

# GLOBAL Gas Turbine News

ATLANTA, GEORGIA USA • ASME INTERNATIONAL GAS TURBINE INSTITUTE

50<sup>TH</sup> ANNIVERSARY

**ASME  
TURBO EXPO**

Power for Land, Sea & Air

**JUNE 6 - 9, 2005  
RENO HILTON  
RENO-TAHOE, NEVADA USA**



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## ASME TURBO EXPO TO CELEBRATE 50 YEARS OF SERVICE TO THE GAS TURBINE COMMUNITY

by Kevin Gaffney, Staff Writer

In mid-April 1956, led by the ASME Gas Turbine Division's first Chairman of the Board, R. Tom Sawyer, 747 engineers and professionals gathered in Washington, D.C., to discuss the development of an exciting new technology, the gas turbine engine. ASME Turbo Expo was born!

Originally called the ASME Gas Turbine Conference and Products Show, the first edition featured 25 exhibitors, and six technical sessions with a grand total of 17 papers presented.

When recently asked what significance ASME Turbo Expo has had on the development of gas turbine technology over the years, Lee Langston, a longtime supporter of ASME Turbo Expo, commented, "The very first gas turbine started out at something like 18 percent efficiency in 1939. Now we are talking up into the 60s (60 percent). IGTI and Turbo Expo have been at the forefront of presenting the material that has brought that about." Langston, who is currently with the University of Connecticut, also served as Chair of IGTI's Board of Directors in 1994-95.

Today, ASME Turbo Expo has become the world's premier conference and exposition focused exclusively on international gas turbine technology. Having gathered tens of thousands of engineers, operations personnel, suppliers, educators, and consultants through the years, Turbo Expo continues a rich tradition as a showcase for innovative technology, technical publications and information exchange.

"Over the years, I am very much impressed by the international attraction that IGTI has. ... It has been able to further the development of (the) gas turbine and jet engine," says Sigmar Wittig, Chairman of the Board for the German Aerospace Center (DLR).

In accordance with its mission, IGTI is dedicated to supporting the international exchange and development of information to improve the design, application, manufacture, operation and maintenance, and environmental impact of all types of gas turbines and related equipment. In keeping with this charter, and continuing the tradition of excellence that has been set over the last fifty years, we invite you to join us June 6-9 in Reno-Tahoe, "America's Adventure Place." Be a part of the celebration marking 50 years of bringing together gas turbine professionals for an open exchange of ideas: an exchange that has become even more critical as the technology changes more and more rapidly.

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Official Publication  
of Turbo Expo

South Carolina Institute for Energy Studies (SCIES)  
Participating Organization,  
Turbo Expo 2005





## VIEW FROM THE CHAIR

Ron Natole, Chair, IGTI Board of Directors



**Ron Natole**  
Chair

IGTI Board of Directors

IGTI members, Board of Directors, and staff continue to plan and move forward with changes and improvements. The Gas Turbine Users Symposium (GTUS) 2004 was separated from the Turbo Expo conference for the first time this year, and co-located with PowerGen International in Orlando, Florida, the week after Thanksgiving. Attendance exceeded expectations, with over 200 attendees—more than double any previous GTUS! I present this as evidence of the continuing success of IGTI's multi-conference strategy, adopted in 2003. The next standalone, co-located GTUS will be in Las Vegas, Nev., the first week of December in 2005. See page 20 for a wrap-up of the 2004 Gas Turbine Users Symposium, and a look ahead to 2005.

Plans for the 50th Anniversary Turbo Expo 2005 are largely complete and it will be one of our most memorable. Venues for Turbo Expo 2006 and 2007 have been identified, the details will be worked out, and selections finalized in the first quarter of 2005. Stay tuned for news on these upcoming events! We think you will be eager to attend Turbo Expo in two great international cities where it has never before been held.

Under the IGTI Education Initiative, staff has made strong progress with the digitization of two of our popular paper-based Home Study Courses. Also, a venture between IGTI and a well-known, experienced training company should soon result in new course offerings. Additional educational and enrichment opportunities exist in the form of the annual Gas Turbine Industry Overview (delivered via email), Technical Papers (paper or electronic format available from the 57-year archive), and Conference Proceedings in CD format (Turbo Expo Technical Congresses and IGTI specialty conferences from the past three years—plus GTUS 2004—are available).

