





30 let | 30 years

*Fakulteta za strojništvo | Faculty of Mechanical Engineering
Univerza v Mariboru | University of Maribor*



Univerza v Mariboru

Univerza v Mariboru | *University of Maribor*



Fakulteta za strojništvo

Faculty of Mechanical Engineering

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Nagovor urednika

Editorial

V tej nenehno spreminjajoči se družbi imata znanost in znanje pomembno, če ne ključne vloge. Univerza v Mariboru in njena Fakulteta za strojništvo simbolizirata znanje, ki ga morata s svojim znanstvenoraziskovalnim in izobraževalnim delom pravilno razvijati in prenašati na študirajočo populacijo družbe. Študente morata izobraziti v sposobne, samozavestne strokovnjake z vizijami in znanjem za njihove uresničitve.

Zgodovina človeštva nas uči, da je človek postal najrazvitejše bitje našega planeta zaradi svoje sposobnosti, da dela, razmišlja in se uči. Na svoji razvojni poti je vedno hitreje spoznaval naravne zakone okolja, ki jih je poskušal uporabiti za svoje dobro in napredek.

In na teh področjih so verjetno med najaktivnejšimi sodobniki ljudje, ki živijo v svetu, ki mu pravimo svet tehnike. Ti ljudje želijo in hočejo izkoristiti zakone narave in vse njene sadove v dobro človeka, v dobro vseh živih bitij našega planeta. To je torej svet tehnike! To je svet in delo za radovedne!

Letos, ko praznujemo 30. obletnico Fakultete za strojništvo Univerze v Mariboru ter 66-letnico študija strojništva in tekstilstva, bi radi v tej publikaciji predstavili poslanstvo in vizijo fakultete, korenine, organizacijo in povezljivost fakultete ter težnje in potrebe industrije, ki je omogočila nastanek naše fakultete konec petdesetih let prejšnjega stoletja.

In today's ever-changing society, science and knowledge play an important – if not crucial – role. The University of Maribor and its Faculty of Mechanical Engineering symbolise knowledge that must be developed properly and passed on to the student population through scientific research and educational work. They are tasked with educating students to become capable, confident professionals with visions and the knowledge to realise them.

The history of humankind teaches us that humans have become the most advanced beings on our planet due to their ability to work, think and learn. Along the path of development, we have come increasingly to understand the natural laws of our environment – laws we have sought to use for our benefit and progress.



red. prof. dr. Andrej Polajnar

urednik
editor

In these areas, it is perhaps the people living in the world of technology who are among the most active today. These individuals strive to harness the laws of nature and all its fruits for the good of humanity and all living beings on our planet. This is the world of technology! A world and a vocation for the curious!

This year, as we celebrate the 30th anniversary of the Faculty of Mechanical Engineering at the University of Maribor, and the 66th anniversary of mechanical and textile engineering studies, we aim through this publication to present the mission and vision of the Faculty, its roots, organisational structure, and connectivity, as well as the aspirations and needs of the industry that enabled the founding of our Faculty in the late 1950s.



TEHNIŠKE FAKULTETE

Univerza v Mariboru
Fakulteta za strojništvo, računalništvo in informatiko
Fakulteta za gradbeništvo in arhitekturo
Fakulteta za kmetištvo in gozdarstvo
Fakulteta za kemijo in biotehnologijo

30

Nagovor dekana

The Dean's Editorial

Fakulteta za strojništvo je s svojimi izobraževalnimi, znanstvenoraziskovalnimi, strokovnimi in umetniškimi dosežki ena najuspešnejših članic Univerze v Mariboru. S svojo široko paletto znanj in izkušenj ter vrhunskim kadrom povezuje tradicijo s potrebami družbe. Nove generacije inženirk in inženirjev, ki so na trgu delovne sile zelo iskan in zaposljiv kader, ustvarjamo s sodobnimi študijskimi programi. Študentkam in študentom pa ne ponujamo le visoko strokovnega znanja in praktično uporabnih veščin, ampak spodbujamo tudi številne obštudijske dejavnosti in aktivno študentsko življenje, s čimer širimo njihova obzorja.

Naša pomembna skrb je tudi povezovanje akademske sfere z okoljem, soustvarjanje tehnološkega napredka ter posledično vpliva na trajnostni razvoj družbe. Krepi-mo interdisciplinarna in mednarodna sodelovanja tako zaposlenih kot študentov, saj ima povezovanje s partnerskimi ustanovami izjemen obojestranski doprinos.

Kot dekan želim s svojo vodstveno ekipo, zaposlenimi in študenti še naprej skrbeti za najvišjo kakovost znanstvenoraziskovalne in izobraževalne dejavnosti, k čemur bo bistveno prispevala načrtovana prenova infrastrukture tehniških fakultet. Stimulativnega delovnega okolja za zaposlene in študente pa ne gradijo le materialni pogoji, ampak predvsem medsebojni odnosi, ki spodbujajo dobro delovno vzdušje in gradijo ustvarjalno energijo. Tako bo naša fakulteta še naprej pisala zgodbe o uspehih, inženirke in inženirji pa bodo ustvarjali boljšo prihodnost.

The Faculty of Mechanical Engineering, with its educational, scientific-research, professional, and artistic achievements, ranks among the most successful members of the University of Maribor. With its broad range of knowledge and experience, and a highly qualified staff, it bridges tradition successfully with the needs of society. We educate new generations of engineers – highly sought-after and employable professionals on the labour market – through modern Study Programmes. Our students are offered not only in-depth professional knowledge and practical skills, but also encouraged to engage in numerous extracurricular activities and an active student life, thereby broadening their horizons.

An important part of our mission is also the connection of the academic sphere with the wider environment, contributing to technological advancement, and, consequently, influencing the sustainable development of society. We continue to stren-



red. prof. dr. Matej Vesenjāk

dekan Fakultete za strojništvo
dean of the Faculty of Mechanical Engineering

gthen interdisciplinary and international cooperation, both among staff and students, as collaboration with partner institutions brings immense mutual benefit.

As the Dean, together with my leadership team, the Faculty, and students, I remain committed to maintaining the highest quality of research and educational activities – efforts that will be supported further by the planned renovation of the infrastructure of the Technical Faculties. However, a stimulating working environment for employees and students is not built solely on material conditions, but, above all, on mutual relationships that foster a positive working atmosphere and generate creative energy. In this way, our Faculty will continue to write stories of success, while our engineers will help shape a better future.



Nagovor rektorja

The Rector's Editorial

Več kot pol tisočletja stari rokopisi, sloviti Kodeksi Leonarda da Vinci, enega največjih genijev in vizionarjev človeštva, spadajo med prva sistematična strokovna dela o strojih. V enem od njih je zapisal pomenljivo misel: »Vse znanosti, ki niso rojene iz izkušenj, matere vsega znanja, so prazne in polne napak.« Leonardo je bil radoveden in je po svetu hodil z odprtimi očmi. Verjel je, da stvarjem lahko prideš do dna z natančnim opazovanjem, vztrajnim preizkušanjem in temeljitim premislekom. V ozadju Leonardovega delovanja se skrivajo pomembne lastnosti dobrega inženirja, ki najbrž veljajo za vse čase: namreč želja po raziskovanju, inoviranju in izboljševanju sveta, seveda na podlagi odličnega znanja in zaveze vseživljenjskemu učenju.

Lahko trdimo, da so enake ali podobne lastnosti krasile tudi vizionarje in pionirje ob snovanju študija strojništva in tekstilstva, ki je pred 66 leti ob močni podpori gospodarstva stekel v okviru Višje tehniške šole v Mariboru ter se v naslednjih letih in desetletjih razvijal v interdisciplinarni povezavi z drugimi tehničnimi vedami in v izmenjavi profesorjev.

Iskreno čestitam ob 30. obletnici Fakultete za strojništvo Univerze v Mariboru. Celotni akademski fakultetni skupnosti izrekam priznanje za dosednji razvoj in rast fakultete z željo in prepričanjem v nadaljnjo rast kakovosti pedagoškega, znanstvenoraziskovalnega in raziskovalno-razvojnega dela kot trajne temeljne usmeritve, ki zagotavlja fakulteti prepoznavnost v mednarodnem, nacionalnem in lokalnem prostoru.

More than half a millennium old, the famous manuscripts of the Codex Leonardo da Vinci, one of the greatest geniuses and visionaries of mankind, are among the first systematic scientific works on machines. In one of them, he wrote a significant thought: „All sciences that are not born of experience, the mother of all knowledge, are empty and full of errors.“ Leonardo was curious, and walked around the world with his eyes open. He believed that you could get to the bottom of things by careful observation, persistent experimentation and careful reflection. Behind Leonardo's work are important qualities of a good engineer that are probably true forever: a desire to explore, innovate and improve the world, based, of course, on excellent knowledge and a commitment to lifelong learning.

It can be argued that the same, or similar qualities, also characterised the visionaries and pioneers who conceived the



red. prof. dr. Zdravko Kačič

rektor Univerze v Mariboru
rector of the University of Maribor

study of mechanical engineering and textiles, which started 66 years ago, with strong support from the industry, within the framework of the Technical College in Maribor, and developed in the following years and decades in an interdisciplinary relationship with other technical disciplines and in the exchange of professors.

My sincere congratulations on the 30th anniversary of the Faculty of Mechanical Engineering, University of Maribor. I would like to express my appreciation to the entire academic community of the Faculty for the development and growth of the Faculty so far, with the wish and belief for further growth in the quality of education, scientific research and research development as a lasting fundamental orientation, which ensures the Faculty's recognition in the international, national and local areas.

868.

Na podlagi 335. člena in prvega odstavka 342. člena ustave Socialistične republike Slovenije, prvega odstavka 9. člena zakona o visokem šolstvu (Uradni list SRS, št. 13-593/75), 2. člena odloka o začasnem poslovniku Skupščine Socialistične republike Slovenije in četrtega odstavka 241. člena poslovnika Skupščine Socialistične republike Slovenije je Skupščina Socialistične republike Slovenije na sejah Zbora združenega dela in Zbora občin dne 2. julija 1975 sprejela

ODLOK

**o potrditvi samoupravnega sporazuma o združitvi v
Univerzo v Mariboru**

Potrdi se samoupravni sporazum o združitvi v Univerzo v Mariboru, ki ga je Skupščini Socialistične republike Slovenije poslalo v potrditev Združenje visokošolskih zavodov Maribor dne 5. junija 1975.

Št. 022-16/75

Ljubljana, dne 2. julija 1975.

**Skupščina
Socialistične republike Slovenije**

Predsednik

Mejniki razvoja fakultete

Milestones in the Development of the Faculty

Fakulteta za strojništvo Univerze v Mariboru (FS UM) je s svojim razvojem začela leta 1959, ko so bile v Mariboru ustanovljene prve višje šole:

The Faculty of Mechanical Engineering, University of Maribor (FME UM) began its development in 1959, when the first colleges were established in Maribor:

Ljudska skupščina Republike Slovenije sprejme Zakon o ustanovitvi Višje tehniške šole (VTŠ) v Mariboru. Ustanovijo se strojni, elektrotehniški in tekstilni oddelki (26. november 1959).

1959

The People's Assembly of the Republic of Slovenia adopted the Law on the Establishment of the Technical College in Maribor. The Mechanical Engineering, Electrical Engineering and Textile Departments were established (26 November 1959).

Slovesno odprtje Višje tehniške šole (5. marec 1960) in začetek predavanj na strojnem in tekstilnem oddelku (7. marec 1960).

1960

Inauguration of the Technical College (5 March 1960) and the start of lectures in the Mechanical Engineering and Textile Departments (7 March 1960).

Ustanovitev Združenja visokošolskih zavodov v Mariboru.

1961

The Higher Education Institutions Association was founded.

Ustanovitev prvih laboratorijev.

1963

Establishment of first laboratories.

Preselitev VTŠ v nove prostore na Smetanovi ulici.

1965

The Technical College moved to new premises on Smetanova Street.

Ustanovitev Oddelka za dopolnilno dejavnost.

1967

Establishment of the Department of Complementary Activities.

Tekstilni oddelek se preimenuje v Oddelek za tekstilno tehnologijo.

1969

The Textile Department was renamed the Department of Textile Technology.

Oddelek za tekstilno tehnologijo se kot odsek priključi Oddelku za strojništvo.

1970

The Department of Textile Technology was merged into the Department of Mechanical Engineering as a Section.

Uveden je 5. semester programe višješolskega izobraževanja.

1971

The 5th semester is introduced in the programmes of post-secondary education.

Sprejetje Zakona o Visoki tehniški šoli v Mariboru. VTŠ postane visokošolski zavod z visokošolskim in podiplomskim študijem.

1973

The Act on the Higher Education Technical Institution in Maribor was adopted. The Technical College became a Higher Education Institution with higher education and graduate studies.

Ustanovitev študijske smeri Konfekcijska tehnologija. Odsek za tekstilno tehnologijo se je preimenoval v Odsek za tekstilno in konfekcijsko tehnologijo.

1974

Establishment of the Confectionery Technology study course. The Department of Textile Technology was renamed The Department of Textile and Confectionery Technology.

Ustanovitev Visokošolske temeljne organizacije (VTO) za strojništvo.

1975

Establishment of the Higher Education Basic Organisation for Mechanical Engineering.

Ustanovitev Univerze v Mariboru (18. september 1975).

The University of Maribor was founded (18 September 1975).

Rektor Univerze v Mariboru
prof. dr. Ludvik Toplak

podeljuje

Svečano listino

Fakulteti za strojništvo,
s katero se potrjuje ustanovitev nove fakultete
Univerze v Mariboru,
nastale 1. 1. 1995 na osnovi Odloka
o preoblikovanju Univerze v Mariboru

Maribor, 17. marca 1995

Rektor
Univerze v Mariboru
prof. dr. Ludvik Toplak

Začetek študija tekstilstva na 2. stopnji in študija strojništva na 3. stopnji.	1976	<i>The beginning of Textile studies at the 2nd level and Mechanical Engineering studies at the 3rd level.</i>
Sprememba organizacijske oblike VTO za strojništvo in oblikovanje kateder.	1977	<i>Organisational change of the Higher Education Basic Organisation for Mechanical Engineering and creation of Chairs.</i>
Ustanovitev inštitutov na Visoki tehniški šoli. Na VTO Strojništvo delujeta Inštitut za strojništvo (osem laboratorijev in dva centra) ter Inštitut za tekstilno in konfekcijsko tehnologijo (osem laboratorijev).	1980	<i>Institutes were set up at the Higher Education Technical Institution. The Institute of Mechanical Engineering (eight laboratories and two centres) and the Institute of Textile and Clothing Technology (eight laboratories) were established at the Higher Education Basic Organisation for Mechanical Engineering.</i>
Preimenovanje Visoke tehniške šole v Tehniško fakulteto (TF). Oddelek za strojništvo sestavlja sedem inštitutov in katedra za splošne predmete.	1985	<i>The Higher Education Technical Institution was renamed to the Faculty of Technical Sciences. The Department of Mechanical Engineering consists of seven institutes and a Chair for General Subjects.</i>
Začetek izvedbe interdisciplinarnega univerzitetnega študijskega programa Gospodarsko inženirstvo – smer Strojništvo.	1993	<i>The launch of the interdisciplinary university Study Programme Industrial Engineering – course Mechanical Engineering.</i>
Sklep znanstveno-pedagoškega sveta TF o preoblikovanju TF v štiri nove fakultete (14. junij 1994).	1994	<i>Decision of the Scientific-Pedagogical Council of the Faculty of Technical Sciences on the transformation of the Faculty of Technical Sciences into four new Faculties (14 June 1994).</i>
Ustanovitev Fakultete za strojništvo UM (1. januar 1995).	1995	<i>Establishment of the Faculty of Mechanical Engineering UM (1 January 1995).</i>
Začetek izvajanja univerzitetnega študijskega programa. Ukinje se višješolski študij in uveljavi triletni visokošolski strokovni študijski program.	1996	<i>Start of the academic study programme. The college programme ends, and a three-year professional higher education study programme is introduced.</i>
Začetek izvajanja doktorskega študijskega programa Strojništvo, Tekstilna tehnologija in Tehniško varstvo okolja.		<i>Start of the Mechanical Engineering, Textile Technology and Environmental Engineering Doctoral Programmes.</i>
Uvedejo se nove smeri na univerzitetnih študijskih programih: Okoljevarstveno inženirstvo, Podjetniško inženirstvo, Inženirsko oblikovanje, Eko-tekstilno inženirstvo, Oblačilno inženirstvo in Inženirski management.	1998	<i>New courses in academic Study Programmes are introduced: Environmental Engineering, Industrial Engineering, Engineering Design, Eco-textile Engineering, Clothing Engineering and Engineering Management.</i>
Reorganizacija izvedbe znanstvenoraziskovalne dejavnosti in začetek delovanja raziskovalnih programov (8).	1999	<i>Reorganisation of scientific research activities and launch of research programmes (8).</i>
Začetek študentskega inženirskega projekta Formula Student.		<i>The Formula Student engineering project launched.</i>



FS bo stalno izboljševala razpoznavnost ter raziskovalno in izobraževalno odličnost.

Moving forward, FME remains committed to enhancing its visibility continuously, as well as its research and educational excellence.

Uvedba kreditnega sistema študija.

2000

Introduction of the credit-based system of study.

Nova interdisciplinarna univerzitetna študijska smer Mehatronika in nove smeri na visokošolskih strokovnih študijskih programih: Vzdrževanje, Nega tekstilij in oblačil, Konstrukcija in modeliranje oblačil.

2001

A new interdisciplinary academic Study Programme, Mechatronics, and new professional higher education Study Programmes, Textile and Clothing Care, Construction and Modelling of Clothing.

Nova študijska smer Orodjarstvo na visokošolskem strokovnem študijskem programu Strojništvo.

2003

A new study course in Tool Engineering at the professional higher education Study Programme Mechanical Engineering.

Modulni način študija na podiplomskih magistrskih in doktorskih študijskih programih Strojništvo, Tekstilna tehnologija in Tehniško varstvo okolja.

2004

Modular mode of study in the postgraduate Master's and Doctoral programmes in Mechanical Engineering, Textile Technology and Environmental Engineering.

Začetek bolonjskega študija – izvedba diplomskega univerzitetnega študijskega programa 1. stopnje Oblikovanje in tekstilni materiali.

2006

Launch of a Study Programme aligned with the Bologna Directives – 1st-cycle Academic Study Programme Design and Textile Materials.

Prvostopenjski bolonjski študij se začne izvajati še na drugih dodiplomskih univerzitetnih študijskih programih: Strojništvo, Gospodarsko inženirstvo – smer Strojništvo in Mehatronika.

2007

Other Study Programmes aligned with the Bologna Directives – 1st-cycle Academic Study Programmes were also launched: Mechanical Engineering, Industrial Engineering – Mechanical Engineering and Mechatronics.

11

Začetek bolonjskega študija na 1. stopnji dodiplomskih visokošolskih strokovnih študijskih programov (Strojništvo in Tehnologije tekstilnega oblikovanja), na 2. stopnji podiplomskega magistrskega študijskega programa (Oblikovanje in tekstilni materiali) in na 3. stopnji doktorskih študijskih programov (Strojništvo in Tehniško varstvo okolja).

2009

Start of Study Programmes aligned with the Bologna Directives – 1st-cycle professional higher education Study Programmes (Mechanical Engineering and Textile Design Technologies), 2nd-cycle postgraduate Master's degree programme (Design and Textile Materials), and 3rd-cycle Doctoral degree programmes (Mechanical Engineering and Environmental Engineering).

Ustanovitev Alumni kluba FS.

Establishment of the FME Alumni Club.

Začetek bolonjskega študija na 2. stopnji magistrskih študijskih programov (Strojništvo, Tehniško varstvo okolja, Mehatronika in Gospodarsko inženirstvo – smer Strojništvo) in na 3. stopnji doktorskega študijskega programa (Tekstilni materiali).

2010

Start of Study Programmes aligned with the Bologna Directives – 2nd-cycle postgraduate Master's Study Programmes (Mechanical Engineering, Environmental Engineering, Mechatronics and Industrial Engineering - Mechanical Engineering), and 3rd-cycle Doctoral degree programme (Textile Materials).



FS je izjemno aktivna in uspešna članica UM na izobraževalnem, znanstvenoraziskovalnem in umetniškem področju ter sodelovanju z okoljem. S svojim delovanjem pomembno vpliva na lokalno okolje, z gosto mrežo sodelovanja pa je stkala tudi v mednarodnem prostoru.

FME is a highly active and successful constituent of the UM, excelling in education, scientific research, the arts and community engagement. It has made a substantial impact locally through its diverse activities, and established extensive international connections via a robust network of collaborations.

Začetek bolonjskega študija na 1. stopnji visokošolskega strokovnega študijskega programa Mehatronika, na 1. stopnji univerzitetnega študijskega programa Tehniško varstvo okolja in na 2. stopnji magistrskega študijskega programa Inženirsko oblikovanje izdelkov.

2011

Start of Study Programmes aligned with the Bologna Directives – 1st-cycle professional higher education Study Programme Mechatronics, 1st-cycle Academic Study Programme Environmental Engineering, and 2nd-cycle postgraduate Master's Study Programme Product Design.

Pridobitev delavniških prostorov na Smetanovi ulici 18.

Acquisition of a workshop infrastructure at Smetanova Street 18.

Izvedba prvega Dneva FS, osrednjega letnega praznika fakultete s podelitvijo priznanj za posebne dosežke.

2016

The first FME Day, the main annual celebration of the Faculty, with acknowledgement and recognition for special achievements.

Začetek prenovljenega univerzitetnega študijskega programa 1. stopnje (Tehniško varstvo okolja) in magistrskih študijskih programov 2. stopnje (Tehniško varstvo okolja in Inženirsko oblikovanje izdelkov).

2017

Launch of the renewed 1st-cycle Academic Study Programme (Environmental Engineering) and 2nd-cycle postgraduate Master's Study Programmes (Environmental Engineering and Product Design).

Začetek prenovljenega magistrskega študijskega programa 2. stopnje Strojništvo.

2018

Launch of the renewed 2nd-cycle postgraduate Master's Study Programme Mechanical Engineering.

Začetek največjega raziskovalno-infrastrukturnega projekta Nadgradnja nacionalnih raziskovalnih infrastruktur Univerze v Mariboru (RIUM).

Launch of the largest research and infrastructure project, Upgrading National Research Infrastructures of the University of Maribor (RIUM).

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Začetek platforme INNOVUM – vzpostavitev Tehnološkega inovacijskega centra UM.

2019

Launch of the INNOVUM platform – establishment of the UM Technological Innovation Centre.

Začetek prenovljenega doktorskega študijskega programa 3. stopnje Doktorska šola FS in uvedba študijskih smeri Oblikovanje izdelkov ter Oblikovanje tekstilij in oblačil na magistrskem študijskem programu 2. stopnje Inženirsko oblikovanje izdelkov.

Launch of the renewed 3rd-cycle Doctoral degree programme, Doctoral School of the FME, and the introduction of Product Design and Textile and Fashion Design courses at the 2nd-cycle postgraduate Master's Study Programme Product Design.

Akreditacija doktorskega študijskega programa Gospodarsko inženirstvo.

2020

Accreditation of the 3rd-cycle Doctoral degree programme Industrial Engineering.

Upravni odbor UM potrdi Dokument identifikacije investicijskega projekta – platforma INNOVUM, ki vključuje prenovo in novogradnjo tehniških fakultet.

2021

The Management Board of UM approves the Investment Project Identification Document – the INNOVUM platform, which includes the renovation and new buildings of the Technical Faculties.

Ustanovitev Centra za vseživljenjsko učenje.

2022

Establishment of the Centre for Lifelong Learning.

Odprtje Pomurskega laboratorija, opremljen z donacijami 40-ih pomurskih podjetij.

2024

Opening of the Pomurje Laboratory, equipped with donations from 40 companies from the Pomurje region.



Fakulteta od nastanka do danes
The Faculty from its Foundation to the Present

Višja tehniška šola (VTŠ) je bila ustanovljena na pobudo mariborskih gospodarskih organizacij in strokovnih združenj 26. novembra 1959. Leta 1973 je Višja tehniška šola prerasla v Visoko tehniško šolo, ki je leta 1975 postala sestavni del tedaj ustanovljene UM, deset let pozneje pa se je preimenovala v Tehniško fakulteto. Od takrat je oddelek za strojništvo v okviru Visoke tehniške šole oziroma Tehniške fakultete deloval kot samostojna enota s študijskima programoma Strojništvo in Tekstilstvo.

FS je bila ustanovljena z odlokom o preoblikovanju UM, ki je začel veljati 1. januarja 1995. V skladu z odlokom in na predlog znanstveno-pedagoškega sveta članic je tedanji rektor UM prof. dr. Ludvik Toplak takoj po ustanovitvi FS za prvega vršilca dolžnosti dekana imenoval prof. dr. Adolfa Šostarja.

Prvi dekan samostojne fakultete je za Univerzitetno revijo takrat dejal: »Delitev Tehniške fakultete na štiri fakultete je bila zasnovana že leta 1975, ko smo oblikovali visokošolske temeljne organizacije in ustanovili štiri organizacijske enote. Te štiri ustanove so prevzele strukturo fakultet. Zgledovali smo se po evropskem tipu univerze. ... V osemdesetih letih je bila tehnološka opremljenost fakultete precej časa pred industrijo in smo tako z usposabljanjem in prenosom znanja bistveno prispevali k dvigu znanja in tehnologije v praksi. ... Primarna naloga na naši fakulteti bosta tudi v prihodnje doseganje čim višje kakovosti izobraževalnih in raziskovalnih procesov ter profesionalen odnos vseh delav-

The Technical College was founded on 26 November 1959, initiated by Maribor's business organisations and professional associations. In 1973, the Technical College evolved into a Higher Education Institution, which became an integral part of the newly established UM in 1975. Ten years later, it was renamed the Faculty of Technical Sciences. Since then, the Department of Mechanical Engineering has operated as an independent unit within the Higher Education Institution and the Faculty of Technical Sciences, offering Study Programmes in Mechanical Engineering and Textile Technology.

The FME was officially established by the Decree on the Reorganisation of the UM, effective from 1 January 1995. Following this Decree, and based on the proposal of the Scientific-Pedagogical Council, the Rector of UM, Prof. Dr. Ludvik Toplak, appointed Prof. Dr. Adolf Šostar as the first Acting Dean immediately after the establishment of the FME.

The first Dean of the independent Faculty told the University Magazine at the time: 'The division of the Faculty of Technical Sciences into four Faculties was conceived in 1975, when we formed the Higher Education Basic Organisation and established four organisational units. These four institutions took over the structure of the Faculties. We were inspired by the European type of university. ... In the 1980s, the technological equipment of the Faculty was well ahead of the industry, and so we made a significant contribution to raising the level of knowledge and technology in practice through training and knowledge transfer. ... The primary task of our Faculty will continue to be to achieve the highest possible quality of educational and research processes, and a professional attitude of

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Prvi dekan FS prof. dr. Adolf Šostar
First Dean of the FME Prof. dr. Adolf Šostar

cev fakultete do stroke. Naslednja pomembna stvar pa je, da ustvarimo tak lik diplomanta, ki bo pomagal našemu gospodarstvu. Ustvariti želimo študentom prijazno fakulteto. Ustanovitev samostojne FS je samo logičen korak na poti razvoja tehniških znanosti v Mariboru, korak, ki je omogočil nadaljnjo širitev in razvoj pedagoškega in znanstvenoraziskovalnega dela ter mednarodnega sodelovanja na področju strojništva in tekstilstva.«

Ustanovitev samostojne fakultete je ustvarila nove možnosti za še hitrejši razvoj in še bolj kakovostno okolje za akademski kader in študente.

Leta 1999 je bila fakulteta že na tako visoki oziroma konkurenčni znanstveno-strokovni ravni, da je bila potrebna evalvacija oziroma certifikacija tudi v mednarodnem in meduniverzitetnem prostoru. Zaradi tega je fakulteta zraven evalvacije kakovosti CRE izvedla tudi certifikacijo po standardih ISO 9001 oziroma sistemu EN 4500, s ciljem, da svoje poslanstvo optimalno prilagodi prioriteti znanstvenih disciplin in stroki.

V prvih letih obstoja je bila prevladujoča povezava z lokalno industrijo v skupnih raziskovalno-razvojnih projektih, kar je bilo pogojeno predvsem s takratnim pedagoškim in raziskovalnim kadrom, ki je prišel na fakulteto iz lokalnega gospodarstva, znanega po kovinskopredelovalni, avtomobilski in tekstilni proizvodnji. Z leti je fakulteta postala kadrovsko in materialno prepoznavna tudi v širšem domačem in mednarodnem okolju. Fakulteta se je od ustanovitve prilagajala sodobnim trendom v znanosti in stroki ter si že takrat prizadevala oblikovati strokovnjake za 21. stoletje. Danes je na FS skupno zaposlenih približno 200 sodelavk (približno 40 %) in sodelavcev (približno 60 %).

all Faculty members towards the profession. The next important thing is to create a graduate character that will help our industry. We want to create a student-friendly Faculty. The establishment of an independent FME is only a logical step on the path of development of technical sciences in Maribor, a step that has enabled the further expansion and development of teaching and scientific research work and international co-operation in the field of Mechanical Engineering and Textile Technology."

The establishment of an independent Faculty opened new opportunities for accelerated development and the creation of a higher-quality environment for both academic staff and students.

By 1999, the Faculty had reached such a high and competitive scientific and professional standard that it required international and inter-university evaluation and certification. Consequently, alongside the CRE quality evaluation, the Faculty also achieved certification under the ISO 9001 and EN 4500 Standards, aiming to align its mission optimally with the priorities of scientific disciplines and professional practice.

In its early years, the Faculty's primary connection with local industry was through joint research and development projects. This was due largely to the presence of teaching and research staff originating from the local industry, which is well-known for metalworking, automotive and textile production. Over time, the Faculty has gained recognition, both nationally and internationally, for its human and material resources. Since its inception, it has adapted continuously to modern scientific and professional trends, striving to educate professionals equipped for the demands of the 21st century. Today, the FME employs approximately 200 staff members (approximately 40% awomen and 60% men).





Dan FS, ki je osrednji letni slovesni dogodek fakultete, praznujemo 26. novembra. Ta dan predstavlja obletnico, ko je bil leta 1959 sprejet zakon o ustanovitvi Višje tehniške šole v Mariboru. Na slovesnosti ob Dnevu FS, ki smo ga prvič praznovali leta 2016, podeljujemo priznanja zaposlenim na FS, študentom FS in zunanjim organizacijam za izredne uspehe, dosežke in zasluge pri znanstvenoraziskovalnem, izobraževalnem, strokovnem, umetniškem in drugem delu, ki pomembneje prispevajo k razvoju FS.

The Day of FME, the Faculty's main annual celebration, is observed on 26 November. This date commemorates the anniversary of the enactment of the Law establishing the Technical College in Maribor in 1959. The celebration, first held in 2016, includes a ceremony during which acknowledgements are awarded to FME employees, students and external organisations, for their outstanding achievements and contributions in scientific, research, educational, professional, artistic, and other activities that advance the development of FME significantly.



FS UM, s povezovanjem kakovostnega izobraževalnega, znanstvenoraziskovalnega, umetniškega in strokovnega dela na področju inženirskih ved, prispeva k razvoju znanosti, tehnološkemu napredku gospodarstva in družbenega okolja. Pri svojem delovanju upošteva sodobne družbene in okoljske trende ter skladno s poslanstvom UM skrbi za človeka in trajnostni razvoj, bogati zakladnico znanja, dviguje raven zavedanja, krepi humanistične vrednote, kulturo dialoga, kakovost bivanja in globalno pravičnost.

FME UM, by integrating high-quality education, scientific research, artistic endeavours, and professional work in engineering sciences, contributes significantly to the advancement of science, technological innovation, economic progress and societal development. In all its activities, the Faculty remains attentive to contemporary social and environmental challenges, and, in alignment with the UM mission, promotes the well-being of people and sustainable development. It enriches the knowledge base, fosters awareness, and strengthens humanistic values, a culture of dialogue, quality of life and global justice.

Na fakulteti se zavedamo, da je ob klasičnem strojništvu nujno potrebna in pomembna vzpostavitev interdisciplinarnosti v povezavi z elektrotehniko, ekologijo, informatiko, logistiko, posameznimi področji medicine, kemijo, materiali, biotehniko, pa tudi ekonomijo in drugimi znanstvenimi področji. Bodoči diplomanti bodo v praksi namreč hkrati ustvarjalci izdelkov, njihovi proizvajalci s procesno opremo in robotiko ter prodajalci, saj zakonitosti sodobnih proizvodno-poslovnih procesov predvidevajo proizvodnjo izdelkov za vsakega naročnika posebej. Od bodočih strokovnjakov se bodo tako pričakovale številne kompetence, zato si na fakulteti prizadevamo, da študenti že med študijskim procesom sodelujejo pri čim več razvojno-raziskovalnih projektih in razvijajo oziroma krepijo svojo inovativnost.

Glede na sedanjo tehnološko razvitost, geopolitični položaj Slovenije in specifične okoliščine pa ugotavljamo, da se bodo v Sloveniji še posebej hitro razvijale posamezne dejavnosti, npr. logistika, transportni sistemi, vzdrževalni sistemi, trajnost in krožno gospodarstvo, ekološki sistemi, računalniško upravljanje, avtomatizacija proizvodnih procesov, robotizacija, novi materiali, energetika v povezavi izkoriščanja novih virov energije, proizvodni menedžment, prav tako pa bo tudi Slovenija, če bo želela pritegniti tuji kapital, potrebovala tehnološko zahtevne lastne proizvode. Zato fakulteta v svojih študijskih programih prav posebno pozornost namenja omenjenim strokovnim področjem in interdisciplinarnosti.

Sodobna znanja, ki jih ponuja FS, omogočajo, da bodoče inženirke in inženirji učinkovito ustvarjajo nove stroje, naprave in izdelke s pomočjo metod navidezne resničnosti, navidezne proizvodnje, virtualnega testiranja in analize izdelkov, simulacijo procesov in strojev, prostorskega prikazovanja, industrijskega oblikovanja, kjer je tržna in ekološka vrednost oziroma primernost izdelka omejitveni pogoj proizvodnje. Moderne proizvodnje si danes ne predstavljamo zgolj kot strojniške oziroma tekstilne, ampak povezane z drugimi tehničnimi disciplinami.

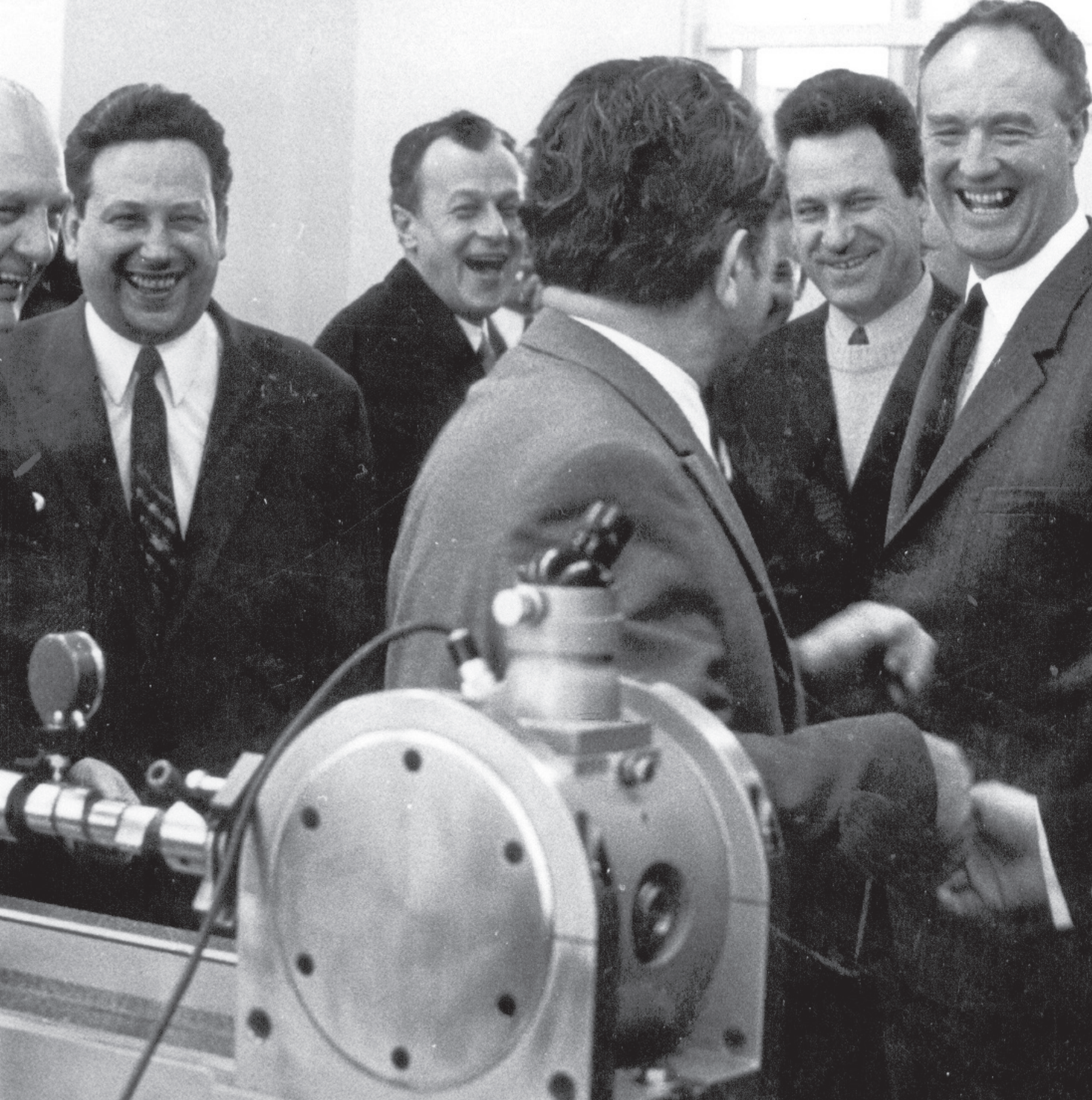
Opremljenost laboratorijev s sodobno opremo predstavlja raziskovalno infrastrukturo fakultete ter je ključnega pomena pri izvedbi raziskovalnih in študijskih programov ter pri sodelovanju z gospodarstvom. Temeljni in aplikativni raziskovalni programi neposredno vplivajo na prenovo vsebin dodiplomskih in podiplomskih študijskih programov.

At the Faculty we recognise that, alongside traditional Mechanical Engineering, fostering interdisciplinarity with fields such as Electrical Engineering, Ecology, Informatics, Logistics, Medicine, Chemistry, Materials Science, Biotechnology, Economics and other scientific disciplines is essential. In practice, future graduates will not only be designers and manufacturers of products and robotic process equipment, but also sales professionals, reflecting the demands of modern manufacturing and business processes, which, increasingly, require customisation for individual customers. Consequently, graduates must possess a broad spectrum of competencies. To support this, the Faculty emphasises involving students in a wide range of research and development projects, to cultivate and enhance their innovative capabilities.

Considering Slovenia's current level of technological development, its geopolitical position and unique circumstances, certain sectors are expected to experience particularly rapid growth. These include Logistics, transport and maintenance systems, sustainability and the circular economy, ecological systems, computerised management, production process automation, robotics, new materials, energy (especially relating to new energy sources) and production management. Additionally, Slovenia will require technologically advanced proprietary products to attract foreign investment. Accordingly, the Faculty prioritises these areas of expertise and interdisciplinarity within its Study Programmes.

The modern skills imparted at FME enable future engineers to design and develop new machines, devices, and products effectively using advanced tools such as virtual reality, virtual manufacturing, virtual product testing and analysis, process and machine simulation, spatial visualisation, and industrial design – always considering the market and ecological viability as key constraints on production. Today's manufacturing is no longer confined to mechanical engineering or textiles alone, but is linked integrally with other technical disciplines.

The Faculty's state-of-the-art laboratory infrastructure plays a critical role in supporting research and study programmes as well as collaboration with industry. Basic and applied research activities inform and drive the continual renewal of both undergraduate and postgraduate curricula directly.



Dekani, prodekani in tajniki
Deans, Vice-Deans and Secretaries General

Dekani in prodekani

Deans and Vice-Deans



red. prof. dr. Adolf Šostar
dekan | *Dean*
1995 – 2001

red. prof. dr. Jože Flašker

prodekan za izobraževalno dejavnost (1995 – 2001)

red. prof. dr. Slava Jeler

prodekanja za raziskovalno dejavnost (1995 – 1997)

red. prof. dr. Leopold Škerget

prodekan za raziskovalno dejavnost (1998 – 2001)



red. prof. dr. Maks Oblak
dekan | *Dean*
2001 – 2003

red. prof. dr. Jože Flašker

prodekan za izobraževalno dejavnost (2001 – 2006)

red. prof. dr. Leopold Škerget

prodekan za raziskovalno dejavnost (2001 – 2006)

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red. prof. dr. Andrej Polajnar
dekan | *Dean*
2003 – 2006

red. prof. dr. Jože Flašker

prodekan za izobraževalno dejavnost (2001 – 2006)

red. prof. dr. Leopold Škerget

prodekan za raziskovalno dejavnost (2001 – 2006)



red. prof. dr. Milan Marčič
v. d. dekana | *Acting Dean*
2006 – 2007

izr. prof. dr. Andrej Predin

p. p. prodekan za študijske in kadrovske zadeve za področje strojništva (2006 – 2007)

red. prof. dr. Alenka Majcen le Marechal

p. p. prodekanja za študijske in kadrovske zadeve za področje tekstila (2006 – 2007)

red. prof. dr. Maks Oblak

p. p. prodekan za raziskovalno dejavnost za področje strojništva (2006 – 2007)

red. prof. dr. Karin Stana Kleinschek

p. p. prodekanja za raziskovalno dejavnost za področje tekstila (2006 – 2007)



red. prof. dr. Niko Samec
dekan | *Dean*
2007 – 2015

red. prof. dr. Zoran Ren

prodekan za izobraževalno dejavnost (2007 – 2011)

prodekan za sodelovanje z gospodarstvom (2011 – 2015)

red. prof. dr. Karin Stana Kleinschek

prodekanja za raziskovalno dejavnost (2007 – 2008)

red. prof. dr. Jože Balič

prodekan za mednarodno in medfakultetno sodelovanje (2007 – 2008)

red. prof. dr. Jože Balič

prodekan za raziskovalno dejavnost (2008 – 2015)

izr. prof. dr. Franc Zupanič

prodekan za izobraževalno dejavnost (2011 – 2015)



red. prof. dr. Bojan Dolšak
dekan | *Dean*
2015 – 2023

red. prof. dr. Iztok Palčič

prodekan za izobraževalno dejavnost (2015 – 2019)

prodekan za infrastrukturo in sodelovanje z okoljem (2019 – 2022)

red. prof. dr. Simona Strnad

prodekanja za raziskovalno dejavnost (2015 – 2023)

red. prof. dr. Nenad Gubelj

prodekan za sodelovanje z gospodarstvom (2015 – 2019)

red. prof. dr. Tatjana Kreže

prodekanja za kakovost (2015 – 2023)

izr. prof. dr. Janez Kramberger

prodekan za izobraževalno dejavnost (2019 – 2023)

izr. prof. dr. Filip Kokalj

prodekan za infrastrukturo in sodelovanje s okoljem (2022 – 2023)



red. prof. dr. Matej Vesenjajk
dekan | *Dean*
od 2023

doc. dr. Matej Zadravec

prodekan za izobraževalno dejavnost (od 2023)

red. prof. dr. Lidija Fras Zemljič

prodekanja za raziskovalno dejavnost (od 2023)

red. prof. dr. Iztok Palčič

prodekan za sodelovanje z okoljem in kakovost (od 2023)

Prodekani za študentska vprašanja

Vice-Deans for Student Affairs

Dominika Bezek (1997 – 1999)
Dejan Šlemer, v. d. (2002 – 2002)
Peter Cokan (2003 – 2005)
Niko Rozman (2005 – 2006)
Boštjan Rajh (2006 – 2013)
Jožef Alen Kohne (2013 – 2014)
Vid Videtič (2014 – 2016)
Lea Grešovnik, v. d. (2016 – 2016)
Teodor Varga (2016 – 2017)
Filip Hercog (2017 – 2018)
Jani Humar (2018 – 2021)
Andreja Kumer (2021 – 2024)
Peter Škrilec (od 2024)

Tajniki fakultete

Faculty Secretaries General

mag. Janez Gujt (1995 – 2008)
mag. Janez Gujt, v. d. (2008 – 2016)
Mojca Jež Gole (od 2017)

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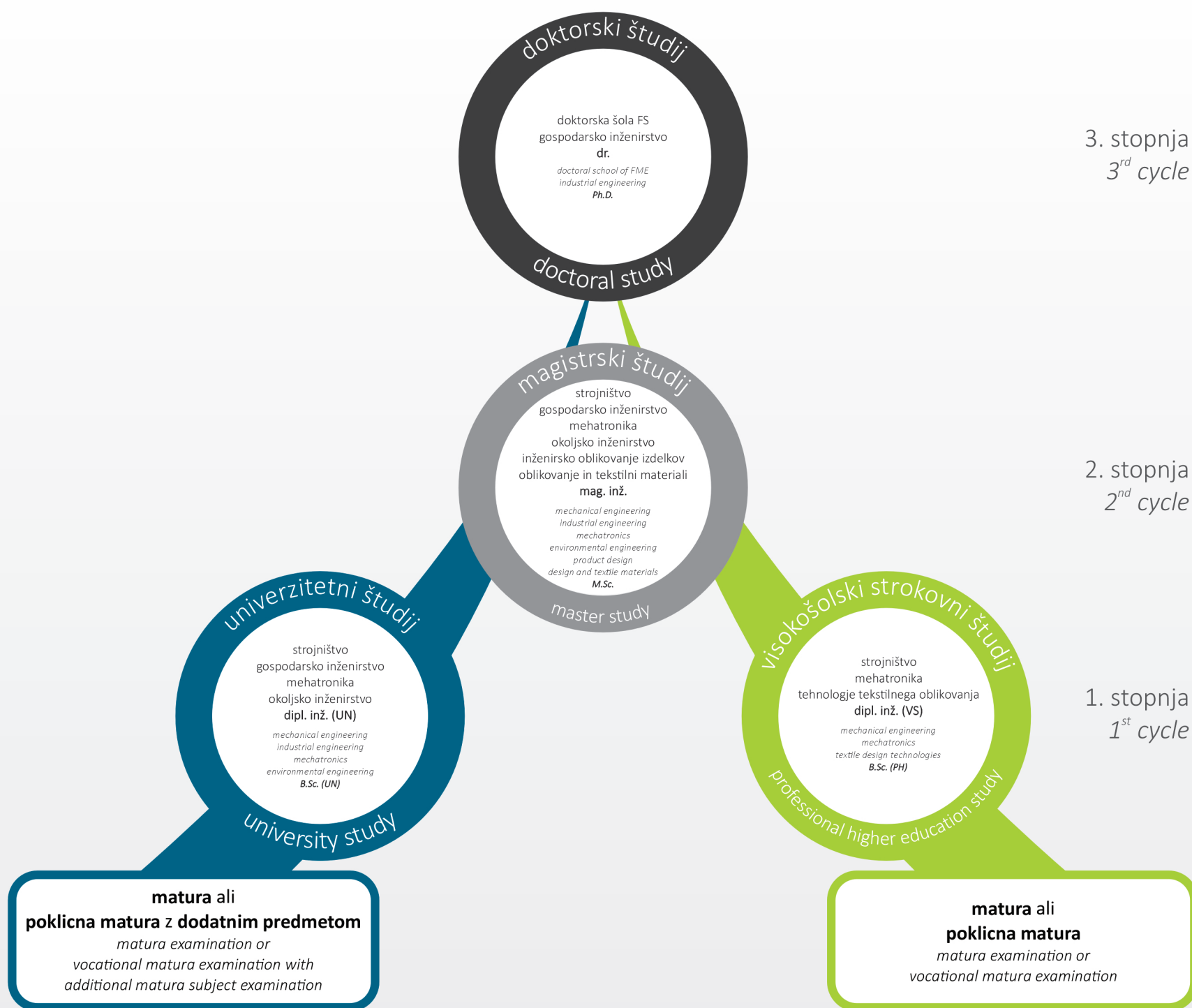
AKADEMSKI ZBOR

Academic assembly

SENAT <i>Senate</i>	DEKAN <i>Dean</i>	TAJNIK <i>Secretary</i>	Strokovne službe <i>Administration</i>
Komisija za študijske zadeve <i>Commission for study matters</i>	Prodekan za izobraževalno dejavnost <i>Vice-dean for studies</i>		
Komisija za znanstveno raziskovalne zadeve <i>Commission for scientific research matters</i>	Prodekan za raziskovalno dejavnost <i>Vice-dean for scientific research</i>		
Komisija za ocenjevanje kakovosti <i>Commission for quality assessment</i>	Prodekan za sodelovanje z okoljem in kakovost <i>Vice-dean for cooperation with industry and quality assurance</i>		
Habilitacijska komisija <i>Commission for habilitations</i>	Prodekan za študentska vprašanja <i>Vice-dan for student affairs</i>		
Študentski svet <i>Student council</i>	Strateški svet <i>Stratetgic council</i>		

KATEDRE, CENTRI, LABORATORIJI

Chairs, centers, laboratories



Izobraževalna dejavnost

Educational Activity

Nove tehnologije, materiali, proizvodni procesi in rastoč spekter znanja vplivajo na to, da v industriji 21. stoletja ostaja nepogrešljiv inženirski kader, ki se bo lahko optimalno angažiral na vseh znanstvenih in strokovnih področjih ter v vseh gospodarskih panogah, kjer stroji in naprave poganjajo tehnologijo, procese in produkte. Prav zato smo na FS prepričani, da so sodobni in interdisciplinarni študijski programi, ki jih ponujamo, izjemno perspektivni.

