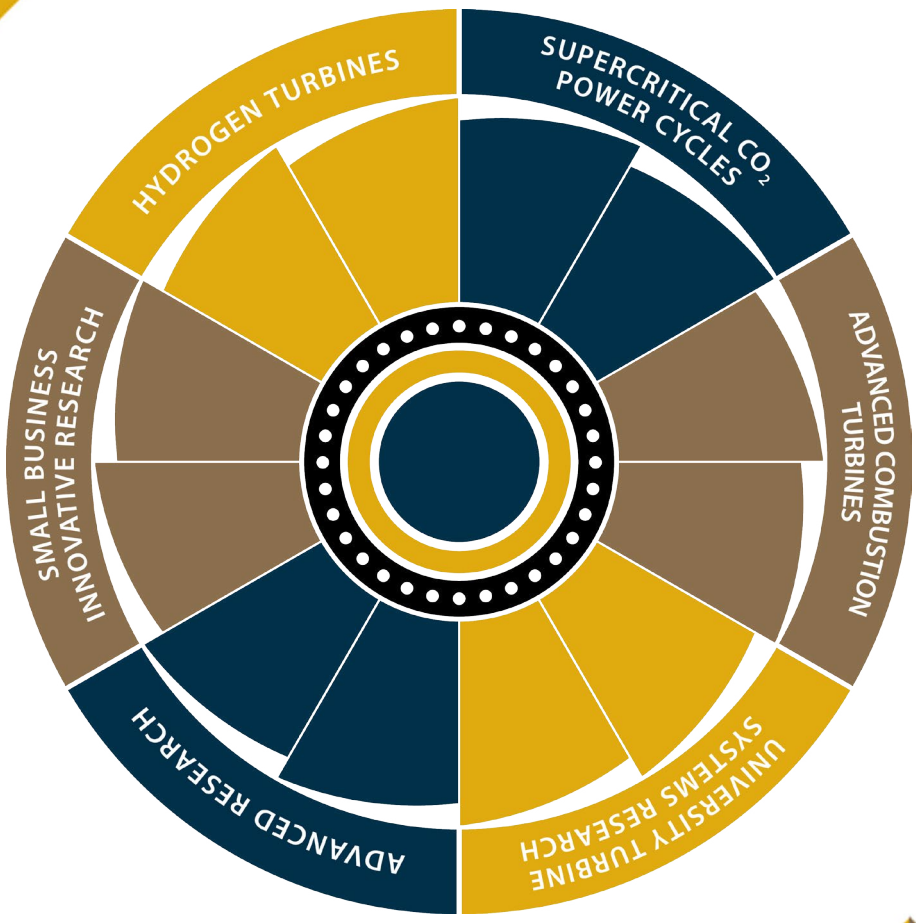
2015 University Turbine Systems Research Workshop



November 3-5, 2015 | Atlanta, GA

Co-organized by

U.S. Department of Energy | Office of Fossil Energy | National Energy Technology Laboratory | Georgia Institute of Technology

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ABOUT THE 2015 UTSR WORKSHOP

The National Energy Technology Laboratory University Turbine Systems Research (NETL-UTSR) program manages a portfolio of university-based turbine research projects. The UTSR program offers a Gas Turbine Industrial Fellowship funded by sponsoring gas turbine manufacturers. This fellowship has helped to facilitate the transition of the best students from academia to the gas turbine industry, thereby helping to maintain U.S. leadership in this important area of technology.

The success of the UTSR program has been made possible by a network of universities, the collaborating gas turbine industry, and the DOE turbine program – all of which are facilitated by an annual UTSR workshop. The workshop is open to the public and brings together experts from academia, industry, and government to present and discuss ongoing turbine research sponsored by the DOE Office of Fossil Energy UTSR program through existing cooperative agreements.

The UTSR program chooses workshop venues that are in close proximity to the leading universities directly involved in turbine research. This year, the UTSR workshop is being held at the Georgian Terrance Hotel, near the Georgia Tech campus in Atlanta, Georgia. This will allow tours of the Georgia Institute of Technology's gas turbine combustion research facilities and the Georgia Tech. Manufacturing Institute. This year's workshop theme is "Advanced Manufacturing for Gas Turbines." Thomas Kurfess, (Professor and HUSCO/Ramirez Distinguished Chair in Fluid Power and Motion Control Georgia Institute of Technology) will be the keynote speaker. Dr. Kurfess recently completed an assignment for the White House Office of Science and Technology Policy where he advised on policy for advanced manufacturing. The workshop will feature two panels focused on advanced manufacturing technologies for the turbine platforms and related R&D needs and challenges. The workshop will include three technology tracks: Materials/Aerodynamics/Heat Transfer, Combustion, and Pressure Gain Combustion/Oxy-Fuel Combustion. The workshop will also include a majority of NETL's extramural projects for the Advanced Turbines Program as well as internal NETL R&D projects. The meeting will feature approximately 60 DOE sponsored projects in the form of oral and poster presentations, including selected oral presentations from the UTSR fellows. There will also be a special after-dinner presentation by David Garrison, (Vice President – Engineering, Quality and Planning of Delta Airlines).

UTSR TECHNOLOGY SUMMARY

Since the inception of the DOE turbine program, the NETL-UTSR program has sought to support the underlying scientific research necessary to develop advanced turbines and turbine-based systems in support of the DOE's turbine program's strategic goals and program mission needs. This is accomplished by funding university-based research projects that address scientific R&D, as well as technical challenges in turbine-based systems and technology. This research focuses on the fundamental and applied issues associated with advancing the performance and efficiency of turbines in fossil fuel power generation beyond current state-of-the-art. Technical areas of interest include combustion, aerodynamics, heat transfer, materials, technology development for supercritical carbon dioxide based power cycles, pressure gain combustion, and oxy-fuel turbine based systems and technology.