All of these activities reflect our ongoing commitment to IGTI's mission: supporting the international exchange and development of information to improve the design, application, manufacture, operation and maintenance, and environmental impact of all types of gas turbines, turbomachinery and related equipment.

### Individual Staff Recognition

In this second installment of IGTI staff profiles, I would like to call attention to Sarah Trowbridge, editorial administrator for IGTI. Known for her wry wit and keen intelligence, Sarah applies her considerable talents and skills to all of IGTI's house publications, including this newsletter and the conference programs. She is also our webmaster. Many of you may know her from Turbo Expo where she has provided valuable logistical support for the Technical Congress and supervised the session assistants. A life-long Atlanta resident, Sarah has the greatest seniority among IGTI employees with her 10th anniversary of ASME employment coming up in March 2005. Thank you, and keep up the good work, Sarah!

Thanks,

*Ronald A. Natole*

## CALENDAR OF EVENTS

### MARCH 7-11, 2005

#### 6th European Conference on Turbomachinery

Lille, France

Fluid dynamic and thermodynamic problems in the design, development and operation of axial and radial turbomachinery.

### MARCH 14, 2005

#### IGTI Board of Directors Meeting

Atlanta, Georgia, USA

### MARCH 24, 2005

#### IGTI Marine Committee Meeting

Indianapolis, Indiana, USA

Contact Jack Halsey for more information.

### JUNE 6-9, 2005

#### ASME TURBO EXPO 2005

Reno Hilton  
Reno-Tahoe, Nevada, USA

Celebrate the 50th TURBO EXPO amid the spectacular natural beauty of northern Nevada. IGTI's flagship event comprises a major gas turbine conference and exhibition. <http://www.asme.org/igti/>

### JUNE 10, 2005

#### IGTI Board of Directors Meeting

Reno-Tahoe, Nevada, USA

### SEPTEMBER 4-9, 2005

#### ISABE 2005 – 17th International Symposium on Airbreathing Engines

Munich, Germany

All aspects of airbreathing engines for flight propulsion and power production.

<http://www.isabe2005.com/>

### SEPTEMBER 19-23, 2005

#### International Symposium on Stability Control of Rotating Machinery (ISCORMA-3)

Cleveland, Ohio, USA

A biennial forum on rotor dynamic stability in rotating machinery.

<http://www.iscorma.com/>

### DECEMBER 6-8, 2005

#### ASME Gas Turbine Users Symposium

co-located with Power-Gen International

Sands Expo/Venetian  
Las Vegas, Nevada, USA

Intended for gas turbine users/operators, knowledge providers, OEMs, project developers, third-party providers and others in the gas turbine community, GTUS 2005 will offer ideas and practical solutions for gas turbine operating challenges.

<http://www.asme.org/igti/>



## 2005 IGTI Scholar Lecture

Monday, June 6, 2005

8:15 - 9:00 a.m.

Reno Hilton

**Dr. Ben T. Zinn**

*David S. Lewis, Jr., Chair, and Regents Professor  
Georgia Institute of Technology*



presents his award-winning paper:

### ***“Smart Combustors—Just Around the Corner”***

*ASME Paper GT2005-69138*

This year's Scholar Lecturer is Professor Ben Zinn from Georgia Tech. His paper entitled, “Smart Combustors—Just Around the Corner,” will provide a better understanding of combustor technology as well as insight into the direction of advancements.

Dr. Zinn will review the state of the art of active control of gas turbine combustors processes, opening with a discussion of recently developed approaches for active control of detrimental combustion instabilities, through the use of “fast” injectors to modulate the fuel injection rate at the frequency of the instability and appropriate phase and gain. Two additional approaches will be offered for damping of combustion instabilities: active modification of the combustion process characteristics, and open loop modulation of the fuel injection rate at frequencies that differ from the instability frequency.

