

# EDEM 과 RecurDyn의 연동 해석, 이렇게 적용해보자!

서준원

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1. RecurDyn Product Introduction
2. EDEM + RecurDyn Co-simulation application
3. Interface setting
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# 1. **RecurDyn Product Introduction**

# What is "RecurDyn" ?

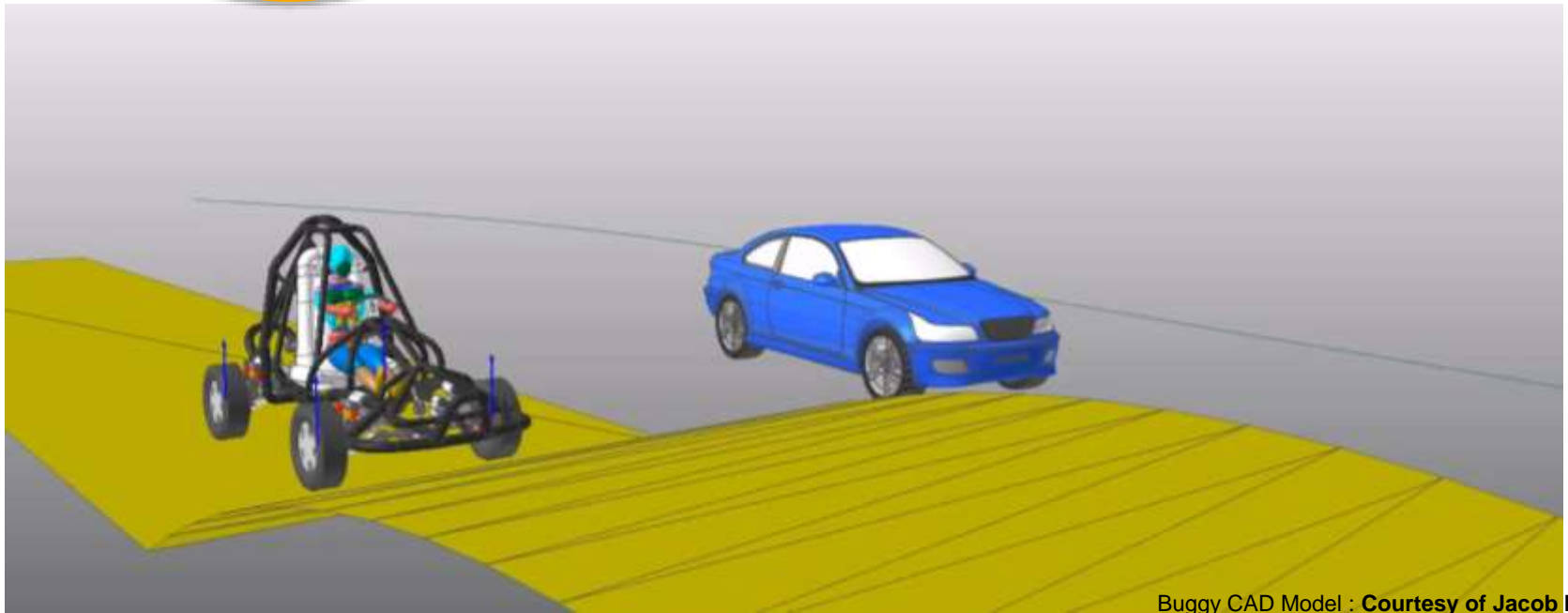
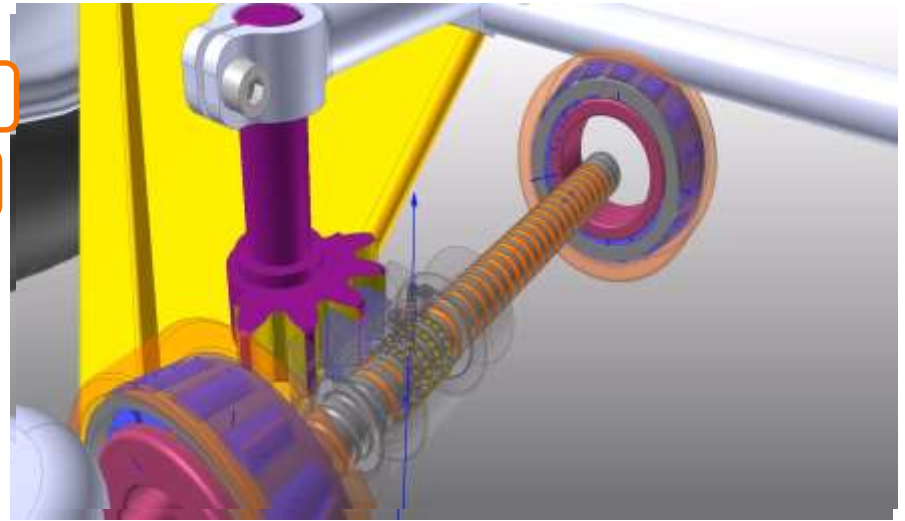
**MBD**

