ASSEMBLY DESIGN

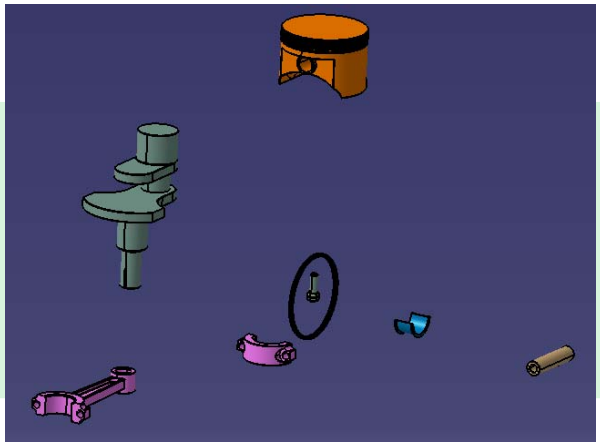
Computational Design Laboratory
Department of Automotive Engineering
Hanyang University, Seoul, Korea

Copyright © Computational Design Lab. All rights reserved.

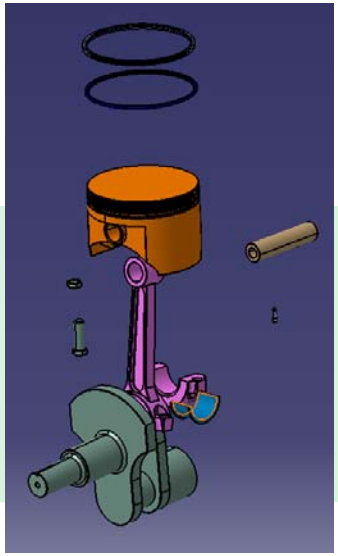
CONTENTS

Copyright © Computational Design Lab. All rights reserved.

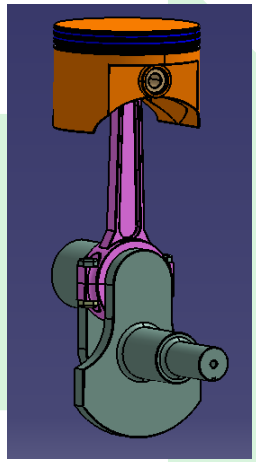
ASSEMBLY DESIGN



모델 불러오기



대략적 배치/수정

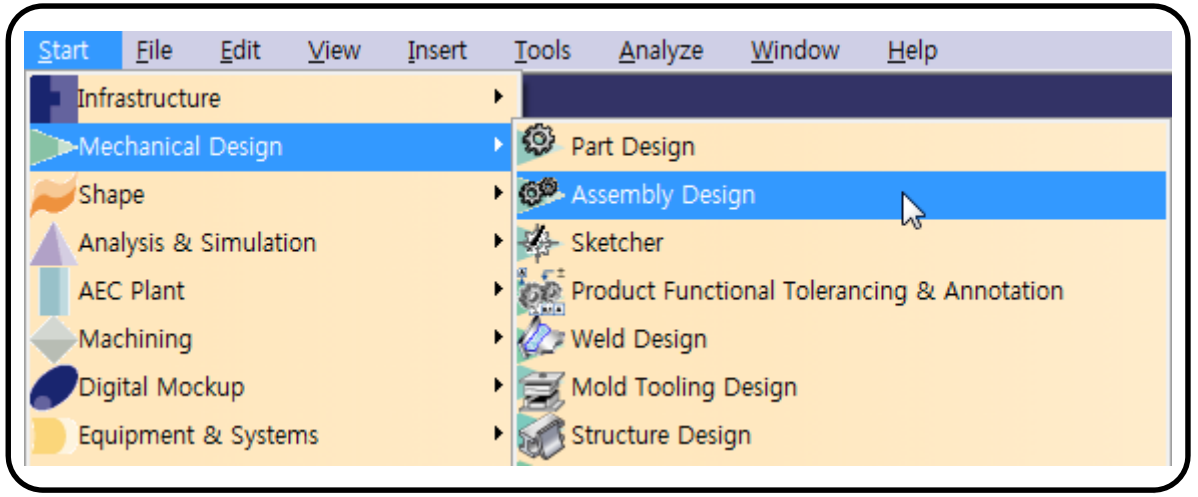


조립

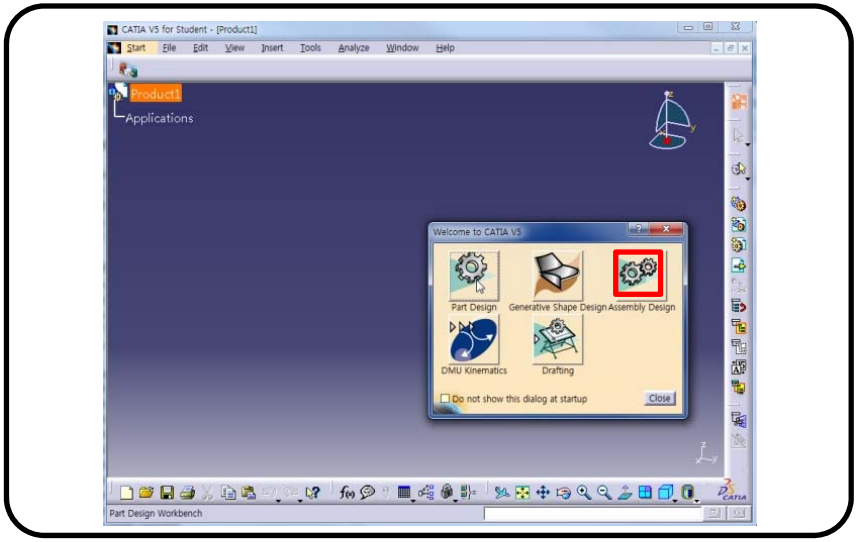
Copyright © Computational Design Lab. All rights reserved.

ASSEMBLY DESIGN 시작하기

Start 메뉴에서 Mechanical Design → Assembly Design 선택

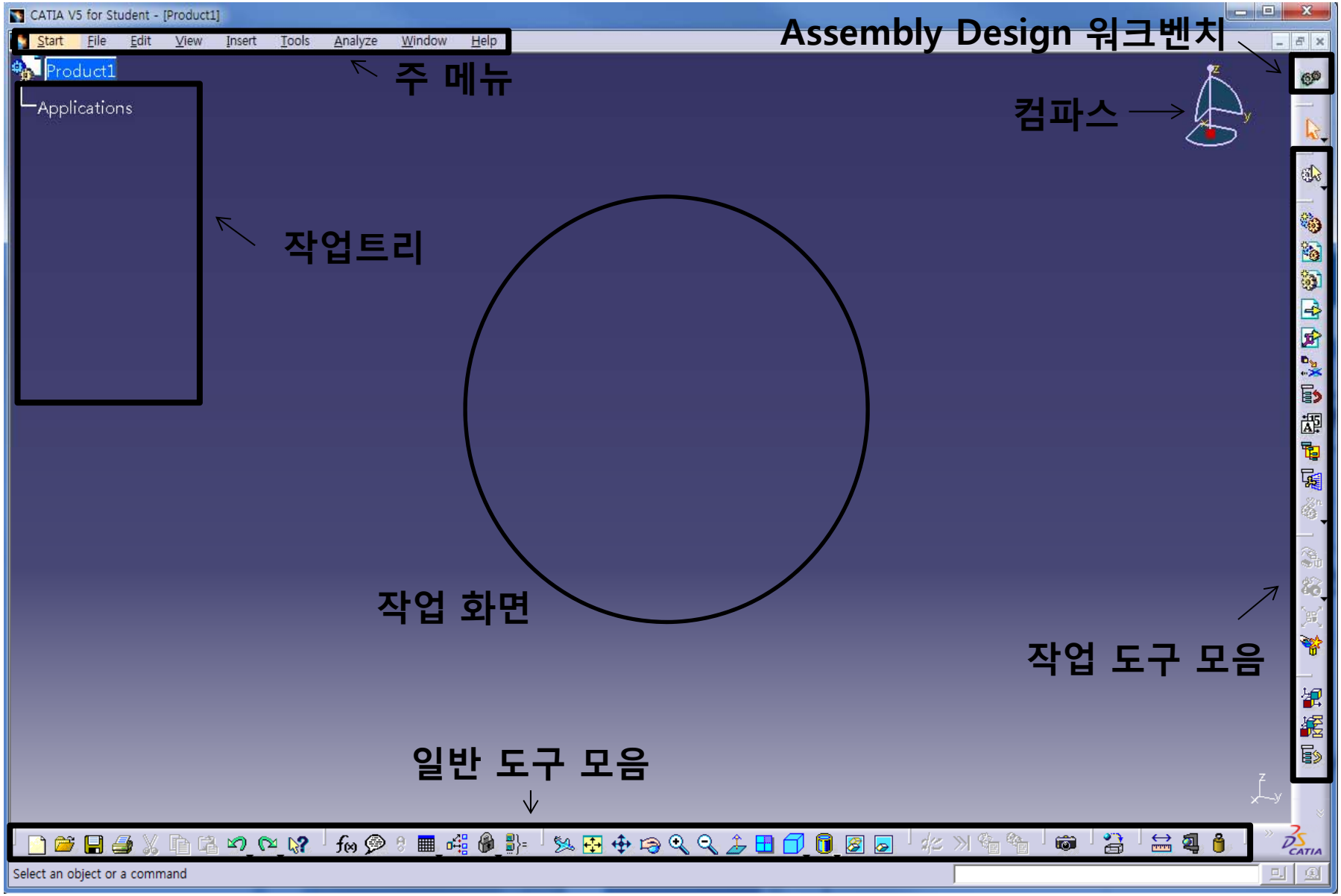


혹은, 카티아 실행화면에서 선택 (Start menu 설정시)



Copyright © Computational Design Lab. All rights reserved.

ASSEMBLY DESIGN 작업화면



Copyright © Computational Design Lab. All rights reserved.

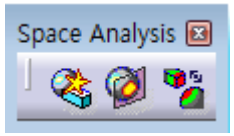
ASSEMBLY DESIGN 툴바 종류

새로운 Part, Component, Product등을 만들거나 만들어진 Part, Component, Product 등을 불러들이는 툴바

불러온 Part의 위치를 움직이게 할 수 있는 툴바

불러온 Part 간에 구속조건을 부여하는 툴바

Part Design의 몇 가지 툴바를 Assembly Design 내에서 사용할 수 있게 하는 툴바



Component간에 간섭을 확인하거나, 단면을 확인함.

Copyright © Computational Design Lab. All rights reserved.

CONTENTS

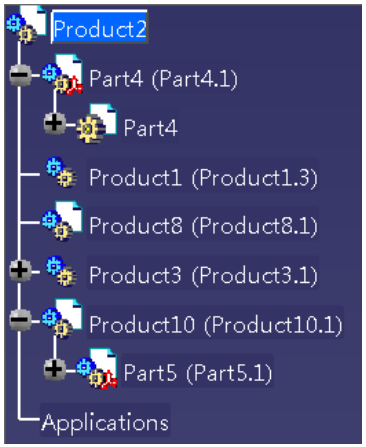
Copyright © Computational Design Lab. All rights reserved.

ASSEMBLY DESIGN TOOLS

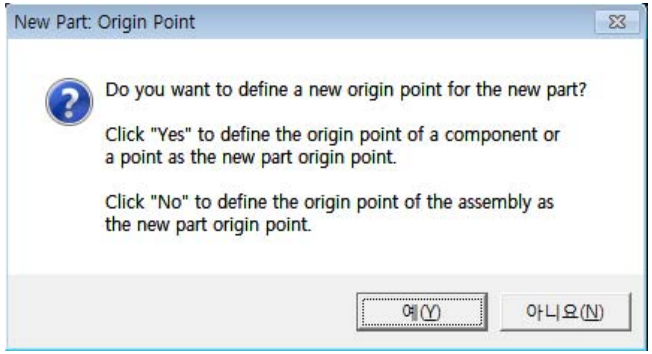
Product Structure Tools

Component, Product, Part

- 새로운 Component, Product, Part 생성

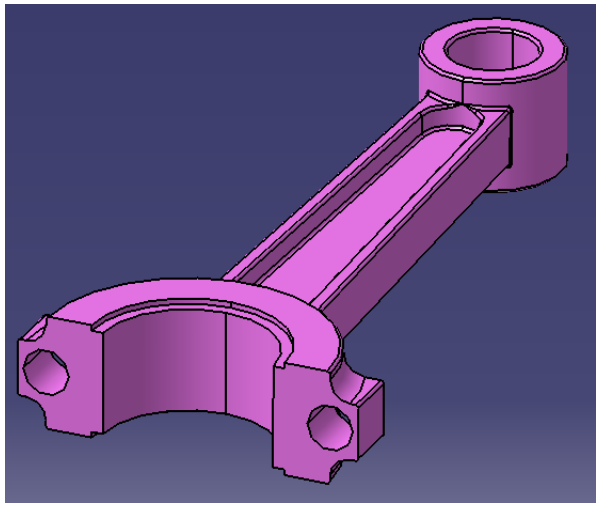


<Part 사용시>



Existing Component

- 이미 있는 Component or Part를 Product에 추가

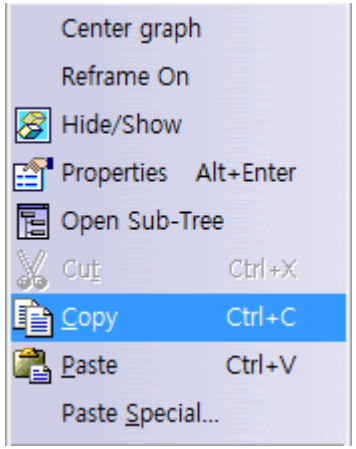


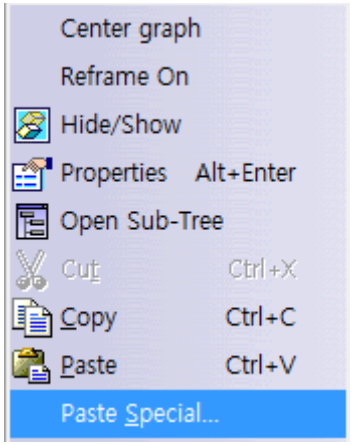
Copyright © Computational Design Lab. All rights reserved.

