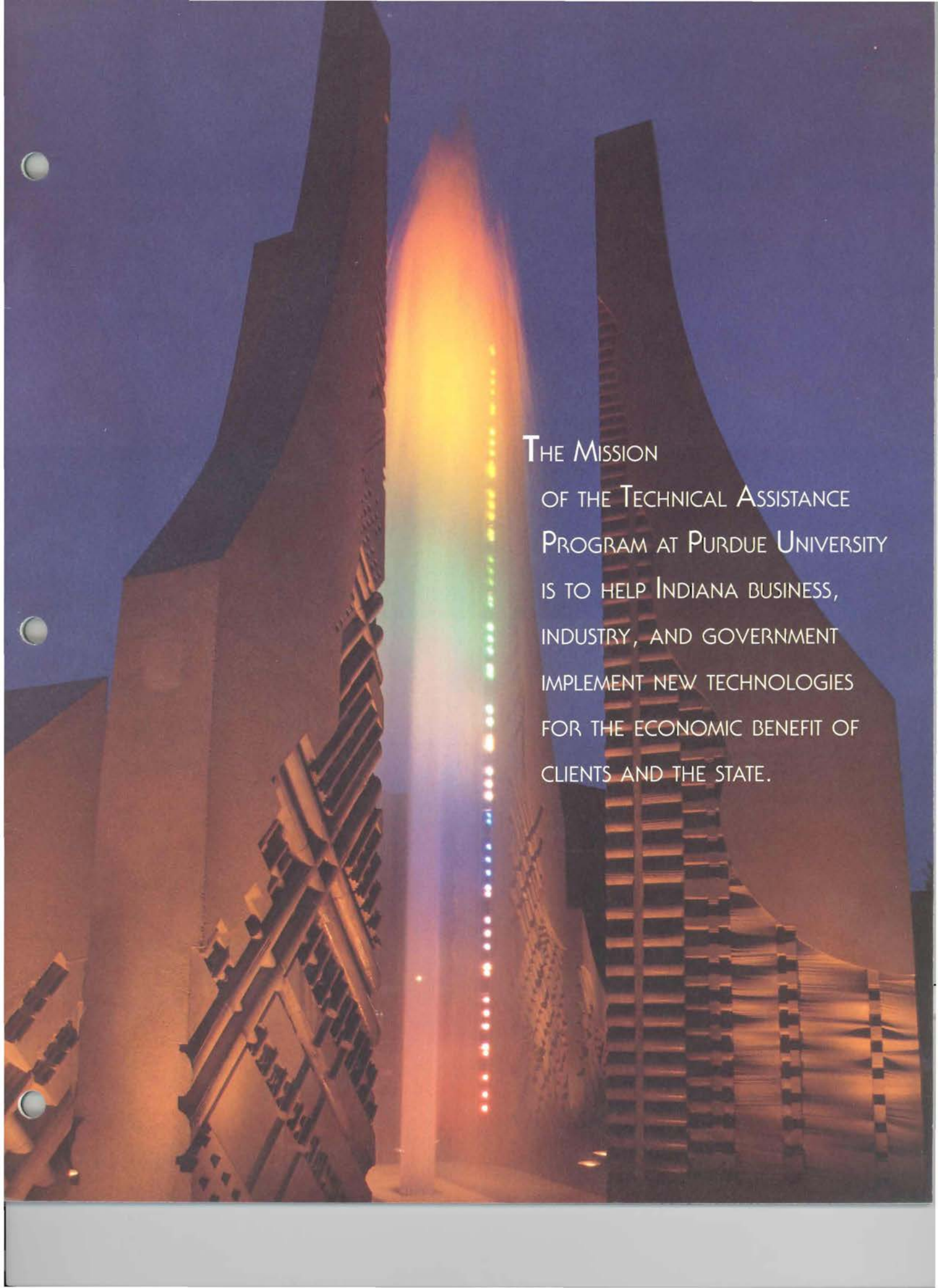


PURDUE
UNIVERSITY

TECHNICAL
ASSISTANCE
PROGRAM

ANNUAL
REPORT

YEAR ENDING
JUNE 30, 1990



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 rapid pace of advancing technology intensifies the pressure on companies to remain competitive. The effects of international competition are well documented; awareness of environmental and consumer issues is increasing. During its fourth year, the Technical Assistance Program—administered through Purdue University—has continued to respond to the needs of Indiana industry, business, and government for rapid, individualized, and confidential technical assistance.

