

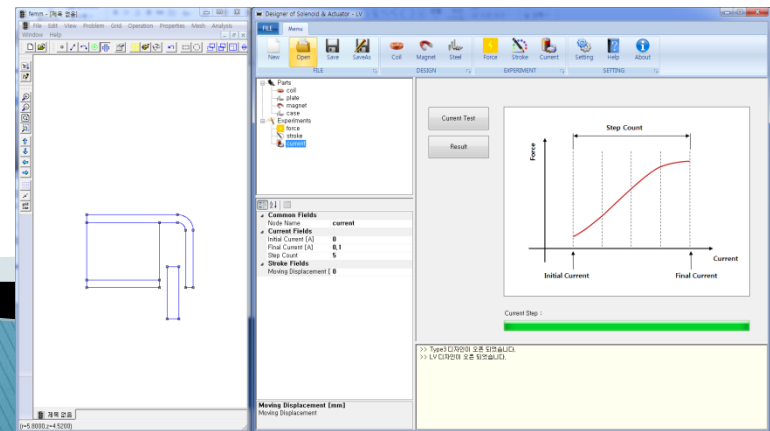
# DoSA-2D 사용 메뉴얼

## Voice Coil Motor Example

( Speaker, Auto-Focus, Linear Vibrator )

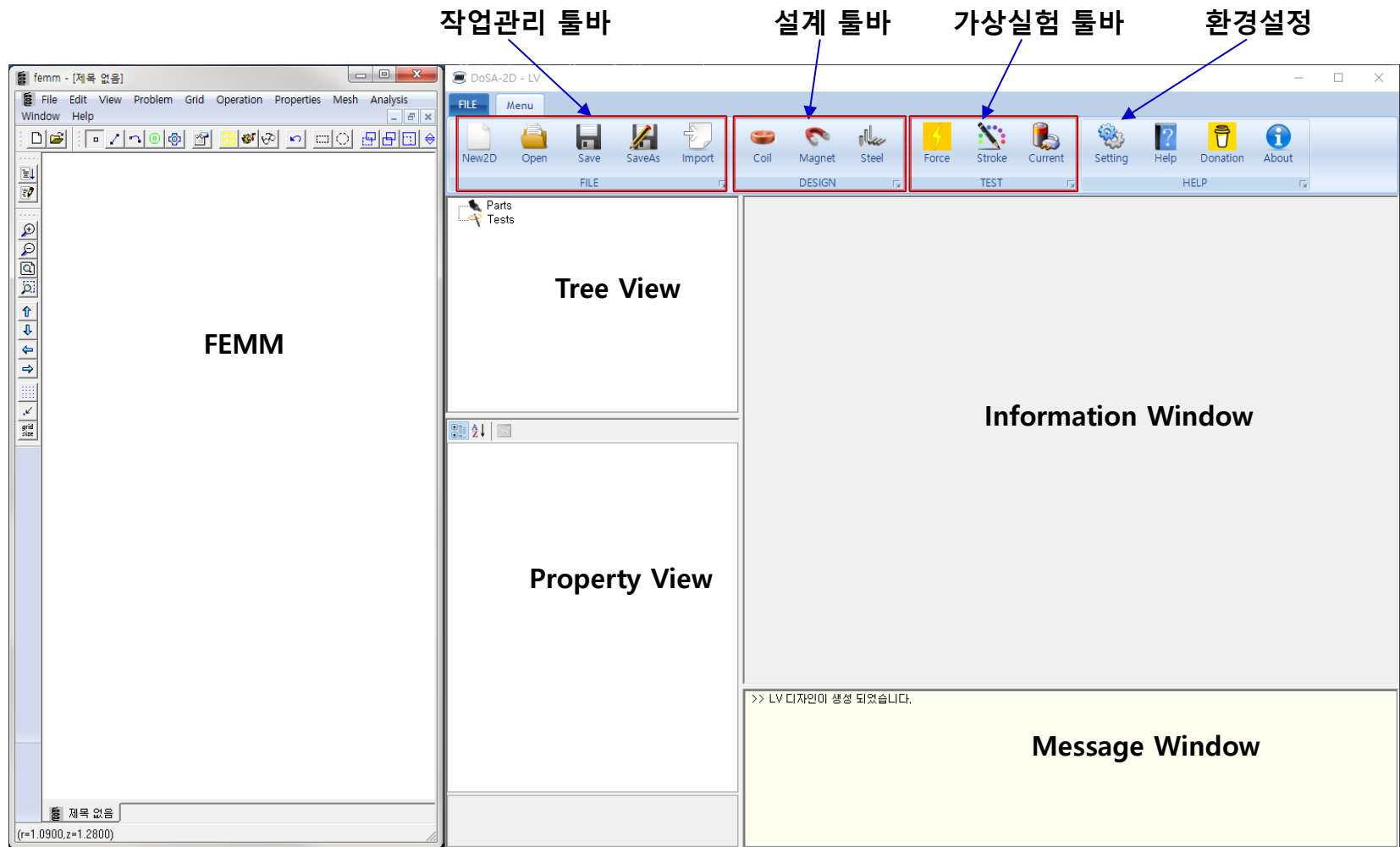
2022-05-06

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# DoSA 구성

# 프로그램 구성



# Toolbar

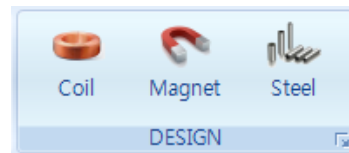
## 1. 작업관리

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



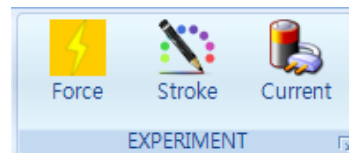
## 2. 설계

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



## 3. 가상실험

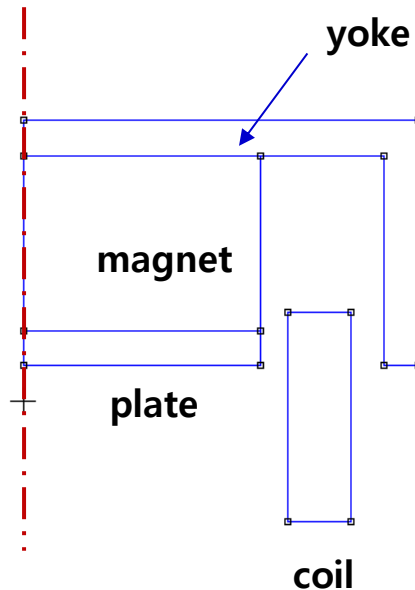
