

1장. 드론 제작 프로젝트 '스카이로버 나노'

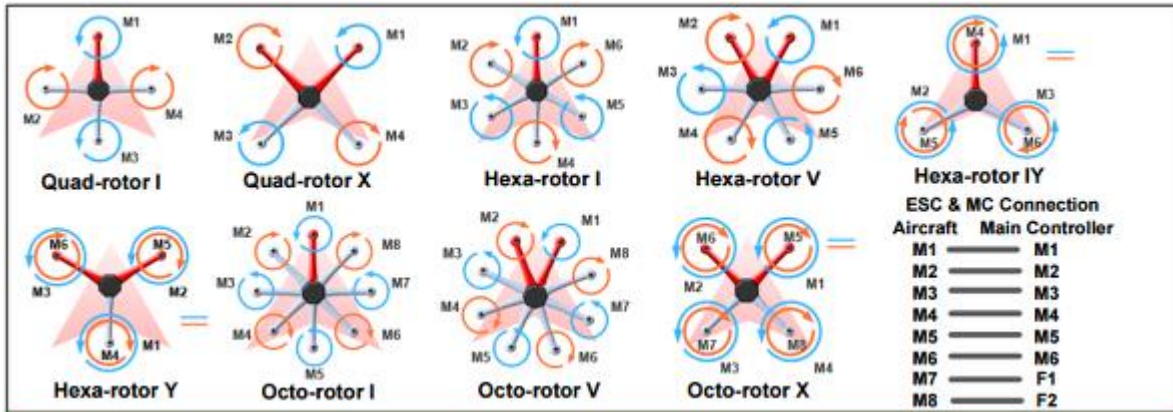


그림 1-1 멀티콥터의 종류(출처: <http://www.dji.com>)

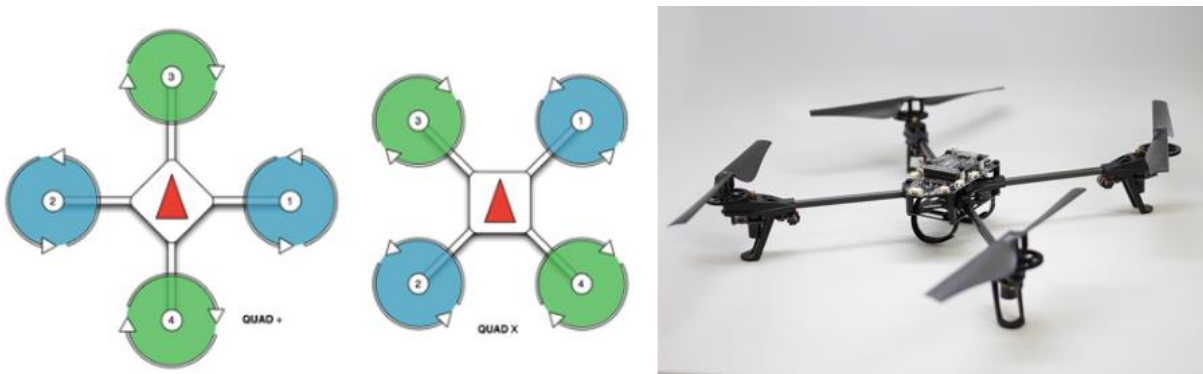


그림 1-2 출처: <https://pixhawk.org/platforms/multicopters/start>

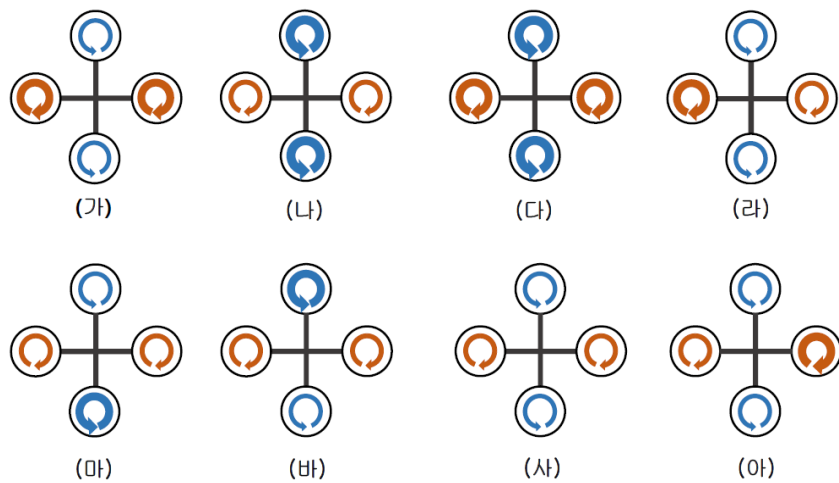


그림 1-3 멀티콥터의 비행 원리

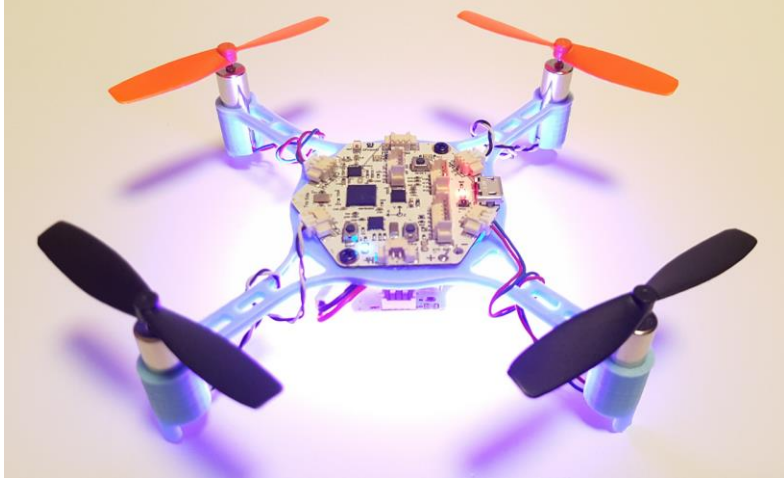


그림 1-4

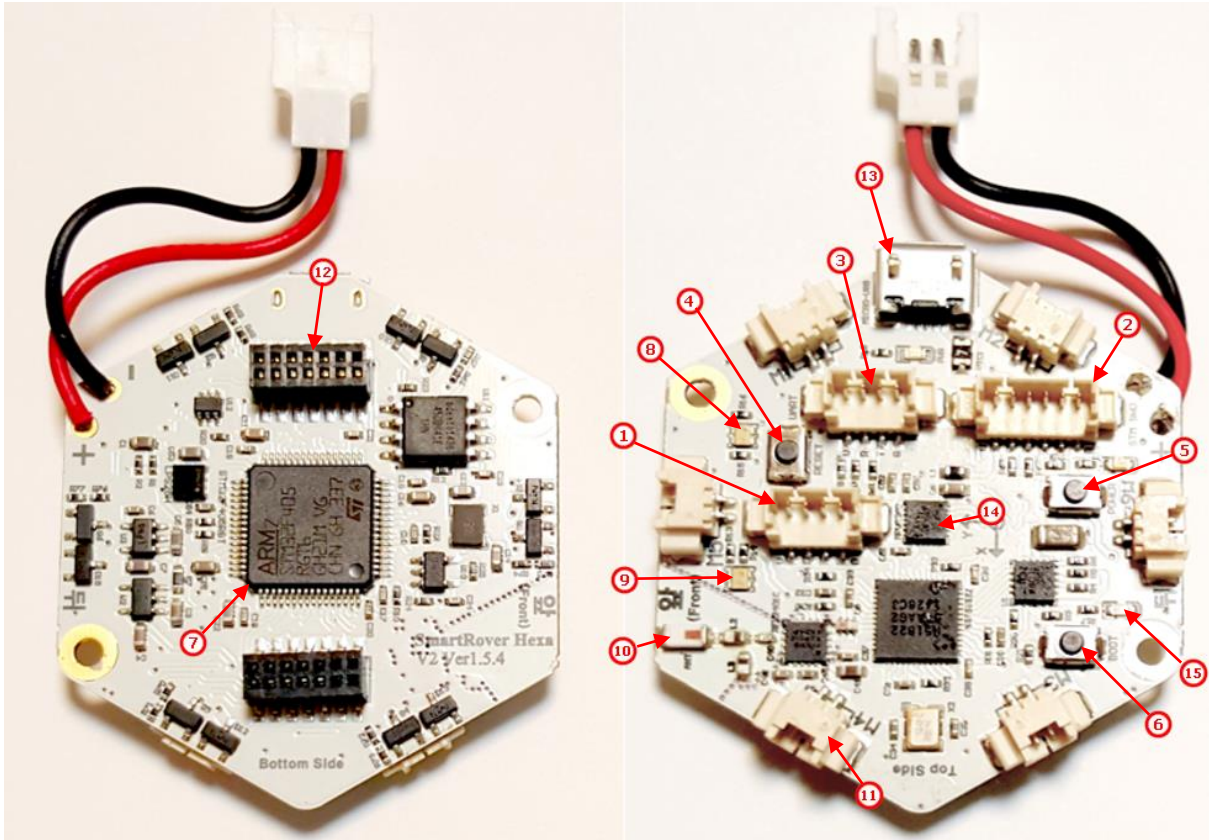


그림 1-5

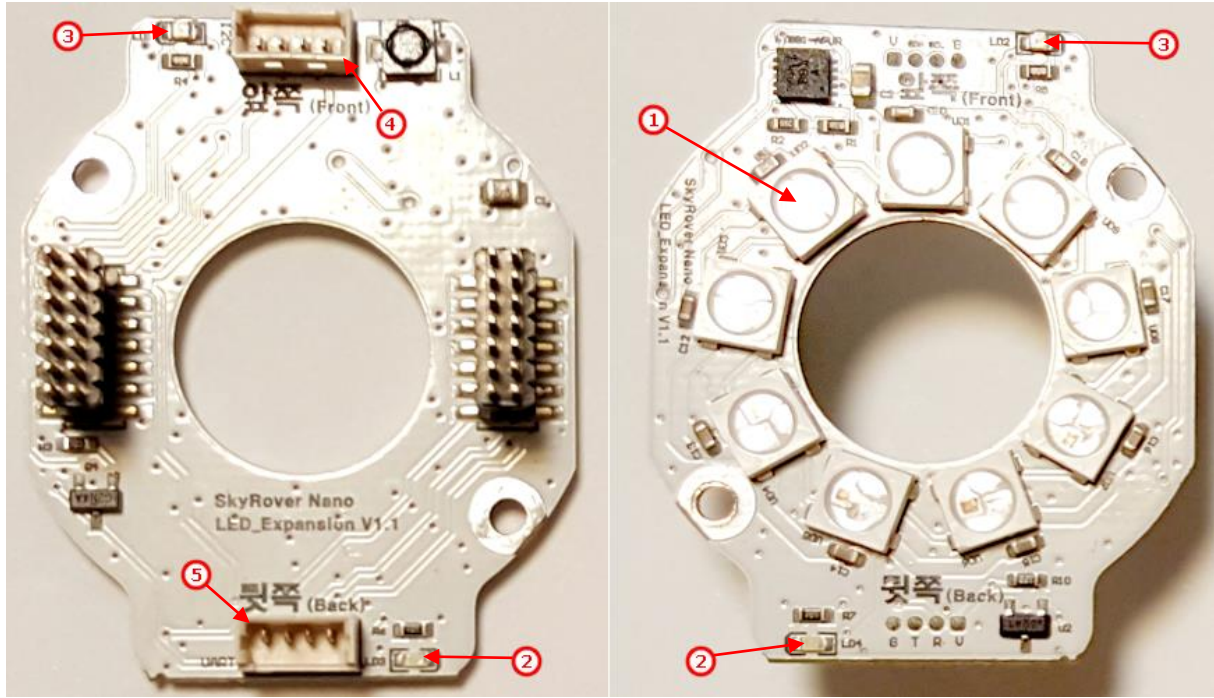


그림 1-6

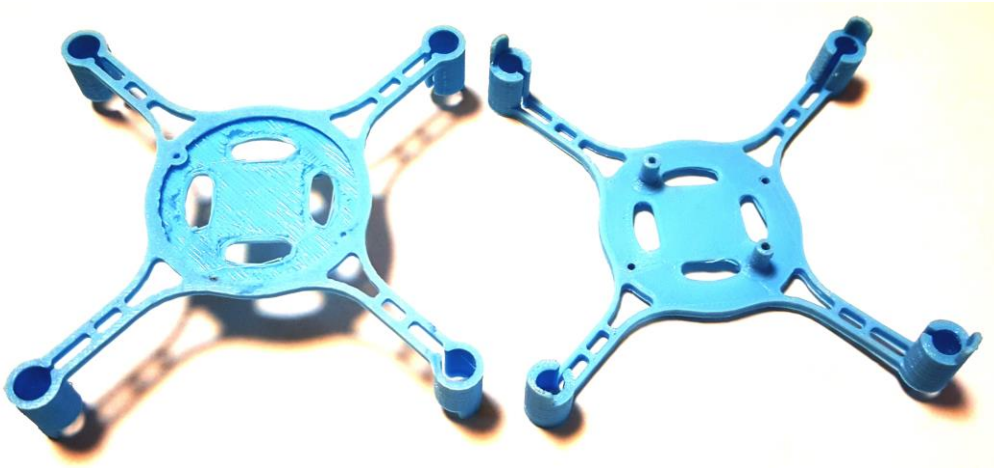


그림 1-7

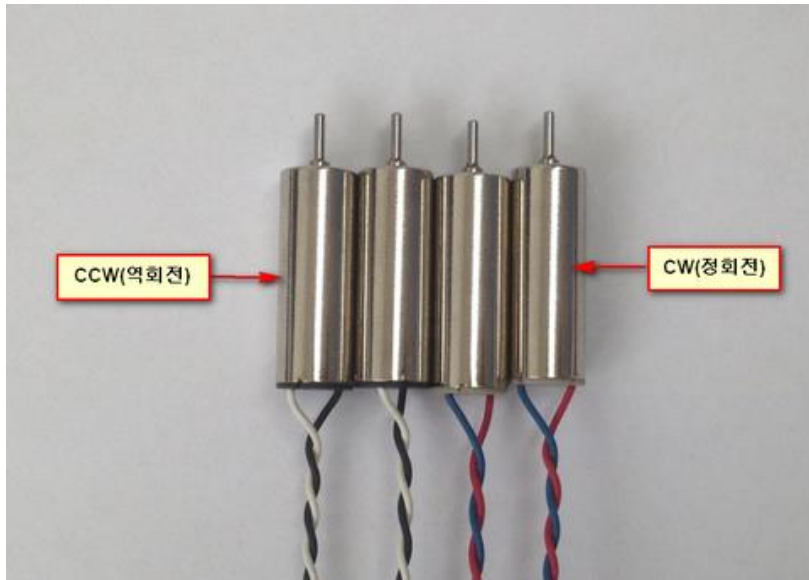


그림 1-8 모터



그림 1-9 회전날개



그림 1-10 리튬폴리머 배터리



그림 1-11

The image shows a screenshot of the PTC website. At the top, the PTC logo and tagline "PRODUCT & SERVICE ADVANTAGE" are visible. A navigation menu includes links for "왜 PTC인가?", "솔루션", "제품", "서비스", "커뮤니티", and "지원". A prominent blue banner reads "30일간 무료로 PTC Creo Parametric 사용해 보기". Below this, a section titled "3D CAD 소프트웨어 무료 30일 평가판 다운로드" contains a description of PTC Creo Parametric's capabilities. To the right is a registration form with fields for name, email, company, phone, country, and zip code. A checkbox for "제일조항의 연락 요청" is also present. At the bottom, a small screenshot of the PTC Creo software interface shows a 3D model of a mechanical assembly.

그림 1-12 양식 제출 페이지

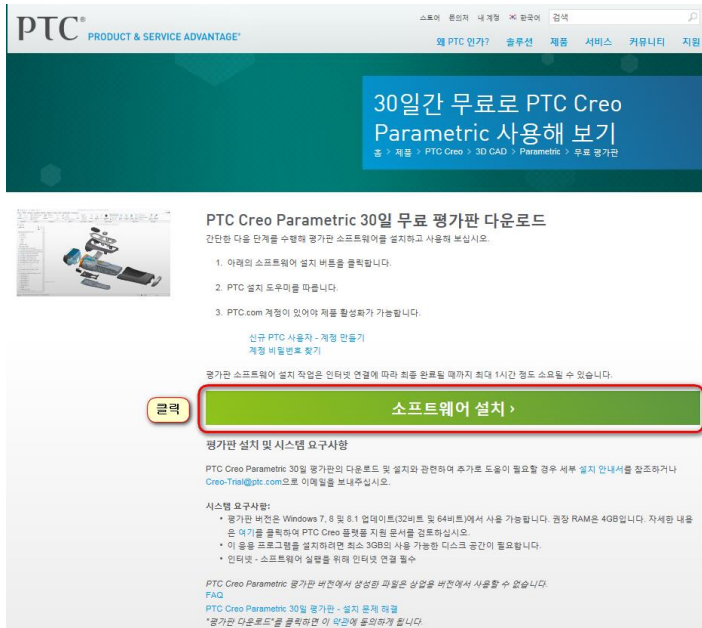


그림 1-13 Creo 내려받기 페이지

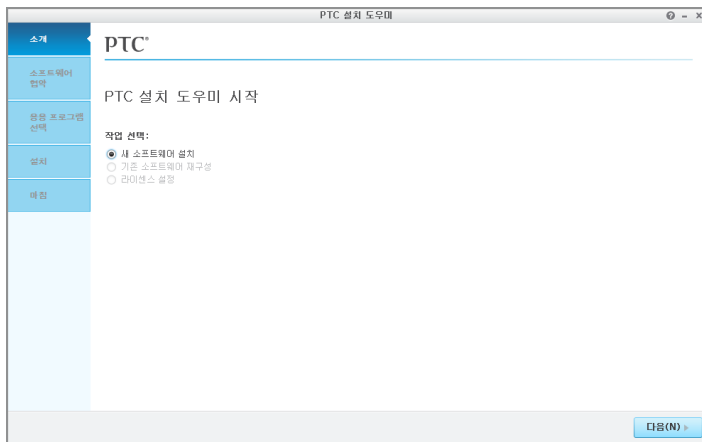


그림 1-14 설치 도우미



그림 1-15 라이선스 협약

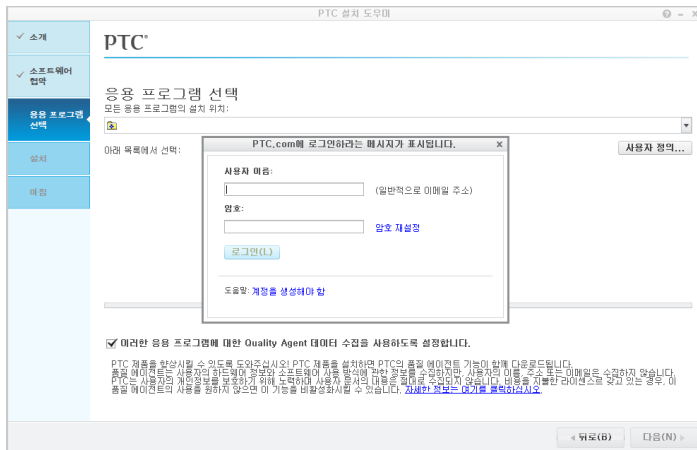


그림 1-16 PTC 계정 로그인

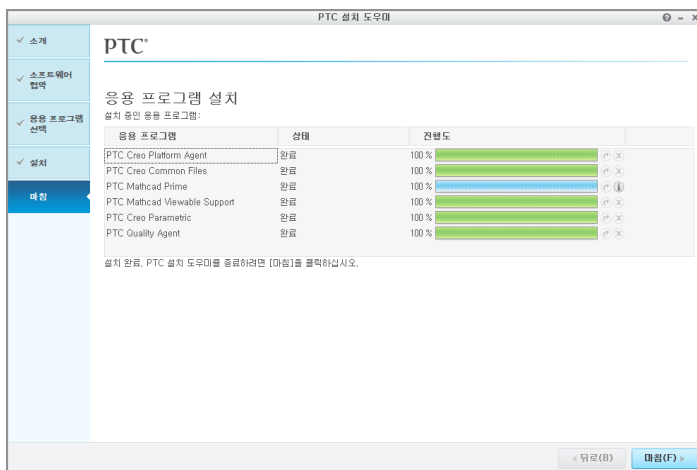


그림 1-17 설치 완료



그림 1-18 실행 초기화면

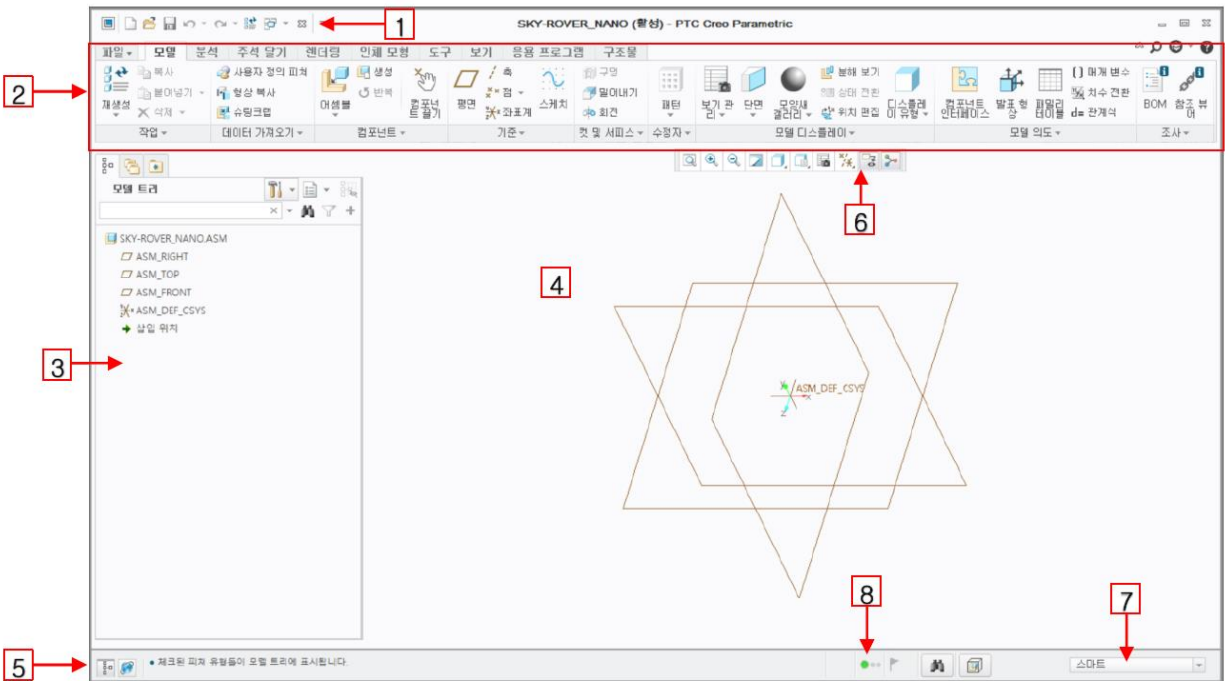


그림 1-19 Creo 화면구성



그림 1-20

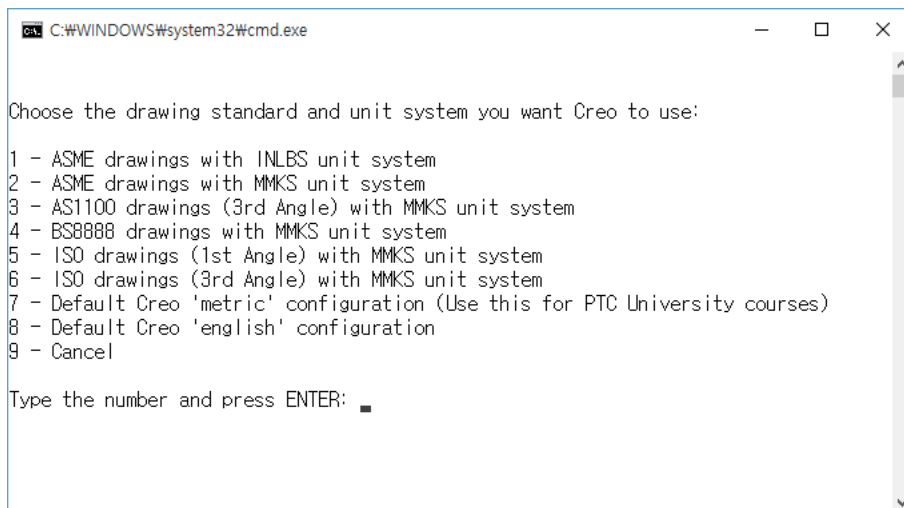


그림 1-21 환경설정 유틸리티 메뉴

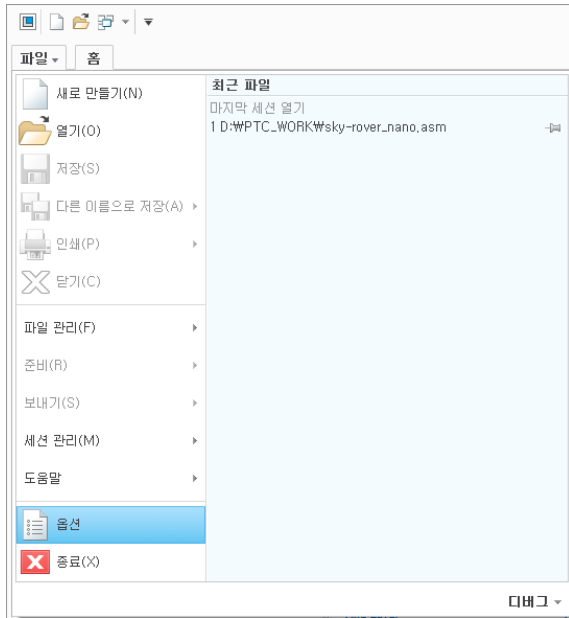


그림 1-22 옵션 메뉴

이름	값	상태	설명
rename_drawings_with_object	both	●	시스템이 관련 드로잉들을 부품과 어셈블리와 합
retrieve_data_sharing_ref_parts	yes	●	독립적인 데이터 공유 피쳐의 참조 부품 자동 가
retrieve_merge_ref_parts	yes	●	중속 결합을 위해 참조 부품 자동 읽어오기
save_dialog_for_existing_models	no *	●	저장 위치를 이미 알고 있는 모델에 대하여 저장
save_model_display	shading_low	●	저장된 그래픽 데이터 양을 설정합니다. Wirefran
search_path	\$pro_directory\cr...	●	객체/파일 읽어들이기를 위한 검색 디렉토리 목
search_path	\$pro_directory\cr...	●	객체/파일 읽어들이기를 위한 검색 디렉토리 목
show_sketch_dims_in_feature	yes	●	피쳐 정의 환경에서 내부 스케치 치수의 기본 디
shrinkwrap_alert	no	●	품질 단계가 상향조정된 후 슈링크랩 경고를 한
sketcher_refit_after_dim_modify	no	●	2D 단면에 치수를 수정한 후 또는 첫 피쳐 생성
sketcher_starts_in_2d	yes	●	스케치 모드에서 초기 모델 방향을 정의합니다.
skip_small_surfaces	no	●	사용자가 작은 음영처리된 서피스들을 표시하지
spin_with_part_entities	yes	●	Yes - 기존 피쳐가 모델의 동적 회전 중에 표시
start_model_dir	\$pro_directory\cr...	●	시작 부품과 어셈블리를 포함하는 디렉토리로
suppress_appearance_message	yes	●	Lightworks 모양새 변환 알림 대화상자를 억제
system_background_color	100 100 100	●	그래픽 영역 바탕 색상을 정의합니다. 세 자리수
template_designasm	\$pro_directory\cr...	●	지정 기본 어셈블리를 지정합니다. 문제를 예방
template_drawing	\$pro_directory\cr...	●	기본 드로잉 템플릿으로 사용될 드로잉을 지정
template_mfgcast	\$pro_directory\cr...	●	기본 제조 캐스트 템플릿으로 사용될 모델을 지
template_mfgemo	\$pro_directory\cr...	●	기본 제조 expert machinist 템플릿으로 사용
template_mfgmold	\$pro_directory\cr...	●	기본 제조 몰드 템플릿으로 사용될 모델을 지
template_mfgnc	\$pro_directory\cr...	●	기본 제조 어셈블리 템플릿으로 사용될 모델을
template_sheetmetalpart	\$pro_directory\cr...	●	기본 판금 부품 템플릿으로 사용될 모델을 지
template_solidpart	\$pro_directory\cr...	●	기본 부품 템플릿으로 사용될 모델을 지정하
tolerance_standard	iso	●	모델 생성시 사용할 공차 표준을 설정합니다.
trail_dir	\$TEMP	●	시작 디렉토리가 아니라 지정된 디렉토리에 트레
visible_message_lines	\$TEMP	●	Creo 메시지 영역의 기본 표시 메시지 줄 수를
weld_ui_standard	찾아보기	●	용접 사용자 인터페이스에 대한 표준을 지정
windows_scale	.97	●	지정된 계수로 Creo 창을 배율합니다. 일반적으

그림 1-23 구성 편집기

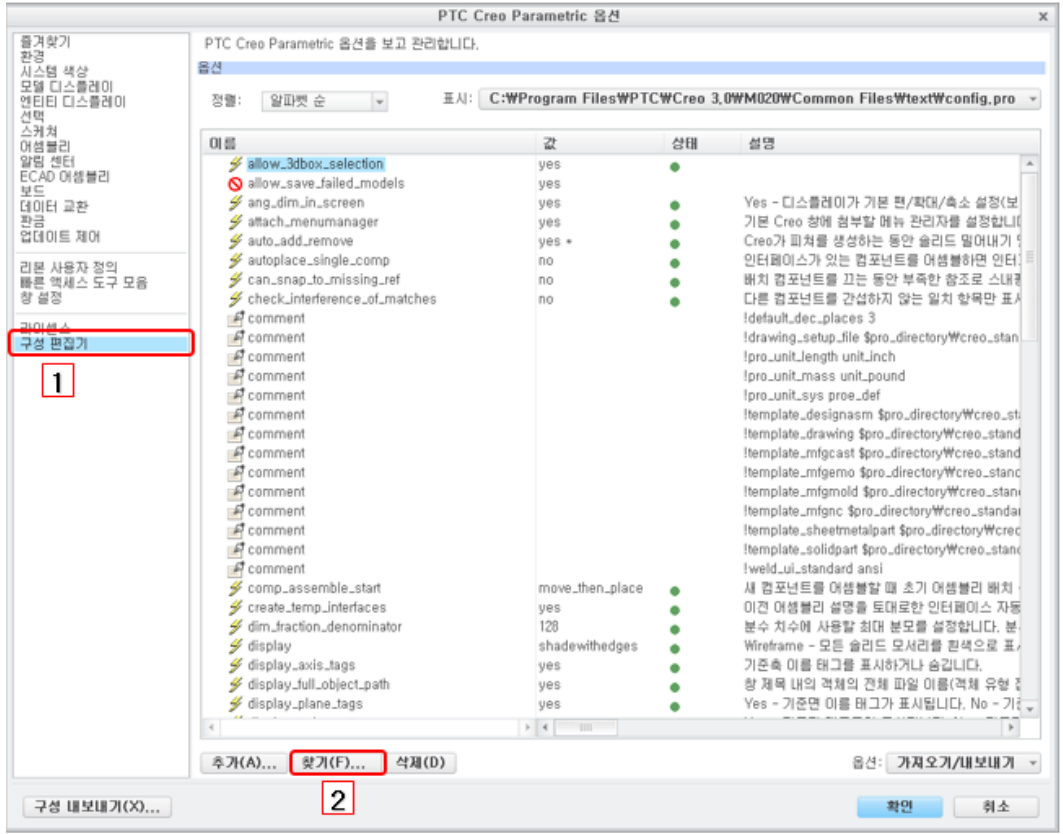


그림 1-24 구성 편집기



그림 1-25 구성 편집기 찾기 옵션

이름	값	상태	설명
comment			!template_mfgmod \$pro_directory\wcreo_stand
comment			!template_mfgnc \$pro_directory\wcreo_stand
comment			!template_sheetmetalpart \$pro_directory\wcreo
comment			!template_solidpart \$pro_directory\wcreo_stand
comment			!weld_lui_standard ansi
comp_assemble_start	move_then_place	●	새 컴포넌트를 어셈블할 때 초기 어셈블리 배치
create_temp_interfaces	yes	●	이전 어셈블리 설명을 토대로한 인터페이스 자동
default_dec_places	3	★	새로 생성된 치수를 반올림할 기본 소수점 자릿수
dim_traction_denominator	128	●	분수 치수에 사용할 최대 분모를 설정합니다. 분

그림 1-26 구성 편집기 옵션

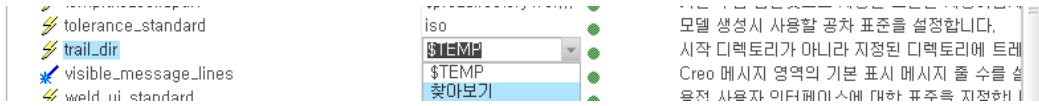


그림 1-27 구성 편집기 옵션 값 변경

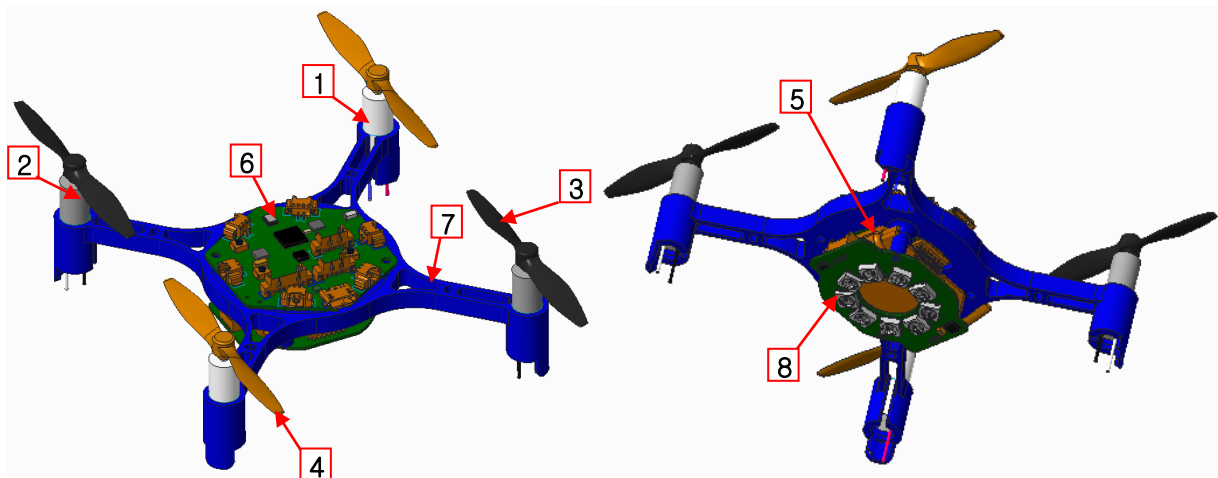


그림 1-28 스카이로버 나노의 구조

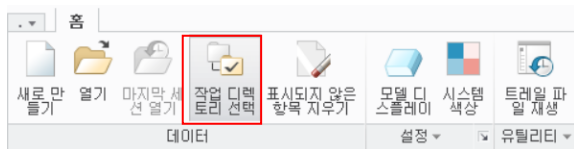


그림 1-29 작업 디렉토리 선택

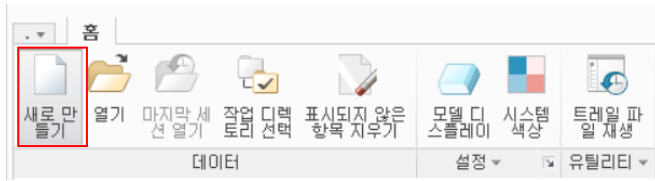


그림 1-30 새로 만들기

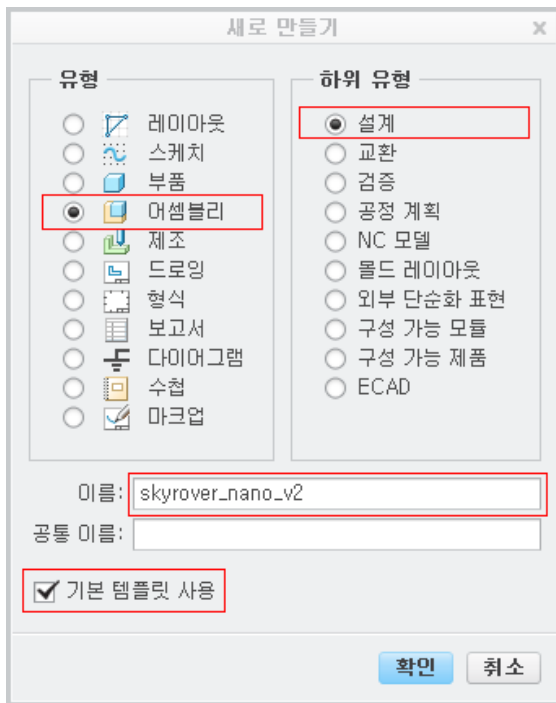


그림 1-31

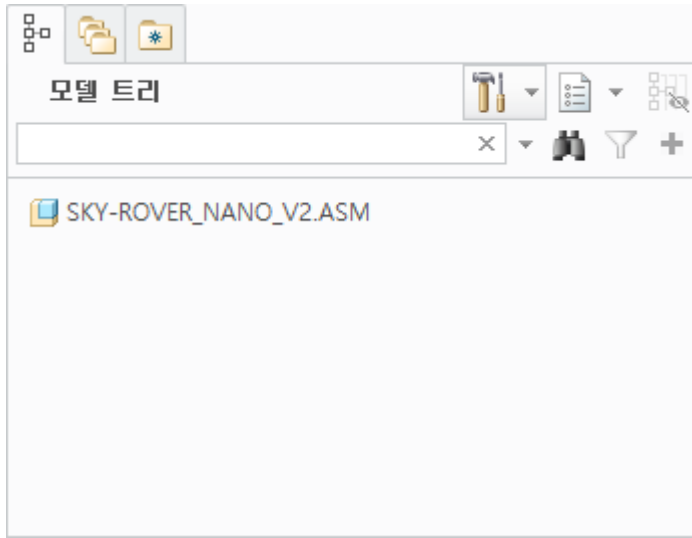


그림 1-32

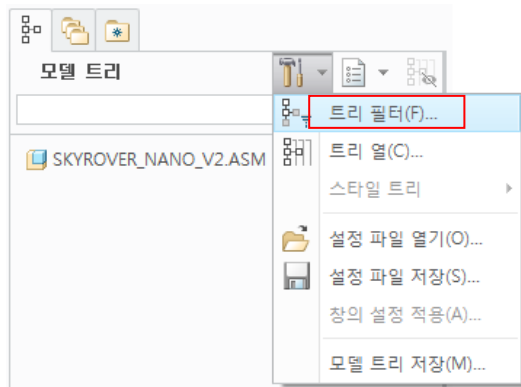


그림 1-33

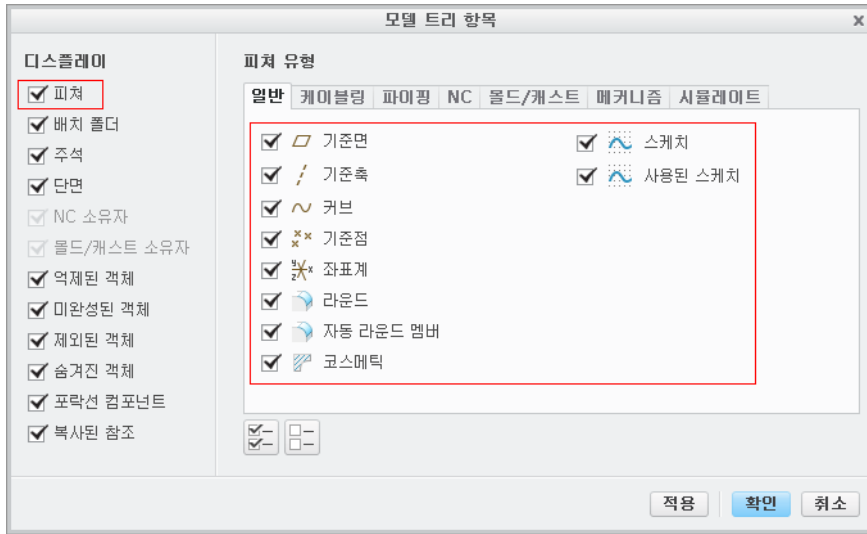


그림 1-34

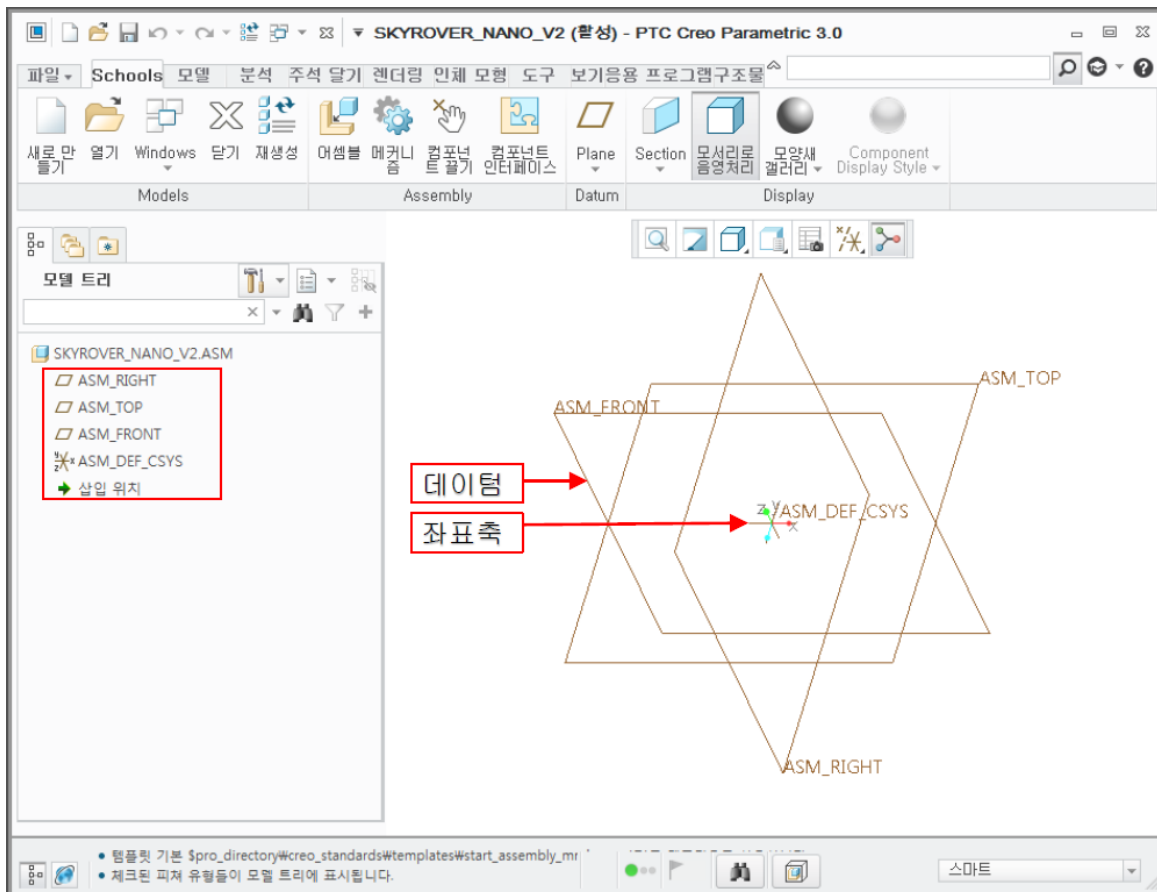


그림 1-35

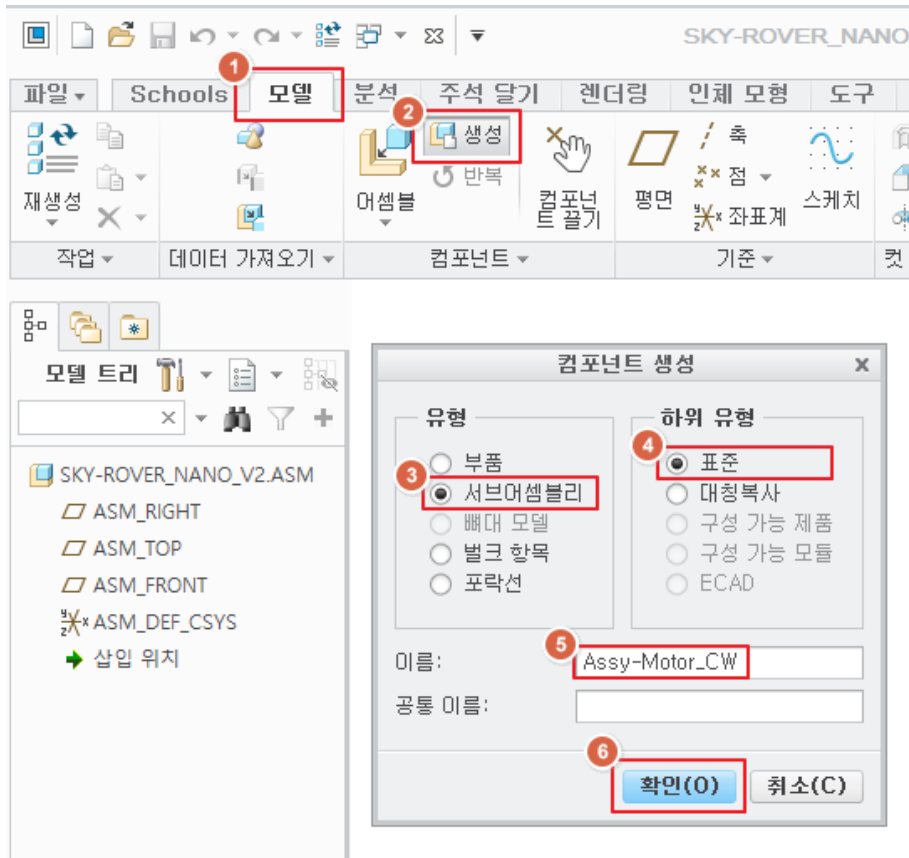


그림 1-36

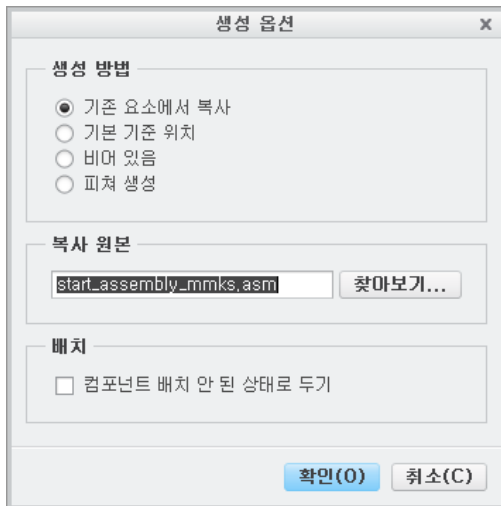


그림 1-37

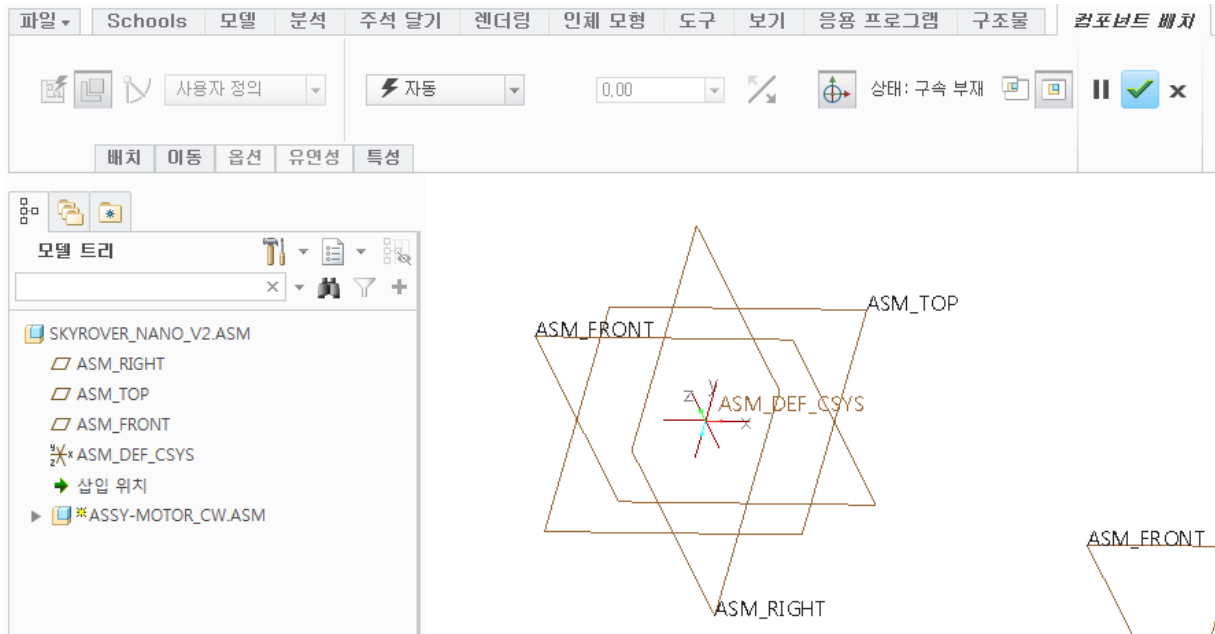


그림 1-38

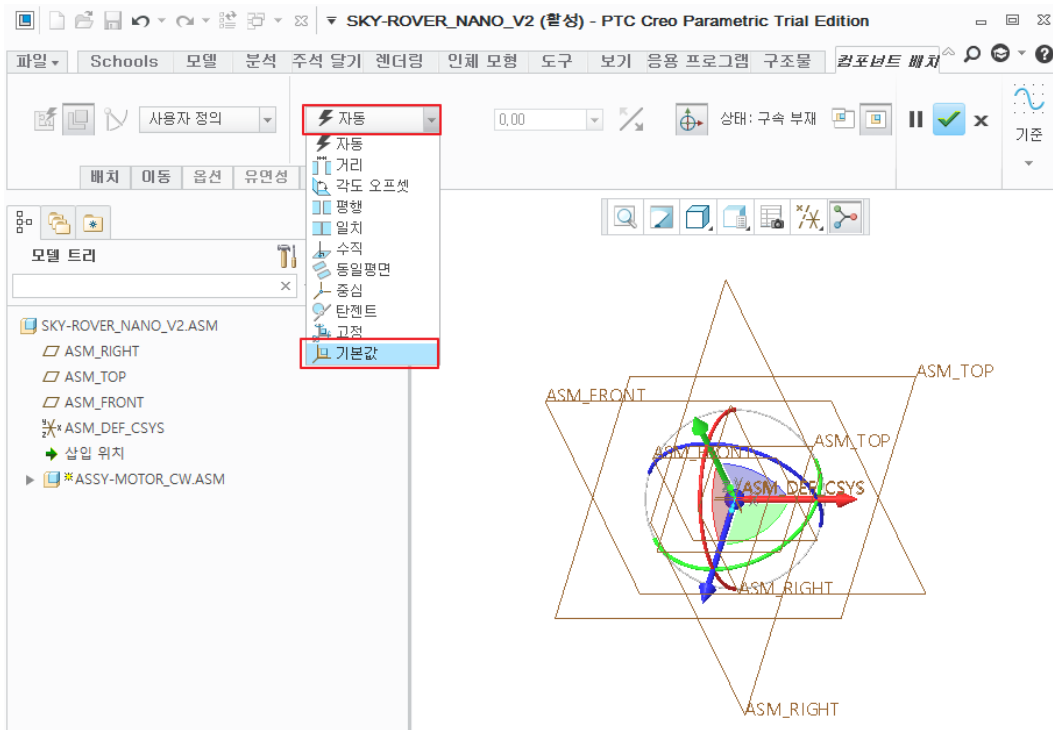


그림 1-39

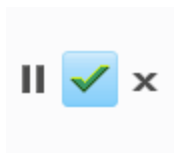


그림 1-40

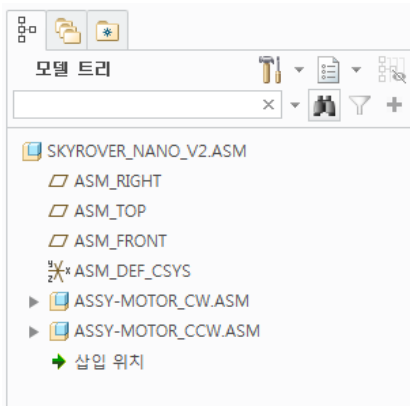


그림 1-41

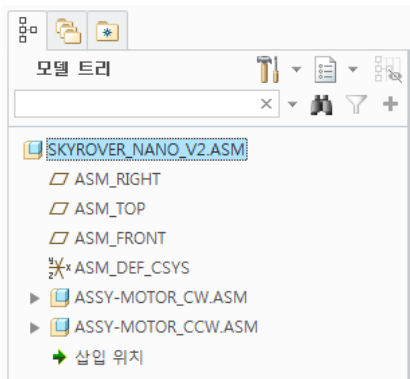


그림 1-42

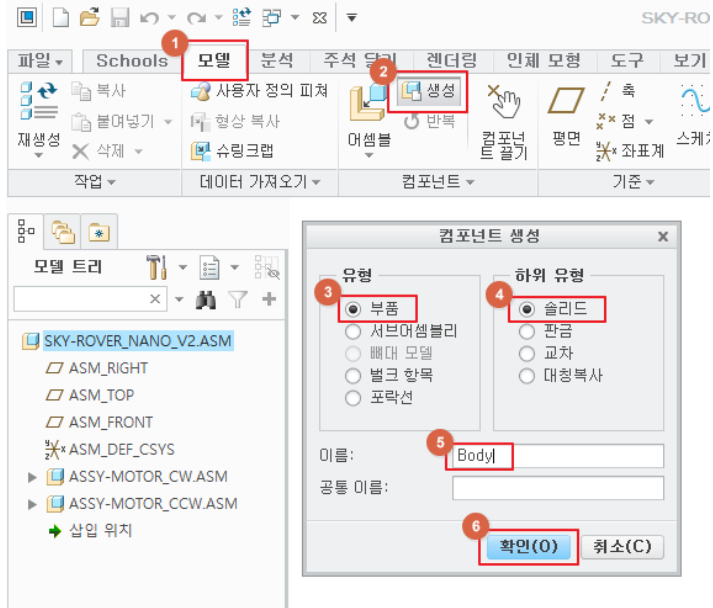


그림 1-43

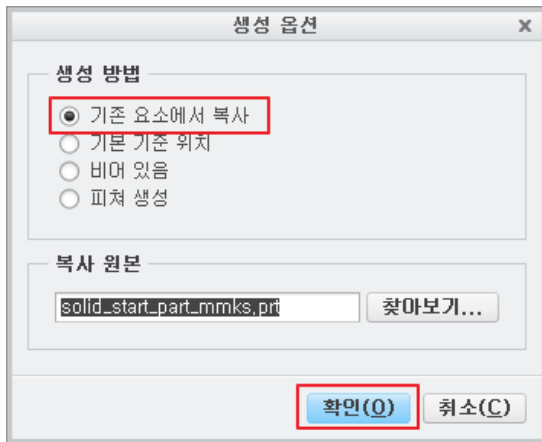


그림 1-44

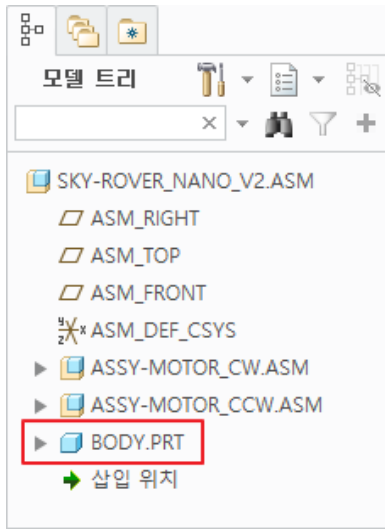


그림 1-45

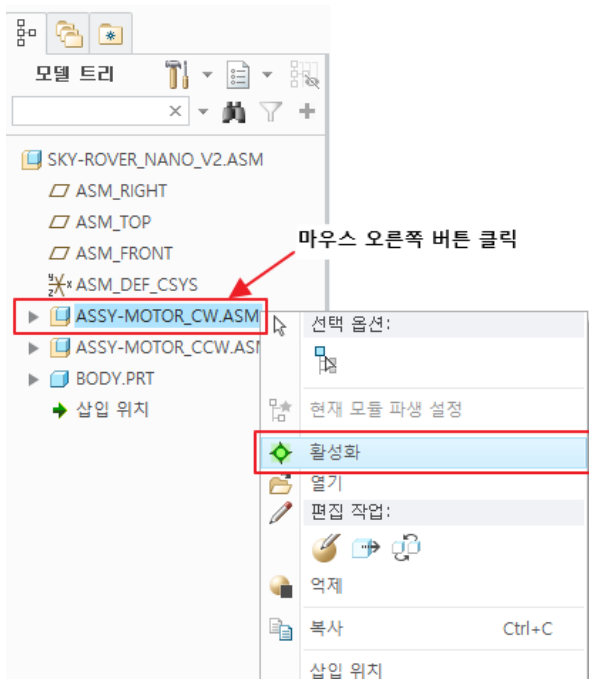


그림 1-46

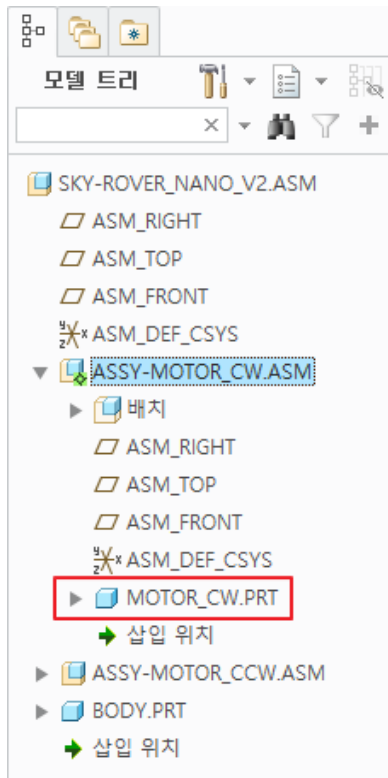


그림 1-47

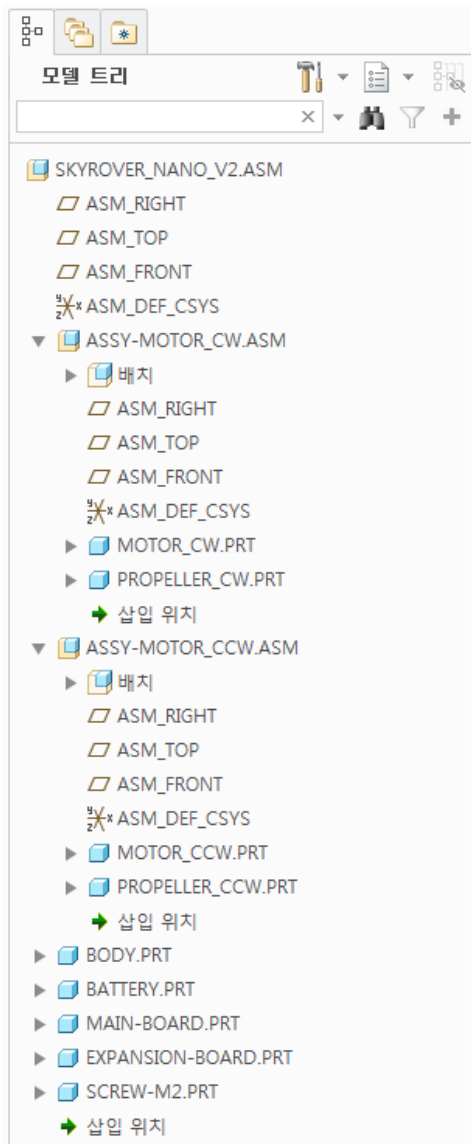


그림 1-48

2장. 뼈대 모델링(3D 배치도)

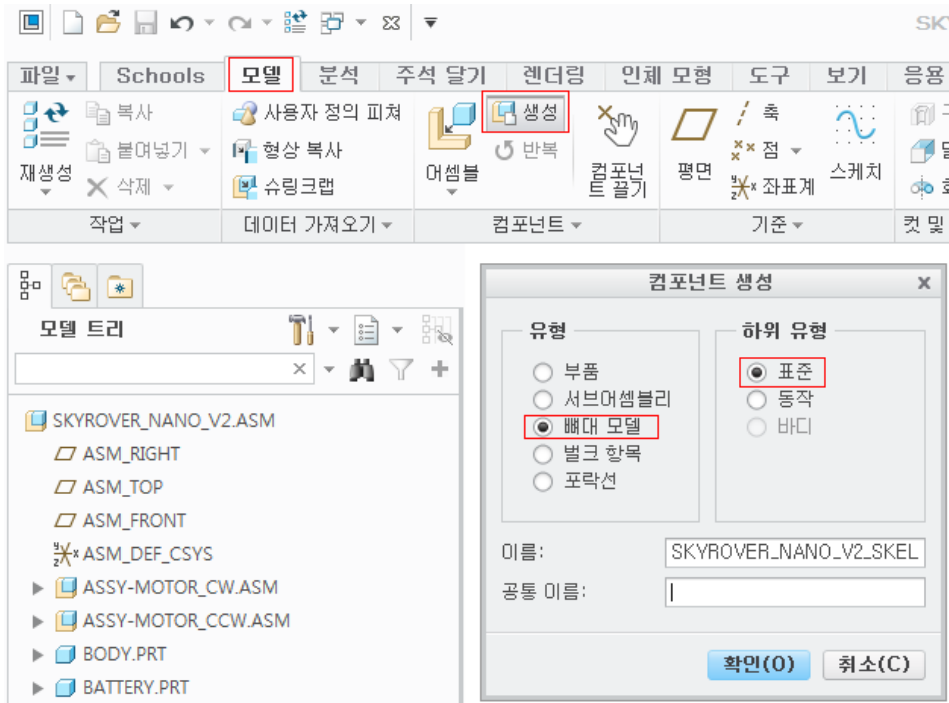


그림 2-1

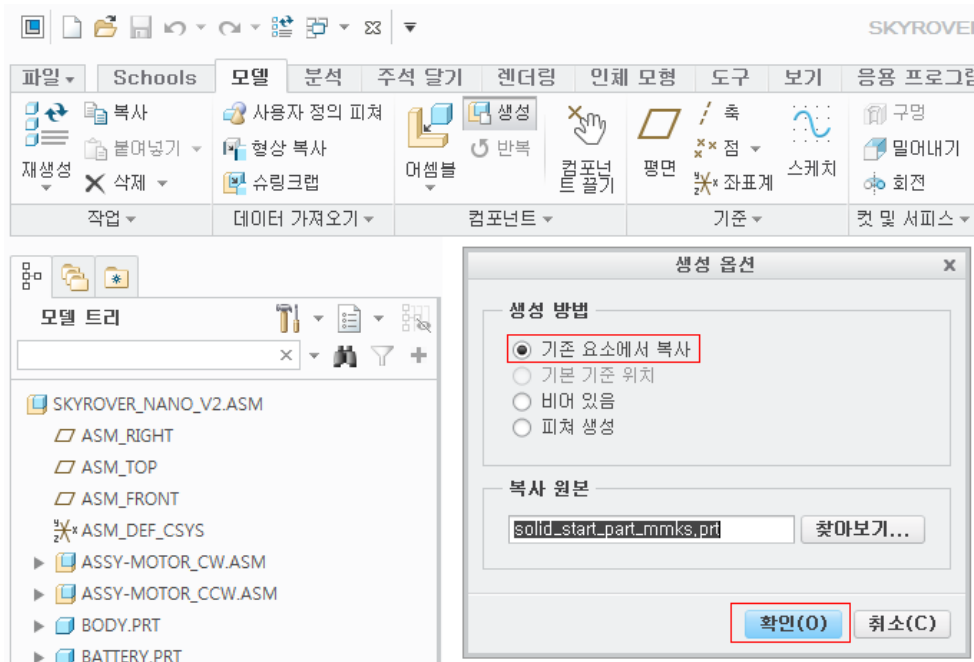


그림 2-2

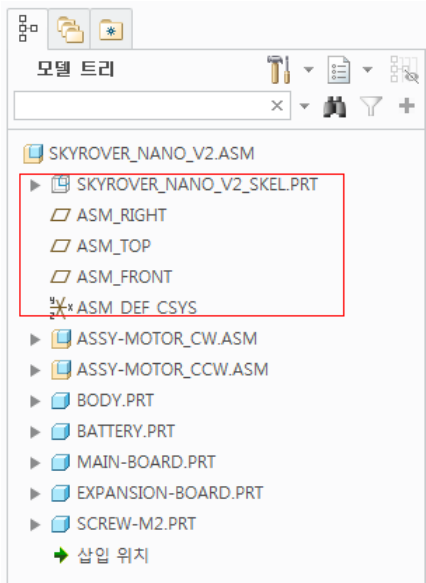


그림 2-3

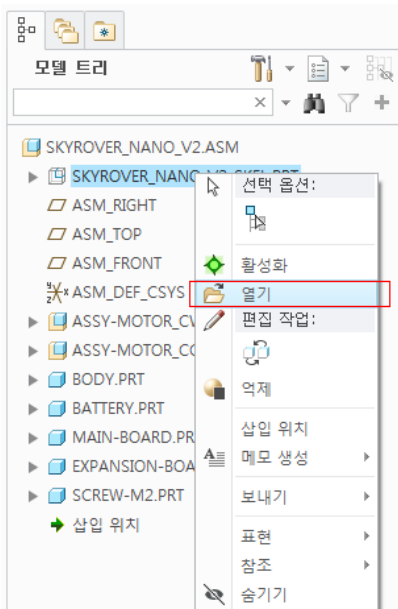


그림 2-4

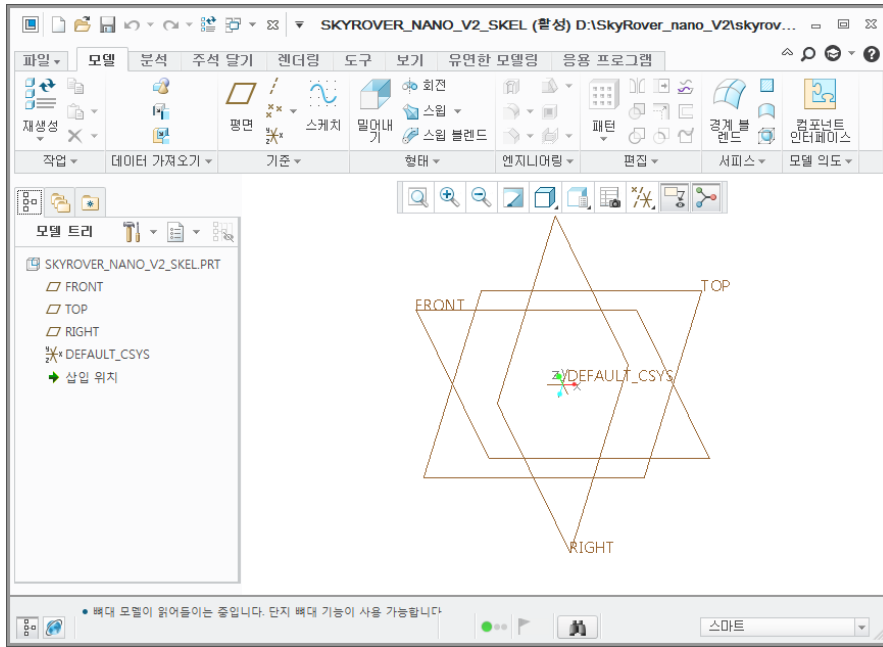


그림 2-5

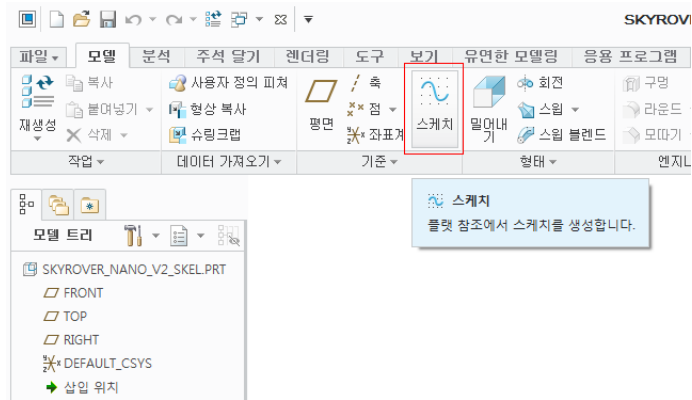


그림 2-6

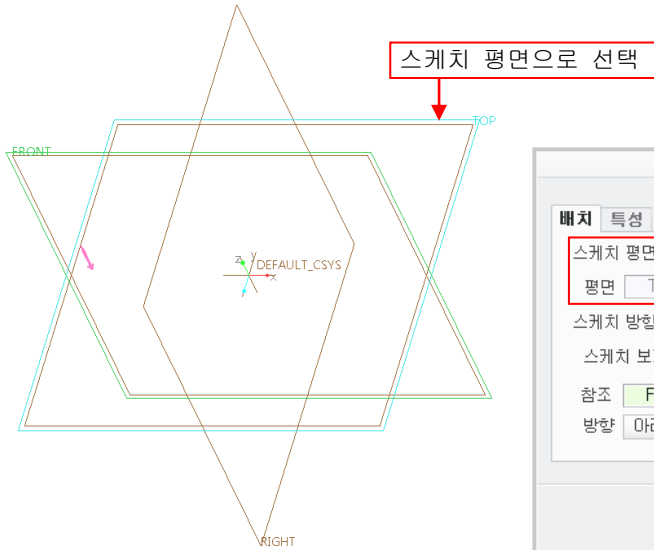


그림 2-7



그림 2-8

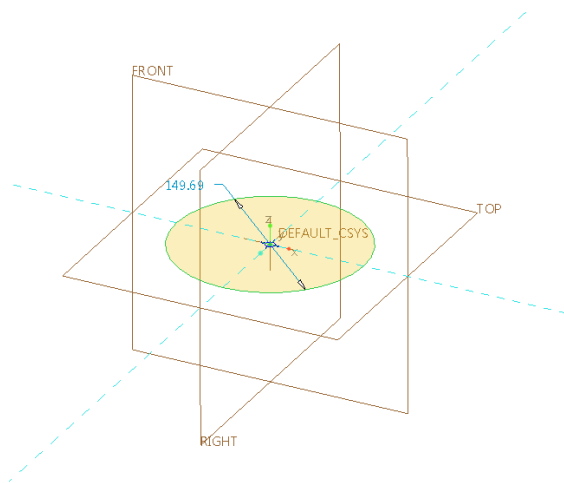


그림 2-9 sketcher_starts_in_2d: No

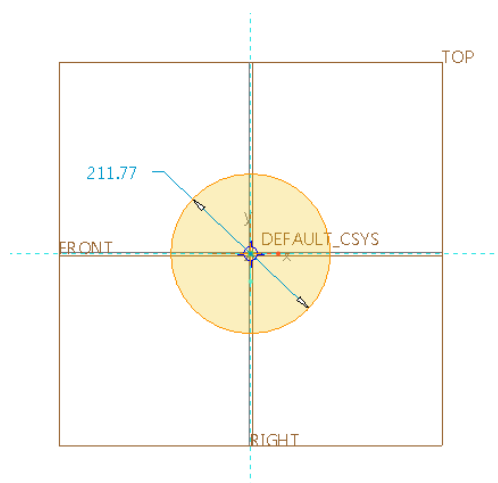


그림 2-10 sketcher_starts_in_2d: Yes



그림 2-11 그래픽 도구 모음에서 2D/3D 변경

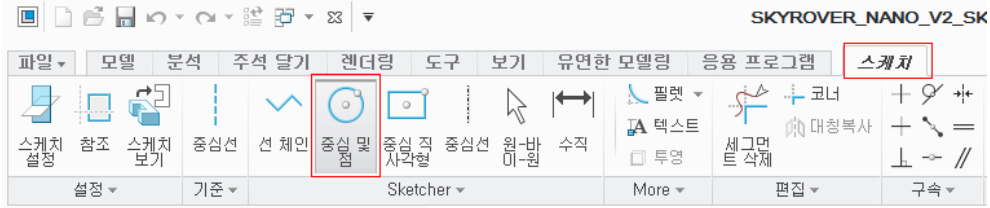


그림 2-12

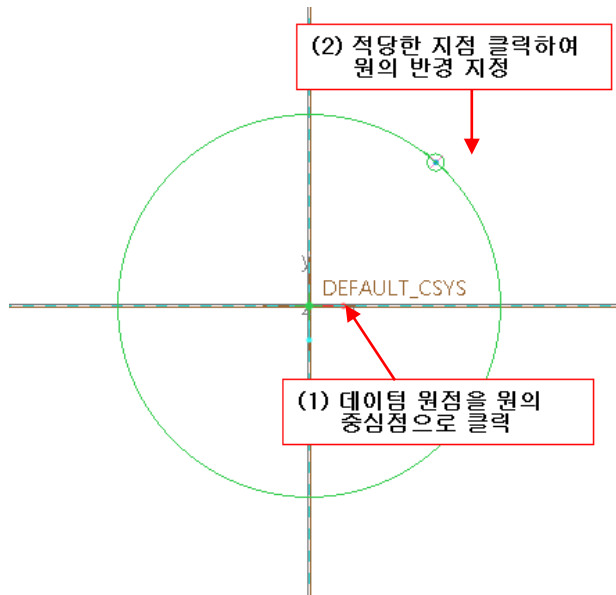


그림 2-13

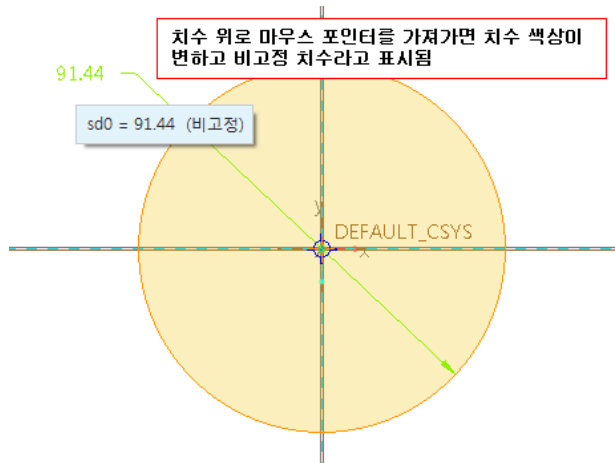


그림 2-14

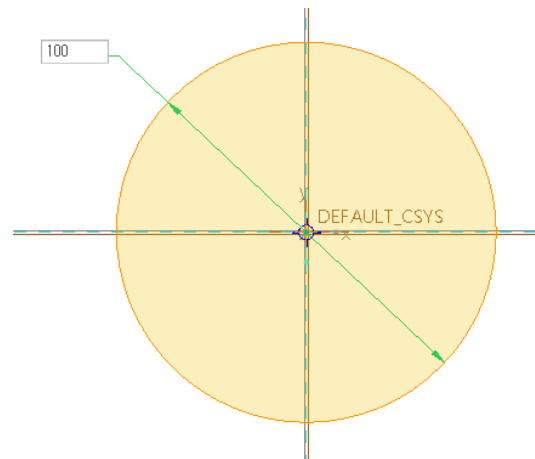


그림 2-15

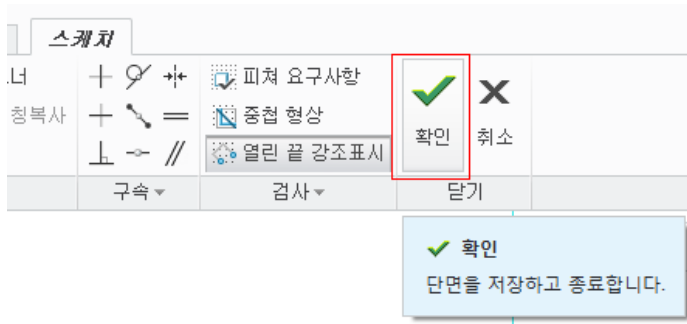


그림 2-16

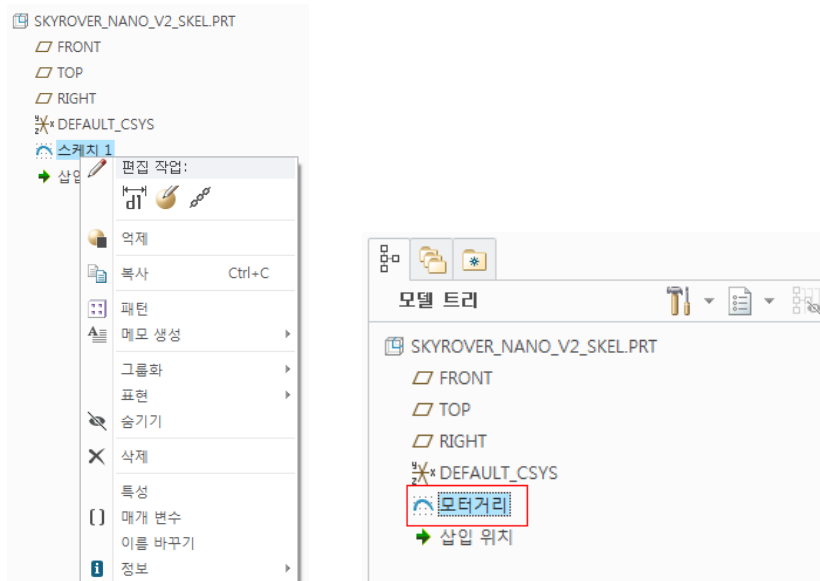


그림 2-17

그림 2-18

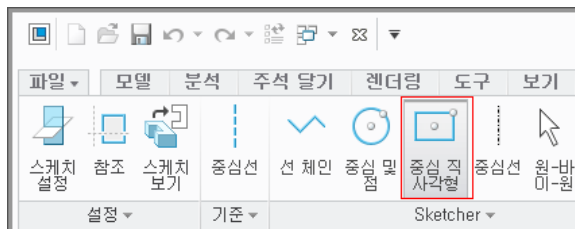


그림 2-19

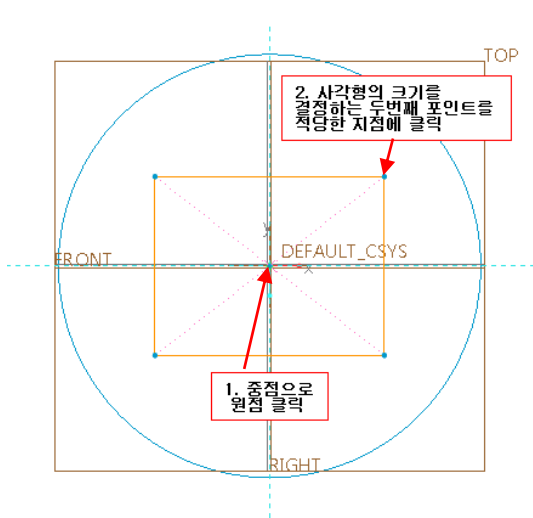


그림 2-20 직사각형 정의

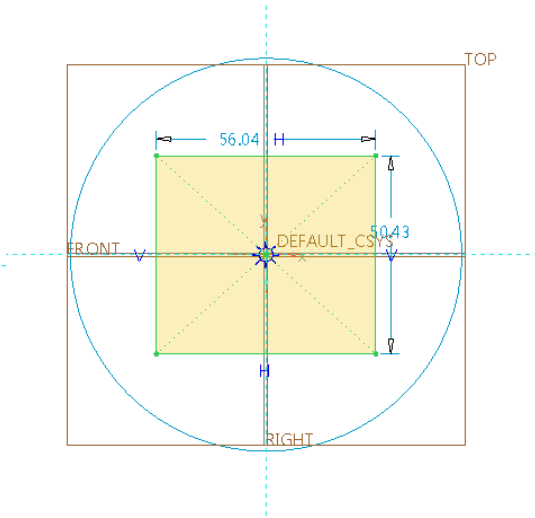


그림 2-21 중점 직사각형 완료

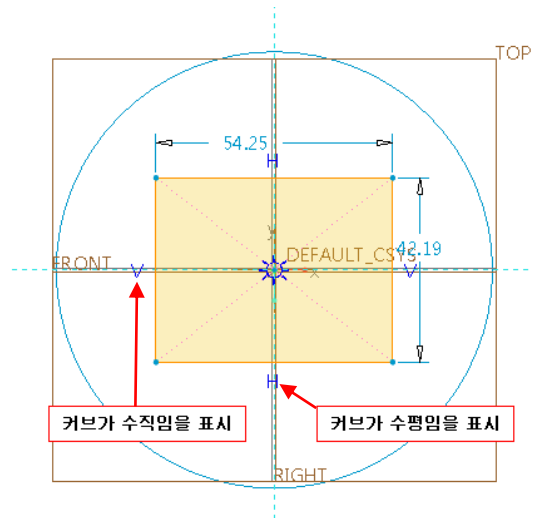


그림 2-22

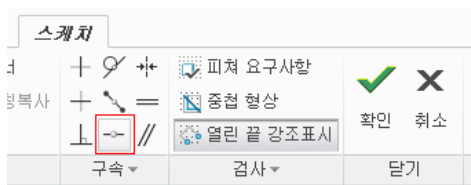


그림 2-23

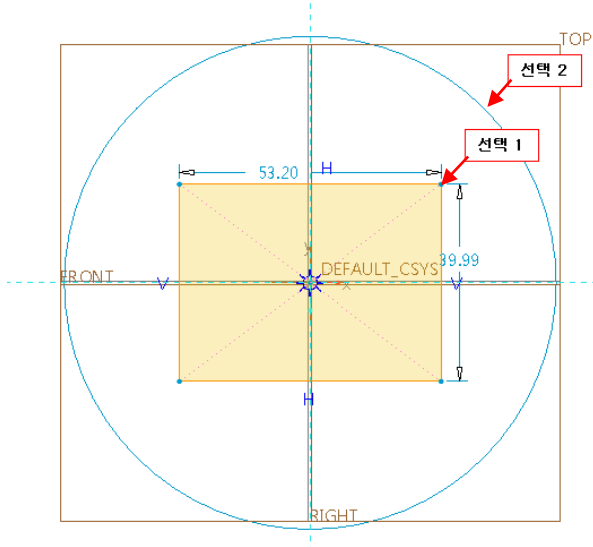


그림 2-24

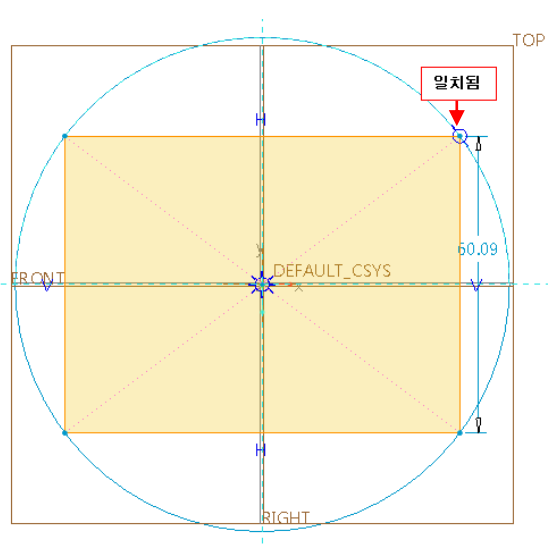


그림 2-25

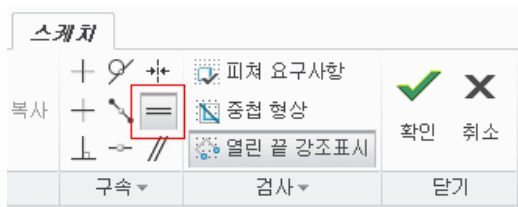


그림 2-26

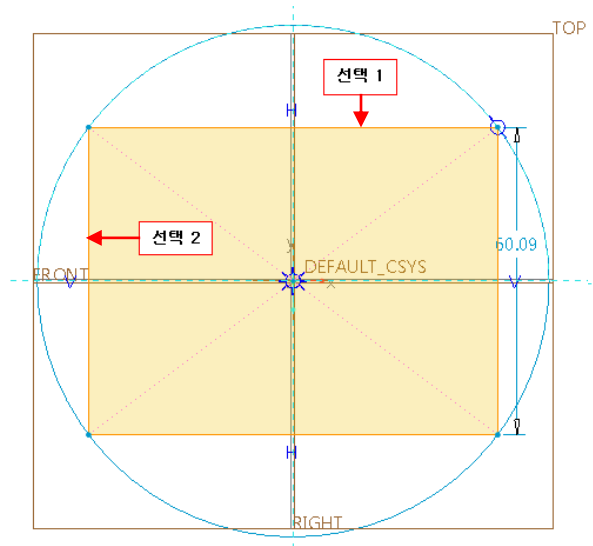


그림 2-27

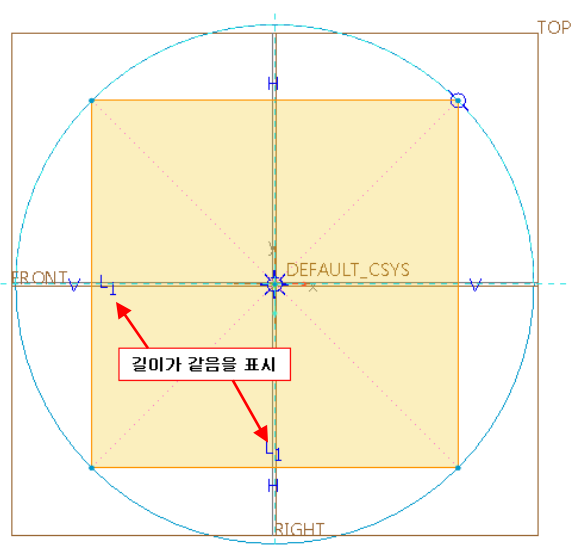


그림 2-28

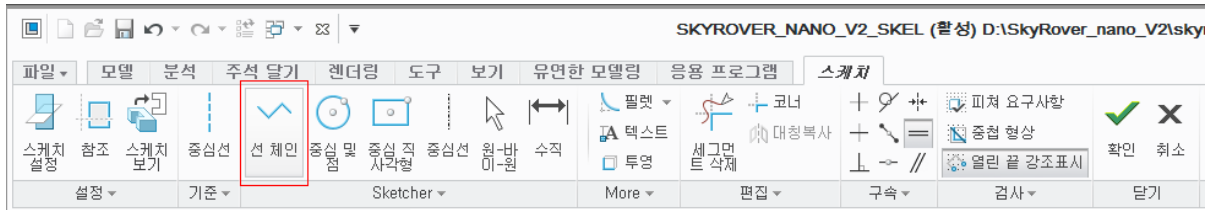


그림 2-29

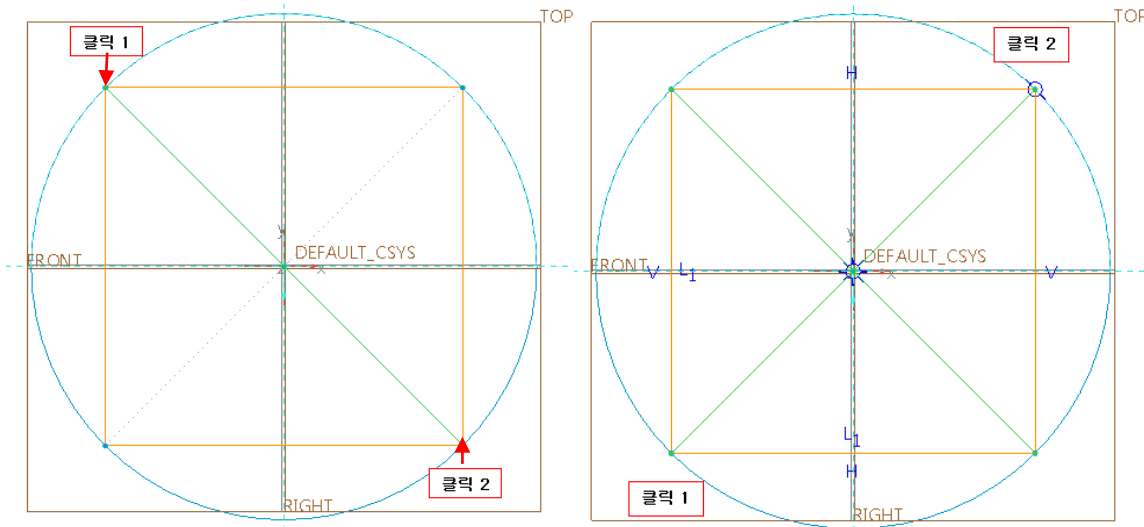


그림 2-30

그림 2-31



그림 2-32 회전날개 지름: 55.68mm



그림 2-33 모터 지름: 7.05mm

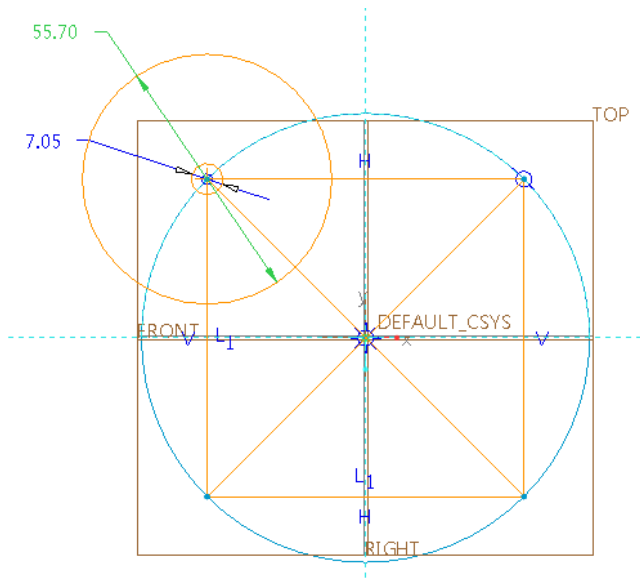


그림 2-34

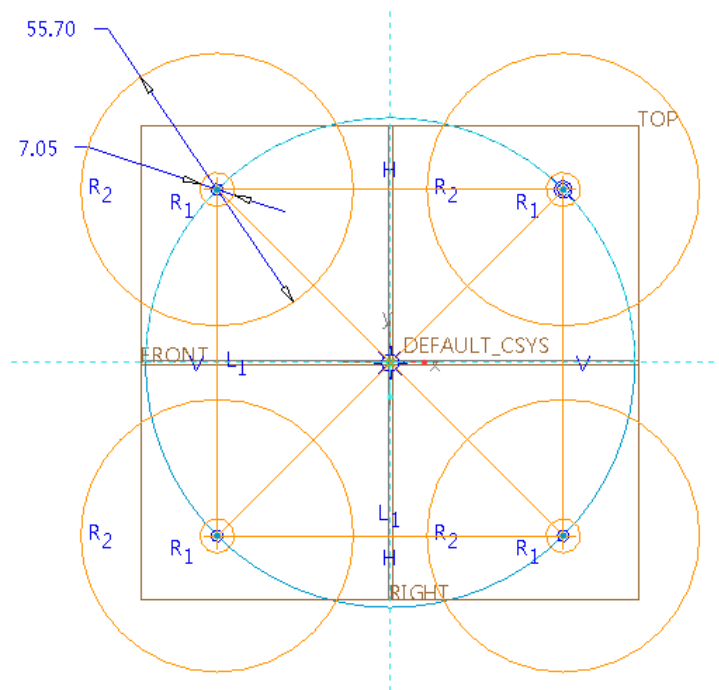


그림 2-35

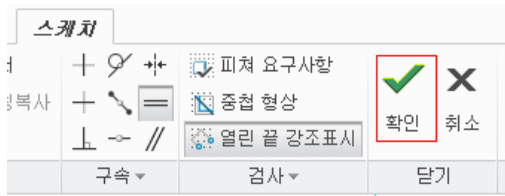


그림 2-36

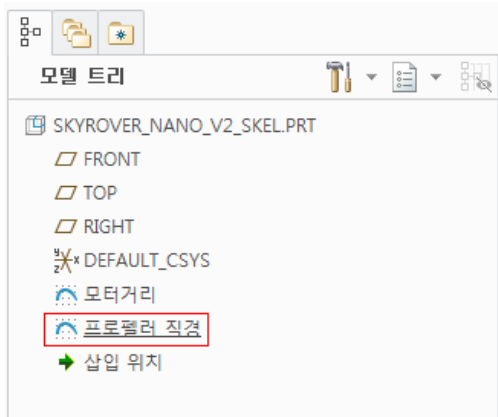


그림 2-37

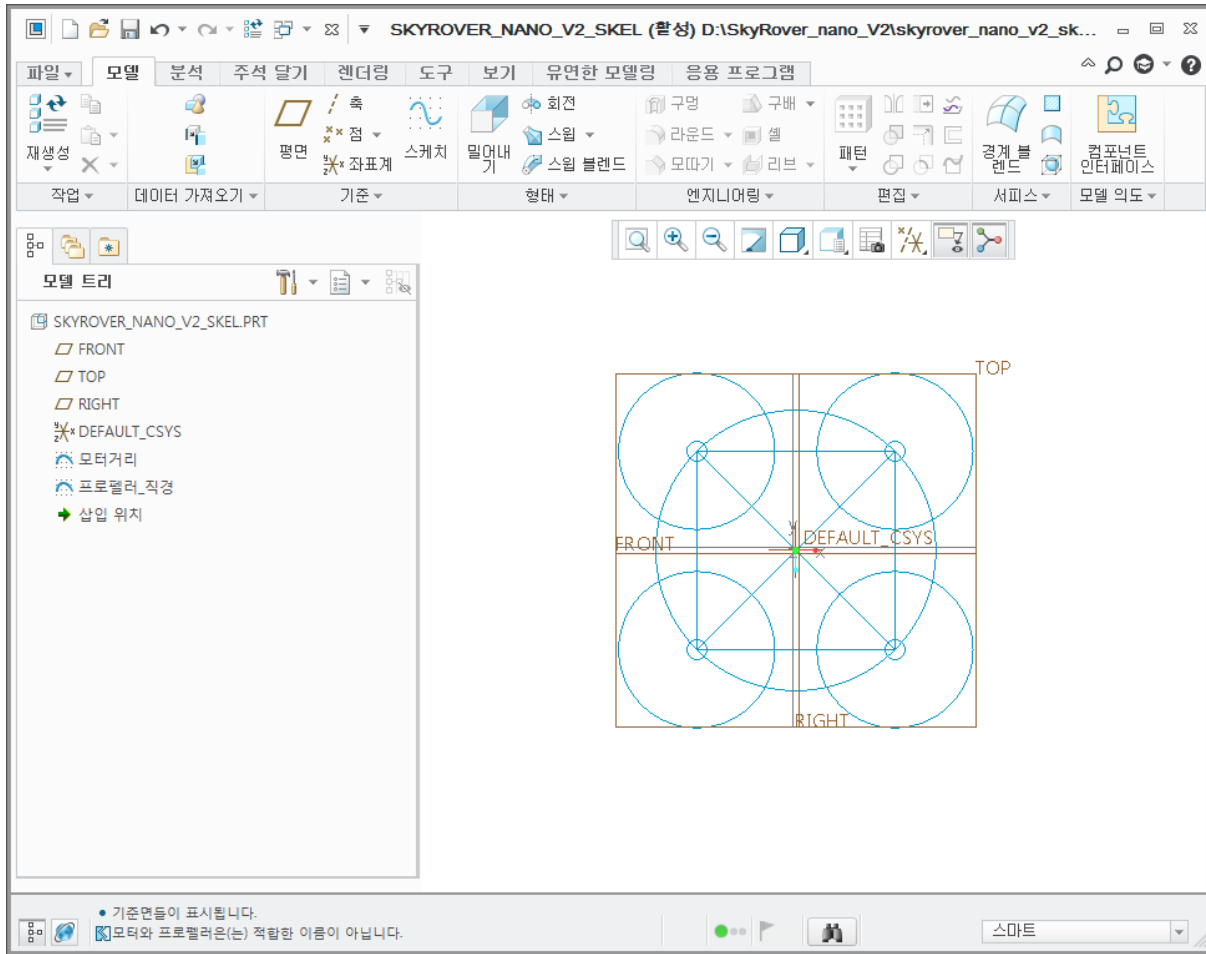


그림 2-38

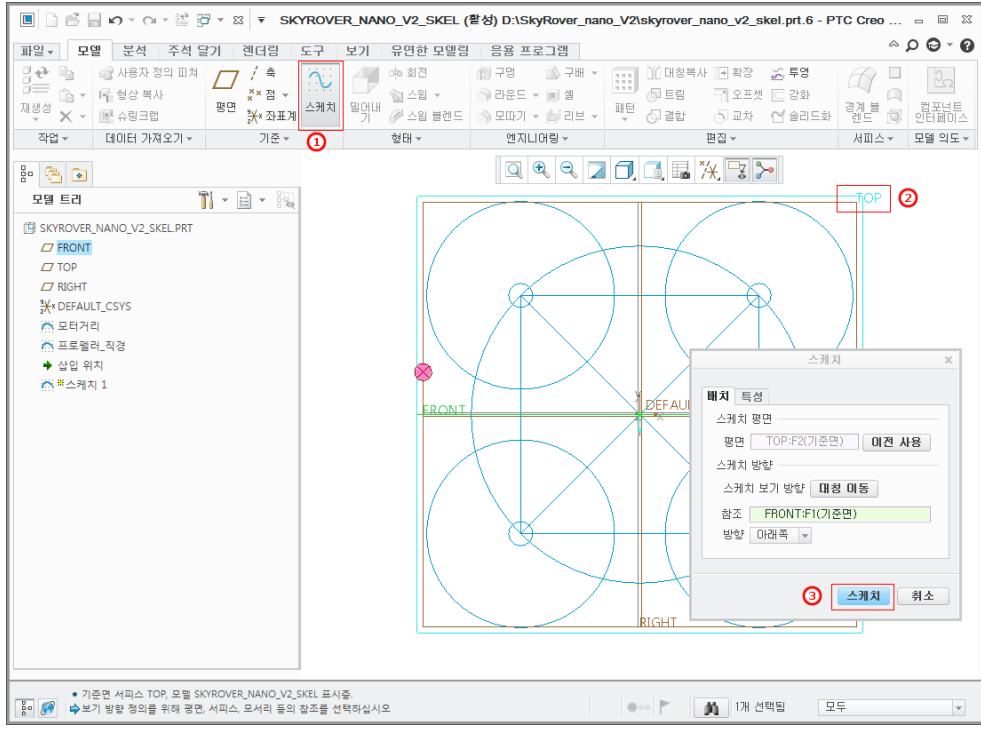


그림 2-39

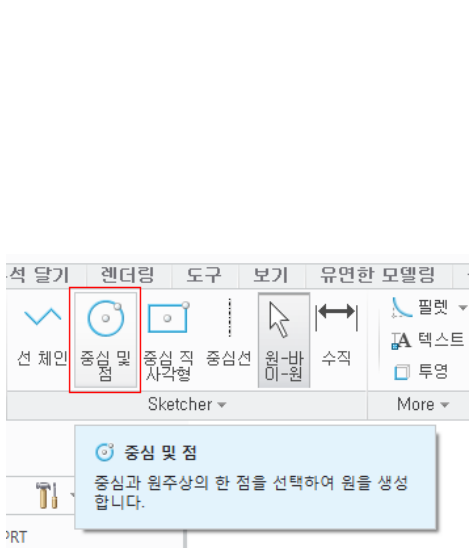


그림 2-40

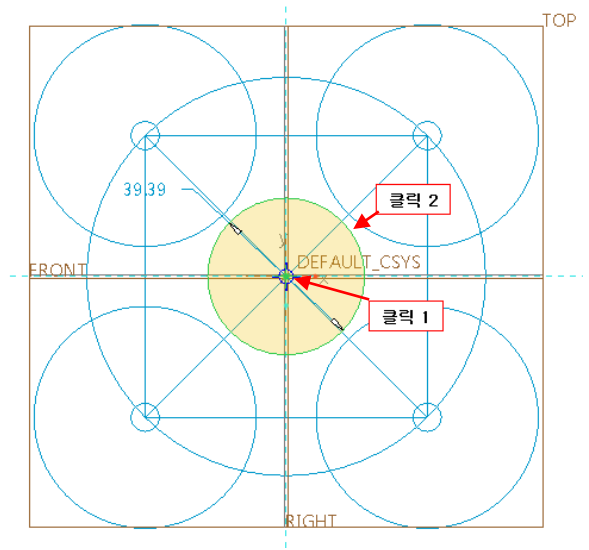


그림 2-41

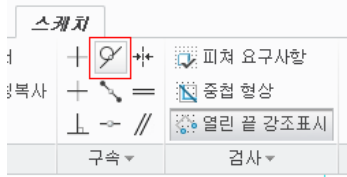


그림 2-42

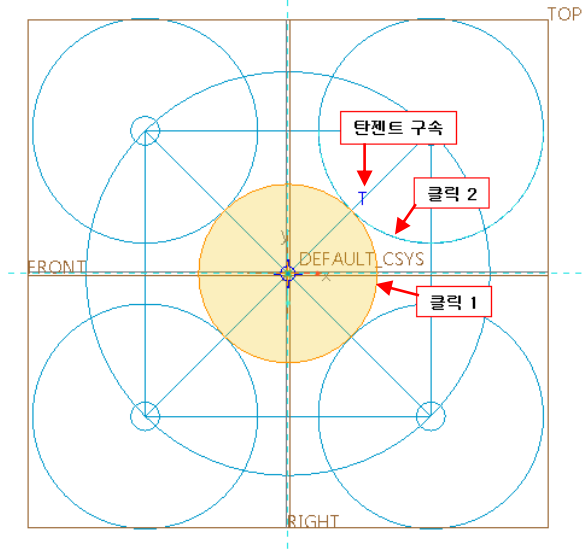


그림 2-43



그림 2-44

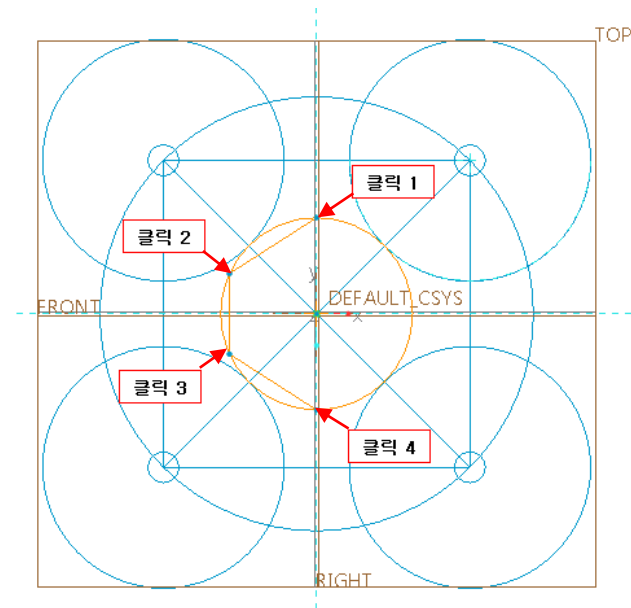


그림 2-45

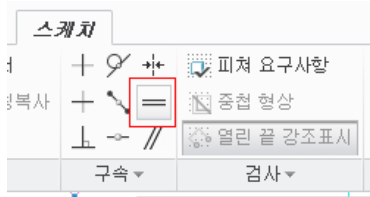


그림 2-46

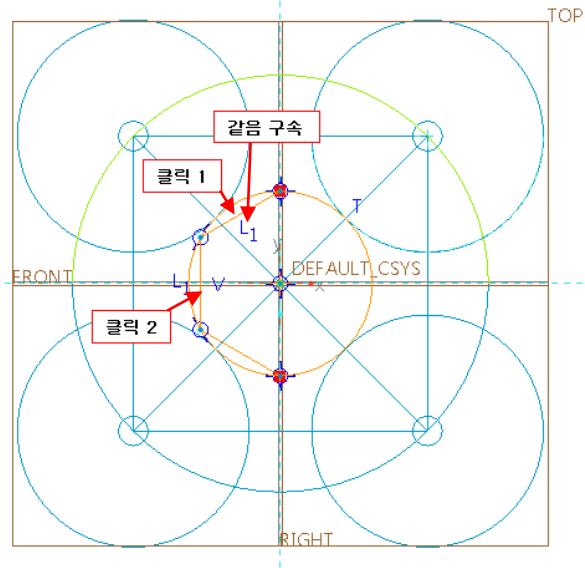


그림 2-47

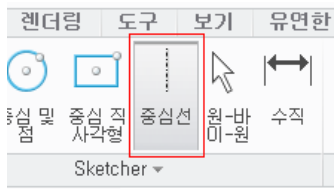


그림 2-48

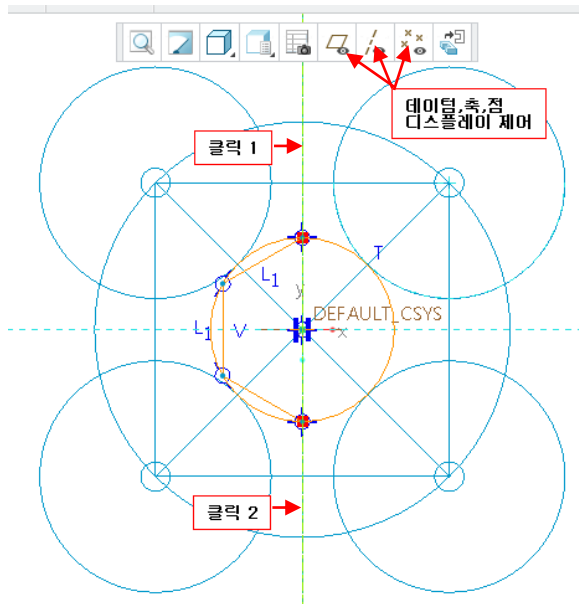


그림 2-49

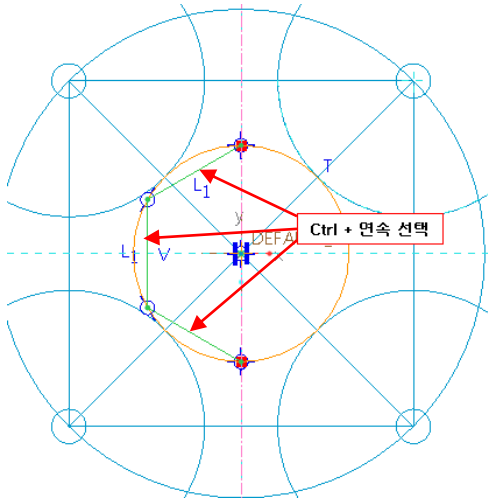


그림 2-50

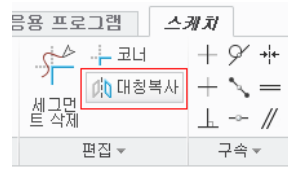


그림 2-51

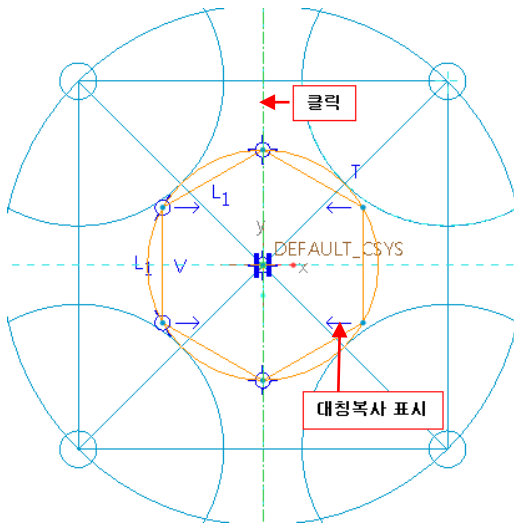


그림 2-52

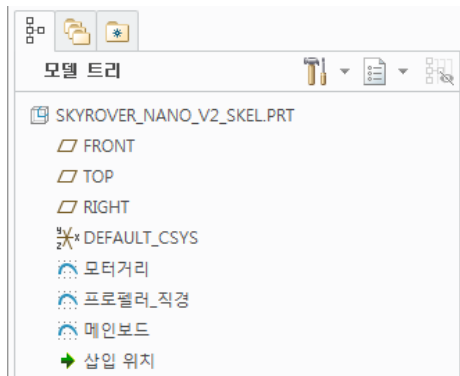


그림 2-53



그림 2-54

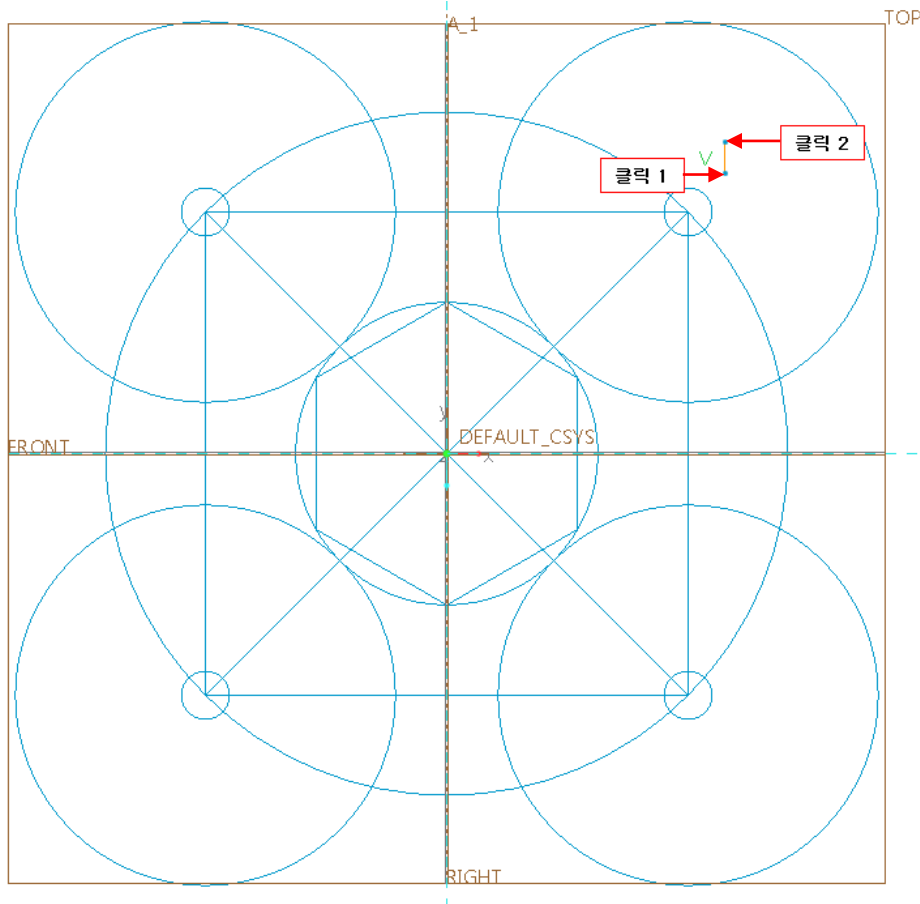


그림 2-55

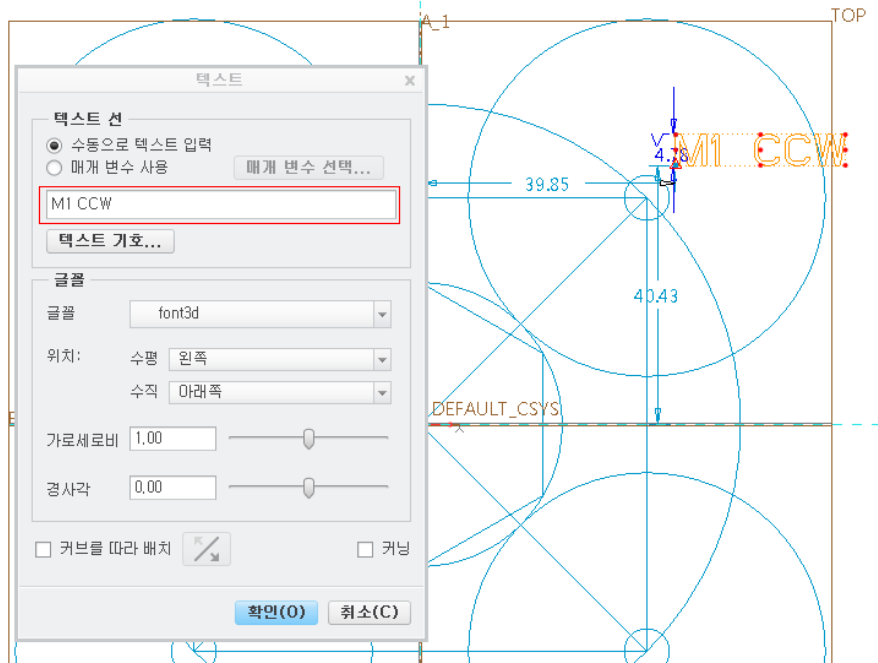


그림 2-56

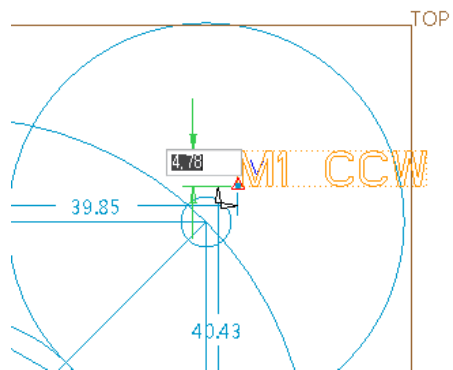


그림 2-57

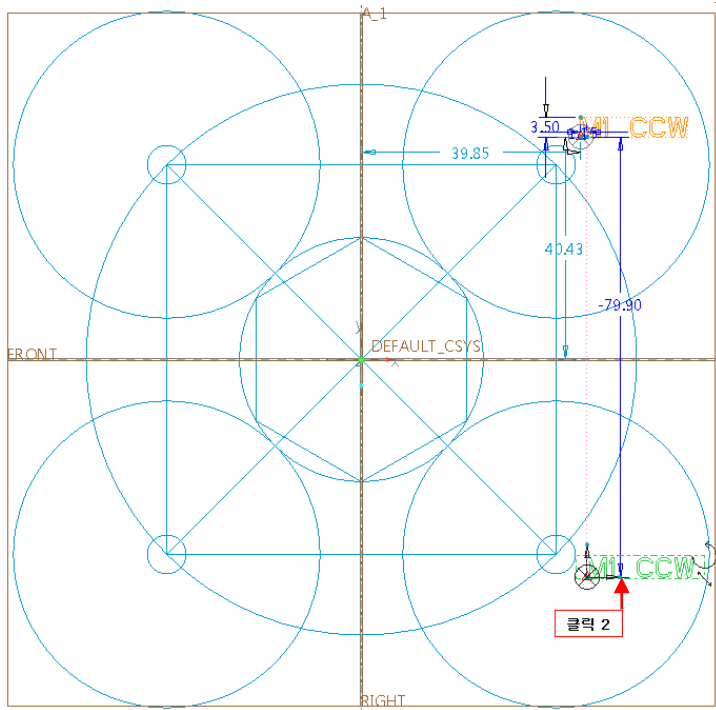


그림 2-58

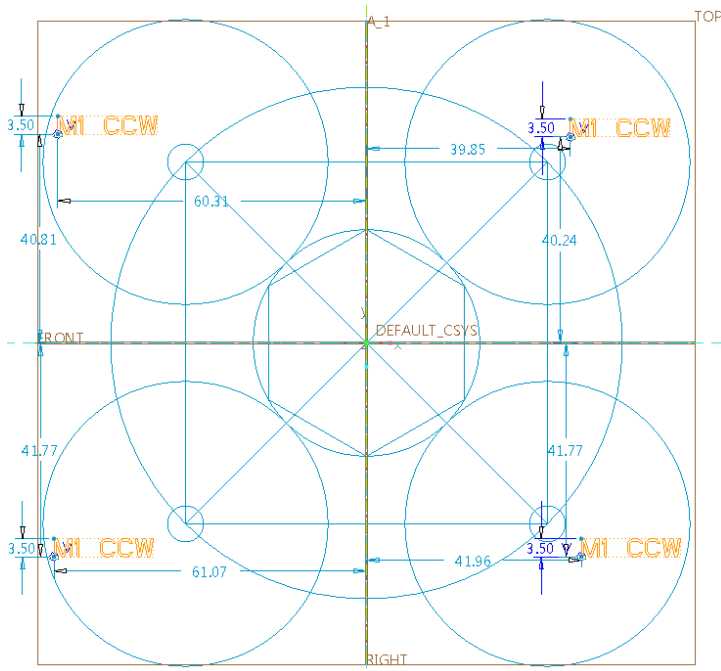


그림 2-59

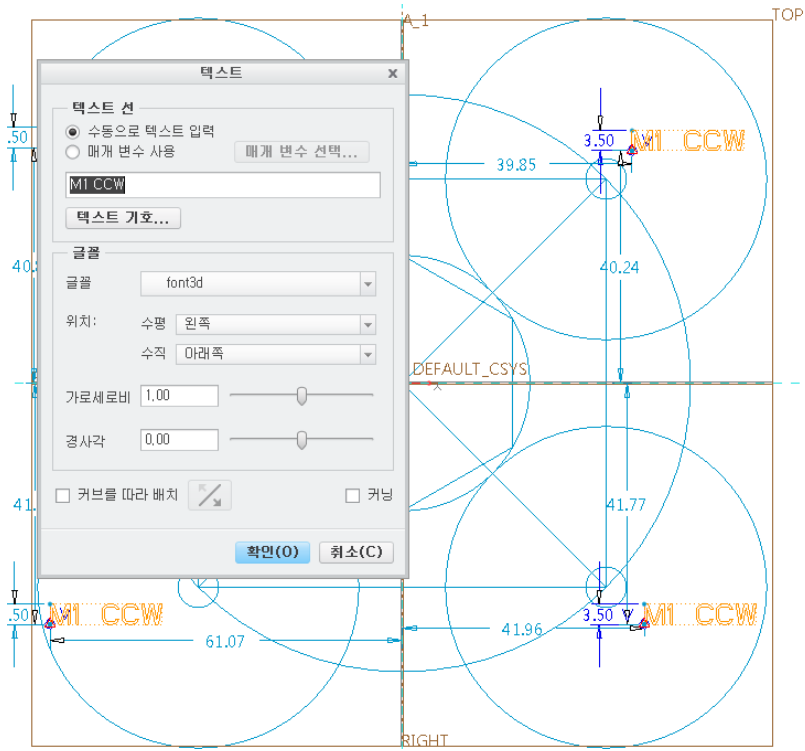


그림 2-60

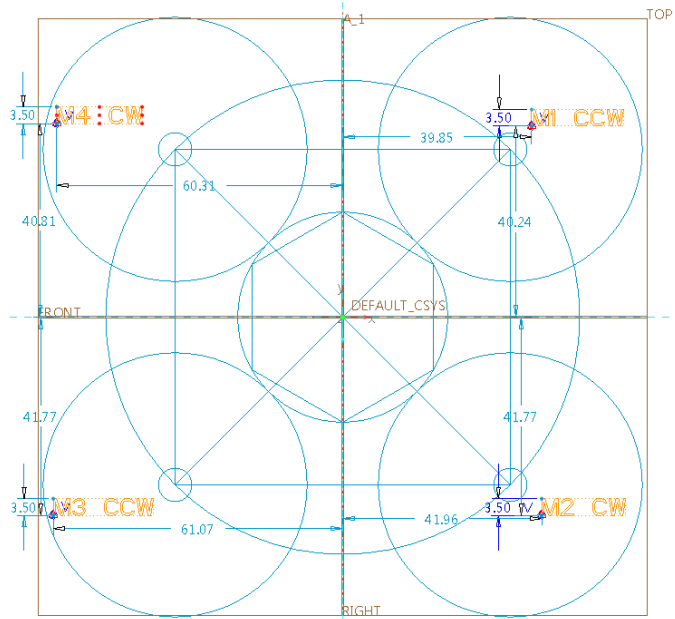


그림 2-61

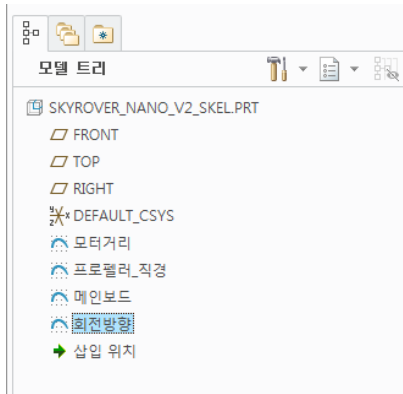


그림 2-62

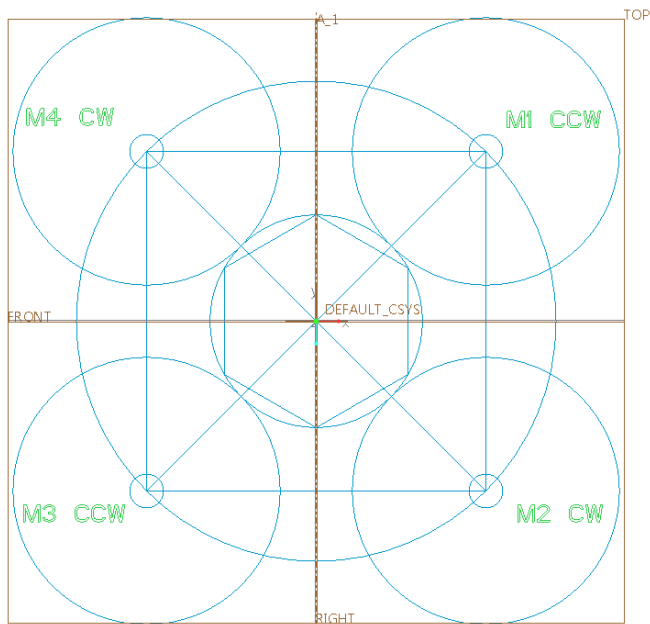


그림 2-63 스카이로버 나노 뼈대 모델링 완성

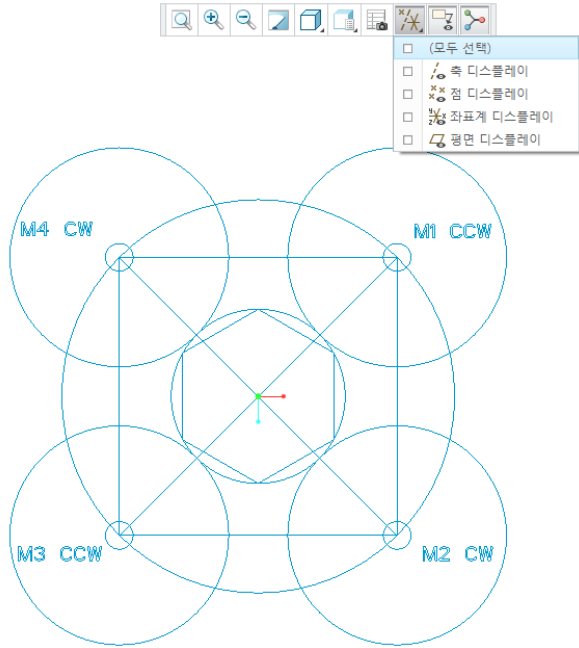


그림 2-64

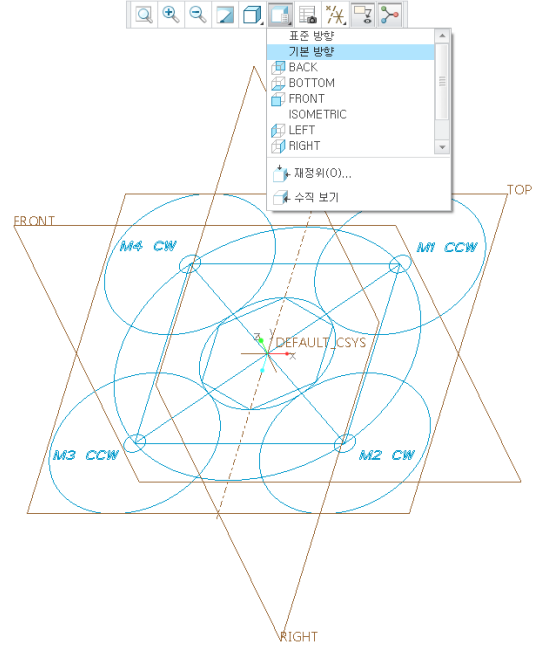


그림 2-65

3장. 모터와 회전날개 모델링



그림 3-1 버니어 캘리퍼스

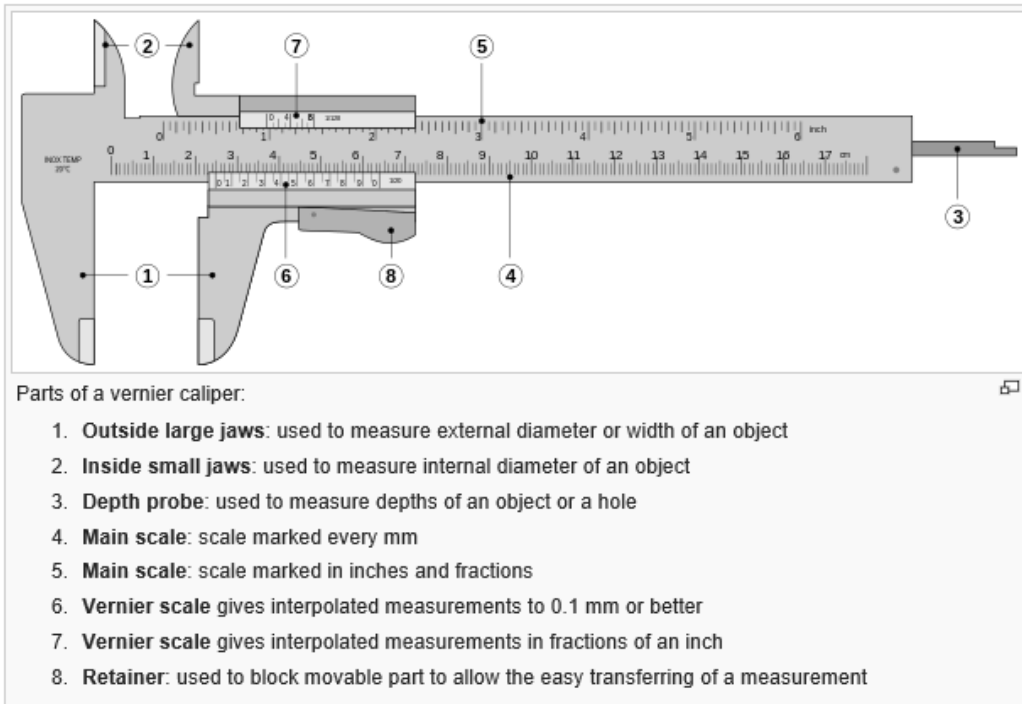


그림 3-2 버니어 캘리퍼스의 부위별 명칭과 기능(출처: <http://www.wikipedia.org>)

