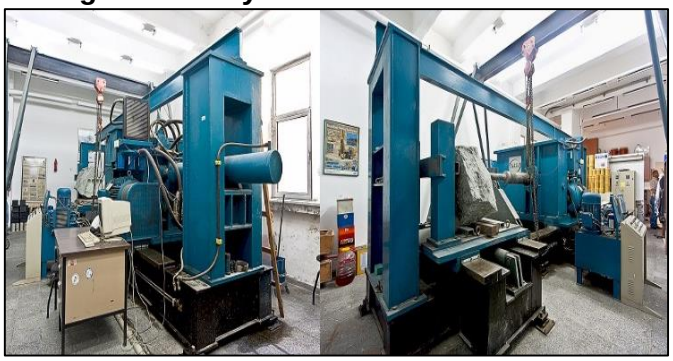
ITU Faculty of Mines Mining Engineering Department Laboratories

Our laboratories are renewed in 2010 to present our students more convenient conditions for their research work and develop their skills during their education.

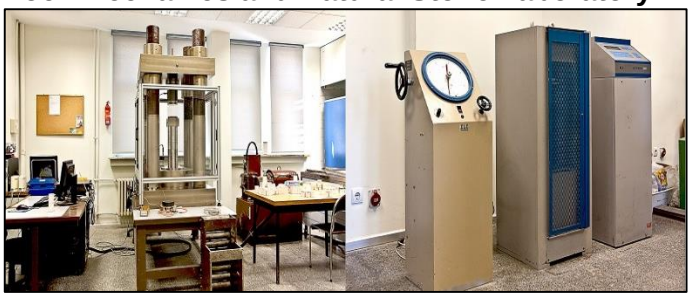
Drilling Laboratory



This rig can perform drilling and boring tests up to 1 m in diameter. Cutterhead rotational speed can be varied up to 80 rpm, the power is 132 kW, a thrust of 50 tons may be obtained, and it is possible to apply a lateral force up to 20 tons. Cutterheads and drill bits up to l m in diameter can be tested and the cutting actions of a roadheader or drum shearer can be simulated by moving the rock sample sideways with a hydraulic actuator. Penetration rate, thrust, torque, rotational speed can be measured during testing by a computer based data acquisition system. Any combination of thrust and rotational speed can be set precisely and maintained during testing. This rig enables to test the performance of any type of tri-cone bits, coring bits, reaming bits, the cutting head of small diameter tunnel boring machine, roadheaders and shearers or to help to design a machine to give less fines.

Laboratory Lecturers:
Assoc.Prof.Dr. Ömür Acaroğlu Ergün (acaroglu@itu.edu.tr)

Rock Mechanics and Natural Stone Laboratory

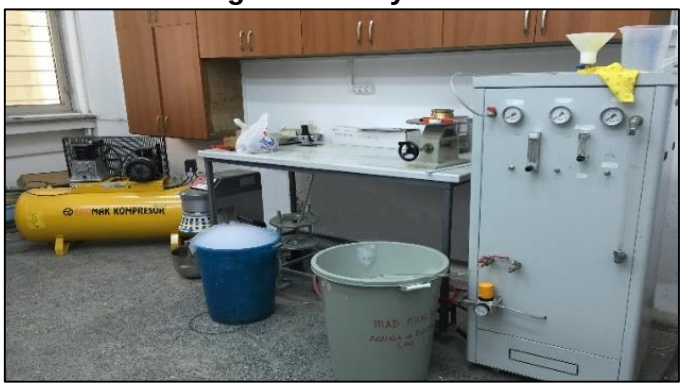


In this laboratory physical and mechanical properties of rock samples, taken from the surrounding rocks of underground structures (galleries, tunnels, underground openings) and natural building stones like marble, travertine, are determined.

Physical Properties tests like Density, Porosity, Water absorption, Seismic Velocity (PUNDIT), Permeability, Slake Durability Index, Swelling Index and Mechanical Properties and index tests like Uniaxial Compressive Strength (including Modulus of Elasticity and Poisson's Ratio Determination), Indirect Tensile Strength, Direct and Indirect Shear Strength, Triaxial Compressive Strength, Point Load Strength, Bending Strength, Impact Strength, Schmidt Hammer Hardness Index, Mohs Hardness Index, Abrasiveness Index, Shore Hardness Index are carried out in the laboratory.

