

## NEWS

# News Blurbs Now! (NBN)

**JF Automation USA** has been retained by Forever Board to provide Electrical Controls Engineering for the production of a revolutionary new product; a replacement



for drywall that is lighter, is waterproof, and does not allow mold growth. A few years ago, Ron Voit (Forever Board's inventor and President) bought a vacant factory near the Buffalo River and moved in production equipment he acquired from a defunct plant in Ohio. JF Automation USA, a Tonawanda control systems integrator that specializes in high technology industrial and manufacturing control systems, will upgrade and modernize the electrical control system for Forever Board. Visit [www.JFAutomation.ca](http://www.JFAutomation.ca).

**Jon Kolber** spoke about his recent post-flood Colorado deployments to the Buffalo District, US Army Corps of Engineers on September 9. Jon represents ESB well!



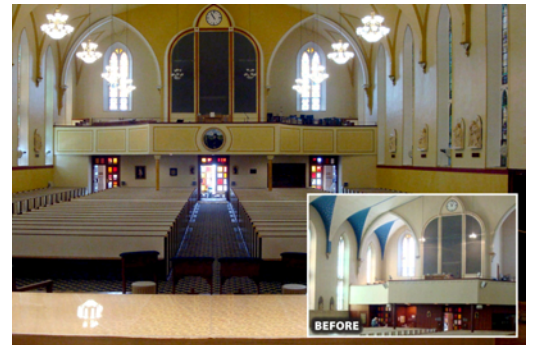
**Egypt** wanted to pay tribute to the planned extension of the Suez canal. What better way than to provide a line of stamps that could honor the multi billion dollar endeavor.

Well unfortunately, a few of the stamp designers got a bit mixed up and portrayed the Panama Canal instead. Stamp production has been halted but authorities have already been mocked and are already a bit embarrassed. Whoops!

**Don Kossuth** was knocked out but not out for good. No seven hour oral surgery will keep him down. Wish him Godspeed and a shorter than expected medical journey!

**National Fuel** is looking for an electrical engineer (automation & controls) to work in Williamsville NY or Erie PA.

**Picone Construction** has completed renovations to Saints Peter and Paul Church in Williamsville. Work included chandeliers, sound system,



power system, stations of the cross, marble work, parquet flooring, and terrazzo. Picone Construction hired Silvestri Architects, PC as the architect of record.

**SolarCity** will be investing \$5 billion in the Buffalo region to build one of the world's largest manufacturing facilities for solar panels. Ground has already been broken and the factory will generate about 3000 jobs by the time it opens around 2016.

**LaBella Associates, DPC** is expanding their Buffalo office and will move into their new space on October 10. They have designed two bridge crossings in the Cattaraugus Territory of the Seneca Nation of Indians. The Milestrip Road bridge is a 382 foot long structure supported on jointless concrete cantilever abutments and a concrete solid median pier founded on spread footing on rock. The other is located at Four Mile Level Road. LaBella has also hired West Seneca's Jeff Wackowski EIT as a Junior Structural Engineer and are looking for another!

**LABELLA** Associates, D.P.C. | Engineering  
Architecture  
Environmental  
Planning

We need your news blurbs NOW! We want to know about your recent projects, awards, hires, promotions, patents, new products, partnerships, open houses, tours, and anything else you'd like to share. Send your news to [ESB1894@gmail.com](mailto:ESB1894@gmail.com).

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## PRESIDENT'S MESSAGE



Activity at canalside and the surrounding waterfront district is flourishing. In 2013, canalside offered more than 800 activities with more than 800,000 visitors. The growth continued to explode in 2014. The first phase of the Harbor Center is about to open, with the Harbor Center Hotel to follow in 2015. The canalside skating rink is nearing completion with two NHL rinks worth of ice. What is not as well known is that going into the 2014 season, there were seven construction projects and three design projects active along the inner and outer harbor front. A total of \$295 million of private and public funding is going into waterfront development. Clearly, a critical mass of activities, events, construction, and a warm welcoming environment has been established to maintain the momentum of Buffalo's waterfront development.

One of the key players in this development is the Erie Canal Harbor Development Corporation (ECHDC). The ECHDC's stated mission is to revitalize the Western New York waterfront and to restore economic growth to Buffalo based on the regions legacy of pride, urban significance, and natural beauty. We are honored that Tom Dee, President of the ECHDC will be speaking at this year's Past Presidents Dinner on Thursday October 23. Mr. Dee will be speaking about the ECHDC past accomplishments, current and future projects, and the private investment that has been spurred by the success of canalside. Having heard Tom speak at past engagements I've attended, I know that he is an interesting and dynamic speaker. What's the next round of development at the waterfront? Is there a Stadium on its way? Come to the Past Presidents Dinner for fellowship and hear from one of the key steering agencies. You may even find out what the Buffalo Waterfront may yet become. Hope to see you there.

