



LIST AND PRICE LIST OF RESEARCH EQUIPMENT - UNIVERSITY OF LJUBLJANA FACULTY OF MECHANICAL ENGINEERING

No.	Equipment administrator	Naziv opreme	Full name of equipment	Purchasing year	Access to equipment/ contact	Purpose of equipment and additional information	Price per hour (EUR - VAT not included) *
1	prof. dr. Edvard Govekar	Sistem za vizualno karakterizacijo obdelovalnih procesov in parametrov	System for visual characterisation of manufacturing	2002	The equipment is available in the laboratory and is available to several users under the supervision of a qualified member of the research group. Contact: edvard.govekar @ fs.uni-lj.si	Equipment is used for visualization in the visible and infrared spectrum.	45,00
2	prof. dr. Iztok Golobič	Hitrotekoči sistem za spremljanje dinamičnih in termičnih procesov	Fast speed fluid system for monitoring dynamical and thermo processes	2002	Via web or e-mail contact iztok.golobic @ fs-lj.si the equipment is available together with the operator. The reservation is needed at least 3 days before.	Follow-up fast and extremely fast phenomena in laboratory, industrial and natural environment when you recorded with tens of thousands of frames per second. Allows you to record even through a microscope up to 1500 times zoom.	45,00
3	prof. dr. Mitjan Kalin	Naprava za raziskavo fretinga s pripravajočo opremo za analizo površin	Fretting test rig with equipment for contact surface analysis	2003	Equipment is available at CTD, Bogišičeva 8 with preliminary arrangement Contact: mitjan.kalin@fs.uni-lj.si	The equipment is intended for the research of fretting wear mechanism, which arises at high frequency and high amplitude oscillations in micrometre domain.	45,00
4	prof. dr. Janez Možina	Laserski izvori z opremo	Laser sources with equipment	2003	Access to equipment is in the domain head of the Laboratory. Contact: janez.mozina @ fs.uni-lj.si	Laser sources with equipment designed for research of laser machining processes and laser measurement methods.	45,00
5	prof. dr. Mitjan Kalin	Naprava za analizo degradacije biološko razgradljivih olj	Instrumentation for degradation stability analysis of biodegradable oils	2003	Equipment is available at CTD, Bogišičeva 8 with preliminary arrangement Contact: mitjan.kalin@fs.uni-lj.si	The instrumentation is intended for analysis of stability of biologically degradable and other oils and greases with emphasis on degradation stability.	45,00
6	prof. dr. Igor Emri	Sistem za analizo mikrodeformacij submikronskih vlaken pri termomehanskem obremenjevanju s pulznim laserjem	System for analyzing of microdeformations submicronic fibers by thermo-mechanical loading with pulse laser	2003 / 2004	Access to equipment is in the domain head of the Laboratory. Contact: cem@fs.uni-lj.si	The main purpose of equipment is specimen morphology investigation. It can be done at magnification up to 100x10 at transmitted or reflected light. Additional equipment allows also investigation at elevated temperature, up to 350°C, temperature scan from 0.01 to 30°C/min and sample preparation.	45,00
7	prof. dr. Janez Kopač	Skenirna naprava CYCLON S TIPALI	Cyclone scanning device with sensors	2003	Access to the Cyclon scanning device is possible on a rent bases. Condition for a rent is that with equipment handled qualified operator and that a rent is paid after use of equipment. Contact: janez.kopac@fs.uni-lj.si	Renishaw Cyclone 2 scanning device is independant unit for very precise 3D-scanning and measuring tasks outside the production lines. Enclosed software offers a lot options concerning different ways to gather data from unknown 2D- profiles and 3D-surface.	45,00

