

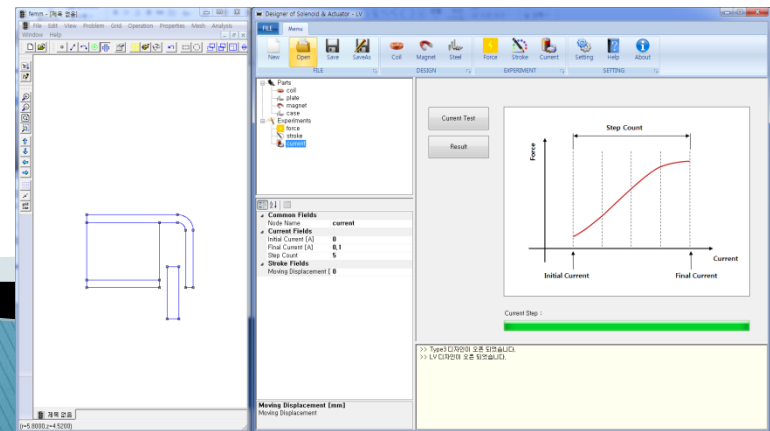
DoSA-2D 사용 메뉴얼

Voice Coil Motor Example

(Speaker, Auto-Focus, Linear Vibrator)

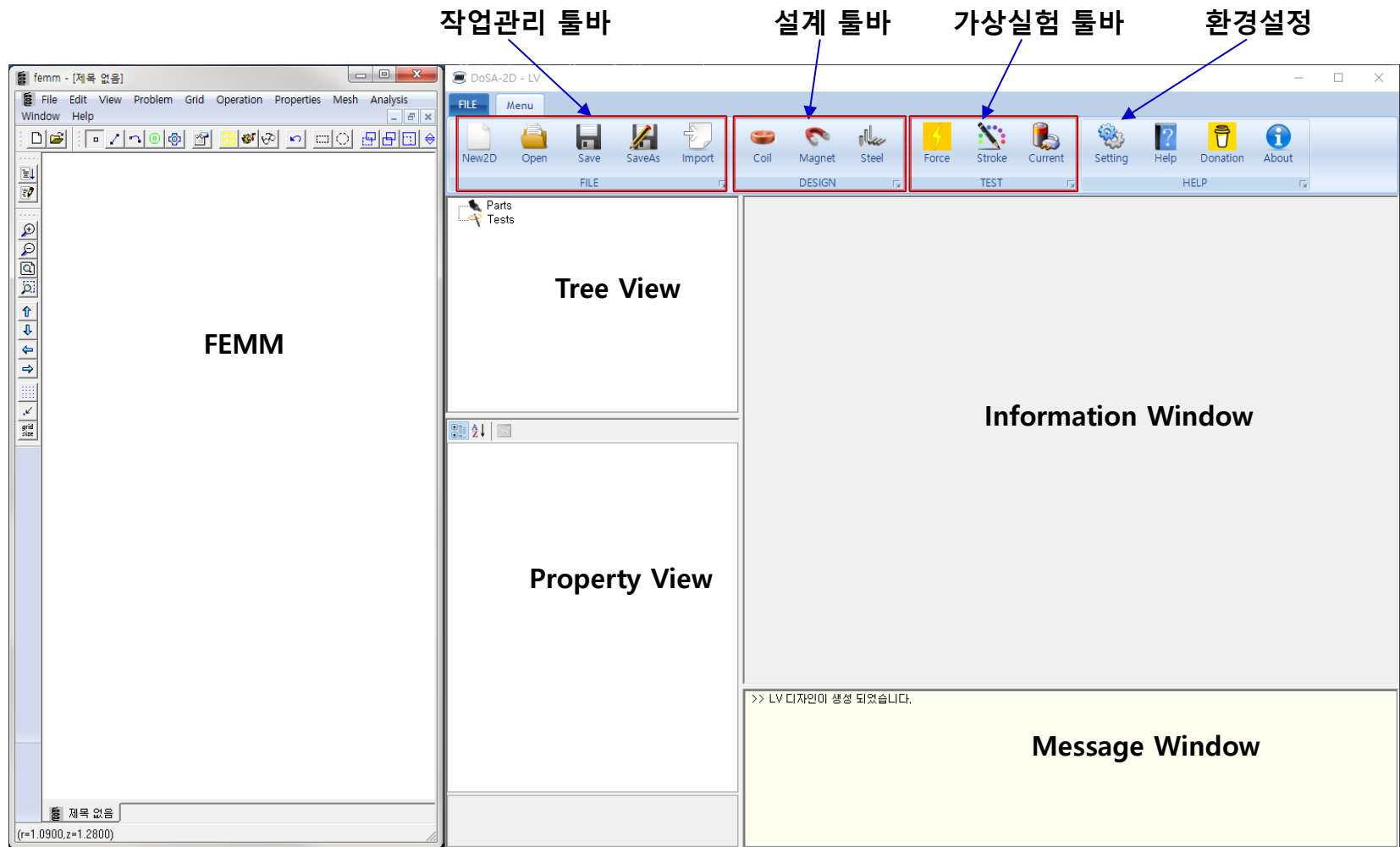
2022-05-06

zgitae@gmail.com



DoSA 구성

프로그램 구성



Toolbar

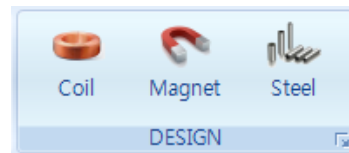
1. 작업관리

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



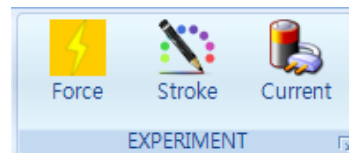
2. 설계

- ✓ 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



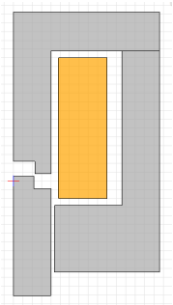
작업 흐름

제품 설계

가상 실험

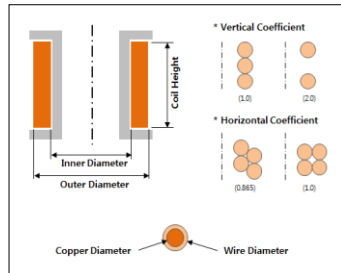