ASSEMBLY DESIGN TOOLS

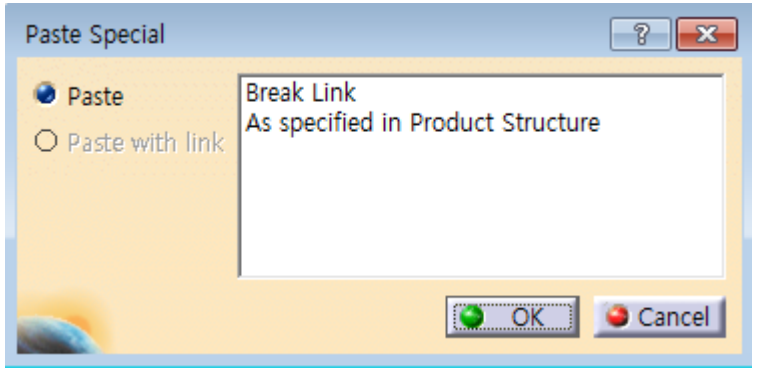
Component 복사하기

- 원하는 Component 에 마우스 오른쪽 클릭을 하여 Copy 한 후 상위 목록에 Paste.
- Copy된 Component는 기존의 Component가 수정될 경우 같이 수정됨.
- Paste Special을 이용하여 Break Link를 사용할 경우 독립적으로 복사됨.





<Paste Special>



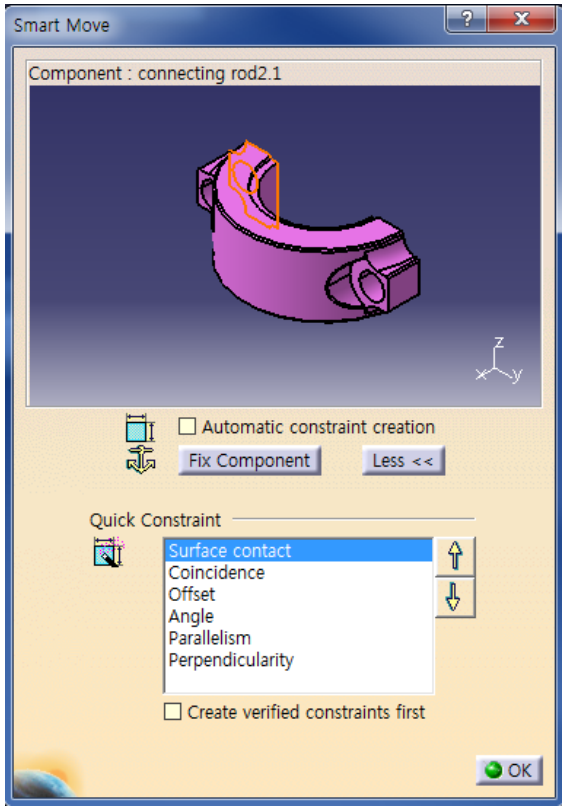
Copyright © Computational Design Lab. All rights reserved.

ASSEMBLY DESIGN TOOLS

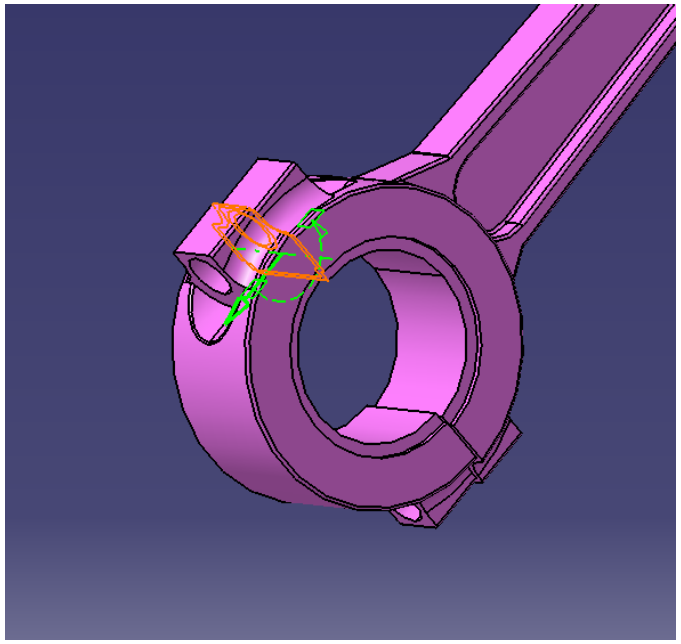
Product Structure Tools

Existing Component With Positioning 

- Component or Part를 Product에 추가 하면서 대략적인 위치, 구속도 결정.



<Surface contact>



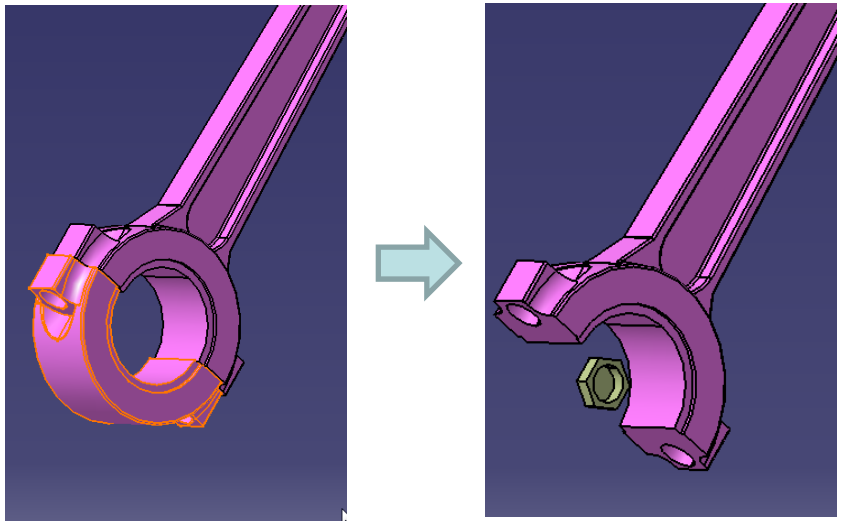
Copyright © Computational Design Lab. All rights reserved.

ASSEMBLY DESIGN TOOLS

Product Structure Tools

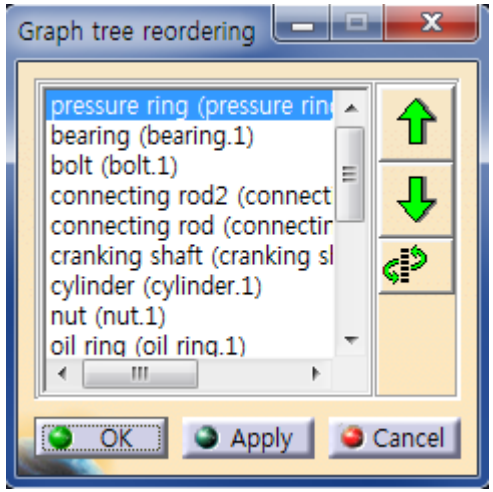
Replace Component

- 선택한 Component를 새로운 Component로 대체



Replace Component

- 작업 트리의 순서를 변경



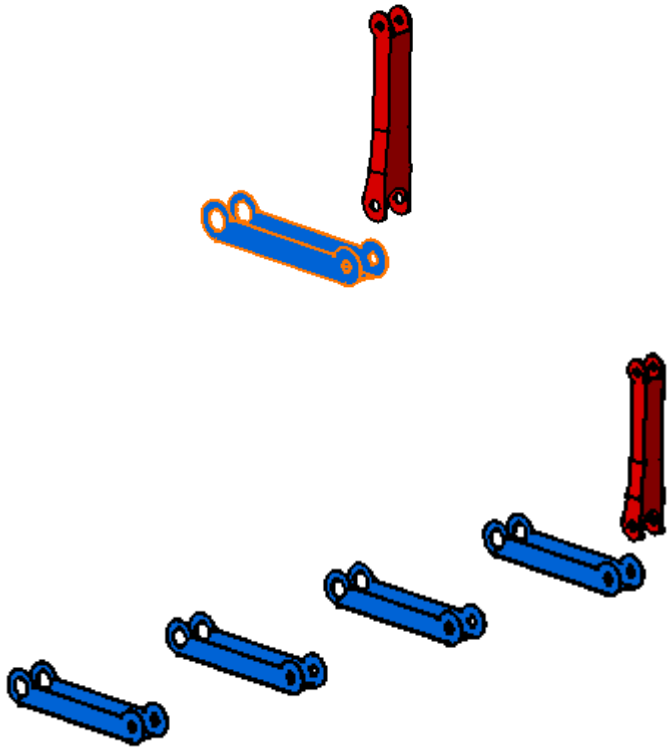
Copyright © Computational Design Lab. All rights reserved.

ASSEMBLY DESIGN TOOLS

Product Structure Tools

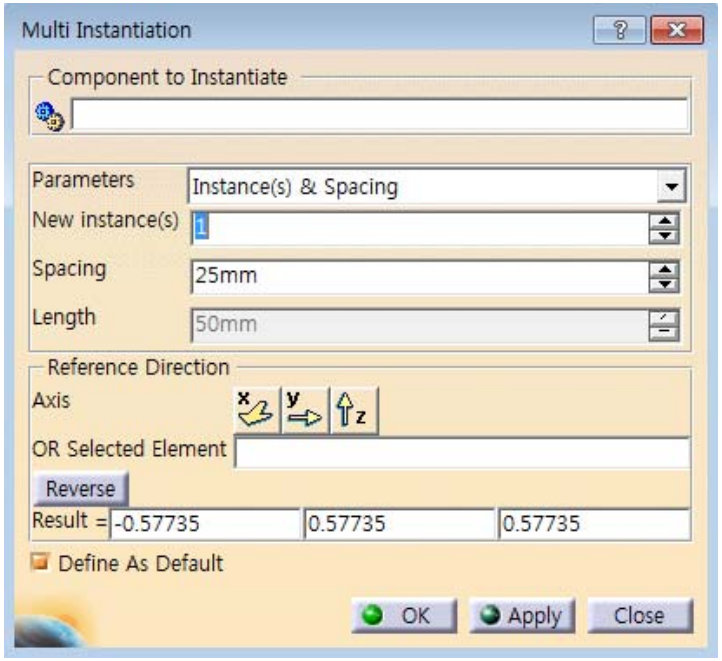
Fast Multi-Instantiation

- Component를 복사를 간편하게 해줌.



Define Multi-Instantiation

- Component 복사하는 방법 등을 정의함.



Copyright © Computational Design Lab. All rights reserved.

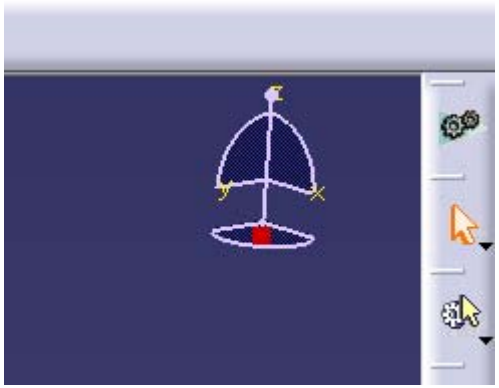
CONTENTS

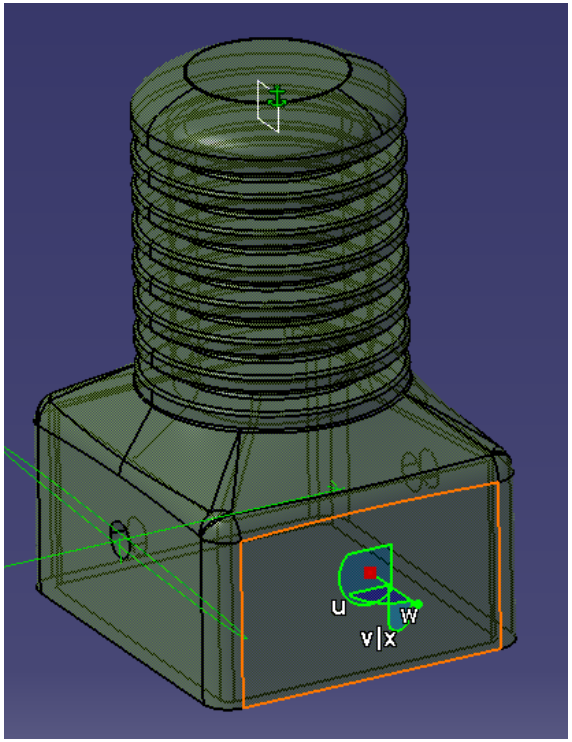
Copyright © Computational Design Lab. All rights reserved.

