IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

28 February 2002

Institute for Physical Research and Technology

The **Institute for Physical Research and Technology** is a federation of 10 research and technology transfer centers that supports economic development through world-class, interdisciplinary research. IPRT is a critical component in the university's efforts to strengthen the economic vitality of the State of Iowa, linking the university research community to Iowa manufacturers and entrepreneurs. IPRT's mission is to

- promote world-class, fundamental and applied interdisciplinary research,
- foster the development of new technologies,
- facilitate technology transfer, and
- provide technical assistance to Iowa manufacturers and entrepreneurs.

In addition to the faculty, staff, and students who will lose their livelihoods if IPRT is not funded**, the State loses a critical engine in its economic development efforts.** The following provides examples of IPRT's impact in Iowa and illustrates activity that occurs through IPRT's Special Appropriations funding.

World-class research centers promote economic development—Universities, industries, and entrepreneurs work together to move technology from the researcher's bench to new products that are made and sold by new and existing companies. The State's investment in IPRT fuels the infrastructure for Iowa's world-class research facilities at Iowa State University that

- **bring federal tax dollars back to Iowa**—In total, the Special Appropriations FY01 $4.5M investment in IPRT was leveraged to ~$40M, and already this year $7.5M in new federal funds were appropriated to IPRT for four new initiatives—initiatives that earlier had been "seeded" by IPRT. In addition, Special Appropriation funds are used to meet critical match requirements on research projects.
- **make and keep Iowa's businesses world class**—Examples include: *Virtual Reality Applications Center* and *Deere & Company* collaborated to introduce VR into Deere's product development and design process; *Microanalytical Instrumentation Center* and *Fisher Controls* teamed to create a new, automated emission sensor system that is more efficient than the current manual, EPA-mandated system; and the *Center for Sustainable Environmental Technologies* and *Pioneer Hi-bred International* built and tested a gasifer that converts waste seed corn to generate process heat.
- **spin off high-tech companies that provide high-tech jobs for Iowa graduates**—Examples are two spin-offs from *VRAC* technologies: *EAI*, Ames–250 Iowa jobs; $85M gross, 130 ISU graduates; *Mechdyne*, Marshalltown—30 Iowa jobs, $9M gross, 12 ISU graduates.

IPRT is Iowa manufacturers' gateway to world-class research—Through IPRT's Industrial Outreach Programs, Iowa manufacturers have access to the facilities and expertise of ISU. In the past five years, the three outreach programs have carried out more than 850 technical assistance projects with Iowa companies and entreprenuers. **None of these projects would have occurred without the Special Appropriations funding and the programs will cease if funding is lost.**

IPRT's **Center for Advanced Technology Development (CATD)** is specifically charged to link Iowa industry with ISU's technical capabilities.

- CATD works with companies to commercialize new technologies and assist in product and process development and has worked with more than 40 of the companies that have spun off from ISU technologies. Through the Iowa Industrial Incentive Program (IIP), companies are matched with university resources (faculty expertise, facilities, and equipment) in cost-shared research contracts, thus increasing the competitiveness of Iowa firms by finding solutions to technical problems and improving and developing products and processes. In the past 5 years, IIP has initiated more than 170 cost-shared research contracts, leveraging the State's investment 3:1. For example, *CombiSep, Inc.*, Ames, is commercializing ISU analytical technology; *Heartland Resource Technologies*, Oelwein, is commercializing ISU soy-based adhesive technology; *Consumer Safety Technology*, Urbandale, is designing a process to produce fuel cells, reducing production costs by 40%; *Schafer Systems*, Adair, is improving the durability and strength of its floating docks.

- CATD plugs Iowa industry into the SBIR/STTR federal research funding program and since this assistance began in 1996, SBIR research funding to Iowa companies has nearly doubled. Examples: *Shivvers Manufacturing*, Corydon, two awards—predict energy effects of tempering in corn drying and study feasibility of hot-air preheating conveyor to improve corn-dryer performance; *Phytodyne,Inc.*, Ames, award to develop ISU plant transformation technology.

- This year CATD was selected by SBA to lead Iowa's first FAST Partnership, which seeks to stimulate the growth of high technology, knowledge-based businesses that emerge from research and development activities in Iowa. IPRT's Special Appropriations funding provides the infrastructure for CATD to direct this statewide initiative.