Projects this year included technical assistance in engineering, manufacturing, food science, industrial pharmacy, and management. The projects were significantly more complex, requiring increased effort to complete them. This year the Technical Assistance Program worked with 295 clients distributed across the state; the 1,000th request for technical assistance was received in February. Program faculty and staff members traveled extensively throughout the state, making more than 150 trips to client facilities.

Results of typical projects are highlighted in this annual report. Client response was overwhelmingly positive, showing that the program staff were able to solve the correct problems, providing valuable and timely assistance to clients. Client satisfaction was demonstrated by their evaluations and the fact that over 20 percent of the requests were from former clients.

Requests for technical assistance in environmental engineering increased significantly this year, a trend which is expected to continue. Strategic planning is underway to help find efficient ways to deal with the increased load in this area.

A new Technology Alert Service was introduced to keep clients informed of new developments. Clients have begun using this service with great results, and details about the service are included in this report.

The summer intern program is in its third year—18 student interns were placed with firms throughout the state this summer. Three companies hired former interns permanently following their graduation; the economic benefits of these linkages will continue for years.

The past year has been filled with challenging requests from companies vitally interested in improving their competitive positions. The Technical Assistance Program has responded quickly and effectively to these requests. This annual report illustrates the breadth and depth of the successful technology transfers which have improved the economy of Indiana and increased the ability of Indiana companies to compete worldwide.

Alan T. McDonald

July 1990

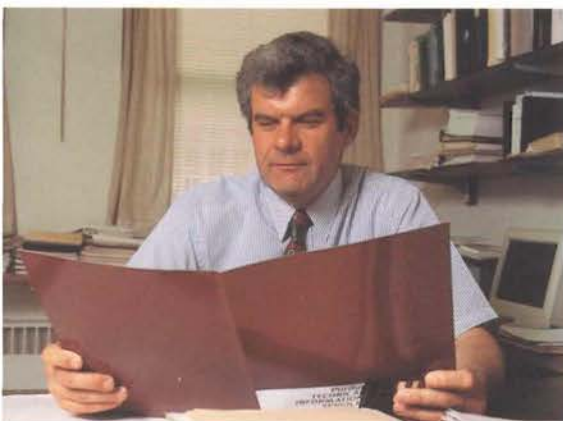
Meeting the technical needs faced by industry today requires advanced expertise in many fields. The Technical Assistance Program responds to this need with a team of twenty-five senior research faculty and graduate students. This team works with companies on an individual basis to implement new and advanced technologies in the areas of product development, manufacturing methods, and industrial management. In this way, a company receives help from a group with both industrial and research expertise. Companies are advised on current solutions as well as promising new developments that apply to their areas of need. Through this process of technology transfer, companies increase their competitive capabilities and, in turn, strengthen the Indiana economy.

AREAS OF EXPERTISE INCLUDE:

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

Established in 1986, Purdue's state-wide Technical Assistance Program has undertaken over 1,100 projects dealing with a full range of difficult technical questions. The results described in this report are representative of the positive influence the Technical Assistance Program faculty and graduate students have had with companies throughout the state. Their expertise, combined with University facilities, provide powerful tools to meet the technical needs of Indiana industry.

