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ICE

INTERNAL COMBUSTION ENGINE DIVISION

Internal Combustion Engine Division Newsletter

Editor, Tony Siegel *Summer 1999*

Chair's Message

Teoman Uzkan

As the new chair of the ICE Division, I want to do three things in this column. First, I would like to express my pleasure at being able to address you about the Division at the time for a new millennium. Second, I want to give an overview of the goals, recent achievements, present position and the future activities of our Division. Finally, I would like to extend an invitation to you to join our Division or increase your participation in our activities.

The goals of the Division can be recognized in its mission statement. The mission of the Internal Combustion Engine Division is to promote, encourage and recognize the advancement of the Art, Science and Practice of Mechanical Engineering in the field of Internal Combustion Engines. The Division strives to be a major information source by providing a forum for the documentation, worldwide dissemination and recognition of the advancements and ideas of the people engaged in this work. This goal covers a wide spectrum of activities. In a sense it is all-inclusive. The efforts of

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CIMAC-the Worldwide ICE Organization

ASME is the American member of CIMAC and has been active on the international ICE scene for many years. During the last few years CIMAC has introduced new activities and organizational measures.

The International Council on Combustion Engines (CIMAC) was founded in Paris in 1951 with the intent to include member countries from around the world that are involved in the IC engine business. Today, CIMAC is comprised of 18 National Member Associations (NMAs) representing the following countries (in alphabetical order): Austria, China, Denmark, Finland, France, Germany, Greece, Italy, Japan, Korea, The Netherlands, Norway, Poland, Spain, Sweden, Switzerland, United Kingdom and the USA.

One of the guiding principles of CIMAC is to join together all partners of the combustion engine industry. These include IC engine and gas turbine manufacturers, users, scientists and research organizations, component, fuel and lubricant suppliers as well as consultants and classification societies. This enables the CIMAC members to interface with customers and competitors in a relaxed atmosphere without fear of surrendering specific market advantages. There are many problems within the global industry that

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every one of our members, however diversified they may be, is a part of this mission.

A short history of our Division within the last few decades may be appropriate. The Division has changed and improved continuously over time. Even the name has changed a few times within the 20th century, from Gas Power Section (1908) to Gas Power Division (1921) to Oil and Gas Power Division (1924) and to Diesel and Gas Engine Power Division (1965) and finally to the Internal Combustion Engine Division (1986). In the early 1970's attendance at our meetings was at the mid- 500 level, i.e. it was 544 at the Dallas 1970 meeting. Rising costs and decreases in business reduced the attendance at our conference and exhibits during the late 70's. Projections of our operational funds indicated we could expect deficits starting in 1977. As a result, a decision was made to hold joint meetings with other ASME Divisions. The first such conference, the so-called Energy Sources Technology Conference and Exhibition (ETCE) was held in September 1977 in Houston, Texas. It continued to be the major event of the Division for more than a decade. With an improving business environment and increased interest in the Division, separate fall meetings started with a main theme. The 1980's were a period of change and renewal for the Division. Some of the important new activities initiated within this period are:

- Division by-laws changed
- Long Term Strategic Planning Sessions started
- Three new Administration Committees established
- ICED Newsletter changed format
- Associates Group has doubled
- First Calvin W. Rice Lecture delivered at an ICED Conference
- First ASME ICED award was established
- A new Soichiro Honda Lecture was established
- A new divisional R. S. Woodbury Award started
- Papers presented at a meeting were bound in proceedings
- Approval was obtained to devote one quarterly Journal to ICE Division
- Spring Technical meetings were established
- Tutorial Lectures started as part of the Technical programs
- Student Paper Competition initiated

These changes were realized by a group of dedicated people who deserve mentioning here. Some names that come to mind are: John M. Bailey, Peter C. Enslin, Douglas Exline, Karl T. Geoca, Melvin J. Helmich, Joseph W. Hibbard, William W. Nugent, Karl J. Springer, Garin VanDeMark, Hugh A. Williams Jr., Richard S. Woodbury, Albert A. Zagotta and others too numerous to mention. I apologize to those that I failed to remember. With the continuous devotion of such a group of talent, our Division is stronger and healthier today than it was two decades ago; technically, organizationally and financially.

Technically, the number of papers presented in our conferences has increased several fold. For example, the Fall 1986 Conference at Oakbrook, Illinois had 12 papers presented and published in one volume. They were selected from a total of 16 offerings and presented in morning and afternoon sessions in two days. All attendees were in the same session. The number of papers in recent Spring and Fall conferences is about 35-50 each. The average size of paper offerings is about 60-70, so the selection ratio is much higher than before. The papers are usually published in three symposium volumes and presented in three parallel sessions at the conference. This is a healthy sign of growth.

The ICE Division is also healthy organization-wise. We have conducted two conferences per year for about a decade without having any subsistence or assistance from another group or Division. On the contrary, we were able to assist and accommodate the needs of some other Divisions by allocating parallel sessions to them at our meetings. Our Associates are very active and willing to devote their time and energy for the divisional goals and objectives. Strategic planning and other organizational management tools are utilized extensively for planning and implementing programs. We are all proud of the strong bonds and camaraderie that were established decades ago and continue today among the ICE Division members and Associates.

We are also very healthy financially. The registration fee at our meetings is unbelievably low in comparison to other meetings. For example, the registration fee for the Spring 1999 Conference was only $130.00, including breakfast and lunch for two days, and refreshments during breaks, at a very unique Conference Center. This fee gave the participants the opportunity to attend three parallel sessions of paper presentations for two days, one panel discussion on Emissions, and one invited lecture from a world-renown expert, plus the chance to visit an engine manufacturing facility and an injector manufacturing facility. The cost of one symposium volume with about 12-15 papers is $25.00 at the conference; it sells for $75.00 to the general public after the meeting. Despite this low cost structure, the Division is in the black for all of our recent meetings. Our custodial account has continually increased, and is more than triple that of 1983. This growth is much more than the inflation rates within that time period.

