

## Automotive Manufacturing Training Simulator Showcase

CIVS is collaborating with the Automotive Manufacturing Technology Education Collaborative (AMTEC), a National Science Foundation (NSF) ATE Center in the Kentucky Community and Technical College System.

The collaboration will bring forth a workforce training simulator designed by industry experts from Toyota and Nissan, community college educators, and CIVS staff and students. It creates a **3-D interactive virtual machine with over 70 scenarios** for troubleshooting electric, mechanical, hydraulic, pneumatic, and PLC-related problems that occur on the assembly line.

On April 11th and 12th the AMTEC group visited CIVS for a hands-on demonstration and training on the simulator. The simulator will be completed in 2017 for full application to the 70+ community colleges in the AMTEC network. "AMTEC is proud to have such a distinguished team of Purdue's best engineers on our project" stated AMTEC Executive Director, Danine Alderete-Tomlin.



## CIVS Director Speaks at National Academy of Engineering and SMLC

On April 18, Dr. Chenn Zhou was a featured panelist at the 2016 convocation of the National Academy of Engineering and the American Association of Engineering Societies. The panel theme, **The Revolution in Modeling and Simulation in Engineering**, focused on new approaches to solving contemporary engineering problems. CIVS is an acknowledged leader in the use of computational modeling, simulation, and visualization tools as key drivers in accelerating innovation and cost reduction in processes and products across numerous engineering disciplines.

Dr. Zhou was also invited to present a web-based seminar and an invited expert panel talk in February and March of this year to the Smart Manufacturing Leadership Coalition, an organization that addresses manufacturing-related challenges across the automotive, food, military, materials, chemical, oil and gas, refining, pharmaceutical, information technology, process control and automation industries. CIVS research methodology is broadly applicable to design and optimization solutions across this broad range of industries.



CENTER FOR INNOVATION THROUGH  
VISUALIZATION & SIMULATION

**PURDUE**  
UNIVERSITY  
NORTHWEST

*Giving to CIVS*

2200 169th Street  
Hammond, IN 46323

219.989.2765  
civs@pnw.edu  
centers.pnw.edu/civs



## Steel Consortium Featured at AIST Chapter and Lakeshore Chamber Meetings

The Steel Manufacturing Simulation and Visualization Consortium (SMSVC) was featured on April 12, 2016 at the AIST Midwest Chapter dinner meeting in Merrillville, Indiana. Representing the SMSVC were Mitch Day, Praxair; David Barker, U. S. Steel; Larry Fabina, ArcelorMittal; Chenn Zhou, Purdue Northwest; Love Kalra, AIST Midwest Chapter Chairperson and Yury Krotov, Steel Dynamics, Inc.

The Consortium's vision and mission, the technology roadmap, as well as research plans and projects were presented. Several previous projects were showcased. The consortium members also shared with 280+ audience members why their companies joined the SMSVC. Their comments include: quality of work of CIVS, capabilities and leadership, excellent team with practical approach and proven-track records, opportunity to solve mutual issues collectively, build closer working relationships with producers and collaborators, lower cost for solving problems, access to well-educated and trained engineers.

At its April 28 General Membership Meeting, the Lakeshore Chamber of Commerce was introduced to SMSVC by a panel of regional consortium members. The panel discussion was moderated by Don Babcock, Director of Economic Development of NIPSCO. The panelists were Dr. Chenn Zhou, Director of the SMSVC; Kelly Dallas, Past Chairperson, AIST Midwest Chapter; Mitch Day, Strategic Account Director, Praxair; David White, Director, Process Research, ArcelorMittal; and Mike Zdyb, Director of Strategy, NIPSCO. More than 200 Chamber members from local businesses, organizations and government attended. The panelists discussed the importance of applications of simulation and visualization undertaken through CIVS at Purdue Northwest to projects designed to make the American steel industry more competitive, more efficient and more environmentally friendly. Panelist Dave White noted that "there are issues that are common to us all, like safety, energy efficiency and reducing the environmental footprint." Kelly Dallas commented that the technology can also be used for training and outreach programs. Mitch Day summed up the importance of the Consortium and the research conducted through CIVS by observing that "this is the next chapter in the evolution of the steel industry." See more details in news article by [NWI Times](#).



