

# Purdue **Powers** Manufacturing



Technical  
Assistance  
Program

Purdue  
University

Annual Report • Year Ending June 30, 1998

# Directors' Message



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

Purdue's Bell Tower is a landmark that incorporates both tradition and innovation.





# Economic Impact



Aerial view  
of the northeast  
corner of Purdue's  
West Lafayette  
campus.

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.*

## TAP's History of Helping Indiana

1987



Facilities Planning  
Purdue University  
West Lafayette

1988



Component Part Design  
T.M. Morris  
Logansport

## 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

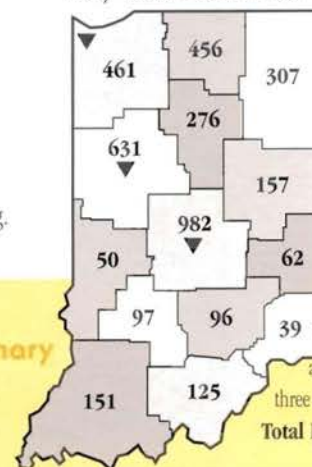
- Determine if a plant or process is within EPA regulations.
- Assist in understanding and completing the environmental permitting process.
- Solve specific waste treatment and disposal problems.
- Compliance with the Clean Air Act.
- Find consultants, test labs, and summer interns for extended projects.

### 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.

## Projects by Economic Region

May 1986 – June 1998



## Economic Impact Summary

Based on Client Evaluations of TAP Work With Industry  
May 1986 – June 1998

**Total Projects: 3,890**

	Year 1*	Year 2*	Total
Capital Investment	\$33,023,400	\$9,140,600	\$42,164,000
Cost Savings	\$9,895,930	\$6,709,840	\$16,605,770
Increased Sales	\$41,947,300	\$104,366,100	\$146,313,400
Jobs Added	363	798	1,161
Jobs Saved	1,131	932	2,063

