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New Research Heights

University of Dayton

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NEWS

Thursday September 1, 2016

New Research Heights

On the cusp of its 60th anniversary, the University of Dayton Research Institute has extra cause for celebration: a record-breaking year in annual sponsored research and significant milestones reached in cumulative sponsored research and employee population.

For the first time, researchers at the Research Institute performed more than \$100 million in research and development in a single year. Combined with research performed by faculty, sponsored research at the University totaled \$117.6 million in fiscal year 2016 – a leap of nearly 20 percent more than the previous year – pushing cumulative sponsored research past the \$2 billion milestone.

The figure ranks ninth among private comprehensive research universities without medical schools in the U.S.

To put a little icing on the anniversary cake, the number of employees working at the Research Institute topped 500 for the first time as well.

"This has been a remarkable year for us," said Research Institute Director Allan Crasto. "It really reflects the hard work and dedication of our people, who bring in and perform great research every day. It also speaks to the reputation we've developed among our customers that we will deliver outstanding work on budget and on time."

Although the revenue and employee numbers are record-breaking, they are not a surprise, Crasto said.

"The Research Institute has experienced nearly steady growth since its first year, ever expanding into new research areas while continuing to enhance expertise in legacy areas, such as aging systems sustainment and materials."

A bit of background

The Research Institute's roots are in a single, \$10,200 contract from Wright-Patterson Air Force Base, awarded to the University in 1949 to help the Air Force better understand aircraft fatigue. The Rev. Charles Collins, vice

president and dean of the University, saw the Air Force's request for research assistance as an opportunity for the Marianist university to play a role in America's postwar reconversion economy, provide service to its local community, and provide new opportunities for faculty and jobs for students paying their way through school.

Three years later, the University hired five full-time researchers to support its growing number of contracts – a bold move for a then-small Midwestern Catholic university focused on undergraduate teaching. In 1956, with researchers working on 20 sponsored projects totaling \$1 million, the need for a centralized research organization to manage and attract additional programs became clear, and the University of Dayton Research Institute was born.

Today, 515 employees work in labs and offices on campus and at Wright-Patterson Air Force Base, as well as at Robins Air Force Base, Georgia.; Eglin Air Force Base, Florida.; Hill Air Force Base, Utah; and the High Performance Computing Modernization Program office in Lorton, Virginia.

In a nutshell, the Research Institute performs basic and applied research, engineering services, testing and technology transition for government, industry, academic and nonprofit customers. "We develop innovative technical solutions," Crasto said. "More simply put, we solve problems – whether it's by developing new materials or technologies, finding the best way to put new technologies into service, or both."

During six decades, the organization has emerged as a globally recognized leader in the fields of advanced materials – pioneering developments in advanced polymers, composites, nanomaterials and, most recently, additive manufacturing – as well as structures, aerospace systems and propulsion, mechanical systems and human factors. It is quickly developing renown for work in the relatively newer sciences of sensors and biofuels and other alternative energies.

Points of pride

Since 2002, the Research Institute – whose researchers perform approximately 90 percent of total sponsored research at the University – has kept the University within the top three spots among all colleges and universities in the nation for the amount of sponsored materials research it performs, according to statistics released annually by the National Science Foundation. Approximately 70 percent of its research revenue comes from the Department of Defense – putting the University at the top in Ohio for DOD-sponsored research – and a significant portion of that research comes from programs at Wright-Patterson Air Force Base.

"UDRI has been a valued partner of the Air Force Research Laboratory throughout its tenure, providing outstanding support to our mission to 'keep the fight unfair' via overwhelming technological advantage," said Doug Ebersole, AFRL executive director. "The Lab congratulates UDRI on its 60th anniversary."

Research efforts for the Department of Defense have largely focused on technologies to keep aging aircraft flying, including structural testing and design, corrosion prevention and control, and the development of advanced materials and novel repair technologies, Crasto said, noting the Research Institute's largest single award to date – a \$99 million, five-year contract awarded last year by the Air Force Materiel Command Life Cycle Management Center – will help the Air Force quickly integrate new or better technologies to more affordably, safely and efficiently sustain its entire fleet.