Through two programs, Iowa manufacturers and entrepreneurs access short-term, no-cost technical assistance at the **Iowa Companies Assistance Program (ICAP)** and **Iowa Demonstration Laboratory for Nondestructive Evaluation (IDL)**.

- ICAP capitalizes on the materials science strengths of the *Ames Laboratory*, offering Iowa manufacturers assistance with materials analysis, characterization, and testing; materials-related manufacturing problems; and synthesis of custom and specialty materials samples. During the past 5 years, ICAP has assisted Iowa companies in 500 projects (e.g., evaluate and improve solder joints, exceeding customer requirements at *Pipeline Cleaners*, Ft. Madison; investigating uses of media scrap at *Donaldson Corporation*, Cresco; tracking down and introducing a method to fix a failed component, preserving clients' satisfaction at *Universal Harvester*, Ames).

- IDL draws on the strengths of the *Center for Nondestructive Evaluation*, offering Iowa manufacturers NDE facilities and expertise in assessing integrity of materials, components, and structures; developing company-specific NDE techniques; and providing on-site training and assistance. During the past 5 years, IDL has assisted Iowa companies in 200 projects (e.g., recommending leak inspection process to improve tanks at *Den Hartog Company*, Hospers; providing techniques to study overloaded circuit breakers at *Square D*, Cedar Rapids; assisting in a feasibility study for new product development at *Solution Innovations*, Blue Grass).

IPRT—Centers and Programs

AMES LABORATORY OF THE U.S. DEPARTMENT OF ENERGY—Conducts fundamental and applied research in energy, materials, and chemical sciences

CENTER FOR ADVANCED TECHNOLOGY DEVELOPMENT—Links the university's technical expertise, facilities, and resources with the private sector; includes Iowa Industrial Incentive Program

CENTER FOR NONDESTRUCTIVE EVALUATION—Develops noninvasive methods and instruments for assessing the integrity of structures and materials

CENTER FOR PHYSICAL AND COMPUTATIONAL MATHEMATICS—Researches high-performance computing via computer-cluster development and parallel-computing strategies

CENTER FOR SUSTAINABLE ENVIRONMENTAL TECHNOLOGIES—Develops and demonstrates renewable energy, chemical, and environmental technologies

FAA AIRWORTHINESS ASSURANCE CENTER OF EXCELLENCE—Identifies and provides solutions for national aircraft reliability problems

MATERIALS PREPARATION CENTER—Prepares specialized high-purity metal compounds for research

MICROANALYTICAL INSTRUMENTATION CENTER—Develops innovative, small-scale analytical and bioanalytical instrumentation

MICROELECTRONICS RESEARCH CENTER—Characterizes advanced semiconductor materials, devices, and processing technologies

VIRTUAL REALITY APPLICATIONS CENTER—Applies virtual reality technology to the challenges of science and engineering

IOWA COMPANIES ASSISTANCE PROGRAM—Helps Iowa companies with materials-related questions and problems

IOWA DEMONSTRATION LABORATORY FOR NONDESTRUCTIVE EVALUATION—Assists Iowa businesses with nondestructive evaluation techniques and equipment

