ASME International

COMPUTERS & INFORMATION IN ENGINEERING DIVISION

Summer 2004 — *Imre Horváth, Editor*

Chair's Message

As Chair of the Computers and Information in Engineering Division during 2003-04, I've been honored to serve the membership in an effort to re-invigorate the division and to look forward as the division begins celebrating its 25th Anniversary.

Your Division Officers have successfully addressed a few long standing tasks that the leadership of the division has been working on for several years. The ASME Council on Engineering through its Bylaws Committee is currently voting on our submission to revise the Division's Constitution, Bylaws and Executive Committee's Operating Procedures. The version that ASME recognizes as being in effect is a "draft" that dates to our founding as the "Computers Division". Needless to say, all of us and the division have seen a great deal of change since 1979. The effort to revise the division's operating documents began in earnest back in 1998 and I wish to acknowledge Rich Crawford, Peggy Bocks, David Rosen and Simon Szykman for their dedication to the task.

The CIE Division is also in the process of defining its strategic plan. In working with the ASME, we've been able to gather some great information as to where the division membership works (62% in industry, 6% in academia, 25% are students and 4% are retired), the average length of ASME membership (almost 15 years, but note that there is at least one member of the CIE Division who's been an ASME member for over 70 years!), and where the membership resides (15% are international, and of the remaining 85%, 50% of you reside in either California, Ohio, Texas, Pennsylvania, Michigan, New York, New Jersey or Massachusetts). We are working to provide services and opportunities to interact and participate based on this data as well as bringing more CIE info up to the division's web site.

I invite you to participate in the technical committees established within the CIE Division, to be an author for the 25th CIE Conference in Long Beach, California or the IMECE in Orlando, Florida, to consider being a reviewer for these papers, to help us organize the 25th Anniversary Celebration of the CIE Division (also in Long Beach), to work within a local section to bring the CIE's Technical Tutorials to your area, to help set up CIE sponsored student-specific activities at your university and offer up recommendations on how both the CIE Division and ASME can more effectively serve the needs of its members as we embrace the changes occurring within ASME.

Together we can always do more. Keep those e-mails coming!

David E. Lee (leed515@asme.org)

Contents

CIE Division's Vision and Mission

Our vision:

The Computers and Information in Engineering Division will provide a forum for enhancing the practice of engineering by understanding the application of emerging technologies that impact critical engineering issues of representation, product design and product development, exchange, management and integration of information throughout the entire engineering product and process life-cycle.

Our mission:

The Computers and Information in Engineering Division will enhance the practice of engineering through the dissemination of emerging technology and knowledge that will enhance the integration of Mechanical Engineering, Software Engineering, and Computer Engineering.

Subscribe to Your Journal: JCISE

All CIE Division members are encouraged to subscribe to the Journal of Computing and Information Science in Engineering (JCISE)

www.asme.org/pubs/journals/infosci/

CIE Division Web Site

For more information, please visit us online at:

www.asme.org/divisions/cie

25 Years of Computers and Information in Engineering

Four years ago, the Computers and Information in Engineering Division (CIE) of ASME celebrated its 20th anniversary. At the 2000 ASME Design Engineering Technical Conferences and Computers and Information in Engineering Conference, Professor Kos Ishii of Stanford University organized a special panel session to discuss 20 years of accomplishments, and future challenges for the Division. The panel featured Kos along with several other past Chairs of the division.

At that time, it had only been two years since 1998, when the Division had merged with the Engineering Information Management program and revised its name from what had previously been the Computers in Engineering Division. This was one of the more important developments in the history of the Division, one that had been motivated by a significant evolution in the role of computers in the engineering field. As may have been expected, those same issues continued to remain important.

Among the topics of discussion at the special CIE session in 2000 was the evolving role of CIE in ASME as computers were increasingly commonplace and were no longer a specialized research area within engineering. More generic changes were discussed as well, including the increased reliance on heterogeneous information in engineering, the emergence of Internet- and web-based tools, as well as trends related to e-commerce, globalization, and the evolving role.

