CIVS NEWSLETTER

CENTER FOR INNOVATION THROUGH VISUALIZATION & SIMULATION

"Where Ideas Become Reality"

PURDUE UNIVERSITY CALUMET

Giving to CIVS

2200 169th Street
Hammond, IN 46323

219.989.2765
civs@purduecal.edu
www.purduecal.edu/civs

AIST Foundation Board of Trustees Meet at CIVS

The Association for Iron and Steel Technology (AIST) Foundation Board of Trustees, made up of steel industry leaders, held their semi-annual meeting at CIVS on Oct. 16, 2013. This was the first time the board has met at a non-conference location.

During their visit, CIVS staff and students presented an overview of steel-related projects in the CIVS Immersive Theater. Trustees also toured the CIVS labs and discussed projects in detail with students. Students highlighted research projects that focused on using computer simulation and 3D visualization to solve complex challenges that are facing the steel industry today. These projects addressed issues such as preventing boiler overheating, improving furnace fuel efficiency, identifying causes of material buildup in mixing vessels, predicting equipment failures before they happen, and developing effective training.

Trustees also experienced hands-on interactive demonstrations with personal virtual reality devices and immersive 3D systems. They expressed afterward how impressed they were with the CIVS projects, facility, and students.

Left: Ron Ashburn, AIST Exec. Dir. and Nicholas Walla, CIVS graduate assistant, discuss a poster on equipment life prediction. Right: CIVS graduate assistant, Lucas Phillips assists Mark Didiano, Mgr. Finance and Admin., AIST, in using the Oculus Rift, a 3D head-mounted display used for virtual training research.

Featured News

CIVS Facts and Impacts

CIVS's multidisciplinary research projects are having substantial economic and intellectual impacts on local and global communities as well as providing great research opportunities for Purdue Calumet faculty and students. Following are highlights since 2009.

- $30++ million savings for companies
- 2,600+ students used CIVS for experiential learning and virtual labs
- 73 external organizations collaborated with CIVS
- 116 completed projects
- 84 technical publications
- 267 graduate and undergraduate students employed and mentored
- 61 Purdue Calumet faculty and staff involved
- 10,000+ local, national and international visitors since October 2011

Signature Areas and Key Technologies

- Virtual Design
- Virtual Learning/ Training
- Simulation
- Visualization
- High Performance Computing

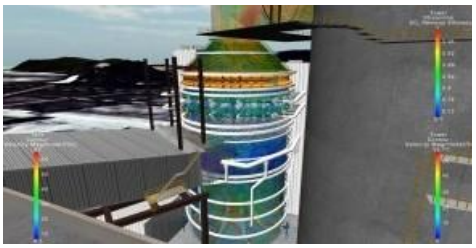
CIVS Research Fields

- Biomedical
- Construction
- City Planning
- Economic Development
- Education
- Engineering
- Energy
- Environment
- Healthcare
- Liberal Arts
- Advanced Manufacturing
- Marketing
- Safety
- Science
- Supply Chain
- Transportation

Selected Funded Projects

Project Title	Sponsor
Minimization of Blast Furnace Fuel Rate by Optimizing Burden and Gas Distributions / Technology Transfer Workshop	American Iron & Steel Institute
Analysis of Torpedo-Car for Improved Mixing Process	ArcelorMittal
CO Boiler CFD Study	CITGO
Simulation and Visualization Model for the Gostlin Street Roundabout	City of Hammond
Mixed Reality Simulators for Wind Energy Education	Dept. of Education
The Center for Computational Simulation and Visualization Project	Dept. of Energy
Active Threat-Shooter Visualization	St. Margaret
McDonald's Innovation Center Visualization	McDonald's Corp.
NIPSCO Bailly Generating Station Flow Evaluation and Optimization	NiSource
Integrating Virtual 3D Lab Modules for Flood Modeling Studies in Civil Engineering Curriculum (in collaboration with Engr. Dept.)	NSF
Northwest Indiana (NWI) RDA Projects	NWI RDA
Investigation of Co-Injection of Natural Gas and PCI in Blast Furnace Ironmaking	Severstal
Development of Blast Furnace Virtual Training System	U.S. Steel

Visualization of a proposed roundabout in the City of Hammond uses traffic simulation based on real data.



