

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

PURDUE  
UNIVERSITY

TECHNICAL  
ASSISTANCE  
PROGRAM

ANNUAL  
REPORT

YEAR ENDING  
JUNE 30, 1991





**T**HE 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



In May 1991, the Technical Assistance Program reached a new milestone by celebrating its fifth anniversary. The statewide program—administered through the Schools of Engineering at Purdue University—continued to respond to the needs of Indiana industry, business, and government for rapid, confidential, and individual assistance to locate and interpret new information and to implement advanced technologies.

Projects completed this year include technical assistance in engineering, manufacturing, food science, industrial pharmacy, and management. The trend toward more complex projects continued, increasing the effort required to complete them. This year, the Technical Assistance Program worked with 300 clients distributed across the state; the 1,425th request for technical assistance was received in June. Faculty and graduate students working with the program traveled extensively throughout the state, making more than 180 trips to client facilities.

Typical projects and results are highlighted in this *Annual Report*.

Client satisfaction was demonstrated by evaluations and the increase—to about 25 percent—of requests from former clients. Feedback from clients was most positive: program staff solved the correct problems and provided timely and valuable assistance.

Requests for technical information and documents from the Technical Information Service continued at a high level. TIS completed 407 in-depth research assignments and delivered 9,108 documents this year. More than 1,000 documents were delivered during each of the last three months of the fiscal year. The new Technology Alert Service—introduced to keep clients informed of new developments—is growing in popularity. Clients using this service report results whose value far exceeds the nominal cost of the service.

The summer intern program—in its fourth year—placed 12 student interns with firms throughout Indiana during the summer of 1991. Three Indiana companies hired former interns permanently following their graduation; another major company hired a graduate student who had worked with them on several Technical Assistance Program projects. The economic benefits of these placements will continue for years.

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

Alan T. McDonald

July 1991

## THE PURDUE UNIVERSITY TECHNICAL ASSISTANCE PROGRAM

was established in 1986 to help Indiana business, industry, and government. Working primarily with small- to medium-sized industrial companies, projects have included solving difficult material corrosion problems, reorganizing production facilities, and updating product costing systems.

Through this program, a team of over thirty senior faculty, graduate students, and professional staff are available to help Indiana companies, responding directly to their expressed needs. The program staff meet in person with company personnel to define projects and ensure that the assistance provided is timely, feasible, and technically sound. To date, over ten percent of Indiana companies have used the program for 1,425 separate projects.

The results detailed in this report include millions of dollars in cost reductions, many jobs created, and significant capital investment in communities throughout the state. These achievements demonstrate the strong commitment that Indiana companies are making to improve their economic competitiveness.

### AREAS OF EXPERTISE INCLUDE

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



The Technical Assistance Program faculty and staff made 180 visits to companies during the past year. Nick Sorak (right), professor of electrical engineering technology at Purdue Calumet, reviews product designs with Ralph Skoog, president of Provar, Inc., a Hammond company which makes process controls and specialized test equipment.

# TECHNICAL INFORMATION SERVICES



Information for Indiana companies and businesses is obtained from sources throughout the world. During the past year, clients ordered over 9,000 documents.

Keeping abreast of new developments in a specific technical area or business is difficult and time consuming. The Technical Assistance Program provides the following services to help companies quickly find the information they need. The costs of these information services vary by use and are estimated in advance.

- **Dial-up Access to the Purdue Libraries:** With a personal computer and 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 one week loan, and copies of documents can be ordered.
- **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.
- **Information Searches:** Through this service, information specialists search for material on virtually any technical, business, or scientific subject using Purdue library resources and worldwide on-line databases. Copies of documents are obtained and forwarded as requested.



## SUMMER INTERN PROGRAM

Many companies have short-term engineering, manufacturing, or industrial management projects that can be completed during the summer by qualified senior- and graduate-level students. The summer intern program is designed to help companies find the right students, and to assist both the company and the summer interns in successfully completing these projects.

