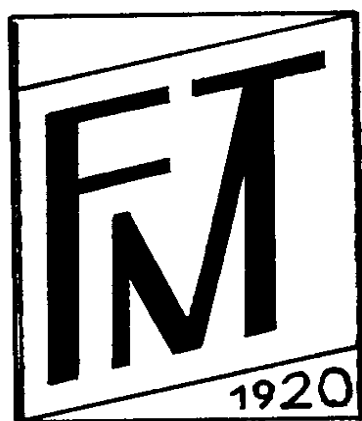


***FACULTY OF  
MECHANICAL ENGINEERING***



**Bd. Mihai Viteazul, Nr. 1  
300222 – Timișoara, Romania  
Tel: +40-256-403521  
Fax: +40-256-403523**

**E-mail: [decan@mec.utt.ro](mailto:decan@mec.utt.ro)  
Web: [www.mec.utt.ro](http://www.mec.utt.ro)**



## 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, the University of Medicine and Pharmacy, the Municipal Hospital of Oro-Maxillo-Facial Surgery, the Departmental Hospital of Traumatology and Orthopedy.

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.

### 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;

### KEYWORDS

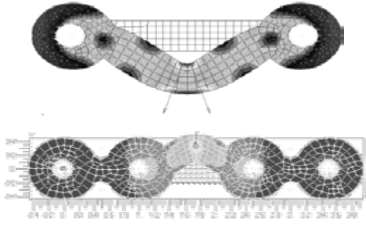
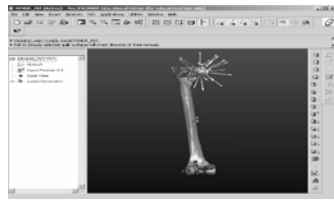
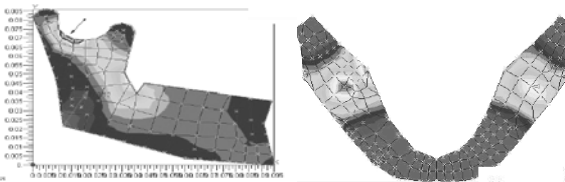
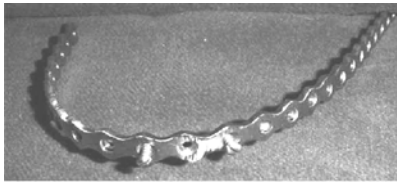
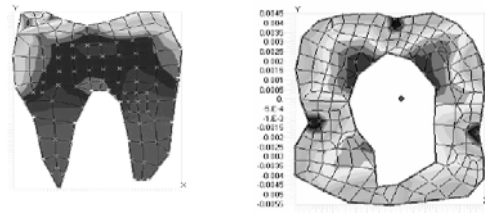
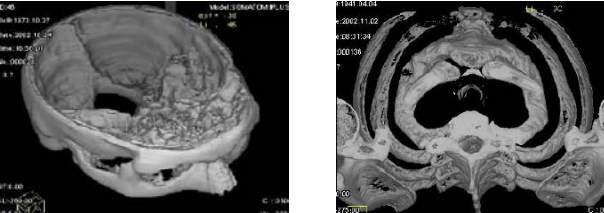
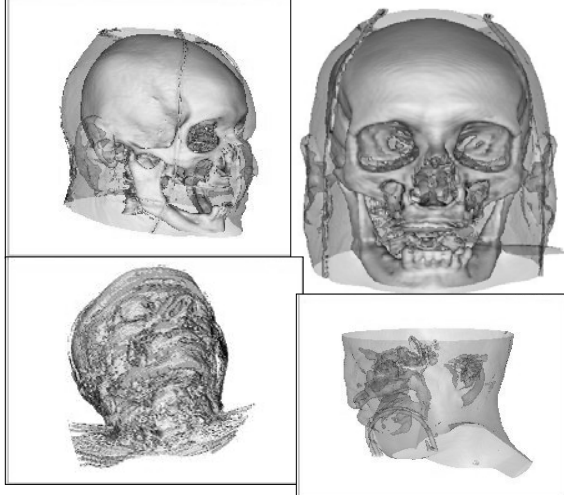
Medical imaging, implant, prosthesis, mandibular distractor, surgical technique, biocompatible material, biological structure modelling, 3D reconstruction.

### 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 maxillo-facial surgery*, using biocompatible materials, in the LOPIFO Laboratory;
- *Implementation of quality system* in the CIDUCOS Testing Laboratory;
- *Promoting collaboration* in related fields with universities and research institutes;
- *Promoting the Medical Engineering Specialization in Politehnica University of Timișoara*.

### RESEARCH RESULTS

- Biological structures reconstruction based on computed tomography;
- FE analysis of human mandible, teeth, femur/tibia and spine;
- FE analysis of facial implants;
- Manufacture facial implants.

 <p>Modelling implants using finite elements method</p>	 <p>Modelling the human femur using finite elements method and Pro/Engineer</p>
 <p>Modelling and dynamic study of human mandible</p>	 <p>Artificial mandible</p>
 <p>Modelling stress distribution in human teeth</p>	 <p>Computed tomography based structures reconstructions</p>
 <p>3D reconstruction software</p>	

#### ***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. *Laboratory of medical images acquisition*: computer tomography system and ortho-panoramic X-ray apparatus are installed;
4. *Laboratory for production implant devices, orthoses and prosthetic devices* LOPIFO:



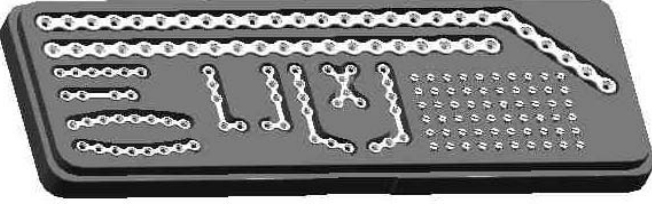
equipment to manufacturing prosthetic devices;


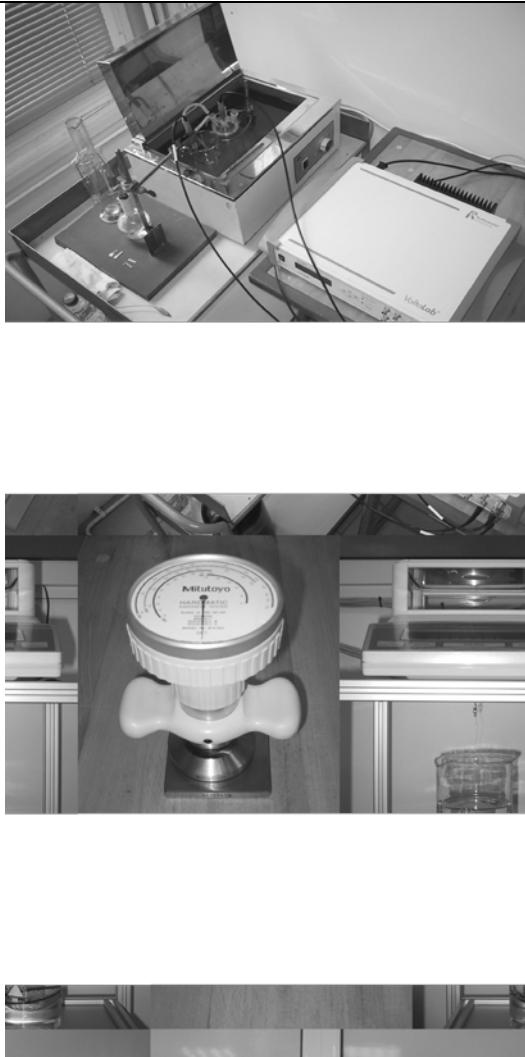
5. *Laboratory to control the quality of surgical implants and prosthetic devices* CIDUCOS: conformably to UE ISO 9001-17025 system;

#### ***RESEARCH CONTRACTS***

1. Contract 32940/22.06.2004, Theme 7, CNCSIS code 11, Director prof. dr. eng. Doina Drăgulescu, *Dynamic study of the mandible and modelling of maxillo-facial implants for surgical rebuilding of mandible's accidental breaks: Surgical implant testing and designing*

- of correction device for facial skeleton.*  
Beneficiary: Ministry of Education and Research, value 190,500,000 ROL
2. Contract 32940/22.06.2004, Theme 2, CNCISIS code 32, Director prof. dr. eng. Doina Drăgulescu, *Comparative evaluation for recovering the biomechanical parameters for motion handicap patients.* Beneficiary: Ministry of Education and Research, value 700,000,000 ROL
  3. Contract PNCDI/BIOTECH, 02-6-PA-346/2002, Director prof. dr. eng. Doina Drăgulescu, *Contributions to the population's state of health improvement by producing of prosthetic devices, surgical instrumentation and implant's cases for skeletal deficiencies* recovery. Beneficiary: Ministry of Education and Research, value 545,000,000 ROL
  4. Contract PNCDI/INFRAS, Nr. 187/06.11.2003, Director prof. dr. eng. Doina Drăgulescu, *Laboratory for certifying the mandibular implants and distractors used in maxillo-facial surgery – CIDUCOS.* Beneficiary: Ministry of Education and Research, value 1,335,000,000 ROL
  5. Contract PNCDI/VIASAN, Nr. 313/2004, Director prof. dr. eng. Doina Drăgulescu, *Developing of nonconventional medical techniques for optimizing the growth of cultivated live tissues in bioengineering.* Beneficiary: Ministry of Education and Research, value 95,000,000 ROL

<p><b>Laboratory for medical imaging</b></p>	
<p><b>Laboratory of modelling and design</b></p>	
<p><b>Laboratory for implant manufacturing LOIIFO</b></p>	 <p>Maxillo-facial surgery implant set Certificate of Conformity CS04</p>

	 <p>External distractor Certificate of Conformity CS04</p>
<p><b>Laboratory to control the quality of implant devices CIDUCOS</b></p>	

## PUBLICATIONS

### PAPERS IN JOURNALS

1. Rusu, L., Morcovescu, V., Dreucean, M., Drăgulescu, D., Stanciu, A., Demian, C., *Femur modeling and analysis for surgical implantation*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Automatic Control and Computer Science, Tom 49(63), No.2, 2004, ISSN 1224-600X, pp. 137-142
2. Drăgulescu, D., Toth-Tașcău, M., Dreucean, M., Morcovescu, V., Rusu, L., *Vibrations influence on the human pelvic girdle motion*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Automatic Control and Computer Science, Tom 49(63), No.2, 2004, ISSN 1224-600X, pp. 143-148
3. Drăgulescu, D., Toth-Tașcău, M., Morcovescu, V., Rusu, L., *Some aspects on the tennis player's upper limb motion modelling*, Scientific Bulletin of the "Politehnica"

University of Timișoara, Transactions on Automatic Control and Computer Science, Tom 49(63), No.2, 2004, ISSN 1224-600X, pp. 201-204

4. Drăgulescu, D., Rusu, L., Morcovescu, V., Precup, C., *Comparative study of mechanical stresses in human limbs bones*, Applied Bionic and Biomechanics, vol.1(2), no.1, Ed. Openmindjournals- New Zealand, 2004, ISSN 1176-2322 , pp.123-129

#### PAPERS IN PROCEEDINGS

1. Drăgulescu, D., Toth-Tașcău, M., Dreucean, M., Rusu, L., Morcovescu, V., *Vibrations influence on the human composite motion*, Proceedings 30<sup>th</sup> JUPITER Conference, University of Belgrade, 2004, ISBN 86-7083-459-6, pp. 3.135-3.138
2. Drăgulescu, D., Rusu, L., Toth-Tașcău, M., Morcovescu, V., Dreucean, M., *About mechanical behaviour of human lower limb bones*, Proceedings of the 13<sup>th</sup> Congress of European Society of Biomechanics, Proceedings on CD, July 4 – 7, 2004, S'Hertogenbosch, The Netherlands
3. Drăgulescu, D., Stănculescu, V., Toth-Tașcău, M., Dreucean, M., *Modelling and rebuilding the complex anatomical structures*, Proceedings Mathematical Biology and Ecology, 2004 WSEAS International Conference, Corfu, Greece, 17-19.08.2004, ISBN -960-8457-01-7, pp. 488-505
4. Drăgulescu, D., Toth-Tașcău, M., Morcovescu, V., Rusu, L., Dreucean, M., *Kinematics aspects of human body composite motion*, Proceedings SACI 2004, First Romanian-Hungarian joint symposium on Applied Computational Intelligence, Timișoara, Romania, May 25-26, ISBN 963 7154 26 4, pp. 1-10
5. Drăgulescu, D., Rusu, L., Raduta, A., Stanciu, A., *Stainless steel implants to repair the skeleton fractures*, Proceedings International Conference *Biomaterials & Medical Devices* BiomMedD 2004, București 5-7 November, Ed. Printech, ISBN 973-718-083-6, pp.128
6. Drăgulescu, D., Rusu, L., Toth-Tașcău, M., *Mechanical behaviour of long bones implants*, Proceedings International Conference *Biomaterials & Medical Devices* BiomMedD

2004, București 5-7 November, Ed. Printech, ISBN 973-718-083-6, pp.130

7. Drăgulescu, D., Rusu, L., Dreucean, M., *Comparative study of the head skeleton implant plates in Titanium alloy*, Proceedings International Conference *Biomaterials & Medical Devices* BiomMedD 2004, București 5-7 November, Ed. Printech, ISBN 973-718-083-6, pp. 129

#### PhD THESIS

Antonius STANCIU: *Design and control considerations for a dedicated equipment used for producing maxillo-facial surgical implants*, scientific coordinator prof. dr. eng. Doina Drăgulescu, 2004

#### PERSPECTIVES

- Manufacturing new implants models and prosthetic devices in order to be certified conformably to European standards;
- Motion analyzes for lower and upper limb;
- Extention of testing methods for medical devices;
- Further research in the field o f3D reconstruction of human body elements.

#### RESEARCH TEAM

- Prof. dr. eng. Doina Drăgulescu – Director
- Prof. dr. eng. Mirela Toth-Tașcău
- Assoc. prof. dr. eng. Mircea Dreucean
- Assist. eng. Vlad Morcovescu, PhD student
- Eng. Lucian Rusu, PhD student
- Eng. Camelia Demian, PhD student
- Eng. Adrian Voicu, PhD student
- Eng. Karoly Menyhardt, PhD student
- Eng. Ioan Dan Stoia, PhD student
- CMPICUSU partners in Timișoara, București, Cluj-Napoca, Craiova.

#### CONTACT

Prof.dr.eng. Doina DRĂGULESCU  
CMPICUSU Research Centre Director  
Faculty of Mechanical Engineering  
Bul. Mihai Viteazu, nr. 1  
300222, Timișoara, Romania

E-mail: [ddrag@cmpicsu.utt.ro](mailto:ddrag@cmpicsu.utt.ro)  
<http://cmpicsu.utt.ro>

Tel: +40-256-203637

Fax: +40-256-403523

## NATIONAL CENTER FOR ENGINEERING OF SYSTEMS WITH COMPLEX FLUIDS – *NCESCF*

### GENERAL PRESENTATION

The *National Center for Engineering of Systems with Complex Fluids (NCESF)* is structured as a Multiple User Research Centre (MURC). Its research team joins professors and researchers from “Politehnica” University from Timișoara, Romanian Academy – Timișoara Branch, and Politehnica University from Bucharest, and the research facilities are used in association with scientists from leading Universities and Research Institutes from Romania as well as Germany, France, Hungary, U.S.A.

The NCESF 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 Timișoara.

### HISTORY

- In 1997 was started the first pilot program financed by WORLD BANK (25000 USD) to set up the basic centre infrastructure;
- The main grant (317000USD) 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

### MISSION

The *National Center for Engineering of Systems with Complex Fluids (NCESF)* 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

- Flow properties of magnetic nanofluids 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;
- Mathematical and numerical modelling of complex fluid hydrodynamics, including fluids with complex rheology, two-phase cavitating flows, turbulent 3D flows in complex geometries;
- Analysis and optimization of hydraulic turbomachines, for both energetical and cavitation aspects;
- Development of research and professional software for parallel computing with applications in engineering hydrodynamics, turbomachineries, hydromechanical equipments.
- Flow properties of magnetic nanofluids and composites, magnetorheological fluids, polymeric melts, emulsions, gels;
- Magnetic and magnetorheological properties of magnetizable complex fluids; Magnetic and rheological characterization of biocompatible/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

Complex fluids, magnetic nanofluids, magnetorheological fluids, magnetizable nanocomposites, magnetic properties, rheological properties, numerical hydrodynamics, cavitation, hydraulic turbomachines, parallel computing.

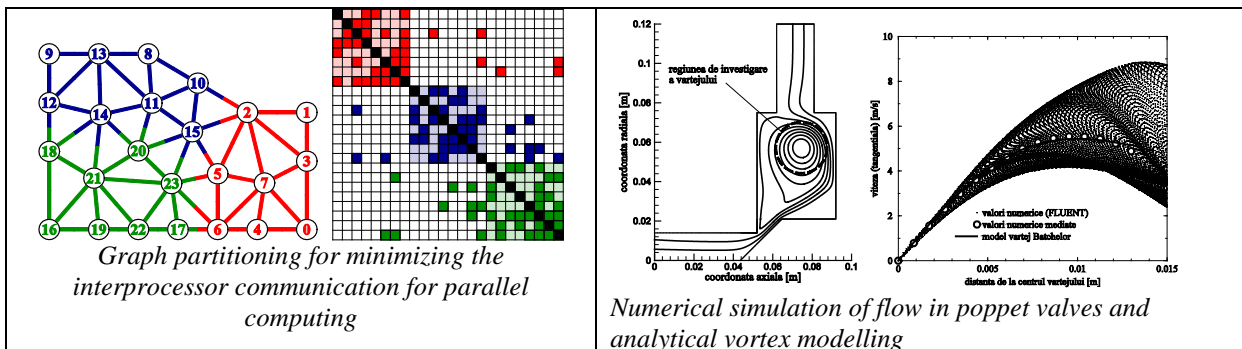
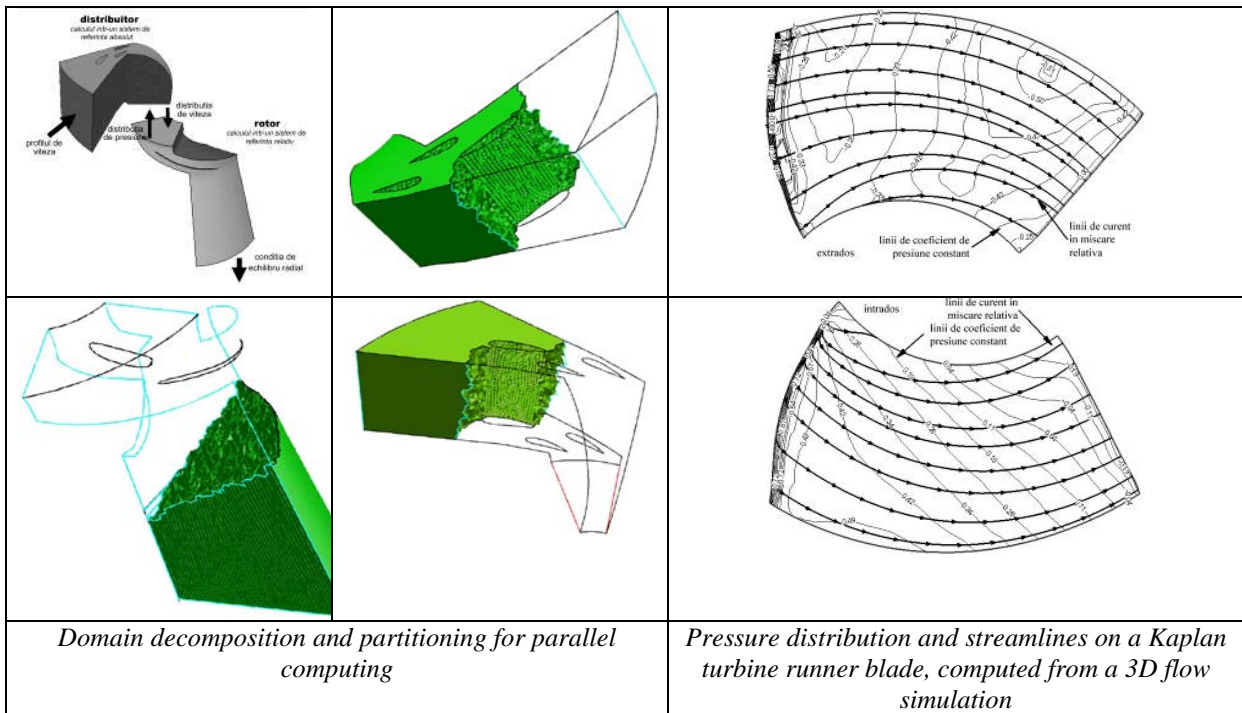


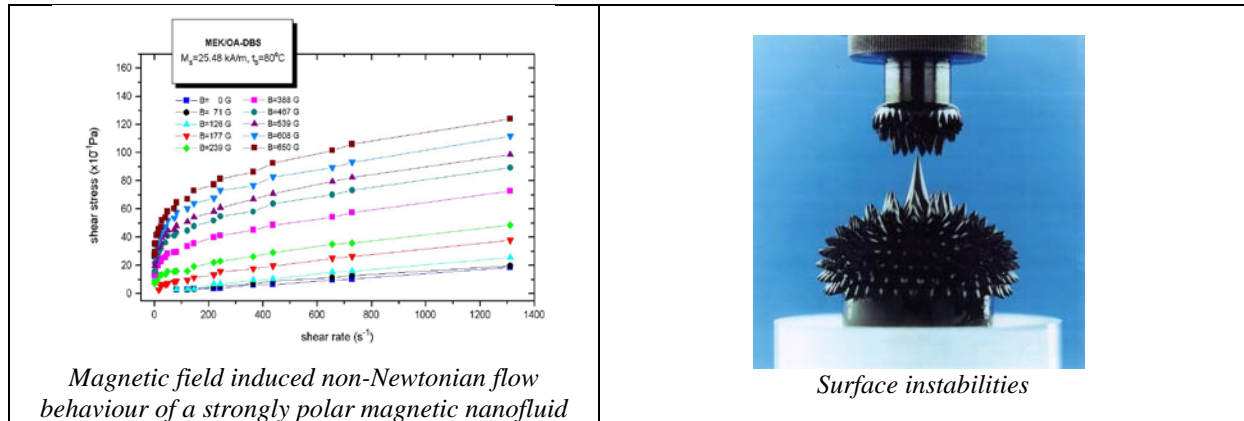
**ACTIVITIES**

- *Complex characterization* of magnetic nanofluids 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**

- Full three-dimensional flow simulation in Kaplan hydraulic turbines;
- Parallel computing algorithms, development and implementation;
- 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.





### 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).



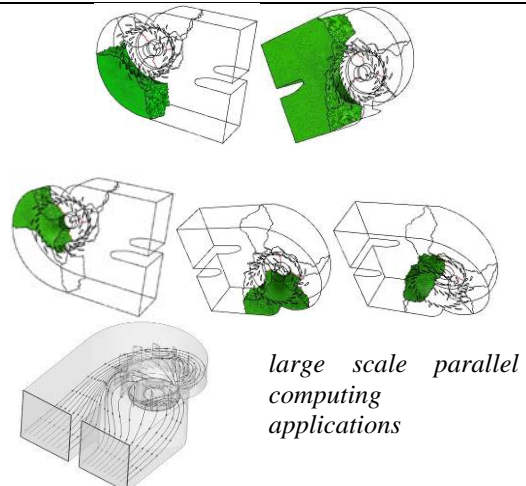
### Numerical Simulation and Parallel Computing Laboratory

Hardware infrastructure:

- 14 workstations computer cluster 4 Statii de lucru, PIII, 1 GHz, memorie 1 GB RAM
- IBM X225 Windows server
- Dual PIII, 2GB RAM Linux server
- DELL Precision workstation, 2 INTEL XEON 3 GHz, 4 GB RAM.

