



March 2009; Issue #74

TOPIC: HVAC & Going Green

In this issue, you'll find the tools to help your students explore...assess...and experience engineering! From a look into the world of Mark Lensen, an Energy Management engineer and his work to help commercial and industrial facilities become more environmentally sustainable to an activity that teaches students specifically about evaporative cooling air conditioning systems. Students will recognize first-hand how engineering is all around them. Enjoy!

EXPLORE...

Find your dream job, meet extreme engineers, watch videos

What Do Engineers Do?**HVAC&R engineers make a difference in the world by...**

- Designing energy-efficient building systems that limit the impact on the earth's natural resources.
- Developing new refrigeration and cooling equipment that is CFC-free.
- Managing a team of engineers responsible for developing an energy-efficient system to provide a comfortable, healthy cabin. Environment for a new aircraft design.
- Creating safe, comfortable indoor air quality.

Your most important challenges will be meeting the requirements of energy conservation and the demands for a clean environment, while designing, installing or operating air-conditioning and refrigeration systems to maintain human comfort or to process and store food. To accomplish this balancing act, HVAC&R engineers must be familiar with all fields of engineering, from electrical and controls to structural and lighting. The chemical combustion process in the boiler and the corrosion in the cooling tower are part of our vocabulary. If we fail in our mission, people can die.

Did You Know?

Currently, buildings are responsible for 40% of all energy consumption. In the United States, residential and commercial buildings account for approximately 40% of the total primary energy use. Heating, ventilation, air conditioning, refrigeration (HVAC&R) and water heating are responsible for about 75% of residential and 64% of commercial building site electrical energy use. Cost effective energy efficiency is critical for the economy, the environment and energy security.

Salary

The average starting salary for a HVAC&R (2007 Mechanical Engineer):

Bachelor's	Master's	Ph.D.
\$54,128	\$62,798	\$72,763

More to Explore

Check out the complete HVAC&R engineering *What Do Engineers Do* webpage at <http://www.jets.org/explore/what/hvacr.cfm>.

Extreme Engineer: Mark Lenssen

What He Does

Mark works for Puget Sound Energy (PSE) and conducts energy audits. Energy audits analyze how customers' heating, cooling, lighting, production and other energy-consuming systems operate and provide them with cost-effective energy efficiency upgrade recommendations.

Making a Difference

Mark is making a difference by helping commercial and industrial facilities become more environmentally sustainable by reducing their carbon footprint. Lenssen notes, "I value our resources, so by helping people save energy, I'm helping reduce the resources that our community consumes." Through his work at PSE, he has improved energy efficiency in more than 100 projects, saving more than 7.5 million kilowatt hours per year, or enough to power more than 600 homes in Western Washington for one year.

Why Engineering?

"I loved math and science and loved building things. My Dad is a civil engineer, so he was my primary connection with the Engineering world." "I find my work very gratifying because PSE's conservation programs are helping our customers improve their business operations and bottom line," said Lenssen. "Saving energy is good for both PSE's and the customers' businesses and it's good for the environment and our community."

Advice

"Keep up the hard work! By challenging yourself now in your school work and extracurricular work, you'll be preparing yourself for the many different roles engineers play in the work force. If you have a connection to any engineers, find out if they can be a mentor, or at a minimum, job shadow them on days when they're working outside the office. Engineers aren't always tied to your desk!"

Hobbies/Free Time

Mark loves playing with his two kids (both under three), remodeling part of his home, and commuting on his bicycle. He said that his kids help him maintain a creative mind and that remodeling takes lots of thought and planning. He explained that commuting by bicycle helps promote alternative modes of transportation, which indirectly improves our impact on the environment, thus, becoming more and more important in the engineering community.

Education

A Seattle native, Mark graduated from Inglemoor High School in Kenmore, WA. Mark then went on to earn his Bachelor of Science degree in mechanical engineering from the University of Washington in Seattle.

ASSESS...

Find your strengths, prepare for the future

PathAssess NOW Available!

PathAssess is an online tool aligning students' interests with careers in engineering. Students answer a series of questions and receive a customized profile relating their interests to engineering careers they may wish to pursue. Go to www.jets.org/assess to learn more.

EXPERIENCE...

Get active and unlock the mysteries of engineering

Hand-On Activity: HVAC&R Engineering



Swamp Cooler

Grade Level: 9 (9-11)

Group Size: 3

Time Required: 2 hours

This month's activity teaches students specifically about evaporative cooling air conditioning systems. In [Swamp Cooler](#), student teams design and build their own evaporative cooler prototype devices using a household fan, cardboard box and paper towels. They learn about the process that cools air during the evaporation of water. They make calculations to determine a room's cooling load, and thus determine the swamp cooler size. The activity is part of a lesson that contains a great deal of important information on [heat transfer](#). This activity adds to students' understanding of the behind-the-scenes mechanical devices that condition and move air within homes and buildings for human health and comfort.

Swamp Cooler Activity URL:

http://teachengineering.org/view_activity.php?url=http://www.teachengineering.org/collection/cub_/activities/cub_housing/cub_housing_lesson01_activity2.xml

The [Engineering Pathway](#) Portal to the National Science Digital Library (NSDL) brings together quality engineering education materials 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 highlights one or more engineering activities available on the collection related to the month's theme. This month's activity is from the [TeachEngineering Digital Library](#), which is a part of the Engineering Pathway.

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 125 — Microwave Communications

[Click here to download a printable version.](#)

Microwave communication towers can penetrate almost any weather, but the sending and receiving cones must be able to see each other. No obstructions are allowed because the signal cannot bend like radio waves do. It is 40 miles across Lake Ontario between tower cones located in Toronto and Niagara Falls, and the diameter of the earth is 7,918 miles.

The Challenge: At what height (in feet) must the microwave cones be mounted between these cities due to the curvature of the earth?



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.

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