Although traditional computers-in-engineering topics continue to remain important, since the official name change in 1998 the Division has successfully made the transition to one in which the "I" in the division acronym stands for "information." Information modeling, data representation, and intelligent, distributed and knowledge-based systems are as much areas of interest as long-standing topics of engineering analysis and computer-aided design. The increasing emphasis on knowledge in engineering is not limited to the CIE Division, but is affecting ASME more generally as well. Indeed, one of the key concepts in ASME's ongoing strategic planning activities and reorganization of the Council on Engineering is a shift toward becoming a knowledge-based organization.

Long Beach, California – Venue for the 25th CIE Conference

Next year, the Division will celebrate its 25th anniversary. This milestone will be an important theme at the 2005 Computers and Information in Engineering Conference, as we look back over the quarter century since the Division was first founded. As Chair of the 2005 conference, I invite Division members to suggest ideas for how they'd like to see this theme captured at the conference, or simply to submit their own reflections on the past 25 years of computers and information in engineering. We'd also be happy to hear from past Division leaders. Comments or suggestions can be submitted to David E. Lee, (leed515@asme.org) the Past Chair of the CIE Division, who has graciously taken on the role of planning for 25th anniversary events at the conference.

Simon Szykman

25th Anniversary Activities and Planning

Stop by:

www.asme.org/divisions/cie/

and click on: *25th Anniversary*

Participants of CIE Division Annual Meeting (22nd CIE Conference, Montreal Canada)

Do You Know About ASME's Discussion Forums?

The ASME leadership is looking for a broad participation of the members, volunteers and staff in the process of renewal and reinvigoration of our Society. A web site providing background on the process and unmoderated discussion forums has been launched and is accessible at www.asme.org/change. You are invited to participate in this process and provide your input, particularly between now and September 1, 2004, through the discussion forums.

Imre Horváth

Organizing a New Technical Committee in System Engineering

We'd like to invite members of the CIE Division who are working in or interested in the field of system engineering to help us start up a new technical committee. Clearly of interest are the fundamentals of system engineering (requirements definition and flowdown, validation and verification, etc.), the infrastructural issues in developing and using computing tools for system engineering, as well as the application of system engineering to specific domains within mechanical systems and broadly applied to engineered systems. If you're interested, please send e-mail to leed515@asme.org.

David E. Lee

Call for Papers: 25th CIE Conference

Submit your papers, panel proposals and tutorial ideas via:

www.asme.org/divisions/cie/events/cie2005/cie2005cfp.html

Remember: everything is electronic!

Join Our Tributes to Professor Bob Fulton

It is with deep sadness that we report the sudden death of Dr. Robert (Bob) Fulton on February 24, 2004. A retired NASA engineer, Bob was a Fellow of ASME and Professor of Mechanical Engineering at Georgia Tech, and founded ASME's Engineering Database Program (EDBP) in 1987. Bob's leadership, enthusiasm and influence was very palpable during the early EDB Symposia (1987 – 1997), which brought forth exciting interactions between academia, early adopters in industry and government, the Standards community and tool vendors. The EDBP evolved into the Engineering Information Management Program (EIMP) to address the broader scope of information in product development organizations, and it merged with the CIE Division in 1998, where it continues to contribute significantly to this multidisciplinary area of research and practice.

