



Zheng Rong '12, Ryan Maddalo '12 and Anderson Lebbad '12 meet with Senior Staff Engineer Robert Weingard (center) during a visit to Exelon's Limerick Generating Station.



ROOM With a View

Multidisciplinary Design Lab opens up professional world to students

By Suzanne Wentzel

Gary Gabriele, PhD, could not have asked for a more sympathetic listener. As the Drosdick Endowed Dean of Engineering described the strategic goal of bringing multidisciplinary, industry-sponsored projects into the curriculum, John Paul Jones III '72 COE nodded his head. "Go on."

Jones, the retired chairman and CEO of Air Products and Chemicals Inc., knew full well that in engineering practice, no one works in the silo of a single discipline. He liked this idea of exposing College of Engineering students to the complexities that drive decision making in the professional world.

And he wanted to help the College bring the idea to life.

"MDL" is the word

Thanks to a generous endowment from Jones (see sidebar on Page 25), the dream has become reality in the form of the Multidisciplinary Design Lab (MDL). Here in this renovated room in the Center for Engineering Education and Research, teams of undergraduates tackle actual design problems from industry clients.

Real specs, real deadlines, real deliverables.

MDL project teams have first dibs on the room's workstations, but anyone can use the space to study, do group assignments and catch up with friends. It's one of the go-to places for engineering students.

"Meet you at the MDL." Message sent.

The MDL makes collaboration easy. Productive. Fun. Seated at state-of-the-art workstations, students connect their laptops to a large wall monitor so that—click!—they can view each other's screens. Watch a video of a manufacturing process. Be on the same page. Fix mistakes as they go. ("Dude, I think *bore scope* is one word.")

It may be roll-up-your-sleeves-and-brainstorm-ideas work. Or it may be button-your-suit-and-look-the-client-in-the-eye work, since project teams use the MDL to meet with industry sponsors. Whatever the task, the MDL provides a quiet, group-oriented place in which to do it.

The best of both worlds

"The beauty of the MDL is that students don't need to leave campus to have meaningful interaction with industry professionals," Dean Gabriele says. "We call it an 'in-house' or 'stay-at-home' co-op experience."

The students call it awesome.

"There is no price you can put on doing real work for a company," says Lindsey Kreisher '12, who believes having an MDL project on her résumé helped her land a job at Navigant Consulting. "By doing it in-house, you get experience without having to leave Villanova every day or give up a semester."

That experience pays off. Working on an industry-sponsored project (an option for the senior capstone) teaches students that most real-world problems don't have tidy solutions.

"We can't duct-tape our way out," jokes Brian Maxwell '12, project leader of the team designing a surveillance robot that can function in power plant contamination areas. "We have to make something work and meet the client's specs."

The experience also closes the inevitable skills gap between the knowledge needed to get an "A" on a test and the knowledge needed to function in a workplace.

"Industry-sponsored projects immerse students in a company's culture and give them the inside knowledge to meet the needs of that particular business," says George Simmons '87 MS, director of the MDL.

Sponsors gain inside knowledge, too: about Villanova, the College and students likely to be top draft picks in the job market. MDL partnerships enable employers to scout the talent (every company sponsor has offered jobs or internships to students on their project teams) and, at the same time, to benefit from the solutions the groups come up with.



In the Multidisciplinary Design Lab, Frank Pezzolla '12 and Lindsey Kreisher '12 explore ways to automatically measure and control the outside diameter of bolts processed by centerless grinders.

THE DENNY FAMILY GIFT

The use of the space that now serves as the Multidisciplinary Design Lab was originally made possible by the generosity of Joseph P. Denny '68 COE, whose gift in memory of his father, Joseph G. Denny III '37 COE, created the Computer Aided Design Lab.

The room has been updated in response to the changing needs of the College of Engineering. The College remains grateful to Mr. Denny and his family for supporting Villanova University in its mission to educate the next generation of students.

Nuts and bolts of design

To non-engineers, the mission of some project teams may register low on the glamour meter. “Design and implement a cost-effective process to detect burrs on castle nuts.” Or “improve the way to measure a bolt’s outside diameter, which may be off by 2000th of an inch.”

But such manufacturing issues, while not critical path, are worthy of students’ time and attention. Just ask airline passengers cruising 30,000 feet above ground. These are the nuts and bolts holding their plane together.

Sponsors like SPS appreciate working with “skilled student teams whose solutions help to drive operational and quality objectives,” Irons says.

Student-sponsor interaction is the cornerstone of MDL projects. That means sustained engagement, face time and advice from company mentors.

“We don’t want partners who say, ‘Here is the project. We’ll be back at the end to watch the presentation,’” Dean Gabriele says. “We want industry professionals who will engage with our students on an ongoing basis.”