The projects are typically three years in duration and focus on applied laboratory/bench scale R&D. Currently 16 universities and 28 projects are involved in the NETL-UTSR program. The innovations and scientific understanding generated under this program will then be transferred to industry manufacturers for incorporation in their next generation turbine technology products with the goal of producing reliable, clean, efficient, and cost-effective energy supplies.

One of the main purposes of this UTSR workshop is to facilitate peer-to-peer knowledge sharing and collaboration across boundaries to create a network of expertise and facilitate the acceleration of advancements in those fields.

ORGANIZING COMMITTEE

Klaus Brun – *Southwest Research Institute*
Patcharin (Rin) Burke – *US DOE – NETL*
Bill Day – *Leonardo Technologies Inc.*
Richard Dennis – *US DOE – NETL*
Tim Lieuwen – *Georgia Institute of Technology*
Karen Lockhart – *Smart Data Solutions, LLC*
Heather Quedenfeld – *US DOE – NETL*

UTSR INDUSTRY COMMITTEE

John Alday – *FlexEnergy*
Jim Causey – *Woodward Governor*
Jim Downs – *Florida Turbine Technologies*
Mike Fox – *Solar Turbines*
Ken Hall – *Siemens*
Kathy Rominger – *GE Power & Water*

LABORATORY TOUR

The Ben T. Zinn combustion lab is one of the largest university combustion research facilities in the country, with approximately 70 faculty, research scientists, and students. Work encompasses a variety of topics for the power generation, aviation, rocket, oil and gas, industrial heating, and petrochemicals industries. With high flow, high pressure, and preheated air capabilities, as well as state of the art diagnostics, the facility works across the R&D spectrum on fundamental to applied problems.

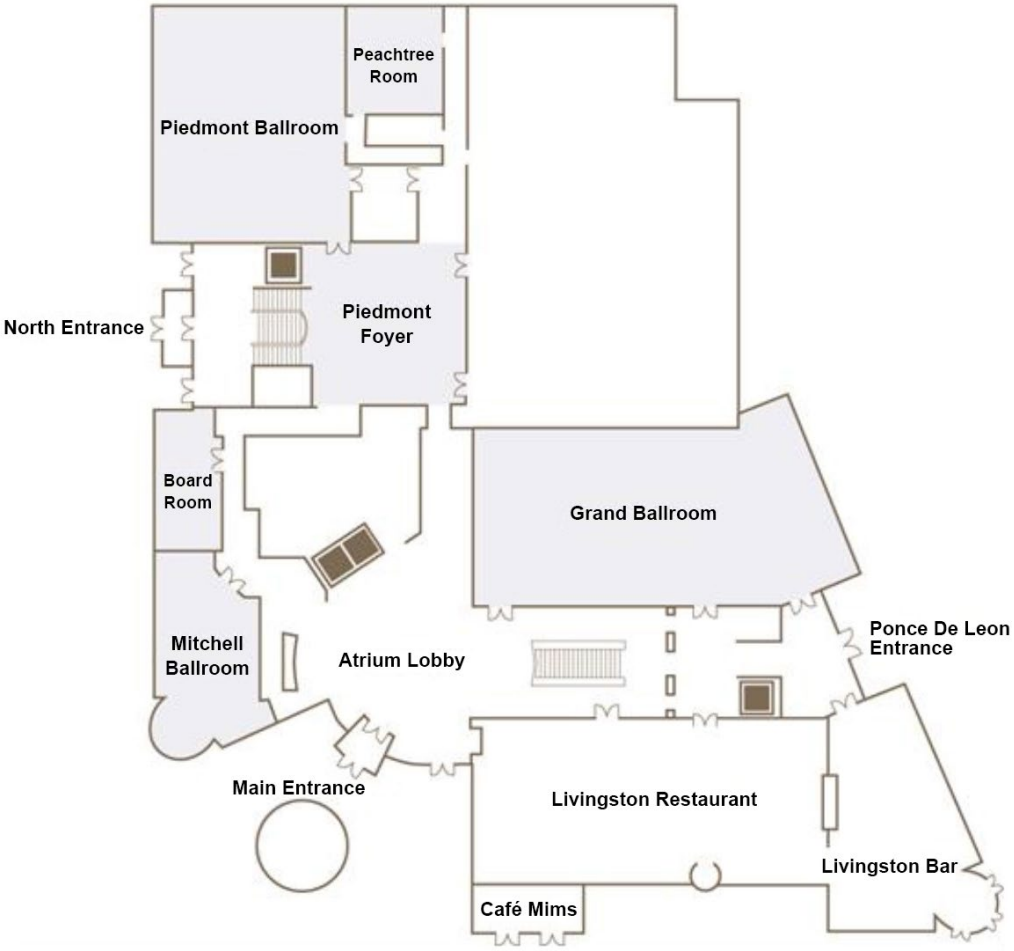
The Georgia Tech Manufacturing Institute brings together top researchers and thought leaders from the many varied disciplines that shape manufacturing — science, engineering, policy, robotics, and management — to help define and solve some of the greatest challenges facing the U.S. industry today. The GT Manufacturing Institute tour will include visiting state of the art labs focused on advanced manufacturing, including the additive manufacturing lab, the precision machining center, the prototyping service center, and the sheet mold compounding line.