(Multi Body Dynamics)

Contact

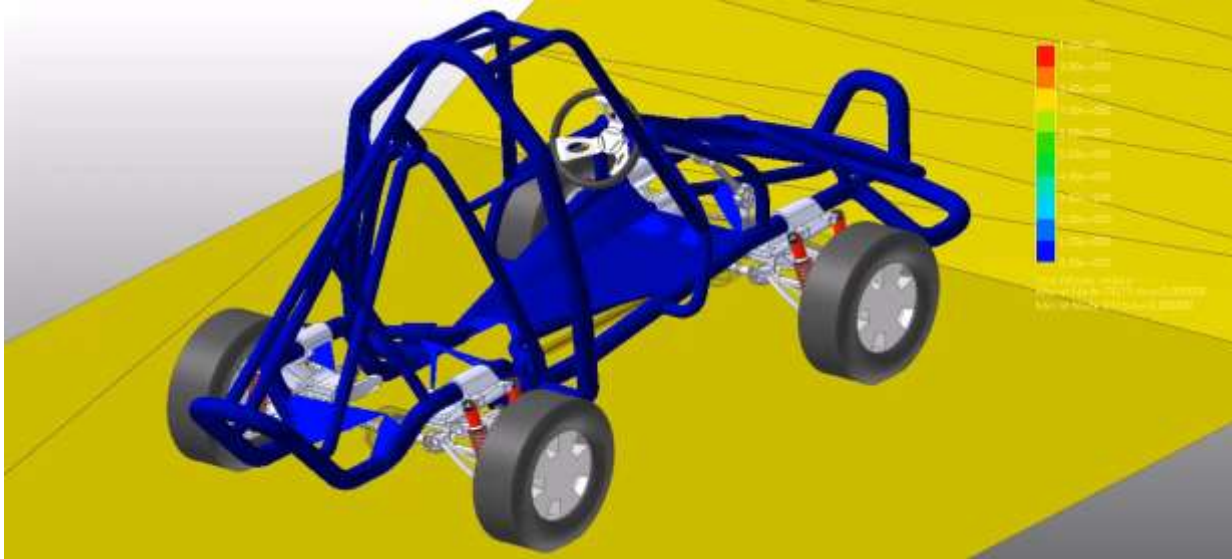
Reaction Force

Vibration



Buggy CAD Model : Courtesy of Jacob Hustad

# What is "RecurDyn" ?



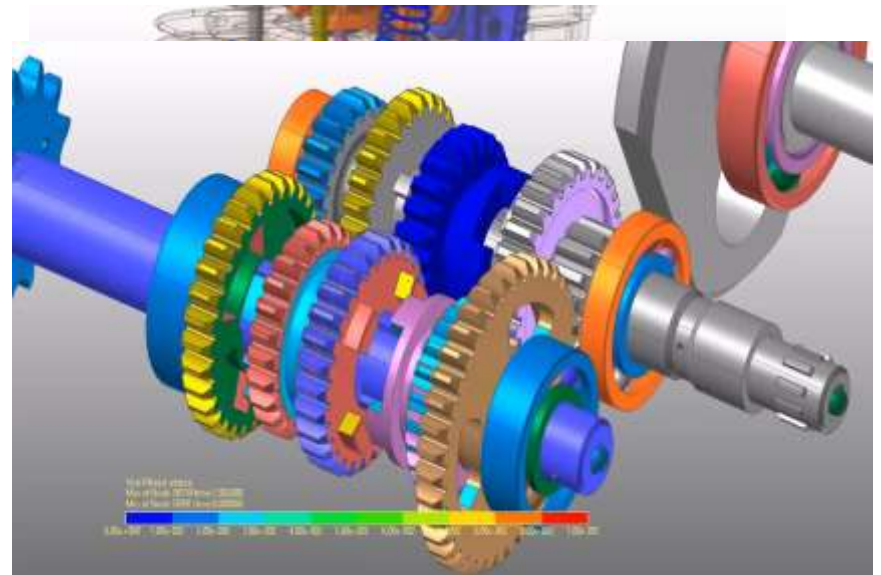
## MFBD

(Multi Flexible Body Dynamics)

Fatigue

Flexibility

Durability



# What is "RecurDyn" ?

**MBD**

(Multi Body Dynamics)



**Control**

(Co-simulation with  
the other solution)

**Multi-physics**

Hydraulic

Electronic control

Fluid dynamics

DEM particle

**MFBD**

(Multi Flexible Body  
Dynamics)



