

CAD Final Project

Dual Clutch Transmission

“저희 다 잘하죠”

2019032115 강래완 / 2019035914 김영기

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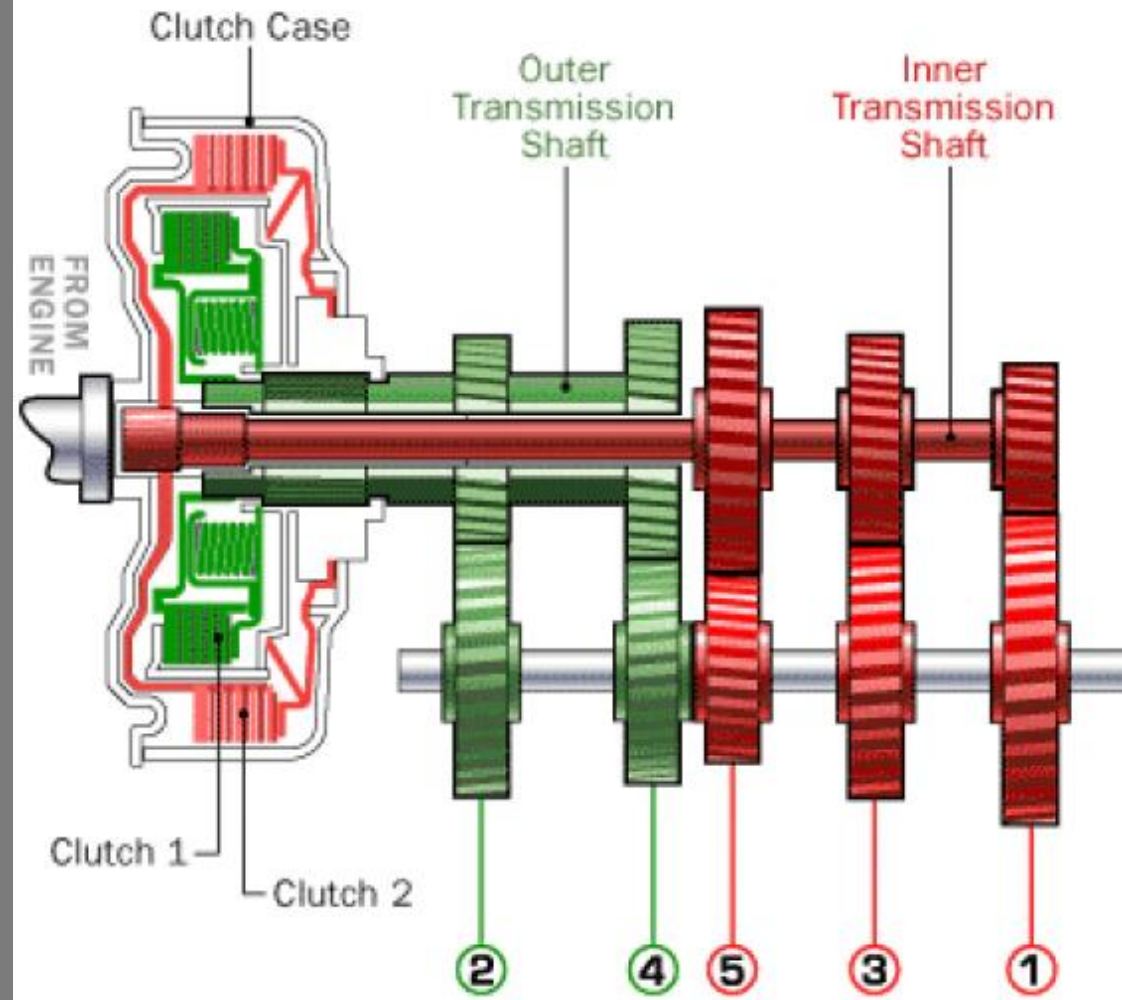
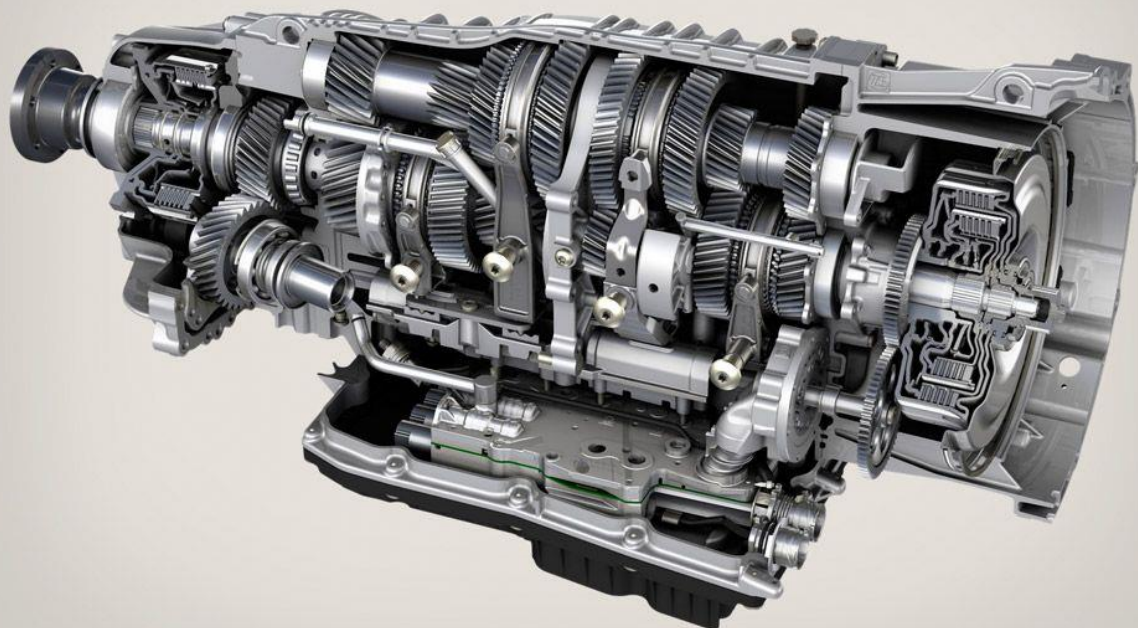
Dual Clutch Transmission

1. 주제 선정 & 팀명 & 역할 분담

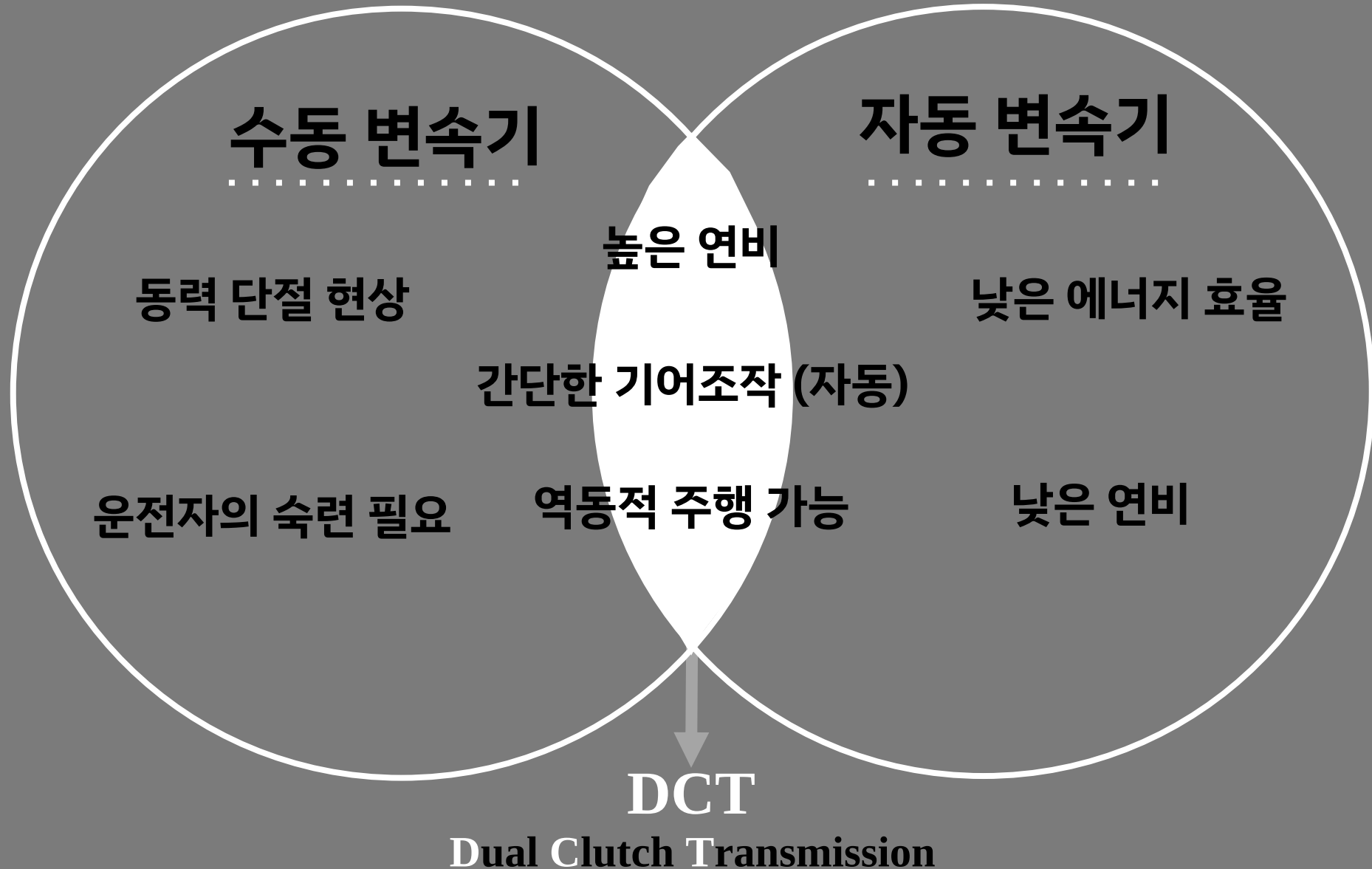
주제 선정

Dual Clutch Transmission

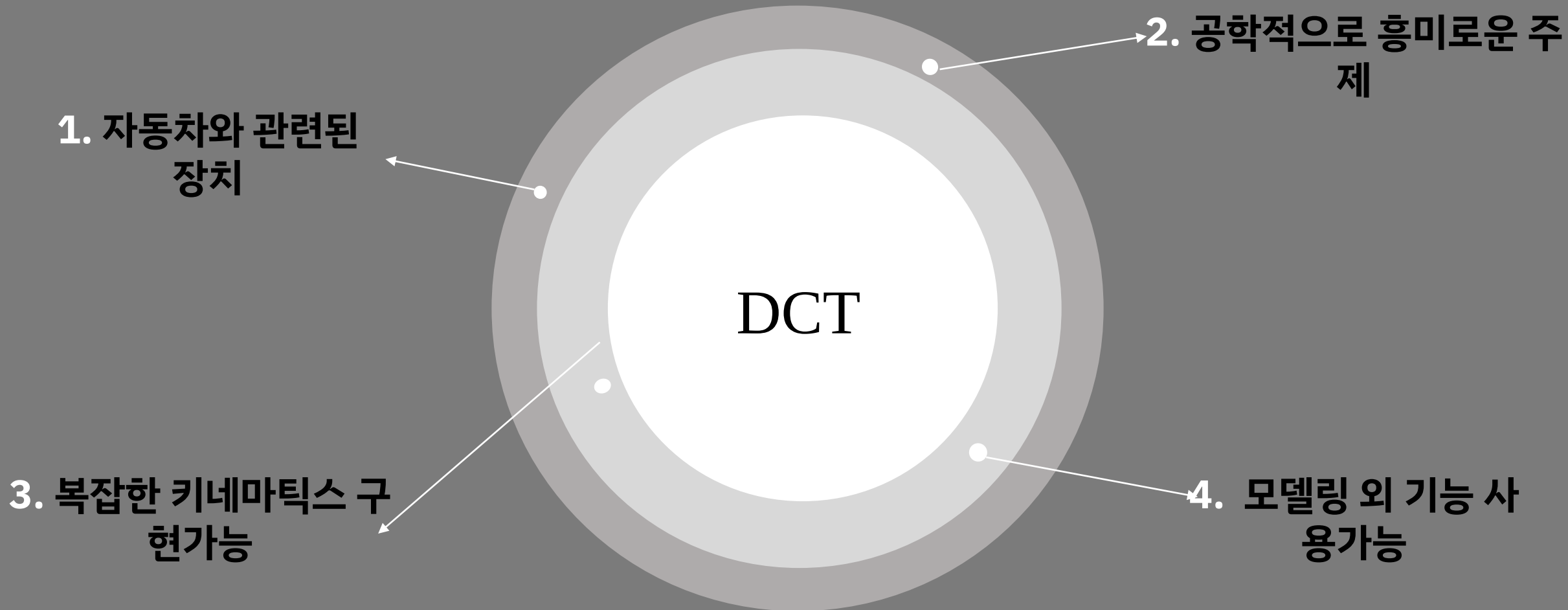
BREAKDOWN
DUAL CLUTCH TRANSMISSION



주제 선정



주제선정: Why DCT?