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**

1. CNCSIS contract no. 24/2004, *Modern Parallel Computing Numerical Methods for Fluid Flow Simulation, with Applications in Hydraulic and Pneumatic Machines and Systems*, Director: Prof. dr. eng. Romeo Susan-Resiga, value: 220,000,000 ROL
2. GAR 103/2004, Grantul Academiei Romane, *Numerical Modeling and Analysis of Two-Phase Cavitating Flows in Hydraulic Turbines*, Director: Acad. Ioan Anton, 50,000,000 ROL
3. *Researches on the behaviour of magnetizable fluids with complex micro and nanostructure under terrestrial and microgravity conditions*, Program AEROSPATIAL, PNCDI- MEC. Period: 2001-2004, Director of the project: Dr. Doina Bica, Responsible for the project (NCESCF team): Assoc.prof.dr.eng. Floriana Stoian (coop. with the Institute of Space Science, Bucharest), value 120,000,000 ROL
4. *Researches on the influence of simulated hypogravity conditions and of magnetic nanoparticles on the activity of genes in procarote and eucariote systems*, Program AEROSPATIAL, PNCDI-MEC, Period: 2001-2004, Responsibles for the project: Dr. Doina Bica, Dipl.-Phys. Oana Marinica (coop.with Univ.Agricultural Sciences and Veterinary Medicine, Timisoara), value 110,000,000 ROL
5. *Investigations using magneto-optical methods of the structure of concentrated magnetic fluids*, Program CERES, PNCDI-MEC, Period: 2003-2005, Responsibles for the project: Dr.L Vekas, Dipl.-Phys. Oana Marinica (coop. with the National R&D institute for Electrochemistry and Condensed Matter, Timisoara), value 85,000,000 ROL

**PUBLICATIONS****BOOKS**

1. Anton, L., Balint, D., Baya, A., Bădărău, T., Bălășoiu, V., Bej, A., Miloș, T., Muntean, S., Resiga, R., Stuparu, A., *Mecanica Fluidelor, Mașini Hidraulice și Acționări. Aplicații de calcul*, Orizonturi Universitare Publishing House, Timisoara, 2004, 262 pages, ISBN 973-638-076-9
2. Susan-Resiga, R., Bernad, S., Muntean, S., Popoviciu, M., (Editors), *Proceedings of the 6<sup>th</sup> International Conference on Hydraulic Machinery and Hydrodynamics*, Orizonturi Universitare Publishing House, Timișoara, 2004, ISSN 1224-6077, 740 pages

**JOURNAL PAPERS**

1. Bica, D., Vekas, L., Avdeev, M.V., Balasoiu, V., Marinica, O., Stoian, F.D., Susan-Resiga, D., Torok, G., Rosta, L., *Magnetizable colloids on strongly polar carriers-preparation and manifold characterization*, Progr. Colloid Polym. Sci., vol. 125 (2004) pp. 1-9
2. Avdeev, M.V., Balasoiu, M., Aksenov, V.L., Garamus, V.M., Kohlbrecher, J., Bica, D., Vekas, L., *On the magnetic structure of magnetite/ oleic acid/ benzene ferrofluids by small-angle neutron scattering*, J. Mag. Mag Mater., vol. 270 (2004), pp.371-379
3. Turek, J., Stelina, C., Musil, J., Bracinik, P., Kopcansky, M., Timko, M., Hnatic, M., Repasan, I., Potocova, L., Vekas, L., Bica, D., *Light induced structuralization in magnetic fluids with negativ Soret constant*, Czechoslovak Journal of Physics, vol. 54 (2004) Suppl. D, pp. 599-606
4. Popa, N.C., Sibli, A., Jorat, L., *Magnetic fluids in flow meters network for gases*, International Journal of Applied Electromagnetics and Mechanics (IJAEM), 19 (2004), pp. 509 – 514
5. Liță, M., Popa, N.C., Velescu, C., Vékás, L., *Investigation of a Magnetorheological Fluid Damper*, IEEE Transactions on Magnetics, Vol. 40 (2) 2004, pp. 469 – 472

**PUBLISHED PAPERS**

1. Muntean, S., Balint, D., Susan-Resiga, R., Anton, I., Dârzan, C., *3D Flow Analysis in the Spiral Case and Distributor of a Kaplan Turbine*, Proceedings of the 22<sup>nd</sup> IAHR Symposium, June 29 – July 2, 2004, Stockholm, Sweden, A10-2
2. Muntean, S., Susan-Resiga, R., Anton, I., *Mixing Interface Algorithm for 3D Turbulent Flow Analysis of the GAMM Francis Turbine*. In Vad J., Lajos T., Schilling R. (eds), *Modelling Fluid Flow: The State of the Art*, Springer Verlag, 2004, pp. 359-372
3. Muntean, S., Resiga, R., Bernad, S., Anton, I., *3D Turbulent Flow Analysis of the GAMM Francis Turbine for Variable Discharge*, Proceedings of the 22<sup>nd</sup> IAHR Symposium, June 29 – July 2, 2004, Stockholm, Sweden, A11-2
4. Muntean, S., Susan-Resiga, R., Bernad, S., Anton, I., *Analysis of the Francis GAMM Turbine Distributor 3D Flow for the Whole Operating Range and Optimization of the Guide Vane Axis Location*, Proceedings of the 6<sup>th</sup> International Conference in Hydraulic Machinery and Hydrodynamics, 21-22 Oct.

- 2004, Timișoara, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics, Tom 49(63). Special Issue, 2004, ISSN 1224-6077, pp. 131-136
5. Bernad, S., Susan-Resiga, R., Muntean, S., Anton, I., *Numerical Simulation of Two-Phase Cavitating Flow in Turbomachines*, Proceedings of the 6<sup>th</sup> International Conference in Hydraulic Machinery and Hydrodynamics, 21-22 Oct. 2004, Timișoara, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics, Tom 49(63). Special Issue, 2004, ISSN 1224-6077, pp. 439-446
  6. Balint, D., Susan-Resiga, R., Muntean, S., Anton, I., *A Numerical Investigation of the Full 3D Turbulent Flow in Kaplan Hydraulic Turbines*, Proceedings of the 6<sup>th</sup> International Conference in Hydraulic Machinery and Hydrodynamics, 21-22 Oct. 2004, Timișoara, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics, Tom 49(63). Special Issue, 2004, ISSN 1224-6077, pp. 59-66
  7. Miloș, T., Susan-Resiga, R., Anton, L.E., Baya, A., Muntean, S., Stuparu, A., *The Implementation of CAD and CFD Techniques in the Design of a Centrifugal Ventilator with Restraints of form and Size*, Proceedings of the 6<sup>th</sup> International Conference in Hydraulic Machinery and Hydrodynamics, 21-22 Oct. 2004, Timișoara, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics, Tom 49(63). Special Issue, 2004, ISSN 1224-6077, pp. 59-66
  8. Bernad, S., Muntean, S., Susan-Resiga, R., Anton, I., *Cavitation Phenomena in Hydraulic Poppet Valve*, Scientific Bulletin of the "Politehnica" University of Timisoara, Transactions on Mechanics, Tom 49(63), no. 2, 2004, pp. 65- 72
  9. Bernad, S., Muntean, S., Susan-Resiga, R., Anton, I., *Multiphase Modeling of Cavitating Flow*, Scientific Bulletin of the "Politehnica" University of Timisoara, Transactions on Mechanics, Tom 49(63), no. 2, 2004, pp. 73-80
  10. Bernad, S., Susan-Resiga, R., Bernad, E., Gaita, D., Mihalas, G.I., Munteanu, I., *Computerized Study of the Blood Flow in Arterial Stenosis*, Timisoara Medical Journal, 54, no. 2, 2004, pp. 142-145
  11. Vekas, L., Bica, D., Marinica, O., Rasa, M., Socoliuc, V., Stoian, F.D., *Concentrated magnetic fluids on water and short chian lenght organic carrier*, 10-th International Conference on Magnetic Fluids, August 02-06, 2004, Guaruja - Sao Paolo, Brazil, Abstracts, pp. 203-204
  12. Socoliuc, V., Bica, D., *Magnetic induced dichroism in magnetic fluids with particles made of soft magnetic materials*, 10-th International Conference on Magnetic Fluids, August 02-06, 2004, Guaruja - Sao Paolo, Brazil, Abstracts, pp. 230-231
  13. Sincai, M., Argherie, D., Ganga, D., Bica, D., *The protection against sun radiations by using some magnetic nanocompounds*, 10-th International Conference on Magnetic Fluids, August 02-06, 2004, Guaruja Sao Paolo, Brazil, Abstracts, pp. 56-57
  14. Balasoiu, M., Avdeev, M.V., Kuklin, A.I., Aksenov, V.L., Ghencescu, O., Torok, G., Rosta, L., Bica, D., Vekas, L., *Structural studies of ferrofluids by small-angle neutron scattering*, Workshop: Magnetic forces in nano-and biotechnologies, September 16-18, 2004, Riga, Latvia, Abstracts, ISBN 9984-770-10-9, pp.19-20
  15. Avdeev, M.V., Khokhryakov, A., Aksenov, V.L., Balasoiu, M., Torok, G., Rosta, L., Garamus, V., Bica, D., Vekas, L., *Structure of magnetic fluids based on non-polar organic carriers studies by means of small-angle neutron scattering*, XVIII National Workshop on Neutron Scattering in Condensed Matter, Research (RNIKS-2004) Zarechnyj, Ekaterinburg, October 12-16, 2004

#### 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.

#### RESEARCH TEAM

- Prof. dr. eng. Romeo SUSAN-RESIGA, Director NCESCF
- Dr. phis. 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. Floriana STOIAN, head of the Magnetometry Laboratory

#### CONTACT

Prof. dr. eng. Romeo SUSAN-RESIGA

Tel: +40-256-403692

Fax: +40-256-403700

E-mail: [resiga@mh.mec.utt.ro](mailto:resiga@mh.mec.utt.ro)

<http://mh.mec.utt.ro/cnisfc>

## HYDROPNEUMATIC MACHINES AND SYSTEMS RESEARCH CENTRE

### GENERAL PRESENTATION

The Research Center was established around a strong material base and an experienced and dedicated staff. The Research Centre has, also, benefits from the Hydraulic Machinery Laboratory of the "Politehnica" University of Timișoara, laboratory build in 1929 and was – and still is – a strong basis in creating conditions to develop research and support didactic experiments in order to offer practical habits to students.

The centre was founded by the Department of Hydraulic Machinery, the Research Centre for Aero-energetics, the National Centre for Engineering of Systems with Complex Fluids, the Hydrodynamics Cavitation and Magnetic Liquids Centre. It has been accredited by CNC SIS as a research centre, type C, with the certificate no. 56/CC.

Besides the experimental facilities, the Hydraulic Machinery Department has five computer networks, one of them direct connected to some facilities. Those networks assure a modern didactic process and creation and use of powerful software numeric methods in turbomachinery field.

The mission of the centre is to realize experimental research in turbomachinery and hydraulic drives systems field in correlation with numerical analysis, using adequate software.

### MAIN ACTIVITIES

#### Research domains:

- Machines and hydro-pneumatic equipment
- Turbomachinery hydrodynamics and cavitation
- Drive systems and automation.

**Keywords:** *hydro-turbines, turbo-pumps, hydrodynamics, cavitation, hydraulic drives, numerical methods*

#### Areas of expertise:

- Elaboration of computational methods in hydrodynamics of turbomachinery and hydraulic equipment and development of software bases for intelligent machines and installations
- Elaboration of numeric methods to simulate the flow in turbomachines, cascades and development of complex models to determine the universal characteristics of cascades and turbomachines

- Elaboration of constructive solutions for turbines and micro-turbines and research and design of turbomachines
- Optimization of hydraulic machinery by using numerical methods
- Static and dynamic identification and study of transients in pumps and turbines
- Analyze of aero-energetic potential of western Romania and particular the Banat Mountains
- Researches in aero-energetical offer of a zone for an aero-electric farm
- Hydrodynamics of cavitation in turbomachinery with application to Francis and Kaplan turbines
- Researches in the domain of cavitation resistance of materials used for hydraulic turbines
- Follow - up the exploitation cavitational behavior of hydraulic machinery and hydraulic drives
- Design the hydraulic drives systems for several industrial applications
- Modular optimization of the structures and elements of hydraulic drives systems
- Modeling the flow in hydraulic drives and analyze their static and dynamic behavior
- Experimental tests on standard and proportional hydraulic equipment, using automated acquisition of experimental data
- Assisted study and design of hydraulic drives systems.

### RESULTS

#### RESEARCH CONTRACTS

1. CNC SIS 154, theme 3, contract no. 32940 / 22.06.2004, *Investigations upon deformations and cracks produced as a result of cavitation erosion to the austenitic stainless steel used for casting hydraulic turbines blades*, Director: Assoc. prof. dr. eng. Ilare Bordeășu, value: 169,000,000 ROL
2. CNC SIS 145, theme 2, contract no. 32940 / 22.06.2004, *Theoretical and experimental investigations regarding the hydro-mechanical equipments for driving and power system*. Director: Prof. dr. eng. Victor Bălășoiu, value: 227,500,000 ROL
3. MENER, No. 333 / 25.09.2003, *Erection of a hydraulic turbine model type F220, which enhances the performances of hydropower plant "Stejarul" through refurbishment*,

Director: Prof. dr. eng. Mircea Bărglăzan,  
value: 300,00,000 ROL

4. MENER, No. 335 / 25.09.2003, *Modernization of Kaplan hydraulic turbines with the purpose of increasing the performances of these equipment*, Director: Prof. dr. eng. Mircea Bărglăzan, value:300,000,000 ROL

#### BOOKS

1. Anton, L., Balint, D., Baya, A., Bădărău, T., Bălășoiu, V., Bej, A., Miloș, T., Muntean, S., Resiga, R., Stuparu, A., *Mecanica Fluidelor, Mașini Hidraulice și Acționări. Aplicații de calcul*, Orizonturi Universitare Publishing House, Timisoara, 2004, 262 pages, ISBN 973-638-076-9
2. Pădurean, I., *Mecanica Fluidelor Mașini și Acționări Hidraulice. Fundamente teoretice. Aplicații*, Eurostampa Publishing House, Timisoara, 2004, 110 pages, ISBN 973-687-245-9
3. Bălășoiu, V., Pădurean, I., *Echipamente și sisteme hidraulice de acționare. Compendium*, Orizonturi Universitare Publishing House, Timișoara, 2004, 294 pages, ISBN 973-638-115-3

#### PUBLISHED PAPERS

1. Popoviciu, M., Bordeasu, I., Bălășoiu, V., *Cavitation erosion qualities for 40Cr10 steel with and without thermal treatment*, Journal FMF, Transactions Faculty of Mechanical Engineering, vol.32, Nr.2/2004, Belgrade, pp. 77-82, YU ISSN: 1451-2092
2. Bălășoiu, V., Rasga, C., Popoviciu, M., Bordeasu, I., *Experimental Results in the Analysis of Flow in a Sliding Control Valve*, PNEU-HIDRO 2004, XI International Conference and Exhibition on Pneumatics and Hydraulics, Miskolc-Eger, 2004, ISSN 1215-0851, pp. 55-60
3. Rasga, C., Bălășoiu, V., Popoviciu, M., Bordeasu, I., *Numerical simulation of the flow in a Sliding Control Valve*, PNEU-HIDRO 2004, XI International Conference and Exhibition on Pneumatics and Hydraulics, Miskolc-Eger, ISSN 1215-0851, pp. 60-67
4. Bordeșu, I., Popoviciu, M., Pătrășoiu, C., Bălășoiu, V., *An Analytical Model for the Cavitation Erosion Characteristic Curves*, Proceedings of the 6<sup>th</sup> International Conference in Hydraulic Machinery and Hydrodynamics, 21-22 Oct. 2004, Timișoara, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics, Tom 49(63),

Special Issue, 2004, ISSN 1224-6077, pp. 253-258

5. Baya, A., Anton, L., Miloș, T., Stuparu, A., *Achiziții și prelucrări de date în timp real pentru experimente de hidrodinamică*, Proceedings of the third Conference of the Romanian Hydro-energetics, Vol. II, Bucharest, 2004, pp. 351-361
6. Dobândă, E., *Comanda stațiilor de pompare cu ajutorul logicii vagi*, IX-th Scientific Session with International Participation «SCIENCE AND EDUCATION XXI-th CENTURY BASE», Section VIII.3 – Technical Science – vol. 3, pag. 37 – 44, Terrestrial Forces Academy «Nicolae Bălcescu», Sibiu, 2004, ISBN 973-7809-08-04 – 01 / ISBN 973-7809-03-03
7. Bălășoiu, V., Raszga, C., Bordeasu, I., *Cavitația în distribuitoarele hidraulice cu sertar cilindric liniar*, The third conference of Romanian Energetics, 28-29 May 2004, Bucharest, pp. 523-530
8. Miloș, T., Bărglăzan, M., *CAD Technique used to Optimize The Francis Runner Design*, Proceeding of the 6<sup>th</sup> International Conference in Hydraulic Machinery and Hydrodynamics, 21-22 Oct. 2004, Timișoara, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics, Tom 49(63), Special Issue, 2004, ISSN 1224-6077, pp. 125 –130
9. Bordeasu, I., Dobândă, E., *Considerații asupra criteriilor de precizie a rezistenței materialelor la eroziune cavitațională*, Fourth National Conference with International Participation «Professor Dorin Pavel – Romanian Hydroenergetics Founder», Vol. V, Science and Engineering, Sebeș, 2004, pp. 281

#### PERSPECTIVES

- Checking the micro-hydroelectric stations in situ; building dynamic models for Pelton turbines
- Determination of main parameters of tangential turbines using dynamic identification methods
- Building modern test facility to test the pumps and connect it to computer
- Using the grapho-analytical and numeric method in design turbines and pumps and experimental validation by comparing with experimental data
- Up - to - date hydraulic schemes of hydro-mechanic equipment by using logic elements and proportional components; optimization of

- hydraulic schemes for automation and synchronization of hydro-mechanic equipment
- Study of hydrodynamic phenomenon in hydraulic drives
  - Study the influence of compressibility of oil on the dynamic of hydraulic drives systems
  - Theoretical and numeric study of cavitation coefficients in hydraulic drives systems components
  - Determination of cavitation behavior of different types of steel using both experimental and statistical methods
  - Study of the influence of tiredness (fatigue) stresses on the cavitation characteristics of types of steel used for hydraulic turbines
  - Study the microstructure transformations produced by cavitation in austenitic steels
  - Use of numerical simulation of flow in reversible turbomachines
  - Analyzis of the aero-energetic potential of Semenic by using statistic methods on the INMH databases
  - Selection of adequate technologies to refurbish wind turbines of Semenic site

#### RESEARCH TEAM

- 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. Ioan FITERO
- Prof. dr. eng. Victor BĂLĂȘOIU
- Prof. dr. eng. Mircea BĂRGLĂZAN
- Prof. dr. eng. Liviu Eugen ANTON
- Prof. dr. eng. Alexandru BAYA
- Prof. dr. eng. Romeo RESIGA
- Assoc. prof. dr. eng. Teodor MILOȘ
- Assoc. prof. dr. eng. Ilare BORDEAȘU
- Lect. dr. eng. Adriana MANEA
- Lect. dr. eng. Eugen DOBÂNDĂ
- Lect. dr. eng. Corneliu VELESCU
- Lect. dr. eng. Adrian BEJ
- Lect. dr. eng. Dorin GALERIU
- Assist. eng. Ionel BACIU
- Assist. eng. Rodica BĂDĂRĂU
- Assist. eng. Liliana SUCITU
- Assist. eng. Ioan PĂDUREANU
- Assist. eng. Daniel BALINT
- Prep. eng. Adrian STUPARU

#### CONTACT

Assoc. prof. dr. eng. Ilare BORDEAȘU  
 Faculty of Mechanical Engineering  
 1 Mihai Viteazul Bvd.  
 Timișoara, 300233  
 Tel: +40-256-403693, +40-256-403694,  
 +40-256-403681  
 E-mail: [bordeasu@hotmail.com](mailto:bordeasu@hotmail.com);  
[ilarica@mec.utt.ro](mailto:ilarica@mec.utt.ro)  
[www.mec.utt.ro](http://www.mec.utt.ro)

## RESEARCH CENTRE FOR VIBROIMPACTS AND MECHANICAL VIBRATIONS

#### GENERAL PRESENTATION

Because of the existing tradition due to the results obtained in research, the premises appeared for funding a centre of scientific excellence with preoccupations in the field of vibroimpacts and mechanical vibrations. As consequence of the competitions organized by CNCSIS, concerning the identification and evaluation of the research centers, the developed activity was specially appreciated, so the research centre was recognized. By the certificate no. 15/CC-B from 11/05/2001, it has been recognized as a **research centre**, type B: **VIBROIMPACTS AND MECHANICAL VIBRATIONS**. It has to be underlined that the research in the field of the vibroimpacts is done, with priority, by the collective from this centre.

The director of the Centre is PhD. Prof. Eng. **Liviu Brîndeu**, from the Department of Mechanics and Vibrations of the Faculty of Mechanical Engineering.

#### MISSION

The main mission of the centre is to realize specific activities of continue training, research, technical assistance, documentation and expertise. In order to realize its mission, the centre has as objectives:

- promotion of works of fundamental and applied research in the field of vibroimpacts, vibrations and technical acoustics;
- expertise and consulting in specialty;
- promotion of the field, selected from the themes of the specialty as a high field, and

realization of cooperation programs with other research institutes in this field;

### RESEARCH FIELDS

The main fields of the research are:

- vibroimpacting interactions and vibroimpacts
- mechanical vibrations
- technical acoustics
- vibrations of nonlinear systems

### KEYWORDS

Vibration, vibroimpact, noise, impact, spectrum, auto-spectrum, prediction, diagnosis, homotopy variational method; stability, weakly nonlinearity

### ACTIVITIES

- Dynamics of vibroimpact systems. Theoretical and experimental methods for the study of stable vibroimpact motions;
- Modeling of work of vibroimpact mechanisms, calculus and optimization algorithms;
- Methods of study for the vibrations of mechanical systems, with applications in engineering. Diagnosis by vibrations of defections at machines and equipment;
- Theoretical and experimental studies, concerning the elaboration of new methods and equipment for the decreasing of levels of vibrations and noises;
- Expertise of capacity of isolation at airy noise of building elements. Determination of noise levels at civil buildings;
- Study of the oscillation with cubic elastic restoring force;
- Study of stability;
- Application of the Homotopy method to nonlinear oscillations.

