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Students unveil eco-product prototypes

David Chandler, MIT News Office
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The assignment was wide open: Design something based on the principles of reduce, reuse and recycle, and develop it into a prototype product. The results ranged from simple mechanical devices to complex electronic machines, but all served that central purpose in original ways.

To meet the challenge, seven teams of 18 students in this year's 2.009 Product Engineering Processes class, taught by David Wallace, came up with a wide variety of ingenious ideas, which they presented last week at a packed session attended by about 150 outside engineers and product developers.

"A big part of it is figuring out a good problem to solve," said Wallace, the Esther and Harold E. Edgerton Associate Professor of Mechanical Engineering and engineering systems co-director of the MIT CADlab. "Otherwise, you could do a really nice thing that's irrelevant. So the first thing is deciding where to put your energy."

Some of the projects resulting from the class are already being tried in real-world settings and could become commercial products. One of these is a solar-powered bin that automatically sorts the recyclable bottles and cans dumped into it.

The bin, called Recycl-o-sort, is being tested in Boston's Codman Square area as part of Family, Inc.'s recycling awareness campaign and a citywide antilitter campaign. The self-contained device uses a turntable to pass each item through three different sensors, whose readings can differentiate between glass, plastic and aluminum containers, or non-recyclable trash, directing each type into a separate storage bin.

Another team addressed the problem of poorly insulated houses in Pakistan, where winter temperatures can be severe in the north. They came up with a way of making insulation panels out of old plastic bottles, of which about a half million are discarded each year in the city of Karachi alone. The cost of enough panels to insulate a typical home would be paid back in fuel savings in about one year, the students calculated, and in the process would create jobs for local people while reducing local fuel needs and the amount of waste sent to landfills.

Also working to help with developing nations' needs, one team developed a way of processing the West African shea nut into a butter that can be used both for cooking oil and cosmetics, using a bicycle-powered grinding machine. The device replaces the traditional mortar-and-pestle method or higher-priced, centralized mills, and can be built from locally available materials and labor.

The team will take their prototype to Ghana in January for field-testing through a local women's co-op. People from various villages will be invited to watch the tests, and micro-financing through local institutions will be arranged for those who want to put the system to work.

Another project that could help developing-world farmers is a system for sorting coffee beans, which must be sorted to a uniform size before roasting. Aimed at the estimated 20 million or more small-scale coffee farmers worldwide, the device, which can be locally manufactured and should pay for itself

PHOTO / **DONNA COVENEY**

Nicolina Akraboff, left, works on an MIT product engineering course project while Roderick La Foy looks on. The two mechanical engineering seniors were part of a team that sewed discarded, flattened plastic bottles together to create insulation for thin walls in Pakistani homes.

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Students unveil eco-product prototypes cont'd

in two months, will be field-tested in January in Guatemala.

Addressing both water shortages and the cost of water heating, one team designed a shower system that automatically reduces the water flow while a person is lathering up. It does this by using photocells to detect when the person reaches for the soap.

Another team came up with a way of avoiding the cost of constantly replacing batteries in remote controls for television sets and other electronics, as well as the environmental cost of constant battery disposal. They came up with a remote that can be powered for a couple of hours by just pulling a trigger. The team calculates that if one out of 100 remotes in the U.S. were replaced by their units, five million batteries would be saved every year.

And finally, to alleviate the pollution caused by the disposal of old oil filters that still are clogged with dirty oil, one team came up with a device that can extract the oil and allow it to be reused as a lubricant. The team's research showed that 450 million oil filters are discarded every year, mostly in landfills, and that a single dirty filter could contaminate 62,000 gallons of drinking water.

While these projects may end up as real products--and many of those from past classes have indeed gone commercial--Wallace says that's not the course's primary goal. "We want to teach people what it takes to be a technical innovator," he says. And the results, which can be viewed at web.mit.edu/2.009, show that they have indeed.

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