



## **ALTAIR EDEM 2021 – VIRTUAL STUDENT WORKSHOP**

ALTAIR EDEM SIMULATION FLOW AND BEST PRACTICE

Cesar Barreto / Senior Engineer / 16th September 2021

## EDEM agenda

What is DEM ?



Altair EDEM Software  
Demo



EDEM Applications



# WHAT IS DEM?

## What is DEM?

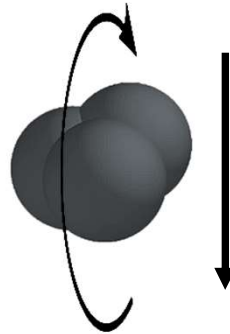
- Discrete Element Modelling – a way of simulating discrete matter
- The bulk behavior emerges from the collective interaction of each individual object

### Soft-sphere Method

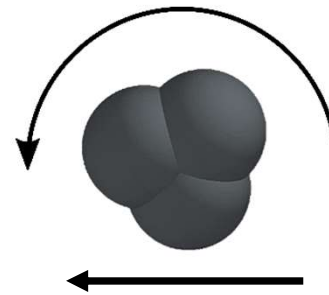
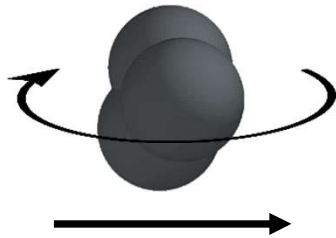
Rigid particles but small overlaps allowed  
Evaluates forces accurately



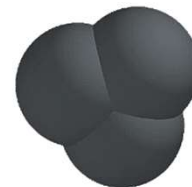
## What is DEM?



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## What is DEM?

