

24시간이 모자라

미래자동차공학과
2013009212 김상혁
2012003545 이대식

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팀명 선정 이유

제작할 물건이었던 “시계”에 대해 생각을 하다가 유명한 노래인 '24시간이 모자라'가 주제와도 연관 되고 현재 우리가 처한 상황과도 비슷한 것 같아 정하게 되었습니다.

팀원

2013009212 김상혁

2012003545 이대식

제작 목표 및 선정 조건

제작 목표

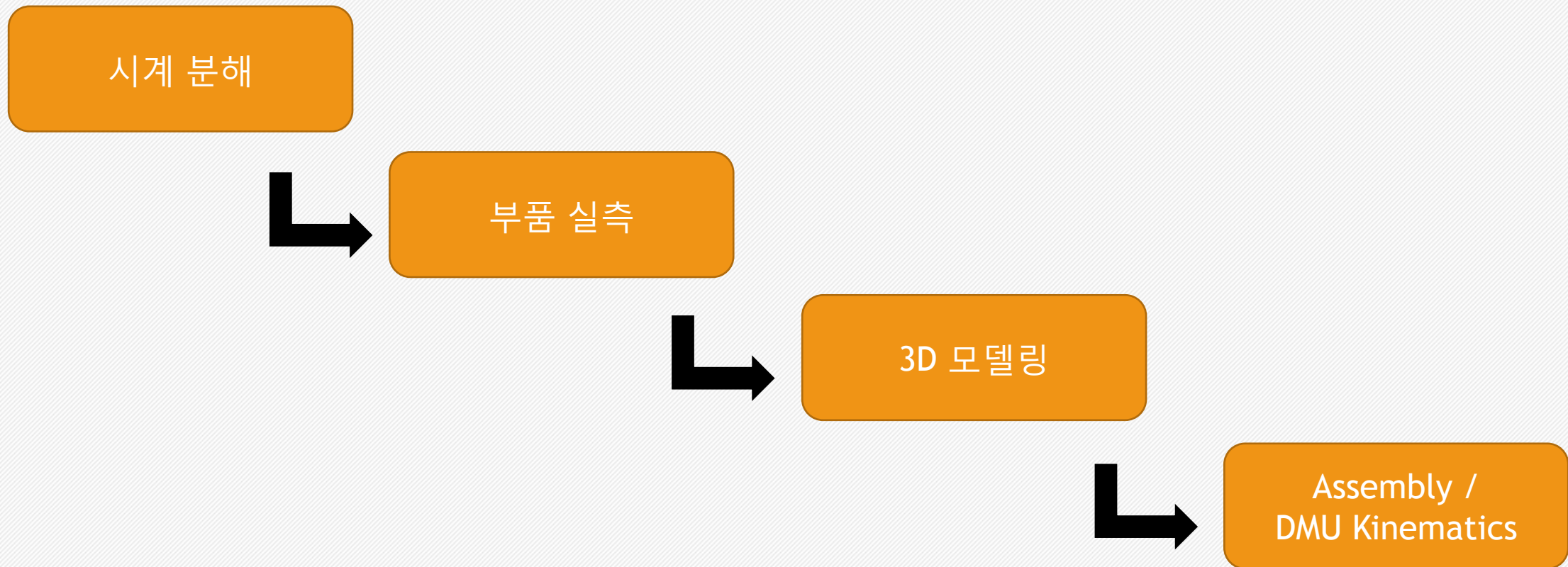


제작 목표 및 선정 조건

선정 조건

- 직접 물체의 크기를 측정할 수 있는 물건
- 내부 Mechanism을 이해할 수 있고 이를 직접 확인할 수 있는 물건
- 주위 생활에서 많이 볼 수 있는 물건

제작 순서



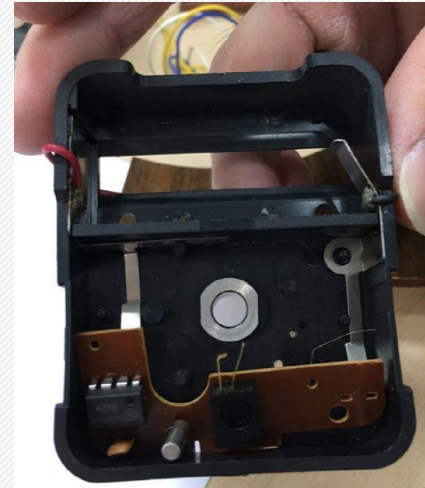
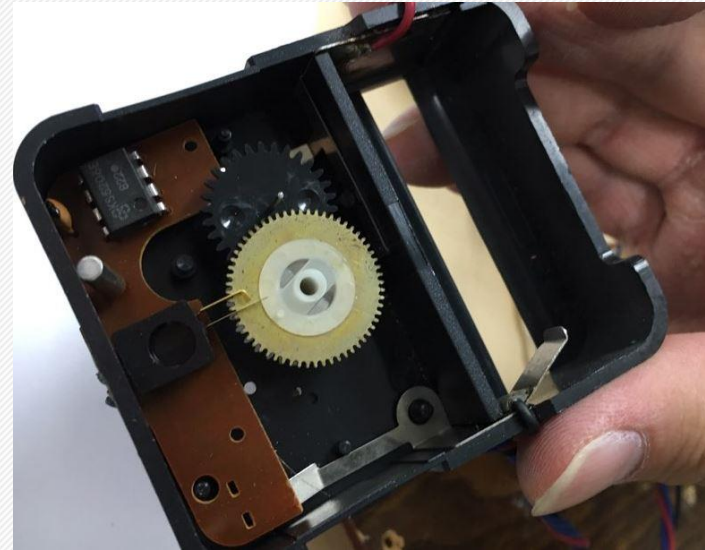
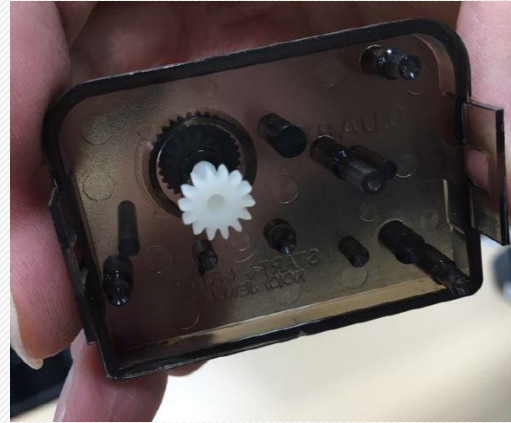
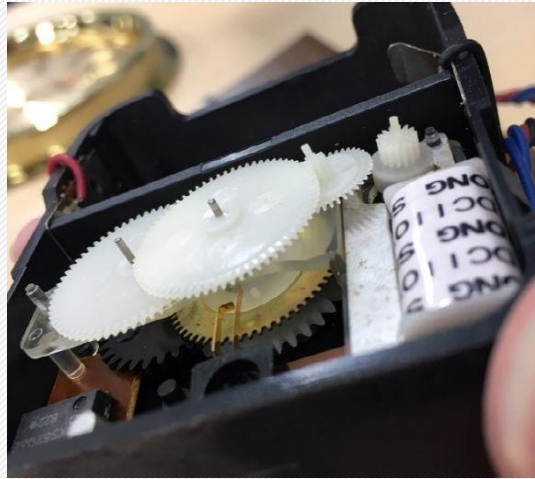
“시계분해”

