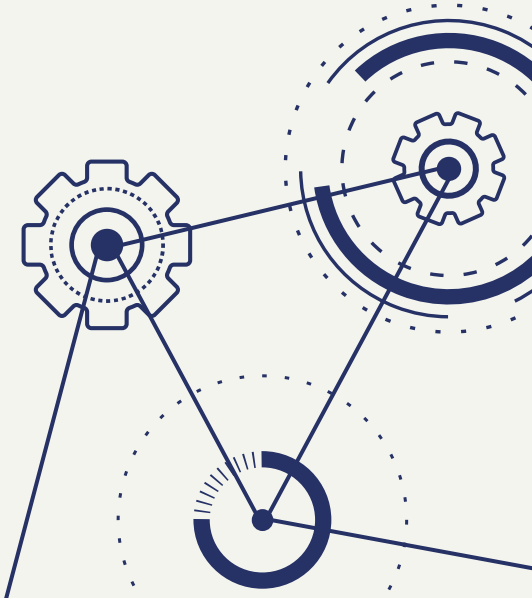
Wine opener

Team name : 와인따주는남자(들)
조장 : 2023043154 김주혁(맡은 역할 : 모든 것)



https://www.youtube.com/shorts/ozyrosbeYwU

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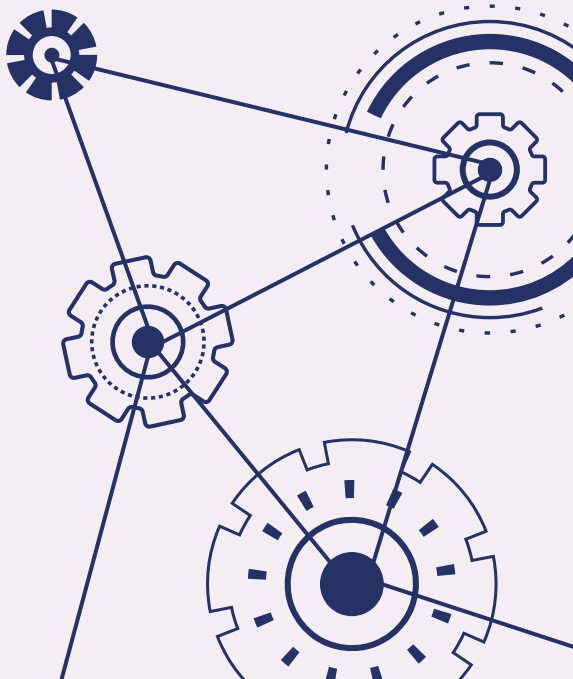
01
계획

- 모델링 근거
- 실측,구상 후 2D 계획



모델링 근거

- **부품 수**

부품이 4~5개여서 Part Design 과 Shape Design 기능을 활용하여 부품을 만든 후 Assembly 기능을 사용하여 조립할 수 있다.

- **운동 양상**

내부에서 기어가 맞물려 움직이는 것, 기어가 맞물리는 부분에서 Rack joint를 적용하는 등 Kinematics에서 다양한 기능을 사용할 수 있을 것이다.

- **적합성**

복잡하지 않은 구조임에도 다양한 기능을 사용할 수 있다. 특히 원형 기어와 선형 기어 사이에 어떤 joint를 주어 구현 할지에 대한 고찰 과정에서 다양한 해석이 가능할 것으로 보여 프로젝트에 적합하다고 생각했다.

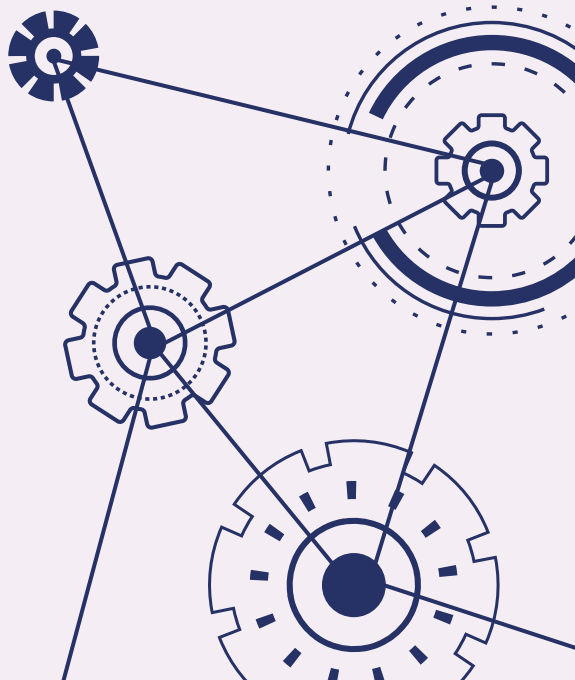
실측 및 구상 과정

02

설계 및 제작

CATIA, 3D 설계

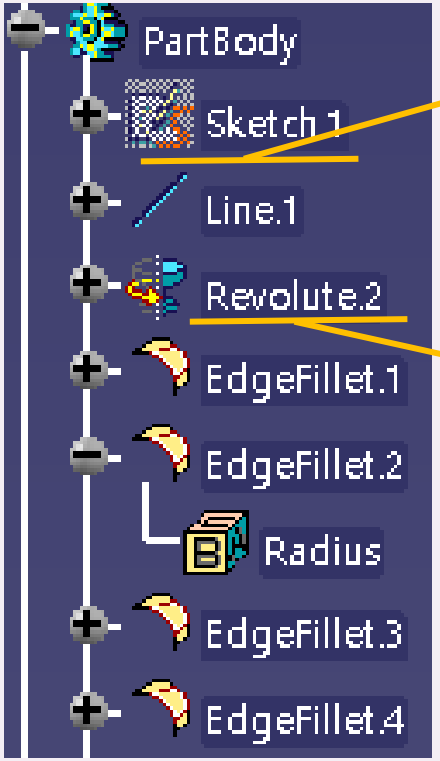
- Part1
- Part2
- Part3
- Part4

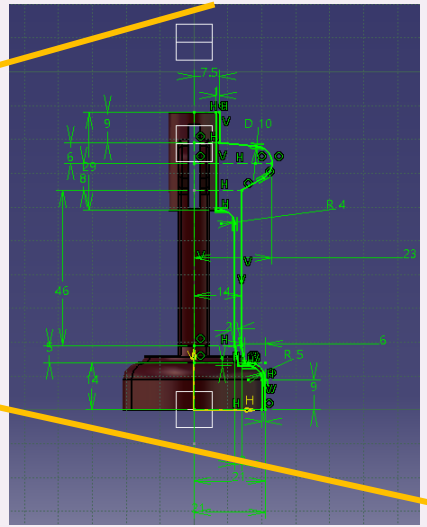


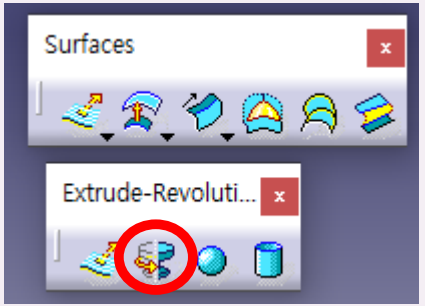
2. 설계 및 제작
Part 1_Main Body

2. 설계 및 제작_ Part1

"Generative shape design"







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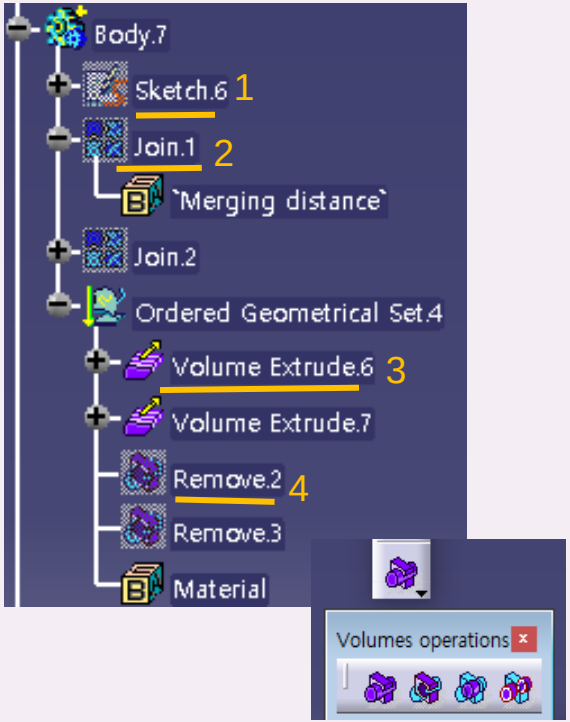

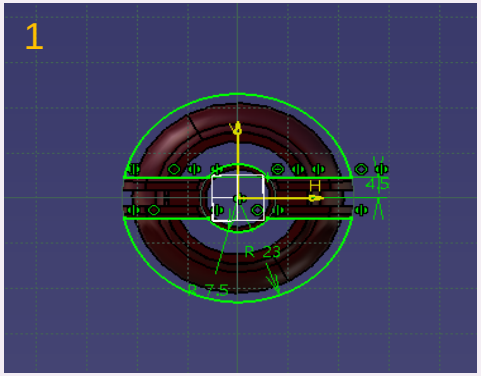

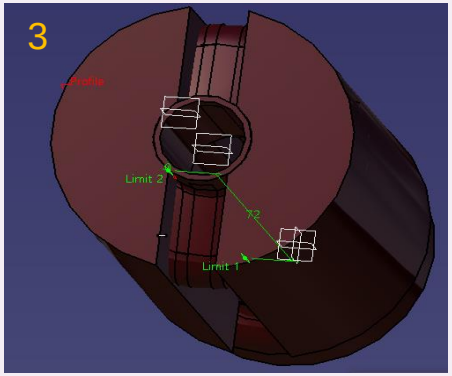

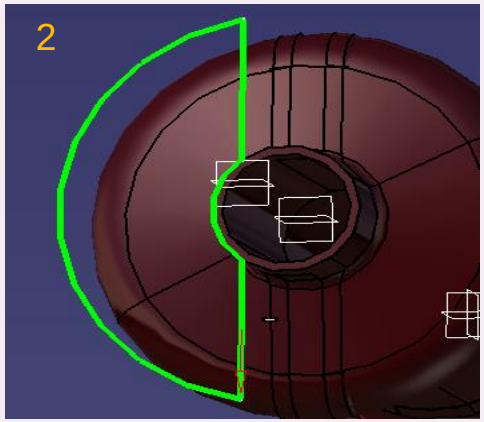

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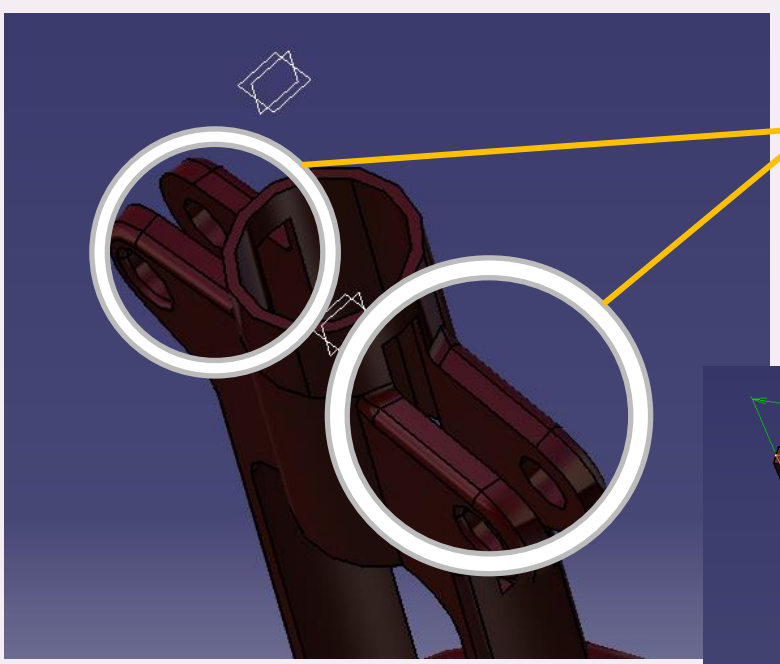

