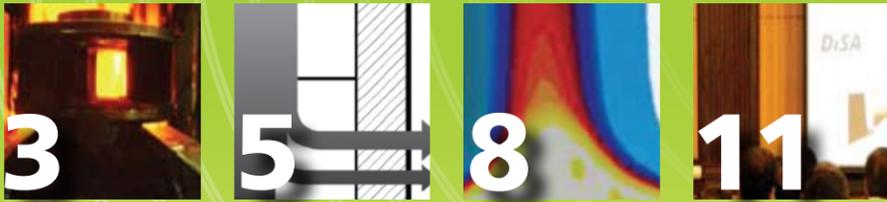


# Foundry Review



**ADI — new dream material for gear designers**  
Taking into account all material and processing cost, ADI is relatively less expensive to manufacture than other commonly used engineering materials

**Induction furnace technology and melting, pouring, automation**  
During the 60s and 70s a dramatic growth of mains frequency induction furnace was seen across the world. This was starting of a boom of induction furnace in foundries

**Simulation of the entire core making production process**  
The simulation of the core making process can significantly improve the predictability of the entire casting production process

**DISA symposiums for foundry industry**  
Disa emphasized the need of upgrading manual foundries with Disa ARPA and other Disa HPML solutions. The delegates showed key interest in challenges faced while upgrading existing foundries

## Highlights

### News

The modernization of Indian industries is creating growth opportunities for the machine tool industry  
**More on page 2...**

### Events

A technical session was organized by the IIF Coimbatore Chapter focussing on 'Selection of Grinding Wheels, Grinding Practice and Safety procedure', which was conducted by Grindwell Norton Ltd, Coimbatore, and Fine Product  
**More on page 12...**

### In Person

"Ample opportunities in environmental protection, recycling and production control," says David Scott, Group Director for Rapidly Growing Markets for Oxford Instruments Ltd  
**More on page 14...**

## 'Accord industry status to metals recycling': MRAI

The Metal Recycling Association of India (MRAI), the country's apex body for ferrous and non-ferrous metals recycling industry, recently organized an annual conference in Mumbai.

It was inaugurated by Kalraj Mishra, Union Minister, MSME, who was the Chief Guest on the occasion. Addressing the conference, the minister assured to look

into various issues and concerns in coming months in order to protect the interests of secondary metal manufactures.

More than 250 delegates attending the conference comprised national and international ferrous and non-ferrous scrap suppliers; as well as delegates from national and international associations like BIR, ISRI, BMR, etc.

(contd. on pg 16)



Iqbal Nathani, President, MRAI and Kalraj Mishra, Union Minister, MSME lighting the lamp



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**Gargi Engineering Enterprises Pvt. Ltd.**  
2, Mercantile Apts. Dr. C. G. Road, Chembur, Mumbai 400 074, Maharashtra, India  
Email: gargi@gargi-india.com Website: www.gargi-india.com  
Tel: +91(022) 25201396/97, 25201596/97  
Fax: +91(022) 25203080

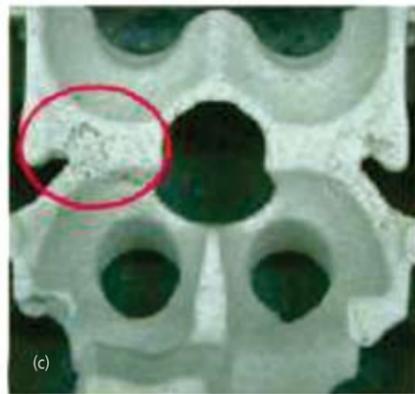
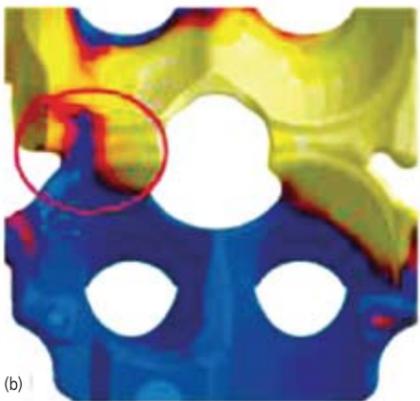
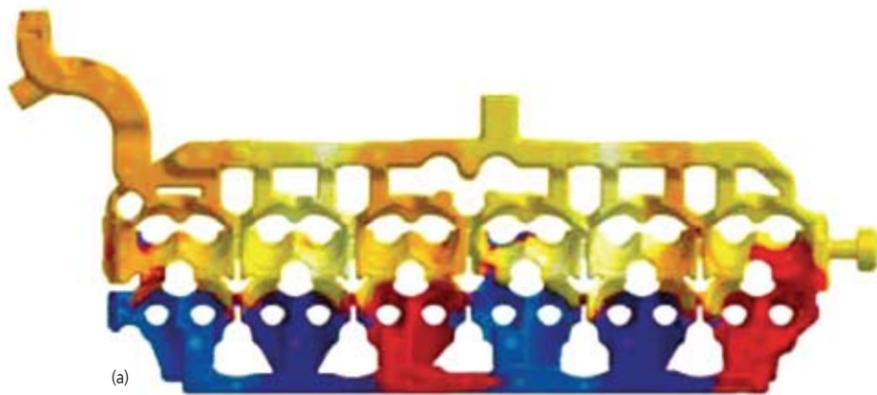


Fig. 5. Core shooting simulation of a water jacket core using colors to differentiate the sand flow from different nozzles (a-b) and experimental result showing a void where two sand fronts merge (c).

Using core density simulation results in conjunction with finite element analysis it is possible to simulate forces that are applied to cores when exposed to additional handling after removal from the core box as well as the mechanical and thermo-mechanical loads that the core will experience during the casting process. Critical and non-critical areas for core defect locations can be derived from an analysis of these loads.