- 제작과정 Part 1

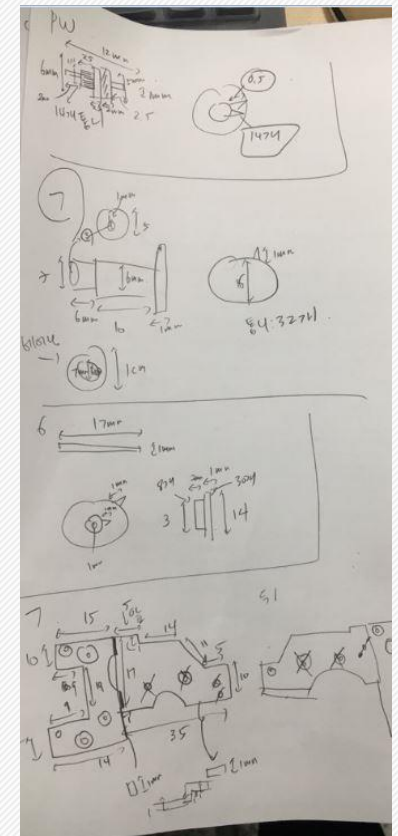
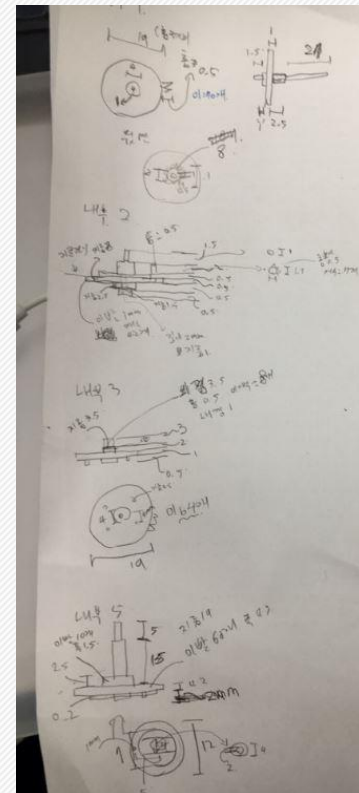
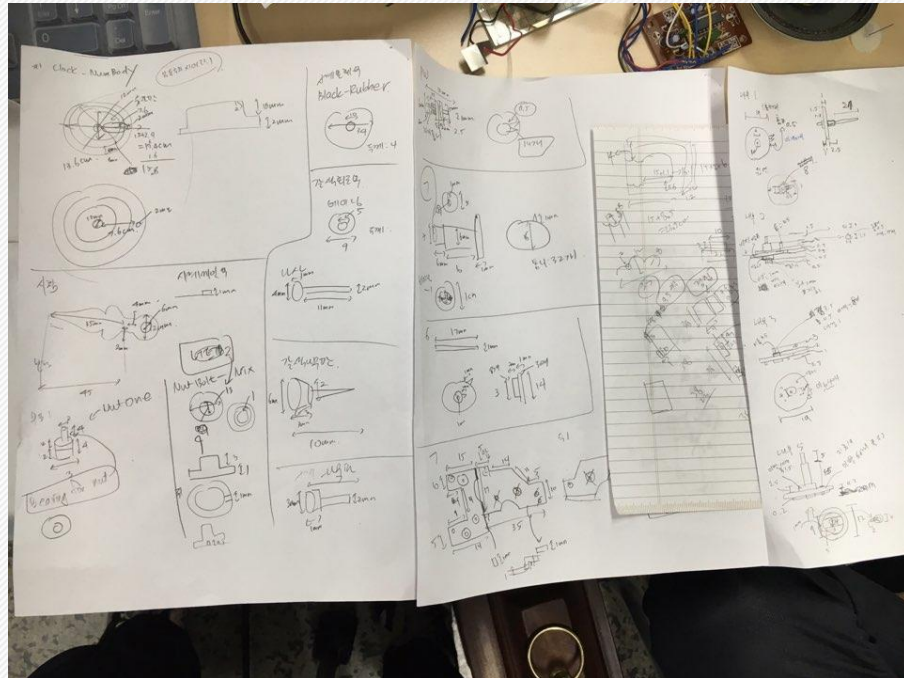
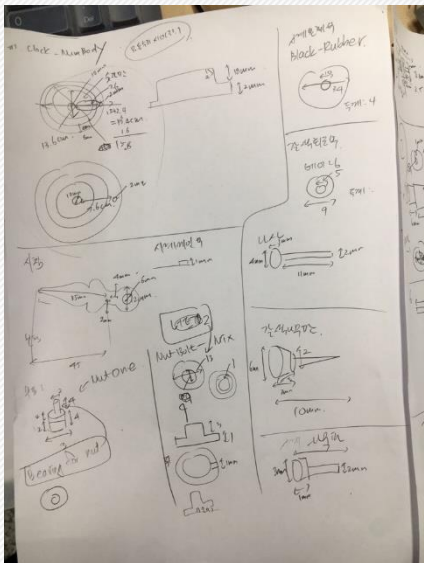


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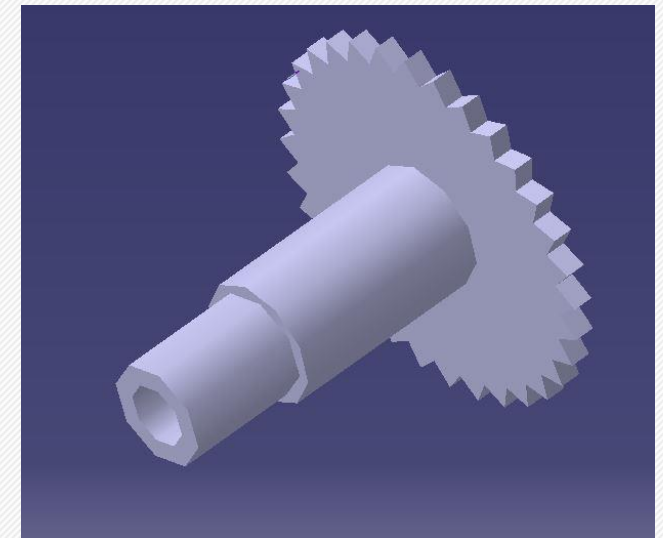
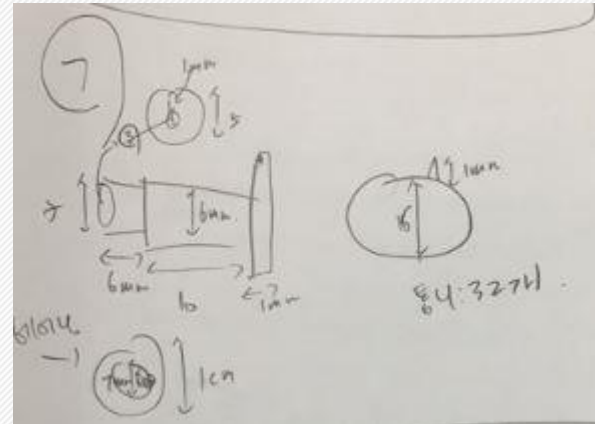
- 제작과정 Part 1



