



## CORPORATE CURRICULUM

June 2015

### Society data

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Full name: Ergon Research s.r.l.

Incorporation date: 23/07/2008

Fiscal code: 05877940485

N° Business Register: 05877940485 – registration date 08/08/2008

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University of Florence SPIN-OFF since 2012



### Mission

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Ergon Research is a consulting and research firm in the mechanical and energetic engineering field. The mission of the corporation is the supply of specialized services for the development and design of innovative products, components and systems.

Its mainstay is the integration between theoretical aspects and the most advanced simulation and experimental techniques in the thermo-fluid-dynamic field.

Ergon Research operates in an highly skilled engineering environment as link between the academic and the industrial communities bringing into action all the experience of its founders.

The use of cutting-edge simulation and experimental tools allows to offer valuable consulting and design solutions in many energetic and mechanical fields such as: turbomachinery, aerospace, automotive, fire safety engineering, energy management.

### Services

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#### **Simulation**

*3-D Thermo-fluid-dynamic simulations and mechanical analysis (CFD, FEA) in the field of: heat transfer, aerodynamics and acoustics, combustion and waste-to-energy systems.*

*Development of tailored tools for the design and testing of energy production systems, the selection of machine parts as well as the detailed behavior of single components.*

### **Experiments**

*Design and manufacturing of test rigs, experimental tools and measurements systems. Data acquisition and post-processing software.*

*Field-testing of Industrial processes.*

### **Research**

*Development of innovative solutions, procedures and products.*

*Specific training courses on in house developed software and in the energy conversion field tailored on customers needing.*

## **Members**

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The five members of the society can boast a Master degree in Mechanical Engineering and a PhD in Energy Engineering and Innovative Industrial Technologies gained at the Energy Engineering Department of the University of Florence.

Dr. Lorenzo Tarchi:

- 2007 PhD in Energy Engineering and Innovative Industrial Technologies
- 2003 Master degree in Mechanical Engineering

Dr. Tarchi in 2008 founded Ergon Research and now he is the director and the responsible for the experimental division. During the last ten years his activities mainly focused on the investigation of innovative cooling schemes for gas turbine combustor liners and internal cooling systems making use and developing innovative measuring techniques. It has been involved in several EU funded projects within FP5, FP6 and FP7 and in many activities in collaboration with industrial companies such as AnsaldoEnergia, Avio, GE Oil&Gas and Ferrari GeS.

Dr. Riccardo Da Soghe:

- 2010 PhD in Energy Engineering and Innovative Industrial Technologies
- 2006 Master degree in Mechanical Engineering

Dr. Da Soghe gained a relevant experience in the Computational Fluid Dynamics field mainly related to the analysis and the optimization of gas turbine components. His research activity started in the framework of the INTELLECT D.M. European Project focusing on turbulent combustion in GT. His PhD course was dedicated to the CFD analysis of gas turbine secondary

air system components (SAS) and more in general to GT cooling. The PhD course activity was mainly related to the EU project MAGPI (Main Annulus Gas Path Interaction) for which Dr. Da Soghe was responsible for the optimization of an aeronautical gas turbine stator-well by means of CFD. The results of the study were quite promising, resulting in a registered patent. Nowadays Riccardo's interests cover several areas of gas turbine design, verification and optimization. He was involved, collaborating with the University of Florence, in several EU programs (among the others, TECC-AE, ERICKA, KIAI) and he also led several activities promoted by Industrial Companies such as AnsaldoEnergia, Avio and GE Oil&Gas. His role in Ergon Research is to manage company's CFD branch.

Dr. Mirko Micio:

- 2011 PhD in Energy Engineering and Innovative Industrial Technologies
- 2006 Master degree in Mechanical Engineering

Dr. Micio has an extensive experience in blade cooling and secondary air systems modeling using customized simplified tools. This experience began with research activities carried out during his PhD course where he worked on experimental activities and tools development to model blade cooling and secondary air system components. He is currently involved in two principal fields of research: upgrade and maintenance of preliminary design and selection tools for turbomachinery and the aero-thermal analysis of hot components and secondary air systems using conjugated approaches and 0D/1D programs.

His role in Ergon Research is to coordinate the activities related to design tools.

Dr. Cosimo Bianchini:

- 2011 PhD Thesis "Assessment of boundary conditions for heat transfer and aeroacoustic analysis"
- 2007 Master Thesis "Implementation and Validation of RANS Turbulence Models for Heat Transfer Analysis in an Object Oriented CFD Code"

Dr. Bianchini is responsible for Ergon Research of the development and customization of CFD tools. In particular he acquired valuable expertise in the field of turbulence modeling (RANS and LES analysis) and advanced boundary conditions treatment for heat transfer and aero-acoustic applications. During the course of his PhD he was involved in several FP-6 and 7 EU funded research projects being technical contact person for specific tasks in AITEB2 and KIAI. Thanks to his experience in the use and upgrade of the open-source suite OpenFOAM, he is currently involved in the

development of several tools principally devoted to the study of gas turbine cooling systems and combustion chambers.