IPRT Funding

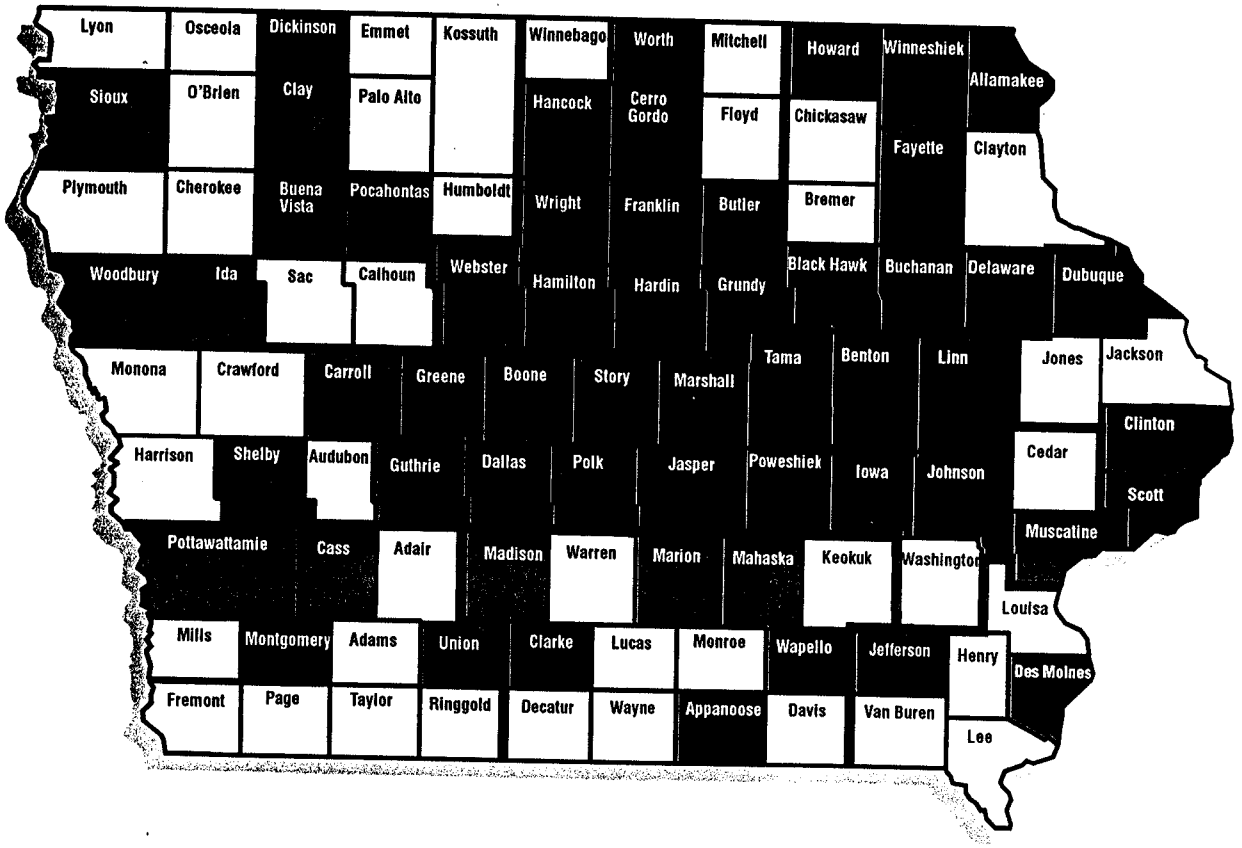
	FY01 Actual	FY02 Projected*	FY03 Estimated**
Sponsored Funding			
Private Industry Project Funds	2,826,000	2,608,700	2.6M
Federal Project Funds			
Dept. of Commerce	258,000	195,800	.2M
Dept. of Defense	739,400	1,566,800	.9M
Dept. of Energy	27,010,800	27,892,700	27.5M
Dept. of Transportation	5,285,500	6,926,800	6.3M
Health and Human Services	359,100	431,200	.4M
NASA	746,900	641,700	.6M
Nat'l Science Foundation	1,337,700	753,200	1.2M
USDA	924,400	963,900	.9M
Various Federal Agencies	1,098,900	1,783,000	1.3M
Total Federal	37,760,700	41,155,100	39.3M
ISU Foundation Funds* **	977,900	134,400	.2M
ISU Research Foundation Funds	132,800	109,300	.1M

* First seven month's spending rate projected over twelve months.
** Funding of competitive sponsored projects is difficult to estimate with certainty.
***Restricted for donor-specified projects. Not available for general use.

IPRT Economic Development Appropriations Utilized as Match or Cost Share	**FY01 Actual**	**FY02 Actual**
AFOSR- DURIP Program Match	-	20,000
Dept. of Energy- University Coal Program Cost Share	15,000	15,000
Dept. of Energy- University Coal Program Match	8,722	5,505
Dept. of Transportation- FAA Center of Excellence Cost Share	294,614	150,135
Iowa Energy Center- BECON Facility	28,978	31,141
Keck Foundation- Keck Lab Commitment	53,521	42,770
National Science Foundation- MRI Program Match	15,000	26,215
Total	415,835	290,766

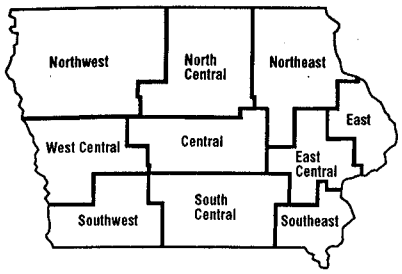
Institute for Physical Research and Technology

IPRT WORKS for Iowa



Counties with IPRT interactions/assistance in 2001.