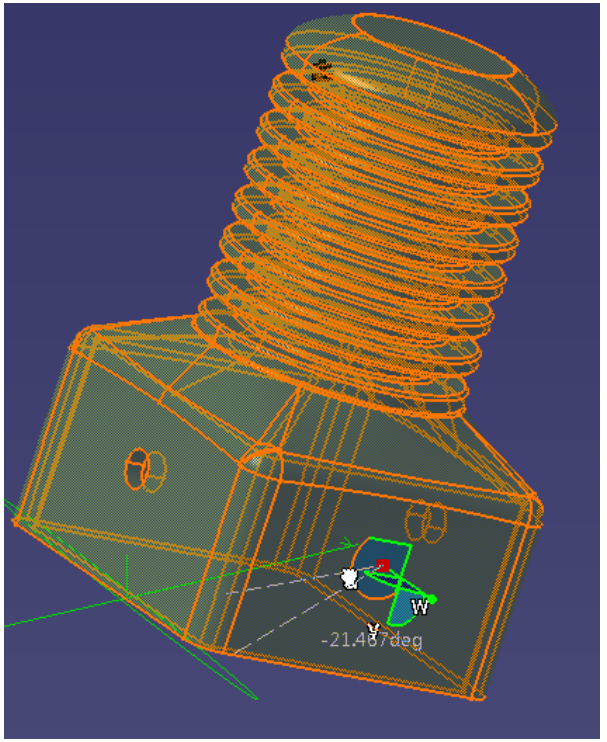
COMPASS 사용하기

화면 오른쪽 상단의 Compass를 원하는 모델에 드래그

- Part Design에서 사용법과 같으나, Assembly Design의 경우 업데이트 하면 구속한 위치로 이동함.







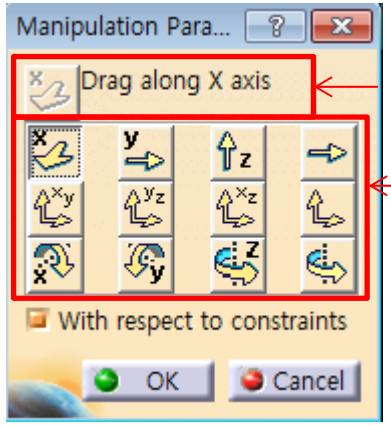
Copyright © Computational Design Lab. All rights reserved.

ASSEMBLY DESIGN TOOLS

Move 

Manipulation 

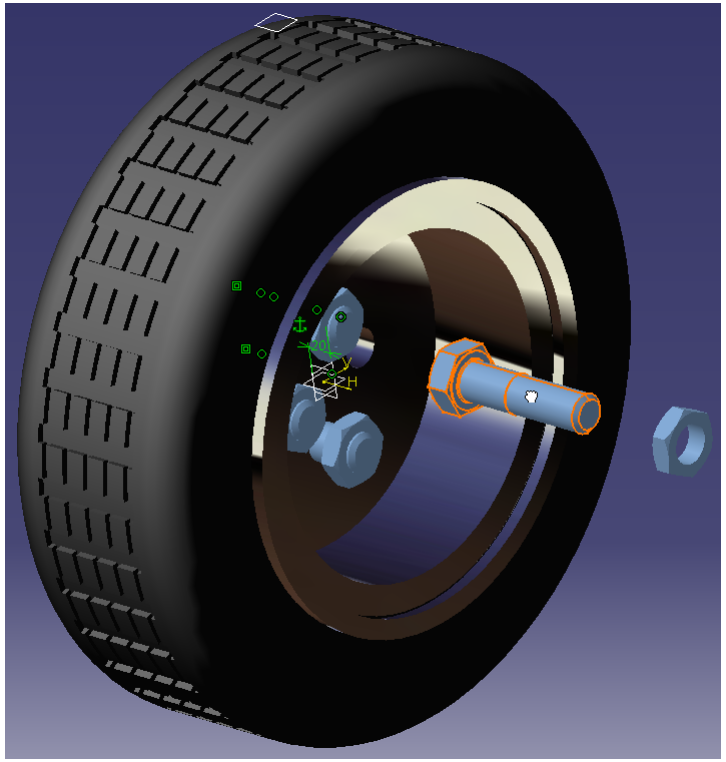
- 선택한 방법으로 선택한 component를 이동 가능하게 함



선택한 이동방법에 대한 설명

이동방법 선택

<Drag along X axis>



Copyright © Computational Design Lab. All rights reserved.

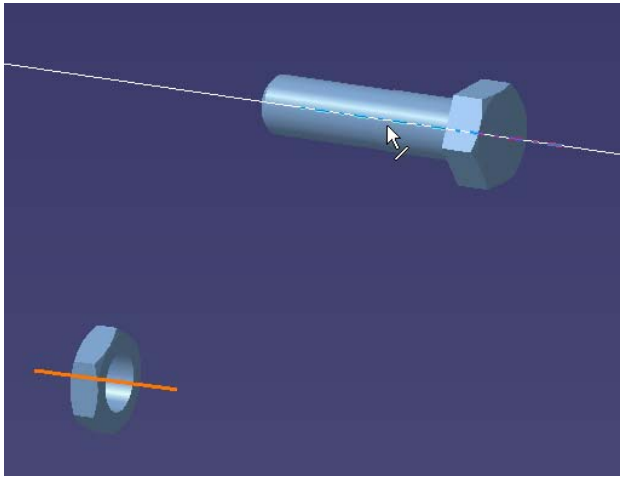
ASSEMBLY DESIGN TOOLS

Move 

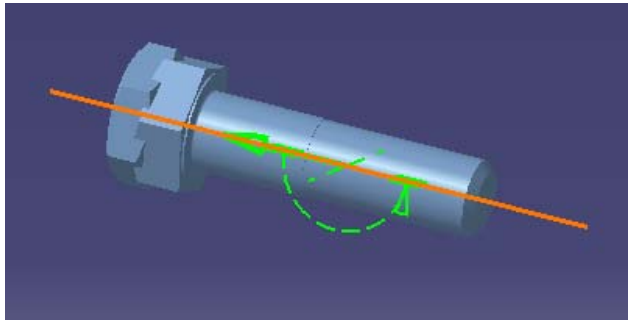
Snap 

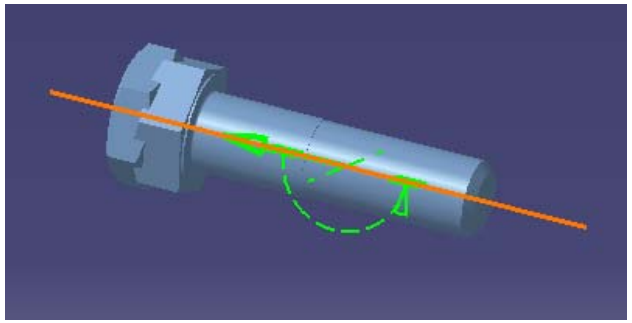
- 구속조건을 이용하여 이동을 보다 간편하게 해줌 (실제로 구속되지는 않음)

<constraint와 유사하게 선택>



<방향 선택 가능>





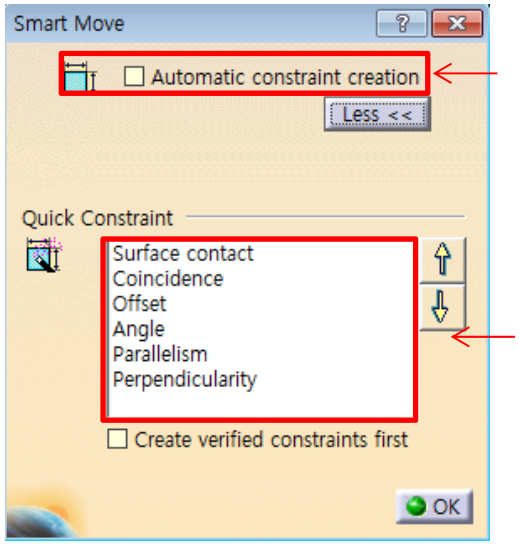
Copyright © Computational Design Lab. All rights reserved.

ASSEMBLY DESIGN TOOLS

Move

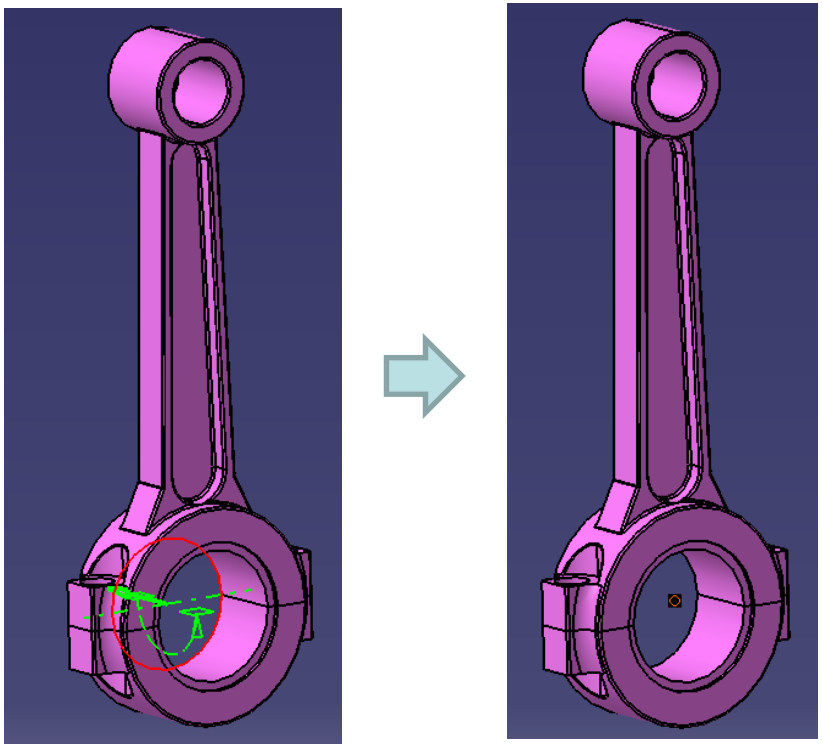
Smart Move

- Manipulation + Snap + Constraint



자동으로 구속을 부여할 것인지 선택

구속조건 우선순위 변경



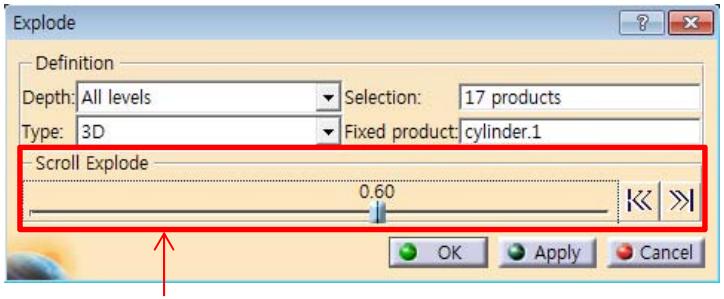
Copyright © Computational Design Lab. All rights reserved.

ASSEMBLY DESIGN TOOLS

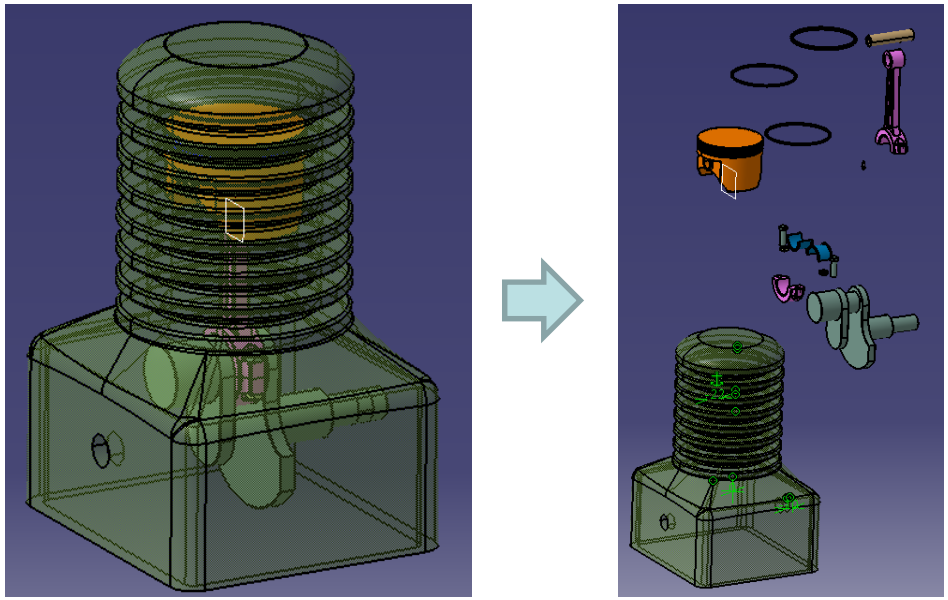
Move 

Explode 

- 조립되어있는(뭉쳐있는) 모델을 분산시킴 (구속되어 있지 않는 경우 update시 원상복구가 안됨)



분산 정도를 조절



Copyright © Computational Design Lab. All rights reserved.

