

PURDUE UNIVERSITY

# TECHNICAL ASSISTANCE PROGRAM

*ANNUAL REPORT  
YEAR ENDING JUNE 30, 1994*



*INDUSTRIAL HELP FROM TECHNICAL  
EXPERTS AT PURDUE UNIVERSITY*



*STUDENT INTERNS FOR MANUFACTURING, DESIGN,  
MANAGEMENT, AND ENVIRONMENTAL PROJECTS*



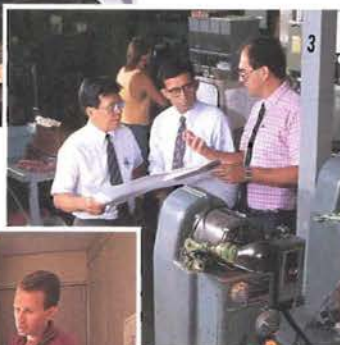
*INFORMATION SEARCHES AND DOCUMENTS FROM  
WORLDWIDE SOURCES ON ANY TECHNICAL TOPIC*



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### ECONOMIC IMPACT DATA—

The project results shown here are based on material provided by the users of the program's services. One in three client evaluations includes specific economic impact data which is summarized in this chart. Many other evaluations include positive benefits that are not quantifiable. In total, over 90 percent of the evaluations state that help from the Technical Assistance Program was beneficial and that the recommendations are being used.

### EVALUATION SUMMARY

Based on Client Evaluations of TAP  
May 1986 through June 1994

	Year 1*	Year 2*	Total
Capital Investment	\$14,454,400	\$2,605,600	\$17,060,000
Dollars Saved	\$4,998,575	\$4,396,000	\$9,394,575
Increased Sales	\$69,740,800	\$155,337,000	\$225,077,800
Jobs Added	188	441	629
Jobs Saved	375	339	714

\* Following date of TAP assistance

THE TECHNICAL ASSISTANCE PROGRAM IS FUNDED BY THE STATE OF INDIANA THROUGH THE INDIANA BUSINESS MODERNIZATION AND TECHNOLOGY CORPORATION.

## DIRECTOR'S MESSAGE

TAP and TIS professionals work on a wide array of critical technical problems facing small- and medium-sized companies all over Indiana. This report describes several typical projects performed this year. TAP specialists study the problems and recommend solutions. TIS specialists find and deliver the knowledge needed to understand and make changes. These services are provided by Purdue University with a grant from the State of Indiana through the Indiana Business Modernization and Technology Corporation.

During the past eight years, the program has responded to almost 2,500 requests for technical assistance from over 1,600 Indiana companies. This year TAP worked with 374 clients across the state, providing technical assistance in many areas of engineering, manufacturing technology, food science, pharmacy, and management. TAP faculty and students traveled extensively throughout the state to visit clients, collect data, and deliver results; making almost 300 trips this year.

Client evaluations are used to measure TAP's performance. One-third of the new project requests come from former clients. Over 90 percent of the clients indicate that TAP solved the correct problems, providing timely and valuable assistance. The economic impact results are shown in this *Annual Report*. The application of advanced technologies and new information helped many companies reduce costs, increase sales, save jobs, and create new ones.

Requests for information searches and documents from the Technical Information Service continue to grow. This year, TIS completed 432 in-depth research assignments and delivered 13,152 documents. The peak delivery rate was nearly 1,350 documents per month.

The TAP summer intern program placed 45 engineering, technology, and management students with Indiana firms this summer, bringing the seven year total to 153 jobs. Many Indiana firms need extended help to introduce new technology; a summer intern can provide such support. Interns receive direction and advice from TAP faculty, as needed, during the summer. Several Indiana companies have hired former interns as permanent employees after graduation.

By responding quickly and effectively to many challenging requests from their clients, the Technical Assistance Program and Technical Information Service are working hard to improve the economy of Indiana and increase the ability of Indiana companies to compete worldwide.

We appreciate your interest and we welcome your comments regarding this *Annual Report*.

