Computing and Systems Technology Division Communications

Volume 13, Number 1, Winter 1990

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CAST Division of AIChE 1990 Executive Committee

Elected Members

Past Chairman
Bruce A. Finlayson
Department of Chemical Engineering
University of Washington
Seattle, WA 98195
(206) 543-2250
Bitnet: FINLAYSON@MAX

Chairman
Joseph D. Wright
Xerox Research Centre of Canada
2660 Speakman Drive
Mississauga, Ontario, Canada
L5K 2L1
(416) 823-7091
Bitnet: WRIGHT.XRCC-NS@XEROX.COM

1st Vice Chairman
G. V. (Rex) Reklaitis
School of Chemical Engineering
Purdue University
West Lafayette, IN 47907
(317) 494-4075
Bitnet: GVR@PURCHE

2nd Vice Chairman
Ignacio Grossmann
Chemical Engineering Department
Carnegie-Mellon University
Pittsburgh, PA 15213
(412) 268-2228
Bitnet: D391GR99@CMCCVB.BITNET

Secretary/Treasurer
Maria K. Burka
Chemical and Thermal System Division
Room 1115
National Science Foundation
Washington, DC 20550
(202) 357-9606
Bitnet: MBURKA@NSF.GOV

Director, 1988-1990
Herbert I. Britt
Aspen Technology, Inc.
251 Vassar Street
Cambridge, MA 02139
(617) 497-9010

Director, 1988-1990
Thomas J. McAvoy
Department of Chemical & Nuclear Engineering
University of Maryland
College Park, MD 20742
(301) 454-4593

Director, 1989-1991
Henry H. Chien
Monsanto
800 N. Lindbergh Boulevard
St. Louis, MO 63167
(314) 694-8274

Director, 1989-1991
Arthur L. Parker
Shell Oil Company
P.O. Box 10
Norco, LA 70079
(504) 465-7627

Director, 1990–1992
Lorenz T. Biegler
Chemical Engineering Department
Carnegie-Mellon University
Pittsburgh, PA 15213
(412) 268-2232
Bitnet: D101LB01@CMCCVB.CC.CMU.EDU

Director, 1990–1992
Mohinder K. Sood
Mobil Research and Development Corp.
P.O. Box 1026
Princeton, NJ 08540
Office: (609) 737-4960
Home: (215) 968-7862

Ex-Officio Members

Programming Board Chairman
Jeffrey J. Siirola
Research Laboratories – B95
Eastman Chemical Company
Kingsport, TN 37662
(615) 229-3069

Area 10a Chairman
Kris R. Kaushik (Krishna)
Shell Oil Company
P.O. Box 6249
Carson, CA 90749
(213) 816-2276

Area 10a Vice Chairman
Christodoulos A. Floudas
Department of Chemical Engineering
Princeton University
Princeton, NJ 08544
(609) 258-4595

Area 10b Chairman
Duncan A. Mellichamp
Department of Chemical & Nuclear Engineering
University of California
Santa Barbara, CA 93106

Area 10b Vice Chairman
Christos Georgakis
Chemical Process Modeling & Control
Research Center
Lehigh University
111 Research Drive
Mountaintop Campus
Bethlehem, PA 18015-4781
(215) 758-5432
Bitnet: CG00@LEHIGH

Area 10c Chairman
Rajeev Gautam
UOP
Tarrytown Technical Center
Saw Mill River Road @ Route 100
Tarrytown, NY 10591
(914) 789-3206

Area 10c Vice Chairman
Mark A. Stadtherr
Department of Chemical Engineering
University of Illinois
1209 W. California Street
Urbana, IL 61801
(217) 333-0275
Bitnet: MARKST@UIUCVMD
Internet: markst@vmd.cso.uiuc.edu

Area 10d Chairman
Doraiswami Ramkrishna
School of Chemical Engineering
Purdue University
West Lafayette, IN 47907
(317) 494-4066

Area 10d Vice Chairman
Julio M. Ottino
Department of Chemical Engineering
University of Massachusetts
Amherst, MA 01003
(413) 545-0593

AIChE Council Liaison
Thomas F. Edgar
Department of Chemical Engineering
University of Texas
Austin, TX 78712-1062
(512) 471-3080

Other Members

Publications Board Chairman
Peter R. Rony
Department of Chemical Engineering
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061
(703) 231-7658
Bitnet: RONY@VTVM1

Associate Editor, CAST Communications
Joseph D. Wright
Xerox Research Centre of Canada
2660 Speakman Drive
Mississauga, Ontario, Canada
L5K 2L1
(416) 823-7091
Bitnet: WRIGHT.XRCC-NS@XEROX.COM

About This Issue

Peter R. Rony, Joseph D. Wright and Jeffrey J. Siirola

The significant advantages of timing the publication of CAST Communications (more or less) immediately after the spring and fall AIChE meetings has become evident with this issue of the newsletter. Members of the Division benefit from the timely publication of the results of the numerous CAST Division meetings held during the national and annual meetings: (a) the Chairman's Report, (b) excerpts from the minutes of each Executive Committee Meeting, (c) updated information on Area 10 programming activities, (d) summaries of proposals and special reports, (e) results of elections for new CAST officers, and (f) excerpts from the Treasurer's Report. In retrospect, we should have changed the publication deadlines several years ago. One hitch with the publication schedule remains, however: our inability to receive in a timely fashion complete details for Area 10a, 10b, 10c, and 10d programming activities, especially Calls for Papers. The provision of a complete set of Calls for Papers is, in the opinion of the editors, a critical contribution of each newsletter to Division members. We had some problems with the Summer 1989 issue, and fewer but several problems with this issue.

We thank the CAST Division Award Winner, Coleman Brosilow, for the time and care he contributed to the writing of this issue's feature article, "Does American Industry Need Cooperative R&D in Automation and Control?" We believe that his topic will be of interest to the many division members who did not attend the CAST Division award banquet. We also congratulate the other two divisional winners, E. H. Bristol and Sigurd Skogestad. In this issue, Bob Spotnitz presents a proposal on a controversial topic, free technical software, and Carol Nemetz provides a timely commentary on the changing copyright law associated with work-for-hire material. James Davis and George Stephanopoulos, wearing their hats as CACHE trustees, announce the availability of monographs for understanding and applying expert systems to process engineering problems. Finally, John Baldwin's presentation – at the previous CAST Executive Committee meeting – of a proposal for a Process Data Exchange Institute (PDXI) is summarized.

The CAST Division has just received word from Charles Wentz, MPC for the Chicago Meeting, that all 27 of the sessions that CAST had requested (including the new ones requested by Areas 10b and 10d) have been approved. To make room for the 305 sessions for this meeting, Wentz has devised sessions of different lengths, including those suitable for 7 papers, 6 papers, and only 4 papers. His allocation to CAST of these different types of sessions are:

	Number of Papers			Total
	7	6	4	Sessions
Area 10a	2	2	2	6
Area 10b	2	3	5	10
Area 10c	2	2	2	6
Area 10d	1	2	2	5

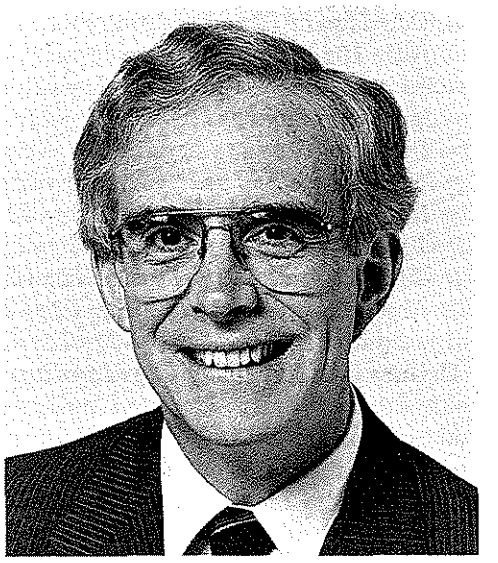
CAST is attempting its all-time largest divisional program in Chicago.

The ASPEN User's Group has disbanded and has contributed $48 to the CAST treasury to support the CAST division of the AIChE. To reinforce Chairman Finlayson's letter to John E. Myers, CAST Communications would be delighted, on a semiannual basis, to communicate the material that the User's Group used to include in its newsletter.

Your editor thanks the CAST Division Executive Committee for its kind and thoughtful presentation of the Distinguished Service Award "in Recognition and Appreciation of his Leadership and Service as Publication Board Chairman and Editor, CAST Communications" at the CAST Division Award Dinner, November 7, 1989 in San Francisco. It was a complete surprise, and greatly appreciated.

CAST Division, A.I.Ch.E. 1989 Annual Report

by Bruce A. Finlayson, Chairman



The most important activites of the Division are the programming at national meetings, the newsletter, and the awards. Most of the activities are performed by the officers of the Division, who for 1989 were:

- Bruce Finlayson, Univ. Washington, Chairman
- Joseph Wright, Xerox, First Vice-Chairman
- Rex Reklaitis, Purdue, Second Vice-Chairman
- Mac Clarke, Olin, Past Chairman
- Maria Burka, NSF, Secretary-Treasurer
- Stuart Bacher, Merck, Sharp and Dohme, Director
- Manfred Morari, Caltech, Director

- Herb Britt, Aspen Technology, Director
- Thomas McAvoy, Univ. Maryland, Director
- Henry Chien, Monsanto, Director
- Arthur Parker, Shell Oil, Director
- Peter Rony, Virginia Tech, Editor, Newsletter
- Joseph Wright, Xerox, Assoc. Editor, Newsletter
- Jeff Siirola, Eastman Kodak, Programming Board Chairman
- Michael Doherty, Univ. Massachusetts, Area 10a Chairman
- Duncan Mellichamp, Univ. Calif. at Santa Barbara, Area10b Chairman
- Rajeev Gautam, UOP, Area 10c Chairman
- Doraiswami Ramkrishna, Purdue, Area 10d Chairman
- Kris Kaushik, Shell Oil, Area 10a Vice-chairman
- Christos Georgakis, Lehigh, Area 10b Vice-chairman
- Mark Stadtherr, Illinois, Area 10c Vice-chairman
- Julio Ottino, Univ. Massachusetts, Area 10d Vice-chairman

Primary Activities: Programming

Much of the CAST activity is programming for meetings. During the year the meetings sponsored by CAST were:

- Houston, 9 sessions
- American Control Conference, 8 sessions by Area 10b, 3 more jointly
- FOCAPD, July 1989
- San Francisco, 22 sessions

During the next year we have plans for programming as follows:

- Orlando, 14 sessions
- Chicago, 23-24 sessions

We have also agreed to co-sponsor sessions along with other divisions. The FOCAPD meeting at Aspen, Colorado was a big success. Approximately 180 participants were there and the program evoked lively discussion. A proceedings is being printed for sale and distrubution to the participants.

Primary Activities: Newsletter

CAST Communications is an excellent publication and was issued twice during the year, with issues of 56 and 40 pages. CAST Communications is edited by Peter R. Rony, Virginia Polytechnic Institute and State University, and Joseph D. Wright, Xerox Research Centre of Canada. It contains feature articles as well as information about computer programs and future meetings. It is used as the standard place where our members go to learn about calls for papers, what papers are being presented in upcoming meetings, and so forth. Information is sent to the editors electronically and the issue is composed at Xerox. Then the camera-ready copy is sent to New York, where it is printed and mailed.

Primary Activities: Awards

Three awards are given by the division. The awards process is under the management of the second vice-chairman, Rex Reklaitis. The award winners this year are:

Computing in Chemical Engineering (sponsored by Simulation Science and Dow Chemical): Professor C. B. Brosilow, Case Western Reserve University

Computing Practice Award (sponsored by Pergamon Press): E. H. Bristol, II, The Foxboro Company

Ted Peterson Student Paper Award (sponsored by IBM and ChemShare): Sigurd Skogestad, Norwegian Institute of Technology

The award plaques and checks were awarded at the CAST Division Award Dinner, November 7, 1989.

Primary Activities: Future Plans

Other Activities CAST is currently considering is a proposal (to be made to Council, if approved) to form a Process Data Exchange Institute. The goal is the creation of a process data exchange format so that data can be exchanged in a standard format. Part of the project may involve writing standard subroutines that could be used "off-the-shelf" to translate data from the company format to the standard format, and vice versa. Dr. John Baldwin of Kellogg is spearheading the effort. Within CAST Henry Chien and Herb Britt are coordinating the effort.

Primary Activities: Paper Retrieval Project

During the AIChE meeting in San Francisco the CAST Division made available a computerized service to obtain copies of the papers presented. The user supplied his/her card, with the paper numbers he or she desired. This information was put into a computer database by high-school students who served as session aides. The session aides were extremely competent and many were familiar with the use of data bases. After the meeting, the information was sorted. Each author was provided with a set of mailing labels of both the attendees who requested their paper and the attendeeds who requested all papers of their session. The authors were asked to send copies of their papers to these individuals. The transmittal of the papers was completely voluntary, but it was hoped that in return for a list of people interested in your work the author would do so. Obviously there would be some expense to the author. The project is still being evaluated and the final success will not be known before this newsletter goes to press. However, you might be interested in some statistics. The service was used very heavily–much more heavily than anticipated. This caused some delays in processing the information. The

CAST division sponsored or co-sponsored 170 papers at the meeting. About 300 people left their names. We had 1324 requests for individual papers, and 154 requests for all papers in a session. We do not know yet how many of the authors actually sent copies or even had a printed version made; this will be evaluated soon.

Organizational Information: Membership and Officer Nominees

The membership in the CAST Division was 1946 on September 29, 1989, compared with 1855 in September 1988; 1852 in 1987; and 1980 in 1986

It is of course necessary to elect officers, manage and spend dues money wisely, and try to increase the number of members. The election of new officers was under the direction of the Past Chairman, W. McMaster Clarke, Olin Corporation. Elections are held in October. The nominees were:

For 2nd Vice Chairman: Michael F. Doherty, University of Massachusetts and Ignacio E. Grossmann, Carnegie Mellon

For Secretary-Treasurer: Maria K. Burka, National Science Foundation and Jerry S. Wareck, Aspen Technology

For Directors: N. Fred Brannock, Simulation Science, Lorenz (Larry) T. Biegler, Carnegie Mellon, Mark Juba, Eastman Kodak, and Mohinder (Moe) K. Sood, Mobil.

Organizational Information: Finances

The finances for the division are organized on a yearly cycle beginning January 1, and financial reports are prepared for the November AIChE meeting, so that it is not possible to give a complete breakdown in October. This report then gives the summary for the 1988 calendar year. The income and expenses are separated into award activities and regular activities.

CAST Awards

Income	
Industrial Award Sponsors (for multiple years)	$ 8000.00
Expenses	
Award Stipends	$ 3000.00
Plaques & Banquet Expenses	306.48
Total Expenses	$ 3306.48

Regular Activities

Income	
Dues Received	$ 8900.00
Interest, McLachlen	1190.66
Total Income	$ 10090.66
Expenses	
Newsletter Printing & Mailing	$ 4539.51
Mailing Labels	402.36
Officer's expenses	73.49
Miscellaneous	76.30
Repay Loan	3000.00
Total Expenses	$ 8091.66
Closing Balance	$ 31706.16

Organizational Information

The Chairman, Bruce Finlayson, University of Washington, wrote a letter addressed to all new members of the division. This letter was sent to the AIChE office and was to be sent to any new members as they enrolled. Also, past copies of the newsletter were to be sent, if they were available. In this way we hope to have some immediate information in the hands of new members so that they can see how the Division operates and hopefully participate more fully in the activities. This process is just beginning.

Organizational Information

The Second Vice-Chairman, Rex Reklaitis, Purdue University, attended the 1989 Officers Conference in St. Louis, June 4-6, 1989.

Bruce A. Finlayson
Chairman, CAST

Executive Committee Meeting: Excerpts from Minutes

by Maria Burka, Secretary/Treasurer

On November 6, 1989, at the San Francisco AIChE meeting, Bruce Finlayson, Chairman of the CAST Division, opened the meeting and gave his Chairman's Report (published elsewhere in this newsletter). Terry Langevin is the new AICHE publication relations liaison, replacing Connie Carrol. Terry needs slides containing a brief message – What is the CAST Division? – for the AIChE membership road show. Mac Clarke presented the election results: new Directors are Larry Biegler and Moe Sood, the new 2nd Vice Chairman is Ignacio Grossman, and the Secretary/ Treasurer is Maria Burka.

The minutes of the Houston Executive Committee Meeting, the treasurer's report, and the proposed budget were accepted. The CAST Practice Award Fund needs to be replenished. Two advertisements have appeared in one issue of the Newsletter, but AIChE has not yet passed the income to CAST.

In his 1st Vice Chairman's Report, Joe Wright solicited ideas concerning how to increase membership in the CAST division. Initiated this year is a welcome letter from the Chairman, with CAST brochure and a copy of last year's newsletter, is being sent to all new members by the AIChE. A CAST Division 35mm slide has been provided to all Area 10 session

chairman, to be shown at the beginning of each session, with appropriate comment by the session chairman. It will be the responsibility of the 2nd year directors to contact the chairmen and produce slides at future AIChE meetings. A standard "advertisement" published in the CAST newsletter will contain a brief plug for the division, a solicitation to join, and a membership application form. The audience for this solicitation would be two-fold: "Join the CAST Division" (for readers who are not members of CAST), and "Get a friend to Join" (for readers who are members).

Rex Reklaitis, in his 2nd Vice Chairman's Report, stated that CAST had many more nominations for awards than in the past: six for the CAST Award, six for the Practice Award, and seven for the Ted Peterson Award.

Tom McAvoy, an 2nd Year Director, tried an experiment at the American Control Conference (ACC): CAST brochures were left out at each session and the CAST slide was used to introduce each session. It is unclear that these actions helped generate new CAST members. Herb Britt, another 2nd Year Director, suggested that CAST should solicit new members through the newsletter. This suggestion will be implemented in each newsletter starting with Winter 1990.

Jeff Siirola, in his Programming Board Chairman's Report, informed the Committee that FOCAPD in Snowmass, Colorado had attendees from 19 countries. CAST has 21.5 sessions at the San Francisco Meeting, and has proposed 14 sessions for Orlando (Spring 1990) and 24.5 sessions for Chicago (Fall 1990). All have been accepted. For 1991 and 1992, plans are under way for 15 sessions at the spring meetings and 25 at the fall meetings. AIChE is stressing block programming and specialty sessions. CPC IV is scheduled for February 1991 in Texas. PSC '91 will be in Montebello, Quebec. Joe Wright pointed out that the National Research Council of Canada is tentatively providing financial backing for the meeting. Gerry Sullivan is the meeting chairman; Professor Takematsu, Rex Reklaitis and Roger Sargent are co-chairmen.

Mike Doherty, reporting on Area 10a programming activities, indicated that attendance continues to be high, the rooms were not big enough at the San Francisco meeting, all session chairmen for Orlando have been chosen, and all session chairmen (except one vice chairman) have been assigned for Chicago. Christos Georgakis, reporting on Area 10b, stated that Area 10b is organized so that the chairman takes care of AIChE meetings and the vice chairman takes care of ACC meetings, everything is set for eight sessions in Chicago, and planning is in progress for eight sessions at the ACC meeting during May 1990. Doraiswami Ramkrishna, reporting on Area 10d activities, mentioned that Area 10d was set up in 1986, had two sessions in 1987, and is growing rapidly. Sessions have been well attended, and five sessions have been planned for Chicago.

Peter Rony, in his Publication Board Chairman's Report, stated his strong interest in suggestions for feature articles for the Newsletter. Please call him or send suggestions by BITNET email, RONY @ VTVM1. CAST Communications has not been permitted to independently solicit advertisements, and has not done so. AIChE is very sensitive to the potential for siphoning of money from CEP advertisement revenues. Tom McAvoy suggested that CAST consider providing all award sponsors free advertising space in the Newsletter. The deadline is December 1, 1989 for all programming inputs to the Winter 1990 newsletter.

In New Business, John Baldwin discussed a proposal for a Process Data exchange Institute (PDXI). His summary of the proposal is featured elsewhere in this newsletter. Baldwin and the organizing committee desire CAST sponsorship, i.e., "blessing." They hope to involve 200 to 300 companies in the Institute. Tom Edgar cautioned that "guideline" instead of "standard" be used. ASME was sued over this issue because their standard was interpreted to exclude some people, and thus was in restraint of trade. The Executive Committee voted to "bless" the project and to encourage that it proceed. A motion was also passed to have an ad hoc committee, consisting of Chin, Baldwin, and others, initiate this effort.

Council Liaison, Thomas Edgar, discussed AIChE election results; see CEP. The AIChE budget is very tight, but AIChE is close to a balanced budget. AIChE has formed a new center for waste reduction technologies. EPA has promised some funding for this center. The Professional Development Committee has recommended that some mechanism be established whereby companies are expected to tell students what the terms of their employment are. The AIChE is having trouble getting recently graduate students to join the Institute. Suggestions for nominees for next year's AIChE officers should be sent to Tom.

