Quality control techniques in Materials engineering laboratories activities (36h)

Activities/workshop	Instrument/equipment	How the student is involved
Tensile test on metallic materials	Tensile machine by Zwick-Roell	Observation of the test
Data manipulation from real tensile test	Spreadsheet software	The student learns how to determine mechanical properties and materials constants from real world raw data
Macro Hardness and micro hardness tests	Micro-Vickers Leica MVH1200 Macro hardness EMCO-TEST Optical Microscope Leica MEF4	Direct measurement and familiarization with hardness assessment of different materials as well as carburized steel hardened cases
Thickness measurements	Use of different calipers to measure thickness of samples	Direct measures of real components
Image analysis applied to real microstructures	Personal computers or ITlab computers running ImageJ / Fiji	Creation of binary images from ordinary micrography and real-world application involving image analysis

Pictures of the pieces of equipment available during the workshop