CONTENTS

- ✓ 시작하기
- ✓ Product Structure Tools
- ✓ Move
- ✓ **Constraints**
- ✓ Assembly Features Toolbar
- ✓ Space Analysis

Copyright © Computational Design Lab. All rights reserved.

ASSEMBLY DESIGN TOOLS

Constraints

Coincidence : Component 간의 축을 일치시킴

Contact : Component간의 면을 일치시킴

Offset : Component의 요소 사이에 Offset을 부여함

Angle : Component의 요소 사이에 Angle을 부여함

Fix : 선택한 Component를 고정시킴

Fix Together : 선택한 Component들을 함께 움직이도록 함

Quick Constraint : 위의 Constraint들을 자동으로 선택해서 부여함

Flexible/Rigid Sub-Assembly : 복사한 component 사이의 종속/독립 관계를 설정

Change Constraint : 존재하는 constraint를 다른 constraint로 변경함

Reuse Pattern : Part Design의 Pattern기능을 이용하여 component를 복사함

Copyright © Computational Design Lab. All rights reserved.

ASSEMBLY DESIGN TOOLS

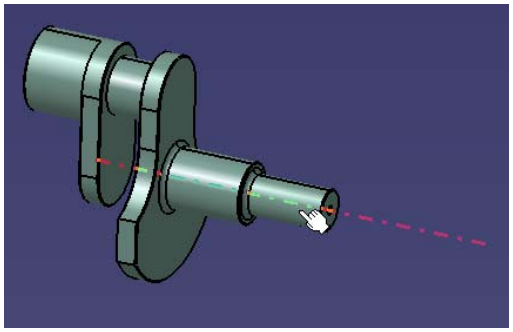
Constraints 

Coincidence Constraint

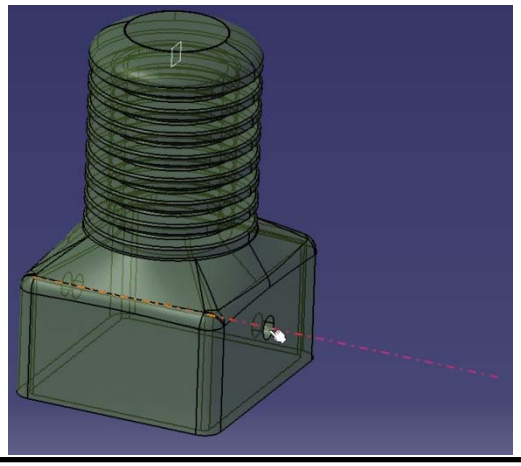
- Component의 중심선을 선택하여 일치시키도록 함

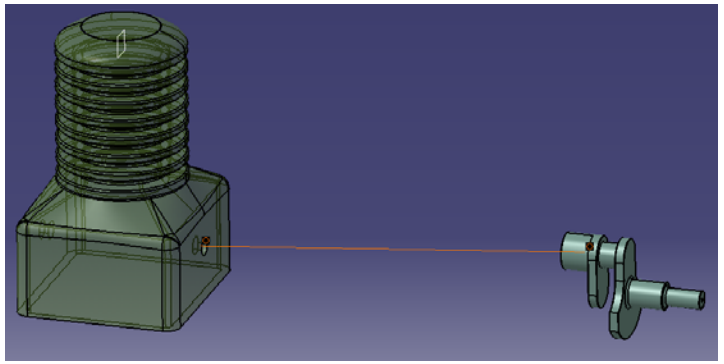
<중심선 선택>

Crank shaft

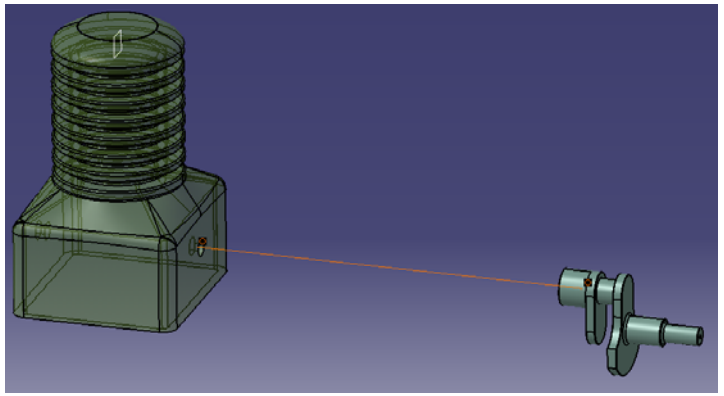


Cylinder





update



Copyright © Computational Design Lab. All rights reserved.

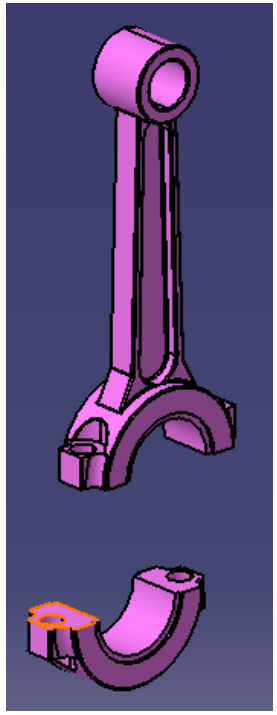
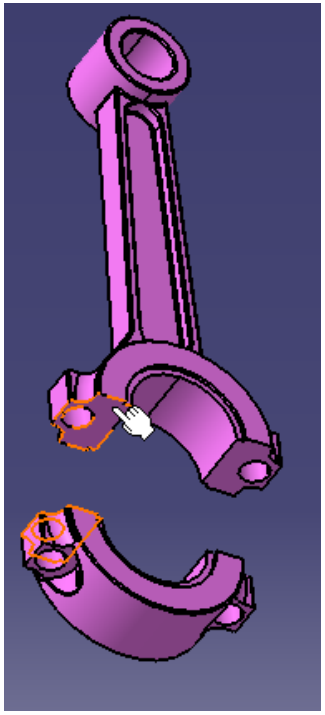
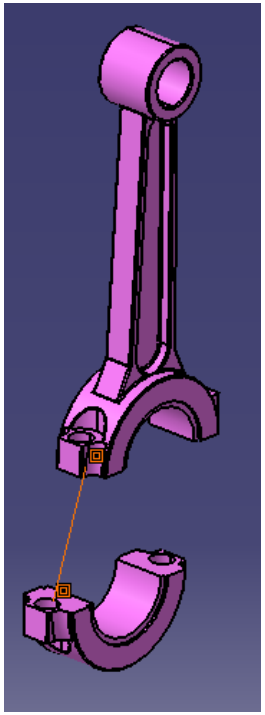
ASSEMBLY DESIGN TOOLS

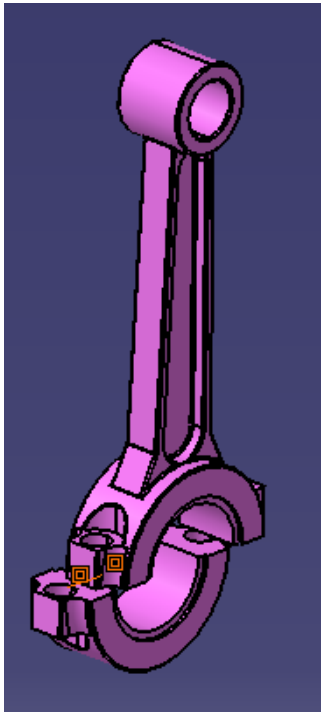
Constraints 

Contact Constraint 

- 선택한 Component의 면들을 동일 plane 상에 위치하도록 함

<접촉할 면 선택>

Copyright © Computational Design Lab. All rights reserved.

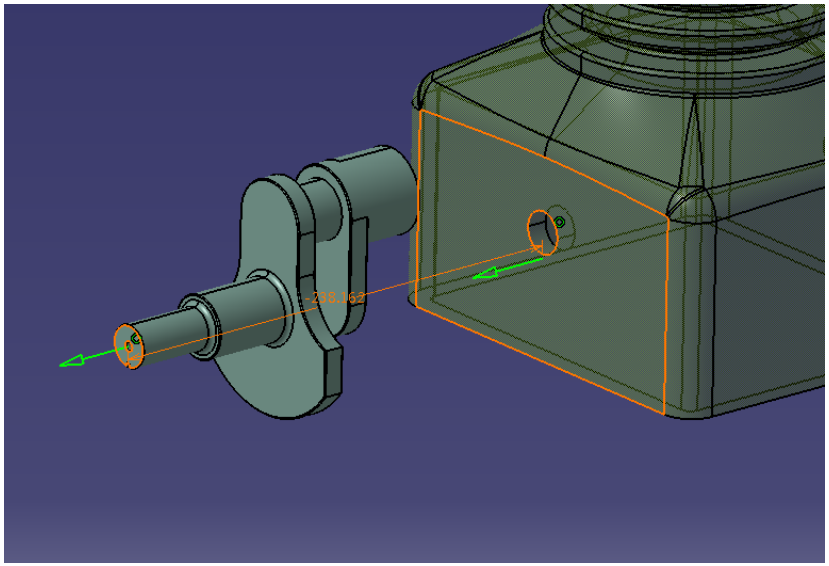
ASSEMBLY DESIGN TOOLS

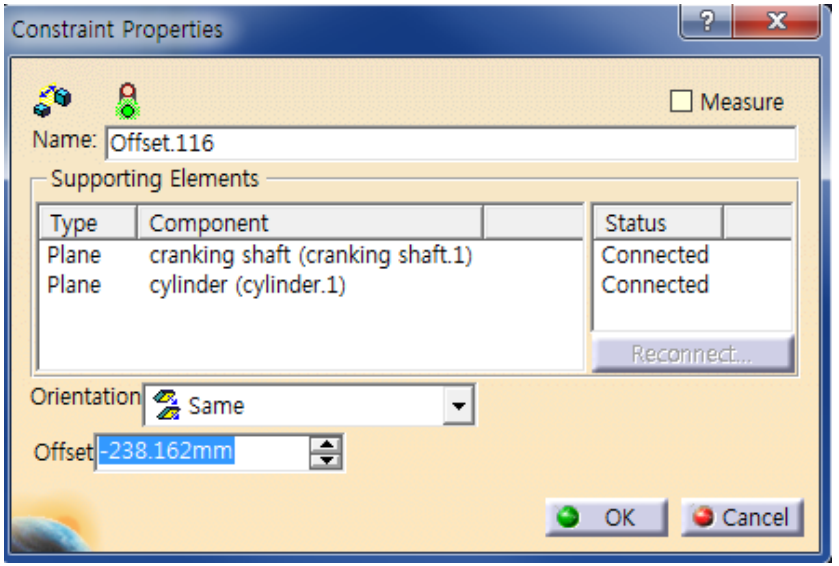
Constraints 

Offset Constraint 

- 선택한 요소들이 특정 거리를 갖도록 구속

<구속할 면 선택>





Copyright © Computational Design Lab. All rights reserved.

