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Casting Defects & Remedies - A Review

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Abstract - *Casting is a process which allied to some defects which gives the chipper quality of the desired product To increase the quality and productivity of the any organization the casting defects Should be reduced, this paper will shows. The casting defects & remedies.*

Key Words: defects, remedies, casting, productivity, quality

1. INTRODUCTION

Casting is a process which having a massive History of 7000 years which is one of the oldest manufacturing process, even tough. Today also the initial stage of the most of the manufacturing processes is casting.

In the casting process, firstly the metal is converted into liquid state by the heating process at high temperature & then liquids metal pour into the mould cavity. And leaves to solidify, after the solidification the product take out, clean & trim to get the desired shape.

In the casting process there are some defects like Blow, pin hole, Drop, shrinkage & many more. It impossible to eliminate but it can be reduced. The Taguchi method is used to analysing some casting defects Like Sand & maid related methods such as Sand drop poor mould, blow boles etc. also can use the six-sigma methodology, as the researchers said that there is a Break through improvement. In reducing defects nearly there is a 50%. Reduction in casting defects.

2. Literature review

Rahul T Patil, Veena S Metri [1] In this research paper different casting defects are studied. These will help to quality control department of casting industriousness for analysis of casting defect. This study will surely be helpful in perfecting the productivity.

Avinash Juriani [2] A focus on industrial case studies for casting defects is bandied in this paper. By using cause and defect analysis conception the various causes and remedial measures are suggested.

Vasdev Malhotra, Yogesh Kumar [3] Casting defects are veritably serious for the industry. These defects should be minimized. In this paper the different review of researchers has bandied regarding the casting defects.

Mrs. Rashi P. Gaikwad, Mr. Pankaj [4] In this research work different casting defects are studied. By referring different exploration papers causes and their remedies are listed. By the analysis the different defect the metal the industries will improve there quality control department.

AkashA. Gaware, Dr.A.K. Mahalle [5] In this research paper research that Simulation helps to manufacture defect free casting without consuming too important time. In India, casting simulation technology is adding fleetly. Besides perfecting the being casting, this technology can also be used for rapid-fire development of new products.

Vaibhav Ingle, Madhukar Sorte [6] In the paper, a new bracket of defects and imperfections or Al amalgamation castings has been presented. three orders of casting defect have been linked stuffing- related blights, loss blights, shape related blights, thermal-affiliated defects.

N D Mehta, A V Gohil [7] From the review of literature it's perceived that research has been carried out about various casting blights, their causes and remedies to be taken to amend casting defect. Research has also been done for optimization of colorful casting defect minimization.

Pradip Kumar Ganguly [8] In this exploration Understand current script of foundry assiduity. in now a day's foundry assiduity produce product different types like ferrous and non- ferrous, this case study substantially focuses on sword foundry.

Anil B Ghubade [9] Defect free casting is necessary in the manufacturing sector as casting is one of the most promising manufacturing processes to produce complex part with intricate details. Defect free casting is the main challenged presently faced by assiduity owing to difficulty to control the process parameters.

Chelladurai,N.S. Mohan [10] In this review several casting defects and their occurrence cause were linked. This will help in assaying the disfigurement and remedies to overcome them. Casting Rejection on the base of the casting blights should be as minimal as possible for advanced quality. Casting blights are veritably serious for the assiduity. These blights should be minimized.

Nirav Mehta,A.V. Gohil [11]The research carried out in the present article provides knowledge- grounded intertwined

module to help casting defect analysis process in medium and small scale industries. The database structure for casting defect analysis is been strengthened considering both industrial and theoretical approaches.

Vishal Choundiye [12] The research carried out in the present article provides knowledge of sand casting and various defects can develop during manufacturing, depending on factors such as raw material quality, mold design and control of machining parameters.

3. Casting defect

It is undesirable irregularities occurs in the casting process , there are various factors responsible for that, in that in this paper we will discuss the various type of defects and its remedies to get the defect free product.

