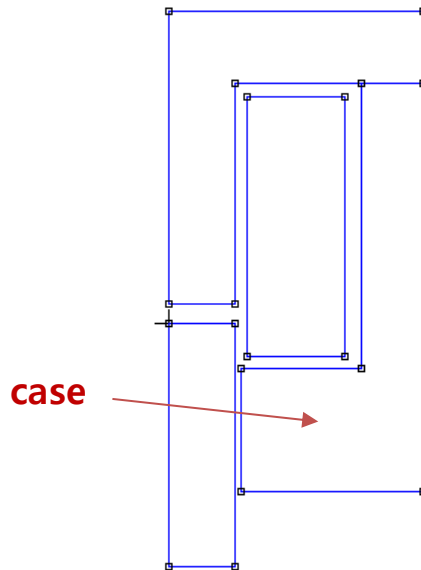
Core 지정

1. Treeview > "DXF_Shape_3" 더블 클릭
2. Name 변경 : "core"
3. 파트 속성 변경 : STEEL
4. OK 버튼 클릭



Case 지정

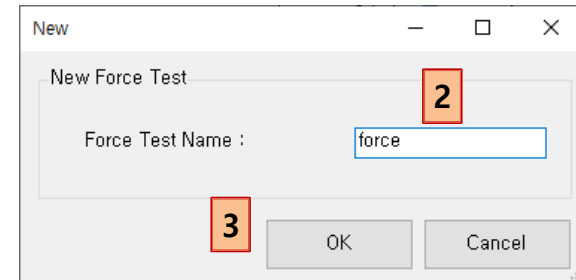
1. Treeview > "DXF_Shape_1" 더블 클릭
2. Name 변경 : "case"
3. 파트 속성 변경 : STEEL
4. OK 버튼 클릭



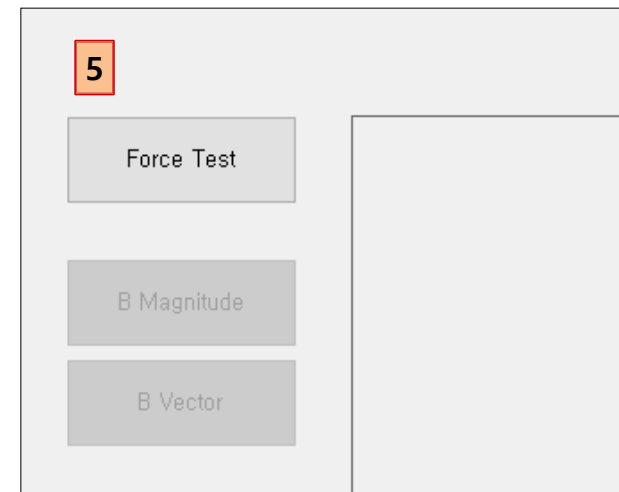
Virtual Test

자기력 가상실험

1. Toolbar > Force 버튼 클릭
2. Test Name : "force"
3. OK 버튼 클릭
4. 자기력 가상실험 설정
 - ✓ Voltage : 14.5 V
5. Force Test 버튼 클릭



✓ Common Fields	
Node Name	force 4
✓ Current Fields	
Voltage [V]	14.5
Max. Current [A]	0.95335
✓ Stroke Fields	
Moving Stroke [mm]	0
✓ Condition Fields	
Mesh Size [%]	2