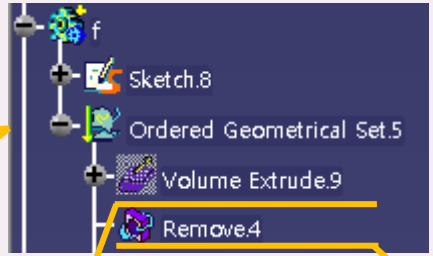

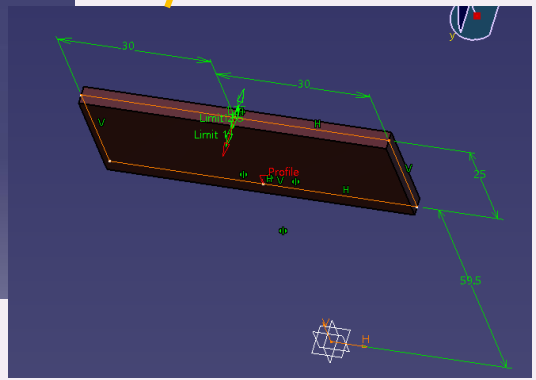

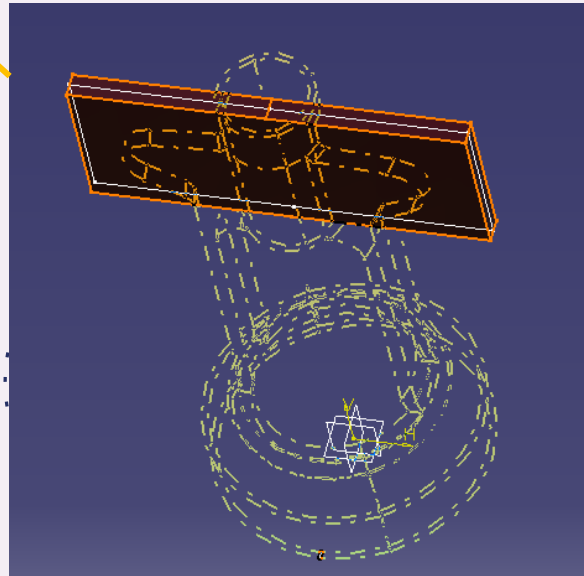

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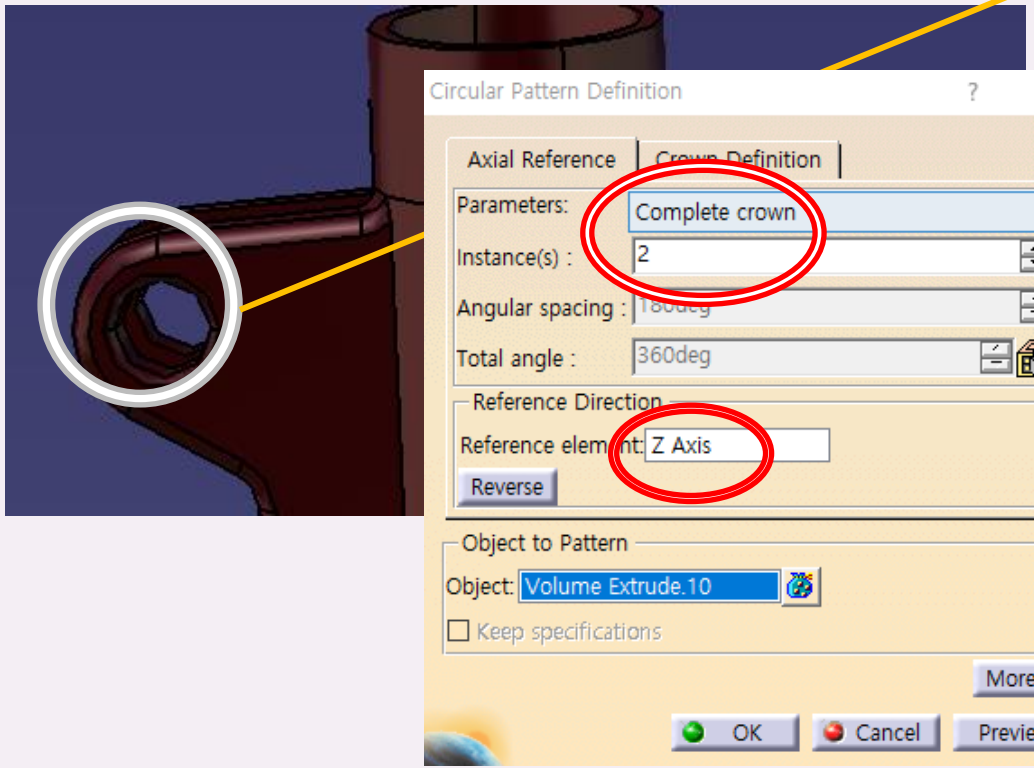
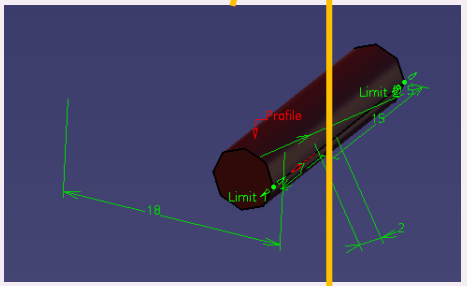
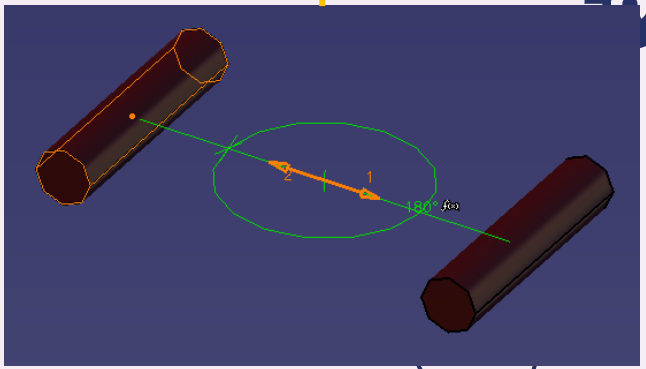






2. 설계 및 제작_ Part1

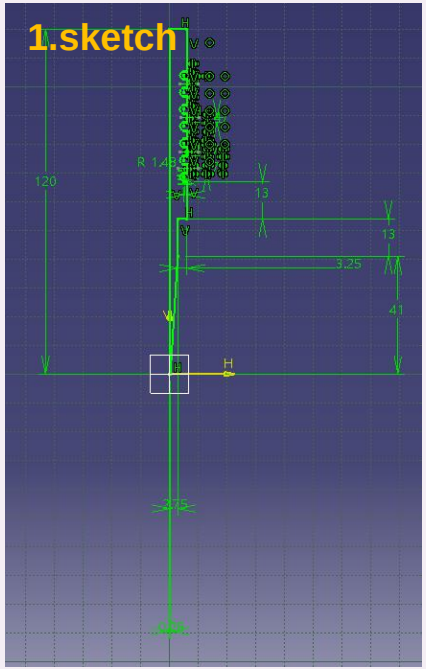
Part1 완성

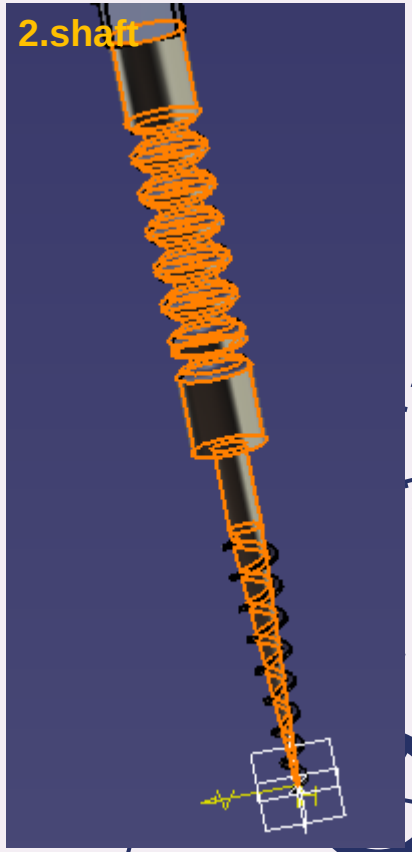
2. 설계 및 제작

Part 2_Middle Helix

2. 설계 및 제작_ Part2

Part Design





2. 설계 및 제작_ Part2

Helix Curve Definition

Type

Helix Type: Pitch and Revolution

Constant Pitch / Variable Pitch — Law...

Pitch: 5mm

Revolutions: 8

Starting Point: Sketch.2

Axis: Z Axis

Orientation: Counterclockwise

Starting Angle: 0deg

Radius variation

Taper Angle: 3.48deg

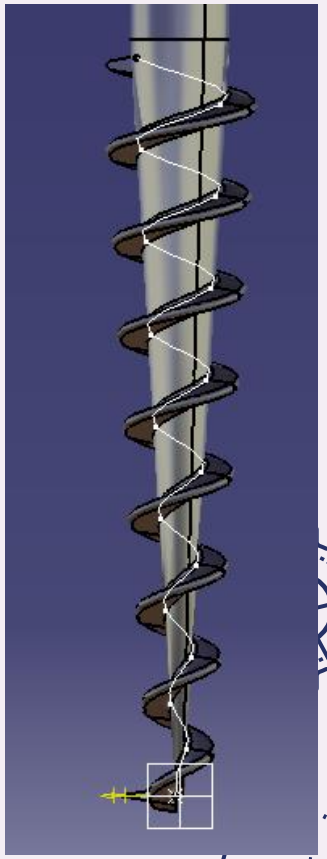
Way: Outward

Profile: No selection

Reverse Direction

OK | Cancel | Preview

Helix 생성



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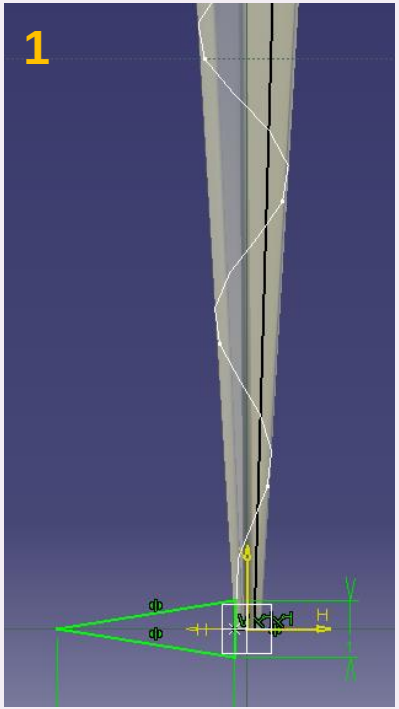