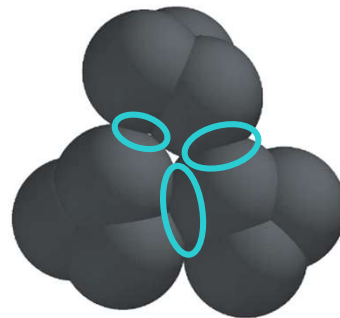


## What is DEM?

Normal overlaps  
Tangential overlaps



Normal forces  
Tangential forces



## What is DEM?

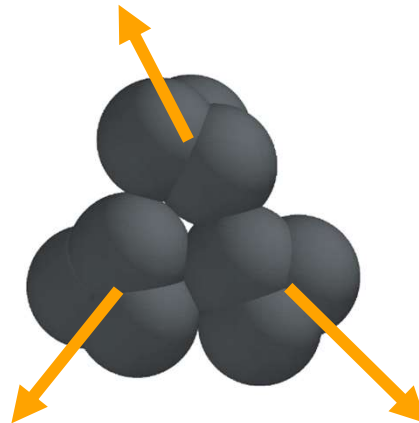
**Resultant  
forces and  
moments**



**Solve Newton  
equations of motion to  
get accelerations**



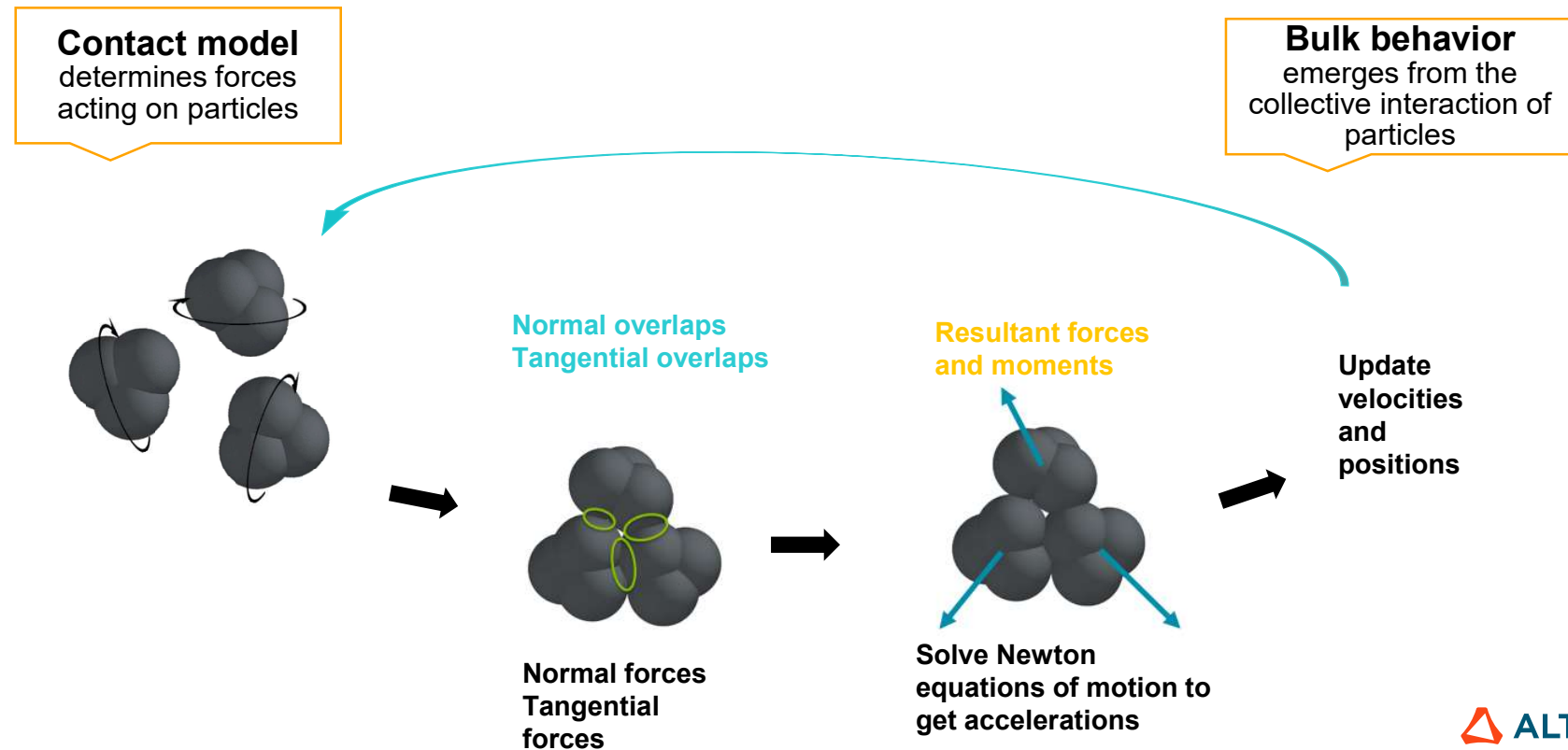
**Update  
velocities and  
positions**



## What is DEM?



# The DEM Method



# EDEM APPLICATIONS

## EDEM Applications

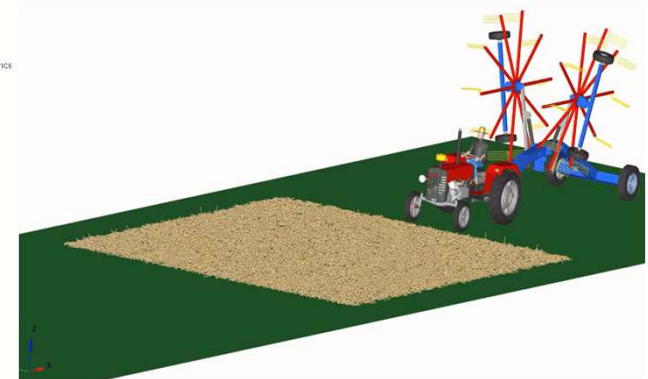
### Heavy Equipment



### Mining

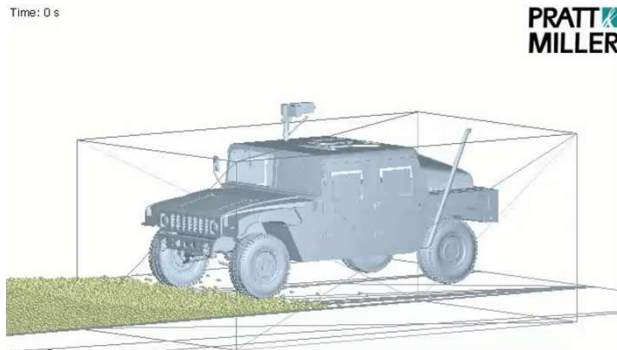