자기력 가상실험 결과

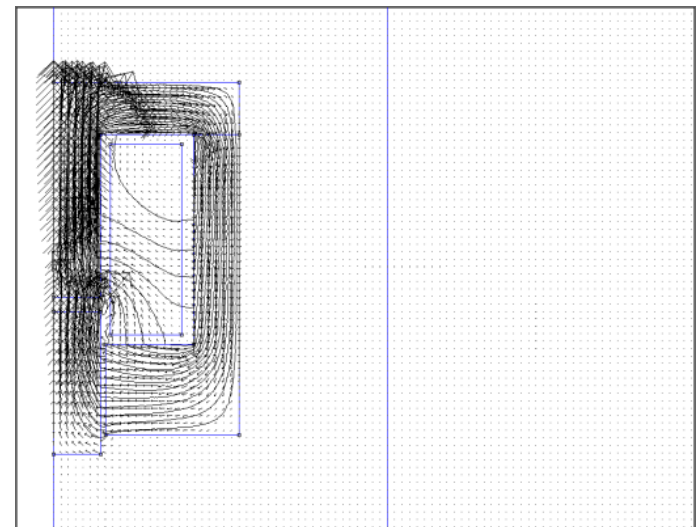
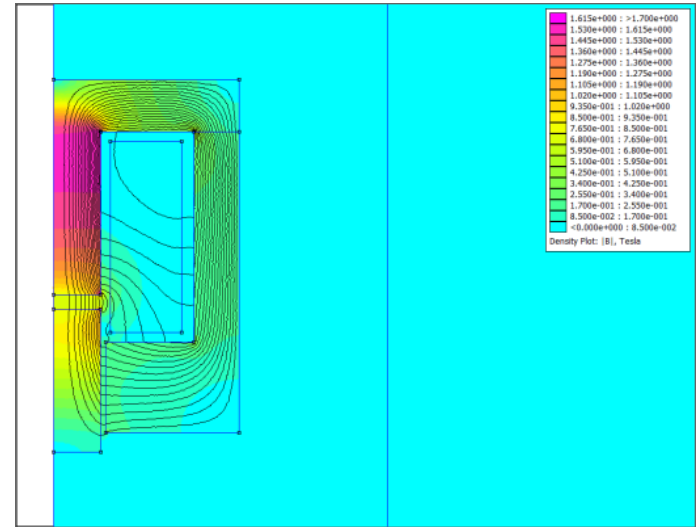
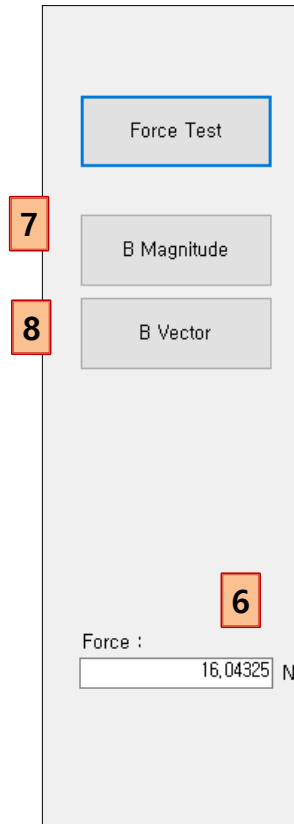
6. 자기력 확인 : 16.04 N

7. 자속밀도 확인

✓ B Magnitude 버튼 클릭

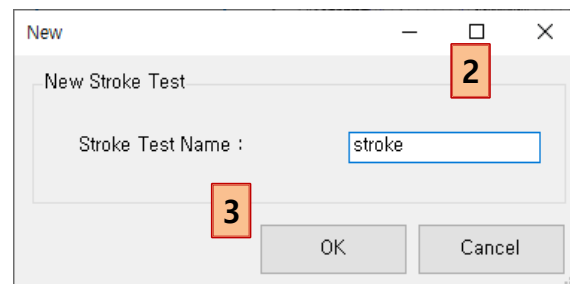
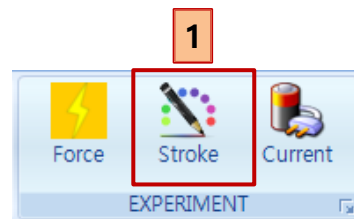
8. 자속밀도 벡터 확인

