

# Online Short-Term Course on "Foundry Engineering"



21<sup>st</sup> -25<sup>th</sup> Sept, 2020

Centre for Continuing Education (CCE)

Indian Institute of Science, Bangalore, India - 560012

## Theme:

1. Refresh basics in Foundry Engineering and prepare to effectively lead productivity improvements.
2. Skill development to become competent and to excel in manufacturing.
3. Introduce contemporary trends in foundry technology.
4. Inculcate engineering focus in process-design, product development.

		DAYS				
		1	2	3	4	5
HOUR	1	Melting	Solidification	Mold Flow	Pressure assisted casting process	Heat Treatment
	2	Furnace Technologies	Feeding Concepts	Gating System Design	Melt fill defects in Pressure Die Casting	Heat Treatment
	3	Melt Preparation and Melt Quality	Influence of part geometry	Melt fill defects	Accelerated Cooling for productivity improvement	CQI-9 Continuous Quality Improvement (for HT Process)
	4	Energy Management, Energy Audit	Casting Parameter Optimization - Case Studies	Melt fill defects – Case Studies	Additive Mfg, Process Parameters – Case Studies	Course Feedback
	5	Cases in Melting Energy Management	Rapid Solidification – Industrial Case Studies	Melt fill defects – Case Studies	Case studies – Microstructure evolution in Additive Mfg.	Conclusion

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## **Description of the \*Case Studies:**

**\*\***(1,4– 1,5) Energy Management; Energy Audit

Operational problems in fuel fired furnaces - induction furnaces – audit-based melt quality controls.

- i. Capacity calculation and operation issue related case study for oil fired furnace.
- ii. Alloy making for proper mixing and chip melting for oxide control
- iii. Crystal pulling furnace controls

(2,4 – 2,5) Casting Parameter Optimization; Solidification rates

- i. Liquidus, eutectic point-based s/w system for process control
- ii. Concept of process optimization and Concept of product quality improvements

(3,4 – 3,5) Metal Fill Defects – Case Studies; Metal Fill Defects – Design Options

Fluid Flow simulation - 3D simulation results

Flow line defects - Control of oxide / oxide bi-film distribution - Pouring spout design - Simulation as a process improvement tool - Dialogue between process design and operation team.

(4,3) Accelerated Cooling for Productivity Improvement

Solidification simulation - riser design - die temperature monitoring, conformal cooling - feeding importance to turbine blades - Cooling rate influence – ferrous and non-ferrous - rapid solidification

(4,4 – 4,5) Additive Mfg. Process Parameters – Case studies; Case studies in Additive Mfg

Energy density - quench cooling - principles extended for welding to additive manufacturing – Materials

(5,3) CQI-9 Continuous Quality Improvements (for HT process)

Process requirement – Data capture – Data handling – Audit process

\*Case studies to cover Data analysis - Weibull distribution – Mechanical properties - Defect distribution - Influence of processing parameters on defect distribution.

**\*\***[Day, Hour]

**Participants:**

1. Manufacturing Engineers
2. Process, Design and Purchasing Engineers
3. New Product Development Managers
4. Engineering Project Managers, Technology Managers
5. Industrial Researchers, Application s/w Designers
6. Practicing Mech/Met Engineer

**Course Coordinator:****Minimum Qualification Required:**

Basic Engineering Degree

- Prof. Satish V. Kailas, Dept. of Mechanical Engineering, Indian Institute of Science, Bangalore - 560012

**Duration:** 5 days (21<sup>st</sup> – 25<sup>th</sup> Sept, 2020)

**Registration:** This course can be attended only by registration. The number of participants is limited to 40. The registration will be accepted on a first-come first-served basis.

**Apply online at:** <http://cce.iisc.ac.in/ssp-stc.html>

**The registration fee is INR 6000 +18%**

**Last Date to Apply:** 13/09/2020

**Note: Classes will be conducted via Microsoft Teams.**

**Dr. Sundara Murthy is a practicing Foundry Specialist and Dr. Ravichandran is a consultant who has worked in several industries. Both are alumnus of IISc, Bangalore.**