## Students Earn Research Awards

48 CIVS students participated Purdue University Northwest Student Research Day on April 5 with two student teams winning awards. Student research projects were presented in both oral and poster presentation categories. Awards earned were: 1<sup>st</sup> place (Undergraduate Oral Presentation) by Yuchao Chen, Huinan Shao for their project titled "Design of a Bottom-Blow Basic-Oxygen Furnace" and 2<sup>nd</sup> place (Graduate Oral Presentation) by Zichao Zhou, Zhiheng Huang, and Yu Du for their project titled "Design of a Ball Bearing Replacement Simulator for Wind Simulator".

## Professor Sarac Uses 3D Visualization to Improve Student Learning



Dr. Radmila Sarac is collaborating with colleagues in CIVS and the College of Education to examine the impact of 3D molecular visualization in biology education. The project goal is to assess whether comprehensive 3D visualization learning materials effectively improve STEM learning outcomes and enhance the learning experience. The learning module is currently being implemented in the first year biology course and the study will address how various 3D technologies influence student learning outcomes and motivation. Professor Sarac's research focuses on the structure and function of macromolecules such as ion channel proteins. She has expanded this work to evaluate how molecular visualization in a 3D setting like the CIVS Theater enhances the learning environment. Professor Sarac was a recipient of the fall 2015 Teaching Innovation Grant and also teaches molecular techniques and anatomy and physiology courses in the Department of Biological Sciences.

## Safety Training for Fall Protection

CVIS is developing a fall protection simulator for training in the steel industry. Initial development funded through Association for Iron and Steel Technology’s Don B. Daily Safety grant has served as a foundation for other development through the Steel Manufacturing Consortium at CVIS. A technical committee advising the development includes consortium members and industry partners. Nucor has provided reference incidents; U.S. Steel Canada and Steel Dynamics each provided scripted scenarios. A paper describing the developments will be presented at the AISTech conference in Pittsburgh, May 16-19.



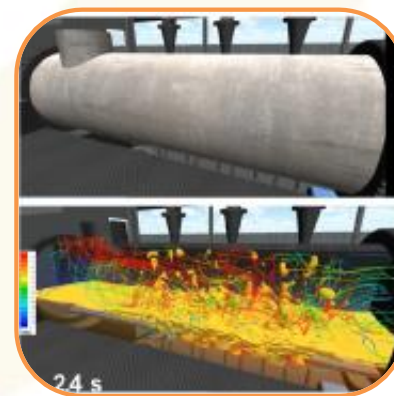
## Global Leadership Simulator

Global Leadership is a topic in the behavioral sciences and in the business environment. With a globalized society a number of large companies need for leaders to know how to influence and inspire different people from different cultures. Virtual training environments are the fastest and safest way to prepare the global leaders of tomorrow. This project created a simulation with leadership learning situations to practice and enhance behaviors in a practical global scenario. The design was made based on the Brazilian Culture, specifically the city, São Paulo. In the simulation, the subject or player would have to travel to Brazil, recognize and interact with the location and Brazilian people, show his product, and close the deal with a public department.



## Simulation and Visualization of a New Copper Smelting Technology

Bath smelting technology, such as bottom-blown oxygen furnace is used in modern copper making industry. To help provide industry with a better understanding of the smelting process, CVIS research assistants developed a 3D computational fluid dynamics (CFD) model of the furnaces’ working process and a virtual reality (VR) visualization model to visualize the process. The CFD model will be used to understanding the process and conduct optimization to ensure high furnace throughput with high product quality. Both the CFD model and the VR model is under final development stage, and they will be used for troubleshooting, process optimization, and training purpose, which will provide real-world improvement and cost saving for the company.



## Student Success: Jerry Dekker



Jerry Dekker was one of the first students to join CVIS. He began his undergraduate degree in Computer Science in 2005, and joined the Purdue Calumet Visualization Lab in 2008, working on a virtual reality program for chemistry and the Plank Visualization project for Astronomy. He continued on to his M.S. degree and joined CVIS when the center was established in 2009. During his time at CVIS, he worked as one of the center’s lead programmers and system administrators, helping to develop VR software, 3D simulators, and a variety of utilities to help with the center’s workflow. Projects included simulators for Wind, Civil Engineering, Astronomy, Chemistry, Disaster Planning, Dance with Motion Capture, and many others. Jerry went on to work at ESMA Inc, in South Holland, IL, a manufacturer of high quality ultrasonic cleaners, washers, and electropolishing equipment.