TECHNOLOGY ALERT SERVICE



HOW TO OBTAIN THIS SERVICE

To set up a Technology Alert for your subject of interest, contact:

Suzanne Ward, Manager
Technical Information Service
Krannert Library
Purdue University
West Lafayette, IN 47907

Phone: (317) 494-9876
FAX: (317) 494-0142

Keeping up to date with new developments in a specific field is a difficult and time-consuming task. The Technology Alert Service provides a way to very quickly scan new information on a given subject by providing companies and individuals with the most recently published information in areas critical to their business or profession.

For each subject of interest, a special information search program is established which identifies all new publications, patents, or other information on that topic. Abstracts of these items are sent to the client on a weekly or monthly basis.

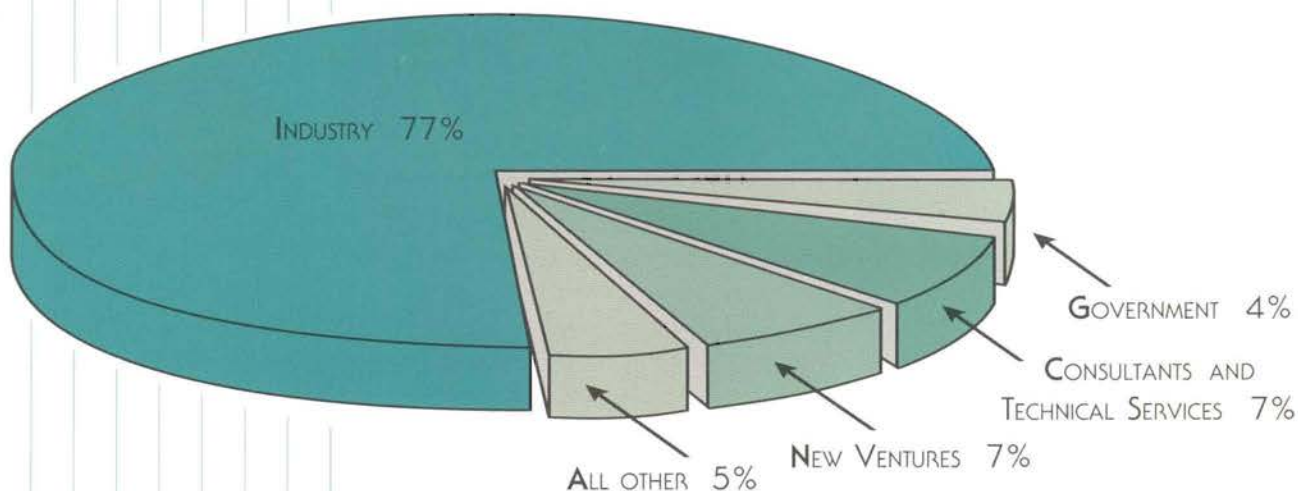
Through this service, a company or individual can significantly reduce the time required to keep informed of important new developments, and can ensure that new information is not missed.

TECHNOLOGY ALERTS CAN BE USED TO:

- ▲ Obtain news media information about companies, products, or industries (new product announcements, articles in business and trade magazines, statistical information, market surveys, etc.).
- ▲ Track new developments on specific industrial processes.
- ▲ Monitor research being published by scientists at specific companies, universities, or government agencies.
- ▲ Review new patents by specific process or device, or by company name.

FEES AND CONFIDENTIALITY

Fees for the alert service vary by use and are estimated for each new request. All information provided, and the names of those participating, is kept confidential.



