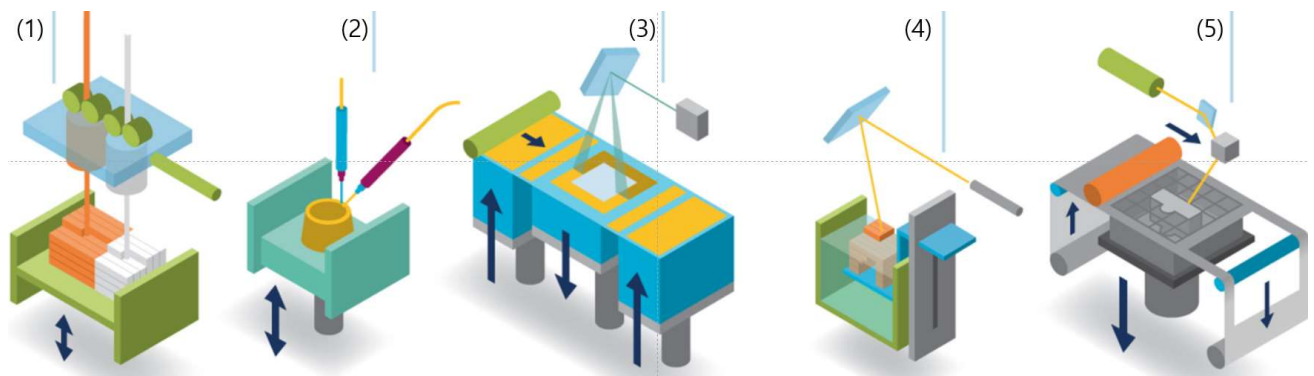
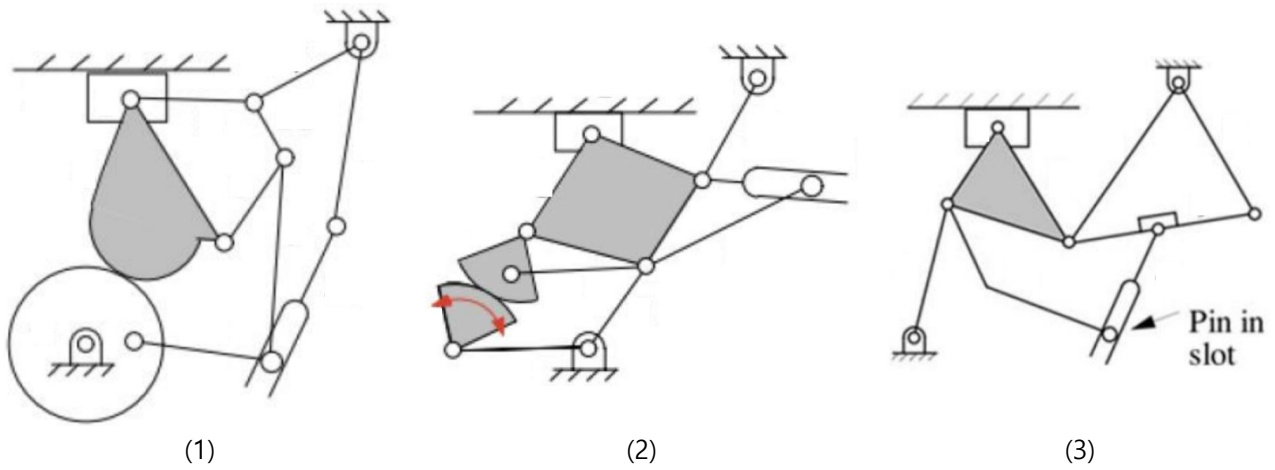


1. Write down the additive manufacturing technology corresponding to each figure. (각 2 점)



2. Determine the number of degrees of freedom, using Gruebler's equation, for the mechanisms. (설명 없으면 0 점) (각 5 점)



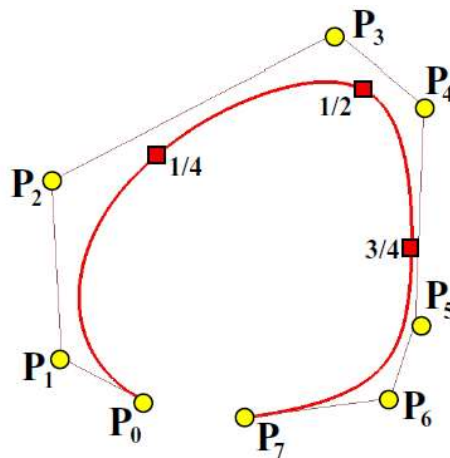
3. What are the three conditions to obtain a four-bar crank-rocker mechanism? (5 점)

$$\mathbf{P}(u) = \sum_{i=0}^n \mathbf{P}_i N_{i,k}(u), \quad 0 \leq u \leq n-k+2$$

$$N_{i,k}(u) = \frac{(u-t_i)}{t_{i+k-1}-t_i} N_{i,k-1}(u) + \frac{(t_{i+k}-u)}{t_{i+k}-t_{i+1}} N_{i+1,k-1}(u), \quad t_i = \begin{cases} 0 & 0 \leq i < k \\ i-k+1 & k \leq i \leq n \\ n-k+2 & n < i \leq n+k \end{cases}, \quad N_{i,1}(u) = \begin{cases} 1 & \text{if } t_i \leq u < t_{i+1} \\ 0 & \text{otherwise} \end{cases}$$