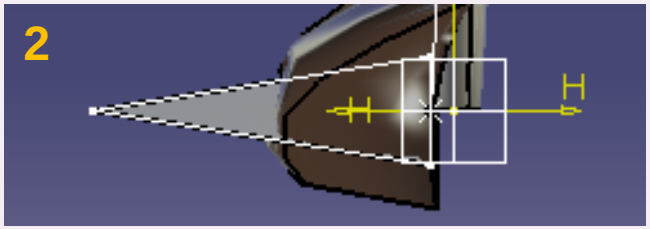

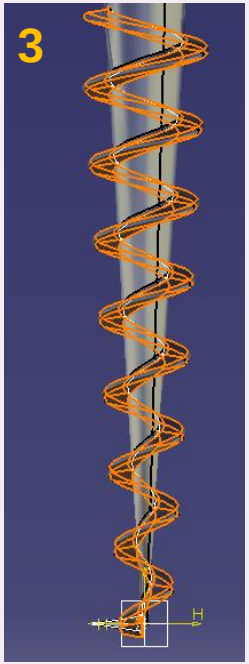

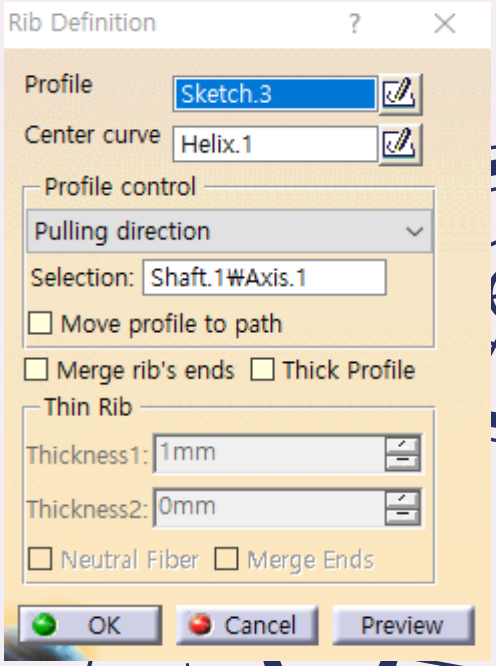

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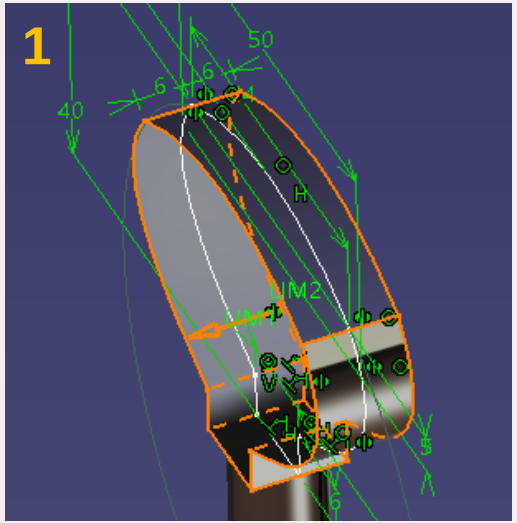
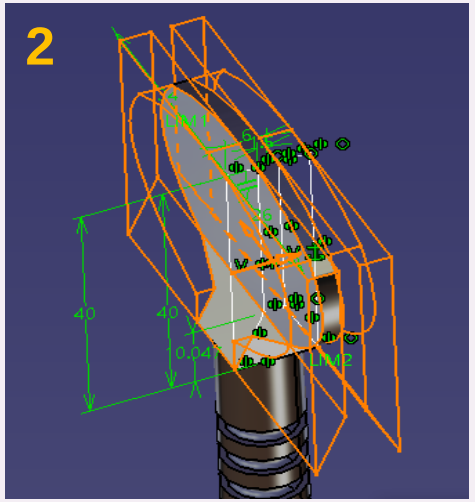
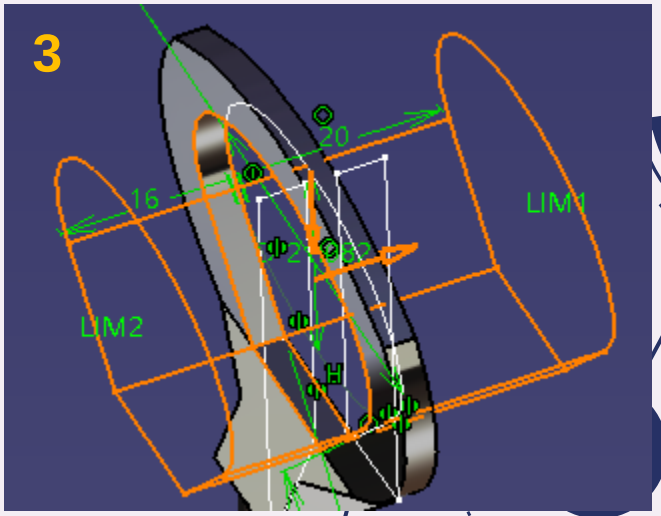
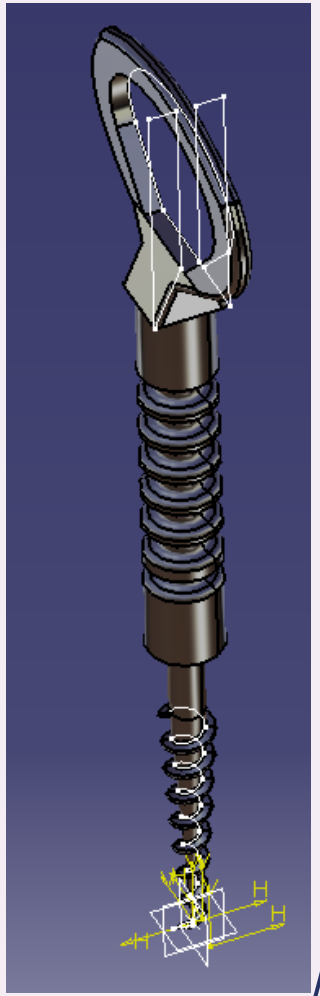






2. 설계 및 제작_ Part2

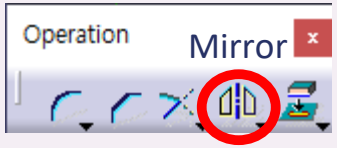


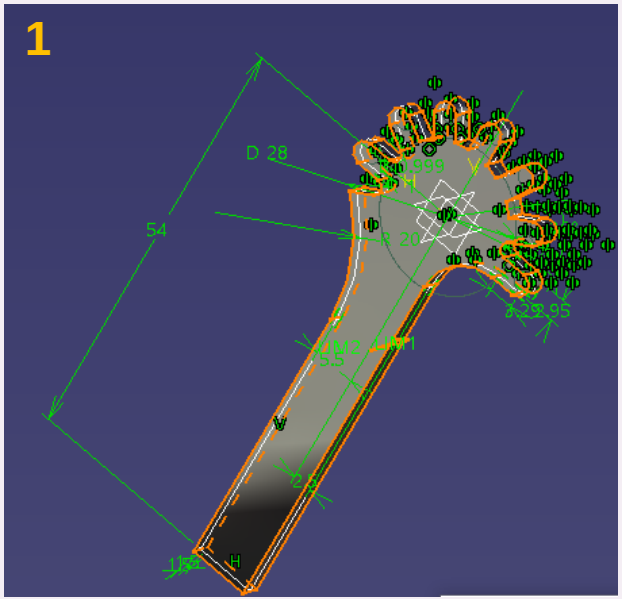
Part2 완성

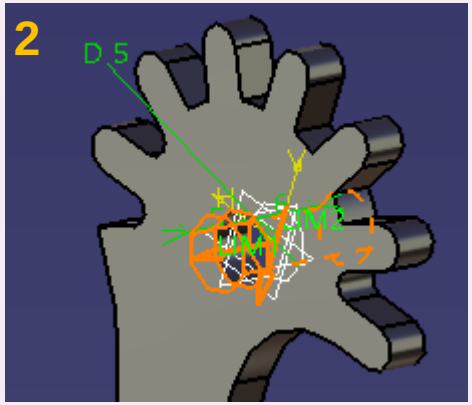
2. 설계 및 제작
Part 3_Handle

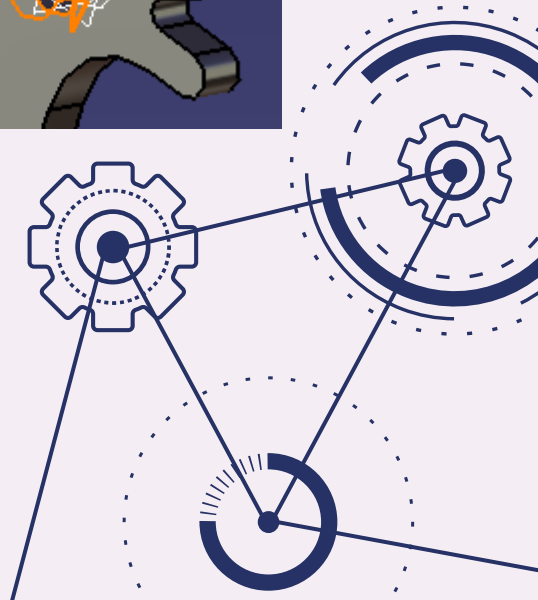
2. 설계 및 제작_ Part 3

Part Design









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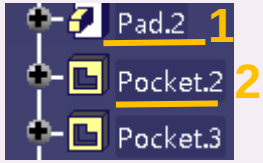

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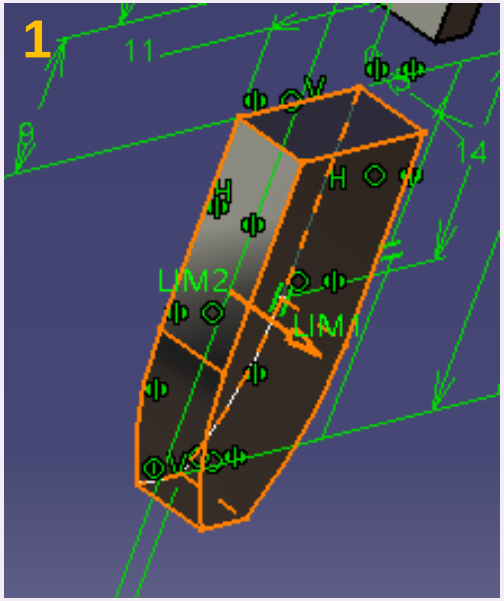

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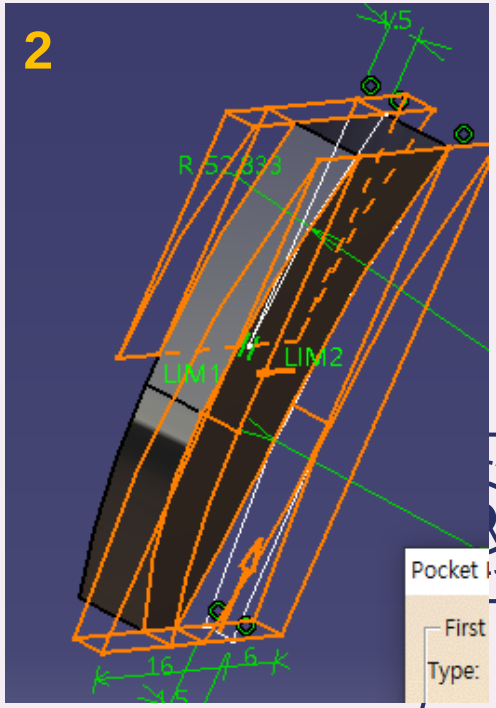

