



Federal University of Santa Catarina

<http://dpgi.proplan.ufsc.br/ufsc-em-numeros/>



45,006 Students
2551 Faculty staff
3242 Technical and administrative staff
119 Undergraduate courses
64 Master programs
55 Doctoral programs



Federal University of Santa Catarina
Prof. Ubaldo Balthazar- Dean of the
University

Technological Center
Prof. Edson Roberto De Pieri - Director

Mechanical Engineering Department
Prof. Edson Bazzo - Department Head



Engenharia Mecânica CTC

Created in 1971

67 Full time faculty

25 Laboratories or research groups

About 15.000 m² building area

2 Undergraduate courses

2 Master programs and

2 Doctoral programs

1600 Students



Mechanical Engineering (1962)

The undergraduate program in Mechanical Engineering has a duration of 5 years

55 students/semester (4,032 hours)

Approximately 3100 graduates by 2017

<http://emc.ufsc.br/gradmecanica/>



Materials Engineering (1999)

The undergraduate program in Materials Engineering has a duration of 5 years

35 students/semester (4,344 hours)

Approximately 600 graduates by 2017

<http://emc.ufsc.br/gradmateriais/>



At least 60% of students do research work in laboratories, they take part in competition teams and other extracurricular activities.

100% of **undergraduate students** do internship in the industry.



Master and Doctoral Degree Program in Mechanical Engineering

Master Degree level (1969)
Alumni: 1,530 by 2016

Doctoral Degree level (1981)
Alumni: 390 by 2016

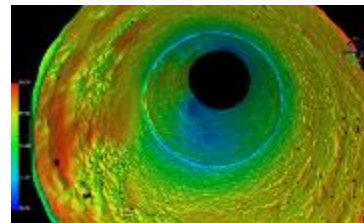
<http://ppgmec.posgrad.ufsc.br/>



Hydraulic and Pneumatic



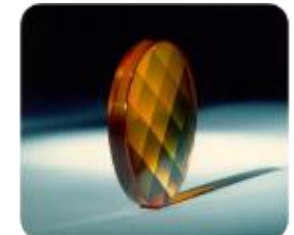
Laser Inspection



Metrology and Measurement



Robotics & Welding



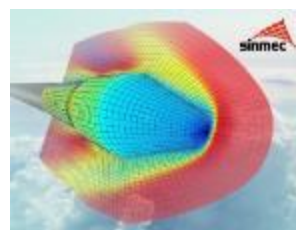
High Precision Machining



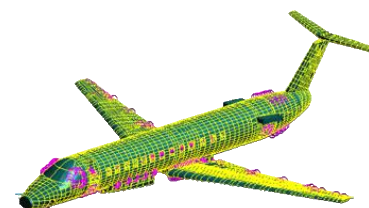
Energy



Combustion



CFD



Noise and Vibration



Aerospace Research

Master and Doctoral Degree Program in Materials Science and Engineering

Master Degree level (1994)
Alumni: 300 by 2016

Doctoral Degree level (1994)
Alumni: 140 by 2016

<http://www.pgmat.ufsc.br/portal/>



Microstructural Characterization



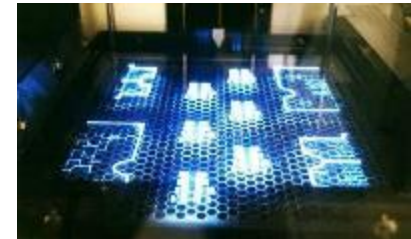
Ceramic and Polymeric Materials



Biomechanics

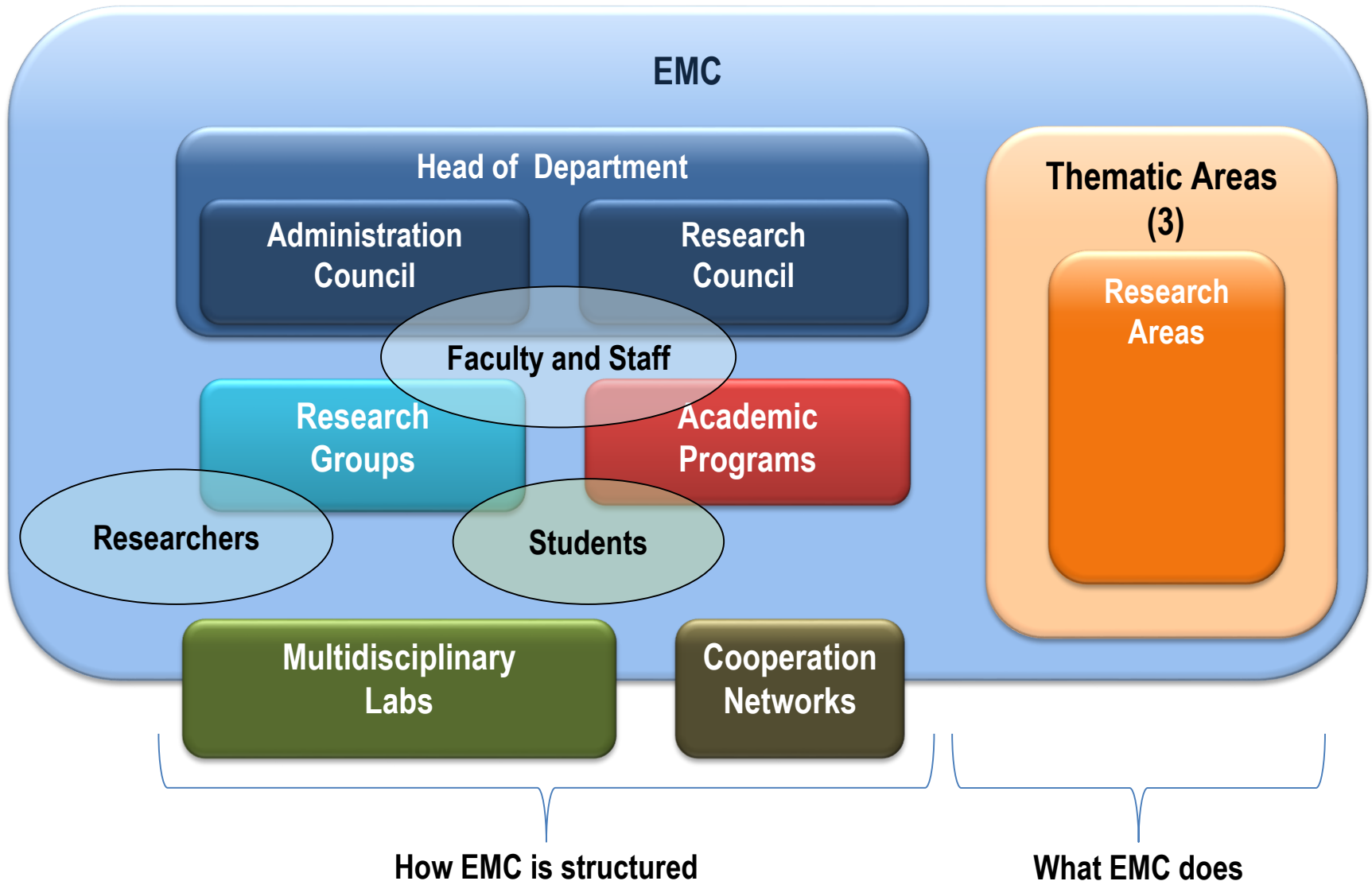


Powder metallurgy, plasma processing and Nanotechnology



Additive Manufacturing

Research Areas and Integration



Laboratories and Research Groups



People:

Faculty staff: 5

Research fellow: 1

Scientific collaborators: 5

Master and Doctoral students: 24

Undergraduate student: 10

Partnership:

King's College London, Norwegian University of Science and Technology (NTNU), Genova University, Tianjin University China, London South Bank University and others.

