Technical Assistance Program
Purdue University

Annual Report
Year Ending June 30, 1985
Director's Message

INFRASTRUCTURE: AN UNDERLYING BASE OR FOUNDATION, ESPECIALLY FOR AN ORGANIZATION OR A SYSTEM.

Purdue University has been an integral part of Indiana's economic well-being since its founding as a land-grant institution in 1869. Today, there are thousands of alumni making positive contributions in every sector of business, industry, and government. University research in areas such as pharmaceutical products, medical devices, communication technology, transportation, advanced manufacturing, and agriculture benefits the everyday lives of our citizens.

In recent years, the era of intense international competition has driven the need for new forms of support to Indiana's large and very important manufacturing sector. The Technical Assistance Program (TAP) was established in 1986 to provide technical infrastructure for industrial modernization in Indiana. Since that time, TAP has assisted thousands of Indiana companies with assessments of new technologies, environmental compliance, factory modernization, manufacturing management, product development support, and technical information. This joint effort between talented university faculty, graduate engineers, and staff, and the hard working people in manufacturing, has generated a substantial impact on the state's economy.

The work of industrial modernization is never complete. There is every indication that competition will become even more intense and that new challenges will arise. However, the many examples in this report demonstrate that Indiana companies can continue to compete internationally, grow, and prosper. The faculty, graduate engineers, and staff of the Technical Assistance Program look forward to working with Indiana manufacturers to meet the new challenges and help secure the economic vitality of the state.

Robert A. Greenkorn
July 1996
The Technical Assistance Program provides a broad range of services to Indiana companies through a team of over forty faculty, graduate engineers, and staff located at four Purdue campuses.

Assessment of new technologies...
In our era of rapid technological change, companies find TAP a valuable resource for the assessment of new technological developments such as advanced 3-D modeling, graphical manufacturing simulation, finite element analysis, design of experiments, high speed machining, nondestructive testing, and rapid prototyping.

Mohammad Zahraee (left), professor of mechanical engineering technology at the Purdue Calumet campus, demonstrates the advantages of the use of solid modeling to a new local company.

Environmental compliance...
TAP guides companies through the complex permitting process, and identifies the best alternatives for the treatment of industrial wastes.

Bob Jacko (right), professor of environmental engineering, helps a southern Indiana company upgrade their environmental control systems to meet the Clean Air Act regulations.

Factory modernization...
Companies utilize TAP for improvement of plant layout, assembly lines, manufacturing work cells, quality systems, and individual production processes.

Colin Moodie (right), professor of industrial engineering, assists a Goshen company with the redesign of a furniture assembly line.
Manufacturing management...
Accurate product costing systems, focused industrial marketing, and careful strategic planning are very important in today's global business climate. 

Keith Smith (left), professor of management, provides strategic planning guidance to a rapidly growing Petersburg metal fabricator.

Product development support...
TAP supports product development efforts by providing advice on design methods, material selection, product testing, industry standards, and manufacturing processes.

Lynn Schlager, professor of mechanical engineering at Indiana University-Purdue University Fort Wayne, develops performance specifications for a hydronic heating unit for a local company.

Technical information...
The Technical Information Service (TIS) provides patents, standards, technical reports, market data, and the latest information on virtually any topic to a wide range of businesses and organizations.

TIS ships over 15,000 documents per year. Many companies take advantage of overnight service.

Expertise for extended projects...
Through summer interns and graduate student externs, Indiana companies receive the benefit of highly qualified and motivated students for in-depth manufacturing, product development, and industrial management projects.

Links to economic development resources...
TAP and TIS work closely with companies to link their needs to other Purdue programs offering in-house training, distance education, export assistance, research, pollution prevention assistance, and support for business attraction and retention. Referrals are also routinely made to state and federal programs, testing laboratories, and consulting engineers.
Economic Impact Data

The results detailed in this report include millions of dollars in cost reductions, job creation and retention, and significant capital investment in communities throughout the state. These achievements demonstrate the strong commitment of Indiana companies and the Technical Assistance Program to work together to improve the state's economic competitiveness.