Študijski programi so bili v obdobju 2004–2009 preoblikovani v skladu s cilji bolonjske prenove študija. S tem je bilo spodbujeno sodelovanje visokošolskih ustanov UM pri oblikovanju skupnih študijskih programov, mobilnosti študentov in predavateljev, priznavanje študijskih obveznosti in kompetenc znanja za potrebe zaposlovanja na skupnem trgu delovne sile. FS z UM tako sooblikuje evropski visokošolski prostor, ki temelji na jezikovni in kulturni raznolikosti ter enakopravnosti.

Danes je FS znanstvenoraziskovalna ustanova z diplomskimi in podiplomskimi študijskimi programi, prepletenimi s sodobnimi vsebinami. Možen je vpis na univerzitetne študijske programe 1. stopnje Strojništvo, Gospodarsko inženirstvo, Mehatronika in Okoljsko inženirstvo ter visokošolska strokovna študijska progra-

Advances in technology, new materials, innovative production processes, and the expanding body of knowledge, ensure that 21st-century industry will continue to demand engineering professionals capable of contributing effectively across all scientific and technical disciplines, as well as in every sector where machines and devices drive technology, processes and products. At the FME, we firmly believe that our modern, interdisciplinary Study Programmes are exceptionally well suited to meet these evolving challenges.

Between 2004 and 2009, our Study Programmes were restructured comprehensively in accordance with the objectives of the Bologna Process. This reform fostered collaboration between the UM higher education institutions in developing joint Study Programmes, promoting student and Faculty mobility, and facilitating the recognition of study requirements and competencies for employment within the European labour market. Together, FME and UM contribute actively to building a European Higher Education Area grounded in linguistic and cultural diversity and equality.

Today, FME stands as a leading scientific research institution, offering undergraduate and postgraduate programmes enriched with contemporary content. Our 1st-cycle Bachelor's degree programmes include Mechanical Engineering, Industrial Engineering, Mechatronics, and Environmental

Dodiplomski študij	
Strojništvo (UN)	174
Gospodarsko inženirstvo (UN)	47
Mehatronika (UN)	58
Okoljsko inženirstvo (UN)	3
Strojništvo (VS)	293
Mehatronika (VS) skupaj s FERI	99
Tehnologije tekstilnega oblikovanja (VS)	21
Podiplomski študij	
Strojništvo (MAG)	148
Gospodarsko inženirstvo (MAG)	75
Mehatronika (MAG) – skupaj s FERI	95
Inženirsko oblikovanje izdelkov (MAG)	20
Okoljsko inženirstvo (MAG)	10
Oblikovanje tekstilnih materialov (OTM)	2
Doktorska šola FS (DR)	42
Gospodarsko inženirstvo (DR)	5
Skupaj: 967 študentk in študentov (1056 skupaj s FERI)	

Undergraduate studies (1 st -cycle)	
Mechanical Engineering (Academic)	174
Industrial Engineering (Academic)	47
Mechatronics (Academic)	58
Environmental Engineering (Academic)	3
Mechanical Engineering (Professional)	293
Mechatronics (Professional) together with FERI	99
Textile Design Technologies (Professional)	21
Postgraduate studies (2 nd and 3 rd -cycles)	
Mechanical Engineering (Master's)	148
Industrial Engineering (Master's)	75
Mechatronics (Master's) - together with FERI	95
Product Design (Master's)	20
Environmental Engineering (Master's)	10
Textile Design (Master's)	2
Doctoral School of the FME (Doctoral)	42
Industrial Engineering (Doctoral)	5
Total: 967 students (1056 together with FERI)	

ma Strojništvo, Mehatronika in Tehnologije tekstilnega oblikovanja. Na magistrskem študiju 2. stopnje lahko študentje izbirajo med študijskimi programi Strojništvo, Gospodarsko inženirstvo, Mehatronika, Okoljsko inženirstvo, Inženirsko oblikovanje izdelkov ter Oblikovanje in tekstilni materiali. Na doktorskem študiju 3. stopnje pa ponujamo študijska programa Doktorska šola FS in Gospodarsko inženirstvo.

Da bi uspešno usposabljali bodoče nove generacije inženirk in inženirjev, si na fakulteti nenehno prizadevamo za izpopolnjevanje in prenovo študijskih programov, pa tudi za razvijanje kreditno ovrednotenih obštudijskih dejavnosti, proste izbire predmetov in študija na daljavo ter mednarodnega sodelovanja.

Fakulteta postopno spreminja tudi razmerje med temeljnimi in strokovnimi znanji oziroma povečuje slednja. Pri razvoju študijskih programov se bomo še naprej povezovali z industrijo z željo, da bi sledili skupnim razvojno-raziskovalnim ciljem. Cilj FS je, da bi naši diplomanti znali povezovati usvojeno znanje z različnih področij in da bi med študijem razvili čim več kompetenc, ki jih iščejo tudi bodoči delodajalci, npr. kreativnost, zmožnost sodelovanja, vodenja, timskega dela, organizacijske in komunikacijske spretnosti ...

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Študijski in raziskovalni programi potekajo na katedrah FS. V celotnem obdobju rasti in razvoja fakultete smo znanstvenoraziskovalno in raziskovalno-razvojno delo dojemali kot trajno usmeritev. Tako smo ustvarili pogoje za uspešni dodiplomski in še posebej za podiplomski študij, hkrati pa našim diplomantom zagotavljamo prepoznavnost v domačem in mednarodnem prostoru.

Ponosni smo, da lahko svojo kakovost izkažemo z mednarodno primerljivim dodiplomskim in podiplomskim študijem ter z rezultati v obliki doktorskih disertacij kot dokazih najkakovostnejšega znanstvenoraziskovalnega dela. Odličen podiplomski študij omogoča vključevanje v mednarodne in domače raziskovalne in tehnološke projekte ter izobražuje vrhunske strokovnjake.

V 65 letih študija tehnike v Mariboru smo izobrazili številne generacije mladih inženirk in inženirjev ter slovesno podelili 11.483 diplomskih listin:

- 6212 diplomantkam in diplomantom predbolonjskih univerzitetnih študijskih programov,
- 1829 diplomantkam in diplomantom predbolonjskih visokošolskih strokovnih študijskih programov,
- 1093 diplomantkam in diplomantom univerzitetnih študijskih programov 1. stopnje,

Engineering, alongside higher professional degree programmes in Mechanical Engineering, Mechatronics, and Textile Design Technologies. At the second-cycle Master's level, students can specialise in Mechanical Engineering, Industrial Engineering, Mechatronics, Environmental Engineering, Product Design, and Design and Textile Materials. For Doctoral studies, we offer programmes through the Doctoral School of the FME and Industrial Engineering.

To prepare the next generation of engineers effectively, the Faculty is committed continuously to enhancing and updating its Study Programmes. This includes the development of credit-bearing extracurricular activities, the provision of elective courses, the expansion of distance learning options, and the strengthening of international cooperation.

The Faculty is also adjusting the balance between foundational knowledge and specialised skills progressively within its curricula. We collaborate actively with industry partners in shaping our Study Programmes to align with shared research and development objectives. Our goal is to ensure that graduates not only acquire interdisciplinary knowledge, but also develop a broad spectrum of competencies valued by future employers, such as creativity, collaboration, leadership, teamwork, adaptability, organisational skills and effective communication.

Academic and research activities are conducted within the FME's academic Chairs. Throughout the Faculty's history, scientific research and research and development have remained central priorities, fostering a robust environment for both undergraduate, and, especially, postgraduate education. This foundation enhances the national and international significance of our graduates.

We take pride in the quality of our internationally comparable undergraduate and postgraduate programmes, as well as the excellence reflected in our Doctoral Dissertations, which stand as evidence of top-tier scientific research. Our outstanding postgraduate education enables active participation in international and domestic research and technology projects, producing highly skilled professionals.

Over 65 years of engineering education in Maribor, we have graduated 11,483 young engineers across various levels of our study programmes:

- 6,212 graduates of pre-Baccalaureate university courses,
- 1,829 graduates of pre-Baccalaureate professional higher education programmes,
- 1,093 graduates of first-cycle university study programmes,

- 729 diplomantkam in diplomantom visokošolskih strokovnih študijskih programov 1. stopnje,
- 826 magistricam in magistrrom študijskih programov 2. stopnje,
- 418 magistricam in magistrrom znanosti,
- 92 specialistkam in specialistom,
- 284 doktoricam in doktorjem znanosti.

Stopnja zaposljivosti naših diplomantov je še zmeraj zelo visoka, saj so zelo iskan kader na trgu delovne sile. Izjemno smo ponosni tako na dosežke naših dodiplomskih in podiplomskih študentk in študentov, ki se uspešno udeležujejo različnih študentskih projektov ter tekmovanj doma in v tujini. Najbolj odmevna študentska projekta sta Formula Student in Aeronavtično društvo UM, kjer so naše študentke in študenti v preteklosti že dosegli izjemno odmevne dosežke v mednarodnem merilu. Zelo pomembni in uspešni pa so še projekt Product Innovation v sodelovanju s Tehniško univerzo iz Gradca, projekti Javnega štipendijskega, razvojnega, invalidskega in preživninskega sklada Republike Slovenije, Po kreativni poti do praktičnega znanja (PKP) ter Študentski inovativni projekti za družbeno korist (ŠIPK), projekti UM Študentski izzivi UM ter Projektno delo za pridobitev praktičnih izkušenj in znanj študentov v delovnem okolju ter sodelovanje študentov na več razpisih oziroma tekmovanjih gospodarskih družb.

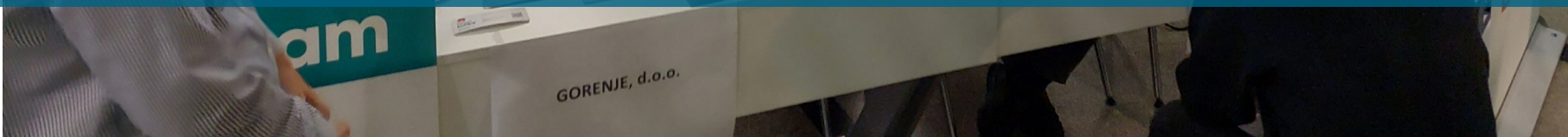
- 729 graduates of first-cycle professional higher education programmes,
- 826 graduates of second-cycle Master's programmes,
- 418 Masters of Science,
- 92 specialists,
- 284 Doctors of Philosophy (Ph.D.).

Our graduates enjoy a very high employability rate, and are sought after highly in the labour market. We are proud of our students' achievements, demonstrated through their participation and success in numerous national and international projects and competitions. Notably, the Formula Student team and the UM Aeronautical Society have garnered significant international recognition. Other important initiatives include the Product Innovation project in cooperation with the Technical University of Graz, various projects supported by the Public Scholarship, Development, Disability and Maintenance Fund of the Republic of Slovenia, the "On the Creative Path to Practical Knowledge" (PKP) initiative, Student Innovative Projects for Social Benefit (SIPK), UM Student Challenges, and the Project Work for Acquisition of Students' Practical Experience and Skills in the Workplace. Our students also participate actively in calls for tenders and competitions organised by companies.



Poštenost, iskrenost, profesionalna etika in družbena odgovornost pri raziskovanju in izobraževanju.

Integrity, honesty, professional ethics and social responsibility in research and education.





***Znanstvenoraziskovalna in
umetniška dejavnost***
Scientific Research and Artistic Activities

Odličnost raziskovalnega dela potrujemo z uspešnim izvajanjem številnih domačih in mednarodnih projektov ter programov. Od leta 1999 se temeljno raziskovalno delo izvaja v okviru devetih raziskovalnih programov, od leta 2022 smo pridruženi tudi k izvajanju dveh novih raziskovalnih programov. Poleg tega so samo v zadnjem desetletju naše raziskovalke in raziskovalci uspešno vodili ali sodelovali pri 29 temeljnih, 22 aplikativnih projektih in dveh ciljnih raziskovalnih projektih, ki jih je financirala Javna agencija za znanstvenoraziskovalno in inovacijsko dejavnost Republike Slovenije (ARIS). Naša fakulteta je bila prva med članicami UM, ki je uspešno pridobila financiranje evropskih projektov programa FP6 in FP7. Ob zaključku obeh okvirnih programov smo se lahko pohvalili z uspešno zaključnimi sedmimi mednarodnimi projekti FP6 in devetimi projekti FP7. Podobno smo orali ledino na UM pri prijavah v okviru programa H2020 in Obzorje Evropa. Uspešno smo zaključili osem projektov programa H2020. Trenutno se izvaja še en projekt v okviru programa H2020 in dva nova projekta v okviru programa Obzorje Evropa. Poleg navedenega so naši raziskovalci in raziskovalke v zadnjih desetih letih vodili ali sodelovali pri 36 mednarodnih projektih v okviru drugih mednarodnih programov: M-era.Net (2), Flag-Era (1), Era-Net (6), COST (8), Tempus (1), Erasmus Mundus Euphrates (1), Erasmus+ (10) idr.

Mednarodno vpetost neprestano krepimo tudi z izvajanjem številnih bilateralnih projektov in sodelovanjem z raziskovalci iz različnih držav sveta: Argentine, Avstrije, Bosne in Hercegovine, Brazilije, Črne gore, Danske, Francije, Hrvaške, Indije, Japonske, Litve, Madžarske, Nemčije, Norveške, Rusije, Srbije, Turčije, Ukrajine in ZDA. V okviru razpisov Evropskega sklada za regionalni razvoj (ESRR) smo se aktivno vključili v šest strateških razvojno-inovacijskih partnerstev (SRIP).

Ves čas posvečamo posebno pozornost razvoju in usposabljanju mladih raziskovalnih kadrov. V zadnjih dvajsetih letih so naši mladi sodelavci pod mentorstvom izkušenih kolegov izvedli 23 podoktorskih projektov. V okviru programa Raziskovalci na začetku kariere je bilo uspešno zaključenih sedem projektov, kjer so mladi doktorji znanosti razvijali svoje raziskovalne potenciale tudi v sodelovanju s podjetji. V okviru programa usposabljanja Mladih raziskovalcev je do sedaj doktoriralo več kot 240 raziskovalk in raziskovalcev, trenutno pa je vanj vključenih 22 mladih strokovnjakov.

Rezultati znanstvenoraziskovalnega dela naših sodelavcev so vidni v številnih objavah znanstvenih člankov v priznanih revijah, izdanih monografijah in podeljenih

Our Faculty's outstanding research achievements are founded on the successful execution of numerous national and international projects and programmes. Since 1999, fundamental research has been conducted within nine established Research Programmes, with two additional programmes joining since 2022.

In the past decade alone our researchers have led, or contributed to, 29 basic, 22 applied, and two targeted research projects funded by the Slovenian Public Agency for Scientific Research and Innovation (ARIS) successfully. FME was the first member of the UM to secure funding from the European Commission's Framework Programmes FP6 and FP7. By the conclusion of these Programmes, we had completed seven FP6 and nine FP7 international projects. Our involvement has continued actively with Horizon 2020 and Horizon Europe initiatives, where we have completed eight H2020 projects successfully, and currently have one ongoing H2020 project alongside two Horizon Europe projects.

Beyond these, over the last ten years, our researchers have participated in 36 international projects under various other programmes, including M-era.Net (2), Flag-Era (1), Era-Net (6), COST (8), Tempus (1), Erasmus Mundus Euphrates (1), and Erasmus+ (10), among others.

We strengthen our global engagement continuously through bilateral projects and collaborations with researchers from a diverse range of countries, including Argentina, Austria, Bosnia and Herzegovina, Brazil, Croatia, Denmark, France, Germany, Hungary, India, Japan, Lithuania, Montenegro, Norway, Russia, Serbia, Turkey, Ukraine and the United States.

Moreover, we are involved actively in six Strategic Research and Innovation Partnerships (SRIPs) supported by the European Regional Development Fund (ERDF), underscoring our commitment to applied research and innovation.

Recognising the importance of nurturing emerging talent, we emphasise the development and training of young researchers. Over the past 20 years, our early-career staff have undertaken 23 postdoctoral projects under the guidance of senior mentors. Seven projects have been completed successfully through the Early Career Researchers Programme, where young Ph.D.'s have developed their research potential in collaboration with industry partners. To date, the Young Researchers Training Programme has supported over 240 researchers, and currently fosters the development of 22 young professionals.

The results of our scientific research are reflected in numerous high-quality publications, monographs and patents. Over

patentih. V zadnjem desetletju smo objavili 2511 znanstvenih del, vključno s 634 članki v najvišje ocenjenih znanstvenih revijah. Poleg navedenega smo izdali 24 monografij pri mednarodnih založbah in pridobili 19 mednarodnih patentov. Naši raziskovalci so zaradi izjemnih dosežkov med najuspešnejšimi tudi pri pridobivanju raziskovalne infrastrukture. V okviru projekta RIUM smo pridobili najnaprednejšo opremo, ki omogoča vrhunsko znanstveno delo in prebojne rezultate.

Projekte izvajamo znotraj finančne podpore Javne agencije za znanstvenoraziskovalno in inovacijsko dejavnost RS, Evropske komisije, Ministrstva za visoko šolstvo, znanost in inovacije, Ministrstva za kohezijo in regionalni razvoj ter Ministrstva za kmetijstvo, gozdarstvo in prehrano. FS je kot organizator aktivna tudi pri organizaciji domačih in mednarodnih znanstvenih konferenc:

- Mednarodna konferenca Fluidna tehnika,
- CEEPUS zimska šola Design Week,
- Mednarodna konferenca ECO DAY,
- Mednarodna konferenca NANOAPP,
- Nacionalna konferenca Kuhljevi dnevi,
- Mednarodna konferenca o dodajalni izdelavi iCAT,
- Mednarodna konferenca EPNOE,
- Dan varilne tehnike, industrijske robotike in transporta v industriji,
- Mednarodna konferenca o mehaniki fluidov AFM,
- Mednarodni simpozij ESHP.

Z namenom krepitev mreženja raziskovalcev in doseganja še večjega raziskovalnega uspeha smo na FS v letu 2023 ustanovili Raziskovalni klub, ki deluje na treh ključnih področjih:

- Kreativna jedra (skupne prijave večjih projektov),
- Okrogla miza raziskovalcev (debate in zanimiva strokovna predavanja za zaposlene) in
- Debatni klub doktorskih študentov FS (povezovanje doktorskih študentov in podpora pri njihovi karierni poti).

Kot ena prvih fakultet na UM smo sprejeli Kodeks etike raziskovanja in objavljanja, ki ga tudi aktivno udeležamo. Etično ravnanje, spoštovanje človeškega dostojanstva, korektnost in družbena odgovornost so namreč temeljne vrednote, ki predstavljajo temelj zdrave družbe in nikoli ne izgubijo svoje vrednosti.

the last decade, our Faculty has published 2,511 scientific papers, including 634 articles in leading journals. Additionally, we have published 24 monographs with international publishers and secured 19 international patents. Our researchers are also highly successful in acquiring cutting-edge research infrastructure; notably, through the RIUM project, we have procured state-of-the-art equipment enabling pioneering scientific breakthroughs.

Our projects receive financial support from multiple sources, including the Slovenian Public Agency for Scientific Research and Innovation, the European Commission, the Ministry of Higher Education, Science and Innovation, the Ministry of Cohesion and Regional Development, and the Ministry of Agriculture, Forestry and Food. The FME also plays an active role in organising national and international scientific conferences, fostering further knowledge exchange and collaboration. Here is a list of the most important conferences and symposia:

- *International Fluid Engineering Conference,*
- *CEEPUS Design Week Winter School,*
- *ECO DAY International Conference,*
- *NANOAPP International Conference,*
- *National conference Kuhl Days,*
- *iCAT International Conference on Additive Manufacturing,*
- *EPNOE International Conference,*
- *Day of Welding Technology, Industrial Robotics and Industrial Transport,*
- *AFM International Conference on Fluid Mechanics,*
- *ESHP International Symposium.*

To strengthen the networking of researchers and achieve even greater research success, the FME established a Research Club in 2023, which works in three key areas:

- *Creative Cores (joint applications for major projects),*
- *Researchers' Roundtable (debates and interesting expert lectures for staff), and*
- *FME Doctoral Students' Debating Club (networking and career support for Doctoral students).*

We are one of the first Faculties at UM to adopt a Code of Ethics for Research and Publication, which we are implementing actively. Ethical conduct, respect for human dignity, correctness and social responsibility, are the fundamental values that form the basis of a healthy society and never lose their value.



Usmerjenost raziskovanja in izobraževanja v dobrobit
človeštva in ustvarjanje vključujoče družbe.

*Focusing on research and education for the benefit of humani-
ty and the creation of an inclusive society.*

Umetniška dejavnost

Umetniški pristop je vključen v proces oblikovanja tekstilij, oblačil in modnih dodatkov na obeh stopnjah študija, prav tako pa se uporablja pri oblikovanju izdelkov na magistrski stopnji. Ta pristop spodbuja ustvarjalno razmišljanje in raziskovanje, pri čemer tehnično znanje ter sodobne tehnologije omogočajo pretvorbo idej v otipljive in uporabne oblike.

V procesu razvoja idej nastajajo skice, 3D vizualizacije, prototipi in končni izdelki, ki so ključni pri povezovanju teorije s prakso. Ta povezava omogoča študentom pridobivanje dragocenih izkušenj, prilagajanje potrebam trga in vključevanje principov inkluzivnega dizajna, kar zagotavlja konkurenčnost na trgu ter predstavlja izziv za generacijo, ki se sooča z zahtevami sodobnega oblikovanja.

Ob upoštevanju konceptnega oblikovanja in ergonomije nastajajo eksperimentalne ter funkcionalne oblike uporabnih izdelkov, ki odgovarjajo potrebam različnih naročnikov, kot so Alpina, Kauch, Sixinch, Sericyne in drugi. Ta podjetja z zaupanjem sprejemajo izzive, ki jih prinašajo mlade generacije študentov, jim omogočajo razvoj potenciala ter spodbujajo kreativnost in inovativnost.

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Številna priznanja na področju oblikovanja potrjujejo uspehe naših študentov in zaposlenih ter kažejo, da so smernice našega dela učinkovite in usmerjene v pravo smer.

Artistic Activity

The artistic approach is embedded deeply in the design process for textiles, clothing, and accessories, at both undergraduate and graduate levels, and is also extended to product design at the Master's level. This methodology fosters creative thinking and research, while combining technical expertise and modern technologies to transform innovative ideas into tangible, functional products.

The development journey – from initial sketches and 3D visualisations to prototypes and final products – serves as a vital bridge between theoretical knowledge and practical application. This connection equips students with valuable hands-on experience, enabling them to adapt to evolving market demands and integrate inclusive design principles. Such preparation ensures their competitiveness in the marketplace, and empowers a generation poised to meet the challenges of contemporary design.

By emphasising conceptual design and ergonomics, students create experimental and functional products tailored to diverse client needs, including renowned companies such as Alpina, Kauch, Sixinch, Sericyne, and others. These industry partners embrace the innovative challenges presented by our students actively, fostering their creative potential and encouraging continuous innovation.

The numerous design awards garnered by our students and staff attest to the success and impact of our educational approach, demonstrating that our work is both effective and aligned with the forefront of design excellence.



Odličnost, avtonomija in odprtost raziskovalnega, umetniškega in izobraževalnega dela.

Excellence, autonomy and openness in research, art and education.

Založniška dejavnost

Na FS omogočamo objavlanje dosežkov avtorjev v okviru postopkov, ki jih vodi Komisija za založniško dejavnost. Ta deluje na sodobnih temeljih in izpolnjuje zahteve znanstvenega komuniciranja. Predvsem objavljamo učna gradiva (učbeniki, skripta, navodila za vaje), znanstvene in strokovne monografije, zbornike konferenc, informativne brošure ipd. s področja strojništva in tekstilstva. Od leta 2017 smo v okviru Univerzitetne založbe UM objavili 72 del v tiskani ali elektronski obliki, večinoma v obliki odprtega dostopa.

Založniška dejavnost je ključnega pomena za življenje fakultete, saj podpira akademski ugled, karierno napredovanje in širjenje znanja. Znanstvena dela dokazujejo raziskovalno odličnost, prispevajo k akademski skupnosti in povečujejo ugled institucije. Učna gradiva služijo kot temeljno orodje za izobraževanje, medtem ko podajajo monografije poglobljeno raziskovanje specializiranih raziskovalnih tem in napredek področij. Zborniki konferenc poudarjajo tekoče raziskave in spodbujajo sodelovanje. Publikacije so pogosto sestavni del izpolnjevanja pogojev za zaposlitev, napredovanj in štipendij ter tako igrajo ključno vlogo pri poklicnem razvoju in potrjevanju kakovosti članov fakultete.

FS izdaja oziroma aktivno sodeluje pri izdaji treh znanstvenih revij s področja strojništva: *Advances in Production & Engineering Management*, *Strojniški vestnik* (*Journal of Mechanical Engineering*) in *International Journal of Simulation Modelling*. Vse tri revije imajo faktor vpliva in so indeksirane v vodilnih bibliografskih bazah, vključno z Web of Science in Scopus.

Publishing Activity

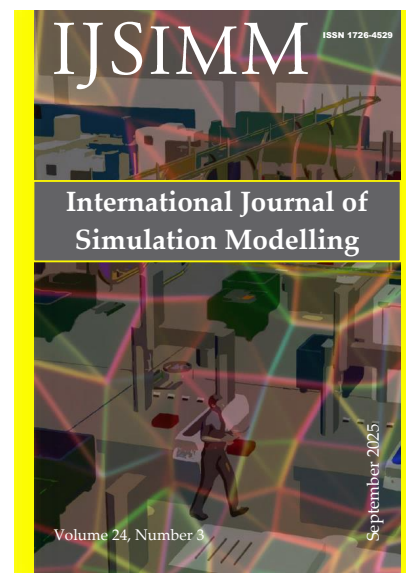
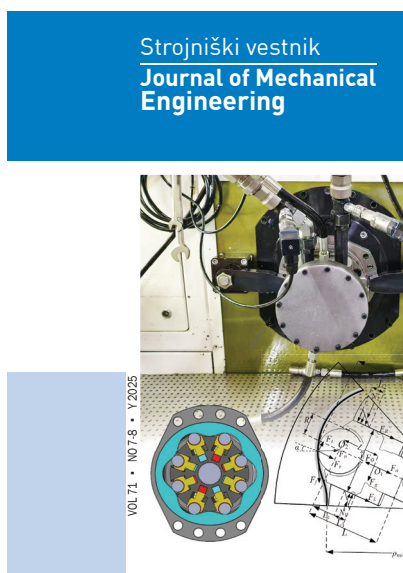
The FME facilitates the publication of its authors' achievements through procedures overseen by the Publishing Commission. Operating on a modern and efficient basis, the Commission ensures compliance with contemporary standards of scholarly communication. Our publications include teaching materials (such as textbooks, scripts, and tutorials), scientific and professional monographs, conference proceedings, informational brochures, and other works in the fields of Mechanical Engineering and Textiles. Since 2017, we have published 72 titles in both print and electronic formats – predominantly as open access – through the UM University Press.

Publishing is a cornerstone of the Faculty's academic life, playing a crucial role in building its reputation, supporting career advancement, and disseminating knowledge. Scholarly publications showcase research excellence, contribute to the wider academic community, and elevate the institution's standing. Teaching materials provide essential educational resources, while monographs offer comprehensive studies on specialised research topics and advanced subject areas. Conference proceedings highlight ongoing research and foster academic collaboration.

Publications are often integral to Faculty members' eligibility for employment, promotion, and fellowship opportunities, underscoring their importance in professional development and quality assurance.

*FME also publishes and supports actively three prominent scientific journals in Mechanical Engineering: *Advances in Production & Engineering Management*, *Strojniški vestnik* (*Journal of Mechanical Engineering*), and the *International Journal of Simulation Modelling*. All three journals hold impact factors, and are indexed in leading bibliographic databases, including the Web of Science and Scopus.*

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Sodelovanje z okoljem

Collaboration with Industry

Izobraževalna in raziskovalna dejavnost sta ključna elementa poslanstva FS, za njuno realizacijo pa je potrebno veliko dejavnikov. Eden najpomembnejših je uspešno sodelovanje z različnimi deležniki iz okolja.

FS se zaveda pomena sodelovanja z okoljem, predvsem z gospodarstvom. Sodelovanje z okoljem pomeni tudi vključevanje proizvodnih podjetij s področja strojništva in tekstila ter materialov v naš izobraževalni proces. Na fakulteti razvijamo področja, ki so po svoji naravi zelo aplikativna, še posebej za razvojna in proizvodna podjetja iz Slovenije in tujine. Z njimi sodelujemo v obliki raziskovalno-razvojnih ali aplikativnih projektov, kjer so podjetja neposredni naročnik, ali v okviru različnih razpisov, kjer smo projektni partnerji v nacionalnih ali mednarodnih konzorcijih. Podjetjem ponujamo tudi storitve, npr. preizkušanje materialov, računalniške analize in simulacije specifičnih izzivov, hitro izdelavo prototipov, industrijske meritve in umerjanje instrumentov, pripravljamo različne študije, strokovna mnenja itd. Projekti in storitve za gospodarstvo predstavljajo približno 8 % našega celotnega proračuna.

Z željo po čim boljši predstavitvi gospodarstvu in drugim deležnikom smo pripravili celovito ponudbo naših znanj, kompetenc storitev in opreme, ki si jo je mogoče ogledati po posameznih področjih oziroma laboratorijih na naših spletnih straneh. Prav tako smo pripravili tiskano in digitalno brošuro Sodelovanje z gospodarstvom.

Strateška partnerstva

Določena podjetja so izkazala večji obseg potreb po sodelovanju z našo fakulteto. Ker je bilo pobud za sodelovanje vse več, smo se odločili za razvoj celovitega sistema sodelovanja s podjetji. Posledično z zainteresiranimi podjetji sklepamo posebne sporazume o sodelovanju, podjetja pa so prejela naziv strateški partnerji FS UM.

V okviru teh sporazumov smo razvili mehanizme, ki so koristni za tri strani: podjetja, študente in fakulteto/zaposlene. Ob že razvitih in prej opisanih mehanizmih sodelovanja zaposlenih s podjetji prek razvojno-raziskovalnih projektov in storitev smo dali velik poudarek vključitvi podjetij v izobraževalni proces, promocijskim dejavnostim in infrastrukturi. Za zaključna in projektna dela študentom smo razvili sistem razpisa tem, ki nam jih posredujejo naši strateški partnerji. Če potrebujejo študenti pomoč pri iskanju podjetja za opravljanje praktičnega usposabljanja, jih napotimo k strateškim partnerjem. Podjetja skupaj z nami organizirajo strokovne

Education and research are central pillars of the mission of the FME, and their excellence depends on a variety of factors, chief among them is effective collaboration with external stakeholders.

FME places high value on strong partnerships with industry. This cooperation extends beyond traditional boundaries, as we involve companies from the fields of Mechanical Engineering, Textiles and Materials Science actively in our educational and research activities. Our Faculty focuses on areas with high practical relevance, particularly for development and production-oriented enterprises in Slovenia and abroad.

We engage with industry through research and development as well as applied projects – either commissioned directly by companies, or carried out in collaboration within national and international consortia under various funding schemes. In addition, we provide a wide range of professional services, including materials testing, computational analysis and simulation, rapid prototyping, industrial measurements, instrument calibration, technical studies and expert evaluations.

Projects and services for industry account for approximately 8% of our annual budget, reflecting our commitment to applied research and knowledge transfer.

To ensure transparency and accessibility for companies and other stakeholders, we have compiled a comprehensive overview of our expertise, service capabilities and technical equipment. This information is organised by area and laboratory, and is available on our website. Additionally, we have published a printed and digital brochure titled Working with Business to showcase our collaboration opportunities further.

Strategic Partnerships

An increasing number of companies have expressed an increasing interest in cooperating with our Faculty. In response to this growing demand, we have developed a comprehensive system to foster collaboration with industry partners. Consequently, special cooperation agreements are concluded with interested companies, which are then awarded the title of Strategic Partners of FME UM.

These agreements establish mechanisms that benefit all three parties involved: companies, students and Faculty/staff. Beyond the established frameworks for employee-enterprise cooperation through R&D projects and services, we emphasise the active involvement of companies in education, promotional activities and infrastructure development. For student final projects and theses, we have implemented a call system

ekskurzije, podjetjem ponujamo možnost predstavitve našim študentom na fakulteti, strokovnjaki iz podjetij nastopajo pri nas kot gostujoči predavatelji. Podjetja promoviramo v naših medijih, na informativnem dnevu in na drugih promocijskih dogodkih. Objavljamo tudi njihove ponudbe za zaposlitev, štipendije, študentsko delo itd. To so vse načini, kako podjetja povečujejo svojo prepoznavnost med študenti. S tem, ko spoznajo študente prek projektnih ali zaključnih del, praks in štipendiranja, si bistveno povečajo možnosti za zaposlitev dragocenih kadrov.

Določeni strateški partnerji so pomagali pri izobraževalni infrastrukturi. Podjetja GKN Driveline, BSH Hišni aparati, d. o. o., Nazarje, Turna, d. o. o., Menerga, d. o. o., in Kovinarstvo Bučar, d. o. o., so prenovila po eno (ali celo dve) izmed naših predavalnic. Prostore so uredila v skladu s svojo celotno podobo in razstavila del svojega proizvodnega programa v vitrinah. Tako so pomembno povečala svojo prepoznavnost med študenti in jim hkrati omogočila bolj prijetno izobraževalno okolje.

for topics proposed by our strategic partners. Additionally, when students seek practical training opportunities, we connect them with these partners.

Our strategic partners also organise field trips, present to students at the Faculty, and contribute as guest lecturers. We promote these companies actively through our media channels, Information Days, and other promotional events. Job offers, scholarships, and student employment opportunities provided by these partners are published regularly, to enhance their visibility among students. Through engagement in projects, theses, internships, and scholarships, companies increase their potential to recruit talented graduates.

Certain strategic partners have made significant contributions to our educational infrastructure. Companies such as GKN Driveline, BSH Hišni aparati d. o. o., Nazarje, Turna d. o. o., Menerga d. o. o., and Kovinarstvo Bučar d. o. o. have renovated one or more of our lecture halls. They have redecorated these spaces to reflect their corporate identity and showcased parts of their product ranges. These efforts have enhanced their visibility among students greatly, while simultaneously creating a more welcoming learning environment.

V podjetju ARCONT vidimo v mariborski FS strateškega partnerja, saj je večina naših inženirjev, vključno z mano, prav vaših diplomantov. Dolgoletno vzajemno delovanje in podporo smo v zadnjih nekaj letih še nadgradili z aktivnim sodelovanjem na področju razvoja, kar me izjemno veseli. Verjamem, da s skupnim spodbujanjem študentov k reševanju konkretnih izzivov iz prakse krepimo tako njihovo znanje ter kompetence kot tudi vrednost naših produktov in učinkovitost naših tehnoloških procesov. Pozitivni rezultati našega sodelovanja s fakulteto se kažejo v novem znanju in inovativnih rešitvah ter v priložnostih za širitev kroga potencialnih kandidatov za bodoče sodelavce. Pri tem bi radi izpostavili odlično sodelovanje z vodstvom fakultete. Veseli me, da vidi v sodelovanju z gospodarstvom dodano vrednost svojih programov onkraj lepo zvenečih krilatic, ampak si za to ves čas tudi aktivno prizadeva in se izkazuje s svojo angažiranostjo. Prepričana sem, da se bo naše sodelovanje v prihodnosti še poglobilo, zato se s svojo ekipo že veselim nadaljnjih skupnih projektov.

dr. Tatjana Fulder,
vodja tehnično razvojnih projektov v podjetju Arcont, d. d.

At ARCONT, we see the Maribor FME as a strategic partner, as most of our engineers, including me, are your graduates. We have built on our long-standing interaction and support over the last few years by cooperating actively in the field of Development, which I am extremely pleased about. I believe that, by encouraging students to work together to solve concrete practical challenges, we are strengthening their knowledge and competencies, as well as the value of our products and the efficiency of our technological processes. The positive results of our collaboration with the Faculty are reflected in new knowledge and innovative solutions, as well as in opportunities to broaden the pool of potential candidates for future collaborators. In this context, we would like to highlight the excellent cooperation with the management of the Faculty. I am pleased that they see the added value of the programmes in cooperation with business beyond nice-sounding words, but also strive actively for this, and demonstrate their commitment to it all the time. I am confident that our cooperation will deepen in the future, and I look forward to further joint projects with my team.

dr. Tatjana Fulder,
Technical Development Project Manager at Arcont, d.d.



Smotrna poraba sredstev.

Value for money.

Strateški svet

Na pobudo gospodarstva, članov Društva Alumni in vodstva FS je bil v začetku leta 2014 oblikovan Strateški svet FS, ki ga sestavljajo predvsem strokovnjaki in vodilni posamezniki iz gospodarstva, med njimi so pogosto predstavniki naših strateških partnerjev. S strani FS sta vključena dva prodekana in dva predstavnika Alumni FS.

Združljivost gospodarstva in izobraževalnih programov, ki so namenjeni razvoju stroke, je ključna za ekonomsko učinkovito gospodarstvo. Poglavitni motiv za delovanje Strateškega sveta FS je prispevati k razvoju in posodobitvi študijskih vsebin, ki jih gospodarstvo potrebuje, ter uskladiti potrebe gospodarstva in smernic razvoja stroke z vizijo in cilji FS. Predstavnikom gospodarstva predstavljamo naše dejavnosti, še posebej tiste, ki se tičejo sodelovanja z njimi, ter iščemo možnosti za še intenzivnejše sodelovanje.

Strategic Council

At the initiative of business representatives, members of the Alumni Association, and FME management, the FME Strategic Council was established in early 2014. The council comprises primarily experts and leading figures from the business sector, often including representatives of our strategic partners. From the Faculty's side, two Vice-Deans and two representatives from the FME Alumni Association participate actively.

The alignment of industry needs with educational programmes, aimed at professional development, is crucial for fostering an economically efficient industry. The primary objective of the FME Strategic Council is to support the development and modernisation of study curricula that meet the demands of the economy. It seeks to harmonise economic requirements and professional development guidelines with the Faculty's vision and strategic goals. Through this platform, we present our activities – particularly those related to industry collaboration – to economic stakeholders and explore opportunities for deeper and more intensive cooperation continuously.

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Strateško partnerstvo našega podjetja in FS ocenjujemo kot zgleden primer sodelovanja gospodarstva in institucij znanja. Kot v vsakem gre tudi v našem partnerstvu za obojestransko korist, kjer mi kot podjetje dobimo dostop do znanja in dobrega sodelovanja na razvojno-raziskovalnem področju, fakulteta in raziskovalci pa realne izzive iz gospodarstva in povratne informacije s trga ter našo finančno podporo fakulteti. Z razvojnimi izzivi in s tem, da smo opremili sodobno predavalnico za študente, pa postajamo bolj prepoznavni in zanimivi tudi za študente. V zadnjih letih smo zaposlili kar nekaj diplomantov, nekatere smo pred tem tudi štipendirali ter podprli pri njihovem izobraževalnem in raziskovalnem delu. Danes pa soustvarjamo našo skupno prihodnost!

Vladimir Pogač,
direktor podjetja Turna, d. o. o.

We see the strategic partnership between our company and FME as a great example of cooperation between business and knowledge institutions. As in any partnership, it is a win-win situation, where we as a company get access to knowledge and good cooperation in the field of Research and Development, and the Faculty and researchers get real challenges from the economy and feedback from the market, as well as our financial support for the Faculty. The development challenges and the fact that we have equipped a modern lecture theatre for students, make us more visible and interesting to students as well. In recent years, we have recruited several graduates, some of whom we have previously granted scholarships and supported in their educational and research work. Today, we are co-creating our common future!

Vladimir Pogač,
Director of Turna, d.o.o.



Sodelovanje fakultete s strateškimi partnerji prinaša študentom številne koristi. Prenovljene predavalnice in dodatna oprema ustvarjajo kakovostnejše pogoje za študij, predavateljem omogočajo nazornejšo podajanje znanja, nam študentom pa možnost dodatnega raziskovanja ter krepitev radovednosti in ustvarjalnosti. Ob sodelovanju fakultete z okoljem pridobimo študenti možnost, da sodelujoče partnerje spoznamo, se z njimi povežemo za opravljanje prakse, študentskega dela ali kot sodelovanje pri pisanju zaključnih del. Osebnostne predstavitve sodelujočih podjetij nam podajo jasno in celovitejšo sliko o trendih in potrebah okolja, predstavijo še nepoznana področja in morda navdušijo prav za njihovo raziskovanje. Strateški partnerji s fakulteto pogosto sodelujejo tudi v obliki različnih projektov, kjer študentom postavijo realne izzive in omogočijo, da svoje znanje preizkusimo na praktičnem primeru ter pridobimo dandanes nujna znanja timskega dela in mehkih veščin. Študenti imamo ravno tako koristi od strateškega sodelovanja z vidika ekskurzij oziroma ogledov podjetij. S tovrstnimi obiski pridobimo izkušnjo z realnim proizvodnim obratom in proizvodnimi procesi ter ne nazadnje potencialnim delodajalcem. Pomemben rezultat medsebojnega sodelovanja pa je zagotovo tudi štipendiranje in pridobitev zaposlitvenih ponudb. Študenti, še posebej tehniških smeri, stremimo k načrtovanju svoje kariere pota že v času študija, zato je sodelovanje fakultete s strateškimi partnerji za nas izrednega pomena in upamo, da se v prihodnje še okrepi.

