



NATIONAL KNOWLEDGE NETWORK

E-Foundry



E-Foundry is a part of the NKN mission to connect knowledge providers and seekers through a high bandwidth network. Users can **freely** access the teaching content developed in IIT-B, to update their knowledge in casting design and simulation.

Teachers: Deliver more interesting lectures, engage students

Students: Understand casting process, explore industry projects

Industry: Gain better insights, ensure casting quality and yield



**DST- Lockheed Martin
India Innovation 2012
Award Winner**



<p>Welcome</p> <p>Onkar</p> <p>Log Out</p>	<div style="text-align: center;"> <h2>E-Foundry</h2> <p>Free online learning resources in casting design and simulation</p> <p><i>For students, teachers, and industry professionals</i></p> </div>			<p>At a Glance</p> <table> <tr> <td>Visits</td> <td>23431</td> </tr> <tr> <td>Users</td> <td>644</td> </tr> <tr> <td>Simulations</td> <td>2748</td> </tr> </table>	Visits	23431	Users	644	Simulations	2748
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<p>Classroom</p> <p>Sim Lab</p> <p>Library</p>	<p>Lesson of the day</p>	<p>Simulation Spotlight</p>	<p>Industrial Cases</p>	<p>Win these Prizes!</p> <p>Display your animation clip, simulation case study or industry video in E-Foundry and win cash prize plus certificate. Entries open for summer 2013.</p> <p>News / Events</p> <p>6th July 2013: Certificate training course for teachers of engineering and polytechnic Institutes, at CHARUSAT, Changa, Gujarat. Brochure</p>						
<p>Tutorial</p> <p>Projects</p> <p>The Hub</p>	<p>Question of the day</p> <p>Which casting metals, processes and phenomenon can be simulated?</p> <p>In theory, any metal that can be melted and poured into a mould can be simulated. In practice, simulated is limited to only those metals and processes for which relevant data is available. This includes thermo-physical properties of metal (like</p> <p>more</p>	<p>Casting Process</p>	<p>Star of the week</p> <p>ARTURO JUAREZ</p> <p>From : UANL</p> <p>Weekly Score : 31</p> <p>Total Score : 33</p>	<p>Gallery</p> <p>About E-Foundry</p> <p>This project is supported by the National Knowledge Network mission of the Government of India, New Delhi. The education content is derived from courses and R&D projects at IIT Bombay.</p>						

Metal Casting Industry

India is among the top three global casting producers, but faces an *acute dearth of skilled manpower*, as per a recent annual report of Institute of Indian Foundrymen. There is an urgent need for manpower trained in CAD & simulation technologies, which are needed for casting quality and yield improvement. The E-Foundry resources can be freely used by students and industry professionals to enhance their knowledge. IIT Bombay also conducts certificate courses to train engineering and polytechnic teachers in using these resources, so they can support their own courses, student labs and industrial projects.

NKN E-Foundry Resources

- **Lesson videos**, in five parts: introduction, science, engineering, technology, and application.
- **Online simulation lab**, which accepts a 3D CAD model and generates solidification images.
- **Reference material**: animations, presentation slides, paper abstracts, industrial case studies, web links.
- **Quizzes and tutorial** with answers for self-evaluation
- **Discussion hub** for questions and answers.
- **Projects page** for researchers.



