

Grant Recipient Report

Kent D. Peaslee Junior Faculty Award

Jean-Charles Stinville, University of Illinois at Urbana-Champaign

This project aims to revitalize interest and engagement in the iron and steel industry by developing a skilled, diverse, and sustainability-focused workforce through educational outreach, industry partnerships and innovative research. Led by Jean-Charles Stinville at the University of Illinois Urbana-Champaign, the initiative combines hands-on student experiences, such as bladesmithing and industrial visits, with graduate research projects on advanced high-strength steels in collaboration with Nucor and Steel Dynamics. Emphasizing innovation, technology and social responsibility, the project seeks to attract the next generation of engineers and scientists to address workforce gaps and drive the future of steel manufacturing in North America.

Over the three years, this project aims to significantly strengthen the pipeline between the University of Illinois at Urbana-Champaign (UIUC) and the iron and steel industry. Key goals include achieving a 50% increase in student interest in the iron and steel sector within the College of Engineering, as assessed by iSTEM and university outreach offices. The program will secure 10 internships and five full-time positions in the steel industry, with a commitment to ensuring that over 35% of these opportunities are allocated to candidates from underrepresented groups. Additionally, the project will support student participation in the AISTech conference, with a target of at least three technical presentations and three technical papers. Two Ph.D. students specializing in iron and steel research will complete their degrees, and the initiative will pursue NSF GOALI funding to strengthen long-term academic-industry collaboration.

The project, led by Jean-Charles Stinville at the University of Illinois at Urbana-Champaign, is a comprehensive initiative designed to re-engage students, faculty and the broader community with the iron and steel industry by developing a modern, diverse and highly skilled workforce. It addresses the pressing need for innovation-driven talent in North America's steel sector, which faces a growing skills gap and evolving market demands.

Central to the project is a focus on hands-on student engagement, industry-integrated research, and educational outreach that spans from K–12 to graduate levels. Activities include the expansion of existing summer programs — such as Mid-GLAM and GEMS — to introduce young students, particularly from underrepresented groups, to metallurgy and sustainable steelmaking practices through the newly proposed “Girls Learning About Steels” module. Undergraduate students will be engaged through TMS Bladesmithing, AIST video contests and senior design projects directly tied to real-world problems provided by Nucor Corp. and Steel Dynamics Inc.

In addition, biannual field trips to Nucor Steel–Indiana and the planned visit to Steel Dynamics in Heartland, Ind., USA, will give approximately 30 students per trip the opportunity to see steel manufacturing in action and engage with professionals in the field. To build community awareness and bridge academic-industrial collaboration, the project will launch an annual “Steel and Fracture Day,” combining UIUC’s historical strength in fracture mechanics with a modern focus on sustainable steelmaking and industry innovation. On the research front, two graduate research thrusts will be launched in close collaboration with industrial partners: one investigating strain partitioning in dual-phase and complex-phase steels to optimize mechanical performance, and another exploring novel processing routes for boron-containing high-strength steels to improve sustainability and structural properties. These projects aim not only to advance fundamental understanding but also to translate directly into industrial impact. The project emphasizes sustainability, digital innovation and social responsibility — core values of Generation Z and Alpha — ensuring alignment with the expectations of the future workforce. It also targets measurable outcomes, including increased student interest in steel-related careers, publication of research findings, acquisition of NSF GOALI funding, and expanded internship and job placement opportunities, particularly for underrepresented students. Through this multifaceted approach, the project aims to reinvigorate the steel industry’s image, enhance academic-industry synergy, and contribute to the long-term resilience and technological advancement of steel manufacturing in the U.S. The existing MSE Metals and Alloys elective class, which devotes 6 weeks to steelmaking and steel heat treating, is often taken by mechanical engineering, industrial and systems engineering, and civil and environmental engineering students. Virginia Tech takes a hands-on, engaging approach to education and the on-campus foundry allows the students to perform melting and casting.