

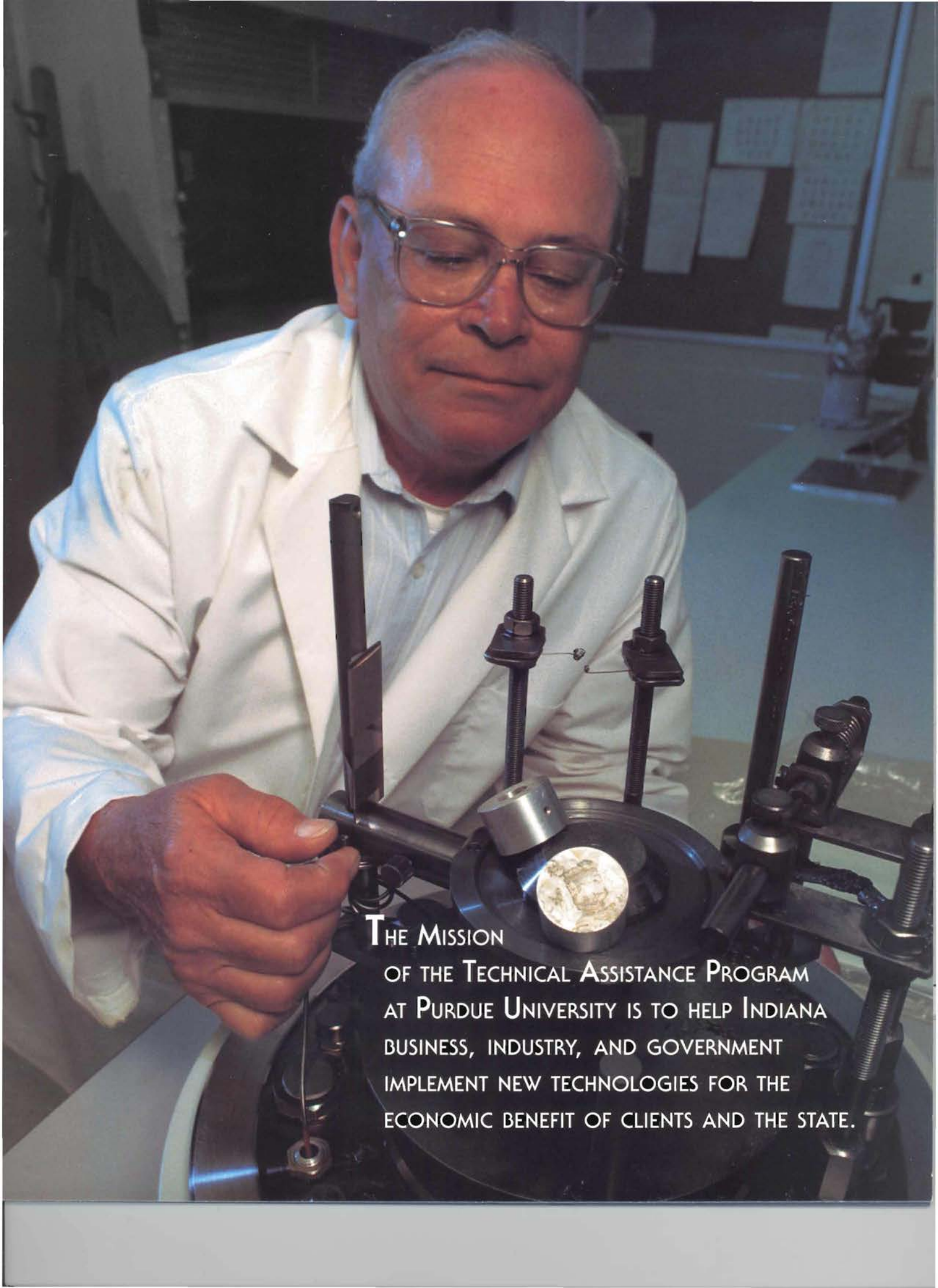
A series of vertical lines of varying heights and thicknesses, arranged in a rhythmic pattern on the left side of the cover.

PURDUE
UNIVERSITY

TECHNICAL
ASSISTANCE
PROGRAM

ANNUAL
REPORT

YEAR ENDING
JUNE 30, 1992



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.