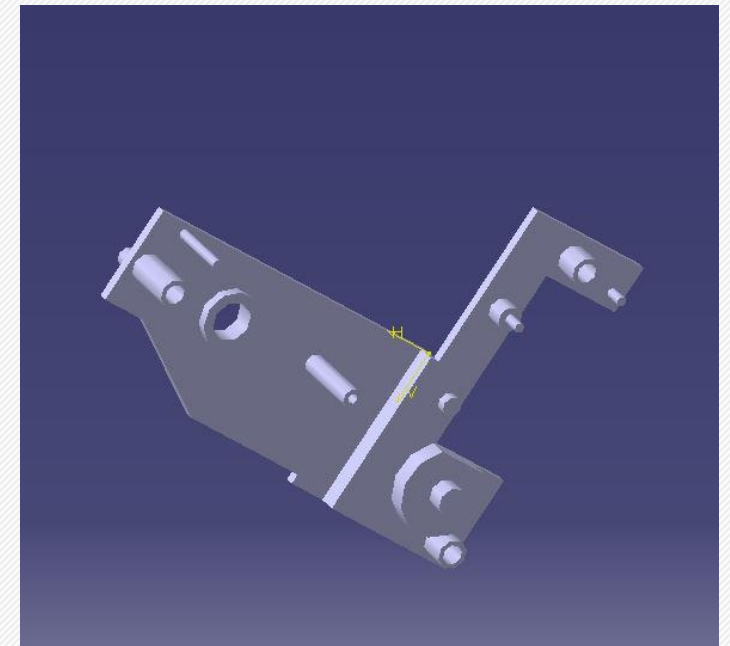
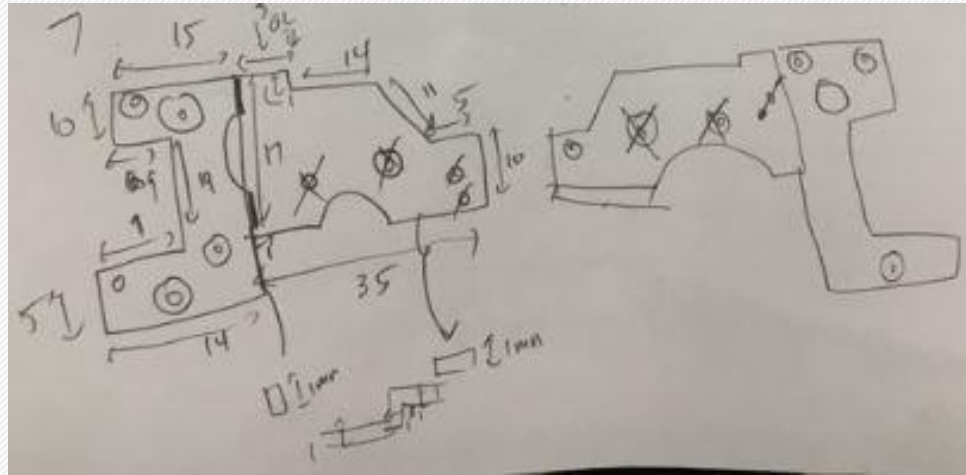
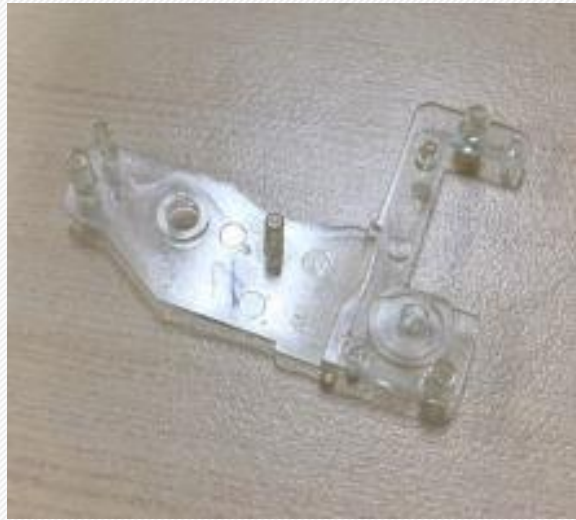
“부품 실측” - 제작과정 Part 2



