Purdue University has a long history of promoting economic vitality in the State of Indiana. Thousands of alumni are employed in business, public service, and industry, and the university offers a broad range of educational, research, and economic development programs designed to strengthen our diverse economy.

The Technical Assistance Program (TAP) was established in 1986 to provide much needed support to Indiana’s important industrial sector. Since that time, TAP has played a considerable role in improving the capability and productivity of manufacturing firms throughout the state. TAP has undertaken 3,890 assistance projects, placed 476 summer interns, performed 3,769 information searches, and has delivered 111,779 technical documents. Valuable support has been provided on issues such as advanced manufacturing, factory modernization, new product development, environmental compliance, industrial management, and information technology. The 3,000 companies served have reported significant impact from TAP assistance, including 3,224 jobs added or saved, $42,164,000 in capital investments, $16,605,770 in cost savings, and $146,313,400 in increased sales.

Economic development requires a strong commitment by all involved parties. The examples provided in this report illustrate the excellent working relationship between Purdue and Indiana industry, a relationship that is providing substantial benefits to our citizens. The faculty, staff, and graduate engineers in the Technical Assistance Program are pleased to work with Indiana’s dedicated people in manufacturing to meet today’s tough business challenges, and to help secure the economic vitality of the state.

Robert A. Greenkorn, Director
David R. McKinnis, Associate Director
July 1998
The Purdue University Technical Assistance Program makes the vast resources of Purdue readily available to Indiana business, industry, and governmental units. Since 1986, TAP has worked closely with Indiana companies to improve manufacturing competitiveness, assist in new product development, implement advanced industrial management tools, and solve difficult environmental problems. Over forty-five faculty, graduate students, and professional staff from three Purdue campuses work with hundreds of companies throughout the state each year.

The program staff meet in person with company representatives to define projects and ensure that the assistance provided is timely, feasible, and technically sound. Program effectiveness is measured in many ways, including the impact on capital investment, cost reduction, sales, and employment. Over ninety percent of those using the program report positive results.

The many achievements listed in this report demonstrate the strong commitment of Indiana companies and Purdue University to work together to improve the state's economic competitiveness.
Technical Assistance Projects

To date, 3,890 projects have been undertaken for Indiana companies on a wide range of technical issues. The most common requests for assistance include:

Advanced Manufacturing
- Plant layout in production and warehouse areas.
- Implementation of advanced methods for measuring product attributes and controlling quality.
- Process improvements for machine centers, assembly lines, and individual workstations.
- Systems development such as scheduling, computer-aided design, and computer-integrated manufacturing.
- Reduction of material handling costs.

Product Development and Engineering
- Review of design changes and improvements.
- Material selection for specific applications.
- Problem solving such as corrosion or component failure.
- Identification and demonstration of new design, testing, and evaluation methods.

Environmental
- Determine if a plant or process is within EPA regulations.
- Assist in understanding and completing the environmental permitting process.
- Solve specific waste treatment and disposal problems.
- Compliance with the Clean Air Act.
- Find consultants, test labs, and summer interns for extended projects.

Industrial Management
- Improvement of product costing and financial systems.
- Assistance with strategic planning.
- Development of improved methods for industrial marketing.
- Evaluation of proposed plant and equipment investments.

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Economic Impact Summary

Based on Client Evaluations of TAP Work with Industry
May 1986 - June 1998

<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>$33,023,400</td>
<td>$9,140,600</td>
<td>$42,164,000</td>
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<tr>
<td>Cost Savings</td>
<td>$9,895,900</td>
<td>$6,709,840</td>
<td>$16,605,740</td>
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<tr>
<td>Increased Sales</td>
<td>$41,947,300</td>
<td>$104,366,100</td>
<td>$146,313,400</td>
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<tr>
<td>Jobs Added</td>
<td>363</td>
<td>798</td>
<td>1,161</td>
</tr>
<tr>
<td>Jobs Saved</td>
<td>1,131</td>
<td>932</td>
<td>2,063</td>
</tr>
</tbody>
</table>

*Following date of TAP assistance
Technical Information Service (TIS)

Since 1989, companies and individuals have received 3,769 information searches and 111,779 documents from this service. Most questions fall into the following categories:

- Engineering and technology.
- Marketing.
- Biological, veterinary, and pharmaceutical sciences.
- Management.
- Agriculture.

