Purdue Powers Manufacturing

Technical Assistance Program

PURDUE UNIVERSITY

ANNUAL REPORT
YEAR ENDING JUNE 30, 1997

Directors' Message

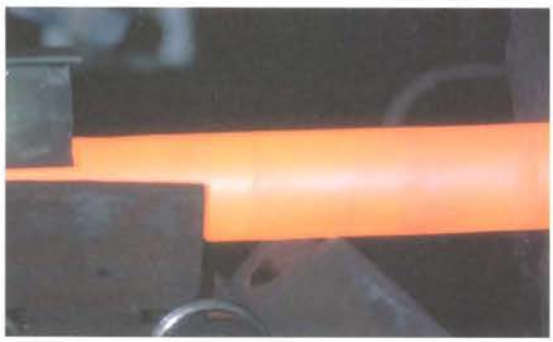
Since its founding as a land-grant institution in 1869, Purdue has been an integral part of Indiana's economic well-being. Through a wide range of programs, dedicated faculty and staff support the current needs of business, industry, and governmental units throughout the state.

The Technical Assistance Program was established in 1986 to support Indiana's large and very important industrial sector. Through this program, Purdue faculty, graduate engineers, and staff work year-round providing timely and relevant advice on a broad scope of questions. Over 2,100 companies have received assistance with factory modernization, product development, environmental compliance, industrial management, and technical information. Hundreds of companies have also employed summer interns and many have added Purdue graduates on a full-time basis.

The project examples and information in this report illustrate the excellent working relationship between Purdue University and Indiana industry, a relationship that has resulted in substantial economic benefit to Hoosier citizens. The faculty, graduate engineers, and staff of the Technical Assistance Program look forward to a continued joint effort to meet today's tough manufacturing challenges, and to secure the economic vitality of the state.

Robert A. Greenkorn, Director
David R. McKinnis, Associate Director
July 1997

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.

Environmental compliance...

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

BOB HOLDEN (RIGHT), GRADUATE ENGINEER, ASSISTS A MOORESVILLE WOOD PRODUCTS COMPANY WITH DEVELOPING EMISSIONS CALCULATIONS NEEDED FOR THE PERMITTING PROCESS.

Factory modernization...

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

JOE ELGOMAYEL (CENTER), ASSOCIATE PROFESSOR OF INDUSTRIAL ENGINEERING, ASSISTS A TIPTON COMPANY WITH THE IMPROVEMENT OF A PRESS 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, 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.

Economic Impact Summary

Based on Client Evaluations of TAP Work With Industry
May 1986 through June 1997

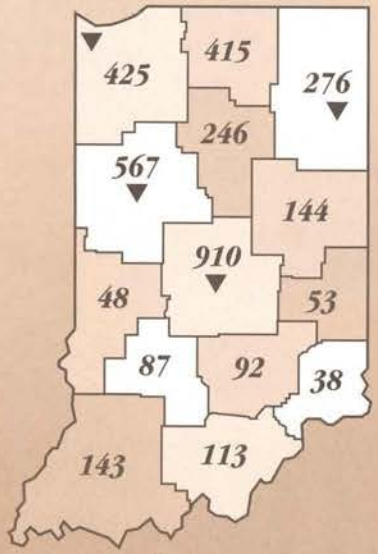
	Year 1*	Year 2*	Total
Capital Investment	$31,075,400	$8,740,600	**$39,816,000**
Dollars Saved	$8,694,030	$6,499,840	**$15,193,870**
Increased Sales	$40,343,300	$103,116,100	**$143,459,400**
Jobs Added	321	754	**1,075**
Jobs Saved	691	580	**1,271**