Ferdinand F. Leimkuhler  
July 1994

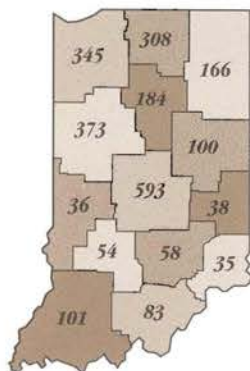


*THE MISSION  
OF THE TECHNICAL  
ASSISTANCE PROGRAM  
AT PURDUE UNIVERSITY*

*IS TO HELP INDIANA  
BUSINESS, INDUSTRY, AND  
GOVERNMENT IMPLEMENT  
NEW TECHNOLOGIES*

*FOR THE ECONOMIC  
BENEFIT OF CLIENTS  
AND THE STATE.*





#### PROJECTS BY ECONOMIC REGION May 1986 through June 1994—

The Technical Assistance Program has served organizations throughout the state, including companies in every manufacturing sector.

Total Projects: 2,474

#### AREAS OF EXPERTISE

ELECTRICAL ENGINEERING  
ELECTRICAL ENGINEERING TECHNOLOGY  
ENVIRONMENTAL ENGINEERING  
CIVIL ENGINEERING  
INDUSTRIAL ENGINEERING  
MATERIALS ENGINEERING  
MECHANICAL ENGINEERING  
INDUSTRIAL MANAGEMENT  
FOOD SCIENCE  
INDUSTRIAL PHARMACY  
TECHNICAL INFORMATION

## TECHNICAL ASSISTANCE PROGRAM

The Purdue University Technical Assistance Program makes the vast resources of Purdue readily available to Indiana business, industry, and governmental units. 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. A team of 52 faculty, graduate students, and professional staff 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. Many measures of program effectiveness are taken, including the impact on capital investment, sales, and employment. Over 90 percent of those working with the program report positive results.

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

The program's activities during the eight years ending June 30, 1994, include:

### TECHNICAL ASSISTANCE PROJECTS

To date, 2,474 projects have been undertaken for Indiana companies on a wide range of technical issues. The most common requests for assistance include:

1. Manufacturing
  - Improved plant layout in production and warehouse areas.
  - Implementation of work cells.
  - Process improvements for machine centers, assembly lines, and individual work stations.
  - Systems development such as scheduling, computer-aided design, and computer-integrated manufacturing.
2. Product Development and Engineering
  - Design advice for specific engineering questions.
  - Material selection.
  - Analysis of corrosion problems.
  - Identification and demonstration of new design, testing, and evaluation methods.
3. Environmental
  - Determine if a plant or process is within regulations.
  - Evaluate the need for permits, and the type of permits required.
  - Recommend specific solutions to compliance problems.
4. Industrial Management
  - Improvement of product costing and financial systems.
  - Assistance with strategic planning.
  - Development of improved methods for industrial marketing.



## TECHNICAL INFORMATION SERVICE (TIS)

Since 1989, companies and individuals have received over 2,000 information searches and 54,000 documents from this service. Questions fall into the following categories:

- Specific engineering and technology questions ..... 36%
- Marketing information ..... 28%
- Management issues ..... 17%
- Agricultural questions ..... 10%
- Biological, veterinary, and pharmaceutical sciences ..... 5%
- Other ..... 4%

## SUMMER INTERN PROGRAM

To date, 153 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 9000.
- Development of Clean Air Act permits.
- Product design, testing, modeling, and evaluation.
- Implementation of activity-based cost accounting.
- Infrastructure projects for municipalities.

This pilot project, funded by the National Science Foundation and participating companies, placed three graduate students in advanced engineering projects.

## MARKETING PLANS MADE AT INDIANA DIE CAST TOOL

*Nathan Myers, general manager, Mal Bass, president of Indiana Die Cast Tool, and Keith Smith, professor of management, observe the precision machining of a plastic injection mold.*

Indiana Die Cast Tool is a Franklin manufacturer of complex plastic injection and compression molds. The company has developed the unique ability to manufacture and deliver reliable molds in a very short lead time, often four to eight weeks less than the competition. The company contacted TAP for advice on marketing this unique and valuable capability, and advice on building long-term business relationships with key customers. During the next six months, TAP worked closely with the company, providing many recommendations for improved marketing and development of long-term customer commitments. The company has successfully implemented these recommendations, and sales have increased by over one million dollars annually.