Andreja Kumer,
nekdanja prodekanja za študentske zadeve, doktorska študentka

Students benefit greatly from the Faculty's collaboration with strategic partners. Renovated lecture halls and enhanced equipment provide improved learning environments, allowing lecturers to deliver content more effectively, and enabling students to pursue additional research, fostering curiosity and creativity. Community collaboration offers students the chance to connect with partners for internships, student jobs, or final thesis collaborations. Company presentations give students a clearer, more comprehensive understanding of industry trends and needs, often introducing new areas that inspire further exploration.

Strategic partners collaborate with the Faculty frequently on projects that present students with real-world challenges, providing practical experience and opportunities to develop essential teamwork and soft skills. Students also gain from excursions and company visits, experiencing firsthand production plants, layouts and processes, while potentially identifying future employers. Scholarships and job offers are other valuable outcomes of this cooperation.

Engineering students tend to plan their career paths early, making the Faculty's strategic partnerships critically important. We look forward to strengthening these relationships further, to continue supporting our students' professional growth and success

Andreja Kumer,
former Vice-Dean for Student Affairs, Doctoral student



ARAMIS

Študenti in sodelovanje z okoljem

Vse omenjene dejavnosti imajo neposredni ali posredni vpliv na naše študente, ki jih želimo že med študijem na različne načine povezovati s poslovno prakso. V ta namen na FS že obstaja Karierni center, ki ga bomo v prihodnosti še nadgrajevali, intenzivno pa sodelujemo s Kariernim centrom UM. Študenti se zelo radi odzivajo na razpisane teme zaključnih del in projektnih nalog ter predstavitve podjetij. Študenti imajo na naši fakulteti tudi možnost praktičnega usposabljanja na 2. stopnji, kar je v Sloveniji posebnost.

Na naši fakulteti je leta 2022 nastal inovativen prostor znanja – Center za vseživljenjsko učenje. Nova dinamična organizacijska enota je katalizator novih idej ter ključno orodje za oblikovanje mostov med fakulteto in zunanjim okoljem. Je gonilo povezovanja, ustvarjanja in prenosa znanja med izobraževalnim okoljem in gospodarstvom. Veliko poudarka dajemo mikrodokazilom, v okviru katerih posameznika s kratkotrajnim učenjem opremimo s specifičnimi znanji, veščinami ter kompetencami, usmerjenimi v družbene, osebne in kulturne potrebe trga dela. Gre za obliko študija, s katero nadomeščamo klasični izredni študij.

Students and Collaboration with Industry

All these activities have a direct or indirect impact on our students, whom we strive to connect with business practice in diverse ways throughout their studies. To support this, the faculty has established a Career Centre, which will be developed further in the future, and we maintain close cooperation with the UM Career Centre. Our students engage actively with company-driven topics for final theses, project assignments and presentations. Additionally, students at our Faculty have the unique opportunity in Slovenia to undertake practical training at 2nd-cycle.

In 2022, an innovative knowledge hub – the Centre for Life-long Learning – was launched at our Faculty. This dynamic organisational unit acts as a catalyst for new ideas, and a vital bridge between the Faculty and the external environment. It drives the connection, creation and transfer of knowledge between education and the economy. Particular emphasis is placed on micro-credentials, a form of short-term learning that equips individuals with specific knowledge, skills and competencies tailored to the social, personal and cultural demands of the labour market, effectively complementing or replacing traditional part-time study.



Strokovna in raziskovalna podpora gospodarstvu.

Expertise and research support for industry.



Študenti in Študentski svet

Students and the Student Council

Študentski svet FS predstavlja srce študentske skupnosti fakultete. Njegova osrednja naloga je zastopanje interesov študentov v dialogu z vodstvom fakultete, kjer se zavzema za izboljšanje študijskega procesa in študentskega življenja. Aktivna vključenost študentov v procese in organe upravljanja omogoča vzpostavljanje enakopravnega vzajemnega odnosa med študenti in preostalim delom akademske skupnosti ter predstavlja prednost pri inovativnem razvoju dela s študenti.

Predstavniki študentov obravnavajo študentske problematike, sodelujejo v komisijah in organih ter poskrbijo, da je glas študenta povsod prisoten. Študentski svet aktivno sodeluje pri ocenjevanju pedagoškega dela visokošolskih učiteljev in sodelavcev ter oblikovanju predlogov za izboljšave, ki prispevajo k višji kakovosti izobraževanja. Poleg tega je nosilec obštudijske dejavnosti fakultete, kjer z organizacijo različnih dogodkov krepi povezanost med študenti, spodbuja športno in kulturno udejstvovanje ter prispeva h kariernemu razvoju študentov FS.

Obštudijska dejavnost na FS je zelo raznolika. Študenti se lahko udeležijo različnih tečajev in delavnic s področja programskih orodij, jezikov in mehkih veščin, večerov kvizov in družabnih iger, zabav ter drugih oblik druženja. V okviru Univerzitetne športne lige se lahko pomerijo v nogometu, košarki in odbojki, kjer s ponosom zastopajo barve fakultete. Vsako leto Študentski svet FS organizira tudi strojniški piknik in zaposlitveno tržnico, ki veljata za zelo priljubljena dogodka in pomembno prispevata h krepitvi vezi med študenti, akademsko sfero in gospodarskim okoljem.

FS je skozi svoja tri desetletja obstoja postala sinonim za kakovostno in bogato obštudijsko življenje, kjer vsak študent najde nekaj zase. Skupaj z aktivnim Študentskim svetom in pestro ponudbo obštudijskih dejavnosti fakulteta ustvarja spodbudno in podporno okolje, ki študentom omogoča, da se razvijajo v celovite in uspešne posameznike.

The FME Student Council is the vibrant heart of the Faculty's student community. Its primary role is to represent student interests in dialogue with Faculty management, striving to enhance both the study process and student life. Active student involvement in governance fosters an equal and reciprocal relationship between students and the wider academic community, serving as a key driver for innovation in student engagement.

Student representatives address various student concerns, participate in committees and decision-making bodies, and ensure that the student voice is heard consistently. The Student Council contributes actively to the evaluation of teaching quality by the higher education Faculty and staff, and proposes improvements aimed at raising educational standards. Additionally, it champions extracurricular activities, strengthening student bonds by organising diverse events, promoting sports and cultural participation, and supporting the career development of FME students.

The extracurricular offerings at FME are extensive and varied. Students can take part in courses and workshops covering software tools, languages and soft skills, as well as enjoy quiz nights, board games, parties and other social events. They also compete in football, basketball and volleyball within the University Sports League, representing the Faculty's colour proudly. Annually, the Student Council organises signature events, such as the Engineering Picnic and the Job Market, both of which play a crucial role in fostering connections between students, academia and the business community.

Over its three decades of existence, FME has become synonymous with a vibrant and diverse extracurricular life, offering every student the opportunity to engage and grow. Together with a proactive Student Council and a broad array of activities, the Faculty cultivates a stimulating and supportive environment that nurtures well-rounded, successful individuals.



Formula Student

Projekt Formula Student, ki poteka v okviru FS, je eden najprepoznavnejših študentskih projektov univerze, z začetki že leta 1999. V 25 letih je ta projekt postal ključna platforma za študente, kjer pridobivajo dragocene izkušnje s področja razvoja, načrtovanja in izdelave dirkalnikov. Projekt ne omogoča le teoretičnega znanja, ampak tudi praktično aplikacijo, kar je odlična popotnica za prihodnje inženirske kariere. Študentje prihajajo iz različnih programov, smeri in fakultet z UM. Od leta 2019 projekt izvajamo skupaj s Fakulteto za elektrotehniko, računalništvo in informatiko UM.

Vsako leto ekipa študentov razvija povsem nov dirkalnik, s katerim se poleti udeležujejo prestižnih tekmovanj po Evropi. Tekmovanja Formula Student so sestavljena iz statičnih in dinamičnih disciplin. Med statičnimi disciplinami izstopajo poslovni in finančni načrt ter tehnični zagovor (engineering design), kjer ekipa predstavi razvoj in oblikovanje dirkalnika. Dinamične discipline pa vključujejo preizkuse zmogljivosti in zanesljivosti dirkalnika na progi, vendar šele po opravljenih tehničnih pregledih, ki zagotavljajo skladnost s pravilnikom in varnostjo. Med dinamične discipline spadajo pospeševanje, vožnja osmice, »autocross« in vzdržljivostna vožnja.

Sezona 2024 je bila za ekipo prelomna, saj so prvič razvili električni dirkalnik (EV dirkalnik), kar je prineslo tudi številna nova znanja. Pred tem so vrsto let izdelovali dirkalnike z motorji na notranje zgorevanje (CV dirkalnik), vendar so z EV dirkalnikom stopili korak naprej v prihodnost avtomobilske industrije.

Z več kot 25-letno tradicijo je ekipa med najstarejšimi v Evropi, zanimivost pa je, da je prav naša ekipa pred več kot 15 leti uvedla prepoznavno sliko dirkalnika na boku avtomobila – trend, ki ga danes uporablja več ekip. Projekt Formula Student je neprecenljiva priložnost za vse bodoče inženirje, ki se želijo preizkusiti v realnih projektih in nadgraditi svoje akademsko znanje z industrijsko prakso.

Formula Student

The FME Formula Student Project is one of the most recognizable student projects at the University of Maribor, established in 1999. Over more than 25 years it has evolved into a vital platform for students to acquire hands-on experience in the development, design and manufacturing of racing cars. The project bridges theoretical knowledge with practical application, serving as an excellent foundation for future engineering careers. The participants come from various programmes, majors and Faculties across UM. Since 2019 the project has been run jointly with the Faculty of Electrical Engineering, Computer Science and Informatics at UM.

Each year, the student team designs and builds a completely new racing car to compete in prestigious Formula Student competitions across Europe during the summer. These competitions consist of static and dynamic disciplines. The static disciplines include presentations of the business and financial plan, as well as the engineering design, where the team showcases the development and technical design of the car. The dynamic disciplines test the car's performance and reliability on the track, following strict technical inspections, to ensure compliance with the safety regulations. Dynamic events include acceleration tests, figure-of-eight driving, autocross, and endurance racing.

The 2024 season marked a milestone for the team, with the development of their first electric racing car (EV), introducing new technical challenges and skills. Previously, the team had built internal combustion engine race cars for many years, but the EV car represents a significant step towards the future of the Automotive industry.

With a tradition spanning over 25 years, the team is among the oldest Formula Student teams in Europe. Notably, it was this team that introduced the distinctive side-car racing graphics over 15 years ago – a trend now adopted by many teams. The Formula Student project remains an invaluable opportunity for aspiring engineers to engage in real-world projects, enhancing their academic knowledge with practical industrial experience.





Aeronavtično društvo UM

Aeronavtično društvo UM (ADUM) je bilo ustanovljeno leta 2016, in sicer z namenom spodbujanja tehnične kulture na področju letalstva. Skupina navdušencev je ustanovila društvo z željo, da bi letalstvo približali študentom tehniških fakultet. Projektu se je v zadnjih letih pridružila tudi Fakulteta za elektrotehniko, računalništvo in informatiko UM. Glavni cilj in motivacija študentske ekipe v okviru društva sta zasnova in izdelava vodene brezpilotne letalne naprave ter udeležba na mednarodnem tekmovanju Design, Build, Fly v ZDA, ki ga vsako leto organizira Ameriški inštitut za aeronavtiko in astronautiko (AIAA). To tekmovanje študentom ponuja edinstveno priložnost za uporabo teoretičnega znanja v praksi ter omogoča pridobivanje dragocenih izkušenj pri načrtovanju letal.

Vsako leto se projektne zahteve in cilji tekmovanja prilagajajo, kar udeležencem prinaša nove izzive in spodbuja inovativne rešitve. Poleg tega tekmovanje ponuja priložnost za uporabo tehnologij, ki so jih ekipe razvile v preteklih letih. S skoraj 30-letno tradicijo je to tekmovanje zelo prestižno, na njem pa sodeluje več kot 100 univerz z vsega sveta, kar zahteva predhodno kvalifikacijo.

Ekipo ADUM se tekmovanja udeležuje že več let zapored. Njihov prvi nastop je bil leta 2019, ko so kljub omejenim sredstvom in pomanjkanju izkušenj osvojili odlično 24. mesto med 104 ekipami. V naslednjih letih so nadaljevali z uspehi: leta 2020 so dosegli 16. mesto, leta 2021 pa 29. mesto. Leta 2023 so se v predizboru med 135 univerzami uvrstili na izjemno 3. mesto, vendar so zaradi nesrečnih okoliščin tekmovanje zaključili na 49. mestu.

Ti dosežki dokazujejo, da je ekipa ADUM sposobna konkurirati najboljšim univerzam, ki že vrsto let sodelujejo na tem tekmovanju. Njihovi uspehi so vir navdiha za nadaljnje delo, nadgradnjo znanja in zastavljanje ambicioznih ciljev za prihodnost. Ekipa se osredotoča na tehnološki napredek, vedno stremi k izdelavi lažjih in naprednejših letal, hkrati pa poudarja pomembnost sodelovanja, pridobivanja izkušenj pri reševanju kompleksnih inženirskih izzivov in mednarodne povezljivosti. Člani društva vedno vabijo motivirane študente, da se jim pridružijo in postanejo del te ambiciozne ekipe.

Aeronautical Society of the UM

The Aeronautical Society of the UM (ADUM) was established in 2016 by a group of enthusiasts aiming to promote technical culture in aviation and bring this field closer to students of technical faculties. In recent years, the Faculty of Electrical Engineering, Computer Science and Informatics at UM has also joined this initiative. The primary goal and motivation of the student team within ADUM is to design and build a guided drone, and participate annually in the international Design, Build, Fly competition in the USA, organised by the American Institute of Aeronautics and Astronautics (AIAA). This prestigious competition offers students a unique opportunity to apply theoretical knowledge practically and gain valuable experience in aircraft design.

The competition's project requirements and objectives are updated yearly, presenting new challenges that encourage innovative solutions. Moreover, it allows teams to leverage technologies developed over previous years. With a history of nearly 30 years, the event attracts participation from over 100 universities worldwide and requires pre-qualification to compete.

The ADUM team has been participating consecutively since 2019. Despite limited resources and initial inexperience, their debut was impressive, securing 24th place out of 104 teams. Subsequent years brought continued success, with the team ranking 16th in 2020 and 29th in 2021. In 2023, ADUM achieved an outstanding 3rd place in the preliminary round among 135 universities, but ultimately finished 49th due to unforeseen circumstances.

These achievements demonstrate that ADUM competes on par with the best universities with long-standing participation in the competition. Their successes inspire continued dedication, knowledge improvement and the setting of ambitious future goals. The team prioritises technological advancement, striving to develop lighter and more advanced aircraft, while valuing collaboration, gaining experience in solving complex engineering problems, and fostering international connections. Motivated students are always welcome to join and become part of this ambitious and dynamic team.



Izjave diplomantov

Graduates' Statements

Po zaključku študija na Tehniški fakulteti UM sem se pred več kot 30 leti zaposlil kot mlad inženir in štipendist v podjetju BSH Hišni aparati, d. o. o., v Nazarjah. Danes sem direktor podjetja, odgovoren za tehnično področje. Podjetje BSH, ki je del skupine BOSCH, je največji proizvajalec gospodinjskih aparatov v Evropi in tretji največji na svetu. Moje področje odgovornosti obsega razvoj, kakovost in proizvodnjo aparatov za pripravo hrane in kavnih napitkov za gospodinjsko uporabo. Vsako leto v našem podjetju proizvedemo več kot šest milijonov aparatov. Skupaj s svojo ekipo skrbim za iskanje rešitev, da so aparati razviti po zahtevah kupcev z vsega sveta. V podjetju stremimo k temu, da so naši visokotehnološki aparati izdelani iz modernih materialov v ekonomsko učinkovitih procesih ter na trajnosten način, ki minimalno vpliva na okolje.

Med študijem na Tehniški fakulteti v Mariboru, smer Proizvodno strojništvo, sem pridobil obilo znanja na področju proizvodnega managementa in managementa kakovosti ter imel vseskozi odlično podporo svojih kolegov študentov pri skupinskih projektih. Seveda moram poudariti strokovno usmeritev izkušenih profesorjev, ki so me uspešno vodili k uresničitvi mojega poklicnega cilja – postati strojni inženir. Vsa ta znanja, ki sem jih pozneje nadgradil z različnimi dodatnimi izobraževanji, so še danes zame in za naše podjetje osnovno vodilo za vodenje modernih, visoko avtomatiziranih in digitaliziranih proizvodnih procesov.

Kolektivu FS ob 30. obletnici ustanovitve iskreno čestitam in vam želim še naprej uspešno delovanje pri izobraževanju mladih inženirk in inženirjev ter na drugih področjih vašega delovanja.

After graduating from the Faculty of Technical Sciences UM, I joined BSH Hišni aparati, d. o. o., in Nazarje as a young engineer and a scholarship holder more than 30 years ago. Today, I am the company's Director responsible for the technical area. BSH, part of the BOSCH Group, is the largest manufacturer of household appliances in Europe and the third largest in the world. My area of responsibility covers the development, quality and production of food and coffee beverage appliances for household use. We produce more than six million appliances every year. Together with my team, I work to find solutions to ensure that appliances are developed according to the requirements of customers from all over the world. We strive to ensure that our high-tech appliances are made from modern materials in cost-effective processes, and in a sustainable way that has minimal impact on the environment.



Matija Petrin

diplomant študijskega programa Strojništvo
graduate of the Study Programme Mechanical Engineering

During my studies at the Faculty of Technical Sciences UM, majoring in Production Engineering, I gained a lot of knowledge in the field of Production Management and Quality Management, and had excellent support from my fellow students in group projects. Of course, I must highlight the professional guidance of experienced professors who guided me successfully towards my career goal - to become a mechanical engineer. All this knowledge, which I have subsequently built on through various additional training courses, is still a basic guideline for me and for our company to manage modern, highly automated and digitalised production processes.

I would like to congratulate the FME team on the 30th anniversary of its foundation, and wish you continued success in the education of young engineers and in other areas of your work.



Matevž Vremec

diplomant študijskega programa Okoljsko inženirstvo
graduate of the Study Programme Environmental Engineering

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Trenutno sem zaposlen kot gostujoči raziskovalec na Univerzi Alma Mater Europaea v Mariboru, hkrati pa raziskovalno delo opravljam tudi na Univerzi Karl-Franzens v Gradcu. Moje trenutno raziskovalno delo se osredotoča na uporabo modelov umetne inteligence za učinkovitejše upravljanje in napovedovanje

I am currently a visiting researcher at the Alma Mater Europaea University in Maribor, and I am also doing research at the Karl-Franzens University in Graz. My current research focuses on the application of Artificial Intelligence models for more effective management and prediction of surface and groundwater. I am also involved in projects investigating the impact of climate change on water resources in the Alps, and developing technologies for modelling groundwater flow and heat storage in underground systems. During my undergraduate and postgraduate studies, I studied Environmental Engineering. The knowledge I gained in this Programme was crucial for my future career. The technical skills I acquired enable me to solve complex environmental challenges, while a broader insight into environmental aspects contributes to a more comprehensive understanding of the issues I face in my work. During my studies, I would like to highlight the out-

površinskih in podzemnih voda. Sodelujem tudi pri projektih, ki raziskujejo vpliv podnebnih sprememb na vodne vire v Alpah ter razvijajo tehnologije za modeliranje toka podzemne vode in shranjevanje toplote v podzemnih sistemih. V času dodiplomskega in magistrskega študija sem študiral smer Tehniško varstvo okolja (danes Okoljsko inženirstvo). Znanja, pridobljena v tem programu, so bila ključnega pomena za mojo nadaljnjo kariero. Tehnične veščine, ki sem jih pridobil, mi omogočajo reševanje kompleksnih okoljskih izzivov, medtem ko širši vpogled v okoljske vidike prispeva k celovitejšemu razumevanju problematike, s katero se srečujem pri svojem delu. Med študijem bi želel izpostaviti izjemno delo profesorjev, ki so nam poleg vrhunskih predavanj in vaj omogočili sodelovanje pri različnih projektih z gospodarskimi družbami. Te praktične izkušnje so mi omogočile globlji vpogled v resnične izzive ter mi dale dragocene veščine, ki jih danes uspešno uporabljam v svoji raziskovalni karieri.

Študij mi je omogočil tudi mednarodne izkušnje. Kot dodiplomski študent sem izmenjavo opravil na Portugalskem, med magistrskim študijem pa sem prakso opravljal v Gradcu in Innsbrucku, kar mi je omogočilo pridobitev dragocenih izkušenj v mednarodnem okolju ter pozneje možnost opravljanja doktorata na Univerzi Karla Franzensa v Gradcu.

Znanje, pridobljeno med študijem, mi omogoča, da vsakodnevno prispevam k napredku na svojem strokovnem področju in iščem rešitve za aktualne okoljske izzive.

standing work of our professors, who, in addition to excellent lectures and tutorials, enabled us to participate in various projects with companies. These practical experiences gave me a deeper insight into real-world challenges, and provided me with valuable skills that I now apply successfully in my research career. My studies have also given me the opportunity to gain international experience. As an undergraduate student I did an exchange in Portugal, and during my Master's studies, I did internships in Graz and Innsbruck, which gave me the opportunity to gain valuable experience in an international environment, and later to pursue my Doctoral studies at the Karl Franzens University of Graz.

The knowledge I have gained during my studies enables me to contribute to the progress of my field of expertise, and to find solutions to current environmental challenges daily.

Za študij oblikovanja in tekstilnih materialov sem se odločila zaradi veselja do ustvarjanja ter zanimanja za modo in modno oblikovanje. Privlačila me je raznolikost področij, ki sem jih lahko spoznavala med študijem, od oblikovanja in tekstilne tehnologije do raziskovanja materialov. To mi je omogočilo široko razumevanje oblikovalskih in tehnoloških pristopov v tekstilni in modni industriji. Znanje, pridobljeno na dodiplomskem študiju, sem želela nadgraditi, zato sem se odločila za nadaljevanje na magistrski stopnji. Program mi je omogočil poglobljeno povezovanje tehničnega in oblikovalskega znanja ter razvoj inovativnih in trajnostno naravnanih rešitev na področju mode. V tem času sem sodelovala pri različnih projektih, razstavah in natečajih, kjer sem nadgradila celoten proces preoblikovanja koncepta v kolekcijo (analiza trendov, izbor in validacija materialov, konstrukcija krojev), pripravo tehničnih specifikacij in vizualnih predstavitev ter profesionalno nastopanje pred strokovnimi komisijami. Te izkušnje so okrepile moje kompetence projektnega vodenja in koordinacije z zunanjimi partnerji. Pridobljene veščine sem nato usmerila v razvoj lastne znamke oblačil LUCI, ki temelji na strokovnem znanju oblikovanja in oblačilne tehnologije ter trajnostnem pristopu.

Trenutno sem na Fakulteti za strojništvo zaposlena kot mlada raziskovalka in svoje področje nadgrajujem v okviru doktorskega študija. Moje raziskovalno delo je interdisciplinarno; v doktorski nalogi se komplementarno povezujejo znanja s področja tekstilnega inženirstva, naprednih digitalnih tehnologij in umetnostne zgodovine. Takšna sinteza analitičnih, eksperimental-

I decided to study design and textile materials because of my passion for creativity and my interest in fashion and fashion design. I was drawn to the diversity of fields I could explore during my studies, ranging from design and textile technology to textile materials research. This provided me with a broad understanding of both design and technological approaches within the textile and fashion industries. I wanted to further develop the knowledge I had gained during my undergraduate studies, so I decided to continue at the master's level. The program allowed me to deepen the connection between technical and design knowledge and to develop innovative and sustainability-oriented solutions in the field of fashion. During this time, I participated in various projects, exhibitions, and competitions, where I enhanced my ability to transform a concept into a complete collection (trend analysis, material selection and validation, pattern construction), as well as to prepare technical specifications and visual presentations, and to present professionally before expert panels. These experien-



Lucie Görlichová

diplomant študijskega programa Oblikovanje in tekstilni materiali
graduate of the Study Programme Design and Textile Materials

nih in interpretativnih pristopov prispeva k celovitejšemu razumevanju oblačilne kulturne dediščine ter sodobnih praks. S tem povezujem znanost in kulturo ter soustvarjam odgovorne, trajnostno usmerjene rešitve za prihodnost tekstilne industrije in ohranjanje kulturne dediščine.

ces strengthened my project management and coordination skills in collaboration with external partners. I then applied these competencies to develop my own clothing brand, LUCI, which is based on professional expertise in design and garment technology combined with a sustainable approach.

Currently, I am employed as an early-stage researcher at the Faculty of Mechanical Engineering, where I am further developing my field within my doctoral studies. My research work is interdisciplinary; my doctoral dissertation integrates knowledge from textile engineering, advanced digital technologies, and art history. This synthesis of analytical, experimental, and interpretative approaches contributes to a more comprehensive understanding of clothing cultural heritage and contemporary practices. Through this, I connect science and culture, contributing to the creation of responsible, sustainability-oriented solutions for the future of the textile industry and the preservation of cultural heritage.

Danes sem zaposlen v družinskem podjetju Soven, ki je že več kot 30 let vodilno in edino podjetje v Sloveniji, ki se ukvarja s predelavo naravne ovčje volne. Podjetje Soven, d. o. o., se ukvarja z odkupom neoprane ovčje volne in izdelavo več kot 160 različnih produktov iz volne. Stremimo h krožnemu gospodarstvu, tako da je vsak naš izdelek za okolje in ljudi neškodljiv. To vse dokazujemo s certifikati BIO, GOTS in OEKOtex. Vsi izdelki so plod lastnega razvoja, precej pa so nam pri različnih laboratorijskih preskušanjih pomagali zaposleni na FS, za kar smo izredno hvaležni. Pozornost posvečamo predvsem izdelavi izdelkov visoke kakovosti. Izdelujemo volneno prejo, posteljnino, kot so odeje, nadvložki in vzglavniki, naravna volnena ležišča in izolacijo za hiše.

Na FS sem obiskoval študijski program Tehnologije tekstilnega oblikovanja. Program je bil zelo zanimiv in raznolik. Imeli smo ogromno praktičnega dela, kar je bilo za prihodnost zelo pomembno, saj se iz prakse naučiš potrebnih zadev precej lažje in hitreje kot nepomembnih podatkov iz knjig, ki jih lahko vedno preveriš, ko jih potrebuješ. Učitelji so bili odlični in so poučevali s srcem in tako nam je bilo študentom čim boljše prikazana določena tema. Imeli smo tudi nekaj ekskurzij in primerov dobre prakse.

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Vsa znanja, pridobljena na študijskem programu, mi danes pomagajo pri vsakodnevnem delu, naj si bo to v tehnični smeri, kot so popravila strojev, v predilnici, kar se tiče kakovosti preje, ali pri razvoju novih izdelkov. Brez znanja, pridobljenega na FS, si težko predstavljam svoj vsakdan v službi.

Today I work for Soven, a family-owned company that has been the leading and only company in Slovenia processing natural sheep wool for more than 30 years. Soven, d.o.o. is engaged in the purchase of unwashed sheep wool and the manufacture of more than 160 different wool products. We strive for a circular economy, so that each of our products is environmentally and human-friendly. All our products are a result of our own development, and we have had a lot of help from FME employees in various laboratory tests, for which we are extremely grateful. Our focus is on producing high-quality products. We produce wool yarns, bed linen such as blankets, mattress toppers and pillows, natural wool mattresses and insulation for houses.

I attended the Textile Design Technologies Study Programme at FME. The programme was very interesting and varied.



Žiga Srblin

diplomant študijskega programa Tehnologije tekstilnega oblikovanja
graduate of the Study Programme Textile Design Technologies

We had a lot of practical work, which was very important for the future, because you learn the things you need from practice much easier and faster than from irrelevant information in books that you can always check when you need it. The teachers were excellent and taught with heart, so we, the students, got the most out of each topic. We also had some excursions and examples of good practice.

All the knowledge I acquired during the Study Programme helps me today in my daily work, whether it is in a technical field such as machine repairs, in the spinning mill in terms of yarn quality, or in the development of new products. Without the knowledge gained at FME, it is hard to imagine my daily work life.



Urška Butolen
 diplomantka ŠP Gospodarsko inženirstvo – smer Strojništvo
graduate of the SP Industrial Engineering – Mechanical Engineering

Za študijski program Gospodarsko inženirstvo sem se odločila, ker je program ponujal edinstveno ravnovesje med tehničnim in poslovnim znanjem. Pritegnili so me projekti, pri katerih smo sodelovali že med študijem, saj so omogočali praktično uporabo teorije v resničnih situacijah. Izpostavim naj projektno nalogo, ki je bila izhodišče za diplomsko nalogo, v kateri smo v mednarodnem multidisciplinarnem projektne timu snovali

I chose to study the Industrial Engineering Programme because it offered a unique balance between technical and business knowledge. I was attracted by the projects we worked on during my studies, which allowed me to apply theory in real-life situations. I would like to highlight the project assignment that was the starting point for my thesis, in which we worked in an international multidisciplinary project team to conceptualise an innovative product, which gave me an invaluable experience in innovation and teamwork.

During my studies I received a staff scholarship, and, immediately after defending my Master's thesis, I got a job in one of the leading manufacturing companies in Slovenia. The interdisciplinary nature of my studies enabled me to gain a comprehensive understanding of the company's business, from the perspective of customers and sales, as well as development and production. I started my career in Product Management, where the key was to match market needs with the design of technically feasible and cost-effective products. Later, I took

koncept inovativnega izdelka, kar mi je omogočilo neprecenljivo izkušnjo na področju inovacij in timskega dela.

Že med študijem sem prejela kadrovske štipendije in se takoj po zagovoru magistrske naloge zaposlila v enem izmed vodilnih proizvodnih podjetij v Sloveniji. Interdisciplinarna narava študija mi je omogočila celostno razumevanje poslovanja podjetja, tako z vidika kupcev in prodaje kot tudi razvoja in proizvodnje. Kariero sem začela na področju produktnega vodenja, kjer je bilo ključno usklajevanje potreb trga z zasnovano tehnično izvedljivih in stroškovno učinkovitih izdelkov. Pozneje sem prevzela vlogo vodilnega inženirja v predrazvoju, s poudarkom na inovacijah. Med delom v predrazvoju se mi je ponudila priložnost, da sem z ekipo zasnovala trajnostno strategijo podjetja in prevzela vodenje oddelka, odgovornega za njeno implementacijo skozi projekte. Tako sem v svoji karieri postopno prešla iz tehničnih vlog v strateško upravljanje, pri čemer mi tehnično znanje še vedno služi kot pomembna prednost in ena izmed ključnih kompetenc za ustrezno odločanje. Le redki študijski programi študentom omogočijo razumevanje obeh vidikov – tehničnega in poslovnega –, kar se mi zdi ključnega pomena za uspešno kariero. Med razvojem trajnostne strategije sem vpisala tudi doktorski študijski program Gospodarsko inženirstvo, ki je neposredno povezan z mojim delom. Pri raziskovanju se osredotočam na strateško upravljanje trajnosti. Študij mi omogoča, da na podlagi svojih izkušenj in znanja pripomorem k razvoju raziskovalnega področja, hkrati pa pridobljena spoznanja neposredno uporabim pri vsakodnevnih izzivih v praksi.

on the role of Lead Engineer in pre-development, with a focus on innovation. While working in pre-development, I had the opportunity to work with a team to design the company's sustainability strategy, and take charge of the department responsible for implementing it through projects. In this way, I have moved gradually from technical to strategic management roles in my career, with technical knowledge still serving as an important asset, and one of the key competencies for sound decision-making. Few Bachelor's Study Programmes allow students to understand both aspects - technical and business, which I consider crucial for a successful career. During the development of the sustainability strategy, I also enrolled in a Doctoral Programme in Industrial Engineering, which is related directly to my work. My research focuses on the strategic management of sustainability. My studies allow me to contribute to the development of the research field by drawing on my experience and knowledge, while applying the lessons learned directly to everyday challenges in practice.

Zaposlen sem v podjetju KingsBox, ki se ukvarja z razvojem in prodajo športne opreme, natančnejše fitnes opreme ter orodij in pripomočkov za vadbo moči. Moja vloga v podjetju zajema različna področja, med drugim primarni razvoj in oblikovanje novih izdelkov ter vpeljevanje in skrb za ohranjanje oblikovalskega jezika.

Izkušnja študija na fakulteti, še posebej na študijskem programu Inženirsko oblikovanje izdelkov, je bila zelo pozitivna. Program oblikovanja se odlično dopolnjuje s študijem strojništva na prvi stopnji, saj vključuje bolj človeško naravnan pogled, osredotočen na uporabniško izkušnjo, kreativnost in spodbujanje razmišljanja izven strogih tehničnih okvirov. To je še posebej pomembno pri razvoju in proizvodnji izdelkov za končne uporabnike.

Pridobljena znanja med študijem ponujajo dober temelj in širok pregled nad celotnim področjem dela, na katerem posameznik nato gradi specifična znanja, potrebna za opravljanje svojega dela. Dobro poznavanje računalniških orodij, razumevanje osnov teorije materialov, proizvodnih tehnologij, strojniških zakonitosti, poznavanje uporabniških potreb ter proučevanje funkcionalnosti in pomen oblikovanja pri razvoju novih izdelkov so ključna področja za uspešno opravljanje dela.

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Kot sem že omenil, je študijski program Inženirsko oblikovanje izdelkov odlična dopolnitev študija strojništva. Program bi priporočal vsakomur, ki ga zanima razvoj izdelkov za končne uporabnike. Na programu se naučiš pomembnosti razumevanja uporabnika in njegove

I work for KingsBox, a company that develops and sells sports equipment, specifically, fitness equipment and strength training tools and accessories. My role in the company covers various areas, including the primary development and design of new products, as well as introducing and maintaining the design language.

The experience of studying at the Faculty, especially the Product Design Programme, has been very positive. The Design Programme is a great complement to the first cycle of Mechanical Engineering studies, as it includes a more human-centred perspective, focusing on user experience, creativity, and encouraging thinking outside of strict technical frameworks. This is particularly important in the development and production of end-user products.

The knowledge acquired during your studies provides a solid foundation and a broad overview of the whole field of work, on which you can then build the specific skills needed to do your



Denis Štajdohar

diplomant študijskega programa Inženirsko oblikovanje izdelkov
graduate of the Study Programme Product Design

izkušnje z izdelkom, kako pomembna je pravilna funkcionalnost izdelka ter kako premisliti in vključiti celoten proces izdelave. Izdelava preprostih, a funkcionalnih prototipov, s katerimi hitro potrdiš ali ovržeš zastavljene hipoteze, ter spodbujanje kreativnega razmišljanja so ključne prednosti, ki jih program ponuja.

job. A good knowledge of computer tools, an understanding of the basics of materials theory, manufacturing technologies, mechanical engineering laws, an understanding of user needs and the study of functionality and the importance of design in the development of new products are key areas for successful job performance.

As I mentioned earlier, the Product Design Programme is a great complement to a degree in Mechanical Engineering. I would recommend the programme to anyone interested in developing products for end-users. The programme teaches you the importance of understanding the user and their experience of the product, how important it is to get the functionality of the product right, and how to think about and integrate the whole manufacturing process. Creating simple, but functional prototypes that confirm or disconfirm hypotheses and stimulating creative thinking quickly are key benefits of the programme.



Saša Stradovnik
diplomantka študijskega programa Mehatronika
graduate of the Study Programme Mechatronics

Študijski program Mehatronika na FS je široko zastavljen in povezuje znanja z različnih področij. Ta interdisciplinarni pristop mi je omogočil, da sem med študijem razvila celovit vpogled v kompleksne mehatronske sisteme, hkrati pa sem imela možnost izbiranja specifičnih izbirnih predmetov, ki so me še posebej zanimali. Praktično naravnost študija so še dodatno podkrepile laboratorijske vaje, ki so mi omogočile, da teoretično

The Mechatronics Study Programme at FME is broad-based and integrates skills from different fields. This interdisciplinary approach allowed me to develop a comprehensive insight into complex mechatronic systems during my studies, while, at the same time, giving me the opportunity to choose specific electives that were of particular interest to me. The practical orientation of my studies was enhanced further by laboratory exercises, which allowed me to put the theoretical knowledge acquired in lectures into practice. Being involved in projects in cooperation with businesses has given me valuable practical experience and additional skills that are crucial for a successful entry into the labour market. These projects have been about finding creative and innovative solutions to the challenges facing industry, which has prepared me for the dynamic environment in which I work today. The knowledge and experience gained during my studies serve as a good basis for further development and success in my career path, and allow me to find solutions to my daily challenges more quickly with such a professional background.

znanje, pridobljeno na predavanjih, prenesem v prakso. Vključevanje v projekte v sodelovanju z gospodarstvom mi je prineslo dragocene praktične izkušnje in dodatna znanja, ki so ključnega pomena za uspešen vstop na trg dela. V okviru teh projektov smo iskali kreativne in inovativne rešitve za izzive, s katerimi se sooča industrija, kar me je pripravilo na dinamično okolje, v katerem delujem danes. Znanje in izkušnje, pridobljene med študijem, mi služijo kot dobra podlaga za nadaljnji razvoj in uspehe na moji karierni poti in omogočajo, da s takšno strokovno podlago hitreje najdem rešitve svojih vsakodnevnih izzivov.

Med študijem sem bila vključena tudi v delo v našem družinskem podjetju, kjer sem lahko pridobljena znanja s fakultete prenesla tudi v realno okolje. Pridobljene praktične izkušnje pa so mi bile v veliko pomoč pri razumevanju teoretičnih osnov, ki smo jih obravnavali v okviru študija. Po končanem študiju mehatronike se mi je ponudila priložnost doktorskega študija na FERI, ki sem ga tudi uspešno zaključila. V okviru doktorskega študija sem se ukvarjala s področjem robotike, kjer so mi pridobljena znanja s področja strojništva še kako koristila, saj je robotika tesno povezana z osnovnimi principi strojništva.

Danes opravljam dve službi. Po končanem doktorskem študiju sem se zaposlila kot asistentka in raziskovalka na FERI, kjer pokrivam študijske predmete s področja robotike in avtomatizacije. Poleg tega sem zaposlena v našem družinskem podjetju kot razvojna inženirka na področju avtomatizacije in robotike, kjer razvijamo namenske stroje za različna področja industrije.

During my studies I was also involved in our family business where I was able to transfer the knowledge I gained at university to the real world. The practical experience I gained was a great help in understanding the theoretical basics we covered during my studies. After finishing my studies in Mechatronics, I was offered the opportunity for a Doctoral at FERI, which I completed successfully. During my Doctoral studies, I worked in the field of Robotics, where the knowledge I gained in Mechanical Engineering was very useful, as Robotics is related closely to the basic principles of Mechanical Engineering.

Today I have two jobs. After finishing my Doctoral studies, I joined FERI as a research assistant and researcher, where I cover courses in Robotics and Automation. In addition, I am employed in our family company as a development engineer in the field of Automation and Robotics, where we develop dedicated machines for different industrial fields.



Alumni FS
FME Alumni

Društvo Alumni FS je bilo ustanovljeno leta 2009 in predstavlja prostovoljno, nepridobitno, nepolitično, nereligiozno in samostojno združenje predvsem diplomantov vseh študijskih programov FS, ki se združujejo z namenom formalnega sodelovanja na strokovni in družabni ravni.

Alumni FS je prepoznavno po razvijanju in promoviranju interdisciplinarnega sodelovanja med FS, njenimi diplomanti ter institucijami doma in v tujini.

Alumni FS razvija in promovira interdisciplinarno mrežo med FS in njenimi diplomanti ter med fakulteto, gospodarskimi subjekti in drugimi družbenimi institucijami z namenom doseči obojestranske profesionalne in osebne koristi pri izmenjavi znanja in izkušenj. Alumni FS podpira razvoj FS kot ene najbolj priznanih fakultet v srednji Evropi z mednarodno upoštevanim znanstvenoraziskovalnim delom in z najsodobnejšim prenosom znanja, ki bo sposobna odgovarjati na stvarna vprašanja gospodarske in družbene prakse.

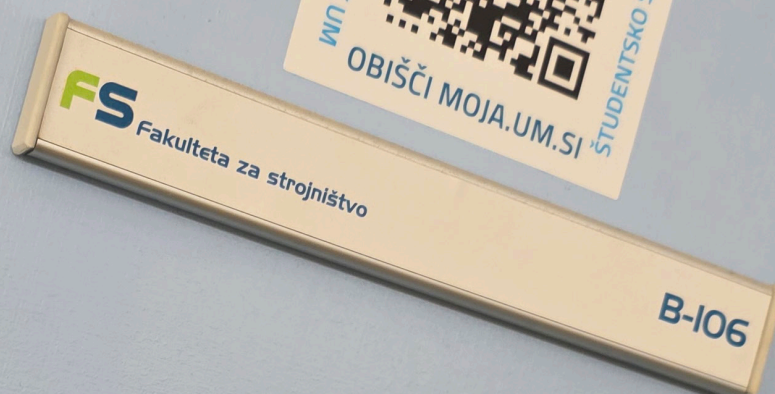
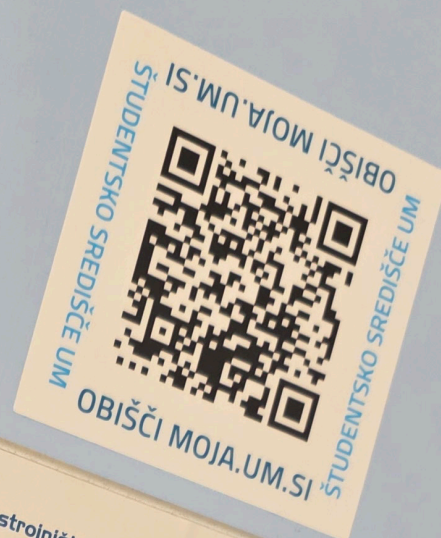
Established in 2009, the FME Alumni Association is a voluntary, non-profit, non-political, non-religious and independent organisation that brings together graduates of all the Study Programmes offered by the FME. Its purpose is to foster formal collaboration on both professional and social levels.

The Association is committed to strengthening interdisciplinary cooperation between FME, its alumni, and academic, economic and social institutions in Slovenia and abroad. It serves as a dynamic platform for building and nurturing a professional network that connects the alumni with the Faculty and wider society.

By facilitating the exchange of knowledge, experience and expertise, the FME Alumni Association promotes mutual professional and personal growth. It supports the advancement of FME actively as a leading Faculty in Central Europe – an institution distinguished by internationally recognised research excellence and cutting-edge knowledge transfer, capable of addressing the real-world challenges of both industry and society.



Predavanje Aleksandra Hercoga o žerjavih v predavalnici inž. Ivana Munde leta 2016
Lecture by Alexander Hercog on cranes in the Eng. Ivan Munda Lecture Hall in 2016



FAKULTETA ZA STROJNIŠTVO

REFERAT

URADNE URE
od 11. do 13. ure

Strokovne službe
Professional Services

Vstopajte posamezno!

Za uspešno delovanje fakultete so potrebne ustrezne strokovne službe, ki skrbijo za posamezna področja na fakulteti.

Tajništvo dekanata skrbi za nemoteno delovanje dekanata in zagotavlja neposredno podporo vodstvu fakultete.

Oddelek za gospodarjenje in splošne zadeve skrbi za področje izvajanja javnih naročil in za področje tehnično-vzdrževalnih del ter ponuja administrativno podporo predstojnikom kateder, poskrbi za pravočasen krogotok dokumentacije na področju naročil, potnih nalogov, pogodb, poročil, evidenc in drugih administrativnih zadev.

Oddelek za raziskovalne in mednarodne zadeve skrbi za izvajanje podpornih nalog v okviru znanstveno-raziskovalnega dela, sodelovanja z gospodarstvom in promocijskih dejavnosti na področju raziskovalne dejavnosti.

Oddelek za študijske in študentske zadeve skrbi za redni in izredni dodiplomski in podiplomski študij, za praktično usposabljanje študentov, za ERASMUS pisarno, za urnike ter nemoteno delovanje celotnega študijskega procesa na FS.

Oddelek za finančne in računovodske zadeve je tesno povezan z delovanjem vseh strokovnih služb na fakulteti. Sodelavke v tej službi poskrbijo za pravilno in pravočasno evidentiranje poslovnih dogodkov, tekoče opravljanje plačilnega prometa, izvajanje računovodskega nadzora, nadzirajo poravnavanje terjatev, izvajajo obračun plač, pripravo računovodskih izkazov, finančnih načrtov in drugih poročil.