** 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.

Projects by Economic Region

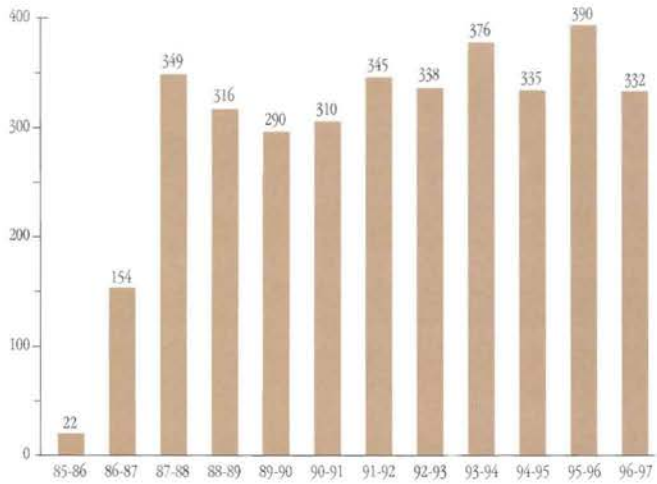
May 1986 through June 1997



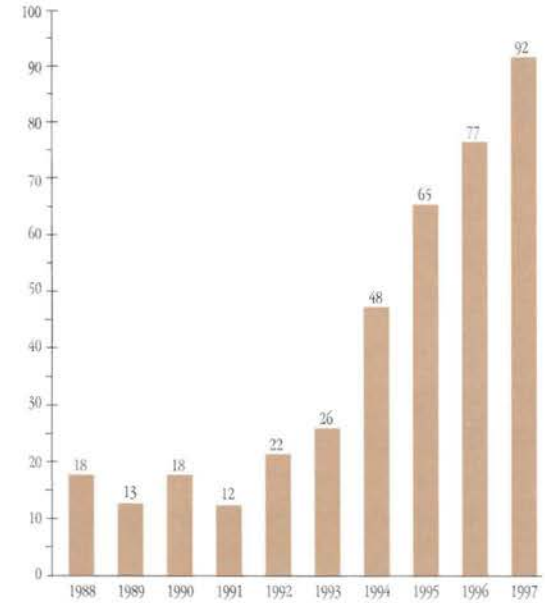
Total Projects: 3,557

▼ TAP faculty are available from four Purdue campuses.

Assistance Projects by Fiscal Year



Summer Interns by Calendar Year



Program Funding for Fiscal Year 1996-97

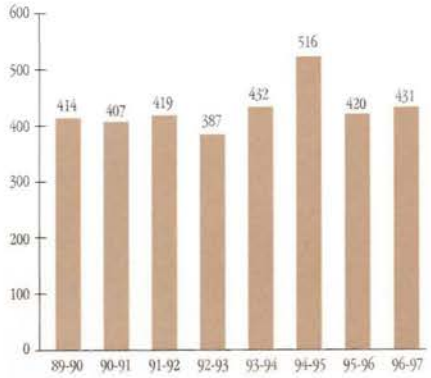
TAP was funded by the Indiana Business Modernization and Technology Corporation during fiscal year 1996-97. Purdue University became the TAP funding source on July 1, 1997.

Technical Information Service

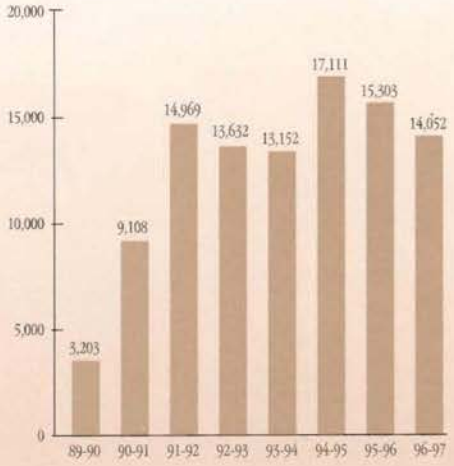
TIS offers comprehensive research and document delivery services on a cost-recovery basis to companies in every business sector.

TIS Activity Summary

Information Projects Completed



Document Orders Filled



VINCE SITTERDING, QUALITY ENGINEER, RENEE JONES, STATISTICS GRADUATE STUDENT, AND REGINA BECKER, MANAGER OF STATISTICAL CONSULTING, INSPECT A TOOL SET GAGE.