AGENDA AT-A-GLANCE

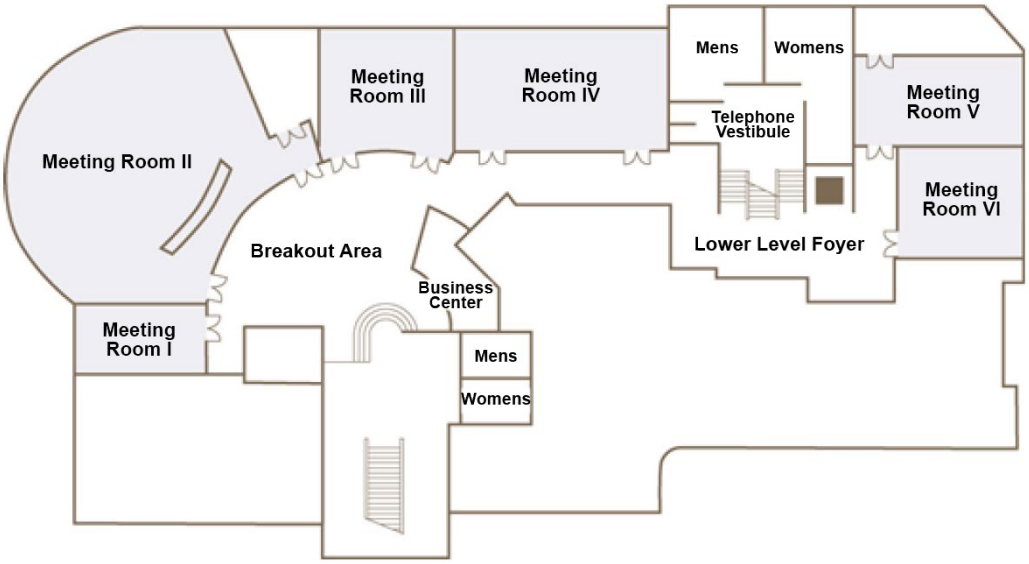
Day/Time	Track 1-Combustion	Track 2-Aero/Heat Transfer/Materials	Track 3- Pressure Gain Comb. & Oxy Fuel Comb.
Tuesday, November 3, 2015			
Tues, 7:00am	Registration - Grand Ballroom Foyer - Continental Breakfast - Meeting Room II		
Tues, 8:00am	Welcome and Introduction - Steve Cross, Executive Vice President for Research, Georgia Institute of Technology		
	General Session - Grand Ballroom		
Tues, 8:10am	Opening Remarks - Richard Dennis, Turbine Technology Manager, NETL		
Tues, 8:20am	Panel Discussion: Gas Turbine OEMs Perspectives on Advanced Manufacturing Technology (Bryan Dods, General Electric Power & Water; Allister James, Siemens Energy, Inc.; Bob Provitola, Mitsubishi Hitachi Power Systems Americas, Inc.; Bill Brindlley, Pratt & Whitney; Karl Wygant, Samsung Techwin America; and David G. Teraji, Solar Turbines, Inc.)		
Tues, 10:20am	Coffee Break - Meeting Room II		
Tues, 10:50am	Panel Discussion: Developers and Practitioners of Advanced Manufacturing Technology (Mike Aller, Energy Florida/CAPE; Tim Simpson, Penn State University; Bruce Pint, ORNL; Suman Das, Georgia Institute of Technology; and Sanjay Sampath Center for Thermal Spray Research, Stony Brook University)		
Tues, 12:30pm	Lunch - Meeting Room II		
	Piedmont Room	Mitchell Room	Grand Ballroom
	New Advanced Turbines Projects (2014)		
	Moderator: Steve Richardson	Moderator: Seth Lawson	Moderator: Don Ferguson
Tues, 1:30pm	GE Power & Water - Michael J. Hughes	Siemens Energy, Inc. - Jay Morrison	Aerojet Pressure Gain Comb. - Scott Claflin
Tues, 2:15pm	Siemens Energy, Inc. - J. Enrique Portillo	GE Power & Water - John Delvaux	United Technologies Research Center - Adam Holley
Tues, 3:00pm	Coffee Break - Meeting Room II		
Tues, 3:30pm	Florida Turbine Technologies. Inc. - Jim Downs	General Electric Global Research - Rahul Bidkar	8 Rivers Capital, LLC - Jeremy Fetvedt
Tues, 4:15pm	Thar Energy, LLC - Lalit Chordia	Gas Technology Institute - Tony Eastland	Southwest Research Institute - Aaron McClung
Tues, 5:00pm	Lab Tour (Georgia Institute of Technology)		
Tues, 7:00 pm	Poster Session/Reception - Meeting Room II		
Wednesday, November 4, 2015			
Wed, 7:00am	Registration - Grand Ball Foyer - Continental Breakfast - Meeting Room II		
	Track 1 - Combustion	Track 2 - Aero/Heat Transfer/Materials	Track 3 - Pressure Gain Comb. & Oxy Fuel Comb.
	Keynote Presentations - Grand Ballroom		
Wed, 8:00am	Key Note Presentation - Thomas R. Kurfess, P.E, Georgia Institute of Technology		
	Moderator: Patcharin Burke	Moderator: Briggs White	Moderator: Robin Ames
Wed, 8:45am	Stanford University - Matthias Ihme	University of California, Irvine - Daniel Mumm	Penn State University - Stephen Peluso
Wed, 9:30am	The University of Texas at Austin - Noel Clemens	Univ. of North Dakota - Forrest Ames, and Univ.of Memphis - Sumanta Acharya	University of Michigan - Mirko Gamba
Wed, 10:15am	Coffee Break - Meeting Room II		
Wed, 10:45am	Univ. of Michigan - Pinaki Pal and Margaret Wooldridge	Purdue University -Thomas Siegmund	NETL- Don Ferguson
Wed, 11:30am	Texas A&M - Eric Petersen	Georgia Insitute of Technology - Rick Neu	Purdue University - Carson Slabaugh
Wed, 12:15pm	Lunch - Meeting Room II		
	Moderator: Patcharin Burke	Moderator: Briggs White	Moderator: Seth Lawson
Wed, 1:30pm	Princeton Univ.- Yiguang Ju, Purdue Univ.- Robert Lucht	Penn State University - Karen Thole	Georgia Institute of Technology - Wenting Sun
Wed, 2:15pm	University of South Carolina - Tanvir Farouk	Univ. of North Dakota, EERC - John Hurley	University of Central Florida - Subith Vasu
Wed, 3:00pm	University of California Irvine - Vince Mcdonell	Virginia Tech. - Srinath Ekkad, and David Gomez Ramirez	ORNL - Bruce Pint
Wed, 3:45pm	Coffee Break - Meeting Room II		
	Moderator: Steve Richardson	Moderator: Robin Ames	Moderator: Don Ferguson
Wed, 4:15pm	University of Michigan - Venkat Raman	NETL - James Black Purdue University - Tom Shih	University of Connecticut - Eric Jordan
Wed, 5:00pm	Penn State University - Jacqueline O'Connor	University of Pittsburgh - Minking Chyu	UES, Inc. - Amarendra K. Rai
Wed, 5:45pm	Georgia Institute of Technology - Tim Lieuwen	The Ohio State University - Jeff Bons	Questek Innovations - James Saal
Wed, 7:00pm	Dinner / Dinner Speaker - David Garrison, Delta Airlines; Vice President – Engineering, Quality and Planning - Grand Ballroom		
Thursday, November 5, 2015			
Thur, 7:30am	Registration / Continental Breakfast - Piedmont Foyer		
	General Session - Grand Ballroom		
Thur, 8:30am	UTSR Fellowship Program - Bill Day, Leonardo Technologies, Inc.		
Thur, 8:45am	UTSR Fellows Presentations - Felipe Alberto Betancor Bernasconi; Christopher Reuter		
Thur, 9:45am	What's Next in UTSR FY 2016-2019 - Richard Dennis, Turbine Technology Manager, NETL		
Thur, 10:00am	Coffee Break - Piedmont Foyer		
Thur, 10:30am	Open Discussion, Workshop Summary, Closing Comments, & Wrap-up - Richard Dennis, Turbine Technology Manager, NETL		
Thur, 11:00am	Adjourn		

