CIVS Newsletter

March 2021 — *"Where Ideas Become Reality"* — Issue 27

CENTER FOR INNOVATION THROUGH VISUALIZATION & SIMULATION

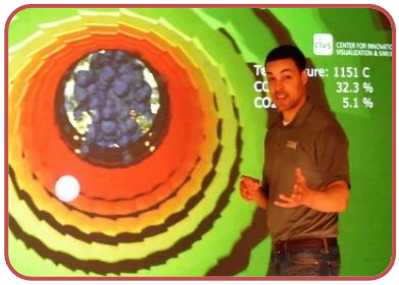
PURDUE UNIVERSITY NORTHWEST

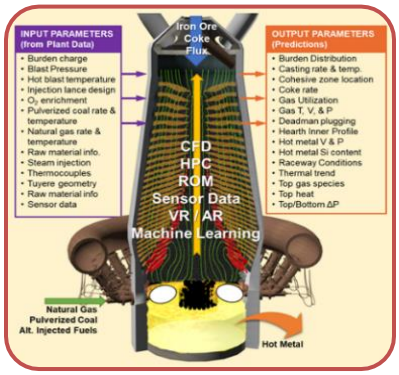
STEEL MANUFACTURING SIMULATION & VISUALIZATION CONSORTIUM

2200 169th Street
Hammond, IN 46323

219.989.2765
civs@pnw.edu
www.pnw.edu/civs

$7 million DOE Grant for "Integrated Virtual Blast Furnace for Real-time Energy Efficiency Improvement"



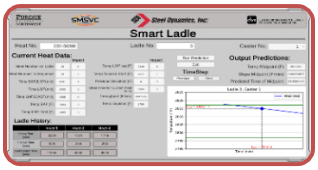


The U.S. Department of Energy announced on January 2021 that PNW Steel Manufacturing Simulation and Visualization Consortium (SMSVC) housed at CIVS was selected to develop a next-generation Integrated Virtual Blast Furnace (IVBF). The $7M 3-year grant will allow CIVS to bring together a team of experts from Purdue Northwest and West Lafayette, Oak Ridge National Lab, and companies in the U.S. including Cleveland-Cliffs, Linde, and U. S. Steel. The project will provide a unique and powerful platform for improving operational and energy efficiency as well as emissions in blast furnaces both offline and in real time. "This project is an excellent example of the positive effect CIVS has on the regional and national economy and serves as a strong foundation for further research over the coming years," said Kenneth C. Holford, PNW provost and vice chancellor for academic affairs. "We are very grateful for this prestigious award by DOE and the strong support from our university, collaborators and supporters," said Chenn Zhou, CIVS director. "The project is expected to have a significant impact by reducing energy consumption by 4.5% to 10% in blast furnace and downstream processes, improving productivity and product quality, and reducing emissions," explained Tyamo Okosun, CIVS senior research engineer who will head the project. The project is also expected to generate education and training modules to provide critically needed workforce development within the steel industry. See more in **PNW News** & **CIVS News…**

Congressman Frank Mrvan Visits

Congressman Frank J. Mrvan visited CIVS on Oct. 7th, 2020. His two-hour visit included discussion of CIVS and SMSVC projects. Of particular interest was the presentation of ongoing work to support the U.S. steelmaking industry, renewable energy, workforce development, etc. Congressman Mrvan said recently. "I am grateful for the opportunity to tour CIVS last year, and understand the incredible benefit that the research at Purdue Northwest provides our industrial manufacturing base. Their capabilities are critical to the strength of our regional economy and the ability of Northwest Indiana steelworkers and tradesmen to utilize their skills with innovative technology and be a global leader in manufacturing." **More…**

AIST 2021 Digitalization Applications Technology Best Paper Award



Congratulations to CIVS researchers (Nick Walla, Zhankun Luo, Chenn Zhou) and collaborator Yury Krotov (Steel Dynamics, Inc.) on receiving the AIST 2021 Digitalization Applications Technology Best Paper Award. The paper is titled "Smart Ladle: AI - Based Tool for Optimizing Casting Temperature". **More…**

Presentation of Simulator at Virtual Die Casting R&D Meeting

CIVS Senior Research Scientist, John Moreland showcased the latest developments on the die casting process simulator at the Virtual Die Casting R&D Meeting on Feb. 11 hosted by the North American Die Casting Association (NADCA). **More…**