The defects can be classified into the 5 steps as follows

- **Gas porosity:** blow hole, open hole, pin hole.
- **Shrinkage defects:** Shrinkage.
- **Mold material defect:** cut & washes, swell, drops, Metal penetration, rat tail.
- **Metal pouring defect:** cold shut, misrun, slag inclusion.
- **Metallurgical defects:** hot tears.

4. Types of defects and remedies as follows:

i. **Shift or mismatch:** shift or mismatch defect can occur due to misalignment of drag & cope box.

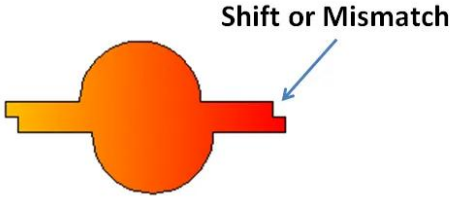

Fig .1 shift or mismatch

Cause:

1) Misalignment of cope & drag box
2) Misalignment in pattern plates.

Remedies:

1) Do the correct alignment of drag & cope box
2) Check pattern plates.
3) Align a flask.

ii. **Blow holes:** it Blow holes i- it is a large circular Cavity creates due to the gas of molten metal. This type of defect cavity forms in cope or Surface part of mold.

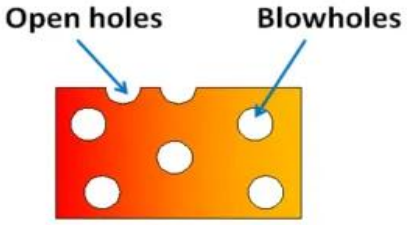

Fig .2 Blow hole

Causes:

1) Immoderate moisture in sand.
2) Fine grains of Sand
3) Too much rammed Sand.
4) Improper venting,

Remedies:

1) Control the moisture of Sand.
2) Sufficient ramming should be done
3) Provide proper vents.
4) use proper and desired sand

iii. **Pin holes:** pin holes are the very small holes are about the 2-3 mm in size. Which can occur on surface of casting.

This defect occurs at the time of solidification ion, & Solubility of hydrogen gas decrease & starts run off molten metal & creates small holes card pin hole.

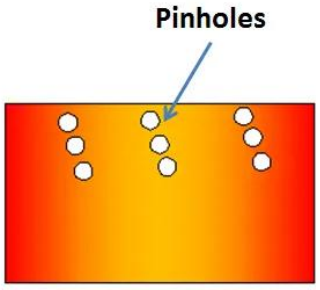

Fig .3 Pin holes

Remedies:

1) use moderate moisture content sand
2) use proper material.
3) pour the molten metal in correct way.
4) increase permeability of sand

Causes:

1) high moisture Content
2) hydrogen gas solubility

iv. **Shrinkage:** it is a. formation of the cavity because of insufficient molten metal pouring or it is a volumetric contraction called shrinkage.

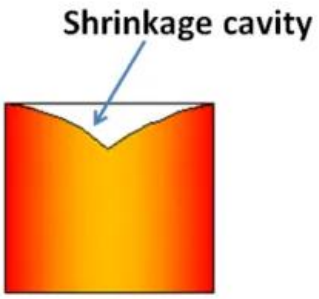

Fig .4 Shrinkage

Causes:

1) high pouring temperature.
2) undesirable Solidification of metal.

Remedies:

1) pour required amount of molten metal
2) Make proper vents
3) Riser should be at proper location.

v. **Misrun:** Whenever there is a solidification before the required molten metal filled, Because of pre solidification, the space is Creates in mold cavity & this defect is Called as misrun.

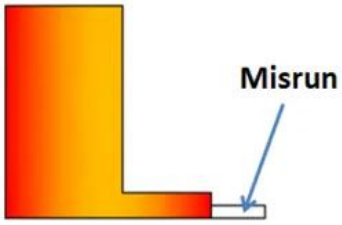

Fig.5 Misrun

Causes:

1) undesirable or less fluidity of molten metal
2) less temperature of the molten metal.
3) Improper getting system.