GEORGIAN TERRACE HOTEL FLOOR PLAN

Ballroom Level Meeting Space



Lower Level Atlanta Conference Center



DETAILED PROGRAM

TUESDAY, NOVEMBER 3RD

REGISTRATION / CONTINENTAL BREAKFAST
7:00 AM -- Registration - Grand Ballroom Foyer / Continental Breakfast - Meeting Room II

WELCOME AND INTRODUCTION -- Grand Ballroom
8:00 AM -- *Dr. Steve Cross, Executive Vice President for Research at Georgia Institute of Technology*

OPENING REMARKS -- Grand Ballroom
8:10 AM -- *Richard Dennis, Turbine Technology Manager, U.S. Department of Energy, National Energy Technology Laboratory*

PANEL DISCUSSION: GAS TURBINE OEMS PERSPECTIVES ON ADVANCED MANUFACTURING TECHNOLOGY
8:20 AM -- Grand Ballroom -- Moderator: *Richard Dennis, U.S. Department of Energy, National Energy Technology Laboratory*

Bryan Dods, General Electric Power & Water
Allister James, Siemens Energy, Inc.
Bob Provitola, Mitsubish Hitachi Power Systems Americas, Inc
Bill Brindley, Pratt & Whitney
Karl Wygant, Samsung Techwin America
David G. Teraji, Solar Turbines, Incorporated

10:20 AM -- COFFEE BREAK -- Meeting Room II

PANEL DISCUSSION: DEVELOPERS AND PRACTITIONERS OF ADVANCED MANUFACTURING TECHNOLOGY
10:50 AM -- Grand Ballroom -- Moderator: *Tim Lieuwen, Georgia Institute of Technology*

Mike Aller, Energy Florida/CAPE (Consortium for Advanced Production and Engineering of Gas Turbines and Rotating Machinery)
Tim Simpson, Penn State University
Bruce Pint, ORNL
Suman Das, Georgia Institute of Technology
Sanjay Sampath, Stony Brook University, Center for Thermal Spray Research

12:30 PM -- LUNCH -- Meeting Room II

COMBUSTION -- PIEDMONT ROOM (TRACK 1)
Moderator: *Steve Richardson, U.S. Department of Energy, National Energy Technology Laboratory*

1:30 PM -- *DLN Technology for 65% Efficient Generation*
Michael J. Hughes, GE Power & Water

2:15 PM -- *Low NO_X Combustor Design for 65% CC Efficiency*
J. Enrique Portillo, Siemens Energy, Inc.

3:00 PM -- COFFEE BREAK -- Meeting Room II

3:30 PM -- *Advanced Industrial Gas Turbine Development at FTT*
James P. Downs, Florida Turbine Technologies, Inc.

4:15 PM -- *Novel Microchannel Heat Exchangers*
Lalit Chordia, Thar Energy, LLC

DETAILED PROGRAM

TUESDAY, NOVEMBER 3RD

AERO/HEAT TRANSFER/MATERIALS -- GRAND BALLROOM (TRACK 2)

Moderator: *Seth Lawson, U.S. Department of Energy, National Energy Technology Laboratory*

1:30 PM -- *Ceramic Matrix Composite Advanced Transition for 65% Combined Cycle Efficiency*
Jay Morrison, Siemens Energy, Inc.

