

ASME 2012 Gas Turbine India Conference

presented by the ASME International Gas Turbine Institute

December 1, 2012 | Mumbai, Maharashtra, India

FINAL PROGRAM

Schedule at a Glance



Registration	7:00 a.m. – 5:00 p.m.
Presenter Coffee	7:30 a.m. – 8:00 a.m.
Morning Sessions	8:00 a.m. – 10:00 a.m.
Exhibit Open	9:30 a.m. – 6:00 p.m.
Inaugural Address	10:00 a.m. – 10:50 a.m.
Forenoon Sessions	11:00 a.m. – 12:20 p.m.
Lunch	12:20 p.m. – 1:30 p.m.
IGTI India Chapter Meeting	1:00 p.m. – 1:20 p.m.
Afternoon Sessions	1:30 p.m. – 3:30 p.m.
Coffee Break	3:30 p.m. – 3:50 p.m.
Afternoon Sessions	3:50 p.m. – 5:30 p.m.

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Welcome



Joseph Machnaim
Conference Chair

On behalf of the IGTI Board of Directors, our chairman Prof. Thomas Sattelmayer, and the IGTI staff, I would like to welcome you to the first ASME Gas Turbine India Conference 2012. The primary focus of this conference is to bring together those from across India who are working in industry, academia, and government to hear the latest developments in gas turbine technology. Our endeavor has been to provide the platform to share great ideas from within India and Asia at large. We chose the business Capital of India, Mumbai to host the first ASME GT conference because it is a city with a rich history of small initiatives having a great impact for India and a city that celebrates diversity.

This year's keynote theme is "Development of Gas Turbine Technology in India." Those working in the gas turbine field in India are aware that there is a great opportunity for technological development in the area of gas turbines in this country. Dr. Vijay Kumar Saraswat, Chief Scientific Advisor to Defense Minister, being one of the most knowledgeable gas turbine experts in India, will address the opportunities and challenges in India. He will also provide the Indian perspective on how to fuel growth through research and development to meet the future requirements for aero engines and power systems.

An estimated 300 conference participants will have the opportunity to attend 20 technical sessions in 4 major technical categories, including Aerodynamics, Thermal, Structures and GT Operability. There will be 90 final technical papers presented by leading experts. As this is our first conference in India our efforts have been focused on providing and maintaining the highest possible technical standards for the papers. We also hope to provide the best networking opportunities between industry, academia & governmental organizations.

Finally, on behalf of IGTI, we graciously thank all those companies who have supported GT India conference 2012 through sponsorship. This event would not be possible without the hundreds of hours spent by the volunteers who served as authors, reviewers, session organizers, and vanguard chairs. Given the overwhelming response of 250 abstracts in the first year, a big round of applause needs to be given to Prof. Bhamidi VSS Prasad, Review Chair, and Prof. Amboor Madathil Pradeep, Technical Program Chair for all their dedicated work in handling the technical papers. Our sincere thanks to Prof. Seung Jin Song, Conference Chair, (IGTI) and Prof Howard Hodson, Review Chair, (IGTI) for their support and guidance. Finally, much appreciation goes to the IGTI staff that pulled everything together in a seamless way. We trust your time here will be both enjoyable and professionally rewarding. Thank you for attending.



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Inaugural Address...

Development of Gas Turbine Technology in India

Saturday, December 1, 2012 • 10:00 a.m. | Champagne II

Born in 1949, Dr. Saraswat completed his Bachelors in Engineering from Madhav Institute of Technology & Science, Gwalior, MTech from Indian Institute of Science (IISc) Bangalore, and obtained a Doctorate in Propulsion Engineering from Osmania University.

Dr. Saraswat, a Ph.D. in Combustion Engineering, started his career in DRDO in 1972 at the Defence Research and Development Laboratory (DRDL), Hyderabad and was responsible for the development of country's first Liquid Propulsion Engine, DEVIL. As Project Director of Prithvi, he steered the design, development, production and induction of the first indigenous Surface-to-Surface missile system into the armed forces. The successful testing of Dhanush missile on board a moving ship with high terminal accuracy brought a new dimension to the national defence capability. As Program Director AD (Air Defence), Dr. Saraswat pioneered the concept of theatre defence system and integration of national Air Defence elements. He was Director, Research Centre Imarat (RCI) before taking over as CCR&D (MSS) in November 2005. He established facilities for design, production and testing of engines and the RCS technologies for the missile applications. Under the able leadership of Dr. Saraswat, India has embarked on a challenging, futuristic Air Defence Programme encompassing development of complex anti-ballistic missile systems, radars, C41 systems and integration of battle management resources into a national authority. As Programme Director, he has spearheaded the concept of theatre defence systems and integration of national Air Defence elements. As Director, Research Centre Imarat, Hyderabad, he conceptualised and established facilities for development of Micro and Nano Sensors for future avionics.

Dr. Saraswat is the recipient of DRDO Scientist of the Year Award - 1987, National Aeronautical Prize - 1993, DRDO Technology Transfer Award - 1996 and Performance Excellence Award - 1999. For his outstanding contributions to the Nation, he has been conferred with Padma Shri in 1998.

Vijay Kumar Saraswat presently serves as the Director General of the Defence Research and Development Organisation, Secretary of Defence Research and development and the Chief Scientific Advisor to the Minister of Defence.