Dr. Antonio Andreini:

- 2008-Present Assistant Professor at University of Florence
- 2004 PhD in Energy Engineering and Innovative Industrial Technologies
- 2001 Master degree in Mechanical Engineering

Antonio Andreini is the technical supervisor of all numerical activities of the HTC-Group of the Dept. of Industrial Engineering at the Univ. of Florence. Relevant is the investigation in the field of combustion and heat transfer applied to gas turbine combustors, with a particular focus on different aspects such as emissions, flame stability, thermoacoustics and liner cooling.

In particular, since 2004 he is involved in several research programs regarding innovative low emissions combustion systems for aeroengines and industrial gas turbines. Research programs on aeroengine combustors are mainly funded by EU where HTC-Group is the reference academic partner of AvioGroup (most significant programs are NEWAC, TECC, KIAI, FIRST LEMCOTEC and IMPACT-AE).

Research activities on industrial gas turbine combustors are funded by two Italian gas turbine manufacturers (GEOil&Gas, AnsaldoEnergia). Antonio represents the key person and the direct operative contact with the key personnel in the R&D departments of such companies, supervising and reviewing the different tasks.

Important is his role of link person with the team involved in the experimental analysis, necessary for a proper comprehension of obtained results and for the exploitation of data for code validation purpose.

He is Ergon Research associate, member of the scientific committee and coordinator of the activities with the University of Florence.

## **Society members background**

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Ergon Research associates have been actively involved by the University of Florence in the following EU research programs in cooperation with the main European gas turbine manufacturer (AVIO, RRUK, RRD, Snecma, Turbomeca, ITP, MTU, Siemens, Alstom):

- AITEB – FP5 (2000-2004)
  - Aerothermal Investigation of Turbine Enwalls and Blades
- AITEB2 – FP6 (2005-2009)
  - Aerothermal Investigation of Turbine Enwalls and Blades
- LOPOCOTEP – FP5 – (2001-2006)

- Low Pollutant Combustor Technology Project
- INTELLECT D.M. – FP6 STREP (2004-2008)
  - INTEgrated Lean Low Emission Combustor Design Methodology
- NEWAC – FP6 (2006-2011)
  - New Aero Engine Core Concepts
- MAGPI – FP6 (2006-2010)
  - Main annulus Gas Path Interactions
- TECC-AE – FP7(2008-2012)
  - Technologies Enhancement for Clean Combustion in Aero-Engines
- ERICKA – FP7 (2009-2013)
  - Engine representative internal cooling knowledge and applications
- KIAI – FP7 (2009-2012)
  - Knowledge for Ignition, Acoustics and Instabilities
- FACTOR – FP7 (2010-2013)
  - Full Aero-thermal Combustor-Turbine interactiOn Research
- FIRST – FP7 (2011-2014)
  - Fuel Injector Research for Sustainable Transport
- LEMCOTEC – FP7 (2011-2015)
  - Low Emissions Core-Engine Technologies
- IMPACT-AE – FP7 (2011-2015)
  - Intelligent Design Methodologies for Low Pollutant Combustors

## Past and ongoing activities

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### ***EU funded projects***

*2013-today* Low pressure system for Ultra High By-Pass Ratio Engine

#### **ENOVAL FP7 project**

Ergon Research is partner in the ENOVAL project financed by the EU in the FP7. Its role is the design and the commissioning of an innovative test rig for the investigation of gearbox heat rejection issues and the development of related CFD models and design best practices.

*2013* Commissioning of a combustor test rig

#### **IMPACT-AE FP7 project**

Ergon Research is subcontractor in the IMPACT-AE project. Its role is to assist the development and the commissioning of a new gas turbine combustor test rig operating in engine-like conditions.

*2011-today* Design of a turbine combustor simulator

#### **LEMCOTEC FP7 project**

Ergon Research is partner in the LEMCOTEC project financed by the EU in the FP7. Its role is the design and the commissioning of a turbine combustor simulator to be used for the investigation of

compact size combustor by means of the most innovative experimental and numerical techniques.

### ***National funded projects***

*2013-today Advanced Technologies for ENergy Efficiency*

#### **ATENE**

ATENE is a research program funded by the local government of Regione Toscana. Ergon Research is involved in the development of innovative solutions for the design of compressors, gas and steam turbine components.

