



Laboratory of Comminution and Classification Comminution Laboratory Unit

- 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:

Ádám Rácz, PhD, associate professor
3515 Miskolc-Egyetemváros A/4 II. 207
Telephone: +36-46-565-111/22-73
e-mail: adam.racz@uni-miskolc.hu
- IV. Responsible researcher/person:

Izabella Márkus, assistant research fellow
3515 Miskolc-Egyetemváros C/2 building, 1. hall
e-mail: izabella.markus@uni-miskolc.hu
- V. The aims and tasks of the laboratory on the education, scientific and research fields:

The main research tasks are the examination of the basic phenomena of crushing and grinding, grinding kinetics, mechanical activation, preparation of mineral raw materials (coal, ores, non-metallic raw materials, clinkers, glass, etc.) by comminution and comminution of waste materials (metal-containing waste, glass, construction and demolition waste, plastics, rubber) as well as determination of the grindability, experimental investigation of comminution, modelling and computer simulation of the comminution process and cycles.

Tasks of education and research:
Laboratory classes for students in both B.Sc. and M.Sc. level.
Laboratory training for postgraduate courses.
Laboratory background for PhD students.
Laboratory background for domestic and international R&D programmes.



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

- Determination of Bond's work index and Hardgrove's grindability index.
- Conducting high temperature (max. 200 °C) and special media (acid, alkali) grinding experiments.
- Examination of open and closed circuit grinding.
- Laboratory testing and modelling of comminution-classification cycles.
- Measurement of the recorded electric power and work of the listed comminution machines to determine the specific grinding energy requirement of different materials.
- Mechanical activation of various industrial wastes (EAF dust, coal power plant fly ash).
- Sample preparation for analytical purposes.
- Comminution of waste and primary raw materials to liberate valuable components.
- Development of comminution machines.
- Experimental examination, measurement and evaluation of the operation of crushers, mills and shredders.
- Dimensioning of comminution machines.

VII. Available equipment for education, research, and innovation

- Self-developed Bond mill equipped with frequency converter, heatable mantle and energy meter.
- Laboratory, industrial-semi-industrial size jaw crusher (PE 02), impact crusher (RTE 24/18) and hammer crusher (10 693) - Jászberényi Comminution Machine Factory, Jaw crusher (Krupp Nr. 4659); Hammer mills (VEB Maschinen und Apparatenbau 19 h and VEB 21 h, 5-100 kg/h); Self-built hammer crusher; Vertical axis impact crusher - BARMAC DUOPACTOR 2400 (semi-operational size).
- Semi-industrial size PALLA 200OUT vibration mill manufactured by Humboldt Wedag - processing capacity 50...100 t/h, available fineness: $x_{50}=5...10 \mu\text{m}$; Laboratory vibrating mill 4/24 – KUTESZ; Kolloid mill J. V. 10 – Kolloid Technik.; Beating rod mill 26 – Prerovske Strojirny.
- Porcelain ball mill and iron bar mill LE 101 – Laboratory Equipment Factory Budapest.
- Collar route.
- Retsch planetary mill.



- Vertical (Jászberényi Shredder Factory. 200x100) and horizontal axis cutting mill for the comminution of non-brittle materials ($x_{50} \approx 2 \mu\text{m}$ for the product).
- Retsch radial gap rotary shear mill for the production of fine grinds ($< 250 \mu\text{m}$).
- Continuous operation dry ball mill: $D \times L = 400 \times 800 \text{ mm}$. Processing capacity: approx. 10...30 kg/h.
- Axial gap rotary shear ($P = 2 \times 11 \text{ kW}$): for shredding PET bottles, paper, wood, household waste, plastics, electronic wastes, battery wastes.

VIII. Main professional partners / references:

- Omya Hungária Ltd.,
- Cemkut Ltd.,
- Vertikál Ltd.
- Biokom Ltd
- Basalt Középkő Kőbányák Ltd.,
- Colas Északkő Banyászati Ltd

IX. Compiler of the information material:

Ádám Rácz



jaw crusher, impact crusher

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