GLOBAL Gas Turbine News

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ATLANTA, GEORGIA USA • ASME INTERNATIONAL GAS TURBINE INSTITUTE

IN THIS ISSUE...

New Benchmarks for Operating Efficiency

Industry Leaders Address Keynote Theme

ASME TURBO EXPO 2004 • June 14-17 • Vienna, Austria

AUGUST WILHELM HENNINGSEN

HANS-OTTO JESKE

KLAUS STEFFENS

"The keynote session, over the years, has been a highlight of each ASME TURBO EXPO," according to **Professor Dr. Sigmar Wittig**, Executive Conference Chair for 2004. Wittig has assembled a prominent slate of professionals from the gas turbine field to address the opening keynote session on Monday, June 14, 2004.

"This year, three distinguished, high ranking representatives of German industry will provide insights on the status and perspectives of advanced gas turbines and jet engines," he said.

"Development and manufacturing aspects of modern stationary and air transport systems will be addressed, and the user's point of view discussed. In addition to technical and economic requirements, environmental considerations are taken more and more into account. For the audience, it will be most interesting to learn how occasionally contradictory positions can be merged, thus serving as benchmarks for future developments," Professor Dr. Wittig said regarding the session focus.

Addressing the topic of "New Benchmarks for Operating Efficiency" will be **August Wilhelm Henningsen**, Chairman of the Executive Board of Lufthansa Technik AG, **Hans-Otto Jeske**, Member of the Executive Board of MAN Turbomaschinen AG, and **Klaus Steffens**, President and CEO of MTU Aero Engines GmbH.

Mr. **August Wilhelm Henningsen** has been with Lufthansa since 1979, and has overseen the flight operation department, the aircraft-control group, aircraft structure and systems engineering, aircraft cabins and systems, and the overhaul line of the Boeing 737 fleet. With the formation of Lufthansa Technik AG in 1993, he took charge of the new company's aircraft components services division. Mr. Henningsen became Chairman of the Executive Board in 2001.

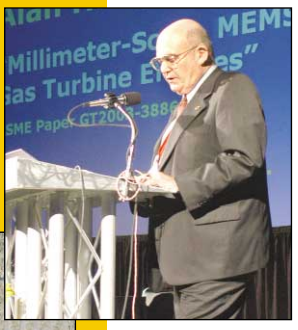
Dr. **Hans-Otto Jeske**, as a Member of the Executive Board (Technology) for MAN Turbomaschinen AG, is responsible for design and development, calculation, instrumentation and controls, systems engineering, production, test facilities, quality assurance, and materials technology. Dr. Jeske is also president of MAN Turbomacchine S.r.l. de Pretto in Schio/Italy, one of the core companies that make up MAN Turbomaschinen AG.

Dr. **Klaus Steffens** assumed his current position at the head of MTU Aero Engines in 2000, having joined DaimlerChrysler Aerospace MTU München in 1996, as executive vice president of engineering/production. Prior to that, he spent ten years working in automatic and manual transmission production and development for Ford, with global responsibility for manual transmissions.

Professor Dr. **Wittig**, who is Chairman of the Executive Board, German Aerospace Center (DLR), Cologne, Germany, is providing leadership and strategic support in his role as Executive Conference Chair for ASME TURBO EXPO 2004. See pages 2-3 for details on all of the dynamic components of the conference that will be held at the Austria Center Vienna.

ASME TURBO EXPO
Power for Land, Sea & Air

ATTEND TURBO EXPO 2004 and let us educate your organization! We do it through structured education, exposure to the latest gas turbine technology and extensive networking opportunities with the world's leading gas turbine professionals!



EXPO PHOTOS PAGES 2&3:
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Pre-Conference Workshops (June 13, 2004)

If you are new to all or part of the gas turbine discipline or simply need a refresher, come early to TURBO EXPO 2004 and attend one of the full-day workshops on the fundamentals of gas turbine operation, repair and combustion. Industry experts will provide in-depth courses covering the basics, as well as current innovations in three excellent workshops:

- Combustion Dynamics
- Gas Turbine Repair and Metallurgy Techniques
- Industrial Gas Turbine Operation and Performance

You can't get a better return on your education dollar.

Keynote Session (June 14, 2004)

The Keynote session will feature A.W. Henningsen (Lufthansa Technik), Hans-O. Jeske (MAN Turbomaschinen), and Klaus Steffens (MTU Aero-engines), who will address the theme of "New Benchmarks for Operating Efficiency."