CAST Treasurer Maria Burka, in a Report distributed with the Executive Committee Minutes, provided the following financial information for the CAST Division for the period, March 22, 1989 through November 1, 1989:

Ted Peterson Memorial Student Award Fund:

Opening balance	$ 4543.27
Award	(500.00)
Investment income	186.59
Closing balance	$ 4229.86

CAST Award Fund:

Opening balance	$ 4844.45
Award	(1500.00)
Investment income	198.66
Closing balance	$ 3543.41

CAST Practice Award Fund:

Opening balance	$ 1019.82
Award	(1000.00)
Investment income	41.88
Closing balance	$ 61.70

Operating Fund:

Opening balance	$ 20713.07
Income	
Dec 88 dues	1060.00
Jan 89 dues	1610.00
Feb 89 dues	625.00
Mar 89 dues	620.00
Apr 89 dues	205.00
May 89 dues	125.00
Jun 89 dues	105.00
Jul 89 dues	70.00
Aug 89 dues	60.00
Investment income	850.71
Aspen User's Grp dues	48.00
Total	5378.71
Expenses	
Newsletter	7036.90
Data processing	296.90
Plaques	226.48
Refund dues (deceased member)	5.00
Officer's expenses	509.88
Total	8075.16
Closing balance	$ 18016.62

Consolidated Account:

Opening balance (Citizen Bank of Washington)	$ 31120.61
Income	
Dues	4480.00
Interest	1278.14
Aspen User's Grp dues	48.00
Total	5806.14
Expenses	
Operating expenses	8075.16
Ted Peterson Award	500.00
CAST Award	1500.00
CAST Practice Award	1000.00
Total	11075.16
Closing balance (Citizen Bank of Washington)	$ 25851.59

1990 Proposed Budget:

Opening balance	$ 18016.62
Income	10000.00
Expenses	9700.00
Closing balance	$ 18316.62

Report on AIChE Officers' Conference

by Rex Reklaitis, 2nd Vice Chairman

The theme and focus of the meeting was: Understanding and Meeting Membership Needs. To address this theme, a full-day workshop was organized on Monday, June 5th, using the services of a trainer/facilitator to conduct the meeting. The objective of this session was to explore the customer/supplier relationships that exist between various entities within AIChE and its membership. Definition of all aspects of these relationships (inputs, outputs, requirements, and how to meet these requirements) was pursued via group discussions and reports to the group as a whole.

Tuesday's program consisted of two parts: Council of Division Officers in the morning and elective workshops in the afternoon. The items of discussion in the former ranged from public relations, the use of AIChE Extra, the possibility of Division-sponsored meetings, recognition of session aides, interactions with the Government Programs Steering Committee, recognition awards for those active in division projects, improved membership information, and intersociety liaison.

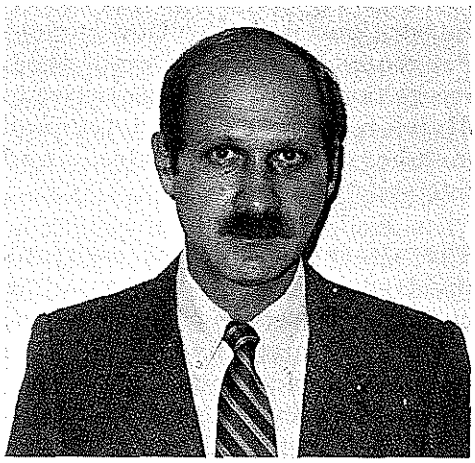
The afternoon elective sessions involved a range of topics: AIChE budgets, local section public relations, student chapters and effective committee leadership. The former gave an overview of how local sections should conduct their finances, division bookkeeping, and a detailed view of AIChE expenditures and income streams. The latter offered a useful review of matters such as selection of members, role and duties of the chair, meeting management, communication, stirring members into action, etc. These sessions were useful and reasonably well attended. Next year's meeting will return to previous formats: focusing of more intense reviews of specific AIChE organization, services, and benefits. The site has not yet been selected.

New CAST Division Officers Elected

The CAST Division officers election, as certified by Gordie Ellis of the AIChE New York Office, are as follows: 574 valid ballots returned of 1892 sent. Elected were:

Ignacio Grossman, Second Vice Chairman

Professor Ignacio E. Grossmann received a B.S. degree in Chemical Engineering from the Universidad Iberoamericana, Mexico City, in 1974, and a M.S. and Ph.D. degree in Chemical Engineering from Imperial College, London, in 1975 and 1977. He worked at the Mexican Petroleum



Institute as leader of the Process Optimization Group in 1978. He is currently Professor of Chemical Engineering at Carnegie Mellon University and director of the Synthesis Lab at the Engineering Design Research Center. He is a member of AIChE, ORSA, ACS and Sigma Xi. Professor Grossman's research interests are in the areas of process synthesis, optimization, flexibility and planning and scheduling. He is the author of more than 70 technical publications, and he has been a consultant with a number of companies.

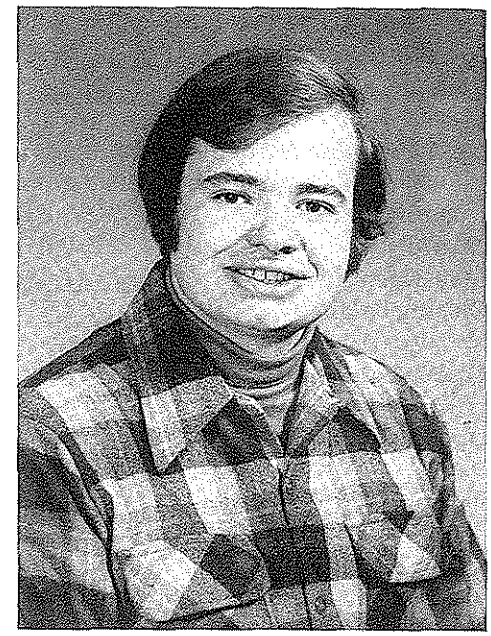
In 1983, Professor Grossmann was elected as an Academic Trustee of CACHE; in 1984 he received a National Science Foundation Presidential Young Investigator Award; in 1986 he was the 6th Robert Vaughn Lecturer of Chemical Engineering at the California Institute of Technology; and in 1986-87, he was the Mary Upson Visiting Professor at Cornell University. He is also a member of the editorial board of Computers and Chemical Engineering.

Professor Grossmann has been very active in the programming activities of the CAST Division. He was chairman of Area 10c, Computers in Operations and Information Processing, in 1987-88, and co-vice chairman of FOCAPD '89. He has also co-chaired many technical sessions and has presented numerous papers.

Maria K. Burka, Secretary/Treasurer

Maria, who has a Ph.D. from Princeton University, is currently a program director for the Chemical Reaction Processess program at the National Science Foundation. The program funds basic and applied research in the areas of controls, design, polymerization, and reaction engineering. Previously, she was an environmental scientist at the Environmental Protection Agency, involved in research programs dealing with controlling NO pollution from stationary sources and pollutants from oil shale processing. Prior to that position, Maria was an Assistant Professor in the Department of Chemical Engineering at the University of Maryland at College Park. She is a member of AIChE, the CAST Division, and Sigma Xi. For the past two years, she has been the Secretary-Treasurer of the CAST Division.

Lorenz T. (Larry) Biegler, Director (1990-1992)



Larry Biegler is an associate professor of chemical engineering at Carnegie-Mellon University, where he has taught since 1981. His chemical engineering education includes a B.S. from Illinois Tech and M.S. and Ph.D. degrees from the University of Wisconsin. His research work includes process optimization with both steady-state and dynamic models, synthesis of chemical reactor networks, and process control strategies for nonlinear systems. In addition, Larry has contributed to teaching short courses on process modeling and optimization at Carnegie Mellon, MIT, and for the AIChE. For the CAST division, Larry has participated in Area 10a, 10b, and 10c programming meetings, and has chaired or co-chaired technical sessions at the 1985 Annual AIChE meeting (Design and Analysis, 2 sessions), the 1987 National Meeting (Human Factors in CAD), the 1987 Annual Meeting (Advances in Optimization, 2 sessions), and the 1989 National Meeting (Process Design and Simulation). He is currently a CACHE trustee.

Mohinder K. Sood, Director (1990-1992)

Moe Sood received his Ph.D. from the University of Mississippi and conducted post doctoral study at Purdue University. He has been an active member of the CAST Division since its inception. He has raised funds for the Division and served on awards committees. He has influenced CAST programming into new technology areas in order to meet rapidly growing industrial computing needs. At Mobil, Moe is responsible for a large group of professionals in Technical Computing and Information Technology. He is also the inventor of Mobil's highly profitable Model-Actuated Control System (MACS) technologies, and is managing several projects around the world. Moe has over 25 technical computing publications.

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Awards

Coleman Brosilow Receives the 1989 Computing in Chemical Engineering Award

The Computing in Chemical Engineering Award is given in recognition of an outstanding contribution in the application of computing and systems technology to chemical engineering. The award, supported by Simulation Sciences, Inc. and Dow Chemical, consists of $1500 and a plaque.

The winner for 1989 was Professor Coleman B. Brosilow, Professor of Chemical Engineering at Case Western Reserve University for "his substantial contributions to both computational methods and systems technology as applied to chemical processes." Professor Brosilow delivered his award address, "Does American Industry Need Cooperative R & D in Automation and Control," the CAST Division Award Dinner, November 7, 1989, at the San Francisco Annual AIChE Meeting.

The supporting statement for the award reads as follows:

Professor Brosilow's pioneering work in integration methods for staged separation processes (e.g., distillation) changed the art and led to significant follow-up studies by his colleagues at other institutions. More recently, his work on modular integration methods has opened up the possibility of large scale parallel simulations of complex chemical plants. This work, which has generated substantial interest around the world, is typical of Professor Brosilow's ability to introduce practical new ideas for solving long-standing engineering problems.

In the field of systems technology, Professor Brosilow is unquestionably best known for his work in process control, even though his early work on multi-level optimization is often cited for its insight and for the introduction of several new methodologies. His work on Inferential Control literally changed the field. Most of the work in model-based control (e.g., Internal Model Control) can be directly or indirectly traced to the Inferential Control papers. More recently, his work on Coordinated Control (i.e., nm square systems), modular multivariable control, and unstable systems promises to change the way control is practiced.

Supporting statements on behalf of his candidacy include: "Rather than pursuing the academically 'safe' approach of concentrating solely on the theoretical aspects of control, Professor Brosilow has pursued the more difficult and frequently less rewarding path of using advanced control theory to solve industrially relevant problems. Professor Brosilow's early pioneering work with model based control, Inferential Control, is widely recognized for presenting a formal mathematical approach to dealing with the control of unmeasured process variables using secondary measurements. Since that time, he has extended Inferential Control to areas of keen interest to industry – control of uncertain processes, nonlinear systems, systems with constraints on the manipulated and/or controlled variables, and on-line identification and adaptation of model based control. His work has amply demonstrated that modern control theory need not exist solely in an academic environment, but can be applied to real industrial control problems."

"There have been many advances in model predictive control, yet a decade later, it seems that most papers trace the development of the initial concepts back to Coleman's papers in 1978 and 1979. These were the first of several insightful papers by Coleman and his students that have contributed to the rapidly expanding research and application in this area. Coleman's contributions are exemplified by his ability to find simple solutions that work. Others often seek the most generalized solutions, involving analysis of the entire structure using, for example, sophisticated mathematical programming techniques or methods for integrating the stiff differential equations. Coleman's solutions often involve decompositions and coordinations of the submodels of larger systems. He is an excellent lecturer and his presentations are distinguished by his ability to transmit the logic and simplicity of his approach."

"Coleman's most significant contributions have come in the area of process control. His papers on Inferential Control constitute the landmark contributions and are of the most influential in the field. Rich in insights, they have put together a novel control structure, i.e., that of

Inferential Control, which has been directly or indirectly the starting point for most of the process controller design work in the last ten years. The design techniques his papers have put forward span the range of linear, non-linear, and adaptive control systems and have offered valuable intuitive approaches with generic practicality. Furthermore, his recent work on (a) Constrained Control through Linear Programming, and (b) Coordinated Control follows Coleman's earlier trademark, i.e., full of refreshing insights with significant potential for growth. I expect that these ideas, as they are being developed, will be very influential. His work on Coordinated Control has recently given rise to the concept of Modular Multivariable Controllers, which promises to provide a unifying framework for the design of process control systems in the presence of (a) regulatory, tracking and optimizing control objectives, (b) constraints on inputs and/or additional outputs, and (c) secondary measurements to enhance robustness of control in the presence of primary sensor failures. Its modular character provides simpler tuning, easier extensibility of the controller design formulation, and smooth maintainability of control systems over long periods. I consider this work the most exciting new development in process control. In conclusion, Coleman Brosilow has been one of the most impressive generators of novel ideas of lasting influence."

"I have spent over thirty years in industrial research on the application of computers to the control of chemical processes and the use of computers to develop process models...From that vantage I can speak with authority that Brosilow's research is a significant advance in the state of practical chemical process control. His recent developments of coordinated control and nonlinear inferential control are unique contributions. His original inferential methodology for the design of process control systems offers practitioners a unified approach to understand and evaluate competing designs – both the stability and the quality of the control."

The 1989 CAST Division Computing Practice Award Goes to Edgar. H. Bristol, II

The Computing Practice Award, sponsored by Pergamon Press, is intended to honor an outstanding effort that resulted in a specific embodiment, or possibly an industrial or commercial application, of computing and systems technology. The award consists of $1000 and a plaque.

Edgar H. Bristol, a Consulting Research Engineer for the Foxboro Company, was cited for two major contributions in process control: his development of the Relative Gain Array and the concept behind the EXACT adaptive controller. He was presented the 1988 award at the CAST Division Award Dinner, November 7, 1989, in San Francisco.

The award nomination statement of qualifications included the following:

Ed's paper on the Relative Gain Array (RGA) in the IEEE Transactions on Automatic Control...was purely an intuitive idea which came out of Ed's feeling (gained from experience) that one can identify control difficulties in multivariable systems, without extensive simulations, based on steady-state gains. The RGA is a dimensionless quantity, which adds to its appeal. In the last 20 years, there have been probably several hundred papers published on theory and applications of the RGA...I certainly think the RGA is an important practical concept that qualifies Ed Bristol for the Computing Practice Award.

A second major contribution by Ed Bristol is the EXACT adaptive controller. Ed first published a paper in ISA Transactions in the 1970s on the concept, which later was developed as an expert-system PI controller. This panel-mounted device automatically adjusts the controller tuning parameters based on load response characteristics. Foxboro's development strategy prevents the inventor from taking an active role in commercialization, hence the final hardware product involved a number of other people. Nonetheless, over 10,000 EXACT controllers have been operated in industry. A number of papers by various industrial and academic users have shown that the controller works, which is a tribute to Ed's algorithm, and it is a valuable addition to the suite of control tools for improving quality control of nonlinear, time-varying processes.

These two contributions stand out in the control applications field and they both originated with Edgar Bristol.

Other supporting letters provided the following comments:

"I feel that he is one of the most creative people that I have met in my professional career. Ed is best known for his paper on the relative gain that was published in 1966. This paper must be one of, and probably the most widely cited, papers dealing with process control...Ed also was a major contributor to the research that led to Foxboro's EXACT adaptive controller... The EXACT is based on pattern recognition and it functions much like an expert system. In developing the basis for it, Ed showed that he was well ahead of his time and that he could anticipate where the process control field was headed. Among Ed's other accomplishments are the concept of idioms (idiomatic control) to describe how experienced practitioners synthesize industrial controllers. He also was among the first to recognize the importance of

right-half-plane zeroes when he published on the concept of pinned zeroes."

"The pattern recognition approach of the EXACT controller represented a radical departure from conventional ideas. To my knowledge, the EXACT controller is the most widely used adaptive controller in industry today."

"The contribution made by Bristol in postulating the Relative Gain Array (RGA) was a significant one that has had great influence on the way we develop control strategies at...The RGA allows us to easily screen candidate control strategies for control loop interactions. We have made calculation of the RGA an integral part of our control system analysis software. Our process simulation programs automatically generate steady-state gain matrices from which we directly calculate the RGA, along with singular value analysis. We have found the RGA to be a reliable tool for assessing control loop interaction. Our primary applications of the RGA are in the areas of distillation control and reactor control. For distillation control we use the RGA to evaluate the feasibility of double-ended temperature control. With reactor control, the RGA is helpful for determining which variables are most effective for controlling temperature, composition, and production rate."

Sigurd Skogestad Wins the 1989 Ted Peterson Student Paper Award

The Ted Peterson Student Paper Award is given to recognize an outstanding published work, performed by a student, in the application of computing and systems technology to chemical engineering. This award, sponsored by ChemShare and IBM, consists of $500 and a plaque. The award was presented on November 7, 1989 at the San Francisco CAST Division Award dinner.

The 1989 winner is Sigurd Skogestad, who holds the chair for process control at the Norwegian Institute of Technology. Dr. Skogestad performed this work while a graduate student of Manfred Morari at the California Institute of Technology.

The award nomination provided the following identification and evaluation of the accomplishments of the nominee:

Sigurd Skogestad is nominated on the basis of his outstanding Ph.D. thesis research on robust control with application to distillation columns, as exemplified by the following three publications:

1. S. Skogestad, M. Morari, and J. C. Doyle, "Robust Control of Ill-Conditioned Plants: High Purity Distillation," IEEE Transactions on Automatic Control 33, 1092-1105 (1988).

2. S. Skogestad and M. Morari, "Understanding the Dynamic Behavior of Distillation Columns," Ind. Eng. Chem. Res. 27, 1848-1862 (1988).

3. S. Skogestad and M. Morari, "LV-Control of High-Purity Distillation Column," Chem. Eng. Sci. 43 [1], 33-48 (1988).

His work is characterized by a sound mix of scientific rigor and engineering insight. He showed not only how to successfully apply modern robust control theories developed in the electrical engineering community to chemical engineering problems, but he has also contributed to the theoretical foundations of the so-called μ-theory. In particular, he extended the mu-theory to the decentralized control of multivariable systems.

In the area of distillation control, Skogestad has contributed significant new insights into the dynamic and steady-state behavior of distillation columns. For example,

- *He was the first to discover the fundamental difference between the effects of external and internal flow changes, both at steady state and dynamically, and their profound impact on the mulitivariable aspects of distillation column control.*
- *He showed rigorously the linearizing effect of logarithmic composition transformations. They make it possible to operate a column over a wide operating range with a single linear controller.*
- *He has developed new insight into the important area of control configuration selection for distillation columns.*

His theoretical work focused on the issues of model uncertainty (robustness) and on "directionality" (which is the main difference between multivariable and single-loop systems). In particular, he has published papers on the directionality of disturbances, and on the deteriorating effect of input uncertainty when a controller with large Relative Gain Array values (e.g., a decoupler) is employed. His work has transformed the popular Relative Gain Array from a mere interaction measure to a measure of plant-inherent performance limitations.

It is believed that these new insights, combined with the new control-theoretical results, may help bridge the gap between distillation column control theory and practice, a tap that has been increasing steadily for the last twenty years.

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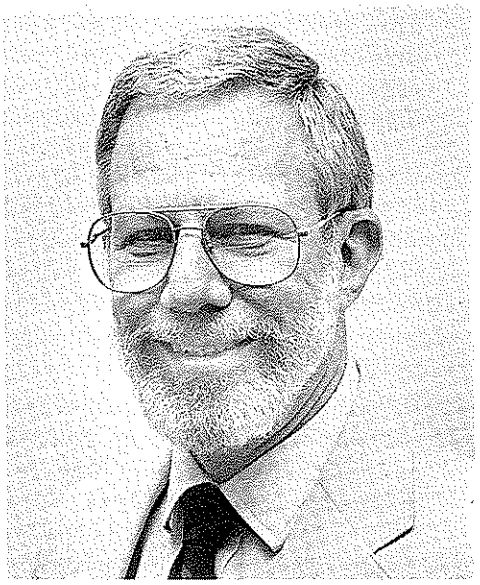
Articles

Does American Industry Need Cooperative R&D In Automation and Control?

by Coleman B. Brosilow, Case Western Reserve University



When I was called by the AIChE and asked for the title of the talk for this evening, I thought it might be fun to talk about cooperative R & D in automation and control. In particular, I wanted to address the issue as to whether or not there was a need for a consortium on the order of the other consortia that have been in the papers recently, for example, SEMATECH. Since I was not really sure that there was a need, I selected a title in the form of a question.

The first thing you want to think about when you ask a question as to whether there is a need for a consortium is, What is the motivation for consortia in general? Why do we have these things? I propose that the basic motivation is survival. You have to understand that survival means survival of the current management. Now, if you think that is more cynical than it ought to be, I point you to the current takeover trend and the machinations that management will go through to avoid an unfriendly takeover. In fact, the very term "unfriendly takeover" implies that the management is going to be sacked. A "friendly" takeover is where the current management stays in power. Now, I do not want to pick on industry alone. There are organizations like the March of Dimes which, after succeeding in their mission, change their mission so as to continue to survive. Another example: when I worked for a living many, many long years ago, before I retired to academia, the company with which I worked had a process that was outmoded by a new technology that they did not own. Instead of attempting to buy the rights to the new technology, they decided to develop their own; they planned to get around the competition's patent with a minor variation of the same technology. Their hope was to build a plant based on laminar rather than turbulent flow. The laminar flow technology worked beautifully as long as things were small. They could not, however, scale up the process without the flow becoming turbulent, and thereby infringing the existing patent. They sank a lot of money into the laminar technology, but the result was that they could not scale it up except by building lots of little pilot plants. On the back of an envelope, you could calculate that a plant consisting of many small pilot plants would never make money. And so, I assumed in my naivete, they would buy the competition's patent. Wrong! They chose to go with the many small pilot plants. Then I began to understand what was involved. Management's survival depended on it not looking bad. Survival often requires that you improve or protect your competitive position, but it equally often requires that you improve or protect your political position. I think engineers have to recognize this fact because we too often think that technology drives a company or economics drives a company, when in point of fact politics is often more important. In addition to concerns about political position with stockholders and with upper management, one now also has to worry about the political position with society. A lot of the motivation or lack of motivation for cooperative work has to do with the three political issues listed in Figure 1.