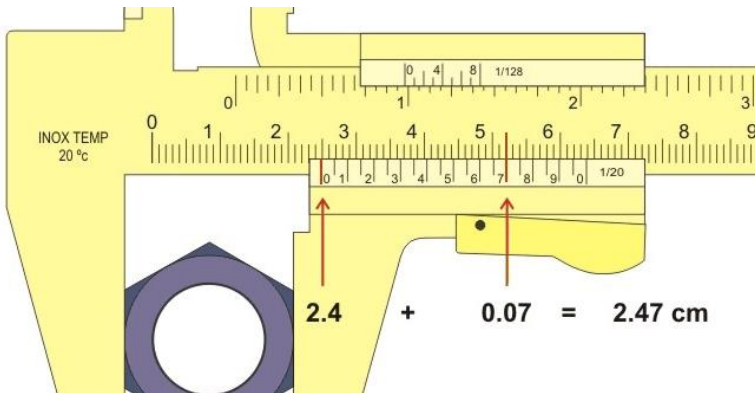


그림 3-3 버니어 캘리퍼스의 치수 측정 방법(출처: <http://www.wikipedia.org>)



그림 3-4 외경 측정 모습



그림 3-5 내경 측정 모습(왼쪽), 틸새 측정 모습(오른쪽)

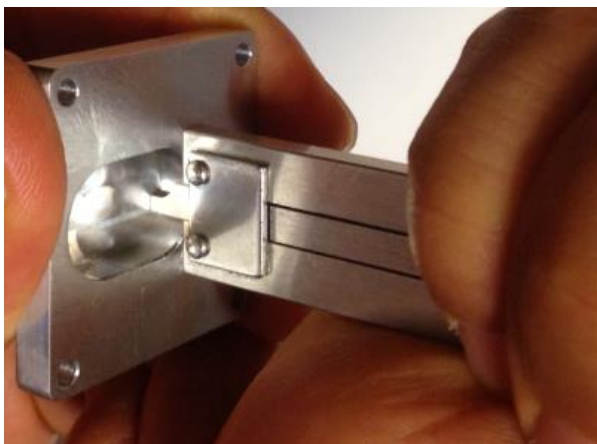


그림 3-6 깊이 측정 모습



그림 3-7 코어리스 모터

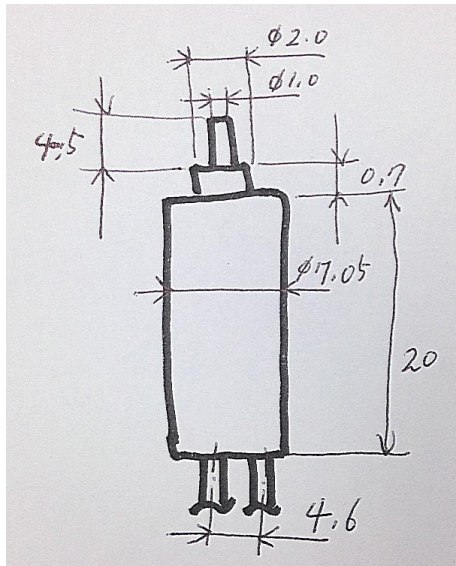


그림 3-8 모터의 치수

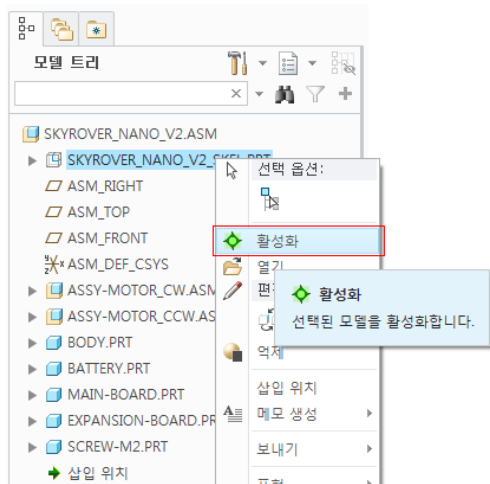


그림 3-9

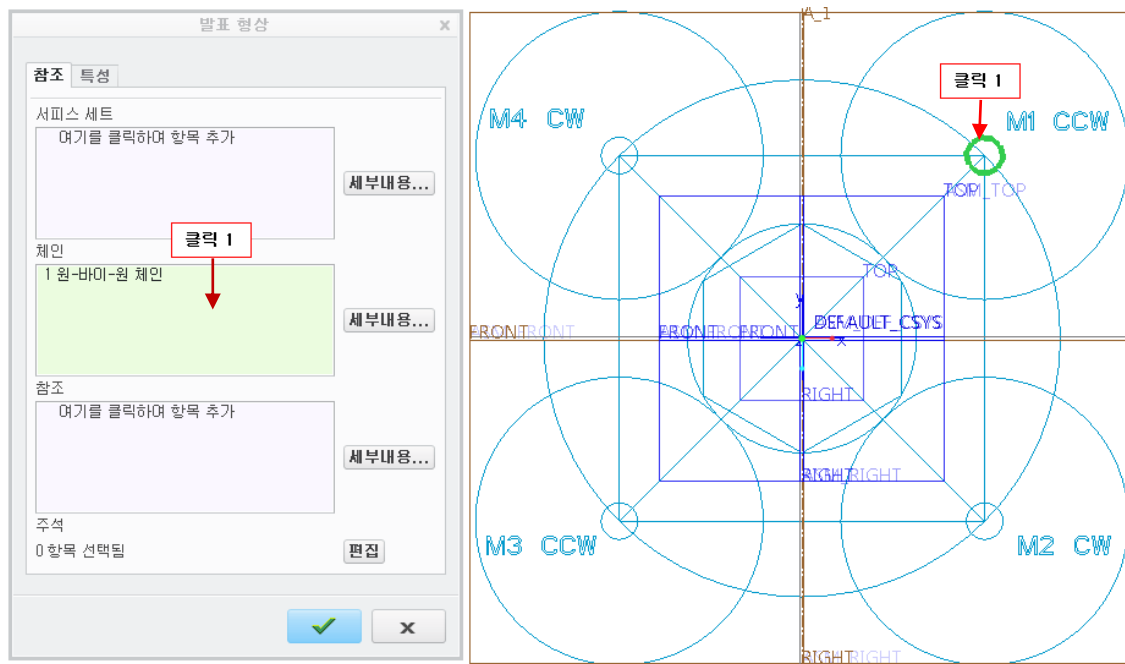


그림 3-10

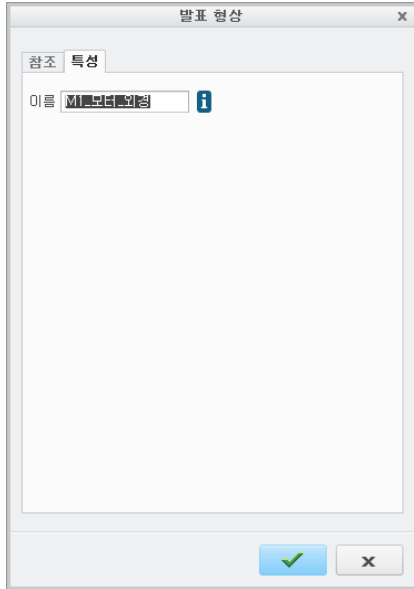


그림 3-11

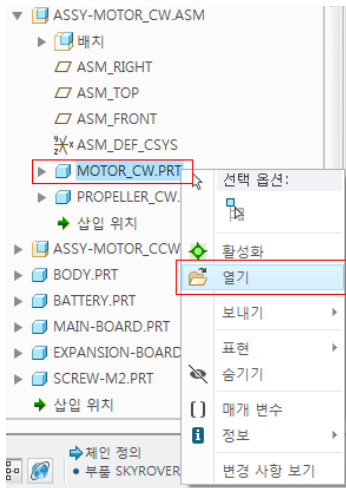


그림 3-12

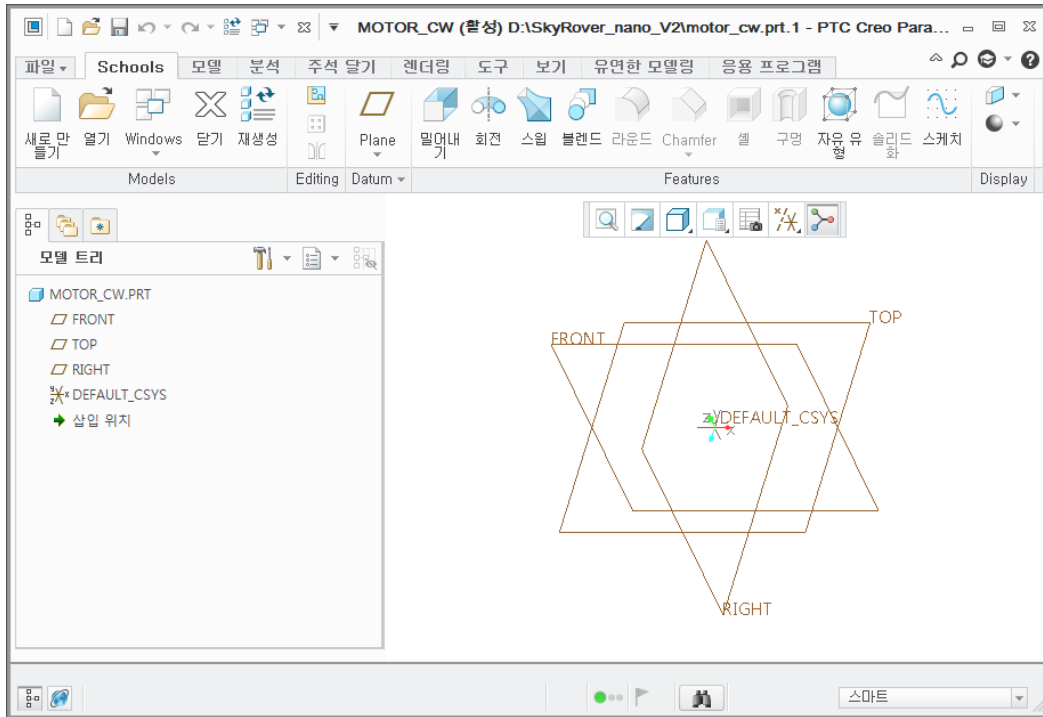


그림 3-13

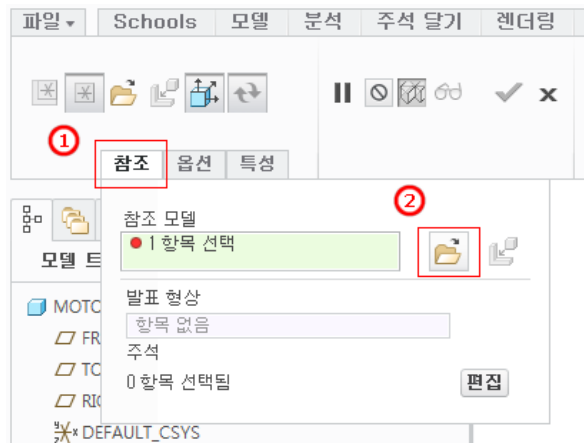


그림 3-14

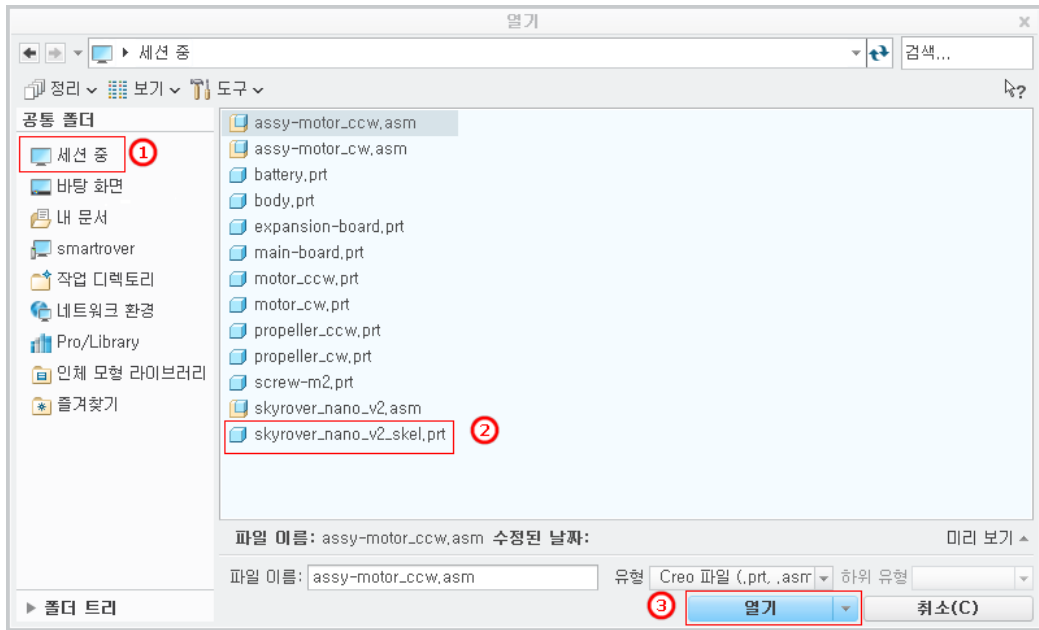


그림 3-15

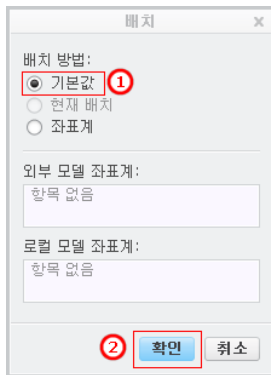


그림 3-16

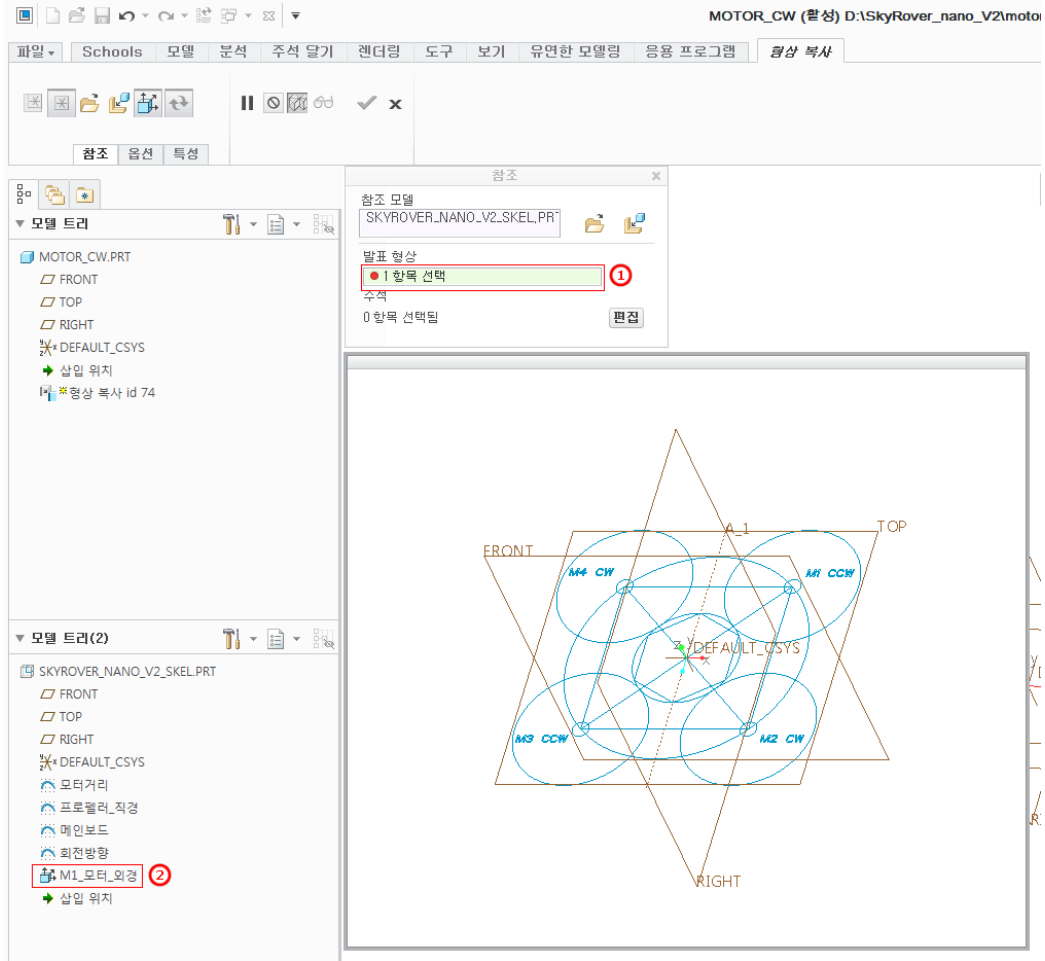


그림 3-17

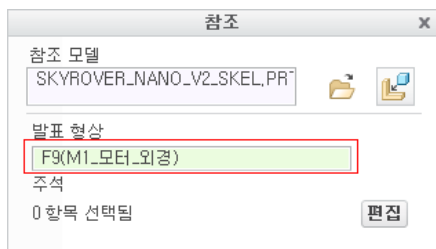


그림 3-18

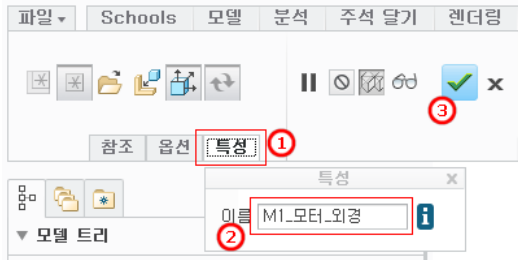


그림 3-19

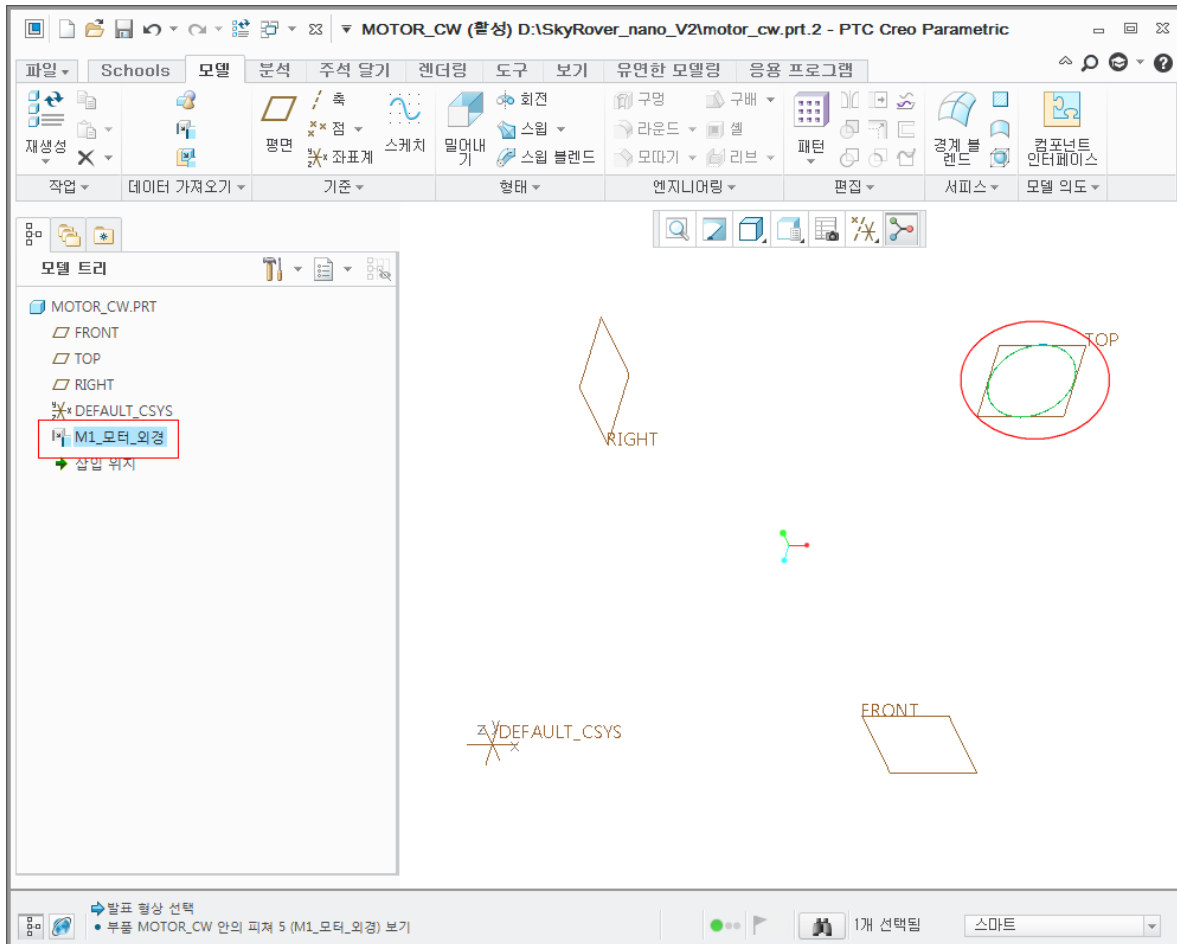


그림 3-20

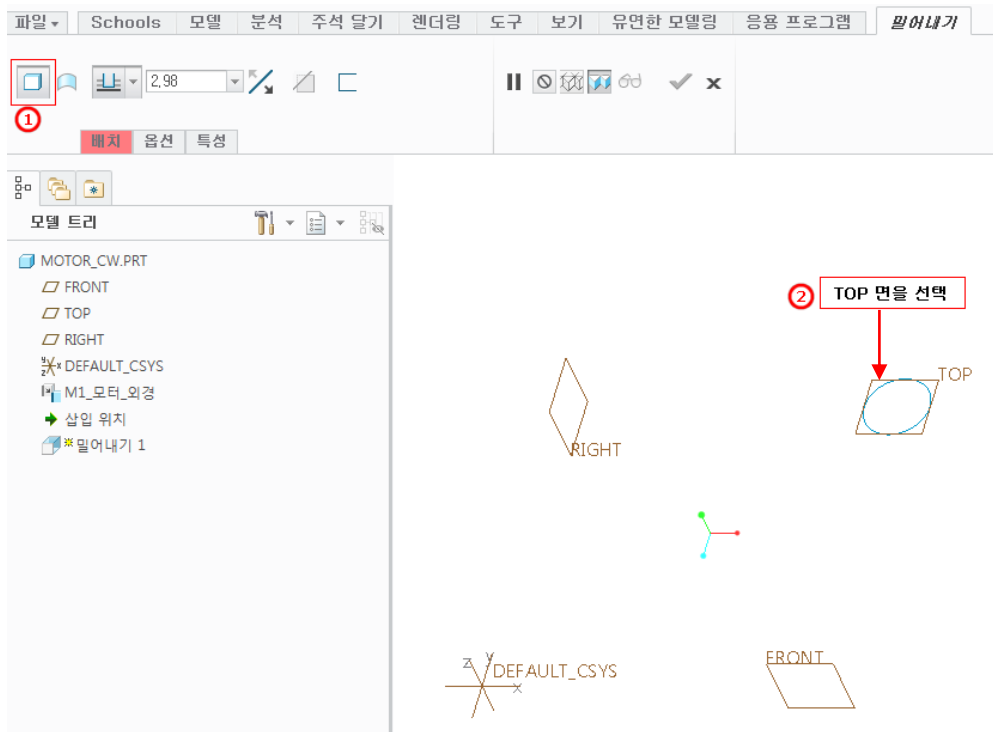


그림 3-21

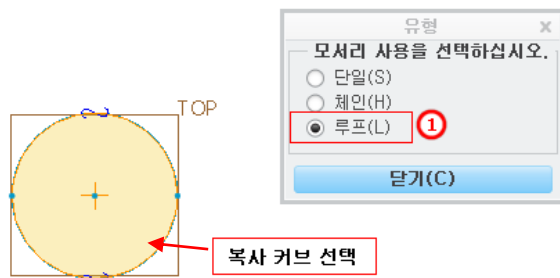


그림 3-22

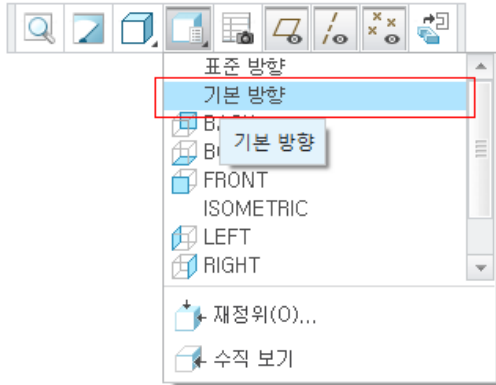


그림 3-23

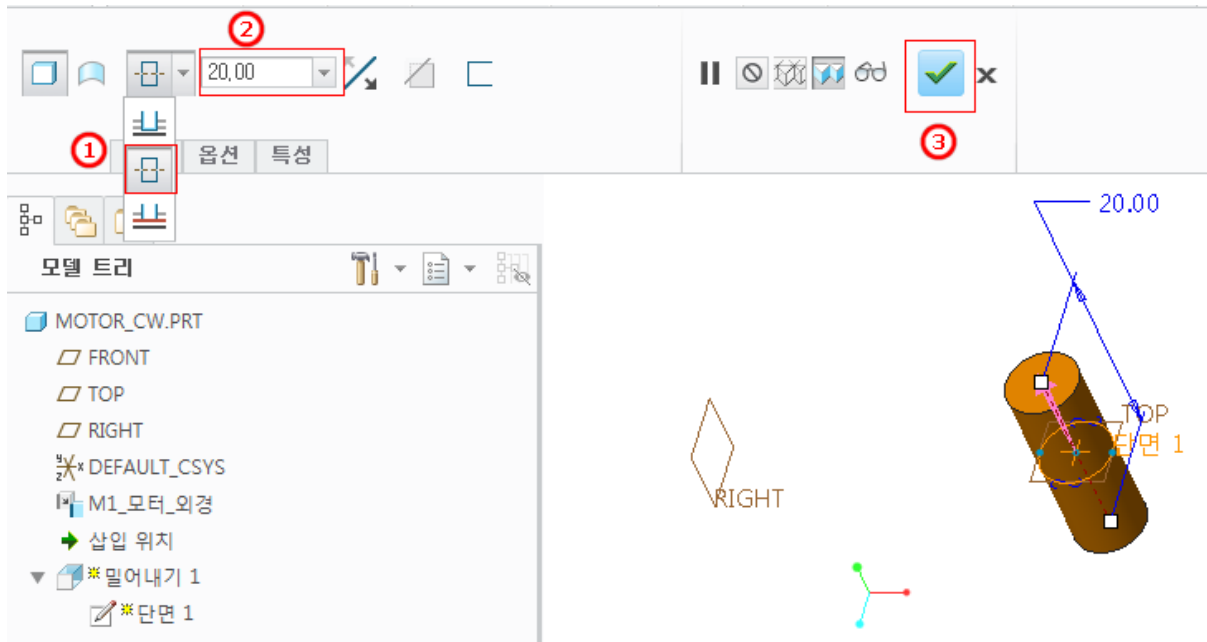


그림 3-24

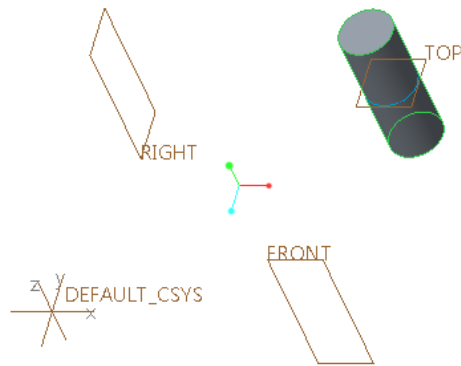
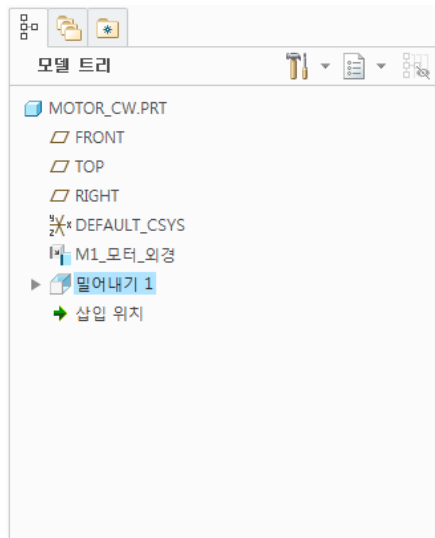


그림 3-25

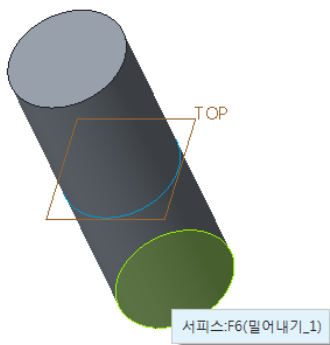


그림 3-26

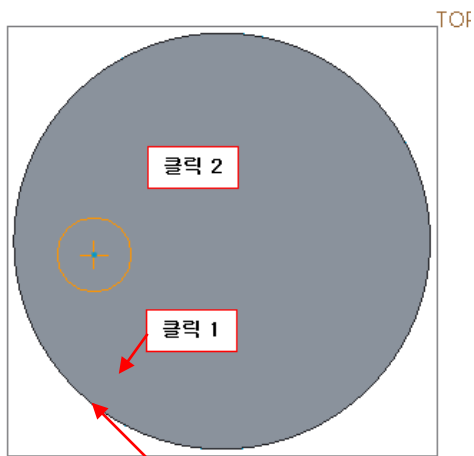


그림 3-27

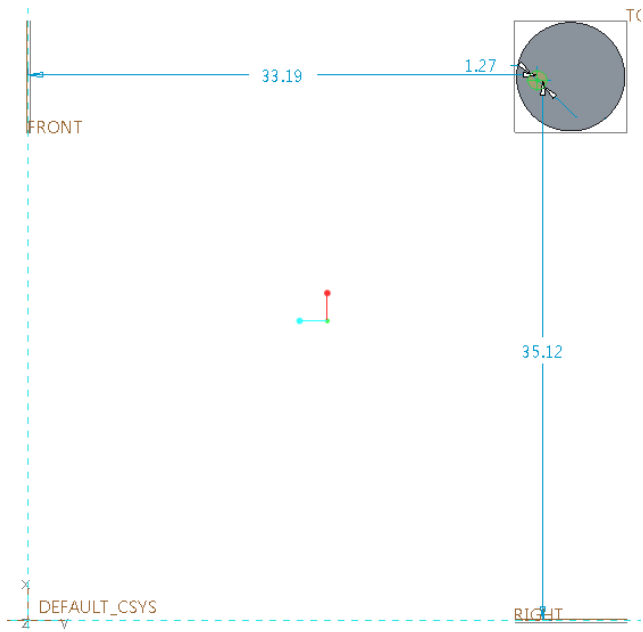


그림 3-28

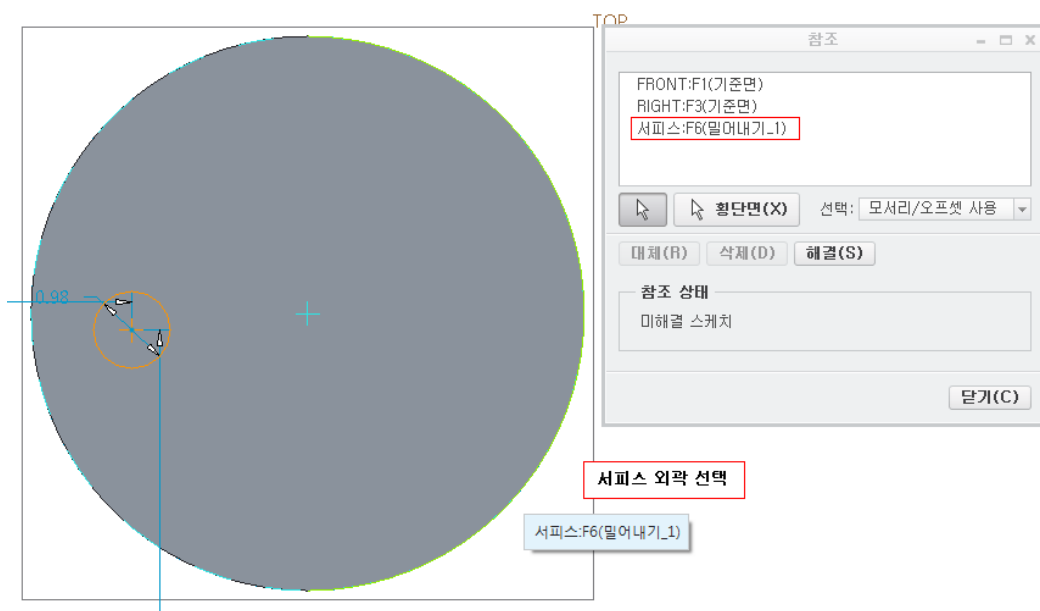


그림 3-29

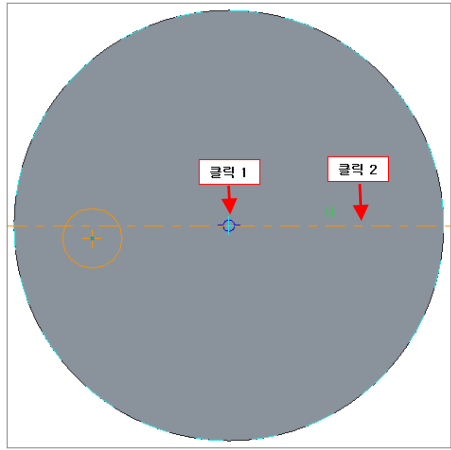


그림 3-30

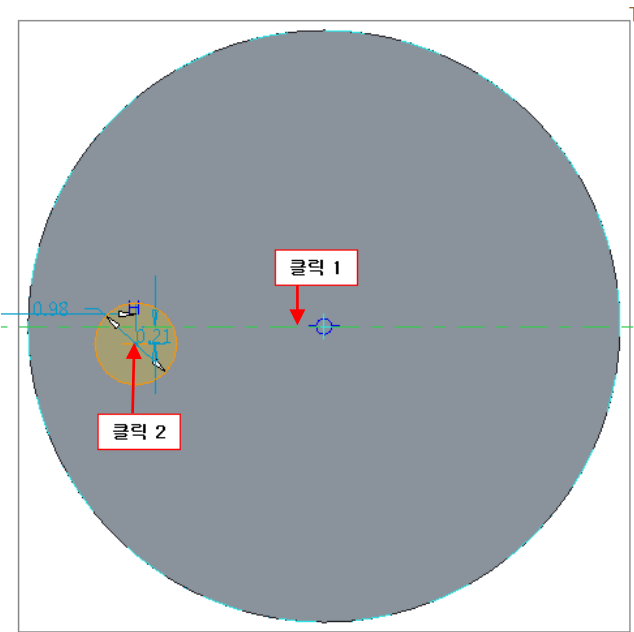


그림 3-31

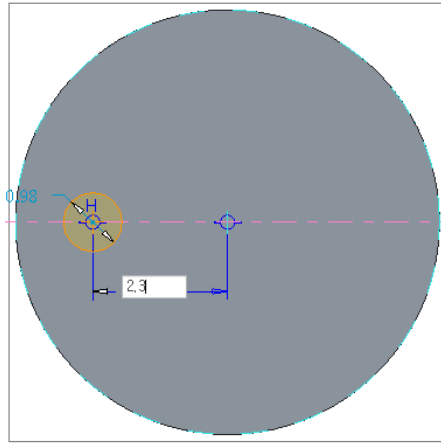
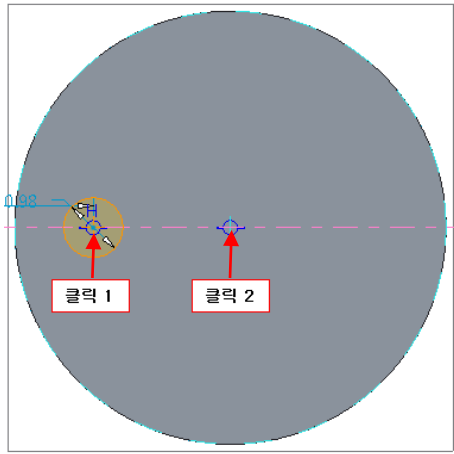


그림 3-32

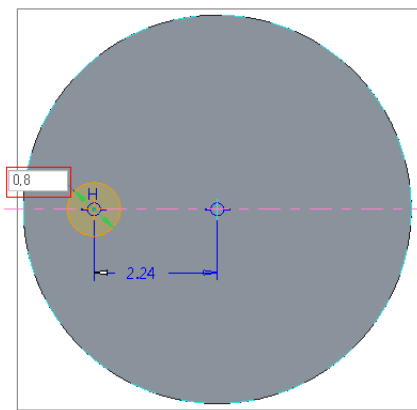


그림 3-33

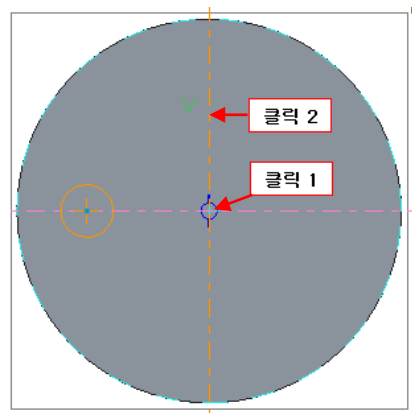


그림 3-34

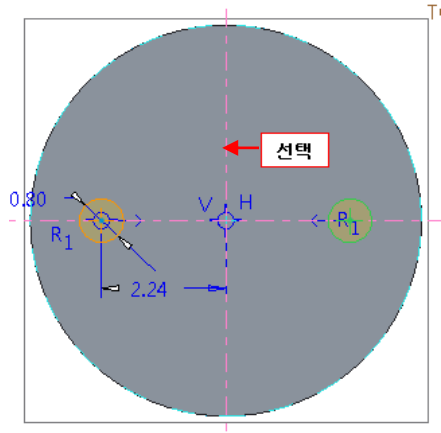


그림 3-35

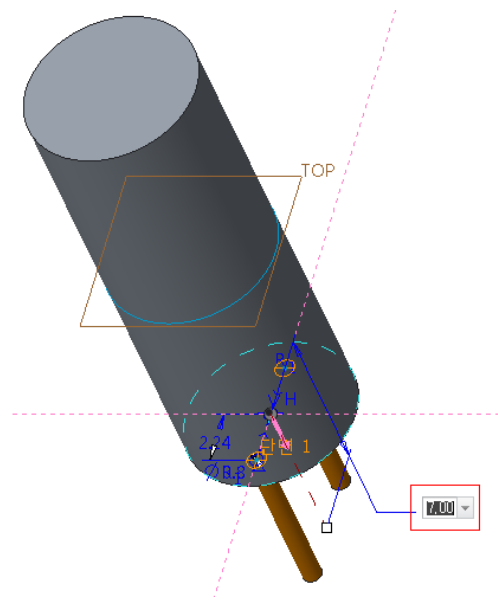


그림 3-36

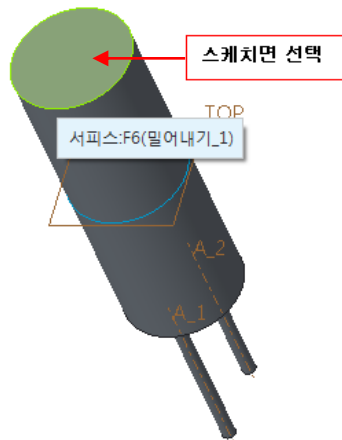


그림 3-37



그림 3-38

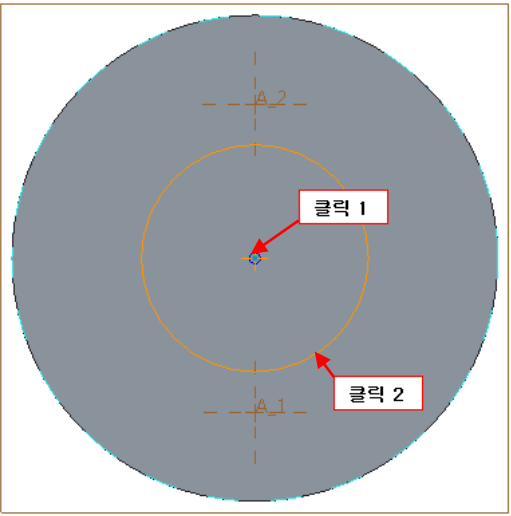


그림 3-39

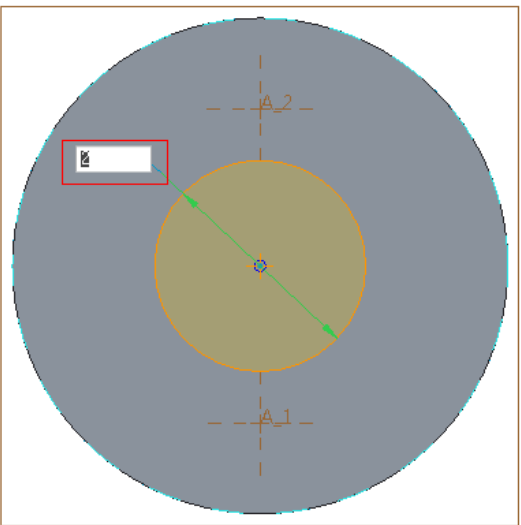


그림 3-40

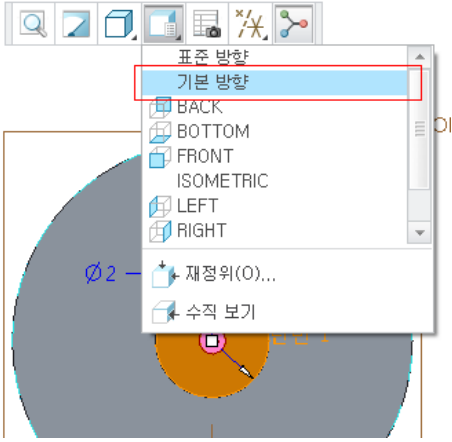


그림 3-41

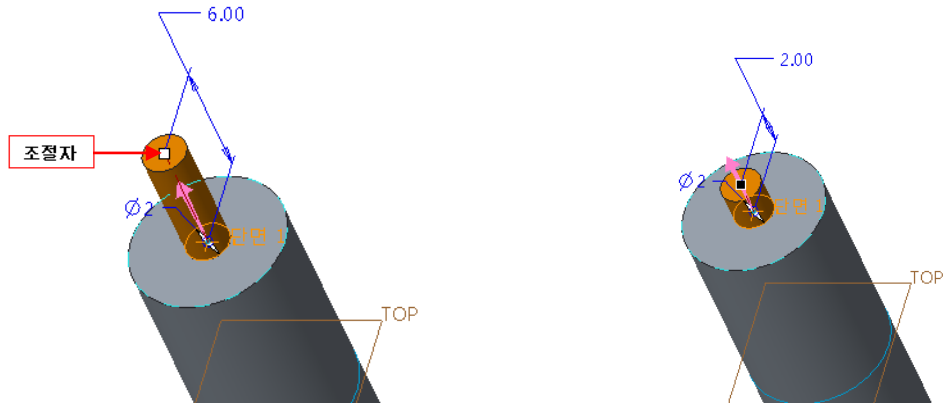


그림 3-42

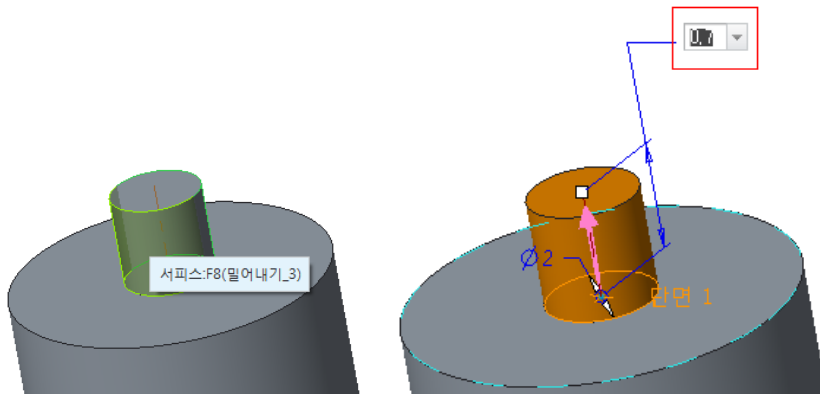


그림 3-43



그림 3-44

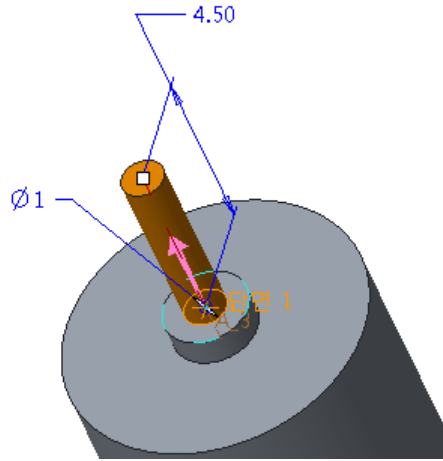


그림 3-45

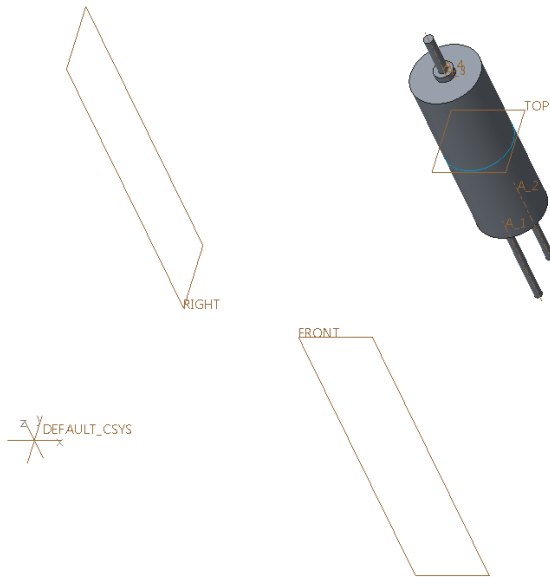


그림 3-46

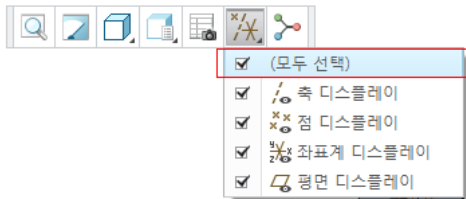


그림 3-47

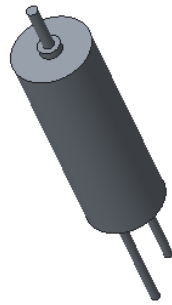
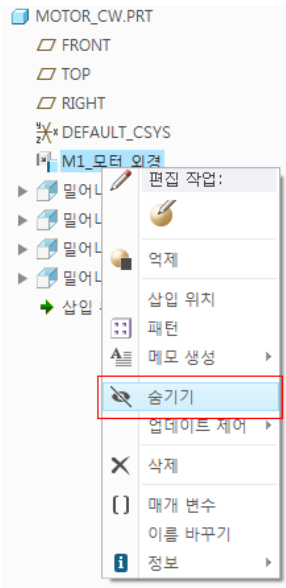


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그림 3-49

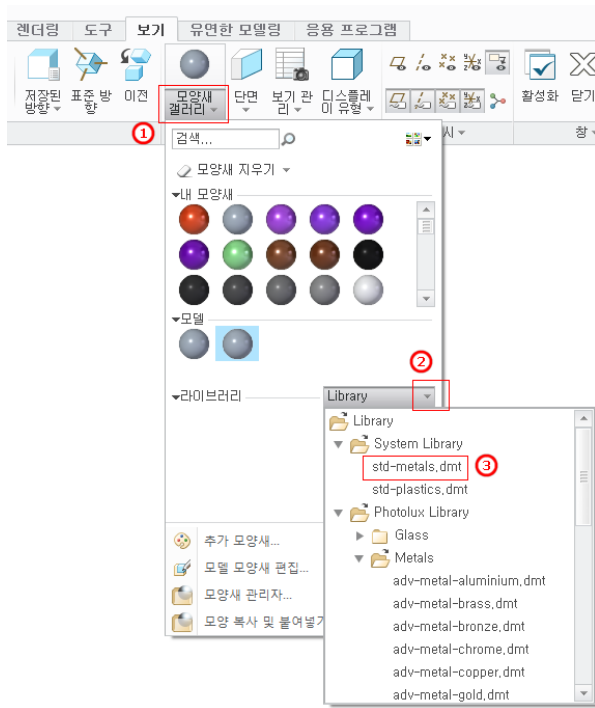


그림 3-50

그림 3-51

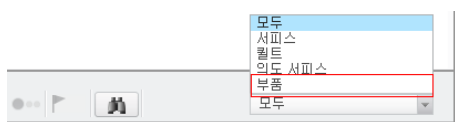


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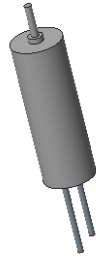
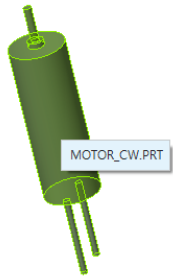


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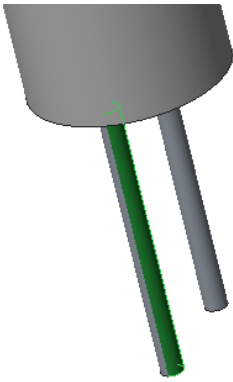


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그림 3-55

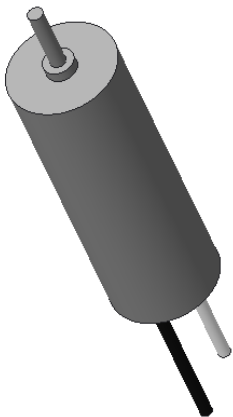


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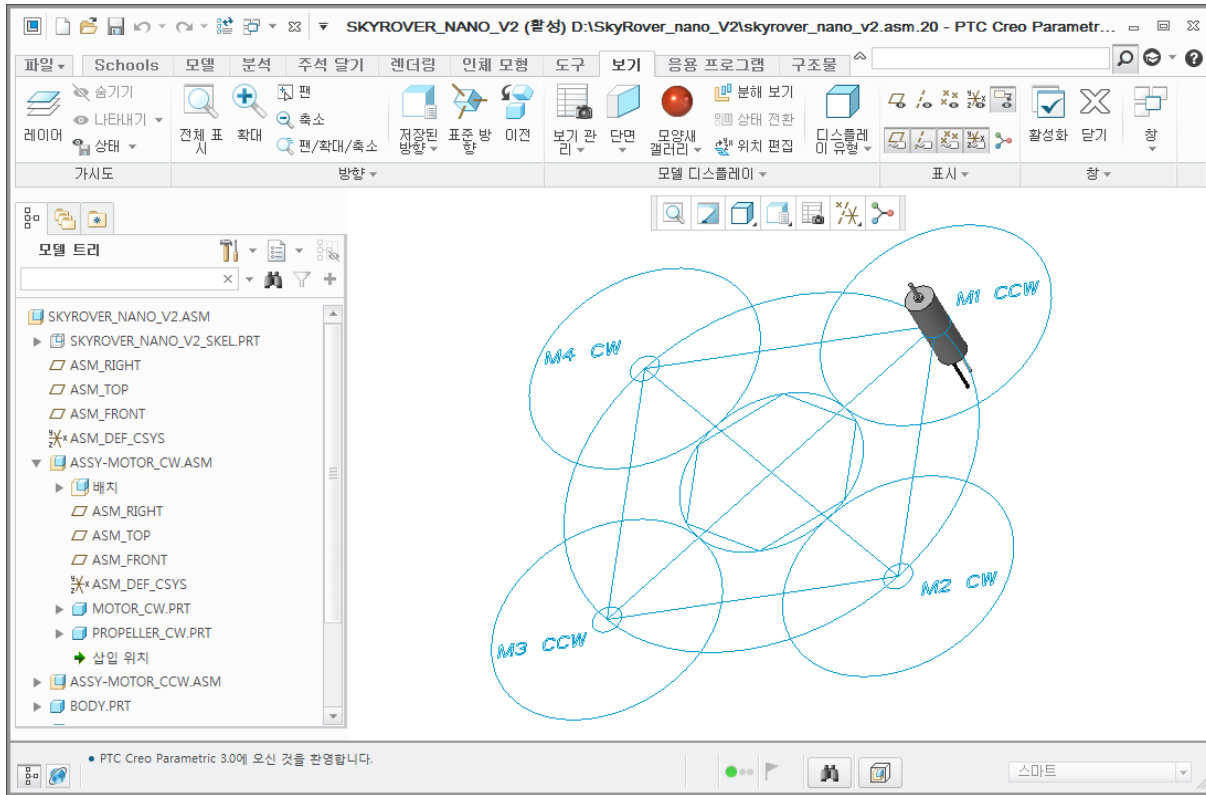


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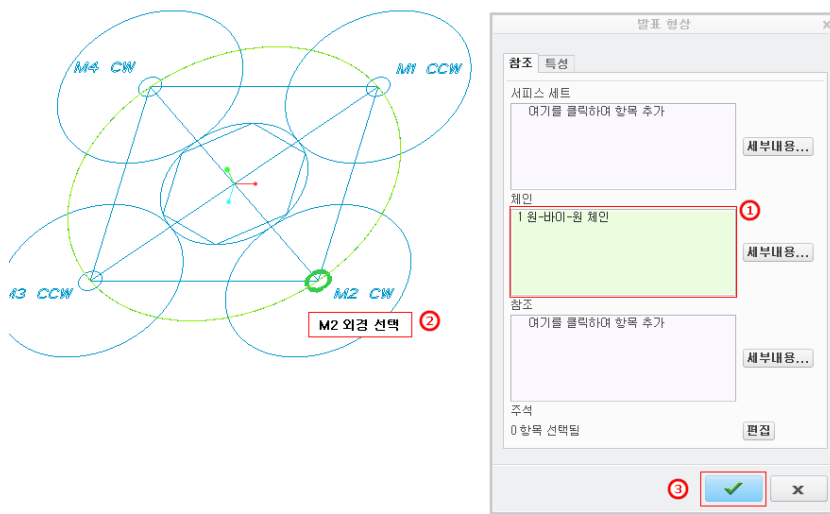


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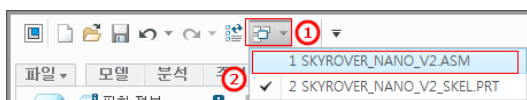


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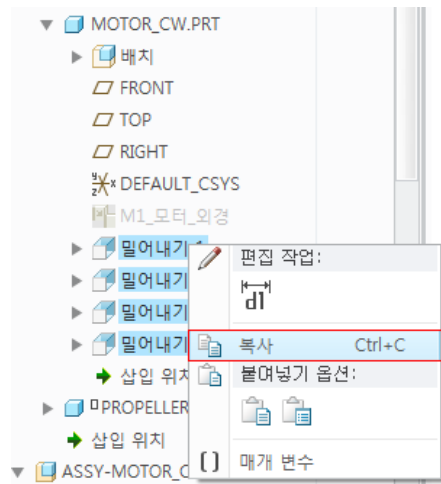


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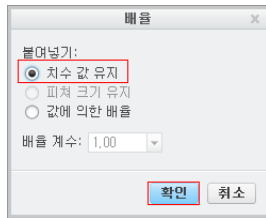


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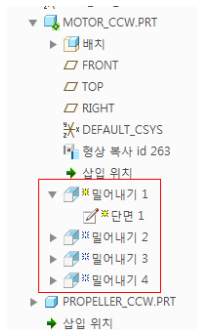


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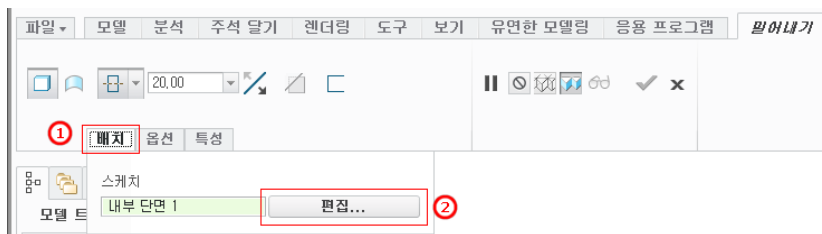


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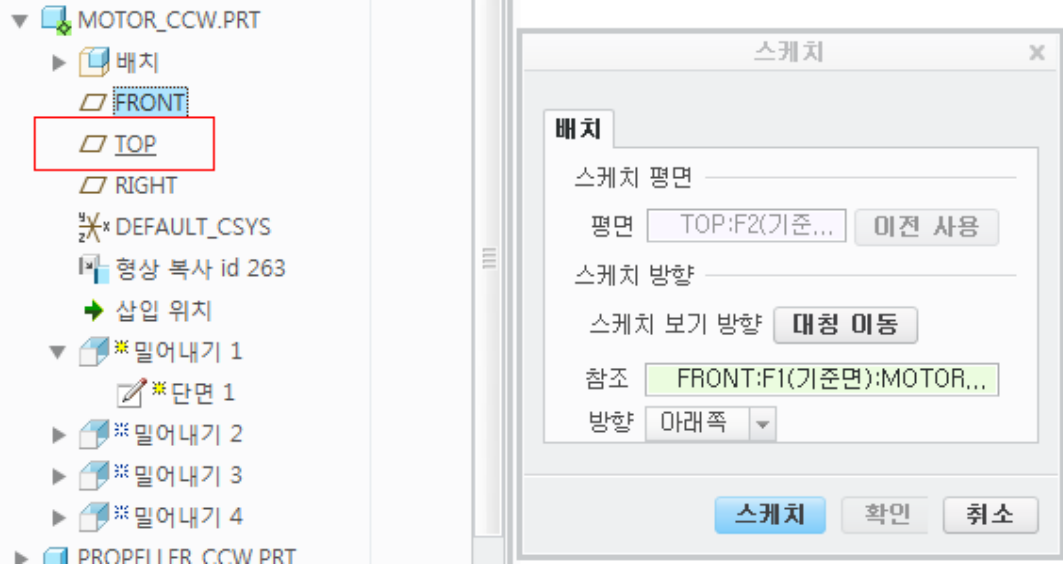


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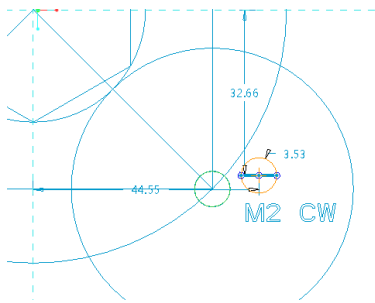


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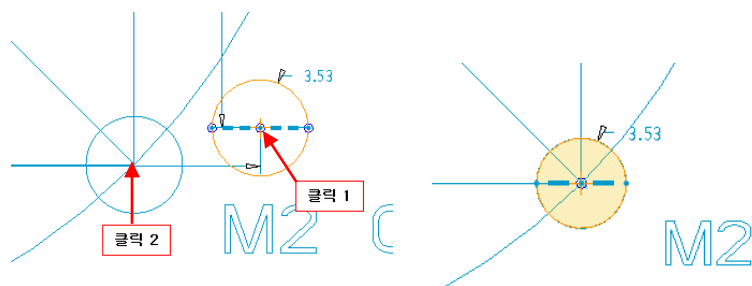


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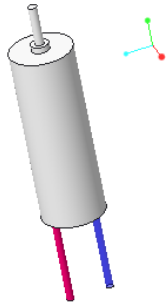


그림 3-67

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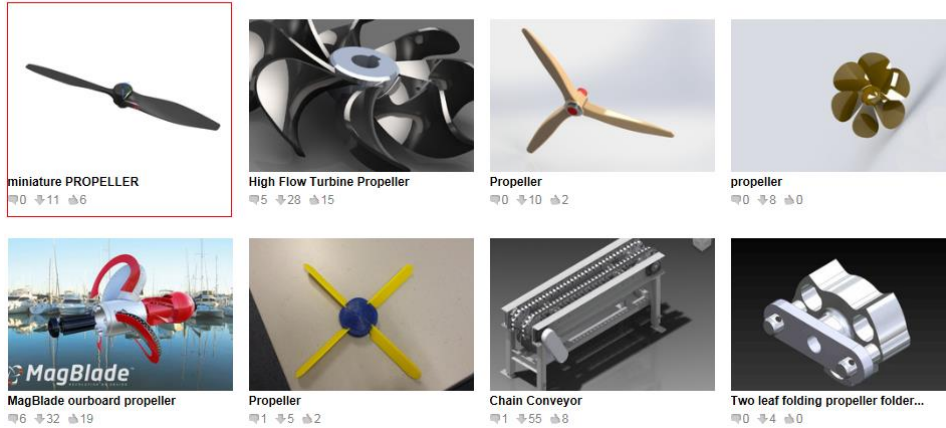


그림 3-69

miniature PROPELLER

STEP / IGES Parasolid Rendering By marcus bak on July 26, 2015 14:28 in Components

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PROPELLER-CW_59mm.x_t	3D view 500 KB	V1 by marcus bak 1 day ago	Parasolid	0 comments
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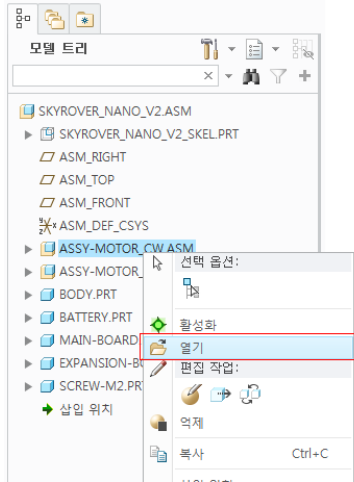


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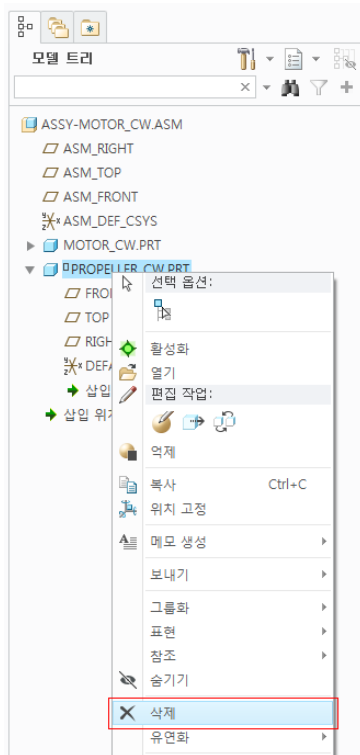


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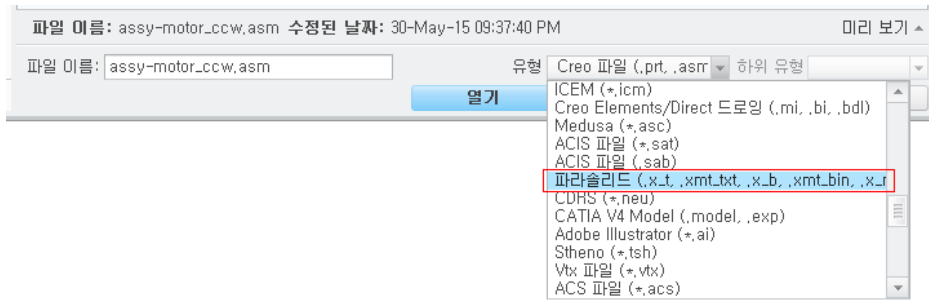


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그림 3-74

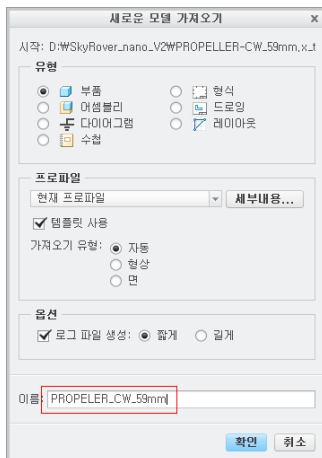


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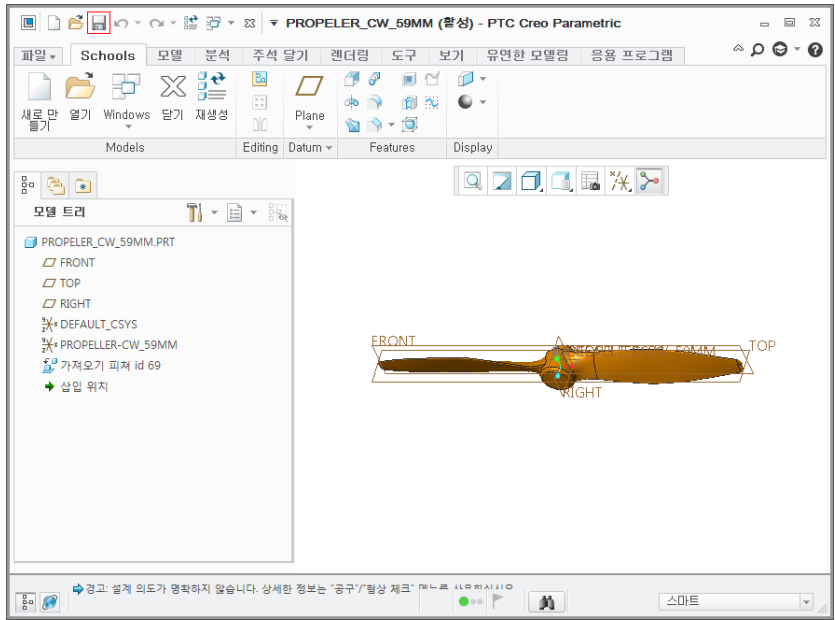


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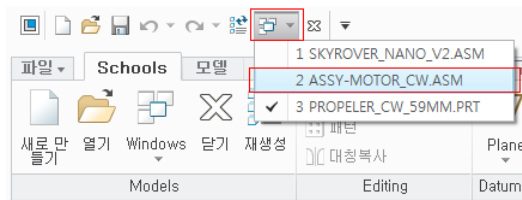


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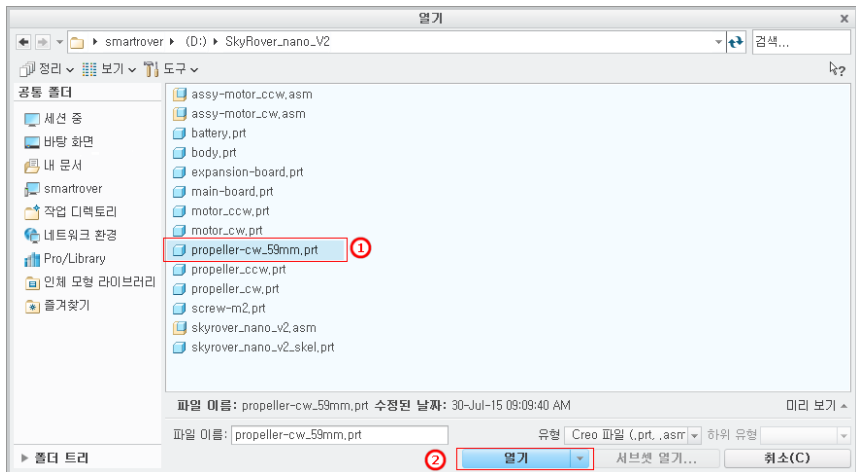


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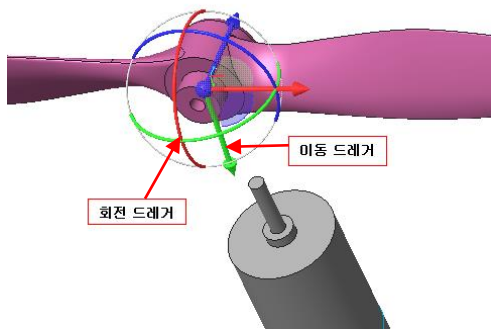


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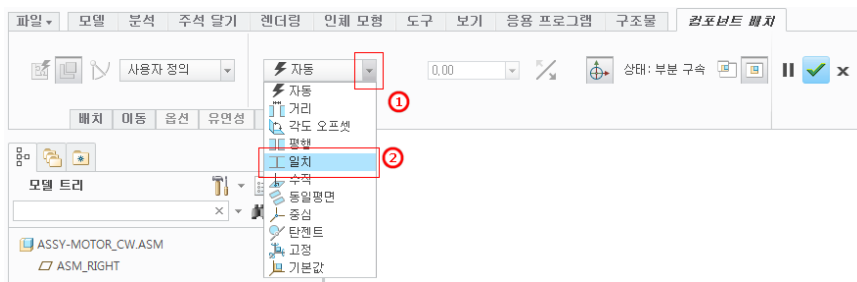


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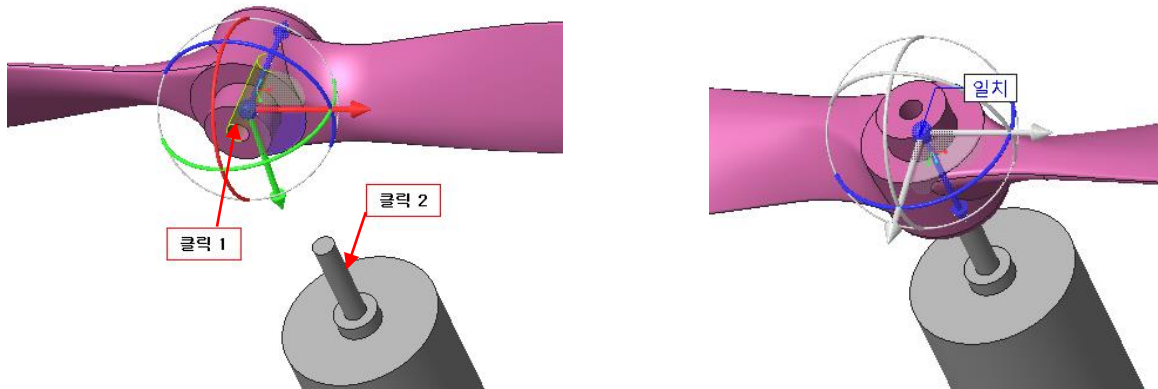


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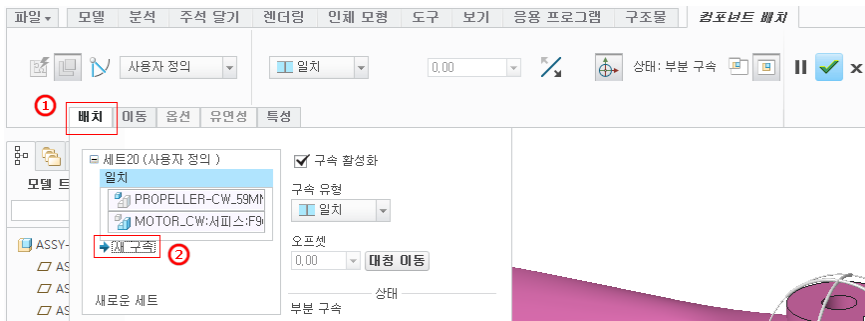


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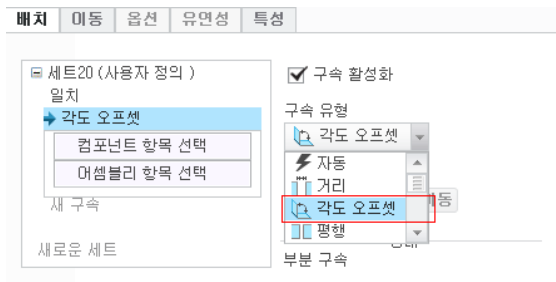


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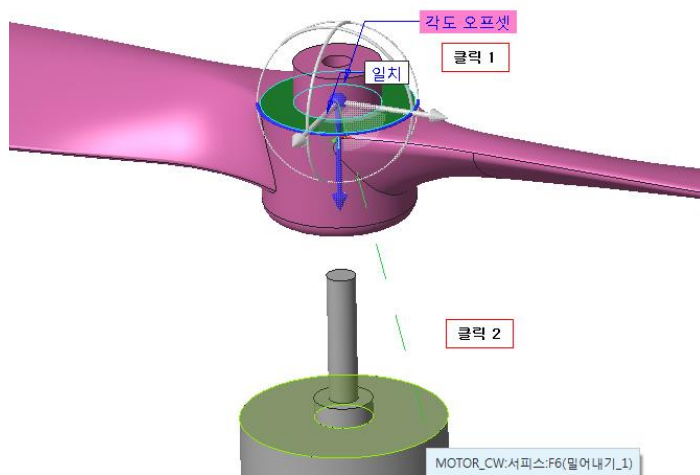


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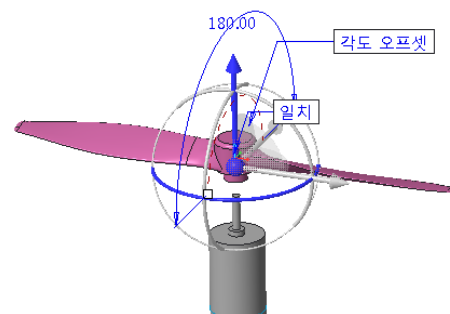
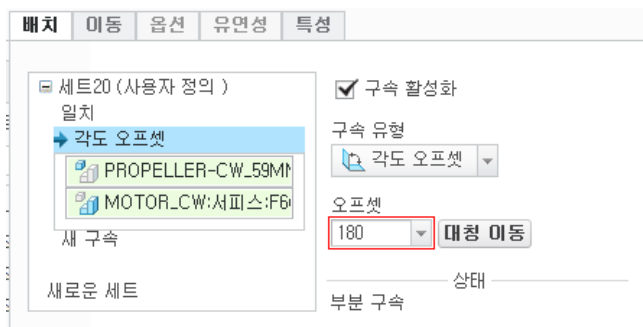


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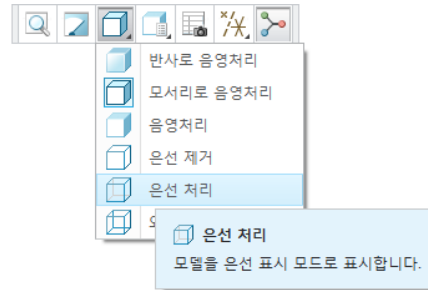
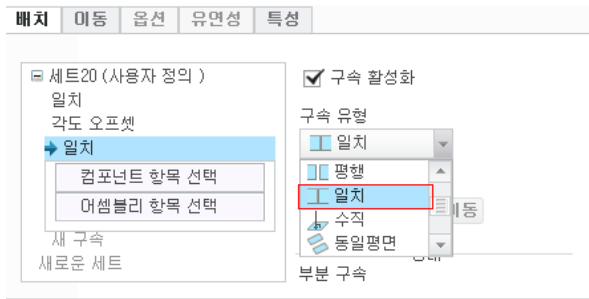


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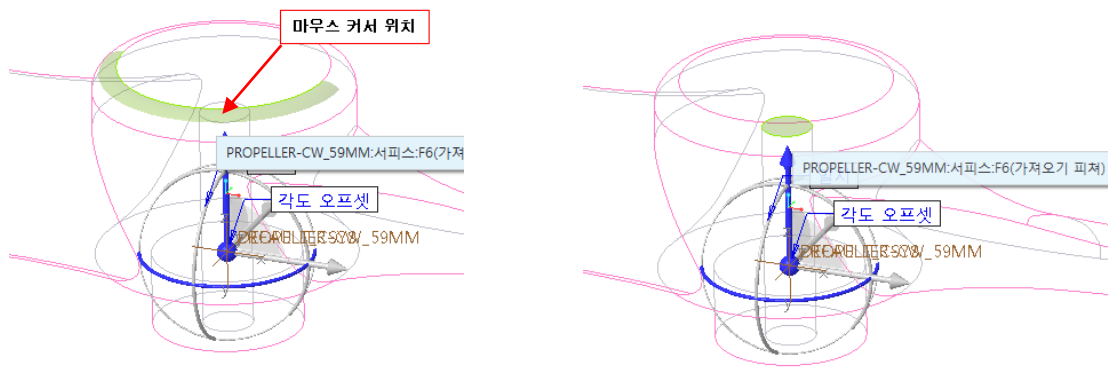


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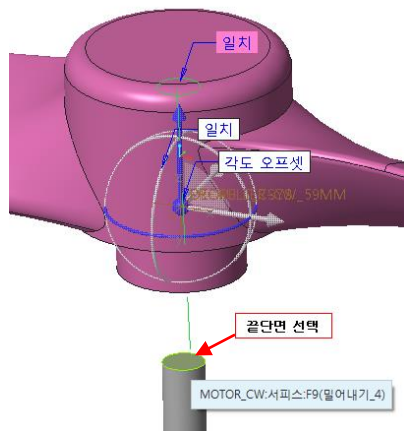


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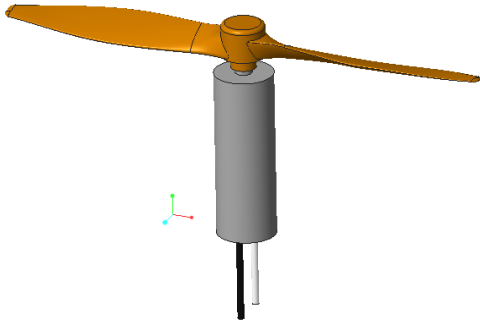


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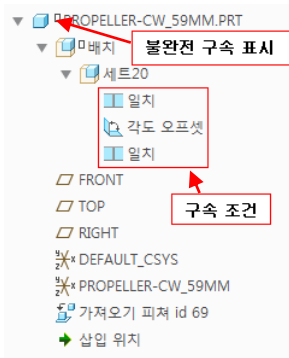


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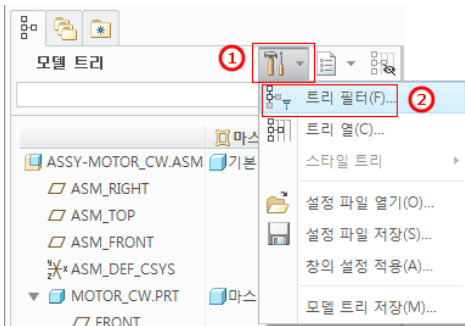


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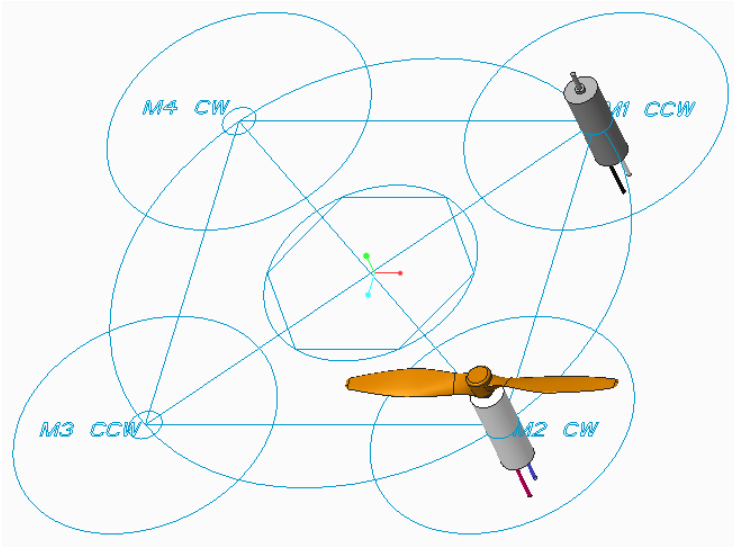


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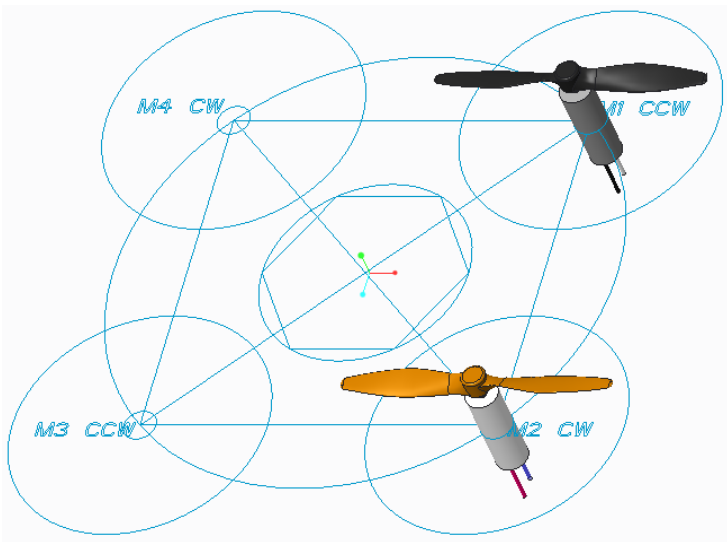


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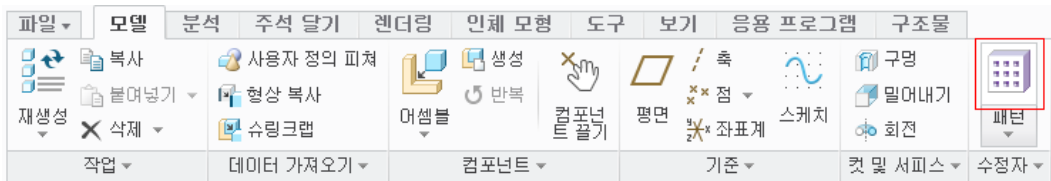


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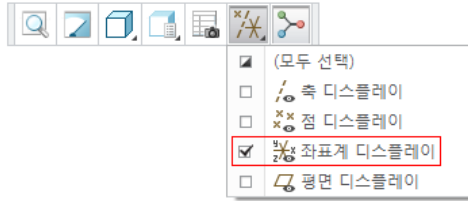


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그림 3-95

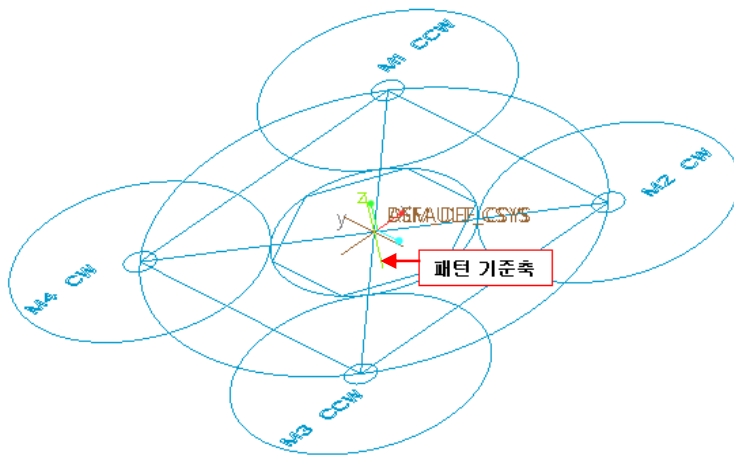


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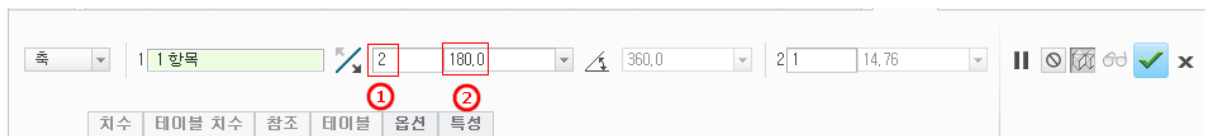


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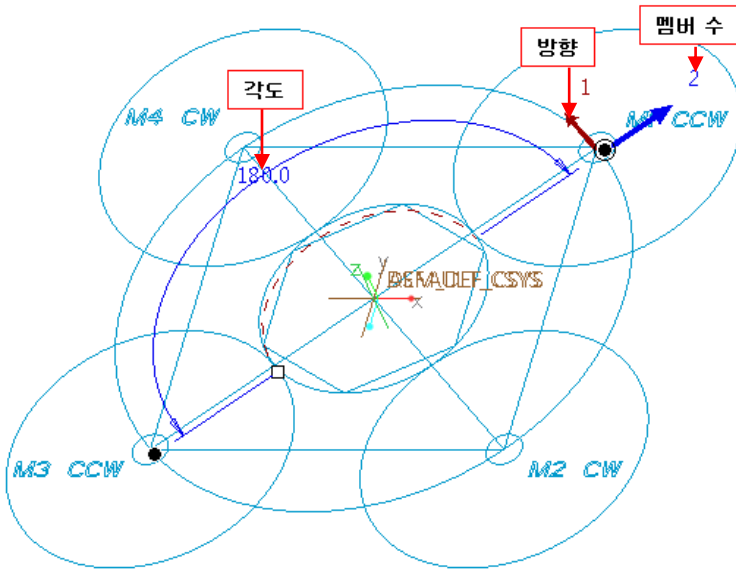


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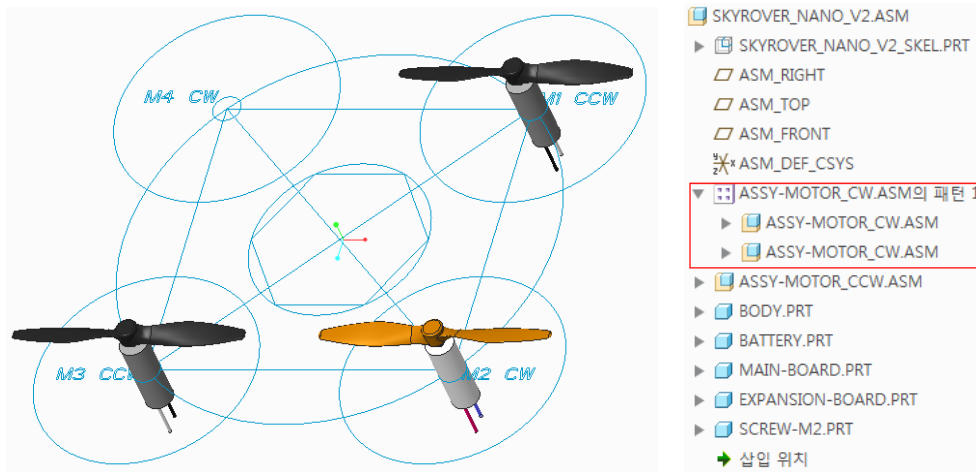
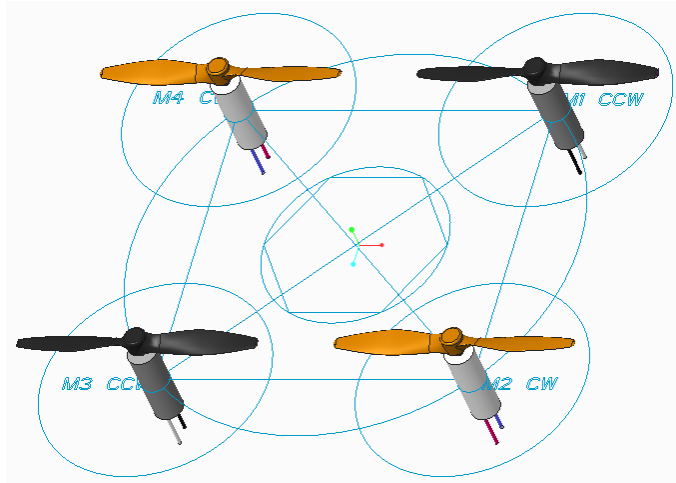


그림 3-99



- SKYROVER_NANO_V2.ASM
 - SKYROVER_NANO_V2_SKEL.PRT
 - ASM_RIGHT
 - ASM_TOP
 - ASM_FRONT
 - ASM_DEF_CSYS
 - ASSY-MOTOR_CW.ASM의 패턴 1
 - ASSY-MOTOR_CW.ASM
 - ASSY-MOTOR_CW.ASM
 - ASSY-MOTOR_CCW.ASM의 패턴 2
 - ASSY-MOTOR_CCW.ASM
 - ASSY-MOTOR_CCW.ASM
 - BODY.PRT
 - BATTERY.PRT
 - MAIN-BOARD.PRT
 - EXPANSION-BOARD.PRT
 - SCREW-M2.PRT
 - 삽입 위치

그림 3-100

4장. 메인보드와 배터리 모델링

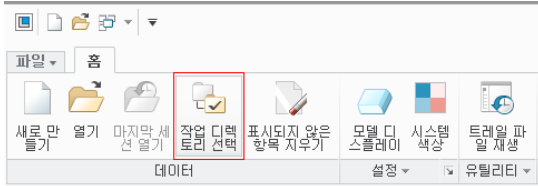


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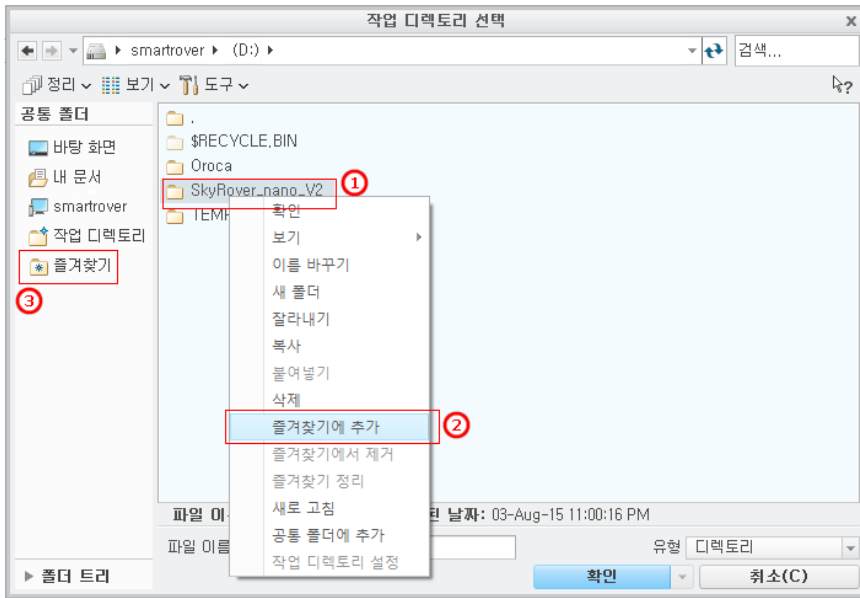


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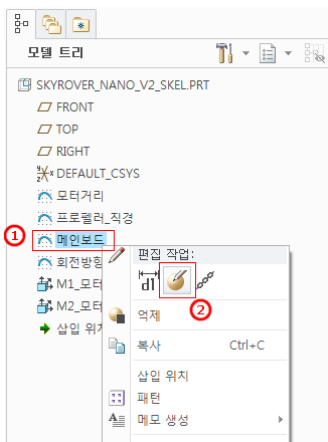


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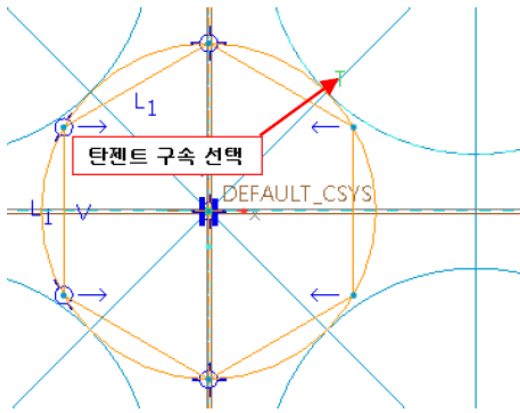


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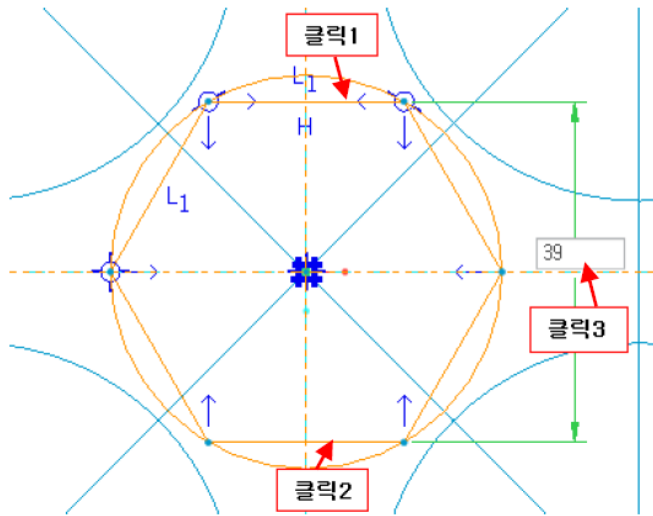


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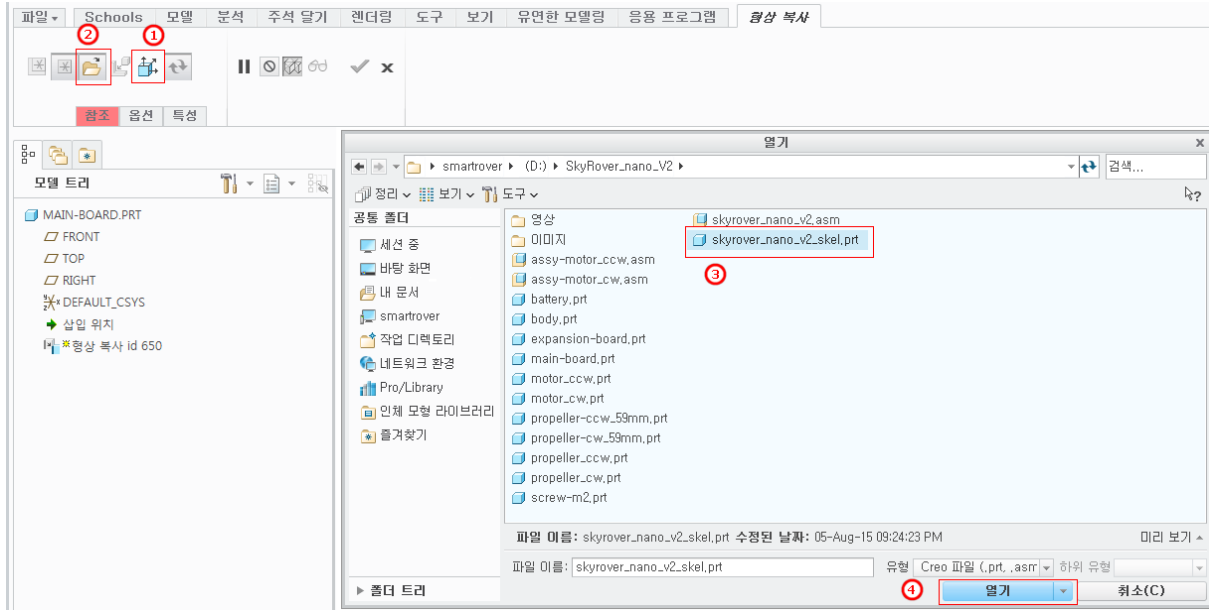


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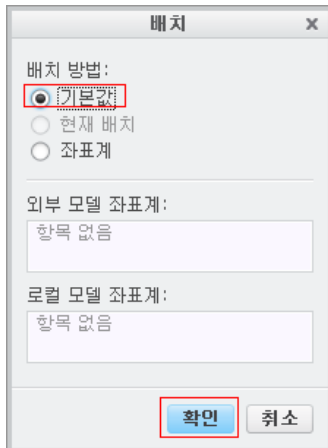


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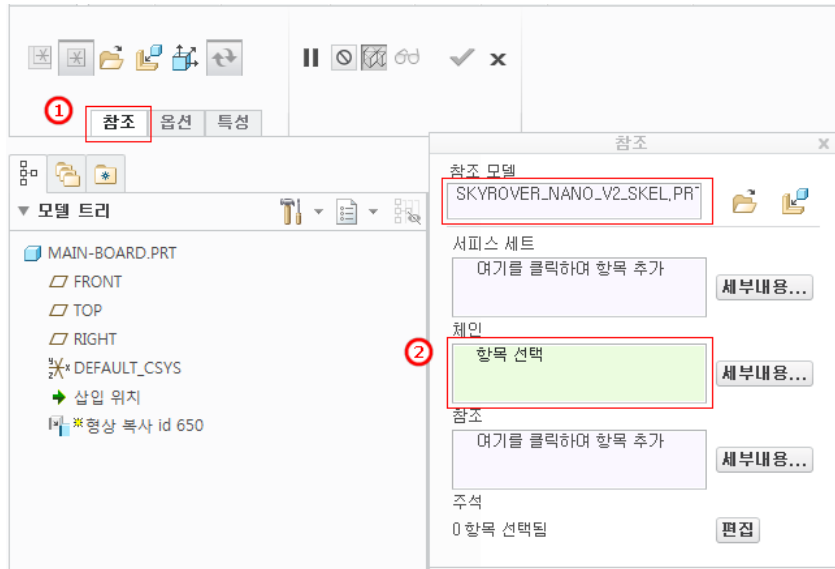


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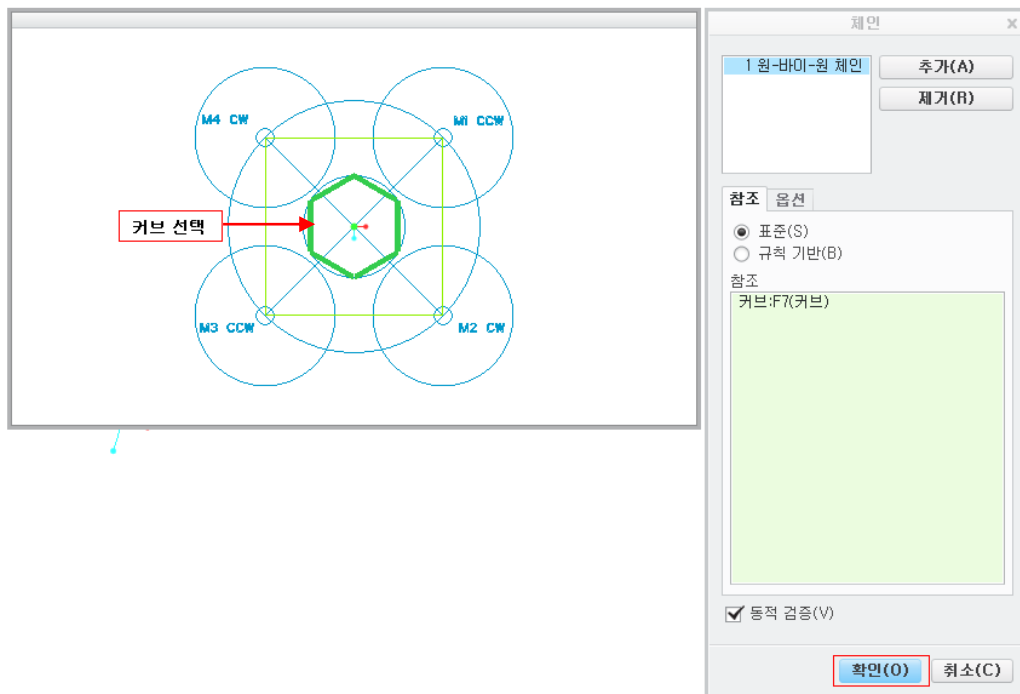


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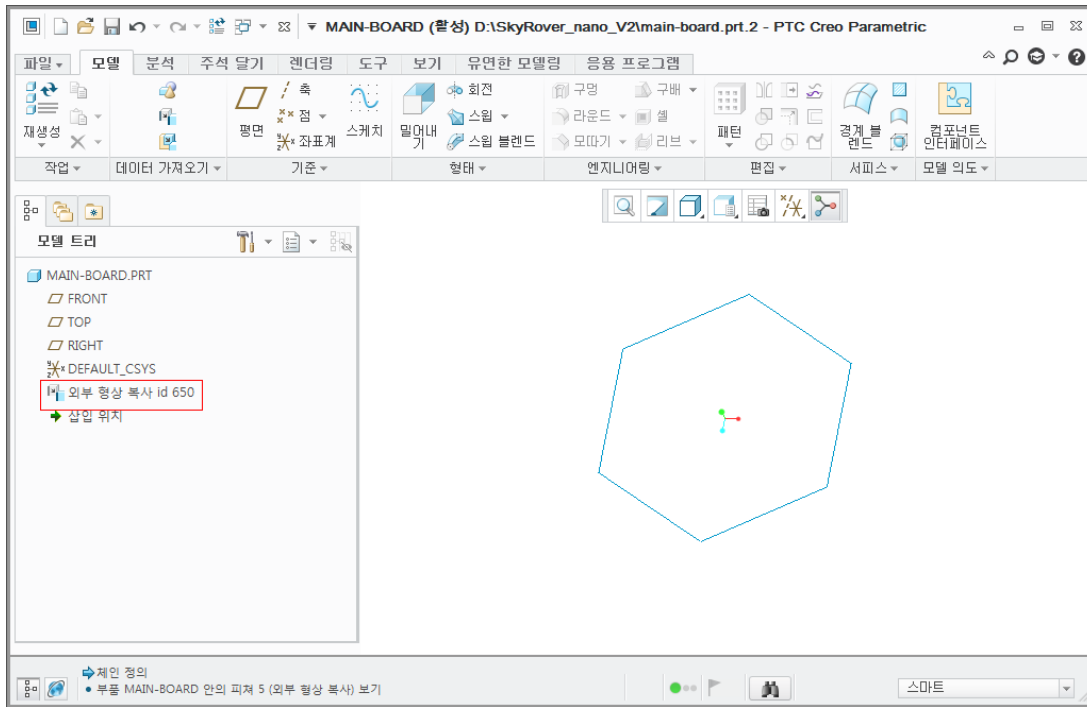


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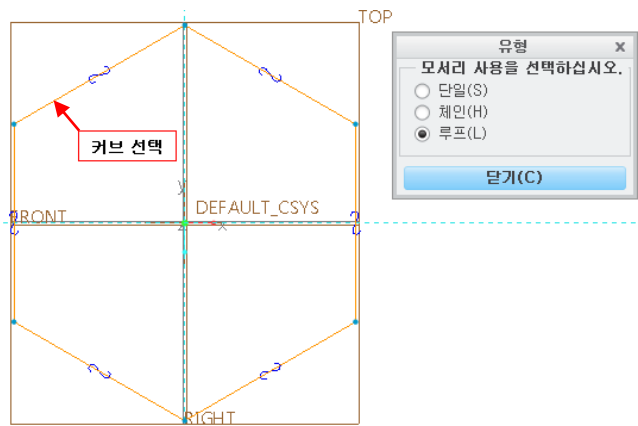


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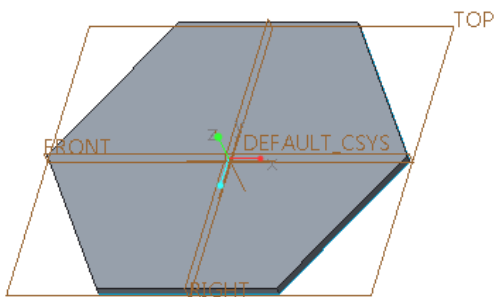


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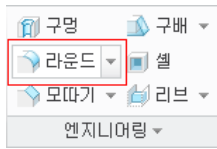


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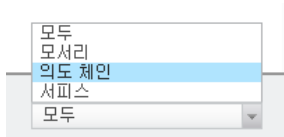


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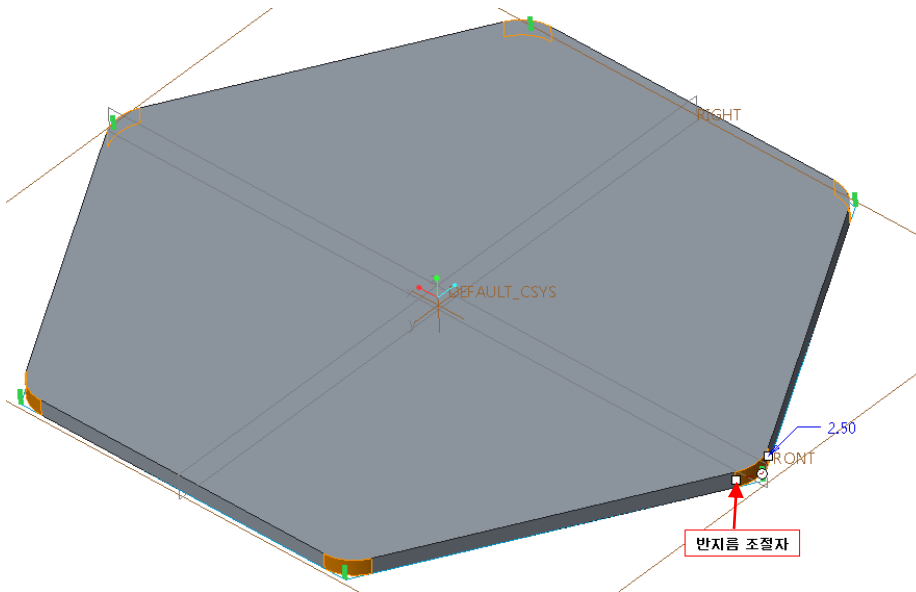


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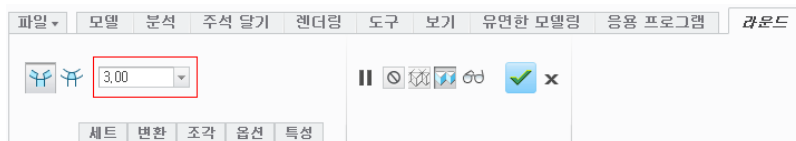


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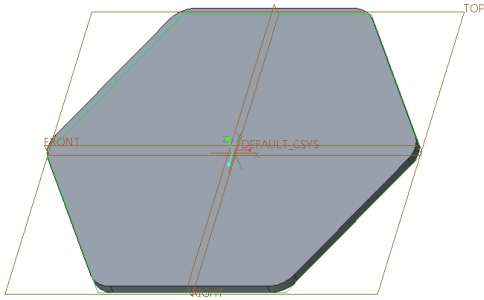


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그림 4-18



그림 4-19

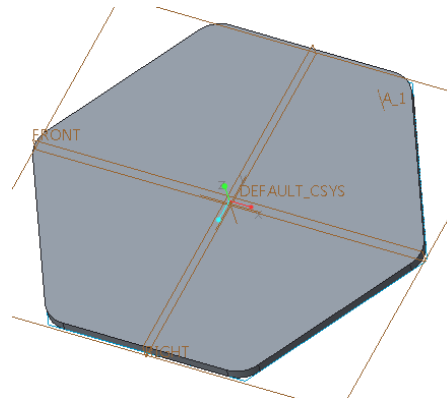


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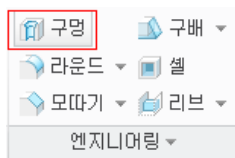


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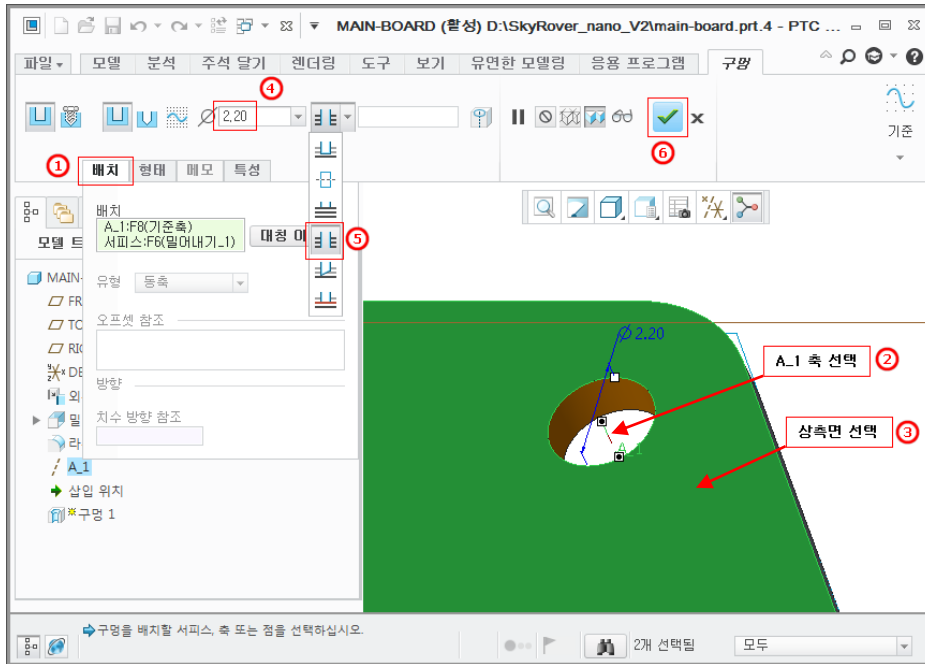


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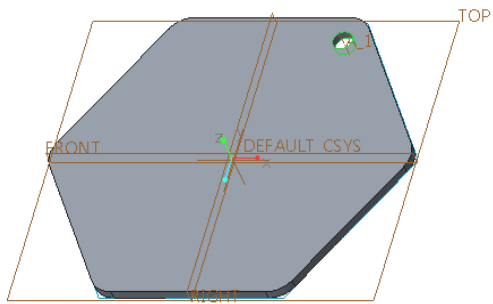


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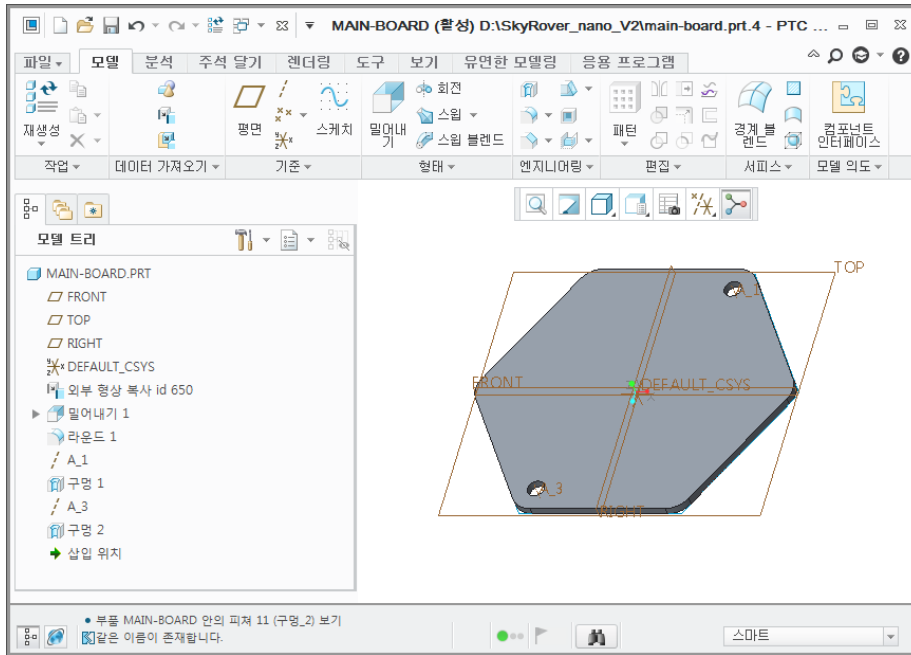


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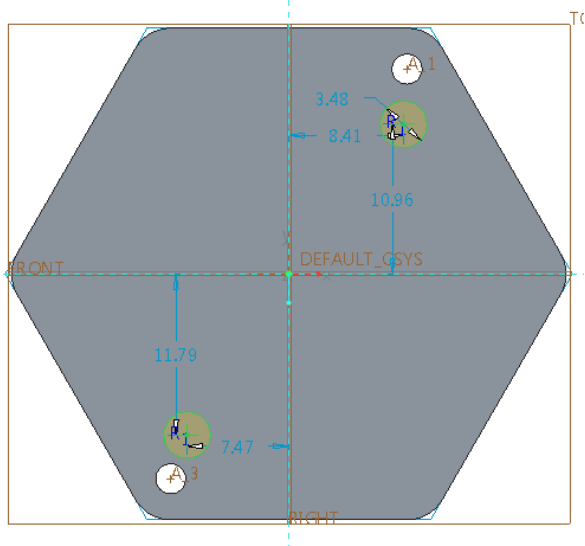


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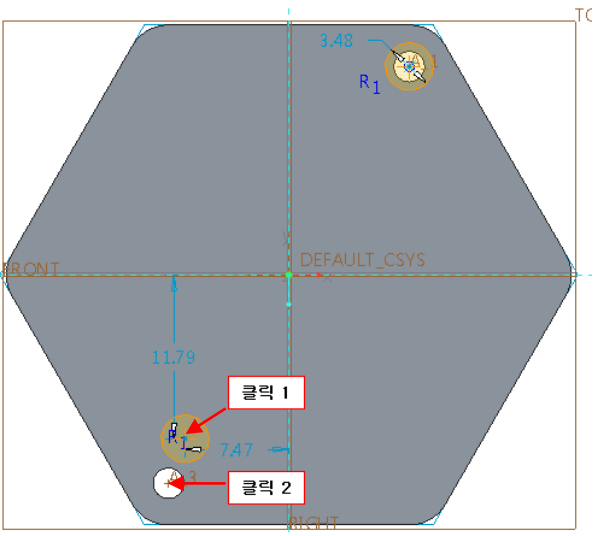


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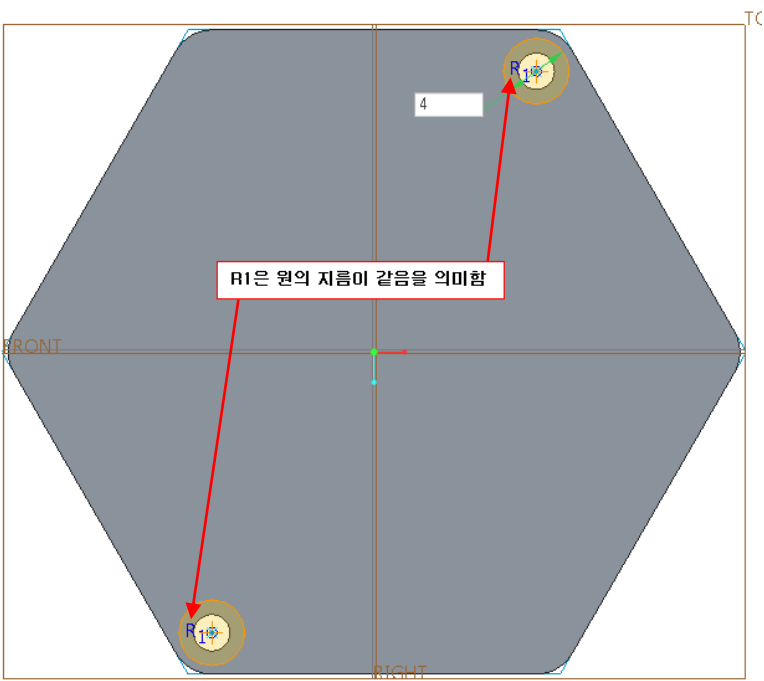


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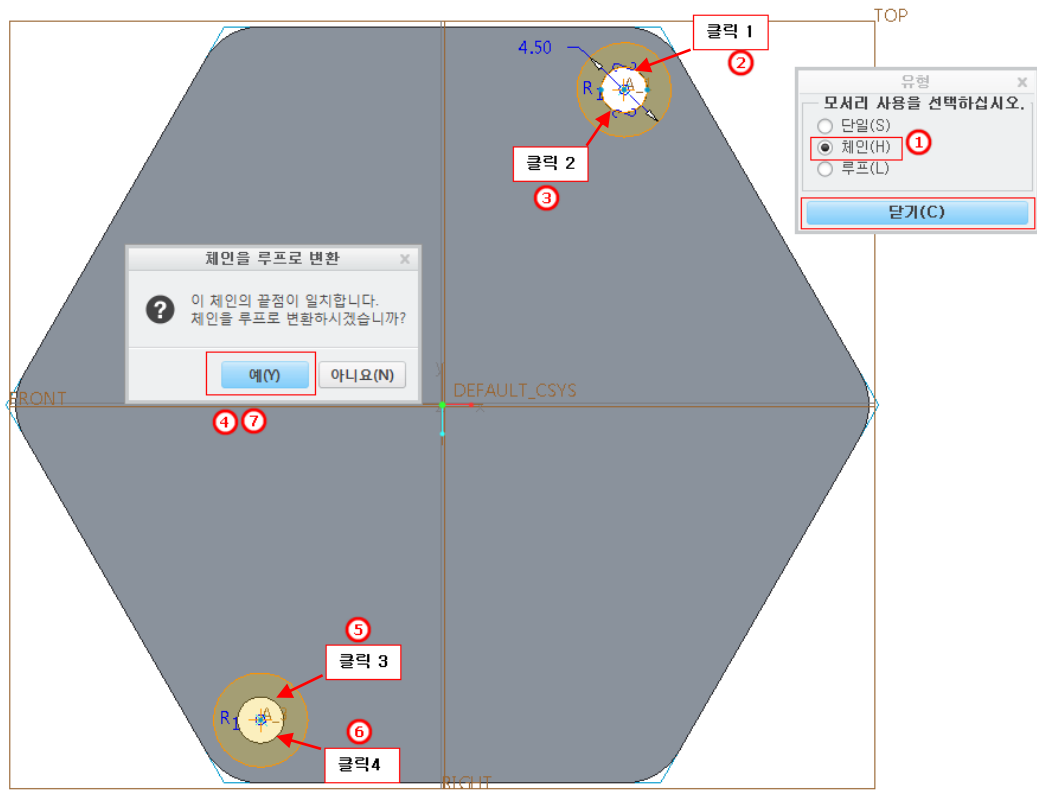


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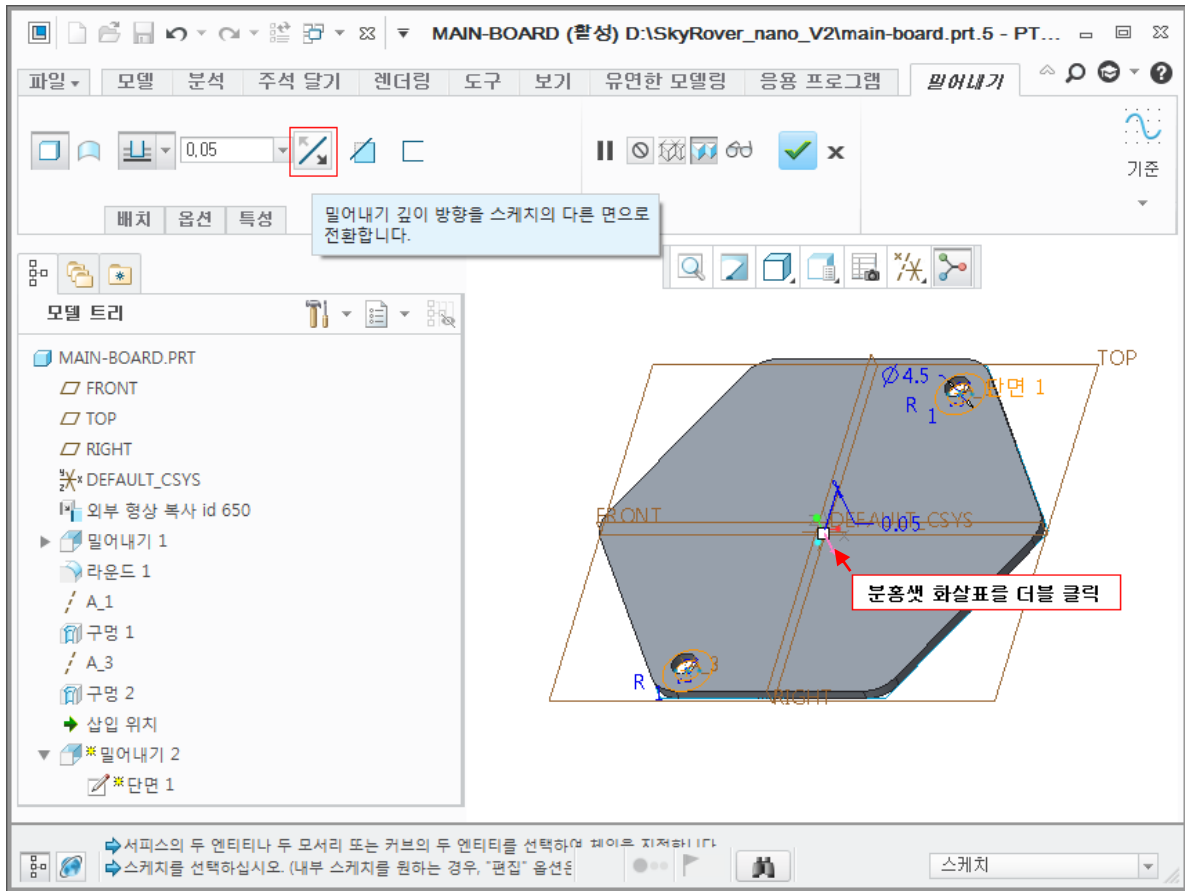