Sodelavke **Oddelka za kadrovske in pravne zadeve** poskrbijo za vse dejavnosti v zvezi s kadrovskimi postopki in postopki habilitacij. V okviru Službe za kadrovske in pravne zadeve deluje še vložišče.

Računalniško-informacijski center skrbi za računalniško opremo in ponuja celovito informacijsko podporo za nemoteno delovanje fakultete na področju računalniško-informacijske tehnologije.

Center za vseživljenjsko učenje je nastal zaradi potreb v okviru projekta Vpeljava podpornega okolja za vseživljenjsko učenje za trajnostno inženirstvo, ki ga financirata Republika Slovenija, Ministrstvo za visoko šolstvo, znanost in inovacije ter Evropska unija iz sklada EU Next generation in je del evropskega Načrta za okrevanje in odpornost (NOO). S projektnimi dejavnostmi,

The successful operation of the FME relies on the effective work of its professional support services, each responsible for key operational areas that ensure the Faculty's smooth day-to-day functioning.

The Secretariat of the Dean's Office

This office provides direct administrative and organisational support to the Faculty's management, ensuring the efficient operation of the Dean's office and coordination of leadership activities.

Division of Management and General Affairs

This division oversees procurement, facility management, and technical maintenance. It also provides administrative support to department heads, and ensures the timely handling of procurement documentation, travel orders, contracts, reports, records and other operational processes.

Division of Research and International Affairs

Dedicated to fostering scientific collaboration, this division supports cooperation with industry, and coordinates activities aimed at the promotion and dissemination of research outcomes. It also facilitates international academic and research initiatives.

Division of Academic and Student Affairs

Responsible for organising and managing all aspects of undergraduate and postgraduate education (both full-time and part-time), this division ensures the efficient delivery of the academic process. It oversees student internships, the ERASMUS+ Programme, course scheduling, and the overall coordination of the study lifecycle at FME.

Division of Finance and Accounting

This division plays a critical role in the financial operations of the Faculty. It is responsible for the accurate and timely recording of transactions, management of payment operations, accounting controls, payroll processing, receivables tracking, and the preparation of financial plans, statements and regulatory reports. It works in close collaboration with all Faculty departments.

Division of Human Resources and Legal Affairs

This division manages personnel-related activities and legal procedures, including the habilitation processes. It also operates the central filing office, ensuring proper documentation and compliance with legal Standards.

IT Centre

The IT Centre administers and maintains the Faculty's computer infrastructure, and provides comprehensive Information Technology support. Its mission is to ensure the reliable and secure operation of all digital systems and services within the Faculty.

ki vključujejo razvoj mikrodokazil, in krajših izobraževanj manjšega obsega je mogoče dopolniti klasične študijske poti in razširiti ponudbo na širši krog zainteresirane populacije.

Knjižnica tehniških fakultet je skupna knjižnica štirih tehniških fakultet UM. Primarno je namenjena študentom, pedagoškim sodelavcem in raziskovalcem tehniških fakultet za podporo pedagoškega procesa in znanstvenoraziskovalnega dela. Odprta pa je tudi drugim uporabnikom. Knjižnica tehniških fakultet je polnopravna članica sistema COBISS. Knjižnično gradivo je računalniško obdelano in zbrano v lokalni bibliografski bazi KTFMB.

Centre for Lifelong Learning

Established as part of the Implementing a Supportive Environment for Lifelong Learning for Sustainable Engineering project, this centre addresses the growing need for continuous education. The project is co-funded by the Republic of Slovenia, the Ministry of Higher Education, Science and Innovation, and the European Union through the EU Next Generation Fund, within the framework of the European Recovery and Resilience Plan. Activities include the development of micro-credentials and short-form educational modules, aimed at broadening the Faculty's educational offer, and engaging a more diverse learner population beyond the traditional Study Programmes.

Library of the Technical Faculties

Shared among the four Engineering Faculties at the UM, the Library of Technical Faculties supports teaching, learning and research activities. It serves primarily students, teaching staff and researchers, but is also open to the broader public. As a full member of the COBISS system, the library maintains a digital catalogue, and its materials are accessible through its local bibliographic database.



Pripadnost fakulteti.

Belonging to the Faculty.





Akaderske insignije UM
Academic Insignia of UM

FS, ki je 1. 1. 1995 z odlokom o preoblikovanju UM stopila na pot samostojne fakultete, je na slovesni promociji, kot je pisalo v Univerzitetni reviji, 17. marca 1995 prejela akademske insignije. Rektor UM prof. dr. Ludvik Toplak je prvemu dekanu prof. dr. Adolfo Šostarju predal slovesno listino o ustanovitvi fakultete in insignije fakultete kot simbol dekanove pravičnosti in njegove predanosti znanosti in pedagoškemu delu, da bi s svojim znanjem in izkušnjami, odgovornostjo in vestjo skrbel za kakovost, ustvarjalni preboj in ugled izobraževalnega in znanstvenoraziskovalnega dela fakultete.

Prvotne insignije dekana sta sestavljali dekanova veriga in akademska toga, ki je leta 2018 dobila novo podobo, ter posebej za to oblikovana kravata oziroma dodatek za ženske. Ob nastopu novega rektorja prof. dr. Zdravka Kačiča je bila oblikovana iniciativa za idejno zasnovo nove podobe akademske toge, pomembnega sestavnega dela insignij rektorja UM.

Idejna zasnova insignij rektorja kot ceremonialnega akademskega oblačila temelji na tradiciji in simboliki, preneseni v oblačilo v obliki prepoznavnih detajlov. Insignije rektorja predstavljajo drugo največjo in drugo najstarejšo univerzo pri nas, univerzo z dolgo tradicijo, zaradi česar je ohranjena oblika daljše akademske toge, linije, ki poudarjajo stabilno silhueto, lepoto in akademsko dostojanstvo. Barvna zasnova temelji na tradicionalni črni barvi, ki jo v skladu s celostno grafično podobo UM dopolnjujeta modra 7706CP Pantone, ki je uporabljena tudi za izdelavo kravat, in zlata v obliki obrob.

Simbolika, ki poudarja samopodobo UM, je izražena v detajlih insignij rektorja. Obrobe, ki se nizajo z notranjega dela ovratnika navzven, predstavljajo liste knjige in vsa znanja, ki smo jih pridobili, razvili in ponotranjili, da lahko na temelju kulture dialoga in sodobnih učnih oblik ter metod v odprtosti za sodelovanje vodimo mlade na poti do znanja in ciljev. Prenos znanja na študente in v širšo družbeno skupnost izraža oblika ovratnika, ki simbolizira odprto knjigo, medtem ko je prisotnost UM v slovenskem prostoru, integrirane v sedmih slovenskih mestih, simbolično ponazorjena v obliki sedmih gub na prednji in zadnji strani insignij rektorja, pri čemer izrazitejša sredinska guba predstavlja UM, preostalih šest gub pa simbolizira mesta, v katerih je UM prisotna.

Uporabo akademskih insignij, ki jih sestavljajo akademska toga, pokrivalo, veriga, kravata oziroma dodatek za ženske, določa hierarhični položaj (287. člen Statuta UM; Uradni list RS, št. 41/2021-UPB13). Na prireditvah, organiziranih na ravni univerze, so v akademske insignije oblečeni rektor, prorektorji, dekani, prodeka-

On 1 January 1995, the FME officially became an independent Faculty within the UM, following the Decree on the university's reorganisation. The Faculty received its academic insignia during a ceremonial promotion on 17 March 1995, as documented in the University Magazine. At this event, the then Rector of UM, Prof. Dr. Ludvik Toplak, presented the inaugural Dean, Prof. Dr. Adolf Šostar formally, with the official charter establishing the Faculty and the Dean's insignia. These symbols recognised the Dean's commitment to academic integrity, scientific advancement and educational excellence, underscoring his responsibility to uphold the Faculty's prestige and drive for creative and scholarly progress.

The original Dean's insignia consisted of an academic chain and toga, later complemented by a specially designed tie, or women's accessory. This ensemble was redesigned in 2018. With the appointment of a new Rector, Prof. Dr. Zdravko Kačič, the initiative was taken to conceptualise a new visual identity for the academic toga, an integral component of the UM Rector's ceremonial insignia.

The design of the Rector's insignia draws from academic tradition and symbolism, incorporating distinctive elements into the garments. As the second-oldest and second-largest university in Slovenia, UM sought to reflect its heritage and dignity through the ceremonial gown's elongated silhouette, refined lines and formal appearance. The updated colour palette retains classic black, now complemented by Pantone Blue 7706CP – used in accessories such as ties – and gold trimming, aligning with the university's visual identity.

Rich symbolism is embedded in the Rector's insignia. The gold borders extending from the inner collar outward represent the pages of a book, symbolising the accumulation, development and internalisation of knowledge. This design element highlights UM's mission to foster a culture of dialogue and modern educational methods, guiding students towards intellectual and personal growth. The collar's shape – resembling an open book – symbolises the dissemination of knowledge to students and society at large. Additionally, the insignia features seven pleats on the front and back of the gown, with a prominent central pleat representing UM itself, and six smaller pleats symbolising the university's presence in six other Slovenian cities.

The use of academic insignia – including the toga, cap, chain, tie and women's accessory – is regulated by hierarchical status, in accordance with Article 287 of the Statutes of the University of Ljubljana (Official Gazette of the Republic of Slovenia, No. 41/2021-UPB13). At university-level events, the insignia is worn by the Rector, Vice-Rectors, Deans, Vice-Deans (when acting as Deans), and the newly appointed honorary Doctors. At events organised by individual uni-

ni (če nadomeščajo dekana) in novi častni doktorji UM, medtem ko so na prireditvah, organiziranih na ravni članice univerze, v akademske insignije oblečeni rektor, prorektorji (če nadomeščajo rektorja), dekan in prodekani članice, ki organizira prireditev, ter dekani drugih članic univerze oziroma tudi prodekani (če nadomeščajo dekana).

Hierarhični položaj akademske toge se loči po izrazitosti vizualnih elementov na ovratniku in rokavih, tj. po različnih širinah našitih zlatih trakov in trakov modre barve, ki se po hierarhiji z odzemanjem vizualnega učinka zmanjšujejo. Pokrivalo v obliki pravilnega šestkotnika, z zlato in modro obrobo ter dodanim cofom v zlati barvi, dopolnjuje akademsko togo rektorja, črna izpeljanka pokrivala pa je namenjena častnemu doktorju.

Idejna zasnova in tehnološka izvedba insignije rektorja kot ceremonialnega akademskega oblačila, vključno s kravato in pokrivali, sta potekali v okviru Raziskovalno-inovacijskega centra za design in oblačilno inženirstvo FS. Insignije rektorja je oblikovala izr. prof. dr. Sonja Šterman, medtem ko je prototip oblačila izdelal VB oblačilni inženiring iz Tešanovcev.

versity members, the Rector, Vice-Rectors (when acting in place of the Rector), Deans and Vice-Deans of the organising member, as well as Deans or Vice-Deans from other Faculties, wear the academic insignia.

The visual hierarchy of the academic toga is conveyed through the design elements of the collar and sleeves, particularly the varying widths of the gold and blue ribbons, which indicate the wearer's academic rank. The Rector's cap – a regular hexagon adorned with gold and blue edges and a gold coif – complements the gown, while honorary Doctors wear a simplified black version of the cap.

The conceptual design and production of the Rector's insignia, including the gown, tie and cap, were undertaken at the Research and Innovation Centre for Design and Clothing Engineering at FME. The insignia was designed by Assoc. Prof. Dr. Sonja Šterman, with the prototype manufactured by VB Clothing Engineering from Tešanovci.

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Insignije rektorja: akademska toga in pokrivalo
Rector's insignia: academic toga and cap

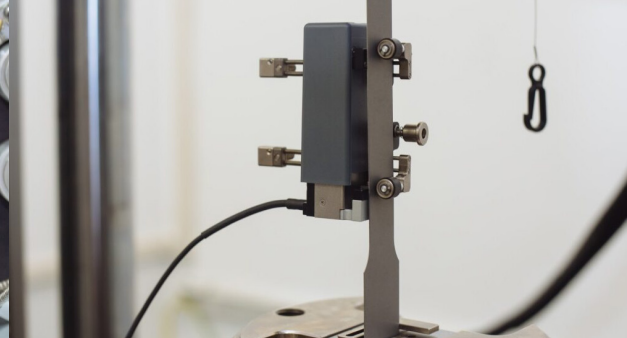


Akademska toga za prorektorja, dekana, prodekana in častnega doktorja
ter pokrivalo za častnega doktorja
*Academic toga for the Vice-Rector, Dean, Vice-Dean and honorary Doctor,
and cap for the honorary Doctor*



Slovesnost ob Dnevu UM leta 2023
UM Day ceremony in 2023





Primernost in urejenost infrastrukture se začneta pri zgradbi in njeni neposredni okolici, kjer FS izvaja svoje dejavnosti. Pedagoška infrastruktura je tista, s katero smo zaposleni in študenti največ v neposrednem stiku, in je vezana predvsem na opremljenost predavalnic in tistih delov laboratorijev, v katerih se izvaja izobraževalni proces. V zadnjih letih smo posodobili več predavalnic in laboratorijev, nekatere tudi v sodelovanju s podjetji, in s takšnim načinom sodelovanja bomo nadaljevali tudi v prihodnosti. Pred fakulteto smo namestili promocijsko bivalno enoto (donacija podjetja Arcont, d. d.), v kateri prikazujemo naše dosežke širši javnosti.

Raziskovalna infrastruktura UM (RIUM) je najbolj podvržena tehnološkemu napredku in potrebi po posodabljanju. Na FS nadgrajujemo raziskovalno opremo z lastnimi sredstvi, v sodelovanju s podjetji in prek najrazličnejših razpisov. Ker je tudi Republika Slovenija zaznala potrebo po odlični raziskovalni opremljenosti fakultet, smo v letih 2019-2023 pridobili najsodobnejšo raziskovalno opremo na več področjih (v približni vrednosti 8 mio EUR). RIUM je neposredno potrjen projekt na podlagi poziva Ministrstva za visoko šolstvo, znanost in inovacije, ki sledi celostni viziji mednarodne konkurenčnosti raziskav, inovacij in tehnološkega razvoja v skladu s področji Strategije pametne specializacije Slovenije (S5) ter predstavlja nadgradnjo raziskovalne infrastrukture UM. Z njim ustvarjamo pogoje za uporabo najsodobnejše znanstvenoraziskovalne opreme po načelu odprtega dostopa za univerzitetne raziskovalce

The adequacy of the infrastructure at the FME begins with the main building and its immediate surroundings, which form the foundation for the institution's core activities. Of particular importance is the teaching infrastructure, as it represents the primary point of interaction for both staff and students. This includes the equipment in the lecture rooms and the teaching areas within laboratories. In recent years, several lecture rooms and laboratory spaces have been modernised, in some cases through partnerships with industry. These efforts are ongoing, and reflect a commitment to maintaining high-quality teaching environments. Additionally, a promotional living unit – donated by Arcont d.d. – has been installed in front of the Faculty to present our accomplishments to the broader public.

The Research Infrastructure of the UM (RIUM) is particularly sensitive to rapid technological advancements and the ongoing need for modernisation. To address this, the FME upgrades its research equipment regularly using its own resources, through collaborations with industry partners, and by participating in various public funding calls. Recognising the importance of cutting-edge research infrastructure, the Republic of Slovenia supported significant investments between 2019 and 2023, enabling the acquisition of advanced equipment valued at approximately 8 million EUR across several research domains. RIUM is a directly approved initiative under the call issued by the Ministry of Higher Education, Science and Innovation, aligned with the national Smart Specialisation Strategy (S5). The project aims to enhance the international competitiveness of Slovenian research, innova-



in druge raziskovalce, s ciljem opravljanja visokokakovostnega raziskovalnega dela, povečanja sodelovanja v razvojno-raziskovalnih projektih in širšega razvoja specifičnih kadrov, ob zagotavljanju široke dostopnosti za namene izobraževanja in usposabljanja.

Naši načrti pa so še bolj drzni, saj želimo zgraditi novo stavbo v neposredni bližini fakultete, ki bo namenjena raziskovalni in aplikativni infrastrukturi. Po več kot 30 letih bo FS v okviru projekta INNOVUM pridobila nov sodoben in energetsko učinkovit objekt z okoli 11.000 m² uporabnih površin, ki bo omogočil delovanje vseh kateder in laboratorijev FS v skupnem objektu. Investicijski projekt Celovita prenova in dograditev objektov tehniških fakultet - I. FAZA se financira iz Programa Evropske kohezijske politike v obdobju 2021-2027 in je del krovnega programa Tehnološki inovacijski center oziroma platforma INNOVUM, katerega osrednji namen je zagotovitev celostnega pristopa pri oblikovanju inovacijsko-podjetniškega ekosistema, ki je nujno potreben za razvojni preboj kohezijske regije Vzhodna Slovenija.

Objekt FS bo zgrajen na vogalu Smetanove in Prežihove ulice predvidoma v obliki zrcaljene črke C, kjer bo južni del namenjen študijski dejavnosti, severni del pa raziskovalni dejavnosti. Objekt bo zajemal več nivojev kletnih prostorov s podzemnimi parkirišči in z laboratoriji s težjo in hrupno opremo, pritličje z avlo, veliko predavalnico, večjimi laboratoriji, nekaj manjšimi predavalnicami, referatom in pomožnimi prostori ter nadstropne etaže s kabineti, laboratoriji, učilnicami in prostori za skupne službe. Skupno bo na voljo okoli 4.500 m² pedagoških, skupnih in upravnih prostorov, 4.600 m² laboratorijev in posebnih pedagoških prostorov ter okoli 2.000 m² komunikacijskih površin. Energijsko učinkovita novogradnja bo zasnovana kot živ laboratorij in bo raziskovalcem omogočala spremljanje raznih parametrov njenega obratovanja in pametnega upravljanja njenega delovanja.

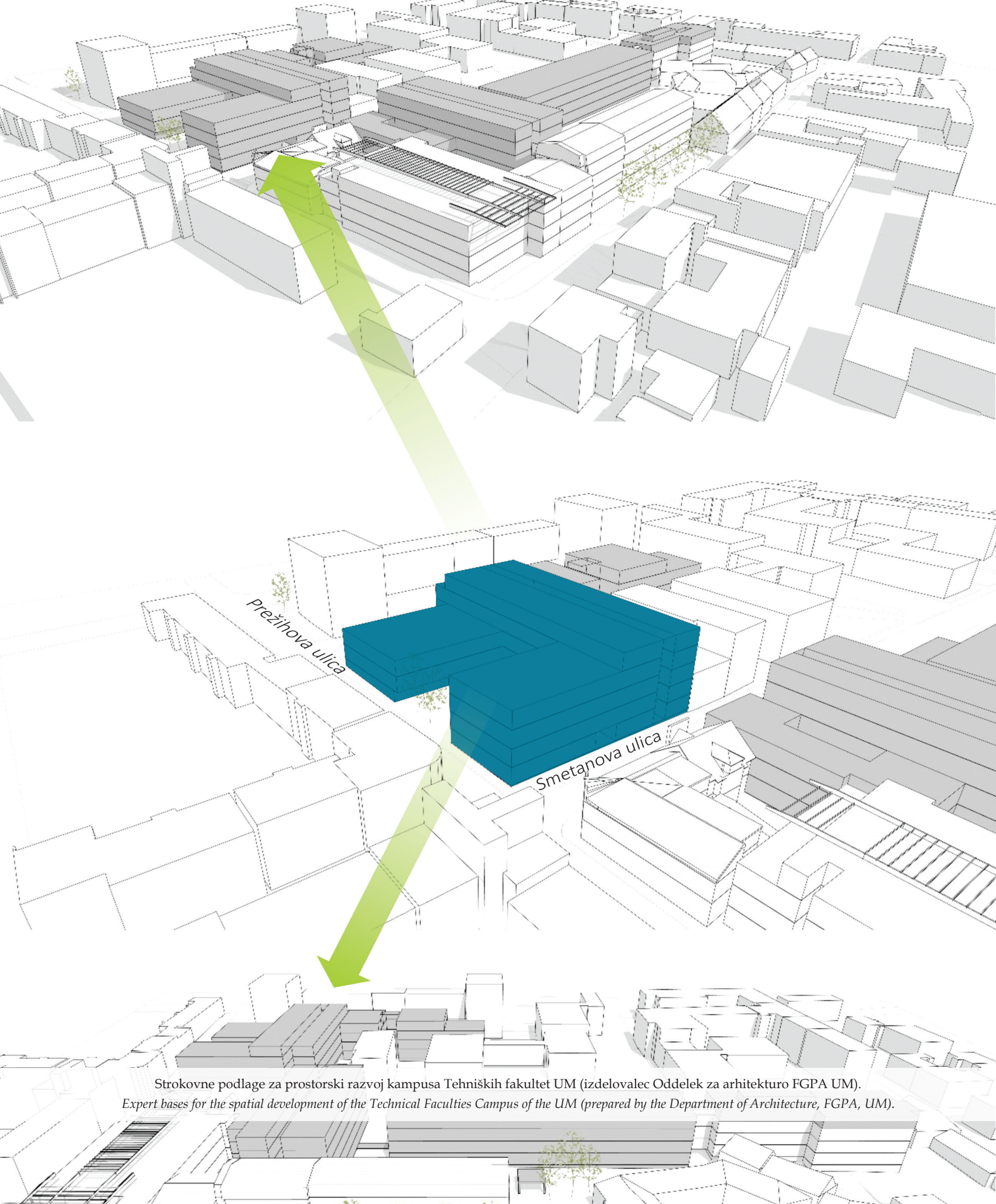
Z ureditvijo nove sodobne izobraževalne in raziskovalne infrastrukture FS ter načrtovano nabavo in umestitvijo vrhunske raziskovalne opreme bo FS vzpostavila odlične pogoje za podporo študijskemu procesu, znanstvenoraziskovalnim in inovacijskim procesom ter prenosu znanja in tehnologij v okolje.

tion and technological development. RIUM strengthens the university's research capabilities by providing open access to state-of-the-art scientific equipment for both university and external researchers. This facilitates high-quality research, boosts participation in R&D projects, supports the development of specialised human resources, and promotes broad accessibility for educational and training purposes.

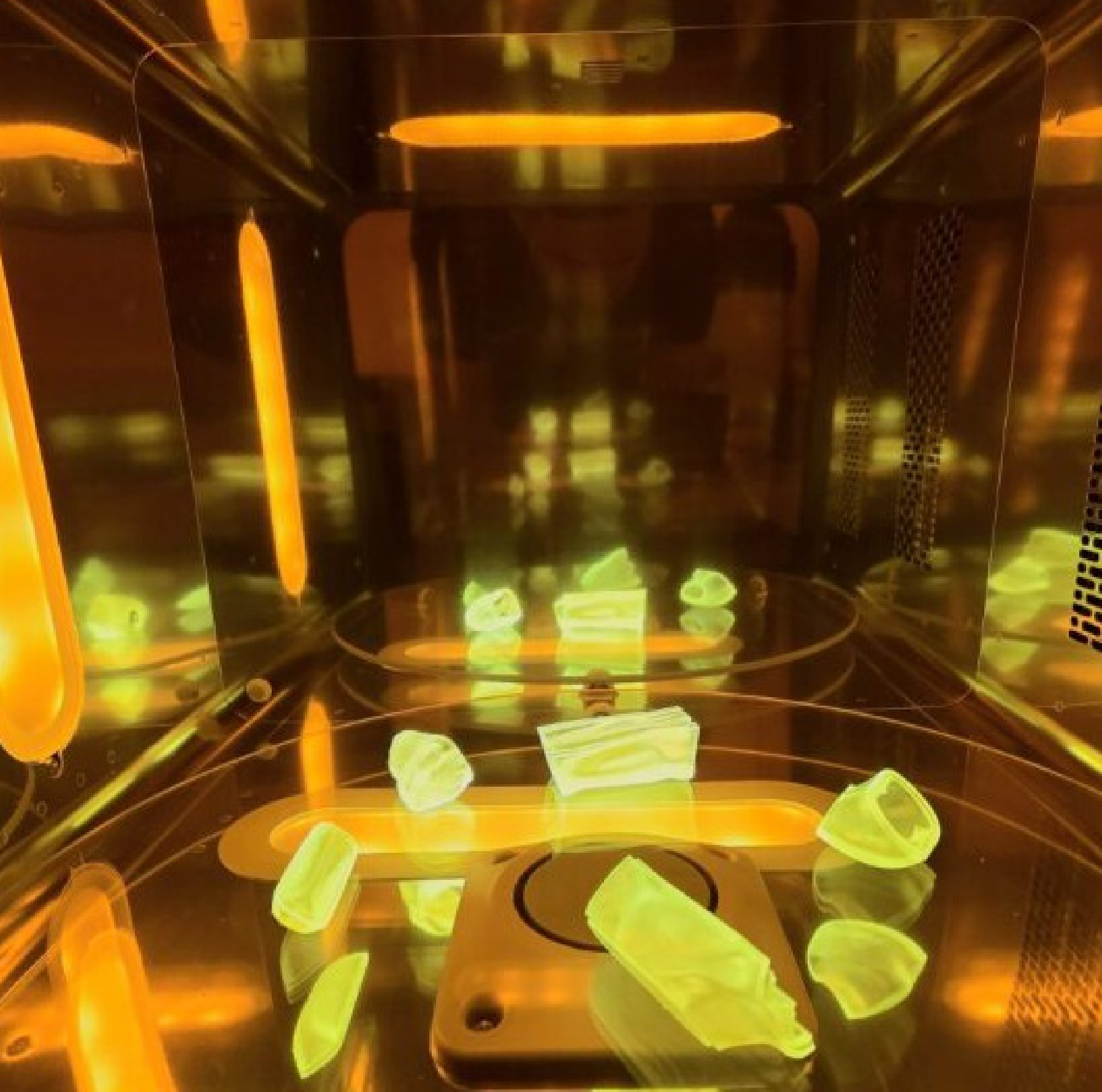
Our future plans are even more ambitious, as we are preparing to construct a new building adjacent to the existing Faculty, dedicated to research and applied infrastructure. This marks the first major expansion of the FME in over 30 years, and will result in a modern, energy-efficient facility with approximately 11,000 m² of usable space. The new building will enable all Faculty Chairs and Laboratories to operate under one roof, enhancing collaboration and efficiency significantly. This development is part of the INNOVUM project, specifically, the investment initiative Comprehensive Renovation and Upgrading of Technical Faculty Facilities - PHASE I, which is funded through the European Cohesion Policy Programme 2021–2027. The project is integrated into the broader Technological Innovation Centre - INNOVUM platform, whose primary goal is to foster a comprehensive innovation and entrepreneurship ecosystem. This initiative is crucial for achieving a developmental breakthrough in the Eastern Slovenia Cohesion Region.

The new FME building will be constructed at the corner of Smetanova and Prežihova Streets, featuring a distinctive mirrored „C“ shape. The southern wing will be dedicated to educational activities, while the northern wing will house research facilities. The building will include several basement levels, accommodating underground parking and laboratories designed for heavy and noisy equipment. The ground floor will feature a central lobby, a large lecture hall, spacious laboratories, multiple smaller lecture rooms, a lecture theatre and various support areas. The upper floors will contain offices, laboratories, classrooms and shared service areas. In total, the facility will comprise approximately 4,500 m² of space for teaching, administration, and common areas; 4,600 m² for laboratories and specialised teaching spaces; and about 2,000 m² for communication and circulation areas. Designed to be energy-efficient, the new building will function as a „living laboratory“, enabling researchers to monitor and analyse its operational parameters and intelligent building management systems.

With this advanced educational and research infrastructure – combined with the planned acquisition of cutting-edge equipment – the FME will establish an outstanding environment for academic instruction, scientific research, innovation, and the effective transfer of knowledge and technologies to the broader community.



Strokovne podlage za prostorski razvoj kampusa Tehniških fakultet UM (izdelovalec Oddelek za arhitekturo FGPA UM).
Expert bases for the spatial development of the Technical Faculties Campus of the UM (prepared by the Department of Architecture, FGPA, UM).



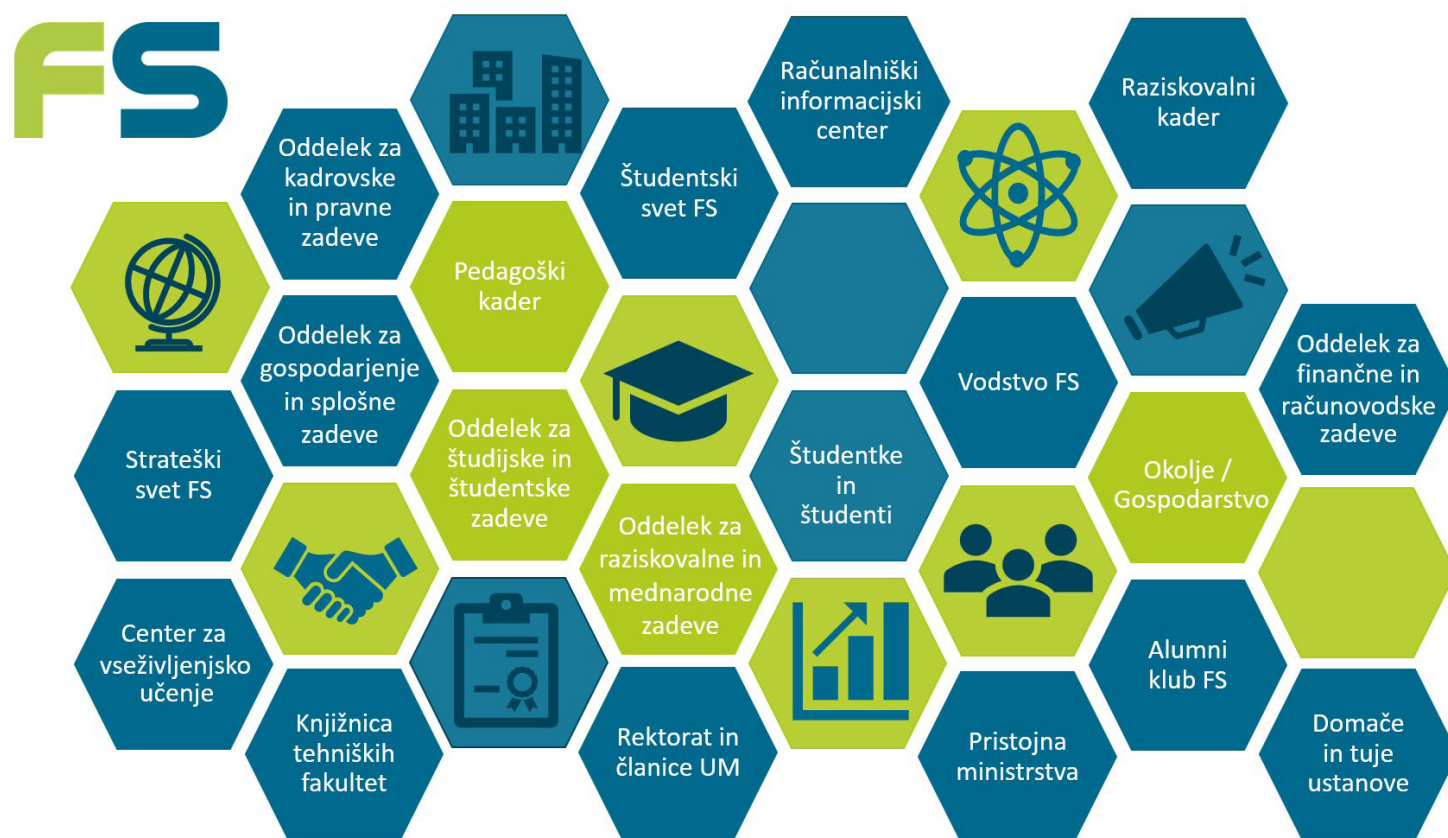
Strateške usmeritve 2021–2030
Strategy and Objectives 2021-2030

Strateške usmeritve

FS se bo v skladu s strateškimi usmeritvami UM 2021-2030 aktivno vključevala v reševanje družbenih problemov in prenos znanja ob upoštevanju načel družbene odgovornosti in trajnostnega razvoja. S sinergijskimi učinki bo izboljševala svojo razpoznavnost in znanstveno odličnost. Razvijala bo študijske programe s problemsko in projektno orientiranim študijem, osredotočenim na študenta, ter spodbujala timsko in kreativno delo. Fakulteta bo izvajala programe v tujem jeziku, vseživljenjsko izobraževanje ter krepila sodelovanje z gospodarstvom. Spodbujala bo mednarodno mobilnost, zagotavljala kakovost ter omogočala spodbudno delovno okolje in razvoj človeških virov. Stalno bo prepoznavala odličnost študentov in zaposlenih ter razvijala infrastrukturo, ob spodbujanju akademskih vrednot in profesionalne etike.

Strategy

In alignment with the UM 2021–2030 strategy, the FME is committed to addressing societal challenges and promoting the transfer of knowledge, guided by the principles of social responsibility and sustainable development. The Faculty aims to enhance its visibility and scientific excellence by leveraging synergistic collaborations. It will continue to develop Study Programmes that are problem- and project-oriented, student-centred, and focused on fostering teamwork and creative thinking. Emphasis will be placed on offering courses in foreign languages, supporting lifelong learning, and deepening partnerships with industry. The Faculty also seeks to promote international mobility, ensure high quality in all aspects of its operations, and cultivate a supportive working environment that fosters human resource development. Ongoing efforts will be made to recognise and reward excellence among students and staff, expand and modernise the infrastructure, and uphold the highest standards of academic values and professional ethics.



Odličnost fakultete je povezana s skrbjo za odnose na fakulteti in zunaj nje.

Faculty excellence is linked to nurturing relationships within and outside the Faculty.

Strateški cilji

FS izobražuje kadre za inženirske poklice in z raziskovalnim delom ustvarja nova znanja, ki so ključna za razvoj gospodarstva in družbe.

1. Organizacija in povezljivost fakultet

Fakulteta bo okrepila povezovanje z univerzo in med-fakultetno sodelovanje ter optimizirala svojo organiziranost in procese. Razvijala bo nova znanstvena in študijska področja z nadaljnjim razvojnim potencialom. Uveden bo učinkovit sistem odločanja, fakulteta pa bo sodelovala pri oblikovanju stimulativnega sistema za delitev proračunskih sredstev.

2. Izobraževalna dejavnost

FS bo izvajala študijske programe s problemsko in projektno orientiranim pristopom, kjer so študentje partnerji v procesu, ob uporabi najsodobnejše opreme. Namenjeno je tudi vseživljenjsko izobraževanje za tehniške strokovnjake in širšo populacijo. Dolgoročno bo načrtovala prenovu študijskih programov ob vključevanju zunanjih deležnikov. Vpis bo družbeno odgovoren, poučevanje inovativno in osredotočeno na študente. Skrbela bo za kakovost dodiplomskega in podiplomskega študija ter povezovanje izobraževalnega procesa s potrebami gospodarstva. Sistem vseživljenjskega učenja bo odprt, fleksibilen in prilagojen individualnim potrebam, izboljšanje kakovosti študija pa bo podprto z aktivnim sodelovanjem študentov, projektnim delom, infrastrukturo in povezovanjem s podjetji.

3. Znanstvena in umetniška dejavnost

FS si prizadeva postati prepoznavna mednarodna znanstvenoraziskovalna institucija, doseči trajnostni in družbeno odgovorni razvoj znanstvenih ved ter spodbujati znanstveno odličnost. Fakulteta bo sodelovala s slovenskimi in tujimi podjetji ter institucijami, izvajala raziskovalne in razvojne projekte, implementirala načela Evropske listine za raziskovalce ter promovirala dosežke raziskovalcev. Aktivno bo podpirala partnerske odnose z industrijo, prijave na razpise za raziskovalno opremo ter prizadevanja za odprt dostop do znanstvenih dokumentov in rezultatov raziskav.

4. Spodbudno delovno okolje

Fakulteta se zavzema za aktivno, transparentno in na dosežkih temelječo politiko zaposlovanja ter dolgoročni razvoj vrhunskih kadrov. Spodbuja interdisciplinarno sodelovanje, dobre medosebne odnose, kulturo dialoga in medgeneracijsko povezanost. Poudarja izobraževanje zaposlenih in pomoč pri njihovem kariernem razvoju, zagotavlja ustrezne delovne razmere, socialno varnost

Strategic Objectives

The FME plays a pivotal role in training future engineers and generating new knowledge through research, both essential drivers of societal and economic development.

1. Organisation and Integration

FME is committed to strengthening its integration within the UM and enhancing interfaculty collaboration. It will optimise its internal organisation and decision-making processes, while fostering the development of emerging scientific and academic fields. The Faculty will also contribute to the creation of a performance-based model for budget allocation, ensuring effective resource management.

2. Educational Excellence

The Faculty will continue offering student-centred, problem- and project-oriented Study Programmes, supported by cutting-edge equipment. It will expand lifelong learning opportunities for both technical professionals and the general public. Curriculum renewal will involve external stakeholders, ensuring alignment with societal needs. Teaching will remain socially responsible and innovative, with a strong emphasis on quality assurance and integration with industry. Active student participation, enhanced infrastructure and business partnerships will support this vision.

3. Research and Innovation

FME aspires to become a recognised international research institution that promotes scientific excellence and sustainable development. It will collaborate with domestic and international companies and institutions, lead R&D projects, and uphold the European Charter for Researchers. The Faculty will support open science, including open access to research outputs and active engagement in research equipment funding programmes.

4. Supportive Work Environment

FME fosters a transparent, merit-based recruitment system, and invests in the long-term development of high-quality staff. It promotes interdisciplinary collaboration, positive interpersonal relationships, and a culture of dialogue and intergenerational cohesion. Continuous professional development, social security and academic values – such as ethical conduct and critical thinking – will remain core priorities. Excellence in research and teaching will be recognised and rewarded actively.

5. Student Engagement

The Faculty will ensure that students participate as partners in governance, development and quality assurance. It su-

ter strokovni in osebnostni razvoj. Prav tako spodbuja inovativnost, ustvarjalnost, neodvisno in kritično razmišljanje ter akademske vrednote in profesionalno etiko ter prepoznavna in nagraduje odličnost na raziskovalnem in izobraževalnem področju.

5. Študenti

Fakulteta bo spodbujala partnersko sodelovanje študentov pri upravljanju in razvoju ter spremljanju kakovosti delovanja. Poskrbela bo za celostni razvoj študentov z zagotavljanjem kakovostnih študijskih in obštudijskih vsebin, študentske mobilnosti in zdravega življenjskega sloga. Študenti bodo aktivno vključeni v znanstveno-raziskovalno dejavnost in sooblikovanje izobraževalne dejavnosti, hkrati pa bo zagotovljeno praktično usposabljanje v sodelovanju z gospodarstvom.

6. Internacionalizacija

Fakulteta bo krepila svojo mednarodno prepoznavnost, razvijala skupne interdisciplinarne študijske programe v tujem jeziku ter se aktivno vključila v mednarodne, bilateralne in regionalne mreže ter združenja. Spodbujala bo mednarodno mobilnost zaposlenih in študentov ter si prizadevala za enotne pogoje izvajanja Erasmus študija na celotni univerzi.

7. Razvoj skozi sistem kakovosti

Fakulteta bo izvajala in nadgrajevala sistem notranjega spremljanja in zagotavljanja kakovosti za podporo strateškim razvojnim prioritetam. Poudarek bo na učinkovitem doseganju ciljev odličnosti in odgovornem zaključevanju kroga kakovosti. Komisija za ocenjevanje kakovosti bo aktivno prispevala k razvoju kulture kakovosti, temelječe na odgovornosti, etiki, transparentnosti in vključevanju vseh deležnikov. Spremljanje kazalnikov bo informacijsko podprto, razvijala se bodo orodja za celovito spremljanje kakovosti. Fakulteta bo skrbela za uspešnost nacionalnih in mednarodnih akreditacij ter evalvacij, kar bo povečalo njeno mednarodno prepoznavnost.

8. Vpetost v okolje

Fakulteta bo aktivno reševala družbene probleme in krepila prenos znanja v domačem in mednarodnem prostoru. Okrepila bo delovanje Alumni kluba, Strateškega sveta in sodelovanje s Kariernim centrom UM. Vse dejavnosti bodo temeljile na načelih družbene odgovornosti in trajnostnega razvoja. Prav tako bo fakulteta sooblikovala inovacijski ekosistem v Vzhodni Sloveniji skladno s strategijo UM in Strategijo razvoja Slovenije 2030.

pports their holistic development by offering high-quality academic and extracurricular environments, promoting student mobility and encouraging healthy lifestyles. The students will be integrated into research activities and the co-creation of educational content, with practical training facilitated through partnerships with industry.

6. Internationalisation

To strengthen its global presence, FME will develop interdisciplinary joint Study Programmes in foreign languages and expand participation in international, bilateral, and regional networks. The Faculty will promote international mobility among both staff and students, and work toward unified conditions for Erasmus exchanges across the university.

7. Quality Assurance and Development

A robust internal Quality Assurance system will support the



Faculty's strategic goals, focusing on excellence and responsible completion of quality cycles. The Quality Assessment Committee will foster a culture of accountability, ethics, transparency and stakeholder engagement. IT-based monitoring tools will be developed to track key indicators, and the Faculty will pursue national and international accreditations actively to boost its international profile.

8. Societal Engagement

FME will strengthen its role in addressing societal challenges and facilitating knowledge transfer both locally and internationally. It will support the Alumni Club, Strategic Council, and the UM Career Centre actively, and all initiatives will align with the principles of social responsibility and sustainable development. The Faculty will contribute to the innovation ecosystem of Eastern Slovenia, in line with the UM Strategy and the Slovenian Development Strategy 2030.

9. Prostorski razvoj fakultete

FS bo vzdrževala in posodabljala obstoječe prostore za izboljšanje delovnih razmer zaposlenih in študentov ter sodelovala pri oblikovanju smernic prostorskega razvoja UM. Predvidena je celovita prenova obstoječih objektov in gradnja novih, vključno z integracijo raziskovalno-razvojne infrastrukture v lokalna okolja za razvoj gospodarstva (INNOVUM). Poleg tega bo razvijala in trajnostno posodabljala svojo infrastrukturo v okviru univerze.

10. Informacijska podpora dejavnosti

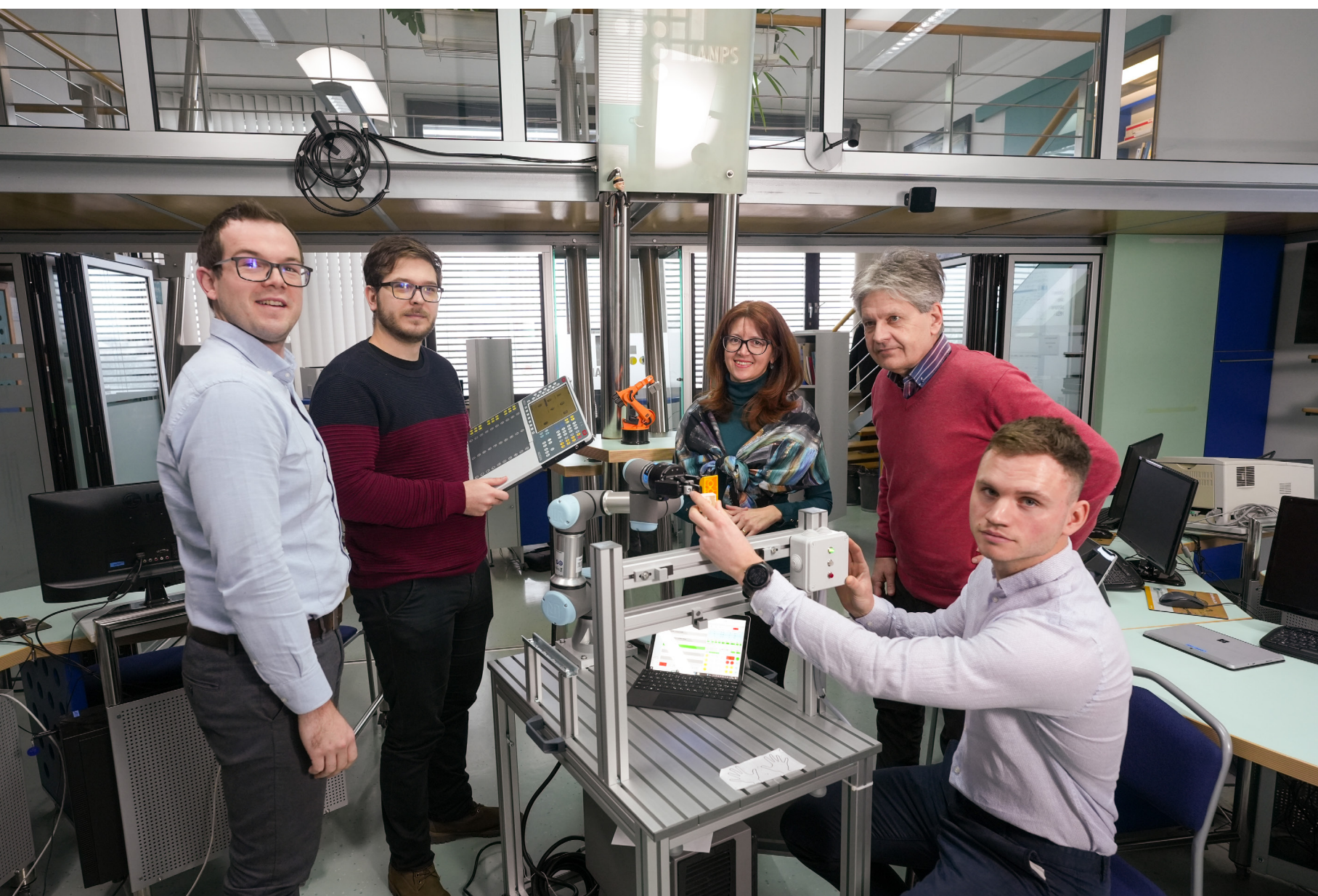
Fakulteta bo zagotavljala kakovostno informacijsko podporo procesom in dejavnostim, podpirala digitalno optimizacijo z razvojem platform za poučevanje in raziskovanje ter digitalizacijo administracije. Omogočen bo dostop do raziskovalne IKT-infrastrukture, orodij, virov in opreme, upravljanje informacijske varnosti pa bo potekalo v skladu z določeno politiko informacijske varnosti.