Program faculty discuss each project in detail with the company, helping to establish realistic goals, determining the specific technical expertise needed, and screening students for interviews. During the summer, assistance is provided and visits are made as needed.

This program has resulted in many benefits to the companies involved, including new products developed, substantial manufacturing cost reductions, and improved engineering design systems.

During the past four years, 60 students have been involved in projects such as:

- Low cost manufacturing improvements.
- Plant layout.
- Product design and development.
- Improved manufacturing processes.
- Updating product cost systems.

### SUMMER INTERN PROGRAM 1988 through 1991

TOTAL INTERNS: 60





Steve Milter, president of National Recovery Systems, Keith Smith, professor of management, and Mike Komisarick, graduate student in management, review production cost data.

## PRODUCT COSTING

National Recovery Systems is an East Chicago based company which recycles and processes minerals, alloys, and waste oxides for the steel making and foundry industries. As a leader in this industry, the company produces numerous product variations, and production quantities range from a few pounds to many tons.

In order to develop a product costing system that supports rapid growth in production levels and new products, Mike Komisarick was employed for the summer to perform an extensive analysis of the company's production costs, and to determine how to allocate these costs accurately to each product. The results of his work are being used to guide the company in cost control, pricing, quoting, and selecting new products.

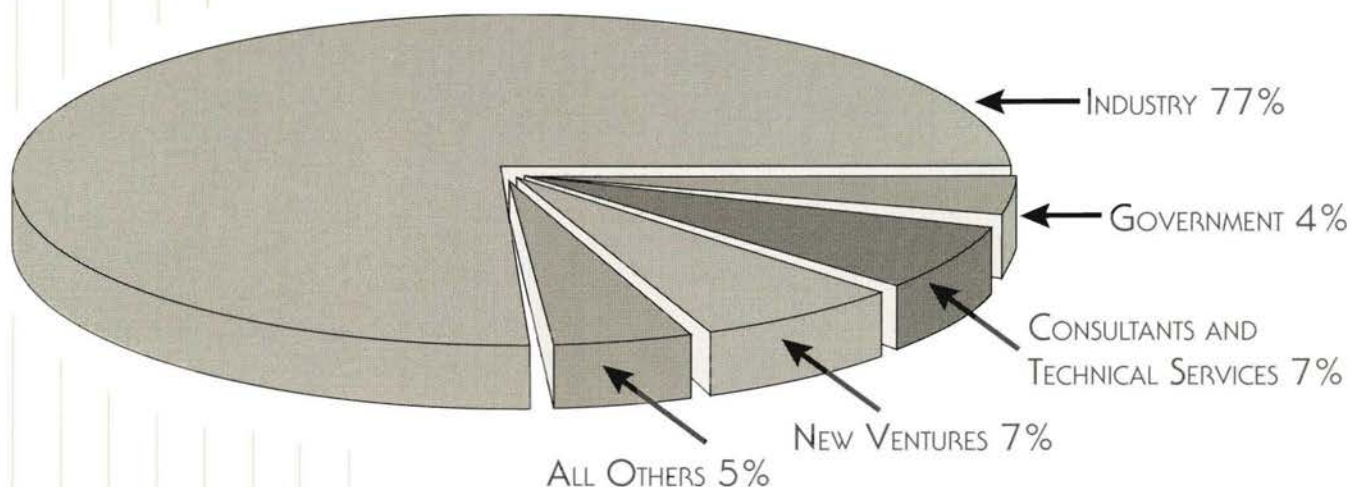


Bill Loudermilk, vice president of engineering of Anchor industries, Kevin Gentry, senior in industrial engineering, and Colin Moodie, professor of industrial engineering, observe the cutting of fabric for a large custom tent.

## MANUFACTURING PLANNING

Anchor Industries in Evansville is the nation's largest manufacturer in its field of custom fabric products. Their product line consists of thousands of items such as tents, awnings, and soft luggage.