Does American Industry need Cooperative R&D in Automation and Control ?

Motivation for Cooperative R&D : ***SURVIVAL***

Survival means survival of the *current* management

Survival often requires
- Improve or protect competitive position
  - —improve &/or protect technology + have workforce capable of utilizing the technolgy
- Improve or protect political position
  - with society (e.g. Government)
  - with Stockholders
  - with upper management

Figure 1

I have listed in Figure 1 just one way that one can improve or protect a competitive position. I am not competent to go into all the marketing and other aspects, which are equally important or perhaps more important. What I want to do, however, is to point out that part of improving your competitive position is to make sure that you have a work force that is capable of implementing the technology you have. I am going to want to get back to that point later.

What I would like to do now is just go through a very small selection of typical cooperative efforts (Figure 2). The most famous, the one that has been in the news most recently, is SEMATECH. Its budget is a smashing $200 million a year. Lest you get too impressed by that number, the budget for the Gas Research Institute, which most of the people in this room support through fees added to their gas bills, is $175 million a year. SEMATECH members contribute anywhere from $65 thousand a year to the order of $2 million per year. So, they are contributing a lot of money. Half of

the $200 million is government money. The Cleveland Advanced Manufacturing Program, which is an Ohio State program, spends about $5 million a year, mostly state money, in its effort to improve the competitive position of the state of Ohio vis-a-vis other states. The Heat Transfer Institute is a consortium of small, medium size, and large companies. The membership fee is quite modest, between $15 and $50 thousand per year. Finally, there are several AIChE design institutes (I was surprised to learn) where industries spend only a few thousand dollars to support research in several often neglected areas of general interest.

A Selection of Cooperative R&D Efforts	
Organization	Apprx. Annual Budget
Sematech	200,000,000
Gas Research Inst. (GRI)	175,000,000
Cleveland Advanced Manufacturing Program (CAMP)	5,000,000
Heat Transfer Research Inst. (HTRI)	2,700,000
AIChE Design Institutes	200,000

Figure 2

The way that cooperative research is organized is as varied as the number of people in this room. Figure 3 shows how SEMATECH is organized. SEMATECH is built to a very large extent around the Semiconductor Research Corporation (SRC), which is no small enterprise by itself, as you will see in just a second. The university centers of excellence were formed by the SRC to increase fundamental knowledge. SEMATECH's role is to go beyond pure research into the development of new equipment and new manufacturing technology for semiconductors, and that is where a very large fraction of the new money will go. The pie charts of Figure 4 give you an idea of how much SEMATECH is spending, and where. Almost all of the R & D funding for this year is from the Semiconductor Research Corporation. Next year a large fraction of it will be in new development activities in semiconductor processing technology. What impresses an academic most of all, industrial chemical engineers please note, is the fraction of the total number of Electrical Engineering Ph.Ds produced in this country that is supported by the Semiconductor Research Corporation. Of the 700 Electrical Engineering Ph.Ds produced a year, 200 are supported by the Semiconductor Research Corporation. I would like our chemical industry to reach the same level.

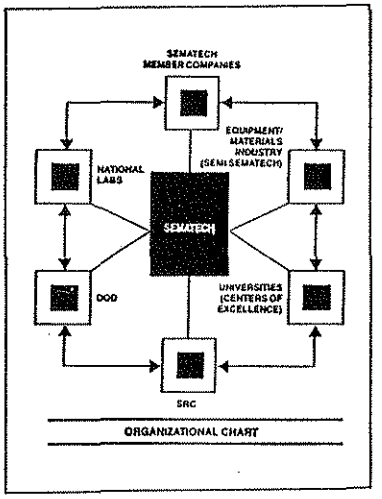


Figure 3

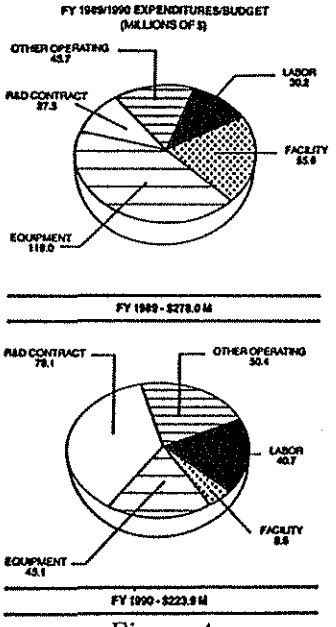
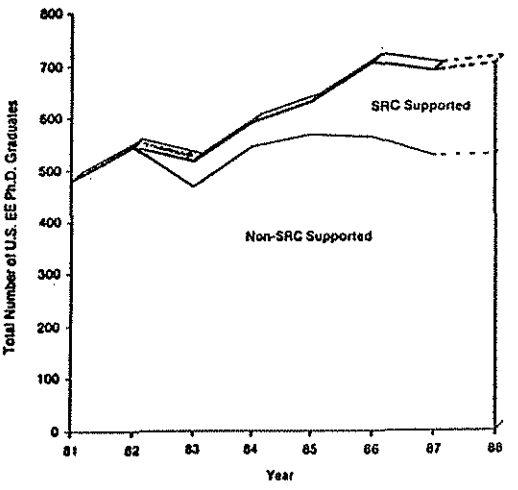


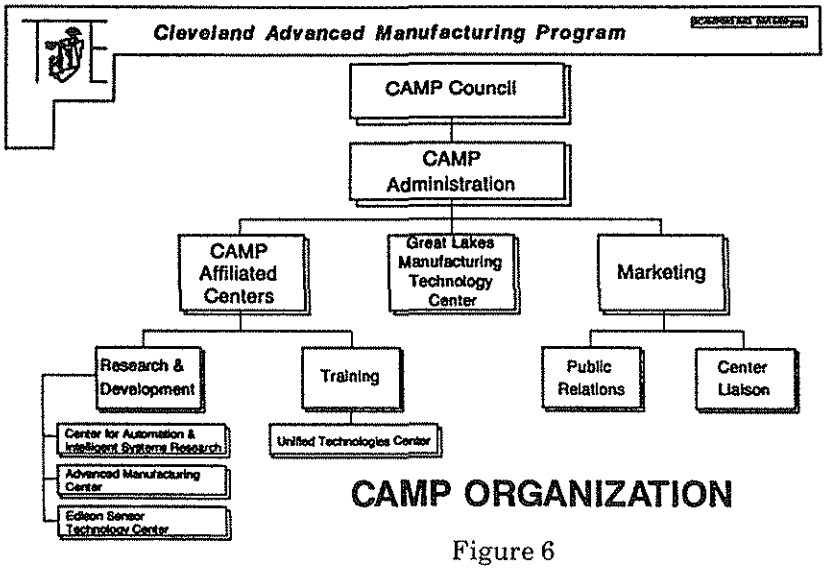
Figure 4

The Cleveland Advanced Manufacturing Program (CAMP) is one of six State-of-Ohio Thomas-Edison technology Centers. It is organized as shown in Figure 6. There are three university-based technology centers (the Center for Automation and Intelligent Systems Research and the Sensor Technology Center are at Case Western Reserve University, and the Advanced Manufacturing Center is at Cleveland State University) and two technology transfer and education centers (the Unified Technologies Center and the Great Lakes Manufacturing Technology Center). Each center has a director, associate director and steering committee that control all project activities within the center. The technology transfer and training centers have budgets of about $3 million per year while the three research centers have total budgets of about $2 million per year. Industry interacts with the centers through memberships which range from general memberships at $1200 per year to center memberships at $25,000 per year. In addition, industries support specific research projects in return for patent rights. Patent rights and copyrights from research supported by state funds or membership fees remain with CAMP.



The SRC's contribution to the U.S. technology manpower base continues to increase.

The Heat Transfer Research Institute, (HTRI), is an example of consortium completely run by industry. That is,



CAMP ORGANIZATION

Figure 6

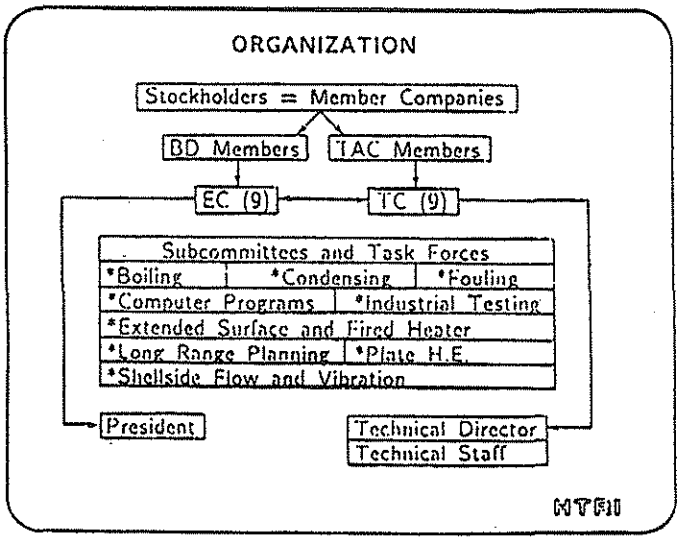


Figure 7

there are no governmental or university inputs to the HTRI. The stockholders are the member companies which elect board of directors and technical advisory committees that run the consortium. The consortium itself is split up into a number of activities, as shown in Figure 7. Most of these activities produce software for the exclusive use of the member companies. None of the research carried out by HTRI is in the public domain. The AIChE design institutes (Figure 8), on the other hand, do research that is completely within the public domain. The largest of these institutes, the Design Institute for Physical Property Data (DIPPR), has a budget of around $110,000 per year and develops physical properties data of interest to the member companies. The research is mainly carried out by universities. All of the research becomes public domain after about one year.

From the foregoing very brief overview of a number of different kinds of research consortia, I hope that I have managed to show you that there a large number of different kinds of consortia which meet the special needs of the individual organizations belonging to those consortia.

AIChE Design Institutes

Center for Chemical Process Safety (CCPS)

Design Institute for Emergency Relief Systems (DIERS)

Design Institute for Physical Property Data (DIPPR)

Research Institute for Food Engineering (RIFE)

Research Center for Energy & Engineering (RCEE)

Figure 8

What is the status of cooperative R & D in automation and control? There are several university/industry consortia typical of which are the research consortia at Lehigh run by Professor Georgakis, the LISPE Center at MIT run by Prof. Stephanopoulos, and the Control Industrial Systems Program at Case Western Reserve run by myself. In these consortia member companies pay a membership fee of around $25,000. The university participants use these funds as seed money to initiate research that is later supported either by government (e.g. NSF) grants or industrial contracts. The member companies usually have a royalty-free license to use any patents or software that result from the research.

Another common form of cooperative R&D is that engaged in by a single vendor working with a single operating company to solve a particular technical problem or to develop new control hardware and/or software. The vendor company needs the operating company in order to have a test bed for their new product(s). The operating company benefits by obtaining the new technology first, which gives them a chance to get ahead of their competitors. The operating company invests relatively little of its own capital in the development of the product but, on the other hand, does not have a proprietary position in the developed product.

What is the motivation for more broadly based research and development in automation and control? One benefit is to enable large-scale development projects. I have listed in Figure 9 several possible large-scale development projects that should be useful in the processing industries. The first of these is the simulation of plant dynamics. There are as yet no simulation facilities for process dynamics that are comparable

to those which are available for steady state simulation such as the ASPEN simulation system. Such software is needed for the development of control systems, for studying plant start up and shut down, and, most importantly, for operator training. Large amounts of money are currently spent on the development of special purpose operator training vehicles. It would make a great deal of sense to spend yet more money but only once – to develop a user-friendly software system with a very large database to enable one to put together simulations of plant dynamics relatively easily. Since the development of such a software system might cost on the order of $10 million, it is unlikely that any single company would be willing to undertake development alone. A large number of companies coming together, however, could with relative ease carry out such a development over a period of several years. Another possible development activity would be to capitalize on the new object-oriented programming techniques that are becoming ever more popular. Those of you who own Macintosh computers have used object-oriented programs. Most of the graphics software is object oriented, which makes it easy for the user to manipulate and reconfigure images as he or she sees fit. I believe that object-oriented programming techniques can also play a significant role in simplifying the configuration of control systems, and in enabling the addition of logic to control systems. I have always been impressed with how hard it is to take even relatively simple new developments in process control and bring them into the field. Even the new distributed control systems are relatively inflexible and hard to change, in the sense that a significant amount of effort is required. Ease of reconfiguration and inclusion of logic is essential if we are to make use of the power that is inherent in modern computing systems. Finally, it is unclear at the current time how the new developments in parallel architectures for computers will impact the process control industry. Some early and wise decisions as to standards in parallel computing could enable much more rapid achievement of benefits from parallel computers in process control than might otherwise be possible. I am certain that there are other projects that might be suggested and other benefits associated with broad based R & D.

Cooperative R&D in Automation & Control

Current Status
- University/Industry Research Consortia
- Adhoc Single Vendor/Operating Company R&D

Motivation for broad based R&D
- Enable large scale development projects
  - Simulation of Plant Dynamics
  - Simplify configuration of systems & addition of logic via real-time object oriented programming
  - Develop massively parallel computers for control
- Improve skills of technical workforce

Problem : Can our workforce effectively utilize new computer technology

Figure 9

One of the less obvious benefits of broad based R & D is that it provides training for the people who are engaged in such R & D. The very act of carrying out the research provides a more highly trained technical work force. Unfortunately, the training is limited to those people actually engaged in the research and development.

Are there any negatives? I believe there are. A major problem is whether or not we can effectively utilize the new technology which might come from such broad-based R & D. Many of the new developments which have come out of this country in the past 20 years have been more successfully seized upon by our foreign competitors than our own industry. Is that likely to happen in automation and control, and in particular, in chemical automation and control? I am afraid it might. Let us look at the production of engineers in, for example, Japan and the United States, as shown in Figure 10. Note that in 1985 the Japanese

Enrollments in first-degree engineering programs by field of study:[1] 1985

Field of study	Japan		United States	
	Number	Percent	Number	Percent
Total	343,590	100.0	384,191	100.00
Mechanical	74,354	21.6	66,738	17.4
Electrical and computer	95,429	27.8	132,917	34.6
Chemical	39,679	11.5	23,423	6.1
Civil	75,801	22.1	37,556	9.8
Engineering science	5,966	1.7	7,092	1.8
Nuclear	1,551	.5	1,857	.5
Mining	1,623	.5	2,431	.6
Metallurgical and materials	7,226	2.1	3,204	.8
Marine	1,003	.3	2,068	.5
Aeronautic/aerospace	2,428	.7	15,699	4.1
Industrial	19,829	5.8	16,434	4.3
All others	16,701	5.4	[2]77,781	20.2

[1]Full-time students only.
[2]Part of this group are undoubtedly engineering majors.
SOURCES: Government of Japan, Ministry of Education, Science, and Culture, *Annual School Survey 1984* (Tokyo, Japan, 1985), and *Engineering Education* (October 1986), p. 58.

had a total enrollment in chemical engineering of nearly 40,000 students. In the United States by contrast, we had roughly 23,000 students enrolled in chemical engineering. 1985 was the year when chemical engineering enrollment in the United States peaked. Enrollments currently are about two-thirds of what they were at the peak, and so if the Japanese enrollments have remained the same, they are producing almost three times as many chemical engineers as we are. That is bad, but what is even worse is that a relatively small fraction of those chemical engineers that we produce will end up in plant operations. Plant operations do not attract a high percentage of chemical engineering graduates. The Japanese, on the other hand, place great emphasis on plant operations. Figure 11 presents graphically the benefits of what the Japanese call "Kaizen," which means continual attention to plant operations with the aim of improving such operations. American industry has traditionally focused on process innovations. In the Japanese view, process innovation is fine and important, but after innovation, unless the operations are constantly improved, they degrade until the next innovation. If, however, constant

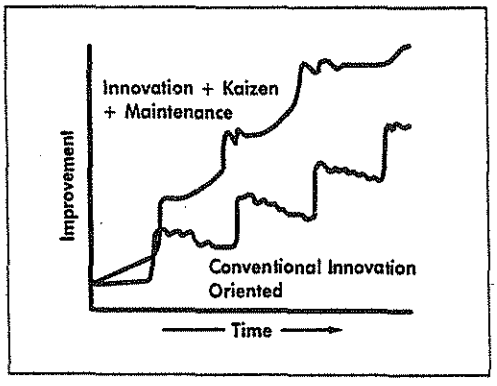


Figure 11

attention is paid to improving plant operation along with innovation, the net result is a more productive plant. This is exactly how the Japanese have managed to succeed in the manufacturing industries. They both out-produce us, and produce a better product at a lower price.

Am I saying that our process industries are at risk from foreign competition? There are indications on both sides. First, our chemical industry currently is extremely strong. We are a net exporter, as shown in Figure 13. Notice in Figure 13 that there are only four areas where Japan imports more from the U.S. than they export: aircraft, industrial inorganic chemicals, pharmaceuticals, and agricultural chemicals. Clearly, the chemical industry plays a large role in helping to reduce our trade deficit with Japan. This fact is very comforting for the moment, but the Japanese also know these figures and one must assume that they are or will take actions to reverse the current trade balance in chemicals.

Factors that indicate that our process industries may be at risk are first, our industry is mature. The likelihood of continuing innovation in bulk chemical processing is slight. Second, we now import a large fraction of our raw materials. Finally and most important, foreign competition has a better supply of well trained and motivated plant operators and engineers. It is in my opinion that the Japanese have beat us in manufacturing not because their technology is better, but rather because they have been able to capitalize on the technology that is known worldwide through a more productive work force. It is a work force that is better trained than the work force in the United States. Let us face it: technology can be bought, stolen, or reproduced (e.g. Russia and our short-lived nuclear weapons monopoly). However, it is much harder and often impossible to buy or import well-trained and motivated manpower. Contrary to popular conception, computerized plants of the future will require more highly trained technicians than is currently the situation.

Based on the foregoing, I recommend that we consider the formation of an industrially-supported Center for Process Operations. In Figure 14, I have listed just a few of the activities that might occupy such a center. I have already discussed the opportunities in the development of new technologies in simulation and in software for process computer control. I would like to focus now on other activities of an industrially supported Center for Process Operations.

An extremely important activity could be the certification and training of plant operators and engineers. Currently, to the best of my knowledge, there is no organization that certifies that an operator is competent to run a process. Most operators have, at best, two years of college training. Nonetheless, they

Are the Process Industries at Risk ?

NO !

Economically very strong
Net Exporter

Maybe ?

Industry is Mature

It imports large fraction of its raw materials

Foreign competition has better supply of well trained/motivated operators & engineers

Computerized plants reguire more skill to run effectively

Figure 12

Japanese trade with the United States in technology-intensive products:[1] 1985

Product group	Balance	Exports to United States	Imports from United States
Total	13,024.0	21,252.2	8,228.1
Aircraft and parts	−1,931.1	113.0	2,044.1
Industrial inorganic chemicals	−886.4	116.7	1,003.1
Radio and TV receiving equipment	5,919.3	5,925.9	6.6
Office and computing machines	2,915.8	4,101.5	1,185.7
Electrical machinery and equipment	713.4	1,922.1	1,208.6
Communications equipment	3,139.6	4,064.8	925.2
Professional and scientific instruments	2,660.0	3,270.6	610.6
Drugs	−450.0	94.7	544.7
Plastic materials and synthetics	2.3	472.1	469.8
Engines and turbines	1,027.0	1,155.0	128.0
Agricultural chemicals	−85.8	15.7	101.6

[1]Technology-intensive products are defined as those for which U.S. R&D expenditures exceed 2.36 percent of sales (U.S. Department Commerce DOC2 and Organisation for Economic Co-operation and Development definition). Data reflects information from 24 reporting countries on exports to, and imports from, each of nearly 200 partner countries.

SOURCE: National Science Foundation, DRI Special Tabulations of International Trade, 1987.

Figure 13

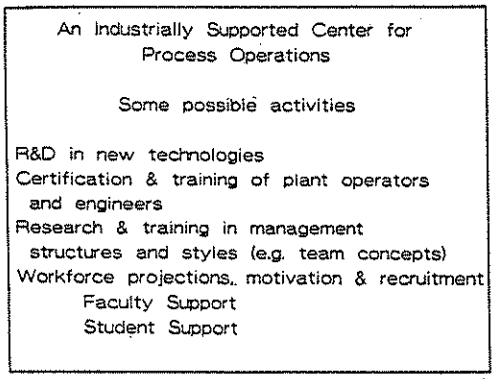


Figure 14

are in charge of processes worth hundreds of millions of dollars. A catastrophe in a plant can cost many lives – witness Bhopal – and can pollute the environment for centuries. I am quite certain that no one in this room would get in an airplane piloted by someone who did not have a license from the FAA. Yet, in many ways the skills required of a pilot are less than those required of a plant operator. There are, in fact, a great many similarities between a pilot and a process operator. The pilot runs a process that is computer controlled. Most of the time, like operators, he has rather little to do. Flying is a fairly boring activity . . . that is, until something goes wrong. But things are always going wrong. Instruments fail, weather is not totally predictable, and components like engines, on occasion, break down. All of the pilot's training is to deal with such situations. In fact, an instrument-rated pilot – all commercial pilots are instrument rated – spends a great deal of his time in flight simulators where he can practice what to do when a component or an instrument fails. Similarly, I envisage plant operators of the future spending a great deal of their time controlling dynamic simulations of their plant so that they can be ready when components fail or when the computer itself fails. Also, like pilots, there might be several levels of certification for operators with different levels of responsibility and training. A primary difference, currently, between operators and pilots is the amount of prestige that the pilot has relative to that of the plant operator. First and foremost, that prestige comes from the fact that we obviously put our lives in the hands of the pilot, whereas we do not so obviously put our economic well being in the hands of the operator. The pilot wears a fancy uniform and has FAA certification. Operators, more often than not, at least in this country, wear no particular uniform and are certified by no one. Finally, the substantial responsibility borne by the pilot is recognized by a substantial salary. While operators in this country are not poorly paid, their salaries are not commensurate with the responsibilities that they should have. Operators, in cooperation with plant engineers ought to have the responsibility for operating the plant in a safe and efficient manner. That means that the operator should understand what an efficient manner means and have input into how to achieve the most efficient operation. In the future, I expect that the plant operators will work with expert systems and will have an important role in building such expert systems. We will want the operator to willingly contribute his knowledge to the expert system so that the expertise of the system can grow over time and plant operations can become ever more efficient.

