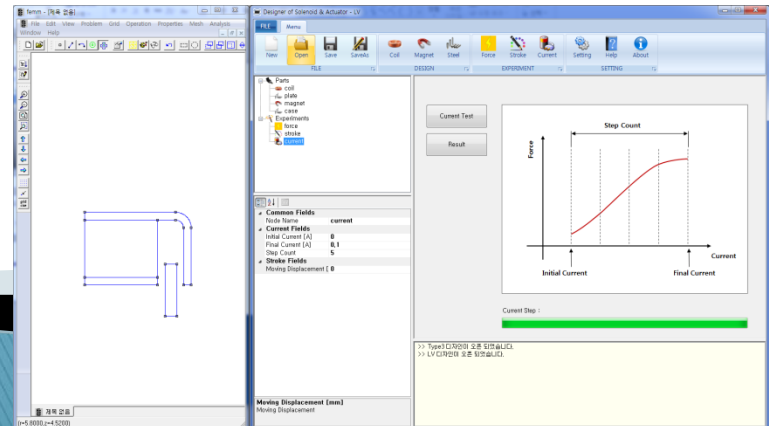


DoSA-2D 사용 메뉴얼

Solenoid Example

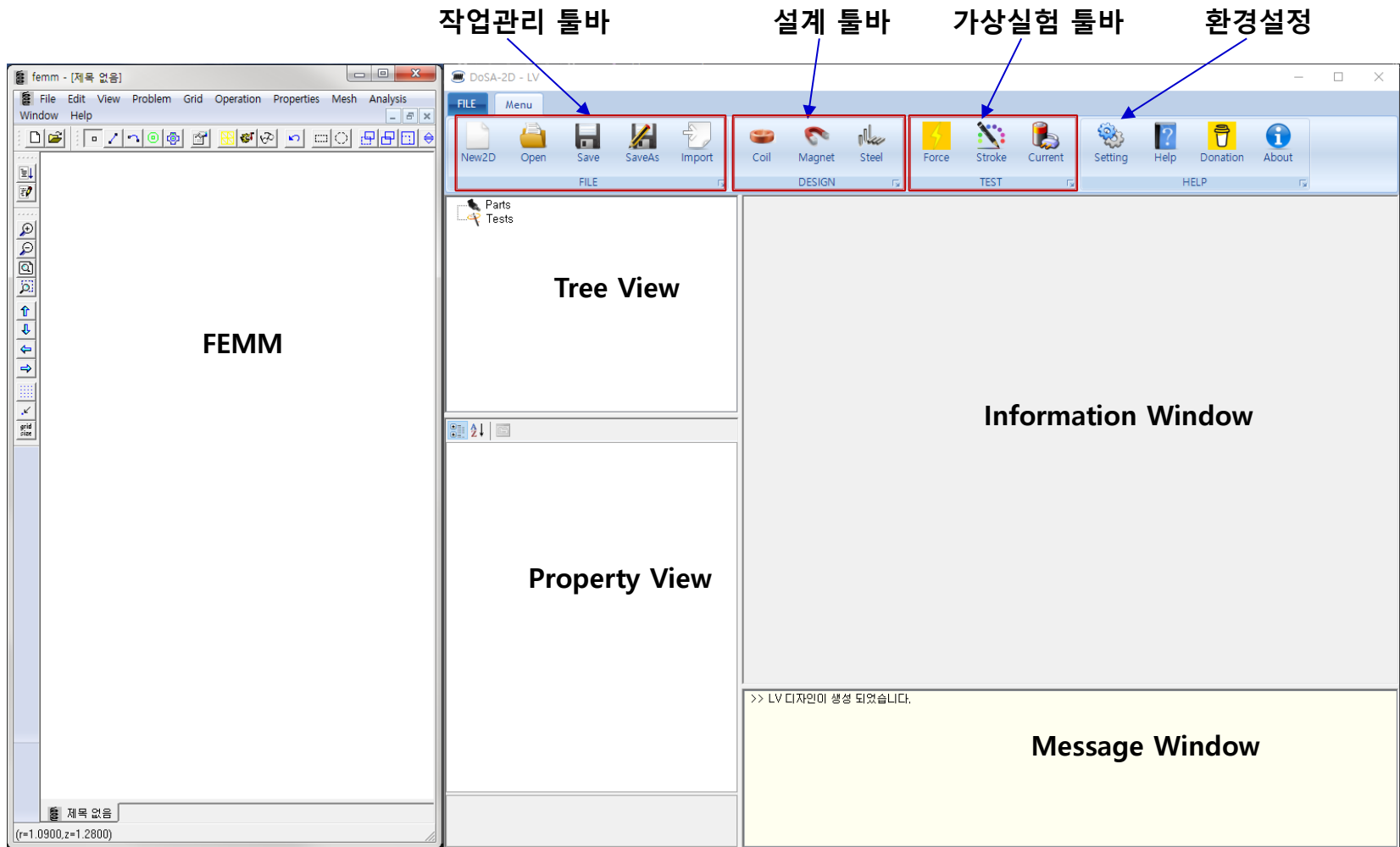
2022-05-06

zgitae@gmail.com



DoSA 구성

프로그램 구성



Toolbar

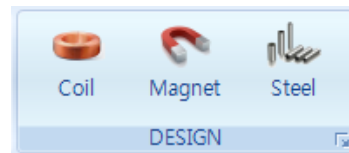
1. 작업관리

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



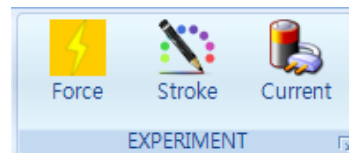
2. 설계

- ✓ 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



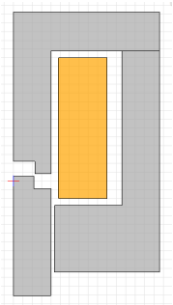
작업 흐름

제품 설계

가상 실험

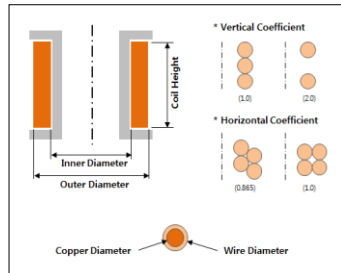
1. 형상설계

Geometry



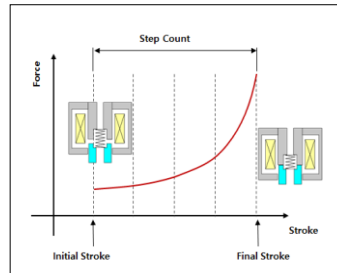
2. 부품설계

Components



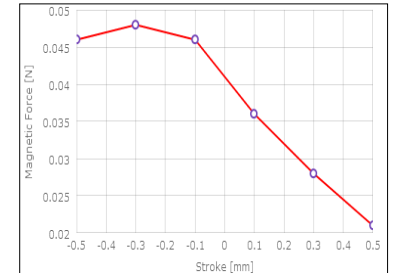
3. 시험조건

Test Condition



4. 가상실험 (자동실행)

Virtual Test



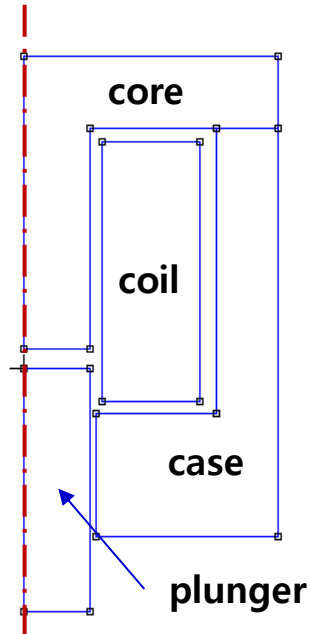
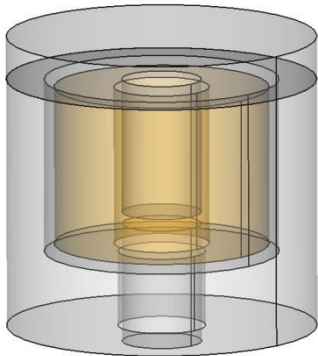
5. 결과확인

