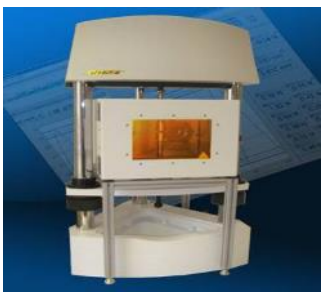
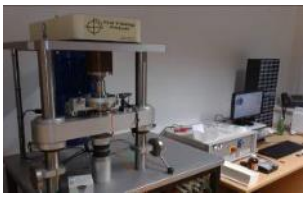
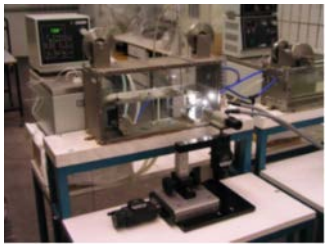
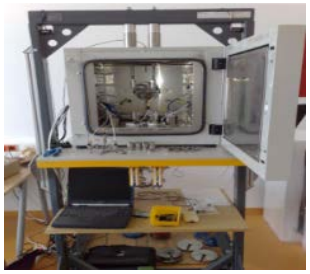
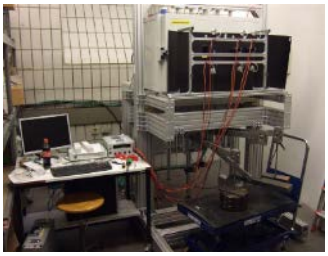
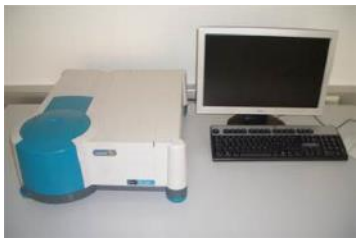
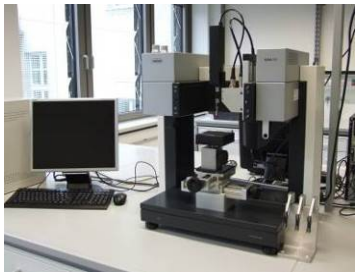
Mechanical Testing		
7 Universal testing machines incl. temperature chambers *(Zwick GmbH & Co. KG., Instron Deutschland GmbH.)* *Contact: S. Gloggnitzer* *stefan.gloggnitzer@unileoben.ac.at* *Materials Science & Testing of Polymers*	Tensile, compression and flexural testing, deformation measurement by various optical and contact extensometers. • Load range up to 250 kN • Displacement up to 1500 mm • Temperature range: -80 to 250°C	
8 Servo-hydraulic testing machines incl. temperature chambers *(MTS Systems GmbH.)* *Contact: J. Föttinger* *juergen.foettinger@unileoben.ac.at* *Materials Science & Testing of Polymers*	High-speed, high frequency and fatigue life analysis of polymers. • Impact-testing up to 6 m/s • Force up to 250 kN • Frequencies up to 300 Hz • Temperature range: -80 to 250°C	
Multiaxial component test field *(MTS Systems GmbH.)* *Contact: J. Föttinger* *juergen.foettinger@unileoben.ac.at* *Materials Science & Testing of Polymers*	Multiaxial high load component test field with 3 individual axes. • 15 kN, 250 kN and 1000 kN hydraulic actuators • Frequencies up to 100 Hz • Standard climate (23 °C/50 % rel.H.)	
Electrodynamic testing machine Bose 3450 *(Bose Corporation)* *Contact: F. Arbeiter* *florian.arbeiter@unileoben.ac.at* *Materials Science & Testing of Polymers*	High frequency and fatigue life analysis of polymers. • Linear and/or dynamic displacement control • Dynamic distance: +/- 12 mm • Force range up to 3,5 kN • Frequency up to 200 Hz • Temperature range: -80 to 250°C	
Electrodynamic testing machine BOSE 3230 *(Bose Corporation)* *Contact: M. Berer* *michael.berer@pccl.at* *Polymer Competence Center Leoben*	Axial and torsional dynamic mechanical analysis of polymers. • Normal resolution: +/- 450 N (axial) • +/- 2.8 Nm (torsion) • +/- 6.5 mm (axial) • +/- 100 ° (torsion) • max. 200 Hz • Temperature range: -160 to + 300°C	

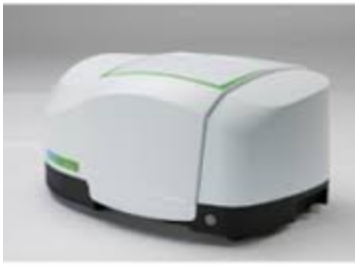
DMA 8000, PerkinElmer Dynamic mechanical analyser *(PerkinElmer Inc.)* *Contact: A. Rauschenbach (PCCL)* *astrid.rauschenbach@pccl.at* *Polymer Competence Center Leoben*	Thermo-mechanical material testing - single cantilever bending, dual cantilever bending, 3-point bending, tension, compression, shear, material pocket for testing of powder, mesh pockets, TMA mode, immersion studies (liquid environment). • Frequency 0,001 - 300Hz • Force ±0,002-10 N, resolution: 0,002 N • Temperature range: -190 to + 400°C • Displacement: 1-100µm, resolution: 1µm	
2 Dynamic mechanical analysers, DMA/SDTA861^e *(Mettler-Toledo GmbH)* *Contact: P. Guttmann* *peter.guttmann@unileoben.ac.at* *Materials Science & Testing of Polymers*	Thermo-mechanical material testing under tensile, bending, compression or shear loading. • Force range: 0.005 to 40 N • Frequency range: 0.001 to 1000 Hz • Temperature range: -150 to +500 °C	
2 Thermo-mechanical analysers, TMA/SDTA840/841^e *(Mettler-Toledo GmbH)* *Contact: P. Guttmann* *peter.guttmann@unileoben.ac.at* *Materials Science & Testing of Polymers*	Determination of the linear thermal expansion coefficient. • Max. specimens length: 20 mm • Measuring range: +/- 5 mm • Resolution: 10 nm • Temperature range: -150 to +600 °C	
Drop-weight-impact testing system *(Instron Deutschland GmbH.)* *Contact: F. Arbeiter* *florian.arbeiter@unileoben.ac.at* *Materials Science & Testing of Polymers*	Drop tower for high-speed and impact testing with anti-rebound mechanism. • 0.77 to 24 m/s • 0.6 to 1800 J • -70 to 150° C	
2 Impact testing pendulums *(CEAST GmbH., Zwick GmbH. & Co KG)* *Contact: F. Arbeiter* *florian.arbeiter@unileoben.ac.at* *Materials Science & Testing of Polymers*	For testing arrangements in izod, charpy and tensile impact. • 0.5 to 50 J • -70 to 150 °C	
Rotary tribometer, TE93 *(PhoenixTribology Ltd.)* *Contact: A. Hausberger (PCCL)* *andeas.hausberger@pccl.at* *Polymer Competence Center Leoben*	Friction and wear testing at component level. • Rotational movement • Force range from 1 up to 1000 N • Temperature range from 23 up to 200°C	

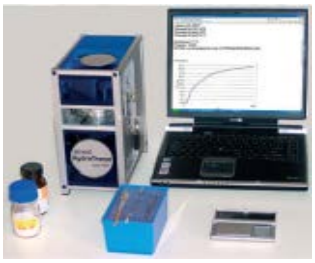
Universal Microtribometer UMT-2 *(Bruker Corporation)* *Contact: A. Hausberger (PCCL)* *andreas.hausberger@pccl.at* *Polymer Competence Center Leoben*	Local surface characterisation of friction and wear, scratch and indentation. • Rotational, linear and cyclic movement • Force range from 0.1 up to 500 N • Temperature range from 23 up to 150°C	
Pipe internal pressure tester *(self-made)* *Contact: F. Arbeiter* *florian.arbeiter@unileoben.ac.at* *Materials Science & Testing of Polymers*	Accelerated long-term property test for plastic pipes. • Pressurizing liquid water • 150 test stands • Up to 30 bar • From RT up to 110 °C	
2 fracture mechanical long-term testing machines *(self-made)* *Contact: F. Arbeiter* *florian.arbeiter@unileoben.ac.at* *Materials Science & Testing of Polymers*	For fracture mechanical long-term testing of various specimen geometries. • Testing environment: water, air • 5 test stands • Force up to 1,5kN • From RT up to 90 °C	
Testing device for creep-measurements *(Mechatronik Moharitsch)* *Contact: D. Tscharnuter (PCCL)* *daniel.tscharnuter@pccl.at* *Polymer Competence Center Leoben*	Analysis of creep behaviour via optical strain measurement. • 4 specimen • Tensile load • Force up to 1000N on each specimen • 23° to + 150°C	
Testing device for CRB creep *(Mechatronik Moharitsch)* *Contact: A. Frank (PCCL)* *andreas.frank@pccl.at* *Polymer Competence Center Leoben*	Fracture mechanics creep tests of Cracked Round Bar (CRB) specimens to rank pipe grades by their resistance against slow crack growth. • RT up to + 150°C • Up to 2500N on each specimen • Clip gages for strain measurement	
Testing device for creep and relaxation *(Mechatronik Moharitsch)* *Contact: M. Berer (PCCL)* *michael.berer@pccl.at* *Polymer Competence Center Leoben*	Testing of creep or relaxation under tensile and compression load with optical strain measurement. • 5 specimen • Tensile and compression loads • Up to 10 kN • -20°C up to + 250°C	