The second part of the lecture concerns active control of lean blowout in combustors that burn fuel in a lean premixed mode to reduce NO<sub>x</sub> emissions. This discussion describes recent development of optical and acoustic sensing techniques that employ sophisticated data analysis approaches to detect the presence of lean

blowout precursors in the measured data. Dr. Zinn will show that this approach can be used to determine in advance the onset of lean blowout and that the problem can be prevented by active control of the relative amounts of fuel supplied to the main, premixed, combustion region and a premixed pilot flame.

The 2005 IGTI Scholar Lecture will close with a discussion of research needs, with emphasis on the integration of utilized active control and health monitoring and prognostication systems into a single combustor control system.

Dr. Zinn's research interests include: combustion instabilities; oscillatory flame phenomena; control of combustion processes; acoustics and pulse combustion. He has published around 150 refereed papers and 270 non-refereed reports and papers, edited two books on combustion diagnostics, and given nearly 450 presentations at various universities and conferences throughout the world. He is the co-holder of nine patents. A recipient of several awards from AIAA, the Combustion Institute, and Georgia Tech, Dr. Zinn is a Fellow of ASME and a Member of the National Academy of Engineering. ☆

## **TURBO EXPO** *TURNS 50!*

Join us June 6-9 in Reno-Tahoe, Nevada, as IGTI marks the 50th annual Turbo Expo. This milestone is made possible because of the dedication of IGTI's volunteers, exhibitors, presenters and attendees. There have been many changes in Turbo Expo, as the number of presentations and exhibits has grown substantially since 1956, when we had 17 presentations and 25 exhibitors in Washington, D.C.

IGTI is working hard to make this historic anniversary a very special event. Many activities are planned. Although the details are still being finalized, potential activities include posters, historical exhibits, heritage sessions at the Technical Congress, alumni photos, a special edition of an ASME journal, a wall of past Turbo Expo attendees, a special edition CD-ROM of award-winning papers, historical markers throughout the Expo, and a Heritage reception.

We hope to see you in Reno-Tahoe this June, as gas turbine professionals from around the globe gather to commemorate 50 years of Turbo Expo. Visit the IGTI website at [www.asme.org/igti](http://www.asme.org/igti) for program information and online registration. ☆

# Meet the

In this issue, we recognize three of the IGTI volunteers currently serving in office. Profiled here are a Technical Committee Chair, a Task Force Chair, and a Board Member. For details on all of IGTI's activities and offices, visit the website at <http://www.asme.org/igti>.

## IGTI Officers



**R**eza holds the Chair of Aerothermodynamics at the Swiss Federal Institute of Technology in Zurich, in addition to being the Head of the Department of Mechanical and Process Engineering. He is the past head of the Institute for Energy Technologies at ETHZ. He is a fellow of ASME, past chair of the IGTI Turbomachinery Committee, associate editor of the *Journal of Turbomachinery*, and a member of the editorial board of IMechE's *Journal of Power and Energy*. He is also an active member of a number of international expert committees, as well as being an advisor to several corporations. ✧

### Board of Directors Incoming Member

**Reza S. Abhari**  
Swiss Federal Institute of Technology (ETHZ), Department of Mechanical and Process Engineering  
Professor, Head of Department  
Zurich, Switzerland  
Attended: Oxford University and MIT

### Ceramics Committee Chair

**Gary Linsey**  
United Technologies Corporation  
Research Center  
Program Manager  
East Hartford, Connecticut, USA  
Attended: Rensselaer Polytechnic Institute and Alfred University

**G**ary has worked for UTC since 1986, including 10 years at Pratt & Whitney in East Hartford, Conn., four years at Pratt & Whitney in West Palm Beach, Fla., and four years at the United Technologies Research Center. He has published over 30 papers and has multiple patents. Gary has been a session chair for Turbo Expo for five years. Prior to taking office as chair of the Ceramics Committee, he served as committee secretary for two years and committee vice chair for two years. Gary's favorite leisure time activities include sports, travel, games, and anything with his kids. ✧



### Distributed Generation Task Force Chair

**William H. Day - "Bill"**  
South Carolina Institute for Energy Studies (SCIES)  
Manager of Outreach  
Clemson, South Carolina, USA  
Attended: Cornell University and Polytechnic University



**B**ill started as an engineer with General Electric in 1960. During his career with GE's Gas Turbine Division he was responsible for establishing and managing the High Temperature Turbine Technology Program, and managed the business with EPRI and the US Department of Energy.