\*Following date of TAP assistance



▼ 1989  
Quality Control  
**Indiana Brass**  
Frankfort



1990 ►  
Product Improvement  
**Miller Structures**  
Elkhart



1991  
Material Formability Characteristics  
**Stone City Products**  
Bedford

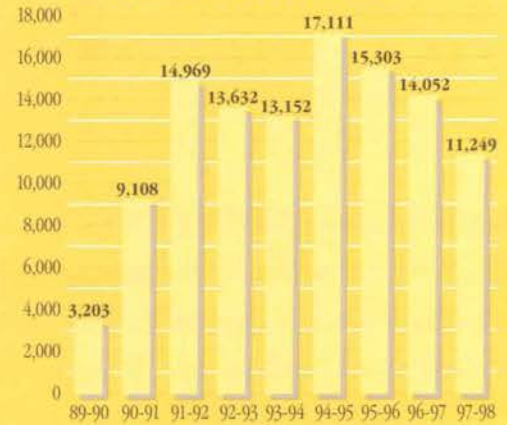


## Technical Information Service (TIS)

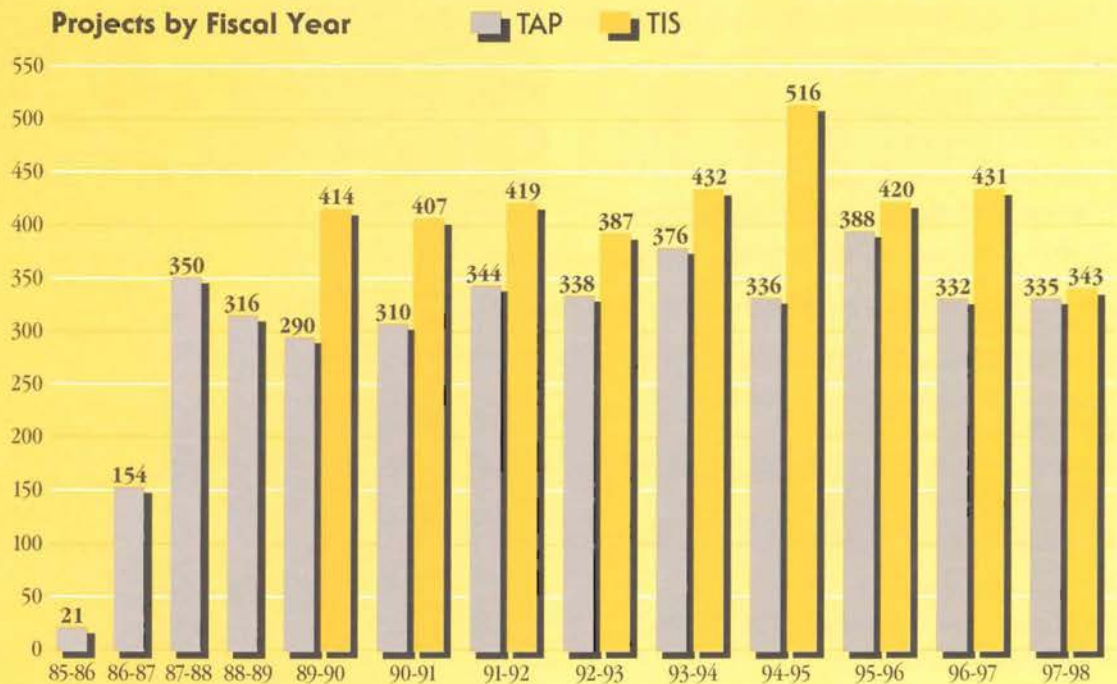
Since 1989, companies and individuals have received 3,769 information searches and 111,779 documents from this service. Most questions fall into the following categories:

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

**TIS Document Orders Filled**



**Projects by Fiscal Year**



1992 ▶



Technical Information Service  
**Purdue University**  
West Lafayette



Site Assessment  
**Newnam Manufacturing**  
Kendallville

◀ 1993



Improved Market Planning  
**Indiana Die Cast Tool**  
Franklin

▼ 1994

## Summer Intern Program

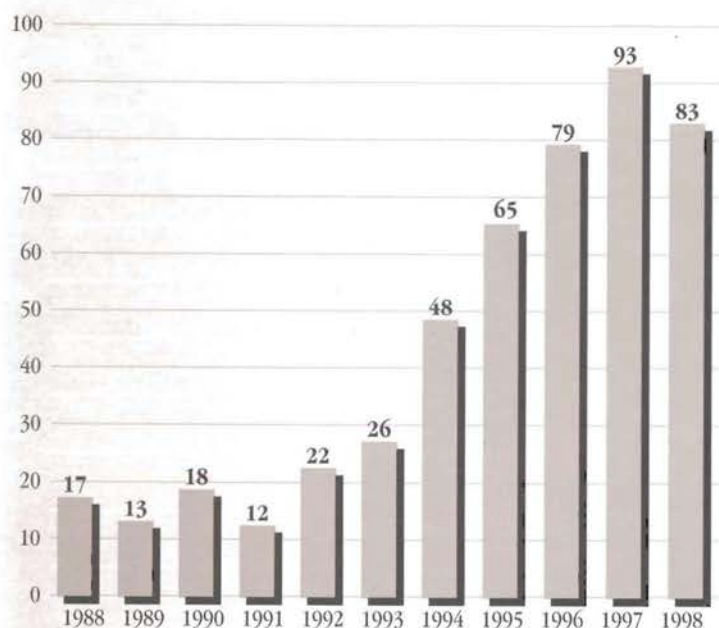
To date, 476 students have been placed with Indiana companies to work on product development, manufacturing, environmental, and industrial management projects. Typical projects include:

- 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.



Dave McKinnis (third from left) accepts a \$10,000 check from GTE Foundation representatives (left to right) Ron Ploner, Dick Abbott, and Dick Henry. GTE funds are being used to assist not-for-profit workshops throughout the state.