International Aerospace Dinner & Panel (June 15, 2004)

A unique opportunity to hear the insights of a select panel of members of the Commission on the Future of the U.S. Aerospace Industry and members of the "STAR 21" European Advisory Group on Aerospace. Panelists from the United States include Bob Walker, Commission Chairman and former Congressman; John Douglass, President/CEO of the Aerospace Industries of America; and Bill Schneider, Jr., Chairman of the Defense Science Board. Panelists from the EU group will include Sir Ralph Robins, former Chairman of Rolls-Royce plc, and Jean-Paul Béchat, Snecma Group's Chairman and CEO. A limited number of tickets are sold separately for this exclusive activity.

Technical Congress (June 14-17, 2004)

The Technical Congress provides the world's premier forum for gas turbine power and propulsion professionals and the largest volume of refereed technical papers on all aspects of gas turbine technology. Sessions on basic and applied research findings offer the latest innovations and technical trends.

Applied Operations & Maintenance (June 14-17, 2004)

This track of 10 sessions focuses on current, primary issues for those involved in hands-on gas turbine operations and maintenance. Don't miss this opportunity to share lessons learned and best business practices for greater efficiency and profitability.

June 14-17, 2004
Austria Center Vienna

ASME TURBO EXPO
Power for Land, Sea & Air

Raise Your Gas Turbine Technology IQ at ASME TURBO EXPO 2004 in Vienna, Austria!

Exposition (June 14-16, 2004)

The Exposition will showcase over 150 of the leading gas turbine industry manufacturers, suppliers and their "cutting edge" technology and services. The Exposition feature of TURBO EXPO 2004 transforms the discussions in the Technical Congress and Applied Operations & Maintenance track into market-ready solutions to gas turbine related challenges.

Gas Turbine Facility Tours (June 18, 2004)

After TURBO EXPO 2004, facility tours will be available for participants to visit the operations of several leading European gas turbine equipment manufacturers.

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REGISTRATION INFORMATION

Register online at http://www.asme.org/igti

Register on or before May 14 and pay the discounted rate

CONFERENCE & EXPOSITION REGISTRATION

Member 4-day *	$720
Nonmember 4-day *	$960
Exhibiting Company Employee 4-day *	$660
Exhibiting Company Employee 1-day	$360
Member 1-day	$420
Nonmember 1-day	$570
ASME Life Member 4-day	$60
Nonmember Student 4-day	$90
Exhibition Visitor	Free
ASME Student Member	Free

** Includes CD-ROM Proceedings. CD-ROM also available for separate purchase on-site.*

WORKSHOP REGISTRATION

$480 - Discounted fee for 4-Day Technical Congress paid registrants
$660 – Pre-Conference Workshop Only

International Aerospace Dinner & Panel

Separate tickets required. Order in advance by email: igti@asme.org
Tickets:
$100 per person – full price
$75 per person – discounted fee for paid Technical Congress registrants

VIEW FROM THE CHAIR

Dilip Ballal, Chair, IGTI Board of Directors

Dilip Ballal
Chair
IGTI Board of Directors

Ready for Shaping a Bright Future in the New Year!

IGTI has the vision "to be the world's foremost vehicle for the development and dissemination of all gas turbine educational and technilogical information." In 2004, we shall be vigorously moving toward our vision by offering a world-class program of conferences, educational products, and information in all areas of gas turbine technology for our stakeholders. We need your enthusiastic support of these IGTI offerings. Here is what is coming your way during 2004!

Three World-Class Conferences in 2004

1. **A Specialty Conference:** "Aero Engine Life Management in the 21st Century," 2-3 March 2004, London, England, co-sponsored by U.S. Air Force and U.S. Navy, and supported by the British Ministry of Defence.
2. **TURBO EXPO:** "ASME TURBO EXPO 2004," 14-17 June, Vienna, Austria (details on pages 1-3)
3. **IGTI Fall Conference:** "Gas Turbine Users Symposium 2004," Orlando, FL (details on page 12)

Board of Advisors Established

IGTI has established a Board of Advisors (details on page 7). Under the leadership of Richard J. Hill, U.S. Air Force (retired), 15 outstanding leaders from industry, government, and academia have pledged their support to enhance IGTI's visibility in new markets, improve IGTI's conferences and exhibitions, and assist with revenue generation. Their efforts and ideas will propel IGTI towards our vision. We congratulate these individuals and salute them for their volunteerism on behalf of IGTI. Now, the Board of Directors, the Board of Advisors, and Council of Chairs together will provide a triad to move IGTI forward.

Business and Marketing Plans Delivered!

