AIChExtra

Rising to the Chem-E-Car Challenge

Fuel-cell driven cars dominate the top slots

Similar to the Olympics, the 6th Annual Chem-E-Car Competition delivered several high-intensity cheering sections that did the "wave," and even a competitor draped in the Puerto Rican flag running around the track. But, unlike the Olympics, this event challenges intellectual perseverance, rather than physical endurance. Stepping up to the task were 31 universities that developed creative car designs using such consumer products as K'nex model-building toys, near-obsolete 3-1/2-in. floppy disks, CDs and balloons.

With nearly 800 spectators in the audience, the Chem-E-Car competition challenges chemical engineering students to test their knowledge by building shoebox-sized cars powered by controlled chemical reactions. But the work doesn't stop there — these small cars have to transport a certain payload a specified distance, both of which the students don't find out until one hour before the competition. Then, the teams race into action, working feverishly to make all the critical calculations and adjustments needed to meet the contest objectives. This year, the payload was 400 mL of water and the target distance was 75 ft.

FINAL RESULTS

Top 10 Finishers

1. University of Tulsa
2. Tennessee Technological University
3. University of South Carolina
4. Purdue University
5. Rensselaer Polytechnic Institute
6. Kansas State University
7. Colorado State University
8. University of Kentucky, Paducah
9. University of Dayton
10. University of Idaho

Posters

1. University of Puerto Rico, Mayaguez
2. Oklahoma State University
3. Drexel University

Most Creative Drive System

Oklahoma State University

Most Consistent Performance

Tennessee Technological University

Spirit of the Competition

University of Puerto Rico, Mayaguez

Golden Tire Award

Oklahoma State University

The final results are in for the Chem-E-Car competition. Securing first place was the University of Tulsa (above left). In second place was Tenessee Technological University (above) and in third place was the University of South Carolina (car shown on left).

Tough competition

For much of the competition, Kansas State University's dual fuel-cell car was in the lead, with a distance of 70 ft and 2 in. But, as Kansas State senior Ashley Robertson, pointed out, "This is a long distance away from the 75-ft target." And, unfortunately for Kansas State, Robertson was right. Purdue University eventually took the lead with its vinegar/baking-soda-driven car, registering a distance of 70 ft and 10.5 in. While this chemical reaction may be one that many chemical engineers remember from their childhood, the twist in Purdue's strategy was that "we used statistical software to optimize the reaction," said Purdue sophomore Jim Anderson. And although these young chemical engineers used sound science to develop their car, they figured, it never hurts to have luck on your side. For Purdue, this came in the form of "Ferguson," their lucky gnome, who, like a good chemical engineer, wore his safety goggles for the competition.

But, Purdue's lucky gnome wasn't enough to fend off the competition. In the end, it was the University of Tulsa that prevailed as the first place winner, scoring an impressive distance of 73 ft and 10 in. The car, which was originally designed two years ago, was equipped with fuel cells on the side and a capacitance bank in the front. "We optimized the design by adding a stop switch," said University of Tulsa senior Taylor Coleman, which was basically a strip of Mg placed into a dilute HCl solution. His teammate, Christina Bishop, noted, "We are particularly proud of our achievement, especially since we are a small school with limited resources."

Finishing in second place was Tennessee Technological University; whose zinc-air fuel-cell/battery powered car traveled a best distance of 72 ft and 3 in. "We initially investigated a dissolved-fuel alkaline electrolyte fuel cell, as well as an aluminum-air fuel cell/battery. But after many long nights of calculations and testing, we decided to go with the zinc-air fuel cell/battery," said Tennessee Tech's Richard Lawson. Upon reflection, "all that hard work paid off."

Taking third place was the University of South Carolina, with a best distance of 71 ft and 4 in.; its car was powered by a PEM fuel cell. To power the fuel cell, the students used a volumetric flask filled with vinegar and water, a balloon filled with sodium borohydride, and another balloon filled with air from a bike pump. When the car was ready to start, "we opened up the valves to the fuel cell," said University of South Carolina junior Katie Pizzolato.