주제 선정

참고 자료

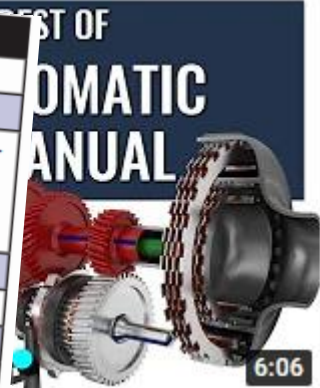
DCT
개념정리

카맹썰 EP09

TREMEC TR-9070 DCT Specifications			
Type:	Rear-wheel drive, seven-speed dual clutch transmission		
Clutch architecture	Parallel wet dual clutch - normally open with separator springs to eliminate drag		
Clutch cooling	With engine torque control, thermal events are predicted and controllable. Cooling is proactive (not reactive) for long life and high efficiency. Parallel architecture allows ability to cool clutches individually only as needed, which increases efficiency.		
Housings	SAE 308 die cast aluminum		
Dual counter-shaft design	85 mm and 90 mm center distances		
Overall length*	786 mm *For reference only. Dependent on bell housing and flange requirement.		
Lubricant type	Pentosin FFL-4; DCT formulated		
Weight	Wet: 104.2 kg (229.25 lb); Dry:		
Available Gear Ratios <i>Alternative ratios available upon request; may result in different maximum input torque</i>	Gear	Ratio A	Ratio B
	1	3.14	3.24
	2	2.05	2.02
	3	1.43	1.45
	4	1.10	1.08
	5	0.86	0.81
	6	0.68	0.63
	7	0.56	0.50
	R	2.76	2.93
	Gear Ratio Span	5.6	6.5
	Torque Capacity	900 Nm 664 lb-ft	900 Nm 664 lb-ft

- Responsive and precise clutch control
- Sophisticated transmission control unit and control software
- Fast and precise clutch control systems

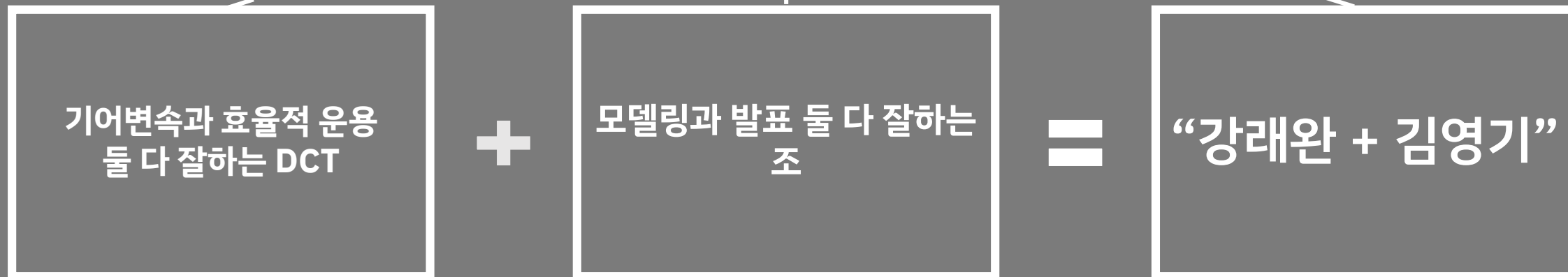
46643 Ryan Court | Novi, MI 48377 U.S.A. | www.tremec.com



kuo Group Company
being defined

팀명

“저희 다 잘하조”



역할 분담

강래완 : DCT 자료조사

Part Design(DCT modeling) + GSD(Boat + Propeller)

PPT 제작

김영기 : DCT 자료조사

Part Design

DMU Kinematics (DCT + Boat + Propeller)

영상 제작

Dual Clutch Transmission

2. MODELING PROCESS

MODELING PROCESS

DCT의 구성

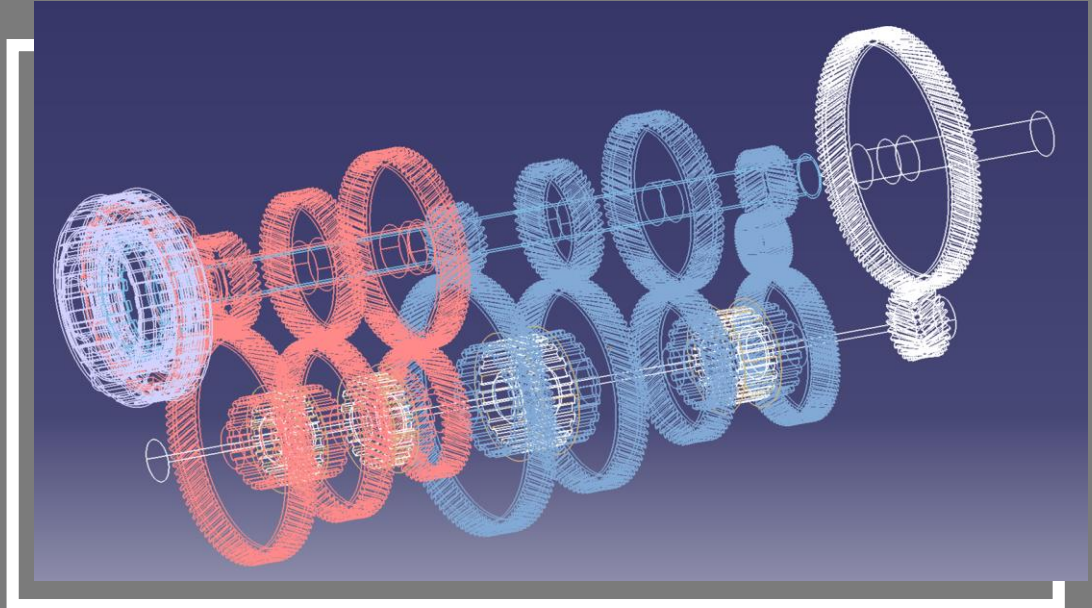
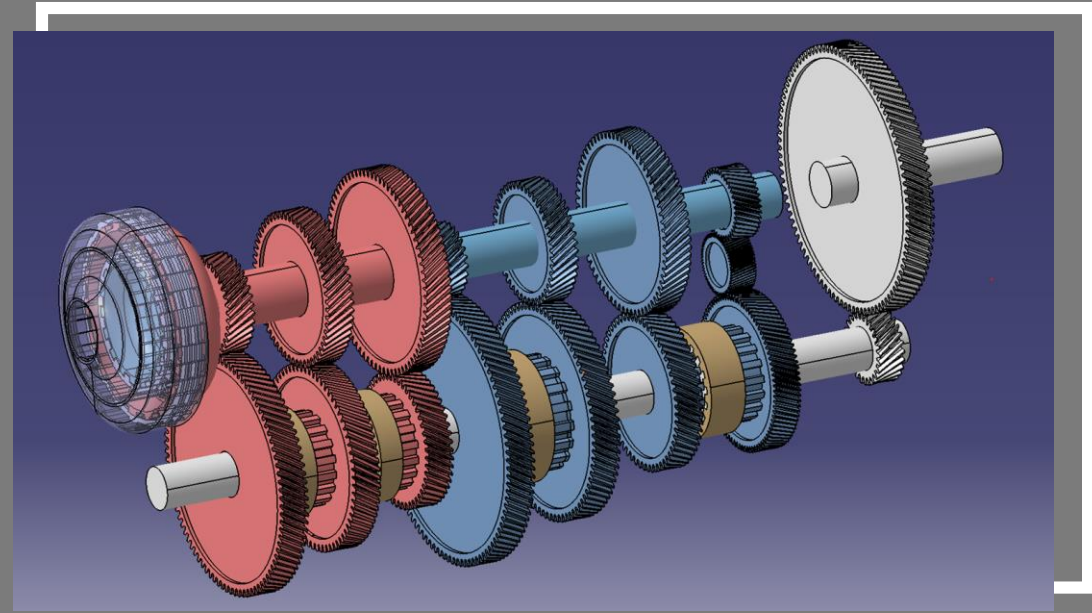
- ▶ Shaft x4

