# Annual Report 2004

# of the EFCE Working Party on the Mechanics of Particulate Solids

1. Complete address of Working Party/Section Chairman and Secretary

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2. Scientific Matters

2.1 Standard Shear Testing Technique

Since its inauguration the EFCE Working Party on the Mechanics of Particulate Solids has been concerned with the characterization of bulk solids for flow. In 1989 the project came to generate the first world wide accepted standard for shear testing, known as the "Standard Sheer Testing Technique"!
It describes the preparation of shear testing samples, the operation of shear tests and the interpretation of shear testing data. In this respect it is much more concise than the later standards which were generated from it:

ASTM-D6128: "Standard Shear Testing Method for Bulk Solids Using the Jenike Shear Cell",

ASTM-D6773-02: "Standard Shear Test Method of Bulk Solids Using the Schulze Ring Shear Tester".

While the above documents provide an international standard, their use in Laboratories and by lab technicians in many EFCE countries is hampered by the language barrier. Therefore the Working Party on the Mechanics of Particulate Solids has started to provide national language documents on shear testing. It started with an undated German version of the original Standard Sheer Testing Technique which has been completed in 2004 and is currently in the process of being published by DECHEMA.

## 2.2 Glossary

In conjunction with the British Materials Handling Board (BMHB) the Working Party on the Mechanics of Particulate Solids also developed a glossary of solids handling terms. This long ongoing work has been led by the British delegate Lyn Bates, who also arranged for the final manuscript to be published by the BMHB.

## 2.3 Relevant Trends

The field of the Working Party on the Mechanics of Particulate Solids has seen two major trends in the last couple of years:

a) the drive to smaller (nano)particles.
b) the wide use of Discrete Element Methods.

While nowadays nobody seems to be doing anything worth talking about which is not "nano", the handling of such powders is looked at rather seldomly. The DFG-Schwerpunktprogramm "Handhabung hoch disperser Pulver (Handling of highly disperse powders)" in Germany devoted only two of its eight subject areas to its nameplate activity. Of the others, two were on particle formation and one each on coatings, suspensions, mixing and sintering. Nevertheless, to become truly successful dealing with nano-particles, we have to learn how to handle them.

Discrete Element Methods, developed around 1984 by Cundall and Strack from older Molecular Dynamics work, have started to impact the field of the Mechanics of Particulate Solids in the 1990's. For the last four years they have carried the largest part of the research effort for bulk solids. By now we have ways of dealing with inter-particle cohesive forces, liquid bridges, non-spherical particle shapes and particle-wall interactions. What is still missing, is the development of a meta structure representing a cluster of particles, since the idea of representing each particle individually in a computer simulation still overwhelms today's most powerful computers.

# 3. Administrative Matters

## 3.1 Date of election and term of office of the Working Party/Section Chairman and Secretary

Current Chairman: Dr. Hermann J. Feise

Election Date: 26.03.2002
Inauguration: 23.07.2002
Term End: 14.07.2005

3.2 Date and venue of the last scientific and business meetings

Technical and Business Meeting: 15.03.2004, Nürnberg, Germany

3.3 Next main thematic scientific European and World events

The Working Party on the Mechanics of Particulate Solids has been able to initiate a topic on "Particulate Systems" for the upcoming World Congress of Chemical Engineering held in Glasgow from 10 – 14 July 2005. The Working Party Chairman Dr. Feise serves as a topic leader. The topic is placed within the section on "Advancing the Fundamentals" led by Prof. R. Ocone.

The Working Party intends to sponsor the 5th International Conference of Conveying and Handling of Particulate Solids in Sorrento, Italy during August 2006.

3.4 Awards and prizes

None

Ludwigshafen, den 22.12.2004

Hermann Feise