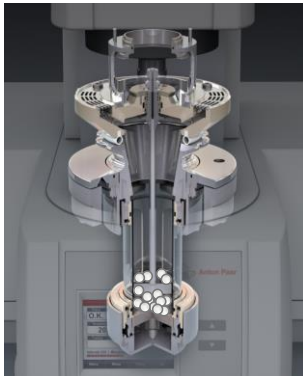


Open PhD position on DEM (meso-)particle property calibration with powder rheometry and other flow characterization techniques

The Powder Technology group at the **University of Salerno** (US), Italy, under the supervision of Dr. Diego Barletta and the Multi-Scale Mechanics group at the **University of Twente** (UT), The Netherlands, under the supervision of Professor Stefan Luding, offer a **four years** joint PhD project on **DEM (meso-)particle property calibration with powder rheometry and other flow characterization techniques**, in the framework of the EU funded MSCA Innovative Training Network TUSAIL (<https://tusail.eu/>). The first two years will be spent in Salerno and the final one in Twente. Secondments in industry at **MercuryLab**, NL and **Procter & Gamble**, UK, are also planned.

The project aims at determining the calibration procedures of the parameters of discrete element models (DEM) for granular materials. These procedures should be adapted to the model adopted to describe interparticle interactions and, therefore, could be different in the case of van der Waals interparticle interaction, capillary or electrostatic, as well as with the most appropriate model chosen to describe the mechanics of the contacts between the particles.



Courtesy of Anton Paar GmbH

Rotational rheometers will be used to develop experimental protocols useful for calibration. In particular, it will be possible to easily change the geometry of the impeller and the rotational speed to modify the predominant phenomena in the flow and in the determination of the torque measured by the impeller. Additionally, the rheometer could allow modifying and tuning some of the temperature-influenced material properties. This high operating flexibility of the rheometers, together with the remarkable precision of the quantitative measurements of torque and forces parallel to the rotation axis, make it possible to collect experimental data corresponding to different flow regimes that can be used to calibrate the DEM model.

The results of the sensitivity analysis will be compared with experiments in which a limited number of material properties will be varied by changing the particle size, the particle material, the amount of liquid available for capillary bridges, the system temperature. This will allow deriving relationships to predict the effect of the internal variables of the system, such as particle size distributions and particle contact shape distributions. Experiments will not necessarily be limited to powder rheology, but other experiments, such as uniaxial compaction, shear test at high temperature or controlled humidity and powder vibration, could be used to complete the characterization of the particle system or to validate the calibrated model.

The PhD project will **start in June 2021** and will offer a very generous salary if compared to EU standards. We are looking for outstanding candidates holding a **Master degree in engineering, physics or chemistry** with good capabilities in both experimental activities and scientific programming.

The official call, with instructions to apply **by 26 April 2021**, is available here:

<https://web.unisa.it/ricerca/assegni-ricerca/bandi?anno=2021&bando=5032>

Informal inquiries can be sent to Dr. Barletta (dbarletta@unisa.it), eventually attaching a one page CV with the date of Master graduation, the transcript of records and a one page abstract of the Master thesis or equivalent research project.