## PROJECT EXAMPLES



### DC RELAY DEVELOPED AT J. ALEXANDER & ASSOCIATES

*Nick Sorak, professor of electrical engineering technology, Patrick Eich, chief engineer, J. Alexander & Associates, Everett B. Truett, and Marian C. Truett, students, examine a prototype high-voltage solid-state DC relay.*

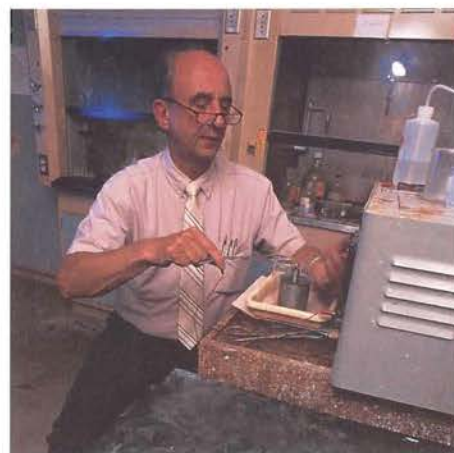
J. Alexander & Associates is an East Chicago-based firm providing consulting and engineering for industrial controls. Many of their customers have a need for a high-voltage solid state DC relay that is not currently available. To meet this need, the company requested TAP help in developing such a relay. With the assistance of Nick Sorak, professor of electrical engineering technology at Purdue Calumet, two students, Marian and Everett Truett, developed initial designs that are now being beta tested by the company.



### SURGE PROTECTION STUDIED FOR PROFILE SYSTEMS

*Eric Furgason, professor of electrical engineering, and Doug Munro, graduate student, study methods of surge protection for an electronic controller used on billboards.*

In early 1993, Gary Conkrite, president of Profile Systems in Merrillville, contacted TAP for assistance in the development of a new controller for billboard illumination. This unique device enables owners of billboards to control the lighting with radio frequency paging technology. TAP provided the requested advice on protecting the controller from power surges caused by lightning and other sources. These recommendations were successfully implemented later in 1993. During the past year, over 3,000 controllers have been produced and installed, and the company's employment has increased from three to nine.



### ELECTROPOLISHING PROCESS TESTED FOR TATE MODEL & ENGINEERING

*Sam Hruska, professor of materials engineering, performs an electropolishing experiment in a materials engineering laboratory.*

Tate Model & Engineering is a well established Kokomo manufacturing company engaged in the design, development, and production of top quality, complex, and critical patterns, prototypes, and machine components. Ed Eves, vice president of sales, asked TAP for assistance in finding a method to sharpen a complex shaped, stainless steel instrument being developed for a new surgery system. TAP reviewed many mechanical and chemical sharpening methods and determined that a process called electropolishing had the best potential for meeting the sharpness requirements. Because electropolishing is not normally applied to the alloy used in this instrument, TAP ran a series of small scale experiments to confirm that the method would work. With the information provided in the TAP report, the company was able to successfully scale up the process for production use. The solution to this problem has made this product viable and has increased the company's sales by \$500,000 annually.

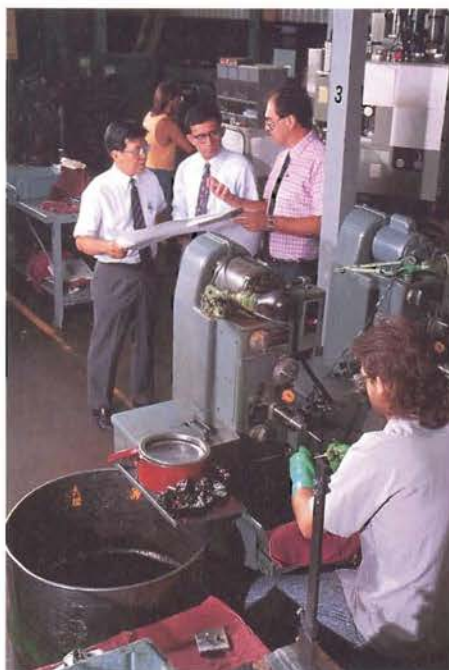




### INCINERATOR IMPROVEMENT AT FLOYD MEMORIAL HOSPITAL

*Phil Shoopman, graduate student, Charles Huckleberry, plant engineer for Floyd Memorial Hospital, and Bob Jacko, professor of environmental engineering, observe incinerator performance.*

