TryEngineering Today!

The monthly newsletter of TryEngineering - find out more at www.tryengineering.org

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Students Win Wind Energy Challenge

Students from around the world recently converged on Australia's Monash University as part of the International Future Energy Challenge. Seven finalist student teams battled it out in the "Wind Turbine Power Maximiser" part of the challenge, which aims to promote student interest in power electronic converters, wind, and power engineering. The three day competition was the culmination of 18 months of work to design and build an electronic circuit that maximizes the power from a wind turbine. The teams' designs were tested in the Monash wind tunnel to ascertain their ability to function well. Research fellow Dr. Freere noted that in the process the students learn how to evaluate and improve on technology. "It helps turn them into engineers," he says. The International Future Energy Challenge is a student competition run biannually by the IEEE Power Electronics Society and the Power Sources Manufacturers Association. Overall First Prize for the competition went to the team from the University of Central Florida, in the U.S.

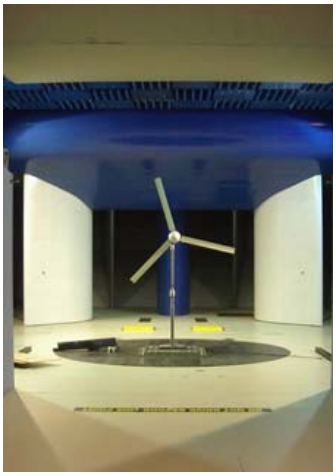
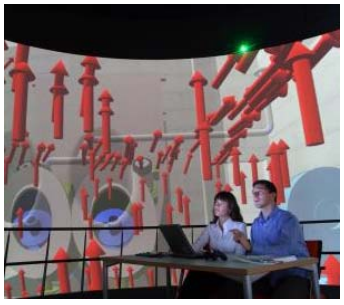


Image Credit: Monash University

TryEngineering offers a new lesson in which students design their own wind turbine. Explore this and other lessons at www.tryengineering.org.

Virtually Engineering a Power Plant

Photovoltaic and wind energy plants, hydroelectric power stations, and biogas plants supply energy without polluting the environment. However, they are complex to design and maintain. But now, virtual reality makes planning and operation easier. Researchers from the Fraunhofer Institute for Factory Operation and Automation IFF in Germany have developed a method that visualizes the processes inside energy conversion plants. "A special software tool has enabled us to visualize all the motion sequences for the first time ever – at just the push of a button," explains Dr. Matthias Gohla, Manager of the Process and Plant Engineering Business Unit. Arrows that move through the virtual model show engineers the direction in which and speed at which fluids and gases flow through a plant. Colored markings indicate potential weak points such as areas where critical temperatures, deposits or erosions could occur. Plus, personnel can be trained to handle a plant before it is operational, and even critical situations can be simulated without endangering employees.



Engineers developing a combustion plant use a new VR model to study the direction in which gases will flow through it.
Credit: Dirk Mahler / Fraunhofer IFF

Inside this issue:

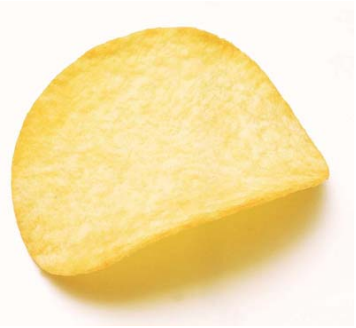
Ship the Chip!

Each issue, TryEngineering Today profiles one of the many lesson plans available on TryEngineering.org. Each lesson plan is aligned with education standards to allow teachers and students to apply engineering principles in the classroom.

Have you ever wondered about the engineering behind product packaging? Almost everything you buy must be safely encased in packaging in order to be shipped from where it is made to where it is used.

The "Ship the Chip" lesson focuses on engineering package designs that meet the needs of safely shipping a product. Students work in teams of "engineers" to design a package using standard materials that will safely ship a single potato chip through the mail to the school address. They'll use a variety of everyday items from string to tape to foil to paperclips to create their package design. The lesson not only explores how engineers develop packaging design requirements, but also evaluates the external stresses that engineers must consider when developing a package or product design. The lesson can be adapted for ages 8-18, and includes teacher and student handouts and worksheets. It can also be adapted to work without shipping by having students drop their packages from a height such as the top of a ladder or out of a first floor window.

Find this and many other engineering lessons at www.tryengineering.org/lesson.php.