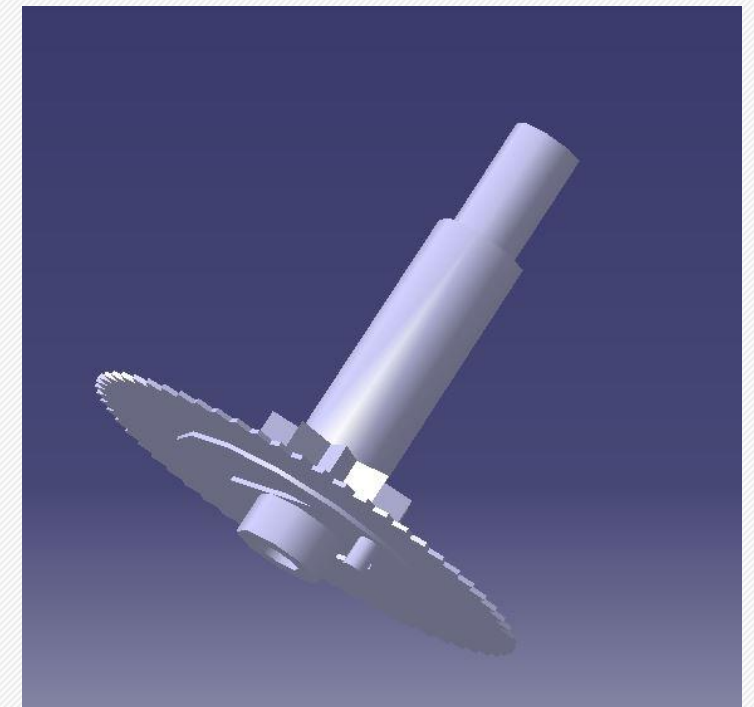
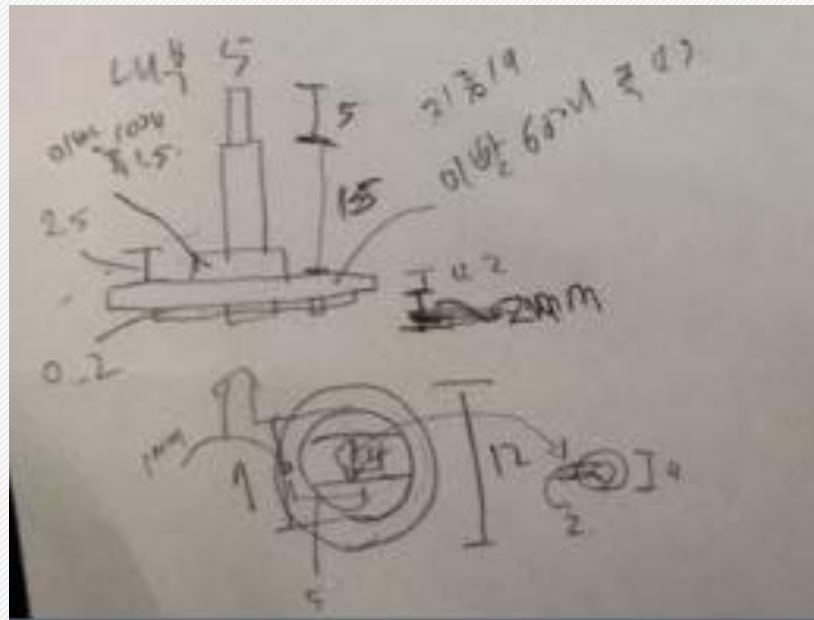
“3D 모델링” - 제작과정 Part 3



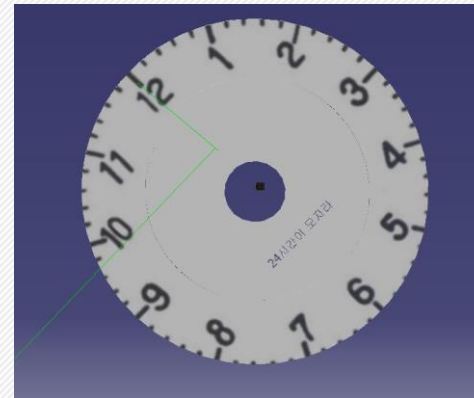
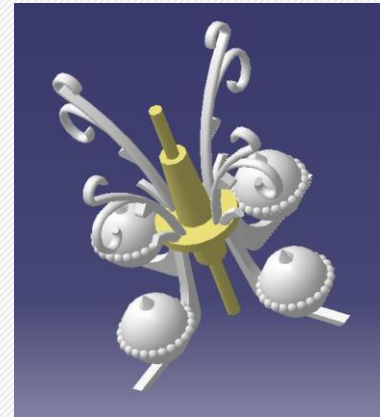
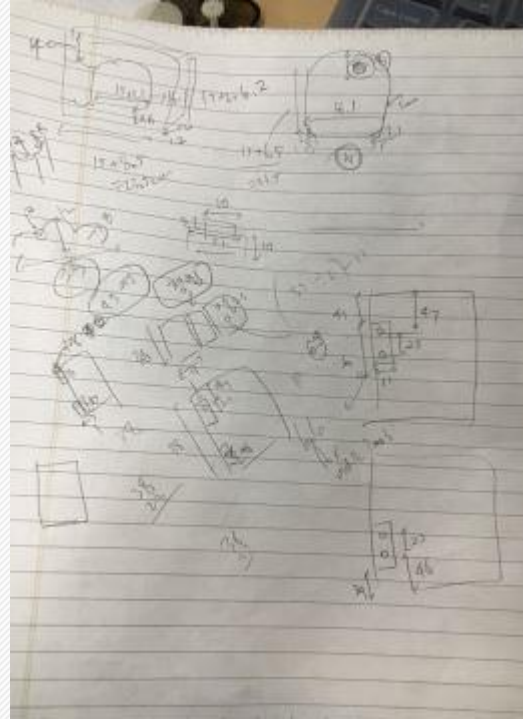
“3D 모델링” - 제작과정 Part 3



“3D 모델링” - 제작과정 Part 3



“3D 모델링” - 제작과정 Part 3



“Assembly / DMU Kinematics”

- 제작과정 Part 4

Assembly / DMU Kinematics

Product

- battery_case (Part1.1)
- gear6 (Part1.2)
- gear7 (Part1.3)
- gear6_pin (Part1.5)
- Part4 (gear.5)
- internal_4 (Part1.6)
- Part3 (Part3.1)
- internal_1 (Part1.7)
- gearcase (Part1.8)
- wood_box_outside (wood_box_outside.1)
- braket_outside_hole (braket_outside_hole.1)
- braketinput (braketinput.1)
- outside_Case_Door (outside_Case_Door.1)
- Nut_brown_board (Part1.4)
- Clock_hour_pin (Part1.11)
- Clock_minute_pin (Part1.12)
- nut_one (Part1.14)
- Part1 (Part1.15)
- support_board (support_board.1)
- Nut_brown_board (Part1.16)
- braketinput (braketinput.2)
- braket_outside_hole (braket_outside_hole.2)
- out_inner_coned_pin (out_inner_coned_pin.1)
- out_inner_coned_pin (out_inner_coned_pin.2)
- out_inner_coned_pin (out_inner_coned_pin.3)
- out_inner_coned_pin (out_inner_coned_pin.4)
- out_inner_coned_pin (out_inner_coned_pin.5)
- out_inner_coned_pin (out_inner_coned_pin.6)
- out_inner_coned_pin (out_inner_coned_pin.7)
- out_inner_coned_pin (out_inner_coned_pin.8)
- bottom_ground (bottom_ground.1)
- bottom_decorate (bottom_decorate.1)
- clock_number (clock_number.1)
- cap_in_minute (cap_in_minute.1)
- second_bar (second_bar.1)

