



2025 CAD TEAM PROJECT

Prosthetic Hand Simulation

Team_HANDSOME | 2022042833 나현웅 2024013936 최현규



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CHAPTER 01 🔍

주제 선정 배경



기계적 원리 다수 포함

공익 증진



CHAPTER 01 🔍

역할 분배

나현웅

- 1. 팔 상완 & 하완 모델링
- 2. 손 & 팔뚝 ASSEMBLY DESIGN
- 3. DMU KINEMATICS

최현규

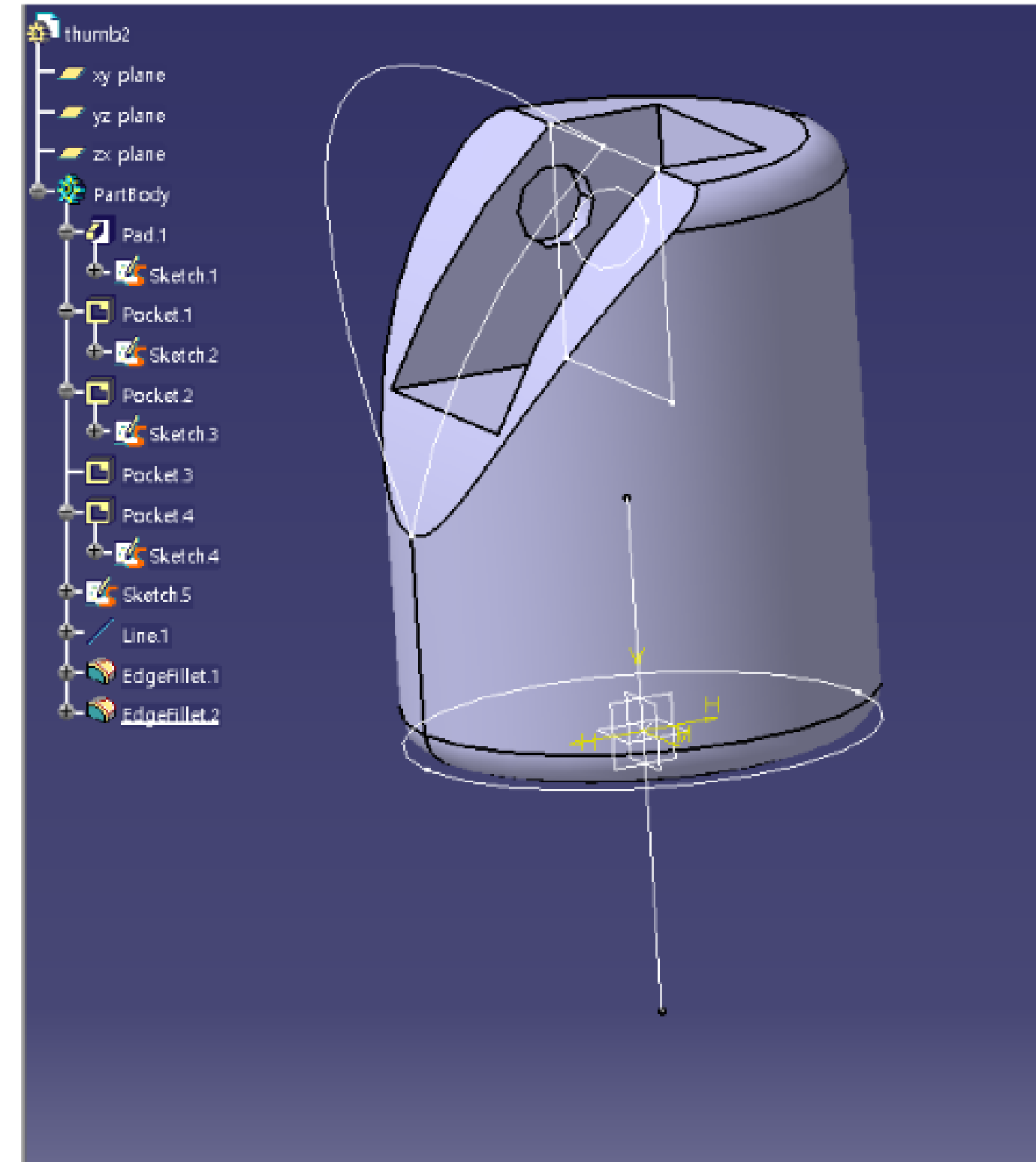
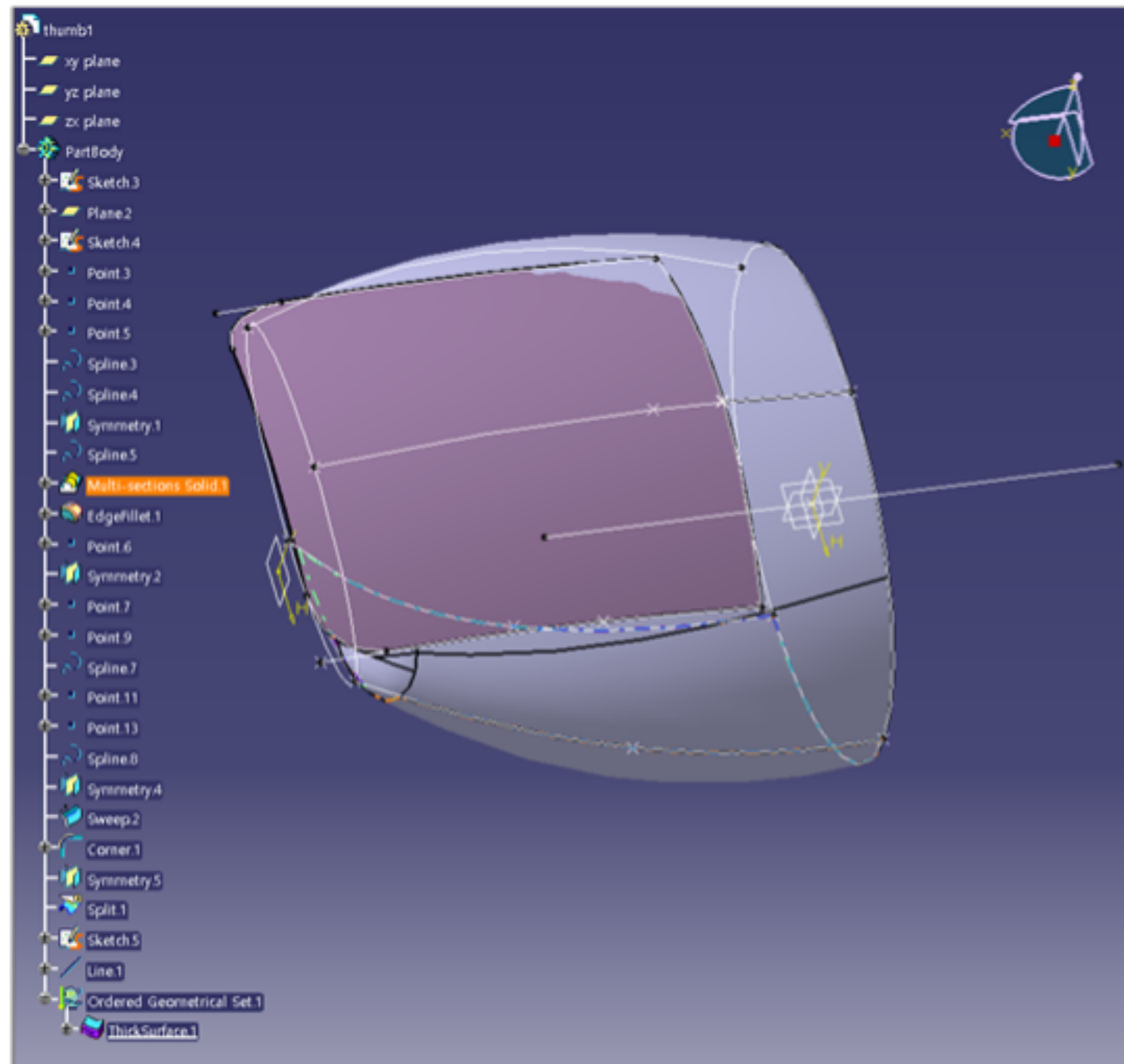
- 1. 손가락 & 손 모델링
- 2. 손 전체 ASSEMBLY DESIGN
- 3. 발표 자료 제작