Projects by Fiscal Year

![Graph showing projects by fiscal year for TAP and TIS from 1985-86 to 1997-98.](image-url)
Summer Intern Program

To date, 476 students have been placed with Indiana companies to work on product development, manufacturing, environmental, and industrial management projects. Typical projects include:

- Plant layout and process improvement.
- Implementation of ISO and QS 9000.
- Development of environmental management systems.
- Improvement of management systems such as costing and scheduling.
- Product design, testing, modeling, and evaluation.
- Infrastructure projects for municipalities.

### Program Funding - Fiscal Year 1997-98

During the past fiscal year, the Technical Assistance Program and the Technical Information Service were supported by state, business (fees for service), and private foundation sources.

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>FY 97-98 Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>State of Indiana</td>
<td>$1,056,000</td>
</tr>
<tr>
<td>Fees for Service</td>
<td>$329,000</td>
</tr>
<tr>
<td>GTE Foundation</td>
<td>$10,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$1,395,000</strong></td>
</tr>
</tbody>
</table>

In addition to the above funding, the total payroll for TAP summer interns (paid directly to students by their employers) was $400,000.

The Technical Assistance Program is administered by the Purdue University Schools of Engineering.
American Precast Concrete, Inc.

Indianapolis

Jay Ridens, civil engineering summer intern, Doug Sutton, associate professor of civil engineering, Gary Oakes, president, and Joe Retzner, vice president of engineering, inspect stadium risers for the new Indiana Pacers' basketball arena.

American Precast Concrete produces precast and prestressed structural components for customers throughout the Midwest. Jay Ridens performed quality control functions and prepared drawings in the engineering department.
Chemical Engineering

Bremen Corporation

Bremen

Stephen Johnson, paint mixer, and Diane Whirledge, chemical engineering summer intern, inspect a football yard marker.

Bremen Corporation, subsidiary of Creative Foam, is a fabricator of closed and open cell foam specializing in vinyl coatings for the medical, recreational, automotive, and industrial markets. Diane Whirledge was assigned the task of developing improved coatings and coating processes for the company's wide range of products.

Mechanical Engineering

Bucciconi Engineering Company

Gary

Laurent Sattaquilani, vice president of Bucciconi Engineering Company, and Masoud Mojtahed, associate professor of mechanical engineering at Purdue Calumet, review the design of a 50,000 pound sheet metal fabrication machine.

Bucciconi Engineering Company designs and builds material handling and processing equipment for the automotive industry. Masoud Mojtahed and others from Purdue have assisted the company with design considerations for large lifting devices, bearing systems, and sliding hooks. The TAP input has helped the company implement specific product improvements, resulting in more competitive products and increased sales.
PDS/ERAM

Merrillville

Mysore Dayananda, professor of materials engineering, examines a corroded electrical contact in the scanning electron microscopy laboratory. PDS/ERAM remanufactures and repairs electric circuit breakers. The company requested TAP help in identifying the cause of corrosion for a contact used in a very harsh environment. Professor Dayananda's investigation identified the root cause of the problem, and led to a solution that has been successfully implemented.

G & H Wire Company

Franklin

Michael Juhns, president of G & H Wire Company, and Jack Posey, TAP consultant, discuss the company's new 15,000 square foot facility in Franklin.

G & H Wire produces orthodontic appliances for domestic and international markets. The company requested TAP assistance in planning efficient process flow for a new facility. Working closely with the company, a production layout plan was developed and successfully implemented, resulting in increased production and productivity.

Loyal Manufacturing Corporation

Indianapolis

Joseph ElGomayel, associate professor of industrial engineering, Irwin Poernomo, industrial engineering summer intern, and Ronald D. Lambert, president, review new job estimating procedures.

Loyal Manufacturing produces custom metal fabrications for a wide range of customers. Irwin Poernomo developed improved methods for job cost analysis and customer quotations, designed the company's first Web page, and developed aptitude and personality testing for prospective employees.
Myron Noble, president of Pi Rod, David McKinnis, TAP associate director, and Eric Furgason, professor of electrical and computer engineering, examine a new enclosure used on antenna support structures.