A specialist in Structures, Bob's early involvement with EIM issues dates back to his NASA days in the 1960's and 1970's, where he was a key player in the IPAD Program, which integrated multiple analysis programs to support the Aerospace design process. Techniques in information modeling, process modeling and relational database design were significantly exercised in this large-scale system integration endeavor, thereby setting an early stage for this field of study. He was instrumental in Georgia Tech's thrust in the field of Engineering Information Systems and PLM, graduating several Ph.D. and M.S. level students who are currently active researchers and practitioners in the field. In his final days Bob was actively working towards establishing a PLM Center at Georgia Tech. Bob is survived by his wife, Jackie, his three children, and grandchildren, and also leaves behind a rich and active legacy in the form of students and fellow professionals who continue to be passionately committed to this field

As a tribute to honor Bob's contributions to the field of engineering information management, the CIE Division is planning the following events:

- Special events to recognize Dr. Fulton's contributions to the field will be held at the 2004 CIE Conference at Salt Lake City, UT
- A special issue on Engineering Information and Product Lifecycle Management dedicated to the memory of Dr Bob Fulton to appear in ASME's Journal of Computing and Information Science in Engineering (JCISE)
- A volume of EDB, EIM and CIE abstracts and key papers published over the last 25 years during the 25th Anniversary of the CIE Division

We welcome your active participation in honoring his memory.

Ravi Rangan

Don't Forget!

24th CIE Conference
Sept. 28-Oct. 3, 2004
Salt Lake City, Utah

The ASME International 24th Computers and Information in Engineering (CIE) Conference will be held on September 28-October 3, 2004, in Salt Lake City, Utah.

This year's conference provides a forum for enhancing the practice of engineering by understanding the application of emerging technologies that impact critical engineering issues of representation, product design and product development, exchange, management and integration of information throughout the entire engineering product and process lifecycle.

The conference will offer 29 technical paper sessions and three panels. The Keynote Speaker will be Rodney Dreisbach from The Boeing Company and our Luncheon Speaker will be Jan Bjernfalk from Evans and Sutherland.

A Pre-Requisite to Business Process Optimization

Managing engineering information is in the focus. Engineers are constantly distracted by activities that keep them from engineering. Recent studies indicate that 11% of an engineer's time is spent doing creative engineering activities, 34% in administration, 31% on communication and 24% waiting for approvals, decisions and information. Notwithstanding the realities of industrial culture, these studies expose significant opportunities for process improvement. Over the years we have witnessed leaps in task automation through advances in CAD, CAM, CAE, and practices such as DFM and related concurrent engineering approaches (DFX). In contrast, the field of engineering information management takes a systems perspective to facilitate the efficient use, dissemination, creation and change of product related information through representations that efficiently capture engineering semantics to optimize business processes and system integrations spanning multiple phases of the product lifecycle.

Early advances in engineering database management (circa 1980's) dealt with building databases to support relatively static elements such as materials databases, catalogue parts, and databases to support standards-based schemas. This facilitated sharing and data exchange. In the early 1990's, this evolved into information management for design processes, and we saw product data management (PDM) tools and technologies to support collaboration and process automation – such as vaulting of design files and workflow to route these files for approval, release, and change management. This enabled workgroup collaboration, but many industry implementations limited themselves to organizational silos. Starting from the mid-90's, early adopters (Boeing, Ford, etc.) began employing finer grain representations to facilitate intelligent handling of design processes – streamlining tasks such as platform management for mass customization, change impact analysis, distributed design and manufacturing operations, and configuration management, often across business process silos.

Many of these solutions customized commercial PDM toolkits and involved arduous process analysis and customization. The current emphasis in product lifecycle management (PLM) adopts a more holistic perspective that ties information management and system integration with business strategy, thereby exploring system effects across the full product realization process. However, this is currently a vision, rather than a practice in the majority of companies.

As we look beneath the buzz-words, we discover patterns and domain principles – age-old concepts such as form-fit-function part interchangeability could be extrapolated to interface management techniques to enable process autonomy; synchronization at critical control points eliminates noisy change propagation across intra and inter-company supply chains. The benefits include elimination of non-value added processes, making for lean and robust processes across the full value chain to enable continuity, consistency and integrity of information and process flows across distinct life cycle phases, such as marketing, engineering, design, manufacturing, service and support. Current industry innovators are working on implementations to formalize relationships between requirements, function, form, process into an information architecture that streamlines the overall business process flow. But new chasms must be crossed: the insidious specter of legacy data, legacy systems, legacy process, culture and comfort makes "change" the biggest challenge. We cannot afford ad-hoc implementations - process development projects must be afforded the same rigor that we apply to product development projects.