Results

해석 모델

해석모델 설명

1. 형상 모델



2. 제품 사양

가. 코일권선

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

나. 전원

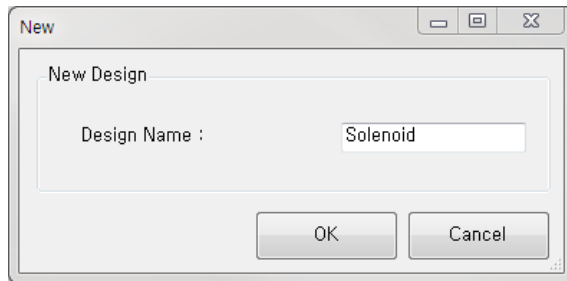
- Voltage : 14.5V

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

Design 생성

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

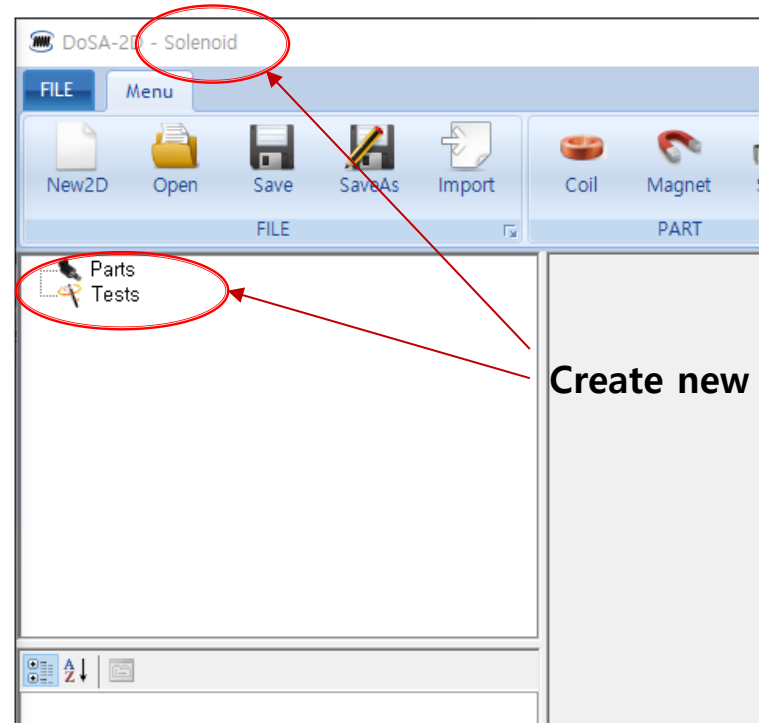
2



1



3



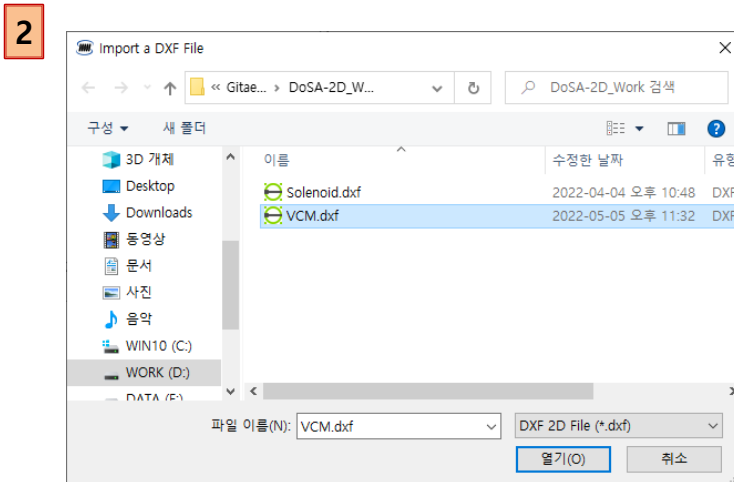
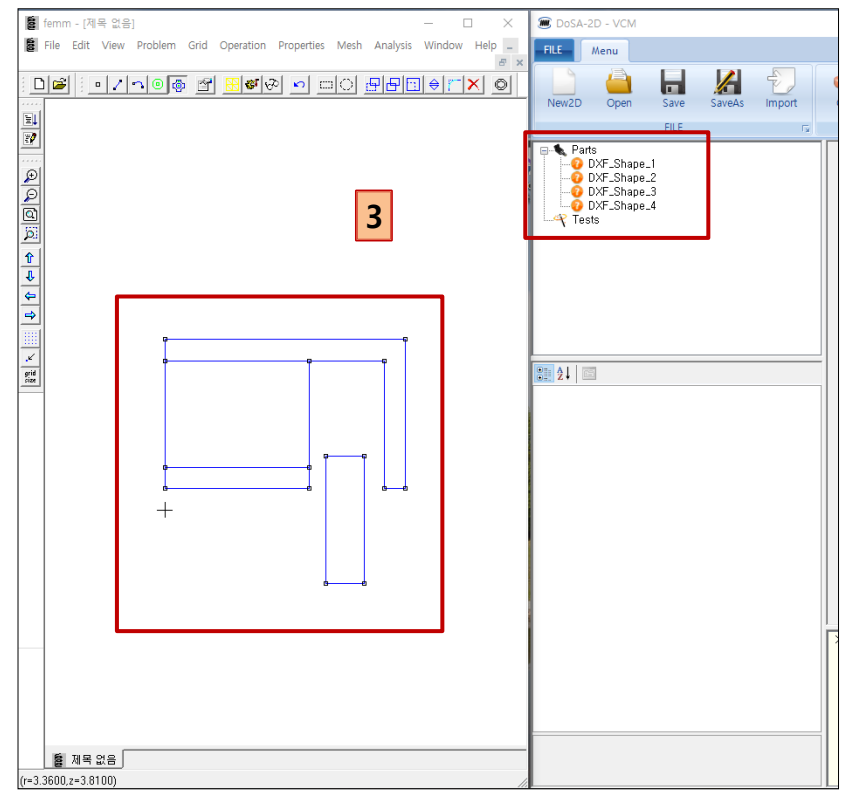