1.3.5 shaft, 2.4.6 shaft, engine shaft, counter shaft

- ▶ Clutch Pack x 8

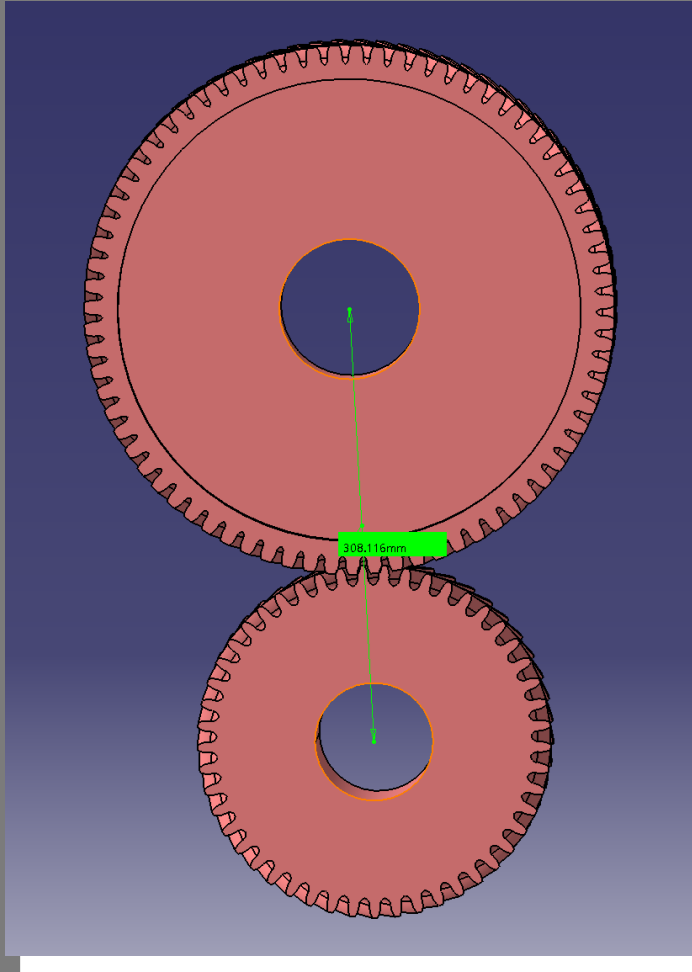
- ▶ Gear x17

- ▶ Gear selector x 4



Gear Ratio

Gear Design

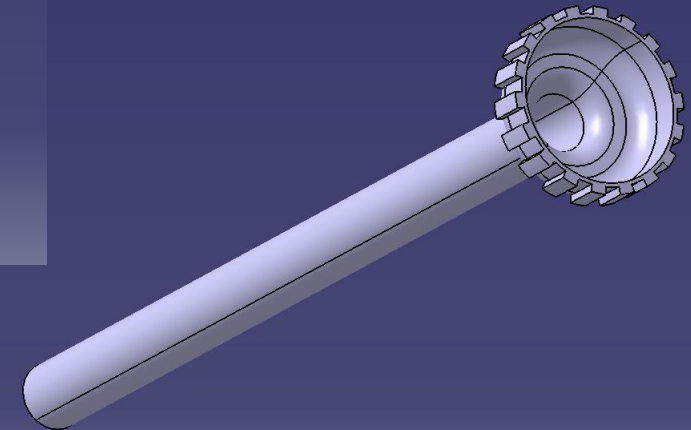
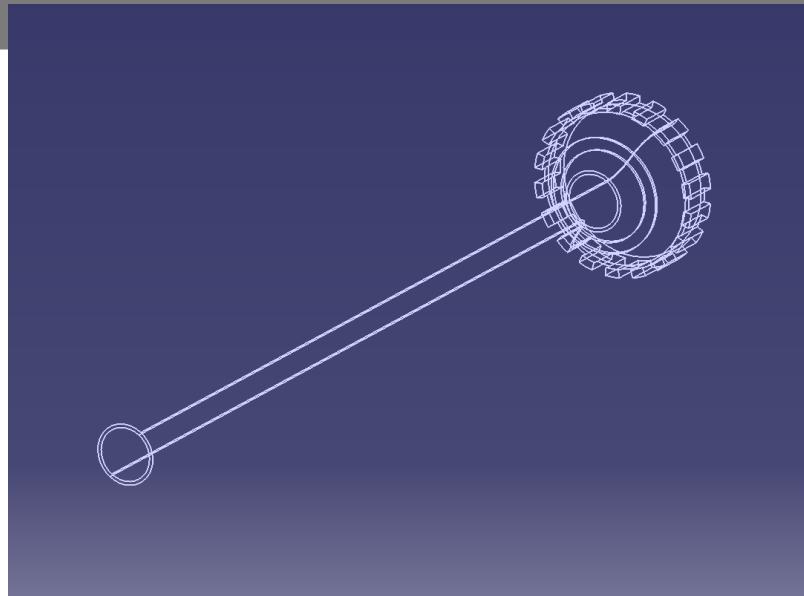
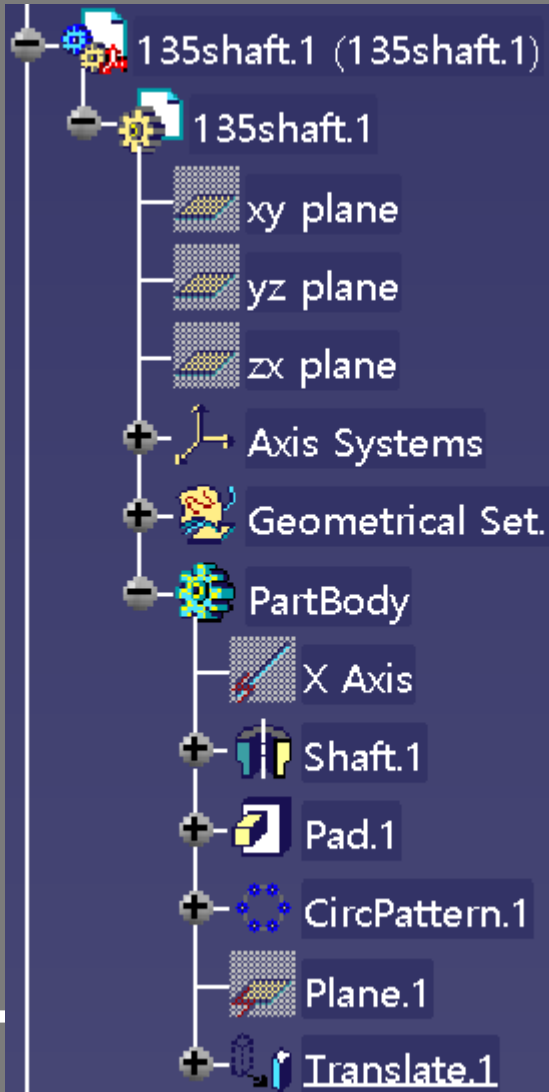


	반지름 합(mm)	원주(mm)	톱니 수(개)	기어비		톱니개수	
1	308.1	967.92	124	3.96	1	99	25
2				2.542	1	89	35
3				1.818	1	80	44
4				1.124	1	68	56
5				0.85	1	57	67
6				0.516	1	49	75
reverse				2.263	1	86	38
			총감속비	1	3.769	26	98

MODELING PROCESS

SHAFT

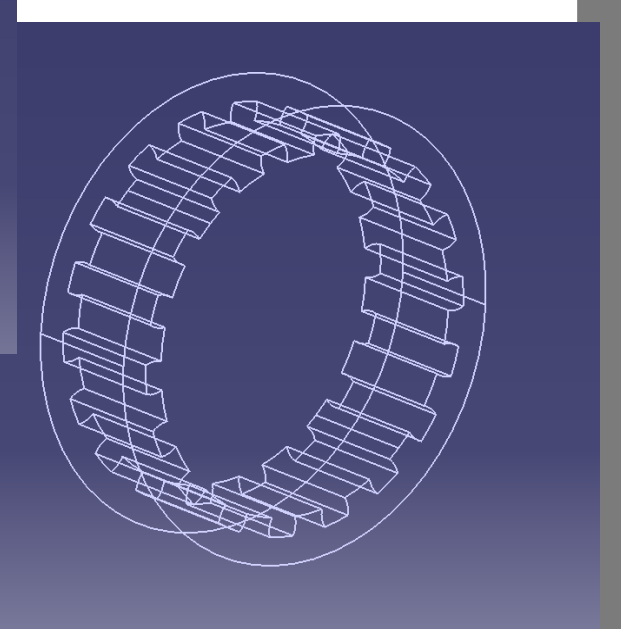
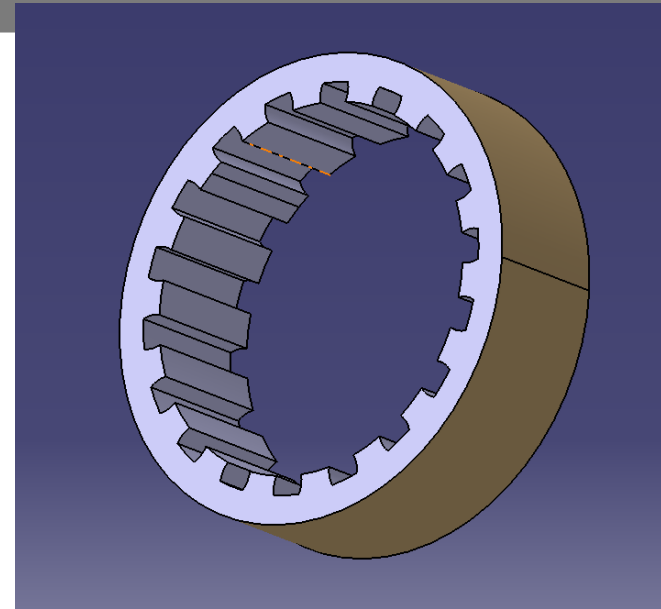
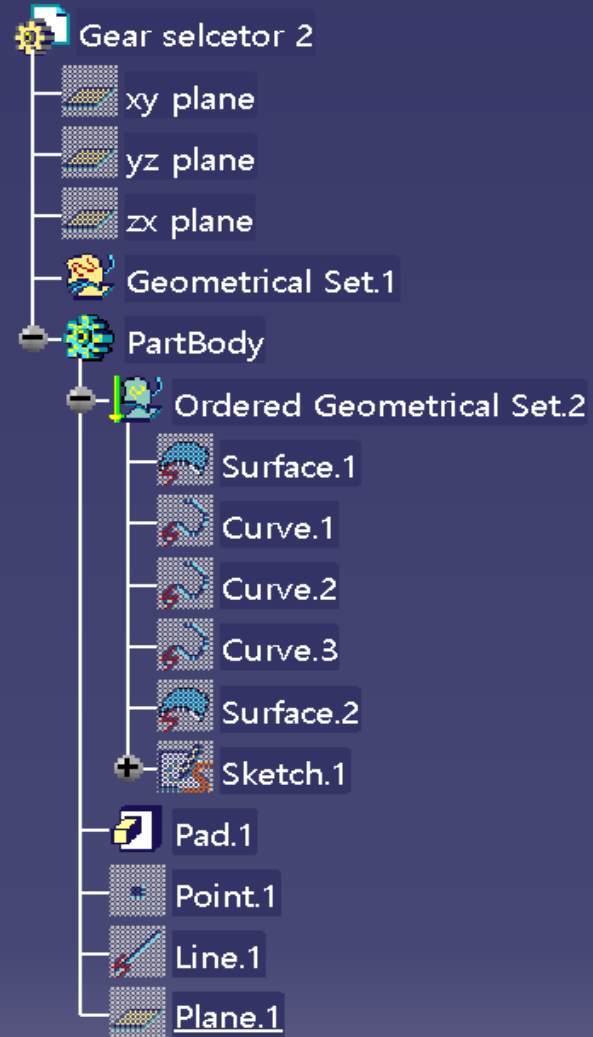
Part design & GSD



MODELING PROCESS

Gear Selector

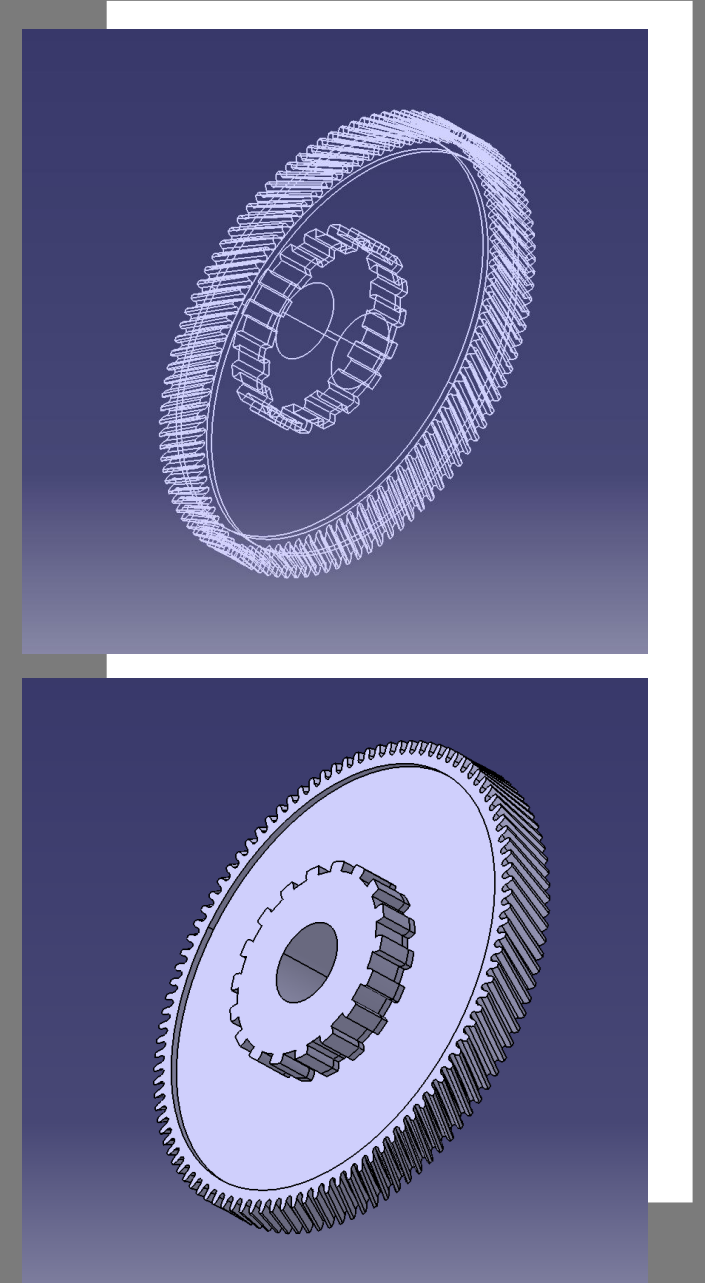
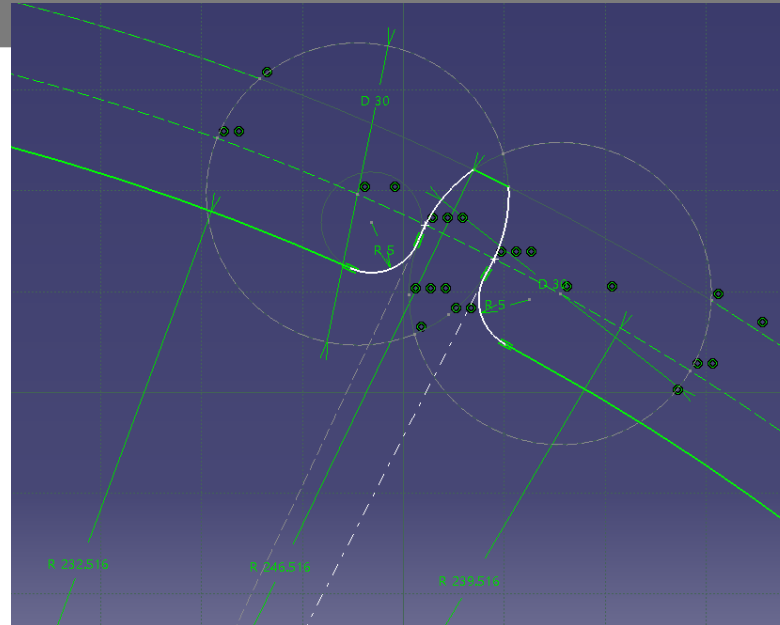
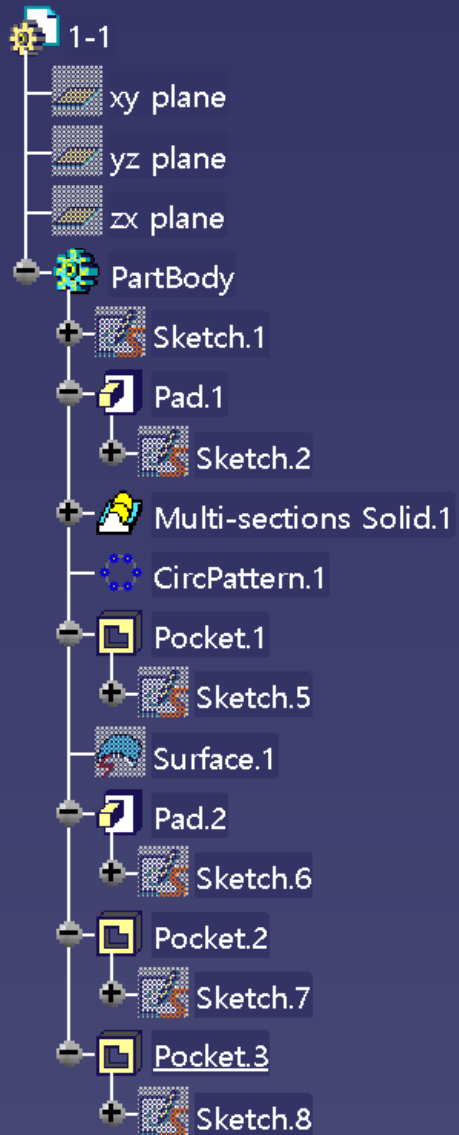
Part design & GSD