Marco Scofidio PE  
ESB President  
mscofidio@gmail.com



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## CALENDAR OF EVENTS

10-13-14	6pm	Ways and Means Meeting	2555 Walden Ave, Buffalo (Wendt Corp)
10-13-14	7pm	Directors Meeting	2555 Walden Ave, Buffalo (Wendt Corp)
10-14-14		FE Exam Review Classes Begin	University at Buffalo North Campus
10-23-14	6pm	Past President Dinner	550 N French Rd, Amherst (Banchetti)
10-18-14	9am	Adopt A Highway	Corner of Colvin & Brighton, Tonawanda
10-20-14	10am	Friction Stir Welding of High Performance Steels Webinar	
10-21-14	11am	Single-Stage Flyback PFC for LED Lighting Designs Webinar	
11-10-14	6pm	Ways and Means Meeting	2555 Walden Ave, Buffalo (Wendt Corp)
11-10-14	7pm	Directors Meeting	2555 Walden Ave, Buffalo (Wendt Corp)



## NEXT BIG ESB EVENT

# ESB Past President Dinner 2014

**Banchetti By Rizzo's**  
**550 North French Road**  
**Amherst, New York 14228**

**Thursday October 23, 2014**

**6:00 pm Cocktails - Cash Bar**

**6:30 pm Dinner followed by  
program/presentation**

**Cost is \$35 per person.**

**Free to ESB Past Presidents and  
Scholarship Recipients.**

**(No shows will be billed, however.)**

**Send name, complete address, phone  
number, & payment to ESB by Oct 15.**

**Buffet dinner includes:**

**Relish tray**

**Fresh vegetable platter**

**Chef salad**

**Rolls and butter**

**Seasonal vegetable medley**

**Penne broccoli alfredo**

**Stuffed roast pork loin**

**Bourbon chicken**

**Ice cream**

**Coffee and tea**

**Tom Dee will present Current and  
Future Plans for the Buffalo Waterfront.  
He is the president of the Erie Canal  
Harbor Development Corporation.**



**PPD  
2014**  
**Please invite a guest  
to come see this  
dynamic speaker...  
Tom Dee!!!**

**Erie Canal Harbor Development Corp.**

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## TECHNICAL ARTICLE

# The Power To Move You

By Dan Lewis

Seoul, South Korea is home to 10 million people. Roughly 350,000 of them live in the Gwangjin District on the northern bank of the Han River, which itself bisects the city. One of the more notable buildings in the Gwangjin District is home to something called Techno Mart, a mall dedicated to everything electronic -- from computers, printers, mobile phones, and even household appliances such as refrigerators. But Techno Mart's offerings aren't what makes it notable. Its size is. It is home to over 2,000 stores and is 39 stories tall.

So when it started shaking violently, people noticed.

Techno Mart, like many uber-malls, isn't just stores. It has a food court, of course, but also a gym in case you want to work off the meal you just ate. There are open spaces overlooking the river too, but if you'd rather find some artificial entertainment, Techno Mart is home to one of the area's larger movie theaters. Shutting down the complex for two days is a big deal, but that's exactly what happened on July 5, 2011. Without immediate explanation, the building began shaking for ten minutes. There were no earthquakes nor heavy winds during that ten minute period, leaving officials befuddled. To be on the safe side, authorities shuttered the complex until they could determine if it was safe to occupy.

Those assurances came within 48 hours or so, but the explanation for the pseudo-seismic activity didn't come to light for another two weeks. The cause, ultimately, involved a snap and the power, but not in the way you'd think. The "snap" in this case was "Snap!" a German music group and "The Power" was their hit song from 1990.

The culprit: Techno Mart's gym, located on the 12th floor. A Tae Bo class attended by 17 to 23 middle-aged exercisers (reports differ) were guided through a more-intense-than-

usual class, dancing aggressively to the song. As they worked out, the building shook. Chung Lan, a professor at Seoul's Dankook University, explained how such a thing was possible:

It just happens to be that the vibration set up by the Tae Bo exercises coincided with the resonance frequency unique to the building. When an external vibration hits the resonance frequency of a certain object, the vibration is amplified and causes excess shaking even from slight movement.