Interactive Virtual Flue Gas Desulfurization (FGD) Simulator for operator safety training at NiSource.

Virtual Training Programs Benefit Engineers and Technicians

One of the core research areas of CIVS is virtual learning/training. Through this research, new frontiers are being explored for student learning and employee training. Two examples in this area are the Virtual Blast Furnace Simulator for U.S. Steel's Iron-making Academy, and Mixed Reality Simulators for Wind Energy Education funded by the U.S. Dept. of Education's FIPSE program.

The blast furnace is a key component of steelmaking and has many complex processes and phenomena. Due to the difficulties associated with traditional blast furnace training, CIVS developed Virtual Blast Furnaces based on real furnace structures and operating conditions through 3D visualization and CFD simulations. One of them was specifically used for training engineers and operators from U.S. Steel. Brian Koon of Fairfield Works, who took part in the training, said "This interactive model helped me visualize the material flowing through the process which was very helpful in understanding the flow dynamics."

Another area benefiting from virtual training is wind energy. CIVS was awarded a $749,853 grant to develop simulators to help train the wind energy professionals of tomorrow. CIVS is developing and evaluating simulators for multiple platforms including PC, web, tablets, smart phones, and virtual reality. Simulators are being used and evaluated at multiple colleges and have showed positive impacts on student learning.

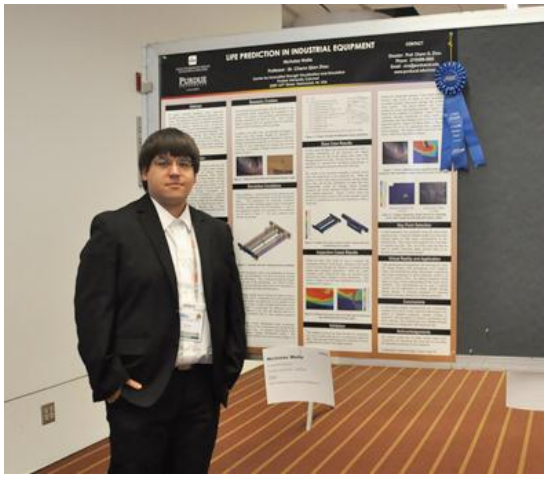
Participants of U.S. Steel's Iron-making Academy experience virtual blast furnace training.

Students at Kalamazoo Valley Community College's Wind Turbine Technician Academy learn about aerodynamics with a wind turbine simulator.

Student Successes:

CIVS graduate assistant, Nick Walla, won 1st Place at the Association for Iron and Steel Technology's 2013 AISTech Conference, Graduate Student Poster Competition. The competition was held on Monday, May 6 in Pittsburgh, PA. Nick presented his project titled "Life Prediction in Industrial Equipment" sponsored by U. S. Steel.

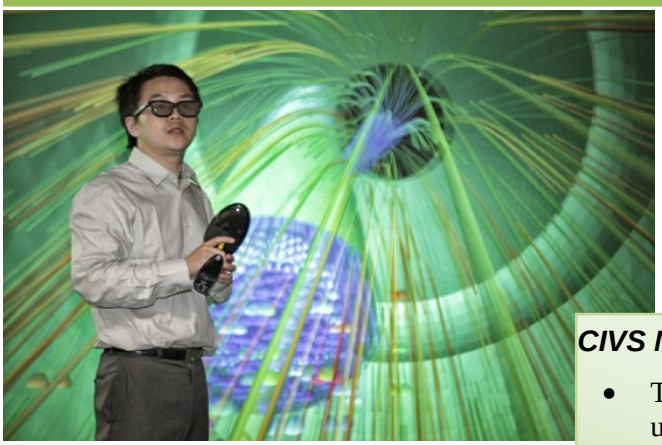
The student competition is held annually at AISTech, an international conference that is steel's premier technical event and North America's largest steel exposition. Over 123 students competed this year. More than 7,000 professionals attended the conference from all around the world. Nick received his Master of Science in Mechanical Engineering degree in December 2013. This is the second year in a row that a CIVS graduate student has won first place. Last year, CIVS graduate assistant Md Taifur Rahman won the award for his project developing blast furnace simulations.