### ***Turbomachinery industrial partners***

#### **AVIO AERO**

*2013 Stator-Rotor cavities analysis*

This activity dealt with the analysis, by means of CFD, of realistic aeroengine stator-rotor cavities for design and optimization purposes.

#### **AnsaldoEnergia**

*2012-today Gas turbine blades aero-thermal analysis*

This activity focuses the analysis, by means of CFD, FEA and 1D flow network tools, of the thermal behavior of gas turbine nozzle and blades.

*2013-today Numerical analysis of GT combustors*

Support for the analysis of heavy-duty GT combustors by means of CFD. These activities deal with reactive CFD simulations aimed at the testing of innovative combustion configurations.

*2013-today Numerical analysis of Steam Turbine and GT auxiliary components*

Support in the analysis of power generation machines auxiliary components by means of CFD. Typical examples for these analysis are the optimization of air intakes or exhaust diffuser geometries in order to reduce the aerodynamic losses. These analysis are conducted for both gas and steam turbines.

*2013-today Secondary Air System analysis*

This activity is devoted to the analysis of Secondary Air System flows exploiting CFD. Typical applications concern realistic stator-rotor cavities, preswirl system and internal cooling systems for airfoils, endwalls and combustors.

**GE Oil&Gas***2013-today Numerical analysis of GT combustors*

Support for the analysis of GT combustors by means of CFD. These activities deal with conjugate and reactive CFD simulations aimed at the estimation of the combustor liner metal temperature.

*2013-today Numerical analysis of Steam turbine regulation systems*

Analysis of admission valves and discharge volutes exploiting CFD modelling. Main goals of these computations are the evaluation of unsteady loads within the admission system and the optimization of such components for optimal steam distribution and lowest aerodynamic losses.

*2013-today Numerical analysis of tilting-pad oil bearings*

Support for the design of innovative oil injectors to feed tilting-pad oil bearings by means of CFD. These activities deal with multiphase CFD simulations with heat transfer and cavitation models to understand pad and shaft working temperatures and pressures and verify reliability of lower order design tools.

*2012-today Advanced turbomachinery components optimization*

Support for the design and the optimization of advanced turbomachinery components such as centrifugal compressors swirl and thrust brakes, sealing systems, stator-rotor cavities and preswirl systems as well as gas turbine cooling systems by means of CFD optimization and experimental surveys.

*2011 Test rig design of an heat exchanger test bed*

The aim of the activity was to design a test bed for the performance validation of innovative heat exchangers combining both the common practices and exploiting CFD simulations to validate the proposed design.

*2010-today Performance analysis of industrial components*

Regular support for the design and control of industrial heat exchanger and large scale industrial liquid/gas separators by means of CFD.

*2010-today Development of design software for turbomachinery*

Continuous upgrade of customer's proprietary software for preliminary dimensioning of centrifugal compressors, turboexpanders, steam and gas turbine engines introducing new components and implementing different selection criteria.

*2008-today Study of steam plants and combined cycles layout*

Analysis, design and optimization of plant layout for electric power production from biomass, fossil fuels and concentrating solar power based on steam and combined cycles.

### **Oral Engineering**

*2010-today* **Research Project:** "Study of innovative solutions for a miniaturized turboengine for "on board vehicle power" and trigenerative applications with design and manufacturing of a prototype"

The society is responsible for the design from a white paper of a turboengine of small size for electric power generation. The complete dimensioning of the engine has been completed exploiting both in house developed design tools and simulation techniques. A software for estimating engine performance at design and off-design conditions has also been released. The final design of the principal components is performed with detailed CFD analysis. In particular the combustion chamber is verified in terms of combustion process and pollutant emissions by means of reactive computations. The power shaft has been analyzed by means of FEM calculations to point out its flexional and torsional characteristics.

### **Global energy supplier partners**

#### **ENEL**

*2014-today* **Support in the analysis of actual power plant auxiliary devices**

Support for the analysis of auxiliary components employed in power generation plant by means of CFD such as heat exchanger and condense collectors.

*2014* **Study of an industrial heat exchanger affected by acid condense**

The study aimed at a redesign of an existing heat exchanger to avoid acid condense within the inner pipes. The analysis was focused on conjugate heat transfer CFD analysis and proposed a by-pass system able to avoid condense and to minimize manufacturing costs.

#### **GDF-SUEZ**

*2014-today* **External consultant for a large scale heavy-duty GT upgrade project**

Ergon Research acts as an external reviewer for the methodologies employed by the consultants in this large GT upgrade project involving significant performance improvements.