And in this case, "excess shaking" means that there was enough shaking to make people think they were in the middle of an earthquake.

To test the theory, researchers had another class of Tae Bo dancers repeat their workout, to the same song, two weeks later. It yielded the same result, but this time, Chung and others were able to measure where the violent shaking was most noticeable. Only on the top floors could the vibrations be felt significantly, and all six researchers agreed that mechanical resonance was the likely culprit.

Another Short Story: In 2011, National Football League running back Marshawn Lynch broke eleventy-billion tackles during a 67-yard touchdown run in one of the biggest games of the year. In the process, fans at the game were so loud and active that they caused the equivalent of a minor earthquake. A pretty amazing feat, to be sure. But even more amazing? In 2014, Lynch ran for another touchdown in a playoff game -- against the same team! -- and the fan reaction created yet another minor earthquake.

Visit <http://NowIKnow.com> and get daily knowledge delivered to your inbox each day. Dan Lewis isn't an engineer but he writes about some pretty interesting stuff!

OCTOBER BIRTHDAYS

Robin M Closs PE SE

Jerome R Meyer

David Baker

Edward Murphy PE

Frank Boeck

Ed Lutz

Jonathan Kolber PE

Shawn D'Angelo



STUDENT INFO

# Police Radar Gun...For Texting?

You may brake when you see an officer with a radar gun pointed down the road, but do you stop texting your friend too? Cops aren't there to ruin our lives, but to make the road a safer place for everyone. And there might be one more tool coming to aid in providing safer highways.

ComSonics is close to production on a device that can parse through various frequencies of telephone and data signals and detect radio waves from an active phone. (It would be similar to how cable guys find cable lines that are damaged.) The device wouldn't catch you if you received an email or if you were talking using your Bluetooth device but send that text and ouch, you are nabbed red button handed!

The Virginian-Pilot reports that a new tool has emerged that can tell police officers if you are texting. If you are texting, you are probably not paying enough attention to the great road ahead. Besides, it's illegal to text and drive. If you have a passenger though, could you "blame" the texting on them?



Photo courtesy of Cheryl Julicher



# ACEC Student Scholarship



The online portion of the ACEC New York scholarship is now available online. Complete the application at <http://www.acecny.org/index.php/component/rsform/form/12-2015-scholarship-application> and mail all associated materials by December 19, 2014 for consideration.

# Local/Online PDH Opportunities

For additional information regarding these opportunities, contact our office at [ESB1894@gmail.com](mailto:ESB1894@gmail.com) or 716-873-4455. Discounts for some pricing are available for certain society members, small companies, etc. And if you have information regarding future PDH opportunities that may be of interest to our members, please forward them to our office for inclusion in the newsletter and on our website at [www.tesb.org](http://www.tesb.org).

Date	Hours	Location	Information	Cost
All	Varies	Online	Multiple at <a href="http://aspe.org/webinararchives">http://aspe.org/webinararchives</a>	\$130
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All	Varies	Online	Multiple at <a href="http://campusonline.iccsafe.org/crscatalog.php">http://campusonline.iccsafe.org/crscatalog.php</a>	Free
All	2.0	Online	ASME Standards and Certification	Free
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10/08/14	4.0	Webinar	HVAC Systems Overview	\$258
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10/16/14	1.0?	Webinar	Energy&Industrial: Designing High Performance Structures & Systems with Precast	Free
10/16/14	4.0	Webinar	Helical and Push Piers in Deep Foundation	\$258
10/16/14	1.5	Webinar	Overview Codes Affecting Midrise Construct. & Special Design Considerations Re Shrinkage	\$225
10/16/14	1.5	Webinar	Shrinkage in Multi-Story Wood Buildings	\$275
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10/30/14	4.0	Buffalo	Upcoming 2014 New York State Codes - Significant Changes	\$195
10/30/14	4.0	Webinar	Passive Solar Heating For Buildings	\$258
11/04/14	8.0	Batavia	Seismic Design Manual and Application of the 2010 AISC Seismic Provisions	\$350
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# Junk Warriors-Requesting Backup!

Service to others is the rent you pay for your room here on Earth. –Muhammad Ali, American boxer.

Your rent is due! Email [ESB1894@gmail.com](mailto:ESB1894@gmail.com) to let us know that you are interested in helping cleanup our stretch of Colvin Boulevard in Tonawanda. Meet in the Family Video parking lot (Colvin & Brighton) on Oct 18 at 9am.



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# Lighthouses Are Seen Miles Away

A lighthouse light is a concentrated beam, focused by special lenses. Because of its highly increased intensity, this beam of light can travel a very long distance.

