



Engineers Week Classroom Visits

Maureen Hanson / Cathy Campbell
25 January 2012



JOHN DEERE

Agenda

- Background / history of Engineers Week at the Product Engineering Center (PEC)
- Background / history of classroom visits during Engineers Week
- JD Inspire
- Review of the classroom training information

Background / History of Engineers Week at the Product Engineering Center

- First celebration: 2008
- Focus was on promoting engineering to K-12 students and celebrating engineering
- Activities
 - Table Tents with Engineering Facts in cafeteria
 - Recognition luncheon for people who promoted engineering to K-12 students over the past year
 - Student demonstrations



Waterloo News

March 10, 2008 Vol. 20, No. 4

JOHN DEERE

Developing Tomorrow's Engineers

PEC Celebrates National Engineers Week

On February 21 three student groups showcased their engineering abilities at PEC's celebration of National Engineers Week.

PEC employees enthusiastically attended the students' demonstrations. The Model Room was crowded during the entire two-hour event. Employees enjoyed talking with the students about their accomplishments, and the students enjoyed interacting with the employees.

This event provided a great way to support these students as they explore the possibilities of engineering.



Students from Orchard Hill School in Cedar Falls demonstrated the Lego robot they used for this year's FIRST Lego League competition

FIRST - For Inspiration and Recognition of Science and Technology

FIRST Vision Statement. "To create a world where science and technology are celebrated... where young people dream of becoming science and technology heroes"

SAE "A World in Motion". The SAE Foundation and SAE International introduced the A World In Motion[®] program in 1990 with the goal of increasing students' interest in math and science.



Students from Cedar Falls High School demonstrated robots from previous years' FIRST Robotics Competition

An update: The FIRST Robotics team attended the regional competition in St. Louis on February 28 - March 1. The team ended up with a fourth place seed going into the finals. They lost in the semi-finals to the eventual competition winner. The Cedar Falls team received the Motorola Quality Award for the most robust robot design, which was a huge accomplishment!



Students from Saint Patrick School in Cedar Falls demonstrated vehicles from the SAE World in Motion competition.



Background / History of Classroom Visits during Engineers Week

- Started visiting classrooms in 2009
- Contacted Cedar Valley schools
- Response: Very positive!!
- Have continued to work with Cedar Valley Schools
- Will do our best to support other requests

JD Inspire

- John Deere initiative to promote STEM
- Started in 2011
- Pat Barnes, Program Director Global STEM
 - BarnesPatrickO@JohnDeere.com
- Focus partners:
 - *FIRST* (Junior Lego League, Lego League, Tech Challenge, Robotics Competition)
 - <http://www.usfirst.org/>
 - Project Lead the Way
 - <http://www.pltw.org/>
 - Southeastern Consortium for Minorities in Engineering (SECME)
 - <http://www.secme.org/>

JD Inspire

John Deere Inspire

Inspiring the Next Generation of Innovators

John Deere Inspire is the name of the new enterprise initiative that desires to inspire the next generation of innovators through education in science, technology, engineering and mathematics (STEM) coupled with connections and experiences with the real world. This involves earlier exposure of students to our people, technology, and our John Deere Brand and nurturing their interest in STEM. This means creating a relationship years before they become a potential candidate to meet our growing needs.

The ultimate goal of John Deere Inspire is to significantly increase the number of high quality students, including underrepresented talent, who enroll, graduate and are successfully working in STEM related professions and consider John Deere an employer of choice.