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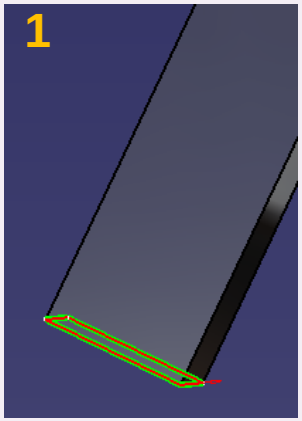
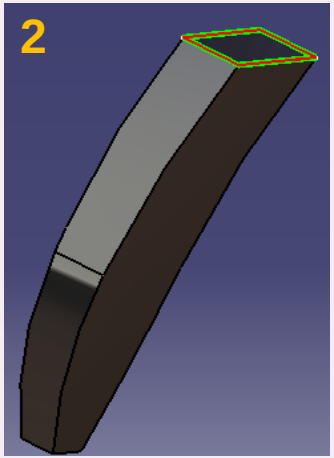
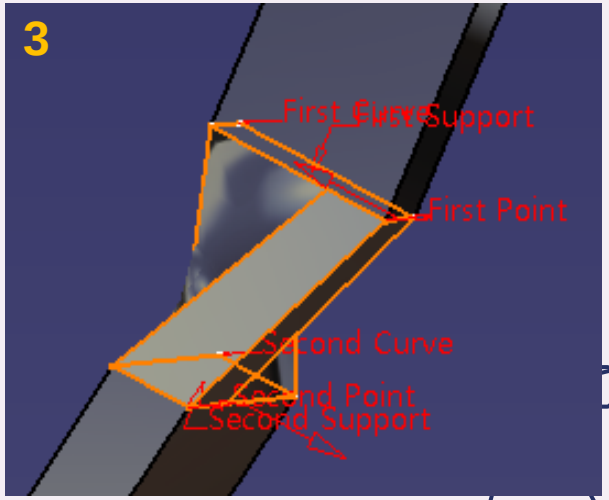




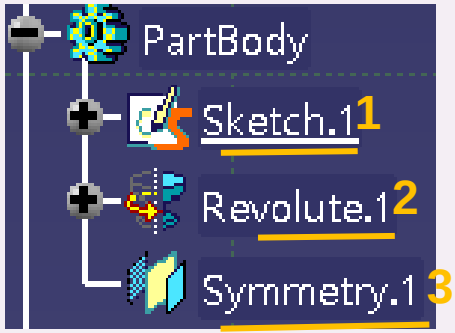


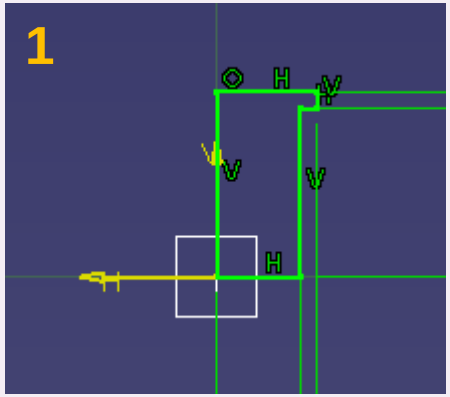
2. 설계 및 제작_ Part 3

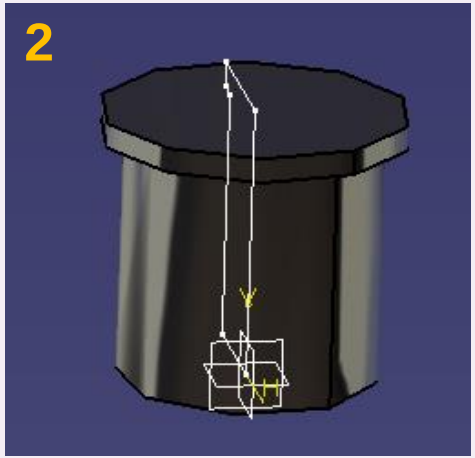
Part3 완성

2. 설계 및 제작
Part 4_Bolt

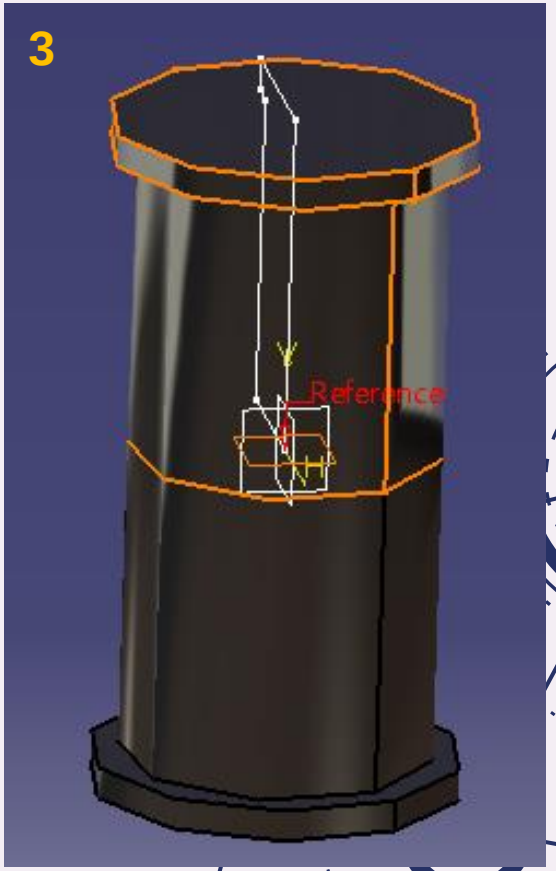
2. 설계 및 제작_ Part 4







Part4 완성

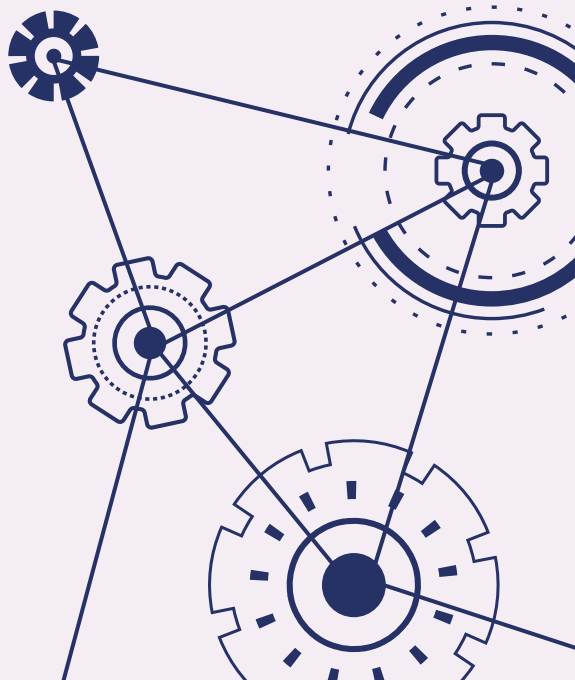


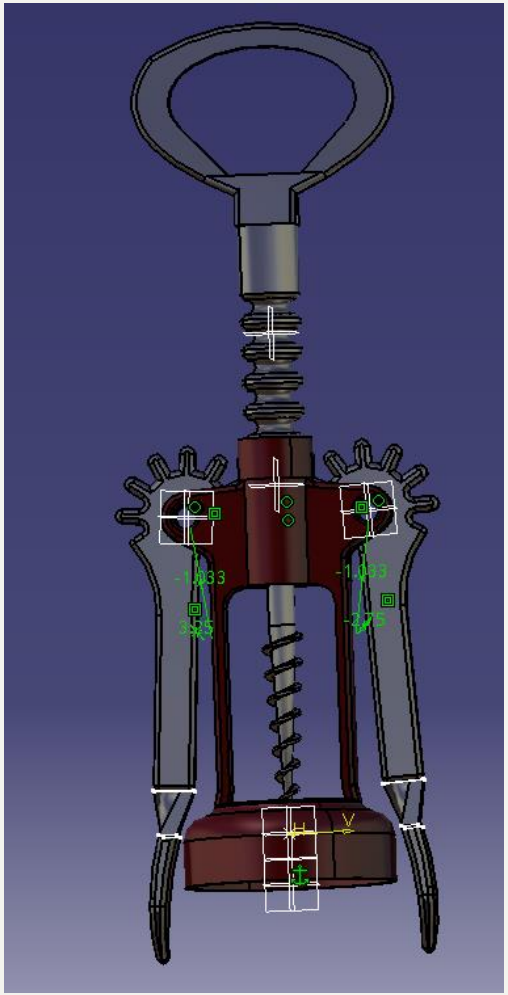
03

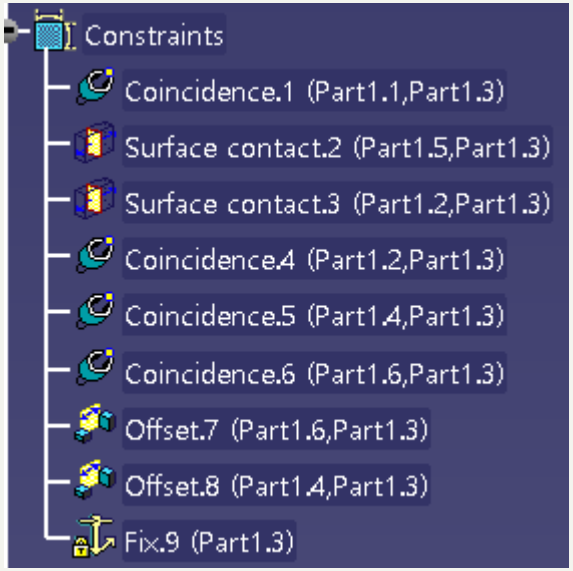
구현

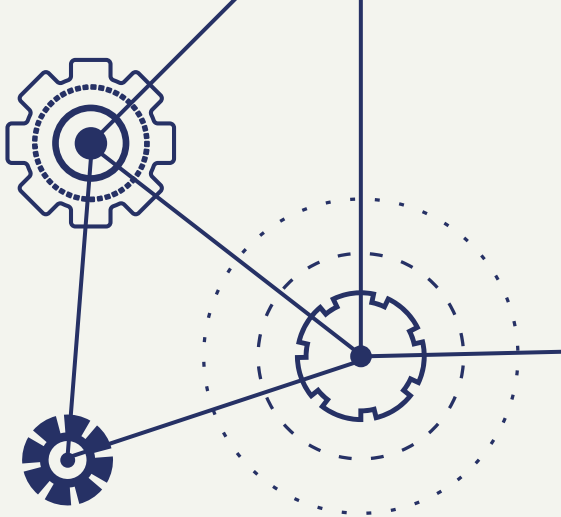
실제 모형의 동작 구현(CATIA)

- Assembly
- DMU Kinematics





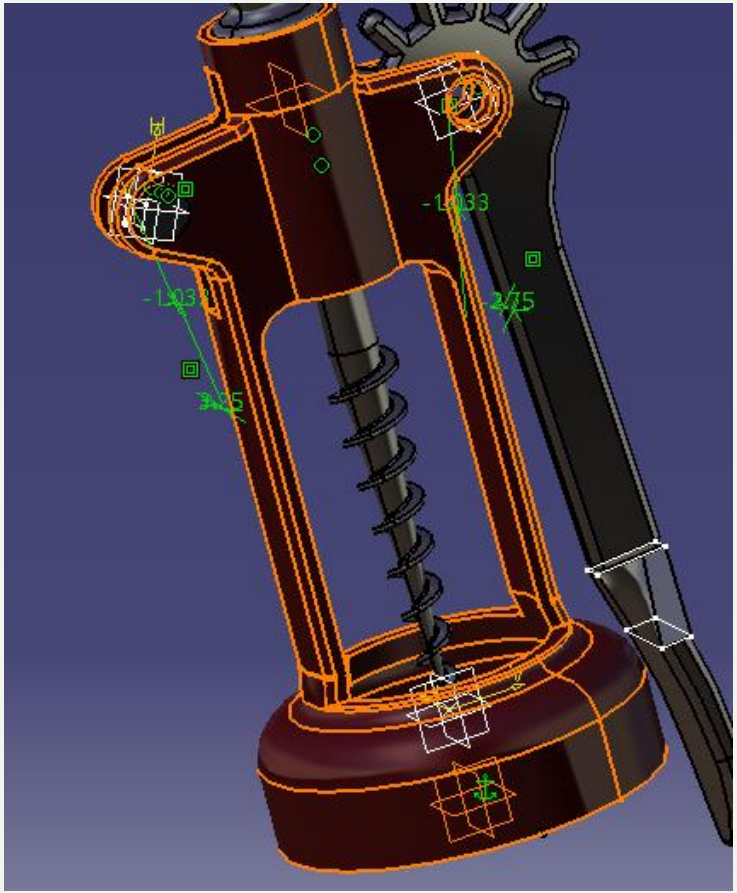

Constraints
Coincidence.1 (Part1.1,Part1.3)
Surface contact.2 (Part1.5,Part1.3)
Surface contact.3 (Part1.2,Part1.3)
Coincidence.4 (Part1.2,Part1.3)
Coincidence.5 (Part1.4,Part1.3)
Coincidence.6 (Part1.6,Part1.3)
Offset.7 (Part1.6,Part1.3)
Offset.8 (Part1.4,Part1.3)
Fix.9 (Part1.3)