Presently the ICE Division is a healthy, medium-sized organization, which is growing and continuously changing to serve its constituency within its mission. About 2800-3000 ASME members have selected the ICE Division as their first interest choice. We mail about 3600 individual announcements of our conferences. This newsletter will go to about 6000 ASME members. Our ICE Division Associates group has about 125 members actively supporting our Technical and Administrative programs. A very large portion of our members are over forty, which means that we represent a considerable amount of Technical and Management expertise and talent in the IC Engine field. We are an active, healthy and growing society.

What lies in the immediate future of the ICE Division? This question can be best addressed by focusing on the contents of the recent long-range strategy plan. In a brainstorming session at Fort Collins, Colorado, the executive committee identified important issues, evaluated alternatives and focused necessary activities in three major areas:

- Improvements in Technical Papers
- Utilization of ICED Associates
- ICED Marketing

Several committees were established to define strategies, evaluate alternatives and prepare programs to address the essential needs of the Division. Implementation of these programs will continue in the upcoming year.

For the improvement of technical papers, our emphasis is to raise the quality of technical paper content, timeliness and value-added contribution. Additionally, we would like to do the following: 1. Improve the exposure of ICED papers, 2. Ensure that ICED technical publications are easily retrievable, 3. Optimize the forums for paper presentation and 4. Improve the paper review process.

On the utilization of Associates, we would like to develop Associates for ICED leadership positions and increase the number of active Associates. Moreover, we want to increase the activities of the Technical and Administrative Committees, develop international ICED Associate memberships and document and distribute their expertise.

Concerning marketing the ICE Division, there are several topics to consider. First, we will try to improve the advertising effectiveness of ICED papers and meetings. Then we will try to expand our base by including more entry-level engineers, appeal to the interest of the ICED customers and enhance the value of ICED

membership. Finally, we will try to recognize significant technical contributions to the science and technology of IC Engines by institutions, corporations, universities, patents, university thesis, research laboratories as well as by individuals.

Several programs to implement these changes are in place or just starting. Some of them are described in other articles in this newsletter. We will continue to implement these programs in the coming year. It will be a pleasure for me to give you a positive report on these activities next year.

Our Spring and Fall Technical Meetings will continue in the upcoming years. This fall we will be at Ann Arbor, Michigan with the University of Michigan as the local host. Our defined agenda is to have the following meetings with the local organizers shown:

Spring 2000, San Antonio, TX
Hosted by Southwest Research Institute
Fall 2000, Peoria, IL
Hosted by Caterpillar Inc.
Spring 2001, Philadelphia, PA
Hosted by the Naval Surface Warfare Center
Fall 2001, Chicago, IL
Hosted by Argonne National Laboratory

The meetings following these are in the planning stage.

These examples clearly show that the Internal Combustion Engine Division is an active, healthy, developing and growing Division of the ASME. We are focused on the needs of our customers and trying to serve them in a cost-effective way. We know we must adapt to the changing environment and change the way we do ICED business accordingly.

I believe that any person who has a sincere interest and some stake in internal combustion engines is a customer and should be a participant at our Division activities. If you are in this group, I would like to extend to you an invitation to join us, participate in our activities and enjoy the benefits of belonging to such a unique group. The benefits are various, depending on your needs and expectations. Participating in our meetings will not only give you the technical information on the agenda but also the opportunity to interact with people having the same professional interests. The Associates make up a small, dynamic, experienced group, open to all ages, gender and background. If you are a young engineer, you will benefit from intermingling with several older generations of experts through friendly, sincere discussions. You will not have the feeling of getting lost in the crowd. We are small enough for you to be a part of it. If you are in your mid-career, you can get information about your market and competition as well as upcoming trends or hone your managerialskills by actually taking responsibility for activities. If you are in the fall of your career, you can meet your old acquaintances or friends and keep up with the changes in your field. Wherever you are in this spectrum, we have a place for you. The amount of time and involvement depends on you. Start up and keep up your association and connection with us.

In closing, I would like to state that the upcoming year will be a welcome challenge for me. I have enjoyed every minute of my time spent in the workings of the ICE Division for the last two decades. It has been a pleasure to be able to serve and help at every level in this organization. I am thankful for the opportunity to continue to serve the ICE Division.

Teoman Uzkan

CIMAC

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are solved easier and cheaper for all when done in a joint effort in the framework of CIMAC. This guiding principle implies that the success of CIMAC very much depends on the input that members are willing to give. Members of CIMAC steer the activities and policies of the association so each member can influence the activities of CIMAC.

CIMAC organizes various activities. They run from the world renowned CIMAC Congresses (with reduced participation fees for CIMAC members) held every two to three years, to activities of its diverse Working Groups and the CIMAC Days that were introduced in 1996 and have become successful features at major trade fairs. The next CIMAC Congress, the 23rd, will be held from May 7th to 10th, 2001 in Hamburg and CIMAC's 50th Anniversary will be celebrated. A number of trade magazines regularly feature a CIMAC page with reports by some of the Working Groups. Such CIMAC Working Groups Reports have so far included topics on Exhaust Emissions, Heavy Fuels and Lubricants.

CIMAC publications - papers, recommendations and guidelines - are available from the Central Secretariat. They can be ordered either directly or via CIMAC's internet homepage: www.cimac.com where a lot of other information about CIMAC can also be found.

Engine Users may now join the CIMAC Board. The Users Working Group has become an extremely active and popular unit in the CIMAC organization. So far the Users Working Group has introduced the following:

- CIMACUSE, the working group's database. CIMACUSE is growing and is updated once or twice yearly. It provides specific information on engine failures and analyzes general engine performance. The latest results will be published at the next CIMAC Congress in May, 2001 in Hamburg, but are available to members of the Working Group at other times, too.
- Member Case Stories / Early Warning System. Mutual information on recent engine failures is shared between members.
- Grading system for service letters. The users recommend that engine builders accept a common format for their service letters.
- Recommendation by users regarding engine guarantees. This project has just started and is expected to be finalized in one year.

