SAPIENZA
UNIVERSITÀ DI ROMA

DIMA

DIPARTIMENTO DI INGEGNERIA MECCANICA E AEROSPAZIALE

MISSION

- Empower students to achieve their goals through the highest quality education and research
- Advance research and innovation technologies to tackle society challenges
- Contribute to the strategic goals of La Sapienza University as a prominent player for research and education in the national and international context

VISION

- Build a multi-disciplinary network sharing ideas and knowledge to look at excellence and innovation
- Promote and develop the major areas of scientific knowledge and competencies to foster international collaborations and partnerships along major strategic research lines
- Support our greatest asset: Students, Faculty and Staff to improve community cooperation

VALUES

- Autonomy
- Ambition
- Integrity
- Excellence
- Teamworking
- Transparency

STRATEGIC LINES

Computational Mechanics
Structural Dynamics
Energy
Green Engineering
Space Science
Space Propulsion
Aerospace Technologies
Advanced Composite structures
Additive Manufacturing
Automotive
Engineering for Cultural Heritage
Advanced Design & Production Processes
Engineering for Health

DIMA OVERVIEW

58 Faculty Members

36 Research Associate

22 Staff

3000+ Students

1 Main Site

3 Complementary Sites

12 Labs

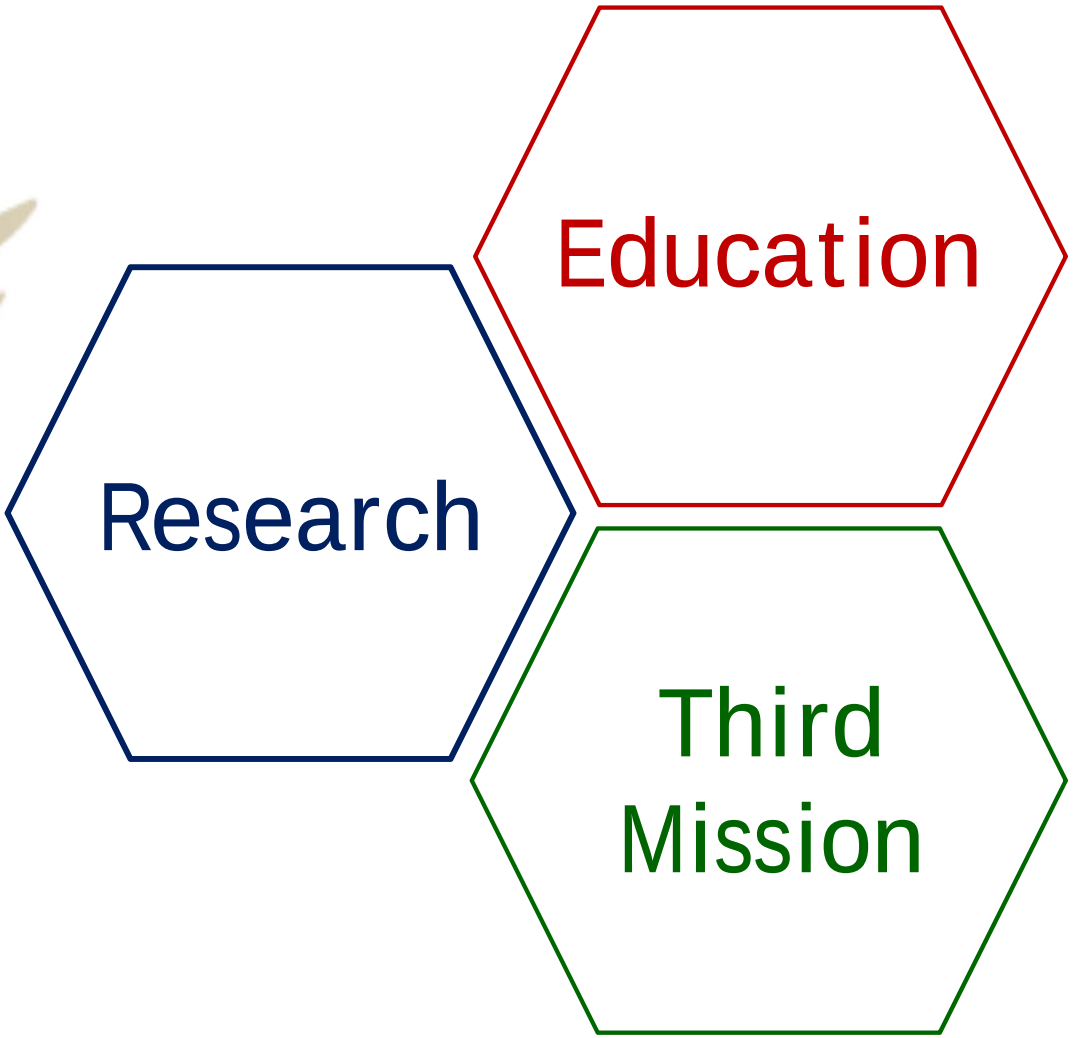
2 Bachelor Degrees

3 Master Degrees

3 PhD Programs

5 Professional Master Programs

OBJECTIVES



EDUCATION

ACADEMIC PARTNERSHIPS

BACHELOR AND MASTER OF SCIENCE

DIMA offers two Bachelor of Science and three Master of Science courses lasting three and two years respectively. Undergraduate application requires an admission test.

Bachelor of Science

- Aerospace Engineering
- Mechanical Engineering

Master of Science

- Aeronautical Engineering
- Space and Astronautical Engineering
- Mechanical Engineering

Ph.D.