### Agriculture



## EDEM Applications

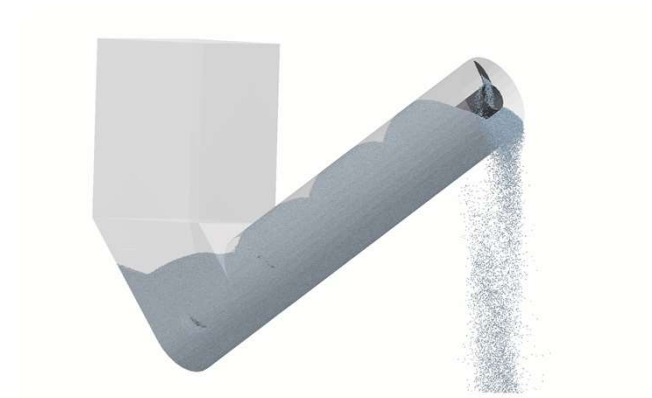
### Automotive



### Pharmaceutical



### Process Manufacturing



# HOW DOES ALTAIR EDEM WORK?

# Set up EDEM

BulkMaterial Properties

Poisson's Ratio ( $\nu$ ): 0.25

Solids Density ( $\rho$ ): 2500 kg/m<sup>3</sup>

☒ Shear Modulus (G): 1e+08 Pa

☐ Young's Modulus (E): 2.5e+08 Pa

Work Function: 0 eV

Interactions

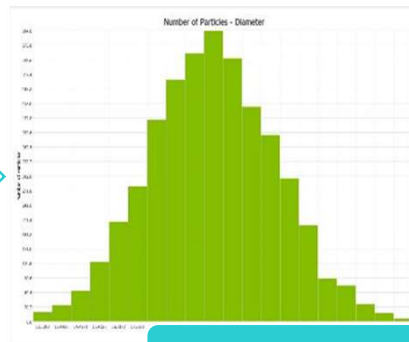
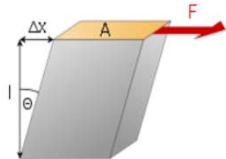
Interaction: BulkMaterial

