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## TECHNICAL ARTICLE

# Flopping Fast

by Dan Lewis

A gigaflop is a billion -- one thousand millions -- flops. A flop is a "floating point operation" -- the "fl" from "floating point" and the "op" from "operation" -- which is, basically, a bit of arithmetic involving a variable with some number of digits before the decimal place and some after. (Take 340.202 and multiply it by -8.943 for example -- calculating that would be one "flop.") We use gigaflops per second as a way to benchmark how fast a computer's processor is. Many current laptop computers are capable of roughly 50 gigaflops per second, and in the twenty or so seconds it took you to read those last sentences, the computer is capable of doing a trillion flops. (It's not actually performing all those calculations right now, but it could.) That's a lot of math, done incredibly fast.

But how fast? Here's another way of looking at it -- one which shows just how incredible our computers are.

Let's say you're on your laptop taking a math test -- something from the fifth grade.

You don't get to use the computer's calculator or any other automated way of doing the arithmetic, but there's a pad and some pencils next to you so that you can calculate the answers by hand.



The computer shows you 100 questions, each one of which is like the  $340.202 * -8.943$  example above. All the questions are the same type -- lots of decimals -- but not all are multiplication questions. There's some division, some addition, and some subtraction. The test would take you, hopefully, about an hour. (Okay, maybe two.)

You're sitting about two feet away from the screen -- for ease of math, let's say 23.6 inches, or about 0.4 inches short of that two foot mark. It feels like the words are hitting your eyes instantaneously, but they're not. The light has to travel from your computer screen to your monitor, and while that happens quickly, it does take some measurable amount of time -- about two nanoseconds. (Yes, light travels about 11.8 inches per nanosecond.) A nanosecond is a billionth of a second, and typically, we discount those incredibly tiny amounts of time.

But in this case, that super-tiny amount of time is important -- because it shows just how fast the computer can complete that same math test. Again, each question on your test is one flop, and a gigaflop is a billion flops. At 50 gigaflops per second, the computer can, therefore, answer 50 such questions in a nanosecond -- or complete all 100 in two nanoseconds. In other words, in the amount of time it takes the questions from your computer screen to hit your eyes, the computer is done with the test.

Subscribe to Dan Lewis's free daily e-newsletter, *Now I Know*, at [nowiknow.com](http://nowiknow.com).

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## PRESIDENT'S MESSAGE



### Engineering the Sochi Olympics

What does the Olympics have to do with Engineering? LOTS! The 2014 Winter Olympics were reportedly the most expensive in history at a reported \$50 billion.

Where does the cost come from? Everything from new buildings and roads to sports gear and apparel. The major cost is the new buildings that are constructed just for the specific sports. Four major buildings round up the majority of the Olympic venues.

Adler Arena is an 8,000 seat speed skating arena that was built in 2012 for the Russian Speed Skating Championships. It alone cost \$32.8 million. "A crystal face theme is supported by angular walls and triangular stained-glass windows. The gray and white color of the building enhances this impression. The walls along the sides of the skating rink are made transparent so that spectators can look outside. The skating center is designed to make the utmost use of local natural features" according to Wikipedia.

Fischt Olympic Stadium is a 40,000 seat stadium that is the venue for the opening and closing ceremonies at a cost of \$778.8 million. Named for nearby Mount Fischt, the structure boasts a semi-clear, bi-winged

polycarbonate "shell" roof supported by some 8,000 tons of steel.

Shayba Arena is where the hockey games for the 2014 Olympics are being held. Shayba is Russian for "hockey puck". This stadium is also a movable building. Meaning they can disassemble it and move it to an entirely new location. This 7,000-seat arena cost some \$27.2 million to build.

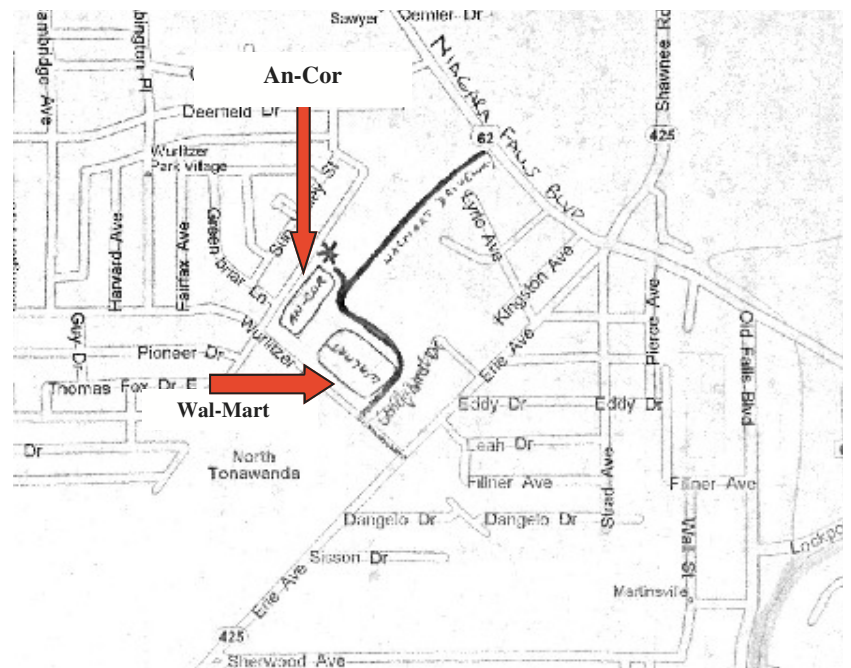
The Bolshoy Ice Dome is the last hockey arena in the Sochi Olympic village. The Bolshoy ice dome roof also doubles as an exterior score board. It's very impressive to see as you are walking down the street.