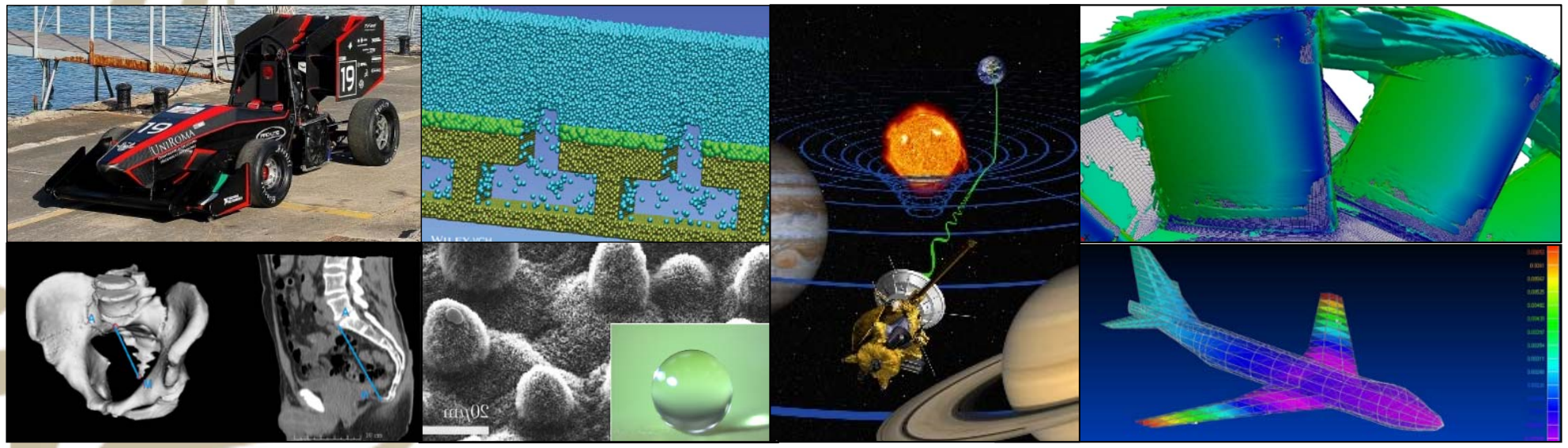
PhD programs aim at training the skills needed to carry out high quality research activities in the aerospace, industrial and mechanic field.

- Aeronautics and Space Engineering
- Theoretical and Applied Mechanics
- Industrial and Management Engineering

PROFESSIONAL MASTER PROGRAMS

These post-graduated programs last one years and admission requires MSc degree.

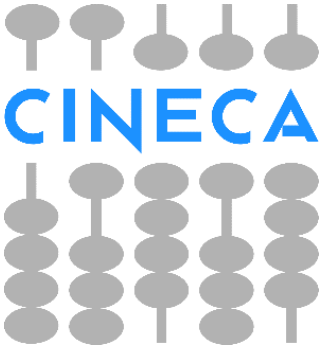
- Satellite Systems and Services
- Space Transportation Systems
- Civil Aviation Managment
- Energy Efficency and Renewable Energy Sources
- Inventive Engineering



RESEARCH

FUNDING AND GOVERNAMENTAL AGENCIES

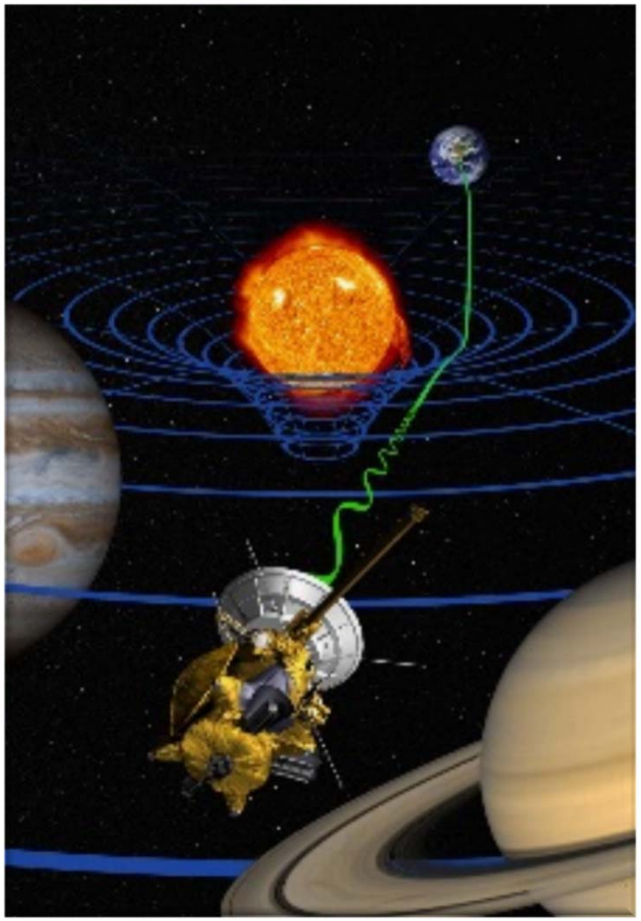
ENEA
ENTE PER LE NUOVE TECNOLOGIE, L'ENERGIA E L'AMBIENTE