For more information on CIMAC and its activities, interested parties are invited to contact the CIMAC Central Secretariat: Phone ++49-69-6603-1567 / Fax ++49-69-6603-1566 / e-mail: cimac@vdma.org.

Martina Pelzer

1999 FTC in Michigan

The 1999 Fall Technical Conference will be hosted by The University of Michigan in Ann Arbor, MI from October 17th through October 20th. The temperature in Ann Arbor in mid-October averages a low of 50 and a high of 60-70°F.

The conference will be formatted around an exceptionally strong technical program that includes over 40 papers covering a range of engine related topics. Three parallel paper sessions will be held on Monday and Tuesday and will include the following session titles:

- In-Cylinder Flow and Combustion - Measurements and Modeling
- Direct Injection Sprays
- Alternative Fuels
- High Speed Direct Injection Diesel Engine Technology
- Engine Controls
- Lubrication and Friction
- Engine Emissions and Controls
- Engine Design

Also included will be a panel discussion on Marine Emissions Regulations. The panel will feature a selection of speakers who are experts in the field of emissions regulations and the marine engine environment. The panel discussion will provide an important forum for discussion of the key issues in this emerging area.

The technical program will start on Monday, October 18th and will include the 1999 Honda Lecture. The Soichiro Honda Lecture has been established as a National Lecture by the ASME to recognize achievement and significant contribution in the field of personal transportation. Dr. Thomas W. Asmus will present the 1999 Honda Lecture entitled "A Manufacturer's Perspective on IC Engine Technology at Century's End."

A number of social events are planned. On Sunday evening the conference will kick off with a cocktail party featuring complimentary hors d'oeuvres and a cash bar. You will then be free to enjoy dinner on your own at any of several superb

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1999 FTC *(Continued from Page 3)*

restaurants in downtown Ann Arbor. Maps and selected menus will be available.

Practice your Italian on Monday night - we're going to Geonetti's! A casual 7-course authentically Italian dinner is only part of this evening's agenda. You'll also enjoy a bit of theater, Geonetti-style, as you dine. Geonetti's Hole in the Wall dinner theater is located in historic downtown Northville, Michigan. Transportation will be provided.

On Tuesday, the annual Honors and Awards Banquet takes center stage. This event recognizes ICED members for their special contributions. A reception will precede the dinner with a cash bar and music by local artists.

During the days, spouses and guests of conference attendees will enjoy a variety of activities. On Monday morning they will tour the Edsel and Eleanor Ford estate in Grosse Point Shores. Built in 1926-29, this magnificent estate was the home of Edsel Ford (Henry Ford's only child), his wife Eleanor, and their four children. The 60-room mansion beautifully captures the lifestyle enjoyed by this prominent automotive family. Lunch is included. Visit their website at: www.fordhouse.org for more details about this historic home. Then it's on to the Henry Ford Museum and Greenfield Village. This is the nation's largest and most visited indoor/outdoor museum (94 developed acres). Your unique educational experience will be based on authentic objects, stories, and fascinating lives from America's traditions of ingenuity, resourcefulness and innovation.

Spouses and guests start the day Tuesday with a scenic bus tour of Ann Arbor, known for its trees, gracious homes, a melange of architectural innovations, plus the ever-present kinetic campus atmosphere wrought by University of Michigan students, faculty and staff. Then it's on to lunch at the Gandy Dancer - Ann Arbor's well-known Muer restaurant, offering seafood, pastas and much, much more. Housed in one of the city's most historic buildings, the Michigan Central Railroad station built in 1886, the Gandy Dancer will delight you with it's menu, service, and ambiance. And the trains still run, so don't be surprised to hear the rumble from the tracks as the afternoon's Amtrak train makes its appearance.

After lunch, you are free to roam downtown Ann Arbor to enjoy a variety of shopping experiences-everything from the Michigan Store (Occasionally Yours) to eclectic home furnishings (Jules), to University of Michigan sports clothing, souvenirs, etc. (Stein and Goetz) and some truly exceptional art galleries and antiques (Selo Shevel, Peaceable Kingdom, 16 Hands, and the Arcadian). And there's a coffee shop or two along the way if you need a caffeine boost.

Dennis Assanis and Stuart Bell

Heywood Describes Future of IC Engine

Professor John B. Heywood was invited to provide the keynote address for the 1999 Spring Engine Technology Conference. Professor Heywood is the Sun Jae Professor of Mechanical Engineering and Director of the Sloan Automotive Laboratory at the Massachusetts Institute of Technology. The title of his presentation was "The Future of the Internal Combustion Engine." Obviously, this topic was of extreme interest to the audience, and many were on the edge of their seats to learn the answer to Professor Heywood's provocative title. Heywood's talk included a brief historical review, a description of the uses and successes of current IC engines, an illustration of some new innovations, comments on the characteristics of the future, opportunities for future improvements in current engines and in alternative concepts for IC engines, and finally, a prognosis on the future of IC engines. The presentation was packed with important, stimulating and detailed information -- too much, in fact, to be completely summarized here. The following, then, is a brief description of some of the highlights of this talk.

Early in his talk, Professor Heywood described the uses and advantages of current IC engines. In particular, Professor Heywood cited that (although accurate counts are not available) billions of IC engines may be in existence. He explained that the large number of successful applications of engines is a testimony to the obvious achievement of this technology. These engines are used in a wide range of applications including vehicle, stationary power, aircraft, railroad, marine and many other uses. He pointed out that the two successful versions of the IC engine (gasoline and diesel) are a natural match to our petroleum-based fuels (which produce comparable amounts of gasoline and diesel fuels). Professor Heywood feels that the success of IC engines is largely due to the favorable cost-power and power-weight ratios of IC engines compared to other prime movers. In addition, IC engines are robust, versatile, well matched to inexpensive current fuels (which possess high energy density), efficient and meet emission requirements.