### RESEARCH PROJECTS

1. GAR Project 172/2004, *Dynamic analyses and optimization of working regimes of vibroimpacts hammers*, Director: Prof. dr. eng. Liviu Brîndeu, Value: 26,000,000 ROL
2. GAR Project 102/2004, *Digital techniques for determination of proper pulsation of some vibrating systems*, Director: Prof. dr. eng. Vasile Marinca, Value: 27,000,000 ROL
3. CNCISIS Project 32940/22.06.2004, theme 5, *Dynamics and optimization of work of roto-percussive and percussive drilling equipment*, Director: Prof. dr. eng. Adrian Chiriac, Value: 120,000,000 ROL
4. CNCISIS Project 32940 / 22.06.2004, *Researches and applications of dynamics of linear and nonlinear systems submitted to vibrating and vibroimpacting actions*, Director: Assist. dr. eng. Nicoale Herișanu, Value: 120,000,000 ROL

5. CNCISIS Project 32940/22.06.2004, *Original numerical methods, applied in the study of parametric and nonlinear vibrations*, Director: Prof. dr. eng. Vasile Marinca, Value: 130,000,000 ROL

### PUBLICATIONS

#### PUBLISHED PAPERS

1. Herișanu, N., Popa, Radovan Smaranda, *Algorithm for dynamic behavior prediction of elastic bar type impact-vibration hammers*, Journal of Technical Institute of Iași - Section: Machine Construction, Tom L (LIV), Fasc B, 2004, ISSN 1011-285-51, pp. 13-16
2. Brîndeu, L., Nagy, Ramona, *Application of Van der Pol method of slowly variable parameters in the study of non-linear vibration*, Annals of the Oradea University, Fascicle of Management and Technological Engineering, CD-Rom Edition, 2004, ISSN 1583-0691, pp. 12
3. Bacria, V., Bărbulescu, C., *Attenuation of the noise generated by the electrical transformers*, "IX-th Scientific Meeting with International Participation: Science and Fundamental Education in XXI Century", Technical Sciences, Tom V, Sibiu, 25-26.11.04, ISBN 973-7809-04-1, pp. 31-38
4. Cioară, T.Gh., Alampalli, S., *Consideration on damage detection of a structure using vibration test data*, Proceedings of International Modal Analysis Conf. HYATT – Dearborn Michigan 2004, January 26-29, ISBN 0-912053-86-0, CD paper no. 146
5. Toader, M., Bacria, V., *Consideration upon the acoustic arrangement of transport vehicles from urbane environment*, Int. Conference „Noise and Vibration”, Niš, Serbia and Montenegro, 2004, CD paper no 19-07
6. Bărbulescu, C., Bacria, V., *Consideration upon the noise generated by the electrical transformer*, VI-th International Symposium Romania-Serbia & Montenegro - Hungary, ISYPMR-2004, Timișoara, Romania, 2004, ISBN 973-8539-26-0, pp. 343-348
7. Marinca, V., Herișanu, N., *Construction of periodic solutions for some nonlinear problems with iteration perturbation method*, Annals of "Aurel Vlaicu" University of Arad, Textile Series, Fasc. Textile Technologies, 2004, ISSN 1582-3431, pp. 224-229
8. Dănoiu, A., *Critical study on the dynamic models used in study of the working process of plane vibrating sieves*, International Multidisciplinary Symposium "University



- ROPET 2004” Mechanical Engineering, ISBN 973-8260-69-8, pp. 73-78
9. Moga, I., Vesseleny, T., Brîndeu, L., Cocaină, A., *Design of an experimental device used for vibroimpact metal cutting of high plasticity materials*, Annals of the Oradea University, Fascicle of Management and Technological Engineering, 2004, CD-Rom edition, ISSN 1583-0691, pp. 37
  10. Chelu, P., Chiriac, A., *Determination of dynamic effort in the cable of a mining machine, taking account of the characteristic of driving motor*, Proceeding of the 19-th International Conference on Noise and Vibration, Niš, 2004, YU ISBN 86-7181-051-8, CD paper 19-23
  11. Chelu, P., *Dynamic response of an anisotropic plate impacted by a moving rigid body using Wavelet-Galerkin technique*, Proceeding of the 19-th International Conference on Noise and Vibration, Niš, 2004, YU ISBN 86-7181-051-8, CD paper 19-24
  12. Dănoiu, A., *Dynamic model for the working process of pan vibrating sieve considering their interaction with the driving engine*, Annals of “Aurel Vlaicu” University of Arad, Textile Series, Fasc. Textile Technologies, 2004, ISSN 1582-3431, pp. 236-241
  13. Brîndeu, L., Fântână, N., Nagy, Ramona, *Dynamic effects at the vehicle displacement on the rolling track*, Annals of the Oradea University, Fascicle of Management and Technological Engineering, 2004, CD-ROM Edition, ISSN1583-0961, pp. 15
  14. Brîndeu, L., Fenchea, M., Fântână, N., Nagy, Ramona, *Dynamics of vehicle in motion over the irregularities of rolling track*, 9-th Conference on “Vehicle System Dynamics, Identification and Anomalies” VSDIA, 2004, Budapest-Hungary, ISBN 9634208177, 8 pages
  15. Brîndeu, L., Chiriac, A., Nagy, Ramona, *Dynamic models in the stable motion regimes of vehicle study*, 9-th Conference on “Vehicle System Dynamics, Identification and Anomalies” VSDIA, 2004, Budapest-Hungary, ISBN 9634208177, 8 pages
  16. Dănoiu, A., *Experimental method for determination of the vibratory movements of plane screen*, Scientific Bulletin of the “Politehnica” University of Timișoara, Mechanics Series, Fasc.1/2004, ISSN 1224-6077, pp. 7-12
  17. Cioară, T.Gh., Cireș, I., Grama, A., Roșca, I., Simoiu, D., Tocarciuc, A., *In situ mass balancing method for a store yielding machine with bucket wheel*, Scientific Bulletin of the “Politehnica” University of Timișoara, Mechanics Series, Fasc.2/2004, ISSN 1224-6077, pp. 1-6
  18. Brîndeu, L., Hule, V., Tătaru, B., Hora, H., *Longitudinal vibrations of visco-elastic beams with concentrated masses at extremities*, Annals of the Oradea University, Fascicle of Management and Technological Engineering, 2004, CD-Rom Edition, ISSN 1583-0691, pp. 13
  19. Popa, Radovan Smaranda, *On impulse transmission in unlimited elastic medium*, Journal of Technical Institute of Iași - Section: Machine Construction, Tom L (LIV), Fasc. 6B, 2004, ISSN-1011-2855, pp. 17-20
  20. Marinca, V., *On the generalized Van der Pol equation*, Annals of “Aurel Vlaicu” University of Arad, Textile Series, Fasc. Textile Technologies, 2004, ISSN 1582-3431, pp. 218-223
  21. Marinca, V., Herișanu, N., *On the rotational harmonic balance for mixed parity nonlinear oscillators*, Annals of “Aurel Vlaicu” University of Arad, Textile Series, Fasc. Textile Technologies, 2004, ISSN 1582-3431, pp. 230-235
  22. Dănoiu, A., *On the vibration motions of a plane sieve*, Scientific Bulletin of the “Politehnica” University of Timișoara, Mechanics Series, TOM 49(63), fasc.1/2004, ISSN 1224-6077, pp. 1-6
  23. Dănoiu, A., Dănila, I., *The influence of the length of elements in the driving mechanism of plane sieves on their working regime*, Annals of “Aurel Vlaicu” University of Arad, Textile Series, Fasc. Textile Technologies, 2004, ISSN 1582-3431, pp. 242-247
  24. Marinca, V., Herișanu, N., *The oscillator with cubic elastic restoring force*, Proceeding of the 19-th International Conference on Noise and Vibration, Nis, 2004, YU ISBN 86-7181-051-8, CD paper 19-30

#### BOOKS

1. Gheorghe Luca, *Vibration generators*, Politehnica Publishing House, Timisoara, 2004, ISBN 973-625-151-9, 215 pages
2. Vasile Marinca, Nicolae Herișanu, *Mechanics, Vol. II*, Politehnica Publishing House, Timisoara, 2004, ISBN 973-625-199-3, 300 pages
3. Vasile Bacria, *Mechanics. Kinematics*, Politehnica Publishing House, Timisoara, 2004, ISBN 973-625-171-3, 104 pages

4. Csizmadia B., Hegedus A., Gelencser E., Brîndeu L., Paczelt I., 2004, *Műszaki mechanica – Technical Mechanics*. Ed. Nemzeti Tankönyvkiado, ISBN 963 1945898, ISSN 1785-8461, 236 pages

#### PhD THESIS

1. Lazăr Bogdan, *Analyses of ultrasounds interactions with non-homogeneities from the metallic materials*, 20 February 2004, PhD coordinator: Brîndeu Liviu
2. Bălă Dumitru, *Methods of study of motions of vibrating and vibroimpact systems*, 17 August 2004, PhD coordinator: Brîndeu Liviu

#### PERSPECTIVES

The results obtained by the collective will be developed in a few priority directions, concerning the elaboration of general methods for the study of vibroimpact motions, modeling of work of mechanisms (calculus algorithm and optimization), studies concerning the attenuation of sonorous sources and elaboration of methods and equipment for the decreasing of vibration levels.

#### RESEARCH TEAM

- Prof. dr. eng. Liviu BRÎNDEU, member of the Academy of Technical Sciences of Romania
- Prof. dr. eng. Vasile BACRIA
- Prof. dr. eng. Liviu BERETEU
- Prof. dr. eng. Adrian CHIRIAC

- Prof. dr. eng. Titus CIOARĂ
- Prof. dr. eng. Vasile MARINCA
- Prof. dr. eng. Ioan SMICALĂ
- Prof. dr. eng. Mihai TOADER
- Assoc. prof. dr. eng. Pantele CHELU
- Assoc. prof. dr. eng. Gheorghe DRĂGĂNESCU
- Assoc. prof. dr. eng. Nicolae HERIȘANU
- Assoc. prof. dr. eng. Dimitrie UROȘU
- Lect. dr. eng. Valeriu ANGHELESCU
- Lect. dr. eng. Alexandru DĂNOIU
- Lect. eng. Nicolae FĂNTĂNĂ
- Lect. dr. eng. Gheorghe LUCA
- Lect. dr. eng. Smaranda POPA-RADOVAN
- Assist. eng. Ramona NAGY
- Eng. Gabor Romeo PALINCAȘ, PhD student
- Eng. Adriana BALȚĂ, PhD student
- Eng. Cristina BASARABĂ-OPRIȚESCU, PhD student
- Econ. Dănuț BIRCEANU, PhD student
- Phys. Alexandru BOLTOȘI, PhD student
- Math. Gabriela COSTEA, PhD student
- Eng. Gheorghe BECHERU, PhD student

#### CONTACT

Prof. dr. eng. Liviu BRÎNDEU, Director of the Centre

Department of Mechanics and Vibrations

Faculty of Mechanical Engineering

Bul. Mihai Viteazu, no. 1

300222, Timișoara

E-mail: [brindeu@mec.utt.ro](mailto:brindeu@mec.utt.ro)

Tel.: +40-256-403628

## 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 Timișoara. 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 modelling;
- 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 traducers 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
- Participation to the EU Sixth Framework Programe (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 CNCISIS, national programmes 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:
  - 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.EN.A – Balkan Environmental Association

### KEYWORDS

Integrated engineering, Concurrent engineering, Manufacturing engineering, Materials advanced welding, Manufacturing processes management, Plasturgy, Rapid prototyping and three-dimensional measurements, Cold forming, Non-traditional machining processes, Welding processes, Welding equipment, Defectology, Quality assurance, Equipment and technologies for non-conventional technological processes, Laser materials processing, Plan and equipment for food industry, Piezoceramic traductors, Degradation of materials, remaining durability of exploitation.

### 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.).

### RESEARCH CONTRACTS:

1. CNCISIS 32940/2004, *Real time control of machining operations in manufacturing systems*, Director: Assoc. prof. dr. eng. Eugen Pămîntaş, Value: 243,675,000 ROL
2. CNCISIS 32940 / 2004, *Innovated, collaborative, integrated product design*. Director: Prof. dr. eng. George Drăghici, Value: 126,100,000 ROL
3. CNCISIS 32940/2004, *Researches regarding the ultrasonic activation of some machining processes*, Director: Prof. dr. eng. Mihai Crăciun Nica, Value: 110,500,000 ROL
4. CNCISIS 32940/2004, *Products re-engineering based on rapid prototyping techniques and 3D measurement*, Director: Lecturer Aurel Tulcan, Value: 90,000,000 ROL
5. CNCISIS 32940/2004, *Evaluation procedure of patents. Intermediating and consulting pole for its using*, Director: Lecturer Aurel Tulcan, Value: 130,000,000 ROL

6. UPT 62/2004, *Evaluation and analyze of ultrasonic activated processes for the polymeric materials flow using specialized equipment*, Director: Prof. dr. eng. Tudor Iclanzan, Value: 50,000,000 ROL
7. AMTRANS Grant C501-2003 / 2005, *Rehabilitation "in situ" of Railroad Infrastructure Elements*, Director of grant: Prof. assoc. dr. eng. Mihaela Popescu, Value (2004): 318,620,000 ROL
8. AMTRANS Grant C605-2003 / 2005, *Technological Center for Mechanized Welding Fabrication and Reability of Railroad Elements*, Director of grant: Prof. dr. eng. Gheorghe Gliță, Value (2004): 394,380,000 ROL
9. Contract C59/21.04.2004 (S.C. SUDROM S.R.L. Buzău), *Comparative approaches in the exploitation of steel and PEHD gas distribution pipelines*, Director of contract: Prof. assoc. dr. eng. Mihaela Popescu, Value: 9,811,550 ROL

#### **Prospective:**

- Participation to the **EU Sixth Framework Programme (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 CNCISIS, national programmes RELANSIN, AMTRANS, INFRAS, MATNANTECH etc.

### **PUBLICATIONS**

#### **BOOKS**

1. Mihaela Popescu, *Joining techniques of plastics* (published in Romanian), Politehnica Publishing House, Timișoara, 2004, 316 pages, ISBN 973-625-165-9
2. Mircea Burcă, Stelian Negoitescu, *MIG/MAG welding*, (published in Romanian) Edition II, Sudura Publishing House, Timișoara, 2004, 228 pages, ISBN 973-8359-22-8
3. Ioan Lucaciu, Mircea Burcă, *Fusion welding technology*, (published in Romanian), vol. 1, Oradea University Publishing House, 2004, 167 pages, ISBN 973-613-558-6
4. Aurel Nanu, coord, *Tratat de tehnologii neconventionale, vol. VIII, Prelucrarea cu unde ultrasonice*, Bren Publishing House, Bucharest, 2004, 522 pages, ISBN 973-648-385-1
5. Mihaela Nistoran Botiș, *Controlul coroziunii și al acoperirilor anticorozive*, Orizonturi

Universitare Publishing House, Timișoara, 2004, 145 pages, ISBN 973-638-103-X

#### **PUBLISHED PAPERS**

1. Popescu, M., Mocuța, E.G., Rădescu, D., *Tram rails wear and the possibility to weld and reconditioned them*, 3-rd Conference with international participation, Bucharest University, 28-29 Oct, 2004, Mirton Publishing House, Timișoara, ISBN 97-3-585-926-2, pp. 41-48
2. Popescu, M., Rădescu, D., Miloș, L., Glița, G., *Solution for the welding/reconditioning installation of tram rails*, 3-rd Conference with international participation, Bucharest University, 28-29 Oct, 2004, Mirton Publishing House, Timișoara, ISBN 97-3-585-926-2, pp. 101-110
3. Mocuța, E.G., Popescu, M., Căneparu, P., *Comparative analysis on welding / reconditioning processes of rails*, 3-rd Conference with international participation, Bucharest University, 28-29 Oct, 2004, Mirton Publishing House, Timișoara, ISBN 97-3-585-926-2, pp. 81-90
4. Mocuța, E.G., Berger, E., *The in-situ reconditioning of tram rails with worn channels*, 3-rd Conference with international participation, Bucharest University, 28-29 Oct, 2004, Mirton Publishing House, Timișoara, ISBN 97-3-585-926-2, pp. 1-6
5. Țunea, D., Popescu, M., Berger, E., *Peculiarities of mechanized filler metal feeding in the WIG welding process*, International Conference - *High Productivity Welding Processes*, ISIM Timișoara, 10-11 June 2004, CD-ROM Edition, pp. 1-3, ISBN 973-83-59-21-x
6. Burcă, M., Dumbravă, D., Căneparu, P., Petrica, O., *Technological methods to increase productivity in MAG welding of membrane walls in the structure of heat exchangers*, International Conference - *High Productivity Weding Processes*, 10-11 June 2004, ISIM Timișoara, CD-ROM Edition, pp. 62-66, ISBN 973-83-59-21-x
7. Burcă, M., Dumbravă, D., Căneparu, P., Burcă, C.L., Bodnar, C., *On technological performance of tungsten electrodes in TIG welding*, ASR Conference „WELDING 2004”, Constanța, 15-17 September 2004, ISBN 973-8359-25-2, pp. 256-266
8. Burcă, M., Burcă, C.L., *Sintetical analysis of aluminium alloys used in welding*, Arad University Conference, 3-4 November, 2004, ISSN 1583-0691, pp. 38-42

9. Dumbravă, D., Safta, V., Stancu, V., Herman, M., *Calculus of residue bending displacement for welding of grinders. Part I. Preliminary considerations*, International Conference „Structural integrity of welded structures”, 4-5 November 2004, ISIM Timișoara, CD-ROM Edition, pp. 112-122, ISBN 973-83-59-27-9
10. Dumbravă, D., Safta, V., Stancu, V., Herman, M., *Calculus of residue bending displacement for welding of grinders. Part II, Calculus of residual bending displacement for straight bars with variable rigidity*, International Conference „Structural integrity of welded structures”, 4-5 November 2004, ISIM Timișoara, CD-ROM Edition, pp. 123-128, ISBN 973-83-59-27-9
11. Țunea, D., Popescu, M., Mușat, L., Cărbunaru, T., *US and RX control applied to welded joints on PEHD pipes*, International Conference „Structural integrity of welded structures”, 4-5 November 2004, ISIM Timișoara, CD-ROM Edition, pp. 81-84, ISBN 973-83-59-27-9
12. Popescu, M., Mușat, L., Cărbunaru, T., Berger, E., *Tendances dans l'élargissement d'utilisation des tuyaux en polyéthylène dans le transport d'eau et gaz naturel, rapportés aux tendances existantes dans le monde*, Annals of the Oradea University, Fascicle of Management and Technological Engineering, May 2004, CD-ROM Edition, pp. 144, ISSN 1582-3431
13. Berger, E., *L'utilisation des matériaux composites pour l'ameublement et matériel de bureau*, Annals of the Oradea University, Fascicle of Management and Technological Engineering, May 2004, CD-ROM Edition, pp. 99, ISSN 1582-3431
14. Burcă, M., Lucaciu, I., Glița, G., Sima, G., *Applications of bolt welding with stored energy*, Annals of the Oradea University, Fascicle of Management and Technological Engineering, Vol III (XIII), 27-28 May 2004, Oradea, CD-ROM Edition, pp. 102, ISSN 1582-3431
15. Dumbravă, D., Safta, V., Costache, D., Berta, L., *Researches on the plan state of residual strains when welding. Part I Experimental data*, Timis Academic Days, Actual preoccupations in metallic constructions and welding, Timișoara, 23 May 2004, ISBN 973-638-140-4, pp. 111-114
16. Dumbravă, D., Safta, V., Costache, D., Berta, L., *Researches on the plan state of residual strains when welding, Part II, Experimental data processing*, Timis Academic Days, Actual preoccupations in metallic constructions and welding, Timișoara, 23 May 2004, ISBN 973-638-140-4, pp. 115-120
17. Mitelea, I., Leuștean, D., Burcă, M., *Process of self-shielded flux cored tubular wire welding depositing of manganese austenitic steel layers*, Scientific Bulletin of the “Politehnica” University of Timișoara, Transactions on Mechanics, Tome 49(63), Fasc 1, 2004, ISSN 1224-6077, pp. 69-76
18. Dumbravă, D., Safta, V., Stancu, V., Costache, D., *Global quantification of residual stresses and distortion in bed-on-plate welding. Part I. Quantification of the influence of welding bead's eccentricity*, Scientific Bulletin of the “Politehnica” University of Timișoara, Transactions on Mechanics, Tome 48(62), Fasc 2, 2004, ISSN 1224-6077, pp. 121-126
19. Dumbravă, D., Safta, V., Stancu, V., Costache, D., *Global quantification of residual stresses and distortion in bed-on-plate welding. Part II, Experimental research and particular results of generalised calculus model*, Scientific Bulletin of the “Politehnica” University of Timișoara, Transactions on Mechanics, Tome 48(62), Fasc 2, 2004, ISSN 1224-6077, pp. 127-130
20. Cristescu, G., Harjan, I., Stancu, V., Dumbravă, D., *Research regarding the cutting capability of dymetil eter*, Scientific Bulletin of the “Politehnica” University of Timișoara, Transactions on Mechanics, Tome 49(63), Fasc 2, 2004, ISSN 1224-6077, pp. 85-90
21. Țunea, D., *European Norms to implement the quality assurance systems in welded structure production*, Bulletin of the Engineers' General Association from Romania, SR EN 729, AGIR papers, 2004, ISSN 1224-79-28, nr. 1, pp. 46-47
22. Stan, D., Iclanzan, T., Tulcan, A., *Considerations on the optimised design of the ultrasonic horn for industrial applications*, Academic Journal of Manufacturing Engineering, vol. 2, nr. 3/2004, ISSN 1583-7904, pp. 32
23. Suru, P., Pamintas, E., Dume, A., *The influence of the Trees Reciprocal Position on the Aggregation Preciseness in Tool-Machine's Functioning*, Academic Journal of Manufacturing Engineering, vol. 2, nr. 1/2004, ISSN 1583-7904, pp. 42-47
24. Tulcan, A., Grozav, I., Turc, C., Tulcan, L., *TESA MICRO-MS 343 Coordinate Measuring Machine Accuracy Evaluation*, Academic

- Journal of Manufacturing Engineering, Vol. 2, Nr. 3/2004, pp.38
25. Ferician, F., Seiculescu, V., *Simulation of transient heating at the surface thermic treatment of a stainless steel plate by glow discharge electron gun*, 1st International Conference on Computing and Solutions in Manufacturing Engineering, COSME 2004, Brasov, CD-ROM, ISBN 973-635-373-7, Section 1, pp. 173-178
  26. Iclanzan, T., Seiculescu, V., Latcu, P., *Stress simulation in the pin-tool used in the autofrettage process of barrels working at high pressure, with finite element analysis*, 1st International Conference on Computing and Solutions in Manufacturing Engineering, COSME 2004, Brasov, CD-ROM, ISBN 973-635-373-7, Section 1, pp. 180-184
  27. Nica, M., Grosu, F., Pircea, I., Cretu-Nica, M., Turc, C., *Researches regarding the ultrasonic activation of some machining methods*, 1st International Conference on Computing and Solutions in Manufacturing Engineering, COSME 2004, Brasov, CD-ROM, ISBN 973-635-373-7, Section 2, pp. 389-396
  28. Urdea, G., Sbirciog, I., But, A., *Adaptive command algorithm for circular sawing*, 1st International Conference on Computing and Solutions in Manufacturing Engineering, COSME 2004, Brasov, CD-ROM, ISBN 973-635-373-7, Section 2, pp. 466-476
  29. Urdea, G., Popescu, C., Popescu, I., *Sensor for measuring the moment and axial force for milling machines*, 1st International Conference on Computing and Solutions in Manufacturing Engineering, COSME 2004, Brasov, CD-ROM, ISBN 973-635-373-7, Section 2, pp. 477-485
  30. Pircea, I., *Job shop scheduling in manufacturing systems*, 1st International Conference on Computing and Solutions in Manufacturing Engineering, COSME 2004, Brasov, CD-ROM, ISBN 973-635-373-7, Section 5, pp. 838-843
  31. Draghici, G., Banciu, F., *Development of a conceptual design methodology for products*, International Conference on Manufacturing Systems, ICMAS 2004, 7-8 October, Bucharest, Romania, pp.575-578
  32. Draghici, G., Draghici, A., *Manufuture paradigm: the future of manufacturing in Europe (invited paper)*, Annals of Oradea University, Fascicle of Management and Technological Engineering, 2004, ISSN 1583-0691, CD-ROM Edition, Section Technologies, pos. 22
  33. Dejeu, L., Brissaud, D., Draghici, G., *Tracking justifications to guide decision making design*, 5th International Conference on Integrated Design and Manufacturing in Mechanical Engineering, IDMMME 2004, Bath, UK, 5-7 April 2004, CD-Rom, ISBN 1 85790 129 0, Session 3D, pos. 1
  34. Selariu, M., Grozav, I., *Optimization of workholding design using momentrs separation method*, 29 HIPNEF 2004, Scientific - Expert Conference with International Participation, Vrnjacka Banja, 19-21 May 2004, pp. 562-566
  35. Grozav, I., *Attributive Measurement Systems Evaluation*, Bulletin of the Engineers' General Association from Romania, Nr. 4 Oct-Dec. 2004, ISSN 124-7928, pp. 28-32
  36. Turc, C., *Machine for electrical discharge machining by massive electrode*, Romanian Academy, Journal of Technical Sciences, Applied Mechanics Series, Bucharest, 2004, ISSN 0035-4074, pp. 379-382
  37. Turc, C., *Some considerations regarding the control of electrical discharge machining process*, Romanian Academy, Journal of Technical Sciences, Applied Mechanics Series, Bucharest, 2004, ISSN 0035-4074, pp. 215-218
  38. Draghici, G., *Manufuture paradigm – a new challenge for the european manufacturing research and education (invited paper)*, Romanian Academy, Journal of Technical Sciences, Applied Mechanics Series, Bucharest, 2004, ISSN 0035-4074, pp. 31-38
  39. Pamintas, E., Suru, P., *An approach of design real-time controlled machine tools*, Romanian Academy, Journal of Technical Sciences, Applied Mechanics Series, Bucharest, 2004, ISSN 0035-4074, pp. 199-202
  40. Urdea, G., Sbirciog, I., But, A., *Adaptive command for circular saw*, Romanian Academy, Journal of Technical Sciences, Applied Mechanics Series, Bucharest, 2004, ISSN 0035-4074, pp. 219-222
  41. Pamintas, E., *Cutting case study at turning: chip forming and breakage, tool wear and endurance*, Romanian Academy, Journal of Technical Sciences, Applied Mechanics Series, Bucharest, 2004, ISSN 0035-4074, pp. 293-296
  42. Putz, V., *An informational system for the regulation and preregulation of the tools and tools-holders in the system of flexible fabrication*, Romanian Academy, Journal of Technical Sciences, Applied Mechanics