MODELING PROCESS

Gear

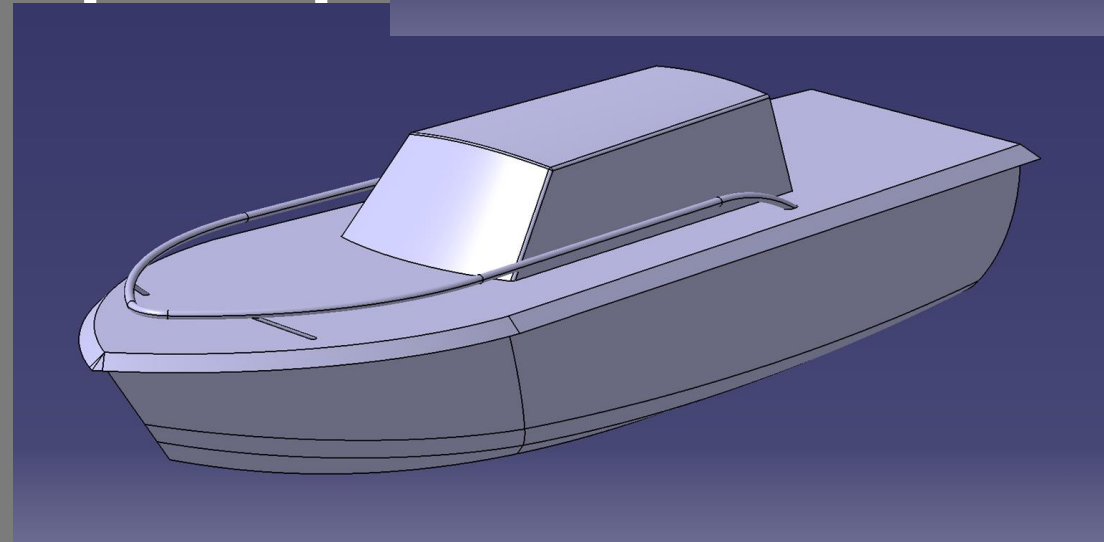
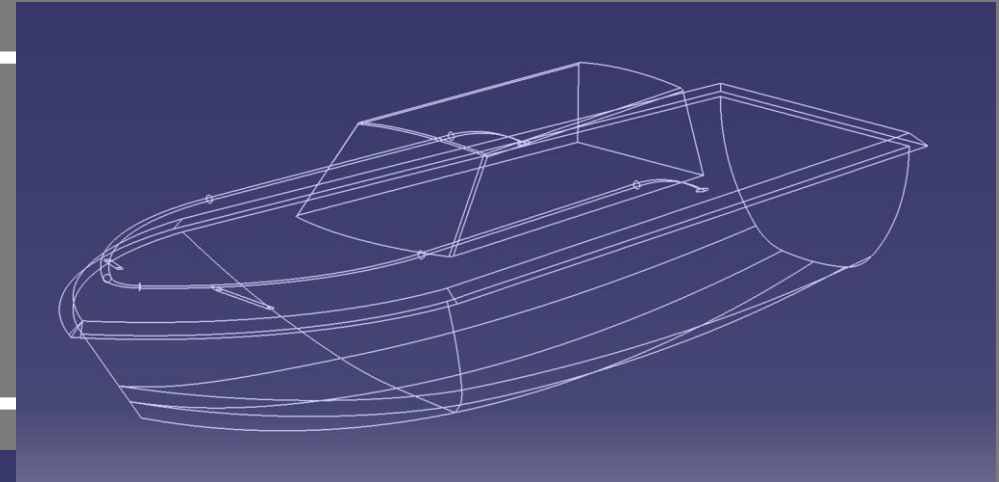
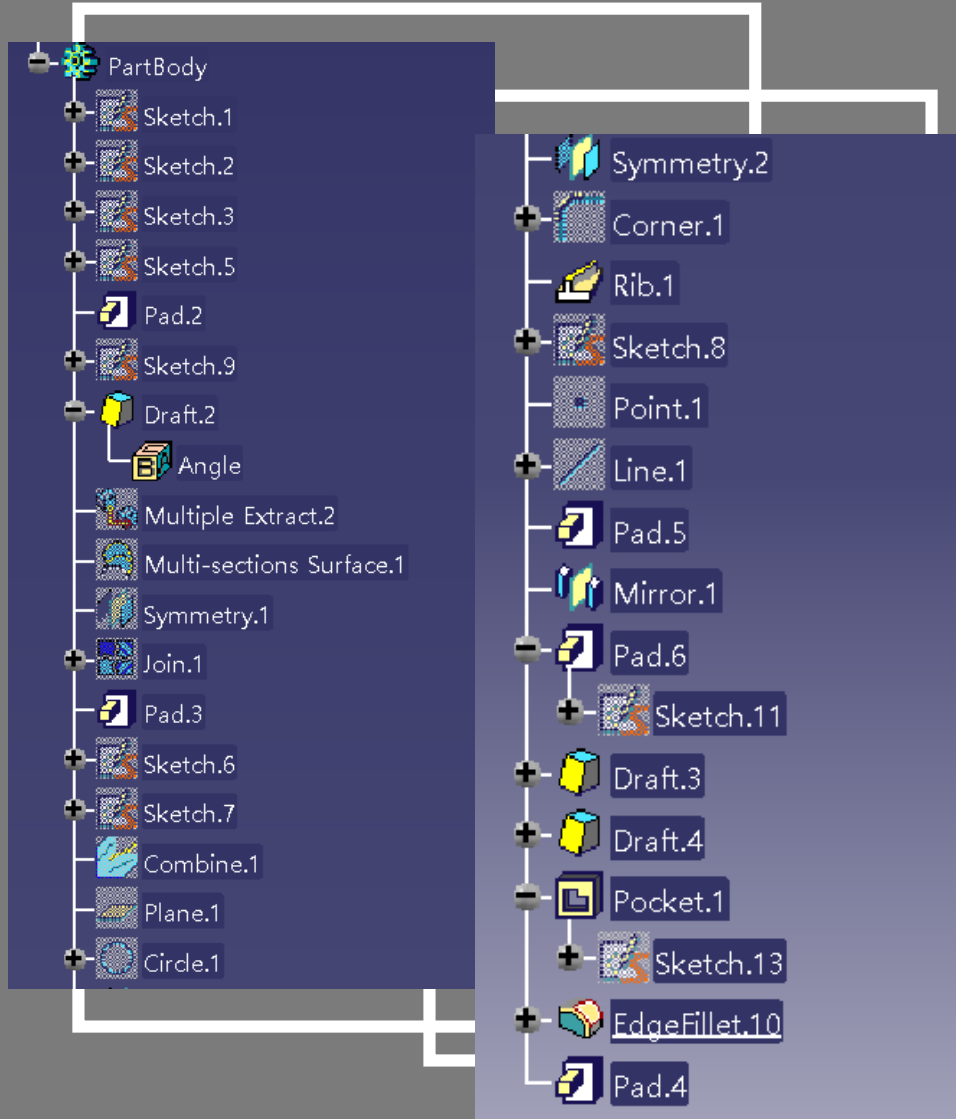
Part design & GSD



MODELING PROCESS

Boat

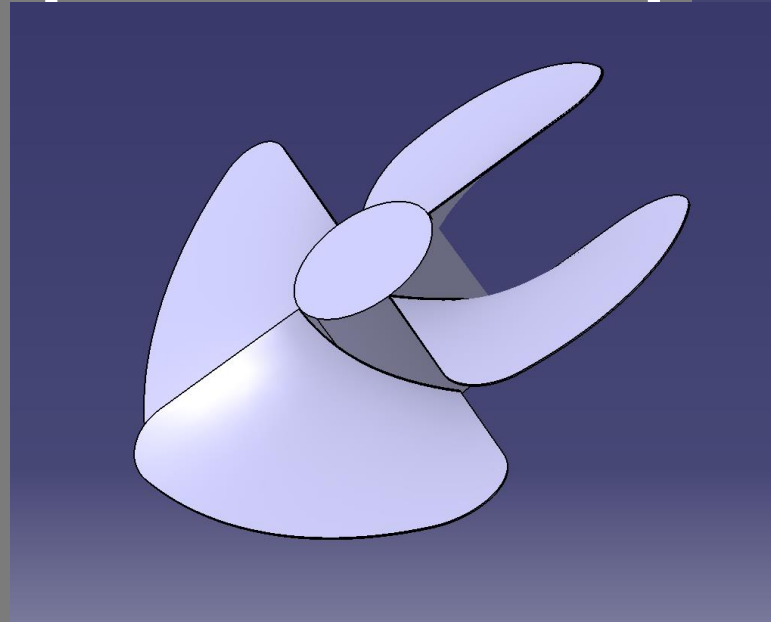
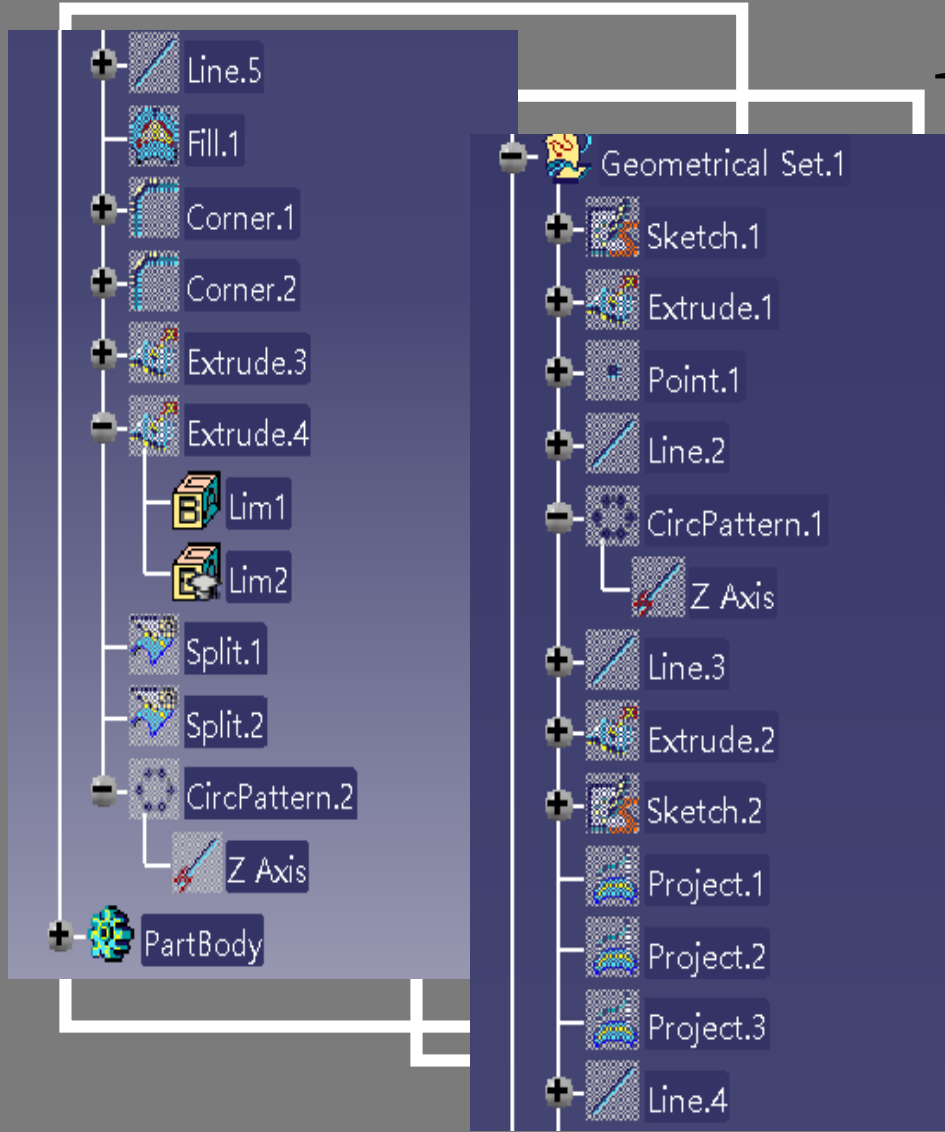
Part design & GSD