IOWA STATE UNIVERSITY



FY01

The Institute for Physical Research and Technology assisted over 190 companies/others in 56 Iowa counties, covering every region of the state. This assistance ranged from initial contact and referral to full research projects. This listing is incomplete as many companies request their contact remain confidential.

NORTHWEST

Alta
Enron Wind Corp.
Hospers
Den Hartog Industries
Ida Grove
Midwest Industries, Inc.
Laurens
Positech
Lawton
Schaeff
Orange City
Van Beek Global
Rock Valley
Valley Machining Co.
Sioux City
All Power, Inc.
City of Sioux City
Kind and Knox Gelatine, Inc.
Sioux Rubber Applicators
Sioux Tools, Inc.
SOSINC
Spencer
Maurer Manufacturing, Inc.
Tecton Industries, Inc.
Spirit Lake
Polaris Industries, Inc.

NORTH CENTRAL

Alden
Martin Marietta Aggregrates, Inc.
Allison
Allan, Inc.
Belmond
Eaton Corp.
Blairsburg
Chamness Technology
Clear Lake
Cole Sewell
Frontier Labs, Inc.
Kingland Systems Corp.
TeamQuest Corp.
Conrad
Green Products Co.
Ritchie Industries, Inc.
Ellsworth
Casual Cuts
Fort Dodge
Iowa National Guard
Josephson Manufacturing Co.
Moeller Furnace Co.
Garner
Iowa Mold Tooling Co.
Iowa Falls
Paul Zoske
Mason City
Alexander Manufacturing Co.
Bugless Limited
DSC, Inc.
IMI Cornelius
Metalcraft, Inc.
Northwood
Advanced Component Technologies, Inc.
Radcliffe
Mirenco, Inc.
Sheffield
Creative Solutions Unlimited, Inc.
Sukup Manufacturing
Shell Rock
Hobson Brothers Mold & Pattern Works
Webster City
Beam Industries
Frigidaire Co.
Land O' Lakes
Van Diest Supply Co.

NORTHEAST

Cedar Falls
Iowa Metal Spinners, Inc.
Patricia Murphy
Viking Pump, Inc.
Wayne Engineering Corp.
Cresco
Donaldson Co.
Featherlite Manufacturing, Inc.
Decorah
Bruening Rock Products, Inc.
Dewar
Fence Scape
Earlville
E.I.P. Manufacturing Inc.
Independence
Geater Machining and Manufacturing
Lansing
Alliant Energy
Oelwein
Heartland Resource Technologies, Inc.
Transco Railway Products, Inc.
Postville
Industrial Laminates/ Norplex, Inc.
Vinton
Frog Legs, Inc.
Waterloo
Deere & Co.
John Deere Product Engineering Center
Omega Cabinets, LTD
West Union
Dura Automotive Testing

WEST CENTRAL

Adair
Schafer Systems, Inc.
Council Bluffs
Milco
Omaha Standard, Inc.
Harlan
BioMass Agri Products
Insul-8
Jacobs Corp.
Templeton
Paq-cell, Inc.