Dr. Vijay Kumar Saraswat
Chief Scientific Advisor to
Defence Minister
Government of India

Session Schedule

ROOM	08:00 - 10:00	11:00 - 12:20
Bordeaux	AERODYNAMICS Axial Compressors I	AERODYNAMICS Wind Turbines & Propellers I
Olio	AERODYNAMICS Centrifugal Compressors I	THERMAL Combustion
Champagne II	AERODYNAMICS Axial Turbines I	GAS TURBINE SYSTEM OPERABILITY & PERFORMANCE Performance I
Gadda Da Vida	THERMAL Combustion, Fuels and Emissions	THERMAL Film Cooling II
Burgundy	STRUCTURES & DYNAMICS General Topics and Vibration	STRUCTURES & DYNAMICS Fatigue and Fracture II



Session Schedule

13:30 - 15:30	15:50 - 17:30
AERODYNAMICS Axial Turbines II	AERODYNAMICS Combustors
AERODYNAMICS Intakes & Ducts	AERODYNAMICS Wind Turbines & Propellers II
GAS TURBINE SYSTEM OPERABILITY & PERFORMANCE Operability	GAS TURBINE SYSTEM OPERABILITY & PERFORMANCE Performance II
THERMAL Droplets and Atomization	THERMAL Film Cooling I
AERODYNAMICS Axial Compressors II	STRUCTURES & DYNAMICS Fatigue and Fracture I



ASME Gas Turbine India 2012 Leadership Team

Conference Chair

Joseph Machnaim
GE Aviation
Bangalore, India

Conference Chair, IGTI

Prof. Seung Jin Song
Seoul National University
Seoul, Korea

Technical Program Chair


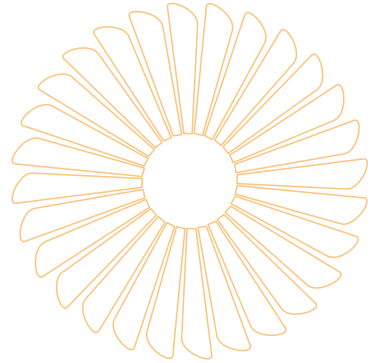
Prof. Amboor Madathil Pradeep
Indian Institute of Technology Bombay
Mumbai, India

Review Chair

Prof. Bhamidi VSS Prasad
Indian Institute of Technology Madras
Chennai, India

Review Chair, IGTI

Dr. Howard Hodson
University of Cambridge
Whittle Laboratory
Cambridge, UK



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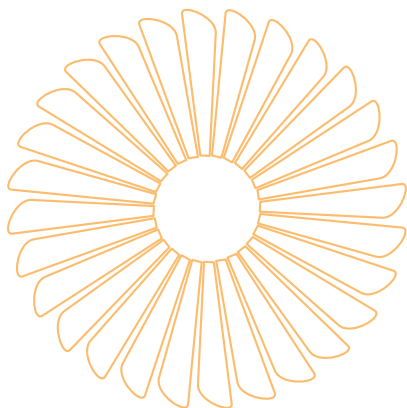
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ASME Gas Turbine India 2012 Vanguard Chairs



Aerodynamics

Subhrajit Dey, GE Global Research, India

Thermal

Prabhu SV, Indian Institute of Technology, Bombay, India

Structures & Dynamics

Vikram Reddy, GE, India

A S Sekhar, Indian Institute of Technology, Madras, India

Gas Turbine System Operability & Performance

Hemant Gajjar, AAIL, India

Gas Turbine India Exhibitor

Exhibit Open 9:30 a.m. - 6:00 p.m.

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- and much more ...

Session Details

SATURDAY, DECEMBER 1, 2012 | 08:00 to 10:00

TRACK: AERODYNAMICS

1-1 Axial Compressors I

Room Name: Bordeaux

Session Chair: Joseph Mathew, Indian Institute of Science

Session Co-Chair: Trilok Vashist, Infotech Enterprises Limited

GTIndia2012-9531 – **Understanding the Flow Behavior in a Low Hub-Tip Ratio, High Aspect Ratio Contra-Rotating Axial Fan Stage**
Chetankumar Mistry, Indian Institute of Technology Bombay; Pradeep A, Indian Institute of Technology Bombay

GTIndia2012-9571 – **CFD Code Validation and Qualitative Study of Effects of Tip Clearance Variation on Performance of Transonic Axial Compressor Rotor**

Aniket Patkar, Sardar Patel College of Engineering, Mechanical Engineering Department; Srinivethan Rangasamy, Zeus Numerix Pvt. Ltd.; Vilas Kalamkar, Visvesvaraya National Institute of Technology, Nagpur; Sreekanth Raghunath, Zeus Numerix Pvt. Ltd.

GTIndia2012-9639 – **The Effect of Reynolds Number on Transonic Compressor Blade Rotor Section**

Alireza Shahrabi Farahani, Amir Kabir University; Ali Madadi, Amirkabir University of Technology; Hossein Beheshti Amiri, Amirkabir University (Tehran Polytechnic); Alireza Fathi, K. N. Toosi University of Technology; Habib Khazaei, Amirkabir University of Technology

1-3 Centrifugal Compressors I

Room Name: Olio

Session Chair: Dr Jagadish Kshirsagar, Kirlosakar Brothers Limited

Session Co-Chair: Christian Aalborg

GTIndia2012-9525 – **Effect of Impeller Blade Trimming on the Performance of a 5.5:1 Pressure Ratio Centrifugal Compressor**
Daniel Swain, Michigan State University; Abraham Engeda, Michigan State University