1. 형상설계

Geometry



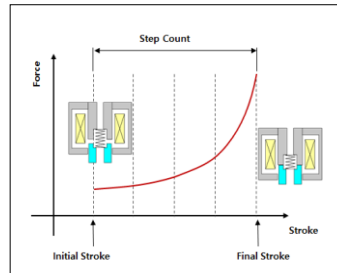
2. 부품설계

Components



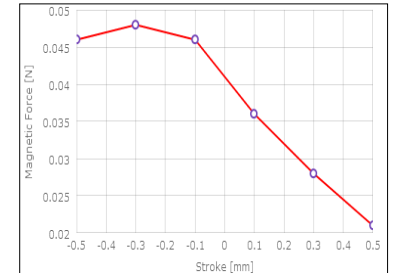
3. 시험조건

Test Condition



4. 가상실험 (자동실행)

Virtual Test



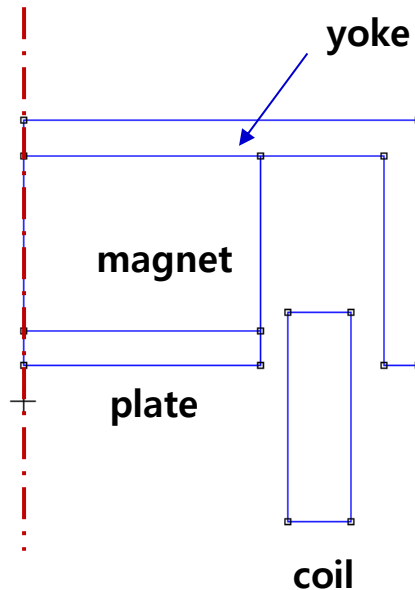
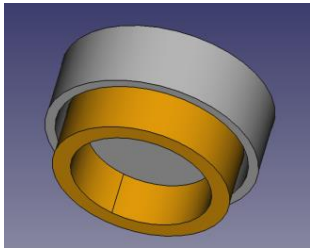
5. 결과확인

Results

해석 모델

해석모델 설명

1. 형상 모델



2. 제품 사양

가. 코일권선

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

나. 영구자석

- Material : N52 (NdFeB 52)
- 착자방향 : 90 (UP)

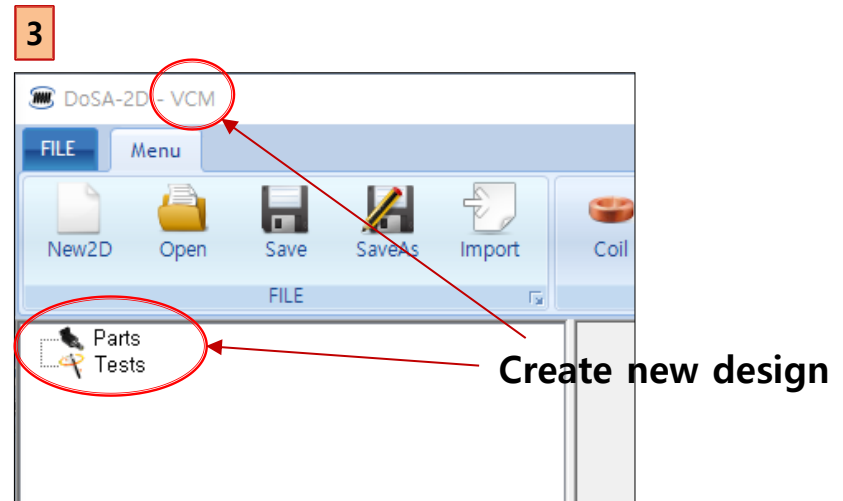
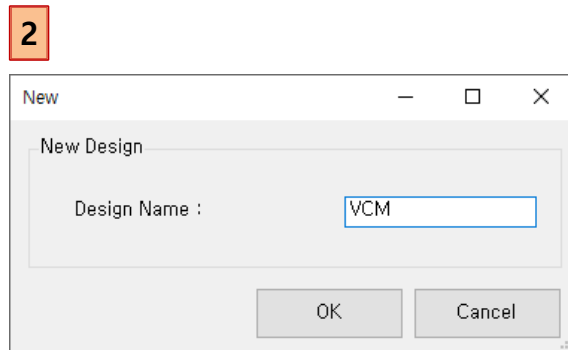
다. 전원