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% 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 1990*

	Year 1 *	Year 2 *	Total
Dollars saved	\$1,195,000	\$1,630,000	\$2,825,000
Increased Sales	\$7,987,000	\$22,931,000	\$30,918,000
Jobs added	73	248	321
Jobs saved	33	44	77

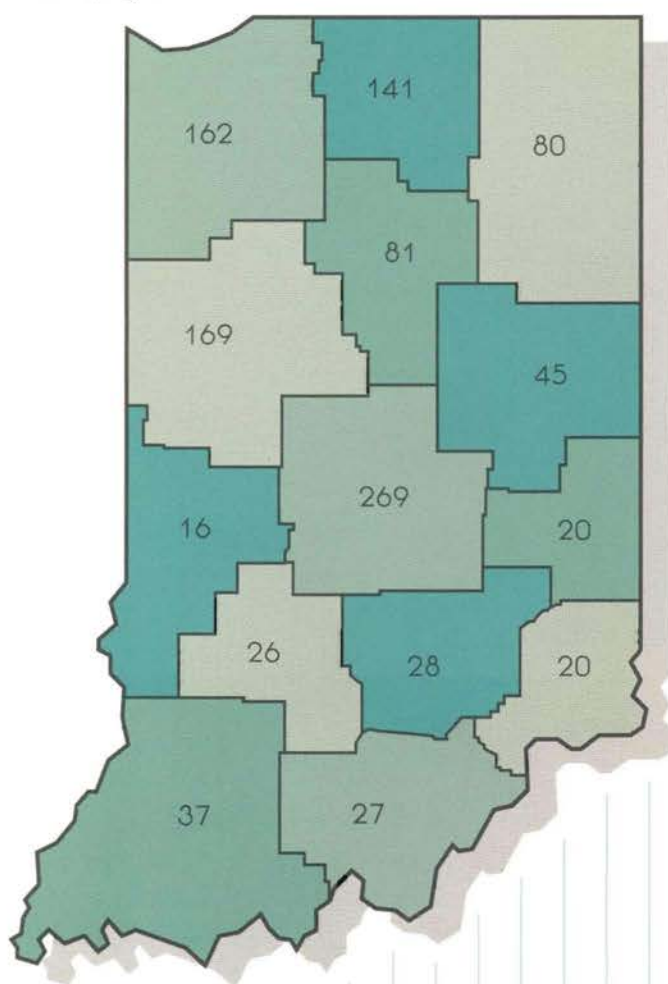
** Following TAP assistance*

PROJECTS BY ECONOMIC REGION

May 1986 through June 1990

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

Total projects: 1121



PURDUE TECHNICAL ASSISTANCE PROGRAM RECEIVES FIRST PLACE AWARD FROM NAMTAC



Each year the National Association of Management and Technical Assistance Centers (NAMTAC) presents awards for the best assistance projects in the nation.

In October 1989, the Purdue Technical Assistance Program received the first place award for technical assistance at the NAMTAC annual conference in Washington, D.C. The award was earned by Gerald T. Heydt, professor of electrical engineering, and Kraig Olejniczak, Ph.D. student in electrical engineering for their assistance to a medium-sized automotive supplier in defining the specifications for a new product. A large order was subsequently placed by an automotive customer resulting in the addition of over twenty jobs in the company.

PROJECT EXAMPLES

ENVIRONMENTAL ENGINEERING

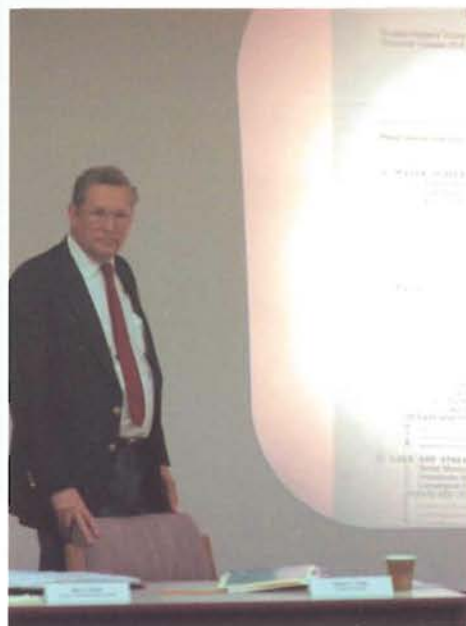
Small companies face many difficult environmental issues requiring expertise beyond their own employees. One example is the company pictured at right, which needed advice on appropriate disposal of spent caustic and acid plating solutions. The Technical Assistance Program determined the extent of their disposal requirements and recommended solutions. With this information, the company is making the necessary changes to their plating operation.