EWeek Classroom Visit Training

Casee Eisele

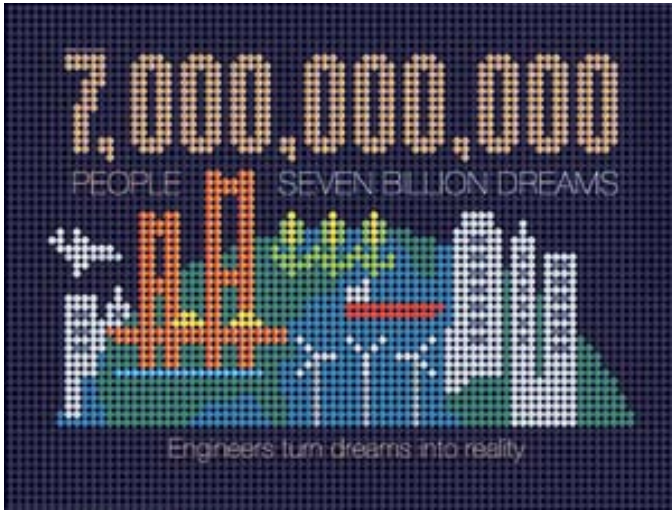


JOHN DEERE

Agenda

- PEC EWeek Activities
- Preparation for Visit
- Presentation Review

PEC EWeek Activities



20-24 Feb

- Monday: Advanced John Deere Project Displays
- Tuesday: Balloon-Powered Vehicle Competition
- Wednesday: Patent Coffee / Recognition Lunch
- Thursday: Chris Boyens, Speaker
- Friday: ETC (Engineers Trivia Contest)
- Ongoing throughout the week: School Visits

Preparation for Classroom Visits

- Contact Cathy Campbell to sign up for a class (with or without a partner)
- Contact your teacher
- Prepare a presentation and activity
 - Modify the presentation template or create your own
 - Use pictures or video clips from your own experience, the Sharepoint site, or the Internet
 - <https://jdforums.deere.com/clearspace/community/engweek>
 - http://www.ti.com/corp/docs/landing/thank-an-engineer/index.htm?DCMP=thank_an_engineer&HQS=NotApplicable+OT+thanks
- Pick from one of three available DVD's to show students
 - PEC Video
 - "Ask an Engineer"
 - "Discover Engineering"
- Use the video at the ASME site
 - <http://www.asme.org/kb/news---articles/media/2011/09/eweek-2012-welcome-video> (3+ minutes – very good video!)
- Make sure you DO NOT share confidential information
- Prepare an interactive demonstration – practice and gather needed materials
- Print the appropriate number of Engineering Resource Sheets
- Take a give-away: pencils for everyone and Frisbees or hats as incentives to participate

Contact Your Teacher

- Confirm schedule – class time and duration
- Confirm visit logistics – parking, sign-in location and procedure, classroom location, classroom size
- Discuss AV Equipment
 - Projector availability (some are available for checkout at PEC)
 - Computer availability (may be easiest to bring presentation on removable media and use the computer in the room rather than your laptop)
 - Teacher's knowledge level of using these (may need to request they have IT support on hand for set-up)
- Obtain approval for planned activity (i.e. use butter instead of peanut butter)
 - Projector availability (some are available for checkout at PEC)
- Discuss any special needs students
(some items from JA teacher's guide)

Things to Remember – Day of Visit

- Pick up materials from Taylor Lubben or Sophia Spier or make arrangements ahead of time - Building 5, Level 2, Aisle 5207A
- Allow time for parking, sign-in, set-up, etc.
- Think about how you would feel at the students' age
- Be aware of a wide range of learning abilities
- Give lots of compliments
- Leave disciplinary issues to the teacher
- Do not have contact with students without teacher or school staff present
- Ask for feedback – improvements, good stuff, and quotes
- Thank the students and teacher
- Hand out resource sheet and giveaways

(some items from JA teacher's guide)

Suggestions from a Teacher

1. Start by asking the students what they think engineers do. Students could write something in words, draw a bubble map (or mind map) or draw a picture. This is to engage the students immediately. You can walk around and see what students are doing - perhaps there are some that you would like to call attention to (without embarrassing the student, of course).
2. Ask the students to look for something specific in each video. Most students will stay engaged watching videos, but it helps to give them something to watch for.
3. Before the PowerPoint presentation, hand out a worksheet that contains many of the main ideas, but has some missing words. That way students have to watch the PowerPoint to fill out the worksheet and they will stay engaged. Students tend to get distracted during PowerPoint presentations so it helps to give them something to do that is related to the PowerPoint. The exercise also helps them retain the information contained in the PowerPoint.
4. If you want to know if the students "got it" (understood the material presented), then ask the students questions about engineers at the end. (Could use giveaways for correct answers, if desired) You could also ask the students to draw a picture or write in words or draw a bubble map of what an engineer does. If they did this at the beginning, they can compare the two and identify differences. If they didn't do this at the beginning, it is a good way to summarize what they learned.