4. Suppose we have a clamped B-spline curve of degree 4 defined by 8 control points P_0 to P_7 and 13 knots $0, 0, 0, 0, 0, 1/4, 1/2, 3/4, 1, 1, 1, 1, 1$. Note that 0 and 1 are multiple knots of multiplicity 5. The red squares on the curve mark the points corresponding to knots $1/4, 1/2$ and $3/4$.

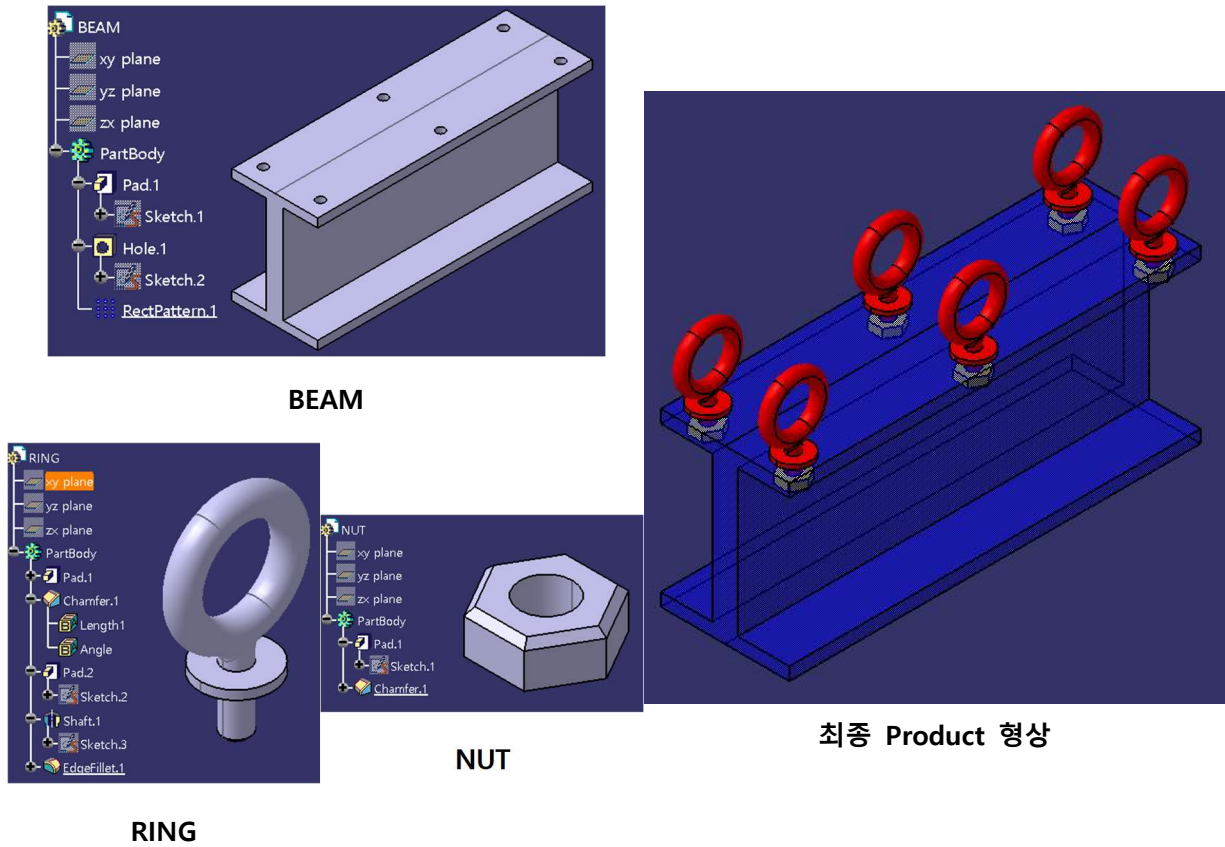
- (1) What is the convex hull that contains the curve segment defined on knot span $[1/4, 1/2)$ according to the strong convex hull property? (10 점)
- (2) If control point P_5 is moved to a new position, which curve segments will be affected? (10 점)