The next portion of Professor Heywood's talk addressed his vision of the future with respect to prime movers, and how IC engines will fit into that future. He stated that emission requirements will continue to become stricter (with more emphasis on "real world" emission controls), the need for higher efficiencies will continue to be important, the volume occupied by the engine will need to be matched to new vehicle designs, and the complete power-train system will need to be successful.

Heywood explained that a number of areas exist for continued improvement of engine concepts. Areas that he believes are especially important include breathing, low friction engine components, smart cooling systems and mixture preparation. He also sees possible new or alternative IC engine concepts for the future. He mentioned as possibilities direct-injection gasoline engines, engines with variable valve timing, boosted smaller displacement engines and various hybrid combinations. With respect to alternative engines such as the steam engine, gas turbine, "adiabatic" engine and Stirling engine, Professor Heywood showed that these have been attempted in the past and have not been successful in displacing the IC engine for a number of reasons.

Recently, the fuel cell has been described as an attractive replacement for the IC engine because of its potential low emissions, high efficiency, high power density and quiet operation. At this time, fuel cells work best with hydrogen gas which may be supplied, for example, through the use of a reformer using methanol. Professor Heywood showed that if one considers fossil fuels as the source of energy, the "well to wheels" efficiency of the fuel cell for the best of conditions is not much better than current IC engines. Further, the current cost of fuels cells is not competitive with IC engines.

Finally, for the climax of his presentation, Professor Heywood informed the audience of his view of the future of the IC engine. He feels that for the "foreseeable" future (which he noted as something like the next 25 years) the IC engine would continue in its dominant role as the prime mover of choice. This will happen because the IC engine will continue to improve through good engineering, new innovations, and advancing technologies in related areas (e.g., catalysts and materials). He pointed out that there is plenty of near-term petroleum and that IC engines will continue to be a good match to this fuel. The audience continued to breathe.

Summary of Prof. Heywood's Keynote address by Dr. Jerald Caton, P.E.

New ICED Associates

The Associates group of the Internal Combustion Engine Division consists of those members from our division who take active roles in accomplishing our objectives and who participate in our programs. More than 2500 ASME members have selected ICED as their division of primary interest. Of these members, there are now 124 ICED Associates or Senior Associates who are, or have been, involved in leading the activities of this division.

Since the publication of the 1998 ICED Newsletter, the following individuals have been elected to this group.

•Dr. Basil Ubanwa, Texas Natural Resource Conservation Commission, Austin, Texas; •Christian Haller, MPR Associates, Inc., Alexandria, Virginia.

Please offer them your congratulations. If you are interested in becoming an Associate, please contact any of the Executive Committee members listed in this Newsletter.

Bruce Chrisman

1999 Spring Conference in "Cummins Country"

Over 225 engineers attended the ICE Division Spring Technical Conference held at Columbus, Indiana in late April. Hosted by Cummins Engine Company, Inc., this conference represents our fifth and most successful spring conference.

The conference opened with an informative and entertaining presentation by Professor John B. Heywood, Sun Jae Professor of Mechanical Engineering and Director of the Sloan Automotive Laboratory, Massachusetts Institute of Technology, on "The Future of the Internal Combustion Engine." Professor Heywood reviewed many of the issues facing development of various power plants and concluded with the reassurance that the internal combustion engine would be around for a long time and is worthy of further development. With Professor Heywood's comments fresh on their minds, the attendees set out to gather information from the 43 technical papers presented on a variety of engine-related topics. In addition to technical sessions on engine modeling, lubrication and friction, natural gas engines, emissions, and mechanical design, there was also a panel discussion.

The focus of the panel was to present and discuss issues centered on "Complying with EPA Locomotive Exhaust Emission Regulations." All the panel presentations were informative, and generally focused on issues surrounding rebuilding locomotive engines to meet emission levels that were not required when the engines were originally manufactured. Although no EPA certified rebuild kits are on the market yet, the EPA rule will take effect January 1, 2000. For more information about the presentations made by the panel members, please go to the ASME ICED web page (http://www.asme.org/divisions/ice/) and see the "ICE technology links" page.

Of particular interest to all the conference attendees was the exceptional display of engines provided by Mr. Mike Marsh of Cummins. The display included working models of some of the earliest historical engines, and a cut-away of the Cummins Signature 600. Those attending were able to interact with colleagues from around the world during lunches, breaks and social events in the evening, especially on the evening when everyone was faced with the dilemma of "Who Killed Harry J. Ripley." Out of all those engineers present, Tim Callahan, an ICED Associate, took the prize for solving the dinner theater mystery.

The spouses program included a guided tour of the renowned classic architecture of the City of Columbus, along with a visit to Brown County's Artists Colony Inn and the quaint shops of Nashville, IN. In nearby Indianapolis, the spouses visited the Eiteljory Museum and the Indianapolis Museum of Art.

The conference concluded with a tour of two of Cummins Engine Company's finest manufacturing facilities, the Fuel Systems Plant and the Mid-Range Engine Plant. Both plants reflect implementation of state-of-the-art design, development and manufacturing processes carried out in a safe and pleasant work environment.

Terry Ullman

Executive Committee Adds Gutoski

Greg Gutoski

Your ICE Division is guided by eight dedicated members who serve as its officers. Together they make up the Executive Committee, listed elsewhere in this Newsletter. Six of them rotate through a variety of assignments during their seven-year commitment, eventually becoming Chairman and then Past Chairman before retiring from office. The other two are the Treasurer and Secretary who serve in those posts for a number of years. Each year the committee invites an engineer into its ranks as the "New Member" to begin the rotation cycle. Obviously, the future success of the Division depends upon recognizing and choosing those with fine leadership qualities to become the incoming New Member. This year they have selected Greg Gutoski for that honor.