Create new design

형상 Import

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

[형상작업 주의사항]

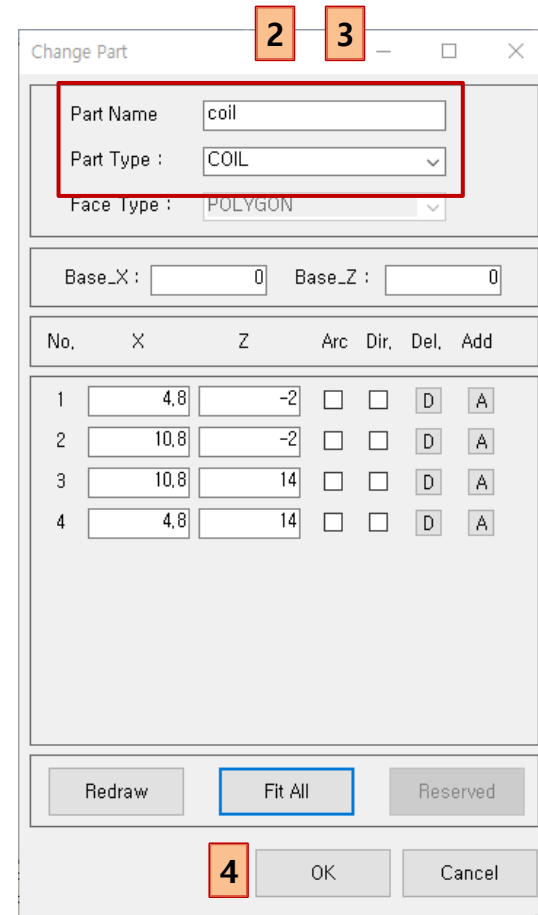
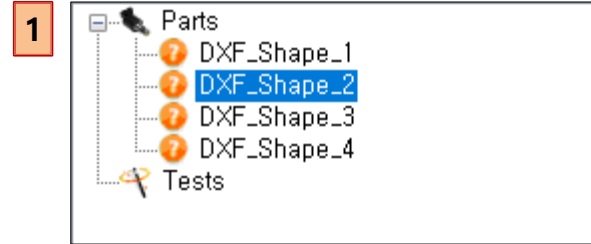
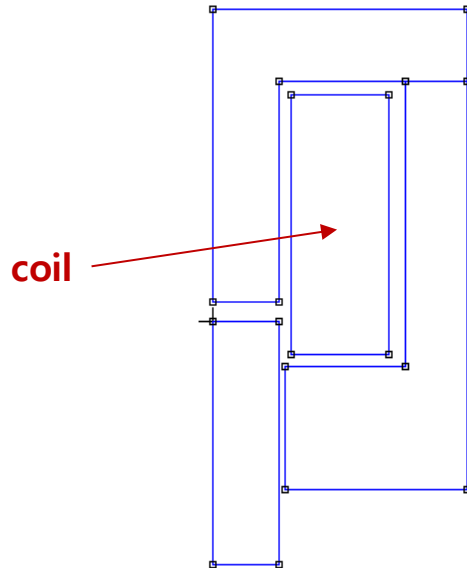
- Part 는 Polyline 으로 작성되어야 함
- "해석 전 형상작업 가이드" 참고 할 것
- https://solenoid.or.kr/data/Drawing_Guide_KOR.pdf



Parts Design

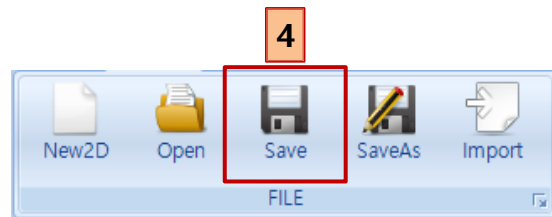
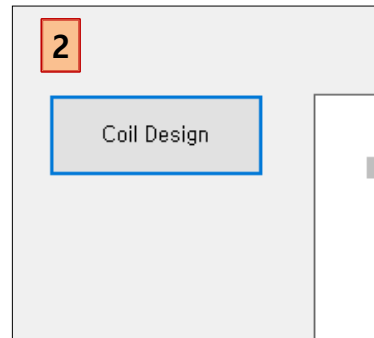
Coil 지정