2:15 PM -- *GE CMC*
John Delvaux, GE Power & Light

3:00 PM -- COFFEE BREAK -- Meeting Room II

3:30 PM -- *SCO_2 Turbomachinery and Low-Leakage End Seals for SCO_2*
Rahul A. Bidkar, General Electric Global Research

4:15 PM -- *Turbomachinery for SCO2 Power Cycles*
Anthony Eastland, Gas Technology Insitute

PRESSURE GAIN COMBUSTION & OXY FUEL COMBUSTION -- MITCHELL ROOM (TRACK 3)

Moderator: *Don Ferguson, U.S. Department of Energy, National Energy Technology Laboratory*

1:30 PM -- *Rotating Detonation Combustion for Gas Turbines*
Scott Claflin, Aerojet Rocketdydne

2:15 PM -- *Combined Cycle Power Generation Employing Pressure Gain Combustion*
Adam Holley, United Technologies Research Center

3:00 PM -- COFFEE BREAK -- Meeting Room II

3:30 PM -- *Syngas Combustor for Oxy-Fuel SCO_2 Cycles*
Jeremy Fetvedt, 8 Rivers Capital, LLC

4:15 PM -- *Oxy-Combustion for Direct Fired Supercritical Carbon Dioxide Power Cycles*
Aaron McClung, Southwest Research Institute

LAB TOUR

5:00 PM -- The Ben T. Zinn Combustion Lab and the Georgia Tech Manufacturing Institute
Buses will board outside of the hotel on Peach Street in front of Buffalo Bayou.

POSTER SESSION/RECEPTION

7:00 PM -- Meeting Room II

DETAILED PROGRAM

WEDNESDAY, NOVEMBER 4TH

REGISTRATION / CONTINENTAL BREAKFAST
7:00 AM -- Grand Ballroom Foyer / Meeting Room II

KEYNOTE PRESENTATION -- Grand Ballroom
8:00 AM -- Advanced Manufacturing, Policy, and Technology Opportunities for American Innovation
Dr. Thomas R. Kurfess, Georgia Institute of Technology

COMBUSTION -- PIEDMONT ROOM (TRACK 1)
Moderator: *Patcharin Burke, U.S. Department of Energy, National Energy Technology Laboratory*

8:45 AM -- *Combustion-Modeling and Fuel-Effects in Gas Turbine Combustors and Experimental Facilities*
Matthias Ihme, Stanford University

9:30 AM -- *Experiments and Large-Eddy Simulation of Flashback in a Model Swirl Combustor*
Noel Clemens, The University of Texas at Austin

10:15 AM -- COFFEE BREAK -- Meeting Room II

10:45 AM -- *Robust, Reliable Low Emission Gas Turbine Combustion of High Hydrogen Content Fuels*
Pinaki Pal and Margaret Wooldridge, University of Michigan, Ann Arbor

11:30 AM -- *High-Pressure Turbulent Flame Speeds and Chemical Kinetics*
Eric Petersen, Texas A&M University

12:15 PM -- LUNCH -- Meeting Room II

1:30 PM -- *Effects of Exhaust Gas Recirculation (EGR) on Turbulent Combustion and Emissions in Advanced Gas Turbine Combustors with High Hydrogen Content (HHC)*
Yiguang Ju, Princeton University and Robert P. Lucht, Purdue University

2:15 PM -- *An Experimental and Modeling Study of NO_X-CO Formation in High Hydrogen Content (HHC) Fuels Combustion in Gas Turbine Applications*
Tanvir Farouk, University of South Carolina

3:00 PM -- *Development of Criteria for Flashback Propensity in Jet Flames for High Hydrogen Content and Natural Gas Type Fuels*
Vincent McDonell, University of California, Irvine

3:45 PM -- COFFEE BREAK -- Meeting Room II

Moderator: *Steve Richardson, U.S. Department of Energy, National Energy Technology Laboratory*

4:15 PM -- *Flame Flashback in Hydrogen-Rich Gas Turbines*
Venkat Raman, University of Michigan

5:00 PM -- *Understanding Transient Combustion Phenomena in Low-NO_X Gas Turbines*
Jacqueline O'Connor, Pennsylvania State University

5:45 PM -- *High Temperature, Low NO_X Combustor Concept Development*
Timothy Lieuwen, Georgia Institute of Technology

DETAILED PROGRAM

WEDNESDAY, NOVEMBER 4TH

AERO/HEAT TRANSFER/MATERIALS -- GRAND BALLROOM (TRACK 2)

Moderator: *Briggs White, U.S. Department of Energy, National Energy Technology Laboratory*

8:45 AM -- *Abradable Sealing Materials for Emerging IGCC-Based Turbine Systems*
Daniel R. Mumm, University of California, Irvine

9:30 AM -- *Thermally Effective and Efficient Cooling Schemes for Advanced Gas Turbines*
Forrest Ames, University of North Dakota and Sumanta Acharya, University of Memphis

10:15 AM -- COFFEE BREAK -- Meeting Room II

10:45 AM -- *Towards Models for Creep-Fatigue Interaction for Gas Turbine Components*
Thomas Siegmund, Purdue University

11:30 AM -- *Long-Term Creep-Fatigue Interactions In Ni-Base Superalloys*
Rick Neu, Georgia Institute of Technology

12:15 PM -- LUNCH -- Meeting Room II

1:30 PM -- *Sealing Measurements for a Vane-Only Configuration*
Karen Thole, Pennsylvania State University

2:15 PM -- *Evaporative Metal Bonding of APMT to Nickel Superalloys*
John Hurley, University of North Dakota, Energy & Environmental Research Center

3:00 PM -- *Lean Pre-Mixed Combustor Flow and Heat Transfer: Isothermal Studies and Start of Reacting Flow Conditions*
Srinath Ekkad and David Gomez Ramirez, Virginia Polytechnic Institute and State College

3:45 PM -- COFFEE BREAK -- Meeting Room II

Moderator: *Robin Ames, U.S. Department of Energy, National Energy Technology Laboratory*