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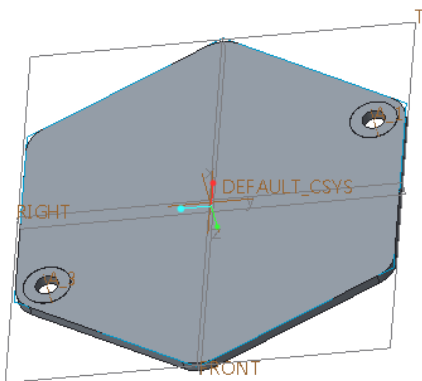


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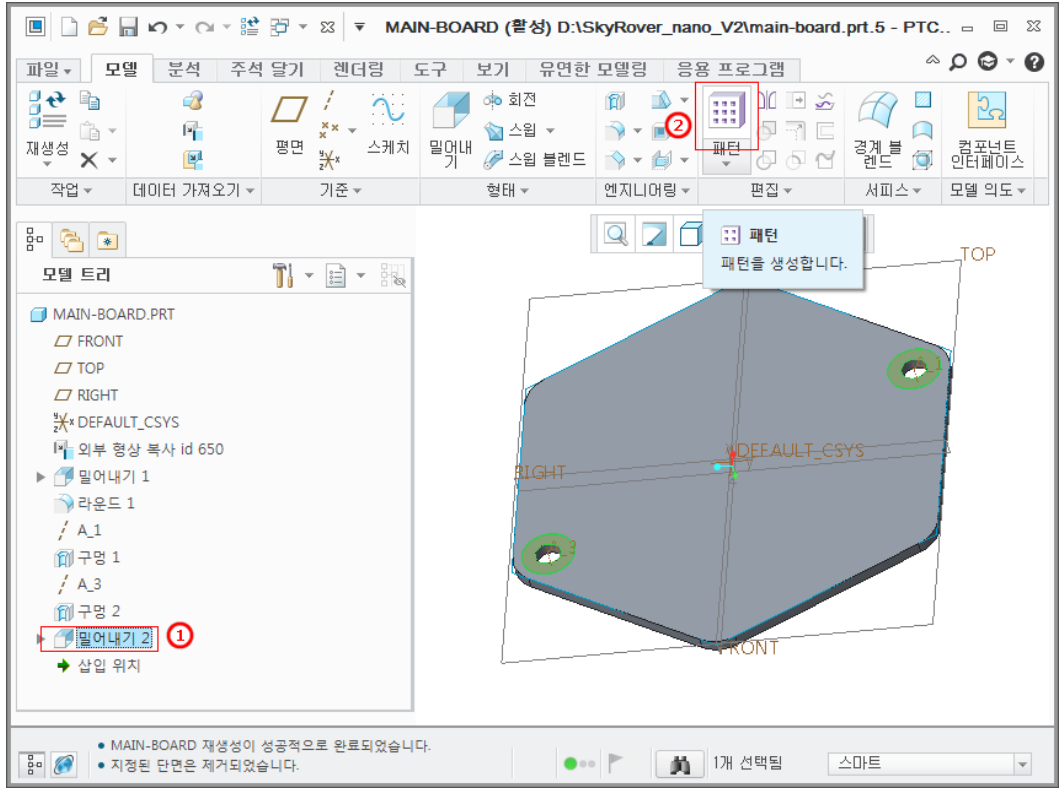


그림 4-31



그림 4-32

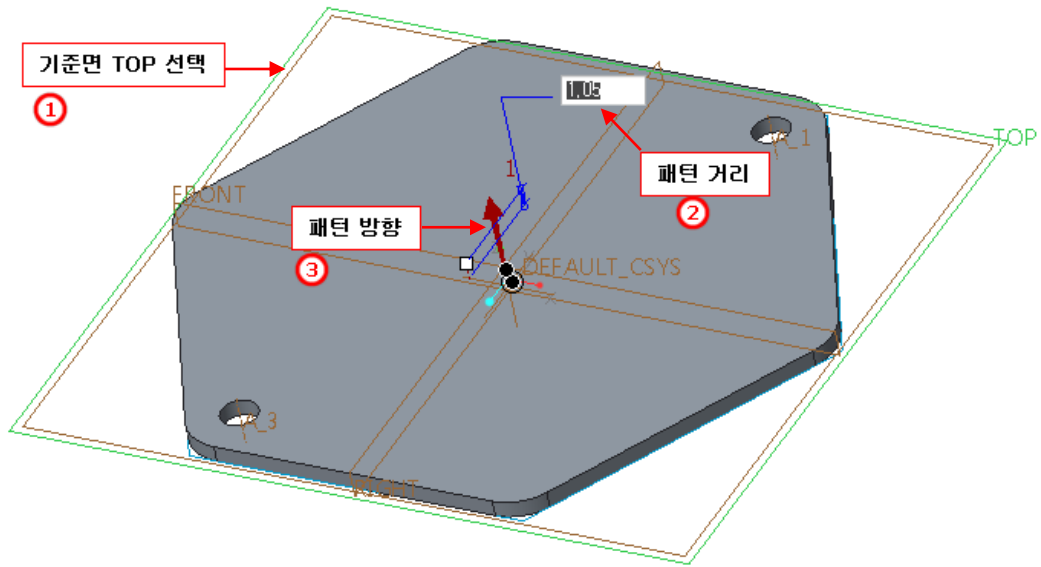


그림 4-33

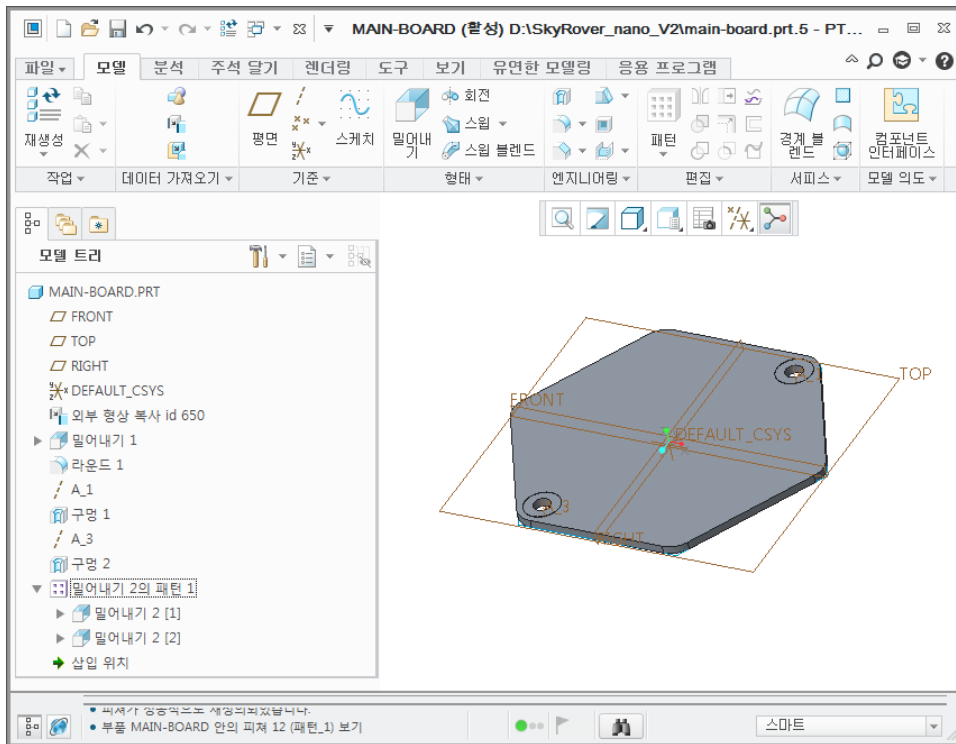


그림 4-34

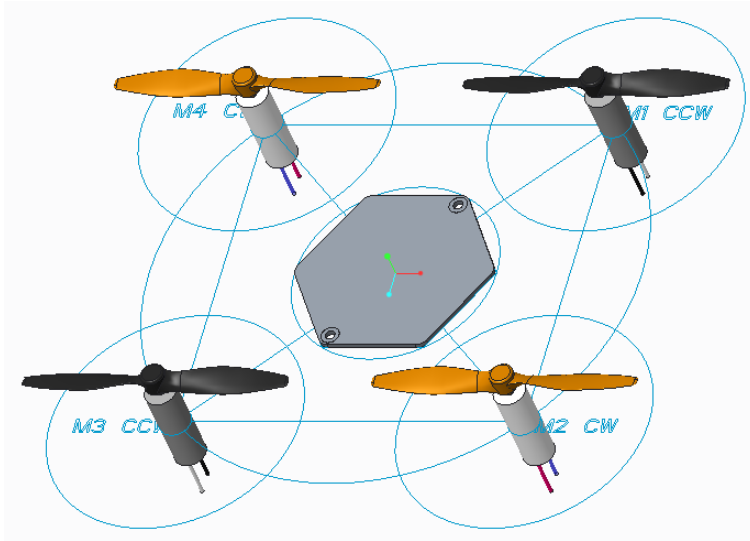


그림 4-35

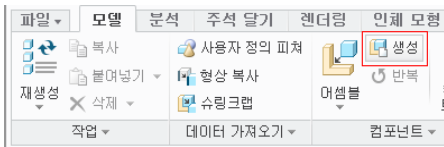


그림 4-36



그림 4-37

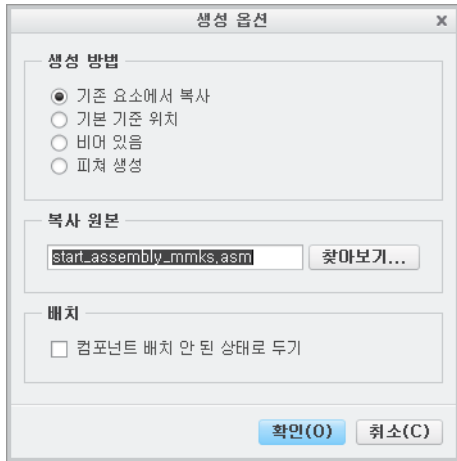


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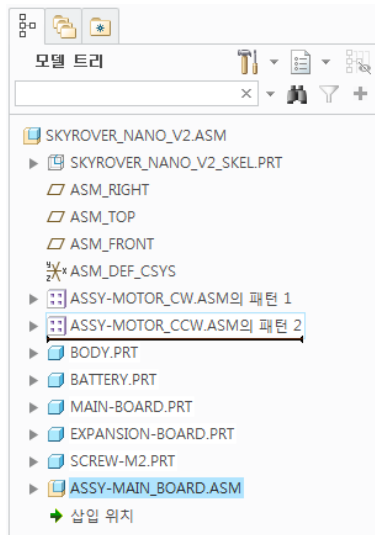


그림 4-39

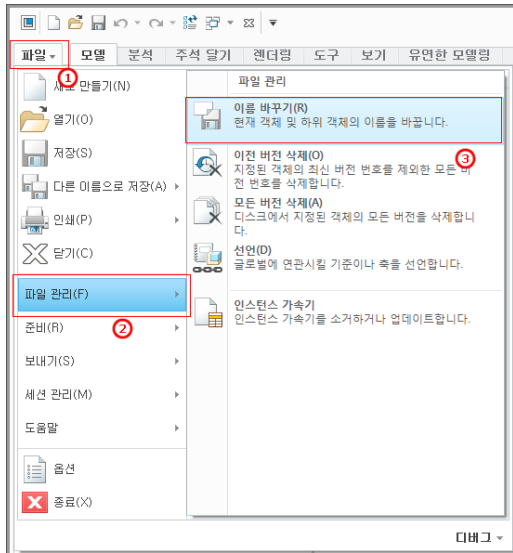


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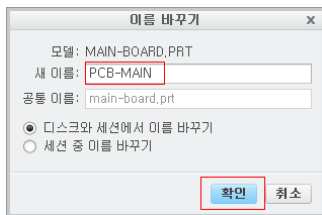


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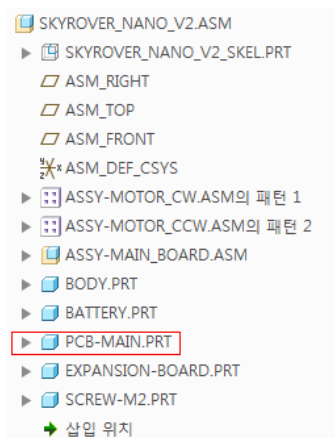


그림 4-42

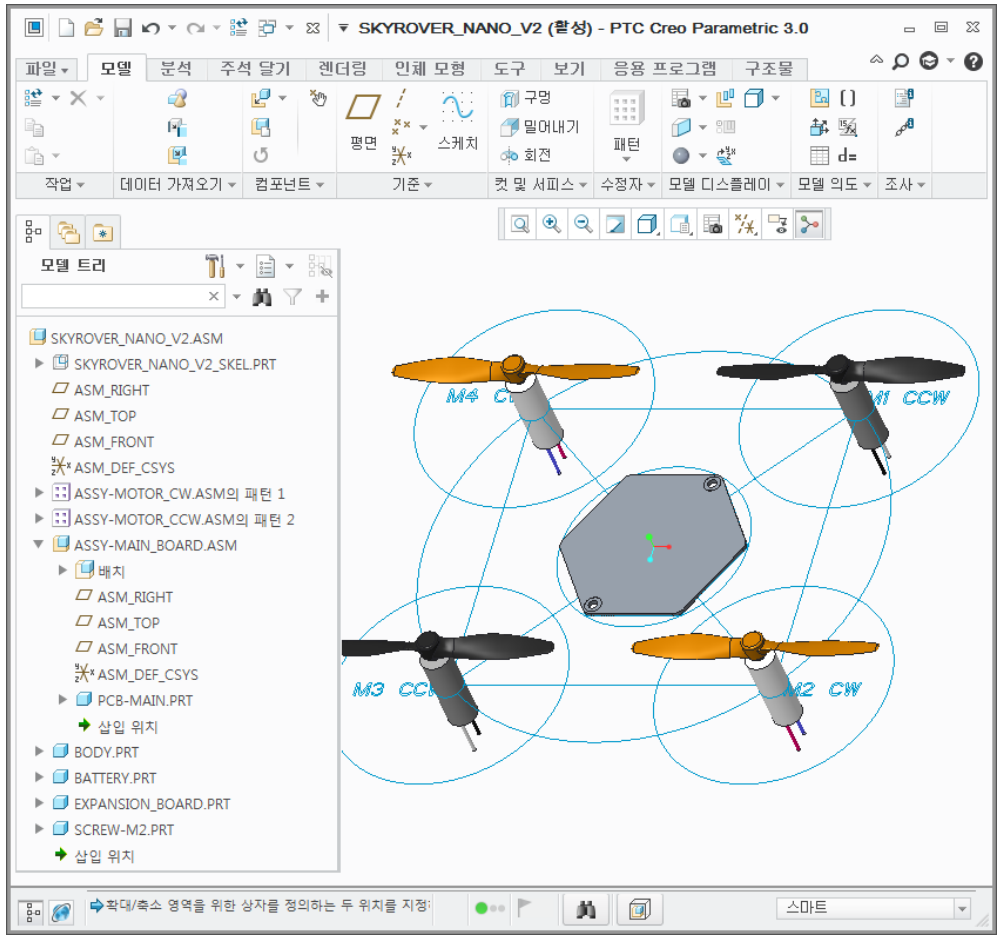
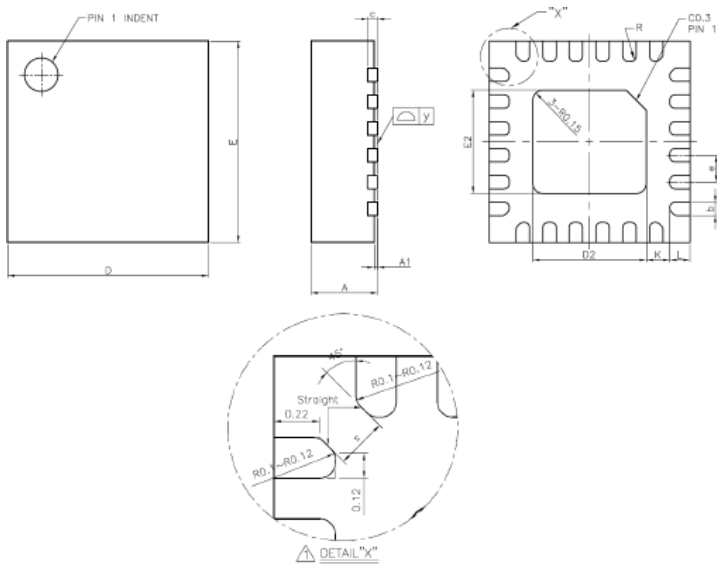


그림 4-43 부품의 조립 위치 변경



SYMBOLS	DESCRIPTION	DIMENSIONS IN MILLIMETERS		
		MIN	NOM	MAX
A	Package thickness	0.95	1.00	1.05
A1	Lead finger (pad) seating height	0.00	0.02	0.05
b	Lead finger (pad) width	0.15	0.20	0.25
c	Lead frame (pad) height	—	0.15 REF	—
D	Package width	2.90	3.00	3.10
D2	Exposed pad width	1.65	1.70	1.75
E	Package length	2.90	3.00	3.10
E2	Exposed pad length	1.49	1.54	1.59
e	Lead finger-finger (pad-pad) pitch	—	0.40	—
f (e-b)	Lead-Head (Pad-Pad) space	0.15	0.20	0.25
K	Lead (pad) to Exposed Pad Space	—	0.35 REF	—
L	Lead (pad) length	0.25	0.30	0.35
R	Lead (pad) corner radius	0.075	REF	—
s	Corner lead (pad) outer radius to corner lead outer radius	—	0.25 REF	—
y		0.00	—	0.075

그림 4-44

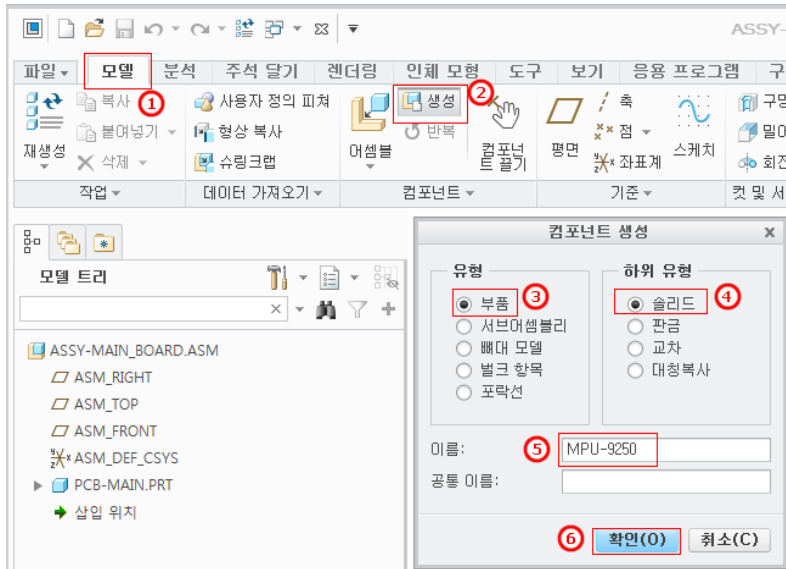


그림 4-45

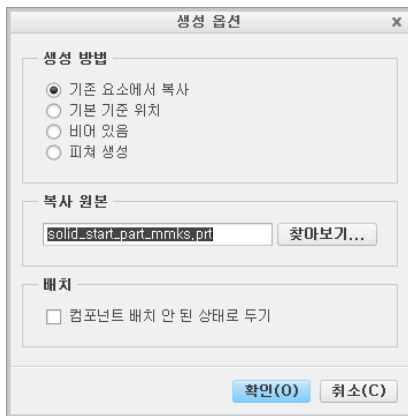


그림 4-46

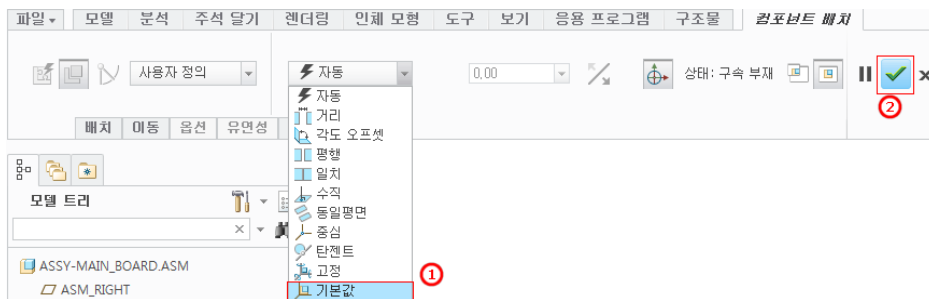


그림 4-47

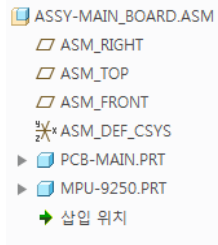


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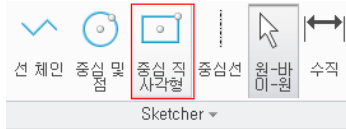


그림 4-49

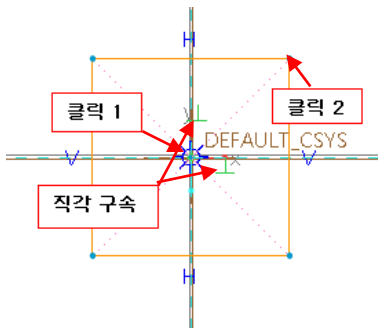


그림 4-50

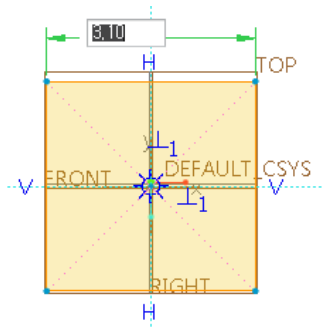


그림 4-51



그림 4-52

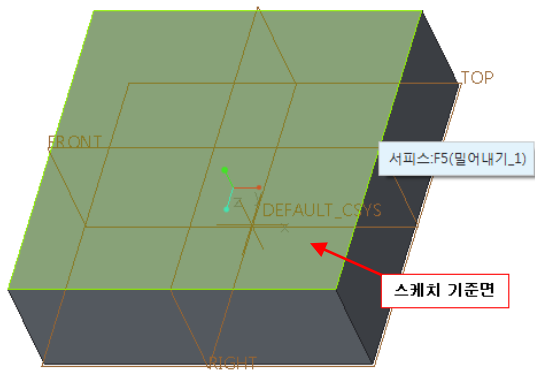


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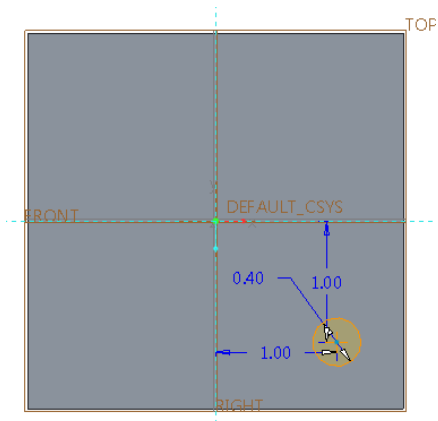


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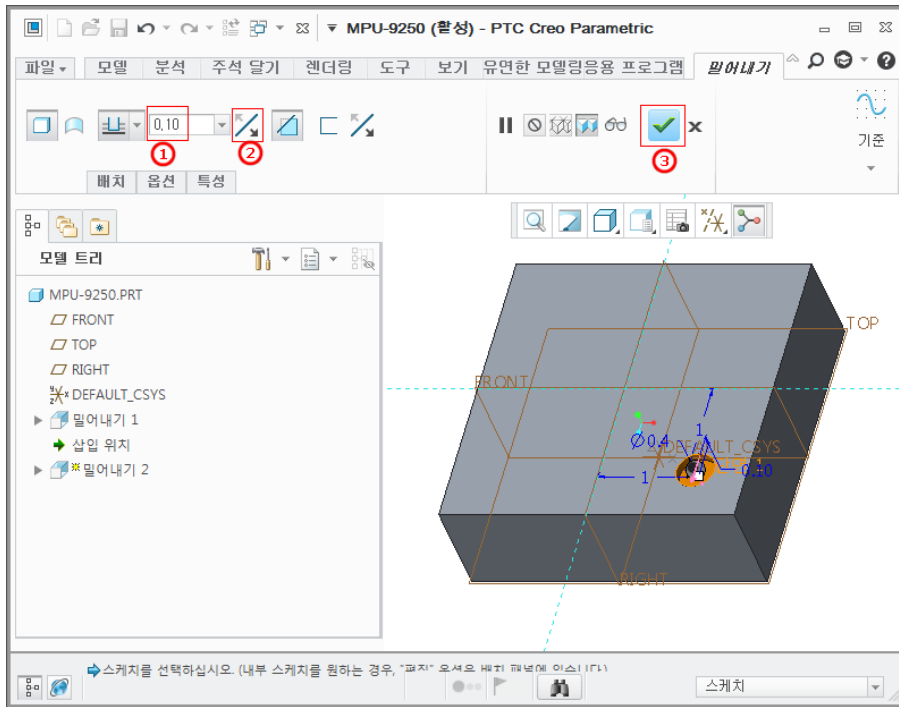


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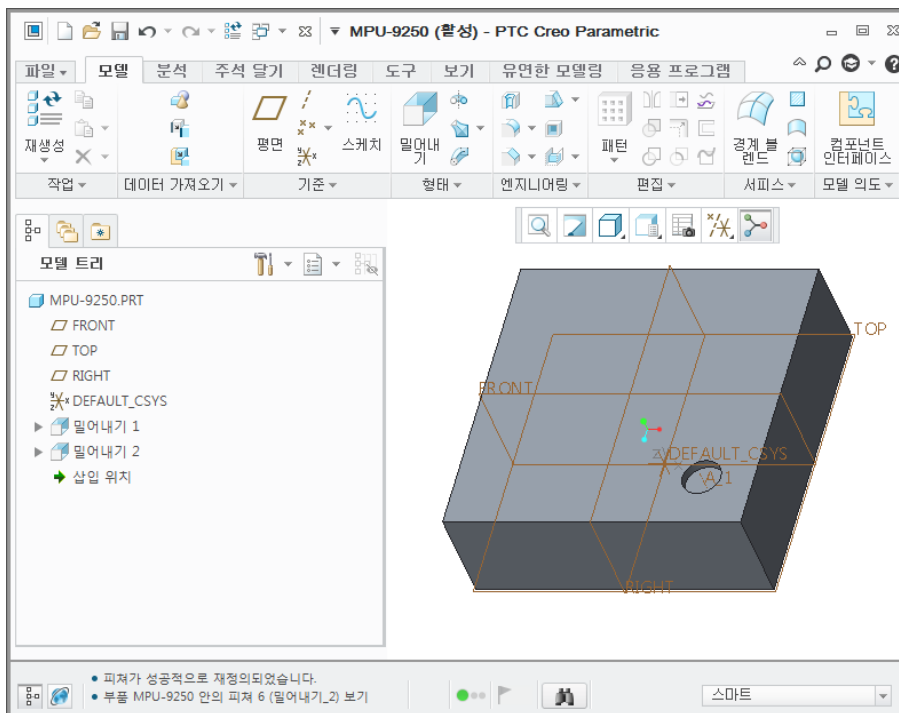


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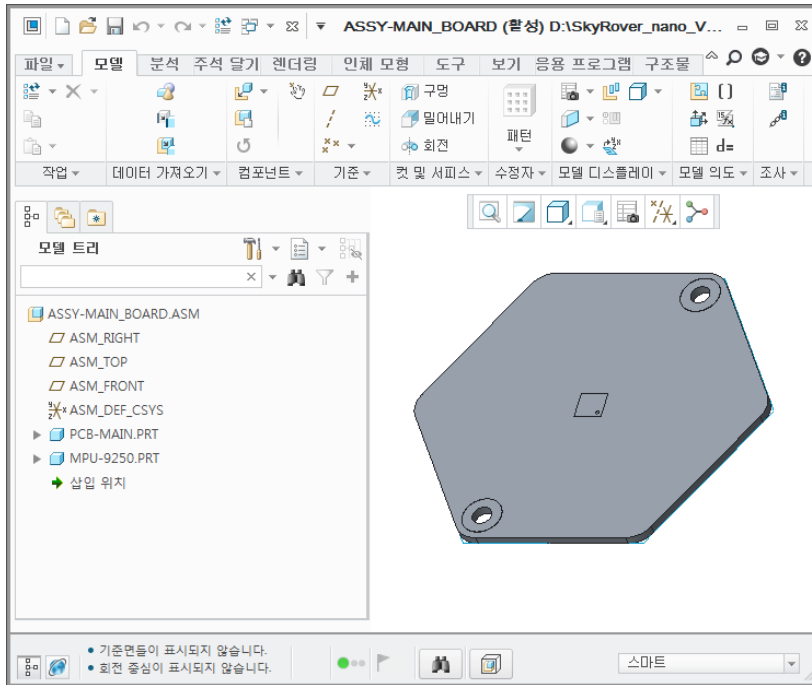


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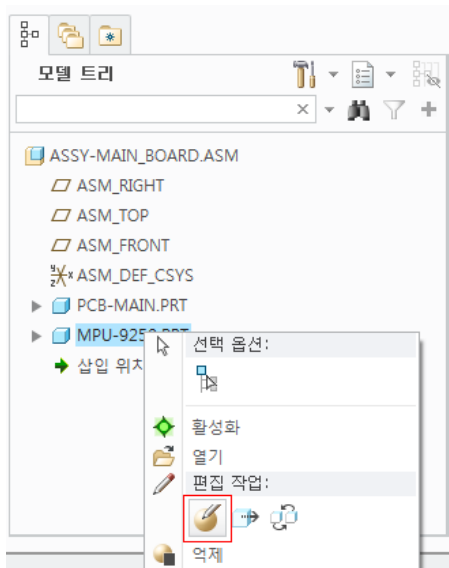


그림 4-58



그림 4-59

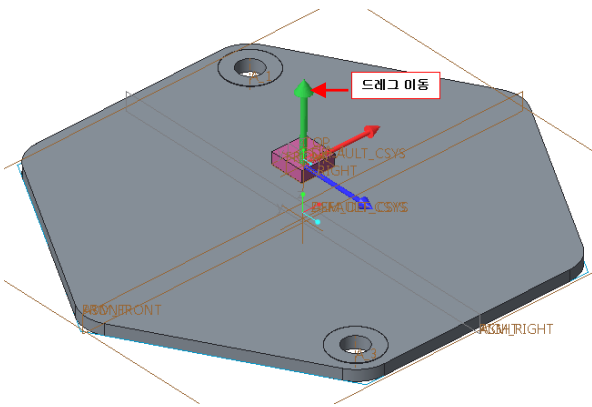


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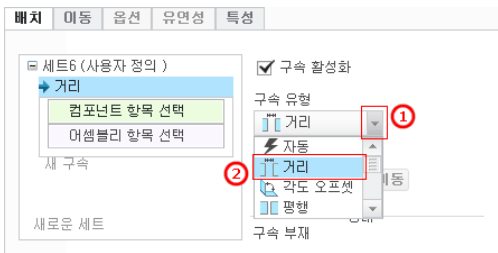


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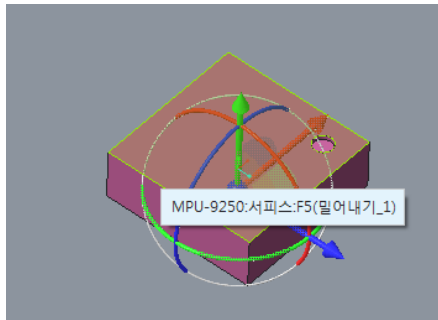


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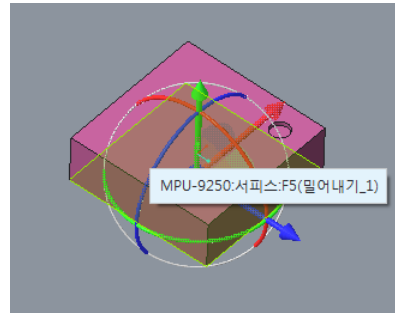


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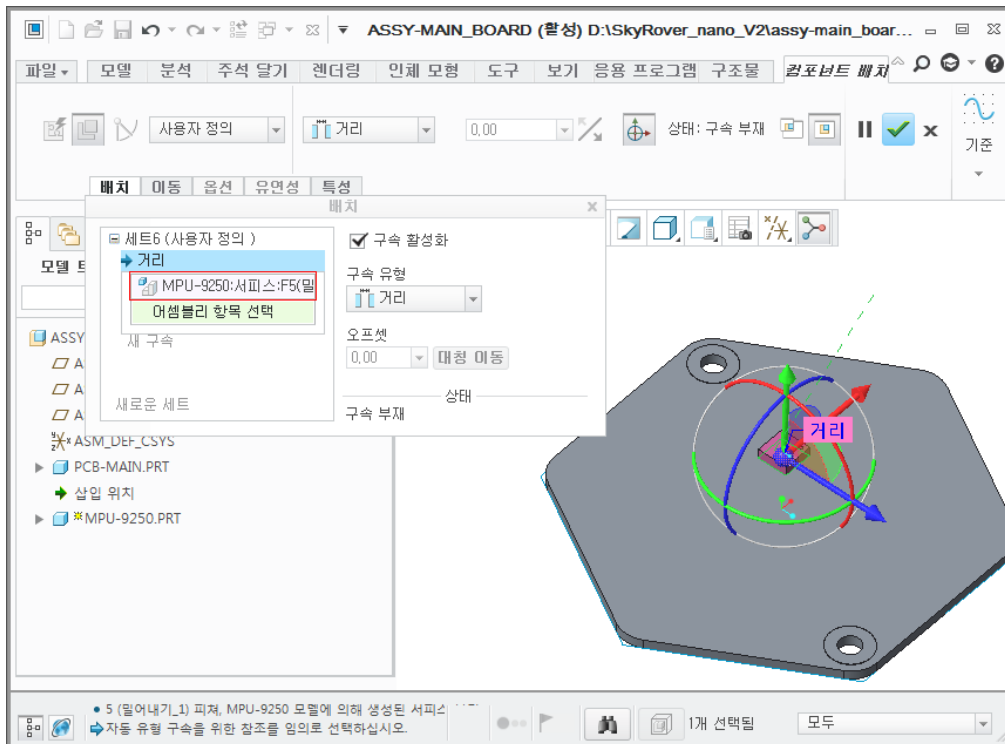


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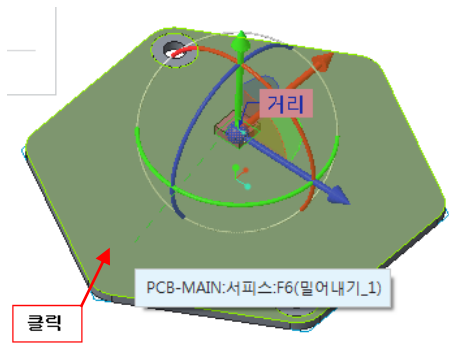


그림 4-65

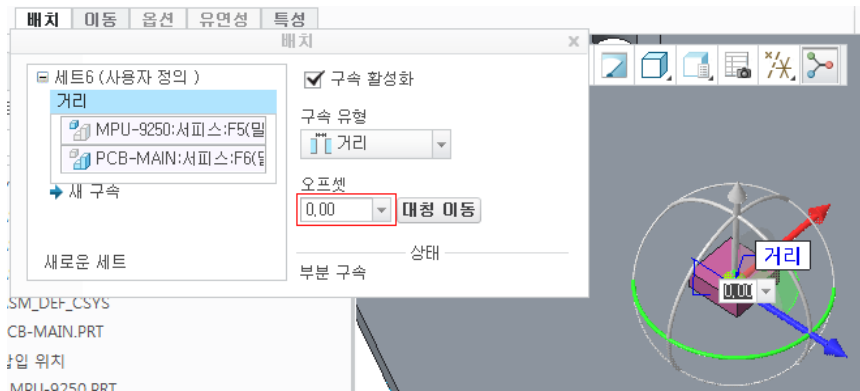


그림 4-66

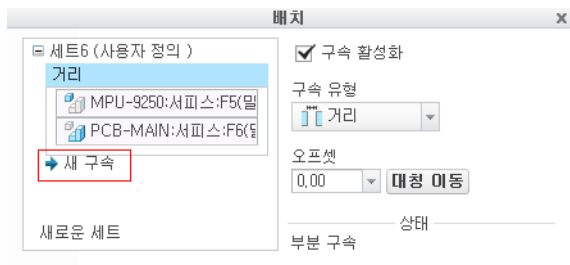


그림 4-67

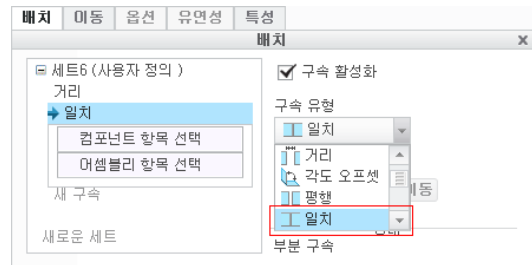


그림 4-68

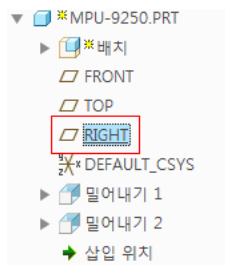


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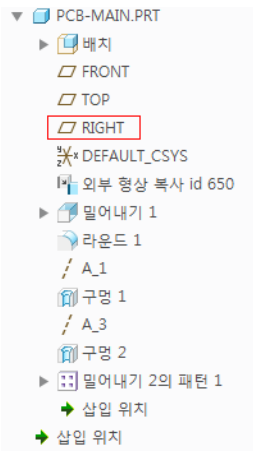


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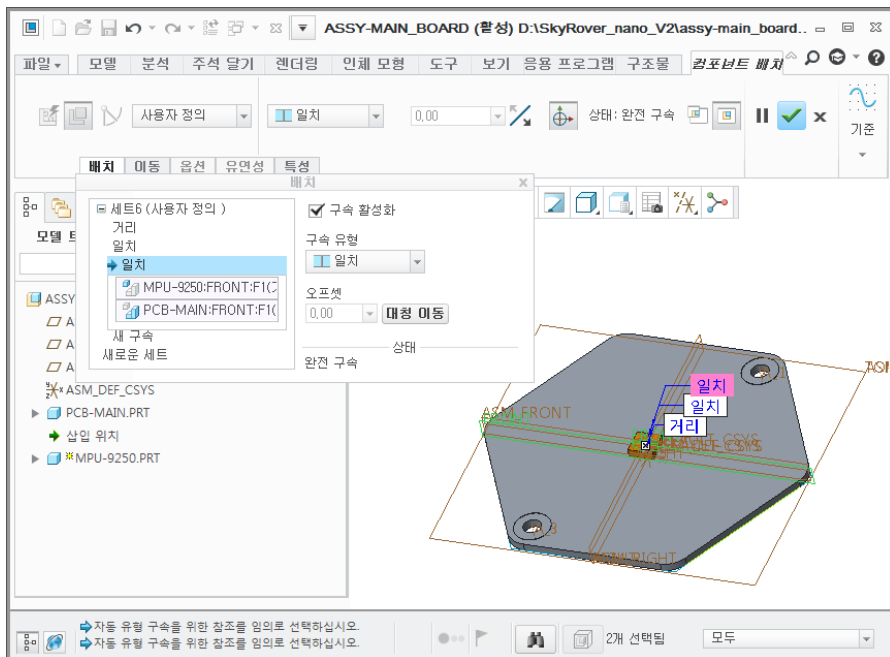


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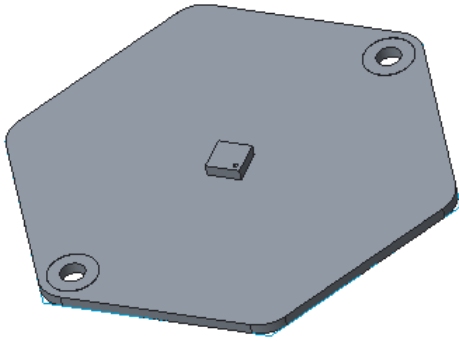
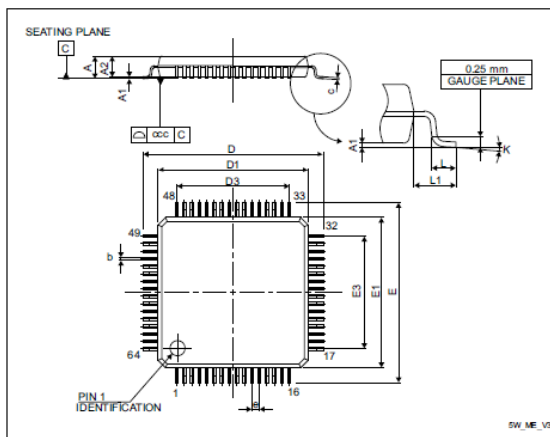


그림 4-72



Symbol	millimeters			inches ⁽¹⁾		
	Min	Typ	Max	Min	Typ	Max
A	-	-	1.600	-	-	0.0630
A1	0.050	-	0.150	0.0020	-	0.0059
A2	1.350	1.400	1.450	0.0531	0.0551	0.0571
b	0.170	0.220	0.270	0.0067	0.0087	0.0106
c	0.090	-	0.200	0.0035	-	0.0079
D	-	12.000	-	-	0.4724	-
D1	-	10.000	-	-	0.3937	-
D3	-	7.500	-	-	0.2953	-
E	-	12.000	-	-	0.4724	-
E1	-	10.000	-	-	0.3937	-

그림 4-73

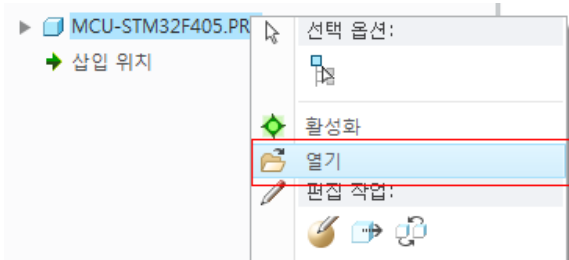


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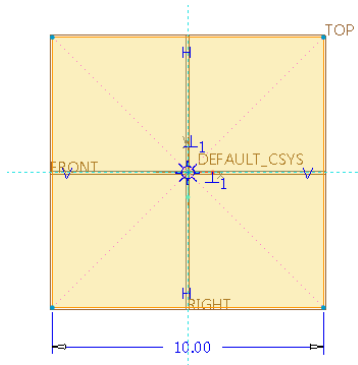


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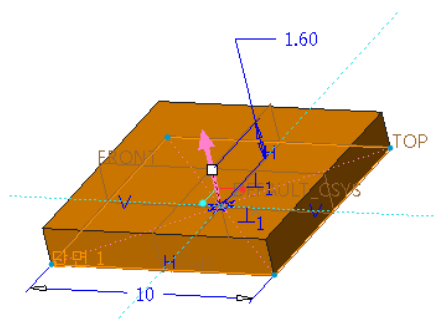


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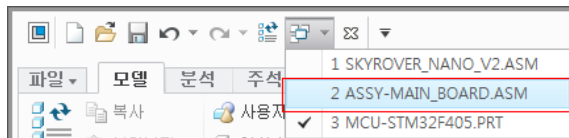


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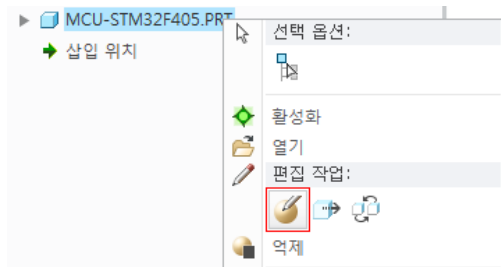


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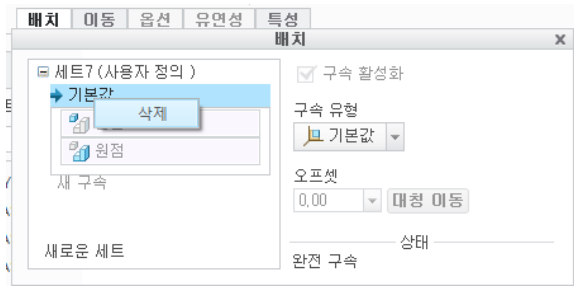


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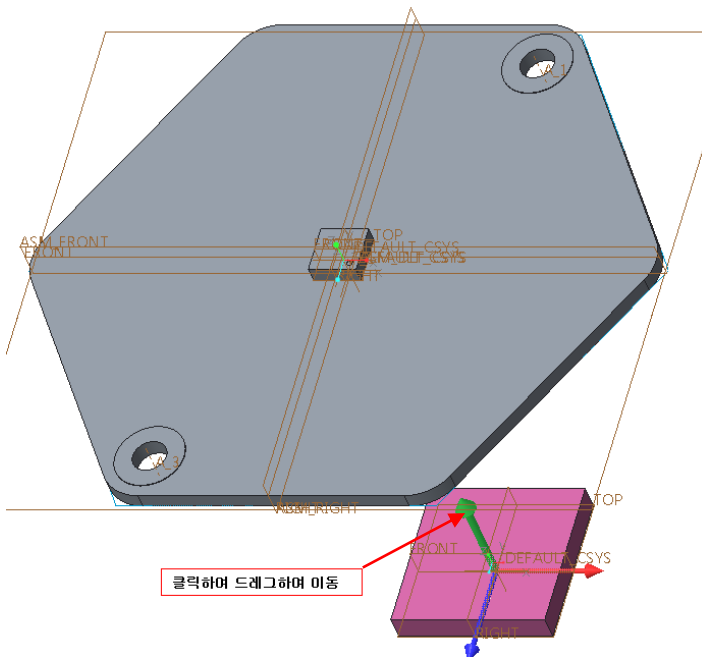


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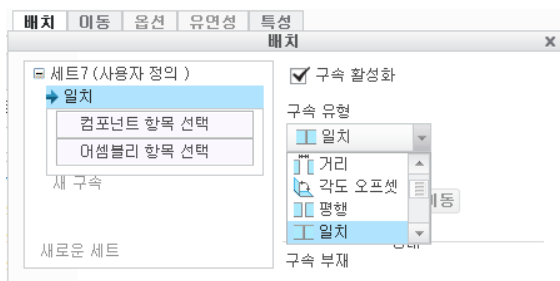


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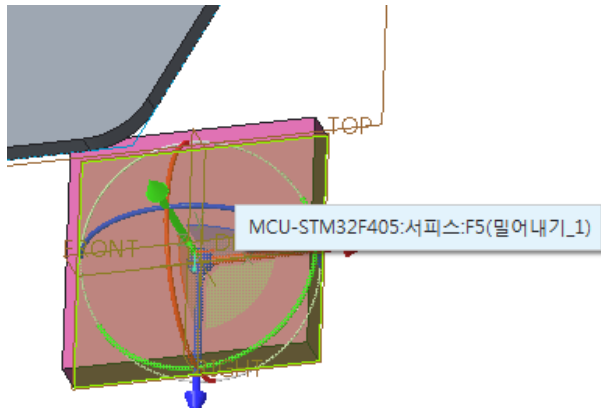


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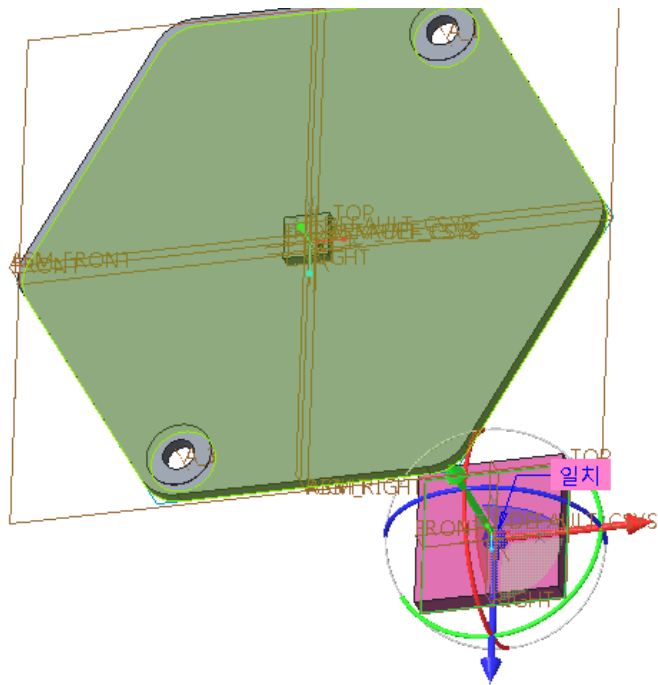


그림 4-83



그림 4-84

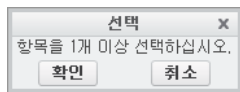


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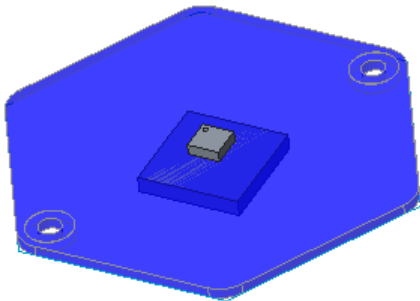
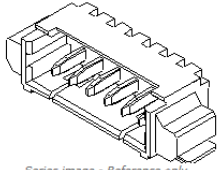


그림 4-86

Home: PCB Headers >

Part Number: 53261-0271

1.25mm Pitch PicoBlade™ Header, Surface Mount, Right Angle, 2 Circuits



Series image - Reference only

Status: Active
Series: [53261](#)
Category: PCB Headers
Overview: [PicoBlade™ Connector System](#)

Go to [Part Detail](#) ▼

Mates With Part(s):

[51021](#) PicoBlade™ Wire-to-Wire and Wire-to-Board Housing

Specifications & Other Documents:

- [Part Details \(PDF\)](#)
- [Product Specification PS-51021-024.pdf](#)
- [Packaging Specification SPK-53261-002.pdf](#)

Sales Drawings, 3D Models, and Brochures

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Application Tooling

[FAQ](#)

Tooling specifications and manuals are found by selecting the products below.

Crimp Height Specifications are then contained in the Application Tooling Specification document.

Previously Available Application Tooling

[Check our list of old tooling that used to be available for this part](#)

그림 4-87

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- [3D CAD Models - IGES](#)
- [3D CAD Models - STEP](#)

그림 4-88



그림 4-89

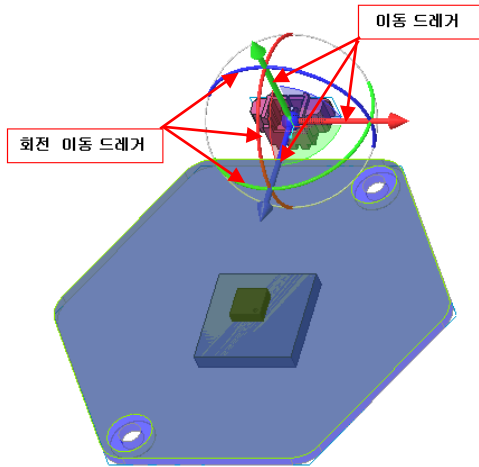


그림 4-90

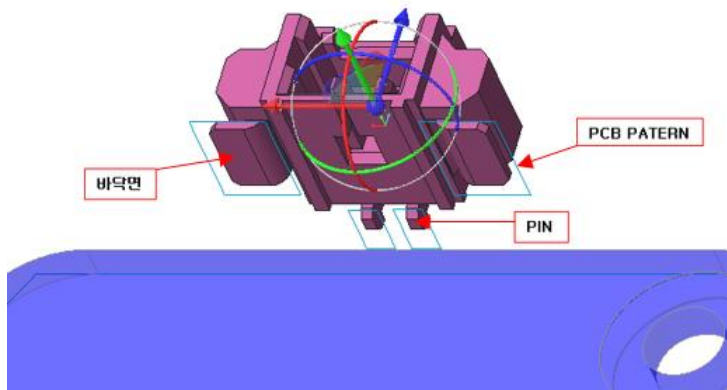


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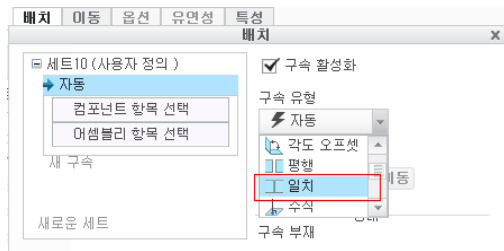


그림 4-92

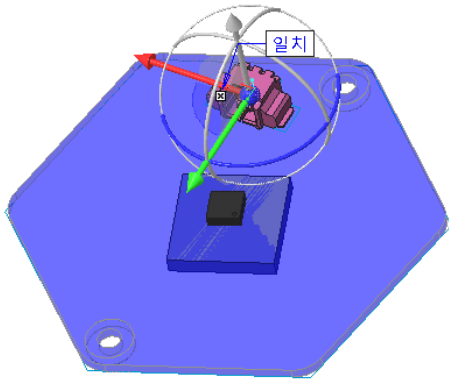


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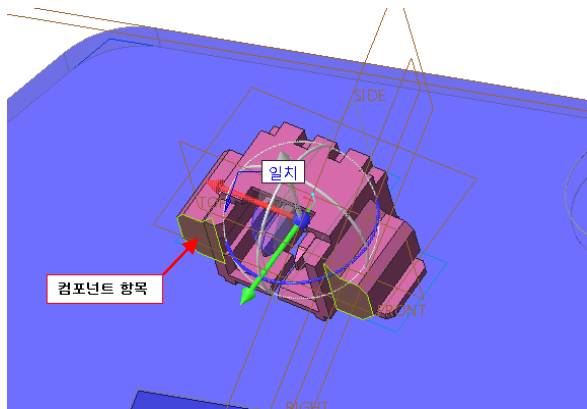


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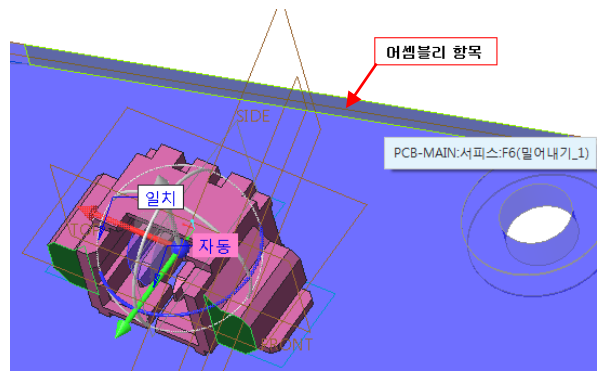


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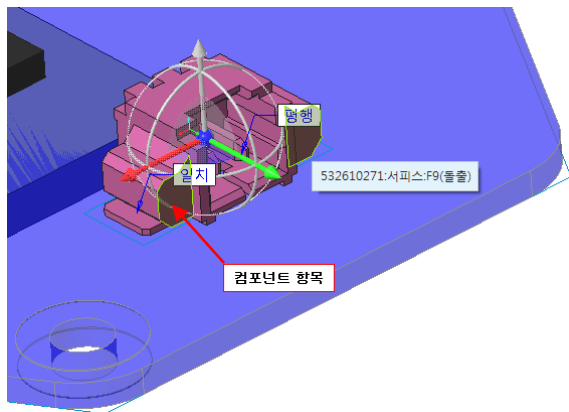


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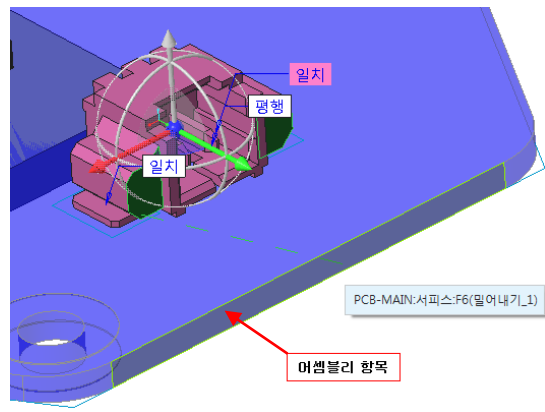


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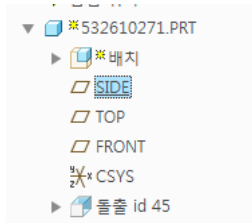


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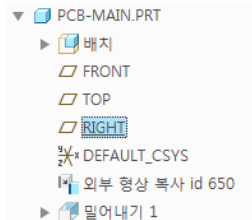


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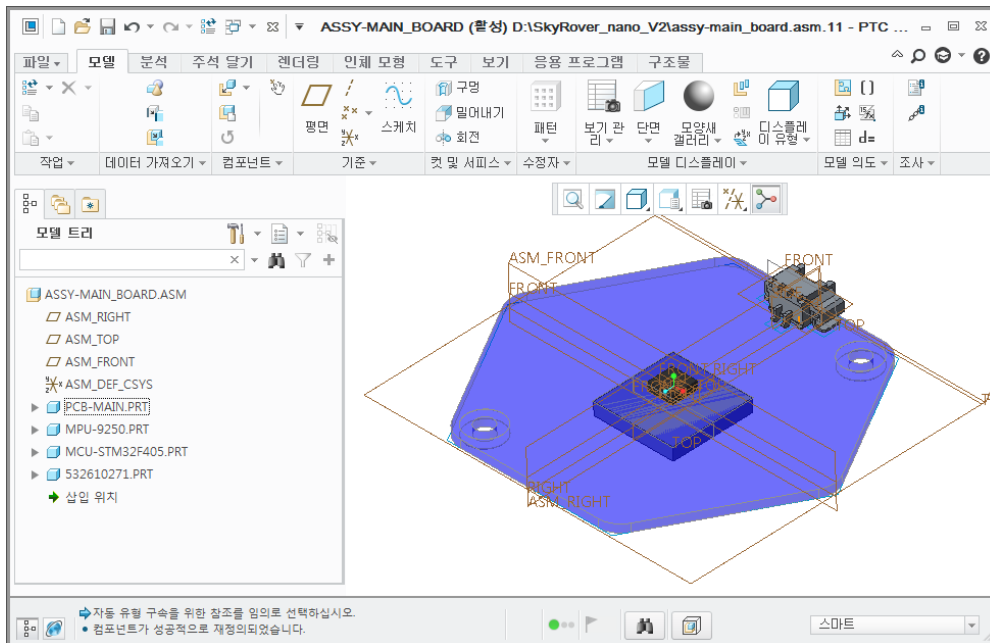


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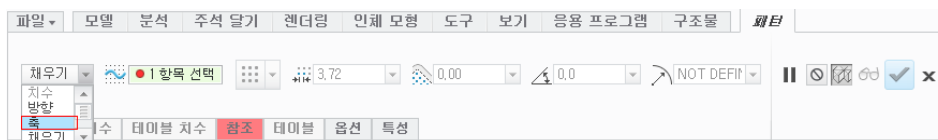


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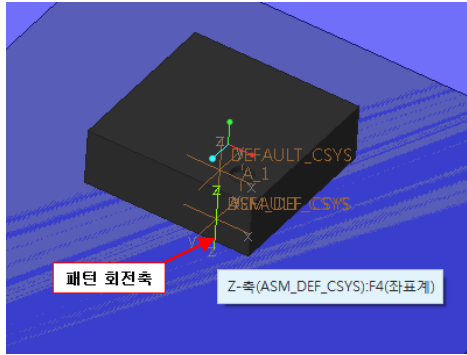


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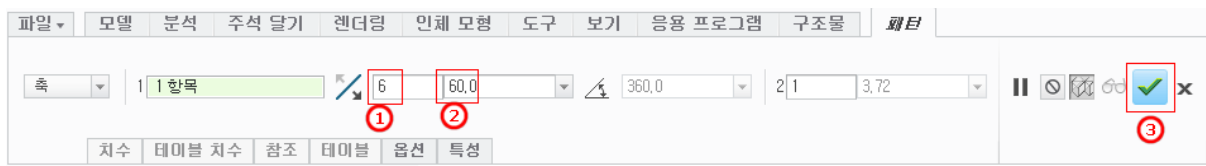


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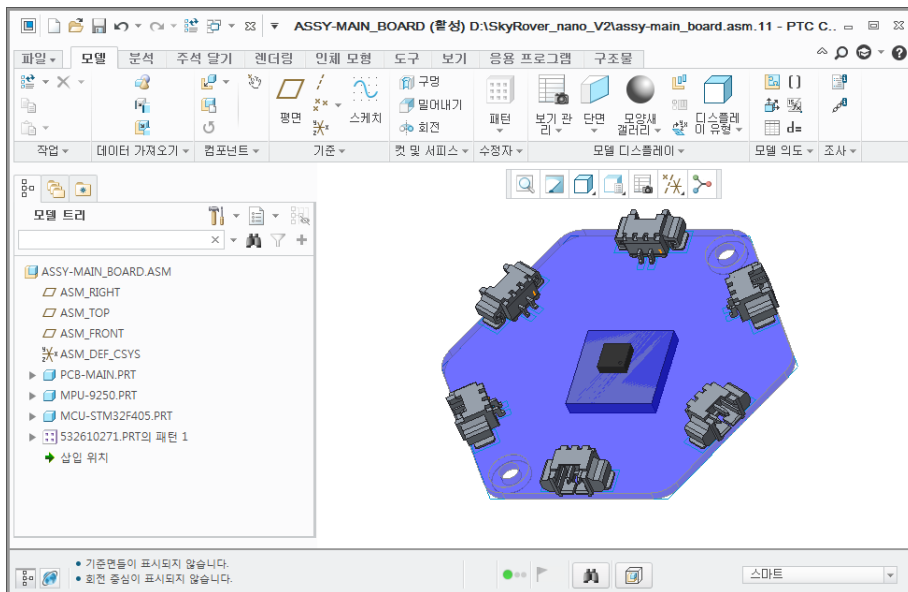


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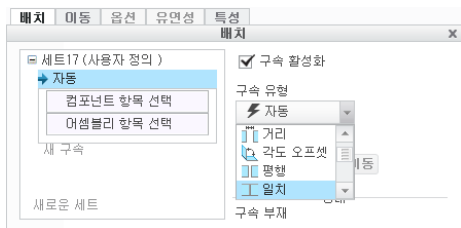


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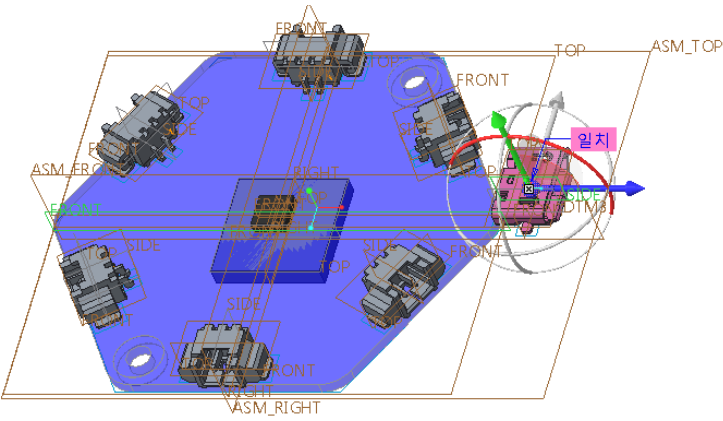


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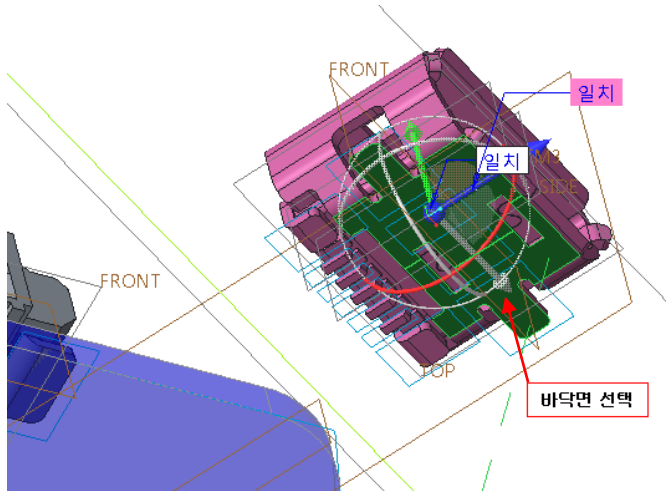


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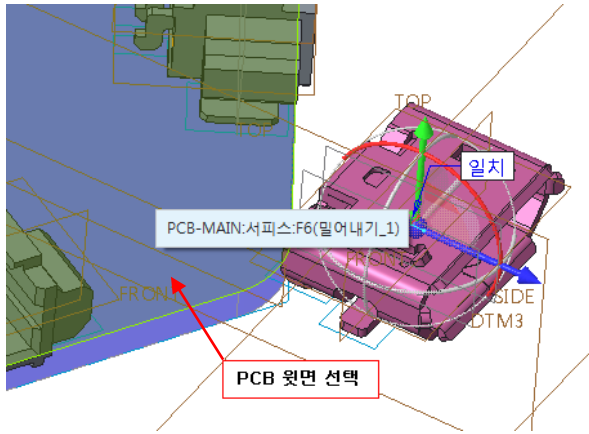


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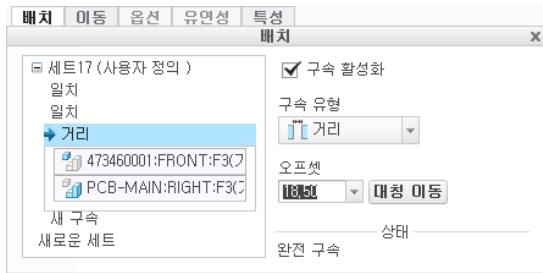


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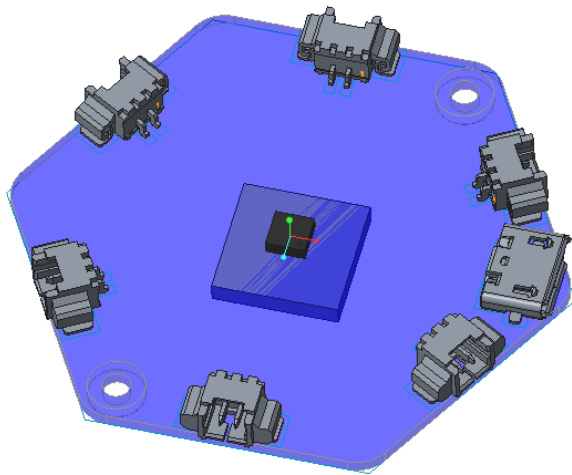


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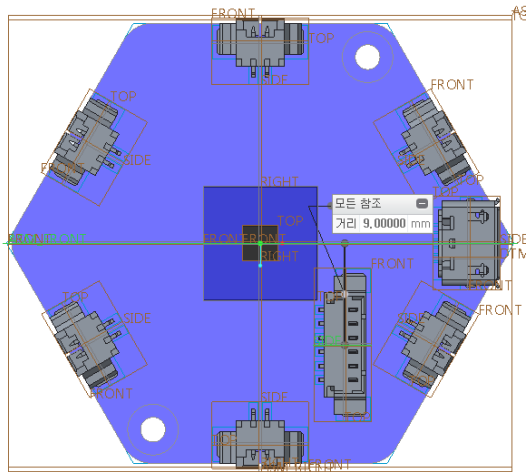


그림 4-111

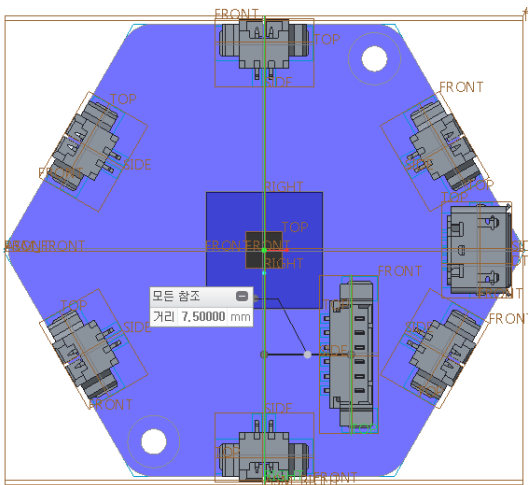


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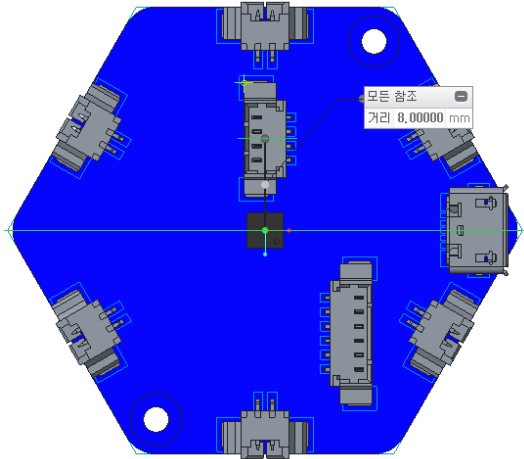


그림 4-113

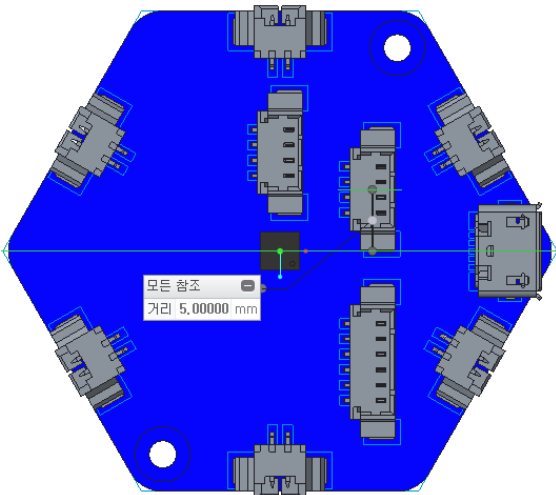


그림 4-114

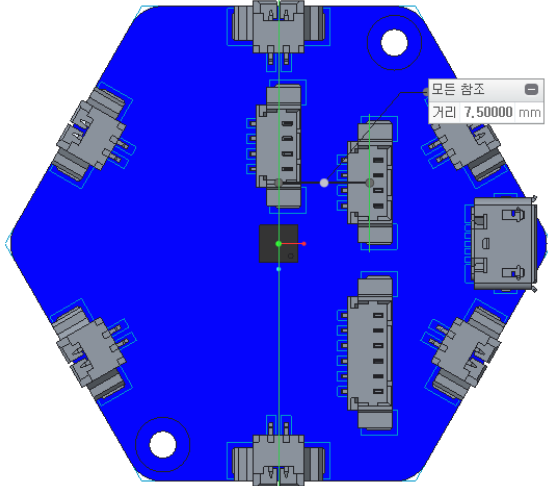


그림 4-115

ZONE 영역구분	SEQ. NO. 순서	REV. P/NO. 개정 번호	ECO NO. 시정보정필요시 번호	DESCRIPTION 설명	DATE 날짜	PAGE

SPECIFICATION

- * Current Rating: 1 A
- * Withstanding Voltage: 500 VAC (1 min.)
- * Insulation Resistance: 1000 Megohms MIN.
- * Contact Resistance: 30 Milliohms MAX.
- * Operating Temperature: -40°C to +105°C

ORDER INFORMATION

SMDBB127 - D - XX - G

Series: SMDBB127, Style: D, No. of pos: XX, Plating: G

Plating: T : TIN, G : GOLD

Style: D : DUAL, S : SINGLE

MATERIAL

- * Contact: Phosphor Bronze
- * Insulator: PA46
- * Plating: All Gold

Recommended P.C. Board SMD Layout

VERSION NO.	MODEL	DESCRIPTION		REMARKS
DRAWN	DESIGNED	CHECKED	APPROVED	

지시하지 않은 일반공차	각 ANGLE	TITLE	REVISION
치수 mm	3rd	HEADER SOCKET 1.27mm PITCH	REV.
0. ±0.2	SCALE	DUAL SMD TYPE	A
0.1 ±0.1			
0.05 ±0.05			
0.01 ±0.01			
0.0005 ±0.0005	크기 SIZE	DWG. NO.	시트 SHEET
	A4	SMDBB127-D SERIES	1/1

그림 4-116

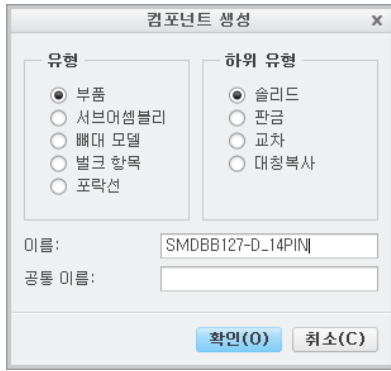


그림 4-117

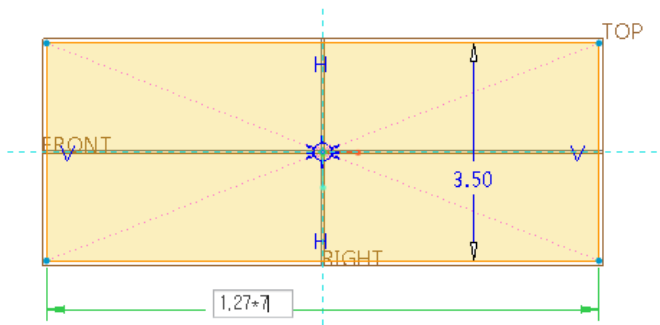


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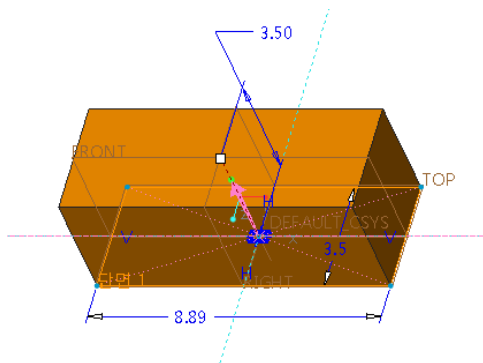


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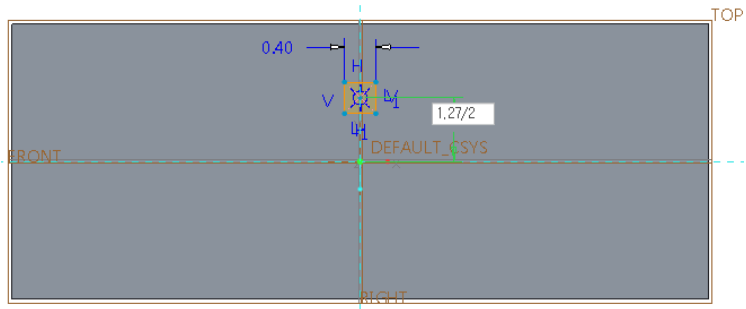


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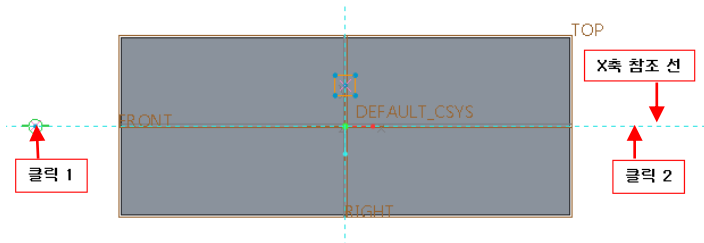


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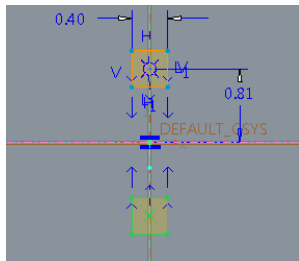


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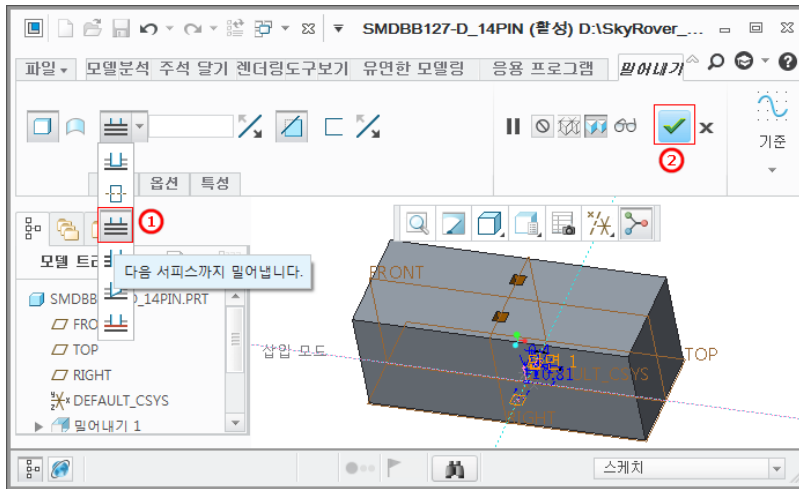


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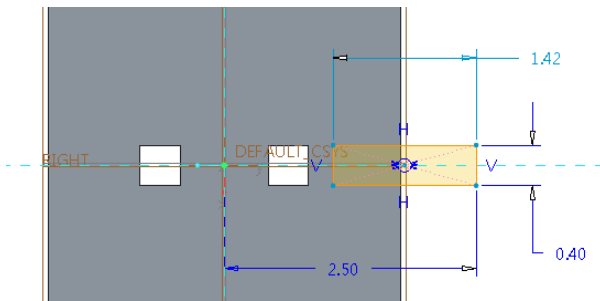


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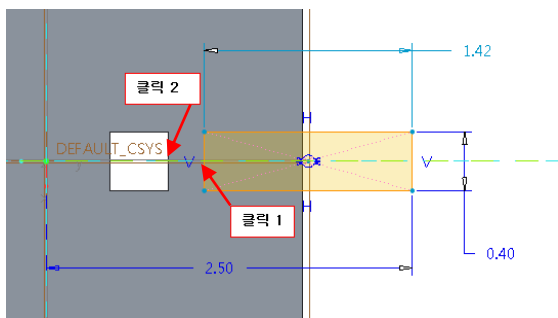


그림 4-125

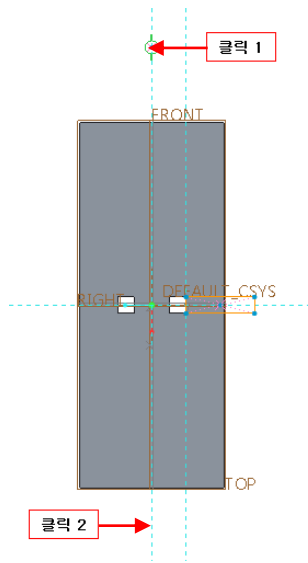


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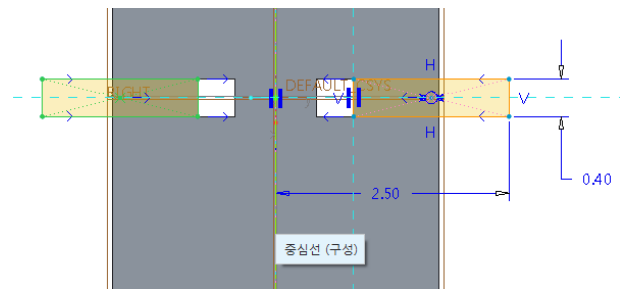


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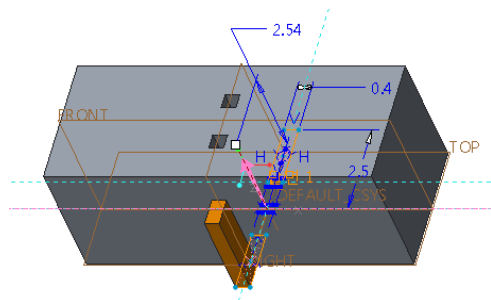


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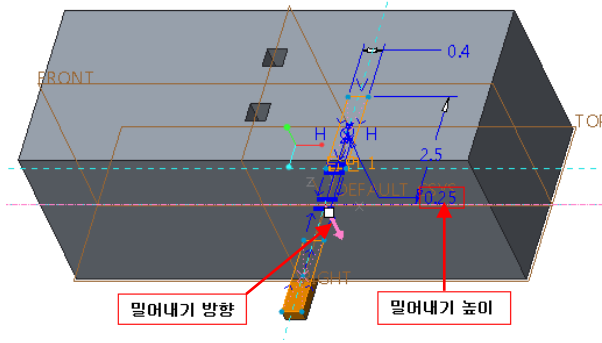


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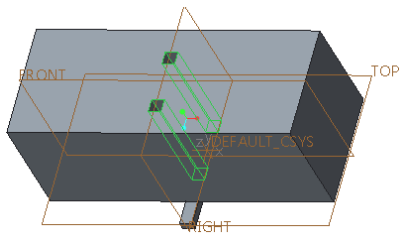


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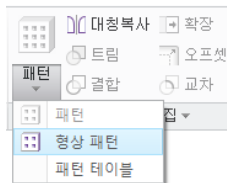


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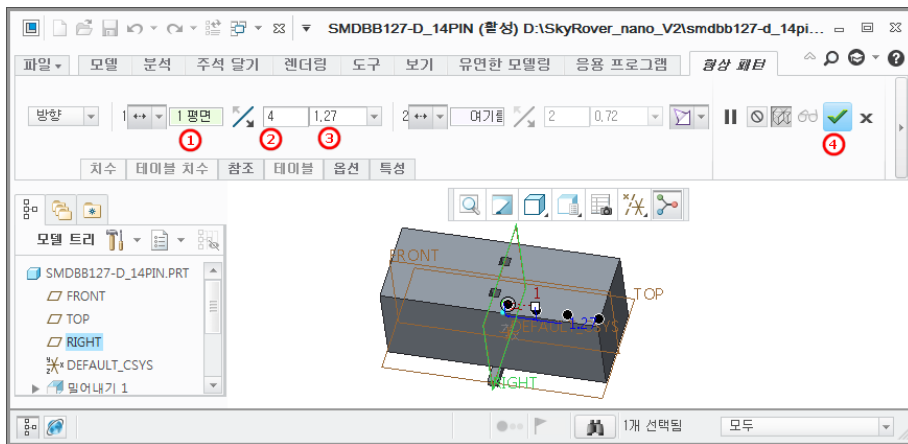


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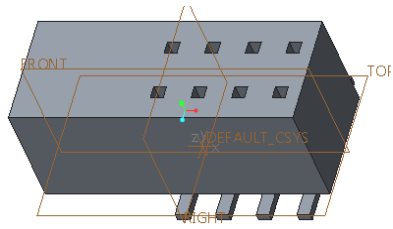


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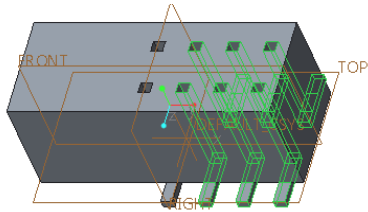


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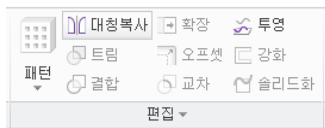


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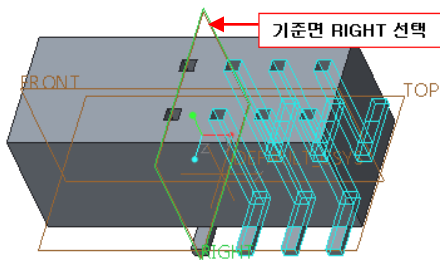


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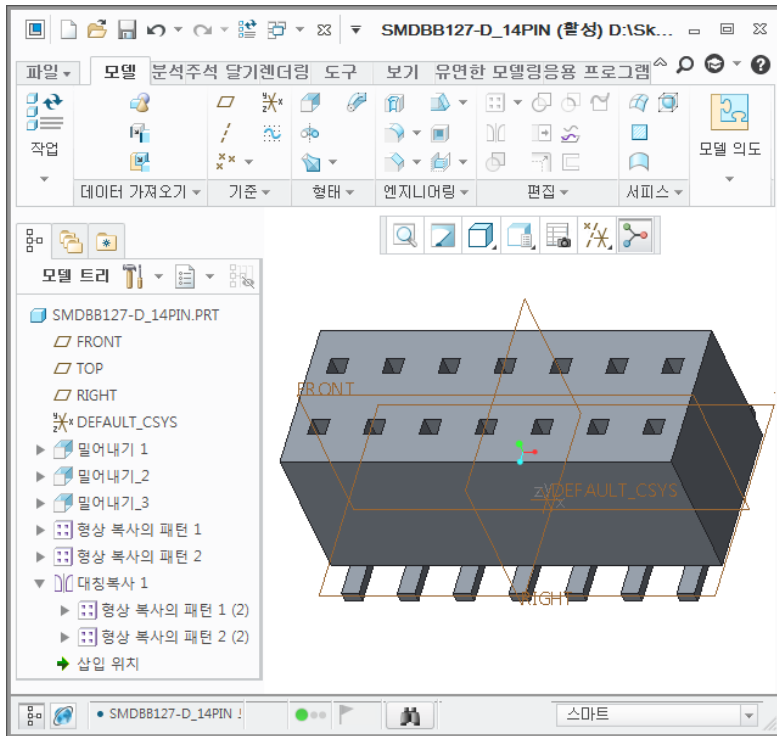


그림 4-137



그림 4-138

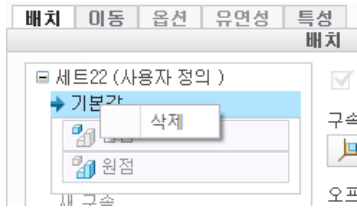


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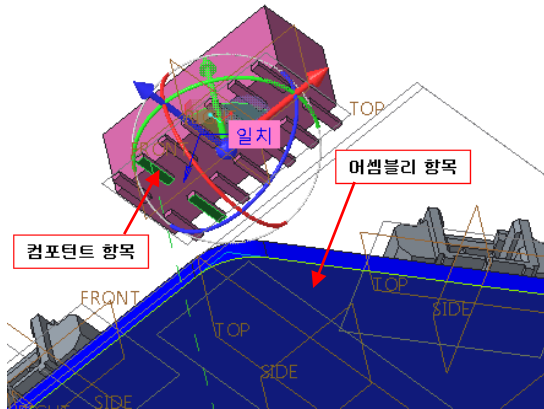


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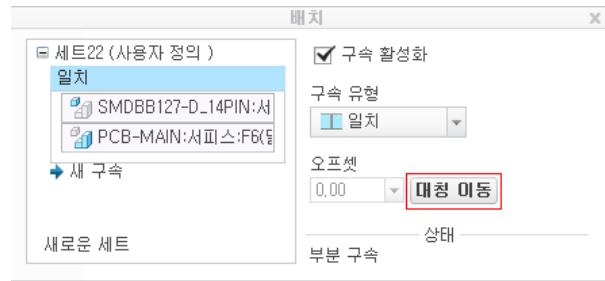


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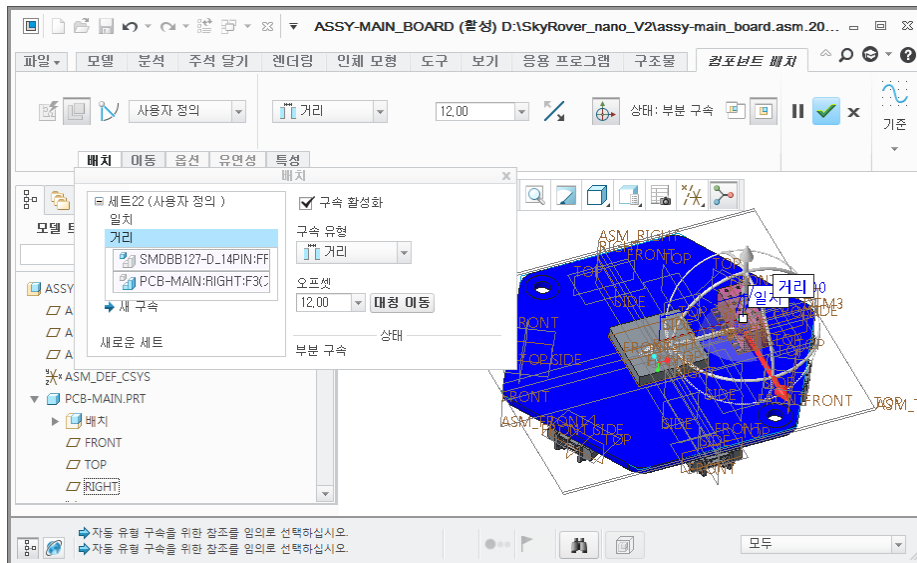


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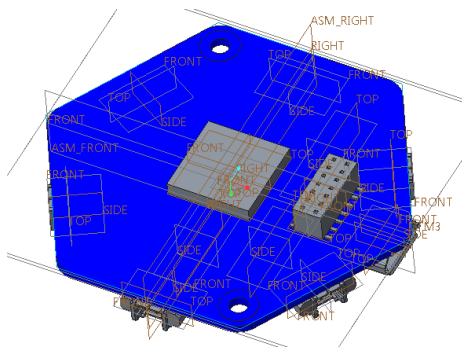


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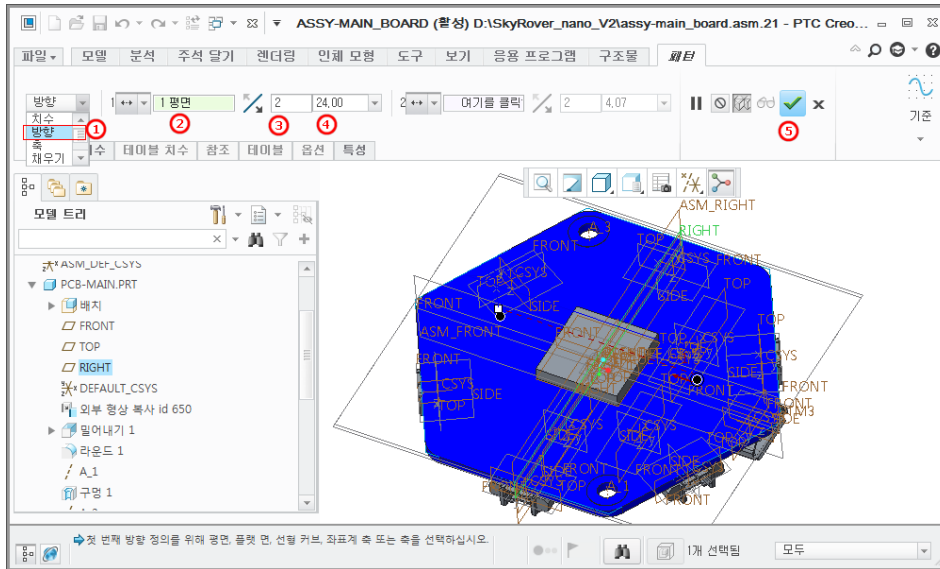


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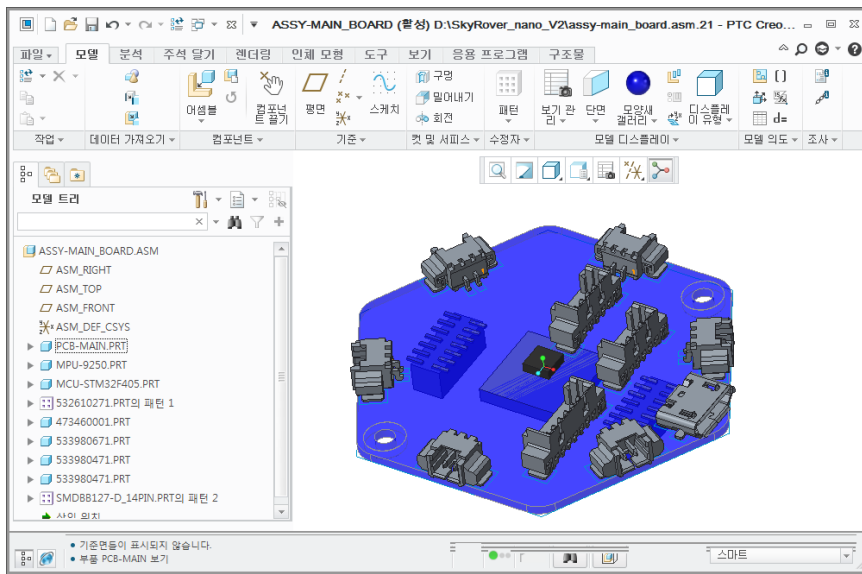


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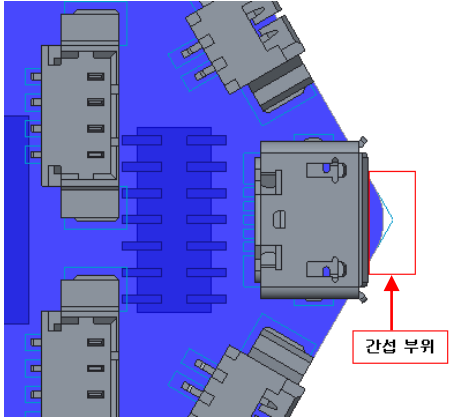


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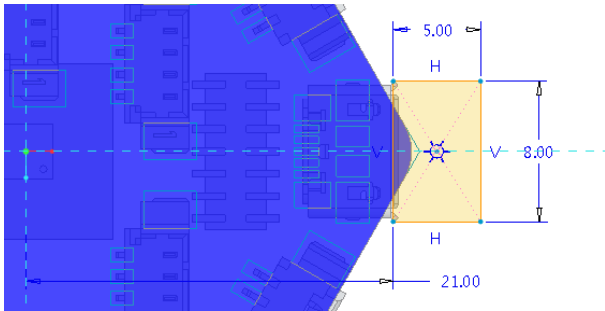


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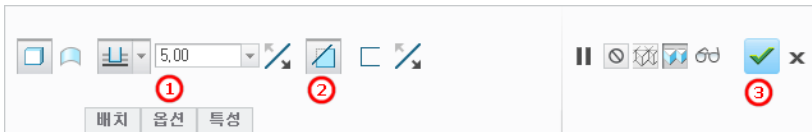


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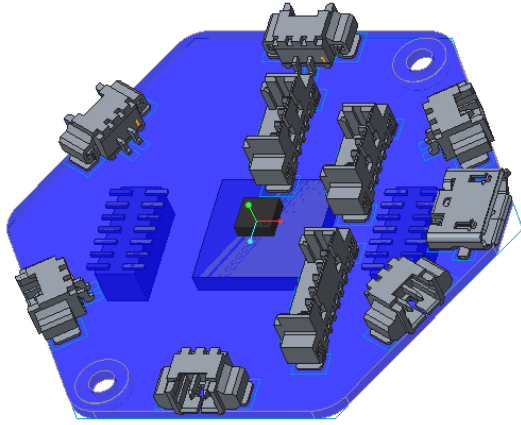


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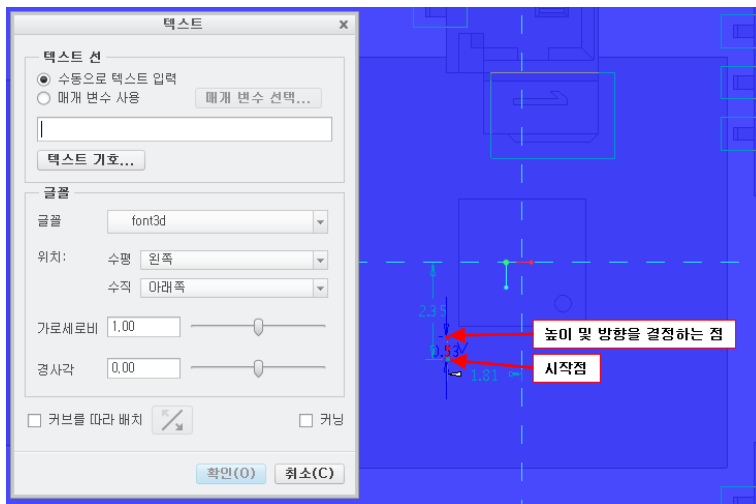


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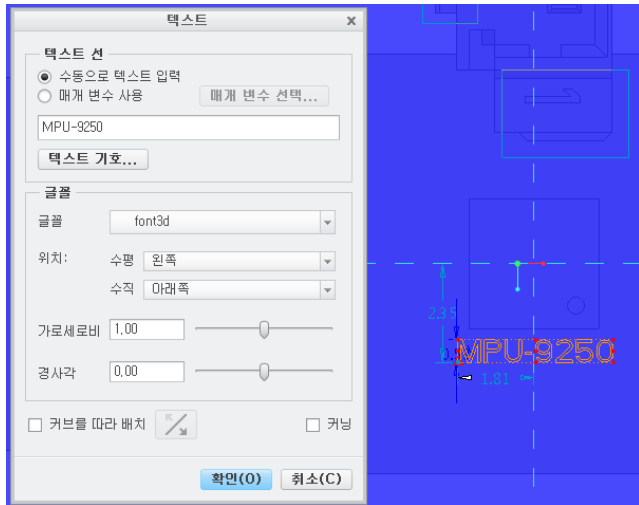


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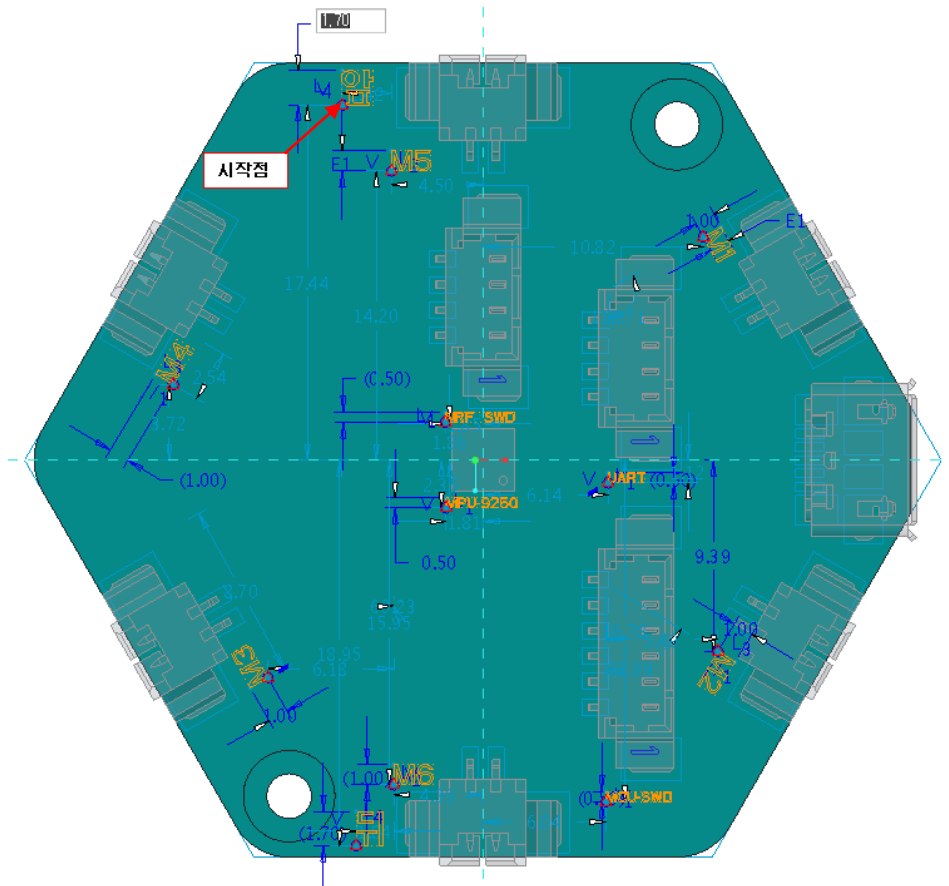


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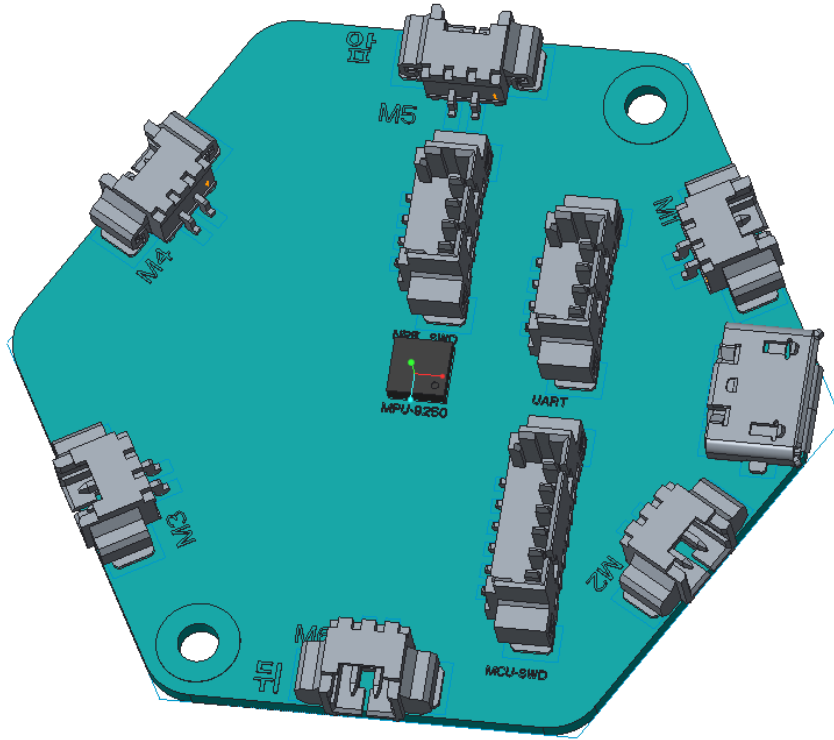


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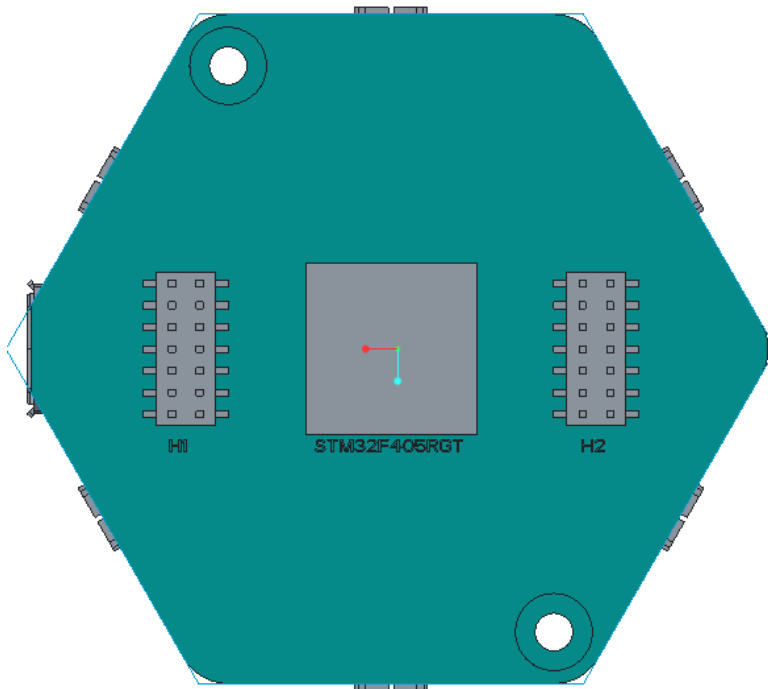


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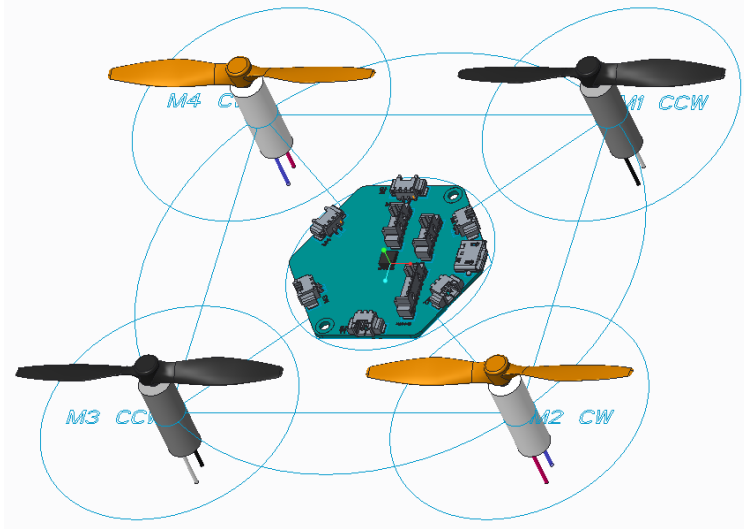


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그림 4-156

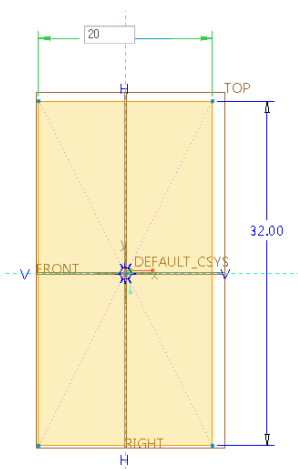


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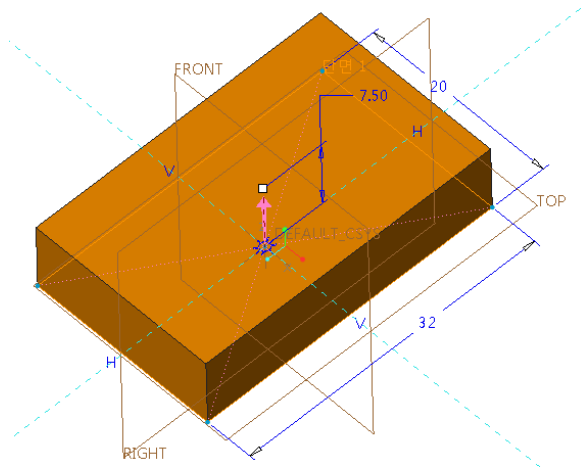


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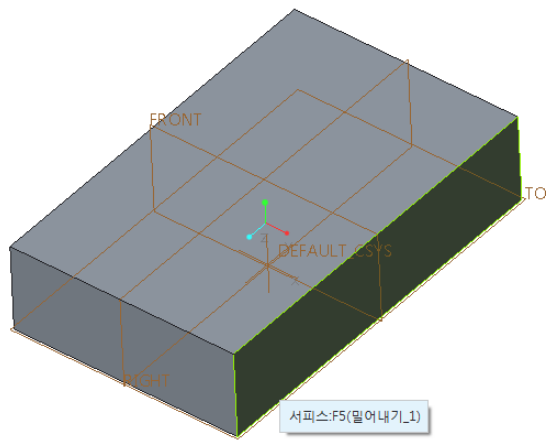


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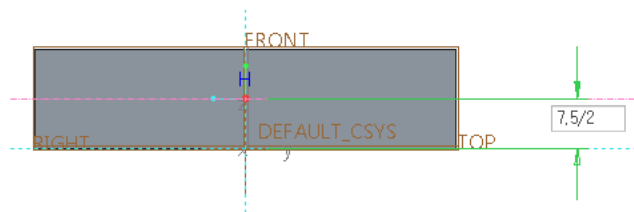


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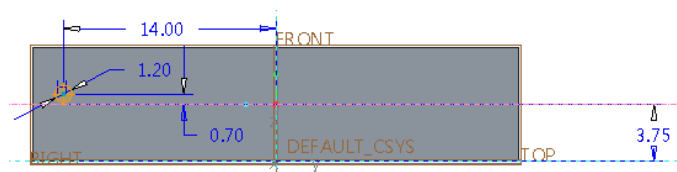


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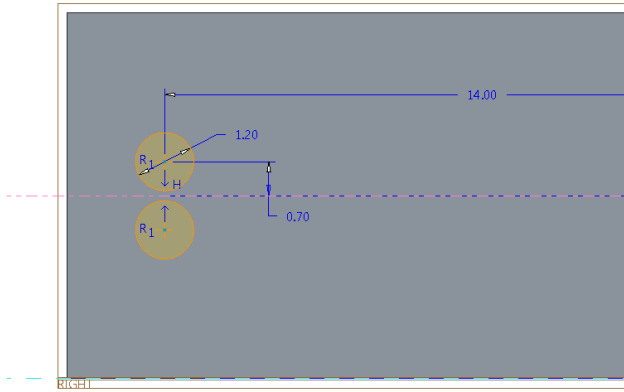


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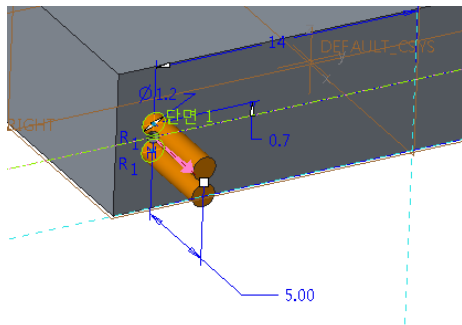


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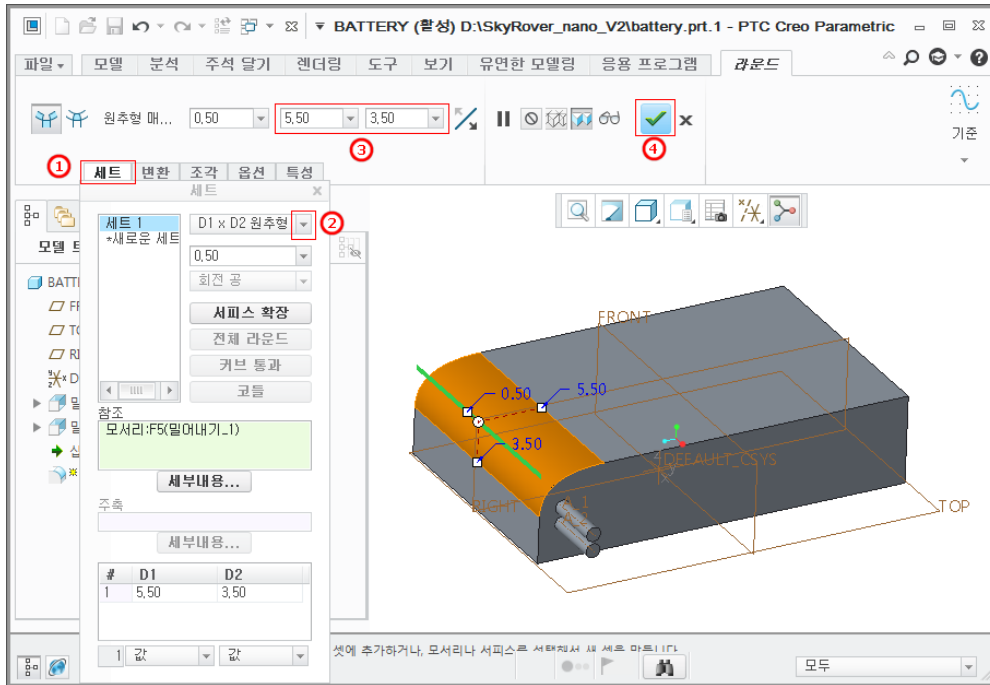


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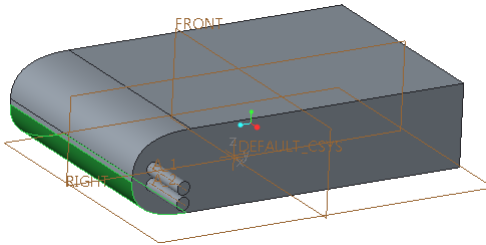


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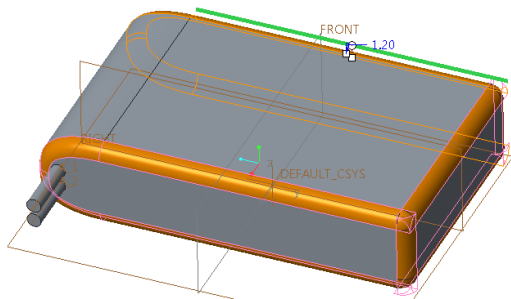


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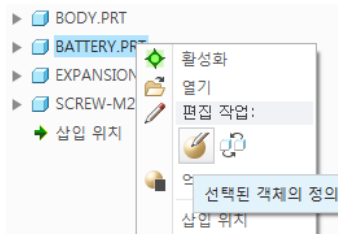


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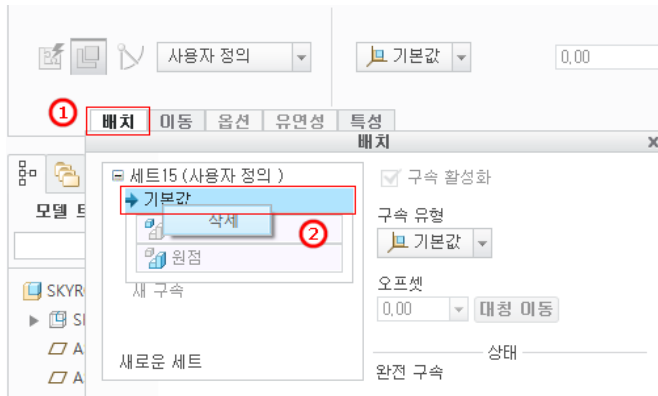


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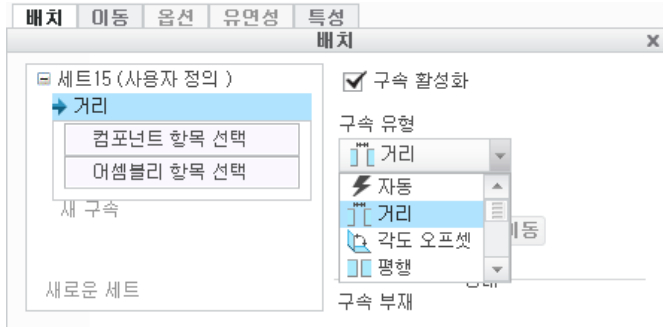


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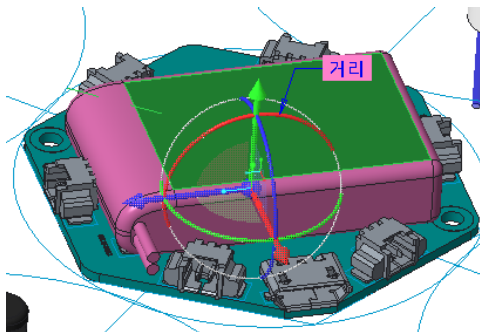


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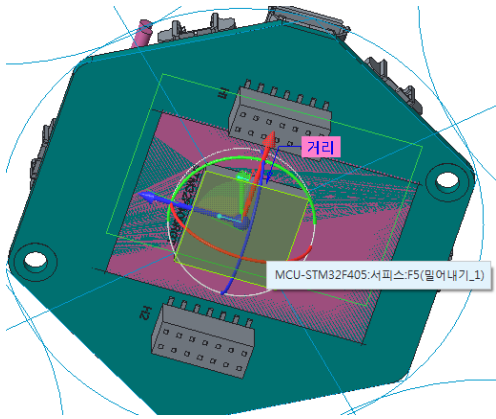


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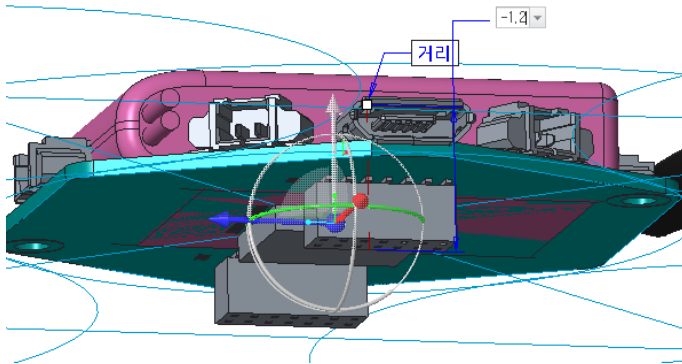


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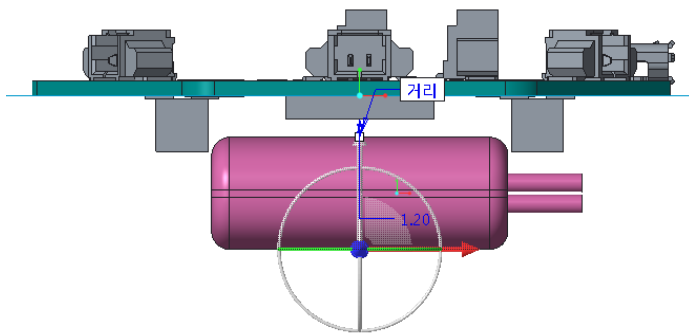


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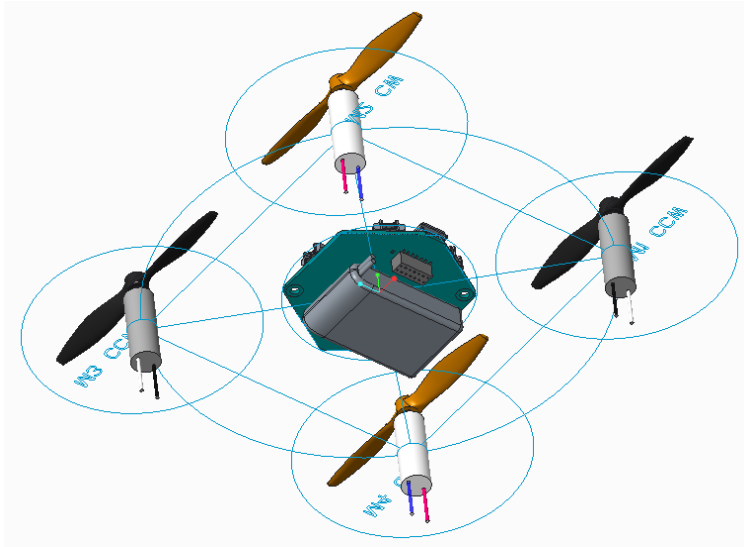


그림 4-174

5장. 확장보드와 몸체 설계

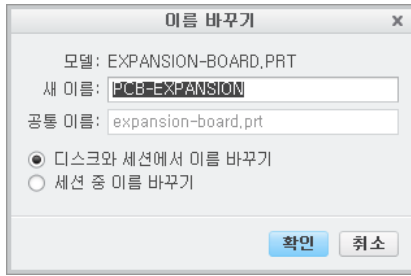


그림 5-175



그림 5-176

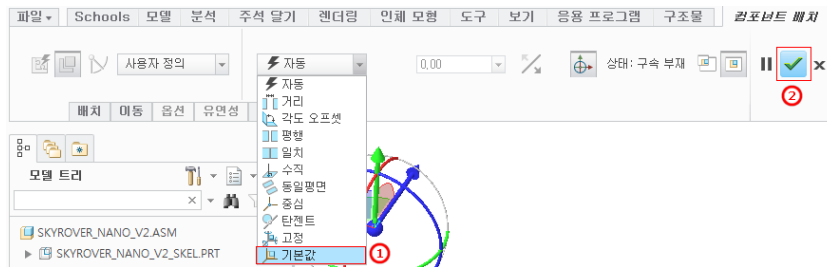


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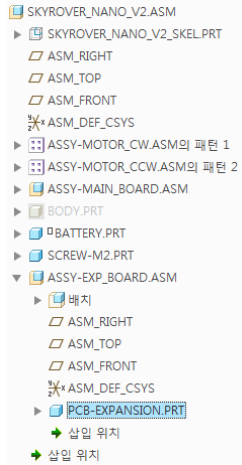


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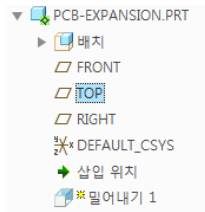


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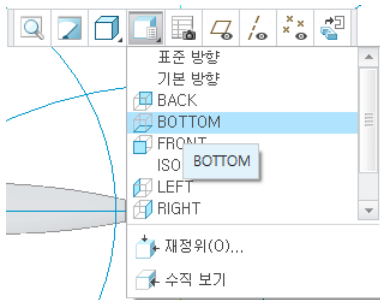


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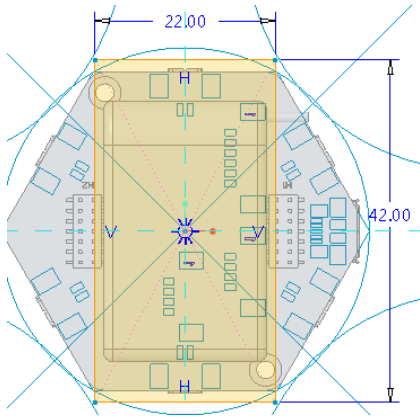


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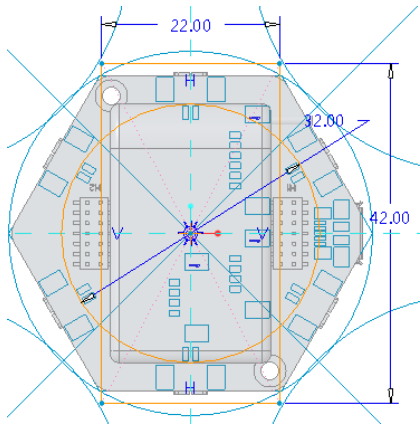


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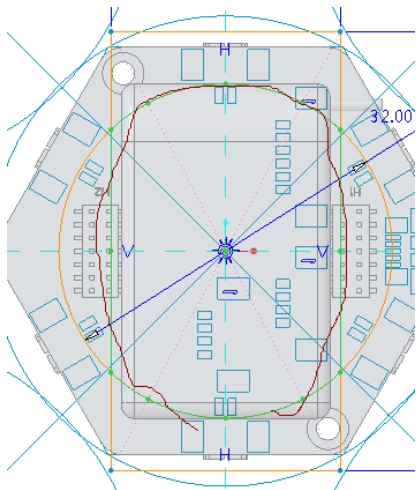


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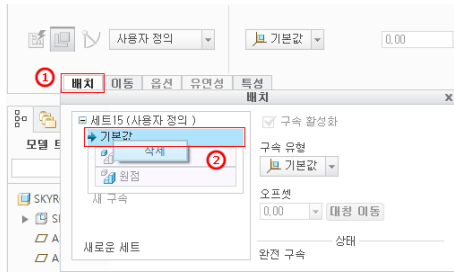


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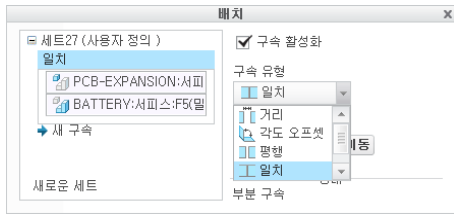


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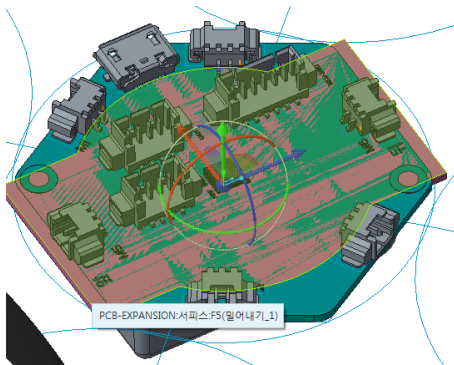


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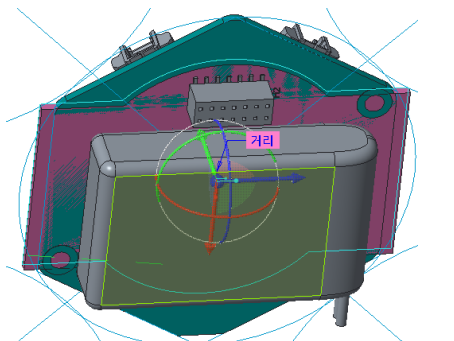


