



## US Department of Energy's Real World Design Challenge

### THE NATION'S INNOVATION ENGINE: How America Competes

Global Competition is currently in a transformative stage. The United States has been strong and prosperous through many generations of hard work, visionary innovation and ingenuity, and a first rate education system. All this is changing. The United States must not only adapt, it must transform its education systems to lead.

The best investment the United States can make right now is in its education system. We need to provide students with the background and framework for competing differently and more effectively than the United States has ever competed before.

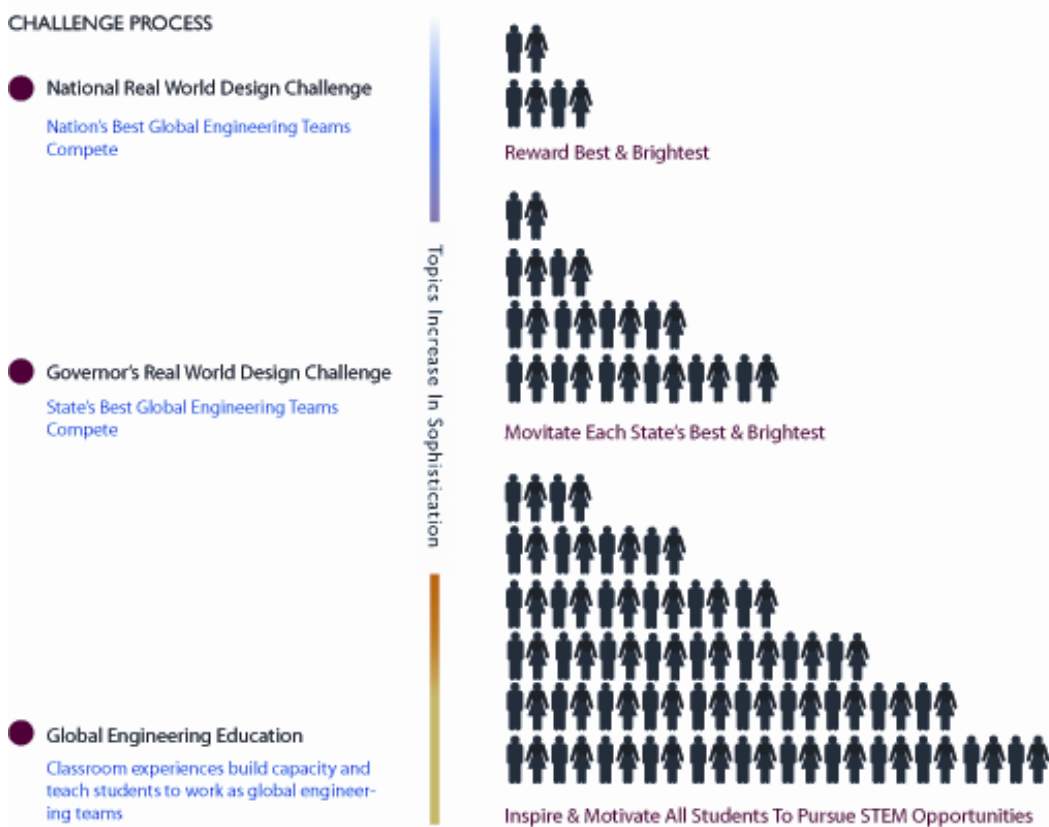
The Department of Energy's Real World Design Challenge aligns secondary education with 21<sup>st</sup> Century workforce needs, and strengthens professional development for teachers by providing training and support by mentors from National Laboratories. The Real World Design Challenge is a prime example of how the government, private industry, and our educational system can work together to keep our workforce the best in the world.

A highly skilled engineering workforce is at the core of both our economic competitiveness and national security. Our National Laboratories possess scientific and engineering expertise beyond that of any other nation. The Real World Design Challenge will harness this expertise using web-based professional collaboration tools to break down the geographic limitation that has previously restricted student contact with experts. It will build and innovative workforce for the future by inspiring and engaging all students in STEM education and by systematically highlighting the potential opportunities open to workers in scientific and engineering fields. Many students are already proficient in the types of high tech tools that allow our industry leaders to collaborate, and this proficiency will be focused on the Challenge, putting it to constructive use. Students too often dismiss what they learn in school as having no real world connection. But the Real World Design Challenge will excite students about what they learn in school because it will allow them to tackle real world problems, and see the difference their efforts can make in the future.

The Real World Design Challenge "bridges the needs of industry with the future of education." It teaches innovation, creativity, and collaboration using the expertise that industry has been perfecting for decades. With this real world approach to learning, we can keep our workforce strong, and ensure America's prosperity for the future.

**The Goals of the Challenge** are to (1) inspire and engage all students in STEM education and (2) systematically highlight the potential future workers in science and engineering fields.

