



THE AMERICAN SOCIETY OF

Central Oklahoma Section Newsletter
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The Central Oklahoma Section Newsletter is nominally published nine times per year to convey monthly meeting dates, meeting topics, section activities, and/or other ASME information to its membership.

***** **JOINT MEETING WITH THE OKLAHOMA SWE SECTION** *****

PROGRAM: Earthquakes in Oklahoma

SPEAKER: **Dr. G. Randy Keller**, Geology Professor, University of Oklahoma and Director, Oklahoma Geological Survey



DATE: Thursday, December 4, 2014

LOCATION: OSU-OKC Campus, 900 N. Portland, Okla. City Business Technology Building, Room 304A

Dr. G. Randy Keller will present a comprehensive overview of Oklahoma seismology and recent earthquakes. Included is discussion of recent debates regarding possible man-caused earthquakes such as hydraulic fracturing and water (disposal) injection. Some of the questions to be addressed are:

Are all these earthquakes unusual? HINT: Yes the number of earthquakes felt in 2009, 2010, 2011, 2012, 2013 and currently in 2014 are unusual. The frequency of earthquakes has increased in Oklahoma

Is it better to have a large quantity of small earthquakes like we've had? HINT: The increase of magnitude of 3.0 and greater earthquakes indicates a greater possibility of having a magnitude 4.0 or greater event in the future

These and many more earthquake-related topics and questions will be discussed at our meeting! We welcome the Oklahoma Section of the Society of Women Engineers (SWE) who will be joining us!

Please join us for this meeting on December 4! PDH certificates will be available for attendees.

Time: 5:30 - 6:00PM: Meet & Register at OSU-OKC meeting site.

6:00 – 6:30PM: Catered Meal

6:30 – 6:45PM: Introductions & Section Business

6:45 – 7:45PM: Program by Dr. G. Randy Keller

Cost: \$10 for ASME Sr. members and Guests, \$5 for ASME Student Members. Please place your reservation with Albert Janco (Ph: 405-848-1991 (leave message); e-mail: JANCOA@asme.org) **by Tuesday, December 2 at NOON.** PLEASE furnish the name of each person attending and their affiliation (ASME, SWE, IEEE, etc). If a student, please indicate school/university. If a P.E. please indicate if a PDH certificate is desired.

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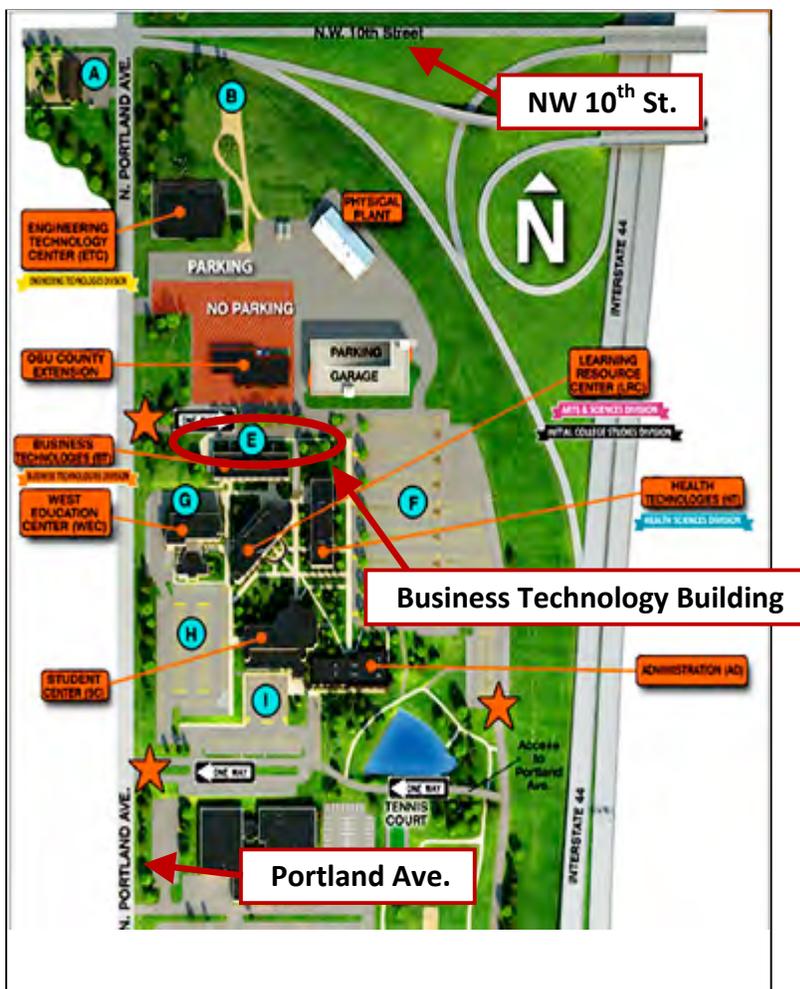
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ADDITIONAL NOVEMBER-DECEMBER MEETING INFORMATION

