

Background:

The Center for Iron and Steelmaking Research (CISR) is a University/Industry Cooperative Center devoted to education and research related to the production of iron and steel. The CISR was established in 1985 with a special grant from the National Science Foundation and initially eleven industrial members. The Center currently has ten major industrial members who support the Center financially and technically and is the largest academic center for steelmaking research in the USA. The Center also receives funding from several US government agencies.

The Center not only involves steel producers but also suppliers of materials and services. Over the past twenty-five years, over seventy students have taken positions with steel and steel related companies.

Mission:

“The mission of CISR is to conduct basic and long term research to improve the production and quality of steel and to educate students for the steel industry.”

Research Programs:

The CISR conducts research projects in ironmaking, steelmaking, clean steel, and casting. Typically the Center has about twelve projects at any given time. The projects are designed in conjunction with and approved by the industrial partners and last approximately three years. Two Center meetings are held annually in Pittsburgh (normally in May/June and October/November). During these meetings, feedback is given on existing projects, and new projects are planned.

The CISR has unique high temperature equipment, including confocal scanning laser microscopy for *in situ* study of high-temperature reactions, and a cold-finger probe to quantify heat transfer through mold-flux films. CISR researchers make extensive use of the instruments in the Materials Characterization Facility of the Department of Materials Science and Engineering, including scanning electron microscopy for automated inclusion analysis, focused ion beam instruments, X-ray diffraction and X-ray fluorescence.

Partner Benefits:

The industrial partners have a number of benefits including:

- Selection of research topics
- Access to research results, with two extensive progress reports and meetings each year
- Access to individual student researchers and the ability to evaluate them for future positions
- Royalty free use of any patents, process development or software
- The ability to send researchers to CISR to conduct research and audit selected courses
- High leveraging of research funds
- Overhead cost waiver by the University

Fees and Funding:

The total research budget of CISR is about one million dollars per year. The annual member fees range from about \$45,000 for small producers and suppliers to \$60,000 for large integrated producers. In addition, CISR receives additional funding from government programs. An industrial partner receives about a twenty-five to one leveraging of their funds. A typical project costs about \$90,000 per year.

For more information please contact:

P. Chris Pistorius

Telephone: 412-268-7248

E-mail: pistorius@cmu.edu

Bryan Webler

Telephone: 412-268-2675

E-mail: webler@cmu.edu

Roxann Martin Eckman (Administrator)

Telephone: 412-268-2683

E-mail: roxann@cmu.edu

Richard J. Fruehan

Telephone: 412-268-2677

E-mail: fruehan@andrew.cmu.edu

Website: <http://www.cmu-cisr.org/>

Industrial Members

ArcelorMittal USA

Nucor Steel Crawfordsville

Nucor Steel Berkeley

Nucor Steel Decatur

POSCO

Praxair Inc.

Saudi Basic Industries Corporation (Hadeed)

Universal Stainless

U.S. Steel Research and Technology Center

Vallourec Star

Current Projects

Carbon transfer from direct-reduced iron in EAF steelmaking

Impurity control in Advanced High-Strength Steel

Inclusion changes during reoxidation

Modeling kinetics of inclusion changes during steel processing

Transient inclusion changes in silicomanganese-deoxidized steels

Inclusion size distributions in liquid steel

Automated inclusion analysis – instrument effects and automated inclusion classification

Heat transfer through mold flux

Oscillation mark formation

Cracking of continuously cast Advanced High-Strength Steel slabs

Oxidation of Advanced High-strength Steel

Policy for Visiting Researchers

The CISR offers a special program for employees or any designated person of CISR member companies. Given below are the general guidelines for the program.

1. The Visiting Researcher can come for any length of time up to two years. We recommend a minimum of 6-8 months.
2. The Visiting Researcher may conduct research of mutual interest to their company and CISR in general. No confidential or restricted research should be done. The research, in general, will be reported to all CISR members in the usual manner.
3. The Visiting Researcher may participate in courses given by CISR faculty, including Kinetics of metallurgical reactions and processes, Thermodynamics, Solidification, Metal-environment reactions and Computational thermodynamics.
4. There is no cost to the member company or the Visiting Researcher for the program including use of research facilities, faculty supervision or participating in courses. There will be no charge for experimental materials used in CISR projects.
5. The member company or Researcher is responsible for all living and traveling expenses of the Researcher.