CHAPTER 02 🔍

Modeling 및 Design 과정

엄지

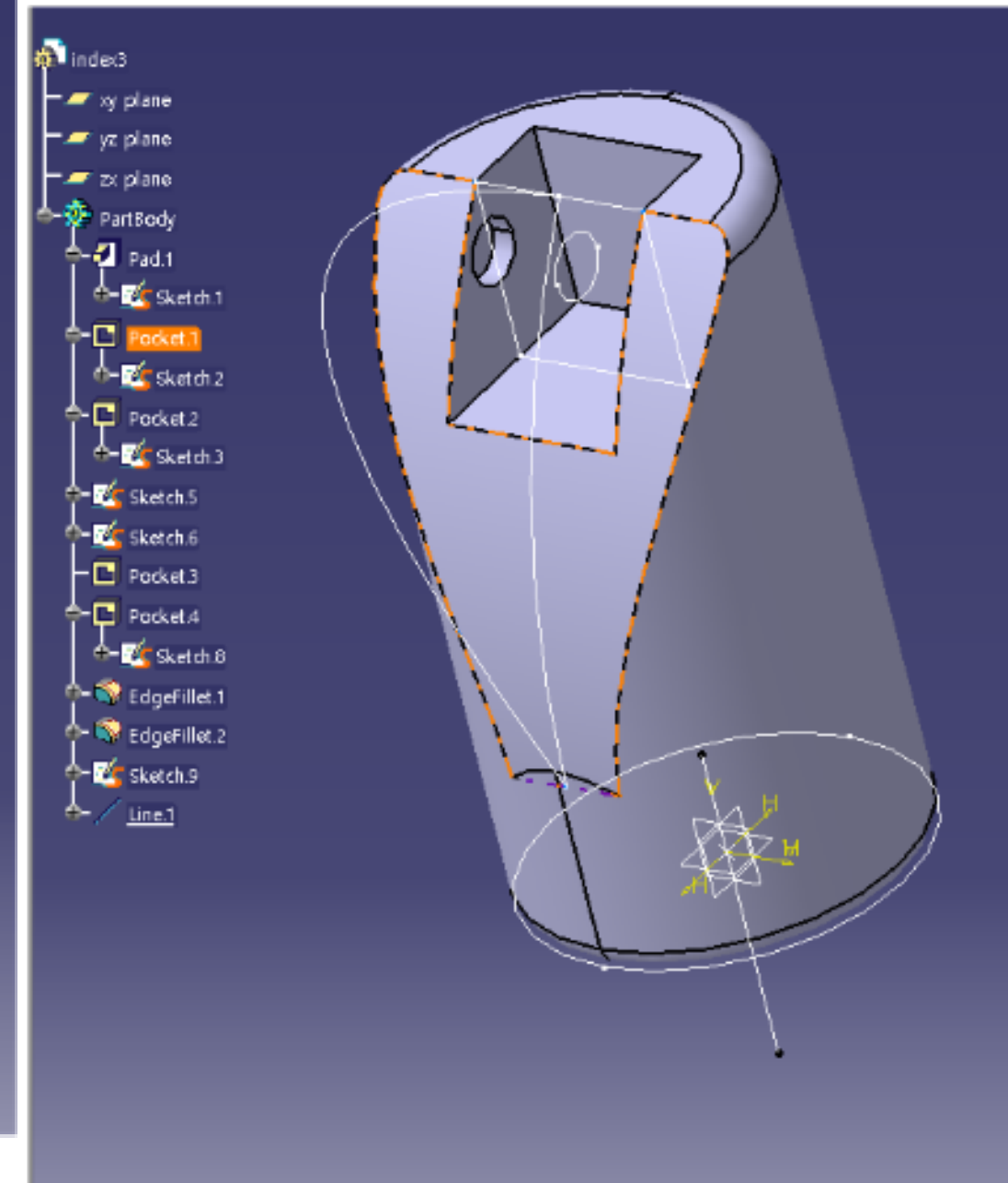
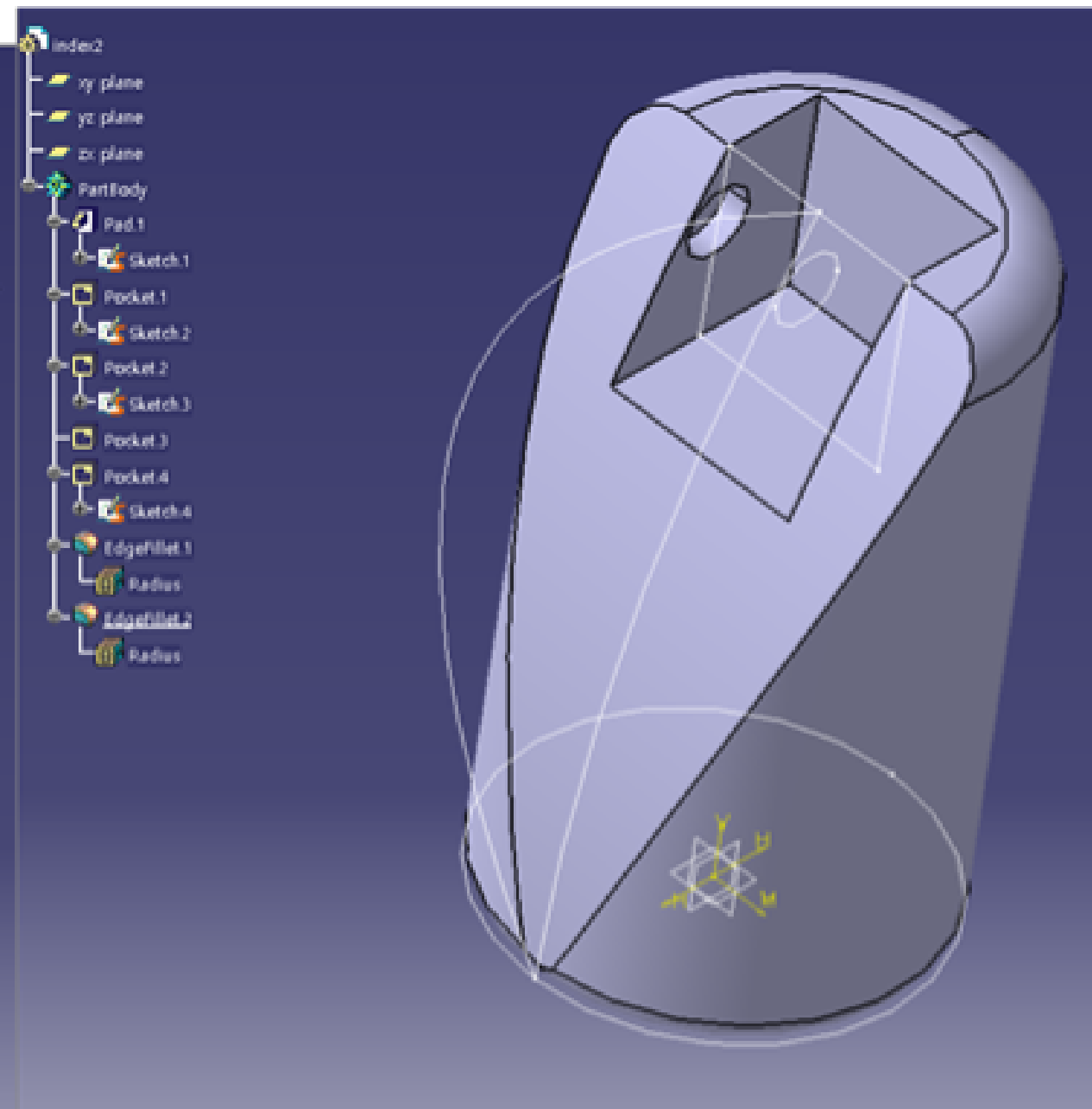
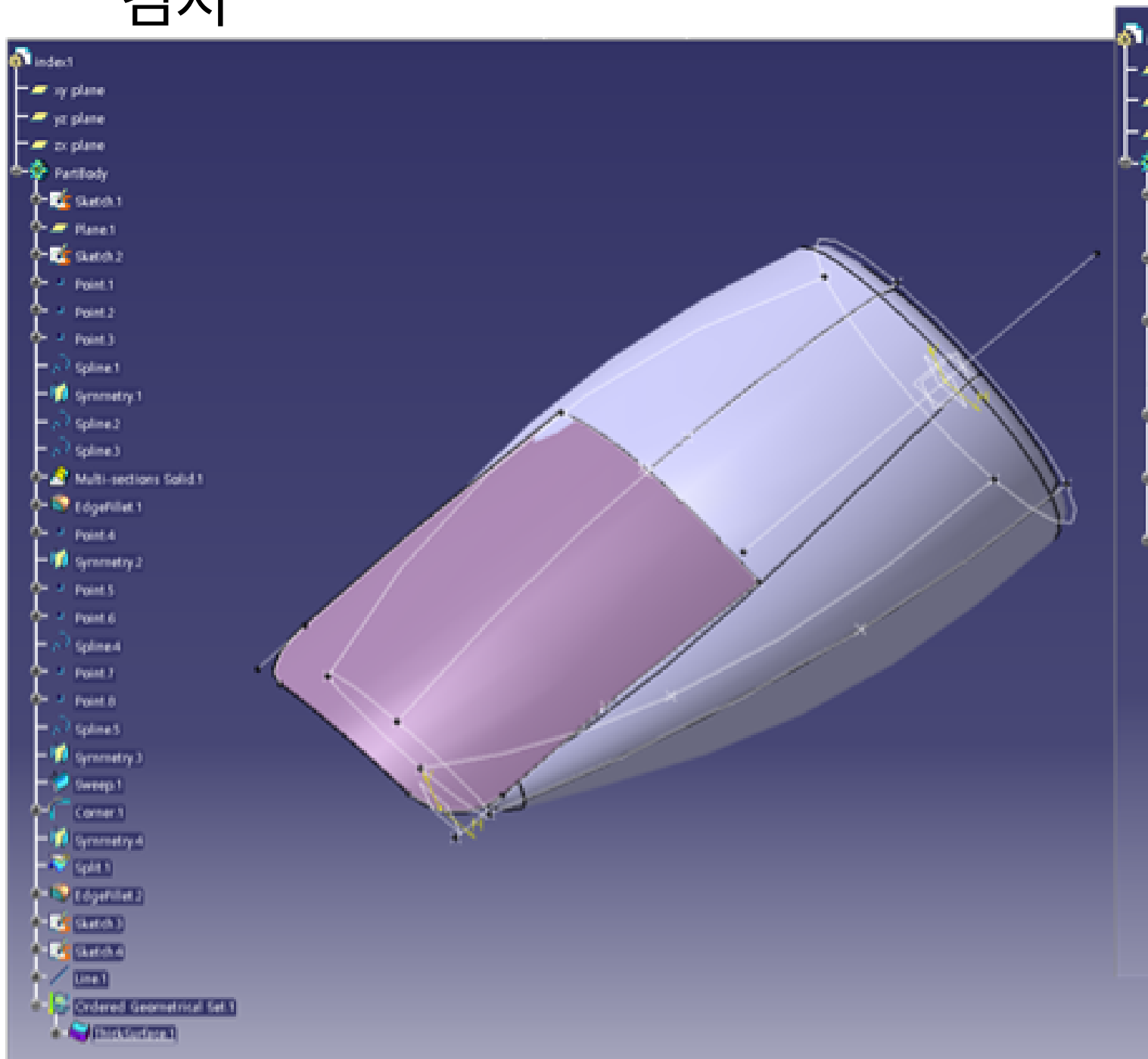




