

2021-2022 GRANT RECIPIENT REPORT

Mingzhi Xu

GEORGIA SOUTHERN UNIVERSITY
KENT D. PEASLEE JUNIOR FACULTY AWARD

Funding from the AIST Foundation is used at Georgia Southern University to enrich the student learning experience in the areas of steelmaking and metalcasting, and to prepare Georgia Southern students for careers in the iron and steel industry.

Thanks to the support of AIST, the Foundry Educational Foundation (FEF), the American Foundry Society (AFS), the iron and steel industry, and university administrators, Georgia Southern University has had another successful year.

One of the most efficient ways to raise interest in iron and steel among the students is the hands-on experience of melting and pouring molten metal. After the completion of the brand-new ferrous foundry in January 2021, Georgia Southern has melted and poured more than 5,000 lbs. of iron since then. The foundry has seen continuous improvements on equipment, including a continuous sand mixer, a LECO C&S analyzer, a teapot pouring ladle, a shotblaster, and a home-built sand core blower.

After the recent additions of the two new courses (Steel Heat Treatment and Microstructure taught by Jingjing Qing, and Metalcasting taught by Mingzhi Xu), a third course, Molten Metal Processes, has been added into the curriculum, and was offered in spring 2023 for the first time to sophomore students. In addition, the university has approved a new emphasis in metalcasting for the mechanical engineering B.S. degree.

Students have hosted more than 10 internal metalcasting events and participated in two national casting competitions. Specifically, Georgia Southern students came in 1st place in the American Foundry Society Southeast Cast Competition, and 2nd place in the Steel Founders' Society of America Cast in Steel competition. The competitions challenged university students to use modern casting tools to creatively design and produce a functioning version of a Celtic leaf sword.

Georgia Southern mechanical and manufacturing engineering students Noah Brack, Shelton Fowler, Xander Bowen and Michael Jones participated in the competition. The team created a 3D model of the sword, designed the gating system with MAGMASOFT, prepared the molds with no-bake sand, and cast the sword with a modified version of the SAE4130 steel.

The student team partnered with Carolina Metal Casting to cast the sword.

Three industry events were held on campus involving more than 50 industry professionals in total. Students have also participated in three plant tours, including Nucor Steel-Berkeley, Aludyne Foundry, and Goldens' Foundry and Machine Co. Students also showed great enthusiasm in attending AIST events, including AIST university visit, MS&T 2021, The Making, Shaping and Treating of Steel training course, Southeast Member Chapter meeting, and AIST workshops. More than US\$20,000 scholarships were awarded to students, including one recipient of the AIST Steel Intern Scholarship.

The proposed research is moving forward, and it has received additional funding from the Ductile Iron Society. Two master's students have graduated in the year 2021-2022, and both are working in the iron and steel industry.



Students pouring cast iron with the new teapot ladle.