Move

Constraints

- Surface contact 3 (Part1.3,Part1.1)
- Surface contact 5 (Part1.5,Part1.1)
- Offset 7 (Part1.3,Part1.2)
- Coincidence 8 (gear.5,Part1.3)
- Surface contact 9 (gear.5,Part1.3)
- Surface contact 12 (Part1.6,gear.5)
- Surface contact 14 (Part3.1,Part1.2)
- Coincidence 15 (Part1.7,Part1.6)
- Surface contact 17 (Part3.1,Part1.7)
- Coincidence 19 (Part1.2,Part1.5)
- Coincidence 20 (Part3.1,Part1.5)
- Offset 21 (Part1.8,Part1.1)
- Offset 22 (Part1.8,Part1.1)
- Surface contact 23 (Part1.8,Part1.1)
- Coincidence 24 (Part3.1,Part1.5)
- Surface contact 25 (Part1.1,Part1.15)
- Coincidence 26 (Part1.6,gear.5)
- Coincidence 27 (support_board.1,wood_box_outside.1)
- Coincidence 28 (support_board.1,wood_box_outside.1)
- Surface contact 29 (support_board.1,wood_box_outside.1)
- Coincidence 30 (Part1.15,support_board.1)
- Surface contact 31 (Part1.15,support_board.1)
- Coincidence 32 (Part1.4,wood_box_outside.1)
- Offset 34 (support_board.1,Part1.4)
- Coincidence 35 (Part1.16,support_board.1)
- Offset 36 (Part1.16,support_board.1)
- Surface contact 37 (braketinput.1,wood_box_outside.1)
- Surface contact 38 (braketinput.1,wood_box_outside.1)
- Offset 40 (braketinput.1,wood_box_outside.1)
- Surface contact 41 (braketinput.2,wood_box_outside.1)
- Surface contact 42 (braketinput.2,wood_box_outside.1)
- Offset 43 (braketinput.2,wood_box_outside.1)

Fix

- Fix:44 (wood_box_outside.1)
- Coincidence 45 (braket_outside_hole.1,outside_Case_Door.1)
- Coincidence 46 (outside_Case_Door.1,braket_outside_hole.1)
- Surface contact 47 (braket_outside_hole.1,outside_Case_Door.1)
- Coincidence 48 (braket_outside_hole.2,outside_Case_Door.1)
- Coincidence 49 (outside_Case_Door.1,braket_outside_hole.2)
- Surface contact 50 (braket_outside_hole.2,outside_Case_Door.1)
- Coincidence 51 (braket_outside_hole.1,braketinput.1)
- Coincidence 52 (braket_outside_hole.2,braketinput.2)
- Surface contact 53 (braket_outside_hole.1,braketinput.1)
- Coincidence 55 (braketinput.2,out_inner_coned_pin.1)
- Surface contact 56 (out_inner_coned_pin.1,wood_box_outside.1)
- Coincidence 57 (out_inner_coned_pin.2,braketinput.2)
- Surface contact 58 (out_inner_coned_pin.2,wood_box_outside.1)
- Coincidence 59 (out_inner_coned_pin.3,outside_Case_Door.1)
- Offset 60 (out_inner_coned_pin.3,braket_outside_hole.2)
- Coincidence 61 (out_inner_coned_pin.4,outside_Case_Door.1)
- Offset 62 (out_inner_coned_pin.4,braket_outside_hole.2)
- Coincidence 63 (out_inner_coned_pin.5,outside_Case_Door.1)
- Offset 64 (out_inner_coned_pin.5,braket_outside_hole.1)
- Coincidence 65 (out_inner_coned_pin.6,outside_Case_Door.1)
- Offset 66 (out_inner_coned_pin.6,braket_outside_hole.1)
- Coincidence 67 (out_inner_coned_pin.7,braketinput.1)
- Surface contact 68 (out_inner_coned_pin.7,wood_box_outside.1)
- Coincidence 69 (out_inner_coned_pin.8,braketinput.1)
- Surface contact 70 (out_inner_coned_pin.8,wood_box_outside.1)
- Surface contact 71 (bottom_ground.1,wood_box_outside.1)
- Offset 72 (bottom_ground.1,wood_box_outside.1)
- Surface contact 73 (bottom_ground.1,wood_box_outside.1)
- Coincidence 74 (bottom_decorate.1,bottom_ground.1)
- Offset 75 (bottom_decorate.1,bottom_ground.1)
- Parallelism 77 (Part1.1,wood_box_outside.1)
- Parallelism 81 (Part1.6,Part1.1)
- Coincidence 82 (clock_number.1,Part1.3)
- Surface contact 83 (Part1.15,clock_number.1)
- Offset 84 (Part1.15,clock_number.1)
- Offset 85 (Part1.15,clock_number.1)
- Offset 86 (Part1.15,clock_number.1)
- Offset 87 (Part1.15,clock_number.1)
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- Offset 193 (Part1.15,clock_number.1)
- Offset 194 (Part1.15,clock_number.1)
- Offset 195 (Part1.15,clock_number.1)
- Offset 196 (Part1.15,clock_number.1)
- Offset 197 (Part1.15,clock_number.1)
- Offset 198 (Part1.15,clock_number.1)
- Offset 199 (Part1.15,clock_number.1)
- Offset 200 (Part1.15,clock_number.1)