CHAPTER 02 🔍

Modeling 및 Design 과정

검지

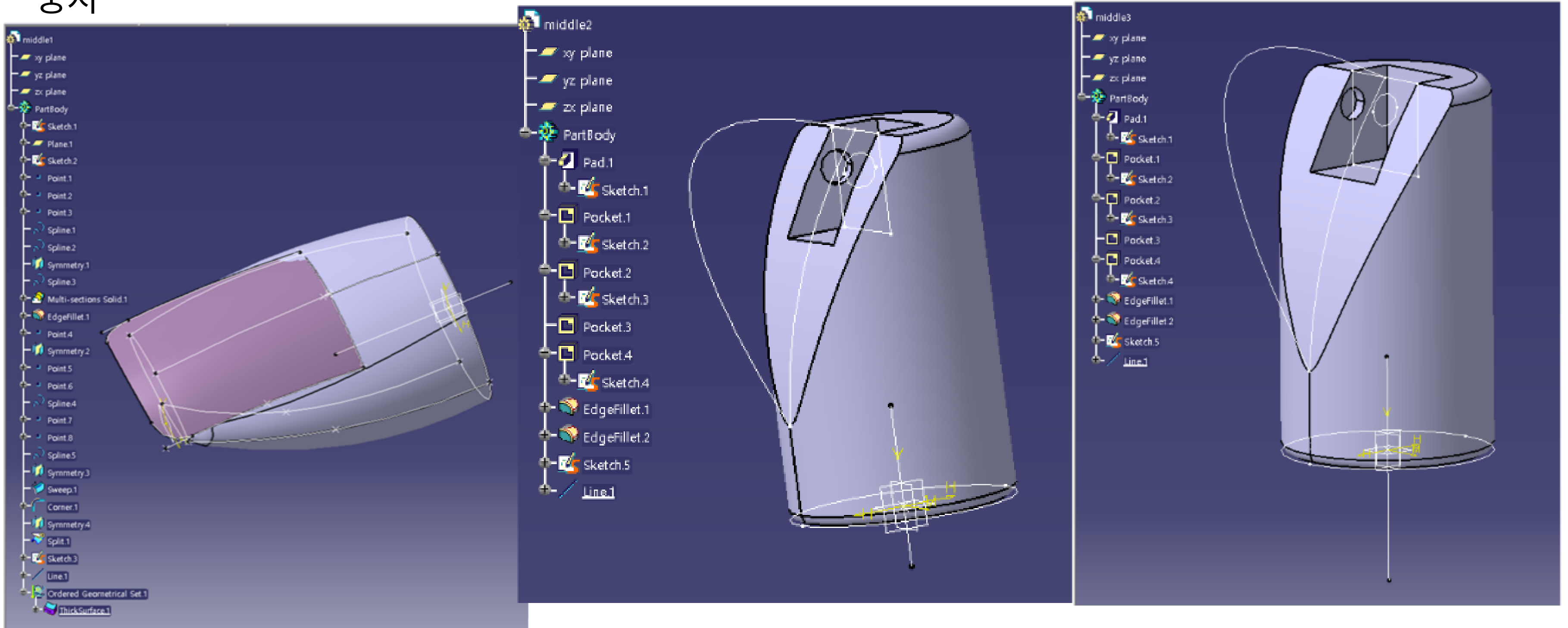




CHAPTER 02 🔍

Modeling 및 Design 과정

중지

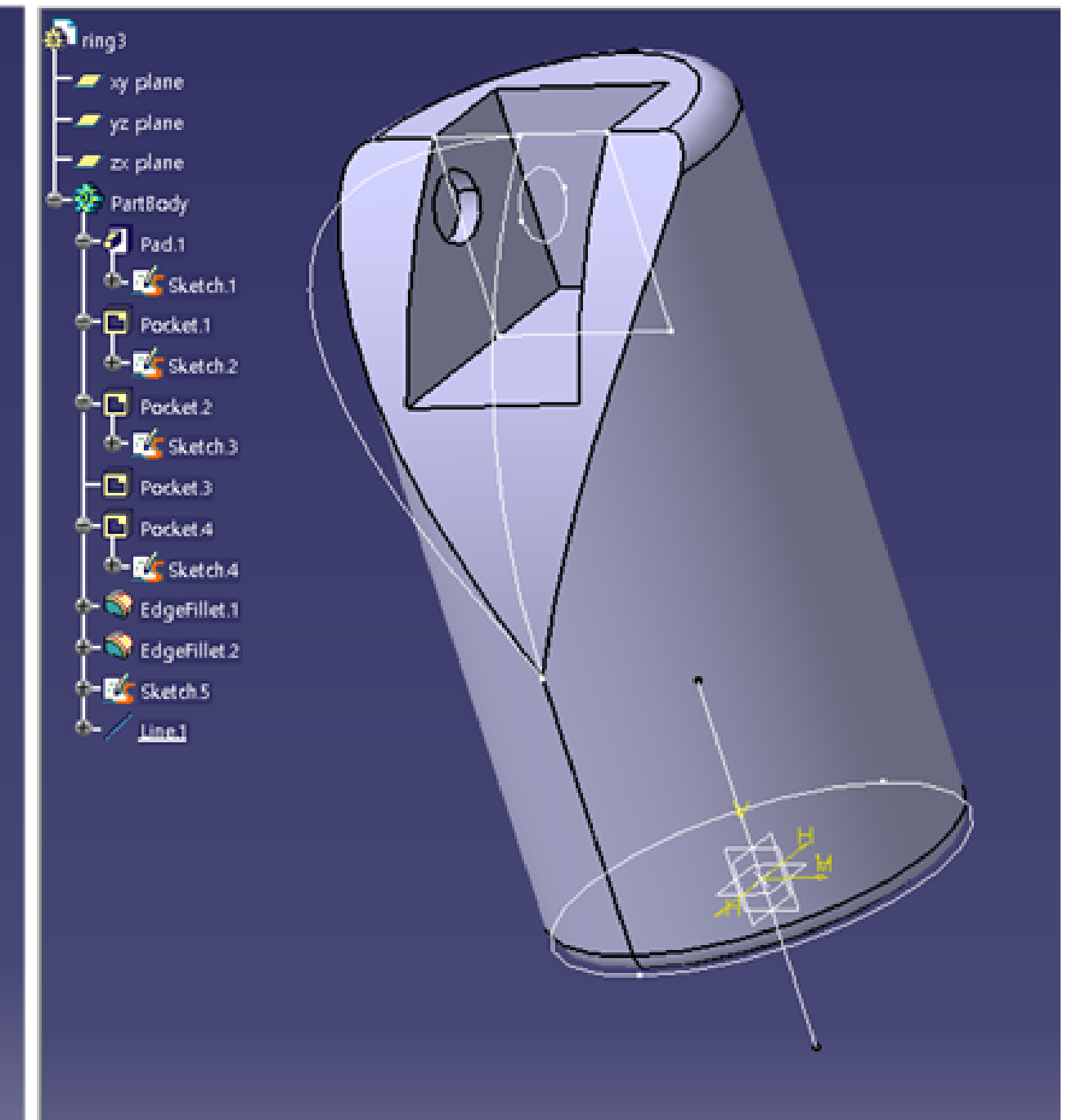
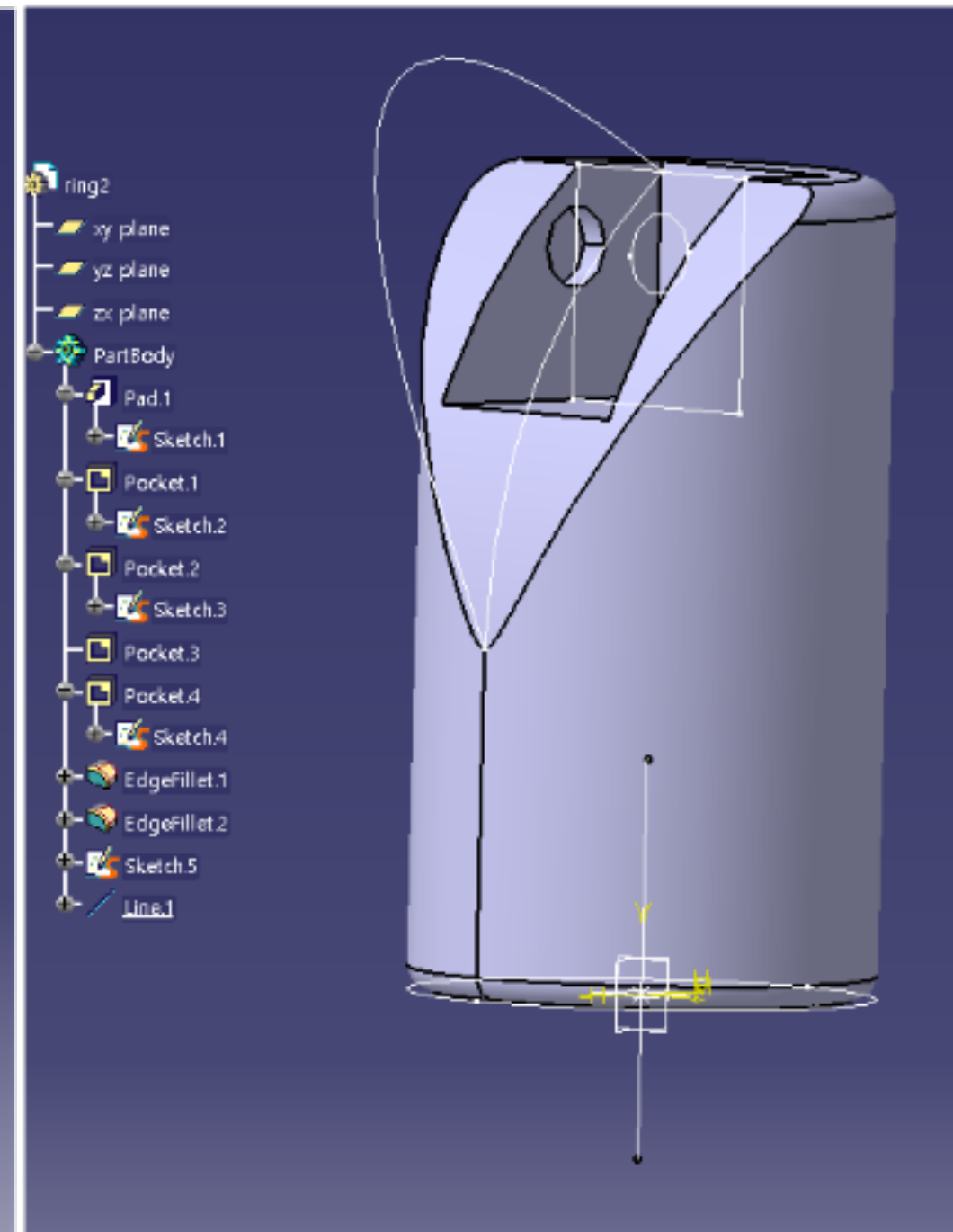
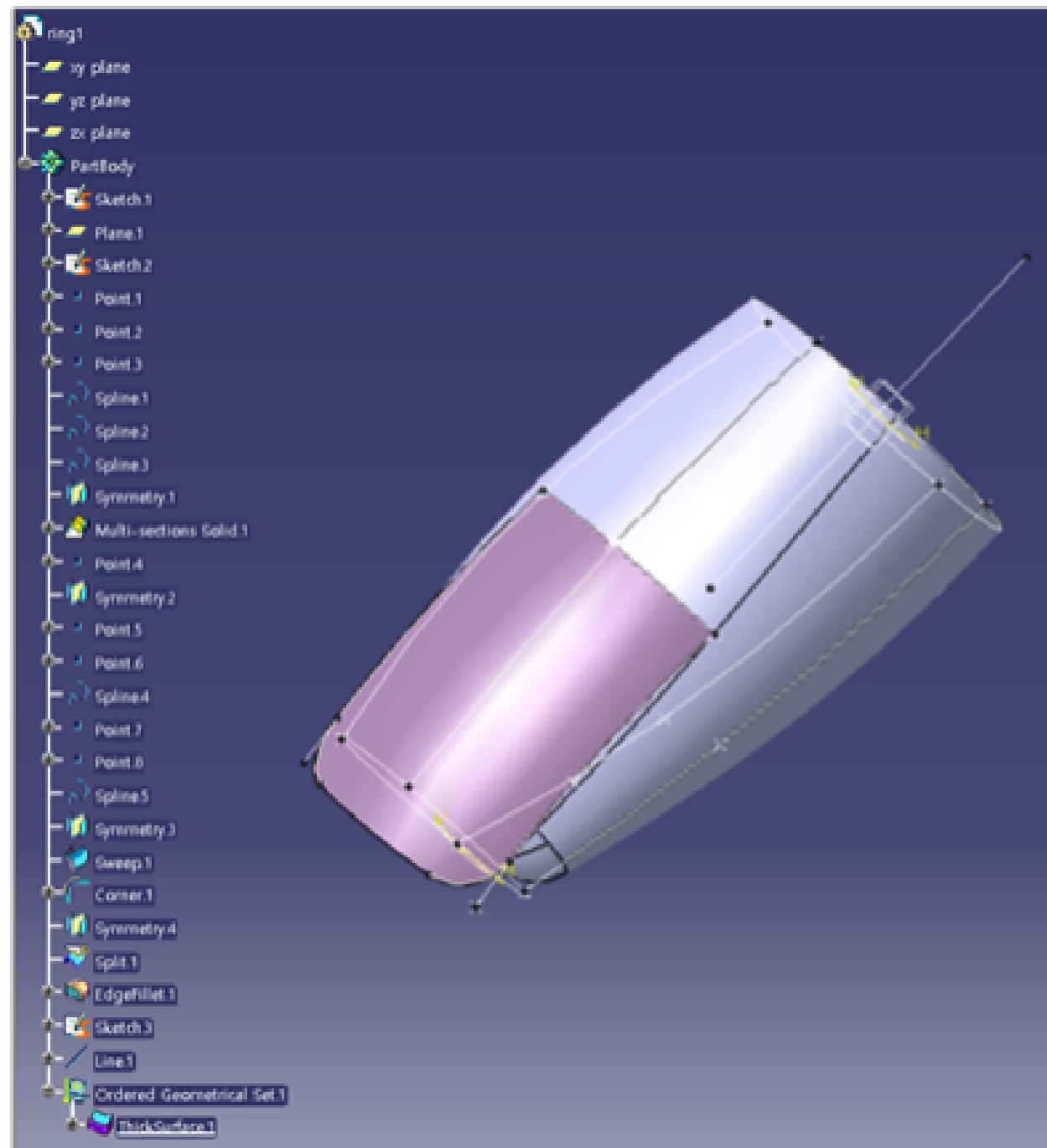




CHAPTER 02 🔍

Modeling 및 Design 과정

약지

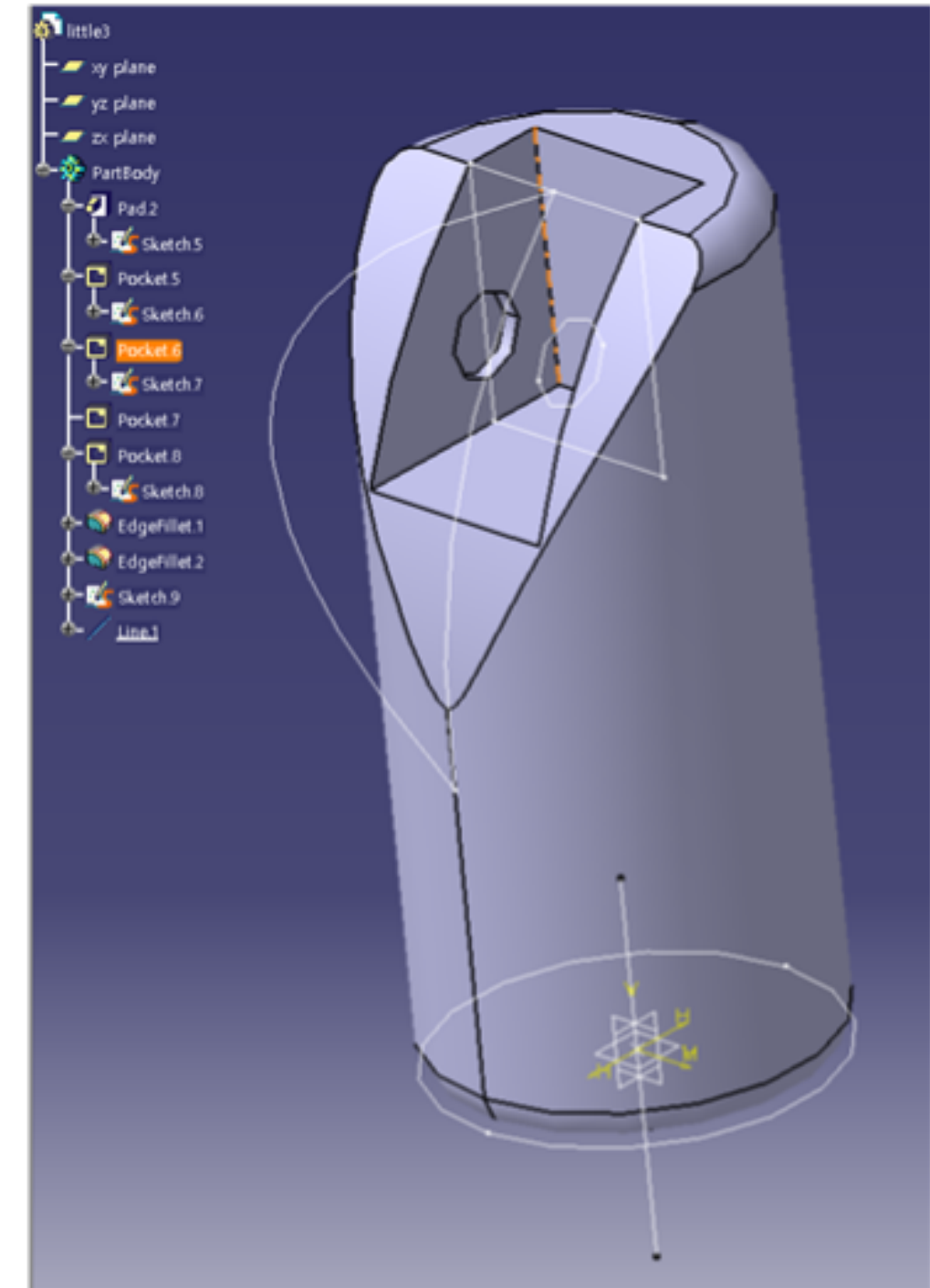
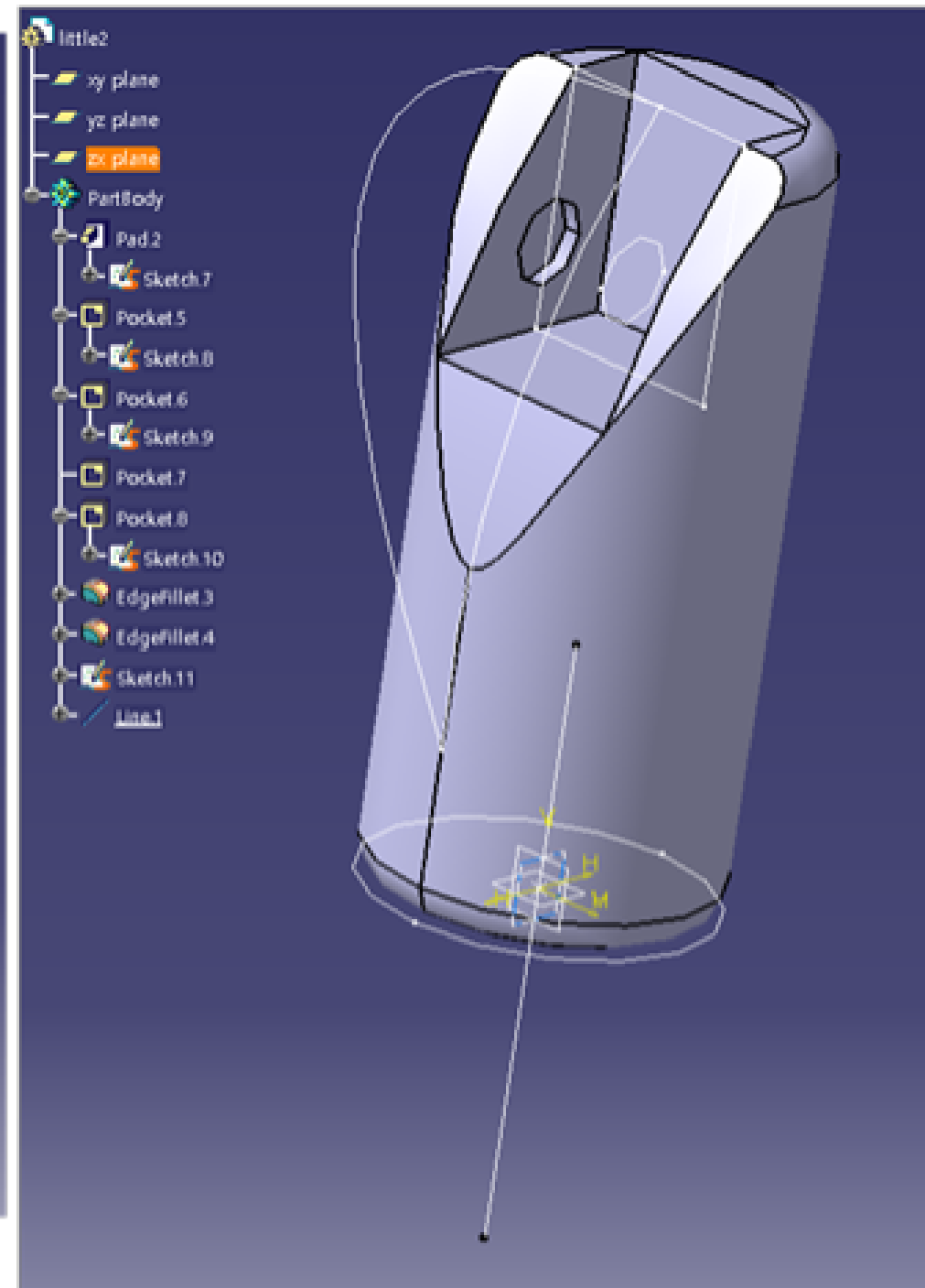
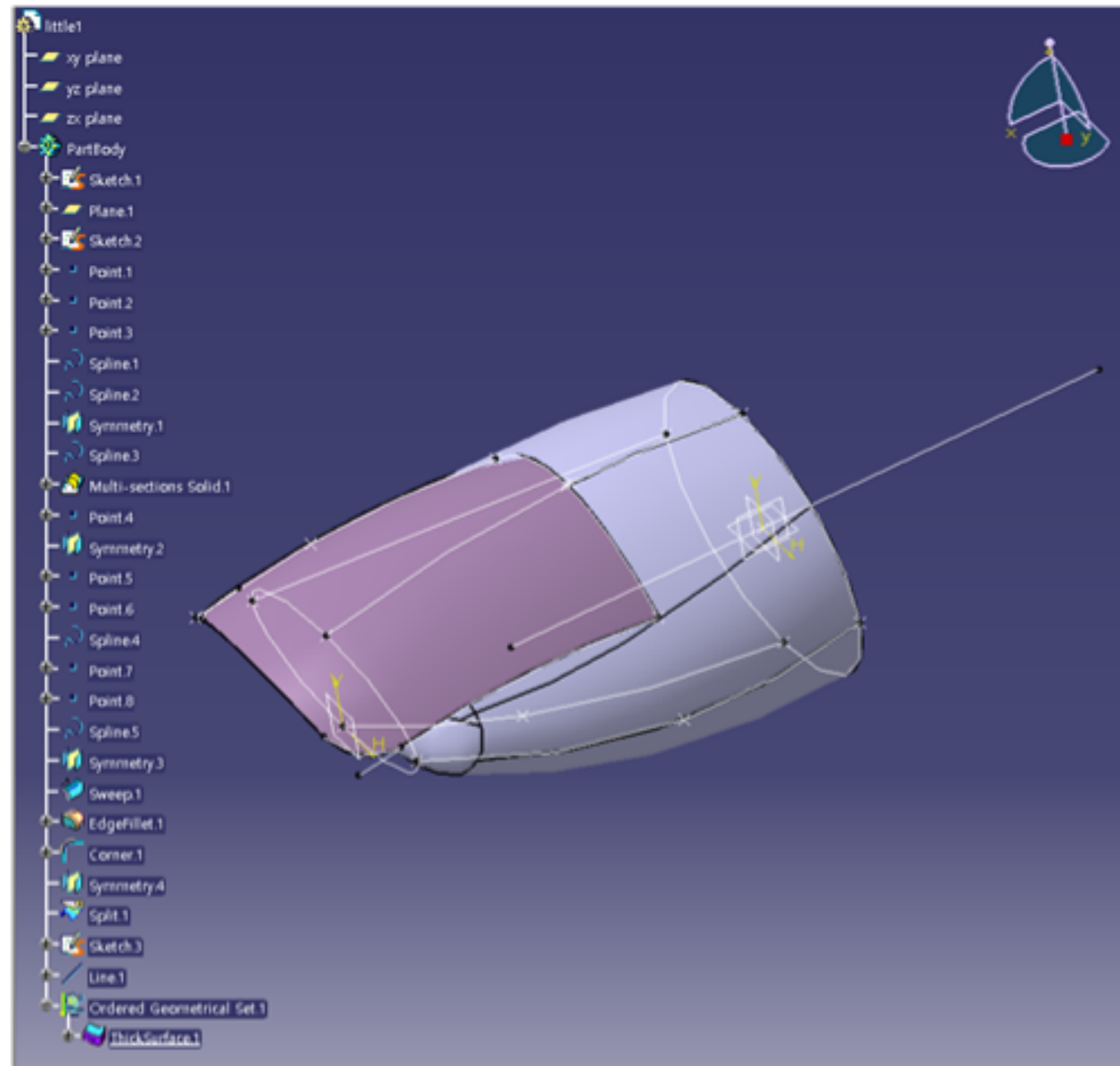