Speaking of impressive buildings, the Catholic Health Tour at 144 Genesee Street is March 5 at 5:30pm. This \$46 million dollar building will be open to anyone for \$20 and \$15 for members. I think this building will be a gold medal winner.

Matthew J. Plizga, P.E.  
ESB President  
mplizga811@aol.com

The April meeting will be held at  
An-Cor  
900 Niagara Falls Blvd  
North Tonawanda.

It's not an easy place to find so give yourself a few extra minutes!  
Once parked, follow the very small signs that say office.



## CALENDAR OF EVENTS

03-03-14	6:00pm	Ways and Means Meeting	2555 Walden Ave, Buffalo (Wendt Corp)
03-03-14	7:00pm	Directors Meeting	2555 Walden Ave, Buffalo (Wendt Corp)
03-05-14	5:30pm	Catholic Health Tour	144 Genesee St, Buffalo
03-12-14		ASME Climate Change - Science & Solutions	
03-18-14		Technical Societies Council Joint Dinner	6461 Transit Rd, Depew (Salvatore's)
04-07-14	6:00pm	Ways and Means Meeting	900 Niagara Falls Blvd, N Tonawanda (An-Cor)
04-07-14	7:00pm	Directors Meeting	900 Niagara Falls Blvd, N Tonawanda (An-Cor)
04-12-14	10am	Adopt A Highway	Corner of Colvin and Brighton, Tonawanda
06-01-14		ESB Scholarship Applications Due	
08-05-14		ESB/BEAM Golf Tournament	



## ESB COMING EVENTS

# The Junk Warriors Are Coming!



Warriors are needed for the bi-annual adopt a highway spring clean up!  
Can you spare two hours (or less) to clean up our two-mile stretch of Colvin Boulevard?

The more people that help, the less time it will take!

Everyone who helps will get a gift card good for a free Tim Horton's coffee!  
Students, this is a great opportunity to establish relationships with other members  
and a great way for everyone to give back to the community.

Meet us Saturday April 12 at 10am

in the parking lot of Family Video at the corner of Colvin and Brighton in Tonawanda.

If you are interested, you can let us know any time by sending an email to [ESB1894@gmail.com](mailto:ESB1894@gmail.com).



# Catholic Health Construction Tour Rescheduled

**Wednesday, March 5 at 5:30pm**

**Come see this building up close and personal with a construction tour from Construction Manager Denis Steszewski!**

**For more information contact Matt Plizga at [mplizga811@aol.com](mailto:mplizga811@aol.com) or 716-541-5840.**

**To reserve your spot, make checks payable to The Engineering Society of Buffalo and mail to: ESB, c/o Matthew J. Plizga, 671 Lafayette Ave., Buffalo, NY 14222**

**1.0 PDH Approved**

**Cost: \$15 members/\$20 non-members**

**Dinner will be provided by Euro Deli at the Ukrainian Cultural Center (562 Genesee Street) following the tour.**

Located at 144 Genesee St just as you get off the Kensington expressway is the newest building in downtown buffalo. The six story steel framed building is Catholic Health's major plan to centralize its employees instead of being at eight scattered locations. I took a pre-tour and wanted to share with you.

The building uses as much of the site as possible with only a seven foot setback from the street. The \$46 million dollar new building will encompass 140,000 square feet of space. The first and second floors will be office and meeting space. Floors three, four and five will be more office space.

The structure of wide flange steel sections have welded moment connections on the flanges and A325 bolted web connections. The floors are steel deck with shear studs protruding from the wide flange beams. The decking is covered with concrete with an unfinished floor height to allow a 2-5/8" floating floor for network connections.

The building will also have its own parking ramp with over 900 spaces for vehicles. Both the building and the parking ramp will be supported on circular piles. The four floor parking ramp will be made from precast concrete and will be connected to the building via a walkway.

The outside of the building will have brick on the lower two stories and curtain wall construction extending up to the roof. One of the building challenges was setting the lintels. The composite concrete floors had to be poured first before setting the lintels. "We needed the deflection to take the camber out of the beams in order to properly set the lintels," said Project Manager Denis Steszewski.

Walking through the building, one can get a sense of how great the building will be. This building should be a tipping point for the economic development and growing work population of the downtown area.

Thank you to Denis Steszewski and Ed W from Uniland for the great tour. Thank you to George Eberl from Eberl Iron Works for acting as the Knowledge base for the surrounding area. George actually grew up one block away on Sycamore. I would also like to thank Therese Hickok and Erin Casell from Uniland for putting the tour together.



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## TECHNICAL ARTICLE

# Childhood Myths Debunked

By Tara Pfarner

Remember those cool facts you shared with your friends that made you sound really smart? Or perhaps things your parents told you? Well, it turns out that some of those just might be myths after all.

