8-28-2017

Imaginative Minds

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udayton.edu/blogs/president/2017/08/imaginative_minds.php

Monday August 28, 2017

The Shroyer Park Center, tucked away unobtrusively in a residential neighborhood, is a world-class research center.

That could surprise some of its neighbors, who may not realize its reach extends to the frontiers of space.

I recently stopped by for a half-day tour, one of my periodic stops through the University of Dayton Research Institute to meet some of the imaginative minds behind our record-breaking sponsored research volume. To say that I was impressed by the quality, strength, and impact of the research is an understatement.

For an aerospace and mechanical engineer, I felt like I entered a Disneyland of sorts — one designed specially for engineers and scientists for imagining, dreaming, designing, building, and testing innovation.

Where does NASA come for creative solutions for designing structures that can withstand orbital debris, or “space junk?”

With a 45-foot light-gas gun that fires plastic “peas" and aluminum BBs at speeds greater than 22,000 miles per hour, Kevin Poormon and researchers from the Aerospace Mechanics division simulate the impact of manmade space junk that can cause catastrophic damage to the International Space Station, satellites, rockets, and shuttles. It’s the only gun in the world that can perform this type of critical testing.

That’s not all. This team conducts tests on aircraft flight data recorders (“black boxes”) to certify their survivability in crashes. They work with manufacturers on the design of aircraft windshields that can withstand bird strikes. They test impacts on bulletproof cars to ensure that they remain safe for their occupants.

Elsewhere in this same building, Steve Zabarnick and researchers from the Energy and Environmental Engineering division collaborate with faculty, graduate students, and Air Force Research Laboratory scientists to test and certify new jet fuels.

They’ve developed an environmentally friendly jet fuel additive for the Air Force that allows fuel to withstand higher temperatures and burn more cleanly. They routinely conduct studies on how fuel composition affects performance. In the lab, I listened to Thusitha Gunasekera and staff from his Environmental Microbiology group talk with such enthusiasm about how they use the tools of microbiology to determine how bacteria degrade jet fuel and how they can mitigate the damage this causes.

I’m so proud that the University of Dayton is part of a Federal Aviation Administration Center of Excellence for Air Transportation — along with MIT, Stanford and 14 other universities in the country — at the cutting edge of developing alternative fuels. This is an example of the tremendous collaboration between faculty and UDRI staff, with faculty such as Professor Josh Heyne of mechanical engineering teaming with UDRI researchers, led by Scott Stouffer, to put UD on the map in this important area of research.

We’re advancing environmental science in a meaningful way on the international stage. In the last six years alone, our researchers and faculty have published their findings in 150 peer-reviewed journals. That’s a remarkable achievement.

Everywhere I toured that day, I marveled at the ingenuity, passion, and curiosity of our researchers. They’re innovative thinkers. They’re flexible. And they’re pushing the boundaries of creativity.

For instance, in the SMART (Structures and Materials Assessment, Research and Test) Lab, Susan Hill’s group in the Structural Integrity division is testing the step bolts on a cell-phone tower to determine if they are strong enough to protect a repairman from falling. Engineer Steve Fuchs talked about the flexibility of UDRI to solve any myriad of problems for government or industry.

Looking around the high-ceilinged lab with reconfigurable floor space for custom performance testing of everything from air bags to aircraft landing gear, he quipped, “Welcome to our tinker toy set.”

I love that spark of excitement, that joy that comes with being passionate about your work.

The researchers in the Shroyer Park Center may work off the beaten path, but it’s clear they’re charting new paths for humanity.