Contractors:

Petrobras, BMW, Furnas, Copel, Cemar, Petrosix, WEG, Ministério das Cidades and others.

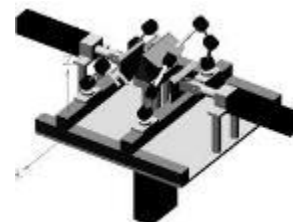


Focus:

Cutting-edge research solutions for engines and robots for special applications development especially in the areas of Mechanical Design and Synthesis and Analysis of Mechanisms



Contact:
Prof. Daniel Martins
daniel.martins@ufsc.br
www.robotica.ufsc.br



Research areas:

- Mechanical design of mechanisms and machines
- Robotic surgery
- Process control and trajectory generation
- Specialized applications simulators
- Cable-driven for load/person transportation
- Robotized inspection in submerged environment
- Vehicle suspension mechanism design



Faculty staff: 5

Research fellow: 2

Scientific collaborators: 2 (KTH)

Master and Doctoral students: 35

Undergraduate student: 21

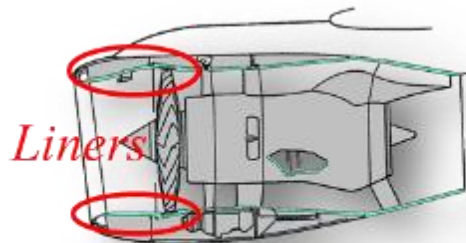
Partnership:

MWL - Marcus Wallenberg Laboratory for Sound and Vibration Research – KTH, Stockholm

Contractors: Embraer, Petrobras, Embraco and others.

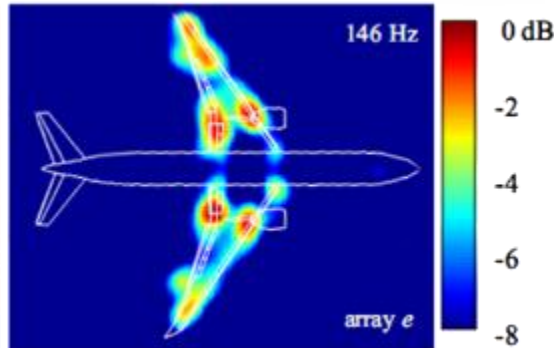
Focus:

Research on topics related to acoustics and vibration with focus on: noise and vibration control on aircrafts, aeroacoustics and numerical methods.



Research areas:

- Numerical methods for aircraft interior noise simulation (FEM, BEM and SEA)
- Silent Aircraft Project - Design and construction of test facilities for liner impedance eduction and jet noise studies
- Application of beamforming techniques for source localization
- Noise control of air-conditioning and hydraulic systems
- Application of viscoelastic and poroelastic materials for noise and vibration control



Contacts:

Prof. Arcanjo Lenzi
arcanjo.lenzi@ufsc.br
Prof. Júlio A. Cordioli
julio.cordioli@ufsc.br
Prof. Andrey R. da Silva
andrey.rs@ufsc.br

www.lva.ufsc.br





Precision Engineering Laboratory

Faculty staff: 4

Staff: 1

Scientific collaborators: 1

Master and Doctoral students: 20

Undergraduate student: 20

Partnership:

RWTH Aachen University, ETH Zürich, Welle LASER, TU Berlin, TH Ilmenau, Fraunhofer ILT, Fraunhofer IPT, Hochschule Offenburg and others

Contractors: Petrobras, Embraco HERGEN, and others.

Focus:

Research on topics related to machining with geometrically defined and not defined cutting edges, Precision Engineering and materials processing with LASER (Welding, Cladding, Heat treatment)



Research areas:

- Machining Processes - Turning and grinding
- Machining of Hardened Materials
- Machining of Self Lubricated Materials
- Modeling and Simulation of Machining Processes
- Materials Processing with LASER
- Mechatronic Systems Design and Construction
- Precision and Ultraprecision Machine Development
- Precision Manufacturing
- Biomaterials Fatigue Studies
- Silicon cutting with diamonds wire

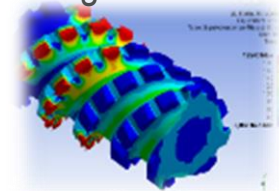


Contact:

Prof. Walter L. Weingaertner
w.l.weingaertner@ufsc.br

Prof. Rolf B. Schroeter
rolf.schroeter@ufsc.br

Prof. Milton Pereira
milton.pereira@ufsc.br
Prof. Fábio Antônio Xavier
f.xavier@ufsc.br



Focus:

- Materials Synthesis & Processing
- Mechanical Behaviour: Simulation & Measurement

Academic Staff: 5
 Technical Staff: 1
 Scientific Associates: 5
 Master and Doctoral Students: 23
 Undergraduate Students: 25

Partnership & Contractors:

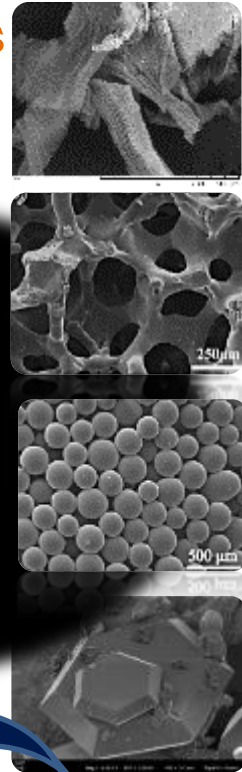
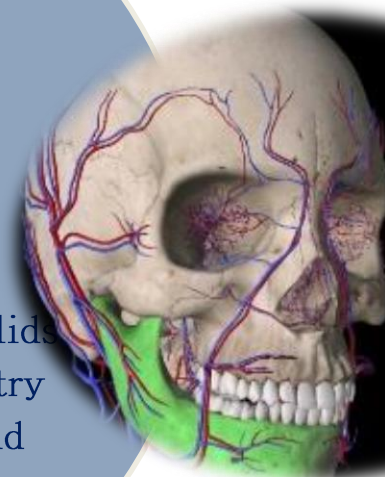


LABORATORIES

Research areas:

- Numerical methods for functionally graded materials/FGM (FEM)
- Biomaterials
- Composites Additive Manufacturing
- Mechanical Behavior of Solids
- Materials Applied Colorimetry
- Nanomaterials: Synthesis and Processing
- Creep Resistant Materials