Pi Rod designs and manufactures antenna support structures for both domestic and international markets. In response to customer requests for a more aesthetically pleasing structure, the company developed a design with an enclosure for the RF transmission equipment. TAP was asked to evaluate the effect of several enclosure materials on RF transmissions. Eric Furgason conducted an evaluation in his Purdue laboratory under controlled conditions to determine which enclosures would have a negligible effect. The TAP assistance has helped Pi Rod complete the design process, and the new system is now being offered to its customers.
Industrial Engineering

Precise Manufacturing, Inc.
Fort Wayne

Ross Bowers, Industrial engineering summer intern, Aaron Mani, management graduate assistant, Keith Smith, professor of management, and John Whitcraft, operations manager of Precise Manufacturing, discuss the company's new product costing system.

Precise Manufacturing produces custom screw machine parts for a variety of markets. The company employed Ross Bowers to implement an enterprise resource planning system needed to support continued company growth. Keith Smith and Aaron Mani assisted Ross Bowers in identifying criteria for deciding on an appropriate product costing module.

Statistics

Sofamor Danek Manufacturing
Winona Lake

Regina Becker, manager of statistical consulting, and James O'Malley, graduate statistician (far right), are shown with Steve Skerritt, senior quality engineer at Sofamor Danek.

Sofamor Danek produces surgical implants and associated instruments for spinal orthopedic surgery applications. The company employs rigorous statistical methods in their manufacturing process control systems. Regina Becker was asked to help the company evaluate, develop, and implement additional advanced statistical methods.
Environmental Engineering

South Bend
Water Works

South Bend

Chris Michalos, Water Works engineer, and Andrew Karch, environmental engineering summer intern, review the South Bend water distribution system.

South Bend Water Works serves 42,000 residential and commercial customers. Andrew Karch was one of four summer interns employed to conduct hydraulic testing and analysis, perform water testing, and develop a hydraulic model of the system to support improved customer service.

Mechanical Engineering

Tuthill Corporation/Fill-Rite Division

Fort Wayne

Brian O’Hear, mechanical engineering summer intern, Tab Johnson, Fill-Rite design engineer, and Joseph Pearson, associate professor of mechanical engineering, examine a new metering product.

The Tuthill Corporation Fill-Rite Division designs and produces fuel and chemical dispensing pumps, meters, and electronic fuel management and security control systems. Brian O’Hear assisted in the testing and calibration of a new flow meter for agricultural markets.
Technical Assistance Program

Personnel

Faculty

Mysore A. Dayananda
Professor
Materials Engineering

Samuel J. Hruska
Professor
Materials Engineering

Charles F. Scholer
Professor
Civil Engineering

Robert A. Greenkorn
TAP Director & Professor
Chemical Engineering

Sherry L. Million
Secretary

Suzanne M. Ward
TIS Manager

Akin Ecer
Professor
Mechanical Engineering
IUPUI

Masoud Mojtabah
Associate Professor
Mechanical Engineering
Calumet

Keith V. Smith
Professor
Management

Regina Becker
Manager
Statistical Consulting

Jack W. Posey
Consultant
Industrial Engineering

J. Lynette Carte
Clerk

Joseph I. ElGomayel
Associate Professor
Industrial Engineering

Joseph T. Pearson
Associate Professor
Mechanical Engineering

C. Douglas Sutton
Associate Professor
Civil Engineering

David R. McKennis
Associate Director

Juanita L. Thayer
Secretary

Linda K. Chadwell
Clerk

Eric S. Furgason
Professor
Electrical and Computer Engineering

Garnet E. Peck
Professor
Industrial Pharmacy

Ronald F. Wukasch
Professor
Civil Engineering

Cindy L. Meadows
Administrative Assistant

TAP is located in the
Civil Engineering Building.