- Series, Bucharest, 2004, ISSN 0035-4074, pp. 309-312
43. Tulcan, A., Tulcan, L., Stan, D., *Coordinate measuring machines role in quality assurance*, Romanian Academy, Journal of Technical Sciences, Applied Mechanics Series, Bucharest, 2004, ISSN 0035-4074, pp. 375-378
  44. Putz, V., Putz, M., *Contributions related with a flexible production program employing the catastrophe surface concept*, Romanian Academy, Journal of Technical Sciences, Applied Mechanics Series, Bucharest, 2004, ISSN 0035-4074, pp. 471-474
  45. Nistoran-Botiș, Mihaela, Gubencu, D., *Posibilities for sewage removing from food industry using chemical methods*, Journals of University "Aurel Vlaicu" from Arad, Food Inginery Section, ISSN 1582-3415, 3-4 November, 2004, Arad, pp. 82-88
  46. Nistoran-Botiș, Mihaela, Gubencu, D., *Pectine obtaining from apples pomace*, Journals of University "Aurel Vlaicu" from Arad, Food Inginery section, ISSN 1582-3415, 3-4 November, 2004, Arad, pp. 88-93
  47. Herman, R., Herman, Mihaela, Botis, Mihaela, *Methods for study of thermic field at the processing by complex*, Anniversary Conference TCM – 50 years of evolution, Bucharest, ISBN 973-718-071-2, 2004, pp. 231-236
  48. Nanu, A., Herman, Mihaela, Herman, R., Nistoran-Botis, Mihaela, *World between conventional and non-conventional*, Anniversary Conference TCM-50 years of evolution, ISBN 973-718-071-2, 2004, pp. 197-198
  49. Stoicoiu, F., Nanu, A., Brestin, A., Ghiță, M., Nistoran-Botis, Mihaela, *Considerations about deviations of the working parameters at the system for theirs determination by mathematical simulation that appear at the processing by splintering of the steels with hardness HRC > 60 with preinductive heating of the splintered surface layer*, Anniversary Conference TCM-50 years of evolution, Bucharest, ISBN 973-718-071-2, 2004, pp. 41-46
  50. Fleșer, T., *A comparative evaluation between non-destructive techniques for estimation of degradation of the alloyed steels*, Proc. of Int. Conf. *Structural Integrity of the Welded Constructions*, 4/5 XI 2004, ISIM Timișoara
  51. Pascu, D., Mateiu, H., Fleșer, T., Farbaș, N., *Analysing with finite elements of the vessels under pressure using ANSYS programme*, Int. Conf., *Structural Integrity of the Welded Constructions*, 4/5 XI 2004, ISIM Timișoara
  52. Cucu, S., Fleșer, T., Bobic, A., Bălțeanu, G., *States analysing of the boilers components*, Int. Conf. *Structural Integrity of the Welded Constructions*, 4/5 XI 2004, ISIM Timișoara
  53. Pascu, D., Mateiu, H., Fleșer, T., *Researches about influence of the maintaining time at the maximum temperature at the stress of thermic fatigue of the thermo-resistant steels*, Com. Symposium "Advanced materials, processing and characterization", Romanian Academy, 22-23 V 2004, Timișoara, Eurostampa Publishing House, ISBN 973-687-127-4
  54. Țucu, D., Mnerie, D., Crainic, N., Anghel, Gabriela-Victoria, Pepu, N., *Considerations about achieving of a model for evaluation of the risks in construction*, European week for health and security in work, Arad, 2004
  55. Tucu, D., Mnerie, D., Anghel, Gabriela, Oprea, M., *Considerations about the new fat raw materials used in biodiesel production*, 1<sup>st</sup> International and 18<sup>th</sup> Croatian Congress of Technologists for Post-Harvest Technology, Stubicke Toplice, Croatia, 2004
  56. Anghel, Gabriela-Victoria, Mnerie, D., Țucu, D., Oprea, M., *The lyophilization using in the studies of cereals*, 1<sup>st</sup> International and 18<sup>th</sup> Croatian Congress of Technologists for Post-Harvest Technology, Stubicke Toplice, Croatia, 2004
  57. Grevey, D., Sallamand, P., Cicala, E., Ignat, S., *Gas protection optimization during Nd:AG laser welding*, Optics & Laser Technology Journal of Materials Technology, 2004, Elsevier
  58. Han, G., Pillon, G., Nichici, A., Gubencu, D., Grevey, D., Cicala, E., *Study of Polymer Laser Grooving Using a Complete Factorial Experiment*, Lasers in Engineering, Journal of Materials Technology, 2004, Elsevier
  59. Moures, F., Cicala, E., Sallamand, P., Grevey, D., Vannes, A.B., Ignat, S., *Optimisation of refractory coatings realised with cored wire addition using a power diode laser*, Surface and Coatings Technology, Journal of Materials Technology, 2004, Elsevier
  60. Cicala, E., Duffet, G., Andrzejewski, H., Grevey, D., Ignat, S., *Process parameter effects on laser welding of 6056 alluminium alloy*, Journal of Materials Technology, 2004, Elsevier

**PhD THESIS**

1. Adrian Petrica, *Contributions to pieces availability increasing*, Thesis supervisor: Prof. dr. eng. Livius Milos
2. Laurențiu Răducu Popescu, *Development of ultrasonic and magnetic NDT, aplicable in aeronautics*, Thesis supervisor: Prof. dr. eng. Voicu Safta, member of the Romanian Academy of Technical Sciences

**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. Mihai Nica – team leader
- Prof. dr. eng. Tudor Iclănzan – team leader
- Prof. dr. eng. Livius Milos – team leader
- Prof. dr. eng. Gheorghe Gliță – team leader
- Prof. dr. eng. Traian Fleșer – 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 Pămîntaş
- Assoc. prof. dr. eng. Viorel Putz
- Assoc. prof. dr. eng. Florin Grosu
- Assoc. prof. dr. eng. Valentin Seiculescu
- Assoc. prof. dr. eng. Ioan Pircea

- Assoc. prof. dr. eng. Dănuț Șosdean
- Lect. dr. eng. Adrian But
- Lect. dr. eng. Cristian Turc
- Lect. dr. eng. Daniel Stan
- Lect. dr. eng. Aurel Tulcan
- Assist. Eng. Florin Ferician
- Assist. Eng. Cristian Cosma
- Assist. Eng. Adrian Dume
- Assist. Eng. Felicia Banciu
- Assist. Eng. Lidia Dejeu
- Eng. Alin Sirbu, PhD student
- Eng. Alin Schmidt, PhD student
- Eng. Alina Donose, PhD student
- Prof. dr. eng. Voicu Safta
- Assoc. prof. dr. eng. Mihaela Popescu
- 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 Vasilescu
- 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: +40-256-403610  
 Fax: +40-256-403523  
 E-mail: [gdraghici@eng.utt.ro](mailto:gdraghici@eng.utt.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

### Researches in 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.

### Researches in 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.

### Researches in 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 fiber 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  $\mu\text{m}$  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.

### Researches in 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.

#### Researches in *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.

#### Researches in *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

1. M. Truşculescu: *Concentrated energies – impact of materials thermal processing* (published in Romanian), Politehnica

Publishing House, Timișoara, 2004, 127 pages, ISBN 973-635-172-1

2. A. Răduța, M. Nicoara, C. Firu: *Advanced Materials*, Orizonturi Universitare Publishing House, Timișoara, 189 pages, ISBN: 973-638-130-7
3. I. Mitelea, B. Radu *Selection and usage of engineering materials* (published in Romanian), Politehnica Publishing House, Timișoara, 2004, 382 pages, ISBN 973-625-134-9

##### PUBLISHED PAPERS

1. Șerban, V.A., Codrean, C., *Nanocrystalline AL-based alloys*, Advanced Materials, Summer School, 12-15 September 2004, Timișoara, Orizonturi Universitare Publishing House, ISBN: 973-638-130-7, pp. 131-145
2. Codrean, C., Șerban, V.A., Firu, C., *Ni-Cr brazing alloys with metastable structure*, VI-th International Symposium „Young people and multidisciplinary research”, 23-24 September 2004, Timișoara, ISBN: 973-7911-77-6, pp. 23-29
3. Bordeasu, I., Șerban, V.A., Vodă, M., Codrean, C., *Cavitation erosion for G-X5CrNi13-14 martensitic stainless steel with various heat treatments*, VI-th International Conference on Hydraulic Machinery and Hydrodynamics – HMH 2004, 21-22 October, Timișoara, Tom 49(63), ISSN 1224-6077, pp. 259-264
4. Șerban, V.A., Codrean, C., Nicoară, M., Uțu, D., *Nanostructured Al-Ni-based alloys*, Material - wissenschaftliches kolloquium Nanotechnologie: Anwendungen, Perspektiven Und Chacen”, 25-26 November 2004, Gelsenkirchen, Germany, pp. 91-96
5. Crăciunescu, C.M., *Smart Nanoengineering* Advanced Materials, Summer School, 12-15 September 2004, Timișoara, Orizonturi Universitare Publishing House, ISBN 973-638-130-7, pp. 99-113
6. Rumpf, H., Crăciunescu, C.M., Wuttig, M., Quandt, E., *A study of ferromagnetic NiMnGa sputtered films including shape memory properties*, Deutsche Physikalische Gesellschaft E. V. (DPG) Symposium Magnetic Shape Memory Alloys, 2004, E-transactions, pp. 285-287
7. Timco, M., Koneracka, M., Kopcansky, P., Vekas, L., Jozefczak, A., Skumiel, A., Radenovic, A., Ditle, G., Bystrenova, E., Lita, M., *Complex characterization of physiology solution based magnetic fluid*, Indian Journal of Engineering & Material Sciences, (ISI), Vol II, 2004, pp. 276-282

8. Lita, M., Udrescu, L., Duma, S., *The analysis of the hardness and structural characteristics of thermic and thermochemically treated Rp3 steel, in corelation with the internal stress*, Scientific Bulletin of the "Politehnica" University of Timișoara, Romania, Transactions on Mechanics, Tome 49(63), Fasc 1, 2004, ISSN 1224-6077, pp. 53-61
9. Duma, S., Cartis, I., *Studies concerning the production of hardness standard bloks for transferring the vickers scale 100...550 HV0,2 and HV0,5* Scientific Bulletin of the "Politehnica" University of Timișoara, Romania, Transactions on Mechanics, Tom 49(63), Fasc 1, 2004, ISSN 1224-6077, pp. 41-47
10. Duma, S., Cartis, I., *The influence of technological parameters on the martensitic transformation of 105Cr6 steel due to the treatment at subzero temperatures*, Scientific Bulletin of the "Politehnica" University of Timișoara, Romania, Transactions on Mechanics, Tom 49(63), Fasc 1, 2004, ISSN 1224-6077, pp. 47-53
11. Duma, S., Cartis, I., *Studies regarding the acquirement of hardness standard blocks for transmitting the brinell hardness scale HB2,5/187,5 and HB5/750*, Scientific Bulletin of the Technical University of Iasi, Romania, 2004, pp. 47-53
12. Duma, S., Cartis, I., *Experimental research concerning structural and hardness stability of 105Cr6 steel machine parts*, IX International Conference on the Theory of Machines and Mechanisms, Liberec, Czech Republic, August 31 - Sept. 2, 2004, pp. 126-134
13. Mitelea, I., Leustean, D., Radu, B., *Abrasion wear resistance of manganese austenitic layers deposited with electric arc welding*, Scientific Bulletin of the "Politehnica" University of Timișoara, Romania, Transactions on Mechanics, Tom 49(63), Fasc 1, 2004, ISSN 1224-6077, pp. 61-69
14. Mitelea, I., Leustean, D., Burca, M., *Process of self-shielded flux cored tubular wire welding depositing of manganese austenitic steel layers*, Scientific Bulletin of the "Politehnica" University of Timișoara, Romania, Transactions on Mechanics, Tom 49(63), Fasc 1, 2004, ISSN 1224-6077, pp. 69-77
15. Mitelea, I., Leustean, D., Radu, B., *Carbides precipitation phenomena in manganese austenitic steel deposited with electric welding*, Scientific Bulletin of the "Politehnica" University of Timișoara, Romania, Transactions on Mechanics, Tom 49(63), Fasc 2, 2004, ISSN 1224-6077, pp. 89-96
16. Mitelea, I., Leustean, D., *Contributions of mecanism of work hardening in manganese austenitic layers deposited with electric arc welding*, Scientific Bulletin of the "Politehnica" University of Timișoara, Romania, Transactions on Mechanics, Tom 49(63), Fasc 2, 2004, ISSN 1224-6077, pp. 81-88
17. Mitelea, I., *Selection of hardfacing processes and of hardfacing materials*, Advanced Materials, Summer School, 12-15 September 2004, Timișoara, Orizonturi Universitare Publishing House, ISBN 973-638-130-7, pp. 65-79
18. Nicoara, M., *Metallic foams*, Advanced Materials, Summer School, 12-15 September 2004, Timișoara, Orizonturi Universitare Publishing House, ISBN 973-638-130-7, pp. 79-99
19. Raduta, A., Damian, C., *Biomaterials- current status and future perspectives*, Advanced Materials, Summer School, 12-15 September 2004, Timișoara, Orizonturi Universitare Publishing House, ISBN 973-638-130-7, pp. 113-131
20. Radu, B., *Welding composite materials*, Advanced Materials, Summer School, 12-15 September 2004, Timișoara, Orizonturi Universitare Publishing House, ISBN 973-638-130-7, pp. 171-179
21. Firu, C., *Metal matrix composites - manufacturing techniques*, Advanced Materials, Summer School, 12-15 September 2004, Timișoara, Orizonturi Universitare Publishing House, ISBN 973-638-130-7, pp. 179-189
22. Trușculescu, M., *Particularitățile folosirii energiilor concentrate*, In *Concentrated energies – impact of materials thermal processing*, Edited by M. Trușculescu, Politehnica Publishing House, ISBN 973-625-172-1, 2004, pp. 2-12
23. Trușculescu, M., *Criterii de alegere și selecție a oțelurilor termorezistente sudate*, Sudura Journal, ISBN 973-8359-27-9, 2004, pp. 17-23
24. Kishi, Y., De Graef, M., Crăciunescu, C., Lograsso, T.A., Neumann, D.A., Wuttig, M., *Microstructures and phase transformation behavior of cobalt-base ferromagnetic shape memory alloys*, Journal de Physique, USA, Coll. C4, (112), 2004, pp. 1021-1024

#### PhD THESIS

Leustean Dumitru, *Cercetari asupra mecanismului de durificare a suprafetei pieselor incarcate prin*

*sudare cu material de adaos austenitic manganos*, scientific supervisor: prof. dr. eng. Ion Mitelea

#### RESEARCH CONTRACTS

1. Theme No. 16, 2004, Code CNC SIS 182, Grant Type A, *Metallic foams based on Al processed by powder metallurgy techniques*, Director: assoc. prof. dr. eng. Mircea Nicoară, Value: 110,000,000 ROL
2. Subcontract No. 545/31.10.2001, 2001-2004, *Nanoicosaedral alloys and alluminium based nanocrystals*, Director: prof. dr. eng. Viorel Aurel Șerban, Value (2004): 170,040,000 ROL
3. Contract No. 166/29.10.2004, *Technical assistance in optimizing technologies and MEVA products quality control*, Director: assoc. prof. dr. eng. Aurel Răduță, Value: 100,000,000 ROL
4. Contract No. 41/2004, *The influence of post-welding local heat treatments on the structural and mechanical characteristics of welded repairs*, Director: assoc. prof. dr. eng. Aurel Răduță, Value: 122,309,247 ROL
5. Contract No. 7/2004, *Technical expertise concerning the structure and properties of materials and welded structures*, Director: assoc. prof. dr. eng. Aurel Răduță, Value: 1,334,419,671 ROL
6. Contract No. 12/2004, *Research concerning the design of data acquisition devices*, Director: eng. Miron Gavriloni, Value: 120,000,000 ROL
7. Contract No. 27/2004, *Design and fabrication of dental technique pliers*, Director: eng. Miron Gavriloni, Value: 20,000,000 ROL
8. Contract No. 9/2004, *Macrostructural analysis and sclerometric measurements on samples extracted from welds*, Director:

Assist. eng. Carmen Firu, Value: 15,000,000 ROL

9. Contract No. 5/2004, *Surface treatments of shaft –type mechanical parts*, Director: assoc. prof. dr. eng. Mircea Nicoară, Value: 78,535,359 ROL
10. Contract No. 6/2004, *Heat Treatments of shaft –type mechanical parts*, Director: assoc. prof. dr. eng. Mircea Nicoară, Value: 690,724,720 ROL
11. Contract No. 98/ 01.07.2004, *Technical assistance and metallographic bulletins for macroscopic, microscopic and hardness measurements on welded samples*, Director: prof. dr. eng. Budău Victor, Value: 16,200,000 ROL

#### RESEARCH TEAM

- Prof. dr. eng. Ioan CĂRȚIȘ – Director
- Prof. dr. eng. Marin TRUȘCULESCU
- Prof. dr. eng. Ion MITELEA
- Prof. dr. eng. Victor BUDĂU
- Prof. dr. eng. Roland Laurențiu CUCURUZ
- Prof. dr. eng. Viorel Aurel ȘERBAN
- Prof. dr. eng. Livius UDRESCU
- Assoc. prof. dr. eng. Aurel RĂDUȚĂ
- Assoc. prof. dr. eng. Mircea NICOARĂ
- Assoc. prof. dr. eng. Bogdan RADU
- Assoc. prof. dr. eng. M. CRĂCIUNESCU
- Lecturer dr. fiz. Marin LIȚĂ
- Assist. dr. eng. Sebastian Titus DUMA
- Assist. eng. Cosmin CODREAN
- Assist. eng. Carmen FIRU
- Eng. Dragoș UȚU
- Eng. Miron GAVRILONI

#### Contact

Dr. eng. Sebastian Titus DUMA  
 Email: [sduma@eng.utt.ro](mailto:sduma@eng.utt.ro)  
 Tel: +40-256-403655

# RESEARCH CENTRE FOR QUALITY IN MECHANICAL TRANSMISSION, PRECISION MECHANICS AND MECHATRONICS

## GENERAL PRESENTATION

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

The head of the research center is **Prof. PhD eng. Dan Perju**,  
e-mail: [Dan.Perju@mec.utt.ro](mailto:Dan.Perju@mec.utt.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;
- Bio-medical apparatus;
- Robotics;
- Mechatronics;
- Simulation and artificial intelligence;
- Finite element analysis.

The research center was founded in order to coordinate the scientific fundamental studies:

- mechanisms and mechanical transmission;
- robotics, precision mechanics and mechatronics;
- biomedical techniques; instrumentation and control;

and applied studies materialized 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, variators, 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, traducers, metrology, quality assurance and optical systems.

## 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, synchronic - 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
- Consulting prof. dr. eng. Francisc KOVACS
- Prof. dr. eng. Lucian MĂDĂRAS
- Prof. dr. eng. Voicu MESAROȘ-ANGHEL
- Prof. dr. eng. Marius MARINA
- Assoc.prof.dr.eng. Francisc IOANOVICI
- Assoc.prof.dr.eng. Ștefan VARGA
- Assoc.prof.dr.eng. Erwin-Christian LOVASZ
- Assoc.prof.dr.eng. Iosif CĂRĂBAȘ
- Lect.dr.eng. Angela DREUCEAN
- Assoc.prof.dr.eng. Mircea DREUCEAN
- Assoc.prof.dr.eng. Veronica ARGESĂNU
- Prof. dr. eng. Arjana DAVIDESCU
- Assoc.prof.dr.eng. Carmen STICLARU
- Assist.eng. Ioan COȚA
- 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.

### Researches in *ROBOTICS AND MECHATRONICS*

## 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.

## ACTIVITIES AND RESULTS

Fundamental, oriented and applied research aiming realization and industrial implementation of computer integrated manufacturing systems. Conception of flexible manufacturing modules, machining of medium – size parts (axles, bushings and prismatic parts). Flexible systems for manufacturing processes.

## RESEARCH BENEFICIARIES

Ministry of Education, Ministry of Research and Technology, Fraunhofer Institut IPA Stuttgart, Germany, Technical University of Dresden

## RESEARCH TEAM

- Consulting 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-ANHEL
- Prof. dr. eng. Inocențiu MANIU
- Assoc.prof.dr.eng. Ștefan VARGA
- Assoc.prof.dr.eng. Mircea DREUCEAN
- Assoc.prof.dr.eng. Nicolae DEHELEAN
- Lect.dr.eng. Sanda GRIGORESCU
- Lect.dr.eng. Anca POPA
- Lect.dr.eng. Aurel DIACONU
- Assist.eng. Adrian RADU
- Lect.dr.eng. Milenco LUCHIN
- Lect.dr.eng. Mariana FLOREA
- Lect.dr.eng. Marius MATEAȘ.

## 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's

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 BENEFICIARIES

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

## RESEARCH TEAM

- Prof. dr. eng. Dan PERJU
- Prof. dr. eng. Ioan NICOARĂ
- Prof. dr. eng. Octavian GLIGOR
- Prof. dr. eng. Alfred POMMERSHEIM
- Prof. dr. eng. Geroge SAVII
- Prof. dr. eng. Valeria VĂCĂRESCU
- Prof. dr. eng. Valer DOLGA
- Assoc.prof.dr.eng. Corina GRUESCU
- Prof. dr. eng. Arjana DAVIDESCU
- 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. Bio-medical apparatus.