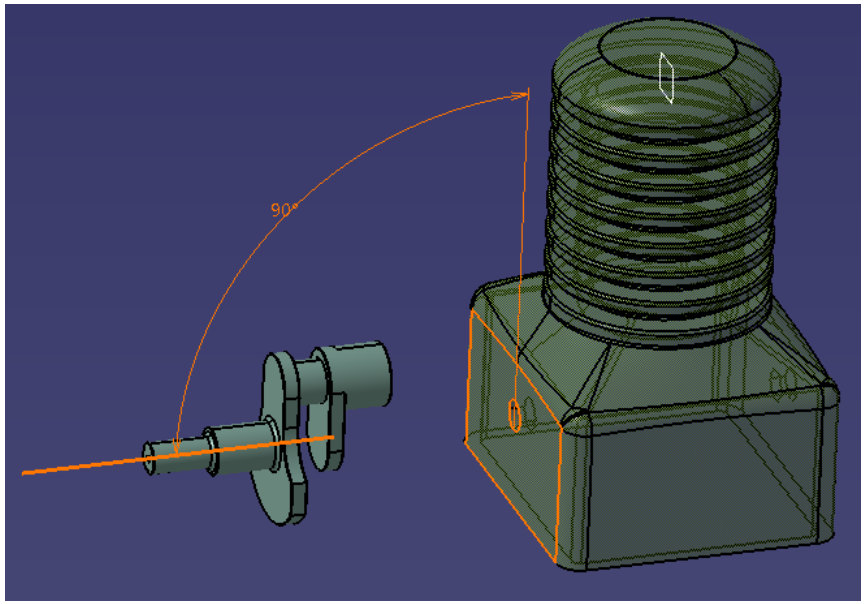
ASSEMBLY DESIGN TOOLS

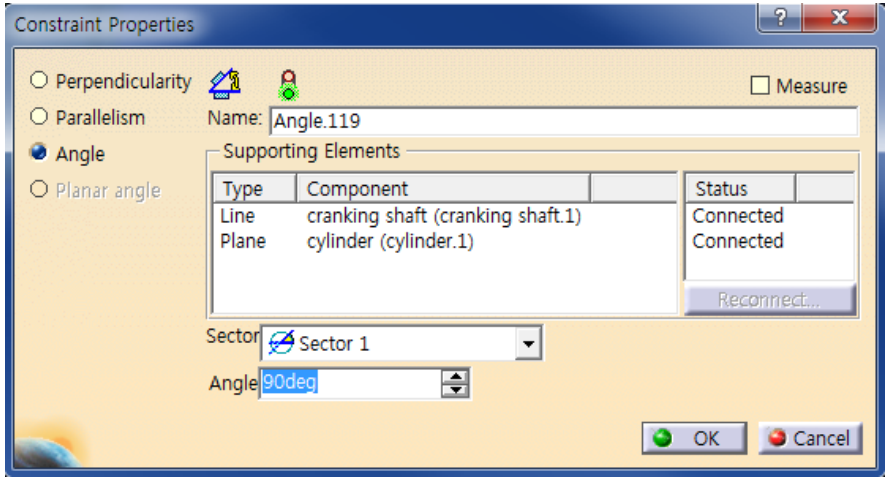
Constraints

Angle Constraint 

- 선택한 요소 사이에 각도를 부여하여 구속

<구속할 요소 선택>





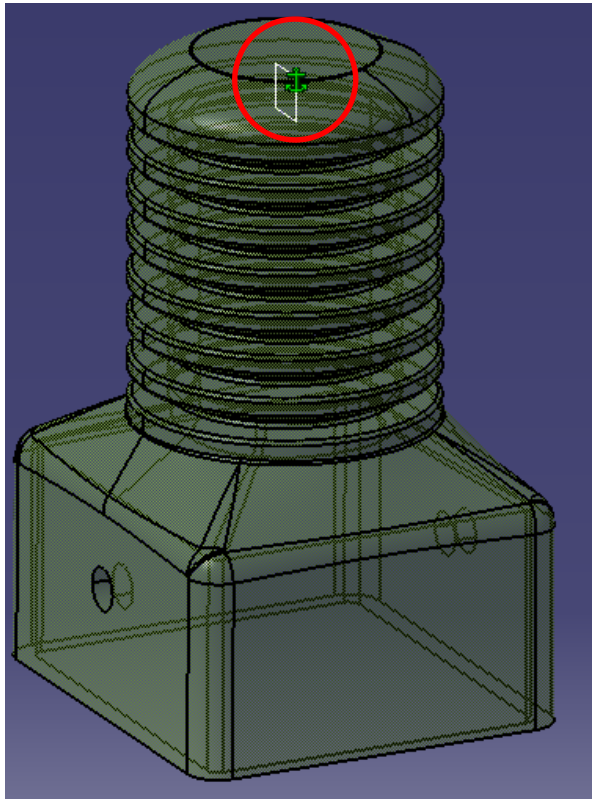
Copyright © Computational Design Lab. All rights reserved.

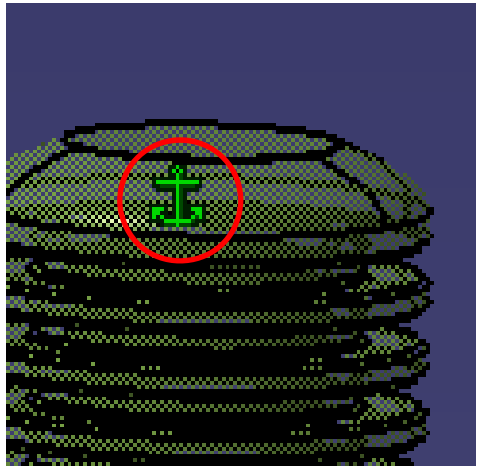
ASSEMBLY DESIGN TOOLS

Constraints

Fix Component

- 현재 위치하고 있는 자리에 구속





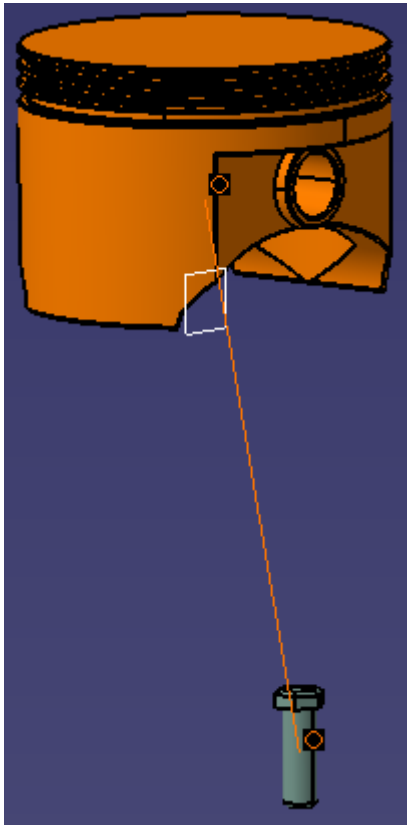
Copyright © Computational Design Lab. All rights reserved.

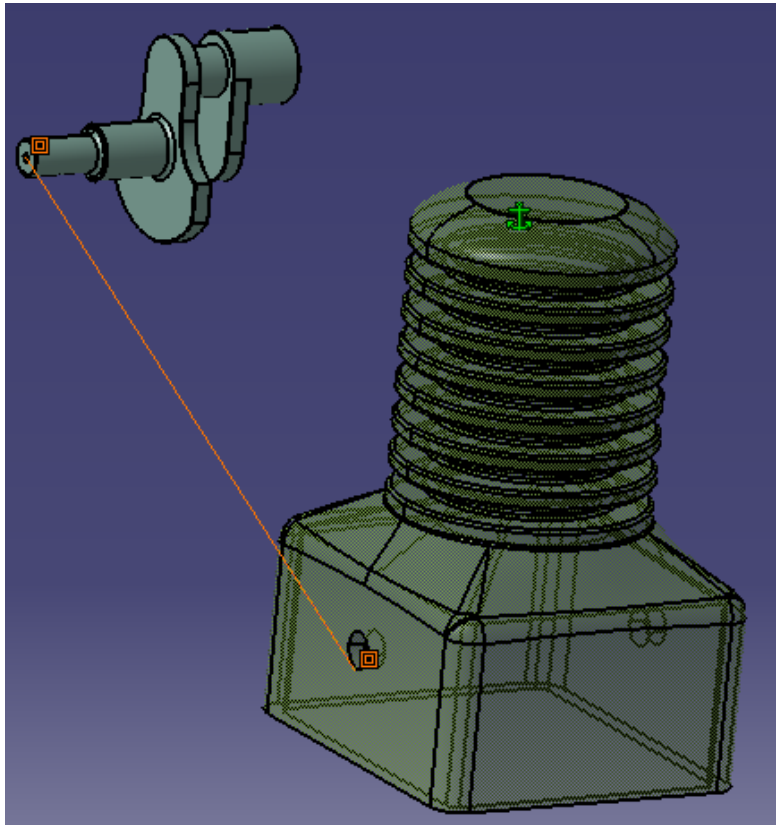
ASSEMBLY DESIGN TOOLS

Constraints 

Quick Constraint 

- Constraint 종류를 자동으로 결정해줌





Copyright © Computational Design Lab. All rights reserved.

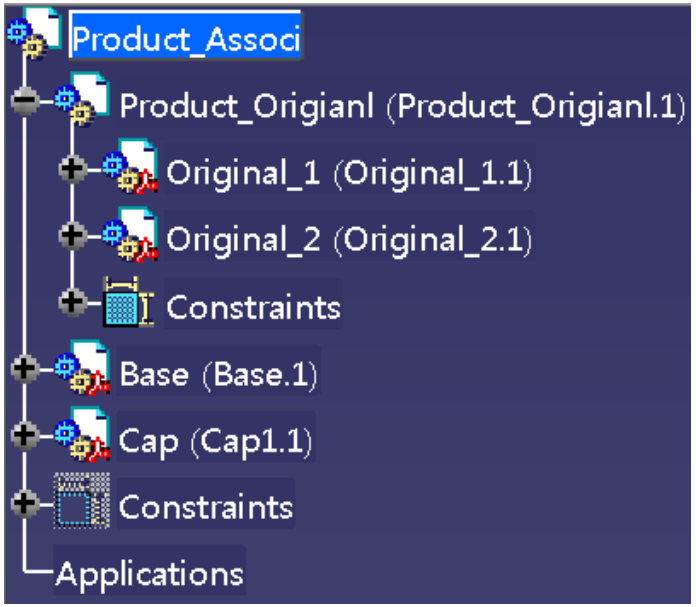
ASSEMBLY DESIGN TOOLS

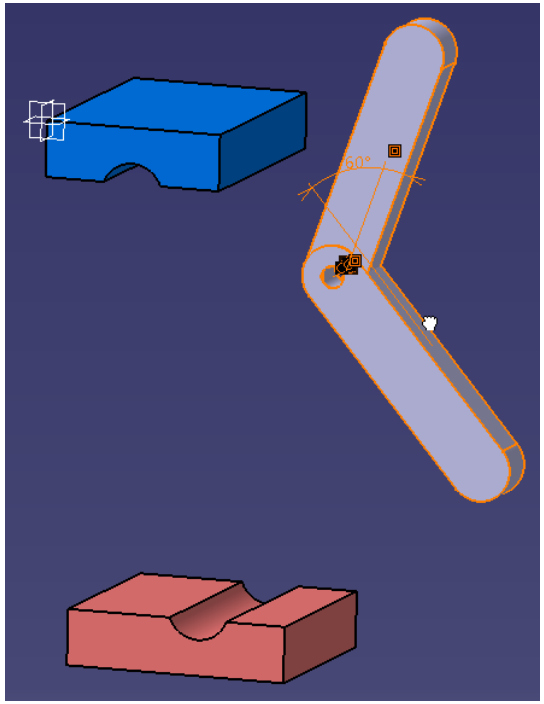
Constraints 

Flexible-Rigid Sub-Assembly 

- 그림과 같이 Product_Associ 를 활성화 시킬 경우 Product_Original 안의 2개의 component는 동시에 움직이게 된다.

<기본 트리>





Copyright © Computational Design Lab. All rights reserved.

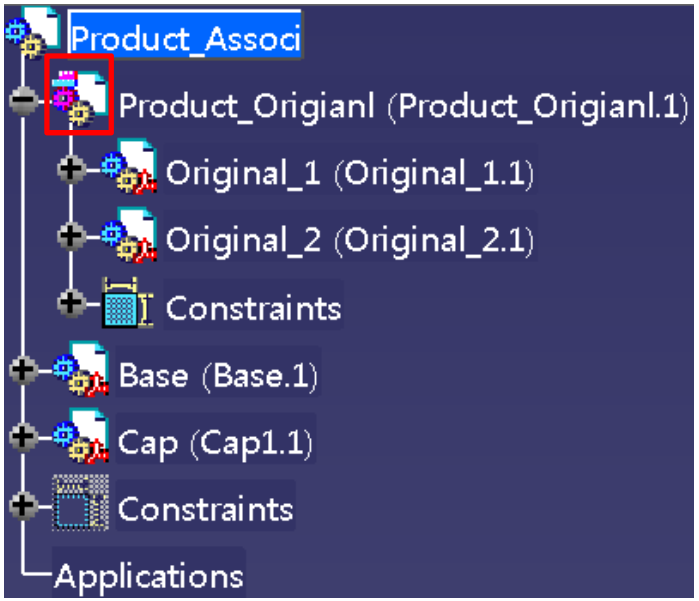
ASSEMBLY DESIGN TOOLS

Constraints 

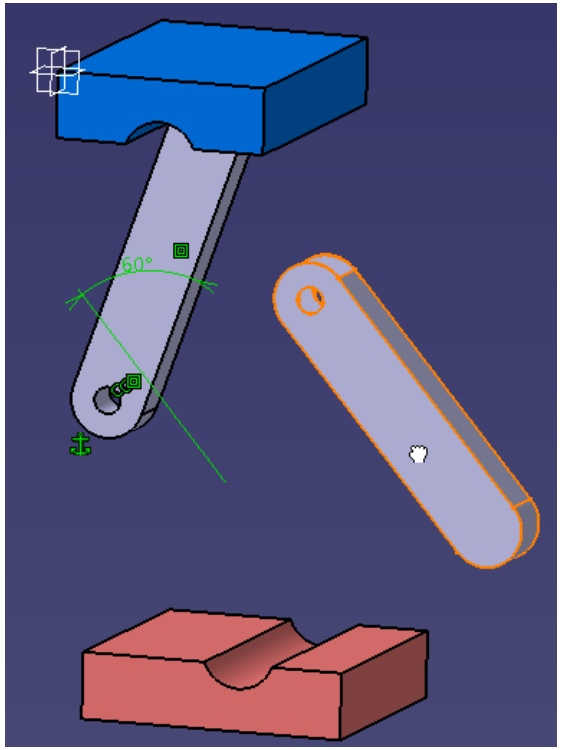
Flexible-Rigid Sub-Assembly 

- Sub-Assembly를 이용하게 상하 관계가 사라짐(혹은 다시 생성)

<Flexible-Rigid Sub-Assembly 적용>



<선택된 component만 독립적으로 이동>



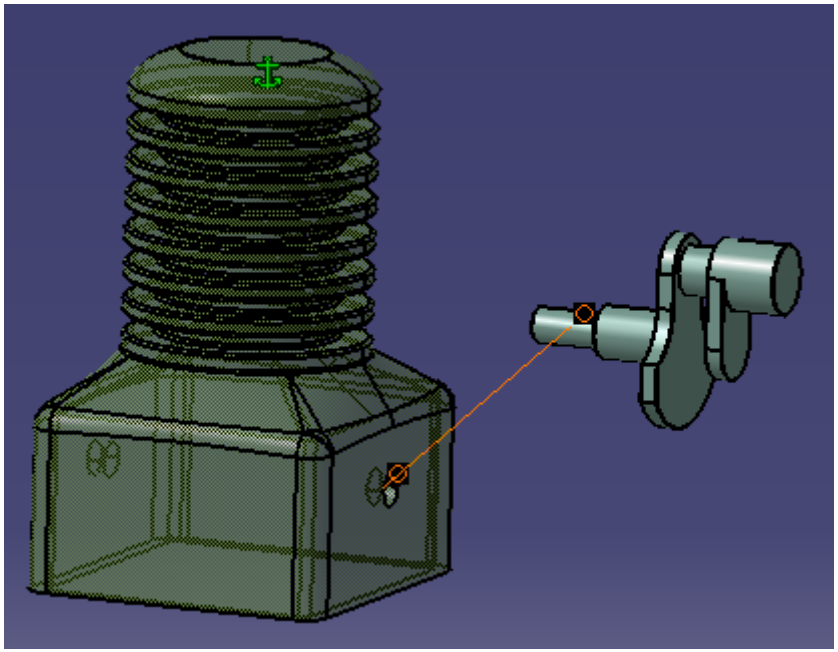
Copyright © Computational Design Lab. All rights reserved.