GTIndia2012-9529 – **Effects of Inlet Pressure Distortion on the Performance and Flow Field of a Centrifugal Compressor at Off-Design Conditions**

Sitaram N, IIT Madras; K. V. Murali, CEMILAC; Govardhan M, Indian Inst of Technology Madras

1-5 Axial Turbines I

Session Chair: Ravikanth Avancha, GE Aviation

Session Co-Chair: Hiteshkumar Mistry, GE Global Research

GTIndia2012-9537 – **Aerodynamic Measurements on the Interaction of Secondary Jets and Separation Bubble**

Subrata Sarkar, Indian Inst of Tech Kanpur; Samson A Ratna Kumar, IIT Kanpur

GTIndia2012-9701 – **Numerical Optimization of Thermo-Compressors Based on Non-Dimensional Geometrical Parameters**

Navid Sharifi, Amirkabir University of Technology; Masoud Boroomand, Amirkabir University of Technology

GTIndia2012-9634 – **Aerodynamic Design and Analysis of a High Loaded Supersonic Compressor**

Hu Yingjiao, Harbin Institute of Technology; Wang Songtao, Harbin Institute of Technology

GTIndia2012-9625 – **Performance of Different Serpentine Intake Ducts**

Ritesh Gaur, Gas Turbine Research Establishment; Vimala Narayanan, Gas Turbine Research Establishment; S Kishore Kumar, Gas Turbine Research Establishment

GTIndia2012-9676 – **Non-Axisymmetric Flow Structure in Vaneless Diffuser of Centrifugal Compressor for Turbochargers**

Chuanjie Lan, Tsinghua University; Xinqian Zheng, Tsinghua University; Hideaki Tamaki, IHI Corporation

GTIndia2012-9573 – **Stall Margin Improvement in a Centrifugal Compressor Through Endwall Reshaping**

Q.H. Nagpurwala, M.S. Ramaiah School of Advanced Studies; Suhas R. Sope, M. S. Ramaiah School of Advanced Studies

Room Name: Champagne II

GTIndia2012-9689 – **LCT and PIV Investigations Behind Trapezoidal-Rib with a Slit Mounted on Bottom Wall of a Rectangular Duct**

Md Shaikat Ali, Indian Institute of Technology Roorkee; Bhupendra Gandhi, Indian Institute of Technology Roorkee; Andallib Tariq, Indian Institute of Technology Roorkee

Session Details

TRACK: THERMAL

2-3 Combustion, Fuels and Emissions

Session Chair: Achintya Mukhopadhyay, Jadavpur University

Session Co-Chair: Vasudevan Raghavan, Indian Institute of Technology Madras

GTIndia2012-9543 – Multi Eulerian PDF Transport Modelling of Turbulent Swirling Flame

Abhinav Kapoor, Indian Institute of Technology Kanpur; Ashoke De, Indian Institute of Technology Kanpur; Rakesh Yadav, ANSYS Fluent India Pvt. Ltd.

GTIndia2012-9719 – Numerical Investigation of Combustion Characteristics in a Liquid Fuelled Can Combustor

Vivek Pandey, Indian Institute of Technology Kanpur; Ashoke De, Indian Institute of Technology Kanpur; Abhijit Kushari, Indian Institute of Technology Kanpur

GTIndia2012-9585 – Detection Of Precursor At Blowout in Non-Partially Premixed Gas Turbine Type Combustor At Atmospheric Pressure

Kurpet P Aditya, Indian Institute of Technology Madras; Thiruchengode M Muruganandam, Indian Institute of Technology Madras

GTIndia2012-9613 – Evaluating Fuel Flexibility in an IGCC Combustor Using CFD

Abinash Baruah, GE India; Hasan Karim, GE; Azardokht Hajiloo, GE

GTIndia2012-9620 – Thermal Analysis of Gas Turbine Bearing Compartment During Normal Operation

Nagaraju Kanike, Infotech Enterprises Ltd; Dateswara Taluru, Infotech Enterprises Ltd; Krishna Nelanti, Infotech Enterprises Limited; Kamlesh Gujar, Infotech Enterprises Limited

GTIndia2012-9728 – Laminar Burning Velocity of LPG-Air Mixture at Elevated Temperatures

Mohammad Akram, Indian Institute of Technology Bombay; Sudarshan Kumar, IIT Bombay; Priyank Saxena, Solar Turbine Inc.

Room Name: Gadda Da Vida

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Session Details

TRACK: STRUCTURES & DYNAMICS

3-5 General Topics and Vibration

Session Chair: Ashish Darpe, IIT Delhi

Session Co-Chair: Jagadish Thammanna, UTC Aerospace Systems

GTIndia2012-9527 – **Multistage Coupling of Eight Mistuned Bladed Disk on a Solid Shaft, Forced Vibration Analysis**

Romuald Rzakowski, Institute of Fluid-Flow Machinery; Artur Maurin, Institute of Fluid-Flow Machinery, Polish Academy of Sciences

GTIndia2012-9586 – **Health Monitoring of Gear Elements Based on Vibrations by Support Vector Machine Algorithms**

Rajiv Tiwari, IIT Guwahati; Dhruva Jyoti Bordoloi, Indian Institute of Technology Guwahati

GTIndia2012-9542 – **Identification of Multiple Faults with Incomplete Response Measurements in Rotor-Bearing-Coupling Systems**

Rajiv Tiwari, IIT Guwahati; Mohit Lal, Indian Institute of Technology Guwahati

GTIndia2012-9521 – **Comparison of Fluid-Structure Coupling Methods for Blade Forced Response Prediction**