The **Oklahoma Geological Survey** is a state agency for research and public service located on the Norman Campus of the University of Oklahoma and affiliated with the OU College of Earth and Energy. The Survey is chartered in the Oklahoma Constitution and is charged with investigating the state's land, water, mineral, and energy resources and disseminating the results of those investigations to promote the wise use of Oklahoma's natural resources consistent with sound environmental practices.

Since 2006 **Dr. Keller** has served as Professor and E. L. McCollough Chair in Geophysics at the University of Oklahoma. He has served as the Oklahoma Geological Survey Director since 2007. Prior to that he was a distinguished geophysics Professor and Department Chair at the University of Texas-El Paso for many years.

Dr. Keller's academic and professional experience spans back to 1970. He holds memberships in several geology-related professional societies and is/has served as editor of several technical journals and books. He has authored or co-authored over 250 technical journal articles and has mentored numerous masters- and doctoral-level students.



History of the Oklahoma Geological Survey Observatory near Leonard, OK

In 1960 the Jersey Production Research (Oil) Co built the original Observatory. This location was selected because it was seismically and magnetically quiet (i.e. no heavy industrial and traffic vibrations) and was in driving distance from their Tulsa headquarters.

In 1965 Jersey gave the Observatory to OU in which it functioned as a small department in the College of Arts and Sciences.



Later, through generosity of the Sarkys Foundation, the quarter section (160 acres, 64.8 hectares) of leased land at the site was purchased for the State of Oklahoma. In 1976 a Nuclear Regulatory Commission grant through the Oklahoma Geological Survey provided for a statewide network of remote seismographs. Then in 1978, the Observatory became part of the Oklahoma Geological Survey, and was named the "Oklahoma Geophysical Observatory". It was soon renamed the "Oklahoma Geological Survey Observatory".

During 1978, the last photo paper seismogram drum recorders were converted to heat writing (and some to ink writing). During 1989, a Dept. of Energy grant through Lawrence Livermore National Laboratories reworked a 760 meter deep

borehole and placed vertical motion sensing seismometers at depths of five, 432, and 748 meters below the surface. Triggered digital recording was provided near the borehole winch. Digital data was analyzed on the Observatory's first Unix workstation, a SUN 3/50.

On June 1, 1990 Bush and Gorbachev signed a protocol that called for building a Soviet Nuclear Monitoring site near the Observatory Building. The Soviets (later Russians) were allowed to have a seismograph station there to record seismic waves from American, and an occasional British, underground nuclear blast in Nevada.

Seven years later, after Russian-UK-US Nuclear testing ended, Russia released the site, and the United States turned the dollar-per-year leased land back to Oklahoma.

Read more at <http://www.ogs.ou.edu/pdf/Observatoryhist.pdf>

Increasing Number of Undergrads Earn Engineering Degrees

(courtesy *PE Report* publication, October 2014)

The number of U.S. students who graduated with engineering bachelor's degrees increased by 6% to reach 93,360 in 2013, according to the American Society for Engineering Education. The growth in the number of engineering bachelor's degrees awarded is expected to continue its upward trend because enrollments increased by nearly 8% from 2012 to 2013.

Mechanical and civil engineering remained the top disciplines for 2013 with 21,707 and 12,464 degrees awarded, respectively. Some smaller engineering disciplines also experienced significant increases in bachelor's degrees awarded in 2013. The number of civil/environmental engineering degrees increased by 27% from 2012, with 953 degrees awarded. General engineering degrees increased by 30%, with 1,554 degrees awarded.

