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TOPIC: Nuclear Engineering

In this issue, you'll find the tools to help your students explore...assess...and experience engineering! From a look into the world of Ross Radel and his work to find cost effective options for nuclear power on the Moon and on Mars to enjoying a hands-on activity where students will control energy production in a nuclear reactor! Students will learn first-hand how Nuclear engineering is all around them. Enjoy!

EXPLORE...
Find your dream job, meet extreme engineers, watch videos

What Do Engineers Do?

Nuclear engineers make a difference in the world by...

- Providing clean energy to homes all over the world.
- Developing safe, long-term storage of nuclear waste.
- Guiding the design of treatments that destroy cancer cells.
- Designing power systems for the next mission to Mars and beyond.
- Providing guidance and expertise on [nuclear nonproliferation](#).

Nuclear engineers harness the power of the atom to benefit humankind. Nuclear engineers meet the challenges of electricity, space exploration, water and food supply issues, environment and pollution, medical tests and treatments, and transportation. They design nuclear power plants, medical equipment, power systems for naval vessels and spacecraft, and much more.

Did You Know?

The U.S. Navy operates half the nuclear power reactors in the U.S. aboard surface ships and submarines. Nuclear power allows ships to travel at high speeds for years without refueling. For example, the first nuclear-powered submarine, USS Nautilus, operated on nuclear power for more than two years and covered 62,562 miles before refueling. In contrast, a diesel-powered ship would use two million gallons of fuel to cover the same number of miles. WOW!

Salary

The average starting Salary for a Nuclear Engineer (2007):

B.S. degree	M.S. degree	Ph.D.
\$56,587	\$59,167	n/a

Extreme Engineer: Ross Radel

What He Does

Ross is employed with [Sandia National Laboratories](#) in New Mexico where he helps to develop and test power conversion units to demonstrate the readiness of fission surface power technology and provide NASA with viable and cost effective options for nuclear power on the Moon and on Mars.

Making a Difference

Ross makes a difference by developing safe and reliable control methods to gain valuable operational experience for NASA.

Why Engineering?

Ross has always had an interest in engineering. As a kid, Ross loved building and taking apart different items around his family farm in Spring Green Wisconsin. Later in high school he was introduced to nuclear engineering through a family friend. "I loved the way that I was able to work to find the solution to the puzzle."

Advice

Ross's advice to any high school student thinking about going into this field is to get involved in many different competitions and clubs such as [TEAMS](#) and math and science clubs. Also, make sure to take lots of math and science classes to see if you really enjoy the curriculum.

Hobbies/Free Time

Ross enjoys spending free time with his wife (also a Nuclear Engineer) and their 2 month old son. He enjoys running, playing video games as well as participating in a good game of Frisbee golf.

Education

Ross graduated from River Valley High School in Spring Green Wisconsin in 1999. He then graduated in 2003 from the University of Wisconsin and received his PhD in the spring of 2007.

To read more about Ross go to http://www.nasa.gov/home/hqnews/2008/sep/HQ_08-227_Moon_Power.html and read NASA's press release about the lunar reactor that he is helping to design.

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



Nuclear Fission Simulation

Grade Level: 9 through College

Group Size: Variable

Time Required: Variable

This month's Engineering Pathway activity is an [online simulation for nuclear fission reactions and a nuclear reactor](#). Start a chain reaction, or introduce non-radioactive isotopes to prevent one. Watch alpha particles escape from a Polonium nucleus, causing radioactive alpha decay. Control energy production in a nuclear reactor! Fun, interactive simulations of physical phenomena from the Physics Education Technology project at the University of Colorado. Simulations are available in both English and Spanish.

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.

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

This Week's Challenge:

Challenge 114 — Talkin' Turkey

The amount of heat (Q in Btu/hour) released from a single growing turkey as a function of body mass (W in lbs) is given by $Q = 6.6 \cdot W^{0.75}$. This body heat is usually removed by large fans that pull a flow rate of outside air (cfm at T_{out}) through the building to lower the air temperature in the space (T_{in}). The rate of energy removed by this ventilation process is given by the equation

$$Q = 109 \cdot cfm \cdot (T_{out} - T_{in})$$

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The Challenge: If the summer temperature reaches 92°F and the maximum safe inside temperature before the critters start dying is 96°F, Find the required flow rate of air through a 300x65 ft facility that houses 4,000 turkeys that weigh 15 lbs (W) each and 6,000 turkeys that weigh 20 lbs (W) each.

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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