The company employed Kevin Gentry to collect and analyze production data for use in manufacturing planning for the great diversity of products and manufacturing operations. Kevin's work included developing sophisticated analysis techniques and is being used to improve cost estimating, production scheduling, and work force planning.



## 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.

## 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 1991*

	Year 1*	Year 2*	Total
Capital Investment	\$2,349,000	\$959,000	\$3,308,000
Dollars Saved	\$3,775,500	\$2,065,500	\$5,841,000
Increased Sales	\$15,787,000	\$29,891,000	\$45,678,000
Jobs Added	98	301	399
Jobs Saved	184	248	432

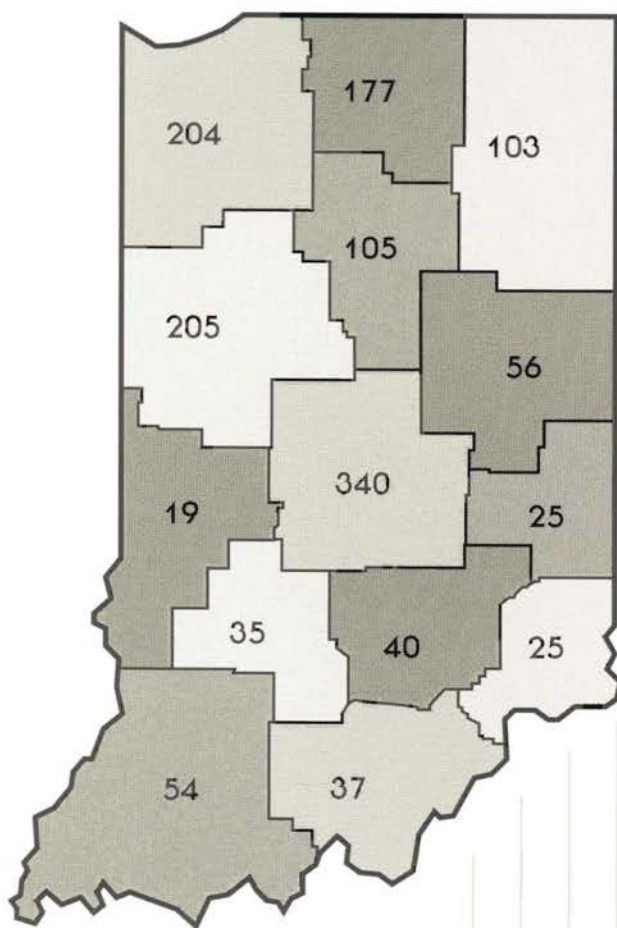
*\* Following TAP assistance.*



## PROJECTS BY ECONOMIC REGION

*May 1986 through June 1991*

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



TOTAL PROJECTS: 1425



## ADVISORY COUNCIL

The Technical Assistance Program is served by an advisory council consisting of 30 outstanding leaders from industry, consulting, government, and education. The chairman of the council is F. A. "Rick" Ahaus, vice-president of Ahaus Tool & Engineering in Richmond.



