



Training and Recruiting High-Quality Next Generation through Industry Partnered Competitions

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Connections to Students through competitions, Cast In Steel



- **Presentation outline:**
 - **Establish connections through student competitions**
 - **Types of competitions**
 - **Cast in Steel**
 - **Why Cast in Steel for ICI members**
 - **Process**
 - **Challenges**
 - **Student Perspective**
 - **Foundry Perspective**
 - **How can a Foundry Participate if Interested?**
 - **Conclusion**
 - **Acknowledgments**



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- Establish connections through student competitions
 - Lack of contact between industry and students
 - Interest on both parties to improve this
 - Get to know each other in an actual project setting
 - Sound like an interview?



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- Types of competitions
 - Academic/Research
 - Research type papers
 - Sponsored but disengaged
 - Formula SAE, MiniBaja SAE
 - Industry partnered
 - Cast In Steel



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- **Cast in Steel**
 - **Students use modern design tools to design a contest entry**
 - **CAD, Solidification simulation, etc.**
 - **Technical and performance element**
 - **Artistic element**
 - **Originality**
 - **“True to historical” item**
 - **2019: Viking Axe**
 - **2020: Bowie Knife**
 - **2021: Thor’s Hammer**
 - **2022: Celtic Sword**
 - **2023: African Spear Point**
 - **Videos (ie Marketing)**
 - **Technical Report**



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- Why Cast in Steel for ICI members
 - Most entries are investment cast due to artistry and detail requirements.



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■ Process

- Student team is paired up with a foundry
- Students design the component
- Foundry tells them why they can't do that (AKA, provide technical expertise!)
- Work collaboratively to improve design, foundry typically will help with technical aspects
- For investment castings, part is 3D printed (by students or foundry)
- Part is produced by foundry
- Foundry may/may not also: provide simulations, heat treat, sharpen, sometimes NDT, etc.

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- **Process (cont)**
 - **The bulk of the geometry must be cast.**
 - **Students will:**
 - **Design parts or features that are not castable, or can be significantly improved**
 - **Select the wrong alloy, or an alloy that is not produced by the foundry (this is where they learn reality)**
 - **Want an item each (thus ideal production will be one item each for each student, competition entry, company, others by the company as gifts), but in reality only one, the competition entry is needed.**
 - **Not understand lead time**
 - **Not communicate properly**
 - **Produce all entry items (report, videos, additional handle fitting, etc.)**
 - **Entries are sent to SFSA**

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- **Challenges**
 - **Students' inexperience**
 - **With real design and deliverables**
 - **With industry**
 - **Unrealistic expectations (Students: Deliver pattern today, expect casting tomorrow; Foundries: assume knowledge and experience that is not there)**
 - **Communication**
 - **General open ended project planning and execution.**
 - **Meeting deadlines, setting effective deadlines, 'freezing' the design (or having a design ready to freeze).**
 - **Team formation**
 - **Internal team communication**
 - **Students do not understand professional behavior**

Examples (2023 Comp)



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■ Student Perspective

- Work with industry
- Professional networking
- Closer to real world experience
 - True capabilities of process beyond textbook
 - What lead times are and why
 - Expectations from industry and professionalism
 - Project management experience
 - Professional communication
 - Teamwork and leadership
- Excitement and fun
- Learn by doing
- Research – how to do practical research to address immediate problems
- Technical skill development (alloy selection, design, new processes, simulation, gating design, patternmaking, 3D printing, heat treatment, materials testing, NDT, etc.).





■ Foundry Perspective

- Fun. It is fun working with students despite occasional frustrations.
- Personally rewarding to see their growth through the process by helping educate students with a real world project and show the realities of working in/with industry
- Exposing the next generation to casting
- Become actively engaged with the university for projects
- Screening for hiring
- Showcasing company and capabilities
- One common situation is that students, through their inexperience, sometimes question some things in the foundry which leads the foundry to learn and/or improve their processes in some areas.



- **How can a Foundry Participate if Interested?**
 - Contact the Steel Founder's Society of America (www.sfsa.org) or Joe Fritz
 - If you have a local school that could be involved and you would like to work with them, introduce them to the contest.
 - Schools with four year engineering degrees have participated but is also open to community colleges
- Currently there is exploration on how to make versions of this competition available to high schools with the same objective: get students interested in metal casting through a compelling, fun and interesting project

Day of Competition

- Final Judging
- Performance tests



We won! Just had to say it...



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■ Conclusion

- The Cast In Steel competition allows students to design and manufacture an interesting and fun competition item. The competition is challenging at a technical, performance and artistic level. The students work directly with a foundry which provides benefits to both parties.

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- Acknowledgements
 - SFSA
 - Students
 - Partner Foundries