

SpreadDEM

Centrifugal Spreading Simulation Software

Mercè López¹, Guillermo Casas^{1,2}, Miguel Ángel Celigueta^{1,2}, Salvador Latorre¹ and Ferran Arrufat¹

¹ International Centre for Numerical Methods in Engineering - CIMNE

² Universitat Politècnica de Catalunya (UPC)

SpreadDEM [1] is the first industrial numerical tool to perform virtual experiments of centrifugal (rotary) spreaders. Such devices are commonly used worldwide to disperse granulated fertilizer on farmland, as well as other materials such as salt or seeds in a variety of contexts. SpreadDEM offers a very friendly and intuitive interface, based on the GiD [2] environment, with all the necessary ingredients for running a spreading simulation.

SpreadDEM's technology is based on the DEM, a well-established numerical method for simulating granular matter. Its numerical implementation is powered by DEMPack [3], the official DEM application of the Kratos [4] framework. DEMPack has been extensively validated over several years.

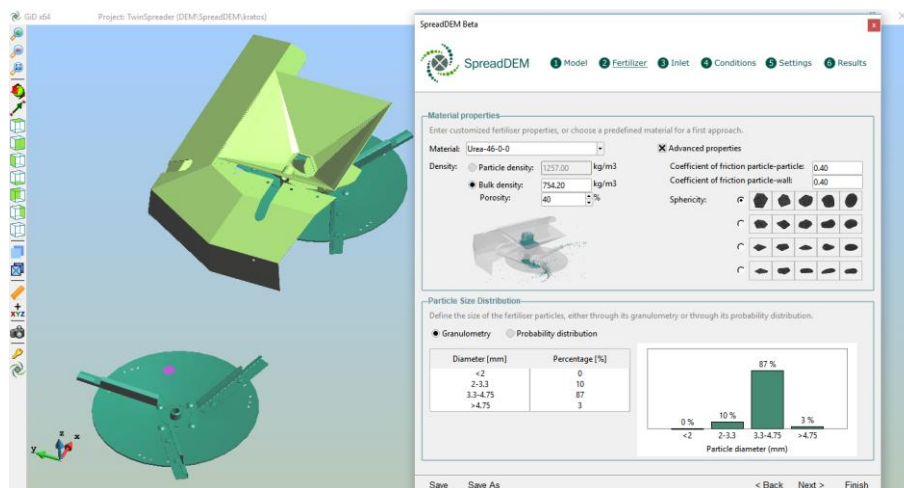


Figure 1. Example of one of the sections in the program interface.

The user of SpreadDEM can obtain, after a few simple steps, the relevant data to analyze and evaluate their spreading system. The program has a wizard format that guides the user through its six separate sections: Model, Fertilizer, Inlet, Conditions, Settings and Results. Figure 1 shows a screenshot of one of the sections in the wizard.

With SpreadDEM, it is very easy to obtain the same outcome that would be expected from a physical experiment by simply importing a particular geometry from a CAD tool and following the six steps. For instance, the spread patterns and transversal

distributions or the coefficient of variation graph are automatically generated. This information can be used to improve the design of the spreader or to determine the optimal working width.

The software has also very powerful postprocessing capabilities, inherited from GiD, whereby realistic animations can be easily created to focus on particular results or aspects of the simulation, and enriching the understanding of the system with very detailed outputs (granules motion, impact velocities, etc.), that would not be available otherwise.

References

- [1] SpreadDEM, the Centrifugal Spreading Software. cimne.com/spreaddem
- [2] GiD. The personal pre and post processor. gidhome.com
- [3] DEMPack. Discrete/Finite Elements simulation software. cimne.com/dempack
- [4] Kratos Multi-physics. cimne.com/kratos