# Fast, flexible particle simulations

The University of Twente in the Netherlands has developed an open-source particle simulation tool it calls MercuryDPM. Thomas Weinhart, assistant professor in the multiscale mechanics group at the University of Twente, told ABHR about it.

Computational modelling can significantly shorten the product development process by reducing prototype testing.

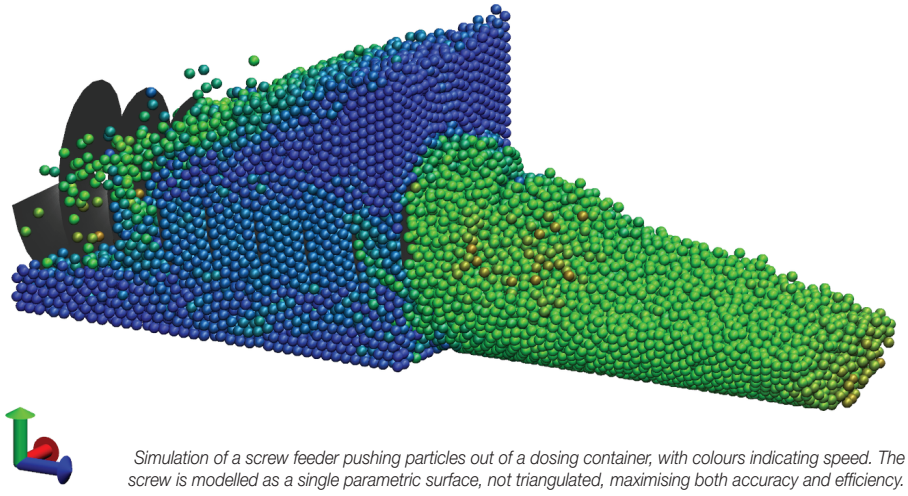
While the fluid dynamics and solid mechanics communities strongly rely on continuum solvers, the bulk handling community is beginning to embrace particle simulations.

The method models the dynamics of each individual element of a particulate system and is thus able to resolve the microstructural details of particulate bulks.

In recent years, with the development of advanced contact models and calibration techniques, the method has matured to the point where quantitative predictions can be made. Thus, it has become an efficient and reliable tool to optimise bulk handling and processing apparatus.

The University of Twente describes itself as a world leader in the development of contact models and algorithms that form the foundations of such methods.

"Our expertise in contact models is unique in the world, allowing for simulations of complex interactions such as sintering, breaking, plastic deformation, wet-materials and cohesion, all of which have important industrial applications," explained Weinhart.



*Simulation of a screw feeder pushing particles out of a dosing container, with colours indicating speed. The screw is modelled as a single parametric surface, not triangulated, maximising both accuracy and efficiency.*

"MercuryDPM contains a novel complex wall technique meaning we can exactly model real industrial geometries such as screw feeders (see image). Additionally, MercuryDPM's state-of-the-art built-in statistics package constructs 3D continuum fields such as density, velocity, structure and stress tensors, providing information often not available from scaled-down model experiments or pilot plants.

"The code was originally developed for granular flows over inclined channels, and has since been extended to many other granular applications, ranging from the geophysical modelling of cinder cone creation, vibrofluidised waste separation, flows in silos, screw feeders, conveyor belts and drum mixers. Furthermore, we offer a range of training and consultancy services via our sister company, MercuryLab, optimising handling and processing equipment under the constraints users specify." ■

*Contact: MercuryDPM.org and MercuryLab.org.*