Physical Testing		
Heat Deflection Temperature testing device *(CEAST GmbH)* *Contact: M. Feuchter* *michael.feuchter@unileoben.ac.at* *Materials Science & Testing of Polymers*	Determination of deflection under temperature according to ISO 75 and Vicat softening temperature according to ISO 306.	
4 Differential Scanning Calorimeters *(Mettler-Toledo GmbH, NETZSCH GmbH & Co. Holding KG)* *Contact: H. Weingrill (WPK)* *helena.weingrill@unileoben.ac.at* *Materials Science & Testing of Polymers* *Contact: I. Duretek (KV)* *ivica.duretek@unileoben.ac.at* *Polymer Processing*	Determination of thermo-calorimetric properties of polymers (glass transition, melting/crystallization, oxidation, curing, etc.). • Automatic sampler • Pre-programmable methods for 34 samples • 50°C to +700°C • Heating rate up to 60 K/min	 
Infrared-Spectrometer *(BRUKER VERTEX 70)* *Contact: B. Kaynak (PCCL)* *baris.kaynak@pccl.at* *Polymer Competence Center Leoben*	Material characterization and identification. • Wavelength 8000 - 350 cm^{-1} • MIR • Transmission, ATR, Reflexion	
Infrared-Spectrometer, PerkinElmer Spectrum One *(PerkinElmer Inc.)* *Contact: G. Rieß* *gisbert.riess@unileoben.ac.at* *Chemistry of Polymeric Materials*	Material characterization and identification. Crosslinking kinetics of polymers and resins. • Wavelength 4000 – 370 cm^{-1} • Reflectance mode combined with heating chamber for real-time measurements	
UV/VIS Spectrophotometer Cary 50 Conc *(Varian Inc.)* *Contact: S. Radl (PCCL)* *simone.radl@pccl.at* *Polymer Competence Center Leoben*	Measurement of UV/VIS/NIR-transmittance of liquid and solid samples. • Wavelength 200 - 1100 nm • Temperature controlled cuvette holder • Determination of absorption of polymers and compounds • Investigation of changes of optical properties	

Fluorescence-Spectrophotometer *(Varian Inc./Agilent)* *Contact: A. Mihaljevic (PCCL)* *antonia.mihaljevic@pccl.at* *Polymer Competence Center Leoben*	Fluorescence analysis of liquid samples and films. • Xenon flash lamp • Reduced volume cuvettes • (40 and 400 µL) can be measured • Schwarzschild collection optics • Red-sensitive photomultiplier tube	
XPS spectrometer *(Thermo Fisher Scientific Inc.)* *Contact: M. Edler (KC)* *matthias.edler@unileoben.ac.at* *Chemistry of Polymeric Materials*	Surface characterization, elemental analysis, chemical State Imaging and rapid survey spectrum acquisition. • Characterization methods: depth • Profiling, mapping, insulator analysis • Lateral resolution 30 µm • Energy resolution 0.5 eV • Source-defined analysis area 30 to 400 µm	
NMR Spectrometer 400 MHz *(Agilent Inc.)* *Contact: D. Hennen (KC)* *daniel.hennen@unileoben.ac.at* *Chemistry of Polymeric Materials*	Substance identification and structure determination of polymers. • ^{1}H, ^{13}C and other nuclei liquid sampling	
Low Field Time Domain-NMR spectrometer, Minispec mq20 *(Bruker Biospin GmbH)* *Contact: S. Ayalur-Karunakaran (PCCL)* *santhosh.ayalur@pccl.at* *Polymer Competence Center Leoben*	Characterization of elastomeric network, matrix-filler interactions, polymer dynamics. • Magnetic field strength:0.5 T (1H to 20 MHz) • Temperature: RT – 200°C • Sample requirements: sheets, powders, granules, liquids and gels, mass: min. 30 mg, dimensions: max. 10*10*8 (mm)	
Contact Angle Measurement, DSA 100 *(Krüss GmbH.)* *Contact: B. Maroh (PCCL)* *boris.maroh@pccl.at* *Polymer Competence Center Leoben*	Determination of the surface polarity and the surface energy of materials. • Different test fluids can be applied. • Standard test liquids are water and diiodomethane • Applicable for solid materials	

Contact Angle Measurement, DSA 100-HT400 *(Krüss GmbH.)* *Contact: G. Berger (SGK)* *gerald.berger@unileoben.ac.at* *Injection Moulding of Polymers*	Determination of the surface polarity and the surface energy of materials at elevated temperatures (50°C to 200°C/400°C). Different test fluids can be applied. • Standard test liquids are ethylene carbonate and 1-Bromo-naphatalene (40°C to 200°C) • Applicable for solid materials • Additional dosing unit for polymer drops (up to 400°C). • Heated chamber (50°C to 400°C) • Pendant drop & sessile drop	
Tensiometer K100 *(Krüss GmbH)* *Contact: S. Poetz (PCCL)* *sandra.poetz@pccl.at* *Polymer Competence Center Leoben*	Determination of the surface polarity and the surface energy of materials. • Different test fluids can be applied. • Standard test liquids are water and diiodomethane • Applicable for solid materials, powder like materials and liquids	
Printer DMP-2800 *(Fujifilm Dimatix Inc.)* *Contact: A. Samusjew (KC)* *aleksandra.samusjew@unileoben.ac.at* *Chemistry of Polymeric Materials* *Contact: F. Mostegel (KC)* *florian.mostegel@unileoben.ac.at* *Chemistry of Polymeric Materials*	Printer for testing ink jet inks with dropwatcher. • Dimensions up to A4 • Temperature range 20 - 60 °C	
Photo-DSC, 204 F1 Phoenix *(Erich NETZSCH GmbH & Co KG)* *Contact: D. Hartmann (KC)* *delara.hartmann@unileoben.ac.at* *Chemistry of Polymeric Materials* *Contact: M. Gassner (KC)* *martina.gassner@unileoben.ac.at* *Chemistry of Polymeric Materials*	Characterization of photo-initiated reactions in a broad variety of materials. • Gas-tight measuring cell measuring the cross-link kinetics of polymer resins, paints, coatings and to analyze the influence of UV stabilizers • 100°C to 200°C (temperature range)	
1412i Photoacoustic Gas Monitor *(LumaSense)* *Contact: F.Mostegel (KC)* *florian.mostegel@unileoben.ac.at* *Chemistry of Polymeric Materials*	Detection of gases. • 5 Filters for Alkene, Cyclic Alkane, Ester and Ammonia, • Manual injection only, • Operation temperature: RT • Response time: ~150 s, • Pumping rate: 30 cm^3/s	

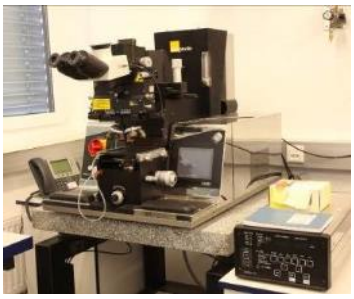
Viscosimeter DV-III Ultra with TC-602 *(Brookfield)* *Contact: M. Edler (KC)* *matthias.edler@unileoben.ac.at* *Chemistry of Polymeric Materials*	Determination of the viscosity of fluids. • 0,1001- 250 min^{-1} (viscosity range) • 15 to 65°C (temperature range)	
EGA/PY 3030D Multi Shot Pyrolysator *(Frontier Lab)* *Contact: S. Poetz* *sandra.poetz@pccl.at* *Polymer Competence Center Leoben*	Analysis of solid or liquid organic material, single and double shot. • Pyrolysis temp. 25°C up to 1000 °C • Manual sample injection • Sample mass: >2 mg	
Pyrolysator 2020id *(Frontier Lab)* *Contact: S. Poetz* *sandra.poetz@pccl.at* *Polymer Competence Center Leoben*	Analysis of solid or liquid organic material. • Single and double shot, • Pyrolysis temp. 25°C up to 1000 °C • Manual sample injection • Sample mass: >2 mg	
Thermogravimetric Analysis TGA/DSC 1 *(Mettler Toledo GmbH.)* *Contact: W. Ziegler (KC)* *wolfgang.ziegler@unileoben.ac.at* *Chemistry of Polymeric Materials*	Determination of a temperature induced weight loss as well as the heat flow into the sample. • +25°C to +900°C (temperature range) • Various atmospheres (nitrogen, air, oxygen)	
UV/VIS/NIR Spektrophotometer, Lambda 950 *(Perkin Elmer Inc.)* *Contact: A. Rauschenbach (PCCL)* *astrid.rauschenbach@pccl.at* *Polymer Competence Center Leoben*	Measurement of optical properties and constants in the UV/VIS and NIR-region. • Wave length range 175 to 3300 nm • 150 mm integrating sphere • Measurement of hemispherical and diffuse transmittance and reflectance spectra	
FTIR-Spectrometer Spectrum Two *(Perkin Elmer, Inc.)* *Contact: A. Rauschenbach (PCCL)* *astrid.rauschenbach@pccl.at* *Polymer Competence Center Leoben*	Material characterization and identification, analysis of ageing, analysis of additives or stabilizing systems of polymers. • Heatable ATR-device for curing studies • Wave length range: 10000 - 370cm-1 • GladiATR: Attenuated Total Reflectance, Zn/Se-crystal • Wave length range: 4000 – 450cm-1 • Controlled heating (RT-200°C)	