Laboratory Lecturer:
Assoc.Prof. Dr. Hakan Tunçdemir (tdemir@itu.edu.tr)

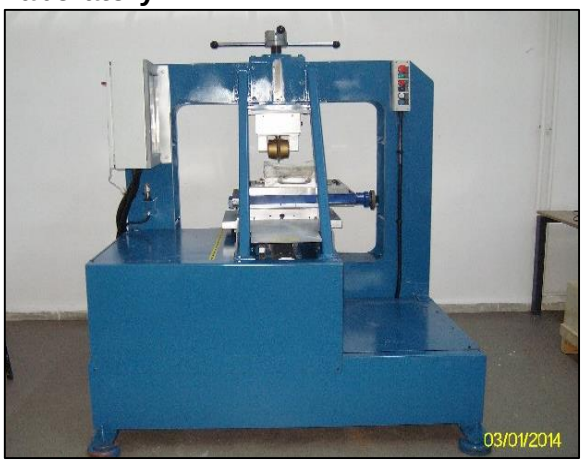
Soil Conditioning Laboratory



In recent years, shielded and earth pressure balanced tunnel boring machines able to balance rock and hydrostatic pressure, thus, capable of providing stability are utilized in order to solve stability problems and undesired deformations in soft formations and excavations in tunnel and mine galleries. In these eqipments, excavated material is conditioned in front and spaces of cutting head and in auger conveyor by mixing with special foams(air+water+foam chemicals+polymers), therefore, the deformations, wearing of cutters and metal assemblings and torc-compressive forces are minimized to increase excavation rate. Accordingly, the design and optimization of the foam used directly affects performance and costs of these equipments. In this laboratory, according to the formation and soil specimens taken from the field, most appropriate foam design is produced by performing several tests.

Laboratory Lecturer:
Prof. Dr. Hanifi Çopur (copurh@itu.edu.tr)

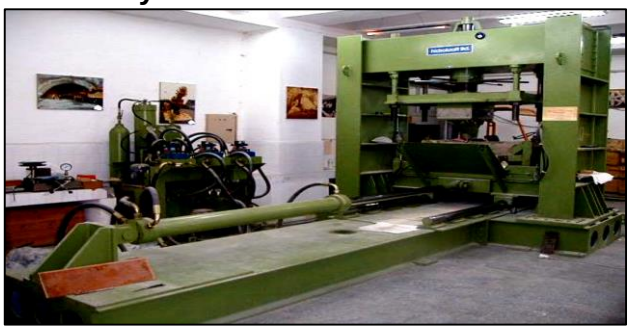
Advanced Mechanical Excavation Technology Laboratory



Portable linear cutting machine (PLCM) developed in scope of Tubitak project having number of 112M859 is utilized to determine excavation equipment selection, design and performance estimation. Without the need to large rock blocks, this equipment is able to perform experiments on small rock blocks and cores. Cutting tests with different cutters (V, CCS, conical and chisel cutters) can be performed. By using this set, in order to determine optimum values of cutting head design and performance estimation, significant parameters such as spacing of cutters and cutting depth can be adjusted easily and optimum excavation conditions can be specified. This developed test set was sold to "National Technical University of Athens, School of Mining Engineering & Metallurgy, Greece" and "Universit of New South Wales, School of Mining Engineering UNSW Sydney, Australia".

Laboratory Lecturer:
Prof.Dr. Cemal Balcı (cemalb@itu.edu.tr)

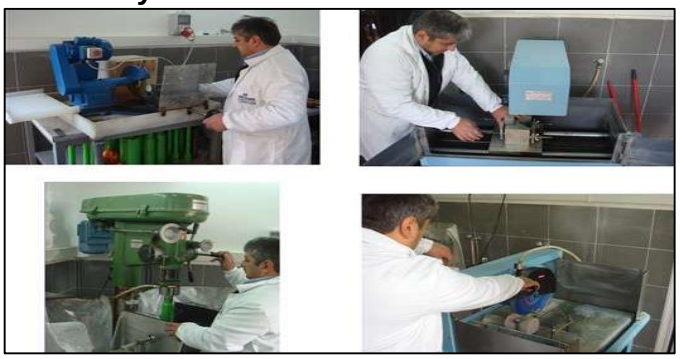
Excavation Technology and Mining Machinery Laboratory



This laboratory was created for the specific purpose of providing the tunneling and mining industries with solid solutions to practical problems, for this reason we test the rock and determine its cuttability and drillability characteristics in actual conditions. The laboratories contain a selection of equipment that allows physical testing of every type of commercially available rock cutting or drilling tools at full scale. A group of experienced staff can produce solutions to excavation projects of mining and construction sector as 'Selection of Excavation Equipments, Design, Performance Optimisation, Performance Estimation, etc.'.

