

Casting Defects - Sand Mold, Metal Casting

Introducing various [metal casting defects](#) with many pictures by Dandong Foundry in China. These are the common [sand casting defects](#) on the surface and inside of cast iron and cast steel parts.

1. Blowhole is a kind of cavities defect, which is also divided into pinhole and subsurface blowhole. Pinhole is very tiny hole. Subsurface blowhole only can be seen after machining.



Blowhole Defect

2. Burning-on defect is also called as sand burning, which includes chemical burn-on, and metal penetration.



Sand Burning Defect

3. Sand inclusion and slag inclusion are also called as scab or blacking scab. They are inclusion defects. Looks like there are slag inside of metal castings.



Sand Inclusion Defect

4. Sand hole is a kind of shrinkage cavity defect. They are empty holes after sand blasting.



sand hole defect

5. Cold lap or also called as cold shut. It is a crack with round edges. Cold lap is because of low melting temperature or poor gating system.



Cold Lap Defect

6. Joint flash is also called as casting fin, which is a thin projection out of surface of metal castings. Joint flash should be removed during cleaning and grinding process.



Joint Flash Defect

7. Misrun defect is a kind of incomplete casting defect, which causes the casting uncompleted. The edge of defect is round and smooth.



Misrun Defect

8. Shrinkage defects include dispersed shrinkage, micro-shrinkage and porosity. For large porosity on the surface, you could see them easily, but for small dispersed shrinkage, you may see them after machining.



Porosity Shrinkage Defect

9. Shrinkage cavities are also called as shrinkage holes, which is a type of serious shrinkage defect, you can see them easily on the rough surface of the metal castings.



Shrinkage Cavity Defect

10. Shrinkage depression is also a type of shrinkage defect, which looks like depressed region on the surface of metal castings.



Shrinkage Depression Defect

11. Elephant skin is a type of surface defect, which cause irregular or wrinkle shapes surfaces.



Elephant Skin Defect

12. Veins defect is also called as rat tail, which looks like many small water flow traces on the surface of metal castings.



Veins Defect

13. Rough surface, coarse surface is also a kind of surface defect. Normal rough surfaces can not be judged as defects, but too rough and uneven in surface will be a defect.



Rough Surface Defect

14. Mismatch in mold defect is because of the shifting molding flashes. It will cause the dislocation at the parting line.



Mismatch Mold Defect

15. Mechanical damage is because the damage during machining or delivery processes.



Mechanical Damage Defect

16. Slag inclusion is also called as exogenous inclusion, entrapped slag.



Slag Inclusion Defect

17. Raised mold defect. Because of the flotation of liquid metal, the mould flasks are raised, which caused the top part of casting become higher or thicker than lower part.



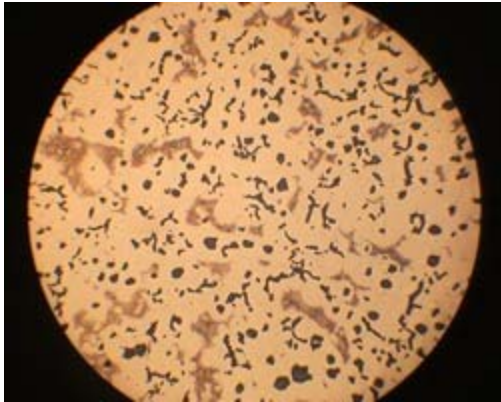
Raised Mold Defect

18. Crack defects normally happen inside of metal castings. This defect will reduce the physical properties of metal castings.



Crack Defect

19. Abnormal nodulizing or under-nodulizing defects. Because of many reasons, the spheroidization of graphite for ductile iron will be affected, therefore, caused the bad spheroidization rate. By metalloscope, you can see very few graphite balls, and many worm-like graphite.



Abnormal Nodulizing Defect

20. Uneven hardness defect means the uneven hardness on the same surfaces. When machining to harder positions, the machining will become more difficult.



