Casting Defect Identification and Solution by Optimum Design Of Riser And Gating System- A Review

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Abstract— Casting defects caused due to evolution and entrapment of gases during casting process and many other reason. This review aims focus mainly on a systematic approach for prediction for defect in casting based on available knowledge, experience of experts in this area and with use of mold flow software like auto-cast, pro-cast. Defects of casting are observes and casting process is also known as process of uncertainty challenges explanation about the case of casting defect in order to identify the casting defects and problem related to casting. How to find defects and that defect can be solve by practical and simulation approach are discussed.

Key words: Casting Defects, Mold Flow Software, Simulation

I. INTRODUCTION

Casting filling process plays an important role in casting production process. Many casting defects, such as blowhole, slag inclusion, shrinkage, cold shut and so on, are related to filling process. The process that high-quality castings are obtained by controlling the order of filling and flow patterns is quite necessary. The filling process is the first stage of molding process, as well as the most complicated process, because many subjects, including computational fluid dynamics (CFD), Therefore, the Numerical simulation of filling process is very difficult, filling simulation is still one of the hot areas of casting numerical simulation heat transfer, numerical methods, computer graphics, and partial differential equations and so on were involved.

II. LITERATURE REVIEW

'New Approach to Casting Defects Classification and Analysis Supported by Simulation' V.V.Mane, Amit Sata and M. Y. Khire **[2]** Foundry industry suffers from poor quality and productivity due to the large number of process parameters, combined with lower penetration of manufacturing automation and shortage of skilled workers compared to other industries. Global buyers demand defect-free castings and strict delivery schedule, which foundries are finding it very difficult to meet. Casting defects result in increased unit cost and lower morale of shop floor personnel.

Analysis and Validation of Gravity Die Casting Process using Pro-CAST' by Mr. Ankit D. Oza, Prof. Tushar M. Patel, International Journal of Application or Innovation in Engineering & Management (IJAIEM) Volume 2, Issue 4, April 2013 ISSN 2319 – 4847,**[1]**

In this paper the comparison of FE Analysis with actual experimental data of shell core drum is presented for the validation. Shell Core Drum is the Product of Mehtex Engineering Pvt. Ltd. (Naroda – GIDC, Ahmedabad). During the production of Shell Core Drum Company suffers of defects regarding porosity. Experimental results are investigated by using Tool Maker Microscope. The model of the drum is developed in solid works 2009 and porosity analysis is done in ProCAST. The results indicate that the ProCAST analysis is quite nearer to experimental results. Experimental results are taken by using Tool Maker Microscope we get the % of porosity is 12.30% and in FE Analysis by using ProCAST we get the % of Porosity is 13.86%. Experimental result and Pro-CAST result variation % **'Solidification Analysis and Optimization Using Pro-Cast',** Bhupendra J. Chudasama, International Journal of Research in Modern Engineering and Emerging Technology Vol. 1 Issue: 4, MAY: 2013 (IJRMEET) ISSN: 2320-6586 **[3]**.

Now days in Industries it is very important to save time and money in manufacturing product, because there is lots of competition in industrial world. Main objective of this project is re-designed of component using Pro-cast software and increasing of this product life.

Many researchers reported that about 90% of the defects in castings are due to wrong design of gating & risering system and only 10% due to manufacturing problems. Casting simulation process can able to solve these problems. It has observed that various type of simulation software has been used in foundry, out of which FEM and VEM based casting simulations are widely used in foundry.

'Design Optimization of Feeding System and Solidification Simulation for Cast Iron' by Harshil Bhatta,*, Rakesh Barota, Kamlesh Bhatta, Hardik Beravalaa, Jay Shahb a *Department of Production Engineering,BVM Engineering College, V.V. Nagar-388120, India Director of FINE CAST Pvt. Ltd., GIDC, V.U. Nagar-388121, India.**[4]***

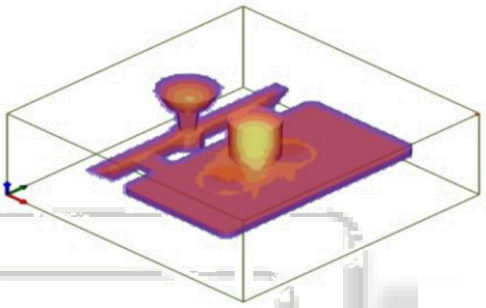
Casting Simulation is very powerful tool which is used to predict the growth of the process without physically performing the process. Solidification simulation provides iterative means of designing or modifying the feeding system. This reduces the overall cost of developing the method for new casting by minimizing the time as well as labor involved in it. Large number of trials can be performed quickly on simulation software package and optimum result can be obtained which ultimately increases the profit margin of foundry. Simulation also adds confidence to the methods engineer about the functionality of feeding system design.