In 1979 Bill joined the United Technologies Corporation. He was responsible for negotiating the contract with the People's Republic of China that launched the FT8 gas turbine and for directing the development of the FT8. He also negotiated the contract with Siemens that led to development of the V84.3A gas turbine and was in charge of that development effort at UTC. From 1995 until his retirement from United Technologies in 2002, he was manager of Advanced Engine Programs for Pratt & Whitney's industrial gas turbine business, and in 2001 was named a Fellow of Pratt & Whitney in recognition for his expertise in industrial gas turbines. Bill holds four patents and has published over 60 technical papers.

In 1995, Bill led the founding of the Gas Turbine Association (GTA), the trade association for the gas turbine industry. He served as Chairman of the Board of GTA from its founding in 1995 until his retirement from United Technologies in 2002, when he joined SCIES. ✧

## In Memoriam Dr. Vijay K. Garg

by Raymond Gaugler



**DR. VIJAY K. GARG**, Senior Research Engineer, Department of Mechanical, Industrial and Manufacturing Engineering, University of Toledo, on-site at the NASA Glenn Research Center, Cleveland, Ohio, passed away suddenly on May 3, 2004.

Dr. Garg received his Bachelor of Technology (Mechanical Engineering) degree in July 1968, from the Indian Institute of Technology in Delhi, India, his Master of Engineering (Mechanical Engineering) degree in August 1969, from McMaster University, Hamilton, Ontario, Canada, and his Ph.D. degree (Mechanical Engineering) in May 1971, from Carnegie Mellon University, Pittsburgh, PA.

From 1972 to 1989, Dr. Garg was on the faculty of the Indian Institute of Technology Kanpur, India, the last nine years as professor. During that period he spent sabbaticals in the United States as a visiting professor at Rensselaer Polytechnic Institute (1981-1982), the Naval Postgraduate School (1982-1983), and Ohio State University (1986-1988). In 1989 he moved permanently to the United States, serving as a visiting professor at the University of Pittsburgh (1989-1991), then at the University of Arkansas (1991). In January 1992, Dr. Garg began a three-year term as a National Research Council (NRC) Senior Research Associate in the Turbomachinery

Flow Physics Branch of what was then NASA Lewis Research Center in Cleveland, Ohio. After that, he continued at NASA Glenn as an on-site contractor, first with AYT Research Corporation, then most recently with the University of Toledo. After joining NASA Glenn in 1992, Dr. Garg published almost 30 technical papers on his work, primarily on the computational modeling of the film cooling of gas turbine engine turbine blades.

Dr. Garg joined the American Society of Mechanical Engineers (ASME) in 1977, and in 1990, based on his significant contributions to Computational Fluid Dynamics and Heat Transfer, he was elected a Fellow of the ASME. He was also recognized as a Fellow of the Institution of Energy Engineers in India in 1984. He was a very active member of IGTI's Heat Transfer Committee, regularly organizing sessions and contributing papers.

Dr. Garg is survived by his wife, Dr. Anita Garg, and their two children, Ankur and Anubhav. A memorial technical session in his honor is planned for the ASME Turbo Expo 2005, June 6-9 in Reno, Nev., to which his family has been invited. Contributions to help bring the Garg family to the conference should be made out to the "Vijay Garg Memorial Fund" and sent to Dr. Ali Ameri, NASA Glenn Research Center, MS 5-11, 21000 Brookpark Rd., Cleveland, OH 44135. ✧

50<sup>TH</sup> ANNIVERSARY  
**ASME TURBO EXPO**  
Power for Land, Sea & Air  
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CELEBRATING



50 YEARS

## ASME Turbo Expo 2005... Celebrating the Past with a Focus on the Future

To help celebrate this significant milestone, five of the world's leading power industry executives will gather to discuss their outlook on future technology needs and market opportunities for gas turbines during a landmark panel keynote session at ASME Turbo Expo 2005—Power for Land, Sea and Air, to be held June 6-9, in Reno-Tahoe, Nev., USA.