At the 2003 CIE conference in Chicago, Il, the EIM Panel (Bernhard P. Bettig, Michigan Technological University, Larry Howell, Retd., GM Corporation, Mark Jennings, Ford Motor Company) cogently argued that the one key issue being overlooked by practitioners and researchers in PLM is the role of transition processes in deploying new solutions: working with legacy processes and tools are not an issue, neither are the new processes and tools – the biggest challenge from an organization standpoint is moving from the old to the new. This issue of change management is a key inhibitor to progress, and we must find ways to facilitate this transition. There are technical issues such as schema evolution, business rule phasing (old rules/ policies to new rules/ policies), data migration, multi-representation/ process co-existence, etc. In addition, there are also cultural and management issues such as training and planning that are critical during this transition phase, given that the organization must continue to deliver its business commitments. The vendor / tool community is responding to this challenge by making their tools deployment friendly. Frameworks that required significant consulting and customization are being supplanted by business/ process focused applications that can be rapidly deployed now that we better understand operational processes and patterns and associated transition issues. These solutions take a pragmatic approach by configuring operational policies within their architecture, thereby eliminating the costly and time-consulting customization activities.

These issues serve as key challenges for the CIE Division, as we move the results of our research into the industrial sector thereby enabling engineers to pursue creative engineering tasks with more effectiveness.

Ravi Rangan

Planning the 25th CIE Anniversary Celebrations

Both the CIE Division and the CIE Conference will be celebrating their 25th anniversaries in 2005. A committee has been established to plan and coordinate activities related to the 25th anniversaries. We'll present the past as well as the future of the Division to the members, supporters and people interested. We will be bringing the lists of papers and authors from the past two and a half decades online, identifying all fellows associated with the CIE Division, locating past chairs of the division and organizing special events to be held during the 25th CIE Conference. If you would like to know more, please join us at the 25th Anniversary Committee meeting at the CIE Conference in Salt Lake City.

Imre Horváth

Get Involved: Help Organize the 25th CIE Anniversary Celebrations

At the 25th CIE Conference in Long Beach, California, we'll be celebrating both the 25th Conference as well as the 25th Anniversary of the CIE Division. We need your help.

We've begun to organize activities relevant to the 25th Anniversary Celebration in the following areas:

- **25 Years of CIE Publications**: By Long Beach, the CIE will have published over 2000 papers both at its conferences and in the JCISE - we want CIE to get credit for these papers and to actually make them available and searchable online @ ASME; if you have expertise in (or know of) cost-effective scanning & OCR and want to be involved in this effort, we'd like to hear from you.
- **History and Perspective**: I have photos of CIE conferences that date back to 1990 - we need more! These will be brought up to the division web site to show where we've been. We're also organizing a CIE Division Chairs' Reunion and want your help.
- **Computational Futures**: We think we know where we've been. We also want to think broadly and forecast where computing as applied to mechanical systems is going. If you know, we'll be needing you.
- **125th ASME - 25th CIE**: In addition to CIE's 25th Anniversary, the ASME is celebrating its 125th - The CIE Division's genesis arose from efforts ASME's 100th Anniversary: the Century 2 - Emerging Technology Conferences. We'll be having a party and we want to make it especially memorable with you there too!
- **Not Sliderules**: Remember card decks, PDP-11s, Altairs, and core memories? How about early CAD systems such as CADAM and light pens? We're looking to put together a contest to show how computing in mechanical engineering used to be done and the challenges involved. If you'd like to help, please get in touch.

If you're interested, please send e-mail to *leed515@asme.org*.