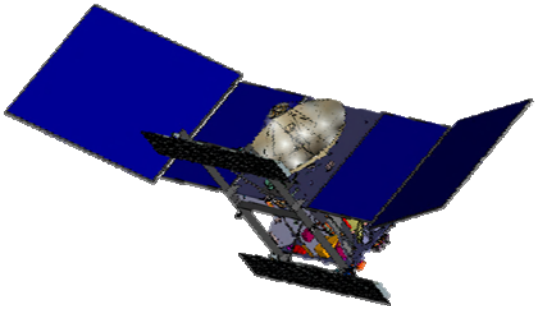
EUROPEAN DEFENCE AGENCY

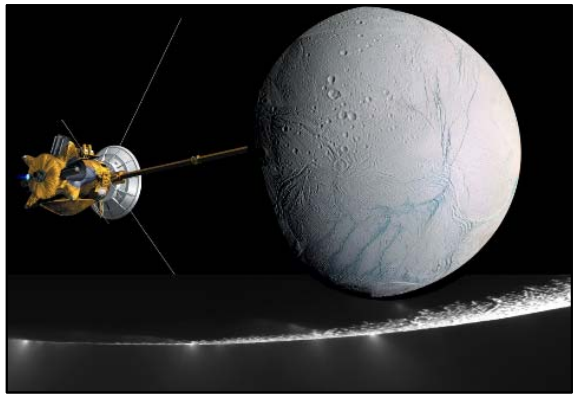
Coni

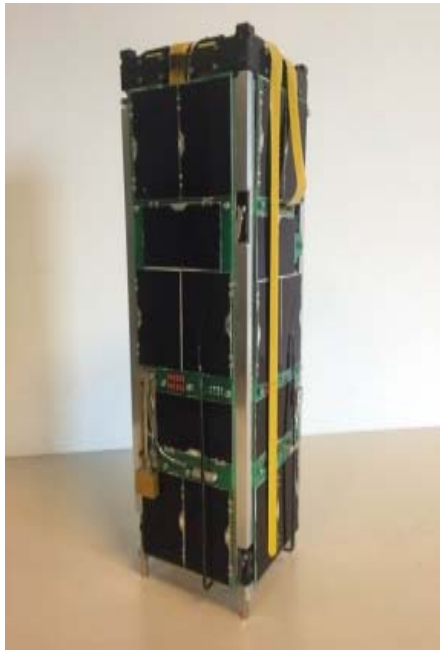
SPACE SCIENCE



Bertotti B., Iess L. and Tortora P., 'A test of general relativity using radio links with the Cassini spacecraft' *Nature*, 425, 374, (2003)

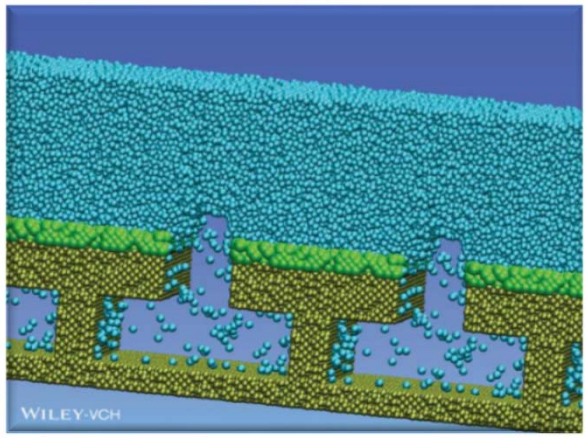


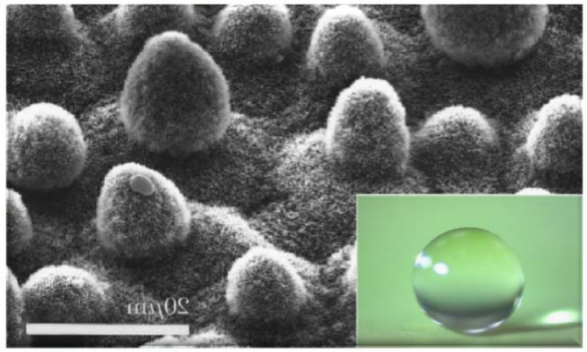


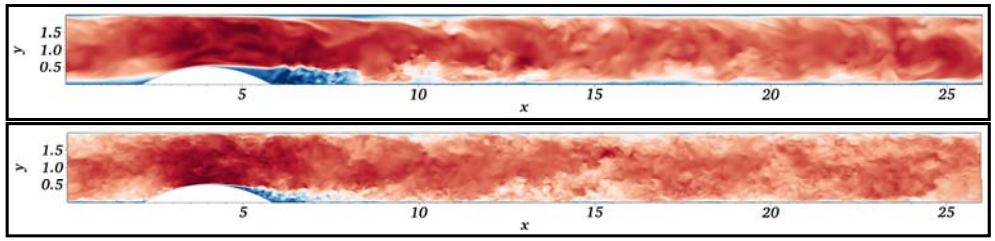


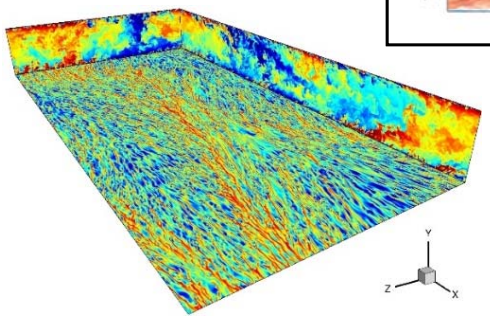
- Participation in deep space missions: Cassini (Saturn) – Juno (Jupiter) - BepiColombo (Mercury)
- Tests of relativistic gravity
- Determination of planetary mass distribution
- Space Surveillance and tracking
- Development of satellites systems

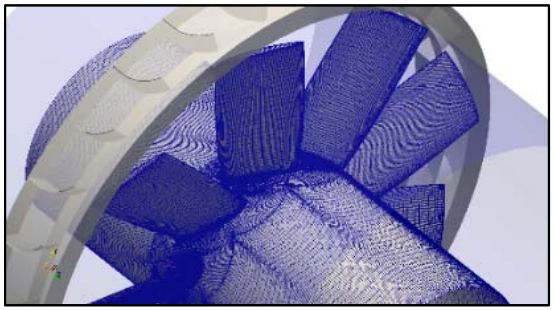
COMPUTATIONAL MECHANICS

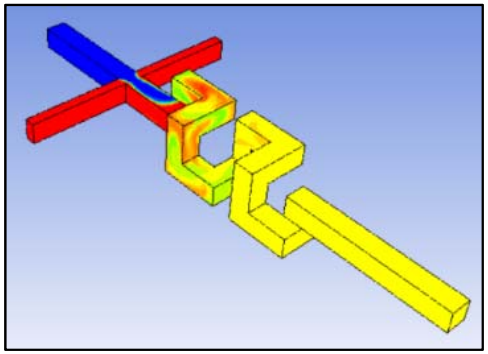












Amabili M., Giacomello A., Meloni S. and Casciola C.M. 'Unraveling the Salvinia paradox: design principles for submergedsuperhydrophobicity' *Advanced Materials Interfaces*, Vol. 2, (2015)