Panelists include:

- **David L. Calhoun**, president and chief executive officer at GE Transportation
- **Louis Chênevert**, president of Pratt & Whitney
- **John G. Rice**, president and chief executive officer of GE Energy
- **Sir Ralph Robins**, former chairman of Rolls-Royce
- **Randy H. Zwirn**, president and chief executive officer at Siemens Westinghouse Power Corp

Brian H. Rowe, chairman emeritus of GE Aircraft Engines and executive conference chair of Turbo Expo 2005, will act as moderator for the panel. Following the presentations, a question-and-answer period will allow conference attendees a unique opportunity to ask the experts about the role gas turbines will play in meeting the future transportation and power generation needs in today's global economy. For those interested in attending this can't-miss session, information on registration options can be found by visiting the official show web site at [www.asme.org/igti](http://www.asme.org/igti)

Powered by its ability to meet the ever-changing needs of its markets in power generation, the aero industry and other gas turbine arenas, the future for ASME Turbo Expo looks very bright. Somewhere, R. Tom Sawyer is smiling. ✧



# Gas Turbine Users Symposium Establishes Itself as a Success in Orlando

by John P. Platt Jr., GTUS Chair

Combustion turbine maintenance was clearly a fundamental focus of attendees at the first annual, separate Gas Turbine Users Symposium (GTUS) held in Orlando, Florida, alongside Power-Gen International, November 30-December 2, 2004. The maintenance management strategies tutorial was one among sixteen sessions, over three days, drawing strong attendance from the world's gas turbine operators, owners, managers, OEMs, and non-OEM aftermarket provider companies.

Over 200 registrants, representing 17 countries worldwide, had a varied selection of major user topics from which to choose, organized under three primary tracks—Environment, Operations, and Maintenance. Expert, influential leaders of the gas turbine user community offered an impressive array of panel sessions and tutorials, addressing day-to-day challenges confronting both hands-on gas turbine operators and management-level decision-makers.

Evaluations by attendees gave the conference sessions and presentations high scores for selected topics and content value. GTUS 2004 session details remain available on IGTI's web site at

<http://www.asme.org/igti/events/gtus04/sessions.html>.

For the first time in 2004, GTUS emerged as a conference on its own, independent of Turbo Expo, IGTI's flagship event for gas turbine technology and applications. A component of Turbo Expo since 1994, GTUS is designed to offer educational and networking opportunities for those who operate, maintain, and make purchasing decisions about gas turbines. To more effectively serve the needs of the gas turbine user community, the IGTI Board of Directors launched GTUS as a separate conference, co-locating with PennWell's popular trade show, Power-Gen International.

Two high-quality all-day workshops preceded the main program. John Stevens, operations & maintenance director for ProEnergy Services in Marietta, Georgia, delivered a course on "Gas Turbine Fundamentals," providing a general foundation for understanding the basics of gas turbine design and technology. "Gas Turbine Repair & Metallurgy Techniques" once again proved a popular topic, as Lloyd Cooke and Paul Lowden, both with Liburdi Engineering in Dundas, Ontario, and Warren Miglietti with General Electric in Greenville, South Carolina, reprised the workshop they presented at Turbo Expo in Vienna last June.

Following a well-attended and spirited networking session, plans are already underway for GTUS 2005 next December in Las Vegas. Development of the GTUS 2005 program will be led by the GTUS 2005 Steering Committee:

- Chair: John Platt, BP Exploration & Production Technology Group
- Co-Chair: Patrick Campbell, Alliance Pipeline
- Henry Bernstein, Gas Turbine Materials Associates
- Klaus Brun, Southwest Research Institute
- Kirby Chapman, Kansas State University
- Bill Couch, El Paso Pipeline Company
- Roger Harker, IGTI Board of Directors
- Rainer Kurz, Solar Turbines, Inc
- Cyrus Meher-Homji, Bechtel
- Terry Morgan, Terry Morgan & Associates
- Ron Natole, Natole Turbine Enterprises
- Harold Simmons, Southwest Research Institute

See the Call for Sessions at right for guidelines in submitting a session proposal for consideration.★

## CALL FOR SESSIONS

ASME Gas Turbine Users Symposium 2005

December 6-8, 2005

Las Vegas, Nevada USA

Co-located with Power-Gen International

The ASME International Gas Turbine Institute is now accepting proposals for sessions to be offered during the 2nd annual Gas Turbine Users Symposium (GTUS).