*2015* **Mitigation of wind effects on Air Cooled Condenser**

The study focused on provide an effective proposal for wind screens positioning in an actual power plant equipped with ACC to avoid performance degradation at high wind conditions. The



analysis exploited CFD modelling with ad-hoc sub-models for the fans and heat-exchanger modules.

## ***HVAC and Ventilation***

2012 Performance characterization of an industrial cold room  
Customer: **ELI LILLY**

Detailed CFD analysis of a large-size cold room for insulin storage. The main aim of the analysis was to reveal the presence of hot spot inside the storage and to optimize the cooling air injection.

## ***Fire safety engineering***

2009-today Research project *“Design and testing of innovative water-mist fire prevention systems for passenger environment and enhancement of current fire extinction system in use on train cars by means of mathematical models”*

Customer: **Trenitalia**

Partners: **Ergon Research, Università degli Studi di Firenze**

The project aims at setting up dimensioning and installation criteria for fire extinction systems on passenger cars exploiting advanced CFD techniques. In particular a first phase is focused on customizing the open-source code FDS for railway applications to exploit the big amount of experimental data available by the customer to characterize employed materials. The second part is instead focused on the set up and realization of realistic experiments involving fires on both mock-up and real scale train cars measuring temperature evolutions, radiative heat transfer and pollutant emissions.

2010-today Fire scenario analysis in commercial, house and office buildings  
Customer: **ESA Engineering, M&E**

Continuous support to fire extinction system design exploiting performance approach and flight simulation for security plan approval. The procedure includes the selection of performance criteria, of fire scenario and the direct simulation of the fire evolution with fire extinction system activation.

## Members Publications

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### **Patents**

- 2012 "Assieme Statore-Rotore di una Turbina a Gas per Motori Aeronautici"  
**Patent number TO2012A001012**

### **International Journals**

- 2004 "Gas Turbines Design and Off-Design Performance Analysis with Emissions Evaluation"  
**ASME Journal of Engineering for Gas Turbines and Power vol 126**
- 2008 "Correlative Analysis of Effusion Cooling Systems"  
**ASME Journal of Turbomachinery, vol 130**
- 2008 "Experimental Investigation of Innovative Internal Trailing Edge Cooling Configurations with Pentagonal Arrangement and Elliptic Pin Fin"  
**International Journal of Rotating Machinery, vol 2008**
- 2009 "Application of the Inverse Analysis for Boundary Condition Retrieval"  
**Inverse Problems in Science and Engineering, vol 17**
- 2010 "Adiabatic and Overall Effectiveness Measurements of an Effusion Cooling Array for Turbine Endwall Application"  
**ASME Journal of Turbomachinery, vol 133**
- 2011 "Analysis of Gas Turbine Rotating Cavities by a One-Dimensional Model: Definition of a New Discs Friction Coefficients Correlations Set"  
**ASME Journal of Turbomachinery, vol 133**
- 2011 "Turbine Stator Well CFD Studies: Effects of Coolant Supply Geometry on Cavity Sealing Performance"  
**ASME Journal of Turbomachinery, vol 133**
- 2011 "Numerical Study of Aerodynamic Losses of Effusion Cooling Holes in Aero-Engine Combustor Liners"  
**ASME Journal of Engineering for Gas Turbines and Power vol 133**
- 2012 "Numerical Characterization of Aerodynamic Losses of Jet Arrays for Gas Turbine Applications"  
**ASME Journal of Engineering for Gas Turbines and Power vol 134**
- 2012 "Numerical and Experimental Investigation of Turning Flow Effects on Innovative Pin Fin Arrangements for Trailing Edge Cooling Configurations"  
**ASME Journal of Turbomachinery vol 134**
- 2012 "Numerical Characterization of Pressure Drop Across the Manifold of Turbine Casing Cooling System"  
**ASME Journal of Turbomachinery (Transaction of IGTI)**
- 2012 "Some Improvements in a Gas Turbine Stator-Rotor System Core-Swirl Ratio Correlation"  
**International Journal of Rotating Machinery**
- 2012 "Numerical Benchmark of Non-Conventional RANS Turbulence Models for Film and Effusion Cooling"  
**ASME Journal of Turbomachinery (Transaction of IGTI)**
- 2012 "Aero-Thermal Analysis of a Turbine Casing Impingement Cooling System"  
**International Journal of Rotating Machinery**