A well designed feeding system is very important to ensure the better quality of castings. Design of feeding system also involves the decision about correct location of risers and number of risers to be used. For new castings or the castings having very high rejection rates, modification of feeding system design is of prime importance. These modifications are done manually which involves huge time, cost and other resources. Casting simulation can effectively overcome these difficulties and provide powerful tool for

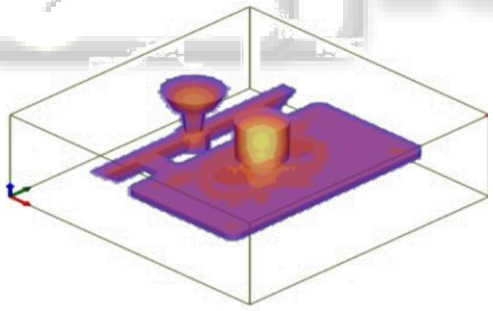
prediction of the process growth. Simulation of existing feeding system provides the location/s of the point/s where chances of defects are high. This information can be used to modify the feeding system design.

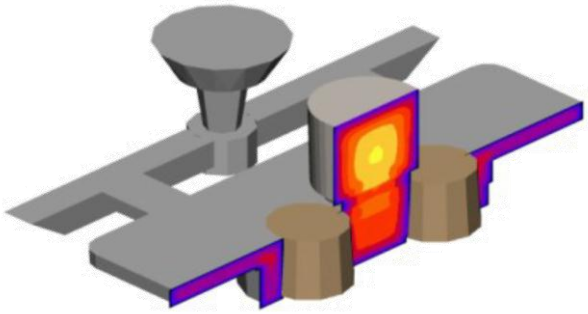
'Casting Design and Simulation of Cover Plate using AutoCAST-X Software for Defect Minimization with Experimental Validation' C. M. Choudharia*, B. E. Narkhedea, S. K. Mahajanb, 3rd International Conference on Materials Processing and Characterisation (ICMPC 2014) A Department of Production Engineering, Veermata Jijabai Technological Institute, Mumbai,400019 India Technical Education, Maharashtra State, Mumbai,400001 India **[5]**

The defects like shrinkage cavity, porosity, and sink can be minimized by designing an appropriate feeding system to ensure directional solidification in the casting, leading to feeders. Major parameters of a feeding system include: feeder location, feeder shape and size and feed aids.



In this study, the component suffered from shrinkage porosity defect leading to premature failure. It also was subjected to incomplete fill due to sudden variation in thickness. Hence, it was necessary to redesign and redevelop the component.





Feed metal paths enable visualizing the directional solidification of a casting. It flows microscopically along the feed paths from regions that solidify later, to regions that solidify earlier (along highest temperature gradients) to compensate the solidification shrinkage. Ideally, feed paths should end inside a feeder. Long and hot feed paths converging inside the casting imply a local hot spot that can result in a shrinkage porosity defect. Short and cold feed paths are usually harmless.

III. Conclusion

Riser And Gating System Take Part A Vital Role In Any Casting For Its Soundness. As From This Review We Can Consider A Proper Runner And Gating System Is Very Important To Secure Good Quality Of Casting Through Providing A Homogenous Mould Filling Pattern. A Numerical Simulation Technique Was Used For Optimization Of The Runner And Gating Systems For The Hot Chamber Die Casting Of A Thin-Walled Magnesium Telecommunication Part. Two Types Of Runner And Gating Systems Were Numerically Analyzed. After Some Of The Good Research We Concluded That Simulation Method Now A Day's Very Powerful Tool For Reducing Many Of The Casting Defects.

Reference

[1] Mr. Ankit D. Oza, Prof. Tushar M. Patel **"Analysis And Validation Of Gravity Die Casting Process Using Pro-CAST"** (IJAIEM) Volume 2, Issue 4, April 2013 ISSN 2319 – 4847.

[2] V.V.Mane, Amit Sata And M. Y. Khire. **'New Approach To Casting Defects Classification And Analysis Supported By Simulation'** V.V.Mane, Amit Sata And M. Y. Khire.

[3] Bhupendra J. Chudasama "**Solidification Analysis And Optimization Using Pro-Cast"** (IJRMEET) Vol. 1 Issue: 4, MAY 2013 ISSN: 2320-6586.

[4] Harshil Bhatta,*, Rakesh Barota, Kamlesh Bhatta, Hardik Beravalaa, Jay Shahb **"Design Optimization Of Feeding System And Solidification Simulation For Cast Iron"** A *Department Of Production Engineering,BVM Engineering College, V.V. Nagar-388120, India Director Of FINE CAST Pvt. Ltd., GIDC, V.U. Nagar-388121, India.*

[5] C. M. Choudharia*, B. E. Narkhedea, S. K. Mahajanb **"Casting Design And Simulation Of Cover Plate Using Autocast-X Software For Defect Minimization With Experimental Validation"**, 3rd International Conference On Materials Processing And Characterisation (ICMPC 2014).