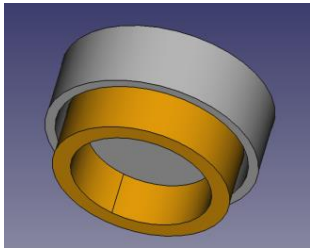
- ✓ Force : 자기력 예측
- ✓ Stroke : 변위별 자기력 예측
- ✓ Current : 전류별 자기력 예측



# 해석 모델

# 해석모델 설명

## 1. 형상 모델



## 2. 제품 사양

### 가. 코일권선

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

### 나. 영구자석

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

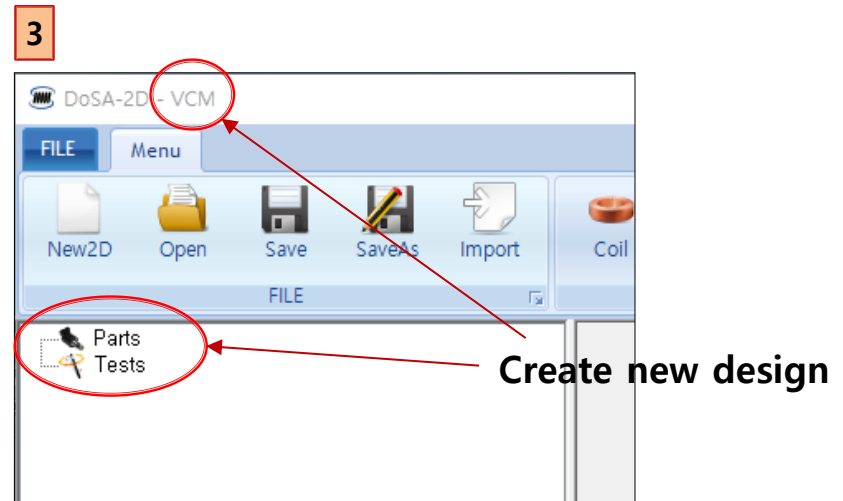
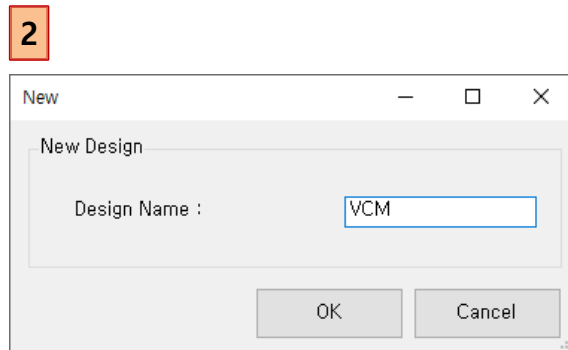
### 다. 전원

- 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

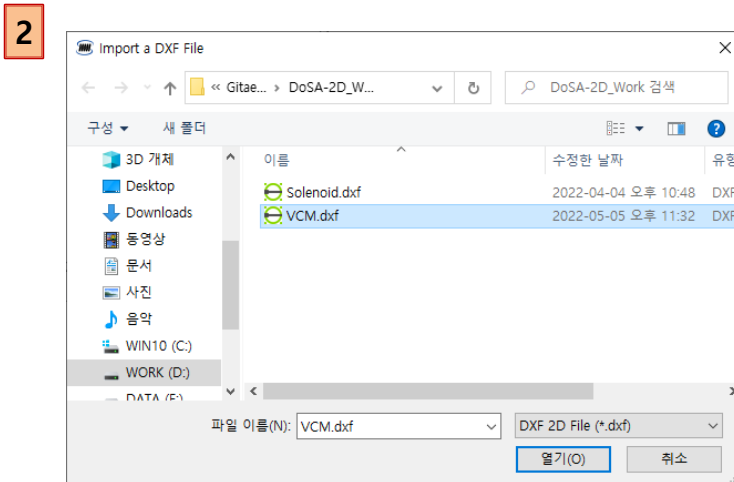
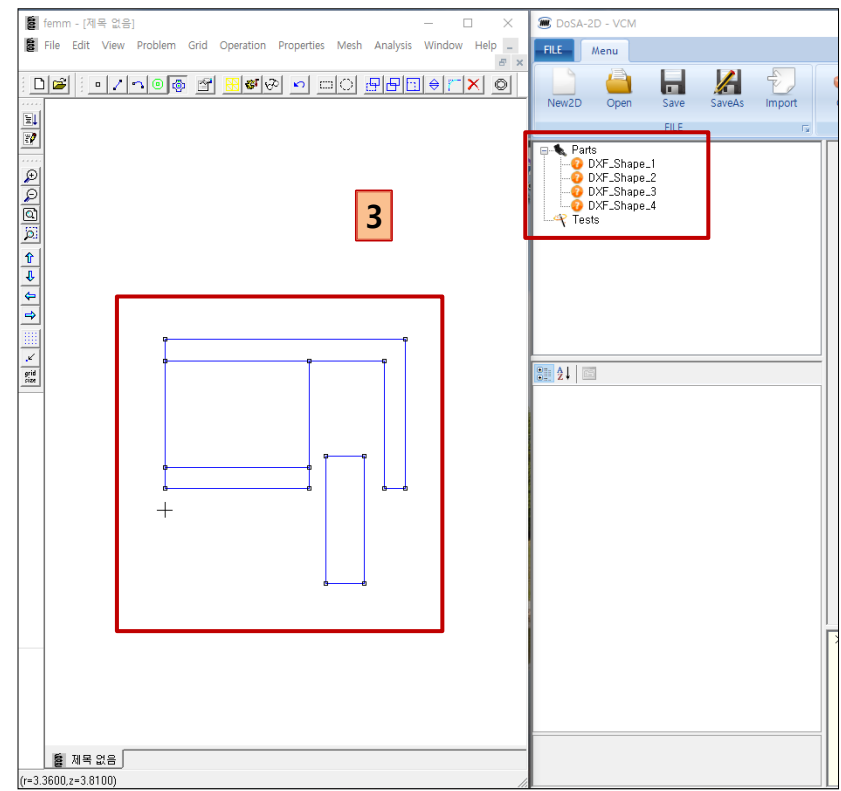