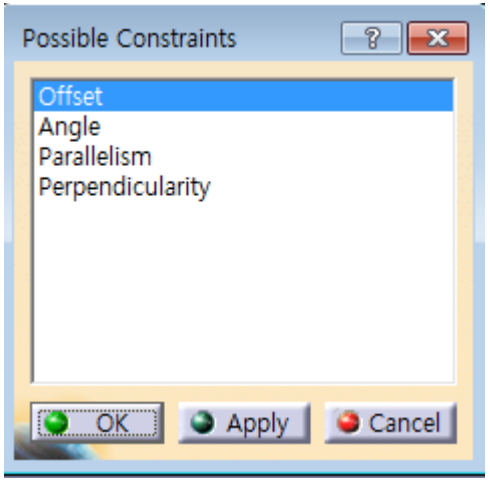
ASSEMBLY DESIGN TOOLS

Constraints 

Change Constraint 

- 생성한 constraint를 변경함 (변경 가능한 List 생성)





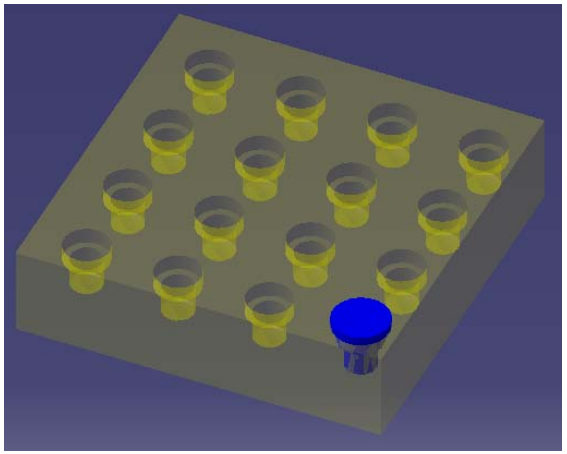
Copyright © Computational Design Lab. All rights reserved.

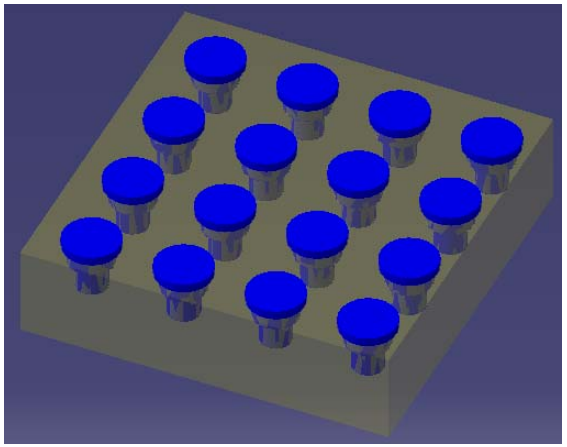
ASSEMBLY DESIGN TOOLS

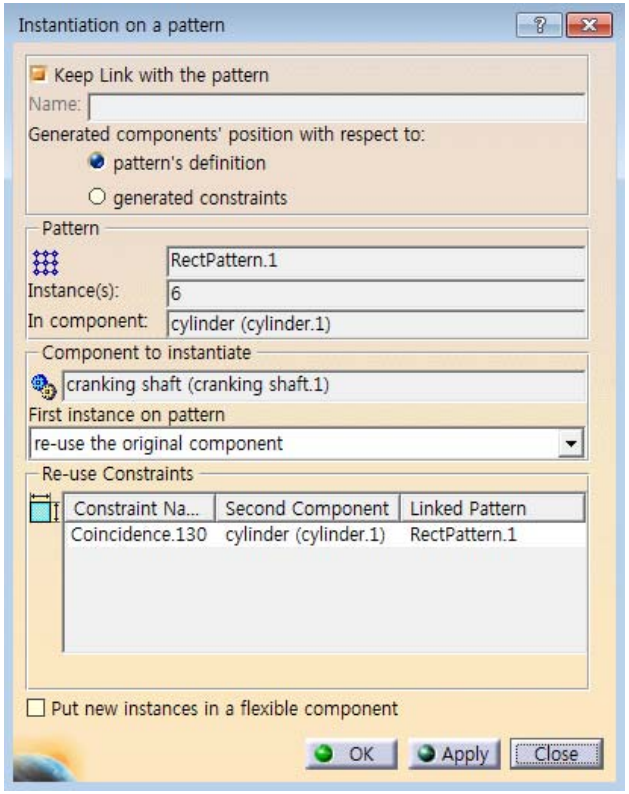
Constraints

Reuse Pattern 

- 기존에 생성된 Pattern을 이용해 constraint로 연결된 component를 복사함



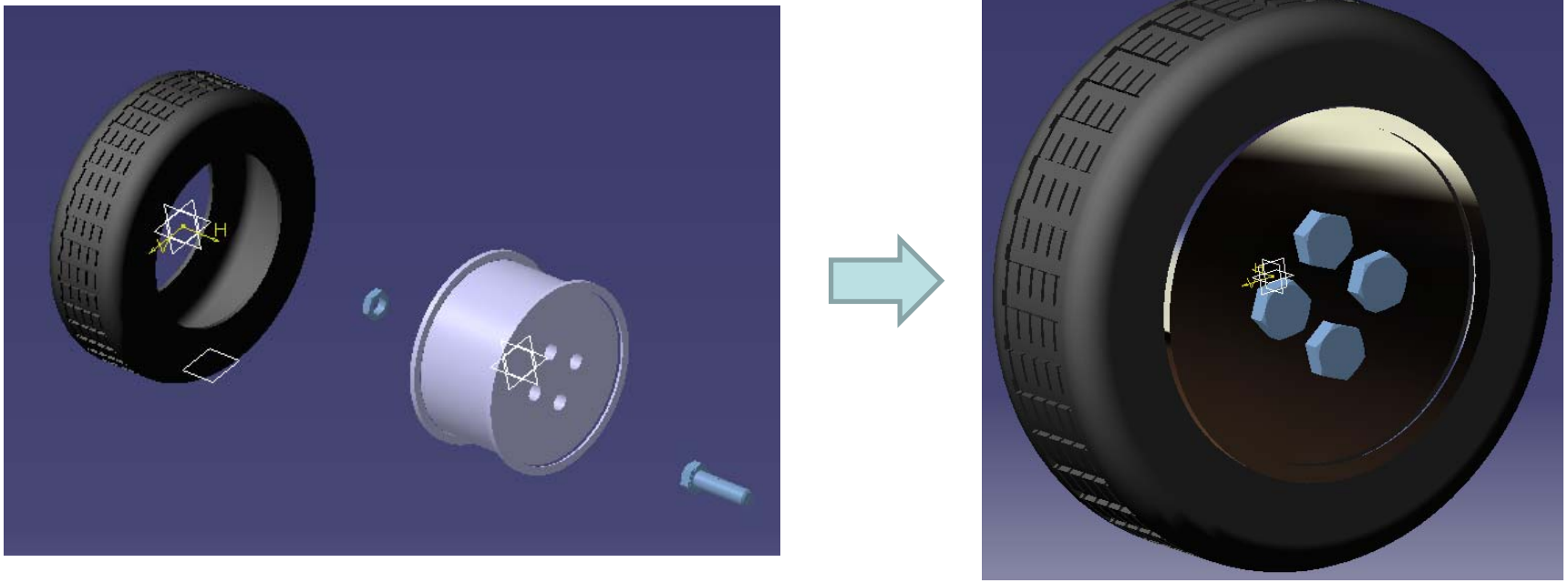




Copyright © Computational Design Lab. All rights reserved.

실습 예제

홈페이지의 Car_Wheel 파일을 이용하여 오른쪽 그림과 같이 Assembly Design 작업을 진행
(Assembly Design 작업 후 Explode 하여 다시 Update 했을 때 조립되어야 함)



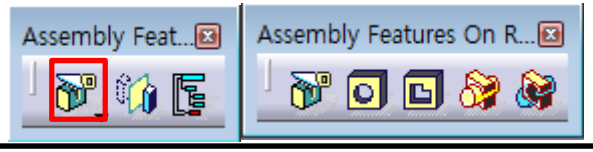
Copyright © Computational Design Lab. All rights reserved.

CONTENTS

Copyright © Computational Design Lab. All rights reserved.

ASSEMBLY DESIGN TOOLS

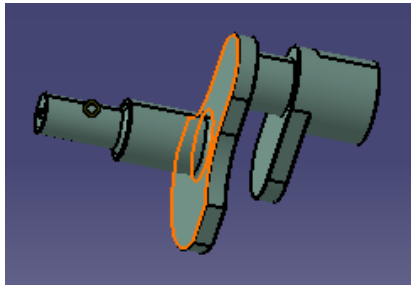
Assembly Features



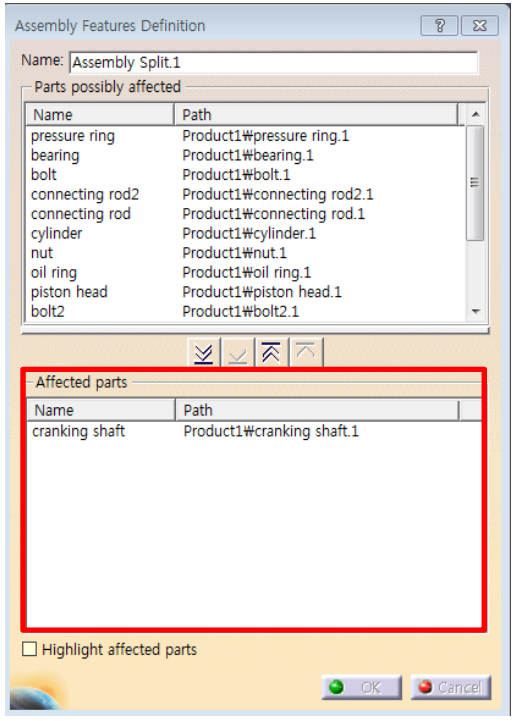
Assembly Split 

- 선택한 면을 기준으로 component를 분할함

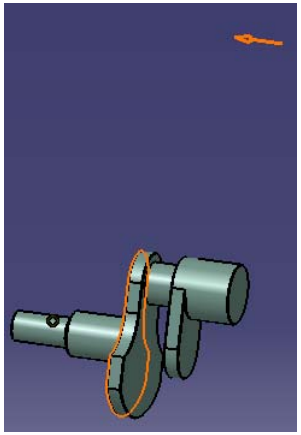
<임의의 part 선택>

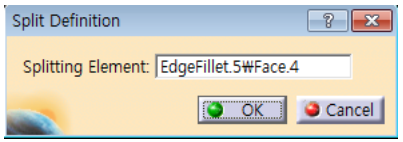


<적용할 part 선택>

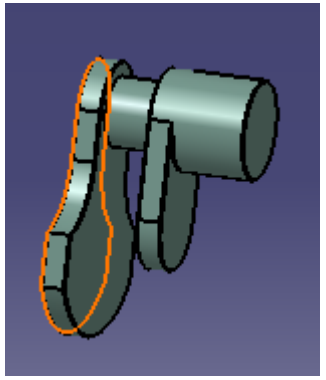


<기준면 선택>





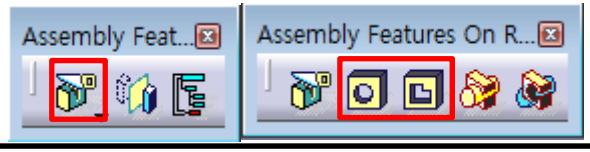
<기준면 선택>



화살표 방향의 부분만 남게됨

Copyright © Computational Design Lab. All rights reserved.