9. Spatial Development

The Faculty will maintain and upgrade its current facilities to improve conditions for staff and students, and participate in shaping UM's spatial development strategy. Plans include a comprehensive renovation of existing spaces and construction of new facilities, including the integration of an R&D infrastructure into the local economic environment through the INNOVUM platform. All the infrastructure development will follow the principles of sustainability.

10. Digital and Information Support

FME will ensure high-quality IT support for its academic, research and administrative processes. This includes digital optimisation through platform development, enhanced access to the research IT infrastructure, and the implementation of a defined information security policy to safeguard data and systems.







Katedre, laboratoriji in centri
Chairs, Laboratories and Centres

Na FS je skupno 35 laboratorijev in 5 centrov razporejenih v sedem kateder, ki skrbijo za razvoj in izvajanje izobraževalne in znanstvenoraziskovalne dejavnosti.

The FME has a total of 35 laboratories and 5 centres, organised into seven Chairs, which are responsible for the development and implementation of educational and scientific research activities.

Katedra za energetske, procesne in okoljske inženirstvo | Chair for Energy, Process and Environmental Engineering – KEPOI

Laboratorij za energetske sisteme in naprave | *Energy Systems and Devices Laboratory* – LESN

Laboratorij za motorje z notranjim zgorevanjem | *Laboratory of Internal Combustion Engines* – LMNZ

Laboratorij za prenosne pojave v tekočinah in trdninah | *Laboratory for Liquids and Solid Transport Phenomena* – LPPTT

Laboratorij za procesno inženirstvo in računalniško dinamiko tekočin | *Laboratory of Process Engineering and Computational Fluid Dynamics* –LCFD

Laboratorij za termodinamiko, zgorevanje in okoljsko inženirstvo | *Laboratory of Thermodynamics, Combustion and Environmental Engineering* – LTZOI

Laboratorij za toplotne stroje in tehniške meritve | *Laboratory for Thermal Machines and Technical Measurements* – LTSTM

Laboratorij za turbinske stroje | *Turbomachinery Laboratory* – LTS

Center za senzorsko tehniko | – CST

Katedra za konstruiranje in oblikovanje | Chair for Construction and Design – KKO

Laboratorij za integriran razvoj izdelkov in CAD | *Integrated Product Development and CAD Lab* – IPD-CAD Lab.

Laboratorij za inženirsko oblikovanje | *Laboratory of Engineering Design* – LIO

Laboratorij za strojne elemente in konstrukcije | *Laboratory of Mechanical Elements and Structures* – LSEK

Laboratorij za transportne naprave, sisteme in logistiko | *Laboratory of Transportation Equipment, Systems and Logistics* – LTN

Laboratorij za varjenje | *Welding Laboratory* – LAVAR

Laboratorij za vrednotenje konstrukcij | *Laboratory for Structural Evaluation* – LAVKON

Laboratorij za zahtevne inženirske simulacije in eksperimentiranje | *Laboratory for Advanced Engineering Simulation and Experimentation* – LACE-X

Katedra za materiale in preoblikovanje | Chair for Materials and Transformation – KMP

Laboratorij za materiale | *Materials Laboratory* – LM

Laboratorij za preoblikovanje materialov | *Laboratory for Material Transformation* – LPM

Univerzitetni center za elektronsko mikroskopijo | *University Centre for Electron Microscopy* – UCEM

Katedra za mehaniko | Chair for Mechanics – KM

Laboratorij za aplikativno mehaniko | *Laboratory of Applied Mechanics* – LAM

Katedra za proizvodno strojništvo | Chair for Production Engineering – KPS

Laboratorij za dodajalno izdelavo | *Laboratory for Additive Manufacturing* – LDI

Laboratorij za inteligentne obdelovalne sisteme | *Laboratory for Intelligent Machining Systems* – LIOS

Laboratorij za mehatroniko | *Laboratory of Mechatronics* – LAMEH

Laboratorij za načrtovanje proizvodnih sistemov | *Laboratory for the Design of Production Systems* – LANPS

Laboratorij za odrezavanje | *Laboratory for Cutting Off* – LABOD

Laboratorij za oljno hidravliko | *Laboratory of Oil Hydraulics* – LaOH

Laboratorij za prilagodljive obdelovalne sisteme | *Laboratory for Flexible Processing Systems* – LaPOS

Laboratorij za robotizacijo | *Laboratory for Robotics* – LaRo

Laboratorij za simulacije diskretnih sistemov | *Laboratory for Simulation of Discrete Systems* – LASDIS

Laboratorij za tehnološke meritve | *Laboratory of Technological Measurements* – LTM

Katedra za tekstilne materiale in oblikovanje | Chair for Textile Materials and Design – KTMO

Laboratorij za barvanje, barvno metriko in ekologijo plemenitenja | *Laboratory of Staining, Colour Metrics and Breeding Ecology* – LBBE

Laboratorij za kemijo in okoljevarstvo | *Laboratory of Chemistry and Environmental Science* – LKO

Laboratorij za obdelavo in preizkušanje polimernih materialov | *Laboratory for Processing and Testing of Polymeric Materials* – LOPPM

Laboratorij za oblačilno inženirstvo, fiziologijo in konstrukcijo oblačil | *Laboratory of Apparel Engineering, Physiology and Construction* – LOIFKO

Laboratorij za projektiranje in konstrukcijo tekstilij | *Laboratory for Textile Design and Construction* – LPKT

Laboratorij za tiskanje tekstilij in nego oblačil | *Textile Printing and Garment Care Laboratory* – LTTNO

Center za barvanje in barve | *Centre for Dyeing and Painting* – CBB

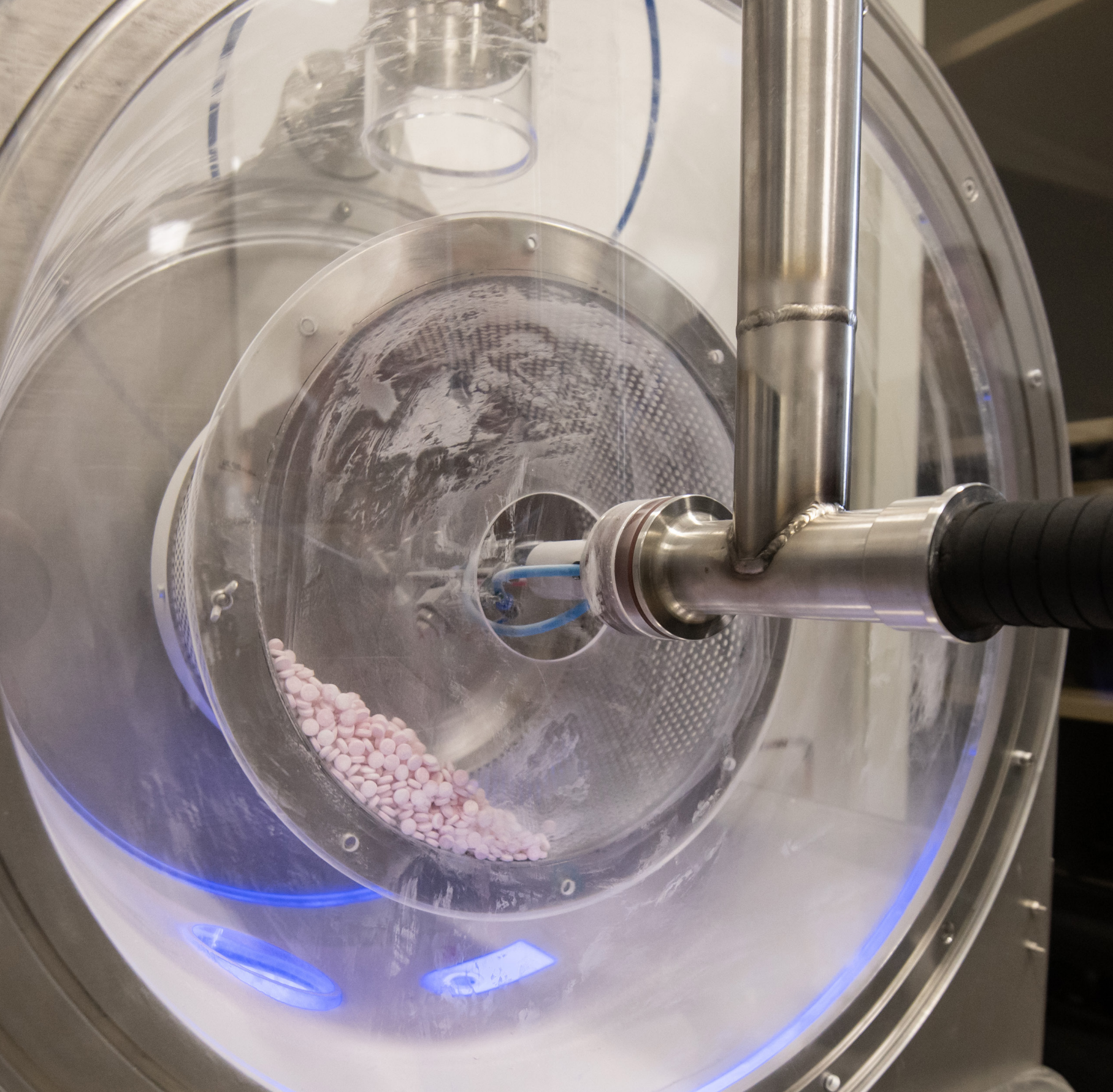
Center za nego tekstilij in oblačil | *Centre for Textile and Clothing Care* – CNTO

Raziskovalno inovacijski center za design in oblačilno inženirstvo | *Research Innovation Centre for Design and Clothing Engineering* – RICDOI

Katedra za temeljne in splošne predmete | Chair for Basic and General Subjects – KTSP

Laboratorij za fiziko | *Laboratory of Physics* – LaF

Laboratorij za matematiko | *Laboratory of Mathematics* – LaM



Katedra za energetska, procesna in okoljska inženirstvo

Chair of Power, Process and Environmental Engineering

Predstojnik katedre | Head of the Chair: red. prof. dr. Matjaž Hriberšek

Laboratorij za energetske sisteme in naprave

Laboratory for Power Systems and Devices

Vodja laboratorija | Head of the Laboratory: **red. prof. dr. Jure Marn**

Laboratorij deluje na področju prenosnih pojavov, kot sta prenos toplote in procesnih pojavov ter uparjanje in kondenzacija, in na področju energetike na splošno. Odlična kadrovska zasedba laboratorija omogoča odlično znanstvenoraziskovalno in razvojno delo na področju načrtovanja in izvedbe energetskih sistemov oziroma posameznih naprav na področju energetike ter na področju določevanja udobja, ogrevanja in hlajenja oziroma na HVAC-sistemih in na področju smotrne rabe energije ter določevanja varnosti in zanesljivosti energetskih sistemov in naprav. V zadnjem času posegamo tudi na področje medicine, še posebej pri prenosu toplote in termoregulacije ter pri uporabi dinamične termografije za diagnosticiranje različnih obolenj. Cilj naših raziskav je nadaljnji razvoj energetskih sistemov in naprav z večjo učinkovitostjo ter natančnostjo in občutljivostjo na področju medicine, kot sta termoregulacija človeka in dinamična termografija, saj le tako lahko pridemo do parametrov opazovanega sistema. Imamo ekspertna znanja in orodja za izvedbo teoretičnih, analitičnih, numeričnih in eksperimentalnih študij s poudarkom na analizi prenosnih pojavov, kot je prenos toplote in energije, ki jih lahko apliciramo na različne sisteme, kot so energetske naprave, in tudi na človeka.

The laboratory works in the field of Transport Phenomena, such as heat transfer and process phenomena, evaporation and condensation, and in the energy field in general. The excellent staffing of the laboratory allows for excellent scientific research and development work in the design and implementation of energy systems or individual installations in the field of Energy, and in the determination of comfort, heating and cooling or HVAC systems, and in the field of Energy Efficiency and the determination of the safety and reliability of energy systems and installations. More recently, we have also been making inroads into the medical field, in particular, in heat transfer and thermoregulation, and in the use of dynamic thermography for the diagnosis of various diseases. The aim of our research is to develop energy systems and devices further, with greater efficiency, accuracy and sensitivity in the medical field, such as human thermoregulation and dynamic thermography, as this is the only way to access the parameters of the system being monitored. We have the expertise and tools to carry out theoretical, analytical, numerical and experimental studies, with a focus on the analysis of transport phenomena such as heat and energy transfer, which can be applied to different systems, such as energy devices and also to humans.

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RFLIR A655SC termokamera
FLIR A655SC thermocamera

Laboratorij za motorje z notranjim zgorevanjem

Laboratory for Engine Research

Vodja laboratorija | Head of the Laboratory: **red. prof. dr. Aleš Hribernik**

Člani laboratorija izvajajo eksperimentalne in računalniško podprte raziskave toka snovi ter preobrazbe energije v motorjih z notranjim zgorevanjem, ki so ključni deli sistemov za pridobivanje električne energije in toplote. Posebna pozornost je namenjena raziskovanju pridobivanja alternativnih goriv iz odpadne plastike ter njihovi uporabi za pogon motorjev, s poudarkom na vplivu procesa vbrizgavanja goriva in tvorbi škodljivih emisij. Laboratorij ima lastno opremo za računalniško podprte meritve temperature, tlaka, pomika in pretoka snovi v različnih obratovalnih pogojih, pri čemer aktivno razvijamo tehnologije za zajemanje, obdelavo podatkov ter krmiljenje in regulacijo osnovnih parametrov procesov.

Members of the laboratory carry out experimental and computer-based research on the flow of matter and energy transformation in internal combustion engines, which are key components of power and heat generation systems. Particular attention is paid to research on the production of alternative fuels from waste plastics and their use for engine propulsion, focusing on the impact of the fuel injection process and the generation of harmful emissions. The laboratory has its own equipment for computer-based measurements of temperature, pressure, displacement and material flow under different operating conditions, and we are developing technologies actively for data acquisition, data processing, and the control and regulation of the basic parameters of the processes.

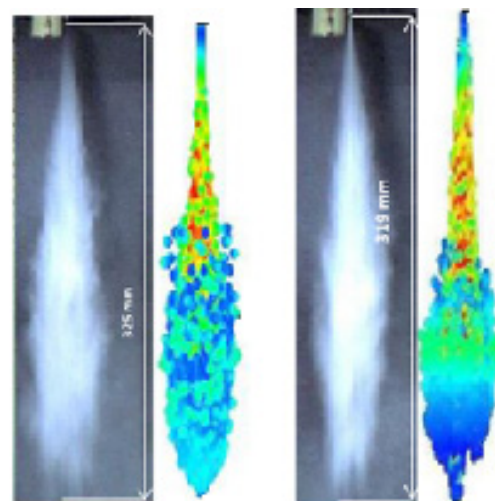
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Preskuševališče za visokotlačne vbrizgalne sisteme
Testing facility for high pressure injection systems



Preskuševališče za motorje z notranjim zgorevanjem
Testing ground for internal combustion engines



Eksperimentalni in numerični rezultati analize strukture curka
Experimental and numerical results of jet structure analysis

Laboratorij za prenosne pojave v tekočinah in trdninah

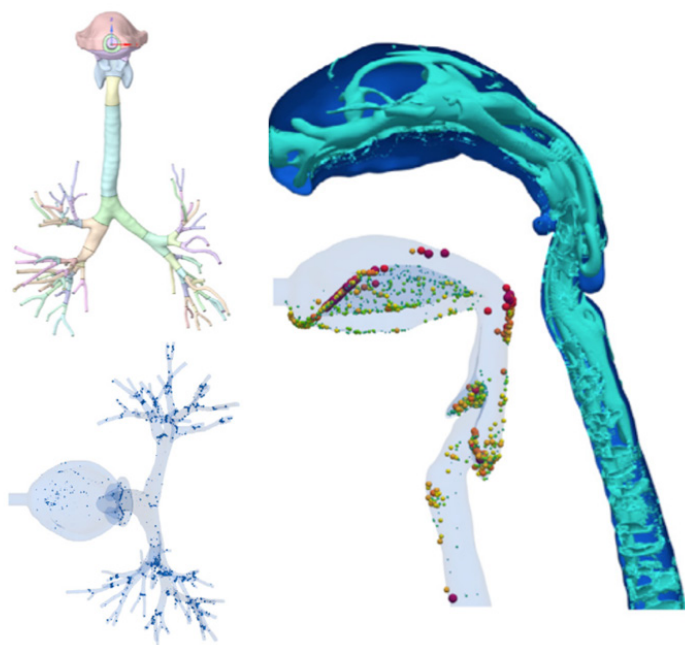
Laboratory for Transport Phenomena in Solid and Liquids

Vodja laboratorija | Head of the Laboratory: **red. prof. dr. Jure Ravnik**

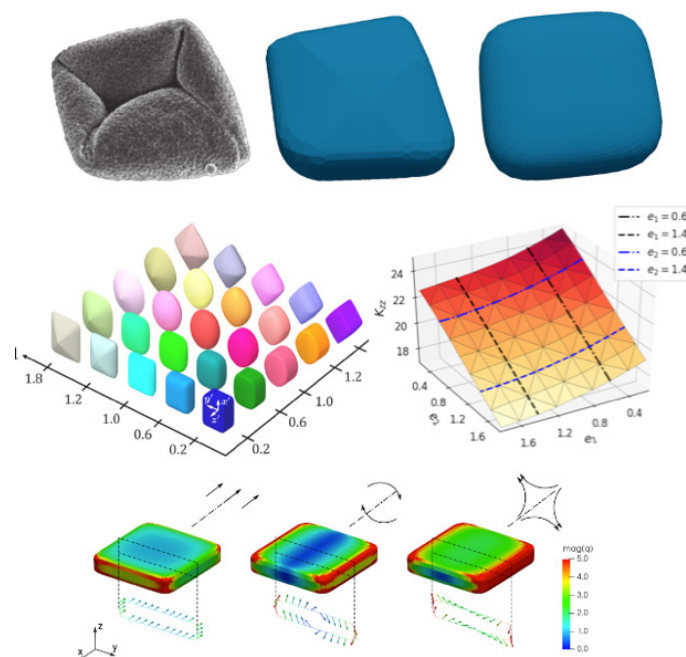
Laboratorij za prenosne pojave v trdninah in tekočinah deluje na FS UM. Ukvarjamo se z raziskovanjem narave pojavov, ki zajemajo prenos energije, snovi in gibalne količine. Znanja uporabljamo za načrtovanje in izvedbo rešitev na področju energetskega, procesnega in okoljskega inženirstva. Jedro našega dela zavzema razvoj numeričnih modelov in simulacijskih orodij za širše področje računske dinamike tekočin. Razvijamo lastne rešitve in hkrati nadgrajujemo in modificiramo komercialna ali odprtokodna orodja z namenom doseganja visoko natančnih in izredno zmogljivih simulacij na področju prenosnih pojavov. Okolju ponujamo razvoj uporabniku prilagojenih matematično fizikalnih modelov na področju procesnega in okoljskega inženirstva, po meri nadgradnjo komercialne ali odprtokodne programske opreme za simulacije v procesnem in okoljskem inženirstvu, šolanje na področju uporabe računske dinamike tekočin, učinkovite rabe visokozmogljive računalniške opreme in učinkovitega ter avtomatiziranega vrednotenja rezultatov simulacij in eksperimentalnih meritev ter izvajanje simulacij in optimizacijo inženirskih rešitev na področju energetskega, procesnega in okoljskega inženirstva.

The Laboratory for Transport Phenomena in Solid and Liquids is located at the FME UM. We do research in the field of Transport Phenomena – the transport of momentum, mass and energy. We use our knowledge to design and implement solutions in the fields of Energy, Process and Environmental Engineering. The core of our work is the development of numerical models and simulation tools for the broader field of Computational Fluid Dynamics. We develop our own solutions, as well as upgrade and modify commercial or open-source tools, to achieve highly accurate and extremely powerful simulations in the field of Transport Phenomena. We offer the development of customised mathematical and physical models in the field of Process and Environmental Engineering, the customised upgrade of commercial or open-source simulation software in Process and Environmental Engineering, training in the use of Computational Fluid Dynamics, efficient use of high-performance computing and effective and automated evaluation of simulation results and experimental measurements, and the simulation and optimisation of engineering solutions in the fields of Energy and Process and Environmental Engineering.

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Raziskave obnašanja vdihnenih kapljic v človeških dihalnih poteh
Investigations into the behaviour of inhaled droplets in the human airways



Model upora za delce nesferičnih oblik v večfaznih tokovih
A drag model for non-spherical particles in multiphase flows

Laboratorij za procesno inženirstvo in računalniško dinamiko tekočin

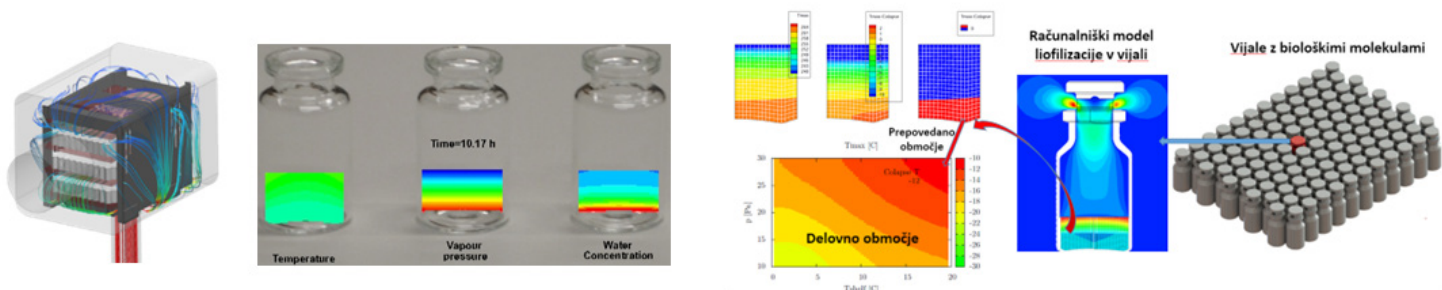
Laboratory for Process Engineering and Computational Fluid Dynamics

Vodja laboratorija | Head of the Laboratory: **red. prof. dr. Matjaž Hriberšek**

Raziskovalci in razvojni inženirji imajo pogosto zgolj približno predstavbo, kateri deli naprave niso optimalni, vendar natančno ne vedo, zakaj je tako. V takšnih primerih lahko računalniška simulacija delovanja naprave razkrije vzroke za pomanjkljivosti, kar omogoča inženirjem, da že med razvojem naprave identificirajo te pomanjkljivosti in jih odpravijo ali izboljšajo delovanje naprave. Zlasti pri napravah, ki delujejo s tekočinami (plini ali kapljevinami), je optimiranje s klasičnimi inženirskimi pristopi, kot so dimenzijska analiza in eksperimenti na modelih, zelo omejeno uporabno, kar poudarja pomembnost računalniške simulacije pri razvoju teh sistemov. Področje razvoja računalniških metod za simulacijo toka tekočin ter prenosa toplote in snovi v večfaznih sistemih, ki zaznamuje dogajanje v večini procesnih naprav, je tako osrednje področje raziskovalnega dela laboratorija. Z napredovanjem računalniške moči dostopnih računalniških sistemov se raziskovalno delo v vse večji meri prekriva z razvojnim in raziskovalnim delom za mednarodna podjetja in za slovensko industrijo, ki vse bolj spoznava dodano vrednost takšnih rešitev. Izmed številnih primerov dobre prakse izpostavljamo razvoj modela sublimacijskega sušenja, ki je osnova razvitega digitalnega dvojčka liofilizatorja za uporabo v farmaciji, model mašenja in obremenitve mikrofiltracijske membrane za izvedbo sterilne filtracije, model razpršilnega sušenja ter razvoj naprednih modelov za analizo toplotne in snovne (vlaga) obremenitve modernih avtomobilskih svetil. Razvoj računalniških modelov podpiramo tudi z validacijo v modernem eksperimentalnem laboratoriju, opremljenem tudi s pomočjo številnih, še posebej pomurskih podjetij.

Researchers and development engineers often have a rough idea of which parts of a device are sub-optimal, but they don't know exactly why. In such cases, computer simulation of the device's performance can reveal the causes of the deficiencies, allowing engineers to identify these deficiencies early in the development of the device and correct or improve the device's performance. In particular, for devices operating with liquids (gases or liquids), optimisation by classical engineering approaches such as dimensional analysis and model experiments is of very limited use, which underlines the importance of computer simulation in the development of these systems. The development of computational methods for the simulation of fluid flow and heat and material transfer in multiphase systems, which is a feature of most process plants, is, therefore, a central area of the Laboratory's research work. With the advancement of the computing power of available computer systems, research work is overlapping increasingly with development and research work for international companies and for Slovenian industry, which is, increasingly, realising the added value of such solutions. Among the many examples of good practice, we highlight the development of a sublimation drying model, which is the basis of a digital twin lyophiliser developed for pharmaceutical applications, a microfiltration membrane lubrication and loading model for sterile filtration, a spray drying model, and the development of advanced models for the analysis of the thermal and material (moisture) load of modern automotive lamps. The development of the computer models is also supported by validation in a modern experimental laboratory, also equipped with the help of a number of companies, especially from the Pomurje region.

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Razvoj digitalnega dvojčka procesa liofilizacije za uporabo v farmacevtski industriji
Development of a digital twin of the lyophilisation process for use in the Pharmaceutical industry

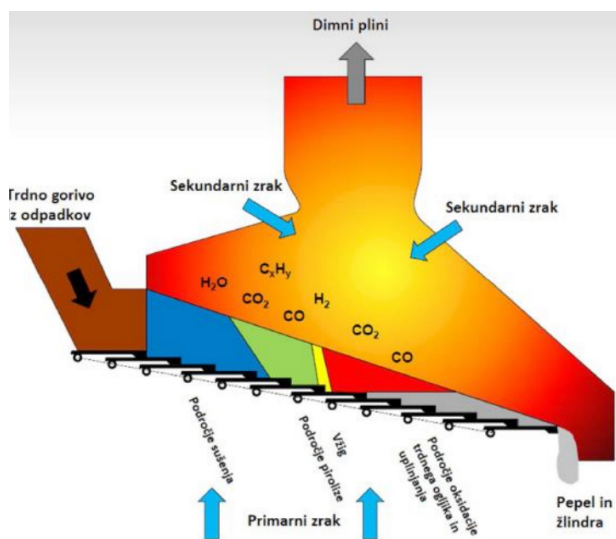
Laboratorij za termodinamiko, zgorevanje in okoljsko inženirstvo

Laboratory for Thermodynamics, Combustion and Environmental Engineering

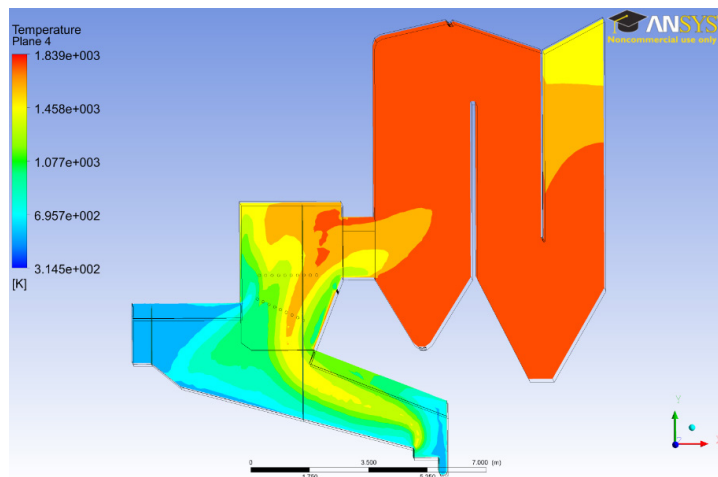
Vodja laboratorija | Head of the Laboratory: **red. prof. dr. Niko Samec**

Modeliranje, kontrola in preprečevanje vplivov industrijskih in komunalnih onesnaževanj na okolje so pomembne vsebine okoljevarstvenega inženirstva. Na to področje spadajo tudi problemi uporabe novih in alternativnih goriv ter racionalna izraba obstoječih goriv predvsem s stališča povečanja učinkovitosti zgorevanja in zmanjševanja nastajanja škodljivih snovi. Velik del raziskav predstavljata numerično modeliranje in simulacija procesov zgorevanja. Področje uporabe sega v vse vrste industrijskih panog, kjer se pojavljajo problemi z odpadnimi snovmi, ter na področje komunalnih odpadkov, njihovega shranjevanja in okolju neškodljivega uničevanja oziroma recikliranja. Raziskave so pomembne za ohranjanje okolja in zdravja ljudi ter omogočajo trajnostno rabo naravnih virov in zmanjšanje negativnih vplivov industrijskih dejavnosti na okolje.

Modelling, control and prevention of the environmental impacts of industrial and municipal pollution are important topics in Environmental Engineering. This area also includes the problems of the use of new and alternative fuels and the rational use of existing fuels, particularly from the point of view of increasing combustion efficiency and reducing the production of harmful substances. Numerical modelling and simulation of combustion processes form a large part of the research. The scope of application extends to all types of industries where waste material problems arise, as well as to municipal waste, its storage and environmentally sound disposal or recycling. Research is important for the preservation of the environment and human health, enabling the sustainable use of natural resources, and reducing the negative environmental impacts of industrial activities.



Zgorevalni prostor kurilne naprave za goriva iz odpadkov
Combustion chamber of a combustion plant for fuels from waste



Primer numerične simulacije zgorevanja trdnega goriva iz odpadkov
Example of numerical simulation of solid fuel combustion from waste

Laboratorij za toplotne stroje in tehniške meritve

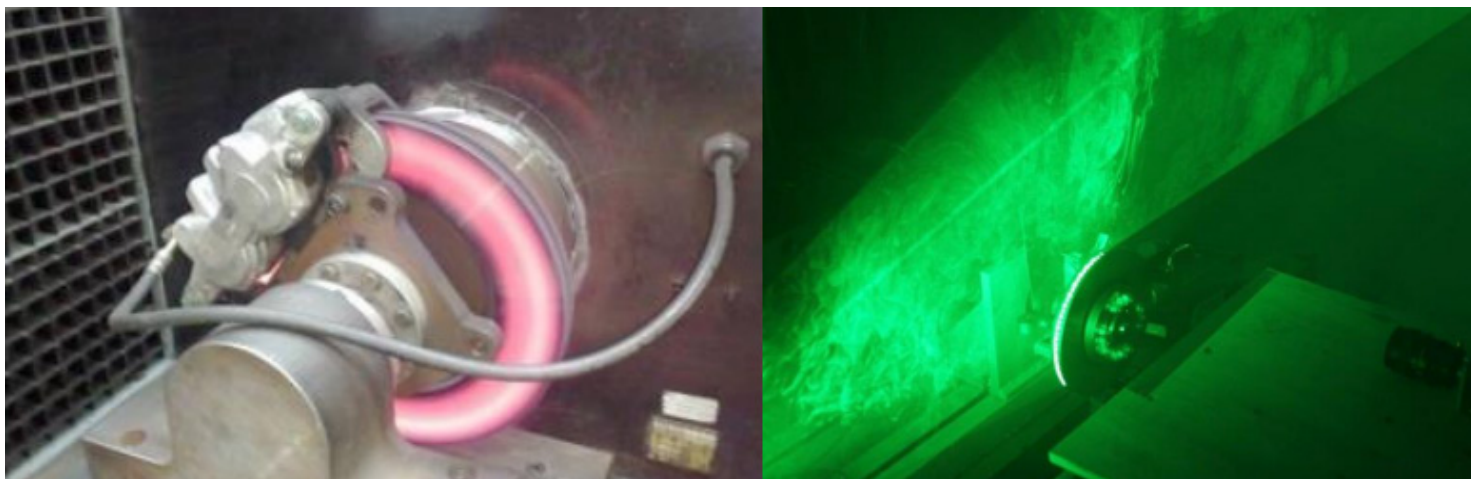
Laboratory for Heat Engines and Engineering Measurements

Vodja laboratorija | Head of the Laboratory: **red. prof. dr. Aleš Hribernik**

Laboratorij izvaja eksperimentalne in računalniško podprte raziskave pretoka snovi ter preobrazbe energije v toplotnih strojih, ki so ključni deli sistemov za proizvodnjo električne in toplotne energije v termoelektrarnah ter sodobnih kogeneracijskih in trigeneracijskih modulskih postrojih. Naš pristop k raziskavam vključuje celovit pregled pretoka snovi med različnimi komponentami, kot so turbine, kompresorji in motorji z notranjim zgorevanjem, ter podrobno analizo procesov v posameznih sklopih. Z integralnim pristopom se rešuje pretok snovi med različnimi komponentami, kot so turbine, kompresorji in motorji z notranjim zgorevanjem, medtem ko se z diferencialnim pristopom podrobneje analizirajo procesi v posameznih sklopih. Poseben poudarek je na raziskavah obratovalnih lastnosti plinskih turbostrojcev ter uporabi za tlačno polnjenje motorjev z notranjim zgorevanjem.

The laboratory carries out experimental and computer-based research on material flow and energy transformation in heat engines, which are key components of power and heat generation systems in thermal power plants and modern cogeneration and trigeneration modular plants. Our research approach includes a comprehensive overview of the material flow between different components, such as turbines, compressors and internal combustion engines, and a detailed analysis of the processes in each assembly. The integral approach addresses the material flow between different components, such as turbines, compressors and internal combustion engines, while the differential approach analyses the processes in the individual assemblies in more detail. Particular emphasis is placed on the investigation of the operating characteristics of gas turbomachinery and the application to the supercharging of internal combustion engines.

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Snemanje hitrostnega polja v rotorskem kanalu avtomobilske zavore z metodo PIV
PIV recording of the velocity field in the rotor channel of a car brake

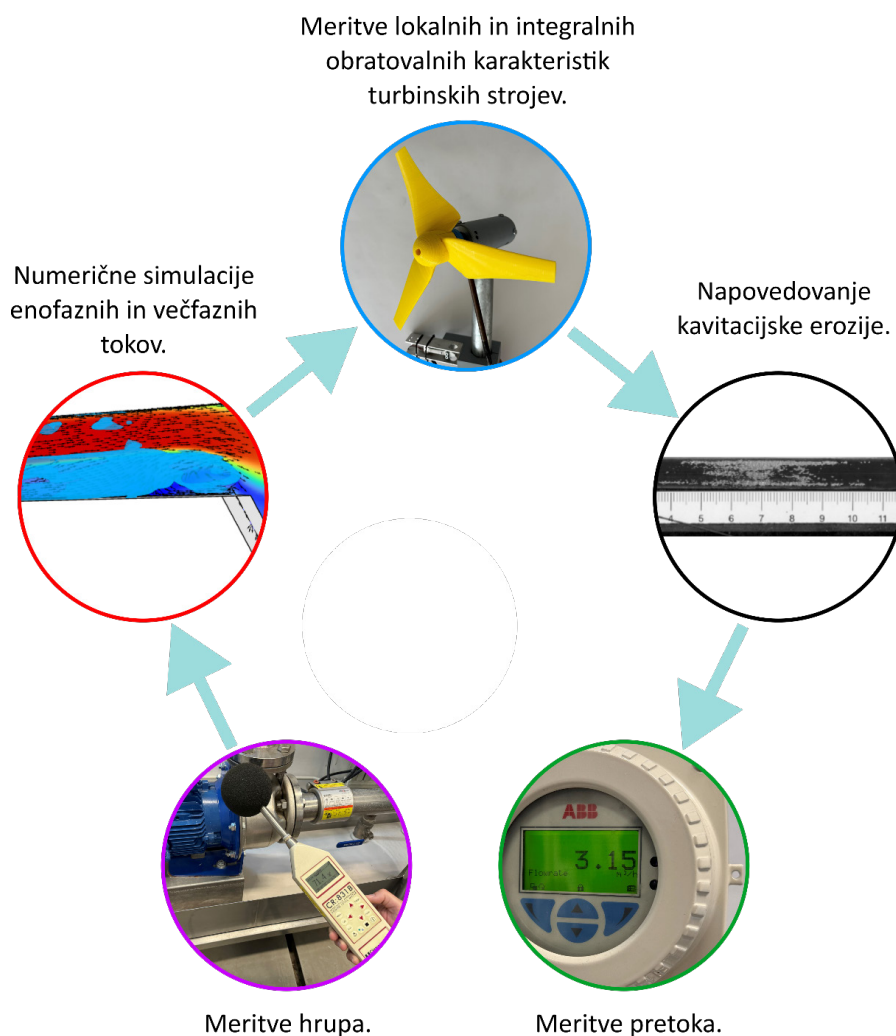
Laboratorij za turbinske stroje

Laboratory for Turbomachinery

Vodja laboratorija | Head of the Laboratory: **izr. prof. dr. Ignacijo Biluš**

V laboratoriju izvajamo celovite numerične simulacije in laboratorijske eksperimente, ki se osredotočajo na analizo tokovnih pojavov na področju hidravličnih turbinskih strojev. Aktivno raziskujemo pojav kavitacije, kar zajema numerično in eksperimentalno napovedovanje kavitacijskih obratovalnih karakteristik in erozije v kombinaciji z abrazijo delcev. Naše raziskave vključujejo določanje integralnih obratovalnih karakteristik, analizo sekundarnih pojavov ter merjenje vibracij in hrupa v različnih režimih delovanja hidravličnih sistemov. Slednje je pomembno za izboljšanje učinkovitosti hidravličnih strojev, zmanjšanje stroškov obratovanja, povečanje zanesljivosti delovanja in razvoj trajnostnih energetskih sistemov.

The laboratory performs comprehensive numerical simulations and laboratory experiments focusing on the analysis of flow phenomena in the field of Hydraulic Turbomachinery. We are investigating the phenomenon of cavitation actively, which includes numerical and experimental prediction of cavitation operating characteristics and erosion in combination with particle abrasion. Our research includes the determination of integral operating characteristics, the analysis of secondary phenomena and the measurement of vibration and noise in different operating regimes of hydraulic systems. The latter is important, to improve the efficiency of hydraulic machines, reduce operating costs, increase operational reliability and develop sustainable energy systems.



Aktivnosti laboratorija
Laboratory activities

Center za senzorsko tehniko

Centre for Sensor Technique

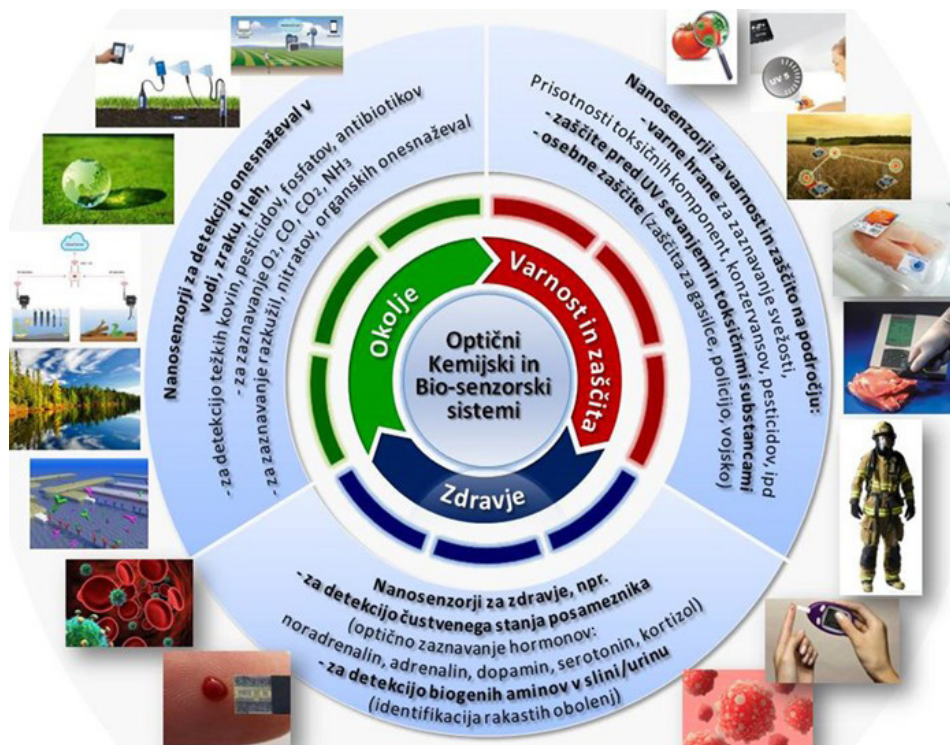
Vodja centra | Head of the Centre: **red. prof. dr. Aleksandra Lobnik**

Center za senzorsko tehniko (CST), ustanovljen leta 2001 na FS, se posveča varovanju okolja in zdravja ter opravlja standardizirane okoljske meritve. Specializiran je za razvoj novih metod in senzorjev za določanje ekoloških parametrov odpadnih voda in tehnoloških ter procesnih parametrov v različnih industrijskih sektorjih. Velik poudarek daje razvoju biosenzorjev, mikrosenzorjev in sol-gel nanomaterialov ter njihovi praktični uporabi. CST tudi aktivno sodeluje v prenosu znanja v industrijo preko seminarjev, tečajev ter sodelovanja v nacionalnih in evropskih razvojnih projektih. Organizira izobraževalne dogodke, kot so delavnice, konference in seminarji, med katerimi izstopa konferenca NANOAPP. Sodeluje z različnimi domačimi in mednarodnimi laboratoriji ter inštituti in je del Centra odličnosti za nanoznanost in nanotehnologije, NANOCENTER.

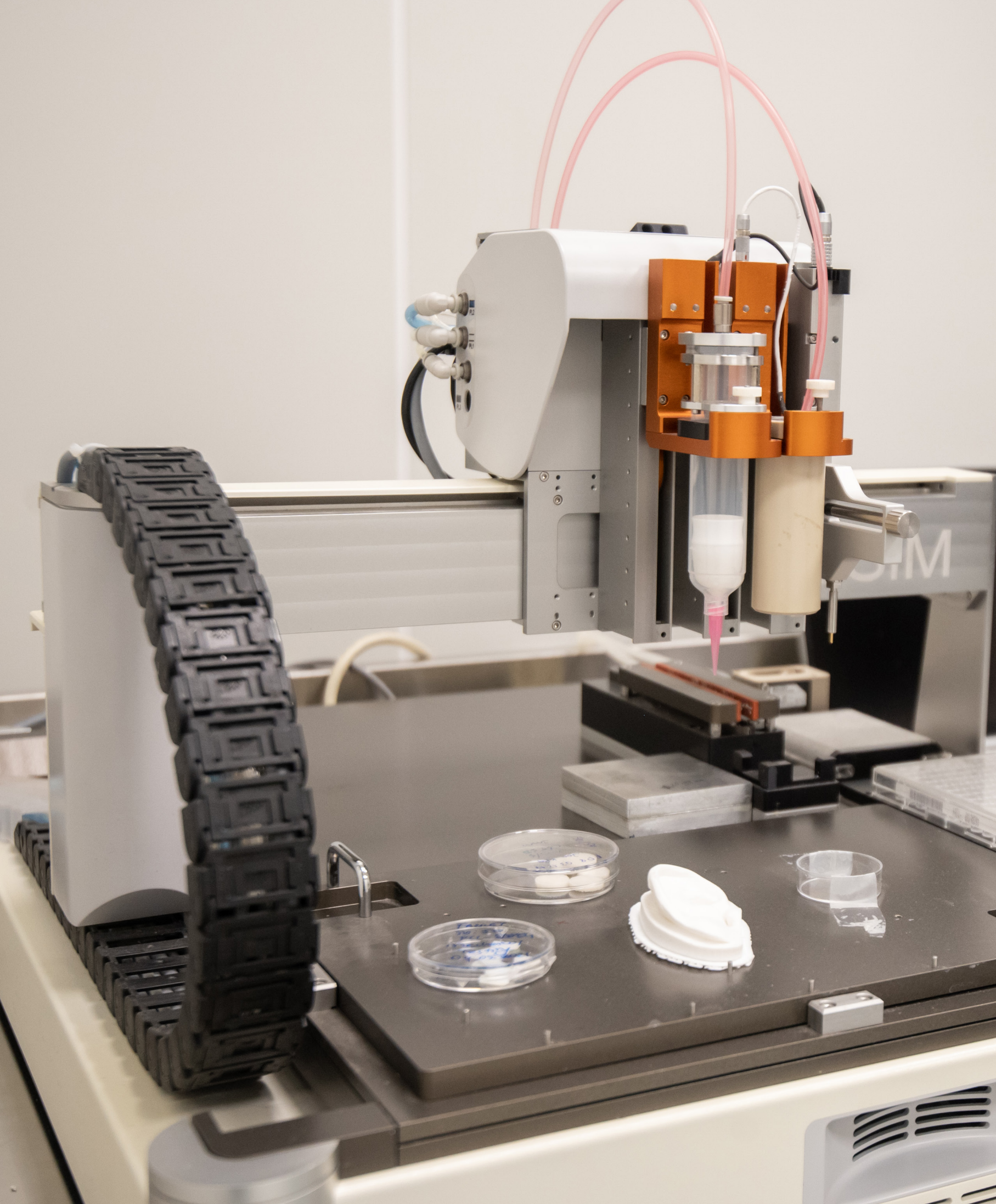
Dejavnosti Centra za senzorske tehnologije (CST) vključujejo področja recikliranja voda in odpadkov, razvoj optičnih kemijskih in biokemijskih senzorskih receptorjev ter razvoj nanomaterialov za okoljske in senzorske aplikacije. CST je kot soavtor prispeval k več kot 30 patentom in patentnih prijav, od katerih je 15 mednarodnih.

