



GT India

ASME 2021 Gas Turbine India Conference

December 2 - 3, 2021

Virtual, Online

FINAL PROGRAM

*Presented by The American Society of
Mechanical Engineers® (ASME®)*

<https://event.asme.org/GT-India>



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ASME 2021 Gas Turbine India Conference



Message from the Conference Chair



A warm welcome to invited guests, honorable members, speakers, contributors and all the online participants to the biennial Gas Turbine (GT) India Conference 2021. GT India Conference is a keenly observed event which brings turbomachinery Original Equipment Manufacturer's, Component Suppliers & vendors, End customers, Academics, Researchers, Policy makers in Government bodies under one roof.

Due to the ongoing worldwide Covid-19 pandemic, this is the first time in the history of 9 years of GT India Conference that we are conducting this event virtually. Nonetheless, we can expect strong technical presentations, engaging panel discussions, End user ambitions and industry observations around the application's, developments, challenges, solutions and ongoing research in the area of Gas Turbine.

Thank you to exhibitors & sponsors for your continued support of this conference over the years. I wish to also thank the core organizing group led by Vidya Venkataramani from GE, Prof. A. M. Pradeep from IIT-Bombay, Dr. Shraman Goswami from Honeywell for bringing this event to life.

Even today Gas Turbine's continuing to play a vital role in aircraft propulsion, combined-cycle power generation for heat & power, industrial application and Oil & Energy vertical. Recently, there is an observable shift in their R&D focus from higher output and efficiency, towards exploring newer fuel mixes, lowering emissions, novel materials & manufacturing methods/techniques, smarter predictive service, digital solutions incl. digital twins. In this conference, in addition to the traditional sessions we have created focused sessions on service solution, additive manufacturing and artificial intelligence/machine learning to accommodate these emerging areas of innovation.

Perhaps now more than any time in the past, fast growing economies are witnessing a strong growing demand for Energy. However, an increased focus on decarbonization and climate change poses a challenge for industries and governments to take steady and sustainable action. This present' a huge opportunity to develop viable technical solutions that must suit the local economies and the emerging geo-politics. Given India's bold policy measures in the Energy sector & transportation sector, I am confident that Gas Turbine's technology will remain relevant in the foreseeable future.

Globally we already see several examples of Gas Turbine's offering significant potential in the transition and transformation to a cleaner and greener society. For instance, Using Green Hydrogen as part of fuel mix in GT's for power generation, Bio-fuels in aircrafts, Power-to-X-to-Power and Mobile power generation unit for flexible and emergency power requirements closer to the consumer zones (natural calamities, war stricken zones).

The scale of these challenges requires a well networked ecosystem in which stakeholders (OEMs, Academia/research org, End customers, policy makers etc.) bring forth their specialization to enable co-creation of specific solutions in different verticals. I sincerely hope and wish GT India 2021 will serve as valuable forum for policy makers & think tanks who work closely with the Government bodies to present their views and analysis of the future; the industry/research agencies to understand the challenges and formulate appropriate solutions & for the academia to explore novel innovative research topics that could be commercialized for the benefit of all.

I share your enthusiasm in learning about the technical innovations related to Gas Turbines and look forward to your active engagement in collectively making this event a grand success.

Stay safe and wish you all good health.

Manish Purohit

Siemens India

Sponsors and Exhibitors

Platinum Club



Silver Club



Bronze Club





Schedule at a Glance

Thursday, December 2, 2021





Inauguration	10:00 AM-10:15 AM
Keynote Paul Garbett, Siemens Energy : The Role of Turbomachinery in the Decarbonization of Energy	10:15 AM-11:15 AM
Coffee & Tea Break	11:15 AM - 11:25 AM
Technical Sessions	11:25 AM-12:55 PM
Posters Review Session & Lunch Break	12:55 PM-1:35 PM
Panel Discussion: Advanced methods for Analysis & Design	1:35 PM - 3:05 PM
Coffee & Tea Break	3:05 PM - 3:15 PM
Technical Sessions	3:15 PM -5:15 PM
BVSSS Prasad Memorial Lecture: Prof. Srinath Ekkad, North Carolina State University	4:30PM - 5:15 PM

Friday, December 3, 2021

Technical Sessions	9:30 AM-11:00 AM
Coffee & Tea Break	11:00 AM-11:10 AM
Keynote Alok Nanda, GE: Energy Transition Imperatives for Sustainability	11:10 AM-12:10 PM
Future of Aviation and Disruptive Innovation: Ramakrishnan Parasuraman, Honeywell	12:10 PM-1:40 PM
Lunch Break	1:40 PM-2:20 PM
Panel Discussion: Decarbonization of Turbomachinery	2:20 PM-3:50 PM
Coffee & Tea Break	3:50 PM-4:00 PM
Technical Sessions	4:00 PM-5:30 PM
Closing Ceremony	5:30PM-5:45PM

Conference Leadership

Organizing Committee

Conference Chair	Technical Program Chair	Review Chair	Review Vice Chair
			
Manish Purohit Siemens India	Vidya Venkataramani GE Aviation	Professor A M Pradeep IIT Bombay	Dr. Shraman Goswami Honeywell

GT India Group Executive Committee

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Hiteshkumar Mistry, GE

Past Chair

Prof. Joseph Mathew, IISc

Student Seminars Chair

Abdul Nassar, SoftInWayDigital Engineering Private Limited

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Kali Charan, INFOSYS

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Sanjay Sharan, ONGC

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Mariasundaram Antony, GE Power

A M Pradeep, IIT Bombay

Muthu Veerappan, GTRE

Manish Purohit, Siemens

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Vice-Chair

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Member

Caroline Marchmont, Ansaldo Energia

Richard Sandberg, University of Melbourne

Daniela Gentile, Ansaldo Energia

Tim Stone, GE

Charles Soothill, Sulzer

Nateri Madavan, NASA

Susan Scofield, Siemens



Keynote Speaker

The Role of Turbomachinery in the Decarbonization of Energy

Thursday, December 2, 10:15 - 11:15 AM



Paul Garbett

General Manager, Large Gas Turbine Modules Engineering for Siemens Energy,
Gurgaon, India

Garbett is currently the Head of Product & Solution Development and the General Manager of Large Gas Turbine Modules Engineering for Siemens Energy based in Gurgaon, India.