✓ B Vector 버튼 클릭



변위-자기력 가상실험

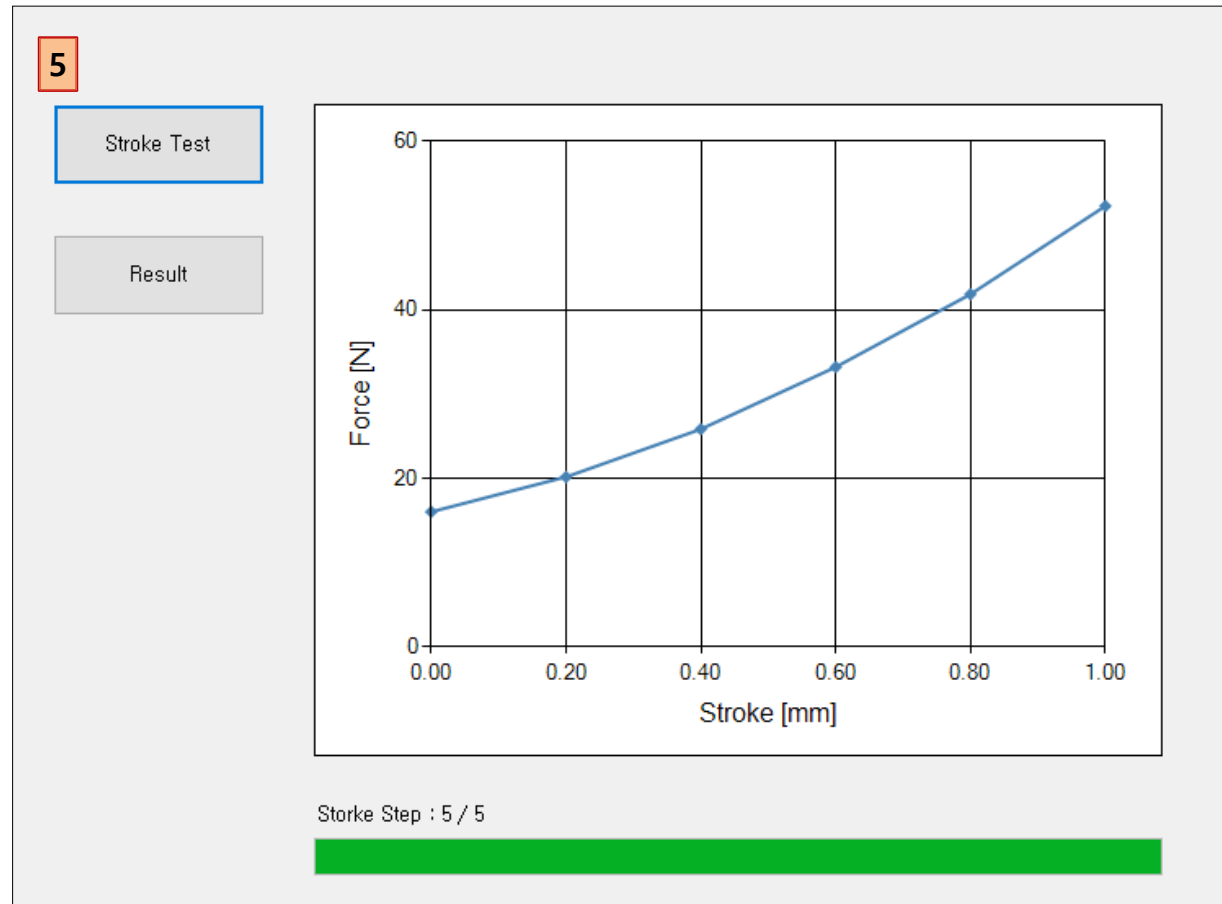
1. Toolbar > Stroke 버튼 클릭
2. Test Name 입력 : "stroke"
3. OK 버튼 클릭
4. 자기력-전류 가상실험 설정
 - ✓ Voltage : 14.5
 - ✓ Initial Stroke : 0.0
 - ✓ Final Stroke : 1.0
 - ✓ Step Count : 5



▼ Common Fields	
Node Name	stroke
▼ Current Fields	
Voltage [V]	14.5
Max. Current [A]	0.95335
▼ Stroke Fields	
Initial Stroke [mm]	0
Final Stroke [mm]	1
Step Count	5
▼ Condition Fields	
Mesh Size [%]	2