**Myth #1: In the northern hemisphere, water swirls counterclockwise in toilets, but in the southern hemisphere, it swirls clockwise.**

The Coriolis Effect, first noted in 1835 by French scientist Gaspard-Gustave Coriolis, is caused by the rotation of the Earth. It does affect some things, but not toilet water. Large events which cover much ground or continue for a long period of time, such as cyclones and hurricanes, are affected by it. The direction in which the toilet water leaves the bowl, however, is influenced by the angle of the jets under the rim which give the water its "initial swirl". Even tiny pits or imperfections in the porcelain can affect the path the water takes.



**Myth #2: Milk is good for growing bones.**

Milk=calcium=strong bones, right? Not necessarily. While milk is healthy, moderation is key (as it is with most anything we put into our bodies). A number of factors affect bone growth and calcium absorption, including exercise, hormone levels, heredity, and your intake of vitamins D, K, and protein. And there is in fact, such a thing as *too much* calcium consumption which can cause maladies such as fatigue and kidney stones.

**Myth #3: The Five Second Rule**

You dropped your cookie on the lunchroom floor. What to do? Grab it in five seconds or less and chow down!

Not unless you like the germs, bacteria, and other icky stuff that lives under the lunch table. No matter the amount of time, germs are germs and will stick to whatever they can. They don't discriminate based on how long a potential host has been hanging around. And they like cookies as much as you do.



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Please send your birth month to ESB1894@gmail.com for inclusion!

UPCOMING EVENTS



# Mark Your Calendars For These Upcoming Events

**NASCC: The Steel Conference** will be held at Toronto's Metro Toronto Convention Centre March 26-28. Attendance at this year's event is expected to top 3,500. Will you be there?

The conference will feature over 100 seminars on topics including "Floor Vibration on Joist-Framed Floors", "Multi-Tier Concentric Braced Frame Procedures", "Tips for Successful Delegation of Connection Design", and "Torsion in Practice."

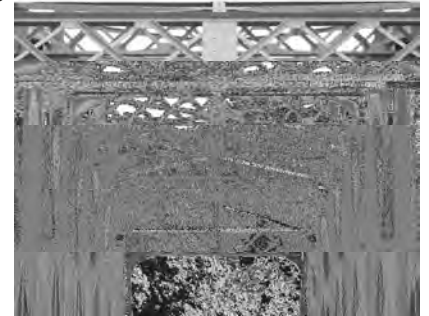
This year, the World Steel Bridge Symposium will be co-located with NASCC: The Steel Conference, so your registration allows you to attend technical sessions from both conferences. This is in addition to two other conferences held concurrently: the Annual Stability Conference and the Technology in Steel Conference. Attendees can earn up to 18.5 professional development hours (1.85 CEU's), plus another four for attending pre-conference short courses.

The event promises cool stuff from over 200 exhibitors, including bridge components and systems, cranes and lifts, fabrication equipment/tool/accessories (providing full demonstrations of their equipment right on the exhibit floor!), safety equipment, software, and structural systems and components. Attendees also have the

opportunity to hear expert speakers, including Duane Miller of Lincoln Electric, Larry Kloiber of LeJeune Steel, and Larry Griffis of Walter P. Moore. Various facility and construction tours are being offered as well.

This event is a great opportunity to network with vendors and colleagues and make new connections, and learn something along the way.

**The Association for Bridge Design and Construction Spring Seminar** is planned for April 30 at the Clarion Hotel in Batavia. Bridge industry professionals will present regarding all aspects of bridge design, engineering, and construction.



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# Local/Online PDH Opportunities

For additional information regarding these opportunities, contact our office at 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.

Date	Hours	Location	Information	Cost
All	Varies	Online	Multiple at <a href="http://aspe.org/webinararchives">http://aspe.org/webinararchives</a>	\$130
All	Varies	Online	Multiple at <a href="http://continuingeducation.zweigwhite.com">http://continuingeducation.zweigwhite.com</a>	Free
All	Varies	Online	Multiple at <a href="http://www.csemag.com/media-library/on-demand-webcasts.html">http://www.csemag.com/media-library/on-demand-webcasts.html</a>	Free
All	Varies	Online	Multiple at <a href="http://campusonline.iccsafe.org/crscatalog.php">http://campusonline.iccsafe.org/crscatalog.php</a>	Free
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2/28/14	6.5	Syracuse	2014 National Electric Code	\$269
3/3/14	1.5	Webinar	Dynamics and Response (AISC Night School Series)	\$185
3/3/14	1.5	Amherst	Calibration of Temperature Sensors in the Process Industry ( <a href="http://isa-niagara.org">isa-niagara.org</a> )	\$35
03/04/14	1.5	Webinar	Verification of Computer Calculations by Approximation Methods	\$349
03/10/14	1.5	Webinar	Building Dynamics and Response (AISC Night School Series)	\$185
03/12/14	1.5	Webinar	Improving Project Communication: Within and Outside of the Project Team	\$349
03/12/14	2.0	TBD	Climate Change - Science & Solutions (ASME Dinner Meeting-PDH pending)	TBD
03/17/14	1.0	Webinar	Seismic Design of Nonbuilding Structures/Nonstructural Components ASCE 7-10	\$299
03/17/14	1.5	Webinar	Steel Behavior (AISC Night School Series)	\$185
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03/26/14	1.5	Webinar	Stormwater BMPs: What Works, What Doesn't, and What About Maintenance	\$349
03/27/14	1.0	Webinar	Design Loads on Structures During Construction Using ASCE 37	\$299
03/28/14	6.5	Rochester	Shallow Foundation Design, Construction, and Repair	\$269
03/31/14	1.5	Webinar	Antiquated Structural Systems	\$349
03/31/14	1.0	Webinar	Earthwork 101	\$299
03/31/14	1.5	Webinar	System Ductility and Seismic Design (AISC Night School Series)	\$185



