GLOBAL Gas Turbine News

Volume 49, No. 1 • March 2009

ATLANTA, GEORGIA USA • ASME INTERNATIONAL GAS TURBINE INSTITUTE

Register Today for Turbo Expo 2009 in Orlando!

TURBO EXPO
Gas Turbine Technical Congress & Exposition
Presented by the International Gas Turbine Institute

IN THIS ISSUE...

Solving complex global challenges can be a puzzle; attend **ASME Turbo Expo June 8-12, 2009, in Orlando, FL** to piece it all together! For complete details and the latest updates, visit www.turboexpo.org.

Registration for Turbo Expo 2009 is now available online at **www.turboexpo.org**. Register on or before May 11, 2009 to take advantage of early-bird savings! For only $185 (single/double), you can also reserve your room online now at the Orlando World Center Marriott & Resort – a luxurious, world-class resort with golf, tennis, spa, 10 restaurants and lounges and much more.

Highlights of the 2009 conference will include:

SATURDAY-SUNDAY, JUNE 6-7, 2009

• **Training Workshops** - Select from four in-depth, interactive courses being offered.

MONDAY, JUNE 8, 2009

• **Scholar Lecture** - Dr. Nicholas Cumpsty, former Head of the Sustainable Energy Group and Emeritus Professor of Mechanical Engineering, Imperial College, UK, will present his award paper with a perspective on rising fuel costs and the need to reduce emissions. Both land-based power generation and aviation will be addressed.

• **Grand Opening** - Featuring annual awards, a networking lunch and prominent keynote speakers addressing the theme of *Gas Turbine Technologies: Meeting Complex Global Challenges*. Scheduled speakers include Lou J. Cerone, Senior General Manager, Advanced Technology Operations for GE Energy; John Elnitsky, Vice President of Generation and Transmission Construction, Progress Energy; Steve Welhoelter, General Manager, Gas Turbine Product Line, Siemens Energy; and Sunao Aoki, Executive Vice President & Member of the Board, General Manager, Technical Industries, Mitsubishi Heavy Industries, LTD.

• **Technical Congress** - The best in the industry with five days of innovation and state of the art on every aspect of gas turbine technology contributed by academia, government and businesses from around the world.

• **Opening Reception** - Another great networking opportunity with complimentary beverages hosted by the Turbo Expo Local Liaison Committee and Platinum Sponsors, GE, Mitsubishi and Siemens!

TUESDAY, JUNE 9, 2009

• **Expo Hall Open** – View cutting-edge technologies and gas-turbine focused products from a variety of key industry organizations.

• **Women in Gas Turbines Dinner** - Women who work in the gas turbine area are invited to join their colleagues for this complimentary networking event, which is sponsored by Solar Turbines, Incorporated.

WEDNESDAY, JUNE 10, 2009

• **Early Career Engineer - Exposition Hour** - Delegates in the early stages of their engineering careers are encouraged to stop by specially-identified booths and pick up information provided by exhibiting companies with promising openings.

• **Student Mixer** - Network with fellow engineering students while enjoying complimentary refreshments.

We look forward to seeing you in Orlando! ✻

ASME Gas Turbine Golf Tournament Fundraiser

Have fun while supporting the inaugural **ASME Gas Turbine Golf Tournament** benefiting IGTI's Student Scholarship Program. This event is co-hosted by the University of Florida - College of Engineering, the University of Central Florida and the Central Florida Chapter of Virginia Tech.

The tournament will take place on **Sunday, June 7, 2009 at 8:00 AM** (Shotgun Start) at the Hawk's Landing Golf Club, World Center Marriott Resort, Orlando, FL. Register today at **http://www.asmeconferences.org/TE09/GolfFundraiser.cfm.**

The fee of $250 includes 18 holes of golf, golf cart, breakfast, lunch, prizes and awards. Suppliers, consider buying a foursome and have fun while spending one-on-one time with your customers! There are also several sponsorship opportunities. Remember, your participation in this event will benefit our future engineers!

For questions about the Golf Tournament, contact bartons@asme.org.

VIEW FROM THE CHAIR

Dr. Reza S. Abhari, Chairman, IGTI Board of Directors

With the co-printing of GGTN with the ME Magazine, it may be useful to give a brief primer to those who may not be familiar with the International Gas Turbine Institute (IGTI). IGTI is one of the two technical institutes of ASME with its history going back some 65 years. As an institute under the ASME umbrella, IGTI operates with its own separate dedicated professional staff under the direction of our Managing Director in Atlanta, Georgia. Setting strategic direction, as well as oversight of the operations are provided by the IGTI Board of Directors, with a diverse international membership from academia and industry. Key features of IGTI are outlined below.