Virtual Wind Turbine Simulator Presented at NSF Conference

Research Scientist John Moreland & Research Engineer Kyle Toth presented the most recent version of the "Troubleshooting and Safety Simulator for Wind Turbine Technicians" project at NSF's annual Advanced Technology Education PI Conference, held Oct. 19-23. **More…**

Caster Digital Twin Presented

Research engineer Kyle Toth gave a presentation and a live demonstration of the Caster Digital Twin at a Clean Energy Smart Manufacturing Innovation Institute (CESMII) meeting on Feb. 2, 2021. **More…**

CIVS Received Grant to Optimize Gopher's Reverberatory Furnace

CIVS, in collaboration with Gopher Resource, recently received an exciting new grant entitled "Numerical Simulation of a Secondary Lead Reverberatory Furnace." The project is a component of the larger project entitled "Design of Synthesis of Materials for Agile Manufacturing," led by the Center for Resource Recovery and Recycling at the Worcester Polytechnic Institute (WPI). **More…**

CIVS Joins Purdue's Team in CYMANII

CIVS is part of the Purdue team which is one of five founding university members of Innovation Institute (CyManII) to improve cybersecurity and energy efficiency for American manufacturing. CIVS will assist in the application of cybersecurity technologies to steel and other manufacturing processes. The University of Texas at San Antonio is leading the $110 million national effort joining the national Cybersecurity Manufacturing. **More…**

CIVS Director Gave Invited Lectures at AIST and DOE Workshops

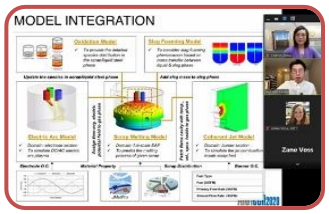
Dr Chenn Zhou delivered an invited presentation at the Department of Energy Workshop on Transforming the Way Industry Uses Thermal Process Energy – Transformative Supplemental Technologies on Dec. 2, 2020. **More…**

Dr. Zhou was also an invited speaker and panelist at the AIST Steel Mill Combustion and Thermal Systems conference on Oct. 28, 2021. She gave a lecture on CFD Application in the Steel Industry: Fundamentals and Applications. **More…**

PNW Undergraduate Research & IN Space Grants Awarded to CIVS Students

Sixteen CIVS Students were awarded PNW Undergraduate Research and Indiana Space Grants to support their senior design and research projects on Oct. 16, 2020. **More…**

Electric Arc Furnace Models Presented at Virtual AIST Electric Steelmaking Committee Meeting and Virtual TMS



CIVS Ph.D. Student, Yuchao Chen, was invited to present his research findings at the AIST Electric Steelmaking committee meeting on Oct. 20, 2020. **More…**

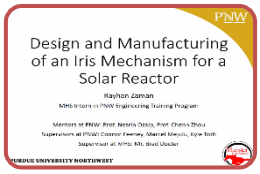
He also presented "A study of numerical modeling of jet heating phenomenon in porous media" at the Minerals, Metals & Materials Society (TMS) 2021 Virtual conference on March 15th, 2021. **More…**

Two CIVS Research Assistants Received Master's Degrees

John Resa, CIVS Graduate Research Assistant, received a Master's Degree in Mechanical Engineering from PNW with the thesis titled "Numerical Study of Solidification and Thermal-Mechanical Behaviors in a Continuous Caster" in Dec., 2020. He will work at NSWC Crane Division. **More…**

Aoya Sun, CIVS Visualization Graduate Research Assistant, received a MBA degree and a Master's Degree in Electrical and Computer Engineering from PNW with the thesis titled "Development of an Interactive Virtual Environment for Training Manufacturing Operators" in Dec. 2020. Recently, she will work as a software engineer at Goldman Sachs. **More…**

PNW MCE, CIVS & Munster High School Partnerships for Internships

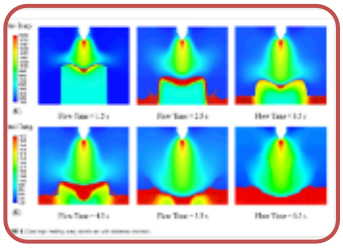


The Engineering Internship Program for high school students began in fall 2019 through PNW's department of Mechanical and Civil Engineering (MCE) and CIVS, partnering with Munster High School. **More…**