MODELING PROCESS

Propeller

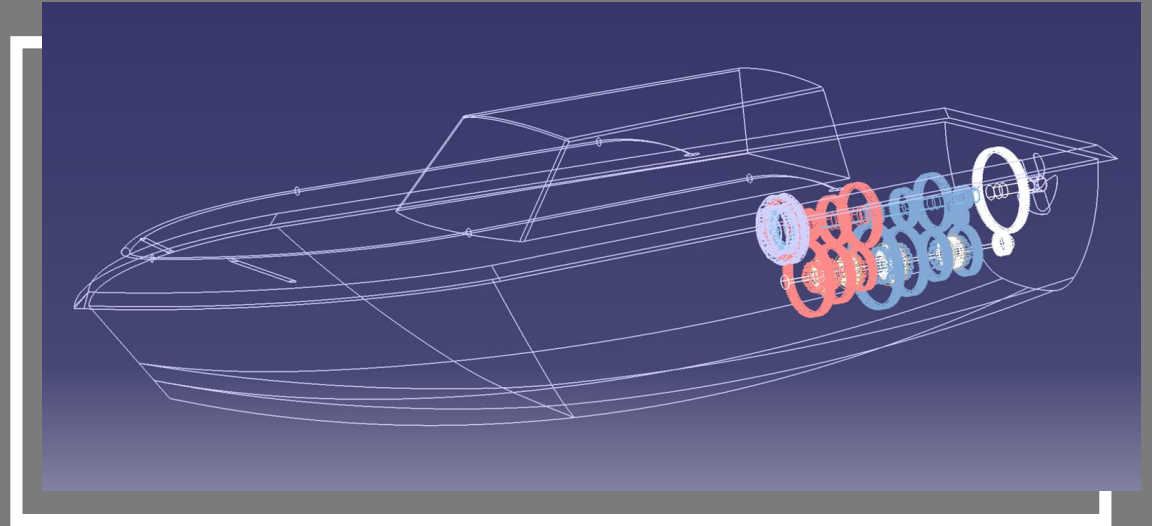
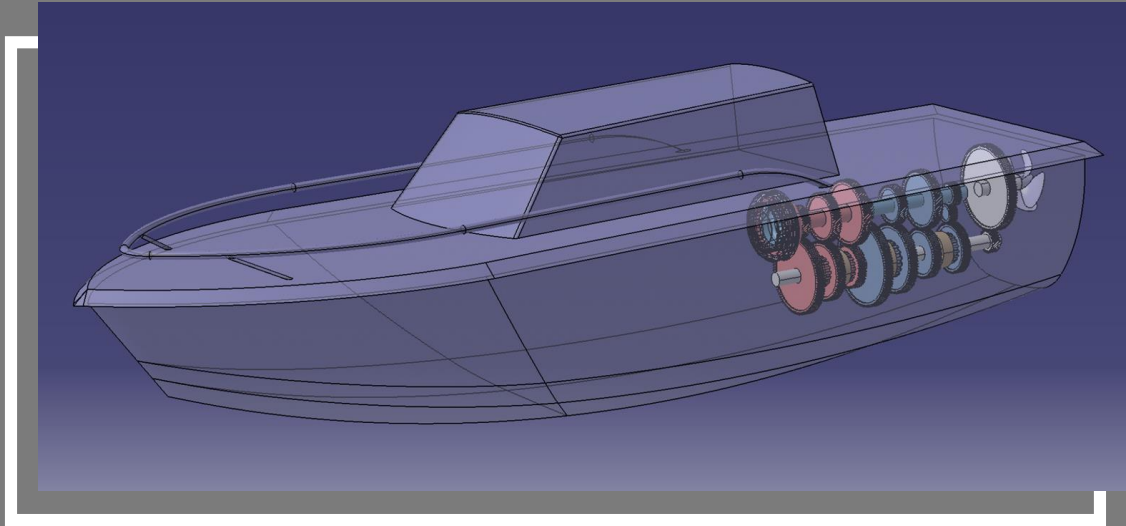
Part design & GSD



