

TRANSACTIONS OF THE SPRING 2003 MEETING OF THE TEXAS TECH PROCESS CONTROL AND OPTIMIZATION CONSORTIUM

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HIGHLIGHTS

- The presentations will be made available to the consortium members at the website, <http://www.che.ttu.edu/pcoc/>. Please contact either Professor Riggs at (806) 742-1765 for login and password or Professor Hoo as (806) 742-4079 if assistance is needed.
- **Workshop:** Dave Hoffman of CCI presented the tutorial portion of the workshop entitled “Building Inferentials”. Dave considered in some detail the development and analysis of inferentials for product compositions (i.e., ASTM boiling points, flash points and Reid vapor pressure) for typical fractionators found in the refining industry. He made the point that the laboratory data used to develop an inferential should be as accurate as possible and presented an analysis of the sources of errors in laboratory data. He also presented a method to estimate the repeatability and reproducibility of laboratory samples. Dave presented an analysis of where best to locate temperature and pressure sensors for composition inferentials for fractionators. He further recommended the use of pressure corrected temperatures for sensors for the general case and partial pressure corrected temperatures for cases that involve steam stripping. Even though Dave’s presentation was focused on building inferentials for the refining industry, the principles that he demonstrated may be used in the development of effective inferentials for a wide range of industries.
- **Panel Discussion:** Following the workshop a panel discussion lasted for about 1.5 hours. The panel members were Steve Johanson (Honeywell), Dave Hoffman (Control Consulting, Inc.), Dave Hokanson (ExxonMobil Chemicals) and Pierre Carrette (Shell Global Solutions). Each panelist made a 15-minute summary statement on the industrial application of inferentials. Steve and Pierre also addressed the key features of their companies products in this area. The panelists then responded to questions from the industrial representatives.
- **The first presentation,** “Automated Linearizing Transformations for Advanced Control Applications” was given by Chuck Johnston of Cutler-Johnston Corp, Houston, TX. Chuck described new software that he has developed that facilitates the used of linearizing nonlinear aspects of a DMC application. He used a nonlinear valve to illustrate the approach used and applied the software to typical plant data to linearize the impact of a nonlinear valve.
- **The second presentation,** “Web-Based Real-Time Optimization” was presented by Steven Hendon of eSimulaltion, Inc. Steve described how his company is offering real-time optimization services for gas plants using the world-wide web as the communication link

with these remote installations. Besides providing real-time optimization with remote monitoring, these applications also provide convenient remote monitoring of equipment performance and data storage. Steve also demonstrated his software by accessing his companies web site. He indicated that the payout periods are typically 1.5 months and yearly return on investments in excess of 300%.

- Video tapes and possibly DVD's of the workshop, workshop panel discussion, and business meeting presentations are available to consortium members. Please contact Jim or Karlene to receive you copies.
- Presentations were made by students.
 - Dale Slaback (advisor Jim Riggs) discussed empirical models for the time to runaway for exothermic CSTRs.
 - Zdravko Stefanov (advisor: Karlene Hoo) presented an application of multivariate statistical analysis in a novel two-level hierarchical framework to an industrial problem that is common to the pulp and paper industry. The work was sponsored by industrial member company Tembec, Inc (Canada). A peer-reviewed paper will appear shortly in Control Systems Magazine. Abstract can be obtained from the web site www.che.ttu.edu/pcoc/members/students/zstefanov.htm.
 - Eric Vasbinder's (advisor: Karlene Hoo) presentation covered the difficult topic of integration of design and control. He introduced his modified Analytical Hierarchical Procedure that ranks consistently competing design, operational, and control objectives. The thrust of this approach rests with a modular decomposition of the flowsheet and ranking to reduce the dimensionality of the plantwide control problem. A peer-reviewed paper has been accepted to Industrial and Engineering Chemistry Research (to appear in October). An abstract can be obtained from www.che.ttu.edu/pcoc/members/students/evas.htm.
- Jim Riggs presented an overview of his research program. He discussed studies on reactive distillation control, optimization and control of an ethylene oxide reactor sytem, and using surrogate models for large-scale process optimization.
- Karlene Hoo presented an overview of her research program. She introduced her two new students Vikram Shabde (PhD) who joined in Fall 02 and C. Dewey Buscher (MS) who joined in Spring 03. Since two of her students gave presentations, she concentrated her remarks on a new experimental project related to biotransport/biomechanics. The work is a collaboration with Prof. Herbert F. Janssen and the Texas Tech Health Science Center and involves the study of blood flow in human venous system. The objective is to understand the fluid flow as it relates to serious diseases such as deep venous thrombosis and chronic venous insufficiency. For more details see <http://www.che.ttu.edu/faculty/hoo2/bioResearch.htm>
- The feedback from the industrial audience and visitors was very lively and informative. The poll conducted after the workshop indicated that "Maintaining MPC" controllers was the overwhelming favorite topic for the Fall 03 workshop. There were additional topics that were suggested that generated a great deal of passionate discussion as to why they should be

addressed. Indeed, almost all topics suggested for workshop were added to the list. Other topics were set aside for business day presentations. The outcome of these can be found on the “workshop response” form for Fall 03 at

<http://www.che.ttu.edu/pcoc/meetings/meetings.htm>

- We will try to set a date and draft an agenda for for Fall 03 meeting and put it on our web site as soon as possible.

ATTENDANCE

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