### Summer Interns by Calendar Year



### 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.

Funding Source	FY 97-98 Funding
State of Indiana	\$1,056,000
Fees for Service	\$329,000
GTE Foundation	\$10,000
<b>Total</b>	<b>\$1,395,000</b>

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.



Environmental Permitting  
**Fluidrive**  
Brookston

◀ 1995



Emission Calculations  
**Thiesing Veneer Company**  
Mooresville

1996 ▼

1997



Reduced Process Variation  
**Caterpillar**  
Lafayette



# Examples of TAP Assistance



Civil 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.

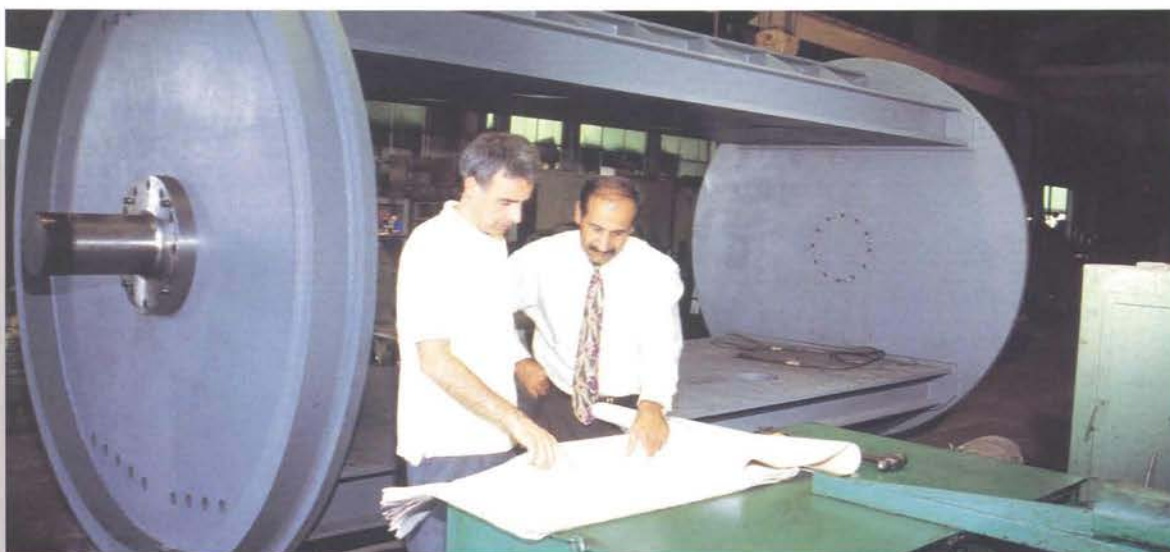
Bremen Corporation, subsidiary of Creative Foam, is a fabricator of closed and open cell foam specializing in vinyl coatings for the medical, recreational, automotive, and industrial markets. Diane Whirledge was assigned the task of developing improved coatings and coating processes for the company's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

## Mechanical Engineering Bucciconi Engineering Company

### *Gary*

Laurent Santaquilani, 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.







## Industrial Engineering **G & H Wire Company** *Franklin*

Michael Jahns, 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.