MODELING PROCESS

Final Product

Part design & GSD



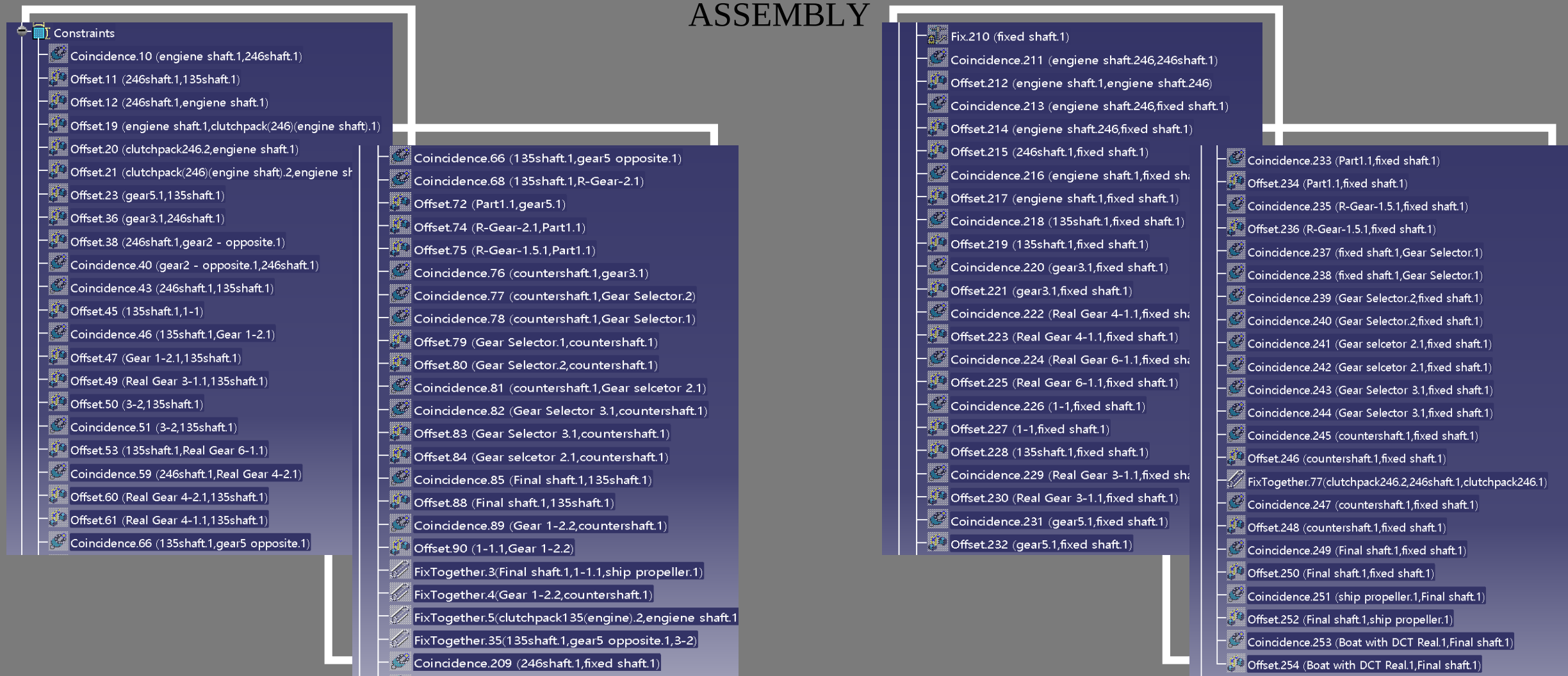
MODELING PROCESS

Dual Clutch Transmission

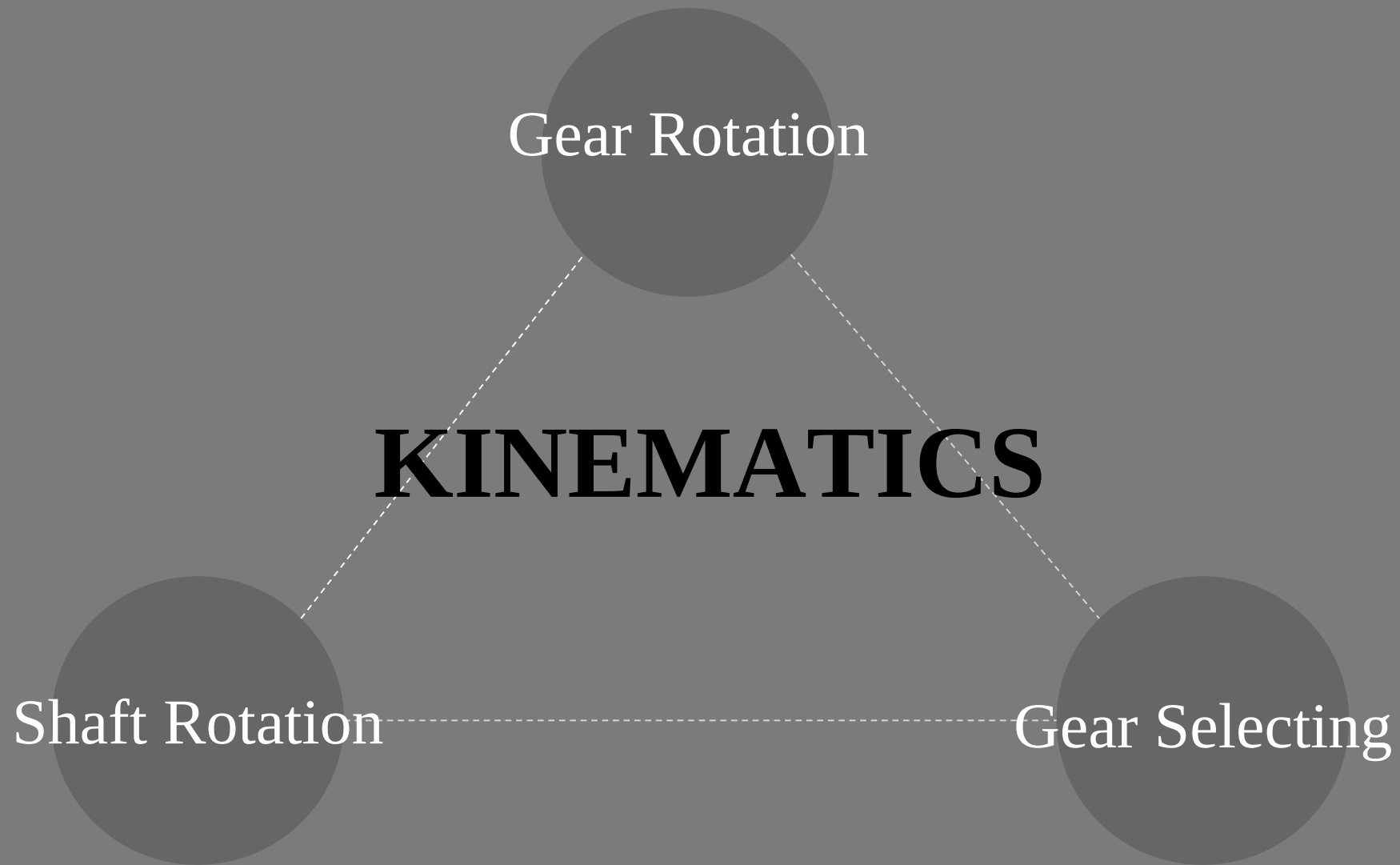
3. DMU KINEMATICS & ASSEMBLY

Boat with DCT

ASSEMBLY

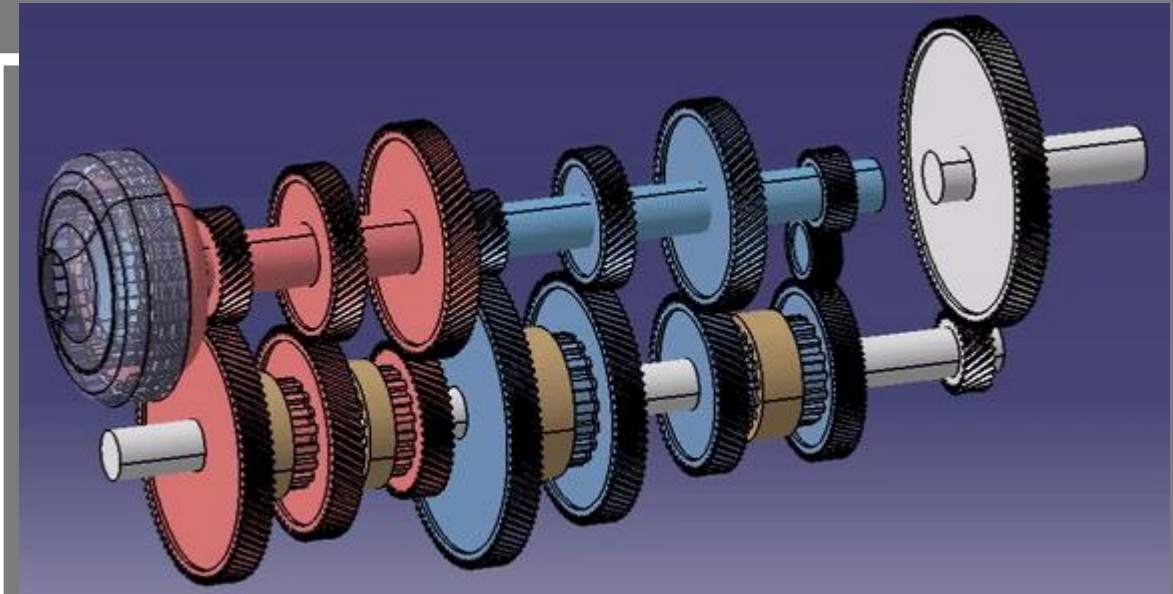
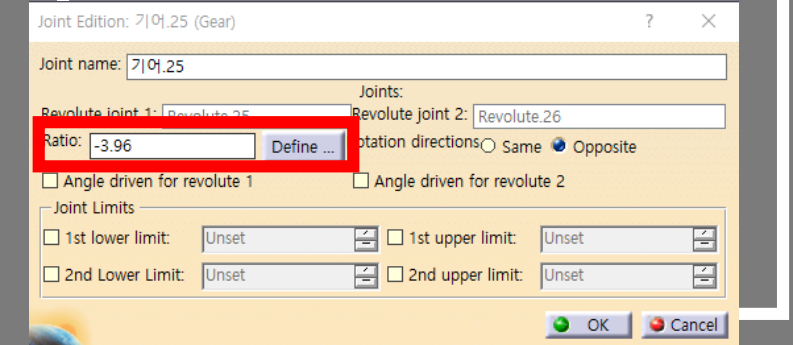
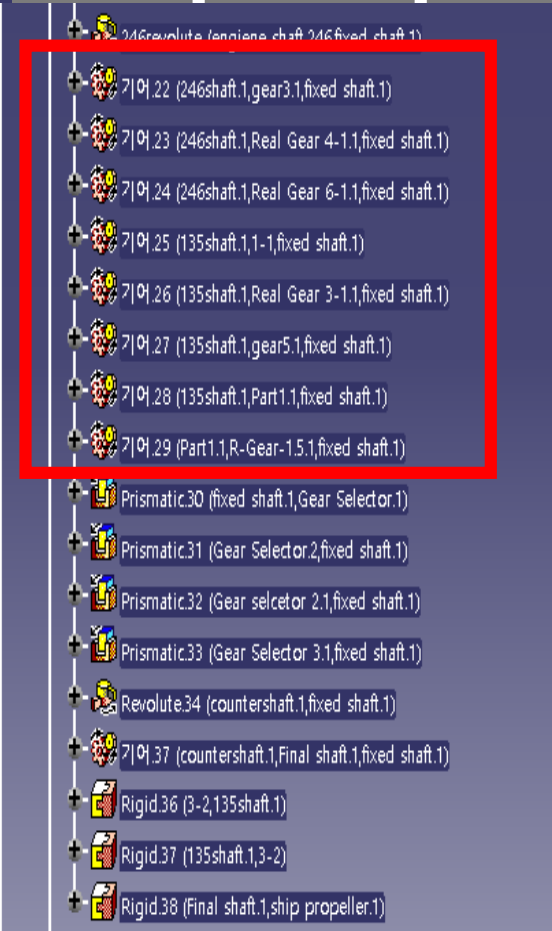
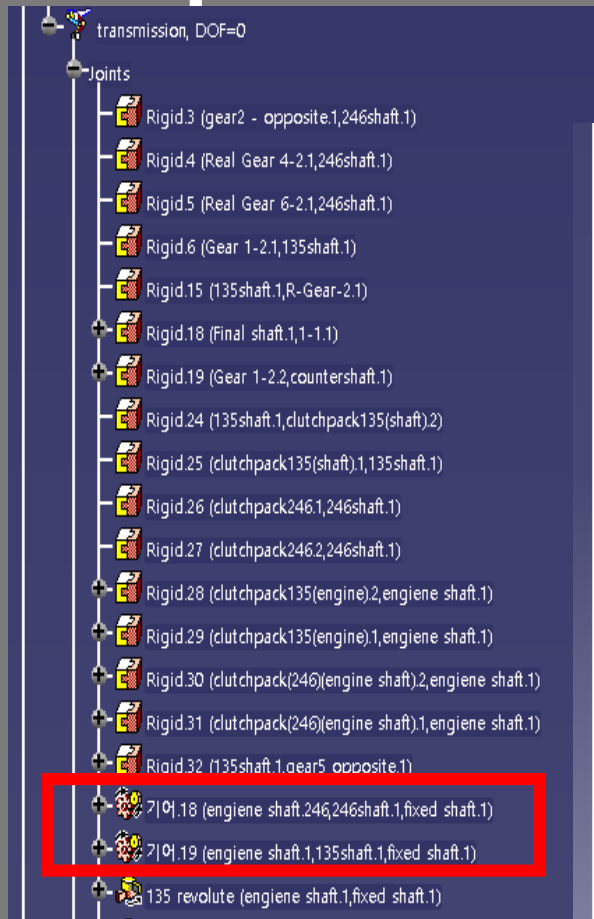


DMU KINEMATICS & ASSEMBLY



Gear Rotation

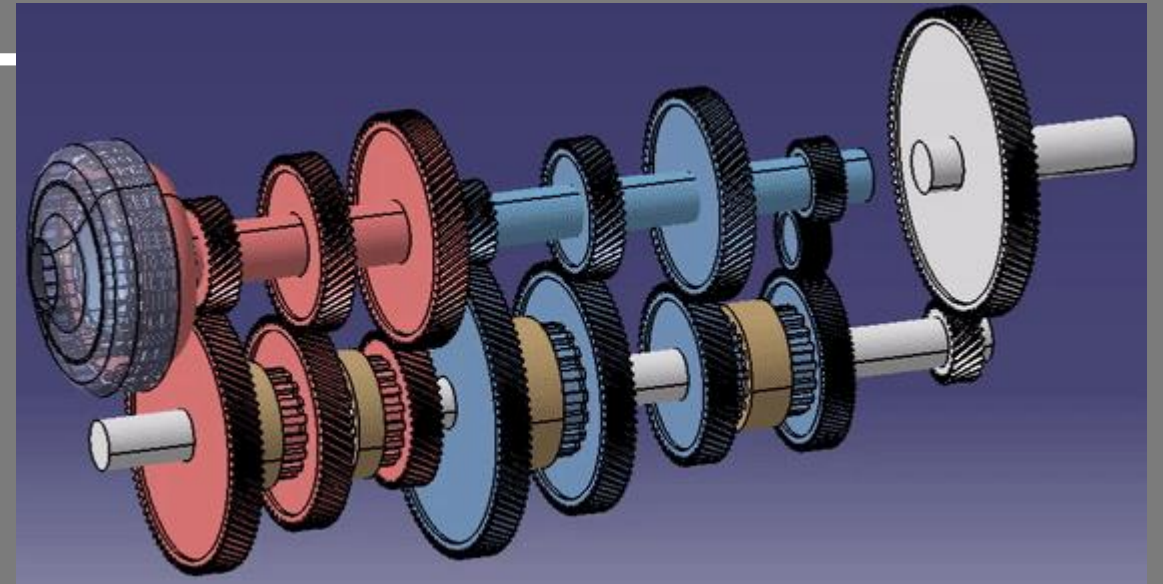
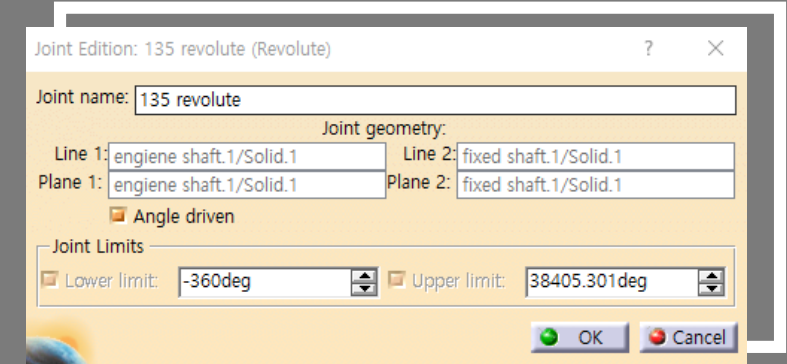
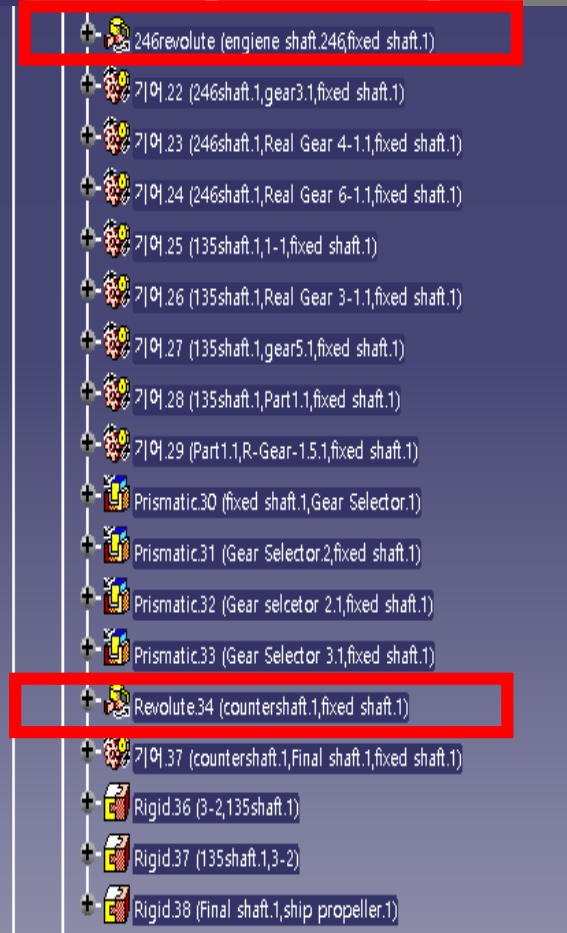
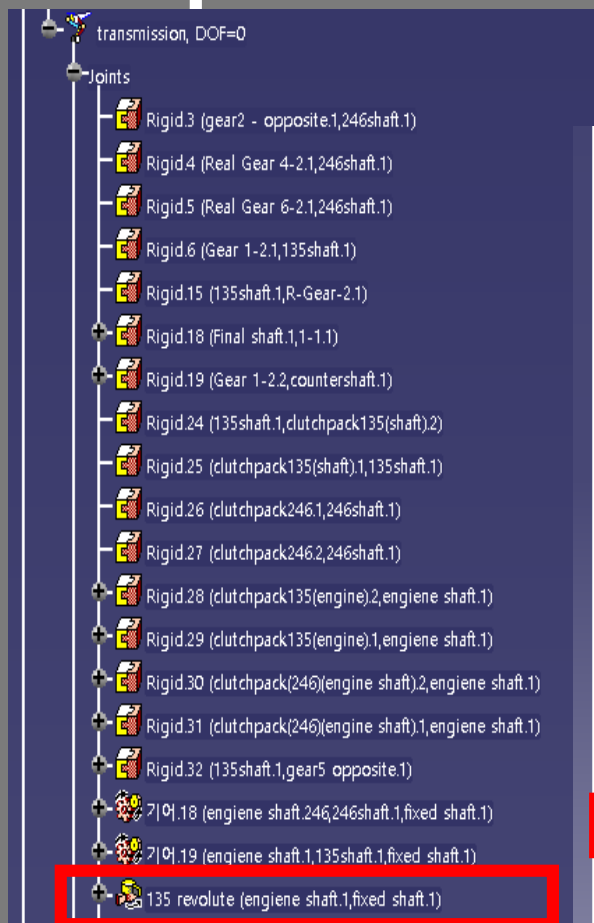
DMU KINEMATICS