4:15 PM -- *Recent High Temperature Film Cooling Testing at NETL*
James Black, U.S. Department of Energy, National Energy Technology Laboratory

4:45 PM -- *Challenges in Measuring the HTC for Turbine Cooling*
Tom I-P. Shih, Purdue University

5:15 PM -- *Design, Fabrication, and Performance Characterization of Near-Surface Embedded Cooling Channels with an Oxide Dispersion Strengthened (ODS) Coating Layer*
Minking Chyu, University of Pittsburgh

5:45 PM -- *Revolutionizing Turbine Cooling with Micro-Architectures Enabled by Direct Metal Laser Sintering*
Jeffrey Bons, The Ohio State University

DETAILED PROGRAM

WEDNESDAY, NOVEMBER 4TH

PRESSURE GAIN COMBUSTION & OXY FUEL COMBUSTION -- MITCHELL ROOM (TRACK 3)

Moderator: *Robin Ames, U.S. Department of Energy, National Energy Technology Laboratory*

8:45 AM -- *The Effect of Mixture Concentration Inhomogeneity on Detonation Properties in Pressure Gain Combustors*
Stephen Peluso, The Pennsylvania State University

9:30 AM -- *A Joint Experimental/Computational Study of Non-Idealities in Practical Rotating Detonation Engines*
Mirko Gamba, University of Michigan

10:15 AM -- COFFEE BREAK -- Meeting Room II

10:45 AM -- *Experimental and Computational Study of Rotating Detonation Wave Technologies at the National Energy Technology Laboratory*
Don Ferguson, U.S. Department of Energy, National Energy Technology Laboratory

11:30 AM -- *Advancing Pressure Gain Combustion in Terrestrial Turbine Systems*
Carson Slabaugh, Purdue University

12:15 PM -- LUNCH -- Meeting Room II

Moderator: *Seth Lawson, U.S. Department of Energy, National Energy Technology Laboratory*

1:30 PM -- *Investigation of Autoignition and Combustion Stability of High Pressure Supercritical Carbon Dioxide Oxy-Combustion*
Wenting Sun, Georgia Institute of Technology

2:15 PM -- *Chemical Kinetic Modeling Development and Validation Experiments for Direct-Fired SCO_2 Systems*
Subith Vasu, University of Central Florida

3:00 PM -- *Materials Issues for Advanced Supercritical CO_2 Cycles and high Efficiency Gas Turbines*
Bruce Pint, U.S. Department of Energy, Oak Ridge National Laboratory

3:45 PM -- COFFEE BREAK -- Meeting Room II

Moderator: *Don Ferguson, U.S. Department of Energy, National Energy Technology Laboratory*

4:15 PM -- *Ultra-High Temperature Thermal Barrier Coatings*
Eric Jordan, University of Connecticut

5:00 PM -- *High Temperature Unique Low Thermal Conductivity TBC Architectures*
Amarendra K. Rai, UES, Inc.

5:45 PM -- *ICME Design of High Performance Turbine Alloys*
James Saal, Questek Innovations

DINNER/DINNER SPEAKER - GRAND BALLROOM

7:00 PM -- East and West Facility Lounge
David Garrison, Delta Airlines; Vice President, Engineering, Quality and Planning

DETAILED PROGRAM

THURSDAY, NOVEMBER 5TH

REGISTRATION / CONTINENTAL BREAKFAST
7:30 AM -- Piedmont Foyer

UTSR FELLOWSHIP PROGRAM
8:30 AM -- Grand Ballroom

Bill Day, Leonardo Technologies, Inc.

UTSR FELLOWS
8:45 AM -- Grand Ballroom

Felipe Alberto Betancor Bernasconi, General Electric/University of Central Florida – Direct Metal Laser Melting – Analyzing Surface Roughness

Christopher Reuter, Princeton University – Dynamic Instability Limitations in the Testing of an Advanced Premixed Combustor

WHAT'S NEXT IN UTSR FY 2016-2019
9:45 AM -- Grand Ballroom

Richard Dennis, U.S. Department of Energy, National Energy Technology Laboratory

10:00 AM -- COFFEE BREAK -- Piedmont Foyer

OPEN DISCUSSION, WORKSHOP SUMMARY, CLOSING COMMENTS AND WRAP-UP
10:30 AM -- Grand Ballroom

Richard Dennis, Turbine Technology Manager, National Energy Technology Laboratory

ADJOURN
11:00 PM

KEYNOTE BIOGRAPHIES

STEPHEN E. CROSS

In addition to serving as Georgia Tech's Executive Vice President for Research, Dr. Stephen E. Cross is a professor in the H. Milton Stewart School of Industrial and Systems Engineering and an adjunct professor in the College of Computing and the Ernest J. Scheller College of Business. He served as a Vice President and Director of the Georgia Tech Research Institute from 2003 to 2010.

Previously, Dr. Cross was at Carnegie Mellon University as a research faculty member in computer science and Director and CEO of the Software Engineering Institute. Earlier, he was a program manager at the Defense Advanced Research Projects Agency and a faculty member at the Air Force Institute of Technology. A retired military officer, he received the Defense Superior Service Medal and the Air Force Research Award.

Dr. Cross was the University System of Georgia representative to a State of Georgia strategic planning task force on science, technology, and innovation in 2011. He is a member of the Defense Science Board, an advisory service to the Secretary of Defense. A past member of the Air Force Scientific Advisory Board, he has supported studies by the National Research Council, testified to Congress, and served as a consultant to government and industry. During this time he led studies on system-level experimentation and adaptive organizations. He has published widely on leadership, innovation, culture change, software engineering, and technology transition. Dr. Cross is a Fellow of the Institute of Electrical and Electronic Engineers (IEEE) and a former Editor-in-Chief of IEEE Intelligent Systems and an Associate Editor of the Journal of Information, Knowledge, and Systems Management.