Florent Payer, Snecma; Pascal Ferrand, Laboratoire de Mécanique des Fluides et d'Acoustique; Alain Dugeai, Onera; Fabrice Thouverez, Laboratoire de Tribologie et Dynamique des Structures

GTIndia2012-9551 – **The Fluid-Thermal-Structure Coupled Analysis and Optimization of Turbine Mortise/ Disc**

Xiuli Shen, BeiHang University; Xiaodong Qi, BeiHang University; Shaojing Dong, BeiHang University

GTIndia2012-9593 – **Voxel-based Approach for Computation and Optimization of Unoccupied Space in CAD Assemblies**

Rahul Rajadhyaksha, Geometric Limited; C Saikrishna Swamy, Geometric Limited; Nabarun Paul, Geometric Limited

Room Name: Burgundy

SATURDAY, DECEMBER 1, 2012 | 11:00 to 12:20

TRACK: AERODYNAMICS

1-9 Wind Turbines & Propellers I

Session Chair: L Venkatakrishnan, National Aerospace Laboratories

Session Co-Chair: Vidyadhar Mudkavi

GTIndia2012-9617 – **Effect of Some Design Parameters on Performance of a Shutter Type Vertical Axis Wind Turbine**

Sandeep Wangikar, SVERI's College of Engineering; Nitin Misal, SVERI's College of Engineering

GTIndia2012-9623 – **An Effect of Spacing and Surface Finish on the Performance of Bladeless Turbines**

Hanumant Borate, VPCOE, Baramati; Nitin Misal, SVERI's College of Engineering

GTIndia2012-9655 – **A Numerical Investigation to Study Effects of a Savonius Rotors Plate Shape on its Optimum Overlap Ratio**

Morteza Abbaszadeh, Urmia University; Fariba Bagherzadeh, Sharif University of Technology; Mina Iravani, Sharif University of Technology

GTIndia2012-9656 – **A Numerical Investigation on Effects of Gap Between Plates of Savonius Vertical Axis Wind Turbines with Different Shapes on Their Performance**

Morteza Abbaszadeh, Urmia University; Fatemeh Doroodian, Sharif University of Technology

Room Name: Bordeaux

Session Details

TRACK: THERMAL

2-2 Film Cooling II

Session Chair: Subrata Sarkar, Indian Inst of Tech Kanpur

GTIndia2012-9558 – Experimental Evaluation of Cooling Effectiveness of High Pressure Turbine Nozzle Guide Vane

Venkata Subramanya, Gas Turbine Research Establishment; Vasudev S A, Gas Turbine Research Establishment; Sunil Chandel, DIAT (DU)

GTIndia2012-9560 – TLC Measurements of Heat Transfer Under Rotating Conditions at High Reynolds Number in an Innovative Trailing Edge Cooling System

Beniaiche Ahmed, Ecole Doctorale d'Energetique et Developpement Durable (EDED) Université M'hamed Bougara; Carcasci Carlo, Sergio Stecco Department, University of Florence; Bonanni Leonardo, Sergio Stecco Department, University of Florence

2-4 Combustion

Room Name: Olio

Session Chair: Sudarshan Kumar, IIT Bombay

GTIndia2012-9602 – Numerical Simulation to Characterize Homogeneity of Air-Fuel Mixture for Premixed Combustion in Gas Turbine Combustor

Kamalika Chatterjee, Jadavpur University; Arkadeep Kumar, Jadavpur University; Swarnendu Sen, Jadavpur University; Souvick Chatterjee, Jadavpur University; Achintya Mukhopadhyay, Jadavpur University

GTIndia2012-9640 – A Detailed Validation Study of Multi Environment Eulerian PDF Transport Method for Modelling Turbulent Non Premixed Combustion

Rakesh Yadav, ANSYS Fluent India Pvt. Ltd.; Abhijit Kushari, Indian Institute of Technology Kanpur; Vinayak Eswaran, I.I.T Hyderabad; Atul Verma, Ansys Fluent India Pvt. Ltd.

GTIndia2012-9671 – Thermodynamic Analysis of Evaporation Characteristics of Moving Two-Component Liquid Fuel Droplets in Pre-Vaporizer Systems

S. Raghuram, IIT Madras; Vasudevan Raghavan, Indian Institute of Technology Madras

GTIndia2012-9681 – Experimental Investigations of an Industrial Lean Premixed Gas Turbine Combustor with High Swirling Flow

Ivan R. Sigfrid, Thermal Power Eng., Lund University; Ronald Whiddon, Lund University; Robert Collin, Lund University; Jens Klingmann, Thermal Power Eng., Lund University; Abdallah Abou-Taouk, Chalmers University of Technology

Room Name: Gadda Da Vida

GTIndia2012-9607 – Internal Wall-Jet Film Cooling with Tangential Coolant Holes

Shine S R, Indian Institute of Space Science and Technology; Sunil Kumar S, LPSC, Indian Space Research Organization; Suresh B N, Indian Space Research Organization

GTIndia2012-9672 – Enhancement of Film Cooling Effectiveness Using Upstream Ramp

Paresh Halder, Indian Institute of Technology Madras; Abdus Samad, Indian Institute of Technology Madras

GTIndia2012-9669 – Effect of Thermal Conductivity on Heat Transfer from a Flat Plate With Combined Impingement and Film Cooling

Rajesh Kumar Panda, Indian Institute of Technology, Madras; Bhamidi V S S S Prasad, Indian Institute of Technology Madras

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Session Details

TRACK: STRUCTURES & DYNAMICS

3-3 Fatigue and Fracture II

Session Chair: Baskaran Bhuvanaraghan, GE India Technology Center

GTIndia2012-9691 – **An Assessment of Centrifugal Loading Effect of Rotor Disc on Fretting Variables at a Dovetail Interface of an Aero-Engine**

Anandavel Kaliyaperumal, InfoTech Enterprises Limited; Raghu V Prakash, Indian Institute of Technology Madras

GTIndia2012-9557 – **Investigations into the Creep Behavior of Gas Turbine Component Assemblies**

K S Raghavan, Infotech Enterprises Limited



IGTI India Chapter Meeting...