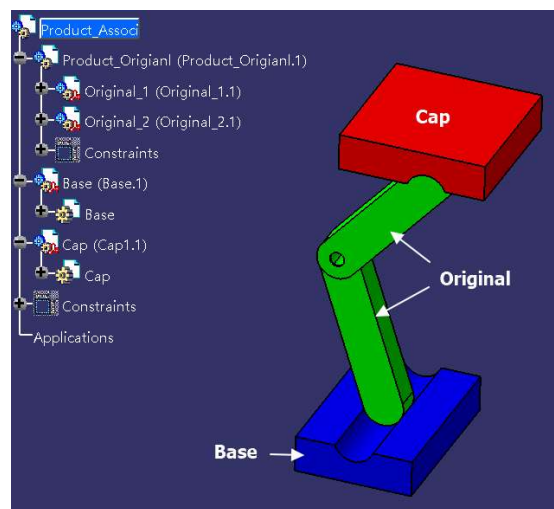
5. Suppose we have a NURBS curve $\mathbf{C}(u)$ of degree 2 defined by control points $(-2, 0)$, $(0, 4)$ and $(2, 0)$ with weights 1, 3 and 1, and knots $0, 0, 0, 1, 1, 1$. Do the following:

- (1) Compute $\mathbf{C}(0.5)$ (10 점)
- (2) Divide the NURBS into two at $u = 0.5$. What are the control points, their weights, and knots? (10 점)

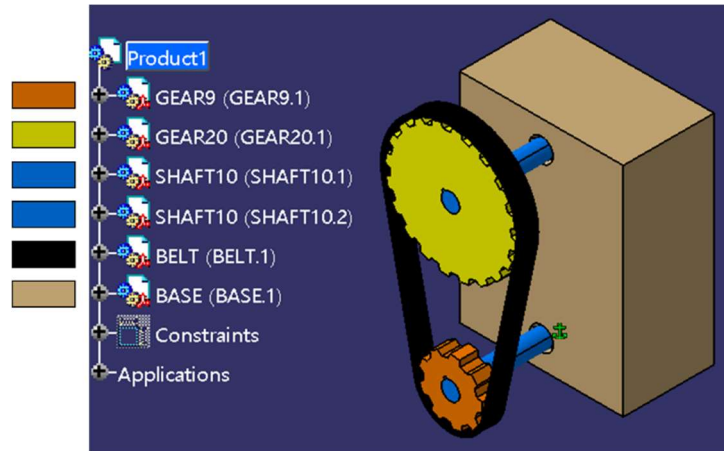
6. Assembly Design Workbench 에서, 주어진 Part(BEAM, RIGN, NUT)를 Assemble 하여 아래 그림과 같은 Product 를 생성하기 위한 작업(Part 를 불러오는 작업 포함, 작업이 여러 번 필요한 경우 작업의 횟수와 함께)을 순서대로 자세하게 기술하시오. (12 pts)



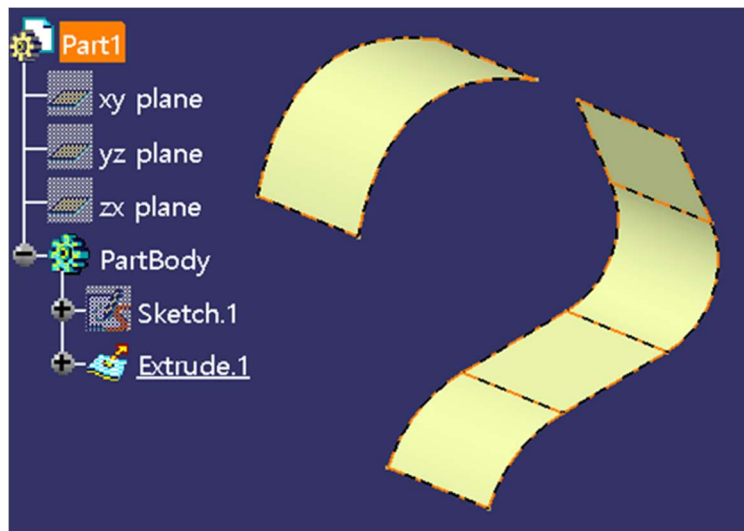
7. Assembly Design Workbench 에서, 아래 그림과 같은 Product_Associ의 하위 product 인 Product_Original 내의 Original_1 인스턴스와 Original_2 인스턴스의 상대적 위치를 변경하기 위해 선행해야 하는 작업에 대해 설명하시오. (8 pts)



8. DMU Kinematics 에서 아래 Mechanism 을 구현하기 위한 방법을 두가지 이상 자세히 설명하고 그 때 필요한 Joint 의 종류를 서술하시오(기어비는 9:20). Hint. BELT 는 Mechanism 에 포함시키지 않는다. (12 pts)



9. Generative Shape Design 에서 아래 Extrud.1 에 Disassemble 기능을 이용할 때 All cell 옵션과 Domain only 옵션을 사용한 결과를 각각 작업트리와 함께 도시하고 그 차이를 설명하시오. (9 pts)



10. Generative Shape Design 에서 왼쪽으로부터 오른쪽 결과를 얻기 위한 작업 방법을 두가지 방법을 설명하고 본인이라면 두 방법 중 어떤 방법을 이용할 것인지 그 이유와 함께 제시하시오. (9 pts)