# 형상 Import

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](https://solenoid.or.kr/data/Drawing_Guide_KOR.pdf)

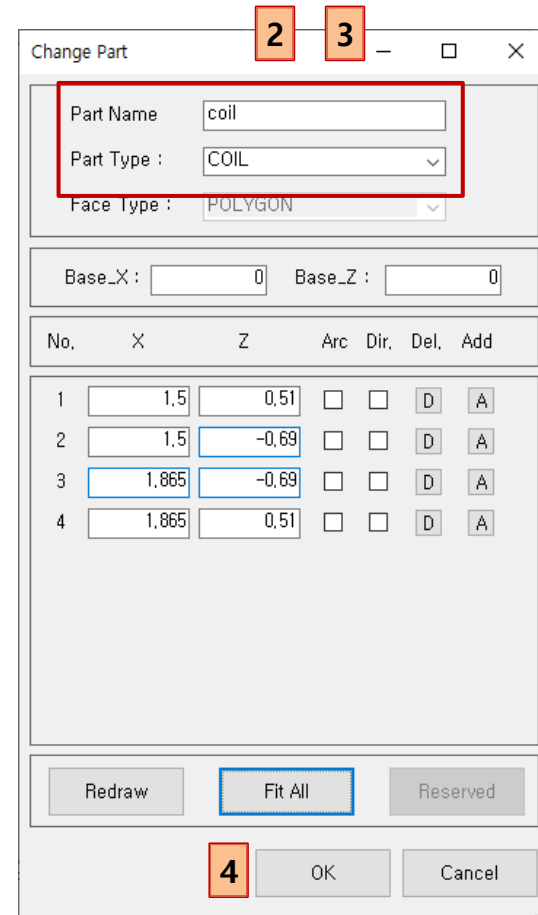
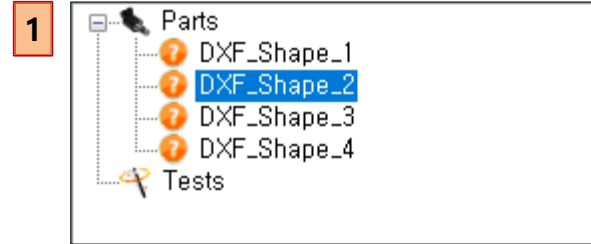
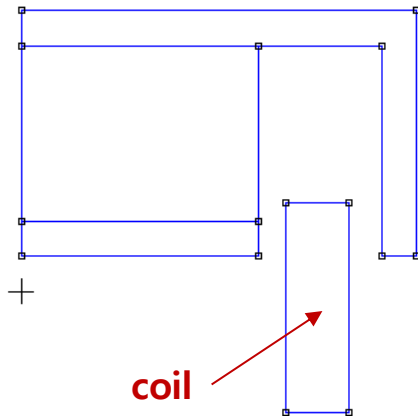




# Part Design

# 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

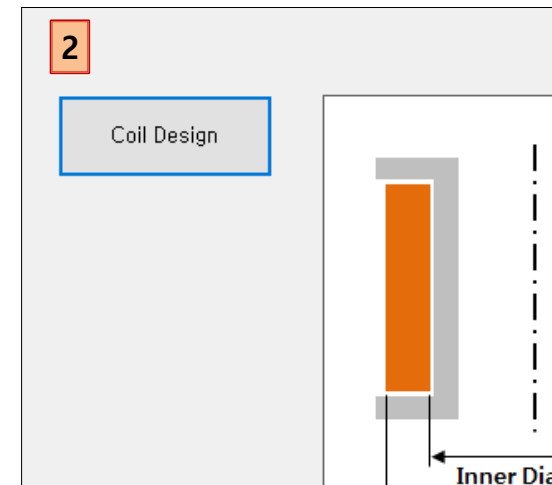
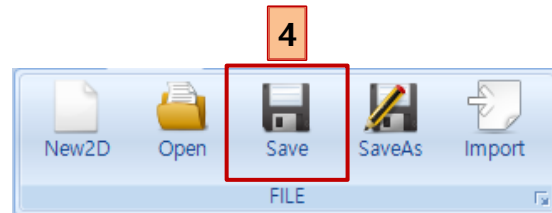
## 2. Coil 사양 계산