He received his BSEE from the University of Cincinnati, his MSEE from the Air Force Institute of Technology, and his PhD from the University of Illinois at Urbana-Champaign.

DAVID GARRISON

David Garrison is vice president – Engineering, Quality and Planning responsible for Delta's engineering and technical services, reliability and maintenance programs, inspection, quality assurance and maintenance planning.

David is a 23 year veteran of Delta TechOps, joining the division in 1991 as a Propulsion Engineer. Since then, he has held various positions throughout TechOps with increasing responsibility. David's diverse leadership experiences include leading Engine & Component Maintenance, Engineering and most recently the Materials, Planning & Logistics organization.

David holds a bachelor's degree in Applied Physics from Emory University as well as a bachelor's degree in Mechanical Engineering from Georgia Institute of Technology. David is from Atlanta. He and his wife Martha have 2 children, Andrew and Megan.

THOMAS K. KURFESS

Thomas Kurfess is the HUSCO/Ramirez Distinguished Chair in Fluid Power and Motion Control and Professor of Mechanical Engineering, Georgia Institute of Technology. During 2012-2013 he was on leave serving as the Assistant Director for Advanced Manufacturing at the Office of Science and Technology Policy in the Executive Office of the President of the United States of America. In this position he had responsibility for engaging the Federal sector and the greater scientific community to identify possible areas for policy actions related to manufacturing. He was responsible for coordinating Federal advanced manufacturing R&D, addressing issues related to technology commercialization, identifying gaps in current Federal R&D in advanced manufacturing, and developing strategies to address these gaps. His research focuses on the design and development of advanced manufacturing systems targeting digital manufacturing, additive and subtractive processes, and large scale production enterprises.

PANEL BIOGRAPHIES

MIKE ALLER

As Executive Director and CEO, Mike Aller is responsible for managing Energy Florida's operations, community and public sector outreach and helps to coordinate several of Energy Florida's industry working groups. Since taking on his current role in 2010, Mike has worked to develop a robust ecosystem of support services for the Florida and the Southeastern U.S. energy technology industry, and built public-private partnerships to help Florida's aerospace, defense and agribusiness industries identify and capture new opportunities in the power generation and clean technology industries.

One of Energy Florida's major areas of focus is advanced turbine technologies and related manufacturing processes. In the turbine sector, Energy Florida is coordinating the NIST Advanced Manufacturing Technology Consortium (AMTech) for Advanced Turbine Manufacturing Technologies - the Consortium for Advanced Production and Engineering of Gas Turbines and Rotating Machinery (CAPE). The CAPE consortium is working with a broad coalition of industry partners from across the country to outline the necessary steps for developing new industrial materials, testing standards and certification parameters enabling the introduction of new materials into the manufacture of gas turbines and rotating machinery.

Mike has over fifteen years' experience in economic and policy analysis, including five years as a researcher at the Brookings Institution and the Peterson Institute for International Economics in Washington DC, and served on the staff of the White House Office of Management and Budget (OMB). He has also served as an adjunct faculty member at Rollins College in Winter Park, Florida, teaching courses on international economics, emerging economies (China and India), and global energy and resource issues. Mr. Aller holds a Masters in international economics and environmental policy from the University of California at San Diego, and a Bachelor's degree in science, technology and international affairs from Georgetown University's Walsh School of Foreign Service. He speaks Mandarin Chinese and French, and is a former member of the US National Rowing Team.

BILL BRINDLEY

Dr. William Brindley is manager, Advanced Manufacturing and Aftermarket Technology and Fellow of Aftermarket Technology at Pratt & Whitney, a world leader in the design, manufacture and service of aircraft engines. Dr. Brindley addresses advanced topics in Manufacturing and Repair and Overhaul, which includes Additive Manufacturing.

Brindley has been involved in multiple aspects of Aerospace research and development for 29 years. At NASA-Lewis (Glenn) Research Center, he studied oxidation and corrosion of aerospace alloys and development of protective coatings, with an emphasis on thermal barrier coatings. At Rolls-Royce Corporation, he served as the manager of the Coatings and Joining groups and managed the development of powder laser deposition (laser cladding) for repair applications.

Brindley is a Fellow of ASM International, has over 55 publications, has been awarded seven patents and has seven patents pending.

SUMAN DAS

Professor Suman Das is the Morris M. Bryan Chair in Mechanical Engineering for Advanced Manufacturing Systems and the Director of the Direct Digital Manufacturing Laboratory at the Georgia Institute of Technology in Atlanta. Das is internationally known for his leadership in the fields of 3D printing and additive manufacturing, having conducted 25 years of research in these fields. His current research interests cover a broad variety of interdisciplinary topics under the overall framework of advanced manufacturing and materials processing, computational design, and materials science for next-generation additive manufacturing. Overall, these efforts are directed towards applications in the Aerospace, Defense, Energy, Healthcare, Automotive and Nanotechnology sectors.

PANEL BIOGRAPHIES

BRIAN DODS

Bryan Dods has 28 years manufacturing experience and serves as the Chief Consulting Engineer - Manufacturing for GE Power & Water with responsibility for ensuring manufacturability and establishing the long range technology plans. He is the 2013 recipient of the M. Eugene Merchant Manufacturing Medal of ASME & SME. Bryan has a Bachelor of Science in Metallurgy, Mechanics, & Materials Science from Michigan State University, a Masters of Science Materials Engineering from Washington University in St. Louis, and a Masters in Business Administration from Washington University in St. Louis. He is currently pursuing degrees in Mathematics. He serves on the advisory boards for the SME North American Manufacturing Research Institute, Greenville Technical College Foundation, Clemson University Mechanical Engineering, University of South Carolina McNAIR Center for Aerospace Innovation & Research, University of South Carolina Upstate Engineering Technology and the South Carolina Upstate STEM Collaborative.

