

**Raw material preparation and waste preparation laboratory,
Gravitational Enrichment Laboratory Unit**

I. Location of the laboratory:

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

II. Operating Institute of the laboratory:

Institute of Raw Material Preparation and Environmental Technology

III. Scientific head of the laboratory:

Imre Gombkötő, PhD,

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IV. The aims and tasks of the laboratory on the education (BSc, MSc), scientific and research fields:

The laboratory aims to investigate the characteristic physical properties (mechanical properties, density, and particle size) of coarsely dispersed systems (minerals and waste, aggregates) and the basic and applied research on the basic separation phenomena based on the variation of these properties, the enrichment of primary and secondary raw materials and the separability of components. The results of the studies can be used for the development of separation technologies, process optimization, and the development of new processes and equipment.

Tasks of education and research:

- Laboratory exercises for students, in both Bs.C and Ms.C.
- Manual training for postgraduate courses
- Laboratory background for PhD works
- Laboratory background for domestic and international R&D programs

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

In the laboratory, it is possible to study the separability of the particles forming a granular mass by density and sinking velocity in both gravitational and centrifugal fields and to determine different yield values (mass yield, constitutive yield) for given operating parameters. The equipment in the laboratory are suitable for testing different sensor systems, for testing the density enrichment of not identified materials, and for carrying out demonstration measurements in the practical training of further courses.



V. Available equipment for education, research, and innovation:

- Hydraulic piston press
- Vibrating desk (wet)
- Aero table
- Humphrey – spiral
- Pneumatic power device
- Surface wet power device
- Enrichment hydrocyclone, vortex tube, and enrichment centrifuge
- Heavy-suspension enrichment bath
- Concentrating vortex tube
- Knelson separator
- Heavy medium enrichment device
- Modeling software, such as MOD-SIM, USIM PAC
- Laboratory fluid bath separator (dry heavy medium separator)

VI. Laboratory development plan:

An important element in the progress of the laboratory is the development of facilities to preserve and maintain existing equipment and to facilitate this. In any case, an important area is the provision of logistics units, systems, and space for sample loading of test systems, product removal, and appropriate sample storage, considering occupational health and safety aspects of the operation.

- In the area of fine particle processing, the development of centrifugal concentrators and potential acquisitions in this field are important: multi-gravity concentrators, Falcon concentrators, and centrifugal settling equipment.
- Another important development is the simultaneous availability of equipment capacities in small laboratory sizes (for basic and educational measurements) and larger semi-industrial sizes.
- The third development direction is the development of instrumentation for appropriate sensor and measurement data acquisition systems and compatibility with modeling software, the development of a modeling software park, and competences.



VII. Main professional partners/ references

Our laboratory has worked with several national and international partners in the past and is currently working with the following partners as references:

- Fe-Group Ltd., Alcufer Ltd.; Mirehuköz Ltd.; Nemark Hungária Ltd.; Bay Zoltán Nonprofit Ltd.

VIII. Author of the informational material: Ildikó Fóris, Imre Gombkötő (PhD)

Photos:

