CENTRE FOR MODELLING THE PROSTHETIC APPLIANCES AND SURGICAL OPERATIONS ON THE HUMAN SKELETON – CMPICSU

GENERAL PRESENTATION

The Centre for Modelling the Prosthetic Appliances and Surgical Operations on Human Skeleton is structured as a Multiple User Research Centre (MURC). The MURC connections in Timișoara are: “Politehnica” University, University of Medicine and Pharmacy, Municipal Hospital of Oro-Maxillo-Facial Surgery, Departmental Hospital of Traumatology and Orthopaedy.

The centre also supports the Medical Engineering specialization within the framework of the Faculty of Mechanical Engineering, in order to provide the training of engineers to design: prosthesis, implants, correcting equipment and specialized software for medical applications.

MISSION

The Multiple User Research Centre Centre for Modelling the Prosthetic Appliances and Surgical Operations on Human Skeleton CMPICSU has been created in order to integrate the scientific research results from different universities and hospitals from our country in fields like: acquisition and image processing, biomechanics, implant designing and manufacturing, repairing surgical techniques. Thus, the CMPICSU MURC represents a connecting factor, oriented towards interdisciplinary research and education. Also, CMPICSU centre offers medical imaging investigations for regular patients. The CMPICSU’s extensions are two laboratories: LOPIFO for implants and prosthetic devices manufacturing and CIDUCOS for control the quality of materials (metals, plastic and ceramics, etc) generally biocompatible, focused on implants and prosthetic devices. The last one is under way to be accredited conformably to SR EN ISO/CEI 17025:2005 norm. The most recent extension of the CMPICSU MURC is the Platform of implantology, intelligent prosthetics and biomechanical rehabilitation. The platform is destined to be a union place for research-production and education destined both to interdisciplinary formation of specialists in Medical Engineering and to release integrated solution of diagnosis, prosthetization and mobility and functional rehabilitation.

RESEARCH FIELDS

- Fundamental and applied research in Biomechanics;
- Image acquisition and processing in order to correct congenital or accidental defects of human skeleton;
- Research on prosthetic appliances and implants optimization depending on skeleton defects;
- Complex data basis for different categories of skeleton defects and repairing surgical techniques;
- Conceiving of new surgical techniques;
- New technologies to manufacture surgical implants and prosthetic devices;
- New testing methods designed for various materials but focused on implants and prosthetic devices.

KEYWORDS

Medical imaging, implant, prosthesis, mandibular distracter, surgical technique, biocompatible material, biological structure modelling, 3D reconstruction.

ACTIVITIES

- Image processing and interpretation in order to correct congenital or accidental defects of the human skeleton;
- Prosthetic appliances and implants optimization as function of skeleton defects;
- Complex data basis for different categories of skeleton defects and the repairing surgical techniques;
- New surgical techniques to improve the skeleton structure and the sustaining demo operations;
- Development of appropriate technologies to realize implants and prosthesis using biocompatible materials.
- Manufacturing of implants and external distractors for maxilla-facial surgery, using biocompatible materials, in the LOPIFO Laboratory;
- Development of the production capacity in the Platform laboratories;
- Certification of new prototypes of implants and prosthesis;
Mobility rehabilitation based on gait analysis for patients under recovery and also for the high performance sportmen;

Implementation of quality system in the CIDUCOS Testing Laboratory;

Promoting collaboration in related fields with universities and research institutes;

Promoting the Medical Engineering Specialization including master degree studies in Politehnica University of Timisoara.

Development of PhD programmes in the field of Medical Engineering, for engineers and other specialists in the medical area of rehabilitation and motion recovery

RESEARCH RESULTS

Biological structures reconstruction based on computed tomography;

FE analysis of human mandible, teeth, femur/tibia and spine;

FE analysis of facial implants;

Certified set of maxillo-facial implants and external distracter;

Implants for orthopaedics surgery, both for human patients and animals;

Gait analysis of patients having different locomotor deficiencies.

CMPICSU LABORATORIES

1. Laboratory of structures modelling: professional software for design of both prosthetic devices, implants and surgical operations;
2. Motion planning laboratory: 5 mobile robot systems;
3. Medical Imaging Laboratory: computer tomography system, ortho-panoramic X-ray apparatus and bio resonant equipment both for diagnosis and therapy;
4. Manufacturing Laboratory for implant devices, orthoses and prosthetic devices LOPIFO: equipments to manufacturing prosthetic devices as prototyping and electro erosion equipments;
5. Testing Laboratory CIDUCOS in the final stage of accreditation conforrnably to SR EN ISO/CEI 17025:2005 standard: corrosion test, hardnes test, mass and density determination, metallographic analyses, mechanical tests, spectrometry test;
6. Manufacturing laboratories of Platform of implantology, intelligent prosthetics and biomechanical rehabilitation;
7. Motion analysis Laboratory: systems for stance and gait analysis with integrated force distribution measurement, body band massage device, upright bike, treadmill, and kit for measuring of human physiological parameters.

RESEARCH CONTRACTS

1. Contract A1/GR181/19.05.2006, CNCSIS code 655, type A, Director prof. dr. eng. Doina Drăgulescu, Autonomous prehension system to support handicapped persons and access in dangerous areas Beneficiary: Ministry of Education and Research, value for 2007 year: 30,000 RON


3. Contract CEEX-Medical Sciences Academy no.45/2005, Director prof. dr. eng. Doina Drăgulescu, Development of innovative therapies for osteoarticular reconstruction CELL-ART. Beneficiary: Ministry of Education and Research, total value: 200,000 RON, value for 2007 year: 11,000 RON


5. Platform code CNCSIS 43, Contract MEC no 05/15.09.2006, Platform of implantology, intelligent prosthetics and biomechanical rehabilitation, Director prof. dr. eng. Doina Drăgulescu, total value 8,380,800 RON, value for 2007 year: 180,000 RON

6. Contract 58/GR/19.05.2006, CNCSIS code 95, type TD, Director PhD student Dan Ioan Stoia, Research oriented to improvement of modeling and technological techniques for spine implant Beneficiary: Ministry of Education and Research, value for 2007 year: 19,000 RON

7. Contract 58/GR/19.05.2006, CNCSIS code 93, type TD, Director PhD student Karoly Menyhardt, Research, drawing and manufacturing of intelligent system for upper limb prosthesis, Beneficiary: Ministry of Education and Research, value for 2007: 18,000 RON
8. Contract CNCSIS type BD, CNCSIS code 178, 
Director PhD student Lucian Rusu, 
Precertification studies and research of implants and prosthesis, value for 2007 year: 2,880 RON

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<th>Medical imaging Laboratory</th>
<th><img src="image" alt="Computer tomography system Somatom Plus 4 Power, Printer AGFA" /></th>
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<td><img src="image" alt="Bio resonant equipment DDFAO" /></td>
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<th>Laboratory for motion analysis</th>
<th><img src="image" alt="Treadmill, upright bike and body band massage device" /></th>
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<td><img src="image" alt="Kit for measuring of human physiological parameters" /></td>
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<td>Laboratory for implants and prosthetic devices manufacturing LOPIFO</td>
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<td>Systems for stance and gait analysis with integrated force distribution measurement</td>
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<td>Certified set of maxilo-facial implants and external distracter</td>
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<td>Modelling of implant and distracter use</td>
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<td>Prototyping and electro erosion equipments. Implant during manufacturing process</td>
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<td>Implant manufactured using electro erosion equipment and analysed using Finite Element Method</td>
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Laboratory for control the quality of implant devices CIDUCOS

Microscop Olympus BX51M. Stereomicroscop Olympus SZ7X

Metallographic analyses results

Automatic precision cut-off machine for sectioning materialographic and ceramic specimens Minitom ISOTO

ARL QuantoDesk optical emission spectrometer for metals analysis, based on CCD
PUBLICATIONS

PAPERS IN JOURNALS


13. M. Toth-Taşcău, D.I. Stoia, M. Dreucan, Gait analysis using Zebris measurement system,

PAPERS IN PROCEEDINGS


PhD THESIS - Scientific coordinator prof. dr. eng. Doina Drăgulescu
- Rusu Lucian: Studies and tests of implants and prosthetic devices in against homologation, November 2006

PhD STUDENTS - Scientific coordinator prof. dr. eng. Doina Drăgulescu
- Menyhardt Karoly: Intelligent prosthetic system for human upper limb
- Stoia Dan Ioan: About modeling and setting the appropriate technology for spinal implants
- Dragomir Lavinia: Contributions to mathematical modeling of spaces with obstacles to plan the motion
- Belu Nica Remus: Considerations about welding technologies of thin plates in metallic composite

- Albu Adriana Nicoleta: About expert systems for the diagnose of liver diseases
- Cărăbaş Ionich: Biomechanical study of characteristic motions in running during athletic proofs and handball
- Şimon Andreea Anca: Contributions to the conceiving of a virtual mannequin to model fashion clothes
- Gherghel Daniela: Contribution to prosthetic replacing of mechanical functions of human upper limb
- Biauv Arcadie: Biomechanical studies for improving physical performances of sport-beginners
- Ştefan Vigaru Cosmina: Theoretical and experimental studies about vibration sources and levels produced by some types of looms
- Ungureanu Loredana: Models of human hand rebuilding and its functions

PERSPECTIVES
- Manufacturing new implants models and prosthetic devices in order to be certified conformably to European standards;
- Motion analyzes for lower and upper limb as well as the global static posture of the human body;
- Extention of testing methods for medical devices;
- Further research in the field of 3D reconstruction of human body elements.

RESEARCH TEAM
- Prof.dr.eng. Doina Drăgulescu
- Prof. dr. eng. Mirela Toth-Taşcău
- Assoc. prof. dr. eng. Mircea Dreucean
- Lect. dr. eng. Vlad Morcovescu
- Assist. eng. Cosmina Vigaru, PhD student
- Assist. dr.eng. Lucian Rusu
- Eng. Camelia Demian, PhD
- Eng. Adrian Voicu, PhD
- Eng. Karoly Menyhardt, PhD student
- Eng. Ioan Dan Stoia, PhD student
- CMPICSU partners in Timişoara, Bucharest, Cluj-Napoca, Craiova

CONTACT
Prof.dr.eng. Mirela TOTH-TAŞCĂU
CMPICSU Research Centre Director
Faculty of Mechanical Engineering
Bul. Mihai Viteazu, nr. 1
300222, Timişoara, Romania

E-mail: mirela@cmpicsu.upt.ro
Tel: +40-256-403637
Fax: +40-256-403637
HYDRAULIC MACHINERY DIVISION and the
NATIONAL CENTER FOR ENGINEERING OF SYSTEMS
WITH COMPLEX FLUIDS – NCESCF

GENERAL PRESENTATION
The Hydraulic Machinery Division within the Mechanical Engineering School of the Politehnica University of Timisoara, has been established in 1948, although courses on Hydraulics and Hydroelectric Power Plants have been taught since 1922. For the past half century, the Hydraulic Machinery Division has become an internationally recognized engineering school in turbomachinery hydrodynamics and cavitation, as well as in hydraulic and pneumatic power systems. Moreover, for the past three decades, a research group led by Acad.Prof.dr.doc.eng. Ioan Anton has developed new magnetic liquids and various technical applications.

The National Center for Engineering of Systems with Complex Fluids (NCESCF) is structured as a Multiple User Research Centre. Its research team joins professors and researchers from the “Politehnica” University of Timisoara, Hydraulic Machinery Division, and Romanian Academy – Timisoara Branch. NCESCF coordinates a nationwide research consortium including Politehnica University of Bucharest, Technical University of Civil Engineering From Bucharest, University “Dunarea de Jos” Galati, Technical University from Cluj-Napoca, University “Eftimie Murgu” Resita, and Technical University “Gh. Asachi” Iasi. At international level, NCESCF is actively engaged in academic and research agreements with Ecole Polytechnique Federale de Lausanne, Switzerland, University of Stuttgart, Germany, Luleå University of Technology, Sweden, Laval University, Canada, University of Porto, Portugal. The NCESCF also supports educational activities for master and PhD programs in mechanical engineering and computer science, as well as the Microsoft Academic Program within the “Politehnica” University of Timisoara.

BRIEF HISTORY
- In 1997 was started the first pilot program financed by WORLD BANK (25,000 USD) to set up the basic centre infrastructure;
- The main grant (317,000 USD) was finished in 2002, with the set up of the research infrastructure for the three main laboratories: magnetometry, rheology, and numerical simulation;
- A partnership with Microsoft Company allowed the continuous development and upgrade of the software infrastructure.

In January 2006 we have started the evaluation procedure for NCESCF, resulting in the formal recognition as a national research center by the National University Research Council (CNCSIS). The NCESCF joins now the staff from the Hydraulic Machinery Division and the research team from the Magnetic Liquids Laboratory, in a coordinated scientific research effort.

MISSION
The National Center for Engineering of Systems with Complex Fluids (NCESCF) main goal is to support high level research and education in the domain of complex fluids characterization, production, and application developments. Our three decades experience in producing magnetic liquids and developing engineering applications, as well as in cavitating flow theoretical and applicative studies, allows us to coordinate and support research programs in magnetometry, rheology and magnetorheology of multiphase fluids, nano-fluids, various polymers, as well as on complex hydrodynamic problems in hydraulic machines, hydromechanic equipments, biomedical applications. Our experimental and computational capabilities are able to support top level PhD research programs, as well as international scientific cooperations.

RESEARCH FIELDS
- Mathematical and numerical modelling of complex fluid hydrodynamics, including fluids with complex rheology, two-phase cavitating flows, turbulent 3D flows in complex geometries;
- Mathematical and numerical modelling of turbomachinery swirling flows as well as development and testing of novel flow control methodologies using magnetorheological devices;
Development of research and professional software for parallel computing with applications in engineering hydrodynamics, turbomachines, hydromechanical equipment;

Analysis and optimization of hydraulic turbomachines, in order to improve both efficiency and cavitating behaviour;

Flow properties of magnetic nano-fluids and composites, magnetorheological fluids, polymeric melts, emulsions, gels;

Magnetic and magnetorheological properties of magnetizable complex fluids;

Specially tailored magnetic fluids as cooling agents: nucleate boiling heat transfer under the influence of a magnetic field;

Magnetic and rheological characterization of bio-compatible/bioactive magnetizable fluids, ointments, composites for applications in plant biology and veterinary medicine;

Magnetizable nanocomposite polymers with micrometric reinforcement elements;

Engineering applications: rotating seals for high vacuum and moderate pressures, inductive sensors, MRF dampers;

**KEYWORDS**

Numerical hydrodynamics, cavitation, hydraulic turbines and pumps, hydraulic drives, parallel computing, complex fluids, magnetorheological fluids, magnetizable nanocomposites, magnetic properties, rheological properties.

**ACTIVITIES**

- **Numerical Simulation** in hydrodynamics of turbomachinery and hydraulic equipment and development of software bases for intelligent machines and installations

- **Development of numerical methods** to simulate the flow in turbomachines, cascades and development of complex models to determine the universal characteristics of cascades and turbomachines

- **Constructive solutions** for turbines and micro-turbines and research and design of turbomachines

- **Optimization of hydraulic machinery** using modern numerical methods

- **Cavitation** in turbomachinery with application to Francis and Kaplan turbines, cavitation erosion of materials used for hydraulic machines.

- **Design** of hydraulic drive systems for several industrial applications, modular optimization of the structures and elements of hydraulic drives systems

- **Experimental tests** on standard and proportional hydraulic equipment, using automated acquisition of experimental data

- **Complex characterization** of magnetic nano-fluids and composites, magnetorheological fluids, polymeric melts, emulsions, gels: oscillatory and rotational rheometry, magnetometry;

- **Research and production** of new magnetic nano-fluids, magnetorheological fluids;

- **Application development** using magnetic fluids, in aerospace and bio-medical projects;

- **Numerical simulation** of flows with complex rheology and/or complex geometries, cavitating flows, applications for turbomachinery analysis and optimizations.

- **Software development** customized for special engineering applications;

- **Educational activities** in mechanical engineering and computer science, including master and PhD programs.

**RESEARCH RESULTS**

- Numerical analysis and stability analysis of decelerated swirling flows in hydraulic turbine draft tube; development of novel flow control techniques for Francis turbines operated at partial discharge.

- Full three-dimensional flow simulation and analysis in Kaplan and Francis hydraulic turbines;

- Parallel computing algorithms, development and implementation;

- Technical solutions for micro-hydroturbines and development of design methods for hydraulic turbomachinery design;

- Static and dynamic identification and study of transients in pumps and turbines;

- Hydrodynamics of cavitation with applications to Kaplan and Francis turbines;

- Cavitation erosion studies for materials used in hydraulic turbines;

- Experimental investigations for hydraulic proportional equipment;

- Simulation and analytical modelling of flows in hydraulic poppet valves;

- Advanced characterization methods of the flow and magnetic behaviour of complex fluids and nanocomposites;

- High performance multifunctional materials for magnetically controlled heat transfer processes;

- Rotating seals, sensors, semiactive dampers;

- Biomedical applications.
Jet control of the swirling flow downstream a Francis turbine runner and reduction in pressure fluctuations downstream in the draft tube cone.

Vortex rope mitigation in the draft tube cone of a Francis turbine operating at partial discharge using the jet control technique.

Venous bypass graft, 3D geometrical reconstruction.

Velocity fields representations using particle traces motion.
Evolution of the velocity fields in Achard turbine

Evolution of the vorticity fields in Achard turbine

Pressure coefficient distribution on the NACA 0009 hydrofoil at 2.5 degree angle of attack and cavitation number 0.81

Pressure coefficient distribution of the different turbulence intensity for NACA 0009 hydrofoil at cavitation number =0.81

Magnetic field induced non-Newtonian flow behaviour of a strongly polar magnetic nanofluid

Surface instabilities

**Magnetometry Laboratory**

- VSM 880 magnetometer
- the DMS Vibrating Sample Magnetometer (VSM) is a computer-controlled measurement system capable of characterizing a wide variety of magnetic samples
- The VSM supports all known magnetic measurements such as Hysteresis and Minor Loops, IRM and DCD Remanence Loops, SFD, Delta M and Henkel Plots, and Angular and AC Remanence Loops. Any series of measurements can be run without user intervention, using the flexible *EasyVSM* software.
Rheology Laboratory
The PHYSICA MCR 300 rheometer performs a wide range of steady and dynamic tests in both CSS and CSR mode. It covers a wide range of applications, from generating simple flow curves to the dynamic analysis of complex fluids, melts, and co-polymers:
- Shear stress (CSS), Creep and recovery, Normal force, Stress relaxation, Linear tensile and compression,
- Amplitude sweep, Frequency sweep, Temperature sweep, Time sweep, Multiwave, Oscillation with superimposed rotation or any combination of the above. Our rheometer has additional magnetorheological capabilities, as well as a wide range of temperature settings (up to 300 Celsius).

Numerical Simulation and Parallel Computing Laboratory
Hardware infrastructure:
- 14 HP workstations computer cluster, PIV, 2,2 GHz, 1 GB RAM
- IBM X225 Windows server
- Dual PIII, 2GB RAM Linux server
- 5 workstations, DUAL INTEL XEON 3 GHz, 4 GB RAM.
- TYANPSC supercomputer with 10 processors on 64 bit and 40 GB RAM, data storage of 1.2 TB with fast acces.
Software infrastructure
- FLUENT/FIDAP/POLYFLOW suite for a wide range of numerical flow simulations; available for parallel computing
- TECPLOT for advanced data post-processing
- Software for developing parallel computing applications.

RESEARCH CONTRACTS
2. Taming the Vortex Rope project – TAVORO, contract 2214/19.04.2007 between General Electric Company – Canada and UPT, 20,000 USD, Director Prof.dr.eng. Romeo Susan-Resiga
7. CEEX Contract X2C16/2006 (MARGAS), Subcontract UPT 9256/20.07.2006, Mathematical and numerical model for liquid gas transport with ship, 107,000 RON/2007, Director Prof.dr.eng. Romeo RESIGA.
8. CEEX Contract 51/03.10.2005 (SACOS), Subcontract UPT 11711/05.10.2005, Autonomous Advanced Systems for Structure Oscillation Control, 60,000 RON/2007, Director Dr.fiz. Ladislau Vékás.


17. GRANT CNCSIS 76/23.05.2007 Theoretical and experimental researches regarding the operation of turbomachines with biphasic agent applied to hydrodynamic turbomissions, CNCSIS 2007, 23,500 RON, Director Prof.dr.eng. Mircia Bărglăzan.

18. Assimilation in fabrication of some wind turbines families of low/medium , Contract nr. 661/18.05.2007 Beneficiary: SC CLAGI SRL, Biled, Romania, Contract: 21,000 RON, 2007: 10,000 RON, Contractor "Politehnica" University of Timişoara, Director: Assoc.prof. dr.eng. Teodor MILOS

19. Program Idei, PN II- ID 34/77/01.10.2007 Models Development for the Evaluation of Materials behavior to Cavitation MEDCT, 100,000 RON, Director Prof.dr.eng. Bordeasu Ilare

20. RU 102/14.05.2007, Cod CPV 74233500-6 BC 660/15.05.2007, The analyze regarding the solution of turbine stator reability of hydroagregates from power plants Iron Gates I, Value 25,000 RON, Director prof.dr.eng. Bordeasu Ilare


**PUBLICATIONS**

**BOOKS**


**JOURNAL PAPERS**


2. D. Bica, L. Vekas, M.V. Avdeev, O. Marinica, V. Socoliu, M. Balasoiu, V.M. Garamus Sterically stabilized water based magnetic fluids: Synthesis, structure and properties


27. Pădurean I., Nedelcu D., Experimental researches upon cavitation erosion resistance of the austenitic stainless steel heat treating by solution treatment and nitriding, Scientific Bulletin of the „Politehnica” University of Timisoara, Transactions on Mechanics, Tom 52(66), ISSN 1224-6077, Fasc. 1, pp. 77-82


31. Pădurean I., Nedelcu D., Experimental researches upon cavitation erosion resistance of the martensitic stainless steel GX4CrNi13-4 heat treating by quenching tempering and nitriding, Scientific Bulletin of the „Politehnica” University of Timisoara, Transactions on Mechanics, Tom 52(66), ISSN 1224-6077, Fasc. 5, 2007

32. Pădurean I., Nedelcu D., Influence of structural state on cavitationsal erosion of martensitic stainless steel GX4CrNi13-4 quenching tempering and nitriding, Scientific Bulletin of the „Politehnica” University of Timisoara, Transactions on Mechanics, Tom 52(66), ISSN 1224-6077, Fasc. 5, 2007


35. Tucu Dumitru, Popoviciu Mircea, Rotărescu Vasile, Tiţa Ovidiu, Pădurean Ioan Study Regarding the Influence of Active Yeast 5 „Aglocompact” in the Process of Sparkling Wines Production using the Classis
INTERNATIONAL CONFERENCES


NATIONAL CONFERENCES


7. I.D. Baciu, M. Bărglăzan Calculation of ψ and φ functions, for an axial turbine cascade, by BEM, HERVEX, hidraulica; pneumatica; mecanica fină; elemente de etanșare; scule,mecatonică; dispozitive și echipamente electronice specifice, Ed. XV, Edited by INOE 2000 IHP, Vâlcea, nov. 2007, ISSN 1458-8003

ORGANIZED CONFERENCE

1. 3rd Romanian – German Workshop on Turbomachinery Hydrodynamics, Timisoara, 10-12 May 2007, organized with the University of Stuttgart, Institute of Fluid Mechanics and Hydraulic Machinery, Germany.


3. 2nd IAHR International Meeting of the Workgroup on Cavitation and Dynamic Problems in Hydraulic Machinery and Systems, Timisoara, 24-26 October 2007.
PERSPECTIVES

- Development of new nano-fluid materials and magneto-rheological suspensions, with aerospace and bio-medical applications;
- Development of new numerical simulation techniques for complex 3D cavitating flows.
- Development of new numerical simulation techniques for complex 3D biomedical applications.

RESEARCH TEAM

- Prof.dr.eng. Romeo SUSAN-RESIGA, Director
- Dr.phys. Ladislau VEKAS, Scientific Director, head of the Rheology Laboratory
- Dr.eng. Sandor BERNAD, Executive Director
- Dr.eng. Sebastian MUNTEAN, head of the Numerical Simulation Laboratory
- Assoc.prof.dr.eng. Floriana STOIAN, head of the Magnetometry Laboratory
- Prof.dr.eng. Liviu EUGEN ANTON, Head of the Fluid Mechanics Laboratory
- Prof.dr.eng. Alexandru BAYA, Head of the Hydraulic Turbines Laboratory
- Assoc. prof. dr. eng. Theodor MILOȘ, Head of the Pump Laboratory
- Prof. dr. eng. Ilare BORDEAŞU, Head of the Cavitation Laboratory
- Prof. dr. eng. Victor BĂLAȘOIU, Head of the Power Systems Laboratory
- Acad. prof. dr. doc. eng. Ioan ANTON
- Prof. dr. eng. Iosif PREDA
- Prof. dr. eng. Francisc GYULAI
- Prof. dr. eng. Mircea POPOVICIU
- Prof. dr. eng. Mircea BĂRGLĂZAN
- Lect. dr. eng. Adriana Sida MANEA
- Lect. dr. eng. Eugen DOBÂNDĂ
- Lect. dr. eng. Corneliu VELESCU
- Lect. dr. eng. Adrian BEJ
- Lect. dr. eng. Dorin GALERIU
- Lect. dr. ing. Ioan PĂDUREANU
- Assist. Prof. Ionel BACIU
- Assist. Prof. Rodica BĂDĂRAU
- Assist. Prof. Alin BOSIOC
- Assist. Prof. Daniel Catalin STROIŢĂ
- Assist. Prof. Adrian STUPARU
- Phys. Oana MARINICĂ
- George GIULA
- Florica BALANEAN
- Marianna TODIRUȚĂ
- Ioan POTORAC
- Delia BOLOJAN
- Angela VATAU
- Pavel POBEGA
- Petru IGNEA

PhD STUDENTS

- Lecturer Mircea IVANOIU, Analysis and Optimisation of Hydrofoil Cascades for Efficiency and Cavitation, scientific advisor Acad.Prof.dr.doc.eng. Ioan ANTON.
- Assist. Prof. Daniel BALINT, Numerical Computing Methods for Three-Dimensional Flows in the Distributor and Runner of Kaplan Turbine, scientific advisor Acad.Prof.dr.doc.eng. Ioan ANTON.
- Assist. Prof. Adrian STUPARU, Numerical and Experimental Investigation of the Flow in Centrifugal Pumps, scientific advisor Acad.Prof.dr.doc.eng. Ioan ANTON.
- Inf. Teodora FRUNZA, Methods of the Real Flow Simulation in Hydrofoil Cascades, scientific advisor Acad.Prof.dr.doc.eng. Ioan ANTON.
- Assist.Prof. Rodica BĂDĂRAU, Contributions to the Study of Axial Turbomachines, scientific advisor Prof.dr.eng. Francisc GYULAI.
- Eng. Adrian SIMEDRU, Optimisation of an Axial Hydraulic Turbine Operation, scientific advisor Prof.dr.eng. Mircea BĂRGLĂZAN.
- Assist.Prof. Adriana CATANASE, Dynamic Identification of a Tangential Hydraulic Turbine of Pelton Type, scientific advisor Prof.dr.eng. Mircea BĂRGLĂZAN.
- Assist.Prof. Ionel BACIU, Reversible, Axial Hydrodynamic Profile Cascade Applied to Turbomachinery Design, scientific advisor Prof.dr.eng. Mircea BĂRGLĂZAN.
- Eng. Walter SWOBODA (Germany), Contribution to the Design and Operation Optimisation of the Silica-Chip Wafers Cleaning Equipment used in Semiconductor Technology, scientific advisor Prof.dr.eng. Mircea BĂRGLĂZAN.
- Eng. Ilie Florin SILION, Aerosol Particle Dynamics Applied to the Design of Noxa Washing Machine from Ventilated Air, scientific advisor Prof.dr.eng. Mircea BĂRGLĂZAN.
- Ing. Maria PERNEVAN, Dynamic Identification and Optimisation of the Hydraulic Dampers, scientific advisor Prof.dr.eng. Mircea BĂRGLĂZAN.
- Eng Catalin STROIŢA, Dynamic Identification of Cross-Flow Hydraulic Turbines, scientific advisor Prof.dr.eng. Mircea BĂRGLĂZAN.
- Eng. Alin BOSIOC, Control of the rotation flow in the aspiration tube cone of hydraulic turbines, scientific advisor Prof.dr.ing. Romeo SUSAN-RESIGA.

CONTACTS

Prof.dr.eng. Romeo SUSAN-RESIGA, Director
Tel/Fax: +40-256-403692
E-mail: resiga@mh.mec.upt.ro; romeo.resiga@mec.upt.ro

Prof.dr.ing. Ilare BORDEIASU
Tel: +40-256-403680
E-mail: ilarica@mec.upt.ro
INTEGRATED ENGINEERING RESEARCH CENTRE
I. E. R. C.

GENERAL PRESENTATION AND MISSION
The Integrated Engineering Research Centre (IERC) is organized within the Department of Manufacturing Engineering (TCM), the Department of Mechanical Technology (TM) and the Department of Welding Equipment and Technology (UTS). IERC is organized as a research unit and transfer of technology of the “Politehnica” University of Timisoara. IERC is accredited by the National Scientific Research Council for Higher Education (CNCSIS - Romania) with the certificate CNCSIS no. 103 / CC-C in May 11, 2001.
IERC mission is to coordinate teams of researchers from different departments of the Faculty of Mechanical Engineering, who are developing programs in the integrated engineering field of research.

RESEARCH FIELDS
The main fields of research are:
- Products, processes and manufacturing systems integrated design;
- Processes and manufacturing systems integrated management;
- Products and manufacturing devices new models design;
- Integrated Design of products, manufacturing processes and systems;
- Integrated control of the manufacturing processes and systems;
- New products and manufacturing equipment;
- Welding processes modeling;
- Advanced materials joining;
- Welding technology optimisation using computer;
- Limiting methods for stress and distortion in welded structures;
- Defectology of welded structures;
- The development of the equipments and technologies for non-conventional technological processes;
- Studies referring to the optimization of laser materials processing;
- Studies referring to the development of modern constructive solutions for making of technological equipment from the processional and food industry;
- The creation and the making of piezoceramic traductors for the usage in the construction of technological equipment;
- Studies referring to the degradation of the materials used in technologies equipment and the calculation of the remaining durability of exploitation;
- Optimizing metallic flexible pipes processing.

KEYWORDS

ACTIVITIES
- IERC assure the co-ordination and harmonization of the training programs through scientifically research (PhD. programs, post-graduated programs) for the researchers or research teams of different departments. The post-graduate program developed by IERC is: Integrated Engineering. The PhD. programs coordinated by IERC are in the field of Industrial Engineering.
- The research teams from IERC develop: fundamental and applicative research activities; products and technology design activities; technological development and technology transfer all attending the present industrial demands.
- IERC is involved in national and international research programs, is member of different professional and scientifically organizations and organizes different scientific meetings (seminars, conferences etc.).
- Participation to the EC Sixth Framework Program (FP6) as a partner to a network of excellence project: Virtual Research Lab for a Knowledge Community in Production (VRL-KCiP), contract no. FP6-507487-2.
- Participation to grant competitions through CNCSIS, national programs CEEX, RELANSIN, AMTRANS, INFRAS, MATNANTECH etc.
- Developing of fundamental and applicative research activities, technological development for the present industrial demands, welders’ education and qualification according to EN 287, welding procedures qualification according to EN 288-3 and AD-Mblt. HPO, welders’ certification, according to TÜV requirements, technical supervision of the
pressure vessels, tanks and complete projects according to TÜV requirements.

- IERC members are part of the following professional bodies and associations:
  - EMIRAcle – European Manufacturing and Innovation Research Association, a cluster leading experience
  - AGIR – The General Association of the Engineers in Romania
  - AUIF – Academic Association of Manufacturing Engineering in Romania
  - ARTN – Romanian Association of Nonconventional Technologies
  - ASR – Romanian Welding Society
  - ACM-V – Association for Multidisciplinary Research West Zone
  - AWS – American Welding Society
  - ISL-FD – International Society of Lyophilization-Freeze Drying
  - B.ENG.A – Balkan Environmental Association

**RESEARCH CONTRACTS**


6. Contract CEEX- MIPCUC nr. 758/2006-2007, UPT 10673/11.09.06. The method and equipment for chlorine made and used to water chlorination with direct introduced in network used. Partner director: Prof. Țucu Dumitru, Value: Val. 335,000 lei


9. CNCSIS no. 358/2007, The expensive national and international visibility R&D activities in range of evaluation situation high stressed parts in processed technical systems. Director: Prof. Traian Flăeșor, Value: 63,500 lei

10. CNCSIS 46 GR, 2007-200: Dezvoltarea modelului virtual 3D al articulației de sold prin tehnici CAD/CAM si Rapid Prototyping, Director: Assoc. Prof. Nicolae Crainic, Value: 200,000 lei


12. Marie Curie Cipru Program, Nanocomposite Materials Manufacturing by Ultrasonic Welding (UltraNanoMan), Director assist. prof. Crainic N.


**Prospective:**

- Participation to the EC Seven Framework Program (FP7)
- Participation to grant competitions through CNCSIS, national programs
PUBLICATIONS

BOOKS

PUBLISHED PAPERS
University, Fascicle of Management and Technological Engineering, Volume VI (XVI), ISSN 1454-9166, pp. 246 (abstract), full paper on CD-ROM


23. Tucu, D., s.a.: The considerations on active 5 Agglomcompact effect yeast using in froth wine with “Champenoise” classical method, Revista de Chimie nr. 10/2007, vol.58, ISSN 0034-7752


33. Burcă, M., Glița, G., Dumbravă, D. Căneparu, P., Stoian, C., Proceeding of stud welding with
large diameter, International Conference on Material Science and Engineering BRAMAT 1223-9631, Romania, 2007, pp. 196

35. Petrica, A., Milos, L., Structural transformations of the deposited layers by thermal spraying obtained by heat treating, 13th International Symposium of Metallography”, Stara Lesna, Slovakia, ISSN 1335-1532, pp. 848-852


AWARDS
"Toma Dragos" Award for prof.dr.eng. Tucu Dumitru: The Agriculture and Silviculture Scientific Academy

PhD THESIS

3. Caneparu, P., *Contributions regarding the improvement of mechanized thermal cutting equipment*, Thesis supervisor: Prof.dr.eng. Livius Milos


**PhD Students**


**RESEARCH TEAM**

IERC consists of research teams with common research projects, in three departments: Manufacturing Engineering, Mechanical Technology and Welding Equipments and Technology. The human resources consist of researchers which are doctor degree graduates or which leads post-graduates programs. Also, in the team are working post-graduates and master students.

The IERC management is assured by the director and the Scientific Council, which is composed of professors or associate professors that have been recognized for their research activity and results.

The Scientific Council is composed of the research team leaders.

The members of the research team are:

- Prof. dr. eng. George Drăghici – IERC director
- Prof. dr. eng. Livius Milos – team leader
- Prof. dr. eng. Gheorghe Gliţă – team leader
- Prof. dr. eng. Traian Fleşer – team leader
- Prof.dr.eng. Richard Herman – team leader
- Prof.dr.eng. Dumitru Mnerie – team leader
- Prof. dr. eng. Dumitru Țucu – team leader
- Prof. dr. eng. Petru Suru
- Assoc. prof. dr. eng. Ion Grozav
- Assoc. prof. dr. eng. Eugen Pămîntaș
- Assoc. prof. dr. eng. Viorel Putz
- Assoc. prof. dr. eng. Florin Grosu
- Assoc. prof. dr. eng. Ioan Pirea
- Assoc. prof. dr. eng. Dănulţ Şosdean
- Lect. dr. eng. Adrian But
- Lect. dr. eng. Cristian-Gheorghe Turc
- Assist. Eng. Felicia Banciu
- Assist. Eng. Lidia Dejeu
- Eng. Alin Schmidt, PhD student
- Prof. dr. eng. Voicu Safta, Academic of European Science and Arts, Academic of Technical Science from Romania
- Assoc. prof. dr. eng. Mihaela Popes
- Lect. Dr.eng. Dan Mălai
- Lect. dr. eng. Doru Dumbravă
- Lect. dr. eng. Mircea Burcă
- Lect. Dr.eng. Daniel Țunea
- Assist.eng. Aurelian Magda
- Eng. Eduard Berger – PhD student
- Prof. dr. eng. Aurel Mărcușanu
- Prof. dr. eng. Mihai Ghiță
- Prof. dr. eng. Vasile Popovici
- Prof. dr. eng. Titus Slavici
- Assoc. prof. dr. eng. Nicolae Crainic
- Assoc. prof. dr. eng. Mircea Olariu
- Assoc. prof. dr. eng. Eugen Cicală
- Assoc. prof. dr. eng. Antoniu-Levay Reviczky
- Assoc. prof. dr. eng. Mircea Văsilescu
- Lect. dr. eng. Traian Botea
- Lect. dr. eng. Ioan Groza
- Assist. dr. eng. Sorin Ignat
- Eng. Alina Simoiu, PhD student
- Eng. Nicoleta Popescu, PhD student
- Eng. Adelina Han, PhD student
- Eng. Simona Achim, PhD student

**CONTACT**

Prof.dr.eng. George DRĂGHICI – IERC Director  
Faculty of Mechanical Engineering  
Bul. Mihai Viteazu, nr. 1  
300223, Timișoara, Romania  
Tel/fax: +40-256-403610  
Fax: +40-256-403523  
Web: [http://www.mec.utt.ro/~tcm/ccii_ro.html](http://www.mec.utt.ro/~tcm/ccii_ro.html)  
E-mail: gdraghici@eng.upt.ro
RESEARCH CENTRE FOR PROCESSING AND CHARACTERISATION OF ADVANCED MATERIALS

MAIN RESEARCH FIELDS
Examinations and thermal analysis, design and elaboration of advanced materials and improvement of the processing technologies, thermo-mechanical processes for improving materials characteristics, training and consulting for specialists from the industry in the field of investigations, technology and designing of materials.

- Studies and investigations on metallic glasses Fe-Ni-P and Fe-Cr-P
  **Keywords:** amorphous alloy, liquid quenching, ribbons, powders, thermo-stability, magnetic properties

- Studies and researches on behaviour of materials during welding and weldability of materials
  **Keywords:** weldability, welding, microstructural investigations, mathematical modelling

- Manufacturing and characterization of advanced materials
  **Keywords:** amorphous, metallic matrix composites, stainless steels, micro-alloyed steels

- Increasing fiability of machine parts by mean of surface treatments and use of advanced materials
  **Keywords:** plasma nitriding, gas carbonising, surface inductive treatment

- Modern investigation of materials structure and properties, image acquisition and processing in optic and electronic microscopy
  **Keywords:** digital photo camera, computer aided image processing, image archive

STUDIES AND INVESTIGATIONS ON THE METALLIC GLASSES Fe-Ni-P AND Fe-Cr-P
FIELD DESCRIPTION
Metallic glasses are a new class of materials used in applications that require high saturation magnetic induction and low magnetic loss, in high strength fibres and for magnetic shielding.

ACTIVITIES AND RESULTS
Researches on Fe-Ni-P and Fe-Cr-P amorphous alloys allowed designing of an elaboration technology and corresponding facilities for amorphous ribbons and powders.

The properties of the obtained ribbons and powders were studied by X-ray analysis, in order to observe the materials amorphous change. The researchers aim is to obtain magnetic materials with outstanding properties.

SHAPE MEMORY ALLOYS
FIELD DESCRIPTION
The shape memory alloys are materials with a large number of interesting properties as: shape memory effect, pseudoelastic behaviour and high dumping capacity.

ACTIVITIES AND RESULTS
Researches on Fe-Ni-P and Fe-Cr-P amorphous alloys allowed designing of an elaboration technology and corresponding facilities for amorphous ribbons and powders.

The properties of the obtained ribbons and powders were studied by X-ray analysis, in order to observe the materials amorphous change. The researchers aim is to obtain magnetic materials with outstanding properties.

METAL MATRIX COMPOSITES
FIELDS DESCRIPTION
Particle reinforced metal matrix composites are relatively new class of materials witch combine high mechanical properties with cost that are significant lower in comparison with long fibber reinforced composites.

ACTIVITIES AND RESULTS
A new class of particle reinforced composites based on a hardenable Al-Cu-Si-Mg reinforced with SiC particles (10 µm average dimension) has been produced via a powder metallurgy technique.

Significant progresses have been made in technological optimisation, as well as the characterization of some important mechanical properties and the structural changes during heat treatment or thermo-mechanical processing of the materials.

TECHNOLOGY AND EQUIPMENT FOR INDUCTION HARDENING
FIELD DESCRIPTION
Surface treatments are important in order to improve exploitation characteristics of wear stressed machine parts. Induction hardening is the proper treatment for cylindrical parts and plane surfaces, applied in serial manufacturing.
ACTIVITIES AND RESULTS
The research team developed and optimised surface hardening technologies by inductive treatment of different machine parts as: camshaft, guide conduit, inner cylindrical surfaces. A significant reduction of heating time and improve of exploitation characteristics of stud and railway switches was obtained.

INCREASE OF RELIABILITY ON DIFFERENT MACHINE PARTS BY SURFACE ENGINEERING

FIELD DESCRIPTION
Modern technology requires high quality machine parts with improved mechanical properties and reduced specific weight. Surface treatment as plasma nitriding and gas carburising on medium and high alloyed steels are meant to improve wear and fatigue strength, together with good behaviour in presence of dynamic stresses.

ACTIVITIES AND RESULTS
Advanced researches on plasma nitriding, gas carburising on medium and high alloyed steels, surface inductive treatment offer ready-to-use treatment technologies at industrial scale for high quality machine parts.

MODERN INVESTIGATION OF MATERIALS STRUCTURE AND PROPERTIES, IMAGE ACQUISITION AND PROCESSING IN OPTICAL AND ELECTRONIC MICROSCOPY

FIELD DESCRIPTION
Optical and electronic microscopy are investigation methods that provide complete information concerning the structure of materials. Computer aided acquisition and processing of images aloud the increase of the above methods’ efficiency, for quantitative as well as qualitative measurements.

ACTIVITIES AND RESULTS
The improvement of the investigation equipment and the image acquisition and processing methods lead to the increase of the metallographic investigations results (image quality, measurements precision).

MAIN PUBLICATIONS

BOOKS

PUBLISHED PAPERS
10. I. Mitelea, C. Codrean, *Conventional metallic glasses and bulk amorphous alloys*, Scientific


15. C. Craciunescu, V. Budau, I. Mitelea, *Microstructural observations of the fracture surface of shape memory alloys ribbons*, Scientific Bulletin of the “Politehnica” University of Timisoara, Transactions on Mechanics, Tom 52(66), Fasc. 2, pag 57-60, ISSN 1224-6077


17. S. Duma, *Study regarding the acquisition of gauge blocks for transmitting the Brinell HBW hardness scales*, Scientific Bulletin of the “Politehnica” University of Timisoara, Transactions on Mechanics, Tom 52(66), Fasc. 2, pag 93-98, ISSN 1224-6077


22. C. Codrean, V.A. Şerban, D. Uţu, I. Chineaca, *Some Aspects Concerning Crack Sensitivity of Austenitic Manganese Steel During Laser Beam Welding*, Scientific Bulletin of the „Politehnica” University of Timisoara, Mecanica, Tom 52(66), Fasc. 8, pp 7-12, ISSN 1224-6077


microhardness change after 980 nm high power diode laser irradiation, World Federation for Laser in Dentistry, European Division, First Meeting, Nice, France, 27-28th April, 2007, poster


PhD THESIS

1. Teodora Maghet, Morphology and properties of MCrAlY layers deposited through HVOF thermal spray, Scientific Coordinators: Prof. dr. eng. I. Mitelea, Prof.dr.eng. W. Brandl

2. Camelia Demian, Researches regarding the behavior of osseous implantation materials according to quality European standards, Coordinator Prof.dr.eng. Viorel Serban

3. Adrian Voicu, Studies regarding the biocompatibility of surgical human implants made from titanium alloys, Coordinator Prof. dr. eng. Viorel Serban

4. Remus Belu Nica, Contributions regarding the processing and welding joining of some thin sheets made of Al based alloys matrix composites, Coordinator Prof. dr. eng. Viorel Serban

RESEARCH CONTRACTS

1. Contract No. 46 GR/11.05.2007 T58 Grant: Studies upon the improvement of the HVOF sprayed MCrAlY, Director: As.dr.ing. Ion Dragos Utu, Value: 75,000 lei


3. Contract No. 591/ 30.01.2007, Evaluation and determination of physical and chemical characteristics of some steel verified at inspections conducted by ISIM Timisoara, Director: Assoc. prof. dr. eng. Raduta Aurel, Value: 580 LEI

4. Contract No. 597/ 06.02.2007, Technical assistance and consultancy in the field of product quality from the current production of Zoppas Industries Romania, Zoppas Industries Romania SRL, Director: Assoc.prof.dr.eng. Raduta Aurel, Value 350 Lei

5. Contract No. 663/ 28.05.2007 - Technical assistance and consultancy in the field of quality for materials, tools and semi-products in the current production line, - S.C. Alcoa România SRL - Director: Assoc. prof. dr. eng. Raduta Aurel, Value: 3,000 LEI


8. Contract No. 728/ 03.08.2007 - Analysis and tests for the verification of the stress state of the sluice gate of the Iron Gates concerning the stresses induced in the filling welding - S.C. Institutul de Studii și Proiectări Hidroenergetice SA - Director: Assoc. prof. dr. eng. Raduta Aurel, Value:10,948 LEI


10. Contract No. 740/2007 - Technical assistance and consultancy in the field of quality for materials, tools and half finished products from the current production line - Dura Automotive Romania - Director: Assoc. prof. dr. eng. Nicoara Mircea, Value: 4,000 LEI


14. Contract No. 643/2007 - Technical assistance and consultancy in the field of quality for tools, equipment and products in the current production line of Contitech


19. Contract No. 41-091/2007 Reconstruction of osseous segmentary defects using biomimetic matrix colonized with osseo genetic cells, RECON-OS, Director: Prof. dr. eng. Cucuruz Roland, Value: 10,000 LEI

20. Contract No. 66/01.10.2007 Program IDEI, ID-18, Bulk amorphous and nanocrystalline ferromagnetic alloys with applicability in making magnetic screens, Director: Prof. dr. eng. Serban Viorel, Value: 90,000 LEI


22. Contract No. 582/2007 Technical assistance and consultancy regarding spare parts used for tractors and agriculture machines, Director: Prof.dr.eng. Cucuruz Roland, Value 1,870 LEI

23. Contract No. 621/2007 Researches regarding high productivity welding processes with applications in the machine industry, Director Prof.dr.eng.Mitelea Ion, Value 5,000 LEI

24. Contract No. 688/2007 Amorphous ribbons made from amorphous alloys, with 0.03X5X2000 mm size, Director: Dr.eng. Codrean Cosmin, Value: 500 LEI


RESEARCH TEAM

- Prof. dr. eng. Ioan CARŢIŞ
- Prof. dr. eng. Marin TRUŞCULESCU
- Prof. dr. eng. Ion MITELEA
- Prof. dr. eng. Victor BUDĂU
- Prof.dr.eng. Roland Laurentiu CUCURUZ
- Prof. dr. eng. Viorel Aurel ŞERBAN - Director
- Prof. dr. eng. Livius UDRESCU
- Assoc. prof. dr. eng. Aurel RĂDUŢĂ
- Assoc. prof. dr. eng. Mircea NICOARĂ
- Assoc. prof. dr. eng. Bogdan RADU
- Assoc. prof. dr. eng. M. CRĂCIUNESCU
- Lecturer dr. fiz. Marin LIŢĂ
- Lecturer dr. eng. Sebastian Titus DUMA
- Lecturer dr.eng. Cosmin CODREAN
- Assist. eng. Carmen OPRIŞ
- Assist. eng. Cosmin LOCOVEI
- Dr. eng. Dragoş UŢU
- Drd. eng. Diana Carmen POPESCU
- Drd. eng. Radu Alexandru ROŞU
- Eng. Angela ZIMCEA
- Eng. Miron GAVRILONI
- Eng. Adrian Voicu

Contact

Dr. eng. Sebastian Titus DUMA
Email: sduma@eng.utt.ro
Tel: +40-256-403751
RESEARCH CENTRE FOR QUALITY IN MECHANICAL TRANSMISSION, PRECISION MECHANICS AND MECHATRONICS

GENERAL PRESENTATION

The research centre was founded in 11.05.2001 by the teaching staff of the Mechanisms and Machine Parts’ Department. The research centre was recognized by CNCSIS as a C type centre with certificate number 71/CC-C/11.05.2001. From 2002, the research centre belongs to the Mechatronics’ Department from „Politehnica” University of Timisoara.

The head of the research centre is Prof. Dr. eng. Inocentiu Maniu: Inocentiu.Maniu@mec.upt.ro

The major research domains are:

- Mechanical Transmission;
- Precision Mechanics;
- Mechatronics and Robotics

The main research topics are:

- Mechanisms;
- Machine design and parts for precision mechanics and mechatronics;
- Tribology;
- Instrumentation and metrology;
- Optical and opto-electronical apparatus;
- Biomedical apparatus (medical robotics and medical investigation);
- Robotics;
- Mechatronics;
- Simulation and artificial intelligence;
- Finite element analysis;
- Internet teleoperation;
- Domestic robots;
- Prosthesis;
- Sensors and Actuating systems;
- Computer Aided Design;
- Virtual reality;
- Computer Aided Quality, Quality Assurance, Quality Management.

The research centre was founded in order to:

- coordinate the scientific fundamental studies:
  - mechanisms and mechanical transmission;
  - robotics, precision mechanics and mechatronics;
  - biomedical techniques; instrumentation and control;
  - develop of applied studies in different research projects for economical societies.

The research team disseminates the results in various publications: books, papers presented at national and international symposia, congresses etc.

MAIN RESEARCH FIELDS

- Theoretical and experimental research of mechanisms and mechanical drives.
  Keywords: gears, belts, linkages, cams, aviators, tribology, finite element method.
- Robotics
  Keywords: robots, flexible fabrication systems, CIM systems, modelling/simulation and artificial intelligence.
- Studies and researches in the precision mechanics field and mechatronics.
  Keywords: measuring devices, transducers, metrology, quality assurance and optical systems.
- CAD, artificial intelligence and virtual reality.
  Keywords: 3D modeling, virtual reality, finite element method.

Researches in MECHANISMS AND MECHANICAL DRIVES

FIELD DESCRIPTION

- theoretical study, design and tests of special purpose mechanisms and mechanical drives, cams and linkages, mechanical variators, behavior of machine elements and mechanisms
- tribological behavior of machine elements and mechanisms
ACTIVITIES AND RESULTS
- Collective competence used in computer aided design for general purpose or special mechanical drives (gears, belts, synchronous - belts etc.)
- Software for gears, cams and linkages design
- Improvement of mechanisms and machine elements standardization. Studies for service life increase and reducing of wear

RESEARCH TEAM
- Prof.dr.eng. Dan PERJU
- Prof.dr.eng. Francisc KOVACS
- Prof.dr.eng. Octavian GLIGOR
- Prof.dr.eng. Lucian MĂDĂRAS
- Prof.dr.eng. Voicu MESAROȘ-ANGHEL
- Prof.dr.eng. Inocențiu MANIU
- Prof.dr.eng. Arjana DAVIDESCU
- Assoc.prof.dr.eng. Francisc IOANOVICI
- Assoc.prof.dr.eng. Erwin-Christian LOVASZ
- Assoc.prof.dr.eng. Iosif CĂRĂBAȘ
- Assoc.prof.dr.eng. Mircea DREUCEAN
- Assoc.prof.dr.eng. Veronica ARGEȘANU
- Assoc.prof.dr.eng. Carmen STICLARU
- Assist.eng. Ioan COTA
- Lect. Dr.eng. Angela DREUCEAN
- Lect. Dr.eng. Dan MĂRGINEANU
- Lect. Dr.eng. Andreea DOBRA
- Lect. Dr.eng. Rodica MILITARU,
- Lect. Dr.eng. Mihaela JULA,
- Assist.eng. Adriana TEODORESCU.

RESEARCH OFFERS
- Computer aided design of special purpose mechanisms and mechanical drives
- Automatic equipment, reducers and gears
- Design and testing of cam and linkages
- Studies with finite element method.

FIELD DESCRIPTION
Fundamental and applied research in the field of the automation of flexible manufacturing processes, of computer aided design, as well as related to the component equipment’s and techniques of flexible manufacturing systems.
RESEARCH BENEFICIARES
Ministry of Education, Ministry of Research and Technology, Fraunhofer Institute IPA Stuttgart, Germany, Technical University of Dresden

RESEARCH TEAM
➢ Prof.dr.eng. Francisc KOVACS
➢ Prof.dr.eng. George SAVII
➢ Prof.dr.eng. Corneliu RĂDULESCU
➢ Prof.dr.eng. Valer DOLGA

➢ Prof.dr.eng. Valeria VĂCĂRESCU
➢ Prof.dr.eng. Voicu MESAROȘ-ANGHEL
➢ Prof. dr. eng. Inocenţiu MANIU
➢ Assoc.prof.dr.eng. Mirea DREUCEAN
➢ Assoc.prof.dr.eng. Nicolae DEHELEAN
➢ Lect. Dr. eng. Sanda GRIGORESCU
➢ Lect. Dr. eng. Anca POPA
➢ Lect. Dr. eng. Aurel DIACONU
➢ Lect. Dr. eng. Milenco LUCHIN
➢ Lect. Dr. eng. Marius MATEAȘ
➢ Assist. eng. Adrian RADU

RESEARCH OFFERS
➢ On- and off-line diagnosis of flexible manufacturing systems components.
➢ Factory transports flexibility. Conception and industrial implementation of flexible manufacturing systems.
➢ Conception and different types of sensors. Modernizing methodologies of NC equipment’s.
➢ Methodologies for integration of equipment purchased from heterogeneous manufacturer in unitary production systems.

Researches in PRECISION MECHANICS

FIELD DESCRIPTION
The research in the field of precision mechanics deals with the improvement of the measurement techniques, apparatus and precision mechanics equipment’s, as well as quality assurance in mechatronics.

ACTIVITIES AND RESULTS
• The analysis, synthesis and testing of apparatus and precision mechanics equipment’s
• modern laboratory techniques and quality assurance
• CAQ.

RESEARCH BENEFICIARES
Direcția Sanitară Județeană Timiș, S.C. Optica Timișoara, INCDFM București, Ministry of National Education (CNCSIS), Siemens Automotive VDO.

RESEARCH TEAM
➢ Prof.dr.eng. Dan PERJU
➢ Prof.dr.eng. Octavian GLIGOR
➢ Prof.dr.eng. Ioan NICOARĂ
➢ Prof.dr.eng. Alfred POMMERSHEIM
➢ Prof.dr.eng. Gérege SAVII
➢ Prof.dr.eng. Valeria VĂCĂRESCU
➢ Prof.dr.eng. Valer DOLGA
➢ Prof.dr.eng. Ariana DAVIDESCUC
➢ Assoc.prof.dr.eng. Corina GRUESCU
➢ Assoc.prof.dr.eng. Erwin-Christian LOVASZ
➢ Assoc.prof.dr.eng. Nicolae DEHELEAN
➢ Lect. Dr.eng. Marius MATEAȘ
➢ Lect. Dr.eng. Liana DEHELEAN
➢ Lect. Dr.eng. Adrian George RADU
➢ Lect. Dr.eng. Andreea DOBRA
➢ Assist.eng. Adriana TEODORESCU

RESEARCH OFFERS
➢ Modern techniques for metrological testing. Measuring instruments and equipment’s for quality control.
➢ Optical and optoelectrical equipments. Biomedical apparatus.

PUBLICATIONS

BOOKS
1. Davidescu A. Statistical process control. Matlab applications, 238 pages, Politehnica

**PUBLISHED PAPERS**

14. Dolga V., Dolga L. *The education in Mechatronics at the „Politehnica” University of Timisoara, between tradition and the Bologna declaration 12th IFTOMM World Congress, Besançon, France;
20. Varga S., Radulescu C. *A New Unitary Synthesis Method of Line Generator
Mechanisms for Flexible Manufacturing Systems, Devices 12th IFToMM World Congress, Besançon, France, vol. 5, pp. 441-446;  
22. Sticlaru C., Davidescu A. Comparative Study of Fixation Devices for Intertrochanteric Fractures 12th IFToMM World Congress, Besançon, France, vol 1, pp. 118-123;  
23. Radulescu C., Varga S., Grigorescu S. Calibrating procedure by teach-in Robotized flexible manufacturing system 18th International DAAAM SYMPOSIUM, "Intelligent Manufacturing & Automation: Focus on Creativity, Responsibility and Ethics of Engineers", pp. 353-360;  
28. Dobra A. Proposal type of database for robot end effectors application and accessibility variant, Robotica & Management vol. 11, 13-16, ISSN 1453-2069;  
42. Gruescu C., Nicoară I. Closed-loop transmission test stands – specific parameters and optimization, Review of mechanical engineering and electrotechnics, Sofia, Bulgaria, nr. 12, pp. 64-67, ISSN 0025-455X;
43. Gruescu C., Nicuță I. Energetic optimization of closed-loop transmission test stands using the multicriteria method ELECTRE III, Review of Mechanical Engineering and Electrotechnics, Sofia, Bulgaria, nr. 12, pp. 68-71, ISSN 0025-455X;
44. Popa M., Popa A., Ciocarlie H. Mobile Telephony with Pocket PC’s Phone Edition, WSEAS Transactions on communications, Issue 1, vol. 6, pp. 125-130, ISSN 1109-2742;

GRANTS / RESEARCH PROGRAMS

1. Researches on using the robotic systems for the enhancement of the technical and economical competitiveness in Romanian industry, 21 CEEX I 03 / 07.10.2005, Director: Prof.dr.eng. Maniu Ioan, Value for 2007: 300,000 lei;
2. Nanomaterials with controlled porosity and magnetic & optical properties, obtained by sol-gel and sono-synthesis method, with
potential applications in environment protection, biology and medicine, CEEX P-CD/98-9-11750/2005. Director: Prof.dr.eng. Savii George, Value for 2007: 130,000 RON


5. Simulation, Control and Testing Platform with applications in mechatronics (ConMec) 112 CEEX II 03/2007, Director: Prof.dr.eng. Dolga Valer, Value for 2007: 94,000 lei;

6. Intelligent CAD Methods used for customized design of bone system deficiency corrections CNCSIS 2739 /19.05.2006 Director prof. dr. eng. Davideascu Arjana, Value for 2007: 29,200 lei;


9. Development and implementation of performant rehabilitation and investigation systems for human spine deformation at school aged people and sedentary professional CEEX 1612 Director Assist. prof.dr.eng. Lovasz Erwin, Value for 2007: 380,000 lei;

10. Advanced pneumatic systems for precise in robotics in other industrial applications, based on the development of new types of proportional servo - distributors in mechatronic conception (SPASERVODIST) CEEX 89 Director: prof.dr.eng. Maniu Inocentiu, Value for 2007: 33,500 lei;

11. Development of an infomatics platform for potential characterization of fine mechanics, Mechatronics and automation branches, regarding the increase of competitiveness and optimization of specific activities – development of a collaborative environment IPCPMMA CEEX 105 Director: prof.dr.eng. Maniu Inocentiu, Value for 2007: 20,000 lei;


15. Constructive-functional optimization for quadruped walking robot 46GR/11.05.2007, dr.eng. Vatau Steliana, value for 2007: 15,000 lei;

PhD STUDENTS

1. Craciun Mihaela Daciana: Information System for Credit Soliciting Companies Evaluation, scientific supervisor: Prof.dr.eng. George Savii

2. Şerban Sorina Gabriela: Computer Aided Education in Chemistry, scientific supervisor: Prof.dr.eng. George Savii

3. Alba Claudio: Information System for Remote Operation and Monitoring, scientific supervisor: Prof.dr.eng. George Savii


6. Uruoiu Constantin: Information System for Efficient Knowledge Transfer, scientific supervisor: Prof.dr.eng. George Savii

7. Pentelie-Cotosman Dumitru: Information System for Distance Learning, scientific supervisor: Prof.dr.eng. George Savii

8. Mioe Mirella: Medical Applications Oriented Knowledge Bases, scientific supervisor: prof. Dr.eng. George Savii


10. Gyiman Carmen: Expert System for Production Management, scientific supervisor: Prof.dr.eng. George Savii

11. Alba Lavinia: Teleoperated service robot over Internet, scientific supervisor: prof.mhc.dr. eng. Francisc Kovacs

13. Dragotăiu Oana, Optimal solution to finance robotics flexible manufacturing systems investments, scientific supervisor: prof.mhc.dr. eng. Francisc Kovács

14. Ursu Gabriel Vasile, Contributions at elastic joint parameters optimization and the influence of elastic joint upon turn running of locomotive articulate bogie, prof. dr. eng. Lucian Mădărăș


16. Dungan Luiza, Contributions at study and research upon flexi coil spring from electrical locomotive CFR 060-EA 5100 kW, prof. dr. eng. Lucian Mădărăș

17. Vela Daniel Gheorghe, Contributions at functional and constructional development of harmonic drive, prof. dr. eng. Lucian Mădărăș

18. Olaru Mihai, Contributions concerning risk improvement stabilization in traffic safety, prof. dr. eng. Lucian Mădărăș


20. Hotea Adriana, Contributions to optimal synthesis of cams mechanisms, prof. dr. eng. Dan Perju


22. Moldovan Cristian, Study of centroidal type mechanisms, prof. dr. eng. Dan Perju

23. Ciorogar Ciprian Alin, Contributions to improving the quality of the measuring instruments/apparatus of register type, prof. dr. eng. Dan Perju

24. Lupa Florin Sebastian, Contributions to optimum synthesis of linkage and cam mechanisms, prof. dr. eng. Dan Perju


26. Pop Ioan Adrian, Special mechanical transmissions, prof. dr. eng. Dan Perju

27. Herbai Alexandru Modelling techniques for automatic reconfiguration of production systems, Prof.dr.eng. George Savii.

CONTACT
Prof.dr.eng. Erwin-Christian Lovasz
Head of Department, Bul. Mihai Viteazu Nr.1
300222 Timișoara, Romania
Tel: +40-256-403551
E-mail: mecatronica@mec.upt.ro
Web: www.mec.upt.ro/mecatronica

RESEARCH CENTRE
FOR THERMAL MACHINES AND EQUIPMENT,
TRANSPORTATION AND POLLUTION CONTROL

GENERAL PRESENTATION
This research centre was founded in 2001 (CNCSIS Certificate 70/CC/C/2001) and re-approved in 2006 (CNCSIS Certificate 14/12.IX.2006) by the National Council for University Research (CNCSIS), being recognized for the following main research fields:

- Thermal machines and equipment
- Environmental protection
- Transport vehicles

The research team includes the members of the founding chairs:

- Chair of Thermodynamics, Thermal Machines and Road Vehicles
- Chair of Transportation Engineering, as well as associated researchers and PhD & master students.

<table>
<thead>
<tr>
<th>Category</th>
<th>Under 35 years</th>
<th>Between 35 and 45 years</th>
<th>Over 46 years</th>
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<td>Fem</td>
<td>Male</td>
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<td>PhD title holders</td>
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<td>Research personnel (part-time)</td>
<td>2/-</td>
<td>8/-</td>
<td>1/-</td>
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<tr>
<td>from RO/ from abroad</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CONTACT

Director: Prof. Dr. eng. habil Ioana IONEL
Address: 1, Bv. Mihai Viteazu
300222 Timişoara
Tel. +40-256-403670
Fax: +40-256-403669
E-mail: ioana.ionel@mec.upt.ro

MISSION

➢ To promote its main expertise fields, by means of research projects & university curricula, by fundamental & applied, industrial, lab scaled & numerical simulations research, by offering expertise & consultancy, by performing educational activities at undergraduate & graduate level, doctoral training, and post-university or expert training;

➢ To develop a self-financement budget by applying for research fundings, completion of basic equipment and additional activities (conferences, publications);

➢ To organize workshops, conferences, summer schools and other training modalities.

➢ To penetrate in the European research network and establish/apply/receive dissemination of high level curricula and R&D fields.

➢ To enlarge the thematic offer and activities.

Researches in INTERNAL COMBUSTION ENGINES (ICEs) AND FUEL CELLS

Keywords: spark-ignition engine, diesel engine, heat flow, carburetor hot spot, compression rate, heat exchanger, mixture formation, combustion process, numerical evaluation of pollutants, fuel cell, energy use reduction, emission reduction

Activities:

➢ experimental researches regarding the operation, the level of pollution and energetic performance of ICEs using gaseous fuels

➢ experimental researches regarding the endurance and reliability qualities of ICEs

➢ experimental researches regarding the thermo-mechanical stresses in the ICEs sub-units

➢ numerical evaluation of the mixture formation and the combustion process, based on the fuel drops evolution (Diesel engines)

➢ numerical evaluation of pollutants

➢ calculation of the energetic and ecological performances for ICEs using gaseous fuels

➢ studies regarding the use of fuel cells to reduce energy use and emissions for transportation and stationary power applications

RESEARCH PROJECTS

1. CEEX grant AMTRANS, Contr. No. X1CO1 / 2007, The possibilities and limitations of the ecologisation of urban traffic using fuels obtained from vegetable oils, Director UPT (Partner): Assoc.prof.dr.eng. Liviu Mihon, Value: 27,000 RON


PUBLICATIONS

PUBLISHED PAPERS


6. V.D. Negrea. N. Uricanu, Ostoia D, Audi Q7 Hybrid: The Clean Way to High Performance

8. D. Iorga, I. Vrabie, L. Mihon, A. Irimescu, Researches regarding behaviour of the nozzle’s with modified holes for a high power Diesel engine Acta Technica Napocensis, Seria Mecanica, Tom 50, Vol IV, ISSN 1221-5872, pag 102-105

9. Irimescu, D. Iorga, L. Mihon Study of the intake air properties influence on the fuel injected mixture formation in a spark ignition engine using the I-x air-gasoline diagram Acta Tehnica Napocensis, Seria Mecanica, Tom 50, Vol IV, ISSN 1221-5872, pag 110-113


PhD THESIS

1. Eng. George DRAGOMIR: Researches regarding the constructive and operational improvement of a road vehicle internal combustion engine, in correlation with the process of construction and the adjustment to the road conditions and pollution control, PhD supervisor: Prof.dr.eng. Virgiliu Dan Negrea

2. Eng. Virgil STOICA: Studies regarding the vaporization of hydrocarbons, PhD supervisor: Prof.dr.eng. Virgiliu Dan Negrea

3. Mariana Dora FORTOFOI: Researches regarding the systemic-cybernetic approach of the traffic on public roads, in correlation with the civil, criminal and administrative responsibility, PhD supervisor: Prof.dr.eng. Virgiliu Dan Negrea

PERSPECTIVES

Development of the Laboratory for Processes in Internal Combustion Engines

Development of the Multifunctional Lab for Road Vehicles

PhD STUDENTS

PhD Supervisor: Prof.dr.eng. Virgiliu Dan Negrea

1. Sandu IONESCU: Studies and researches regarding the heat transfer enhancement in heat exchangers with discontinuous fins

2. Liviu Mirecu POINARIU: Studies and researches regarding the conditions and accuracy of measurement of the performance parameters for electronically controlled spark-ignition engines

3. Cristian Dumitru BOZAN: Researches regarding the performance control level for a supercharged diesel engine by the improvement of intermediate cooler constructive and operational characteristics

4. Adela FILIP: Studies and researches regarding the improvement of thermo-mechanical performances of components made by sinterization from atomic clusters with application to internal combustion engines

5. Radu THUMA BRANZEAU: Contributions regarding the pollutants control for very high pressure direct injection diesel engine

6. Radu MARIAN: Researches regarding the low power diesel engines performances with the use of double injection

7. Ferencz VOLLONCS: Researches regarding the effects of the fittings made between technical inspections on the technical and operational performances and the level of pollutants of urban road vehicles

8. Narcis Petru URICANU: Studies and researches regarding the level of pollutants measured at the cars technical inspection, as a function of their type, duration and conditions of operation

9. Radu Iuliu COVACI: Researches regarding the constructive and operational optimisation of a diesel engine from the point of view of the energetic and pollution performances

10. Florian Călin NEGRUTIU: Contributions regarding the pollutants evaluation in connection with the conditions of operation for heavy vehicles equipped with high pressure direct injection diesel engines

11. Adriana TOKAR: Researches regarding the interaction between the automobile equipped with internal combustion engine and the environment

12. Alexandra Ana GARBONI: Researches regarding the implications of harmful factors on the environment quality in the western part of Romania

13. Lucian Ioan RAFAN: The phenomenon accident in correlation with the environment protection

14. Silviu Vasile PONORAN: Road traffic and environmental pollution

PhD Supervisor: Prof.dr.eng. Daniel IORGA

1. Cristian NEGIHINA: Contributions regarding the optimization of the methods and techniques used to raise the quality level in the criminological activities through the thermo-mechanical control of ballistics

2. Radu HORATIU: Studies and researches regarding the conditions for mixture formation through injection in the valve port of a spark-
ignition engine, related to the engine performances and the level of stresses
3. Călin MOLDOVEANU: Researches regarding the energetic performances and the pollution reduction for a direct injection diesel engine using a system of high pressure injection pressure
4. Daniel PICIORA: Contributions to the adjustment of an injection system to use unconventional liquid fuels for a direct injection diesel engine
5. Ludovic BAKOS: Contributions to the analysis of the causes and effects of the road accidents from Arad county and methods of limiting it
6. Adrian IRIMESCU: Mechanical Engineering

RESEARCH TEAM

- Prof.dr.eng. Virgiliu Dan NEGREA
- Prof.dr.eng. Daniel IORGA
- Prof.dr.eng. Traian RAICA
- Assoc.prof.dr.eng. Liviu MIHON
- Lect.dr.eng. Andrei FERENCZ
- Lect.dr.eng. Gheorghe POP
- Lect.Dr.eng. Gheorghe POP
- Lect. Dr.eng. Arina Speranţa NEGOŢESC
- Assist. eng. Virgil STOICA, PhD student
- Assist. eng. Daniel OSTOIA, PhD student
- Eng. Ileana NEGREA, PhD student
- Eng. Adriana IRIMESCU, PhD student

CONTACT PERSONS

Prof.dr.eng. Virgiliu Dan NEGREA (vdnegrea@mec.upt.ro)
Prof.dr.eng. Daniel IORGA (diorga@mec.upt.ro)
Assoc.prof.dr.eng. Liviu MIHON (mihon@mec.upt.ro)
Lect.dr.eng. Gheorghe POP (padure@mec.upt.ro)
Lect.Dr.eng. Arina Speranţa NEGOŢESC
Assist. eng. Virgil STOICA, PhD student
Assist. eng. Daniel OSTOIA, PhD student
Eng. Ileana NEGREA, PhD student
Eng. Adriana IRIMESCU, PhD student

Activities

- Environmental on line measurements, with attested methods (emissions and air quality), in real time data acquisition for CO, SO2, NOx, CnHm, combustion quality, including meteorological data
- Hg measurements
- Waste management (combustion) and flue gas cleaning
- Optical & classical methods for air quality investigation
- Optimization of energy production & transmission (power plats), using fossil and renewable fuels
- Numerical simulation of the pollutant dispersion, using various statistical methods, regarding the stationary combustion installations (boilers, furnaces etc.) and mobile combustion installations (vehicles equipped with ICES: ISC3 View, Caline 3, Emisfac, Cal3qhcr
- Numerical experiments regarding the optimization of combustion installations by modelling of the velocity, temperature and concentration fields in the furnaces of boiler using the FLUENT program package
- The ecological evaluation (with attestation of ISCIR, the Romanian Authority for Safety of Boilers and Pressurized Installations) of the stationary and mobile combustion sources (burners, heaters, furnaces, ICES) by experimental and theoretical researches, taking into consideration their toxicological effects;
- Energetic and ecological optimization of low quality coal, heavy oils and alternative fuels (such as domestic waste, biomass etc.) combustion process by experiments;
- Experimental researches regarding the performance indicators, safety and pollution level for small boilers (for individual heating systems);
- Thermal balances for simple or complex thermal installations, with proposals for optimization.

Results

Research Projects / Contracts

1. Sampling methods for on-line analysis of the concentrations of the solid and gaseous pollutants, SC CELROM Drobeta Turnu Severin nr. 1230/2006-2007, Director: Prof.dr.eng.habil Ionel Ioana
2. Technologies for burning and treatment of the flue gas from the biomass incineration,
Comunitatea Europeana CT SES6-CT-020007
Director: Prof.dr.eng.habil Ionel Ioana

3. Sampling methods for on-line analysis of the concentrations of the solid and gaseous pollutants, RAAN Halanga nr. 1207/2003 si nr. 6/2007 Director: Prof.dr.eng.habil Ionel Ioana

4. Sampling methods for on-line analysis of the concentrations of the solid and gaseous pollutants, SC BERG BANAT SRL nr.700/02.07.2007 Director: Prof.dr.eng.habil Ionel Ioana

5. Sampling methods for on-line analysis of the concentrations of the solid and gaseous pollutants, COCA COLA HBC Romania SRL, Timişoara 725/01.08.2007 Director: Prof.dr.eng.habil Ionel Ioana

6. Sampling methods for on-line analysis of the concentrations of the solid and gaseous pollutants, SC TRW Automotive Safety Systems, Timisoara 691/22.06.2007 Director: Prof.dr.eng.habil Ionel Ioana

7. Sampling methods for on-line analysis of the concentrations of the solid and gaseous pollutants, Alto Gradimento SRL, 664/2007 Director: Prof.dr.eng.habil Ionel Ioana

8. Specific methods for evaluation of the gas and solid emissions, SC Drumuri Municipale Timisoara, 1232/2007, Director: Prof.dr.eng. habil Ionel Ioana

9. Sampling methods for on-line analysis of the concentrations of the solid and gaseous pollutants, Europlastic Timisoara 1231 / 2007, Director: Prof.dr.eng.habil Ionel Ioana

10. Theoretical and experimental research on air quality assessment in the west part of the Timisoara county, Primaria mun. Timisoara 1233/2007, Director: Prof.dr.eng.habil Ionel Ioana

11. Sampling methods for on-line analysis of the concentrations of the solid and gaseous pollutants, SC Hella Electronics Timisoara 589/2007 Director: Prof.dr.eng.habil Ionel Ioana

12. Experimental set-up for energy evaluation of the cogeneration plant, European Community, COLL/CT/2005/012566 Director: Prof.dr.eng. habil Ionel Ioana

13. Methods and technologies for continuous analysis of the solid and gaseous pollutants from the flue gas produced from the burning of the lignite, C.E.T. Arad nr. 3/2007 Director: Prof.dr.eng.habil Ionel Ioana

14. Clean technologies development for the coal based energy production, Ministerul Educatiei, Cercetarii si Tinereului TECEBAC nr. CEEX 12233 Director: Prof.dr.eng.habil Ionel Ioana

15. Set-up for visualization and data reduction of the pollutant measurements results, Ministerul Educatiei, Cercetarii si Tinereului EmSHIPS nr. CEEX 12232 Director: Prof.dr.eng.habil Ionel Ioana

16. Standard and non-standard comparative methods for major pollutant measurements in the air (CO, NOX, SO2, O3, VOC, particles) MEdCT, CEEX 9064 Director: Prof.dr.eng.habil Ionel Ioana

17. Investments optimization of the greenhouse through economical numerical modeling, Ministerul Educatiei, Cercetarii si Tinereului CORINT Nr 89 Director: Prof.dr.eng.habil Ionel Ioana

18. Sampling methods for on-line analysis of the concentrations of the solid and gaseous pollutants, Metalimpex Arad, 717/19.07.2007 Director: Prof.dr.eng.habil Ionel Ioana

19. Sampling methods for on-line analysis of the concentrations of the solid and gaseous pollutants, OMV ICPET ECO Bucuresti 690, Director: Prof.dr.eng.habil Ionel Ioana

20. Romanian network of the systems LIDAR, Ministerul Educatiei, Cercetarii si Tinereului PN II, Parteneriate, nr. 31-002/14.09.2007 Director: Prof.dr.eng.habil Ionel Ioana

21. Thermal measurements regarding the air pollution impact produced by the plant for asphalt mixture production, ADP Grup Colas SA 779/02.11.2007 Director: Prof.dr.eng.habil Ionel Ioana

22. Thermal and chemical measurements in the frame of the authorization of the SC Aquacalor Sa Brad, Nr 792/28.11.2007 Director: Prof.dr.eng.habil Ionel Ioana

23. Experimental study regarding esterification of the waste fat sources and the environmental impact on the urban air quality, applied to Timisoara county, CNCSIS, tip AT 46GR/11.05.2007, Tema 1, cod 59, Director: Lect. Dr.eng Francisc Popescu.

24. Theoretical and experimental study regarding the execution of the semi-automatic installation for biogas production from the fat sources of the animal and vegetable origins. CEEX-M2, 1427 / 24.03.2006, 2006-2008. Director: Lect. Dr.eng Francisc Popescu.

BOOKS
PUBLISHED PAPERS

1. Ioana Ionel Experimental research concerning co-combustion Energie- und Umwelttechnik in der Lebensmittelindustrie, VDI Fortschritt Berichte Reihe 6, Energieotechnik, Nr 547, pp 280-290.


PhD THESIS

Lelia DOBJANSCHI: Contributions regarding the share of ROMAG-TERMO Turnu Severin coal Power Plant to the zonal pollution and measures
for reducing it. PhD. supervisor: Prof.dr.eng. Corneliu Ungureanu

**PhD STUDENTS**

PhD supervisor: Prof.dr.eng. Corneliu Ungureanu

1. Alexandru Anghel C. GHENEA: Contributions to the study of efficiency measures regarding the durable development of Ișalnița Power Plant

2. Florica TUDOR: Contributions regarding the diminution of environmental pollution due to the ash produced at the lignite combustion at Turceni Power Plant

3. Marius MARIN: Contributions regarding the diminution of environmental pollution due to gaseous pollutants produced due to the lignite combustion at Turceni Power Plant

4. Vasile GRUESCU: Contributions regarding the energetic technology of domestic and street waste

5. Adrian Iulian TENCHEA: Contributions regarding the research of the biomass combustion in fluidized bed

6. Victor EBETIUC: Studies and researches regarding the efficient production and distribution of thermal energy in Turnu Severin city

7. Marian Gabriel MILI: Contributions regarding the modernization of existing energetic units using the combined cycle steam-gas with parallel disposition

8. Marian DOBRIN: Contributions regarding the elaboration of a methodology of evaluation of technical and economic efficiency of energetic projects in the view of promoting the funding

9. Ina Liliana VODISLAV (BLIDEA): Contributions regarding the ecological utilization of the rubber waste

PhD supervisor: Prof.dr.eng.habil Ioana Ionel

1. Adrian MAGDA: Thermal and gasodynamic optimization study for the processes in the steam boilers, in view of reduction the fuel consumption and the level of pollutants

2. Lucia VARGA: Studies and researches regarding the air quality in Bihor county

3. Aristică BABUCEA: Studies and researches regarding the evaluation of dispersion of pollutant resulted from the combustion process in industrial thermal installations existing in Gorj county

4. Florin IACOBESCU: Theoretical and experimental studies regarding the reduction of pollutants concentration for internal combustion engines and the study of the effects on air by applying novel technologies

5. Adrian GOANȚĂ: Theoretical and experimental researches regarding the thermal and gasodynamic processes from the combustion chambers

6. Adina CÎRTOG: Heat transport device with phase change, using one way parallel tubes

7. Carmencita CONSTANTIN: Contributions to the elaboration of a technical and economic strategy regarding the durable development of the urban heat generation sector

8. Gavrilă TRIF-TORDAI: Researches regarding the combined burning of combustible wastes with low quality coal

9. Nicolae GIORGI: Theoretical and experimental researches regarding the elaboration of the environment surveys for Tg. Jiu city

10. Nicolae Stelian LONTIŞ: Mechanical Engineering (Researches regarding the biodiesel as renewable fuel for small energy groups)

11. Dan Simion STEPAN: Mechanical Engineering (Researches regarding the reduction of vibrations, noise in transportation/railway vehicles)

12. Diana SILAGHI: Researches regarding the utilization of solar energy

**RESEARCH TEAM**

- Prof.dr.eng. Corneliu UNGUREANU
- Prof.dr.eng.habil Ioana IONEL
- Assoc.prof.dr.eng. Dan OPRISA-STANESCU
- Lect. Dr.eng. Dorin LELEA
- Assist. dr. eng. Francisc POPEȘCU
- Eng. Daniel BISORCA, PhD student
- Eng. Adrian GOANTA, PhD student
- Eng. Lucia VARGA, PhD student
- Eng. Aristică BABUCEA, PhD student
- Eng. Claudiu GRUESCU, PhD student
- Eng. Vasile GRUESCU, PhD student
- Eng. Florin IACOBESCU, PhD student
- Eng. Adrian MAGDA, PhD student
- Eng. Adrian TENCHEA, PhD student
- Eng. Gavrilă TRIF-TORDAI, PhD student
- Eng. Lelia DOBRIANȘCHI, PhD student
- Eng. Aurel MATEI, PhD Student
- Eng. Florica TUDOR, PhD Student
- Eng. Alexandru Anghel C. GHENEA, PhD Student
- Eng. Marius MARIN, PhD Student
- Eng. Victor EBETIUC, PhD Student
FACULTY OF MECHANICAL ENGINEERING

Eng. Marian Gabriel MILI, PhD Student
Eng. Marian DOBRIN, PhD Student
Eng. Ina Liliana VODISLAV (BLIDEA), PhD Student
Eng. Adina CÎRTOG, PhD Student
Eng. Carmencita CONSTANTIN, PhD Student
Eng. Nicolae GIORGI, PhD Student
Eng. Nicolae Stelian LONTIȘ, PhD Student
Eng. Dan Simion STEPAN, PhD Student
Eng. Diana SILAGHI, PhD Student
Techn. Gavril BRATEANU

CONTACT
Prof.dr.eng.habil Ioana IONEL
Faculty of Mechanical Engineering
1 Mihai Viteazul Bv.,
Timişoara, RO-300222, Romania
Tel.: +40-256-403670, Fax: +40-256-403669
E-mail: ioana_joule@saratoga.ro
ioana@mec.upt.ro

Researches in ENHANCEMENT AND CONTROL OF HEAT AND MASS TRANSFER FOR THERMAL EQUIPMENTS AND ELECTRONIC COOLING, THERMAL NETWORKS

Keywords: heat transfer enhancement, heat transfer control, magnetizable nanofluids, nanoscale systems, bubble dynamics, electronic equipment cooling, thermal network, heat exchangers, refrigerating machines, heat pumps, thermal phenomena, microchannel heat transfer

ACTIVITIES

- researches regarding the optimisation of heat exchangers
- theoretical studies concerning the heat transfer enhancement by means of numerical simulations
- researches regarding the mechanism of multi-phase heat transfer control by applying a magnetic field to a magnetizable nanofluid
- theoretical studies concerning the behaviour thermodynamic systems by molecular dynamics and Monte Carlo simulations
- electronic equipment cooling
- optimization of urban thermal networks

RESULTS

RESEARCH CONTRACTS


2. Experimental research on density changes of the LPG, SISTEMGAS Timişoara 616/09.03.2007 Director: Prof.dr.eng. Nagi Mihai, value: 2,000 RON.

3. Contract No. A1/GR181/19.05.06, Theme 33, CNCSIS Code 665, Researches regarding the utilization of magnetizable nanofluid as thermal fluid, Director: Assoc.prof.dr.eng. Floriana D. Stoian, value: 18,500 RON


BOOKS


PUBLISHED PAPERS


6. M. Vartolomei, M. Jădăneanţ, The management of quality in transport field


24. L.D. Moşteoru, M. Jădăneanţ, Fl. Moşteoru, 
Sterilization efficiency by dry heat sterilizers 
Proceedings Internat. Conf. „Research People 
and Actual Tasks on Multidiscipli-nary 
Sciences”, Lozenec, Bulgaria, 6-8 June 2007, 

25. L. Călin, M. Jădăneanţ, Consideration upon 
the Cooling Preservation Method of Grains 
„Research People and Actual Tasks on 
Multidisciplinary Sciences”, Lozenec, 
Bulgaria, 6-8 June 2007, Vol. 2, pp. 257-261, 

26. L. Călin, M. Jădăneanţ, Constructive 
solutions regarding the purification of used 
water coming from the beer industry, 
International Conference on „Quality of Life 
and Environment in the Frame of E.U. 
Sustainability”, 15-17 November 2007, 

27. M. Gh. Mocuţa, M. Jădăneanţ, On the 
modifications in the electrical energy 
production industry after the oil crisis, 
Ştiinţă şi Inginerie vol. XI, 2007, pp. 53-58, 
A VII-a Conf Naţ „Prof. D. Pavel” ISBN 

28. L. Călin, M. Jădăneanţ, Waste water 
treatment released by the beer factories, 
Ştiinţă şi Inginerie vol.XII, Editura AGIR, 
973-720-123-2

29. M. Mocuţa, M. Jădăneanţ, C. Rus, D. 
Filimon, Possibilities for energy savings 
through the thermal recovery of the 
residential sector, Academia Română Filiala 

30. L. Călin, M. Jădăneanţ, A. Pop, Gasification 
of the wood biomass-energy source, 
Academia Română Filiala Timișoara, 

31. L. Moşteoru, M. Jădăneanţ, Fl. Moşteoru, 
Ecology and sterilization devices with dry hot 
air, Academia Română Filiala Timişoara, 

32. M. Mocuţa, M. Jădăneanţ, Energy efficiency 
and renewable energy re-sources in 
European Union energy policy, Conferinţa 
Naţională de Termo-tehnică cu participare 
naţională, 31.05.-01.06.2007, Ploieşti, 

33. L. Călin, M. Jădăneanţ, New technology by 
cooling grain, Conferința Națională de 
Termo-tehnică cu participare internațională, 
31.05.-01.06.2007, Ploiești, Ediția XVI-a, Vol. 

