VI. Laboratory of Powder Technology and Multi-phase Flow

I. Location of the laboratory:

Research, Education and Innovation Centre of Earth and Environmental Science
University of Miskolc building C/2 hall 1

II. Operating institute of the laboratory:

Institute of Raw Material Preparation and Environmental Technology

III. Scientific head of the laboratory:

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IV. Responsible researcher/person:

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V. The aims and tasks of the laboratory on the education, scientific and research fields:

The laboratory was established for the examination of the basic phenomena of mechanical process engineering. Measurements of particle motion in fluids, in one and multi-phase media. Examination of solid – gas and solid – liquid two-phase flow in pipes and the rheological properties of continuum like suspensions. Examination of separation processes in different flow separators. Characterization and analysis of fine powders, examination, modelling and computer simulation of compacting. Development of processes and equipment. Place of practical education of the following subjects: in BSc level: „Basics of processing", „Design and operation of waste processing plants", „Preserve of air cleanliness", „Sampling and quality control", in MSc level: „Flow of mixtures, design of multi-phase systems", „Mechanical process engineering I-II-III" and „Dust separation".

VI. Laboratory experiments, services (on-site experiment is possible):

Examination of solid – liquid mixtures

- Basic research before designing plants. Physical material testing: (particle size distribution, density distribution, particle shape distribution, specific surface, porosity, bulk density, etc..). Measurements of suspension rheology. Pilot scale testing of hydraulic transport. On-site plant testing of wet technologies.

Examination of solid – gas mixtures

- Basic research before designing plants. Physical material testing: (particle size distribution, density distribution, particle shape distribution, specific surface, porosity, bulk density, etc..). Laboratory examination of dust separators. On-site plant testing of pneumatic transport and dust separation.

Powder technology

- Fundamental measurements (Freeman FT4 powder shear test) for the design and control of powder technology equipment, feeders, silos, etc..

VII. Available equipment for education, research and innovation

Computer data acquisition systems

- DAQ cards (100 … 200 kHz, 12 … 16 bits)
- AC and DC measuring amplifiers
- LabWindows CVI data acquisition software

Sensors and transducers for liquids

- No dead space gauge pressure transducers: ATM, IFM, Labom, Hottinger 1 … 10 bar
- Differential pressure transducers: Hottinger 0.01 … 2 bar
- Inductive flow transducers: Kaliber NA 25 … 50
- Polysius ultrasonic flow meter (0 … 8 m/s)
- UVP Duo ultrasonic flow meter (for measuring velocity profiles in max. 3 m length and 1 mm resolution)
- Force transducers: Kaliber 50 … 1000 kg
- Torque transducers (0 … 20 Nm)

Sensors and transducers for gases

- Differential pressure transducers (0 … 5000 Pa)
- Prandtl and Pitot tubes
- Different manometers (tilted and U tube, etc..)

Other equipment

- Anton-Paar rotational rheometer, cylinder – cylinder and cone – plate measuring systems (10 … 1000 mPas)
- Tube rheometer (100 l sample, Diameter = 16, 21, 29 mm pipes)
- Höppler (settling ball) viscometer (50 cm^3 sample).
- Stromer viscometer.
- Propeller mixer test rig (10 l sample)

- Floating bodies density measuring set for liquids (50 floating bodies, 700 …. 3000 kg/m3)
- Jenike shear tester
- Porosity measuring device for compacted powders.
- Denver dust cyclone measuring rig
- Sartorius Porticon dust imission measuring device
- Griffin device for measuring specific surface
- Blaine device for measuring specific surface
- UNIPAN revolving propeller homogenizator
- Device for measuring drag coefficient of particles in air flow (pipe diameter: 300 mm).

VIII. Laboratory development plan, requirements:
Further development of instrumentation and DAQ programming.

IX. Main professional partners / references:
Enexio Kft.; Ventifilt Légtechnikai Rt.; 3B Hungária Kft.; .A.S.A Magyarország Kft., Felső-Bácskai Hulladékgazdálkodási Kft., Weir Minerals,

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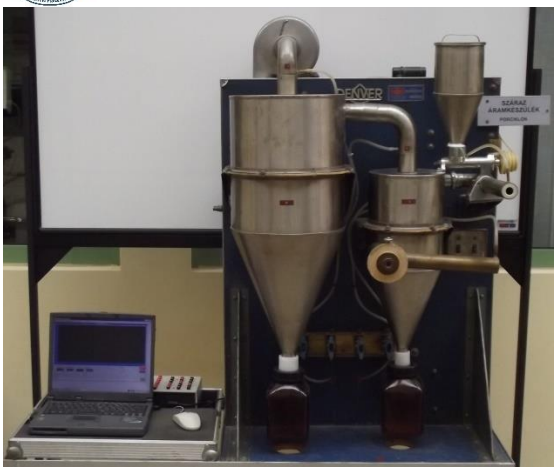
Photos:


Höppler viscometer


Permeability tester



Dust cyclone test rig

Anton Paar rotational rheometer

Miskolc, 19 June 2024