Among other numerous highlights of the last decade, Crasto cites as particularly noteworthy:

* The Research Institute's move of headquarters and most lab and office space to River Campus, the former NCR world headquarters located at 1700 S. Patterson Blvd. "The advances in research and development that came out of this impressive space are known around the world, and we have taken up the mantle for what it stood for – innovation, progress and productivity."

* The Research Institute's role in persuading GE Aviation to choose Ohio from among the global locations it had been considering for its \$51 million EPISCenter research and development complex for advanced power technologies.

* The development of a strong partnership with the state of Ohio through the Ohio Third Frontier, created to boost jobs creation and economic development in the state by supporting the development of new technologies and technology-based companies. "With Ohio Third Frontier funding, UDRI played a substantial role in building the technology infrastructure and jobs base in sensors, nanomaterials and advanced manufacturing in Ohio," Crasto said. "We take great pride in that."

Community impact

These same highlights – reviving and repurposing an abandoned corporate campus, attracting a major R&D center and building a technical foundation for job growth – are indicative of the many ways the Research Institute's presence has positively impacted the community and economy, locally and statewide, said John Leland, vice president for research at the University of Dayton and executive director of the Research Institute. "Partnering with the state allowed us to develop new technologies, and it allowed us to develop much stronger relationships with our industry partners who needed and employed those technologies to become more competitive. Our initiatives created jobs, fostered collaborations among businesses, attracted businesses to the area and fostered start-up tech companies in the Dayton region and throughout the state. We were able to support the revival of Ohio industry and support the growth and vibrancy of the local community – an initiative driven by the University's Marianist values."

Jeff Hoagland, president and CEO of the Dayton Development Coalition, said the Research Institute "represents the best of what our region has to offer—an incredible commitment to innovation, collaboration and education, right in the heart of Dayton. The partnerships UDRI has formed with the local scientific community, like Wright-Patterson Air Force Base, and the amazing work its researchers do every day, help our community stand out. It also boosts the region's reputation as a leader, which helps drive economic development and attract top talent."

Making the world a better place

While it's fairly common knowledge the global positioning system (GPS) technologies that allow our phones to give us driving directions originated with the Department of Defense, it's likely that most people do not know the true extent of how much the technologies they enjoy today similarly originated in government-sponsored programs, according to Crasto.

"During the last 60 years, we've made significant contributions to science and engineering knowledge bases – contributions that have helped drive major advances toward new and improved technologies in transportation,

alternative energies, the environment, personal safety and countless other fields," Crasto said. "These advances have not only benefited our customers, but also the general public, who ultimately reap the rewards of research driven by our government sponsors. In fact, what motivates our researchers, and our organization as a whole, is the belief that the work we do here is going to improve the quality of life for everyone."

Bob Brockman, a distinguished research engineer in the Research Institute's aerospace mechanics division, cites safety as one of the research areas that benefits customers and the public alike.

"Most of UDRI's research divisions have a strong structures and materials flavor, which means that a large portion of what we all do is aimed at improving the reliability and safety of the structures we live in, ride on, and use every day," said Brockman, a 43-year employee. "The same research that helps a military aircraft perform more efficiently without failing often makes our autos, bridges, homes and recreational equipment safer, stronger, lighter, longer-lasting, and more enjoyable to use."

Preparing tomorrow's workforce

A key component of the Research Institute's mission is to help educate University of Dayton students and prepare them to seamlessly step into jobs in technology, the sciences and engineering upon graduation, Crasto said. Nearly 13,000 undergraduate and graduate students have been engaged in sponsored research activities in the last 60 years, working alongside professional and academic researchers in labs on campus and on base.

University Provost Paul Benson said the research work experience serves as an invaluable complement to academic studies.

"The opportunities that UDRI offers for both undergraduate and graduate students to participate in applied research projects for real clients provide them with an outstanding educational experience," Benson said. "They gain a deep appreciation for the stimulating challenges of a research-intensive environment, and they develop capabilities in technical understanding, creative problem-solving, and teamwork that are indispensable for their future success in engineering and applied science."