The design of the lighthouse light as we know it today, originated at the beginning of the 18th Century. The French inventor Augustin Fresnel had correctly deduced that light was pure energy that traveled in waves, and he

then spent his life developing lenses and reflectors that could capture and concentrate light. The first lighthouse optics that he designed combined highly polished prisms with an array of lenses that captured light and concentrated it back into a main beam. The design was concentric in arrangement, funneling the light into a beam that was many times brighter than its source. This light could be seen for more than twenty miles. Fresnel's

design of concentric glass rings to concentrate light is still used today in the production of automobile headlights, traffic signals, and projectors. Many of today's lighthouses have a system of rotating lenses, and the newer ones flash off and on as a way of conserving energy.

Information taken from the Library of Congress Everyday Mysteries Web site at [www.loc.gov/rr/scitech/mysteries/lighthouse.html](http://www.loc.gov/rr/scitech/mysteries/lighthouse.html).



Light House for South West Ledge  
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Michael J. Kistner

# Your Mind Deserves A Promotion

By David Allen

Have you ever had a job or a task that was beneath your skill level, doing work that contributed less value and used less of your creativity than you knew you had to offer? If you're like me, you will underperform at that lower-level work. In the same way, if you're still using your mind to keep track of things, then you have a big productivity improvement opportunity by promoting it to higher-level work. Your mind has better things to do than remembering and reminding, and better things to do than to think the same thoughts over and over. I bet you'll find that giving your mind a promotion will give you more of the "mind like water" experience that you're looking for.

I'm often identified by my description of a relaxed state of control as "mind like water." This is not an empty mind (it's impossible to have nothing on your mind, if you're conscious). It's rather one that is operating at a more productive and creative level. But in order to achieve and maintain that optimal condition, you should be using your mental energies to be thinking *about* things rather than thinking *of* them.

You really don't have any excuses to be having thoughts more than once, unless you like having those thoughts. Most people badger themselves incessantly with the same things, over and over. That's mainly because they do not take the responsibility to capture, clarify, objectify, and review those ideas, commitments, ought-to's, might-want-to's, etc sufficiently to renegotiate their agreements with themselves, and to give their mind a trustworthy system to support its creative process.

You can't fool your mind! It knows whether you've put its creations into an objective, seamless container and process that can be trusted to use that thought in the way it was intended. If you told yourself "I need to call Fred," and you didn't write that somewhere that your mind knows you will look when you are at a phone and could possibly make that call, it will not relinquish the task of reminding you. If you have a great idea about how to train your salespeople about a critical new product feature, and you don't put that somewhere you know you'll look when you're designing their seminar, your mind will take on the job of trying to ensure it will still happen. The problem is, your mind (like many taskmasters I've known) doesn't really have much of a plan about how to make sure the phone call gets done, so it wakes us up at 3am with the reminder!

It's a strange phenomenon in professional development: When a person is tasked to do activities that are really beneath their talent and appropriate skill level, they will usually screw up royally! The same is true of your mind.

Until you have installed sufficient idea-capturing and idea-processing tools and procedures, and the habits to use them effectively, your mind will be burdened with a job beneath its rank—something it dislikes and doesn't do very well. I suggest you do some appropriate organization development, so you can give it the promotion it deserves.

David Allen created Getting Things Done, the work-life management system that has helped countless individuals and organizations bring order to chaos with stress-free productivity. Visit <http://gettingthingsdone.com> and sign up for his newsletter.



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## MEETING MINUTES

**Attendees:** Officers: Closs, Samol, Scofidio  
Board Members: Bandriwsky, Kolber, Masse, Mooney  
Members: N/A

**Call to Order:** President Marco Scofidio called the meeting to order at 6:15pm

**Minutes:** N/A

### Committee Reports

**Advertising:** One new advertiser. Previous advertisers have been emailed to renew.

**Audit:** No report

**Bowling:** Sixteen teams were formed. Bowling began 8-27-14.

**Bylaws:** No report

**Education:** Reorganization meeting was held. PE to head up this year and ESB will head up next year. FE class is on hold until there is enough interest. Civil PE class will still be held in Jan. Jon Kolber did PE talk using ESB banner and shirt.

