2020–2021 GRANT RECIPIENT REPORT

Jingjing Qing Georgia Southern University

STEEL CURRICULUM DEVELOPMENT GRANT

This grant has enabled the development of a new steel curriculum for the engineering students at Georgia Southern University. Lectures and labs about steel heat treatment, steelmaking and processing and microstructure were tailored based on Georgia Southern engineering students' background and knowledge level.

The goals of the project were to develop a senior-level to graduate-level course for Georgia Southern mechanical engineering (MENG) and manufacturing (MFGE) students, which covers knowledge and skills needed by the steel and iron industry; design parallel lab activities to enhance students' learning; educate students about steel processing and help students to identify their interest in steel; promote students' networking with local and nationwide steel and iron industries; establish connections between Georgia Southern University and AIST; and prepare Georgia Southern students to work in iron and steel industries.

Jingjing Qing has developed a new course on steel heat treatment and microstructure. The course is made up of two lecture sessions and a lab each week, which allows sufficient communication between students and instructor, as well as enhanced learning with hands-on activities.

This course has been offered in the fall 2020 and spring 2021 semesters, and it was opened to engineering students from both the Mechanical Engineering Department and the Manufacturing Engineering Department. The course is offered as a senior undergraduate session for undergraduate students combined with a graduate session for the graduate students. The course content and the lab activities have been designed based on the knowledge level of the students and also considering the facility capabilities at the Statesboro campus.

The grant has been spent on upgrading the metallurgical teaching facilities. Through the two semesters' teaching, lectures of the course currently cover the following chapters/subjects: iron and its interstitials; strengthening and alloys in irons; Fe-C phase diagrams and carbon steels; ferrite and its morphology; austenite grain formation; substitutional solid solutions and carbides in steels; martensite and its transformation; bainite and its transformation; tempered martensite; hardenability; low toughness and embrittlement of steels; thermal mechanical processing of steels; and surface treatment of steels.

Qing will continue to improve her lecture documents. The lab activities will be improved when additional instruments are acquired and new capabilities are enabled. With less restrictions on travel, Qing will take students to tour steel mills and to attend AIST conferences. Qing will maintain good communication with AIST Foundation, AIST Southeast Member Chapter, and regional and nationwide steel industry to promote students' involvement in the steel and iron industry. Qing is also the recipient of the 2022 Kent D. Peaslee Junior Faculty Award. ✦

Did You Know?

AM Dofasco and Mohawk College Partner on Digital Transformation Project

ArcelorMittal Dofasco has teamed up with researchers from Mohawk College's Sensor Systems and Internet of Things Lab to create a deep learning–based automated slag raking system for its ladle metallurgy station, reports *The Bay Observer* newspaper.

The proposed slag raking system will employ automated sensor and image processing as well as deep learning to better identify and remove slag from molten steel, an operation that requires precision and consistency, *The Bay Observer* said.

The project has received a CA$300,000 Applied Research and Development Grant from the National Sciences and Research Council of Canada, as well as support from Dofasco and Next Generation Manufacturing Canada.

"We believe in the collaboration required to achieve a world's first for digitization at a ladle metallurgy facility," Tony Valeri, vice president of corporate affairs for ArcelorMittal Dofasco, said, according to *The Bay Observer.* "The Mohawk College team's contribution for an imaging and deep learning–based automated system is a critical component of our larger project portfolio."