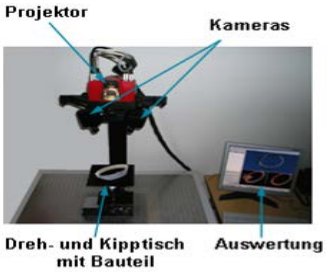
FTIR Spektrophotometer Spectrum GX *(Perkin Elmer Inc.)* *Contact: A. Rauschenbach (PCCL)* *astrid.rauschenbach@pccl.at* *Polymer Competence Center Leoben*	Material characterization and identification, analysis of ageing, analysis of additives or stabilizing systems of polymers. Optical characterization of samples in the NIR, MIR and FIR-region (integrating sphere). • Wave length range: 10000 – 370 cm-1 • Attenuated Total Reflectance (ATR): Wave length range: 4000 – 650cm-1 • Pike MIRacle Mikro ATR with ZnSe/Diamond crystal • Pike VeeMax II variant angle ATR with ZnSe and Ge crystal for depth profiling (0.5 – 10µm) • Gold coated integrating sphere (100 mm diameter): wave length range: 4000 – 580cm-1	
Moisture-Meter FMX HydroTracer *(aboniGmbH für Mess- und Automatisierungstechnik)* *Contact: I. Duretek (KV)* *ivica.duretek@unileoben.ac.at* *Polymer Processing*	Instrument for measuring of low water contents in solids. • Sample weight:0.01 g to 50 g (100 g) depending on density and moisture • Sample volume: approx. 50 cm^3 • Measuring range:0.0005 % - 5 % moisture content	
Flaw Detector, Olympus OmniScan MX *(Olympus Austria GmbH.)* *Contact: O. Rausch-Schott (PCCL)* *oliver.rausch-schott@pccl.at* *Polymer Competence Center Leoben*	OmniScan is a portable and modular phased array and eddy current array test instrument. • Multi-technology flaw detector with PA • Full-featured A-Scan, B-Scan, S-Scan and C-Scan • Real time data processing, 64 elements, ultrasonic beam	
Hot Disk TPS 2500 S Thermal Constants Analyzer *(Hot Disk AB)* *Contact: D. Tscharnuter (PCCL)* *daniel.tscharnuter@pccl.at* *Polymer Competence Center Leoben*	Designed for analysing thermal transport properties of solids, liquids, paste and powders. • Thermal conductivity, diffusivity and specific heat measurement; cryogenic to 750°C; • Measures solids (isotropic, transverse isotropic), liquids, powders, films	

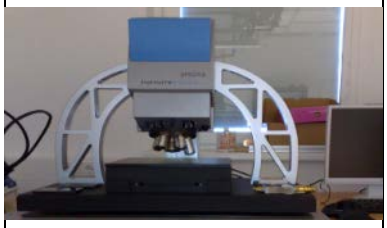
Dielectric Analysis, DEA 230, 231 *(Netzsch Gerätebau GmbH.)* *Contact: M. Wolfahrt (PCCL)* *markus.wolfahrt@pccl.at* *Polymer Competence Center Leoben*	Investigation of processing behaviour, physical and chemical structure of thermosetting resins and other polymers. • Frequency from 10^{-3} to 10^{5} Hz • Sampling time 2s/point • Temperature up to 400°C	
Guarded heat flow meter DTC 300 *(TA Instruments)* *Contact: A. Wanner (PCCL)* *andreajohanna.wanner@pccl.at* *Polymer Competence Center Leoben*	Designed for analysing the thermal conductivity of solids, paste and powders. • Determination of the thermal conductivity in the range of 0.1 – 40 W/mK • Thermal conductivity over a temperature range of -20 to 300 °C • Sample thickness up to 25 mm, sample diameter 50 mm	
Heat Flux DSC 4000 *(Perkin Elmer Instruments LLC)* *Contact: A. Rauschenbach (PCCL)* *astrid.rauschenbach@pccl.at* *Polymer Competence Center Leoben*	Dynamic heat flux calorimeter for determining thermal properties of polymers. • Temperature from -70 to 445 °C, heating rates 0.1 to 50°C, cooling rates up to -20°C/min Temperature accuracy: +/- 0.1°C • Heat flux range: +/- 175 mW Heat flux accuracy: +/- 2% • Dual, digital mass flow controller (gas controller) • Auto sampler for 42 samples • Optionally nitrogen or synthetic air atmosphere, automatic switchover of gas supply during the measurement	

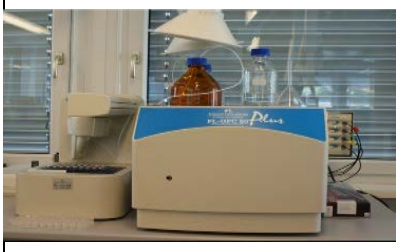
Microscopy and optical methods		
3 Optical microscopes *(Leica Microsystems GmbH, Olympus Europa GmbH)* *Contact: W. Rath (WPK)* *walter.rath@unileoben.ac.at* *Materials Science & Testing of Polymers* *Contact: N. Andraschek (PCCL)* *natascha.andraschek@pccl.at* *Polymer Competence Center Leoben*	Optical characterization of surfaces. • Lenses: 10x, 20x, 50x, 100x • Phase contrast lenses: 10x, 20x • Polarizing filters • *analySIS* data analysis-software (Soft Imaging Systems GmbH)	

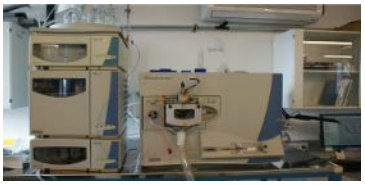
2 Stereomicroscopes Stemi 2000C *(Carl Zeiss GmbH)* *Contact: A. Hausberger (PCCL)* *andreas.hausberger@pccl.at* *Polymer Competence Center Leoben* *Contact: T. Laposa (KKV)* *thomas.laposa@unileoben.ac.at* *Designing Plastics and Composite Materials*	Specifications for stereomicroscope. • 10X eyepieces • 6.5X to 50X magnification range • Field of view from 35.4mm-4.6mm	
Leica DCM8 Dual Core Microscope *(Leica Microsystems GmbH)* *Contact: R. Hinterberger (PCCL)* *Robert.hinterberger@pccl.at* *Polymer Competence Center Leoben*	Leica DCM8 is an optical 3-dimensional measuring-system combining interferometry, confocal microscopy and variation of focus. • Vertical resolution: 0,1nm • Lateral resolution: 140nm	
2 Scanning Electron Microscopes incl. EDX analysis *(Carl Zeiss GmbH, Tescan Orsay Holding)* *Contact: H. Weingrill (WPK)* *helena.weingrill@unileoben.ac.at* *Materials Science & Testing of Polymers*	Determination of surface topography and composition with high resolution and high depth of sharpness. • Low voltage cathode optimized for testing of polymeric materials • Tungsten heated cathode intended for high vacuum operations • Back scattered electron detector (BSE) to analyse material contrast • Energy dispersive x-ray detector (EDX) for chemical/structural x-ray analysis • Additional 3D-module for topographical information	
Atomic Force Microscope *(Asylum Research)* *Contact: K. Resch-Fauster (WPK)* *katharina.reschfauster@unileoben.ac.at* *Materials Science & Testing of Polymers*	Atomic force microscopy is a very high-resolution type of scanning probe microscopy. • Contact mode, lateral force mode, • non-contact AC mode, intermittent-contact mode (Q Control, phase amplitude), dual AC mode, force mode, force modulation, force spectroscopy • Polymer heater for temperature dependent measurements up to 250°C	