**RECURDYN X**

**EDEM™**

## **2. EDEM + RecurDyn Co-simulation application**

# 1. Soil Road Simulation



Make a difference particle behavior  
from particle contact model

Hertz-Mindlin

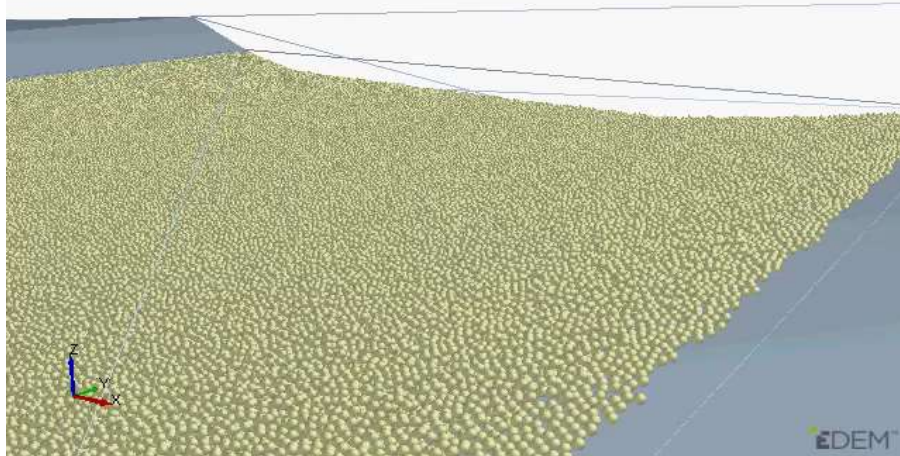
Hertz-Mindlin + JKR

Hysteretic spring

Hear transfer

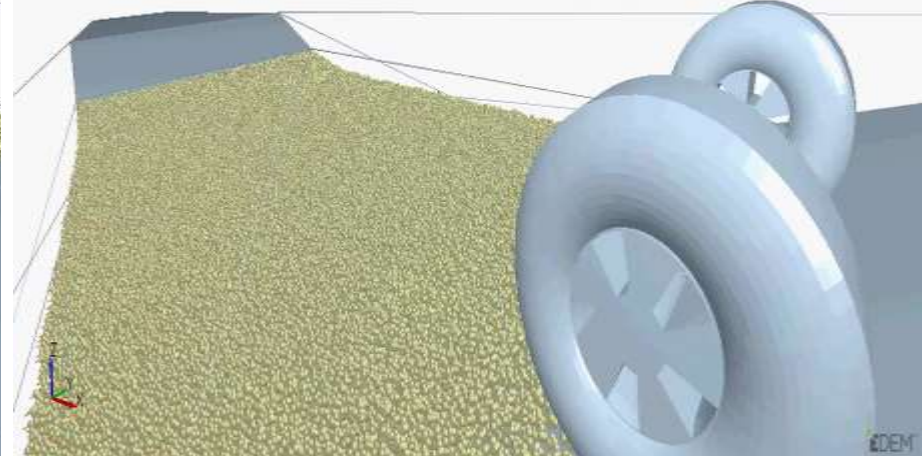