DIRECTOR'S MESSAGE



The Technical Assistance Program provides rapid, confidential, and individual assistance to Indiana industries, businesses, and governmental units. Administered through the Purdue University Schools of Engineering, this statewide program helps to implement new and advanced technologies and to locate and interpret new information for clients. This *Annual Report* describes typical projects and results. This year technical assistance was provided in engineering, manufacturing, food science, industrial pharmacy, and man-

agement; the Technical Assistance Program worked with 338 clients located across the state (in six years the Program has received 1,763 requests for technical assistance). Projects continued to become more complex this year, increasing the effort required to complete them.

Faculty and graduate students with the program travel extensively throughout the state to collect data and present project results; 175 trips were made to client facilities this year. Evaluations are used to measure project success. The results are consistently positive, indicating that program staff solved the correct problems, providing timely and valuable assistance. New project requests from former clients (now 30 percent of total requests) also indicate satisfaction.

The Technical Information Service locates and delivers new technical information to clients. Requests for technical information and documents continue to increase: TIS completed 419 in-depth research assignments and delivered 14,969 documents this year; the peak delivery rate was over 1,500 documents per month. *Technology Alerts*—using modern electronic database technology to keep clients informed of new developments—grew in popularity. Clients report benefits that far exceed the nominal cost of this service.

The summer intern program placed 22 student interns for the summer of 1992 with firms throughout Indiana (the five-year total is 82 interns). Three Indiana companies selected former interns for permanent employment following their graduation; another company hired a graduate student who had worked with them on several projects. The economic benefits of these placements will continue for years.

The Technical Assistance Program and Technical Information Service this year responded quickly and effectively to many challenging requests from Indiana companies. The results allowed companies to apply new information and advanced technologies to improve their competitive positions. This *Annual Report* illustrates the breadth and depth of these successful technology transfers which have improved the economy of Indiana and increased the ability of Indiana companies to compete globally.

Alan T. McDonald
July 1992



Purdue research laboratories are often used in project work for problem definition and analysis (routine testing is referred to professional testing laboratories).

THE PURDUE UNIVERSITY

TECHNICAL ASSISTANCE PROGRAM

AREAS OF EXPERTISE

ELECTRICAL ENGINEERING
ELECTRICAL ENGINEERING
TECHNOLOGY
ENVIRONMENTAL ENGINEERING
CIVIL ENGINEERING
INDUSTRIAL ENGINEERING
MATERIALS ENGINEERING
MECHANICAL ENGINEERING
INDUSTRIAL MANAGEMENT
FOOD SCIENCE
INDUSTRIAL PHARMACY
LIBRARY RESEARCH

Since 1986, the Purdue University Technical Assistance Program has responded to the technical needs of Indiana industries, businesses and governmental units. A team of thirty-four senior faculty, graduate students, and professional staff work directly with companies to improve manufacturing competitiveness, assist in new product development, implement advanced industrial management tools, and solve difficult waste treatment problems.

The program staff meet with companies in person to define projects and ensure that the assistance provided is timely, feasible, and technically sound. The measured results of completed projects include jobs saved and created, increased sales, capital investments, and cost reductions. Additionally, many companies have reported benefits which cannot yet be specifically measured. These achievements demonstrate the strong commitment of both Indiana companies and the Technical Assistance Program staff to work together to improve the state's economic competitiveness.

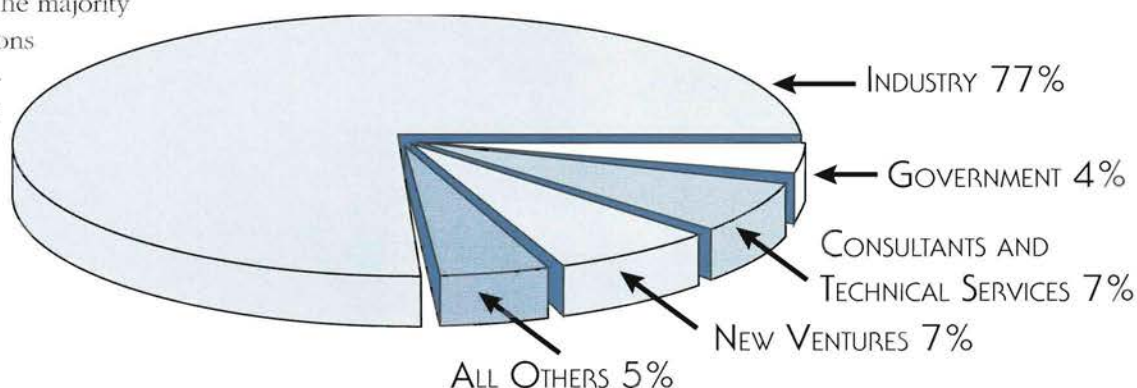
The program's work during the six years ending June 1992 has included:

- **Technical Assistance:** Over 1,200 of Indiana's 10,000 manufacturing companies have called upon the Technical Assistance Program for help with important technical questions and projects.
- **Technical Information:** Over 1,700 companies and individuals have used the program's information services.
- **Summer Interns:** Fifty-two companies have employed summer interns for engineering and management projects.

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

THE PROGRAM CASE LOAD

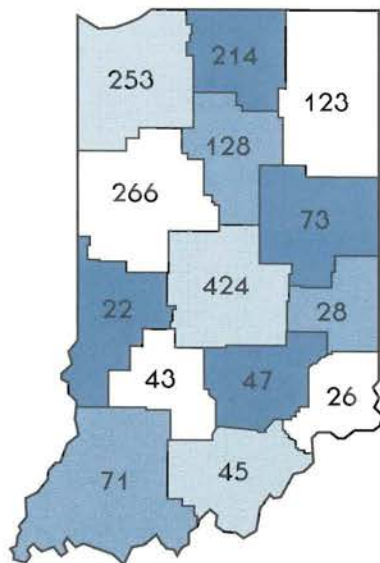
As shown by this chart, over three-fourths of the program case load comes from industry. The majority of the organizations served are small- to medium-sized manufacturing companies.



PROJECTS BY ECONOMIC REGION

May 1986 through June 1992

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



TOTAL PROJECTS: 1,763

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 Assistance
May 1986 through June 1992

	Year 1*	Year 2*	Total
Capital Investment	\$12,479,000	\$1,479,000	\$13,958,000
Dollars Saved	\$4,061,500	\$2,368,500	\$6,430,000
Increased Sales	\$26,160,000	\$80,574,000	\$106,734,000
Jobs Added	117	330	447
Jobs Saved	212	287	499

*Following TAP assistance.

PROJECT EXAMPLES

Landis & Gyr Metering, Inc. is a Lafayette company which designs and produces a full line of products for electricity metering. John Voisine, a manager in the company's research and development department, requested TAP assistance in identifying factors that affect the long-term reliability of electronic products. In response to this request, Professor Eric Furgason provided specific advice and relevant scientific articles. This assistance has been used by Landis & Gyr to implement processes that ensure their products meet the high reliability requirements of the electric utility industry.

Eric Furgason, professor of electrical engineering, and John Voisine, Landis & Gyr Metering, Inc. discuss some of the company's new developments in electronic metering.



Continental Group is an East Chicago metal fabricating company which provides engineering, manufacturing, and installation of heavy industrial equipment for the metals producing and processing industries. The company asked TAP for help in analyzing and evaluating the pressure, at specified flow rates, for a laminar flow water cooling system used on the runout table of a hot strip mill. The results of the TAP report were used to make several changes in pipe size and configuration which improved the flow of the cooling water. The assistance also helped the company increase their general understanding of this type of cooling system, providing knowledge which can be applied to future customer orders.

Bill Cahillane, manager of engineering of Continental Group, and Nick Sorak, professor of electrical engineering technology at Purdue Calumet, review the design of one of the company's products.





Morfam is a Mishawaka company which makes hand held massagers used by chiropractors, athletic teams, and private individuals. Faced with the need to make significant improvements in product quality, the company asked for TAP assistance in reducing the handle vibration in existing and new product designs. After analyzing sample units at Purdue, TAP recommended a number of specific changes. These recommendations were successfully tested and implemented by Morfam, resulting in a new level of product quality and a turn-around in company sales volume.

Joe Pearson, professor of mechanical engineering, Sue Morey, chief executive officer of Morfam, and Tim Lyon, graduate student in mechanical engineering, examine the company's product line.