- ✓ Design Coil 버튼 클릭

## 3. Coil 사양 확인

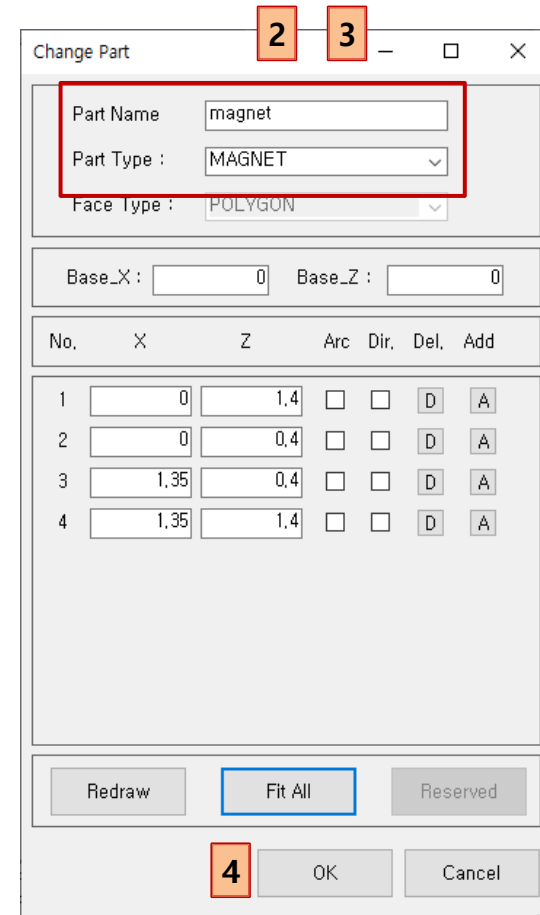
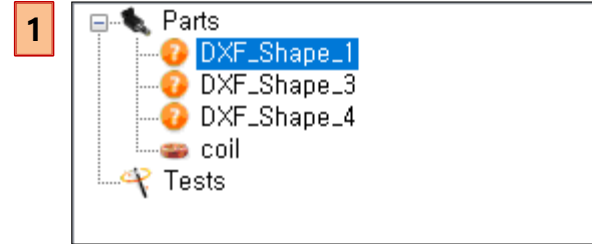
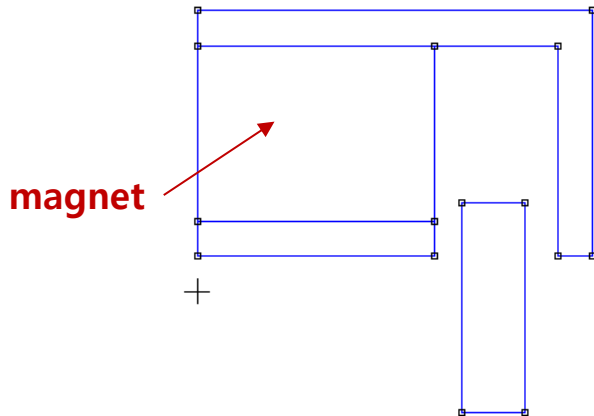
## 4. 리본바 > Save