CIVS grad student, Nick Walla, stands with his award winning poster which covers a new method of using simulation and visualization to determine stress and predict equipment failures in the steel industry.

Steve Dubec, a former graduate research assistant at CIVS, recently accepted a position as a Project Engineer with Lazar Anode, one of CIVS' research project sponsors. Steve was among two other interns in review for this position. In his new position, Steve is responsible for ensuring a project's design functions and to work on design improvements.

When asked about his employment in CIVS, Steve stated "My critical thinking skills were developed due to the different aspects, creativity and problem solving involved in every aspect of my research in the center." He also went on to say that "Professor Zhou pushed us hard. She talked us into taking courses that were to our benefit. She always has the student's best interest at heart." Steve graduated in the summer of 2013 with a Master's Degree in Engineering.



CIVS Ph.D. Student, Dong Fu, demonstrates a virtual blast furnace simulation in the CIVS Immersive Theater.

This research was partially supported by U.S. Department of Energy Grant DE-NA000741 under the administration of the National Nuclear Security Administration.

"The innovation taking place at Purdue Calumet's CIVS center is helping Northwest Indiana maintain its global competitiveness"
- Donald L. Babcock, Director of Economic Development, NIPSCO

"CIVS is solving complex problems and advancing industrial initiatives relating to economic development, energy, environment, education and training"
- Charlie Tilleman, Site Engineering Authority, BP Whiting Business Unit

CIVS Mission

- To foster innovation through advanced visualization and simulation using multidisciplinary approaches
- To conduct cutting edge applied research using state-of-the-art computer simulation, visualization technologies, and high performance computing to solve challenging problems and promote economic development
- To educate individuals and organizations in the use of modeling, simulation, and visualization

Purdue Calumet Faculty Research Day

Purdue Calumet showcased 92 faculty research projects in Alumni Hall on October 29, 2013. Fifteen projects were presented by faculty collaborating on CIVS research. For more information, please click here.

CIVS Faculty Collaborator, Besma Smida, receives an award from Chancellor Thomas L. Keon & Interim Vice Chancellor and Provost Peggy Gerard.

CIVS Students Earn Awards at Student Research Day

Five CIVS students won awards at the Purdue University Calumet Student Research Day held on April 4, 2013. For more event details, please click here.

CIVS graduate & undergraduate students presented a variety of research through oral and poster presentations during the annual Student Research Day.

CIVS Receives Chanute Prize for Team Innovation

In March of 2013, CIVS was co-recipient of the Chanute Prize for Team Innovation, awarded by the Society of Innovators of Northwest Indiana (NWI).

CIVS was recognized as being a model across the nation for its integration of simulation and visualization technologies to solve real world problems, combined with its application driven approach and close partnerships with collaborators. CIVS has saved more than $30 million for industries.

John Davies, Managing Director of the Society of Innovators said of CIVS, "In short, Northwest Indiana has a cutting edge regional economic tool in CIVS that gives us an edge in the world!" Click here for more details.

(Back Row) Bin Chen, Roy Evans, Robert Rescot, Yueqi Zhang, Ge Jin, Armin Silaen, Bin Wu; (Front Row) Linda Robinson, Doreen Gonzalez-Gaboyan, Howard Cohen, Thomas L. Keon, Ralph Rogers, Chenn Zhou, John Moreland, and Roger Kraft

HAST High School Students doing Research at CIVS

Dr. Chenn Zhou (CIVS Director, Left) & Dr. Sean Egan (HAST Principal, Center) stand with HAST students and graduate research assistant mentors at CIVS where the students conduct projects twice per week.

Eleven high school seniors from the Hammond Academy of Science and Technology (HAST) are gaining unique learning experiences through weekly classes at CIVS. The students are taking part in the national "Project Lead the Way" program. At CIVS, students work on projects using cutting edge technologies to address complex issues in engineering and other fields.

Students are learning fundamental problem-solving and critical-thinking skills through projects involving 3D Printing, a Virtual Power Plant Boiler, Wind Energy, and a Virtual City of Hammond. Click here for more information.