CHAPTER 02 🔍

Modeling 및 Design 과정

소지



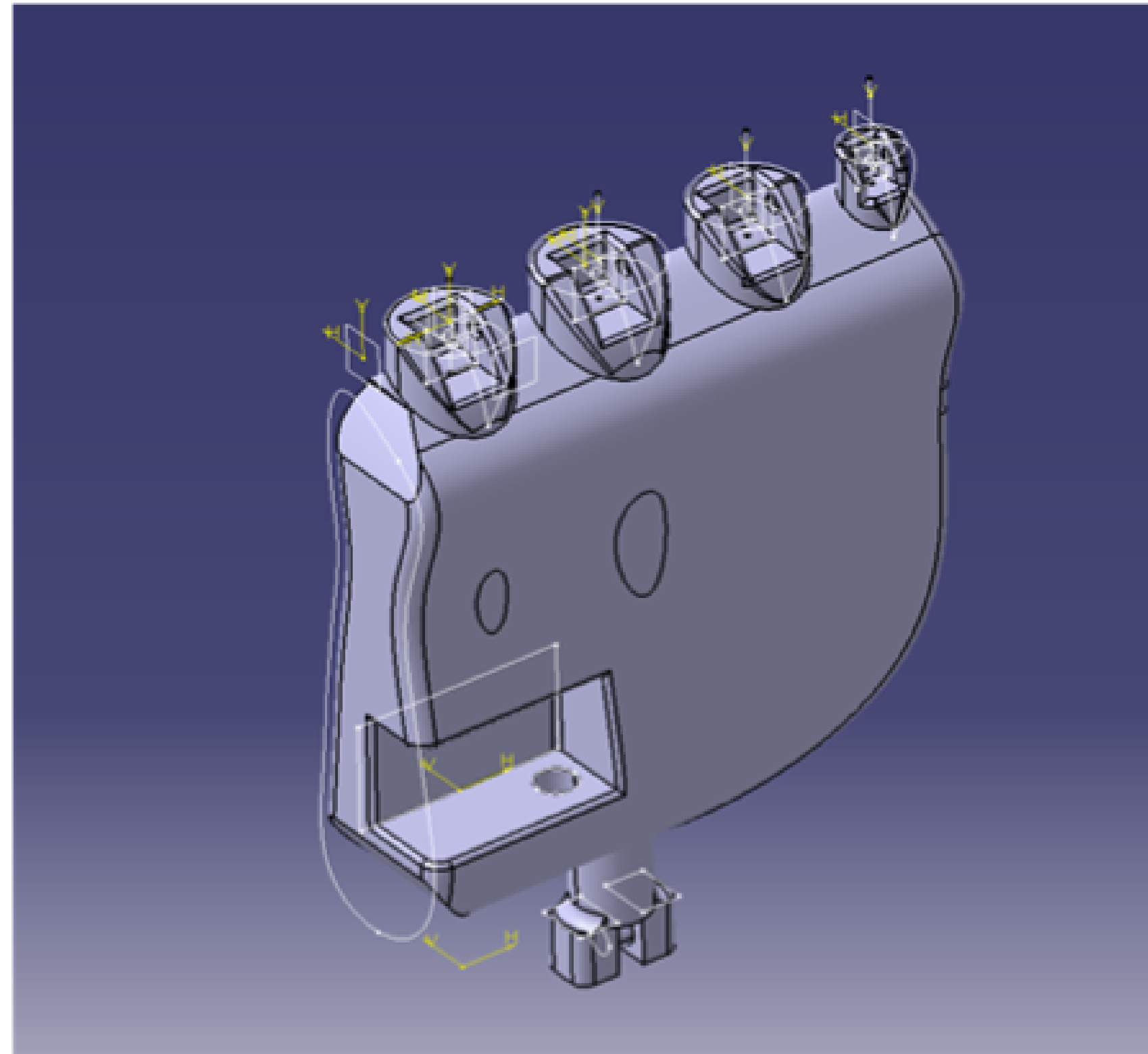


CHAPTER 02



Modeling 및 Design 과정

수

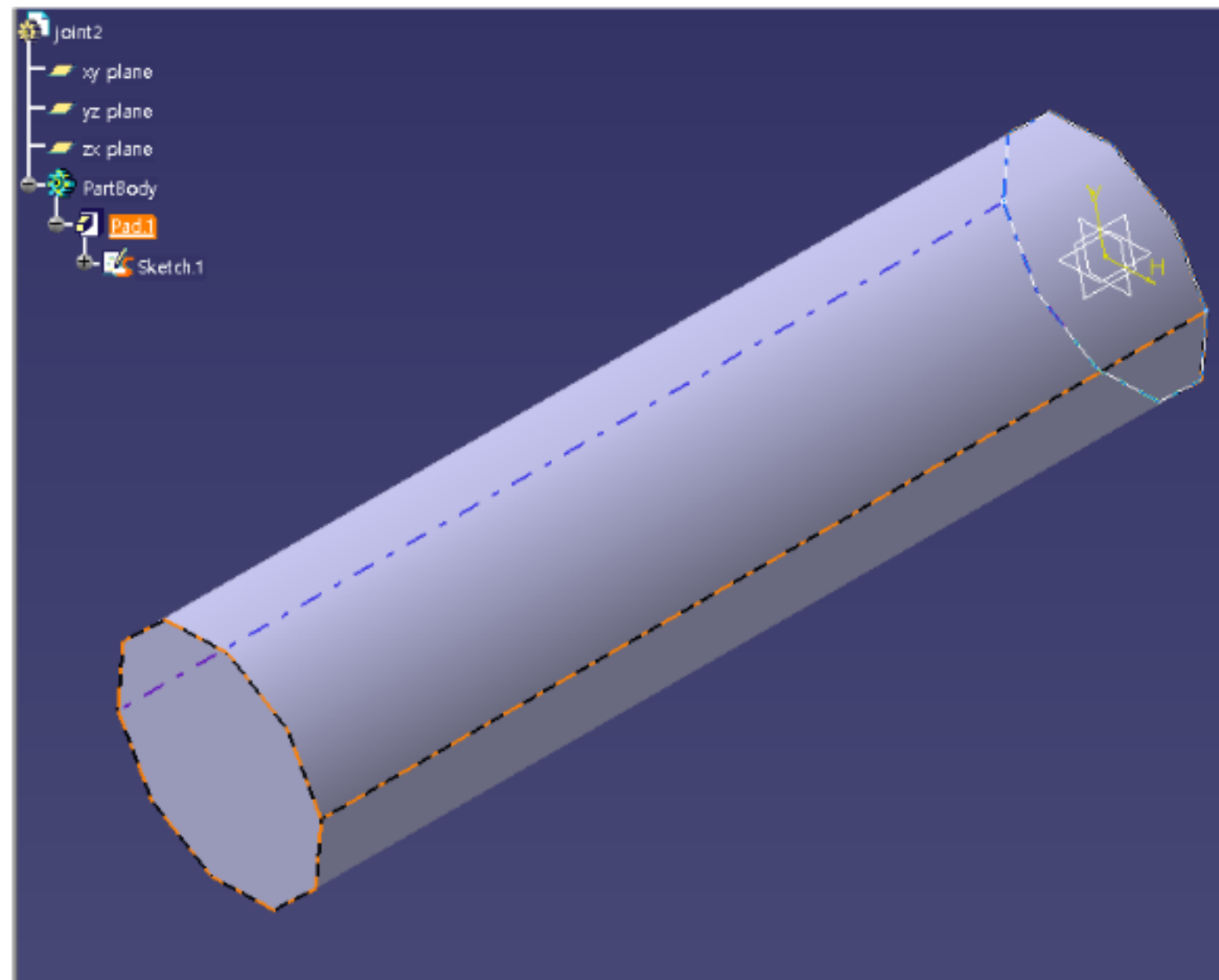
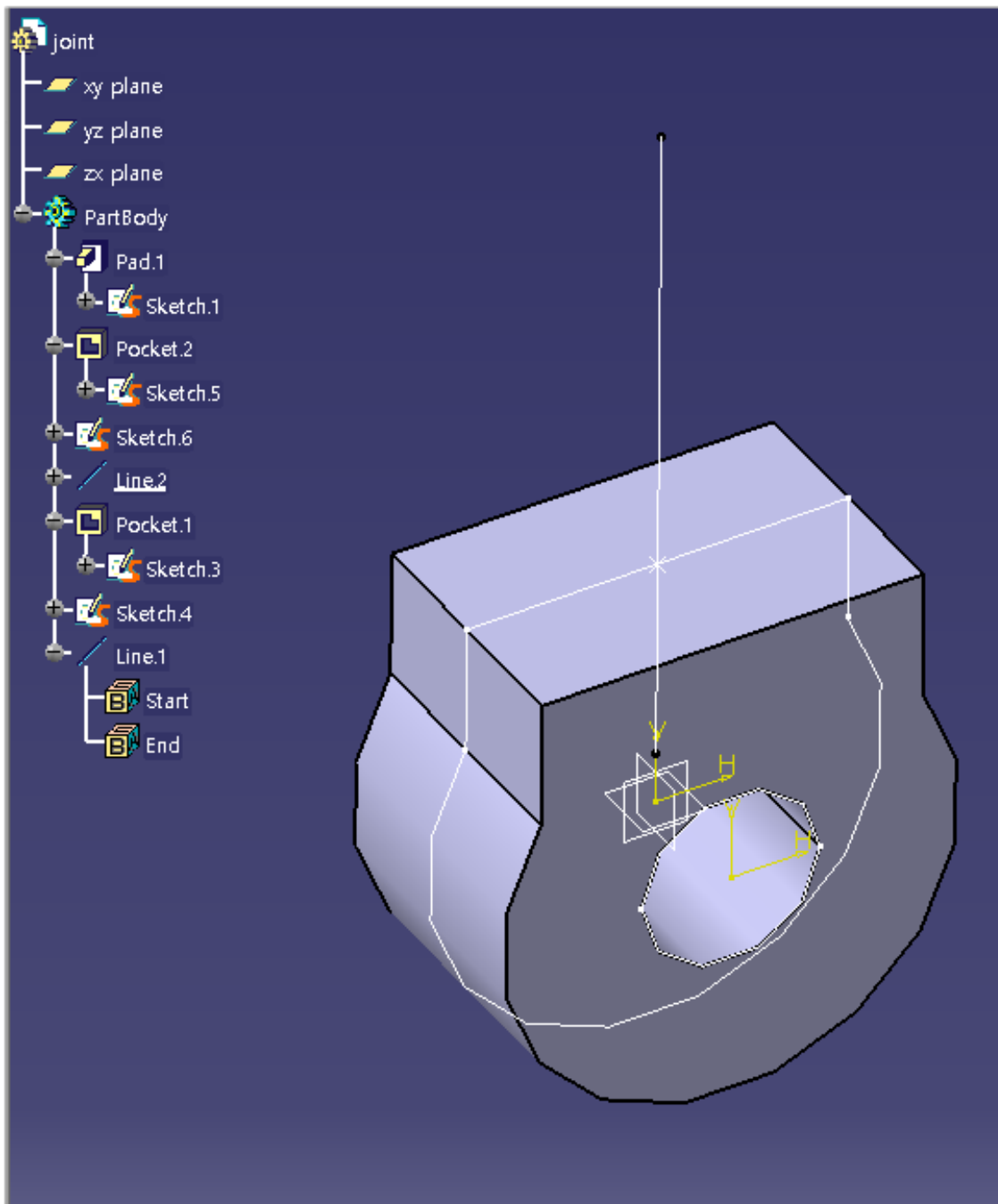