The conference program will consist of multiple concurrent panel, tutorial and discussion sessions. A limited number of paper sessions may also be organized to offer repeat presentations of user-oriented technical papers published at ASME Turbo Expo 2005.

Proposed sessions should address the specific needs and interests of individuals who operate, troubleshoot and maintain combustion turbines, and for those who provide products and services to users. While GTUS session topics have historically related to one of the following three primary conference tracks:

**Environmental ❖ Maintenance ❖ Operations**

... Other track(s) will be considered either as an alternative or an addition to these if sufficient developer and user interest is indicated.

Please submit session proposals by email to [igtiprogram@asme.org](mailto:igtiprogram@asme.org) in the following format:

**Subject of Email:** GTUS05 Session Proposal

Include the following in the body of the email:

**Primary Contact/Session Organizer:**

Include:

- Name
- Complete Mailing Address
- Job Title
- Phone Number
- Company
- Email Address

**Session Topic:**

Enter Tentative Session Title

**Session Type:**

Enter only ONE session type:

- Panel
- Tutorial
- Discussion

**Conference Track:**

Enter only ONE conference track:

- Environmental
- Operations
- Maintenance
- Other

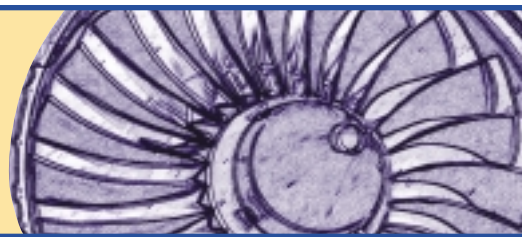
**Session Description:**

Include:

- How this session will address the needs and interests of gas turbine users
- What type of companies will be asked to provide presenters for the session
- A list of several potential presentation topics or discussion points



# JOURNAL OF ENGINEERING FOR GAS TURBINES AND POWER



## Important News ... from Lee Langston, Editor

As of July 1, 2004, the *Journal of Engineering for Gas Turbines and Power* went to full use of the ASME Journal Tool. All papers submitted to the Journal now come through this electronic web tool, which can be accessed at <http://journaltool.asme.org/>. A significant portion of *Journal* papers come from IGTI conferences, where, for the past three years, authors have been submitting papers electronically on the ASME Conference Tool (<http://www.asmeconferences.org/>). Currently, these two online systems are separate and do not "talk" to one another. This requires extra effort from authors whose conference papers have been recommended for journal publication, to upload their paper to the Journal Tool. I have recommended to the ASME Publications Committee that this problem be solved by appropriately connecting the two online "tools". I hope that this will be accomplished in the near future.

The *Journal* receives the manuscripts that it publishes from three primary sources: a) International Gas Turbine Institute (IGTI) conferences; b) Internal Combustion Engine (ICE) conferences; and c) individual authors who submit their manuscripts directly to me or to one of our associate technical editors. The majority (60 to 75 percent) of the manuscripts received for the *Journal* are obtained from IGTI conferences.

The *Journal* is published quarterly, with a nominal yearly page allotment approved by the ASME Publications Committee of 950 pages. For your possible interest, here is the breakdown of number of papers published since I became editor:

| YEAR | PAPER TOTAL | TOTAL NO. OF PAGES | AVERAGE PAGES/PAPER |
|------|-------------|--------------------|---------------------|
| 2001 | 125         | 972                | 7.78                |
| 2002 | 129         | 1064               | 8.25                |
| 2003 | 135         | 1104               | 8.18                |
| 2004 | 109         | 952                | 8.73                |

In 2001-2003, I used 300 additional journal pages authorized by the Publications Committee to eliminate an old backlog. During the past year or so, the backlog has steadily built up again, brought about by increased technical activity in the areas of gas turbines (IGTI) and internal combustion engines (ICE Division). Our current backlog is approaching an uncomfortable 1½ - 2 years. For example, the bulk of IGTI's Turbo Expo 2004 papers from the Vienna conference last June (about 74 recommended for the journal) will be published in the October 2005, January 2006 and April 2006 issues, with the current allotment of 950 pages. This has prompted a request from me to the Publications Committee for an increase in the annual page allotment to 1100 pages (from 950) and to change the issuance from four to six issues per year. We hope that the committee will vote to approve the request.