1:00 - 1:20 pm

Champagne II

Please join us for a meeting to establish the IGTI India Chapter.

Room Name: Burgundy

GTIndia2012-9690 – **Effects of Disk Geometry on Strength of a Centrifugal Compressor Impeller for a High Pressure Ratio Turbocharger**

Xinqian Zheng, Tsinghua University; Yangjun Zhang, Tsinghua University; Fenghuo Liu, FuYuan Turbochargers Co., Ltd; Huihua Qian, SinoTurbo Power Co., Ltd; Lei Jin, Tsinghua University

GTIndia2012-9633 – **Improved Analytical Model for Bolted Joint Evaluation in Gas Turbines**

Prasanna Kumar HS, Indian Institute of Technology; Mayuram MM, Indian Institute of Technology/Madras; K S Raghavan, Infotech Enterprises Limited

TRACK: GAS TURBINE SYSTEM OPERABILITY & PERFORMANCE

4-1 Performance I Room Name: Champagne II

Session Chair: Amitava Datta, Jadavpur University

GTIndia2012-9580 – **Part-Load Performance of Gas Turbines-Part I: A Novel Compressor Map Generation Method Suitable for Adaptive Simulation**

Elias Tsoutsanis, Qatar University; Yiguang Li, Cranfield Univ; Pericles Piliidis, Cranfield University; Michael Newby, Manx Electricity Authority

GTIndia2012-9581 – **Part-Load Performance of Gas Turbines-Part II: Multi-Point Adaptation with Compressor Map Generation and GA Optimization**

Elias Tsoutsanis, Qatar University; Yiguang Li, Cranfield Univ; Pericles Piliidis, Cranfield University; Michael Newby, Manx Electricity Authority

GTIndia2012-9599 – **Form Factor for The Top-Level Comparison of the Condition of Supply of High Pressure-Compressor Blades**

Marcus Schrade, Institute of Aircraft Propulsion Systems, University of Stuttgart; Matthias Voigt, Institute of Fluid Mechanics, Technical University of Dresden; Matthias Weisschuh, Rolls-Royce Deutschland Ltd & Co KG; Stephan Staudacher, Institute of Aircraft Propulsion Systems, University of Stuttgart

Session Details

SATURDAY, DECEMBER 1, 2012 | 13:30 to 15:30

TRACK: AERODYNAMICS

1-2 Axial Compressors II

Room Name: Burgundy

Session Chair: S Kishore Kumar, Gas Turbine Research Establishment (GTRE), DRDO

GTIndia2012-9565 – **Numerical Simulation of Effects of Tip Geometry on the Performance of an Axial Compressor**

Hongwei Ma, Beihang University; Jun Zhang, Beihang University

GTIndia2012-9601 – **Effect of J-Shaped Casing Treatment on Flow Stability and Performance of an Axial Compressor**

Ramjan Pathan, M S Ramaiah School of Advanced Studies, Bangalore; Prof Nagpurwala QH, M S Ramaiah School of Advanced Studies, Bangalore; Ananthasha Bhat, M S Ramaiah School of Advanced Studies, Bangalore

GTIndia2012-9657 – **A Novel Approach To Design Reversible Counter Rotating Aerial Fans**

Morteza Abbaszadeh, Urmia University; Ramin Taheri, Sharif University of Technology; Parvin Nikpour, Sharif University of Technology

GTIndia2012-9684 – **The Effect of Changing the Stator Reduced Frequency in a Compressor Cascade on Transition and Separation in the Leading Edge Region**

Samuel Perkins, University of Tasmania; Alan Henderson, University of Tasmania

GTIndia2012-9643 – **A Strategy for Multi-Point Compressor Blading Using Multi-Objective Optimization**

Alireza Fathi, K. N. Toosi University of Technology; Abdollah Shadaram, K.N.T. University; Mohammad Alizadeh, University of Tehran

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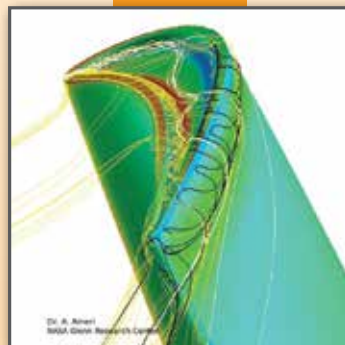
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The multidisciplinary **ASME 2013 Turbine Blade Tip Technical Symposium & Course Week** will address the current state of the art in the design, analysis, and improvement of turbine blade tips. Despite decades of applied research, the issue of blade tip burnout has remained as one of the most intractable in gas turbines. Yet the degradation of blade tips continues to represent a large fraction of the turbine losses, both in terms of the operational aero-thermal efficiency and the engine life cycle maintainability. A two-day course of lectures will precede the technical symposium to provide background, state-of-the-art design, and operability issues surrounding the topic. A two-day symposium will build upon the lecture series with current proposed or enacted solutions, studies to gain insight to the physics, and an industry panel session for open discussion. Interested attendees can register for the course only, symposium only, or for both parts of the event.