- 2012 "Heat Transfer Measurements in a Leading Edge Geometry with Racetrack Holes And Film Cooling Extraction"  
**ASME Journal of Turbomachinery (Transaction of IGTI)**
- 2012 "Experimental and Numerical Analysis of Multiple Impingement Jet Arrays for an Active Clearance Control System"  
**ASME Journal of Turbomachinery (Transaction of IGTI)**
- 2013 "Comparison of PSP and TLC Steady State Techniques for Adiabatic Effectiveness Measurement On A Multiperforated Plate"  
**Experimental Thermal and Fluid Science.**
- 2013 "Turbulent Couette-Taylor Flows with Endwall Effects: a Numerical Benchmark"  
**International Journal of Heat and Fluid Flow**
- 2013 "Turbulent Impinging Jet Flow into an Unshrouded Rotor-Stator System: Hydrodynamics and Heat Transfer"  
**International Journal of Heat and Fluid Flow**
- 2013 "Local Source-Based CFD Modeling of Effusion Cooling Holes: Validation and Application to an Actual Combustor Test Case"  
**ASME Journal of Engineering for Gas Turbines and Power**
- 2014 "Investigation on the Effect of a Realistic Flow Field on the Adiabatic Effectiveness of an Effusion-Cooled Combustor"  
**ASME Journal of Engineering for Gas Turbines and Power (Transaction of IGTI)**
- 2014 "Thermo-Fluid Dynamic Analysis of a Gas Turbine Transition-Piece"  
**ASME Journal of Engineering for Gas Turbines and Power (Transaction of IGTI)**
- 2014 "Experimental and Theoretical Investigation of Thermal Effectiveness in Multiperforated Plates for Combustor Liner Effusion Cooling"  
**ASME Journal of Turbomachinery (Transaction of IGTI)**
- 2014 "Development of an Engine Representative Combustor Simulator Dedicated to Hot Streak Generation"  
**ASME Journal of Turbomachinery (Transaction of IGTI)**
- 2014 "Heat Transfer and Pressure Loss Measurements of Matrix Cooling Geometries for Gas Turbine Airfoils"  
**ASME Journal of Turbomachinery (Transaction of IGTI)**

### ***International Conferences and Symposiums***

#### *Combustors*

- 2004 "RANS Analysis of Turbulent Premixed Flames Using a Level Set Flamelet Method"  
**Joint Meeting of the Italian and Greek Section of Combustion Institute**
- 2005 "Numerical Study Of Radiation And Cooling On The Upper Part Of A Gas Turbine Combustor Liner"  
**Numerical Heat Transfer Conference EURO THERM82**
- 2005 "Numerical Heat Transfer Analysis Of An Innovative Gas Turbine Combustor: Coupled Study Of Radiation And Cooling In The Upper Part Of The Liner"  
**ASME Turbo Expo GT2005-68365**

- 2005 "Combustor Liner Cooling: Numerical Analysis Of Impingement Geometries"  
**Numerical Heat Transfer Conference EURO THERM82**
- 2005 "NOx Emissions Reduction In An Innovative Industrial Gas Turbine Combustor (GE10 Machine): A Numerical Study Of The Benefits Of A New Pilot-System On Flame Structure And Emissions"  
**ASME GT2005-68364**
- 2005 "Impingement Cooling For Modern Combustors: Experimental Analysis And Preliminary Design"  
**ASME Turbo Expo GT2005-68361**
- 2006 "Correlative Analysis Of Effusion Cooling Systems"  
**ASME Turbo Expo GT2006-90405**
- 2006 "Advanced Liner Cooling Numerical Analysis For Low Emission Combustors"  
**International Congress Of The Aeronautical Sciences ICAS**
- 2006 "Fuel Flexibility Test Campaign On A Ge10 Gas Turbine: Experimental And Numerical Results"  
**ASME Turbo Expo GT-2006-90510**
- 2008 "A post processing procedure for the evaluation of adiabatic and overall effectiveness of effusion cooling geometries"  
**Symposium on Measuring Techniques in Turbomachinery**
- 2008 "Modeling Of Turbulent Combustion And Radiative Heat Transfer In A Object-Oriented CFD Code For Gas Turbine Application"  
**ASME Turbo Expo GT2008-51117**
- 2008 "Development And Validation Of A 1-D Tool For Thermoacoustic Instabilities Analysis In Gas Turbine Combustors"  
**ASME Turbo Expo GT2008-51248**
- 2009 "Investigation Of Circular And Shaped Effusion Cooling Arrays For Combustor Liner Application - Part 1: Experimental Analysis"  
**ASME Turbo Expo GT2009-60047**
- 2009 "Investigation of circular and shaped effusion cooling arrays for combustor liner application - Part 2: numerical analysis"  
**ASME Turbo Expo GT2009-60038**
- 2009 "Dual investigations on the improvement of effusion cooling by shaped holes"  
**World Conference on Experimental Heat transfer Fluid mechanics Thermodynamics**
- 2009 "Assessment Of A Set Of Numerical Tools For The Design Of Aero Engines Combustors: Study Of A Tubular Test Rig"  
**ASME Turbo Expo GT2009-59539**
- 2010 "Combined Effect Of Slot Injection, Effusion Array And Dilution Hole On The Heat Transfer Coefficient Of A Real Combustor Liner - Part 1 Experimental Analysis"  
**ASME Turbo Expo GT2010-22936**
- 2010 "Combined effect of slot injection, effusion array and dilution hole on the heat transfer coefficient of a real combustor liner Part 2: numerical analysis"  
**ASME Turbo Expo GT2010-22937**
- 2010 "Numerical study of aerodynamic losses of effusion cooling holes in aero-engine combustor liners"  
**ASME Turbo Expo GT2010-22942**