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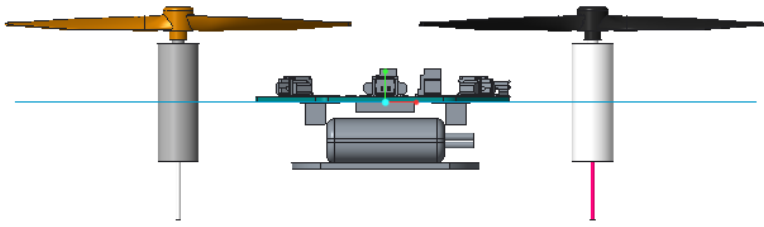


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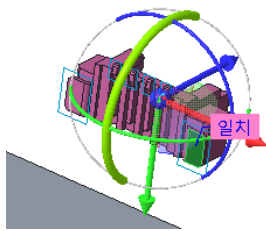


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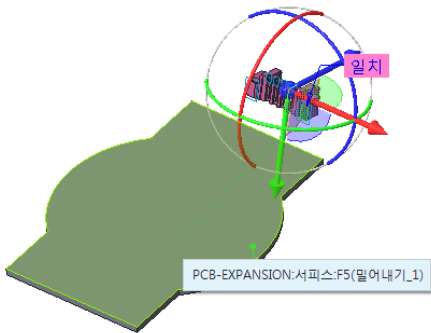


그림 5-190



그림 5-191

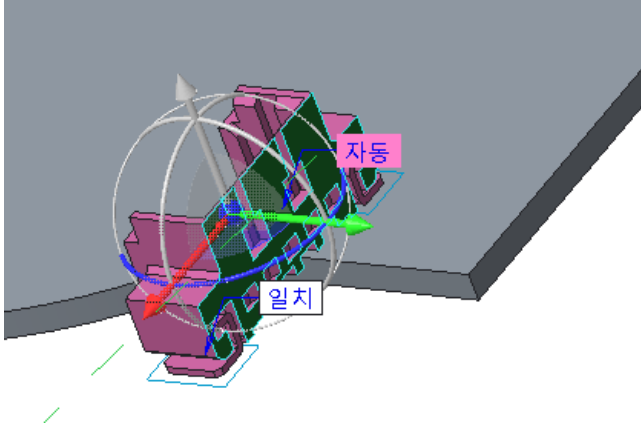


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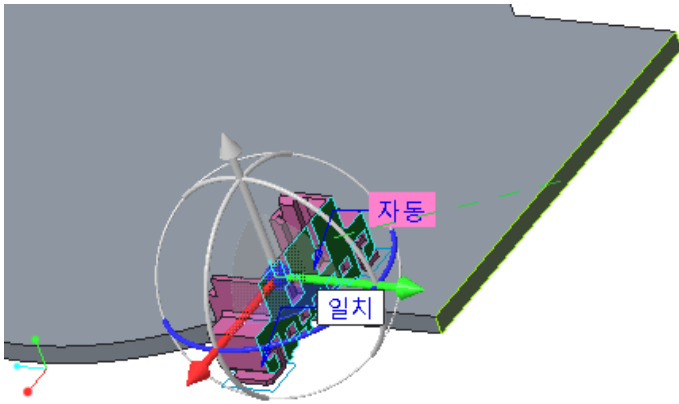


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그림 5-194

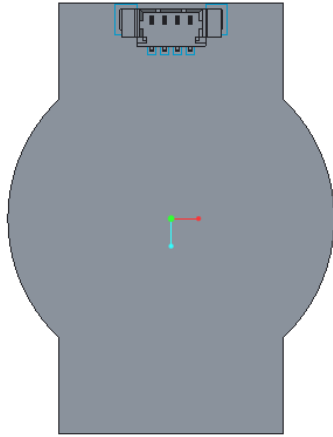


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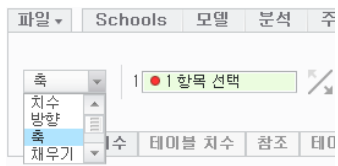


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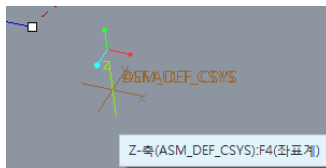


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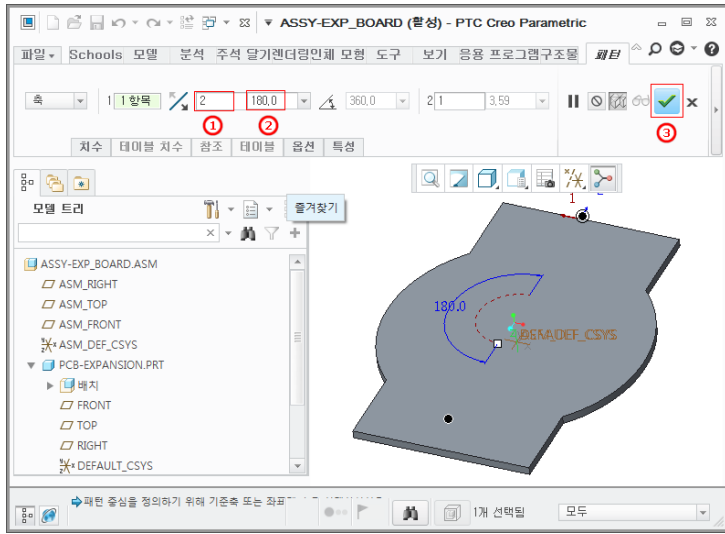


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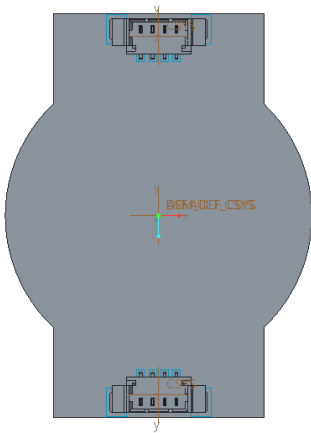


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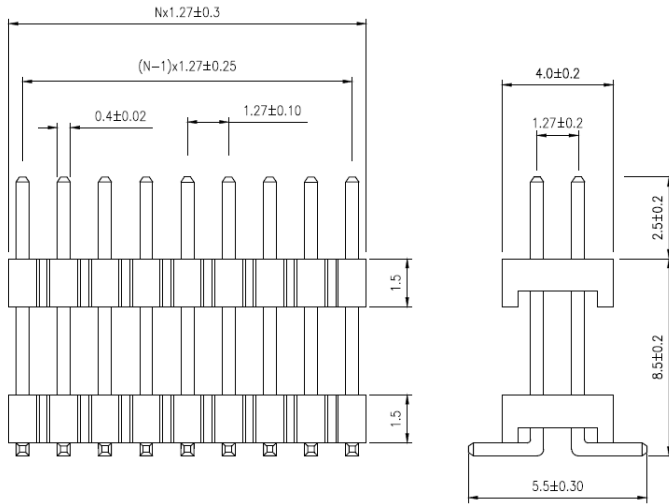


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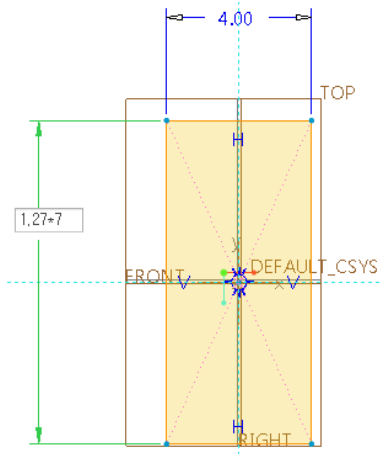


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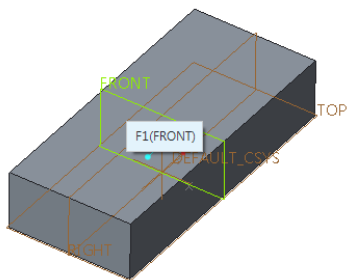


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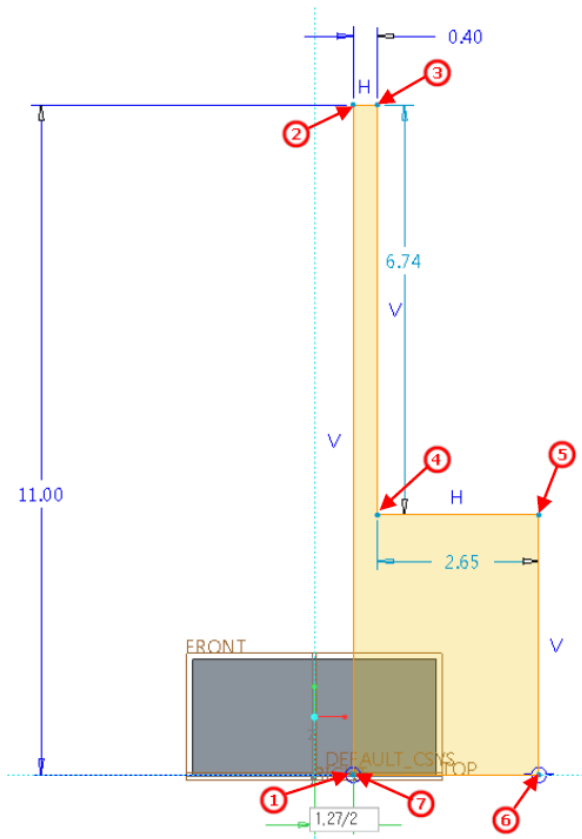


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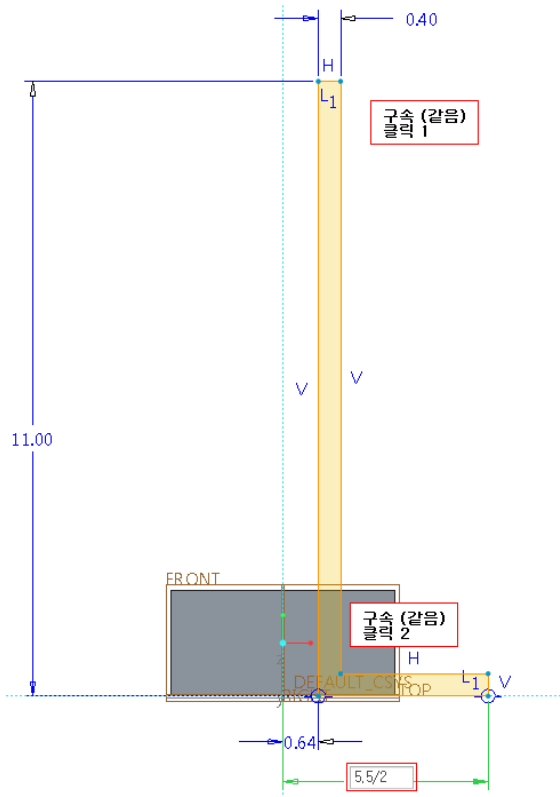


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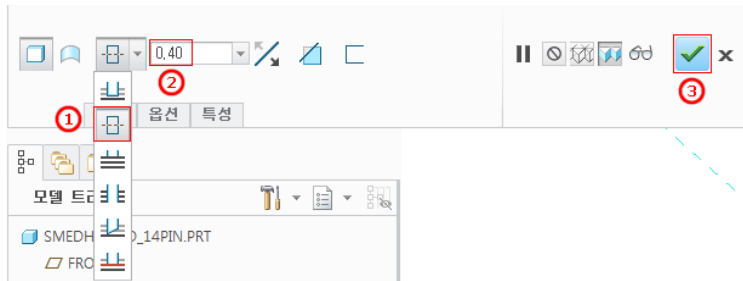


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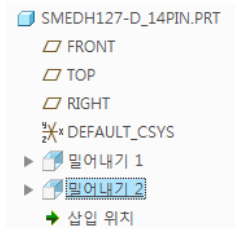


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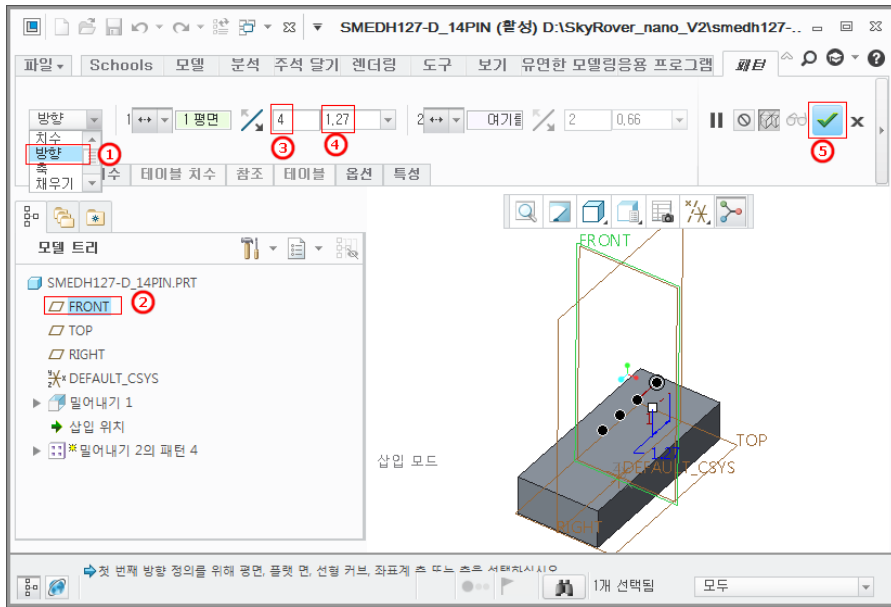


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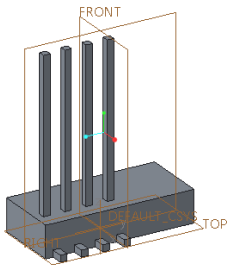


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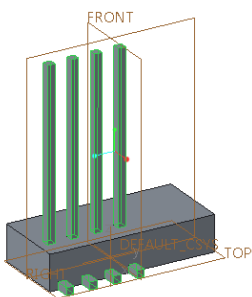


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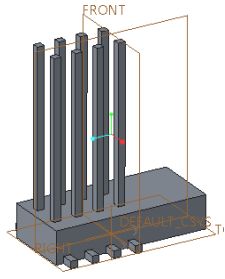


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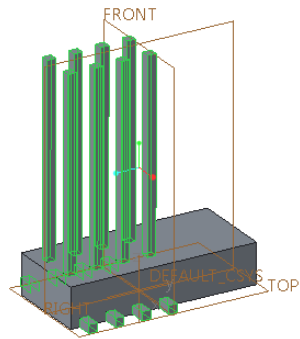


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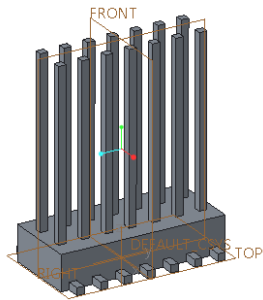


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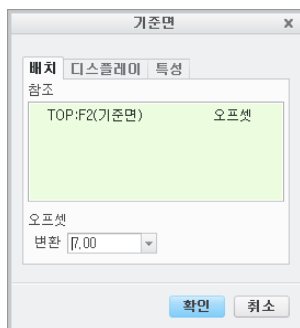


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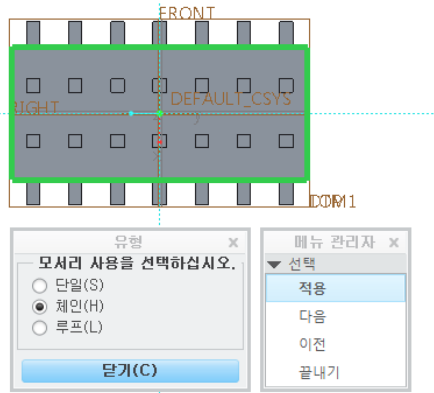


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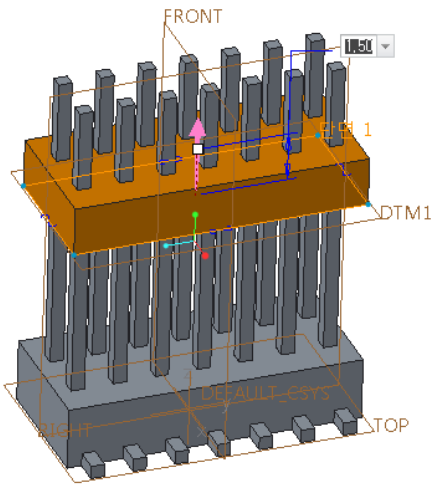


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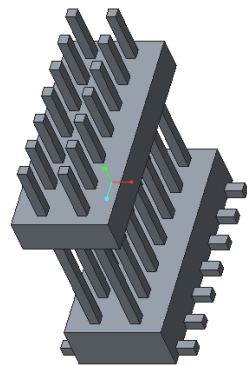


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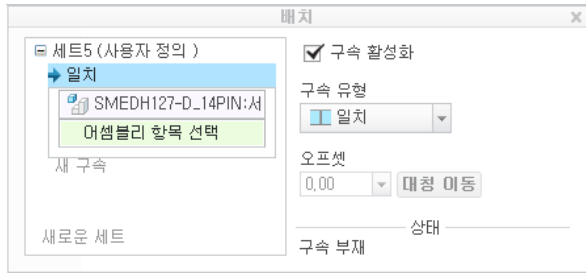


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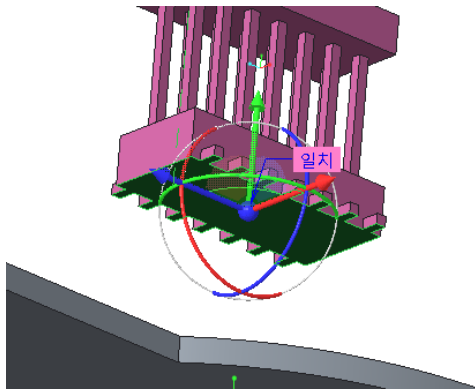


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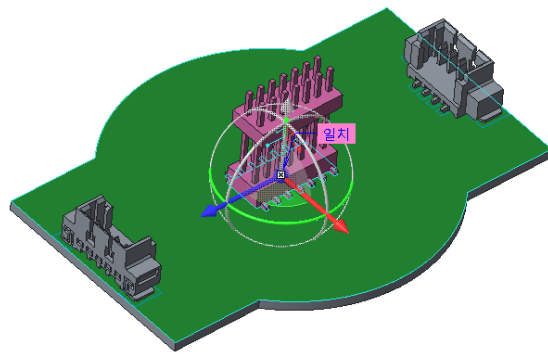


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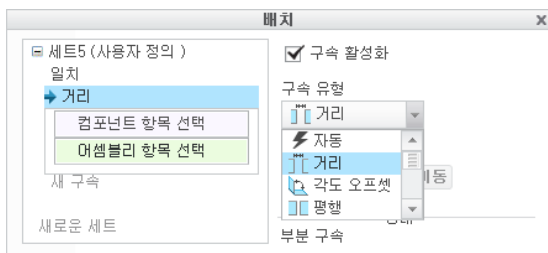


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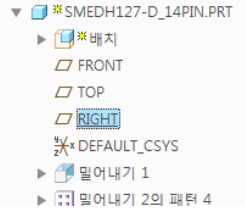


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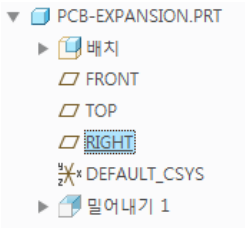


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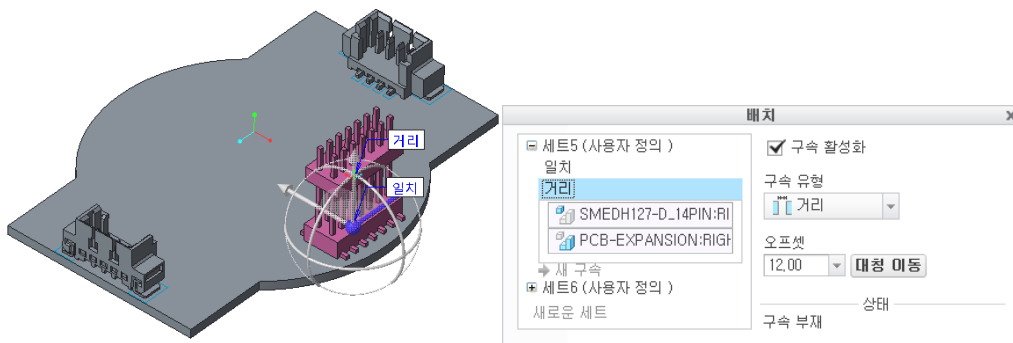


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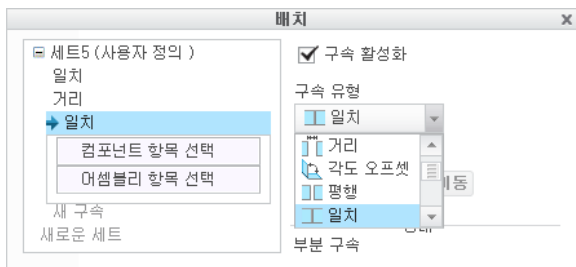


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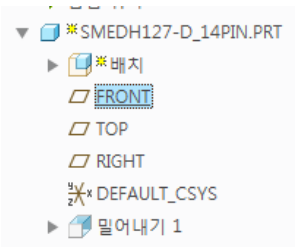


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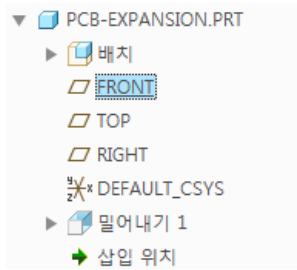


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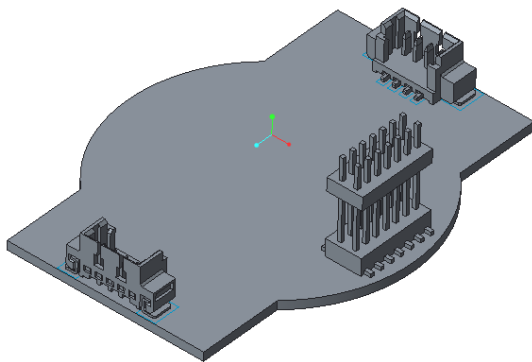


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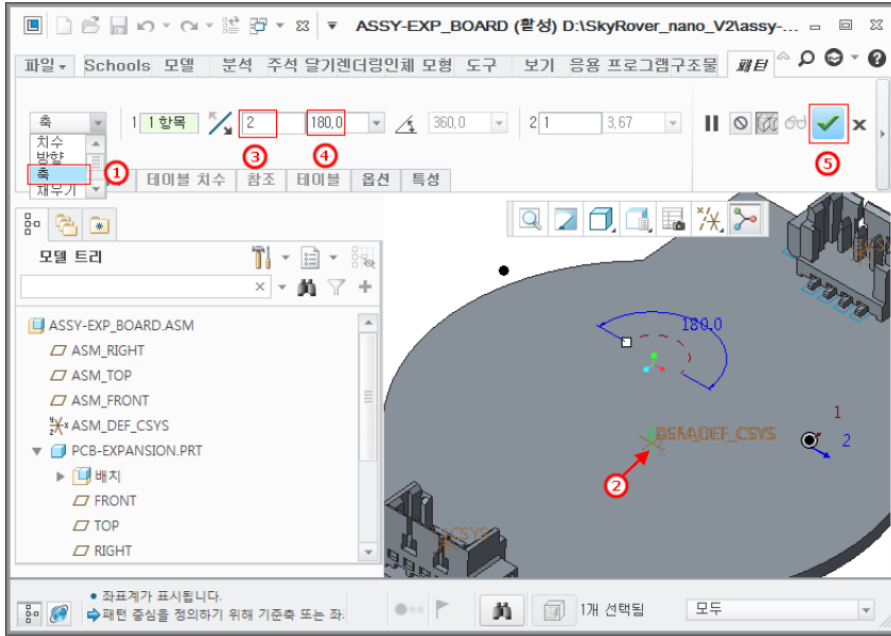


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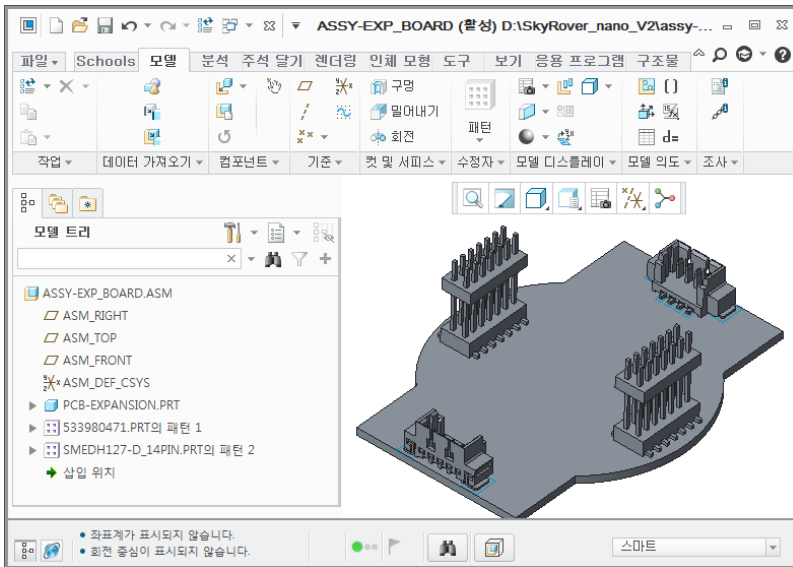


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WS2812B RGB LED (Adafruit Neopixel)

STEP / IGES NX 9 Parasolid Rendering

By [Kyle C](#) on April 26, 2014 01:37 in [Components](#) [Electrical](#) [Tech](#)

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Name	Size	Last modified	Software	Comments
Renderings	-	by Kyle C about 1 year ago	-	-
WS2812b Updated.prt	550 KB	V1 by Kyle C about 1 year ago	NX	0 comments
WS2812b updated.x_t	94 KB	V1 by Kyle C about 1 year ago	Parasolid	0 comments
WS2812_RGB_LED_Updated.igs	280 KB	V1 by Kyle C about 1 year ago	STEP / IGES	0 comments
WS2812_RGB_LED_updated.stp	99 KB	V1 by Kyle C about 1 year ago	STEP / IGES	0 comments
WS2812_RGB_LED.PNG	42 KB	V1 by Kyle C over 1 year ago	Rendering	0 comments

그림 5-231



그림 5-232

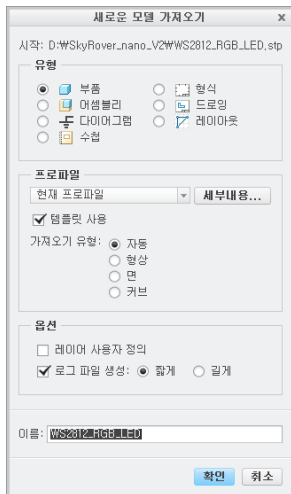


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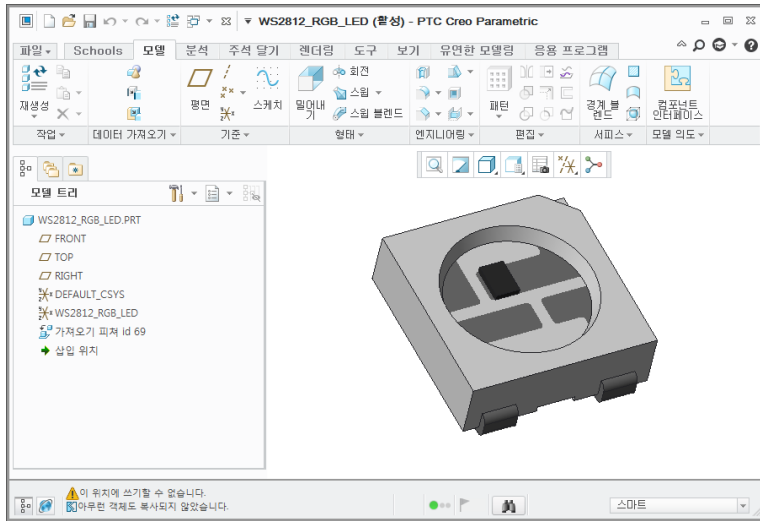


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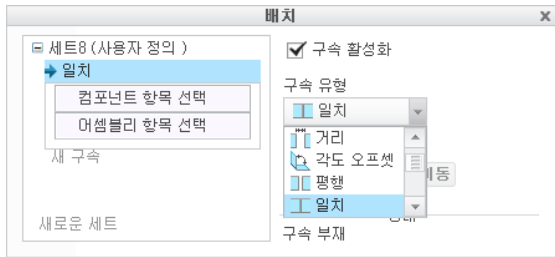


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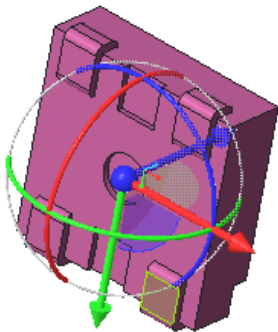


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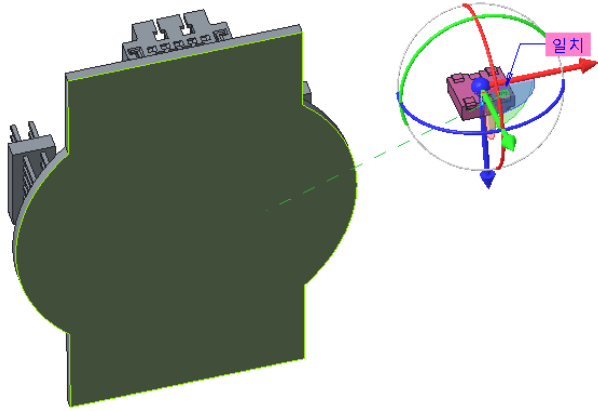


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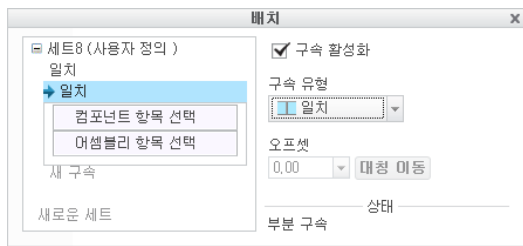


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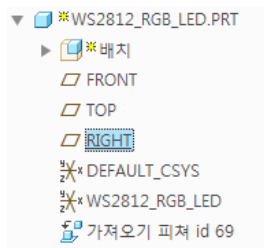


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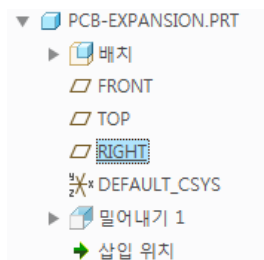


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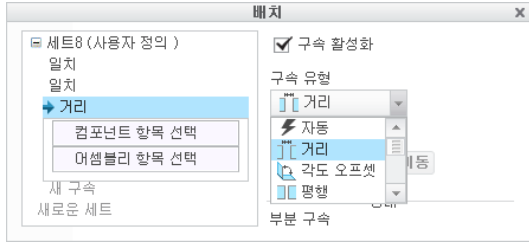


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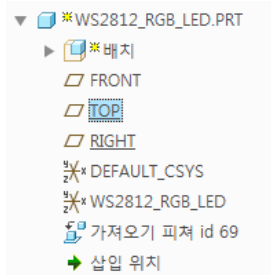


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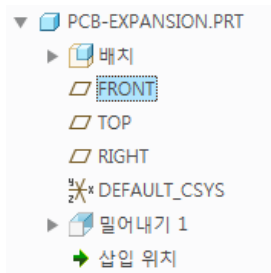


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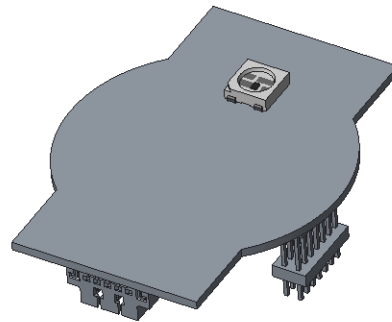
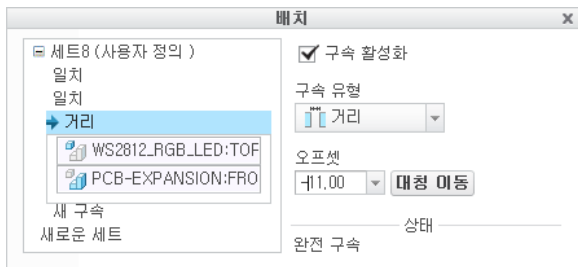


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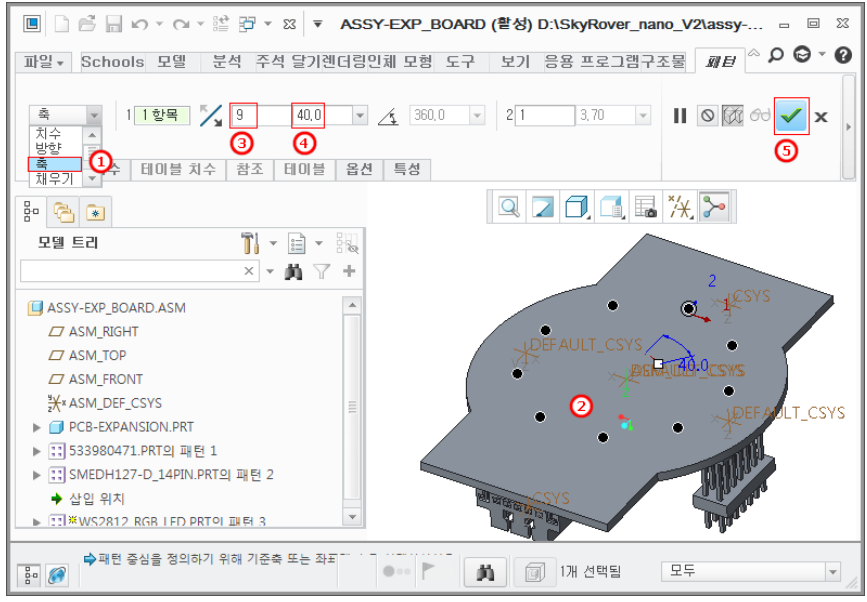


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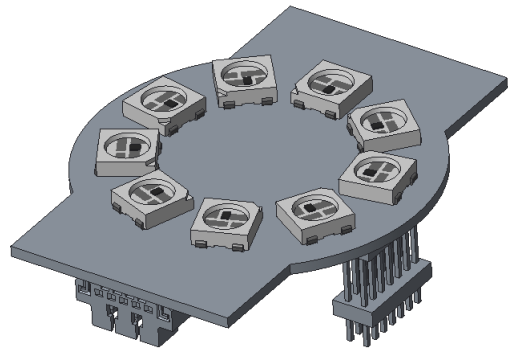


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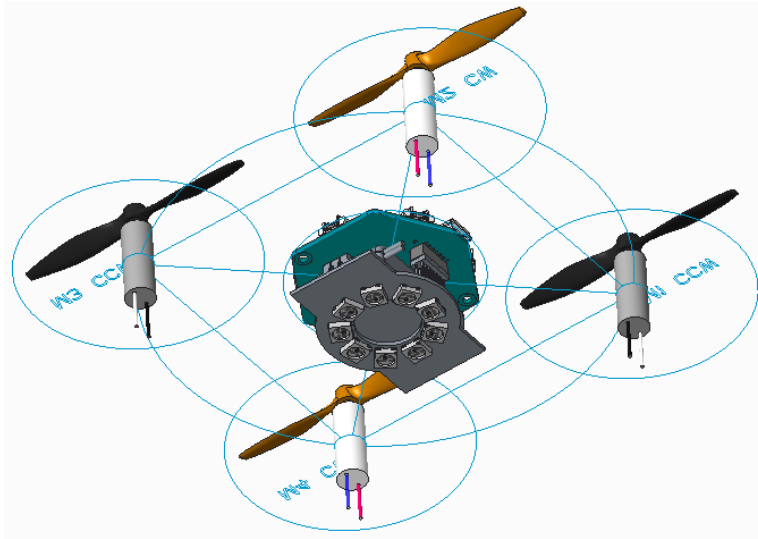


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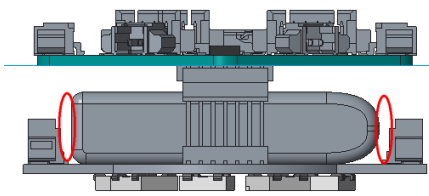


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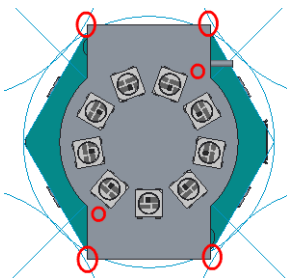


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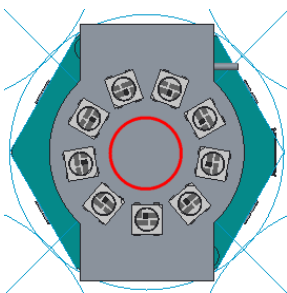


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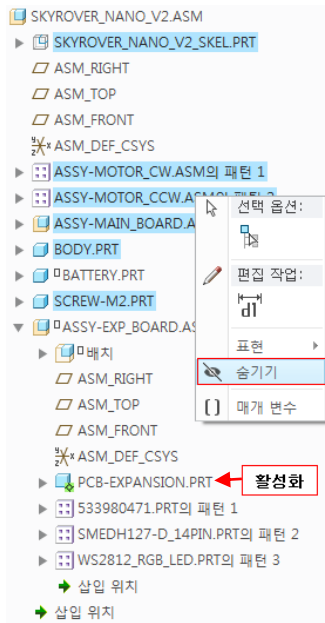


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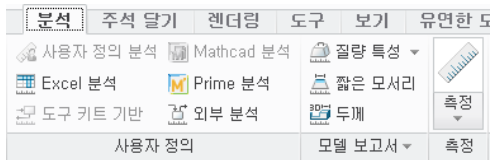


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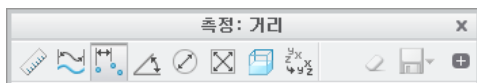


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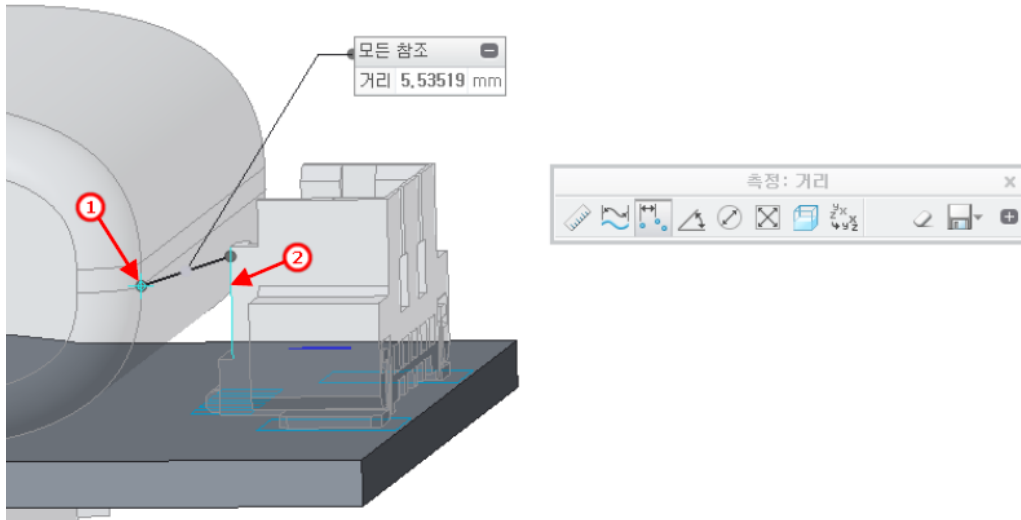


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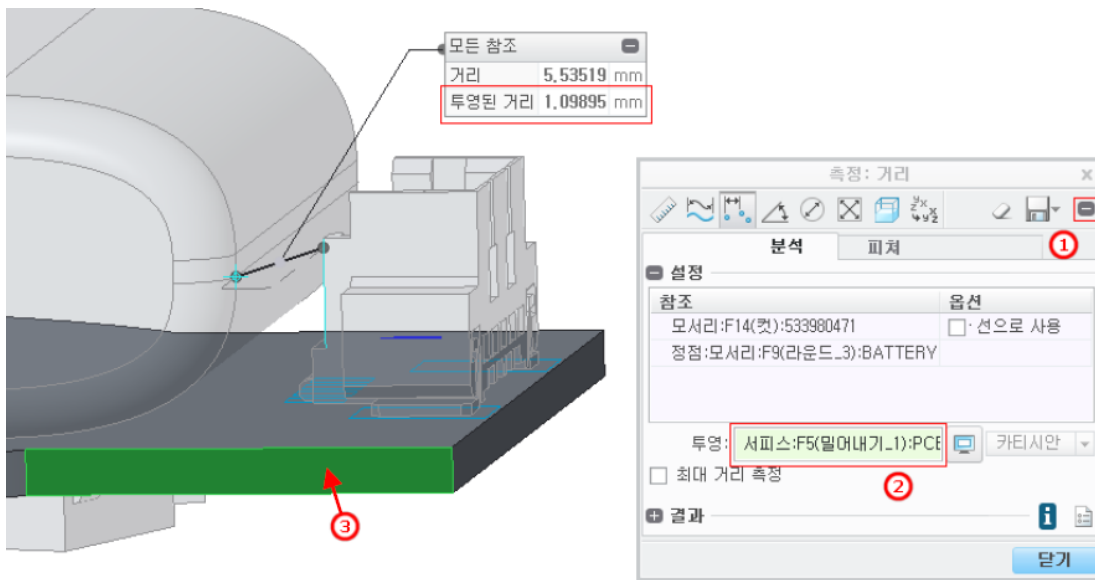


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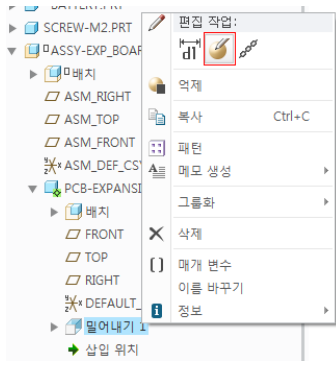


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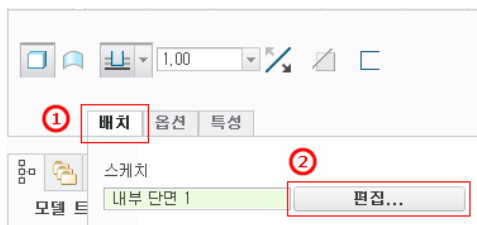


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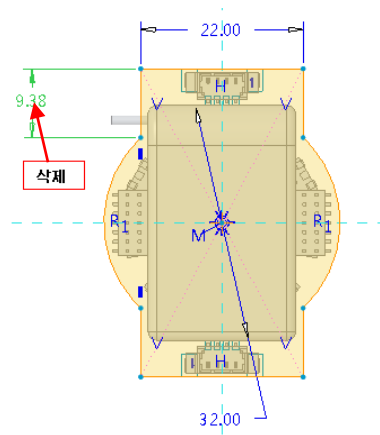


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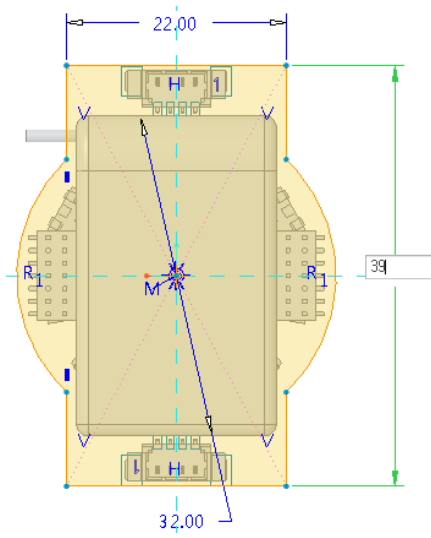


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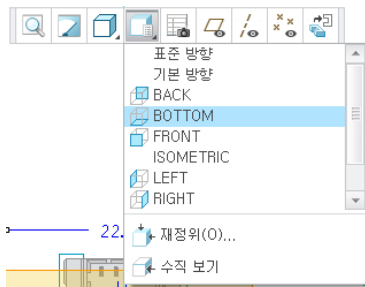


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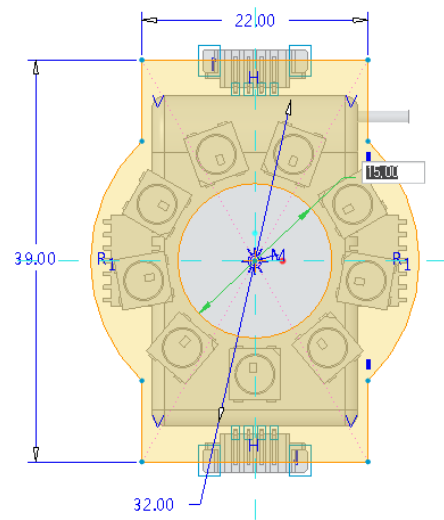


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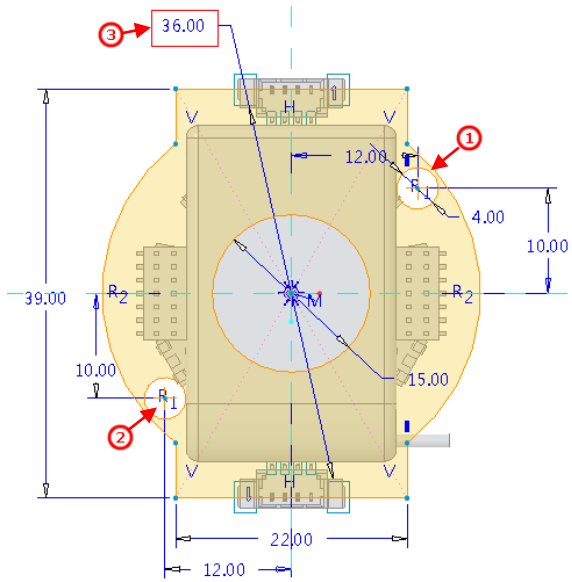


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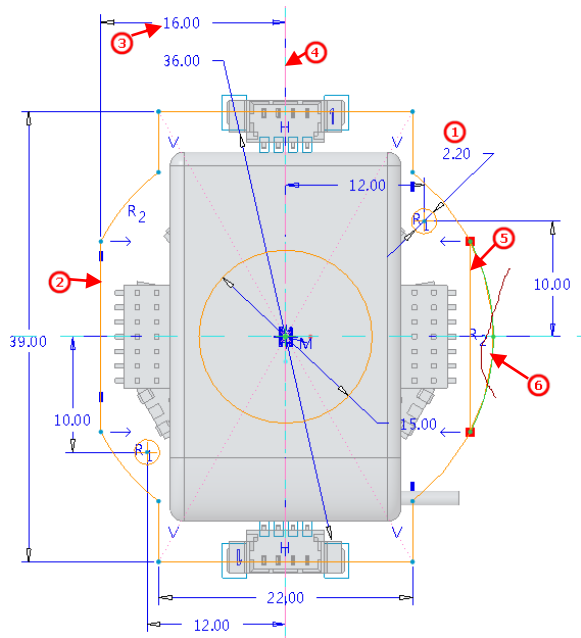


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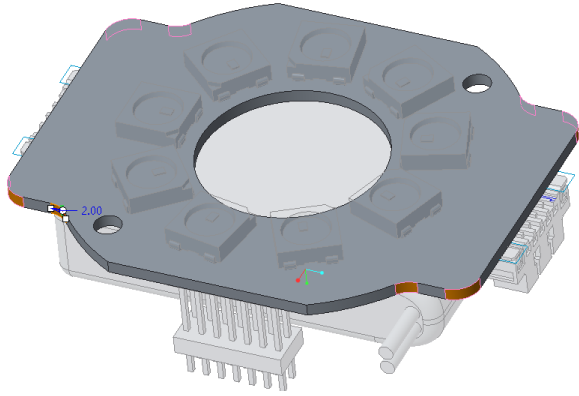


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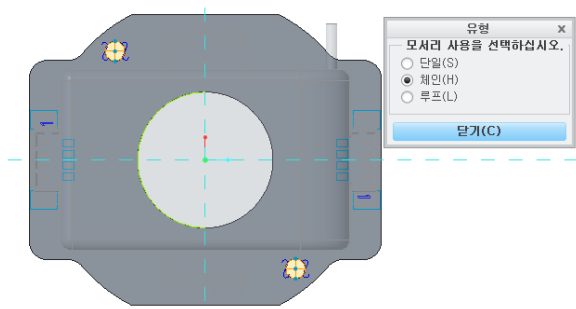


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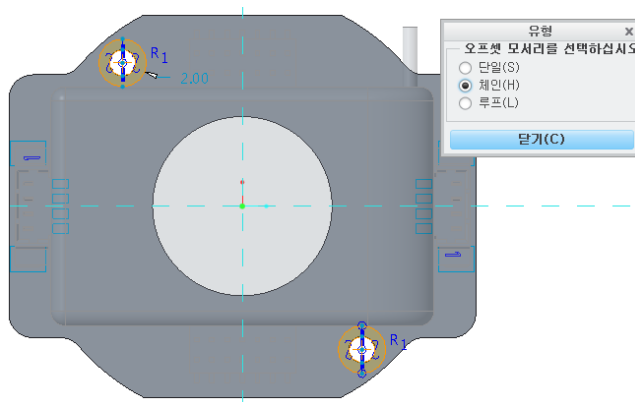


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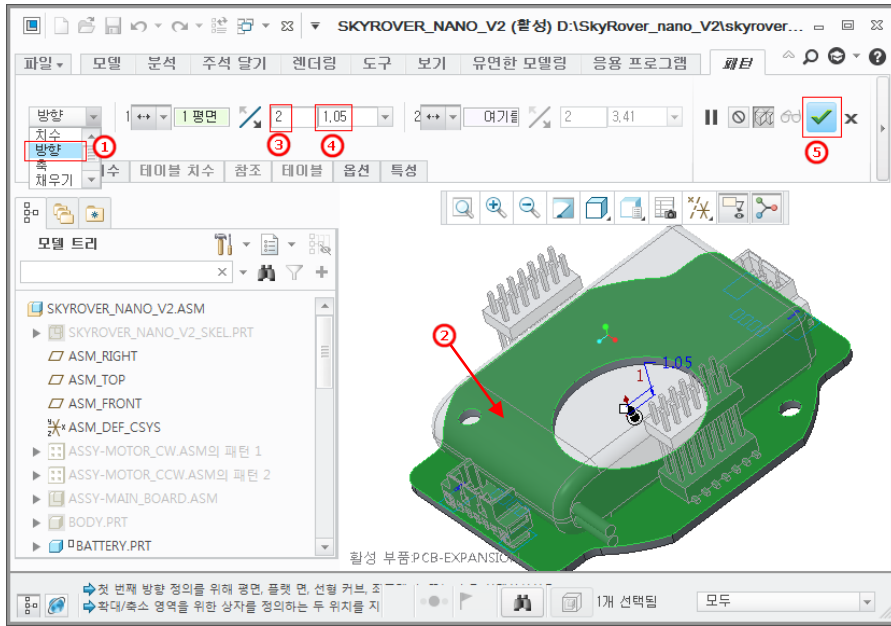


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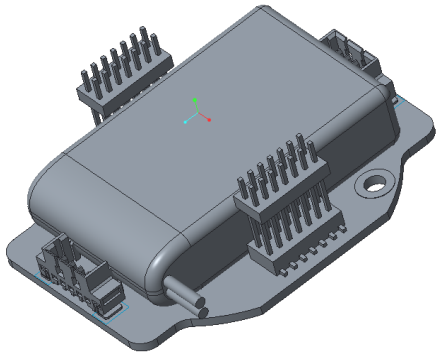


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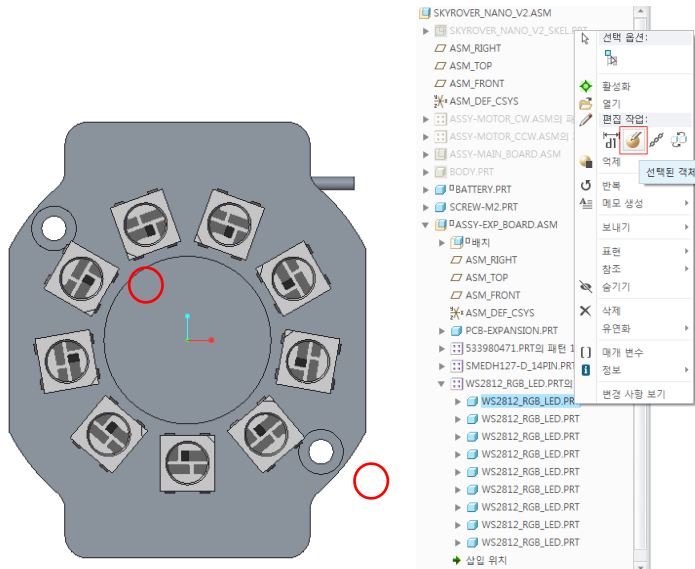


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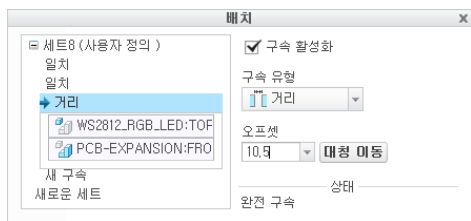


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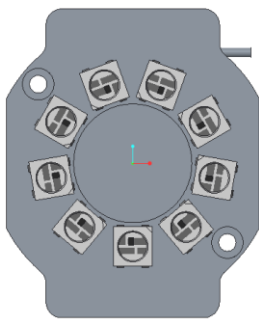


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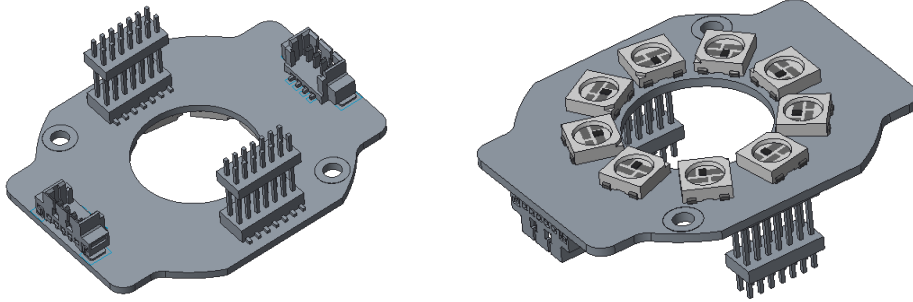


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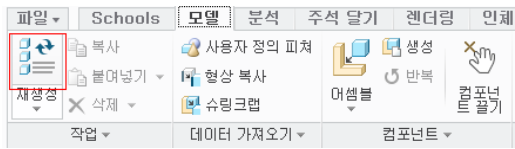


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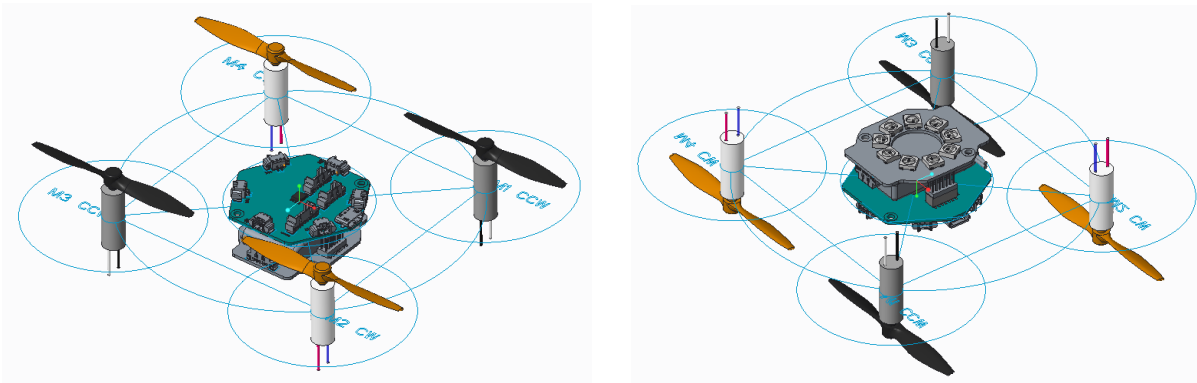


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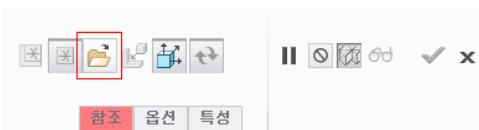


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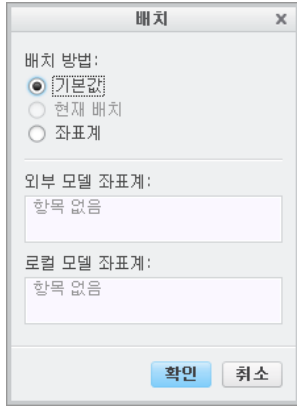


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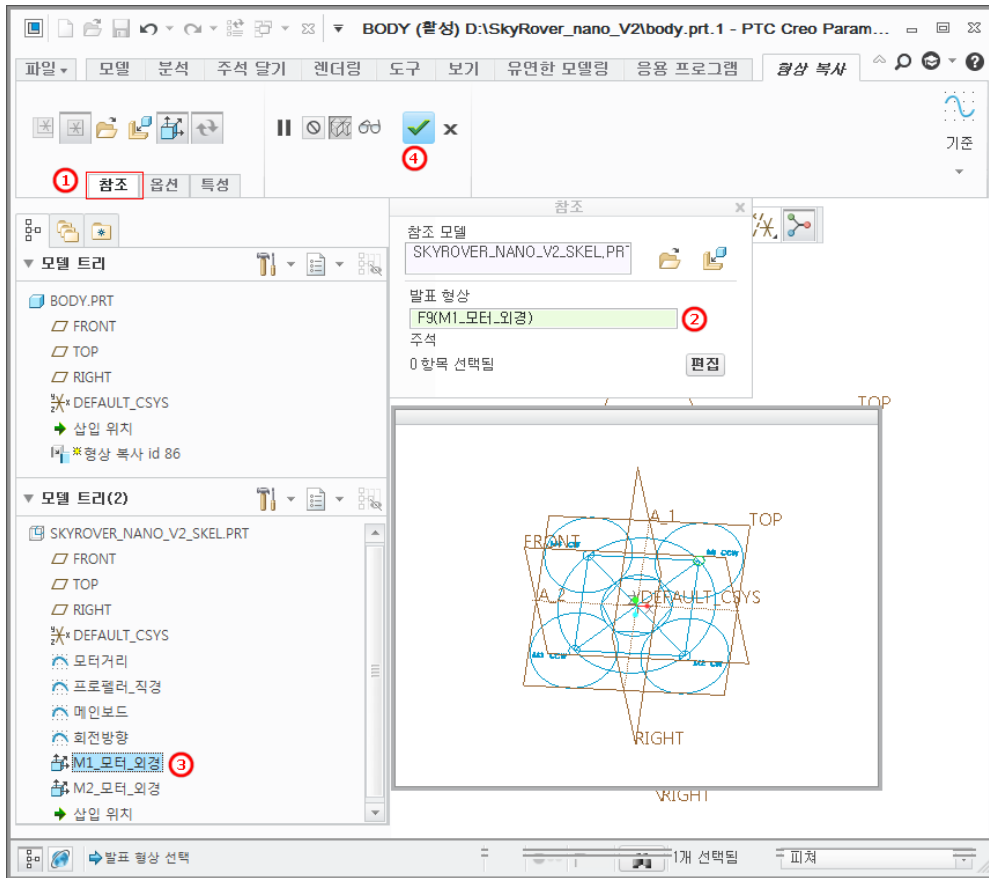


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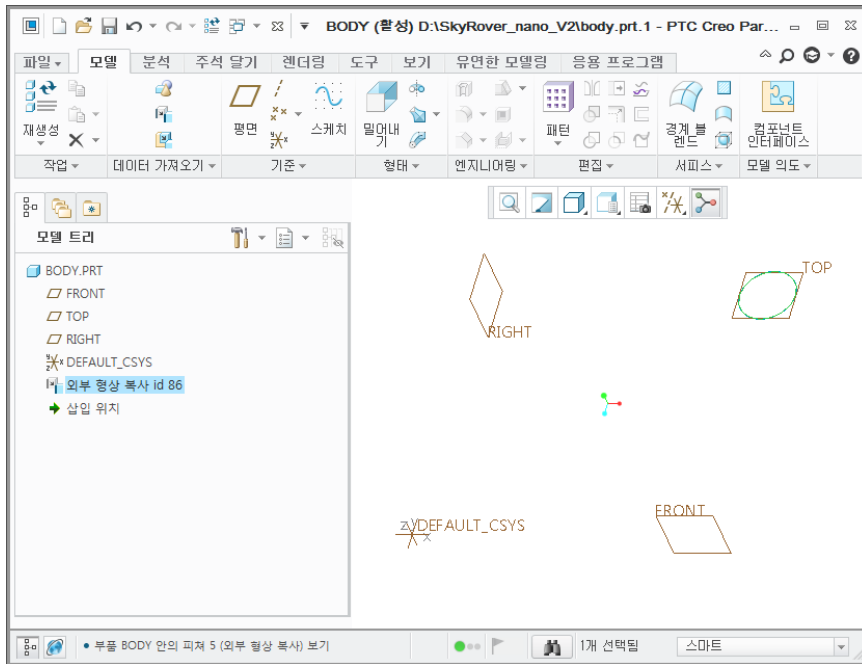


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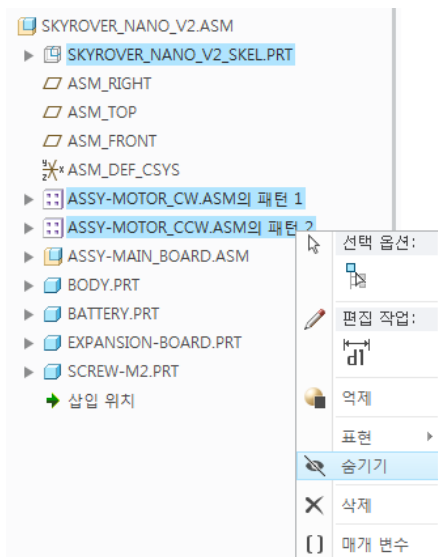


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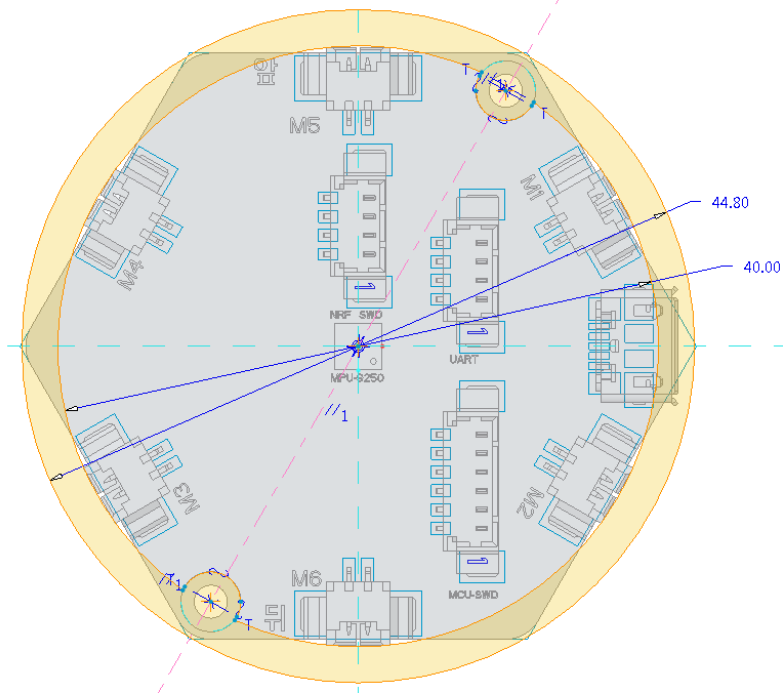


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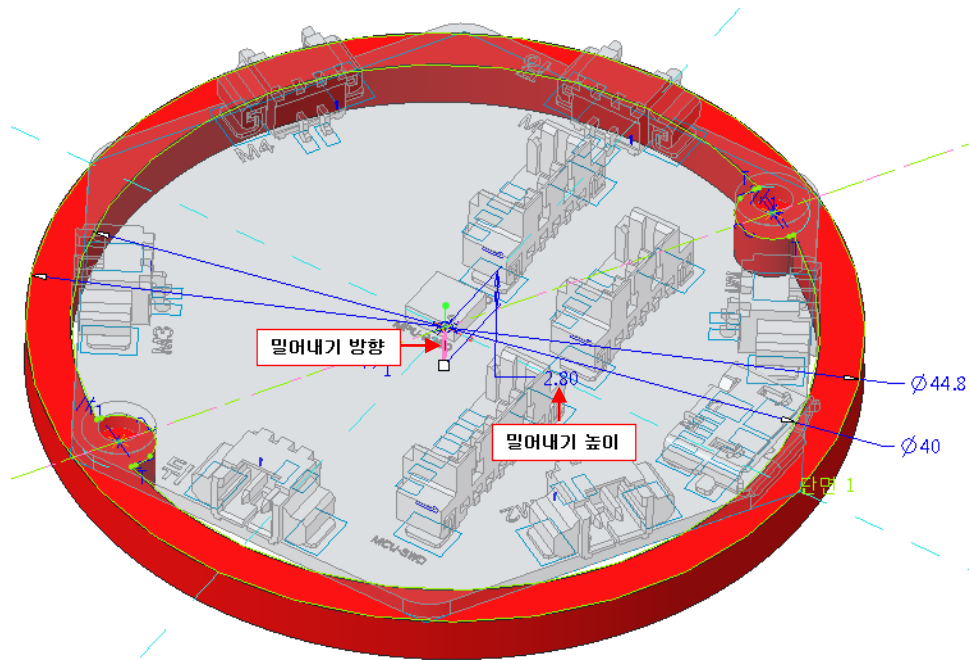


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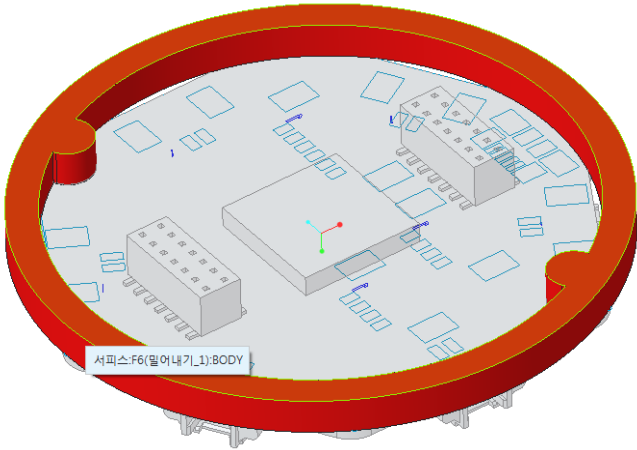


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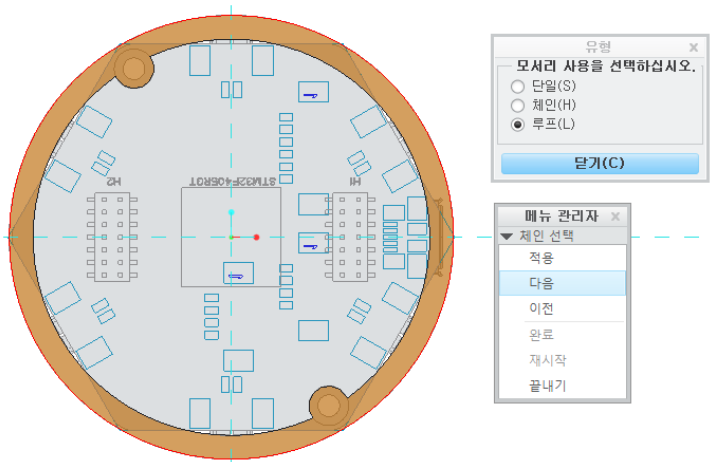


그림 5-283

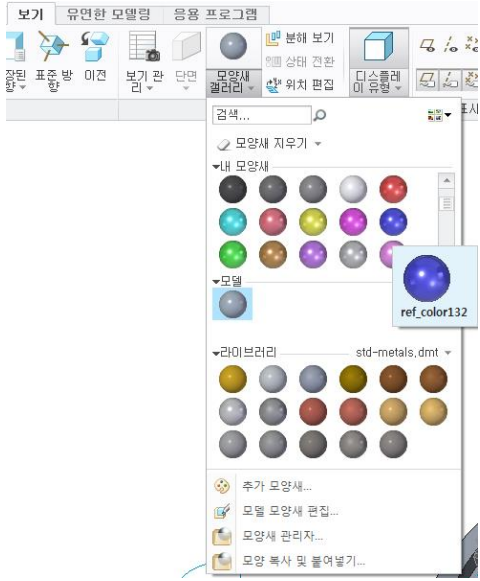


그림 5-284

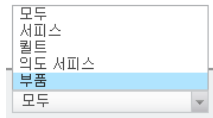


그림 5-285

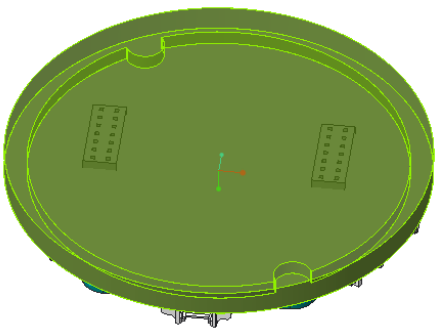


그림 5-286

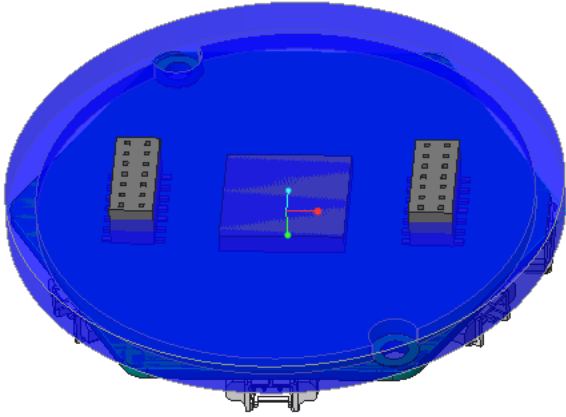


그림 5-287

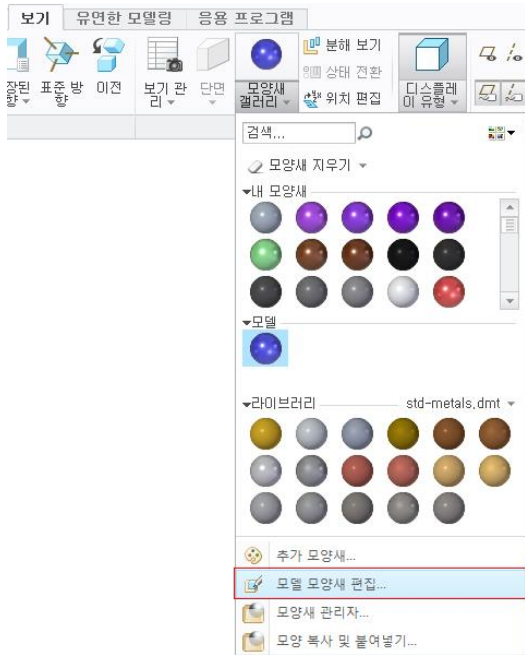


그림 5-288



그림 5-289

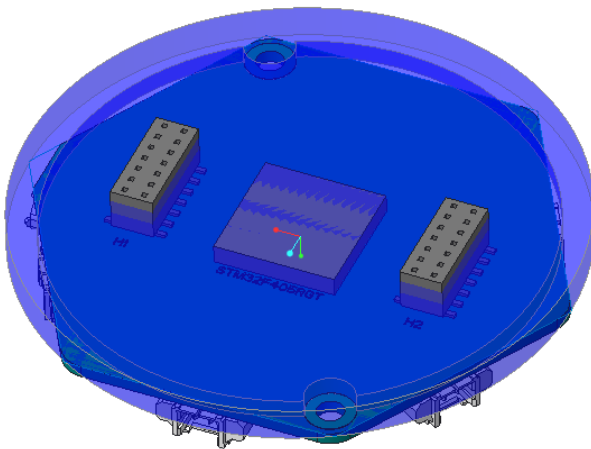
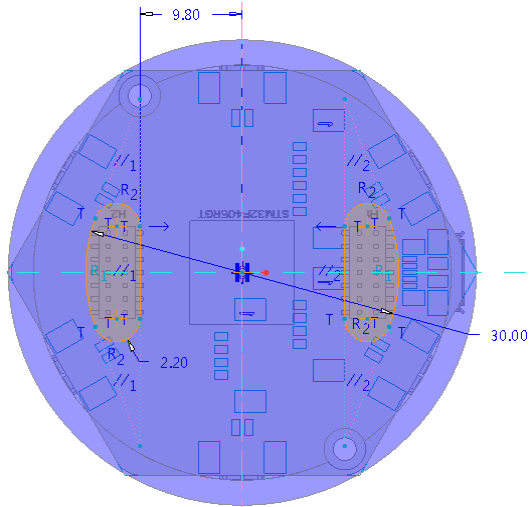


그림 5-290



- <스케치 순서>
1. 30mm 원 생성
 2. 9.8mm에 위치하는 세로 선 생성
 3. 세로 선 대칭 복사
 4. 원의 세그먼트 삭제
 5. 끝단 2.2mm 필렛 적용

그림 5-291

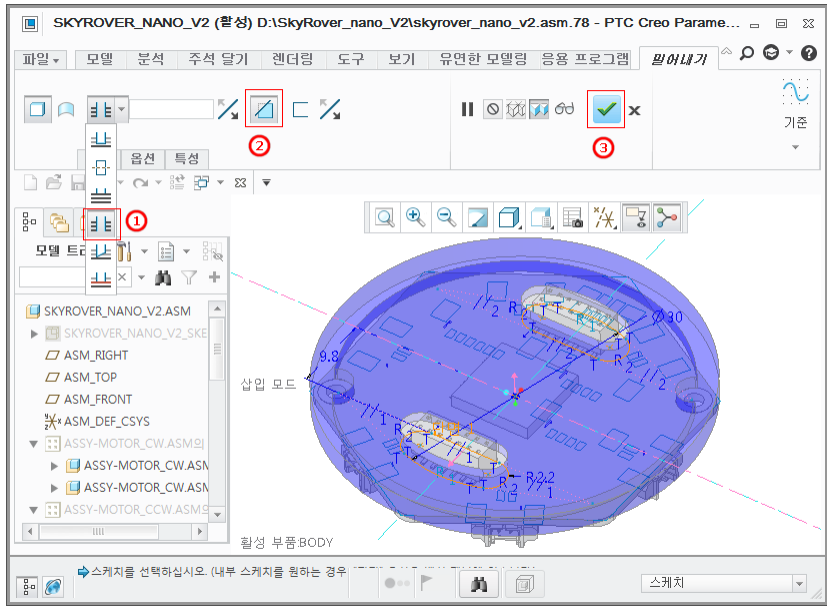


그림 5-292

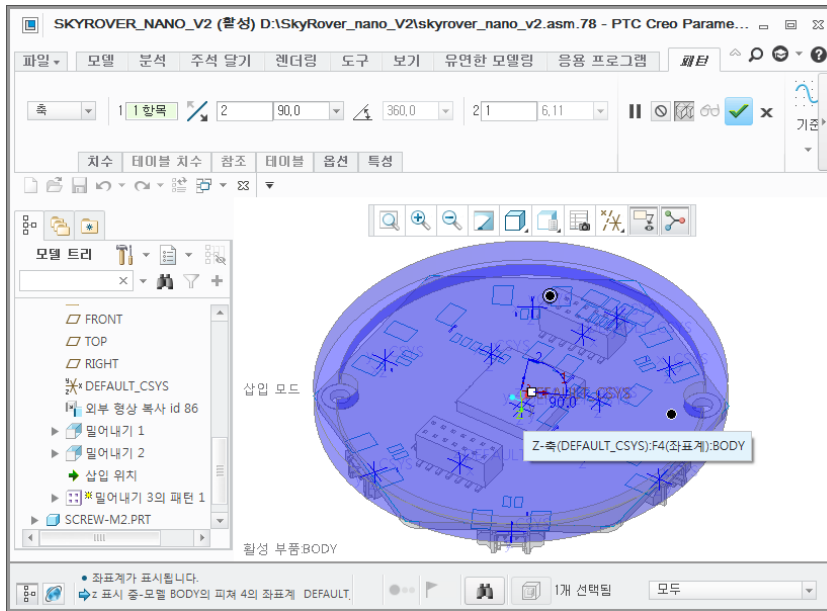


그림 5-293

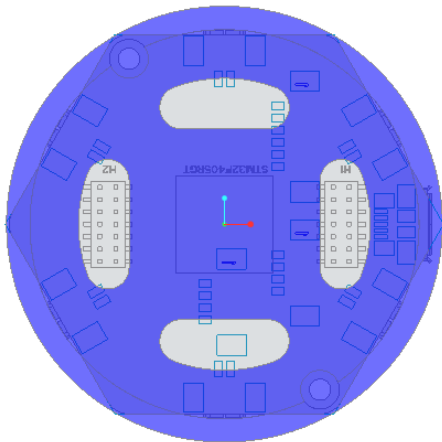


그림 5-294

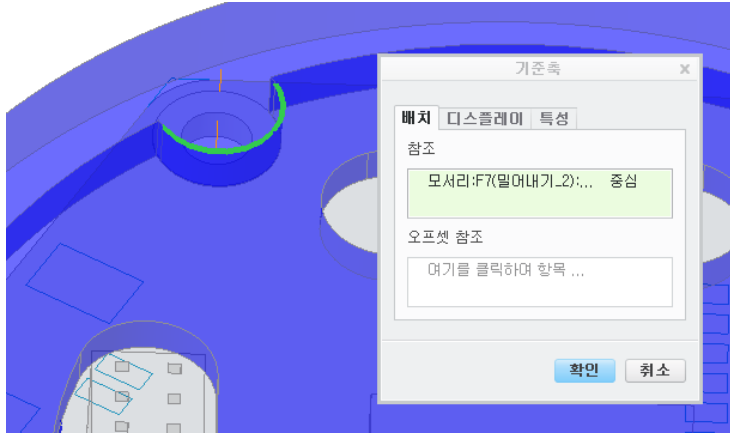


그림 5-295

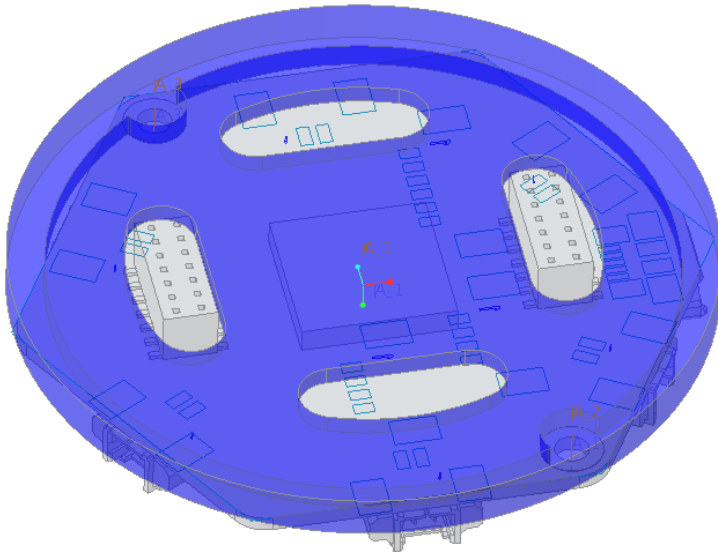


그림 5-296

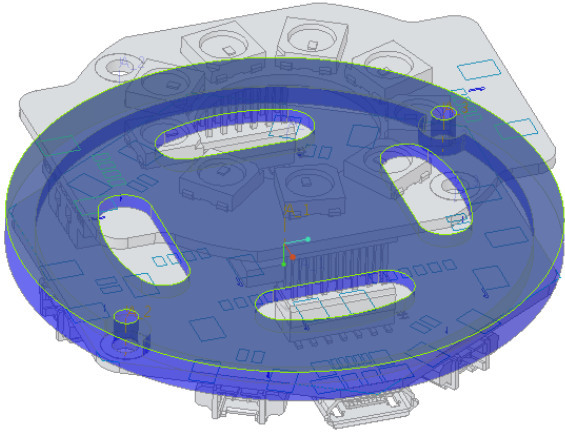


그림 5-299

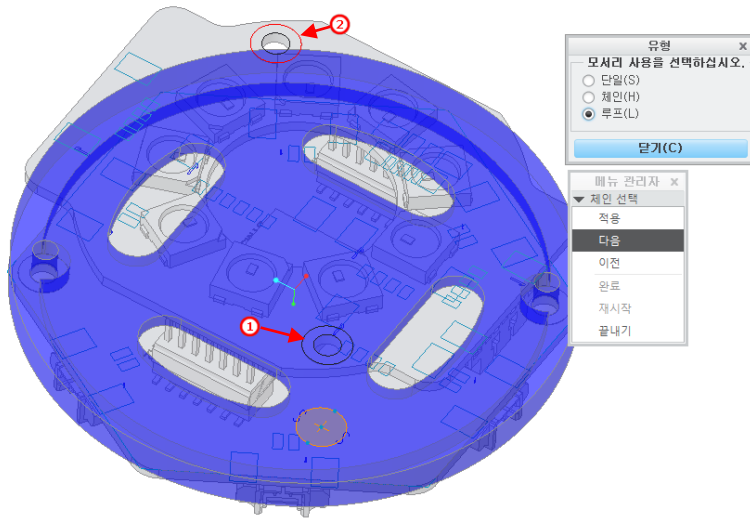


그림 5-300

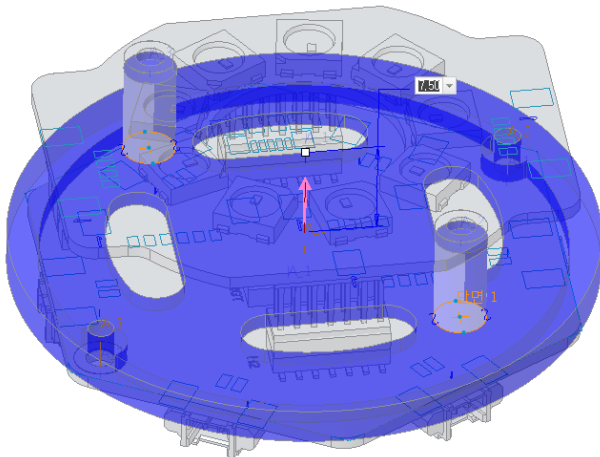


그림 5-301

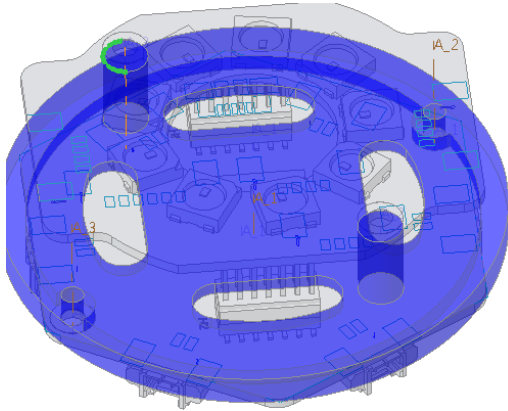


그림 5-302

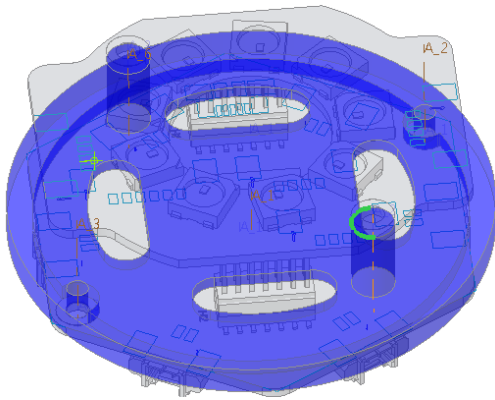


그림 5-303

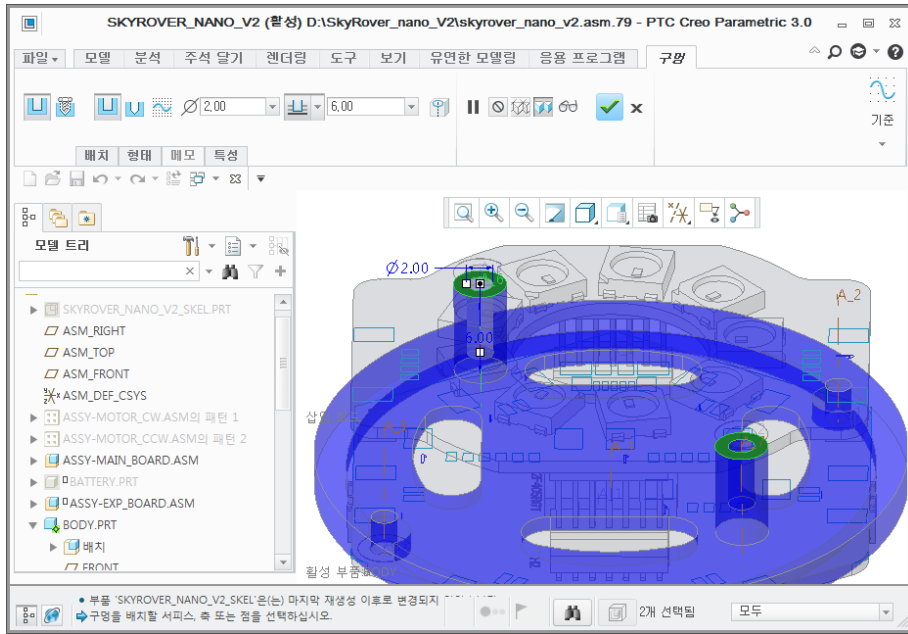


그림 5-304

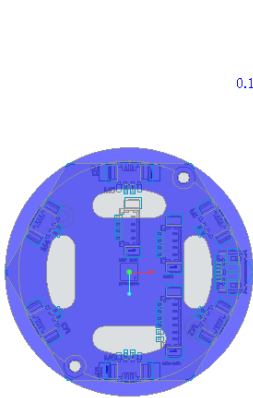


그림 5-305

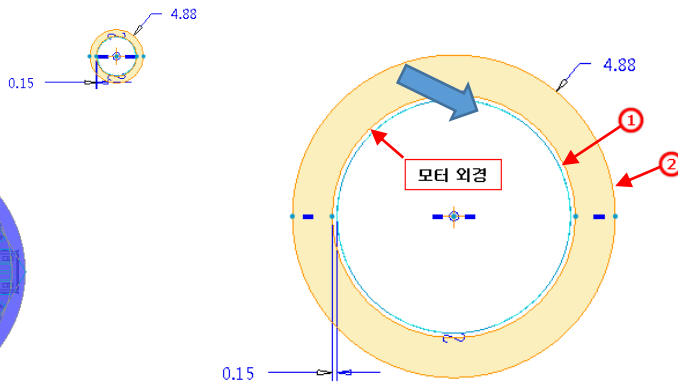


그림 5-306

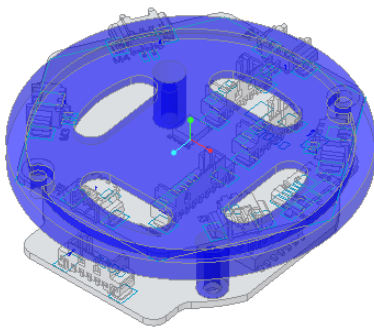
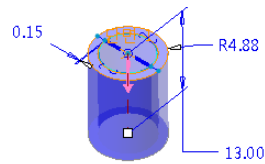