Greg Loraine and Richard Johnson, graduate students in environmental engineering, and John Bell, associate professor of environmental engineering review the plating process of a small company.

The Technical Assistance Program works with both industrial and municipal clients in the areas of solid waste, hazardous waste, water treatment, and waste water treatment. All work is kept confidential, including the names of companies and municipalities involved.

Dean Nold, professor of electrical engineering technology at the Calumet Campus, addresses a manufacturing group on the environmental concerns of companies in northwest Indiana.



ELECTRICAL ENGINEERING TECHNOLOGY

As the Technical Assistance Program representative for northwest Indiana, Dean Nold has received a great number of assistance requests in the area of environmental issues. In addition to helping companies individually on specific projects, the Technical Assistance Program conducted a half-day seminar on environmental issues at the Calumet Campus in June 1990.

Dan Bollinger, senior in pharmacy, and Garnet Peck, professor of industrial pharmacy, are compressing a reagent tablet (safety shielding has been removed for illustrative purposes).



Keith Smith, professor of management, addresses a group of small business owners on the importance of strategic planning.



To obtain a copy of the report, "Strategic Planning for Small Business," contact the Technical Assistance Program.

INDUSTRIAL PHARMACY

Most people think of a few large companies as "the pharmaceutical industry." However, many small Indiana firms make products that require the same methods and controls used by large pharmaceutical firms. These products include over-the-counter personal care items, certain medical diagnostic tests, cosmetics, and various reagents. The Technical Assistance Program provides these small companies assistance in planning product development, selecting and evaluating formulations, developing product testing plans, identifying manufacturing methods and contract manufacturers, and determining how to meet applicable manufacturing regulations.

MANAGEMENT

"If you don't know where you're going, you probably won't get there." This familiar quote by Yogi Berra is very applicable to the success of the small business in today's ever-changing, increasingly competitive environment. Several small industrial companies have requested assistance in strategic planning, a comprehensive procedure designed to help firms anticipate the future and prepare for it logically.

In response to these requests, Keith Smith, professor of management, and Melissa Green, graduate student in management, have worked closely with five small Indiana firms to develop a practical, four-stage approach to strategic planning. After trial use by these firms, the planning procedures have been developed into a report, "Strategic Planning for Small Business."

ELECTRICAL ENGINEERING

A successful supplier to the automotive industry must maintain a strong commitment to new product development. Marshall Electric of Rochester, Indiana, produces ignition coils and other automotive products, and uses a strong research and development program to meet the needs of its customers. One new product, in the initial stages of development, must ensure that radio-frequency interference (RFI) propagating from the spark plug to the ignition coil will not damage the coil or other components. In this case, measurement of the RFI signals required very sophisticated instrumentation and setup, and the company requested help in devising a method of making measurements. Using laboratory instrumentation and a number of creative ideas in setup, Professor Eric Furgason successfully quantified the RFI involved. This information is now being used by Marshall Electric in the next step of this long-term product development project.



Eric Furgason, professor of electrical engineering, and Tom Marrs, president of Marshall Electric, observe radio-frequency interference measurements.



Sam Hruska, professor of materials engineering, and Jess Helsel, president of Helsel, Inc., review a low-temperature bonding process.



MATERIALS ENGINEERING

Competing in the international marketplace is nothing new for Helsel, Inc. of Campbellsburg, which designs and manufactures highly engineered powdered metal parts for a variety of industries. One new product area for Helsel requires a difficult operation of bonding two dissimilar metals. After a thorough development program, they contacted the

Technical Assistance Program for help in developing a workable bonding process. A study of the bonding problem and selected experiments were conducted which identified an existing, but little known, method for this application. Since that time, Helsel has successfully implemented this solution, and recaptured \$650,000 of sales from an Asian competitor.