- 2011 "Assessment of numerical tools for the evaluation of the acoustic impedance of multi-perforated plates"  
**ASME Turbo Expo GT2011- 46303**
- 2011 "Experimental Investigation On The Effects Of A Large Recirculating Area On The Performance Of An Effusion Cooled Combustor Liner"  
**ASME Turbo Expo GT2011-46458**
- 2011 "Measurements of the Cooling Performances of a Real Combustor Liner with Air and CO<sub>2</sub> Injection Through a Slot and an Array of Effusion Cooling Holes"  
**ATI 155**
- 2012 "LES For The Evaluation Of Acoustic Damping Of Effusion Plates"  
**ASME Turbo Expo GT2012-68792**
- 2012 "Experimental Survey On Heat Transfer In A Trailing Edge Cooling System: Effects Of Rotation In Internal Cooling Ducts"  
**ASME Turbo Expo GT2012- 69638**
- 2012 "Measurement Of Thermal Contact Conductance Of A Heatshield For Gas Turbine Combustors In A Realistic Test Rig Setup"  
**ASME Turbo Expo GT2012-68410**
- 2012 "Density Ratio Effects On The Cooling Performances Of A Combustor Liner Cooled By A Combined Slot/ Effusion System"  
**ASME Turbo Expo GT2012-68263**
- 2012 "A Steady-State Eulerian-Lagrangian Solver For Non-Reactive Sprays"  
**ICLASS, 12th Triennial International Conference on Liquid Atomization and Spray Systems**
- 2013 "Local Source-Based CFD Modeling of Effusion Cooling Holes: Validation and Application to an Actual Combustor Test Case"  
**ASME Turbo Expo GT2013-94874**
- 2013 "Experimental and Theoretical Investigation of Thermal Effectiveness in Multi-Perforated Plates for Combustor Liner Effusion Cooling"  
**ASME Turbo Expo GT2013-94667**
- 2013 "Numerical Analysis of the Acoustic and Flow Field Associated with Perforated Liners at Varying Acoustic Forcing"  
**34th AIAA Aeroacoustics Conference**
- 2013 "Numerical Analysis of Effusion Plates for Combustor Liners Cooling with Varying Density Ratio"  
**ASME Turbo Expo GT2013-95039**
- 2014 "Multi-Coupled Numerical Analysis of Advanced Lean Burn Injection Systems"  
**ASME Turbo Expo GT2014-26808**

### Internal Heat Transfer

- 2004 "Pedestal and endwall contribution in heat transfer in thin wedge shaped trailing edge"  
**ASME Turbo Expo GT2004-53152**
- 2004 "Heat Transfer Analysis Of A Wedge Shaped Duct With Pin Fin And Pedestal Arrays: A Comparison Between Numerical And Experimental Results"  
**ASME Turbo Expo**