CHAPTER 02 🔍

Modeling 및 Design 과정

손가락 관절(검지, 중지, 약지)

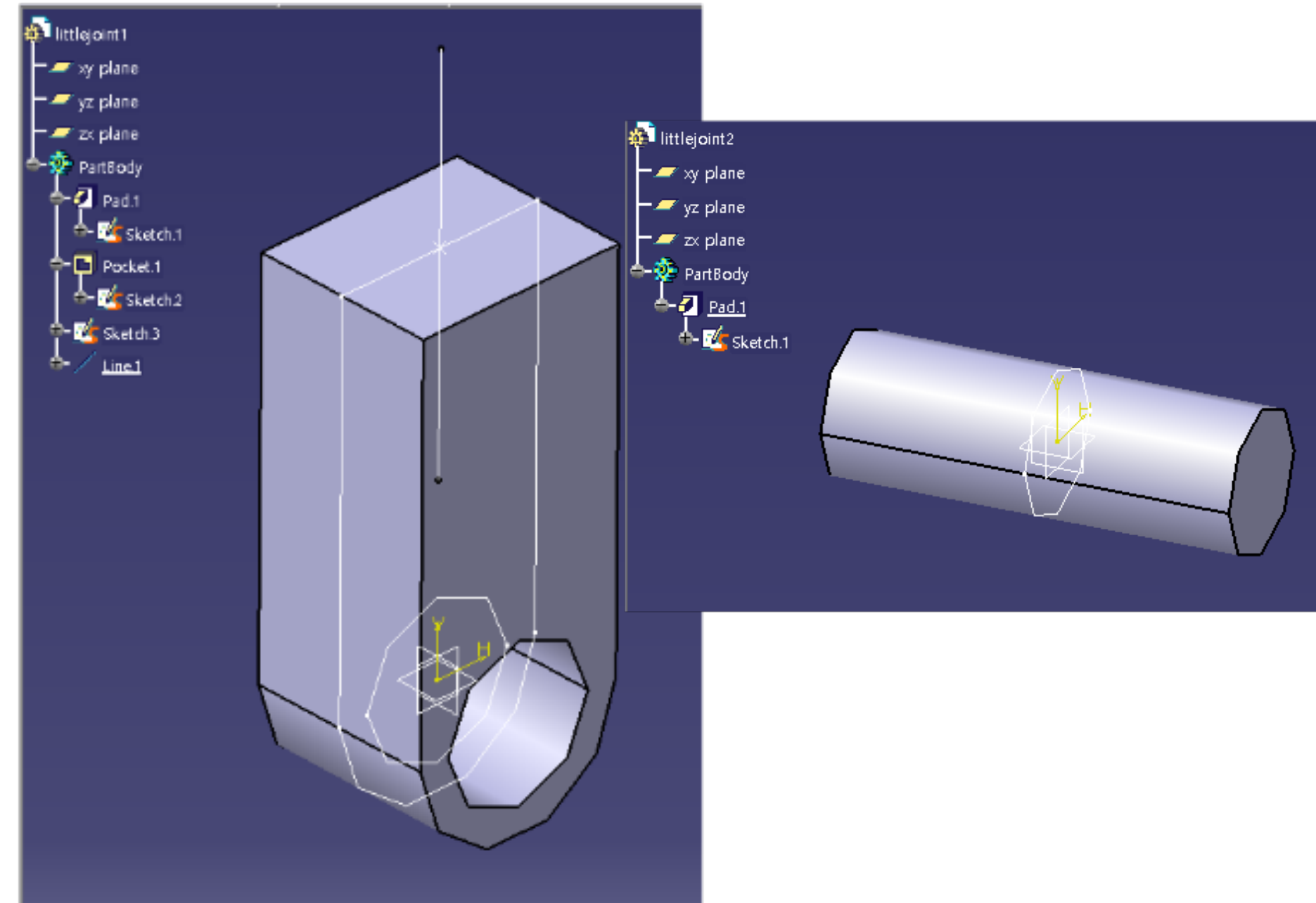
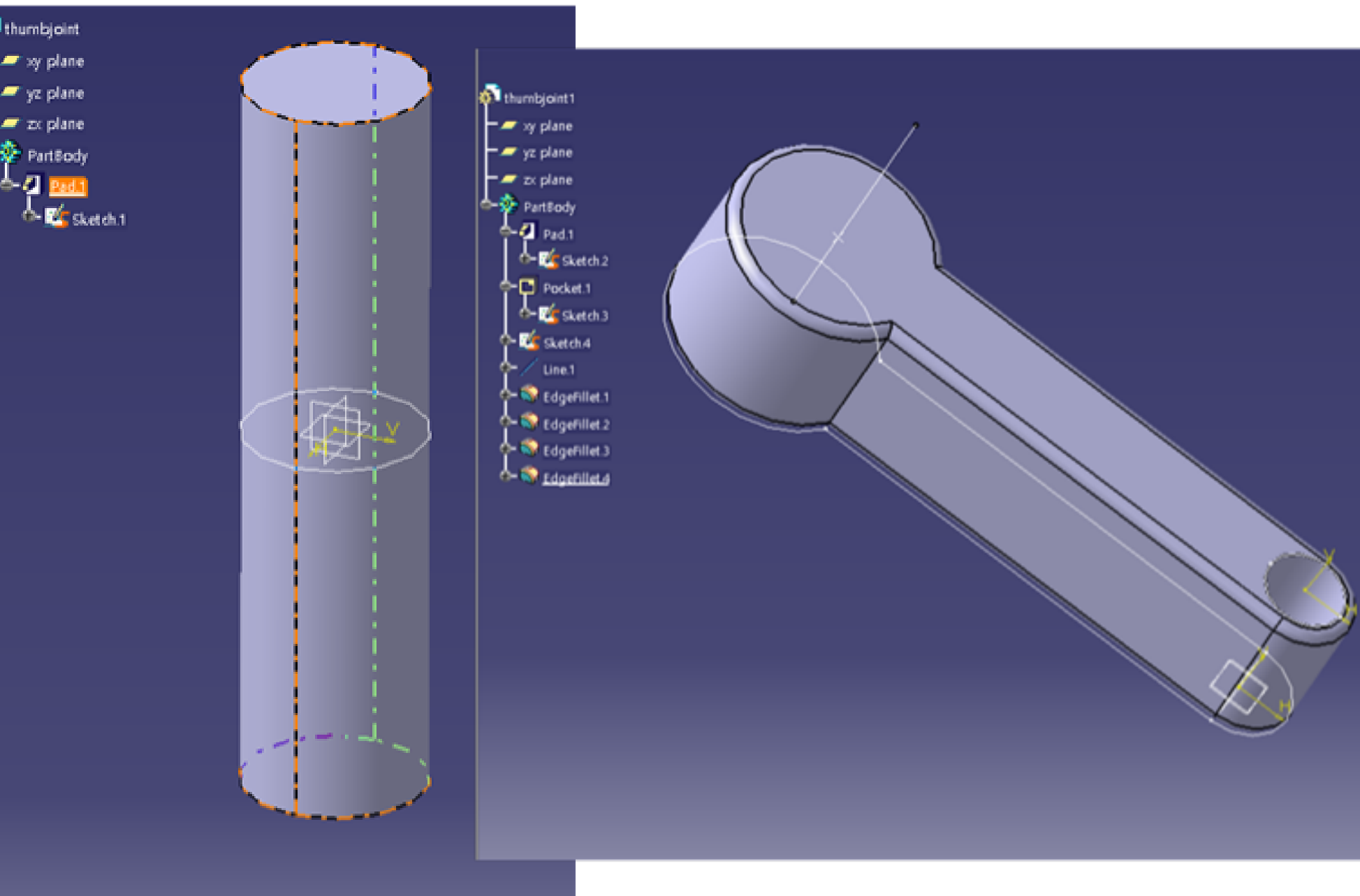




CHAPTER 02 🔍

Modeling 및 Design 과정

손가락 관절(엄지(왼쪽), 소지(오른쪽))

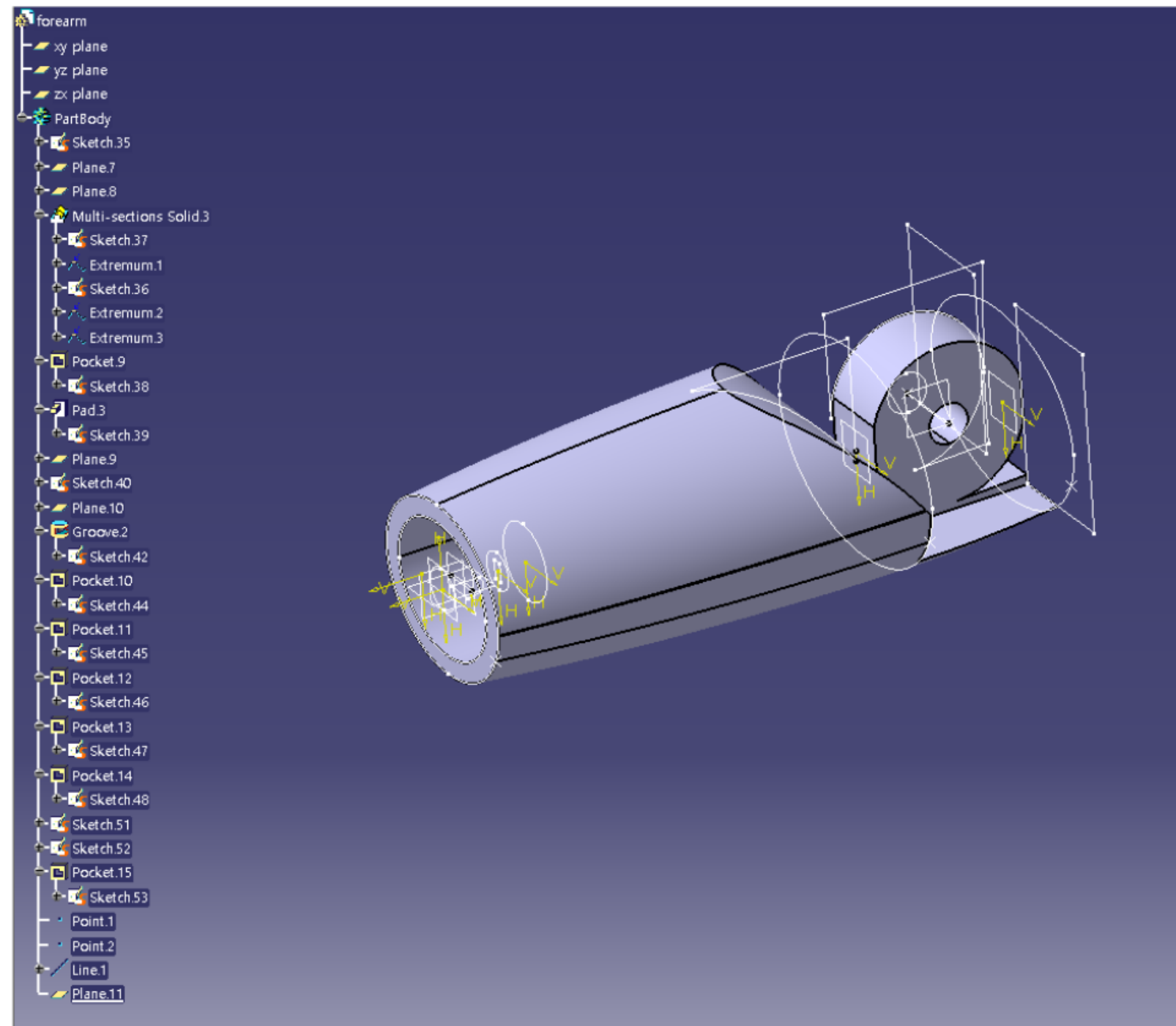
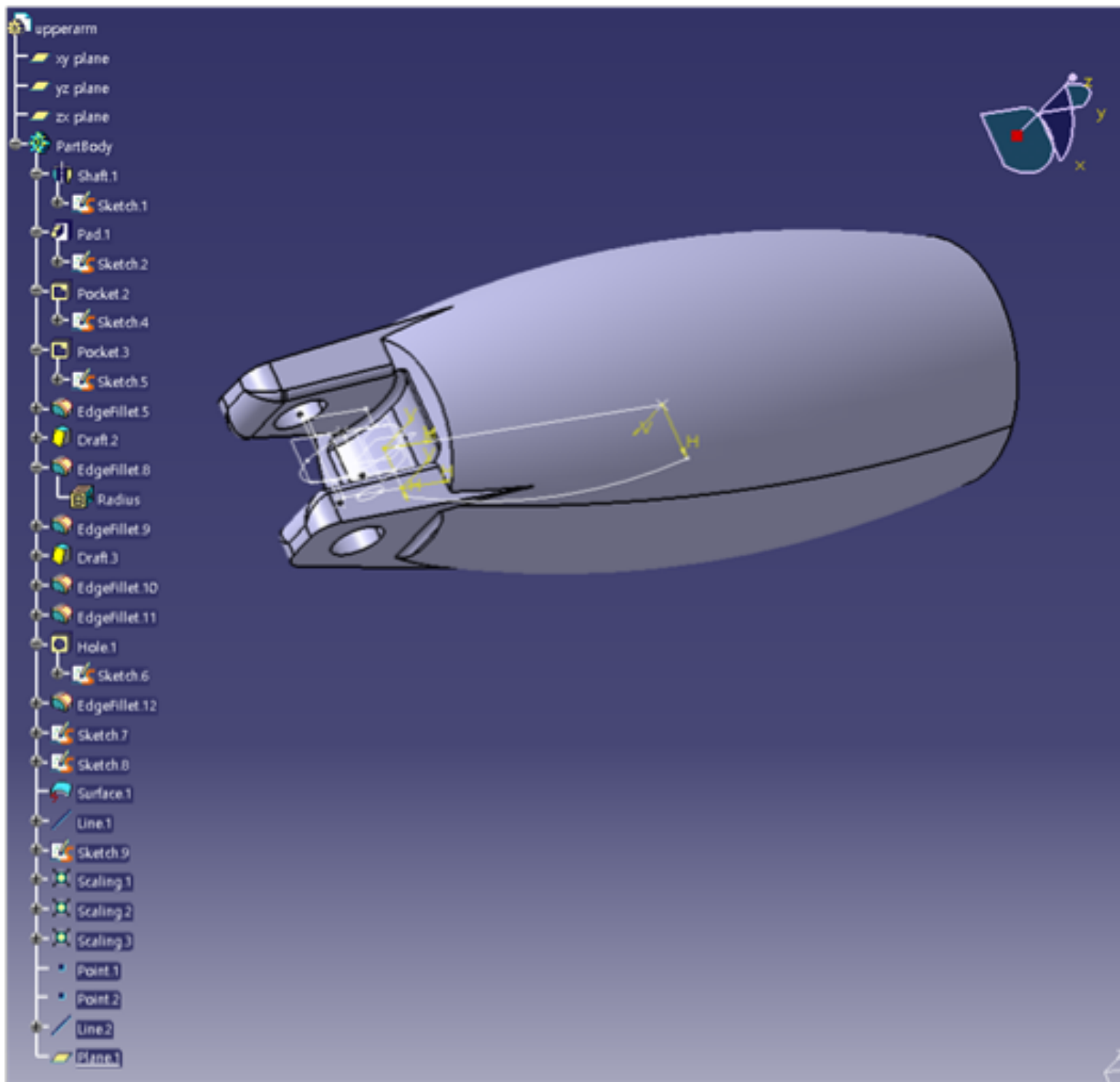