• Consisting of 16 different technical committees, IGTI has evolved into an organization with a sustainable operational model. These committees are the core of IGTI with many enduring cultures and traditions. One common element of this tradition is a strong sense of volunteerism, being very much valued and nurtured within our community.

• Our main annual conference, TURBO EXPO, is the forum for dissemination of gas turbine technology related research and development knowledge worldwide. Every year between October and February, over 2000 authors, reviewers, and organizers from around the world work together to create an excellent technical content for this meeting. In order to maintain the quality of our conference, every presented paper goes through three independent peer review.

• The technical disciplines cover a range of basic sciences in fluid dynamics, combustion, material, mechanical design and control and diagnostics, covering a range of diverse applications from centralized to distributed power generation, to aircraft engines, to coal and biomass usage, amongst others.

• Our membership is global and represents a balance of academic and industrial engineers. An analysis of past TURBO EXPO contributors shows that approximately half are from academia and the other half from industry/government, bringing in a scientific approach with clear focus on application. The same analysis shows that on average approximately 40% of the contributors are from North America, 40% from Europe, with the other 20% from the rest of the world, primarily Asia.

• By exploring the application and needs of gas turbines, IGTI has expanded its breadth in many areas of power generation, transportation, and oil and gas industries. Relating to applications as diverse as steam turbines for power generation to turbochargers for ships propulsion, our community has expanded its reach beyond the leading position in gas turbine technology.

At IGTI, we are continually looking to the future and how to better serve our constituents. An area of interest to us is to continue expanding our community in other related application areas, including but not limited to turbochargers, steam turbines, and gas compressors. With our focus on energy conversion devices with industrial applications, IGTI provides excellent networking and knowledge building opportunities for our current as well as any new members of the energy conversion technical community. ✲

PROFESSIONAL DEVELOPMENT

ASME International Gas Turbine Institute Training Week

March 23 - 27, 2009 • Southwest Research Institute • San Antonio, TX

A special thanks to SwRI for allowing IGTI to use their facilities for this training week.

Don't miss this unique opportunity for career advancement by attending one or multiple courses being offered at one location!

MARCH 23-24, 2009

"Introduction to Gas Turbines and Centrifugal Compressors"

Instructors: Dr. Klaus Brun, SwRI and Dr. Rainer Kurz, Solar Turbines

OVERVIEW:

This two day class is a unique opportunity to join the experts to learn what you need to know to apply and operate gas turbines and gas compressors in your operation as well as to interact and network with your peers in the field of turbomachinery applications. There will also be an opportunity for hands-on learning using Southwest Research Institute's gas turbines and compressors.

In addition to the theoretical presentations, real life case studies will be presented by the instructors in an interactive forum which will further enhance the students' skills in troubleshooting gas turbine and gas compressors issues. Acquiring and perfecting these skills will enable them to go back to the workplace and perform their job with a much higher level of performance and accuracy.

MARCH 23-25, 2009

"Basic Thermodynamics of Gas Turbine Combined Cycle Plants"

Instructor. Can (John) Gulen, GE Energy's Thermal Systems & Power Plant

OVERVIEW:

The objective of the course is to provide the practicing engineers in power generation industry with fundamental thermodynamic principles that govern the design and performance of Gas Turbine Combined Cycle power plants.

At the end of the course, the participants should be able to do simple but reasonably accurate CC calculations, which do not require more than a hand-held calculator and a sheet of paper, to evaluate new design ideas, to do performance comparisons, to interpret test data and other similar tasks. The materials learned in this course should help participants in day-to-day activities in several aspects by increasing their productivity.

MARCH 25, 2009

"Root Cause Failure Analysis of Gas Turbines"

Instructors: Harold Simmons and David Ransom with SwRI

OVERVIEW:

Root cause failure analysis (RCFA) is the process for identifying the fundamental root cause of a particular failure. The objective of RCFA is to establish firm evidence that can be used to set a course for corrective/preventive action. A thorough RCFA investigation involves utilizing multidisciplinary expertise of metallurgical examination, fluid-structure interaction, fatigue and fracture analysis, corrosion assessment, thermodynamics, and structural dynamics. The course will show how the information gained from each discipline can be combined to reach conclusive determination of the root cause of common gas turbine failures.