No guarantees

The Research Institute's accomplishments and growth would merit bragging rights even if a steady stream of funding were assured. But the fact that each contract and grant must be earned – awards are never guaranteed – makes the Research Institute's success that much more laudable, according to Crasto.

"UDRI is entirely self-sustaining, in that all of our operating costs are funded through our contracts. Which means that while our researchers are working hard to fulfill current obligations, they are also looking for new research opportunities and writing proposals to secure work for next month and next year," Crasto said. "And there is no guarantee of work, or of a returning customer. So our researchers have to put together strong, competitive proposals that demonstrate our experience, expertise and ability to deliver what our sponsors need. That's one of the things that impresses me about our people. The private sector may offer more security in terms of a steady paycheck coming each week, but they choose to work here."

Crasto cites the Research Institute's entrepreneurial environment as one of its biggest attractions for employees.

"We give our researchers the flexibility to find and pursue the types of research that interest them, rather than defining for them the areas we want them to be involved in. It's a business model that attracts and keeps people with us, often for decades, in spite of the inherent uncertainty of long-term funding. We also believe in our people, and work hard to help them succeed," he said.

Twenty percent of all employees have been with the Research Institute for more than 20 years, a figure Crasto calls impressive, but also notes would be higher if not for the Research Institute's recent hiring boom – one-third of all employees have been hired in the last three years.

"The fact that 60 to 80 percent of our growth in the last five years has predominantly been in sustainment, a legacy area, and sensors and electronics, a relatively new area for us, speaks volumes about our ability to stay in tune with our customers' changing needs and with emerging technologies," Crasto said. "It also says a lot about our responsiveness; we built a full sensors division of 100 people from a few employees in just eight years. For an organization that sells services, rather than products, that is phenomenal."

Keys to success ...

The Research Institute's expertise in many and diverse technologies has certainly been a key to its success, but it's not the most important key, Crasto added.

"There's a lot we can say about our technical expertise, but then again, there are a lot of organizations that could say the same. What really sets us apart is our outstanding customer service. Our sponsors have learned to rely on us to be innovative and adaptable in meeting our goals, knowing we will always meet those goals on budget and on time. It's what brings them back time and again," Crasto said.

"Our customers also know we want them to succeed," Leland said. "We're not just in transactional relationships; we truly want to understand what our sponsors need and how we can help them get there."

... In good times and in bad (Surviving Sequestration)

Those core business concepts also helped sustain the Research Institute during recessions, Leland said. But it was a much stronger, intangible element that kept it robust and even growing during economic downturns, sequestration in particular.

"A lot of organizations talk about teamwork, and that's very important," Leland said. "But at UDRI, we're more than a team, we're a family, with relationships that are stronger and run deeper than in a team. More than any other time, I saw that manifested when our organization had to face a fiscal cliff, a government shutdown and sequestration – all coming on the heels of five years of recession. It was a perfect storm of federal research funding cutbacks. The future was incredibly uncertain, and none of us knew how long funding challenges would last or if they would get worse."

"While a number of organizations had to make sizeable cutbacks, we lost only a few people – because of the way our folks pulled together. We had researchers make room for their colleagues on their contracts, putting themselves at risk for running out of funding prematurely to make sure their coworkers – their family – could stay employed. This is what happens when people pull together, believe in themselves and believe in something bigger than themselves."

The future

As for the Research Institute's next 60 years, Crasto said there is no magic formula that will guarantee future success, but there are tried-and-true tenets to follow.

"We'll constantly monitor and invest in new and promising technologies, but remain flexible and agile to quickly make course corrections as needed along the way," he said. "We'll continue to expand our customer base, while exploring ways in which we can better serve our current customers and make them more successful. Most importantly, we'll continue to foster an environment that allows our people to enjoy their work and grow to their full potential; an environment that allows all of our researchers – new and seasoned – to help shape what our legacy will be 60 years from now."

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