CHAPTER 02 🔍

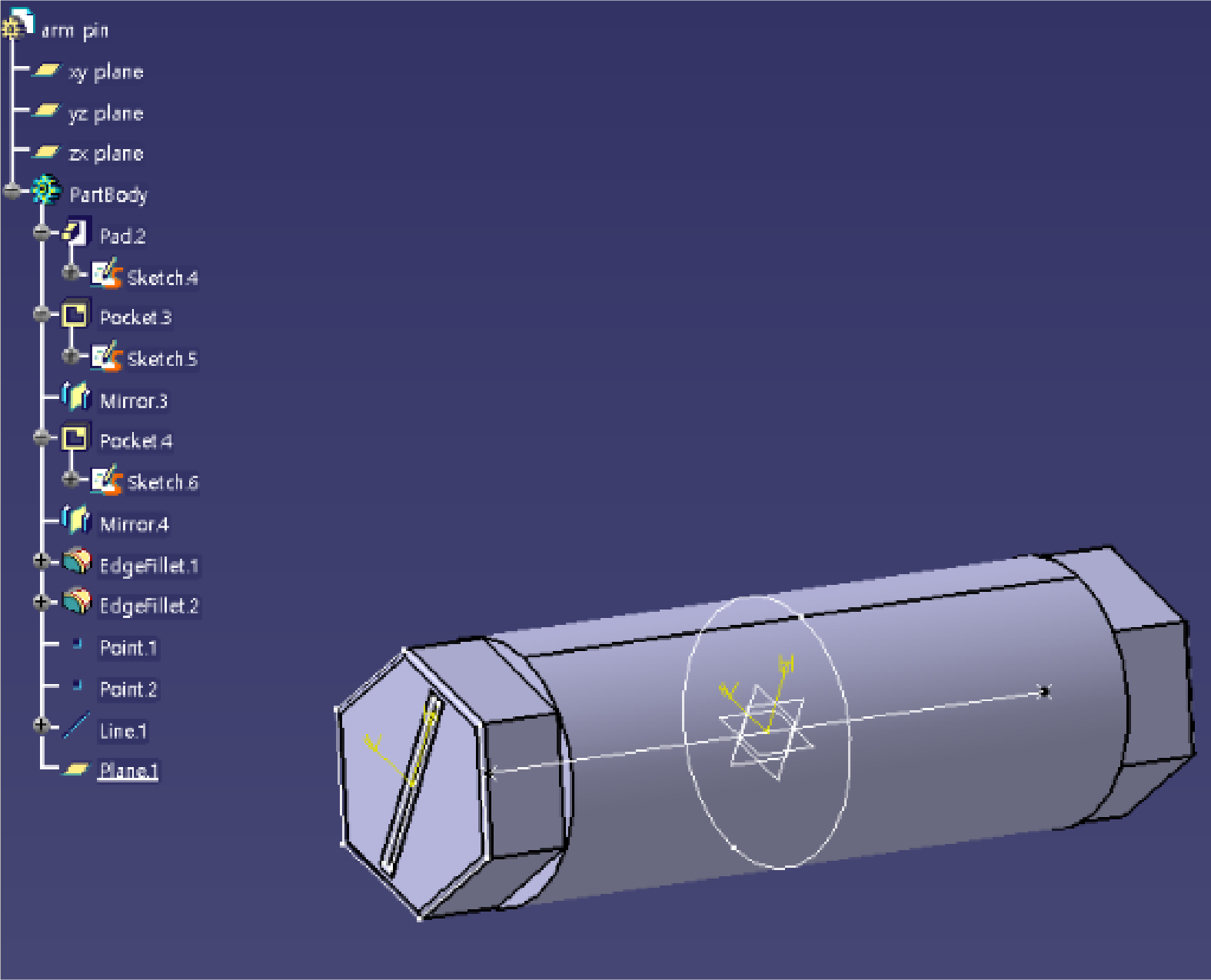
Modeling 및 Design 과정

팔뚝(상완(왼쪽), 하완(오른쪽))

