



Request for Proposal

The Ductile Iron Society (DIS) Research Committee is soliciting universities and research organizations to participate in a DIS research initiative. The DIS mission is to promote the production and application of ductile and compacted graphite iron. Completed projects may be published by DIS on their website and by the International Journal of Metalcasting (IJMC), by request.

The following describes a research need identified by the members of the DIS research committee. Attached to this document is the DIS proposal template. Interested universities and research organizations can complete the proposal, modifying the scope as they deem appropriate. Finished proposals should be sent to the DIS Technical Director (techdirector@ductile.org) and will be evaluated for funding based on the quality of the proposal, thoroughness of research methodology, available facilities and capabilities, student participation (if applicable), and projected timeline and cost. Questions regarding DIS or the research proposal can be addressed to the DIS Technical Director.

Topic: Graphitic Expansion for Riserless Casting Design

Steering Committee Members: Jeremy Lipshaw – Chair (Aalberts surface technologies), Trevor Beach (Betz Industries), Mark Fields (Glidewell Foundry), William Gammill (John Deere), Travis Hepfner (BCI Solutions), Peter Kim (Miller and Company), Ken Way (Miller and Company)

Project Goal: The ductile iron industry is pursuing a research project exploring how to exploit graphitic expansion in ductile iron to minimize the usage of risers and increase casting yield.

Proposed Scope of Research: Previous research by the Ductile Iron Society has determined that the cradle-to-gate energy consumption and greenhouse gas emissions are most significantly impacted by casting yield. Therefore, it is of great interest to the ductile iron industry to maximize casting yield.

Casting yield can be maximized through casting design topology optimization and the minimization of the following: gating, risering, slag production, and machining. Riserless, as the practice of adding sacrificial last-to-freeze sections to the casting to remove macro-porosity, adds a significant amount of mass to the casting, thereby reducing casting yield. Typically, the number and volume of risers is reduced through casting design modifications (i.e., keeping section thickness consistent throughout the part or using a non-safety critical section as an internal riser), the usage of chills, or through proper casting practices such as inoculation. A potentially underutilized technique may be taking advantage of the intrinsic graphitic expansion within cast iron. Consequently, this research initiative will explore how to exploit graphitic expansion to minimize the number and volume of risers for standard production.

The selected university or research organization will be responsible for the following tasks:

1. Literature review on graphitic expansion
2. Proof of concept experiments measuring the effects of molding media, inoculation, chemistry, and/or other variables worth considering on graphitic expansion in ductile iron
3. Presentations and reporting
 - Monthly reports to Steering Committee members
 - In-person or virtual progress reports at triannual DIS Research Committee meetings
 - Final written report submitted to DIS for dissemination to its membership
 - Oral in-person presentation of the final written report at a DIS Annual Meeting