To accomplish the foregoing objectives, plant operators are going to have to be relatively well trained and a simple high school degree will not be adequate. This is especially true given the fact that an unfortunately large number of our high schools are graduating people whose educational level is well below that of their peers in foreign countries. Thus, an important role for an industrially supported Center for Process Operations should be upgrading the training of those people who are interested in becoming plant operators. The question as to who should pay for such training is one which I leave for the Center to decide. In my opinion, it would not be unreasonable to ask those who wish to become operators to pay at least part of the cost of their training. If people had to pay for additional training beyond high school for jobs that previously required high school education, perhaps there would be greater pressure on the high schools and society to do a better job at secondary education.

What I have just recommended is going to require some changes in management style. Thus, I am proposing that one of the activities of the proposed center for process operations be in research into management techniques as well as the training of process managers. I contend that there is a management problem when it becomes difficult to attract intelligent, motivated engineers into plant operations. I suspect that a large part of the problem is that plant engineers find that they can have relatively little impact on plant operations and, therefore, attempt to get out of a messy, smelly job as quickly as possible, especially since they do not feel particularly effective in their job in the first place. I am certain that we have all heard stories about how a plant that was on strike ran better when operated by engineers than by the plant operators. Why is that? I would contend that one of the reasons is that for a change the plant engineers are allowed to go in and make changes which they would otherwise be prohibited from doing. That is a management problem. The fact that there is an adversarial relationship between plant operators and plant engineers is a management problem. We have to strive for a situation where the engineers and the operators work together to achieve efficient safe operations. One move in that direction might be to certify engineers as plant operators so that

WE WILL HAVE FAILED IF:

We have not established and verified a new set of principles and practices

We do not continue to attract the best faculty and students to manufacturing-related positions

- We do not provide attractive manufacturing careers for the best and brightest
- Prestigious business and law schools continue to attract the best student talent
- Operations managers in CEO positions remain scarce
- We have not provided the impetus to stop the trend of U.S. import/export deficits because of noncompetitive manufacturing

September 1989

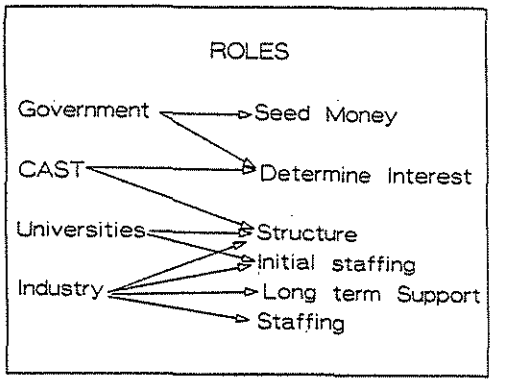


Figure 15

the engineer could with safety and with, of course, the approval of the operator, also operate the plants. I would like to suggest that we seriously investigate team concepts of operating chemical plants similar to those that are used in manufacturing plants in Japan. Since all the foregoing assumes that there exists a work force that is able and willing to undertake the training required to operate a plant efficiently and safely, the Center for Plant Operations might provide industry with work-force projections and do the advertising and recruitment necessary to interest young people in plant operations, either as operators or as engineers.

Finally, the proposed Center could provide support for faculty who are training engineers who might go into plant operations, and support for the students both at the graduate and undergraduate levels. Currently, the mode of support for faculty in the universities is on the basis of research proposals. This is a good method for distributing government research support. For industry, however, it is probably easier and more effective to select faculty who are already doing research and training students in areas of interest and provide them with direct support. One effect of such direct support would be to reduce the amount of time the faculty currently spend attempting to raise money. Many of our best students are not attracted to academic positions in engineering because, I believe, they see that faculty spend inordinate amounts of time trying to raise money. If they are going to have to raise money as faculty, they often feel that they may as well earn a lot more by raising money in industry. I believe that it is in industry's best interest to see to it that faculty positions become more attractive for our best graduates. Again, I would like to compare our current situation with that of our colleagues in manufacturing. Consider Figure 15, which I copied from a poster in a room dedicated to MIT's Leaders in Manufacturing Program. Notice statements 2 through 5. "We will have failed if we do not continue to attract the best faculty and students to manufacturing-related positions; We do not provide attractive manufacturing careers for the best and brightest; Prestigious business and law schools continue to attract the best student talent; Operation managers in CEO positions remain scarce." I contend that we can replace the words "manufacturing-related" with "process-related" and come up with exactly the same statements for the process industries.

How might we go about forming an industrially-supported Center for Plant Operations? I see different roles for different parts of our society. I believe that the federal government might reasonably be expected to provide seed money so that we could determine the level of interest of industry in forming such a Center. The individuals who would carry out the study might reasonably come from the Division that I am now addressing, that is, the CAST Division. CAST could determine how much interest there is out there and what would be a reasonable structure for such a Center. CAST might also make use of the talents of faculties in universities to help to determine possible structures and to provide initial staffing. Finally, industry has to pick up the long term staffing and the long term support for such a center.

Let me conclude by paraphrasing Hillel. If we in CAST should not take the lead in these issues, who should? If you agree CAST should lead, and we in CAST do not lead, what are we? And if not now, when?

A Paraphrase of Hillel

If we (CAST) shouldn't take the lead,
who should ?

If we (CAST) won't lead,
what are we ?

If not now,
when ?

Biographical Sketch of Coleman Brosilow, CAST Award winner

Born in Philadelphia, Coleman Brosilow received his B.S. from Drexel Institute of Technology and his M.S. and Ph.D. degrees in chemical engineering from the Polytechnic Institute of Brooklyn. For two years he worked as a control engineer at American Cyanamid Company. In 1963, he joined Case Western Reserve University, where he has moved through the ranks of Assistant and Associate Professor of Engineering, Chairman of the Chemical Engineering Department, Professor of Chemical and Systems Engineering, Associate Director and, currently, Director of the Control-of-Industrial-Systems Program. During 1971-1972, he took sabbatical leave at Technion – Israel Institute of Technology. He consults for a variety of companies and is active in community affairs. His teaching activities include chemical engineering analysis, digital simulation of dynamic systems, dynamics and control of heat and mass transfer systems, systems optimization, distributed systems, model-based control, process control, transport phenomena, separation processes and laboratory, and chemical reaction processes. He has co-taught a short course, Practical Techniques for Multivariable Process Control, with Manfred Morari every March since 1984.

Free Technical Software!

by Robert M. Spotnitz, Technical Software Distributors

The advancement of science stems in large part from a tradition of free dissemination of printed information. The large scientific literature, consisting of books and journals, has given rise to many great research libraries around the country and the world. Simply by spending a few hours in a great library, one can gain an appreciation for the scope of human achievement in any field of science. Work initiated by researchers a hundred years ago can be easily accessed and built upon by a modern investigator. Unfortunately, the tradition of free access to printed information has not generalized to other media such as computer software. This failure of technical people to disseminate software has caused duplication of effort, retarded scientific progress, and led to an absence of great software collections. This essay describes a system which, by providing the proper incentives for technical software writers, users, and publishers, would lead to free dissemination of technical software.

Free access to technical software is important to the advancement of science and technology because software is potentially the most powerful media known for the communication of scientific work. Imagine a world in which people could access software as easily as they can access books today. Experimentalists could sift through any number of theoretical models to find the best fit to their data. Theorists would have access to gigabytes of data to guide development of new models. Engineers could use the most sophisticated models to evaluate their designs. The general level of science and technology would be raised to dazzling new heights. Although many people appreciate the potential of software for communication, there is no consensus on how software should be disseminated.

In the absence of an accepted means for the dissemination of technical software, many researchers who have written computer programs to solve their specialized problems have then filed away that code, and it is never used again. This is a terrible waste, not only because the same code will undoubtedly be written by other researchers and because someone who really needs the code may not use it. The deeper tragedy is that there is no continuity in the development of the code because there is no opportunity for others to build on what has been done before. The amount of software that any one person can write is insignificant compared to the amount of software that individual could use. Writing software is a slow, laborious process. Only by building upon the work of others, will it be possible to construct software edifices capable of supporting the theories and accumulated data of science.

Science describes the world we live in. As our understanding of the world increases, we develop more detailed descriptions of it. The scientific literature records these descriptions. Software can complement or even occasionally supplant the role of technical books and articles. However, some important differences must be recognized between technical software and technical literature.

Technical software is intrinsically more valuable than technical literature. Software has a dual nature in that in can be interpreted by humans and machines. On the one hand software, when used to control a computer, is a mechanism for the production of goods and services (e.g., spreadsheet programs are like calculators, database programs are like file cabinets). On the other hand, software in the form of source code is a form of communication (e.g., spreadsheet programs describe an algebraic system, database programs describe a way to model data). The value of software qua mechanism is clear, and commercial development of this type of software has flourished. The value of software qua information is often difficult to assess, and development of this aspect of software has progressed slowly.
Technical software requires immediate access to past work. Unlike

technical articles and books which build on the reader's background, computer programs must be self sufficient. For example, a calculus book builds on the reader's knowledge of algebra. A computer program for calculus must incorporate a knowledge of algebra. Today's would-be author of a calculus program would have to first develop an algebra program. Clearly, software authors need access to existing codes in order to build programs with breadth and depth.

The objective of a software distribution system should be to promote the advancement of science and technology. The three key players in a software distribution system are authors, users, and publishers. For a distribution system to be successful, the needs of the key players must be met and the nature of technical software must be recognized.

Technical Software Authors

Graduate students and university faculty write most technical software today, and they do so in order to model some aspect of nature that they are studying. Qua information, the software has value to other scientists. Qua mechanism, the software could have commercial value. To avoid losing the potential commercial value of their work, the tendency of university faculty today is to publish only a description of the theory behind their software.

University faculty and students normally have neither the resources nor interest in maintaining their codes and providing technical support to users. Most likely, the code contains few comments and there is no "user-friendly interface" to speak of; the code is intelligible only to other experts. The program may use subroutines belonging to the computer system on which the code was developed, so the author is not free to distribute a working version. For these reasons the code "as is" has limited commercial value. However the code does work and probably took weeks to write and debug. The code is of definite value to other experts. The author might be willing to give the code to a colleague, but does not feel comfortable about publishing the source code. The author does feel the code has some value (after all, he took the time to write it!) and so feels uncomfortable about putting the code in the public domain. The author may be concerned that unqualified users may misapply the program and then blame the author for reaching erroneous results. The author may feel that the code provides a competitive edge in the author's research field.

Given this situation, one can expect that the following conditions must be met in order to induce university faculty and graduate students to make their code publicly available:

1. All code is supplied as is with no warranties or guarantees of any kind. Users should view the code as they would an unrefereed (or refereed?) technical publication.
2. Authors must be acknowledged whenever the code, or any portion, including modified versions, is used.
3. Authors should financially benefit from any commercial use of the code or portions of the code, including modified versions.

Technical software authors should realize that they will be the first to benefit from the free exchange of source code. First, they will obtain a cornerstone position in subsequent development of their software. Secondly, because of their understanding of software, authors will be able to quickly assimilate and use the work of others.

Authors should expect only nominal financial compensation from the distribution of their work "as is" to those in the technical community who would use the code for scientific purposes. However, authors should expect to receive a fair portion of any profits from commercial development of their work. By retaining copyright to their work, authors are legally protected from others copying their code. Under the law, a software copyright protects not only the exact literal expression but also the detailed design of the program. By publishing their source codes, authors raise awareness in the technical community of their work and put commercial developers on notice that code has been developed.

Technical software authors should list their published programs as they would their technical articles. Authors of technical programs should receive the same prestige given to authors of technical papers.

Users

Users of technical software include industrial and government technical people as well as faculty and students. The user's first problem is to identify software applicable to his problem. A title and abstract will help, but the user will need access to the source code in order to evaluate it. A user may have to scan hundreds of programs to find several of interest. A single user might use a dozen or more programs for a single project. Clearly, users require access to software collections.

Users should be allowed to evaluate software at little or no cost. A user may hope to save time by using existing code, but risks making an error if the code is not thoroughly checked (and reviewing code written by someone else is a difficult and thankless job). If the user plans to build on the existing code, he may find that the program cannot be expanded and must be completely rewritten. Students may simply want to study the code to learn a strategy for solving a problem. In any case, using technical

software requires an investment of time by the user that may not pay off.

Users who build upon the software they use should be granted all the rights of authors for their work in addition to the original authors. Many users will add to the software they use by generalizing the program, adding new options, combining the code with other programs, etc. Such efforts should be recognized and rewarded, for this is the way to build powerful software.

To summarize, the following needs of users can be enumerated:

1. Users require access to software collections. The software collection should be categorized to allow easy access.
2. Users must be allowed to evaluate the software at little or no cost.
3. Users must be allowed to modify the software and thereby acquire rights as authors.

Publishers

The role of publishers is to acquire and disseminate software. Publishers must persuade authors to submit and users to buy software. Publishers should be limited only by their own imagination in the tactics they use to accomplish these objectives.

Financial gain is the major incentive for software publishers, who need to realize an income from software sales in order to meet costs. In addition, publishers deserve a reward for a job well done. However, the desire of publishers to make a profit must be reconciled with the need of users for free or low-cost access to software. Software authors should grant only nonexclusive licenses to publishers. This will create competition among publishers and help to lower prices.

Publishers should also have the right to distribute modified versions of the software they are licensed to distribute. This will help publishers promote the development of large software projects, and free authors from business negotiations with everyone who would modify their work.

The rights and responsibilities of publishers include the following:

1. Publishers should be allowed to profit from their work and be responsible for compensating authors.
2. Publishers should only receive nonexclusive licenses to distribute software.
3. Publishers should be allowed to distribute modified versions of the software to which they have distribution rights.

Publishers should be independent from professional societies and governmental organizations. These agencies have their own agendas and would be tempted to use software distribution as a means to their own ends rather than as an end in itself. Also, these agencies tend to acquire monopolistic positions and so deny users the benefits of competition.

A Software Distribution System

The distribution of technical software is similar to that of technical publications except that authors are expected to retain copyrights to their work. Authors grant licenses to publishers to distribute code and modified versions of their code. Authors may be inclined to grant a number of distribution licenses to insure broad dissemination of their work. Libraries are not licensed to distribute software, but are permitted to allow users to the same access to software that they allow to publications. Users are not allowed to distribute code.

Users who modify published code can expect to benefit from distribution of that modified code, as can the author of the original code. The publisher is expected to share profits with both. The author of the original code has no rights to the modified code other than to share in financial returns. Only publishers who have a license to the original work can accept a license to distribute the derivative work. Consider, as an example, a hypothetical publisher P who agrees to share 20% of the profits from software distribution with authors. Now if author A2 modifies the code of A1 to create code C2 which is distributed by P, then authors A1 and A2 would each receive 10% of the profit from C2 sales. Author A1 would continue to receive the full 20% of the profits from sales of his original work.

Publishers can, of course, refuse to distribute an author's work. A publisher's reputation will be determined by the work it distributes. This will prevent proliferation of trivial modifications. Conversely, authors can refuse to allow their work to be distributed by a publisher.

Authors should demand a percentage of any profits realized from distributing their work, including modified versions. This will limit the ability of publishers to develop commercial versions of the software they receive. Authors are not precluded from selling their work to commercial software developers. Indeed, the availability of the author's source code will facilitate commercial development. Developers will realize the benefits from starting with existing code in developing products. Unscrupulous developers who pirate code will be easier to identify because there will be heightened awareness in the technical community about what code is available.

The software distribution system proposed here will complement existing forms of software. Presently,

there are three major forms of software: public domain, shareware, and commercial. None of these types meets the needs for technical software distribution.

Public domain (PD) software carries no copyright protection, and so is freely available for anyone for any purpose. There are many excellent PD programs available and the PD software is often available as source code. PD software authors typically do not provide technical support to users. Distribution of PD software is done through local software clubs as well as through national distributors. Typically a nominal fee ($2 to $9 per disk) is charged. Many so-called "bulletin boards" list PD software that can be downloaded for no charge.

Shareware can be freely distributed, but the author retains all other copyrights. Users are expected to register with and make a payment to the author. Shareware programs are often excellent programs, though they may not be as polished as their commercial counterparts. Shareware almost always is object code; the source code is not usually available. Authors typically offer incentives for users to register such as providing support to registered users, printed manuals, and notification of updates. Shareware is distributed just as PD software, through clubs and commercial distributors.

Commercial software must be purchased before being used. The publisher usually retains full copyright ownership. Users cannot modify and redistribute the code. Commercial software is supported by the publisher. Users expect commercial software to be both free of significant bugs and user-friendly. Commercial software is distributed through computer stores, bookstores, technical societies, and direct mail. Commercial software is usually object code, though source code can be obtained, in some instances, at an additional charge.

PD software would be an ideal form for technical software distribution except that it provides no financial compensation for authors. Neither shareware nor commercial software provide a mechanism for building on existing code. Shareware places demands on the author to provide technical support to users. Commercial software does not allow users to freely access software collections. The software distribution system proposed here tailors the best elements from the existing types of software to fit the needs of the technical community.

Conclusions And Summary

The first step toward realizing the software distribution system described here is to build a consensus in the scientific/technical community that free dissemination of technical software is desirable and achievable. This will give credibility to publishers in their efforts to acquire software collections.

Officers of professional societies can support this effort by educating their memberships. Societies could subsidize initial efforts of publishers by providing reduced rate advertising. Editors of technical journals should encourage authors of technical papers to make source codes available and then inform readers when source codes were available.

Software promises to be the future language of science. Now is the time to begin to build a tradition of free dissemination of software in the technical community. Authors should retain copyrights to their work but allow publishers to have licenses to distribute both the code "as is" and modified versions. In this way authors will receive some financial compensation, recognition in the scientific/technical community, contribute to the advancement of science and technology, and enhance the opportunity for commercial development of their work. Users will enjoy free access to software collections at libraries or could purchase private copies from publishers. Scientists will be able to build upon the software they use and thus create powerful programs capable of capturing the scientific perception of reality.

University faculty and students should lead the way to this new era of scientific communication by making their code available for publication.

If you are interested in distributing your source code or getting on a mailing list for technical software, contact Robert Spotnitz, Technical Software, 1016 Hartmont Road, Baltimore, MD 21228.

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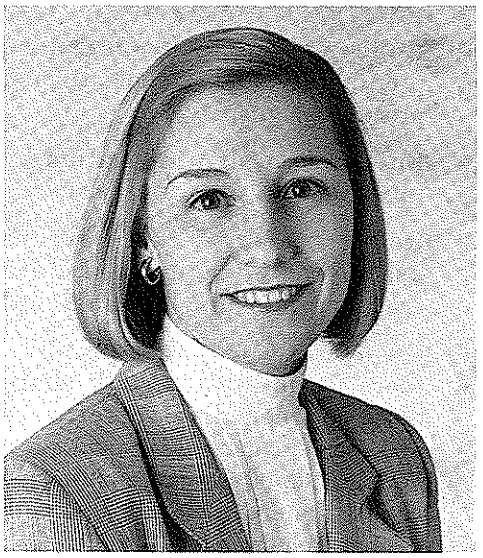
Communications

Agreements with Consultants With Respect to Copyright "Work for Hire" Doctrine

by Carol Nemetz, The BOC Group



The Supreme Court has changed the "work for hire" doctrine as many courts had interpreted it prior to the decision of Community for Creative Non-Violence ("CCNV") v. Reid, No. 88-293 (5 June 1989).

The decision enables authors of copyrightable works to more easily assert ownership rights, including modification and sale to others, and may limit the company which initiated and financed the work to merely the use of a copy. These works include computer software, manuals, technical reports, videotapes and other writings produced by a consultant for the company. This case represents the definitive position on whether a person other than a formal salaried employee of the company may be considered to have impliedly transferred his copyright ownership to the company which paid a fee to that person. The Supreme Court concluded that unless under general common law agency principles the work was prepared by an employee, the copyrighted work was not a "work for hire" and the ownership of the copyright remained with its creator. In the Reid case, (1) Mr. Reid was an independent contractor engaged in a skilled occupation; (2) he supplied his own tools; (3) he worked without daily supervision from the CCNV; (4) he was retained for a relatively short period of time to do the sculpture; (5) he had absolute freedom to decide when and how long to work in order to meet his deadline, and (6) he had total discretion in the hiring and paying of any assistants he may have needed. In addition, (7) the CCNV had no right to assign additional projects to him, (8) they paid him in a manner which independent contractors were often compensated, (9) the CCNV did not engage regularly in the business of creating sculpture or (10) in fact any business, and (11) the CCNV did not pay any payroll or social security taxes, provide any employee benefits, or contribute to any unemployment insurance or workers' compensation funds for Mr. Reid or his assistants. With the above factors in mind, common law agency principles required that Mr. Reid be found not to be an employee on a work for hire basis. It was irrelevant to the Court that CCNV had the right to control the usage of the product, i.e., the sculpture in question.