The Centre for Sensor Technique (CST), established in 2001 at the FME, focuses on environmental and health protection and standardised environmental measurements. It specialises in the development of new methods and sensors for the determination of the ecological parameters of wastewater and the technological and process parameters in various industrial sectors. A major focus is on the development of biosensors, microsensors and sol-gel nanomaterials and their practical applications. CST is also involved actively in the transfer of knowledge to industry through seminars, courses and participation in national and European development projects. It organises educational events, such as workshops, conferences and seminars, among which the NANOAPP conference stands out. It collaborates with various national and international laboratories and institutes, and is part of the Centre of Excellence for Nanoscience and Nanotechnologies, NANO-CENTER.

The activities of the Centre for Sensor Technique (CST) include water and waste recycling, the development of optical chemical and biochemical sensor receptors, and the development of nanomaterials for environmental and sensor applications. CST has contributed as a co-author to more than 30 patents and patent applications, 15 of which are international.



Področja razvoja senzorskih receptorjev
Fields of sensor receptor development





Katedra za konstruiranje in oblikovanje

Chair of Construction and Design

Predstojnik katedre | Head of the Chair: red. prof. dr. Bojan Dolšek

Laboratorij za integriran razvoj izdelkov in CAD

Laboratory for Integrated Product Development and CAD

Vodja laboratorija | Head of the Laboratory: **red. prof. dr. Bojan Dolšak**

Naš laboratorij združuje načela integriranega razvoja izdelkov in računalniško podprtega konstruiranja (CAD) z vizijo postati vodilno središče inovativnega raziskovanja ter izobraževanja na področju računalniško podprtega načrtovanja in celovitega razvoja izdelkov. Naši člani so strokovnjaki z različnih področij, kar nam omogoča optimizacijo razvojnega cikla izdelkov, zmanjševanje stroškov ter povečevanje funkcionalnosti, zmožljivosti in varnosti izdelkov. Sodelujemo z akademskimi in industrijskimi partnerji za premikanje meja na področju integriranega razvoja izdelkov in CAD. Pri svojem delu uporabljamo najnovejšo programsko opremo za razvoj, konstruiranje, oblikovanje, simulacije in testiranje izdelkov. Poleg tega imamo tudi napredno strojno opremo in vire za podporo procesu razvoja izdelkov, kot so 3D-skenerji in tiskalniki, ki omogočajo učinkovito vizualizacijo, analizo različnih rešitev in njihovo stalno izboljševanje.

Our laboratory combines the principles of integrated product development and computer-aided design (CAD) with a vision to become a leading centre for innovative research and education in computer-aided design and integrated product development. Our members are experts in a wide range of fields, enabling us to optimise the product development cycle, reduce costs and increase product functionality, performance and safety. We work with academic and industrial partners to push the boundaries in integrated product development and CAD. Our work uses the latest software for product development, design, engineering, design, simulation and testing. In addition, we have advanced hardware and resources to support the product development process, such as 3D scanners and printers, which enable efficient visualisation, analysis of different solutions and their continuous improvement.



Shematski prikaz uporabe integriranega razvojnega procesa za razvoj naslednje generacije 3D-natisnjenih nožnih protez
Schematic illustration of the use of an integrated development process to develop the next generation of 3D printed foot prostheses

Laboratorij za inženirsko oblikovanje

Laboratory for Product Design

Vodja laboratorija | Head of the Laboratory: **doc. dr. Jasmin Kaljun**

Interdisciplinarna znanja članov pokrivajo več področij industrijskega oblikovanja in oblikovanje izdelkov po meri, konceptno in ergonomsko oblikovanje, od konstruktivnega do evolutivnega s 3D-skenerjem, aplikacijami s 3D-tiskom in drugimi sorodnimi tehnologijami hitre izdelave. Na področju industrijskega oblikovanja sodelujemo z različnimi podjetji, za katera oblikujemo in modeliramo različne predmete, opravimo 3D-skeniranje, vzvratni inženiring in hitre izdelave prototipov za različne namene, kot so ohišja elektronskih naprav, plastična embalaža, platenke, projektiranje kalupov in orodij za platenke, oblikovanje karoserij za avtomobile in avtomobilske dele, kolesa, kuhinjske in sanitarne armature, arhitekturni prototipi, stoli, obutev in dodatki, inovativni pripomočki itd. Prav tako sodelujemo z muzeji, galerijami ter drugimi institucijami pri ohranjanju kulturne dediščine in pri virtualni prezentaciji 3D-objektov s pomočjo digitalizacije 3D-artefaktov, kot so kipi, reliefi in drugi tridimenzionalni objekti. Vpeti smo v projektnih skupinah znotraj podjetij pri razvoju novih izdelkov in pri pregledu merske kontrole velikih objektov.

The interdisciplinary skills of the members cover several areas of industrial and custom product design, concept and ergonomic design, from constructive to evolutionary, with 3D scanning, 3D printing applications and other related rapid manufacturing technologies. In the field of Industrial Design, we collaborate with various companies for which we design and model various objects, perform 3D scanning, reverse engineering and rapid prototyping for various applications, such as electronic device housings, plastic packaging, plastic bottles, mould and tool design for plastic bottles, body design for cars and car parts, bicycles, kitchen and sanitary fittings, architectural prototypes, chairs, footwear and accessories, innovative gadgets, etc. We also work with museums, galleries and other institutions in the preservation of cultural heritage, and in the virtual presentation of 3D objects through the digitisation of 3D artefacts such as statues, reliefs and other three-dimensional objects. We are involved in project teams within companies in the development of new products and in the dimensional control of large objects.

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Svetlobni šotor z vrtljivo mizo za 3D fotogrametrično digitalizacijo
Light tent with turntable for 3D photogrammetric digitisation



GOM Atos II 400 – 3D metrološki skener
GOM Atos II 400 - 3D metrology scanner

Laboratorij za strojne elemente in konstrukcije

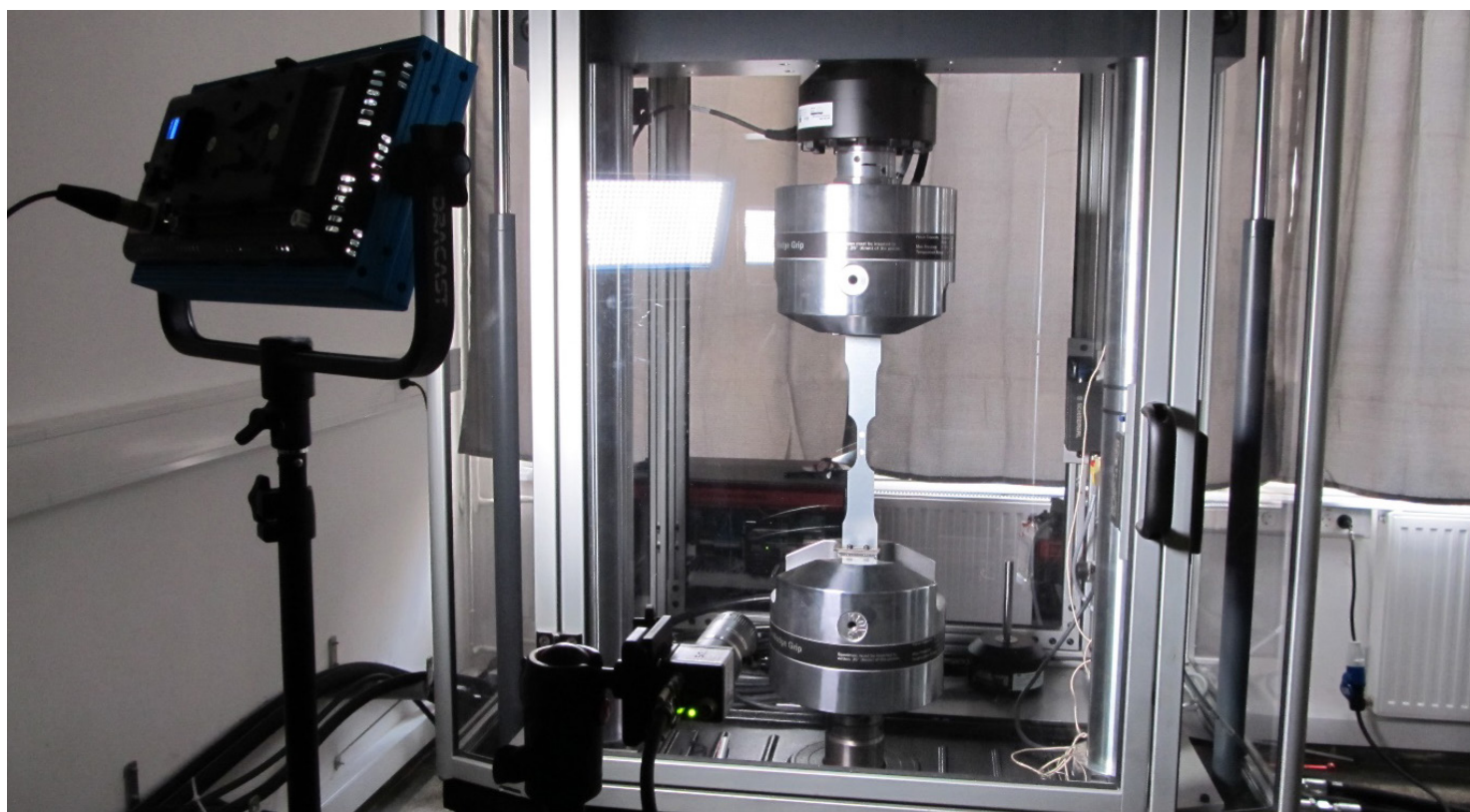
Laboratory for Machine Elements and Structures

Vodja laboratorija | Head of the Laboratory: **red. prof. dr. Nenad Gubelj**

Vrhunsko usposobljena kadrovska ekipa in najsodobnejša infrastruktura laboratorija omogočata izvedbo znanstvenih raziskav ter razvojnega in strokovnega dela na področju karakterizacije mehanskih lastnosti ter napetostno-deformacijskega obnašanja strojnih elementov, konstrukcijskih komponent in naprav. Med široko paleto ciljev posebej izpostavljamo razvoj novih eksperimentalnih metod za spremljanje degradacije materiala in določanje mejnih stanj komponent. S tem želimo razviti konstrukcijske komponente z izboljšano statično in dinamično lomno odpornostjo ter zagotoviti varno obratovanje ključnih konstrukcijskih sistemov ob mejnih obremenitvah. Pri doseganju zastavljenih ciljev se opiramo na numerične trdnostne analize heterogenih materialov ter razvijamo metode in sisteme za spremljanje in diagnostiko stanja materiala konstrukcij. To predstavlja povratno zanko v sistemu strojnega učenja in prenosa umetne inteligence na stroje in naprave. Poleg tega laboratorij gradi in vzpostavlja različne nadzorne sisteme za zgodnjo diagnostiko degradacije stanja materiala konstrukcijskih komponent ter razvija eksperimentalne metode in postopke za verifikacijo in analizo teoretičnih in numeričnih rezultatov.

The laboratory's highly qualified staff and state-of-the-art infrastructure enable it to carry out scientific research, development and professional work in the field of the Characterisation of mechanical properties and stress-strain behaviour of mechanical elements, structural components and devices. Among a wide range of objectives, we highlight particularly the development of new experimental methods for monitoring material degradation and determining the loading limit of components. This aims to develop structural components with improved static and dynamic fracture resistance, and to ensure the safe operation of key structural systems under ultimate loads. To achieve our objectives, we rely on numerical strength analyses of heterogeneous materials, and develop methods and systems for monitoring and diagnosing the material conditions of structures. This represents a feedback loop in the machine learning system, and the transfer of Artificial Intelligence to machines and devices. In addition, the laboratory builds and establishes various monitoring systems for early diagnosis of material degradation of structural components due to dynamic loading, and develops experimental methods and procedures for verification and analysis of the theoretical and numerical results.

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Optična meritev raztegovanja nateznega preizkušanca na servohidravličnem stroju
Optical measurement of tensile elongation of a test sample on a servo-hydraulic machine

Laboratorij za transportne naprave, sisteme in logistiko

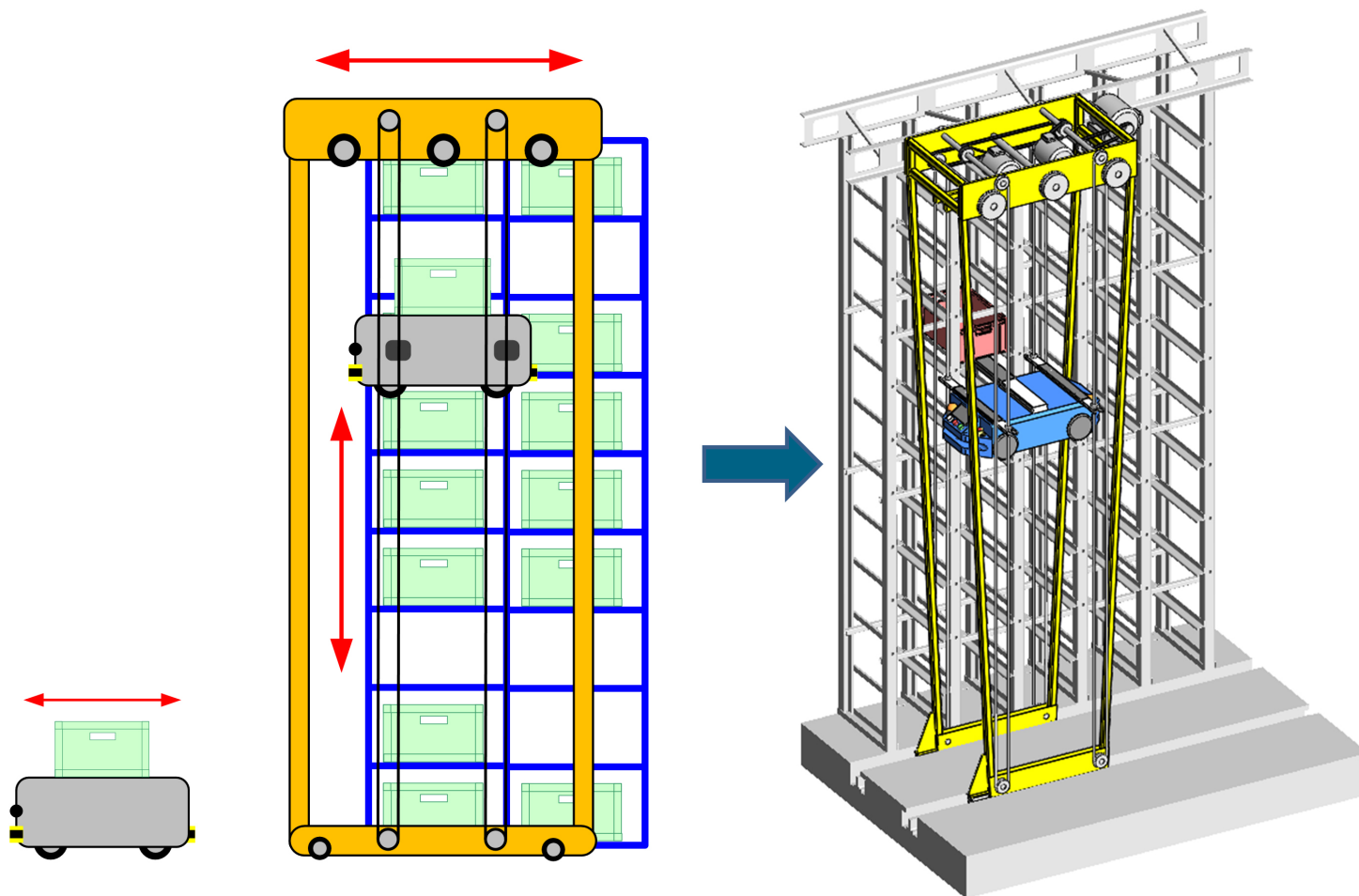
Laboratory for Materials Handling Systems and Logistics

Vodja laboratorija | Head of the Laboratory: **red. prof. dr. Tone Lerher**

Laboratorij za transportne naprave, sisteme in logistiko (LTN) deluje na področju razvoja in konstruiranja transportnih in dvižnih naprav ter skladiščno-komisionirnih sistemov. Težišče temeljnega raziskovalnega dela laboratorija LTN obsega razvoj sodobnih analitičnih in numeričnih modelov za analize in optimiranje transportnih, dvižnih, mobilnih robotskih in skladiščno-komisionirnih sistemov. Industrijske (aplikativne) raziskave so usmerjene v razvoj in konstruiranje prototipov transportne in dvižne tehnike, skladiščno-komisionirnih sistemov, logistične analize toka materiala v intralogistiki, uporabo senzorskih sistemov ter identifikacija in sledenje logističnim procesom. Pri svojem delu uporabljamo sodobne standarde in tehnične predpise ter specialna računalniško podprta orodja, ki omogočajo razvoj, modeliranje, simulacije, optimiranje in analizo transportne in dvižne tehnike ter skladiščno-komisionirnih sistemov.

The Laboratory for Material Handling Systems and Logistics (LTN) operates in the field of the development and construction of transport and lifting devices, along with warehouse order-picking systems. The focus of the basic research work of the LTN laboratory includes the development of modern analytical and numerical models for the analysis and optimisation of transport, lifting, mobile robotic and warehouse order-picking systems. The industrial (applied) research is focused on the development and construction of prototypes of transport and lifting technology, warehouse order-picking systems, logistic analysis of material flow in intralogistics, the use of sensor systems and the identification and tracking of logistics processes. In our work, we use modern Standards and Technical Regulations, as well as special computer-aided tools that enable the development, modelling, simulation, optimisation and analysis of transport and lifting technology, and warehouse order-picking systems.

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Zasnova novega koncepta regalnega skladišča zabojčkov z uporabo mobilnega dvižnega mehanizma za AGV-je
Design of a new racked container storage concept using a mobile lifting mechanism for AGVs

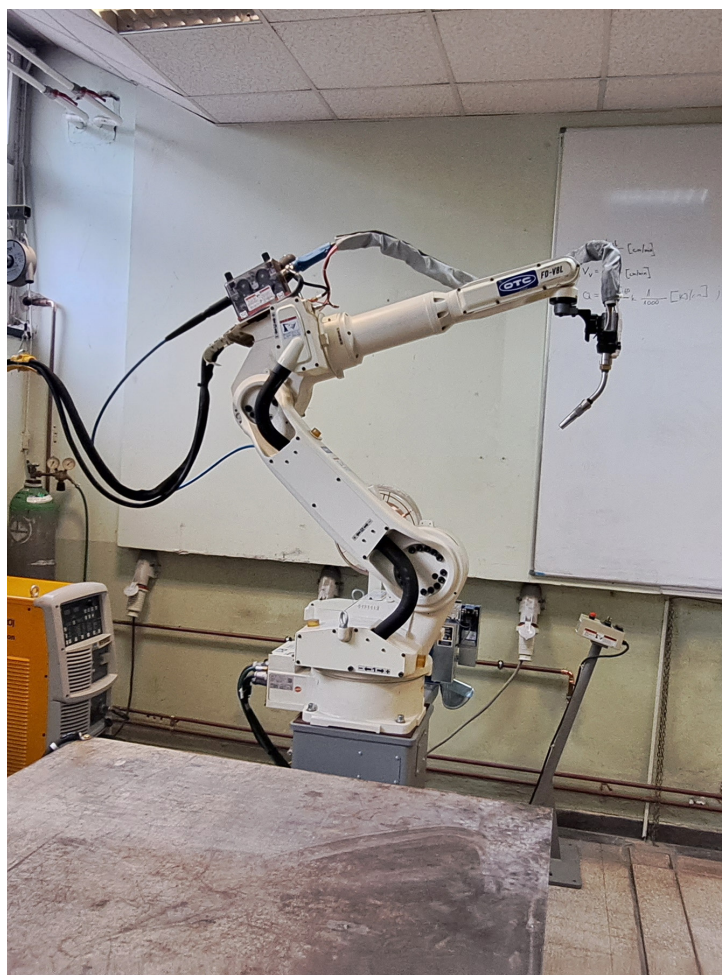
Laboratorij za varjenje

Laboratory for Welding

Vodja laboratorija | Head of the Laboratory: **doc. dr. Tomaž Vuherer**

V laboratoriju disponiramo z odlično raziskovalno opremo ter posebnim znanjem na področju testiranja materialov in zvarnih spojev, kar nam omogoča izvedbo znanstvenih raziskav ter razvojnih aktivnosti na področjih zvarov, materialov in tehnologij varjenja. Naš temeljni fokus je na karakterizaciji zvarov in spojev, zlasti kovinskih, polimernih in kompozitnih materialov. Cilji naših raziskav so oblikovanje in optimizacija varilnih tehnologij ter doseganje želenih mehanskih, tehnoloških in metalurških lastnosti zvarjenih in spojenih materialov skozi celotno življenjsko dobo zvarnega spoja. Naš laboratorij je specializiran za izvajanje različnih mehanskih preizkusov, mehaniko loma, utrujanje materialov in analizo rasti razpoke, kar potrjuje naša odlična ekspertiza na področju preizkušanja materiala in zvarnih spojev.

The laboratory has excellent research equipment and special expertise in materials and weld joint testing, enabling us to carry out scientific research and development activities in the fields of Welds, Materials and Welding Technologies. Our core focus is on the characterisation of welds and joints, in particular, metallic, polymeric and composite materials. The objectives of our research are to design and optimise welding technologies and to achieve the desired mechanical, technological and metallurgical properties of welded and joined materials throughout the lifetime of the welded joint. Our laboratory is specialised in carrying out various mechanical tests, fracture mechanics, fatigue of materials and crack growth analysis, as confirmed by our excellent expertise in material and weld joint testing.



Robotska celica za varjenje z novim robotom
Robotic welding cell with a new robot



Meritve zaostalih napetosti z metodo vrtnja izvrtine na zvarnem spoju, obdelanem z eksplozijo
Measurement of residual stresses by drilling a hole on an explosion-treated weld joint

Laboratorij za vrednotenje konstrukcij

Laboratory for Structural Evaluation

Vodja laboratorija | Head of the Laboratory: **red. prof. dr. Srečko Glodež**

Dobro opremljen laboratorij omogoča raziskovalno in strokovno dejavnost na različnih področjih, ki se pretežno nanašajo na dimenzioniranje dinamično obremenjenih strojnih delov in konstrukcij v povezavi z visokocikličnim utrujanjem (HCF), malocikličnim utrujanjem (LCF) in mehaniko loma. Poleg tega se osredotočamo na različne numerične analize po metodi končnih elementov, strojne elemente, gonila (predvsem zobniška gonila) ter probleme s področij vibracij in hrupa. Poleg temeljnih raziskav izvajamo tudi aplikativne (strokovne) projekte za industrijo z različnimi partnerji doma in v tujini.

The well-equipped laboratory facilitates research and professional activities in various fields, related mainly to the dimensioning of dynamically loaded machine parts and structures in connection with high-cycle fatigue (HCF), low-cycle fatigue (LCF) and fracture mechanics. In addition, we focus on various numerical finite element analyses, machine elements, actuators (especially gear drives) and problems in the areas of vibration and noise. In addition to fundamental research, we also carry out applied (technical) projects for industry with various partners at home and abroad.

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Visokofrekvenčni pulzator Zwick/Roel Vibrophore 100
High frequency pulsator Zwick/Roel Vibrophore 100



Elektrodinamični stroj Zwick/Roel LTM 3
Electrodynamic machine Zwick/Roel LTM 3



Temperaturna komora Zwick/Roel (-80 °C do +250 °C)
Temperature chamber Zwick/Roel (-80 °C to +250 °C)



IMV – Zračno hlajen vibracijski stroj i220 / SA1AM
MV - Air cooled Vibration Test System i220 / SA1AM

Laboratorij za zahtevne inženirske simulacije in eksperimentiranje

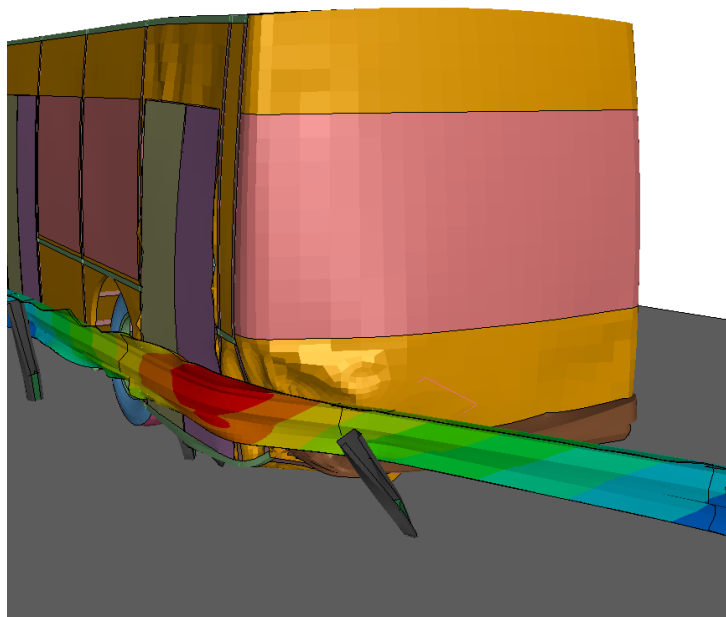
Laboratory for Advanced Computational Engineering and Experimenting

Vodja laboratorija | Head of the Laboratory: **red. prof. dr. Zoran Ren**

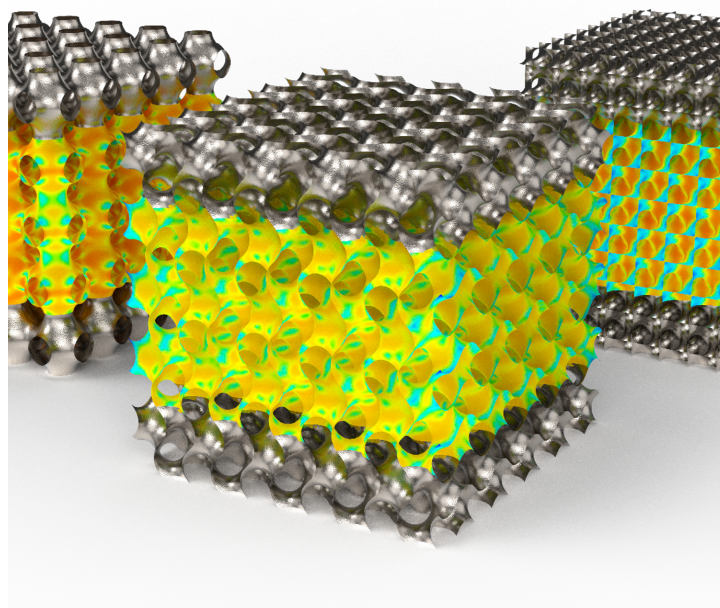
Laboratorij se osredotoča na znanstveno raziskovanje novih metamaterialov z izboljšanimi mehanskimi lastnostmi, predvsem pri visokohitrostnih obremenitvah, kot so udarni učinki eksplozij ali trčenj. Glavni poudarek je na konceptualizaciji metamaterialov s celično notranjo strukturo, pri čemer uporabljamo najsodobnejše matematično in računalniško modeliranje ter izkoriščamo zmogljivosti visokozmogljivih računalnikov za optimizacijo na superračunalnikih. Po potrditvi ustreznosti virtualnih konceptov struktur metamaterialov uporabljamo najnovejše tehnike izdelave v sodelovanju z domačimi in mednarodnimi partnerji, da te koncepte ustvarimo tudi v fizični obliki. Nato izdelane vzorce metamaterialov celovito karakteriziramo z uporabo naprednih eksperimentalnih metod, kar potrди primernost ali izpostavi slabosti zasnovanih konceptov za določene aplikacije. Raziskujemo tudi geometrijsko karakterizacijo notranjih struktur materialov ter razvijamo kompleksne numerične modele in računalniške analize. S svojimi preizkuševališči, kot sta Split-Hopkinson-Pressure-Bar in Direct-Impact-Hopkinson-Bar, izvajamo eksperimentalno določanje materialnih lastnosti pri visokih in zelo visokih hitrostih obremenitve. Naše raziskave imajo velik aplikativni pomen v industriji, še posebej pri razvoju varnostnih elementov za ceste.

The laboratory specialises in cutting-edge scientific research into novel metamaterials with enhanced mechanical properties, particularly under high-speed loading conditions such as explosive impacts or collisions. Our primary focus lies in the conceptual design of metamaterials featuring cellular internal structures, leveraging advanced mathematical and computational modelling techniques alongside high-performance optimisation on supercomputers. Once the virtual metamaterial concepts are validated, we employ state-of-the-art fabrication methods in collaboration with national and international partners to realise these designs physically. The fabricated metamaterial samples undergo rigorous characterisation, using sophisticated experimental techniques to assess their suitability for specific applications or identify potential weaknesses. Additionally, we conduct detailed geometrical analyses of material microstructures, and develop complex numerical models for computational simulations. Our experimental facilities, including the Split-Hopkinson Pressure Bar and the Direct-Impact Hopkinson Bar, enable precise determination of material properties at high and ultra-high strain rates. This research holds significant industrial relevance, particularly in advancing safety-critical components for the transportation infrastructure, such as road safety systems.

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Računalniška simulacija naleta avtobusa na cestno varnostno ograjo
Computer simulation of a bus crashing into a road safety barrier



Gradiran TPMS celični metamaterial
Graded TPMS cell metamaterial



Katedra za materiale in preoblikovanje

Chair of Materials and Forming

Predstojnik katedre | Head of the Chair: red. prof. dr. Ivan Anžel

Laboratorij za materiale

Laboratory for Materials

Vodja laboratorija | Head of the Laboratory: **red. prof. dr. Franc Zupanič**

V Laboratoriju za materiale se posvečamo raziskavam in tehnologijam kovinskih materialov in njihovih kompozitov. Naše delo obsega sintezo novih zlitin in karakterizacijo materialov na različnih ravneh, vključno z makro-, mikro- in nanoobmočji. Pridobljeno znanje iz osnovnih raziskav uspešno uporabljamo v aplikativnih raziskavah ter za potrebe metalurške in kovinskopredelovalne industrije. Podjetjem v naši regiji ponujamo celovite raziskave materialov (metalografske, fraktografske, raziskave mehanskih lastnosti in druge).

Poleg tega integriramo teoretično in praktično znanje o materialih v pedagoški proces, kjer skrbimo za izobraževanje mladih strokovnjakov na področjih strojništva, mehatronike in gospodarskega inženirstva. Študentje pridobijo poglobljeno razumevanje kovinskih, keramičnih, polimernih in kompozitnih materialov, tehnologij njihove izdelave in obdelave ter pristopov k mikrostrukturni in mehanski karakterizaciji materialov.

Sledimo mednarodnemu razvoju materialov in tehnologij, pri čemer nova odkritja in znanja prenašamo v naše raziskovalno in izobraževalno delo.

The Laboratory for Materials is dedicated to research and technology in metallic materials and their composites. Our work includes the synthesis of new alloys and the characterisation of materials at different scales, including the macro-, micro- and nano-regions. We apply the knowledge gained from our basic research successfully to applied research and to the needs of the metallurgical and metalworking industries. We offer comprehensive materials research (metallographic, fractographic, mechanical properties and others) to companies in our region.

We also integrate theoretical and practical knowledge of materials into our teaching process, where we educate young professionals in the fields of Mechanical Engineering, Mechatronics and Commercial Engineering. The students gain an in-depth understanding of metallic, ceramic, polymeric and composite materials, their manufacturing and processing technologies, and approaches to the microstructural and mechanical characterisation of materials.

We keep abreast of international developments in materials and technologies, translating new discoveries and knowledge into our research and education work.

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Martenzitna struktura jekla, barvno jedkanje in svetlobna mikroskopija (levo), taljenje v vakuumski indukciji peči v Laboratoriju za materiale (sredina), ekstrahiran vzorec Al-zlitine (desno).

Martensitic steel structure, colour etching and light microscopy (left), melting in vacuum induction furnace in the Materials Laboratory (centre), and an extracted Al-alloy sample (right).

Laboratorij za preoblikovanje materialov

Laboratory for Materials Forming

Vodja laboratorija | Head of the Laboratory: **red. prof. dr. Ivan Anžel**

V laboratoriju za preoblikovanje materialov poteka-
jo v okviru pedagoškega procesa na dodiplomskih in
podiplomskih študijskih programih laboratorijske vaje,
v okviru raziskovalnih dejavnosti pa študije in analize
procesov ter pojavov pri preoblikovalnih oziroma ob-
likovalnih postopkih. Te dejavnosti sledijo temeljnemu
cilju, da se z optimiranjem parametrov preoblikovanja
oziroma oblikovanja izdelkov dosežeta željena, ciljna
mikrostruktura in načrtovane lastnosti.

Na vseh področjih človeške aktivnosti se nenehno uva-
jajo novi materiali, posledično pa tudi alternativni pos-
topki oblikovanja izdelkov. V laboratoriju za preobliko-
vanje materialov sledimo tem trendom z raziskovalnim
delom na novem sistemu za kompartmentiranje, študijami
izdelave sodobnih polimernih kompozitnih in hibrid-
nih materialov s 3D-tiskanjem, analizami mehanizmov
plastičnega tečenja pri sodobnih inženirskih materialih
ter z razvojem posebnih preoblikovalnih postopkov (na
primer ECAP). S ciljem, da na področju razvoja mate-
rialov in tehnologij sledimo trajnostnemu razvoju, po-
tekajo tudi študije postopkov recikliranja materialov in
analize vpliva tehnoloških postopkov na okolje.

*The Laboratory for Materials Forming is used for laboratory
exercises as part of the teaching process in undergraduate and
postgraduate Study Programmes, and for studies and analy-
ses of processes and phenomena in transformation and for-
ming processes as part of research activities. These activities
follow the fundamental objective of optimising the parameters
of the transformation or forming of products to achieve the
desired target microstructure and the designed properties.*

*New materials are being introduced constantly in all areas of
human activity, and, as a consequence, alternative product
design processes. In the Laboratory for Materials Forming we
are following these trends through research work on a new
compounding system, studies on the production of advanced
polymer composite and hybrid materials by 3D printing, ana-
lyses of plastic yielding mechanisms in advanced engineering
materials, and the development of specific transformation
processes (e.g., ECAP). With the aim of pursuing sustainable
development in the field of Materials and Technology Develo-
pment, we are also carrying out studies on recycling proces-
ses and analyses of the impact of technological processes on
the environment.*

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3D-tiskalnik
3D printer



Injekcijski brizgalnik
Injector



Reometer
Rheometer

Univerzitetni center za elektronsko mikroskopijo

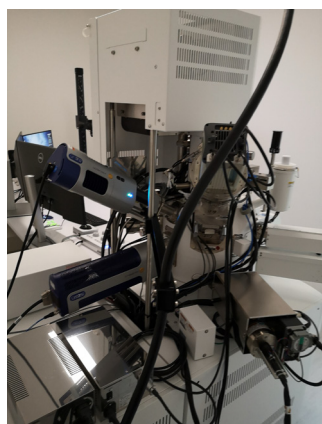
University Centre for Electron Microscopy

Vodja centra | Head of the centre: red. prof. dr. Ivan Anžel

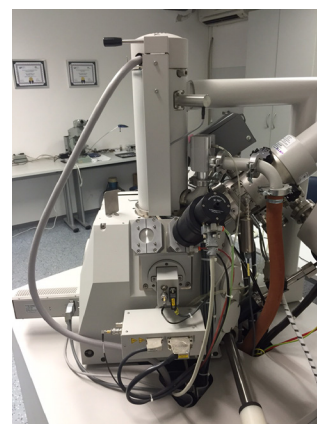
Univerzitetni center za elektronsko mikroskopijo – UCEM je bil ustanovljen leta 2005 kot prvi infrastrukturni raziskovalni center na UM, z namenom združevanja znanj in izkušenj na področju elektronske mikroskopije, ter kot raziskovalna podpora pri analiziranju vseh vrst kovinskih, keramičnih, polimernih, kompozitnih in hibridnih materialov. Delovanje UCEM-a je usmerjeno v povezovanje znanosti o materialih z materialografsko pripravo vzorcev in s tehnikami karakterizacije, ki jih elektronska mikroskopija v UCEM-u omogoča (SEI, BEI, EDX-analize, EBSD-analize, SXES-analize, FIB idr.), s ciljem verodostojne identifikacije mikrostrukturnih konstituentov ter določitve lastnosti materialov v odvisnosti od tehnoloških postopkov izdelave/obdelave. Možno je tudi opazovanje v okoljskem načinu, ki se uspešno uporablja za raziskave na področjih biologije, kemije in medicine. Prav tako se nudi podpora pri analizah specifičnih vzorcev, ki so slabo toplotno in električno prevodni, so mehki (npr. aerogeli), hlapljivi (npr. vanilini) ali pa tekoči (npr. oljne kapljice). Z uporabo ionske mikroskopije FIB/SEM je omogočena tudi fizikalna obdelava posameznih atomskih plasti vzorcev. S pomočjo znanja in izkušenj UCEM ponuja zanesljivo, kakovostno in strokovno kompetentno podporo pri karakterizaciji materialov. Raziskovalno delo na področju elektronske mikroskopije je povezano s pridobljenimi raziskovalnimi projekti in programi, v okviru katerih se uvajajo tudi novi načini in metode karakterizacije. Vsebine raziskovalnih programov in projektov vključujejo identifikacijo in karakterizacijo mikrostrukturnih elementov, analizo vpliva tehnologij izdelave na razvoj mikrostrukture ter študije soodvisnosti med mikrostrukturno, lastnostmi in tehnologijo izdelave materiala.

The University Centre for Electron Microscopy – UCEM, was established in 2005 as the first infrastructural research centre at the UM, with the aim of combining knowledge and experience in the field of Electron Microscopy, and as a research support for the analysis of all types of metallic, ceramic, polymeric, composite and hybrid materials. The activities of UCEM are focused on the integration of materials science with materials science sample preparation and characterisation techniques enabled by electron microscopy at UCEM (SEI, BEI, EDX-analyses, EBSD-analyses, SXES-analyses, FIB, etc.), with the aim of a reliable identification of microstructural constituents and the determination of material properties, depending on the manufacturing/processing technology. Observation in environmental mode is also possible, and has been applied successfully to research in the fields of Biology, Chemistry and Medicine. Support is also provided for the analysis of specific samples that are poorly thermally and electrically conductive, soft (e.g., aerogels), volatile (e.g., vanillins) or liquid (e.g., oil droplets). Physical processing of individual atomic layers of samples is also possible using FIB/SEM ion microscopy. With its know-how and experience, UCEM offers reliable, high-quality and expertly competent support in materials characterisation. Research work in the field of Electron Microscopy is linked to acquired research projects and programmes, which also introduce new characterisation techniques and methods. The contents of the research programmes and projects include the identification and characterisation of microstructural elements, the analysis of the influence of manufacturing technologies on the development of microstructure, and studies of the interrelationship between microstructure, material properties and manufacturing technology.

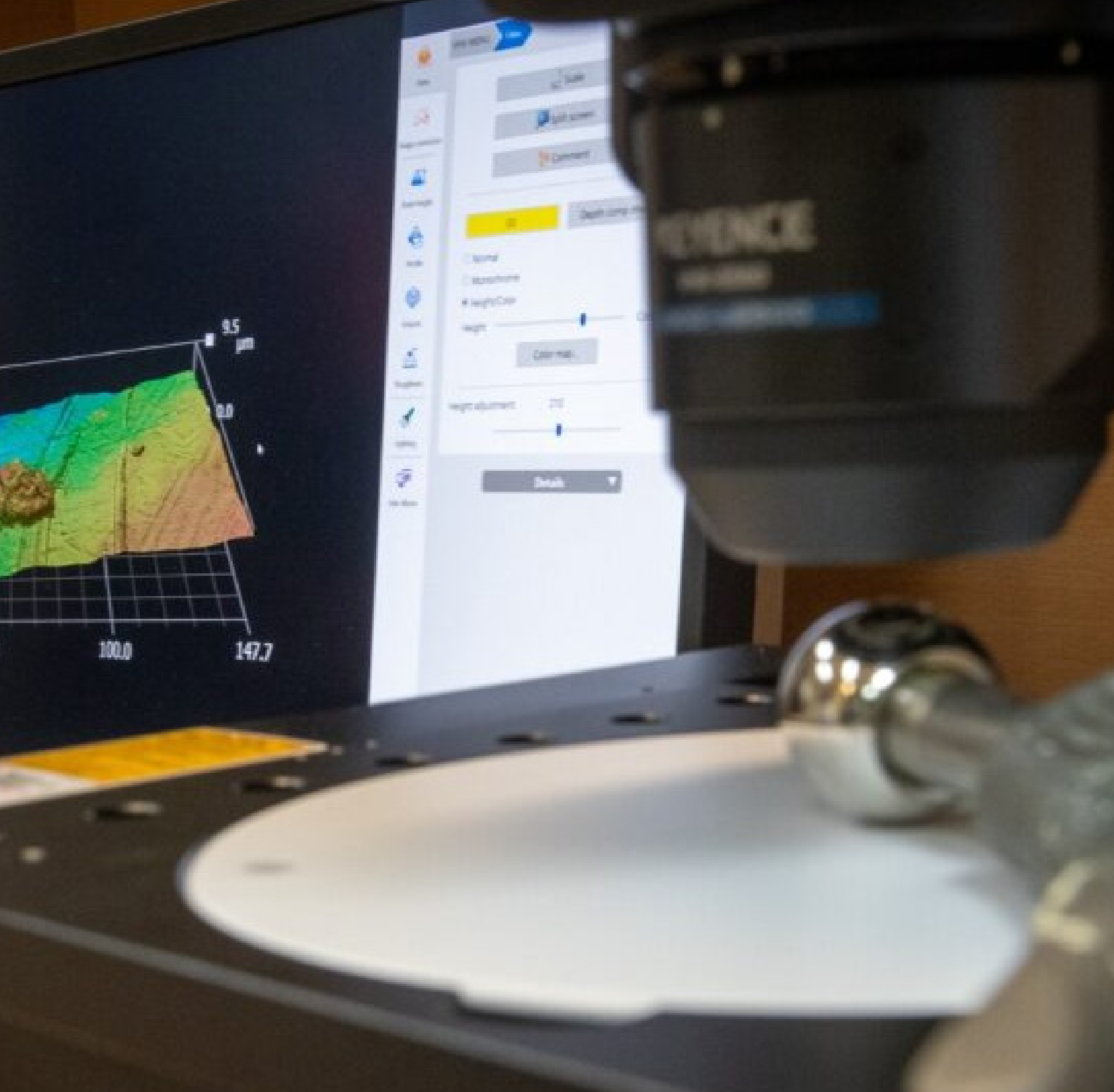
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Vrstični elektronski mikroskop FEG SEM JSM IT 800SHL
Scanning electron microscope FEG SEM JSM IT 800SHL



Vrstični elektronski mikroskop FEI QUANTA 200 3D
Scanning electron microscope FEI QUANTA 200 3D



Katedra za mehaniko

Chair of Mechanics

Predstojnik katedre | Head of the Chair: red. prof. dr. Nenad Gubeljak

Laboratorij za aplikativno mehaniko

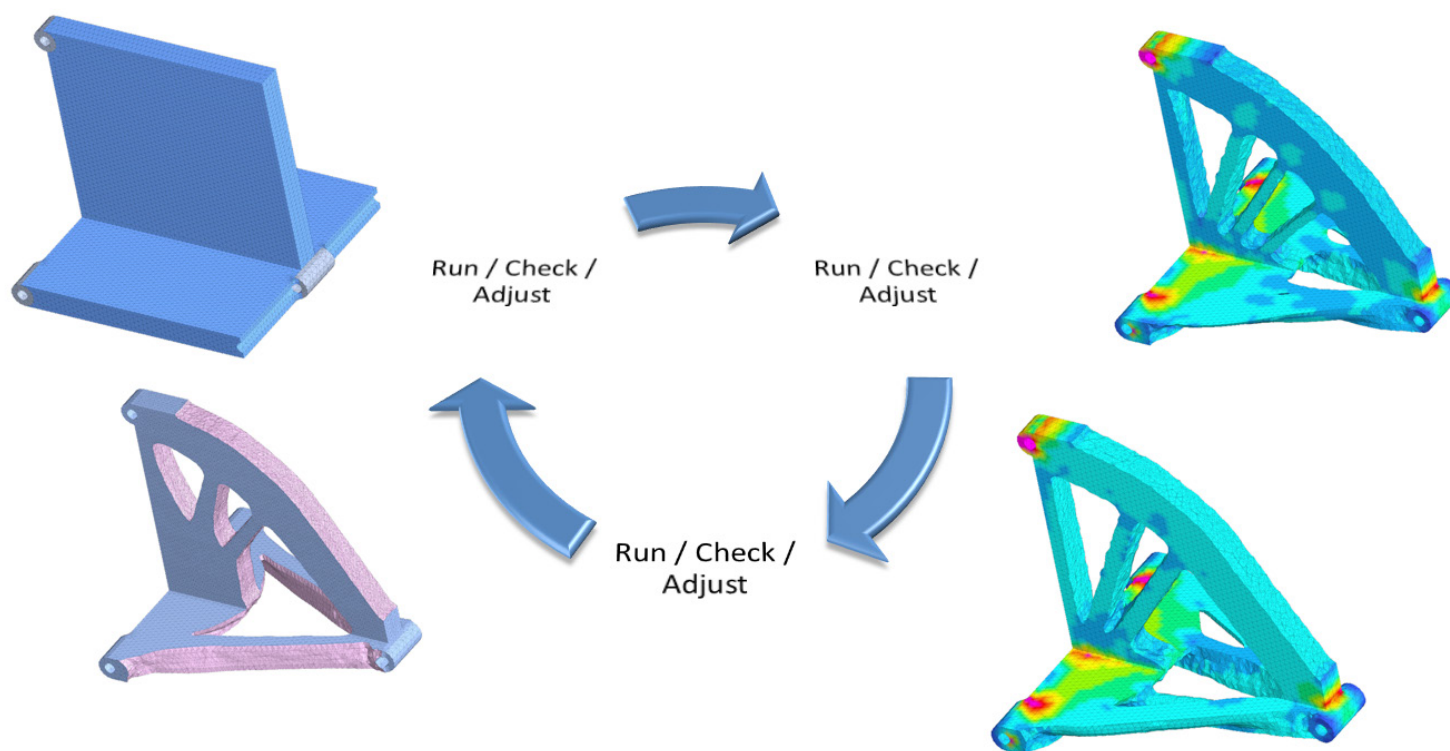
Laboratory for Applied Mechanics

Vodja laboratorija | Head of the Laboratory: **doc. dr. Boštjan Harl**

Delo v laboratoriju je razdeljeno na tri ključne sklope dejavnosti. Prvi sklop se osredotoča na razvoj metodologij in pripadajočih algoritmov za optimizacijo topologije nosilnih konstrukcijskih elementov. Ta pristop omogoča izboljšanje učinkovitosti in trdnosti konstrukcij z minimizacijo materiala. Drugi sklop zajema razvoj algoritmov in numeričnih postopkov za raziskovanje rasti razpok v različnih materialih in pod različnimi pogoji obremenitve. Ta segment omogoča boljše razumevanje mehanizmov rasti razpok ter napovedovanje obnašanja materialov v realnih pogojih. Tretji sklop obsega razvoj naprednih numeričnih algoritmov in pripadajoče programske opreme znotraj okvira numerične mehanike. To vključuje razvoj in implementacijo numeričnih optimizacijskih metod za izboljšanje natančnosti in učinkovitosti simulacij ter optimizacijo dizajna konstrukcij. Razvoj metodologij za optimizacijo konstrukcijskih delov ter algoritmov za analizo rasti razpok in naprednih numeričnih algoritmov v laboratoriju je ključen za izdelavo trdnih, varnih in ekonomičnih konstrukcij v različnih industrijah.