Topic of Lectures and Symposium...

- Turbine blade tip steady and unsteady aerodynamics
- Turbine blade tip heat transfer, internal, external, and film cooling
- Unshrouded and shrouded blade tip design
- Clearance effects and clearance control
- Blade tip or shroud surface treatments and abrasion coatings
- Operational steady and transient effects
- Service and repair requirements and issues
- Turbine stage losses and downstream effects
- New or modified designs and innovations
- Propulsion and power generation gas turbines
- Axial and radial turbines
- Experimental and numerical



Call for Papers... Abstract Deadline: January 28, 2013

For further information...

Please visit the **ASME Turbine Blade Tip Symposium & Course Week** website at: <http://asmeconferences.org/TBTS2013/> or contact the ASME International Gas Turbine Institute (IGTI): Email: igtiprogram@asme.org | Phone: +1-404-847-0072

Session Details

TRACK: AERODYNAMICS

1-6 Axial Turbines II

Session Chair: Hiteshkumar Mistry, GE Global Research

Session Co-Chair: Senthil Kumar, National Aerospace Laboratories

GTIndia2012-9641 – Effects of Blade Manufacturing Deviations on Turbine Performance

Mohammad Alizadeh, University of Tehran; Alireza Fathi, K. N. Toosi University of Technology

GTIndia2012-9659 – Transpiration Boundary Conditions for a Steady Inverse Method

Jinguan Yang, Northwestern Polytechnical University; Hu Wu, Northwestern Polytechnical University

GTIndia2012-9730 – Numerical Studies on Aero-Thermal Performance for a Single Stage Turbine with Variable Rotor-Stator Axial Gap Using Steady and Harmonic Model

Sathish Kumar Sunnam, Honeywell Technology Solutions; Sridhar Murari, Honeywell Technology Solutions; Ramakumar Bommisetty, Honeywell Technology Solutions

1-7 Intakes & Ducts

Session Chair: Ravichandran Srinivasan, PES Institute of Technology

Session Co-Chair: Ashok Gopinath

GTIndia2012-9506 – Aerodynamic Shape Optimization of Air-Intakes of a Helicopter Turboshaft

Ernesto Benini, University of Padova; Andrea Garavello, HIT09 Srl; Claudio Comis, University of Padova; Rita Ponza, HIT09 Srl; Marco Russo, HIT09 Srl

GTIndia2012-9541 – Numerical Analysis of Flow in S-Duct Diffusers With and Without Flow Control

R.K. Sullerey, Indian Institute of Technology; Sourabh Bhat, University of Petroleum and Energy Studies

GTIndia2012-9547 – Annular Supersonic Ejector Design and Optimization

Sathiyamoorthy K, National Aerospace Laboratories; Venkat S Iyengar, National Aerospace Laboratories; Manjunath P, National Aerospace Laboratories

Room Name: Bordeaux

GTIndia2012-9589 – Parametric Study of Axial Flow Turbine for Mean-Line Design and Blade Elements

Ramanamurthy Seepana, Gas Turbine Research Estb.; S. Kishore Kumar, Gas Turbine Research Estb.

GTIndia2012-9510 – Steam Turbine Rotor Blade Cascades Aerodynamic Performance Research at Off-Design Incidence

Ziming Feng, Northeast Petroleum University; Gu Hui-Bin, Northeast Petroleum University; Zhang Jin-Dong, Northeast Petroleum University

GTIndia2012-9650 – Investigation of Outlet-Pressure Adaptation Mechanisms for Steam-Turbine Rotor Section

Hossein Beheshti Amiri, Amirkabir University (Tehran Polytechnic); Mohammad Jafar Kermani, Amirkabir University of Technology (Tehran Polytechnic); Aliakbar Piroozi, Iran University of Science and Technology

Room Name: Olio

GTIndia2012-9555 – Simulations of 3-D Separation in a Diffuser

Amitkumar Shende, InfoTech Enterprises Limited; Manoj Verma, Infotech Enterprises Limited; Trilok Vashist, Infotech Enterprises Limited; Joseph Mathew, Indian Institute of Science

GTIndia2012-9615 – CFD Simulation of Steam Ejector System in High Altitude Test Facility

Venugopal Dadi, JNTU Hyderabad; Kishenkumar Reddy, Jawaharlal Nehru; P. Bharamara, JNTU Collage of Engineering; Pavani Sreekireddy, JNTU Hyderabad

GTIndia2012-9648 – Cost-effective Hybrid RANS-ILES Method for Jet Turbulence and Noise Prediction

Mahak M., University of Cambridge; Prasun K. Ray, Imperial College; Paul G. Tucker, University of Cambridge

Session Details

TRACK: THERMAL

2-5 Droplets and Atomization

Session Chair: Sreedhara S, IIT

GTIndia2012-9544 – Numerical Investigation of High Pressure Hydrogen Released in Air

U Umesh, Indian Institute of Technology Kanpur; Ashoke De, Indian Institute of Technology Kanpur; Dr. Malay Das, Indian Institute of Technology Kanpur

GTIndia2012-9549 – Effective Radiation Modeling Technique for Transient Temperature Prediction of Gas Turbine Components