Greg Gutoski has been an employee of Coltec Industries, Fairbanks Morse Engine Division (FMED) since 1977. He has a Bachelor of Science degree in Mechanical Engineering from Marquette University in Milwaukee, Wisconsin, and previously attended Sheboygan North High School in Sheboygan, Wisconsin.

Greg has been promoted at Coltec, FMED through various levels of engineering management; he is currently the Vice President of Engineering at FMED.

Gutoski has been an Associate Member of the ASME/ICE Division since 1993, is a member of the Mechanical Design Technical Committee of ASME/ICED and has chaired a number of technical sessions at the ASME/ICED conferences.

Greg is also a member of the Marine Machinery Association (MMA) ISO Technical Committee, the American Society of Naval Engineers (ASNE) and participates in SAE conferences/committees. He is 46, married to wife Laurie, has 2 children, Brianne and Justin, and resides in Janesville, Wisconsin.

Comments from the Outgoing Chair

The year has come and gone quickly! I'm just now starting to feel that I understand these responsibilities and it is now time to pass the reigns to my successor. The Internal Combustion Engine (ICE) Division Chair responsibilities involve some rare opportunities in the form of contacts with talented industry experts and meeting some great people. The ICE Division member's view of emerging internal combustion engine technology is much broader than that visible from any individual non-member's scope. The future holds aggressive competition among technologies and manufacturers but the future is encouraging.

Professor John Heywood, Sun Jae Professor of Mechanical Engineering and Director of the Sloan Automotive Laboratory at Massachusetts Institute of Technology, presented the keynote address which opened the recent ICE Division Spring Technical Conference. He remarked that the internal combustion engine continues to enjoy technological progress including efficiency growth and emission reduction at a faster pace than its competing technologies. He further stated words to the effect that the internal combustion engine's future potential looks brighter than its competitors due to the rate of technological innovation evident in this industry. Professor Heywood confirms what many of us have long believed. Our careers are being invested in a field that still has tremendous potential. The IC Engine will continue to be the energy conversion machine of choice for a good many years to come. The ICE Division plays a valuable role in this technological evolution. Its role is to provide the professional forum for engineers to disseminate, discuss, publish and critique these new engine technologies. Thus, the mission of the ICE Division is very relevant and timely in today's environment.

The accomplishments of the ICE Division Board of Associates and the Executive Committee this year have included some significant events. We have a newly approved Long-Range Plan in a rolling, annually updateable format. We have a new and already popular category of membership, the "Senior Associate" to accommodate and retain members retiring from their primary employment. The ICE Division now has its own Web page and has taken the first major step towards full electronic communication with the announcement of the 1999 Spring Technical Conference in electronic format. The year's most significant accomplishments include the successful '98 Fall Technical Conference in Clymer, New York hosted by National Forge Co. and our most successful spring conference ever. The '99 Spring Technical Conference hosted in Columbus, Indiana by Cummins Engine Co. drew over 230 registrants. Excellent programs were provided at both conferences. This has been a productive year for the ICE Division.

A year ago, in my message as incoming chair, I urged non-participating engine engineers to get involved in the ICE Division. We have had good response and are enjoying the participation of some talented new Associates. However, we still have an abundance of challenges for interested new participants. The strength of this group flows from the talent and energy of its members. New engineering talent will provide the innovation for continued progress and improvement of the ICE Division.

Lastly, as outgoing chair, it has been an honor to serve. There is no higher honor than to work with this fine group of engine professionals. Beverly and I have made some great friends. We look forward to continued involvement and association with the Internal Combustion Engine Division of ASME.

Carl L. McClung P.E.

ICED Long Range Plan, Planning for the Future

Like any organization, our Division must establish goals and develop a means to attain those goals. For ICED, this takes the form of a Long Range Plan (LRP). Under the leadership of ICED chair Carl McClung, retired Woodward executive Garin Van DeMark led the 1997-1998 Executive Committee through the previous LRP that included a review of the ICED mission statement, and identified concerns and issues that faced the Division. Those concerns and issues were broadly grouped into three areas, namely, technical papers, utilization of Associates, and marketing.

From that early meeting, focus on these three areas prompted much discussion and consideration of what was routinely being done, and what should be done to make improvements. While trying to develop the LRP, enthusiasm for making improvements led to implementation of an informal paper quality committee, a committee to improve utilization of Associates, and acceleration in utilizing the web for marketing ICED conferences. Using input from these committees, an LRP to improve and grow the Division was assembled and presented to the Associates attending the 1999 Spring Technical Conference in Columbus, Indiana. A copy is included in this Newsletter.

Goals for each of the three areas were written as major objectives, with action items given as examples of ways and means to approach fulfilling these objectives yet leaving room for review and modification as to how the objectives are met. As such, the Executive Committee asked that this LRP be reviewed by the Associates annually to ensure that the objectives are aligned with current and evolving priorities of the Associates as we work together to perform the ICED mission.

Immediately following the unanimous approval of the LRP by the Associates, Bernie Richards, chair of the Paper Quality Committee, presented an overview of the committee's ideas and activities. One aspect was to improve the review process by identifying enthusiastic reviewers. Ramesh Poola presented to the Associates a process to identify qualified reviewers and potential methods to recognize the service provided by dedicated reviewers. To assist organizers in identifying recognized sources of quality papers, Tim Callahan distributed a list of contacts, that at a minimum, form a good starting point from which Associates could solicit papers for future conferences.

Both the LRP and the follow-up presentations represent considerable input from several of the Associates. They reflect the positive attitude of the ICED to not only improve the quality of technical information disseminated, but also to utilize the collective expertise of our Associates to improve the product: our conferences and publications.