The work of the laboratory is divided into three key strands of activities. The first focuses on the development of methodologies and associated algorithms for optimising the topology of load-carrying structural elements. This approach allows us to improve the performance and strength of structures by minimising the material. The second strand covers the development of algorithms and numerical procedures to investigate crack growth in different materials and under different loading conditions. This segment allows a better understanding of the mechanisms of crack growth, and the prediction of the behaviour of materials under realistic conditions. The third strand consists of the development of advanced numerical algorithms and associated software within the framework of Numerical Mechanics. This includes the development and implementation of numerical optimisation methods to improve the accuracy and efficiency of simulations and optimise the design of structures. The development of structural optimisation methodologies and algorithms for crack growth analysis and advanced numerical algorithms in the laboratory is crucial for the production of robust, safe and economical structures in various industries.

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Topološki optimizacijski cikel
Topological optimisation cycle



TruBend 3066



Katedra za proizvodno strojništvo

Chair of Production Engineering

Predstojnik katedre | Head of the Chair: red. prof. dr. Bojan Ačko

Laboratorij za dodajalno izdelavo

Laboratory for Additive Manufacturing

Vodja laboratorija | Head of the Laboratory: **red. prof. dr. Igor Drstvenšek**

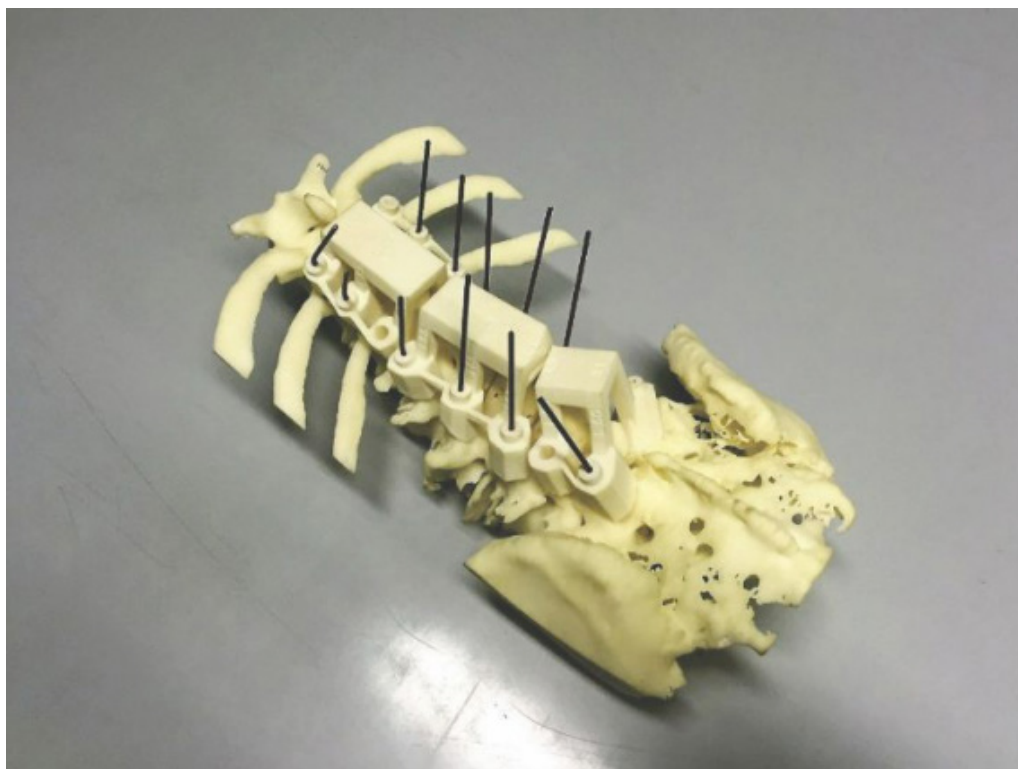
Laboratorij se ukvarja z razvojem in raziskavami na področju 3D-tiska, kot se popularno imenujejo dodajalne tehnologije. Ukvarjamo se z analizo procesov, ki se med postopki dodajalne izdelave dogajajo v materialih in s strukturno manipulacijo materialov, s katero želimo izboljšati njihovo obdelovalnost in storilnost postopkov. Na uporabniškem področju se ukvarjamo z uporabo dodajalne izdelave v medicini, predvsem na področjih nevrokirurgije, ortopedije, travmatologije in obrazne kirurgije, kjer sodelujemo z obema kliničnima centroma pri izdelavi medicinskih pripomočkov, prilagojenih posameznemu pacientu oziroma uporabniku. Od leta 2004 smo z različnimi nevrokirurškimi oddelki sodelovali pri več kot 50 kranioplastikah. Na medicinskem področju poleg konstruiranja medicinskih pripomočkov raziskujemo možnosti izdelave novih biozdružljivih materialov, predvsem kovinskih zlitin, ki posnemajo mehanske lastnosti kosti in omogočajo ustrezno osteointegracijo.

Na industrijskem področju sodelujemo z mnogimi industrijskimi partnerji tako pri določanju obdelovalnih parametrov za različne polimerne in kovinske materiale kot pri razvoju novih naprav za dodajalno izdelavo oziroma pomožne procese pri dodajalni izdelavi.

The laboratory is involved in research and development in the field of 3D printing, as additive technologies are popularly known. We analyse the processes that occur in materials during additive manufacturing processes and the structural manipulation of materials, in order to improve their processability and process performance. In the application area, we are working on the use of additive manufacturing in medicine, mainly in the fields of Neurosurgery, Orthopaedics, Traumatology and facial surgery, where we collaborate with both clinical centres to produce medical devices tailored to the individual patient or user. Since 2004, we have worked with various neurosurgical departments on more than 50 cranioplasties. In the medical field, in addition to the design of medical devices, we are exploring the possibility of producing new biocompatible materials, mainly metal alloys, which mimic the mechanical properties of bone and allow appropriate osseointegration.

In the industrial field, we work with many industrial partners, both in the definition of processing parameters for various polymer and metal materials, and in the development of new additive manufacturing machines or auxiliary processes for additive manufacturing.

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Vodila za postavitve pedikularnih vijakov
Guides for pedicle screw placement

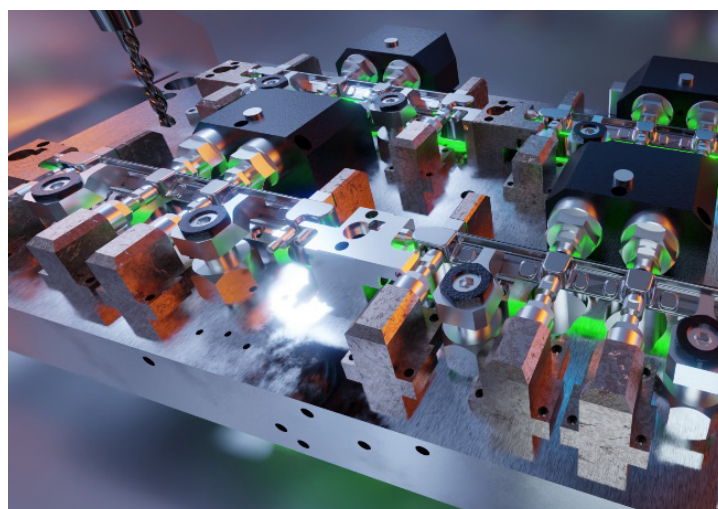
Laboratorij za inteligentne obdelovalne sisteme

Laboratory for Intelligent Manufacturing Systems

Vodja laboratorija | Head of the Laboratory: **izr. prof. dr. Mirko Ficko**

Laboratorij za inteligentne obdelovalne sisteme ima več kot 30 let izkušenj pri razvoju in izrabi inteligentnih obdelovalnih sistemov. Za analizo in optimalizacijo sistemov ter vplivnih veličin procesov snuje in izvaja poizkuse, računalniške inženirske simulacije ter razvija napovedovalne modele. Spoznanja s tega področja sodelavci pogosto prenašajo tudi na druga področja, z rabo prednosti strojnega učenja, evolucijskih algoritmov, inteligence rojev ali umetnih nevronske mreže. Laboratorij uspešno sledi razvoju umetne inteligence od globokega učenja do uporabe obsežnih jezikovnih modelov. Ukvarja se tudi z razvojem rešitev strojnega vida za obdelovalne stroje in sisteme. Vse te dejavnosti služijo za izboljšanje sposobnosti obdelovalnih in proizvodnih tehnologij.

The Laboratory for Intelligent Manufacturing Systems has more than 30 years of experience in the development and use of intelligent machining systems. It designs and conducts experiments, computer-aided engineering simulations, and develops predictive models to analyse and optimise systems and process variables. They often transfer their knowledge to other areas, taking advantage of Machine Learning, Evolutionary Algorithms, Swarm Intelligence or Artificial Neural Networks. The lab has tracked the development of Artificial Intelligence successfully, from deep learning to the use of large-scale language models. It is also involved in the development of machine vision solutions for machine tools and systems. All these activities serve to improve the capability of machining and manufacturing technologies.



Simulacije in optimizacije obdelovalnih postopkov
Simulations and optimisations of machining processes

Laboratorij za mehatroniko

Laboratory for Mechatronics

Vodja laboratorija | Head of the Laboratory: **izr. prof. dr. Uroš Župerl**

Laboratorij za mehatroniko izvaja storitve na področju analiz in sintez zahtevnih mehatronskih sistemov. Ukvarja se z načrtovanjem krmilnih in regulacijskih postopkov vodenja tehničnih sistemov ter izvajanjem dinamičnih analiz obnašanja krmilnih in regulacijskih komponent različnih tehničnih izvedb. Laboratorij optimira regulacijske sisteme s pomočjo računalniških simulacijskih modelov in analizira ter sintetizira računalniške nadzorne sisteme za daljinsko vodenje in nadzor tehniških sistemov. Poleg tega se ukvarja s projektiranjem in vzdrževanjem električnih, elektronskih, pnevmatskih, hidravličnih in hibridnih sistemov avtomatskega vodenja na področjih proizvodnega strojništva, energetike, procesne tehnike in kmetijske mehanizacije. Laboratorij neprestano razvija inovativne rešitve za izboljšanje učinkovitosti in zanesljivosti mehatronskih sistemov ter prispeva k napredku v industriji z izvajanjem naprednih raziskav in praktičnih aplikacij.

The Laboratory for Mechatronics provides services in the analysis and synthesis of complex mechatronic systems. It designs control and regulation procedures for the control of technical systems, and performs dynamic analyses of the behaviour of control and regulation components of various technical designs. The laboratory optimises control systems using computer simulation models, and analyses and synthesises computer control systems for the remote control and monitoring of technical systems. In addition, it designs and maintains electrical, electronic, pneumatic, hydraulic and hybrid automatic control systems in the fields of Production Engineering, Power Engineering, Process Engineering and Agricultural Machinery. The laboratory develops innovative solutions continuously, to improve the efficiency and reliability of mechatronic systems, and contributes to the advancement of industry through advanced research and practical applications.



Popolnoma avtomatiziran Robotikbar
Fully automated Roboticbar

Laboratorij za načrtovanje proizvodnih sistemov

Laboratory for Production and Operations Management

Vodja laboratorija | Head of the Laboratory: **red. prof. dr. Borut Buchmeister**

Laboratorij za načrtovanje proizvodnih sistemov združuje pedagoško delo na vseh stopnjah študija ter teoretično in uporabniško usmerjeno raziskovalno delo za ustanove in industrijo. Osnovno področje dejavnosti laboratorija je proizvodni menedžment, ki vključuje razvoj izdelkov, študij dela, ergonomijo, uvajanje sodelovalnih delovnih mest (koboti), načrtovanje kapacitet, razmestitev virov, uporabo navidezne resničnosti, upravljanje zalog, kakovosti in dobaviteljskih verig, vodenje projektov, vzdrževanje, vitko proizvodnjo in stroške. Posebno pozornost namenjamo gospodarjenju s časom, ergonomskemu oblikovanju delovnih mest, načrtovanju sodelovalnih delovnih mest, načrtovanju tehnologije in vodenju proizvodnje. Ukvarjamo se tudi s projektnim menedžmentom, načrtovanjem zanesljivosti proizvodnih procesov, menedžmentom znanja in inovacij ter menedžmentom storitev. Naša ekipa s svojimi obsežnimi znanji in analitičnimi orodji razvija učinkovite in inovativne rešitve, ki pripomorejo k izboljšanju proizvodnih procesov, k učinkovitemu zelenemu prehodu in povečanju konkurenčnosti v industriji.

The Laboratory for Production and Operations Management combines teaching work at all levels of study with theoretical and application-oriented research work for institutions and industry. The core area of the laboratory's activities is manufacturing management, which includes product development, work study, ergonomics, the introduction of collaborative workplaces (cobots), capacity planning, resource allocation, the use of virtual reality, inventory management, quality and supply chain management, project management, maintenance, lean manufacturing and costing. We pay particular attention to time management, ergonomic workplace design, collaborative workplace design, technology design and production management. We also focus on project management, reliability planning, knowledge and innovations management and service management. Our team uses its extensive knowledge and analytical tools to develop effective and innovative solutions that help improve production processes, enable an efficient green transition and increase competitiveness in the industry.

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Oprema za načrtovanje in optimizacijo pametnih tovarn
Smart factory design and optimisation equipment

Laboratorij za odrezavanje

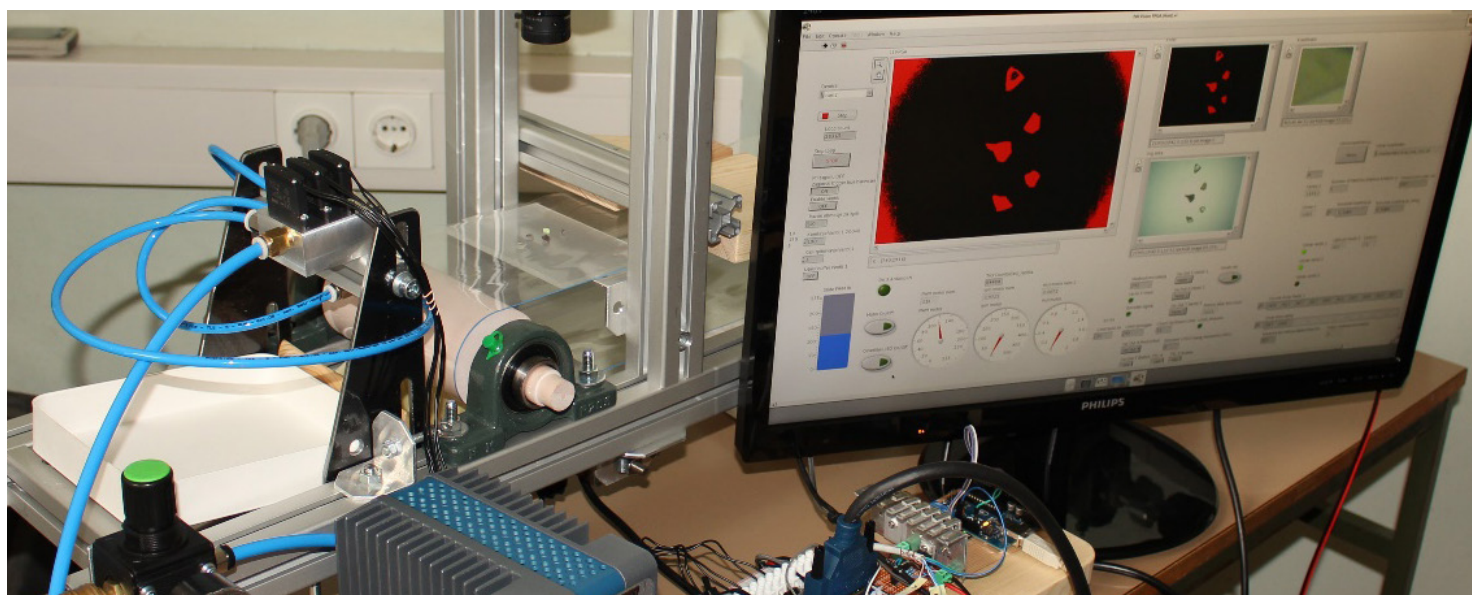
Laboratory for Machining Processes

Vodja laboratorija | Head of the Laboratory: **izr. prof. dr. Simon Klančnik**

Laboratorij omogoča poglobljeno znanstvenoraziskovalno in razvojno delo na področju obdelovalnih sistemov in procesov, zahvaljujoč svoji odlični kadrovske in infrastrukturni strukturi. Osredotočeni smo na razvoj in inovacije na področju digitalizacije proizvodnje, strojnega vida v proizvodnji ter integracije umetne inteligence v proizvodne procese. Laboratorij združuje pedagoško delo na vseh stopnjah študija z intenzivnim raziskovalnim delom, kar omogoča študentom praktično vključitev v najnovejše projekte. Naš cilj je razvijati napredne tehnike strojnega vida in inteligentne sisteme za optimizacijo in avtomatizacijo obdelovalnih procesov, s poudarkom na odrezovalnih procesih. Posebno pozornost namenjamo razvoju naprednih proizvodnih sistemov in procesov v živilskopredelovalni industriji ter kmetijstvu, s ciljem ustvarjanja trajnostnih in okolju prijaznih rešitev. Osredotočamo se tudi na monitoring, diagnostiko in prognostiko obdelovalnih sistemov in procesov, napovedovalno analitiko ter računalniške simulacije proizvodnih sistemov in procesov. Naša ekipa ima obsežna znanja in analitična orodja za razumevanje kompleksnih proizvodnih procesov, kar nam omogoča razvoj učinkovitih in inovativnih rešitev na področju proizvodnje, z vključevanjem naprednih tehnologij in trajnostnih pristopov. V laboratoriju verjamemo, da je ključ do inovacij v tesnem sodelovanju z industrijskimi partnerji in akademsko skupnostjo, kar omogoča izmenjavo znanja in izkušenj, ki so temelj za tehnološki napredek.

The laboratory enables in-depth scientific research and development work in the field of Machining Systems and Processes, thanks to its excellent staffing and infrastructure structure. We focus on development and innovation in the fields of Digitisation of Production, Machine Vision in Manufacturing and the integration of Artificial Intelligence in production processes. The laboratory combines teaching work at all levels of study with intensive research work, allowing the students to get hands-on involvement in cutting-edge projects. Our aim is to develop advanced machine vision techniques and intelligent systems for the optimisation and automation of machining processes, with a focus on cutting processes. We pay particular attention to the development of advanced manufacturing systems and processes in the food processing and agricultural industries, with the aim of creating sustainable and environmentally friendly solutions. We also focus on the monitoring, diagnostics and prognostics of machining systems and processes, predictive analytics, and computer simulations of manufacturing systems and processes. Our team has extensive knowledge and analytical tools to understand complex manufacturing processes, enabling us to develop efficient and innovative manufacturing solutions, integrating advanced technologies and sustainable approaches. At the Lab, we believe that the key to innovation lies in close collaboration with industrial partners and academia, enabling the sharing of knowledge and experience that underpins technological progress.

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Napredni sistem strojnega vida za natančno sortiranje sipkih materialov s pomočjo umetne inteligence
Advanced machine vision system for precise sorting of bulk materials using Artificial Intelligence

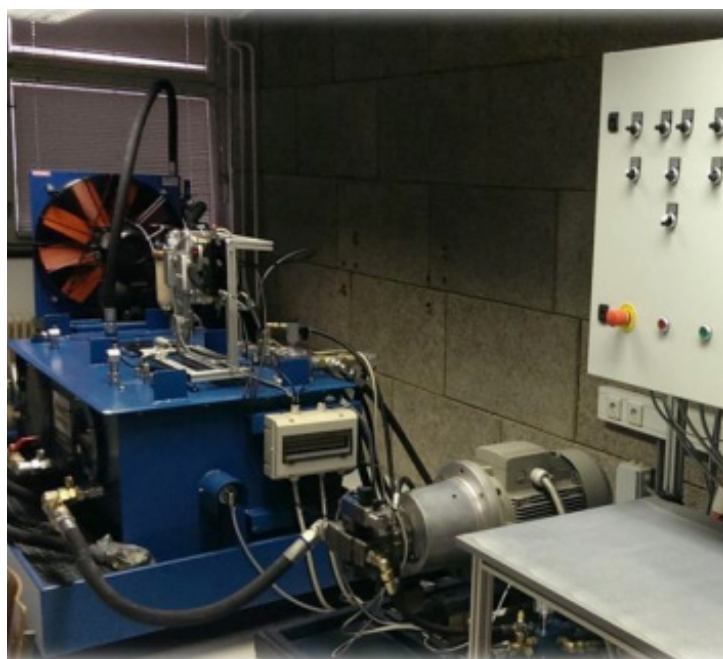
Laboratorij za oljno hidravliko

Laboratory for Oil Hydraulics

Vodja laboratorija | Head of the Laboratory: **red. prof. dr. Darko Lovrec**

V Laboratoriju za oljno hidravliko se osredotočamo na razvojno-raziskovalno, strokovno in pedagoško delo na področju hidravličnih in pnevmatičnih pogonsko-krmilnih sistemov ter avtomatizacije strojev in naprav, vključno s koncepti Industrije 4.0. Projektne dejavnosti vključujejo uporabo klasične in sodobne elektrohidravlične pogonske tehnike, zajemanje signalov, njihovo obdelavo ter nadzor delovanja in zanesljivosti hidravličnih komponent in celotnih pogonskih sklopov. Razvijamo enostavne in namenske elektrohidravlične linearne in rotacijske pogone, uporabljamo klasične in sodobne regulacijske strukture za povečanje natančnosti, dinamike in energetske učinkovitosti. Poseben poudarek je na spletnem nadzoru stanja hidravlične tekočine in razvoju visokotehnoloških, težko vnetljivih in okolju prijaznih hidravličnih tekočin, zlasti ionskih hidravličnih tekočin, ki imajo izjemne fizikalno-kemične lastnosti. Te tekočine razvijamo za uporabo v posebnih in zahtevnih obratovalnih pogojih, kar prispeva k izboljšanju učinkovitosti in varnosti hidravličnih sistemov. Najnovejša spoznanja vključujemo v različne projekte za industrijske partnerje, skozi različna šolanja na področju hidravlike, pnevmatike ter nege in nadzora hidravličnih tekočin ter industrijskih maziv pa jim v obliki vseživljenjskega izobraževanja ponujamo celovito znanje s tega področja.

The Laboratory for Oil Hydraulics focuses on research, development, professional and teaching work in the field of Hydraulic and Pneumatic Drive-control Systems and automation of machines and devices, including Industry 4.0 concepts. Project activities include the application of classical and modern electro-hydraulic drive technology, signal acquisition, signal processing, and monitoring of the performance and reliability of hydraulic components and complete drive trains. We develop systems with simple and special electrohydraulic linear and rotary actuators, using classical and modern control structures to increase the accuracy, dynamics and energy efficiency. Particular emphasis is placed on online hydraulic fluid monitoring and the development of high-tech, non-flammable and environmentally friendly hydraulic fluids, especially Ionic Hydraulic Fluids, which have outstanding physicochemical properties. These fluids are developed for use in specific and demanding operating conditions, contributing to improving the efficiency and safety of hydraulic systems. We integrate the latest findings into various projects for industrial partners, and offer comprehensive knowledge in the field of Hydraulics, pneumatics and the care and control of hydraulic fluids and industrial lubricants through lifelong learning courses.



Hidravlični agregat s spletnim nadzorom stanja obratovalnih parametrov
Hydraulic power pack with online condition monitoring of operating parameters



Kibernetsko-fizični razvojni sistem I4.0 z osmimi delovnimi postajami
I4.0 cyber-physical development system with eight workstations

Laboratorij za prilagodljive obdelovalne sisteme

Laboratory for Flexible Manufacturing Systems

Vodja laboratorija | Head of the Laboratory: **izr. prof. dr. Mirko Ficko**

Laboratorij za prilagodljive obdelovalne sisteme je osredotočen na razvoj obdelovalnih tehnologij in naprav za sodobno proizvodnjo. Raziskave, ki jih izvaja, vključujejo preizkušanje in izvajanje meritev na področju tehnoloških postopkov. Laboratorij izdeluje prototipe in nestandardne izdelke v manjših serijah; ponuja celovite rešitve, od konstrukcije, prek izdelave do končne montaže in preizkusa. Prototipno delavnico dopolnjujejo računalniško podprte obdelave s struženjem in 5-osnim rezkanjem ter laserski razrez in upogibanje pločevin. Laboratorij razvija in izboljšuje obstoječe tehnologije za izzive sodobne industrije.

The Laboratory for Flexible Manufacturing Systems focuses on the development of machining technologies and equipment for modern manufacturing. Its research includes testing and measurement in the field of Process Technology. The laboratory produces prototypes and non-standard products in small batches; it offers complete solutions, from design through manufacturing to final assembly and testing. The prototype workshop is complemented by computer-aided machining with turning and 5-axis milling, as well as laser cutting and bending of sheet metal. The laboratory develops and improves existing technologies to meet the challenges of modern industry.



Stroj za rezanje z laserjem
Laser cutting machine

Laboratorij za robotizacijo

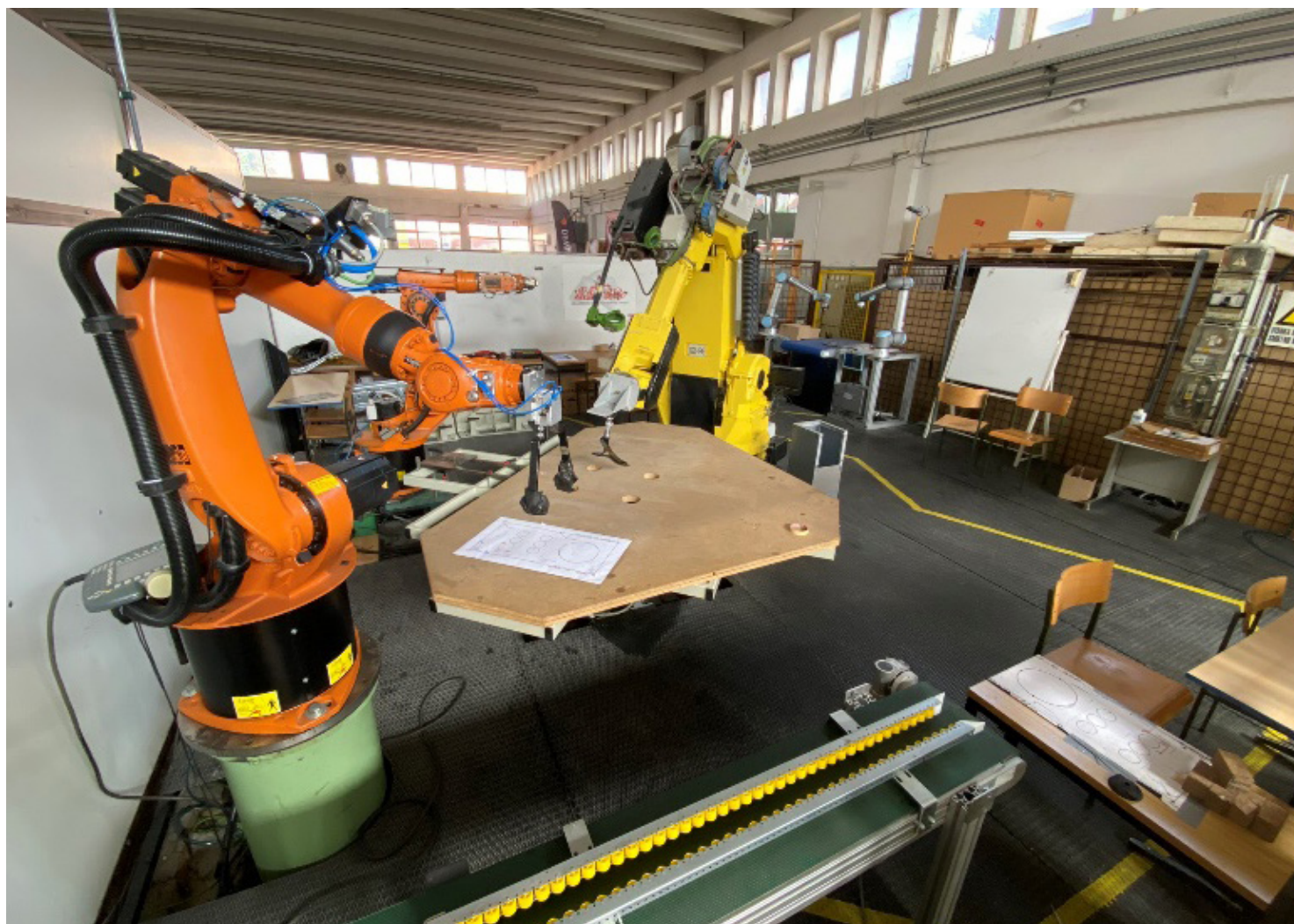
Laboratory for Robotisation

Vodja laboratorja | Head of the Laboratory: **doc. dr. Timi Karner**

V laboratoriju se osredotočamo na kakovostno izobraževanje bodočih inženirjev mehatronike. Naš cilj je, da študentom omogočimo pridobitev znanja in veščin, ki jih potrebujejo za samostojno oblikovanje sodobnih robotiziranih industrijskih celic. To vključuje izbiro primerne robotske tehnologije, postavitve sistema, vzpostavitve komunikacije ter varno in uspešno programiranje tako industrijskih kot sodelovalnih robotov. Naše delo je usmerjeno v zagotavljanje praktičnih izkušenj in razvoj ključnih veščin, ki študentom omogočajo uspešno delo v industrijskem okolju. V laboratoriju se osredotočamo na pionirsko raziskovanje in implementacijo najnovejših tehnologij v robotizaciji in digitalizaciji. Naš cilj je spodbujati inovacije ter ustvarjati napredne rešitve v robotizaciji in digitalizaciji, ki bodo oblikovale prihodnost industrije.

Our focus is on quality education for future mechatronics engineers. Our goal is to provide the students with the knowledge and skills they need to design modern robotic industrial cells independently. This includes selecting the appropriate robotic technology, setting up the system, establishing communication, and programming both industrial and collaborative robots safely and successfully. Our work focuses on providing hands-on experience and developing key skills, to enable the students to work successfully in an industrial environment. In the lab we focus on pioneering research and implementation of the latest technologies in robotics and digitalisation. Our aim is to foster innovation, and create advanced solutions in Robotics and Digitalisation that will shape the future of industry.

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Laboratorij za robotizacijo
Laboratory for Robotisation

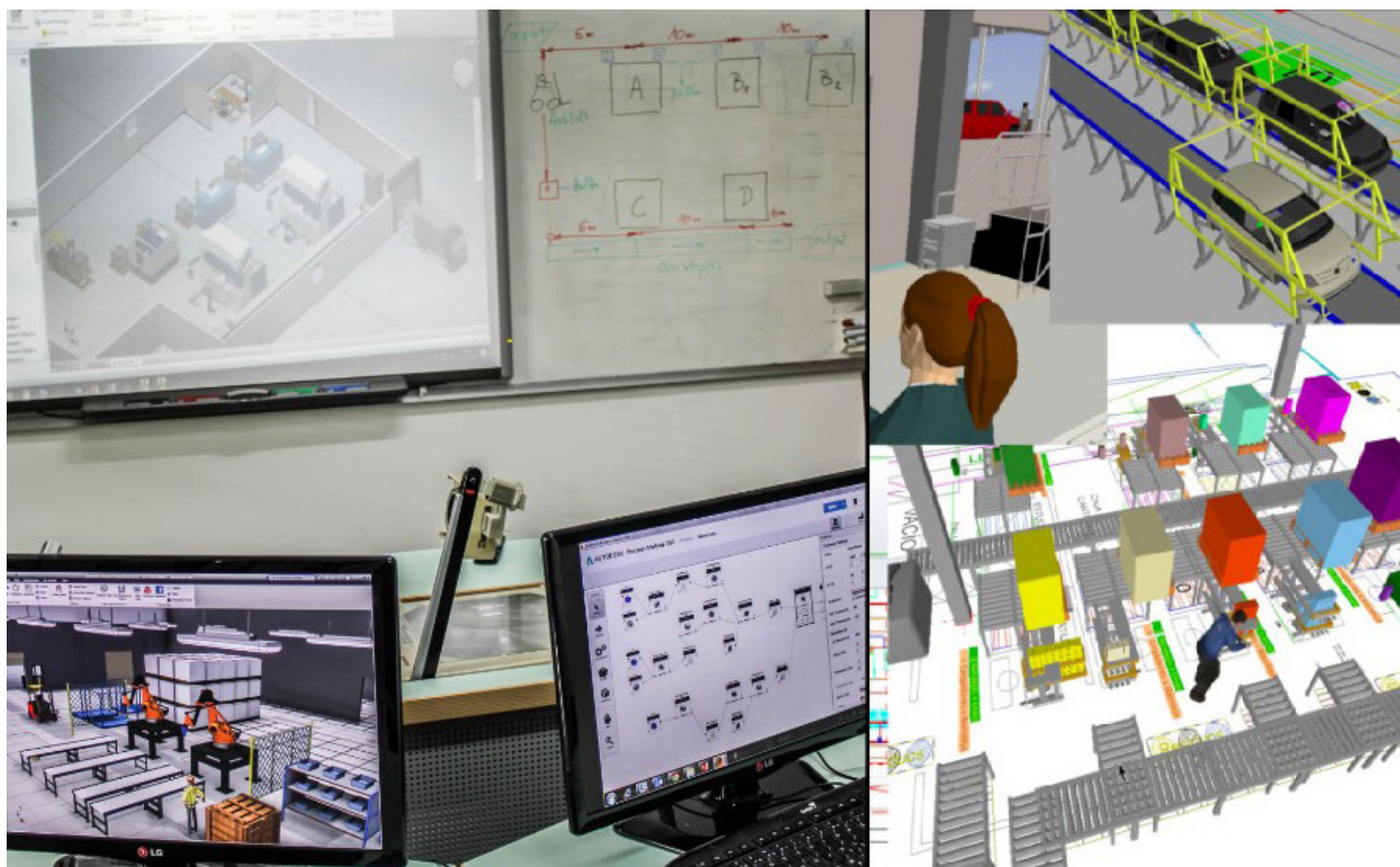
Laboratorij za simulacije diskretnih sistemov

Laboratory for Discrete Systems Simulation

Vodja laboratorija | Head of the Laboratory: **red. prof. dr. Borut Buchmeister**

Laboratorij za simulacije diskretnih sistemov zasleduje dva cilja: vzpostavitev visoko sofisticiranega laboratorija, ki uporablja najsodobnejše simulacijske tehnologije in postopke modeliranja na zmogljivi strojni in programski opremi, ter izgradnja raziskovalne skupine, vključene v nacionalne in mednarodne dejavnosti na področju simulacij diskretnih dogodkov in pedagoškega dela. Dejavnost laboratorija vključuje pedagoško delo na vseh stopnjah študija, teoretično in uporabniško usmerjeno raziskovalno delo za industrijo ter založniško dejavnost. Osnovno področje laboratorija so diskrétne simulacije procesov (izvedba simulacijskih študij za optimizacijo proizvodnih procesov, sodelovalnih delovnih mest, storitvenih dejavnosti). Ključne dejavnosti so načrtovanje procesov, določanje kapacitet delovnih mest, zalogovnikov in transporta, razmestitev delovnih mest in transportnih poti, optimizacija zaporedja izvajanja nalog, predstavitev z navidezno resničnostjo ter analize proizvodnje, vse s ciljem boljšega razumevanja proizvodnih procesov.

The Laboratory for Discrete Systems Simulation has two objectives: to establish a highly sophisticated laboratory using state-of-the-art simulation technologies and modelling techniques on powerful hardware and software, and to build a research team involved in national and international activities in the field of Discrete Event Simulation and Teaching. The activities of the laboratory include teaching work at all levels of study, theoretical and application-oriented research work for industry and publishing activities. The core area of the laboratory is discrete event process simulation (carrying out simulation studies for the optimisation of production processes, collaborative workplaces, service activities). Key activities are process planning, capacity determination of workplaces, inventories and transport, workplace and transport route layout, optimisation of task sequencing, virtual reality demonstration, and production analysis, all with the aim of improving the understanding of production processes.



Simulacijska programska oprema
Simulation software

Laboratorij za tehnološke meritve

Laboratory for Production Measurement

Vodja laboratorija | Head of the Laboratory: **red. prof. dr. Bojan Ačko**

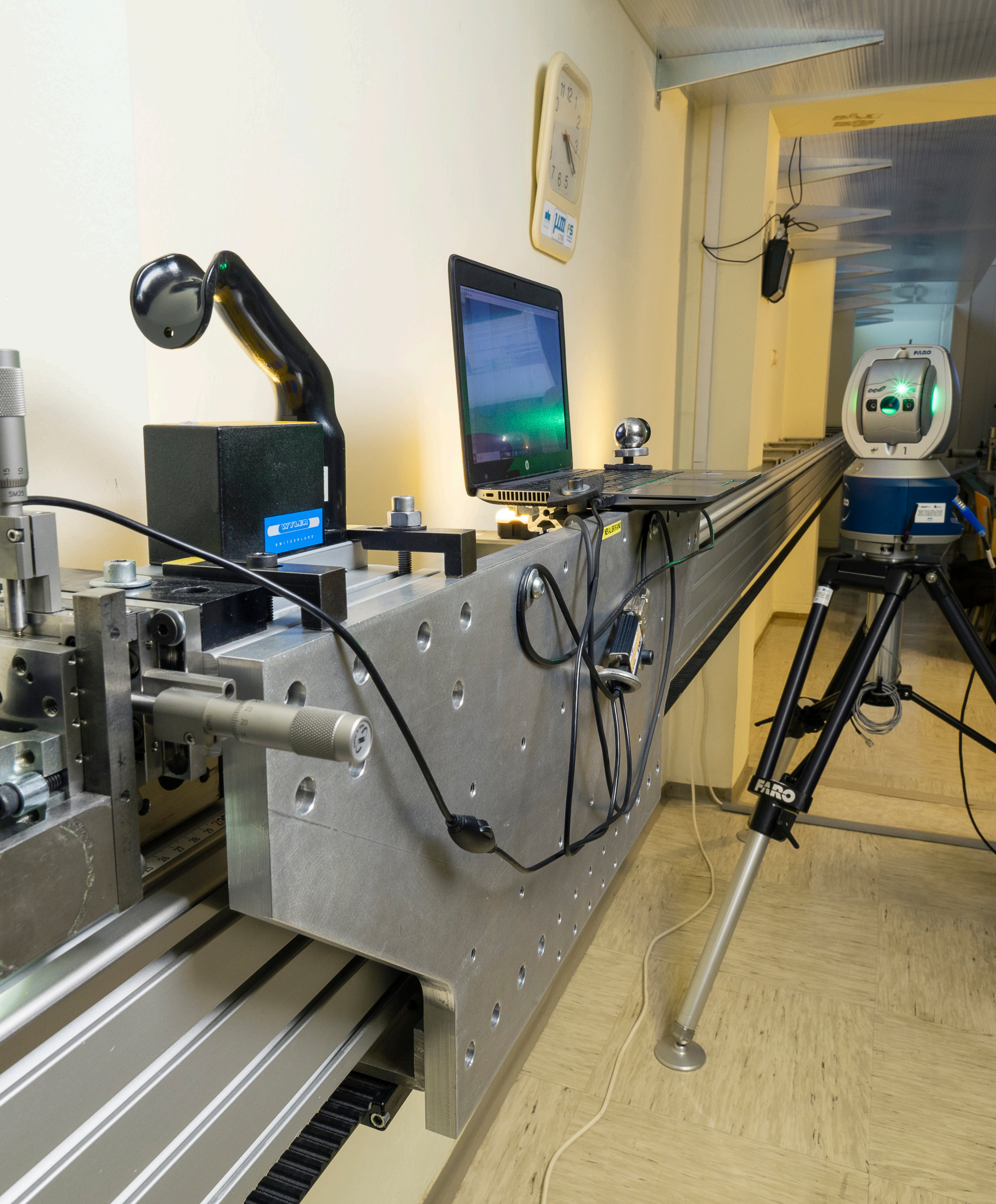
Laboratorij se ukvarja s temeljnimi in industrijskimi raziskavami, pedagoško dejavnostjo in strokovnim usposabljanjem na področjih dimenzionalnega meroslovja, industrijskih meritev in vodenja kakovosti. Osredotočen je na razvoj merilnih metod in postopkov za natančno merjenje dimenzij v eni, dveh in treh koordinatah ter avtomatizacijo merilnih procesov. Ključna strokovna dejavnost laboratorija je umerjanje merilnih instrumentov in opredmetenih mer na področju dimenzionalnih veličin. Ukvarja se tudi z meritvami izdelkov s kompleksno geometrijo in implementacijo metod vodenja kakovosti v industrijske in storitvene procese. Laboratorij vzdržuje akreditacijo za umerjanje dolžinskih opredmetenih mer in instrumentov po mednarodnem standardu ISO/IEC 17025:2017 pri Slovenski akreditaciji, ki je podpisnica multilateralnega sporazuma EA MLA. Prav tako vzdržuje in razvija nacionalni etalon za veličino dolžina. Svoje meroslovne zmogljivosti ima laboratorij objavljene tudi v bazi nacionalnih meroslovnih inštitutov pri Mednarodnem uradu za uteži in mere (KCDB BIPM).

