About the Program

Energy is the second-greatest cost of conversion in the steel industry. Improving energy efficiency will drive down costs in the production of steel. This comprehensive training, with hands-on activities, has been developed to educate attendees on the key aspects of these important utilities in the steel production process. The seminar is a joint effort between the AIST Energy & Utilities Technology Committee and the U.S. Department of Energy’s Better Buildings Initiative.

The subject matter includes electricity, compressed air, thermo processes, along with an introduction to alternative energy options. The course will focus on the energy-efficiency and saving aspects of each utility along with insights to improving reliability. Tools for energy calculations for specific utilities will be discussed. Oak Ridge National Laboratory, home of the world’s most powerful supercomputer, is an ideal location for the latest in technical equipment for hands-on training. As an example, the hands-on sessions will provide in-depth understanding of how motor/drive systems operate and can result in energy savings.

In addition, there will be in-depth training related to overall plant energy savings programs, providing insights into what it takes to implement a long-term strategic plan. The instructors are nationally recognized experts from Oak Ridge National Laboratory and the U.S. Department of Energy, as well as steel industry experts.

Attendees will also have an opportunity to see the latest technological developments at Oak Ridge National Laboratory, including a tour of the world’s fastest supercomputer and the world’s largest concentration of 3D printing equipment. These aspects of the tour are intended to illustrate the opportunities available for collaborative research and for creating full-scale replacement parts via additive manufacturing.

Organized By
AIST’s Energy & Utilities Technology Committee and

Energy and Utilities
Industry Insights and Fundamentals Workshop
7–10 October 2019
Oak Ridge National Laboratory
Oak Ridge, Tenn., USA

Who Should Attend
The tools and programs presented will be beneficial to individuals or plants wanting to implement an energy optimization plan (long term or short term) in all areas of steel manufacturing. Energy managers and engineers, facility managers, electrical managers and electrical project engineers and management personnel with oversight responsibility for plant utilities should consider this course. The workshop offers a great overview for new engineers, providing a basic understanding of energy-related aspects of utilities in steelmaking and a foundation to recognize and implement energy savings projects.

Registration Includes
Registration includes welcome reception Monday, breakfast and lunch Tuesday and Wednesday, and a course workbook or flash drive including presentations. Please note that all registrations must be submitted by Thursday, 26 September, so that Oak Ridge National Laboratory can complete any security clearances.

Hotel Accommodations
A block of rooms has been reserved at the Embassy Suites by Hilton Knoxville West. Please call the hotel at +1.865.246.2309 by 16 September 2019 to secure the AIST discount rate of US$149 per night for single/double occupancy.

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### Schedule of Events

**Monday, 7 October 2019**
- 4–6 p.m. Registration at Embassy Suites by Hilton Knoxville West
- 6–7 p.m. Welcome Reception at Embassy Suites by Hilton West

**Tuesday, 8 October 2019**
- 7:45 a.m. Bus departs for Oak Ridge National Laboratory
- 8:15 a.m. Registration at Oak Ridge National Laboratory
- 9 a.m. Introductions and Opening Remarks
- 9:15 a.m. Introduction to Energy Management
- 10 a.m. Break
- 10:30 a.m. Training Session on Energy Management Systems, Industrial Energy Efficiency Standard (ISO 50001), and DOE’s 50001 Ready Navigator Tool
- 10:45 a.m. Thomas Winning, Oak Ridge National Laboratory, and Rishabh Batel, ArcelorMittal Cleveland

This session provides an overview on the DOE’s training, tools and resources on energy management for manufacturers that can help in implementing an ISO 50001-compliant energy management system. The presenters will also introduce the audience to the DOE’s 50001 Ready Navigator Tool, which helps manufacturers walk through the process of implementing an energy management system, track progress and collaborate with teams.

- 11:15 a.m. Baseline and Rating/Planning Energy Performance
- 11:30 a.m. Sachin Nembalker, Oak Ridge National Laboratory, Larry Fabina, ArcelorMittal Burns Harbor, and Betsy Dutrow, U.S. Environmental Protection

This session will discuss available approaches for energy benchmarking that evaluate energy efficiency in a steel plant. Attendees will learn about ePlant Energy Profiler, Energy Footprint, Energy Performance Indicator (EnPI) Tools and ENERGY STAR Benchmark Tool for Integrated Steel Mills.