- Voltage : 2.5V

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

Design 생성

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

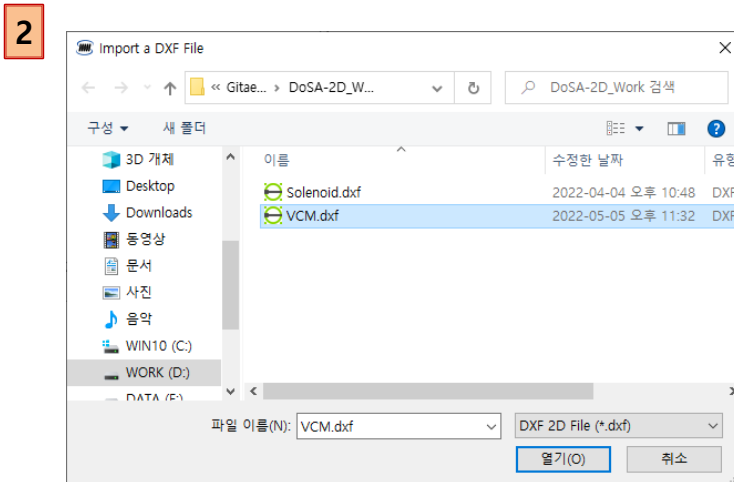
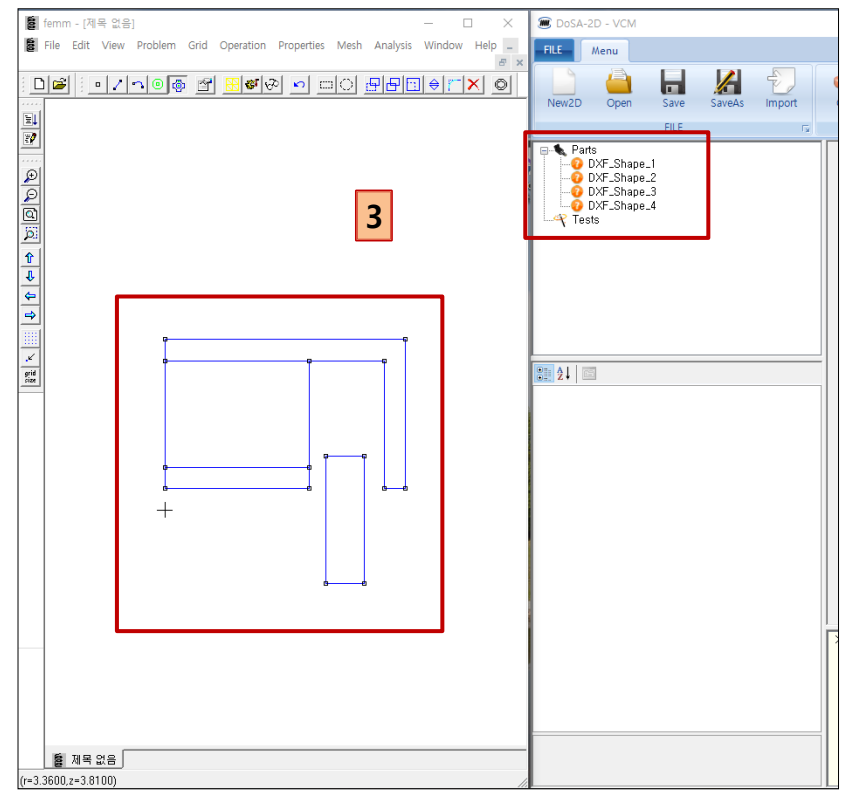


형상 Import

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

[형상작업 주의사항]

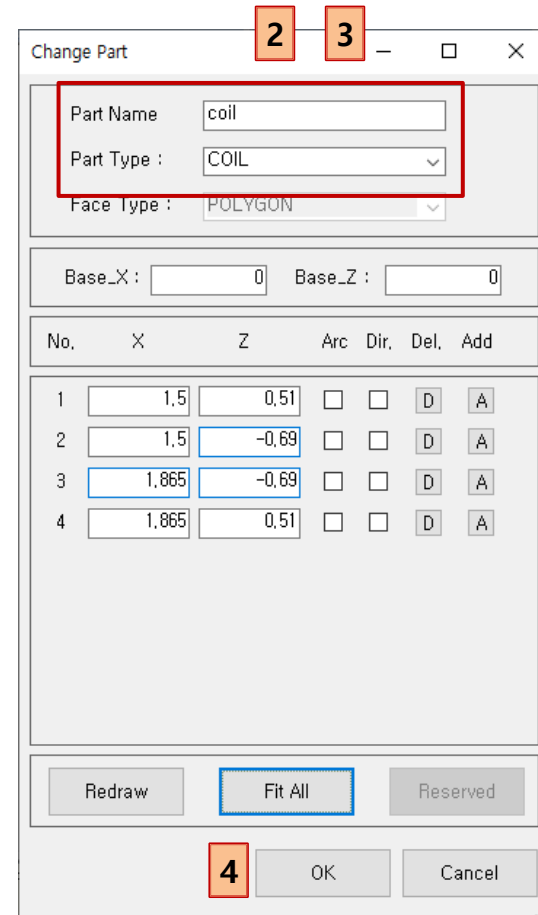
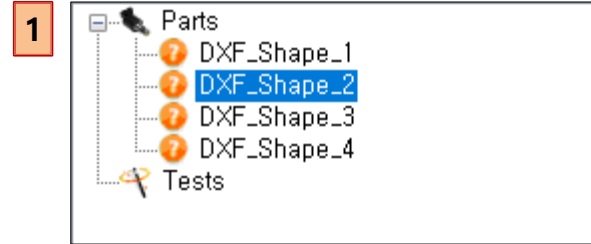
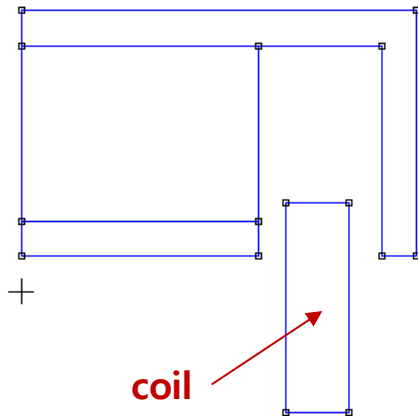
- Part 는 Polyline 으로 작성되어야 함
- "해석 전 형상작업 가이드" 참고 할 것
- https://solenoid.or.kr/data/Drawing_Guide_KOR.pdf



Part 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

자기력 계산 파트 선정

1. Coil 기구사양 입력

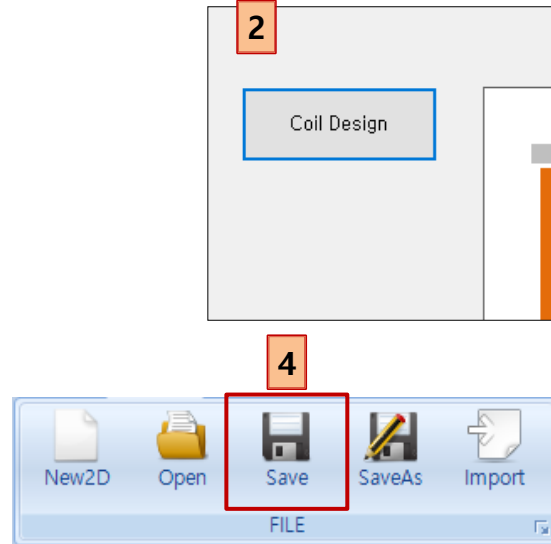
- ✓ Moving Parts : **MOVING**
- ✓ Coil Wire Grade : Bonded_IEC_Grade_1B 선택
- ✓ Copper Diameter : 0.045 입력
- ✓ Horizontal Coefficient : 0.95 입력
- ✓ Vertical Coefficient : 1.13 입력
- ✓ Resistance Coefficient : 1.1 입력