S.Y. Suresh Cherukupalli, Infotech Enterprises Limited; Krishna Nelanti, Infotech Enterprises Limited; John Sunil Palle, Infotech Enterprises Limited; Kamlesh Gujar, Infotech Enterprises Limited

GTIndia2012-9604 – Experimental Characterization of Premixed Flame in Gas Turbine Combustor with Spectroscopy and RGB Analysis

Arkadeep Kumar, Jadavpur University; Kamalika Chatterjee, Jadavpur University; Swarnendu Sen, Jadavpur University; Achintya Mukhopadhyay, Jadavpur University

Room Name: Gadda Da Vida

GTIndia2012-9605 – Effect of a Confined Outer Air Stream on Instability of an Annular Liquid Sheet Exposed to Gas Flow

Souvick Chatterjee, Jadavpur University; Koushik Ghosh, Jadavpur University; Swarnendu Sen, Jadavpur University; Achintya Mukhopadhyay, Jadavpur University; Samiran Samanta, Jadavpur University

GTIndia2012-9539 – Phenomenon of Flow Pumping Through Counterbore Cavities

S. Sendilkumaran, GE India Technology Centre Pvt Ltd; Karthik Srinivasan, QuEST Global



Wind turbines that help power India.

It's not often technology inspires art. This artwork from the Kutch region captures the positive influence of GE wind power on communities across India. Lighting up homes and improving the quality of lives. Just another way GE works to help power India. www.ge.com/in



imagination at work

BDO

Session Details

TRACK: GAS TURBINE SYSTEM OPERABILITY & PERFORMANCE

4-2 Operability

Room Name: Champagne II

Session Chair: Vikas Mishra, L&T Power

GTIndia2012-9515 – Development of a Hydraulic Filter for Nozzle Actuating System of a Gas Turbine Engine

Arul Jothi B, Combat Vehicles Research and Development Establishment; Junaid Basha AM, Combat Vehicles Research and Development Establishment

GTIndia2012-9645 – Thermodynamic Optimization and Offdesign Performance Analysis of a Toluene-based Rankine Cycle for Waste Heat Recovery from Medium Size Gas Turbines

Riccardo Ferraro, Università degli Studi di Firenze; Carlo Carcasci, University of Florence

GTIndia2012-9685 – Filtration of Gas Turbine Lube Oil Using Anti-Static Filters

Khalid Farooq, Pall Corporation; Meghdoot Arwindekar, Pall Corporation

GTIndia2012-9703 – Towards Development of a Diagnostic and Prognostic Tool for Civil Aero-Engine Component Degradation

Nqobile Khani, Cranfield University; Clara Segovia, Cranfield University; Ritindar Singh, Cranfield University; Rukshan Navaratne, Cranfield University; Vishal Sethi, Cranfield University; Pericles Pilidis, Cranfield University

GTIndia2012-9742 – Experimental Investigation of Methane Lean Blowout Limit; Effects of Dilution, Mass Flow Rate and Inlet Temperature

Parisa Sayad, Department of Energy Sciences, Lund University; Alessandro Schonborn, Department of Energy Sciences, Lund University; Denny Clerini, University of Perugia; Jens Klingmann, Thermal Power Eng., Lund University

GTIndia2012-9622 – Development of a Low Varnish & Long Life Gas Turbine Oil

James Hannon, ExxonMobil Fuels, Lubricants & Petroleum Specialties Company; Andrea Wardlow, ExxonMobil Research & Engineering; Jessica Prince, ExxonMobil Research & Engineering

SATURDAY, DECEMBER 1, 2012 | 15:50 to 17:30

TRACK: AERODYNAMICS

1-8 Combustors

Room Name: Bordeaux

Session Chair: Govardhan M, Indian Inst of Technology Madras

Session Co-Chair: Shailesh Bhaisora

GTIndia2012-9520 – Effect of Inlet Tangential Port Area on the Performance of Small Scale Simplex Atomizer

Muthu Selvan, National Aerospace Laboratories; Kumaran S, Anna University; Magesh R, Anna University; Dinesh Kanth TP, National Aerospace Laboratories; Vinod Kumar Vyas, National Aerospace Laboratories; Muralidhara H S, National Aerospace Laboratories

GTIndia2012-9538 – Effect of Casing Geometry on Flow Characteristics in a Model Can-Combustor

Abdur Rahim, Jamia Millia Islamia; Prabal Talukdar, Indian Institute of Technology; Dhirgham Alkhafagiy, University of Babylon

GTIndia2012-9674 – Studies on Optimization of a Liquid Fuel Based Low Emission Combustor

Vanteru Mahendra Reddy, IIT Bombay; Darshan Sawant, IIT Bombay; Sudarshan Kumar, IIT Bombay

Session Details

TRACK: AERODYNAMICS

1-10 Wind Turbines & Propellers II

Session Chair: L Venkatakrishnan, National Aerospace Laboratories

Session Co-Chair: Vidyadhar Mudkavi

GTIndia2012-9741 – Wave Rotor Pressure Gain Combustion Analysis for Power Generation and Gas Turbine Applications

Manikanda Rajagopal, Indiana University – Purdue University Indianapolis; Abdullah Karimi, Indiana University – Purdue University Indianapolis; M Razi Nalim, Purdue University

GTIndia2012-9733 – Numerical Simulation of the Aerodynamic Behavior of Propellers Blades at Subsonic Conditions

Mohamed B. Farghaly, Institute of Aviation Engineering and Technology; Ahmed F. El-Sayed, Zagazig University, Egypt.; Galal B. Salem, Cairo University, Egypt University