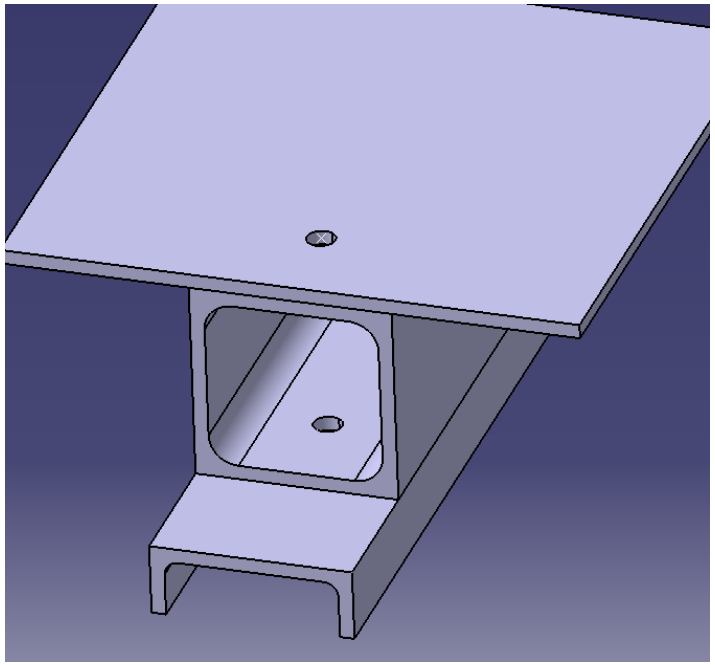
ASSEMBLY DESIGN TOOLS

Assembly Features 

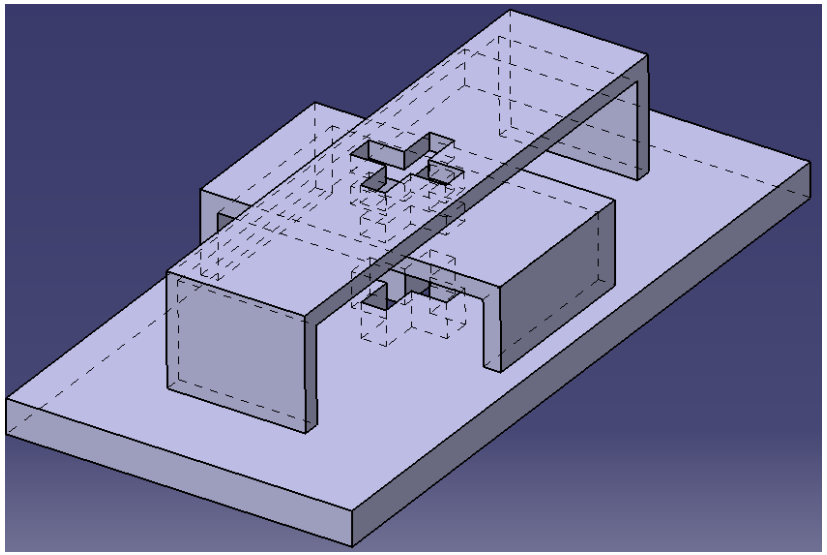
Assembly Hole/ Pocket 

- 선택한 component에 대해 Hole/Pocket 진행 (여러 part에 동시에 생성 가능)

<Hole>

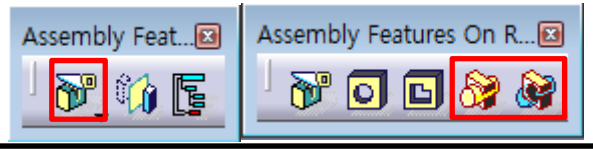


<Pocket>



Copyright © Computational Design Lab. All rights reserved.

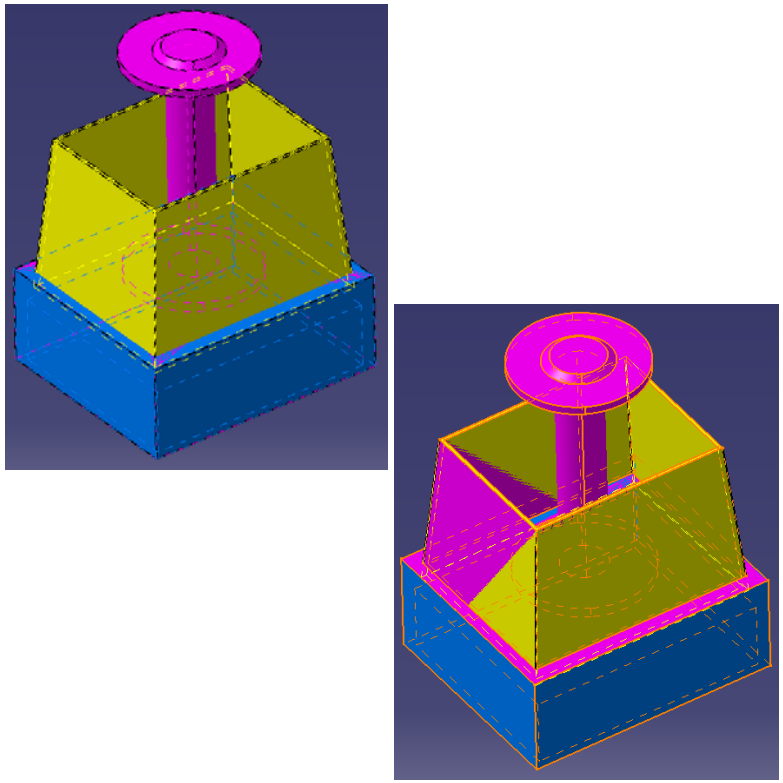
ASSEMBLY DESIGN TOOLS

Assembly Features 

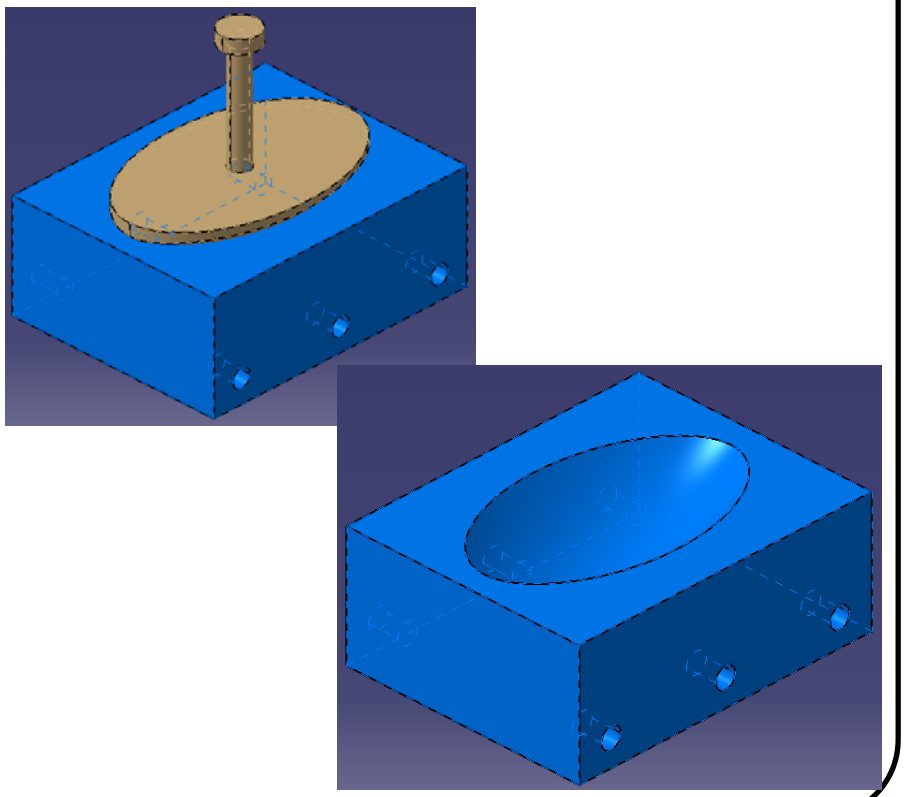
Assembly Add/ Remove 

- 선택한 component 간의 Add/Remove 진행

<Add>



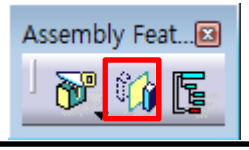
<Remove>



Copyright © Computational Design Lab. All rights reserved.

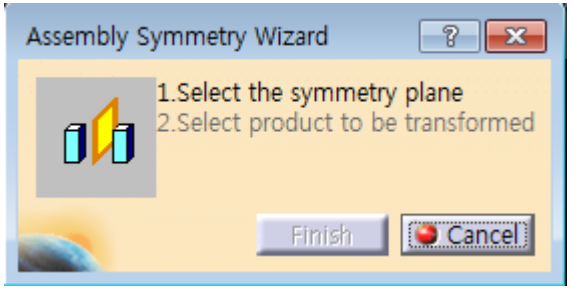
ASSEMBLY DESIGN TOOLS

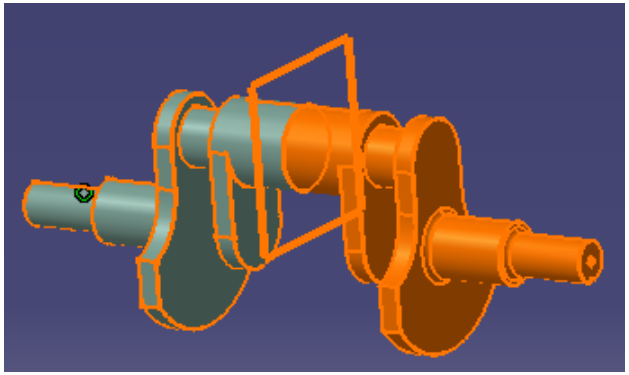
Assembly Features



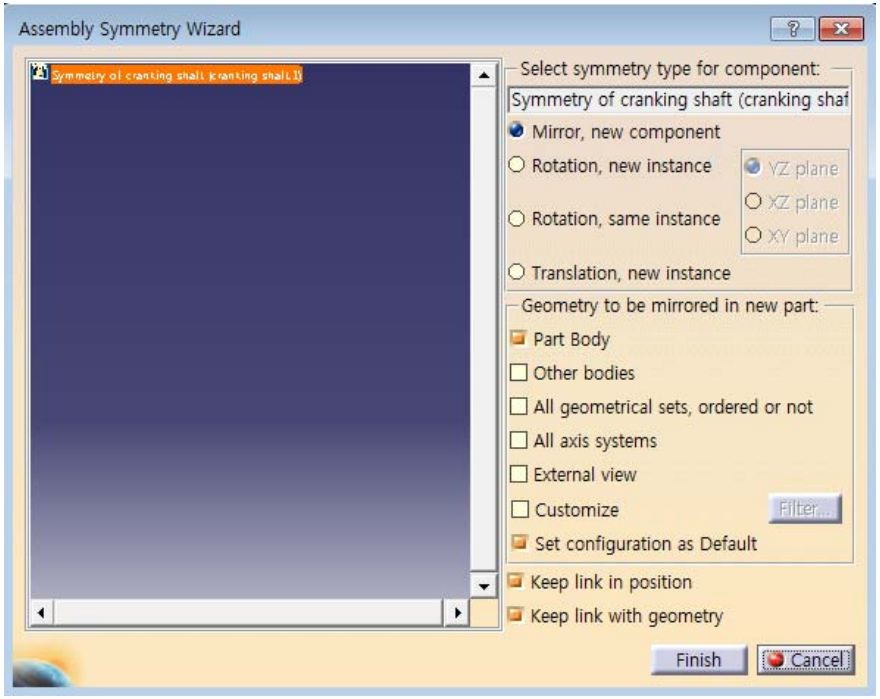
Assembly Symmetry 

- Component 대칭 복사





<세부 설정>



Copyright © Computational Design Lab. All rights reserved.

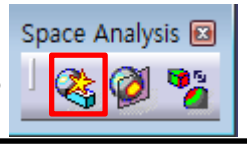
CONTENTS

- ✓ 시작하기
- ✓ Product Structure Tools
- ✓ Move
- ✓ Constraints
- ✓ Assembly Features Toolbar
- ✓ **Space Analysis**

Copyright © Computational Design Lab. All rights reserved.