2. Coil 사양 계산

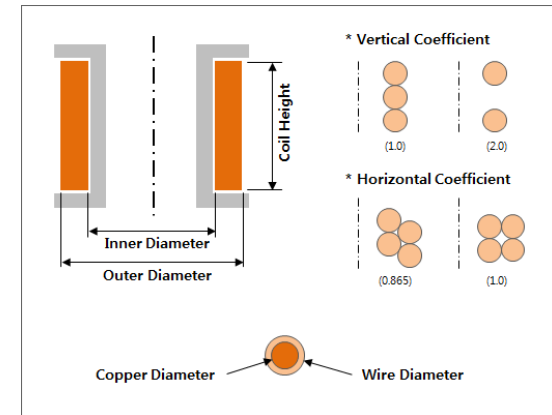
- ✓ Design Coil 버튼 클릭

3. Coil 사양 확인

4. 리본바 > Save

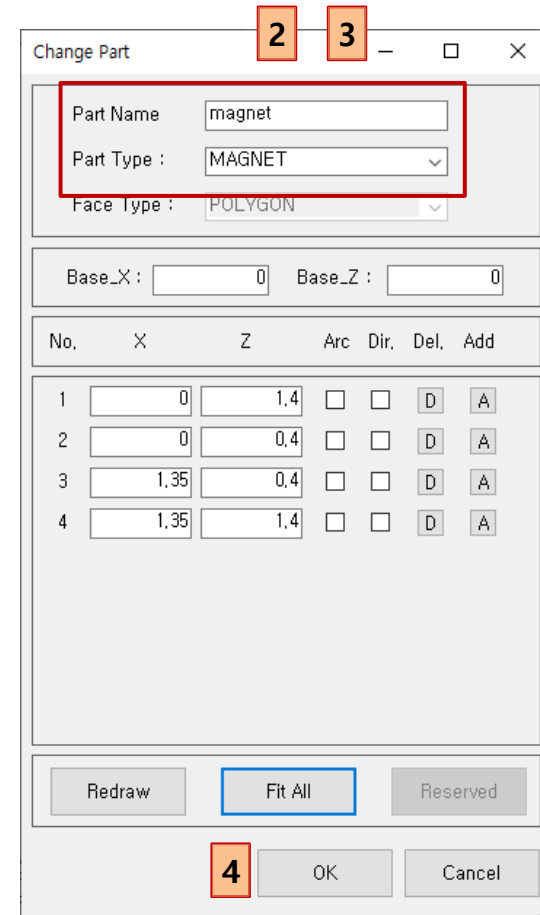
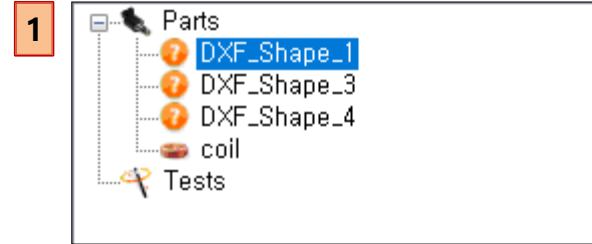
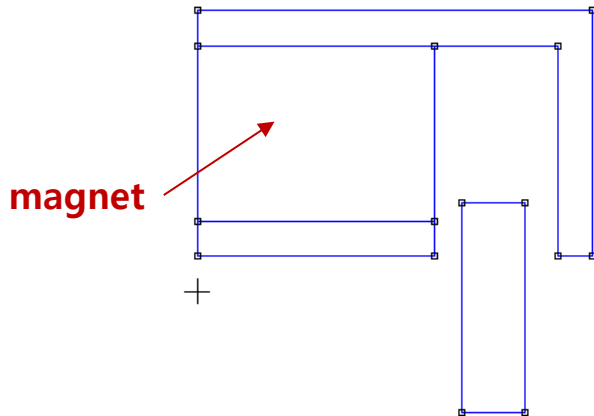


Common Fields	
Node Name	coil
Specification Fields	
Part Material	Copper
Current Direction	IN
Moving Parts	MOVING
Calculated Fields	
Coil Turns	126
Coil Resistance [Ω]	15.74769
Coil Layers	6
Turns of One Layer	21
Design Fields (optional)	
Coil Wire Grade	Bonded_IEC_Grade_1B
Inner Diameter [mm]	3
Outer Diameter [mm]	3.73
Coil Height [mm]	1.2
Copper Diameter [mm]	0.045
Wire Diameter [mm]	0.04953
Coil Temperature [°C]	20
Horizontal Coefficient	0.95
Vertical Coefficient	1.13
Resistance Coefficient	1.1



Magnet 지정

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



Magnet 설정

1. Magnet 속성 설정

- ✓ Part Material : N52
- ✓ Direction : UP

▼ Common Fields	
Node Name	magnet
▼ Specification Fields	
Part Material	N52
Direction	UP
Moving Parts	FIXED