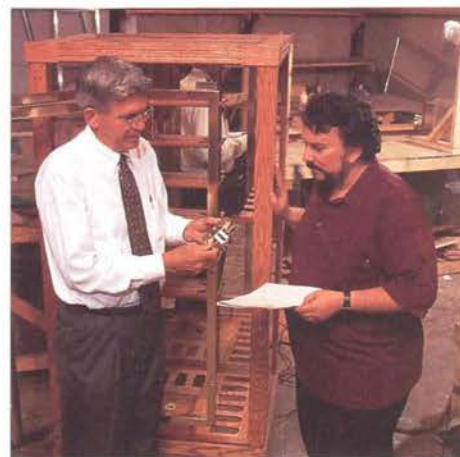
Many medical facilities such as Floyd Memorial Hospital in New Albany use incinerators to dispose of infectious and general wastes. A new incinerator designed to meet the current regulations was installed in 1991. Combustion problems began which were attributed to the rapid increase in the use of disposable high heat content plastics. Although operational changes were made and closely monitored, only incremental improvement resulted. Therefore, Bob Jacko, professor of environmental engineering, and Phil Shoopman, TAP graduate student, were contacted. After studying incinerator performance data, they visited the hospital and determined that the controller for the secondary combustion air supply was operating incorrectly. Bob Jacko suggested a change that was made immediately, and the incinerator has since operated properly and at full efficiency. The short TAP project enabled the hospital to avoid thousands of dollars in alternative disposal costs, and to utilize their significant capital investment in the incinerator.



### MANUFACTURING COSTS CUT AT DAYTON PROGRESS CORPORATION

*Joe Tanchoco, professor of industrial engineering, Rajesh Piplani, graduate student, and Darrell Reeves, general manager of Dayton Progress Corporation, discuss the company's new plant layout.*

Dayton Progress Corporation manufactures die punch retainers and other products in Portland. The company asked TAP to help them develop a new plant layout that would reduce material handling costs and improve manufacturing efficiency. TAP studied the company's material flow and production processes and provided recommendations that were implemented in early 1994. The company estimates that the improvements are saving over \$10,000 annually in manufacturing costs, a significant figure for a small company.



### NEW HINGE DEVELOPED AT MATRIX ENGINEERING

*Joe Pearson, professor of mechanical engineering, and Terry Moore, president of Matrix Engineering, discuss the company's precision hinge mechanism.*

Matrix Engineering, located in Cloverdale, is a new small company specializing in attractive, high security display vaults used by gun collectors, antique collectors, and others. In the fall of 1993, the company requested TAP help in developing a concealed precision compound motion hinge. Start-up production and sales for this new company depended on devising acceptable hinges. Working closely with the company, a method of modifying an existing off-the-shelf hinge was developed and successfully implemented in production. President Terry Moore credits TAP assistance as one of the keys to the start-up of his company, which now has nine employees.



*THE CUSTOMER SATISFACTION WITH THE TECHNICAL INFORMATION SERVICE HAS BEEN EXCELLENT. MOST CUSTOMERS MAKE REPEAT REQUESTS, AND MANY PROVIDE POSITIVE COMMENTS SUCH AS:*

*"THE INFORMATION YOU PROVIDED WAS JUST WHAT WE NEEDED. WE REALLY APPRECIATE BEING ABLE TO GIVE YOU A QUICK CALL WHEN WE'RE IN A TIGHT SPOT."*

*"THANK YOU FOR YOUR RECENT PROMPT SERVICE —LESS THAN 24 HOURS!"*

*"YOU HAVE ALWAYS DONE A GREAT JOB FOR US WHEN WE NEEDED VITAL INFORMATION."*



*TIS staff from left to right, Rebecca Martbey, Vickie McLaughlin, Suzanne Ward (manager), Linda Chadwell, Linda Christie, Lynette Carte, and Heidi Petruzzi.*

## TECHNICAL INFORMATION SERVICE

Successful companies must keep abreast of market trends, new technologies, and the activities of their competitors. Over 2,000 clients have used the Technical Information Service to save time and money in obtaining the information they need. Through the following services, companies can quickly and inexpensively obtain information on virtually any topic. The charges for these information services vary by use and are estimated in advance.