**Various contact models are available in EDEM!**

Time: 1.8904 s



Hertz-Mindlin model

Time: 0.68028 s

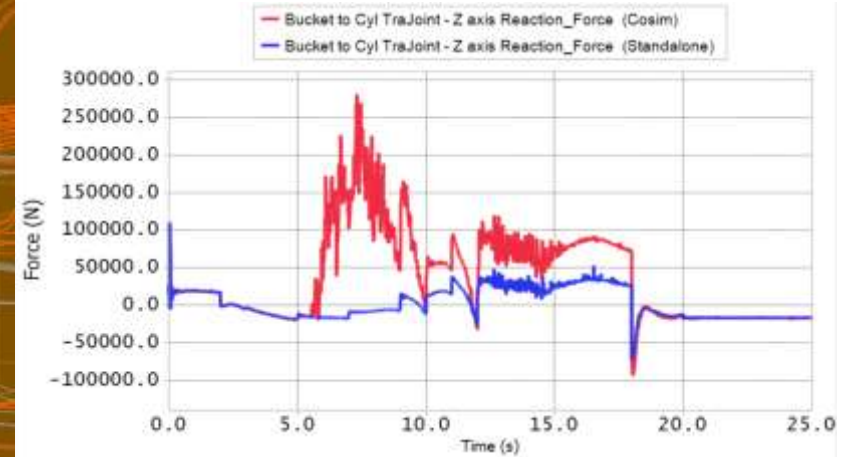
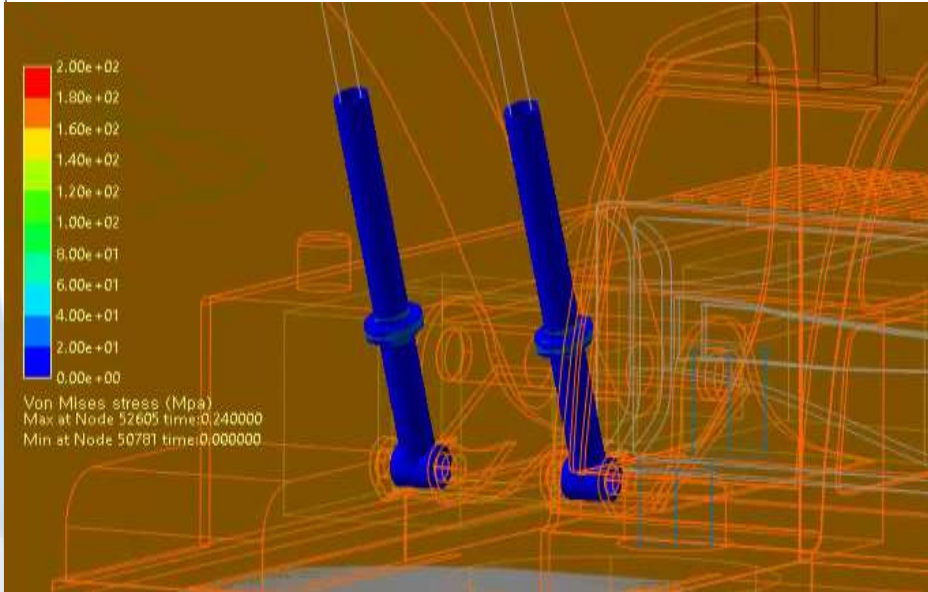


Hertz-Mindlin + JKR model



## 2. Heavy Equipment

### ◆ Excavator



Using the whole system modeling, We can give all results of joint reaction force!

