

## Hardware



### Supported Platforms

- Windows XP Service Pack 2 - 32 bit
- Windows XP Service Pack 2 - 64 bit
- Suse 10.2 Linux - 32 bit
- Suse 10.2 Linux - 64 bit
- RedHat Enterprise Linux Workstation 4 - 32 bit
- RedHat Enterprise Linux Workstation 4 - 64 bit

### System Requirements

- 1 GB RAM
- P4 3GHz or Intel Xeon; AMD64 or Intel 64
- Graphics card: NVIDIA GeForce or ATI Radeon with 128MB
- 300 MB free hard disk space to install the software



## Global Locations

 [info@dem-solutions.com](mailto:info@dem-solutions.com)  
 [www.dem-solutions.com](http://www.dem-solutions.com)



### Global Headquarters

DEM Solutions Ltd.  
49 Queen Street  
Edinburgh  
EH2 3NH  
UK  
 +44 (0)131 558 2681  
 +44 (0)131 558 2672



### Americas Office

DEM Solutions (USA) Inc.  
24 Hanover Street, Suite 10  
Lebanon, NH 03766  
USA  
 +1-603-448-2330  
 +1-866-806-7957

### German Office

DEM Solutions (Deutschland) GmbH.  
Unterster Zwerchweg 38  
Frankfurt/Main  
D-60599  
Germany  
 +49 (69) 695 357 38 or +49 (176)96 160 657  
 +49 (69)695 357 39

### Singapore Office

DEM Solutions Ltd.  
3 Moulmein Rise #05-01  
Singapore 308144  
 +65-9730-3935  
 +65 6234 1381

For a full list of EDEM Distributors please visit  
[www.dem-solutions.com](http://www.dem-solutions.com)

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 **DEM**Solutions

 **EDEM**

EDEM is an advanced DEM (Discrete Element Method) software package for simulation and analysis of particulate solids handling and processing operations.

*EDEM* provides a modeling environment that enables you to handle the complexity of real industrial processes. It is easy-to-use yet provides you with the flexibility to incorporate your own physical models and couple with other CAE tools.

With *EDEM* you can quickly and easily create a parameterized model of your granular solids system. CAD models of real particles can be imported to obtain an accurate representation of their shape. Add the mechanical, material and other physical properties to form your model particles. These can be stored in a library allowing you to build a collection specific to your processes.

*EDEM*'s unique Particle Factory technology provides a method for efficiently generating assemblies of particles in association with the equipment geometry. Boundary surface geometry is imported as a CAD solid model in generic or native formats.

### Solution

Fast, efficient detection of contact between discrete objects is a key feature of *EDEM*'s discrete element solver. The software runs on single processor and shared memory multi-core platforms in both Windows and Linux environments.

*EDEM* provides a range of mechanical contact models implemented using *EDEM*'s applications interface in the form of User Defined Libraries (UDL). These include:

- Hertz-Mindlin
- Linear Spring
- Cohesion
- Bonded Particle
- Moving Surface

UDLs are coded in C,C++ or F90 and are compiled as a dynamic library which is automatically linked at run time. The interface provides a means of dynamically controlling model parameters such as particle and boundary properties and coupling with any external model or look-up tables.

A Particle Body Force interface allows application of any Body force to a particle or component element including fluid drag, electrostatic and electromagnetic forces.

*EDEM* simulations produce a wealth of new and valuable data including:

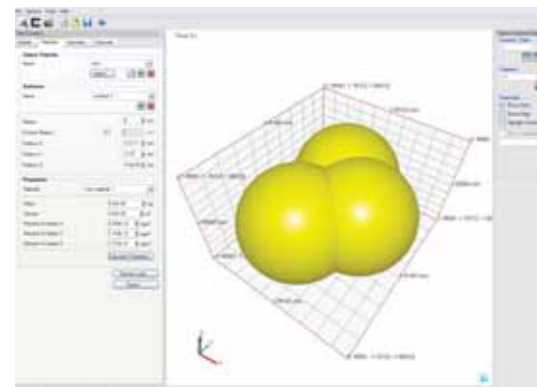
- Internal behavior of a granular bulk
- Interaction between particles and machine surfaces
- Magnitude, frequency and distribution of collisions between system elements
- Velocity and location of each particle
- Energy associated with impact abrasion, cohesion and debonding of particles within a bulk
- Force chains and structural integrity of meta-particle structures

With *EDEM*'s powerful post-processing tools you can visualize and graph any combination of variables. Having identified important system behavior you can easily modify models to refine your simulation and iterate towards your desired solution.

### Modeling

With its unique, easy-to-use Graphical User Interface, the *EDEM* Creator is used to quickly set-up and initialize models. The user-friendly capability enables:

- Import of machine geometry from a CAD model
- Close approximation of real particle shapes using multi-element convex geometric primitives
- Powerful, fast particle initialization for batch or continuous flow
- Specification of physical, mechanical and other particle properties
- A database of model parameter values
- User programmable particle initialization function enabling implementation of user defined packing algorithms.



### Analysis

*EDEM* provides a powerful suite of data analysis and visualization tools for investigation of model behavior.

Features include:

- Fast 3D visualization with pan and zoom
- Built-in video generation from rendered images at each time-step
- Generation of plots of primary data and user-defined parametric data
- Population-based spatial analysis
- Particle tracking, vector plots
- Contact and structure visualization
- Data export to ASCII and other formats.

*EDEM*'s visualization capability is also available at run time so that you can observe changes in your model. This capability enables quick feedback on model set-up and initial conditions.

### Multi-physics simulation

*EDEM* provides a platform for multi-physics simulation. Its API enables a wide range of phenomena to be modeled and it can be coupled with external routines and 3rd party software to add functionality.

### Particle-Fluid Interaction

Particle-fluid interactions can be handled in *EDEM* either as a uni-directional or bi-directional interaction. Uni-directional interaction, where only the fluid drag on the particles is considered, can be implemented in a Particle Body Force UDL, usually by reading the fluid velocity profile from a CFD results file. Two-way coupling requires a dynamic link with the CFD code so that momentum (as well as heat and mass if desired) is exchanged between the particles and fluid. In this type of coupling data is transferred from *EDEM* via an interface to the CFD code in an iterative cycle.

*EDEM*-CFD co-simulation is a powerful addition to the CAE toolkit and has many applications. It is being used to investigate particle agglomeration in fluidized beds, pneumatic conveying, slurry transport, filtration, solid-liquid mixing, pipe erosion, spray coating and many others. Ask your *EDEM* vendor for details of couplings between *EDEM* and CFD codes available from DEM Solutions and its Software Partners.

### Particle-Structure Interaction

Interactions between particles and structures are explicitly calculated in *EDEM* and these data can be used to control the machine dynamics (via a link to multi-body dynamics simulation) and as input to FEA for structural analysis or for prediction of wear. By reading in a FEA surface mesh to *EDEM* a 1-to-1 connection can be established between the FEA and the *EDEM* simulation. This connectivity provides a means of directly coupling *EDEM* with FEA and multi-body dynamics software. Ask your *EDEM* vendor for details of PSI couplings available from DEM Solutions and its Software Partners.

### Particle-Electromagnetic Interaction

Interaction between particles and electric fields and magnetic fields can be implemented in *EDEM* in a similar way to fluid flow fields. A one-way coupling involves reading fields calculated using an analytical function, or look-up from a file generated using third party software. The *EDEM* API can be used to model charge on particles including electrostatic charge and magnetic polarity. An Electrostatics Module is available which models electrostatic forces between particles and tribo-charging of particles contacting equipment surfaces.

