



TryEngineering Today!

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

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Re-engineering Bricks

Engineers have found that bricks made from fly ash -- fine ash particles captured as waste by coal-fired power plants -- may be even safer than predicted.

Instead of leaching minute amounts of mercury as some had predicted, the bricks apparently do the reverse, pulling minute amounts of the toxic metal out of ambient air.

Once colored and shaped, the FPC bricks are similar to their clay counterparts, both in appearance and in

meeting or exceeding construction-material standards.

Henry Liu, president of Freight Pipeline Company (FPC, Columbia, MO, USA), has been working since 2004 with a team of engineers to develop the bricks. First, he made fly ash bricks more durable by engineering them to resist freezing and thawing due to weather.

Liu, a retired professor of civil engineering, is now working to test the brick material's safety and prepare it for market.



Fly ash bricks are a potential "green" alternative to clay bricks.
Image Credit: Henry Liu, Freight Pipeline Company

Find out more at www.freightpipeline.com.

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Speedy Manipulator Robot

Researchers from France's Centre National de la Recherche Scientifique (CNRS) (National Center for Scientific Research) and the Spanish foundation Fatronik have designed a manipulator-type robot that they claim is twice as fast as all existing robots. To achieve this feat, they optimized both the shape of the robot and its

control system. The robot, called the Adept Quattro (from the name of its manufacturer and because of its four arms) is a manipulator robot comprised of several "arms" or kinematic chains linking their base to their mobile parts. Manipulators are employed in various industries to handle small objects on production

lines. The researchers particularly focused on design calculations to optimize the dimensions of each component in order to obtain maximum acceleration. The result is a prototype that can handle 240 parts a minute and attain accelerations of 200 meters per square second. Find out more at www.adept.com.



The Adept Quattro robot, equipped with four arms, can handle up to 240 parts/minute and attain accelerations of 200 meters/square second for loads up to 2 kilograms.
Image: © F. Pierrot - CNRS 2007



Getting Your Bearings

Each month, TryEngineering Today! profiles one of the many lesson plans available on TryEngineering.org.

The Getting Your Bearings activity explores the concept of friction and shows how ball bearings reduce friction. Students learn about different uses for ball bearings, have a chance to test friction using marbles, and identify the use of ball bearings in everyday items.

Topics examined include friction, ball bearings,

engineering design, and problem solving.

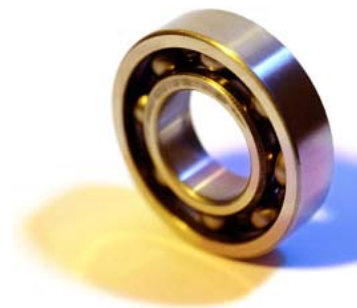
Students compare the reduction in friction when moving a lid across a variety of surfaces when marbles are used to interact with the surface, simulating how ball bearings are incorporated into many machines to reduce friction.

Students also learn that bicycles are a great example of a machine that uses ball bearings to reduce friction.

The lesson is appropriate for students aged 8 - 18, and provides step-by-step instructions for both educators and teachers.

All lessons on TryEngineering.org provide detailed teacher and student handouts and worksheets, many which can serve as pre-activity homework assignments.

Explore this, and other lessons online at www.tryengineering.org/lesson.php.



Reinventing the Wheel

The ZAP-X crossover electric car concept by Lotus Engineering and ZAP will be equipped with an exclusive new drive system from PML of the UK. The compact SUV will be driven by an electric motor built into each wheel. ZAP secured the PML wheel motor technology to play a key role in the development of next generation electric vehicles being developed with Lotus Engineering. "We've sort of reinvented the wheel," said Chris Newman of

PML FlightLink to Car and Driver Magazine. The small British electrical-engineering company has produced a remarkable electric Mini to prove the technology. According to PML, its compact, energy efficient, electric wheel motors produce unrivalled levels of torque with internal heavy-duty tapered roller bearings that can withstand heavy radial loads for robust use, important for the all-wheel drive capability of the ZAP-X.