Terry Ullman

Panel on Proposed EPA Marine Diesel Exhaust Emission Regs Planned for FTC

On December 11, 1998, the U.S. EPA proposed exhaust emission regulations for marine diesel engines at or above 37 kW. A final rule from EPA is expected in December 1999. The EPA marine diesel engine regulations draw upon several similar regulations: for smaller high-speed diesel engines, EPA's nonroad diesel engine regulations; for medium-speed engines, EPA's locomotive engine regulations; and for large-bore, slow-speed diesel engines, the International Maritime Organization (IMO) regulations.

A panel discussion will draw representatives from EPA, IMO, engine manufacturers and end users to discuss the technical aspects of the proposed rule, and opportunities for international harmonization of marine engine exhaust emission standards.

Details of the panel will be included in the preliminary technical program for the Fall Technical Conference, which will be available on the ICED web site in August.

For more details, contact the panel session organizers: Stephen Dexter of AVL at stephen.dexter@avl.com, or Steve Fritz at SwRI at sfritz@swri.org.

Steven G. Fritz, P.E.

Engineers Converge on Peek 'N Peak for Fall Conference

Situated in Southwest New York State is the Peek 'n Peak Resort and Conference Center at Clymer, NY. It served as the location of the latest ICED Fall Technical Conference held last September, hosted by National Forge Company. With a backdrop of beautiful countryside, more than 140 engineers attended technical presentations related to design and development of internal combustion engines.

The three-day conference opened with a Soichiro Honda Lecture. Professor Hiroyaki Hiroyasu, world-renowned expert on spray development, spray-plume interaction and combustion within diesel engines, was chosen by the ICED to present the lecture, and receive an ASME honorarium and plaque. As Director of the Spray and Combustion Laboratory at the University of Hiroshima, Professor Hiroyasu gave an informative lecture on "The Structure of Fuel Sprays and the Combustion Process in Diesel Engines."

Following the lecture, 37 technical papers were presented on topics that included lubrication and friction, engine design, combustion, gaseous fuels, and emissions. Five of these papers originated at the 1998 CIMAC meeting held in Europe, and were re-presented at this conference because of their quality and technical content. Dr. James MacBain, Director, Office of Engineering Research Relations of the University of Michigan, addressed the attendees during the luncheon to present the "University Perspective" of coordinating new product development between government, industry, research labs and universities.

A panel discussion on "Controlling Diesel Engine Particulates in Underground Mines" was held in which perspectives of mine operators, regulators, workers, and manufacturers of equipment and emission control devices were presented. Discussions of ways and means to improve productivity while limiting worker exposure were held. Among all the issues, chief is the dilemma of how to reduce potentially harmful or synergistic engine emissions in coal mining operations while maintaining realistic mine production. As with most complex issues, no easy solutions are apparent, but several were cited as areas in which much work remains.

Spouses enjoyed a tour of Niagara Falls and other prominent scenery of the area. They also visited the "Birthplace of the Oil Industry:" Drake's Well Museum in Titusville, PA, and later viewed an incredible collection of musical instruments spanning two centuries at the DeBence Antique Music World. All the attendees were able to socialize during the breaks, lunches and evening events. One evening featured a wine tasting and barbecue cookout at the Lodge of the Peek 'n Peak with a local quartet providing entertainment of the "good old songs" of the early 1900's. The next evening included rides on the ski lift, providing a great view of the countryside. Afterwards, the annual Division Honors and Awards Banquet was held at the Retreat of the Peek 'n Peak, where attendees recognized those who have contributed to the success of the Division.

Keeping with tradition, all the conference participants and their guests were invited to tour the manufacturing facilities of the National Forge Company, the conference host. Visitors were able to view many interesting facets of manufacturing crankshafts for engines up to 6,000 hp, as well as other specialty products that require specific metallurgy, heat treating and machining capabilities. Feeling the heat from a 15,000-pound, red-hot steel ingot being forged into shape was clearly impressive. The National Forge Company also arranged tours of a nearby Cummins facility that manufacturers diesel engines in the range between 280-450 hp, using start-of-the-art automation for high volume materials handling, machining and assembly. Both plants were vastly different in processes and products, and both were of great interest to all who attended.

Terry Ullman

1998 Honda Lecture Covers Fuel Injection

Professor Hiroyaki Hiroyasu delivered the prestigious Soichiro Honda Award Lecture at the Fall Technical Conference held at Clymer, NY last year. He is a world re-known expert on the spray development, spray-plume interaction and combustion within diesel engines. Presently he is a Professor and Director of the Research Institute of Industrial Technology at Kinki University, Japan.

Prof. Hiroyasu presented an overview of his decades- long research on the fuel injection process and also described the latest findings on fuel sprays. Essentially, he said that diesel combustion is strongly controlled by the fuel spray injected into the combustion cham-

(Continued on Page 8)

Honda Lecture

(Continued from Page 7)

ber. Therefore, to find a solution to balancing emissions concerns and fuel economy he is focusing on the structure of fuel sprays and fundamental combustion processes in the engines. He has concluded that the strong turbulence in the nozzle hole, due to cavitation phenomena, contributes greatly to the disintegration of the liquid jet. His lecture is available in the conference proceedings for the 1998 ICED Fall Technical Conference.

Teoman Uzkan

Senior Associate Status Created

An Associate of the ICE Division is a member who takes an active role in accomplishing the Division's objectives and participates in the Division's technical programs. Associates have the responsibility to enhance the Division's operations in the execution of its mission to disseminate and expand state-of-the-art engine technology to ASME members, to those in the Engineering profession, and to industry. "Associate" status requires attending at least one ICE Division conference every two years to retain one's status as an Associate.

It is now possible to request ICE Division Executive Committee approval of individual "Senior Associate" status with a written request to the Division Secretary. Senior Associate status exempts the Associate from the requirement to attend at least one conference every two years. This status is available only to those associates who have retired or otherwise separated from their primary employment, and thus, have lost organizational financial support for ASME-ICED conference participation. The ICE Division Executive Committee will promote Senior Associate's involvement with selected committee task assignments that can be accomplished from the individual's residence. Senior Associates will be listed along with Associates on ICE letterhead to recognize this group as a resource of the Division.