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# News Blurbs Now! (NBN)

Some UB seniors got a chance to learn that: If a civil engineer designs it, it can be built. Under the direction of Jerome S. O'Connor PE FASCE (an adjunct professor in the School of Engineering and Applied Sciences and the manager of a graduate program that focuses on bridge engineering) and with the assistance of Kelly Rehm PE M.ASCE (a volunteer and board member of the group Bridging the Gap for Africa), students in O'Connor's professional practice class designed a footbridge which would cross a river in southern Kenya near the rural town of Sultan Hamud. They decided to take their capstone project even further and raise the \$20,000 needed to construct it. What an experience!

Picone Construction Corp has recently worked on several local construction projects.



- The 5000 square foot addition to the Gowanda Medical Center was created to accommodate a new waiting/reception area, nurse's station, six exam rooms, mammography room, ultrasound room, office space, and a physical therapy/cardiac rehabilitation room. Picone Construction was responsible for the installation of wood framing, Pella Windows, Hardie Board Siding, shingle roof, and spray insulation. In addition, the interior work consisted of a concrete slab with Barrier One additive, metal stud walls, drywall, painting, acoustical ceiling tiles, millwork, trim, doors, flooring, and toilet accessories.



- The remodeled 2500 square foot area at the University at Buffalo Commons houses Kung Fu Tea, a bubble tea bistro. Work on the former UB Micro store site included: new bathrooms, a kitchen, service area, and dining area with custom millwork.



- The Carquest Auto Parts Store located at 6370 Transit Road in Cheektowaga consists of site development and erection of a new Pre-Engineered Metal Building with colored split face block veneer exterior. This new retail location, scheduled to open in spring of 2014, will replace the current Carquest Auto Parts Store located further down Transit Road.



Eberl Iron Works, Inc. didn't need to look far to make the first acquisition in its 90-year history. Buffalo Metal Forming has been its neighbor on Sycamore Street for almost two decades. EIW will take over BMF's operation on January 24th. "Buffalo Metal Forming fits perfectly into our Metal Fabrication Services Division," said John C Eberl, chief executive officer. "The acquisition will not only broaden our custom fabricating capabilities, but also enable us to diversify and expand our product lines. With greater precision sheet metal capabilities, we can grow established product lines, such as perforated stair pans and rooftop support systems," he elaborated. "We also anticipate augmenting newer lines, such as ladder cages. This should help us grow both locally and nationally." EIW plans new investments in the facility and equipment. Two employees will be added immediately, with further hires in coming months as needs dictate. Established in 1923, Eberl Iron Works serves markets across the Northeast. Its manufacturing and distribution businesses include custom metal fabrication, Unistrut metal framing products, traffic safety products, rooftop support systems and systems installation. Cousins John C Eberl and Nora E Eberl, chief financial officer, represent the third generation of family ownership.

The Erie Canal Harbor Development Corporation is developing Buffalo's Canalside on 21 acres at the western end of the Erie Canal in a public-private initiative to revitalize Western New York's waterfront. The total investment is expected to be about \$460 million. The project includes office and retail space, restaurants, a children's museum, bike trail amenities, a boat and kayak launch, and parking improvements. This is in addition to the recently completed \$5 million public park next door at the East Canal project.

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 noteworthy news to [ESB1894@gmail.com](mailto:ESB1894@gmail.com).

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# Snowflake Science

## By Kate Bannan

We've all heard that no two snowflakes are alike, but what do we really know about them? Snowflakes always have six sides, their form and shape depend on temperature and moisture -- and they may have also inspired a pathway to a new alternative source of energy!

Physicists working on the National Spherical Torus Experiment (NSTX) at the Princeton Plasma Physics Laboratory are using a device called a "snowflake divertor" to solve one of the grand challenges of magnetic fusion research: reducing the effect that plasma has on the walls of the fusion machine, a "tokamak." By using a snowflake divertor, a novel magnetic divertor named for its shape, scientists have reduced the interaction between hot plasma and the cold walls surrounding it. This helps address the challenge of how to reduce the effect of the extremely hot plasma on the tokamak's walls.

When heat escapes from the confined plasma, it can erode the machine's walls and contaminate the plasma. The divertor improves the heat handling interface, and therefore the performance and lifetime of the plasma. Reliable control of the plasma will be necessary for fusion energy to be an

alternative source of energy. If we can solve fusion's challenges, we could have an abundant, domestic and reliable source of clean energy.

You can find out more about snowflakes, tokamaks and fusion via Science Accelerator, a gateway to science, including R&D results, project descriptions, and accomplishments, and resources from the Office of Scientific and Technical Information ([www.osti.gov](http://www.osti.gov)).

Article courtesy of the United States Department of Energy ([www.energy.gov](http://www.energy.gov)).



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# The Science Behind Seasonal Sayings

By Tara Pfarner

We're all familiar with those seasonal phrases related to the weather and other effects of Mother Nature. But where did they come from, and is there any truth to them?

**“March comes in like a lion and goes out like a lamb”**



In theory, the wild winter weather should die down as the month marches on. But is there any truth to this phrase? Well, it's in the stars, so to speak.