Mechanisms

Mechanism1, DOF=0

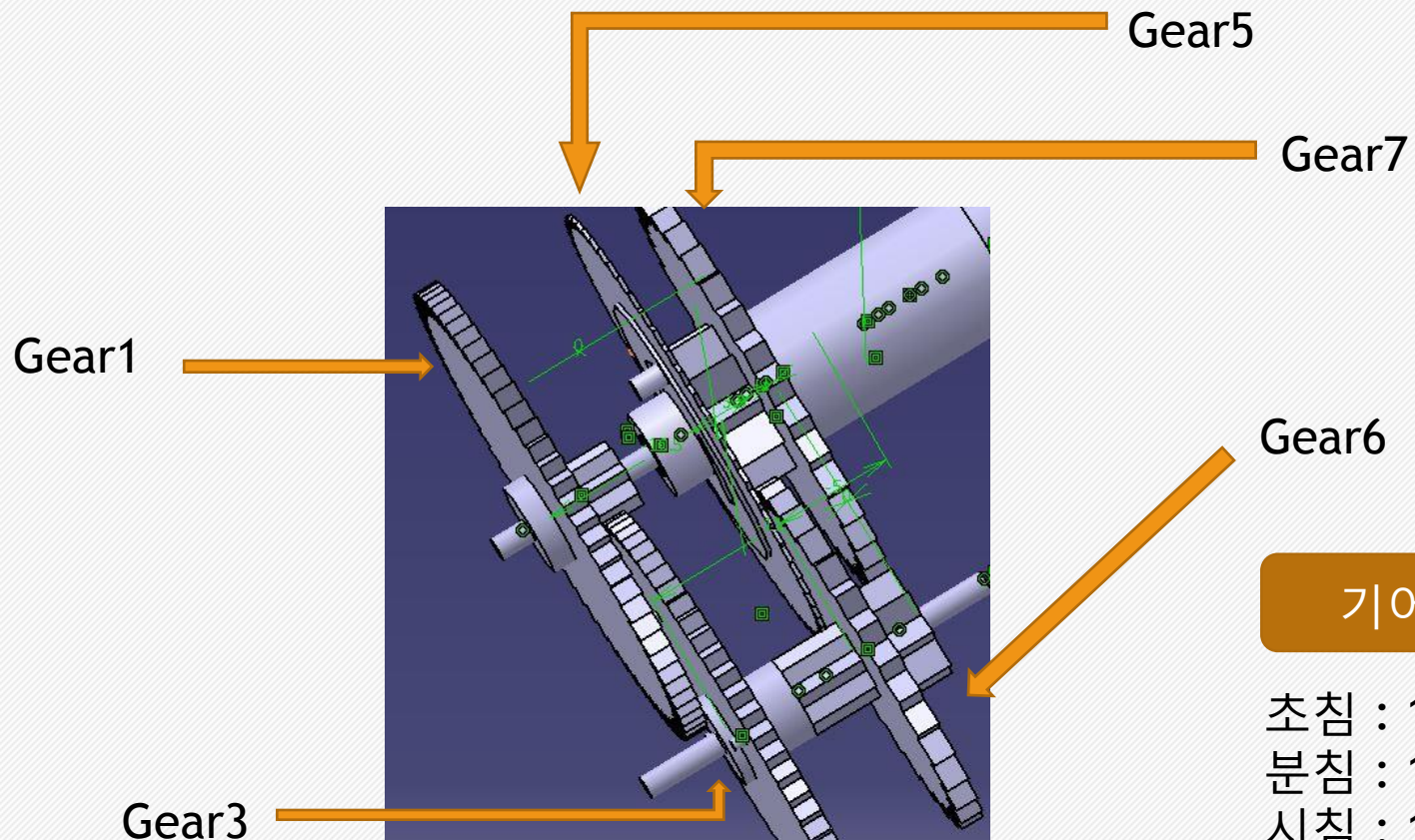
Joints

- Rigid1 (Part1.1,wood_box_outside.1)
- Gear4 (Part1.7,Part3.1,Part1.1)
- Part3.1,gear.5,Part1.1
- Part1.12,Part1.14
- Part1.12,Part1.14
- Part1.12,Part1.14
- Part1.14,Part1.12
- Part1.2,Part1.3,Part1.1
- Part1.3,Part1.11
- gear.5,Part1.12
- second_bar.1,Part1.7
- bottom_ground.1,wood_box_outside.1
- Part1.10 (bottom_ground.1,bottom_decorate.1)
- braketinput.1,wood_box_outside.1
- Part1.10 (braket_outside_hole.1,outside_Case_Door.1)
- out_inner_coned_pin.6,braket_outside_hole.1
- Part1.10 (out_inner_coned_pin.5,braket_outside_hole.2)
- Part1.10 (braketinput.1,braket_outside_hole.1)
- Part1.10 (braketinput.2,wood_box_outside.1)
- Part1.10 (braket_outside_hole.2,outside_Case_Door.1)
- Part1.10 (out_inner_coned_pin.3,braket_outside_hole.2)
- Part1.10 (out_inner_coned_pin.4,braket_outside_hole.2)

A 3D CAD model of a clock mechanism assembly. The main body is a brown wooden case with a circular clock face and a pendulum. Various components like gears, pins, and brackets are highlighted in yellow and green, corresponding to the constraints listed in the adjacent panels. The assembly is shown in a perspective view against a dark blue background.

“기어비”