Several engineering disciplines are projected to see an increase in the number of bachelor's degrees awarded over the next few years due to enrollment growth. Petroleum engineering experienced the greatest growth, with a 23% increase in enrollment. Among the engineering majors experiencing enrollment growths of 7%–15%: biological and agricultural engineering, biomedical engineering, chemical engineering, civil/environmental engineering, and computer science (inside engineering).

For the fifth straight year, women continued to earn a growing percentage of engineering bachelor's degrees. In 2013, women earned 19.1% of engineering bachelor's degrees, up from 17.8% in 2009. Women also earned 23.9% of engineering master's degrees, an all-time high. Below are the numbers by discipline:

Most Engineering Bachelor's Degrees Awarded in 2013:		
Electrical: 10,662	Computer Science (within Engineering): 8,184	Civil: 12,464
Biomedical: 4,709	Industrial/Manufacturing Systems: 4,272	Chemical: 7,717
Computer: 3,906	Aerospace: 3,595	Other: 4,260

Call for Presentations

2015 Oklahoma Engineering Conference

June 18-19, 2015

Skirvin Hotel, Downtown Oklahoma City, OK

DEADLINE TO SUBMIT PROPOSALS: January 15, 2015



The Oklahoma Society of Professional Engineers is now accepting workshop proposals for the 2015 Annual Engineering Conference. The Conference consists of training sessions and workshops, general interest sessions, social events and networking opportunities for members and non-members of OSPE. The attendees will include professional engineers from all cities and counties in Oklahoma as well as engineers with diverse background and work environments.

Visit <http://www.ospe.org/oklahoma-engineering-conference> for the OSPE website offering more detailed information and instructions on submitting your proposal.

NEWS ITEMS OF INTEREST

Where Energy Companies Test What'll Happen if Their Oil Spills

By Omar Mouallem , 11/13/14 included in the *ASME SmartBrief* publication, 11/14/14

(see <http://www.wired.com/2014/11/c-fer-technologies/>)

Oil pipeline leaks are bad. And that means pipeline operators and companies developing leak-sensing technologies are in a bind—they need to test their inventions without actually letting gunk seep into the earth. So they turn to a Canadian company called C-Fer Technologies. “There are few spots where you can dump oil on the ground,” business development director Brian Wagg says. “We're giving them a place.”

That place is a 24-foot length of pipe riddled with adjustable leak ports and embedded in a tank of dirt. The pipe bristles with gear the firms are testing—fiber-optic temperature sensors, hydrocarbon-detecting cables that “taste” for leaks, whatever. C-Fer engineers press a button to trigger a leak, letting diluted bitumen (one of the products pumping through the Keystone systems) or any other liquid hydrocarbon seep through specified ports. Manufacturers from all over spend a week at a time here, assessing their leak-assessment tools. Energy company execs are watching too—so they can gauge what's next in the pipeline.



Hydraulic Fracturing's Greener Tint

by John Kosowatz, Senior Editor, ASME.org, November 2014

(see <https://www.asme.org/engineering-topics/articles/energy/hydraulic-fracturings-greener-tint>)

The overwhelming success of hydraulic fracturing for oil and gas in the U.S. is proven in the results. U.S. crude oil production is at its highest level in three decades, reports the U.S. Energy Information Administration, with output rising to 8.97 million barrels per day largely because of fracking in the Bakken field in North Dakota and the northern Great Plains. Natural gas production from the Marcellus formation in Ohio, Pennsylvania, and West Virginia pushed U.S. output to an all-time high this summer, numbers solely attributed to fracking and horizontal drilling. But the heavy industrial footprint put down by fracking rigs continues to draw opposition, despite the technology's track record in tapping previously inaccessible sources of fossil fuel.

Developers now may have an answer to some of the environmental issues, as one well-driller has developed cleaner technology to power fracking rigs. U.S. Well Services LLC, Houston, claims its patented Clean Fleet technology has already decreased air emissions by 99%, significantly reduced noise pollution, and saved operational costs of \$40,000 per day at sites in the Marcellus Shale Play in West Virginia. The performance is based on equipment using field gas as a fuel, rather than commonly used diesel generators.

“If you run on natural gas, you save quite a bit on fuel costs,” says Jared Oehring, director of technology for U.S. Well Services. “And there's a lot less noise,” about a 70% to 75% reduction from a typical diesel operation, he notes.