MARCH 26, 2009

"Compressor Performance Testing and Dynamics"

Instructors: Dr. Jeff Moore, David Ransom and Marybeth Nored all with SwRI

OVERVIEW:

This interactive, hands-on course will focus on Rotordynamics, Vibration Analysis, and Gas Turbine Compressor Performance Testing. Students will have the unique opportunity to practice what they have learned by taking part in a live demonstration on rotordynamic issues and characterization of key instabilities in the gas turbine laboratory at SwRI. They will also be participating in a hands-on test at the SwRI Natural Gas Closed-Loop Facility.

Real life case studies will further enhance the students' skills in troubleshooting rotordynamic issues, vibration analysis, and gas turbine compressor performance testing. Acquiring and perfecting these skills will enable them to go back to the workplace and perform their job with a much higher level of performance and accuracy.

MARCH 26-27, 2009

"Basic Fluid Mechanics"

Instructor: Dr. Bijay K. Sultanian, PE, MBA , Siemens Energy, Inc.

OVERVIEW:

Empowered by the knowledge gained in this course, participants will develop a unique insight into fluid mechanics, and will start loving the subject matter like never before. With total focus on clear understanding of the fundamental concepts of fluid mechanics and the related simple mathematics with a number of example problems, the course will help participants develop a solid foundation in the subject matter to solve many practical fluids engineering problems. For example, they will master the techniques of control volume analysis of mass, linear momentum, angular momentum, and energy in both inertial and non-inertial reference frames. In addition, they will develop unprecedented depth of understanding of Euler and Navier-Stokes equations, boundary-layer analysis, flow separation, both subsonic and supersonic compressible flows, including Fanno flows, Rayleigh flows, normal shocks, and oblique shocks.

MARCH 27, 2009

"Engineering Ethics in Action"

Instructor: Andrew Taylor, P.E.—Instructor for ASME-IPTI and the U.S. Navy (works for Energy)

* This is a 3 hour course. It will be held in the morning and again in the afternoon.

OVERVIEW:

This class features interactive discussion, a videotape presentation or role-play, and a focus on technical decisions that engineers must make in the workplace. Course material is changed biennially to ensure a fresh learning environment for repeat students. At the conclusion of this class, within a given area of technical competence, each student will be able to perform engineering duties in accordance with an engineering code of ethics.

For more detailed information please visit our website at: http://igti.asme.org

Technology Making It Into Production

By Dr. Günter Wilfert, *Senior Manager, Technical Program Management New Program, MTU Aero Engines, Dept. Business Development Commercial Programs (ACB)*

MTU Aero Engines' high-speed low-pressure turbine for the geared turbofan concept based on the successful EU research program Clean.

Want to frustrate engineers? Then go and lock the results of their research away in a drawer, safely preventing them from ever meeting with an application. Happily, nothing of the sort happened to the findings of the Clean (Component validator for environmentally friendly aero engine) program, a research project sponsored by the European Union (EU). Those results soon went to testify to MTU Aero Engines' variously demonstrated knack for successfully transitioning technology into product lines.

In 2000, MTU partnered with France's Snecma and others under the Clean program to explore a joint technology demonstrator conceived to validate components for future engine concepts. Under the program, MTU developed the high-speed low-pressure turbine, the turbine center frame and an integrated heat exchanger.

"The demonstrator engine was successful in the altitude test facility in Stuttgart," recalls Dr. Günter Wilfert, senior manager, technical program management, new programs, who headed up the Clean program at MTU. "The test runs concluded in 2004 and that wrapped up the Clean program. We figured our turbine would sit around for a few years waiting for a geared turbofan to turn up." But much to the surprise of all involved, Pratt & Whitney (P&W) a year later, launched its geared turbofan (GTF) demonstrator project and asked MTU to be a partner.

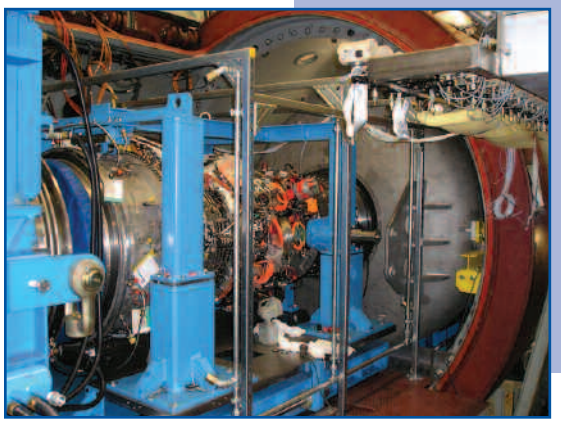
"Our components didn't even have time yet to catch dust on the racks; we rebuilt them right away," enthuses Wilfert. "Good thing we designed the high-speed low-pressure turbine so it could be paired also with a PW6000 core engine. The Clean experience has been invaluable in the design of the PurePower™ PW1000G and appreciably mitigates our development risk."