DMU KINEMATICS & ASSEMBLY

Shaft Rotation

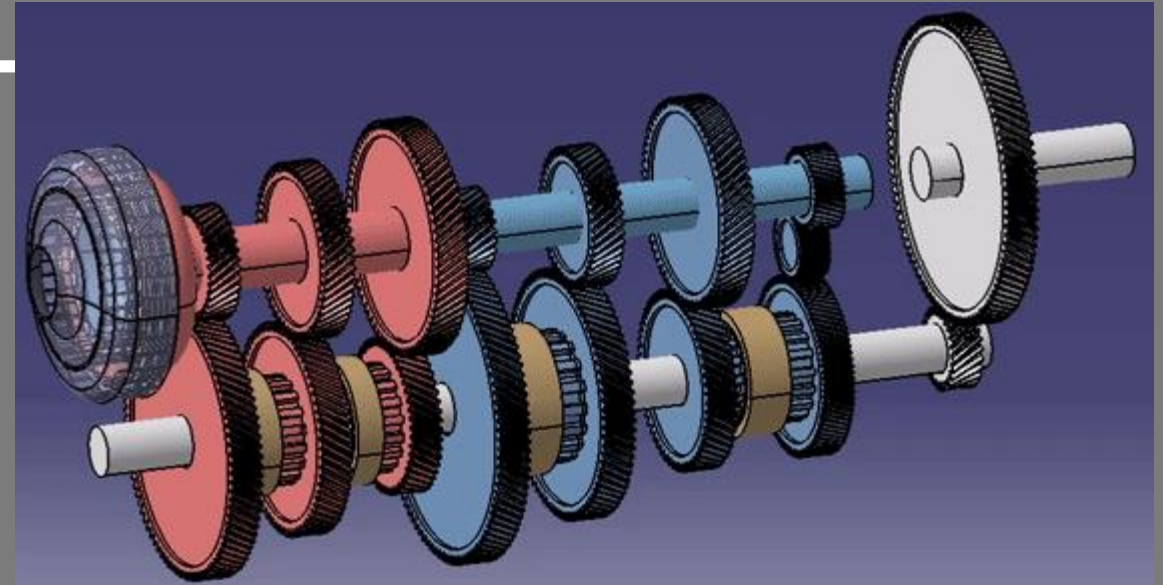
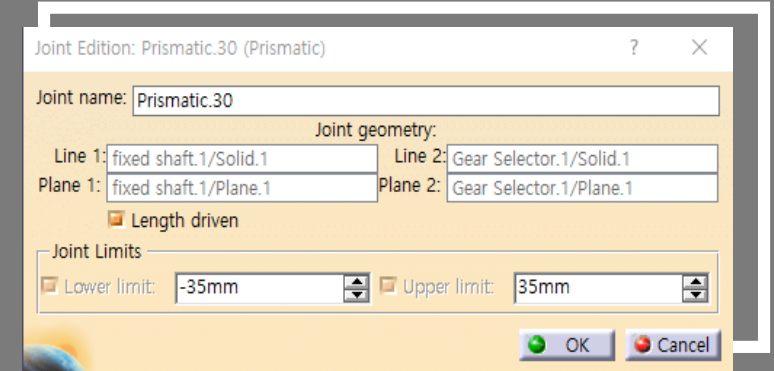
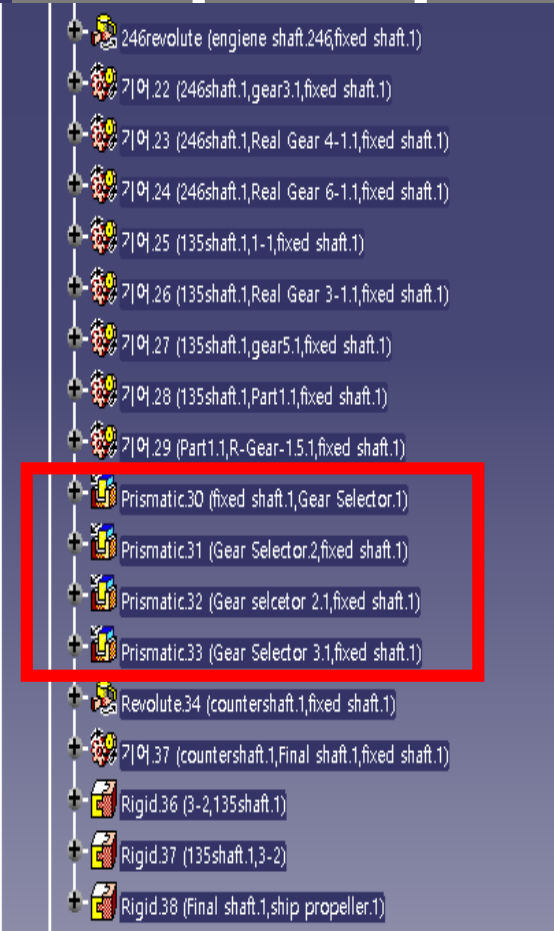
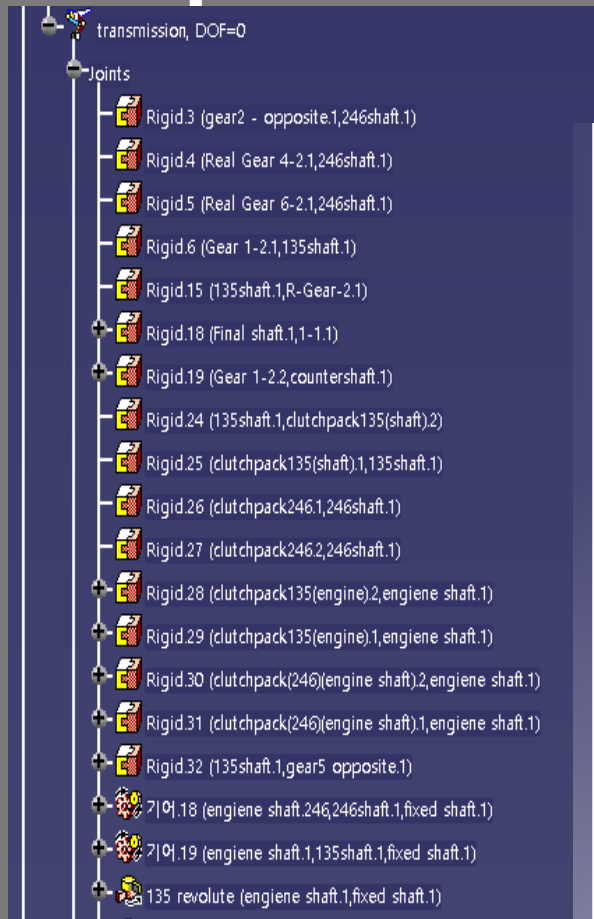
DMU KINEMATICS