Coefficient of Restitution: 0.5

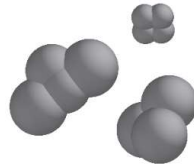
Coefficient of Static Friction: 0.5

Coefficient of Rolling Friction: 0.01

Define Material Properties

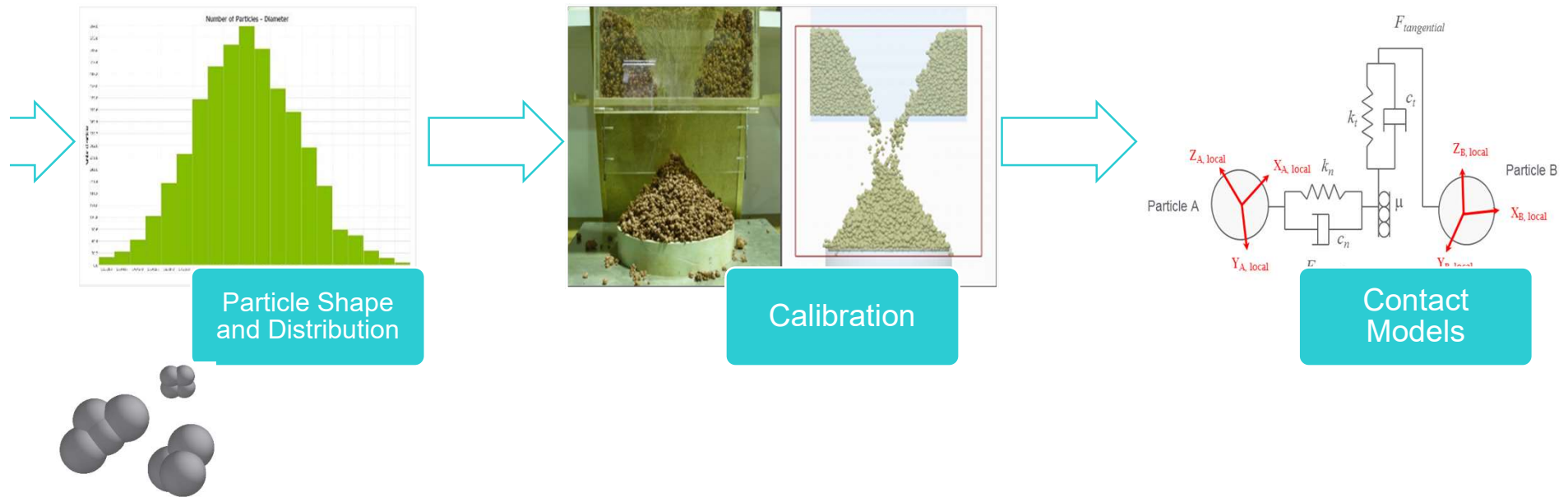


Particle Shape and Distribution

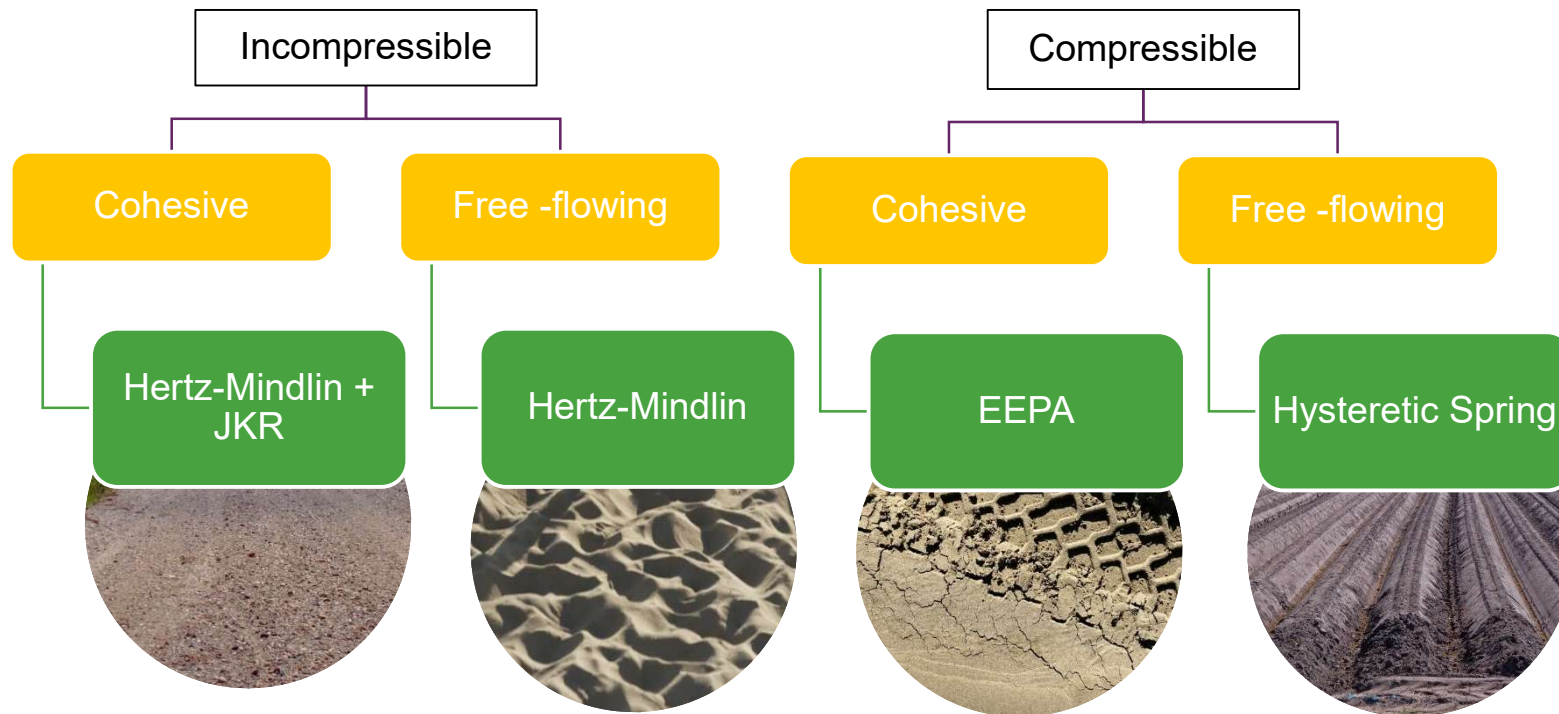


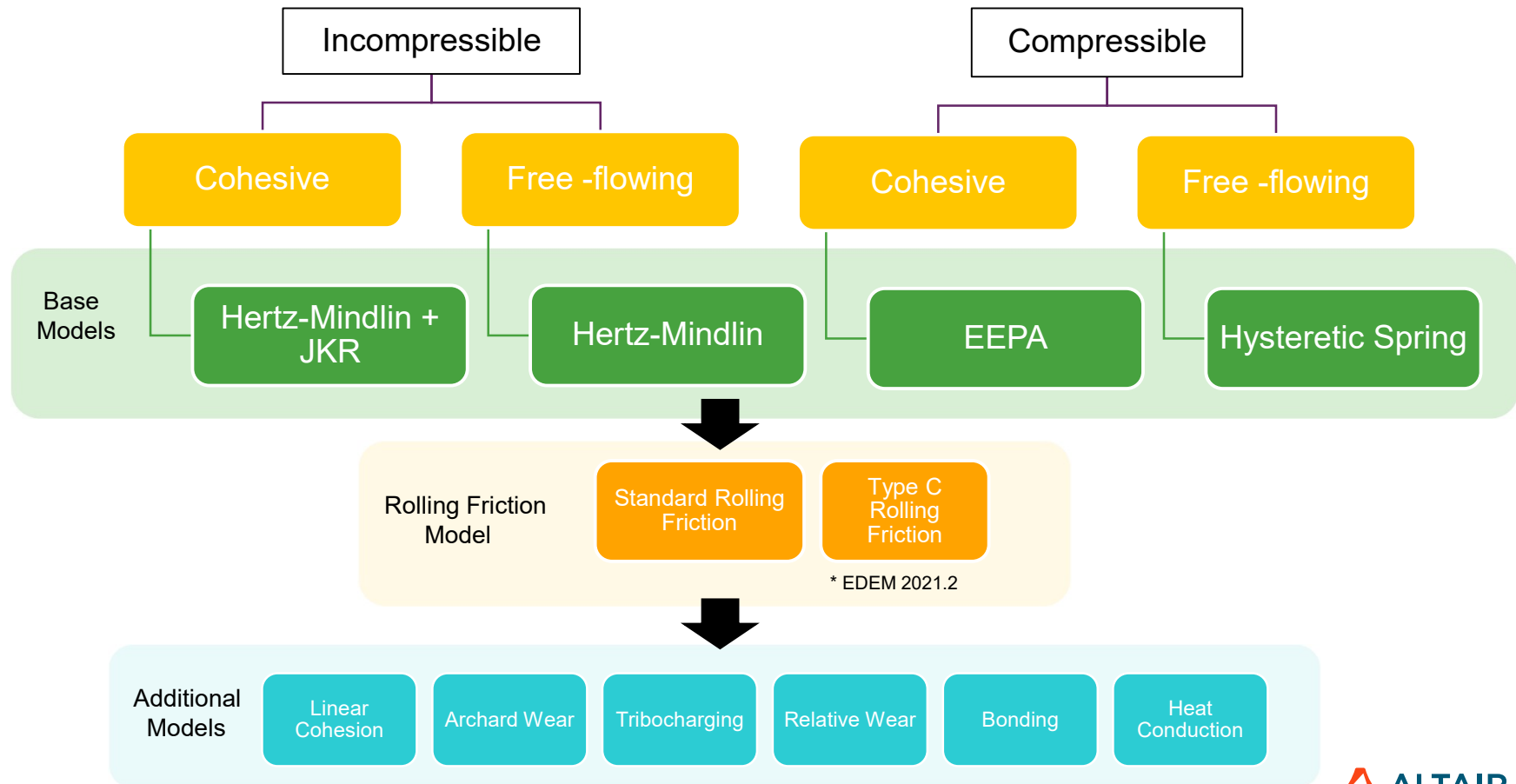