- **Delivery of Documents:** Each month, business people order over 1,100 documents for delivery directly to their offices. Documents include patents, industry standards and specifications, scientific reports, news media articles, information on markets and competitors, and journal articles. Same-day service via fax is available.
- **Patent Information:** The Purdue University Libraries house one of the 70 U.S. Patent Office Depositories. Patent searches and document deliveries are made very quickly.
- **Information Searches:** Business people needing in-depth information on technical, business, or scientific topics can benefit from this service. Purdue Library resources and worldwide on-line databases are used to find the best available information for the client.
- **Technology Alert Service:** This service provides automatic updates of new developments on a given topic, saving clients significant time in monitoring subjects of special interest.
- **Dial-up Access to the Purdue Libraries:** With a personal computer and a modem, clients can dial into the Purdue Libraries on-line catalog and search for book and journal titles on hundreds of subjects. Books can be sent for a three-week loan and copies of documents can be ordered.

### TIS ACTIVITY SUMMARY

Based on Requests  
February 1989 through June 1994

	1989-90	1990-91	1991-92	1992-93	1993-94	Total
Information Projects Completed	414	407	419	387	432	2,059
Document Orders Filled	3,203	9,108	14,969	13,632	13,152	54,064



## PRESS EFFICIENCY RISES AT STEEL PARTS

*Kevin Mostek, summer intern, Joe ElGomayel, professor of industrial engineering, and Michael Smith, director of personnel, observe the operation of a Minster 800 ton press.*

Steel Parts Corporation is a Tipton company that produces automotive stampings, assemblies, clutch plate engine mounts, and other products. Kevin Mostek, summer intern, spent the summer developing set-up procedures for the mechanical presses, and analyzed the causes of down time. His work is being used to improve set-up accuracy and increase machine efficiency.

## TAP SUMMER INTERN PROGRAM

Many small- and medium-sized Indiana companies have needs for short-term engineering help at a reasonable cost. The TAP summer intern program fills this need by making it very easy for a company to find just the right student for a summer project. In 1994, 45 highly motivated engineering, technology and management students spent 12 weeks working on a wide range of important projects including facilities planning, product development, environmental problems, infrastructure improvements, and product costing.

Through this program, companies can very quickly find the right student for the job. TAP arranges for each company to visit the campus and interview a number of well-qualified students for each project. TAP faculty visit these students during the summer and are available to provide limited help to them if needed.

The results from summer intern projects have been significant, with many companies making job offers to students upon graduation. The following examples illustrate the wide range of projects undertaken in 1994 and the great expertise that is available to Indiana companies.

### SUMMER INTERN PROGRAM

1988 through 1994

Total Interns: 153





## INTERN PROJECTS



### ENVIRONMENTAL STUDIES AT DIGITAL AUDIO DISC

*Gary Garraban, environmental engineer, and Monica Bengochea, environmental engineering summer intern, take measurements needed to perform mass balancing.*

Digital Audio Disc Corporation is a major manufacturer of digitized software for audio and CD ROM clientele. The company, a division of Sony, is located in Terre Haute. During the past summer, Monica Bengochea's assignment has been the development of environmental mass balance diagrams for the company's extensive manufacturing facilities.



### IMPROVED PRODUCT COSTING AT THE BIDDLE COMPANIES

*David Salvi, summer intern, Keith Smith, professor of management, Paul Dalton, summer intern, and Dale McCullough, president of the Biddle Companies, examine parts manufactured in a new machining center.*

The Biddle Companies in Sheridan, produce precision machined components for original equipment manufacturers (OEM). Biddle does business in a very competitive environment where good cost control is necessary for long-term success. To improve costing systems, two management summer interns were employed to refine cost allocation systems, establish departmental profit analysis reports, and develop activity-based costing.