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

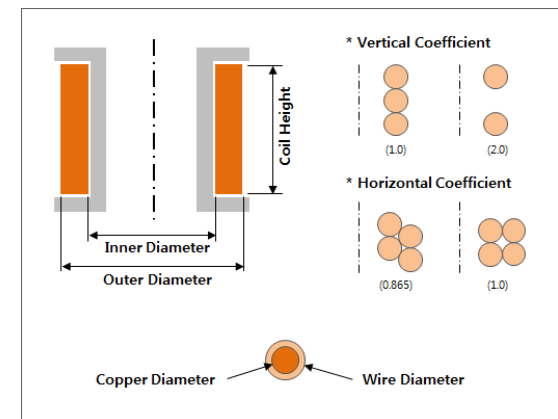


Coil 설계

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

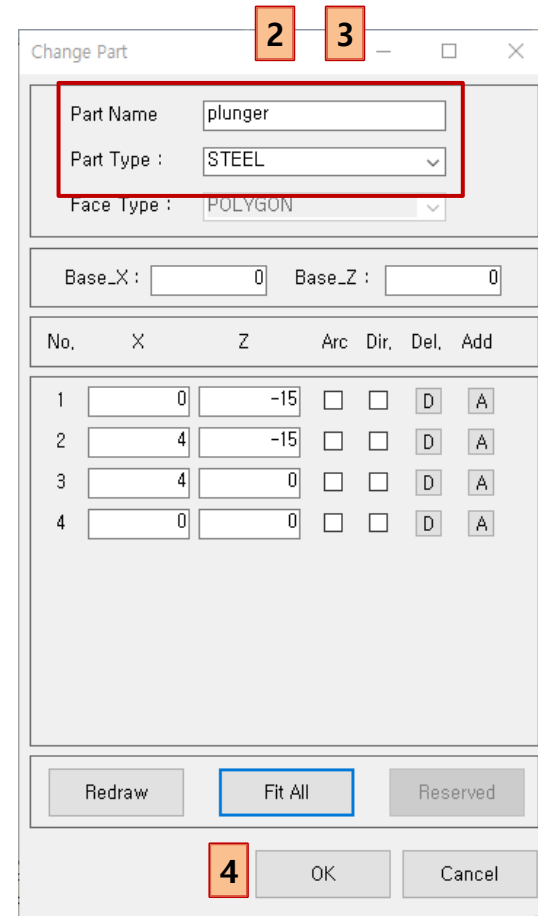
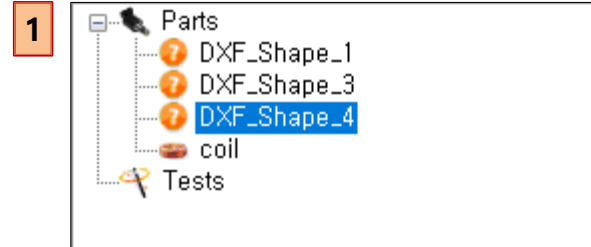
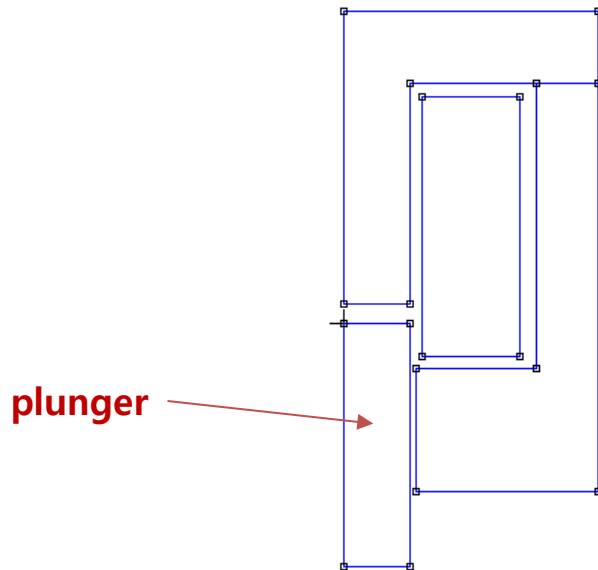


▼ Common Fields	
Node Name	coil
▼ Specification Fields	
Part Material	Copper
Current Direction	IN
Moving Parts	FIXED
▼ Calculated Fields	
Coil Turns	1040
Coil Resistance [Ω]	15.20945
Coil Layers	20
Turns of One Layer	52
▼ Design Fields (optional)	
Coil Wire Grade	Enameled_IEC_Grade_2
Inner Diameter [mm]	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