Advanced Ceramics
 Composites
 Titanium



Contact:
 Prof.Dr.-Ing. M.C.Fredel
m.fredel@ufsc.br
www.ceramat.ufsc.br

Faculty staff: 4

Staff:3

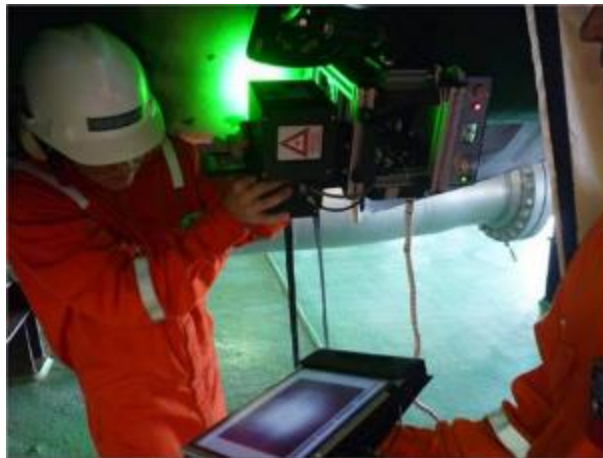
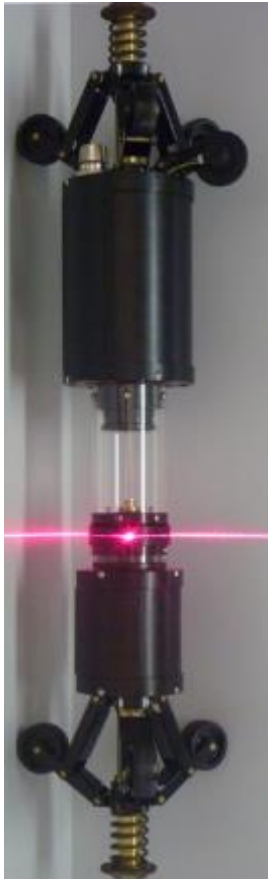
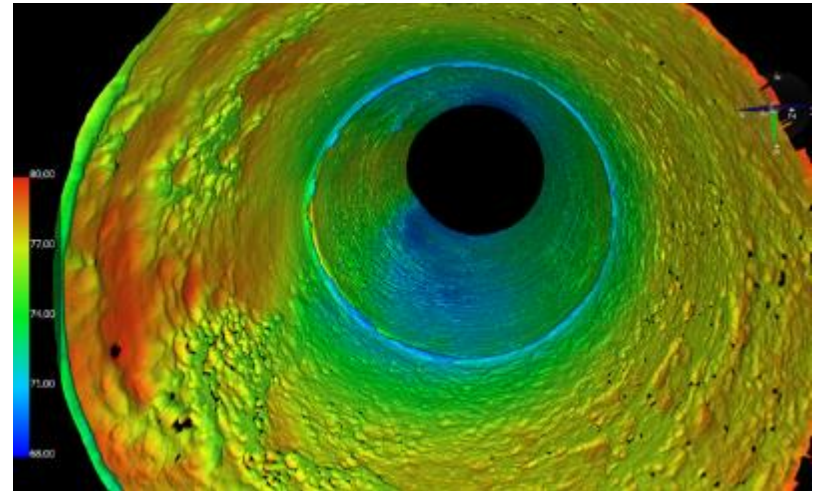
Scientific collaborators: 12

Master and Doctoral students: 35

Undergraduate student: 37

Focus:

- Instrumentation and Measurement Systems Development and Application,
- Systems for Inspection and Industrial Testing



Partnership:

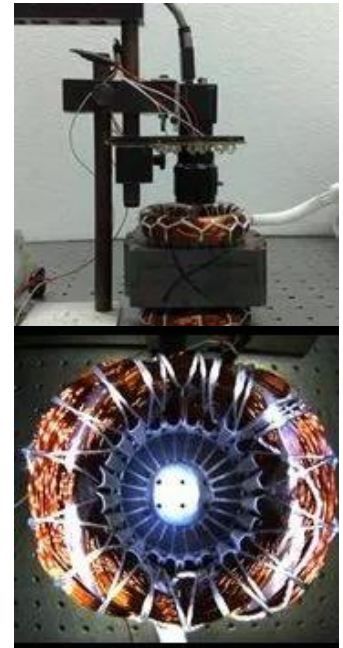
Rwth Aachen University, Stuttgart University, Basilicata University, UFRS, UFU, Photonita, EngeMovi

Contractors:

Petrobras, Embraco, CELESC.

Research areas:

- Hermetic Compressor Testing
- Inspection of Composite Materials
- Residual Stress Measurement
- Pipeline Testing and Inspection
- Artificial Intelligence Applied to Industrial Testing
- Underwater Measurement and Inspection
- Optical Fiber Sensors
- Laser and Other Optical Methods.



Members:

Primary Faculty:

Prof. Alexandre K. da Silva

Prof. Júlio Passos

Prof.^a Marcia Mantelli

Prof. Sergio Colle

Collaborating Faculty: 5

Research fellow: 10

Graduate students: 36

Undergraduate student: 33

Technical staff: 6

Collaborating Institutions:

TUE (The Netherlands)

Clemson University (USA)

IKE (Germany)

INETI (Portugal)

NASA (USA)

PUC (Chile)

Diego Portales University (Chile)

Laval University (Canada)

UT-Austin (USA)

Bermago University (Italy)

Funding Agencies:

FINEP, Petrobras, AEB, Embraer, Tractebel, INPE/
CPTEC, CHESF, CEMIG, COPEL, CTEEP, CNPq,
CAPES, VOLVO, and others .



Infrastructure:

Over 3.000 m² of dedicated space

Numerous commercial packages

BSRN / WMO surface station

Dedicated machine shop

HT vacuum oven

IR, high-speed cameras

Leak detection system

Solar radiometers calibration facilities

General Research Focus:

Fundamental and applied thermal-fluids related research.

Specific research areas:

- Solar radiation mapping
- Solar heating/cooling
- Concentrated solar power
- Thermosyphon technology
- Heat pipe technology
- Thermo-physics
- Micro heat transfer
- Phase change processes
- Heat Exchangers
- Supercritical fluids
- Bioinspired systems



Medição da radiação solar na estação
BSRN – FLO / WMO - NOAA

Faculty: 5

Staff: 2

Post-docs and researchers: 5

Master and Doctoral students: 25

Undergraduate student: 12

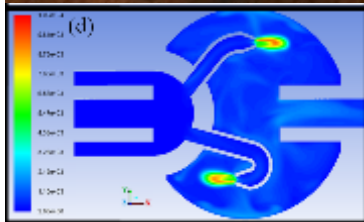
Cooperation: PUC-Rio, UNICAMP, UFRGS, IST-Lisbon (Portugal), C3-NUI Galway (Ireland), IVG-Uni Duisburg-Essen (Germany), IFF-KIT (Germany), UFSM (Chile)

Support: CAPES, CNPq, Petrobrás, FCA, BMW and others.

Focus: Theory, techniques, devices, and equipments for energy conversion with emphasis on (1) combustion, thermochemical and electrochemical conversion, (2) generation and co-generation, (3) biofuels, (4) heat transfer and energy efficiency.

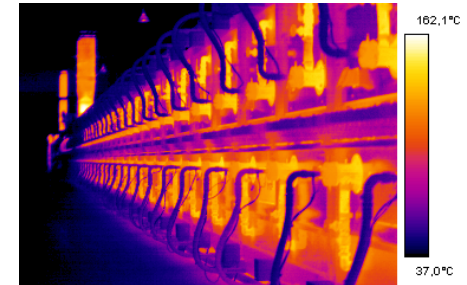
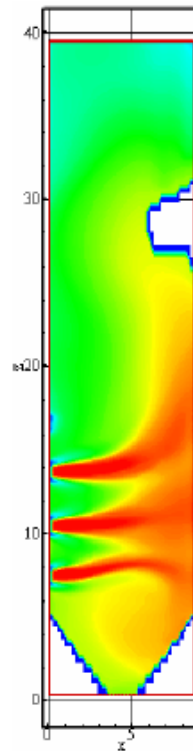
Research areas:

- Chemical kinetics of combustion
- Hydrogen and fuel cells
- Steam generation
- Conversion and rational use of energy
- Industrial ovens and kilns
- Transport and reaction in porous media (porous burners and catalysis)
- Loop heat pipes and capillary pumped loops



Contact:
<http://www.labcet.ufsc.br/>
amir.oliveira@ufsc.br

+55-48-3721-9390



Primary Faculty:
Prof. Amir A. M. Oliveira
Prof. Edson Bazzo
Prof. Vicente P. Nicolau



People:

Faculty staff: 3

Scientific collaborators: 5

Master and Doctoral students: 11

Undergraduate student: 9

12 Doctoral theses concluded

45 Master's theses concluded

Cooperation:

FLUMES/LiU (Sweden)