## Real World Design Challenge Process



### What You Get:

#### 1. Training

- **Training Description:** Teachers will be trained in design, in a two day workshop in which they will learn how to use Pro/ENGINEER and other tools and learn how to apply these tools in teaching design and global engineering. Training in the use of Windchill ProjectLink, the Global Engineering collaboration tool will be done in a web-based workshop subsequent to the design workshop. Participants will access the Windchill ProjectLink training using a computer connected to the Internet and a phone.
- **Training Costs:** Teacher training costs are \$200 for all the training. Fees were negotiated with independent, PTC certified trainers. All software tools and curriculum materials will be provided for FREE.
- **Training Site(s):** View training dates for [July 2008](#) and [August 2008](#) and links to registration. These are typically provided as an in-kind contribution by the hosting organization. The Design training will be done in a computer lab. The computer lab will need to have at least fifteen PCs with Internet access. Each participant will need to use a computer in the training since they will have a great deal of hands-on experience and individual instruction by certified trainers.

## 2. Science and Engineering Mentors

Student teams and mentors use professional tools to collaborate across the Internet. Mentors provide advice on science and engineering content and approaches. Mentors infuse professional science and engineering expertise in the classroom to support professional development for teachers and student learning. The mentors are also professional role models enabling students to gain a sound understanding of professional STEM roles through modeling and practical application.

- DOE Energy Laboratories: The laboratories infuse rare scientific and engineering expertise into the classroom. Science and engineering mentors from the 17 Department of Energy National Laboratories will provide advice on basic science, math and engineering principles and approaches.
- Industry and the Federal Aviation Administration (FAA): Engineering mentors from industry and the FAA will provide expertise on aviation engineering.

## 3. Real Problem

- Aviation Challenge defined by industry: Cessna engineers have defined a Challenge that is currently being addressed by the aviation industry. After learning the basics of design, teachers and students will be challenged to come up with innovative solutions to the Challenge. Classroom experiences build capacity and teach students to work as global engineering teams. The Challenge will be issued to participating teams in the fall of 2008. Topics increase in sophistication from the Governor's Challenge to the National Challenge. School teams across the state will compete to solve the Governor's Challenge. The Challenge submissions will be evaluated by a Peer Review Committee. All participating teams will be invited to an awards ceremony hosted by the Governor at which the winning team will be announced. That team will go on to represent the state at the National Challenge in Washington, DC.
- Developmentally appropriate for high school students: Educators working with the Cessna engineers have helped design the Challenge to ensure that it is developmentally appropriate for high school students and addresses national standards in science, mathematics and technology.

## 4. Real Tools

- Pro/ENGINEER Schools Edition 3D Computer Aided Design (CAD) software: Pro/ENGINEER is 3D CAD parametric design software, created by PTC, and provides solid modeling, assembly modeling and drafting functionality for engineers and designers. Pro/ENGINEER enables students to quickly and easily create complex 3D models, assemblies and 2D measured drawings, and was the first tool to introduce the concept of Parametric Modeling. Attributes of features within the model are 'parameterized', which means that any changes made to a design are automatically disseminated to all facets of the model – enabling students to design with confidence. Each teacher gets FREE licenses of Pro/ENGINEER Wildfire design software (up to 300 seats), project based curriculum and tutorials. We also encourage teachers to allow students to install Pro/ENGINEER at home. All that is required to receive the software and curriculum materials is that teachers attend a workshop. All workshops are taught by fellow teachers that have been certified as instructors by PTC.

- Windchill Global Engineering collaboration software: Times have changed radically in global manufacturing! Due to global outsourcing, the days of professional engineering teams designing ‘shoulder-to-shoulder’—working on 3D designs in isolation— are over. Likewise, the days of student engineers designing alone in isolated classrooms are also ancient history. To ensure their success in the real world, it is imperative that we teach future engineers to design and build next-generation products in cooperation with other engineers, who don’t just live across campus, but across states and nations. Today, PTC is the only company that offers the “Global Engineering” initiative for education. We couple Pro/ENGINEER with our global engineering solution—Windchill ProjectLink – a project-based collaboration tool that students access through the Internet. Working within Windchill ProjectLink’s virtual workspace, teams of student designers – situated anywhere in the world – can access up-to-the minute data pertaining to their project. Windchill offers powerful tools for storing, managing and sharing 3D design and project data, while also providing discussion forums and real-time meeting capabilities. Team members can exchange ideas, build off each other’s input, and capture innovative ideas as they evolve in real-time. Plus, Students have the opportunity to collaborate on “real-world” design challenges with ‘real-world’ professionals. Windchill is web-based and will be hosted by Oakridge National Laboratory. Schools will access it using a computer and the web. It will be FREE to participants.
- Engineering Fluid Dynamics (EFD) is a new breed of Computational Fluid Dynamics (CFD) software produced by Flomerics, Inc. This fluid dynamics simulation software enables mechanical engineers to simulate fluid flow and heat transfer using 3D CAD models. EFD.Pro has been integrated with Pro/ENGINEER and will work with native geometry. Since EFD.Pro is integrated into Pro/ENGINEER it has a similar same “look and feel”. This minimizes the learning curve on learn a new application to operate the software and can therefore focus on solving your problem. Each participating school will be provided with one license of EFD.Pro for FREE.

## 5. Real Roles

- Student teams are built around real industry roles such as project manager, scientist, engineer, and community relations & marketing.

## 6. Real Contribution

- Contribute innovative solutions to real industry design problems. Student teams will be recognized by professionals in industry and government for their contribution to solving current design problems.

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