Research

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colleges receiving support from industry. In 1984-85, the University entered into industrial research contracts for $23,290,751.

At the same time, a November issue of *The Wall Street Journal* reported that of the top 25 research institutions in the country, Penn State received the largest percentage of industrial support for its total expenditures.

"Our top-ranked position demonstrates our strength in the type of research that can be applied to the problems that industry faces," said Charles L. Hosler, vice president for research and dean of the University's Graduate School. "This is a measure of the contribution of a university to the economic development of the country."

James Lundy, director of the University's Industrial Research Office, said that since 1977 the University has received $6,072,883 from IBM, $501,017 from Exxon, and $830,151 from GE.

Research from those companies and others spans a wide spectrum of areas, from solid-state electronics, polymers, fusion, and electro-optics, to hydromechanics, acoustics and radioactive waste disposal.

In laboratories throughout campus, high-tech computer systems, combustors, robots, and heat exchangers run every day. Working with the equipment are thousands of professors and students — most within the colleges of science, engineering, and earth and mineral science — striving to produce and improve technologies that can quickly be applied by manufacturers, engineers and other industrialists.

"There is an increasing recognition on the part of industry that we're in a competitive global economy. In order to compete, industries must be on the cutting edge," Hosler said.

"This means being closely in touch with university research and interacting with professors and graduate students," he added. "They look at the University as a source of new information and new talent."

Although industrial research includes basic research such as the study of atoms, molecules and other basic building blocks, it tends to encompass more applied research, which leads to the transformation of science into technology and direct application, Hosler said.

"Industrial research has tilted toward applied research, although there is a recognition that you have to have the basics also," Hosler said. "Industries are most interested in research that can be directly applied. . . . However, we often won't accept money (grants and contract money) for purely applied research."

Among a variety of leading fields of research and one growing at the University is the area of materials science. Ceramics, concrete, thin films, glass, clays and mixtures of various other materials are being developed and analyzed for use in everything from space shuttles and military equipment to automobiles and everyday appliances.

Hosler said a five-year, $10 million contract for the study of structural ceramics — a non-metallic corrosion-resistant material that can withstand high temperatures and pressures —recently awarded to the University's newly formed Center for Advanced Materials is "Penn State's largest industrial contract with a single industrial association."

Both faculty members and graduate students from the college of earth and mineral sciences, college of science, college of engineering, applied research laboratory, materials research laboratory and combustion laboratory are involved in research projects within the Center.

"Penn State is internationally recognized for its research into materials and high-temperature systems," Hosler said, adding that first-year funding by the Gas Research Institute of Chicago surpasses $1.4 million.

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—Charles Hosler

Richard Tressler, director of the Advanced Materials Center and a University professor of materials science and engineering, said: "Ceramics have traditionally been used to contain hot gases and materials. Now, they are increasingly being used in structural applications, gradually replacing the use of metals."

Bruce Knox, assistant director of the University's Materials Research Laboratory on Hastings Road, said materials being developed by University researchers at MRL have direct industrial applications.

"The materials lab plays a big part in our nation's industry. Twenty-five to 40 percent of our support comes from industry, such as Corning Glass, General Motors, IBM and Texaco," Knox said.

He added that several information-sharing associations between the University and groups of industrial companies act to speed up the "technology transfer" between industrialists and University researchers. "Each can involve 10 to 30 companies who pay us an annual fee to do research. They may be in it for general knowledge or specific research," he said.

Rustum Roy, project researcher and director of the University's Science, Technology and Society program, said one such information-sharing program is the newly formed consortium on diamond coatings that will allow industries to remain up-to-date about achievements on synthetic diamond-coating research performed at the University.

Roy said research efforts on synthetic diamond coatings, which have industrial applications in areas such as electronics, optics and manufacturing, are aimed primarily at "catching up" to researchers in Japan and the Soviet Union, who have already marketed an array of diamond-coated products.

Meanwhile, next door at the Applied Research Laboratory, robotic systems are being developed and improved. Richard Stern, associate director of the ARL, said research on the Laser Articulating Robotic System and Intelligence Robotics Inspection System is being supported by many industries.

"The laser robotics systems can be used in the welding industry. . . we're working closely with Westinghouse on that project," Stern said. "IRIS, the other robotic system, uses a laser to measure dimensions of complicated, large objects. This has applications in all types of industry."

University scientists are also studying energy, its efficiency, and its range of alternative sources at the University's Coal Combustion Laboratory; in the Academic Activities Building between Hastings and Bigler roads, which houses large combustors, boilers and small basic pieces of equipment.

Alan Scaroni, associate professor of fuel science and director of the Combustion Laboratory, said a new process called fluidized bed combustion allows high-sulfur coals to be burned with minimum emission of sulfur oxide. "We burn sulfur coal in a bed of absorbant material within the combustor — in this case, the absorbant material is limestone," Scaroni said. "As soon as sulfur oxide is produced, it is absorbed.

"Our traditional supporters have been companies that build combustors and boilers, oil companies like Exxon and Mobile, and steel companies," Scaroni said. "We also receive support from the Pennsylvania Energy Development Authority and the U.S. Department of Energy."