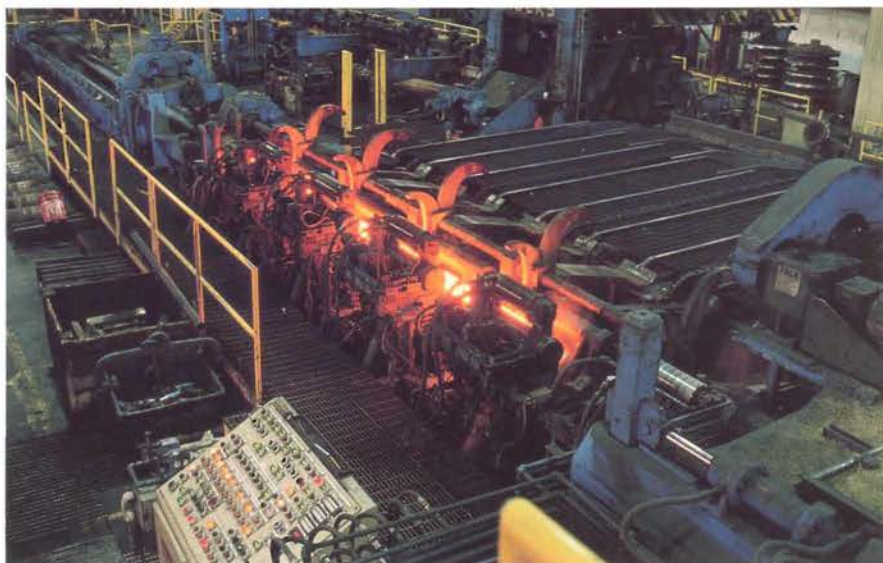
## PROJECT EXAMPLES

### ENVIRONMENTAL MANAGEMENT OF PRODUCTION PROCESSES

Manufacturing companies encounter many short questions regarding their environmental controls. One company which has called upon the Technical Assistance Program with questions in this area is Plymouth Tube Co. in Winamac. The Winamac plant uses some of the world's most advanced manufacturing processes to produce premium quality carbon and alloy steel tubing, both seamless and welded. The Technical Assistance Program has helped the company with questions such as how to perform internal water testing and how to properly ventilate production areas. The availability of expertise in these areas has helped the company save time and make informed decisions on these issues.



Rick Johnson, Ph.D. student in environmental engineering, and Jim Walsh, supervisor of safety and training of Plymouth Tube, discuss process controls for the pickling operation.







Sam Hruska, professor of materials engineering, David Rariden, chairman of Stone City Products, and Adam Peters, materials engineering student, discuss the formability characteristics of the steel used in capacitor cups.

## MATERIAL SPECIFICATIONS

Successful metal fabrication requires constant attention to the incoming quality of raw materials. In Bedford, Stone City Products produces custom stampings for a wide variety of customers using automated processes. One of their high volume products is a cup made from terne-plated steel. After many production runs without problems, the company began encountering a high rate of cracking and peeling of the surface plating during the forming operations. The Technical Assistance Program was asked to help determine the source of the problem. Using photomicrographs and energy dispersive analysis of x-rays, the Technical Assistance Program was able to identify the problem as variation in the thickness and composition of the plating. These conclusions were summarized in a report which the company used to tighten critical plating specifications. The steel purchased under these new specifications has been run without problems, saving the company many dollars of scrap costs and production delays.



Joe Pearson, professor of mechanical engineering, Greg Derylo, graduate student in mechanical engineering, and Bob Van Fossen, senior project engineer at Johnson Controls, discuss the design of a refrigeration water control valve.

## PRODUCT DESIGN IMPROVEMENT

In Goshen, Johnson Controls manufactures a number of products including water control valves for the refrigeration industry. Some of these valves operate under severe conditions, making it difficult to meet stability requirements. The Technical Assistance Program was contacted to provide recommendations which would improve stability characteristics. Using company test data and analysis on campus, a number of design alternatives were presented. The company then tested these alternatives. As a result, a design change was identified which successfully met their improvement objectives, and could be implemented with very little cost. Implementation of this change is now in progress.

## LOW COST MANUFACTURING IMPROVEMENTS

Many small companies contact the Technical Assistance Program in an effort to identify and implement low cost manufacturing improvements. One such company is Plastics Technology, Inc. in Marion. The company is a subcontractor for its parent, Tulox Plastics Corporation, which produces high volume extruded packaging products using automated equipment.

In response to customer requests and market opportunities, a number of specialized but low volume items were added to the packaging product line. Because automation is not feasible on these products, the subsidiary set up manual assembly stations. In order to improve the productivity of these assembly stations, the company asked the Technical Assistance Program to analyze the job components and recommend changes. Since implementing the recommended low cost changes, the company has more than doubled its productivity on many items and achieved a payback on their small investment of only a few weeks. As a result, their products are salable to a larger portion of the packaging market.



