

A PROPOSAL FOR A
CENTER FOR PROCESS MANUFACTURING
SEPTEMBER 12, 1992

Introduction and Mission Statement

The process industries include firms engaging in production which adds value by mixing, separating, forming and/or chemical reactions, in either batch or continuous modes. It is estimated that the process industries comprise approximately 40 percent of all manufacturing firms in the United States. Major process industries include: pharmaceuticals, paper, metals, food processing, chemicals, plastics, and fibers.

Process manufacturing differs from discrete manufacturing in ways that create a unique set of problems and approaches to manufacturing, planning, and control. At present, the process industries lack a resource dedicated to conducting applied research and providing assistance with its unique set of problems. We were unable to identify any university-affiliated, applied-research center focused specifically on the problems of the process industries.

The School of Business at Penn State Erie proposes to develop a center to assist the process industries. The proposed center involves a cooperative effort between the American Production and Inventory Control Society (APICS) Process Industry Specific Interest Group (PISIG), interested industry affiliates representing manufacturing firms from the process industries, and university faculty associates with appropriate expertise. Appendix A contains vitae of faculty associates.

The mission of the center is to assist its industry affiliates through the creation, dissemination, and application of knowledge that promotes the advancement of process manufacturing operations. This mission will be accomplished through several center activities of benefit to its industrial affiliates.

Center Activities Benefiting Industrial Affiliates

Initially, the activities of the center will be limited and highly focused. The first proposed area of inquiry involves scheduling problems relevant to the batch-mix segment of the industry. A proposed schedule of center activities and deliverables is summarized in Appendix B. Activities and areas of inquiry will expand as industry support and faculty participation increase. Eventually the center will organize a full range of educational, research, and knowledge transfer activities, including:

Educational

- Short courses, seminars and workshops on topics of interest to industry affiliates.
- An annual conference featuring research conducted by center associates and sharing of new approaches developed by practitioners.

- Student internships and research projects hosted by industry affiliates and supervised by faculty associates of the center.
- A newsletter to inform industry affiliates regarding center activities, including a column devoted to answering questions of general interest.
- Maintenance of a repository of information applicable to the process industry.

Research

- Generic and proprietary research projects on process manufacturing issues of interest to individual industry affiliates. This will include the development of simplified, cost-effective heuristics as alternatives to complex optimization procedures. Copies of the center's sponsored research agreement is included in Appendix C.
- Free informal consultation and major consultation at reduced rates.
- Reports on generic research projects and reviews translating technically complex decision models into terms understandable to users thereby facilitating their implementation.

Benefits to University and Faculty Associates

The university and faculty associates of the center also will derive many important benefits from the center. These include:

- Funding to support graduate and undergraduate research assistantships.
- Increased contact with industry resulting in research and instruction that is more grounded in "real-world" business issues.
- Greater intellectual stimulation for faculty resulting from research challenges that have the potential for immediate application.
- Improved placement opportunities for graduates resulting from increased contact with potential employers.
- Increased consulting opportunities for faculty associates and students.

Specific Projects and Deliverables

Examples of specific projects and deliverables proposed for center affiliates and associates in the short-term, include:

Newsletter Articles

- Network strategy
 - Strategic planning in process industries
 - Optimal control in planning and scheduling
- Linear and non-linear programming scheduling formulations problems
- Heuristic scheduling
- Simulation methods in scheduling

Working Papers

- Scheduling development based on simulation, linear programming and optimal control
- A new view of network strategy and site location in the process industry
- Use of graphical solution techniques to solve process industry scheduling problems
- Evaluation of major issues regarding packaged finite capacity scheduling software for the process industry
- The use of expert systems for scheduling
- The impact of micro-computer technology on scheduling

Process Industry Symposium

- The application of optimal control to the process industry

Organization of the Center

Three levels of membership are envisioned. Basic memberships are \$1,000 per year and allow members to receive research publications and newsletters of the center, participate in seminars workshops and conferences at reduced rates, have access to free informal consulting, and receive reduced rates for large scale consulting projects. Sponsoring memberships are \$5,000 yearly and include the benefits of basic membership but in addition give priority access to student research associates who work on faculty-supervised research projects within the sponsoring firm. Partners are members who contribute \$10,000 yearly. They receive all of the benefits of basic and sponsoring members but also have representation on the advisory board. A memorandum of agreement covering membership in the center for process manufacturing is contained in Appendix D.

Membership on the advisory board will consist of one representative of each partner organization, the director of the Penn State Erie School of Business who will serve as interim director of the center, a representative of the APICS PISIG, and the director of the center. The role of the advisory board members will be to assist in directing the center's research and knowledge transfer activities. In this way the center's activities are ensured to remain industrially relevant. Members will have the following responsibilities:

- Provide general guidance for the operation of the center.
- Advise on the direction for generic research projects.
- Suggest methods for prudent handling of the center's finances.
- Set direction for recruitment of new center members.
- Help evaluate the effectiveness of the center in meeting its stated goals.
- Serve as liaison between the center and their respective organizations.

Relationship of the Center to the APICS PISIG

The center is being developed in cooperation with the APICS PISIG. The PISIG currently has 2,600 members. By supporting the center, the PISIG seeks to make applied research and expertise more available to its membership. The center's association with the PISIG provides it with legitimacy within the process industries. Through its extensive contacts within the process industries the PISIG can assist the center with marketing of its educational and research programs in two ways: first, by producing and mailing a brochure about the center; and second, by including a column about center activities in its newsletter. The PISIG also will create a position on its steering committee for an academic liaison from the center and support the travel expenses of the liaison to its steering committee meetings and other APICS meetings where appropriate.