Calibration

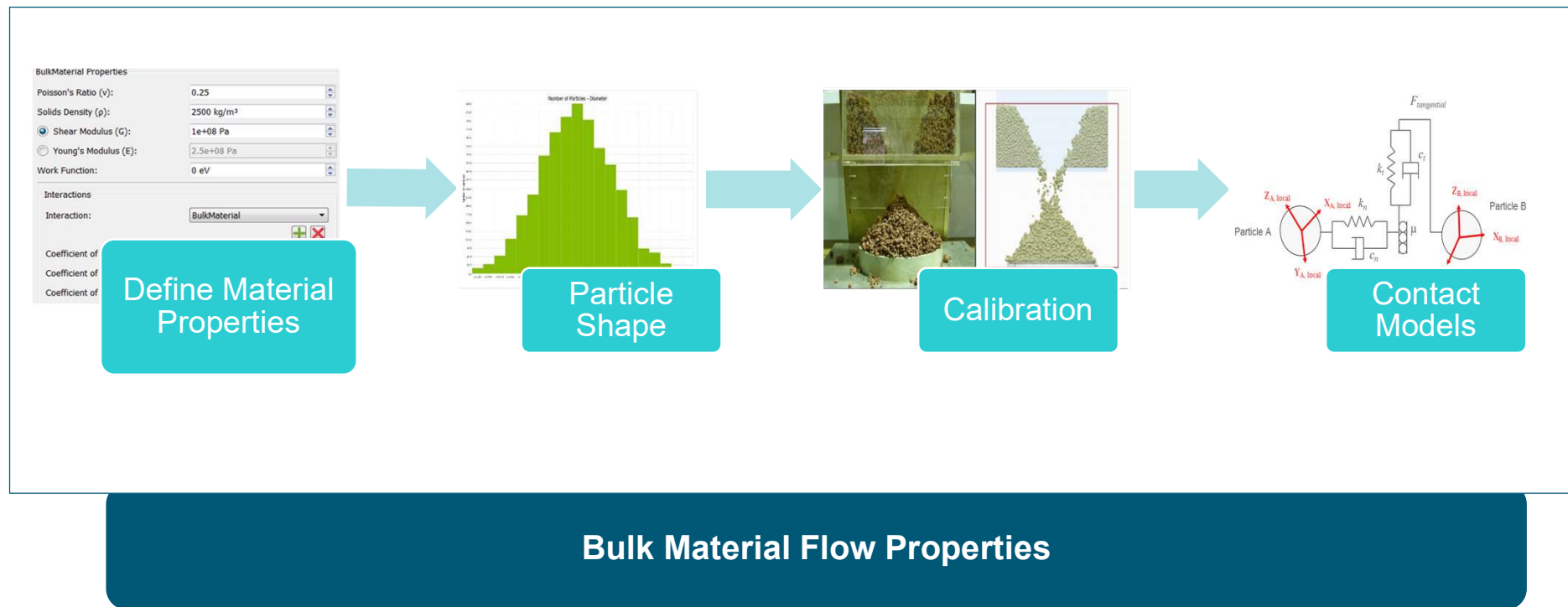
# Set up EDEM



## EDEM Contact Models



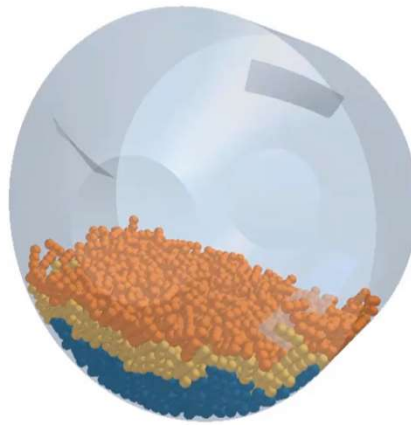




# ALTAIR EDEM AND MOTIONSOLVE COUPLING