DAS/UFSC

NEDIP/EMC/UFSC

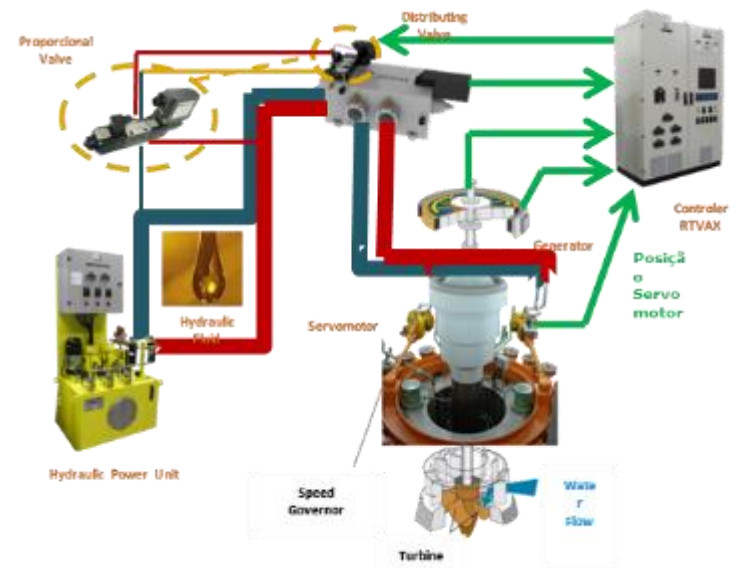
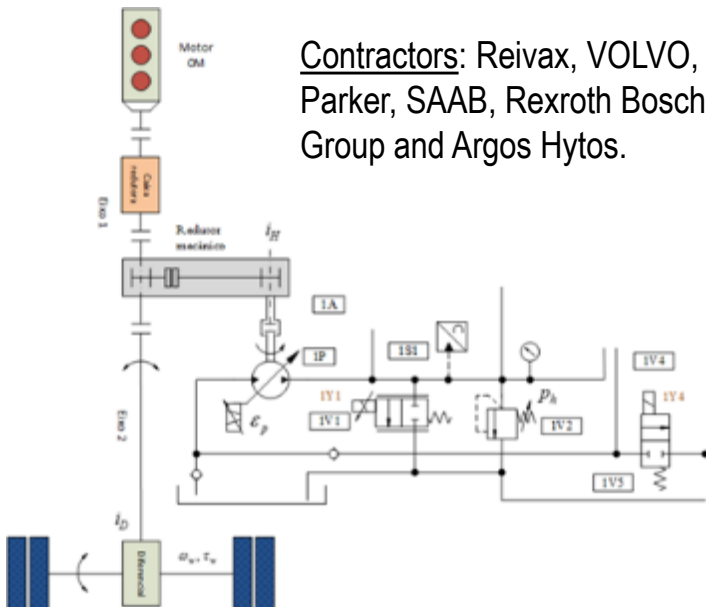
Contractors: Reivax, VOLVO, Parker, SAAB, Rexroth Bosch Group and Argos Hytos.

Focus:

Hydraulics and pneumatics in the automation and control scenario

Research areas:

1. Analysis and design of hydraulic and pneumatic systems and components.
2. Methods for development of mechatronic systems with H&P.
3. Computational systems to support the design of hydraulic systems and components.



Contact:
 Prof. Victor J. De Negri
victor.de.negri@ufsc.br
www.laship.ufsc.br

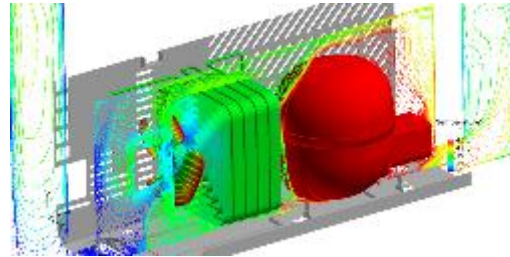
Faculty staff: 5
Research fellow: 5
Master and Doctoral students: 41
Undergraduate students: 44

Partnership:

Embraco, Whirlpool, Petrobrás, Embraer,
Panasonic, Danfoss, Bundy, Komeco,
Electrolux, Esmaltec, Metalfrio, Fanem, BSH,
Marcegaglia and others.

Focus:

Compressors & Cooling Systems



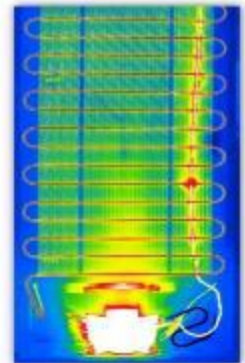
Research areas:

- Expansion devices
- Household compressors
- Frost formation
- Heat exchangers
- Electric motor cooling
- Magnetic cooling
- Refrigeration controls
- Commercial compressors
- Compact systems
- CO₂ systems
- Axial and radial fans
- Thermal management of compressors
- Thermodynamics of compressors
- Thermodynamics of mixtures
- Multiphase flows
- Thermophysical properties



Primary Faculty:

Prof. Claudio Melo
 Prof. Alvaro T. Prata
 Prof. César J. Deschamps
 Prof. Jader R. Barbosa
 Prof. Christian J. L. Hermes



Contact:

melo@polo.ufsc.br
www.polo.ufsc.br

Team:

- ✓ Faculty members: 3
- ✓ External scientific collaborators: 3
- ✓ Researchers (under contract): 5
- ✓ Master and Doctoral students: 8

Partnership:

- ✓ Petrobras;
- ✓ University of Texas at Austin;
- ✓ University of Padova;
- ✓ PRH-ANP/MCTI & PFRH;
- ✓ ESSS - Engineering Simulation And Scientific Software.

Focus:

Development of numerical tools for the solution (via simulation) of engineering problems involving fluid dynamics and heat transfer for the Navier-Stokes and Darcy's equation.

Contact:

maliska@sinmec.ufsc.br
www.sinmec.ufsc.br

Primary Faculty:
Prof. Clovis R. Maliska
Prof. A. Fabio C. Silva

Research areas:

Petroleum reservoirs simulation...

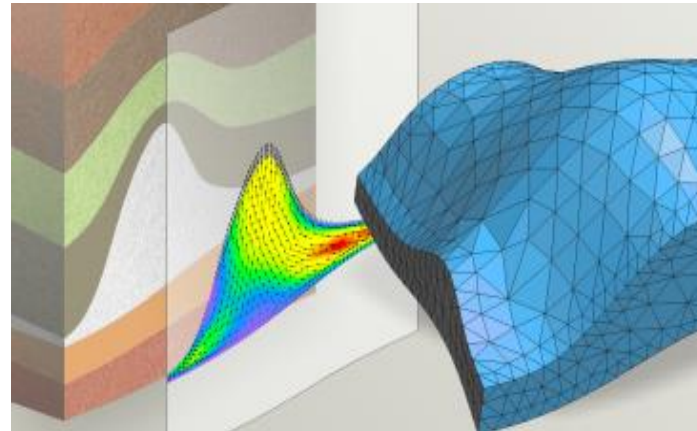
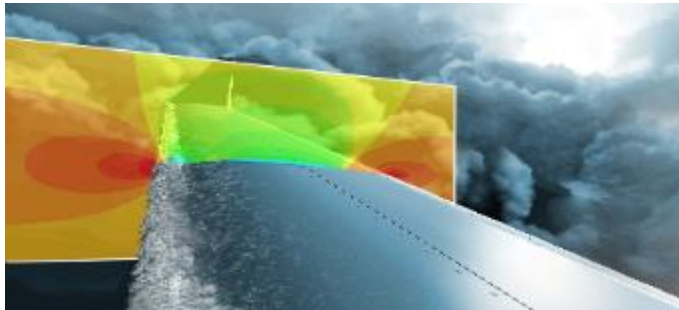
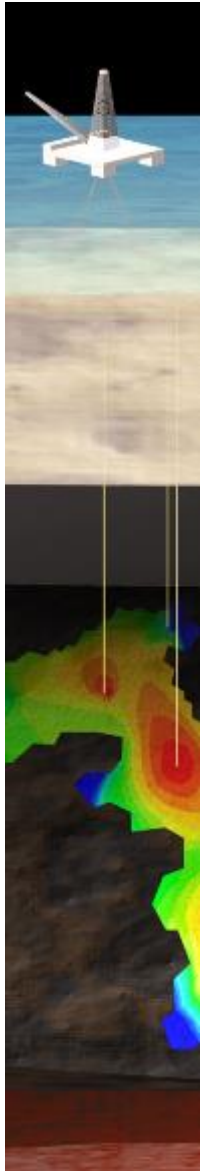
Multiphase flows...