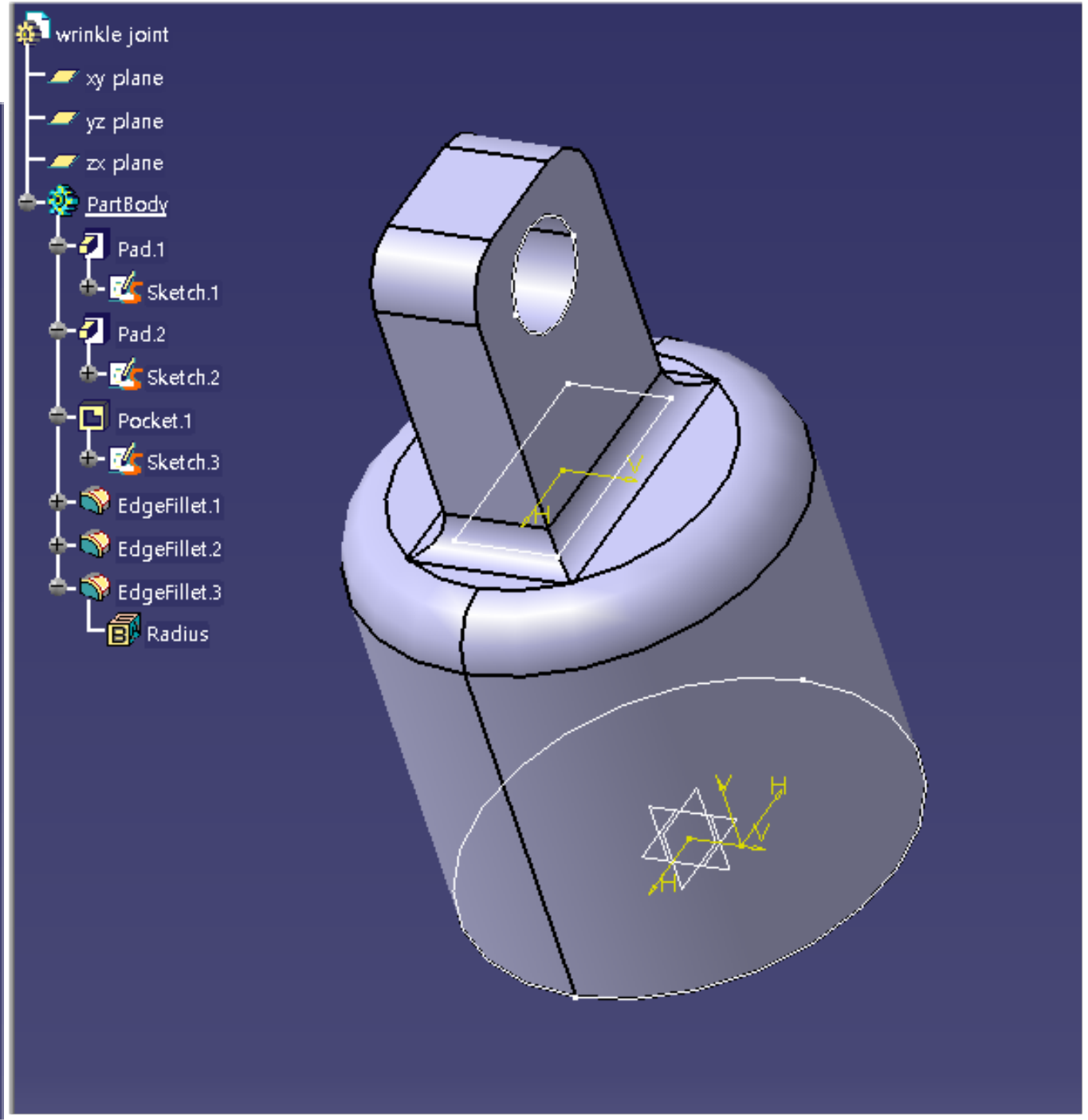


Modeling 및 Design 과정

팔꿈치 관절



손목 관절



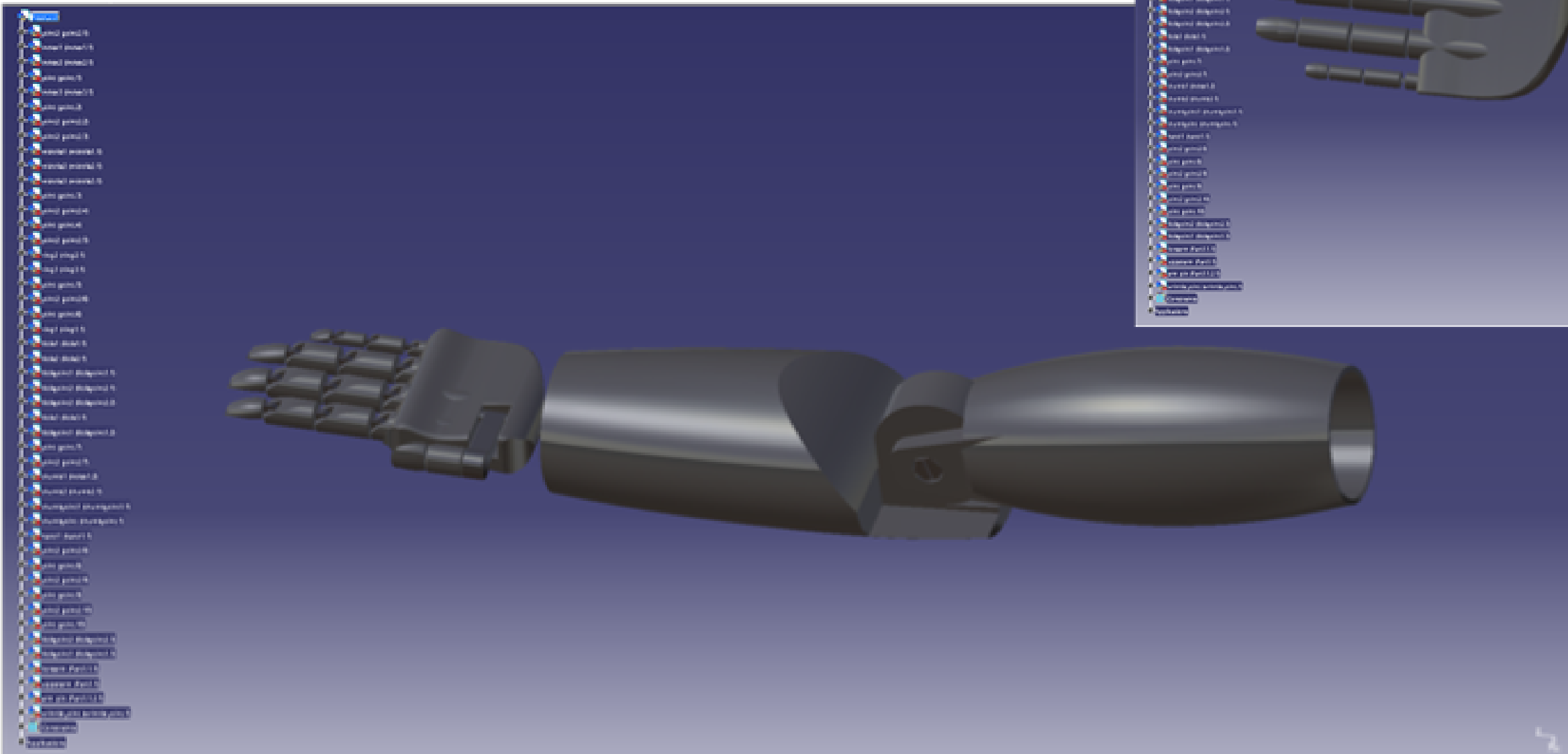
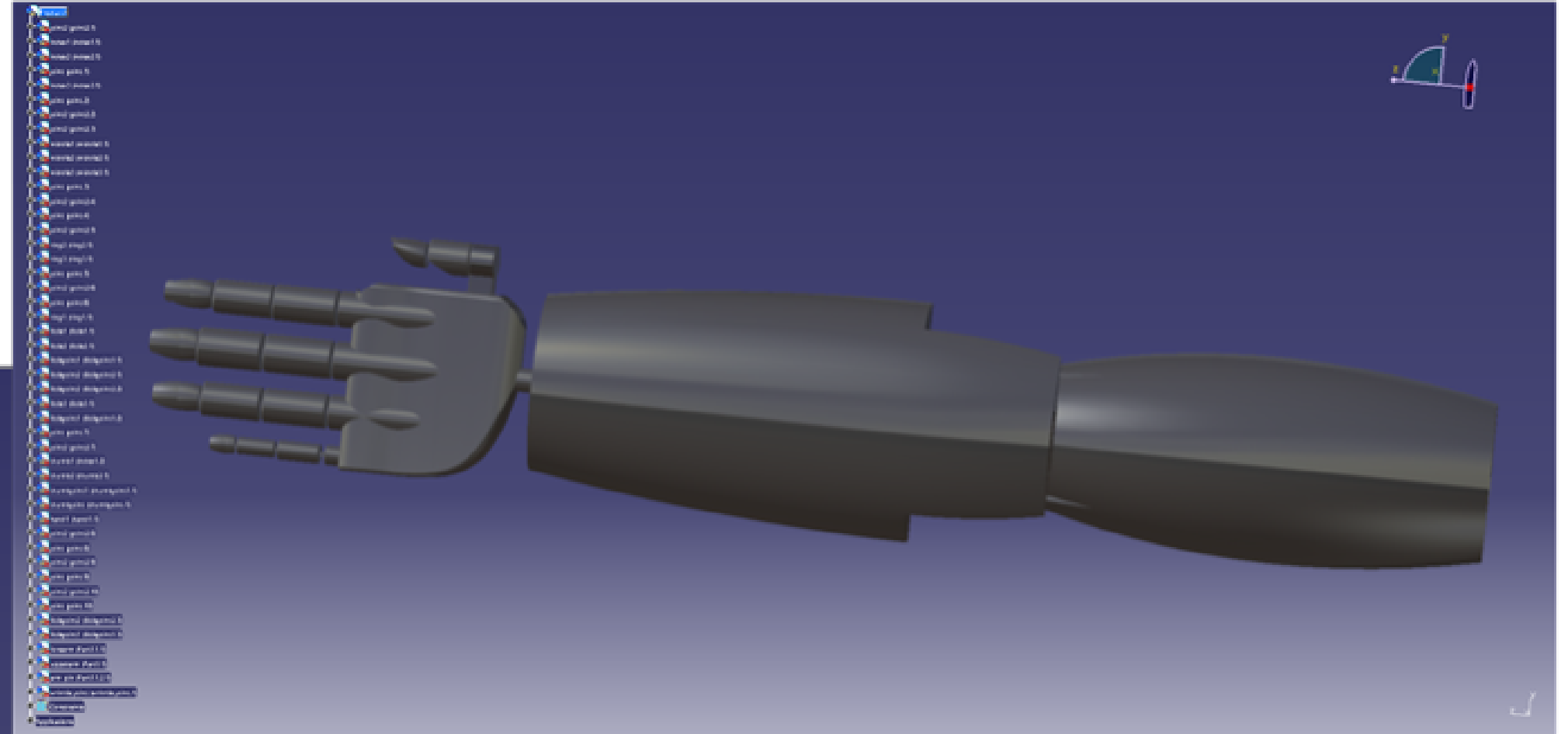


CHAPTER 02 🔍

Modeling 및 Design 과정

결과물

Material : Titanium(body), Steel(joint)



Modeling 및 Design 과정

The image displays a SolidWorks assembly environment. On the left, a vertical list of constraints is shown, categorized by type (Coincidence, Surface contact, Offset, Angle, FixTogether). The constraints are applied to various parts of the assembly, including joints and surfaces. The 3D view on the right shows a hand model with green lines indicating the constraints. The hand model consists of several parts, including the thumb, index, middle, ring, and little fingers, and the palm. The constraints are applied to the joints between these parts and to the surfaces of the fingers and palm.

Constraints List:

- Coincidence.1** (index1.1,joint.1)
- Surface contact.2** (index1.1,joint.1)
- Angle.3** (index1.1,joint.1)
- Angle.4** (index2.1,joint.1)
- Coincidence.5** (joint2.1,joint.1)
- Coincidence.6** (joint.1,index2.1)
- Surface contact.7** (joint2.1,index2.1)
- Offset.8** (joint.1,index2.1)
- Angle.9** (joint.2,index3.1)
- Surface contact.10** (index3.1,joint2.2)
- Coincidence.11** (joint2.2,index3.1)
- Coincidence.12** (joint2.2,joint.2)
- Offset.13** (joint.2,index3.1)
- Surface contact.14** (joint.2,index2.1)
- Coincidence.15** (joint.2,joint.1)
- Surface contact.16** (middle2.1,joint2.3)
- Coincidence.17** (middle2.1,joint2.3)
- Coincidence.18** (joint.3,joint2.3)
- Offset.19** (joint.3,middle2.1)
- Coincidence.20** (middle1.1,joint.3)
- Surface contact.21** (middle1.1,joint.3)
- Angle.22** (middle1.1,joint.3)
- Coincidence.23** (joint2.4,joint.4)
- Surface contact.24** (joint2.4,middle3.1)
- Offset.25** (joint.4,middle3.1)
- Coincidence.26** (middle2.1,joint.4)
- Angle.27** (joint.4,middle2.1)
- Surface contact.28** (joint.4,middle2.1)
- Coincidence.29** (middle3.1,joint2.4)
- Surface contact.39** (ring1.1,joint.6)
- Coincidence.40** (joint.6,joint2.6)
- Coincidence.41** (joint2.6,ring2.1)
- Surface contact.42** (joint2.6,ring2.1)
- Coincidence.43** (ring1.1,joint.6)
- Offset.44** (joint.6,ring2.1)
- Coincidence.45** (ring2.1,joint.5)
- Surface contact.46** (ring2.1,joint.5)
- Coincidence.47** (joint.5,joint2.5)
- Offset.48** (joint.5,ring3.1)
- Coincidence.49** (joint2.5,ring3.1)
- Surface contact.50** (joint2.5,ring3.1)
- Coincidence.58** (littlejoint1.1,littlejoint2.1)
- Coincidence.59** (littlejoint1.1,little1.1)
- Angle.60** (littlejoint1.1,little1.1)
- Coincidence.61** (littlejoint2.1,little2.1)
- Surface contact.62** (littlejoint2.1,little2.1)
- Surface contact.63** (little1.1,littlejoint1.1)
- Offset.64** (littlejoint1.1,littlejoint2.1)
- Coincidence.65** (littlejoint1.2,little2.1)
- Surface contact.66** (little2.1,littlejoint1.2)
- Angle.67** (littlejoint1.2,little2.1)
- Coincidence.68** (littlejoint1.2,littlejoint2.2)
- Coincidence.69** (littlejoint2.2,little3.1)
- Surface contact.70** (littlejoint2.2,little3.1)
- Offset.71** (littlejoint1.2,littlejoint2.2)
- Coincidence.72** (joint.7,thumb2.1)
- Offset.73** (thumb2.1,joint.7)
- Surface contact.75** (joint2.7,thumb2.1)
- Coincidence.76** (index1.2,joint.7)
- Surface contact.77** (index1.2,joint.7)
- Angle.78** (index1.2,joint.7)
- Offset.79** (thumbjoint.1,thumbjoint1.1)
- Coincidence.81** (thumbjoint1.1,thumb2.1)
- Surface contact.82** (thumbjoint1.1,thumb2.1)
- Coincidence.83** (thumbjoint.1,hand1.1)
- Surface contact.84** (thumbjoint.1,hand1.1)
- Coincidence.85** (joint2.8,joint.8)
- Offset.86** (joint2.8,joint.8)
- Coincidence.87** (joint.8,index3.1)
- Surface contact.88** (joint.8,index3.1)
- Angle.89** (joint.8,index3.1)
- Coincidence.90** (joint2.8,hand1.1)
- Surface contact.91** (joint2.8,hand1.1)
- Coincidence.92** (middle3.1,joint.9)
- Surface contact.93** (joint.9,middle3.1)
- Angle.94** (joint.9,middle3.1)
- Offset.96** (joint2.9,joint.9)
- Coincidence.97** (joint2.9,hand1.1)
- Surface contact.98** (joint2.9,hand1.1)
- Coincidence.99** (joint2.10,joint.10)
- Offset.100** (joint2.10,joint.10)
- Coincidence.101** (joint.10,ring3.1)
- Surface contact.102** (joint.10,ring3.1)
- Coincidence.103** (joint2.10,hand1.1)
- Surface contact.104** (joint2.10,hand1.1)
- Coincidence.105** (littlejoint2.3,littlejoint1.3)
- Offset.106** (littlejoint2.3,littlejoint1.3)
- Angle.107** (littlejoint1.3,little3.1)
- Coincidence.108** (littlejoint1.3,little3.1)
- Surface contact.109** (littlejoint1.3,little3.1)
- Coincidence.110** (littlejoint2.3,hand1.1)
- Surface contact.111** (hand1.1,littlejoint2.3)
- Angle.112** (thumbjoint1.1,hand1.1)
- Angle.114** (middle2.1,middle3.1)
- Angle.115** (middle1.1,middle2.1)
- Angle.116** (middle3.1,hand1.1)
- Angle.117** (index1.1,index2.1)
- Angle.118** (index2.1,index3.1)
- Angle.119** (index3.1,hand1.1)
- Angle.120** (ring1.1,ring2.1)
- Angle.121** (ring2.1,ring3.1)
- Angle.122** (ring3.1,hand1.1)
- Angle.123** (little1.1,little2.1)
- Angle.124** (little2.1,little3.1)
- Angle.125** (little3.1,hand1.1)
- Angle.126** (index1.2,thumb2.1)
- Angle.127** (index1.2,thumbjoint1.1)
- Coincidence.129** (Part1.1.1,Part1.1)
- Surface contact.130** (Part1.1.1,Part1.1)
- Coincidence.189** (thumbjoint1.1,thumbjoint.1)
- Surface contact.192** (joint2.7,joint.7)
- Coincidence.193** (joint2.7,thumb2.1)
- Offset.197** (joint.9,joint2.9)
- Surface contact.199** (Part1.1.1,wrinkle joint.1)
- Surface contact.201** (hand1.1,wrinkle joint.1)
- Fix.233** (Part1.1)
- FixTogether.17** (Part1.1,Part1.1.2.1)
- Fix.237** (Part1.1.1)
- Coincidence.248** (Part1.1.1,Part1.1.2.1)
- Coincidence.250** (Part1.1.1,wrinkle joint.1)
- Offset.251** (Part1.1.1,wrinkle joint.1)
- Fix.252** (wrinkle joint.1)
- Coincidence.253** (wrinkle joint.1,hand1.1)
- Offset.254** (wrinkle joint.1,hand1.1)
- FixTogether.36** (thumbjoint1.1,thumb2.1,joint2.7,joint.7,index1.2)
- Coincidence.256** (thumbjoint1.1,thumbjoint.1)
- Offset.257** (thumbjoint1.1,thumbjoint.1)
- Fix.258** (thumb2.1)
- Coincidence.261** (joint.7,joint2.7)
- Offset.262** (joint.7,joint2.7)
- Coincidence.263** (joint2.8,joint.8)
- Offset.264** (joint2.8,joint.8)
- Fix.265** (index3.1)
- Coincidence.266** (joint.2,joint2.2)
- Offset.267** (joint.2,joint2.2)
- Fix.268** (index2.1)
- Coincidence.269** (joint.1,joint2.1)
- Offset.270** (joint.1,joint2.1)
- Coincidence.271** (joint.9,joint2.9)
- Offset.272** (joint.9,joint2.9)
- Fix.273** (middle3.1)
- Coincidence.274** (joint.4,joint2.4)
- Offset.275** (joint.4,joint2.4)
- Fix.276** (middle2.1)
- Coincidence.279** (joint.3,joint2.3)
- Offset.280** (joint.3,joint2.3)
- Fix.281** (hand1.1)
- FixTogether.44** (hand1.1,joint2.10,littlejoint2.3)
- FixTogether.45** (joint.10,ring3.1,joint2.5,joint.5)
- Coincidence.282** (joint.10,joint2.10)
- Offset.283** (joint.10,joint2.10)
- Fix.284** (ring3.1)
- Coincidence.287** (joint.5,joint2.5)
- Offset.288** (joint.5,joint2.5)
- FixTogether.48** (littlejoint1.3,little3.1,l