Atomic Force Microscope *(Nanosurf FlexAFM)* *Contact: D. Fleischmann (PCCL)* *darya.fleischmann@pccl.at* *Polymer Competence Center Leoben*	High-resolution scanning probe microscopy for surface analysis. • Static Force, Dynamic Force, Lateral Force, Phase Contrast, Force Modulation, • Multiple Spectroscopy modes, • Lithography and Manipulation modes • Maximum scan range: 100 µm • Maximum Z-range: 10 µm	
Raman Microscope incl. opt. table *(HORIBA Jobin Yvon GmbH)* *Contact: K. Resch-Fauster (WPK)* *katharina.resch-fauster@unileoben.ac.at* *Materials Science & Testing of Polymers* *Contact: A. Mihaljevic (PCCL)* *antonia.mihaljevic@pccl.at* *Polymer Competence Center Leoben*	Contactless spectroscopic characterization of polymers via Raman-scattering, chemical and morphological analysis of polymers. • Lenses: 10x, 50x, 100x and LWD 100x • Lateral resolution: 0.8 to 5 µm • Vertical resolution: 2 µm • Spectral resolution: 0,5 cm^{-1} • Green laser (514 nm) and red laser (632 nm)	
Mask Aligner, MJB 4 *(SÜSS MicroTec AG)* *Contact: M. Edler (KC)* *matthias.edler@unileoben.ac.at* *Chemistry of Polymeric Materials*	Optical lithography for pattern reproduction in photoresist films. • Lateral resolution 0,3 µm • Wavelength range 250 - 400 nm • Contact and non-contact lithography	
Abbe Refractometer *(A. Krüss Optronic)* *Contact: N. Zarfl (PCCL)* *nicole.zarfl@pccl.at* *Polymer Competence Center Leoben*	Bench-top device for high-precision measurement of index of refraction. • Measures Indices nD (at a wavelength of 589 nm of the sodium-D-line), • Solid contents in % and mean dispersion values nF-nC of transparent and translucent liquids or solids • Refractive index 1.300 to 1.70 0 nD), dry substance: 0.0 to 95% Brix • Scale division: refractive index 0.0005 (nD), 0.25%Brix • Resolution/accuracy: 0.0002 (nD), 0.1%Brix • Refractive indices from 0 to 70°C	

2x ARAMIS – 3D-Digitial Image Correlation *(GOM GmbH.)* *Contact: D. Tscharnuter (PCCL)* *daniel.tscharnuter@pccl.at* *Polymer Competence Center Leoben*	Three-dimensional full field deformation and strain analysis based on digital image correlation. • Maximum frame rate of 500 fps (1280x1024).	
3D-Scanner ATOS II SO *(Gesellschaft für optische Messtechnik GOM)* *Contact: R. Hinterberger (PCCL)* *robert.hinterberger@pccl.at* *Polymer Competence Center Leoben*	Contact-free measuring of complete contour of a sample part. • Measuring area from 45x36x20 mm to • 200x160x150 mm • Camera resolution1280x1024 points	
High speed camera Photron SA1 *(Photron Europe Limited)* *Contact: P. Fuchs (PCCL)* *peter.fuchs@pccl.at* *Polymer Competence Center Leoben*	High end high speed camera for impact material characterization and process analysis. • Maximum frame rate 675000 fps	
AVT Dolphin Camera F-201B *(STEMMER IMAGING GmbH)* *Contact: B. Schrittesser (PCCL)* *bernd.schrittesser@pccl.at* *Polymer Competence Center Leoben*	Demanding surface inspection and image processing. • Monochrome CCD progressive scan, UXGA resolution • Speeds up to 12.75 frames per second at full resolution • FireWire (IEEE 1394a) interface, Pixel Size: 4,4 µm x 4.4 µm	
Mercury-Videosystem *(Sobriety s.r.o.)* *Contact: G. Meier (PCCL)* *gerald.meier@pccl.at* *Polymer Competence Center Leoben*	Three-dimensional full field deformation and strain analysis based on digital image correlation. • 29 Megapixel camera resolution • Wide angel lenses	
Thermography system *(InfraTec GmbH)* *Contact: B. Satheesh (LVV)* *britto.satheesh@unileoben.ac.at* *Processing of Composites*	Thermography system for sensing and controlling of manufacturing processes. • Spectral range 0,8 to. 2,5 µm • Detector format (IR pixels) 320 x 256 • Temp. resolution 0.025 K @ 30 °C • Temp. measuring range -40 to 1200°C	

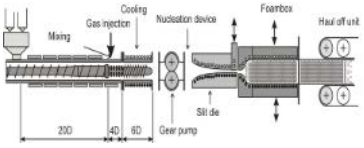
Confocal Microscope *(Fries Research & Technology GmbH)* *Contact: G. Pacher (PCCL)* *gernotalois.pacher@pccl.at* *Polymer Competence Center Leoben*	Optical 3D – measurement for computer-based measuring of roughness and profiles. • Contactless and non-destructive measurement in microscale • Calculation of sample-area and volume	
Infinite Focus System *(Alicona Imaging GmbH)* *Contact: R. Hinterberger (PCCL)* *robert.hinterberger@pccl.at* *Polymer Competence Center Leoben*	Optical 3D micro-coordinate system for measurement of shape and roughness. • Optical technology based on focus-variation yielding a vertical • Resolution of up to 10nm and a lateral resolution of 400 nm • Measuring of steep flanks up to 85° with highest precision	
Optical Inspection Testsite *Contact: R. Hinterberger (PCCL)* *robert.hinterberger@pccl.at* *Polymer Competence Center Leoben*	System for mapping surfaces and analysing visually perceivable defects and gloss effects. • Modular design for different measurement problems	
Nanostar *(Bruker AXS GmbH.)* *Contact: M. Feuchter* *Michael.feuchter@unileoben.ac.at* *Materials Science & Testing of Polymers*	Characterization of nanostructures by SAXS, WAXS, GISAXS, Nanography. • IμS Microfocus Source • VÅNTEC-2000-detector and Image Plate • Temperature controlled measurements • Measurements under mechanical loads	

Chemical methods		
Size Exclusion Chromatography "GPC 50" *(Polymer Laboratories Ltd.)* *Contact: S. Radl (PCCL)* *simone.radl@pccl.at* *Polymer Competence Center Leoben*	Determination of the molar mass distribution and long-chain branching of polymers. • Temperature range: 25 – 50°C • Oligomeric and polymeric molecules • Universal calibration method	
Size Exclusion Chromatography "GPC 220" *(Polymer Laboratories Ltd.)* *Contact: N. Aust (KC)* *aust@unileoben.ac.at* *Chemistry of Polymeric Materials*	Determination of the molar mass distribution and long-chain branching of polymers, especially polyolefins. • Temperature range up to 220°C • Oligomeric and polymeric molecules • Universal calibration method • Several detectors incl. light scattering	

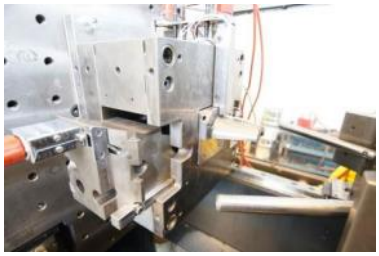
Temperature Rising Elution Fractionation "TREF 200" *(PolymerChar)* *Contact: N. Aust (KC)* *aust@unileoben.ac.at* *Chemistry of Polymeric Materials*	Determination of short-chain branching of polymers and chemical composition distribution of copolymers. • Methods of temperature rising elution fractionation and crystallization analysis fractionation are possible • Fractionation in analytical scale • Sequential analysis of up to five samples	
LC-MS – System "LCQ Advantage Max" *(Thermo Finnigan)* *Contact: B. Maroh (PCCL)* *boris.maroh@pccl.at* *Polymer Competence Center Leoben*	High performance liquid chromatography coupled to mass spectrometry. • Ion trap with m/z from 150 up to 2000 at a scan rate of at least 5500 amu/s • Sensitivity for small molecules in the lower nmol/L range • ESI and APCI positive and negative ion mode	
Preparative Fractionation "PREP-mc2 plus" *(PolymerChar)* *Contact: N. Aust (KC)* *aust@unileoben.ac.at* *Materials Science & Testing of Polymers*	Fractionation according to molar mass, short-chain branching and chemical composition distribution. • Methods of temperature rising elution fractionation • Crystallization analysis fractionation and Holtrup fractionation are possible • Fractionation in semi-preparative scale	
GCMS-QP2012 Plus with Auto Sampler AOC-20i *(Shimadzu HandelsgmbH)* *Contact: G. Rieß (KC)* *gisbert.riess@unileoben.ac.at* *Chemistry of Polymeric Materials*	Gas chromatography – mass spectrometer for material characterization and identification. • Capillary: fused silica • Purge gas: Helium • Injection: auto sampling or manual injection	
Plasma Ion Etching *PlasmaLab 80Plus* *(Oxford Instruments)* *Contact: S. Radl (PCCL)* *simone.radl@pccl.at* *Polymer Competence Center Leoben*	Dry etching and surface functionalization of organic and inorganic materials with reactive gases. • 13.56 MHz parallel plate reactor • 240 mm substrate electrode • Etch modes: RIE, PE, ICP • Various process gases	