Geomechanics...

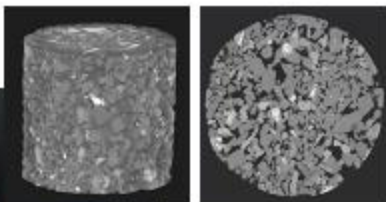
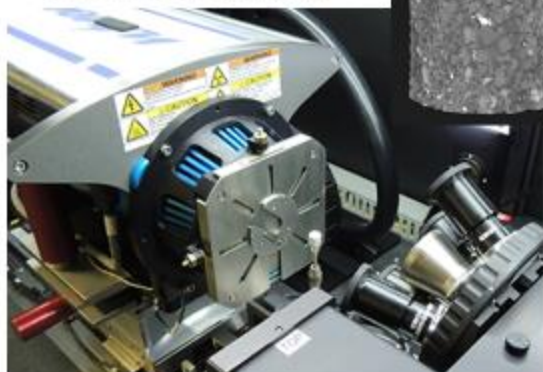
Aerodynamics...

Development of tools for CFD applications...

Among others.



X Ray Nano and Micro-Tomography



Laser Ablation

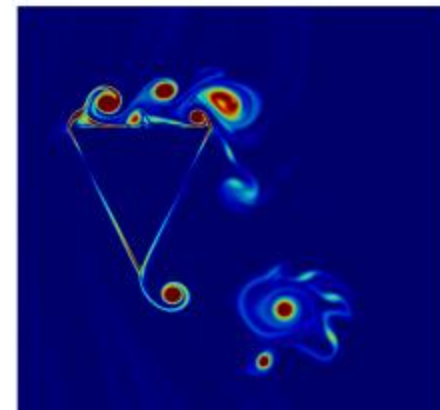


Surface Physics



Goniometer

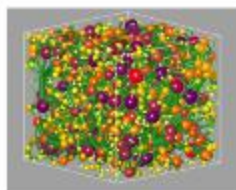
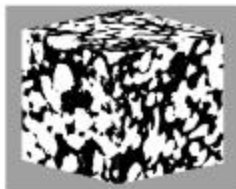
Lattice Boltzmann simulation of fluid dynamics



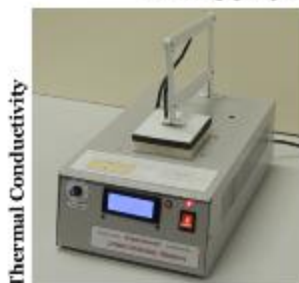
Research on porous media properties Numerical Simulations



Mercury Intrusion Porosimetry



Development of Thermal Transducers Research on Thermal Comfort Energy Efficiency of Buildings



Thermal Conductivity



Heat Fluxmeter

Contractors:
CENPES
PETROBRAS
ELETROBRAS
CAPES
CNPq

Scientific Collaboration:

University of Edinburgh-UK
Heriot-Watt University-UK
Teesside University-UK
Université de Lille-FR
Université d'Aix-Marseille-FR
IMFT de Toulouse-FR
University of Jyväskylä-FI
LBL, Berkeley/CA-USA
ITMO University/St. Petersburg-RUS
University of Cape Town-South Africa
GFNA/UEL-BR
IAMIR/UFPR-BR
Instituto de Geociências/UNICAMP-BR
INT/RJ-BR
Laboratório de Petrofísica/UFMG-BR
Laboratório de Sistemas Térmicos/PUC PR-BR
Laboratório de Mecânica dos Fluidos/UFU-BR
Depto. de Engenharia de Petróleo/UEDESC-BR

Contacts:

Prof. Celso Peres Fernandes - Prof. J.A.Bellini da Cunha Neto - Prof. Paulo Cesar Philippi - Prof. Saulo Güths
celso@lmpt.ufsc.br bellini@lmpt.ufsc.br philippi@lmpt.ufsc.br saulo@lmpt.ufsc.br

www.lmpt.ufsc.br

Faculty staff: 3

Research fellow: 2

Scientific collaborators: 1

Undergraduate student: 4

Partnership:

Université Laval – Québec

Cethil - INSA de Lyon - France

Contractors: SCGás, Casan,

Metalúrgica Souza, Cerâmica

Guarani, Metalúrgica Krueger, CCS

Plásticos, ITC exaustores, Plasson,

WEG, Whirlpool.

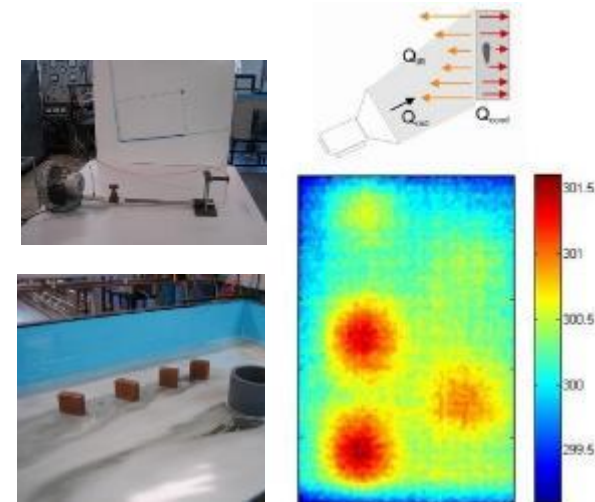
Focus:

Didactic laboratory - graduate and undergraduate teaching and equipment development.

Performance test and measurements.

Research areas:

- Development of didactic equipment;
- Radiative properties measurement;
- Nondestructive test methods using thermography.



Contact:

Prof. Vicente de Paulo Nicolau

vicente.nicolau@ufsc.br

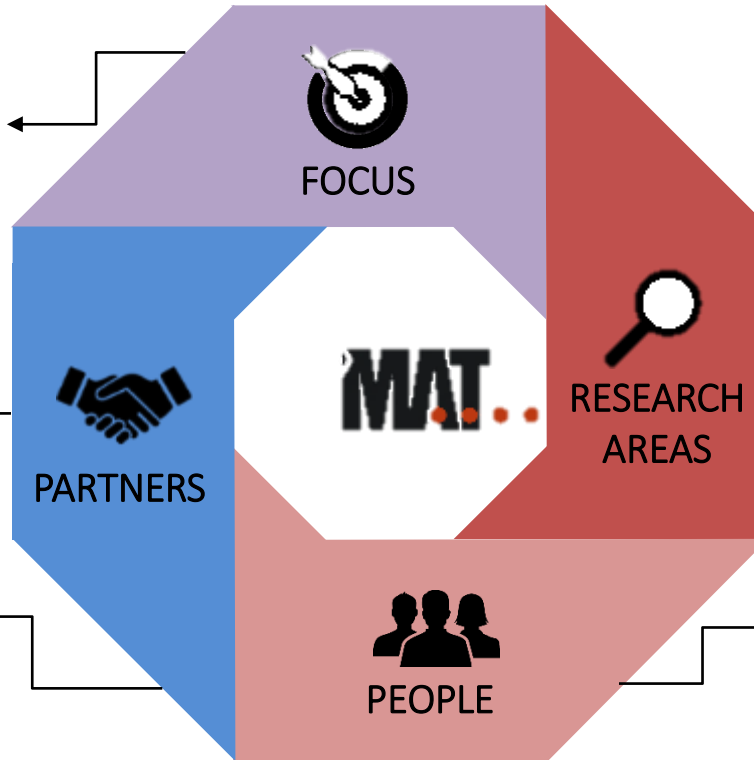
www.labtermo.ufsc.br

MAT... Materials Laboratory

Research on topics related to development of materials and processes for special applications