REDUCED PROCESS VARIATION

Caterpillar

Lafayette

The Caterpillar large engine division in Lafayette produces engines for electric power generation, transportation, marine power, and many other applications. The company asked TAP for assistance in reducing the variation in a boring process on a large casting. The TAP project focused on the setup procedures, and an experiment was designed to determine the reproducibility and reliability of the tool set gage. The specific causes of variation were identified and new training methods have been implemented, resulting in significantly reduced process variation.

Analysis of a Bearing System

Delphi Body Works, Inc.

Delphi

Delphi Body Works designs and manufactures many products including aerial lifts. The company asked TAP to review a new bearing system for use in the aerial lifts. The TAP analysis resulted in a number of suggested improvements that have been successfully incorporated into the design. The new design will reduce costs by over $37,000 annually as well as increase product sales.

Joe Pearson, associate professor of mechanical engineering, and Jim Johnston, production coordinator, discuss a new bearing system.

Environmental and Safety Engineering

Essroc Cement Corporation

Logansport

Essroc produces a wide variety of Portland and masonry cements to suit individual applications in construction. To support the company's ongoing environmental and safety programs, Holly Ann Buschman was employed to complete a number of tasks, including compiling emissions data from the hazardous waste recycling process.

Brian Graf, environmental manager, and Holly Ann Buschman, environmental engineering summer intern, review production processes.

Improved Motor Support

Godfrey Marine

Elkhart

Godfrey Marine is the world's largest manufacturer of pontoon and deck boats. The company asked TAP for assistance in improving the life of a motor support that is subjected to high stresses while being moved on a trailer. The TAP recommendations were developed in close cooperation with company engineers and have been successfully implemented, resulting in a better product and reduced warranty costs.

Lynn Schlager, associate professor of mechanical engineering at Indiana University-Purdue University Fort Wayne, and Van Kessler, operations manager, discuss a pontoon boat design.

AARON SCROGGIN, MATERIALS ENGINEERING STUDENT, JERRY PATRICK, QUALITY ASSURANCE MANAGER, AND SAM HRUSKA, PROFESSOR OF MATERIALS ENGINEERING, REVIEW THE PRODUCTION OF PISTONS USED IN AUTOMOTIVE STRUTS.

HEAT TREATING DEVELOPMENT

KYB Industries, Inc.

Franklin

KYB Industries, Inc. is a division of Kiaba Industries Ltd. which produces automotive struts for the North American market. The development and careful control of heat treatments of the pistons is critical to the performance and longevity of the struts. TAP was asked to provide recommendations for heat treatment of pistons for a new customer with very demanding specifications. The TAP analysis and recommendations have supported the successful development of the new business. The company will soon expand the facility and increase employment to produce struts for the new customer.

CIVIL ENGINEERING

Harrison County Engineering Department

Corydon

Like all Indiana counties, Harrison County must carefully plan the construction and maintenance of its system of roads and bridges. Heather Balentine was employed to help with this planning by conducting traffic counts, culvert inspections, and an evaluation of roadway surface conditions.

DARIN DUNCAN, HIGHWAY ENGINEER, TOM MAHON, GRADUATE ENGINEER, AND HEATHER BALENTINE, CIVIL ENGINEERING SUMMER INTERN, SET UP A TRAFFIC COUNTER.

IMPROVED PRODUCTION AND WORK METHODS

Greene Manufacturing

Connersville

Greene Manufacturing produces a wide variety of metal parts and assemblies for customers nationwide. Matthew Orvick was employed to assist the company with its initiative to significantly upgrade production processes and work methods.