그림 5-307



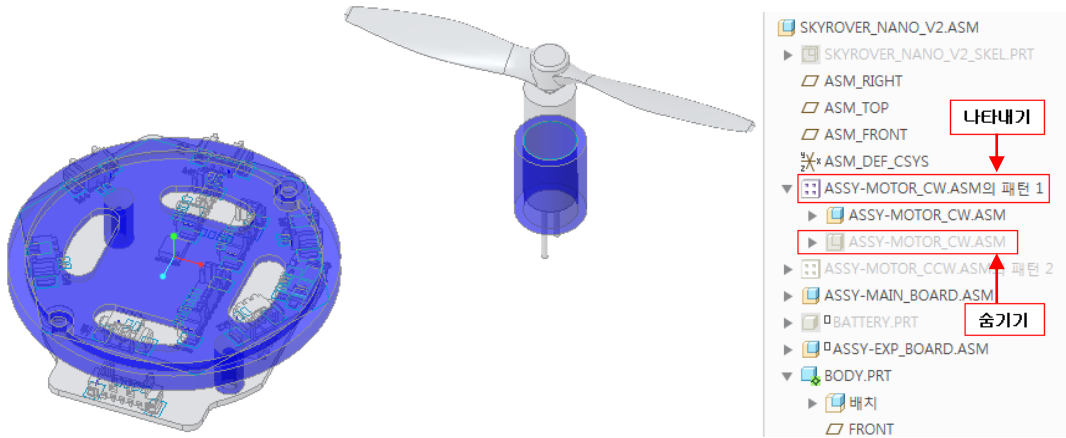


그림 5-308

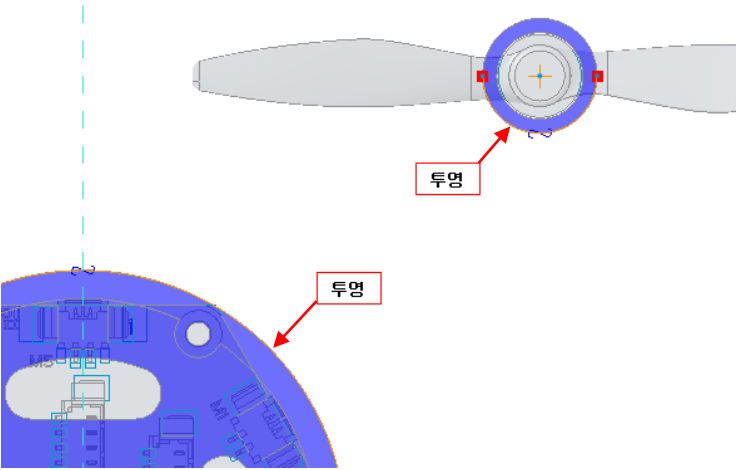


그림 5-309

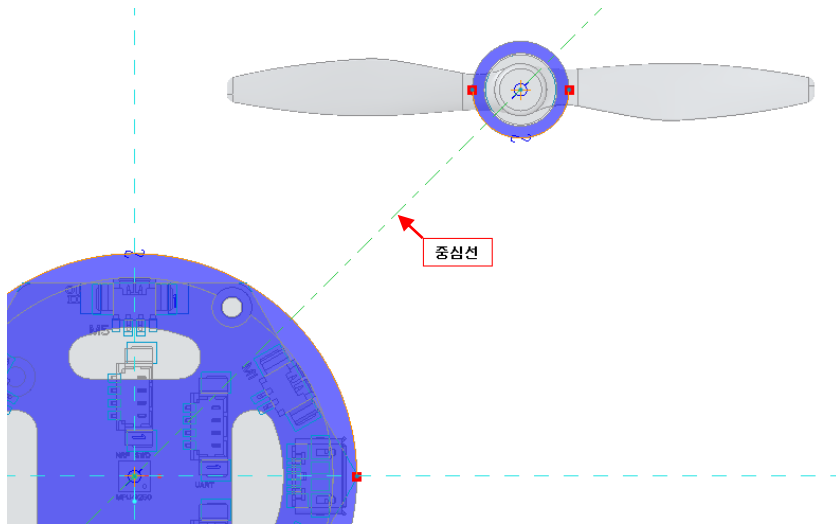


그림 5-310

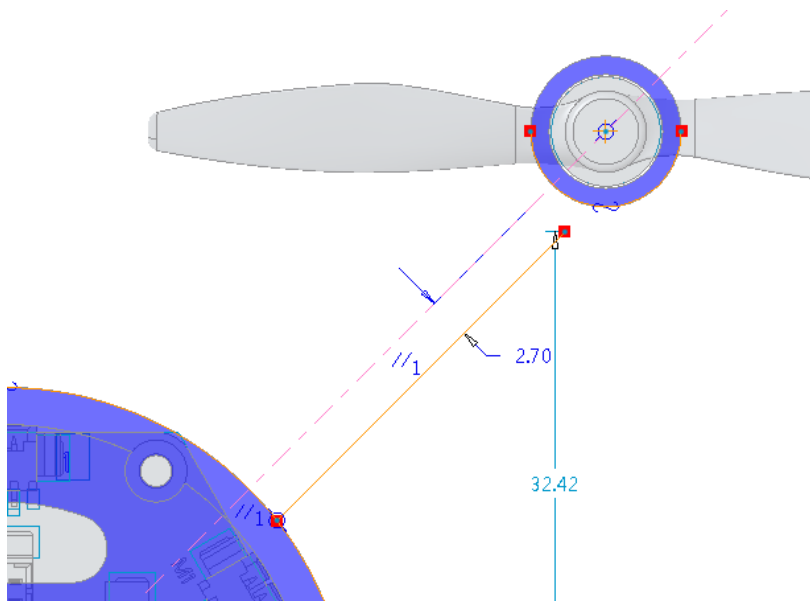


그림 5-311

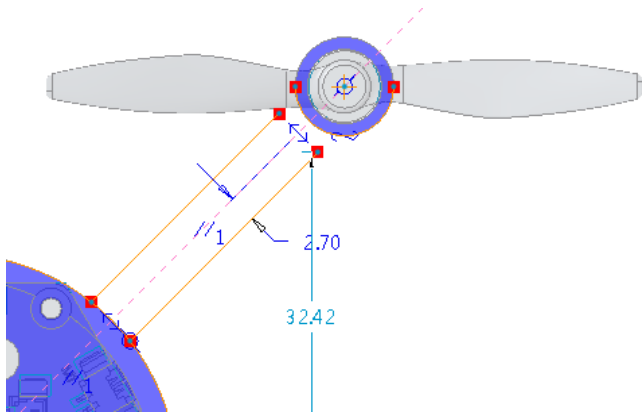


그림 5-312

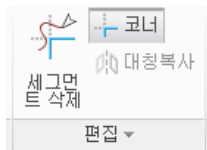


그림 5-313

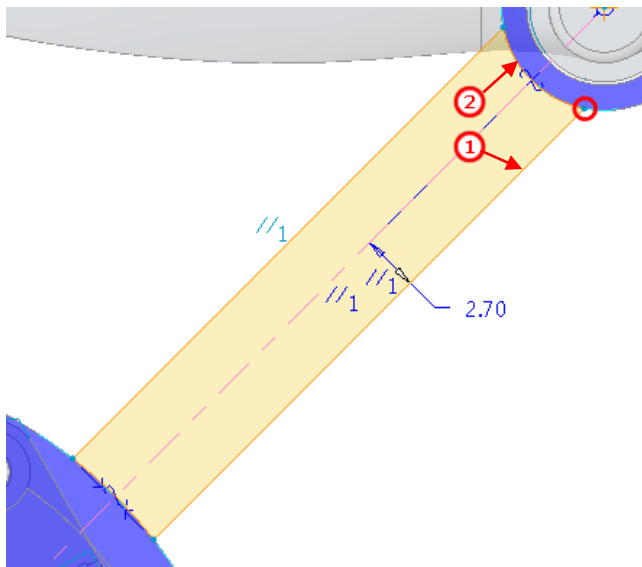


그림 5-314

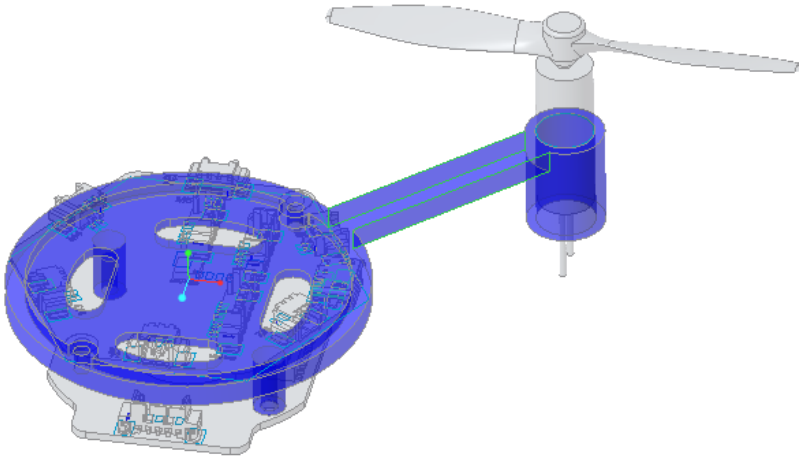


그림 5-315

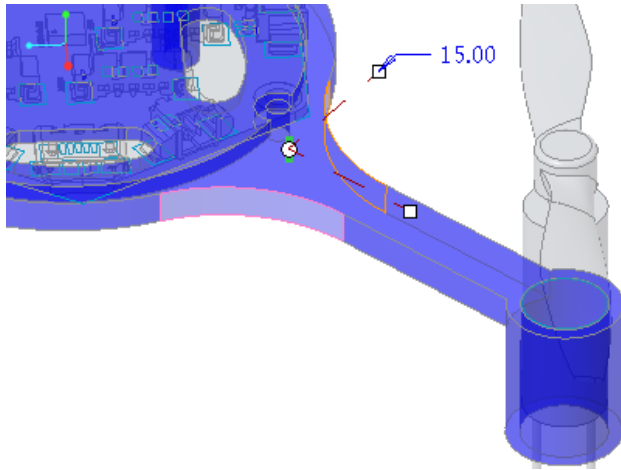


그림 5-316

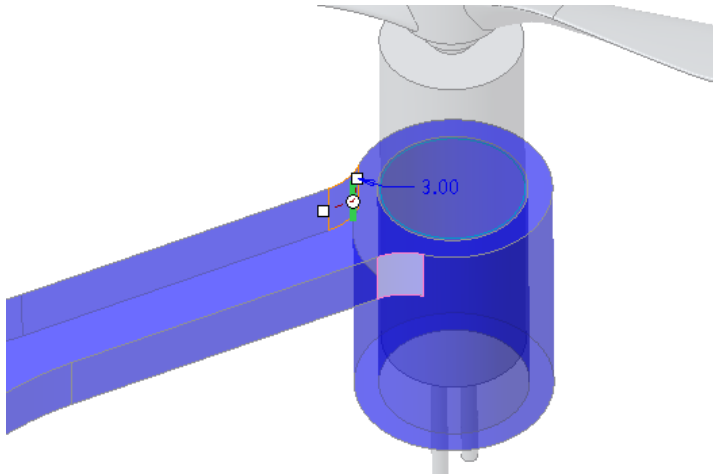


그림 5-317

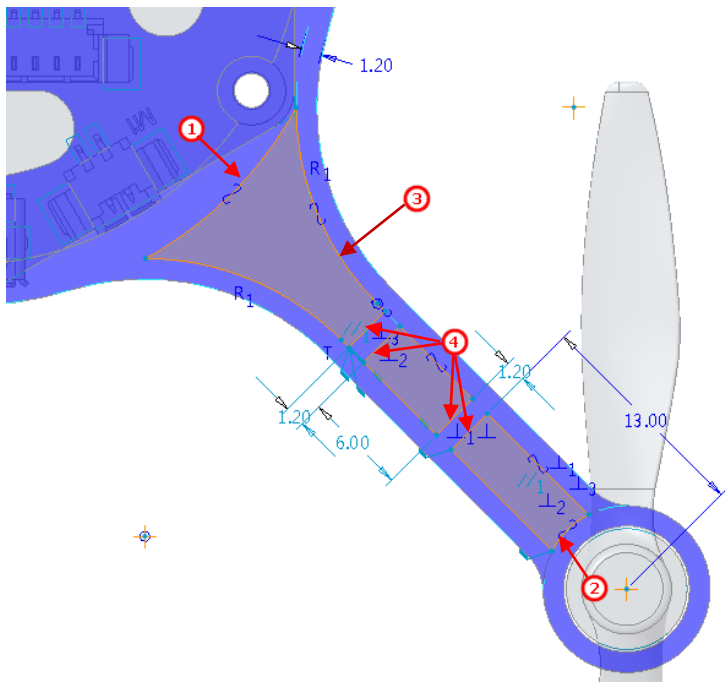


그림 5-318

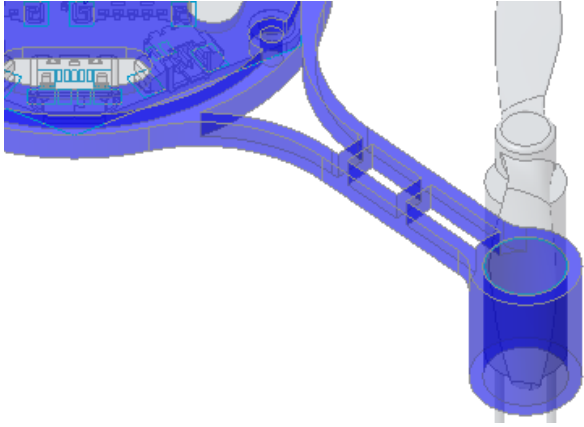


그림 5-319

14. [모델] → [라운드]를 선택하고 라운드 값으로 "1.5"를 입력하고 아래 그림과 같이 라운드를 생

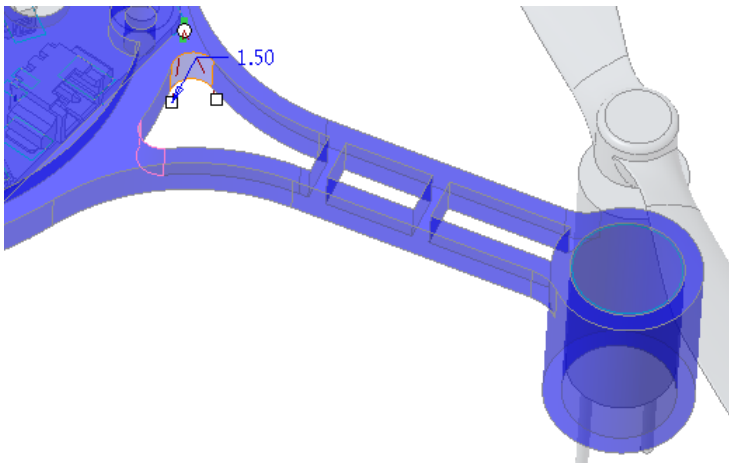


그림 5-320

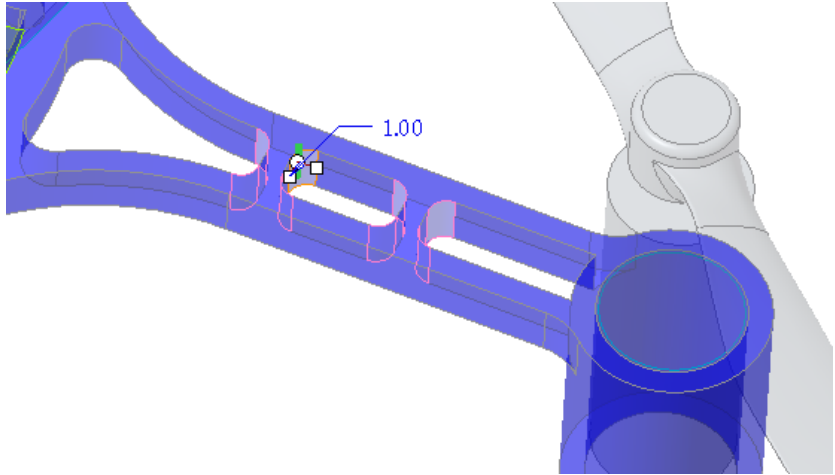


그림 5-321

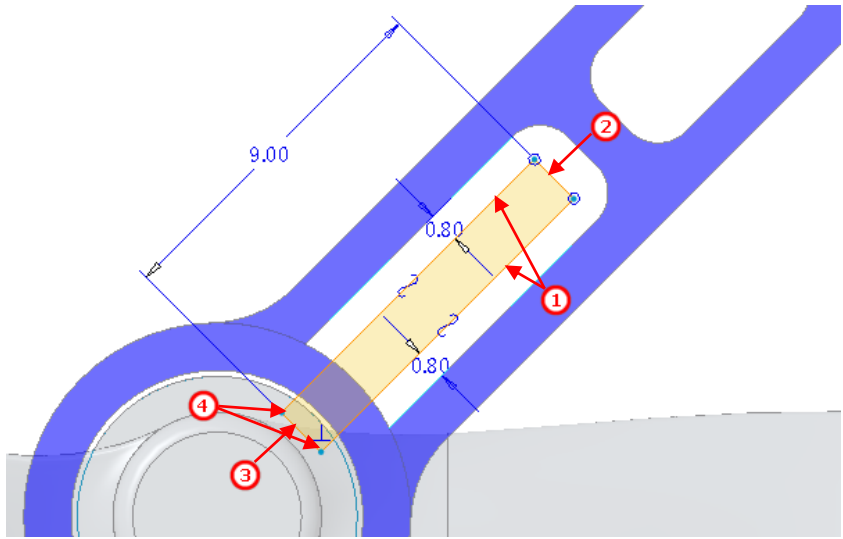


그림 5-322

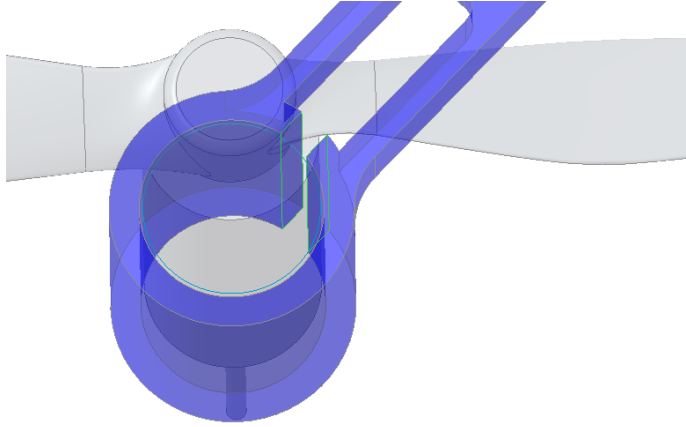


그림 5-323

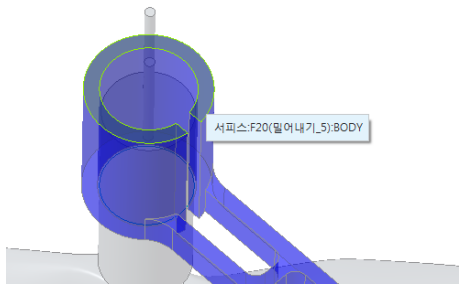


그림 5-324

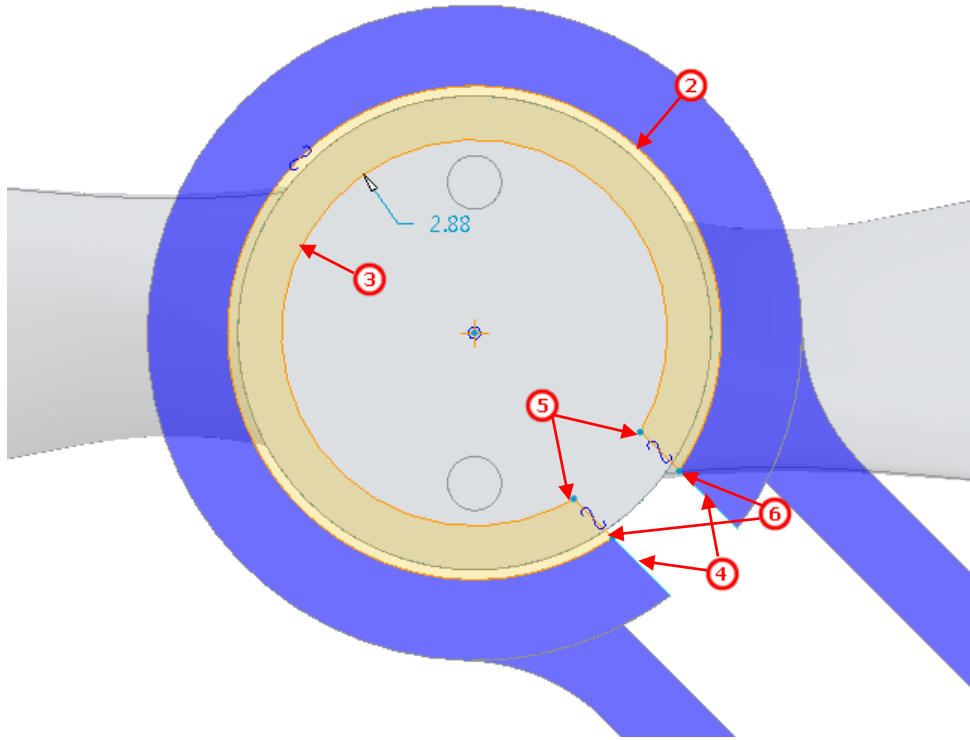


그림 5-325

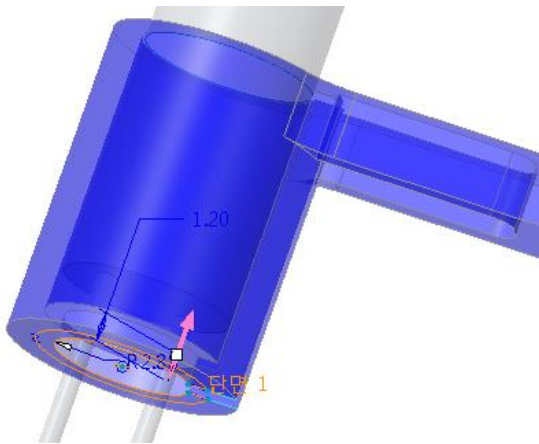


그림 5-326

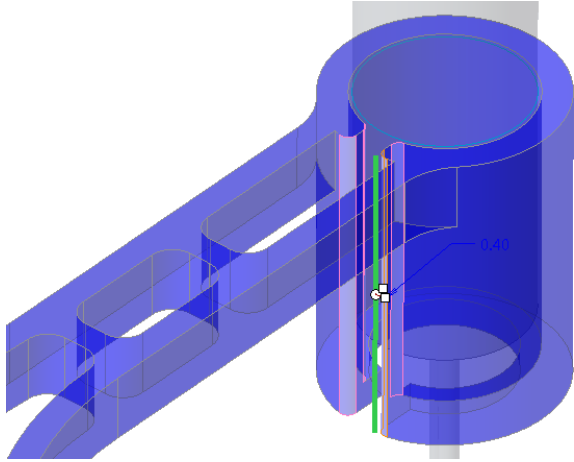


그림 5-327

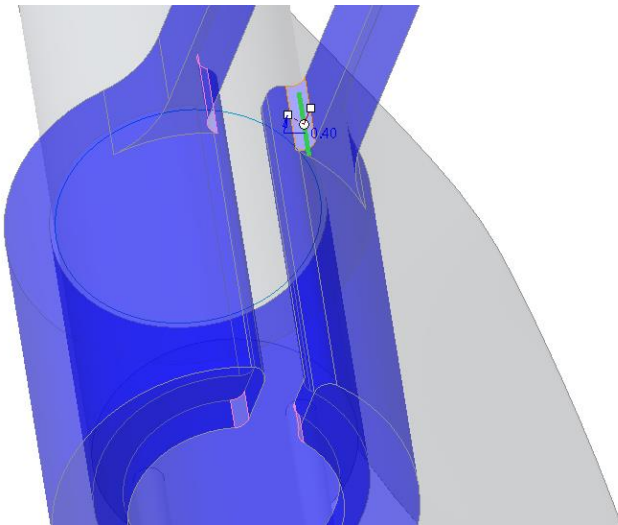


그림 5-328

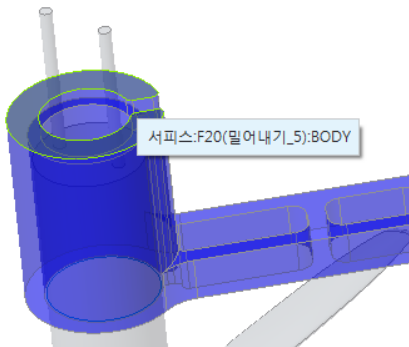


그림 5-329

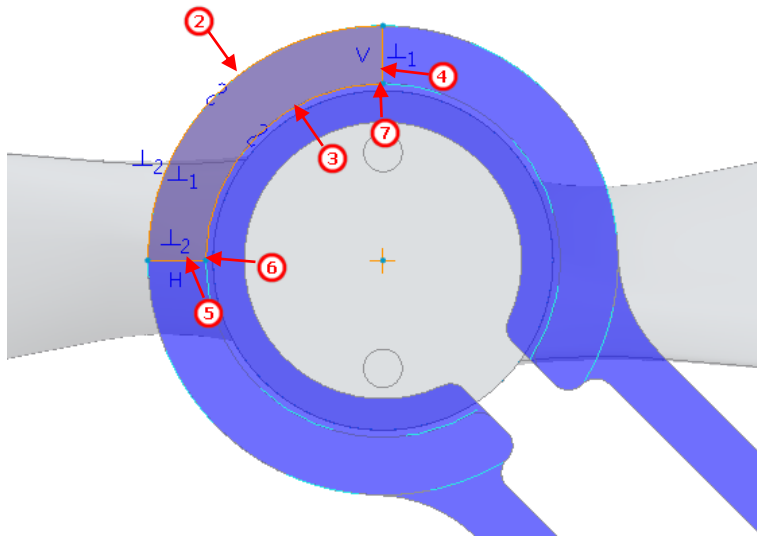


그림 5-330

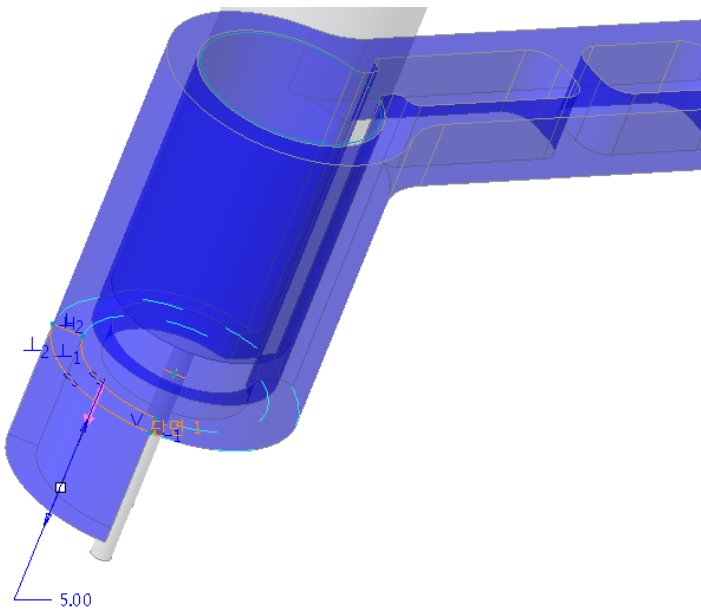


그림 5-331

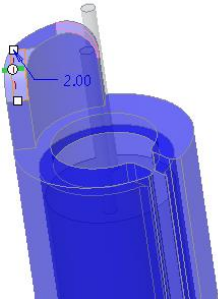


그림 5-332



그림 5-333

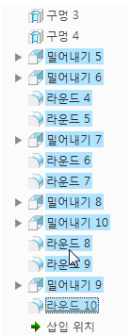


그림 5-334

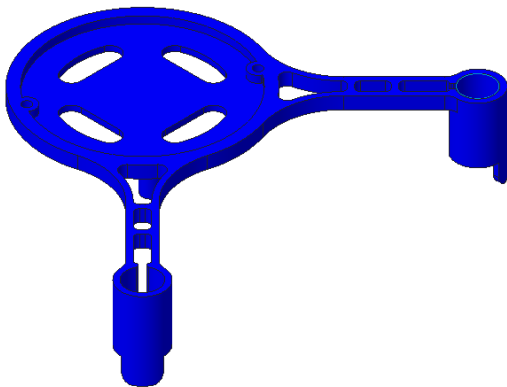


그림 5-335

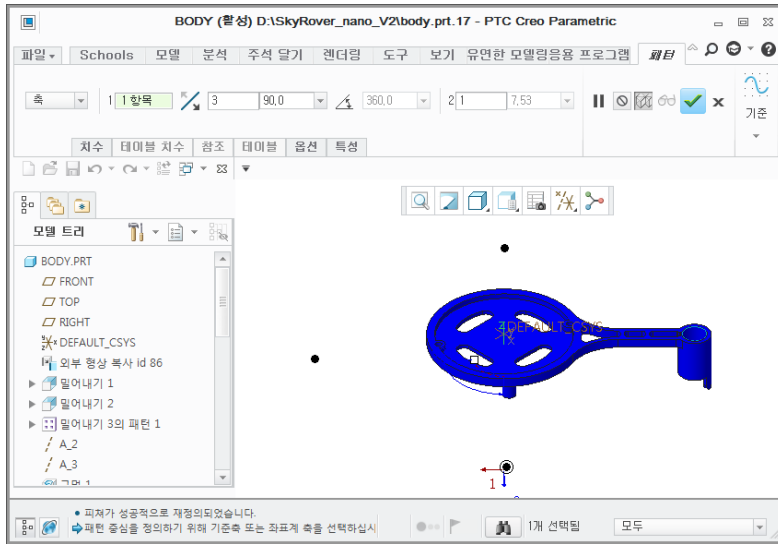


그림 5-336

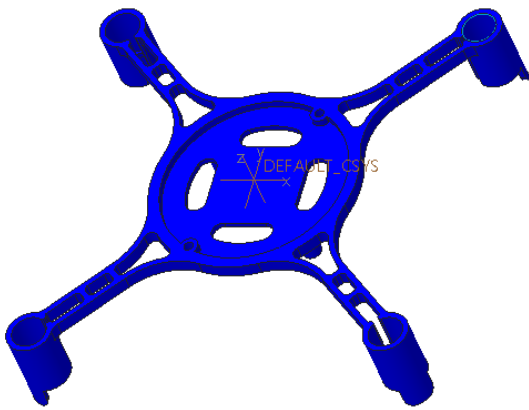


그림 5-337

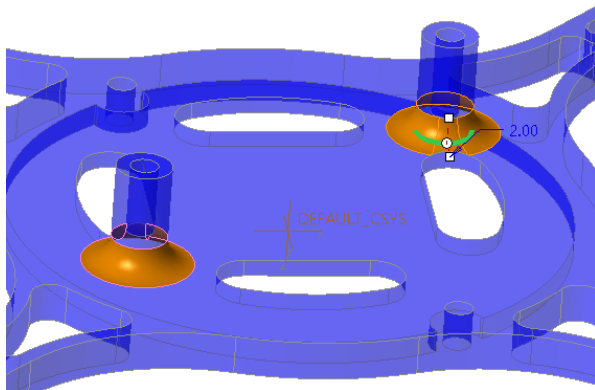


그림 5-338

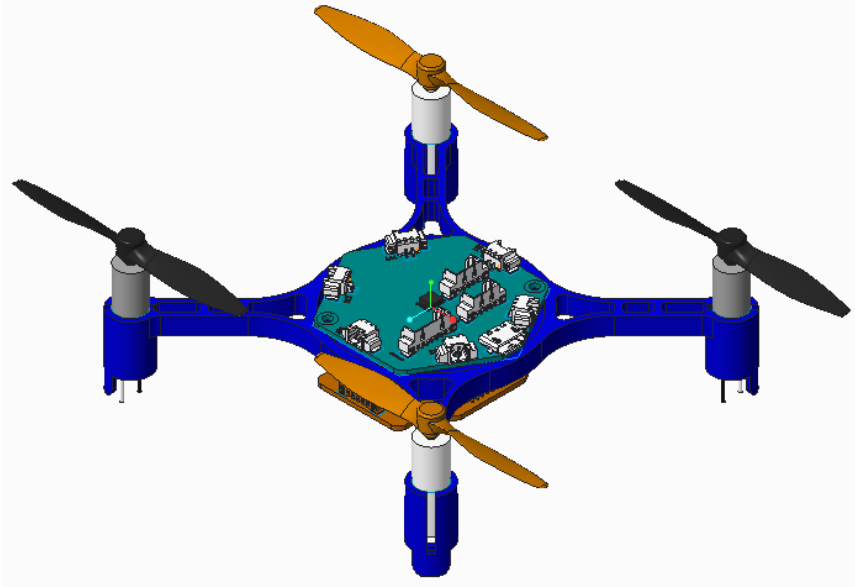


그림 5-339

6장. 협업 설계와 3D 프린팅



그림 6-340

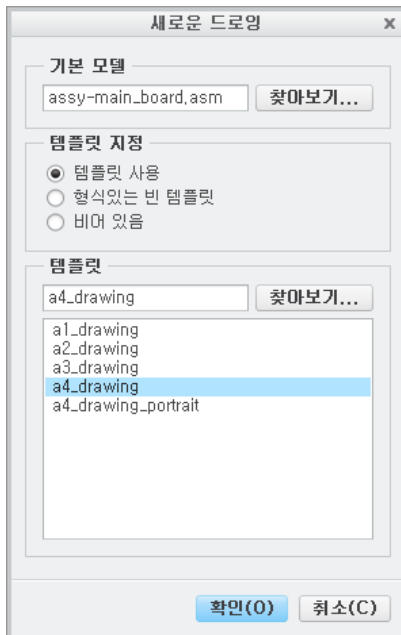


그림 6-341

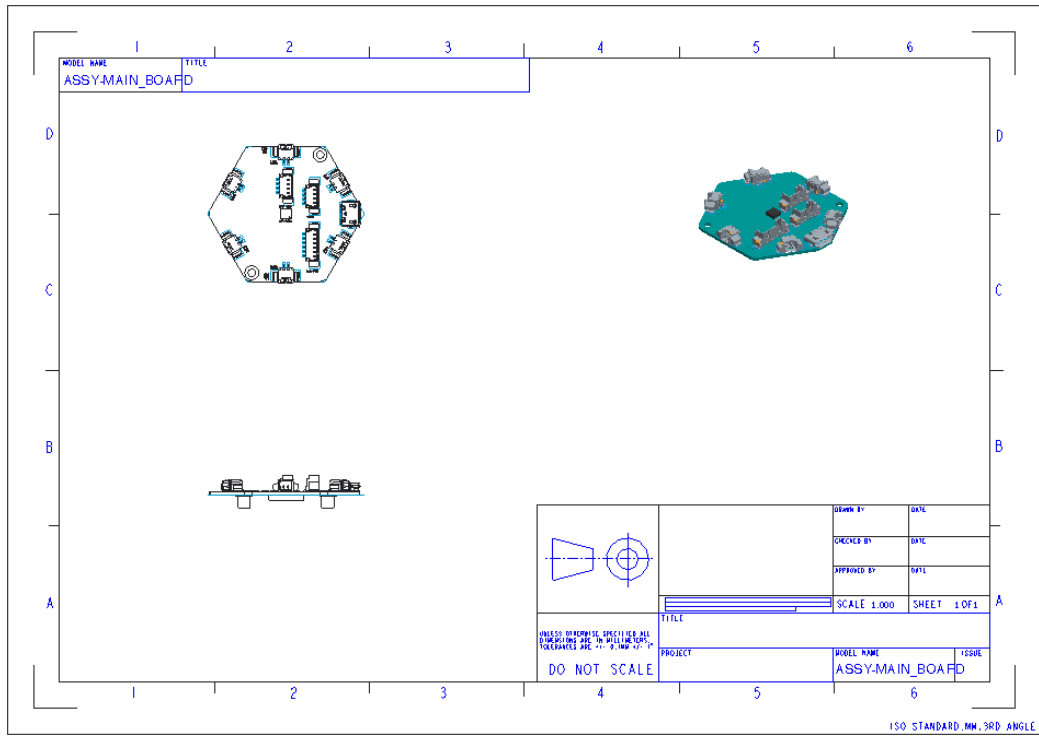


그림 6-342



그림 6-343

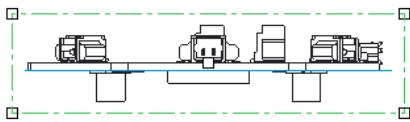


그림 6-344

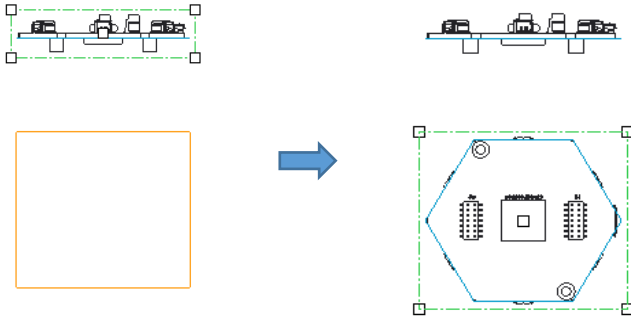


그림 6-345



그림 6-346

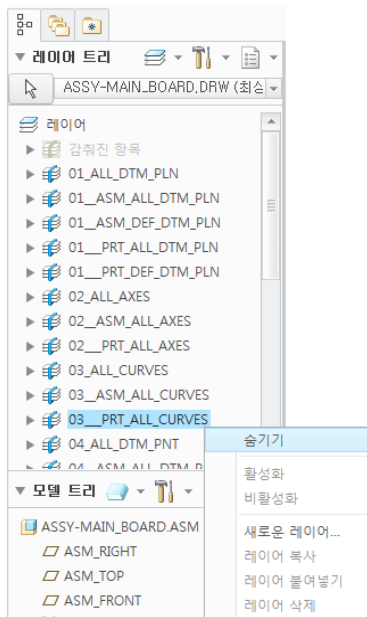


그림 6-347

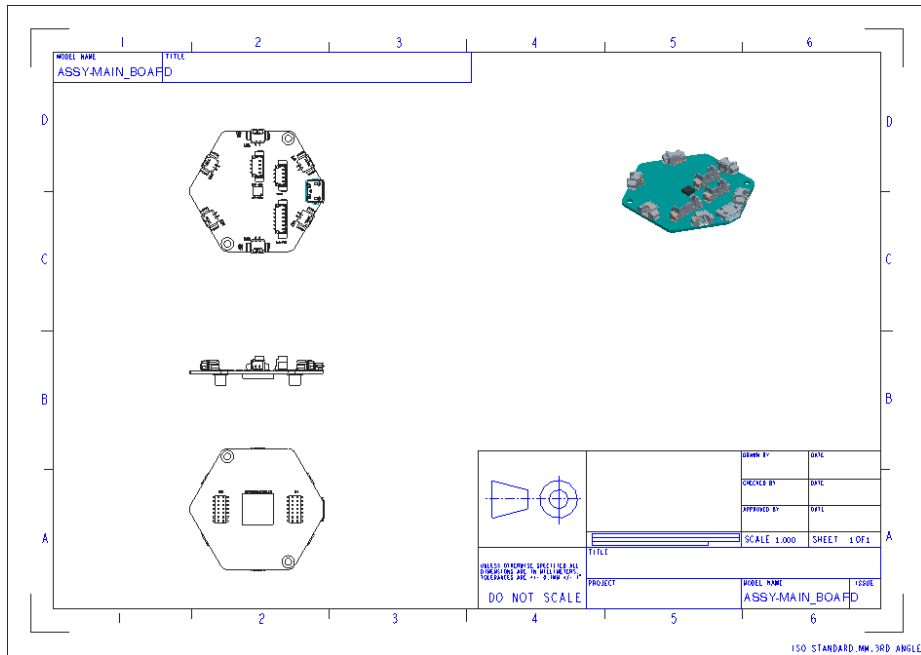


그림 6-348

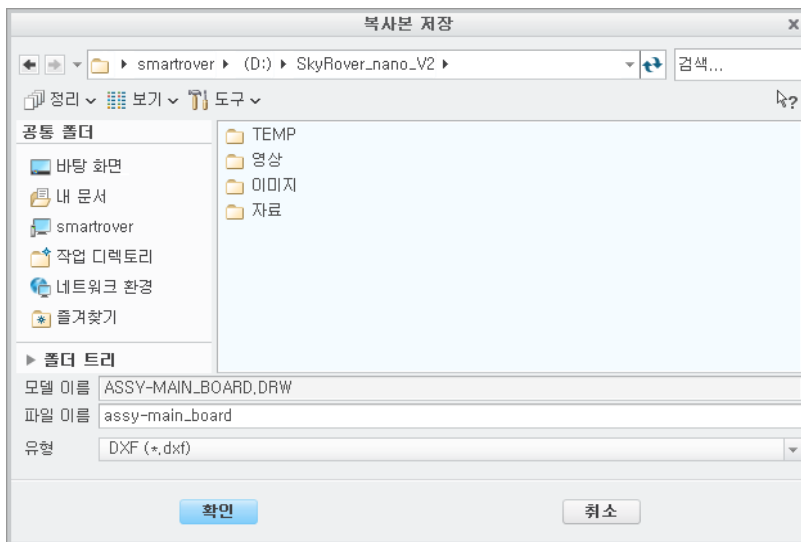


그림 6-349

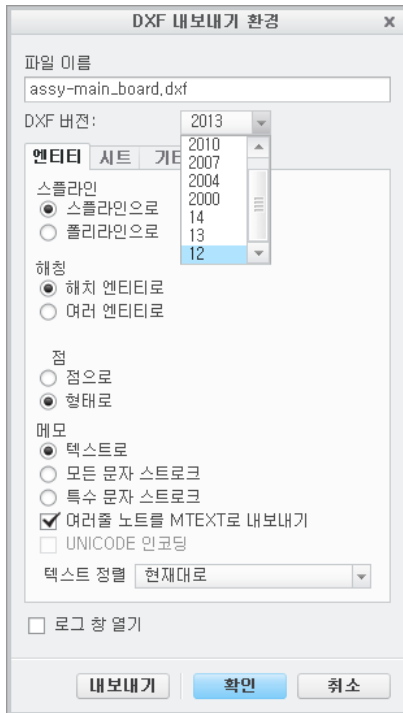


그림 6-350

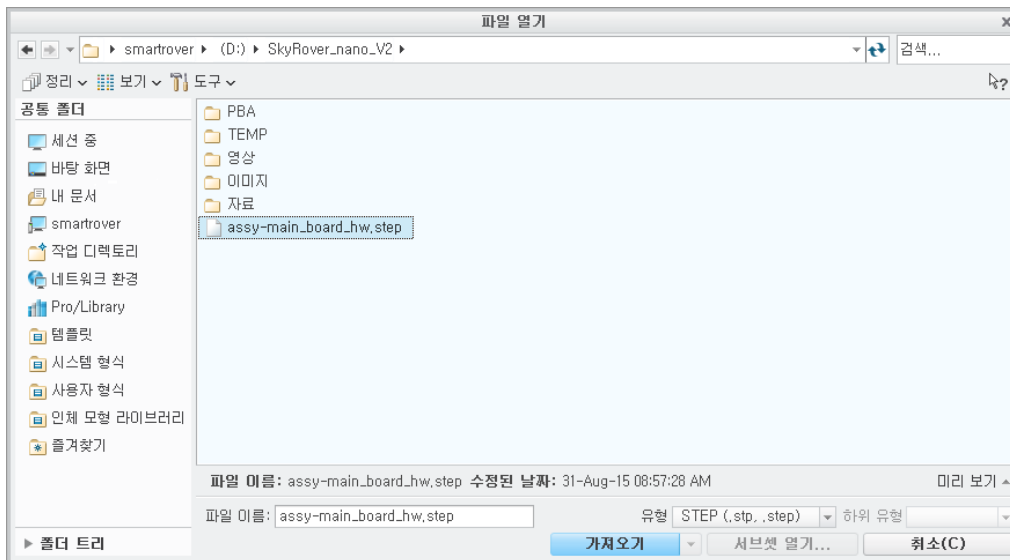


그림 6-351

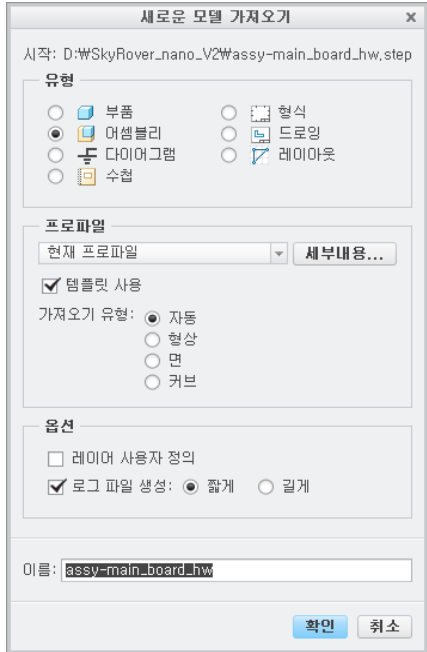


그림 6-352

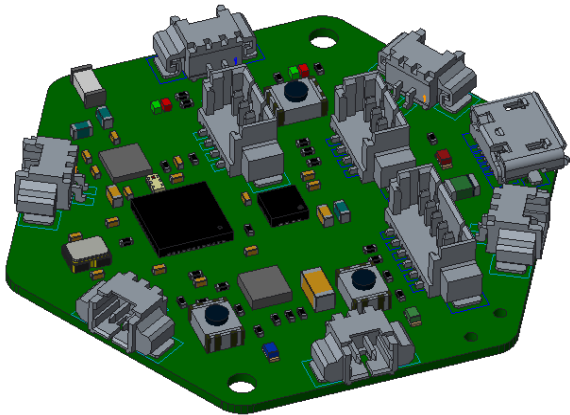


그림 6-353

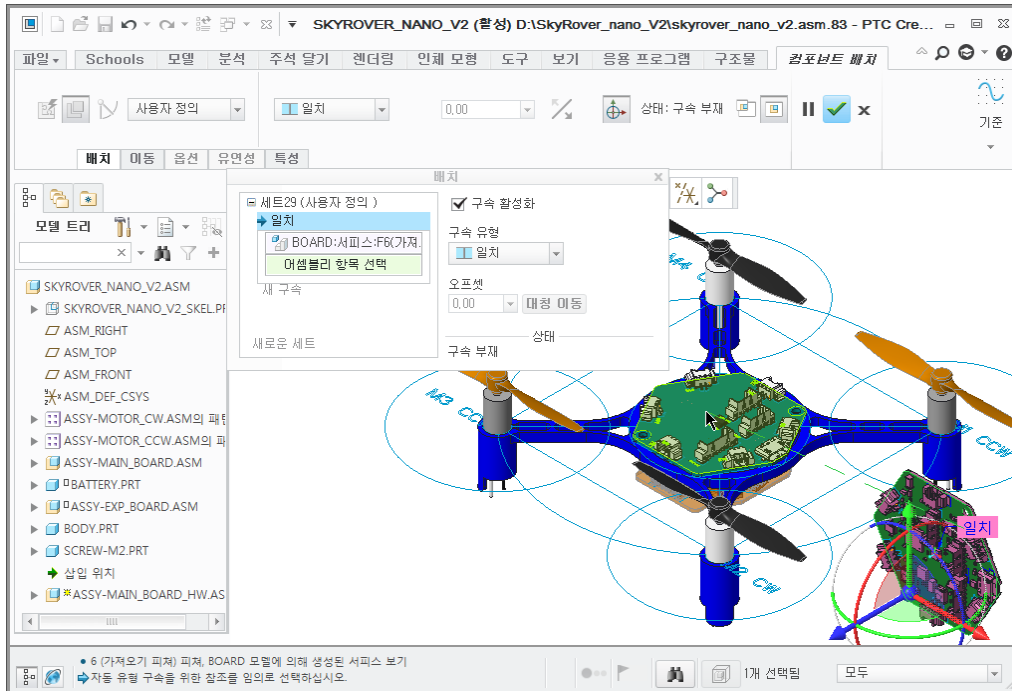


그림 6-354

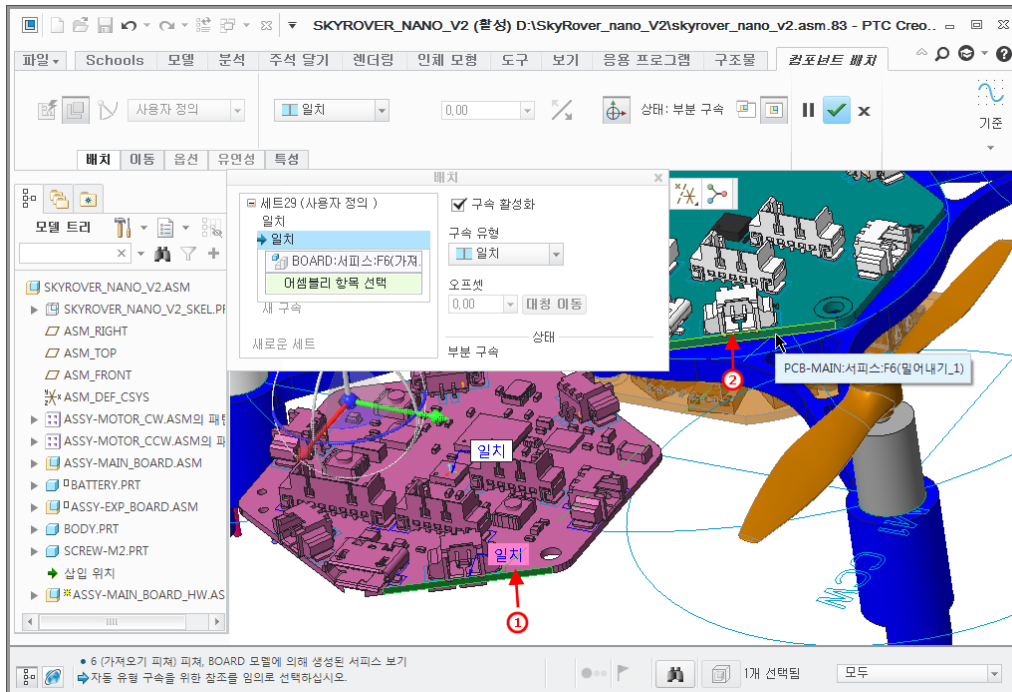


그림 6-355

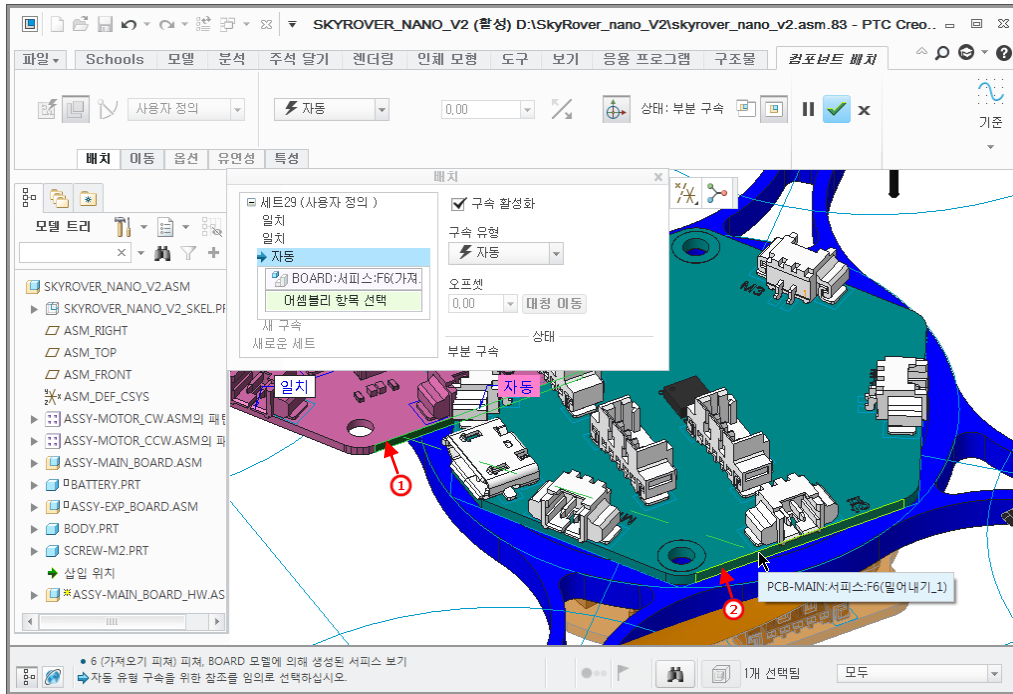


그림 6-356

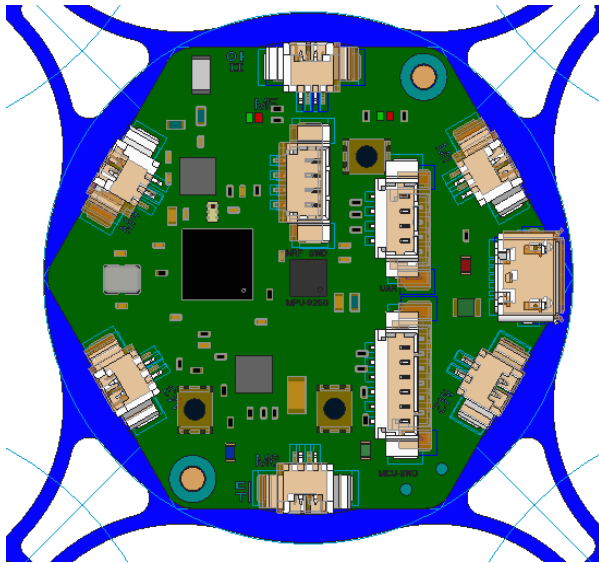


그림 6-357

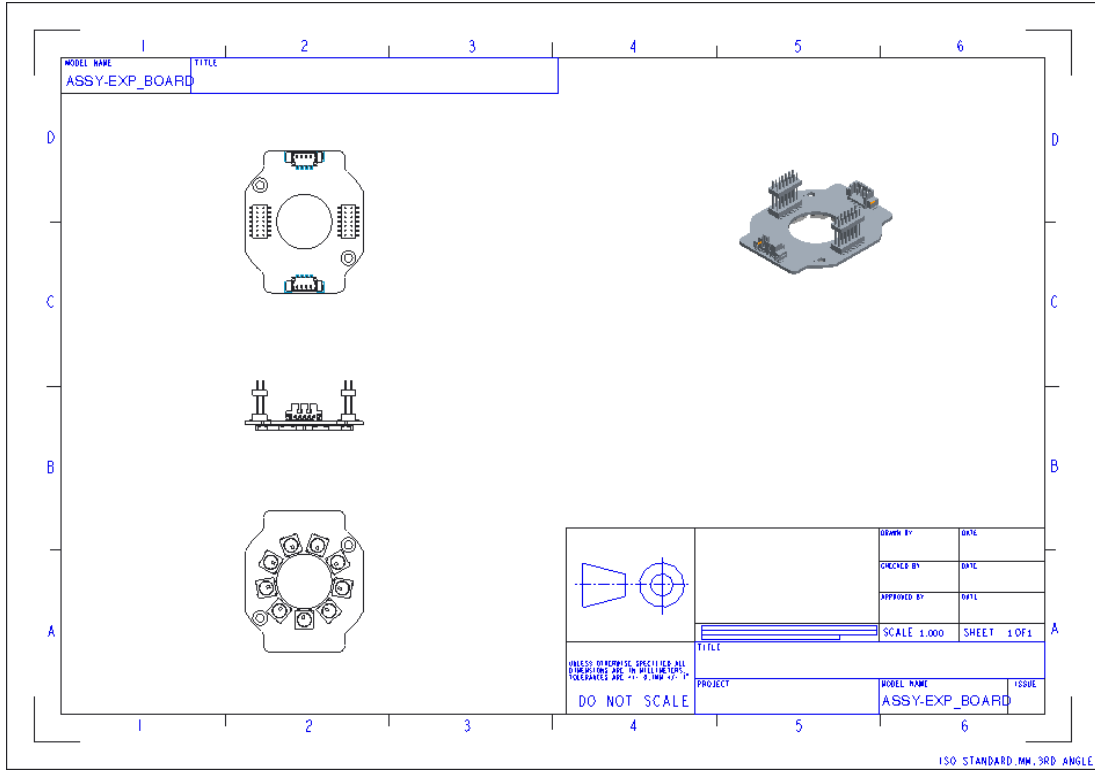


그림 6-358

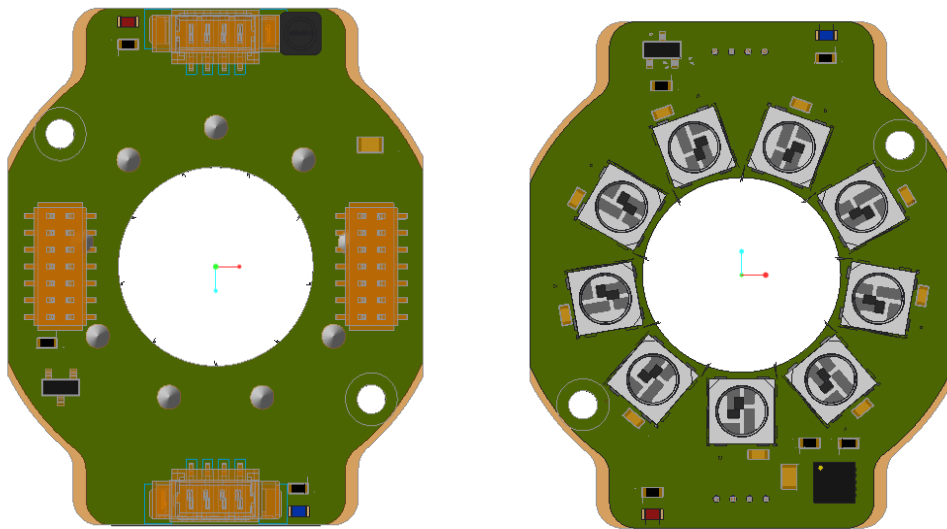


그림 6-359



그림 6-360



그림 6-361



그림 6-362



그림 6-363

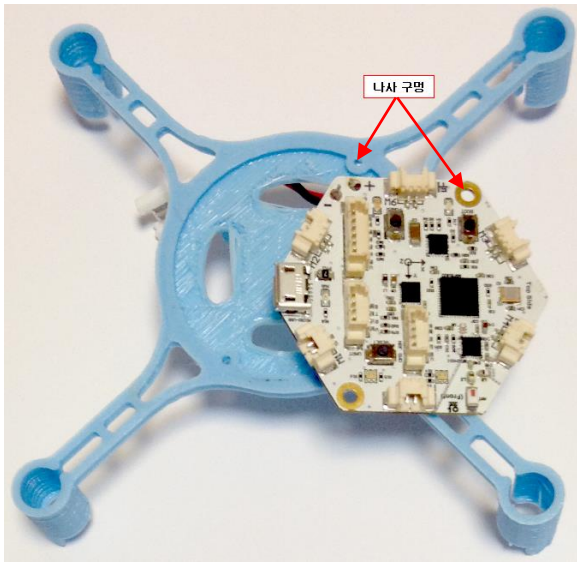


그림 6-364



그림 6-365

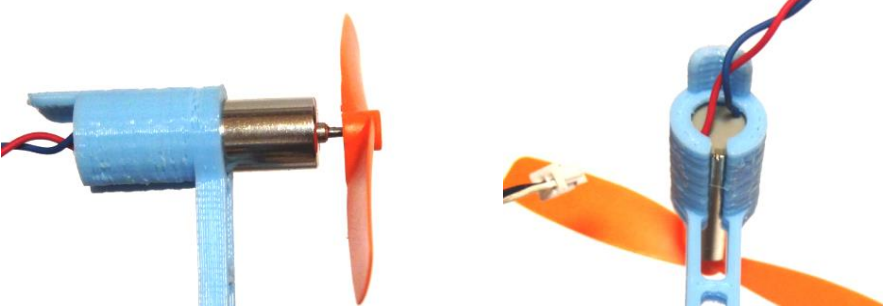


그림 6-366



그림 6-367

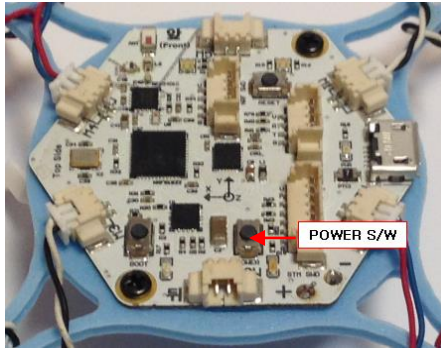
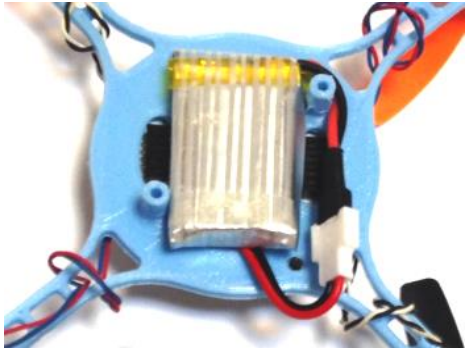


그림 6-368

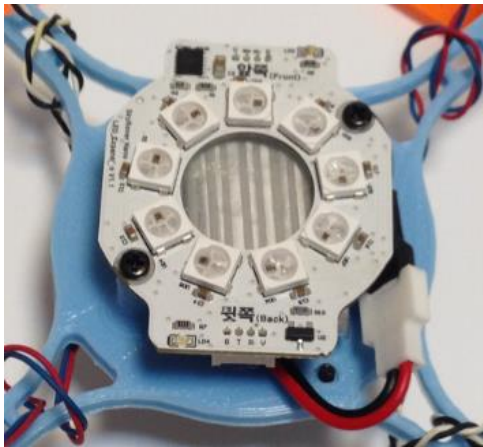


그림 6-369

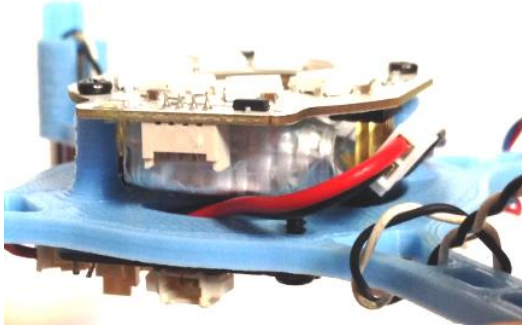


그림 6-370



그림 6-371

7장. 스카이로버 회로 및 부품 설명

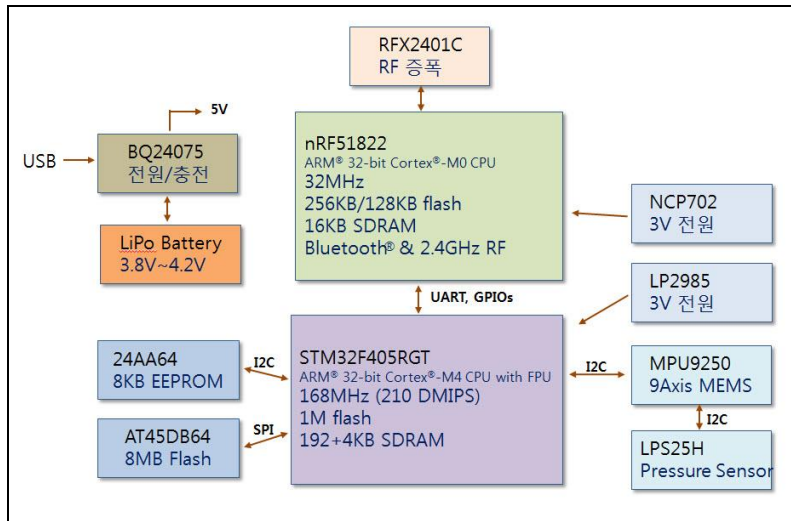


그림 7-372 전체 구성도

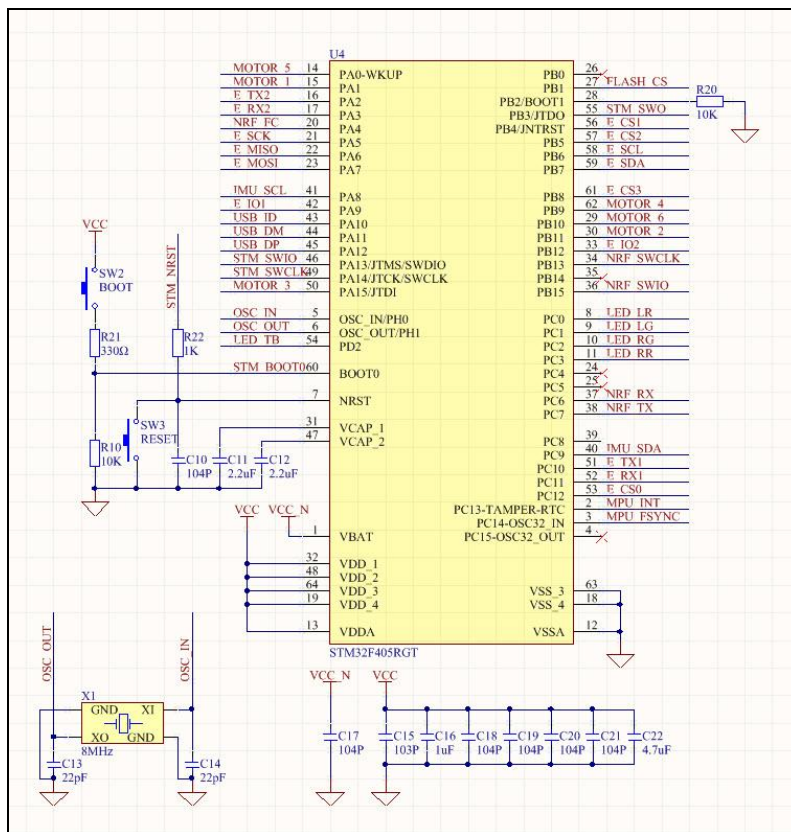


그림 7-373 주 MCU인 STM32F405 회로 부분

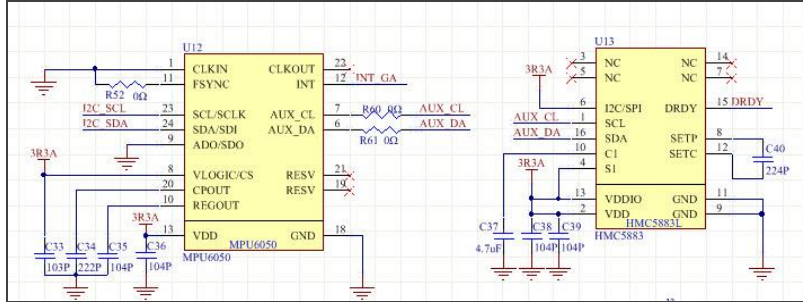


그림 7-374 버전 1의 IMU 센서 회로

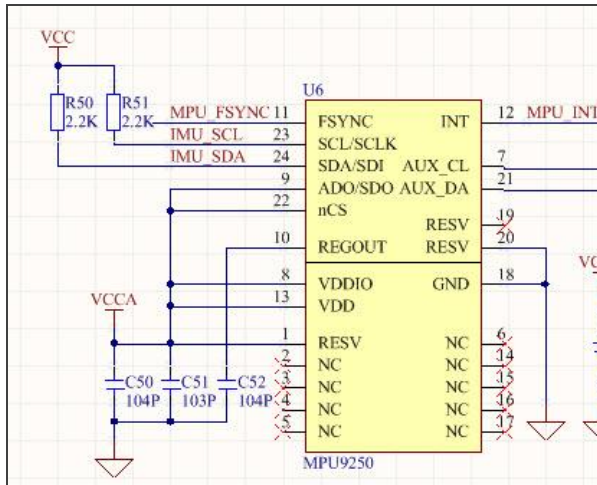


그림 7-375 버전 2의 IMU 센서 회로

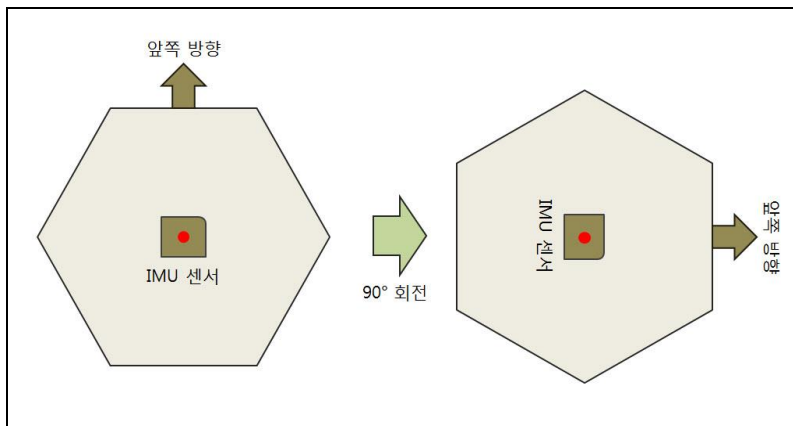


그림 7-376 IMU 센서 중앙 위치

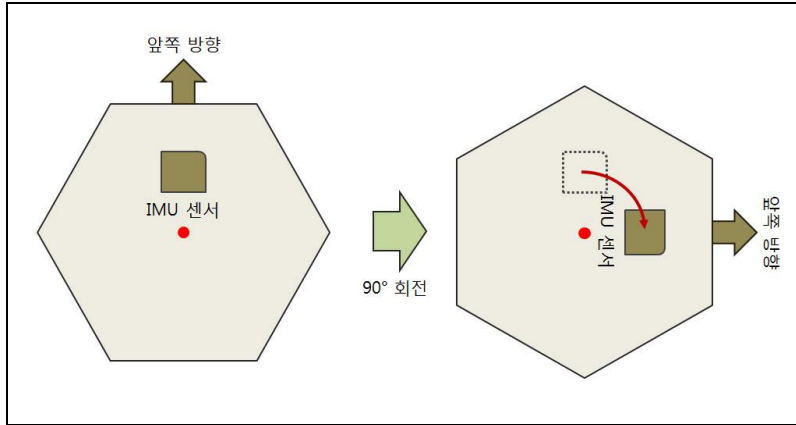


그림 7-377 IMU 센서가 보드 앞쪽에 위치 시

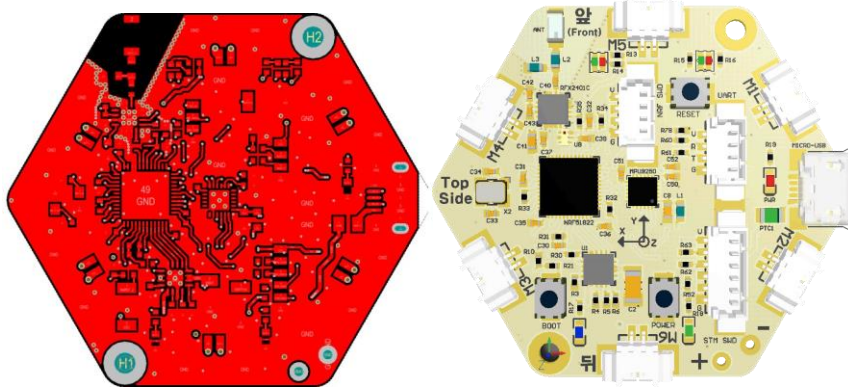


그림 7-378 PCB 윗층 Copper 모습

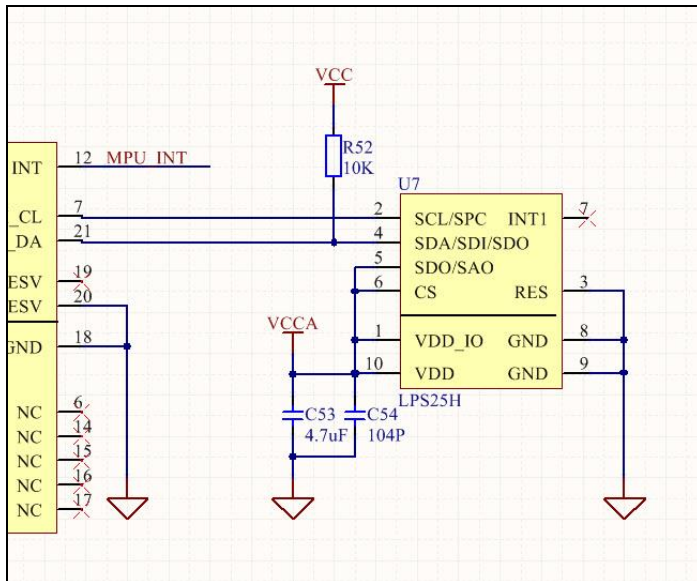


그림 7-379 기압 센서 회로 부분

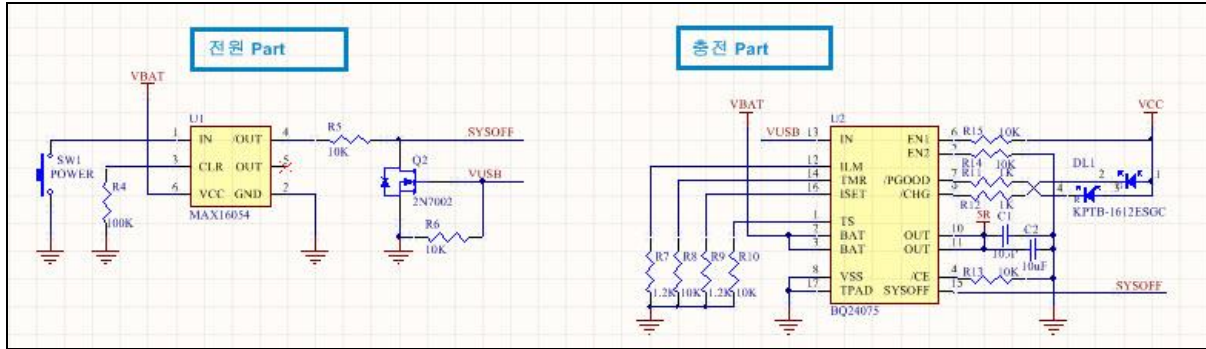


그림 7-382 버전 2 Sample 보드 충전 회로

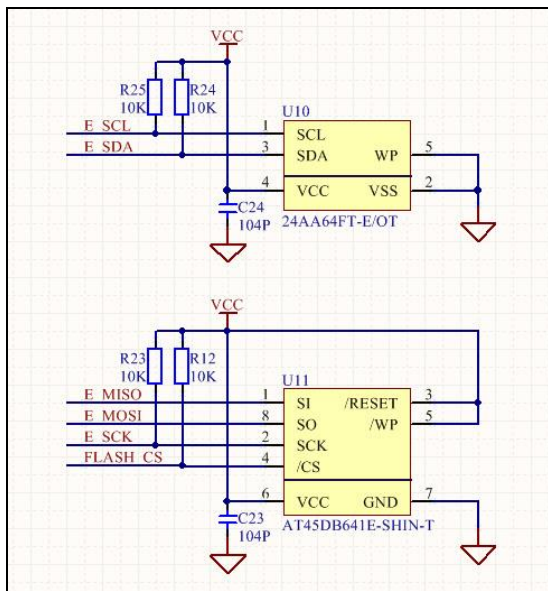


그림 7-383 Memory 회로

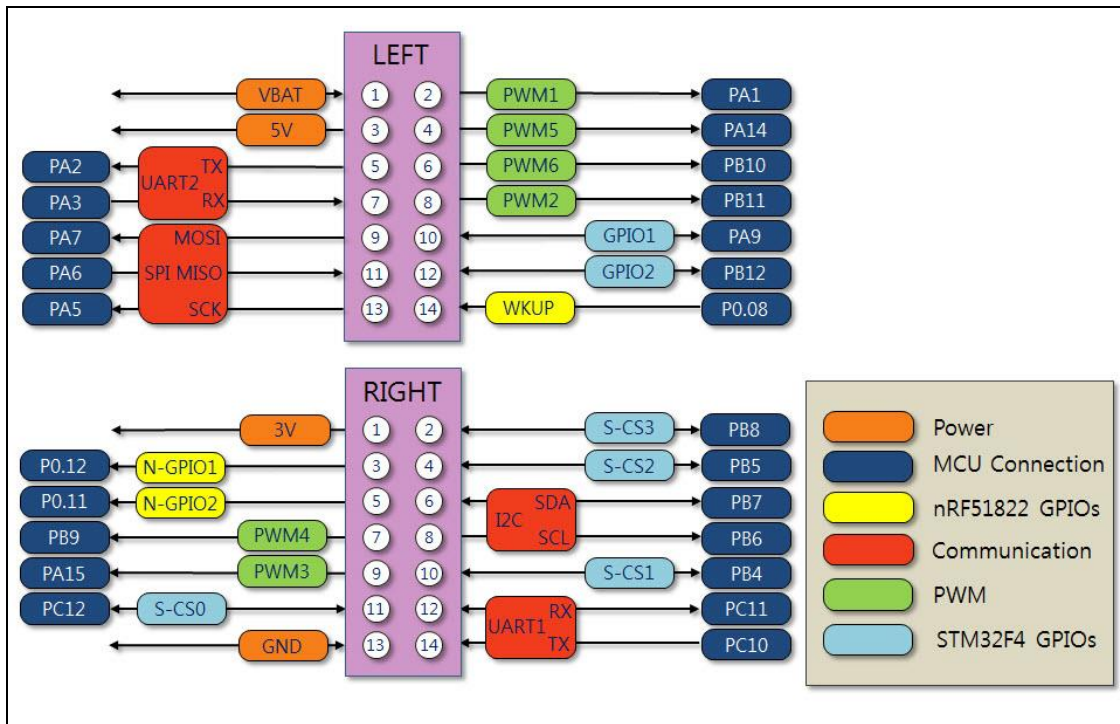
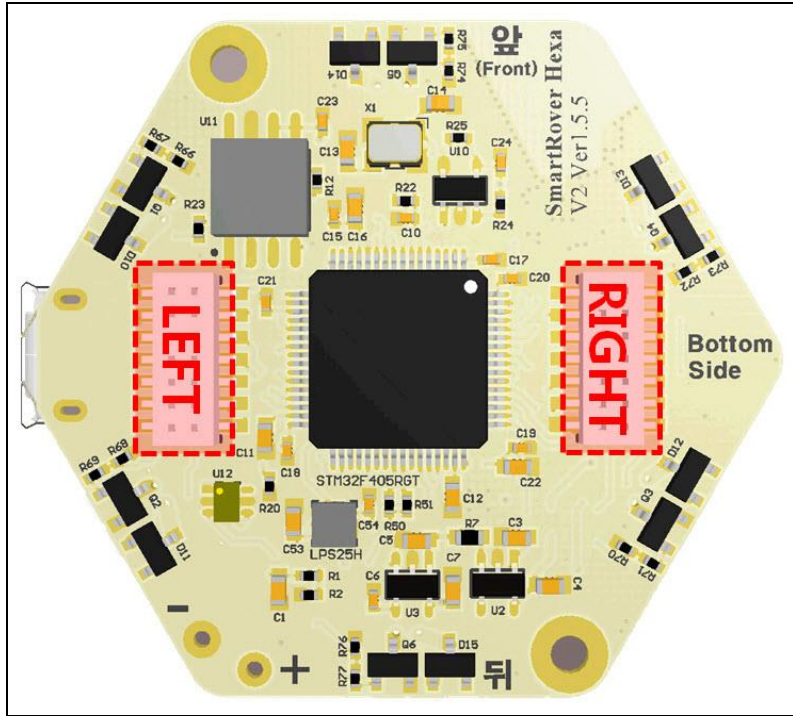


그림 7-384 확장 커넥터

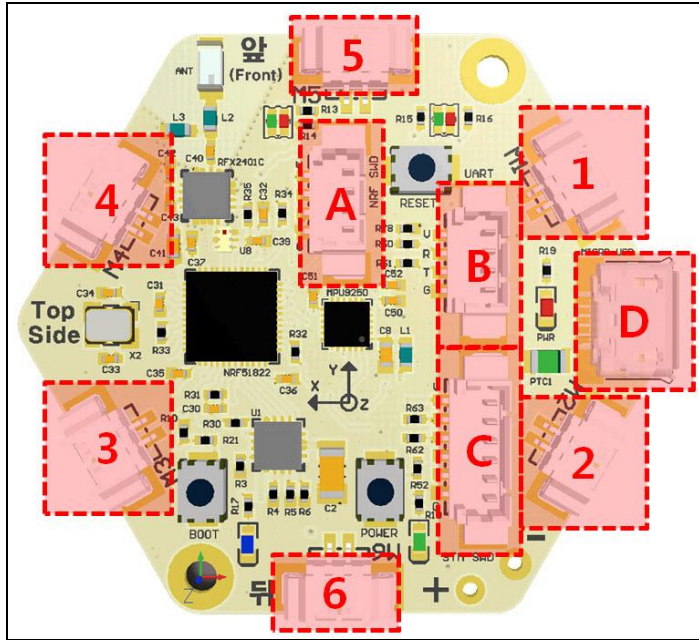


그림 7-385

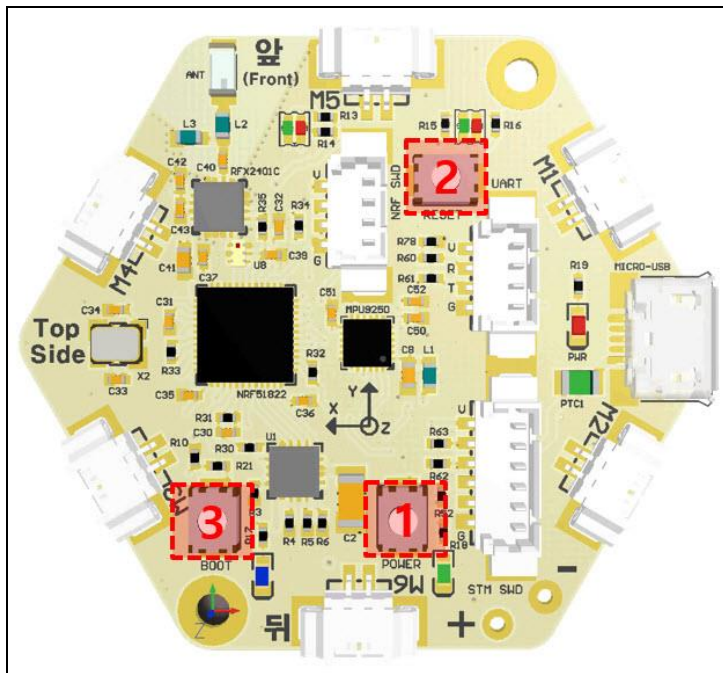


그림 7-386 버튼

Boot mode selection pins		Boot mode	Aliasing
BOOT1	BOOT0		
X	0	User Flash memory	User Flash memory is selected as the boot space
0	1	System memory	System memory is selected as the boot space
1	1	Embedded SRAM	Embedded SRAM is selected as the boot space

그림 7-387 Boot pin 설정

8장. Altium Designer를 이용한 회로 설계

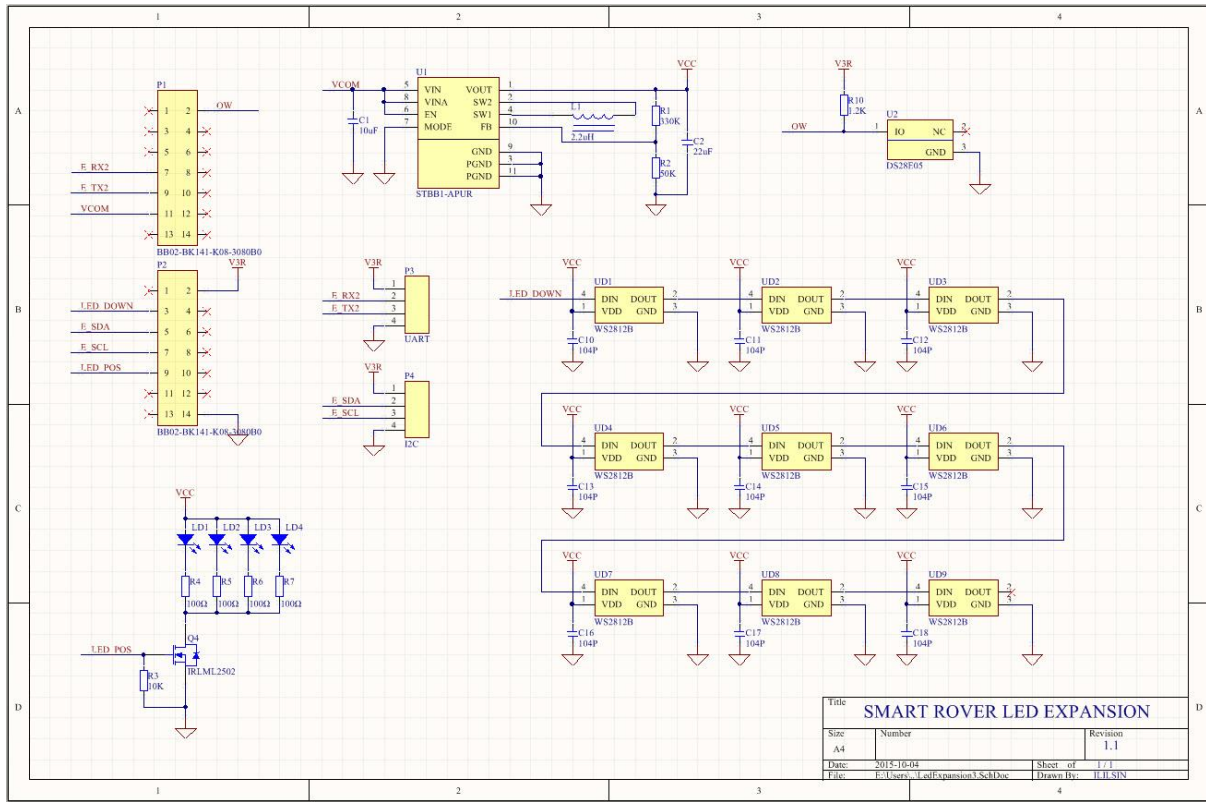


그림 8-388 SkyRover LED 확장보드 회로도

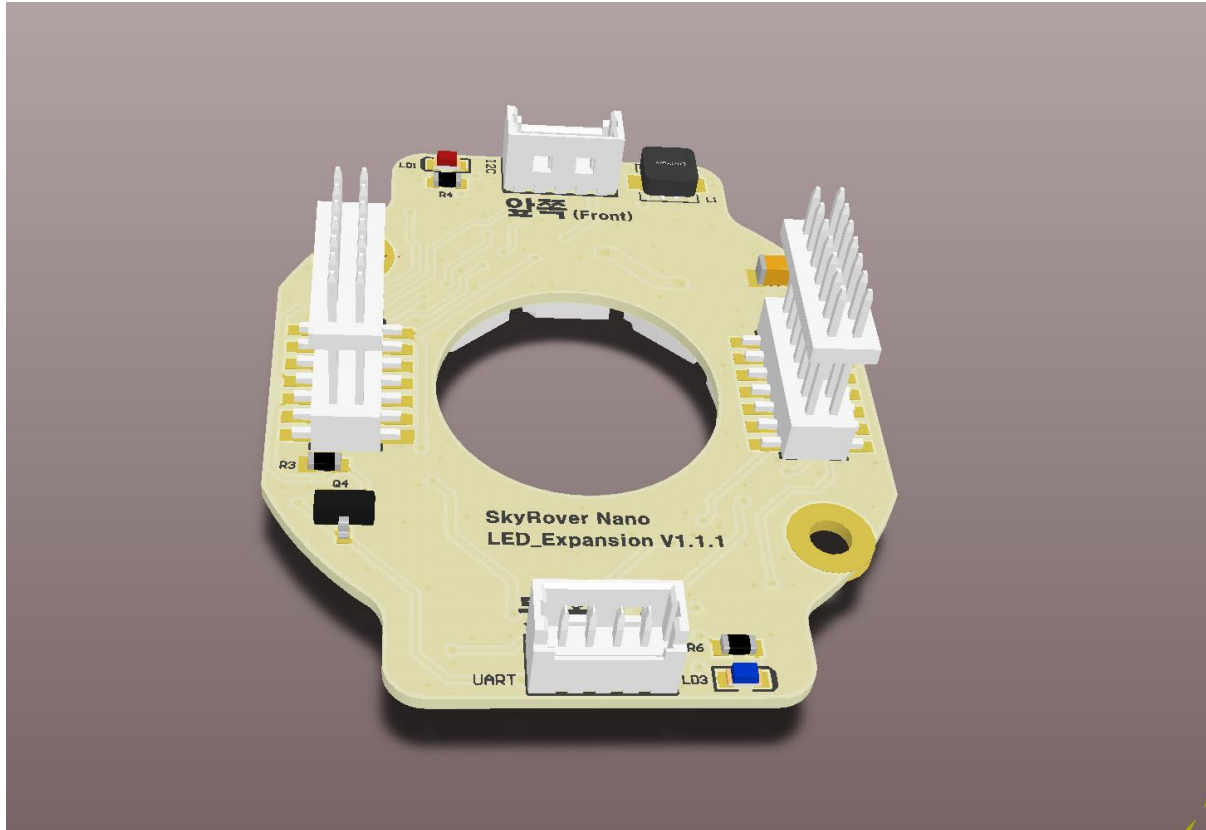


그림 8-389 SkyRover LED 확장보드 3D 형태

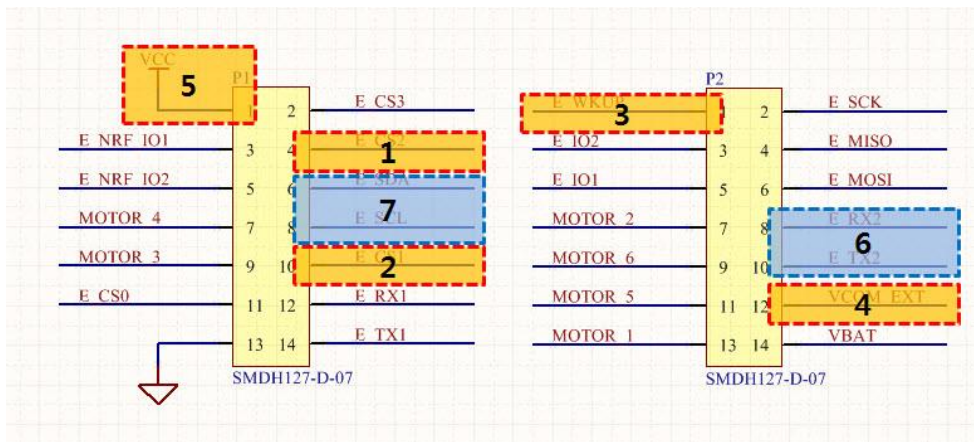
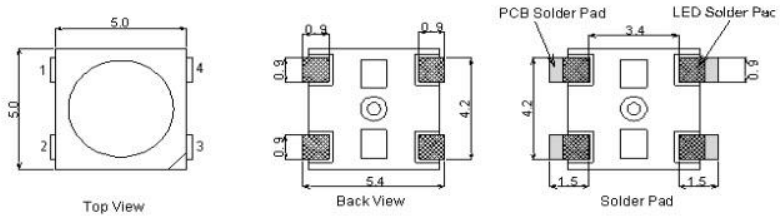
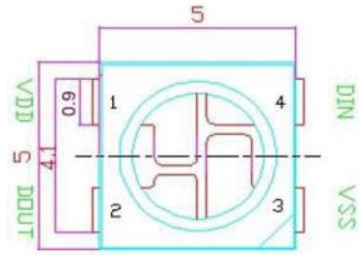


그림 8-390 LED 확장보드 I/O 핀 구성도

Mechanical Dimensions



PIN configuration



PIN function

NO.	Symbol	Function description
1	VDD	Power supply LED
2	DOUT	Control data signal output
3	VSS	Ground
4	DIN	Control data signal input

Data transmission method:

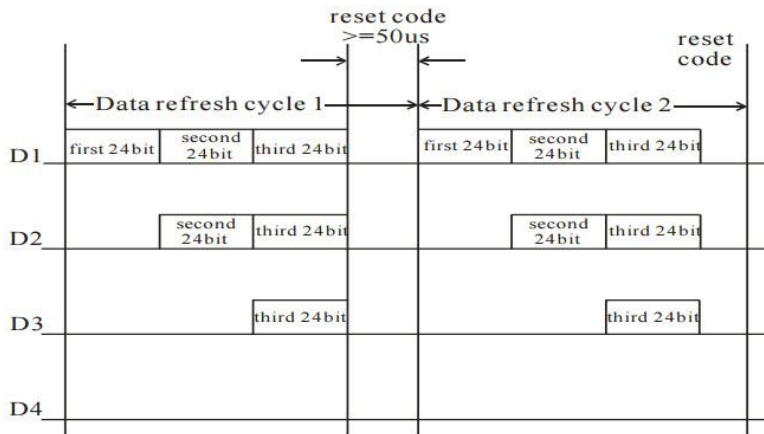


그림 8-391 WS2812B 제원과 신호 전달 방법

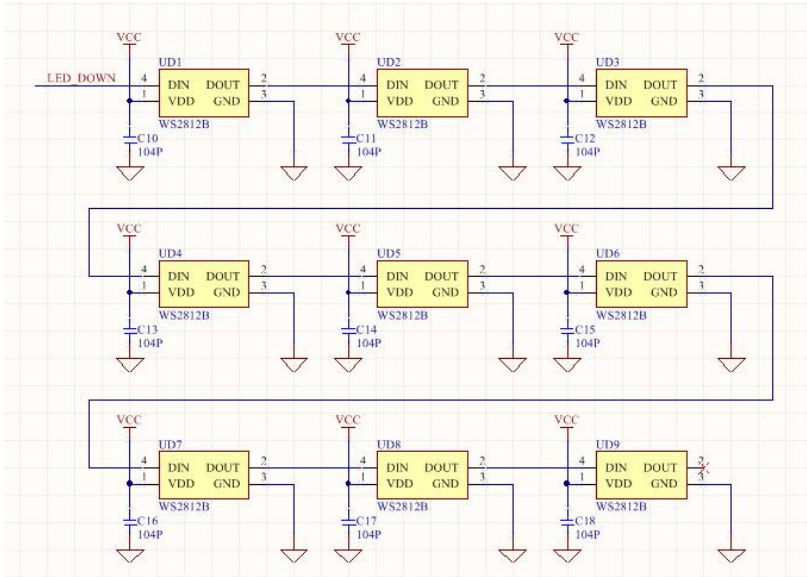


그림 8-392 LED 확장보드 LED 회로

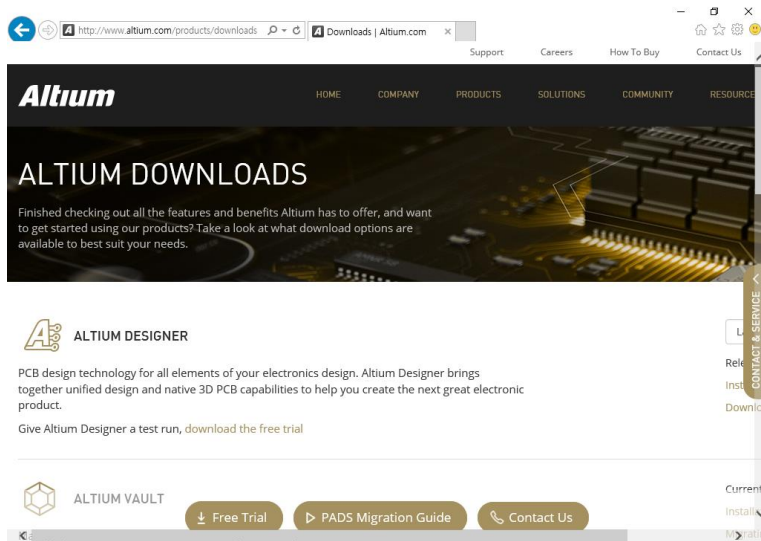


그림 8-393 Altium 홈페이지

Thank you for registering for your 15-day trial to Altium Designer. Follow the steps below to get started:

1. [Click here to go to the download page and for help installing](#)
2. Download your **free trial license** and save it locally
3. Install Altium Designer using the username and password below

Username:	evaluser@altium.com
Password:	1#tSzNmG

4. Run Altium Designer, from the **My Account** page click **Add standalone license file** and choose the license file from step 2 you saved on your computer.
5. Start designing

그림 8-394 등록 안내 메일

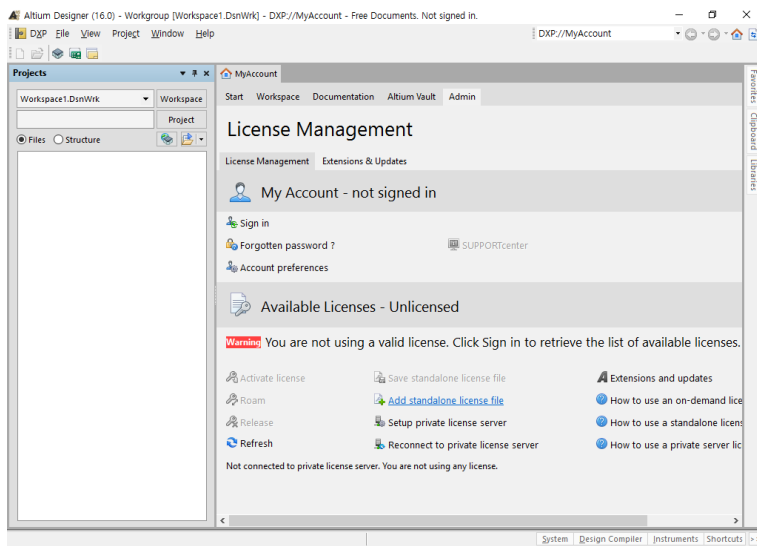


그림 8-395 라이선스 등록

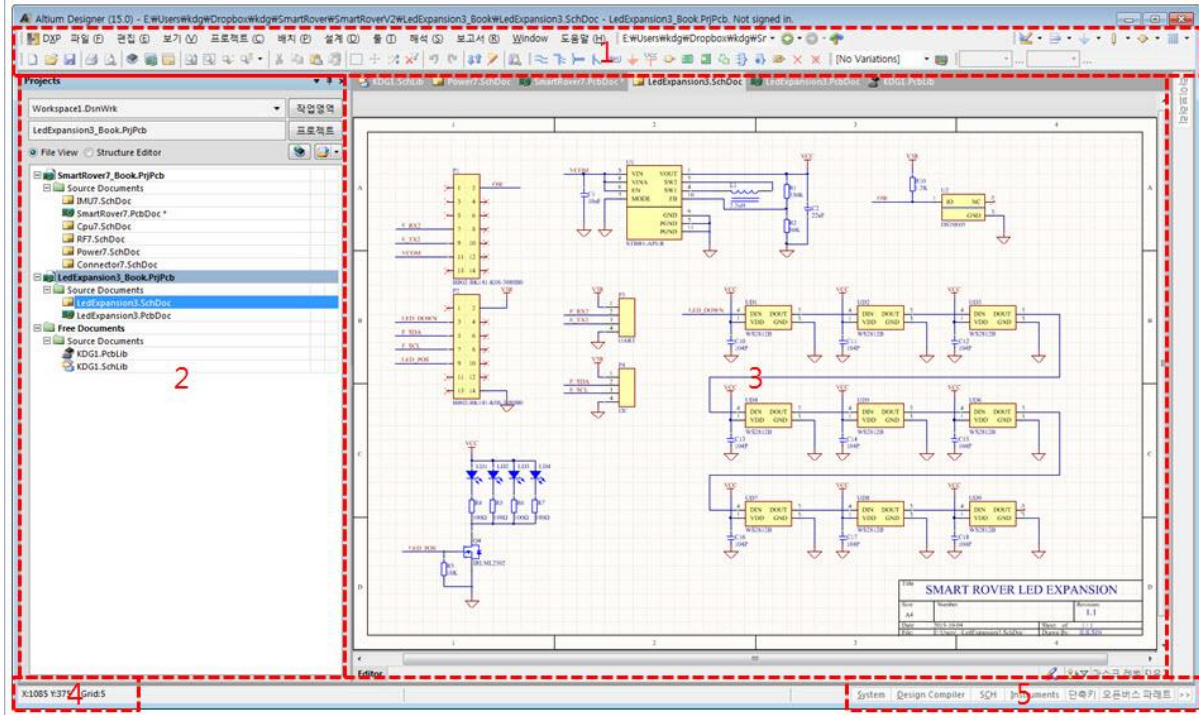


그림 8-396 Altium Designer 화면 구성

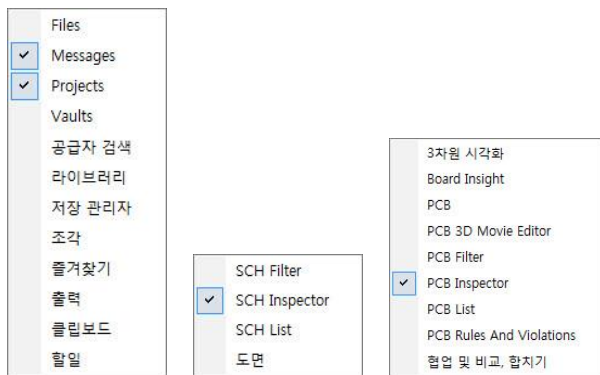


그림 8-397 시스템 팝업 메뉴

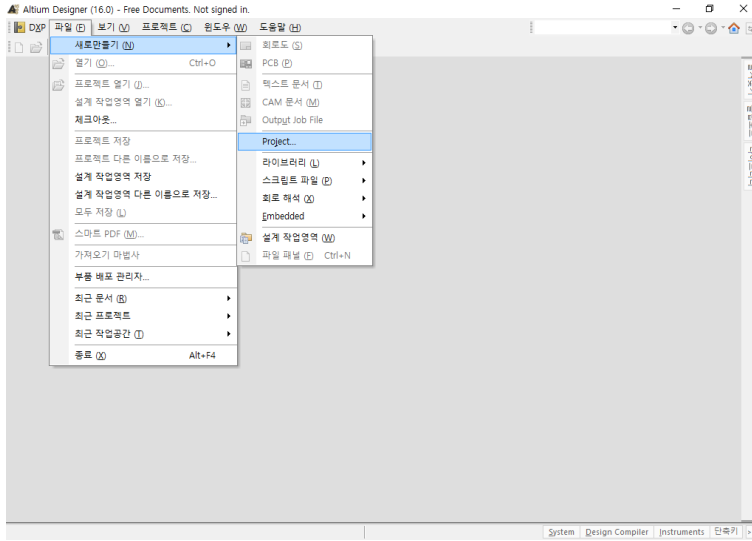


그림 8-398 프로젝트 생성 메뉴

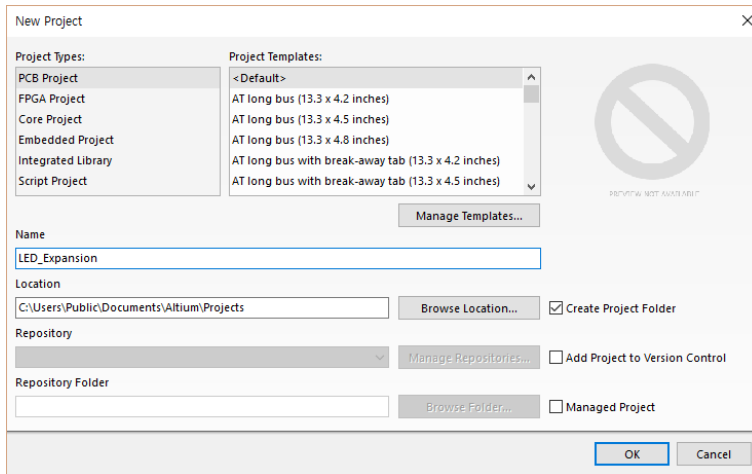


그림 8-399 프로젝트 이름과 위치 입력

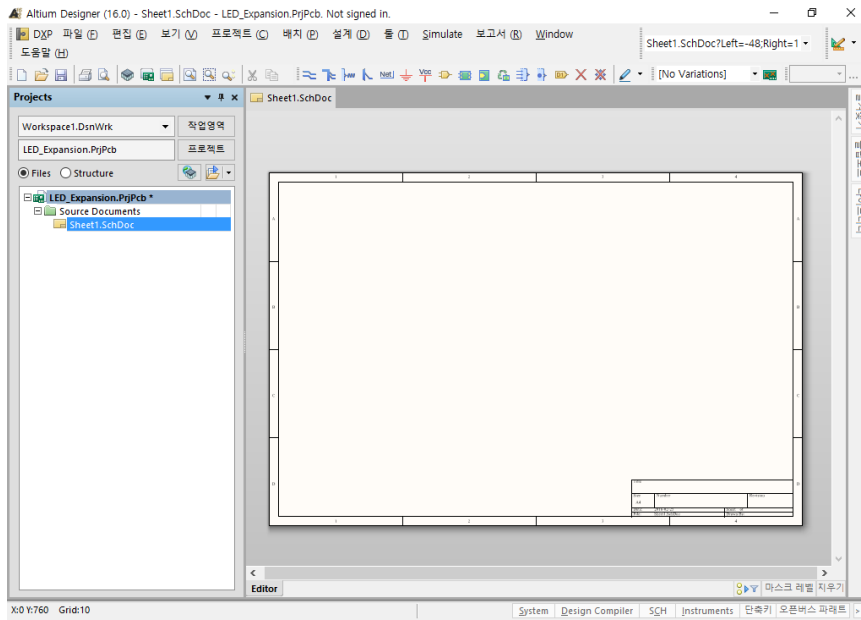


그림 8-400 회로도 생성 초기 화면

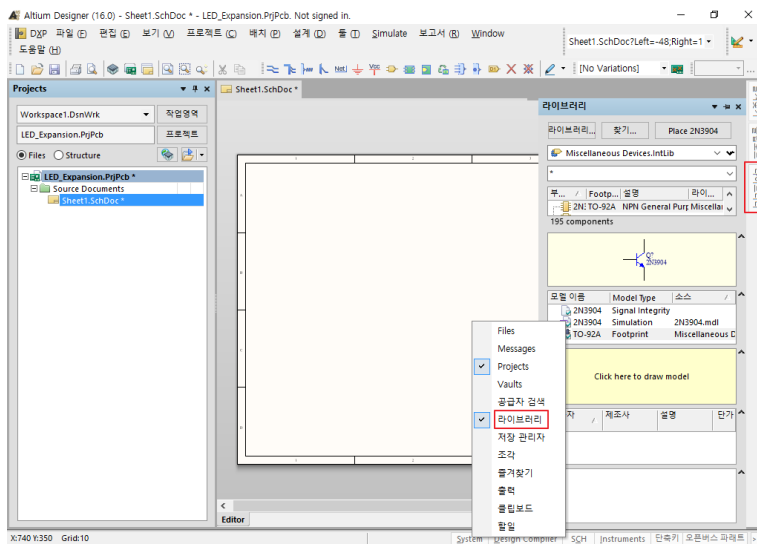


그림 8-401 라이브러리 보기

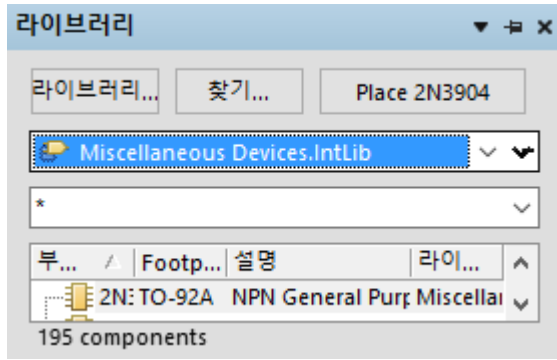


그림 8-402 라이브러리 선택

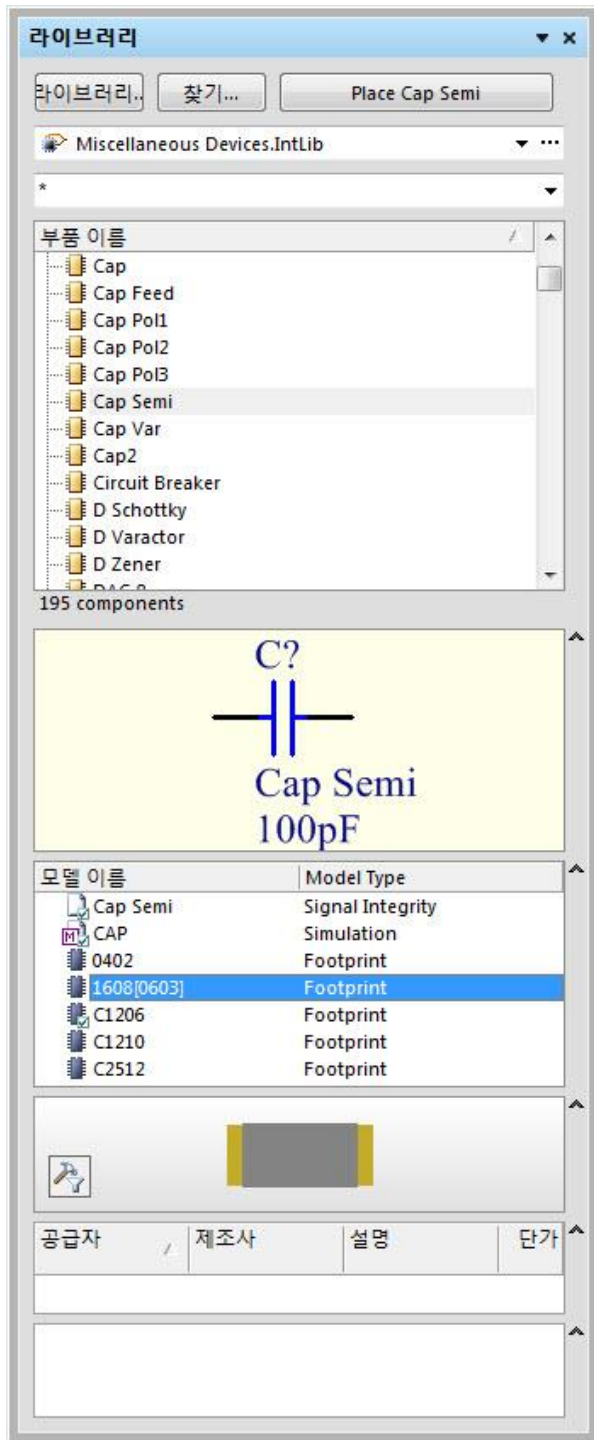


그림 8-403 라이브러리에서 부품 선택

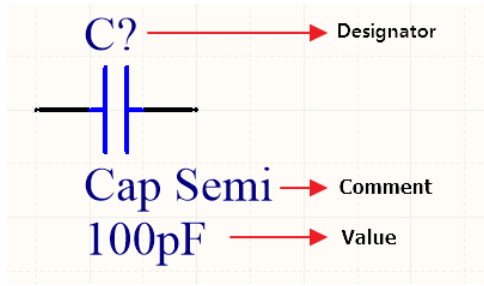


그림 8-404 부품 배치

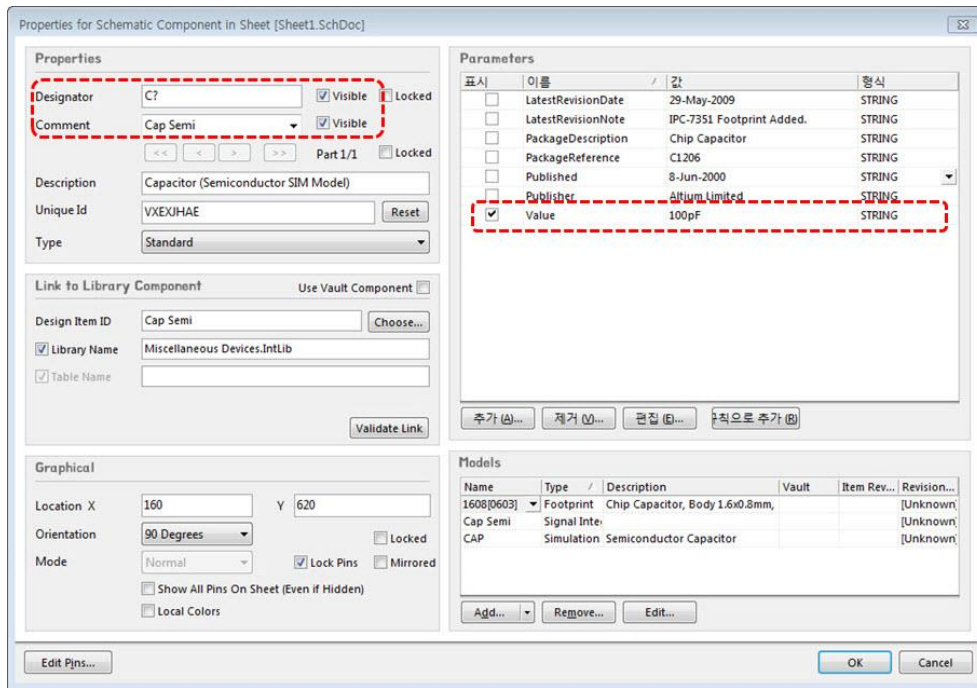


그림 8-405 부품 속성 창

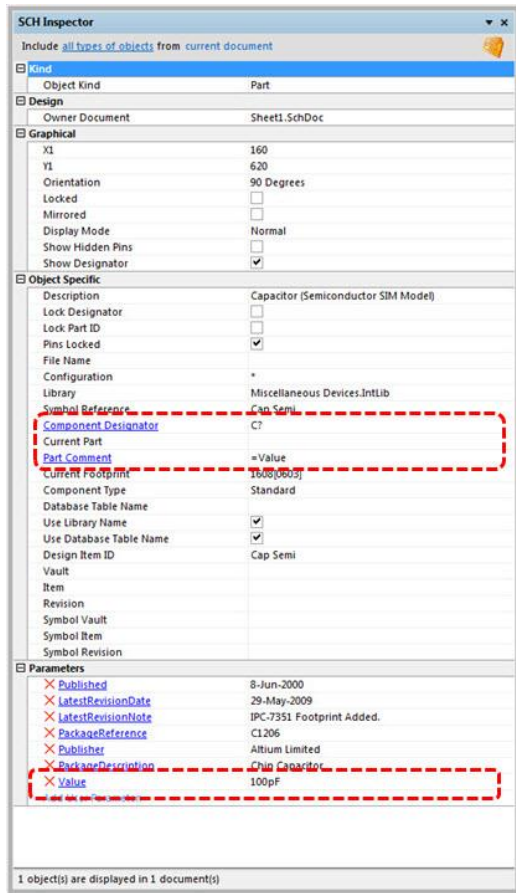


그림 8-406 부품 속성 창 (SCH Inspector)

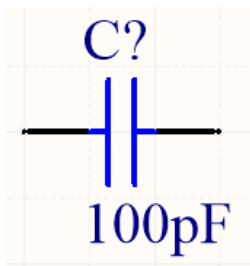


그림 8-407 부품 표현

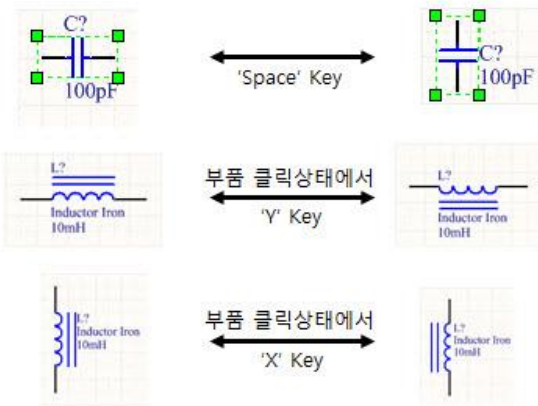


그림 8-408 회전에 따른 부품 표시

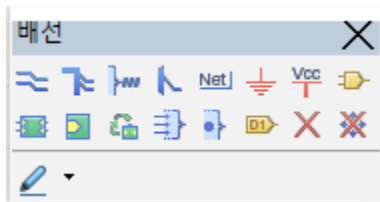


그림 8-409 배선 Icon 박스



그림 8-410 전원 포트 창

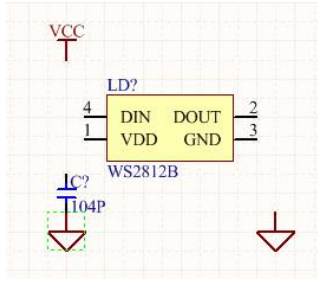


그림 8-411 부품 배치(예)

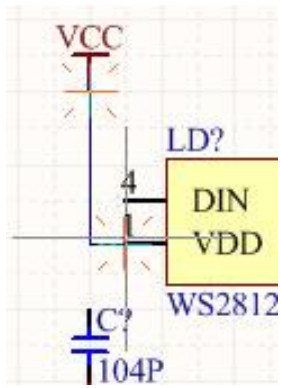


그림 8-412 배선(예)

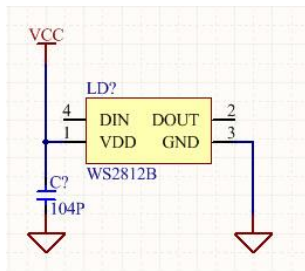


그림 8-413 배선(예2)

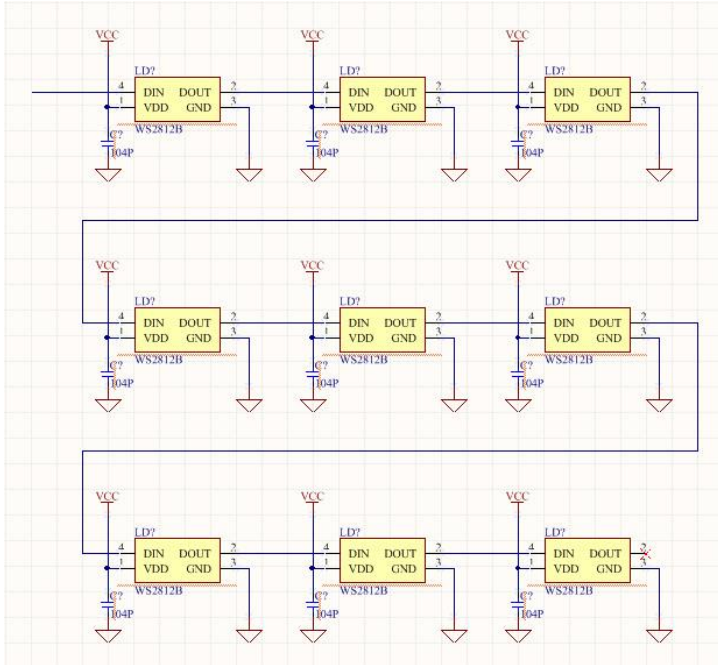


그림 8-414 배선 완료 형태(예)

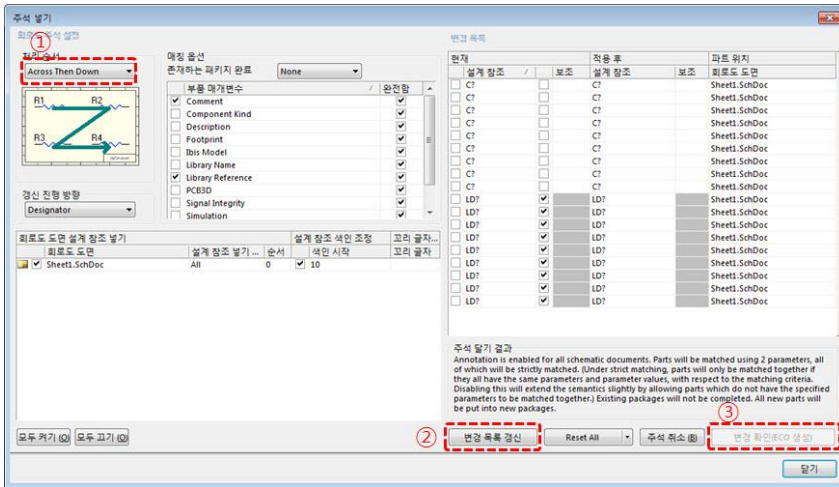


그림 8-415 주석 넣기 창

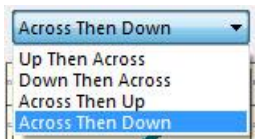


그림 8-416 번호 매기기 방법 콤보박스

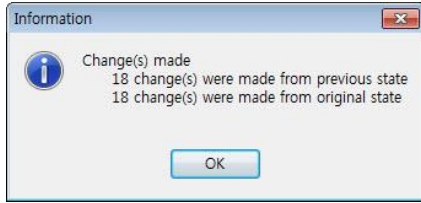


그림 8-417 번호 매기기 완료 창

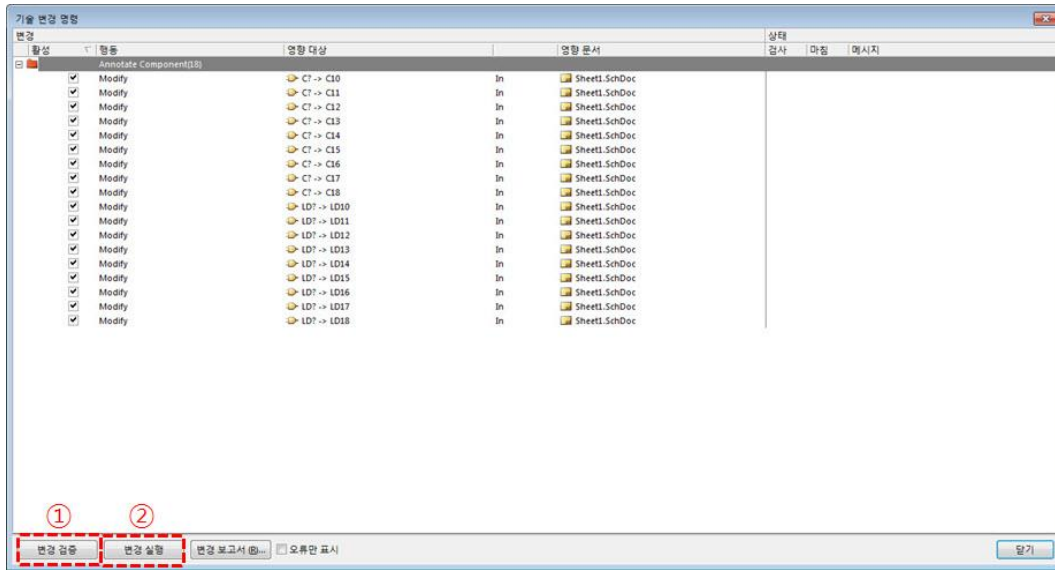


그림 8-418 번호 변경 창

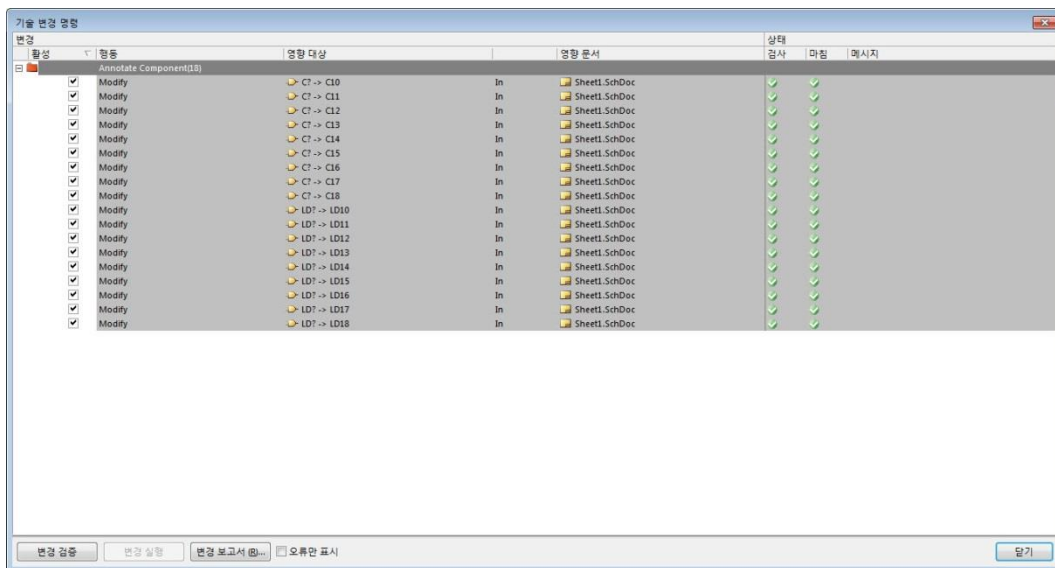
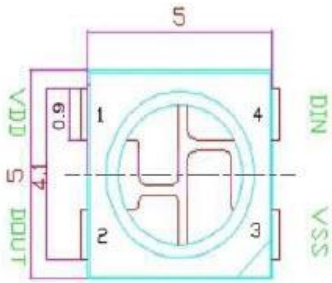


그림 8-419 번호 변경 창2



The mechanical size and pin drawing of WS2812B

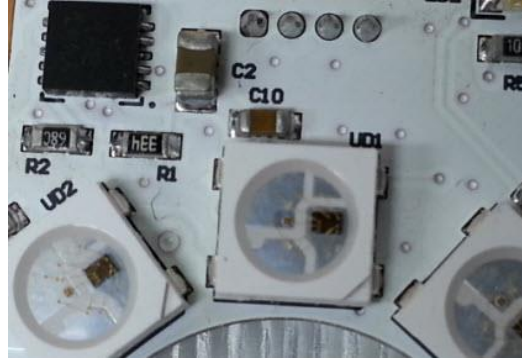


그림 8-420 WS2812B 구조와 실장(예)

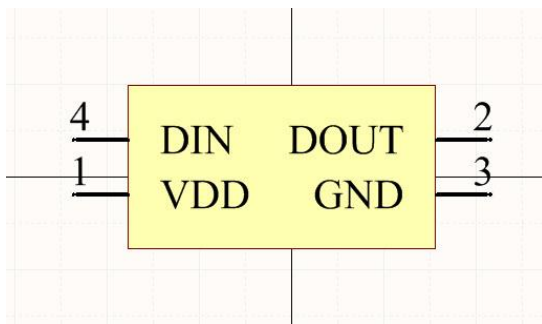


그림 8-421

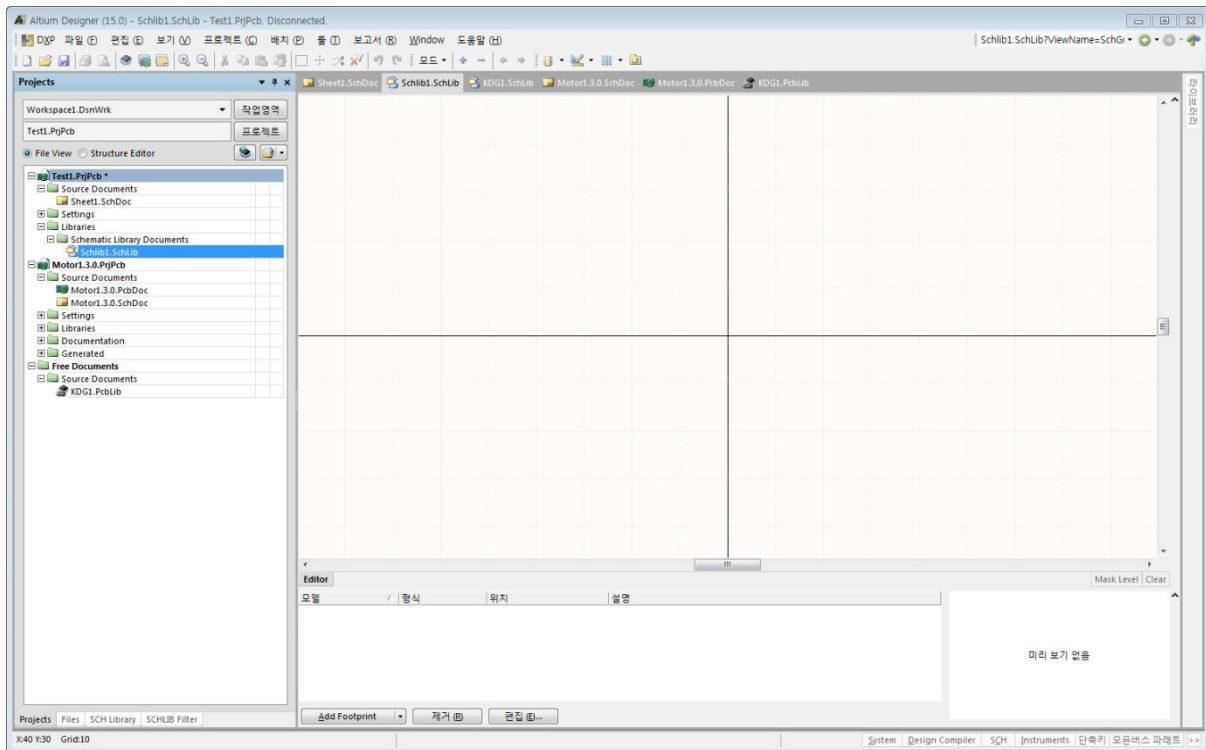


그림 8-422 프로젝트 생성 초기 화면

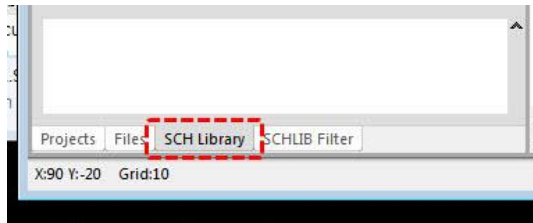


그림 8-423 Altium 왼쪽 하단의 'SCH Library' 화면

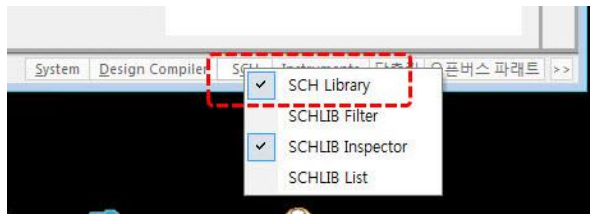


그림 8-424 'SCH Library' 팝업 메뉴

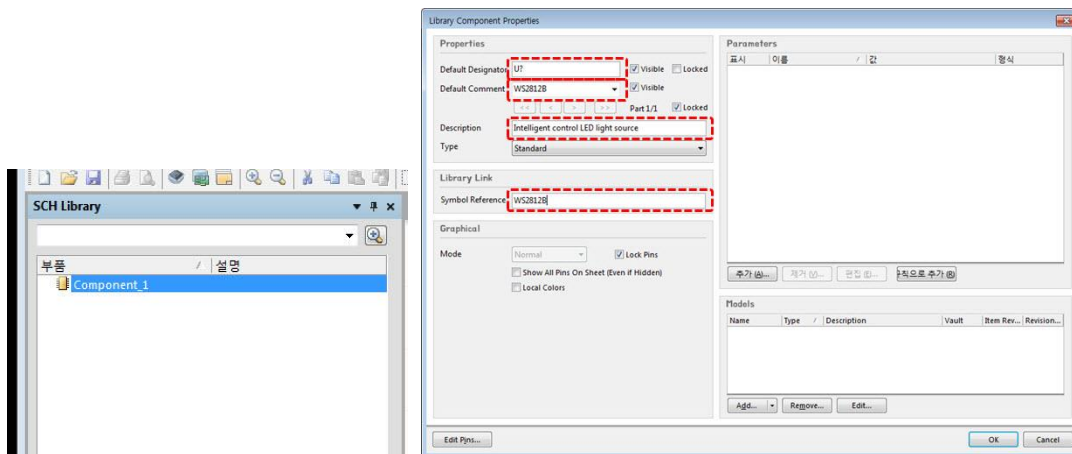


그림 8-425 부품 속성 변경 창

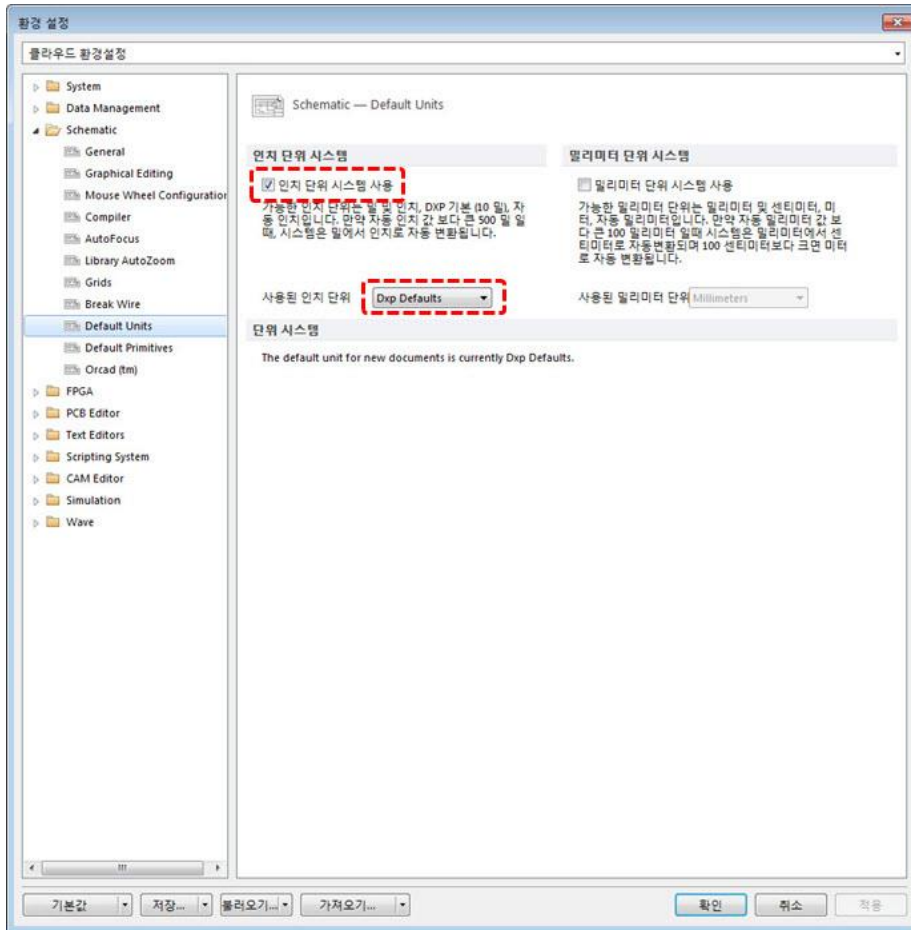


그림 8-426 '환경설정'의 단위 설정 창

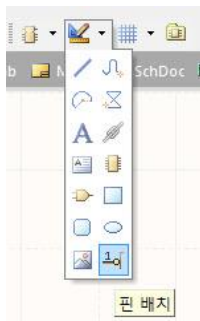


그림 8-427 '핀 배치' ICON 선택

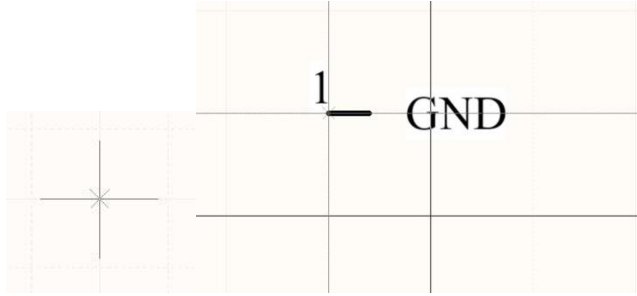


그림 8-428 '핀 배치' 시 ICON 형태

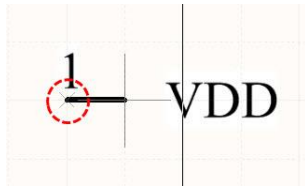


그림 8-429 첫 번째 Pin 배치 화면

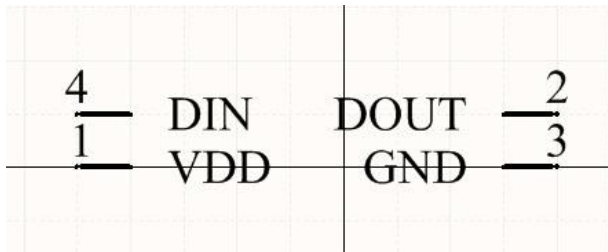


그림 8-430 부품 핀 배치 화면

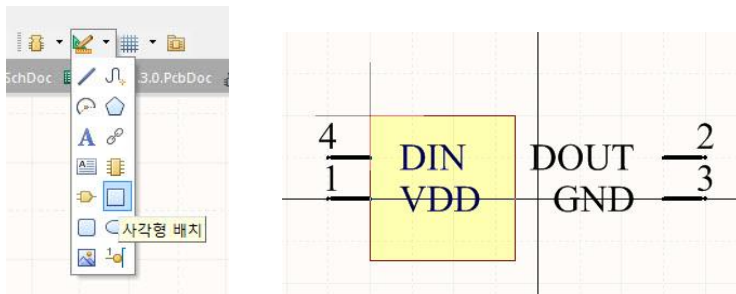


그림 8-431 '사각형 배치' 선택 화면

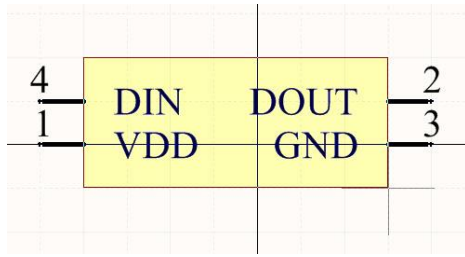


그림 8-432 사각형 배치 화면

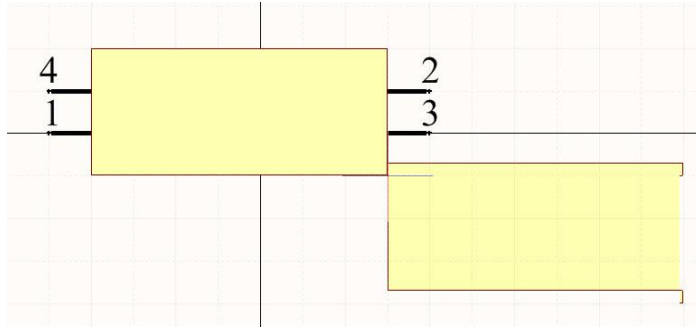


그림 8-433 사각형 배치 두 번째 클릭 시 화면

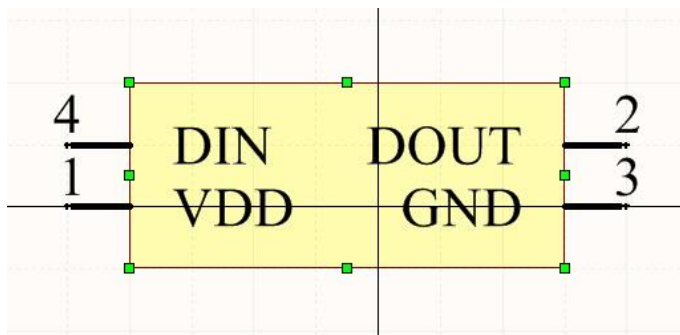
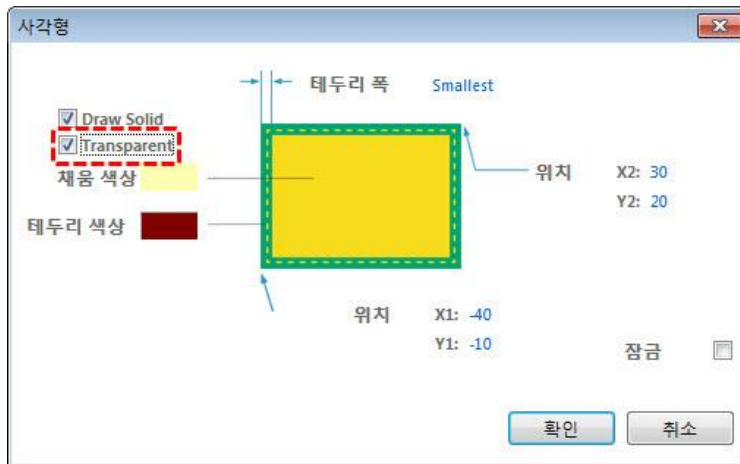


그림 8-434 '사각형'속성에서 'Transparent'를 체크 시 화면

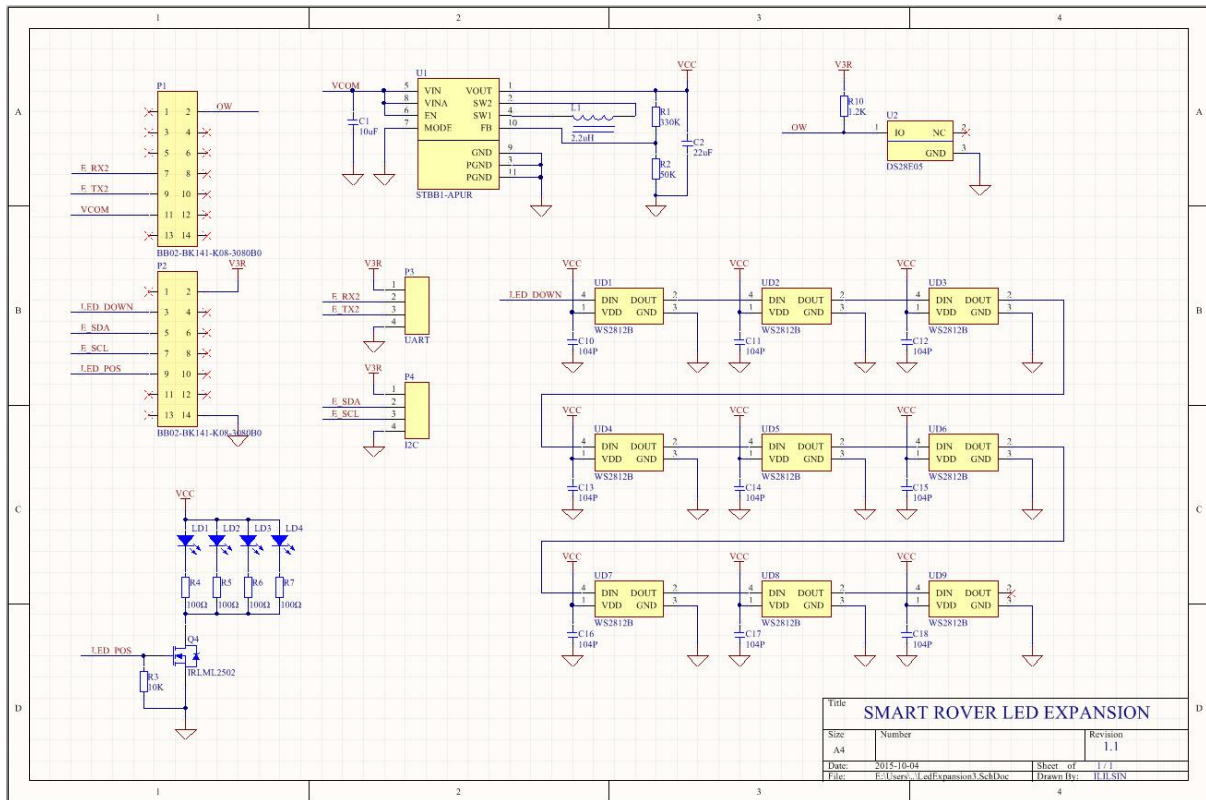


그림 8-435 LED 확장보드 회로

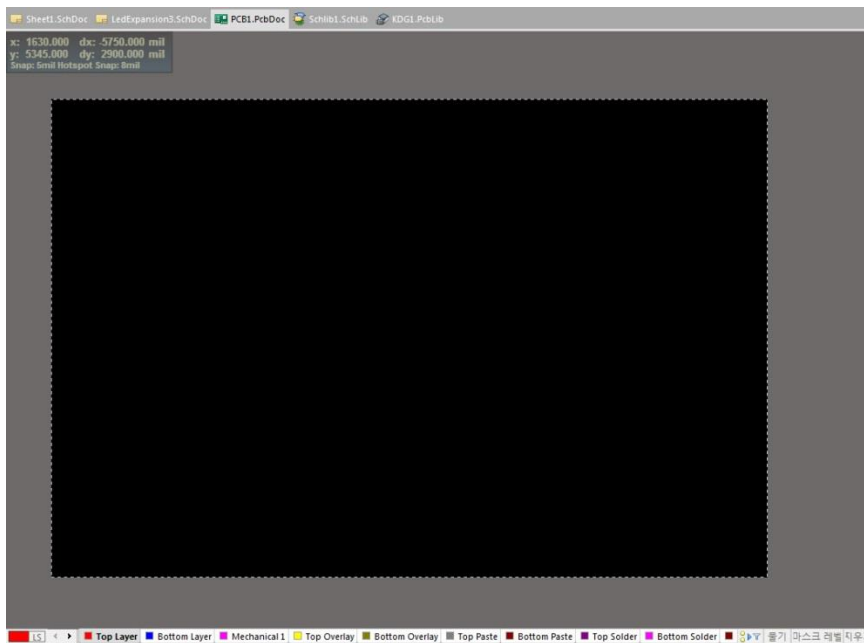


그림 8-436 PCB 생성 시 초기 화면

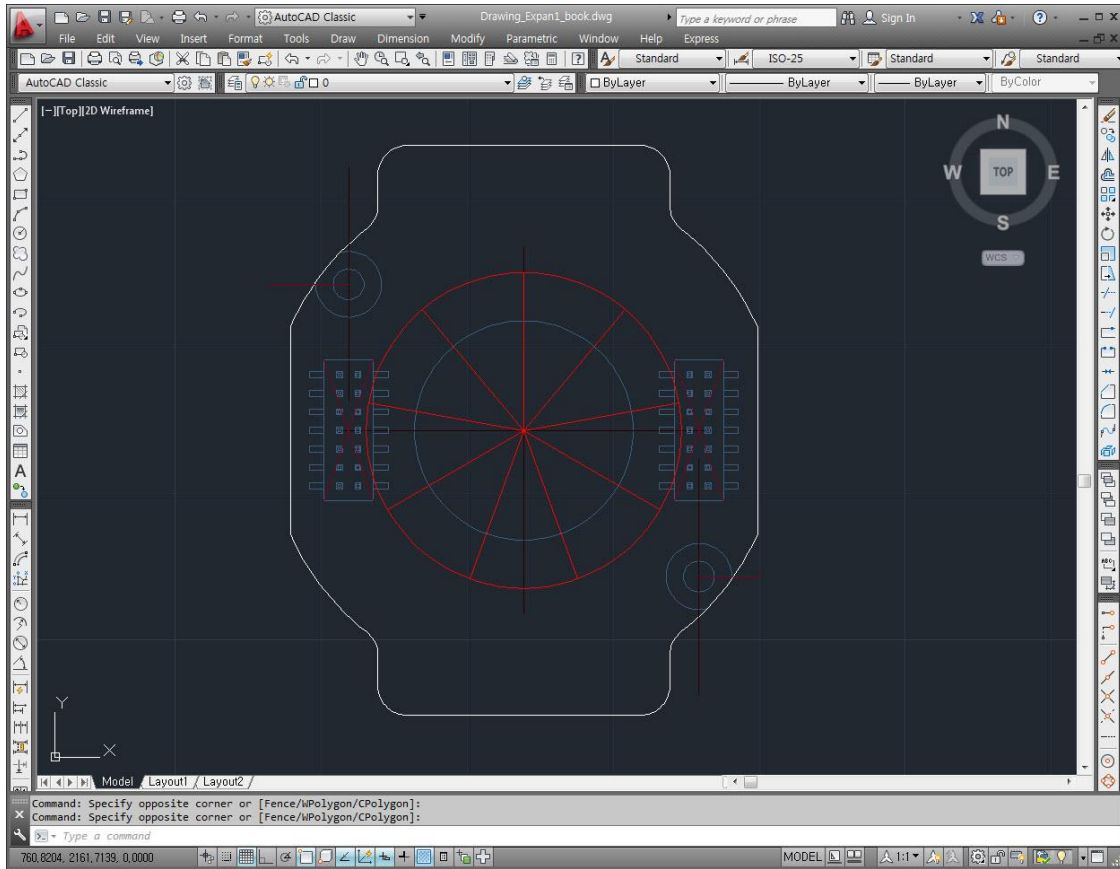


그림 8-437 AUTO CAD에서 작업 화면

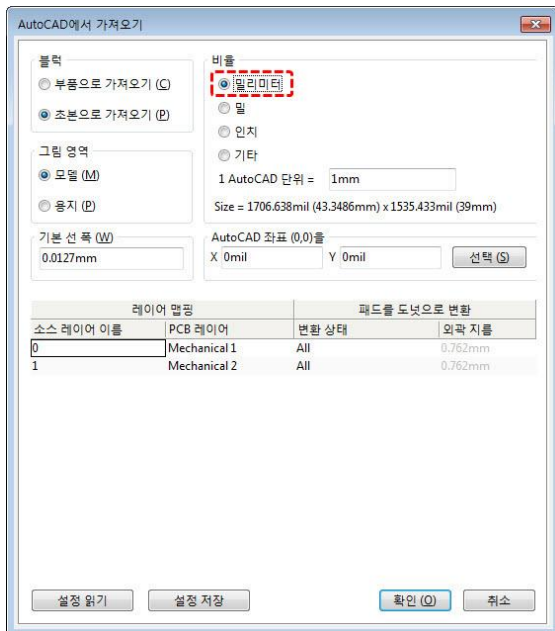


그림 8-438 AutoCad에서 가져오기 화면

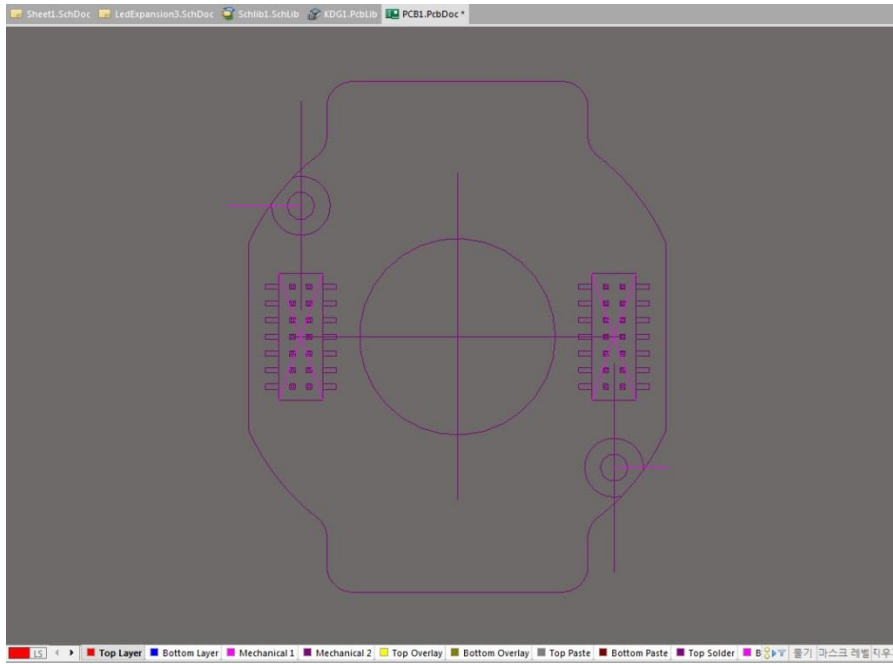


그림 8-439 외부 파일을 불러오기 화면

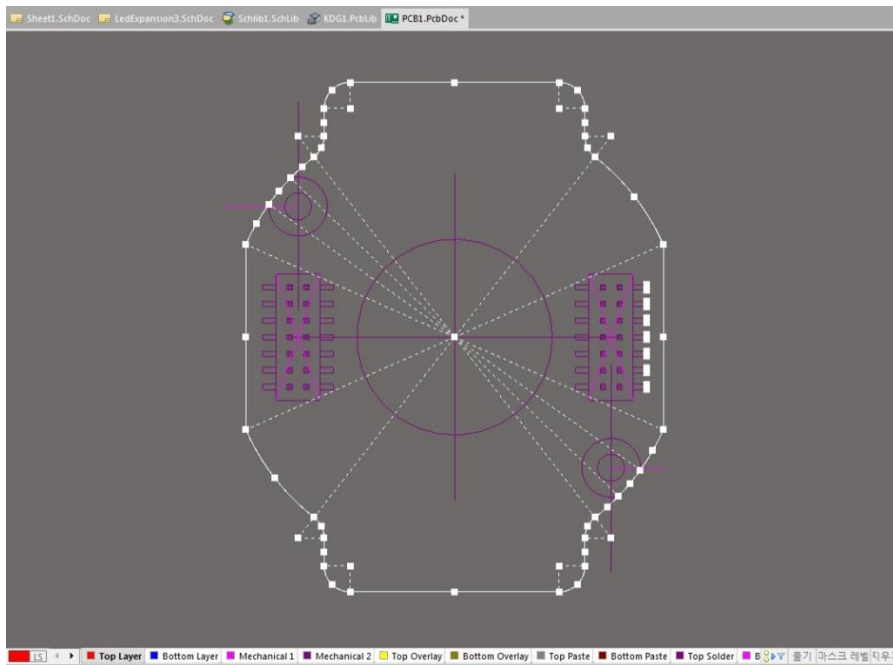


그림 8-440 외곽선 선택 화면

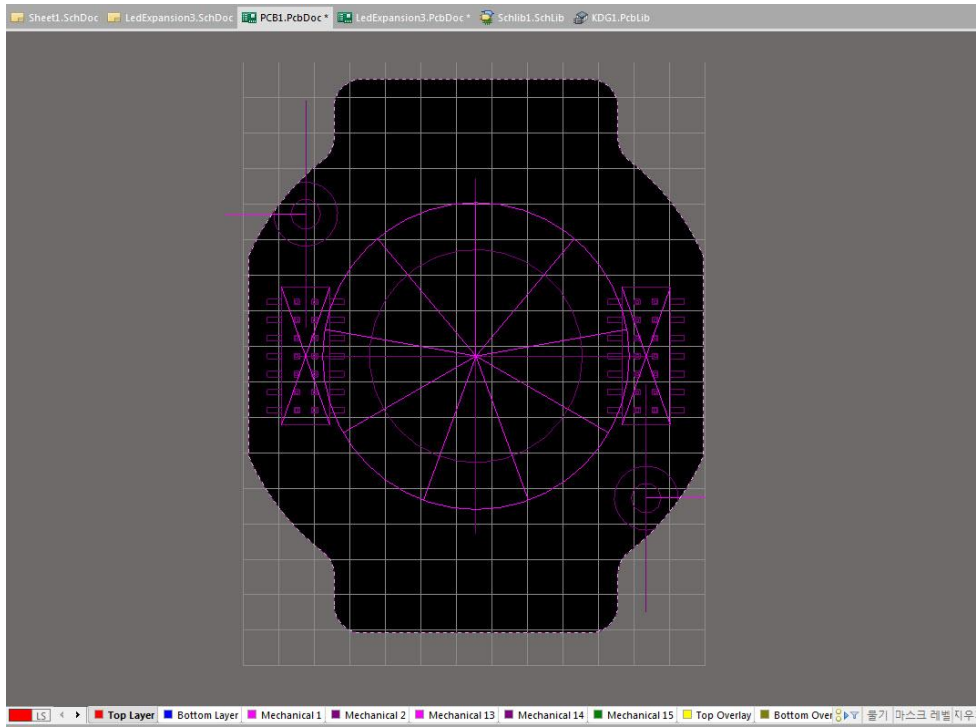


그림 8-441 PCB 정의 화면

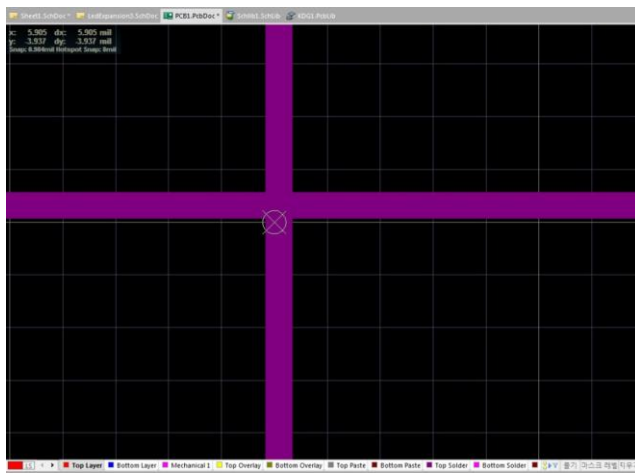


그림 8-442 기준점 선택 화면

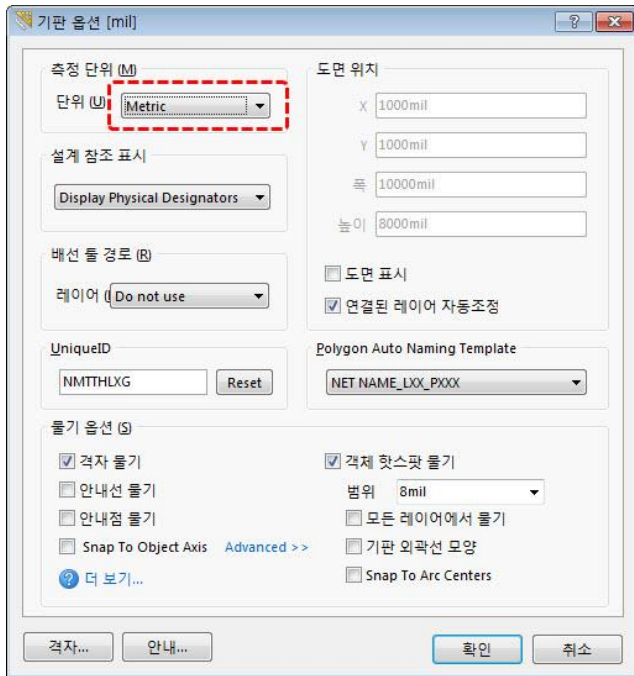


그림 8-443 '기판 옵션' 창

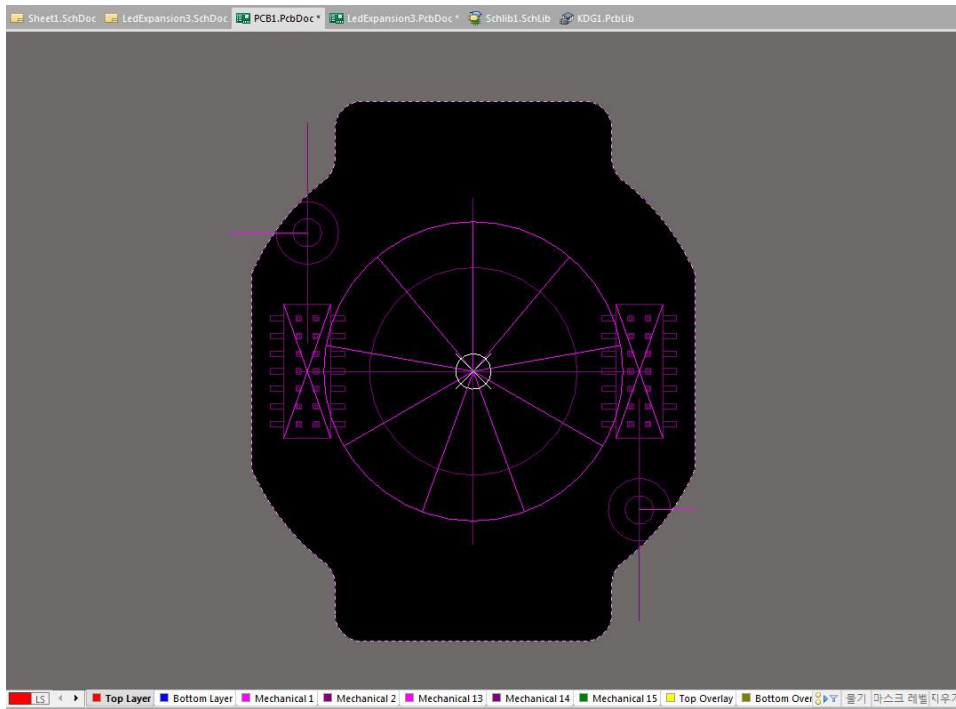


그림 8-444 기판 형태 정의 완료 화면

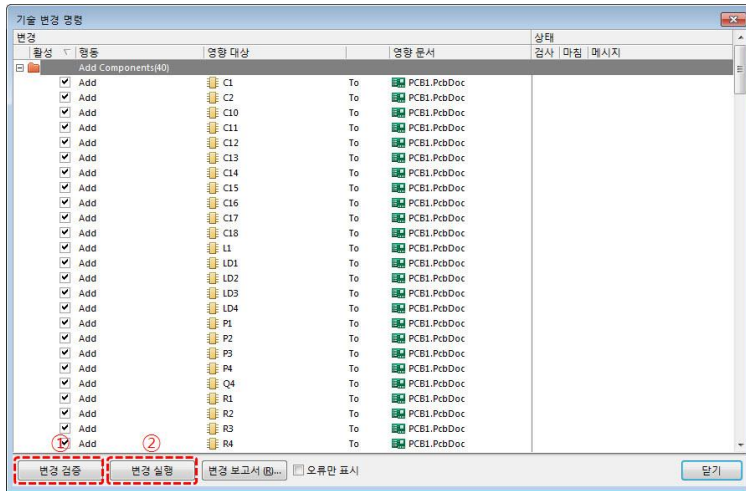


그림 8-445 PCB로 변경 창1

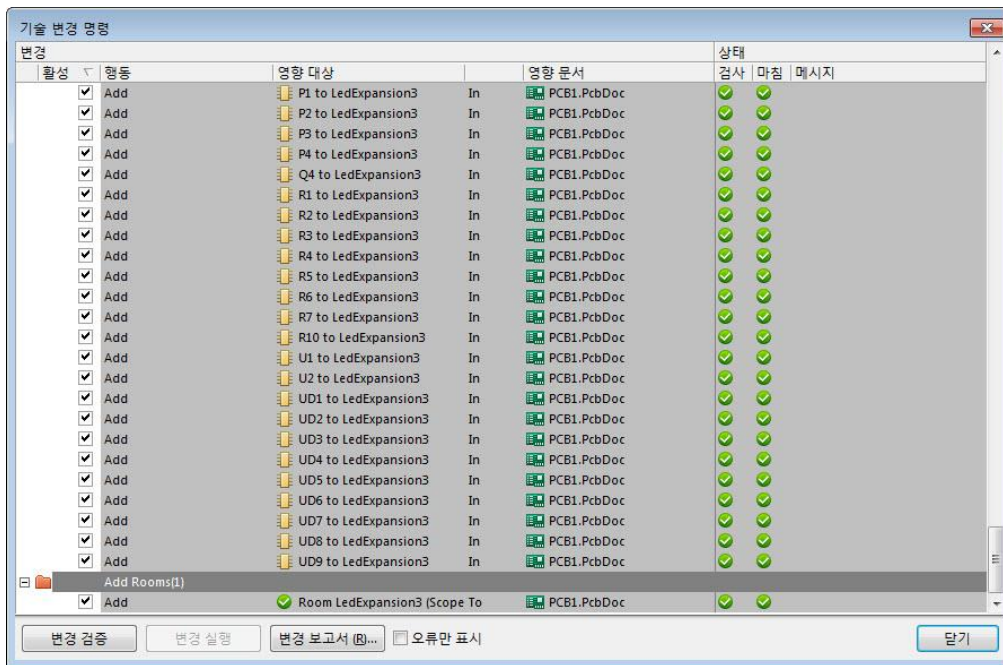


그림 8-446 PCB로 변경 창2

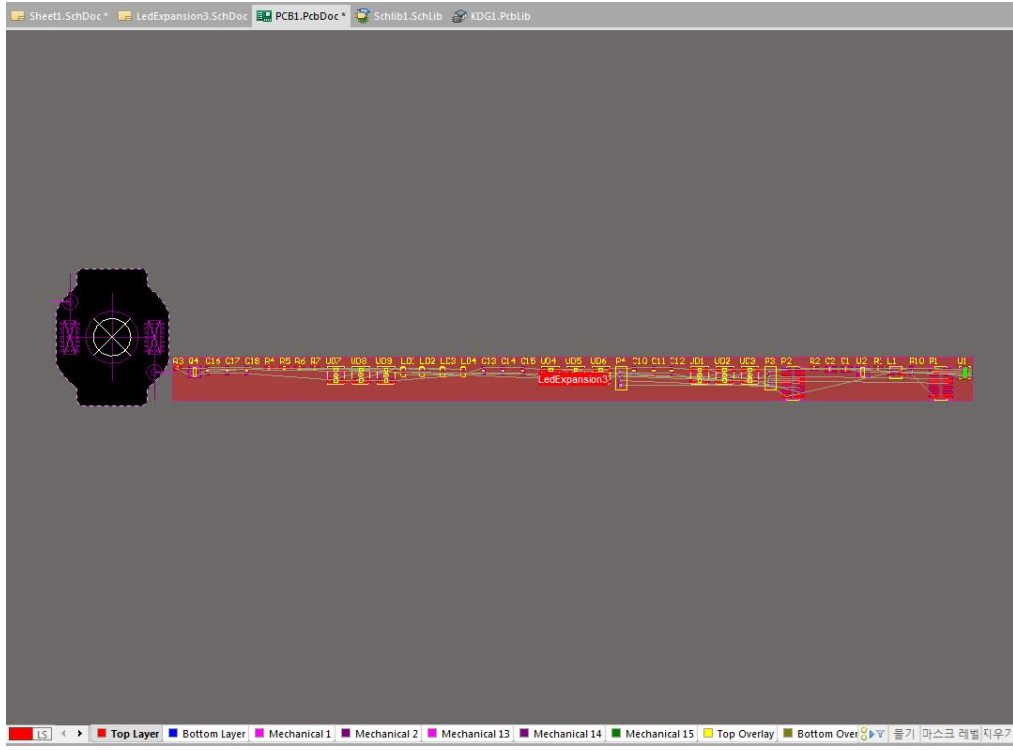


그림 8-447 PCB로 변경 시 초기 화면

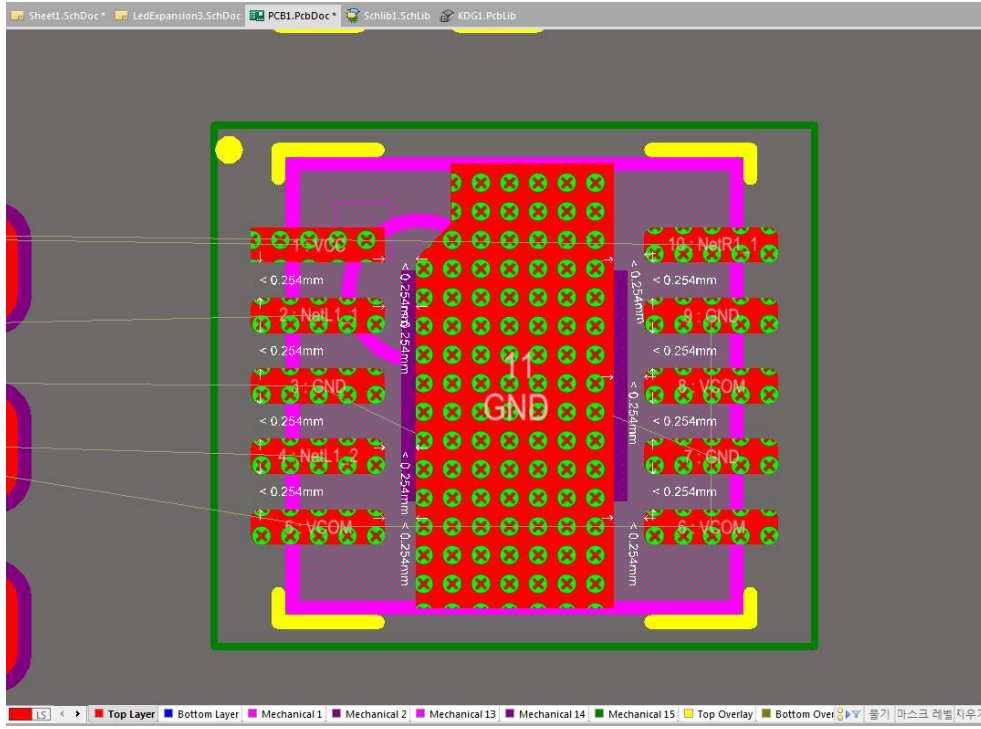


그림 8-448 PCB 에러 형태(예)