No.	Equipment administrator	Naziv opreme	Full name of equipment	Purchasing year	Access to equipment/ contact	Purpose of equipment and additional information	Price per hour (EUR - VAT not included) *
8	prof. dr. Iztok Žun	CTA anemometer	Constant Temperature Anemometer	2003	Access to equipment is in the domain of the Head of Laboratory. Contact: iztok.zun@fs.uni-lj.si	CTA anemometer allows measurements of local velocity dynamics in gases and liquids.	45,00
9	prof. dr. Brane Širok	Dvokomponentni laserski Dopplerjev anemometer	Two component lase Doppler anemometer	2005	Equipment is available by arrangement with the Head of the laboratory. The equipment can be rented stupaj the operator. Contact: brane.sirok @ fs.uni-lj.si	The equipment is intended to measure the velocity of fluid flow. The laser power is 5W. The probe uses an optical fiber. Can be used in rotating systems.	45,00
10	prof. dr. Janez Grum	Sistem za popis integritete površin po mehanski in toplotni obdelavi	System for survey of surface integrity after mechanical and thermo processing	2006	Monday - Friday, when the equipment is available. Contact: janez.grum @ fs.uni-lj.si	SEM - electron microscopy, EDS analysis, WDS analysis, tensile test up to 45 kN, bending and pressure testing, testing of glued and welded joints, fatigue testing, to determine / or nec. crack propagation speed, determine the resistance of materials and surface protective layers against corrosion. The possibility of using different types of corrosive media with different concentrations.	45,00
11	prof. dr. Marko Nagode	Eksperimentalna oprema za verifikacijo obratovalne trdnosti	Zwick HB100 in Zwick T1-FR005TEW.A50	2005	In relation to procedures and conditions, please contact the administrator of the equipment. Contact: marko.nagode @ fs.uni-lj.si	The equipment is intended for static (up to 5 kN) and dynamic (up to 100 kN) testing of specimens of rubber and air springs. The temperature chamber from -80 ° C to 250 ° C.	45,00
12	prof. dr. Igor Emri	Modificiran ekstruder z regulacijo termo-mehanske obremenitve materiala	Modified extruder with regulation of thermo-mechanical load of material	2005	Possible in accordance with the agreement, contact: cem@fs.uni-lj.si	Extruder is designed for extrusion of powder and plastic granules in a temperature range between room temp. and 400 ° C. Extruded material may have circular or tape shape.	45,00
13	prof. dr. Marko Nagode	Merilna in računalniška oprema za specialna razvojna vrednotenja	Mesurement and CAE equipment for special R&D evaluations	2005	Access to the equipment have industry development center CRV and other partners in the laboratory LAVEK UL-FS, with which we cooperate on joint development and research projects. Contact: marko.nagode@fs.uni-lj.si	Measurement and computer equipment that was purchased as part of the package 12, is intended solely for the experimental and numerical evaluation of the behavior of structures, which are burdened with extreme mechanical stress (eg, vehicle collision). The experimental equipment comprises triaxial with universal modules for signal conditioning, speed camera and laser sensor displacements. Equipment for numerical scale software for the simulation of highly dynamical phenomena, and the appropriate extension hardware.	45,00
14	prof. dr. Mitjan Kalin	Oprema za raziskave in karakterizacijo obrabnih mehanizmov na področju nanotribologije	Equipment for investigation and characterization of wear nano-tribological mechanisms	2005	Equipment is available at CTD, Bogišičeva 8 with preliminary arrangement Contact: mitjan.kalin@fs.uni-lj.si	The equipment provides means of research for nano-scale wear mechanisms, which involves loads in nN range and strokes in the 10 nm - 10 μm range. The equipment provides possibilities for research and characterization of nano-scale tribological processes for different types of materials, surface layers and surface treatment with emphasis on interactions between surface and lubricant.	45,00
15	prof. dr. Jožef Duhovnik	Laserski merilnik	Laser scanner Kreon Zephyr KZ 50	2005 / 2006	Direct contact with the administrator, each case is handled separately. Contact: joze.duhovnik @ fs.uni-lj.si	The equipment is intended for research in the measurement of free form surfaces.	45,00
16	prof. dr. Franc Kosel	Temperaturna komora z zahtevanim priborom, merilno in programsko opremo za mehansko analizo inteligentnih gradiv	Temperature chamber with required equipment, mesurement and programm equipment for analyzing intelligent elements	2005	Access to equipment is in the domain head of the Laboratory. Contact miha.brojan@ fs.uni-lj.si	It is used to analyze the mechanical properties of materials.	45,00