What is engineering?

Casee Eisele
Project Engineer
Operator Station Continuous
Improvement
John Deere Waterloo Works



JOHN DEERE

Agenda

- What is an engineer?
- Why did I choose engineering?
- What do I do every day as an engineer at John Deere?
- Do you want to be an engineer?

What is an engineer?

Engineering is the discipline and profession of applying technical and scientific knowledge and utilizing natural laws and physical resources in order to design and implement materials, structures, machines, devices, systems, and processes that safely realize a desired objective and meet specified criteria. (from Wikipedia)

An **engineer** is a problem-solver. From the earliest invention of the wheel, to the modern science of the personal computer, engineers are busy solving the problems of everyday life.



"Scientists study the world as it is;
engineers create the world that has
never been."

- Theodore von Karman



There are many types of engineers

- Aerospace
- Agricultural and Biological
- Architectural
- Biochemical
- Biomedical
- Chemical
- Civil
- Computer
- Construction
- Electrical
- Environmental
- Food
- Geological
- Industrial
- Materials
- Mechanical
- Nuclear
- Software
- Systems

Why did I choose engineering? And why did I stay with it?

- Combines my favorite disciplines: math and science
- Challenges me personally
- Allows me to contribute to the advancement of our society
- And its fun!



What do I do every day as an engineer at John Deere?

- Design parts and systems
- Test electronically, in the lab, or in the field
- Improve value to the customer through innovation



Do you want to be an engineer?

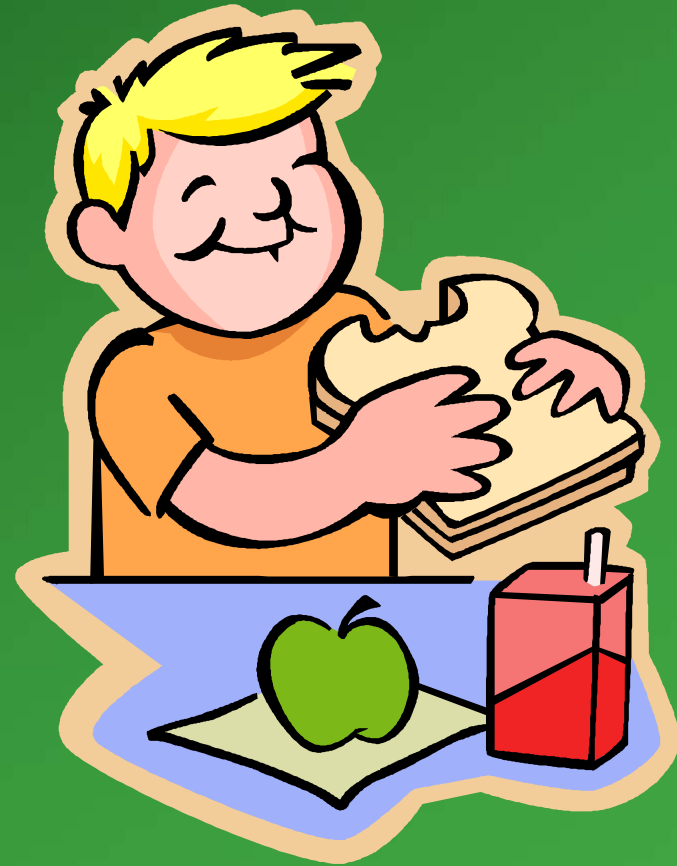
- Get a head start in high school
 - Four years of math
 - Four years of science
 - Four years of language arts
 - Three years of foreign language
- Get a taste of engineering
 - Science fairs
 - Summer camps
 - Engineering TV
 - "Design Squad" on PBS
 - "Myth Busters" on Discovery
 - FutureCity competition
 - FIRST LEGO League
- Pick a discipline: know what you enjoy



Pictured here: Design Squad host Nate Ball and season two cast members recline in a chair created from recycled cardboard, an inspiration for the Trash to Treasure competition.