David E. Lee

Imre Horváth Receives the First Timer's Wesner Award at TEC 2004

The CIE Division congratulates Imre Horváth on receiving the John Wesner Award for his contributions as a first timer to this year's ASME Technical Executives Conference (TEC 2004). Held this year at the Pittsburgh Airport Hyatt Regency, the annual conference brings together technical division leaders from across the 38 divisions within ASME's Council on Engineering to provide information about leading a unit within ASME and background on issues such as the continuity and change process underway within ASME.

(and, yes, the award is a troll doll!)

It was said about the challenges for CIE ...

Almost five year ago, at the ASME 20th Computers and Information in Engineering Conference, an Anniversary Panel Session was organized to look back to the 20 years of existence of the CIE Division, reflect on the accomplishments and discuss the new challenges. The session was chaired by Kos Ishii (University of Stanford) and the panel consisted of three past CIE Division Chairs, Prof. Don Riley (University of Maryland), Prof. Gary Gabriele (RPI) and Ms. Peggy Bocks (EDS). As a preparation for the discussions, the panelists were asked how they saw the future challenges of CIE. Now, five years later, it is more than just interesting to recall the opinions.

Prof. Riley: "Particularly with the merger with the EIM program, CIE could enhance the understanding of how the engineering function fits into a broader context of information flows within the organization. The real challenge seems to be in the realm of how engineering fits into the broader corporate information systems, and into general societal issues in the new global information economy. A little more narrowly, how new web-based tools, 'deep computing', knowledge and information management tools and systems can benefit and integrate the engineering and product definition roles. Another question: what is the role of engineering in e-commerce, e-learning, etc.? What about recognition for online learning?"

Prof. Gabriel: "Computing and its application to engineering is changing so quickly, CIE's biggest challenge may be in keeping up with the change. When I headed CIE, there was no web, and Pro/Engineer had just been introduced. CIE needs to find a way to be flexible, and perhaps always be ready to provide for the unanticipated. It needs to find a way to give its members a glimpse of the future, and how engineering, and particularly engineering education, might evolve."

Ms. Bocks: "Engineering is faced with unprecedented challenges: global competition, heterogeneous engineering information, competing technology solutions in the midst of powerful technological advances. Fundamental to meeting these challenges is the management of business and technical engineering data. The challenge and opportunity is to create collaboration within an international network of businesses, academia, and other engineering professionals to test new ideas, make contacts, and conduct business with wider industry collaboration. CIE must foster business, academic, professional collaboration and friendships."

Prof. Ishii: "The areas of interest to the CIE community continually change dynamically. Stand-alone tools for CAD, FEM, etc. were the focal points in the 80's, but the last decade has seen the emergence of new and exciting areas such as virtual reality and agent-based concurrent engineering. The above trend is much more pronounced than in other

ASME Divisions and keeps the executive committee on its toes, particularly after the merger of CIE with Engineering Information Management Program. CIE needs to keep up with the needs of practicing engineers as well as academics in keeping mechanical engineers on top of the rapidly changing world of computers, information, and networking technology."

Imre Horváth

The CIE Technical Seminar Series

The CIE Division has been working with the Council on Member Affairs and the Southeastern Michigan Section to develop a technical event called the CIE Technical Seminar Series. The series targets:

- **Practicing Engineers:** Provide opportunities for engineers in industry to learn how current developments in computing and IT may impact their jobs
- **Early Career Engineers (New Professionals):** Enable engineers who typically do not have travel budgets to attend meetings but are interested in new developments in computing and IT

Topics considered include: Systems Engineering, PLM (product life cycle management), grid computing, simulation-based design, and virtual environments.

If you and your local section would like to host a series, please contact Simon Szykman (szykmans@asme.org).