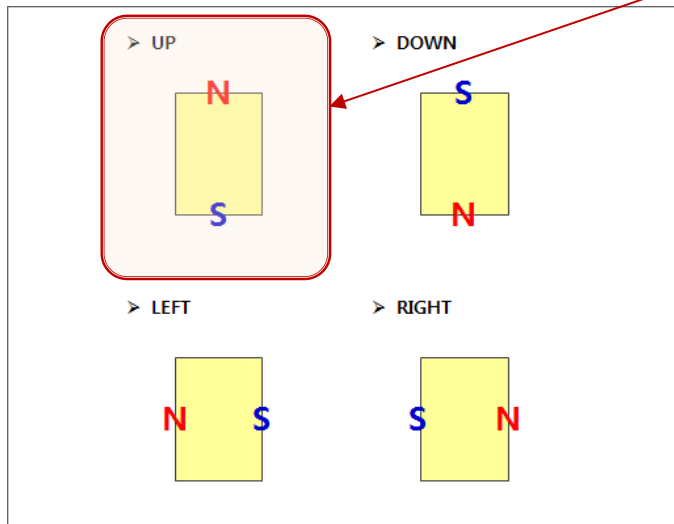
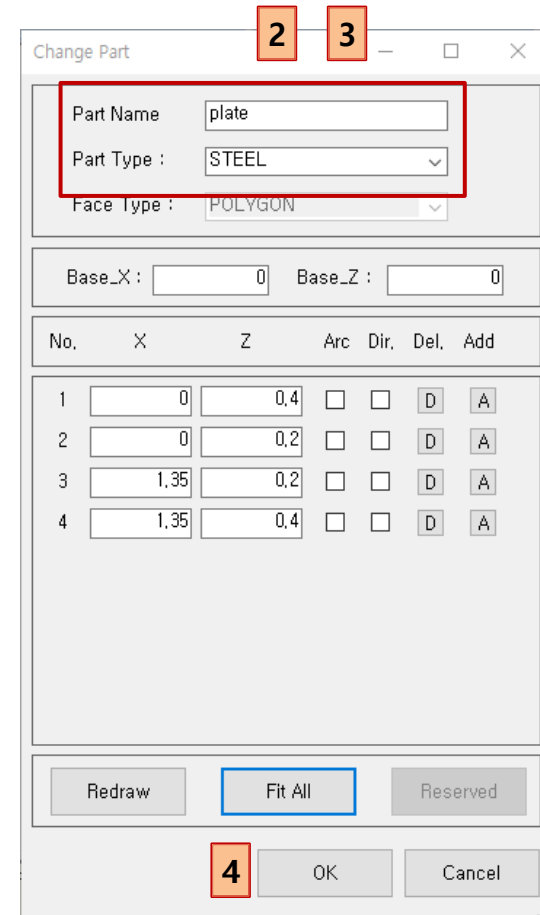
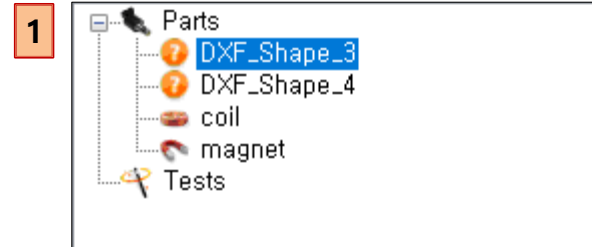
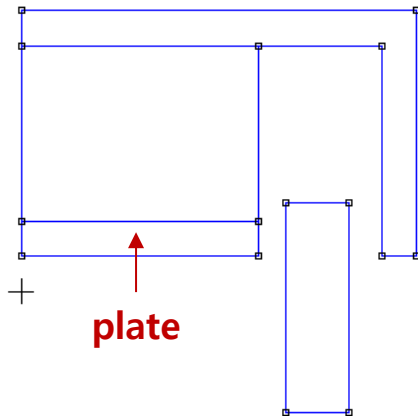


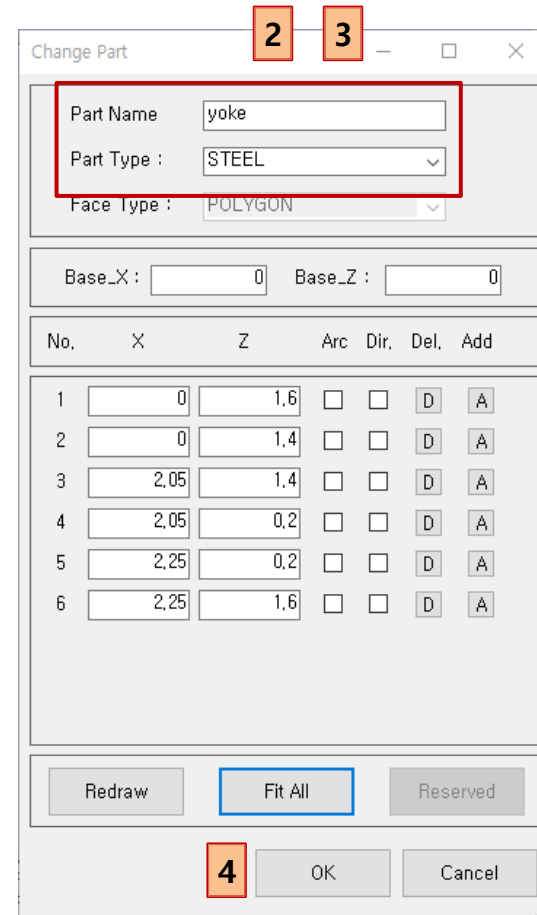
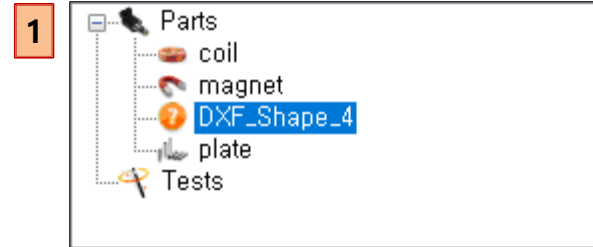
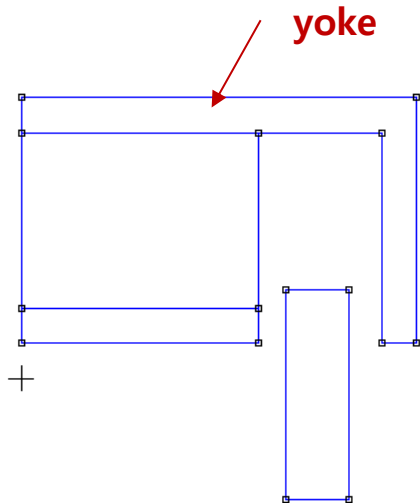
Plate 지정

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



Yoke 지정

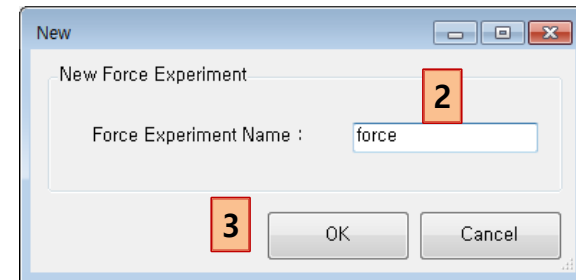
1. Treeview > "DXF_Shape_4" 더블 클릭
2. Name 변경 : "yoke"
3. 파트 속성 변경 : STEEL
4. OK 버튼 클릭