The third place finish was a sweet victory for the University of South Carolina. "In the 2003 contest, our car didn't even start. We were heartbroken, but I think that our loss might have helped inspire us this year," said team captain Heather Mentzer. "When our car started this afternoon, we knew all of our long nights and stressful days of hard work were well worth it."

At the end of the competition, all of the students who participated were winners. "These kids should be proud of their achievements," said Purdue advisor Steve Beaudoin. Other team advisors agree, the students did all the work and they deserve all the credit for the fantastic job with the innovative cars.


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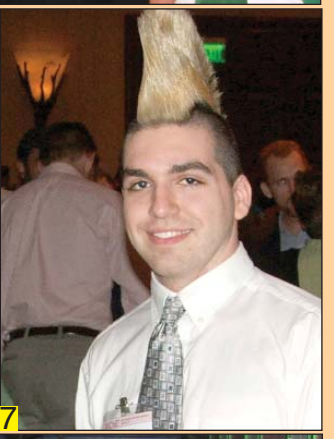
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1. John McKetta (l), Pinky McKetta and Bruce Finlayson (r) at Leadership Dinner.
2. Young professionals kicking back at the Annual Meeting.
3. John Chen (l) and John Forgac (r) at the Leadership Dinner.
4. Hank Kohlbrand (l), David Rosenthal and Scott Love (r) at the Leadership Dinner.
5. Tim McCreight (l), Denise Creech and Bill Byers (r) at the Leadership Dinner.
6. Self-deprecating humor at the ChemE Car competition.
7. A young chemical engineer arrives at the Annual meeting with a unique hair style.
8. Joe Cramer (l) with Andrew Furlong (r) at the Welcome Reception.
9. Chemical engineering students party at the Student Bash.

Board of Directors and Institute Awards

1. Stanley I. Sandler, University of Delaware
2004 Founders Award for outstanding contributions to the field of chemical engineering.
2. Teh C. Ho, Exxon Mobil Research and Engineering Co.
2004 R. H. Wilhelm Award in chemical reaction engineering.
3. Michael F. Doherty, University of California, Santa Barbara
2004 Alpha Chi Sigma Award for chemical engineering research.
4. Warren D. Seider (l), University of Pennsylvania , and J. D. Seader (r), University of Utah
2004 Warren K. Lewis Award for contributions to chemical engineering education.
5. Arup K. Chakraborty (l), University of California, Berkeley, with Air Products & Chemicals sponsor Steven Auvil (r)
2004 Professional Progress Award for outstanding progress in chemical engineering.
6. Michael W. Deem (l), Rice University, with DuPont sponsor Bert Diemer (r)
2004 Allan P. Colburn Award for excellence in publications by a young member of the Institute.
7. Keith P. Johnston (l), University of Texas, Austin, with Praxair sponsor Frank Notaro (r)
2004 Institute Award for excellence in industrial gases technology.

Q&A Session

Boston Section Shares Its Formula for Success

Steve: The Ichthyologists [Boston Section] have doubled meeting attendance over the last year, including holding a Student Night that was attended by 250 students and AIChE professionals (Nov. 2004; p. 61). In addition, you are in the process of tripling your member volunteer participation. How have you accomplished so much so quickly?

Rob: First, we tried to learn more about what our members wanted, adjusted our programming accordingly, and then marketed aggressively to get our message out to the members. We conducted an extensive online market survey. The process started by polling other sections through the Local Sections message board. This is a powerful tool, and I strongly recommend all sections to take advantage of it. It allows you to leverage the experiences of other sections nationwide. Through the message board, we were able to get some useful feedback about the successes and failures of other sections' market surveys, as well as find out what their most popular topics were over the past several years. Using this information as a starting point, we created a list of 20 meeting topics to test through a market survey.

Steve: So what did you learn?

Rob: Three key interests surfaced. First, members want to come to meetings that relate to their personal career success, and not just for topics that are interesting. Emerging technologies in the alternative energy field, such as solar power, wind power and fuel cells all scored high, as well as topics such as "Future Trends in Chemical Engineering," and biotechnology related topics. Second, we learned that people attend meetings 50% for the topic and 50% to make business connections. And third, members want to extend their career networking by becoming more involved with our section.