▼ 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

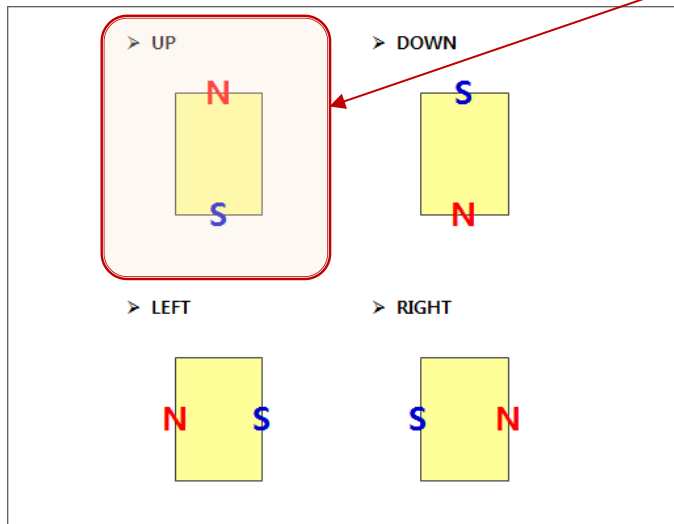


# Magnet 설정

## 1. Magnet 속성 설정

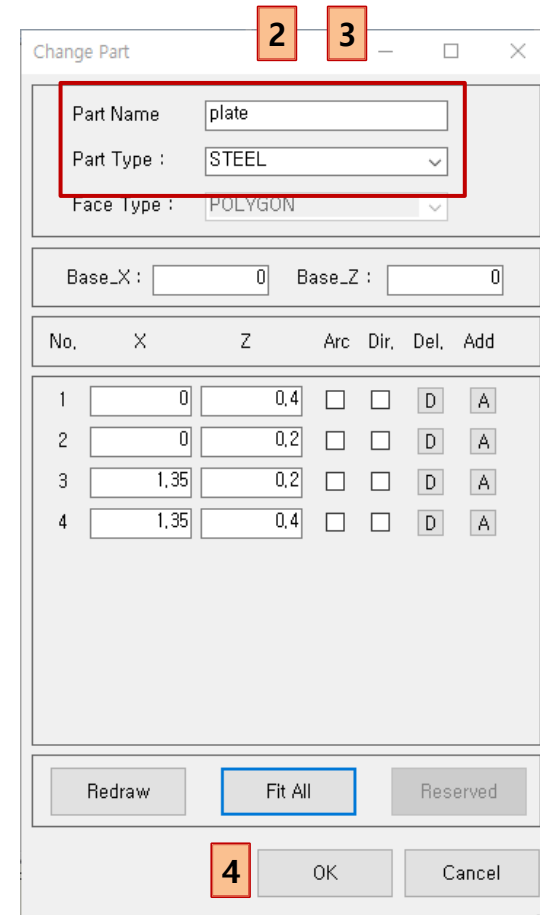
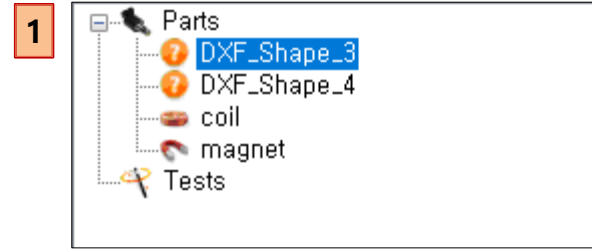
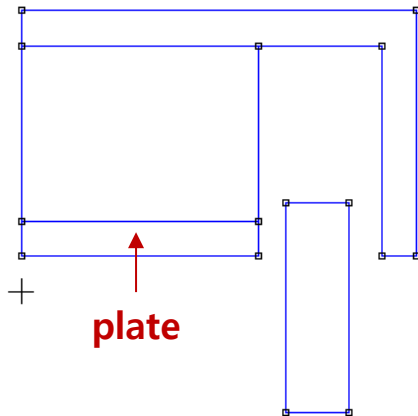
- ✓ Part Material : N52
- ✓ Direction : UP

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



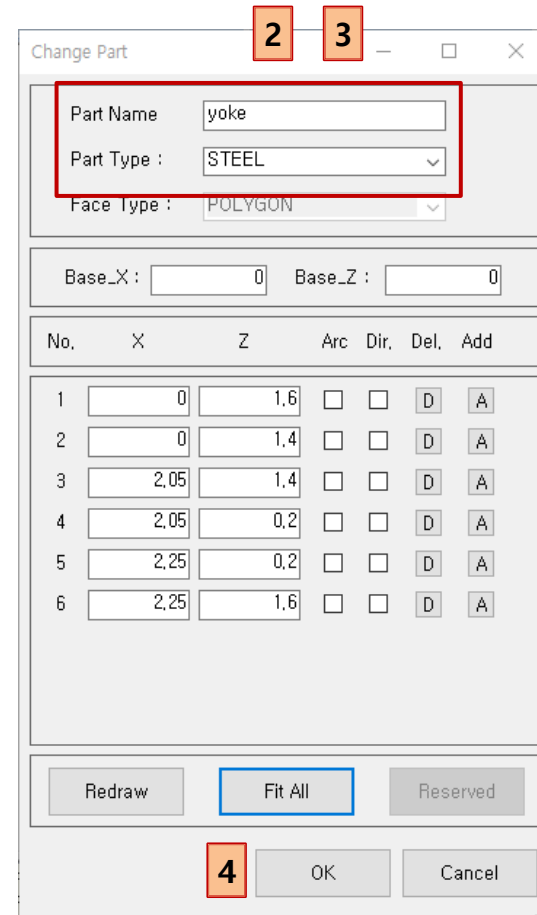
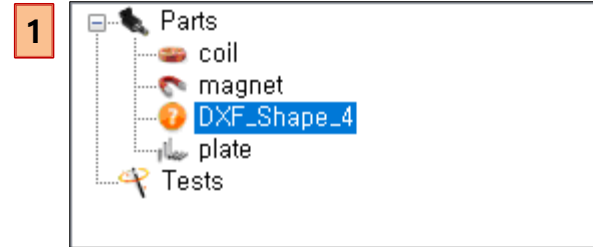
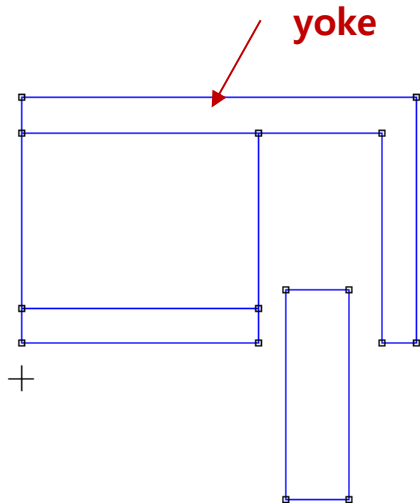
# Plate 지정