To keep IGTI in the forefront, during 2003, your Board of Directors actively reviewed various business strategies and marketing initiatives. IGTI has a "Business Plan" document that will serve as a blueprint and guide for strategy, opportunities and threats, strengths and weaknesses, core competencies, competition, and long-term goals. This document will be updated regularly.

IGTI's "Marketing Plan" is a comprehensive report that discusses how each core business segment of IGTI can be improved to respond to rapidly changing business climate. Below are some key recommendations that will be implemented through 2004:

- New ideas to increase TURBO EXPO and GTUS attendance
- Attractive corporate pricing strategies
- Promotion of home study courses on IGTI website, brochures, and GGTN
- Produce updated educational material and innovative pre-conference workshops
- Offer updated educational products to the repair, parts, and maintenance sectors

> ***"We need your enthusiastic support of these IGTI offerings."***

Better Use of ASME Services!

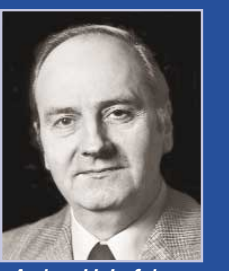
IGTI has forged a new strong relationship with our parent organization ASME and its leaders. ASME provides IGTI with technical support (tech pubs, web tool), membership information support, fund management, contract review and legal approvals (hotels, convention centers, conference sponsors), and other advice and direction for association issues. With the hiring of the new Managing Director and supporting him with a Marketing & Programs Manager, IGTI is already making a better use of available global resources and services of ASME. This is enhancing our operational strength productivity, response, and value to our stakeholders. As the new year unfolds, the fruits of our labor will be seen in the bright future that is shaping up for IGTI.

Thanks for your efforts and support of IGTI. A happy new year to you! ✲

In Memoriam

Arthur H. Lefebvre

by Dilip R. Ballal



Arthur H. Lefebvre
(14 March 1923 – 24 November 2003)

Professor Arthur H. Lefebvre, an ASME Fellow and a member of IGTI's Combustion and Fuels Committee for three decades, passed away on November 24, 2003 in Pebworth, England as a result of pancreatic cancer. Wife Sally, sons David and Paul, daughter Anne, and six grandchildren survive him.

Professor Lefebvre made exceptional contributions over five decades to gas turbine combustion and combustor design. His pioneering work covered combustor aerodynamics, flame stabilization, turbulent flame propagation, ignition, fuel atomization, fuel injector design, droplet combustion, combustor heat transfer, gas turbine fuels, and emissions.

A "θ-parameter" correlation for gas turbine combustors developed by Professor Lefebvre established the design and development methodology for modern gas turbine combustion systems. He held 13 patents, and co-authored 160+ papers and three books, including the classic, *Gas Turbine Combustion*. Among his many honors were the ASME Gas Turbine Award, the ASME R. Tom Sawyer Award, the IGTI Scholar Award, the IGTI Aircraft Engine Technology Award, and the ASME George Westinghouse Gold Medal. He held doctorate degrees from London University, and an honorary doctorate from Cranfield University, UK. He was a Fellow of the Royal Aeronautical Society and the Royal Academy of Engineering in the UK.

Professor Lefebvre served as the head of the School of Mechanical Engineering at Cranfield University, and then at Purdue University, USA. He was later appointed Reilly Professor of Mechanical Engineering at Purdue. He was an inspiring mentor to a generation of students, a valued consultant to industry, and a dedicated member of the ASME and IGTI community. He was approachable, kind, generous, helpful, and will be remembered for his great sense of humor. The world of gas turbine combustion has lost a pioneer and giant, and we will all miss his friendship, wit, and wisdom. ✲

In Memoriam

Charles MacArthur

by Ron Bunker

Charles MacArthur

It is my sad duty to report the passing of the Heat Transfer committee's Past Chair Charles MacArthur. Many of you may not have been aware of Charlie's struggle with cancer over the last few years, and the fact that he had taken a final turn for the worse recently. He died at his home in Dayton, Ohio, on October 25, 2003. Charlie bravely survived a serious round of cancer several years ago, coming back to nearly full strength at work and life. About a year or so ago, the cancer was found to have returned and spread, and after further surgery he nearly recovered again. Through it all he maintained a very positive outlook.

Charlie, who had advanced degrees in both physics and mechanical engineering, had retired in June 2003 from Wright-Patterson Air Force Base where he had worked for nearly 20 years in the Turbine Branch of the Aero-Propulsion Directorate. He held positions of Branch Chief and Principal Engineer of the Turbine Division, and was a major contributor to aerospace research, an innovator and inventor, designer of the Turbine Research Facility, and Chairman of our K-14 Committee (2000-2002). Prior to 1983, Charlie was employed by the University of Dayton Research Institute.