To aid in the conduct of the Division's business, the Executive Committee has established a Board of Associates. This Board includes Associates, and Senior Associates, which consists of members from administrative committees and technical committees, plus special committees appointed as required. Board of Associates meetings will normally be held during the Spring and the Fall Technical Conferences. The chairperson of each administrative and technical committee is expected to attend meetings of the Associates and be prepared to report on committee activities. All committee members, as well as any member of the Society, are invited to meetings of the Associates. Meetings of the Board of Associates will be called and presided over by the Chairman of the Executive Committee. The Secretary will issue notices of meetings with an agenda and issue minutes of each meeting to all members of the Executive Committee and Board of Associates.

Those who have been granted Senior Associate status so far are: David Aldag, Thomas Carr, John Hallinan, Bruce Ingold, Gene Kasel, Richard Kieser, Warren Nugent, Karl Springer, P.K. Subramanyan and Hugh Williams.

Predicting Turbulence

Researchers at West Virginia University (WVU) have successfully simulated turbulence and combustion processes that occur in a typical internal combustion (IC) engine without resorting to any of the classic turbulence models. The work being conducted at WVU is one of the few unique studies known in the literature which attempts to predict the most energetic large scale fluctuations of turbulent motion in IC engines. In order to predict the velocity fluctuations a Large Eddy Simulation (LES) technique was used in which large scales are resolved on a fine grid and small scales are computed by an appropriate empirical model. The KIVA-3V computer program (Amsden 1993) was modified to incorporate the LES capabilities and a higher order numerical scheme. Two multi-block structured grids of 220,000 and 440,000 nodes were used to represent a typical two-valve cylinder assembly with a swirler intake port in close resemblance with the experimental work of Catania et al (1995). The average grid-cell size in the cylinder region was about 1 mm. A small time step of 5Ÿ10-7 s (less than Kolmogorov turbulent time scale) was used to guarantee the adequate temporal resolution of the fluctuating velocities. A quasi-second order numerical scheme was used for the convective terms of scalar variables, all other spatial derivatives were approximated with the central differencing scheme.

The growth and the subsequent decay of turbulence during the intake phase predicted with the Smagorinsky LES model agrees well with experiments. The power density spectra of the fluctuating velocity components as compared with those obtained from the measurements show that at least some of the inertial range dynamics is captured in the simulations. Combustion of n-Tetradecane is modeled in 2D and 3D geometries using a 7-reaction Arrhenius mechanism and Magnussen eddy-breakup combustion model. A standard Kiva spray model is used to simulate injection and evaporation of the fuel. Auto-ignition of the gaseous phase of the fuel occurs close to 350 crank angle. The onset of combustion leads to the increase in turbulent fluctuations. High memory and execution speed requirements of IC engine LES computations prompted the researchers to develop a parallel version of KIVA-3V, which is being currently tested on the turbulent flow cases.

The study opens a new avenue in computational modeling of IC engine in-cylinder flows that will soon enable one to generate accurate turbulence statistics using LES over many engine cycles. Hence, the need for very expensive experimental studies, particularly under realistic combustion environments, would be drastically reduced.

I.Yavuz, A. Smirnov, A.Gel, I.Celik

Dr. Asmus to give 1999 Honda Lecture

The Soichiro Honda Lecture has been established as a National Lecture by the ASME to recognize achievement and significant contribution in the field of personal transportation. Dr. Thomas W. Asmus has been selected as the 1999 Honda Lecturer.

Dr. Asmus has been with the Chrysler Corporation for the last 26 years (now Daimler-Chrysler). He has researched practically all aspects of the automotive engine during his career with Chrysler. Over the years he has also held faculty positions at several Southeastern Michigan Universities and at the University of Guadalajara in Mexico. He earned his Bachelors, Masters and Ph.D. degrees from Western Michigan University.

The title of the 1999 Honda Lecture is "A Manufacturer's Perspective on IC Engine Technology at Century's End." Dr. Asmus will present his topic during the ICED Fall Technical Conference in Ann Arbor, MI, October 17-20, 1999.

Madan R. Goyal

Patent Information via the Internet

If you have a need for information on U.S. Patents, you may wish to retrieve it over the Internet. If you own a patent, now you can learn which inventors have referenced your patent in their applications. Other uses are searching for patents by subject matter, inventor or number.

The first to offer this service was the IBM Patent Server at www.ibm.com/patents. It contains data on all patents since 1971. The United States Patent office also has comprehensive patent and trademark data available free on the Internet at www.uspto.gov.

Robert L. Rowan, Jr.

CALL FOR PAPERS
INTERNAL COMBUSTION ENGINE DIVISION
of the ASME
2000 SPRING AND FALL
TECHNICAL CONFERENCES

SPRING
April 9-12, 2000
San Antonio, Texas
Hosted by Southwest Research Institute

FALL
September 24-27, 2000
Peoria, Illinois
Hosted by Caterpillar, Inc.

Papers are invited for publication and presentation for topics related to all types of automotive, light-duty and heavy-duty internal combustion engines. Papers may address any aspect of the design, development or application of compression-ignition (diesel), spark ignition, rotary or reciprocating engines. Examples of topics of previous papers include in-cylinder emissions control, alternative fuels, engine cooling, lubrication systems, fuel injection and ignition systems, design analysis, catalysts, computer simulation of basic engine processes, novel combustion systems, operation and maintenance, control systems, heat recovery, bearings and materials.

All accepted papers will be available at the conference and papers will be considered for the Journal of Engineering for Gas Turbines and Power. ASME review and publication policies will apply. Conference highlights will include a tour of the research facilities at Southwest Research Institute during the Spring meeting and a tour of Caterpillar facilities during the Fall conference. .