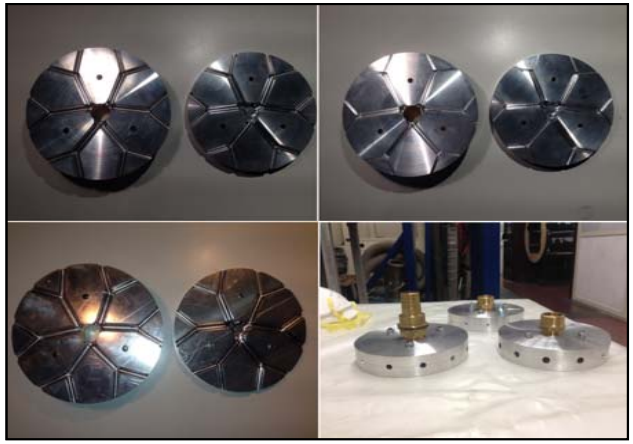
- Numerical simulations of nanoscale wetting and cavitation
- Cavitation at the mesoscale and multiphase flow physics
- Transport of bubbles and particles in turbulent flows
- Large scale DNS of high-Reynolds-number turbulent flows
- Supercritical Combustion in LRE Chambers

ENERGY AND TURBOMACHINERY

DMFC7. Test rig for a 1.5 kW Direct Methanol Fuel Cell system for 800 h of permanent degradation test

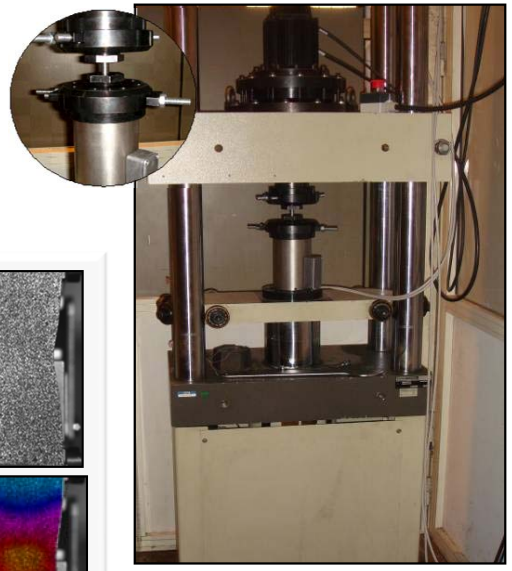
Wells Turbines for open sea applications

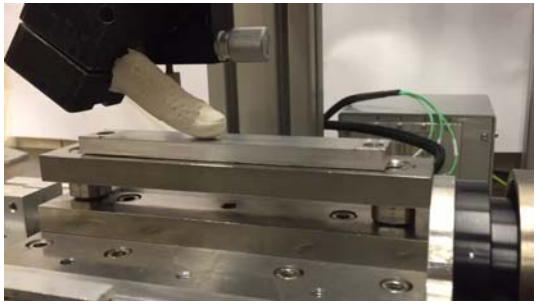
Vegetable oils fuelled common-rail engine installed at DIMA Lab

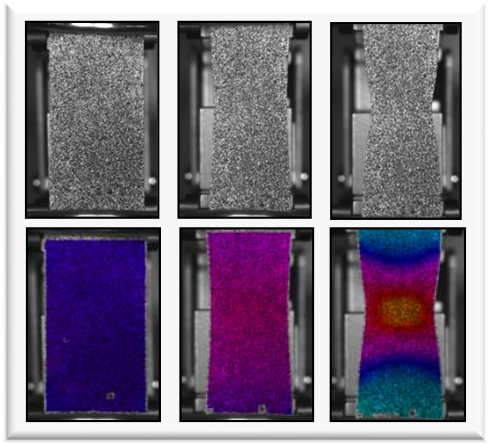


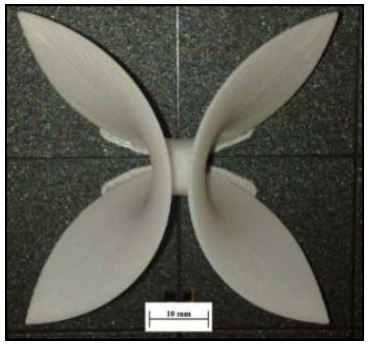
- Internal and film cooling in gas turbine blades
- Analysis of impact deposit and erosion in turbomachines
- Design of innovative fans and compressors
- Large unstructured data sets analysis and optimization
- Simulation and optimization of energy systems and micro grids
- Fuel cells and storage
- Biomasses and biofuels

MECHANICAL TECHNOLOGIES AND MANUFACTURING







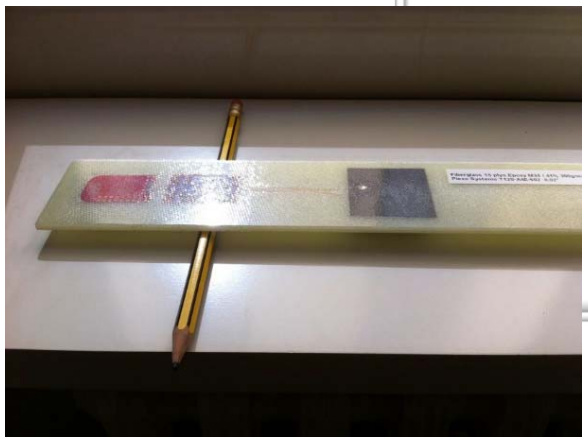


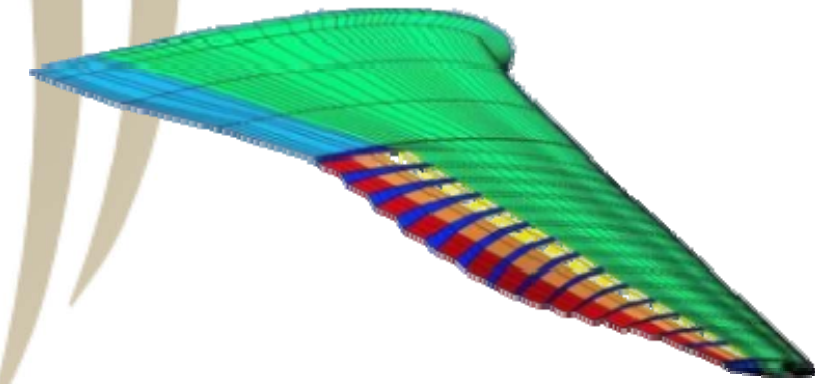
EOS M 290 for manufacturing of high-quality metal serial components