## Industrial Engineering **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.

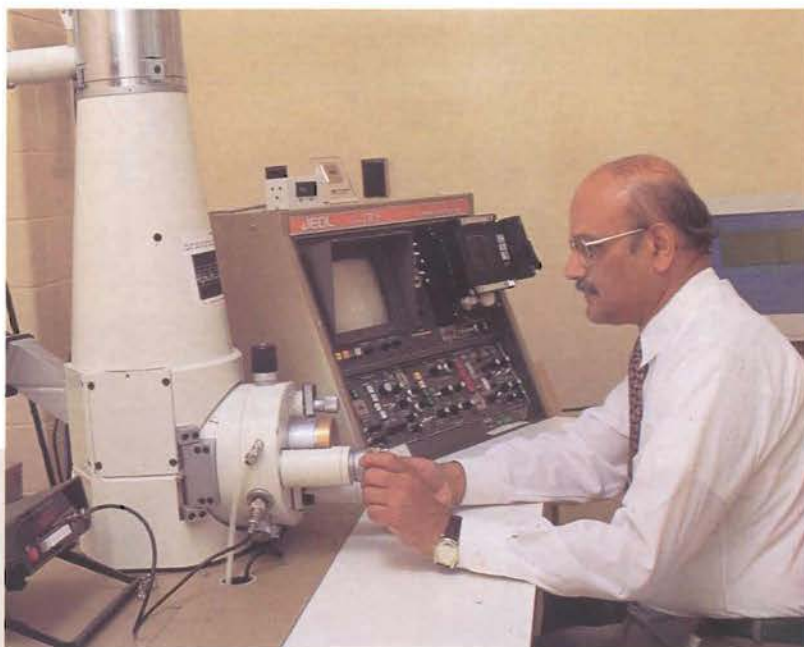
## Materials Engineering

### **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.





#### Electrical Engineering

### Pi Rod, Inc.

#### *Plymouth*

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

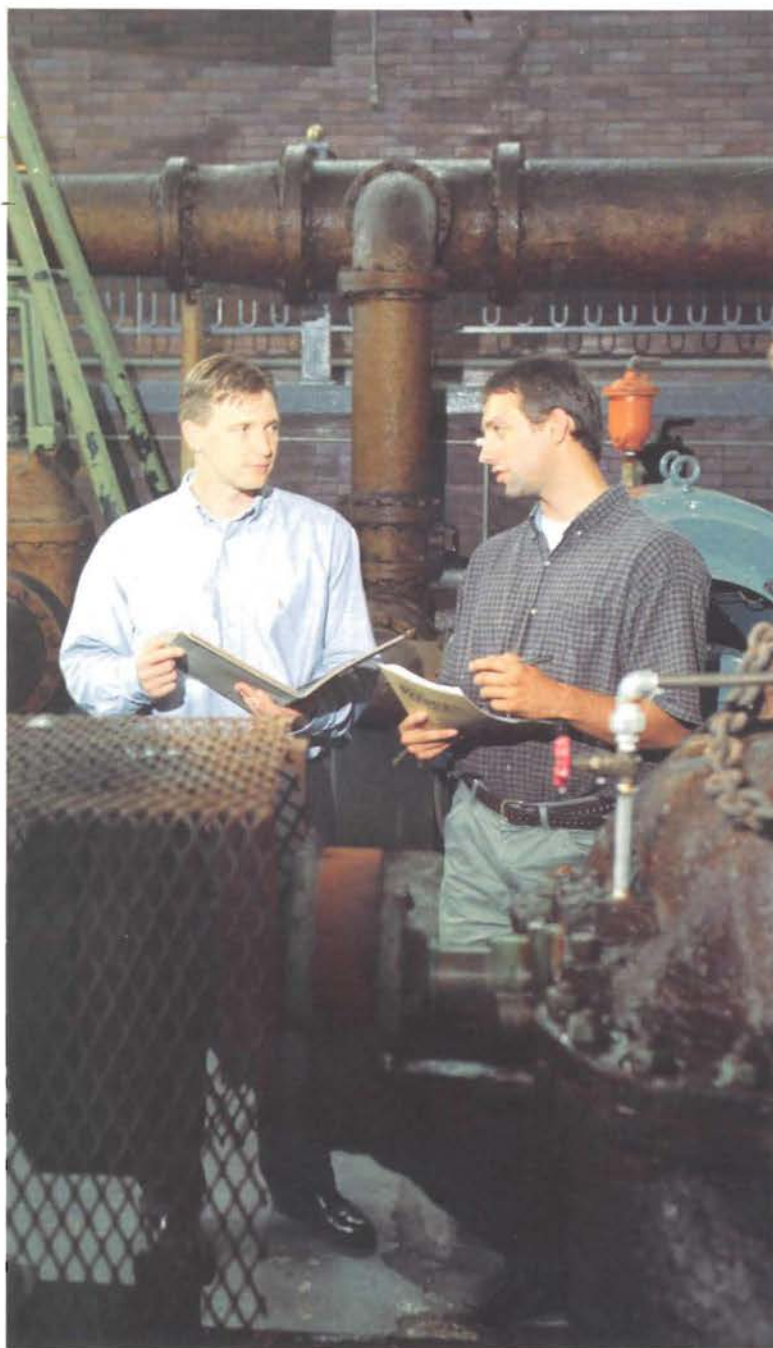
## Sofamor Danek Manufacturing

*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.

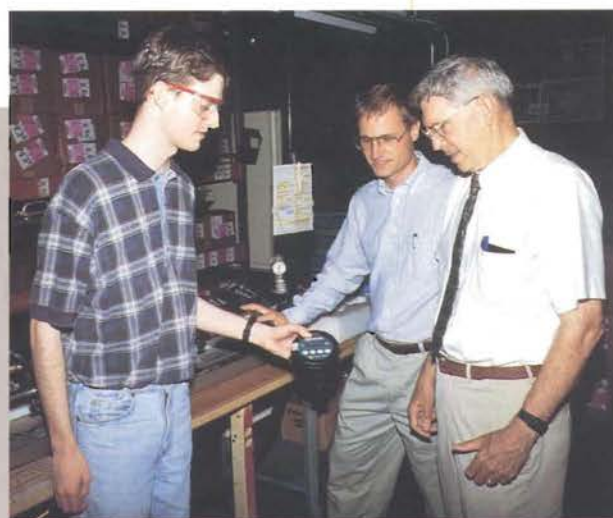
South Bend Water Works serves 42,000 residential and commercial customers. Andrew Karch was one of four summer interns employed to conduct hydraulic testing and analysis, perform water testing, and develop a hydraulic model of the system to support improved customer service.

## 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



**Akin Ecer**  
Professor  
Mechanical Engineering  
IUPUI



**Masoud Mojtahed**  
Associate Professor  
Mechanical Engineering  
Calumet



**Keith V. Smith**  
Professor  
Management



**Joseph I. ElGomayel**  
Associate Professor  
Industrial Engineering



**Joseph T. Pearson**  
Associate Professor  
Mechanical Engineering



**C. Douglas Sutton**  
Associate Professor  
Civil Engineering



**Eric S. Furgason**  
Professor  
Electrical and Computer  
Engineering



**Garnet E. Peck**  
Professor  
Industrial Pharmacy



**Ronald F. Wukasz**  
Professor  
Civil Engineering

## Staff



**Robert A. Greenkorn**  
TAP Director & Professor  
Chemical Engineering



**Regina Becker**  
Manager  
Statistical Consulting



**David R. McKinnis**  
Associate Director



**Cindy L. Meadows**  
Administrative Assistant

## TIS Staff



**Suzanne M. Ward**  
TIS Manager



**J. Lynette Carte**  
Clerk



**Linda K. Chadwell**  
Clerk



TAP is located in the  
Civil Engineering Building.

## Graduate Engineers



**Linda L. Christie**  
Library Assistant



**Mary M. Dugan**  
Information Specialist



**Vickie L. McLaughlin**  
Library Assistant



**Monica R. Musser**  
Clerk

**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 Gebræel**  
Industrial Engineering

**Nath Gopalaswamy**  
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

**Yong-ho Sohn**  
Materials Engineering

**Cliff C. Travis**  
Industrial Engineering

**NaRaye P. Williams**  
Industrial Engineering

**Joseph F. Zawadzki**  
Industrial Engineering

## Industry Advisory Council

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ABC Metals, Inc.  
Logansport

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Viking Engineering Company, Inc.  
Hammond

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President  
Essex Machine  
Seymour

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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