Assembly

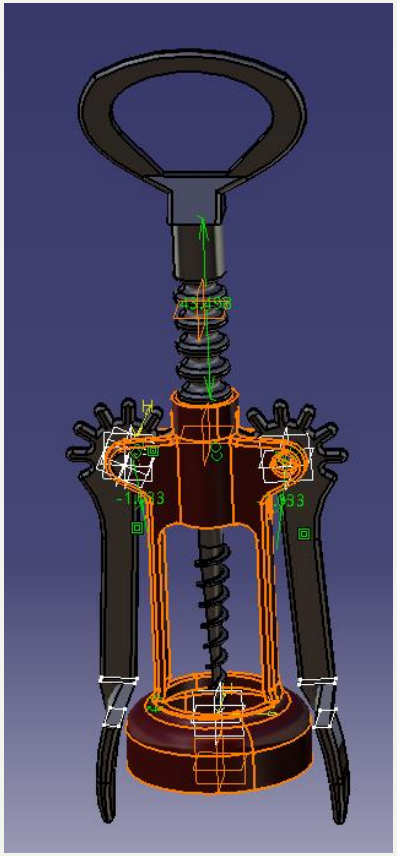
조립

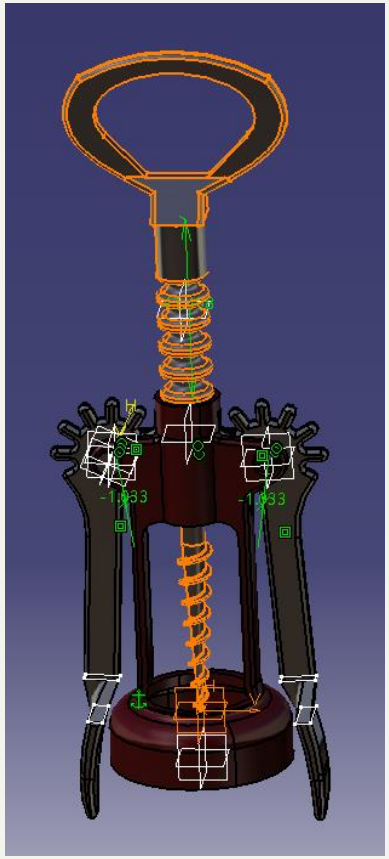

Fix.9 (Part1.3)

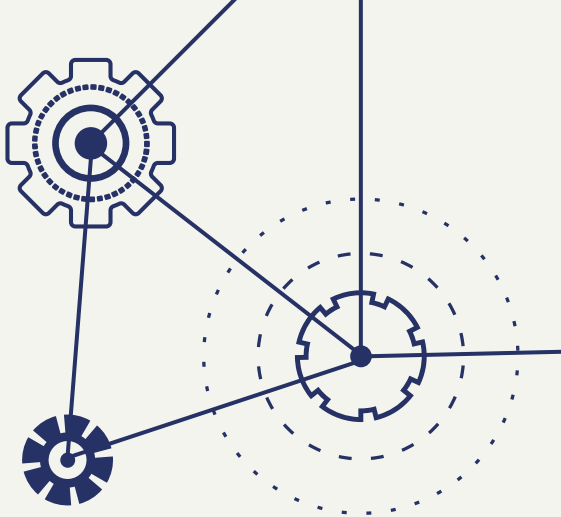


Coincidence.1 (Part1.1,Part1.3)

Offset.21 (Part1.1,Part1.3)

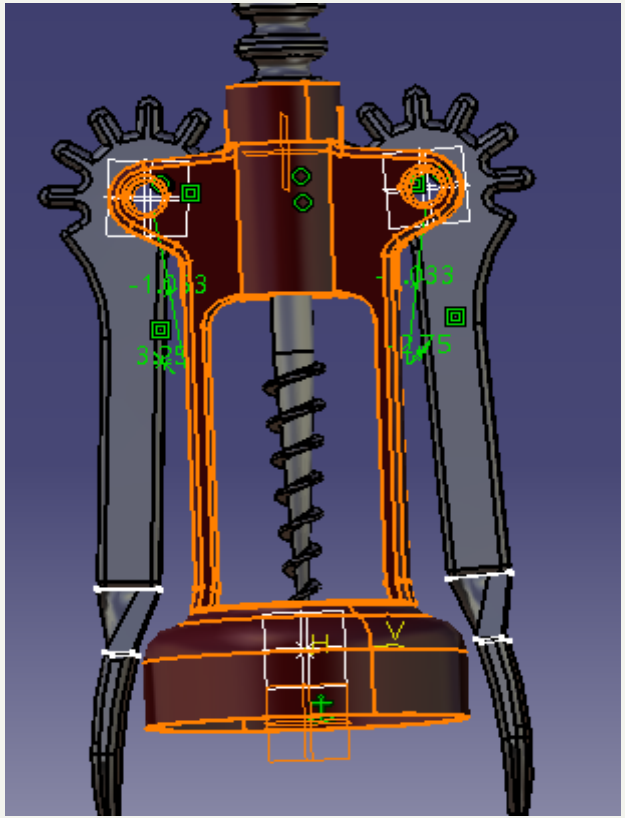


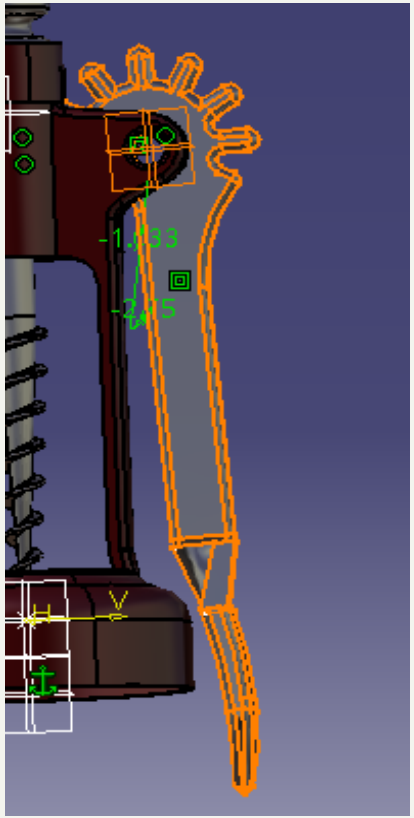


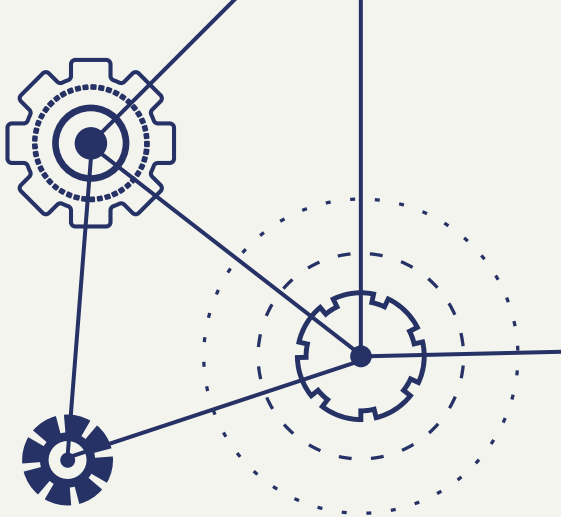


Surface contact.2 (Part1.5,Part1.3)

Coincidence.15 (Part1.3,Part1.5)

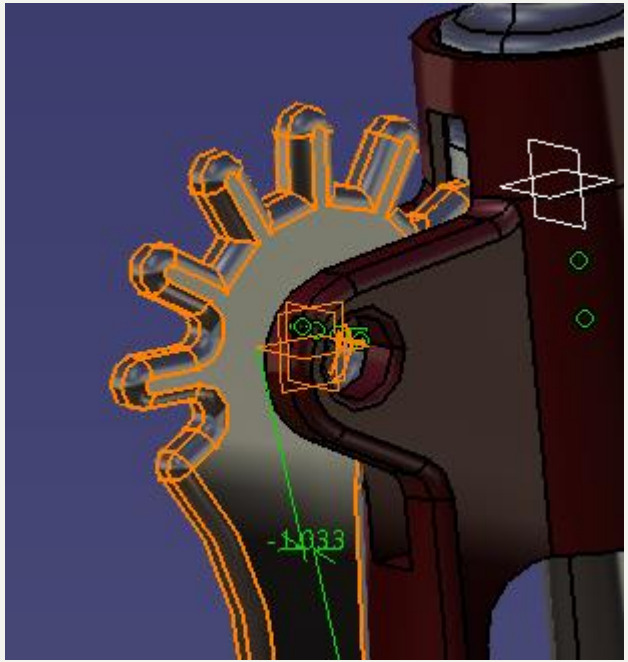


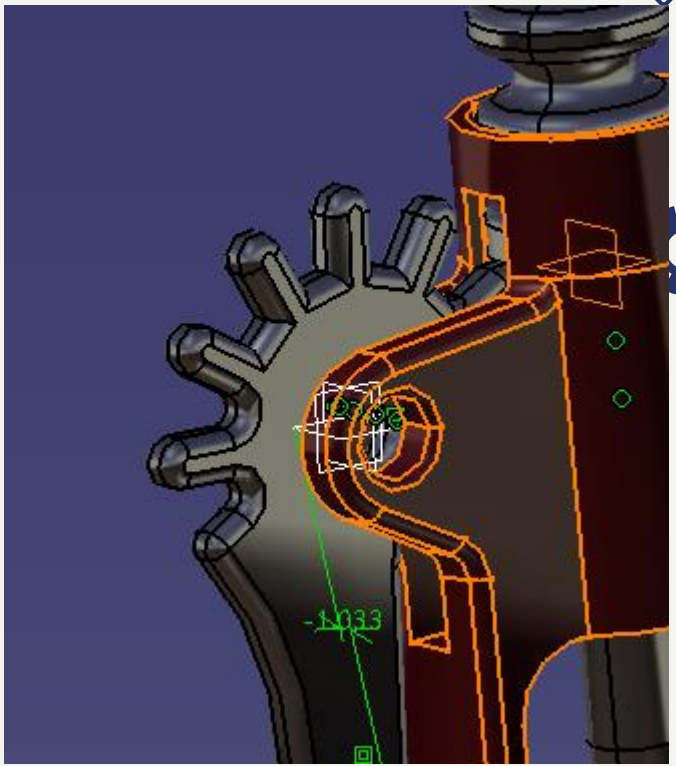




반대쪽도 동일하게

Coincidence.4 (Part1.2,Part1.3)