34. M. Jădăneanţ, A. Jădăneanţ, New thermo- 
en energetic concepts, Ediţia 17-a: Instalaţii 
pentru construcţii şi confortul ambiental, 
Timişoara, 17-18 aprilie 2008, pp. 143-148, 
Edit. Politehnica Timişoara, ISSN: 1842-9491 
ISBN: 978-973-625-640-0

35. Gh. Oancea, M. Jădăneanţ, , Map drawing of 
the Timisoara district for thermal 
measurement of the buildings, Ediţia 17-a: 
Instalaţii pentru construcţii şi confortul 
293-298, Edit. Politehnica Timişoara, ISSN: 1842-

36. Irimescu, L. Călin, M. Jădăneanţ, D. Iorga, 
The aspects regarding the efficient 
management of the biogas obtained from the 
industrial waste water treatment, Ediţia 17-a: 
Instalaţii pentru construcţii şi confortul 
386-394, Edit. Politehnica Timişoara, ISSN: 1842-

37. Holotescu S., Stoian F.D. A theoretical study 
regarding the influence of leakages on the 
thermodynamic loss angle Acta Tехnica 
Napocensis, Seria Mecanica, Tom 50, Vol IV, 
pp. 256-259, ISSN 1221-5872

38. M. Nagi, P. Ilies, V. Marian Influence of the 
waviness in an air fin, Acta Technica 
Napocensis, Seria Mecanica, Tom 50, Vol IV, 
ISSN 1221-5872, pp. 95-98.

39. D. Alexandru, M. Nagi, Liquid petroleum 
gases fuel for internal combustions engines 

40. D. Alexandru, M. Nagi, Experimental 
researches regarding the differential 
pressure in the liquefied petroleum gas pipes 
Conf. nat. termo, part intern, 31-mai-01 iunie, 
2007, Ploiesti, Ed Un. Petrol si gaze, ISSN 

41. P. Ilies, V. Marian, M. Nagi, Influence of 
extended water heat surface on water coolers 

42. M. Nagi P. Ilies, V. Marian, An experimental 
approach for air flow inside the heat

**PhD THESIS**

1. Liliana Daniela MOSTEORU: Contributions to the improvement of thermal performances and ecology of the sterilization equipment for medical instruments, PhD supervisor: Prof.dr.eng. Mihai JĂDĂNEANȚ

2. Gh. Marcel MOCUTA: Theoretical and experimental contributions regarding the combustion and the heat exchange in the hot air generators used on road vehicles, PhD supervisor: Prof.dr.eng. Mihai JĂDĂNEANȚ

**PhD STUDENTS**

PhD supervisor: Prof.dr.eng. Mihai NAGI

1. Catalin BOJAN: Researches regarding the use of shell type tubes for the construction of compact heat exchangers

2. Ovidiu SAFTOIU: Studies and researches regarding the optimisation of the main steam condenser operation for the 350 MW steam turbine, in the conditions of the variation of the cooling fluid parameters

3. Ciprian CAIA: Studies and researches regarding the correlation between the intake air in a direct injection compression ignition engine, the engine performances and the pollution level

4. Tiberiu STANCIU: Researches regarding the use of shell type of tubes for the construction of compact heat exchangers

5. Mihaela BUCULEI, Studies and researches regarding the installlations of unconventional liquid fuel preparation for use in compression ignition engine with direct injection

6. Paul ILIES: Constructive and operational optimization of the aluminum heat exchangers manufactured at S.C. RAAL S.A. Bistrita

7. Francisc SZIKSZAI: The control and enhancement of heat transfer in magnetizable nanofluids

8. Mariela Augusta SPOREA: Studies and researches regarding the recovery of exhaust gases from the cupola furnace

9. Alexandru JĂDĂNEANȚ, Mechanical Engineering

PhD supervisor: Prof.dr.eng. Mihai JĂDĂNEANȚ

1. Cristian DAMIAN: Contributions to the thermal study of the axle boxes with rolling bearing at high speed trains

2. Sorin RUSU: Contributions to the optimisation of the railroad traction diesel engines operation

3. Gh.-Florin OANCEA: Theoretical and experimental contributions regarding the thermal rehabilitation of the buildings from a headquarter in Timişoara city

4. Doina MIHON: Theoretical and experimental contributions regarding the optimisation of the transportation fluxes in view of reducing the pollutants produced by the vehicles driven by internal combustion engines

5. Constantin STROIE: Contributions to the study of the impact of railroad transportation on the environment and the railroad infrastructure

6. Laurențiu CĂLIN, Industrial Engineering

7. Florin MĂRCUȚ, Industrial Engineering

PhD supervisor: Prof.dr.eng. Gavril CREȚĂ

1. Ion Cornel LUPUT: Researches regarding the possibility of reduction the fuel consumption in large cities around the country, with reference to Timisoara city

**RESEARCH TEAM**

- Prof.dr.eng. Mihai NAGI
- Prof.dr.eng. Mihai JĂDĂNEANȚ
- Prof.dr.eng. Gavril CREȚĂ
- Assoc.prof.dr.eng. Floriana D. STOIAN
- Assoc.prof.dr.eng. Liviu MIHON
- Assoc.prof.dr.eng. Ioan LAZA
- Lect. Dr.eng. Gheorghe POP
- Lect. Dr.eng. Dorin LELEA
- Lect. Dr.eng. Arina NEGOFȚESCU
- Assist.eng. Virgil STOICA
- Eng. Paul I Li h, PhD Student
- Eng. Vlad MARTIȘAN, PhD Student
- Eng. D. ALEXANDRU, PhD Student
- Eng. Mariela SPOREA, PhD Student
- Eng. Francisc SZIKSZAI, PhD Student
- Eng. Cătălin BOJAN, PhD Student
- Eng. Ovidiu SAFTOIU, PhD Student
- Eng. Ciprian CAIA, PhD Student
- Eng. Tiberiu STANCIU, PhD Student
- Eng. Mihaela BUCULEI, PhD Student
- Eng. Liliana MOSTEORU, PhD Student
- Eng. Cristian DAMIAN, PhD Student
- Eng. Sorin RUSU, PhD Student
- Eng. Gh.-Florin OANCEA, PhD Student
- Eng. Doina MIHON, PhD Student
- Eng. Gh.-Marcel MOCUTA, PhD Student
- Eng. Constantin STROIE, PhD Student
- Eng. Laurențiu CĂLIN, PhD Student
- Eng. Florin MĂRCUȚ, PhD Student
- Eng. Ion Cornel LUPUT, PhD Student
- Jurist Alexandru JĂDĂNEANȚ, PhD Student
GENERAL PRESENTATION AND MISSION

The Research Group in Plastics Manufacturing (R.G.P.M) is organized in the Department of Manufacturing Engineering (TCM) as a research unit and transfer of technology of the “Politehnica” University of Timişoara.

R.G.P.M mission is to coordinate teams of researchers from the Department of Manufacturing Engineering (TCM), Faculty of Mechanical Engineering, who are developing programs in the plastic injection, rapid prototyping, three-dimensional measurements, reverse engineering and ultrasonic activation of plastic parts manufacturing.

RESEARCH FIELDS

The main fields of research are:

- Computer aided design and manufacturing of plastic parts (CAD / CAM)
- Computer aided design and manufacturing of injection moulds for plastic materials
- Ultrasonic activation of plastic and composite materials processing
- Study of the manufacturing techniques, rapid prototyping and reverse engineering of the corresponding moulds
- Study of the flexible cells for plastics manufacturing
- Study of the quality systems and maintenance in plastics manufacturing

KEYWORDS

Plasturgy, Manufacturing engineering, Rapid prototyping and three-dimensional measurements, Reverse engineering, Cold forming, Non-traditional machining processes, Equipment and technologies for non-conventional technological processes, Piezoceramic traductors, Quality assurance.

ACTIVITIES

- R.G.P.M assure the co-ordination and development of scientifically research (PhD. programs, post-graduated programs) and the training programs. The PhD. programs coordinated by R.G.P.M are in the field of Industrial Engineering.

- The research teams from R.G.P.M. develop: fundamental and applicative research activities; products and technology design activities; technological development and technology transfer all attending the present industrial demands.

- R.G.P.M. is involved in national and international research programs and organizes different scientific meetings (seminars, conferences etc.).

- Participation to grant competitions through CNCSIS, national programmes etc.

- Developing of fundamental and applicative research activities, technological development for the present industrial demands,

- P. T. R. G. members are part of the following professional bodies and associations: AGIR – The General Association of the Engineers in Romania AUIF – Academic Association of Manufacturing Engineering in Romania ARTN – Romanian Association of Nonconventional Technologies

RESEARCH CONTRACTS


PUBLICATIONS

BOOKS

PUBLISHED PAPERS
1. T. Iclănzan, D. Stan, A possible ultrasonic thermofilm effect, volum Sesiunea Comisiei de Acustica a Academiei Romane, SISCOM, mai 2007

AWARDS

INVENTIONS
1. T. Iclănzan, D. Stan, Method and extrusion head with ultrasonic activation, OSIM A/00014/11.01.2007

PhD THESIS
Dana Keri, Contributions to the study of degradation of the rolling wheels, Thesis supervisor: Prof. Tudor Iclănzan

PhD STUDENTS
1. Groza Bogdan Gruiu, Optimization of the management integrated systems in industrial engineering, Thesis supervisor: Prof. Tudor Iclănzan
2. Ferician Florin Cornel, Researches on the technological possibilities of using the plasma electronic guns, Thesis supervisor: Prof. Tudor Iclănzan
3. Cosma Cristian, Quality amelioration study of products from polymeric materials in injection processes, Thesis supervisor: Prof. Tudor Iclănzan
4. Dume Adrian-Ilie, Rapid prototyping techniques optimizations using the milling process in the case of the removal module, Thesis supervisor: Prof. Tudor Iclănzan
5. Tamas Marius, The study of increased operational capacities of the rapid prototyping machines by material, Thesis supervisor: Prof. Tudor Iclănzan

RESEARCH TEAM
R.G.P.M. consists of research teams with common research projects, in the Department of Manufacturing Engineering. The human resources consist of researchers which are doctor degree graduates or which leads post-graduates programs. Also, in the team are working post-graduates and master students. The management is assured by the team leader and the scientific board.

The members of the research team are:
- Prof. dr. eng. Tudor Iclănzan – team leader
- Assoc. prof. dr. eng. Valentin Seiculescu
- Assoc. prof. dr. eng. Daniel Stan
- Lect. dr. eng. Aurel Tulcan
- Assist. Eng. Florin Ferician
- Assist. Eng. dr. Cristian Cosma
- Assist. Eng. Adrian Dume
- Eng. Alin Sirbu, PhD student

CONTACT
Prof.Edr.eng. Tudor ICLĂNZAN – team leader
Faculty of Mechanical Engineering
Bul. Mihai Viteazu, nr. 1
300222, Timișoara, Romania
Tel: +40-256-403611
Fax: +40-256-403523
E-mail: ticlanzan@eng.upt.ro
RESEARCH CENTER IN STRENGTH OF MATERIALS AND SAFETY OF MECHANICAL STRUCTURES, CABLES AND CONDUCTORS

RESEARCH AREAS

- Fatigue and Fracture Mechanics
- Behaviour of composite materials at static loading and fatigue, cracking mechanism, plates behaviour at dynamic loading
- Life-time prolongation of steels at high temperatures
- Accuracy of solutions involved in the stress calculus of curved specimens
- Physical properties of aluminium, steel-aluminium and steel conductors
- Wire and wire ropes and round steel chains
- High temperature behaviour of steels, stability and creep of long vertical pipes, curved beams stress analysis
- Analysis and tests about behaviour of materials belonging of heavy devices being out of working life-time
- Numerical analysis and simulation of stress response of different structures

KEYWORDS

Wohler’s curve, fatigue crack propagation, crack closure, displacement at crack opening, computer tests, life – time, fracture tenacity, stress intensity coefficient $K_{IC}$, J – integral, fatigue at variable deformation, cumulative degradation at variable loading, macroscopically aspects at fatigue fracture, dynamic fatigue, safety and risk, probabilistical aspects of fatigue and fracture mechanics, defects toleration, conductors, stress, strain, modulus of elasticity, creep, ambient temperature, thermal properties, term elasticity, thermal fatigue, fracture, pipes under pressure, composite materials, fatigue, dynamical, loads, composite plots.

FIELD DESCRIPTION

Endurance of Steel wire ropes and round steel chains, service and fatigue life, stress - strain, bending, ropes and chains for cranes and other hoisting or transporting machines.

Stress - Strain Test. Curves’ equations for initial composite, steel and aluminium, final composite, steel and aluminium. Studies concerning the life-time prolongation of steels at high temperatures, studies about the accuracy of solutions involved in the stress calculus of curved specimens. Researches can be used by electro technical materials industry and distributing electrical energy units. There are also useful in order to participate to international auctions.

Studies concerning the behaviour of composite materials at static loading and fatigue, cracking mechanism, plate’s behaviour at dynamic loading. There is analysed the influence of working life-time of different types of steel belonging, of minning equipments being out of working life-time. There were performed some researches regarding the behaviour at variable loads, impacts and also fracture mechanics analysis.