CENTRAL

Ames
3M Corp.
Acumen Instruments Corp.
Advanced Analytical Technologies Inc.
BioForce Laboratory
City of Ames
CombiSep, Inc.
Delta-Tie, Inc.
ETREMA Products, Inc.
EXSeed Genetics L. L. C.
Gilger Design
Haptic Labs, Inc.
Innovative Materials Testing Technologies, Inc.
Iowa Energy Center
MASIM, Inc.
Micrel
Microlite Technologies
Molecular Express, Inc.
MTEC
New Link Genetics
NewMonics
Nitro Ice Cream LLC
Phytodyne, Inc.
Sauer-Danfoss Inc.
Sonic Production Systems LLC
Universal Harvester Co., Inc.
US Filter
Xlinix
Ankeny
John Deere Des Moines Works
Techniplas, Inc.
Tone Brothers, Inc.
Boone
Iowa Army National Guard
Iowa Thin Film Technologies, Inc.
Microlite
Oren Consulting Services
Quinn Machine & Foundry Co.
Clive
Iowa Pork Producers
Des Moines
Chem-Tech, LTD
Eagle Iron Works
EMCO Specialties, Inc.
GeniSus
Hirsch Industries
Iowa Air National Guard
Iowa Business Council's Advanced Manufacturing Research and Collaboration Consortium
Iowa Interstate Railroad
Iowa Pork Producers Association
Kemin Americas
National Pork Producers Council
Natural Resources Conservation Service, U.S.
Pioneer Hi-Bred International, Inc.
The Waldinger Co.
United Machine and Tool Co.
Grimes
American Target Systems, Inc.
Grinnell
LPR, Inc.
Jefferson
American Athletic, Inc.
Sparboe Companies
Johnston
Genetic Enterprises International
Iowa Department of Public Defense
Pioneer Hi-Bred International, Inc.
Marshalltown
Dow Agrosciences, Inc.
Fisher Controls International, Inc.
Lennox Industries, Inc.
Marshalltown Trowel
MechDyne Corp.
Nevada
Sorem Manufacturing Co.
Newton
Maytag Corp.
Perry
Percival Scientific
Roland
Innovative Lighting
Toledo
Pioneer Hi-Bred International, Inc.
Urbandale
Iowa Egg Council
Iowa Soybean Associa-

tion
West Des Moines
Crop 1 Insurance Direct, Inc.
Iowa Corn Promotion Board

EAST CENTRAL
Amana
Amana Appliances
Cedar Rapids
Alliant Energy
Bluestem Solid Waste Agency
Cedar River Paper
Computing Solutions, Inc.
Diamond V Mills
Genecor International, Inc.
PMX Industries, Inc.
Rockwell Collins, Inc.
Silicon Graphics Inc.
Square D
Coralville
Integrated DNA Technologies
Iowa City
Candleworks
Medical Imaging Applications
Radix Corp.
Torus Precision Optics, Inc.
University of Iowa
Lisbon
Lloyd Table Co.
Muscatine
Grain Processing Corp.
McKee Button Co.
Nichols
Reynolds Engineering and Equipment, Inc.
North Liberty
Centro, Inc.

EAST
Bettendorf
The Schebler Co.
Blue Grass
Solution Innovations
Clinton
Equistar Chemicals
Lamson & Sessions Corp.
Davenport
Aluminum Company of America (ALCOA)
De Witt
Brazeway, Inc.
Dubuque
Deere & Co.
John Deere Construction Equipment Co.
The Adams Co.
Eldridge
Olsen Engineering, LP
Princeton
Johnson Manufacturing Co.

SOUTHWEST
Creston
Southern Iowa Rural Water Association
Griswold
Yellow Jacket Manufacturing
Red Oak
Interwest Services, LTD
Red Oak Die Cast

SOUTH CENTRAL
Centerville
Chariton Valley Resource Conservation & Development
Rathbun Regional Water Association
Eddyville
Cargill, Inc.
Osceola
Hormel Foods Corp.
Osceola Foods, Inc.
Oskaloosa
MUSCO Mobile Lighting
Ottumwa
Indian Hills Community College
Meyer Tech, LC
Pella
Pella Corp.
Vermeer Manufacturing Co.
Winterset
Hirsch Systems, L.L.C.

SOUTHEAST
Burlington
Winegard Co.
Fairfield
Fairfield Industries, Inc.
VayTek, Inc.

IPRT WORKS for Iowa

VayTek, Inc., Fairfield

VayTek Inc., a developer of sophisticated software for three-dimensional image processing, received assistance from IPRT's Center for Advanced Technology Development that helped VayTek accelerate product development. The company's flagship product, VoxBlast, is a general-purpose program used in medical, scientific, industrial, geoscience, surveillance and environmental laboratories. It has gained widespread market acceptance for its ease of use and low cost.

When the company needed to upgrade VoxBlast it did so more quickly thanks to assistance from IPRT's Center for Advanced Technology Development and researchers at University of Iowa's ITS Research Technologies. "It probably would have taken us another year if we hadn't had help from CATD," said John Kesterson, VayTek president.

The new version has improved two-dimensional capabilities and the ability to generate data for use with other programs. It also takes full advantage of the latest versions of the Windows operating system for interactivity and ease of use. "We've always been able to maintain a cutting edge in our products," said Kesterson. The reasons, he explains, are its close work with the University of Iowa and by tapping services provided by CATD.