  
RECURDYN

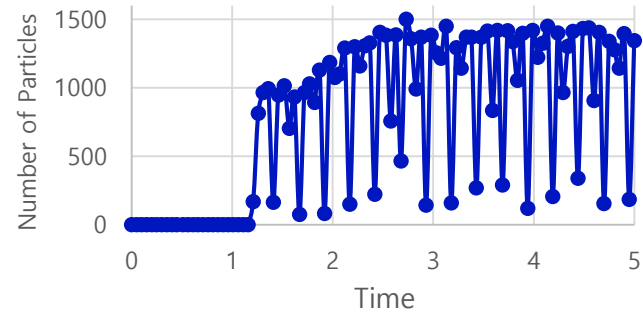
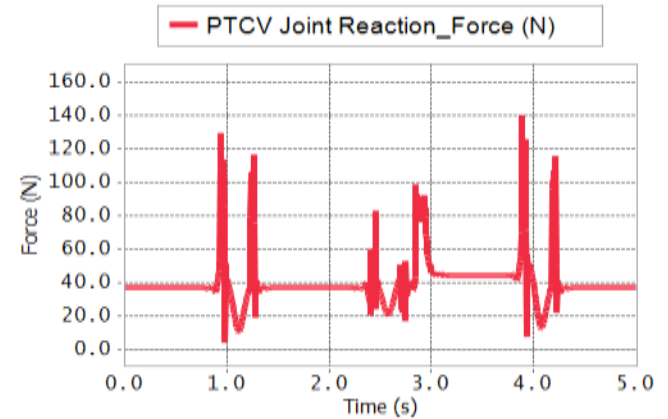
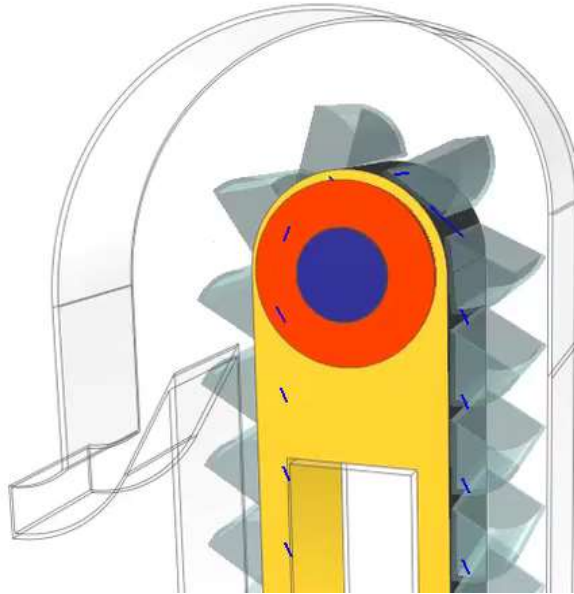
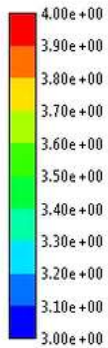


We can generate various particle type and give the external force!

 EDEM™

# 3. Agricultural I

## ◆ Bucket Elevator



What conveyor speed is ideal?