Corona-Station *(Ahlbrandt System GmbH.)* *Contact: S. Kaiser (PCCL)* *simon.kaiser@pccl.at* *Polymer Competence Center Leoben*	Surface activation of foils and polymer materials. • Sample thickness up to 10 mm • Generator power 100 – 600 W • Surface oxidation via corona discharges	
Glove-Box Lab master 130 *(M. Braun GmbH.)* *Contact: S. Radl (PCCL)* *simone.radl@pccl.at* *Polymer Competence Center Leoben*	The glove-box is employed for air or moisture sensitive laboratory work (synthesis, polymerization, etc.). • Working gas (N_2): 200 bar (primarily) • 5,5-6,0 bar (secondarily) • Gas flow rate: 200 l/min • Water cooling (10°C - 15°C) • High vacuum pump	
Falling film photo reactor *(UV Consulting Peschl)* *Contact: S. Schlögl (PCCL)* *sandra.schloegl@pccl.at* *Polymer Competence Center Leoben*	Continuous UV irradiation of liquids and emulsions on technical scale. • Lamp power 800 – 3500 W • Pumping rate 0.2 – 2.5 l/min	
Vacuum / pressure reactor *(Büchi Ltd.)* *Contact: A. Wanner (PCCL)* *andrea.wanner@pccl.at* *Polymer Competence Center Leoben*	Thermo-stated autoclave used for resin impregnation and curing. • Volume 0 - 25 liters • Pressure 0,001 - 7 bar • Temperature 25 - 80°C	
UV-lamp *(Fusion UV Systems GmbH.)* *Contact: S. Schlögl (PCCL)* *sandra.schloegl@pccl.at* *Polymer Competence Center Leoben*	Microwave powered UV-lamp with dichroic reflector and constant UV-emission. • Bulb length 250 mm • Power 240 W/cm • Variable power 25-100% UV • Bulbs Hg / Fe and Ga doped Hg	

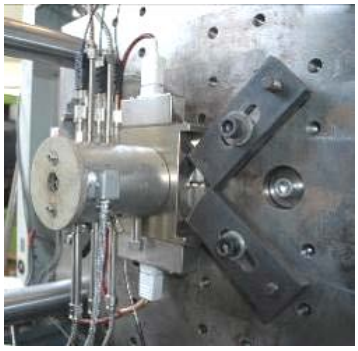
UV-lamp *(Omnicure S1500 spot curing system)* *Contact: S. Pötz (PCCL)* *sandra.poetz@pccl.at* *Polymer Competence Center Leoben*	200 W mercury high pressure spot curing system. • 200 W mercury high pressure lamp • Adjustable light output in 1% increments • Timer • Broad emission spectra	

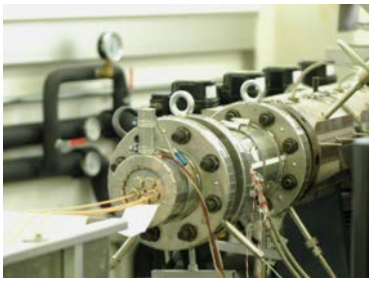
Polymer processing		
Multilayer flat film processing line *(Dr. Collin GmbH.)* *Contact: M. Walluch* *matthias.walluch@pccl.at* *Polymer Competence Center Leoben*	5-layer flat film line. • 2 extruders “Teachline E20T-H SCD15” • Extruder “Teachline” E30P, • Feed block 5 layer • Flat die width 250 mm • Chill roll 136-350 • Corona unit	
Rosendahl extrusion line *(Rosendahl Maschinen GmbH, Colortronic Maschinen- und Anlagenbau AG, Maximator GmbH, SML Maschinengesellschaft mbH)* *Contact: S.Schuschnigg (KV)* *stephan.schuschnigg@unileoben.ac.at* *Polymer Processing*	The single screw extrusion line can be used for film extrusion and foaming. • 2 Volumetric dosing units • Single screw extruder D=45 mm • different screws 24-30 D • Different dies (film, strand, ...) • Chill roll SML	
Foam extrusion line *(in-house development)* *Contact: M. Walluch* *matthias.walluch@pccl.at* *Polymer Competence Center Leoben*	Extrusion line for investigating the physical foaming process. • Different solutions to cool the melt during the extrusion are available to produce foams with small cell sizes and a high number of cells • Suitable for different materials like PE, PP, PS, PET and TPE’s • Suitable for inert gases like CO2, N2 • Screw designed especially for foaming	
Extruder for measuring the friction coefficient *(in-house development)* *Contact: S. Schuschnigg (KV)* *stephan.schuschnigg@unileoben.ac.at* *Polymer Processing*	Extruder for measuring the friction coefficient. The extruder for measuring the friction coefficient is used to measure the outer and inner friction of polymer bulk material under circumstances nearly the same as in real extruders.	

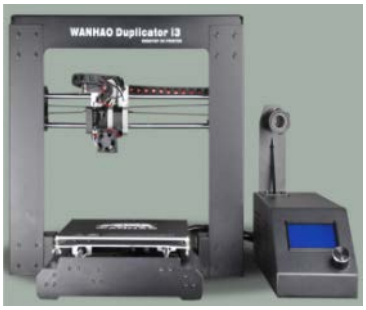
Filter pressure extruder *(Dr. Collin GmbH)* *Contact: S.Schuschnigg (KV)* *stephan.schuschnigg@unileoben.ac.at* *Polymer Processing*	Single screw Extruder. • Filter test extruder FT-E20T-MP-IS • Melt pump • Filter holder • It can detect agglomerates of pigments and other fillers	
Pipe extrusion line *(Cincinnati Extrusion GmbH, KUAG, GRAEWE GmbH)* *Contact: S.Schuschnigg (KV)* *stephan.schuschnigg@unileoben.ac.at* *Polymer Processing*	Pipe extrusion line. • Proton 45-28 G extruder loaned by Cincinnati Extrusion • Vacuum chilling bath ATL-C 63 loaned by Kuag • Puller RAE 63/1Eloaned by Kuag • Cutter TE 63 H by Graewe	
Rheocord 3000/600 *(Thermo Fisher Scientific Inc.)* *Contact: I. Duretek (KV)* *ivica.duretek@unileoben.ac.at* *Polymer Processing*	The Rheocord is mostly used for mixing and kneading small material samples. • + 25 to + 300 °C • Mixing chamber 3000: 300 – 540 ccm • Mixing chamber 600: 70 – 100 ccm • Different rotors (e.g. roller, banbury)	
Extrusion line *(High Tech Extrusion GmbH, Scholz Technology, ECON GmbH, maag group)* *Contact: A. Eder (KV)* *alexander.eder@unileoben.ac.at* *Polymer Processing*	This extrusion line consists of a Theysohn compounder TSK 30, with a vacuum unit, 4 dosing units, a melt pump and an underwater pelletizing unit. • + 25 to + 300 °C • Screw diameter 30 mm • Max. screw speed: 300 rpm • Max. torque to the screws: 190 Nm	
ZSK 25 compounder *(Coperion GmbH, Scholz, Accrapak)* *Contact: A. Eder (KV)* *alexander.eder@unileoben.ac.at* *Polymer Processing*	The ZSK 25 from Werner & Pfleiderer with the four dosing units uses a strand cooling bath, a strand dryer and a pelletiser for processing the polymer. • + 25 to + 300 °C • Screw diameter 25 mm • Max. screw speed: 300 rpm • Max. torque to the screws: 120 Nm	