**Endowment:** No report

**Entertainment:** There will be no PDH talk for past president dinner

**Fundraising:** No report

**Golf:** No report

**Historian:** ESB is still in search of member who would be willing to scan 50 documents

**Media:** Committees have been updated on website

**Newsletter:** See news blurbs and future PDH seminar listings to ESB1894@gmail.com

**Nominating:** No report

**Scholarship:** No report

**Scholarship Run:** Event went well. Matt Plizga did a great job.

**Sunshine:** Don Kossuth had surgery

**Adjournment:** The meeting adjourned at 6:40pm

**Next Meeting:** Monday October 13, 2014      Wendt Corporation      2555 Walden Ave, Buffalo NY

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# Online Resource: Soft Robotics Toolkit

A new resource unveiled recently by researchers from several Harvard University labs in collaboration with Trinity College Dublin provides both experienced and aspiring researchers with the intellectual raw materials needed to design, build, and operate robots made from soft, flexible materials. With the advent of low-cost 3D printing, laser cutters, and other advances in manufacturing technology, soft robotics is emerging as an increasingly important field. Using principles drawn from conventional rigid robot design, but working with pliable materials, engineers are pioneering the use of soft robotics for assisting in a wide variety of tasks such as physical therapy, minimally invasive surgery, and search-and-rescue operations in dangerous environments.

The Soft Robotics Toolkit is an online treasure trove of downloadable, open-source plans, how-to videos, and case studies to assist users in the design, fabrication, modeling, characterization, and control of soft robotic devices. It will provide researchers with a level of detail not typically found in academic research papers, including 3D models, bills of materials, raw experimental data, multimedia step-by-step tutorials, and case studies of various soft robot designs. "The goal of the toolkit is to advance the field of soft robotics by allowing designers and researchers to build upon each other's work," says Conor Walsh, Assistant Professor of Mechanical and Biomedical Engineering at the Harvard School of Engineering and Applied Sciences (SEAS) and a Core Faculty Member at the Wyss Institute for Biologically Inspired Engineering at Harvard University.

By creating a common resource for sharing design approaches, prototyping and fabrication techniques, and technical knowledge, the toolkit's developers hope to stimulate the creation of new kinds of soft devices, tools, and methods. According to Walsh, who teaches a popular course in medical device design at SEAS and is founder of the Harvard Biodesign Lab, soft robotics is especially well suited to shared design tools because many of the required components, such as regulators, valves, and microcontrollers, are largely interchangeable between systems.

Dónal Holland, a visiting lecturer in engineering sciences at SEAS and graduate student at Trinity College Dublin, is one of the lead developers of the toolkit and is especially interested in the toolkit's potential as an educational resource. "One thing we've seen in design courses is that students greatly benefit from access to more experienced peers - say, postdocs in a research lab - who can guide them through their work," Holland says. "But scaling that up is difficult; you quickly run out of time and people. The toolkit is designed to capture the expertise and make it easily accessible to students."

Just as open-source software has spurred far-flung innovation in computing, "open design" hardware platforms - coupled with advances in computer-aided engineering and more accessible prototyping capabilities - have the potential to foster remote collaboration on common mechanical engineering projects, unleashing crowdsourced creativity in robotics and other fields. "Open design can have as disruptive an influence on technology development in this century as open source did in the last," says Gareth J. Bennett, assistant professor of mechanical and manufacturing engineering at Trinity College Dublin and a coauthor of a paper in *Soft Robotics* that describes the toolkit development. Additional coauthors are Evelyn J. Park '13, a SEAS research fellow in materials science and engineering, and Panagiotis Polygerinos, a postdoctoral fellow in the Harvard Biodesign Lab at SEAS and the Wyss Institute.

Much of the material included in the toolkit sprang from the labs of Robert J. Wood, Charles River Professor of Engineering and Applied Sciences at SEAS, and chemist George M. Whitesides, Woodford L. and Ann A. Flowers University Professor, two researchers whose work has helped establish Harvard as a leader in soft robotics. Wood and Whitesides are also core faculty members of the Wyss Institute.



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# Engineering For You Video Contest

During its 2014 annual meeting, the National Academy of Engineering (NAE) announced the winners of the Engineering for You “E4U” Video Contest. In celebration of NAE’s 50<sup>th</sup> anniversary, the E4U contest invited participants to submit a 1-2 minute video showing engineering’s impact on society in the last 50 years and to project its contributions in the next 50 years. More than 600 videos were submitted in six categories: middle school and younger (K-8); high school (grades nine-12); tertiary education (2-year college through graduate school, full or part time); NAE Frontiers of Engineering and Frontiers of Engineering Education participants/ alumni; NAE members and foreign members; and the general public.