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Lessons

Introduction Science Engineering Technology Application

Perfect Mold Design

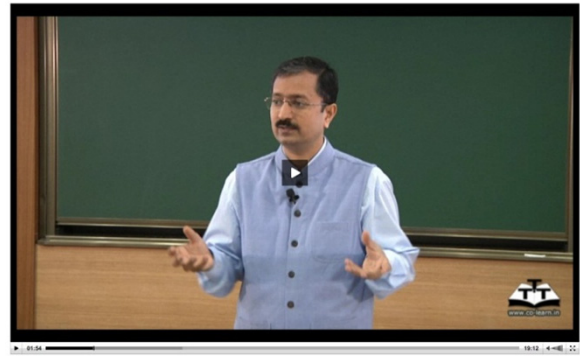
Parting Core Allowances

Perfect Feeder Design

Feeder Types Feeder Design Feedsafe

Perfect Gating Design

Layout Channel Design Evaluation



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Simulation Lab

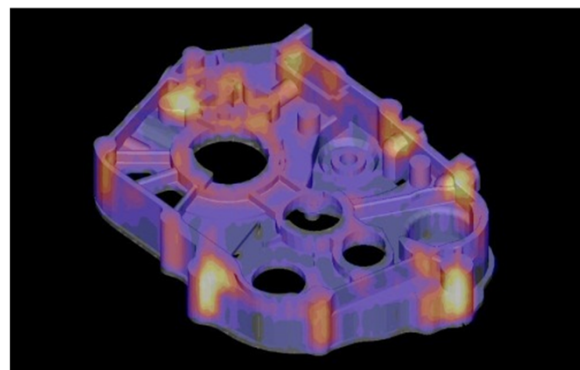
CASTING SIMULATION is a powerful tool to visualize progressive solidification of molten metal inside a mold cavity. It helps in identifying hot spots (yellow regions), which manifest as shrinkage porosity defects. The defect is usually eliminated by connecting a feeder, which is designed to solidify later than the hot spot. It supplies liquid metal to compensate the volumetric contraction at the hot spot. Feeder is cut-off and recycled, hence its size has to be optimized to ensure high yield.

STEPS

1. Solid model a cast part and save it as a STL file.
2. Browse and upload the casting model file here.
3. Wait till the simulation results are displayed.
4. Identify hot spots. Decide feeder size and location.
5. Model the part with feeder and save as a STL file.
6. Simulate again and check the location of hot spots.
7. If hot spots are not shifted inside feeders, repeat 4-6.

STL D:\Simulation\Models\CrankCase.stl

Metal Aluminium
Mold Steel
Mesh Coarse



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Library

Google Custom Search

Abstracts (technical papers published worldwide)

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
2001	2002	2003	2004	2005	2006	2007	2008	2009	2010

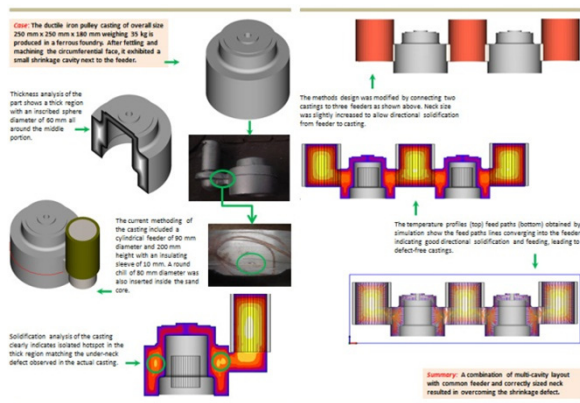
Simulation Cases

Aluminium Copper Cast Iron Ductile Iron Steel

Casting Videos

In-Mold Fill Mold Fill Data Multi-Gate Flow Sand Molding Metal Tapping
Metal Pouring Shakerout Ring Casting Pulley Casting Forging

Web Links (R&D institutes and professional bodies worldwide)



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Tutorial

Exercises

Exercise 12 - Gating Choke Design

Part Data Material Data Mold Data

Pouring rate: $R_p = W/V_p$ (Kg/s) = 2.5

Volumetric flow rate: $R_{vp} = R_p / \rho_{molten}$ (cm³/sec) = 60

Choke area: $A_{choke} = R_{vp} / V_{choke}$ (cm²) =

Gating element cross section: (Assuming ratio 1:2:1.5) Sprue exit

Sprue exit Area: A_{se} (cm²) =

Runner Area: A_r (cm²) =

Gate Area: A_g (cm²) =

Dimensions in cm

Contact:

Prof. B. Ravi, E-Foundry Lab
Mechanical Engineering Department
IIT Bombay, Powai, Mumbai-400076
+91.22.2576.4399 / 2572.3999
efoundry.iitb@gmail.com