Compounder ZSE 18HP-48D *(Leistzritz Extrusionstechnik GmbH)* *Contact: S. Schuschnigg (KV)* *stephan.schuschnigg@unileoben.ac.at* *Polymer Processing*	The ZSE 18 HP compounder from Leistritz is equipped with two dosing units one for polymers and one for metallic powders. • Maximum melttemperature 450°C • Wear resistant	
Plasticorder PL 2000 *(Brabender® GmbH & Co. KG)* *Contact: I. Duretek (KV)* *ivica.duretek@unileoben.ac.at* *Polymer Processing*	The Plasticorder PL 2000 can be equipped with various screw and kneading elements. The melt strand is cooled in a water bath and cut in a pelletizer. • + 25 to + 300 °C • Mixing chamber 40 ccm • Different rotors (e.g. roller, banbury)	
Electric injection moulding machine 470 A 1000-400 *(ARBURG GmbH + Co KG)* *Contact: T. Lucyshyn (KV)* *thomas.lucyshyn@unileoben.ac.at* *Polymer Processing*	Electric injection moulding machine, as a loan by Arburg, for research and education. • Max. clamping force 1000 kN	
Injection-moulding machine rheometer for rubber compounds *(self made construction)* *Contact: T. Hutterer (PCCL)* *thomas.hutterer@pccl.at* *Polymer Competence Center Leoben* *Contact: E. Leitner (SGK)* *eduard.leitner@unileoben.ac.at* *Injection Moulding of Polymers*	Viscosity measurement system for rubber compounds with and without curatives. • Several slit dies (h= 2; 2,5; 3 mm) • Temperatures of up to 150 °C • Measuring the pressure dependence of viscosity • Back pressure: up to 400 bar • Shear rate range: approx. 10 s^{-1} up to 2.000.000 s^{-1}	
Conical counter rotating twin screw extruder *(Cincinnati Extrusion GmbH)* *Contact: I.Duretek (KV)* *ivica.duretek@unileoben.ac.at* *Polymer Processing*	The conical counter rotating twin screw extruder Konos 38RP used for the research in the rheology and processing of PVC-U, WPC and other extrudable polymer melts. • Screw diameter 38 mm • Max. output rates (PVC-U): 65-100 kg/h • Horizontal dosing deeder (synchronized) • Internal screw temperature control Intracool® • Max. screw speed: 47 rpm • Max. torque to the screws: 3,05 kNm	

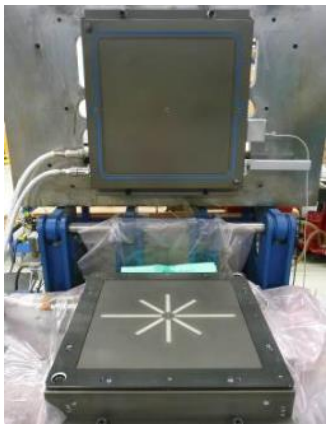
Hybrid injection moulding machine VC 940/130 *(Engel Austria GmbH)* *Contact: G. Berger (SGK)* *gerald.berger@unileoben.ac.at* *Injection Moulding of Polymers*	Hybrid machine with hydraulic, tie bar-less clamping unit and electrical injection unit, for the X-melt technology and for injection-moulding rheometry. • Max. clamping force 1300 kN • X-Melt option • Thermoplastics and rubbers • Ejection option	
Two component injection moulding machine HM 110/350H 130V (2K) (Wittmann Battenfeld GmbH) *Contact: T. Lucyshyn (KV)* *thomas.lucyshyn@unileoben.ac.at* *Polymer Processing*	Two component injection moulding machine, for the research of the bonding between two different polymers as a loan by Wittmann Battenfeld. Additionally, Machine Vision system and variothermal mould temperature control. • Max. clamping force 1100 kN	
Injection moulding machine for powder injection moulding 320 C 500 -100 *(ARBURG GmbH + Co KG)* *Contact: I. Duretek (KV)* *ivica.duretek@unileoben.ac.at* *Materials Science & Testing of Polymers*	Injection moulding machine for metal and ceramic PIM-feedstocks. • Max. clamping force 500 kN • Screw diameter: 20 mm	
Vertical Rubber injection moulding machine MTF 750/160 Edition *(Maplan, GmbH)* *Contact: R. Kerschbaumer (PCCL)* *roman.kerschbaumer@pccl.at* *Polymer Competence Center Leoben*	Vertical Rubber injection moulding machine as a loan by Maplan, for the research of new technologies in cure time reduction. • Max. clamping force 1600 kN • Max. injection volume 750 ccm	
Injection moulding machine rheometer *(self made construction within the framework of the EU-project Pro4Plast)* *Contact: I. Duretek (KV)* *ivica.duretek@unileoben.ac.at* *Polymer Processing*	Viscosity measurement system based on injection moulding machine rheometer. • Several slit dies (h= 0,35; 0,5; 1 mm) • Ambient up to 380 °C • Measuring the pressure dependence of viscosity • back pressure: up to 600 bar • shear rate range: approx. 10 s^{-1} up to 2.000.000 s^{-1}	

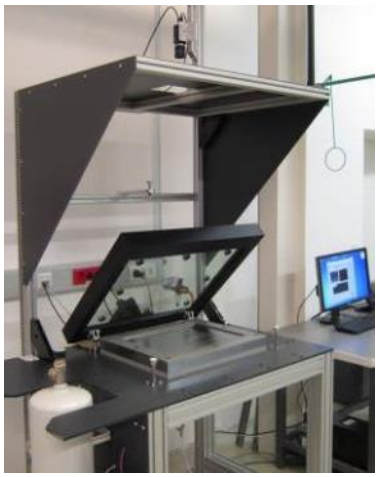
Injection moulding compounder E-Motion 740/180T *(Engel Austria GmbH)* *Compounder ZSE27 MAXX – 44D, 52D (Leistritz Extrusionstechnik GmbH, ECON GmbH)* *Contact: A. Neunhäuserer (SGK)* *andreas.neunhaeuserer@unileoben.ac.at* *Injection Moulding of Polymers*	Injection moulding compounder where the melt delivered by the compounder is transferred directly to the injection moulding machine. • Max. clamping force IMM 1800 kN • Screw diameter IMM: 35 and 45 mm • Screw diameter C: 27 mm • Extruder length 44D or 52D • 5 dosing units (incl. liquids) • Max. temperature 400 °C	
Roll mill Type W 150 P *(Dr. Collin GmbH)* *Contact: I. Duretek (KV)* *ivica.duretek@unileoben.ac.at* *Polymer Processing*	The roll mills are used for processing test formulations and incorporating of additives in materials. • Rolling diameter 150 mm • Working width 315 mm • Rotation speed 3 – 30 1/min • Gap 0.1 – 5 mm • Temperature 20 to 270 °C	
PIM-Injection moulding machine rheometer *(self made construction)* *Contact: I.Duretek (KV)* *ivica.duretek@unileoben.ac.at* *Polymer Processing*	Viscosity measurement system based for rheological measurements on PIM-feedstocks using injection moulding machine. • Several slit dies (h= 1; 1,5; 2; 2,5 mm) • RT up to 400 °C • Shear rate range: approx. 10 s^{-1} up to 10.000 s^{-1}	 
Blow forming machine KEB 1 *(Kautex Maschinenbau, Alpla Inc.)* *Contact: R. Schatzer (KV)* *rudolf.schatzer@unileoben.ac.at* *Polymer Processing*	Single stage blow forming machine KEB 1. • T_{max}=300 °C • V_{max}=500 ml • Single stage blow forming machine KEB 1, produced by Kautex	

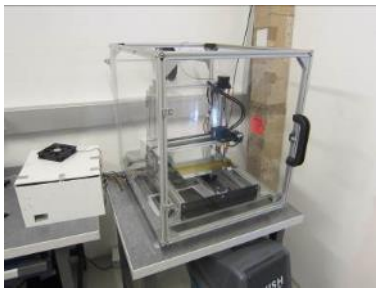
Shear sensor *(in-house development)* *Contact: S. Schuschnigg (KV)* *stephan.schuschnigg@unileoben.ac.at* *Polymer Processing*	Shear sensor used in extrusion and injection moulding. • T_{max}=320 °C • Measurement of shear stress of fluid inline	
Hydraulic pressPolystat 300 *(Schwabenthan)* *Contact: I. Duretek (KV)* *ivica.duretek@unileoben.ac.at* *Polymer Processing*	The Polystat press 300 is used making sample plates and for the material analysis. • +20 to 250 °C	
Vacuum press Type P200PV *(Dr. Collin GmbH)* *Contact: I. Duretek (KV)* *ivica.duretek@unileoben.ac.at* *Polymer Processing*	The vacuum press is used for producing sample plates under vacuum, so that the entrapped air is removed. • plate size 15o x 15o mm • mode with and without vacuum • +20 to 300 °C	
Laboratory platen press COLLIN P 300 E+ *(Dr. Collin GmbH)* *Contact: O. Rausch-Schott (PCCL)* *oliver.rausch-schott@pccl.at* *Polymer Competence Center Leoben*	Production of films or sheets from different types of polymers. • Working space 296 mm x 296 mm • Maximum surface temperature 300 °C • Maximum working pressure 6 bar	
Thermoforming machine, UA 60 EDH OST G *(Illig Maschinenbau & Co KG)* *Contact: R. Schatzer (KV)* *rudolf.schatzer@unileoben.ac.at* *Materials Science & Testing of Polymers*	Thermoforming machine. • Single stage thermoforming machine • T_{max}=300 °C	
2 x FFF Printer Hage3DpA2 *(HAGE)* *Contact: S. Schuschnigg (KV)* *stephan.schuschnigg@unileoben.ac.at* *Polymer Processing*	The FFF Printer from Hage is an additive manufacturing machine using polymers in filament. • Print size(W x L x H) 620 mm x 400 mm x 290 mm • Max. Temperature Hotend 240°C, Bed 110°C	