Away from work, Charlie was an avid reader of nonfiction, a bird-watcher, a photographer, and a lover of art and music. He was a proud descendant of General Duncan McArthur, governor of Ohio (1830-1832) and a general during the War of 1812.

The Heat Transfer Committee will be planning a memorial technical session to honor Charlie, either in Vienna or the following year in Reno. His expertise and friendship will be missed. ✲

Meet the Technical Committee Chairs

In this issue, we recognize three of the current IGTI Technical Committee Chairs. For details on all of IGTI's Technical Committees, visit the website at http://www.asme.org/igti.

COMMITTEE: Marine

Knox Taylor Millsaps - "Knox"
Professor and Associate Chairman MAE, and Director of the Marine Propulsion Laboratory
U.S. Navy, Naval Postgraduate School
Monterey, California, USA
Attended: University of Florida

Knox is currently a professor at the Naval Postgraduate School where he teaches and conducts research in the area of power and propulsion. His current research interests are in turbomachinery leading edge and tip/endwall flow and heat transfer, high-efficiency mixing, rotordynamics, hypersonic flows, and condition-based maintenance. Knox began his career in the 1980s at Pratt and Whitney, working on unsteady and three-dimensional flows. He was a post doc (1991) and a visiting professor (1998) at the Institut für Thermische Strömungsmaschinen, Universität Karlsruhe, working with Prof. Sigmar Wittig. In 2000 and 2001, Knox was a Congressional Fellow in the Office of Congressman John M. Spratt—the Ranking Member on the House Budget Committee and a senior member of the House Armed Services Committee. Knox is a member of the IGTI Turbomachinery Committee, and serves on the ASME DoD Advisory and Policy Board. ✲

COMMITTEE: Turbomachinery

Jayant Sabnis - "Jayant"
Director, Aerodynamics
Pratt & Whitney
East Hartford, Connecticut, USA
Attended: Indian Institute of Technology and Syracuse University

An active contributor in the field of propulsion systems for over 20 years, Jayant has held increasingly responsible positions and has made significant personal technical contributions in a wide range of technologies. His accomplishments include innovations, including patents and technical papers, in fields as diverse as rocket engines, human lung ventilator assists, and a wide variety of turbomachinery components. Jayant's leisure time pursuits include photography, automobiles, and home improvement projects. ✲

COMMITTEE: Industrial & Cogeneration

Ryohei Yokoyama - "Ryohei"
Associate Professor
Department of Energy Systems Engineering
Osaka Prefecture University
Osaka, Japan
Attended: Osaka University

Ryohei began his career with Osaka University in 1982, and joined Osaka Prefecture University in 1990. He has worked for education and research in the field of energy systems analysis and optimization, especially optimal design and operation of cogeneration systems. He received IGTI Industrial & Cogeneration Committee Best Paper Awards in 1991 and 2001, as well as the 1992 John P. Davis Award. Ryohei's hobbies include graphic design and paper craft work, and he has sometimes submitted his graphic design work to competitions. He also enjoys an occasional game of table tennis. ✲

New Group Established to Advise the IGTI Board of Directors

The IGTI Board of Directors (BOD) has established a Board of Advisors (BOA), whose mission is to advise the BOD on issues related to revenue generation and identifying new markets and to recommend strategies for increasing attendance at IGTI conferences and exhibitions. The Board of Advisors is structured as follows:

- The IGTI Board of Advisors will be an honorary body with an advisory role only.
- The IGTI BOD will elect a BOA Chair for a two-year term.
- The BOA Chair will report on BOA activities at IGTI BOD meetings at least once per year.
- BOA members will serve a two-year (renewable) term.
- BOA member appointments will represent a balance between Land/Sea/Air as well as a balance between Industry/Government/Academia.

BOARD OF ADVISORS 2004-2006

Dilip Ballal *Chair, Board of Directors*	University of Dayton Research Institute (UDRI) Division Head Energy & Environmental Engineering Division
Richard Hill *Chair, Board of Advisors*	Universal Technology Corporation Propulsion and Power Technical Area Manager Engineering Division
John Arvin	Vice President Advanced Engine Technology Programs Allison Advanced Development Co.
Richard A. Dennis	Turbine Research Manager US Dept. of Energy
David Garrison	GM - Propulsion Engineering Delta Air Lines, Inc.
Charles Gorton	NAVAIR SYSCOM Propulsion & Power Engineering Director of Propulsion and Power Engineering
Sandra Hoff	Deputy Commander Aviation Applied Technology Directorate
Lourdes Maurice	Federal Aviation Administration
Harvey Maclin	GE-Aircraft Engines Manager, Advanced Technology Marketing & Government Programs
Kelly McGrath	Tractebel Power, Inc.
Gerry McQuiggan	Siemens Westinghouse Director of Engineering
Walter O'Brien	Virginia Polytechnic Institute & State University
Jimmy Reed	Pratt & Whitney Aircraft Manager of Advanced Engines
Shane Reph	Sermatech Power Solutions Pres. of Industrial Gas Turbines
Arun Sehra	NASA Glenn Research Center
Septimus Van der Linden	BRULIN Associates President
Jim Walsh	Alliance Pipeline Ltd.