### MAIN PUBLICATIONS

#### BOOKS

1. Argeșanu Veronica, *Ergonomia echipamentelor și departamentelor medicale*, Eurostampa Publishing House, Timisoara, 2004, ISBN 973-687-200-9, 557 pages
2. Diaconu Aurel, *Microcontrolere in Mecatronica*, Politehnica Publishing House, Timisoara, 2004, ISBN 973-625-175-6, 210 pages

3. Fenchea Mircea, *Calculul și construcția reductoarelor*, Mirton Publishing House, Timisoara, 2004, ISBN 973-661-505-7, 180 pages
4. Nicoară Ioan, Gruescu Corina, *Aparate optice, vol. II, Analiza și sinteza subsansamblurilor optice lenticulare*, Politehnica Publishing House, Timișoara, 2004, ISBN 973-625-158-6, 238 pages
5. Gruescu Corina, Bodea Raneta, Pommersheim Alfred, *Măsurări optice*, Politehnica Publishing House, Timisoara, 2004, ISBN 973-625-195-0, 90 pages
6. Gruescu Corina, Bodea Raneta, *Elemente de analiză și sinteză a sistemelor optice. Aplicații*, Politehnica Publishing House, Timisoara, 2004, ISBN 973-625-196-9, 100 pages
7. Lovasz Erwin, Cărăbaș Iosif, *Principii de sinteză a mecanismelor cu roți dințate și came*, Politehnica Publishing House, Timisoara, 2004, ISBN 973-625-157-8, 190 pages
8. Lovasz Erwin, *Mechanismen in Verarbeitungsmaschinen - Studienbrief*, Lito TU Dresden, 2004, 161 pages
9. Mădăras Lucian, Argeșanu Vera, Ioanovici Francisc, Jula Mihaela, *Organe de mașini*, Mirton Publishing House, Timisoara, 2004, ISBN 973-687-307-2, 387 pages
10. Militaru Rodica, Militaru Cornel, *Calitate și fiabilitate. Elemente de teorie și practică*, Politehnica Publishing House, Timisoara, 2004, ISBN 973-625-189-6, 258 pages
11. Savii George, *Elemente ale inteligenței artificiale*, Eurostampa Publishing House, Timisoara, 2004, ISBN 973-687-260-2, 112 pages
- ROBOTICA – 2004, Reșița, pp. 19-20, ISBN 973-97258-3
4. Argeșanu, V., Mădăras, L., *Reliability aspects of a mechanical face seal*, Acta Technica Napocensis, Technical University of Cluj-Napoca, Series: Applied Mathematics and Mechanics, 47, vol I, 2004, ISSN 1221-5872, pp. 301- 306
5. Bodea, R, Gruescu, C., *Resolution, contrast and general image quality of endoscopes using optical fibers, I*, Annals of the Oradea University, Fascicle of Management and Technological Engineering, 2004, CD-ROM edition
6. Bodea, R., Gruescu, C., *Resolution, contrast and general image quality of endoscopes using optical fibers, II*, Annals of the Oradea University, Fascicle of Management and Technological Engineering, 2004, CD-ROM edition
7. Brindeu, L., Fenchea, M., *Optimization of the forms of the hammer construction for material crushing Optimization of the forms of the hammer construction for material crushing*, The annual symposium of the Institute of Solid Mechanics, SISOM ' 04, Romanian Academy, Bucharest, 2004, pp. 125-130
8. Cărăbaș, I., *The grinding of gear – a way of processing the teeth flanks*, Acta Tehnica Napocensis, Technical University of Cluj-Napoca, 2004, Vol. II, pp. 379-403
9. Ciupe, V., Maniu, I., *Interactive program for simulating a hydraulic robot and its command equipment*, Proceedings of the 2<sup>nd</sup> International Conference on Robotics, Timisoara/Resita, 2004, pp. 39-40, ISBN : 973-97258-3-X
10. Davidescu, A., Sticlaru, C., *The influence of misalignment at working temperature upon functioning of a face seal*, 30<sup>th</sup> JUPITER CONFERENCE, Belgrade, 2004, pp. 2.43-2.46
11. Davidescu, A., Savii, G., Sticlaru, C., *Estimation of grain size from digital images*, Proceedings of the 2<sup>nd</sup> International Conference on Robotics, Timisoara, Romania, Oct. 2004, pp. 49-50, ISBN 973-97258-3-X, CD-ROM, 4 pages
12. Davidescu, A., Dreucean, M., Sticlaru, C., *The influence of temperature and load on stress and strain state of a side sealing*, Acta Technica Napocensis, Series: Applied Mathematics and Mechanics, nr. 47, vol.II, 2004, pp. 483-488
13. Davidescu, A., Sticlaru, C., *Studies by FEM of contact regions from an elastic coupling*,

#### PUBLISHED PAPERS

1. Argeșanu, V., Popa, A., *The elastohydrodynamics (EHD) of a mechanical face seal lubrication*, The Revue Tribology, Fascicle VIII, 2004, ISSN 1245-7633, Dec., pp. 245-248, University Dunarea de Jos of Galati
2. Argeșanu, V., Popa, A., *The leakage-interface pressure differential dependence FEM model of an automotive mechanical face seal*, Proceedings of COMEFIM'7, the 7<sup>th</sup> International Conference of Mechatronics and Precision Engineering, Bucharest, 27-29 May, 2004, ISBN 973- 86886-1-2, pp. 247-249
3. Argeșanu, V., Mădăras, L., *The heat transfer problem of mechanical face seals used in control rod mechanics*, Proceedings of the 2<sup>nd</sup> International Conference of Robotics-

- Machine Building, nr. 12, year LIII, 2004, ISSN 0025-455-X, pp. 75-78, Bulgaria
14. Dehelean, N., Dehelean, L., *A Step to Create an Unpredicted Behaviour Artificial Intelligent System*, ROBOTICA-2004, Proceedings of the 2<sup>nd</sup> International Conference on Robotics, Timisoara, Romania, ISBN 973-97258-3-X, 2004, CD ROM, 4 pages
  15. Diaconu, A., Pugna, A., *Internet-based robotic system for teleoperation*, Manufacturing and Management in 21 Century, 14-17 Sept. 2004, pp. 95-100, Ohrid, Macedonia
  16. Diaconu, A., *A proposed architecture for remote mechatronics laboratory*, Proceedings of the 2<sup>nd</sup> International Conference on Robotics, Oct. 2004, Timisoara, Romania, pp. 49-50, ISBN 973-97258-3-X, CD-rom, 4 pages
  17. Dobra, A., *About Clv (Constant Linear Velocity) Technology*, Acta Technica Napocensis, series: Applied Mathematics and Mechanics, 47, vol.i, 2004, ISSN 1221-5872, Cluj, pp. 565 – 571
  18. Dobra, A., *Software for Determinate Geometrical Dimension of Internal and External Cylindrical Gearwheel*, Acta Technica Napocensis, series: Applied Mathematics and Mechanics, 47, vol.I, 2004, ISSN 1221-5872, Cluj, pp. 55 -60
  19. Dobra, A., *Software for generate evolventic profile for external and internal cylindrical gear*, Proceedings of COMEFIM'7, the 7th International Conference on Mechatronics and Precision Engineering, Bucharest, 2004, pp. 255–260, ISBN 973-86886-1-2
  20. Dobra, A., *Software for generate evolventic profile for external and internal cylindrical gear*, IFToMM, Proceedings of the IXth International Conference on the Theory of Machines and Mechanisms, in association with the II<sup>nd</sup> CEACM Conference on Computational Mechanics, Sept. 2004, Technical University of Liberec, ISBN 80-7083-847-7, pp. 245 – 250
  21. Dobra, A., *Experimental Device to Point Out a CLV (Constant Linear Velocity) Technology*, IFToMM, Proceedings of the IX-th International Conference on the Theory of Machines and Mechanisms, in association with the II<sup>nd</sup> CEACM Conference on Computational Mechanics, Sept. 2004, Technical University of Liberec, ISBN 80-7083-847-7, pp. 239 – 244
  22. Dobra, A., Gligor, O., *Software for Calculate Optimum of Electromagnetical Levitation Bearing*, Bulletin of Technical University "Gh. Asachi", Iasi, Tome L(LIV), 2004, Fasc 6A, ISSN 1011-2855, pp. 351-358
  23. Dobra, A., Grigorescu, S., *Applications Of Dedicated Software for "Off-Line" Robot Programming*, Journal Mechanisms and Manipulators, Vol. 2, Nr. 2, 2004
  24. Dobra, A., Grigorescu, S., *Dedicated Software for "Off-Line" Robot Programming*, Proceedings of the 2nd International Conference on Robotics, 14-16 October 2004, InterGraf Publishing House, Reșița, ISBN 973-97258-3-X, pp. 55 – 58
  25. Dolga, V., Teodorescu, A., *Considerations about the simulation of the robotized grinding-and polishing operations*, Proceedings of the 2nd International Conference on Robotics, 14-16 October 2004, InterGraf Publishing House, Reșița, ISBN 973-97258-3-X, pp. 57 -63
  26. Dolga, V., *The simulation of robotized polishing operation*, Acta Technica Napocensis, vol.III, 2004, pp. 971-976
  27. Dolga, V., Dolga, L., *Modelling and simulation of mechatronic systems*, Journal "Mecatronics", nr.1, 2004, pp. 34-39, ISSN 1583-7653
  28. Dolga, L., Dolga, V., *New approaches in designing mechatronic products*, Annals of the Oradea University, vol. III, 2004, pp. 67
  29. Dolga, L., Dolga, V., *The pseudo-inverse matrix and the condition number in sensorics*, Scientific Bulletin of the "Politehnica" University of Timisoara, series Mechanics, Tome 49(63), fasc.1, 2004, pp. 27-32, ISSN 1224-6077
  30. Dreucean, M., Menyhardt, K., Popa, A., *IR communication module for the control of a mobile robot*, Second International Conference on Robotics, Robotica 2004, Timisoara / Resita, 14-16 October 2004, ISBN 973-97258-3-X, pp. 63-64
  31. Dreucean, A., Mărgineanu, D., Militaru, R., *Some Kinematic Aspects of the Synchronous Belt Drives*, 4th International Conference "Research and Development in Mechanical Industry" RaDMI 2004, CD-ROM, ISBN 86-83803-18-X, 2004, Zlatibor, Serbia and Montenegro
  32. Dreucean, A., Militaru, R., *The Accepted Synchronous Belt Drive's Calculus Algorithm's Limits* (2-nd report), International Conference on Mechatronics and Precision Engineering COMEFIM 2004, ISBN 973- 86886-1-2
  33. Dreucean, M., Drăgulescu, D., Toth-Tașcău, M., *Deadlock Detection Based on Simulation with Petri Nets*, Annual Proceedings of



- Technical University in Varna, 2004, ISSN 1312-1839, pp. 64-67
34. Dreucean, M., Drăgulescu, D., Toth-Tașcău, M., Jianu, C., *Image Processing Based Strategy for a Mobile Robot Control*, Acta Technica Napocensis, Series: Applied Mathematics and Mechanics, 47, Vol. II, 2004, ISSN 1221-5872, pp. 571-574
  35. Dreucean, M., Davidescu, A., Sticlaru, C., *The FEM Analysis fo a Support Blade on the Lower Maxilar*, Acta Technica Napocensis, Series: Applied Mathematics and Mechanics, 47, Vol. II, 2004, ISSN 1221-5872, pp. 489-495
  36. Dreucean, M., Drăgulescu, D., Toth-Tașcău, M., *Robot path planning among stationary obstacles based on visibility graph method in a 3D workspace*, Research and Development in Mechanical Industry RaDMI 2004, Volume 2, Zlatibor, Serbia and Montenegro, 31 August - 04 September, 2004, ISBN 86-83803-163-3, pp. 1-8
  37. Dreucean, M., Sticlaru, C., Davidescu, A., *Some aspects of contact area and strain state of a plate used in trauma reconstruction*, IX International Conference on Theory of Machines and Mechanisms, Liberec, 31 August -02 September, 2004, pp. 269-274
  38. Fenchea, M., *Influence of the percussion center of hammer in the crumbling processes. Percussion center of hammer*, Proceedings of the 2nd International Conference on Robotics, Timisoara-Resita, 2004, CD ROM, ISBN 973-97258-3-X, 2 pages
  39. Fenchea, M., *Influence of the percussion center of hammer in the crumbling processes. Dinamic model of mills with hammers*, Proceedings of the 2<sup>nd</sup> International Conference on Robotics, Timisoara-Resita, 2004, CD ROM, ISBN 973-97258-3-X, 2 pages
  40. Fenchea, M., *The influence of the restitution coefficient on the crumbling process*, International Conference on Mechatronics and Precision Engineering, Bucharest, 2004, ISBN 973-86886-1-2, pp. 36-43
  41. Fenchea, M., *The diagnosis through vibrations of the insufficient tightening or abatement of the mechanical joints*, International Conference on Mechatronics and Precision Engineering, Bucharest, 2004, ISBN 973-86886-1-2, pp. 112-117
  42. Fernengel, V., Popa, A., *Movement Study using Digital Images*, Romanian Journal of Optoelectronics, Romanian Chapter of SPIE, Vol. 12, Issue 4/2004, pp. 53-60, ISSN 1453-0600
  43. Florea, M., Kovacs, F., Maci, C., *Automatic direct programming of robotised machining cell*, Bulletin of Technical University "Gh. Asachi", Iasi, tome L(LIV), 2004, fasc 6A, ISSN 1011-2855, pp. 369-3741
  44. Gruescu, C., Bodea, R., Nicoară, I., *Method for synthesis of apochromatic triplet using minimum primary spherical aberration*, SIOEL 2004, Romanian Journal of Opto-electronics, Romanian Society of Opto-electronics, vol. XII, nr.2/2004, pp. 85-90, ISSN 1453-0600
  45. Gruescu, C., Bodea, R., Nicoară, I., *Method for increasing the aperture of apochromatic triplet using an aspherical surface*, SIOEL 2004, Romanian Journal of Opto-electronics, Romanian Society of Opto-electronics, vol. XII, nr.4/2004, pp. 91-96, ISSN 1453-0600
  46. Gruescu, C., Bodea, R., Nicoară, I., *Image Quality Optimization of an Apochromatic Triplet Using Defocusing and Methods Based on OPD*, Proceedings of COMEFIM '7, The 7-th International Conference on Mechatronics and Precision Engineering, Bucharest, 2004, pp. 263
  47. Gruescu, C., *Ingineria optică – știință integrată mecatronicii*, Proceedings of COMEFIM '7, 7-th International Conference on Mechatronics and Precision Engineering, Bucharest, 2004, pp. 265
  48. Ianoși, E., *Simplified uncertainty estimation method applied to the measurement of the dialysis liquid conductivity*, Proceedings of the 5th International Carpathian Control Conference, Zakopane, Poland, May 25–28, 2004, vol II, pp. 177-182, ISBN 83-89772-00-0
  49. Ianoși, E., *The quality control importance in the dialysis process*, Proceedings of the 5th International Carpathian Control Conference, Zakopane, Poland, May 25–28, 2004, vol I, pp. 919-925, ISBN 83-89772-00-0
  50. Ianoși, E., *Méthode pour évaluation de l'efficacité de la dialyse*, International participation biomedical conference INGIMED 2004, Bucharest, 11-12 Nov. 2004, ISBN 973-8408-11-3, pp. 165-170
  51. Ianoși, E., *Les biocéramiques comme substituts osseux*, International participation biomedical conference INGIMED 2004, Bucharest, 11-12 Nov. 2004, pp. 170-175, ISBN 973-8408-11-3
  52. Ianoși, E., Mateaș, M., *Diagnosticarea circulației capilare la nivelul membrelor superioare prin metode termice*, Proceedings of COMEFIM 7, the 7-th International Conference on Mechatronics and Precision Engineering, 27-29 May 2004, Bucharest, ISBN 973-86886-1-2, pp. 157-159

53. Jula, M., Madaras, L., *About the Tensile Strength in Tangential Belt Drives*, Scientific Bulletin of the „Politehnica” University of Timișoara, Series Mechanics, Tome 49(63), fasc. 2, 2004, pp. 35-38
54. Kovacs, F., Maniu, I., *Activitatea colectivului multidisciplinar de robotica din Timisoara*, Robotics & Management, Vol. 7, No. 2/ 2004, pp. 4-21
55. Lovasz, E.C., Modler, K.H., Perju, D., Militaru, R., *Using the helical springs for contact force optimisation at the cam mechanisms*, Proceeding of the International Conference on the Theory of Machines and Mechanism, Liberec, Czech Republic, 2004, pp. 491-496
56. Lovasz, E.C., Modler, K.H., Perju, D., Wadewitz, C., *Realisierung von Übertragungsfunktionen mit Bereichen konstanter Übersetzung*, 9-th International Conference of Mechanisms and Mechanical Transmissions MTM'2004, Cluj-Napoca, Acta Technica Napocensis, Romania, 06-08 June 2004, vol.1, pp. 103-108
57. Lovasz, E.C., Mateaș, M., Ciupe, V., Sârbu, O., *Imagistic Method for Topological and Kinematical-Positional Analysis of a Human Hand's Movement*, 9-th International Conference of Mechanisms and Mechanical Transmissions, MTM'2004, Cluj-Napoca, Acta Technica Napocensis, Romania, 06-08 June 2004, vol.2, pp. 741-747
58. Maniu, I., Ciupe, V., *Interactive simulation software for hydraulic command equipment operation*, Mecatronica, nr. 2/ 2004, pp. 52-54, ISSN 1583-7653
59. Maniu, I., Ciupe, V., *Interactive program for simulating the functioning of the command hydraulic equipment*, 7-th International Conference on Mechatronics and Precision Engineering, Bucharest, 27-29 May, 2004, pp. 137-138, ISBN 973-86886-1-2
60. Maniu, I., Ciupe, V., *Simulation of the distribution and command hydraulic equipment' operation*, Acta Technica Napocensis, Series: Applied mathematics and mechanics, 47, vol. II, Cluj-Napoca, 2004, pp. 495-498, ISSN 1221-5872
61. Mateaș, M., Ianoși, E., *Interfață pentru achiziția de bioelectrosemnale*, Proceedings of COMEFIM 7, 7-th International Conference on Mechatronics and Precision Engineering, 27-29 May 2004, Bucharest, ISBN 973-86886-1-2, pp. 161-163
62. Mateaș, M., Ianoși, E., *Considerații privind modalități de determinare a presiunii exercitate de bandajele compresive*, Proceedings of COMEFIM 7, 7-th International Conference on Mechatronics and Precision Engineering, 27-29 May 2004 Bucharest, ISBN 973-86886-1-2, pp. 159-161
63. Mădăras, L., Argeșanu, V., *Heat transfer problems in mechanical face seals*, 9-th International Conference of Mechanics and Mechanical Transmissions, MTM 2004, June 10-12, 2004, Cluj-Napoca, Acta Technica Napocensis, Technical University of Cluj-Napoca, Series: Applied Mathematics and Mechanics, 47, vol I, 2004, ISSN 1221-5872, pp. 343- 347
64. Mărgineanu, D., Mărgineanu, E., Modler, K.H., Lovasz, E., Maniu, I., *Load distribution on spline joints*, Proceedings of the 11-th World Congress on the Theory of Machines and Mechanisms, Tian Jin, 01-05 April 2004, pp. 361-365, ISBN 7-111-14073-7
65. Menyhardt, K., Dreucean, M., Popa, A., *Three wheel mobile test robot structure*, Second International Conference on Robotics, Robotica 2004, Timisoara/Resita, 14-16 October 2004, ISBN 973-97258-3-X, pp. 117-118
66. Mesaroș-Anghel, V., Cărăbaș, I., *Un mecanism de temporisation utilise a regler la vitesse dans un cylindre pneumatique*, Journal Mechanisms and Manipulators, nr. 2, 2004, pp. 56-61, ISSN 1583-4743
67. Mesaroș-Anghel, V., Mădăras, L., *Un cylindre pneumatique plus leger que le classiques*, 2-nd International Conference on Robotics, Timisoara, Romania, 2004, ISBN 973-97258-3-X, pp. 121-122
68. Mesaroș-Anghel, V., Cărăbaș, I., *Un cylindre pneumatique a fil auquel on peut regler le temps ou s'effectue la course*, Conference on Robotics, Timisoara, Romania, 2004, ISBN 973-97258-3-X, pp. 123-125
69. Mesaroș-Anghel, V., Mădăras, L., *Une methode perfectionee dans l'appréciation de la qualite des produits*, Acta Technica Napocensis, Series: Applied Mathematics and Mechanics, 47, Vol. II, 2004, ISSN 1221-5872, pp. 843-848
70. Militaru, R., *Sisteme de management: al calității, de mediu, al sănătății și securității ocupaționale, prezentare succintă*, Bulletin AGIR, nr. 4/2004, pp. 32-37
71. Militaru, R., Savii, G., Dreucean, A., *Certification of Product Conformance and Management Systems in Romania – a Case Study*, 4th International Conference "Research and Development in Mechanical Industry"

- RaDMI 2004, ISBN 86-83803-18-X, pp. 486-491, Zlatibor, Serbia and Montenegro
72. Militaru, R., Savii, G., Militaru, C., *Certification of quality management systems in Romania – a case study*, Conference on Robotics, Timisoara, Romania, 2004, pp. 75-79, ISBN 973-97258-3
73. Militaru, R., Dreucean, A., *FMEA, a modern tool of quality management*, 7-th International Conference on Mechatronics and Precision Engineering COMEFIN 2004, ISBN 973-86886-1-2, pp. 203-209
74. Militaru, R., Popa, A., *Helical Springs with a Non Linear Characteristic*, Academic Journal of Manufacturing Engineering, Timisoara, Romania, Volume 2, Number 1/2004, pp. 38-41
75. Modler, K.H., Hollmann, C., Lovasz, E.C., Perju, D., *Geared Linkages with Linear Displacement Actuator Used as Function Generating Mechanisms*, Proceedings of the 11-th World Congress on the Theory of Machines and Mechanisms, Tian Jin, 01-05 April 2004, pp. 1254-1259, ISBN 7-111-14073-7
76. Modler, K.H., Lovasz, E.C., Wilhelm, E., Kleemann, A., *Optimale Auslegung sechsgliedriger Koppelgetriebe zur Erzeugung von Scharnierbewegungen*, VDI Berichte 1845, 2004 Kurvengetriebe, Koppelgetriebe, gesteuerte Antriebe”, pp. 289-308, ISSN 0083-5560
77. Perju, D., Modler, K.H., Lovasz, E.C., Mesaroş, A., *On the Mechanisms' Synthesis of Geometrical and Static Equilibrium Condition*, 9-th International Conference of Mechanisms and Mechanical Transmissions MTM'2004, Cluj-Napoca, Acta Technica Napocensis, Romania, 06-08 June 2004, vol.1, pp. 155-160
78. Perju, D., Lovasz, E.C., Modler, K.H., *Coaxial Function Generating Mechanisms. A New Synthesis Approach*, Proceedings of the 11-th World Congress on the Theory of Machines and Mechanisms, Thian Jin, 01-05 April 2004, pp. 1245-1249, ISBN 7-111-14073-7
79. Popa, A., Argeşanu, V., *Tribologic aspects concerning the contact surface roughness in case of sliding electric contacts*, Journal of Tribology, Fasc VIII, 2004, ISSN 1245-7633, Dec., pp. 236-240, University Dunarea de Jos of Galati
80. Popa, A., Gruescu, C., Popa, M., Uscatescu, M., *Remote Controlled Autonomous Mobile Robot, Equipped with Optoelectronic Devices*, Romanian Journal of Optoelectronics, Romanian Chapter of SPIE, Vol. 12, Issue 3/2004, pp. 1-12, ISSN 1453-0600
81. Popa, A., Uscatescu, M., Marcoane, A., *Programmable Autonomous Mobile Robot*, Scientific Bulletin of the „Politehnica” University of Timisoara, Transactions on Automatic Control and Computer Science, Vol. 49(63), 2004, nr. 4, pp. 23-26, ISSN 1224-600X
82. Popa, A., Gligor, O., *Aspects Concerning the Positional Control for Guidance Systems Based on Electromagnetic Levitation*, Bulletin of the Polytechnic Institute of Iasi, Tome L (LIV), Fasc. 6A, 2004, pp. 407-413, ISSN 1011-2855
83. Popa, M., Marcu, M., Popa, A., *Microcontroller Based Data Acquisition System with USB Interface*, IEEE International Conference on Electrical, Electronical and Computer Engineering, (ICEEC'04) IEEE Catalogue Number 04EX893, Egypt, 2004, pp. 206-209, ISBN 0-7803-8575-6
84. Radu, A.G., Yang, B., Kim, K., Mignolet, M.P., *Prediction of the dynamic response and fatigue life of panels subjected to thermo-acoustic loading*, 45th AIAA / ASME / ASCE / AHS / ASC Structures, Structural Dynamics & Materials Conference, 19-22 April 2004, pp. 132-140, Palm Springs, California, AIAA 2004-1557
85. Savii, G., *Camera Calibration Using Compound Genetic-Simplex Algorithm*, Journal of Optoelectronics and Advanced Materials, Bucharest, Romania, Vol. 6, 2004, No. 4, pp. 1255-1262
86. Savii, G., *Fuzzy decision making in preliminary computer aided design*, Scientific Bulletin of the “Politehnica” University of Timisoara, Transactions on Automatic Control and Computer Science, Vol. 49(63), 2004, No. 4, pp. 91-94
87. Savii, G., Luchin, M., *Modeling and simulation of a contact-task test rig*, Scientific Bulletin of the “Politehnica” University of Timisoara, Transactions on Automatic Control and Computer Science, Vol. 49(63), 2004, No.1, pp. 197-200
88. Sticlaru, C., Davidescu, A., Dreucean, M., *The Influence of Temperature and Load on Contact Area of a Side Sealing*, Acta Technica Napocensis, Series: Applied Mathematics and Mechanics, 47, Vol. II, 2004, ISSN 1221-5872, pp. 503-507
89. Sticlaru, C., Davidescu, A., *Studies by finite element method upon functioning of a elastic coupling*, International Conference Research