Technology leaps are a thing of the past, unless someone comes up with a breakthrough concept. Pratt & Whitney, in concert with MTU Aero Engines and other partners, did just that with its PW1000G two-shaft geared turbofan engine, a leader in terms of economy, environmental compatibility and noise reduction.

"Rather than a common shaft, the geared turbofan uses a reduction gear between the fan and low-pressure turbine, decoupling them," explains Wilfert. With its large diameter, the fan revolves once while the smaller turbine makes three revolutions in the same period of time. "That lets both components operate at their respective optimum speed and efficiency, making them considerably more efficient overall."

The engine burns 15 percent less fuel because the larger fan diameter raises the bypass ratio, and reduces noise by 24 decibels. Additionally, lower stage and blade counts save weight and reduce maintenance costs.

Mitsubishi and Bombardier have ordered the GTF which is expected to enter service in 2013. MTU has secured a 15 percent stake in either GTF version, which brings its high-speed low-pressure turbine, plus the first four stages of the high-pressure compressor. ✲



High-speed low-pressure turbine in the Clean demonstrator at the altitude test facility in Stuttgart.

Geared turbofan demonstrator on the wing of Pratt & Whitney's test aircraft.

Benefits and Challenges of Pressure-Gain Combustion Systems for Gas Turbines

By Prof. Chris Brophy, *Director, Rocket Propulsion Laboratory, Naval Postgraduate School, Monterey, CA, cmbrophy@nps.edu and* Dr. Gabriel Roy, *Office of Naval Research, Arlington, VA*

Gas turbine efficiencies continue to improve incrementally by increased operating pressure ratios, higher turbine inlet temperatures, and better aerodynamic efficiency of compressors and turbines. However there has been little real change in the fundamental thermodynamic cycle employed in these machines since most gas turbines have utilized a simple Brayton or nearly constant-pressure combustion cycle. While more complex cycles, utilizing intercooling, reheat, and regeneration/recuperation, have been used and can offer advantages, the simple Brayton cycle is by far the most used in both power and propulsion applications. For modern cycles, further improvements in turbine inlet temperature and aerodynamic component efficiencies, while still useful, will have diminishing returns.

One approach to substantially improving gas turbine thermal efficiency is to replace the nearly constant pressure combustion process (in fact there is generally a 4 to 5 percent reduction in total pressure during combustion in a gas turbine) with some form of pressure-gain heat release such as either a constant volume or detonative mode of combustion. Constant volume combustion inherently possesses an associated pressure rise, larger temperature increase, and a lower entropy generation for the working fluid during the combustion process, resulting in an increase in the available enthalpy for work extraction when compared to a constant pressure combustion event at the same initial conditions. Brayton cycles have nearly steady-flow conditions, whereas the challenge for utilizing near constant volume combustion involves dealing with the highly transient processes and the associated time-varying flow conditions throughout the cycle. Although challenges exist with these combustors, hybrid gas turbine systems that utilize pressure gain combustion strategies are being explored. Two examples of such technologies are the wave rotor and Pulse Detonation Combustor (PDC) engine cores. Such a modified core is shown in Figure 1.

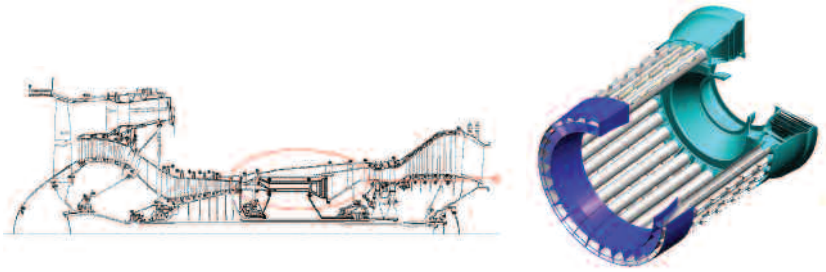


Figure 1: Cross Section of PW2000 Hybrid Engine Concept (Graphic Courtesy of UTC)

A schematic of how an existing core engine could be retrofitted with a PDE combustion system is shown in Figure 2.