David E. Lee

Call for Student Tutorials: 25th CIE Conference Sept. 25-28, 2005 Long Beach, California

Members of the CIE Division are invited to submit proposals for tutorials in areas such as VB development, XML and structured data representations, developing an effective vita, and research opportunities in industry to:

www.asme.org/divisions/cie/events/cie2005/cie2005cfp.html

CIE's Technical Committees

Computational Technologies for Engineering Sciences Applications (CTESA)	John Michopoulos, Naval Research Laboratory C. W. S. To, University of Nebraska
Computer-Aided Product Development (CAPD)	David W. Rosen Georgia Institute of Technology
Computers in Education (CIEd)	Mohammad Khosrowjerdi Western New England College
Computers in Electromechanical Systems (CINEMAS)	Frederick Proctor National Institute of Standards and Technology Harry H. Cheng, University of California, Davis
Energy Systems (ES)	Ryo S Amano University of Wisconsin-Milwaukee Ashwani K. Gupta, University of Maryland
Enterprise Information Management (EIM)	Russell Peak, Georgia Institute of Technology Ip-Shing Fan, Cranfield University
Internet-Aided Design, Manufacturing and Commerce (IADMC)	Karthik Ramani, Purdue University
Non-Traditional Computing (NTC)	Anthony de Sam Lazaro, St. Martin's College
Virtual Environments and Systems (VES)	Peter Ebbesmeyer, UNITY AG

www.asme.org/divisions/cie

1980-1989: A Decade of CIE Conferences

With the celebration of the American Bicentennial and the (then) upcoming 100th Anniversary of the ASME, a group of engineers endeavored for the better part of 4 years to put together the first The International Computer Technology Conference as part of the ASME Century 2 - Emerging Technology Conferences in San Francisco, California during August 12-15, 1980. Sponsored by the Computer Technology Committee of the ASME, the conference published 137 papers in two volumes that encompassed work into:

> Computer Vision for Industry, Computers in Energy Systems, Robots and Manipulators, Mini- and Micro Computing Systems, Computer Applications, CAD Systems, CAD Applications, Microprocessors, Computers in Automotive Industry, Process Computer System Design and Development, Data Base Systems, Finite Element Technology, Computers in the Engineering Workplace, Computers in Education, Computers in Manufacturing, Management Information Systems, Computer Program Languages, Computer Standards, and Personal Computing

By the Second International Computer Technology Conference in 1982, the demand for an outlet to publish and present work in this area enabled the organizers to move from a biennial format to an annual one - the next conference was identified as the 1983 Computers in Engineering Conference and Exhibit.

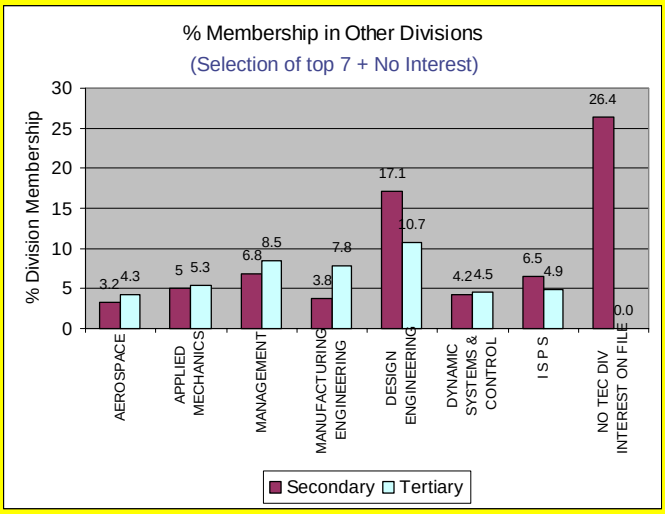
Year	Editors/Chairs	Conference Location
1980	Ali Seireg	San Francisco, California
1982	Irwin Berman	San Diego, California
1983	F. Eugene Hulbert	Chicago, Illinois
1984	William A. Gruver	Las Vegas, Nevada
1985	Ramjee Raghavan, Steve Rohde	Boston, Massachusetts
1986	Gopal Gupta	Chicago, Illinois
1987	Ramjee Raghavan, T. James Cokonis	New York, New York
1988	Edward M. Patton, Vijay A. Tipnis	San Francisco, California
1989	Donald R. Riley, T. James Cokonis	Anaheim, California

