



October 2008; Issue #69

TOPIC: Civil Engineering

Thanks to the [American Society of Civil Engineers \(ASCE\)](#) for sponsoring this issue of the Pre-Engineering Times.

In this issue, you'll find the tools to help your students explore...assess...and experience engineering! From a look into the world of Ken Maschke and his work to build the second tallest building in the world to enjoying a hands-on activity where students will come to understand how torque affects an object and helps an engineer design structures that are safe and sound. Students will learn first-hand how civil engineering is all around them. Enjoy!

EXPLORE...

Find your dream job, meet extreme engineers, watch videos

What Do Engineers Do?**Civil engineers make a difference in the world by...**

- Building amusement parks and roller coasters for people to enjoy.
- Helping to clean up local harbors and restore water quality for surrounding communities.
- Meeting increasing energy needs with computer controlled mirrors that provide solar power for electricity.
- Designing sports arenas and athletic facilities.
- Making buildings safer during earthquakes, hurricanes, and other natural disasters.

Civil engineers work to design and build solutions to ensure the future demands of society. They meet the challenges of pollution, traffic congestion, drinking water and energy needs, urban redevelopment, and community planning. They design roads, bridges, irrigation systems, water treatment plants, transit systems, airports, and much more.

Did you know?

Engineers are some of NASCAR's hottest hires. In a field where .10 second is the difference between winning and losing, people who can interpret math equations, computer codes, and research data; run simulation and test systems; and communicate it to the driver, crew chief, track personnel are definitely in demand. That is just the beginning. Not to mention, that engineers must have a strong understanding of aerodynamics and engine technology. Engineering is a fast paced, ever changing field. Can you keep up? Mechanical engineering can take you anywhere... you can create the most aerodynamic and fuel efficient NASCAR, or you can drive one and compete in NASCAR races such as Ryan Newman and Ashton Lewis, both are NASCAR drivers and both have mechanical engineering degrees.

Salary

The average starting salary for a civil engineer (2007):

Bachelor's	Master's	Ph.D.
\$48,509	\$48,280	\$62,275

More to Explore

Related Articles:

[Drafting and Design Engineering](#)

[Surveying Engineering](#)

[Architectural Engineering](#)

[Roller Coaster Engineering](#)

Extreme Engineer: Ken Maschke

What he Does

Through his work with Thornton Tomasetti in Chicago, Ken has had the opportunity to work on many exciting projects, including the practice facility for the Chicago Bears Football Club as well as working in Denmark with the Danish engineering firm, Leif Hansen. Ken's latest project is designing the structure for the second tallest building in the world, which will be located in Dubai! You can read more about Ken through his blog a <http://blogs.asce.org/bridgingthegap/>

Making a Difference

Ken feels that he makes a difference each day through civil engineering as he specializes in making sure that buildings he designs are structurally safe for public use. Working hand in hand with architects allows them (architect) to explore new shapes and designs through Ken's plans for support of their building model and also gives validity to the project. .

Why Engineering?

While growing up on his family farm Ken always enjoyed building structures on the farm. At the time he wasn't aware that what he was doing was "engineering" until he went to high school. It was there that he participated in a Science Olympiad challenge that he discovered what he knew all along, that he enjoyed engineering! Once Ken started college at the University of Michigan he gravitated to civil engineering because he said "it was BIG and you could drive down the street and see the actual result."

Advice

Ken's advice to students starting out in any engineering field is to get involved in a related engineering society or group while in college. Ken also advised to make a point to get to know your professors and faculty because they can make a big difference when you begin to look for a job.

Hobbies/Free Time

When Ken is not working he enjoys hanging out with his boxer, Roxie and playing soccer twice a week. He also enjoys traveling and skiing when he can. Ken even manages to have time to teach an engineering structures class at the School of the Arts in the Chicago area.

Education

Ken attended Bad Axe High School in Bad Axe Michigan where he grew up. After high school Ken received his degree in Civil Engineering from the University of Michigan.

More to Explore (meet JETS Affiliates)

ASSESS...

Find your strengths, prepare for the future

Coming soon: PathAssess... only from JETS

PathAssess is an online tool aligning students' interests with careers in engineering. Based on the Holland Theory of Vocational Interest and Lent's Social Cognitive Career Theory, students will receive a customized profile relating their interests to engineering careers they may wish to pursue.

EXPERIENCE...

Get active and unlock the mysteries of engineering

Hand-On Activity



Grade Level: 7 (6-8)

Group Size: Variable

Time Required: 3 hours

In this month's activity, [Wimpy Radar Antenna](#), students play the role of an engineering consulting team hired to fix the problem of a poorly designed radar antenna on top of the United Nations Building in New York City. Students are asked to reinforce an antenna tower made from foam insulation, so that it withstands a 480 N-cm bending moment (**torque**) and a 280 N-cm twisting moment (**torque**) with minimal deflection. One class is used to discuss the problem, run the initial bending and torsion tests and graph the results. The following classes are used for design and construction of a sturdier tower, its testing and graphing of the results. Evaluation of the effect of **torsional forces** on objects like supporting beams in buildings or parts of a machine (for civil and mechanical engineers respectively) is extremely important in making sure that a structure or machine does not fail. Understanding how torsion affects an object helps an engineer design structures that are safe and sound.

The [Engineering Pathway](#) Portal to the National Science Digital Library (NSDL) brings together quality engineering education materials for from all over the internet allowing teachers to search all of these documents in a single location. Each month during the year in the Pre-Engineering Times, the Engineering Pathway will highlight one or more engineering activities available on the collection related to the months theme. This month's activity is from the [TeachEngineering Digital Library](#), which is a part of the Engineering Pathway.

For more information on what civil engineers do, visit the [Civil Engineering Education Community Page](#) on the Engineering Pathway.

Wimpy Radar Antenna Activity URL:

http://www.teachengineering.org/view_activity.php?url=http://www.teachengineering.org/collection/wpi/_activities/wpi_wimpy_radar_antenna/wimpy_radar_antenna.xml&rights=true#antenna/header.jpg

JETS Challenge



Each Friday JETS posts a new challenge question. Use these challenges to warm up for TEAMS or NEDC competition, in your classroom for extra credit, or at an engineering club meeting.

Challenge 109 — *On the Radio*

The WBMS radio transmitter is on top of a tower at a height of $H = 200\text{ft}$. It is supported by three sets of four guy wires each on 120° spacing around the base. Each set consists of 4 wires attached to the tower at equal spacing. The top two wires connect to a common anchor located $3H/4$ distance from the tower. The bottom two wires connect to a common anchor located $H/4$ away from the tower.

The Challenge: How many feet of cable are required to support this tower?

Submitting Answers to JETS

E-mail your answer to JETS at challenge@jets.org and enter 'Challenge xx' in the subject line. NOTE: Only those submissions with 'Challenge 84' (enter the actual week's challenge number) in the subject line will be considered for the monthly drawing.

JETS, Inc. – 1420 King Street, Suite 404 – Alexandria, VA 22314 – P: 703-548-5387 – E: info@jets.org – www.jets.org