Institutional
Embraco, BNDES,
Capes, CNPq, Finep

Universities
UFRN, UFU, UFPR,
Bremen, Bayreuth,
Hamburg University
of Technology



Powder Metallurgy
Nanomaterials
Corrosion
Tribology
Plasma
Polymers
Management

Faculty staff: 7
Research fellow: 3
Master and Doctoral students: 24
Undergraduate student: 35



 Prof. Aloisio Nelmo Klein

 a.n.klein@ufsc.br

 www.labmat.ufsc.br

Faculty staff: 3

Staff:1

Scientific collaborators: 3

Master and Doctoral students: 15

Undergraduate student: 18

Partnership:

Rwth Aachen University, FMC Technologies, Durum Verschleißschutz GmbH, SPS, IMC Soldagem, COPPE/POLI/CT/UFRJ

Contractors: Petrobras, Tractebel Energia, Embraco, WEG.

Focus:

Welding Processes and Automation, Procedures, Equipment and Instrumentation



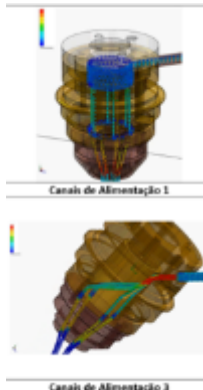
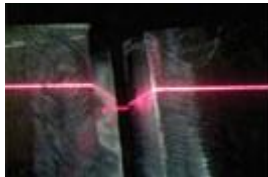
Primary Faculty:
Prof. Regis Silva
Prof. Mateus B. Schwedersky

Contact:

regis.silva@ufsc.br
www.labsolda.ufsc.br

Research areas:

- Welding Processes (Arc, LASER, Hybrid)
- Cladding via Welding Processes
- Orbital Welding
- Power sources and Instrumentation design
- (hardware and software)
- Robotics and Automation (sensors, mechatronics)
- Special Torches and Auxiliary Devices.



Faculty staff: 2

Scientific collaborators: 3

Master and Doctoral students: 2

Undergraduate student: 4

Focus:

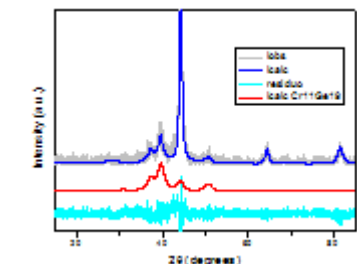
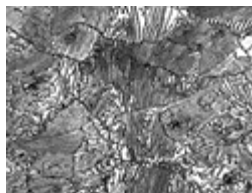
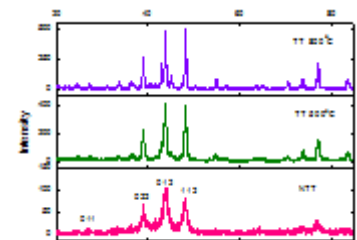
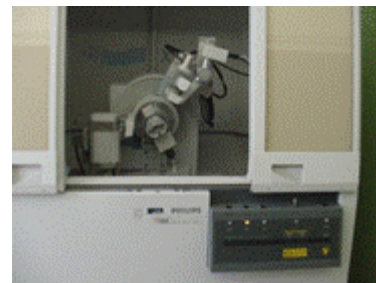
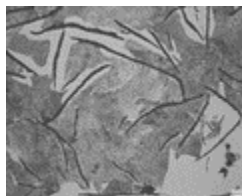
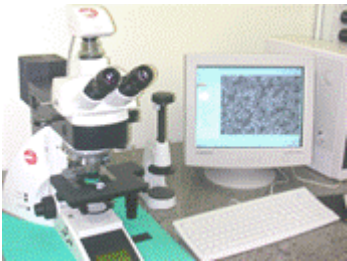
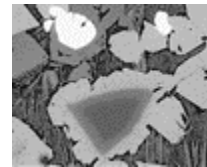
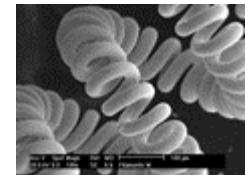
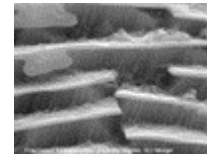
Microstructure and structure characterization of materials.

Characterization techniques:

- X-ray diffraction
- Optical microscopy/Metallography
- Scanning Electron Microscopy

Partnership:

UFPR/UFTPR /IFSC



Contact:

Profª. Ana Maria Maliska

a.maliska@ufsc.br

Staff:

Faculty staff: 2

Scientific collaborators: 4

Master and Doctoral students: 10

Undergraduate student: 8

Partnership:

Additive Manufacturing Network - Br
IFSC, SENAI

UMinho-Portugal and others.

Contractors: FIAT, Embraer, Alkimat,
Nanoendoluminal, Mormaii and others.

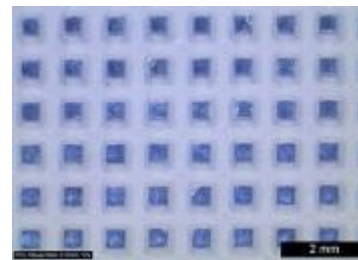
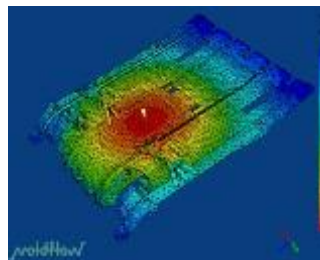
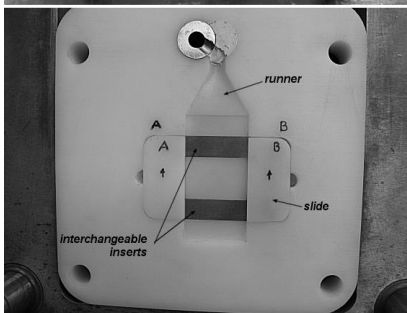
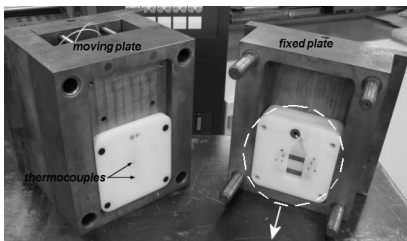
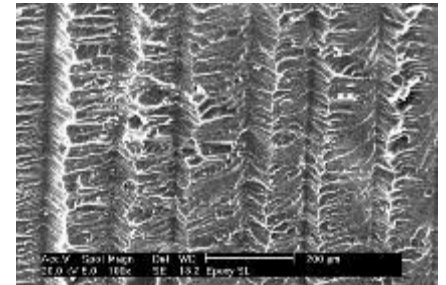
Focus:

Research on topics related to additive manufacturing and molding of plastics focusing on understanding the relations between process parameters, microstructure and properties.