### NEW PRODUCTS EVALUATED AT INDIANAPOLIS DEPARTMENT OF CAPITAL

*Asset Management Chuck Scholer, professor of civil engineering, and Brad Sims and Dirk Medema, both civil engineering summer interns, review plans for a new drainage project.*

The Indianapolis Department of Capital Asset Management has responsibility for all city infrastructure, including roads, bridges, and sewers. The evaluation of new products is an ongoing and very important function for this large department. Brad Sims and Dirk Medema re-engineered the new products evaluation process to improve the effectiveness of the new products committee. Other assignments included surveying and solving drainage problems.



### PRODUCTIVITY INCREASES AT EVERGREEN INTERNATIONAL

*Kelly Watt, summer intern, Joe ElGomayel and Colin Moodie, professors of industrial engineering, and Mark Schafer, Chief Operating Officer of EverGreen International, discuss the operation of a new Piranha P50 iron working machine.*

EverGreen International is a Lebanon manufacturer of tractor-mounted lawn vacuums, dethatchers, and other lawn care equipment. Kelly Watt, summer intern, worked on several projects during the summer. She developed a new layout for some of the production facilities, redesigned work places, and performed a machine justification analysis that resulted in the purchase of a new machine tool that will do the work of three existing tools.





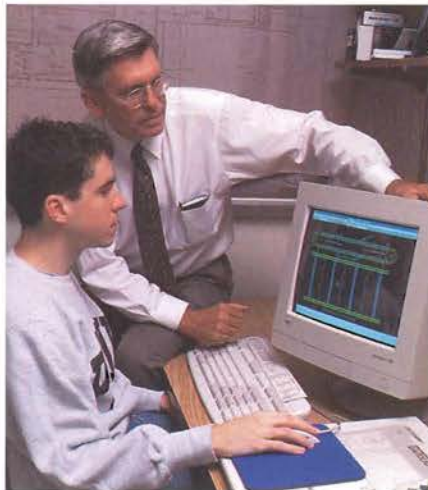
## NEW CONTROLS DESIGNED FOR HURRICANE COMPRESSORS

*John Grimmer, founder of Hurricane Compressors, and Brant Bergdoll, summer intern, review the functions of a compressor control system.*

Hurricane Compressors produces high-pressure natural gas and air compressors, up to 5,000 psi. The natural gas compressors are used to fill vehicles in the emerging natural gas vehicle industry, and the air compressors are used in mineral exploration, water well drilling, seismic analysis and other applications. Brant Bergdoll, electrical engineering summer intern, spent the summer developing a new generation of programmable logic controls (PLC's) for the compressor systems. These new controls include more functions, are capable of remote monitoring, and lower the customer's costs of compressor operation.

# GRADUATE STUDENT EXTERN PROGRAM

During the past year, a pilot extern program was undertaken to address three advanced product design and manufacturing systems projects. These projects required the work of both a graduate student and a faculty member. The funding for these projects was provided by the National Science Foundation and the companies involved.



## COMPUTER MODELING FOR DRUM DRYER AND FLAKER

*Mark Newcomb, graduate student, and Joe Pearson, professor of mechanical engineering, review their computer modeling program.*

Drum Dryer and Flaker Corporation makes custom designed dryers and flakers for the chemical, plastics, and pharmaceutical industries. In order to improve the quoting and design processes, Mark Newcomb, graduate student extern, was employed to develop computer-based tools for the design and modeling of these products. With these tools, the company can be much more responsive to potential customers, and can more accurately size machines for specific customer applications.



## FLEXIBLE SYSTEMS PLANNED AT KIRBY RISK SERVICENTER

*Doug Mansfield, director of the Servicenter Group, and Curt Jenkins, manager of Harness & Cable Products, both of Kirby Risk Servicenter, review system plans with NaRaye Williams, graduate student, and Shimon Nof, professor of industrial engineering.*

The Kirby Risk Servicenter in Lafayette has seen rapid growth in demand for its wire harness products. These products are used on complex applications such as large engines and tractor trailers. Customers require very high product quality, tight delivery schedules, and a wide variety of models and options. NaRaye Williams was employed as a graduate student extern to convert the existing assembly line to multiple flexible assembly lines with integrated electronic testing workstations. Her work has been a significant part of the company's development of responsive cost-efficient computer-integrated manufacturing systems.