The Court remanded the case for determination of whether the sculpture involved, which was copyrightable, was a joint work of Mr. Reid, the sculptor, and the CCNV, which gave certain suggestions for the preparation of the sculpture. The significance of this case cannot be understated. As the Court indicated in footnote 4 at page 6, approximately 40% of all copyright registrations are listed as works for hire according to a Copyright Office study as of 1955 (no more recent statistics available). Many agreements are with consultants, independent contractors, and other individuals who are not considered to be traditional formal salaried employees under the conventional master/servant relationship. These agreements must now be seriously questioned as to whether there was a transfer of the copyrights to the company for which such consultant, etc. did their work. It is suggested that future (and, perhaps, with respect to revisiting some past copyrights of significant value) agreements be tailored to indicate that the creator of the work, for the stated consideration given, specifically and expressly relinquishes all copyright ownership to such work, as well as any derivative or modification rights if such work is changed but maintains some of the originality of the first work, when they are fixed in expression. All company employees dealing with anyone who is not a formal salaried employee of the company should be sensitive to this issue, and consult with an attorney as appropriate. Further, any standard agreement forms should be revised if necessary. As stated above, previously executed agreements may also be reviewed if the subject matter is sufficiently important to the company. Generally, the intent of the company's agreements are for full ownership of the work, including future modifications, to vest immediately and exclusively in the company as author, and for no residual rights to remain with the consultant. The possibility of joint copyright ownership by the company and the consultant, to be decided by further court proceedings in the CCNV v. Reid case, is not a suitable resolution when the intent is to prevent the consultant from using or selling copies of the work, especially to competitors.

About the Author

Carol A. Nemetz, Esq. of Madison, N.J. is Patent Counsel for The BOC Group, Inc. [100 Mountain Avenue, Murray Hill, New Jersey 07974, (201) 665-2400]. She was formerly associated with the law firm of Darby and Darby, PC in New

York City, practicing in the area of patent and trademark litigation. Ms. Nemetz spent six years as a computer control engineer with Exxon and Gulf. Ms. Nemetz holds both a B.S. and M.S. degree in Chemical Engineering from Carnegie-Mellon University and a J.D. in Law from Seton Hall University School of Law. She is admitted to the Bars of New Jersey, Pennsylvania, New York, and the District of Columbia, and is registered to practice before the U.S. Patent and Trademark Office.

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News and Information

A Proposal for a Process Data Exchange Institute (PDXI)

by John Baldwin

At the November 6, 1989 CAST Division Executive Committee meeting, John Baldwin discussed a proposal for a Process Data Exchange Institute (PDXI). His summary of the proposal is as follows:

INTERIM AD Hoc Committee

John Baldwin, M. W. Kellogg
Herbert Britt, Aspen Technology
Henry Chien, Monsanto
McMaster Clarke, Olin
Tom Teague, Exxon Production Research
Peter Winter, Prosys Technology

The Problem

There is no generally accepted format to electronically exchange process data between computing systems or organizations resulting in:

- Ad hoc interface programming,
- Manual data transcription (time consuming and error prone),
- Increased costs for joint-effort design activities,
- Inhibition of design innovation because of poor data flows.

Proposal

Initiate an organizing committee with the objective of forming an AIChE Design Institute named Process Data eXchange Institute (PDXI) to hopefully yield:

- Wide industrial and software vendor support,
- AIChE sponsorship of joint industry-funded effort through PDXI,
- Independent (non-vested) pragmatic approach, and
- Useful results in 18 months.

PDXI Objective Statement

- The objective is to define open approaches to exchange process data between computer applications, databases, and organizations within the process engineering discipline, and to exchange data with other disciplines.
- The term, process data, refers to stream and equipment data and other data normally used to support the process engineering activity.
- The initial emphasis is to define a generic data description and format, and to prepare a set of functional specifications of utility software to support the format.
- The long-term objective is to promote effective data management and exchange via open standards.

Organizations That Benefit

Manufacturing companies, operating companies, engineering contractors, research organizations, and software and database companies.

Benefits

- Easier integration between process engineering and downstream engineering functions and plant engineering,
- Easier integration between joint venture partners and clients/contractors,
- Reduce costs (increase profitability) and calendar time of process designs,
- Encourage design innovation by improved data flow,
- Reduce effort and errors associated with manual data transcription and dimensional unit conversions,
- More flexibility to easily share data between diverse software (e.g., specific/generalized software, verification of results, customized report generation systems, and data search programs),
- Easier-to-apply software in non-traditional applications.

Alternative Approaches

Do nothing, de-facto standard, Europe, or standards organizations.

PDXI Implementation Schedule

6 Nov 89	CAST Executive Committee presentation
8 Nov 89	General meeting
9 Nov 89	Initial organizing
Nov-Dec 89	Notify all AIChE divisions
Nov-Jan 90	Confirmation of interes and potential funding
Jan 90	Organizing Committe meeting to finaliz proposal to AIChE Council
Mar 90	Presentation to AIChI Council
1990	Further organizing funding, confirmation etc.

Fall 90 First PDXI meeting

What Do I Want From You?

- CAST blessing of the PDXI Organizing Committee.
- Agreement that we should proceed toward a proposal with the AIChE Council subject to sufficient acceptance by funding sources.
- CAST input to proposal to AIChE Council.

Process Data Exchange Questionnaire

_____ I agree that Process Data Exchange is important and request that I be included in future mailings.

_____ I wish to participate in the interim organizing committee.

_____ I will solicit my company to participate. Please send informationregarding the potential participation in this activity by my company to:

_____ Me

_____ Another:

Comments:

Your Name:

Company:

Address:

City,State,Zip:

Phone:

Please mail to: John T. Baldwin, Engineering Computer Systems Department, The M. W. Kellogg Company, 3 Greenway Plaza, Houston TX 77046-0395. Thank you.

New Materials for Understanding the Application of Expert Systems to Process Engineering Problems

by James F. Davis, Ohio State University and George Stephanopoulos, MIT

The re-emergence of Artificial Intelligence in the early part of this decade has now significantly challenged the conventional modes of engineering work and education in chemical engineering. In just a few years, chemical engineering has seen the role of AI make the transition from a research topic only into a viable technology in industry and take on a rather pervasive nature as an important problem-solving tool for many types of applications. A considerable amount of early hype has settled into a realistic perspective for a useful technology. Hardware platforms have changed dramatically towards general purpose workstations and software has evolved into packages with sophisticated graphics interfaces, a variety of knowledge representations and inferencing strategies and flexible features.

In responding to these very rapid changes, the AI in Process Engineering Task Force of CACHE has spearheaded several activities which have now produced three categories of products which address the application of AI in process engineering. Specifically, the products offer a practical and working understanding of the AI issues involved.

A Series Of Monographs On AI In Chemical Engineering

Two years ago the task force commissioned a series of monographs on AI in chemical engineering as a mechanism for disseminating detailed information. These monographs have been and are being written for use as main or supplementary material in advanced undergraduate and graduate courses addressing the application of expert systems or as a working introduction to AI by practicing engineers. Three monographs in the series are (or very shortly will be) available. The purpose of these first three monographs is to provide detailed discussions on the principles, ideas, techniques, methodologies and issues of AI as they apply to chemical engineering. Later monographs will address approaches to specific problems of direct interest to chemical engineers such as fault diagnosis, design, etc. Curently available are:

Volume I, entitled, "Knowledge-Based Systems in Process Engineering: An Overview," is authored by George Stephanopoulos of MIT. This volume serves as an introduction to the monograph series and provides a broad perspective on AI. Specifically, this volume addresses the scope, history and market of AI and defines the need and role of knowledge-based systems in chemical engineering. Particular attention is paid to describing the general issues surrounding software and hardware environments.

Volume II, entitled, "Rule-Based Expert Systems in Chemical Engineering," is authored by James F. Davis and Murthy S. Gandikota of Ohio State University. This monograph focuses specifically on the implementation of knowledge-based systems in rule-based languages. The emphasis is not on the mechanics of rule-based programming environments, but on the issues which

impact the implementation and performance of a system. While the focus is on rule-based implementations, many of the issues discussed cut across all general purpose implementation language. Using specific examples, the monograph covers these issues in detail. As a stand-alone chapter, several of the most popular methods for various kinds of uncertainty handling are discussed and compared.

Volume III, entitled, "Knowledge Representation," is authored by Lyle Ungar of the University of Pennsylvania and V. Venkatasubramanian of Purdue University. The content of this monograph is directed at two distinct aspects of knowledge representation. In the first part of the monograph, the problem-independent issues and features of a variety of knowledge representations are presented. Included are discussions on semantic networks, frames, scripts and object-oriented programming. The second part addresses the subject of qualitative physics applied in chemical engineering. The issues of representing structure and behavior are discussed in detail. Examples demonstrating two philosophies are used to illustrate advantages and limitations.

Case Studies

To provide the chemical engineering community with detailed examples of the use of AI methodologies to solve chemical engineering problems, a series of three case studies have been published. The three case studies are of sufficient scope to bring out implementation issues, but are small enough for easy understanding. As rule-based implementations, they are complementary to Monograph II described above. These case studies were drawn from projects in an expert system course taught by V. Venkatasubramanian who is presently with Purdue University. Each of the case studies includes:

1. Methods for representing the knowledge,
2. Details on the search methodologies used;
3. Lists of rules and their structural organization,
4. Details on the computer-implemenation,
5. Alternative scenarios to be explored.

Authored by V. Venkatasubramanian and edited by George Stephanopoulos, the three case studies are as follows:

1. CATDEX: An expert system for troubleshooting a fluidized catalytic cracking unit,
2. PASS: A Pump selection expert system,
3. CAPS: An Expert System for Plastics Selection.

Special Issue Of Computers And Chemical Engineering

An initial objective of the task force was to generate a compilation of current AI research projects in chemical engineering. The purpose of this compilation was to provide a comprehensive and current view of a developing but as yet immature field. Although much has changed even since the publication of the Sept/Oct 1988 issue, the collection of articles still offers a broad perspective on the challenges facing the application of AI in chemical engineering.

The guest editors, George Stephanopoulos of MIT and Michael Mavrovouniotis of the University of Maryland, collected 15 papers by a variety of people working in the field. As a collection, the papers were and still are representative of the breadth of current research and development in progress. Covered in the papers are the following subjects:

1. Alternative schemes for modeling the behavior of physical systems,
2. Design of databases for engineering activities,
3. Methodologies for engineering design,
4. Diagnostic strategies,
5. Planning and scheduling of process operations.

To obtain this special issue, the reference is: "Artificial Intelligence in Chemical Engineering – Research and Development," Computers and Chemical Engineering, vol. **12**, 9.10, September/October (1988)

The monographs and case studies are available through CACHE: CACHE Corporation Attn. Janet Sandy P.O. Box 7939 Austin, Texas 78713-4933 (512) 471-4933.

PC-Based Flowsheet Simulation Software Packages

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	CHEMCAD	SIMSCI*	CHEMSHARE	HYSIM "C"
Required RAM	640K	640K or 4Mb	2 Mb	640K or 3 Mb
Required disk storage	3 Mb	12.5 or 20 Mb	15 Mb	4 Mb
Required processor	8088/80286 /80386	80286/80386	80386	8088/80286 /80386
Required co-processor	8087/80287 /80387	80287/80387	80387	8087/80287 /80387
Operating system	DOS	DOS or UNIX	DOS	DOS
Recycle convergence enhancements?	Y	Y	Y	Y
Graphical input?	Y	Y	N	Y
Interactive input?	Y	Y	Y	Y
Help screens?	Y	Y	Y	Y
Process flow diagram generation?	Y	Y	Y	Y
Number of components (physical	Y	Y	Y	Y
property library)	600	1200	1000	850
Group contribution K values?	keydisk	hardware device	hardware device	hardware device
Unit operations				
Rigorous fractionation?	Y	Y	Y	Y
Pumps, compressors, mixers?	Y	Y	Y	Y
Heat exchanger?	Y	Y	Y	Y
Reactors?	Y	Y	Y	Y

*NOTE: Two versions, PROCESS and PRO2.

Company contacts:

George Kasse, SIMSCI, 2950 North Loop West, Suite 830, Houston, TX 77092, (800) 231-2754.

Dr. Bill Svrcek, Hyprotech, 119 14th Street NW, #400, Calgary, Alberta T2N1Z6, (800) 661-8696.

Marty Bosch, ChemShare, P.O. Box 1885, Houston, TX 77251, (713) 627-8945.

Nathan Massey, Coade/Chemstations, 10375 Richmond Avenue, Suite 1225, Houston, TX 77042, (713) 973-9060

Books, Reports, Articles, and So Forth

Controller Tuning And Control Loop Performance

by David W. St. Clair

In communications with Sheldon Isakoff, Bruce Finlayson and Peter Rony, a recently retired colleague, David St. Clair, who now operates his own consulting company, suggested that CAST Division members may be interested in learning about Controller Tuning and Control Loop Performance: A Primer. We bring David and his Primer to your attention as a human interest story. The author has had 40 years of experience in the chemical process industries, 8 years with Eastman Kodak and 32 years with Du Pont. He took, as he understands, the first college course offered (at MIT in 1946) in the theory of feedback control, a chance event that started his career in the field of instrumentation and controls. One can argue that Mr. St. Clair has applied the scientific method to understanding feedback control longer than anybody in the CPI. He has explained concepts of process controls to non-specialists for most of his career, and now seeks to continue this activity as a private consultant. His primer was issued originally as an internal report at Du Pont to help engineers and technicians who had no special training in control. The document broke all records for the number of requested copies (over 1200) when issued. When he retired, Du Pont granted him permission to offer it to the public. The contents of the Primer can be summarized as follows:

This publication describes how control loop performance is related to controller tuning and to lags in the control loop. The explanation uses time-response concepts, which are relatively easy for the non-specialist to visualize. While occasional reference is made to frequency response analysis, it is not necessary to understand such a technique in order to appreciate the essence of what determines performance in a closed-loop system. After the basic concepts are covered, there are sections to extend basic understanding through coverage of common situations. The following topics are discussed: Tuning Rules, Tuning Rules Discussion, Insight Into Expected Loop Performance, Factors Affecting the Natural Period, Lags, Gains, Numerical Examples of Lags, Cascade Control, Interactions, Derivative Action, Nonlinearities, Digital Control Algorithms, Sampling Frequency and Computer Speed, Load Changes/Upsets/Disturbances, Damping Noisy Measurements, and Improved Control Uniformity. With a money-back guarantee, 1 to 4 copies can be obtained at $15 each from Straight-Line Control Company, 3 Bridlebrook Lane, Newark, DE 19711.

Chemical Process Structures And Information Flows

by Richard S. H. Mah

What is process structure? How should it be represented? How can the knowledge of process structures and information flows be utilized in the design and operation of chemical processes? These are some of the important questions addressed in this book. Beginning with illustrative examples and a review of tools, the reader is guided through three important areas of application. Chapter 3, 4, and 5 deal with the design of continuously operated systems. Chapters 6 and 7 treat batch plant scheduling and design. The last two chapters provide an introduction to the monitoring and treatment of process data. Chemical Process Structures and Information Flows presents for the first time a unified viewpoint of material hitherto scattered in the process literature. It is written in a form suitable for use either in the class or for self study, and it is richly illustrated with more than 150 figures. Each chapter contains examples and numerous problems for reinforcement and further explorations. The state of the art is critically reviewed. ISBN 409-907175-X. At a pre-publication prices of $75, the book can be ordered from Butterworths, 80 Montvale Avenue, Stoneham, MA 02180. Credit-card orders may be phoned in to 1-800-3662665.

Computational Methods for Process Simulation

by W. Fred Ramirez

Computational Methods for Process Simulation develops the computational methods needed for the simulation of real processes found in the chemical, petroleum, and biochemical industries. It also stresses the engineering fundamentals used in developing process models. This book considers both steady state and dynamic systems for spatially lumped and spatially distributed problems. It develops analytical and numerical computational techniques for algebraic, ordinary differential, and partial differential equations. It also stresses the use of the FORTRAN numerical routines in the IMSL library as a means of efficient and robust computer solution. The advantage to this computer implementation approach is that it uses subroutines universally available on most mainframe and IBM-compatible PCs. ISBN 409-90232-4. The book can be obtained for a price of $52.95 from the book can be ordered from Butterworths, 80 Montvale Avenue, Stoneham, MA 02180. For credit-card orders, call 1-800-3662665.

Report on The First International Conference on Computers for The Handicapped, Vienna, Austria (August 21-23, 1989)

by Michael Tayyabkhan

Approximately 250 attendees, representing all West European countries, attended the Conference organized by the Computer Society of Austria. Some of the more important impressions I gained include the following.

What Is Happening in Europe?

The European Economic Community is funding a master project, called "Concerted Effort," that is aimed at gathering and distributing scientific and research information relating to the handicapped. Almost all West European countries are participating. The organization does not fund research directly, but is rather concerned with the development of scientific knowledge, aids and pilot projects for rehabilitation services. Information is distributed through the Royal Institute in London. The development effort is managed by Professor P. L. Emiliani, Florence, Italy. HANDYNET is a computerized database of technical equipment for the handicapped. It is accessible via a modem throughout Europe. Because of the variety of languages in Europe, they are worse off than the United States in the following ways: (a) Braille is different for each language, specially for level 2 and contractions. Automatic translation into Braille for German is a special problem. (b) A separate speed synthesizer computer program has to be developed for each separate language. More languages exist than one would suspect. (c) The total market of potential users is small in each separate language for commercial development of both speech synthesizers or automatic Braille translators.

The governments of West European countries believe more strongly in providing services to the handicapped than does the American government. The attitude is that the handicapped have as much right to economic security, health, and quality of life as the rest of the population. Sweden provides the most extensive services, followed by England, Germany, and Belgium.

Japan! Japan!

Four speakers from Japan were involved with highly sophisticated and unique technology and special "gadgeteering" hardware. One handheld unit spoke the color of the object that it was touching. A special pad registered the writing strokes and converted them into sound, where the pitch and intensity of the note changed as one moved the writing pen. A special probe, which is surgically implanted past the middle ear into the inner ear (where it sends direct electrical signals) picks up sound. Personal computers are used for interpreting information associated with the first two inventions, and are used to simulate the third system. The final presentation was delivered by a Japanese woman, the first whom I have encountered in more than thirty year technical career. She discussed the automatic translation of Japanese into Braille.

Pilot Rehabilitation and Education Programs for Adults

Work in Ireland, at the Catholic University in Belgium, and Karlsruhe University in Germany was reported. The University of California at Los Angeles (UCLA) has 30,000 students, of which 1000 are handicapped to some degree. The University provides special services that cater to these individuals; a director and a staff of almost ten full-time employees are employed.

Braille and Computers

Substantial work is being conducted on the automatic translation of entered, scanned, or electronically transferred text into Braille. Dynamic Braille is the term for new technology wherein a stop of material along the length of a keyboard has retractable pins that form a line of Braille characters that the blind user can sense. The pins retract and a new set of Braille characters can be formed. For the blind, this strip is a substitute for a CRT screen. A Braille mouse has one or two Braille cells on a mouse; displayed dynamically is the character to which a mouse is pointing.

Speech Therapy

IBM Research in Paris has produced an attachment and software for the PC that shows the profile, of the sound a person makes, in the form of a graph that depends on the pitches and volumes associated with the sound. This device can be used to practice speech, and is also useful in voice training for singers.

Strange Ways to Use Keyboards

Voice-activated instructions to computers is old hat, at least in the handicapped community. Desktop computers may become a practical way for the blind to carry electronic notebooks. Diverse methods of simulating a keyboard were presented.

Equipment for the Visually Impaired

A company from New Zealand demonstrated a $2200 V-Tek alternative with a handheld scanner that is light in weight and smaller than existing models. It is not the complete portable that is desired, but it is a step in the right direction. A Hungarian inventor, working with his blind wife, designed from scratch a special-purpose word-processing

computer. A special feature – automatic voice feedback whenever a key is pressed – makes the system more responsive and less expensive.

Another gadget from IBM (in the United Kingdom) was impressive. A special palate was prepared by dental techniques and fit perfectly to the inside of an individual's mouth. The palate had sensitive electrodes, and was wired to a personal computer. The individual made a sound, and the palate's image on the PC screen showed exactly where the speaker's tongue touched. In such a manner, one can identify visually the four different "t" sounds that exist in Indian languages for which there is only one equivalent in English. The electronic palate also responds to air as it rushes out of the mouth; one can observe visually the air flow as letters such as "s", "sh", or "sch" are pronounced. One could also observe the different between "s" and "l", the problem associated with "flied lice." These techniques should become very important for the deaf- and speech-impaired.

For the Deaf and Blind

Their world is extraordinarily lonely. They communicate only through touch. Smith-Ketterwell in San Francisco is developing a robotic hand that has fingers that form letters. The deaf-and-blind person can touch the robotic hand and read the letters as they are formed. The robotic hand is connected to a keyboard. The "other" person who wants to communicate can press the alphabetic key and the hand will form the letter. The robotic hand was developed as a term project by three or four Stanford students in a single semester.

Miscellaneous Quotables and Tidbits

- Some Americans know three languages – English, BASIC, and PASCAL.
- Videophone is the solution for the future for the deaf. They can sign on the telephone.
- At all intersections of Market Street in San Francisco, the blind have special radios that receive broadcasts of street locations.
- Steve Jobs' NEXT computer system may enter into the handicapped market in 1990.
- Educating a handicapped person is an art form.
- The acceptable phrase for "severe mental handicap" is "profound learning difficulty."