- 2005 "Combined Use Of Turbulators And Enlarged Pedestals In Trailing Edge Cooling Systems: An Experimental And Numerical Analysis" **European Turbomachinery Conference 078\_04/94**
- 2008 "Experimental Investigation of Innovative Internal Trailing Edge Cooling Configurations with Pentagonal Arrangement and Elliptic Pin Fin" **ISROMAC12-2008-20089**
- 2008 "Investigation of Innovative Trailing Edge Cooling Configurations with Enlarged Pedestals and Square or Semicircular Ribs. Part 1 - Experimental Results" **ASME Turbo Expo GT2008-51047**
- 2009 "Experimental Investigation Of Turning Flow Effects On Innovative Trailing Edge Cooling Configurations Based On Circular And Oblong Pin Fins" **European Turbomachinery Conference ETC-170**
- 2009 "Experimental Investigation Of Turning Flow Effects On Innovative Trailing Edge Cooling Configurations With Enlarged Pedestals And Square Or Semicircular Ribs" **ASME Turbo Expo GT2009-59925**
- 2010 "Experimental survey on heat transfer in an internal channel of a trailing edge cooling system" **ATI**
- 2011 "Numerical analysis of the heat transfer in a trailing edge cooling duct in stationary and rotating conditions" **European Turbomachinery Conference ETC**
- 2011 "Flow field analysis of a trailing edge internal cooling channel" **ASME Turbo Expo GT2011-45724**
- 2011 "Heat Transfer Measurements and Effects of Rotation in a Trailing Edge Cooling System" **ATI 154**
- 2012 "Conjugate Heat Transfer Calculations on GT rotor blade for industrial applications. Part I: Equivalent Internal Fluid Network Setup and Procedure Description" **ASME Turbo Expo GT2012-69846**
- 2012 "Conjugate Heat Transfer Calculations on GT rotor blade for industrial applications. Part II: improvement of external flow modeling" **ASME Turbo Expo GT2012-69849**
- 2012 "Unsteady CFD analysis of turbulent flow and heat transfer in a gas turbine blade trailing edge subjected to rotation" **ASME Turbo Expo GT2012-69903**
- 2013 "Numerical Analysis Of Heat Transfer In A Leading Edge Geometry With Racetrack Holes And Film Cooling Extraction" **ASME Turbo Expo GT2013-94673**
- 2013 "CHT Analysis of an Industrial Gas Turbine Blade: Comparison between Numerical Results and Experimental Data" **European Turbomachinery Conference ETC-203**
- 2013 "Heat Transfer and Friction in Circular Ducts With Shaped Ribs" **European Turbomachinery Conference ETC-129**

### External Heat Transfer

- 2005 "Film Cooling System Numerical Design: Adiabatic And Conjugate Analysis"  
**ASME Heat Transfer Conference**
- 2007 "Different Manufacturing Solutions of Fan-Shaped Film-Cooling Holes - Part I: Experimental Analysis"  
**International Gas Turbine Congress IGTC2007-ABS-56**
- 2010 "Heat Transfer Performance Of Fan-Shaped Film Cooling Holes. Part I: Experimental Analysis"  
**ASME Turbo Expo GT2010-22808**
- 2010 "Heat transfer performances of fan-shaped film cooling holes. Part II - numerical analysis"  
**ASME Turbo Expo GT2010-22809**
- 2013 "Experimental Investigation On The Heat Transfer In A Turbine Airfoil Leading Edge Region: Effects of The Wedge Angle and Jet Impingement Geometries"  
**European Turbomachinery Conference ETC-130**
- 2013 "Experimental Investigation On The Heat Transfer Of A Leading Edge Cooling System: Effects Of Jet-To-Jet Spacing And Showerhead Extraction"  
**ASME Turbo Expo GT2013-94759**

### Heat Transfer: General Interest

- 2005 "Nucleate Boiling Heat Transfer Modelling for Applications to Internal Combustion Engines Cooling Systems"  
**Numerical Heat Transfer Conference EURO THERM82**
- 2007 "Application of the Inverse Analysis for Boundary Condition Retrieval"  
**Inverse Problems, Design and Optimization Symposium IPDO-028**
- 2007 "Development And Validation Of A C++ Object Oriented CFD Code For Heat Transfer Analysis"  
**ASME Thermal Engineering and Summer Heat Transfer Conference AJ-1266**
- 2007 "Heat Transfer Applications In Turbomachinery"  
**Openfoam International Conference**
- 2008 "Conjugate Heat Transfer Analysis Of An Internally Cooled Turbine Blade – Subsonic And Transonic Tests"  
**OpenSource CFD International Conference**
- 2008 "Adiabatic and Overall Effectiveness Measurements of an Effusion Cooling Array for Turbine Endwall Application"  
**ASME Turbo Expo GT2008-50826**
- 2009 "Conjugate Heat Transfer Analysis Of An Internally Cooled Turbine Blades With An Object Oriented CFD Code"  
**European Turbomachinery Conference ETC**
- 2009 "Hole Spacing Effect On Adiabatic Effectiveness Of Effusion Cooling Arrays For Turbine Endwall Application: Experimental And Numerical Analysis"  
**European Turbomachinery Conference ETC-121**
- 2010 "Endwall Effusion Cooling System Behavior Within A High-Pressure Turbine Cascade. Part 2: Heat Transfer And Effectiveness Measurements"

- 2011 **ASME Turbo Expo GT2010-22932**  
 "Discharge Coefficient Characterization of Jet Array Impingement Holes for an Active Clearance Control System"
- 2011 **European Turbomachinery Conference ETC-252**  
 "Heat Transfer and Effectiveness Evaluation of Multiple Impingement Jet Arrays for an Active Clearance Control System"
- 2012 **ISAIF10-58**  
 "Heat Transfer And Pressure Drop Analysis Of A Turbine Casing Impingement Cooling System"  
**ASME Turbo Expo GT2012-68793**