<table>
<thead>
<tr>
<th>Economic Impact Summary</th>
</tr>
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<tbody>
<tr>
<td>Based on Client Evaluations of TAP Work With Industry</td>
</tr>
<tr>
<td>May 1986 through June 1996</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Year 1*</th>
<th>Year 2*</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Investment</td>
<td>$20,982,400</td>
<td>$5,565,600</td>
<td>$26,568,000</td>
</tr>
<tr>
<td>Dollars Saved</td>
<td>$7,932,030</td>
<td>$6,279,340</td>
<td>$14,211,370</td>
</tr>
<tr>
<td>Increased Sales</td>
<td>$39,762,300</td>
<td>$99,889,500</td>
<td>$139,651,800</td>
</tr>
<tr>
<td>Jobs Added</td>
<td>296</td>
<td>601</td>
<td>897</td>
</tr>
<tr>
<td>Jobs Saved</td>
<td>627</td>
<td>571</td>
<td>1,198</td>
</tr>
</tbody>
</table>

* Following date of TAP assistance

The project results shown here are based on information provided by the users of the program's services. Over ninety percent of the evaluations state that help from the Technical Assistance Program was beneficial and that the recommendations are being used.
**INFRASTRUCTURE: AN UNDERLYING BASE OR FOUNDATION, ESPECIALLY FOR AN ORGANIZATION OR A SYSTEM.**

**Technical Information Service**

TIS offers comprehensive research and document delivery services on a cost-recovery basis to companies in every business sector.

**TIS Activity Summary**

Based on Requests
February 1989 through June 1996

**Information Projects Completed**

**Document Orders Filled**

**Program Funding for Fiscal Year 1995-96**

TAP is funded from a combination of state, university, and industry sources.

* Purdue: $365,000

* Industry: $700,000

* BMT: $1,215,000

* Indiana Business Modernization and Technology Corporation, Indianapolis.

** Includes $300,000 for summer interns paid directly by their employer.
Examples of TAP Assistance

Jim Mathers, Vice President, David Mathers, President, and Bob Holden, Graduate Engineer in Environmental Engineering, examine recently cut veneer.

Thiesing Veneer Company, Inc.
Mooresville

The environmental permitting process can require extended effort in the collection of supporting data. Normally, a company can use existing emission factors for the permit calculations. Because emission factors have not been developed for Thiesing’s wood handling processes, the company requested TAP assistance in estimating their particulate emissions. The normal method of calculating emissions for Thiesing’s processes requires an expensive procedure. After analyzing the company’s processes, TAP was able to provide a cost effective engineering solution for estimating the emissions. The TAP assistance saved the company $15,000 and has shortened their permitting process.
**Environmental Permitting and Training**

Teledyne Casting Service

LaPorte

Teledyne Casting Service produces large gray iron castings for the transportation industry. The nature of the processes Teledyne uses for production requires employees to understand and comply with environmental regulations. Teledyne hired Laurie to train personnel on environmental regulations. She also assisted Teledyne with its environmental permitting efforts and supported the manufacturing engineers with cost analyses.

**Integration of Design and Manufacturing**

Dwyer Instruments, Inc.

Michigan City

The successful integration of design and manufacturing is a challenge faced by all innovative companies. Dwyer Instruments in Michigan City is one of the nation's leading manufacturers of pressure, flow, level, and temperature instrumentation. To support continued sales growth, TAP was asked to help integrate the design and manufacturing of a new low-pressure transducer designed for very high accuracy. The TAP engineering analysis of the mechanics of the device identified steps in the assembly process that were critical to the production of the new product. This information has been used to develop an assembly technique that consistently produces instruments meeting very tight performance specifications. The new product is now in the early production stage and will help Dwyer strengthen their position in the growing market for instruments that measure low pressure.