Research areas:

- Additive Manufacturing (SLS/SLM, SLA, FDM and others)
 - Materials (polymers, metals)
 - Building parameters
 - Fields of application
- Molding of plastics
 - CAE/CAD/CAM
 - Injection molding
 - Extrusion molding
 - Th...



Contacts:

Prof. Carlos H. Ahrens / Prof. Gean V. Salmoria
carlos.ahrens@ufsc.br gean.salmoria@ufsc.br

Faculty staff: 2

Research fellow: 2

Scientific collaborators: 8

Master and Doctoral students: 11

Undergraduate students: 6

Partnership:

- University of Modena and Reggio Emilia (Modena/Italy)
- Institute of Ceramic and Glass (Madrid/Spain)
- UNESCO, UNIVILLE, UNAERP, UNIFESP (Brazil)

Research contractors: CAPES, CNPq, FAPESC.

Focus:

Research on topics related to ceramic e vitreous materials: glass and glass-ceramics, porous ceramics, glazes, traditional ceramics, colloidal processing, recycling of industrial solid wastes.



Research areas:

- Sintered glass-ceramics with different CTE for different applications (e.g. fuel cells, selling, biomaterials)
- Materials with controlled porosity for thermal insulation systems
- Materials for catalyst supports
- Materials for radiant porous burners
- Recycling of industrial waste (glass e ceramics) and synthesis of nanomaterials
- Glazes for especial applications

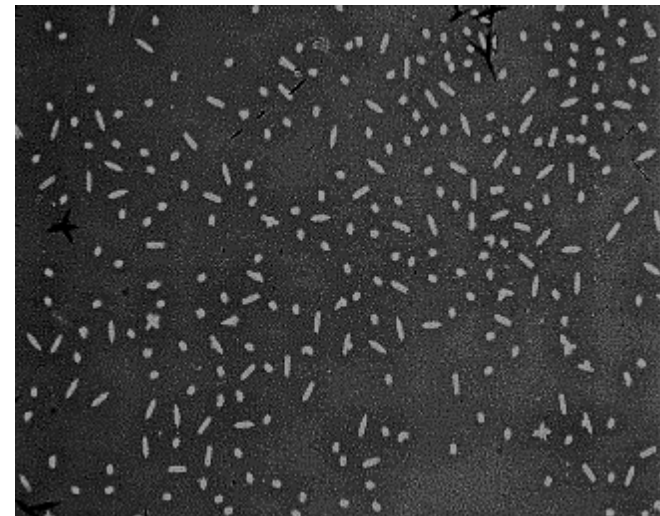


Contact:

Prof. Antonio Pedro N. Oliveira

antonio.pedro@ufsc.br

www.vitrocer.ufsc.br





Mechanical Forming Laboratory

People:

Faculty staff: 1

Master's theses concluded: 28

Doctoral theses concluded: 6

Master students: 7

Doctoral students: 5

Undergraduate students: 3

Partnership:

Marinha do Brasil

Tractebel Energia

Contacts:

Prof. Carlos A. S. Oliveira

carlos.a@ufsc.br

www.labconf.ufsc.br

Focus:

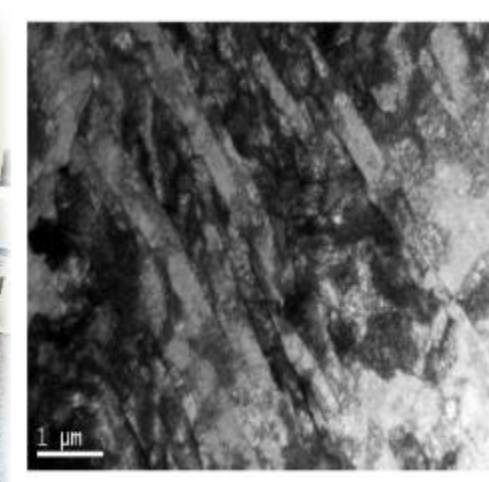
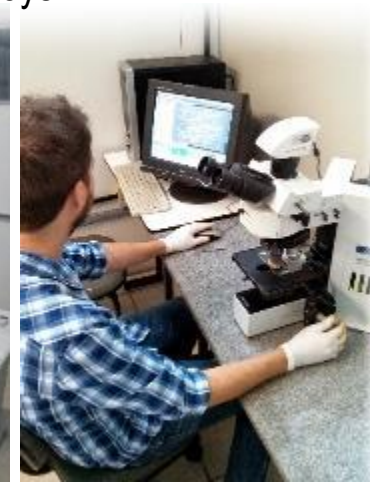
Study the properties and performance of metallic materials, with emphasis on mechanical forming and heat treatment.

Establish correlations between processing, microstructure and behaviour of materials.

Research areas:

- Transformation Metallurgy: mechanical forming; heat, mechanical and chemical treatment
- Physical Metallurgy: phase transformations and mechanical properties of metals and alloys

- Wear assessment of metal forming tools and performance improvements
- Effect of chemical composition on Austenitization and recrystallization of dual-phase steels
- Maraging 350: Microstructure, phase transformations and forming
- Effect of chemical composition and Austempering temperature on microstructural characteristics of Carbide-free bainitic steels



GRANTE Mechanical Analysis and Design

Human resources

- ✓ Faculty staff: 5
- ✓ Scientific collaborators 2
- ✓ Master and doctoral students: 14
- ✓ Undergraduate students: 7

Expertise Area

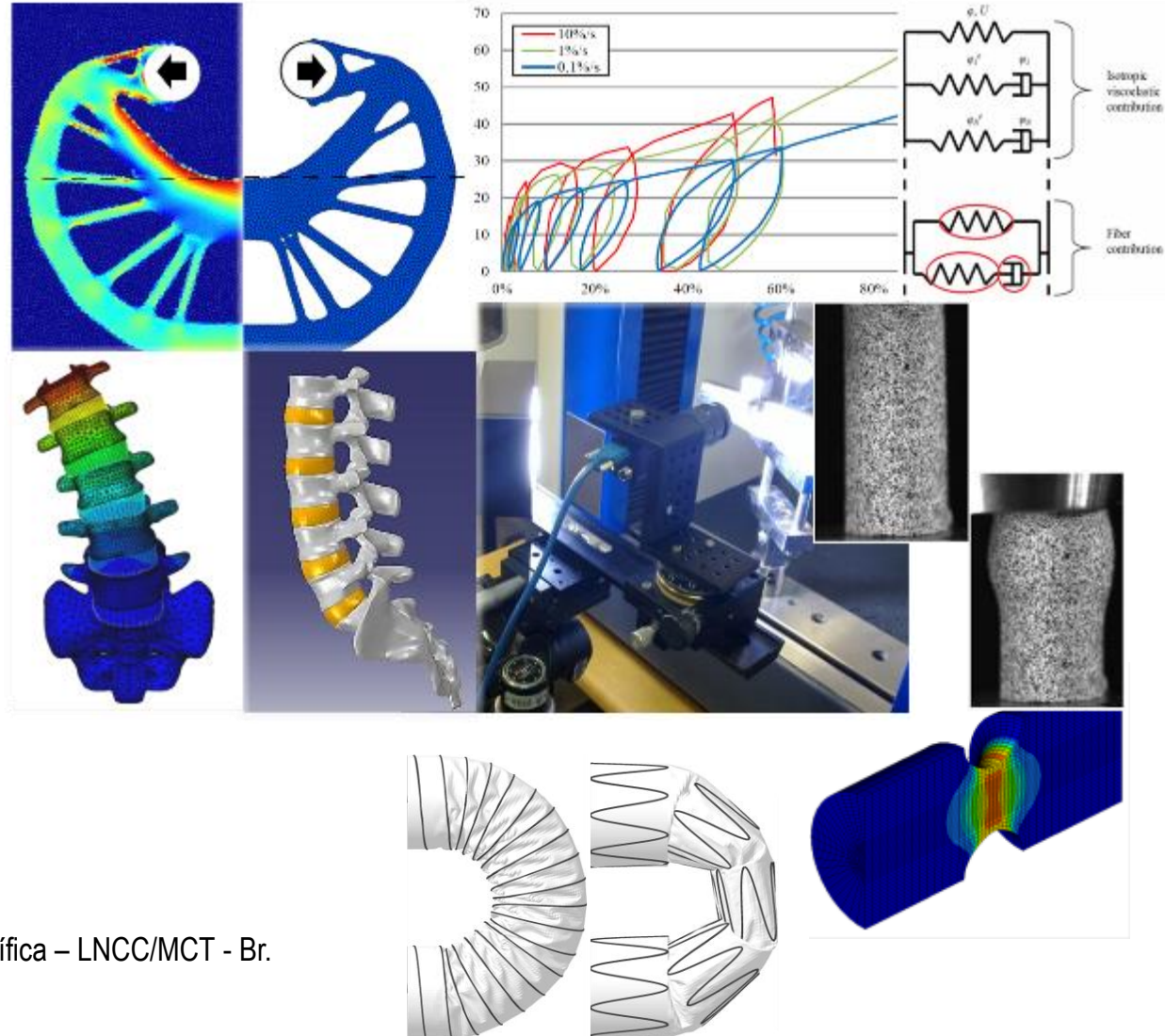
- ✓ Modeling, Testing and Numerical Simulation in Mechanics of Solids and Structures