- and Development in Mechanical Industry, RaDMI 2004, ISBN 86-83803-18-X, CD-ROM, E 31, pp. 762-769
90. Sticlaru, C., Davidescu, A., *The Finite Element Method Applied to Stress and Strain Analysis of Stick-Slip Phenomenon*, 11th World Congress in Mechanisms and Machine Science Tianjin, China, China Machinery Press, edited by Tian Huang, 2004, pp. 2368-2373
  91. Văcărescu, V., Argeşanu, V., *The determination of the minimum acceleration trajectory in the working area of the industrial robots*, Proceedings of the 2nd International Conference of Robotics- ROBOTICA – 2004, InterGraf, Reşiţa, pp. 193-194, ISBN 973-97258-3
  92. Văcărescu, V., *Strukturanalyse einer Handprothese*, Acta Technica Napocensis, nr. 47, vol. II, 2004, ISSN 1221-5872, pp. 751-755, 9th International Conference of Mechanisms and Mechanical Transmissions, MTM 2004, Cluj Napoca
  93. Văcărescu, V., *Optimale Structursynthese eines Mechanismus für eine Handprothese Ungelenkingen Fingern*, Acta Technica Napocensis, nr. 47, vol. II, 2004, ISSN 1221-5872, pp. 755-763, 9th International Conference of Mechanisms and Mechanical Transmissions, MTM 2004, Cluj Napoca
  94. Văcărescu, V., *The Geometrical Calibration of a Transfer Robot, RTTR Type (Part I)*, 4th International Conference Research and Development in Mechanical Industry, RaDMI 2004, Proceedings, Session E, pp. 798-801, Zlatibor, Serbia and Montenegro
  95. Văcărescu, V., *The Geometrical Calibration of a Transfer Robot, RTTR Type (Part II)*, 4th International Conference Research and Development in Mechanical Industry, RaDMI 2004, Proceedings, Session E, pp. 801-805, Zlatibor, Serbia and Montenegro
  96. Văcărescu, V., *The Differential Modelling of End-Effector's Position and Orientation Errors Applied to Robot's Calibration*, IXth International Conference on the Theory of Machines and Mechanisms IFToMM, August 31- Sept. 2, 2004, Liberec, Czech Republik, Proceedings, pp. 799-804, ISBN 80-7083-847-7
  97. Florea, M., *Constructive, technological and process planning activities considered as an integrated system*, Proceedings of the 2nd International Conference on Robotics, Timișoara, 2004, ISBN 973-97258-3, pp. 126-130
  98. Florea, M., Kovacs, F., *Structure and content of the technological concept and of process planning of product as a part of integrated engineering*, Proceedings of the 2nd International Conference on Robotics, Timișoara, 2004, CD-ROM, ISBN 973-97258-3
  99. Kovacs, F., Florea, M., *Structure and content of the defining and constructive conception of product as a part of integrated engineering*, Proceedings of the 2<sup>nd</sup> International Conference on Robotics, Timișoara, 2004, ISBN 973-97258-3, CD-ROM

#### GRANTS / RESEARCH PROGRAMS

1. *Studies on development of a remote mechatronic laboratory*, grant type A, code CNCSIS 162, grant director: Lecturer dr. eng. Diaconu Aurel, Value: 135,000,000 ROL
2. *Modeling, design and manufacturing of a set of medical implants dedicated to maxilo-facial*, grant 32940/22.06.04, theme 8, code CNCSIS 12, grant director: assoc. prof. dr. eng. Dreucean Mircea, Value: 178,800,000 ROL
3. *Automatisation of manufacturing line of thermo isolate glass with convection coefficient  $k < 1.1$* , nr.1.1/07.2004, contract Texnorex SRL Timișoara, contract director: assoc. prof. dr. eng. Gruescu Corina, Value: 20,000,000 ROL
4. *Implementation of automatic technology for profile Wymar line*, nr.1.2/07.2004, contract Tehnorex SRL Timișoara, contract director: assoc. prof. dr. eng. Gruescu Corina, Value: 20,000,000 ROL
5. *Researches in quality assurance of dialyze process*, type AT, CNCSIS 188, grant director: assist. dr. eng. Ianos Endre, Value: 85,000,000 ROL
6. *Flexible modular system for mechatronics education*, grant CNCSIS 32940/ 2004, theme 4, code 30, type E, grant director: prof. dr. eng. Maniu Inocentiu, 1,230,000,000 ROL
7. *Intelligent Technology for Disassembly- and Recycling Oriented Products*, RO-0124-04/05 Program CEEPUS, program director: prof. dr. eng. Radulescu Corneliu

#### DOCTORAL THESIS

1. Ianos Endre, *Studies on dialyze apparatus for quality assurance of dialyze process*, PhD advisor: prof.dr.eng. Dan Perju
2. Mihancea Sorin Gheorghhe, *Theoretical and experimental studies on cycloid gearboxes*, PhD advisor: prof. dr. eng. Lucian Mădăras

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

### GENERAL PRESENTATION

This research centre was approved by the National Council for University Research in 2001 (CNCSIS Certificate 70/CC/C/2001), based on the application made by the Department of Thermal Machines and Transportation, being recognized for the following main research fields:

- Thermal machines and equipment
- Environmental protection
- Transport vehicles

The research team include the members of the founding chairs of the Department:

- ✓ Chair of Thermodynamics, Thermal Machines and Road Vehicles
  - ✓ Chair of Railway Rolling Stock,
- as well as associated researchers and PhD & master students.

Category	Under 35 years		Between 35 and 45 years		Over 46 years	
	Fem	Male	Fem	Male	Fem	Male
Total	3	16	1	4	3	13
PhD title holders	1	2	1	4	2	12
PhD students	2	16	-	-	1	1
Teaching personnel (full-time)	1	4	1	4	3	12
Research personnel (part-time) from RO/ from abroad	3/-	13/-		1/-	-/-	1/-

### CONTACT

**Director:** Prof. dr. eng. Virgiliu D. NEGREA, corresponding member of the Romanian Academy for Technical Sciences

**Contact person:** Prof. dr. eng. habil Ioana IONEL

**Address:** 1, Bv. Mihai Viteazu  
300223 Timișoara

Tel. +40-256-403666

+40-256-403670

Fax: +40-256-403669

E-mail: [ioana\\_joule@saratoga.ro](mailto:ioana_joule@saratoga.ro)

[ioana@mec.utt.ro](mailto:ioana@mec.utt.ro)

[vdnegrea@mec.utt.ro](mailto:vdnegrea@mec.utt.ro)

Web page: <http://www.mec.utt.ro/~tmtar/>

### 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.

### Researches in INTERNAL COMBUSTION ENGINES (ICEs)

**Keywords:** *spark-ignition engine, diesel engine, heat flow, carburetor hot spot, compression rate, heat exchanger, mixture formation, combustion process, numerical evaluation of pollutants*

#### 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.

### RESEARCH PROJECTS

CNCSIS grant, A type, CNCSIS Code 548, Contr. No. 32940/22.06.2004, *Researches regarding the operating - constructive optimization and ecological impact of thermal machines and equipments and of transportation vehicles*, Director: Prof.dr.eng. Virgiliu Dan Negrea, Value: 169,000,000 ROL

## PUBLICATIONS

## BOOKS

1. Virgiliu Dan Negrea, *Basics of experimental research of internal combustion engines and road vehicles* (published in Romanian), Vol.I and II, Univ. Oradea, 2004, ISBN 973-613-663-9, 533 pages
2. Gelu Pădure, *Road vehicles. Construction and calculus, Vol.1* (published in Romanian), Politehnica Publishing House, Timișoara, 2004, ISBN 973-625-137-3, 232 pages

## PUBLISHED PAPERS

1. Negrea, V.D., Pădure, G., Boaru, L.S., Holotescu, S., Pop, Gh., *Omul, mobilitatea sa și mediul*, Annals of Oradea University, Vol. III, CD-ISSN 1583-0691, 2004
2. Negrea, V.D., Boaru, L.S., Tokar, A., Pădure, G., Holotescu, S., Ostoia, D., *Research on the evaluation of noxes of road vehicle engines*, 1<sup>st</sup> International Conference "Emil Gaiginschi" – Advanced Concepts in Mechanical Engineering, Bulletin of the Technical University Iași, Vol. L(L IV) ACME – Iași, CD ISSN 1011-2855, 2004
3. Negrea, V.D., Holotescu, S., Pădure, G., Iorga, D., *Researches concerning direct injection system modelation of a diesel engine for burning evaluation on the basis of droplet cloud evolution*, CONAT 2004 Proceedings, Paper No.CONAT20044077, Brasov, 20-22 Oct. 2004, ISBN 973-635-394-x, Paper CONAT20044077
4. Negrea, V.D., Pop, G., Holotescu, S., Pădure, G., Negoiteșcu A.S., *Forschungen betreffend der Leistung, des Kraftstoffverbauchs und der Schadstoffentwicklung bei Dieselmotoren mit directeinspritzung*, Symposium "Man and the Environment", 3rd edition, Timișoara, CD-ROM Proceedings, Nov. 8th, 2004, ISBN 973-625-176-4, pp. 19-27
5. Negrea, V.D., Forțofoi, M., Lădaru, S., *Echilibrul ecologic și controlul efectului de seră, necesitate imperioasă a conservării mediului inconjurător*, Symposium "Man and the Environment", 3rd edition, Timișoara, CD-ROM Proceedings, Nov. 8th, 2004, ISBN 973-625-176-4, pp. 28-33
6. Negrea, V.D., Meyer-Pittroff, R., Lackenmaier, J., *Renewable Fuels for Small Diesel Engines with SCR and Oxidation Catalysts*, International Conference MVM Kragujevac (Serbia and Montenegro), ed. XII, 4-6 Oct. 2004, ISSN 0352-292-X
7. Iorga, D., Pădure, G., Ostoia, D., *Cercetări complexe privind influența condițiilor atmosferice și a pregătirii termice a combustibilului asupra gradului de poluare al unui motor diesel cu injecție directă*, National Conference of Thermodynamics, Ed. XIV, CD-ROM Proceedings, Nov. 11-12, 2004, Bucharest, Paper B-43
8. Iorga, D., Pădure, G., Ostoia, D., Mekki, Ch., *Synthesis of some researches concerning thermal preparation of the air aspirated in a direct injection diesel engine for reducing of the smoke degree*, CONAT 2004 Proceedings, Brasov, 20-22 Oct. 2004, ISBN 973-635-394-x, Paper No.CONAT20042100
9. Mihon, L., *Reducerea poluării motoarelor diesel prin utilizarea bioetanolului*, Symposium "Man and the Environment", 3rd edition, Timișoara, CD-ROM Proceedings, Nov. 8th, 2004, ISBN 973-625-176-4, pp. 38-46
10. Mihon, L., *Studies and researches concerning the working of the diesel engines with fuel-alcohol mixtures*, CONAT 2004 Proceedings, Brasov, Oct. 20-22, 2004, ISBN 973-635-394-x, Paper CONAT20042130
11. Mihon, L., *Metode de evaluare a poluării mediului datorată vehiculelor rutiere*, Annals of the Oradea University, Fascicle of Management and Technological Engineering, Proceedings of "IMT Oradea - 2004" Scientific Session, Oradea, CD ISSN 1583-0691, 2004, pp. 35
12. Negoiteșcu, A.S., Hamat, C.O., *Some aspects concerning the notions of generalised thermodynamic cycle in gas thermal engines*, Trans&Motoauto'04, Proceedings of Internal Combustion Engines, vol. 2, Technical University Bransh Plovdiv, Bulgaria, Oct. 14-17, 2004, ISBN 954-9322-06-8, pp. 60-62
13. Negoiteșcu, A.S., Hamat, C.O., *Some aspects concerning the notions of generalised thermodynamic cycle in gas thermal engines*, Fourth International Congress "Mechanical Engineering Technologies '04", Vol.4, ISSN 1310-3946, Sept. 2004, Varna, Bulgaria, pp.130-132
14. Negoiteșcu, A.S., Holotescu, S., *Comparația performanțelor energetice (analitic-experimental), pentru motorul diesel supraalimentat cu răcirea intermediară a aerului, de tip ALCO R-251 FLO*, National Conference of Thermodynamics, Ed. XIV, CD-ROM Proceedings, Nov. 11-12, 2004, Bucharest, Paper B-39
15. Ostoia, D., Boaru, L.S., *Studiu experimental privind influența pierderilor prin neetanșeități*

- asupra nivelului de particule la un monocilindru Diesel, Symposium "Man and the Environment", 3rd edition, Timișoara, CD-ROM Proceedings, Nov. 8th, 2004, ISBN 973-625-176-4 , pp. 47-52
16. Ostoia, D., Holotescu, S., *Studiu experimental privind influența pierderilor prin neetașeități asupra consumului de combustibil la un monocilindru Diesel*, Symposium "Man and the Environment", 3rd edition, Timișoara, CD-ROM Proceedings, Nov. 8th, 2004, ISBN 973-625-176-4 , pp. 53-58
  17. Stoica, V., Holotescu, S., *Modelarea funcționării unui sistem de distribuție variabilă cu implicații asupra reducerii nivelului produșilor poluanți*, Symposium "Man and the Environment", 3rd edition, Timișoara, CD-ROM Proceedings, Nov. 8th, 2004, ISBN 973-625-176-4 , pp. 59-68
  18. Boaru, L.S., *The study of theoretical and experimental exhaust emission components with local and regional effects*, Trans&Motoauto'04, Proceedings of Internal Combustion Engines, vol. 2, Technical University Bransh Plovdiv, Bulgaria, Oct. 14-17, 2004, ISBN 954-9322-06-8, pp. 187-190
  19. Boaru, L.S., *The numerical evaluation of weighted toxicity indices for the gasoline engine and compression ignition engine by causeway drive*, CONAT 2004 Proceedings, Brasov, Oct. 20-22, 2004, ISBN 973-635-394-x, Paper CONAT2004S102
  20. Boaru, L.S., Negrea, V.D., *Evaluarea numerică a coeficienților ponderați de toxicitate pentru motoare cu aprindere prin scânteie și motoare cu aprindere prin comprimare de tracțiune rutieră*, National Conference of Thermodynamics, Ed. XIV, CD-ROM Proceedings, Nov. 11-12, 2004, Bucharest, Paper B-42
  21. Tokar, A., Boaru, L.S., Negoșescu, A.S., Ostoia, D., *Studii și cercetări privind influența indicatorilor economici asupra deficitelor ecologice*, Symposium "Man and the Environment", 3rd edition, Timișoara, CD-ROM Proceedings, Nov. 8th, 2004, ISBN 973-625-176-4, pp. 94-99
  22. Mekki, Ch., Iorga, D., Negrea, V.D., Ostoia, D., *The pressure modification influence on a direct injection diesel energetic performances and pollution degree*, XXX<sup>th</sup> Internationally attended Scietific Conference of the Military Academy, Bucharest, Nov.6-7, 2004, ISBN 973-640-012-3
  23. Grigore, L., Negrea, V.D., Pădure, G., *Analyses of the diesel injection pump elements with finite element method*, Bulletin of the Technical University Iași, Vol. L(L IV) ACME – Iași, CD ISSN 1011-2855, 2004
  24. Grigore, L., Negrea, V.D., Mihon, L., *Modelation of the fuel pipe-injector assembly with finite element method*, Bulletin of the Technical University Iași, Vol. L(L IV) ACME – Iași, CD ISSN 1011-2855, 2004
  25. Zs. Szakmary, M. Jădăneanț, *The Importance of the Disciplines from the Field of Internal Combustion Engines in the Formation of Future Specialists*, CONAT 2004 Proceedings, Brasov, Oct. 20-22, 2004, ISBN 973-635-394-x
  26. Pesic, R., Veinovic, S., Davinic, A., Pop, G., *The New Concept of the IC Engine for All Fuels*, CONAT 2004 Proceedings, Brasov, Oct. 20-22, 2004, ISBN 973-635-394-x, Paper CONAT20041078

#### PhD THESIS

1. Cădariu Gelu, *Studies and Researches Regarding the Reduction of thermal Machines and Equipments Pollution (with Emphasis on the Road Traffic)*, PhD adviser: Prof. dr. eng. Virgiliu Dan Negrea
2. Tudora Iancu Ovidiu, *Studies and Researches Regarding the Diesel Engines Thermal-gasdynamics by Numerical Methods*, PhD adviser: Prof. dr. eng. Virgiliu Dan Negrea

#### PERSPECTIVES

For the financial year 2005 the following research grant is proposed for funding:

- CNCISIS research grant, type A Code 548 (to be continued from 2004) *Researches regarding the operating - constructive optimization and ecological impact of thermal machines and equipments and of transportation vehicles*, director: Prof. dr. eng. Virgiliu Dan Negrea, value: 250,000,000 ROL

#### 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. Gelu PADURE
- Lect. dr. eng. Sorin HOLOTESCU
- Lect. dr. eng. Gheorghe POP
- Lect. dr. eng. Arina Speranța NEGOIȚESCU
- Assist. eng. Virgil STOICA, PhD student
- Assist. eng. Daniel OSTOIA, PhD student
- Eng. Lăcrămioara Suzana PETRUȚESC-BOARU, PhD student
- Eng. Adriana TOKAR, PhD student

### CONTACT PERSONS

Prof. dr. eng. Virgiliu Dan NEGREA ([vdnegrea@mec.utt.ro](mailto:vdnegrea@mec.utt.ro))  
 Prof. dr. eng. Daniel IORGA ([diorga@mec.utt.ro](mailto:diorga@mec.utt.ro))  
 Assoc. prof. dr. eng. Liviu MIHON ([mihon@mec.utt.ro](mailto:mihon@mec.utt.ro))  
 Lect. dr. eng. Gelu PĂDURE ([padure@mec.utt.ro](mailto:padure@mec.utt.ro))  
 Lect. dr. eng. Sorin HOLOTESCU ([holos@mec.utt.ro](mailto:holos@mec.utt.ro))

Address: Faculty of Mechanical Engineering  
 1 Mihai Viteazul Bv.  
 Timișoara, RO-300222  
 Tel.: +40-256-403661, 403666  
 Fax: +40-256-403520, +40-256-403669

### Researches in CLASSIC AND UNCONVENTIONAL FUELS, COMBUSTION PROCESS AND COMBUSTION FACILITIES, TECHNOLOGIES FOR THE REDUCTION OF POLLUTING IMPACT OF THE THERMAL MACHINES AND VEHICLES ON THE ENVIRONMENT, AIR QUALITY

**Keywords:** *classic and renewable fuels, waste, biomass, burners, boilers, combustion efficiency and control, pollutant emissions, air quality, thermal and environmental balances.*

### ACTIVITIES

- Environmental on line measurements, with attested methods (emissions and air quality), in real time data acquisition for CO, SO<sub>2</sub>, NO<sub>x</sub>, C<sub>m</sub>H<sub>n</sub>, 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 plants), 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, Cal3qhc)
  - 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. EU project, NNES-2001-00719, *Unification of power plant and solid waste incineration UPSWING*, Director: Prof. dr. eng. habil Ioana IONEL, value 60,000 EUR
2. EU Project, G6RD/CT/2000/00434, *Remote Optical Sensing ROSE*, Director: Prof. dr. eng. habil Ioana IONEL, value 4,500 EUR
3. CNCSIS grant, A type, CNCSIS Code 812, Contr. Nr. 32940/22.06.2004, *Air quality monitoring by the administration of pollution sources*, Director: Prof. dr. eng. habil Ioana IONEL, value 134,000,000 ROL
4. CNCSIS grant, AT type, CNCSIS code 202, Contr. Nr. 32940/22.06.2004, *Pollutants dispersion modelling in canyon type streets*, Director: Eng. Daniel BISORCA (PhD student), value 103,271,000 ROL
5. CNCSIS grant TD type, CNCSIS code 66, Contr. Nr. 32940/22.06.2004, *Comparative researches regarding the experimental and simulation methods for pollutants dispersion*, Director: Eng. Daniel BISORCA (PhD student), value 60,000,000 ROL
6. CNCSIS grant TD type, CNCSIS code 54, Contr. Nr. 32940/22.06.2004, *Simulation by FLUENT code of the velocity and temperature fields in a furnace for simultaneous burning of waste and coal powder*, Director: Eng. Vasile Gruescu (PhD student), value 41,271,000 ROL
7. BENA Fellowship for PhD students, Sponsorship Contract no.38/21.04.2004, *Method to determine the influence of individual heating systems on the air quality in urban areas*, Fellow: Eng. Francisc POPESCU (PhD student), value 17,000,000 ROL
8. National Research Program MENER, contract no. 410/20.09.2004, *Researches regarding the combined combustion of urban waste or biomass with coal and flue gas cleaning*, Director: Prof. dr. eng. habil Ioana IONEL, value 80,000,000 ROL



9. National Research Program MENER, contract no. 461/20.09.2004, *New technology of valorification of biomass by combustion in fluidised bed*, Director: Prof. dr. eng. habil Ioana IONEL, value 40,000,000 ROL
10. Contract 1207/2003 (continued in 2004) with RAAN Drobeta Turnu Severin, *Determination of the gaseous and solid emissions at the two smoke channels for the boilers of 420t/h (no.1, 2 and 3) from Halanga Thermal Power Plant*, Director: Prof. dr. eng. habil Ioana IONEL, value 604,800,000 ROL
11. Contract 41/4.XI 2003 with the Ministry of Education and Research, The Development & Research Fund, *Air quality measurement by opical methods*, Director: Prof. dr. eng. habil Ioana IONEL, value 113,000,910 ROL
12. Contract 41/4.XI 2003 with the Ministry of Education and Research, The Development & Research Fund, *Implementation of a solid waste burner in a thermal power plant*, Director: Prof. dr. eng. habil Ioana IONEL, value 113,000,910 ROL
13. Contract No.1216/2004/ with S.C. Detergenți Procter & Gamble, *Measurement of gaseous and solid emissions at different filters and stacks*, Director: Prof. dr. eng. habil Ioana IONEL, value 47,400 ROL
14. Contract No. 1217/04.06.2004 with SOLECTRON, *Measurement of emissions at boilers and electric generators, indoor and outdoor imissions*, Director: Prof. dr. eng. habil Ioana IONEL, value 38,000,000 ROL
15. Contract SC2004-453/11.03.04 BGCC 56/19.04.2004 with the Timișoara City Hall, *Air quality measurements in the PARTA garbage deposit area*, Director: Prof. dr. eng. habil Ioana IONEL, value 37,500,000 ROL
16. Contract No. 1219/2004 with COLTERM S.A., *Determination of the concentrations of gaseous pollutants and particulate emissions according to the operating prescriptions*, Director: Prof. dr. eng. habil Ioana IONEL, value 39,843,000 ROL
17. Contract No 1215/15.12.2003 (accomplished in 2004) with Arad Power Plant, *Thermal measurements regarding the gas analysis for a 420 t/h boiler*, Director: Prof. dr. eng. habil Ioana IONEL, value 67,200,000 ROL
18. Contract No. 1218/ 2004 with S.C. COCA COLA HBC Romania SRL, , Director: Prof. dr. eng. habil Ioana IONEL, value 38,000,000 ROL
19. Contract 1178/12.09.2003 (continued in 2004) with S.C. Electrocentrale Deva SA, *English / Romanian translation of operating and maintenance handbooks for the re-*

*technologised energetic installation*, Director: Prof. dr. eng. habil Ioana IONEL, value 16,000,000 ROL

#### BOOKS

1. Ioana Ionel, Corneliu Ungureanu, *Thermal powerplants. Advanced thermodynamic cycles*, (published in Romanian), Politehnica Publishing House, Timișoara, 2004, ISBN 973 625 162 4, 250 pages
2. Ioana Ionel (coordinator), Francisc Popescu, Paul-Dan Oprișă-Stănescu, Daniel Bisorca, Claudiu Gruescu, *Energoecology of fossil fuels. Experimental themes* (published in Romanian), Politehnica Publishing House, Timișoara, 2004, ISBN 973-625-186-1, 130 pages
3. Ioana Ionel (coordinator), Francisc Popescu, Daniel Bisorca, Paul-Dan Oprișă-Stănescu, Claudiu Gruescu, *Measurement of air quality and noxes dispersion. Experimental themes* (published in Romanian), Politehnica Publishing House, Timișoara, 2004, ISBN 973-625-187-X, 130 pages