Now for an activity...

The Microprocessor: Butter & Jelly Sandwich



Now for an activity...

Keep a Cube

KEEP-A-CUBE

Can you keep an ice cube from completely melting in 30 minutes?

GRADE LEVEL

K-6

DISCUSSION

Engineers design ways to solve problems. In this activity students will engineer a way to keep an ice cube from melting for 30 minutes.

Ask students what makes ice melt? Heat! Lead class discussion to conclude that the air around the ice cube is warmer than the ice, so they need to keep the warm air away from the ice cube. Insulation is a material that slows heat energy from passing through it.

MATERIALS (per class or team)

- 2 ice cubes
- cardboard box
- wax paper
- masking tape
- newspaper
- aluminum foil
- rubber bands
- paper plate



WHAT TO DO

Use the materials to make a KEEP-A-CUBE box that will keep an ice cube from melting. Remind class to think about what makes ice melt as they design their box. Using one cube, they can wrap up the ice cube, cover the box, or do anything else they can think of.

Put the second ice cube on a plate. This is the control cube. Don't make any changes to this ice cube.

Wait 30 minutes. Compare the ice cube in the KEEP-A-CUBE box to the ice cube on the plate. Which ice cube is bigger? Why?

ZOOMon

Have the kids brainstorm other designs. How could they change the container so the ice cube melts more slowly? If there's time, you might want to encourage the students to repeat the activity with other insulating materials such as foam packing peanuts or cotton balls, or a different size box. Choose one thing to change (the variable) and make a prediction (hypothesis). Then re-test.

This activity provided by WGBH Educational Foundation. Used by permission. Keep-a-Cube is one of several activities found the ZOOM Into Engineering toolkit and at www.discoverengineering.org. ZOOM and the ZOOM words and related indicia are trademarks of the WGBH Educational Foundation.



Now for an activity...

Keep a Cube

Balloon Race

Activity

Divide students into teams of three and tell them that their objective is to hold a string horizontally and get the balloon to land as close to the center of the course as possible. Give each team the necessary materials and no further instructions.

Materials

1. One round balloon (9")
2. 1-1.5" section of straw
3. 1-1.5" piece of tape
4. 4-5' piece of string with a bracelet tied to one end

Comments

It was very fun to watch the trial and error as they tried to figure out what they needed to make it work. (Key to making it work is to connect the straw on the balloon in a place so the propulsion is properly directed and mount the balloon under the string so the center of gravity is working for you.)

At the end we talked a little about what they learned including propulsion, center of gravity, etc.

Age Group – Middle School

Engineering Resource Sheet

Competitions

FutureCity Competition: www.futurecity.org

FIRST LEGO league: www.firstlegoleague.org

Math Counts: www.mathcounts.org

Iowa Science Fair: <http://www.sciencefairofiowa.org/>

Easter Iowa Science and Engineering Fair: www.eisef.org

Summer Camps

UNI summer math and science camps: <http://www.uni.edu/camps/>

Engineering Camps Directory: www.engineeredu.com/summercamps.html

Engineering TV

“Design Squad” on PBS

“Myth Busters” on Discovery

“How Stuff Works” on Discovery

“How It’s Made” on Discovery

“Junkyard Wars” and “Scrapheap Challenge” are cancelled shows, but there is a good web resource:

<http://school.discoveryeducation.com/networks/junkyardwars/fun.html>

Web Resources

(Videos, Activities, Games, etc.)