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Pro Industries  
Franklin

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New Albany

**James N. Hufford**  
Vice President of Research and Development  
CTS Corporation  
Elkhart

**Michael Jahns**  
President  
G&H Wire Company  
Greenwood

**Keith Kirkpatrick**  
President  
KEM 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  
Morfam, 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 Etten**  
President  
Wabash Products  
Terre Haute

## Advisory Board

**Daniel M. Dunn**  
Associate Vice Chancellor  
Academic Affairs  
Purdue University Calumet

**Emily R. Mobley**  
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**G. Allen Pugh**  
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School of Engineering, Technology,  
and Computer Science  
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Business and Industrial Development Center  
Purdue University

**H. Oner Yurtseven**  
Dean  
School of Engineering and Technology  
Indiana University-Purdue University Indianapolis



# 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 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."



#### Agri-business assistance

Cooperative Extension Service  
Phone: 765-494-8491

#### Distance learning

Office of Distance Learning  
Phone: 765-496-3337  
Continuing Engineering Education  
Phone: 765-494-7015  
Continuing Education  
Phone: 800-359-2968

#### Exporting assistance

Center for International Business,  
Education, and Research  
Phone: 765-494-4463

#### Industrial painting and finishing

Coating Applications Research Laboratory  
Phone: 765-494-1285

#### 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: 765-494-0887

#### Pollution prevention

Indiana Clean Manufacturing Technology  
and Safe Materials Institute  
Phone: 765-463-4749

#### Research and development

Division of Sponsored Programs  
Phone: 765-494-6200

#### Technical assistance

Technical Assistance Program  
Phone: 765-494-6258

#### Technical information

Technical Information Service  
Phone: 765-494-9876

#### Transportation infrastructure assistance

Highway Extension and Research Project  
for Indiana Counties and Cities  
Phone: 800-428-7639

You may connect to the above programs at:  
[www.purdue.edu/TAP/Purdue\\_Outreach\\_State\\_Indiana/](http://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.

Purdue's School of Technology is housed in Knay Hall.

### 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/](http://www.lib.purdue.edu/tis/)

#### Technical Assistance and Summer Interns

David R. McKinnis, Associate Director  
Technical Assistance Program  
Phone: 765-494-6258  
Fax: 765-494-9187  
E-mail: [tap@ecn.purdue.edu](mailto:tap@ecn.purdue.edu)  
Web: [www.purdue.edu/TAP/](http://www.purdue.edu/TAP/)











# World Wide Web

[www.purdue.edu/TAP/](http://www.purdue.edu/TAP/)

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

 <p><b>Purdue Outreach Programs</b></p> <p><b>Governmental Assistance Programs</b></p> <p><b>What's New</b></p>	<h2>TECHNICAL ASSISTANCE PROGRAM</h2> <h3>PURDUE UNIVERSITY</h3>		
	<p><b>WELCOME</b></p> <p><b>Year 2000 Problem</b></p>		<p><b>How to Request Assistance</b></p>
		<p><b>Program Services</b></p> <p><b>Economic Impact</b></p> <p><b>Project Examples</b></p> <p><b>Publications</b></p>	
	<p><b>Faculty and Staff</b></p> <p><b>Technical Information Service</b></p>		<p><b>Summer Intern Program</b></p>
<p>  <b>SEARCH</b> <b>Purdue Home Page</b> <b>Engineering Home Page</b> <b>Management Home Page</b> </p>			

Contact the Technical Assistance Program

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

Phone: 765-494-6258  
Fax: 765-494-9187  
E-mail: [tap@ecn.purdue.edu](mailto:tap@ecn.purdue.edu)  
Web: [www.purdue.edu/TAP/](http://www.purdue.edu/TAP/)

*Project & Technical Assistance Program*

*Design by Susan Fennel, Engineering Production Office*

*Photographs by John Enders, Dick Myers, Walls,*

*Jim Whitcraft, David Underwood, Rick Houghton,*

*Bob Lewis, and Delberta Bie*

*July 1998*



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