Clean Fleet is a mobile, fully electric hydraulic fracturing system. Image: U.S. Well Services

A First: Oehring says the equipment is the industry's first fully mobile, fully electric hydraulic fracturing system powered entirely by natural gas. Diesel engines are replaced with electric motors and turbine-generators. Because natural gas is a much cleaner-burning fuel, nitrogen and carbon emissions are reduced by 99%. Fuel costs plummet using field gas, reducing operating costs by 80%, according to the company.

The first of the new equipment is being used by Antero Resources in West Virginia and company officials say they have signed long-term contracts with U.S. Well Services for another unit. Oehring says the equipment has been in development for about two years. "We had to start from scratch," he says. "This is not a retrofit."

Typically, each fracking unit has been powered by a 2,250-hhp diesel engine, notes Oehring. "Basically, we've pulled the engine off and the transmission...and put on an electric motor with variable frequency drive," he says. "We mounted the motor differently. There's a longer drive shaft. We've crammed a lot more [equipment] into a smaller space."

The 14,500-psi fracking units are built to U.S. Well Services specifications by Stewart & Stevenson, Houston. The first of the units has been operating since July and the second is to be delivered in the first quarter of 2015, according to the company.

The equipment's reduced emissions are noteworthy although Oehring points out that mobile off-highway power generators fall in between the cracks of federal and state regulatory rules. "We're in a unique position," he says. "We're a generation ahead of where they're at." But he believes that Clean Fleet's operations will go a long way to satisfy critics.

Opposition: Still, hydraulic fracturing continues to meet sometimes stiff opposition, and in some places where it is unexpected. Voters in Denton, TX, where the technology was first tested and proven in the Barnett shale formation, on Nov. 5 approved a ban on fracking. Opponents were largely residents upset that their homes were being encroached on by noisy, dirty industrial work, and its associated heavy truck traffic.

According to official results, the ban passed with more than 58% of more than 25,000 ballots cast. The Texas Oil & Gas Association has filed for an injunction, claiming a ban is inconsistent with state law, according to published reports. There are about 270 wells in Denton, some 30 miles north of Dallas, most of which produce natural gas. Most Texas crude is produced through hydraulic fracturing in the Eagle Ford and Permian fields.

Quieter: What could give the Clean Fleet equipment a further boost is its quieter operations. "There are regulations on noise control and a traditional fleet cannot meet them without building sound walls. We can operate without disturbing neighbors," Oehring claims. He also points to reduced truck traffic because natural-gas powered equipment eliminates the need for diesel shipments. In West Virginia, the company boasts 25 diesel truck deliveries to the well site were eliminated for an average horizontal well completion, reducing traffic within communities while mitigating associated fire hazards.

Other Developments: In addition to Clean Fleet technology, other firms have developed innovative equipment. In 2013, Halliburton and Apache Corp. announced a dual-fuel system to power hydraulic fracturing pumps using a blend of liquefied or compressed natural gas and diesel. They teamed with Caterpillar to adapt the manufacturer's Dynamic Gas Blending engine technology to the fracking system. Caterpillar's Solar Turbines unit also supplies Clean Fleet rigs with electricity using Taurus 60 mobile power units, each of which can produce upward of 5 MW of power.

3D Printing: 5 Questions with Stratasys CEO David Reis

by Chitra Sethi, Managing Editor, ASME.org

(see <https://www.asme.org/engineering-topics/articles/manufacturing-processing/5-questions-stratasys-ceo-david-reis>)

The global 3D printing market is expected to grow from \$3 billion in 2014 to \$21 billion by 2020, according to industry research. As 3D printing continues its exponential growth trajectory, what will be its future impact on industrial manufacturing?

ASME.org caught up with David Reis, CEO of Stratasys, one of the key players in the 3D printing market, at a media event held in New York recently. Reis spoke about the rapid growth of 3D printing and how it enables cost and time savings in manufacturing including industries like industrial, aerospace, automotive, medical devices, and consumer products.

Approximately 80% of fused deposition modeling (FDM) system owners in the U.S. are using the technology in augmented manufacturing for jigs, fixtures, and end-use parts application, said Reis in his presentation. Using 3D printing, “organizations can realize 40-90% reductions in lead times and 70-90% cost savings,” he added.

An abridged version of our interview with David Reis is below.

Q1: 3D printing has been used for prototyping in manufacturing for almost three decades. Which other areas of industrial manufacturing is it being used in now?