Dynatech is a Goshen manufacturer of hardwood products for the recreational vehicle and park model industry. In the fall of 1991, the company received a large increase in chair orders and asked the Technical Assistance Program for help to increase production using the available manufacturing resources. Working closely with the company, a revised production work cell was recommended. The company has implemented this proposal with great success. Production has been increased over 35 percent, using the same floor space and manufacturing equipment, and the labor used has actually decreased.

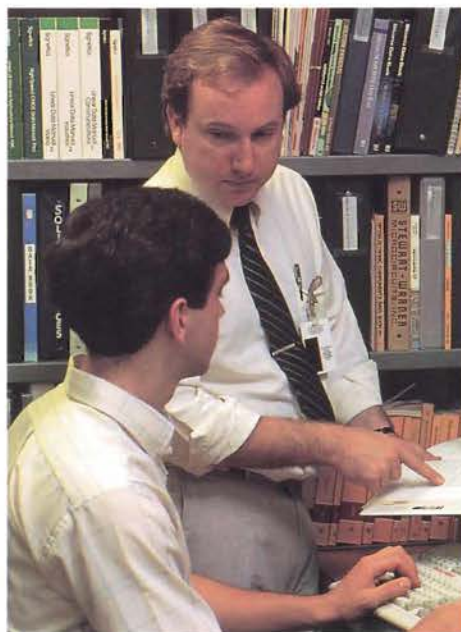
David Gross, president of Dynatech, and Colin Moodie, professor of industrial engineering, discuss productivity improvements in the company's chair department.



Airvac is a Rochester company which makes vacuum sewer systems used in the United States, Europe, and Asia. After having occasional problems with cracks in a section of injection molded wye tubing, the company asked the Technical Assistance Program to identify the specific cause of the problem. Professor Hruska carefully analyzed a number of samples and was able to help the company determine why cracks were occurring in certain applications. With this information, Airvac has been able to work with their supplier to resolve this difficult and costly problem.

Denny Moss, manager of quality control, and Sam Hruska, professor of materials engineering, examine one of the company's vacuum sewer systems.