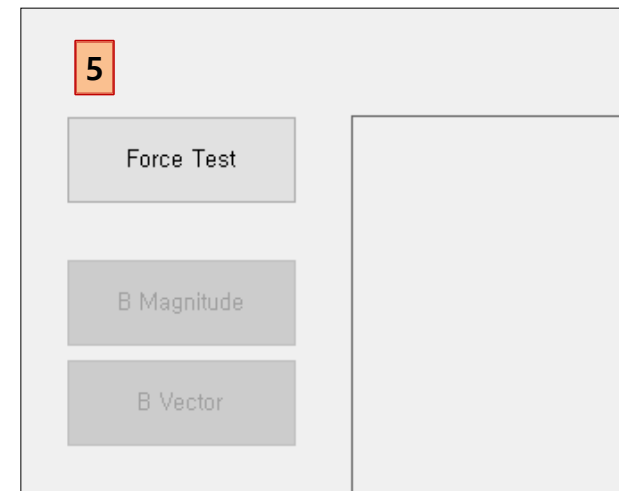
Virtual Test

자기력 가상실험

1. Toolbar > Force 버튼 클릭
2. Test Name 입력 : "force"
3. OK 버튼 클릭
4. 자기력 가상실험 설정
 - ✓ Voltage : 2.5
5. 자기력 가상실험 실행



▼ Common Fields	
Node Name	force
▼ Current Fields	
Voltage [V]	2.5
Max. Current [A]	0.16669
▼ Stroke Fields	
Moving Stroke [mm]	0
▼ Condition Fields	
Mesh Size [%]	2



자기력 가상실험 결과

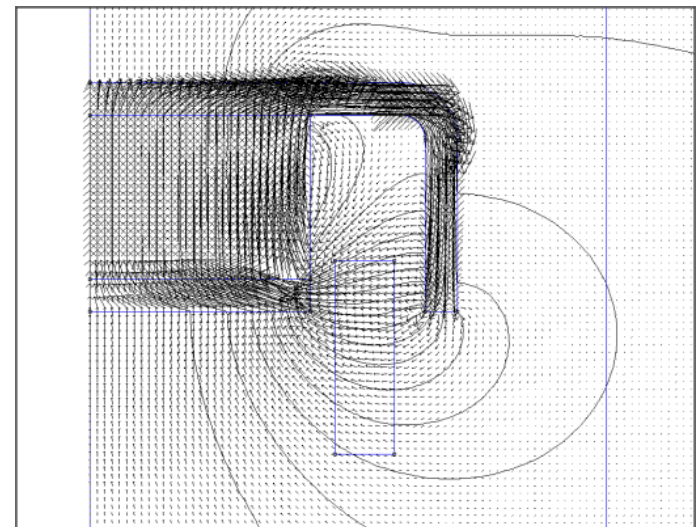
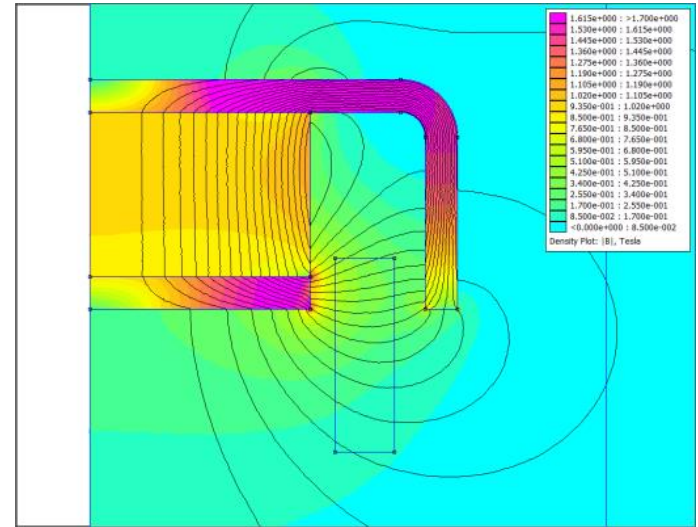
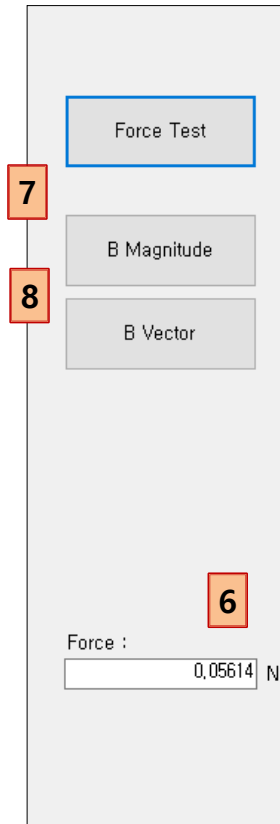
6. 자기력 확인 : 0.05614 N

7. 자속밀도 확인

✓ B Magnitude 버튼 클릭

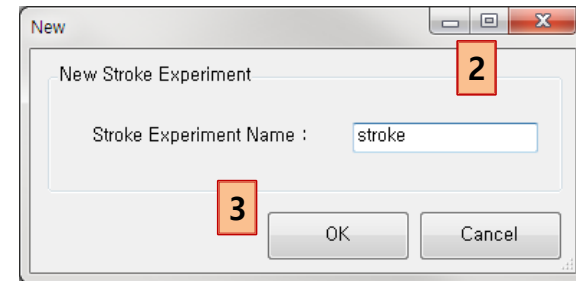
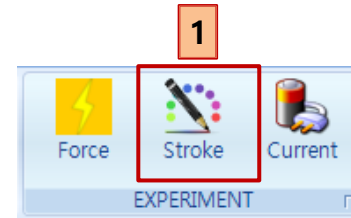
8. 자속밀도 벡터 확인