#### PUBLISHED PAPERS

1. Ionel, I., Ionel, S., *Beurteilung von Luftqualität mittels optischen Fernmesssystemen, in Vergleich zu der ND-IR Methode*, VDI Berichte 1863, VDI Verlag, GmbH Düsseldorf 2004, ISBN 3 18 091863-2, pp. 81 -87
2. Ionel, I., *Evaluarea calității aerului prin modelarea numerică și măsurători directe*, AGIR Bulletin: Quality – a problem of everybody, ISSN 1224/7928, 2004, pp. 12 – 22
3. Ionel, I., Ungureanu, C., Dobjanschi, L., Popescu, Fr., Bisorca, D., Gruescu Cl., Gruescu V., *Principalele probleme ecologice ale CTE pe lignit cu referire la centrala RAAN, Sucursala ROMAG TERMO*, “Buildings and Ambiental Comfort” National Conference internationally attended, Ed 13th, April 22-23, 2004, Timișoara, ISBN 973-625-140-3, pp. 105-110
4. Ionel, I., Magda, A., *Evaluation économique, écologique et sociale du concept LOTHECO dans la production industriel d'ente privés*, COFRET 04, Energie, Environment, Economie et Thermodynamique, EURECO Reseau, Nancy, France, April 22-23, 2004, ISBN 2-905267-41-0, pp. 240-245
5. Ionel, I., *Environmental and social issues of a new gas steam cycle, using low temperature waste heat*, 5th International World Energy System Conference, Oradea, 2004, ISSN 1198-0729, CD presentation, Paper 5.22 (pp. 529)

6. Ionel, I., Constantin, C., Anastasiu, M., Gruescu, Cl., *UPSWING, a new concept for coupling a waste incinerator into a thermal power plant*, 5th International World Energy System Conference, Oradea, 2004, ISSN 1198-0729, CD presentation, Paper 5.23 (pp. 533)
7. Ionel, I., Gruescu, Cl., Gruescu, V., Savu, A., *Studies on a lab facility scrubber for removal of the Hg compounds*, 5th International World Energy System Conference, Oradea, 2004, ISSN 1198-0729, CD presentation, Paper 5.24
8. Ionel, I., Bisorca, D., Popescu, Fr., *Method for air quality prognosis in a high traffic cross road*, Energy Conference, Varna, June 2004, Tom I, pp. 172-177
9. Ionel, I., Ungureanu, C., Dobjanschi, L., Popescu, Fr., Bisorca, D., Gruescu, Cl., Gruescu, V., *Main ecological problems of the cogeneration power plant ROMAG TERMO*, Energy Conference, Varna, June 2004, Tom I, pp. 178-181
10. Ungureanu, C., Ionel, I., Savu, A., Gruescu, V., Trif-Tordai, G., Ţenchea, A., *Instalație pentru arderea combinată a deșeurilor*, Symposium "Man and the Environment", 3rd edition, Timișoara, CD-ROM Proceedings, Nov. 8th, 2004, ISBN 973-625-176-4, pp. 284-290
11. Ionel, I., Gruescu, Cl., Ungureanu, C., Savu, A., *Technology for the mercury removal from flue gases*, Energy Conference, Varna, June 2004, Tom I, pp. 186-191
12. Ionel, I., Ionel, S., Bisorca, D., *A correlative comparison of measured traffic induced carbon monoxide concentrations*, Transport and air pollution, 13-th International Symposium, Boulder, 13-15 Sept, 2004, pp.315-327
13. Ionel, I., *Technical and economic analysis of the implementation of a new humid air cycle proposed for the CASIAL cement factory in Romania*, 29th Annual Congress of the American Romanian Academy of Arts and Sciences (ARA), Bochum, 7-12 Sept. 2004, Alma Mater Publishing House, ISBN 973 632 140 1, pp. 453 – 457
14. Ionel, I., Ungureanu, C., Raica Tr., *Eficientizarea funcționării grupurilor energetice înzestrate cu m.a.i. cu piston*, National Conference of Thermodynamics, Ed. XIV, CD-ROM Proceedings, Nov. 11-12, 2004, Bucharest, Paper B – 37
15. Ionel, I., Popescu, Fr., Bisorca, D., Ungureanu, C., *Studiu privind calitatea aerului în zone urbane*, National Conference of Thermodynamics, Ed. XIV, CD-ROM Proceedings, Nov. 11-12, 2004, Bucharest, Paper C-9
16. Ionel, I., Popescu, Fr., Bisorca, D., *Metodă pentru stabilirea factorului de emisie a unei surse de suprafață*, Symposium "Man and the Environment", 3rd edition, Timișoara, CD-ROM Proceedings, Nov. 8th, 2004, ISBN 973-625-176-4, pp. 255-264
17. Opreșă-Stănescu, P.D., Gheorghiu, M., *Regarding the influence of geometrical Parameters on the Performances of a Supersonic Ejector*, Proc. of 6<sup>th</sup> Int. Conf. Hydraulic Machinery and Hydrodynamics, Timisoara, 21-22 Oct. 2004, pp. 475-480
18. Opreșă-Stănescu, P.D., Ungureanu, C., *Influența asupra producerii NOx la arderea păcurii în urma introducerii divizate a aerului la nivelul focarului*, National Conference of Thermodynamics, Ed. XIV, CD-ROM Proceedings, Nov. 11-12, 2004, Bucharest, paper B-40
19. Opreșă-Stănescu, P.D., *Modelarea cu FLUENT a unui ejector radial supersonic*, National Conference of Thermodynamics, Ed. XIV, CD-ROM Proceedings, Nov. 11-12, 2004, Bucharest, Paper A-39
20. Popescu, Fr., Bisorca, D., *Air quality in urban areas. Case study: city of Timisoara*, CONAT 2004 Proceedings, Brasov, Oct. 20-22, 2004, ISBN 973-635-394-x, Paper CONAT2004S115
21. Popescu, Fr., Bisorca, D., *Transesterification of animal fats with high FFA content for biodiesel production*, CONAT 2004 Proceedings, Brasov, Oct. 20-22, 2004, ISBN 973-635-394-x, Paper CONAT2004S116
22. Popescu, Fr., Bisorca, D., Ungureanu, C., *Study regarding air quality in urban areas*, National Conference of Thermodynamics, Ed. XIV, CD-ROM Proceedings, Nov. 11-12, 2004, Bucharest
23. Bisorca, D., Ionel, I., Magda, A., Goanta, A., *Analiza numerică a dispersiei monoxidului de carbon pentru diferite rezoluții spațiale. Aplicație pentru municipiul Timișoara*, National Conference of Thermodynamics, Ed. XIV, CD-ROM Proceedings, Nov. 11-12, 2004, Bucharest, Paper C-10
24. Bisorca, D., Popescu, Fr., Ionel, I., Ungureanu, C., *Urban pollution is caused by industry or traffic? Case study in the Romanian city of Timisoara*, 5th International World Energy System Conference, Oradea, 2004, ISSN 1198-0729, CD presentation, Paper 5.25
25. Gruescu, Cl., Ionel, I., Savu, A., *Experimental results concerning Hg retention from flue gases*, Symposium "Man and the Environment", 3rd edition, Timișoara, CD-

- ROM Proceedings, Nov. 8th, 2004, ISBN 973-625-176-4, pp. 279 -284
26. Gruescu, C., Ionel, I., *Experimental research concerning mercury removal from waste incinerators flue gases*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanical Engineering, Tom 49(63), No. 2, 2004, Timișoara, ISSN 1224-6077, pp. 35-38
  27. Gruescu, C., Ionel, I., *Cercetări experimentale privind reducerea emisiilor de mercur în gazele de ardere provenite din incinerarea deșeurilor*, National Conference of Thermodynamics, Ed. XIV, CD-ROM Proceedings, Nov. 11-12, 2004, Bucharest, Paper A-36
  28. Gruescu, V., Trif-Tordai, G., Țenchea, A., Ionel, I., *Oxy-fuel combustion as a method for reducing of CO<sub>2</sub> from flue gases. Experimental investigation*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanical Engineering, Tom 49(63), No. 2, 2004, Timișoara, ISSN 1224-6077, pp. 23-27
  29. Gruescu, V., Țenchea, A., Trif-Tordai, G., Ionel, I., *CO<sub>2</sub> sequestration via oxy fuel combustion. Experimental investigation*, National Conference of Thermodynamics, Ed. XIV, CD-ROM Proceedings, Nov. 11-12, 2004, Bucharest, Paper A-37
  30. Trif-Tordai, G., Ionel, I., Gruescu, V., Țenchea, A., *Instalație demonstrativă în cogenerare de ardere a biomasei. Stadiu actual și perspective*, National Conference of Thermodynamics, Ed. XIV, CD-ROM Proceedings, Nov. 11-12, 2004, Bucharest, Paper B – 38
  31. Dungan, L., Oprea Stănescu, P.D., Ionel, I., Ungureanu, C., *The influence of the lateral intake of the secondary air over NOx pollution into a furnace with axial symmetric geometry*, Energy Conference, Varna, June 2004, Tom I, pp. 192-197
  32. Varga, L., Ionel, I., Ungureanu, C., Babucea, A., *Consideration on the reduction of SO<sub>2</sub> emissions in large combustion installations*, 5th International World Energy System Conference, Oradea, 2004, ISSN 1198-0729, CD presentation, Paper 5.21
  33. Dobjanschi, L., Ungureanu, C., *Elaborarea programului de reducere progresivă a emisiilor la CTE pe lignit ROMAG TERMO, sucursala RAAN*, Symposium "Man and the Environment", 3rd edition, Timișoara, CD-ROM Proceedings, Nov. 8th, 2004, ISBN 973-625-176-4, pp. 116-124
  34. Russ, W., Ionel, I., *Fuel saving by waste utilisation from food industry*, Symposium "Man and the Environment", 3rd edition,

Timișoara, CD-ROM Proceedings, Nov. 8th, 2004, ISBN 973-625-176-4 , pp. 255-264

### PhD THESIS

1. Dungan Liviu, *Contributions on the numerical modelling of temperature and chemical concentrations fields of flue gases from hydrocarbons in an axial symmetric furnace*, PhD adviser: Prof. dr. eng. Corneliu Ungureanu
2. Popescu Francisc, *Contributions to the assessment of the air quality in an urban area, with application to Timișoara city*, PhD adviser: Prof. dr. eng. Corneliu Ungureanu

### PERSPECTIVES

For the financial year 2005 the following research grants are proposed for funding:

1. CNCSIS grant , type A, to be continued from 2004, *Air quality monitoring by the administration of the pollution sources*, Director: Prof. dr. eng. habil Ioana Ionel
2. Contract with Arad Lignite Thermal Power Plant, *Framework contract for half-yearly thermal measurements at Arad Lignite Thermal Power Plant*, Director: Prof. dr. eng. habil Ioana Ionel
3. Contract with RAAN Halanga Thermal Power Plant, *Framework contract for monthly measurements at RAAN Halanga Thermal Power Plant*, Director: Prof. dr. eng. habil Ioana Ionel
4. CNCSIS grant , type TD, *Numerical simulation of the temperature and velocity fields in a furnace chamber for simultaneous burning of waste and dust using FLUENT code*, Director: Eng. Vasile Gruescu (PhD student)
5. National Research Program MENER, contract no. 410/20.09.2004, *Researches regarding the combined combustion of urban waste or biomass with coal and flue gas cleaning*, Director: Prof. dr. eng. habil Ioana IONEL
6. National Research Program MENER, contract no. 461/20.09.2004, *New technology of valorification of biomass by combustion in fluidised bed*, Director: Prof. dr. eng. habil Ioana IONEL
7. Greenenergy, (*Energy optimisation in European greenhouses*), EU research program, Proposal NB 012566-2, approx. 40 000 €, Co-ordinator for UPT Prof. dr. eng. Ioana IONEL

### 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. Eng. Francisc POPESCU
- Eng. Daniel BISORCA, PhD student
- Eng. Adrian GOANTA, PhD student
- Eng. Daniel MAXIM, PhD student
- Eng. Daniel EGYED, 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. Liviu DUNGAN, PhD student
- Eng. Adrian ȚENCHEA, PhD student
- Eng. Gabriel TRIF-TORDAI, PhD student
- Eng. Lelia DOBJANSCHI, PhD student
- Techn. Marius TOARTA
- Techn. Gavril BRATEANU

### CONTACT

Prof. dr. eng. habil Ioana IONEL  
 Faculty of Mechanical Engineering  
 1 Mihai Viteazul Bv.  
 Timișoara, RO-300222, Romania  
 Tel.: +40-256-403670, Fax: +40-256-403669  
 E-mail: [ioana\\_joule@saratoga.ro](mailto:ioana_joule@saratoga.ro)  
[ioana@mec.utt.ro](mailto:ioana@mec.utt.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*

### ACTIVITIES

- researches regarding the optimization of heat exchangers for vehicles
- 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

1. Contract 136/2004, with S.C. RAAL Bistrița, *Determination of the thermal and fluid flow performances of Aluminium radiators realised by RAAL Bistrița*, Director: Prof. dr. eng. Mihai Nagi, value: 20,000,000 ROL
2. Contract no. 13/2004, with SISTEM GAS SRL Timișoara, *Researches regarding the vaporization of GPL*, Director: Prof. dr. eng. Mihai Nagi, value: 30,000,000 ROL
3. Contract no.11756/2001 (act ad. 1/2004) National Program for Research, Development and Innovation – Program AEROSPATIAL, (in cooperation with the Laboratory of Magnetic Liquids, Romanian Academy - Timișoara Division - coordinator, Institute of Space Sciences, Bucharest, ROSEAL S.A. Odorheiu Secuiesc), *Studies and researches regarding the behaviour of magnetizable fluids with complex micro- and nano-structure in terrestrial and microgravity conditions*, Director: Assoc. prof. dr. eng. Floriana D. Stoian, Value 50,000,000 ROL

#### BOOKS

1. Ioan Laza, Dorin Lelea, Liviu Mihon, Mihai Nagi, Paul-Dan Oprea- Stănescu, *Energetic equipment and installations* (Romanian Agency for Energy Conservation course), Orizonturi Universitare Publishing House, Timișoara, ISBN 973-638-169-2, 189 pages
2. Mihai Jădăneanț, Ioan Laza, *Efficient use of energy* (Romanian Agency for Energy Conservation course), Orizonturi Universitare Publishing House, Timișoara, ISBN 973-638-171-4, 54 pages
3. Mihai Jădăneanț, *Technical thermodynamics and thermal machines* (published in Romanian), Eurostampa Publishing House, ISBN 973-687-244-0, 374 pages

#### PUBLISHED PAPERS

1. Jădăneanț, M., *Comparație între modurile de producere a energiei folosite pentru încălzirea clădirilor*, Journal “Science and Engineering”, AGIR, vol.V, 2004, ISBN 973-8466-67-9
2. Nagi, M., Ilieș, P., Marțian, V., *Critical considerations regarding the generalization of the results that were obtained at the oil-air coolers testing*, Bulletin of the Technical University Iasi, Tom L(LIV), 2004, No.6C, pp. 133-138
3. Nagi, M., Alexandru, I., *Research respecting LPG distribution, in gaseous phase, from set*

- containers, Bulletin of the Technical University Iasi, Tom L(LIV), 2004, No.6C, pp. 140-144
4. Nagi, M., Motântău, D., Stanciu, T., *Performances of the heat exchages with Field tubes*, CONAT 2004 Proceedings, Brasov, Oct. 20-22, 2004, ISBN 973-635-394-x, Paper CONAT20044079
  5. Nagi, M., Ilieş, P., Marţian, V., *Plates oil coolers with counterflow pattern*, International Conference Motor Vehicles and Mobilily 2004-B13, Kraguevac, Serbia and Montenegro, ISSN 0352-292X, pp. 488-492
  6. Nagi, M., Ilieş, P., Marţian, V., *Consideraţii asupra unor soluţii constructive de radiatoare din aluminiu*, National Conference of Thermodynamics, Ed. XIV, CD-ROM Proceedings, Nov. 11-12, 2004, Bucharest, Paper A-32
  7. Nagi, M., Alexandru, I., *Consideraţii critice privind proprietăţile termo-fizice ale autogazului*, National Conference of Thermodynamics, Ed. XIV, CD-ROM Proceedings, Nov. 11-12, 2004, Bucharest, Paper A-34
  8. Stoian, F.D., Pop, Gh., Bica, D., Stoica, V., Marinică, O., Vékás, L., *Effects of an applied magnetic field on the bubble growth and departure in a magnetic liquid*, 3<sup>rd</sup> International Symposium on Two-Phase Flow and Experimentation, Pisa, Italy, 22-24 September 2004, CD ROM Proceedings, Ed. ETS, Pisa, Paper: pdm03
  9. Stoian, F.D., Holotescu, S., *Electric field effects on the internal structure and thermodynamic properties of a Lennard-Jones type of fluid*, National Conference of Thermodynamics, Ed. XIV, CD-ROM Proceedings, Nov. 11-12, 2004, Bucharest, Paper A-38
  10. Stoian, F.D., Pop, Gh., Vékás, L., Bica, D., Stoica, V., Marinică, O., *Cercetări privind mecanismele transferului termic în nanofluidе magnetizabile multifazice*, First CNCSIS Symposium "Engineering and Nanosciences", Section 1, Bucharest, April 23, 2004
  11. Stoian, F.D., Pop, Gh., Vékás, L., Stoica, V., Bica, D., Marinică, O., *Studies on the dynamics of gas bubbles in magnetizable nanofluids*, Proc. of 6<sup>th</sup> Int. Conf. Hydraulic Machinery and Hydrodynamics, Timisoara, 21-22 Oct. 2004
  12. Mihon, L., *Sisteme de răcire termoelectrică*, National Conference of Thermodynamics, Ed. XIV, CD-ROM Proceedings, Nov. 11-12, 2004, Bucharest, Paper C-11
  13. Lelea, D., Nishio, S., Takano, K., *The Experimental Research on Microtube Heat Transfer and Fluid Flow of a Distilled Water*, Int. J. of Heat and Mass Transfer, Elsevier Science, 2004, pp. 2817-2830
  14. Negoîtescu, A.S., Hamat, C.O., *Some aspects concerning utilization of Monte Carlo technique in heat transfer study*, Proc. Conference on Research and Development of Machine Elements and Systems, IRMES'04, Kragujevac, Serbia and Montenegro, 16-17 Sept. 2004, ISBN 86-80581-66-6
  15. Negoîtescu, A.S., Nagi, M., Negrea, V.D., *The nomograms for generalize the results of the tests on the ALCO oil cooler*, Conference Motor Vehicles and Mobilily 2004-B13, Kraguevac, Serbia and Montenegro, ISSN 0352-292X
  16. Oancea, N., Jădăneanţ, M., *Algoritm şi program pentru calculul câmpului termic în regim nestaţionar*, Journal "Instalatorul", Ed. Artecno Bucureşti, ISSN 1223-7418, Year XII, no.2/2004, pp. 58-62
  17. Ilieş, P., Nagi, M., Marţian, V., *New compact systems for optimising the cooling groups used in industrial machines*, Bulletin of the Technical University Iasi, Tom L(LIV), 2004, No.6C, pp. 3-12
  18. Ilieş, P., Nagi, M., Marţian, V., *Trends of more compact cooling systems for vehicles and self driven cars equipped with diesel engines*, CONAT 2004 Proceedings, Brasov, Oct. 20-22, 2004, ISBN 973-635-394-x
  19. Alexandru, I., Nagi, M., *The processing of autogas in S.C. Sistemgas Timişoara*, CONAT 2004 Proceedings, Brasov, Oct. 20-22, 2004, ISBN 973-635-394-x, Paper No. CONAT20042126

#### OTHER RESULTS

1. Assoc. prof. dr. eng. Floriana D. Stoian – CNR-NATO Senior Researcher Fellowship, at Department of Energetics, University of Pisa, Italy, August – October, 2004
2. Assist. eng. Virgil Stoica (PhD Student) – Associate researcher at the Department of Thermodynamics, Technical University of Darmstadt, Germany, Jan.2004 – April, 2006

#### PERSPECTIVES

For the financial year 2005, the following research grants are proposed for funding:

1. Contract with S.C. RAAL Bistriţa, *Determination of the thermal and fluid flow performances of Alluminium radiators realised by RAAL Bistriţa*, Director: Prof. dr. eng. Mihai Nagi

2. CNCSIS grant, type A, *Studies and researches regarding the utilization of magnetizable nanofluids as thermal fluid*, Director: Assoc. prof. dr. eng. Floriana D. Stoian

#### RESEARCH TEAM

- Prof. dr. eng. Mihai NAGI
- Prof. dr. eng. Mihai JĂDĂNEANȚ
- Assoc. prof. dr. eng. Floriana D. STOIAN
- Assoc. prof. dr. eng. Liviu MIHON
- Assoc. prof. dr. eng. Ioan LAZA
- Lect. dr. eng. Gheorghe POP
- Lecturer dr. eng. Dorin LELEA
- Lecturer dr. eng. Arina NEGOIȚESCU
- Assist. eng. Virgil STOICA, PhD student
- Eng. Paul ILIEȘ, PhD Student
- Eng. Vlad MARȚIAN, PhD Student
- Eng. I. ALEXANDRU, PhD Student
- Eng. Mariela SPOREA, PhD Student
- Eng. Francisc SZIKSZAI, PhD Student

#### CONTACT

Prof. dr. eng. Mihai Nagi ([nagi@mec.utt.ro](mailto:nagi@mec.utt.ro))  
 Prof. dr. eng. Mihai Jădăneanț ([mihaij@mec.utt.ro](mailto:mihaij@mec.utt.ro))  
 Assoc. prof. dr. eng. Floriana D. Stoian ([dstoian@mec.utt.ro](mailto:dstoian@mec.utt.ro))  
 Lect. dr. eng. Dorin Lelea ([ldorin@mec.utt.ro](mailto:ldorin@mec.utt.ro))

Faculty of Mechanical Engineering  
 1 Mihai Viteazul Bv.  
 Timișoara, RO-300222, Romania  
 Tel.: +40-256-403661, Fax: +40-256-403520

Web Page: [www.mec.utt.ro/~tmtar/](http://www.mec.utt.ro/~tmtar/)

#### Researches in FUEL CELLS

**Keywords:** *fuel cell, energy use reduction, emission reduction*

#### ACTIVITIES

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

#### RESULTS

##### RESEARCH CONTRACTS

1. CNCSIS grant, A type Code 548, Contr. Nr. 32940/22.06.2004, *Researches regarding the operating - constructive optimization and ecological impact of thermal machines and equipments and of transportation vehicles*, Director Prof.dr.eng. V.D. Negrea, had for the financial year 2004 the research subject: *Studies and researches regarding the energy use and recovery from the sources of low thermal potential and decrease of the polluting emissions for transportation systems*,

topic responsible: Assoc. prof. dr. eng. Liviu MIHON (see the first research topic)

#### PERSPECTIVES

For 2005 it is estimated the publication and further analyses of the research results followed by a proposal of a new research grant.