A judging committee chaired by Rob Cook, Pixar Animation Studios’ emeritus vice president of advanced technology, selected the winning videos based on the following criteria: (1) creativity in the selection and presentation of content, (2) anticipated breadth of public appeal and interest, and (3) effectiveness in highlighting engineering achievements serving advancement in human welfare and the needs of society in an engaging and entertaining way. The People’s Choice Award was chosen by the public through voting on the NAE YouTube channel.

“The outcome of the NAE 50<sup>th</sup> Anniversary Engineering for You Video Contest was more inspiring than any of us anticipated,” said NAE President C. D. Mote Jr., “The messages touched on the essence of engineering, how it serves people and society. They give present powerful visions of what the future holds.”

The Best Video Overall Award was given to Adrian Burger for “Engineering Is Amazing!” which also won in the General Public category. A grand prize of \$25,000 was awarded to Burger in addition

to the \$5,000 category prize.

All of the winning videos are available to watch on the Engineering for You website at [www.nae.edu/e4u](http://www.nae.edu/e4u).

Awards of \$5,000 were given to the winners of the following categories:

Middle School and Younger - “Engineering, Creating What Was Once Only Imaginable” by Deepa Bhuvanagiri

High School - “Engineering Is Incredible” by Emily Hazen

Tertiary Education - “The Personification of Engineering” by Jacob Bryson

FOE/FOEE Alumni - “Neil Armstrong on Engineering” by Jorge Cham

People’s Choice - “The Future Is Boundless” by the Biomedical Engineering Society - University of California, San Diego

Additionally, two honorable mentions were given in the following categories:

Tertiary Education - “To Engineer Is Human” by Barry Belmont

NAE Members/Foreign Members - “Kiss an Engineer” by Anita Jones, Takahiro Suzuki, and Wm. A. Wulf

The mission of the National Academy of Engineering is to advance the well-being of the nation by promoting a vibrant engineering profession and by marshalling the expertise and insights of eminent engineers to provide independent advice to the federal government on matters involving engineering and technology. The NAE is part of the National Academies (along with the National Academy of Sciences, Institute of Medicine, and National Research Council), an independent, nonprofit organization chartered by Congress to provide objective analysis and advice to the nation on matters of science, technology, and health.



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# Lightweight Construction Materials Modeled On Nature

By Kosta Schnarakis

KIT researchers have developed microstructured lightweight construction materials of highest stability. Although their density is below that of water, their stability relative to their weight exceeds that of massive materials, such as high-performance steel or aluminum. The lightweight construction materials are inspired by the framework structure of bones and the shell structure of the bees' honeycombs. The results are presented in the journal PNAS, DOI: 10.1073/pnas.1315147111.

“The novel lightweight construction materials resemble the framework structure of a half-timbered house with horizontal, vertical, and diagonal struts,” says Jens Bauer, Karlsruhe Institute of Technology (KIT). “Our beams, however, are only 10 μm in size.” In total, the lightweight construction elements are about 50 μm long, wide, and high.

“Nature also uses open-pore, non-massive structures for carrying loads,” Oliver Kraft, KIT, explains. Examples are wood and bones. At the same density, however, the novel material produced in the laboratory can carry a much higher load. A very high stability was reached by a shell

structure similar to the structure of honeycombs. It failed at a pressure of 28 kg/mm<sup>2</sup> only and had a density of 810 kg/m<sup>3</sup>. This exceeds the stability / density ratio of bones, massive steel, or aluminum. The shell structure produced resembles a honeycomb with slightly curved walls to prevent buckling.

To produce the lightweight construction materials, 3D laser lithography was applied. Laser beams harden the desired microstructure in a photoresist. Then, this structure was coated with a ceramic material by gas deposition. The structures produced were subjected to compression via a die to test their stability.

Microstructured materials are often used for insulation or as shock absorbers. Open-pore materials may be applied as filters in chemical industry.

High-strength cellular ceramic composites with 3D microarchitecture, Jens Bauer, Stefan Hengsbach, Iwiza Tesari, Ruth Schwaiger, and Oliver Kraft, PNAS Early Edition, DOI: 10.1073/pnas.1315147111

Research activities at KIT focus on energy, the natural and built environment, as well as on society and technology, and cover the whole range extending from fundamental aspects to application. Work at KIT is based on the knowledge triangle of research, teaching, and innovation. Kosta Schnarakis can be reached at [schnarakis@kit.edu](mailto:schnarakis@kit.edu).

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# Failures That Weren't

By Tara Pfarner

Occasionally, innovation is born of failure. These common items were all created by accident.