Laboratory Lecturer:
Assoc.Prof. Dr. Deniz Tumaç (tumacde@itu.edu.tr)

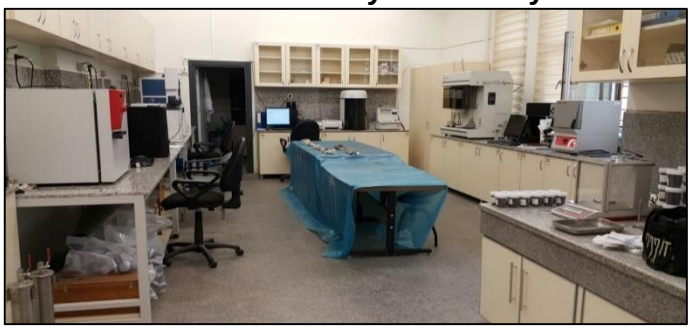
Sample Preparation and Rock Cutting Laboratory



This laboratory is used to prepare rock specimens for mine machinery and mechanization laboratory in order to determine the cuttability and wearability of rocks.

Workshop Manager: Tech. Hurşit Bolat (hbolat@itu.edu.tr)

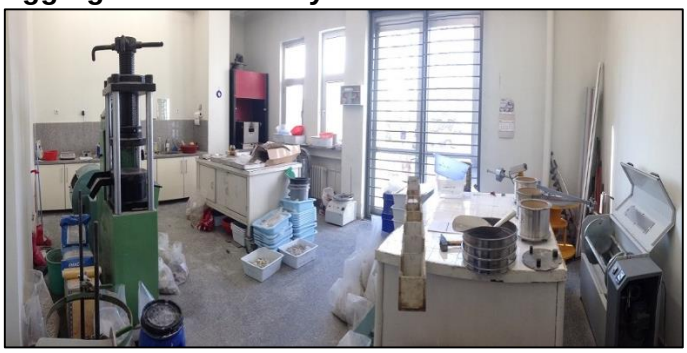
Mine Ventilation and Safety Laboratory



In order to provide a safe and healthy working environment in mines, it is necessary to investigate the physical properties of air and the subsurface mine environmental conditions. It is possible to investigate the Measurement of the characteristics of mine air, measurement of the characteristics of mine climate parameters, dust measurements, determination of coal and rock formations' gas content and composition, gas composition analysis, investigation of coal properties related to gas and coal outbursts, planning ventilation networks and solution of ventilation network problems.

Laboratory Lecturer: Assoc.Prof.Dr. Abdullah Fişne (fisnea@itu.edu.tr)

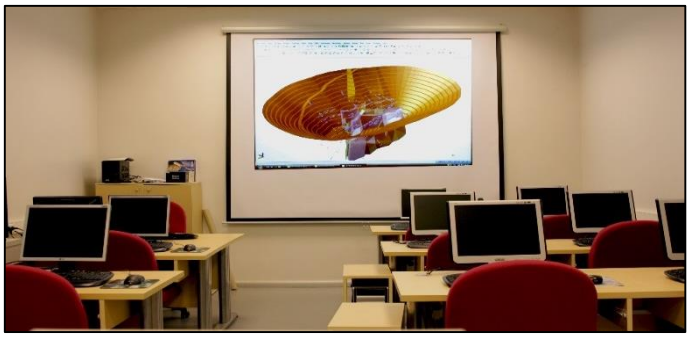
Aggregates Laboratory



In this laboratory, mechanical and physical properties of aggregates are tested in order to determine their quality for the standards. Laboratory equipments are Los Angeles drum to determine abrassion resistance, impact strength test equipment, a crusher for sample preparation, gravel screen and several other apparatus. Physical property tests including particle size distribution determination (sieve analysis, fine materials), particle shape determination, Los Angeles abrassion resistance, aggregate abrassion resistance against impact, flakiness index, resistance to freezing, specific gravity and water absorption, grading of sands and gravels, unit weight and pore space, crushability index etc. are carried out in this laboratory. In order to test the briquetting quality of Turkish coals there are also several testing apparatus in the laboratory.

Laboratory Lecturer:
Assoc.Prof.Dr. C. Atilla Öztürk (ozturkc1@itu.edu.tr)

Computer Aided Mine Design and Planning Laboratory



In this laboratory, by using software such as Micromine and Vulcan, underground and open pit design and planning are conducted. After modeling the ore body in 3D, reserve amount is calculated by using geostatistics. 3D Open pit and underground designs and planning works are made by utilizing these softwares. For subsidence prediction, 2D and 3D finite elements softwares and Plaxis, 3D Tunnel are available. Also, rock and soil mechanics slope stability analysis is done in computer environment.

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