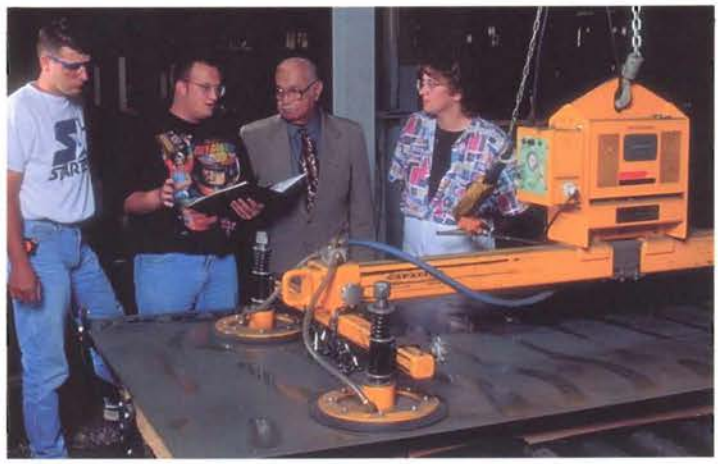
MATTHEW ORVICK, INDUSTRIAL ENGINEERING SUMMER INTERN, AND YUEHWERN YIH, ASSOCIATE PROFESSOR OF INDUSTRIAL ENGINEERING, DISCUSS PLANNED METHODS IMPROVEMENTS.

IME STANDARDS

au Industries

banon

u Industries is the largest North American manufacturer air moving components and fan systems for the heating, tilation, air conditioning, and refrigeration industries. In er to improve its productivity, the Lebanon facility employed thew McCool to upgrade the production time standards used oroduct costing and manufacturing management.



JEFF BUTTS, PRODUCT ENGINEER, MATTHEW MCCOOL, INDUSTRIAL ENGINEERING SUMMER INTERN, JOE ELGOMAYEL, ASSOCIATE PROFESSOR OF INDUSTRIAL ENGINEERING, AND LIZ SWAN, SUPERVISOR OF HUMAN RESOURCES, DISCUSS AN AUTOMATED SHEARING OPERATION.

TIM LANCASTER, MANAGER OF TECHNICAL SERVICES, CHARLIE SCHENK, MECHANICAL ENGINEERING SUMMER INTERN, AND JOE PEARSON, ASSOCIATE PROFESSOR OF MECHANICAL ENGINEERING, EXAMINE AN EROSION CONTROL BLANKET.

PROCESS IMPROVEMENTS

North American Green, Inc.

Evansville

North American Green is a leading manufacturer of rolled erosion control products. Their production process involves combining wheat straw, coconut fibers, and poly fibers into netted blankets. Charlie Schenk was assigned the task of analyzing and changing the manufacturing process to make the distribution of fibers more uniform.

JOE ELGOMAYEL, ASSOCIATE PROFESSOR OF INDUSTRIAL ENGINEERING, AND BRAD MULDER, MANUFACTURING MANAGER, DISCUSS PRODUCTION OF A WORM GEAR.

IMPROVED TOOL LIFE

TRW Commercial Steering Division

Lafayette

The Lafayette TRW facility is part of the Commercial Steering Division and develops and manufactures steering systems for commercial vehicles. TAP was asked to investigate the tool life of a cutter used for worm gear production. Working closely with company personnel, Joe ElGomayel developed the recommendation of using a titanium nitride coating on the cutting tool. This recommendation was successfully implemented, increasing tool life by about ten times.

Resolution of a Measurement Discrepancy

Vista Equipment

Crawfordsville

Vista Equipment produces a number of products including a special cart for use by maintenance inspectors on Japanese rail systems. To prevent unintended activation of railroad signals, the cart is designed with special rubber wheels that must meet a specific resistance specification. Vista's customer claimed that the wheels did not meet the resistance standard, and product shipments were put on hold. TAP was asked to help resolve the discrepancy between Vista and its customer. Using Purdue translators, TAP was able to work directly with Vista and its customer to demonstrate that the wheels were in conformance with the resistance standard. Shipments of the carts to Japan have now resumed.

Eric Furgason, professor of electrical engineering, Bob Thielker, president, and Wayne Galli, graduate engineer, examine a railroad inspection cart that is exported to Japan.

Process Documentation

W. R. Grace & Co.-Formpac Division

Indianapolis

W. R. Grace & Co.-Formpac Division produces foam sheet for conversion to foam packaging. Eric Webb's summer assignment included verifying the mechanical systems of the foam extrusion line and providing documentation needed for the process safety management program.