Engineer’s Week: www.eweek.org

Junior Engineering Technical Society: www.jets.org

Discover Engineering: www.discoverengineering.org

Try Engineering: www.tryengineering.org

Zoom Engineering Activities: <http://pbskids.org/zoom/activities/sci/>

Engineers Week Activities: <http://www.eweek.org/EngineersWeek/DiscoverE.aspx?ContentID=90&Version=2>

Engineering Education in Iowa

UNI Industrial Technology: www.uni.edu/indtech

Iowa State University: www.engineering.iastate.edu

University of Iowa: www.engineering.uiowa.edu

Wartburg College: www.wartburg.edu/engineering



JOHN DEERE



Personalization Examples



JOHN DEERE

HOW'S YOUR HORSEPOWER?

Before engineers harnessed energy to work for us in machines, horses were a common source of power. In the late 18th century, one inventor, James Watt, compared the power of his steam engine to the more familiar power of a horse. He found that a powerful work horse could raise a 1,000 pound weight 33 feet in one minute. Today the term "horsepower" is still used to describe the strength of motors and engines.



TEST YOUR HORSEPOWER

If a 100-pound person raised his or her weight 330 feet in one minute, that person would use one horsepower. People can raise their own weight by climbing stairs. So, if each step is eight inches high, and the 100-pound person runs up 495 steps in one minute, that person will use one horsepower. To determine how many eight-inch steps you would need

to run in one minute, calculate:

$$33,000 \div \text{your weight} = (\text{answer})$$

$$(\text{Answer}) \times 1.5 = \text{number of steps to run}$$

Crouse Example -

$$33000 \text{ ft-lb/min} / 200 \text{ lb} = 165 \text{ ft / minute} \times 1.5 \text{ steps / ft} = 247.5 \text{ steps/min}$$

That seems like a lot of steps

Assume 10 ft per level in a building

You would have to go up 16.5 levels in a minute

People work hard at 0.1 hp so that is 1.5 levels (stories) in one minute

Why Are Engineers Needed?

Lets look at a recent event

- Earth quake in Haiti
 - Rescue equipment
 - Medical
 - Treatment
 - Temporary buildings
 - Water filtration – One of the biggest problems in the world
 - Design of earth quake resistant buildings
 - Forecast and warning tools
- Items you buy everyday
 - Creation
 - Packaging
 - Transportation

Technology Explosion in Last 10 yrs

Cellcam (phone camera)

Sales in 2001 = 0

Sales in 2010 = 80 million

Global smart phones (Internet phones)

Sales in 2001 = 0

Sales in 2010 = 165.2 million

Digital Music

8 track, cassette, Digital compact disc in 1982

I-Pod Nov 2001 @ \$399 – in 18 months sold over 1 million

Sales of MP3 players in 2000 = 500,000

Sales of MP3 players in 2010 = 38.8 million

Global Positioning System

1970 military projects

2000 restrictions were lifted (accuracy 15 meters)

2004 WAAS Technology (accuracy 3 meters)

Sales in 2000 = 107,00

Sales in 2010 = 15.6 million

Future sales will go to phones

Technology Explosion in Last 10 yrs (con't)

Social Networking (Face book)

Face book users in 2002 = 0

Face book users in 2010 = 350 million

Computers

1st laptop in 1985

2005 laptops were a good replacement for desk top units

E-Books

Large Screen TVs

Flat Screens took over around 2007

LCD, Plasma

TV Recording

Beta, VHS, CD, Blu-ray, Replay TV and TiVo (still major usage is playing movies not recording)

Top 10 Reasons to be a Engineer (www.engineeryourlife.org)

1. Love your work and live your life
2. Be creative
3. Work with great people
4. Solve problems, design things that matter
5. Never be bored
6. Make a big salary
7. Enjoy job flexibility
8. Travel
9. Make a difference
10. Change the world.

What John Deere was like in 1976

Phone – 4 people shared a phone

Drafting table – All designs and detail drawings were done with paper and pencil – At one time I worked on 2 16ft drafting tables

Calculator – Not many with more than 4 functions, Slide rules still used, HP35 were purchased using payroll deduction

Computer

- 1 main computer (room about 20 X 20)
- Card punch
- Batch Runs

CRT – Display of information like build specifications (1 per 4 people)



What do I do every day as an engineer at John Deere?

