Prof Corné Coetzee
ccoetzee@sun.ac.za
Tel: +27 (0)21 808 4239

GMRG
Granular Materials Research Group
www.sun.ac.za/gmrg

Dr Danie Els
djnels@sun.ac.za
Tel: +27 (0)21 808 4248

Department of Mechanical and Mechatronic Engineering, University of Stellenbosch

Our research group has the expertise, software and facilities available to conduct research and investigations into a variety of granular flow problems through:

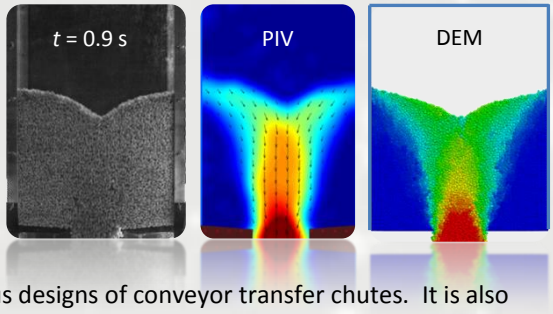
- Simulation of granular flow using the discrete element method (DEM).
- Experimental calibration of simulation parameters.
- Experimental validation of granular flow simulations.

Objectives:

- Broaden our understanding of the behaviour of granular materials and capabilities to model granular materials through scientific research.
- Provide consulting services to industry to solve their bulk materials handling problems, including calibration of DEM parameter values and the critical analysis of existing and new designs.
- Equip engineers with the necessary skills, knowledge and experience to contribute to the field of granular materials research as well as to serve the industry as specialists in the field of bulk materials handling.

Calibration Equipment:

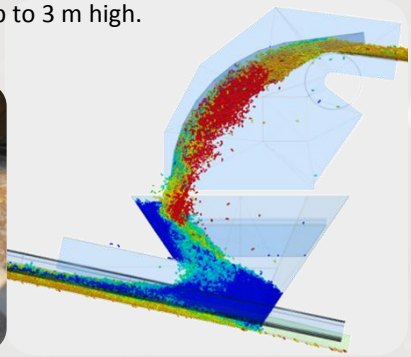
- Pendulum device for measuring contact properties including the coefficient of restitution.
- Large and standard size shear boxes for measuring the internal friction and dilation angles.
- Tribometer for measuring the static and dynamic coefficients of friction.
- Vibrating screen sorter to measure particle size distributions.
- Confined compression tests for measuring the bulk stiffness.
- Rotating drums for measuring the dynamic angle of repose.
- High speed cameras and Particle Image Velocimetry (PIV).
- 3D Laser scanner to obtain particle shapes and models.
- Slump tester for measuring the static angle of repose.
- Annulus ring shear tester.

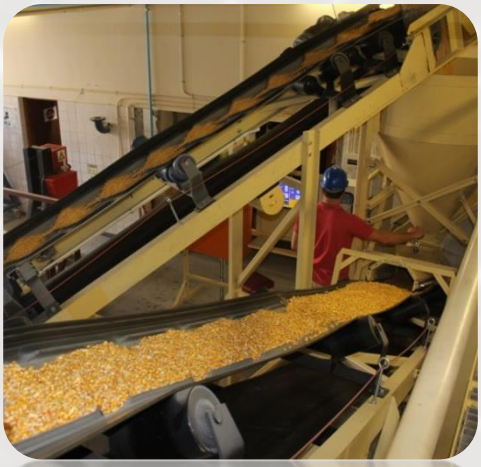


Conveyor Transfer Test Facility:

This is a unique facility that can be used to experimentally test various designs of conveyor transfer chutes. It is also used to validate continuum based design models (CEMA) and DEM models by evaluating the accuracy with which it can predict the material flow rates, spillage, build-up inside the chute, blockage, wear, the loading profile on the receiving conveyor, material trajectories from the feeding conveyor through the whole chute and the impact velocities and angles with the chute and receiving conveyor.

- The conveyors, hoppers and chutes form a continuous loop which allow for testing without reloading of material.
- The belts are equipped with sensitive load cells and belt weighers for mass flow measurements.
- The two hoppers have a storage capacity of 1 m^3 and 0.4 m^3 respectively.
- The belt speed and material feed rate are controlled by a PLC interface.
- High speed cameras are used to capture the material flow.
- The belt speed can be varied between 0 $m \cdot s^{-1}$ and 6 $m \cdot s^{-1}$.
- The belts are 450 mm wide and up to 6 m long.
- The main transfer chute can be up to 3 m high.





December 2017