DMU KINEMATICS & ASSEMBLY

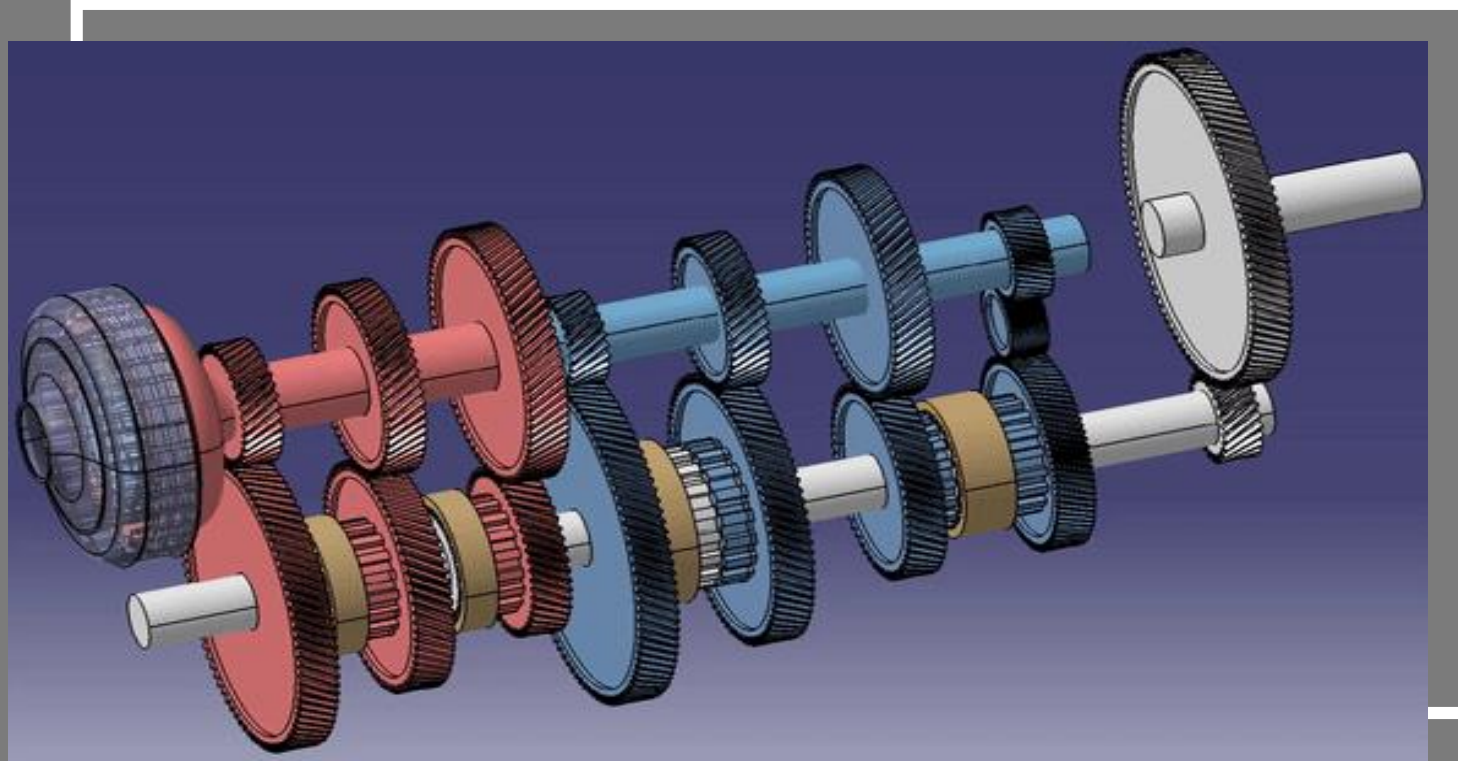
Gear Selector Movement

DMU KINEMATICS



DMU KINEMATICS & ASSEMBLY

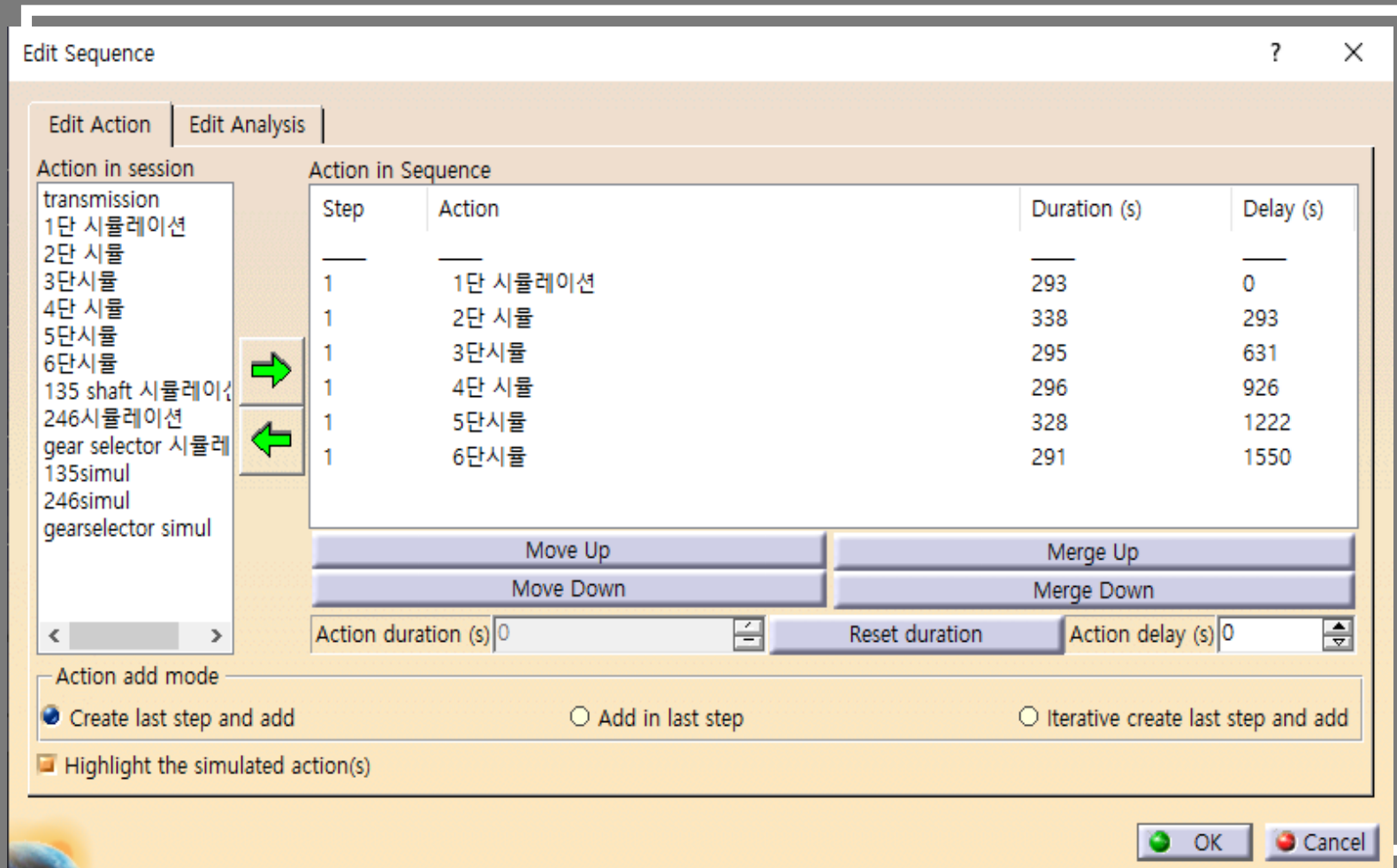
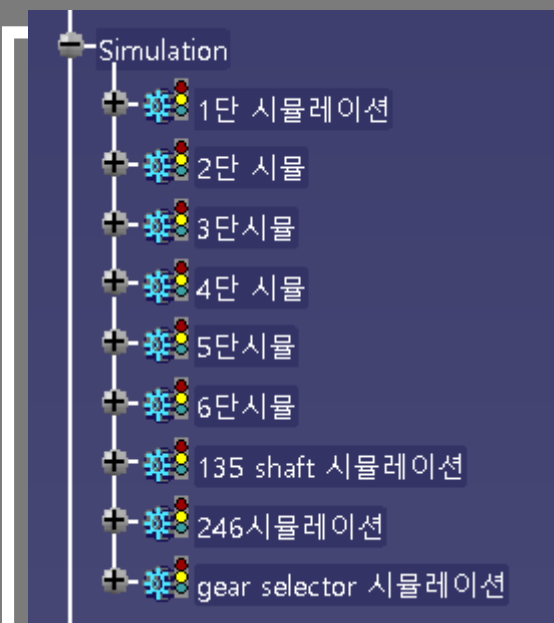
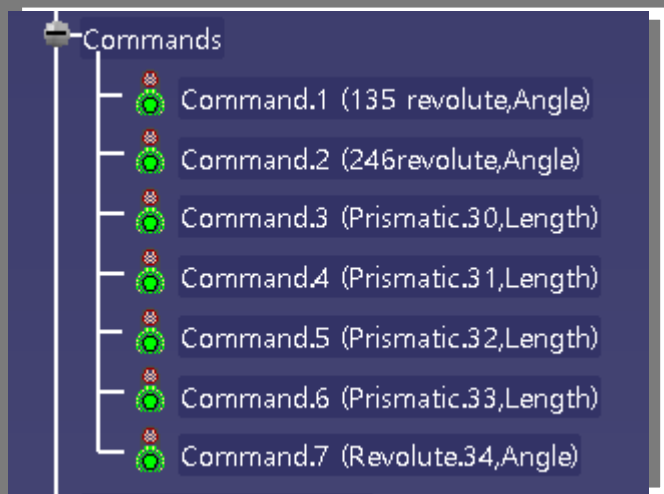
Final Product



DMU KINEMATICS & ASSEMBLY

Commands & Simulation

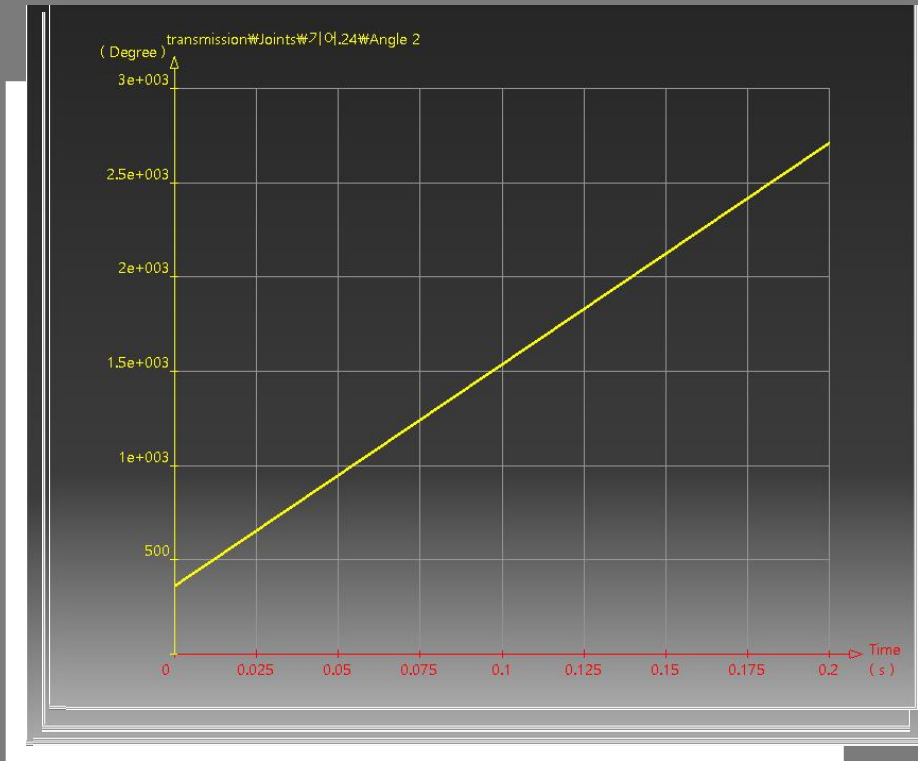
DMU KINEMATICS



DMU KINEMATICS & ASSEMBLY

Function & Graph

DMU Kinematics



$f(x)$ revolute 135shaft: transmission#Commands#Command.1#Angle=transmission#KINTime *(360deg)/(0.02s)
 $f(x)$ revolute 246shaft: transmission#Commands#Command.2#Angle=transmission#KINTime *(360deg)/(0.02s)

$f(x)$ countershaft gear6: transmission#Commands#Command.7#Angle=transmission#KINTime *(-551.02deg)/(0.02s)
 $f(x)$ countershaft gear5: transmission#Commands#Command.7#Angle=transmission#KINTime *(-423.157 deg)/(0.02s)
 $f(x)$ countershaft gear4: transmission#Commands#Command.7#Angle= transmission#KINTime *(-296.47deg)/(0.02s)
 $f(x)$ countershaft gear3: transmission#Commands#Command.7#Angle=transmission#KINTime *(-198deg)/(0.02s)
 $f(x)$ countershaft gear2: transmission#Commands#Command.7#Angle=transmission#KINTime *(-141.573 deg)/(0.02s)
 $f(x)$ countershaft gear1: transmission#Commands#Command.7#Angle=transmission#KINTime *(-90.909deg)/(0.02s)

DMU KINEMATICS & ASSEMBLY

DMU KINEMATICS

Simulation Video

<https://www.youtube.com/watch?v=3JjyIfPpDCs&t=3s>

Dual Clutch Transmission

4. 고찰

어려웠던 점 & 한계

1. Product를 조립하는 과정에서 몇가지 오류들이 발생함.
2. 더욱 정확하고 세세한 모델링을 하고 싶었지만 표현의 한계를 느낌.
3. DMU KINEMATIC를 줄 때 의도한 대로 움직일 수 있는
결합 조합을 찾지 못함.
4. 의도한 것 과 다르게 GRAPH로 단순 각속도밖에 표현하지 못함.

Dual Clutch Transmission

5. 출처

Reference

Real DCT pic

<https://i.pinimg.com/originals/37/f2/52/37f25229399efa9263e6f92bc2ccf4d8.jpg>

DCT pic

https://media.zigcdn.com/media/content/2020/Mar/dct_720x540.png

DCT 참고자료 1(youtube)

<https://youtu.be/miF6QozzBpo>

DCT 참고자료 2(youtube)

<https://youtu.be/IFAtc-zOKZs>

DCT 참고자료 3

<https://youtu.be/fhAjH1qvsPY>

DCT 참고자료 4

https://www.tremec.com/anexos/TREMEC_TR-9070.pdf

DCT 참고자료 5

Walker, Paul, et al. “Recent Advancements in Dual Clutch Transmission Modelling and Simulation.” *Researchgate*,

https://www.researchgate.net/publication/263923094_Recent_advancements_in_dual_clutch_transmission_modelling_and_simulation.

DCT 참고자료 6

[How Dual-clutch Transmissions Work | HowStuffWorks](#)

Dual Clutch Transmission

6. 질의 응답