This project demonstrates how IPRT can collaborate with researchers and companies throughout Iowa, according to Mark Laurenzo, CATD director. "Even though we're part of IPRT and Iowa State University, we can and do work with researchers throughout the state," he said. "We go wherever we need to find the expertise. In this case, the University of Iowa clearly had the knowledge and expertise."

Wayne Engineering Corp., Cedar Falls

Wayne Engineering Corp., a leading manufacturer of garbage trucks, came to IPRT to better understand a problem with a weld and ended up with much more. Scientists from IPRT's Iowa Companies Assistance Program, along with welding experts from IPRT's Ames Laboratory, helped the company improve its welding processes. "We were able to use the information to improve all of our product range. New work instructions and practices have been issued across the whole of the company," said Jim Marks, product engineering manager.

The weld was in a critical component of a garbage truck manufactured by the company. ICAP scientists began their research with sample weldments from Wayne. An examination showed that the weld metal had not penetrated the base metal. Based on these findings, ICAP scientists consulted with welding experts from Ames Laboratory to make recommendations for creating better welds. The team reported to Wayne that problems of cold welds and lack of penetration could be corrected by

running welding equipment at hotter settings. Welders should also avoid starting and stopping the weld in critical stress areas, allowing heat to build up in the base metal to provide better penetration of the weld. "We learned how to correctly construct fabrications for strength and ease of productivity," Marks said.

Olsen Engineering, L. P., Eldridge

IPRT's Iowa Demonstration Laboratory was a key player when Olsen Engineering, L.P. took proactive steps to improve its inspection process and procedures. Mark Dawson, plant manager, said that without IDL's help to correct some deficiencies, Olsen could have incurred a quality problem costing more than $250,000. The company, which fabricates heat-treated pins and bushings used by agricultural equipment manufacturers, had requested a critical review of their inspection process after attending a seminar conducted by IDL.

IDL scientist Rick Lopez visited the plant and observed the operators as they performed the magnetic particle inspections. He gave hands-on demonstrations on how to better perform the inspection process using existing equipment and some affordable new devices, educated them on proper system management, and provided a customized document with references and guidelines for performing the inspections. "The consultation IDL provided helped us upgrade our processes to a level that allows Olsen Engineering L. P. to remain competitive," Dawson said.

Hawkeye Molding Engineers Inc., Albia

IPRT's Iowa Companies Assistance Program and Center for Advanced Technology Development teamed with an Iowa State University research group to help Hawkeye Molding Engineers Inc. test an unusual new material for plastic injection molding. The material is a blend of switchgrass fiber and virgin resin. For the company, the use of such material could reduce resin costs and lower operating costs. The use of switchgrass for such applications may also provide new markets for growers.

The company reports using the switchgrass blend significantly reduced part-making cycle time. The research also compared the physical properties of the switchgrass blend to traditional plastics material as well as the shrinkage of parts made with the two materials. "The results look fairly promising," said Bill Morrow, the company's production and engineering manager.

The study was conducted by ISU's Biocomposite Group, a team within the Center for Crops Utilization Research committed to finding value-added uses for regional agricultural products. With IPRT's assistance, this group is also working with a southern Iowa organization called Prairie Lands Bio-Products to grow and process switchgrass for new uses such an injection molding.

Consumer Safety Technology, Clive

Consumer Safety Technology, Inc. approached IPRT's Center for Advanced Technology Development looking for assistance in improving fuel cells used in the company's Intoxalock product, a breath-alcohol ignition interlock device. The company came away with a better product that is cheaper to make. "It's been a successful operation," said Kevin Doyle, CST president.

CST's Intoxalock is designed to prevent an individual from operating a motor vehicle while under the influence of alcohol. It's connected directly to the electrical system of the vehicle. If the breath alcohol of the driver is above a preset limit, the vehicle will not start. A critical component in this device is a fuel cell, which serves as a sensor to measure alcohol content. In the past, CST bought fuel cells from a supplier, but their failure rate approached 90 percent. So CST decided to make its own fuel cells but needed help developing a "recipe" for manufacturing the complex devices.

CATD and CST turned to Johna Leddy, a fuel cell expert at the University of Iowa. A project was established with cost-sharing funds provided by CATD. The team designed a device that works better and is more efficient. In addition, the cost of the cells is 50 percent less than commercial versions, according to Doyle.