Minnesota Supercomputer Center, Inc.

by Suresh Chandler

Most researchers and MIS staff members have access to advanced computing technology (e.g., departmental mini-supercomputers and/or advanced workstations) to help solve computationally intensive problems. Using these systems can be cost effective for solving small- to medium- problems, but the Minnesota Supercomputer Center (MSC) has successfully demonstrated to many organizations that there is a class of problems that can be solved more efficiently using only Cray supercomputers. Many times the Cray systems, like the CRAY-2 and CRAY X-MP installed at MSP, are the only kind of systems that can solve the most challenging problems.

MSC provides its customers with the tools they need to maintain leadership positions in research and academia. By providing its customers with supercomputing consulting services – and access to the world's most sophisticated supercomputing systems – MSC has become the leading-edge supplier of cost-effective supercomputing services in the world.

MSC's staff has observed that, typically, most scientists and engineers limit the size of their models to ensure that their departmental computer systems can solve problems and yield results in a timely manner. As a consequence, many of these researchers become frustrated with the inability of these systems to model more sophisticated problems because of insufficient memory I/O, slow clock speed, and other computer limitations. These researchers cannot afford to wait for the results produced by the departmental systems in days, weeks, or months. However, by using supercomputing technology – such as the CRAY-2 and the CRAY X-MP – as a supplement to the existing systems available to these individuals, the computational models that would have consumed substantial periods of time may take only seconds, minutes, or hours. MSC's CRAY-2 (4 central processors, over 4 gigabytes of main memory) and CRAY X-MP (4 central processors, 128 megabytes of main memory with 1 gigabyte of SSD) can be accessed in interactive or batch mode. The access to MSC's supercomputers can be accomplished using a variety of simple communication channels. These start from 1200-baud asynchronous dial-up modems to dedicated T1 lines, as well as communication networks such as NSFNET, ARPANET, INTERNET, etc. Additionally, we have installed a number of third-party software applications on our Cray systems. this makes it very easy for your researchers to solve their problems and perform research using the applications already installed on the Crays. These Cray systems run C, and Pascal (among other software) under the UNIX operating system. Many scientists and engineers find it convenient to run their own proprietary programs under these compilers and operating systems. MSC has been supplying supercomputing services for many years, and our record shows that we have constantly maintained state-of-the-art

supercomputers at our facility. No other vendor of supercomputing services can make this claim.

If you have any questions, please contact me at (301) 816-9180. Minnesota Supercomputer Center, Inc., 12300 Twinbrook Parkway - Suite 600, Rockville, MD 20852. Fax (301) 881-6898.

Visualization In Scientific Computing

Computer Magazine, August 1989

Articles in this special issue published by IEEE Computer Society include: Guest Editor's Introduction; Visualization: Expanding Scientific and Engineering Research Opportunities; Representation and Display of Vector Field Topology in Fluid Flow Data Sets; Acquisition and Representation of 2D and 3D Data from Turbulent Flows and Flames; Interactive Visualization of 3D Medical Data; Visualizing Large Data Sets in the Earth Sciences; The Role of Visualization in the Simulation of Quantum Electronic Transport in Semiconductors; and Scientific Visualization at Research Laboratories.

The Xerox Star: A Retrospective

Computer Magazine, September 1989, pages 11-29

In view of the popularity of the Macintosh and Windows 3.0 user interfaces, CAST division members might be interested in reading about the history of the Xerox Star. The editor remembers being at the electronics show (in Spring 1981) when the Star was first introduced. The crowd around the Xerox booth was so large that it was difficult to view the product.

User's Guide To Electronic Mail

by the American Astronomical Society

Contained in the American Astronomical Society 1989 Electronic Mail Directory is an 18-page "User's Guide to Electronic Mail," which summarizes the characteristics of ARPA Internet, BITNET/EARN, SPAN, UUCP/USENET, GTE Telenet, PSI/DETE International Data Communications, ASCNET, CDNNET, CSNET, HEPNET, INFNET/ASTRONET, JANET, SolarMail, and Starlink. A copy of the Directory is available to AAS members for $10. Perhaps members of the CAST Division could also purchase copies for the same price. Contact the American Astronomical Society Executive Office, 2000 Florida Avenue, NW, Suite 300, Washington, DC 20009. Telephone, (202) 382-2010.

Inside EISA

Byte magazine, November 1989, pages 417-425

EISA machines should gain on Micro-channel machines in the IBM PC world during 1990. If you wish to understand how the ISA bus is converted to the EISA bus, read this article by L. Brett Glass. A clever idea.

The IEEE Standards Bearer

Volume 3, Number 4, October 1989

See Fletcher J. Buckley's article, "Transnationalization of IEEE Standards." He states, "Basically, we are interested in providing consensus-derived standards in a timely manner that will help the professionals dealing with the problems of their engineering disciplines." Sounds like what John Baldwin and his ad hoc committee have in mind for PDXI. The IEEE is a world leader in the promotion, development, and communication of national electrical, electronic, and computer standards. Members of AIChE who are interested in standardization would do well to contact the IEEE Standards Board to learn how the Institute approaches the process. Institute of Electrical and Electronics Engineers, Inc., 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331.

Adaptive Control of Chemical Processes 1988

Selected papers from the 2nd International IFAC Symposium, Lyngby, Copenhagen, Denmark, August 17-19, 1988. Edited by M. Kummel.

These proceedings present adaptive control, a method for controlling and regulating industrial plants, processes and systems, within the chemical industry. Contain 33 papers, direct adaptive control and the self-tuning regulating method are discussed and reviewed, and practical applications are illustrated within biochemical engineering systems, thermal processes, and distillation columns. Price, U.S. $72.00. Contact Pergamon Press, Inc., Fairview Park, Elmsford, New York, 10523.

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Meetings and Conferences

The following items summarize information in the hands of the Editor by January 13, 1990. The preferred deadlines for the two issues of CAST Communications – called the Summer and Winter issues – will be approximately May 15 (issue sent to AIChE press by June 15, mailed by July 15) and December 15 (issue sent to AIChE press by January 15, mailed by February 15) several weeks after the Spring and Fall AIChE meetings, respectively. These revised deadlines will give CAST division members who are active in CAST programming activities sufficient time after AIChE meetings to send last-minute information to both the Publications Board Chairman (Jeff Siirola) and the Editor of the newsletter (Peter Rony). We prefer that all communications with us be done in electronic form, either with MS DOS formatted diskettes or with messages sent electronically over BITNET. An up-to-date listing of proposed sessions and Calls for Papers will be maintained electronically by the Publications Board Chairman. CAST Division members can always request such information by sending a BITNET message to RONY @ VTVM1.

Authors are reminded that under current AIChE meeting policy, the meeting booklet will contain only titles of the papers presented. However, a book of extended abstracts is distributed to attendees at the meeting. Moreover, authors may bring hard copies of their papers for distribution at their session, and hard copies or microfiche may be ordered at or after the meeting.

Please send CAST Division session information, Calls for Papers, and meeting and short course announcements to me by May 15, 1990 for inclusion in the "Summer 1990" issue of CAST Communications. For those members of the CAST Division who are engaged in the presentation of seminars and short courses, an advance (draft) copy of your announcement brochure would be appreciated.

. . . *Peter R. Rony, Editor, CAST Communications*

IFAC World Congress, Tallinn (1990)

Sub IPC4: Control of Chemical Processes and Processes for Natural Products Like Food, Wood, and Agriculture

Chairman: Mogens Kummel

Given below, with organizers listed in parentheses, are the planned sessions. Interested authors should contact Professor Thomas J. McAvoy, University of Maryland, Department of Chemical and Nuclear Engineering, College Park, Maryland 20742-2111, (301) 454-2431.

Planned Sessions (first organizer is the session chairman):

1. Expert Control of Chemical Processes (McAvoy and Koivo)

2. Adaptive Control of Chemical Processes (Wittenmark and Bachmann)

3. Robust Control of Chemical Processes (Kantor and Skogestad)

4. Fault Detection and Safety (Bachmann and Takamatsu)

5. Batch Process Control (Rippin and Najim)

6. Plant-wide Production Control (Uronen and Pyzik)

7. Statistical Process Control (MacGregor and Morris)

8. Biotechnological Process Control (Halme and Staniskis)

9. Automatic Control Applications in Agriculture (Hashimoto)

Optimization of Chemical Processes University of Texas at Austin College of Engineering

(This three-day short course already given; contact Dr. T. F. Edgar for the dates of the next course)

Participants who attend this course will be able to formulate optimization problems, analyze typical problems to determine a method of solution, carry out procedures for optimization including linear and non-linear programming, and apply software programs to obtain solutions to typical industrial problems. The emphasis in this course will be placed on learning optimization procedures that can be used to solve meaningful industrial problems, and to gain experience with optimization software.

This course will consist of lectures, discussion, computer laboratories, and software demonstrations. The materials will include a textbook, Optimization of Processes, by Edgar and Himmelblau (McGraw-Hill, 1988) and copies of additional course notes.

Participants should possess a degree in engineering or its equivalent in engineering practical experience and be involved in work related to plant operations, process control or process design. They should possess background knowledge in chemical plants, refineries and typical unit operations contained therein. Some experience with computer programming and numerical analysis will be desirable. Applicable job titles include process engineer, control engineer, design engineer, research engineer or scientist.

Program faculty include Dr. T. F. Edgar, Dr. D. M. Himmelblau, and Dr. Leon Lasdon. For further information, questions should be directed to Continuing Engineering Studies at (512) 471-3506. Questions concerning content of the course should be directed to Dr. Edgar at (512) 471-3080.

Process Control For the Process Industries Santa Barbara, California

February 13-15, 1990

Process control is playing an increasingly important role in the efficient operation of modern processing plants. Reduced operating costs, improved productivity and higher production rates can be achieved through better process control. Yet many engineers, managers and plant personnel have had limited exposure to the fundamental concepts.

This short course provides an introduction to the basic concepts of process control and emphasizes the relationship between theory and industrial practice. The scope of the course includes both process dynamics and control. Mathematical models will be presented for typical process units as well as for sensors, control valves, and controllers. Plant testing methods will also be reviewed. Techniques for feedback and feedforward controller design will be discussed. Both advanced control methods for complex process units and the use of digital computer control will be covered. Applications of important concepts will be emphasized through examples and problem sessions.

This course is designed for scientists and engineers who are involved in the process industries (including petroleum, chemicals, microelectronics, pulp and paper), especially those who have not had formal training in process dynamics and control. IN addition, those engineers who desire a review of the principles of automatic control plus an introduction to new concepts should benefit from the course. The material covered consists of a blend of control theory and practice. Some knowledge of differential equations is presumed, but a working knowledge is not required.

The textbook for this course is Process Dynamics and Control, by D. E. Seborg, T. F. Edgar, and D. A. Mellichamp (John Wiley and Sons, 1989). The course will emphasize the use of interactive desk-top computers to eliminate complicated mathematical analysis. The widespread availability of personal computers coupled with inexpensive yet powerful software means that control engineers now can carry out control system analysis, design, and evaluation of alternatives without requiring a sophisticated mathematical background.

Course instructors include Dale E. Seborg, Thomas F. Edgar, and Duncan A. Mellichamp, co-authors of the course textbook. The $795 course fee includes beverage breaks, lecture notes, textbook, and applicable taxes. Costs of meals and motel accommodations are not included. The course will be held at a resort hotel located adjacent to the Pacific Ocean: Santa Barbara Sheraton Hotel, (805) 963-0744. Enrollment is limited. For further details, please contact Thomas F. Edgar, 5409 Highland Crest Drive, Austin, TX 78731.

The Object-Oriented Systems Symposium Washington D.C.

March 13-15, 1990

By attending this Symposium, you will benefit from:

- Learning all you can about the important challenges of structured methods.
- Attending tutorial sessions prior to the Symposium that are designed to give you the groundwork of object-oriented concepts to build on in the remaining days of the Symposium.
- Learning how to streamline systems and analysis design.
- Improving skills for maintenance and modification of data.
- Minimizing additional programming and project to project by learning the object-oriented approach.
- Viewing three days of product presentations and demonstrations by leading vendors in the industry.
- Educational seminars led by internationally recognized experts, including:

The Object-Oriented Paradigm: An Overview of the World of Objects, by Larry Constantine.

Object-Oriented Analysis, by James J. Odell

Software Engineering of Large Projects with Object-Oriented Design, by Burt L. Rubenstein

The Role of Object-Oriented Concepts in the Specification of Concurrent Real-Time Systems, by Dr. Paul T. Ward

CASE Support for Object-Oriented Structured Design, by Peter Pircher

Object-Oriented Programming in the 1990s, by Zack Urlocker

Digital Consulting's Object-Oriented Systems Symposium is the only event being offered where you can explore the entire spectrum of object-oriented systems. To register for this event or to receive more information, please call Digital Consulting, Inc. at (508) 470-3880. Please mention your priority code LNADW when you call.

Orlando AIChE Meeting
March 18-22, 1990

The Peabody. Meeting Program Chairman: Professor Aydin Akgerman, Texas A&M University, Chemical Engineering Department, College Station, TX 77843, (409) 845-3375.

The CAST Division is planning the following sessions at the Orlando National meeting.

Area 10A: Systems and Process Design

1. Artificial Intelligence Applications in Process and Product Design. Babu Joseph (Chairman), Department of Chemical Engineering, Washington University, St. Louis, MO 63130, (314) 889-6076.

2. Effective Platforms for User Interfaces. Mohinder K. Sood (Chairman), Mobil R&D Corporation, P.O. Box 1026, Princeton, NJ 08540, (609) 737- 4960.

3. Design for Waste Accountability.

4. Process Design and Analysis. Peter Douglas (Chairman), Department of Chemical Engineering, University of Waterloo, Waterloo, Ontario, N2L 3G1, Canada, (519) 885-2913.

Joint Areas 10A and 10C Sessions

1-2. Hazard and Operability Analysis for Process Safety I and II (Joint with Area C). Venkat Venkatasubramanian (Chairman), School of Chemical Engineering, Purdue University, West Lafayette, IN 47907, (317) 494- 4050.

For further information details concerning Area 10A sessions and scheduling, please contact Michael F. Doherty (Area 10A Chairman), Department of Chemical Engineering, University of Massachusetts, Amherst, MA 01003, (413) 545-2359.

Area 10B: Systems and Process Control

1. Control of Polymerization Reactors. W. David Smith (Chairman), Polymer Products Department, E.I. DuPont de Nemours & Company, P.O. Box 80262, Wilmington, DE 19880-0262, (302) 695-1476.

2. Industrial Applications of Process Control. Jorge A. Mandler (Chairman), Research and Engineering Systems - MIS, Air Products and Chemicals, Inc., Allentown, PA 18195, (215) 481-3413.

For further information details concerning Area 10B sessions and scheduling, please contact Duncan A. Mellichamp (Area 10B Chairman), Department of Chemical and Nuclear Engineering, University of California, Santa Barbara, CA 93106, (805) 961-2821.

Area 10C: Computers in Operations and Information Processing

1. Computer Aided Engineering. S. Ganguly (Chairman) and C. E. Bodington (Vice Chairman).

2-3. Application of Expert Systems in Process Operations I and II. Peter Clark (Chairman), School of Chemical Engineering, Cornell University, Ithaca, NY 14853, (607) 255-8656 and Gary D. Cera (Vice Chairman), Mobil Research and Development Corporation, P.O. Box 1026, Princeton, NJ 08540, (609) 737-5299.

4. Management and Reconciliation of Plant Data. Mohinder K. Sood (Chairman), Mobil R&D Corporation, P.O. Box 1026, Princeton, NJ 08540, (609) 737-4960 and A. L. Parker (Vice Chairman), Shell Oil Company, P.O. Box 10, Norco, LA 70079, (504) 465-7459.

5. Computer Networks. Brice Carnahan (Chairman), Department of Chemical Engineering, University of Michigan, Ann Arbor, MI 48109, (313) 764-3366 and Norman E. Rawson (Vice Chairman), IBM Corporation - D051, 6901 Rockledge Drive, Bethesda, MD 20817, (301) 571-4445.

6. Simulation for Process Operations. Heinz A. Preisig (Chairman), Department of Chemical Engineering, Texas A&M University, College Station, TX 77843-3122, (409) 845-0386 and Ravi Nath (Vice Chairman), Union Carbide Corporation, 11111 Katy Freeway, Houston, TX 77079, (713) 973-5609.

For further information details concerning Area 10C sessions and scheduling, please contact Rajeev Gautam (Area 10C Chairman), UOP Molecular Sieve Department, Tarrytown Technical Center, Tarrytown, NY 10591, (914) 789-3206.

Area 10D: Applied Mathematics and Numerical Analysis

No sessions are planned

For further information details concerning Area 10D sessions and scheduling, please contact Doraiswami Ramkrishna (Area 10D Chairman), School of Chemical Engineering, Purdue University, West Lafayette, IN 47907, (317) 494-4066.

Process Integration Using Pinch Technology
Seattle (March 6-9, 1990)
Houston (April 3-6, 1990)

Every engineer knows there is often scope for improvement in process designs. But what about a particular design? Can it be improved? By how much? Until recently, there was no

satisfactory answer to these questions. But now, for the first time, there is an entirely fundamental approach that answers the question of how much a process can be improved. The technique is Pinch Technology, which was developed by Professor B. Linhoff. Pinch Technology provides a clear picture of energy flows in a process, and identifies the most constrained part of the process, the process pinch. By correctly constructing composite heating and cooling curves, the engineer can quantitatively determine the minimum hot and cold utilities required. This is called targeting. Once targets are set, design proceeds directly to an equipment arrangement that accomplishes the targeted minimum utilities consumption.

Application of Pinch Technology to processes in a wide range of industries has yielded outstanding results. Engineers report energy cost savings of 15% to 90%, capital cost reduction of up to 25%, improved flexibility and operability, and increased plant capacity. To date, there have been hundreds of successful studies.

This is the standard introductory course in Pinch Technology that we offer most frequently. It features a combination of lectures and working sessions, and covers energy targeting, heat exchange network design, data extraction, process modifications and other related topics. The instructors for the course are Dr. H. D. Spriggs, Mr. J. D. Kumana, Mr. A. P. Rossiter, and Dr. Ravi Nath. For information, please call Linhoff March, Inc., 2 Cardinal Park Drive, Suite 205A, Leesburg, VA 22075, telephone (703) 777-1118. Telefax, (703) 777-4145.

Second International Symposium on Applications of Analytical Techniques to Industrial Process Control Noordwijkerhout, The Netherlands

April 3-5, 1990

Scope of the Symposium

The importance of analytical techniques for the control of industrial processes is continuously increasing. The development of chemical types of process analyzers, from laboratory instruments to on-line/in-line measuring devices, requires the cooperation of analytical chemists as well as process and system engineers.

Like its predecessor, this second symposium is aimed at an interdisciplinary audience of analytical chemists with an academic or industrial background, and those involved in analytical chemistry and process control.

Scientific Program

Speakers will focus on recent developments in analytical techniques and applications in process control. Topics will include:

K. Carr-Brion (UK), *"Sampling Systems for On-Line Analysis of Difficult-to-Handle Material"*

K. Doerffel (DDR), *"Statistical Aspects of Process Control/Process Analysis"*

J. Inzcedy (Hungary), *"Teaching of Process Analytical Chemistry"*

E. D. Yalvac (US), *"Flow Injection Analysis in Process Control and Optimization"*

D. E. Honigs (US), *"State-of-the-Art in NIR Process Hardware"*

H. van den Hauten (Netherlands), *"Trends and Perspectives in Process Analyzers from the Instrumentation Point of View"*

Particular attention will be paid to sampling problems, sample preparation, in-line and on-line measurements and remote sensing. The scientific program will comprise invited as well as submitted papers (oral and posters). The official language of the symposium will be English. Participants seeking information should contact:

Professor Willem E. van der Linden
Laboratory for Chemical Analysis-CT
University of Twente
P.O. Box 217
NL-7500 AE Enschede,
The Netherlands
Telephone, (53) 892629; Telex 44200; Fax (53) 356024

40th Annual CSChE Meeting

July 15-20, 1990

Program Chairman: Dr. Thomas J. Harris, Department of Chemical Engineering, Queen's University, Kingston, Ontario K7L 3M6, (613) 545-2765.

Twelve (12) sessions on applied mathematics, systems and control.

San Diego AIChE Meeting

August 19-22, 1990

Sheraton Harbor Island Hotel. Meeting Program Chairman: Dr. Danny Reible, Chemical Engineering Department, Louisiana State University, Baton Rouge, LA 70803-7300, (504) 388-1426.

Chicago AIChE Meeting

November 11-16, 1990

The Palmer House. Meeting Program Chairman: Dr. Charles A. Wentz, Argonne National Laboratory, 9700

South Cass Avenue, Argonne, IL 60439, (708) 972- 7693.

The CAST Division is planning the following sessions at the Chicago Annual meeting. Deadlines and final call for papers for this meeting appear later in this issue.

Summary

Area 10A:	6 Sessions
Area 10B:	9.5 Sessions (9 plus 1 joint with 15c)
Area 10C:	6 Sessions
Area 10D:	5 Sessions
CAST Total:	26.5 Sessions Requested

Area 10A: Systems and Process Design

1. Process Synthesis. Christodoulos A. Floudas (Chairman), Department of Chemical Engineering, Princeton University, Princeton, NJ 08544, (609) 452- 4595 and Jeffrey J. Siirola (Vice Chairman), Eastman Kodak Company - B95, P.O. Box 1972, Kingsport, TN 37662, (615) 229-3069.

2. Design and Analysis - I: General. Michael F. Malone (Chairman), Department of Chemical Engineering, University of Massachusetts, Amherst, MA 01003, (413) 545-0838 and Robert L. Kirkwood (Vice Chairman), Polymers Products Department, E. I. DuPont de Nemours & Company, Wilmington, DE 19880-0262, (302) 695-3777.