**Project Management**

C.H. Kraus

Fort Wayne

C.H. Kraus is a specialty fabrication manufacturer facilitating its rapid growth through installation of on-line information systems. John's assignment was to integrate project management functions. This included building a database for use by employees throughout the plant to determine load schedules, track work-in-process, and identify shipping information.
Kirby Risk Corporation

Lafayette

Kirby Risk Corporation has expanded operations in response to increased demand for its quality-certified wire harness products, which are used on various large engines and tractor trailers. Their customers demand very high quality standards, just-in-time delivery, and rapid response to design changes. NaRaye Williams has completed two extern sessions with the company. In the first session (1994-95), she helped convert the existing assembly line to multiple flexible cells with integrated electronic testing. After completing her M.S. thesis research on the design of TestLAN, a networking approach to integrated facility design based on her work with the company, she was employed in a second extern session (1995-96) to design a new assembly facility. Currently, NaRaye is working on her doctoral research to extend the theoretical aspects of TestLAN following her experience at Kirby Risk Corporation. Her work has been a significant part of the company’s development of responsive cost-efficient computer-integrated manufacturing systems.
Floating Docks
Manufacturing Company

Indianapolis

Floating Docks manufactures and installs customized docks in waterways throughout the Midwest. While each design is unique, they are constructed from stock materials. Jody's assignment was to automate the support paperwork. She developed a library of part designs using AutoCAD which has shortened the time to develop site and assembly drawings and the customer quotation process.

Motion Control Industries, Inc.
Logansport

Motion Control Industries, Inc. provides friction materials for the specialty brake and clutch market. As part of an effort to improve the capability to develop new products, Tom was employed as a summer intern to computerize the operation and control of dynamometers used in the product design and testing process. His work has resulted in improved data accuracy, expanded testing capabilities, and improved collection and presentation of technical information.

Anchor Industries, Inc.
Evansville

Anchor Industries in Evansville is the nation's largest manufacturer in its field of custom fabric products. Their product line consists of thousands of items such as tents, awnings, and soft luggage. Bill Loudermilk has been using the Purdue Technical Information Service for over eight years. Through this service, he has obtained numerous technical documents, reports, standards, and engineering documents. For example, he requested data on the amount of hail by region and season, important information for their tent product line. According to Mr. Loudermilk, "The TIS service has always been very responsive. They have saved our company a great deal of time and effort in obtaining the information we need for our research and development programs."
Hockey Tech

Indianapolis

Hockey Tech is an Indianapolis packager and distributor of four scientifically designed tapes used on ice and roller hockey sticks. In order to meet tight specifications such as a high coefficient of friction, TAP was contacted for assistance with material selection and performance evaluation. The TAP evaluation guided the company through a design process that has resulted in the development of high performance tapes. Hockey Tech has grown to seven employees and is now selling its tape under the brand name “STICK IT” in over six hundred stores and pro shops in the United States and Canada.

QS 9000 Certification

Ventra Corporation

Columbus

Many Indiana manufacturers are pursuing ISO 9000 and QS 9000 certification in accordance with customer requirements. Summer interns provide an ideal resource to assist the certification process through the preparation of internal documentation and procedures. Ventra Corporation, a manufacturer of air and fluid reservoirs, hired John to assist with the updating of quality procedures to support their certification effort.

Civil Engineering

Town of Highland

Highland

Municipal organizations commonly use the Technical Assistance Program to find qualified summer help with civil engineering projects. Vincent marked and measured curbing as part of a curb replacement project in Highland. In addition, Vincent provided AutoCAD drafting support and assisted with the implementation of a geographical information system program by providing software expertise.
Wells Electronics, Inc.

South Bend

Wells Electronics is a leading manufacturer of burn-in and test sockets for the international semiconductor industry with operations in Japan, Singapore, the United Kingdom, and South Bend. The company requested TAP assistance in consolidating three separate plants into a new, highly productive manufacturing facility. Working closely with the company, TAP developed recommendations for the tool room and manufacturing areas that have been used to increase productivity by twenty-five percent in the new facility. This substantial improvement is helping the company lead the competition and increase market share in their very competitive international markets.

Development of a New Cutting Tool

Bassett Rotary Tool Company

Monticello

Bassett Rotary Tool Company manufactures solid carbide round shank cutting tools with a major emphasis on milling and drilling. A large potential customer asked Bassett to design an end mill with the capability to machine thin-walled cast iron compressor components holding extremely tight tolerances. Bassett asked TAP to help develop and test the unique tool geometry required for this application. The joint effort was successful and Bassett has obtained substantial orders from the new customer. Manufacturing capacity and employment has been increased by twenty percent to produce the new end mill.