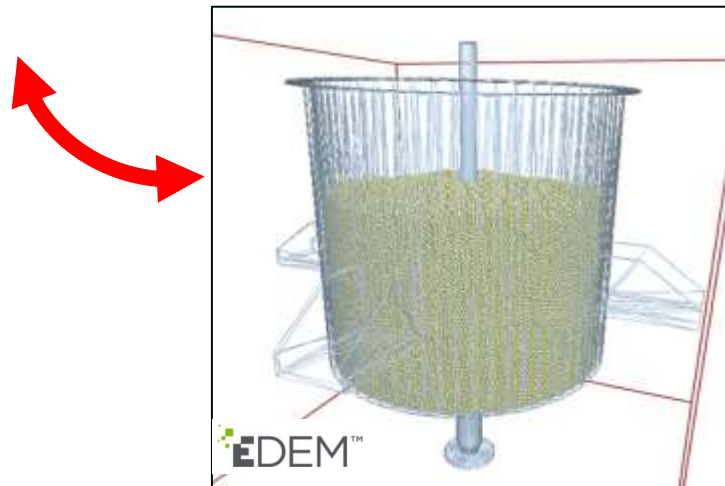
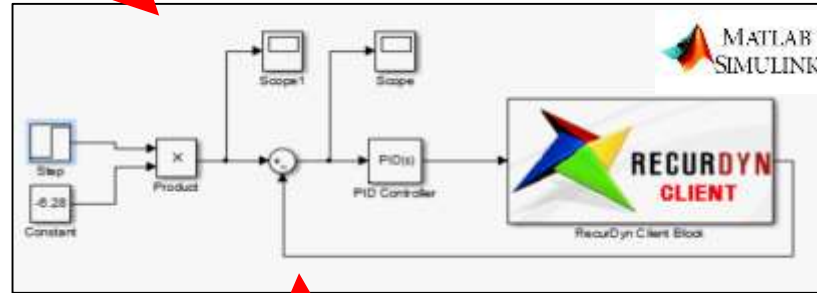
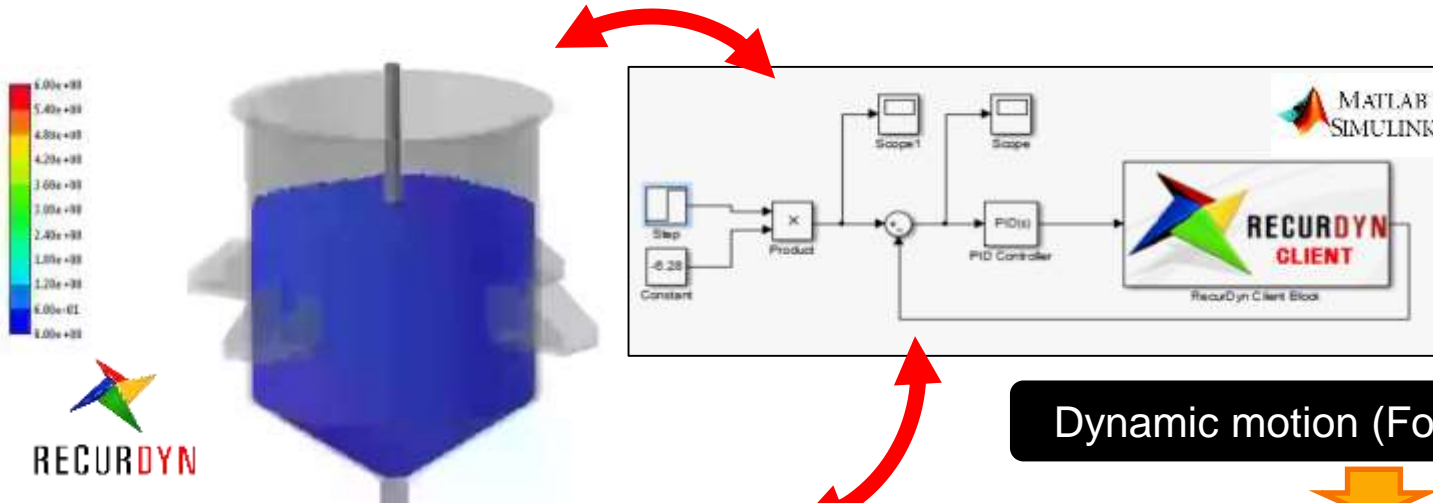
How many particles can enter?