Chuck Scholer, professor of civil engineering, and Ray Helmer, staff engineer with Miller Structures of Elkhart, inspect the composition of concrete being poured on the floor of a semi-mobile structure for a magnetic resonance imaging facility.



CIVIL ENGINEERING

The development of improved products is an on-going task at Miller Structures, Inc., an Elkhart-based company which produces a broad range of manufactured structures. One product line, semi-mobile units used by medical centers for sophisticated diagnostic equipment, requires concrete floors. In an effort to reduce weight, the company has contacted the Technical Assistance Program for help in finding concrete formulations with a better strength-to-weight ratio. After visiting the company, Professor Scholer made an experimental formulation and provided some initial recommendations now under review by the company.



Bernie Liska (right), professor of food science, inspects an aseptically packaged food product.

FOOD SCIENCE

Consumers routinely depend on the food industry to provide products that are safe, nutritious, and flavorful. Packaging methods are an important part of meeting these objectives. One method increasingly being used is called aseptic packaging. This process involves sterilizing the food and the packaging separately, and then packaging

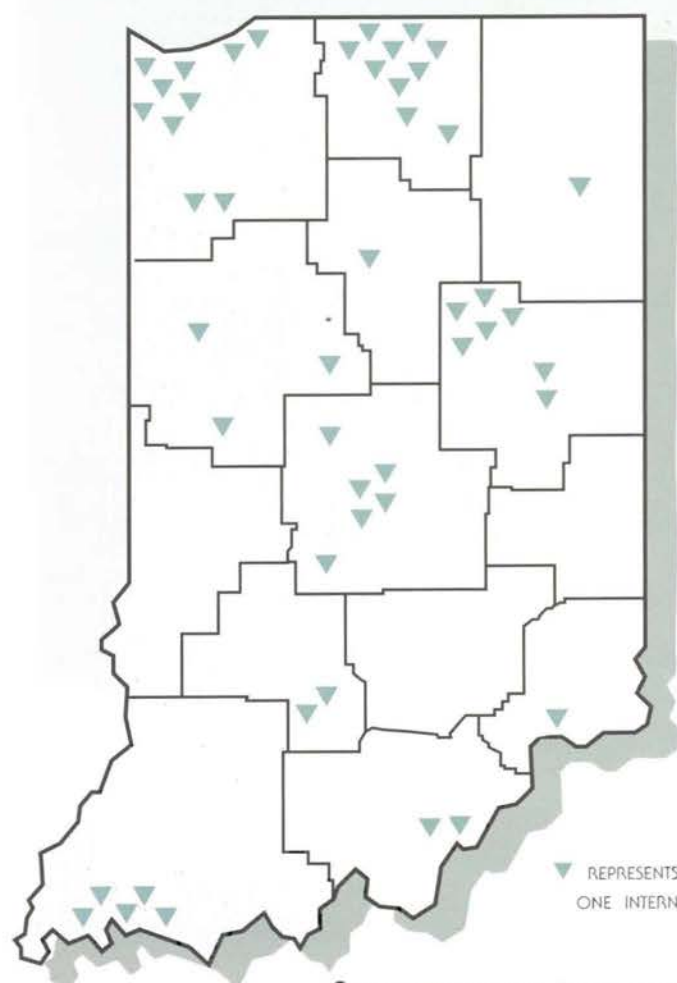
the food under sterilized conditions. This relatively new method offers a number of advantages for certain foods, but requires increased technical expertise and process control. As a result, many food processors have requested Technical Assistance Program help in adopting this technology.