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

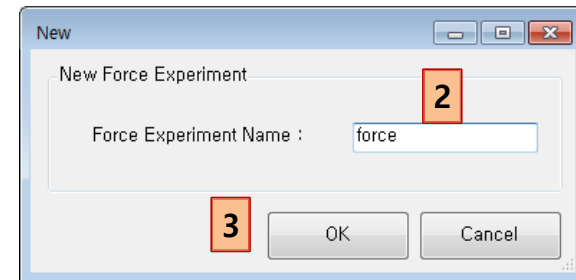


# Virtual Test

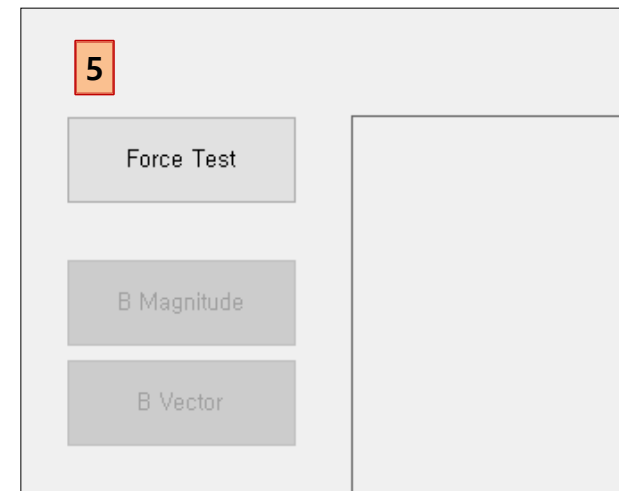


# 자기력 가상실험

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

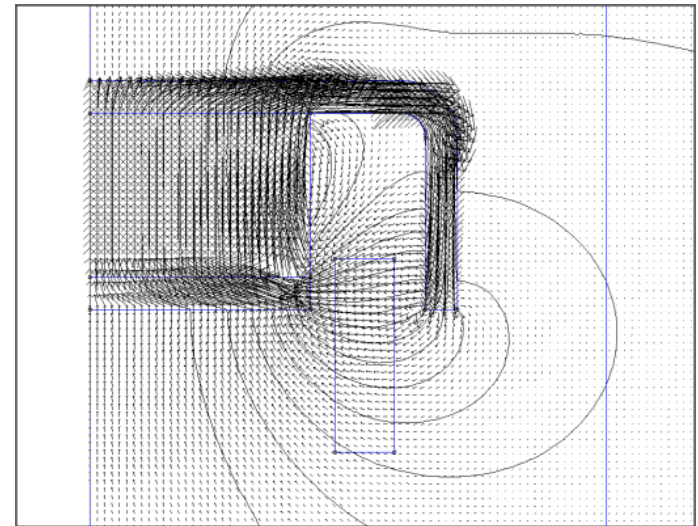
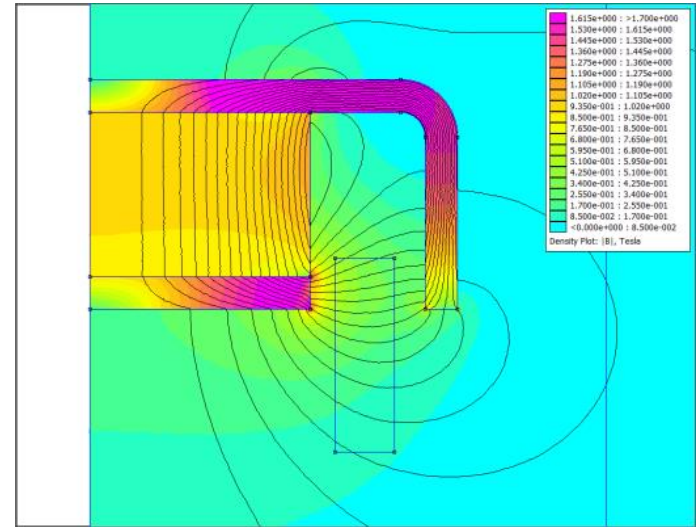
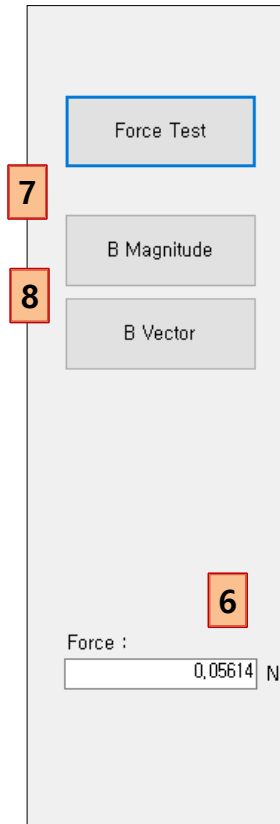
6. 자기력 확인 : 0.05614 N

7. 자속밀도 확인

✓ B Magnitude 버튼 클릭

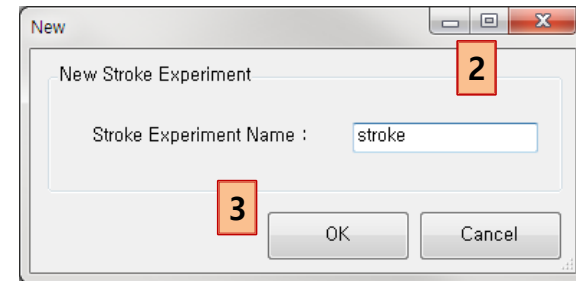
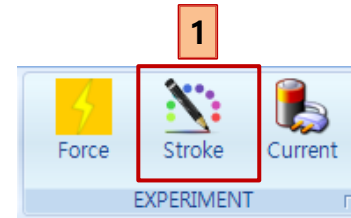
8. 자속밀도 벡터 확인