MRP System Development

Aero Industries, Inc.

Indianapolis

Aero Industries assembles to-order roll tarp and flatbed kits for the trucking industry. Many of the orders the company receives are for single items which require extensive documentation. Aero employed a team of interns to accelerate the implementation of an integrated MRP and financial software system intended to simplify and automate customer order processing.
**TAP Graduate Engineers**

- Charles J. Adam
  - Mechanical Engineering
- Gonzalo R. Castro
  - Industrial Engineering
- Karoly Fekete
  - Mechanical Engineering
- Derek M. Fetzer
  - Industrial Engineering
- Raul L. Garcia
  - Industrial Engineering
- Nath Gopalaswamy
  - Mechanical Engineering
- Robert W. Holden
  - Environmental Engineering
- Rudy H. Kizer
  - Materials Engineering
- Ted M. Kostek
  - Mechanical Engineering
- Kuang J. Ku
  - Mechanical Engineering
- William H. Lee
  - Industrial Engineering
- Douglas J. Lutterloh
  - Mechanical Engineering
- Heather M. Macnific
  - Management
- Thomas A. Mahon
  - Civil Engineering
- Sara A. McComb
  - Industrial Engineering
- R. David Monahan
  - Industrial Engineering
- Sergio F. Palanca
  - Industrial Engineering
- Michelle L. Parsons
  - Management
- Michael L. Rydson
  - Intern Program
- Chiang-Sheng Shiue
  - Mechanical Engineering
- Cara J. Shreves
  - Industrial Engineering
- Carla J. Sheeres
  - Industrial Engineering
- Charles A. Thompson
  - Electrical and Computer Engineering
- John E. Thompson
  - Environmental Engineering
- Cliff C. Travis
  - Industrial Engineering
- NaRaye P. Williams
  - Industrial Engineering
- Chung-I Yan
  - Civil Engineering

**Industry Advisory Council**

- Jack W. Bell
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  - Logansport
- Newton H. Greenshaw
  - President
  - Star Metals
  - Petersburg
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  - Vice President of Technical Operations
  - Shuttleworth, Inc.
  - Huntington
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  - President
  - Hebel, Inc.
  - Campbellsburg
- Patrick M. Houghlin
  - Vice President
  - Hitachi Cable Indiana
  - New Albany
- Randall C. Jacobs
  - Director, Economic Development
  - NIPSCO
  - Hammond
- Edward T. Ketcham
  - Vice President and General Manager
  - Hurricane Compressors
  - Franklin
- Douglas A. Mansfield
  - Vice President of Manufacturing
  - Kirby Risk Corporation
  - Lafayette
- Charlene Massing
  - President
  - FSI Products
  - Aurora
- Sue Morey
  - President and Chief Executive Officer
  - Morfam, Inc.
  - Mishawaka
- M. Dean Pope
  - President
  - Roots Division of Dresser Industries
  - Goshen
- D. Stewart Rariden
  - President
  - Stone City Products
  - Bedford
- Mark P. Schafer
  - Chief Executive Officer
  - Evergreen Intl. (Easy Rake)
  - Lebanon
- Harvey R. Siegel
  - Vice President of Corporate Engineering
  - Coachmen Industries
  - Middlebury
- Andrew Taitz
  - Chairman and Chief Executive Officer
  - Union City Body Company, L.P.
  - Union City
- Stephen J. Vangel
  - Secretary-Treasurer and Chief Executive Officer
  - Steel Cities Steels
  - Gary
- Ken Walker
  - Manager of Facilities and Architecture
  - Digital Audio Disc Corp.
  - Terre Haute
- Kurt H. Westman
  - President and Owner
  - Alfa Corporate Group
  - Fort Wayne

**Advisory Board**

- Emily R. Mobley
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  - LeRoy Silva
    - Director
    - Business and Industrial Development Center
  - Purdue University
- Gerald Silver
  - Dean of Professional Studies
  - Purdue University Calumet
The Purdue Economic Development Team

Purdue University provides a full range of educational, business assistance, and research programs for Indiana manufacturers, businesses, and governmental units. The Purdue Resource Directory provides a complete listing. Call (317) 494-6838 to request a copy.

