

Emmanuel De Moor Colorado School of Mines

KENT D. PEASLEE JUNIOR FACULTY AWARD

A variety of graduate research topics pertaining to sheet, bar and plate steels with research scope proposed by industrial partners are being pursued. The predominant focus of the research is physical metallurgy of steel products. Activities toward building student interest in the steel industry were organized inside and outside the classroom. A number of guest speakers presented on ferrous metallurgy to show the high-tech fundamental research serving the steel industry and get students excited about ferrous metallurgy.

Spring 2020 plant tours and presentations planned for AISTech 2020 and MS&T 2020 were canceled. Papers were prepared for AISTech and MS&T and will be published at a later date through AIST publications.

A senior design team worked during spring 2020 to build a tabletop and laboratory-scale blast furnace. The student team designed and built two furnaces which were successful at melting iron. Students learned about the workings of the blast furnace, cokemaking, slag formation, etc. The senior design project will be proposed to future students, and future iterations of the project will be dedicated toward iron ore reduction by further expanding on the initial designs.

De Moor, along with steel industry representatives and past interns in the industry, presented to the Colorado School of Mines Material Advantage Chapter about research and careers in the steel industry in addition to highlighting opportunities as an undergraduate student and scholarship opportunities with AIST. Two undergraduate students have been awarded AIST scholarships. These initiatives will continue beyond the present program and hopefully these will result into a growing number of AIST scholarship applicants and hires into the steel industry.

The Ph.D. and M.S. students which De Moor is advising are working on the following research topics:

- Influence of hot rolling condition on precipitation and segregation of microalloy elements in low-carbon plate steel.
- Processing effects on interphase precipitation in titanium-molybdenum-vanadium microalloyed steels.
- High-temperature vacuum carburizing of steels enhanced with Mo and Nb additions.
- Double soaking of medium-manganese steels.
- Bake hardening behavior in multi-phase steels and PHS grades.
- Microstructural evolution in intercritically annealed medium-manganese steels.
- Characterization of carbon in direct reduced iron and hot briquetted iron.
- Hydrogen embrittlement of high-strength medium-carbon steels.



De Moor worked with academic mentor John G. Speer, John Henry Moore Distinguished Professor of Physical Metallurgy and Director, Advanced Steel Processing and Products Research Center, Colorado School of Mines; and industry mentor Narayan S. Pottore, group manager, ArcelorMittal Global R&D – East Chicago.