Eric Webb, summer intern and mechanical engineering student at Indiana University-Purdue University at Indianapolis, and Dennis Nuhfer, plant manager of the Formpac Division, discuss production processes.

Manufacturing Process Improvement

Whirlpool Corporation

Evansville

Whirlpool Corporation produces a wide variety of appliances for domestic and commercial use. Charles Roberts was employed to analyze and improve the production processes of an assembly line dedicated to commercial icemakers.

Charles Roberts, mechanical engineering summer intern, Paula Lee, supervisor of technical support, and Joe Pearson, associate professor of mechanical engineering, discuss process improvement plans.

TAP Faculty

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Mechanical Engineering
IUPUI

Joseph I. ElGomayel
Associate Professor
Industrial Engineering

Eric S. Furgason
Professor
Electrical and Computer Engineering

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Consultant
Industrial Engineering

Juanita L. Thayer
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TIS Manager

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Clerk

Linda K. Chadwell
Clerk

Linda L. Christie
Library Assistant

Mary M. Dugan
Information Specialist

Rebecca J. Marthey
Information Specialist

Vickie L. McLaughlin
Library Assistant

Monica R. Musser
Clerk

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Louay Al-Khatib
Industrial Engineering

E. Scott Butler
Management

Gonzalo R. Castro
Industrial Engineering

A. Wayne Galli
Electrical and Computer Engineering

Irwan Hermanto
Industrial Engineering

Robert W. Holden
Environmental Engineering

Rudy H. Kizer
Materials Engineering

Ted M. Kostek
Mechanical Engineering

K'uang J. Ku
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Cindy L. Mock
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Thomas L. Richardson
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Michael L. Rydson
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Johnson Shiue
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Ryan C. Sprowl
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Trisna Y. Tan
Industrial Engineering

John E. Thompson
Environmental Engineering

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Cliff C. Travis
Industrial Engineering

NaRaye P. Williams
Industrial Engineering

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Entrepreneurship Academy
Valparaiso

Douglas A. Mansfield
Vice President of Manufacturing
Kirby Risk Corporation
Lafayette

Charlene Massing
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FSI Products, Inc.
Aurora

Sue Morey
President and Chief Executive Officer
Morfam, Inc.
Mishawaka

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Stone City Products, Inc.
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Coachmen Industries, Inc.
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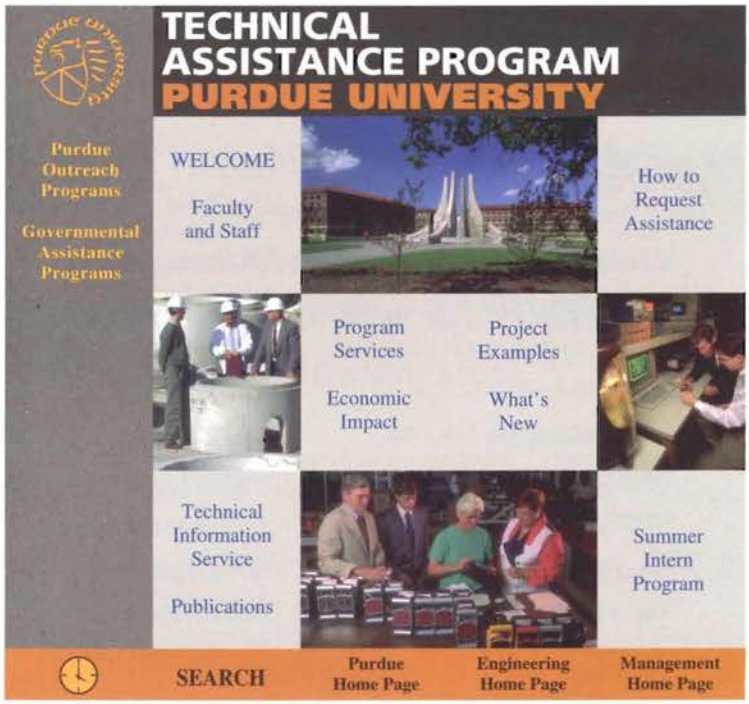

World Wide Web

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:

www.purdue.edu/TAP/

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