DMU KINEMATICS 2

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Computational

DMU KINEMATICS TOOLS

DMU Kinematics



Assembly Constraints Conversion 😤

- Assembly Design에서 생성한 constraint를 Joint로 변경



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Simulation with Commands 🗐

-	생성된	mechanism ⁰	command를	기준으로	동작
			command		0

Kinematics Simulation - Mechanism.1	? ×
Mechanism: Mechanism.1	•
Command.1 -360 360 -360.0000	÷
Activate sensors Plot vectors	
Reset Analysis	< <less< td=""></less<>
Simulation	
Immediate O On request	
Number of steps: 80	
	Close

Joint에서의 Angle/Length driven 수만큼 Command가 생성됨

Command의 Limits 조절 가능

Slider : Command.1	? ×
Lowest value: Highest value:	360
Spin box increments:	5
	OK OK

Revolute Joint 모델



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Simulation with Commands 🧕

- 생성된 mechanism이 command를 기준으로 동작

생성한 Joint를 더블 클릭하여 Limits 조절 가능



Simulation Command의 Limits이 됨





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Simulati... 🖂

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_	생성된	mechanism ⁰	command를	기준으로	동작
		incentariisin • j			0

스크롤이 이동하는 만큼 mechanism이 구동

Kinematics Simulation - Mechanism.1	x
Mechanism: Mechanism.1	-
Activate sensors Plot vectors	▼
Reset Analysis	< <less< td=""></less<>
Immediate O On request	
	Close

Simulation: Immediate

움직인 command 값을 steps수로 나누어 연속적으로 구동



Simulation: On request

Simulati... 🗵

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Formulas: Revolute Joint

Filter On Revolute Joint

New Parameter of type Real

Delete Parameter

Filter Name :

Parameter

Filter Type : All



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Simulation with Laws 💐

- 생성한 Formula를 기준으로 시뮬레이션 적용 (시간에 대한 변수 사용)

③ Parameters → Time → ₩KINTime 더블 클릭 후 수식 입력 후 Ok 클릭 < Mechanism.1₩KINTime *(360deg)/(1s) >









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- 특성 취지의 속도, 가속도 승글 확인?	- 특정	정 위치의	속도,	가속도	등을	확인험
-------------------------	------	-------	-----	-----	----	-----

1	5
-	

🎉 실행 후 Reference product와 측정 Point 선택

Speed and Acceler	ation
Mechanism:	Mechanism.1
Name:	Speed-Acceleration.1
Reference produc	t Body.1
Point selection:	Point.2
Main axis	O Other axis:
	OK Gancel

Reference product -



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- Speed and Acceleration 🥨 - 특정 위치의 속도, 가속도 등을 확인함
 - Simulation with Laws 선택



③ Activate sensors 선택



- ④ 측정하고자 하는 속도, 가속도 등을 활성화 (Observed의 No 클릭→Yes로 변환)
 - EX) X_LinearSpeed, Z_Angular Acceleration, Z_Angular Speed











- - X Sensors Graphical Representation Speed-Acceleration.1\X_LinearSpeed Speed-Acceleration.1₩Z Angular Speed` 4 *

CONTENTS

✓ 시작하기

- ✓ DMU Kinematics Tools
- ✓ DMU Generic Animation

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DMU Generic Animation



Simulation 😻

- 변화된 command 값 만큼 mechanism을 동작시킴



(2)	Insert
\bigcirc	Edit Simulation
	Name: Simulation.1
	Animate viewpoint
	Insert Modify Delete Skip
	Automatic insert
	Interference Distance
	Off 🗸 Off 👻
	Edit analysis Edit simulation objects
	Edit sensors
	Cancel

3) Loop Mode 및 S	Step 선택 후 재생						
Edit Simulation	? ×						
Name: Simulation.1							
1.00	1 💌						
Change Loop Model viewpoint Insert Modify Automatic insert	1 0.2 0.1 interpolation step 0.04 0.02 0.01						
Off V	Off						
Edit analysis Edit s	Edit simulation objects						
	OK Cancel						

DMU KINEMATICS TOOLS

DMU Generic Animation



Simulation 😻

- 변화된 command 값 만큼 mechanism을 동작시킴



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DMU Generic Animation



Compile Simulation

- 만들어진 시뮬레이션을 Replay 또는 동영상 파일로 저장함

Replay 생성

Compile Simula	tion	? **
Generate a	a replay	
Name: Replay	/.2	
Generate a	an animation file VFW Codec	✓ Setup
		File name
Definition -		
Simulation na	ame: 1th gear	-
Time step:	0.2	-
Animate v	iewpoint	
		OK Gancel









DMU KINEMATICS TOOLS

DMU Generic Animation	DMU Generic Animation 📧	DMUGenericS
Replay 📑 - 만들어진 시뮬레이션의 Replay를	를 실행함	
Replay	?	
Name: Replay.2	-	
0.00 🔤 x 1	· · · · · ·	
Animate viewpoint		
Edit analysis	stance	
Off 🔄 Off	-	
	Close	

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DMU Generic Animation MUPla		
Simulation Player 🔛 - 만들어진 simulation, replay, sequences를 실행시킴		
↓ Simulation 또는 Replay 선택	Step 입력	
Player ↓ → ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	→ Sampling Step 0.5s Temporization 0s	
corresponds to the one way loop mode corresponds to the return simulation mode.		

DMU Generic Animation



Edit Sequence 🚠

- 만들어진 시뮬레이션들의 시간을 조절하여 하나의 시뮬레이션으로 구성함



CAD

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Clash Mode

- 시뮬레이션을 실행할 때 간섭여부를 확인함



Deactivates automatic clash detection for simulation Activates automatic clash detection for simulation Activates automatic clash detection stop mode for simulation 기존의 Slider-Crank 모델



간섭이 일어나는 모델



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Trace

- 선택한 elements의 이동을 replay를 기준으로 표시함.

Trace	? 🔀
Object to trace out:	Replay.1
Elements to trace out:	2 selected elements
Reference product:	Part8.1
Number of steps:	101
Trace Destination -	
New part	O Reference product
	OK Gancel





실습 예제

Assembly Design을 완성하고 아래와 같이 DMU Kinematics 작업 진행하기(Screw joint pitch 10)



문제 링크 <u>http://cdl.hanyang.ac.kr/wp-content/uploads/exam/CAD/2013final-lab.pdf</u> 파트 링크 <u>http://cdl.hanyang.ac.kr/wp-</u> <u>content/uploads/2022/CAD/example/07_DMU_Kinematics/DMU_example.zip</u>

실습 과제

Assembly Design의 Piston 모델을 이용하여 아래와 같이 DMU Kinematics 작업 진행하기 (Simulation 동영상 + Product + Part 파일들 압축하여 업로드)