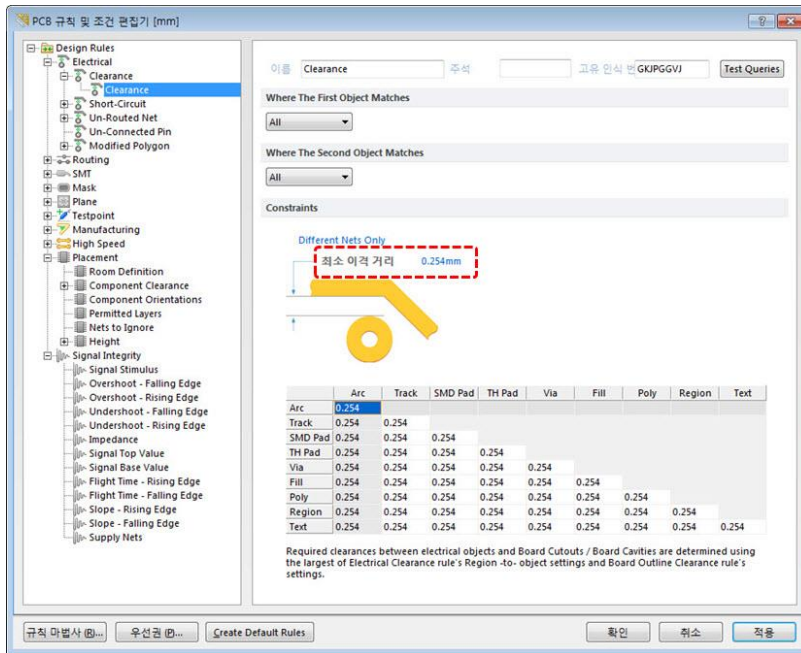


그림 8-449 'PCB 규칙 및 조건 편집기' 창

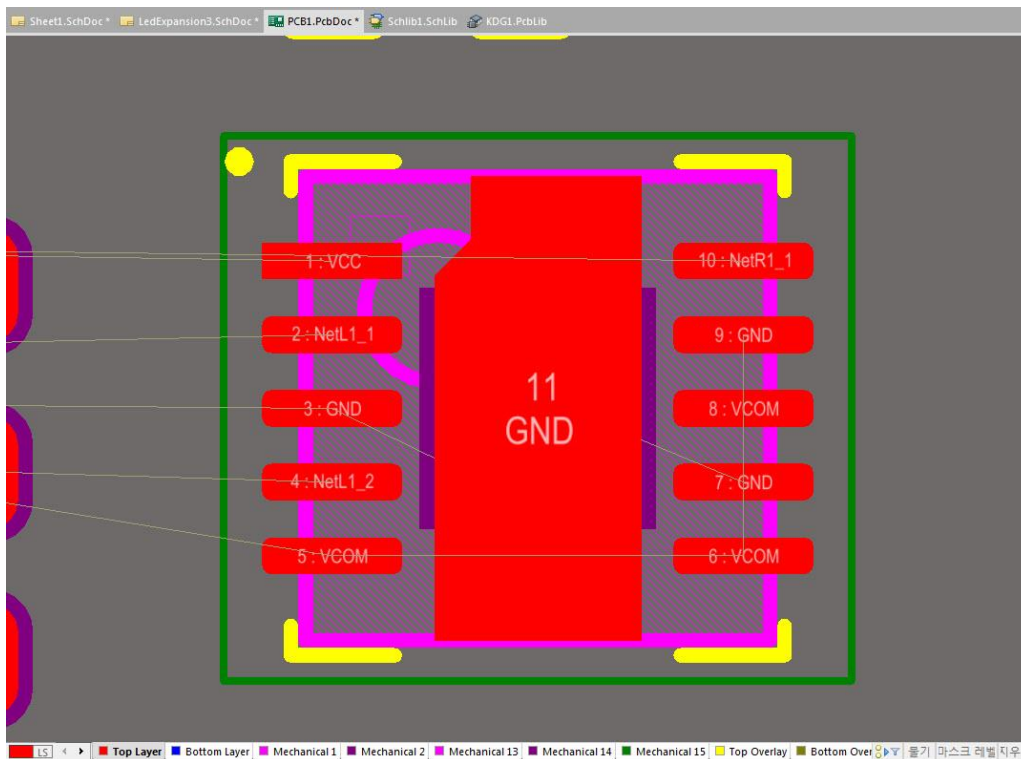


그림 8-450 PCB 조건 변경 후 애러가 없어진 형태(예)

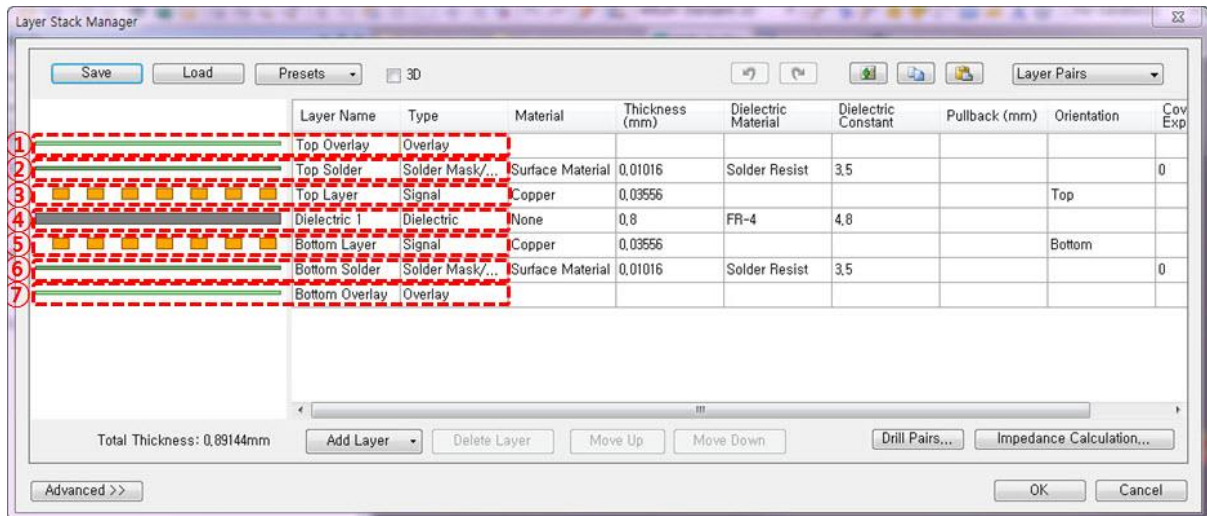


그림 8-451 Layer 변경 창

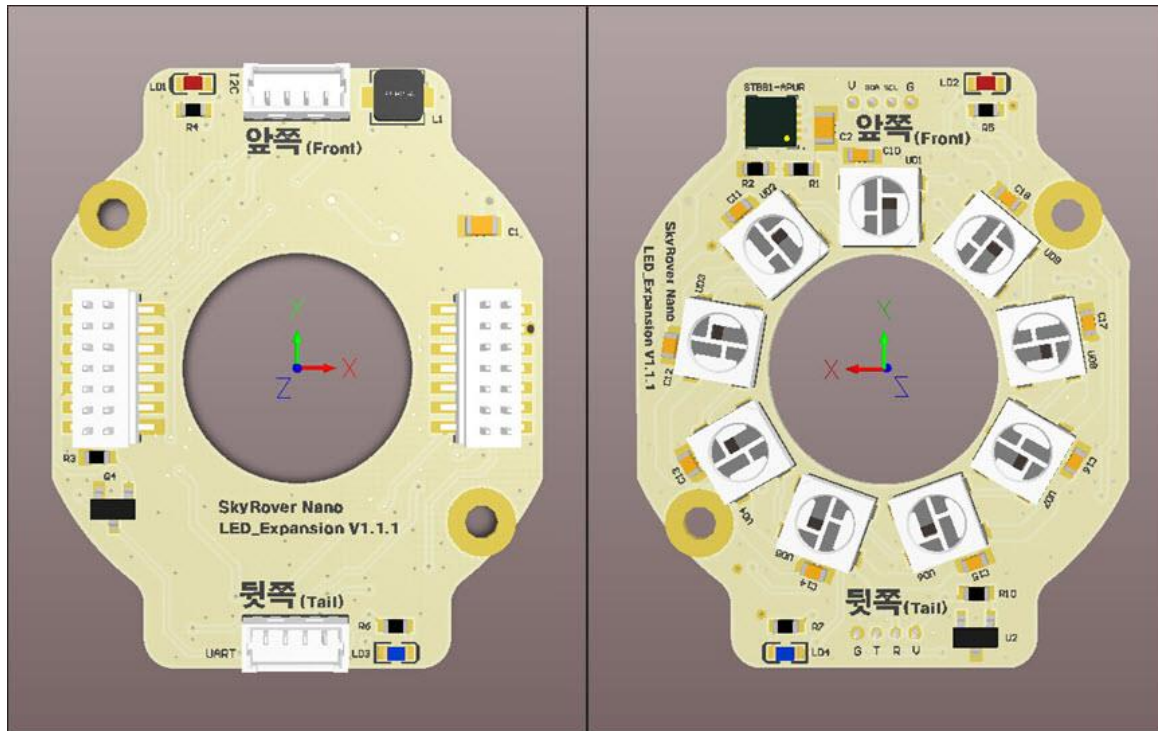


그림 8-452 부품 배치 완료 후 3D 화면(예)

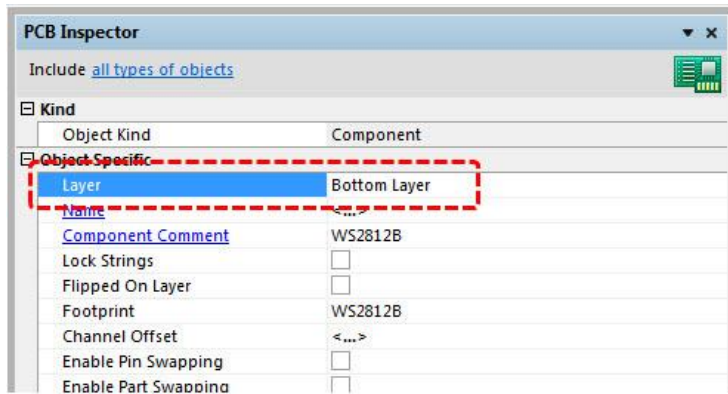


그림 8-453 'PCB Inspector' 창

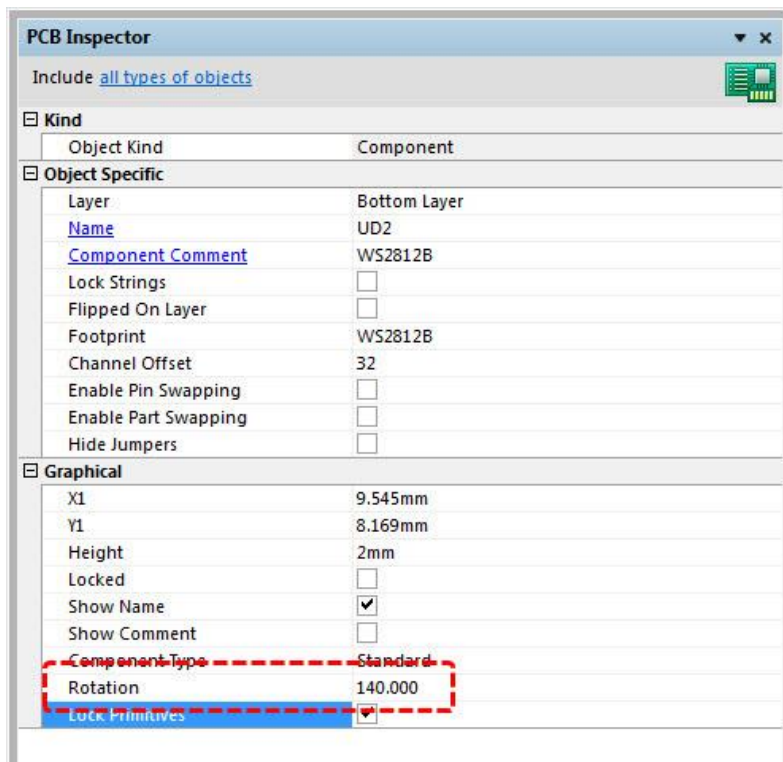


그림 8-454 부품 각도 변경 창

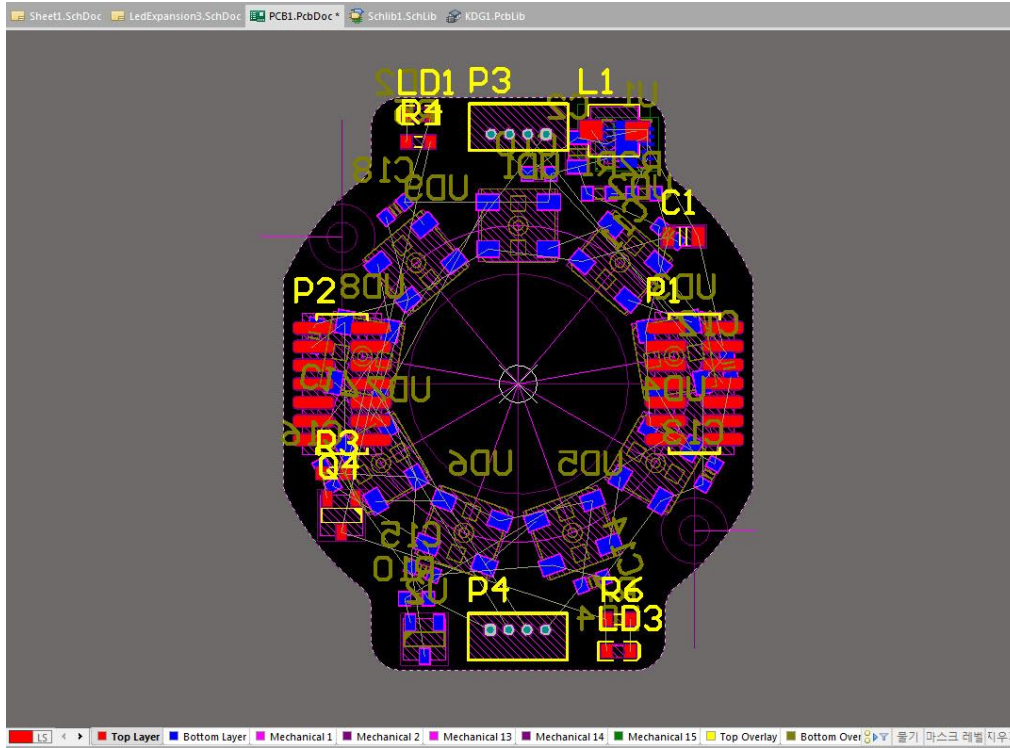


그림 8-455 부품 배치 후 화면

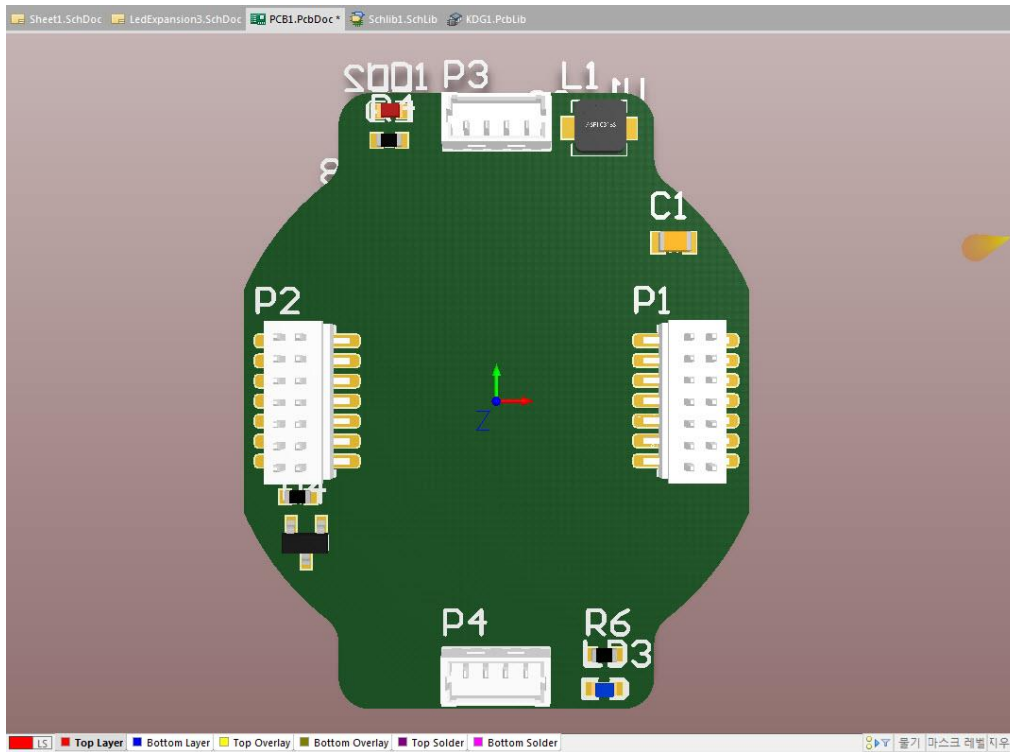


그림 8-456 첫 배치 후 3D 화면

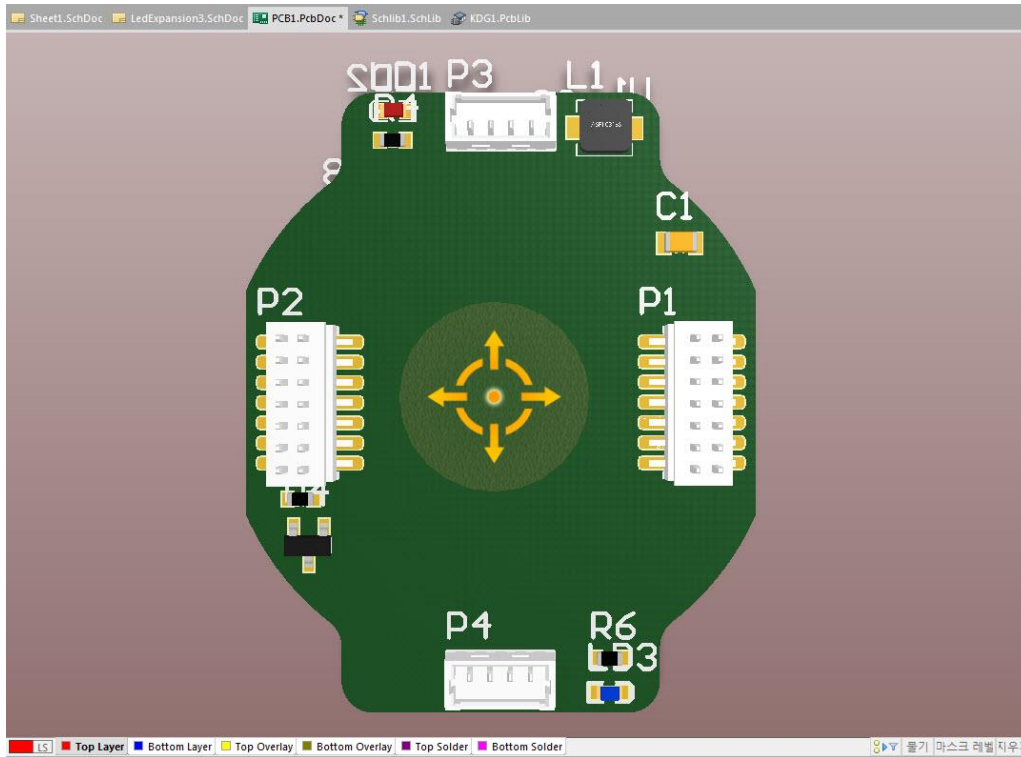


그림 8-457 'Shift' Key를 누르고 있을 때 화면

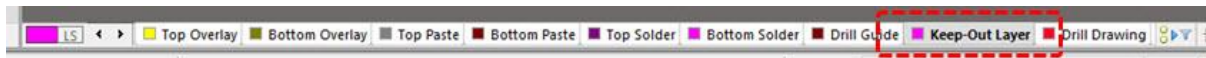


그림 8-458 'Keep-Out Layer' 선택 화면

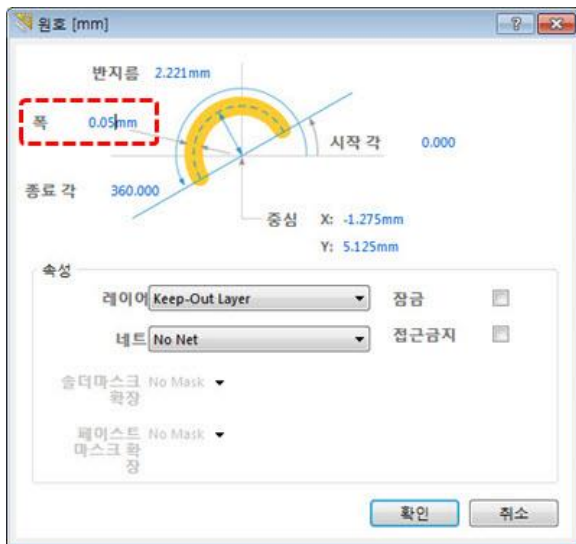


그림 8-459 원호 폭 선택 창



그림 8-460 패드 배치 화면

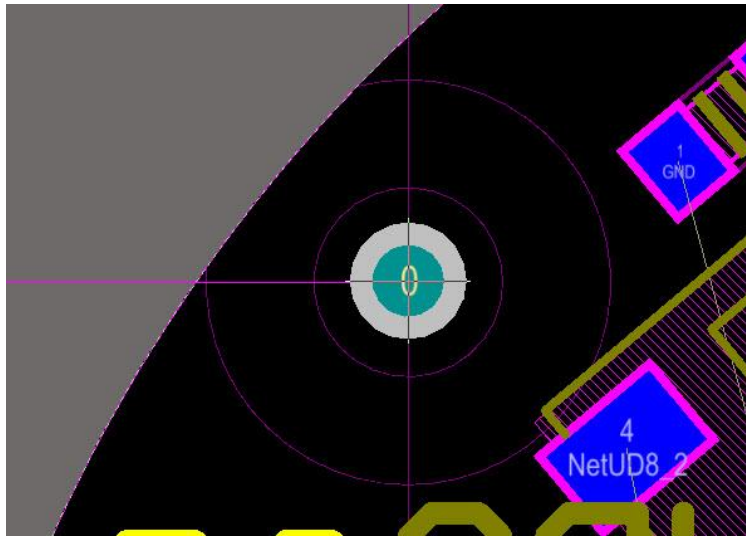


그림 8-461 패드 위치 정렬 화면

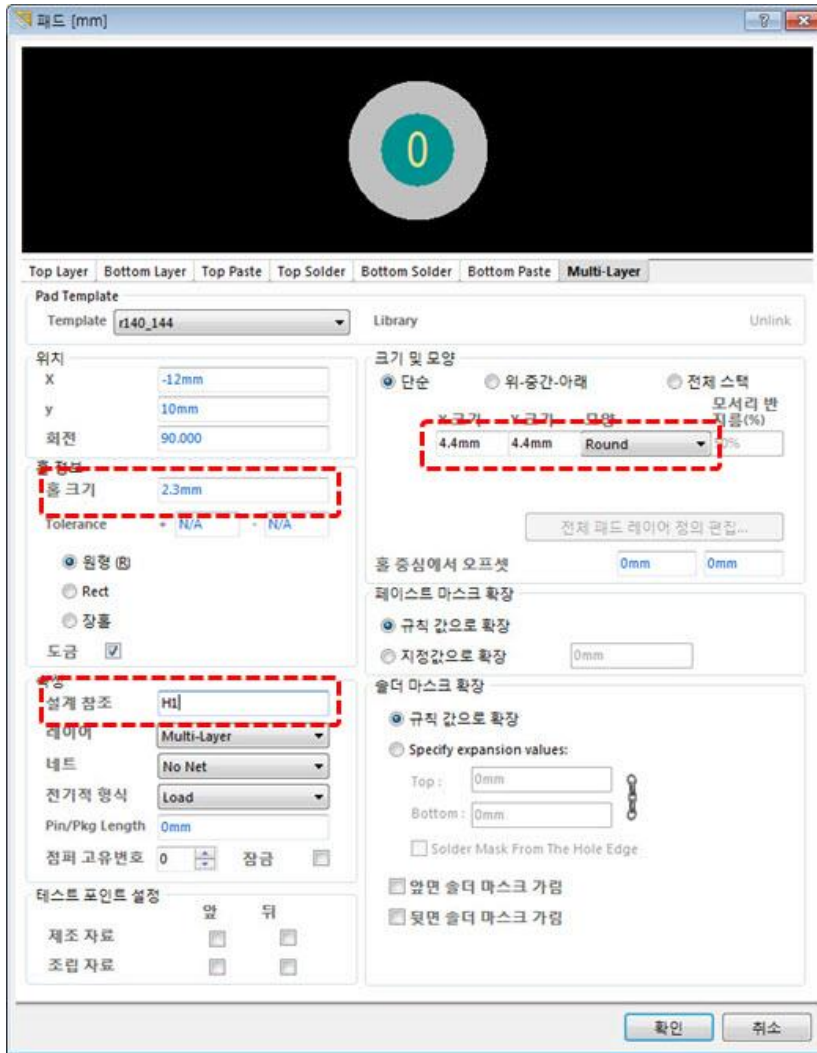


그림 8-462 패드 속성 창

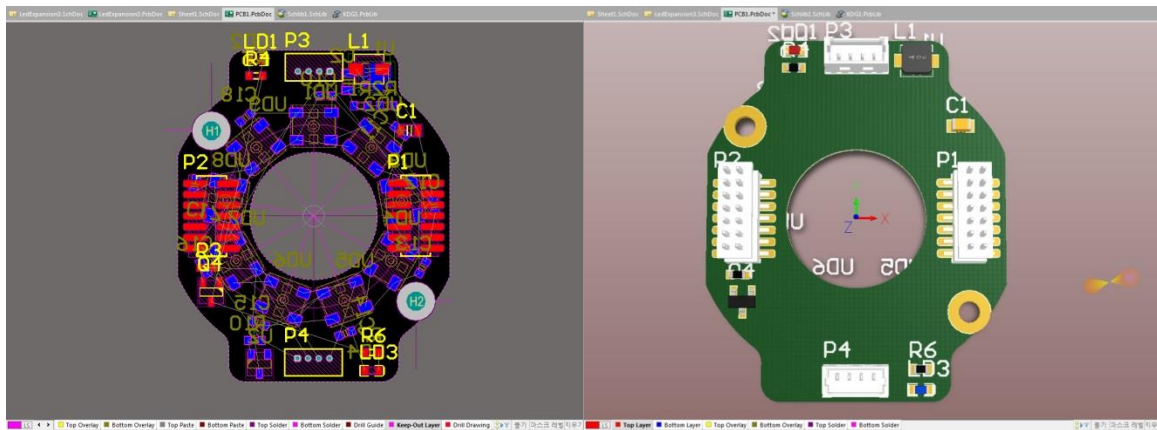


그림 8-463 현재까지 진행 상황 화면

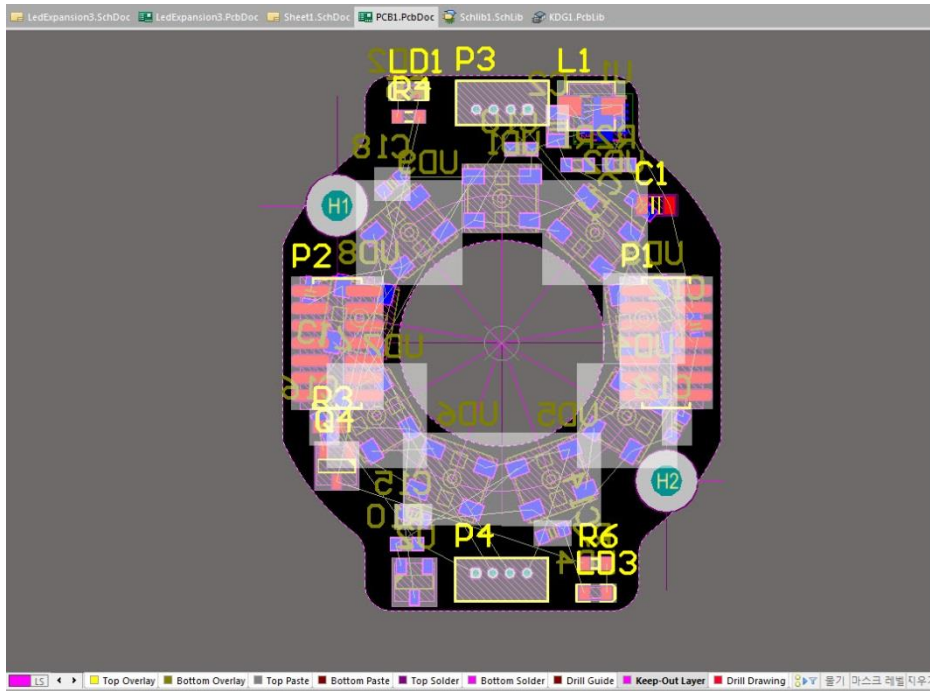


그림 8-464 부품 다중 선택 화면

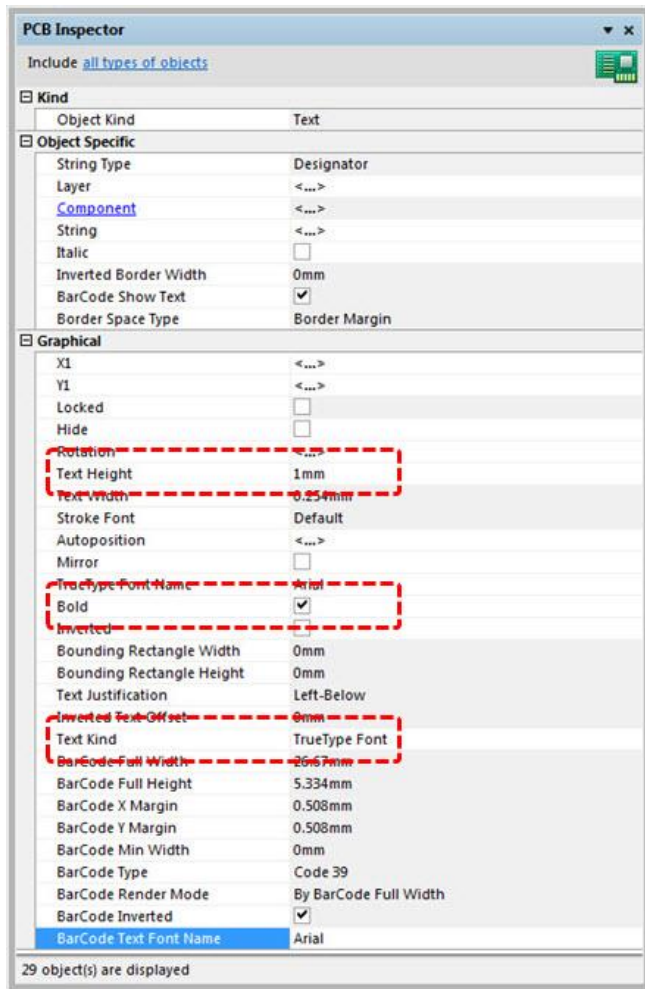


그림 8-465 'PCB Inspector' 창

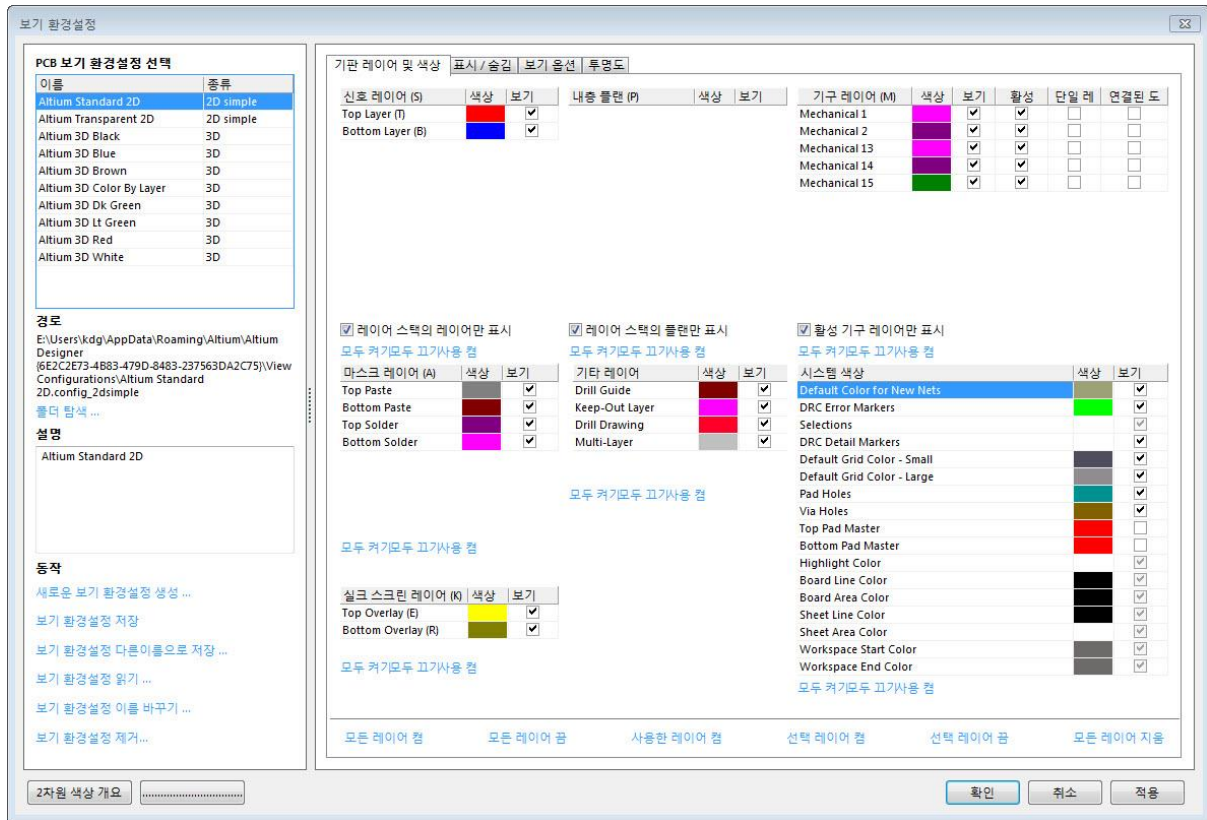


그림 8-466

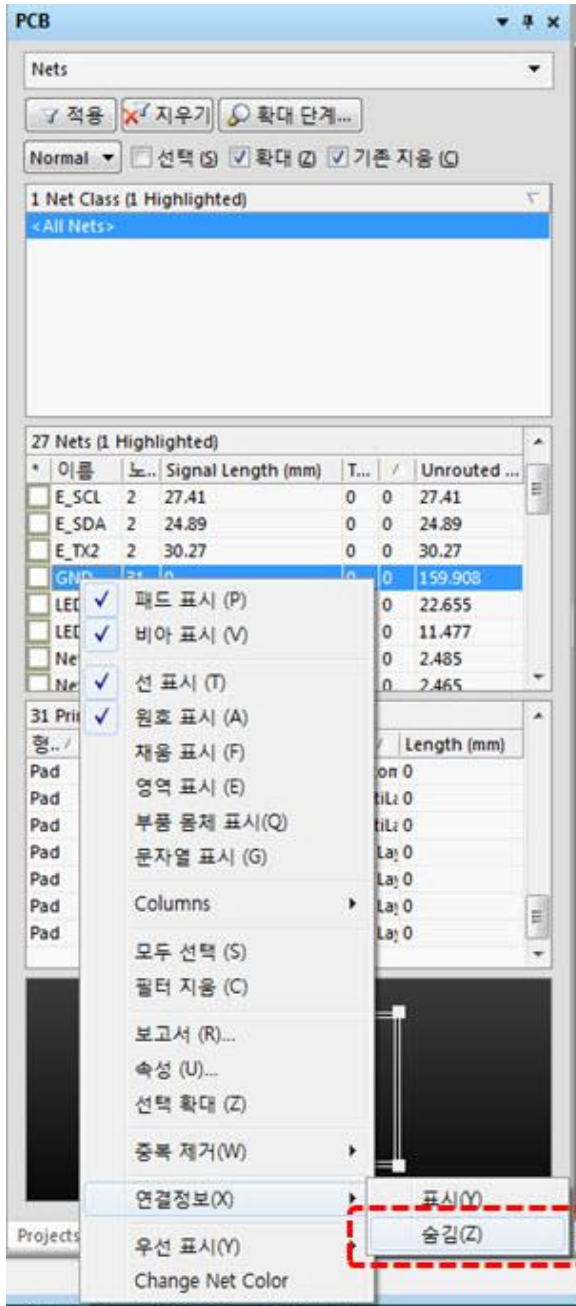


그림 8-467 'GND' Net 표시 없애기 화면



그림 8-468 '가상연결선 능동 배선' 화면

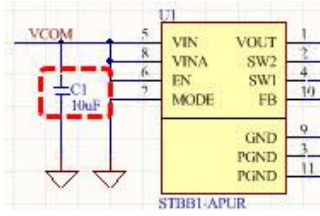


그림 8-469 전원 부분 Capacitor (예)

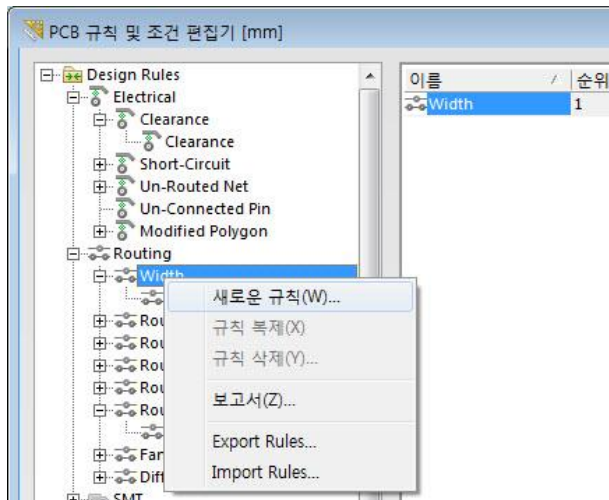


그림 8-470 새로운 규칙 설정 화면1

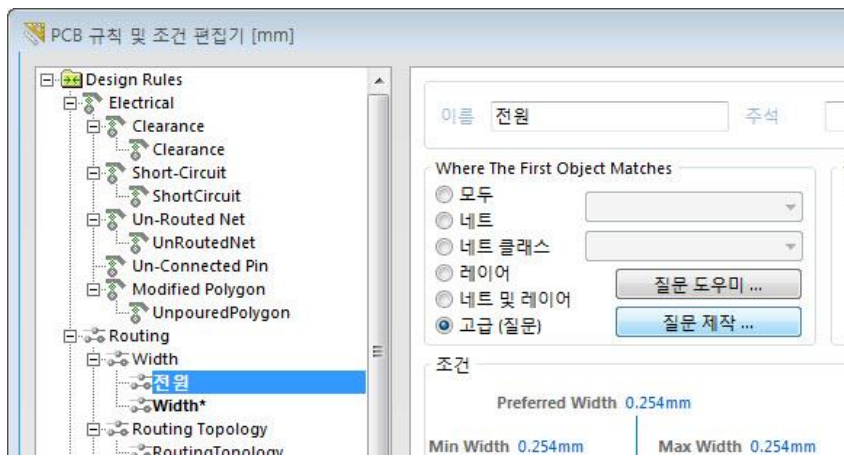


그림 8-471 새로운 규칙 설정 화면2

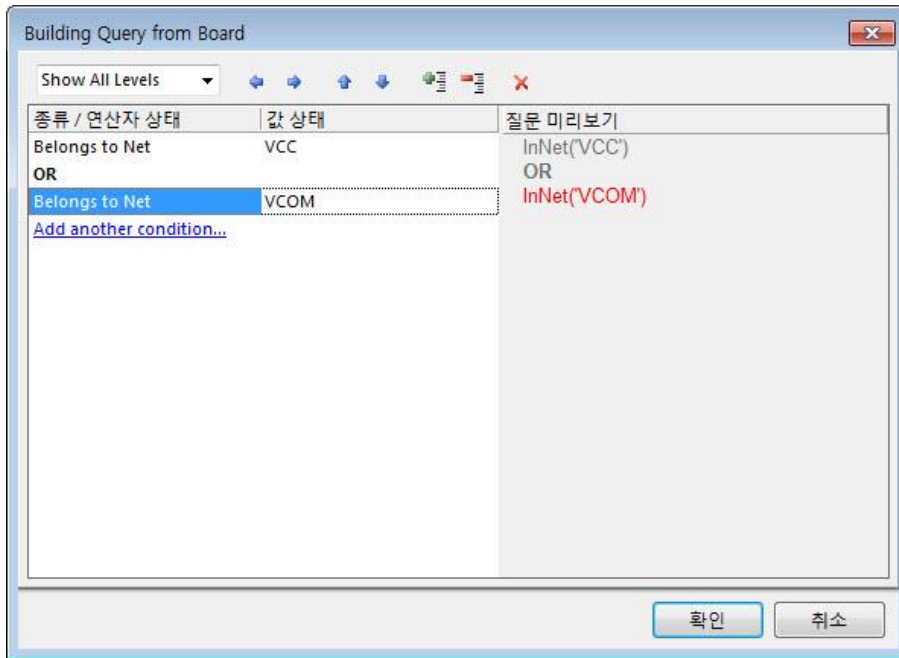


그림 8-472 새로운 규칙 설정 화면3

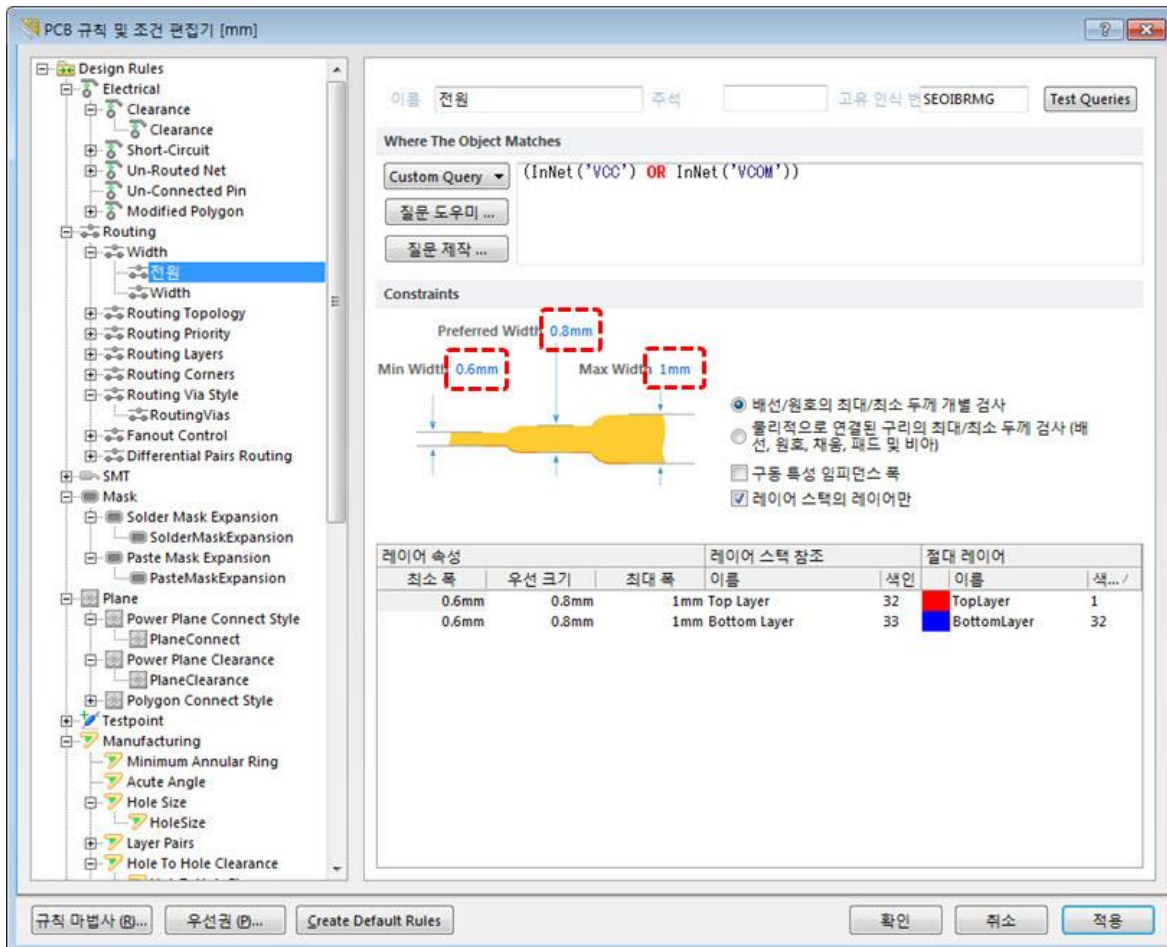


그림 8-473 새로운 규칙 설정 화면4

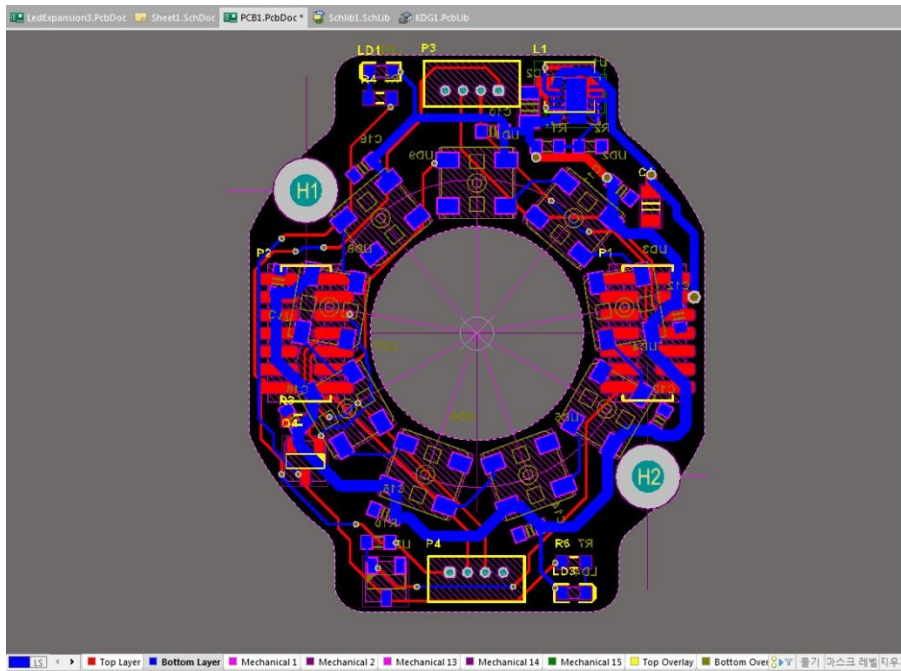


그림 8-474 배선 완료 화면

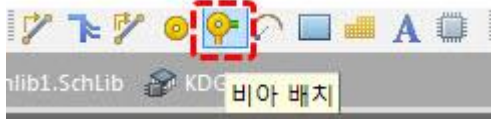


그림 8-475 비아 선택 화면



그림 8-476 Copper를 위한 '다각형 플랜 배치' 선택 화면

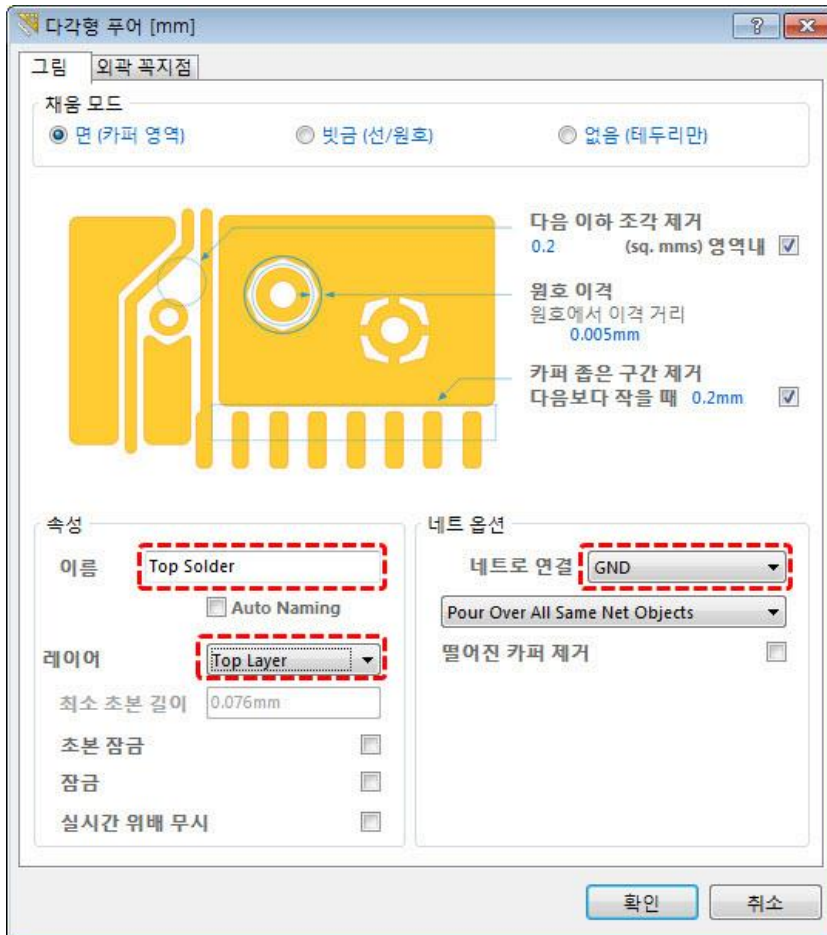


그림 8-477 Copper 속성 변경 창

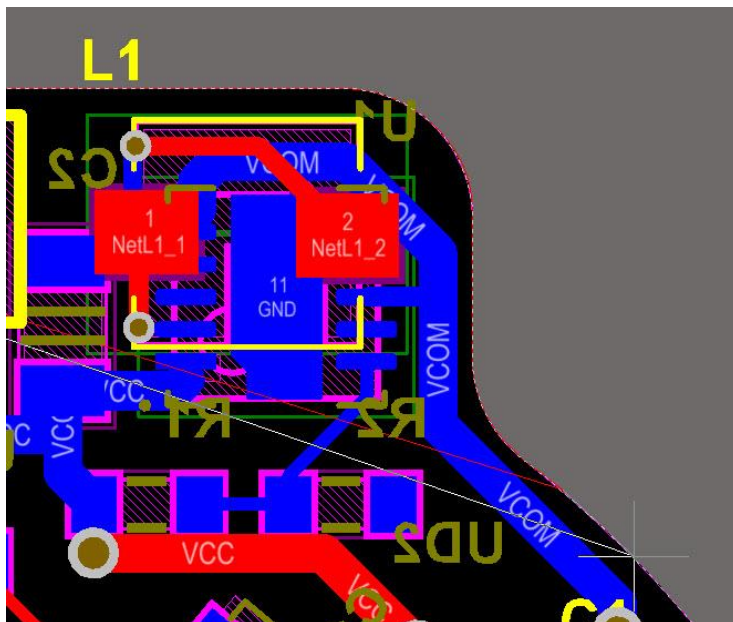


그림 8-478 Copper를 하기 위해 외곽선을 따라 클릭하는 중인 화면

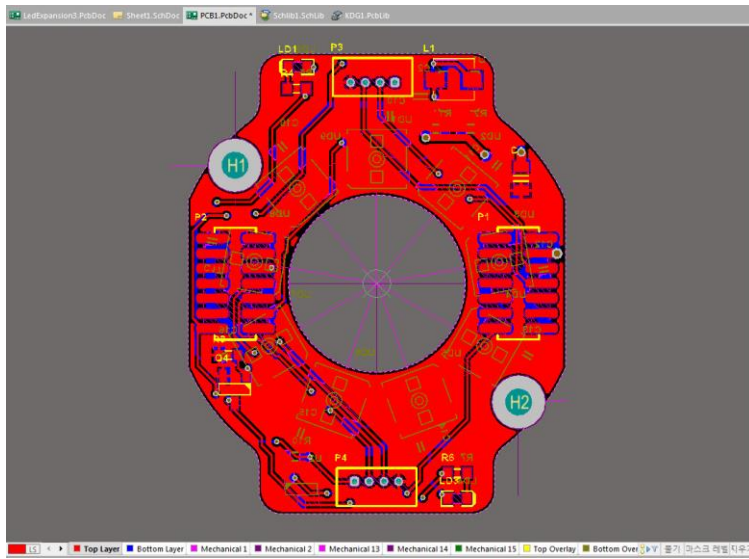


그림 8-479 Copper를 마친 화면

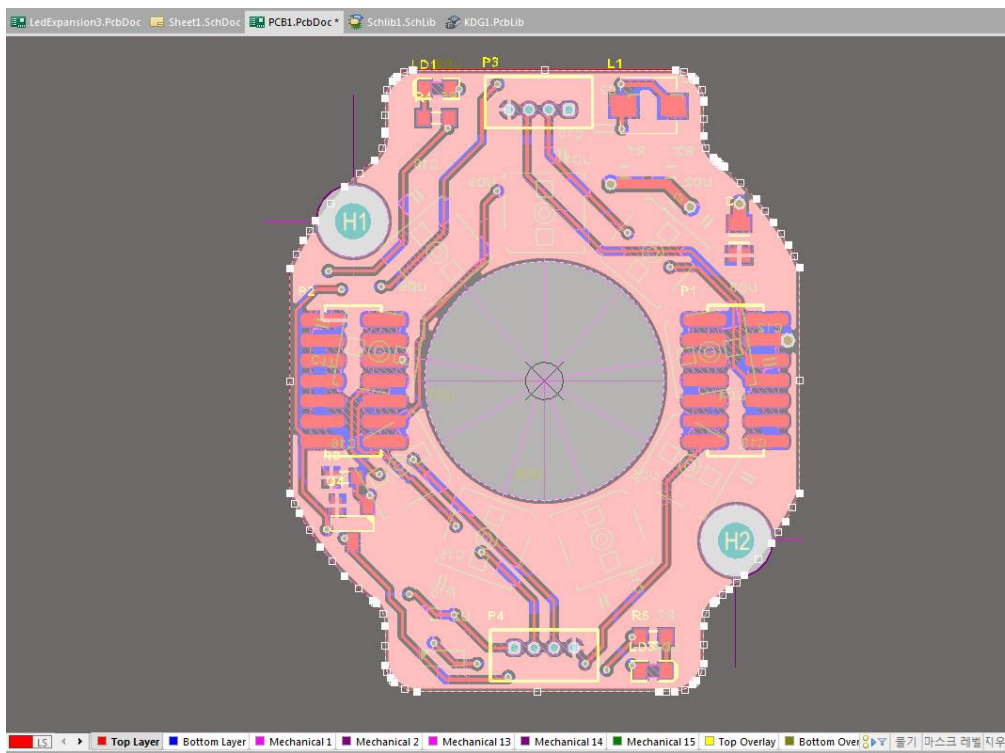


그림 8-480 Copper 복사 화면

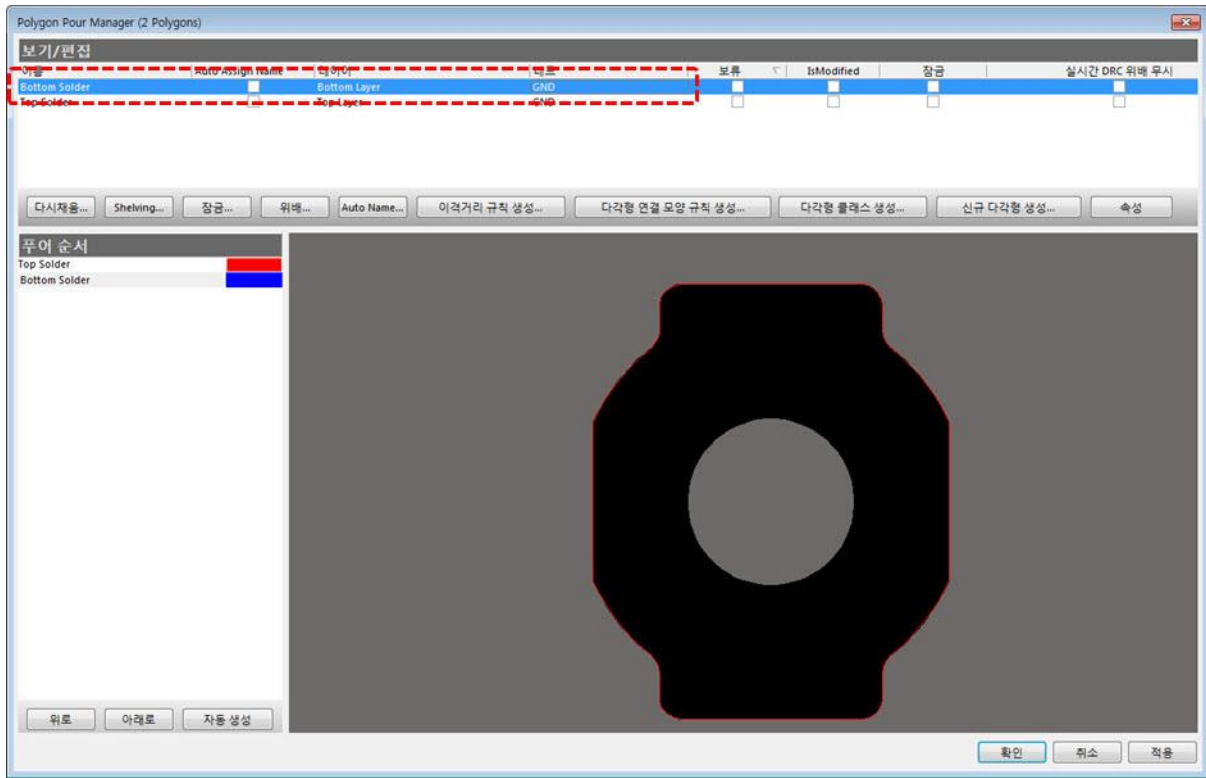


그림 8-481 카피한 Copper 속성 변경 창

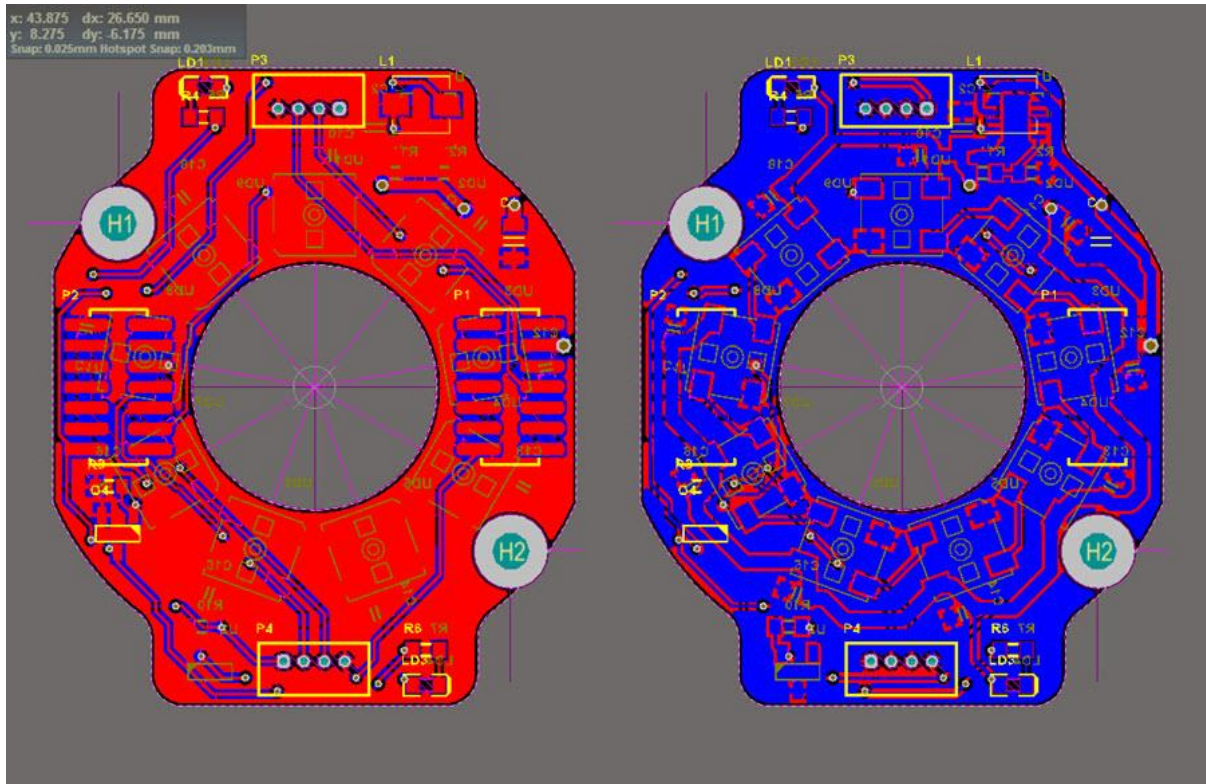


그림 8-482 Top면과 Bottom면 Copper한 상태 화면

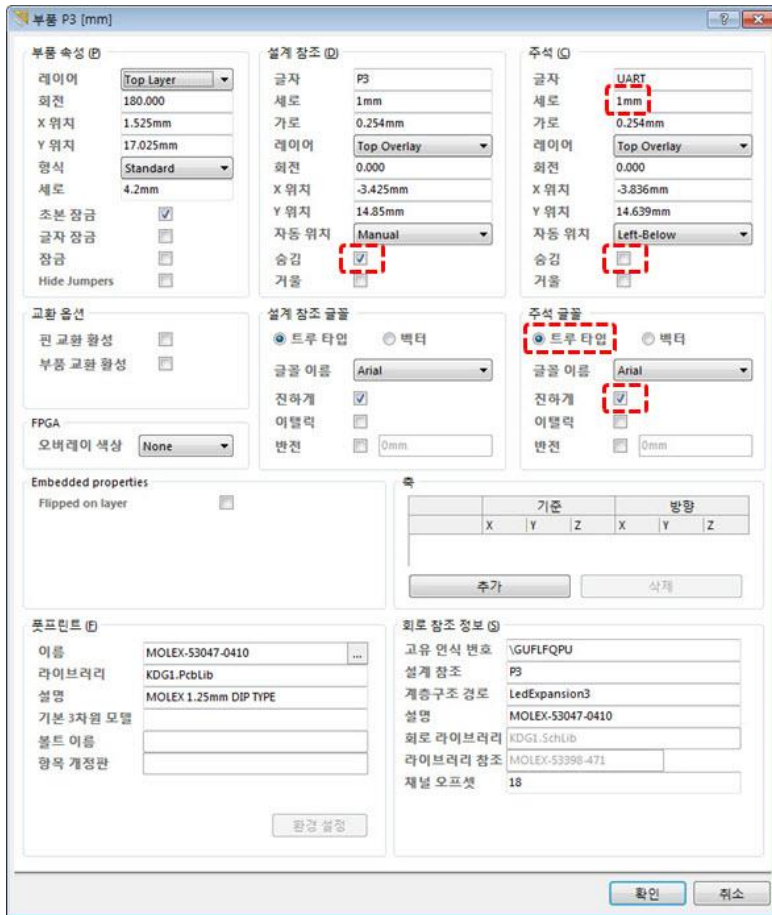


그림 8-483 PCB면에 인쇄할 내용 변경 창



그림 8-484 문자열 배치 선택 화면

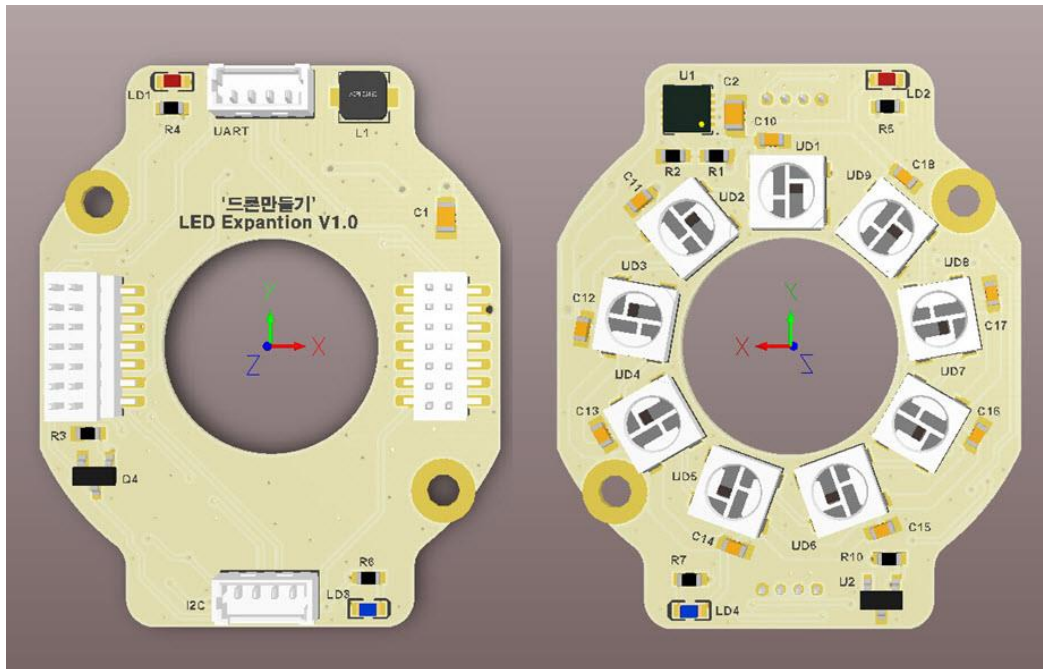


그림 8-485 완료된 PCBdml 3D 보기 화면

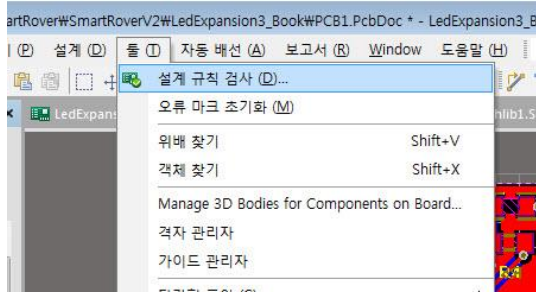


그림 8-486 '설계 규칙 검사' 선택 화면

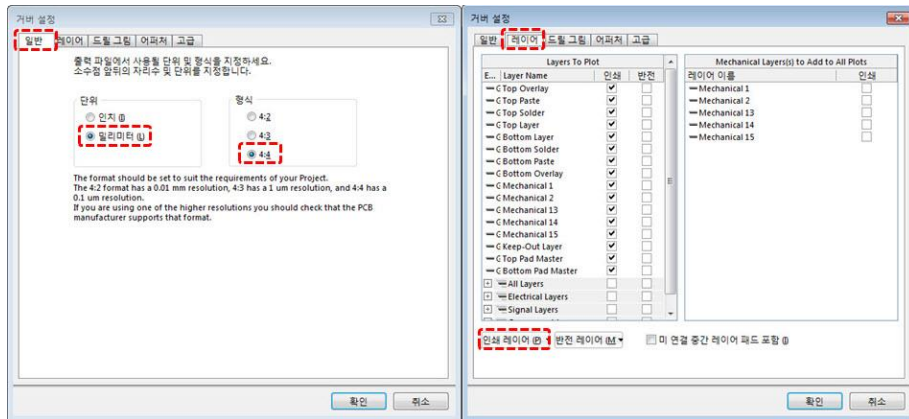


그림 8-487 거버 파일 생성 창

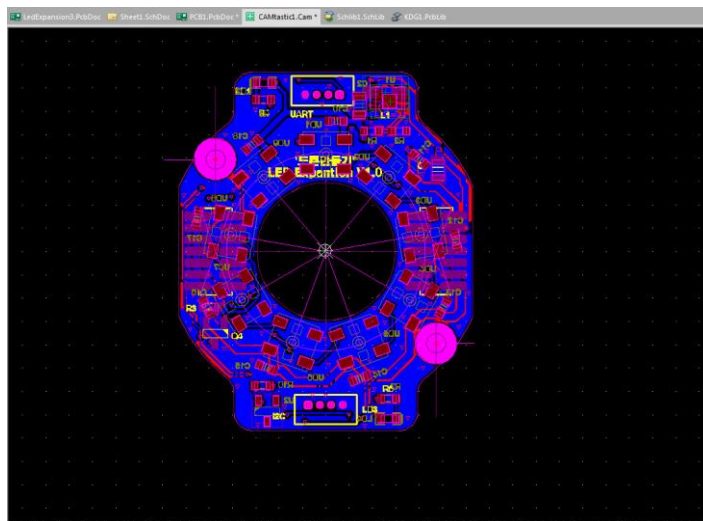


그림 8-488 거버 파일 생성 화면

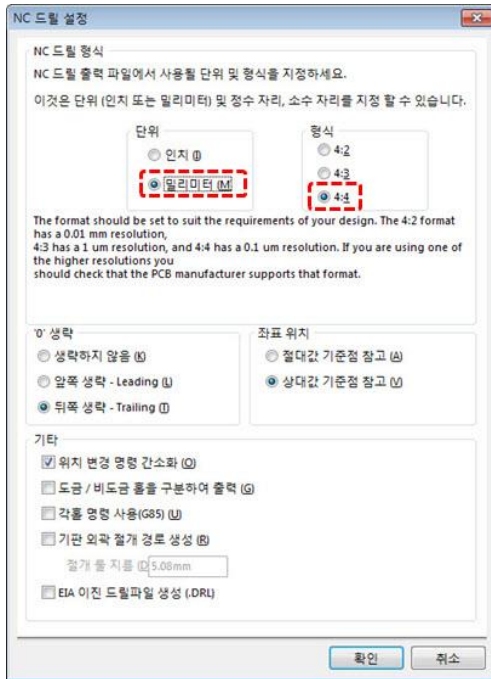


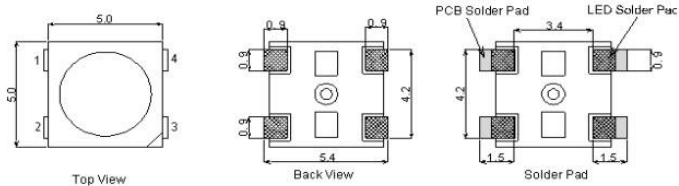
그림 8-489 드릴 파일 생성 창



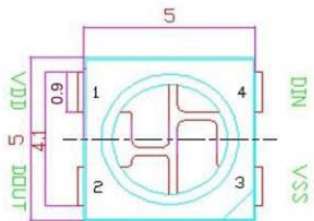
WS2812B

Intelligent control LED
integrated light source

Mechanical Dimensions



PIN configuration



PIN function

NO.	Symbol	Function description
1	VDD	Power supply LED
2	DOUT	Control data signal output
3	VSS	Ground
4	DIN	Control data signal input

그림 8-490 WS2812B 메뉴얼

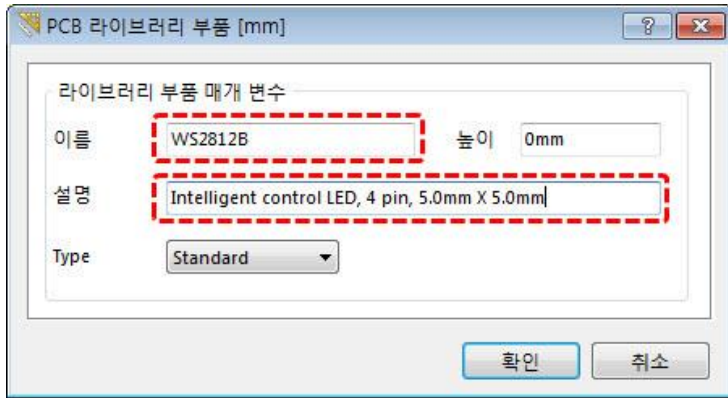


그림 8-491 부품 생성 창

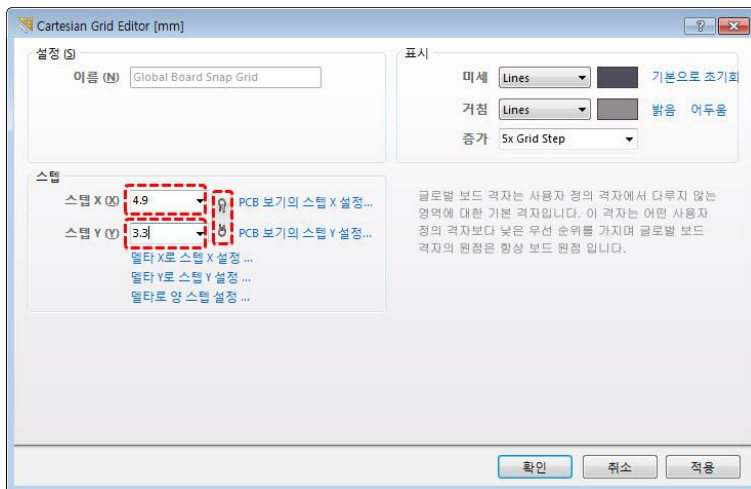


그림 8-492 패드를 그리기 위한 스텝 변경 창

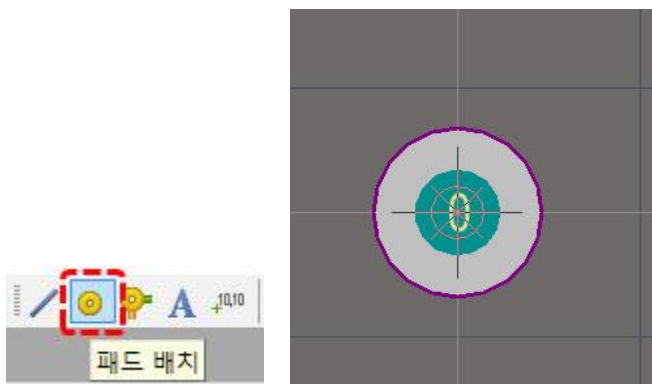


그림 8-493 '패드 배치' 선택 화면



그림 8-494 패드 속성 변경 창

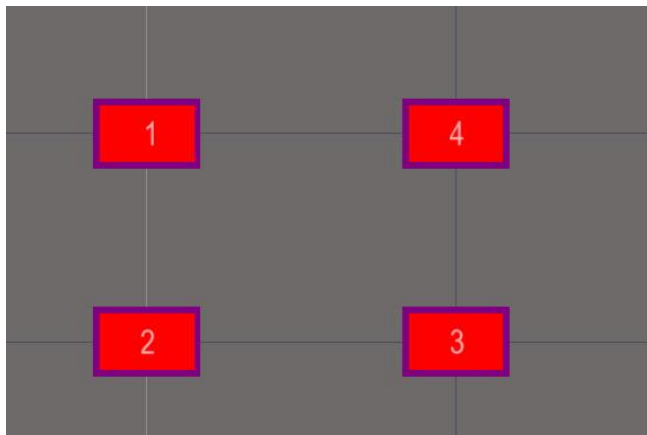


그림 8-495 패드 배치 화면

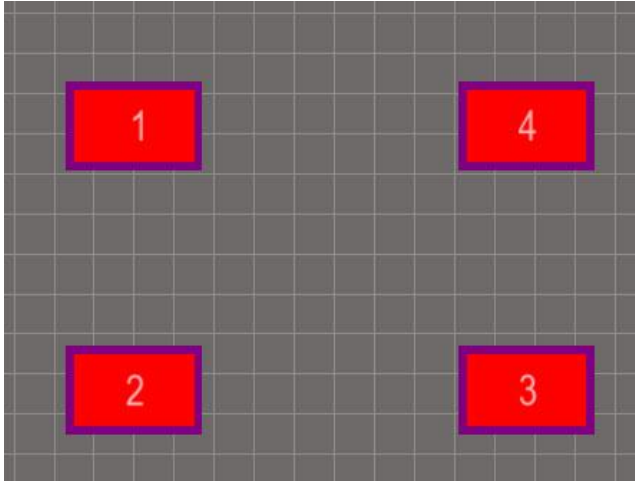


그림 8-496 스텝 변경 후 화면



그림 8-497 '선 배치'선택 화면

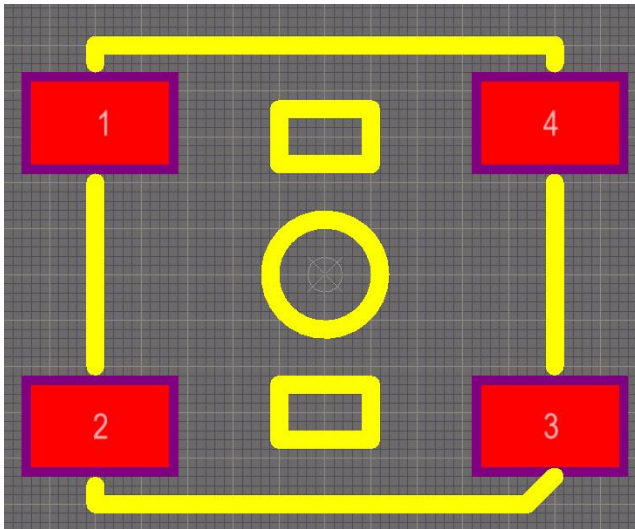


그림 8-498 '선 배치' 완료 화면

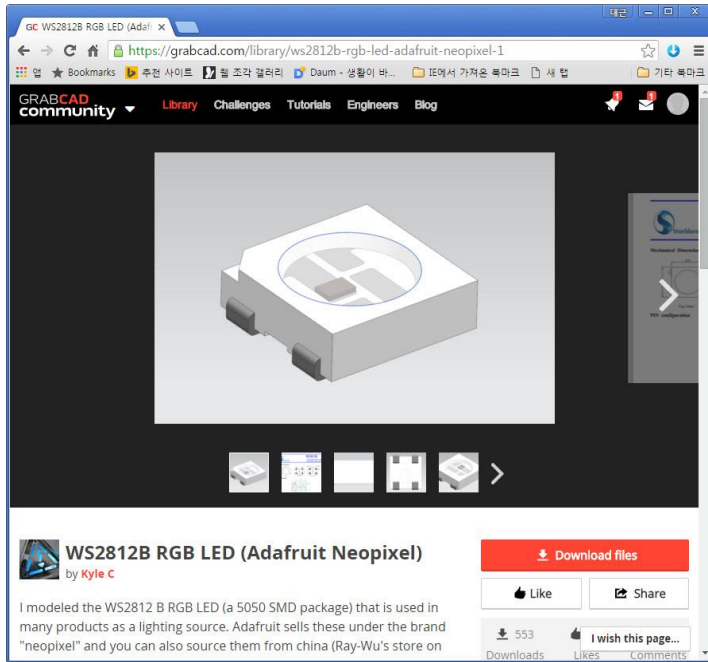


그림 8-499 3D 자료를 위한 Site 화면

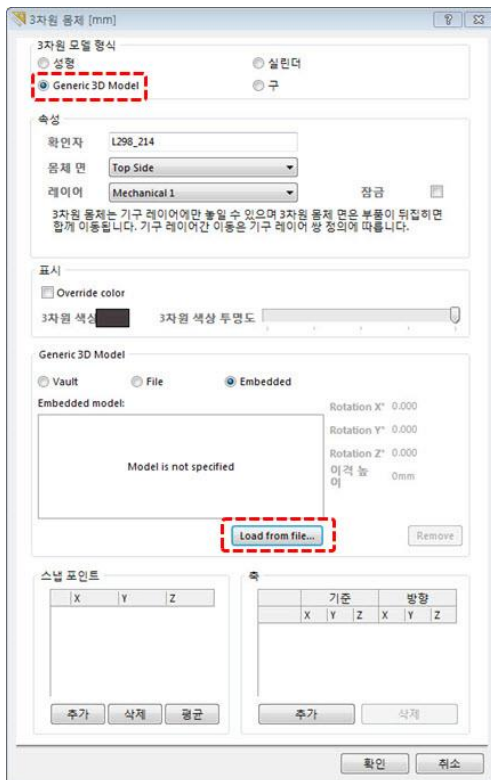


그림 8-500 3D 파일 로드 창

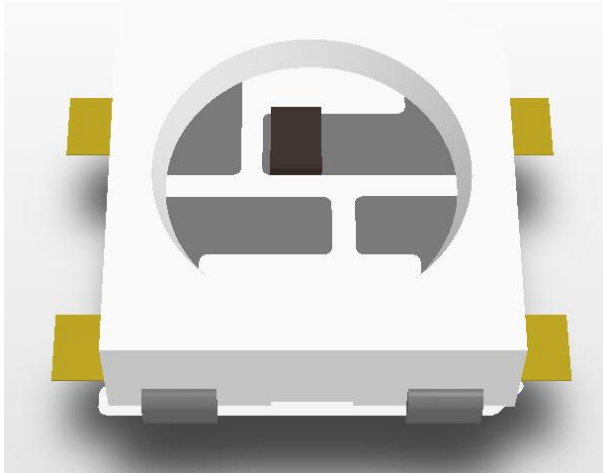


그림 8-501 로드된 3D 자료보기 화면1



그림 8-502 3D 몸체 회전 창

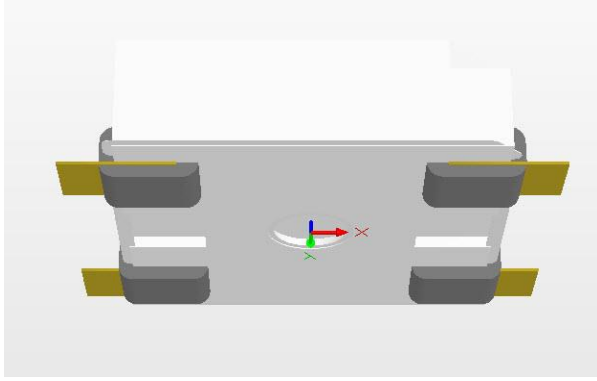


그림 8-503 로드된 3D 자료보기 화면2

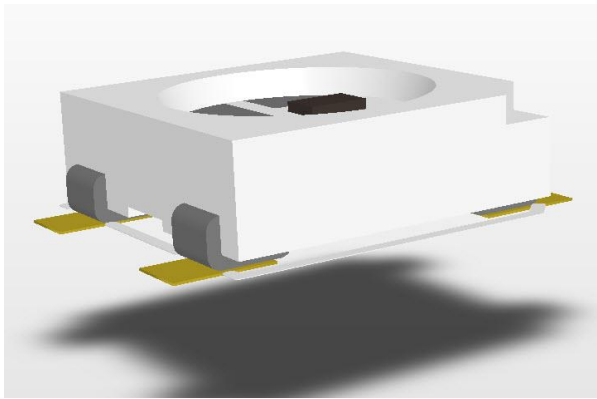


그림 8-504 로드된 3D 자료보기 화면3

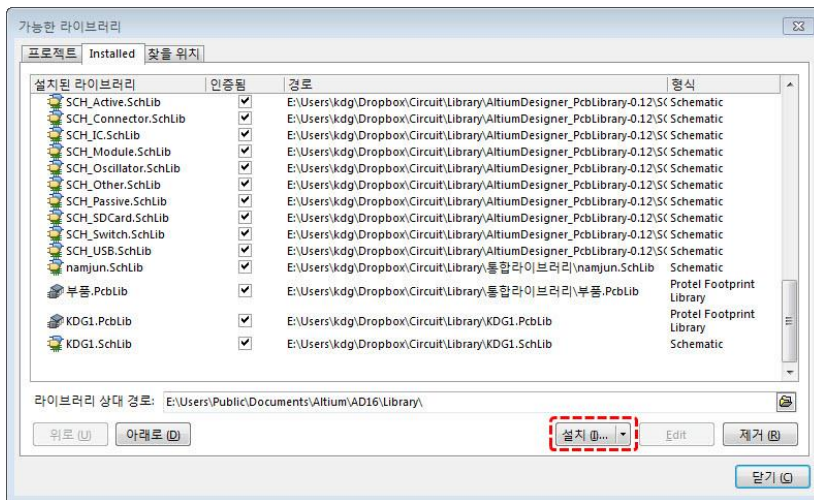


그림 8-505 라이브러리 등록 창

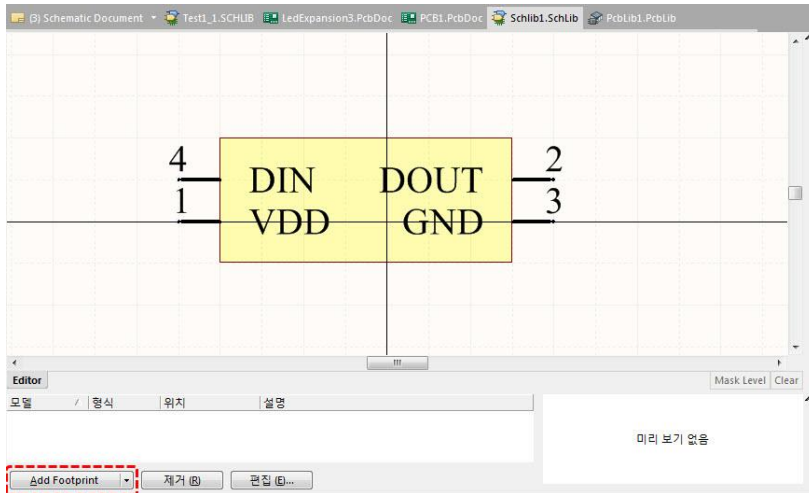


그림 8-506 PCB부품 사용 화면1

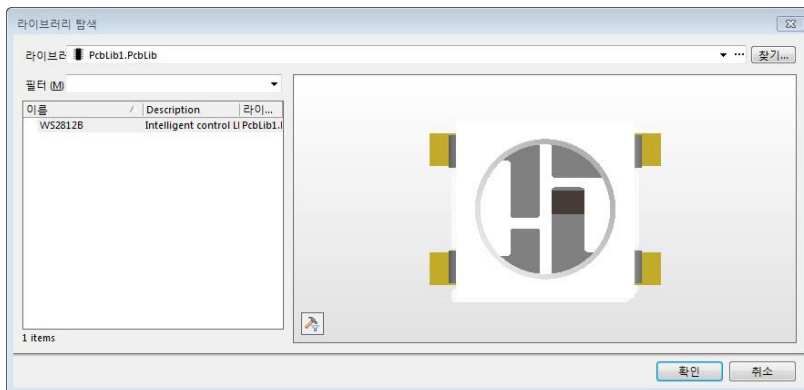


그림 8-507 PCB부품 선택 창

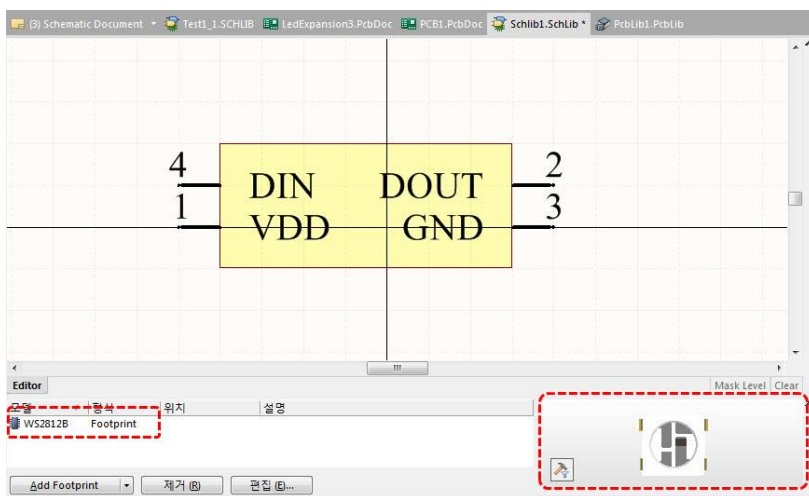


그림 8-508 PCB부품 사용 화면2

9장. 스카이로버 나노 펌웨어

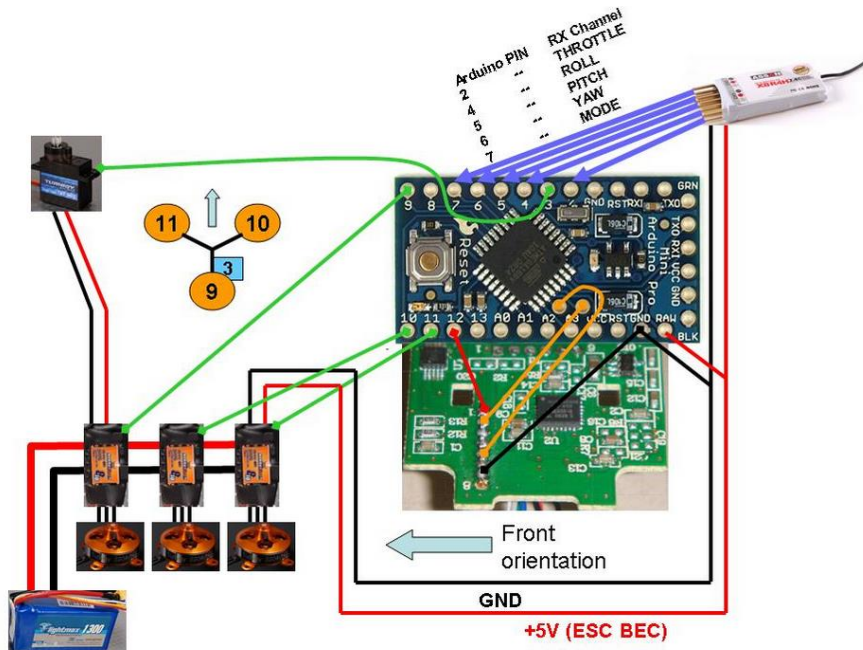


그림 9-1 아두이노 보드와 WMP 센서를 이용한 드론 하드웨어 구성

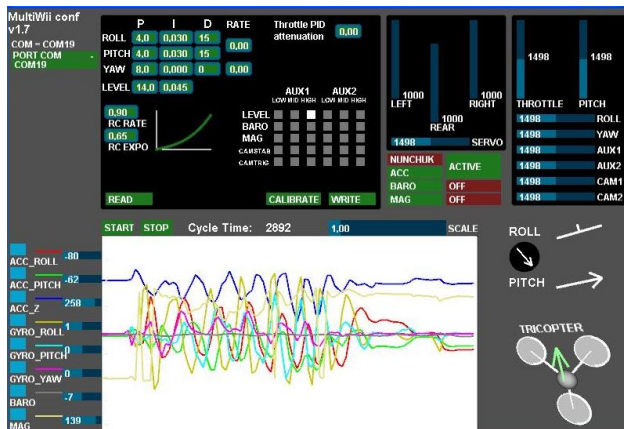


그림 9-2 Multiwii Config 실행 화면

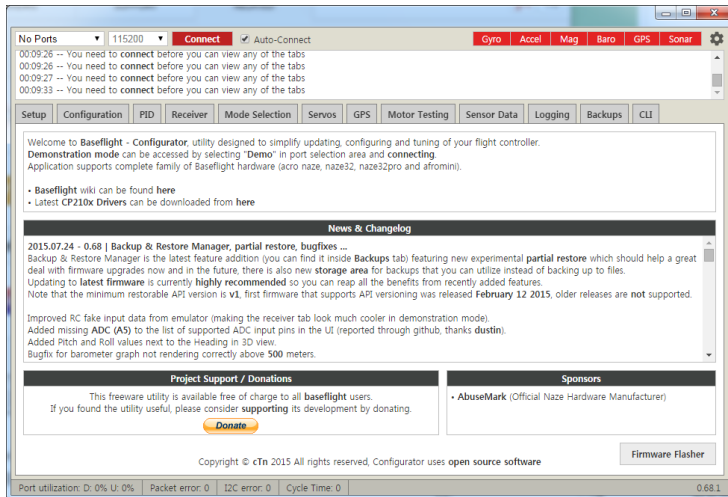


그림 9-3 크롬 브라우저 Afroflight32 설정 앱



그림 9-4 Flexbot 외형

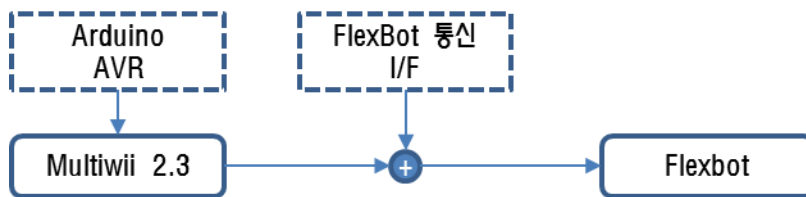


그림 9-5 Flexbot 펌웨어 구성

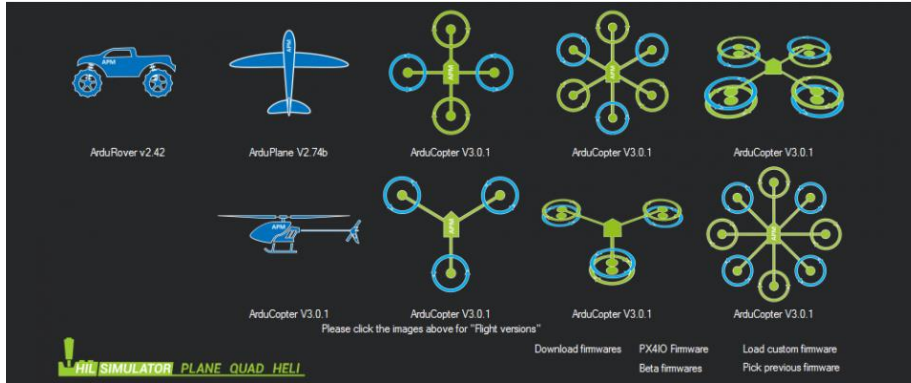


그림 9-6 Ardupilot의 다양한 구성

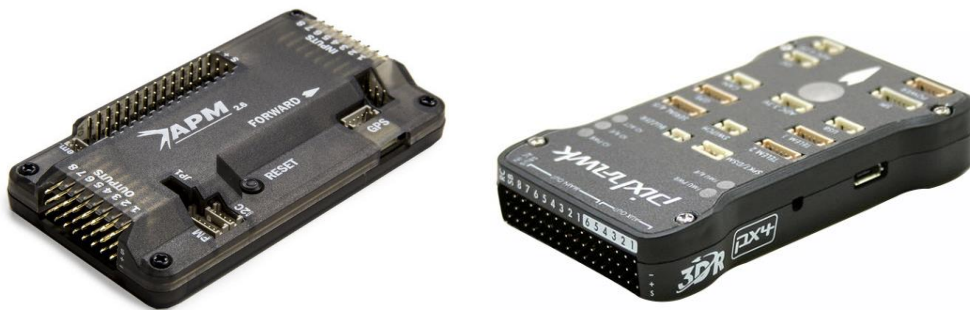


그림 9-7 APM/Pixhawk 보드

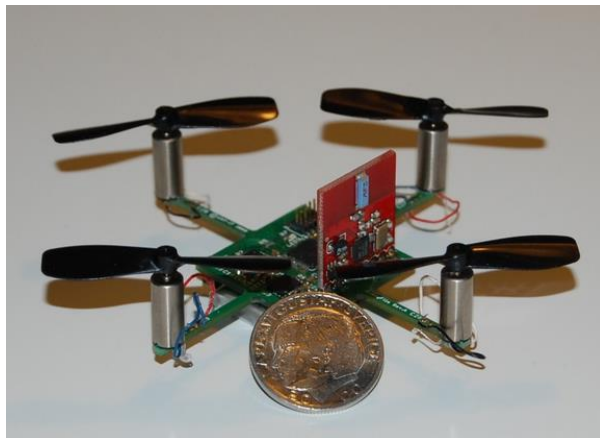


그림 9-8 Crazyflie 개발 버전



그림 9-9 Crazyflie 2.0

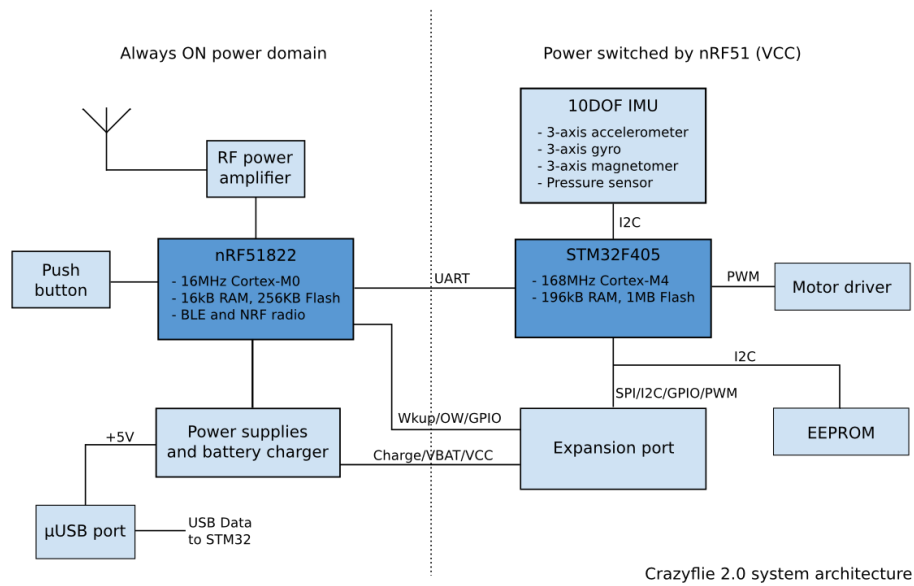


그림 9-10 <출처: <https://wiki.bitcraze.io/projects:crazyflie2:architecture:index>>

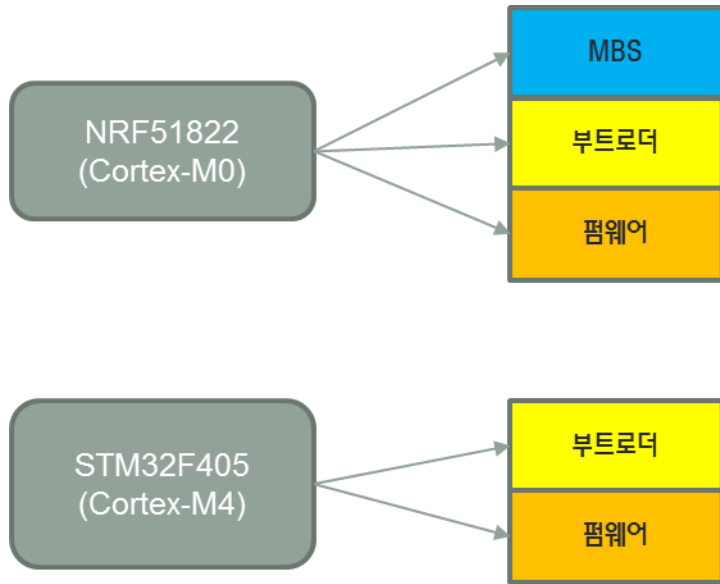


그림 9-11

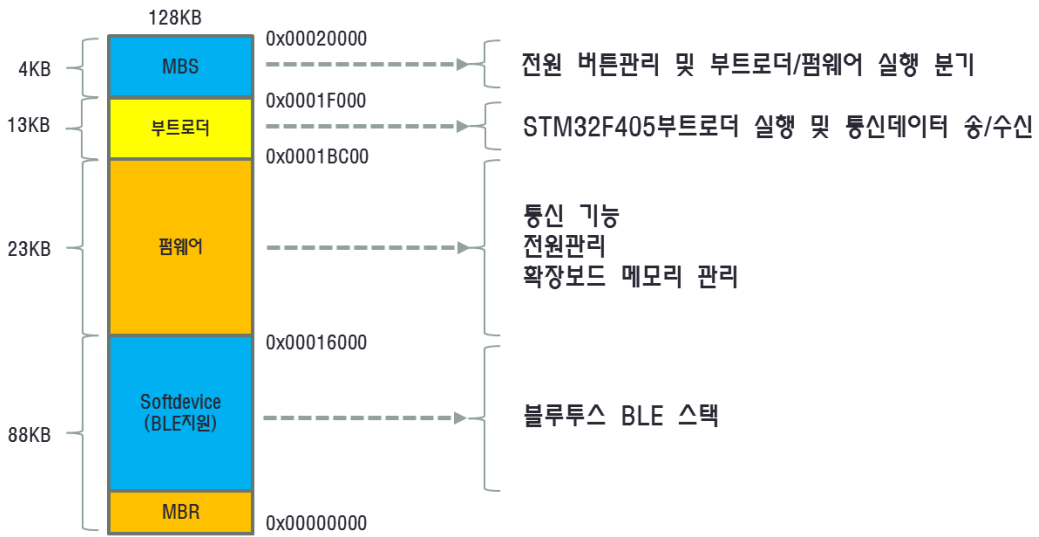


그림 9-12

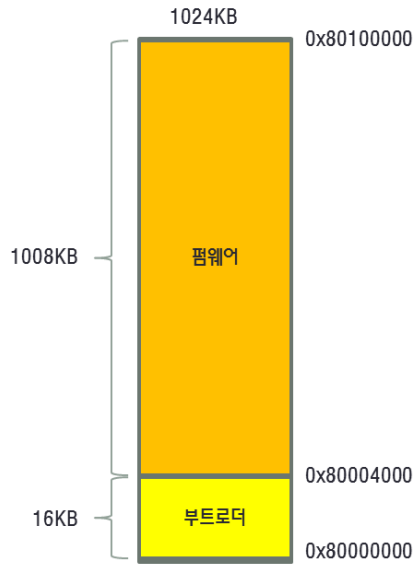


그림 9-13

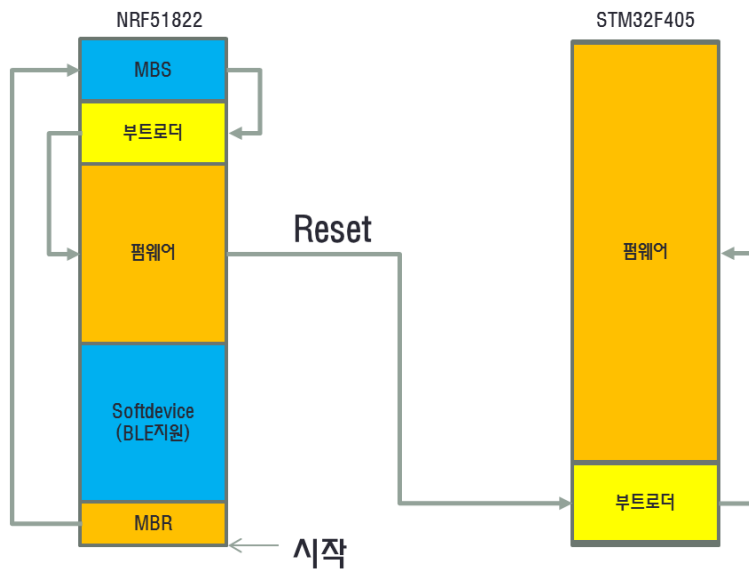


그림 9-14

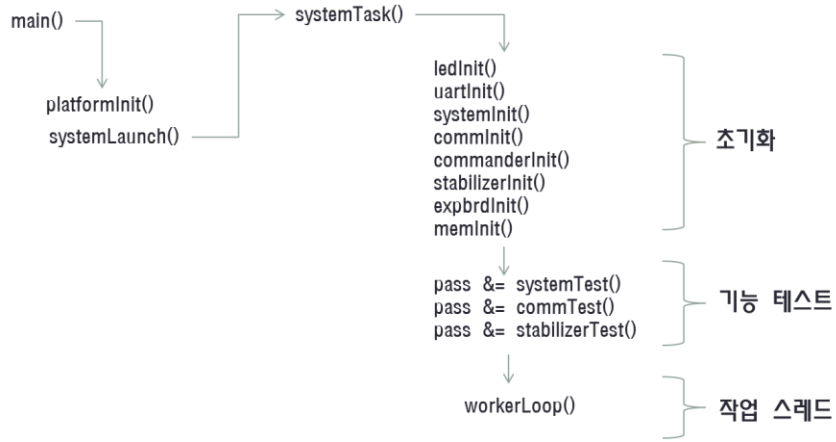


그림 9-15

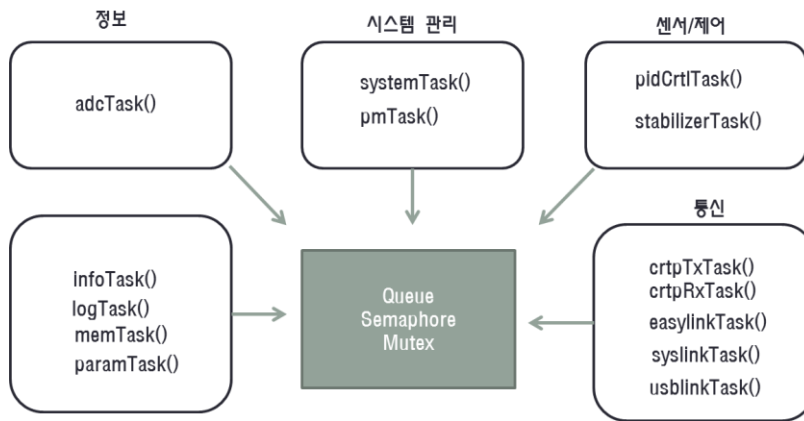


그림 9-16

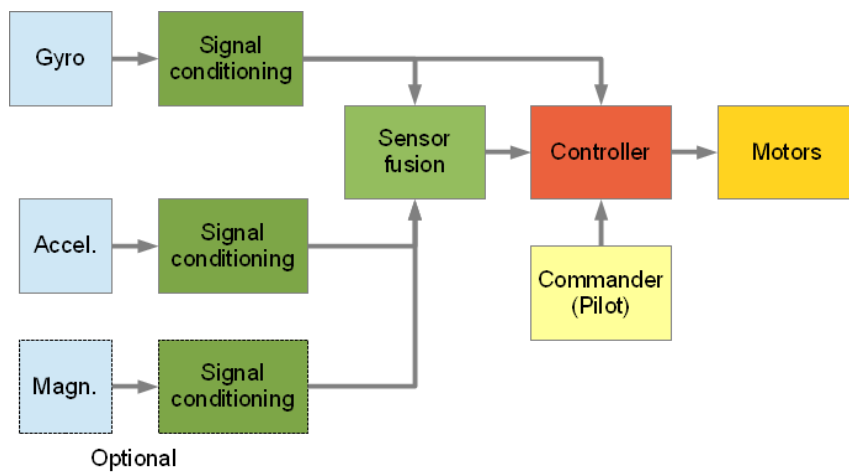


그림 9-17 <출처: https://wiki.bitcraze.io/doc:crazyflie:dev:fimware:sensor_to_control>

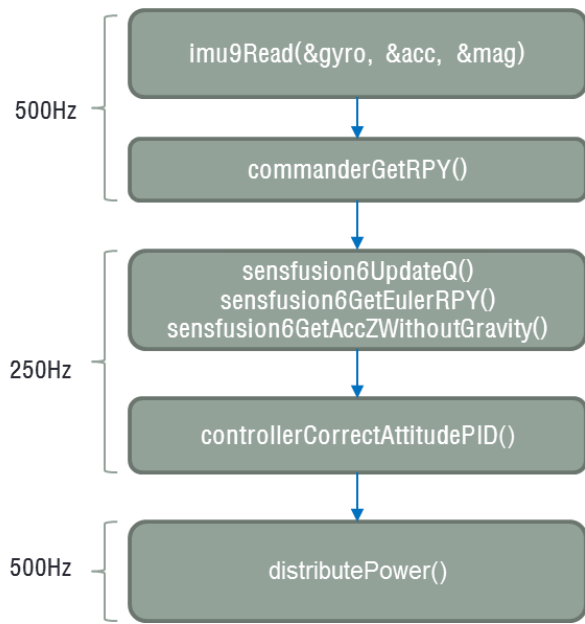


그림 9-18

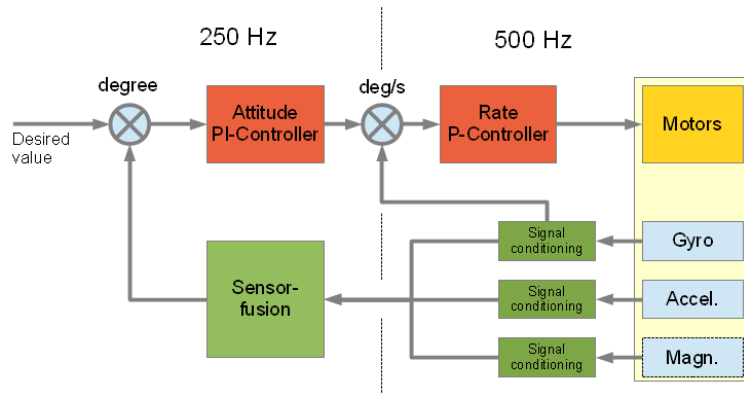


그림 9-19 <출처: https://wiki.bitcraze.io/_media/doc:crazyflie:dev:fimware:pid.png>

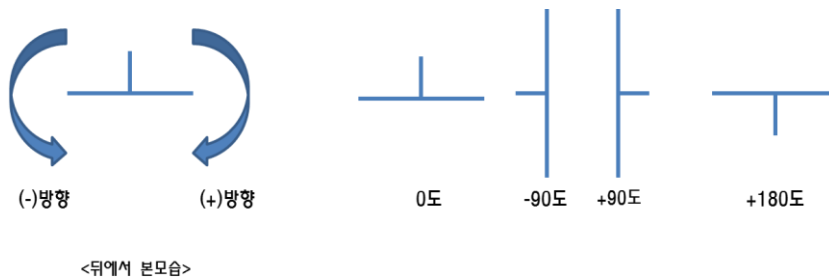


그림 9-20

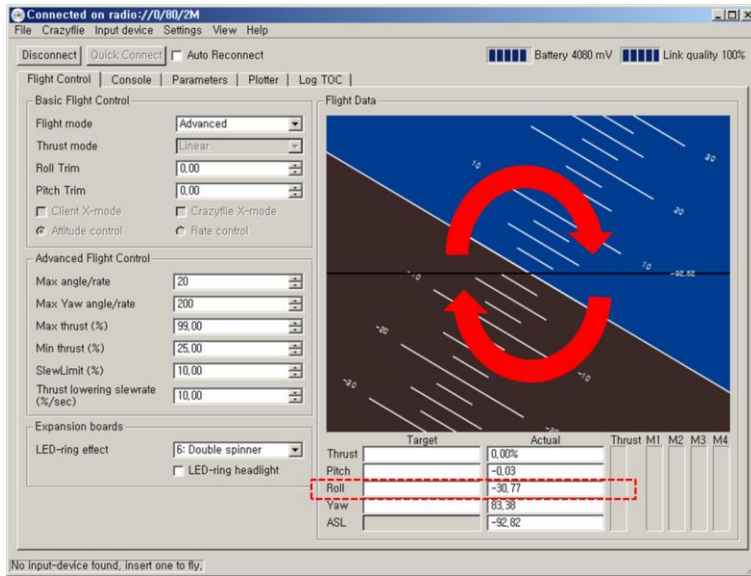


그림 9-21

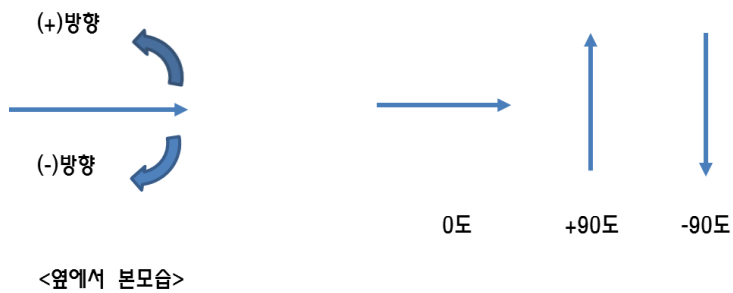


그림 9-22

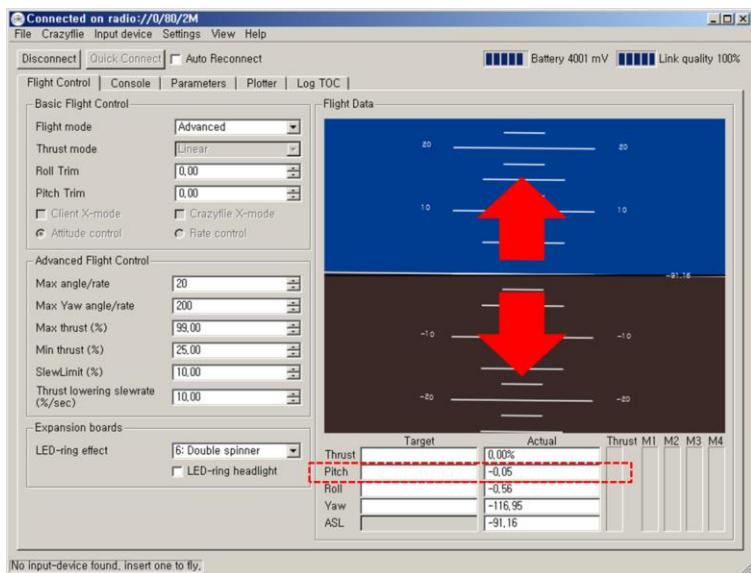


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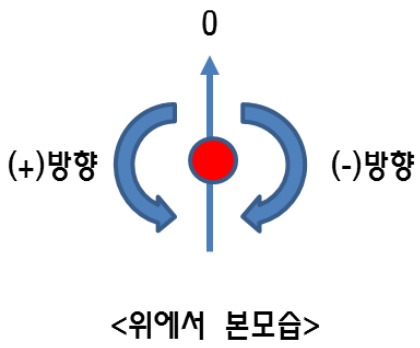