- Additive manufacturing
- Foam fabrication and powder characterization
- Laser processes of materials
- Advanced testing of materials
- Digital image correlation (DIC) measurements
- Design and topological optimization
- Virtual prototyping and process design
- Tactile perception experiments

ADVANCED MATERIALS AND STRUCTURES

Composite material component with embedded self-powered wireless sensor device for structural monitoring
Patent RM2013A000584
P. Gaudenzi L. Lampani





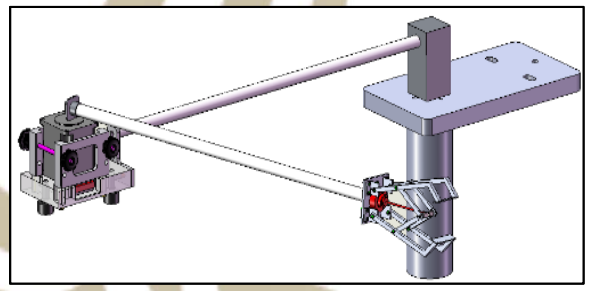
- Wireless smart composite structures
- Damage detection on sensorized composite structures
- Composite structures manufacturing lab
- Nonlinear aeroelastic modeling for flexible airfoils

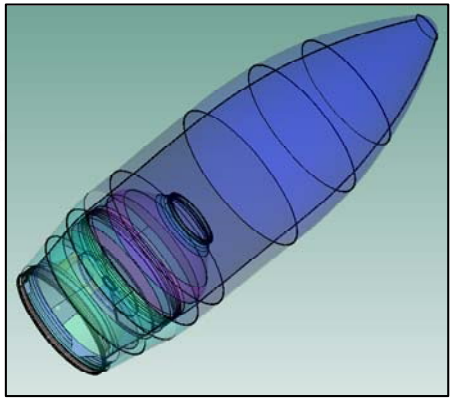
AUTOMOTIVE

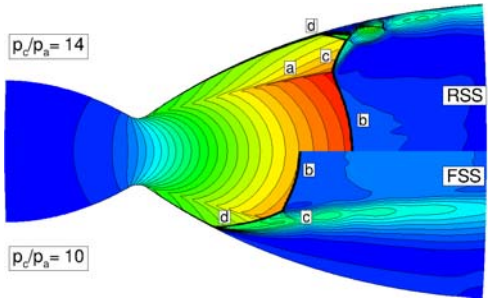
Coppo, F.; Pepe, G.; Roveri, N.; Carcaterra, A.
A Multisensing Setup for the Intelligent Tire Monitoring. *Sensors* 2017, 17, 576.

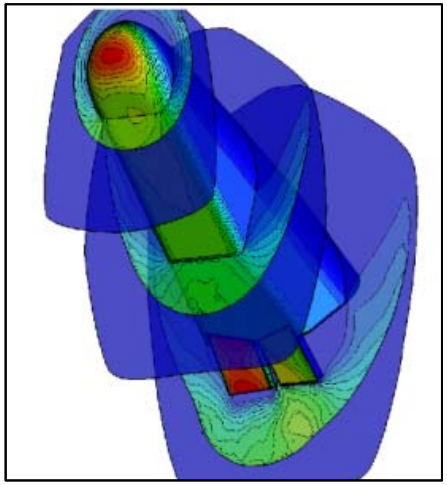
- Robust IP protection
- Vibration and acoustics prediction
- Smart suspension and tyre control
- Damping Control and Energy Harvesting
- Signal analysis on board
- Structural design of vehicle and its parts
- Analysis of aerodynamics and materials
- Vehicle dynamics
- Composite structure testing for racing car design
- Innovative drivetrain devising for racing car design