"Home Energy Savings Simulator" won 1st place in Senior Design Competition

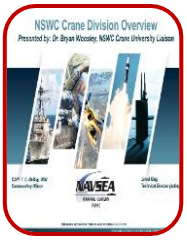
On Dec. 11, 2020, the Senior Design Competition was held virtually. The "Design of Home Energy Savings Simulator" by Roberto Torres, Patrick Gazzillo, and Katie Schoeling was ranked #1. The "Development of a Blast Furnace Simulator" by Adam Binder and Nicholas Rheinheimer also won third place. **More…**

EAF Arc Melting Paper Published in Frontiers in Materials Journal



Yuchao Chen, Qingxuan Luo, Armin Silaen, and Chenn Zhou published the paper entitled "Multi-Physics Modeling of Steel Ingot Melting by Electric Arc Plasma and its Application to Electric Arc Furnace" in the journal of Frontiers in Materials, Vol. 7. It describes a numerical model coupling the electric arc plasma, solid melting, and liquid flow together to simulate the steel ingot melting process using electric arcs. **More…**

Dr. Bryan Woosley Presented at CIVS



On Oct. 30, 2020, Dr. Woosley was invited to give a talk at CIVS with an overview of NSWC Crane Division and introduced employment and scholarship opportunities at Naval Surface Warfare Center Crane Division. **More…**

SMSVC Hosts Successful Virtual Annual Review Meeting

The SMSVC successfully held its second virtual annual meeting via WebEx on Nov. 3rd & 4th, 2020. Over 110 attendees, including engineers, researchers, and managers from 15 SMSVC member companies as well as CIVS staff and students, connected virtually over the two-day online meeting. Seven Project presentations were made and received very positive feedback **More…**

Cleveland Cliffs Senior Director visited CIVS

Nick Kohlhas, Senior Director for Technical Services at Cleveland-Cliffs Company, spent several hours visiting CIVS to discuss ongoing projects, the SMSVC, and future collaborations on February 22, 2021. The group was also joined by Burns Harbor Area Manager Alex Samardzich, who has worked directly with CIVS team on the development of a caster digital twin. **More…**

AIST Scholarship and Benefit Information Session

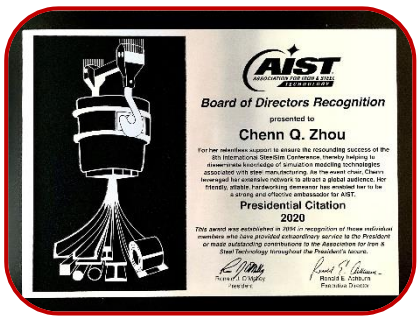
48 PNW students and staff attended the virtual AIST Information Session regarding scholarships and benefit's available to students on Friday, January 29, 2021 via Zoom. **More…**

One Region Lakeshore Chamber of Commerce Meeting at CIVS

One Region Lakeshore Chamber of Commerce held its meeting at CIVS on Febr.18th. Jeff Rea, the current president and CEO of the South Bend Regional Chamber of Commerce , was featured speaker in the meeting. CIVS overviews was also made to attendees. **More…**

CIVS Director Received the 2020 AIST Presidential Citation Award

CIVS Director, Dr. Chenn Zhou, received the 2020 AIST Presidential Citation Award. Presented by AIST President, Ronald J. O'Malley for her "relentless support to ensure the resounding success of the 8th International SteelSim Conference, thereby helping to disseminate knowledge of simulation modeling technologies associated with steel manufacturing. As the event chair, Chenn leveraged her extensive network to attract a global audience. Her friendly, affable, hardworking demeanor has enabled her to be a strong and effective ambassador for AIST." **More…**



SMSVC NOTES

Online Spring 2021 Semi-Annual Meeting:

April 21 - 22, 2021

SMSVC Accepting New Members

SMSVC is accepting new members. If interested in becoming a member, please contact Melissa Mollett at mmollett@pnw.edu.

For information on the Consortium, visit steelconsortium.org.

Facts and Impact [Since 2009]

- $40+ million savings for companies
- $27,100,000+ in external grants and contracts
- 150+ external organizations collaborated with CIVS
- 405+ projects
- 575+ national and local news
- 1,700+ students employed and mentored
- 11,300+ students used CIVS for virtual labs
- 145+ Purdue Northwest faculty and staff collaborators
- 266 student awards and grants (globally, since 2011)
- 35,320+ local and global visitors