## EDEM Demo – Mixing tutorial

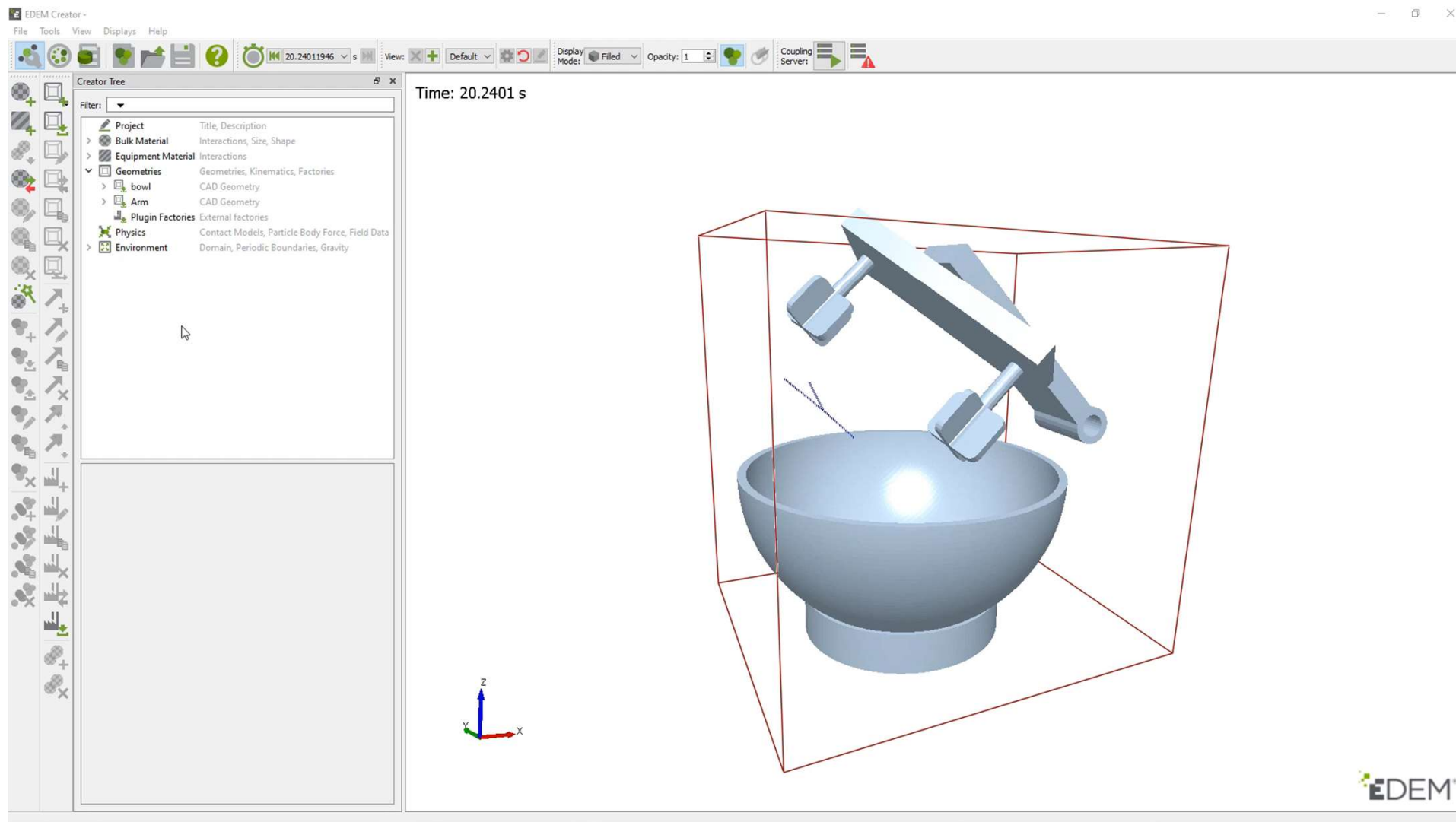
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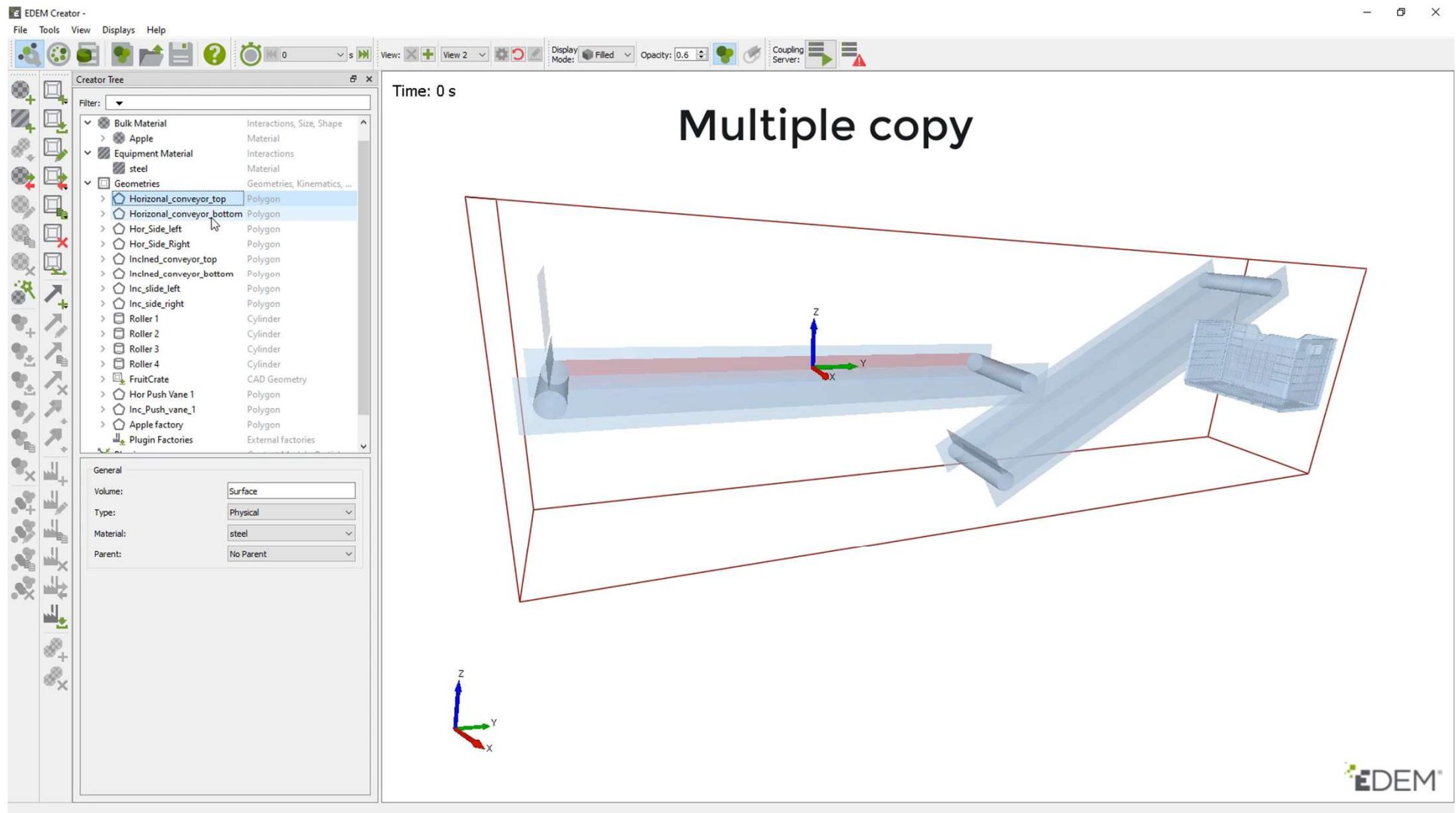