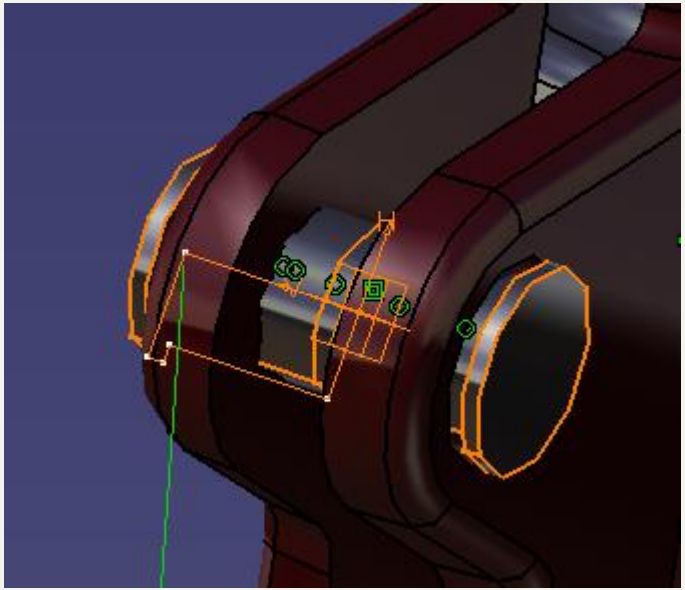


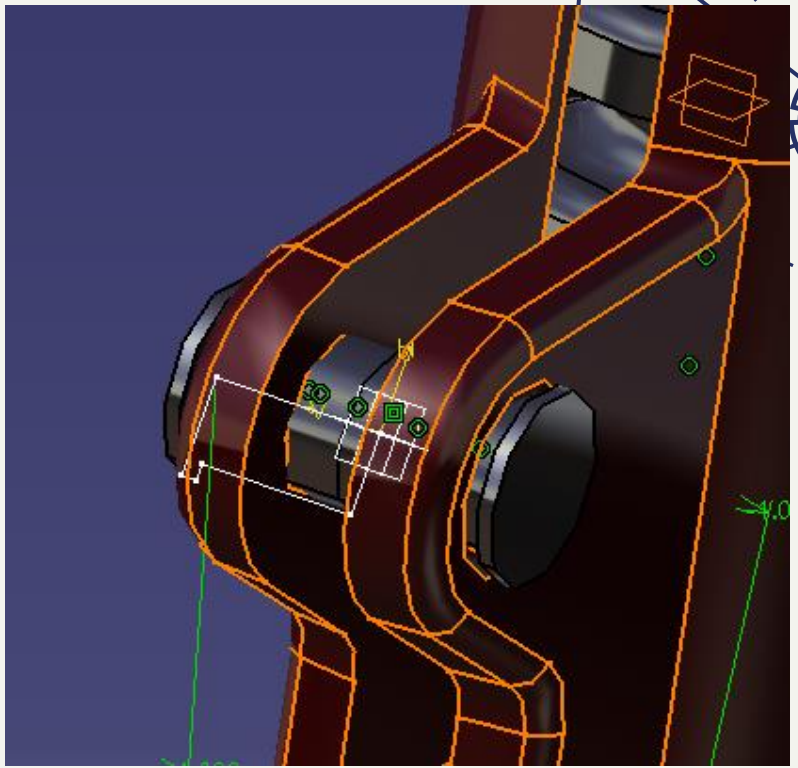


반대쪽도 동일하게

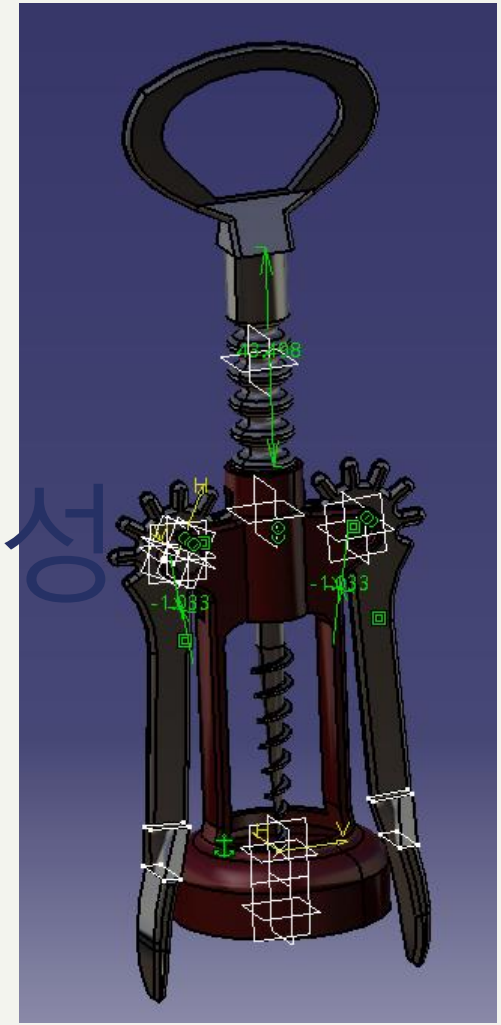
Coincidence.6 (Part1.6,Part1.3)

Offset.7 (Part1.6,Part1.3)

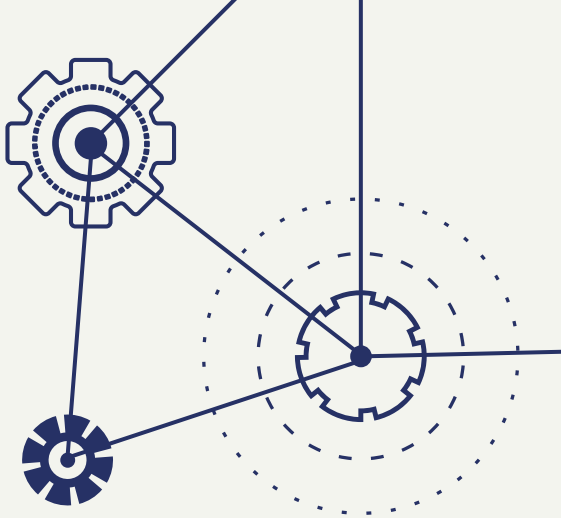


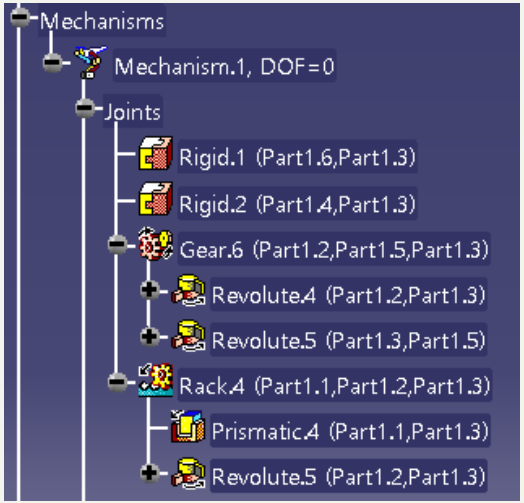


Assembly 완성



DMU Kinematics

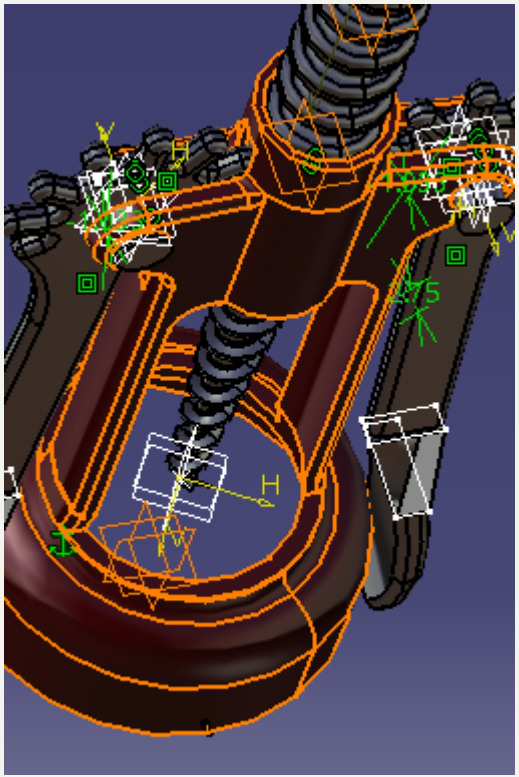




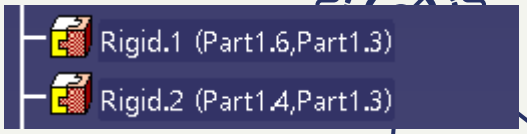
https://www.youtube.com/shorts/ozyrosbeYwU

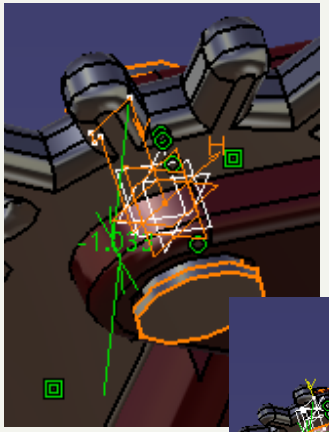
<Mechanism 1>

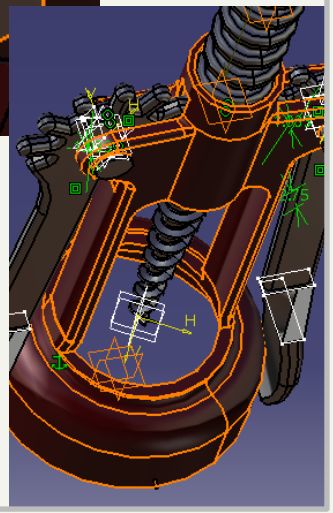
Fix



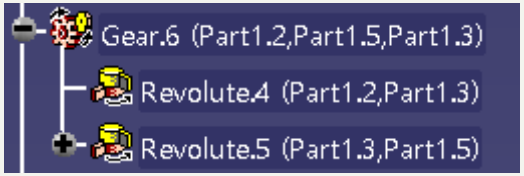
Rigid Joint

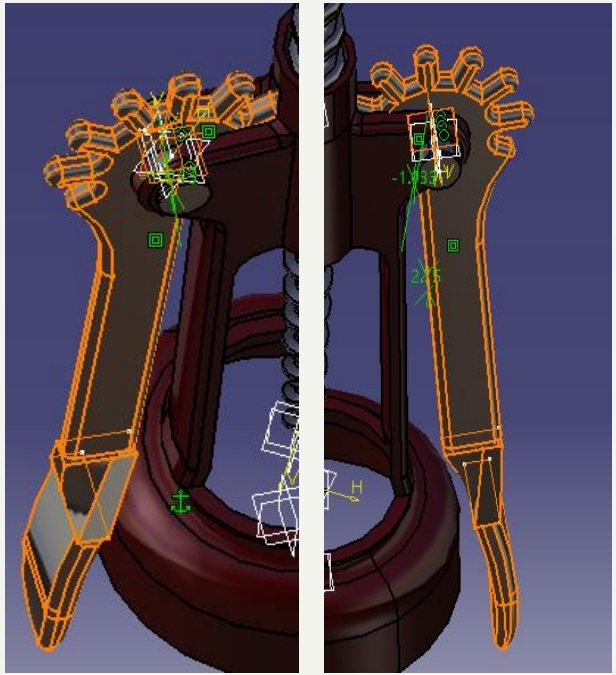




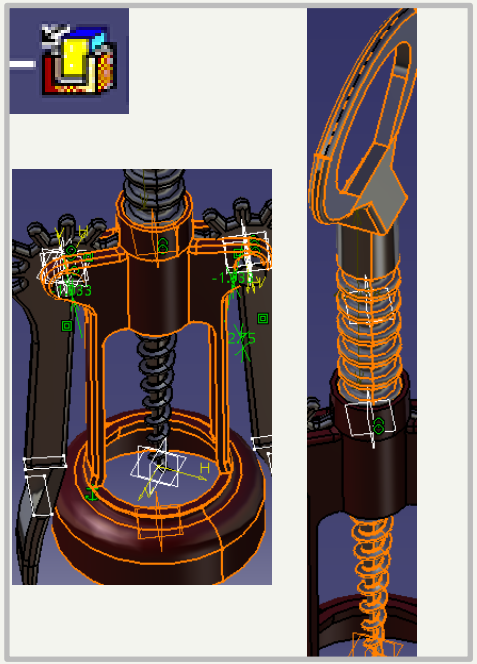


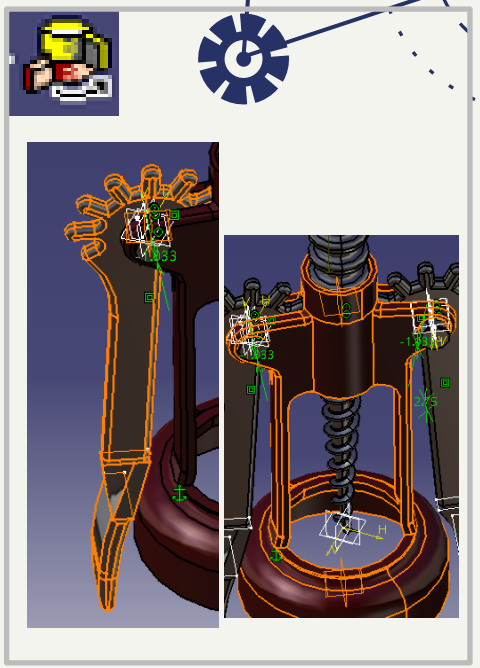
Gear Joint (revolute)