Uneven Hardness Defect

21. Sand drop is also called as sand crush. The sand mold drops part of sand blocks, so they will cause the similar shaped sand holes or incomplete.



Sand Drop Defect

22. Deformation will cause the oversized tolerance for flatness and straightness. This is very common defect for long castings, and flat castings with thin wall thickness. The reasons are the natural deformation during cooling process in sand molds, or in air, sometimes, the overly sand blasting also could cause this problem.



Deformation Problem

23. After welding repair, even after machining or grinding, the welding marks will still be visual. As for unimportant casting surfaces, if the client allow welding repair, then these marks should be acceptable. But for high pressure-bearing positions, or the client has clearly forbidden any welding repair, then these marks will be taken as defects.



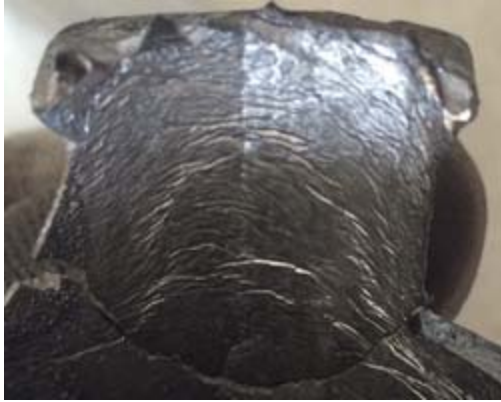
Welding Repair Marks

24. Chill iron could effectively reduce the shrinkage for the key positions, so using chill iron is very common in iron foundries. However, the edges of chill irons could be clearly found by visual inspection. Some clients will not require to grind them if these marks do not affect the appearance. However, the clients could require the casting manufacturer to grind them just for better surface looking. Please clearly notice that these marks should not be judged as the casting defects. Refer to iron-foundry.com.



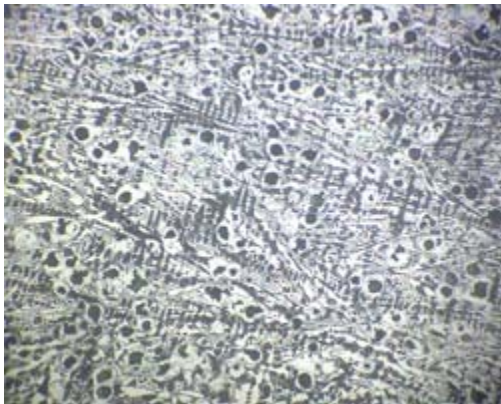
Chill Iron Marks

25. Chill defects are also called as "casting chilling defects". The surface of the castings with this defect will be extremely white, shiny and smooth. The left one of the parts on the following photo is showing this defect. The defective castings will be fragile and crispy, so during machining, some edges and tips will be broken. This defect was caused by the low temperature of sand molds, and prematurely out of sand molds, so the hot iron become chilled quickly. The proper annealing heat treatment to them could solve this defect.



Casting Chilling Defects

26. Massive free carbide. On metallograph, you could see many fish-bone free carbide. This is a serious defect of cast iron material, normally happen on ductile iron. Because of inverse chilling defects and poor inoculation, there will be mass free carbide, which will cause fragile, poor welding property to ductile iron castings. High temperature annealing heat treatment could improve its quality.



Massive free carbide

27. Internal sweating, or called as cold short, short iron. There are iron beans in the castings. This is because of unreasonable gating design, which caused some liquid iron became beans suddenly, then these beans were wrapped by other liquid irons. This is a surface defect, but will cause serious problem if they located in key positions.



Internal sweating, cold short, short iron

28. Stripping defect. There is very thin iron skin on the surface of castings. Two layers. This is because of unreasonable gating system, which caused very thin air layers existed. This defect is a surface defect, so normally it can be grinded off. However, it should be discarded if it is not just on the surface.



Stripping defect