No.	Equipment administrator	Naziv opreme	Full name of equipment	Purchasing year	Access to equipment/ contact	Purpose of equipment and additional information	Price per hour (EUR - VAT not included) *
17	prof. dr. Janez Možina	Laserska izvora z opremo	Laser sources with equipment	2005	Access to equipment is in the domain head of the Laboratory. Contact janez.mozina @ fs.uni-lj.si	Laser sources with equipment designed for research of laser machining processes and laser measurement methods	45,00
18	prof. dr. Miha Boltežar	Izvor vibracij srednje moči	Electrodynamic shaker	2005	Direct contact with the head of the lab. Contact :miha.boltezar@fs.uni-lj.si	Vibrational testing of products, force amplitude at sine excitation is 35 000 N. Controller allows also broadband and impact testing.	45,00
19	prof. dr. Edvard Govekar	Sistem za karakterizacijo tehnoloških procesov	System for characterization of technological processes	2004 / 2005	Direct contact with the administrator for each case. Contact edvard.govekar @ fs.uni-lj.si	The equipment used in capturing and analyzing data.	45,00
20	prof. dr. Alojz Poredoš / prof. dr. Vincenc Butala	Merilna oprema za merjenje temperaturnih polj (termovizijska kamera)	FLIR ThermoCAM S65 - FLIR Systems	2006	Possible renting for max. 3 days. Contact: alojz.poredos@fs.uni-lj.si in vincenc.butala@fs.uni-lj.si	Infrared camera for contactless measurements of the surface temperatures.	45,00
21	prof. dr. Iztok Žun	Tlačni senzor s procesno enoto	Pressure sensor processing unit	2004	Access to equipment is in the domain of the Head of Laboratory. Contact:iztok.zun@fs.uni-lj.si	Optical sensor allows local measurements of pressure dynamics in fluids.	45,00
22	prof. dr. Brane Širok	Kavitacijski tunel	Cavitation tunnel	2007	Equipment is available by arrangement with the Head of the laboratory. The equipment can be rented together with the operator. Contact: brane.sirok @ fs.uni-lj.si	The cavitation tunnel allows measurements at flows to 100 m ³ / h. Test section size is 1000x100x100 mm. The cavitation tunnel offers the possibility to work at temperatures down to 80 ° C. It is possible to replicate all the integral parameters of the station.	45,00
23	prof. dr. Igor Emri	Sistem za refunkcionalizacijo konstrukcijskih polimerov	System for refunctionalizing of construction polymers	2007 / 2008	Access to equipment is in the domain head of the Laboratory. Contact: cem@fs.uni-lj.si	The main purpose of equipment is investigation of a material rheology in compliance with ISO 3219 and ISO 6721. Besides that, also shear creep/relaxation characterization can be performed.	45,00
24	prof. dr. Miha Boltežar	Temperaturna komora za stresalnik	Temperature chamber	2007	Direct contact with the head of the lab. Contact e.miha.boltezar@fs.uni-lj.si	Temperature chamber allows simultaneous vibrational testing in controlled temperature environment in the range from -70deg. C up to 180 deg. C; temp. gradient is 5 deg/min.	45,00
25	prof. dr. Mirko Čudina	Akustična kamera s sistemom za modeliranje širjenja hrupa v prostoru in okolju	Acoustic camera with system for modeling the spread of noise in place and environment	2007 / 2008	Access to the camera is possible on a rent bases. Condition for a rent is that with camera handled qualified operator, this means by Assistant Professor Dr. Jurij Prezelj and that a rent is paid after use of camera. Contact: mirko.cudina@fs.uni-lj.si	By acoustic camera is possible to identified, localized and characterized sound sources in time and frequency domain, and so within an industrial environment, e.g. in production hall, as well as outdoors, outside the factory, e.g. heating plant.	45,00
26	prof. dr. Mitjan Kalin	Merilna oprema za on-line diagnosticiranje okvar na rotirajočih strojih	System for on-line detection and diagnostics of failures on rotating machines	2007	Equipment is available at CTD, Bogišičeva 8 with preliminary arrangement Contact: mitjan.kalin@fs.uni-lj.si	The detection and diagnostics system serves for the continuous condition monitoring of rotating elements of the experimental rig. This includes measuring of electrical quantities, rotating frequency, vibrations, temperature noise and characteristics of the cooling and lubrication agent. The system is comprised of instruments for acquisition and analysis of signals from vibrations, air and oil.	45,00
27	prof. dr. Mitjan Kalin	Naprava za izvajanje prilagojenih triboloških testov	Interchangeable machine for adjustable tribological testing	2009	Equipment is available at CTD, Bogišičeva 8 with preliminary arrangement Contact: mitjan.kalin@fs.uni-lj.si	Interchangeable machine for adjustable tribological testing. Enables the analysis of effects of small forces (mN), adsorbed boundary films, Van der Waals and electrostatic forces, meniscus forces etc.	45,00
28	prof. dr. Mitjan Kalin	Naprava za merjenje debelin "in-situ" mejnih mazalnih filmov v rangu nanometrijske skale	Traction machine for "in-situ" measurement of boundary lubricating films on nanoscale range	2009	Equipment is available at CTD, Bogišičeva 8 with preliminary arrangement Contact: mitjan.kalin@fs.uni-lj.si	Machine for in-situ measurement of boundary lubrication films in the nanometre range	45,00