Paul graduated with a degree in Mechanical Engineering from Cambridge University in 1989 and joined Ruston Gas Turbines as a Graduate Trainee. He specialized in stress methods working on Small Industrial Gas Turbine models.

Paul moved to Westinghouse (now Siemens) in the USA in 1996 as a turbine blade design engineer. From 2003 to 2010 he led the development of the SGT5-8000H Gas Turbine culminating in validation at the Ulrich-Hartmann power plant in Irsching, Germany.

Paul currently leads the Compressor, Combustor, Turbine and Whole Engine design teams for the Siemens Energy Large Gas Turbine product range. Recently Paul relocated to India to also lead the cross-product engineering R&D team focused on rotating machinery and auxiliary systems.

Paul is a Chartered Engineer and Corporate Member of the Institution of Mechanical Engineers in the UK, is a member of the ASME Industrial Advisory Board and formerly a member of the ASME Gas Turbine Segment Leadership Team.

Panel Session

Advanced Methods for Analysis & Design

Thursday, December 2, 1:35 - 3:05 PM

Four panelists, two from Academia and two from Industry, will present their views on this topic drawn from their substantial experience. From academia you can expect coverage of conventional types of analyses that are only now being applied in industrial settings and novel methods that have changed the approach to diagnosing and predicting system dynamics. From industry we will hear of how novel methods have and can be expected to change the practice of analysis and design.

Panelists



Dr. R. I. Sujith
IIT Madras



Santosh Hemchandra
Indian Institute of Science
(IISc)



Ravi Avancha
GE Research



Jaydeep Basani
Honeywell Technology
Solution Lab

Moderator



Dr. Joseph Mathew
Indian Institute of Science
(IISc)



Invited Speaker

Prof. BVSSS Prasad Memorial Invited Lecture

Thursday, December 2, 4:30 - 5:15 PM



Dr. Srinath V. Ekkad

Department Head and RJ Reynolds Professor
Mechanical & Aerospace Engineering Department at
North Carolina State University



Prof. BVSSS Prasad

Dr. S. V. Ekkad (Panelist) is the Department Head and RJ Reynolds Professor in the Mechanical & Aerospace Engineering Department at North Carolina State University since September 2017. He previously served as the Associate Vice President for Research Programs at Virginia Tech. He also held the title of Rolls-Royce Commonwealth Professor for Aerospace Propulsion Systems at Virginia Tech. He was also the Founder and Director of the Rolls-Royce University Technology Center for Advanced System Diagnostics at Virginia Tech, one of 30 centers around the world, prior to joining NC State. He was in the Mechanical Engineering department at Virginia Tech from August 2007 to September 2017 after 9 years at LSU and 2 years at Rolls-Royce Allison Engine Company in Indianapolis. He received his Ph.D. from Texas A&M University and M.S. from Arizona State University. He has over 25 years of experience in heat transfer related research. He has published over 250 journal & conference articles, three patents and co-authored a book and three book chapters. He currently has funding from Solar Turbines, and Trilocus Aerospace Systems/Chromalloy. He has been working on gas turbine cooling and heat transfer issues since 1989 including a stint as a design engineer at Rolls-Royce, Indianapolis before his academic career. Dr. Ekkad has also served as a summer faculty fellow at AFRL, Dayton in 2003. He is well known for his contributions to heat transfer experimental methods. In 2004, he received the inaugural ASME Bergles/Rohsenow Young Investigator in Heat Transfer Award for significant contributions to the field of heat transfer by a researcher under the age of 36. He is also the Editor-in-Chief for the ASME Journal for Thermal Science and Engineering Applications. He was recently named to receive the 2022 AIAA Air Breathing Propulsion Award.

Keynote Speaker

Energy Transition Imperatives for Sustainability

Friday, December 3, 11:10 - 12:10 PM



Alok Nanda

CEO GE India Technology Centre
CTO GE South Asia

Alok Nanda leads 5000+ engineers and scientists across multi-disciplinary R&D labs and industry verticals including Aviation, Healthcare, Power, and Renewables. Alok inspires collocated multi-disciplinary GE technology teams in India to create value beyond individual team potential. He is responsible to drive regional business outcomes through innovative technology solutions and to maximize value for GE from the India ecosystem through strategic partnerships, monetizing IP, and external funding. Prior to his current role, Alok was the Chief Operating Officer at GE India Technology Centre, and General Manager for Engineering in India for GE Aviation. He developed and led an innovative and high-performing team to create deep technical impact across the GE Aviation business and established a successful Services Engineering organization in the region to support GE's key customers. Alok has been with GE for about 20 years and has held engineering and technical leadership positions across Aviation, Power and Global Research. Prior to joining, GE, Alok spent eight years at the Indian Defense Research & Development Organization (DRDO). Alok is the co-chairperson of the CII (Confederation of Indian Industry) National Committee on R&D & Innovation. Alok has a master's degree in mechanical engineering from Indian Institute of Technology, Mumbai; and is based in Bangalore, India.



Invited Speaker

Future of Aviation and Disruptive Innovation

Friday, December 3, 12:10 - 1:40 PM



Ramakrishnan Parasuraman

Honeywell Technology Solutions

Ramakrishnan Parasuraman alias Ramki is the Senior Director of Engineering for Engines and Power Systems at Honeywell Technology Solutions, Bangalore, India. At Honeywell India, Ramki leads the engineering team for aerospace propulsion engines, auxiliary power units and aircraft electrical systems and components. He has over 25 years of progressive experience in the aerospace industry driving global product development and technology initiatives with a strong business acumen. He is responsible to deliver world class solutions from concept to full scale development for leading aerospace majors by leveraging innovation, execution, organizational excellence, and talent transformation. Prior to joining Honeywell, Ramki was a Scientist and Deputy Project Director at National Aerospace Laboratories, Bangalore, India. He was part of the team which designed and developed SARAS, India's first civil aircraft. At NAL, Ramki was responsible for mechanical systems and the integration of aircraft leading to flight tests. Ramki holds a Masters degree in Engineering, in Aviation Transport, from Riga Aviation University, Riga, Latvia. Ramki's interests are in systems design, multi disciplinary optimization, organizational development, and next gen technologies.

Panel Session

Decarbonization of Turbomachinery

Friday, December 3, 2:20 - 3:50 PM

Four panelists, two from Academia and two from Industry, will present their views on this topic drawn from their substantial experience. From academia you can expect coverage of conventional types of analyses that are only now being applied in industrial settings and novel methods that have changed the approach to diagnosing and predicting system dynamics. From industry we will hear of how novel methods have and can be expected to change the practice of analysis and design.

Panelists



Erik Zindel
Siemens Energy



**Prof. Satyanarayanan
Seshadri**
IIT Madras



**Dr. K. A.
Subramanian**
IIT Dlehi



**Prof. Murugesan
Seerangan**
GE Gas Power

Moderator



Prof. Rangan Banerjee
IIT Bombay



THURSDAY, DECEMBER 2, 2021

TRACK: 11-01 Analytics & Digital Solutions (incl. AI/ML) for Gas Turbines/Rotating Machinery Part I

11:25 AM to 12:55 PM

Plenary Hall

Track Chair: **Hiral Shah** – Siemens Ltd.

Track Chair: **Harish R** – Siemens Ltd.

Track Chair: **Aparna Rajaguru** – GE Aviation

Session Chair: **Hiral Shah** – Siemens Ltd

Technical Paper Presentations:

Comprehensive Review & Enhancements on Probe Substitution Techniques for Faulty Steady State Inlet Pressure Distortion Data, {GTIndia2021-75945}

- **Mithilesh Rajendrakumar** - Honeywell Technology Solutions Lab Pvt Ltd.
- **Manu Vyas** - Honeywell Technology Solutions Lab Pvt Ltd.
- **Prashant Deshpande** - Honeywell Technology Solutions Lab Pvt Ltd.
- **Bommaian Balasubramanian** - Honeywell Technology Solutions Lab Pvt Ltd.
- **Kevin Shepherd** - Honeywell International Inc

Inverse Design of Airfoils Using Convolutional

Neural Network and Deep Neural Network, {GTIndia2021-74765}

- **Nagabhushana Rao Vadlamani** - Indian Institute of Technology, Madras
- **Amit Kumar** - Indian Institute of Technology

Application of Machine Learning Based Surrogate Model for Prediction of Sectional Temperature of Radially Cooled Gas Turbine Blades, {GTIndia2021-76053}

- **Rishabh Shrivastava** - Siemens Ltd.
- **Nisha Tamar** - Siemens Ltd.
- **Amit Grover** - Siemens Ltd.
- **Debdulal Das** - Siemens Ltd.

TRACK: 01-01 Compressors, Fans and Pumps

11:25 AM to 12:55 PM

Session Room 1

Track Chair: **Dr. Chetankumar Mistry** – Indian Institute of Technology, Kharagpur

Session Chair: **Dr. N Rao Vadlamani** – Indian Institute of Technology, Madras

Technical Paper Presentations:

3D CFD Approach to Predict the Performance of a Centrifugal Compressor With Surge and Choke Limits, {GTIndia2021-76045}

- **Abishek Sriram** - Simerics India
- **Jeff Schlautman** - General Motors
- **Mehul Varshney** - Simerics India
- **Dipak Maiti** - Simerics India
- **Shyam Sundar Pasunurthi** - Simerics, India
- **Hui Ding** - Simerics Inc
- **Raj Ranganathan** - Simerics Inc

Numerical Investigations on Aerodynamic Design Criteria for Low Speed Mixed Flow Compressor,

{GTIndia2021-76013}

- **Hemant Kumar** - Indian Institute of Technology
- **Chetan S. Mistry** - Indian Institute of Technology

Vaneless Diffuser Performance in a Supercritical Carbon Dioxide Centrifugal Compressor with Real Gas Effects, {GTIndia2021-76030}

- **Lakshminarayanan Seshadri** - Indian Institute of Science
- **Pramod Kumar** - Indian Institute of Science Bangalore

TRACK: 02-01 Turbines**11:25 AM to 12:55 PM****Session Room 2**Track Chair: **Nitin Bhardwaj** – Siemens Ltd.Session Chair: **Pugalenthi Nandagopal** – Siemens**Technical Paper Presentations:****Life Prediction of Thermal Barrier Coated C3X Gas Turbine Blade of CMSX-4 Material,** {GTIndia2021-76004}

- **Ajmit Kumar** - Motilal Nehru National Institute of Technology
- **Sanket Kumar** - Motilal Nehru National Institute of Technology
- **Kailash Narayan Pandey** - Motilal Nehru National Institute of Technology

Numerical Investigations on Effect of Inflow Parameters on Development of Secondary Flow Field for Linear LP Turbine Cascade, {GTIndia2021-76008}

- **Anand P. Darji** - Indian Institute of Technology

- **Beena D. Baloni** - SardarVallabhbhai National Institute of Technology
- **Chetan S. Mistry** - SardarVallabhbhai National Institute of Technology

Thermodynamic Modeling and Performance Simulation of Combined Cycle Power Plant Under Design and Off-Design Condition, {GTIndia2021-75827}

- **Lalatendu Pattanayak** - International Institute of Information Technology
- **Biranchi Narayan Padhi** - International Institute of Information Technology
- **Hemant Gajjar** - TPL (O&M CCPP)

TRACK: 05-01 Structure & Dynamics**11:25 AM to 12:55 PM****Session Room 3**Track Chair: **Siddharth Jain** – Siemens Ltd.Session Chair: **Saurabh Phalke**, GE Aviation



Technical Paper Presentations:

Coupled Thermal-Structural Analysis of Generator For sCO₂ Turbomachinery, {GTIndia2021-76451}

- **Ramesha Guntanur** - Indian Institute of Science
- **Ashutosh Patel** - Indian Institute of Science
- **Vijay Biradar** - Indian Institute of Science
- **Pramod Kumar** - Indian Institute of Science

Natural Frequency and Resonance Study of FGM Turbo-Machinery Blade Using Campbell Diagram, {GTIndia2021-76440}

- **Apurba Das** - IEST
- **Subhendu Pal** - Jadavpur University
- **Su Ziyi** - Tokyo Institute of Technology

- **Mrutyunjay Rout** - Government College of Engineering, Kalahandi
- **Kazuaki Inaba** - Tokyo Institute of Technology
- **Amit Karmakar** - Jadavpur University

Life Augmentation of Turbine Exhaust System Compensators Through Integrated MADM Optimization Approach of Stress Based Fatigue Cycles, {GTIndia2021-76690}

- **Nitin Pagar** - MIT-ADT University
- **Amit Patil** - MESCOE

TRACK: 06-01 Renewable Energy (Solar, Wind)

11:25 AM to 12:55 PM

Session Room 4

Track Chair: **Dhiman Chatterjee** – Indian Institute of Technology, Madras

Session Chair: **Ranjan Das** – Indian Institute of Technology, Ropar

Technical Paper Presentations:

Efficiency Analysis of Savonius-Style Wind Turbine in Hydrodynamic Flow Field, {GTIndia2021-76209}

- **Diplina Paul** - North Carolina State University
- **Abhisek Banerjee** - North Carolina State University

A Numerical Study of Flow Around Different Hydrofoil Systems In Presence of the Free Surface, {GTIndia2021-75821}

- **Nutan Kumari** - Indian Institute of Technology

- **Arnab Chakraborty** - Indian Institute of Technology

Effect of Solidity on Performance of Vertical Axis Wind Turbine Using Constant Chord Reynolds Number, {GTIndia2021-75993}

- **P. Anirudh** - Amrita School of Engineering
- **Ratna Kishore Velamati** - Amrita School of Engineering
- **K. S. Srinath** - Amrita School of Engineering
- **D. Unnikrishnan** - Amrita School of Engineering

TRACK: 01-02 Compressors, Fans and pumps

3:15 PM to 5:15 PM

Session Room 1

Track Chair: **Dr. Chetankumar Mistry** – Indian Institute of Technology, Kharagpur

Session Chair: **Dr. Dilipkumar B. Alone** – CSIR – National Aerospace Laboratories

Technical Paper Presentations:

Impact of Uniform Surface Roughness on the Aerodynamic Performance of an Axial Compressor Rotor at Different Rotational Speeds, {GTIndia2021-75987}

- **Ashima Malhotra** - Honeywell Technology Solutions
- **Shraman Goswami** - Honeywell Technology Solutions
- **A. M. Pradeep** - Indian Institute of Technology, Bombay

A Parametric Study on the Effect of Casing Treatment Slots on Performance Enhancement of a Single Stage Axial Flow Compressor, {GTIndia2021-76007}

- **Gautham A. Amin** - Manipal Institute of Technology
- **Pramod B. Salunkhe** - Manipal Institute of Technology
- **Chandrakant R. Kini** - Manipal Institute of Technology

Investigation on Flat-Fan Spray Characterization in High-Speed Air Coflow for Gas Turbine Online Water Washing Application, {GTIndia2021-76062}

- **Kiran Kumar** - Indian Institute of Technology, Madras
- **Vasudev Chaudhari** - Indian Institute of Technology, Madras
- **Srikrishna Sahu** - Indian Institute of Technology, Madras
- **Ravindra G. Devi** - Baker Hughes

Effect of Airfoil Vortex Generator on the Performance and Stability of a Transonic Axial Compressor Stage, {GTIndia2021-75881}

- **Subbaramu Shivaramaiah** - M.S. Ramaiah University of Applied sciences
- **Mahesh K. Varpe** - M. S. Ramaiah University of Applied Sciences

TRACK: 08-01 Emerging Technologies (Hybrid Electric Propulsion, UAV,...)

3:15 PM to 5:15 PM

Session Room 2

Track Chair: **Sushilkumar Shevakari** – GE Aviation

Session Chair: **Sushilkumar Shevakari** – GE Aviation

Technical Paper Presentations:

Cavity for Flow Control and Performance Improvement of Airfoil, {GTIndia2021-76415}

Anand Verma - Indian Institute of Technology, Guwahati

Bastav Borah - Indian Institute of Technology, Guwahati

Vinayak Kulkarni - Indian Institute of Technology, Guwahati

Design of Autonomous Unmanned System for Aerial Operations from Underwater Platforms, {GTIndia2021-76354}

- **Vindhya Devalla** - University of Petroleum and Energy Studies
- **Cris Thomas** - Università degli Studi di Genova
- **Adhithyan Neduncheran** - University of L'Aquila
- **Shiv Capoor** - TIF Labs Ltd.
- **Amit Kumar Mondal** - Manipal Academy of Higher Education



Vortex Shedding Analysis in the Wake of a Flat Plate at Low Incidence and Low Reynolds Number, {GTIndia2021-75959}

- **Bastav Borah** - Indian Institute of Technology, Guwahati
- **Anand Verma** - Indian Institute of Technology, Guwahati
- **Vinayak Kulkarni** - Indian Institute of Technology, Guwahati
- **Ujjwal K. Saha** - Indian Institute of Technology, Guwahati

Investigations on Selection of Suitable Propellers for High Payload Based Unmanned Aerial Vehicles Using Advanced Computational Simulations, {GTIndia2021-68678}

- **Vijayanandh Raja** - Kumaraguru College of Technology
- **Arul Prakash Raji** - Kumaraguru College of Technology
- **Senthil Kumar Madasamy** - Kumaraguru College of Technology
- **Feonsa Antonitta Bernard** - Kumaraguru College of Technology
- **Vaidegi Rameshbabu** - Kumaraguru College of Technology
- **Vijayakumar Mathaiyan** - Kumaraguru College of Technology
- **Naveen Kumar Kulandaiyapan** - Kumaraguru College of Technology

TRACK: 05-02 Structure & Dynamics

3:15 PM to 5:15 PM

Session Room 3

Track Chair: **Siddharth Jain** - Siemens Ltd.

Session Chair: **Krishna Gogula**

Technical Paper Presentations:

A Study on Low Velocity Impact Behaviour of Functionally Graded Sandwich Conical Shell Under Thermal Environment, {GTIndia2021-73468}

- **Apurba Das** - Indian Institute of Engineering Science and Technology
- **Subhendu Pal** - Jadavpur University
- **Gopal Agarwal** - Jadavpur University
- **Kazuaki Inaba** - Tokyo Institute of Technology
- **Tripuresh Deb Singha** - Government College of Engineering and Textile Technology
- **Amit Karmakar** - Jadavpur University

Stiffness Analysis of Delaminated Composite Beams Using Roller Clamps, {GTIndia2021-76042}

- **P. G. Vivek** - NIT
- **Ankuran Saha** - NIT
- **Apurba Das** - IEST

- **Kazuaki Inaba** - Tokyo Institute of Technology
- **Amit Karmakar** - Jadavpur University

Investigations on Structural Integrity of Piping Compensators Under Angular Rotational Deformation, {GTIndia2021-76462}

- **Nitin D. Pagar** - MIT School of Engineering
- **Sudarshan Sanap** - MIT School of Engineering

Ring Segment Life Improvement Through Hook Gap and Stiffness Optimization., {GTIndia2021-76098}

- **Saurabh Gorai** - Siemens Energy
- **Ravi Khandelwal** - Siemens Energy
- **Debdulal Das** - Siemens Energy
- **Fathi Ahmed** - Siemens Energy
- **Radan Radulovic** - Siemens Energy

TRACK: 11-02 Analytics & Digital Solutions (incl. AI/ML) for Gas Turbines/Rotating Machinery

3:15 PM to 5:15 PM

Session Room 4

Track Chair: **Hiral Shah** – Siemens Ltd.

Track Chair: **Harish R** – Siemens Ltd.

Track Chair: **Aparna Rajaguru** – GE Aviation

Session Chair: **Aparna Rajaguru** – GE Aviation

Technical Paper Presentations:

Modelling Wall-Pressure Spectra in Turbulent Boundary Layers Using Neural Networks, {GTIndia2021-76301}

- **Akash Haridas** - Indian Institute of Technology, Madras
- **Nagabhushana Rao Vadlamani** - Indian Institute of Technology, Madras

Machine Learning Based Classification Model for Predicting Cyclic Failure in Radially Cooled Gas Turbine Blades, {GTIndia2021-76058}

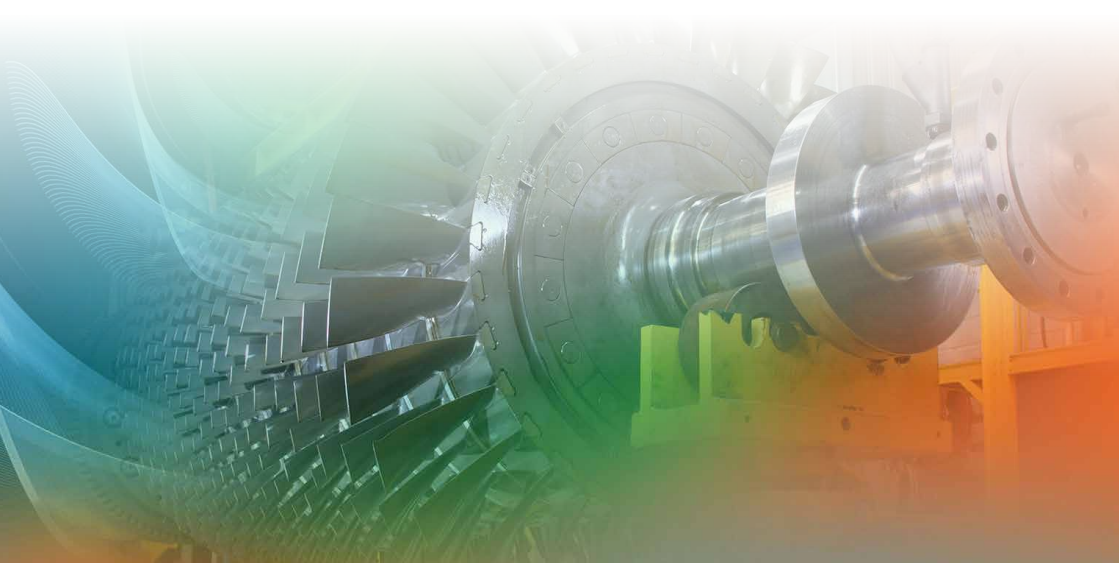
- **Rishabh Shrivastava** - Siemens Ltd.
- **Ankush Kapoor** - Siemens Ltd.
- **Stuti Kaushal** - Siemens Ltd.
- **Amit Yadav** - Siemens Ltd.
- **Pavankumar Vodnala** - Siemens Ltd.

A Nonlinear Dynamic Reduced-Order Model for a Large Gas Turbine Outer Casing Low Cycle Fatigue Prediction, {GTIndia2021-76056}

- **Aditya Dubey** - Siemens Ltd.
- **Rishi Relan** - Siemens Ltd.
- **Uwe Lohse** - Independent Consultant
- **Jaroslav Szwedowicz** - Siemens Energy AG

Application of Machine Learning in Turbulent Combustion for Aviation Gas Turbine Combustor Design, {GTIndia2021-76442}

- **Vishwas Verma** - Honeywell Technology Solutions Lab Pvt. Ltd.
- **Kiran Manoharan** - Honeywell Technology Solutions Lab Pvt. Ltd.
- **Jaydeep Basani** - Honeywell Technology Solutions Lab Pvt. Ltd.





FRIDAY, DECEMBER 3, 2021

TRACK: 04-01 Combustion, Fuels and Emission

9:30 AM to 11:00 AM

Session Room 1

Track Chair: **Ashoke De** – Indian Institute of Technology, Kanpur

Session Chair: **Santanu De** – Indian Institute of Technology, Kanpur

Technical Paper Presentations:

Numerical Investigation Into the Effect of Air Swirl on Non-Premixed Combustion, {GTIndia2021-76016}

B. Anuj - Indian Institute of Technology, Hyderabad

G. Mahesh Nayak - Indian Institute of Technology, Hyderabad

- **B. Yogesh** - Indian Institute of Technology, Hyderabad
- **B. Saravanan** - Indian Institute of Technology, Hyderabad

Numerical Investigation on the Cavity Implementation Methods in Trapped Vortex Combustor, {GTIndia2021-75934}

• **M. S. Nisanth** - Indian Institute of Science, Bangalore

• **Pratikash P. Panda** - Indian Institute of Science

• **R. V. Ravikrishna** - Indian Institute of Science

Numerical Behaviour of Primary Air Flow Field of a Swirl Injector Under High Pressure and High Temperature Condition, {GTIndia2021-76449}

• **Rampada Rana** - Gasturbine Research Establishment, DRDO

• **Muthuveerappan Nagalingam** - Gas Turbine Research Establishment, DRDO

• **Saptarshi Basu** - Indian Institute of Science

TRACK: 06-02 Renewable Energy (Solar, Wind)

9:30 AM to 11:00 AM

Session Room 2

Track Chair: **Dhiman Chatterjee** – Indian Institute of Technology, Madras

Session Chair: **Sukanta Roy** – Curtin University Malaysia

Technical Paper Presentations:

Experimental Investigation of Performance Characteristics for Savonius-Style VAWTs: A Comparative Study, {GTIndia2021-76040}

- **Diplina Paul** - North Carolina State University
- **Abhisek Banerjee** - North Carolina State University

Optimized Small Vertical Axis Wind Turbine, {GTIndia2021-74879}

- **Moshe Zilberman** - AZRIELI, Academic College of Engineering

• **Abdelaziz Abusbaih** - AZRIELI, Academic College of Engineering

• **Ibraheem Hadad** - AZRIELI, Academic College of Engineering

Performance Enhancement of Horizontal Axis Wind Turbine Using Numerical Techniques, {GTIndia2021-76268}

- **Poornima Menon** - Manipal Institute of Technology
- **Srinivas G** - Manipal Institute of Technology

TRACK: 10-01 Additive & Advanced Manufacturing (including material, Coatings, Composites, CMCs)

9:30 AM to 11:00 AM

Session Room 3

Track Chair: **Yathiraj Kasal** – GE Additive

Track Chair: **Megha Navalgund** – GE India Industrial Pvt. Ltd.

Session Chair: **Sanjay Sondhi**, GE Global Research

Technical Paper Presentations:

Microstructural Evolution of Lpbf Alsimg – Effect of Water Quenching Vs Furnace Cooling Vs Direct Aging, {GTIndia2021-75837}

- **Dheepa Srinivasan** - Pratt & Whitney R&D Center
- **Dayananda Narayana** - Pratt & Whitney R & D Center

Experimental and Modeling Studies on the Stress Relaxation Behaviour of Ti-6Al-4V Alloy, {GTIndia2021-75873}

- **Kali Prasad** - Indian Institute of Technology, Madras
- **Hariharan Krishnaswamy** - Indian Institute of Technology, Madras

- **Dilip K. Banerjee** - National Institute of Standards and Technology (NIST)

Characterization of Mechanical Property of PLA-ABS Functionally Graded Material Fabricated by Fused Deposition Modeling, {GTIndia2021-76025}

- **Ziyi Su** - Tokyo Institute of Technology
- **Kazuaki Inaba** - Tokyo Institute of Technology
- **Amit Karmakar** - Jadavpur University
- **Apurba Das** - Indian Institute of Engineering Science and Technology

TRACK: 07-01GT Auxiliary System (Inlets and Exhausts, Fuel gas system, GT starting devices...)

9:30 AM to 11:00 AM

Session Room 4

Track Chair: **Debasish Biswas** – Toshiba Corp

Track Chair: **Muralidhar Manavalan** – Honeywell

Session Chair: **Muralidhar Manavalan** – Honeywell

Technical Paper Presentations:

Development of a New Loss Model for Turbomachinery Labyrinth Seals, {GTIndia2021-76061}

- **Davendu Y. Kulkarni** - Rolls-Royce Plc.
- **Luca di Mare** - University of Oxford

Influence of Texture Portion and Dimple Area

Density on the Tribological_x000B_Characteristics of Dimple Textured Hydrodynamic Journal Bearing, {GTIndia2021-75989}

- **Nayab Rasool Syed** - Indian Institute of Technology, Guwahati
- **Sashindra Kumar Kakoty** - Indian Institute of Technology, Guwahati



TRACK: 01-03 Compressors, Fans and pumps

12:10 PM to 1:40 PM

Session Room 1

Track Chair: **Dr. Chetankumar Mistry** – Indian Institute of Technology, Kharagpur

Session Chair: **Dr. Chetankumar Mistry** – Indian Institute of Technology, Kharagpur

Technical Paper Presentations:

Aerodynamic Performance Evaluation of Axial Flow Fan Using Numerical Techniques,

{GTIndia2021-76443}

- **Raghuvaran D.** - Manipal Academy of Higher Education (MAHE)
- **Satvik Shenoy** - Manipal Academy of Higher Education (MAHE)
- **Srinivas G** - Manipal Academy of Higher Education (MAHE)

Effect of Rotor Tip Casing Treatment on the Performance and Stability of a Transonic Axial Compressor,

{GTIndia2021-75882}

- **Subbaramu Shivaramaiah** - M. S. Ramaiah University of Applied Sciences
- **Mahesh K. Varpe** - M. S. Ramaiah University of Applied Sciences
- **Mohammed Afzal** - M. S. Ramaiah University of Applied Sciences

Lightweight Material Optimization of Aquatic Vehicles' Propeller Based on Fatigue Life Using Hydro Structural Interaction Simulation,

{GTIndia2021-68531}

- **Vijayanandh Raja** - Kumaraguru College of Technology
- **Naveen Kumar Kulandaiyapan** - Kumaraguru College of Technology
- **Raj Kumar Gnanasekaran** - Kumaraguru College of Technology
- **Indira Prasanth Subramaniam** - Kumaraguru College of Technology
- **Kesavan Kandasamy** - Kumaraguru College of Technology
- **Arul Prakash Raji** - Kumaraguru College of Technology
- **Senthil Kumar Madasamy** - Kumaraguru College of Technology

TRACK: 02-02 Turbines

12:10 PM to 1:40 PM

Session Room 2

Track Chair: **Nitin Bhardwaj** – Siemens Ltd.

Session Chair: **Nitin Pundhir** – Siemens AG

Technical Paper Presentations:**Influence of Coolant on Cooling Performance Sensitivity of Internally Convective Turbine Vane,** {GTIndia2021-76021}

- **Thanapat Chotroongruang** - King Mongkut's Institute of Technology Ladkrabang
- **Prasert Prapamonthon** - King Mongkut's Institute of Technology Ladkrabang
- **Rungsimun Thongdee** - King Mongkut's Institute of Technology Ladkrabang
- **Thanapat Thongmuenwaiyathon** - King Mongkut's Institute of Technology Ladkrabang
- **Zhenxu Sun** - Chinese Academy of Sciences
Bo Yin - Chinese Academy of Sciences

Validating the Iterative Design Procedure for an Axial Flow Turbine Test Rig, {GTIndia2021-76080}
Rajat Arora - Indian Institute of Technology, Kanpur (IITK)

- **Ramraj H. Sundararaj** - Indian Institute of Technology, Kanpur (IITK)
- **T. Chandra Sekar** - Indian Institute of Technology, Kanpur (IITK)
- **Abhijit Kushari** - Indian Institute of Technology, Kanpur (IITK)

Design of Duct Passages for an Air Turbine Starter Test Rig, {GTIndia2021-76152}

- **Sadhram Usean R** - Indian Institute of Technology, Madras
- **Prasad B. V. S. S. S.** - Indian Institute of Technology, Madras
- **Milind Dhabade** - GE India Industrial Pvt. Ltd.
- **Amit Kurvinkop** - GE India Industrial Pvt. Ltd.
- **Vishnuvardhan Tatiparthi** - GE India Industrial Pvt. Ltd.

TRACK: 05-03 Structure & Dynamics**12:10 PM to 1:40 PM****Session Room 3**Track Chair: **Siddharth Jain** – Siemens Ltd.Session Chair: **Mayank Rajoria** – Siemens Ltd.**Technical Paper Presentations:****Dynamic Analysis of a Slant-Cracked Functionally Graded Rotor-Bearing System,** {GTIndia2021-74620}

- **Aneesh Batchu** - Bennett University
- **Prabhakar Sathujoda** - Bennett University

- **Srinivas Chinthapally** - Honeywell Technology Solutions Pvt. Ltd.
- **Avinash Kumar** - Honeywell Technology Solutions Pvt. Ltd.

Sensitivity of the Spool Rate on the Dynamic Response of the System, {GTIndia2021-76036}

- **Arnab Das** - Honeywell Technology Solutions Pvt. Ltd.
- **Praveen Iyappan** - Honeywell Technology Solutions Pvt. Ltd.

Numerical Study of Single Pad Externally Adjustable 120° Pad Bearing Using Fluid Structure Interaction, {GTIndia2021-76427}

- **Harishkumar Kamat** - Manipal Institute of Technology
- **Satish Shenoy B** - Manipal Institute of Technology
- **Chandrakant R. Kini** - Manipal Institute of Technology



TRACK: 06-03 Renewable Energy (Solar, Wind)

12:10 PM to 1:40 PM

Session Room 4

Track Chair: **Dhiman Chatterjee** – Indian Institute of Technology, Madras

Session Chair: **Abdus Samad** – Indian Institute of Technology, Madras

Technical Paper Presentations:

Genetic Algorithm Based Optimization Technique for Savonius-Style Wind Turbine, {GTIndia2021-76041}

- **Diplina Paul** - North Carolina State University
- **Abhisek Banerjee** - North Carolina State University

Dimple Shape Effect on the Aerodynamic Performance of H-Rotor Darrieus Vertical Axis Wind, {GTIndia2021-76017}

- **Kabita Naik** - Indian Institute of Technology, Guwahati
- **Niranjan Sahoo** - Indian Institute of Technology,

Guwahati

Estimating the Aerodynamic Coefficients of a Savonius Rotor Blade Profile Developed Through the Simplex Search Method, {GTIndia2021-75990}

- **Man Mohan** - Indian Institute of Technology, Guwahati
- **Divyeshkumar D. Kansagara** - Indian Institute of Technology Guwahati
- **Deepak Sharma** - Indian Institute of Technology, Guwahati
- **Ujjwal K. Saha** - Indian Institute of Technology, Guwahati

TRACK: 03-01 Heat Transfer

4:00 PM to 5:30 PM

Plenary Hall

Track Chair: **Arun K. Saha** – Indian Institute of Technology, Kanpur

Session Chair: **Andallib Tariq** – Indian Institute of Technology, Roorkee

Technical Paper Presentations:

Numerical Investigation Into the Effects of CoFlow Air on a Self-Excited Helium Jet, {GTIndia2021-76002}

- **G. Mahesh Nayak** – Indian Institute of Technology, Hyderabad
- **B. Abinash** – Indian Institute of Technology, Hyderabad
- **Saravanan B.** – Indian Institute of Technology, Hyderabad
- **P. Satyanarayana Raju** – National Institute of Technology Karnataka

Assessment of LES and RANS-LES Hybrid Models for Heat Transfer Predictions in Effusion Cooled Combustor Liners, {GTIndia2021-76467}

- **Vishwas Verma** – Honeywell Technology Solutions Lab Pvt. Ltd.
- **Kiran Manoharan** – Honeywell Technology Solutions Lab Pvt. Ltd.
- **Jaydeep Basani** – Honeywell Technology Solutions Lab Pvt. Ltd.
- **Dustin Brandt** – Honeywell Aerospace

TRACK: 09-01 GT Operation and Maintenance (Services, predictive maintenance, remote diagnostics)

4:00 PM to 5:30 PM

Session Room 1

Track Chair: **Pradeep Chauhan** – Pipeline Infrastructure Ltd.

Session Chair: **Sanjay Sharan**

Technical Paper Presentations:

Identification of the Mathematical Model of a Gas Turbine Engine With Taking Into Account the Uncertainty of the Initial Data, {GTIndia2021-76018}

- **Oleg Baturin** – Samara National Research University
- **Grigorii Popov** – Samara National Research University
- **Paúl Nicolalde** – Samara National Research University
- **Anastasia Korneeva** – Samara National Research University

Combined Cycle Powerplant Cost Sensitivity Analysis, {GTIndia2021-75844}

- **Pugalenth Nandagopal** – Siemens Energy
- **Animesh Pandey** – Siemens Energy
- **Manjunath More** – Siemens Energy
- **Pertik Kamboj** – Siemens Energy

Influence of Degradation, Fuel Price and Electricity Cost Factors on Combine Cycle Power Plant Cost Analysis, {GTIndia2021-75952}

- **Pugalenth Nandagopal** – Siemens Energy
- **Matthias Duerr** – Siemens Energy
- **Ole Fahrendorf** – Siemens Energy
- **Dan Haid** – Siemens Energy
- **Hubert Paprotna** – Siemens Energy

TRACK: 02-03 Turbines

4:00 PM to 5:30 PM

Session Room 2

Track Chair: **Nitin Bhardwaj** – Siemens Ltd.

Session Chair: **Nitin Pundhir** – Siemens AG

Technical Paper Presentations:

Preliminary Aerodynamic Design of a S-CO₂ Axial Turbine, {GTIndia2021-76454}

- **R. Senthil Kumaran** – CSIR-National Aerospace Laboratories
- **Dilipkumar B. Alone** – CSIR-National Aerospace Laboratories
- **Abdul Nassar** – Softinway Turbomachinery Solutions Pvt Ltd.,
- **Pramod Kumar** – Indian Institute of Science

Theoretical Estimation of Minimum and Maximum

Allowable Rotational Speed of Supercritical CO₂ Inward Flow Radial Turbine, {GTIndia2021-76379}

- **Syed J. Hoque** – Indian Institute of Science
- **Pramod Kumar** – Indian Institute of Science

Comparative Study of Barrier Coatings on Turbine Blade Cooling, {GTIndia2021-76436}

- **Kishan A. Singh** – University of Petroleum & Energy Studies
- **Zozimus D. Labana** – University of Petroleum & Energy Studies



TRACK: 05-04 Structure & Dynamics

4:00 PM to 5:30 PM

Session Room 3

Track Chair: **Siddharth Jain** – Siemen Ltd.

Session Chair: **Mayank Rajoria** – Siemens Ltd.

Technical Paper Presentations:

Dynamic Modelling and Free Vibration Characteristics Analysis of Rotating Beams, {GTIndia2021-76426}

- **D. Sachin** – Vellore Institute of Technology
- **Mallikarjuna Reddy** – Vellore Institute of Technology

Effect of Corrosion Pit on the Structural Characteristics of Foil Journal Bearings, {GTIndia2021-76028}

- **Vishal Mourya** – Rotor Dynamics and Vibration Diagnostics Lab
- **Skylab P. Bhore** – Motilal Nehru National Institute of Technology Allahabad

Harmonic Analysis of the High Speed Direct Coupled SC02 Turbo-Generator, {GTIndia2021-76448}

- **Ashutosh Patel** – Indian Institute of Science
- **Vijay Biradar** – Indian Institute of Science
- **Pramod Kumar** – Indian Institute of Science

TRACK: 06-04 Renewable Energy (Solar, Wind)

4:00 PM to 5:30 PM

Session Room 4

Track Chair: **Dhiman Chatterjee** - Indian Institute of Technology, Madras

Session Chair: **Abdus Samad** – Indian Institute of Technology, Madras

Technical Paper Presentations:

Effect of Exit Blade Angle on the Performance of Cross Flow Hydro Turbine: A Numerical Study, {GTIndia2021-76037}

- **Nur Alom** – NIT Meghalaya
- **Bikash Kumar Sarkar** – NIT Meghalaya

Aerodynamic Performance Characterization of a Drag-Based Elliptical-Bladed Savonius Wind Turbine Rotor, {GTIndia2021-76001}

- **Parag K. Talukdar** – Jorhat Engineering College
- **Vinayak Kulkarni** – Indian Institute of Technology, Guwahati
- **Ujjwal K. Saha** – Indian Institute of Technology, Guwahati

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