### Cavities and Seals

- 2008 "Analysis Of Gas Turbine Rotating Cavities By A One-Dimensional Model"  
**ISROMAC12-2008-20161**
- 2008 "Development Of Numerical Tools For Stator-Rotor Cavities Calculation In Heavy-Duty Gas Turbines"  
**ASME Turbo Expo GT2008-51268**
- 2008 "Turbine Stator Well CFD Studies: Effects Of Cavity Cooling Air Flow"  
**ASME Turbo Expo GT2008-51067**
- 2010 "Numerical Benchmark Of Turbulence Modelling In Gas Turbine Rotor-Stator System"  
**ASME Turbo Expo GT2010-22627**
- 2010 "RANS Modeling Of Flow In Rotating Cavity System"  
**ECCOMAS**
- 2010 "1D Tool For Stator-Rotor Cavities Integrated Into A Fluid Network Solver Of Heavy-Duty Gas Turbine Secondary Air System"  
**ASME Turbo Expo GT2010-22203**
- 2011 "Analysis Of Gas Turbine Rotating Cavities: Estimation Of Rotor Disc Pumped Mass Flow Rate"  
**ASME Turbo Expo GT2011-46225**
- 2011 "Benchmark Numérique Des Écoulements De Couette-Taylor Turbulents"  
**17° Congrès Français de Mécanique**
- 2011 "Numerical Predictions Of Flow Field In Closed And Opened Taylor-Couette Cavities"  
**EUCASS**
- 2011 "Experimental Investigation Of The Influence Of Clearance On Leakage Flow In A Straight Through Labyrinth Seal"  
**European Turbomachinery Conference ETC- 268**
- 2011 "Experimental Investigation on Leakage Loss and Heat Transfer in a Straight Through Labyrinth Seal"  
**ASME Turbo Expo GT2011-46402**
- 2011 "Experimental Investigation on Leakage Losses and Heat Transfer in a Non Conventional Labyrinth Seals"  
**ASME Turbo Expo GT2011-46403**
- 2012 "An Investigation Into Numerical Analysis Alternatives For Predicting Re-Ingestion In Turbine Disc Rim Cavities"  
**ASME Turbo Expo GT2012-68592**
- 2013 "Numerical Investigation To Support The Design Of A Flat Plate Honeycomb Seal Test Rig"



- 2014 **ASME Turbo Expo GT2013-95612**  
 "Flat Plate Honeycomb Seals Friction Factor Analysis"
- 2015 **ASME Turbo Expo GT2014-27078**  
 "Flat Plate Honeycomb Seals Acoustic Analysis"  
**European Turbomachinery Conference ETC-163**

### Fire Engineering

- 2011 "Pyrolysis Modeling And Numerical Simulation Of Rail Carriage Fire Scenarios For The Safe Design Of A Passenger Train"  
**Seventh Mediterranean Combustion Symposium**
- 2011 "Fire Scenarios Modelling For The Safe Design Of A Passenger Rail Carriage"  
**World Congress on Railway Research**

### Other Fields

- 2005 "PNEUMA, PNEumatic Uninterruptible MACHine System: an Uninterruptible Pneumatic Power Generator. Part 1: Technical Analysis of a Compressed Air Based Power Backup System"  
**ISIE**
- 2005 "Integration Of Environmental Parameters Into Decision Making Within The Pneuma Project"  
**LCM - 2nd International Conference on Life Cycle Management**
- 2006 "Characterization of Commercially Available Turbochargers for Possible Application in the Ups System Scenario"  
**ASME Turbo Expo GT2006-90442**
- 2010 "Heavy Duty Gas Turbine Simulation: A Compressor IGV Airfoils Off-Design Characterization"  
**ASME Turbo Expo GT2010-22628**
- 2011 "Large Eddy Simulation For Train Aerodynamic Noise Predictions"  
**World Congress on Railway Research**
- 2013 "Numerical Characterization Of Swirl Brakes For High Pressure Centrifugal Compressors"  
**ASME Turbo Expo GT2013-94075**
- 2013 "Numerical Analysis Of Pressure Losses In Diffuser And Tube Steam Partition Valves"  
**ASME Turbo Expo GT2013-95527**
- 2014 "Numerical Analysis of the Unsteady Loads on a Steam Turbine Double Seat Control Valve"  
**ASME Turbo Expo GT2014-26982**
- 2014 "Aeroacoustic Analysis of a Steam Turbine Double Seat Control Valve"  
**European Turbomachinery Conference – ETC-228**