자기력 계산 파트 선정

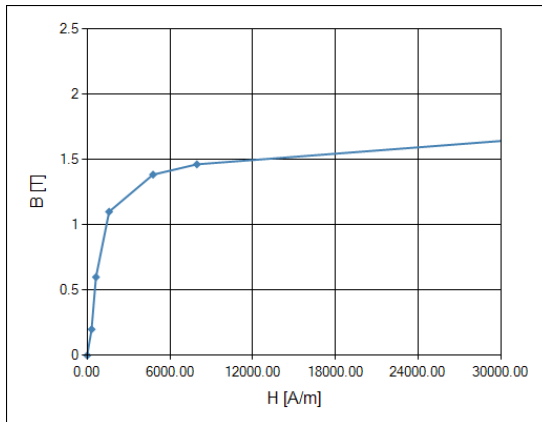
1. Plunger 속성 설정

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

1

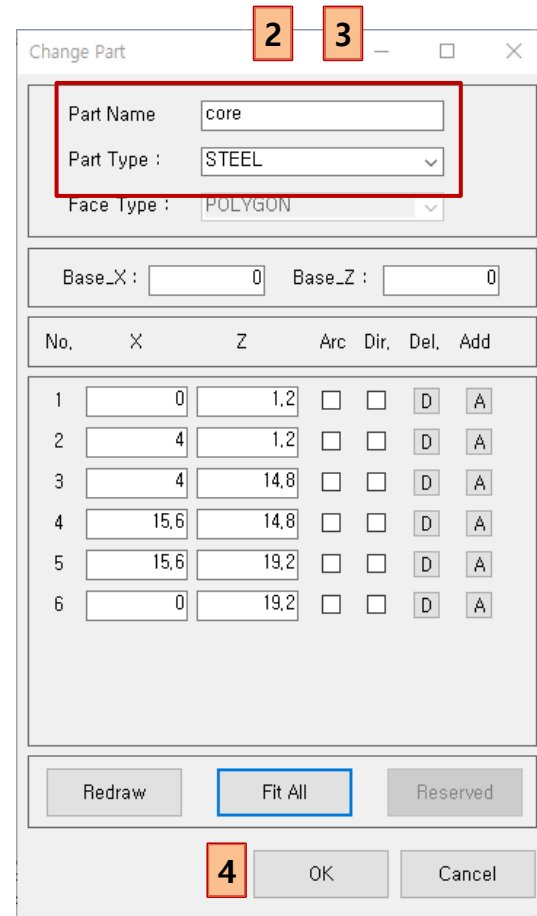
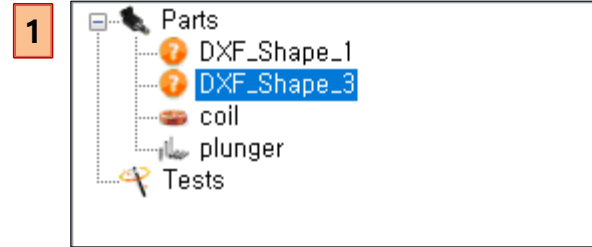
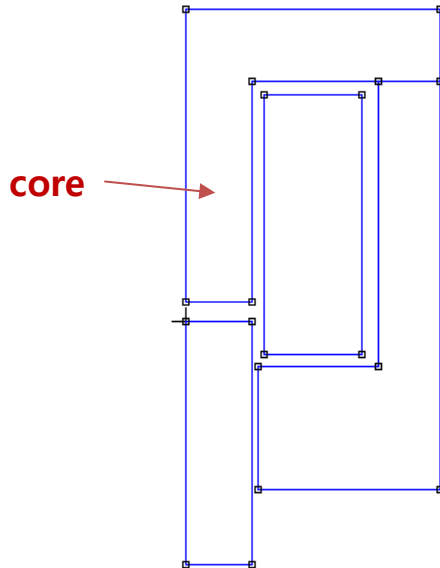
Common Fields	
Node Name	plunger
Specification Fields	
Part Material	430 Stainless Steel
Moving Parts	MOVING

[BH curve]



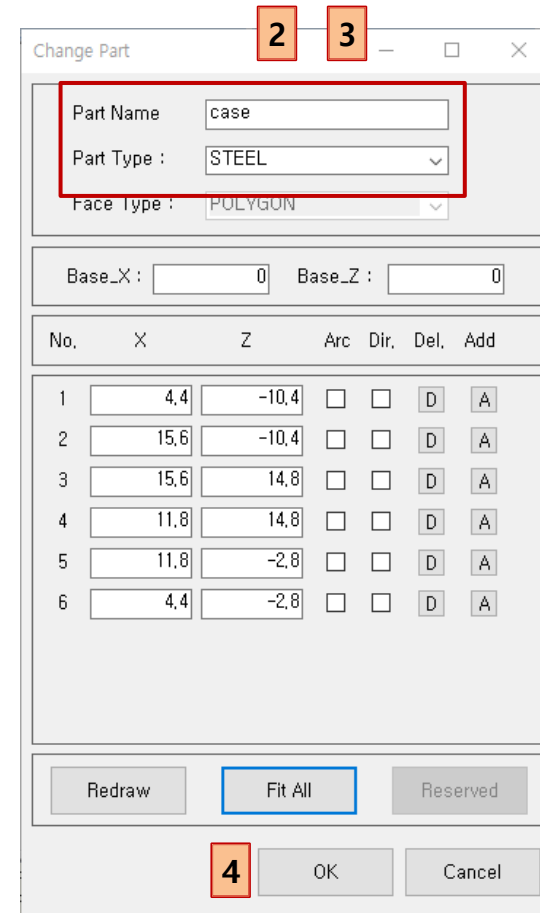
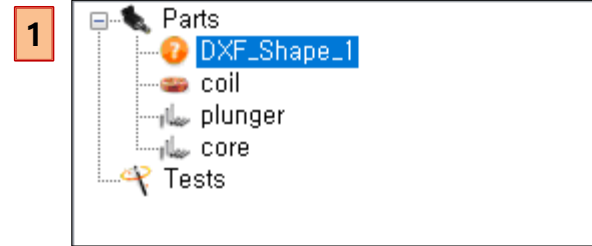
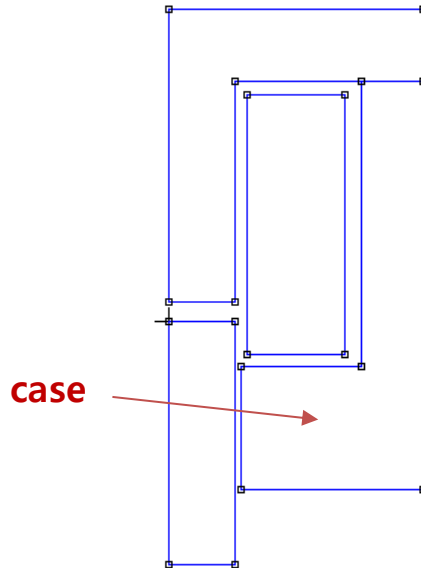
Core 지정