CALENDAR OF EVENTS

MARCH 2-3, 2004

Aero Engine Life Management Conference

Thistle Royal Horseguards Hotel London, England

A new specialty conference focusing on topics of reliability, affordability, durability, monitoring, maintenance, and diagnostics, as they relate specifically to aero engines. Co-sponsored by the U.S. Air Force, U.S. Navy, and ASME IGTI, in cooperation with the U.K. Ministry of Defence, Cranfield University and the Institution of Mechanical Engineering.
http://www.asme.org/igti/events/aero_conf_04.html

APRIL 29-30, 2004

CAME-GT – Second International Gas Turbine Technology Conference

Golf Hotel; Bled, Slovenia

Organized by CAME-GT with the participation of the Gas Turbine Society of Japan and the Association of European Manufacturers of Industrial Gas turbines, the conference aims to bring together researchers in gas turbine technology from Europe, Japan, the U.S. and other countries to discuss current progress and future developments.
http://www.came-gt.com/

JUNE 14-17, 2004

ASME TURBO EXPO 2004

Austria Center Vienna Vienna, Austria

IGTI's flagship event, comprising a major gas turbine conference and exhibition.
http://www.asme.org/igti/events/te2004/index.html

SEPTEMBER 14-17, 2004

ATI 2004

Genoa, Italy

An international gathering of professionals from research, academia, public and private industry, finance and government. The focus is on conventional and emerging power generation technologies and their environmental impact.
http://www.ati2004.unige.it/

NOVEMBER 30-DECEMBER 2, 2004

ASME Gas Turbine Users Symposium

Orange County Convention Center; Orlando, Florida, USA

Ideas and practical solutions for gas turbine operating challenges are the focus of this symposium intended for gas turbine users/operators, knowledge providers, OEMs, project developers, third-party providers and others in the gas turbine community.
http://www.asme.org/igti/

JOURNAL OF TURBOMACHINERY

by David C. Wisler, Editor

David C. Wisler

What You Need to Know About the New ASME Journal Tool

As of August 2003, I switched the *Journal of Turbomachinery* to 100% usage of the new ASME Journal Tool for publication. EVERYTHING is electronic. Nothing is snail mailed, FedEx'd, faxed or sent to me on CD anymore, including paper submissions, reviews, appeals, etc. With that in mind, you may find this article useful.

Right up front I'll tell you that the ASME ConferenceTool used for publishing a paper at IGTI TURBO EXPO does not talk to the ASME Journal Tool. This means that TURBO EXPO papers must be resubmitted through the Journal Tool to be published in the Journal.

Learning About the Journal Tool:

Log onto the ASME Journal Tool web site at http://journaltool.asme.org/. The Journal Tool public home page appears. (Note: or click the "Submit Manuscripts Online" link at http://www.asme.org/pubs/journals/.)

1. The left hand side of the Journal Tool home page gives a list of the ASME journals. Click on "Turbomachinery" and the *Journal of Turbomachinery* home page appears. (Similarly, you would click on "Engineering for Gas Turbines and Power" for that Journal).
2. The Journal of Turbomachinery home page has a menu bar near the top that lists relevant items, the important ones being "Author Center," "Help" and "Login".
3. **"Author Center".** Putting your cursor on "Author Center" gives a drop down box with the following three options.
   - **a.** **"Author Resources"** - gives important information about submitting papers and provides specific instructions about the format you must follow for your text and figures. Under "Author Resources", click on "**Guidelines**" where three self-explanatory choices will appear.
     1. "Submittal of initial documents"
     2. "Submittal of revised documents"
     3. "Submittal of final documents"
   - **b.** **"Submit Paper"** under the "Author Center" drop down box tells how to:
     1. Create an account for the corresponding author, (the author who manages the process, with whom the editor, associate editor, and ASME technical publications correspond and the only author who can access the tool).
     2. "Submit a research paper" to the Journal Tool
     3. "Add authors" (name multiple authors of the paper in addition to the corresponding author).
   - c. "**Paper Status**" provides the corresponding author with the status of the publication process.
4. "**Help**" box on the menu bar. It is well known that men like to drive around lost, so this option will rarely be used. But try it anyway; you may be surprised.
5. "**Login**" box on the menu bar of the home page is used each time you log in as a corresponding author, reviewer, associate editor, guest associate editor, or editor. One must first have an account in order to log in.
   - a. Corresponding authors create their own accounts as described in item 3.b.1 above.
   - b. Associate editor accounts are created by the Journal Editor.
   - c. Reviewer accounts are created by the Journal Editor, associate editor or guest associate editor.