✓ 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 : 2.5
 - ✓ Initial Stroke : -0.5
 - ✓ Final Stroke : 0.5
 - ✓ Step Count : 5

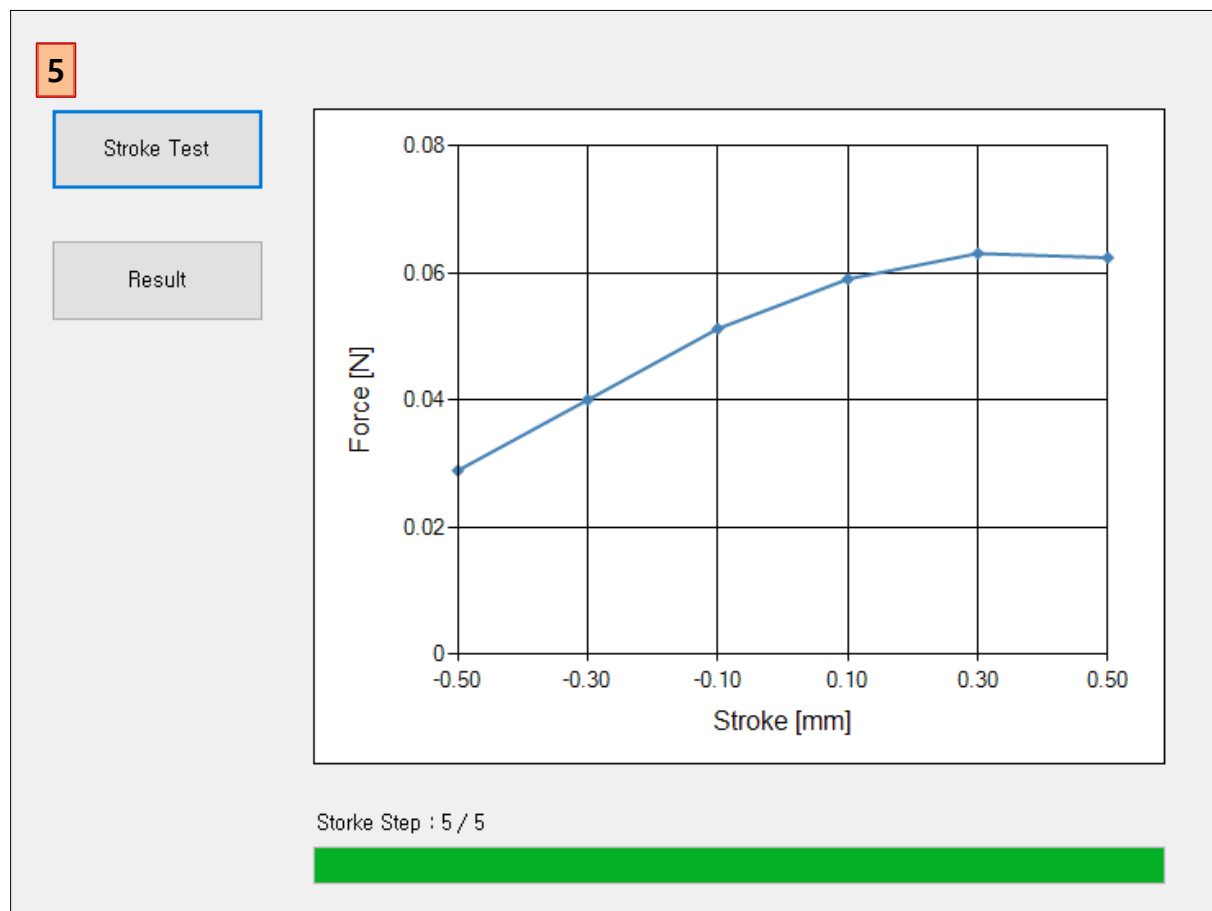


A screenshot of a table showing experimental parameters. The table has two columns: the parameter name and its value. The 'Stroke Fields' section is highlighted with a red rectangular box, and the number '4' is in a small orange box to the left of the box.

▼ Common Fields	
Node Name	stroke
▼ Current 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
▼ Condition Fields	
Mesh Size [%]	2

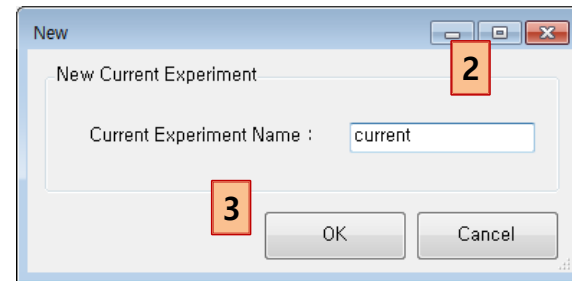
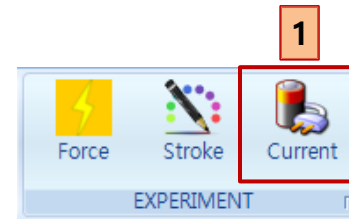
변위-자기력 가상실험 결과