Creep at ambient temperature tests of aluminium and steel-aluminium conductors in order to certify their quality. The loading and unloading behaviours are described by typical diagrams and equations of curves have been estimated. Experimental researches were performed at ambiental and results were extrapolated beginning 100 or 1000 hours to 10000 hours.

ACTIVITIES

- The life – time estimation of some strength elements (wire ropes, links, springs, etc) at imposed loading levels
- The strength at fatigue estimation of some steel and welded elements
- The analysis of the influence of simulated defects about the fatigue strength at welded elements
- The estimation of $K_{IC}$ and $J_{IC}$ for some machine parts steels
- The estimation of the dynamic tenacity coefficients $K_{Idc}$ and $J_{Idc}$
- The analysis of crack propagation at cyclic loading and under repeated shocks
- Estimation of mechanical characteristics obtained at variable loads
- Computer programme analysis for durability of a bar belonging to a heavy minning machine, by using fracture mechanics theory
- Design devices for hanging cracking pipes
Theoretical and experimental studies of vertical long specimens under compressive loading also into account thermal effects.

**RESEARCH TEAM**
- Prof.dr.eng Nicolae NEGUŢ
- Prof.dr.eng Ion DUMITRU
- Prof.dr.eng Nicolae FAUR
- Prof.dr.eng Pavel TRIPA
- Prof.dr.eng Josif HAJDU
- Prof.dr.eng Tiberiu BABEU
- Prof.dr.eng Constantin CRISTUINEA
- Assoc.prof.dr.eng. Dana SILAGHI PERJU
- Assoc.prof.dr.eng. Liviu MARŞAVINA
- Lect.dr.eng. Marcela SAVA
- Lect.dr.eng. Mihai HLUŞCU
- Lect.dr.eng. Nicolae CIOBOTARU
- Assist.eng. Iuliu SISAK
- Assist.eng. Radu NEGRU
- Eng. Herman SEGAL
- Eng. Laurentiu CULEA
- Eng. Claudia SECRERU
- Eng. Maria SECHEI

**RESEARCH OFFERS**
Bending endurance testing, Tensile fatigue testing, Experimental stress analysis, Fatigue prediction, Research on wires, Standards (ISO-TC 85), Stress-strain, Breaking test, Creep at ambient temperature test for 6 month, 1 year, 10 years creep;

Study – test for composite materials, Stress concentration and fatigue, Composite materials structures computation;

Expert study of equipment for heavy machines with expired life-time, Fracture mechanics testing, Fatigue with impact, Non-destructive testing;

High Temperature Study of Creep Properties, Theoretical Analysis and Creep Computation for pipes Stability and Creep for vertical long pipes

**RESEARCH CONTRACTS**

1. PNCDI CEEX nr.147/1.08.2006, The participation and integration promotion of the Romanian Scientific Research at the 7th main programme concerning the mechanisation of the agricultural works, production and durable management of the resources of agricultural soil, Project Manager: Faur Nicolae, Value: 25,000 RON

2. PNCDI CEEX nr.128/1.08.2006, The participation and integration promotion the 7th main programme and development of the National Network of Excellency in the field of surety and the security in transport; Project Manager: Faur Nicolae, Value: 25,000 RON

3. PNCDI CEEX nr.228/1.08.2006, The development and promotion of Excellency Romanian Research for surface traffic and the safety of traffic by connecting at the European programs (pc7), Project Manager: Faur Nicolae, Value: 25,000 RON


5. CEEX Nr.153/2007, Technology and ecological installation for stress-relieving of casted, forged or welded steels assemblies, Project Manager: Pavel Tripa, Value: 5,000 RON

6. 5/12.06.2007, Stress-Strain and Breaking load testing of ACSR conductor made IEC 61089, Construction 6x3,75 mm aluminium wires and 1x3,75 mm galvanized steel wire, Project Manager: Liviu Marsavina, Value: 2,500 RON


8. PNCDI–CEEX AMCSIT Nr.202/20.07.2007, Modelling and simulation of the composite materials from aeronautical industry at complex loads, Project Manager: Liviu Marsavina, Value: 10,000 RON

9. PNCDI–CEEX RELANSIN Nr.255/11.09.07, Technological platform of electrochemical surface engineering for advanced materials: with applications in structural integrity and reliability evaluation of structures, Project Manager: Liviu Marsavina, Value: 5,000 RON

10. PNCDI–CEEX AMCSIT Nr.262/12.09.2007, Hybrid assemblies with adhesives and bolts for composite materials and aluminium alloys, Project Manager: Liviu Marsavina, Value: 20,650 RON

11. BC 548/02.11.2006, Tensometric measures and principal deformational measures for passengers scale tractable and manageable s-ro1, concordant with point 3.15 chapter 3 in testing programm, Project Manager: Faur Nicolae, Beneficiary: SC SAERO SRL, Timişoara, Value: 9,600 RON

12. 48c/2007, Compresion test on packing bins perfusabile solutions, Project Manager: Faur Nicolae, Beneficiary: HELVETICA PROFARM SA, Timişoara, Value: 3,600 RON

13. 583/11.01.2007, Tensile tests on 120 specimens for tensile strength determination in welding joints and bending test for cracks observation in welding joints, Project Manager: Faur Nicolae, Beneficiary: Weld department of UPT, Value: 6,000 RON
14. 657/10.05.2007, Technique verification for DVIA – 6 type instrumentation, Project Manager: Faur Nicolae, Beneficiary: SC Electromontaj Carpati SA, Value: 1,000 RON

15. 675/12.06.2007, Researches about fracture strength for tensile cables, Project Manager: Faur Nicolae, Beneficiary: SC Hidroconstructia SA Bucuresti, Value: 2,500 RON

16. 677/13.06.2007, Experimental researches in fatigue loadings domain, Project Manager: Faur Nicolae, Beneficiary: University of Bacau, Value: 11,000 RON

17. 650/03.05.2007, Pulling out test for metal insert in PAG +30%GF moulding part, detail COVER BSE 8200739388, Project Manager: Faur Nicolae, Beneficiary: SC Plastique Forme Romania Timisoara, Value: 2,500 RON

18. 694/25.06.2007, Determination of STRESS-STRAIN features for Al-steel conductors, Project Manager: Faur Nicolae, Beneficiary: SC IPROEB SA Bistrita, Value: 5,000 RON

DOCTORAL STUDIES

PhD THESIS
1. Daş Doru Ioan, Extension durability study of the pipe lines used in petroleum products transportation, PhD coordinator: Iosif Hajdu, 22.12.2007,
2. Goia Ioan, Study about influence of wheel-rail-truck assemblz in exploitation conditions on trollez-line structure, PhD coordinator: Hajdu Iosif, 22.12.2007,

PhD STUDENTS
Scientific supervisor: Prof.dr.eng. Ion Dumitru:
1. Cernescu Anghel Vasile, Studies about expert systems use for evaluating integrity structures,
2. Branzei Nelu Florin, Some research regarding the durability of a coupling system for railway wagons,
3. Cornea Gheorhe, Some research regarding the stiffness of a test machine for cables and conductors with lengths over 10 m
4. Seceriu Claudia, Applications of Fractal Analysis in the case of dynamic fracture,
5. Sechei Ramona Maria, Technical and experimental research regarding dynamic toughness $K_{Id}$, $J_{Id}$
Scientific supervisor: Prof.dr.eng. Iosif Hajdu:
6. Culea Laurentiu, Crack initialization in copper based blades used in electrical motors collector parts,
7. Negru Radu, Studies of stress concentrations in biaxial stress and strain states

BOOKS

PAPERS
The researches in the fields of fatigue and fracture mechanics present a topical interest. The implementation of new equipments in the laboratory of fatigue and fracture mechanics and the inclusion of the laboratory as a part of the National Research Centre in Construction and Fatigue, BCUM, code CNCSIS 19, will allow the extension of the researches to new directions and...
will offer the opportunity to solve any request in this field.

A special attention will be granted to new materials, and also to traditional materials with unknown mechanical characteristics regarding the fatigue behaviour.

**CONTACT**

Prof.dr.eng. Nicolae FAUR  
Tel: +40-256-403577  
Fax: +40-256-403572  
E-mail: faur@mec.upt.ro

**RESEARCH GROUPS IN THE DEPARTMENT OF DESCRIPTIVE GEOMETRY AND ENGINEERING GRAPHICS**

**Researches in THE PARAMETRIC MODELLING IN ACCORDANCE TO THE ISO STANDARDS "STEP" AND "PLIB" USED FOR MODEL DESCRIPTION AND EXCHANGE OF PRODUCT DATA**

**KEYWORDS:** ISO standardization, products

**FIELD DESCRIPTION**

The research theme will develop the necessary knowledge base and create appropriate conditions for the implementation in the Romanian industry of the current ISO elements regarding a unitary, standardized description and exchange of the product model data, starting from the design stage, and continuing all along the product life cycle. The research team aims to aware the Romanian economical environment about the necessity of a continuous adjustment to the world market and the concurrence requirements in manufacturing and selling industrial products. The team cooperates with the Romanian National Standardizing Authority in adopting and applying the "STEP" and "PLIB" ISO standards.

**RESEARCH TEAM**

- Prof.dr.eng. Lia DOLGA  
- Assist.eng. Mihai REVENCU  
- Lect. Dr. eng. Doina SAFTENCU  
- Assist. Eng. Eugen ZĂBAVĂ

**ACTIVITIES AND RESULTS**

- The parametric and feature-based modelling it is the main subject of the discipline “The ISO modelling of the advanced mechanical systems”, taught to the students of the master specialization *Computer Aided Design of the Advanced Mechanical Systems*. The applications were realized in the MDT and Inventor and CATIA design environments.

- A special chapter regarding the STEP and PLIB standards was created within the course.
The problem regarding the importance of ISO standards was broadly developed at the disciplines taught by the team members. A debate about the STEP and STEP-NC standards was organized with the master students in CAD specialization. A master dissertation including appropriate STEP subjects was sustained in 2006.

**Researches in SHAPE AND FEATURE RECOGNITION**

**KEYWORDS**
3D scanning, feature, feature recognition

**FIELD DESCRIPTION**
The research activities aim to define an optimized method to obtain feature-based models for real objects and parts using three-dimensional scanning environments and appropriate data processing tools. The correlation of the shape and the scanning parameters is envisaged together with the shape reconstruction and the standardized feature recognition.

**RESEARCH TEAM**
- Prof.dr.eng. Lia DOLGA
- Assist. eng. Hannelore FILIPESCU
- Eng. Emese TOTH, master student
- Eng. Laura LELEA, master student
- Tatiana Vionelia STEFU, master student

**ACTIVITIES AND RESULTS**
The electronic support was developed for the CAD disciplines taught by the team members to be used in the Intranet and Internet networks. Some team members graduated a training course organized by SIVECO and became AEL instructors, within the SEI project regarding the Development of the Romanian Education System.

**Researches in NEW METHODS, PROCEDURES AND PROGRAMS TO EDUCATE THE THREE-DIMENSIONAL VISION OF THE STUDENTS**

**KEYWORDS**
Descriptive geometry, 3D vision, technical representation

**FIELD DESCRIPTION**
Beginning from the first study year, the preoccupation to develop the 3-dimensional vision holds a principal function, because of its importance in training many other engineering disciplines. The education of the student's 3D vision is a complex and long-standing process and needs many exercises, diversified methods, ample teaching experience. The activity uses descriptive geometry methods and representations to develop the space vision and the ability to imagine and understand three-dimensional objects. New methods were developed to test students' abilities in imaging and representing different technical parts.

**RESEARCH TEAM**
- Lect. Dr.eng. Mihaela CRETU-NICA
- Lect. Dr.eng. Doina SAFTENCU
- Lect. Dr.eng. Arseniu PECICAN
- Assist.eng. Ileana MLADIN
- Assist. Dr. eng. Marianna ILIE
- Assist. eng. Ladislau WALKOVSZKY
- Assist. eng. Adrian RADU
- Assist. eng. Ioan COŢA
- Assist. eng. Silviu DUMITRAŞ

**ACTIVITIES AND RESULTS**
The student professional contest “Student CAD” is organized annually in May, oriented on the 2D AutoCAD graphics and on the 3D Modelling and Parametric Design in CATIA, Inventor and Solid Work Environment.

**Researches in THE DEVELOPMENT OF THE PARAMETRIC MODELS IN RELIABILITY OF MECHANIC COMPONENTS**

**FIELD DESCRIPTION**
The main goal of this program consists in modeling of the mechanical parameters dependence in comportment of machines during the exploitation using the CAD and FEM techniques to develop the specific software packages in this field.

**KEYWORDS**
Modeling software, CAD, FEM

**RESEARCH TEAM**
- Prof.dr.eng. Mircea VODA
- Prof.dr.eng. Viorel A.SERBAN
- Assist. eng. Hannelore FILIPESCU
- Eng. Gheorghe Pasca, master student
- Eng. Gheorghe Marinescu, master student

**ACTIVITIES AND RESULTS**
The co-operation agreement with the Mechanic Laboratory of Lille, France, in the field of Study and modeling fatigue was pursued. Financing for PhD study was obtained from ALSTOM and LML France, for eng. Adriana Bacila, having as a subject the Crack simulations system for any metallic elements under a charge. The PhD thesis will be stand in 2007.

A poster was presented in the International Congress on Fatigue Damage of Structural Materials VI, Hyannis, USA, and September 17 – 22, 2006 by Bacila, Voda, Serban, and Mesmacque.

**PUBLICATIONS**

**BOOKS**

PUBLISHED PAPERS
9. Voda M., Bordeasu I., Mesmacque G., Chitac V. Aspects concerning polymer assemblages behavior at the mechanical stress, Materiale plastice, Vol. 44, nr. 3, pp. 254-258, ISSN 0025-5289;

GRANTS / RESEARCH PROGRAMS
Study and modeling of the fatigue behaviors for the steel and aluminum structures used in transports, in the case of the random charges , grant CNCSIS – A – theme 6, code 359, nr. GR226/14.09.2006, Director: Assist. Prof. dr. eng. Mircea Voda, Value for 2007: 25,000 lei

CONTACT
Prof.dr.eng. Mircea VODA, Head of Department
Bul. Mihai Viteazul Nr.1
300222 Timişoara, Romania
Tel: +40-256- 403811
E-mail: gddt@mec.upt.ro
Web: www.mec.upt.ro/gddt