



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 and modify the research scope as deemed appropriate. Finished proposals should be sent to the DIS Technical Director (techdirector@ductile.org). Questions regarding DIS, the scope of research, or contractual information can be sent to the DIS Technical Director.

Project Topic: Best Practices for Maximizing Casting Yield by Reducing or Eliminating Risers

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 Best Practices guide that details the current technologies and methodologies used to reduce the number and volume 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. Risering, 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. A multitude of methods exist to minimize the usage of risers; however, most of these methods are either hidden within the literature or held internally as experiential knowledge. Consequently, an all-inclusive Best Practices guide for casting and tooling designers would be very beneficial to the industry.

The ideal guide would not only explain the design rules and guiding principles to reduce the number and volume of risers but it would also present a large range of case studies. Best Practice concepts may include

- 1) Variation in section thickness
- 2) Corners and radii
- 3) Utilizing a non-safety critical casting section as an internal riser
- 4) Chills and inserts
- 5) Inoculation
- 6) Molding media
- 7) Pouring parameters
- 8) Nodularity and nodule count
- 9) Proper gating placement

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

1. Literature review on shrinkage in ductile iron, design guidelines, and processing recommendations
2. 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