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 : 0.1
 - ✓ Step Count : 5

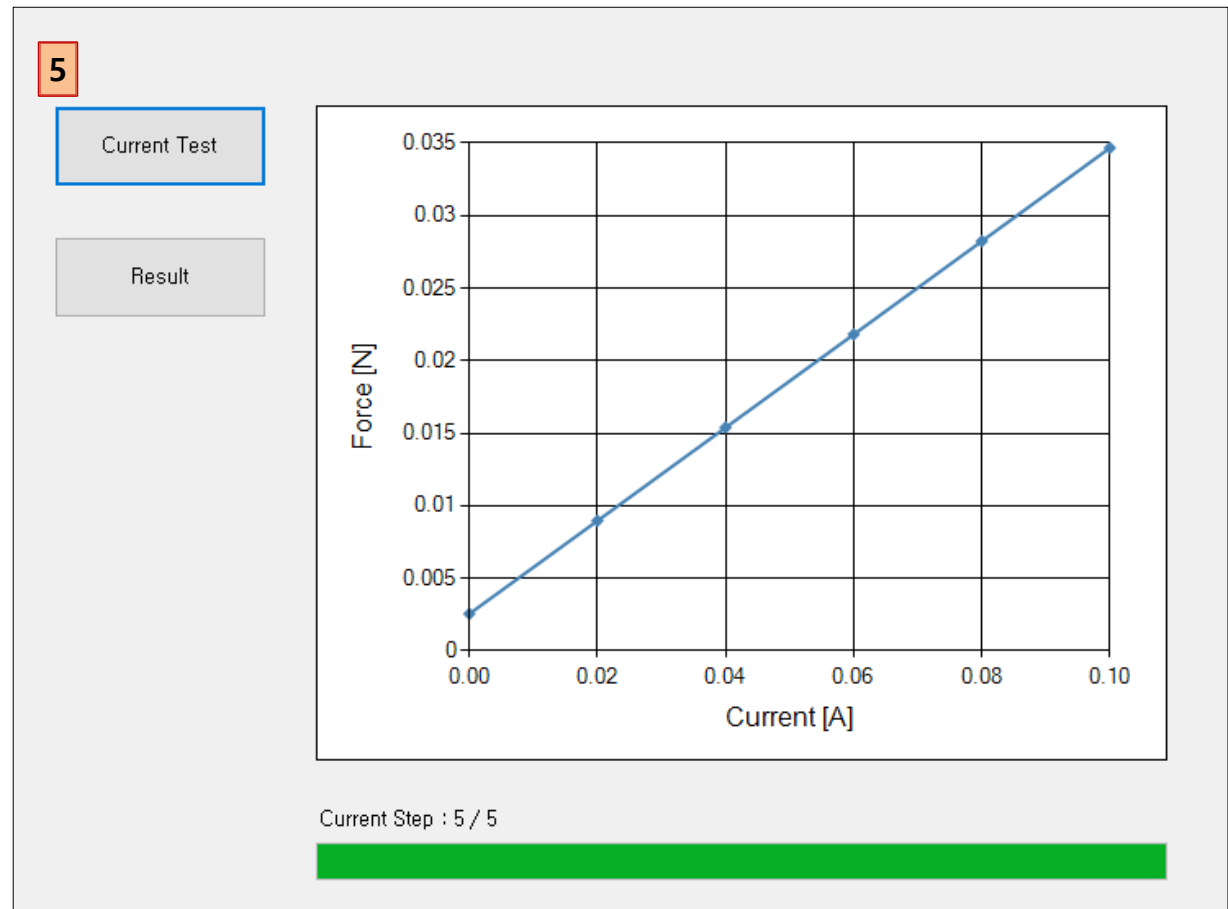


4

▼ 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
▼ Condition Fields	
Mesh Size [%]	2

전류-자기력 가상실험 결과

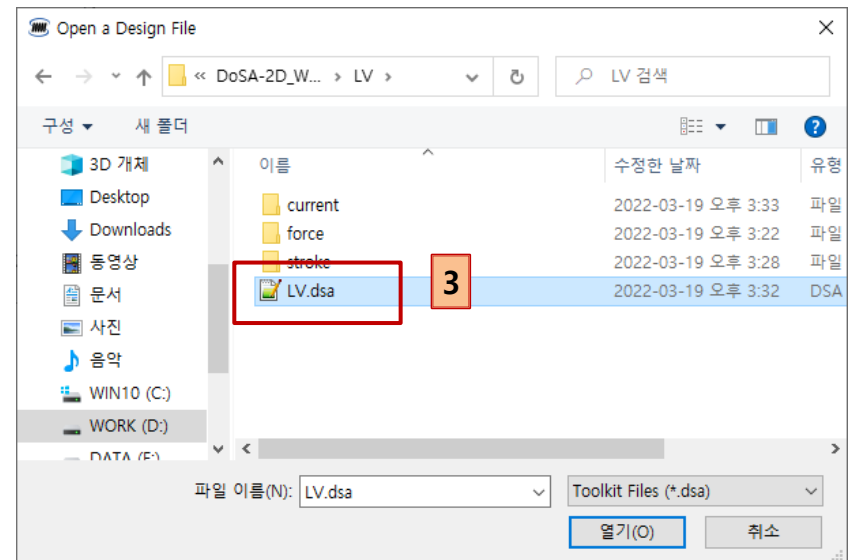
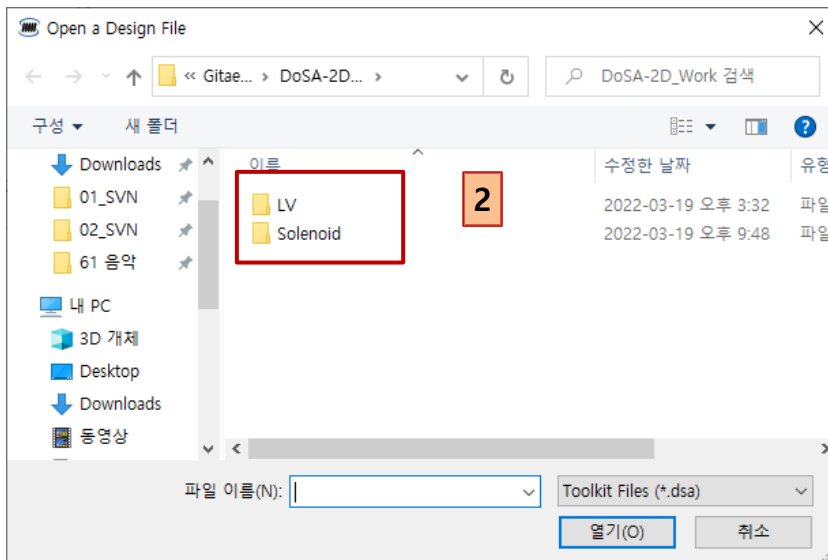
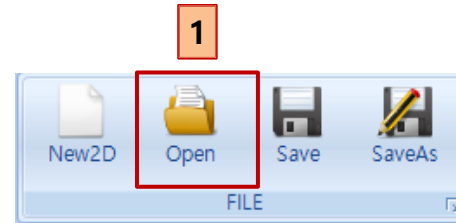
5. Current Test 버튼 클릭



Tips

Design 열기

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



감사합니다

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