## TAP FACULTY



Joseph I. ElGomayel  
Associate Professor  
Industrial Engineering



Wayne L. Ewbank  
Manufacturing  
Laboratory Supervisor  
Industrial Engineering



Eric S. Furgason  
Professor  
Electrical Engineering



Samuel J. Hruska  
Professor  
Materials Engineering



Robert B. Jacko  
Professor  
Environmental Engineering



Bernard J. Liska  
Professor  
Food Sciences



Colin L. Moodie  
Professor  
Industrial Engineering



Shimon Y. Nof  
Professor  
Industrial Engineering



Joseph T. Pearson  
Associate Professor  
Mechanical Engineering



Garnet E. Peck  
Professor  
Industrial Pharmacy



Charles F. Scholer  
Professor  
Civil Engineering



Keith V. Smith  
Professor  
Management



Nikola M. Sorak  
Professor  
Electrical Engineering  
Technology, Calumet



Joe M.A. Tanchoco  
Professor  
Industrial Engineering

## TAP STAFF



Ferdinand F. Leimkuhler  
Director of TAP, Professor  
Industrial Engineering



David R. McKinnis  
Associate Director



Cindy L. Meadows  
Administrative Assistant



Sherry L. Million  
Secretary



Jack W. Posey  
Intern Program



Juanita L. Thayer  
Secretary

## TIS STAFF



Suzanne M. Ward  
Manager of TIS



J. Lynette Carte  
Clerk



Linda Chadwell  
Clerk



Linda Christie  
Library Assistant



Rebecca J. Marthey  
Information Specialist



Vickie McLaughlin  
Library Assistant



Heidi Ann Petruzzi  
Information Specialist

## GRADUATE STUDENTS

Shahid S. Ahmed  
Industrial Engineering

Amy B. Baker  
Industrial Engineering

Anthony G. Chan  
Mechanical Engineering

Ouattara Fatogoma  
Environmental Engineering

Chuck Ganapathi  
Industrial Engineering

Brian D. Grzelewski  
Mechanical Engineering

Brian E. Hannum  
Mechanical Engineering

Robert W. Holden  
Environmental Engineering

Kelly D. Kirkland  
Management

Jacob P. Klosterman  
Management

Andrew Chien-Hung Lee  
Industrial Engineering

Thomas A. Mahon  
Civil Engineering

Peter B. Murphy  
Management

Mark E. Newcomb  
Mechanical Engineering

Rajesh Piplani  
Industrial Engineering

Mark W. Pyclik  
Mechanical Engineering

Mark K. Ratcliffe  
Industrial Engineering

Bernadette Rodriguez  
Industrial Engineering

Richard L. Segar  
Industrial Engineering

Phillip W. Shoopman  
Environmental Engineering

Gary A. Smith  
Industrial Engineering

Charles A. Thompson  
Electrical Engineering

John E. Thompson  
Environmental Engineering

Graeme M.H. Warren  
Industrial Engineering

Brian L. Wasson  
Industrial Engineering



# THE PURDUE UNIVERSITY

## TECHNICAL ASSISTANCE PROGRAM

OFFERS A WIDE RANGE OF SERVICES TO INDIANA COMPANIES.

### TECHNICAL ASSISTANCE PROJECTS

#### DESCRIPTION

THESE SHORT 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.

### TECHNICAL INFORMATION SERVICE

#### DESCRIPTION

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 ON A CONFIDENTIAL BASIS.

### SUMMER INTERNS

#### DESCRIPTION

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

#### DESCRIPTION

THIS PROGRAM IS FOR ADVANCED PROJECTS REQUIRING A GRADUATE STUDENT AND A FACULTY FOR AN EXTENDED PERIOD OF TIME.

#### TYPICAL PROJECTS

- ADVANCED PRODUCT MODELING
- COMPUTED-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 \$10,000. CONFIDENTIALITY IS NEGOTIATED SEPARATELY FOR EACH PROJECT.

CONTACT FOR  
TECHNICAL ASSISTANCE  
PROJECTS, SUMMER INTERNS,  
AND GRADUATE STUDENT  
EXTERNS:

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Associate Director  
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Designed by Pamela Burroff-Murr, Engineering Productions Office.

Photography by John Underwood and Dick Myers-Walls, Center for Instructional Services.





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