Reis: The last 30 years since the industry has established, our main focus was rapid prototyping, both for design and functional testing. In the last few years, we have been rapidly penetrating manufacturing in two areas. One of them is in the production of end-use parts, which is basically replacing traditional manufacturing processes, such as injection molding and machining with additive manufacturing. The other space we are penetrating is what we call augmented manufacturing, which is basically the manufacturing of tools that aid the manufacturing process. It could be guides, jigs, and fixtures, which assist people on the manufacturing floor to manufacture products.

Q2: 3D printing has the potential to disrupt several industries. Is there any application that you think still needs attention and could benefit from additive technology?

Reis: I think there is a great opportunity in the medical space. Already today, there are some companies around the world, which are printing replacement parts for “body” like knees, hips. There are great opportunities, and nevertheless, it will require a lot of research and proof-of-concept in clinical validation of this area.

Q3: There some concerns about the environmental impact of 3D printed products. What's your opinion on that?

Reis: I think the nature of additive manufacturing is that it's more friendly to the environment than the traditional manufacturing processes. Most of the traditional manufacturing processes are subtractive, which means you take bulk of plastic and you subtract plastic from it to get the end part. In additive, you are building bottom up, so you are using only the plastic that you need. So by definition, you are using less plastic and the process will be consuming less energy.

Q4: With so many products now being developed using 3D printing, are standards required?

Reis: The use of additive manufacturing to manufacture products is relatively small but rapidly growing. Most of the use of additive manufacturing today is in rapid prototyping and augmented manufacturing. The production of end-use parts in each industry will require compliance with current standards. A good example could be aerospace. If you want to replace a flying part in the airplane, you have to comply with standards in aerospace. Likewise in medical.

Q5: What is the future outlook for 3D printing and do you think 3D printers will someday become as common as the microwave in homes?

Reis: The outlook is great and the projection is that this industry is going to grow dramatically over the coming decade. The numbers are talking of growth from \$3-3.5 billion in 2014 to \$20 billion in 2020, which is only seven years from now. Whether I think 3D printing will become a household tool for manufacturing parts at home, I am a little bit more pessimistic about it. I think it will take more than a few years to get there, but we might be able to see it 20-30 years from now.

Chair's Corner

As acting Chairperson of our ASME Central Oklahoma Section, I have a very IMPORTANT question to ALL our members. **Do you want to continue to receive future notices of our monthly Newsletter?** Or, if unable to attend a monthly meeting that you really wanted to see, did you know that you can download the meeting presentation slides for viewing? **Due to some pending changes at the reorganized ONE-ASME, they are discouraging our local section from sending out mass e-mailings to its membership. Instead we are asking all ASME members to join a group page on the ASME.ORG webpage.**

After one navigates to the ASME.ORG webpage you will have several choices of Group Pages you can join. Two groups in particular interest are recommended, the Central Oklahoma Section or the Group Pathways & Support (GPS) networks. The quickest way to navigate to either Group page is to type in either Central Oklahoma Section or GPS in the ASME homepage search box and click on the magnifying glass icon. **Since we will be loading our Newsletters and other announcements on the Central Oklahoma Section Group page, it is recommended that you join this group (save as a favorite?) in order to access all future notices.** You can put in as much (or little) personal information as you wish (your choice). If you are really curious of the MAJOR changes that ONE-ASME is making to our international engineering society - join the GPS Group page for all the pending changes and NETWORKING opportunities available to ALL of our fellow ASME members.

Happy networking and please make plans to join us on December 4th for the presentation on Earthquake Theory & Research by Dr G. Randy Keller of the OU School of Geology & Geophysics. All ASME-Central Oklahoma Section members, students, and guests are welcome to join us.

Tom Betzen, Chair, ASME Central Oklahoma Section

Future ASME-Central Oklahoma Section Events

Date	Location	Program Topic and Speaker
Thursday Dec. 4, 2014	OSU-OKC Campus	Program: Oklahoma Earthquakes
Thursday Jan. 22, 2015	TBD	Joint Program with the Oklahoma AIAA Section
Thursday Febr. 26, 2015	OC Gaylord Student Center, Edmond OK	Joint Engineering Societies Banquet

Please visit our Section website:

https://community.asme.org/central_oklahoma_section/default.aspx

IT'S BEEN REVAMPED. Check event updates and other useful information!