3. Design and Analysis - II: Large Envelope Systems. K. R. Kaushik (Chairman), Shell Oil Company, P.O. Box 6249, Carson, CA 90749, (213) 816- 2276.

4. Batch Process Engineering. Heinz A. Preisig (Chairman), Department of Chemical Engineering, University of New South Wales, P.O. Box 1, Kensington, N.S.W. 2033, Australia and Michael F. Malone (Vice Chairman), Department of Chemical Engineering, University of Massachusetts, Amherst, MA 01003, (413) 545-0838.

5. Design Methods for Solid-State Chemical Engineering. Michael F. Doherty (Chairman), Department of Chemical Engineering, University of Massachusetts, Amherst, MA 01003, (413) 545-2359.

6. Design for Process Innovation. Irven H. Rinard (Chairman), Department of Chemical Engineering, The City College of the City University of New York, Convent Avenue at 138th Street, New York, NY 10031, (212) 690- 6624.

Area 10B: Systems and Process Control

1-3. Recent Advances in Process Control I, II and III. Bradley R. Holt (Chairman), Department of Chemical Engineering, University of Washington, Seattle, WA 98195, (206) 543-0554 and Ahmet Palazoglu (Vice Chairman), Department of Chemical Engineering, University of California, Davis, CA 95616, (916) 752-8774.

4. Nonlinear Control. Yaman Arkun (Chairman), School of Chemical Engineering, Georgia Institute of Technology, Atlanta, GA 30332-0100, (404) 894-2871 and Gerry R. Sullivan (Vice Chairman), Department of Chemical Engineering, University of Waterloo, Waterloo, Ontario, CANADA, (519) 885- 2196.

5. Model Predictive Control. B. Wayne Bequette (Chairman), Department of Chemical and Environmental Engineering, Rensselear Polytechnic Institute, Troy, NY 12180-3590, (518) 276-6683 and Jim Rawlings (Vice Chairman),

Department of Chemical Engineering, University of Texas, Austin, TX 78712-1062, (512) 471-4417.

6. Artificial Intelligence/Neural Networks in Process Control. Tom McAvoy (Chairman), Department of Chemical Engineering, University of Maryland, College Park, MD 20742, (301) 454-2432 and Manfred Morari, Department of Chemical Engineering, California Institute of Technology, Pasadena, CA 91125, (818) 356-4186.

7. Process Control Education in the 1990's. Thomas F. Edgar (Chairman), Department of Chemical Engineering, University of Texas, Austin TX 78712- 1062, (512) 471-3080 and Evanghelos Zafiriou (Vice Chairman), Department of Chemical Engineering, University of Maryland, College Park, MD 20742, (301) 454-5098.

8. Industrial Challenge Problems in Process Control. Duncan A. Mellichamp (Chairman), Department of Chemical and Nuclear Engineering, University of California, Santa Barbara, CA 93106, (805) 961-2812 and Joseph D. Wright (Vice Chairman), Xerox Research Centre of Canada, 2660 Speakman Drive, Mississauga, Ontario L5K 2L1, Canada, (416) 823-7091.

9. New Concepts in Dynamic Simulators. Jorge A. Mandler (Chairman), Air Products and Chemicals, Inc., 7201 Hamilton Blvd., Allentown, PA 18195, (215) 481-3413 and Ernest F. Vogel (Vice Chairman), Tennessee Eastman Company, PO Box 511, Kingsport, TN 37662, (615) 229-5994.

Joint Area 10B and Area 15C Session

1. Modeling and Control of Biochemical Processes. Karen McDonald (Chairman), Department of Chemical Engineering, University of California, Davis, CA 95616, (916) 752-8314 and Janice Phillips (Vice Chairman), Department of Chemical Engineering, Lehigh University, Bethlehem, PA 18015, (215) 758-4258.

Area 10C: Computers in Operations and Information Processing

1-2. Advances in Optimization I and II. Angelo Lucia (Co-chairman), Department of Chemical Engineering, Clarkson University, Potsdam, NY 13676, (315) 268-6674 and Peter Clark (Vice Chairman), School of Chemical Engineering, Cornell University, Ithaca, NY 14856, (607) 255-8656.

3-4. Parallel Computing I and II. Mark A. Stadtherr (Chairman), Department of Chemical Engineering, University of Illinois, Urbana, IL 61801, (217) 333-0275 and Richard D. La Roche (Vice Chairman), Department of Chemical Engineering, Pennsylvania State University, University Park, PA 16802, (814) 863-4807.

5. Visualization of Chemical Engineering Systems. Edward M. Rosen (Chairman), Monsanto Company - F2WK, 800 N. Lindbergh Blvd., St. Louis, MO 63167, (314) 694-6412 and Peter R. Rony (Vice Chairman), Department of Chemical Engineering, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061, (703) 231-7658.

6. Application of Neural Networks in Process Engineering. Venkat Venkatasubramanian (Chairman), School of Chemical Engineering, Purdue University, West Lafayette, IN 47907, (317) 494-0734 and Lyle Ungar (Vice Chairman), Department of Chemical Engineering, University of Pennsylvania, Philadelphia, PA 19104, (215) 898-7449.

Area 10D: Applied Mathematics and Numerical Analysis

1. Mathematical Analysis of Complex Systems. Robert A. Brown (Chairman), Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, MA 02139, (617) 253-4561 and Ioannis G. Kevrekides (Vice Chairman), Department of Chemical Engineering, Princeton University, Princeton, NJ 08544, (609) 987-2818.

2. Applied Mathematics and Numerical Analysis. Robert L. Sani (Chairman), Department of Chemical Engineering, University of Colorado, Boulder, CO 80309-0424 and Anthony N. Beris (Vice Chairman), Department of Chemical Engineering, University of Delaware, Newark, DE 19716, (302) 451-8018.

3. Chaos in Deterministic Systems and Applications in Chemical Engineering. Julio M. Ottino (Chairman), Department of Chemical Engineering, University of Massachusetts, Amherst, MA 01003, (413) 545-0593 and Michael F. Doherty (Vice Chairman), Department of Chemical Engineering, University of Massachusetts, Amherst, MA 01003, (413) 545-2539.

4. Novel Applications of Mathematics in Chemical Engineering. Jeffrey C. Kantor (Chairman), Department of Chemical Engineering, University of Notre Dame, Notre Dame, IN 46556, (219) 239-5797 and H.-Chia Chang (Vice Chairman), Department of Chemical Engineering, University of Notre Dame, Notre Dame, IN 46556, (219) 239-5847.

5. Recent Developments in Numerical Methods for ODE/DAE/PDE Systems. George D. Byrne (Chairman), Exxon Research and Engineering Company, Route 22 E., Annandale, NJ 08801, (201) 730-3115 and William E. Schiesser (Vice Chairman), Department of Chemical Engineering, Lehigh University, Bethlehem, PA 18015, (215) 758-4264.

For further information details concerning CAST Division sessions and scheduling, contact Jeffrey J. Siirola (Area Programming Chairman), Research Laboratories - B95, Eastman Chemical Company, P.O. Box 1972, Kingsport, TN 37662, (615) 229-3069.

Computer Process Control IV
(CPC-IV)
South Padre Island, TX
February 17–22 1991

Cosponsored by CAST Division and CACHE Corporation.

Conference Theme: Future Needs and Challenges in Process Control.

Sessions include: Present Status and Future Needs: The View from Industry, On-Line Sensors and Data Analysis, New Modelling Approaches and Dynamic Simulators for Process Control, Issues in Model-Based Process Monitoring and Control, Control of Nonlinear Processes, Learning Systems – Adaptive and AI Control, and Present Status of Technology: New Ideas/Technology as Research Challenges.

For more information, contact W. Harmon Ray (Conference Chairman), Department of Chemical Engineering, University of Wisconsin, Madison, WI 53706, (608) 263-4732, BITNET RAY at CHEWI.CHE.WISC.EDU, Fax (608) 262-6707 or Yaman Arkun (Conference Vice Chairman), School of Chemical Engineering, Georgia Institute of Technology, Atlanta, GA 30332-0100, (404) 893-2871.

Houston AIChE Meeting
April 7-11, 1991

Meeting Program Chairman: Dr. John G. Ekerdt, Department of Chemical Engineering, University of Texas, Austin, TX 78712, (512) 471-4689.

The CAST Division is planning the following sessions at the Houston National meeting. Deadlines and first

call for papers for this meeting appear later in this issue.

Summary:

Area 10A:	4 Sessions
Area 10B:	3 Sessions
Area 10C:	5.5 Sessions (5 plus 1 joint with 5d)
Area 10D:	0 Sessions (no Spring programming)
CAST Total:	12.5 Sessions Requested

Area 10A: Systems and Process Design

1. Applications of Artificial Intelligence in Process and Product Design. Babu Joseph (Chairman), Department of Chemical Engineeriong, Washington University, St. Louis, MO 63130, (314) 889-6076 and Krishna R. Kaushik (Vice Chairman), Shell Oil Company, PO Box 6249, Carson, CA 90749, (213) 816-2276.

2. Industrial Applications of Optimizatyion. Emilio J. Numez (Chairman), Shell Development Company, PO Box 1380, Houston, TX 77251, (713) 493- 8866.

3. Process Design and Simulation. A. L. Parker (Chairman), Shell Oil Company, PO Box 10, Norco, LA 70079, (504) 465-7142.

4. Retrofit Design Techniques and Applications. Don Vredeveld (Chairman), Union Carbide Corporation, PO Box 8361, South Charleston, WV 25303, (304) 747-4829.

Area 10B: Systems and Process Control

1. Intelligent Control. Ali Cinar (Chairman), Department of Chemical Engineering, Illinois Institute of Technology, Chicago, IL 60616, (312) 567-3042.

2. Application of Robustness Concepts in Control System Design. Gerardo Mijares (Chairman), M. W. Kellogg Company, Three Greenway Plaza, Houston, TX 77046-0395, (713) 960-2032 and Carlos Garcia (Vice Chairman), Shell Development Company, P.O. Box 1380, Houston, TX 77001.

3. Industrial Applications of Nonlinear Control. Jim Riggs (Chairman), Department of Chemical Engineering, Texas Technical University, Lubbock, TX 79409.

Area 10C: Computers in Operations and Information Processing

1. On-line Fault Administration. David M. Himmelblau (Chairman), Department of Chemical Engineering, University of Texas, Austin, TX 78712, (512) 471-7445 and Venkat Venkatasubramanian (Vice Chairman), School of Chemical Engineering, Purdue University, West Lafayette, IN 47907.

2. Plant-wide Management Systems. K. R. Kaushik (Chairman), Shell Oil Company, P.O. Box 6249, Carson, CA 90749, (213) 816-2276 and A. L. Parker (Vice Chairman), Shell Oil Company, P.O. Box 10, Norco, LA 70079, (504) 465-7142.

3. Computer Integrated Manufacturing. C. E. Bodington (Chairman), Chesapeake Decision Sciences, P.O. Box 275, San Anselmo, CA 94960 and Rufus A. Baxley (Vice Chairman), Digital Equipment Corporation, 5555 Windward Parkway West, Alpharetta, GA 30201, (404) 772-2121.

4. **Innovative Use Of Spreadsheets In Calculations.** R. A. Freeman (Chairman) and Bruce M. Vrana (Vice Chairman).

5. Applications of Expert Systems. James F. Davis (Chairman), Department of Chemical Engineering, Ohio State University, Columbus, OH 43210-1180, (614) 292-0090 and Duncan A. Rowan (Vice Chairman), E.I. DuPont de Nemours & Company, P.O. Box 6090, Newark, DE 19714-6090, (302) 366-6453.

Joint Area 10C and Area 5D Session:

1. Applications of Robotics. Michael Tayyabkhan (Chairman), Tayyabkhan Consultants, Inc., 62 Erdman Avenue, Princeton, NJ 08540, (609) 924-9174 and John Jepsen (Vice Chairman), Clark Materials Handling Co., Route 2, Box 46, Highway 33, Versailles, KY 40383, (606) 873-9973.

Area 10D: Applied Mathematics and Numerical Analysis

No Sessions are planned.

Fourth International Symposium on Process Systems Engineering (PSE '91) Montebello, Quebec, Canada

August, 4–9 1991

This conference is being sponsored by the Canadian Society for Chemical Engineering (Systems and Control Division), the National Research Council of Canada (NRC), and the American Institute of Chemical Engineers (CAST Division). It is the fourth in a triennial series entitled PSE, and follows highly successful events in Kyoto in 1982, Cambridge in 1985, and Sydney in 1988. Following the tradition of the PSE series, emphasis will be on the presentation of new information on either technology or its application. Papers describing applications will be especially welcomed, particularly where they contain detailed

information relating to the value of a study. Conference topics include process control and optimization, artificial intelligence, batch process design and optimization, industrial applications, failure analysis in design, design of flowsheets, modeling, and process engineering education.

Presentation deadlines include:

August 31, 1990: Abstract of proposed presentation

December 31, 1990: Full paper for refereeing

April 30, 1991: Final manuscript.

For more information, whether you are interested in presenting a paper or attending the conference, contact Gerry R. Sullivan (Conference Chairman), Department of Chemical Engineering, University of Waterloo, Waterloo, Ontario, Canada, N2L 3G1, (519) 885-2196.

Los Angeles AIChE Meeting
November 17-22, 1991

Summary:

Area 10A:	6.5 Sessions (6 plus 1 joint with 10B)
Area 10B:	6 Sessions (7 plus 1 joint with 10A and 1 joint with 10C)
Area 10C:	6.5 Sessions (6 plus 1 joint with 10B)
Area 10D:	6 Sessions
CAST Total:	27 Sessions Requested

The CAST Division is planning the following tentative program at the Los Angeles Annual Meeting:

Area 10A: Systems and Process Design

1. Process Design for Waste Minimization. Rakesh Govind (Chairman), Department of Chemical and Nuclear Engineering, University of Cincinnati, Cincinnati, OH 45221, (513) 475-5742 and Vasilios Manousiouthakis (Vice Chairman), Department of Chemical Engineering, University of California, Los Angeles, CA 90024-1592, (213) 825-9385.

2. Information Management Systems for Process Design. Information Management Systems for Process Design. Mark Kramer (Chairman), Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, MA 02139, (617) 253-6508 and Heinz A. Preisig (Vice Chairman), Department of Chemical Engineering, Texas A&M University, College Station, TX 77843-3122, (409) 845-0386.

3-4. Design and Analysis I and II. Ross E. Swaney (Cochairman), Department of Chemical Engineering, University of Wisconsin, Madison, WI 53706, (608) 262-3641.

5. Batch Process Design. David W. T. Rippin (Chairman), Chemical Engineering Department, Swiss Federal Institute of Technology, ETH-Zentrum, CH-8092 Zurich, Switzerland and Iftekhar A. Karimi (Vice Chairman), Department of Chemical Engineering, Northwestern University, Evanston, IL 60201, (708) 491-3558.

6. Process Synthesis. James M. Douglas (Chairman), Department of Chemical Engineering, University of Massachusetts, Amherst, MA 01003, (413) 545- 2252.

Joint 10A and 10B Session:

1. Batch Process Synthesis and Control. Bill Luyben (Chairman), Department of Chemical Engineering, Lehigh University, Bethlehem, PA 18015, (215) 758- 4781 and Michel F. Doherty (Vice Chairman), Department of Chemical Engineering, University of Massachusetts, Amherst, MA 01003, (413) 545-2252.

Area 10B: Systems and Process Control

1-2. Recent Advances in Process Control. Jeffrey C. Kantor (Chairman), Department of Chemical Engineering, University of Notre Dame, Notre Dame, IN 46556, (219) 239-5797 and Paul Gusciora (Vice Chairman).

3. AI Applications in Process Control. Melinda Golden (Chairman) and George Stephanopoulos (Vice Chairman), Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, MA 02139, (617) 253-3904.

4. Nonlinear Control. Dale Seborg (Chairman), Department of Chemical and Nuclear Engineering, University of California, Santa Barbara, California 93106, (805) 961-3352.

5. Robust Control. Evangelos Zafiriou (Chairman), Department of Chemical Engineering, University of Maryland, College Park, MD 20742, (301) 454-5098 and Ahmet Palazoglu (vice Chairman), Department of Chemical Engineering, University of California, Davis, CA 95616, (916) 752-8774.

6. Statistical Process Control. John MacGregor (Chairman) and Christos Georgakis (Vice Chairman), Department of Chemical Engineering, Lehigh University, Bethlehem, PA 18015, (215) 758-4781.

7. Control of Discrete Event Processes. Erik Ydstie (Chairman), Department of Chemical Engineering, University of Massachusetts, Amherst, MA 01003, (413) 545-2388 and Ed Bristol (Vice Chairman).

Joint 10B and 10C Session:

1. Statistics and Quality Control. Mohinder K. Sood (Chairman), Mobil R&D Corporation, P.O. Box 1026, Princeton, NJ 08540, (609) 737-4960.

Area 10C: Computers in Operations and Information Processing

1-2. Scheduling and Planning of Process Operations I and II. Richard S. Mah (Chairman), Department of Chemical Engineering, Northwestern University, Evanston, IL 60201, (708) 491-5357.

3. Personal Computers in Plant Operations. Michael T. Tayyabkhan (Chairman), Tayyabkhan Consultants, Inc., 62 Erdman Avenue, Princeton, NJ 08540, (609) 924-9174.

4. Computer Architectures. Mark A Stadtherr (Chairman), Department of Chemical Engineering, University of Illinois, Urban, IL 61801, (217) 333- 0275.

5. Artificial Intelligence in Process Engineering. Venkat Venkatasubramanian (Chairman), School of Chemical Engineering, Purdue University, West Lafayette, IN 47907, (317) 494-0734 and Lyle H. Unger (Vice Chairman), Department of Chemical Engineering, University of Pennsylvania, Philadelphia, PA 19104-6393, (215) 898-7449.

6. Issues in Methodology for Process Operations. Ignacio E. Grossmann (Chairman), Department of Chemical Engineering, Carnegie Mellon University, Pittsburgh, PA 15213, (415) 268-2228 and Mark A. Kramer (Vice Chairman), Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, MA 02139, (617) 253-6508.

Area 10D: Applied Mathematics and Numerical Analysis

1-2. Complex Chemical Engineering Systems: Chaos, Fractals, and Neural Networks I and II. Julio M. Ottino (Cochairman), Department of Chemical Engineering, Stanford University, Stanford, CA 94305, (415) 723-9596 and Erik Ydstie (Cochairman), Department of Chemical Engineering, University of Massachusetts, Amherst, MA 01003, (413) 545-2388.

3. Instabilities and Bifurcations in Chemical Engineering Applications. Ioannis G. Kevrekides (Chairman), Department of Chemical Engineering, Princeton University, Princeton, NJ 08544, (609) 258-2818 and H.-Chia Chang (Vice Chairman), Department of Chemical Engineering, University of Notre Dame, Notre Dame, IN 46556, (219) 239-5847.

4. PDE Simulations in Chemical Engineering. Antony N. Beris (Chairman), Department of Chemical Engineering, University of Delaware, Newark, DE 19716, (302) 451-8018 and Lyle H. Ungar (Vice Chairman), Department of Chemical Engineering, University of Pennsylvania, Philadelphia, PA 19104-6393, (215) 898-7449.

5. Numerical Methods in Ordinary Differential Equations. S. Sundaresan (Chairman), Department of Chemical Engineering, Princeton University, Princeton, NJ 08544, (609) 258-4583 and Joseph Pekny (Vice Chairman), School of Chemical Engineering, Purdue University, West Lafayette, IN 47907, (317) 494-7901.

6. Stochastic Models. Kyriacos Zygourakis (Chairman), Department of Chemical Engineering, Rice University, Houston, TX 77251-1892, (713) 527- 8101 x3509 and Robert M. Ziff (Vice Chairman), Department of Chemical Engineering, University of Michigan, Ann Arbor, MI 48109-2136, (313) 764-5498.

For further information details concerning CAST Division sessions and scheduling, contact Jeffrey J. Siirola (Area Programming Chairman), Research Laboratories - B95, Eastman Chemical Company, P.O. Box 1972, Kingsport, TN 37662, (615) 229-3069.

Foundations of Computer-Aided Plant Operations (FOCAPO '92)

(Summer 1992)

Mark A. Stadtherr (Conference Chairman), Department of Chemical Engineering, University of Illinois, Urbana, IL 61801, (217) 333-0275 and John C. Hale (Conference Vice Chairman), E. I. DuPont de Nemours & Company, P.O. Box 6090, Newark, DE 19714-6090, (302) 366-3041.

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CALL FOR PAPERS

Final Call for CAST Sessions
Chicago AIChE Meeting
November 11-16, 1990

The names, addresses, and telephone numbers of the session chairmen are given on the next several pages, as are brief statements of the topics to receive special emphasis in soliciting manuscripts for these sessions. Prospective session participants are encouraged to observe the following deadlines recently shortened by the Meeting Program Chairman:

March 12, 1990: Submit an abstract of the proposed presentation to the session chairman.

April 23, 1990: Authors informed of selection and session content finalized.

August 3, 1990: Submit an extended abstract to be published for distribution at the meeting.

September 25, 1990: Final manuscript submitted to the session chairman.

Area 10a: Systems and Process Design

1. Process Synthesis.

Papers are solicited in all areas of process synthesis including grassroots and retrofit advances in design theory and methodology, reaction path synthesis, reactor networks, non-sharp and complex separation sequences, and heat integration.