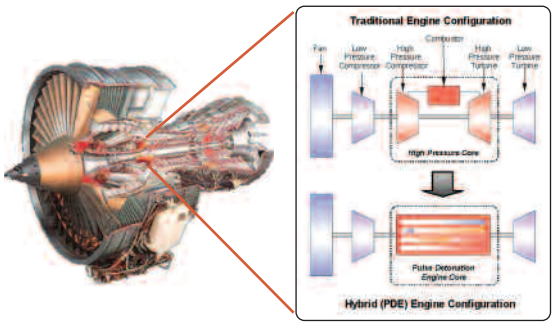


Figure 2: Hybrid Gas Turbine System Utilizing a Pulse Detonation Engine Core (Graphic courtesy of General Electric)

Wave rotor systems involve the transfer of energy through gas dynamic processes rather than the motion of solid surfaces. They have been utilized in a variety of applications and typically involve an assembly of channels that rotate, fixed ports at both ends, which are designed to vary circumferentially to accommodate expansion or compression waves that are moving through the rotating channel assembly. A convenient characteristic of the wave rotor concept is that the unsteady processes are confined within the channel passages, not the exiting outlet manifold, thereby allowing the wave rotor "combustor" to interface more easily with more conventional components.

A PDC system involves the repeated filling, detonating, and purging of multiple combustors. These systems commonly posses some form of rotating inlet valve design to control the filling process for an annular array of combustors and maintain the appropriate amount of inlet isolation. PDCs have not been investigated as long as the wave rotor concepts, and many of the associated technologies have been under limited development during the past 10-15 years only. One of the largest challenges for utilizing PDCs in a gas turbine hybrid configuration is that power extraction under unsteady turbine inlet flow conditions is a relatively new area of research. During the past five years, many industry representatives no longer view unsteady turbine operation as a major impediment for system development. Although evaluation of turbine life and performance needs to continue, turbine efficiencies approaching values comparable to those of steady state operation have been reported.

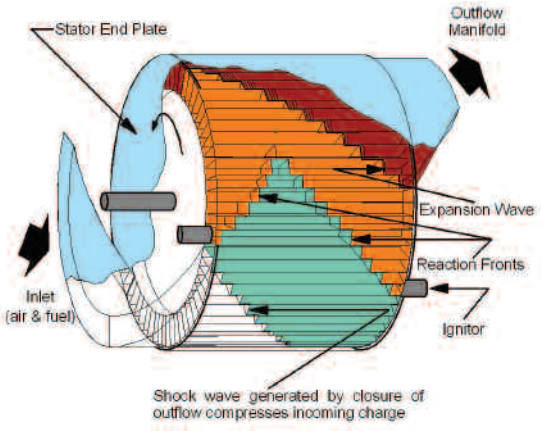


Figure 3: Wave Rotor Constant Volume Combustor (WRCVC). Graphic courtesy of NASA.

The direct thermal efficiency advantage of a hybrid gas turbine system is a relatively straight forward argument, but the practicality and method of implementation remain to be demonstrated. Since the overall pressure ratio of a Brayton cycle is one of the primary parameters determining thermal efficiency, the need for high-compression ratios is often mandatory for high cycle efficiency. This requirement comes at a price due to the complexity and cost of the high-pressure spool of most modern gas turbine systems. If the mechanical compression ratio requirement could be kept at a moderate level, the constant volume or detonative combustion process would be able to inherently deliver an additional pressure gain and increase the final overall operating pressure ratio of the device at a potentially lower system cost. Conversely, if the compression ratio itself was maintained at state-of-the-art levels and the combustion process modified to be near-constant volume or detonative, an increase in thermodynamic efficiency and overall operating pressure ratio would likely be realized resulting in lower SFC and higher thrust density.

General Electric, Rolls Royce, and United Technologies Corporation are some of the companies investing in this area and have an interest in continuing to explore the advantages of these systems. Government agencies such as NASA, Air Force Research Lab (AFRL), and the Office of Naval Research (ONR) are also interested in this technology and are often working in collaborative efforts with universities and industry on these new devices. Fundamental PDC research at the Naval Postgraduate School is supporting both ONR and industry efforts.

Due to the long legacy and developmental history of gas turbine engines, funding for a quantum leap in performance will not be a low-cost initiative. The collaborative efforts, such as those listed above, are ultimately required in times of reduced funding for continued technology development. Even with the risks and challenges associated with this technology, a high payoff potential exists with hybrid gas turbines architectures. ✲

IGTI and ASME Scholarships for Gas Turbines

By Knox Millsaps, *Vice Chairman, IGTI Board of Directors*

The International Gas Turbine Institute (IGTI) provides scholarships for undergraduate and graduate students studying gas turbines. IGTI also is offering travel awards for young engineers to attend Turbo-Expo. These are available for both U.S. and international students.