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# EDEM CREATOR







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# EDEM SIMULATOR



## EDEM Simulator - Processing

- Fast and powerful DEM solver
- Highly parallelized for use on:
  - multi-core shared memory workstations
  - GPU hardware
  - multi-GPU systems
- Fully double precision for high accuracy
- Simulate large and complex particle systems
- Future development planned for Nvidia CUDA solver for both sphere and polyhedral solvers

Solver configuration for EDEM 2021.1	Sphere / Multi-Sphere	Polyhedral Particle
CPU multi-core	Yes	No
Nvidia GPU	Yes (OpenCL solver)	Yes (Nvidia CUDA solver)
AMD GPU	Yes (OpenCL solver)	No



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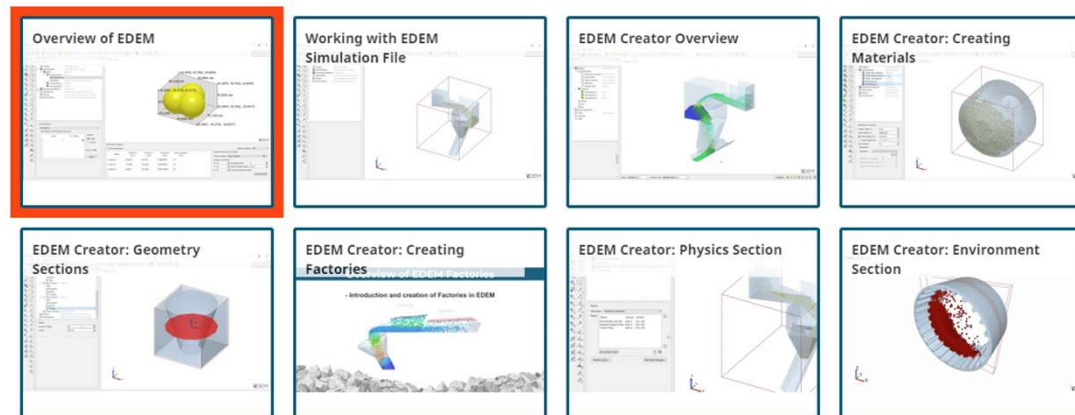
# EDEM ANALYST



**THERE IS ALWAYS MORE TO EXPLORE...**

# Introduction to EDEM eLearning

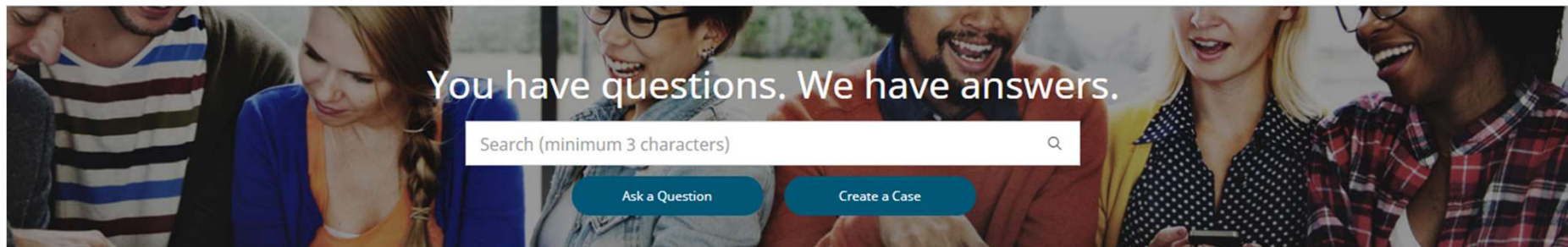
## EDEM eLearning



# Altair Community

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[Knowledge Base](#) [Documentation](#) [Script & Model Library](#) [Resources](#) ▼



## The Path to Success

Join our online community of experts – Share insights, collaborate with fellow colleagues and find more ways to take full advantage of our products. From online discussions to insightful commentary to product training to use cases, we have valuable resources to help you discover, learn and grow, all while having the opportunity to network with fellow explorers like yourself. Welcome to our Community.



### Forums & User Groups

Get answers to your questions with support from community members.



### Knowledge Base

Browse and search for articles and videos, rate or submit feedback.



### Documentation

Find product-specific help manuals and release notes.



### Contact Support

Create a support request or report a problem.



## Questions & Answers





# THANK YOU

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#ONLYFORWARD