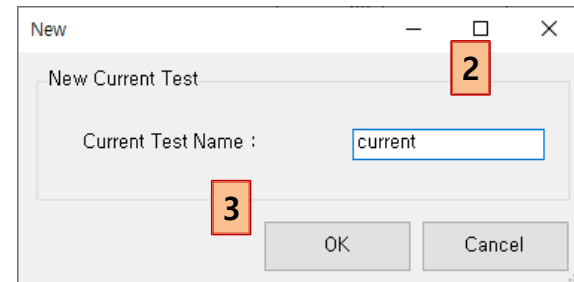
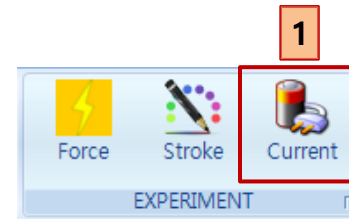
변위-자기력 가상실험 결과

5. Stroke Test 버튼 클릭



전류-자기력 가상실험

1. Toolbar > Current 버튼 클릭
2. Test Name 입력 : "current"
3. OK 버튼 클릭
4. 자기력-전류 가상실험 설정
 - ✓ Initial Current : 0.0
 - ✓ Final Current : 1.5
 - ✓ Step Count : 5

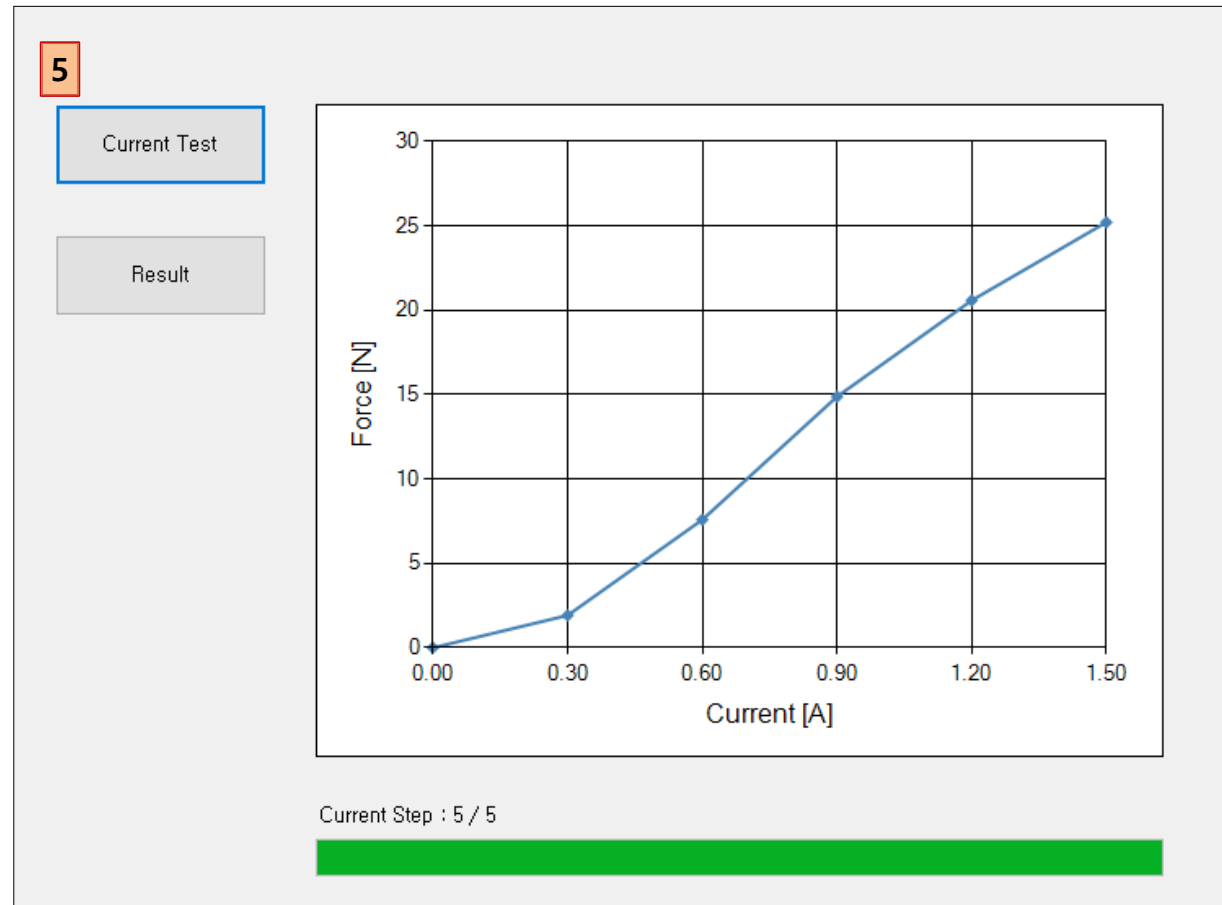


4

▼ Common Fields	
Node Name	current
▼ Current Fields	