IGTI also funds an ASME scholarship for gas turbines. The first recipient of the $4,000 ASME Gas Turbine Scholarship was Gregory Bond of Baylor University. We congratulate Gregory for winning this high-competitive award.

There are currently three different types of awards being funded by IGTI:

1. ***ASME-IGTI Scholarship.*** This $4,000 scholarship is available to any ASME student members from any country and can be for study at either the undergraduate or graduate level. Students can apply online at www.asme.org under "ASME Scholarships".

2. ***IGTI Scholarship Program.*** There will be multiple $2,000 awards, for students at the undergraduate or graduate level. Each University with a gas turbine research or teaching component may nominate one student for the award. Nominations for the 2009 cycle are due by December 31, 2009. Nomination letters from a faculty member, such as the ASME Student Section Advisor or Department Chairman, should be sent to:

IGTI - Attention: Scholarship Committee
6525 The Corners Parkway, Suite 115 • Norcross, GA 30092 USA
igti@asme.org

3. ***Young Engineers Travel Award.*** These are awards for either students or young engineers employed in industry or government to attend the International Gas Turbine Conference and Turbo-Expo to present a paper on which they are an author. To apply the engineer should write an application letter requesting travel funds and send to igti@asme.org. Typical awards are for $2,000.

IGTI will be seeking additional funding for these awards from corporate sponsors. This is a great way to make young engineering students aware of the wide range of exciting career opportunities in the gas turbine industry. If your company is interested in contributing to this worthy cause please contact IGTI at igti@asme.org to make a tax deductible contribution. Become a sponsor today. ✲

Challenges for the Emerging Decade

A Status Report on Journal of Engineering for Gas Turbines and Power (JEGTP)

By Dilip Ballal, *Editor*

While the year 2008 ended with a global economic downturn, the new year poses many uncertainties to overcome in preparation for the next decade. Professional societies and technical journals face challenges on various fronts such as: research funding, conference attendance, industry participation, and journal paper numbers. However, confronting these challenges creates new opportunities, strengths, and eventual success; JEGTP falls into this mold. JEGTP is positioned extremely well in the most important global priority today—Gas Turbines, Energy, and Power. Further, ASME seeks to galvanize "a Grand Energy Challenge focused on achieving a sustainable and diverse national and global energy system/environment." JEGTP papers provide the best technological solutions to define the technology, policy, and market issues to achieve a more sustainable energy system.

In April 2008, ASME's Nuclear Engineering Division (NED) selected JEGTP for the publication of nuclear power engineering papers. This is an important strategic step forward for both NED and JEGTP. ASME's publications committee promptly approved this strategic move and granted 300 additional permanent pages (for a total of 1,600 pages annually) and a monthly JEGTP publication schedule beginning on Jan. 1, 2010. The publication of 50 or more nuclear engineering papers annually will significantly enhance my vision and aspiration for JEGTP, which is to keep it in the top journal spot in the broad areas of gas turbines, power, and energy.

Nuclear engineering is pushing the technology of nuclear power plants to unprecedented levels. For example, tomorrow's supercritical water-cooled nuclear reactors will push overall thermal efficiencies from the current 30 percent to 45-50 percent using novel steam cycles. Steam generators, steam turbines, and heat exchangers will operate at pressures as high as 25 MPa and temperatures to 900K. These parameters mimic the operating envelope of modern IGCC or Combined Cycle gas turbine plants.

Synergies exist among gas turbine technologies, nuclear engineering, fossil power, and internal combustion engines. For example, advances in gas turbine radial blade designs, secondary flow controls, aerodynamic flutter, rotor dynamics, bearing technology, and thermal barrier coatings may readily find applications in tomorrow's steam turbine designs. IGTI's board of directors has been discussing such synergistic ideas during their board retreat with a view to bringing a whole new range of topics of future interest to the IGTI technical committees.

Journal Statistics

	2006	2007	2008	2009
Papers Published	110	135	183	185
Pages Published	941	1135	1616	1600
Issues	4	4	6	6*
Percent Accepted	22	24	27	–
Time to Publish (months)	26	20	16	less than 12#

* 12 issues beginning on Jan. 1, 2010.

e-First online publication is available for citation two months prior to printed journal copy. In 2009, ASME will implement a new Papers Ahead of Print (PAP) publishing model. The author-supplied PDF of editor-approved journal papers will be made available immediately online as the "manuscript version." After the typeset paper version is available with author corrections, it will replace the manuscript version. PAP model will produce web-published papers in as little as six months.