Colin Moodie, professor of industrial engineering, and John Sciaudone, president of Plastics Technology, Inc., observe the assembly of one of the company's many new low volume products.





Eric Furgason, professor of engineering, has worked with Thermwood Corporation, located in Dale, on advanced product development of digital sky mapping.



## HEADING DATA FOR MOVING MAPS

Thermwood Corporation is a 20-year-old company that makes sophisticated electronic manufacturing equipment, as well as certain avionics products. One product, a moving map for general aviation pilots, has recently been released, and many enhancements are being developed. The company asked the Technical Assistance Program for help in developing the complex mathematical formulas needed to provide heading data for the system. The solutions have been internally tested and verified by Thermwood and are now undergoing FAA approvals.



Rochelle Cohen, president of Toogies Cookies & Brownies, and Bernie Liska, professor of food science, discuss the production of the company's most popular brownie product.

## COOKIE AND BROWNIE PRODUCTION

Companies starting up production encounter many questions and problems that require assistance from outside sources. Toogies Cookies & Brownies in Carmel has grown at a 40 percent annual rate since beginning production five years ago. During this time, the Technical Assistance Program has assisted the company on questions such as dry mix cookie formulation, equipment selection, and methods of food testing. The company's new production plant produces up to 44,000 brownies and 120,000 cookies per day, and their products are now being sold nationwide in convenience stores, restaurants, and major retailers.

# TECHNICAL ASSISTANCE PROGRAM STAFF

## FACULTY AND PROFESSIONAL STAFF



**Alan T. McDonald**  
*Director*  
*Technical Assistance Program*  
*Professor*  
*Mechanical Engineering*



**Colin L. Moodie**  
*Professor*  
*Industrial Engineering*



**David R. McKinnis**  
*Associate Director*  
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**Joseph T. Pearson**  
*Associate Professor*  
*Mechanical Engineering*



**John M. Bell**  
*Associate Professor*  
*Environmental Engineering*



**Garnet E. Peck**  
*Professor*  
*Industrial Pharmacy*



**Julia A. Burton**  
*Information Specialist*



**Charles F. Scholer**  
*Professor*  
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**Eric S. Furgason**  
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*Electrical Engineering*



**Keith V. Smith**  
*Professor*  
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**Samuel J. Hruska**  
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**Nikola M. Sorak**  
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**Bernard J. Liska**  
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*Food Sciences*



**Suzanne M. Ward**  
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## GRADUATE ENGINEERS



**Trevor J. Blohm**  
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**Nirmala Saraswat**  
*Environmental Engineering*



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**Bonnie L. Griffioen**  
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**Matthias Wapler**  
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*Environmental Engineering*



**Graeme M.H. Warren**  
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**Kraig J. Olejniczak**  
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## ADMINISTRATIVE STAFF



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**Victoria L. McLaughlin**  
*Clerk*



**Cindy L. Meadows**  
*Administrative Assistant*



**Sherry L. Million**  
*Secretary*

# 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.
  - Reduced material handling costs.
  - 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.
  - Financial analysis.
  - Development of better methods for industrial marketing.
  - Assistance with strategic planning, a comprehensive procedure designed to help firms anticipate the future and prepare for it logically.

## 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. TAP faculty take great care to ensure that the company's question is fully understood. Therefore, we generally meet in person for an initial discussion (sometimes, a very specific question can be answered by phone or mail). 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. When the question is complex, a brief written statement is requested to aid in fully understanding the situation.
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 tangible 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 usually 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 helps companies identify top senior- or graduate-level students and provides assistance to them on their project if needed.

**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 funding:** TAP is funded by the state of Indiana through the Indiana Business Modernization and Technology Corporation.

## PROGRAM CONTACTS:

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