Using the Journal Tool as an Author:

The corresponding author for each paper creates an account as described in Item 3.b.1 above. For each case discussed below, the corresponding author uploads a PDF file of their paper (Item 3.a.1) and includes comments in the "author comments" box. This PDF file is not used for final publication. The author(s) will receive a typeset version of the paper for review before publication.

- **Papers already approved for publication** (TURBO EXPO papers already reviewed and accepted for Journal publication). The corresponding author includes the TURBO EXPO paper number and title under "author comments" when uploading the paper. I put the paper on fast track, which means the corresponding author immediately gets an email requesting him/her to upload the FINAL version of the paper into the tool by explicitly following the Instructions in Item 3.a.3.
- **Papers submitted directly into the Journal** – Under "author comments" when uploading the paper, the author tells me that this is a paper being submitted directly to the Journal. I get the paper reviewed via the Tool.
- **Paper Appeals** - Under "author comments" when uploading the pfd file, the author (1) requests an appeal giving the reasons, (2) lists the TURBO EXPO paper number and title, and (3) provides the name, email and telephone number of the session organizer.

...continued on page 10

ASME TURBO EXPO has cultivated the development and exchange of the most significant advances in the gas turbine field for 49 years. The articles represented by the abstracts on this page provide insight on some of the key contemporary technology issues being addressed at ASME TURBO EXPO 2004.

Debbie Haught, Chair of IGTI's Microturbines & Small Turbomachinery (MST) committee, summarizes significant discussions and findings of panel sessions in Atlanta in 2003. Advancements and new data from the past year will be presented in Vienna.

Scott Samuelsen reviews major activities in the development and application of turbo fuel cell hybrid systems. The latest work on advanced technologies, fuel cell systems, and distributed generation will be presented at ASME TURBO EXPO 2004 in sessions hosted by several IGTI committees, including Combustion & Fuels, Distributed Generation, and Cycle Innovations.

Read the complete articles online at http://www.asme.org/igti. Follow the links under the "Features" heading on the IGTI home page.

Microturbine Sessions 2003: A Review

by Debbie Haught, Microturbine Program Manager, Office of Distributed Energy, U.S. Department of Energy, Washington, D.C., USA

ABSTRACT

Microturbines were once again a popular topic at ASME TURBO EXPO 2003. Microturbines, small combustion turbines about the size of a refrigerator with outputs from 25 to 500 kW, are commercially available from five suppliers with other developers potentially entering the market. Microturbines and other distributed energy devices such as fuel cells and reciprocating engines supply local energy systems that generate electric, thermal or mechanical energy on or near customer sites. With microturbines, customers are reducing energy costs, avoiding power outages like the Northeast Blackout of 2003, reducing environmental impacts and meeting premium power needs.

Panel sessions hosted by the Microturbine & Small Turbomachinery Committee explored the status and advancements in microturbine technology and reviewed operating experiences in various applications. Microturbine developers discussed design and performance improvements in turbomachinery, combustion systems, and recuperators for current products. Development efforts for next generation high efficiency engines and integrated combined heat and power (CHP) packages were also presented. Representatives of users discussed the installation and operational experiences of microturbines in various applications in the United States and Canada. At the end of the meeting, the sentiment from the speakers and participants was that microturbines are a successful new technology on the verge of making significant penetration into the marketplace. Improvements are continuing to be made in the technology at the same time as more and more applications are being identified for microturbines and integrated microturbine based CHP packages. Public awareness of the technology continues to grow and this is fostering increased acceptance of microturbines and distributed generation. ✲

Fuel Cell/Gas Turbine Hybrid Systems

by Scott Samuelsen, Director, National Fuel Cell Research Center, University of California, Irvine, Calif., USA