- Noon Lunch

### Wednesday, 9 October 2019
- 7:45 a.m. Bus Departs for Oak Ridge National Laboratory
- 8:30 a.m. Motors and Motor-Driven Systems (Fans, Pumps and Drives) – Energy Losses, Energy Efficiency Opportunities and DOE’s PSAS and SATS Tools and Other Resources
- 8:45 a.m. Daryl Cox, Oak Ridge National Laboratory

It is estimated that motor-driven systems account for 65% of the electricity consumed by industry, with operating costs far outweighing the initial purchase price. The presentation will discuss both motor and motor-driven system efficiency. Techniques to quantify energy-saving opportunities will be discussed (including use of the DOE MEASUR software tool) and a portable flow loop will be used to demonstrate some of the principles discussed as they relate to pump and fan systems.

- 10 a.m. Break
- 10:15 a.m. Compressed Air System – Energy Losses, Energy Efficiency Opportunities and DOE’s AirMaster+ Tool and Other Resources
- 10:30 a.m. Kiran Thirumaran, Oak Ridge National Laboratory

Compressed air systems consume around 7% of the total electricity used for production in the U.S. manufacturing sector. With almost 80% of this input electricity being dissipated as heat, compressed air is a very expensive resource, with significant potential for energy savings. The presentation will discuss the pros and cons of the different compressor configurations and its contacts with examples from the field. In addition to providing background information on compressed air usage in the iron and steel industry, commonly identified compressed air energy efficiency opportunities are also discussed. The various resources developed by the Department of Energy specifically for modeling and identifying opportunities in compressed air system, including the AirMaster+ tool, are presented along with a brief demonstration.

- 11:45 a.m. Energy Efficiency Primer for Water/Wastewater Treatment Operations
- 11:45 a.m. Wei Guo, Oak Ridge National Laboratory

In the iron and steel sector, water management aims at improving the sustainability of the production cycle, resulting in resource efficiency benefits and in reduced water demand and costs. This session will cover energy and water efficiency opportunities in on-site wastewater treatment operations in iron and steel plants.

- Noon Working Lunch
- 1 p.m. Utility Bill Overview and Incentive Review
- 1:15 p.m. Rishabh Batel, ArcelorMittal Cleveland

The presentation will cover the basic components of a utility bill and the key components to keep a track of. It will train the utility personnel to look out for potential savings in the bill.

- 1:45 p.m. Alternative Energy – Available Technology and Incentives for Implementation
- 2 p.m. Break
- 2:45 p.m. Simulation and Visualization for Energy Reduction in Steel Manufacturing
- 2:45 p.m. Chein Zhou, Purdue University Northwest

Advanced simulation and visualization technologies are increasingly playing a key role for energy reduction in steel manufacturing. These technologies can provide coherent understandings of complex phenomena and processes, and enable faster and better decision-making for process design, optimization, troubleshooting and training. The Steel Manufacturing Simulation and Visualization Consortium (SMSVC) has been formed with the mission to develop and implement innovative technical solutions, through the development of advanced computer simulation and visualization technologies, for the value chain of U.S. steel manufacturing. Energy efficiency is a major focus in SMSVC research. To-date research outcomes include improved energy efficiencies and identification of energy reduction opportunities. This presentation will include an overview of the SMSVC, simulation and visualization technologies and methodologies, as well as high-impact project examples.

- 3:45 p.m. Roundtable Discussion
- 4:30 p.m. Return From Oak Ridge National Laboratory

**Thursday, 10 October 2019**
- 7:30 a.m. Bus Departure for Oak Ridge Manufacturing Demonstration Facility
- 8:15 a.m. Tour of Oak Ridge Manufacturing Demonstration Facility
- 8:45 a.m. Wei Guo, Oak Ridge National Laboratory

Additive manufacturing (using electron beam, ultrasonic and laser metal deposition methods), also the research laboratory equipment used for testing the physical properties of new and exotic materials.

- 9 a.m. Transfer to Oak Ridge National Laboratory Campus
- 9:30 a.m. Tour of Manhattan Project Nuclear Reactor Museum
- 10 a.m. Visit to Oak Ridge National Laboratory Campus
- 10:30 a.m. Transfer to Oak Ridge Advanced Material Characterization Facility and Test Spallation Neutron Source Facility
- 11 a.m. Research into new material properties using a neutron source accelerator.

- 12:15 p.m. Tour to Oak Ridge Manufacturing Demonstration Facility
- 12:30 p.m. Adjourn Conference