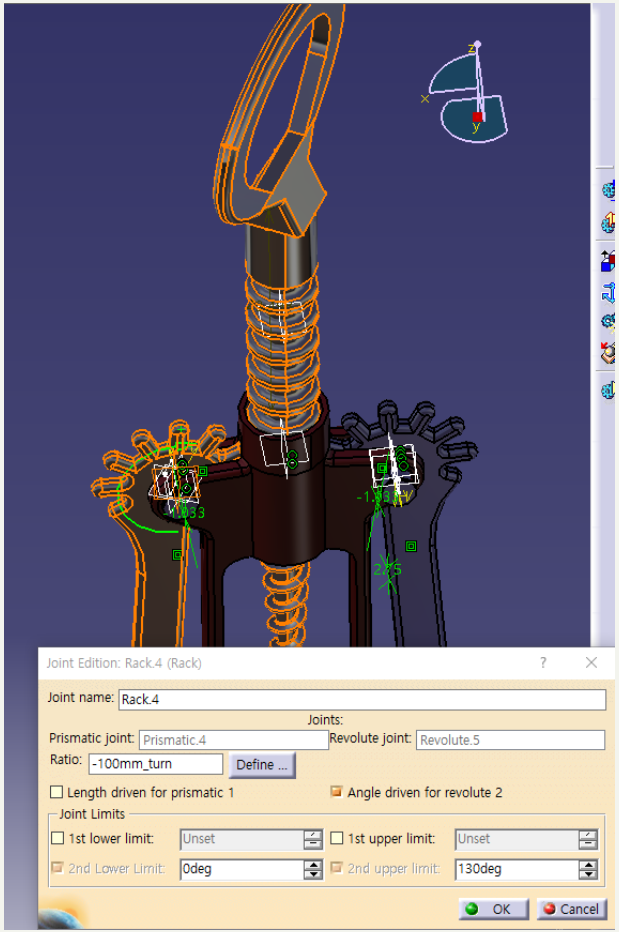




Rack Joint (Prismatic+revolute)







Joint Edition: Rack.4 (Rack)

Joint name: Rack.4

Joints:

Prismatic joint: Prismatic.4 Revolute joint: Revolute.5

Ratio: -100mm_turn Define ...

☐ Length driven for prismatic 1 ☑ Angle driven for revolute 2

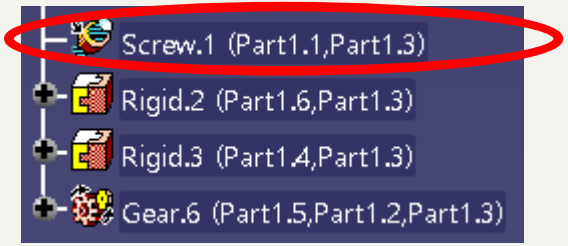
Joint Limits

☐ 1st lower limit: Unset ☐ 1st upper limit: Unset

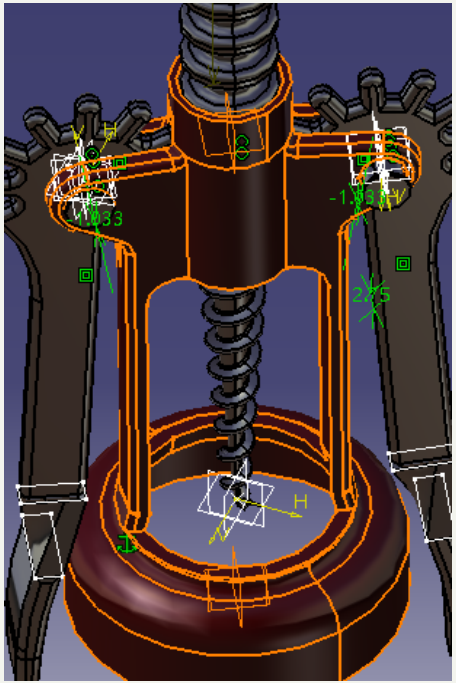
☑ 2nd Lower Limit: 0deg ☑ 2nd upper limit: 130deg

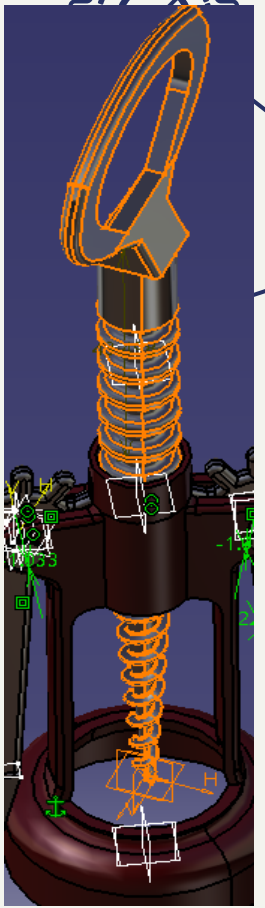
OK Cancel

<Mechanism 2>



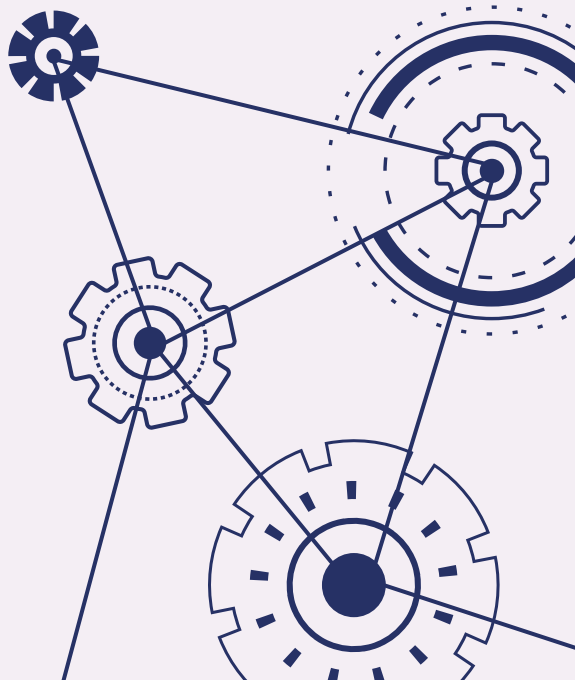
Screw Joint



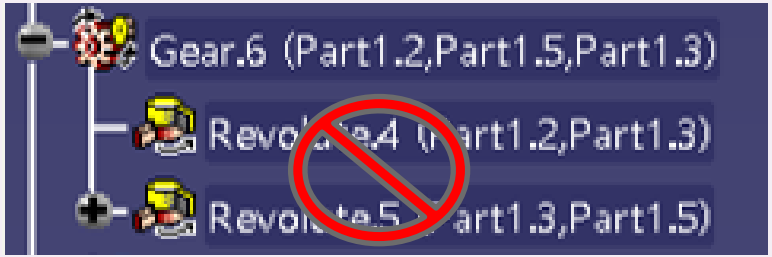


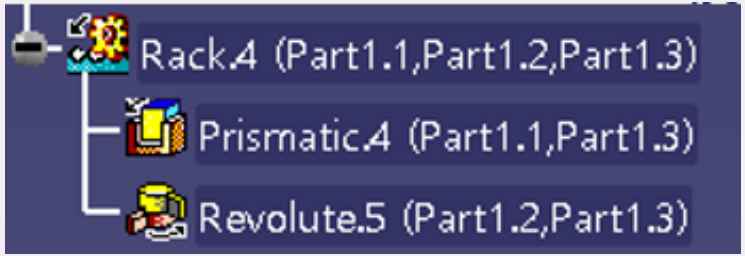
*Fix joint를 제외한 나머지 Joint는 Mechanism 1과 동일