SUMMER INTERN PROGRAM

Many companies as clients of the Technical Assistance Program have been introduced to new technologies that require extended time to adopt. To support these companies, a unique summer intern program has been established. Through this program, a company is assisted in finding a well-qualified student for summer employment on a specific project involving an infusion of new technology, introduction of new analysis tools, or implementation of improved production methods. In turn, the student and the company receive advice and direction on the project from Technical Assistance Program faculty during the course of the project.

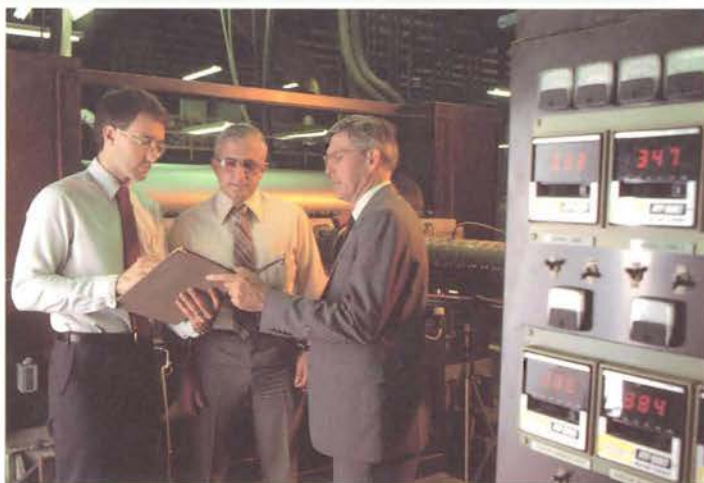
Forty-eight students have been involved in this program on projects such as:

- ▲ Improved production methods and processes.
- ▲ Product design and development.
- ▲ Plant layout.
- ▲ Adoption of new engineering design and analysis tools.
- ▲ Product costing systems.
- ▲ Strategic planning.



Summer Intern Program
1988 through 1990

Total Interns: 48



Ken Betz, senior in mechanical engineering, Frank Palmer, engineering manager of Crawford Industries, and Joe Pearson, associate professor of mechanical engineering, review proposed control system improvements for an extruder.

MECHANICAL ENGINEERING

Companies often can gain improvements from complex process equipment by upgrading to advanced process control systems. This is the case at Crawford Industries, a Crawfordsville company which makes custom plastic binders and folders. Crawford Industries extrudes their own sheet stock, using a number of extruders that have their original, and now outdated, control systems. Ken Betz has been employed as a summer intern to investigate, select, and recommend state-of-the-art controls for the extruders. When implemented, these new systems will reduce startup and changeover times, conserve energy, and improve product dimensional consistency, enabling Crawford Industries to maintain a competitive advantage in manufacturing capabilities.



Krishna Rangarajan, graduate student in industrial engineering, John Lauffer, controller of Bruce Fox, Inc., Colin Moodie, professor of industrial engineering, and Austin Thomas, graduate student in industrial engineering, review plans for an improved plant layout.

INDUSTRIAL ENGINEERING

Manufacturing processes with numerous steps must be carefully planned to be productive. In recent years, Bruce Fox, Inc., a New Albany firm in the business of designing and producing high quality custom award plaques, has expanded rapidly. To maintain an efficient operation, they have employed two industrial engineering interns for the summer,

Krishna Rangarajan and Austin Thomas. Their assignment has been to study the company's manufacturing processes and recommend improvements in work place design, scheduling, and layout. This work is an important part of Bruce Fox, Inc.'s plan to increase productivity as their business continues to grow.