FFF Printer *(Wanhao USA)* *Contact: S. Schuschnigg (KV)* *stephan.schuschnigg@unileoben.ac.at* *Polymer Processing*	The FFF Printer from Hage is an additive manufacturing machine using polymers in filament. • Print size (W x L x H) 200 mm x 200 mm x 180 mm • Max. Temperature Hotend 240°C, Bed 100°C	
Rheometer, MCR102 *(Modular Compact Rheometer - Anton Paar)* *Contact: J.Billiani (KC)* *janine.billiani@unileoben.ac.at* *Chemistry of Polymeric Materials*	Determination of the viscosity of fluids. • Shear rate: 0,1–13.5001/s^1 • Temperature range: 15°C to 40°C	
Modular Compact Rheometer MCR501 *(Anton Paar GmbH)* *Contact: I. Duretek (KV)* *ivica.duretek@unileoben.ac.at* *Polymer Processing*	Measurement of the flow properties and dynamic-mechanical analysis of polymers. • Operating mode: rotational and oscillatory, rate and stress controlled • Dynamical mechanical analysis • Measuring the transient extensional viscosity using SER-tool • Temperature range: ambient - 600 °C • A wide types of cone and plate tools (D=10, 25 and 50 mm is available • Torques range: 0.01 to 300 mNm • Frequency range: 10^{-5} to 500 rad/s	 
Tensile tester Rheotens 71.97 *(Göttfert Werkstoff-Prüfmaschinen GmbH)* *Contact: I. Duretek (KV)* *ivica.duretek@unileoben.ac.at* *Polymer Processing*	Measurement of elongational properties of polymer melts. • Tandem pulley system • Variable acceleration • Elongational velocity up to 1900 mm/s • Software for calculation of elongational viscosity	

High Pressure Capillary rheometer Rheograph 2002 *(Göttfert Werkstoff-Prüfmaschinen GmbH)* *Contact: I. Duretek (KV)* *ivica.duretek@unileoben.ac.at* *Polymer Processing*	The high pressure capillary rheometer is used for measuring the rheology of polymer melts and other fluids. • Operating mode: rate and stress controlled device for measuring the pressure dependence of viscosity • Ambient up to 400 °C • Shear rate range: approx. 10 up to 1.000.000 s^{-1} • Capillary types: round, slit, micro-slit	
Modular Compact Rheometer MCR 501 *(Anton Paar GmbH.)* *Contact: I. Duretek (KV)* *ivica.duretek@unileoben.ac.at* *Polymer Processing*	Determination of deformation and flow properties of sample parts for dynamic experiments, speed and shear controlled. • Electrical heating system to 400°C • Terminal convection package to 600°C	
PVT100 *(SWO Polymertechnik GmbH)* *Contact: I.Duretek (KV)* *ivica.duretek@unileoben.ac.at* *Polymer Processing*	The pvT 100 from SWO is used for measuring the specific volume as function of pressure and temperature (pvt-diagram). • Temperature: ambient up to 400 °C • Isobaric / isothermal (cooling / heating) measuring mode • Pressure range: 200 bar – 2400 bar • Cooling rates: up to 0,1 K/s	
hcr-pvT apparatus *(self-made)* *Contact: T. Lucyshyn (KV)* *thomas.lucyshyn@unileoben.ac.at* *Polymer Processing*	Measurement of pvT-data at process near cooling rates. • Temperature: 40°C to 300°C • Pressure: up to 1000 bar • Cooling rates: up to 15 K/s	
D-RPA 3000 *(MonTech Werkstoffprüfmaschinen GmbH)* *Contact: B. Lechner (PCCL)* *bernhard.lechner@pccl.at* *Polymer Competence Center Leoben*	The Rubber Process Analyser (RPA) is a measurement device for rubber, cured and un-cured rubber compounds, silicones, thermoplastic elastomers and other polymers. • Curemetry, • Dynamic viscosity • Characterisation of viscoelastic properties.	

K-System II *(AC Technology)* *Contact: I.Duretek (KV)* *ivica.duretek@unileoben.ac.at* *Polymer Processing*	The K-System II utilizes a line-source probe to measure the thermal conductivity. • From ambient up to 350°C.	
Injection unit *(Tartler GmbH)* *Contact: P. Hergan (LVV)* *patrick.hergan@unileoben.ac.at* *Processing of Composites*	Flow metering and self-regulating two component metering and mixing machine. • Dimension (B x H x T): 1000 x 2100 x 1400 mm • Tank: 10 l each component • Electrical tank heating: max. 80°C	
Capacitive Permeameter *(Präzisionsmaschinenbau Bobertag GmbH)* *Contact: P. Hergan (LVV)* *patrick.hergan@unileoben.ac.at* *Processing of Composites*	Determination of in-plane permeability of fibre textiles. • 8x capacitive sensors • Possible fibre volume content: <63% • Viscosity: ca. 60mPas • Max. Injection pressure: 10bar • Measurement of permeability using the capacitive sensors	
Vacuum infusion *Contact: Y. Blößl (LVV)* *yannick.bloessl@unileoben.ac.at* *Processing of Composites*	Vacuum infusion technique for especially prototype manufacturing. • Vacuum pump: up to -1 bar • Geometries: depends on the tie geometry, used flow agents, reinforcing fibres and the used matrix system • With or without flow agents • Possible combination with the electrical heated convection oven	
IR-heating system *(LVV construction)* *(available 1.Quartal 2016)* *Contact: E. Fauster (LVV)* *ewald.fauster@unileoben.ac.at* *Processing of Composites*	Double-sided heating system by ceramic radiation emitters. • Heating area: 800x800 mm • Modular construction • Individual regulation of the heating module • Max. heating temperature + 400°C	

Optical Permeameter *(LVV construction)* *Contact: E. Fauster (LVV)* *ewald.fauster@unileoben.ac.at* *Processing of Composites*	Determination of in-plane permeability of fibre textiles. • Possible fibre volume content: <60% • Viscosity: ca. 60mPas • Max. Injection pressure: 10bar • Measurement of main and auxiliary axis permeability by using optical image processing	
Digital Cutter G3 *(Zünd Systemtechnik AG)* *Contact: Ch. Hueber (LVV)* *christian.hueber@unileoben.ac.at* *Processing of Composites*	Digital controlled cutter for textiles and prepreg materials • Working area: 1600 mm x 1330 mm • Pneumatic oscillating cutting tool • Power rotary cutting tool • Vacuum material hold-down	
Ring winding machine *(LVV construction)* *Contact: Ch. Schillfahrt (LVV)* *christian.schillfahrt@unileoben.ac.at* *Processing of Composites*	Fibre fabrication machine for manufacturing open (cylinders) or closed end structures (pressure vessels or tanks). • Carrier system KUKA 6 axis robot • 1 to 6 feed eyes • Up to 24 roving bundles simultaneously • Cadwind winding software	
Roving Test Rig *(LVV construction)* *Contact: E. Fauster (LVV)* *ewald.fauster@unileoben.ac.at* *Processing of Composites*	Test rig for investigation of single fibre bundles as well as fibre-reinforced polymer tapes. • Transportation of single fibre bundles and tapes at specific processing conditions, e.g. speed, tensile force • Analysis of the impregnation behaviour of fibre bundles at static and dynamic conditions • Study of the cross-sectional geometry by means of a light-sectioning sensor • Flexible extensibility of the test rig by additional sensors, e.g. camera system for visual observations	

Through the Thickness Permeameter *(CD-Lab construction)* *Contact: P. Hergan (LVV)* *patrick.hergan@unileoben.ac.at* *Processing of Composites*	Determination of the permeability through the thickness of a stack of fibre textiles. • Possible fibre volume content: <60% • Viscosity: ca. 60mPas • Max. Injection pressure: 6bar • Flow front detection with an ultra-sonic sensor for permeability calculation	
3D-Printer Mendel 2.5 *Contact: M. Tonejc (CD-L)* *maximilian.tonejc@unileoben.ac.at* *Processing of Composites*	Printing of parts for laboratory equipment and prototypes as well as an impregnation unit. • Working area: 250 mm x 320 mm • Accuracy up to 0,1 mm • Additional housing for better safety	
German RepRap X350 Pro 3D-printer *(German RepRap GmbH)* *Contact: M. Gschwandl* *mario.gschwandl@pccl.at* *Polymer Competence Center Leoben*	The German RepRap X350 PRO is a FFF based additive manufacturing machine. • Print Size (WxLxH) 350 x 200 x 210 mm • Max. Temperature Hotend 290°C, • Max. Temperature Bed 120°C • Dual Extrusion	
Thermoplastic tape laying *(LVV construction)* *Contact: M. Tonejc (CD-L)* *maximilian.tonejc@unileoben.ac.at* *Processing of Composites*	Investigations of different laying techniques and their process parameters. Specifications test rig: • Working area: 700 mm x 350 mm • Electrical linear driven heating plate • Tape laying head for tape appliance • Optional sensors for process parameter investigations Specifications robot: • Carrier system KUKA 6 axis robot • Tape laying head for tape appliance	