그림 9-24

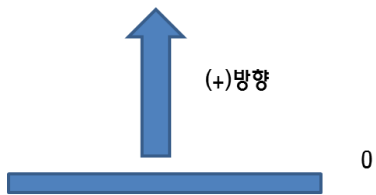


그림 9-25

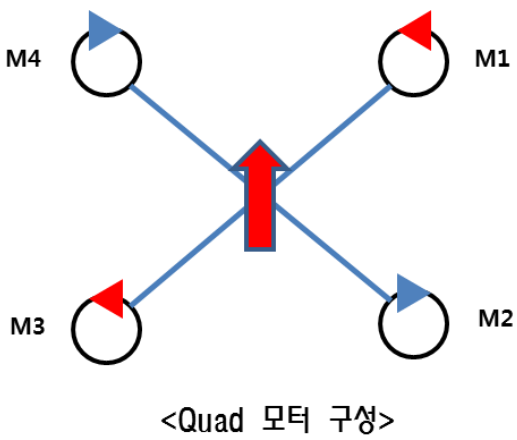


그림 9-26

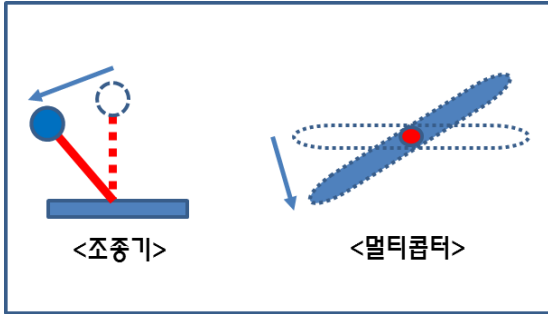


그림 9-27

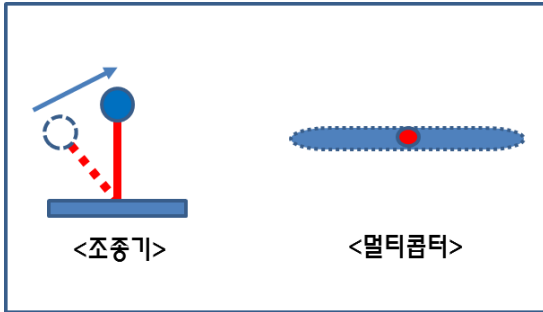


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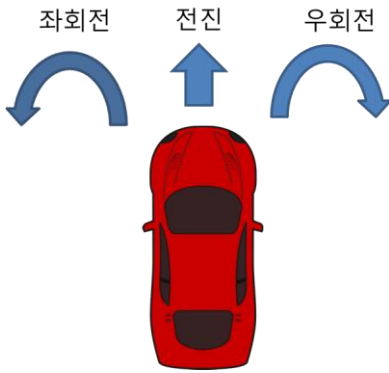


그림 9-29



그림 9-30

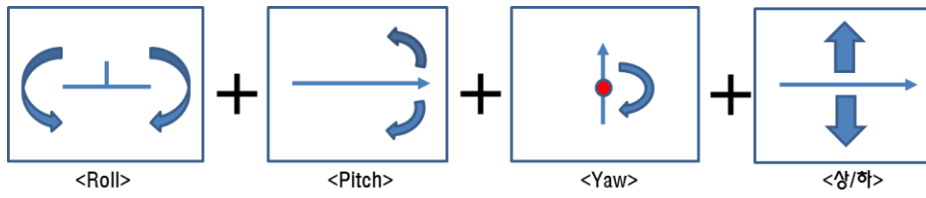


그림 9-31

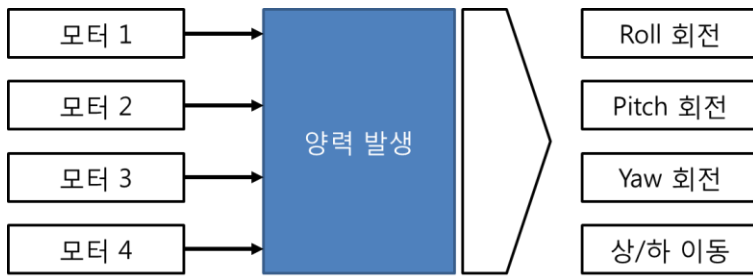


그림 9-32

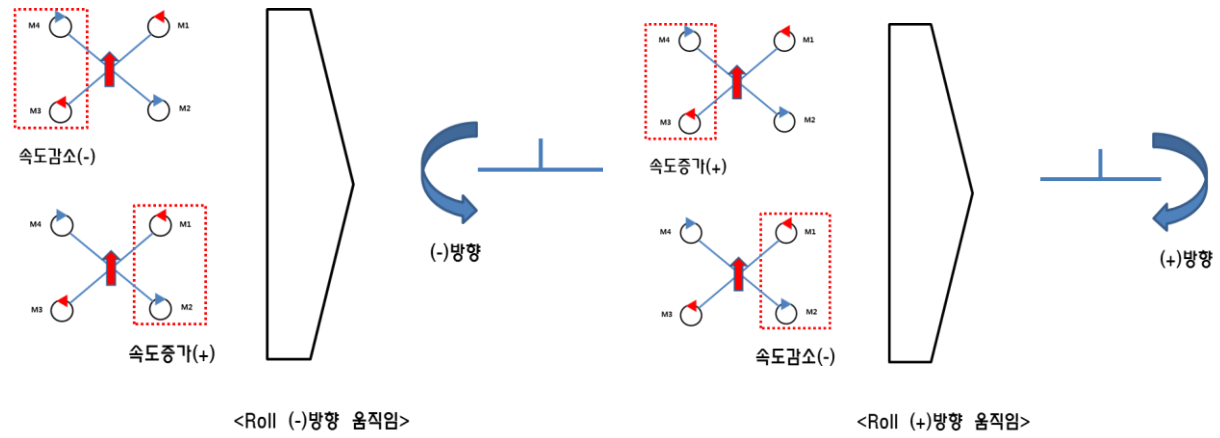
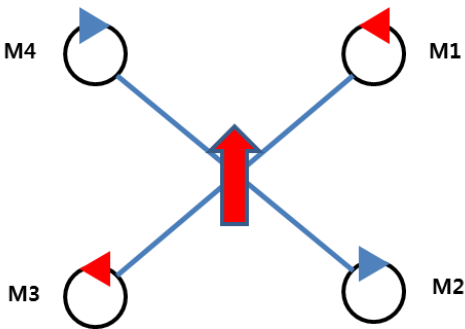


그림 9-33



모터	Roll	Pitch	Yaw	상/하
M1	-	+	+	+
M2	-	-	-	+
M3	+	-	+	+
M4	+	+	-	+

그림 9-34

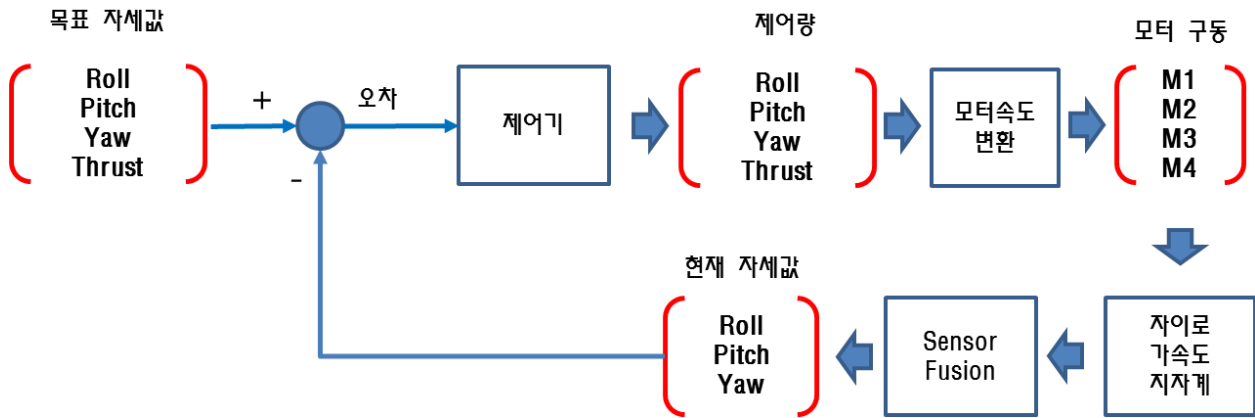


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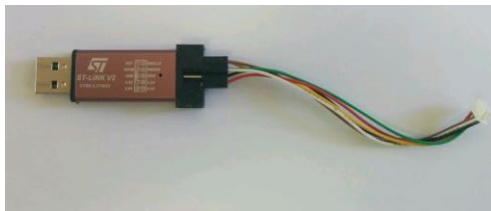


그림 9-36 ST-LINK/V2

- 범용 직렬 버스 컨트롤러
- Generic USB Hub
- Standard Enhanced PCI to USB Host Controller
- Standard Universal PCI to USB Host Controller
- STMicroelectronics STLink dongle
- USB Composite Device
- USB Root Hub
- USB Root Hub

그림 9-37



그림 9-38

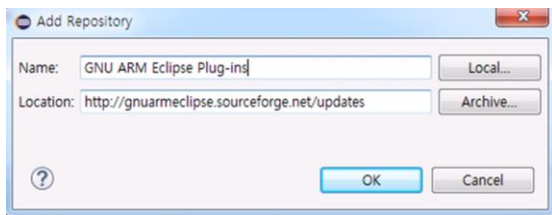


그림 9-39

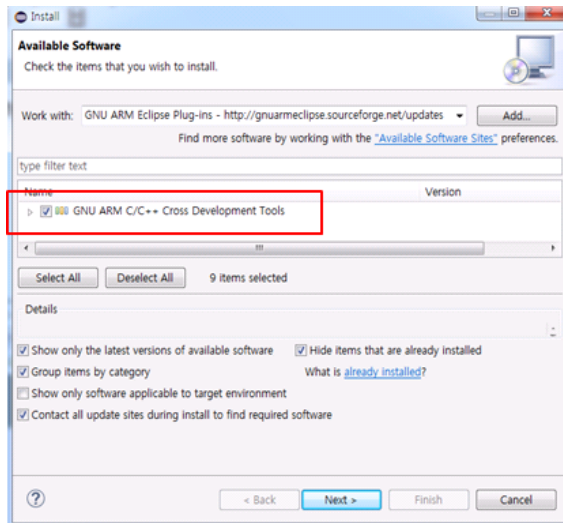


그림 9-40

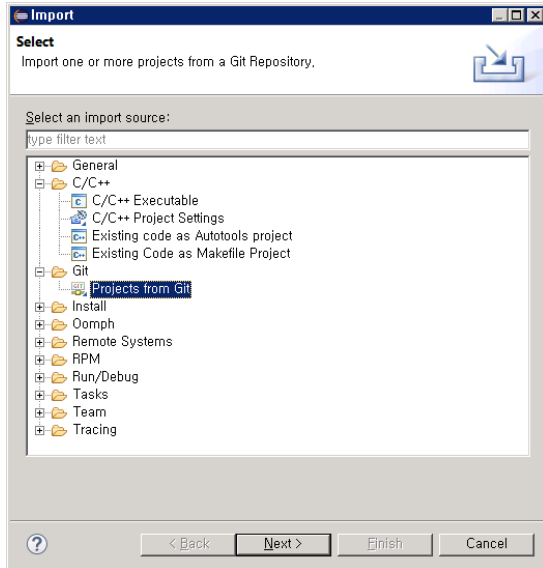


그림 9-41

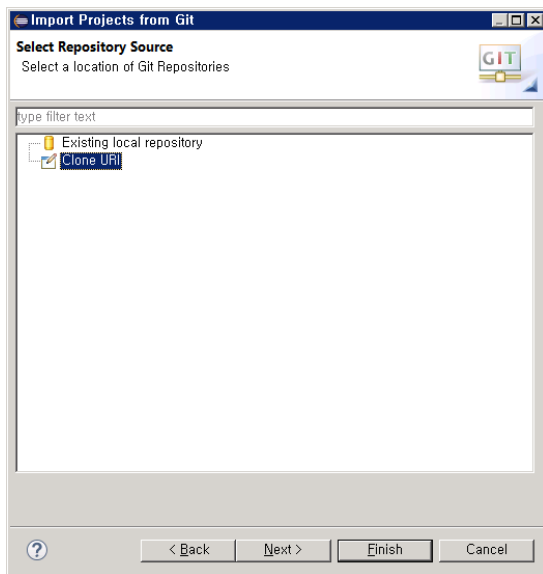


그림 9-42

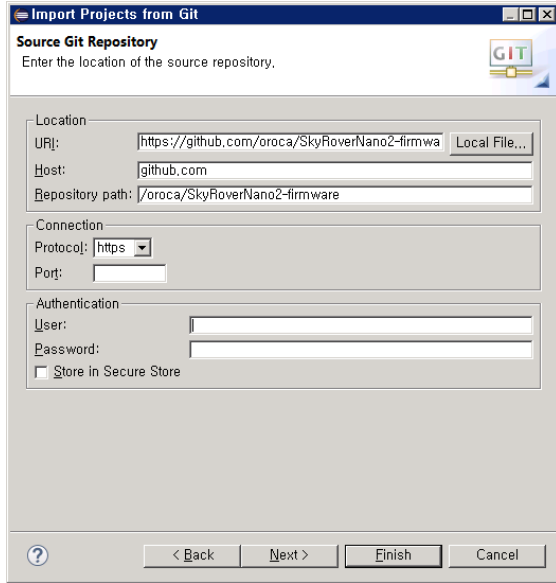


그림 9-43

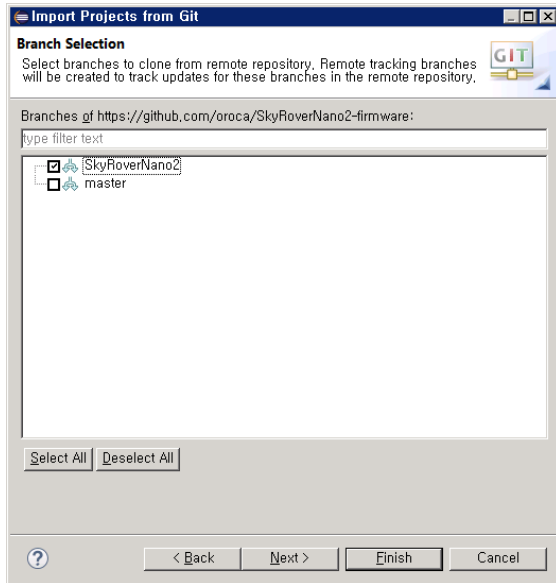


그림 9-44

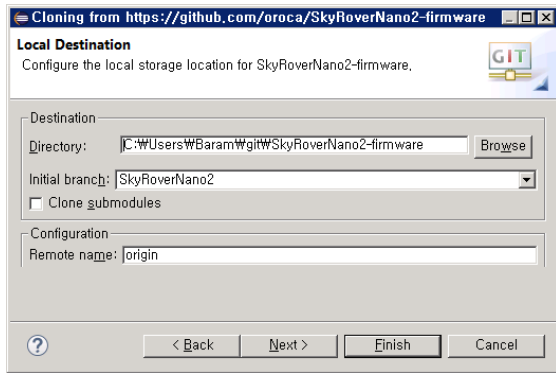


그림 9-45

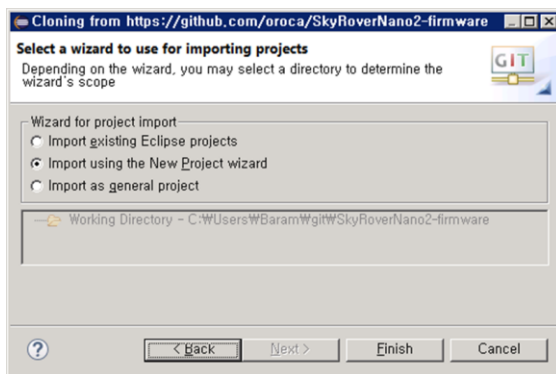


그림 9-46

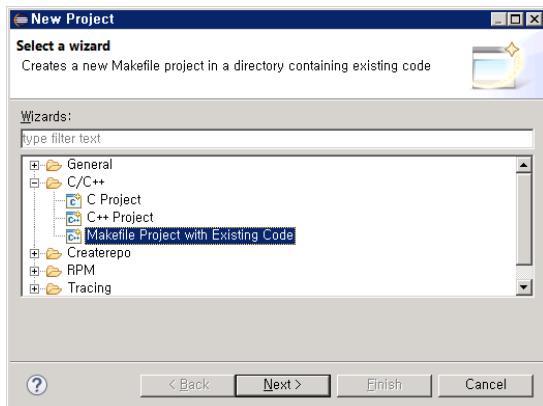


그림 9-47

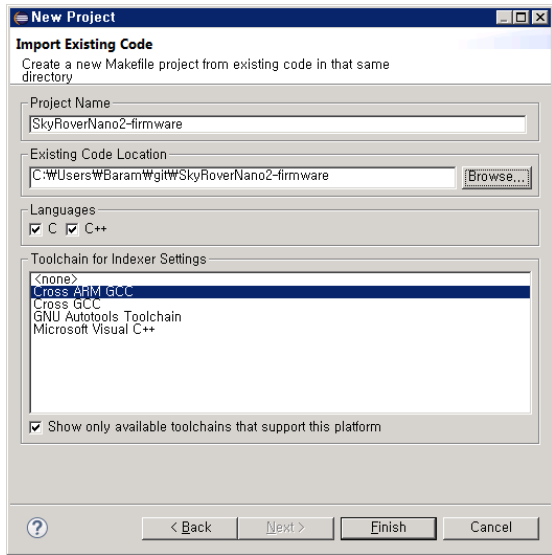


그림 9-48

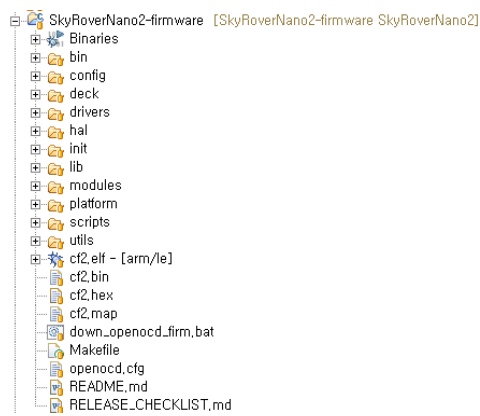


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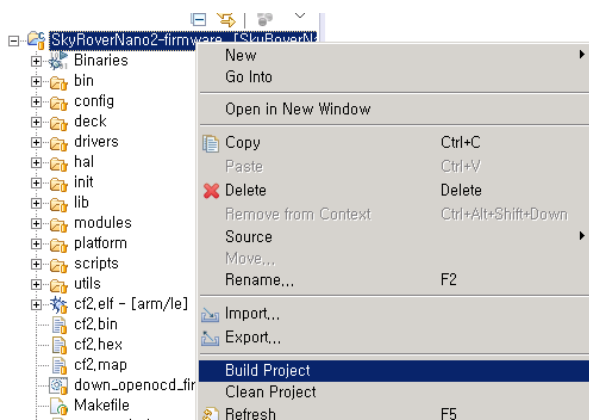


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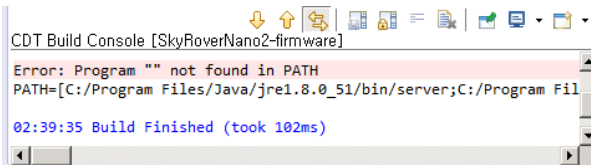


그림 9-51

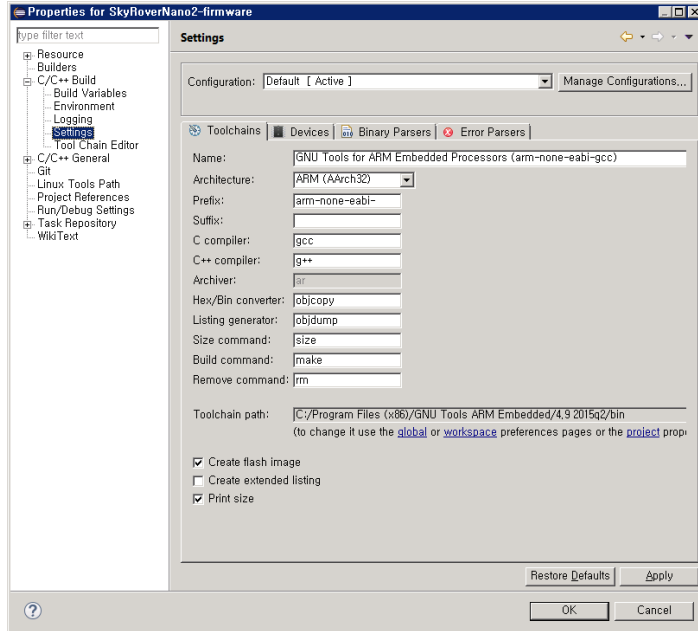


그림 9-52

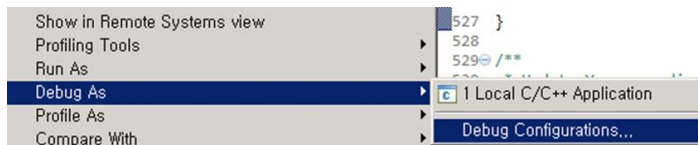


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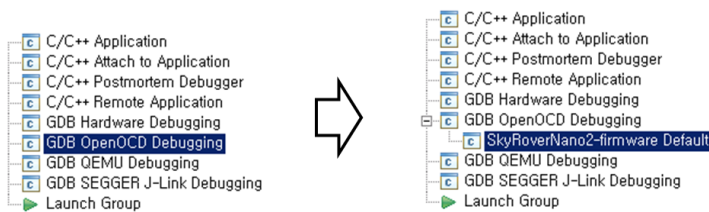


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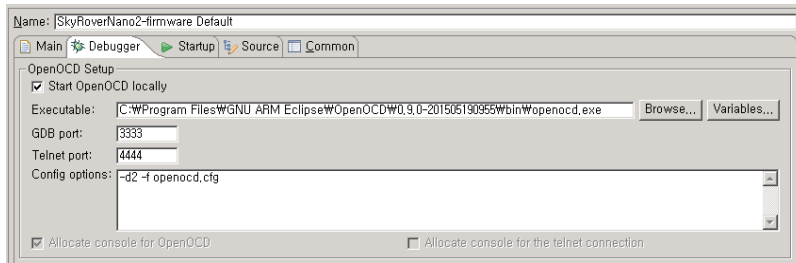


그림 9-55

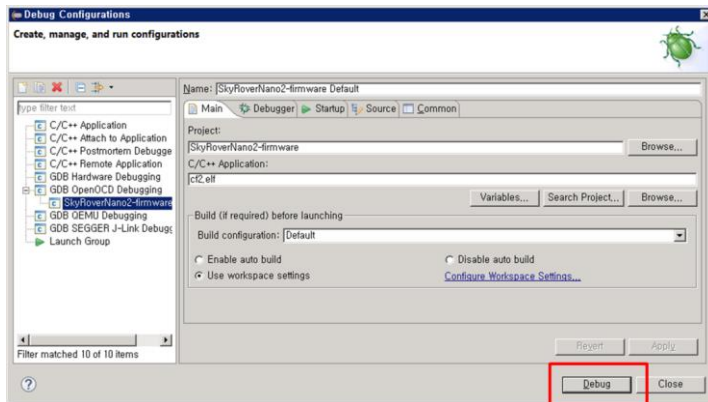


그림 9-56

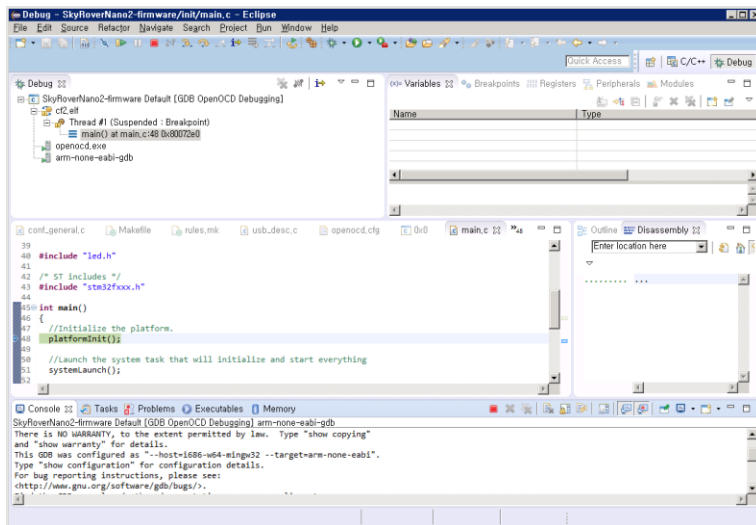


그림 9-57

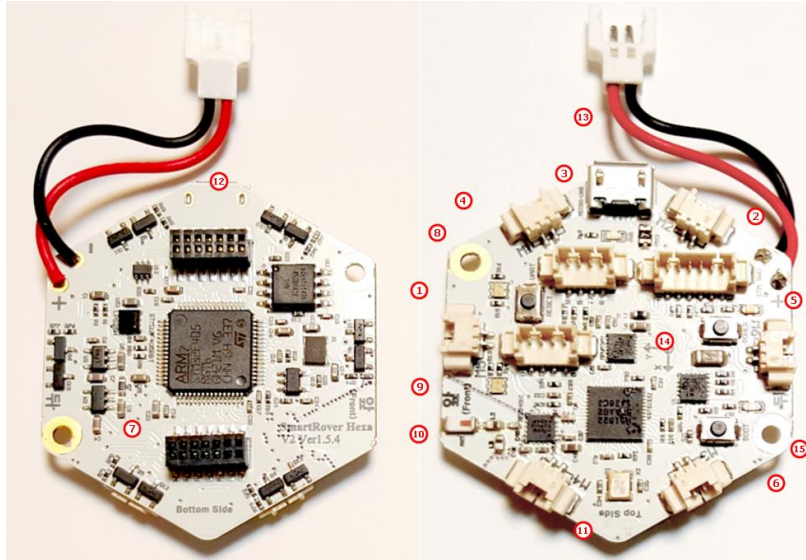


그림 9-58

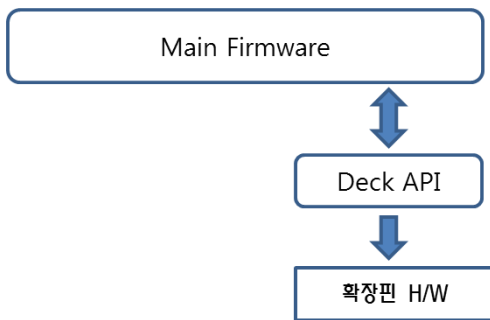


그림 9-59

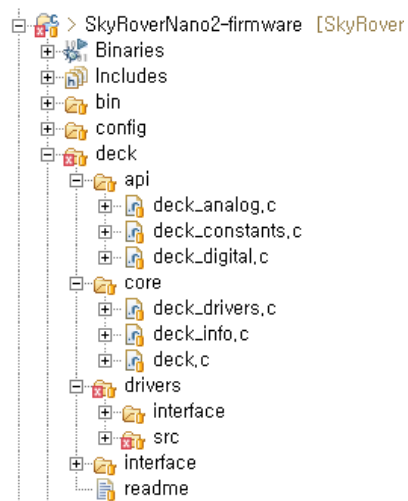


그림 9-60

```

deckGPIOMapping_t deckGPIOMapping[13] = {
{ .periph= RCC_AHB1Periph_GPIOC, .port= GPIOC, .pin=GPIO_Pin_11, .adcCh=-1}, /* RX1 */
{ .periph= RCC_AHB1Periph_GPIOC, .port= GPIOC, .pin=GPIO_Pin_10, .adcCh=-1}, /* TX1 */
{ .periph= RCC_AHB1Periph_GPIOB, .port= GPIOB, .pin=GPIO_Pin_7, .adcCh=-1}, /* SDA */
{ .periph= RCC_AHB1Periph_GPIOB, .port= GPIOB, .pin=GPIO_Pin_6, .adcCh=-1}, /* SCL */
{ .periph= RCC_AHB1Periph_GPIOB, .port= GPIOB, .pin=GPIO_Pin_8, .adcCh=-1}, /* I01 */
{ .periph= RCC_AHB1Periph_GPIOB, .port= GPIOB, .pin=GPIO_Pin_5, .adcCh=-1}, /* I02 */
{ .periph= RCC_AHB1Periph_GPIOB, .port= GPIOB, .pin=GPIO_Pin_4, .adcCh=-1}, /* I03 */
{ .periph= RCC_AHB1Periph_GPIOC, .port= GPIOC, .pin=GPIO_Pin_12, .adcCh=-1}, /* I04 */
{ .periph= RCC_AHB1Periph_GPIOA, .port= GPIOA, .pin=GPIO_Pin_2, .adcCh=ADC_Channel_2}, /* TX2 */
{ .periph= RCC_AHB1Periph_GPIOA, .port= GPIOA, .pin=GPIO_Pin_3, .adcCh=ADC_Channel_3}, /* RX2 */
{ .periph= RCC_AHB1Periph_GPIOA, .port= GPIOA, .pin=GPIO_Pin_5, .adcCh=ADC_Channel_5}, /* SCK */
{ .periph= RCC_AHB1Periph_GPIOA, .port= GPIOA, .pin=GPIO_Pin_6, .adcCh=ADC_Channel_6}, /* MISO */
{ .periph= RCC_AHB1Periph_GPIOA, .port= GPIOA, .pin=GPIO_Pin_7, .adcCh=ADC_Channel_7}, /* MOSI */
};

```

그림 9-61



그림 9-62

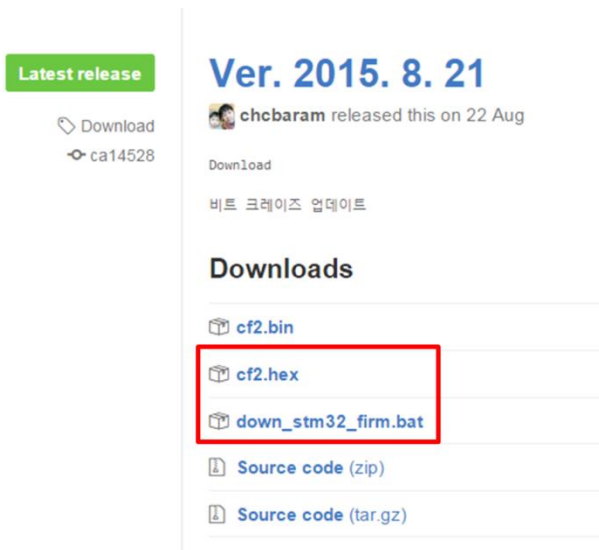


그림 9-63

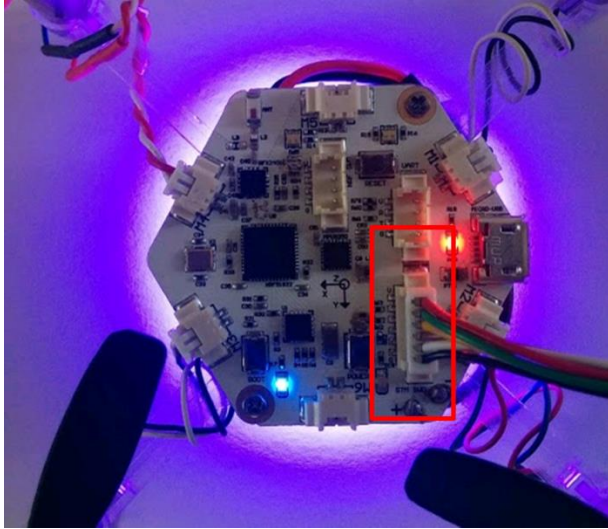


그림 9-64

```

C:\Windows\system32\cmd.exe
Info : using stlink api v2
Info : Target voltage: 3.234233
Info : stm32f4x.cpu: hardware has 6 breakpoints, 4 watchpoints
-----
TargetName      Type      Endian TapName      State
-----
0* stm32f4x.cpu  hla_target little stm32f4x.cpu    running
target state: halted
target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x080002bc msp: 0x2005000
auto erase enabled
Info : device id = 0x10016413
Info : flash size = 1024kbytes
target state: halted
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x20000042 msp: 0x2005000
wrote 114688 bytes from file cf2.hex in 5.274301s (21.235 KiB/s)
target state: halted
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x2000002e msp: 0x2005000
verified 71892 bytes in 1.011058s (69.439 KiB/s)
shutdown command invoked
STM32 FIRM 쓰기 - 완료

C:\Users\Baram\Downloads>pause
계속하려면 아무 키나 누르십시오 . . .

```

그림 9-65



그림 9-66

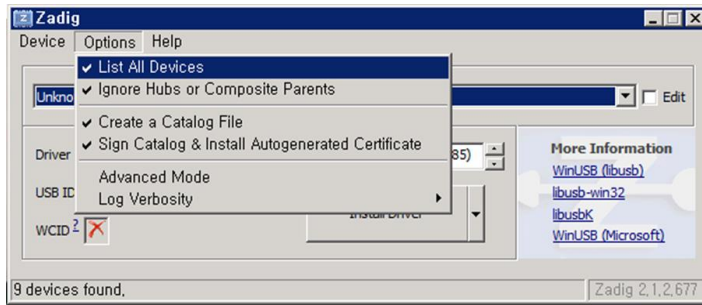


그림 9-67

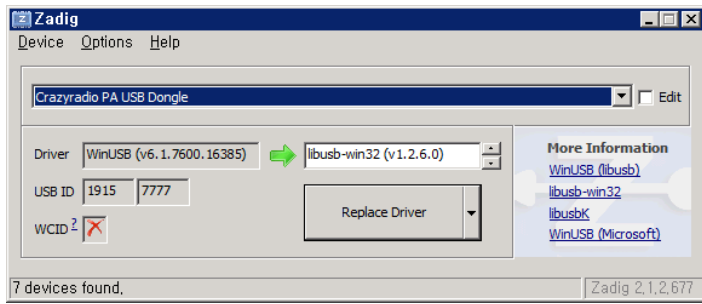


그림 9-68

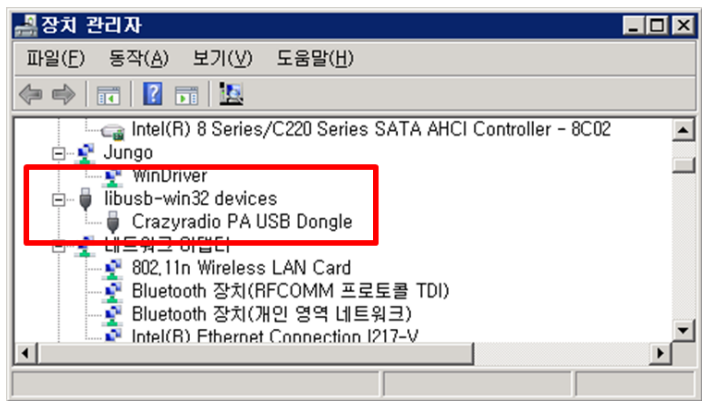


그림 9-69

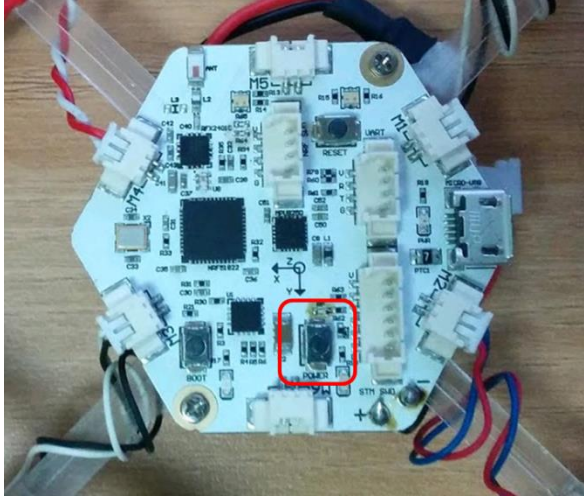


그림 9-70 전원 버튼 위치

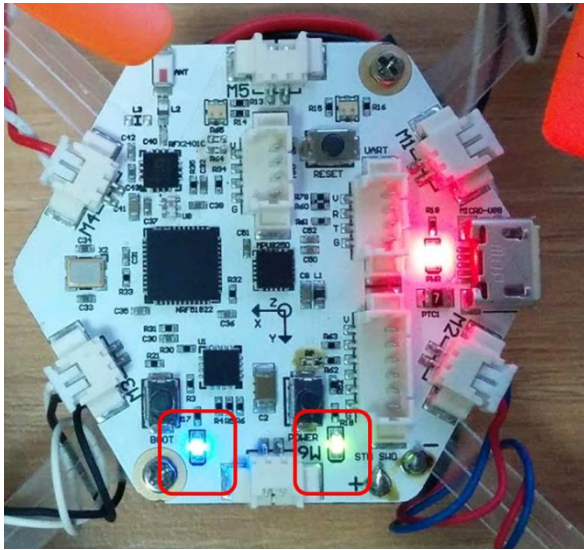


그림 9-71 부트로더 상태 LED

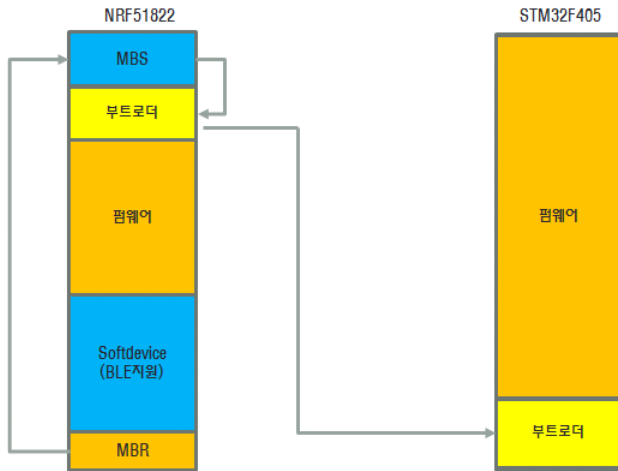


그림 9-72

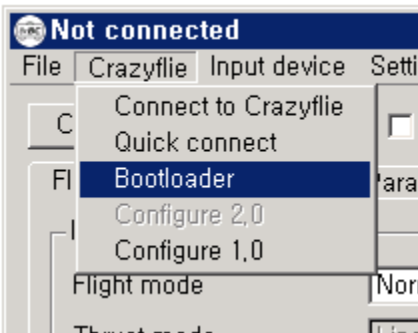


그림 9-73

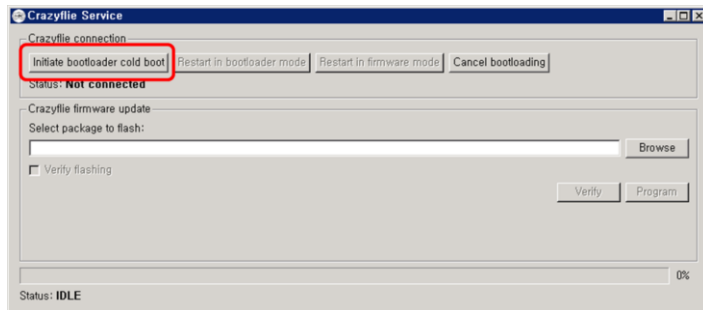


그림 9-74

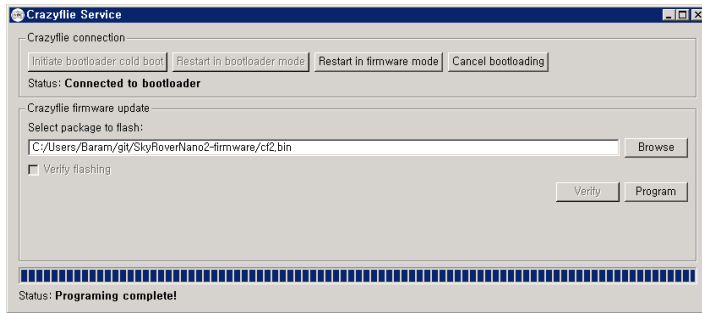


그림 9-75

Get Software

[Top](#)

Part Number	Version	Marketing Status	Order From ST
STSW-STM32080	3.0.5	Active	Download

그림 9-76

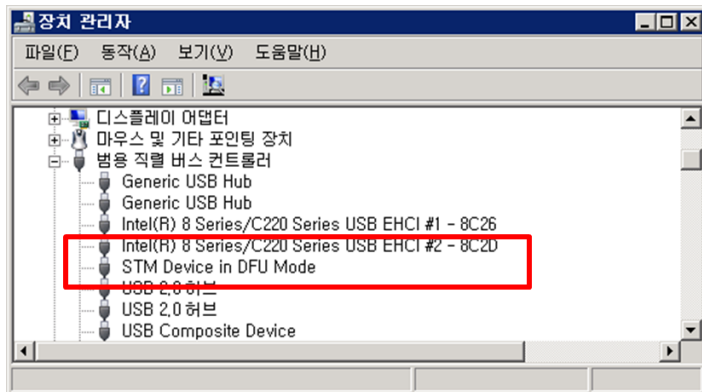


그림 9-77

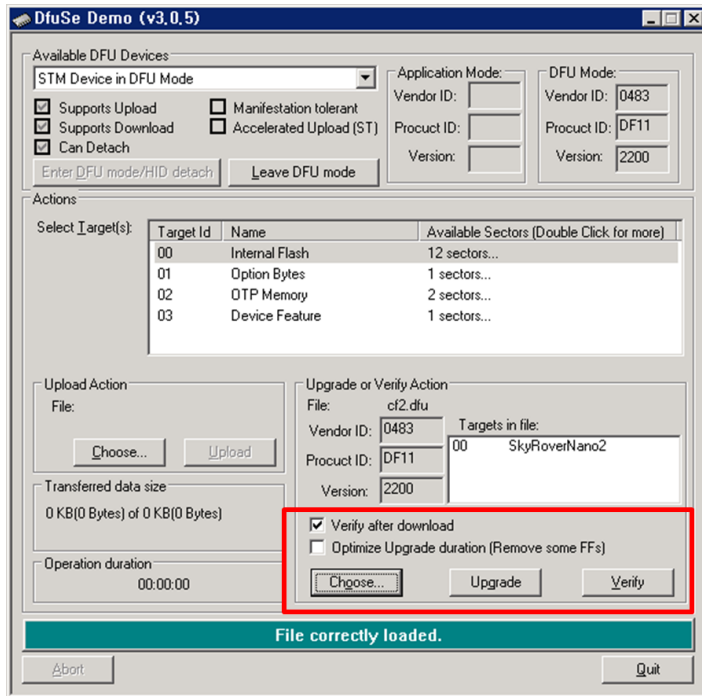


그림 9-78

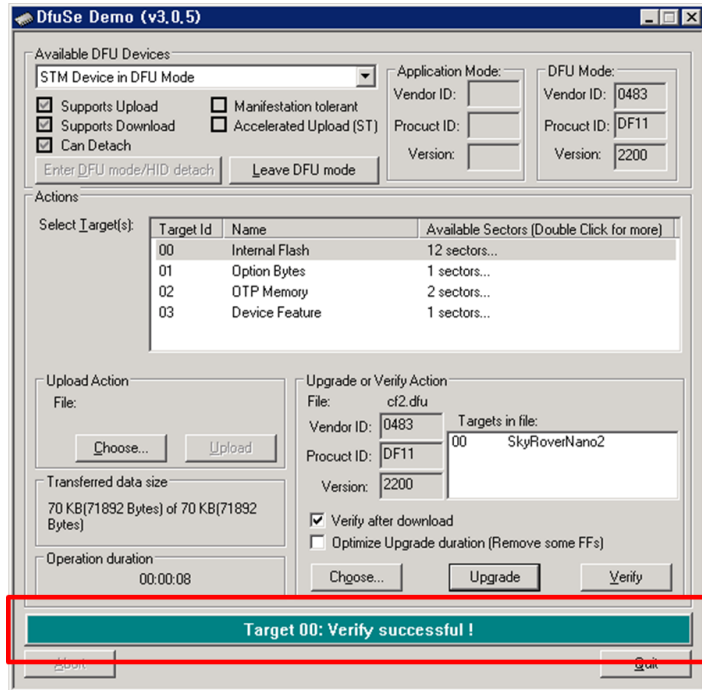


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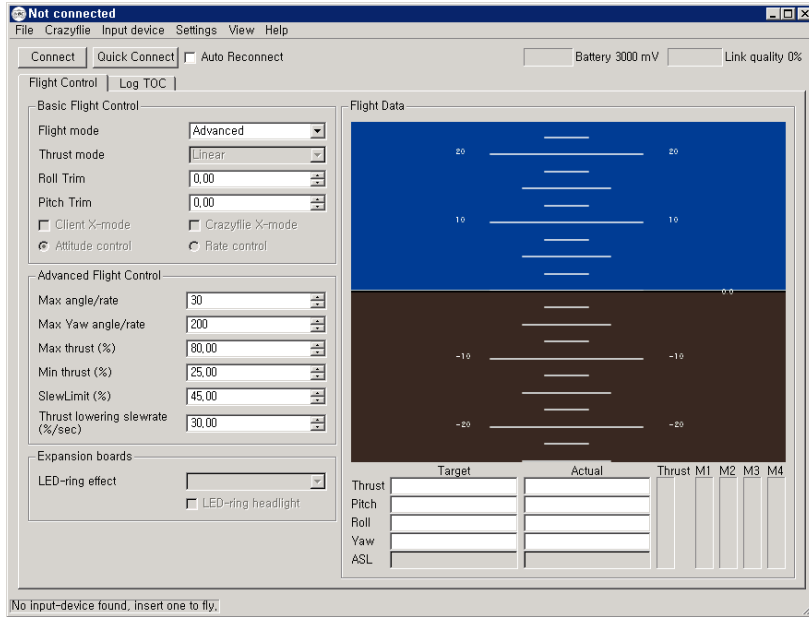


그림 9-80

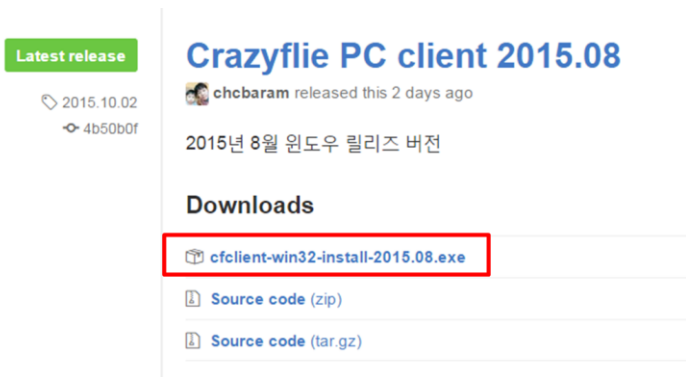


그림 9-81

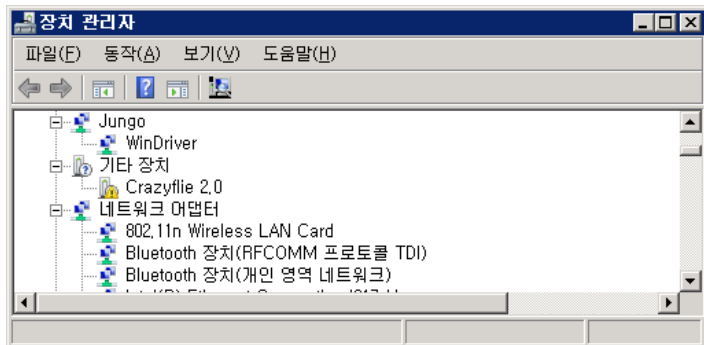


그림 9-82

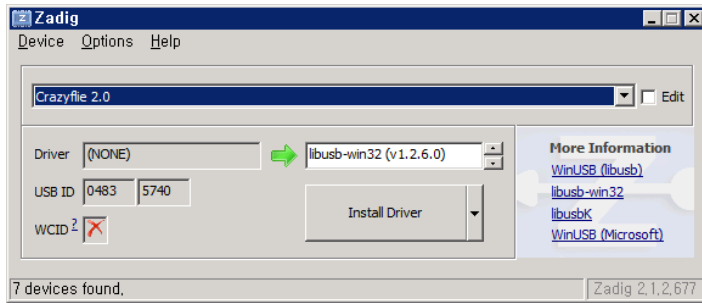


그림 9-83

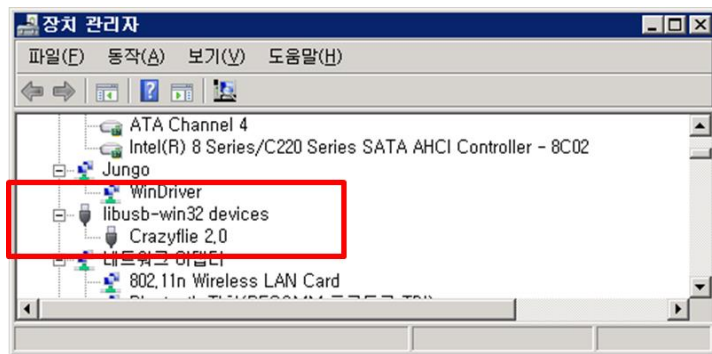


그림 9-84

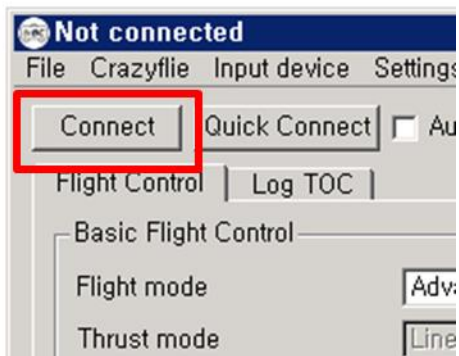


그림 9-85

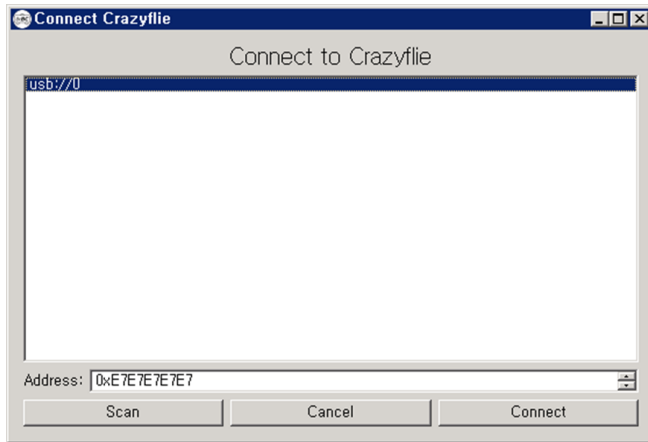


그림 9-86

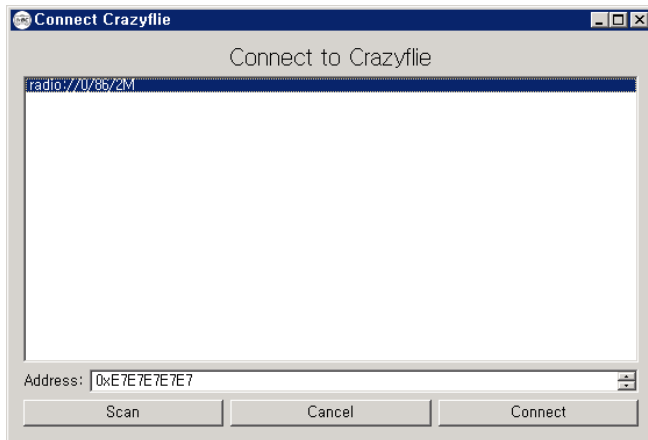


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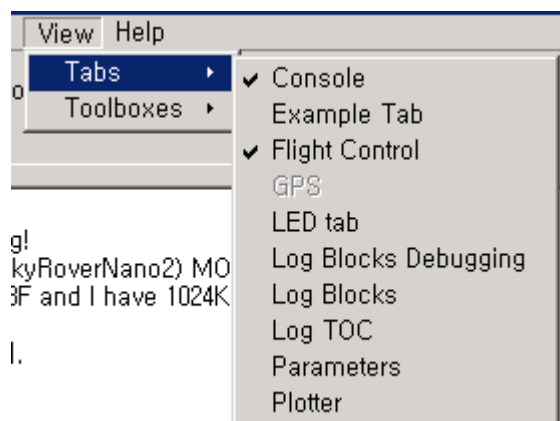


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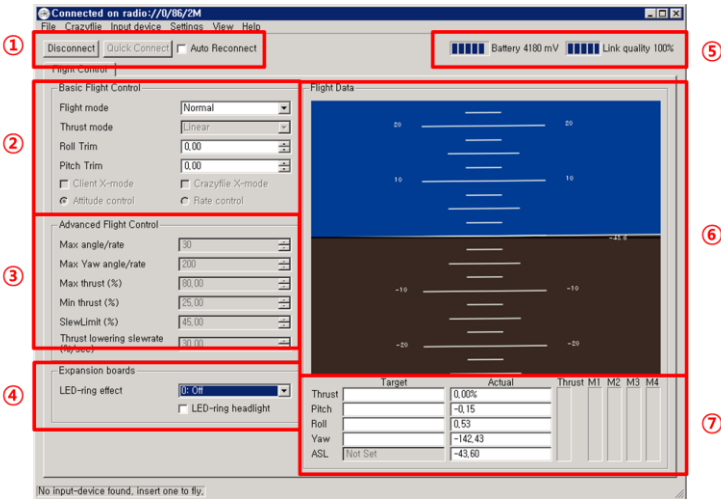


그림 9-89

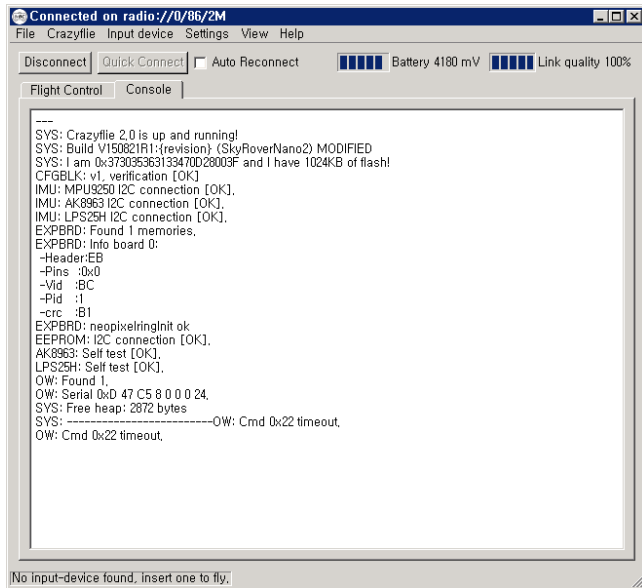


그림 9-90

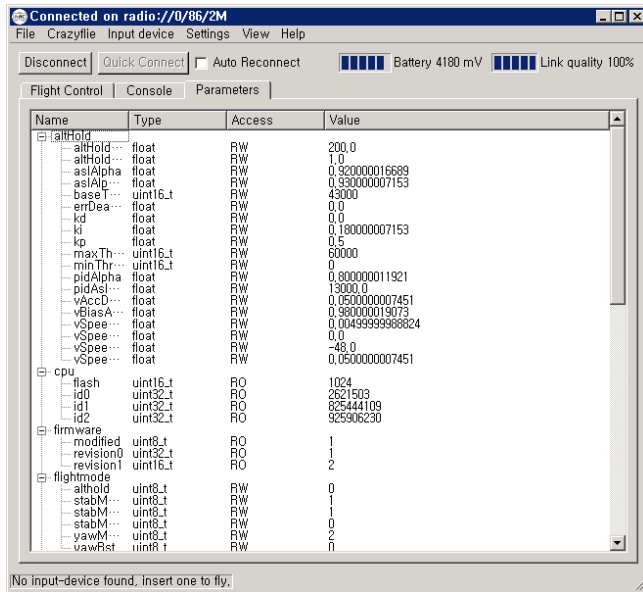


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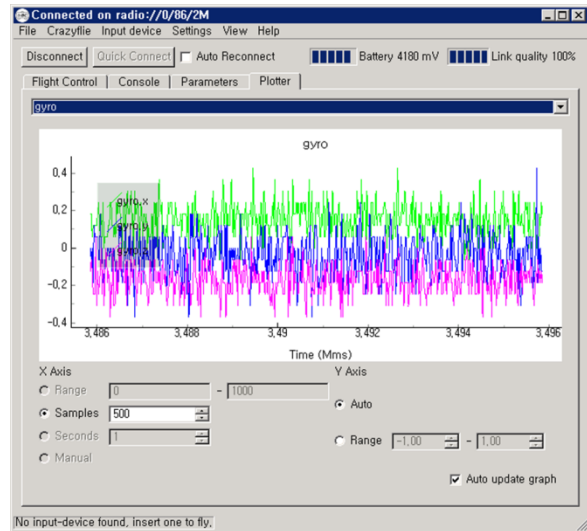
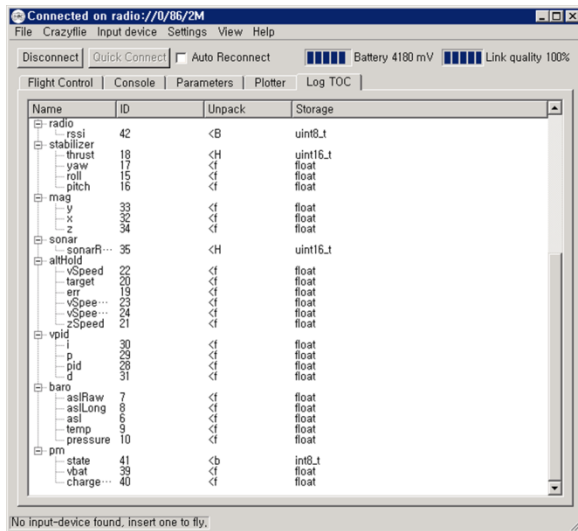


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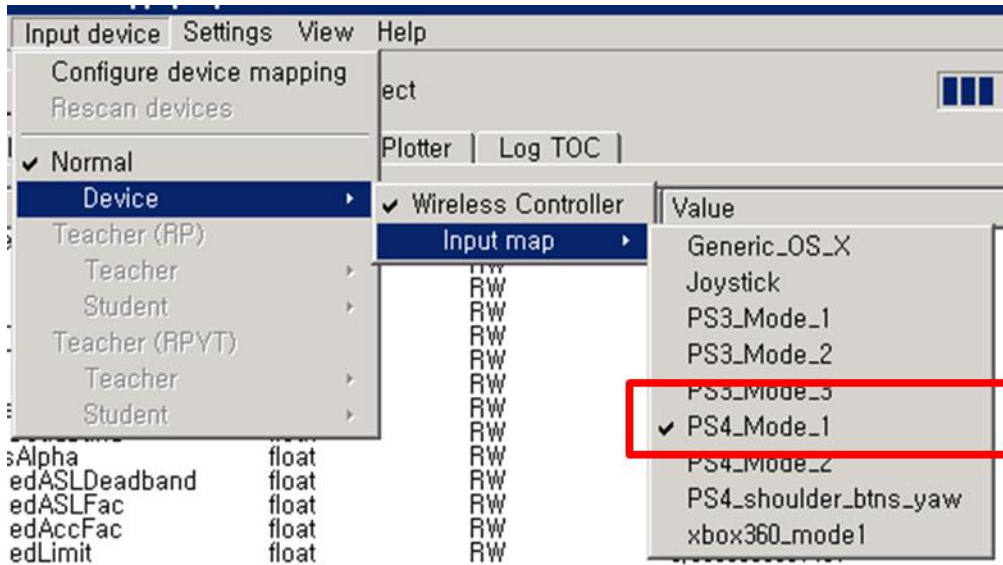


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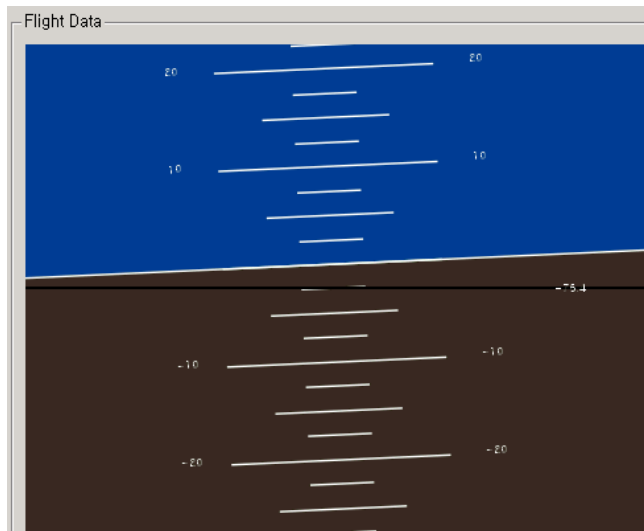


그림 9-94

	Target	Actual
Thrust	0,00 %	0,00%
Pitch	0,00	-2,24
Roll	0,72	2,47
Yaw	0,00	0,40
ASL	Not Set	-76,04

그림 9-95

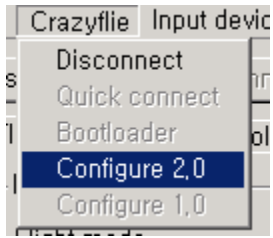


그림 9-96

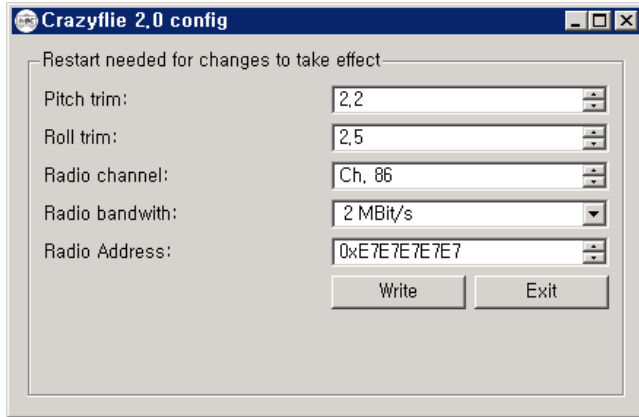


그림 9-97

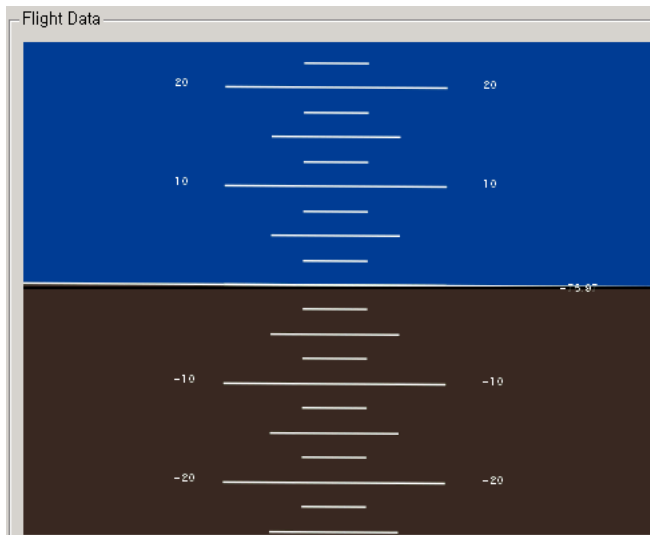


그림 9-98

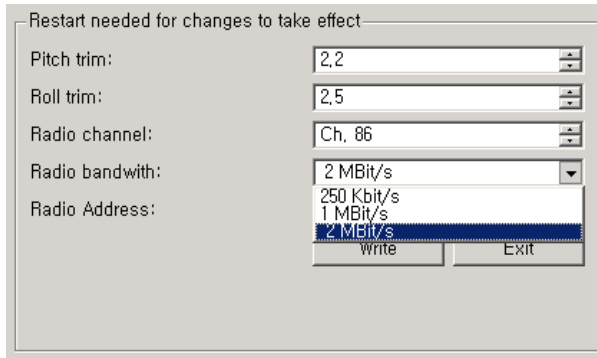


그림 9-99

10장. 스카이로버 안드로이드 조종 앱 개발

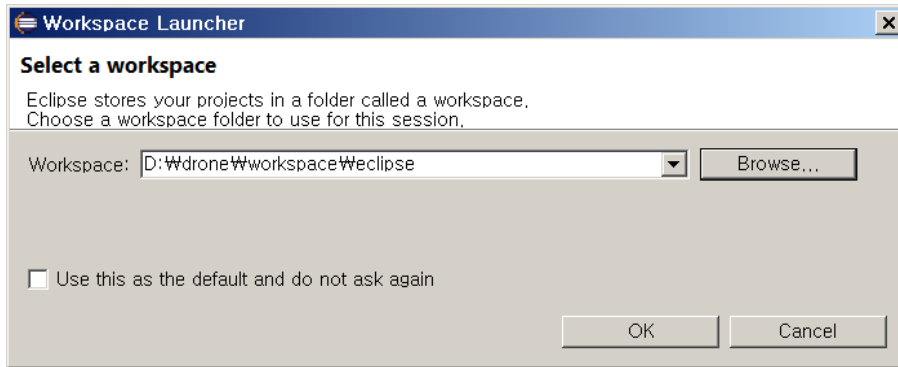


그림 10-509 이클립스 작업공간 지정

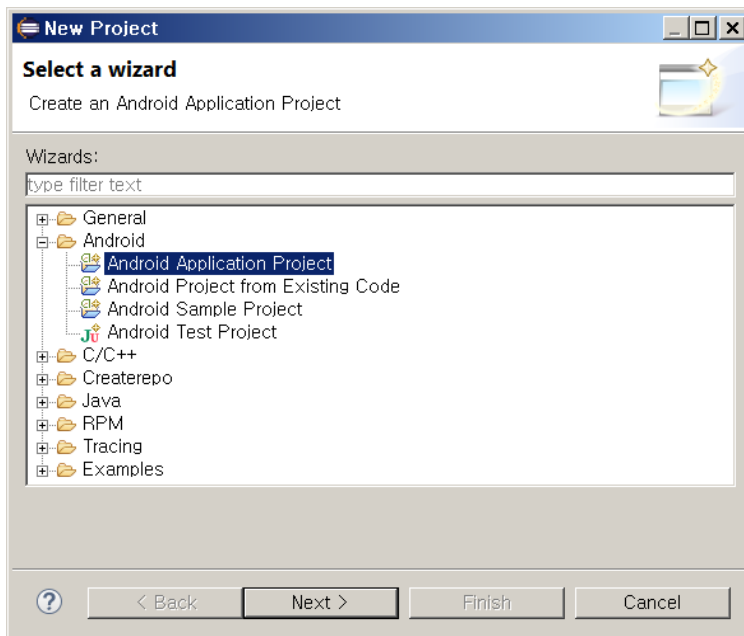


그림 10-510 안드로이드 프로젝트 선택

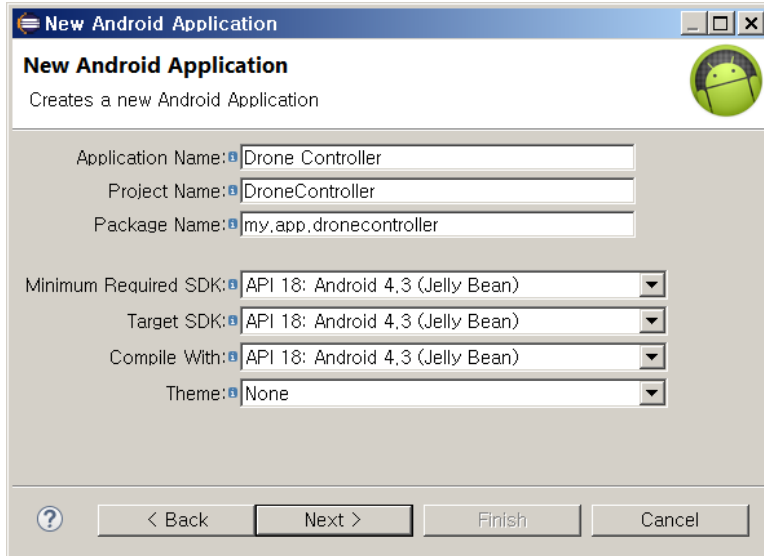


그림 10-511 프로젝트 속성

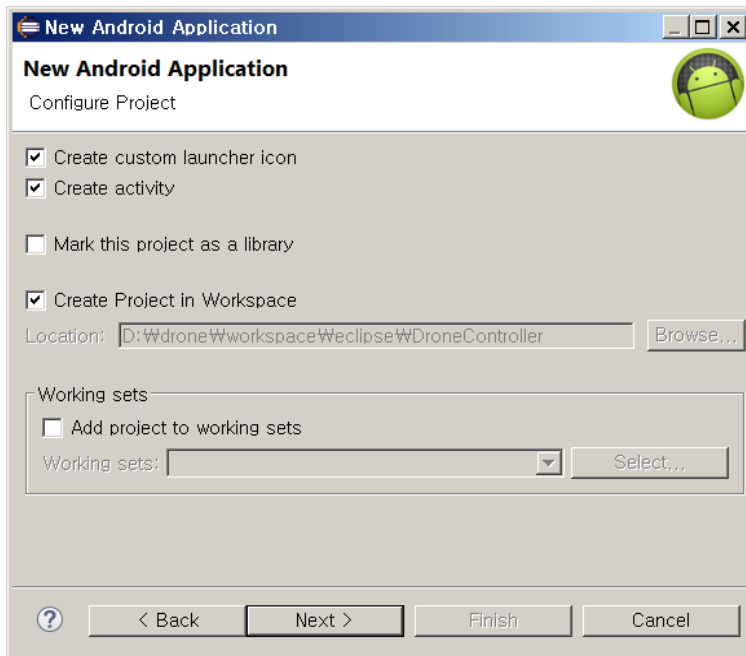


그림 10-512 프로젝트 환경설정

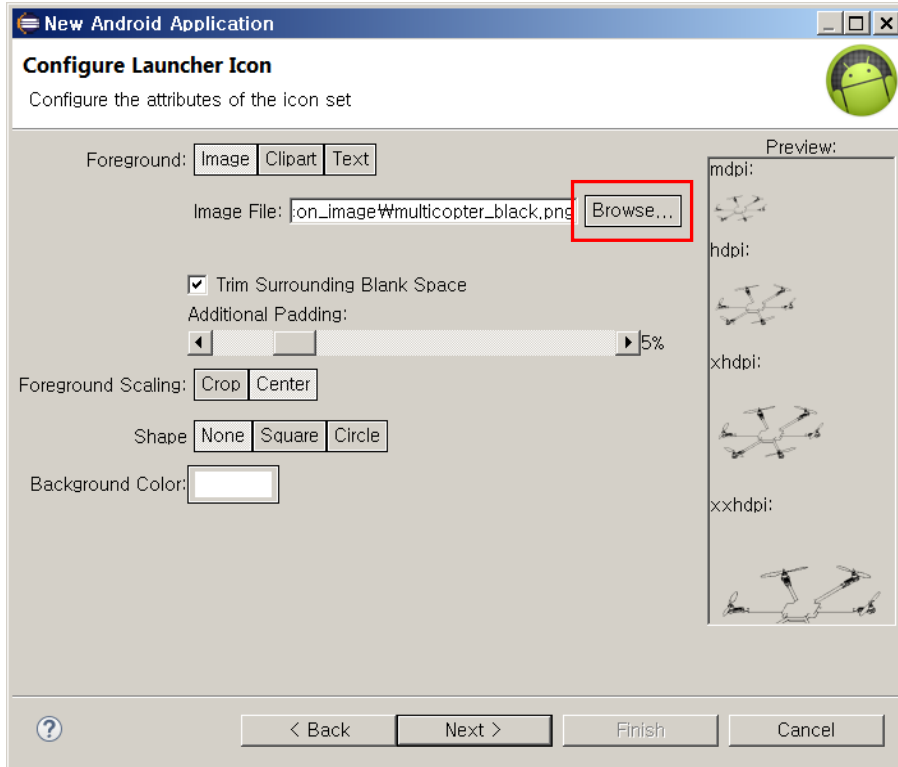


그림 10-513 아이콘 설정

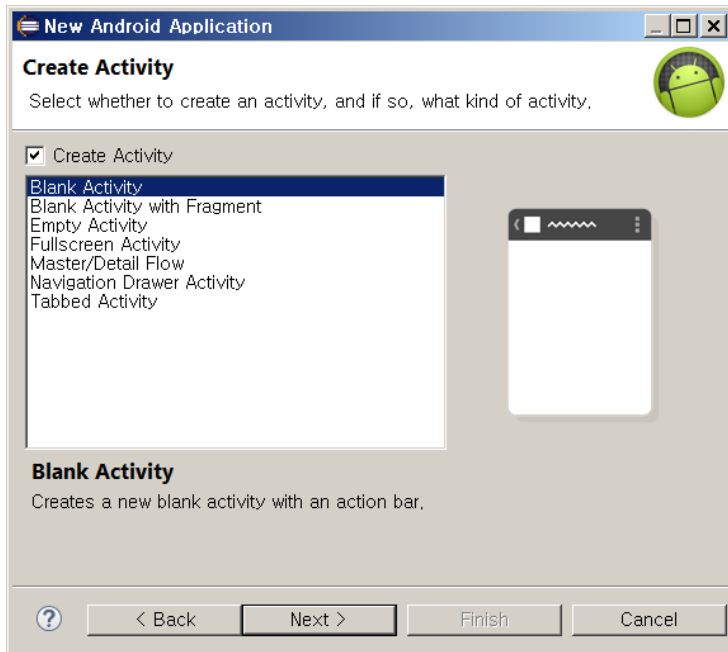


그림 10-514 activity 생성

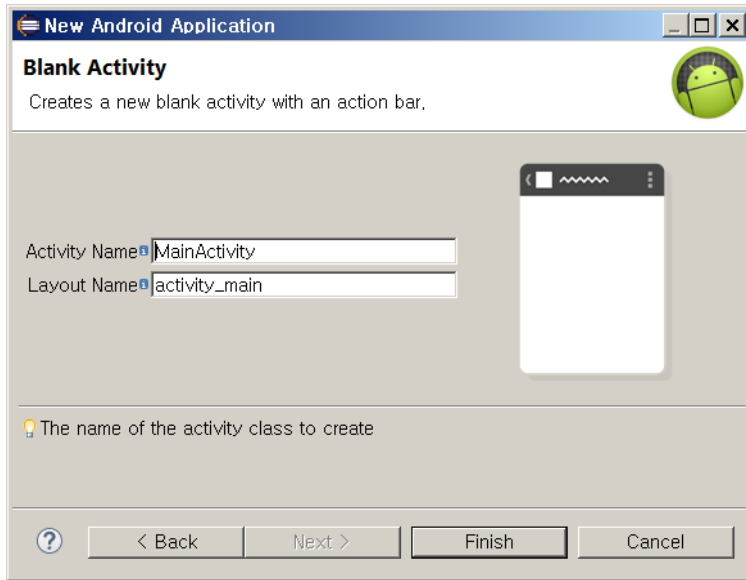


그림 10-515 activity 설정

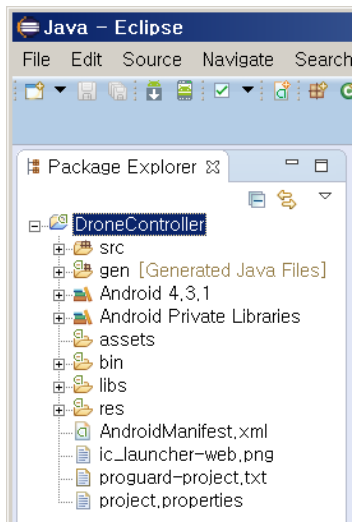


그림 10-516 프로젝트 생성 완료

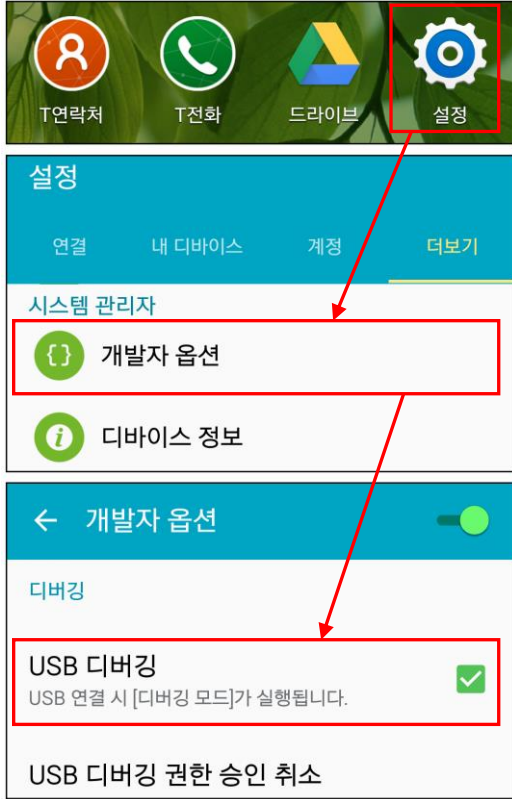


그림 10-517 USB 디버깅 모드 활성화

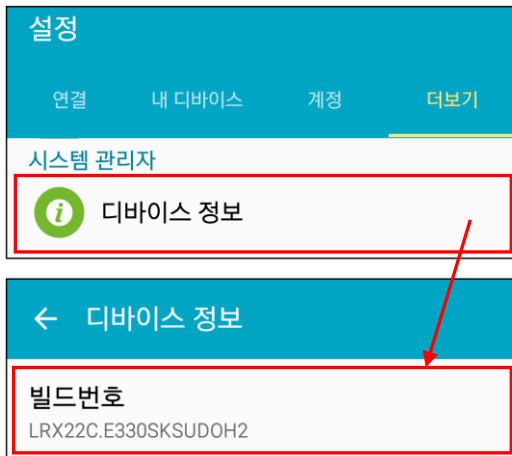


그림 10-518 숨겨진 개발자 옵션 메뉴 USB 디버깅 모드 활성화

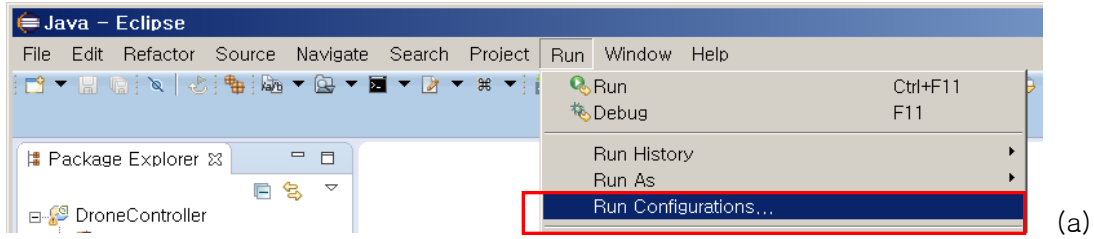


그림 10-519 'Run Configurations' 실행

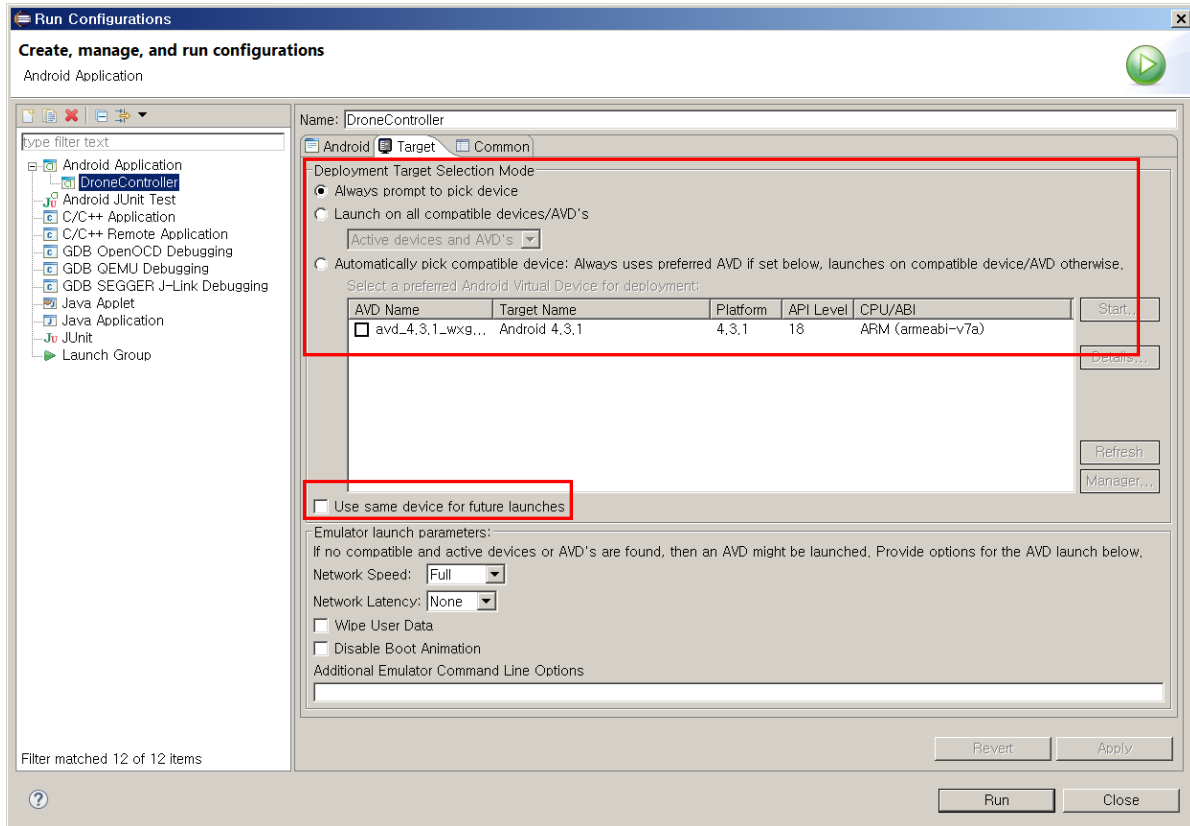


그림 10-520 실행 환경설정

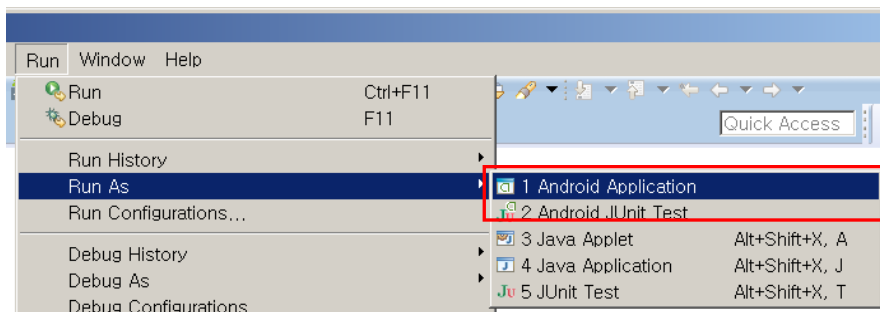


그림 10-521 실행

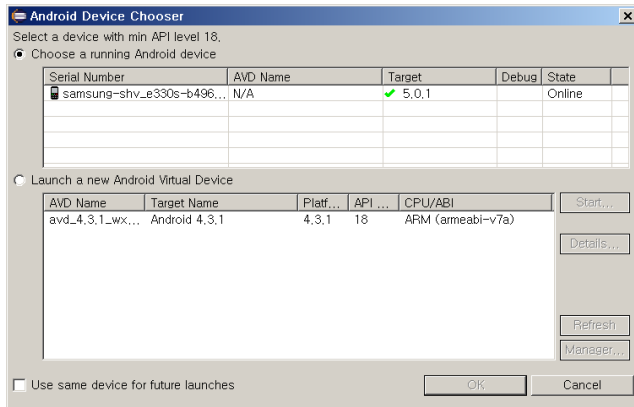


그림 10-522 안드로이드 장치 선택

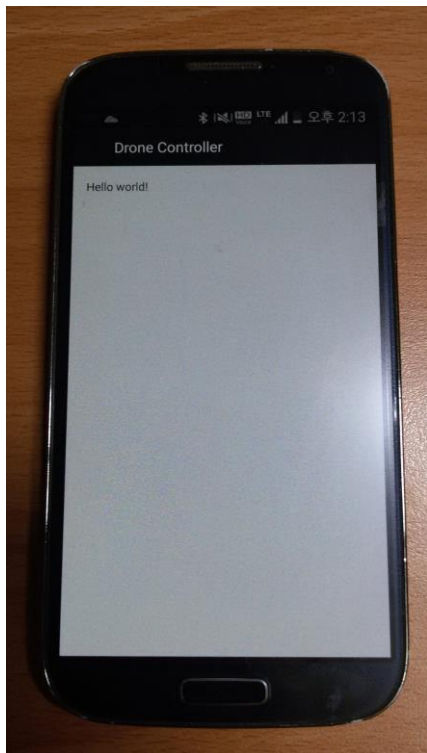


그림 10-523 단말 처음 실행

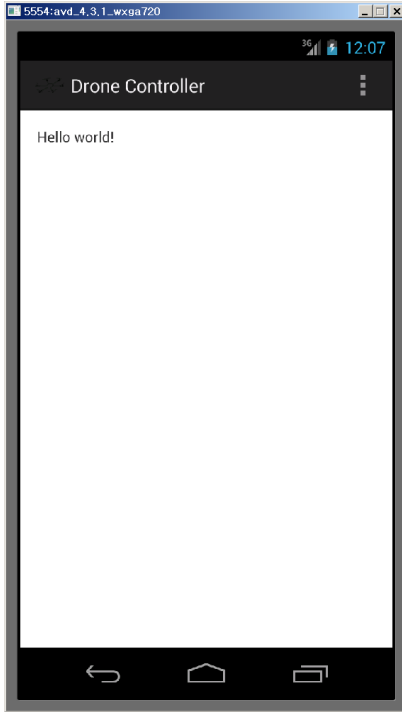


그림 10-524 가상 장치 처음 실행

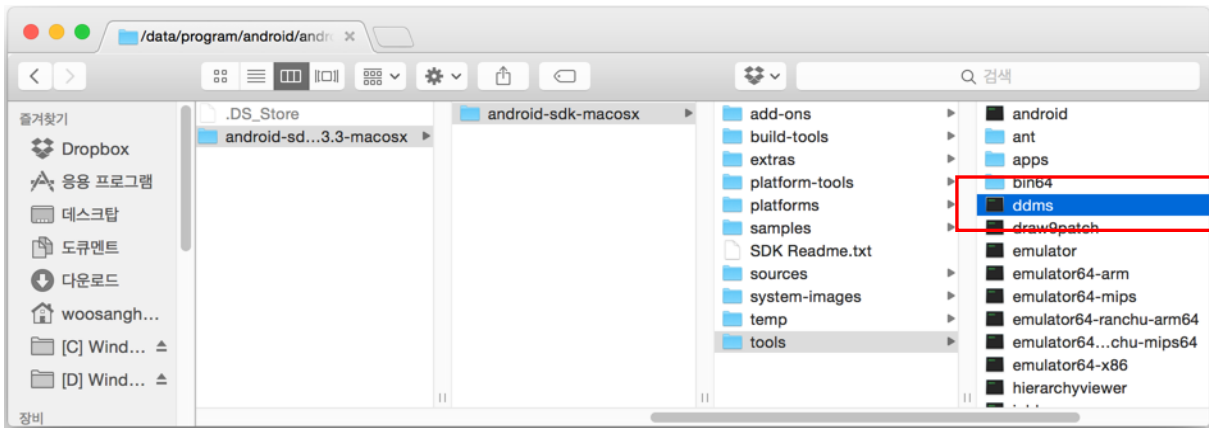


그림 10-525 DDMS 실행 (Mac)

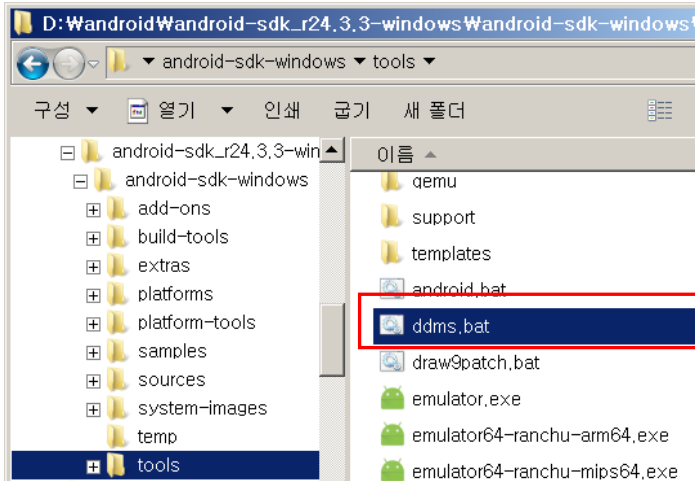


그림 10-526 DDMS 실행 (Windows)

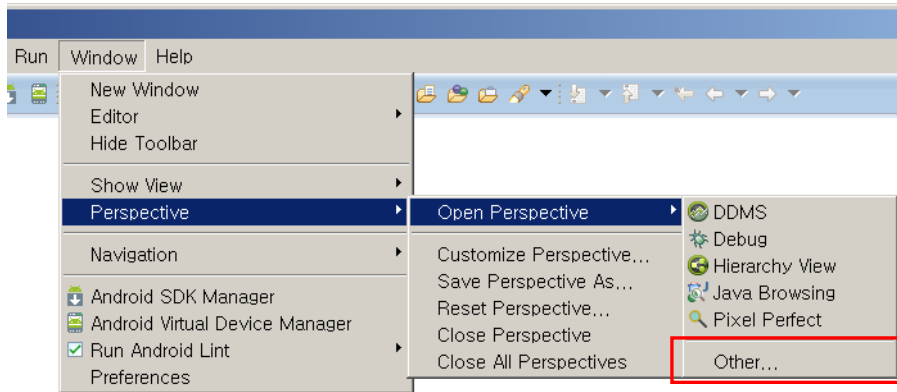


그림 10-527 DDMS perspective 열기

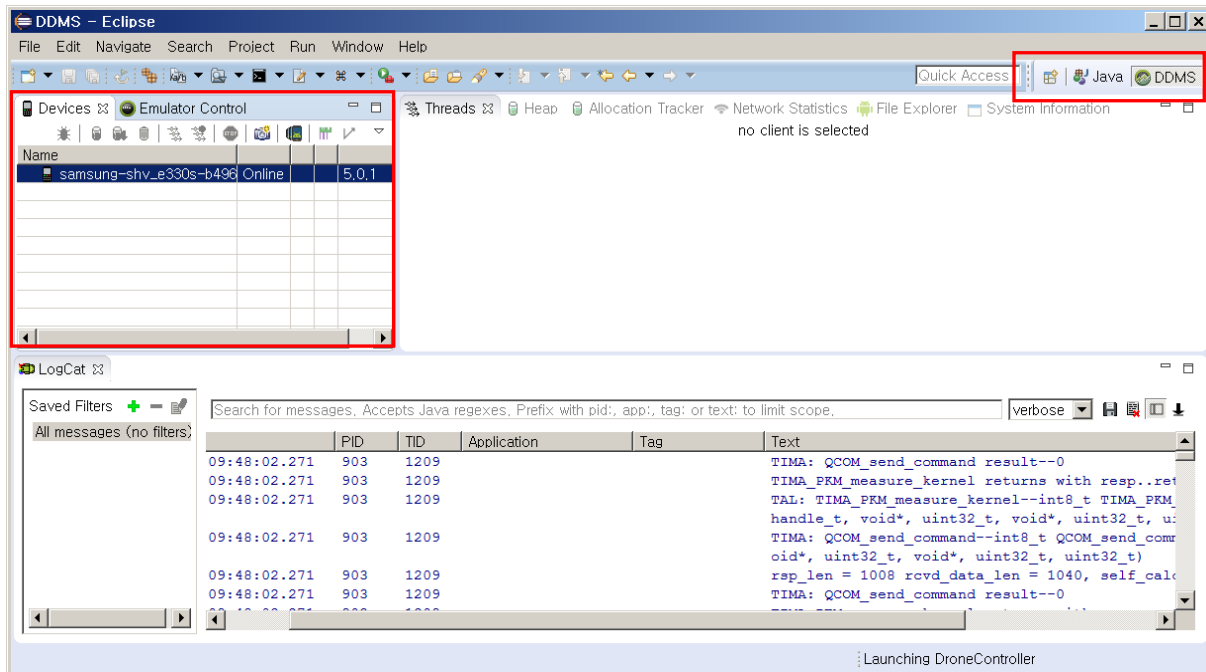
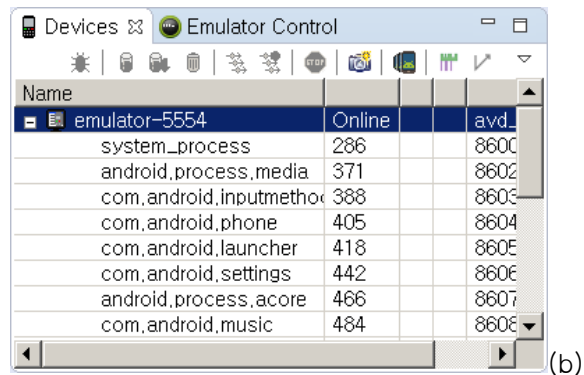
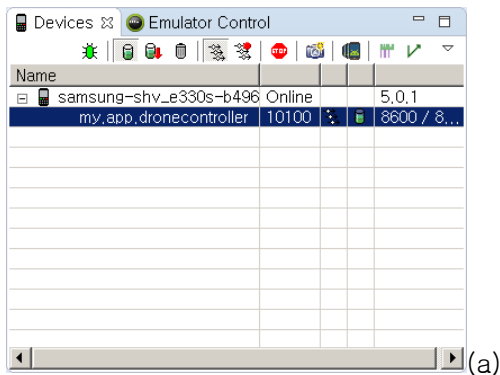


그림 10-528 DDMS 실행



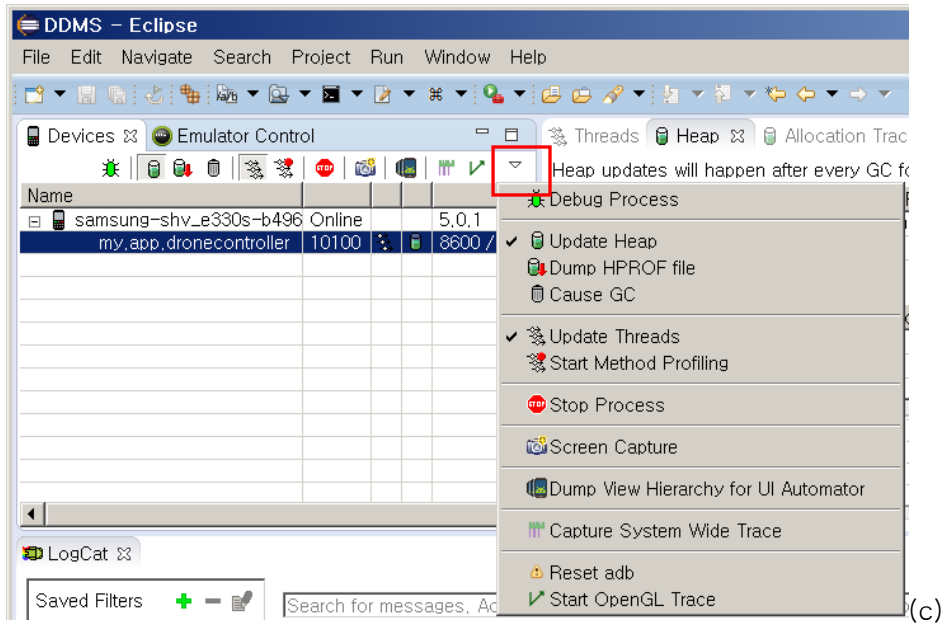


그림 10-529 DDMS의 프로세스 목록

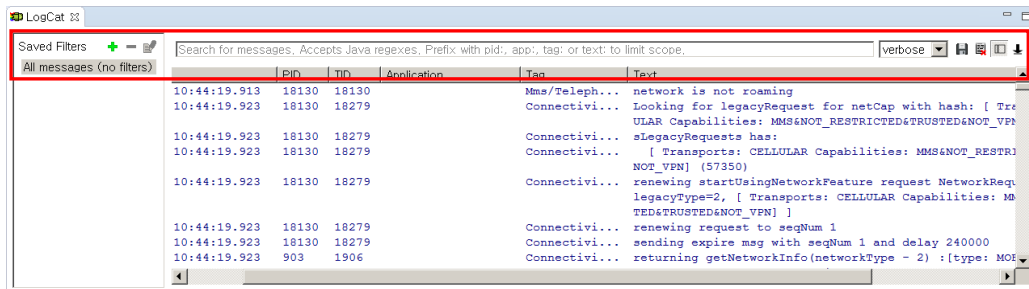


그림 10-530 DDMS의 로그 관리

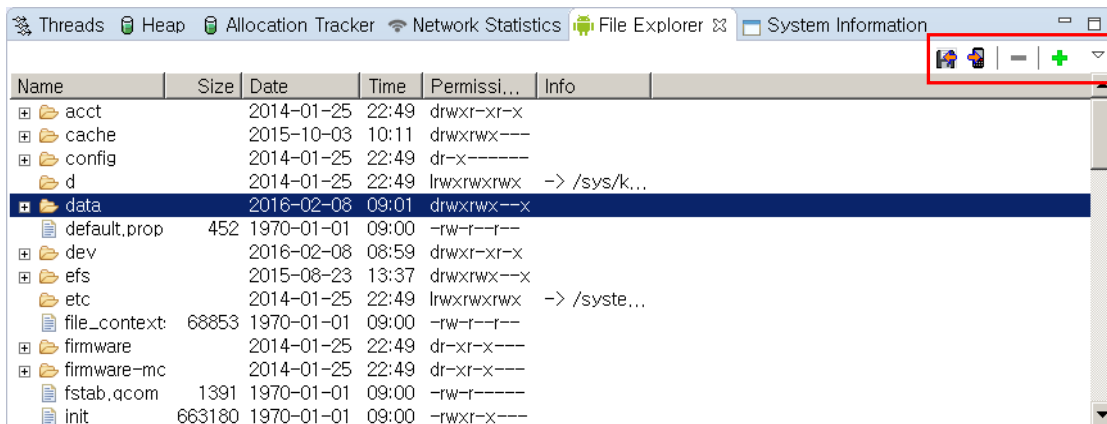


그림 10-531 DDMS의 파일 관리

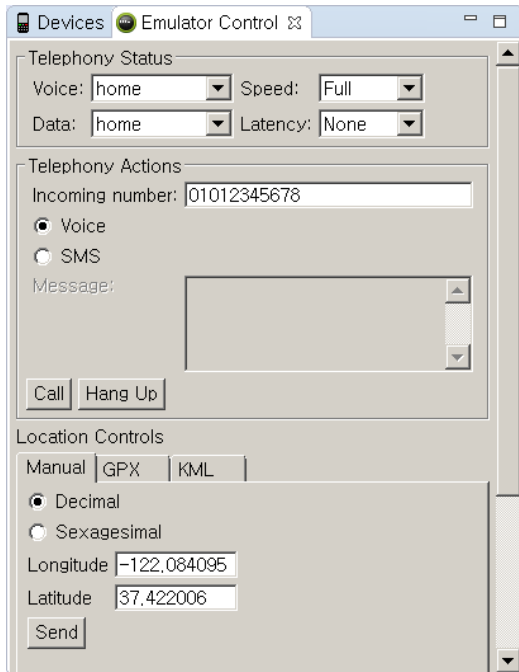


그림 10-532 DDMS의 에뮬레이터 관리

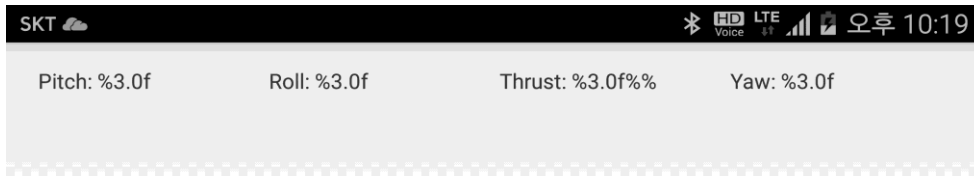


그림 10-533 비행 데이터 표시 추가

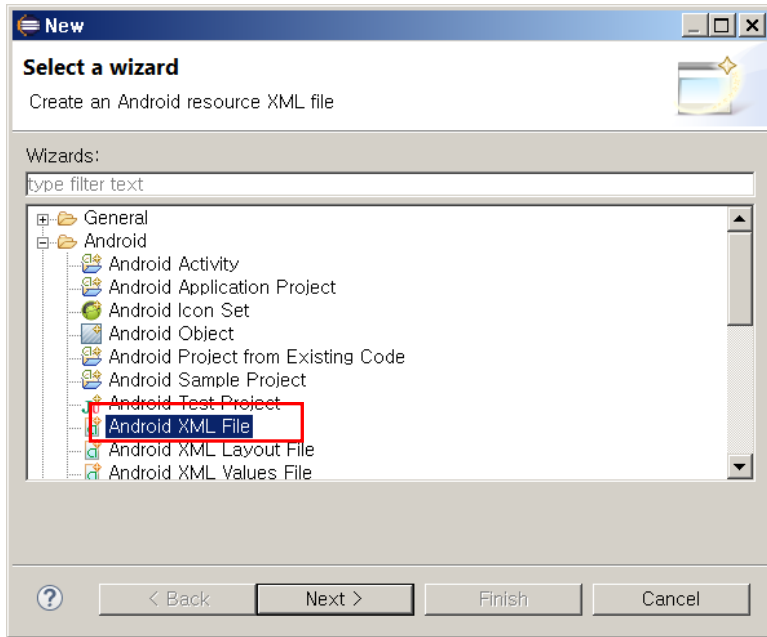


그림 10-534 Android XML File 선택

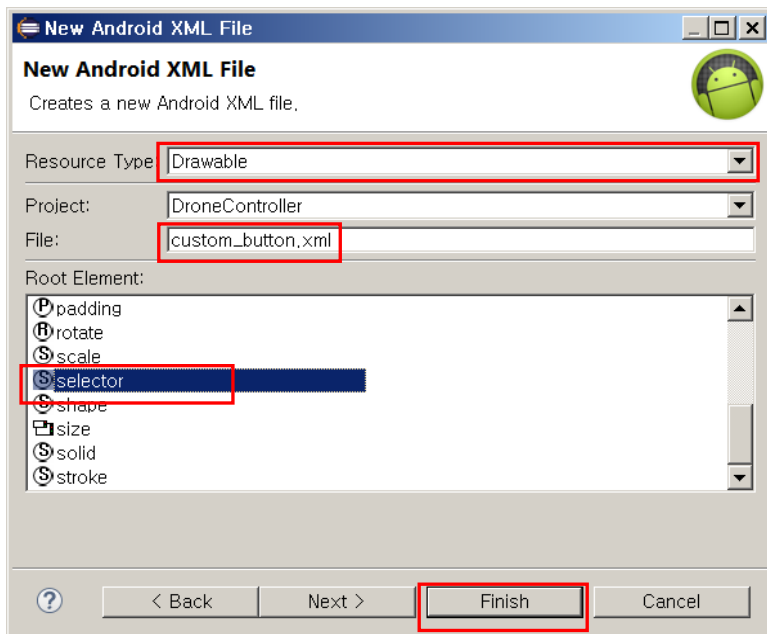


그림 10-535 이미지 버튼 xml 파일 생성

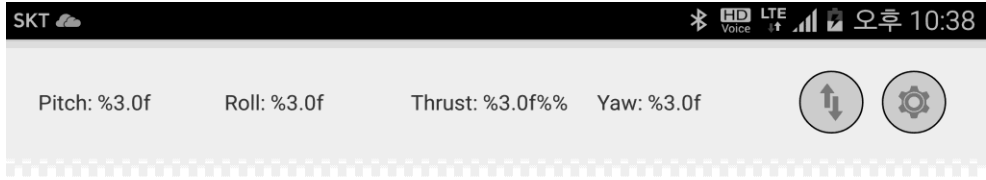


그림 10-536 이미지 버튼 추가

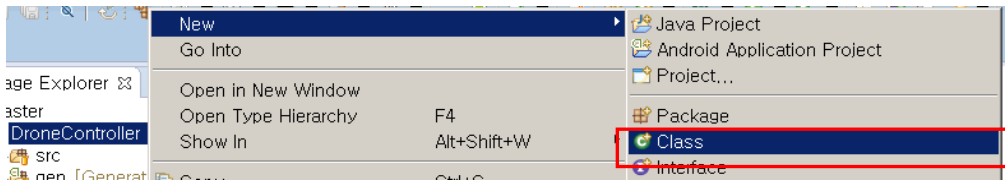


그림 10-537 새 클래스 생성 호출

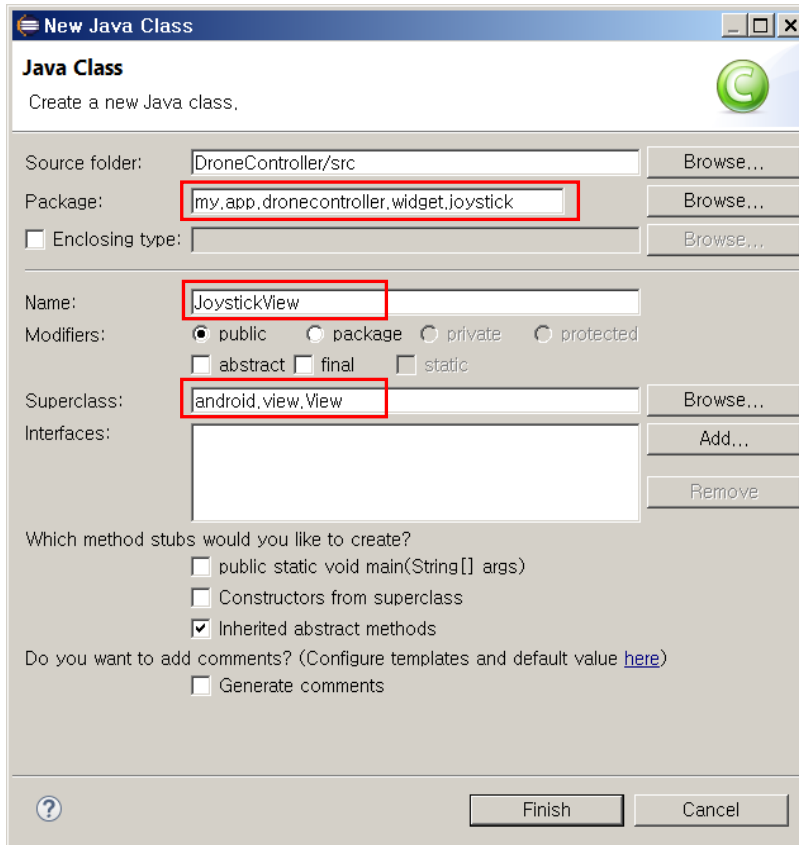


그림 10-538 새 클래스 생성

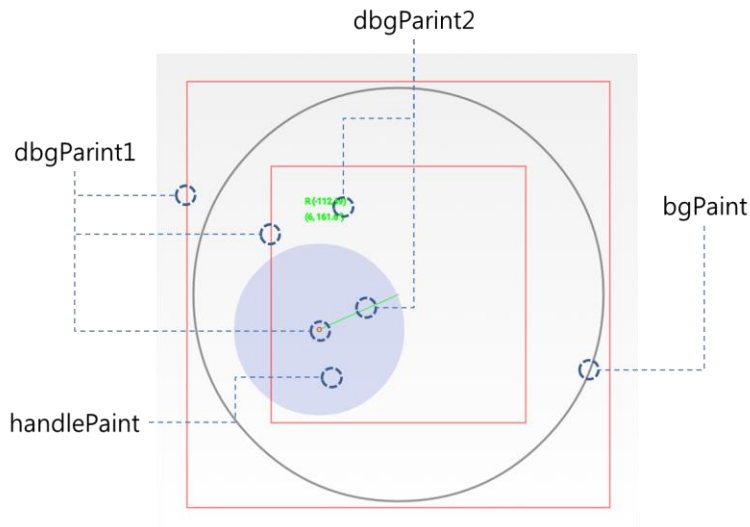


그림 10-539 조이스틱의 Paint 객체 구성

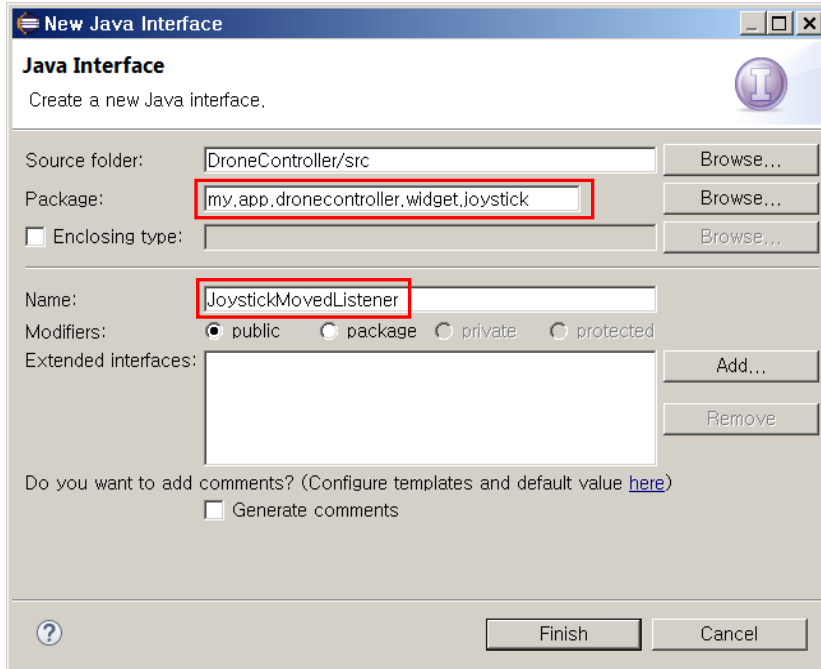


그림 10-540 새 인터페이스 생성

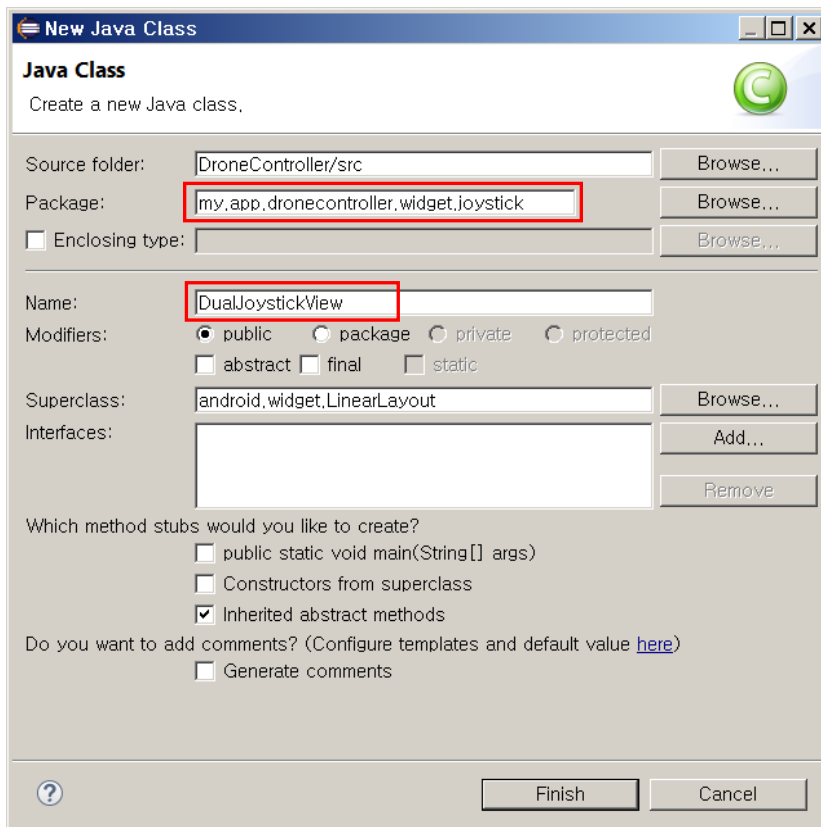


그림 10-541 DualJoystickView 생성

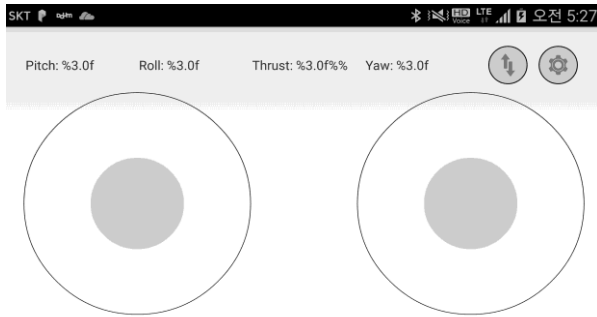


그림 10-542 비구성 - 터치 조이스틱

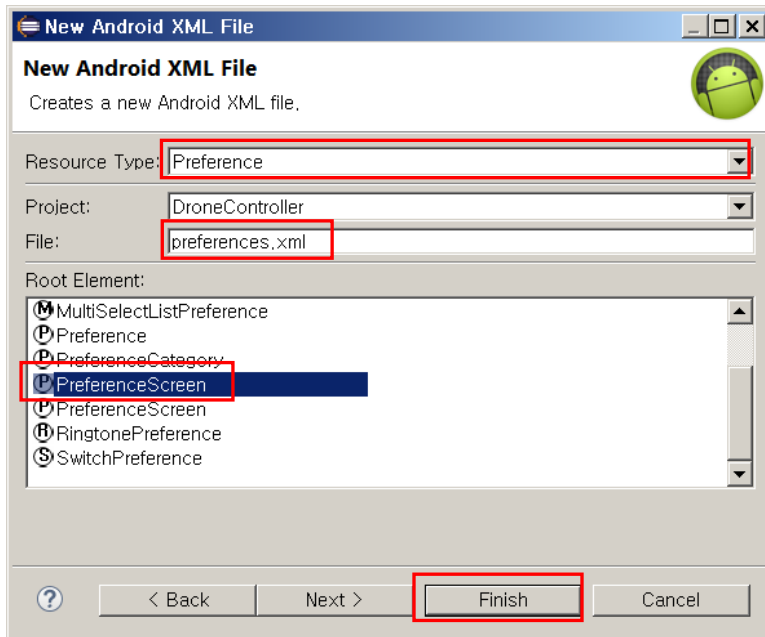


그림 10-543 Preference Type 선택

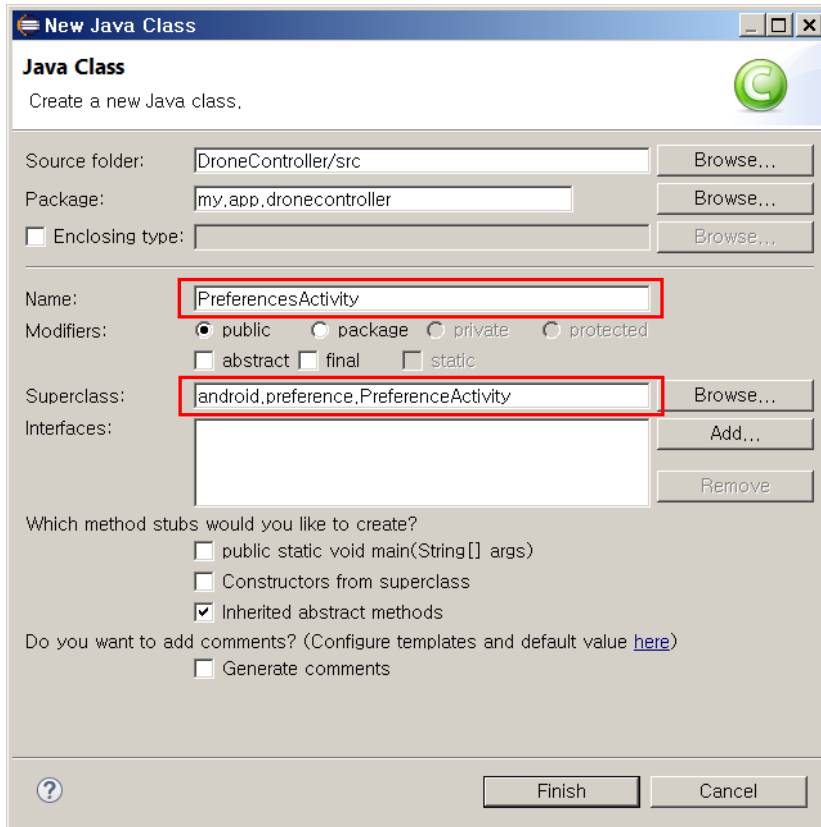


그림 10-544 Preferencesactivity 생성



그림 10-545 설정화면 진입

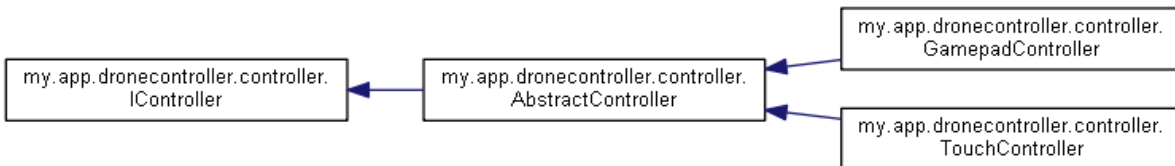


그림 10-546 컨트롤러 구현 및 상속

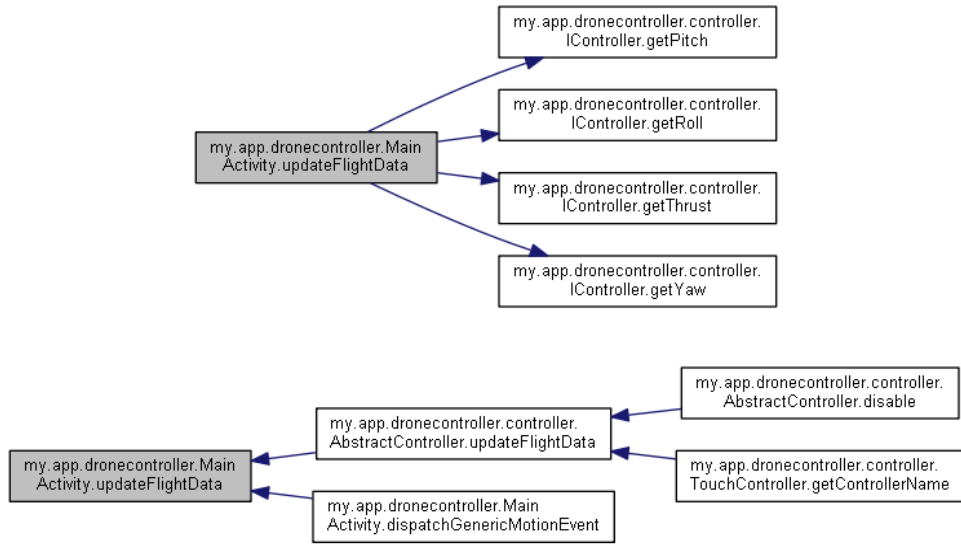


그림 10-547 updateFlightData() 호출

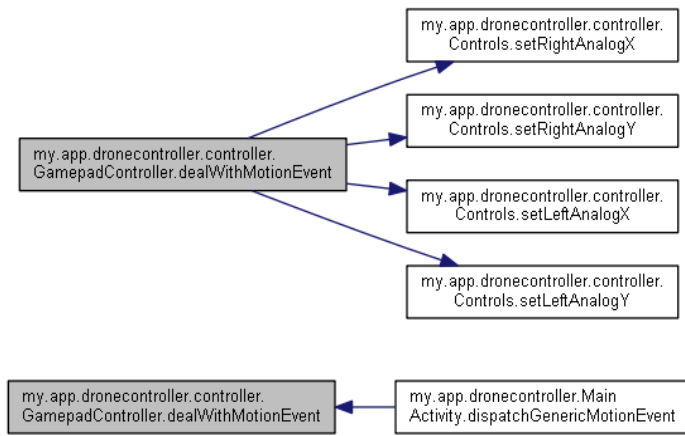


그림 10-548 게임 패드 컨트롤러 dealWithMotionEvent() 호출

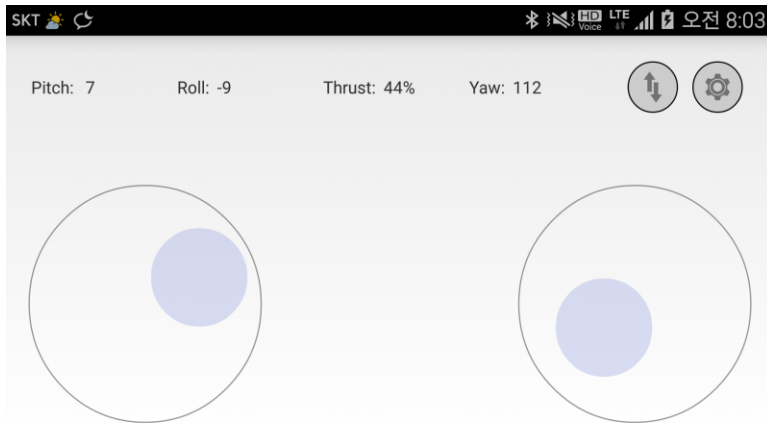


그림 10-549 비행 데이터값 변동

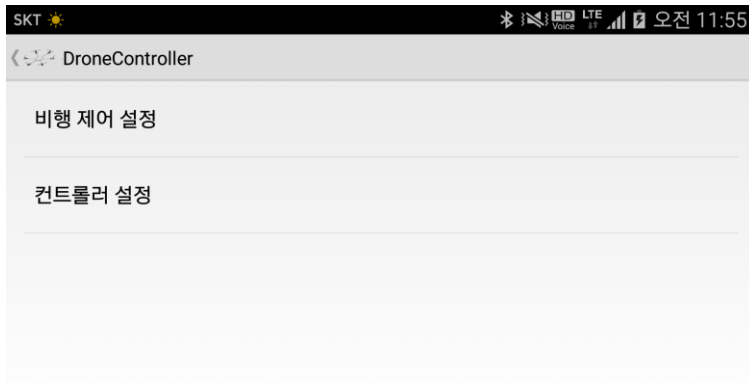


그림 10-42 설정 화면 - 메인

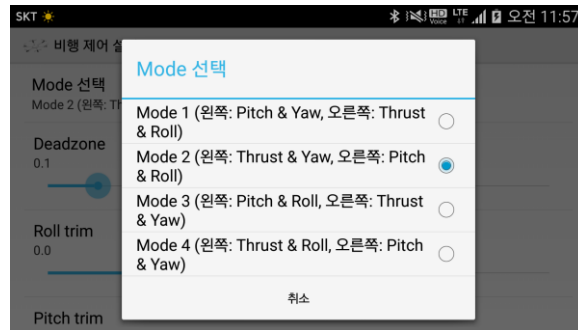
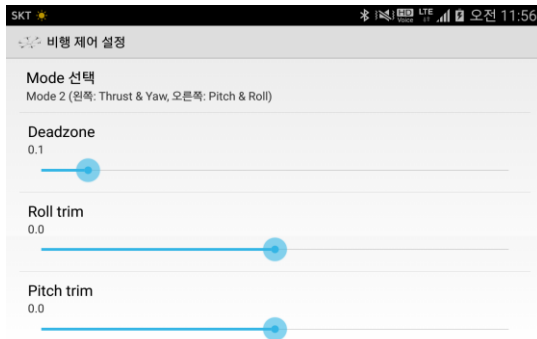
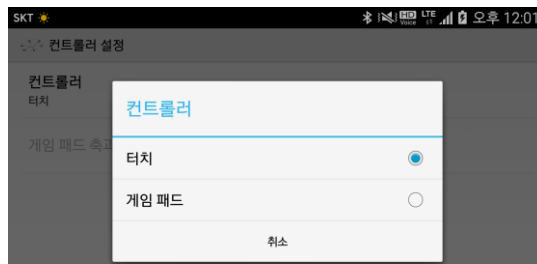
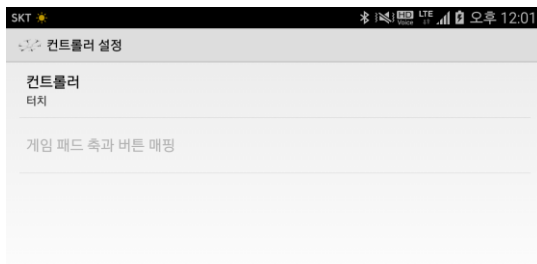


그림 10-43 설정 화면 - 비행제어 설정



(a)