CHAPTER 03 🔍

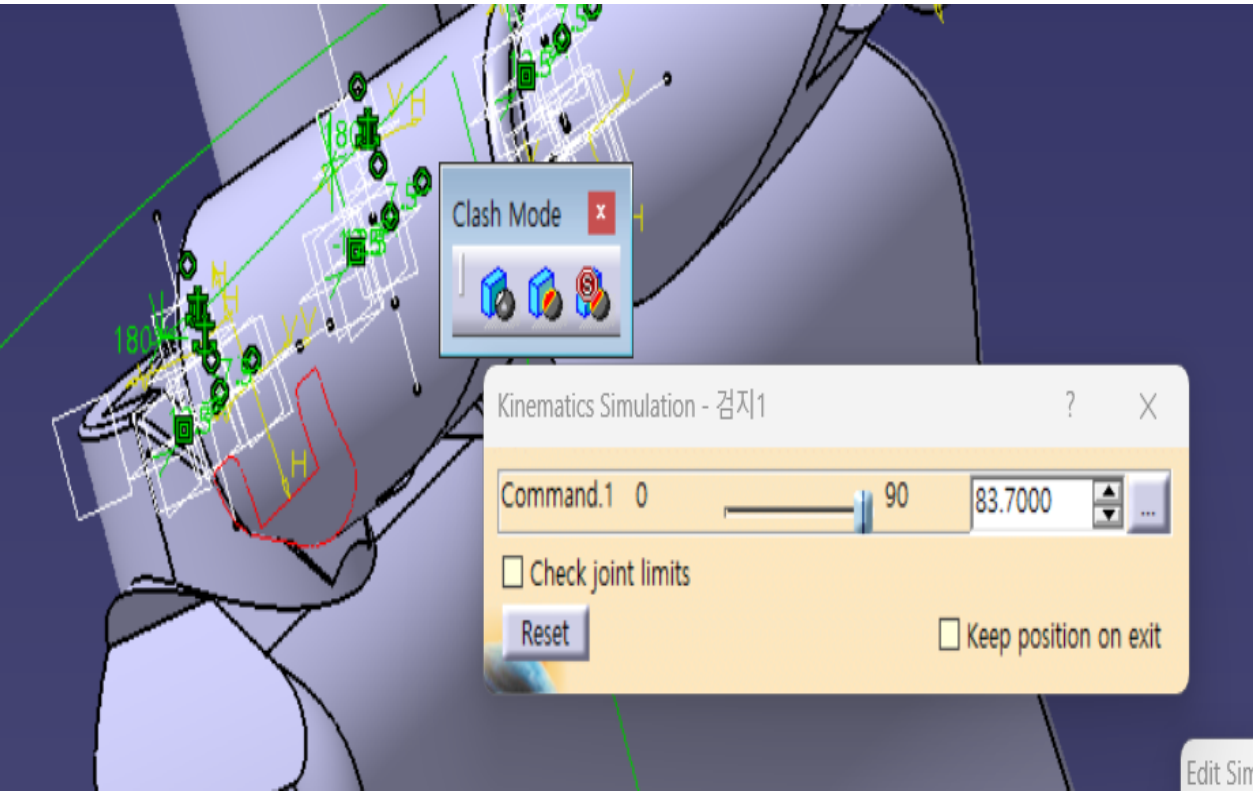
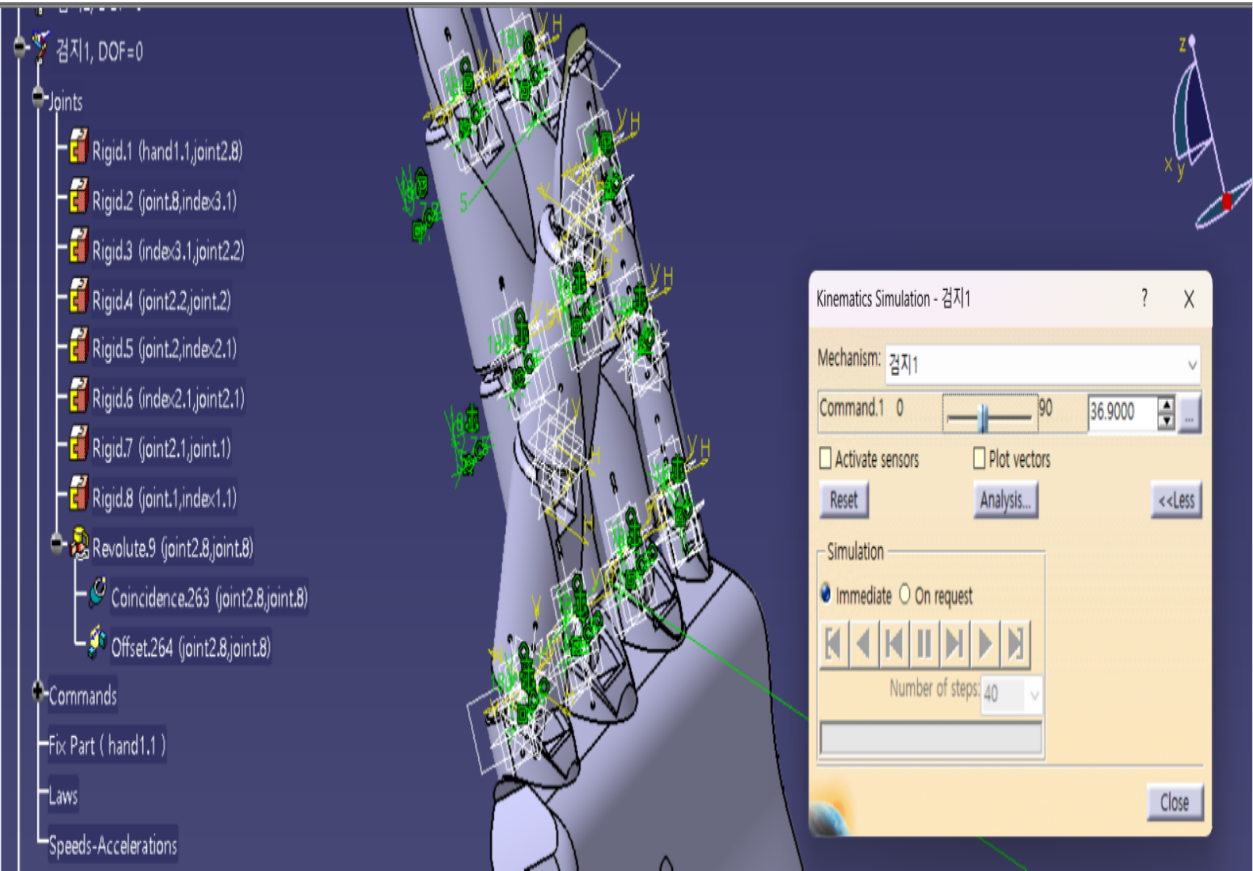
DMU KINEMATICS





CHAPTER 03 🔍

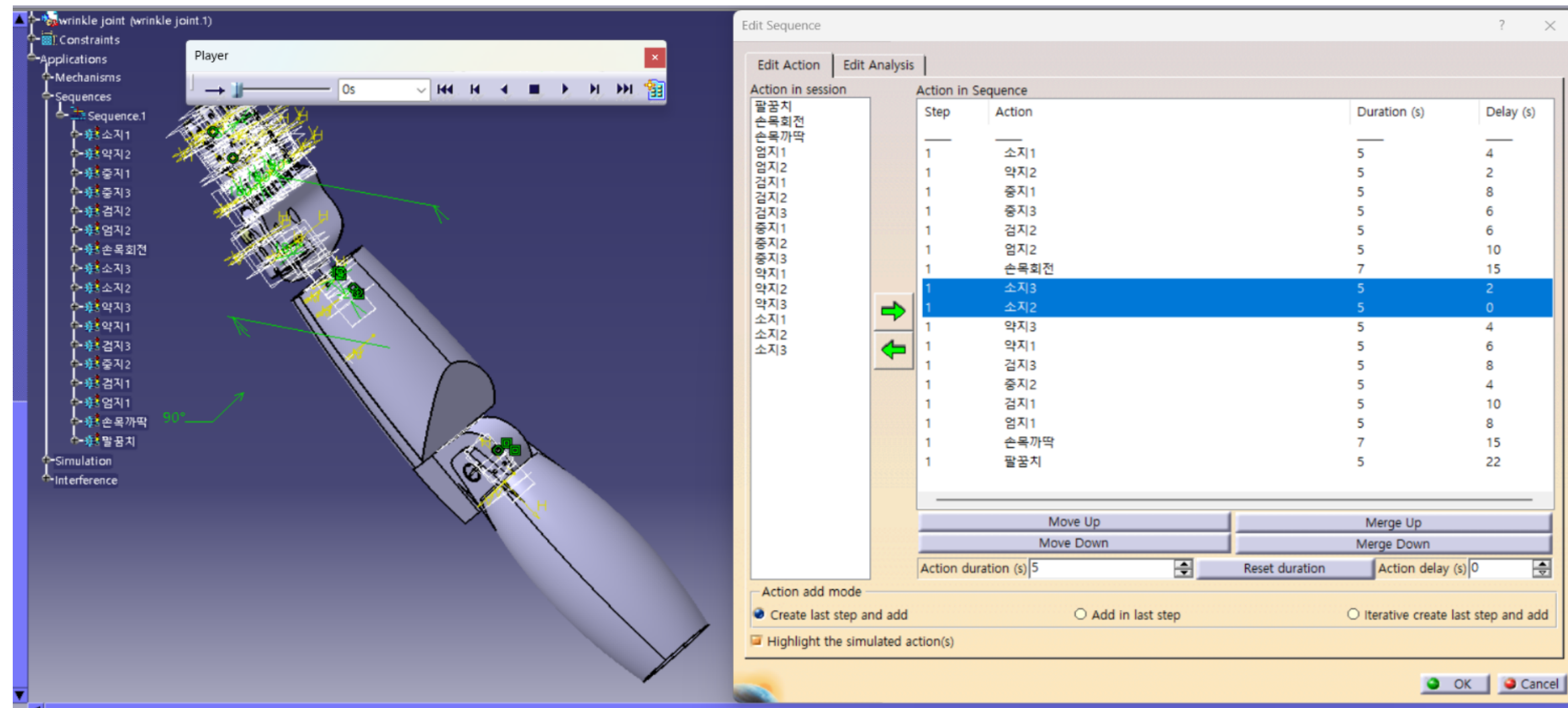
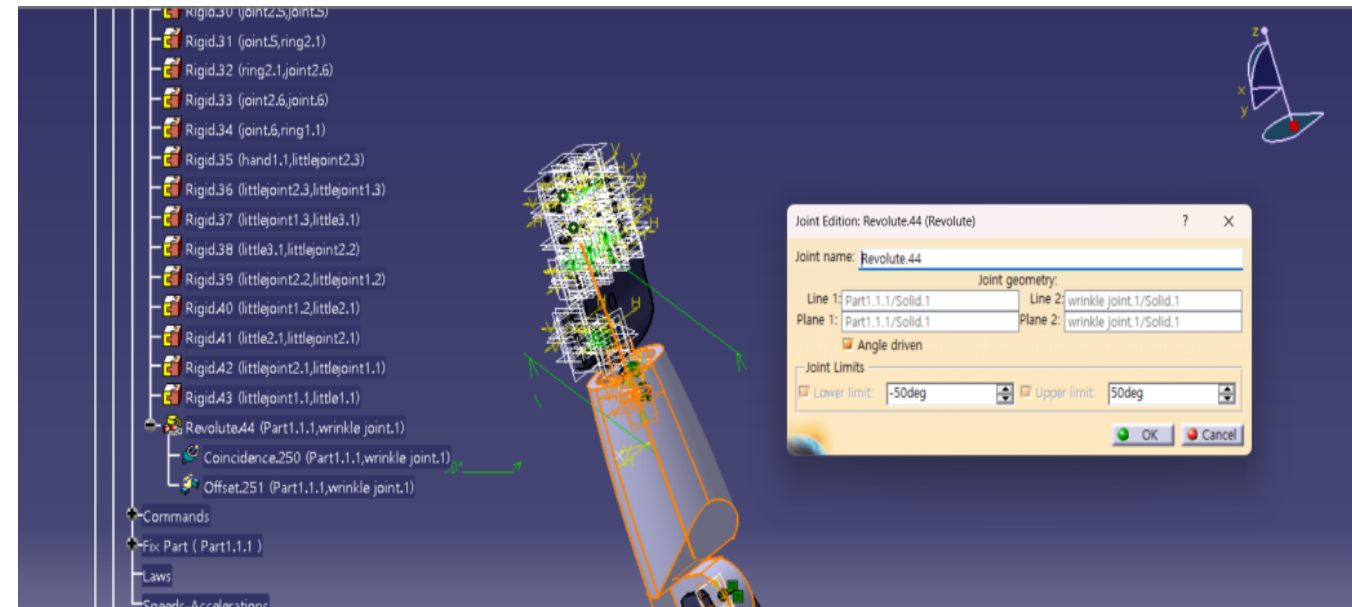
DMU KINEMATICS





CHAPTER 03 🔍

DMU KINEMATICS





HTTPS://CDL.HANYANG.AC.KR



CHAPTER 04 🔍

Simulation 영상

<https://www.youtube.com/watch?v=ANxSAxXw4AI>



고찰

문제점

1. 아웃소싱 無, 모델의 스케일 조정

2. ASSEMBLY DESIGN

3. EDIT SEQUENCE

4. DOF 조정

해결 방안

1. GUIDE CURVE(손가락)

2. ASSEMBLY DESIGN

3. MECHANISM 분할

4. SPHERICAL JOINT -> REVOLUTE + PRISMATIC



CHAPTER 06 🔍

Reference & 질의응답

<https://www.thingiverse.com/search?q=hand&page=1>



HTTPS://CDL.HANYANG.AC.KR



감사합니다.

2022042833 나현웅

2024013936 최현규