Initial Current [A]	0
Final Current [A]	1.5
Step Count	5
▼ Stroke Fields	
Moving Stroke [mm]	0
▼ Condition Fields	
Mesh Size [%]	2

전류-자기력 가상실험 결과

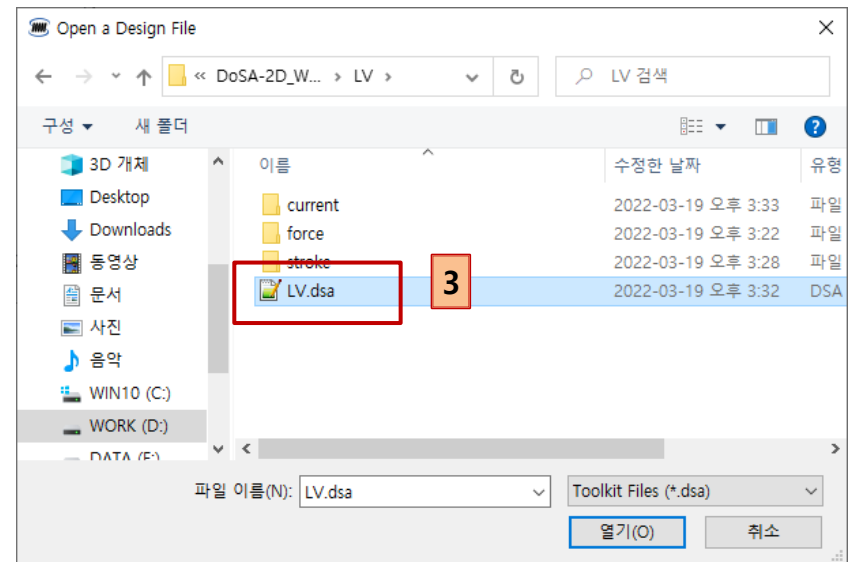
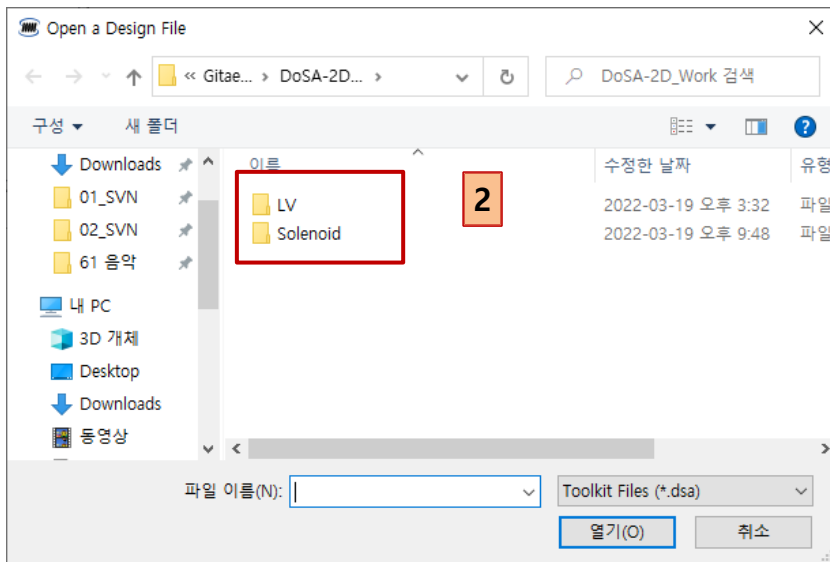
5. Current Test 버튼 클릭



Tips

Design 열기

1. Toolbar > Open 버튼 클릭
2. Design 디렉토리 더블 클릭
3. Design 파일 더블 클릭



Thank You

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