TECHNICAL ASSISTANCE PROGRAM STAFF

FACULTY



Alan T. McDonald
Director
Technical Assistance Program
Professor
Mechanical Engineering



Colin L. Moodie
Professor
Industrial Engineering



David R. McKinnis
Associate Director
Technical Assistance Program



Dean E. Nold
Professor
Electrical Engineering
Technology



John M. Bell
Associate Professor
Environmental Engineering



Joseph T. Pearson
Associate Professor
Mechanical Engineering



Eric S. Furgason
Professor
Electrical Engineering



Garnet E. Peck
Professor
Industrial Pharmacy



Samuel J. Hruska
Professor
Materials Engineering



Charles F. Scholer
Professor
Civil Engineering



Bernard J. Liska
Professor
Food Sciences



Keith V. Smith
Professor
Management

GRADUATE STUDENTS



Trevor J. Blohm
Mechanical Engineering



Elizabeth A. Fennell
Industrial Engineering



Tony A. Gibbens
Electrical Engineering



Melissa M. Green
Management



David G. Humphrey
Industrial Engineering



Richard W. Johnson
Environmental Engineering



Thomas D. Johnson
Materials Engineering



Janet M. Kaski
Management



Gregory A. Loraine
Environmental Engineering



Travis J. Matthews
Materials Engineering



Kraig J. Olejniczak
Electrical Engineering



Charles A. Riegel
Mechanical Engineering



Matthias Wapler
Mechanical Engineering



Detlef M. Weber
Industrial Engineering

ADMINISTRATIVE STAFF



Cindy L. Meadows
Administrative Assistant



Sherry L. Million
Secretary



ADVISORY COUNCIL

The Technical Assistance Program is served by an advisory council consisting of 35 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, Indiana.

TO REQUEST ASSISTANCE CONTACT

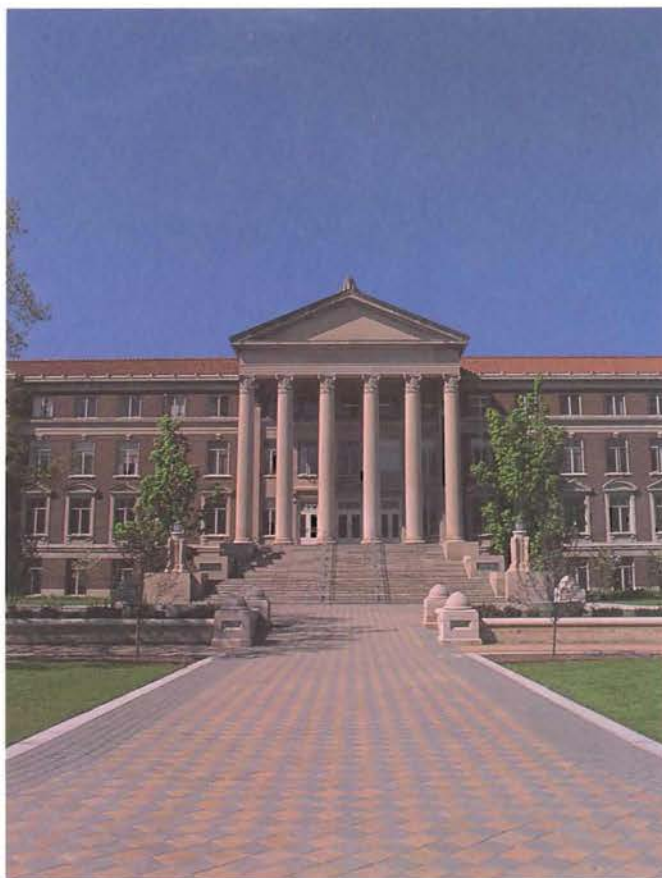
David R. McKinnis, Associate Director
Technical Assistance Program
Purdue University
West Lafayette, Indiana 47907

Phone: (317) 494-6258
FAX: (317) 494-9187

FEES AND CONFIDENTIALITY

The Technical Assistance Program is administered by the Purdue University Schools of Engineering and is supported by the Indiana Economic Development Council.

There are no charges for services provided by the program, except for the Technology Alert Service. However, only a limited amount of time can be allocated to a given project. All project information is kept strictly confidential, including the names of the participating companies.





Technical Assistance Program
Purdue University
West Lafayette, Indiana 47907

Phone: (317) 494-6258
FAX: (317) 494-9187



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