ALLISTER JAMES

Allister James is a Senior Expert within the Manufacturing Development and Industrialization organization at Siemens Energy in Orlando. His primary focus is on the development of advanced manufacturing technologies for hot section gas turbine components.

Allister previously worked for Rolls-Royce Aerospace in Derby, United Kingdom before moving to the USA in 1999 to join the Gas Turbine Materials Development Group at Siemens Westinghouse.

He has a BSc. in Metallurgy and Materials Engineering and a PhD in Advanced materials from the University of Birmingham, United Kingdom.

BRUCE PINT

Bruce Pint is the group leader of the Corrosion Science and Technology group at ORNL where he has worked since 1994. He received his Ph.D. in Ceramic Science and Engineering from M.I.T. in 1992 and has been conducting high temperature oxidation research since 1986. He has led two additive manufacturing projects with industrial partners at ORNL's Manufacturing Demonstration Facility fabricating Ni-base alloys by electron beam and laser processes.

BOB PROVITOLA

Bob Provitola is currently DVP of Global Collaboration for Mitsubishi Hitachi Power Systems Americas in Orlando, Florida. MHPSA is a joint venture of Mitsubishi and Hitachi that encompasses the fossil fuel energy industry. Bob manages business and technical collaboration of MHPSA within the MHPS family companies throughout the globe. Additionally, Bob's duties include M&A, Capitol Asset Management, and Facility Planning. Bob formerly lead the formation of MHPSA factories in Orlando that Manufacture and Repair High Value, Highly Engineered Components for Heavy Duty Industrial Gas Turbines which are supplied to Power Plants throughout the world.

Bob is Chairman of the MAF Center for Advanced Manufacturing Excellence. The Center is a 501C3 focused on promoting Manufacturing Careers and Skills Education in Florida, and the recent recipient of a NIST MEP in Florida now named FloridaMakes.

Additionally, Bob holds positions such as, President of MACF, MAF Board Member, and on the Board of Advisors for the UCF Internship Program, UCF Industrial Engineering, Florida Polytechnic, FLATE, Seminole State College, and Devry University.

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SANJAY SAMPATH

Prof. Sanjay Sampath, is currently director of the Center for Thermal Spray Research at Stony Brook University (www.stonybrook.edu/ctsr) an interdisciplinary industry-university cooperative research center in the field of thermal spray materials manufacturing. Sampath received his Ph.D. degree from Stony Brook in Materials Science in 1989. Following a stint in industry, he rejoined Stony Brook in 1993 and has directed research efforts on various federal and industrially funded programs with emphasis on manufacturing sciences. Under the auspices of the NSF Center, he directed a group of a dozen or so interdisciplinary faculty members towards fundamental understanding of thermal spray processes, materials and applications. The self-sustaining Center is home to the Industrial Consortium for Thermal Spray Technology comprising of 35 leading companies aimed at knowledge transfer from fundamental research to application engineering. He was also principal investigator on a major DARPA grant aimed at developing new processing tools for direct writing of mesoscale electronics and sensors. Sampath has over 250 publications to his credit, 15 patents and several best paper awards. He was elected fellow of two societies (ASM and ACERS), recipient of the R&D 100 award, inducted in the ASM Thermal Spray Hall-of-Fame and recognized as a Distinguished Professor of the State University of New York system.

TIM SIMPSON

Timothy W. Simpson, Ph.D. is a professor of mechanical and industrial engineering at Penn State University and the co-director of the Center for Innovative Materials Processing through Direct Digital Deposition (CIMP-3D), a DARPA-funded manufacturing demonstration facility for additive manufacturing (www.cimp-3d.org). He has received over $30M in funding to support his design and manufacturing research from NSF, ONR, NIST, and DARPA among others, and he has collaborated on projects with a variety of companies, including Bayer Material Science, Boeing, GE, GM, LG, Schlumberger, United Launch Alliance, United Technologies, and Volvo. He is a Fellow of ASME and an Associate Fellow in AIAA, and he is recipient of the 2014 ASME Ben C. Sparks Award and the 2011 ASEE Fred Merryfield Design Award. He is Vice Chair or ASME's Design Engineering Division Executive Committee and Chair of the Executive Advisory Committee for ASME's 2015 and 2016 Additive Manufacturing & 3D Printing Conferences. He is also a member of ASME's Design, Manufacturing, and Materials Segment Leadership Team, and he helped established ASME's new Innovative Additive Manufacturing 3D (IAM3D) Challenge. He received his Ph.D. and M.S. degrees in Mechanical Engineering from Georgia Tech, and his B.S. in Mechanical Engineering from Cornell University.

DAVID TERAJI

David Teraji has spent the last twenty-five years at Solar Turbines Incorporated working in New Product Development, engineering, sales, business development, and customer service support. This included a five-year assignment in Japan. He has been managing new product programs over the last thirteen years, which included Solar's Mercury 50 and Taurus 65 products. Dave also worked at GE Aircraft Engine in Cincinnati for 6 years prior to joining Solar, and has authored numerous technical publications and has two patent awards. Dave has a BSME from the University of Illinois-Champaign-Urbana and an MBA from the University of Antwerp in Belgium.

KARL WYGANT

Dr. Wygant is Vice President and General Manager for the Turbomachinery Advanced Technology Center of Samsung Techwin located in Houston Texas. He holds an M.S. and Ph.D. in Mechanical Engineering from the University of Virginia and an M.B.A. from Norwich University. His management and engineering experience over the past 25 years is related to development of new turbomachinery products and related technology for a wide range of industries.

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