**Agri-Business Assistance**
Cooperative Extension Service  
Phone: (317) 494-891

**Distance Learning**
Continuing Engineering Education  
Phone: (317) 494-7015  
Continuing Education  
Phone: (800) 359-2968

**Exporting Assistance**
Center for International Business, Education, and Research  
Phone: (317) 494-4463

**Industrial Painting and Finishing**
Coating Applications Research Laboratory  
Phone: (317) 494-1285

**Industrial Recruitment and Retention and Purdue Research Park Marketing**
Business and Industrial Development Center  
Phone: (800) 787-2432

**Industrial Training**
School of Technology Centers for Excellence  
Phone: (317) 494-0887

**Pollution Prevention**
Indiana Pollution Prevention and Safe Materials Institute  
Phone: (317) 494-6450

**Research and Development**
Division of Sponsored Programs  
Phone: (317) 494-6200

**Technical Assistance**
Technical Assistance Program  
Phone: (317) 494-6258

**Technical Information**
Technical Information Service  
Phone: (317) 494-9876

**Transportation Infrastructure Assistance**
Highway Extension and Research Project for Indiana Counties and Cities  
Phone: (800) 428-7639

To connect to the above programs, please visit the World Wide Web address:
http://www.ecn.purdue.edu/TAP/Other_Assistance_Programs/

Please note that the 317 area code will change to 765 on February 1, 1997.
How to Request Assistance

Technical Information
The extensive technical collections of Purdue University, as well as sources worldwide, are used to fill information needs on virtually any topic.

Typical Projects
Technical articles
Patent searches
Industry standards
Marketing data

Costs and Confidentiality
Each request is quoted individually. Typical fees are $150 for an in-depth information search and $14 for each document sent. All work is kept confidential.

Contact for Technical Information:
Suzanne M. Ward
Manager
Technical Information Service
Phone: (317) 494-9876
Fax: (800) 289-3144

Assistance Projects
These projects provide recommendations on a wide range of issues including manufacturing improvements, product development, costing and environmental problems.

Typical Projects
Plant layout
Process improvement
Design recommendations
Environmental problem resolution
Activity-based cost accounting

Costs and Confidentiality
No charge for services, but limited to five days of Purdue input. All project information, including company name, is strictly confidential.

Summer Interns
This program provides companies with well qualified students for twelve-week summer projects.

Typical Projects
Product design
Environmental permits
Facilities planning
Product costing
Manufacturing systems

Costs and Confidentiality
Interns are employed directly by the company. Total compensation for the summer ranges from $4,500 to $7,000. There is no charge for limited faculty assistance. All projects are kept confidential.

Graduate Student Externs
This program is for advanced projects requiring a graduate student and a faculty for an extended period of time.

Typical Projects
Advanced product modeling
Computer-integrated manufacturing
Manufacturing systems development

Costs and Confidentiality
Each project is separately quoted and fees are paid to the Technical Assistance Program. A one-semester project costs approximately $12,000. Confidentiality is negotiated for each project.

Contact for Technical Assistance Projects, Summer Interns, and Graduate Student Externs:
David R. McKinnis
Associate Director
Technical Assistance Program
Phone: (317) 494-6258
Fax: (317) 494-9187
E-mail: tap@ecn.purdue.edu
http://www.ecn.purdue.edu/TAP/

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World Wide Web

Current information about TAP is now available on the World Wide Web. Companies can easily review project examples, learn about program services, and request assistance through this site. The address is:

http://www.ecn.purdue.edu/TAP/

Technical Assistance Program
Purdue University
Room G-175
1284 Civil Engineering Building
West Lafayette, Indiana 47907-1284

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E-Mail: tap@ecn.purdue.edu

Purdue is an equal access/equal opportunity university.

Designed by Pamela Runoff-Murr, Engineering Productions Office. Photography by John Underwood and Dick Myers-Walls, Center for Instructional Services, and Mark Fitch and Scott Tanner, Commercial Photography.

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