The laboratory is involved in fundamental and industrial research, teaching and training in the fields of Dimensional Metrology, Industrial Measurements and Quality Management. It focuses on the development of measurement methods and procedures for the accurate measurement of dimensions in one, two and three coordinates, and the automation of measurement processes. The core expertise of the laboratory is the calibration of measuring instruments and material measures in the field of Dimensional Quantities. It is also involved in measuring products with complex geometries, and the implementation of quality management methods in industrial and service processes. The laboratory maintains accreditation for calibration of length material measures and instruments according to the International Standard ISO/IEC 17025:2017 with Slovenian Accreditation, a signatory of the multilateral EA MLA agreement. It also maintains and develops a National Standard for the quantity length. The laboratory also has its metrology capabilities published in the database of national metrology institutes of the International Bureau of Weights and Measures (KCDB BIPM).

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Umerjanje obroča z lasersko interferometrijo z nanometriško ločljivostjo
Ring gauge calibration using laser interferometry with nanometre resolution





Katedra za tekstilne materiale in oblikovanje

Chair of Textile Materials and Design

Predstojnica katedre | Head of the Chair: red. prof. dr. Tatjana Kreže

Laboratorij za barvanje, barvno metriko in ekologijo plemenitenja

Laboratory for Dyeing, Colourimetry and Finishing Ecology

Vodja laboratorija | Head of the Laboratory: **doc. dr. Alenka Ojstršek**

Laboratorij izvaja temeljne in aplikativne raziskave ter izobraževalne programe in ponuja servis na področju barvanja in vrednotenja optičnih lastnosti materialov na UV/Vis/NIR področju valovnih dolžin 200–2500 nm. Raziskave obsegajo tudi odstranjevanje onesnaževal iz odpadnih vod in zraka z različnimi adsorbenti ali filtrnimi membranami iz obnovljivih virov. Pomemben del dela je razvoj inovativnih postopkov trajnostne priprave in funkcionalizacije tekstilnih materialov, polimernih filmov, membran in aerogelov s kromnimi barvili, pigmenti ter nano- ali mikrodelci za posebne lastnosti. Sodelovanje z mikrobiološkimi skupinami sorodnih raziskovalnih institucij vključuje raziskave produkcije bakterijske celuloze in njenih aplikacij. Novo področje zajema razvoj visokotehnoloških materialov, vključno s funkcionalnimi površinami, tiskano elektroniko, senzorji, varnimi dokumenti, OLED-zasloni, baterijami in drugimi aplikacijami, s poudarkom na avtomatizaciji z uporabo naprave Challenger 175. Dodatne raziskave so usmerjene v modifikacijo in funkcionalizacijo bio-polimernih materialov, kot so proteini in nanoceluloza, z uporabo »zelene« kemije.

The laboratory carries out fundamental and applied research and educational programmes, and offers services in the field of Dyeing and evaluation of optical properties of materials in the UV/VIS/NIR wavelength range of 200-2500 nm. The research also includes the removal of pollutants from wastewater and air by various adsorbents or filter membranes from renewable sources. An important part of the work is the development of innovative processes for the sustainable preparation and functionalisation of textile materials, polymer films, membranes and aerogels with chrome dyes, pigments and nano- or microparticles for specific properties. Collaboration with the microbiology groups of related research institutions includes research on bacterial cellulose production and its applications. A new area covers the development of high-tech materials, including functional surfaces, printed electronics, sensors, secure documents, OLED displays, batteries and other applications, with a focus on automation using the Challenger 175. Additional research is focused on the modification and functionalisation of bio-polymeric materials, such as proteins and nanocellulose, using „green“ chemistry.

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Laboratorij za barvanje in vzorci volne, obarvani z naravnimi barvili
Dyeing device and wool samples dyed with natural dyes

Laboratorij za kemijo in okoljevarstvo

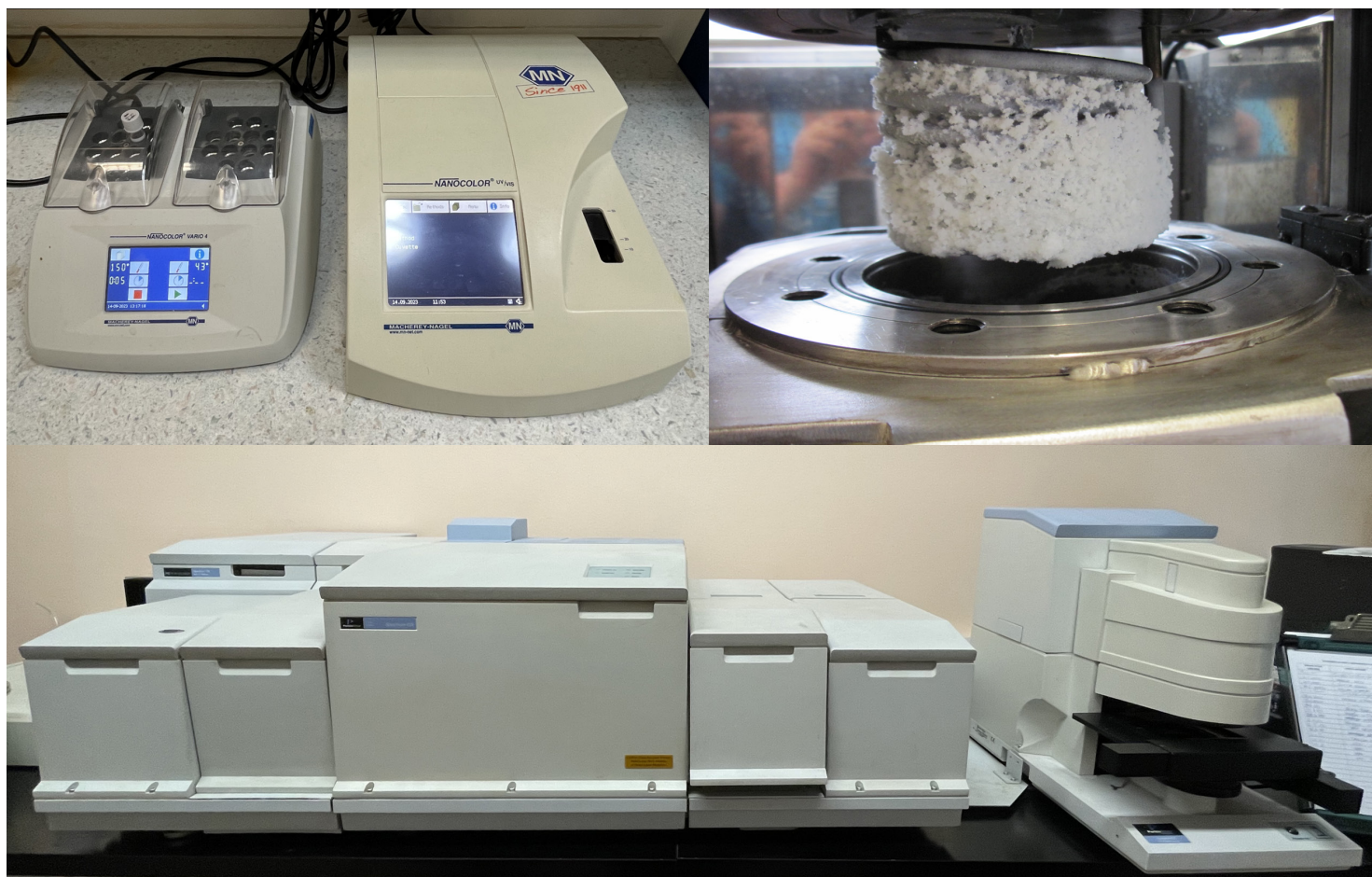
Laboratory for Chemistry and Environmental Protection

Vodja laboratorja | Head of the Laboratory: izr. prof. dr. Julija Volmajer Valh

Osnovni dejavnosti Laboratorija za kemijo in okoljevarstvo (LKO) sta izobraževanje in raziskovalno delo na področju kemije, organske kemije, analiznih metod, recikliranja in proučevanja negativnega vpliva tekstilnih in plastičnih odpadkov na okolje. V laboratoriju izvajamo spektroskopsko karakterizacijo ATR FTIR in RAMAN analizo, analizo UV/VIS in spektroskopsko karakterizacijo na mikroravni z mikroskopijo FTIR. Splošna karakterizacija vod, ki obsega določanje različnih parametrov, kot so trdota, pH, električna prevodnost, motnost, obarvanost, KPK, BPK, TOC vrednosti in določanje težkohlapih lipofilnih snovi (TLS) ter testiranje toksičnosti z uporabo metode Vibrio Fisheri, je prav tako del storitev, ki jih ponuja laboratorij. Raziskovalno je skupina usmerjena v razvoj novih tehnologij čiščenja odpadnih voda s pomočjo naprednih oksidacijskih postopkov ter v kemijsko in termomehansko recikliranje tekstilnih in plastičnih materialov, z namenom pridobitve novih sekundarnih surovin.

The main activities of the Laboratory for Chemistry and Environmental Protection (LCE) are education and research in the fields of Chemistry, Organic Chemistry, Analytical Methods, Recycling, and the study of the negative impact of textile and plastic waste on the environment. The laboratory performs ATR FTIR spectroscopic characterisation and RAMAN analysis, UV/VIS analysis and micro-level FTIR spectroscopic characterisation. General water characterisation, which includes the determination of various parameters, such as hardness, pH, electrical conductivity, turbidity, colour, COD, BOD and TOC values, as well as the determination of low-volatility lipophilic substances (LLS), and toxicity tests using the Vibrio Fisheri method, is also part of the laboratory's range of services. The group's research focuses on the development of new technologies for wastewater treatment using advanced oxidation processes, and on the chemical and thermomechanical recycling of textile and plastic materials to obtain new secondary raw materials.

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Raziskovalna oprema LKO: Visokotlačni in visokotemperaturni reaktor Büchi, NANOCOLOR Macherey-Nagel in Perkin Elmer Spectrum GX
LKO research equipment: Büchi high-pressure and high-temperature reactor, Macherey-Nagel NANOCOLOR, and Perkin Elmer Spectrum GX

Laboratorij za kemijo in okoljevarstvo

Laboratory for Chemistry and Environmental Protection

Vodja laboratorija | Head of the Laboratory: red. prof. dr. Lidija Fras Zemljič

Odlična kadrovska in infrastrukturna struktura laboratorija omogoča znanstvenoraziskovalno in razvojno delo na področjih polimerov, polimernih materialov, tekstilnih materialov in zelenih tehnologij. Osredotočamo se predvsem na napredno funkcionalizacijo in karakterizacijo polimernih materialov, pri čemer posebno pozornost namenjamo tekstilnim materialom in kompozitom. Cilj naših raziskav je razviti pametne in (več) funkcionalne tekstilije, nanovlakna ter polimerne kompozite za različne namene, kot so bioaktivna embalaža, medicinske in inženirske aplikacije. Pri tem izhajamo iz horizontalnega povezovanja nano- in biotehnologij ter razvijamo (nov) koncept zaprte odpadkovne zanke in okolju prijaznih materialov. Imamo ekspertno znanje ter analitična orodja za določanje fizikalno-kemijskih lastnosti polimernih materialov, zlasti pa se osredotočamo na analizo površin in površinskih pojavov ter na poglobljeno razumevanje interakcij na vmesnih površinah med trdnim in tekočim ter trdnim in plinastim.

The excellent staffing and infrastructure structure of the laboratory enables scientific research and development work in the fields of Polymers and polymer-based materials, Textile Materials and Green Technologies. Our main focus is on advanced functionalisation and characterisation of polymer materials, with a particular emphasis on textile materials and composites. Our research aims to develop smart and (multi-) functional textiles, nanofibres and polymer composites for various applications, such as bioactive packaging, medical and engineering applications. We start from the horizontal integration of nano- and biotechnologies, and develop the (new) concept of closed waste loops and environmentally friendly materials. We have the expertise and analytical tools to determine the physicochemical properties of polymeric materials, with a particular focus on the analysis of surfaces and surface phenomena, and on a deeper understanding of solid-liquid and solid-gas interactions at interfaces.



Razumevanje karakteristik vlaken kot ena od glavnih dejavnosti laboratorija
Understanding fiber characteristics as a core laboratory activity

Laboratorij za oblačilno inženirstvo, fiziologijo in konstrukcijo oblačil

Laboratory for Clothing Engineering, Physiology and Garment Construction

Vodja laboratorija | Head of the Laboratory: **izr. prof. dr. Andreja Rudolf**

Laboratorij za Oblačilno inženirstvo, fiziologijo in konstrukcijo oblačil je formalno nastal leta 1999, njegova geneza pa sega v leto 1985, ko je bil ustanovljen Laboratorij za konfekcijsko tehnologijo, ki se je leta 1992 preimenoval v Laboratorij za oblačilno inženirstvo. Laboratorij je razvila in vodila do leta 2025 red. prof. dr. sc. Jelka Geršak (pripravila besedilo).

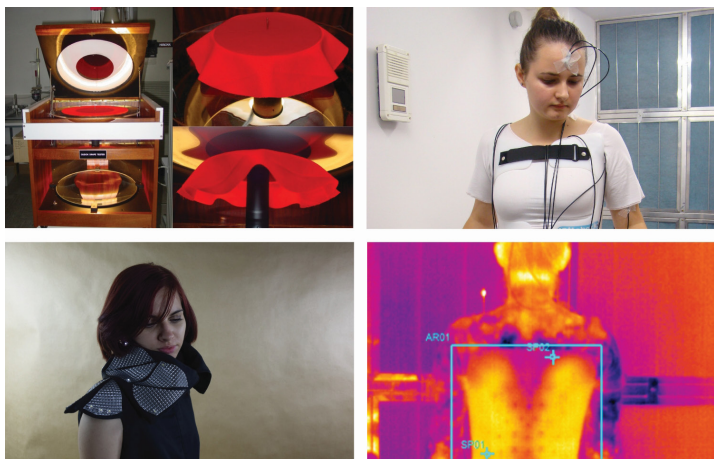
Osnovni dejavnosti laboratorija sta pedagoška in raziskovalna dejavnost. Raziskave so pomemben del dejavnosti, ki potekajo v okviru raziskovalnega programa Oblačilna znanost, udobje in tekstilni materiali (danes: Tekstilna kemija in napredni tekstilni materiali) ter zagotavljajo teoretično in aplikativno podstat za razvoj novih raziskovalnih smeri na področju mehanskega obnašanja fleksibilnih struktur, funkcionalnih, pametnih in inteligentnih oblačil, celovitega zagotavljanja udobja pri nošenju oblačil in oblačilne dediščinske znanosti. Pomemben del raziskav je osredotočen na razvoj inteligentnega oblačila z integriranim personaliziranim nosljivim sistemom, zasnovanim na podlagi umetne inteligence, za detekcijo zamrznjenega koraka in stimulacijo v realnem času za bolnike s Parkinsonovo boleznijo.

Laboratorij je opremljen s sodobno opremo za objektivno vrednotenje fizikalnih lastnosti fleksibilnih ploskih struktur pri malih obremenitvah, toplotnih lastnosti, CAD sistemom za konstruiranje in simuliranje oblačil in drugih tekstilnih izdelkov v virtualnem okolju, 3D body skenerjem za tridimenzionalno zajemanje mer in oblike človeškega telesa ter drugo podporno infrastrukturo.

The Laboratory for Clothing Engineering, Physiology and Garment Construction was established formally in 1999, and its genesis dates back to 1985, when the Laboratory of Clothing Technology was founded, which was renamed the Laboratory of Clothing Engineering in 1992. The laboratory was developed and led until 2025 by Prof. Dr. Sc. Jelka Geršak (text prepared by).

The core activities of the laboratory are educational and research activities. Research is an important part of the activities carried out within the research programme Clothing Science, Comfort and Textile Materials (today: Textile Chemistry and Advanced Textile Materials). It provides the theoretical and applied basis for the development of new research directions in the areas of the mechanical behaviour of flexible flat structures, functional, smart and intelligent clothing, comprehensive provision of comfort when wearing clothing and clothing heritage science. An important part of the research focuses on the development of an intelligent clothing with an integrated personalised wearable system, developed based on Artificial Intelligence, for online freezing of gait detection and real-time simulation for patients with Parkinson's disease.

The laboratory is equipped with state-of-the-art equipment for the objective evaluation of the physical properties of flexible flat structures by low-stress tensile, shear, compression and bending loads, and thermal properties, as well as with a CAD system for the garment construction and simulation of clothing, and other textile products in a virtual environment, a 3D body scanner for three-dimensional acquisition of the human body shape data, and other supporting infrastructure.



Drapiranje, toplotno fiziološke obremenitve oseb, pametna oblačila
Draping, thermal physiological stresses of test subjects, smart clothing



Virtualna rekonstrukcija obleke nadvojvode Janeza in Ane Plohl
Virtual reconstruction of the dress of Archduke Johann and Anna Plochl

Laboratorij za projektiranje in konstrukcijo tekstilij

Laboratory for Fabric Planning and Construction

Vodja laboratorija | Head of the Laboratory: **izr. prof. dr. Polona Dobnik Dubrovski**

Raziskovalna dejavnost laboratorija obsega temeljno, aplikativno in razvojno-raziskovalno delo, ki se osredotoča na področje Tekstilno-mehanskih procesov (klasifikacija ARIS) oziroma Tekstilne tehnologije (klasifikacija CERIF). Glavni poudarek raziskovalnega dela je na načrtovanju in konstruiranju linijskih ter ploskih tekstilij za različne namene uporabe (oblačila, notranjo opremo in tehnične aplikacije). Prav tako se posvečamo posodabljanju procesov izdelave ploskih tekstilij, zlasti posodabljanju procesa digitalizacije priprave za tkanje. Pomembna tematska področja našega raziskovanja vključujejo načrtovanje mehansko-fizikalnih lastnosti klasičnih in tehničnih tekstilij, avksetičnih tekstilij ter drugih fleksibilnih inženirskih materialov, kot so pene, gume, geli, kompoziti in podobno. Poleg tega izvajamo analizo poroznosti tekstilnih in drugih inženirskih materialov, načrtujemo/modeliramo funkcionalne lastnosti tekstilij ter posodabljammo proces vzorčenja in konstruiranja listnih in žakarskih tkanin.

The research activities of the laboratory include basic, applied and R&D work, focusing on Textile Mechanical Processes (ARIS classification) and Textile Technology (CERIF classification), respectively. The main focus of the research work is on the design and construction of linear and flat textiles for various applications (clothing, interiors and technical applications). We also focus on the modernisation of flat textile manufacturing processes, in particular, on the modernisation of the digitalisation process of the preparation for weaving. Important thematic areas of our research include the design of the mechanical-physical properties of conventional and technical textiles, auxetic textiles, and other flexible engineering materials such as foams, rubbers, gels, composites, etc. In addition, we perform porosity analysis of textiles and other engineering materials, design/model functional properties of textiles, and update the process of sampling and construction of dobby and jacquard fabrics.



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Testiranje nateznih lastnosti avksetičnih struktur in načrtovanje žakarske tkanine s CAD-sistemom
Tensile testing of auxetic structures and the design of a jacquard fabric with the CAD system

Laboratorij za tiskanje tekstilij in nego oblačil

Laboratory for Textile Printing and Textile Care

Vodja laboratorija | Head of the Laboratory: **doc. dr. Manja Kurečič**

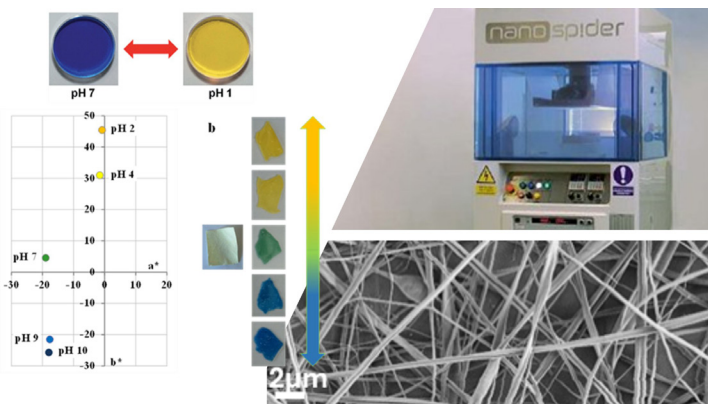
Laboratorij za tiskanje tekstilij in nego oblačil (LTTNO) se ukvarja z izobraževanjem in raziskovanjem na področjih tekstilnega tiska, nege in higiene tekstilij ter razvojem naprednih tekstilnih materialov. LTTNO združuje pomembno raziskovalno opremo in strokovnjake, ki so usposobljeni za izvajanje različnih testiranj ter pristopajo k razvoju sodobnih vlaknatih materialov na inovativen način. V laboratoriju izvajamo klasične tehnologije tekstilnega tiska ter številne analize na področju nege tekstilij, kjer določamo primarne in sekundarne učinke pranja ter analize mikrobioloških parametrov z uporabo bioindikatorjev. Raziskovalci LTTNO se v zadnjem času osredotočajo na problematiko odpadnih pralnih vod in sproščanje mikroplastike oziroma mikrovlaknen med nego tekstilnih materialov, ki predstavljajo veliko breme za okolje. V LTTNO delujemo tudi na področju brizgalnega tiska, kjer razvijamo nove materiale, uporabne kot nosljiva fleksibilna tiskana elektronika. Raziskovalno posegamo tudi na področje razvoja funkcionalnih kompozitnih nanovlaknatih materialov, izdelanih s tehnologijo elektropredenja, uporabnih kot biomedicinski obliži z vključenimi senzorskimi in zdravilnimi lastnostmi, filtrnih materialov ter adsorbentov hlapnih organskih substanc (VOC). Raziskovalci LTTNO sodelujemo v številnih nacionalnih in mednarodnih projektih ter že vrsto let uspešno sodelujemo z industrijo, kjer neposredno prispevamo k tehnološkemu razvoju.

The Laboratory for Textile Printing and Textile Care is a research and development focused laboratory operating within the Chair for Textile Materials and Design. It focuses on two main areas: textile care and hygiene, and textile printing. The laboratory brings together a team of experts with in-depth knowledge in textile materials, printing technologies and care processes. In the area of textile care and hygiene, the laboratory conducts washing and drying performance tests on both household and industrial machines, evaluates the durability and performance of textile materials during repeated care cycles, and studies microplastic release during the washing processes. Special emphasis is placed on developing alternative materials and care methods that minimize the environmental impact. In this context, the laboratory is involved actively in standardisation efforts, and is a member of working groups within the International Electrotechnical Commission (IEC) and the Slovenian Institute for Standardization (SIST) related to microplastics in textile care. In textile printing, the laboratory works on both traditional and advanced techniques, with a strong focus on sustainability. This includes ink jet printing of conductive patterns for smart textiles, classical printing methods using environmentally friendly chemicals, and the incorporation of natural dyes and remedies, particularly for the development of medical and wellness textiles. Through its work, the laboratory supports technological advancements in the textile industry, participates in numerous national and international research projects, and collaborates closely with industrial partners to address practical challenges and promote innovation.

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Razvoj fleksibilne mišične opornice s tiskano elektroniko
Development of a flexible muscle brace with printed electronics



Razvoj halokromnih senzorskih nanovlaknen
Development of halochromic sensing nanofibers

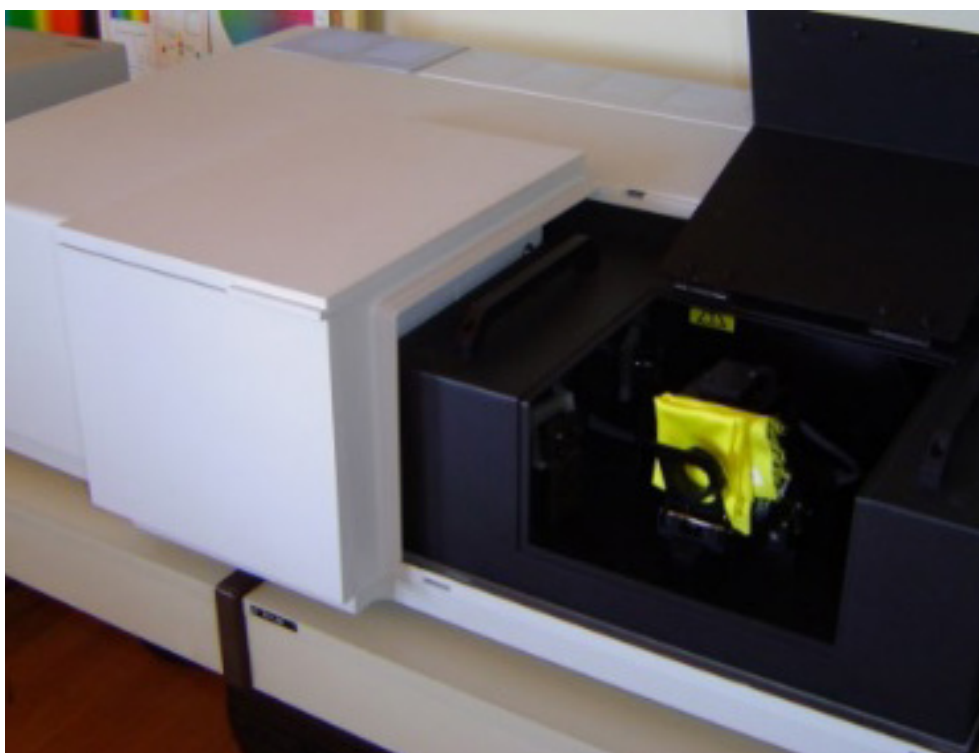
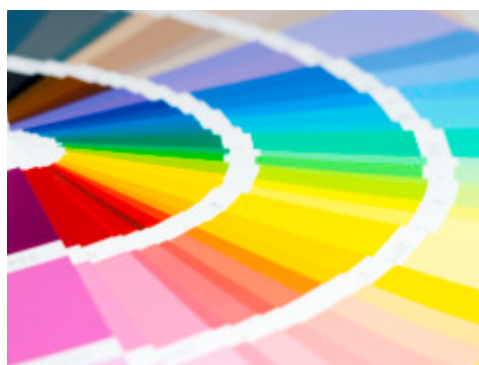
Center za barvanje in barve

Centre for Dyeing and Colour

Vodja centra | Head of the Centre: **doc. dr. Alenka Ojstršek**

Center za barvanje in barve opravlja širok spekter dejavnosti, povezanih z barvnim zaznavanjem in merjenjem barv v različnih industrijskih panogah, kot so tekstil, papirna industrija, arhitektura, umetnost, psihologija, prehrambna industrija, medicina, dediščinska znanost in druge povezane panoge. Njegove dejavnosti vključujejo meritve refleksijskih vrednosti obarvanih vzorcev, določanje barvnometričnih vrednosti in barvnih razlik, merjenje beline, meritve na U-VIS-NIR področju, določanje zaščitnega faktorja vzorcev pred UV-sevanjem, razvoj ekološko sprejemljivih barvalnih procesov, izobraževanje, svetovanje, študije in mnenja. Center ima tudi različne spektrofotometre, sistemizirane barvne karte, sisteme in kataloge. Dejavnosti so ključne za zagotavljanje kakovosti, varnosti in trajnosti barvnih materialov ter procesov v številnih industrijskih panogah.

The Centre for Dyeing and Colour carries out a wide range of activities related to the colour sensing and colour measurement in various industries, such as textiles, paper, architecture, art, psychology, food, medicine, heritage science and others. Its activities include measurements of the reflectance values of stained samples, determination of the colour values and colour differences, whiteness measurements, measurements in the UV-VIS-NIR field, determination of the UV protection factor of samples, development of ecologically acceptable dyeing processes, training, consultancy, studies and opinions. The Centre has a variety of spectrophotometers, systematised colour charts, systems and catalogues. These activities are key to ensuring the quality, safety and sustainability of dyed materials and related processes in a wide range of industries.



Barvni vzorci in spektrofotometer za merjenje na področju U-VIS-NIR
Dyed samples, a spectrophotometer for UV-VIS-NIR measurements and a colour chart

Center za nego tekstilij in oblačil

Centre for Textile Care

Vodja centra | Head of the Centre: **doc. dr. Manja Kurečič**

Center za nego tekstilij in oblačil (CNTO) je FS potrdila 1. januarja 1999. Vse od takrat je s svojo strokovnostjo, večletnimi izkušnjami in znanji vodilni na področju nege tekstilij in tekstilnih izdelkov. Področje nege tekstilij je bilo z leti nadgrajeno z analizo zagotavljanja čistosti, higienskičnosti in razkuženosti negovanih tekstilij. CNTO sodeluje z domačimi in tujimi laboratoriji, inštituti, znanstvenoraziskovalnimi centri in podjetji. Vpet je v temeljne in aplikativne raziskave, katerih rezultate, nova znanja ter veščine posreduje tekstilni industriji, kemičnim čistilnicam in pralnicam, proizvajalcem čistilnih-pralnih-razkuževalnih sredstev, proizvajalcem čistilnih in pralno-sušilnih strojev. Prav tako zbira informacije o novostih na področju nege in higiene tekstilij ter oblačil, izvaja strokovna izobraževanja in usposabljanja.

Established on 1 January 1999 by the FME, the Centre for Textile Care (CNTO) has been a leading institution in the field of Textile and Clothing Care. With a strong foundation of expertise, long-standing experience, and a commitment to innovation, CNTO has advanced knowledge and practice in this domain consistently.

Over the years, the Centre has expanded its focus to include the analysis and assurance of textile cleanliness, hygiene and disinfection, responding to growing demands in both consumer and industrial contexts. CNTO maintains active collaborations with national and international laboratories, research institutes, scientific centres and industry partners.

Its work spans both basic and applied research, with a strong emphasis on knowledge transfer to key sectors, such as the textile industry, laundries, dry cleaners, and manufacturers of cleaning, disinfecting and textile care equipment. In addition, CNTO serves as a hub for monitoring new developments in textile and clothing care, and plays an important role in providing expert education, training and consulting services to professionals in the field.

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Pralna linija Centra za nego tekstilij in oblačil (CNTO)
Washing line at the Centre for textile care (CNTO)

Raziskovalno-inovacijski center za design in oblačilno inženirstvo RICDOI

Research and Innovation Centre for Design and Clothing Science

Vodja centra | Head of the Centre: **red. prof. dr. Jelka Geršak**

Raziskovalno-inovacijski center za design in oblačilno inženirstvo (RICDOI) je bil oblikovan leta 2015 v skladu s potrebami izvajanja, učinkovitega razvijanja, organiziranja in spodbujanja izobraževalnega ter znanstveno-raziskovalnega dela na področju inovativnega designa, oblačilne znanosti in razvoja funkcionalnih in inteligentnih oblačil.

Raziskovalna dejavnost poteka v okviru raziskovalnega programa Oblačilna znanost, udobje in tekstilni materiali, ki se je 1. 1. 2025 pridružil raziskovalnemu programu Tekstilna kemija in napredni tekstilni materiali ter domačih in mednarodnih znanstvenoraziskovalnih projektov. Viden del raziskovalnih dejavnosti je usmerjen na ožje področje oblačilnega inženirstva, eksperimentalno oblikovanje, razvoj oblačil za gibalno omejene osebe, inovativne tehnologije na področju razvoja inteligentnih oblačil, fiziologijo oblačil in udobje pri nošenju ter oblačilno dediščinsko znanost.

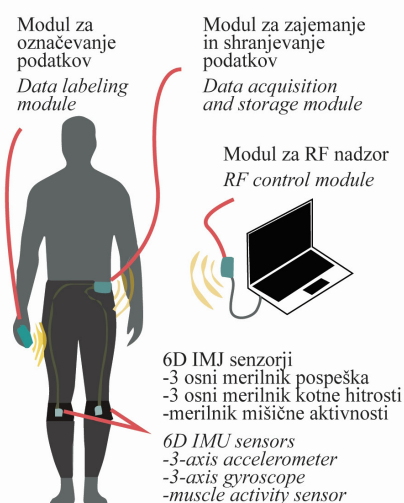
V okviru RICDOI delujeta Laboratorij za oblačilno inženirstvo, fiziologijo in konstrukcijo oblačil ter Modni atelje. Laboratorij je sodobno opremljen z ustrezno opremo in raziskovalno infrastrukturo, ki omogoča kakovostno izvajanje tako znanstvenoraziskovalne kot izobraževalne dejavnosti na širšem področju dejavnosti. Pomemben del raziskovalne infrastrukture predstavlja računalniško krmiljena klima komora za raziskave toplotnega udobja pri nošenju oblačil z ustrezno opremo za merjenje toplotno-fizioloških parametrov – biosignalov testnih oseb.

The Research and Innovation Centre for Design and Clothing Science (RICDOI) was founded in 2015 to meet the needs of implementing, developing effectively, organising and promoting educational and scientific research work in the fields of Innovative Design, Clothing Science and the development of functional and intelligent clothing.

The research activities are carried out in the framework of the Research Programme Clothing Science, Comfort and Textile Materials, which joined the research program Textile Chemistry and Advanced Textile Materials on 1. 1. 2025, as well as national and international research projects. A significant part of the research activities is focused on the narrower field of Clothing Engineering, experimental design, development of garments for the physically challenged, innovative technologies for the development of intelligent garments, clothing physiology and wearing comfort, and Clothing Heritage Science.

RICDOI has a Laboratory for Clothing Engineering, Physiology and Garment Construction and a Fashion Studio. The laboratory is equipped with appropriate modern equipment and a research infrastructure, to enable the quality of both scientific research and educational activities in the broader field of activity. An important part of the research infrastructure is a computer-controlled climate chamber for research on thermal comfort when wearing clothing, with appropriate equipment for measuring thermal-physiological parameters – the biosignals of the test subjects.

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Prepletanje znanosti in oblikovanja: Inovativni projekti RICDOI
Intertwining science and design: Innovative projects RICDOI



Katedra za temeljne in splošne predmete

Chair of Fundamental and General Subjects

Predstojnica katedre | Head of the Chair: doc. dr. Irena Kosi Ulbl

Laboratorij za fiziko

Laboratory for Physics

Vodja laboratorija | Head of the Laboratory: **doc. dr. Robert Hauko**

Osnovna naloga Laboratorija za fiziko je poučevanje fizike na FS. Ob tem smo člani laboratorija raziskovalno aktivni na področjih atomske fizike, biofizike in fizike mehke snovi ter didaktike fizike.

Na področju atomske fizike z metodami rentgenske absorpcije in fluorescence proučujemo večelektronske fotovzbuditve v atomu in analiziramo bližnjo okolico atoma. Večina raziskovalnega dela je opravljena na sinhrotronih v Hamburgu, Grenoblu in Trstu. Merilni tehniki EXAFS in XANES omogočata natančno določanje valence in atomskega okolja izbranega elementa, pri čemer sodelujemo z drugimi raziskovalnimi skupinami na področju materialov in kemijskih reakcij.

Raziskovanje v biofiziki se osredotoča na biološko pomembne molekule, posebej gvanozin ter kratka, z gvaninom bogata DNK-zaporedja. Samourejanje teh molekul v raztopinah proučujemo s sipanjem svetlobe in UV-Vis spektrometrijo, njihovo organizacijo na trdnih površinah pa z mikroskopom na atomsko silo. V fiziki mehke snovi proučujemo tekočerkristalne faze, ki jih tvorijo zgoščene raztopine kratkih, z gvaninom bogatih DNK-zaporedij, s pomočjo optične polarizacijske mikroskopije. Eksperimentalno delo na področju fizike mehke snovi in biofizike poteka v sodelovanju z Institutom Jožef Stefan v Ljubljani.

Na področju didaktike skupaj s študenti raziskujemo nove vsebinske in metodološke pristope pri poučevanju fizikalnih problemov.

The main task of the Laboratory for Physics is to teach physics at the FME. In addition, the members of the laboratory are active in research in the fields of Atomic Physics, Biophysics and Soft Matter Physics and Physics Didactics.

In Atomic Physics, we use X-ray absorption and fluorescence to study multi-electron photoexcitation in the atom and analyse the atom's immediate neighbourhood. Most of the research work is carried out at the synchrotrons in Hamburg, Grenoble and Trieste. The EXAFS and XANES measurement techniques allow precise determination of a selected element's valence and atomic environment, and we collaborate with other groups in material and chemical research.

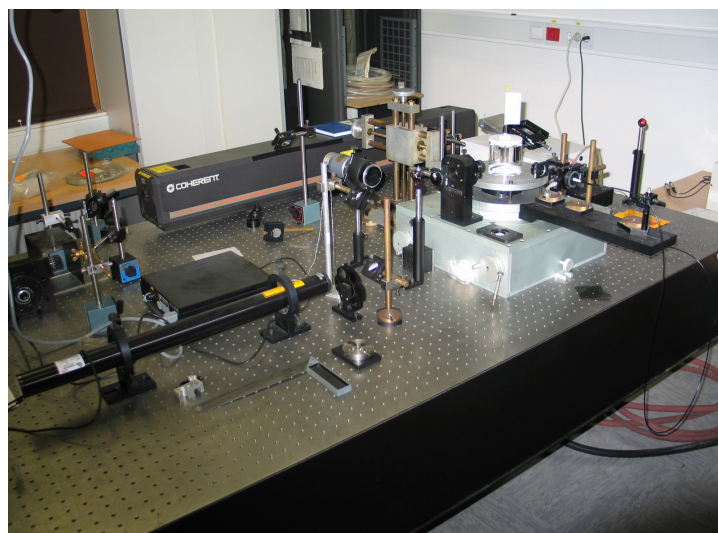
The research in Biophysics focuses on biologically important molecules, especially guanosine and short, guanine-rich DNA sequences. The self-organisation of these molecules in solutions is studied by light scattering and UV-Vis spectrometry, while their organisation on solid surfaces is studied by Atomic Force Microscopy. In Soft Matter Physics, we study the liquid crystalline phases formed by concentrated solutions of short, guanine-rich DNA sequences by means of optical polarisation microscopy. The experimental work in Soft Matter Physics and Biophysics is carried out in collaboration with the Jožef Stefan Institute in Ljubljana.

In the field of Didactics, we work with the students to explore new content and methodological approaches to teaching physics problems.

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Priprava eksperimenta na sinhrotronskem pospeševalniku
Preparing an experiment at the Synchrotron Accelerator



Merilni sistem za dinamično sipanje svetlobe na IJS
Experimental setup for dynamic light scattering at IJS

Laboratorij za matematiko

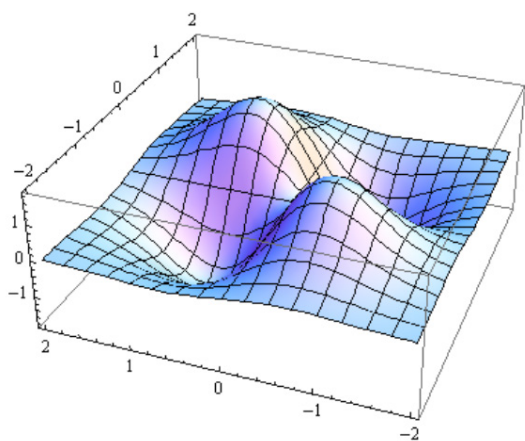
Laboratory for Mathematics

Vodja laboratorja | Head of the Laboratory: **doc. dr. Irena Kosi Ulbl**

Laboratorij za matematiko na FS se osredotoča na poučevanje in raziskovanje matematičnih področij, zlasti teorije grafov in teorije nekomutativnih kolobarjev. V teoriji grafov, ki ima širok spekter aplikacij v fiziki, kemiji, biologiji in drugih vedah, proučujemo modeliranje relacij in procesov. Ta raziskovanja so ključna za razumevanje kemičnih struktur, farmakoloških in bioloških dejavnosti ter za napovedovanje fizikalno-kemičnih lastnosti različnih kemičnih spojin, kar prispeva k optimizaciji iskanja zdravil in drugih kemikalij z želenimi lastnostmi. V drugem delu raziskovalnega dela proučujemo identitete z aditivnimi preslikavami, za katere se izkaže, da so odvajanja, jordska *-odvajanja ali centralizatorji pri določenih pogojih za kolobarje. Ukvarjamo se tudi z reševanjem funkcionalnih enačb na operatorskih algebrah, kjer operatorji delujejo na Banachovih ali Hilbertovih prostorih.

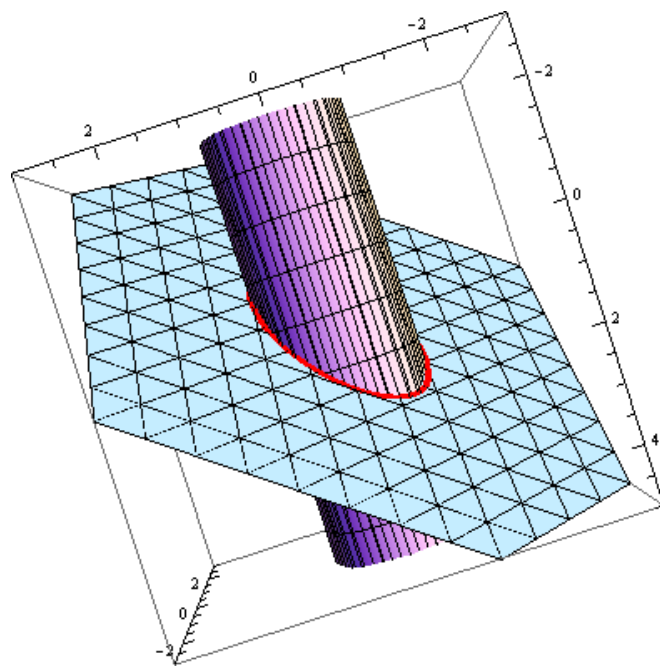
*The Laboratory for Mathematics at the FME focuses on teaching and research in mathematical areas, in particular, graph theory and the theory of non-commutative rings. In graph theory, which has a wide range of applications in physics, chemistry, biology and other sciences, we study the modelling of relations and processes. These studies are key to understanding chemical structures, pharmacological and biological activities, and to predicting the physico-chemical properties of different chemical compounds, which contributes to optimising the search for drugs and other chemicals with desirable properties. In the second part of the research work, we study identities with additive mappings that turn out to be derivations, Jordan *-derivations or centralisers under certain conditions for rings. We are also concerned with solving functional equations on operator algebras, where the operators act on Banach or Hilbert spaces.*

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$$f(x, y) = 10xye^{-(x^2+y^2)}$$

Graf funkcije
Graph of the function



Presečišče ravnine $x+y+z=1$ in valja $x^2+y^2=1$ je elipsa.
Intersection of the plane $x+y+z=1$ and the cylinder $x^2+y^2=1$ is an ellipse



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University of Maribor, Faculty of Mechanical Engineering

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Publikacija Fakultete za strojništvo Univerze v Mariboru predstavlja celovit pregled razvoja, delovanja in vizije ene osrednjih tehniških ustanov v Sloveniji. V uvodnih nagovorih urednika, dekana in rektorja so izražene misli o pomenu fakultete v znanstvenem, izobraževalnem in družbenem prostoru. Zgodovinski del osvetljuje ključne mejnike razvoja fakultete, od njenega nastanka do današnjih dni, ter predstavi vodstvene osebnosti – dekane, prodekane in tajnike – ki so usmerjali njeno pot. Sledi poglobljen prikaz izobraževalne dejavnosti, znanstvenoraziskovalnega in umetniškega dela ter sodelovanja z gospodarstvom in širšim okoljem. Posebna pozornost je namenjena študentom ter izjavami diplomantov, ki odražajo izkušnje in vrednote, pridobljene med študijem. Poglavje o alumnijih povezuje preteklost s sedanjostjo in utrjuje vezi med generacijami. Publikacija predstavi tudi strokovne službe in infrastrukturni razvoj fakultete. Izpostavljena je vloga sodelavk fakultete pri oblikovanju akademskih insignij Univerze v Mariboru, kar poudarja ustvarjalni prispevek fakultete k univerzitetni identiteti. Zaključno poglavje je usmerjeno v prihodnost – strateške cilje in usmeritve za obdobje 2021–2030 ter podrobne opise dejavnosti laboratorijev in centrov, ki predstavljajo jedro raziskovalne odličnosti. Publikacija je tako dokument časa, prostor refleksije in vizija prihodnosti – namenjena študentom, zaposlenim, partnerjem in širši javnosti, ki soustvarjajo zgodbo Fakultete za strojništvo Univerze v Mariboru.

The publication of the Faculty of Mechanical Engineering of the University of Maribor offers a comprehensive overview of the development, activities, and vision of one of Slovenia's central technical institutions. In the introductory addresses by the editor, dean, and rector, reflections are shared on the significance of the faculty from the scientific, educational, and social point of view. The historical section highlights the key milestones in the faculty's evolution, from its foundation to the present day, and introduces the leading figures – deans, vice-deans, and secretaries – who have guided its course. This is followed by an in-depth presentation of educational activities, scientific research and artistic work, as well as co-operation with industry and the wider community. Special attention is devoted to students, along with testimonies from graduates that reflect the experiences and values gained during their studies. The chapter on alumni links the past with the present and strengthens bonds across generations. The publication also presents administrative services and the infrastructural development of the faculty. Emphasis is placed on the contribution of the faculty's coworkers to the creation of the University of Maribor's academic insignia, underlining the faculty's creative role in shaping the university's identity. The concluding chapter looks ahead to the future – strategic goals and orientations for the period 2021–2030, together with detailed descriptions of the activities of laboratories and centres that represent the core of research excellence. Thus, the publication stands as a document of its time, a space for reflection, and a vision of the future – dedicated to students, staff, partners, and the broader public who together shape the story of the Faculty of Mechanical Engineering of the University of Maribor.

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Univerza v Mariboru

Fakulteta za strojništvo