No.	Equipment administrator	Naziv opreme	Full name of equipment	Purchasing year	Access to equipment/ contact	Purpose of equipment and additional information	Price per hour (EUR - VAT not included) *
29	prof. dr. Igor Emri	Sistem za karakterizacijo vedenja časovno-odvisnih materialov na nano in mikro skali (Nanoindenter – sistem za nanoindentacijo)	Nanoindenter – system for nano-indentation	2011	Possible in accordance with the agreement, contact: cem@fs.uni-lj.si	The Nano Indenter enables to measure Young's modulus and hardness in compliance with ISO 14577. System is upgraded with Continuous Stiffness Measurement module that allows dynamic properties characterization of different kinds of materials (metals, polymers, thin films, alloys, ceramics, etc.).	45,00
30	prof. dr. Janez Možina	Eksperimentalni laserski sistem za mikro-obdelave	Experimental laser based micro-machining system	2010	Equipment is available in the laboratory KOLT by prior arrangement with the administrator of the equipment. Contact:janez.mozina@fs.uni-lj.si	The equipment is intended for research into laser micro-processing and related optodynamic phenomena. Special emphasis is given to optimization of processes by using real-time measuring of process parameters.	45,00
31	prof. dr. Janez Kopač	Vertikalni rezkalni center - visokohitrostni obdelovalni stroj	High speed milling machine Sodick MC 430L	2011	Access to the high speed milling machine is possible on a rent bases. Condition for a rent is that with equipment handled qualified operator and that a rent is paid after use of equipment. Contact: janez.kopac@fs.uni-lj.si	CNC-machine (type: MC 430L) manufactured by SODICK , is used for research and education in the field of high-precision micro-milling and milling most challenging materials and complex geometries. A new generation of high-speed (HSC) milling centers combines linear drives in all axes, thus ensuring a high dynamic response of the machine (accelerations up to 10 m/s ²) and the highest level of precision processing in the field of micrometers in maximum spindle speeds (up to 40,000 rev / min). To operate the machine is very easy thanks to the new controller concept based on Windows XP-environment, which is combined with Sodick ovo movement control. All mentioned innovative technology combined into a CNC machine sets new standards for the next generation of micro-milling.	45,00
32	doc. dr. Tone Češnovar	Visokozmogljivi računski sestav HPCFS	External access to computing facilities is granted on the basis of agreement and price list for external users.	2010	External access to computing facilities is granted on the basis of agreement and price list for external users. Contact: leon.kos@fs.uni-lj.si	Computing cluster enables parallel solving of numerical problem that could take weeks and more on desktop computer. Cluster with 768 procesors can quickly solve such problems and provides results in a timely manner. Faster turnaround enables research that is on desktop computer nearly impossible.	45,00
33	doc. dr. Tone Češnovar	Programska oprema ANSYS za HPCFS	Usage of the software is linked to valid HPCFS access and project requiring such software based on the total available licences and academic research agreement with ANSYS for such use.	2011	Usage of the software is linked to valid HPCFS access and project requiring such software based on the total available licences and academic research agreement with ANSYS for such use. Contact: leon.kos@fs.uni-lj.si	ANSYS simulation software provides numerical finite element and finite volume simulations to the compute cluster. Multiphysics simulated includes static, dynamic, stability, temperature and heat transfer analyses of solids and fluids.	45,00
34	prof. dr. Mitjan Kalin	Profilometer optični 3D	3D optical interferometer	2012	Equipment is available at TINT, Bogišičeva 8 with preliminary arrangement Contact: mitjan.kalin@fs.uni-lj.si	3D optical interferometer can be used for the topographical analyses of smooth and rough surfaces with sub-nanometer resolutions. It can also be used for analyses of textured surfaces, analyses of wear mechanism and wear tracks, for the geometrical measurements, ...	45,00
35	prof. dr. Miha Boltežar	Kalibrator pospeškov z opremo	Accelerometer calibrator	2014	Possible in accordance with the agreement, contact: miha.boltezar@fs.uni-lj.si	The equipment allows one to calibrate accelerometers	45,00

UL FS
RR

No.	Equipment administrator	Naziv opreme	Full name of equipment	Purchasing year	Access to equipment/ contact	Purpose of equipment and additional information	Price per hour (EUR - VAT not included) *
-----	-------------------------	--------------	------------------------	-----------------	------------------------------	---	---

* Note: The price may change due to the use of specific tasks or complexity of preparation in case of additional requirements of the customer. For further information please refer to the contact person of the equipment.

Ljubljana, 28.1.2016