PML's Hi-Pa Drive integrates motor and drive electronics in one unit producing an ultra high power density -- up to 20 times more than conventional systems. Hi-Pa Drive provides high torque in a lightweight flat motor package, ideally suited to vehicle in wheel drives, where its impact on suspension dynamics is minimal.

Learn more at www.pmlflightlink.com or www.zap.com.



The ZAP-X crossover electric SUV will be driven by an electric motor (displayed in the upper right) built into each wheel. Photo credit: ZAP



Methane Blast

Earlier this year, a dazzling blue flame blasted across the sands of the Mojave desert in the United States. In many respects, it looked like an ordinary rocket engine test, but this was different. While most NASA rockets are powered by liquid oxygen and hydrogen or solid chemicals, "we were testing a methane engine," says project manager Terri Tramel of NASA's Marshall Space Flight Center. The main engine, built and fired by the NASA contractor team Alliant Techsystems/XCOR Aerospace, is still in an early stage of development and isn't

ready for space. But if the technology proves itself, methane engines like this one could eventually be key to deep space exploration. Methane (CH₄), the principal component of natural gas, is abundant in the outer solar system. It can be harvested from Mars, Titan, Jupiter, and many other planets and moons. With fuel waiting at the destination, a rocket leaving Earth wouldn't have to carry so much propellant, reducing the cost of a mission.

Perhaps surprisingly, this flammable gas has never powered a spacecraft before. But now

scientists and engineers are developing LOX/methane engines as an option for the future. "Several efforts are underway, including a rival LOX/methane main engine design by KT Engineering," notes Tramel. Methane also gets high marks for human safety.

While some rocket fuels are potentially toxic, "methane is what we call a green propellant," Tramel says. "You don't have to put on a HAZMAT suit to handle it like fuels used on many space vehicles."

More details are at www.nasa.gov.



Test firing of a 7,500 pound-thrust LOX/methane engine.
Image credit: Mike Maseel/
XCOR Aerospace

Park World

Have you ever wanted to run your own amusement park? Most rides are great examples of the work that engineers do!

Engineers must consider how gravity, stretching, compression, friction, magnetic forces, and balanced and unbalanced forces impact the design and safety of a ride.

TryEngineering.org links to an interactive game called "Park World" that challenges users to learn how engineers use the science of forces to design safe, fun, and thrilling park rides. It was created by the Department of Engineering at the University of Cambridge.

Through the activity, users examine different

rides and figure out which has been tampered with by a rival park owner to make it unsafe to use. You'll need to understand and apply knowledge of forces to save the day!

For the link to "Park World" and other engineering games, click on "Play Games!" at www.tryengineering.org.





Underwater Radio Telemetry

Kick'em Jenny is its name, and for oceanographers working in the southeastern Caribbean Sea, this undersea volcano has been a handful.

Now, a team of researchers will begin using radio telemetry to monitor the rumblings of Kick'em Jenny from a real-time seismic monitoring device installed on the volcano. Located just off the north coast of the island nation of Grenada, Kick 'em Jenny is a "natural laboratory" -- a

submarine volcano that will eventually emerge from beneath the sea to form a new volcanic island. It is the only "live" submarine volcano in the West Indies, and has erupted at least 12 times since 1939. The last major eruption occurred in 2001. Part of a project to develop new technology for earthquake monitoring in coastal areas, the seismic station, called a Real Time Offshore Seismic Station (RTOSS), uses an ocean-bottom seismometer deployed directly on the volcano.

RTOSS allows seismic data to be transmitted by high-frequency radio to a land-based observatory in a nearby village. The data will reach the shore within milliseconds of being collected.

A key element of RTOSS, developed by engineers at Woods Hole Oceanographic Institution, is the flexible, stretchy hose that connects the seafloor anchor and instruments to the buoy on the sea surface. Find out more at www.whoi.edu.



Researchers and technicians deployed the RTOSS buoy in 250 meters of water, on top of the Kick'em Jenny volcano.
Image Credit: Spahr C. Webb, Lamont Doherty Earth Observatory



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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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