GTIndia2012-9731 – Effect of Eroded Particle Initial Velocity on the Erosion of Propeller Blades for Turbo-prop Engines

Mohamed B. Farghaly, Institute of Aviation Engineering and Technology; Ahmed F. El-Sayed, Zagazig University, Egypt.; Galal B. Salem, Cairo University, Egypt

GTIndia2012-9651 – Investigation of Geometry, Total Condition and Waves Effect on Two Phase Liquid-Vapor Flow Using Equilibrium Thermodynamics

Hossein Beheshti Amiri, Amirkabir University (Tehran Polytechnic); Aliakbar Pirooz, Iran University of Science and Technology; Mohammad Jafar Kermani, Amirkabir University of Technology (Tehran Polytechnic); Sabah Hamidi, Department of Mechanical & Aerospace Engineering, Science & Research Branch, Islamic Azad University

Room Name: Olio



CSIR-National Aerospace Laboratories (NAL), set up at Bangalore in 1959, is one of the largest CSIR laboratories. NAL's primary objective is to offer R&D support in Aerospace Engineering and related areas.



TRACK: THERMAL

2-1 Film Cooling I Room Name: Gadda Da Vida

Session Chair: Andallib Tariq,

Indian Institute of Technology Roorkee

GTIndia2012-9568 – Second Law Efficiency of an Intercooled-Reheated-Regenerative Brayton Cycle with Variable Temperature Heat Reservoirs

Vishal Anand, Infotech Enterprises Limited; Krishna Nelanti, Infotech Enterprises Limited; Kamlesh Gujar, Infotech Enterprises Limited

GTIndia2012-9577 – Unsteady RANS Simulation of Film Cooling Jets in a Cross-Flow with an Improved K-Tau Model

Asif Hoda, International Islamic University; Sumanta Acharya, Louisiana State University

GTIndia2012-9578 – Development of an Improved K-Tau Model for Film Cooling Applications

Asif Hoda, International Islamic University; Sumanta Acharya, Louisiana State University

GTIndia2012-9644 – Flow and Heat Transfer Analysis of Turbine Blade Cooling Passages Using Network Method

Mohammad Alizadeh, University of Tehran; Ali Izadi, University of Tehran; Alireza Fathi, K. N. Toosi University of Technology; Hiwa Khaledi, Sharif University of Technology

Session Details

TRACK: STRUCTURES & DYNAMICS

3-1 Fatigue and Fracture I

Session Chair: *K S Raghavan, Infotech Enterprises Limited*

GTIndia2012-9518 – **Finite Element Transient Dynamic Analysis of Delaminated Composite Conical Shells Subject to Low Velocity Impact**

Sudip Dey, Jadavpur University, Kolkata, India; Manoj Roy, Mechanical Engineering Department, Jadavpur University, Kolkata – 700032, India; Amit Karmakar, Jadavpur University, Kolkata, India

GTIndia2012-9587 – **Review of the State of Art in the Life Evaluation Technologies of Gas Turbine Parts**

Murugesan Seerangan, GE India Tech Centre Pvt Ltd; Jalindar Walunj, GE India Technology Center; Kishore Kumar Somayajula, GE India Technology Center

GTIndia2012-9530 – **Optimization of a Centrifugal Impeller for a Small Gas Turbine Engine: A Finite Element Approach**

R K Mishra, Center for Military Airworthiness and Certification; S. Essaki Muthu, Engine and Testbed R&D Center; S. Dileep, Engine & Test Bed R&D Centre, HAL

GTIndia2012-9590 – **Research on Structural Design and Optimization of Turbine Blade Shroud**

Jiang Fan, Beihang University; Xiuli Shen, BeiHang University; Le Han, Beihang University; Rongqiao Wang, Beihang University; Weiwei Zeng, Beihang University; Zhipeng Chang, Beihang University

Room Name: Burgundy

TRACK: GAS TURBINE SYSTEM OPERABILITY & PERFORMANCE

4-3 Performance II

Session Chair: *Amitava Datta, Jadavpur University*

GTIndia2012-9505 – **Performance of a Turbohaft Engine for Helicopter Applications Operating at Variable Shaft Speed**

Gianluigi Alberto Misté, University of Padova; Ernesto Benini, University of Padova

GTIndia2012-9564 – **Defect Diagnosis of Power Plant Gas Turbine Using Hybrid SVM-ANN Method**

Sangmyeong Lee, Posco Energy; Juchang Lim, Posco Energy; Sangbin Lee, Posco Energy; Sanghun Lee, Posco Energy

GTIndia2012-9660 – **Assessment of Gas Turbine Performance in Pre-Combustion IGCC Power Plant**

Ashok Dave, University of Ulster Jordanstown; Sina Rezvani, University of Ulster Jordanstown; Ye Huang, University of Ulster Jordanstown; David M'iveen-Wright, University of Ulster Jordanstown; Neil Hewitt, University of Ulster Jordanstown

GTIndia2012-9693 – **Numerical Modeling of Erosion in Highly-Loaded Axial Flow Fans**

Alessandro Corsini, Sapienza University of Rome; Paolo Venturini, Sapienza University of Rome; Franco Rispoli, Sapienza University of Rome; Anthony Sheard, Flakt Woods

Room Name: Champagne II



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– Allan J. Volponi, Ph.D., ASME Fellow

Discipline Chief & Senior Fellow, Diagnostics, Prognostics and Health Management, Pratt & Whitney



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