- Assembly / DMU Kinematics



기어 간 관계

Gear1-Gear3 : 8/64

Gear3-Gear5 : 8/60

Gear5-Gear6 : 1/30

Gear6-Gear7 : 8/32

기어비 확인

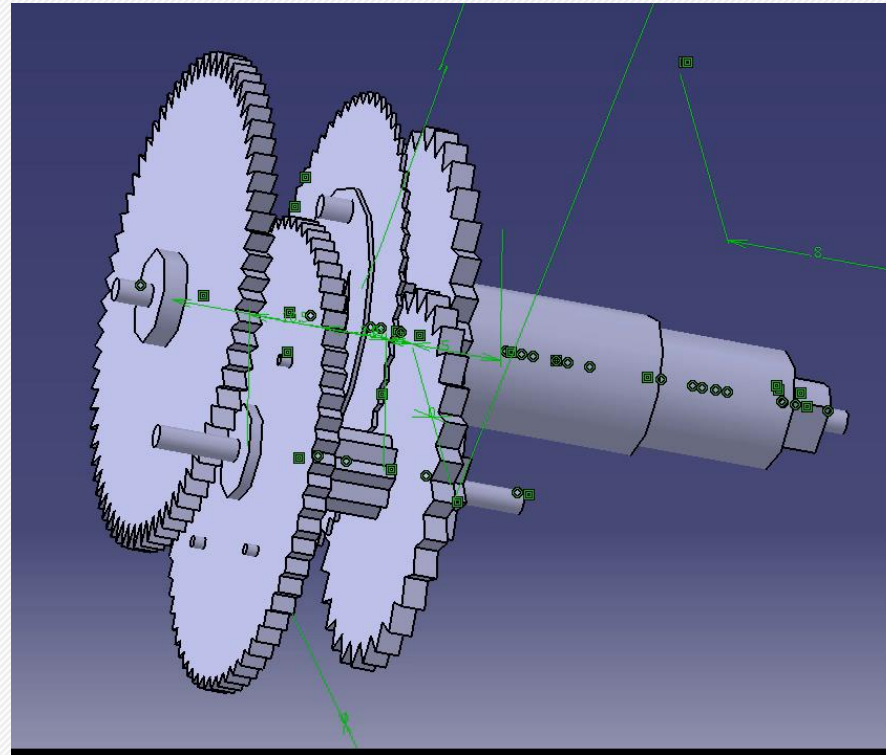
초침 : 1 -> 360°

분침 : $1 \times 8/64 \times 8/60 = 1/60$ -> 6°

시침 : $1/60 \times 10/30 \times 8/32 = 1/12 \times 1/60$ -> 0.5°

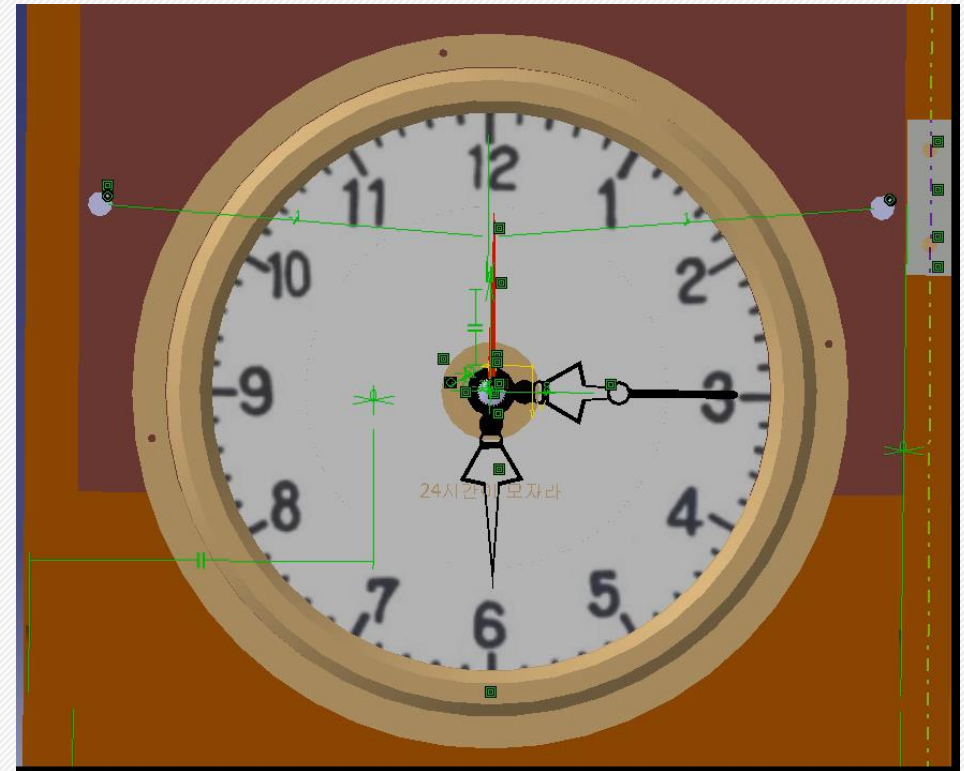
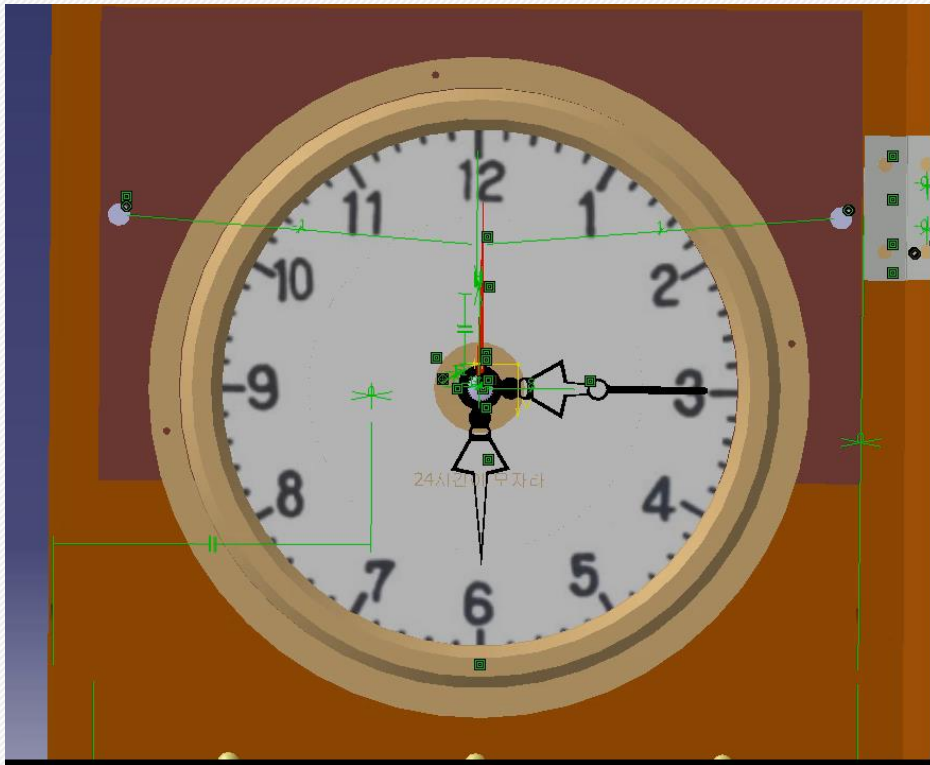
“기어비”