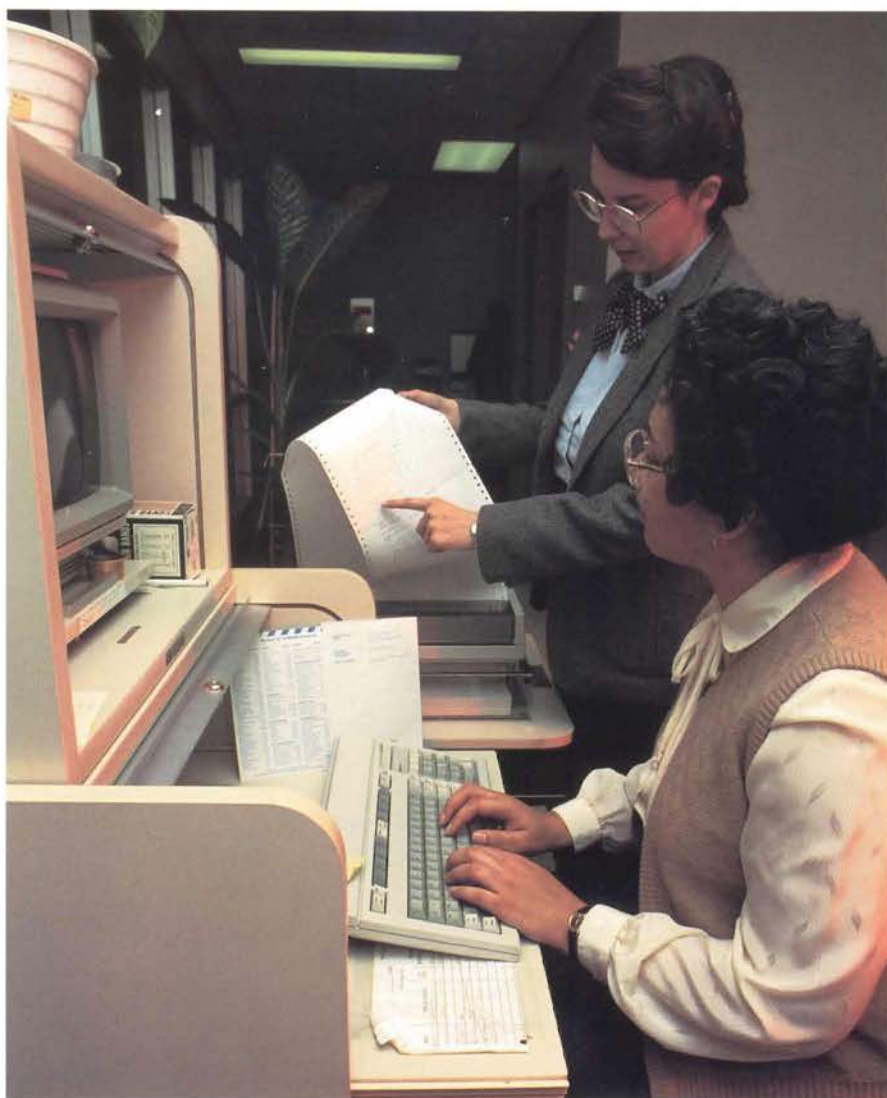




TECHNICAL INFORMATION SERVICE

Successful companies must keep abreast of market trends, new technologies, and the activities of their competitors. Over 1,700 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 costs of these information services vary by use and are estimated in advance.

- **Delivery of Needed Documents:** Each month, business people throughout the state order over 1,200 documents for delivery to their offices. Documents include patents, scientific reports, news media articles, information on markets and competitors, and journal articles.
- **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 a technical, business, or scientific topic can benefit from this service. Purdue library resources and worldwide on-line data bases 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.



Information for Indiana companies and businesses is obtained from sources throughout the world. During the past year, clients ordered nearly 15,000 documents.



TIS ACTIVITY SUMMARY

Based on requests made between February 1989-June 1992.

	1989-90	1990-91	1991-92	Total
Information Projects Completed	414	407	419	1,240
Document Orders Filled	3,203	9,108	14,969	27,280

TAP SUMMER INTERN PROGRAM

Many Indiana companies have taken advantage of summer interns to complete short-term engineering, manufacturing, or product costing projects. Through this program, the Technical Assistance Program faculty help each company:

- **Define the Project:** The faculty will visit the company if needed to ensure that the project is well understood.
- **Identify Qualified Students:** A large pool of seniors and graduate students are available each summer. The faculty recommend to the company the best qualified students for interviews.
- **Assist With the Project During the Summer:** Most interns take advantage of help from the faculty, including visits and progress reviews.

The results from this program have been significant for Indiana companies, including design of new products, implementation of manufacturing process improvements, development of costing systems, and reduction of manufacturing costs.

A NUMBER OF
COMPANIES HAVE
MADE REPEATED
REQUESTS FOR
INTERNS AND HAVE
MADE JOB OFFERS
TO THE STUDENTS
UPON GRADUATION.

SUMMER INTERN PROGRAM
1988 through 1992



TOTAL INTERNS: 82



Global Industrial Finishing Technology (G.I.F.T.) is part of the ITW Finishing Systems and Products Group, an Indianapolis based company which designs and produces industrial coating and finishing systems. Jim England was employed as a summer intern in the G.I.F.T. research group as part of a long-term program to develop innovative improvements in spray finishing technology.

Jim Scharfenberger, chief engineer of G.I.F.T., Jim England, senior in mechanical engineering, and Joe Pearson, professor of mechanical engineering, observe a laboratory test in the company's research facility.

SUMMER INTERN PROJECTS

Product costing can sometimes be difficult. Nappanee Wood Products, a company which makes both custom wood cabinetry for residential kitchens and OEM products for the recreational vehicle industry employed Chris Koenig as a summer intern to develop and implement an activity-based costing system for improved product costing. His work is part of a long-term project which will be continued by others within the company.

Keith Smith, professor of management, Chris Koenig, graduate student in management, and Larry Mast, president of Nappanee Wood Products, tour an area of the plant involved in a product costing study.



General Plastics is a rapidly growing Marion manufacturer of decorations for the Christmas and holiday seasons. Having obtained new contracts with major national retailers, the company has employed two summer interns as part of a program to quickly make significant increases in production. One of the students, Mark Wohlford, assisted in this effort by working on projects to improve production methods, standardize manufacturing processes, and develop effective operator instructions.