The above table shows that JEGTP has come a long way towards meeting authors' needs of fair and prompt paper reviews, rapid publication, and a broader paper mix for 2009 (gas turbines (55%), nuclear engineering (25%), internal combustion engines (15%), fossil power (5%)). All these improvements represent a "win-win" situation for authors, readers, subscribers, and other journal stakeholders. The JEGTP editorial team comprises associate editors, an editorial assistant, reviewers, and ASME journal production staff. I am very grateful to all the team members for their superlative efforts.

To secure rapid publication of your papers, below are a few tips for authors:

- JEGTP publishes papers on a first-come, first-publish basis. Therefore, authors must remain engaged during the publication process and check the status of their papers regularly on the journal-tool as it progresses through various stages of review, copyright form submission, production files uploading, and electronic editing of page proofs. Please contact an associate editor with your journal paper number if your paper continues to remain inactive.
- This year, ASME has simplified the 1903 form (copyright release) significantly. Please sign and file this new simplified form electronically and not by fax. This is more efficient and, should this form get lost or misplaced, you will have an e-mail record.
- Prepare the production files of your paper taking care to eliminate all errors (visit "Authors Center" and read the instructions) because the PAP publishing model must produce a high-quality, error-free "manuscript version" of the paper for rapid online publication. Also, poor-quality graphics are unacceptable and color figures must be checked on your B&W laser printer for adequate contrast before digitizing them. Graphics files must be labeled with Fig. or Figure.

In summary, JEGTP's editorial team and resources are available to meet your publication needs and the global energy challenges for the emerging decade. During 2008, JEGTP has grown to cover a wide range of topics in gas turbines, nuclear engineering, internal combustion engines, and fossil power generation. Now, JEGTP truly represents a centerpiece of ASME's "Grand Energy Challenge." JEGTP remains the number ONE ranked journal in the world in the area of gas turbine engineering and power, and your continuing research contributions will keep it there! ✲

ATTENTION: *Please update your records! Our* **Journal of Turbomachinery** *editor, Dr. David C. Wisler, has retired from GE Aviation. He can now be contacted here:*

40 Trappist Walk • Fairfield, OH 45014
Cell 513-604-7055
Email: davewisler@mac.com

CALENDAR OF EVENTS

MARCH 23-27, 2009

IGTI Training Week
Southwest Research Institute
San Antonio, TX

"Introduction to Gas Turbines and Centrifugal Compressors"
March 23 & 24
Instructed by Dr. Klaus Brun, SWRI and Dr. Rainer Kurtz, Solar Turbines

"Basic Thermodynamics of Gas Turbine Combined Cycle Plants"
March 23-25
Instructed by S. Can (John) Gulen, GE Energy's Thermal Systems & Power Plant Eng.

"Root Cause Failure Analysis of Gas Turbines"
March 25
Instructors: Harold Simmons and David Ransom with SWRI

"Compressor Performance Testing and Dynamics"
March 26
Instructed by Dr. Jeff Moore, David Ransom and Marybeth Nored all with SWRI

"Basic Fluid Mechanics"
March 26-27
Instructed by Dr. Bijay K. Sultanian, PE, MBA , Siemens Energy, Inc.

"Engineering Ethics in Action"
March 27
Instructed by Andrew Taylor, P.E.—Instructor for ASME-IPTI and the U.S. Navy (works for Entergy).

JUNE 6, 2009

Basic Gas Turbine Metallurgy & Repair Technology Workshop
World Center Marriott Resort
Orlando, FL USA

Held in conjunction with Turbo Expo and instructed by Lloyd Cooke and Doug Nagy, Liburdi Turbine Services and Warren Miglietti, Power Systems Mfg., LLC (an Alstom-owned company)

JUNE 6-7, 2009

Physics-Based Internal Air System Modeling Short Course
World Center Marriott Resort
Orlando, FL USA

Held in conjunction with Turbo Expo and instructed by Dr. Bijay K. Sultanian, Siemens Energy, Inc.

JUNE 6-7, 2009

Gas Turbine Aerothermodynamics & Performance Modeling Short Course
World Center Marriott Resort
Orlando, FL USA

Held in conjunction with Turbo Expo and instructed by Syed Khalid, Rolls-Royce North America, this interactive course includes tutorial sessions.