## Examples of Funded Projects

PROJECT	SPONSOR
Automotive Manufacturing Technical Education Simulator	AMTEC
Computer Modeling of E-Iron Nugget Process for Alternative Energy	Lawrence Livermore National Labs
Numerical Simulation and Optimization of Bottom-Blow Basic Oxygen Furnace	Dongying Fangyuan Nonferrous Metals
Flue Structural and Thermal Modeling of an Anode Baking Furnace	ALCOA
Descartes' Meditations	Professor Howard Cohen
Selective Catalytic Reduction Flow Model	NIPSCO

## Steel Consortium Updates – [www.steelconsortium.org](http://www.steelconsortium.org)

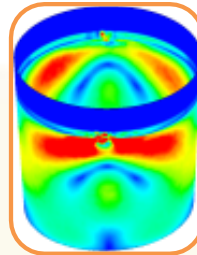
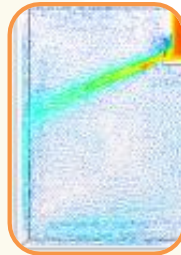
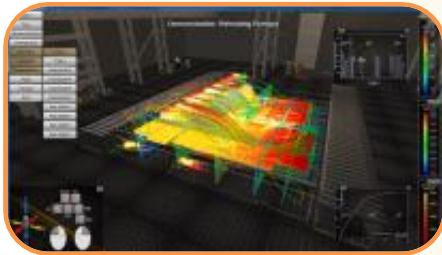
**Research Projects Moving Forward** – Eight focus areas identified: workplace & process safety, energy efficiency, operational efficiency, reliability and maintenance, workforce development, environmental impacts, raw materials utilization and smart manufacturing. Seven projects selected as the first group of consortium projects based on the roadmap. These projects cover topics of safety training, blast furnace, electric arc furnace, reheating furnace, primary and secondary cooling of casting, and the ladle.

**Semi-annual Meeting on June 6, 2016** – The SMSVC semiannual meeting for project updates will be held in conjunction with the Board of Directors meeting to discuss new research for 2017, new member initiatives, and future planning. The meeting is open to member companies only. Contact Doreen Gaboyan at [gaboyand@pnw.edu](mailto:gaboyand@pnw.edu) for more information.

**Web Domain Change** – Purdue University Calumet is changing its name to Purdue University Northwest. Our e-mail and web domains have been changed from purduecal.edu to pnw.edu. Purdue University Northwest will be in full operation July 1. Our new consortium e-mail is [steelconsortium@pnw.edu](mailto:steelconsortium@pnw.edu).

### Consortium Project Topics

- Safety Training
- Blast Furnace
- Electric Arc Furnace
- Reheating Furnace
- Primary Cooling for Casting
- Secondary Cooling for Casting
- Ladle



## Facts and Impact (Since 2009)

- \$38++ million savings for companies
- \$11+ million in external grants and contracts
- 93 external organizations collaborated with CIVS
- 150+ projects
- 147 technical publications
- 230 national and local news
- 1000+ students employed and mentored
- 4,100+ students used CIVS for virtual labs
- 87 Purdue Calumet faculty and staff collaborators
- 52 student awards
- 51 undergraduate research grants (since 2011)
- 22,000+ local and global visitors

### Office of Institutional Advancement – Giving to CIVS



It begins with an opportunity to GIVE something back to a University you care about. It ends with the realization that you helped that University GROW into something even more worthwhile than before. Are you ready to be a leader and INSPIRE others? Make a gift today by visiting us at [centers.pnw.edu/civs](http://centers.pnw.edu/civs) and clicking the “Give to CIVS” button. Specify “Center for Innovation through Visualization and Simulation”. For more information please contact:

Kelly Doucet, Interim Coordinator of Annual Giving Programs, 219.989.2323, [annualgiving@pnw.edu](mailto:annualgiving@pnw.edu)