As March begins, the constellation Leo (the lion) is crossing toward the meridian. As the month progresses, Aries, the ram, begins to rise.

There have been a couple of informal studies that looked at the weather on March 1 vs. March 31 of the same year, and they have found that, yes, the average temperatures are generally higher at the end of the month, which is to be expected as we move towards summer here in the northern hemisphere. There was little correlation seen with respect to precipitation and wind speed.

Like that rodent who looks for his shadow in February, this phrase is essentially just a saying to give those of us who feel worn out by the seemingly non-stop winter a little more hope that spring is just around the corner.



**“April showers bring May flowers”**

This delightful little ditty reminds us that even unpleasant things can bring bright results if we exercise enough patience. It also implies that April is one of the rainier months. However, historical weather data for

the Western New York area points to September as the wettest month of the year, followed by May. April is the time when (hopefully) winter's snow is beginning to change over to rain, melting all that is frozen and brining on our ubiquitous muddy season. The temperature continues to rise steadily, and animals emerge from their winter hiding places (as well as some humans). Common sense tells us that this natural progression of events will lead us to flowers, placing some truth, however obvious, in this statement.



**“Spring Fever”**

Spring fever is characterized as a lazy or restless feeling at the onset of spring. This vague definition makes it difficult to investigate, but there may be some science behind it after all.

Spring fever symptoms usually occur in mid-March to mid-April, and may include weariness, sensitivity to weather changes, dizziness, irritability, headaches, aching joints, and a “lack of drive” in some people (the “lazy” portion of the definition); and an increase in energy and vitality in others (restlessness). Regardless of the scenario, hormone balance may play a role, in that serotonin, the “happiness hormone” whose production depends on daylight, becomes depleted in the body over the winter, making it especially easy for the “sleep hormone” melatonin to take over. As the days get longer, our hormone levels readjust, but this changeover can put a strain on the body, which manifests in some people as a feeling of tiredness. Others may simply feel more energized with the sunshine and fresh air.



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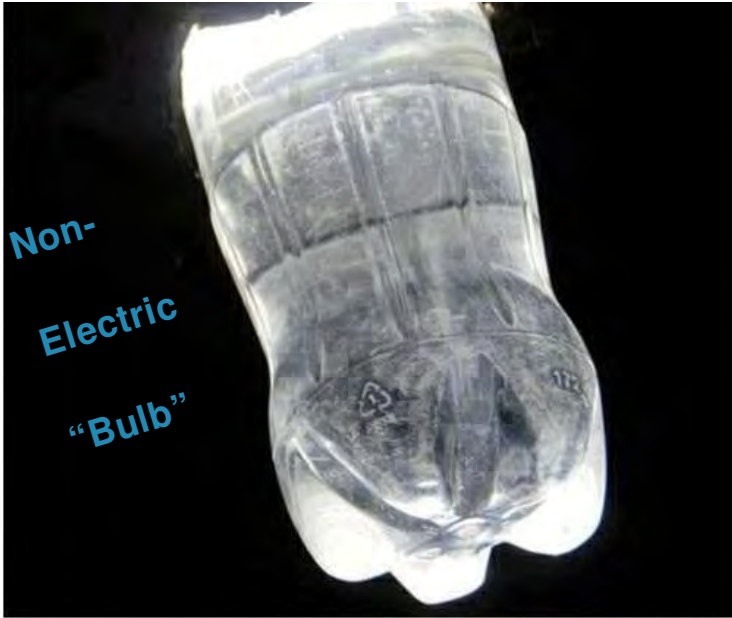
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# Unconventional Car: No Engine, Transmission, Differential

By Marlene Cmons

This car has no engine, no transmission and no differential. It weighs half as much as a conventional car. Each of its four wheels has its own built-in electric battery-powered motor, meaning the car has the ability to make sharp turns and change direction very quickly. Without an exceptional traction and motion control system, however, this car would be quite difficult to drive, providing a driving experience vastly different from anything else on the road, and almost certainly more dangerous. This is where Junmin Wang's expertise comes in.

Wang, assistant professor of mechanical engineering at Ohio State University, and his team are designing algorithms for the vehicle's onboard computer that will calculate and ensure motion control to keep the car stable and operating smoothly. The system, which receives and analyzes input data 100 times per second from the steering wheel, the gas pedal and brake, works out how each wheel should respond. "Without it, the car is quite difficult to drive because the wheels are not coordinated," says the National Science Foundation (NSF) funded researcher, who also directs the university's vehicle systems and control laboratory. "You feel like you are driving something uncontrollable. You could flip over, or travel along an undesired path, or cause a crash. But when the 'controller' is active, based on feedback loops, the vehicle motion can be controlled, just as the driver expects." With a safe and reliable control system, this new electric vehicle ultimately should make the perfect in-city car. It's efficient and maneuverable - and has no emissions. Because it is all electric, "you can use wind power or solar power, and contribute toward reducing our dependency on fossil oils," Wang says.

The computer calculates exactly how much torque the car needs for each of its four wheels. Moreover, because each wheel is independent, "one wheel can be doing the braking, while another is doing the driving," Wang says. "The computer gets signals from the driver from the steering wheel and pedal positions, then calculates the desired speed, or vehicle motion, based on a mathematical model."

