CASTING DEFECTS: AN LITERATURE REVIEW

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ABSTRACT
Casting process is associated with some casting defects that degrade the quality of foundry product. To upgrade the productivity of the organization the casting defects should be minimized. This paper shows the different literature review and root causes of casting defects taken by the different foundry expert’s.

Key words: Casting, foundry, productivity, Defects

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1. INTRODUCTION
In today’s developing world, extent of automation is increasing with a rapid rate day by day. In this race one important thing which was always neglected was to introduce human thinking capability in machines. But now a day this technology is paid attention to a quite larger extent. Concepts of artificial intelligence have a very wide application now a day especially in terms of daily life [5]. A defect may arise due to a single cause or may be due to presence of some more causes it depends on foundry shop and its resources available. The defect occurred in casting are generally very intuitive in nature because the root cause is not particularly identified by the foundry men but if a deep scrutiny of defects is done then you may be able to relate the casting defects with the input variants which can be changed considerably. In order to determine the parameters that affect the formation of porosity and shrinkage defects in castings, a number of discussions were made with concerned technicians in the manual as well as mechanized molding. The probable causes suggested by the the experts of the foundry as below
Casting Defects: An Literature Review

- Mould moisture content
- Pouring velocity
- Pouring time
- Solidification time
- Gate and runner and riser design
- Mould permeability
- Sand binder ratio
- Poor venting

2. LITERATURE REVIEW

The different literature review regarding the casting defects as below:

2.1. M. Dussud et al., 1996, has done a research on minimisation of casting defects by analysing the root causes of some casting defects in ABMI industries. In this paper the statistical analysis is aimed to optimize process parameters at the case study, i.e. Akaki Basic Metals Industry (ABMI) in Addis Ababa Ethiopia, to minimize major steel casting defects. This project is intended to observe just two of the steel casting defects which are severe in their nature i.e., gas defects and shrinkage defects. In order to obtain a representative experimental data it was used a factorial experiment. The relative influence of each factor on the casting defect/porosity/ was determined and suggestions have been given by using the Statistical Analysis method by optimizing the process parameters.

2.2. Adil Mohamed et al., 2011, have done research on feeder design for casting. In this paper, a feature-based solid modeling integrated with a fuzzy expert system was developed. The feature-based model had been developed by the authors, to provide manufacturing information to the fuzzy system application. The fuzzy system is based on heuristic rules of feeder in paper, to classify castings and design feeders. Heuristic rules were encoded inside the fuzzy system in production rules: IF-THEN-ELSE. The fuzzy system was connected with the model through open database connectivity database. Results inferred from fuzzification of inputs and defuzzification of outputs through inference process. A design condition flow chart was built to evaluate the results.[2]

2.3. B. Kalandyk et al., 2009, have done a research on continuous casting process in which product usually got cracked due to internal structure, but these researchers has developed a mechanism to reduce or mitigate these defects by using two fuzzy controllers. In the process of continuous casting, the melted steel from the melting pot is passed through the intermediary of the distributor, in the water-cooled crystallizer tank. In this way, a crust forms here which is solidified at the exterior, and one of the great problems is its cracking or even it’s tearing, due to several factors. This paper describes a new control method we should use during the continuous casting. This method is based on the fuzzy logic, in order to avoid any crack inside the crystallizing apparatus. This method contains two fuzzy controllers which, based on a set of rules and these rules frame a rule base which is based upon certain reasoning implications.

2.4. K. Omura et al., 1990. deals with the problem of molten metal level control in continuous casting. Under normal circumstances, proportional integral derivative (PID) control performs quite well, but abnormal conditions (in particular nozzle clogging/unclogging) require manual intervention. Indeed, when the flow of matter into the mold increases suddenly, the PID controller is not always able to prevent
large level variations that can even lead to mold overflow. So, a fuzzy controller has been designed using the expert knowledge of the operators for controlling the process during disturbed phases. The paper discusses both the design of the fuzzy logic controller and its integration with the PID in a global control architecture.

2.5 Rajesh Rajkolhe, J. G. Khan (2014), has conducted a thorough study of casting defects and their remedies. Foundry industries in developing countries suffer from poor quality and productivity due to involvement of number of process parameter. Even in completely controlled process, defect in casting are observed and hence casting process is also known as process of uncertainty which challenges explanation about the cause of casting defects. In order to identify the casting defect and problem related to casting, the study is aimed in the research work. This will be beneficial in enhancing the yield of casting. This study aims to finding different defects in casting, analysis of defect and providing their remedies with their causes. In this paper an attempt has been made to list different types of casting defects and their root causes of occurrence. This paper also aims to provide correct guideline to quality control department to find casting defects and will help them to analyze defects which are not desired.

3. CONCLUSION
Casting defects are very serious for the industry. These defects should be minimized. In this paper the different review of researchers have discussed regarding the casting defects.

REFERENCES