## A Not-So-Sticky Solution (Without a Problem)

Dr. Spencer Silver was a scientist working at 3M when he accidentally invented the Post-It Note. In an attempt to develop a super strong adhesive, he did entirely the opposite, creating a "low-tack", reusable, pressure-sensitive adhesive. Calling it a "solution without a problem" (clever!), Dr. Silver promoted his accidental discovery for five years, but it failed to catch on. 3M had a "permitted bootlegging policy" which Silver's colleague Art Fry utilized after he used the adhesive to secure his bookmark in his hymnbook. The Post-It Note as we know it was introduced in the US in 1980. (Its original yellow color was accidental too - the lab next door had only yellow scrap paper to use.)



## A Bright Idea

The first decade of the 1900's saw several attempts at creating a rust-proof steel. In 1912, metallurgist Harry Brearly was trying to find a corrosion-resistant material for gun barrels. While his scrap heap of failed attempts grew, he noticed that one of them was still retaining its luster when all the others began to oxidize. This particular version contained about 12%

chromium, which reacted with oxygen to create a thin protective film. This made it more resistant to rust and stains. When Brearly applied for a patent in 1915, he found that Elwood Haynes had beat him to it. The two went on to pool their funding, along with a group of investors, and founded what would become the American Stainless Steel Corporation now headquartered in Pittsburgh PA.



## Heart Work

American engineer Wilson Greatbatch made an important mistake in his quest to develop a device to record irregular heartbeat patterns. Intending to get a 10,000-mega-ohm resistor from a box, he instead pulled out a 1-mega-ohm-resistor. Noticing that the circuit pulsed in a way that modeled the human heart, he changed the focus of his work, turning his failure into a lifesaving invention. Pacemakers at the time were external devices about the size of a television set, and came with many risks in addition to their benefits. Using mercuric oxide-zinc cells allowed the pacemaker to be implanted in the patient's body. This story has a local element as well: Greatbatch was born in Buffalo and attended high school in West Seneca, going on to receive a B.E.E. in electrical engineering from the University at Buffalo in 1957.



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# Local Haunted History

Maybe a familiar story, maybe barely noticeable. Possibly fact, possibly unverifiable. Check out our region's weird history and have a haunting good time!

Iron Island Museum (998 Lovejoy Street) started as a church in 1895 and was converted to a funeral home around 1955. When the museum moved here in 2000, the remains of 24 people were found hanging out in a basement closet. Seven cremated remains were laid to rest in 2010. But are the rest still causing weird reports from volunteers? Strange voices have been heard. Glowing orbs and moving chairs have been noticed. Will you see a shadowy figure if you visit?

Central Terminal (495 Paderewski Drive) saw many people shipped off to World War II only to be returned in coffins. Some people have claimed to see groups of spirits wandering around, only to vanish some time later. Others have seen ghost children playing games. And still others have seen floating orbs. Ghost Hunters on the Syfy channel featured the Art Deco building from 2008 to 2010...so it must be true!

Buffalo State Asylum for the Insane (400 Forest Avenue) is now known as the HH Richardson Complex. From

1870 to 1974 this place housed many horrors from mental health (mal?)practice. What went on here? Injecting insulin or metrazol into schizophrenic patients to put them into a coma or induce seizures. Sterilization of patients so they couldn't reproduce. And lobotomies, electroshock therapy, hydrotherapy...

Holiday Inn Grand Island (100 Whitehaven Road) has been haunted by a young girl in her nightgown who likes to skip down the halls, jump on beds, disappear into corners, and laugh. The fourth floor and room 422 are said to have more sightings and noises than the rest of the hotel. Did Tanya die in a fire at the hotel in the 1800s?

Town Ballroom (681 Main Street) was a speakeasy that Al Capone used to visit often during the prohibition period. There were secret meetings and gambling parties held in the basement. Employees have said they hear party sounds from the basement and there are odd chills in the basement tunnels. Sometimes ghosts in prohibition era dress are sighted or security alarms sound unexpectedly. Can ghosts set off alarms?

There are more if you dare to look them up and go take a visit. The ghosts are waiting for you. Happy Halloween!



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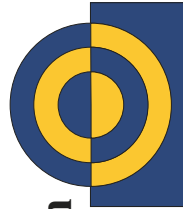
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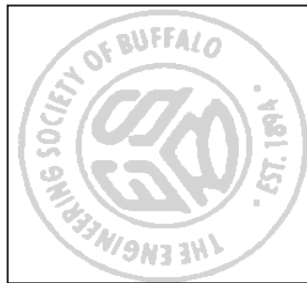
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# Mech Eng Studies Blood Vessels Related To Diabetes Etc

By Marlene Cmons

People with diabetes develop early and severe heart disease, specifically atherosclerosis, a condition in which plaque builds up inside the arteries. Alisa Clyne, a mechanical engineer by training, wants to better understand the biomechanics of this process. "We know people with diabetes get these plaques but not why they are more severe with diabetes," says Clyne, an associate professor of mechanical engineering and mechanics at Drexel University. "Could there be a mechanical aspect to it?"