Wang's work on the car began in 2009 with a grant from the Office of Naval Research Young Investigator Program. In February 2012, he received an NSF Faculty Early Career Development (CAREER) award, which 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. He is receiving \$400,000 over five years. As part of the grant's educational component, Wang's lab hosted a summer program for high school students where, among other things, the teenagers disassembled and reassembled radio-controlled toy

electric cars to increase their understanding of their mechanics. Additionally, students from the Columbus Metro School, a public STEM (science, technology, engineering, math) high school open to students from around the state, participated in research internships on the experimental car in Wang's lab. Wang's research also receives funding from the Honda-Ohio State University Partnership Program and the Ohio State University Transportation Research Endowment Program.

The experimental car weighs a little more than 1,750 pounds, which makes it energy efficient. The researchers retrofitted a commercially available utility terrain vehicle chassis and removed the engine, transmission and differential, then added a 7.5 kW electric motor to each wheel and a 15 kW lithium-ion battery pack. A single electrical cable connects the motors to a central computer. This type of car design, where each wheel has its own individual motor, is known as "four wheel independently actuated." The researchers tested the car and its controller on normal road conditions at the Transportation Research Center in East Liberty, Ohio, an independent automotive site for vehicle crash, emissions and durability testing. On roads with good conditions, the car followed a driver's "desired" path within four inches. To see how it performs on slippery roads, they brought the car to an empty west campus parking lot on a snowy day. The car maneuvered with an accuracy of up to eight inches, and the vehicle traction and motion control system prevented "fishtailing" through independent control of the left and right sides of the car.

The researchers, including doctoral student Rongrong Wang, described the car's ability to follow a specific trajectory in a paper published in January 2013 in the journal *Control Engineering Practice*. Wang can't yet estimate the mileage for a single charge, since the car only has been driven during experimental testing. But he says the car provides "about 8 to 10 hours of driving on a single charge, although not continuously."

Wang thinks it will take another five to ten years before the car is ready for commercial use. The researchers still must fine-tune the computer algorithms and add more safety features. Wang says it is difficult to compare their test results to a conventional car, since the latter's maneuverability is limited by the transmission and differential systems that link the wheels together mechanically. Nevertheless, he predicts that, ultimately, the research will produce an electric car that will be clean, fuel-efficient and "handle better than typical conventional cars," he says.

Courtesy of National Science Foundation



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# Raising the Bar

## By Tim Hillegonds

It might be easy to look at the rigging gear stacked up inside a crane company’s shop and potentially overlook the risks associated with below-the-hook lifting devices. After all, there are employees to manage and job safety requirements to meet, as well as insurance certificates that need to be requested. Even when unintended, companies can compromise on safety issues pertaining to lifting devices such as spreader bars.

ASME B30.20-2010, the standard for below-the-hook lifting devices, defines a below-the-hook lifting device as “a device used for attaching loads to a hoist. The device may contain components such as slings, hooks, and rigging hardware...”

The spreader bar, a frequently used below-the-hook lifting device, is commonly utilized when it’s necessary to protect a load from rigging materials and enable multiple pick points that ensure a certain sling angle is maintained throughout the hoist. According to Sam Meyer, vice president, Marco Crane & Rigging Co., Phoenix, AZ, they are an essential piece of lifting equipment. “A large portion of our work requires some type of spreader bar,” said Meyer. “I would estimate over 60 percent of our jobs require one.”

Spreader bars have long been a critical piece of lifting equipment. Bill Smith, former crane operator and executive vice president of risk mitigation for NBIS, a heavy equipment program underwriter based in Atlanta, GA, spends a great deal of time walking through crane yards on audits and still sees spreader bar practices that make him grimace. “There are times where we see old steel piping and I-beams that have been welded for one particular job or one-time use,” Smith said. “They might be a quick fix, but the problem is that they aren’t properly engineered, welded, rated or load tested. I saw it in the 1970s and I still see it now. Companies that do that are looking for trouble.” What Smith means is that spreader bars – just like slings, hooks and booms – need to adhere to certain standards, both during the manufacturing process and when they’re being used. According to B30-20-1.2.2 Construction (10) “The manufacturer shall verify that structural and mechanical lifting devices are designed by or under the direct supervision of a qualified person. The design shall be in accordance with ASME BTH-1 and shall consider the stresses resulting from the application of rated load plus the weight of the lifting device.” When pipes, I-beams, or any other material that’s just lying around the crane yard is welded on and turned into a spreader bar, there’s a significant amount of risk that’s being created.

These temporary solutions – which certainly don’t adhere to the recommended standards and load-testing requirements – are a proverbial crapshoot. The dice might roll in your favor once, but the next time could be a

disaster. “Spreader bars should always be purchased or manufactured with engineering behind it to meet current OSHA safety factors, which are three to one for yield,” says Meyer. “The bar should be clearly labeled with the weight of the bar, length and safe working load. They should also be inspected prior to use for any damage.”

Meyer’s point is well taken. There’s a certain level of inspection and knowledge that’s required to be able to properly use and select spreader bars. And since spreader bars play an important role in many of today’s lifts, the National Commission for the Certification of Crane Operators (NCCCO), an organization dedicated to improving performance standards through the independent assessment of knowledge, has developed a certification program that tests a candidate’s level of proficiency relating to spreader bars. These certifications are obtained by passing the Rigger Level 1 and Rigger Level 2 exams. “[Using spreader bars] is a common crane and rigging practice, and the committee felt it was important to test that knowledge set,” said Joel Olivia, manager, program development and administration for NCCCO. “The NCCCO rigger exams cover a broad scope of rigging activities, including the identification, selection, inspection and execution of rigging, while using safe rigging practices and applications throughout. Each of these areas is applied to spreader bars, along with slings, hardware and other rigging devices.”