Steve: How have you implemented these results?

Rob: We built a new 10-person program committee out of the members who expressed interest via the survey, and turned the survey results over to them. Ana Echaniz, our program chair last year, did a superb job of directing this new committee.

Andy: One of the things Ana introduced was the concept of having a different meeting coordinator for each meeting. In keeping with our Ichthyologists' tradition of using fish names, they are called the Octopus. We selected the top choices on the survey and let the program committee figure out the best way to give the members what they wanted.

"Offishers " at the Nov. 5th AIChE Boston Process Intensification Meeting. From left to right: Al Porras (Past Chair '02–'03); Andy Irwin (Vice Chair); Bill Flood (Past Chair '72'–'73); Ana Echaniz (Past Program Chair); and Rob Reintjes (Chair).

Steve: What is the connection between increasing the number of your volunteers and career networking?

Rob: The volunteer program is an extension of our emphasis on career networking. Members are discovering they can make much better business contacts, as well as showcasing their professional skills by becoming more active within the Ichthyologists.

Steve: How do you coordinate the volunteers who want to get more involved?

Rob: First, we created a new "Offisher" position — Volunteer Coordinator — and recruited Rich Shandross to take on this important role. Rich uses the term "enlightened self-interest" to help members understand our philosophy in working with volunteers.

Rich: We want our volunteers to get the most out of the time they spend helping the organization. We ask them what they want to achieve as a result of their volunteer work, so that we can match their goals with our needs to the extent possible.

Steve: What are some of the benefits of being a Boston Section volunteer?

James: For me, it is definitely the networking and learning professional skills from others, such as how to write proposals, interact with government agencies, and deliver presentations. It is much easier to meet and engage other professionals when you are visible in the organization. A network is the enabler of synergy and opportunity, for personal and professional growth.

Steve: How does "enlightened self-interest fit" into the team building process?

Steve Horstkamp
AIChE Local Sections Vice-Chair
Account Engineer,
Chemical Operations, FM Global

Rob Reintjes
Boston Section Chair (Kingfish)
Principal, New England Equity Group
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Andy Irwin
Boston Section Vice-Chair and Program Chair (Mackerel and Flounder)
President, IRWIN Engineers, Inc.

James Cross
Boston Section Secretary and Treasurer (Smelt and Shark)
Vice President Technology,
Nuvera Fuel Cells

Rich Shandross
Boston Section Volunteer Coordinator (Anglerfish)
Principal Member, Technical Staff,
General Dynamics C4 Systems

Rich: We use an HR-like process in working with our volunteers. To get the best fit between our requirements and the skills, interests and networking goals of the volunteer, we have all potential volunteers fill out a Volunteer Profile form. The responses are entered in a database for easy access.

Rob: Another way to look at this is from a ROI, standpoint. Members invest their time, a very scarce resource today, in order to come to meetings or to help the section as volunteers. It is the primary responsibility of the Section Chair and the rest of their management team to make sure that the members get the maximum return on this investment of their time.

Visit www.aiche-boston.org to learn more about the Ichthyologists (Boston Section).

AIChE Forum

Strengthening the Chemical Enterprise

On October 28 in Philadelphia, AIChE brought together senior chemical industry executives and government officials to identify ways that AIChE can better support the U.S. chemical enterprise. The group met in Rohm and Haas' offices near Independence Hall, and Tom Archibald, Rohm and Haas vice president of operations and environment, health and safety, served as host. The companies represented were Dow Chemical, DuPont, ExxonMobil, Air Products, Praxair, Lyondell, Eastman Chemical, CH2M Hill and SAIC. Officials of the U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA) and the U.S. International Trade Commission also participated.

The group reviewed the impact of issues including globalization, energy prices and environmental regulation on domestic chemical production, as well as the opportunities presented by energy-efficient technologies, sustainability and trade. While these topics were discussed broadly, attendees also spent time focused on the future economics of olefins production, a major component of many chemical businesses.