AEROSPACE TECHNOLOGIES





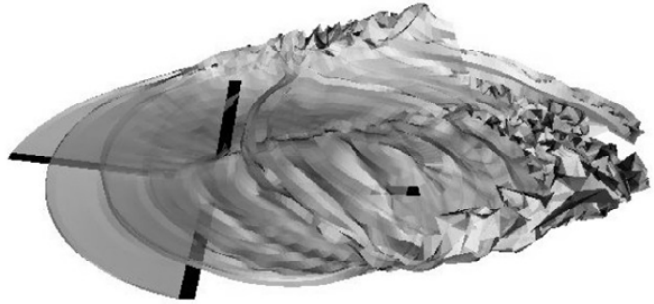


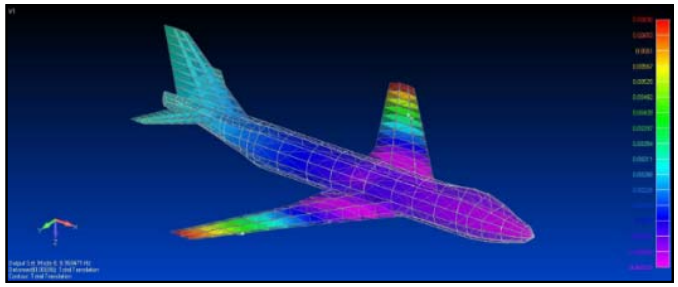


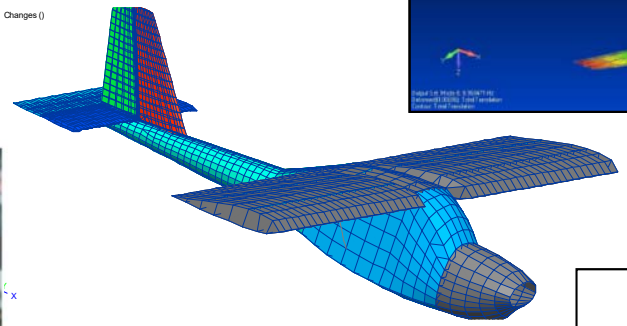
Vega space launcher

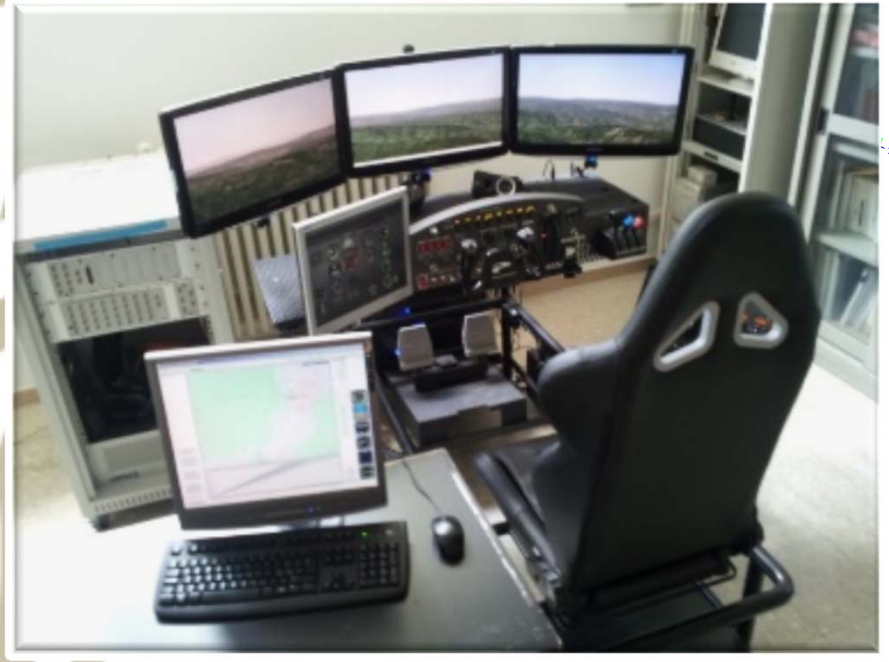
- Analysis of liquid and solid rocket engine performance
- Space launchers vibroacoustics (Vega)
- Wall heat flux estimation in thrust chambers
- Multibody dynamics for space applications
- Transonic nozzles and shock/turbulence interaction
- Numerical Simulations of Hybrid Rockets
- Nozzle design and operations
- Wall heat flux estimation in thrust chambers
- Combustion study with different approachess (Turbulent combustion closure – ignition transient in CC – supercritical combustion in LRE chambers…)

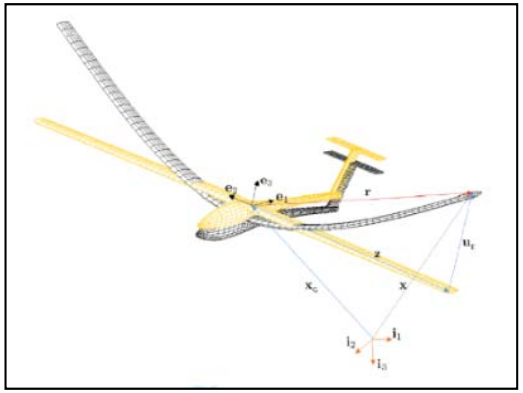
AERONAUTICS







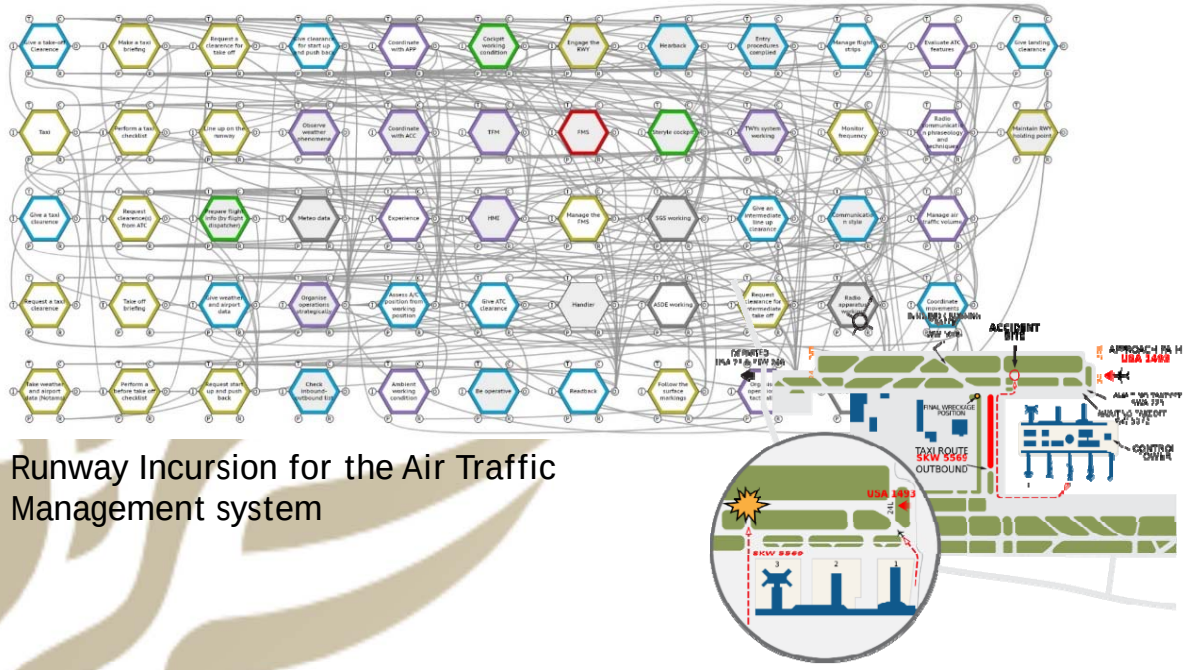




Facility for flight simulations (Flight Dynamics Lab)

- Small vehicle design and FCS developments
- Flight dynamics of flexible aircraft
- Aeroelastic modelling
- Blade vortex interaction noise control
- FE model structural updating

INDUSTRIAL MECHANICAL SYSTEMS ENG.