## Some Issue Issues

The January 2004 and October 2004 issues contained the first book reviews ever published in the *Journal*. I hope to continue doing this feature, as I receive requests from publishers and am able to find expert reviewers.

The lead article in the April 2004 issue was the award-winning paper "Millimeter-Scale MEMS Gas Turbine Engines," by Alan Epstein. The author was the recipient of the 2003 IGTI Scholar Award, and presented his work at the IGTI Scholar Lecture at Turbo Expo 2003 in Atlanta.

Next year, the *Journal* will commemorate the 50th anniversary of IGTI's gas turbine conference (Turbo Expo). The April 2005 issue will feature IGTI papers along with an editorial offering a brief history of fifty years of IGTI conferences.★

Lee S. Langston, Editor

ASME Journal of Engineering for Gas Turbines and Power

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# IGTI Products and Services

## Fostering Gas Turbine Education, Technology and Networking

IGTI offers a variety of products and services on a continuing basis to further gas turbine advancements throughout the world. Visit IGTI's website (<http://www.asme.org/igti/>) for more information.

### Self-Paced Study

Three Home Study Courses provide fundamental education from experts on essential topics. Student discounts available.

#### Basic Gas Turbine Engine Technology, 2<sup>nd</sup> Edition - US \$210 (CD-ROM)

Provides a good, general understanding of gas turbines in an easy-to-read format. Ideal for technicians and management personnel.

#### The Design of Gas Turbine Engines - Thermodynamics & Aerodynamics, 2<sup>nd</sup> Edition - US \$345

Intended for graduate engineers with knowledge of thermodynamics and an interest in design analysis and performance prediction.

#### Gas Turbine Applications & Economics - US \$215

Performance is the key to application decisions for turbine operators. Learn more about the design and performance of gas turbine power systems.

### Reports, Technical Papers & Conference Proceedings

IGTI has exceptional publications to keep you abreast of ground-breaking technology, current events and future trends.

#### Gas Turbine Overview (annual report) -

Delivered electronically - US\$25  
This exclusive report to IGTI contains valuable information and incisive analysis from one of the gas turbine industry's leading experts.

#### Directory of Gas Turbine Technical Papers - Two-volume set - US\$30

Printed, two-volume index of the gas turbine technical papers published by ASME from 1956 through 1991.

#### Digital List, ASME Gas Turbine Technical Papers

Browse, at no cost, online for gas turbine technical papers published from 1990 through 2003,

<http://www.asme.org/igti/services/>

#### Gas Turbine Conference Proceedings on CD ROM - List price: \$595, ASME Member Price: \$475

Complete collection of gas turbine technical papers published for the respective ASME Turbo Expo

- ASME Turbo Expo 2002, 620 gas turbine technical papers on 1 CD
- ASME Turbo Expo 2003, 2 CDs includes 587 gas turbine technical papers plus the 2003 IJPGC proceedings
- ASME Turbo Expo 2004, 732 gas turbine technical papers on 1 CD

### Specialty Conference Proceedings

Captured on CD ROM are panel and plenary presentations focused on specific topics and market segments vital to the gas turbine community.

#### Gas Turbines for a National Energy Infrastructure (2003) -

From a conference co-sponsored by the U.S. Department of Energy, see the slides and hear the synchronized audio on the various aspects of this crucial, contemporary issue.

1 CD - US\$150

#### Aero Engine Life Management Conference (2004) -

The slides (no audio) from the experts in the field plus the transcribed Q&A portion of this leading edge assembly co-sponsored by the U.S. Air Force and the U.S. Navy. 1 CD - US\$195

### Exhibitions and Conferences

See articles, pages 19 and 24.

### IGTI Technical Committee Membership

The heart of the International Gas Turbine Institute is its highly successful committee structure. IGTI's Technical Committees provide regular, ongoing forums for program development and technical exchange, addressing all areas of technical expertise related to gas turbines. For details on a particular committee, visit IGTI's website and select 'Community'.

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