MDL mentors find the perfect hands-on, hands-off balance. They direct students without reducing the relationship to “Mentor, May I?” For students, the freedom to take their own steps is a huge responsibility, but also empowering.

“We get to work with promising students who are developing a useful tool and who may be interested in joining our company,” says Michael Gillin '99 COE, '04 MBA, senior manager of Plant Engineering at Limerick Generating Station, a nuclear-energy plant owned by Exelon.

“We’ve hired two students as a result of the program,” adds Frank Irons, director of Engineering at SPS Technologies, a leading manufacturer of specialty fasteners, assemblies and precision components for critical applications. “Both have adapted well to the challenges they’ve engaged.”

Michael Gillin '99 COE, '04 MBA, senior manager of Plant Engineering at Exelon’s Limerick Generating Station, gives students a tour of the simulator building.





John Paul Jones III '72 COE built his successful career at Air Products and Chemicals upon the foundation of a Villanova education.

“We have so much leeway to make decisions,” says Frank Diaz '12, whose involvement on an MDL project team led to an internship at SPS. “No one tells us, ‘Solve it this way.’”

When students do run into roadblocks, they can email their mentors for guidance. They also meet with them in person, usually in the MDL but sometimes at the industrial site.

Seeing the physical space brings the project to life, says Scott Deady '12. “You can look at pictures all you want, but you can't really understand what's going on until you go there and see the scale of everything.”

And maybe see that your initial solution won't work.

“We weren't prepared for the level of noise—or grease!” says Lindsey of her first visit to the SPS manufacturing plant. “We had to start brainstorming all over again.”

The right stuff

Students *need* to satisfy clients. But that necessity is not the mother of panic. Not with Simmons at the helm of the MDL.

“He looks out for us and makes sure our experience is as good as it can be,” Scott says.

A project engineer, entrepreneur, teacher and business partner of Assistant Professor of Electrical and Computer Engineering Edmond Dougherty '69 COE, '86 MS, Simmons is ideal for the job. He serves as liaison with sponsors, manages all projects and recommends students for internships.

“In industry, I solve a problem and make a dollar,” Simmons says. “Here, I'm shaping lives. It's fulfilling on a completely different level.”

Alumni sponsors feel a special satisfaction, too. They get to close the loop between the place where they are building a successful career and the place where they got the tools to do it.

“Villanova prepared me to be an effective problem solver in a complicated industry,” Gillin says. When the College approached him about Exelon's sponsoring an MDL project, he threw his support behind it.

Being an MDL sponsor is an easy way for first-time alumni partners to break ground. Mark Donegan '79 VSB, chairman and CEO of Precision Castparts Corp., which owns SPS, had sent reps to the College to explore potential engagement opportunities. Their reaction after one visit: when do we start digging?

Hands-on from start to finish

The College's five-star menu keeps getting better. Offerings such as the revised first-year curriculum; entrepreneurial, research and service-learning opportunities; and now the MDL promise to satisfy prospective students hungry for a hands-on, multidisciplinary experience.

“If we want to continue being a first-class institution that attracts high-quality students,” Dean Gabriele says, “we must not only think and act innovatively but also foster a culture of innovation throughout the College.”

Talk about a never-ending process. It requires fresh ideas, ongoing analysis and repeat trips to the drawing board.

Good thing it's in the hands of Villanova engineers. ■

THE BEAUTY OF “WHOLE BRAIN”

In the search for solutions to complex problems, no one skill set will suffice.

This is one of the insights that guided Villanova University Board of Trustees member John Paul Jones III '72 COE during his 36 years with Air Products and Chemicals Inc.

As chairman and CEO of the global supplier of gases, performance materials, equipment and services to customers in industrial, energy, technology and health care markets, Jones realized that multiple engineering disciplines, as well as ethics, communication, business and other areas of expertise, must be brought to the table if issues are to be solved.

A second insight followed: Villanova had laid the groundwork for him to have the first insight.

“My education focused not just on book learning but on understanding real-world problems. That emphasis, combined with the Augustinian presence, provided the foundation I needed to deal with the issues engineers face.”

As the world gets flatter, the need for a multidisciplinary approach becomes greater. Through the sizable endowment that established the College of Engineering's Multidisciplinary Design Lab, Jones is ensuring that the next generation of Villanova engineers will enter the global economic arena with this “whole-brain” perspective.

Key to the lab's success is the participation of industry partners. “I am thrilled to see how quickly companies have come on board to sponsor real-world projects integrating design, manufacturing, business and multidisciplinary-based problem solving.”

If he's feeling pleased about the MDL's success, it's because Jones is motivated by yet another insight: to the extent that they are able, alumni should pay it forward.

“Whenever I look back on my time at Villanova, I am grateful for all that the school has given me. Alumni involvement is critical to the University's future success.”