Research subjects

- ✓ Constitutive Modeling and Testing of Polymers and Soft Tissues
- ✓ Fatigue testing and modeling
- ✓ Extended Finite Elements
- ✓ Topology Design Optimization
- ✓ Vehicle Dynamics
- ✓ Biomechanics and medical implants (LEBm)

Collaboration Network

- ✓ École Centrale de Nantes – Fr
- ✓ Swansea University – Uk
- ✓ Laboratório Nacional de Computação Científica – LNCC/MCT - Br.



Contact: Prof. Eduardo A. Fancello
eduardo.fancello@ufc.br



Biomechanical Engineering Laboratory

Faculty staff: 5

Staff:5

Scientific collaborators: 7

Master and Doctoral students: 13

Undergraduate student: 15

Partnership:

ANVISA - National Health Surveillance Agency , INT – National Technology Institute, INTO- National Traumatology and Orthopedic Institute

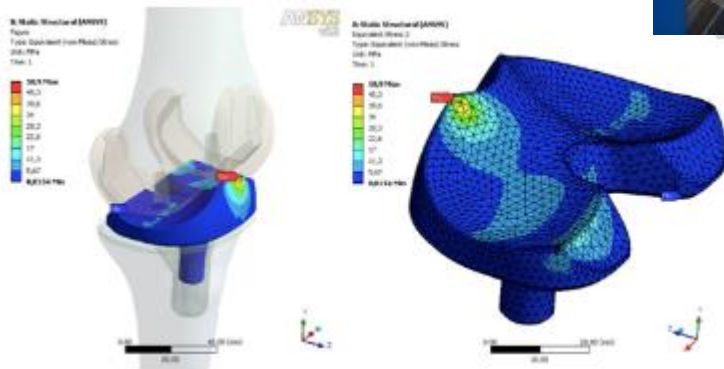
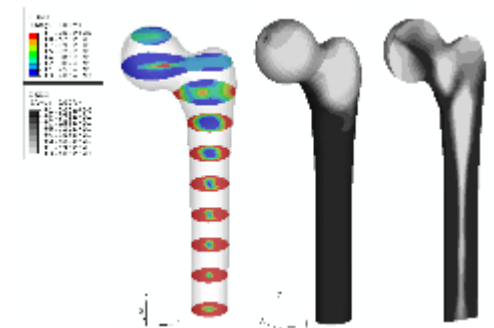
Contractors: MDT Implants, Spine Implants and others.

Focus:

Research on topics related to design and validation of biomechanical performance of medical devices and biomaterials.

Research areas:

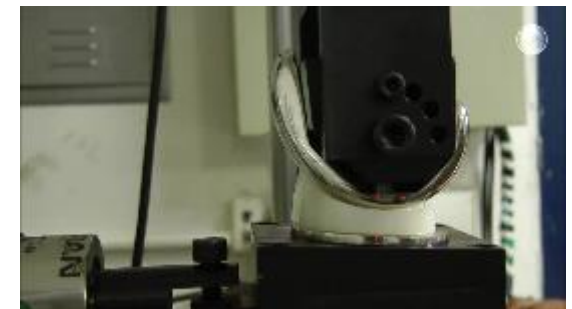
- Design of medical devices
- Modeling and Simulation of Bone-implant systems
- Testing methods development
- Surgical technique evaluation
- Failure analysis of *explantes*
- Fatigue and Wear of hip, knee and spine prostheses



Contact:

Prof. Carlos R. Roesler
r.roesler@ufsc.br

Prof. Eduardo Fancello
eduardo.fancello@ufsc.br



People:

Faculty staff: 4

Associate Professors : 5

Master and Doctoral students: 11

Undergraduate student: 3

32 Doctoral theses concluded

110 Master theses concluded

Cooperation:

LiU (Sweden)

Technische Hochschule

Ingolstadt (Germany)

LASHIP/EMC/UFSC

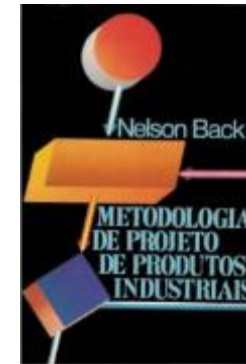
Focus:

Product Development

Research areas:

1. Methodology for product innovation
2. Expert systems to support the design
3. Methodology for reliability and maintainability systems
4. Prototype development of products and equipments

Books:



1983



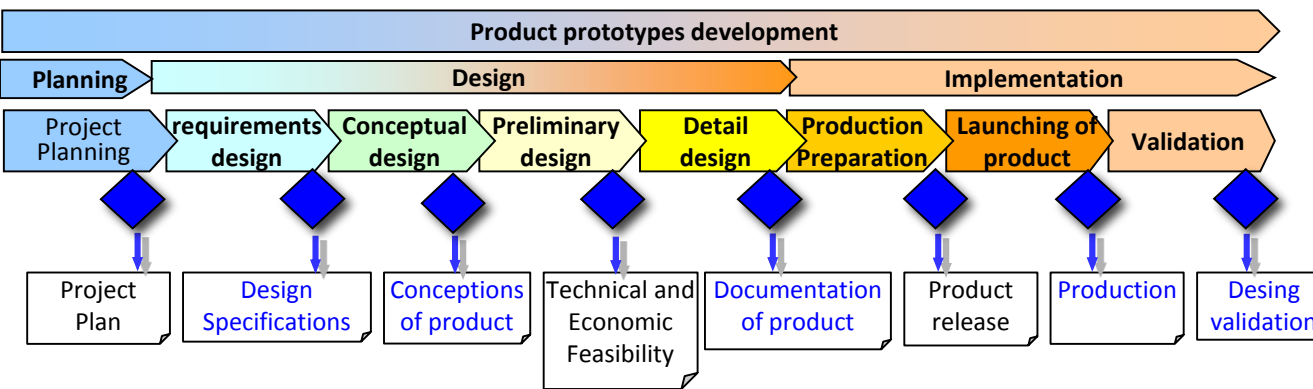
2008



2008



2011



Contact:

Prof. Acires Dias

acires.dias@ufsc.br

www.nedip.ufsc.br