- Assembly / DMU Kinematics



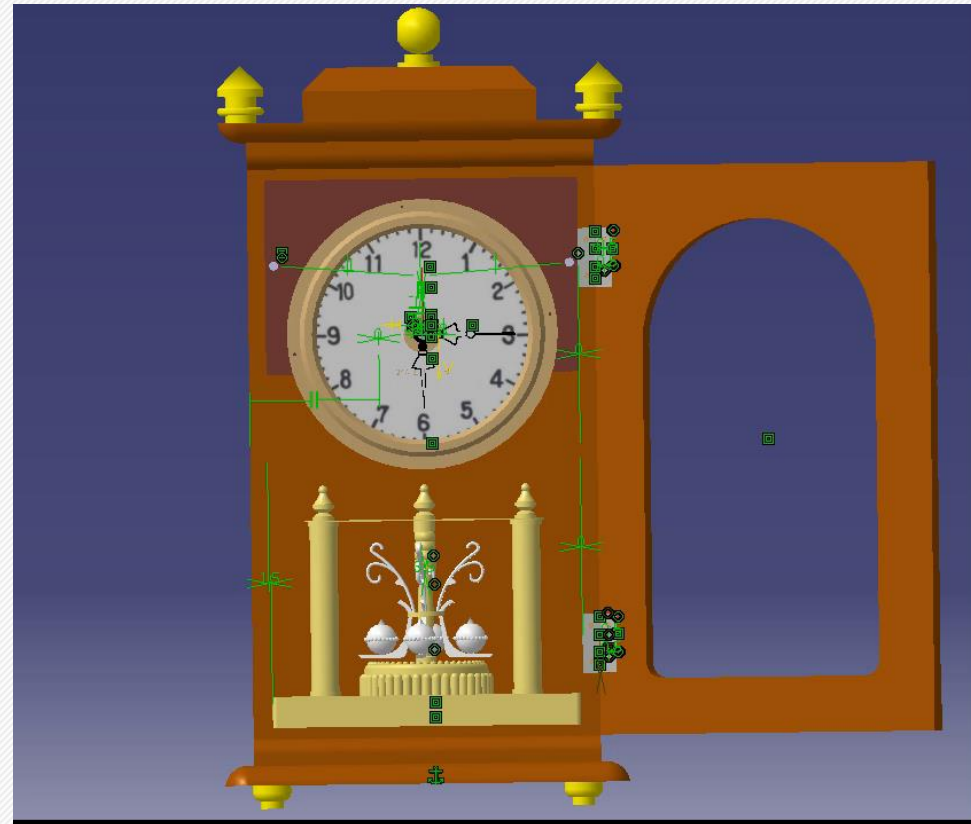
결과

- 시계부분 운전 동영상



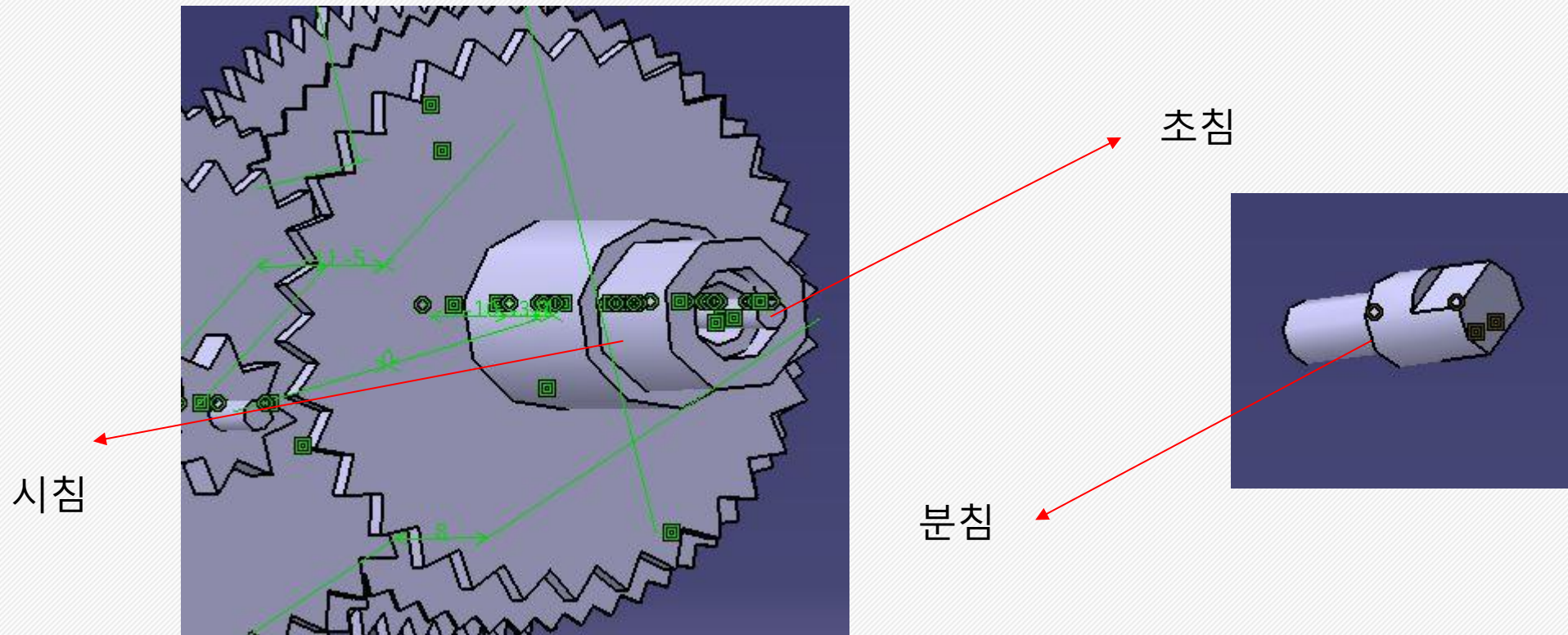
결과

- 전체 동영상



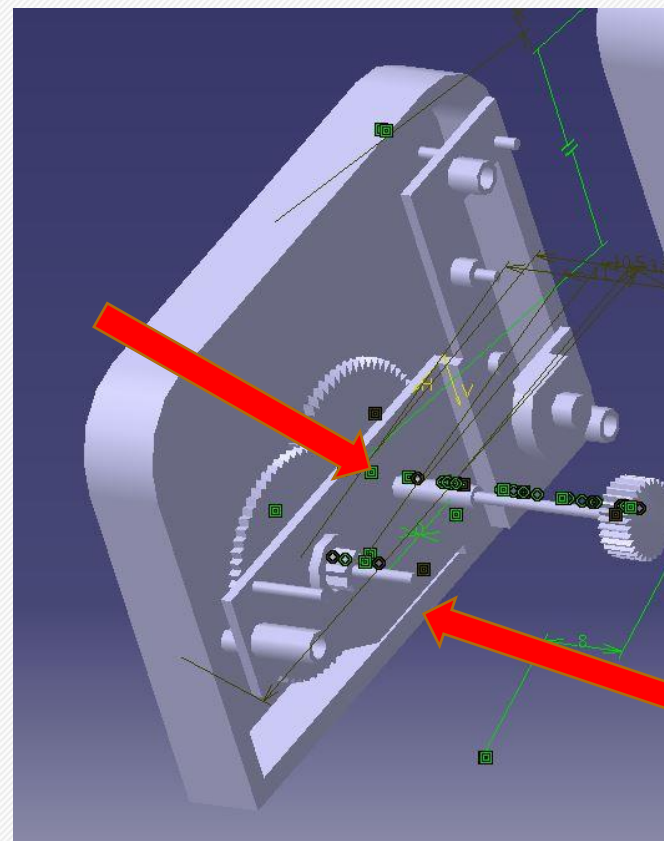
“시침, 분침, 초침”

제작 중 어려웠던 점 및 해결 방안

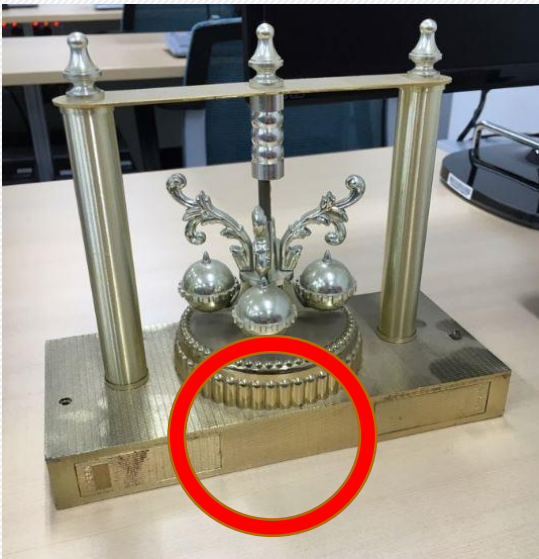


“파트간 오차 발생”

제작 중 어려웠던 점 및 해결 방안



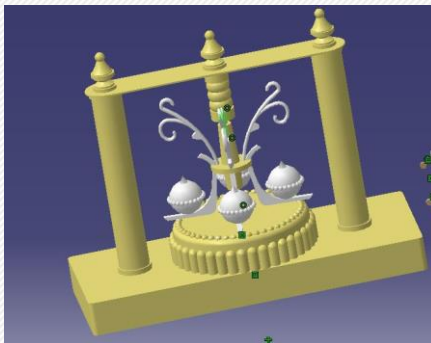
제작 중 아쉬웠던 점



자석의 움직임으로 회전하는 부분



자석을 통한 움직임을
구현할 수 있는 지식 부족





Team Project를 마무리 하며



Q & A



FIN

감사합니다