Runway Incursion for the Air Traffic Management system

Tele-Maintenance and predictive Safety Intelligent System

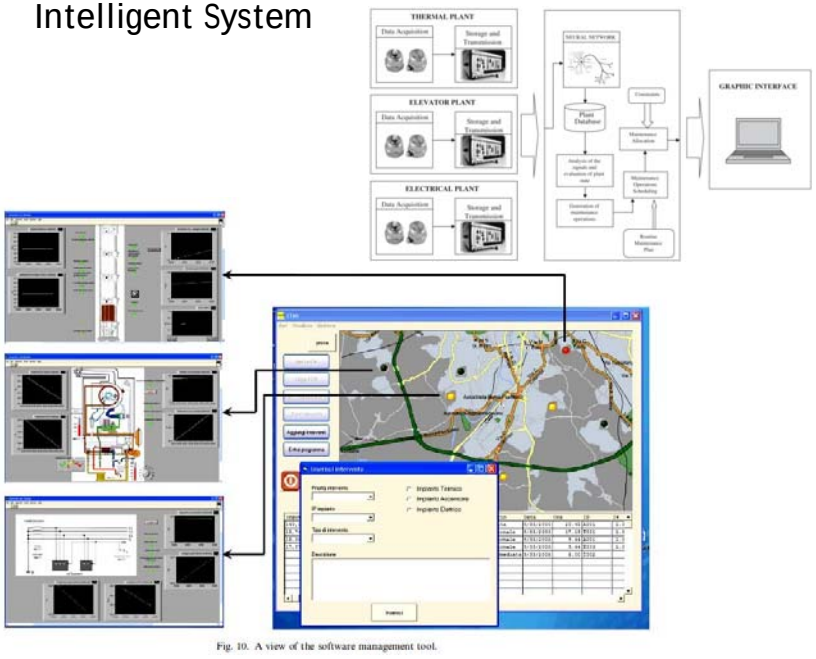
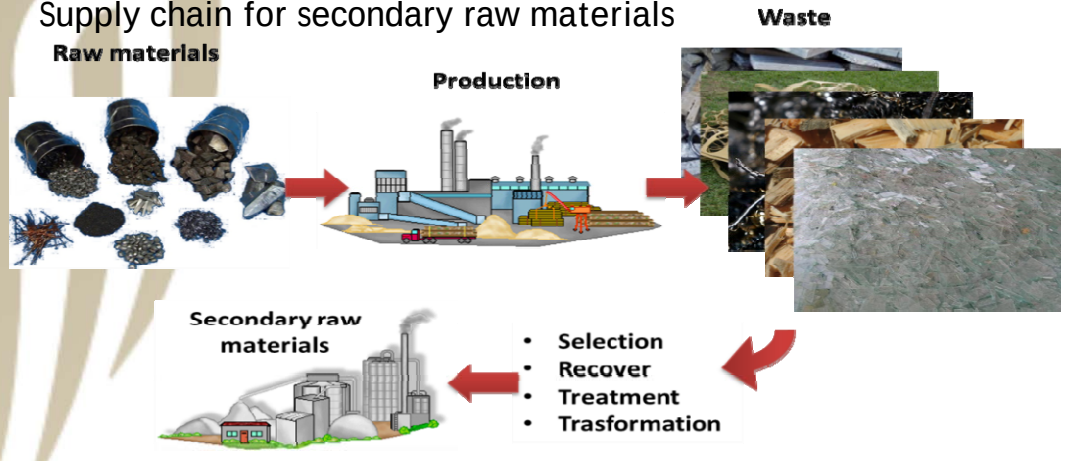


Fig. 10. A view of the software management tool.

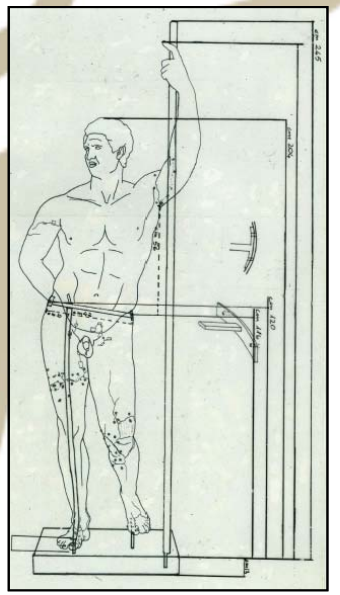
Supply chain for secondary raw materials

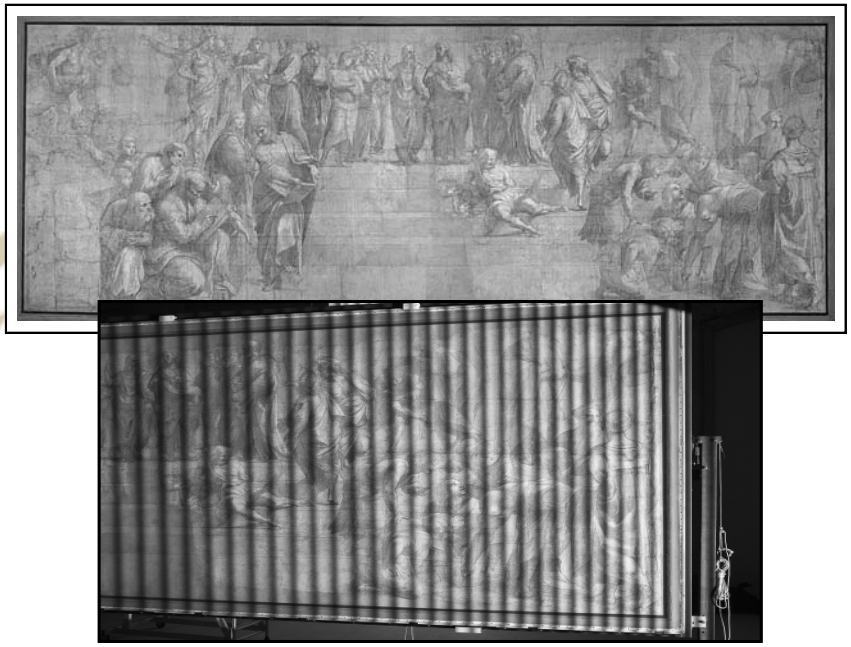


- Rating model for Health and Safety
- Spare parts management for complex systems
- Quality monitoring for airport ground handlers
- Industry 4.0
- Resilience Engineering for complex systems
- Supply Chain rating model