The National Science Foundation (NSF)-funded scientist specifically is studying the behavior of endothelial cells, which form the inner layer of blood vessels, and which "sense the mechanics of their environment and respond to it," she says. "They are exposed to a variety of mechanical forces, mostly from blood flow." Moreover, blood flow, specifically shear stress (the force of flowing blood on the endothelial surfaces) cause the cells to react in multiple ways. "Atherosclerosis occurs in locations where there are disturbances in the blood flow," she says. "We want to know if the relationship between atherosclerotic plaque development and endothelial response to fluid flow is altered in diabetic conditions." With normal flow, "your endothelial cells should not be dysfunctional, and you should not get plaque," she adds. "So the question for us is, if you change the endothelial cell environment to simulate a diabetic condition, such as high blood sugar, would there be a change in the way the cells are able to respond to fluid flow?"

Insights into the role of these cells in plaque development potentially could provide new ideas for drug development, as well as tissue engineering applications, such as designing new blood vessels. "This information about how the cell mechanisms respond to blood flow is important," Clyne says. "For example, you could tissue engineer a better blood vessel for coronary artery bypass surgery by understanding how the endothelial cells respond to flow in a diabetic environment."

Clyne is conducting her research under an NSF Faculty Early Career Development (CAREER) award, which she received in 2009. The award supports junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education, and the integration of education and research within the context of the mission of their organization. NSF is funding her work with about \$400,000 over five years.

Endothelial cells align and elongate in the direction of the shear stress, and change some of their functions as well. For example, in response to increased shear stress, endothelial cells produce more nitric oxide, a vasodilator which causes the blood vessels to expand. This physiological response decreases blood velocity and thereby reduces shear stress down to the original level. Nitric oxide also scavenges reactive oxygen species and reduces inflammation, both of which are factors that contribute to atherosclerotic plaque development. If endothelial cells do

not produce nitric oxide in response to shear stress in a diabetic environment, this could contribute to atherosclerosis in people with diabetes.

In her experiments, Clyne cultures endothelial cells in a parallel plate flow chamber, which allows her to put "flow" over the cells to simulate the stresses they would experience in the human body. "We added high sugar levels to see how the cells would respond in normal flow," she says. "One thing high sugars do is change the structure of proteins," she explains. "There are proteins underneath the endothelial cells, and the cells attach to them. The one we study in particular is collagen. As we age, or if you have high sugar levels, the collagen becomes glycated, meaning that sugar attaches to one of the collagen amino acids. When the cells are attached to glycated collagen, rather than normal collagen, it changes how they respond to fluid flow." The researchers measured the responses, including the release of nitric oxide, and found that the cells "don't align in the flow direction or release nitric oxide when they are on glycated collagen," she says. "The way in which cells adhere to the substrate proteins changes many signaling pathways in the cells. Our cells adhere to glycated collagen in a different way from native collagen, and this changes the way that they are able to respond to mechanical forces from fluid flow." The researchers also looked at the effects of increasing sugar levels in the cultured cells and found that high sugar levels--and low sugar levels--also changed the way the cells respond to fluid flow. "So if you are at either extreme, you're in trouble," she says. "Sugar can either directly affect the cells or affect the proteins the cells adhere to, so it has two effects."

As part of the CAREER educational component, Clyne's lab is conducting an outreach program with the Girl Scouts, including a "Science Saturdays" program at Drexel, bringing in junior high school-age scouts for up to six Saturdays to teach them about different kinds of engineering, and how engineering applications can solve human health problems. The scouts are paired with mentors, who are Drexel engineering undergraduate students. They engage in hands-on activities that relate to engineering. For example, they constructed robot cars (mechanical engineering), made lip gloss (chemical engineering), and participated in a water filtration project (civil engineering). "Over the course of the program, they also worked on a design project related to biomedical engineering. One year, the girls created solutions that would help soldiers coming home from the war without a limb," she says. "One group made a gripper hand to help with eating, whereas another group made a device to improve balance using a prosthetic leg. The girls learned about how engineering contributes to helping others, which hopefully will encourage them to consider engineering careers."



Robin Closs  
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