Present position is in the design of the operator station

- Design parts and systems
- 3D Pro-E models
- Build of Materials for Tractor cab
- Test electronically, in the lab, and/or in the field
- Improve value to the customer through innovation
- Communicate ideas, changes, status, etc

John Deere Tractors



Farmers Control Center and Office



Controls at
Your Finger
Tips

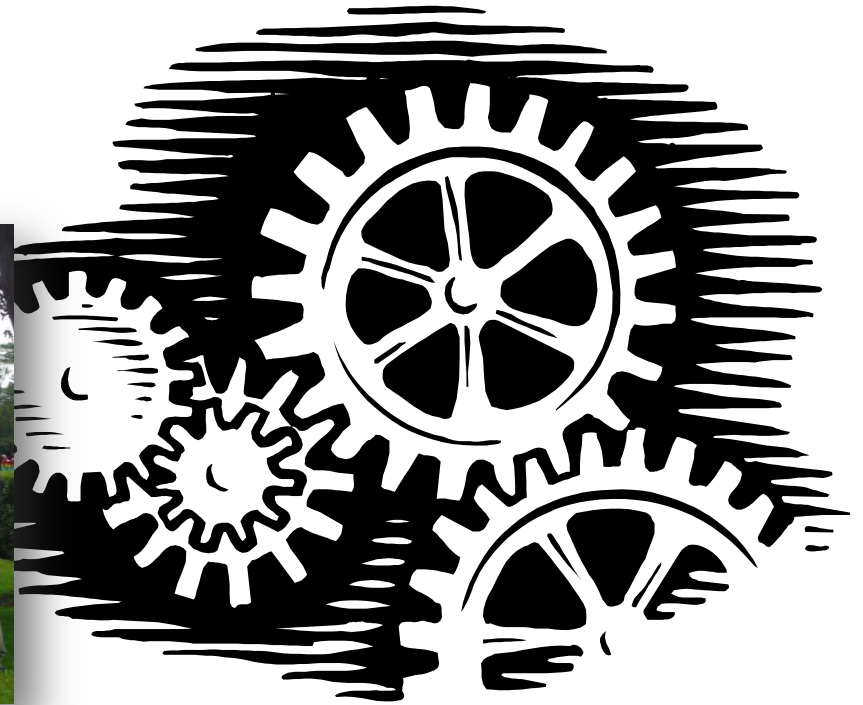


Field of
Vision is
Critical



What do I do every day as an engineer at John Deere?

- Work with people across the globe
- Design parts and systems
- Test electronically, in the lab, or in the field
- Improve value to the customer through innovation





Now for an activity...

The king of Holmes Jr. High has sent out a decree. He wants to build a tower to display his most prized possession and will have a competition to design and build the tower. A prize will be awarded to the team that uses the material given to them to construct the tallest tower that can support the weight of his possession.



More...

Material—marshmallows and toothpicks

Weight = toy JD tractor

Two people per team

Ten minutes to construct tower

Tallest tower that supports the weight wins.

If no tower can hold the weight, tallest wins.

Now for an activity...

The Straw Bridge



Straw Bridge - Description

1. Goal

- Support an egg on a bridge designed and built by your team.
- Bridge must have a 1 foot span (Box)
- The egg must not fall from bridge for 10 seconds

2. Material

- 6 Straws
- 4 Toothpicks
- 1 foot of tape

Straw Bridge - Process

1. Teams
 - 3 to 4 people per team
2. Design (5 minutes)
 - Draw 2 or 3 designs
 - Discuss the pro's and con's of each design
3. Build (10 minutes)
 - Build one prototype
4. Test (10 minutes)
 - Team to position bridge on box
 - Instructor to apply egg to center of bridge and time
5. Discuss Engineering Principles of the designs
 - As time allows

Congratulations!

You have just used engineering to solve a problem!