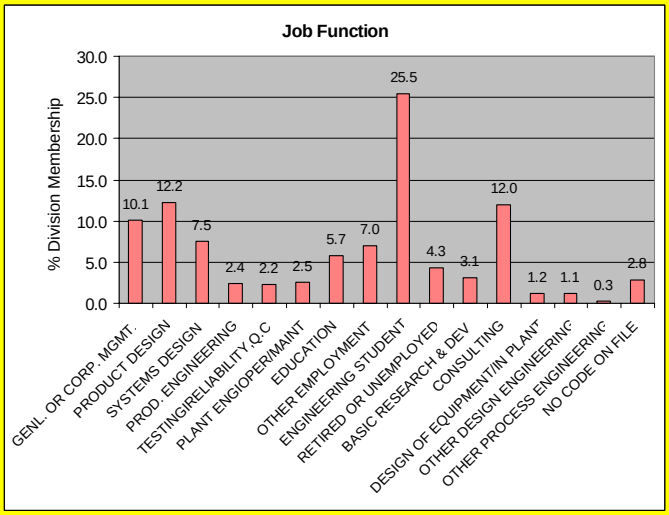
I welcome chairs from these earlier years to contact me and join us in 2005.

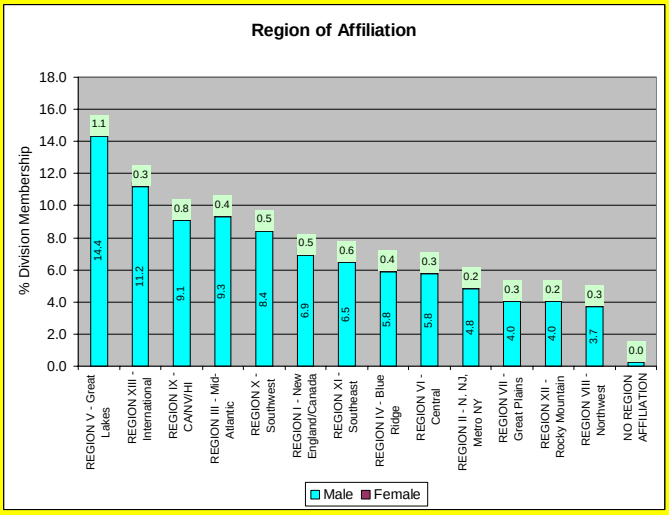
David E. Lee (leed515@asme.org)

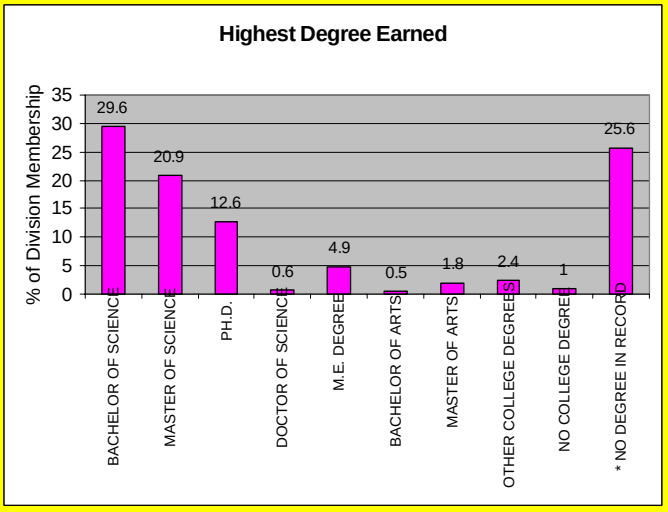
The Demographics of a Division:
The CIE Membership in 2003