(b)



(c)

그림 10-44 설정 화면 - 컨트롤러 설정

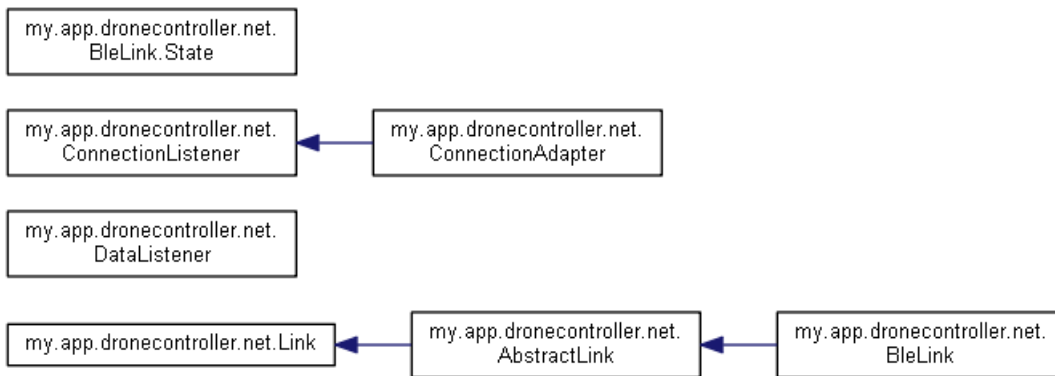


그림 10-45 블루투스 통신 구현 및 상속

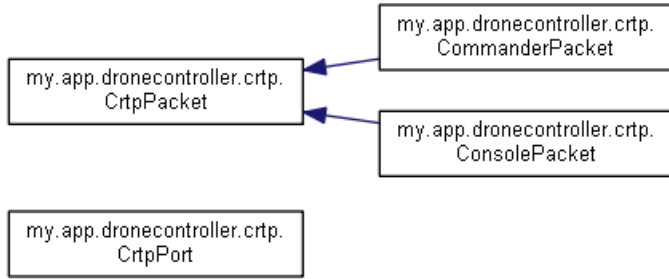


그림 10-46 전송 패킷 구현 및 상속

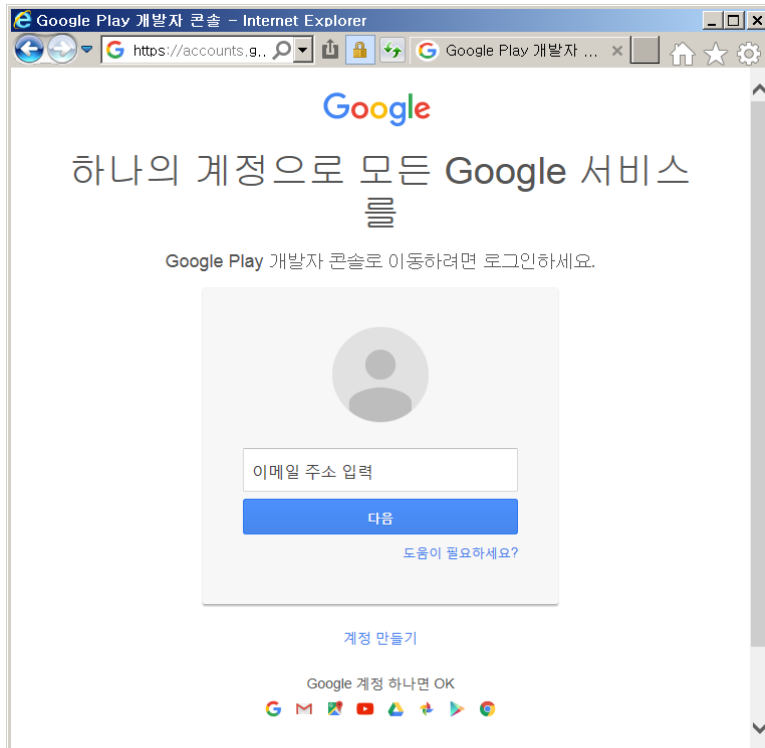


그림 10-47 구글 플레이 마켓 판매자 로그인



그림 10-48 개발자 계약 진행

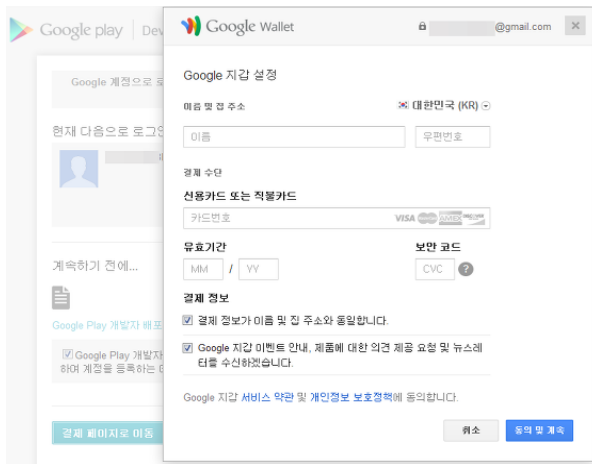


그림 10-49 등록비 결제



그림 10-50 개발자 등록 완료

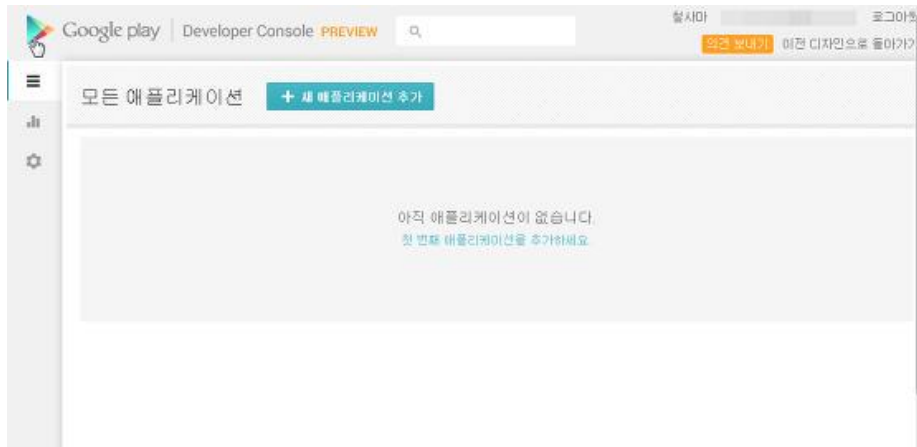


그림 10-51 개발자 콘솔

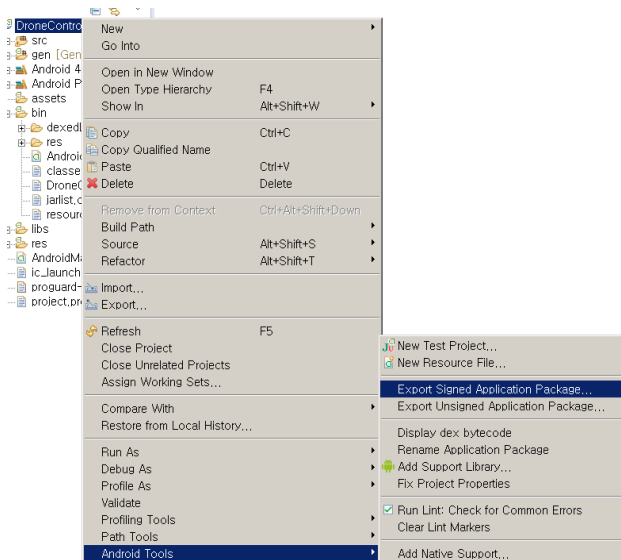


그림 10-52 Signed App 생성 시작

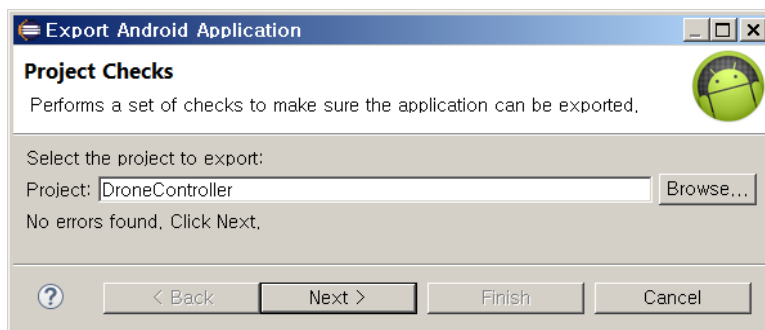


그림 10-53 대상 프로젝트 선택

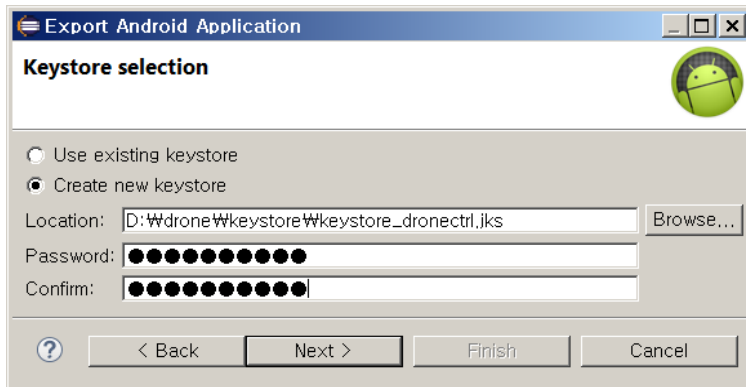


그림 10-54 keystore 생성

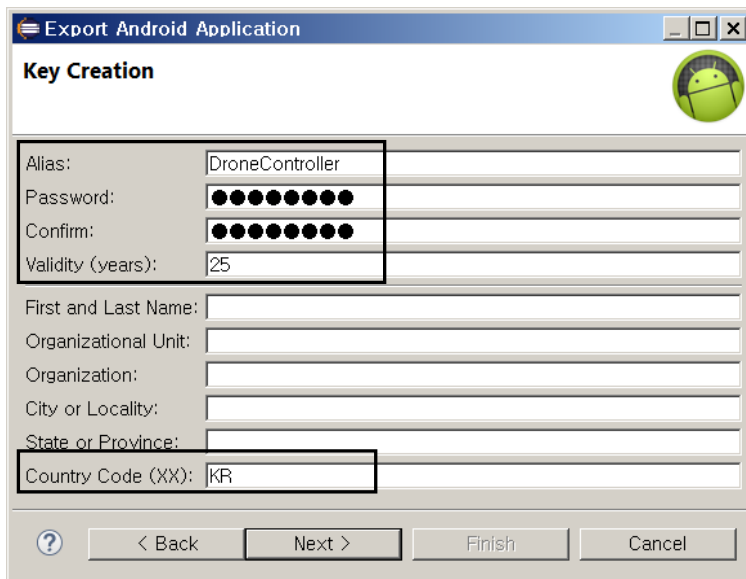


그림 10-55 key 생성

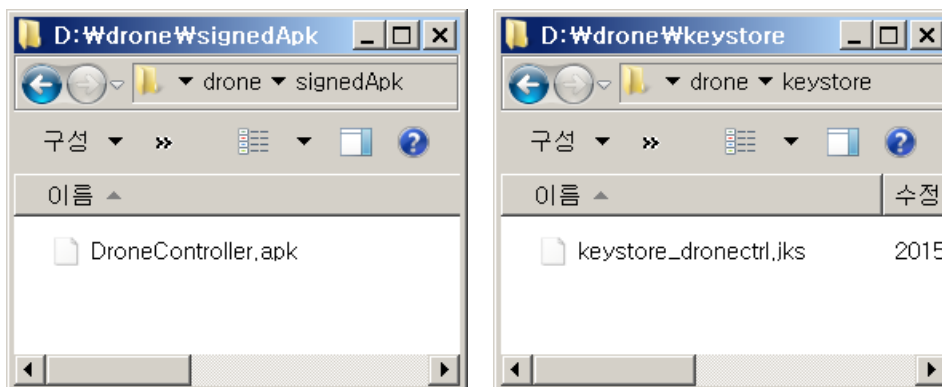


그림 10-56 생성된 apk, keystore 파일

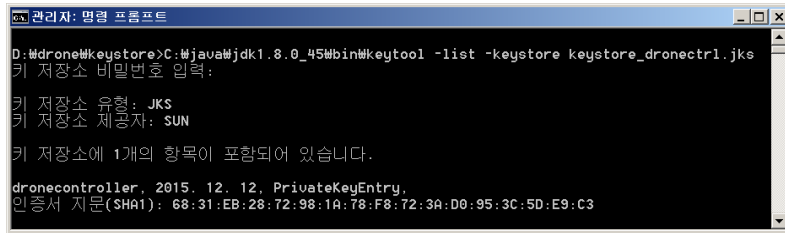


그림 10-57 keystore 확인

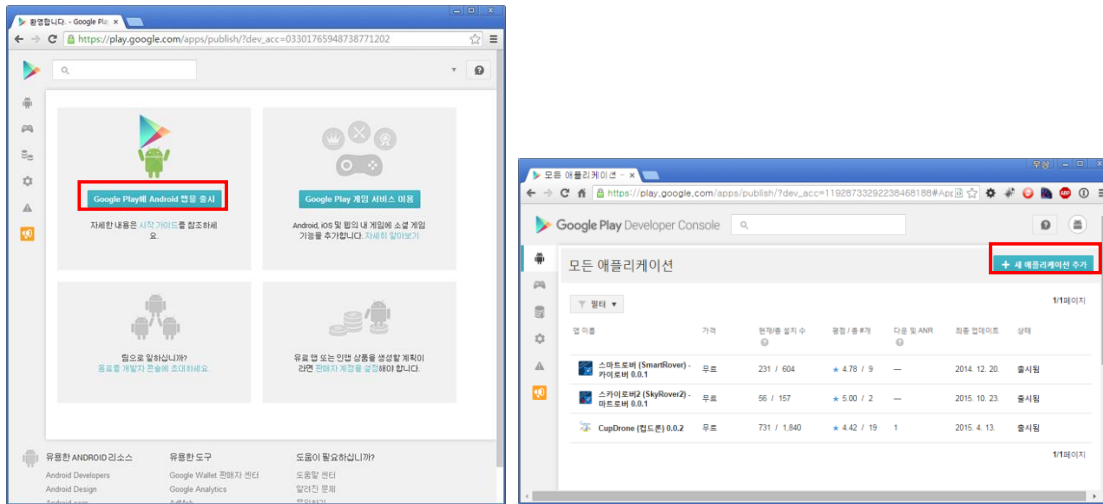


그림 10-58 애플리케이션 등록 시작

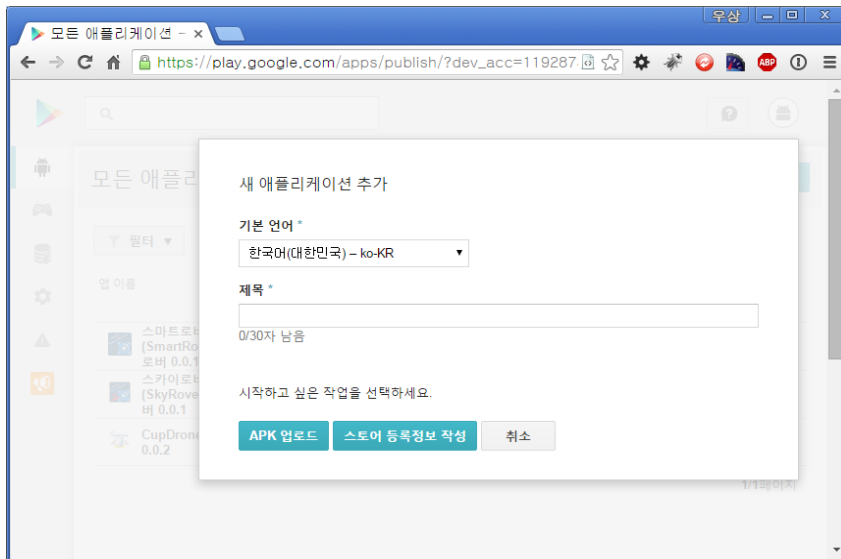


그림 10-59 애플리케이션 제목 입력

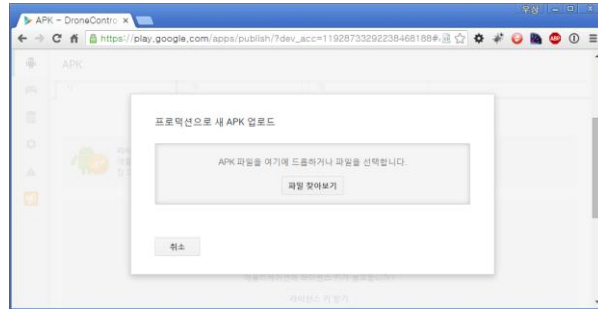
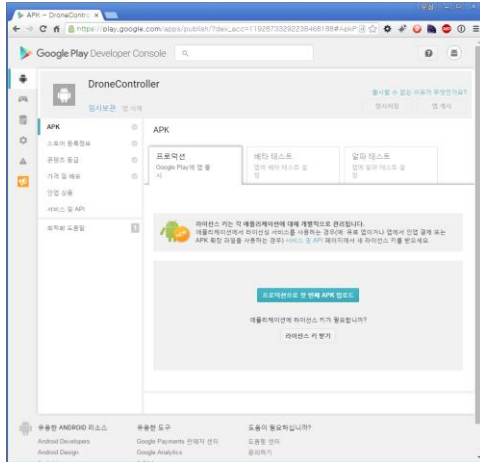


그림 10-60 APK 등록

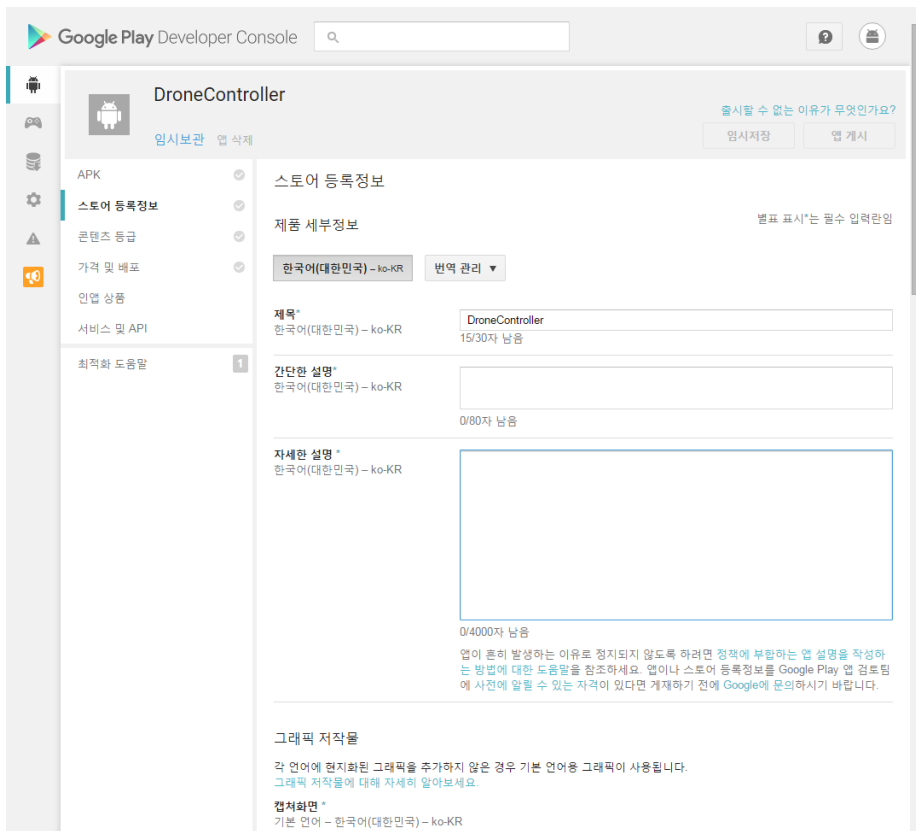


그림 10-61 스토어 등록 정보 입력

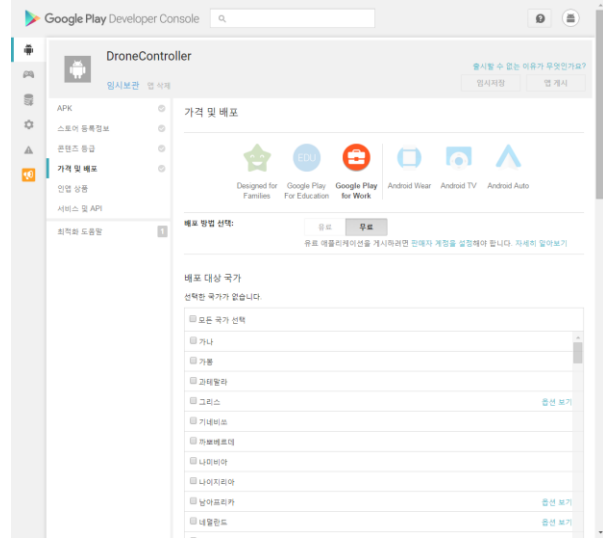
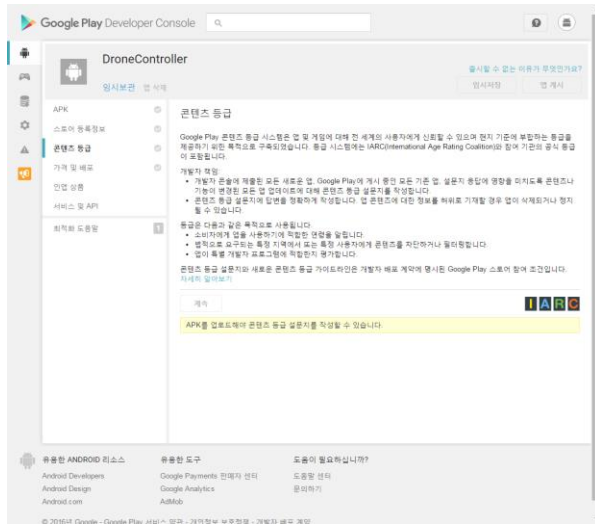


그림 10-62 스토어 등록 정보 입력

11장. 스카이로버의 활용

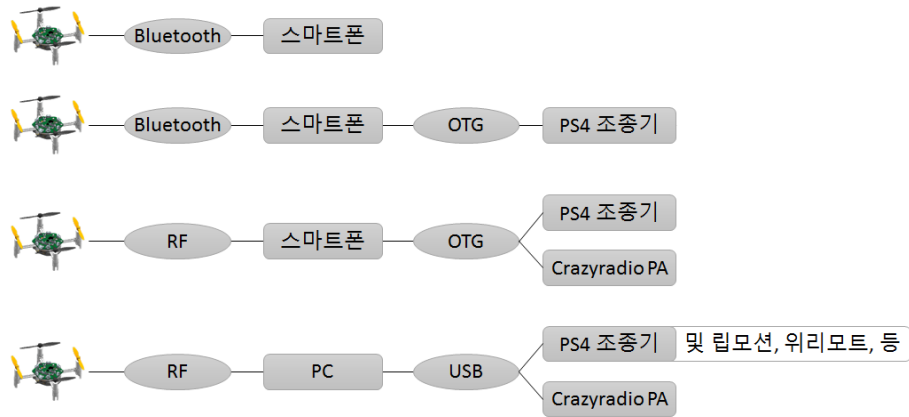
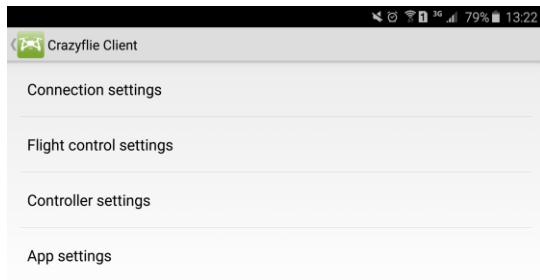


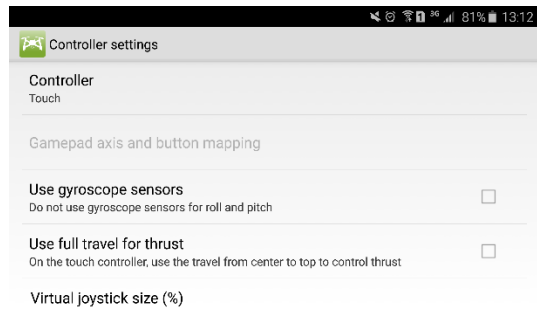
그림 11-1 다양한 조종 방식의 지원



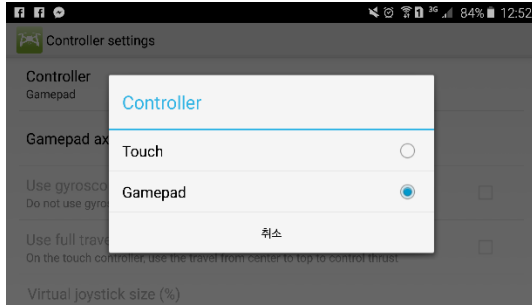
그림 11-2 스마트폰과 PS4 조종기 연결



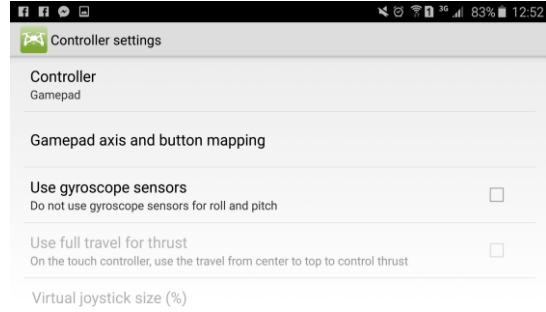
(a)



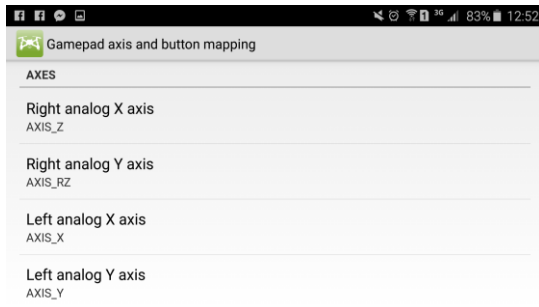
(b)



(c)



(d)



(e)

그림 11-3 스마트폰에서 PS4 조종기를 사용하기 위한 설정

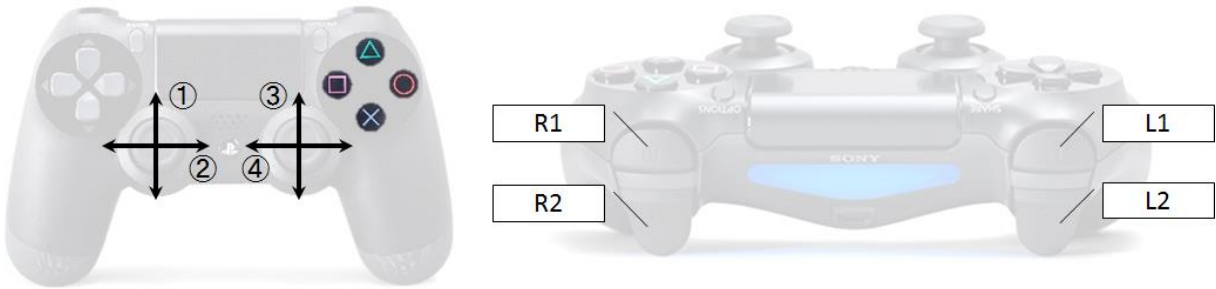


그림 11-4 PS4 조종기의 각 부분별 맵핑



그림 11-5 스마트폰, PS4 조종기, USB RF의 연결

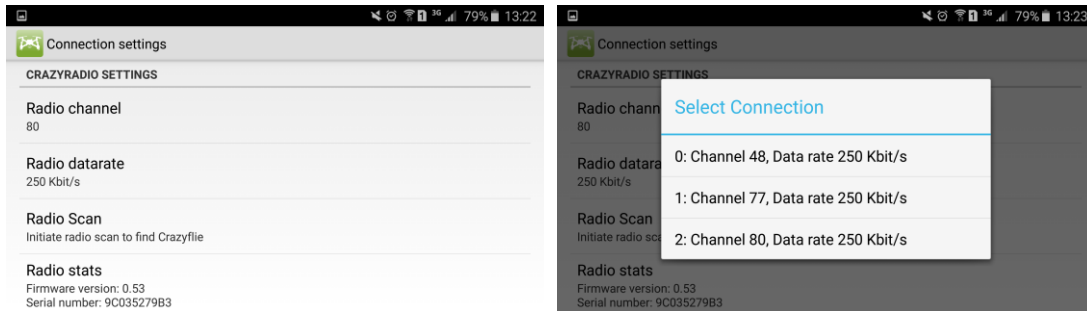


그림 11-6 스마트폰에서 Crazyradio를 사용하기 위한 설정



그림 11-7 PC, PS4 조종기, USB RF의 연결



그림 11-8 PC, PS4 조종기, USB RF, ROS의 연결

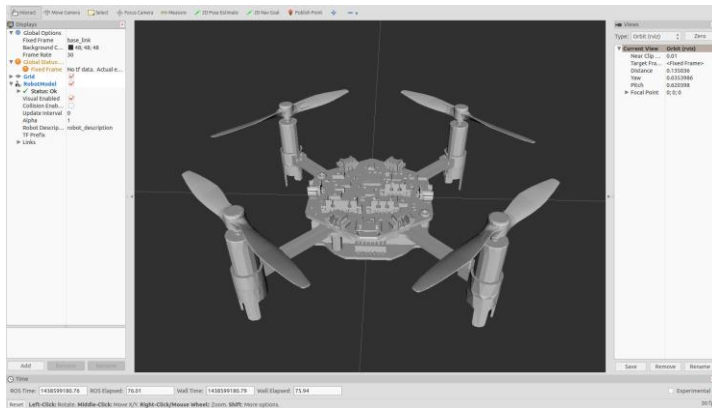


그림 11-9 RViz를 통해서 본 드론의 모습

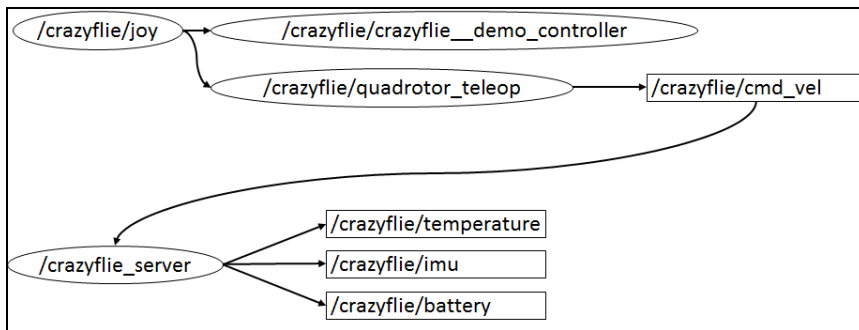


그림 11-10 crazyfly_ros 패키지 실행 시 구동되는 프로그램과 데이터 메시지

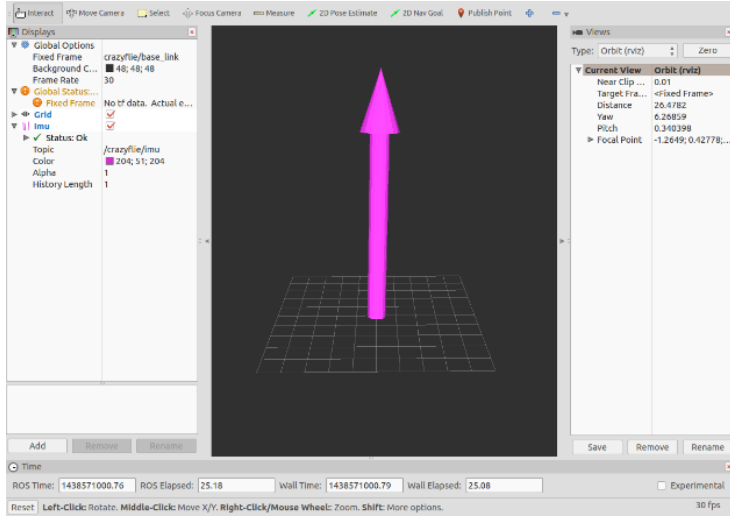


그림 11-11 crazyflie_ros 패키지 실행 시 구동되는 시각화 화면



그림 11-12 립모션의 손 제스처 데이터

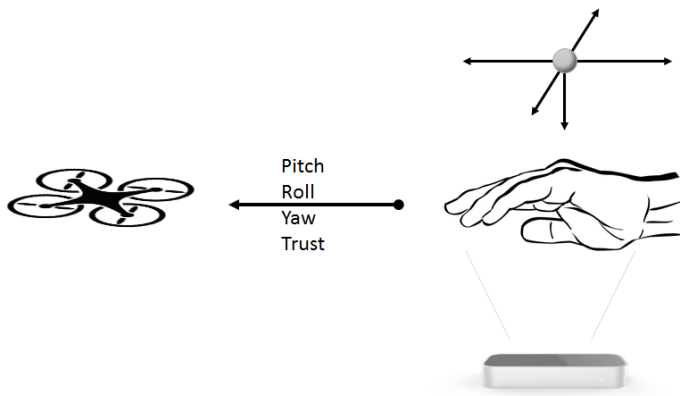


그림 11-13 립모션을 통한 드론 제어



그림 11-14 LCD모니터와 조종기가 일체화된 Parrot사의 Skycontroller(왼쪽), UAV Factory사의



그림 11-15 그라운드 컨트롤 스테이션을 위한 기본 구성



그림 11-16 PS4 조종기 거치대를 이용한 휴대용 그라운드 컨트롤 스테이션



그림 11-17 Trek사의 Ai-Ball(왼쪽), FPV Hobby사에서 판매하는 1그램 PAL 카메라(오른쪽)

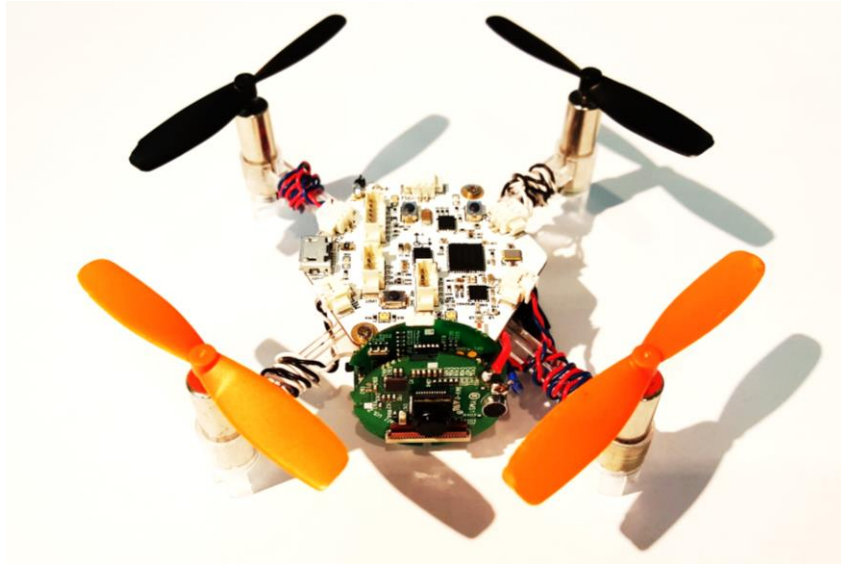


그림 11-18 스카이로버에 장착한 소형 와이파이 카메라

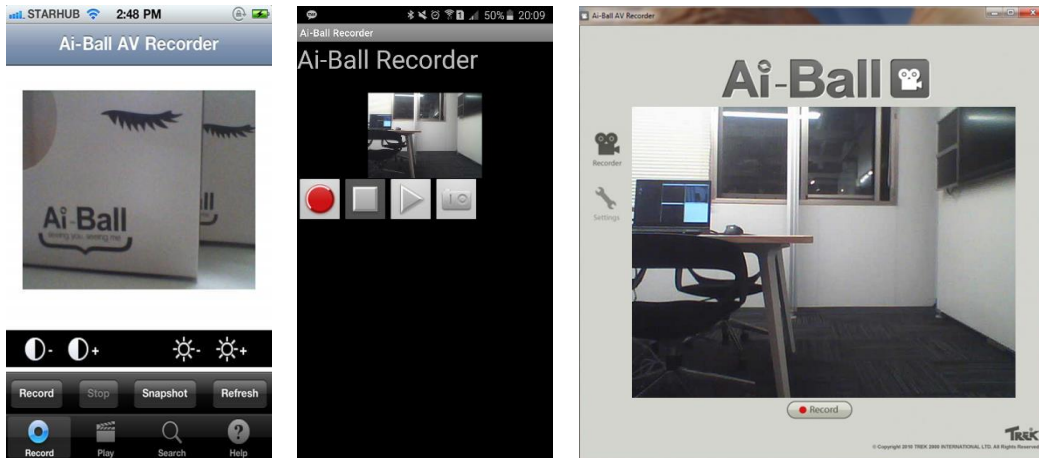


그림 11-19 전용 앱 (왼쪽: iOS 버전, 가운데: 안드로이드 버전, 오른쪽: 윈도우 버전)

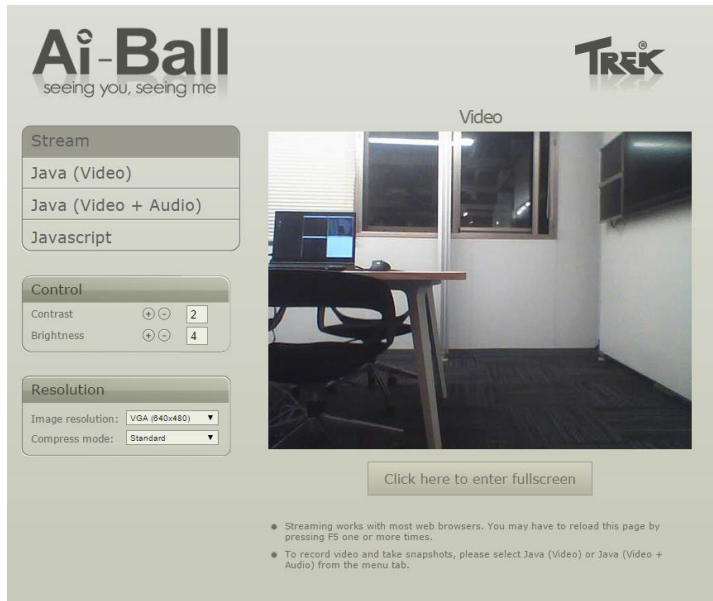


그림 11-20 PC 브라우저에서 스트림 영상 보기

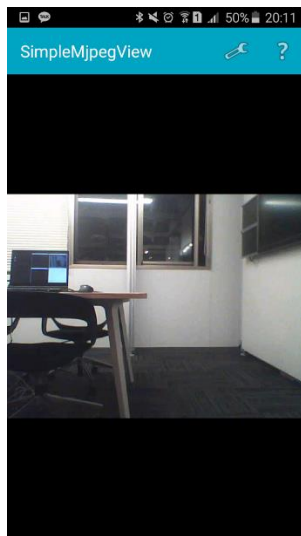


그림 11-21 무상 개발자 버전의 스트림 영상 보기



그림 11-22 스카이로버 전용 앱에서 무선 송신된 영상 확인

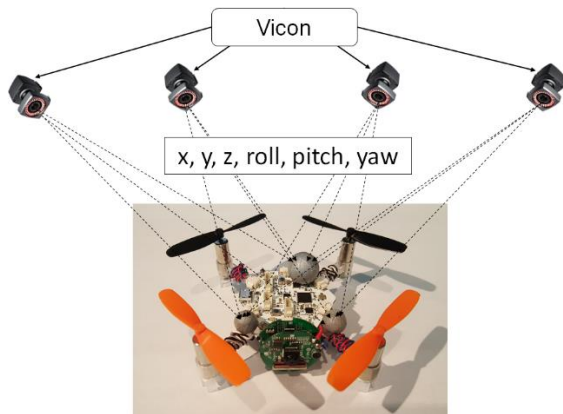


그림 11-23 비콘을 이용한 드론의 위치 추정

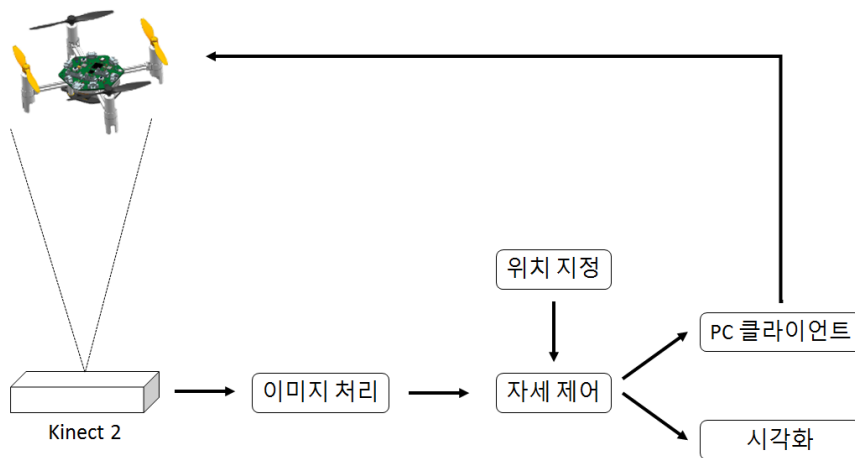


그림 11-24 키넥트를 이용한 호버링 제어 과정



그림 11-25 키넥트 설치

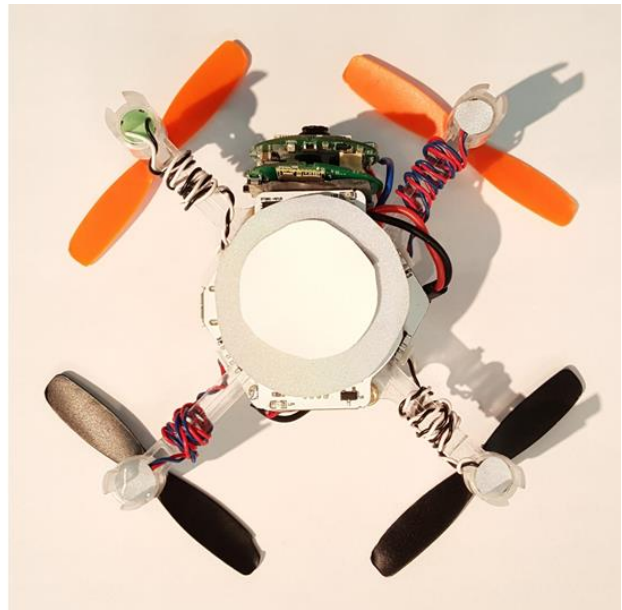
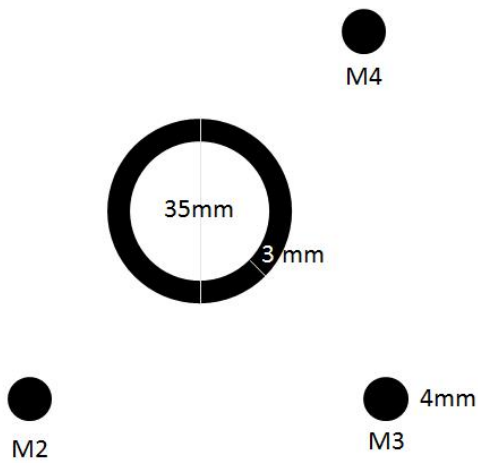


그림 11-26 재귀 반사 테이프 부착 방법(드론의 바닥 면)

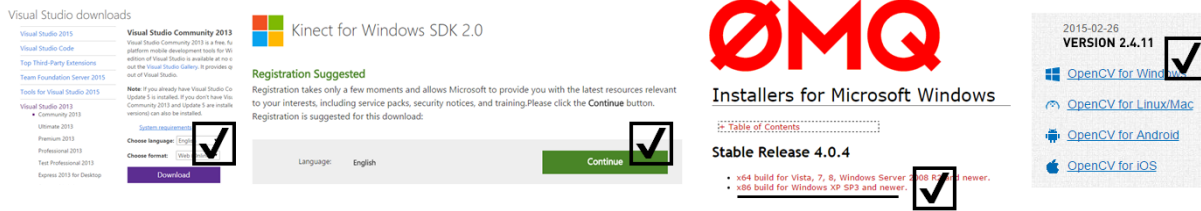


그림 11-27 윈도우 PC에 설치해야 하는 소프트웨어

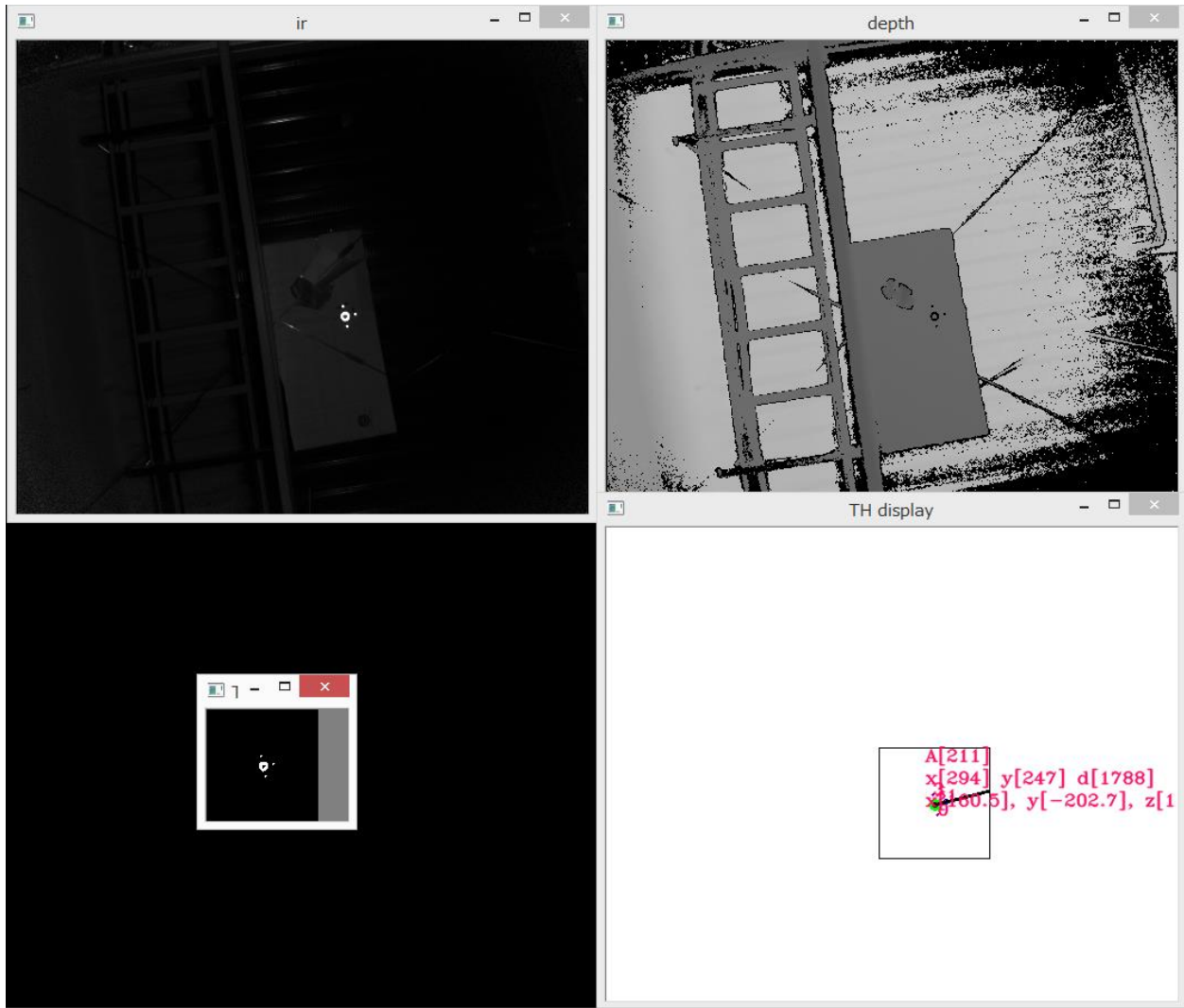


그림 11-28 드론의 x, y, 각도와(a) 높이(d) 값 확인

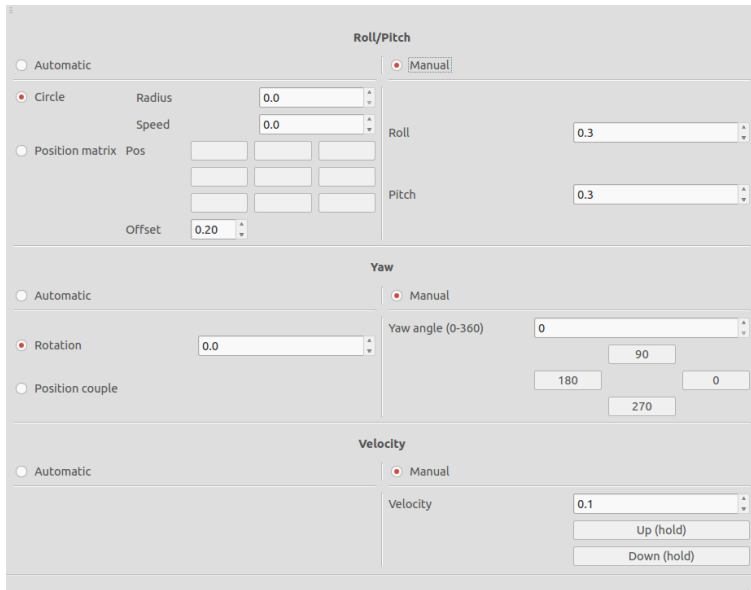


그림 11-29 목표 위치 지정

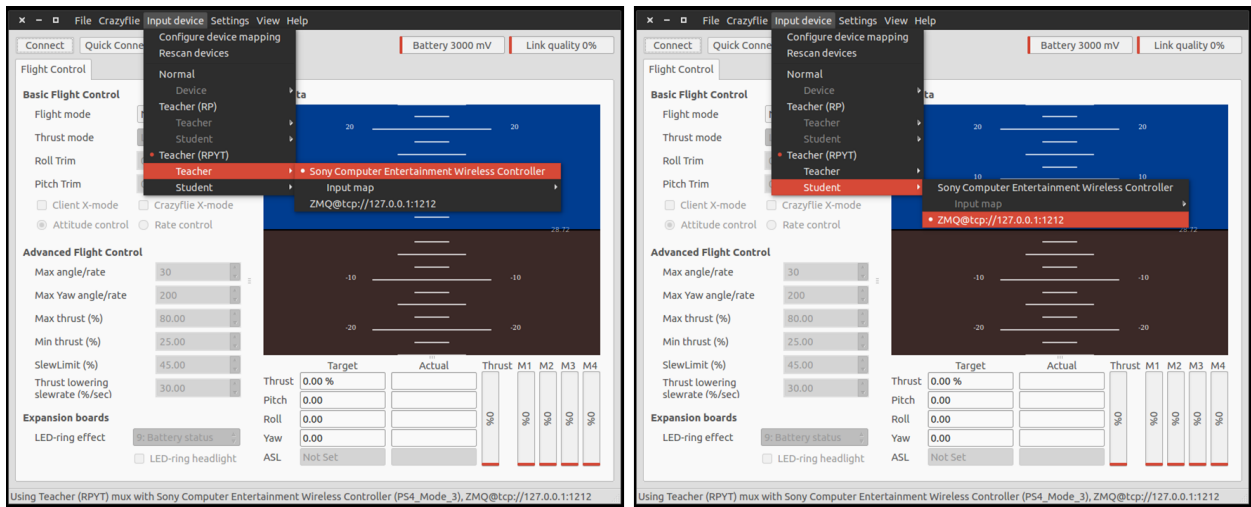


그림 11-30 컨트롤 명령어 MUX 설정 방법

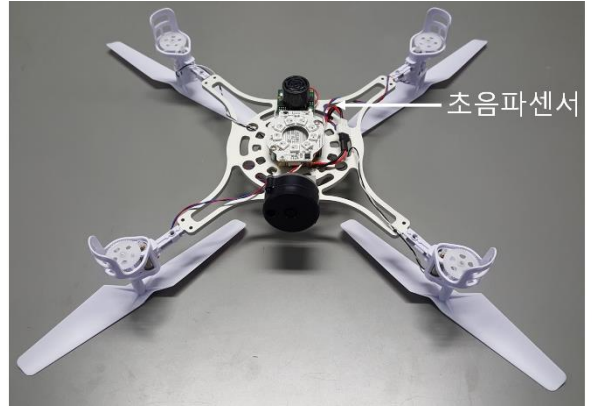
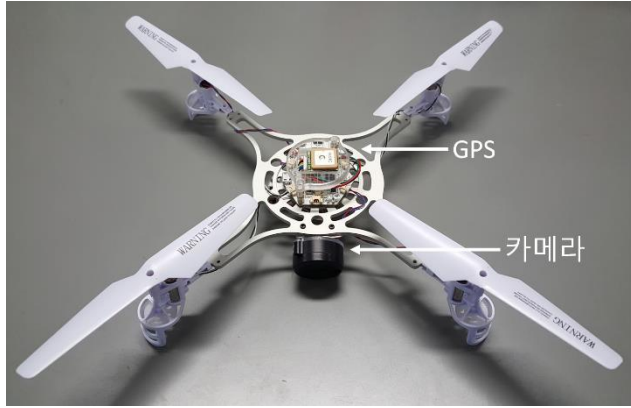


그림 11-31 스카이로버 미니의 외형

부록 A : 펌웨어 개발환경 구축

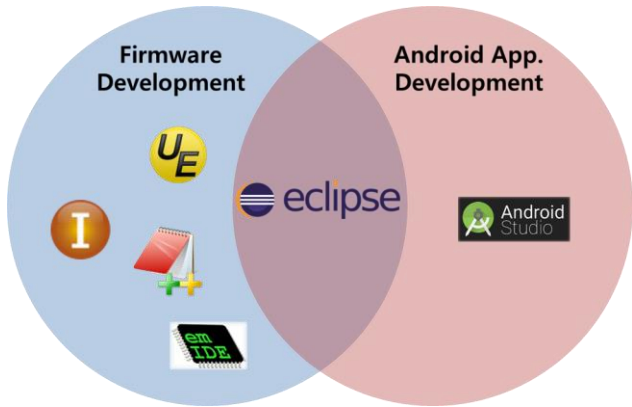


그림 550 개발 툴 비교

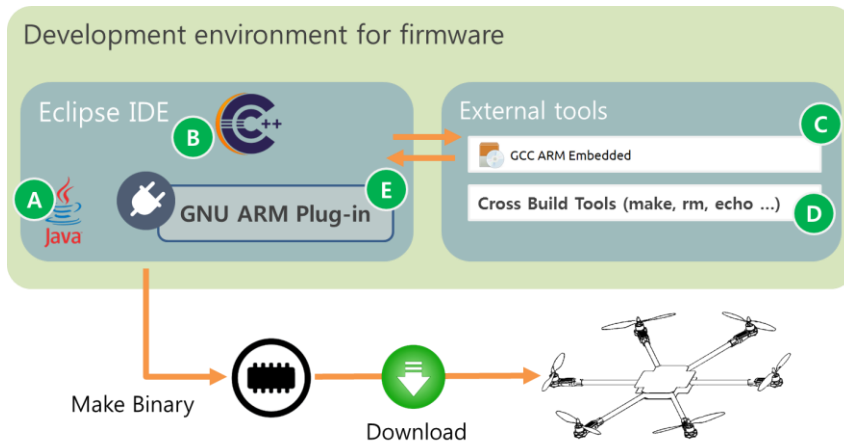


그림 551 펌웨어 개발환경 개요

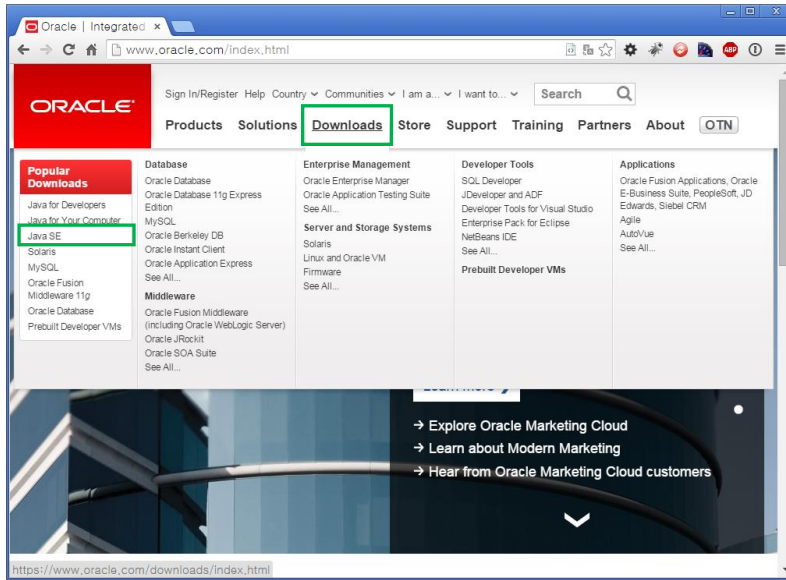


그림 552 오라클 사이트 접속

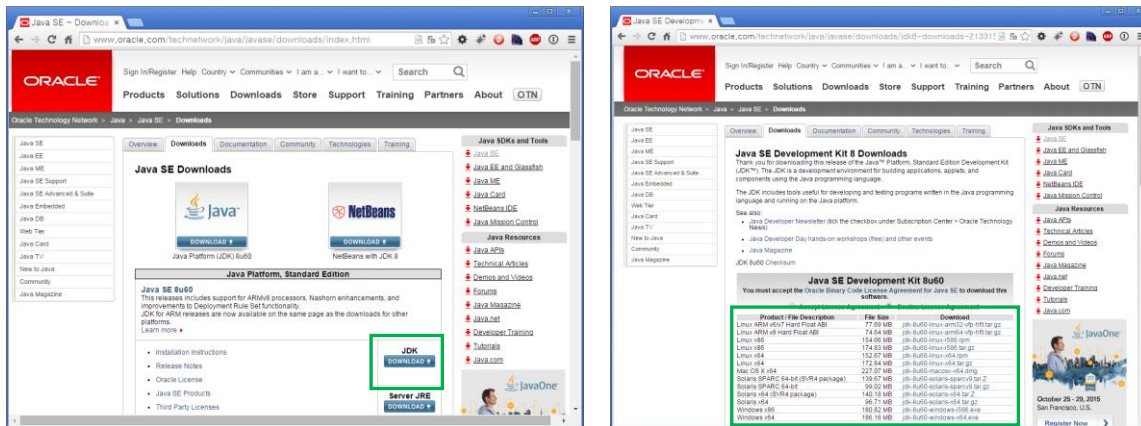


그림 553 JDK 내려받기

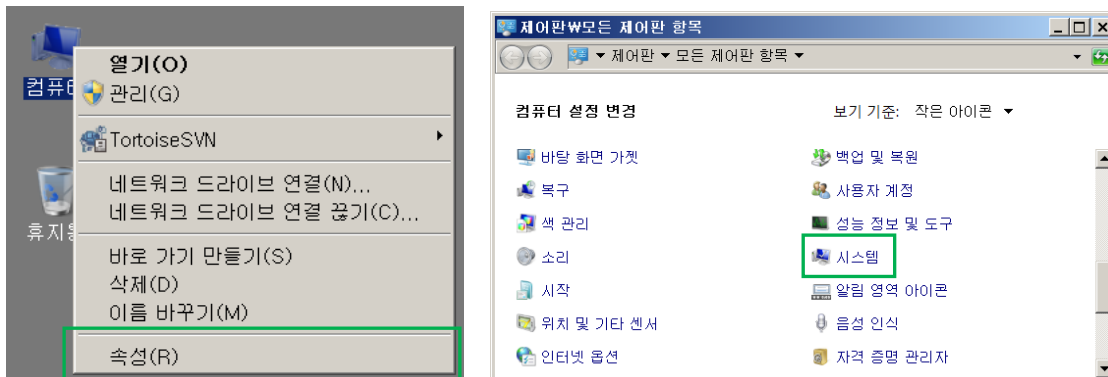


그림 554 시스템 도구 호출

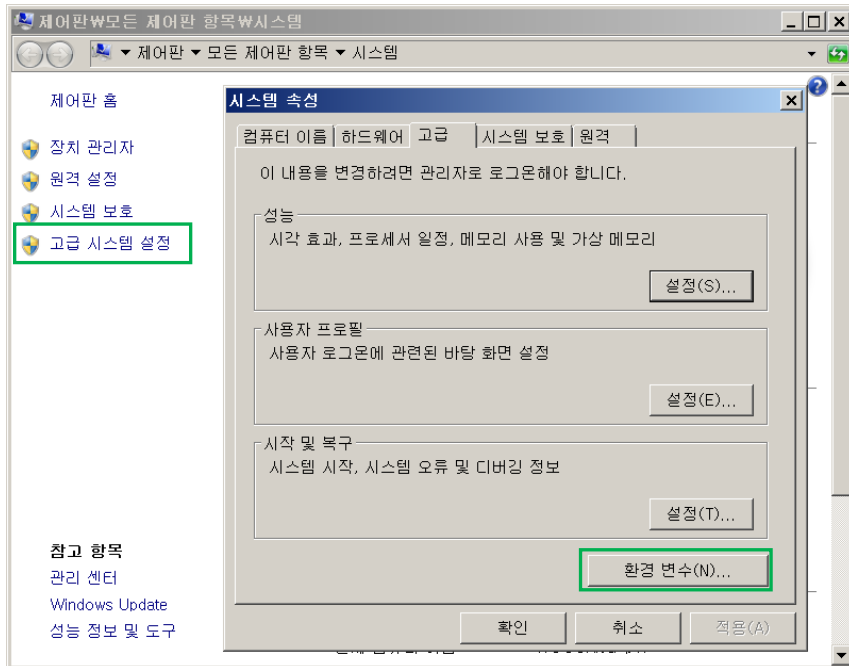


그림 555 환경 변수 설정 도구 호출

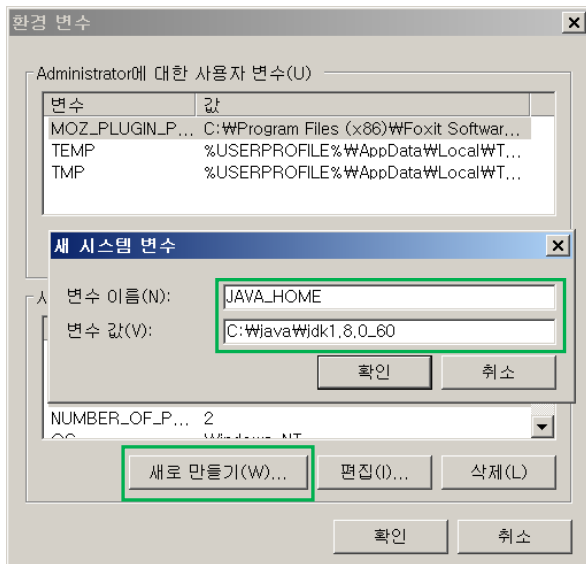


그림 556 JAVA_HOME 환경 변수 생성

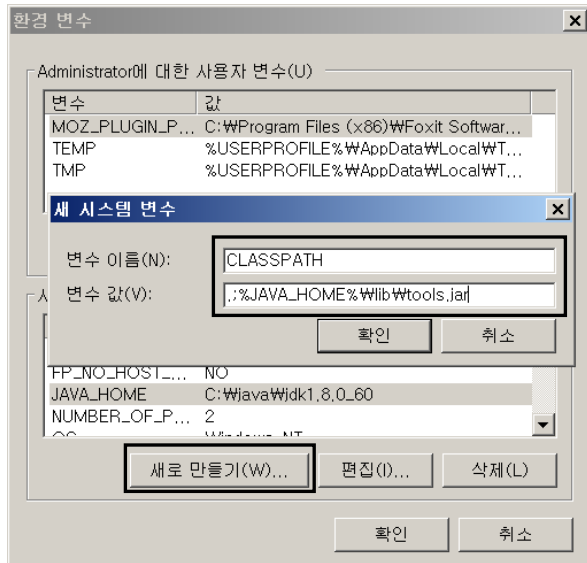


그림 557 CLASSPATH 환경 변수 생성

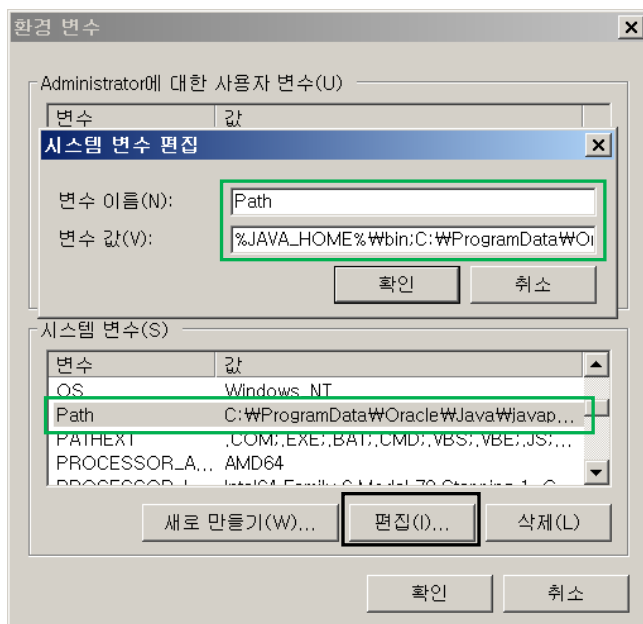


그림 558 Path 환경 변수 수정

```
관리자: C:\Windows\system32\cmd.exe
C:\Users\Administrator>echo %JAVA_HOME%
C:\java\jdk1.8.0_60

C:\Users\Administrator>javac
Usage: javac <options> <source files>
where possible options include:
  -g                Generate all debugging info
  -g:none           Generate no debugging info
  -g:{lines,vars,source}  Generate only some debugging info
  -nowarn           Generate no warnings
  -verbose          Output messages about what the compiler is doing
  -deprecation      Output source locations where deprecated APIs are used
  -classpath <path> Specify where to find user class files and annotations
```

그림 559 윈도우 환경 변수 설정 확인

```
JavaVirtualMachines -- bash -- 70x9
$ pwd
/Library/Java/JavaVirtualMachines
$ ls -al
total 0
drwxr-xr-x  4 root  wheel  136  3  30  20:31  .
drwxrwxr-x  5 root  wheel  170  3  30  20:29  ..
drwxr-xr-x  3 root  wheel  102  3  30  20:29  jdk1.7.0_75.jdk
drwxr-xr-x  3 root  wheel  102  3  30  20:31  jdk1.8.0_60.jdk
```

```
woosanghwang -- bash -- 115x9
$ /usr/libexec/java_home --verbose
Matching Java Virtual Machines (4):
  1.8.0_60, x86_64:  "Java SE 8"      /Library/Java/JavaVirtualMachines/jdk1.8.0_60.jdk/Contents/Home
  1.7.0_75, x86_64:  "Java SE 7"      /Library/Java/JavaVirtualMachines/jdk1.7.0_75.jdk/Contents/Home
  1.6.0_65-b14-466.1, x86_64: "Java SE 6"  /System/Library/Java/JavaVirtualMachines/1.6.0.jdk/Contents/Home
  1.6.0_65-b14-466.1, i386:  "Java SE 6"  /System/Library/Java/JavaVirtualMachines/1.6.0.jdk/Contents/Home

/Library/Java/JavaVirtualMachines/jdk1.8.0_60.jdk/Contents/Home
```

그림 560 맥에 설치된 JDK 목록

```
etc -- bash -- 85x8
$ ls -al ~/.profile
-rw-r--r--  1 woosanghwang  staff  920  6  30  11:18 /Users/woosanghwang/.profile

$ ls -al /etc/profile
-r--r--r--  1 root  wheel  189  10  27  2014 /etc/profile
```

그림 561 맥에서 profile 파일 위치

```
etc -- bash -- 95x12
$ echo $JAVA_HOME
/Library/Java/JavaVirtualMachines/jdk1.8.0_60.jdk/Contents/Home

$ javac
Usage: javac <options> <source files>
where possible options include:
  -g                Generate all debugging info
  -g:none           Generate no debugging info
  -g:{lines,vars,source}  Generate only some debugging info
  -nowarn           Generate no warnings
  -verbose          Output messages about what the compiler is doing
  -deprecation      Output source locations where deprecated APIs are used
```

그림 562 맥에서 환경 변수 설정 확인

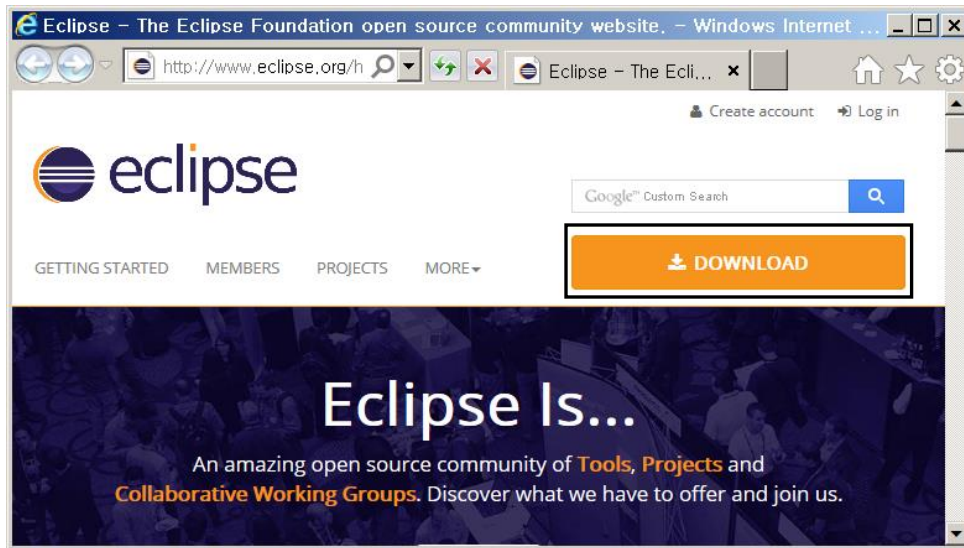


그림 563 이클립스 사이트 접속

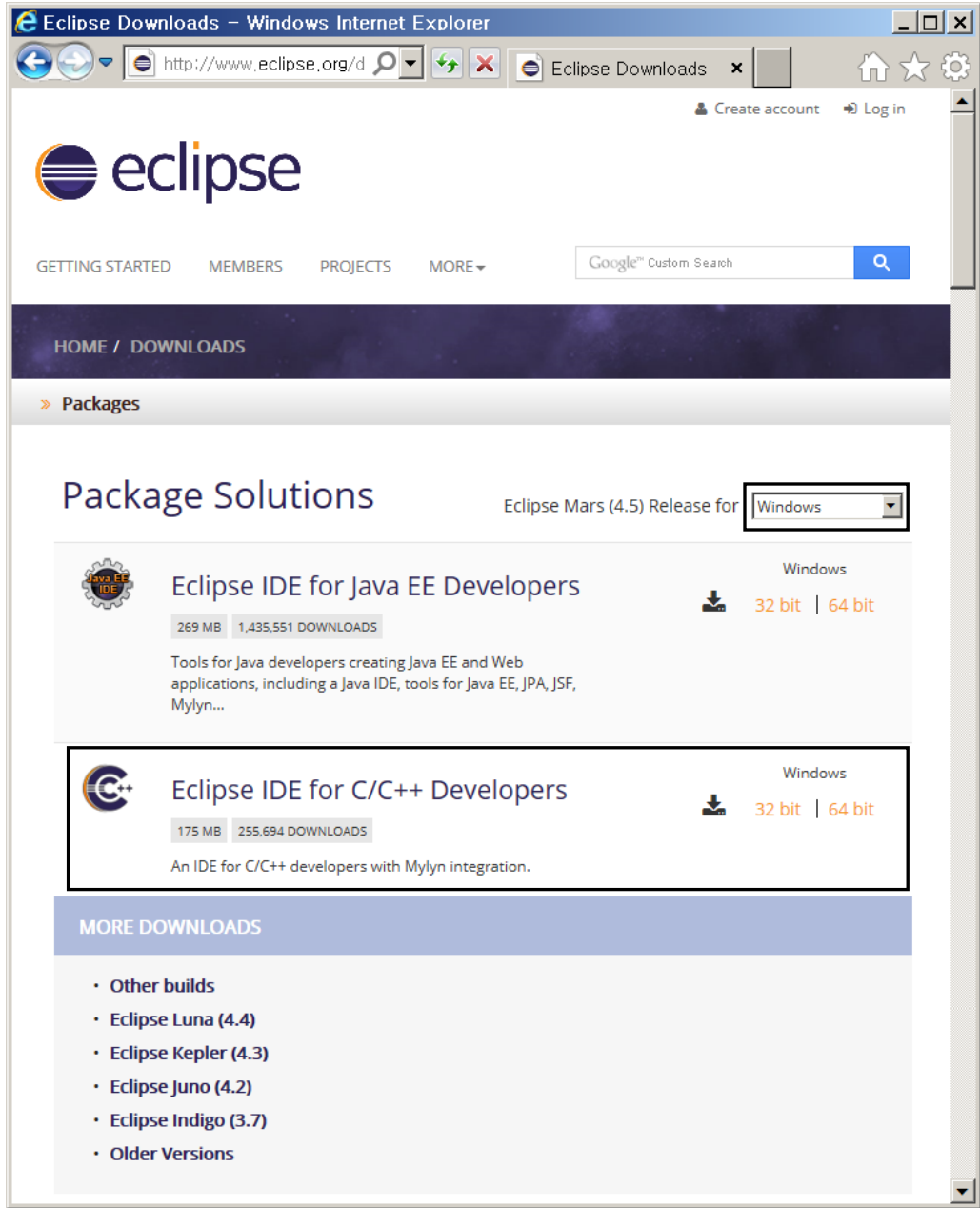


그림 564 OS, 버전별 eclipse CDT 선택

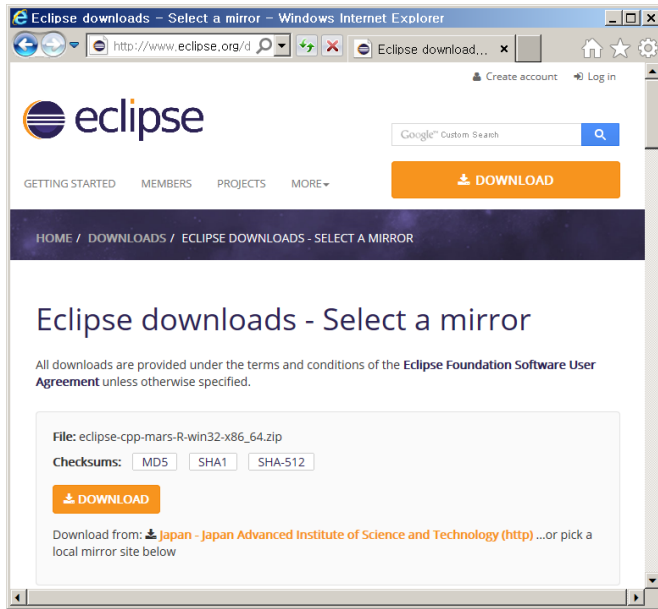


그림 565 eclipse CDT 내려받기

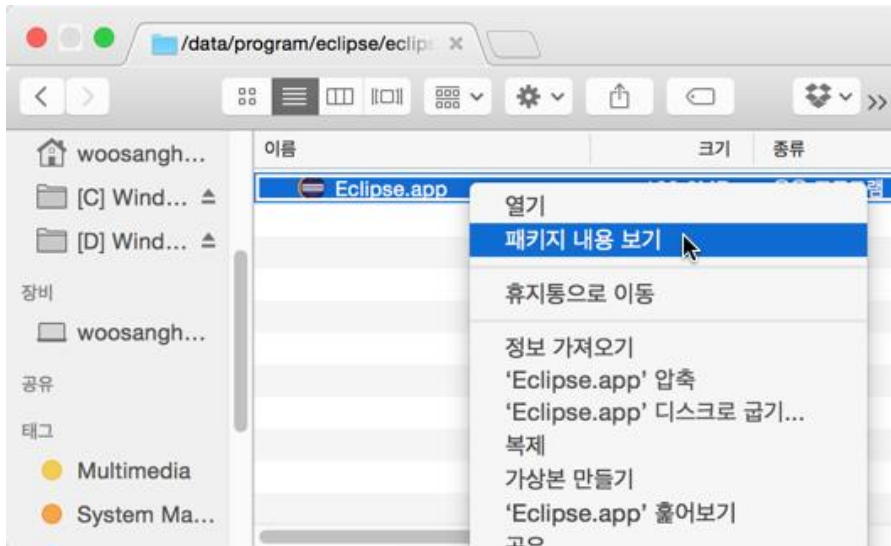


그림 566 맥에서 eclipse.ini 위치

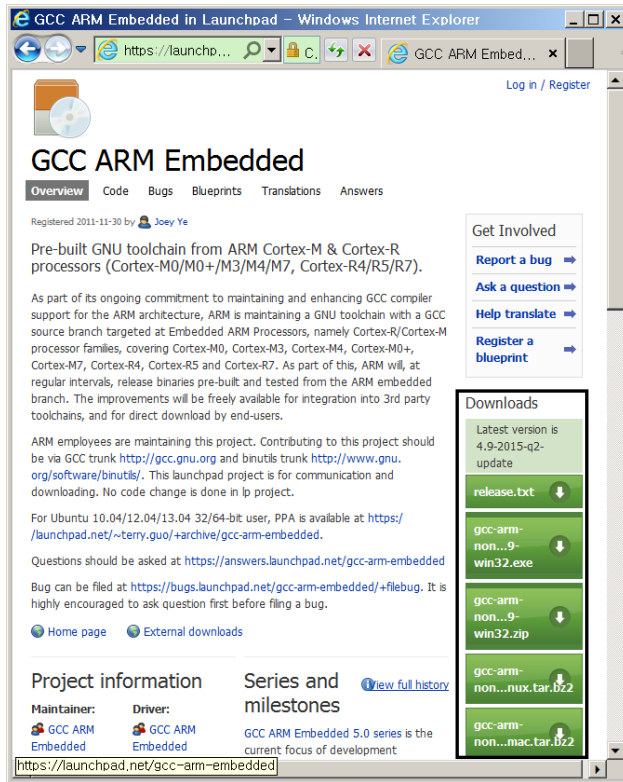


그림 567 GCC ARM Embedded 내려받기

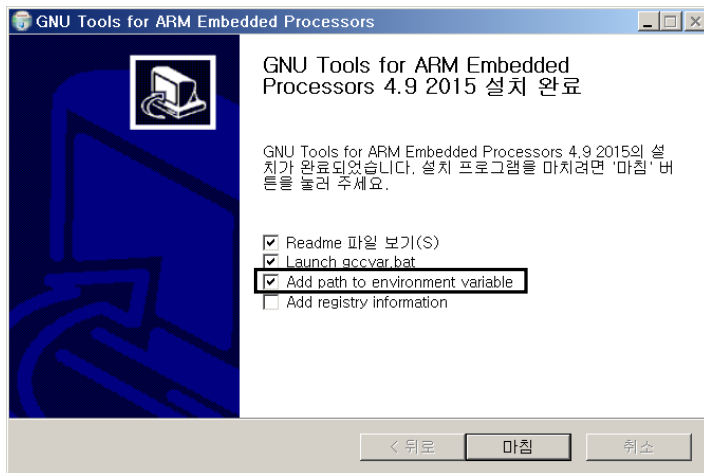


그림 568 GCC ARM Embedded 설치 완료

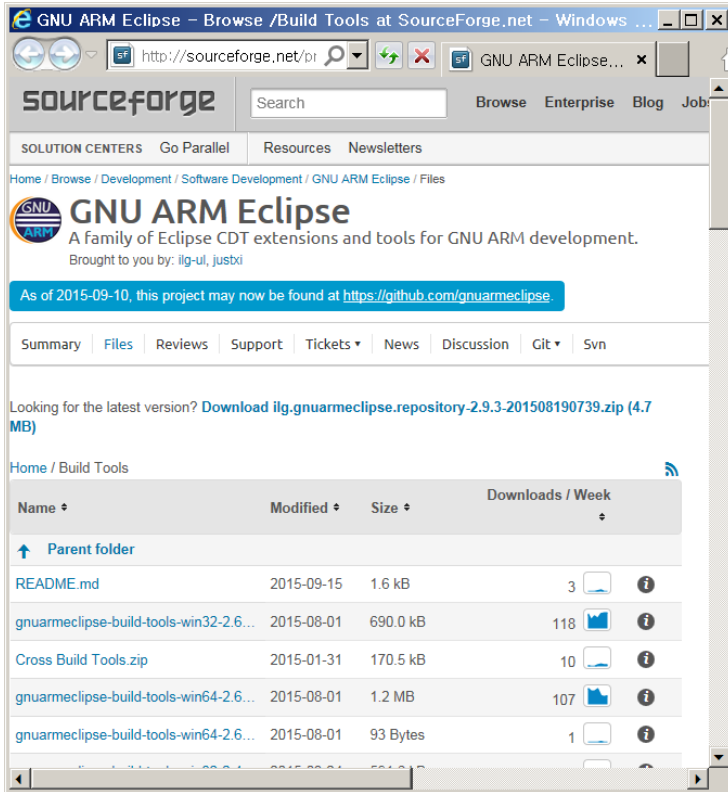


그림 569 Cross Build Tools 내려받기

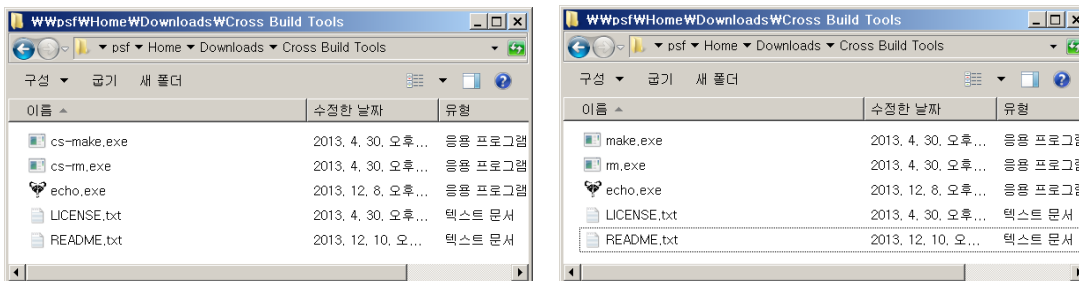


그림 570 Cross Build Tools 파일명 변경

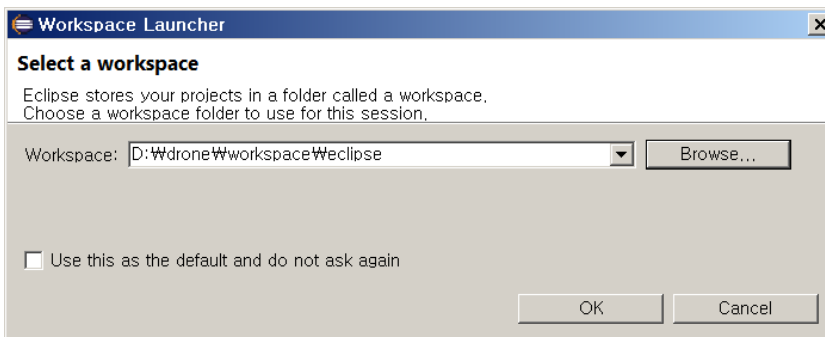


그림 571 이클립스 작업공간 지정

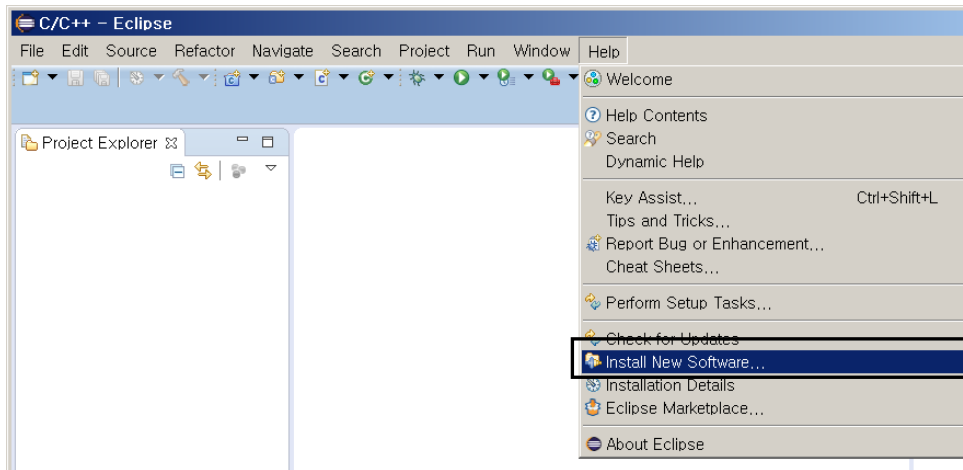


그림 572 이클립스 플러그인 설치 진입

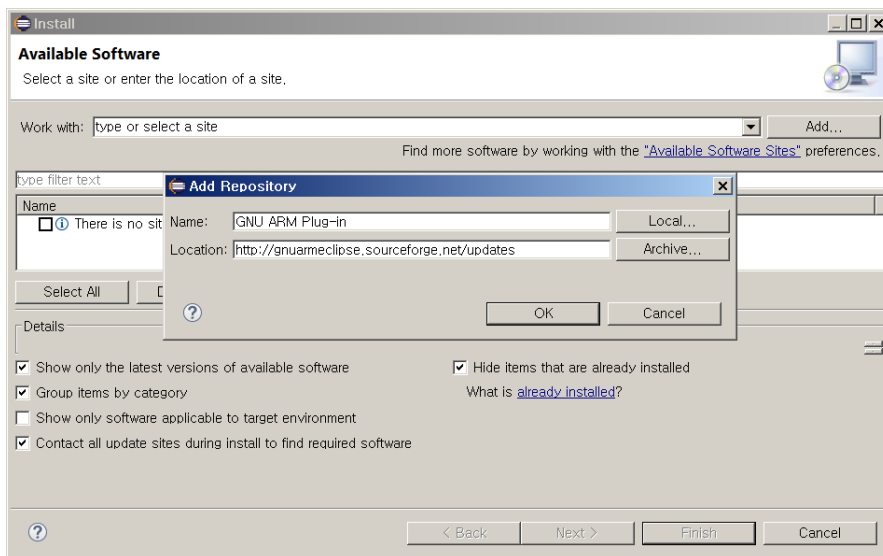


그림 573 GNU ARM 플러그인 설치 정보 입력

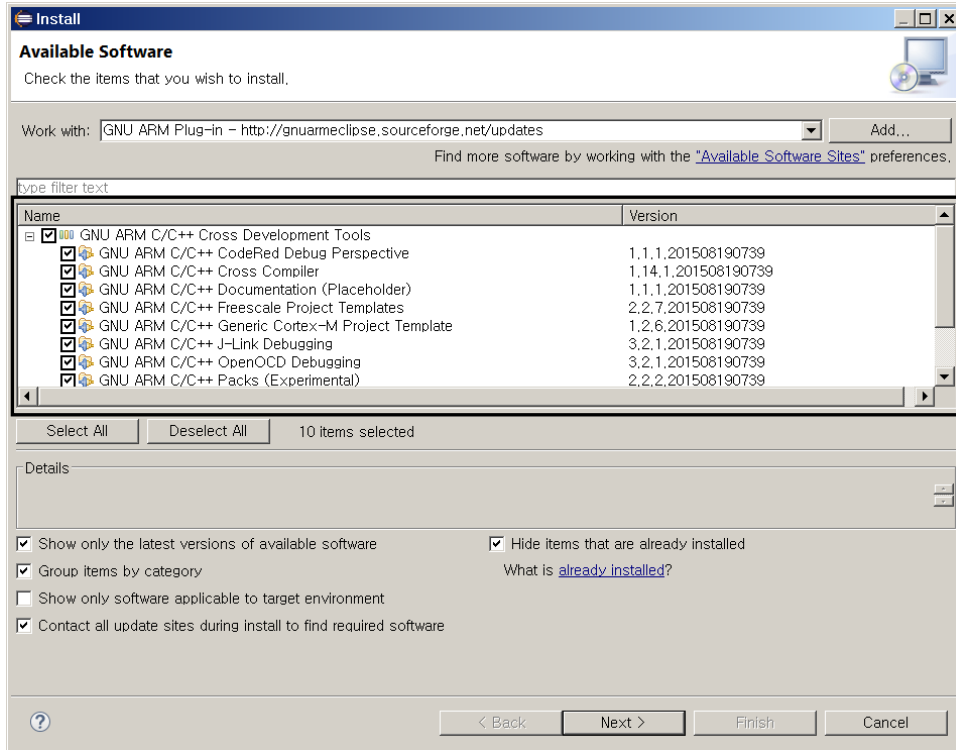


그림 574 플러그인 설치 항목 선택

부록 B : 안드로이드 앱 개발환경 구축

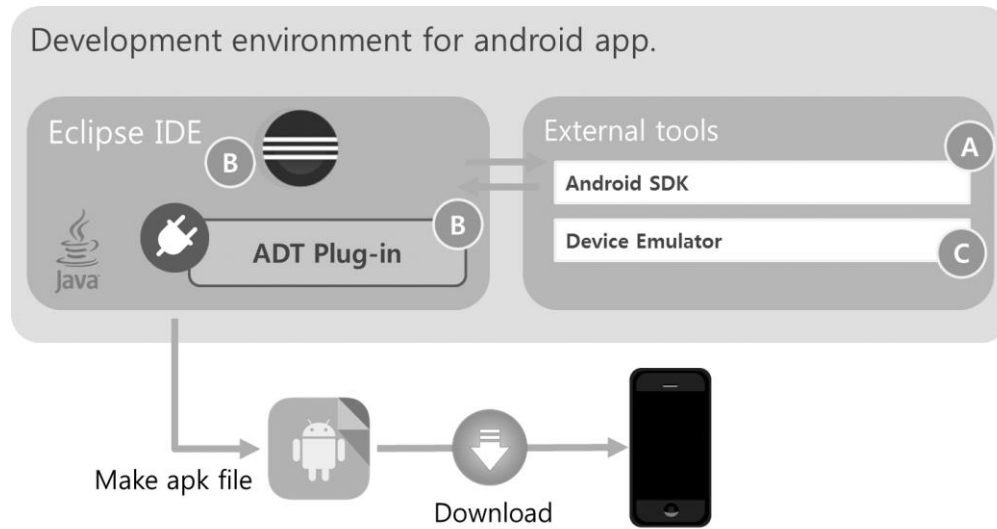


그림 575 안드로이드 개발환경 개요

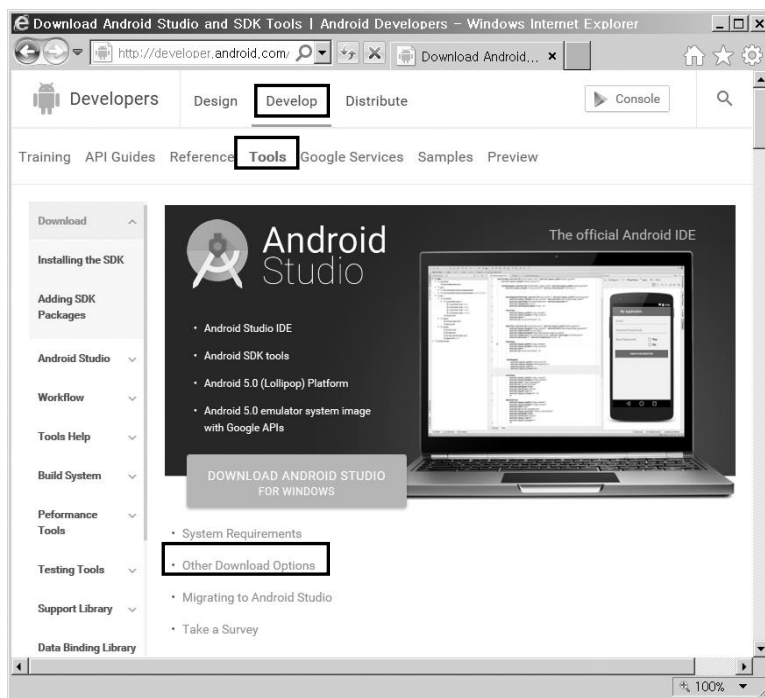


그림 576 안드로이드 개발자 사이트

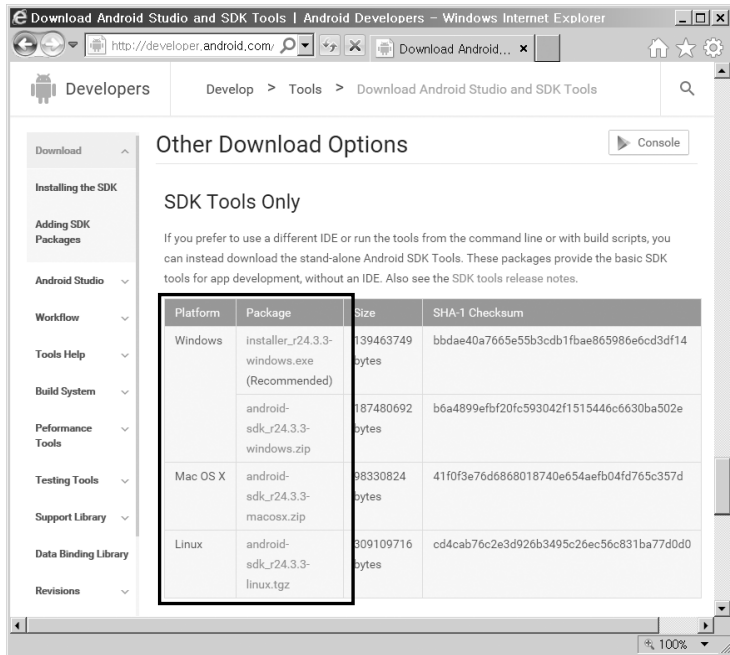


그림 577 SDK 내려받기

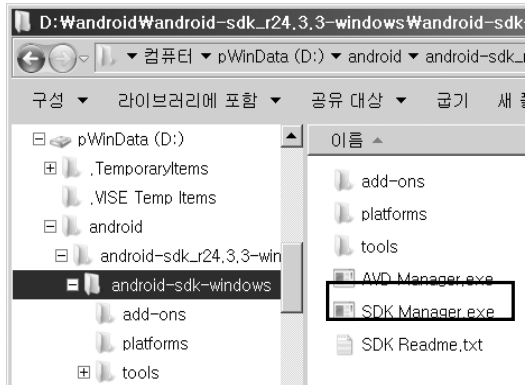


그림 578 SDK Manager 실행

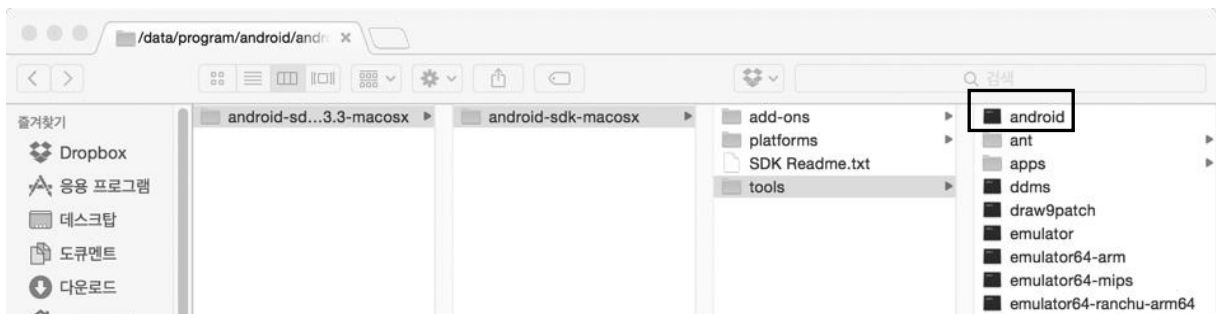


그림 579 SDK Manager 실행

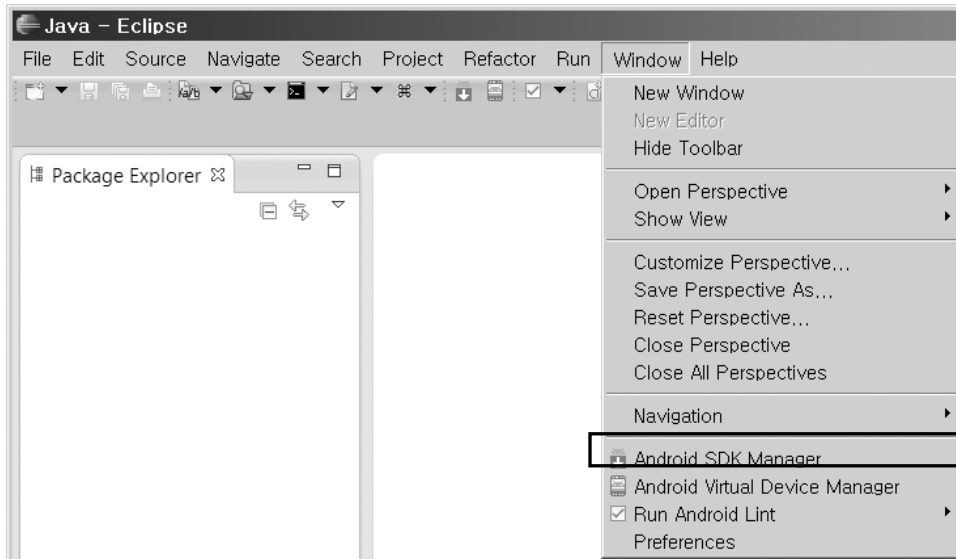


그림 580 SDK Manager 실행

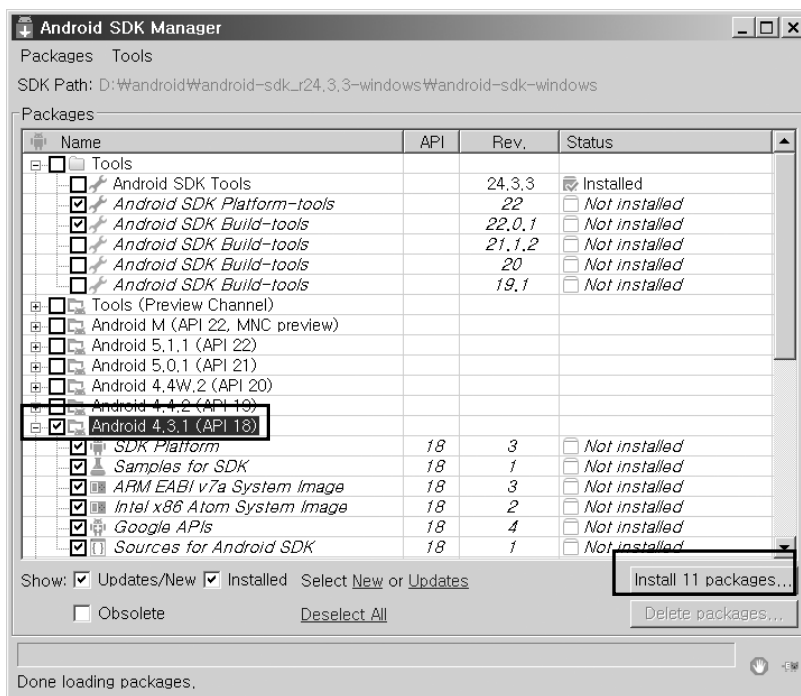


그림 581 타겟 플랫폼 패키지 선택

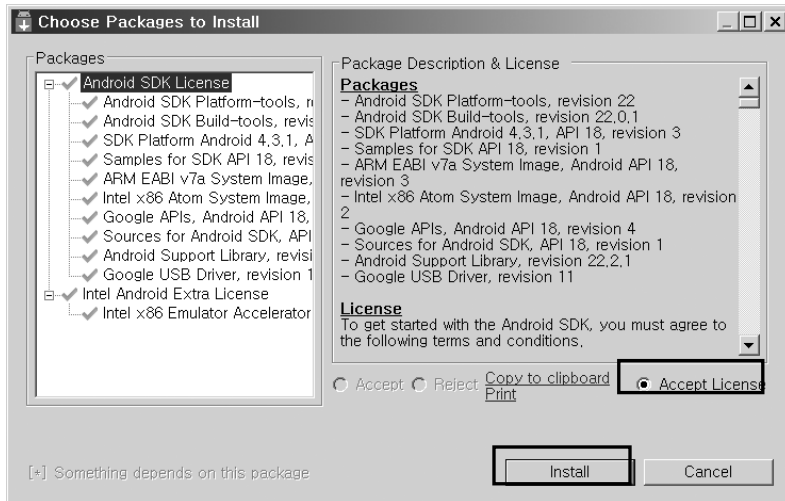


그림 582 패키지 라이선스 동의

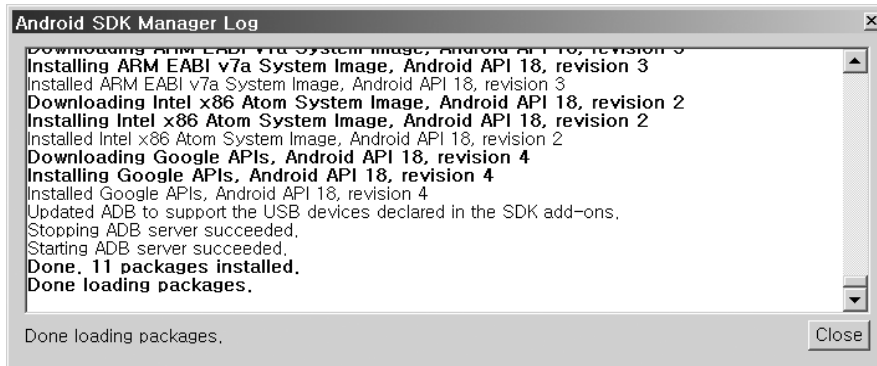


그림 583 패키지 설치 진행

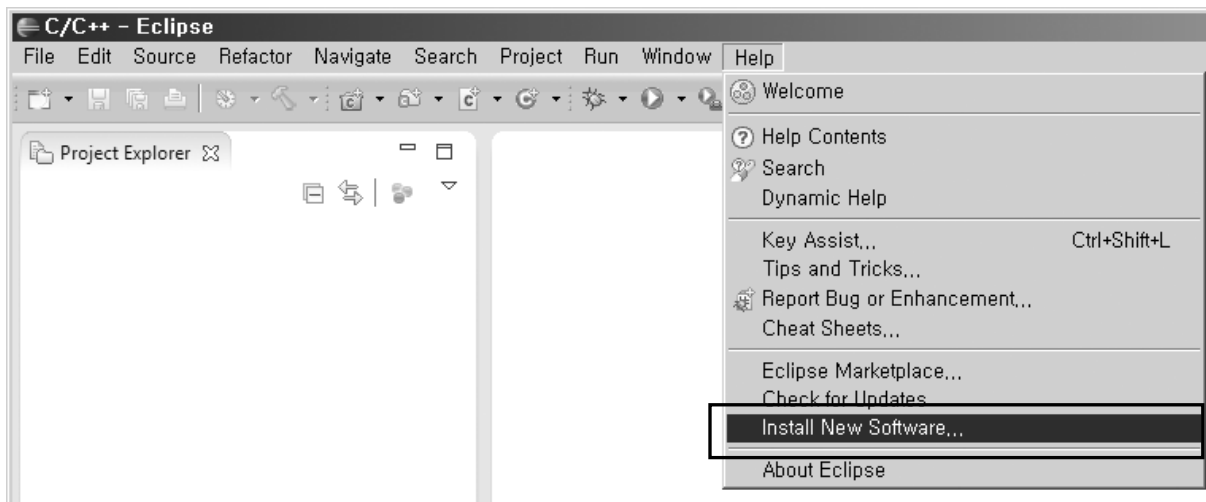


그림 584 이클립스 플러그인 설치 진입

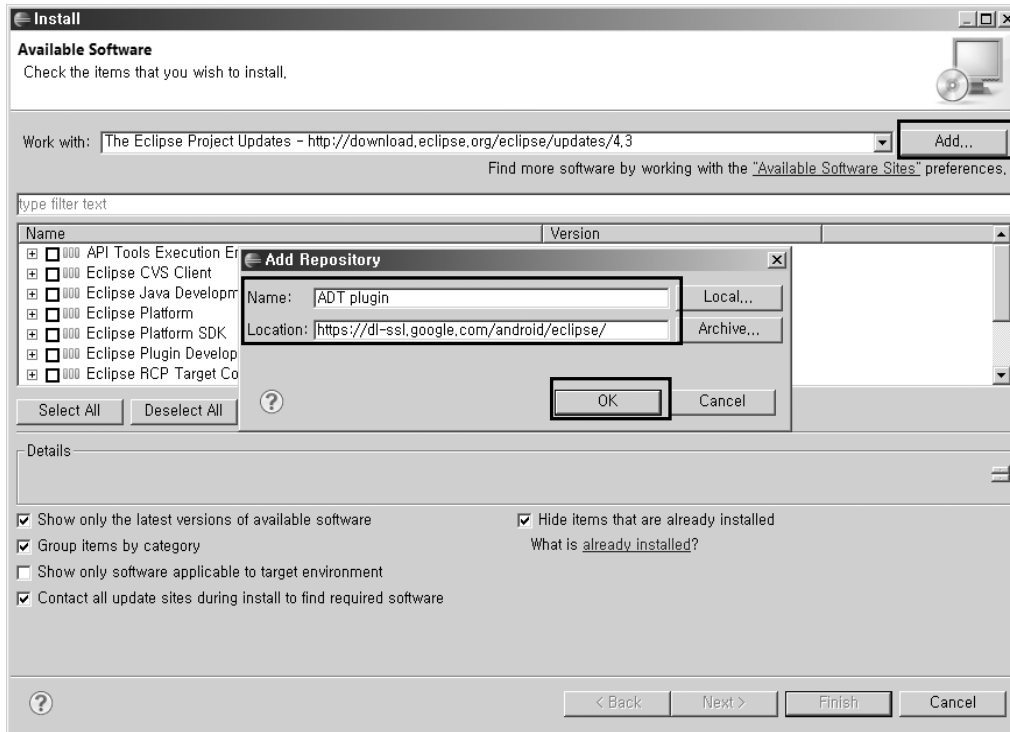


그림 585 ADT 플러그인 설치 정보 입력

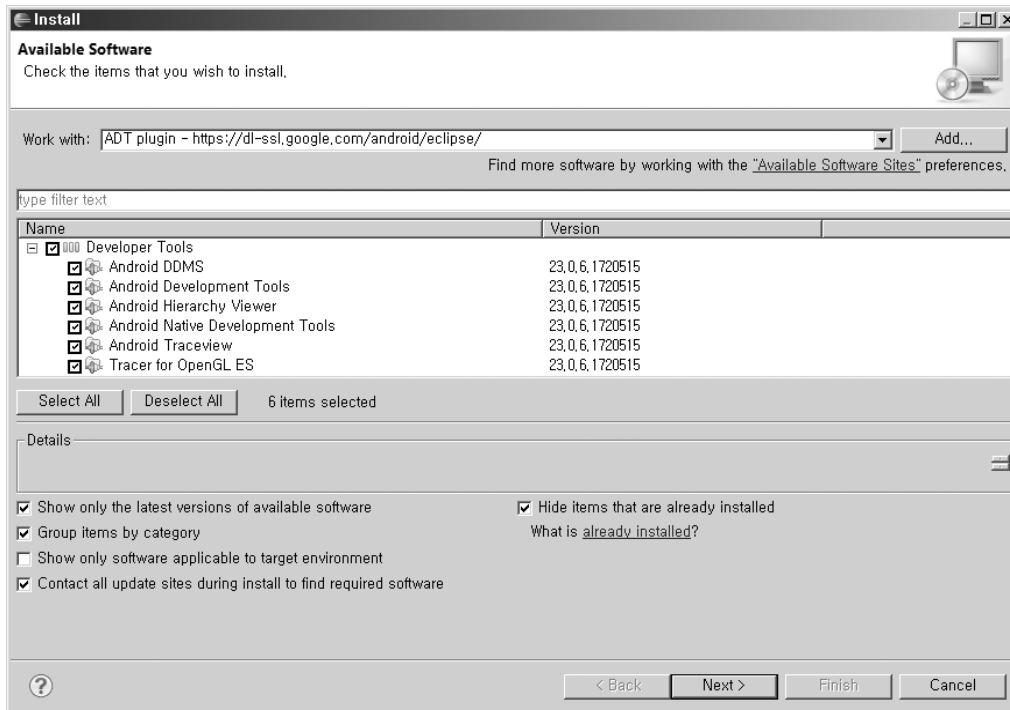


그림 586 플러그인 설치 항목 선택

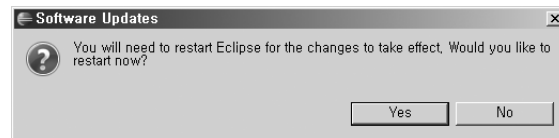
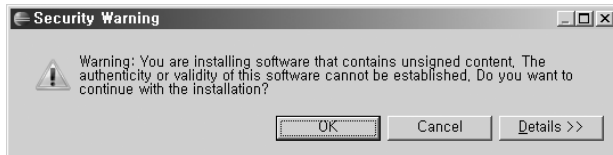
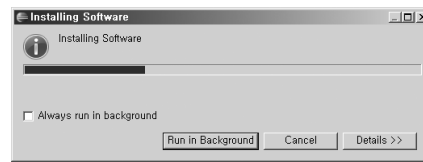
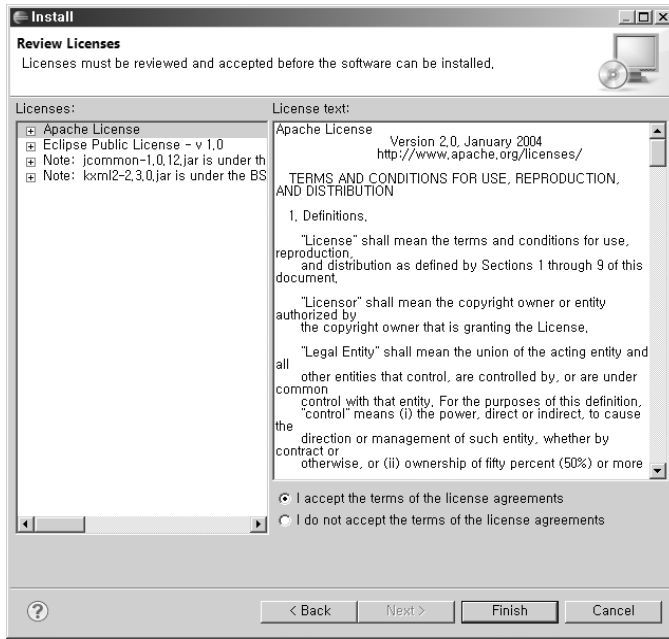


그림 587 플러그인 설치 진행

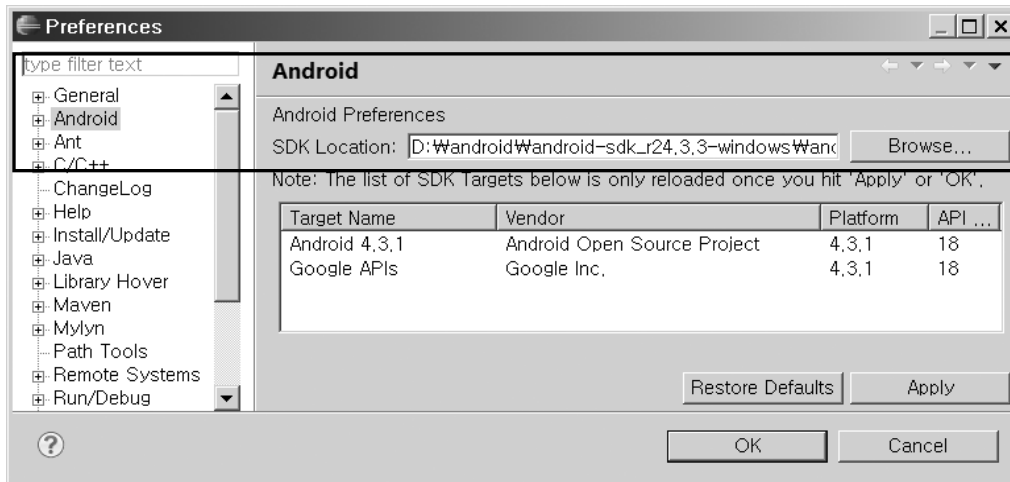


그림 588 SDK 위치 지정

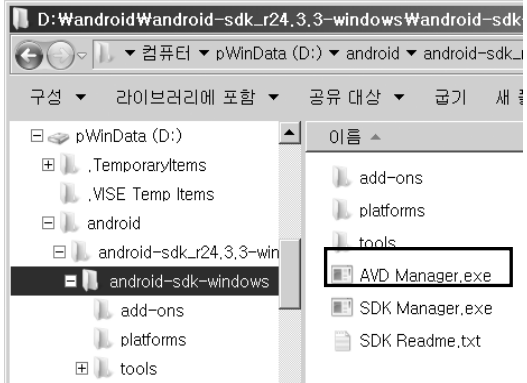


그림 589 AVD Manager 실행



그림 590 AVD Manager 실행

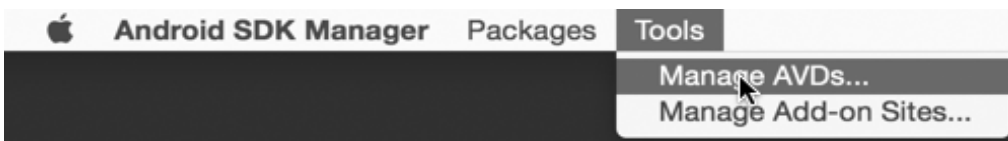


그림 591 AVD Manager 실행

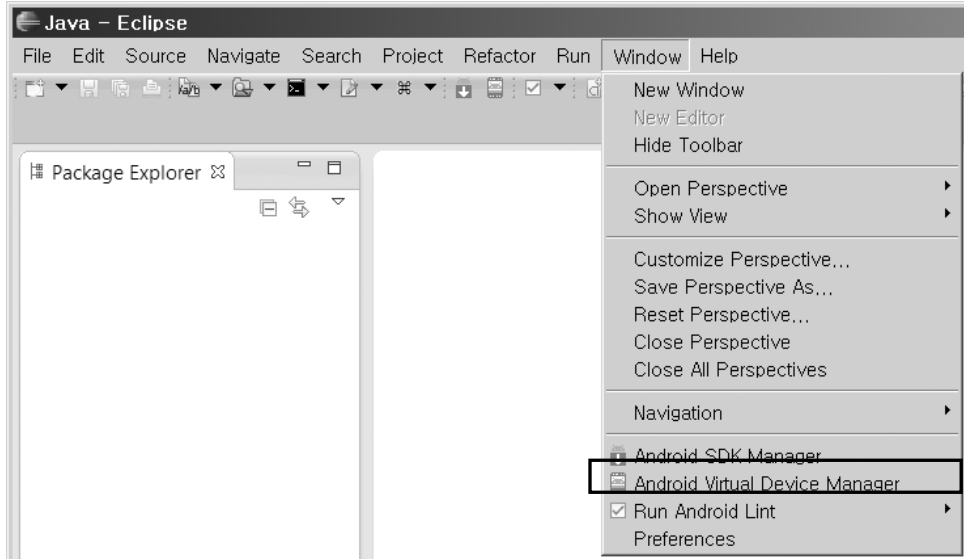


그림 592 AVD Manager 실행 (eclipse 상단 메뉴)

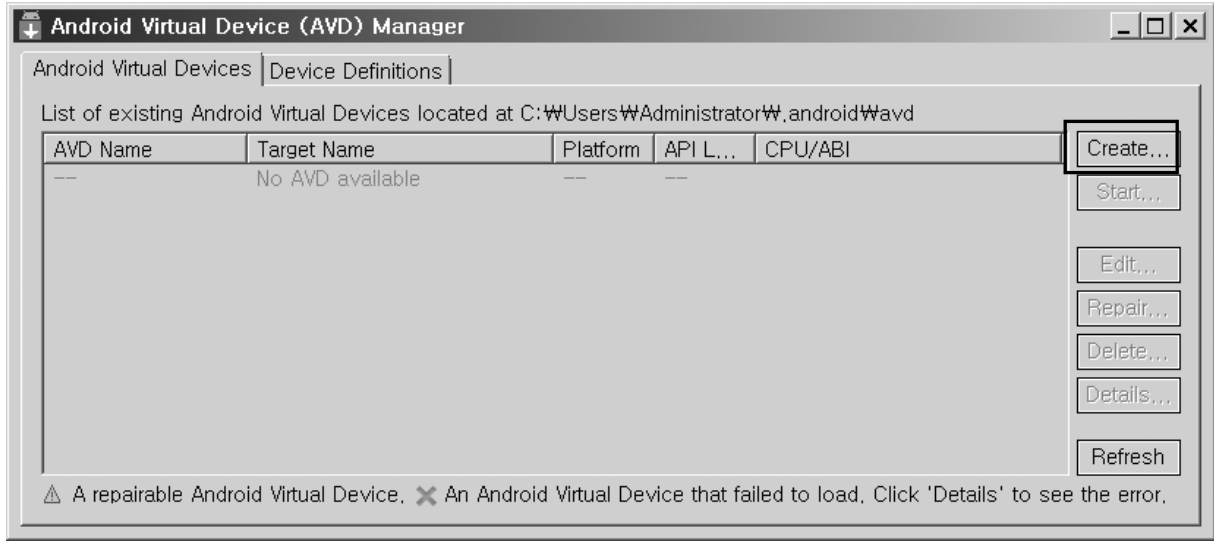


그림 593 안드로이드 가상 장치 목록

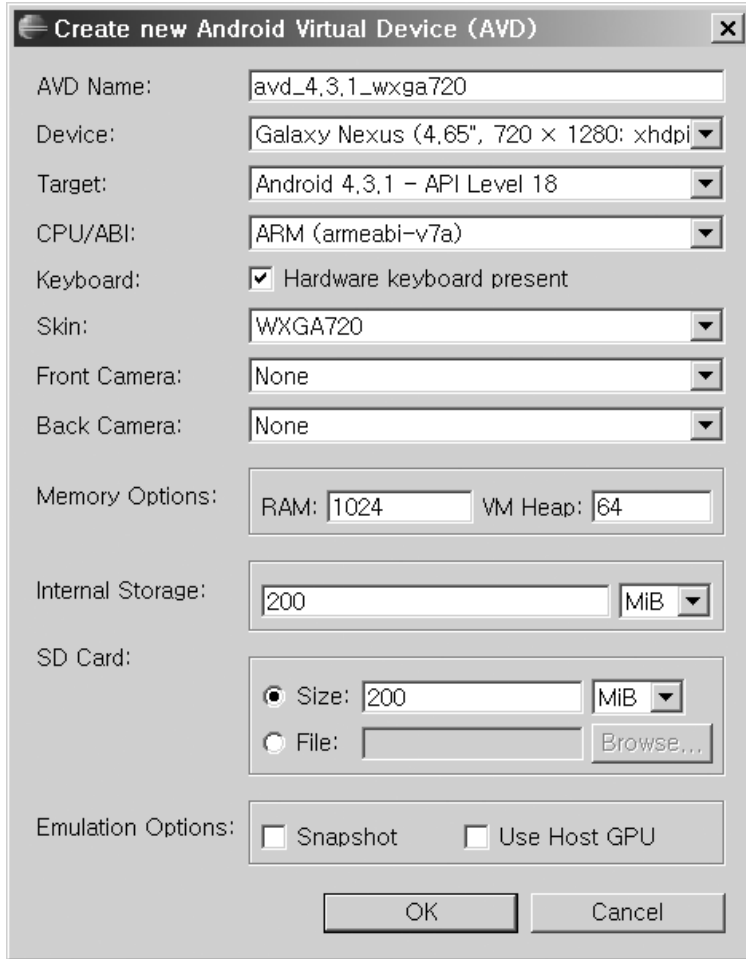


그림 594 AVD 정보 입력

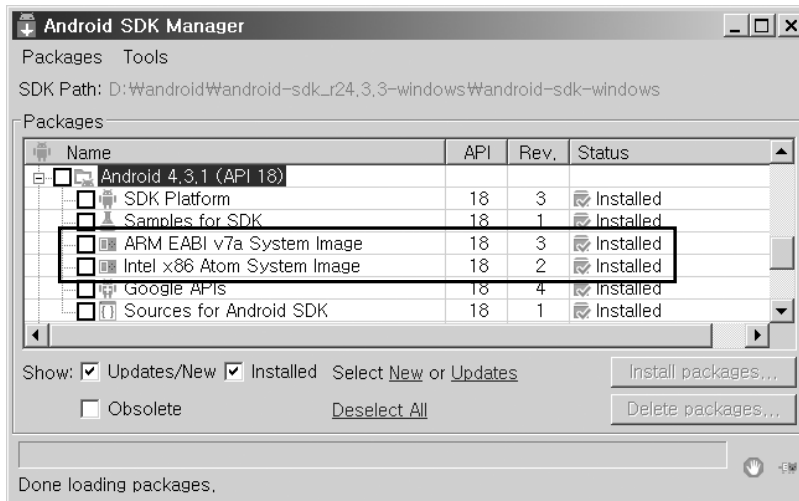


그림 595 설치된 패키지 확인

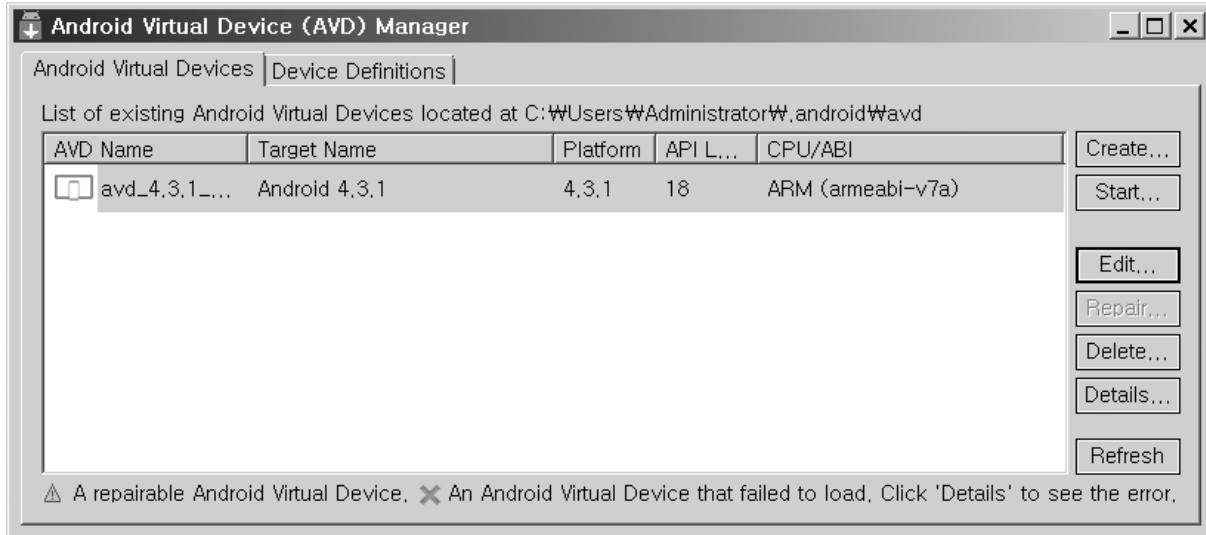


그림 596 AVD 생성 완료