When it comes to testing, Tandemloc, Inc., a designer and manufacturer of lifting equipment based in Havelock, NC that has produced thousands of spreader bars and other lifting products since 1984, believes strongly that it is incumbent upon the manufacturer – for ethical, professional, and safety assurance reasons – to proof-test every below-the-hook lifting device. Tandemloc’s president, John DiMartino, explained how their belief has influenced the structure of their manufacturing plant. “We have a dedicated testing department that is manned full time, and have built a very large, very capable, patented test stand to handle the large volumes we generate. From 2007 through 2012 we conducted and recorded an average of 3,521 tests annually.”

But it’s not just testing that Tandemloc is concerned with, it’s finding new ways to approach old problems, as well. One of Tandemloc’s innovations, the telescopic spreader bar, offers a wide range of minimum and maximum lengths in convenient increments of only a few inches. However, unlike some telescopic spreaders, the Tandemloc spreader bar maintains the load rating no matter how much the spread increases.

DiMartino explains that telescopic spreader bars are simply more versatile. “A traditional or ‘fixed’ spreader bar is designed for one spread and

Continued on page 19



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AND THERE WAS SOME SYMBOL...

DIFFICULTY TO REMEMBER: **HARD**

correct horse battery staple

FOUR RANDOM COMMON WORDS

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THAT'S A BATTERY STAPLE.

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DIFFICULTY TO REMEMBER: YOU'VE ALREADY MEMORIZED IT

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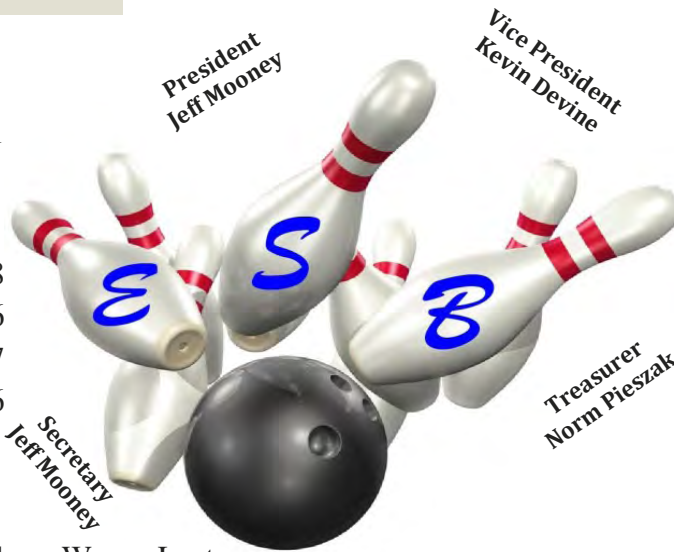
## BOWLING LEAGUE

### Cross Alley w/ Handicap

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### Team Standings Week 21

	Won	Lost
1. K & K TREATS	110	79
2. OUTCASTS	107	82
3. DEAD LOADS	101	88
4. ARCHER IMAGING	100	89
5. CAD/CAMS	98	91
6. PINHEADS	96	93
7. TRANSMITTERS	95	94
8. SPLIT HAPPENS	86	103
9. PROTRACTORS	82	107
10. LOOSE CANNONS	70	119

### Individual High Ave Female

Julia Hay	185.86
Kathy Kovacs	139.78
Deb Restall	134.63

### Individual High Ave Male

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Tom Mann	205.94
John Grembowicz	205.49

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# Tips for Engineering Students

By Joe Mayer

So here I am, a senior in chemical engineering, working what seems like every hour of each day toward a degree and a future. Well, it just so happens that all these years spent in school have not left me without some idea of how I could have done it all better, and what I believe I did right. This semester, I constantly find myself thinking of things that I feel young engineering students would (or should) probably find valuable. So here it is; my list of tips for engineering students!

First and foremost, choose an interesting major! Among the things I find in common with many freshmen in engineering, is that they have no idea what they want to do with their education. The end result of this seems to be either staying in a field that they don't really like at all, or dropping out of engineering altogether. Both of these things can be easily avoided by simply taking the time to learn more about the various field of engineering. This might take some time and effort, but as a first semester freshman who really would like to become an engineer, your field is the most important choice you will make during school. Choose a field of engineering that sounds fun to you!

Take an active interesting in learning. In order to be successful in engineering you are going to have to take on the responsibility of learning the material for yourself. There are going to be classes where you are almost literally going to have to teach yourself everything. Some students just don't learn well from some professors; the successful ones in this group get over it and study harder or get a tutor for that class. To pass many of the classes in an engineering curriculum you are going to have to do more than just show up to lecture and copy down notes off the board. Here is my three step plan to successful learning outside of class:

1. **Read the book!** The book is where you will find most of the information you are going to need to know for the homework and exams. Don't just glance over the book or skim it while you do the assigned problems. Make notations in the books, derive the equations as they appear, and read actively! The best notes in the world won't do you any good if you don't understand the concepts behind them.
2. **Talk about the material with someone.** Whether it is your roommate, friend, professor, or rival, talk about the material you are learning with somebody else. Help explain it to them and have them explain it to you. This will increase your understanding of the material immensely.
3. **Determine what you don't know.** Never think that you know it all, because you don't. There is always something that you do not know or fully understand. The best way to narrow down what you need to study is by determining the areas you are having problems with. Doing old exams or extra homework assignments can help you asses this.