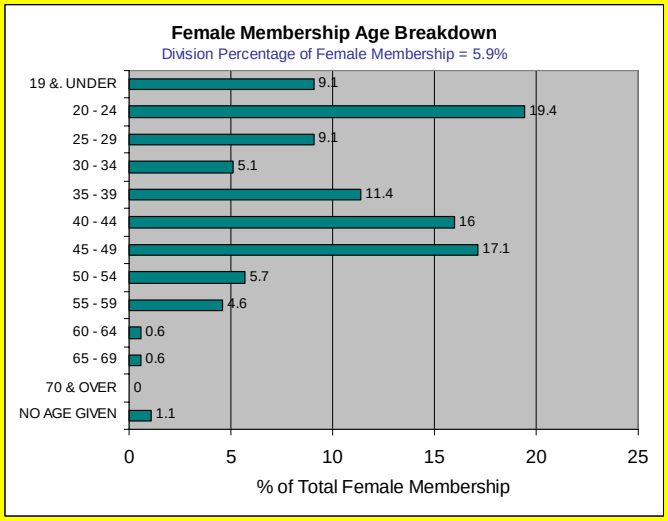
Total Division Membership as of October 03, 2003: **2958**

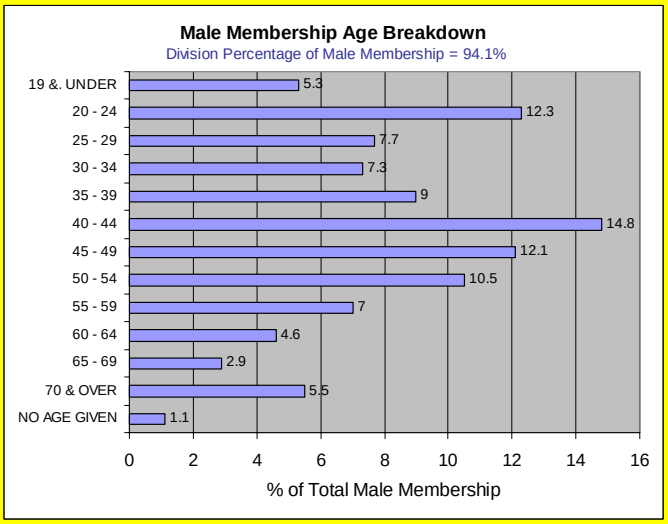












Additional detail regarding division demographics available at: *www.asme.org/divisions/cie*

ASME
Three Park Avenue, New York, NY 10016-5990
www.asme.org/divisions/cie

2005 ASME International Mechanical Engineering Congress & Exposition

November 13-18, 2005
Orlando, Florida • Walt Disney World Dolphin

www.asmeconferences.org/congress05

Join the CIE Division and thousands of your colleagues in Orlando, Florida for a week of exchanging ideas, networking, and conducting business. At hundreds of technical sessions, special forums, product exhibits, industrial tours and social events, you'll receive updates on current trends, learn new techniques, trade tips and explore the technical worlds of your fellow mechanical engineers while venturing out and around the magic kingdoms that comprise Disney World and Central Florida.

We invite you to submit your abstracts and papers via the Congress website and session proposals to Chris Paredis (*chris.paredis@me.gatech.edu*) and be with us in 2005 for an extra special experience.

2004-05 CIE Executive Committee

Chair:	Simon Szykman, US Department of Homeland Security	*szykmans@asme.org*
Vice-Chair:	Plamen Bliznakov, Parametric Technology Corp.	*plamen@ptc.com*
CIE Conference Executive:	Imre Horváth, Technical University of Delft	*i.horvath@io.tudelft.nl*
Secretary:	Chris Paredis, Georgia Institute of Technology	*chris.paredis@me.gatech.edu*
Member:	Ravi Rangan, Product Sight, Corp.	*ravi.rangan@productsight.com*
Past Chair:	David E. Lee, Northrop Grumman Space Technology	*leed515@asme.org*