

Engineering seniors install RIT's first 'green' light

To most passersby, the wind-powered walkway light – the only one of its kind on campus – has gone largely unnoticed, guesses Jessie Gmeinder '07 (mechanical engineering), chief engineer on the 10-person team of mechanical engineering and industrial-and-systems engineering majors that designed and installed the environmentally friendly illuminator this spring.

The team's multidisciplinary senior design project – one of seven in a new sustainable design and product development track – focused on exploring the capabilities and limitations of sustainable technologies on the RIT campus and determining their feasibility for widespread use.

Gmeinder and Jeff Hoover '07 (mechanical engineering), showed off the walkway light in April. As if on cue, a gusty wind kicked up, causing the carbon-fiber-composite-reinforced blades of an AIR-X wind turbine atop a lamppost to rotate into a blur.

Pedestrians using a pathway adjacent to parking lot F probably notice the large control box mounted near the bottom of the post more than the whir of the 46-inch diameter rotors mounted 17 feet above their heads. Behind the padlocked door of the control box are an ammeter, analog and digital voltmeters and two 12-volt deep-cycle batteries that are connected in parallel, both accepting power generated by the wind turbine and supplying power to the 20-watt light-emitting diode (LED) lamp.

"The turbine talks to the batteries and the batteries talk to the light," Gmeinder explains.

The 13-pound, 400-watt-output wind turbine – made of aircraft-quality aluminum alloy castings – can generate power from as little as a breeze of seven miles per hour or from wind gusts of up to 30 mph. At speeds higher than 30, an electric brake stops the blades to prevent overcharging the battery and over-revving that could damage the blades and bearings, and to keep electrical components safe from a current spike. A photocell – a device that detects light – turns on the light after dark.

None of it would be possible without a sturdy lamppost and concrete base – both provided by RIT Facilities Management Services, which assumed guardianship of the light after students graduated in May. Additionally, James Watters, RIT senior vice president for finance and administration, approved project funding of \$3,500.

For Gmeinder, who began a job in the



Jeff Hoover '07, left, Jessie Gmeinder '07 and Chris Chaput '07 (all mechanical engineering) were part of a 10-person team that designed a wind-turbine-powered walkway light as a multidisciplinary senior design project. The light, turbine and control box were permanently installed near F Lot and Cross Campus Drive. The team also investigated the feasibility of a geothermal heating and cooling system.

Corporate Engineering Technologies Lab of Procter & Gamble Co. in Cincinnati in June, the senior project was the culmination of a busy and productive time at RIT. The St. Paul, Minn., native served as president of the student section of the Society of Women Engineers and chair of the RIT student section of American Society of Mechanical Engineers. As a tour guide for the Department of Mechanical Engineering, she also served as an enthusiastic ambassador for RIT.

"I love RIT – I think it's a great school," she says, noting the opportunities to explore varied technologies, the personal attention she received from her professors, and RIT's co-op program, facilities and dedicated faculty members.

Besides the wind-powered light, the team explored the feasibility of another sustainable technology: a heating and cooling system for Riverknoll Apartments utilizing geothermal heat pumps and Genesee River water.

"This system will cost more initially but the yearly electricity costs will be significantly less compared with conventional air conditioning," predicts Kevin Costantini '07 (industrial and systems engineering).

While that part of the project is on the drawing board, the wind turbine-powered

walkway light is a reality. Will more wind turbines be sprouting on campus lampposts? After completing a 30-year life-cycle analysis, the verdict is in: Due to the high cost of fixtures and batteries, it's still cheaper to buy electricity.

But the conclusion doesn't necessarily mean that wind-powered lights aren't in our future. Gmeinder says that a single turbine and proper battery setup could possibly power multiple street or walkway lamps, and mass production would lower the cost per unit – making this a "green" idea that's ripe for future development.

Also on the team were:

Scott Rishell '07 (mechanical engineering), Chris Chaput '07 (mechanical engineering), Bob Snow '07 (mechanical engineering), Lu Xu '07 (industrial and systems engineering), Eric Wong '07 (industrial and systems engineering), Sam Eng '07 (mechanical engineering) and Wojciech Mysliwiec '07 (mechanical engineering).

Mike Saffran

Web extra:

To read an interview with Jessie Gmeinder '07, go to the online version of the magazine at www.rit.edu/magazine.