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



Case 지정

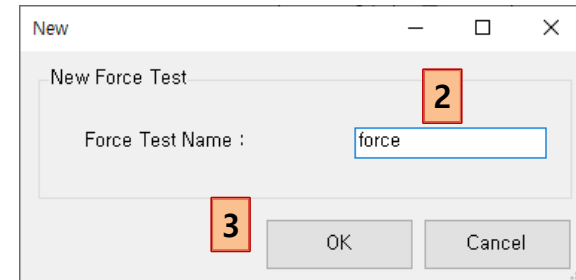
1. Treeview > "DXF_Shape_1" 더블 클릭
2. Name 변경 : "case"
3. 파트 속성 변경 : STEEL
4. OK 버튼 클릭



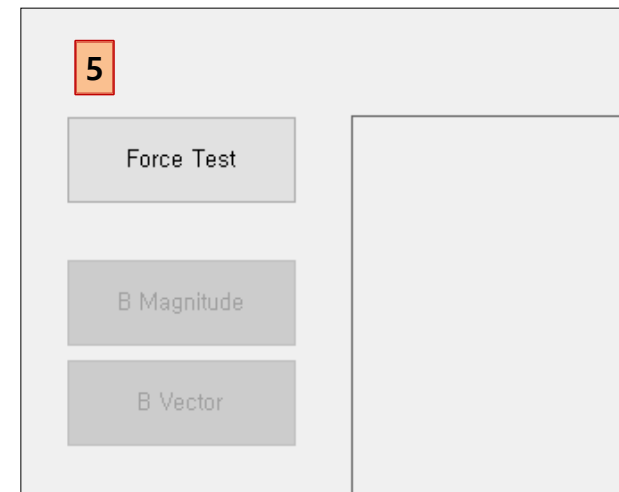
Virtual Test

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

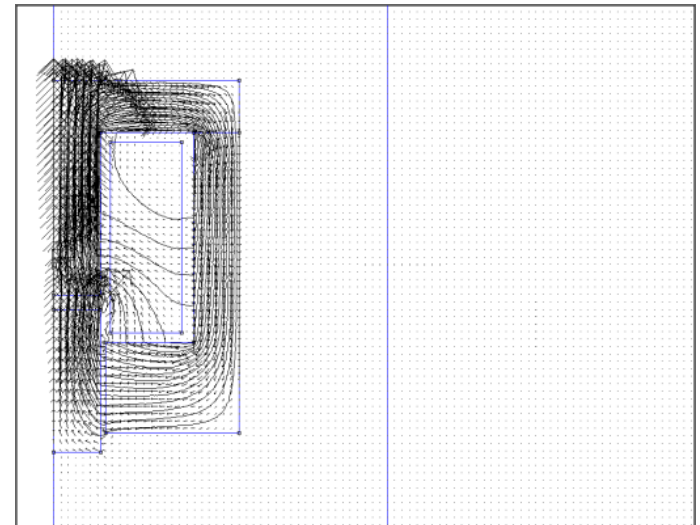
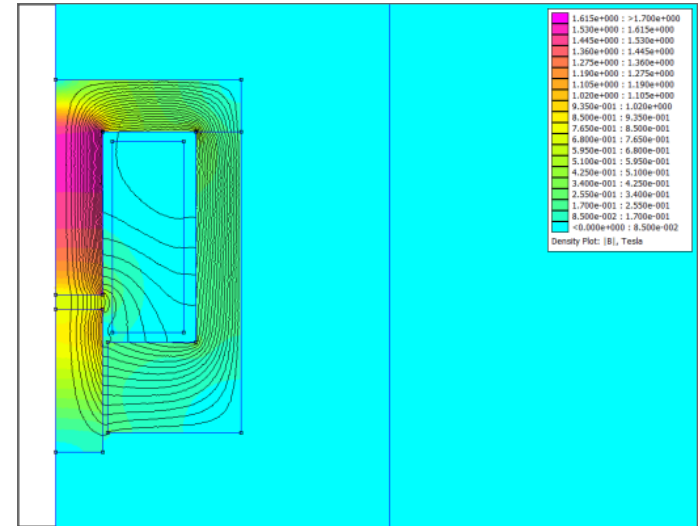
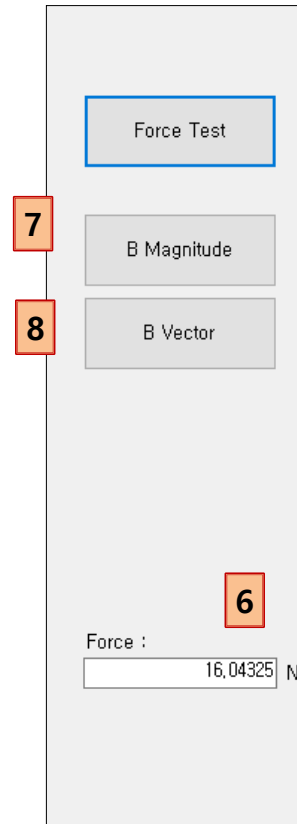
6. 자기력 확인 : 16.04 N

7. 자속밀도 확인

✓ B Magnitude 버튼 클릭

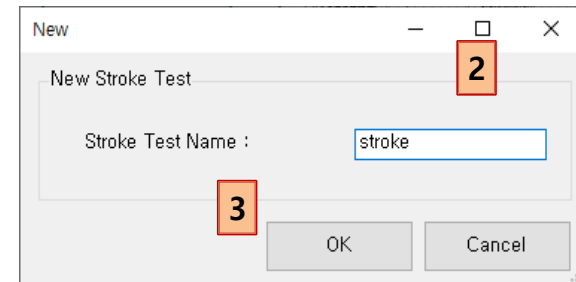
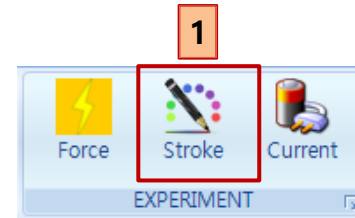
8. 자속밀도 벡터 확인