Remedies:

1) Pouring temperature should be desirable
2) Make proper getting System.

vi. **Slag Inclusion:** this defect is caused. when the molten metal contains some Impurities & it poured in cavity and get solidify.

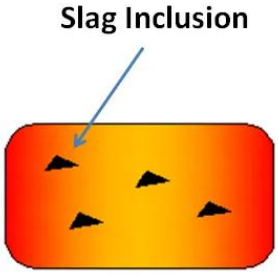

Fig .6 Slag Inclusion

Causes:

1) presence of impurities in molten metal
2) Impurities in mold/sand

Remedies:

1) Remove Impurities from molten metal
2) Check impurities before metal melts
3) Check Impurities in mold cavity / sand.

vii. **Hot tears or hot cracks:** When the molten metal is hot that is weak and because. of residual stresses casting fails. As molten metal becomes cool, & cracks comes on Surface Called hot tears or cracks.

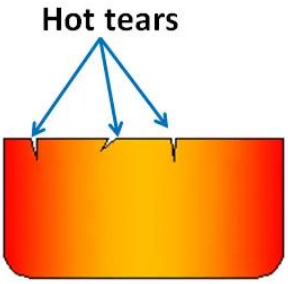

Fig .7 Hot Tears

Causes

1) Improper mold design
2) Residual stresses
3) High temperature.

Remedies

1) make proper mold design
2) Try to reduce Residual stresses melt
3) Pouring temp. Should be desirable.

viii. **Swell:** Swell is the enlargement of the cavity, & Molten metal pressure. Because of this there Is overall enlargement of casting

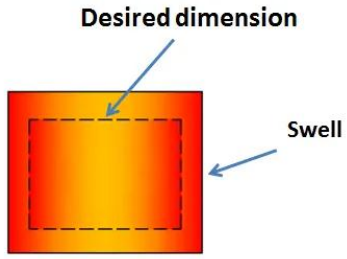

Fig .8 Swell

Causes:

1) Improper design of cavity.
2) Improper ramming.
3) Rate of molten metal pouring.

Remedies:

1) Make proper mold design.
2) make proper ramming
3) pour molten metal with Uniform Speed

ix. **Drop:** Whenever there is a cracking on upper surface of sand, the sand particles fall ino molten metal.

Causes:

1) Improper ramming (soft)
2) less moisture content in sand
3) Composition of sand

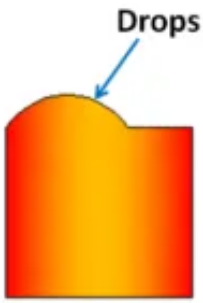

Fig.9 Drop

Remedies:

1) make proper ramming
2) use correct composition of sand
3) use proper moisture content sand,

x. **Cold Shut:** it is a crossing in mold cavity when two metal streams does not intermix & having round edges called cold shut.

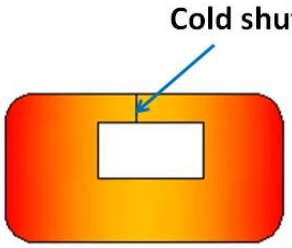

Fig 10. Cold Shut

Causes:

1) Improper getting system
2) thin sections in Casting
3) Less fluidity of molten metal

Remedies:

1) make the proper getting system.
2) use desired & hot molten metal

5. Conclusion:

In this study of the defects by referring the research papers or review papers. the defects and remedies are suggested, this paper will definitely. help to the foundries / Industries to reduce or to eliminate the casting defects, it will also help for quality work, and to Improve productivity and minimize the rejection, In case of Improvement we can use six sigma method to reduce or eliminate the casting defects, As the researchers said there is a breakthrough improvement tht is 50% to eliminate the casting defects, by using the different analyzing as well as designing software's can also help to reduce the casting defects.

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