Peel-Ply Test Rig *Contact: M. Tonejc (CD-L)* *maximilian.tonejc@unileoben.ac.at* *Processing of Composites*	Investigations on welded tapes to characterize interlaminar bonding between two tapes. • Spindle drive for linear movement • Hardened blade for splitting • Two load cells for characterizing bonding strengths	

Specimen preparation and conditioning		
Xenontest - Atlas Beta LM *(Atlas Material Testing Technology LLC)* *Contact: B. Ottersböck (PCCL)* *bettina.ottersboeck@pccl.at* *Polymer Competence Center Leoben*	Artificial weathering of plastic samples. • Xenon arc lamps • Radiation intensity: 2.5 times global radiation • Rel. humidity: up to 100% • Spray option • RT to 90 °C	
UV-Test *(Atlas Material Testing Technology LLC)* *Contact: B. Ottersböck (PCCL)* *bettina.ottersboeck@pccl.at* *Polymer Competence Center Leoben*	Artificial weathering of samples by UV radiation. • UV fluorescence lamps • radiation intensity: 1,8 UV-A und • 1,5 UV-B • Spray option • Temperature up to 80°C	
Suntester CPS+ *(Atlas Material Testing Technology LLC)* *Contact: B. Ottersböck (PCCL)* *bettina.ottersboeck@pccl.at* *Polymer Competence Center Leoben*	Artificial weathering of samples by artificial sunlight. • 1x 1500W air-cooled xenon lamp • 560 cm² exposure area • Direct setting and control of irradiance • Controlled wavelength range 300 - 800 nm	

Climate Test Chamber *(Memmert GmbH Co.KG)* *Contact: O. Rausch-Schott (PCCL)* *oliver.rausch-schott@pccl.at* *Polymer Competence Center Leoben*	Climate chamber for conditioning and preparation of test samples. • 42°C to +190°C • Humidity Range 10% to 95%	
Climate chamber *(Vötsch Industrietechnik GmbH.)* *Contact: St. Oswald (LVV)* *stefan.oswald@unileoben.ac.at* *Processing of Composites*	Climate Chamber for preparing test samples. • 70°C to +180°C • Humidity Range 10% to 98%	
2 Grinding and polishing machines *(BUEHLER USA)* *Contact: W. Rath (WPK)* *walter.rath@unileoben.ac.at* *Materials Science & Testing of Polymers*	Sample-preparation for light microscopy and micro analytical testing. • Sandpaper grit designations from P600 to P2400 and polishing fluids with particle sizes of 3 µm (diamond emulsion) • Specimen holder with applicable pressure, rotating and contra-rotating arrangement	
Microtome *(Leica Microsystems GmbH)* *Contact: W. Rath (WPK)* *walter.rath@unileoben.ac.at* *Materials Science & Testing of Polymers*	For manual or automatic cutting, with disposable blades. Nitrogen-cooling for soft materials. • Thin sections from 0.5 to 600 µm • Automatic cutting velocities from 0.5 to 420 mm/s	

Drying oven FDL 115 *(Binder GmbH)* *Contact: S. Oswald (LVV)* *stefan.oswald@unileoben.ac.at* *Processing of Composites*	Preheating oven by symmetric air convection Construction after EN 1539. • Internal dimensions B x H x T: 600 x 435 x 435 mm • Max. oven temperature +300 °C • Heating rate: RT auf +300 °C in 51 min	
Vacuum drying oven *(Heraeus GmbH.)* *Contact: W. Rath (WPK)* *walter.rath@unileoben.ac.at* *Materials Science & Testing of Polymers* *Contact: I. Duretek (KV)* *Ivica.Duretek@unileoben.ac.at* *Polymer Processing*	Vacuum oven for preparing test samples. • Approximately 25l volume • RT up to 200°C • Up to 0,01 mbar	
Muffle furnace *(Carbolite GmbH)* *Contact: R. Schatzer (KV)* *rudolf.schatzer@unileoben.ac.at* *Materials Science & Testing of Polymers*	Burn composite specimens to determine subsequently the fiber content. • +20°C to +1000°C • Size 210x100x260mm (W x H x D)	
Vacuum Sealer Allpax *(Henkelmann)* *Contact: P. Guttmann (WPK)* *peter.guttmann@unileoben.ac.at* *Materials Science & Testing of Polymers*	The vacuum sealer is used for the tight packaging of specimens and components.	
Laboratory fridge Mediline LKPv 1420 *(Liebherr)* *Contact: T. Hutterer (PCCL)* *thomas.hutterer@pccl.at* *Polymer Competence Center Leoben*	• 1427l storage area • Temperature range: 2-16 °C	

Cutting mill SM200 *(Retsch GmbH)* *Contact: I. Duretek (KV)* *ivica.Duretek@unileoben.ac.at* *Polymer Processing*	Preliminary grinding of soft, medium-hard, elastic and fibrous materials as well as heterogeneous mixes of polymers. • Rotor speed at 50 Hz 1,500 min^{-1}, • Drive power: 2.2 kW • Perforation size of the bottom sieves: square holes 4 m, 6 mm ad 8 mm	
International Standard Tool - Injection mold *Contact: G. Berger (SGK)* *gerald.berger@unileoben.ac.at* *Injection Moulding of Polymers*	Injection-moulding of IST injection mold standard test specimens for mechanical material investigation (e.g. tensile test, impact bending test) and sample parts (plates, step treads, surface samples). • Exchangeable mold inserts • Set of mold inserts for mold temperature up to 220°C	
Test Specimens *Contact: G. Berger (SGK)* *gerald.berger@unileoben.ac.at* *Injection Moulding of Polymers*	• International Standard ISO A Z-gate (170 x 10 x 4 mm) • International Standard ISO B double T-gate (80x10x4 mm) • International Standard ISO D2 double film gate (60 x 60 x2 mm)	
Chlorine Dioxide Exposure Device *(Mechatronik Moharitsch)* *Contact: A. Frank (PCCL)* *andreas.frank@pccl.at* *Polymer Competence Center Leoben*	Conditioning of test specimens in chlorinated water. • Chlorine dioxide (ClO2): max. 10 ppm • Sodium hypochlorite (NaOCl): max. 100 ppm • Temperature: max. 60 °C • pH controlled • Tank volume: 50 l	

Simulation Tools	
Polymer processing *Contact: G. Berger (SGK)* *gerald.berger@unileoben.ac.at* *Injection Moulding of Polymers*	• Sigmasoft (Sigma Engineering GmbH, DE) • Cadmould (simcon kunststofftechnische Software GmbH, DE) • Autodesk Moldflow Insight (Autodesk Inc., US) • Polyflow (Ansys Inc., US) • PAM-RTM (ESI Group)
Structure/structure-fluid interaction/Material modeling/micromechanics *Contact: D. Tscharnuter (PCCL)* *daniel.tscharnuter@pccl.at* *Polymer Competence Center Leoben* *Contact: P. Fuchs (PCCL)* *peter.fuchs@pccl.at* *Polymer Competence Center Leoben*	• Digimat (e-Xstream engineering S.A., BE) • LS-DYNA (Livermore Software Technology Corp.) • Abaqus (Dassault Systemes) • MSC Nastran (MSC Software Corp.) • Ansys (Ansys Inc., US) • Creo Simulate (PTC)
Computer-aided design	• CATIA V6R2012x (Dassault Systemes) • Creo 2.0/Creo 3.0 Parametrics (unlimited Campus Edition, PTC) • Creo 2.0/Creo 3.0 Direct (unlimited Campus Edition, PTC) • Creo Elements Pro 5.0 (=ProEngineer Wildfire 5.0, PTC) • Solid Works 2012 (Educational Edition, Dassault Systemes)
Material Selection *Contact: P. Guttmann (WPK)* *peter.guttmann@unileoben.ac.at* *Materials Science & Testing of Polymers*	• Cambridge Engineering Selector, EduPack (Granta Design) • Ides Prospector • Campus
Manufacturing Cost Estimation *Contact: Ch. Hueber (LVV)* *christian.hueber@unileoben.ac.at* *Processing of Composites*	• SEER-MFG 7.0 Aerospace (Galorath Incorporated)