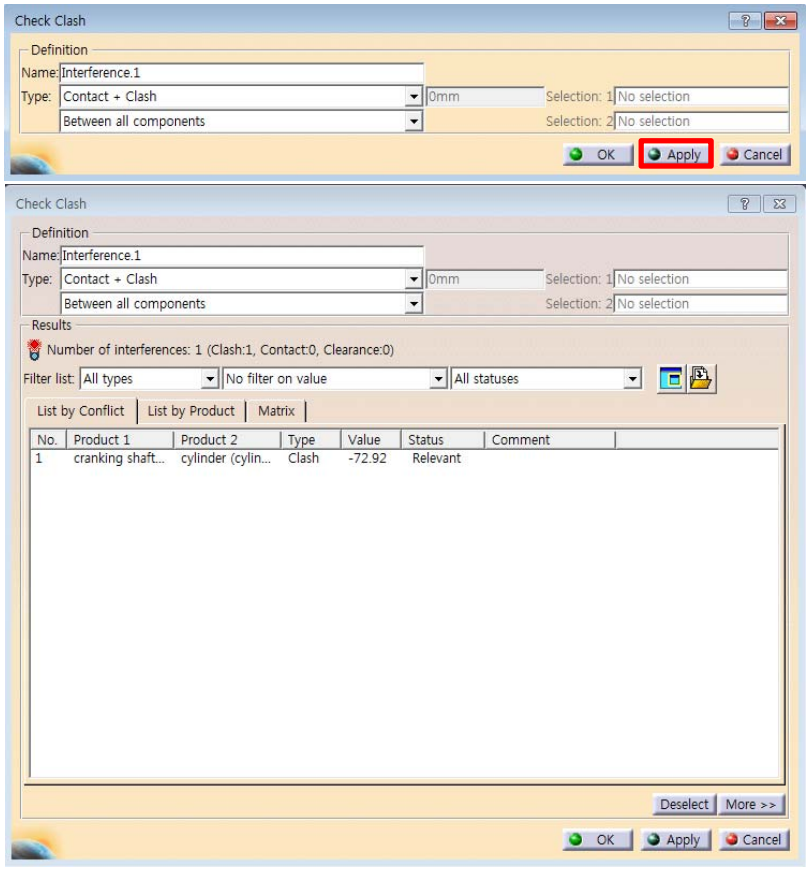
ASSEMBLY DESIGN TOOLS

Space Analysis

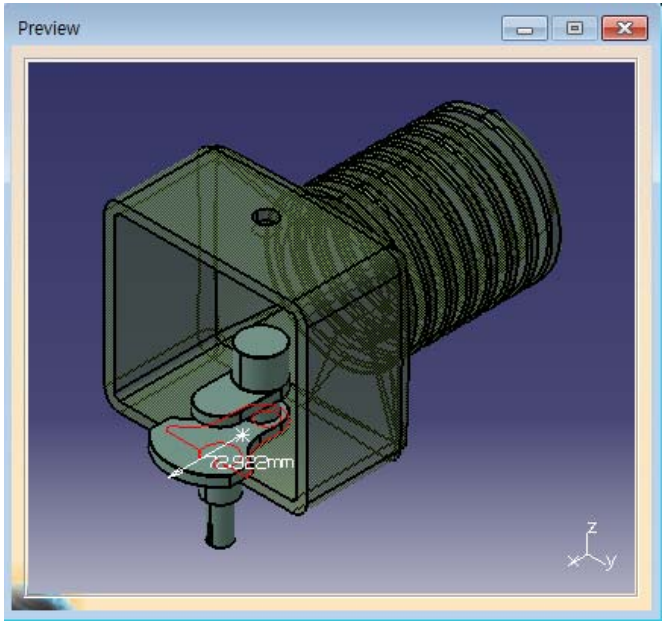


Clash

- Assembly를 구성하는 component 사이의 간섭을 확인



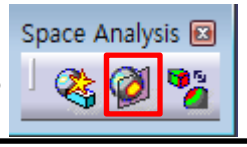
<Preview>



Copyright © Computational Design Lab. All rights reserved.

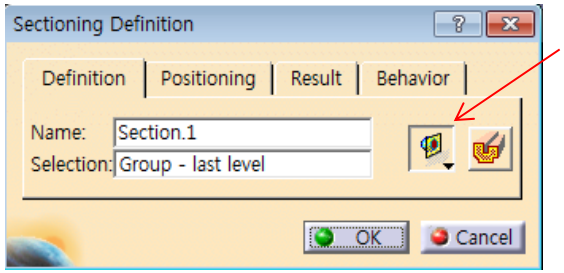
ASSEMBLY DESIGN TOOLS

Space Analysis

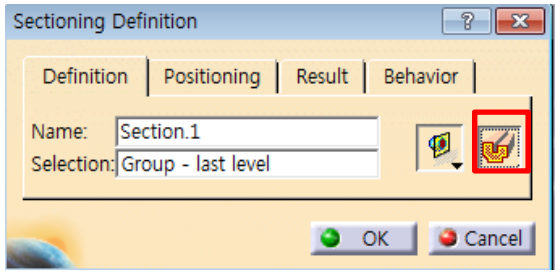


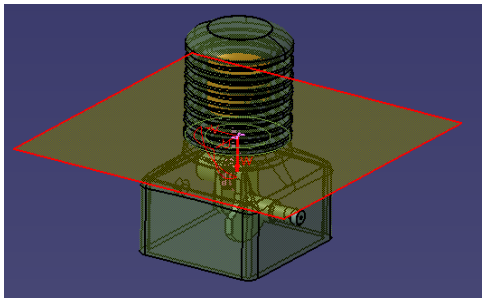
Sectioning

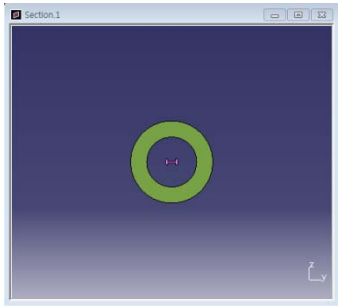
- Component의 단면을 확인

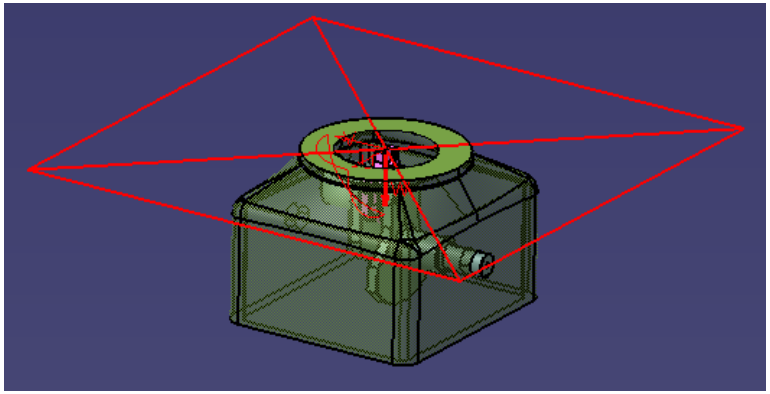


<Volume Cut>





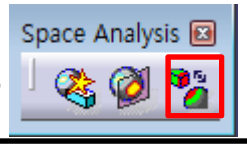




Copyright © Computational Design Lab. All rights reserved.

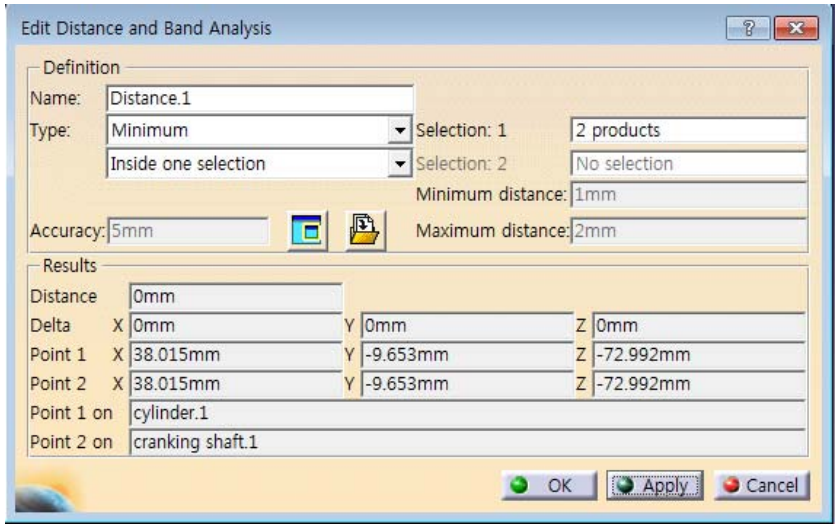
ASSEMBLY DESIGN TOOLS

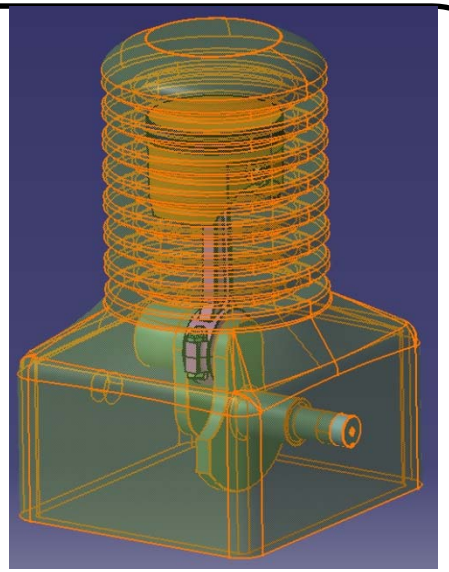
Space Analysis

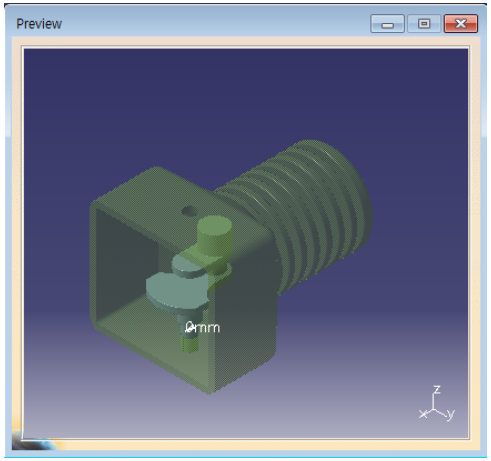


Distance and Band Analysis

- Component간의 거리를 측정





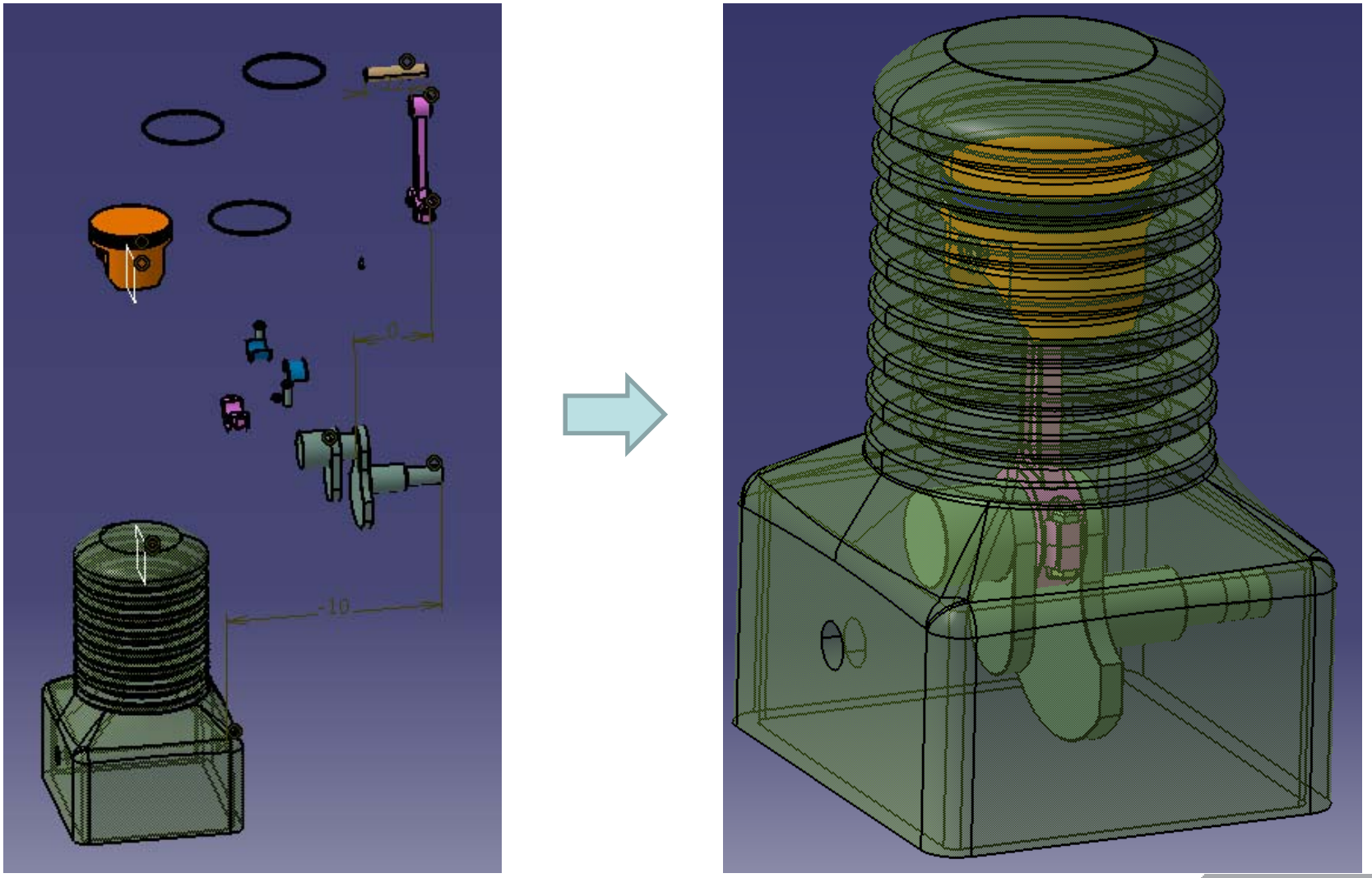


Copyright © Computational Design Lab. All rights reserved.

실습 과제

홈페이지의 HW_Model 파일을 이용하여 오른쪽 그림과 같이 Assembly Design 작업을 진행

(Assembly Design 작업 후 Explode 하여 Update 했을 때 조립되어야 함 – Product + Part 파일들 압축하여 업로드)



Copyright © Computational Design Lab. All rights reserved.