ABSTRACT

The National Fuel Cell Research Center (NFCRC) was established to accelerate the evolution of fuel cells and fuel cell systems. In addition to addressing the key research challenges in the emergence of fuel cells, the Center assists the market to understand this unusual power system and the opportunities for both central and distributed generation. An intriguing fuel cell research initiative in which the NFCRC is focused addresses the development of hybrid gas turbine/fuel cell systems. With an unusually high fuel-to-electrical efficiency, hybrid systems portend a major paradigm shift for the future generation of power in a variety of applications. The first demonstrations of both high-pressure and atmospheric pressure hybrid systems verify the basic principles of the technology, delineate the component features that require technology advances, and confirm the viability of the product for a near-term and long-term market for a broad variety of applications in both stationary and transportation. Both the Molten Carbonate Fuel Cell (MCFC) and the Solid Oxide Fuel Cell (SOFC) are attractive for hybridization due to the high operating and effluent temperature. Systems are emerging for distributed generation (15kW to 50 MW) with combinations of high-temperature fuel cells (HTFCs) and micro-turbine generators (MTGs). Concepts are also evolving for central plant configurations (~300MW) where ultra high-efficiency on both natural gas and coal are desired in combination with zero-emission of criteria pollutants, CO2 sequestration, and hydrogen co-production. ✲

ASME Journal Tool ... continued from page 8

Using the Journal Tool as a Reviewer:

Reviewer accounts are created by the Editor or Associate Editors. The reviewer receives an email regarding the assignment of papers to review with instructions on how to proceed. The email contains the reviewer's email address, an initial password, which the reviewer can customize, and log on instructions. The reviewer must:

- Go to the home page (Item 1), click on "Login" (Item 5c)
- Select his/her role as "Reviewer" and log in. The "Journal Administration Home: Reviewer" page appears.
- Click on "**Help**" in the menu bar and scroll down to "**Reviewer**" for "How To" information
- Click on "**Reviewer Center**" where a drop-down box "**Review Papers**" appears, which lists papers needing the reviewer's attention.
- Reviewers complete their management of the review process from this administration area.

Using the Journal Tool as an Associate Editor:

Associate Editor (AE) accounts are created by the Editor. The AE receives an email regarding his/her appointment with instructions on how to proceed. The email contains the AE's email address, an initial password, which the reviewer can customize, and log on instructions. The AE must:

- Go to the home page (Item 1), click on "login" (Item 5c)
- Select his/her role as "Associate Editor" and log in. The "Journal Administration Home: Associate Editor" page appears.
- Click on "**Help**" in the menu bar and scroll down to "**Associate Editor**" for "How To" information
- Click on "**AE Center**" where a drop-down box appears as:
- "**Paper**" – identifies papers the AE is handling
- "**Contacts**" – permits email to authors and reviewers
- "**Reviewers**" – creates and assigns reviewers
- AEs complete their management of the review process from this administration area.

I hope this helps.

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E-Mail: igti@asme.org • Web Site: http://www.asme.org/igti/

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Home Study Courses

See how much you and your employees can accomplish when you work at your own pace!

IGTI Home Study Courses are moderately priced, well-written treatments of essential gas turbine–related topics, prepared by undisputed experts in their field. Topics include: *Basic Gas Turbine Engine Technology, Gas Turbine Applications and Economics* and *The Design of Gas Turbine Engines: Thermodynamics and Aerodynamics*. Professors from MIT and Virginia Tech played active roles in the course preparation, and senior advisors from major gas turbine manufacturers edited and guided the course development process. Take advantage of this expert training on *your* own schedule.

On-Site Training Support

Save your organization training dollars!

Is your company attempting to manage and maintain a complicated training curriculum for your engineers? Let IGTI do it for you! We have courses already developed, which have proven to be the tops in the gas turbine industry. For large numbers of trainees in an organization, we can arrange to deliver the training on site at your facility. For smaller numbers, the training can be staged in regional locations—perhaps even at a local college or university. Courses may be customized to fit your needs.

Ask us about our course topics . . .
Nobody knows gas-turbine–related education like IGTI!

Raise Your Gas Turbine Technology IQ!

IGTI is the gas turbine industry's technology and knowledge clearinghouse! Should we be playing that role for your organization?

- **TURBO EXPO Exhibitions and Conferences:** Every year, for nearly 50 years, IGTI has produced the TURBO EXPO Exhibition and Conference. We urge you to attend, exhibit, or co-locate your company's important meetings with TURBO EXPO to access the best and brightest in the gas turbine industry!
- **Specialty Conferences (and Exhibits):** IGTI offers specialty conferences to focus on specific topics and market segments of the gas turbine industry. In 2003, IGTI and DOE successfully presented the "Gas Turbines for a National Energy Infrastructure" conference. The "Aero Engine Life Management Conference" is set for London, England, March 2-3, in collaboration with the U.S. Air Force, U.S. Navy and the UK Ministry of Defence.