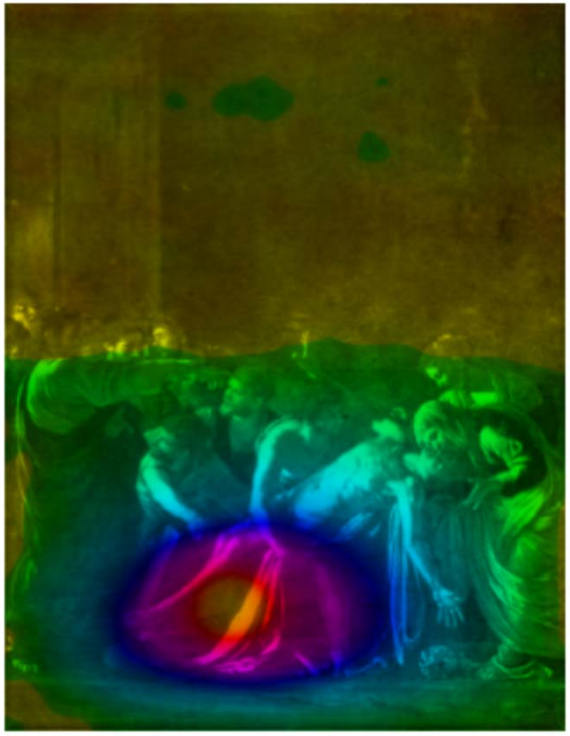
CULTURAL HERITAGE

"Il principe ellenistico"





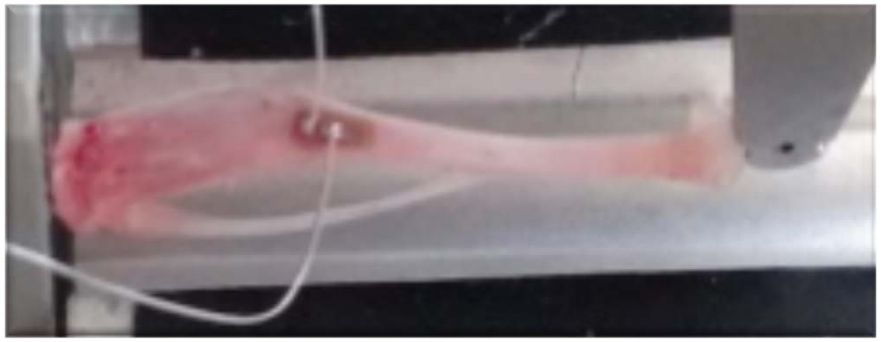
"Il Cartone per la scuola di Atene"
Raffaello



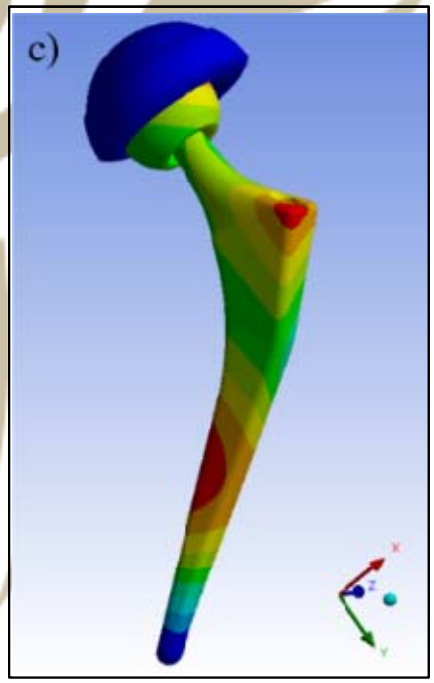
"La resurrezione di Lazzaro"
Caravaggio

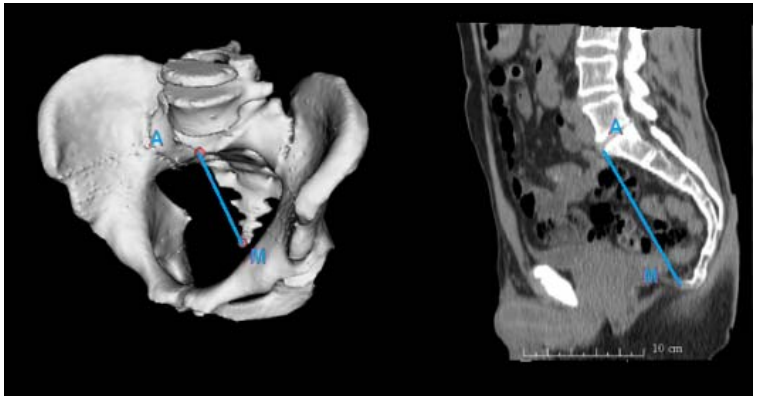
- Experimental-numerical techniques applied to the restoration of cultural heritage
  - Phase-shift measurment techiqnue
  - White light speckle DIC
- Reverse engineering + FE analysis

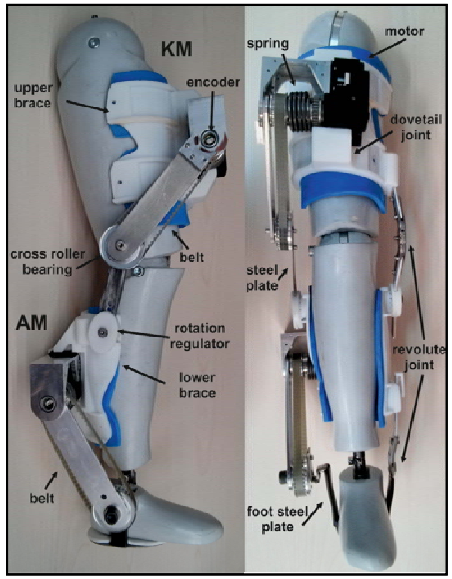
ENGINEERING FOR HEALTH



Characterization of mouse tibia mechanical properties through the Digital Image Correlation System







- Measurements for tissue egineering
- Motion Analysis
- Robot Mediated Therapy
- Medical Imaging
- Wearable monitoring systems for medical and sport applications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Smart Structures Solutions

SED

aiComply

CAESAR

Spin-off Companies promoted by DIMA members

THIRD MISSION

INDUSTRIAL PARTNERSHIPS

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