#### RESEARCH TEAM

- Prof. dr. eng. Daniel IORGA
- Prof. dr. eng. Mihai JĂDĂNEANȚ
- Assoc. prof. dr. eng. Liviu MIHON
- Lect. dr. eng. Dorin LELEA
- Lect. dr. eng. Arina NEGOIȚESCU
- Eng. Lăcrămioara BOARU, PhD student
- Eng. Adriana TOKAR, PhD student
- Eng. Doina MIHON, PhD student
- Eng. Liliana MOȘTEORU, PhD student

#### CONTACT

Assoc.prof.dr.eng. Liviu MIHON  
[mihon@mec.utt.ro](mailto:mihon@mec.utt.ro)

Faculty of Mechanical Engineering  
 1 Mihai Viteazul Bv.  
 Timișoara, RO-300222, Romania  
 Tel.: +40-256-403661  
 Fax: +40-256-403520

#### Researches in DETERMINATION OF COMBUSTIBLE CONSUMPTION AT TRAINS TOW WITH DIESEL LOCOMOTIVES

**Keywords:** *railway traction, traction estimation, combustible and electric energy consumption, pollution*

#### ACTIVITIES

- Determination of combustible and electric energy consumption and the influences of parameters like: line's profile, constructive and functional characteristics of locomotives and wagons, train driving type and stile, heading resistance and others
- Elaboration the solving methodology for train's movement equation by using Runge-Kutta integration method
- Elaboration of a computer code for traction calculation and combustible and energy consumption estimation

#### RESULTS

##### PUBLISHED PAPERS

1. Mocuta, G.E., Popescu, M., Caneparu, P., *Analiza comparativa a procedeeilor de sudare/reconditionare a sinelor*, 3rd National

- Symposium on Railways, 28-29 Oct. 2004, Bucharest, pp. 87-92
2. Mocuta, G.E., Halmagean, A., *An Application for the Evaluation of Professional Knowledge - Referring to the CFR Employers*, International Conference on Automation, Quality and Testing, Robotics, AQTR 2004 (THETA 14), 13-15 March 2004, Cluj-Napoca, ISBN937-713-047-2, pp. 90-96
  3. Mocuta, G.E., *The Conical Intermediary Elements Unconventional Hub to Shaft Press Fits Bearing Capacity by Finite Element Method and by Experimental Assessment*, Annual Scientific Meeting IMT, Oradea, 27-28 May 2004, Felix, pp. 54-60
  4. Pap, P., *Fuzzy Logic Based Method For maintenance in a Power Network System*, 4<sup>th</sup> International Congress on Mechanical Engineering Technologies'04, 23-25 Sept. 2004, Varna, Bulgaria, pp. 76-80
  5. Mocuta, G.E., *Reconditionarea in stare montata a sinelor de tramvai cu caneluri uzate*, 3rd National Symposium on Railways, 28-29 Oct. 2004, Bucharest, pp. 45-51

#### PERSPECTIVES

The theme is part of a type A Grant (2003/2005), *Researches Regarding Constructive-Functional Optimization and the Ecologisation of Thermal Equipment and Machines and Transport Vehicles*, Director: Prof. dr. eng. Virgiliu Dan Negrea, theme: *Studies and Researches Regarding the Optimization of Locomotives' Driving in Train Towing, with the Purpose of Reducing Combustible Consume and Electric Energy*, is scheduled for 2005.

#### RESEARCH TEAM

- Assoc. prof. dr. eng. Gheorghe TUROS
- Prof. dr. eng. Mircea Corneliu DUNGAN
- Lect. dr. eng. Petru PAP
- Assist. eng. Gabriel URSU, PhD student
- Marius GASPARGAR, graduate student
- Marius PINTE, graduate student
- Andrei PREDA, graduate student

#### CONTACT

Assoc. prof. dr. eng. Gheorghe TUROS  
[mrcf@mec.utt.ro](mailto:mrcf@mec.utt.ro)

Faculty of Mechanical Engineering  
 1 Mihai Viteazul Bv.  
 Timișoara  
 RO-300222, Romania

Tel.: +40-256-403721  
 Fax: +40-256-403520

#### Researches in SCIENTIFIC INVESTIGATION OF ECONOMIC AGENTS REGARDING THE OPPORTUNITY OF RO-LA TRANSPORT SYSTEMS

**Keywords:** *multimodal transport, intermodal freight terminals, RO – LA transport, FERRY – BOAT, containers special train, railway conveyance of material, economic agents.*

#### ACTIVITIES

- investigation in the enterprises in the region of the activity of "C.F.R. Marfă - S.A." Timișoara, regarding the utilization of multimodal transport, like RO - LA transport, FERRY - BOAT and containers special train
- analysis of the transport types with respect to conveyance of material, quantity, periods of time, transports relations, etc

#### RESULTS

##### BOOKS

Luiza Izabel Dungan, Gheorghe Sfara, Alexandru Culda, *Command and control installations for train traffic* (published in Romanian), Mirton Publ. Timișoara, 2004, ISBN 973-661-486-7, 92 pages

##### PUBLISHED PAPERS

1. Pap, P., *Advanced techniques for optimization and simulation of the traffic in transports nets*, 25<sup>th</sup> International Conference of the Agency for Research on Military Techniques and Technology, ACTTM, 27-28 May, 2004, Bucharest, pp. 56-60
1. Pap, P., *Urban Environmental Pollution Decreasing by Optimizing Public Transport Services*, 3rd National Symposium "Man and the Environment", 8 Nov. 2004, Timisoara, ISBN 973-625-176-4, pp. 34-38

#### RESEARCH TEAM

- Assoc. prof. dr. eng. Gheorghe TUROS
- Prof. dr. eng. Mircea Corneliu DUNGAN
- Lect. dr. eng. Petru PAP
- Assist. eng. Gabriel URSU, PhD student
- Radu Mihai PANTILE, graduate student
- Carmen BUBLEA, graduate student
- Cristian ROSCH, graduate student

#### CONTACT

Dr. eng. Petru PAP ([mrcf@mec.utt.ro](mailto:mrcf@mec.utt.ro))

Faculty of Mechanical Engineering  
 1 Mihai Viteazul Bv.  
 Timișoara, RO-300222, Romania

Tel.: +40-256-403721, Fax: +40-256-403520

## RESEARCH GROUP IN *ROBOTICS*

### RESEARCH FIELDS

Trajectory generation and motion planning are major problems in the creation of autonomous robots. These problems interact with other important problems, including geometric, kinematic and dynamic modelling, real-time motion control, sensing and task planning. Workspace modelling offers knowledge about the environment where the robot has to accomplish its task.

### KEYWORDS

Robot, modeling, path planning, motion generation, trajectory, workspace

### ACTIVITIES

Robot's mechanics, dynamic modeling, robot path planning, robot motion generation, workspace modeling, robot-workspace complex system modeling.

### PROJECTS

Contract 32940/22.06.2004, Theme 22, CNC SIS code 198, *Knowledge based system for developing of assisted learning technology*

Value: 157,000,000 ROL

Research beneficiary: Ministry of Education and Research

### PUBLICATIONS

#### PAPERS IN PROCEEDINGS

1. Toth-Taşcău, M., Drăgulescu, D., Dreucean, M., *Obstacle expanding for a two-dimensional workspace*, Proceedings 30th JUPITER Conference, University of Belgrade, 2004, ISBN 86-7083-459-6, pp. 3.13-3.16
2. Drăgulescu, D., Dreucean, M., Toth-Taşcău, M., Balint, M., *A potential field approach to path planning for a moving robot in a two-dimensional workspace*, Research and

Development in Mechanical Industry RaDMI 2004, Volume 1, Papers from Sessions C,D,E and F, Zlatibor, Serbia and Montenegro, 31.08-4.09.2004, ISBN 86-83803-18-X, pp. 1-8

3. Drăgulescu, D., Stoicănescu, C., Toth-Taşcău, M., *Robot motion planning in a virtual space*, Proceedings 2nd International Conference on Robotics, Robotica 2004, Timișoara/Reșița, 14-16 October 2004, InterGraf, ISBN 973-97258-3-X, pp. 61-62
4. Stoicănescu, C., Drăgulescu, D., Dreucean, M., Toth-Taşcău, M., *Modeling a virtual laboratory served by mobile robots*, Proceedings 2nd International Conference on Robotics, Robotica 2004, Timișoara/Reșița, 14-16 October 2004, InterGraf, ISBN 973-97258-3-X, pp. 173-174

### PERSPECTIVES

Modelling of a vehicle-workspace system, in order to optimize the typical activities, will allow experiments using virtual spaces, created by the user, available for any application, reducing the cost price and allowing an assisted learning both in education and healthcare.

### RESEARCH TEAM

- Prof. dr. eng. Doina Drăgulescu,
- Prof. dr. eng. Mirela Toth-Taşcău,
- Assoc. prof. dr. eng. Mircea Dreucean,
- Eng. Lucian Rusu, PhD student

### CONTACT

Prof. dr. eng. Doina DRĂGULESCU  
Faculty of Mechanical Engineering  
Mechanics and Vibrations Department  
Bul. Mihai Viteazu, no. 1, 300222 Timișoara

E-mail: [ddrag@cmpicsu.utt.ro](mailto:ddrag@cmpicsu.utt.ro)

Tel: +40-256-403290, +40-256-403637

Fax: +40-256-403523

<http://cmpicsu.utt.ro>



## **RESEARCH GROUP IN MECHANICS AND VIBRATIONS OF TEXTILE MACHINES**

### **RESEARCH FIELDS**

- Study of acoustic field (noise level, frequency spectra) of weaving-mills
- Study of the vibrations appearing in the work of weaving and knitting machines

### **KEYWORDS**

Vibrations, weaving machine, knitting machine

### **ACTIVITIES**

- Experimental determinations of vibration and noise level
- Modelling of mechanisms of weaving machines
- Study of dynamics of knitting machines

### **RESULTS**

- Study of vibrations of Sulzer launching mechanism
- Determination of acoustic field of weaving-mills and elaboration of methods of reduction of the noxious effects

### **PUBLICATIONS**

Chiriac, A., Uroşu, D., *Dynamic Study of Motion of an Automatic Knitting Machine for Socks*, Annals of Univ. „Aurel Vlaicu” from Arad, Textile Series,

Fasc. of Textile Techniques, Arad, 2004, pp. 260-263, ISSN 1582-3431

### **RESEARCH TEAM**

- Prof. dr. eng. Adrian Chiriac
- Lect. dr. eng. Gheorghe Luca
- Assist. eng. Cosmina Vigaru, PhD. student
- Eng. Adriana Baltă, PhD. student
- Assoc. prof. dr. eng. Nicolae Herişanu
- Assoc. prof. dr. Dimitrie Uroşu

### **PERSPECTIVES**

- Study of vibrations and noises at knitting machines
- Experimental determinations concerning the level of vibrations at classical weaving machines and new generations of weaving machines

### **CONTACT**

Prof. dr. eng. Adrian CHIRIAC

Faculty of Mechanical Engineering

Bd. Mihai Viteazu, nr.1

300222 TIMIŞOARA

E-mail: [chiriac@mec.utt.ro](mailto:chiriac@mec.utt.ro)

Tel: +40-256-403627

## **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 will cooperate 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. Marian DĂNĂIAȚĂ
- Eng. Octavian IONESCU, master student
- Eng. Adrian POP, master student
- Stud. Liliana LUP
- Stud. Razvan ORTAN

## ACTIVITIES AND RESULTS

- The parametric and feature-based modelling was 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 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 during the month of December 2004
- A master dissertation was sustained in 2004 and new themes were initiated for the academic year 2004-2005 including appropriate STEP subjects.
- The Romanian National Standardizing Authority was contacted in order to propose the adoption of the STEP and PLIB standards in Romania.
- A research contract for SC RIPO Consulting SRL Timisoara regarding the conception of parametric web application for the offers announcing
- A graphic interface for a PRM web application will be developed for the SC m1Tco SRL Timisoara

## RESEARCH BENEFICIARIES

Students and academic staff from our university, industrial producers

## FINANCIAL SUPPORT

Partner in the KISIS project, managed by the Twente University of Enschede, Netherlands, Laboratory of Measurement and Instrumentation.

### **Researches in *E-LEARNING IN COMPUTER AIDED DESIGN***

#### KEYWORDS

Interactive educational instruments, CAD technique

#### FIELD DESCRIPTION

The main goal of this program consists in creating and developing more adaptive and flexible educational instruments. New interactive learning and teaching methods were studied and experimented. Based on the integration of the

individual instructional methods and the group training procedures, more software packages were developed to help students of different ages in learning CAD techniques.

#### RESEARCH TEAM

- Prof. dr. eng. Lia DOLGA
- Assist. eng. Mihai REVENCU
- Assist. eng. Marian DĂNĂIAȚĂ
- Eng. Octavian IONESCU, master student
- Eng. Adrian POP, master student
- Co-operation with the Department of Continuing Education

#### 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 SIVCO and became AEL instructors, within the SEI project regarding the Development of the Romanian Education System.

#### RESEARCH BENEFICIARIES

Students and academic staff from our university, visitors of the department web site, participants to the mentioned symposium

### **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

- Prof. dr. eng. Iulia VOIA
- Prof. dr. eng. Lia DOLGA
- Assoc. prof. dr. Eng. Mircea VODA
- Lect. dr. eng. Mihaela CRETU-NICA
- Lect. dr. eng. Doina SAFTENCU
- Lect. dr. eng. Arseniu PECICAN

- Assist. eng. Ileana MLADIN
- Assist. eng. Petrica M. DANAIATA
- Assist. eng. Silviu DUMITRAS
- Assist. eng. Simona GAVRILA
- Assist. eng. Mariana ILIE
- Assist. eng. Mihai REVENCU
- Assist. eng. Ladislau WALKOVSKY

#### ACTIVITIES AND RESULTS

- More departments' members participated to the VIII-th National Conference in Descriptive Geometry and Engineering Computer Graphics, organized by the "Politehnica" University of Brasov.
- The IX-th student professional contest "Student CAD" was organized in January, oriented on the 2D AutoCAD graphics. In May a second one was organised, oriented on 3D Modeling and Parametric Design in Inventor Environment and CATIA Environment.
- A debate about the 3D Modeling was organized in co-operation with AutoDesk Center assignee from the UST Lille during the month of Mai 2004

#### Researches in *THE DEVELOPMENT OF THE PARAMETRIC MODELS IN RELIABILITY OF MECANIC 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

- Assoc. prof. dr. eng. Mircea VODA
- Prof. dr. eng. Viorel A.SERBAN
- Assoc. prof. dr. eng. Ilare BORDEASU
- Prof. dr. eng. Lia DOLGA
- Eng. Adriana BACILA, PhD student
- Eng. Cristian TOBA, master student

#### ACTIVITIES AND RESULTS

- The international project Brancusi initiated with the Mechanic Laboratory of Lille, France, in the field of *Study and modeling of couples fatigue – cavitation for the turbine vane* was pursued.
- Financing for PhD study was obtained from ALSTOM, France, for the eng. Adriana BACILA, having as a subject the *Crack simulations system for am metallic elements under a charge*

- The research agreement the "Portile de Fier II" hydroelectric power station was pursued
- A paper was published in the *The 6<sup>th</sup> International Conference on Hydraulic Machinery and Hydrodynamics Timisoara*, Romania, October 21 – 22, 2004

#### FINANCIAL SUPPORT

Own and internal resources of the department  
Partner in the Brancusi project, with the Mechanic Laboratory Lille, France

#### PUBLICATIONS

##### BOOKS

Dolga, L., Revencu, M., *Parametric and feature-based modeling with applications in CATIA and Inventor*, Politehnica Publishing House, 2004, 360 pages, ISBN 973-625-119-5

##### PUBLISHED PAPERS

1. Dolga, V., Dolga, L., *Modelling and simulation of mechatronics systems*, Mecatronica Journal 1/2004, Bucharest, pp. 34-39, ISSN 1583-7653
2. Dolga, L., Dolga, V., *New approaches in designing mechatronics products*, Annals of Oradea University, 2004 (CD-ROM), ISSN 1583-0691
3. Dolga, L., Dolga, V., *The pseudo-inverse matrix and the condition number in sensorics*, Scientific Bulletin of the "Politehnica" University of Timisoara, Romania, Transaction on Mechanics, Tom 49(63), fasc. 1/2004, ISSN 122460-6077, pp. 27-32
4. Voia, I., Dolga, L., Walkovszki, L., *The three-dimensional vision education for the students*, Annals of Oradea University, 2004 (CD-ROM), ISSN 1583-0691
5. Cucu, D., Revencu, M., Alexa, C.A., *The processes identification and description in the Quality Management System ISO 9001:2000*, 35<sup>th</sup> International Scientific Symposium of Military Equipment and Technologies Research Agency (METRA), Bucharest, 2004, pp. 647-652, ISBN 973-0-03501-6
6. Revencu, M., Alexa, C.A., Cucu, D., *Quality tools in constructing and manufacturing design*, 35<sup>th</sup> International Scientific Symposium of Military Equipment and Technologies Research Agency (METRA), Bucharest, 2004, pp. 631-634, ISBN 973-0-03501-6
7. Revencu, M., Alexa, C.A., Cucu, D., *Principles and methods for quality optimization*, 9<sup>th</sup> International Conference of Mechanism and Mechanical Transmissions MTM, Cluj-Napoca, 2004, Acta Technica

Napocensis, nr. 47, pp. 987-990, ISSN 1221-5872 1454-685X

8. Alexa, C.A., Revencu, M., Cucu, D., *Methods for the increase of reliability automatic systems*, 9<sup>th</sup> International Conference of Mechanism and Mechanical Transmissions MTM, Cluj-Napoca, 2004, Acta Technica Napocensis, nr. 47, pp. 983-986, ISSN 1221-5872 1454-685X

## CONTACT

Prof. dr. eng. Iulia VOIA, Head of Department

Bul. Republicii, Nr. 9

Timișoara, Romania

Tel: +40-256- 403811

E-mail: [gddt@mec.utt.ro](mailto:gddt@mec.utt.ro)

Web: [www.mec.utt.ro/gddt](http://www.mec.utt.ro/gddt)

## RESEARCH GROUPS IN THE DEPARTMENT OF MATERIALS' STRENGTH

### RESEARCH FIELDS

Fatigue and Fracture Mechanics

### 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.

### 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

**Researches in THE PHYSICAL PROPERTIES OF ALUMINIUM, STEEL-ALUMINIUM AND STEEL CONDUCTORS, STUDY OF WIRE AND WIRE ROPES AND ROUND STEEL CHAINS**

### 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 aluminum, final composite, steel and aluminum

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 ambiantal and results were extrapolated beginning 100 or 1000 hours to 10000 hours

### KEYWORDS

conductors, stress, strain, modulus of elasticity, creep, ambient temperature, thermal properties

### RESEARCH TEAM

Staff "Stress-Strain":

- Prof. dr. eng. Nicolae NEGUȚ
- Prof. dr. eng. Ion DUMITRU
- Prof. dr. eng. Nicolae FAUR
- Prof. dr. eng. Pavel TRIPA
- Prof. dr. eng. Josif HAJDU
- Assoc. prof. dr. eng. Liviu MARȘAVINA
- Lect. Dr. eng. Mihai HLUȘCU

Staff "Creep":

- Prof. dr. eng. Ionel DOBRE
- Prof. dr. eng. Josif HAJDU
- Prof. dr. eng. Constantin CRISTUINEA
- Lect. Dr. Ing. Mihai HLUȘCU
- Assist. eng. Iuliu SISAK
- Assist. eng. Radu NEGRU

### 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

**Researches in *HIGH TEMPERATURE BEHAVIOUR OF STEELS, STABILITY AND CREEP OF LONG VERTICAL PIPES, CURVED BEAMS STRESS ANALYSIS***

**FIELD DESCRIPTION**

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

**KEYWORDS**

stress, strain, termoelasticity, creep, thermal fatigue, fracture, pipes under pressure

**ACTIVITIES AND RESULTS**

There were analysed a great number of pipes and it was designed a device for hanging cracking pipes. It was established that yield point, ultimate strength and tenacity intensely decreased in time. In the framework of cured specimens it was elaborated a fast calculus method. It were also studied, bath theoretical and experimental, some vertical long specimens under compressive loading also into account thermal effects.

**RESEARCH TEAM**

- Prof. dr. eng. Iosif HAJDU
- Prof. dr. eng. Pavel TRIPA
- Assoc. prof. dr. eng. Liliana BLAJ
- Lect. dr. eng. Mihai HLUȘCU

**RESEARCH OFFERS**

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

**Researches in *THE ANALYSIS AND TESTS ABOUT BEHAVIOR OF MATERIALS BELONGING OF HEAVY DEVICES BEEING OUT OF WORKING LIFE-TIME***

**FIELD DESCRIPTION**

There is analysed the influence of working life-time of different types of steel belonging, of minning equipments beeing out of working life-time. There were performed some researches regarding the behavior at variable loads, impacts and also fracture mechanics analysis.

**ACTIVITIES AND RESULTS**

On the basis of the mechanical characteristics, which were obtained at variable loads and fracture mechanics analysis, it was performed a computer programme concerning the durability of a bar belonging to a heavy minning machine, by using fracture mechanics theory.

**RESEARCH TEAM**

- Prof. dr. eng. Ion DUMITRU
- Prof. dr. eng. Pavel TRIPA
- Prof. dr. eng. Nicolae NEGUȚ
- Prof. dr. eng. Nicolae FAUR
- Assoc. prof. dr. eng. Liviu MARȘAVINA
- Prof. dr. eng. Ionel DOBRE
- Assist. eng. Iuliu SISAK
- Assoc. prof. dr. eng. Dana SILAGHI PERJU
- Assist. eng. Radu NEGRU

**RESEARCH OFFERS**

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

Researches can be used by electrotechnical materials industry and distributing electrical energy units. There are also useful in order to participate at international auctions.

**Researches in *THE BEHAVIOUR OF COMPOSITE MATERIALS***

**FIELD DESCRIPTION**

Studies concerning the behaviour of composite materials at static loading and fatigue, cracking mechanism, plates behaviour at dynamic loading

**KEYWORDS**

composite materials, fatigue, dynamical, loads, composite plotes

**RESEARCH TEAM**

- Prof. dr. eng. Ionel DOBRE
- Dr. eng. Mihaela POPESCU
- Prof. dr. eng. Pantele CHELU

**RESEARCH OFFERS**

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

**RESULTS**

***DESIGNED EQUIPMENT***

- The fatigue testing machine with additional shocks (Acad. Ștefan Nădășanu)
- The fatigue testing machine for wire ropes subjected on alternative bending (prof. Lazăr Boleanțu)
- The life – time estimation equipment for bicycle frames (prof. Ionel Dobre)
- The machine for fatigue tests under repeated traction shocks (prof. Ion Dumitru)

**RESEARCH CONTRACTS**

1. Nr.28/09.03.2004, *The Study of the Material Status of 40 Barr Steam Pipes from CET "SOMES" Dej*

Beneficiary: S.C. "SOMES" Dej  
 Director: Pavel Tripa  
 Value 75,000,000 ROL

2. Nr: 45/2004, *Compression Tests on Packing Cartons for the Perfusion Solutions: Nicolae Faur*

Beneficiary: HELVETICA PROFARM SA, Timișoara  
 Value:12,000,000 ROL

**GRANTS**

Code 13 CNCISIS, *Creep Researches and Studies on Al and Ol Conductors used in Electrical Energy Transport Networks*, Director: Faur Nicolae, Value: 150,000,000 ROL

**BOOKS**

Faur N., *Materials' Mechanics*, Politehnica Publishing House, Timisoara, 2004, 300 pages, ISBN 973-8247-98-5

**PAPERS**

1. Marsavina, L., *The use infrared detectors for determination the fracture mechanics parameters*, Journal of Optoelectronics and Advanced Materials, vol. 6, Nr. 44, 2004, INOE & INFM, Romania, pp. 445-451
2. Faur, N., Hajdu, I., Negut, N., Branzan, O., *The Study of the stress-strain state in a suport plate* Proceedings of the 10<sup>th</sup> International Symposium on Stress analysis and material testing, vol. 1, 21-23 Oct. 2004, pp. 5.39 – 5.44
3. Hluscu, M., Tripa, P., *Short and Long Time Characteristics of a Ferritic Steel Used in Electrical Power Stations*, 4<sup>th</sup> National

Conference "Professor Dorin Pavel – Founder of Roumanian Hydroenergetics", Sebes 21-23 May 2004, in Science and Engineering, AGIR, Bucharest, 2004, vol. VI, pp. 59-64, ISBN 973-8130-82-4

4. Dumitru, I., Cipleu, A., *About an Experimental Method for Determination of the Critical Dynamical Stresses Factor*, Science and Engineering, Vol. V, pp. 135-140, Cluj Napoca, 2004
5. Marsavina, L., *Thermoelastic stress analysis for a branch crack*, 10<sup>th</sup> International Symposium on Experimental Stress Analysis and Testing of Materials, Sibiu, vol. II, 2004, pp. 4-35, ISBN 973-651-918-X

**PERSPECTIVES**

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 Center in Construction and Fatigue, BCUM, code CNCISIS 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. Ion DUMITRU

Faculty of Mechanical Engineering  
 Bul. Mihai Viteazu, nr. 1  
 300223 Timișoara, Romania

Tel: +40-256-403574  
 Fax: +40-256-403572  
 E-mail: [dion@mec.utt.ro](mailto:dion@mec.utt.ro)