Work in progress

AIChE Executive Director John Sofranko kicked the session off by describing the Institute's history of bringing companies together to solve shared problems — most notably with the Center for Chemical Process Safety (CCPS). He offered AIChE's service in facilitating joint efforts to meet challenges that the executives identified.

Government agencies have long been aware of the impact issues raised at this forum. On the subject of globalization, Eleanor Nesbitt of the International Trade Commission, an independent, bipartisan agency, noted that the commission maintains a trade database, publishes tariff information, responds to industry concerns on topics like dumping and patent infringement, and undertakes industry-wide analyses.

With the chemical industry being highly energy intensive, optimizing process efficiencies is vital to continued growth. Paul Scheihing of DOE's Industrial Technologies Program described the chemical industry's impact as a major energy consumer, and what he sees as important opportunities for process efficiencies. He also described how DOE, through efforts like the Vision 2020 program, brings together companies, AIChE, the American Chemical Society, and the American Chemistry Council, to identify and work cooperatively on projects.

Furthermore, the director of EPA's Environmental Engineering Research Div., Stephen Lingle, described how material and energy use has, over the last 50 years, been decoupled from domestic economic growth. To help the chemical industry become more sustainable, EPA has computational tools to foster the development of chemicals with fewer hazardous properties and algorithms to evaluate the impacts of 12 different environmental end-points.

The group also identified many challenges confronting chemical companies and brainstormed what can be done to assure that the U.S. retains a viable chemical manufacturing base. Some suggested that natural gas policies have resulted in the premature shutdown of U.S. facilities and the failure to add upgraded capacity. While there is some sense that the regulatory picture may be uncertain, current environmental rules weren't seen as a significant factor in going off-shore, because global companies use the same environmental standards wherever facilities are located. However, continued strong economic growth in Asia was seen as one major reason that so much capital spending in the chemical industry has happened there.

Institute involvement

What can AIChE do for the chemical enterprise? The group suggested a number of possibilities, including credible facilitation of government and industry interaction to address regulatory uncertainty; providing a forum for sharing best practices; assessing further threats to individual chemical processes from changes in energy prices and global environmental factors; studying the environmental, health and safety issues posed by nanotechnology; and helping the engineering workforce stay competitive. Additionally, attendees acknowledged that the shorter-range of today's corporate planning horizons and the concern that, for individual companies, the incremental benefits realized through further technical innovations might not offset the costs of their development. Therefore, it was suggested that AIChE might lead a collaborative innovation process to reinvent the basic processes that form the foundation of the chemical enterprise.

OBITUARY

Sidney J. Pillow, Jr., 70, The Woodlands, TX

Correction: James C. Newbold of Midland, MI, was inadvertently listed in the November obituaries. Mr. Newbold is in fact still alive and well in Midland. We apologize for the mistake and any inconvenience it may have caused.

Are you in the news?

Tell *Extra* about your recent award or latest research. Or share information on innovative new programs you think members would like to hear about. Email us at news@aiche.org.

SPEAD Wins Fluid Properties Simulation Challenge

The Step Potentials for Equilibria and Dynamics (SPEAD) method developed by Dr. Richard Elliott of the University of Akron and jointly supported by Chemstations, Inc. and the National Science Foundation (NSF/GOALI: CTS-0075883) has won Problem 1 — prediction of vapor pressure and heat of vaporization — of the second International Fluid Properties Simulation Challenge (IFPSC). The IFPSC announced winners on November 7 at the 2004 AIChE Annual Meeting in Austin, TX.

The SPEAD model has been in development since 1999 with goals of predicting pure physical properties, pure thermodynamic properties, phase equilibrium for mixtures, and mixture properties using molecular simulation. "We are very proud of our involvement in the project, and congratulate Dr. Elliott for his success. This represents a large step forward for the future of molecular simulation as it relates to the chemical processing industry, and we are excited to be able to further this technology in the marketplace," said ChemStations' Massey.