✓ B Vector 버튼 클릭



변위-자기력 가상실험

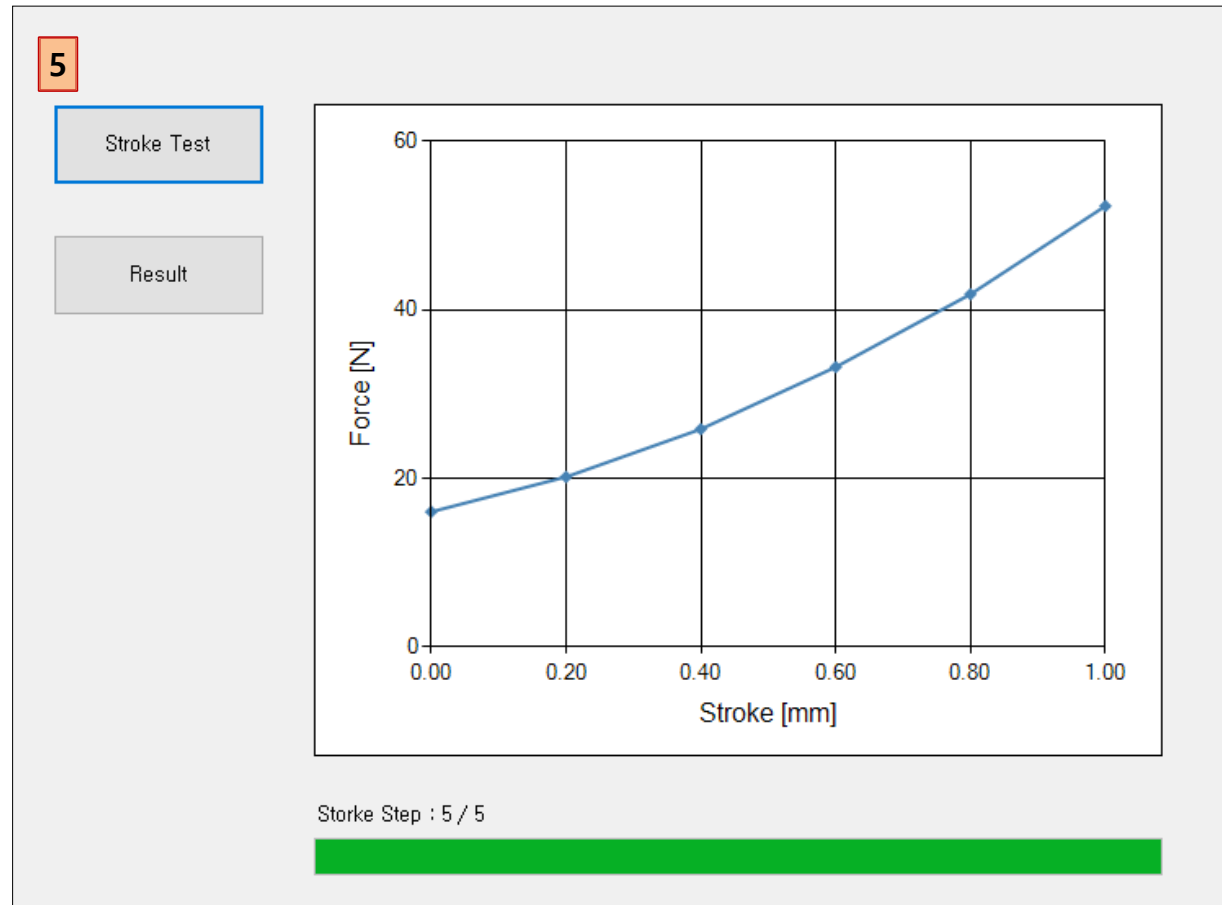
1. Toolbar > Stroke 버튼 클릭
2. Test Name 입력 : "stroke"
3. OK 버튼 클릭
4. 자기력-전류 가상실험 설정
 - ✓ Voltage : 14.5
 - ✓ Initial Stroke : 0.0
 - ✓ Final Stroke : 1.0
 - ✓ Step Count : 5



▼ 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

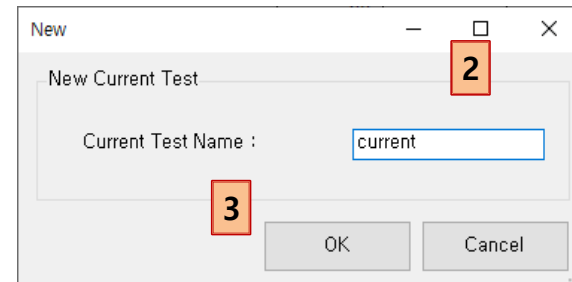
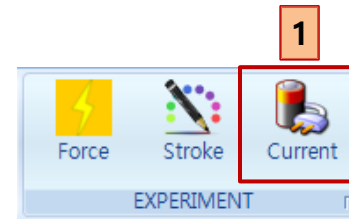
변위-자기력 가상실험 결과