Please complete an ASME paper offer form (M&P 1903 - available on http://www.asme.org) and send the form and an abstract of the paper to the Technical Program Chairman and Proceedings Editor:

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Important Dates for Spring Conference:		**Important Dates for Fall Conference:**
August 26, 1999 (Call if late)	Offer of Paper, One Page Abstract	March 15, 2000
November 15, 1999	Draft Manuscript Due for Review	May 1, 2000
January 15, 2000	Camera Ready Paper Due	June 20, 2000

TAKE ADVANTAGE OF THIS OPPORTUNITY
PUBLISH, PARTICIPATE AND SHARE

LONG RANGE PLAN
INTERNAL COMBUSTION ENGINE DIVISION (ICED)
ASME INTERNATIONAL–APPROVED APRIL, 1999
MISSION STATEMENT

The Mission of the Internal Combustion Engine Division of ASME International is to promote, encourage and recognize the advancement of the Art, Science and Practice of Mechanical Engineering in the field of Internal Combustion Engines. The Internal Combustion Engine Division strives to be an information resource by providing a forum for the documentation, worldwide dissemination, and recognition of the achievements and ideas of the people engaged in this work.

Support of this Mission is currently focused in three areas:

· **Technical Papers**
· **Utilization of ASME ICED Associates**
· **ICE Division Marketing**

I. Technical Papers

Objectives:

1) Improve the quality of technical paper content, timeliness, and value-added.

Actions:

a. Develop a standing committee to periodically review ICED technical paper paper preparation, presentation and meeting format guidelines along with archive and retrieval processes

b. Develop a resource of reviewers, and strengthen the reviewing process.

2) Improve the exposure of ICED technical papers.

Action:

Develop a "tool kit" for session organizers to help them deal with issues related to promoting good technical papers and rejecting poor quality papers.

3) Ensure ICED technical publications are accessible and retrievable.

Action:

Develop retrieval supplementary information and make it available to members.

4) Optimize the forums used for presentation.

Action:

Educate the Associates concerning publications.

5) Improve the technical paper processes.

Actions:

a. Explore utilization of the internet.

b. Develop supplementary information to guide authors and session organizers.

II. Utilization of Associates

Objectives:

1) Develop Associates for ICED leadership.
2) Increase the number of active Associates.
3) Activate Technical and Administrative Committees.
4) Develop international ICED Associate membership.
5) Establish & make known expertise of Associates.

Action:

A sub committee has been formed & has prepared a draft report identifying a number of potential strategies to accomplish these objectives. Many ideas have been developed and the next step is to prioritize the areas of focus & select specific strategies in support of these objectives. This too is scheduled to happen by our Spring Conference. This will allow the priority action items in this area to be identified, specific plans to be formulated and action to commence.

III. Marketing the ICE Division

Objectives:

1) Effectively advertise ICED technical papers and meeting forums.

Action:

a. Evaluate using the internet to distribute ICED meeting programs in conjunction with mailed announcements.

b. Post abstracts of selected technical papers from the most recent conference on the internet.

c. Establish an internet mail list for all Associates to facilitate communication.

2) Expand ICED customer base to include more entry level engineers.Action:

a. Develop a means to identify timely industry topics to be pursued for technical conferences.

b. Identify a topic and create at least one session that focuses on a specific engine industry topic that is of particular current importance to industry.

3) Appeal to interests of ICED customers (and their customers).

Action:

a. Develop a survey to establish technical background and interests of ICED Associates and establish a means to track issues of importance to them.

4) Enhance the value of ICED membership and participation to our customers (engine engineers) and especially engine manufacturers.

Action:

a.Examine needs and means to add continuing education material or workshops to the program for at least one technical conference.

5) Recognize technical contribution to the science and technology of internal combustion engines by institutions in addition to individuals.

Action:

a. Develop the means to recognize a significant technical contribution to internal combustion engine technology by an institution.

Awards Presented

The following awards were presented during the 1998 Fall Technical Conference that was held at Peek'N Peak, Clymer, NY.

ASME Dedicated Service Award

M. J. Helmich

For dedicated voluntary service to the Society marked by outstanding performance, demonstrated effective leadership, prolonged and committed service, devotion, enthusiasm and faithfulness.

ICE Division Speaker Award

Bruce M. Chrisman

For the able presentation of his paper "Investigation of Micro Pilot Combustion in a Stationary Gas Engine", presented at the 1998 ICE Division Spring Technical Conference, Fort Lauderdale, Florida.

ICE Division Speaker Award

Jack A. Smith

For the able presentation of his paper "Using Syngas in a Heavy Duty, Lean-Burn Natural Gas Engine as a Means of NO_x Reduction", presented at the 1997 ICE Division Fall Technical Conference, Madison, Wisconsin.

ASME Retiring Chairman Certificate

Jerald A. Caton, Ph.D., P.E.

In testimony of the high regard of his co-workers and the deep appreciation of the Society for his valued services in advancing the engineering profession as a member of the Executive Committee of the Internal Combustion Engine Division from 1993 to 1998 and serving as Chairman 1997 to 1998.

ICE Division Meritorious Service Award

Anthony H. Siegel

For many years of loyal service and worthy contributions on numerous committee assignments within the Internal Combustion Engine Division. For guidance and leadership in division activities to the benefit of the Engineering profession and the A.S.M.E.

ICE Division Meritorious Service Award

Frank (Francois) W. Aboujaoude

For many years of loyal service and worthy contributions on numerous committee assignments within the Internal Combustion Engine Division. For guidance and leadership in division activities to the benefit of the Engineering profession and the A.S.M.E.

ICE Division Citation

Bruce M. Chrisman

For outstanding achievements and contributions to the design and development of high BMEP two-cycle and four-cycle diesel and gas engines. For his valuable service to ASME/ICE Division.

Richard S. Woodbury Award

P. K. Subramanyan, Ph.D.

For eminent achievement or distinguished contribution to the management of those engaged in design, development, application and operation of internal combustion engines.

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Founded in 1921

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1999-2000

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