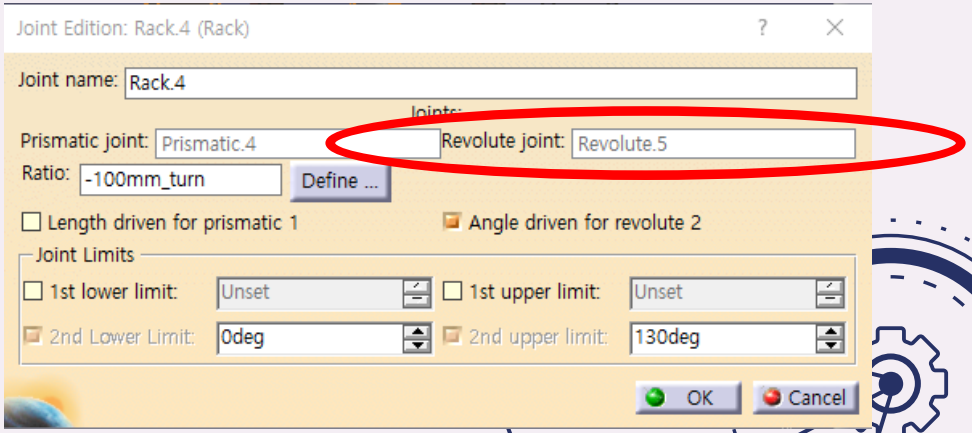
04
시행착오



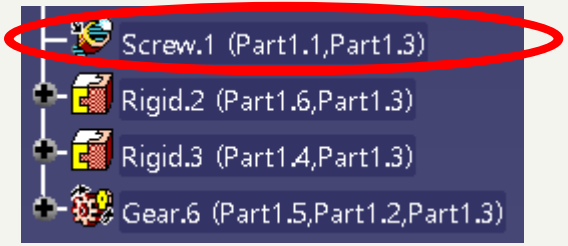
<Mechanism 1을 만들 때>

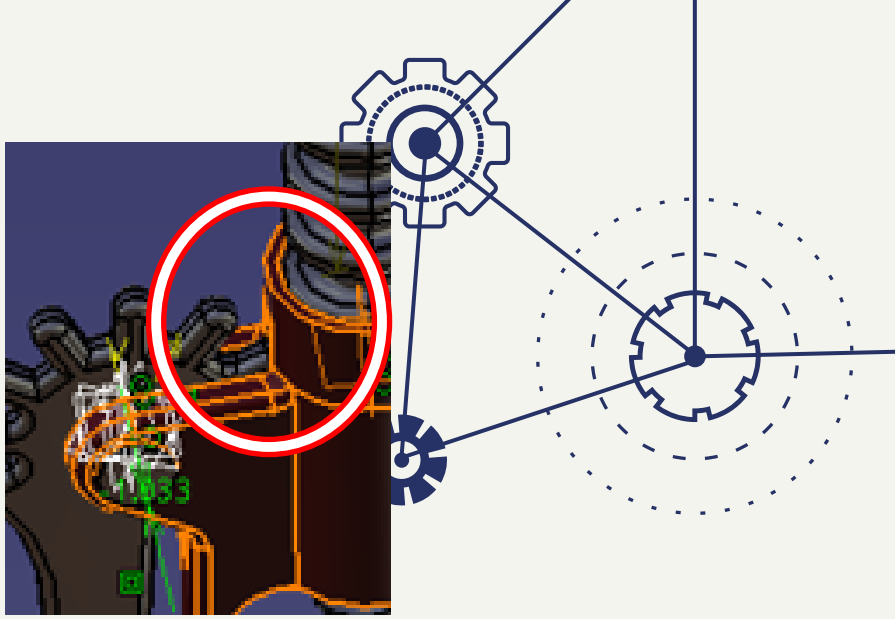


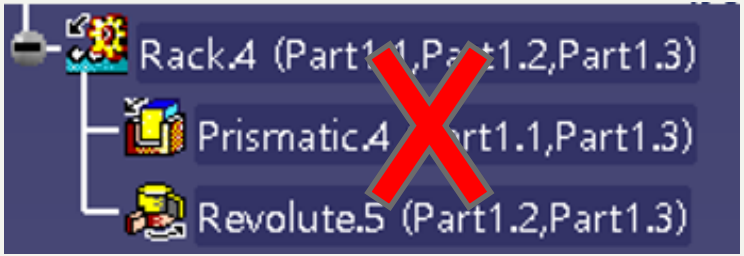




<Mechanism 2를 만들 때>

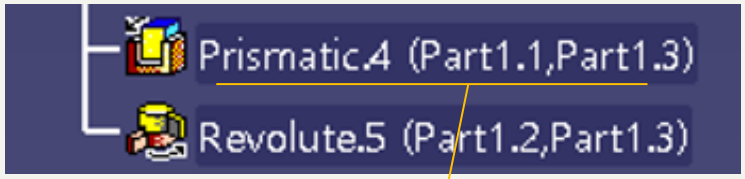


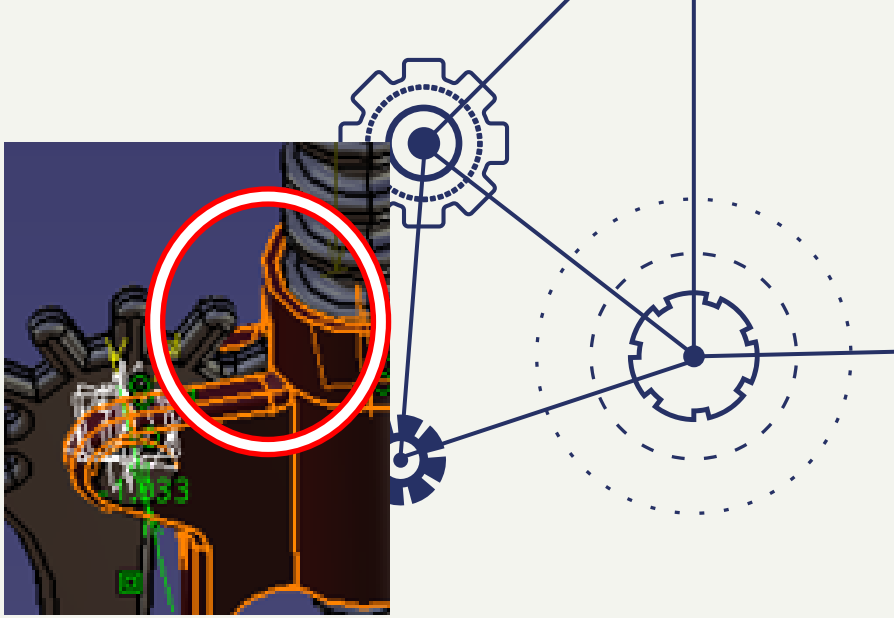




***Fix joint를 제외한 나머지 Joint는 Mechanism 1과 동일**

<Mechanism 2를 만들 때>



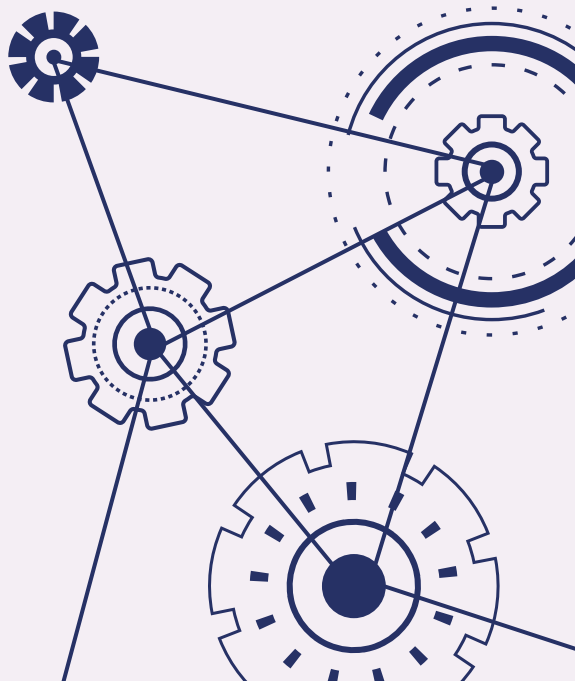


“Too many commands”

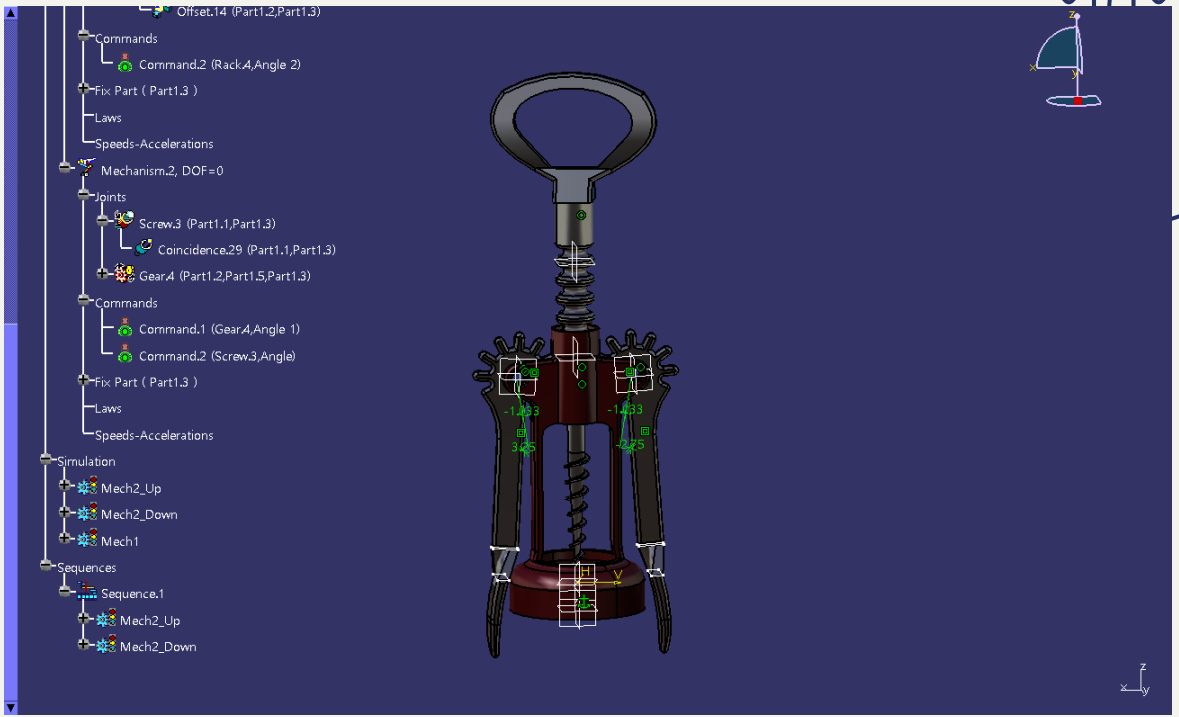
***Fix joint를 제외한 나머지 Joint는 Mechanism 1과 동일**

05

시뮬레이션

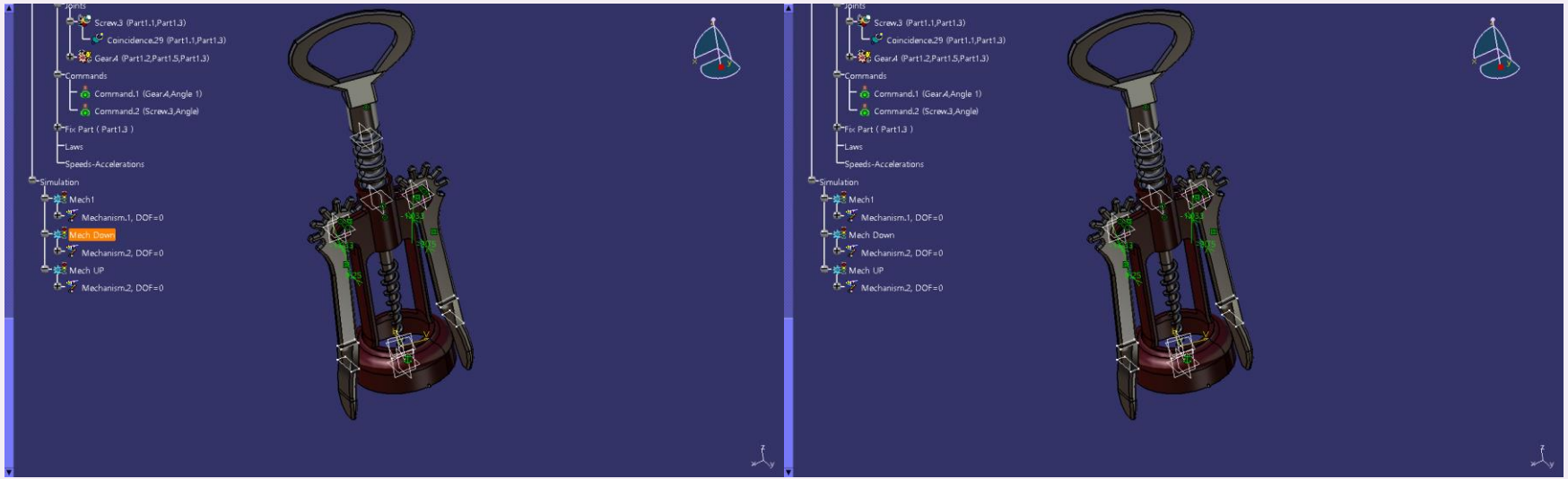


<Mechanism 1>


Offset.14 (Part1.2,Part1.3)
Commands
Command.2 (Rack.4,Angle 2)
Fix Part (Part1.3)
Laws
Speeds-Accelerations
Mechanism.2, DOF=0
Joints
Screw.3 (Part1.1,Part1.3)
Coincidence.29 (Part1.1,Part1.3)
Gear.4 (Part1.2,Part1.5,Part1.3)
Commands
Command.1 (Gear.4,Angle 1)
Command.2 (Screw.3,Angle)
Fix Part (Part1.3)
Laws
Speeds-Accelerations
Simulation
Mech2_Up
Mech2_Down
Mech1
Sequences
Sequence.1
Mech2_Up
Mech2_Down

<Mechanism 2>

Sequence



<Total Mechanism>

2024년 6월 18일 (youtube.com)