Loaded joints is stable?

**Design Optimization**

# 3. Agricultural II

## ◆ Multi Co-simulation (Dynamics + DEM + Control)



Dynamic motion (Force) Modeling

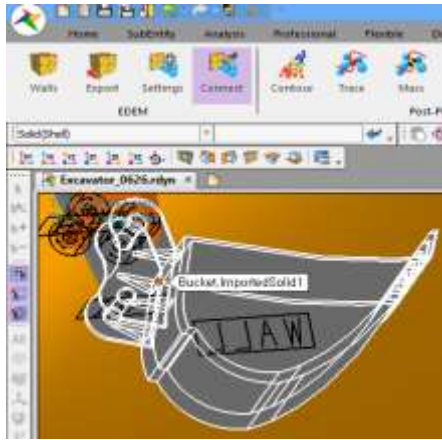
Dynamic motion (Force) Modeling  
+ RPM vs Force Control

Dynamic motion (Force) Modeling  
+ RPM vs Force Control + Grain  
DEM Particle including


More accurate solution acquired!

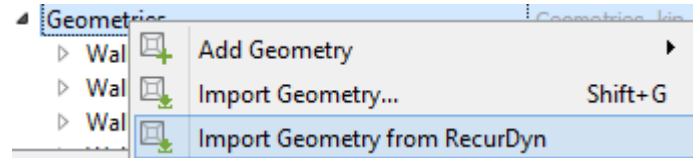
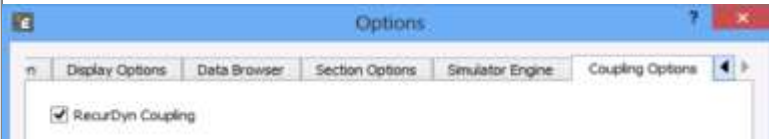
## **3. Interface setting**


# Interface Setting



```
EDM_Par.wall - Notepad
File Edit Format View Help
1010 # File Version
RigidWalls # Rigid wall list
"Wall1.stl" # File Name
"Wall1" # Name
2 # Contact Side -
0 0 0 # Center of Rotat
1 0 0 0 # Orientation
"Wall2.stl" # File Name
"Wall2" # Name
2 # Contact Side -
-17.6 0 -1.68866193853428 # Center of Rotat
1 0 0 0 # Orientation
"Wall3.stl" # File Name
"Wall3" # Name
2 # Contact Side -
0 0 0 # Center of Rotat
1 0 0 0 # Orientation
"Wall4.stl" # File Name
"Wall4" # Name
2 # Contact Side -
0 -1.033 0 # Center of Rotat
0.703993010983763 0.710163471833665 0.0055772555275731 0.00552926187007059 # Orientation
```

- ◆ Design the Dynamic model
  - ◆ Wall define
  - ◆ Export the wall file (format : \*.stl)
- 



- ◆ Design the DEM model
  - ◆ RecurDyn Coupling option "ON"
  - ◆ Import the RecurDyn geometry
  - ◆ Coupling server icon "Play"
- 



**Simulation start in RecurDyn → RecurDyn call EDEM**

# Conclusion

## ◆ Advantage of Co - simulation (EDEM + RecurDyn)

### ➤ Perspective of EDEM

- ✓ Enable to represent more complex dynamic behavior
- ✓ Whole system analysis is possible using RecurDyn solver
- ✓ Stress analysis of flexible body component can predict

### ➤ Perspective of RecurDyn

- ✓ External particle force can be realized using powerful solution of EDEM
- ✓ Specific particle geometry and more accurate material also can applied
- ✓ Various particle contact model can available (ex: Cohesion, Bonding, Heat transfer)

**The solutions are enhanced by feedback  
from each result!**



감사합니다.

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