✓ 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

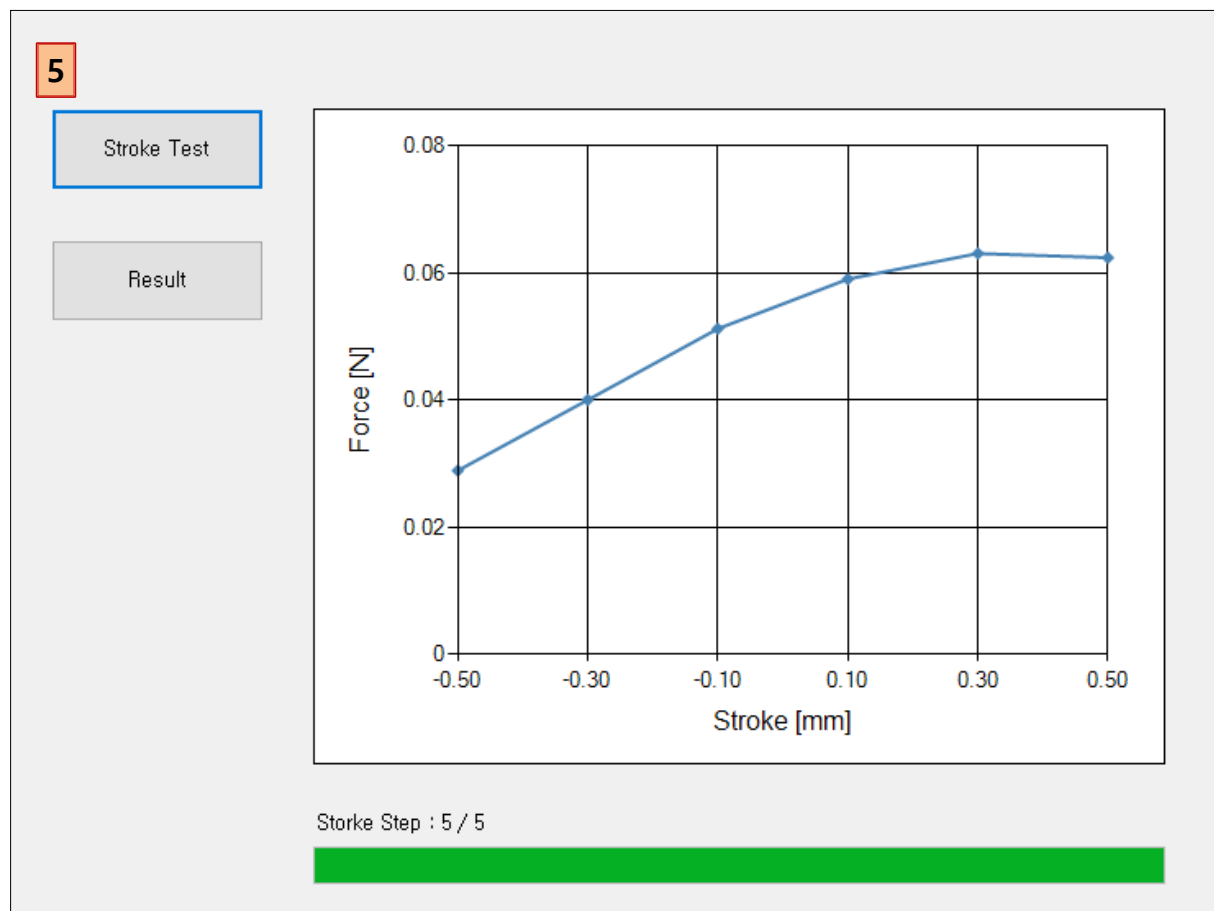


A screenshot of a table showing experiment parameters. The table has two columns: the parameter name and its value. The 'Stroke Fields' section is highlighted with a red rectangular box, and the number '4' is in a small orange box to the left of it.

▼ 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

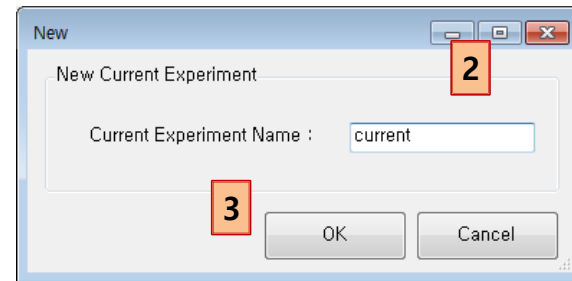
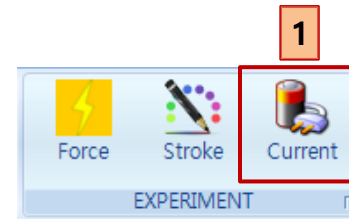
# 변위-자기력 가상실험 결과