  Let IGTI help you design, organize and produce your own meeting, conference or exhibition, from the concept to the conference center!
- **Gas Turbine Users Symposium (GTUS):** In 2004, watch for the new Gas Turbine Users Symposium to be held in Orlando. If you are planning a user group meeting in conjunction with this exciting new forum for gas turbine end-users and operators, we can offer you a special rate.
- **Specialty Conference Proceedings:** All recorded presentations from the 2003 "Gas Turbines for a National Energy Infrastructure" conference are available on one CD for only $150. The CD allows you to see the slides and hear the synchronized audio for any or all of the sessions that may interest you. It is almost as good as being there!
- **Conference Workshops:** IGTI offers workshops on a variety of gas turbine industry topics, which add greater technical depth and learning opportunities for those who attend TURBO EXPO or specialty conferences. Topics include: *Combustion Dynamics, GT Metallurgy & Repair Technology, Industrial GT Operating & Performance, Preliminary Design of Aircraft Engines, Steam Turbine Fundamentals, Basic Gas Turbine Engine Technology, Gas Turbine Applications and Economics* and *The Design of Gas Turbine Engines: Thermodynamics and Aerodynamics.* Take advantage of one of our top-flight workshops while attending an IGTI conference.

  Complete sets of slides form several of our more popular workshops are available for only $300 per set.
- **IGTI Original and Cooperative Publications:** IGTI has exceptional industry publications to keep you abreast of ground-breaking technology, current events and future trends. They include: Index of IGTI Technical Papers (1956-2003); ASME/IGTI Technical Papers (1956-2000); TURBO EXPO Present and Past Conference Proceedings (Turbo Expo 2003, Turbo Expo 2002, Turbo Expo 2001, Turbo Expo 2000); Gas Turbine Industry Overview (2003 Edition); SourceGT (online industry resource currently being upgraded); Gas Turbine Industry Reference Guide (hard copy and online versions under development); Discounted Subscriptions (*Journal of Turbomachinery* and *Journal of Engineering for Gas Turbines and Power*); *The History of Aircraft Gas Turbine Engine Development in the United States*; and *Global Gas Turbine News*.

  Get in the know and stay in the know with IGTI publications!

For more details and pricing information on any IGTI products (ask about discounts), please visit our website (http://www.asme.org/igti/) or contact the IGTI Marketing and Products department (404-419-1646).

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ANNOUNCING
GAS TURBINE USERS SYMPOSIUM 2004

A Dynamic Part of IGTI's New Multi-Conference Strategy

NOV. 30 – DEC. 2, 2004
ORLANDO, FLORIDA, USA

John Platt, Senior Advisor with BP America, Inc., and IGTI's incoming Gas Turbine Users Symposium (GTUS) Chair (2004-2006), has announced plans to hold this year's GTUS alongside Power-Gen International in Orlando, Florida, November 30 - December 2, 2004. Platt believes that locating GTUS with Power-Gen International creates a major opportunity for both events. "Exposure to the expertise of IGTI's gas turbine user members through the GTUS program of training, technology and networking, combined with Power-Gen's exposition and other activities, will produce a tremendous value for attendees," according to Platt.

Originally developed as a component of IGTI's annual ASME Turbo Expo, the primary thrust of GTUS is to create a forum in the gas turbine community to facilitate the dissemination of "best-in-practice" gas turbine operating techniques. With the 2004 meeting in Orlando, the GTUS becomes a distinct, annual event to consistently target the educational and networking needs of gas turbine users in the United States. The GTUS provides a setting for gas turbine owners, operators, and maintenance personnel to gather and share knowledge on the daily challenges arising from purchasing, operating and maintaining gas turbines and related equipment. Gas turbine users/operators, knowledge providers, OEMs, project developers, third-party providers and others will benefit from this exchange of ideas and solutions for gas turbine operating challenges.

The 2004 program will feature tracks and topics relating to key areas of gas turbine ownership and operation. For details, email igtiprogram@asme.org and follow program development at http://www.asme.org/igti.

The GTUS will be co-located with the Power-Gen International conference in December for the next two years. ASME Turbo Expo Technical Congress and Exposition will continue to be in late May/mid-June each year, alternating between the United States and Europe, and operated solely by IGTI in more compact venues. In addition, smaller specialty conferences focused on new emerging technologies or hot topics will be scheduled each year in early spring or early fall, based on market need and sponsor support.

This multi-conference strategy allows IGTI more flexibility to meet the technical and educational needs of its varied membership, which encompasses academia, government, industry and end-users. ✶