Chairman

Christodoulos A. Floudas
Department of Chemical Engineering
Princeton University
Princeton, NJ 08544
(609) 452-4595

Vice Chairman

Jeffrey J. Siirola
Eastman Chemical Co.
– B95
P.O. Box 1972
Kingsport, TN 37662
(615) 229-3069

2. Design and Analysis I: General.

General papers in design and analysis are requested. Contributions concerning new design tools or process simulations are particularly welcome. Priority will be given to papers that are not covered in the sessions on process synthesis, design and analysis of large envelope systems, batch process engineering, solid-state chemical engineering, and design for process innovation.

Chairman

Michael F. Malone
Department of Chemical Engineering
University of Massachusetts
Amherst, MA 01003
(413) 545-0838

Vice Chairman

Robert L. Kirkwood
Experimental Station, E262/314
E. I. DuPont de Nemours & Co.
Wilmington, DE 19898
(302) 695-3777

3. Design and Analysis - II: Large Envelope Systems.

This session will focus on the application of techniques in Process Design and Analysis to problems that involve a number of process units. Contributions are specifically invited in the following areas: large scale optimization, evaluation of process options, detailed simulation of interacting unit operations, design for safety and environmental impact, graphical methods, and visualization in design. Methods with application to a whole plant, refinery, etc., are preferred.

Chairman

K. R. Kaushik
Shell Oil Company
PO Box 2099
Houston, TX 77252-2099
(713) 241-2098

4. Batch Process Engineering.

Papers are solicited reporting on the progress in design and operation of batch processes. The session is not limited to the discussion of a particular aspect but preference will be given to papers that contribute to the integration of design and operation. Another area of strong interest is robust design which accounts for uncertainties in various parts of the overall model such as equipment, planning schedule, utilities, and product market.

Chairman

Heinz A. Preisig
Department of Chemical Engineering
Texas A&M University
College Station, TX 77843
(409) 845-0386

Vice Chairman

Michael F. Malone
Dept of Chemical Engineering
University of Massachusetts
Amherst, MA 01003
(413) 545-0838

5. Design Methods for Solid-State Chemical Engineering.

Papers are sought on systems aspects of chemical processes in which the process stream contains a solid phase at some

or all points of the process. The main purpose of the session is to provide a forum for synthesis and design methods that are not restricted to fluid-phase process systems. Typical processes include, but are not restricted to: crystallizer-filter- dryer systems; polymer, fiber-optic, and microelectronic process systems; agricultural chemical processes; ceramics processes, etc.

Chairman

Michael F. Doherty
Department of Chemical Engineering
University of Massachusetts
Amherst, MA 01003
(413) 545-2359

6. Design for Process Innovation.

How do we design processes which use innovations in processing technology? How do we design processes which incorporate in an integral way: new separation technologies such as PSA or membrane separators; reactor- separators such as membrane reactors or reacting absorbers; periodic operation, particularly of reactors; your innovative process steps? Papers are welcomed on the modeling analysis, synthesis, simulation, or equipment design for innovative processing.

Chairman

Irven H. Rinard
Department of Chemical Engineering
The City College of the City University of New York
Convent Avenue at 138th Street
New York, NY 10031
(212) 690-6624

Area 10b: Systems and Process Control

1-3. Recent Advances in Process Control I, II and III.

Papers are invited which demonstrate advances in all areas of process control with particular emphasis in areas not covered by specialty sessions. This includes, but is not limited to advances in multivariable control, adaptive control, identification, and applications of advanced control to real processes.

Chairman

Bradley R. Holt
Department of Chemical Engineering
University of Washington
Seattle, WA 98195
(206) 543-0554
FAX (206)543-3778

Vice Chairman

Ahmet Palazoglu
Department of Chemical Engineering
University of California
Davis, CA 95616
(916) 752-1031
FAX (916) 752-8774

4. Nonlinear Control.

Papers are sought in the general area of nonlinear process control addressing theoretical or practical issues.

Chairman

Yaman Arkun
School of Chemical Engineering
Georgia Institute of Technology
Atlanta, GA 30332-0100
(404) 894-2871

Vice Chairman

Gerry R. Sullivan
Department of Chemical Engineering
University of Waterloo
Waterloo, Ontario, Canada
(519) 885-2196

5. Model Predictive Control.

Papers which demonstrate advances in model predictive control theory or applications are invited. Topics of particular interest include variable constraints, model identification and parameter estimation, nonlinear model-based control, robustness with respect to structured and unstructured uncertainties, non-square systems, and multi-rate sampling.

Chairman

B. Wane Bequette
Department of Chemical Engineering
Rensselear Polytechnic Institute
Troy, NY 12180-3590
(518) 276-6683
FAX (518) 276-6003

Vice Chairman

Jim Rawlings
Department of Chemical Engineering
University of Texas
Austin, TX 78712-1062
(512) 471-4417
FAX (512) 471-7060

6. Artificial Intelligence/Neural Networks in Process Control.

Papers covering applications of artificial intelligence in the area of process control are sought. Particular emphasis will be given to papers dealing with neural network applications. Papers dealing with all aspects of process control, such as dynamic modeling, fault detection, operator advising, feedback systems, etc. will be considered.

Chairman

Tom McAvoy
Department of Chemical Engineering
University of Maryland
College Park, MD 20742
(301) 454-2432

Vice Chairman

Manfred Morari
Department of Chemical Engineering
California Institute of Technology
Pasadena, CA 91125
(818) 356-4186

7. Process Control Education in the 1990s.

A debate by invitation.

Chairman

Thomas F. Edgar
Department of Chemical Engineering
University of Texas
Austin, TX 78712-1062
(512) 471-3080

Vice Chairman

Evanghelos Zafiriou
Department of Chemical Engineering
University of Maryland
College Park, MD 20742
(301) 454-5098

8. Industrial Challenge Problems in Process Control.

The goal of this session is to showcase a broad cross-section of process control problems that can be serve as vehicles to evaluate new control theory and methods. Papers, both invited and solicited, are being sought that describe realistic industrial control/optimization problems in terms that will challenge academic research groups. The model for these contributions, the "Shell Control Problem," represented an important first step in providing researchers with a more useful test case. What we are looking for here are problems that are reasonable well defined but open ended and that incorporate many of the factors industrial control practitioners tell us have to be handled by academic methodology: constraints, poorly defined model elements, unknown parameters, nonlinearities, too many variables, too few (or unreliable) measurements, conflicting control objectives, uncertain uncertainty descriptions, etc. Contributors need not have a solution of their own problem in hand. Also, "modified" or "disguised" process models can be used, if necessary, to permit publication of otherwise proprietary results.

Chairman

Duncan A. Mellichamp
Department of Chemical and Nuclear Engineering
University of California
Santa Barbara, CA 93106
(805) 961-2821
FAX (805) 961-4731

Vice Chairman

Joseph D. Wright
Xerox Research Centre of Canada
2660 Speakman Drive
Mississauga, Ontario
L5K 2L1 Canada
(416) 823-7091

9. New Concepts in Dynamic Simulators.

This is a session on dynamic simulation. Papers are sought on applications as well as technological advances in the area of dynamic simulation. Topics of interest include: applications to control system design, on-line dynamic simulation, user interfaces / operator training, advances in computational techniques, and new tools for dynamic simulation including new computer architectures, object-oriented programming and databases, and data visualization techniques.

Chairman

Jorge A. Mandler
Air Products & Chemicals, Inc.
7201 Hamilton Blvd.
Allentown, PA 18195
(215) 481-3413

Vice Chairman

Ernest F. Vogel
Tennessee Eastman Co.
P.O. Box 511
Kingsport, TN 37662
(615) 229-5994

Joint Area 10b and Area 15c Session

1. Modeling and Control of Biochemical Processes.

Papers are solicited which report on new developments in biochemical process modeling, on-line monitoring techniques, and advanced control applications.

Chairman

Karen McDonald
Department of Chemical Department
University of California
Davis, CA 95616
(916) 752-8314
FAX (916) 752-1031

Vice Chairman

Janice Phillips
Chemical Engineering Engineering
Lehigh University
Bethlehem, PA 18015
(215) 758-4258
FAX (215) 758-5423

Area 10c: Computers in Operations and Information Processing

1-2. Advances in Optimization I and II.

The emphasis of these sessions is on recent theoretical and computational developments in local and global process optimization. A wide variety of topics are of interest including linear, quadratic, and nonlinear programming, mixed-integer nonlinear programming, and interior point methods for small and large-scale steady-state and unsteady-state processes; stabilization procedures; issues in optimal solution multiplicity; and process control applications.

Cochairman

Angelo Lucia
Department of Chemical Engineering
Clarkson University
Potsdam, NY 13676
(315) 268-6674

Cochairman

Peter Clark
School of Chemical Engineering
Cornell University
Ithaca, NY 14856
(607) 255-4707

3-4. Parallel Computing I and II.

Parallel computing architectures provide the potential to greatly increase the speed of scientific and engineering computing. Topics of interest for these sessions include the application of parallel computing to solve chemical engineering problems, the development of new algorithms or codes for effectively exploiting parallel computer architectures, and descriptions or reviews of recent technological developments related to parallel computing.

Papers are sought involving any type of parallel computing. This includes, but is not limited to: (1) Shared memory architectures with a relatively small number of complex processors; (2) Local memory architectures with a relatively large number of simple processors; (3) Distributed processing over a network of machines; (4) Massively parallel architectures.

The deadline for receipt of 200-word extended abstracts is April 1, 1990. Send abstracts or requests for information to the Co-Chairmen. We encourage submission of abstracts by electronic mail with a verification copy to be sent by regular mail. Authors will be notified of acceptance by May 1, 1990. Full manuscripts will be due on October 1, 1990.

Cochairman

Mark A. Stadtherr
Department of Chemical Engineering
University of Illinois
Urbana, IL 61801
(217) 333-0275
Fax: (217) 244-8068
Bitnet: markst@uiucvmd
Internet: markst@vmd.cso.uiuc.edu

Cochairman

Richard D. La Roche
Department of Chemical Engineering
Pennsylvania State Univ.
University Park, PA 16802
(814) 863-4807
Fax: (814) 865-7846
Bitnet: rdl@psuecl
Internet: rdl@ecl.psu.edu

5. Visualization of Complex Systems.

Visualization (computer graphics) is a tool both for interpreting image data fed into a computer and for generating images from complex, multi- dimensional data sets (e.g., see Computer Graphics, Volume 21 (6), November 1987). This session will explore the use of visualization in applications such as nonlinear phenomena (chaos), fluid mechanics, molecular modelling, materials, and reaction systems.

Chairman

Edward M. Rosen
Monsanto Company - F2WK
800 N. Lindbergh Blvd.
St. Louis, MO 63167
(314) 694-6412

Vice Chairman

Peter R. Rony
Department of Chemical Engineering
Virginia Polytechnic Inst.
Blacksburg, VA 24061
(703) 231-7658

6. Application of Neural Networks in Process Engineering.

Chairman

Venkat Venkatasubramanian
School of Chemical Engineering
Purdue University
West Lafayette, IN 47907
(317) 494-0734

Vice Chairman

Lyle Ungar
Department of Chemical Engineering
Univ. of Pennsylvania
Philadelphia, PA 191104
(215) 898-7449

Area 10d: Applied Mathematics and Numerical Analysis

1. Mathematical Analysis of Complex Systems.

Modelling is playing an increasingly important role in the design, optimization, and control of complex systems for the synthesis, analysis, and processing of bulk chemicals, advanced materials, and products of biotechnology. This session will highlight the use of modern analytical and numerical mathematical methods to the understanding of complex systems. Papers are sought which go beyond simply simulating complex behavior in model systems and which delve into analysis of the structure and dynamics of process models.

Chairman

Robert A. Brown
Department of Chemical Engineering
Massachusetts Institute of Technology
Cambridge, MA 02139
(617) 253-4561

Vice Chairman

Ioannis G. Kevrekides
Department of Chemical Engineering
Princeton University
Princeton, NJ 08544
(609) 987-2818

2. Applied Mathematics and Numerical Analysis.

The application of analytical and numerical modelling techniques in chemical engineering has increased dramatically in recent years due to improvements in techniques and/or hardware. This session will focus on the application and development of analytical and numerical techniques for chemical engineering problems.

Chairman

Robert L. Sani
Department of Chemical Engineering

Vice Chairman

Antony N. Beris
Department of Chemical Engineering

University of Colorado
Boulder, CO 80309-0424
(303) 492-5517

University of Delaware
Newark, DE 19716
(302) 451-8018

3. Chaos in Deterministic Systems and Applications in Chemical Engineering.

Papers are sought in all areas of deterministic chaos and applications to problems of interest in chemical engineering. Topics include analysis of dissipative and Hamiltonian systems, iterative maps, numerical experiments, and techniques for detecting and describing chaos (both analytical and computational). Applications include (but they are not limited to) fluid mechanics, turbulence, and topology of flow fields, magnetohydrodynamics, transport processes, control algorithms, nonlinear optics, quantum chaos, and dynamics of populations.

Chairman

Julio M. Ottino
Department of Chemical Engineering
University of Massachusetts
Amherst, MA 01003
(413) 545-0593

Vice Chairman

Michael F. Doherty
Department of Chemical Engineering
Univ. of Massachusetts
Amherst, MA 01003
(413) 545-2539

4. Novel Applications of Mathematics in Chemical Engineering.

Papers are sought which describe new applications of mathematics to chemical engineering problems. Topics include: new methods for discrete optimization, applications of differential geometry in control and fluid mechanics, dynamical systems, bifurcation theory, nonlinear time series, applications of cellular automata.

Chairman

Jeffrey C. Kantor
Department of Chemical Engineering
University of Notre Dame
Notre Dame, IN 46556
(219) 239-5797

Vice Chairman

H. Chia Chang
Department of Chemical Engineering
University of Notre Dame
Notre Dame, IN 46556
(219) 239-5847

5. Recent Developments in Numerical Methods for ODE/DAE/PDE Systems.

Chairman

George D. Byrne
Exxon Research and Engineering Company
Route 22 E.
Annandale, NJ 08801
(201) 730-3115

Vice Chairman

William E. Schiesser
Department of Chemical Engineering
Lehigh University
Bethlehem, PA 18015
(215) 758-4264

First Call for CAST Sessions Houston AIChE Meeting
April 7-11, 1991

The names, addresses, and telephone numbers of the session chairmen are given on the next several pages, as are brief statements of the topics to receive special emphasis in soliciting manuscripts for these sessions. Prospective session participants are encouraged to observe the following deadlines:

September 1, 1990: Submit an abstract of the proposed presentation to the session chairman.

October 1, 1990: Authors informed of selection and session content finalized.

January 1, 1991: Submit an extended abstract to be published for distribution at the meeting.

February 1, 1991: Final manuscript submitted to the session chairman.

Area 10a: Systems and Process Design

1. Applications of Artificial Intelligence in Process and Product Design.

Chairman

Babu Joseph
Dept of Chemical Engineering
Washington University
St. Louis, MO 63160
(314) 889-6076

Vice Chairman

Krishna R. Kaushik
Shell Oil Company
P.O. Box 6249
Carson, CA 90749
(213) 816-2276

2. Industrial Applications of Optimization.

Chairman

Emilio J. Numez
Shell Development Company
PO Box 1380
Houston, TX 77251
(713) 493-8866.

3. Process Design and Simulation.

Chairman

A. L. Parker
Shell Oil Company
PO Box 10
Norco, LA 70079
(504) 465-7142

4. Retrofit Design Techniques and Applications.

Chairman

Don Vredeveld
Union Carbide Corporation
PO Box 8361
South Charleston, WV 25303
(304) 747-4829

Area 10b: Systems and Process Control

1. Intelligent Control.

Chairman

Ali Cinar
Department of Chemical Engineering
Illinois Institute of Technology
Chicago, IL 60616
(312) 567-3042.

2. Application of Robustness Concepts in Control System Design.

Chairman

Gerardo Mijares
M. W. Kellogg Company
Three Greenway Plaza
Houston, TX 77046-0395
(713) 960-2032

Vice Chairman

Carlos Garcia
Shell Development Co.
PO Box 1380
Houston, TX 77001

3. Industrial Applications of Nonlinear Control.

Chairman

Jim Riggs
Department of Chemical Engineering
Texas Technical University
Lubbock, TX 79409.

Area 10c: Computers in Operations and Information Processing

1. On-line Fault Administration.

Both theoretical contributions and practical examples are desired. Any theoretical presentation should have practical potential. Examples of fault detection and diagnosis should provide sufficient details so that professionals might use the examples in their own work. Papers will be reviewed by senior researchers in the field, and all authors will be informed of the decision about their paper at the end of the review process. A limited number of papers will be accepted, hence it is advisable to submit your paper as early as possible.

Chairman

David M. Himmelblau
Department of Chemical Engineering
University of Texas
Austin, TX 78712
(512) 471-7445

Vice Chairman

Venkat Venkatasubramanian
School of Chemical Engineering
Purdue University
West Lafayette, IN 47907
(317) 494-0734

2. Plant-wide Management Systems.

Chairman

K. R. Kaushik
Shell Oil Company
PO Box 6249
Carson, CA 90749
(213) 816-2276

Vice Chairman

A. L. Parker
Shell Oil Company
PO Box 10
Norco, LA 70079
(504) 465-7142

3. Computer Integrated Manufacturing.

This session will focus on the use of computers to integrate the planning, scheduling, and control of a sequence of either batch or continuous processes or a combination of the two. For example, papers are invited that cover, but are not limited to: scheduling of product mixing or blending, from raw material to finished product; planning and scheduling of multi-step processes for discrete part manufacture, eg. pronted circuit boards; research results in scheduling or optimization of multi-step production; and fermentation and separation sequences in pharmaceutical manufacture.

Chairman

C. E. Bodington
Chesapeake Decision Sciences
PO Box 275
San Anselmo, CA 94960
(414) 453-4906

Vice Chairman

Rufus A. Baxley
Digital Equipment Corp.
5555 Windward Parkway West
Alpharetta, GA 30201
(404) 772-2121

4. Innovative Use of Spreadsheets in Calculations.

Chairman	*Vice Chairman*
R. A. Freeman	Bruce M. Vrana

5. Applications of Expert Systems.

This session will focus on expert system applications which have been installed or are commissioned for installation. Of particular interest are papers reporting on not only the methodological development of an expert system, but also the broader implementation aspects of the project. Appliocations in process operations, design, scheduling, and planning are all welcome. Reports of novel theoretical or methodological developments will also be considered for the session. The abstract should clearly indicate the status of the work, including the degree of completion andweather the approach has been applied successfully.

Chairman	*Vice Chairman*
James F. Davis Department of Chemical Engineering Ohio State University Columbus, OH 43210-1180 (614) 292-0090	Duncan A. Rowan E. I. DuPont de Nemours & Company PO Box 6090 Newark, DE 19714-6090 (302) 366-6453

Joint Area 10c and Area 5d Session:

1. Applications of Robotics.

Papers are invited that deal with any and all aspects of applications of robotics which could include any or all of the following: surveys, principles and theories, design, case studies, etc. Presentations based on applications in operating plants, industrial laboratories, and university/government laboratories are welcome.

Chairman	*Vice Chairman*
Michael T. Tayyabkhan Tayyabkhan Consultants, Inc. 62 Erdman Avenue Princeton, NJ 08540 (609) 924-9174	John Jepsen Clark Materials Handling Company Route 2, Box 46, Hwy 33 Versailles, KY 40383 (606) 873-9973

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

1990 AWARD NOMINATION FORM*

A. BACKGROUND DATA

1. Name of the Award _____ Today's Date _____

2. Name of Nominee _____ Date of Birth _____

3. Present Position (exact title)

_____

4. Education:

Institution	Degree Received	Year Received	Field
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

5. Positions Held:

Company or Institution	Position or Title	Dates
_____	_____	_____
_____	_____	_____
_____	_____	_____

6. Academic and Professional Honours (include awards, memberships in honorary societies and fraternities, prizes) and date the honor was received.

7. Technical and Professional Society Memberships and Offices

8. Sponsor's Name and Address

_____

_____

_____

_____ Sponsor's Signature

* A person may be nominated for only one award in a given year.

B. CITATION

1. A brief statement, not to exceed 250 words, of why the candidate should receive this award. (Use separate sheet of paper.)

2. Proposed citation (not more than 25 carefully edited words that reflect specific accomplishments).

C. QUALIFICATIONS

Each award has a different set of qualifications. These are described in the awards brochure. After reading them, please fill in the following information on the nominee where appropriate. Use a separate sheet for each item if necessary.

1. Selected bibliography (include books, patents, and major papers published.)

2. Specific identification and evaluation of the accomplishments on which the nomination is based.

3. If the nominee has previously received any award from AIChE or one of its Divisions, an explicit statement of new accomplishments or work over and above those cited for the earlier awards(s) must be included.

4. Other pertinent information.

D. SUPPORTING LETTERS AND DOCUMENTS

List of no more than five individuals whose letters are attached.

	Name	Affiliation
1.		
2.		
3.		
4.		
5.		

Please send the completed form and supplemental sheets by April 3, 1989 to the CAST Division 2nd Vice Chairman, Professor Ignacio Grosmann, Chemical Engineering Department, Carnegie-Mellon University, Pittsburgh, PA, 15213. Telephone: (412) 268-2228.
BITNET: D391GR99@CMCCVB.Bitnet

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Application For Membership

I wish to join the Computing and Systems Technology (CAST) Division of AIChE

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Preferred mailing address: _____Home _____Office

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(If not, I understand that I must join AIChE within a one year period to continue as a CAST Division member.)

_____ My CAST dues of $5 are enclosed

_____ I will pay my CAST dues with my annual AIChE dues

Please mail this application to:

American Institute of Chemical
Computing and Systems Technology Division
345 East 47th Street
New York, NY 10017