## 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

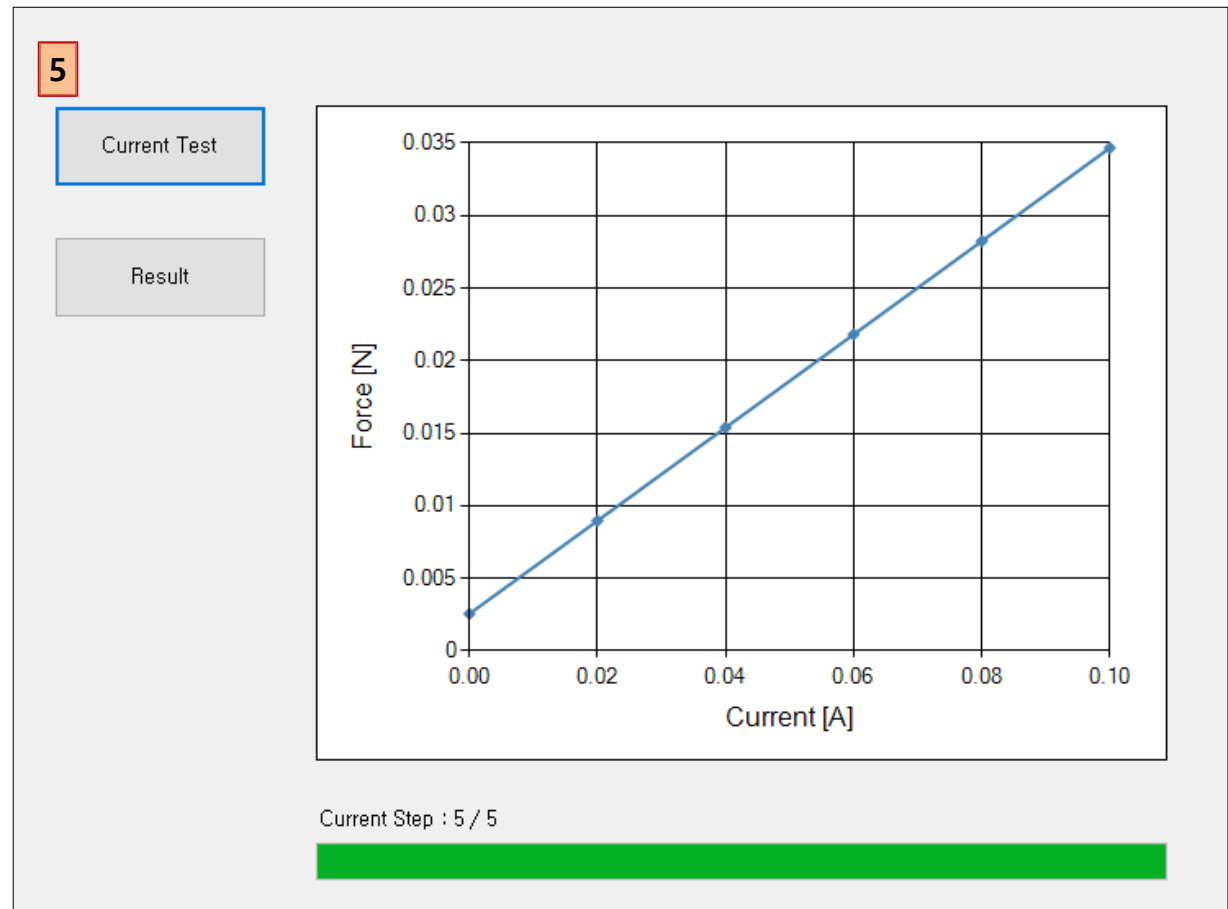


4

▼ 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

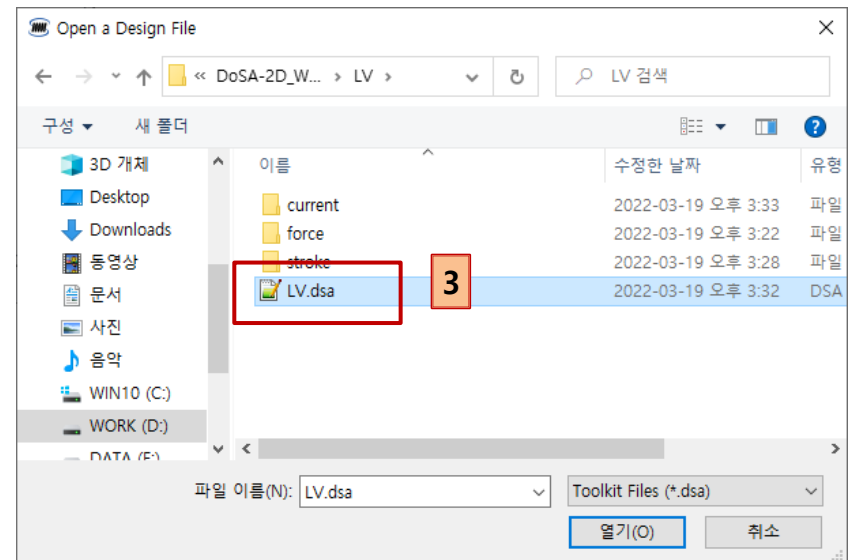
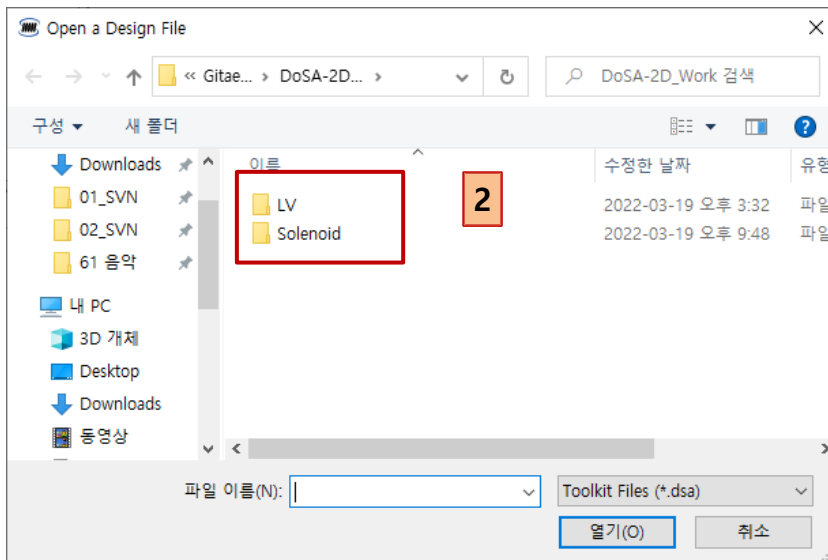
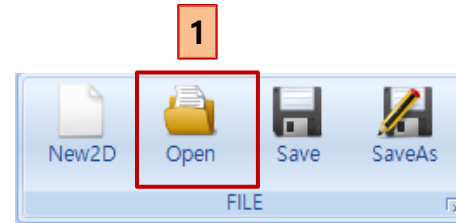
## 5. Current Test 버튼 클릭



# Tips

# Design 열기

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





# 감사합니다

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