Whether you think class is enough for you or not, go talk to the professor. Many professors have office hours, most of them answer emails, and all of them come to class. This means that there is plenty of opportunity to talk to your professor and have all of your questions about the material answered. Most professors like to meet their students and they really do enjoy diving into the lecture topics on a deeper and more personal level. However, there are some important things to keep in mind when speaking with a professor. Whatever the reason is, wherever it came from, do not go in and talk to a professor with a bad attitude. You are not likely to learn anything from them, and they probably will not be so pleased to talk to you. Always be positive and eager when you are going in to ask questions, and be certain when you are there to voice concerns. Arrogance about the subject will not get you anywhere. Remember, they are the ones teaching this subject in college, you are the one there to learn from them. Always be humble when you are talking to your professor, as they do have some control over your future.



Keep your books. If there is one thing I learned during my internship experience it's that you should absolutely keep your engineering books. There will be some point during a future class, internship, or job that you really would love to reference something out of one of your school books. This is engineering; these books are valuable for more than just passing a class. A lot of this information actually cannot be found readily on the internet. As an engineering intern, I was using my own books and the books my manager kept from college almost every day. You might get some money by selling your books back, or save some money by renting, but these are not routes I suggest. Buy your books, use them well, annotate them, and keep them!

Work on your resume. Your resume is a reflection of you as a professional. Make sure it looks good and includes only relevant information. It is important to utilize as many resources as you possibly can to make your resume the absolute best it can be. You are going to want to participate in clubs, events, and anything else that might be considered leadership experience during your college career to help boost your professional profile as a student leader. Get an internship or coop in your field of interest as soon as you can. Practical, educational work experience is actually a requirement to be considered for full time employment in many companies. If you want companies to take you seriously, you must take yourself seriously. Everything you do during your career as a student in engineering should be leading you toward full time employment with a company of your choice. The decisions you make today affect the outcome of tomorrow.

Joe Mayer was a chemical engineering student at Iowa State University when he wrote this article for collegeinfo geek.com. The article can be found at <http://collegeinfo geek.com/guest-post-tips-for-engineering-students/>

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## MEETING MINUTES

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**Attendees:** Officers: Closs, Plizga, Scofidio  
Board Members: Bandriwsky, Masse, Mooney, Papaj  
Members: SanFilippo

**Call to Order:** President Matt Plizga called the meeting to order at about 6:15pm

**Minutes:** The minutes of the January meeting were reviewed and approved.

### Committee Reports

**Advertising:** No report

**Audit:** No report

**Bowling:** There will be a bowling event on March 12

**Bylaws:** No report

**Education:** No report

**Endowment:** No report

**Entertainment:** Robin C. is working with the Science Museum for Engineers' Week. Presenter(s) needed on 2/19 from 1:00-3:30 p.m. NASCC (Steel) Conference will be held in Toronto 3/26-3/28. Tour of Catholic Center has been rescheduled to 3/5 due to weather.

**Fundraising:** No report

**Golf:** No report

**Historian:** No report

**Media:** Marco S has been updating the ESB website. Page was added for golf. Scholarship page was added, but has not been activated yet.

**Newsletter:** No report

**Nominating:** Ron P has been looking for member candidates. Two people may be interested in running for board positions.

**Scholarship:** No report

**Scholarship Run:** Kickoff meeting is scheduled for 2/20

**Sunshine:** No report

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Continued from page 15

therefore is limited in use for lifting a variety of objects," he says. "Telescopic spreaders, as the name implies, offer a multitude of spreads allowing the user a greater range of lift points."

When I asked Sam Meyer of Marco Crane & Rigging what he looks for when purchasing a spreader bar, he stated a number of things, including how frequently it would be used: "When purchasing a new spreader bar, we consider how often we would use it and the safety it will bring to our operations. Does this particular bar reduce our exposure of loss due to injury or property damage? If it's a large, expensive bar, we would also consider how much revenue might be gained by having that particular accessory in our inventory." Other factors he mentioned were how much revenue they could produce using the bar and which spreader design would give them the highest capacity with the lowest amount of weight.

Though spreader bars are just one part of a complicated and demanding daily crane operation, it's important to know what issues revolve around their manufacture and use. By knowing the issues and striving to act in accordance with the standards, we can continue to perpetuate best practices and overall crane safety.

Tim Hillegonds is the founder of Thrive Creative Services LLC, a creative copywriting agency located in Chicago. Learn more by visiting [www.thriveCS.com](http://www.thriveCS.com).

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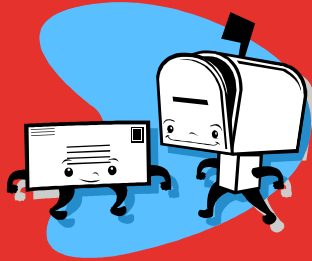
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Earthprobe Rigs	Groundwater Treatment
Hand Augers	Emergency Spill Response

3553 Crittenden Road, Alden, NY 14004



<— Joe Ott volunteered at the Buffalo Museum of Science for Engineer's Week. There were 3-5 kids at the table all day from 11am-3pm. That's a lot of potential future engineers learning about engineering!

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