Astronaut Glove Competition

In the pressure suits that astronauts must wear while performing a spacewalk, one of the toughest parts to design are the gloves. Like an inflated balloon, the fingers of the gloves resist the effort to bend them. Astronauts must fight that pressure with every movement of their hand, which is exhausting and sometimes results in injury. Furthermore, the joints of the glove are subject to wear that can lead to life-threatening leaks. This November, NASA is again sponsoring the Astronaut Glove Challenge that seeks improvements to glove design that reduce the effort needed to perform tasks in space and improve the durability of the glove. In the challenge, competitors demonstrate their glove design by performing a range of tasks with the glove in an evacuated chamber. The gloves are also tested to ensure that they do not leak. The challenge is part of NASA's Centennial Challenges which have been established to encourage the participation of independent teams, individual inventors, student groups and private companies of all sizes in aerospace research and development. In 2007, Peter Homer, a Maine engineer won the prize of $200,000 and started his own company to produce spacesuit gloves. More details are at http://astronaut-glove.tripod.com.

Astronaut Glove
(Image Courtesy NASA)

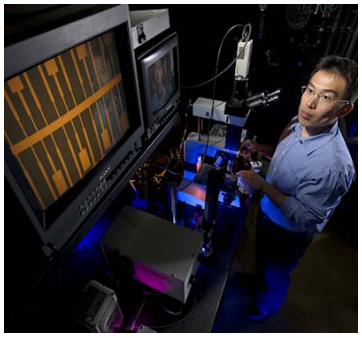
Carbon Nanotube Detects all Colors of the Rainbow

Researchers at Sandia National Laboratories have created the first carbon nanotube device that can detect the entire visible spectrum of light, a feat that could soon allow scientists to probe single molecule transformations, study how those molecules respond to light, observe how the molecules change shapes, and understand other fundamental interactions between molecules and nanotubes. Carbon nanotubes are long thin cylinders composed entirely of carbon atoms. While their diameters are in the nanometer range (1-10), they can be very long, up to centimeters in length. The carbon-carbon bond is very strong, making carbon nanotubes very robust and resistant to any kind of deformation. To construct a nanoscale color detector, Sandia researchers took inspiration from the human eye.

The idea of carbon nanotubes being light sensitive has been around for a long time, but earlier efforts using an individual nanotube were only able to detect light in narrow wavelength ranges at laser intensities. The Sandia team found that their nanodetector was orders of magnitude more sensitive, down to about 40 W/m2—about 3 percent of the density of sunshine reaching the ground.

This research eventually could be used for a number of exciting applications, such as an optical detector with nanometer scale resolution, ultra-tiny digital cameras, solar cells with more light absorption capability, or even genome sequencing. The near-term purpose, however, is basic science.

Find out more about nanotechnology at www.trynano.org.



Sandia researcher Xinjian Zhou measures the electronic and optical properties of carbon nanotube devices in a probe station. The monitor shows the electrode layout on the device wafer; the nanotubes are positioned in the small horizontal gaps.
(Image Courtesy Sandia National Laboratories; Photo by Randy Wong)

How Energy Flows

TryEngineering links to a wide range of online activities and games to encourage students to try out engineering.

In each issue we spotlight a game — this time a fun activity that traces how energy flows from a source (such as the sun) to a machine (such as a stereo system). You'll need to select and connect components such as solar panels, wires, and other materials to allow the energy to flow correctly to reach your goal. In part of the challenge, you'll select components to allow energy to flow from a river with a goal of producing cool air. In another challenge, try tracing the flow of energy from the sun to power a car. This one is a little tricky in that it doesn't incorporate the use of solar panels!

There are many other games on TryEngineering.org too — including those that explore how an MRI works, to others in which you design and test a roller coaster.

All will give you chance to test out engineering principles online and have fun with engineering too! Find out more at http://www.tryengineering.org/play.php!

Seismic Test of Seven-Story Building

A destructive earthquake recently struck a wooden condominium in Japan -- but it was planned by engineers to help improve earthquake resistant designs. It was the largest earthquake simulation ever attempted on a wooden structure. The multi-university team, led by Colorado State University, placed a seven-story building loaded with sensing equipment and video cameras on a massive shake table, and then exposed the building to the force of an earthquake that hits once every 2,500 years.

As the ground shakes, the energy that goes into a building needs to flow somewhere. Typically, a large portion of this energy is spent moving — and damaging — the building. There are proven engineering techniques for absorbing or displacing some of this energy in order to minimize damage, but the technology for doing so has not yet been thoroughly evaluated for wooden structures. The test shake should produce sufficient data to allow the research team to develop accurate computer models of mid-rise wood buildings, which can subsequently be used to advance and validate some of these seismic protection techniques.

Seismometers are instruments that measure and record motions of the ground. A new lesson plan about seismometers and sensing motions of the earth is at www.tryengineering.org.

A multi-university research team placed this seven-story building on the world's largest shake table to expose it to the force of an earthquake that hits once but every 2,500 years.
Photo Credit: Colorado State University

TryEngineering Today!

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TryEngineering.org

is a resource for students (ages 8-18), their parents, their teachers and their school counselors. It is a portal about engineering and engineering careers, developed to help young people understand better what engineering means, and how an engineering career can be made part of their future.

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