5. Stroke Test 버튼 클릭



전류-자기력 가상실험

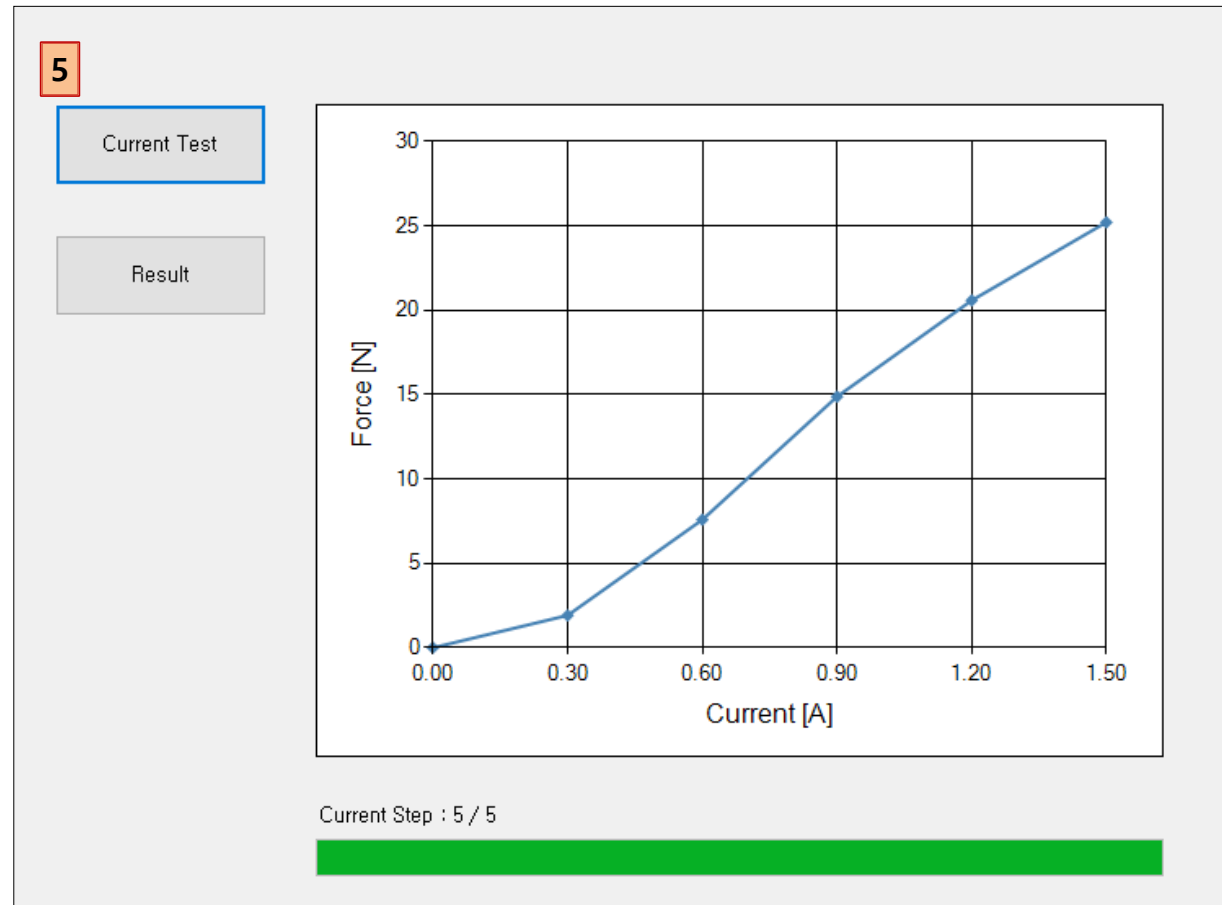
1. Toolbar > Current 버튼 클릭
2. Test Name 입력 : "current"
3. OK 버튼 클릭
4. 자기력-전류 가상실험 설정
 - ✓ Initial Current : 0.0
 - ✓ Final Current : 1.5
 - ✓ Step Count : 5



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

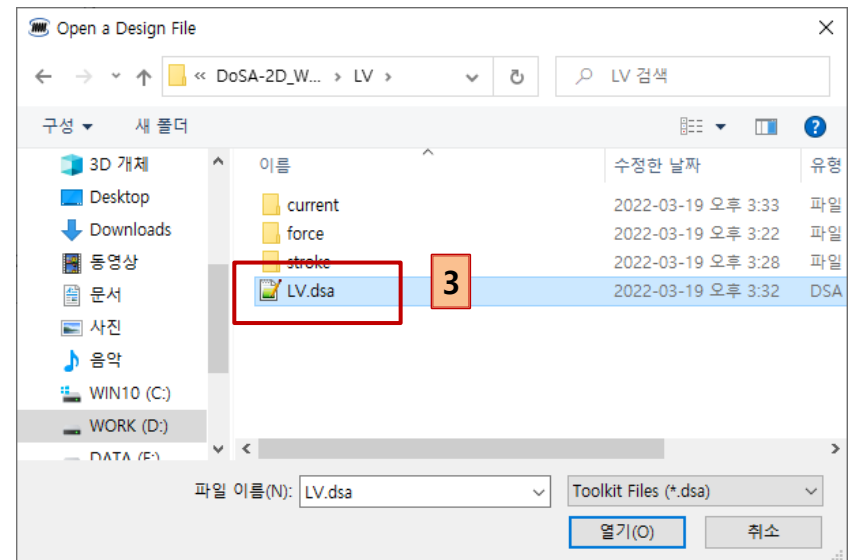
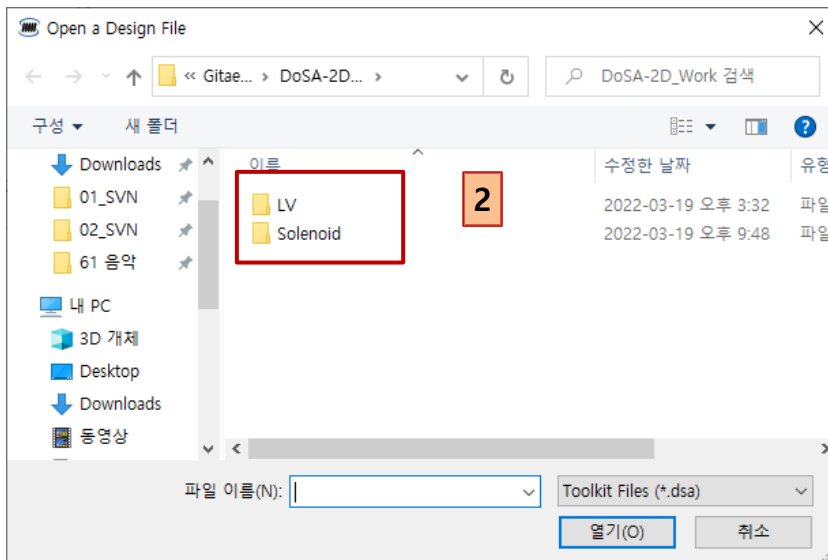
5. Current Test 버튼 클릭



Tips

Design 열기

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



Thank You

Email : zgitae@gmail.com