JUNE 7, 2009

Film Cooling & Technology for Gas Turbines Workshop
World Center Marriott Resort
Orlando, FL USA

Held in conjunction with Turbo Expo and conducted by VKI (von Karman Institute for Fluid Dynamics) and IGTI.

JUNE 7, 2009

IGTI Golf Tournament Fundraiser
Hawk's Landing Golf Club
World Center Marriott Resort & Convention Center
Orlando, FL USA

This inaugural fundraiser will benefit IGTI's Student Scholarship Program, the University of Florida, College of Engineering; the University of Central Florida; and the Central Florida Chapter of Virginia Tech. Participation in this event will benefit future engineers! Register today at: http://files.asme.org/IGTI/16833.doc

JUNE 8-12, 2009

ASME Turbo Expo 2009
Orlando World Marriott Resort and Convention Center
Orlando, Florida USA

IGTI's flagship event comprises a major gas turbine conference and exhibition. This 2009 event will be held at an all-inclusive resort with golf course.

AUGUST 2-5, 2009

45th AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit
7th Annual International Energy Conversion Engineering Conference (IECEC)
Colorado Convention Center
Denver, CO

The objective for the Joint Propulsion Conference is to identify and highlight the propulsion systems, components, and technologies required to enable the next generation of aerospace vehicles. The IECEC conference provides a forum to present and discuss engineering aspects of energy conversion technology, advanced energy and power systems, devices for terrestrial energy systems and aerospace applications, and the policy, programs, and environmental impact associated with the development and utilization of this technology.

AUGUST 24-26, 2009

Asian Congress on Gas Turbines 2009 (ACGT2009)
Institute of Industrial Science, University of Tokyo
Tokyo, Japan

ACGT 2009 will aim to provide an international forum for exchange of information related to gas turbine technology, especially among researchers in the Asian Region. Abstract submission deadline is March 31, 2009. For more details, visit: http://wwwsoc.nii.ac.jp/gtsj/acgt2009/index.html

FEBRUARY 2010

13th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery (ISROMAC-13)
Hawaii – more details TBA

This conference deals with all aspects of transport phenomena and dynamics in rotating machinery, including research, design, manufacturing, and operation. It provides a forum for presentation of new and innovative technologies as well as free exchange of ideas among the world leaders in rotating machinery.

JUNE 14-18, 2010

ASME Turbo Expo 2010
Scottish Exhibition & Convention Centre
Glasgow, Scotland

IGTI's flagship event comprises a major gas turbine conference and exhibition.

AUGUST 7-13, 2010

14th Int'l Heat Transfer Conference (IHTC)
Omni Shoreham Hotel
Washington D.C., USA

Call for Users at GTUS09 in Houston

The ASME Gas Turbine Users Symposium (GTUS) will once again co-locate with Texas A&M's Turbomachinery Symposium, September 14-17, 2009, at the George R. Brown Convention Center in Houston.

"As we co-locate with the Turbomachinery Symposium again this year, our goal is to involve as many users as possible," said David Mucz, GTUS Chair and Manager of Business Operations with Alliance Pipeline, Ltd., in Calgary, Alberta, Canada.

Gas turbine users who would like to contribute session topics or participate in sessions are invited to contact IGTI via email at igtiprogram@asme.org or telephone +1-404-847-0072, ext. 1644.

The co-location will once again bring driven equipment and gas turbine drivers under one roof. For those who purchase, operate and/or maintain gas turbines, GTUS was established to be a setting in which to network and exchange the latest in technology and practices. "Our objective is to offer high-quality, timely and practical content on current challenges," Mucz said.

In addition to admission to GTUS sessions, GTUS registration also includes free access to the Turbomachinery Symposium exhibit floor and an invitation to the Turbomachinery welcome address. Visit www.asmeconferences.org/gtus09 for more details and the latest updates on GTUS09.

Trouble With Your Compressor or Gas Turbine?

Southwest Research Institute® has the Answer

SwRI® provides operational support and design assurance.

See our web page at www.gasturbines.swri.org

- ❒ Field Performance Testing
- ❒ Vibration and Pulsation Control
- ❒ Surge Control System Design Review
- ❒ Remaining Life Analysis
- ❒ Root Cause Failure Analysis

Contact: Klaus Brun
Southwest Research Institute
P.O. Drawer 28510
San Antonio, TX 78228-0510 USA
(210) 522-5449 • kbrun@swri.org

Southwest Research Institute®