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Graduate Engineers

A. Behcet Acikmese  
Mechanical Engineering

Joseph Alex  
Mechanical Engineering

Bonnie J. Bowman  
Mechanical Engineering

Alan T. Burstein  
Electrical and Computer Engineering

Jeffrey T. Carlin  
Mechanical Engineering

A. Wayne Galli  
Electrical and Computer Engineering

Nagi Gebrael  
Industrial Engineering

Nath Gopalswamy  
Mechanical Engineering

Nathan K. Guthrie  
Industrial Engineering

Jonathan S. Hanson  
Mechanical Engineering

John T. Hayes  
Statistical Consulting

Robert W. Holden  
Environmental Engineering

Randall A. Hountz  
Management

Jeffrey W. Kennedy  
Management

Rodolfo E. Kilian  
Environmental Engineering

Jay F. Krueger  
Management

Marco A. Lara  
Industrial Engineering

Thomas A. Mahon  
Civil Engineering

Cindy L. Mock  
Industrial Engineering

James O'Malley  
Statistical Consulting

Jeffrey M. Richwine  
Mechanical Engineering

Surya Simanjuntak  
Mechanical Engineering

Carlos E. Simon  
Industrial Engineering

Young-ho Soln  
Materials Engineering

CHIF C. Travis  
Industrial Engineering

NaRaye P. Williams  
Industrial Engineering

Joseph F. Zawadzki  
Industrial Engineering

Industry Advisory Council

Jack W. Bell  
President

ABC Metals, Inc.

Loganport

Andrew S. Brennan  
President

Viking Engineering Company, Inc.

Hammond

Stephen S. Essex  
President

Essen Machine

Seymour

David C. Grebe  
Vice President and General Manager

CTP Corporation, Div. of Tube Processing Corp.

Indianapolis

Gregory S. Griffin  
Economic Development/Market Research Consultant

Indianapolis Power & Light Company

Indianapolis

Peter L. Grimmer  
President

Pro Industries

Franklin

Steven L. Hart  
Vice President

Shuttleworth, Inc.

Huntington

Jess F. Heisel  
President

Heisel, Inc.

Carmel, Ind.

Charles N. Hetrick  
President and Chief Operating Officer

Maxon Corporation

Muncie

Patrick M. Houghlin  
Vice President

Hitachi Cable Indiana, Inc.

New Albany

James N. Hufford  
Vice President of Research and Development

CTP Corporation

Fishers

Michael Jahns  
President

G&H Wire Company

Greenwood

Keith Kirkpatrick  
President

REM Group, Inc.

Valparaiso

Douglas A. Mansfield  
(Council Chairman)

Vice President of Manufacturing

Kirby Risk Corporation

Lafayette

Mark Michael  
President

Fort Wayne Metals Research

Fort Wayne

Sue Morey  
President and Chief Executive Officer

Momfan, Inc.

Mishawaka

Ron Overton  
President

Overton & Sons Tool & Die Company

Mooresville

Gene A. Pankake  
President

GAP Engineering, Inc.

Newburgh

Andrew Taitz  
Chairman and Chief Executive Officer

Union City Body Company, L.P.

Union City

John W. Van Etcen  
President

Wabash Products

Terre Haute

Advisory Board

Daniel M. Dunn  
Associate Vice Chancellor

Academic Affairs

Purdue University Calumet

Emily R. Mobley  
Dean, Libraries

Purdue University

G. Allen Pugh  
Dean

School of Engineering, Technology, and Computer Science

Indiana University-Purdue University Fort Wayne

Richard J. Schwartz  
Dean

Schools of Engineering

Purdue University

LeRoy F. Silva  
Director

Business and Industrial Development Center

Purdue University

H. Ouer Yurtseven  
Dean

School of Engineering and Technology

Indiana University-Purdue University Indianapolis
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 765-494-6838 to request a copy.

In February 1998, Don K. Gentry, dean of the School of Technology, was given the additional responsibility of special assistant to the president for economic development. "Purdue's unique strengths in certain disciplines have the potential to become a powerful engine of economic development," said President Steven C. Beering. "I have asked Don Gentry to help us mobilize those strengths and to work closely with government offices, business and agricultural leaders, and educators to assure that our state gets the maximum possible advantages from the university's many resources. This is a major part of our vision for the land-grant university of the 21st century."

You may connect to the above programs at: www.purdue.edu/TAP/Purdue_Outreach_State_Indiana/
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.

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

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

Costs and Confidentiality
For qualifying projects, TAP provides up to five days of Purdue assistance at no charge. Extended assistance is available and quoted by project. All project information, including company name, is kept 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
• Civil engineering
• Engineering drawing
• Materials testing
• Safety programs and training
• Software development

Costs and Confidentiality
Interns are employed directly by the company. Competitive compensation for the summer ranges from $5,000 to $7,500. There is no charge for limited faculty assistance. All project information is kept confidential.

For More Information, Please Contact:

Technical Information
Suzanne M. Ward, Manager
Technical Information Service
Phone: 765-494-9876
Fax: 800-289-3144
E-mail: libtis@omni.cc.purdue.edu
Web: www.lib.purdue.edu/tis/

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