Abrahams Parts & Machine Service, Inc., Davenport

Abrahams Parts & Machine Service, Inc. rebuilds and reconditions all types of gas and diesel engine components and industrial products. After hearing about many types of testing at a nondestructive evaluation seminar, Sidney Greenswag, Abrahams' president, contacted IPRT's Iowa Demonstration Laboratory. He requested an evaluation of the method, process and equipment they use for magnetic particle inspection which is performed on many of the components they work on — gears, crankshafts, connecting rods, blocks and valves.

In his observations at the facility, Rick Lopez, IDL scientist, noted the conscientiousness of the machinists in performing the inspections. He demonstrated some techniques and provided information on equipment that would further enhance the accuracy of the inspections. Greenswag said, "It was very beneficial to the quality of our procedures. We learned about test procedures that we were not familiar with and learned about the new products and services that are available."

IPRT FY01 Funds

State of Iowa Special Purpose Funds **4.5 M**

Center and Commercialization Project Support		3,742,000
Faculty and Graduate Assistant Salaries	720,700	
Professional & Scientific Salaries	1,219,400	
General Services Salaries	371,400	
Hourly Wages	91,900	
Materials, Supplies, & Services	863,000	
Equipment	475,600	
Industrial Outreach Program Support		732,100

Iowa Industrial Incentive Program (IIIP)
Iowa Demonstration Laboratory for NDE Applications (IDL)
Iowa Companiés Assistance Program (ICAP)

	IIIP	IDL	ICAP
Faculty and Graduate Assistant Salaries	79,300		
Professional & Scientific Salaries	49,000	138,900	113,200
General Services Salaries			
Hourly Wages	27,700	10,900	
Materials, Supplies, & Services	140,200	56,400	106,700
Equipment	9,800		
Subtotal	306,000	206,200	219,900

Iowa State University Allocation **2.1 M**
(Salaries, Materials and Supplies, Equipment)

Private Industry Project Funds **2.8 M**

Federal Project Funds **37.8 M**

Department of Commerce	258,000
Department of Defense	739,400
Department of Energy	27,010,800
Department of Transportation	5,285,500
Health and Human Services	359,100
NASA	746,900
National Science Foundation	1,337,700
USDA	924,400
Various Federal Agencies	1,098,900

TOTAL **47.2 M**

IPRT was established in 1987 to pursue research and technology development in the physical and engineering sciences that lead to economic development with industrial involvement. This is accomplished through a variety of research, outreach and education activities and programs at the IPRT centers, linking the university research community to industry and government.

Iowa Industrial Incentive Program Leverages State Investment —

During IIIP's nine years, IPRT has leveraged every State of Iowa dollar in this program to an average research value of $4.10. The following table summarizes all program investments.

Year	Number of Projects[1]	IIIP Funds*[2]	Industry Funds*	University & Other Funds*	IMEP*[3]	Totals*
2001	34	329.5	691.6	604.0	N/A	1,625.1
2000	36	426.9	887.8	522.3	N/A	1,836.9
1993[4]	10	282.5	500.6	136.8	N/A	920.0
1993–2001	225	3,001.1	4,865.0	3,762.0	683.0	12,311.5
9-Year Average	28	333.5	540.6	416.0	N/A	1,367.9

* Dollars in thousands

1. At any given point during a year, staff from IPRT's Center for Advanced Technology Development will have 25–30 projects under development. CATD's tech transfer associates work with Iowa industry to define research needs and match those needs with university resources. The reported number reflects the number of discussions that ended in contract research agreements with Iowa industry and businesses. Discussions that do not end in research contracts are often referred to IPRT's other industrial outreach programs — Iowa Companies Assistance Program and the Iowa Demonstration Laboratory for Nondestructive Evaluation — for short-term, no-cost technical assistance.
2. The figure in this column reflects the allowance of carryover funds for one fiscal year.
3. The Iowa Manufacturing Extension Partnership is a U.S. Department of Commerce National Institute of Standards and Technology program with more that 70 programs across the nation. From 1994 through 1996, IMEP directed funds into IIIP industrial research projects, but since 1998, IMEP has not funded these projects.
4. Initiating year, shown for reference.

For more information, contact:

Institute for Physical Research and Technology
Director's Office
311 TASF
Ames, IA 50011-3020
(515) 294-8902
FAX: (515) 294-4456
http://www.iprt.iastate.edu
E-mail: iprtinfo@iastate.edu