Core shooting simulation also allows the user the ability to trace the flow of

sand from each nozzle with different coloured virtual sands. This sand trace result shown in Figures 5 and 6 can be very useful for eliminating defects observed in areas where separate sand fronts from different nozzles try to merge together.

While this result does not actually identify areas of low density or non-fill defects, it can be useful in assigning a root cause for these types of defects. For example, in Figure 5, the defect shown on the left side of the production core

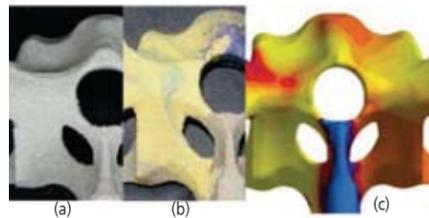


Fig. 6. Production core (a) and experimental core with colored sand (b) and corresponding simulation result for sand trace (c).

would initially be identified using the sand fraction or sand density results to predict the defect.

However, to better understand and troubleshoot the cause of the predicted void the sand trace result could then be utilized to give the user the additional information that the defect lines up with two merging melt fronts and therefore may require additional venting to allow the air between the merging fronts to escape.

### Optimal conditions

Obviously not all areas where fronts merge will have defects, particularly if the venting and nozzle placement create optimal conditions in these areas of merging fronts. It should also be noted that there is an area on the right side of the production core in Figure 5 that appears to have a lower density as well.

Although the sand trace result clearly shows that this defect is not in line with any merging sand fronts, the user could still identify this defect using the sand density and sand fraction results. By identifying areas of cores where multiple

fronts of sand converge, the engineer is able to adjust venting and/or nozzle placement to avoid non filling and low density in these areas.

Figure 6 shows a comparison of cores made using different coloured sands from each shoot nozzle with the simulated sand trace result. The results of these trials show good correlation between the simulated cores and production test cores.

In situations where the quality of a core is highly variable in production, simulation remains an excellent tool to analyze the root causes of defects and to better understand the main sources of variability in the process.

Once the sources of variability are better understood, simulation can then be used to systematically optimize the process parameters. Additionally, using simulation to test the effects of variability in the process (i.e. simulating at the low and high end of a range for a given parameter) will help to determine the acceptable amounts of variability that the process can operate under while still producing a core of an acceptable quality level. These acceptable levels can then be integrated into the utilization of statistical process control methodologies for the core making process.

(Part 2 continued in next issue)

M. Schneider, MAGMA Giessereitechnologie GmbH, Aachen, Germany  
R. Stevenson, MAGMA Foundry Technologies, Inc., Schaumburg, IL  
C. Kleeberg, MAGMA Engineering Asia-Pacific Pte Ltd

## metals recycling': MRAI

(contd. from pg 1)

In his keynote presentation, Ikbal Nathani, President, MRAI, presented an overview of metal recycling process and strongly emphasized on the economic and environmental benefits of metal recycling. He also discussed about how India's scrap metal industry is contributing to its GDP.

"Metal scrap is a vital raw material source for India's electric and induction furnace mills as well as non-ferrous secondary sector producers which are heavily dependent on this important raw material," he said.

He explained about various challenges faced by the domestic metals recycling industry, including import duty levied on all grades for metal scrap, free trade agreements (FTA) signed by the Central government which has inverted the duty structures. Indian secondary metal manufacturers predominantly rely on imported scraps as its prime raw material to manufacture value-added product.

"As per current guidelines, manufacturers and importers have to pay 4 per cent special additional duty (SAD), which is passed as CENVAT credit. However, across the industry, the percentage of value addition achieved from scrap sorting, smelting and production of secondary ingots/billets ranges from 15-20 per cent

average, which is not sufficient to fully utilize the CENVAT credit, which results in blockage of manufacturers funds in government accounts."

Nathani urged the minister to exempt manufacturer units from SAD and expressed concern on the lack of Central and state government support to promote the metal recycling industry.

He also urged the minister to draw attention towards the Free Trade Agreement (FTA) policies and inverted duty structure which are causing concern for secondary metal manufacturers.

"MSME units need to be protected against supply from countries under FTA policy. Duty on raw material cannot be higher than that of finished products. Indian producers cannot become globally competitive due to cost built-ups, that is, customs duty and SAD on raw materials, which FTA partner countries do not impose onto their producers."

He also requested that 2.5 per cent import duty and 4 per cent SAD on ferrous scrap should be removed.

"The Government of India needs to promote metal recycling for energy saving and reduction in CO<sub>2</sub> emissions by setting up scrap yards in every city. It should accord industry status to metals recycling and declare it as a thrust area for development in 5-year plan like China," he added.



L-R (Zain Nathani, VP-General MRAI; Dhaval Shah, VP (Non-Ferrous) MRAI; Smt.Suman Kaushik, Adviser-Mines & Minerals Section, Member of Planning Commission; Ikbal Nathani, President, MRAI; Kalraj Mishra, Union Minister (MSME); Hiten Mehta, Miraj Metals; Sanjay Mehta, VP (Ferrous) MRAI and Ehsan Haji Amin Gadawala (Secretary) MRAI)



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# Foundry Deskbook

## 2014

The Foundry Deskbook 2014, listing the essential 'who-what-where' details, is a compilation of India's grey iron, ductile iron, ferrous/non-ferrous foundries, cast manufacturers, equipment suppliers, raw material providers, buyers and traders of production materials & cast products, affiliated associations, consultants & engineers, institutes, etc.

The collection of all information in one volume, the Deskbook meets the need for sumptuous source of the industry demographics – saving hours of your valuable time and effort.

The volume also includes data on end-users like OEMs, engineering firms, railways, power, pumps & valves, and so on.

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 Bhupal Potdar : 9821151035  
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