Mark Erlewine, president of General Plastics, Mark Wohlford, senior in mechanical engineering, and Joe Pearson, professor of mechanical engineering, observe production of a holiday wreath.





The clean air act requires extensive documentation, evaluation, and permitting for companies such as Al-Fe Heat Treating Inc., a Fort Wayne company which does heat treating to the very exacting standards required by the aluminum industry. Todd Hite spent the summer working on these tasks for the company's three heat treating facilities.

Todd Hite, senior in environmental engineering, Jon Heck, operations manager of the Wabash Division of Al-Fe Heat Treating, and Richard Johnson, graduate student in environmental engineering, review a heat treating process.



In the southern Indiana town of Paoli, Townhouse Penthouse Industries produces upholstered furniture for a number of national retailers. The company employed two industrial engineering summer interns as part of an ongoing effort to improve manufacturing quality, productivity, and cycle time. One of the interns, Vinodh Balaraman, was assigned the task of applying the techniques of group technology to the company's upholstery department, which cuts, sews, and assembles a very large number of different coverings, cushions, and pillows.

Vinodh Balaraman, graduate student in industrial engineering, Ray Whitt, personnel manager and safety director of Townhouse Penthouse Industries, and Shimon Nof, professor of industrial engineering, observe production of upholstered furniture.

TECHNICAL ASSISTANCE PROGRAM STAFF

FACULTY AND PROFESSIONAL STAFF



ADVISORY COUNCIL

The Technical Assistance Program is assisted by an advisory council consisting of 30 outstanding leaders from industry, consulting, government, and education. The chairman of the council is Berl J. Grant, president and chief executive officer of Seymour Manufacturing Company.



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Professor
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Professor
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Rebecca VanderJagt
Management

GUIDELINES FOR COMPANIES REQUESTING ASSISTANCE

The Technical Assistance Program (TAP) provides help to Indiana companies in solving problems and implementing new technologies in manufacturing, product development, and management.

THE MOST COMMON REQUESTS FOR ASSISTANCE INCLUDE:

1. Manufacturing:
 - Improved plant layout.
 - Improved quality assurance methods.
 - Process improvement.
 - Solution to an environmental waste treatment or disposal problem.
2. Product Development and Engineering:
 - Identification and demonstration of new methods for product design, testing, and evaluation.
 - Solution to specific engineering problems.
 - Material selection for a specific application.
 - Analysis of a corrosion problem.
3. Management:
 - Improvements of product costing systems.
 - Development of better methods for industrial marketing.
 - Assistance with strategic planning.

REQUIREMENTS OF THE PARTICIPATING COMPANY:

In order to effectively work together, the following requirements are made of the participating company:

1. Meet in person with the Technical Assistance Program staff. When an understanding of the question requires visiting the company, the TAP faculty will travel for an on-site visit. When a plant visit is not necessary, we request that company personnel travel to the West Lafayette campus for the initial meeting.
2. Clearly state the question or problem.
3. Provide appropriate materials and documents. These may include prints, samples, background information, financial data, videos, or other materials.
4. Complete an evaluation of TAP services. This evaluation is necessary to track the effectiveness of TAP projects and is sent shortly after the completion of a project.

THE TAP RESPONSE:

1. TAP faculty work closely with company personnel during the course of a project with the purpose of providing tan-

gible benefits to the firm. The amount of time that is devoted to each project is normally limited to a total of five days by TAP personnel. This time may be spread over a period of a few weeks. Visits to company facilities are made as needed.

2. Our conclusions are put in writing. When possible, the written recommendations are presented in person.
3. To follow up on TAP recommendations, some companies employ an engineering or management student for a summer work project. TAP's summer intern program is an excellent source of temporary engineering and management expertise.

Please note: TAP does not design components or products for a company (however, summer interns can perform design projects). TAP does not endorse products or processes and does not perform testing to industry standards. Companies may not use TAP analyses in advertising or any other form of endorsement.

Fees and confidentiality: TAP keeps all company information strictly confidential, including the names of companies that contact the program (the companies in this report have given TAP permission to describe their projects). Most technical assistance is provided without charge to the company. Fees for technical information are estimated in advance.

PROGRAM CONTACTS:

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