

Casting Defects with Remedies in Zinc Die Casting Die Casting

Hot Chamber Die Casting defects and remedies.

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Abstract—Die casting is an economical, efficient process, offering border range of geometrically complex components and shapes than any other manufacturing technique. But there are defects in casting observed. To identify the casting defects, the study is aimed in the research work. The main objective of the current paper is finding different defects in Zinc-alloy (ZAMAK-3 and ZAMAK-5), die casting and providing their remedies with their causes. In this paper casting defects are critically discussed and classified according to their root causes of occurrence

Keywords—Hot Chamber Die Casting; Casting Defects; ZAMAK; Zinc Die casting; Die Casting.

I. INTRODUCTION

Casting defects is defined as an undesired irregularity in a metal casting process. A few deformities can be endured which are in worthy cutoff while others can be fixed, else they should be dispensed. Casting defects are caused by failure of material, process not in standards parameters or non optimized process abnormalities in machine. So the defects can be tolerated and repaired. ZAMAK is an acronym of the German names for the metals of which the alloys are composed: Zink (zinc), Aluminum, Magnesium and Kupfer (copper). In Zinc casting the molten zinc is injected into metallic die via gooseneck through piston. There are many sources to cast defects and have many names. In this paper an attempt has been made to provide all casting defects with their causes and remedies.

II. CASTING DEFECTS

2.1 Blisters

It is a type of surface defect in this defect a thin film of small surface blows up on the surface of component, this bubble is hollow.

2.1.1 Causes

- High Die temperature.
- Cooling jam of tool moving side or fixed side.
- Low die coat spray on tool.

2.1.2 Remedies

- Check and open choked die cooling.
- Maintain proper flow of die coat spray.
- Mix proper ratio of die coat chemical and Reverse Osmosis (R.O.) water.

- Check and maintain continuation cycle time and die opening time.

2.1 Blow Holes

Blow holes occur when the metal traps gas during casting. At the point when the casting cools and solidifies, bubbles structure in light of the fact that the metal can't hold as much gas as the fluid form. These air pockets show up on a casting as rounded, circular cavities or holes inside casting.

2.2.1. Causes

- No proper venting available.
- Steam trapped of die coat.
- Excess quantity of die coat spray.

2.2.2 Remedies

- Provide proper venting.
- Set spray for adequate amount of die coat.
- Make proper die coat mixture 1:40 for 1 Liter of Chem Trend Die coat SL-6403 and 40 Liters R.O water.

3.1 Weight Less

When castings weights are less than standard weight then these castings are rejected due to weigh less problem. These casting strength are reduced, failed in tensile strength test and many quality tests.

3.1.1 Causes

- Molten metal not properly filled in mould cavity.
- Melting runners in furnace.
- Molten Zinc passes through plunger during taking shot due to plunger rings worn out.

3.1.2 Remedies

- Melt only ingots because runners contain impurities as they are not processed like ingots.
- Change plunger rings if they are worn out then molten metal will passes through the plunger and less molten metal will reach inside the mould cavity, so weight less problem occurs.
- Check and maintain injection pressure and Main oil pressure.

We have done our work on 50 ton hot chamber die casting machine using ZAMAK-3 ingot, Chem Trend SL-6403 die coat chemical, and R.O water.

Table-1. Parameter Standard

Parameters(Units)	Standard Limits	Actual Parameters
Weight (grams)	31.5±0.5	31.84
Injection Pressure (MPa)	4.5~6.0	5.5
Main Oil Pressure (Mpa)	5.0~7.0	6.0
Melting Temperature (°C)	415±10	420
Furnace Temperature (°C)	500~800	690
Die Temperature (°C)	50~80	70

CONCLUSION

In this paper, I have tried to give causes and remedies of some common casting defects in Zinc die casting or Hot Chamber Die casting as I have faced in industries, also tried to give practical rectification of these defects. By using these remedies casting defects can be controlled at very large scale.



Fig.1- Weight less component

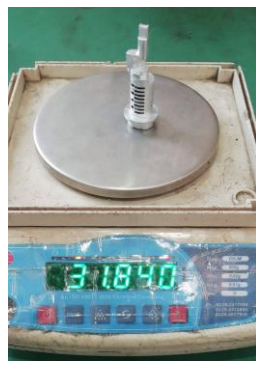


Fig.2 - OK weight component

4.1 Cracks

Cracks occur in casting at the time of end of solidification process. If solidified metal does not have sufficient strength to resist tensile force during solidification then cracks will appear.

4.1.1 Causes

- Die temperature is high.
- Spray not proper.
- Low strength of metal.

4.1.2 Remedies

- Maintain die temperature within limit by setting die open time, continuation time, die open and close speed properly.
- Set die coat spray properly in proper mixture.
- Melt only ingots in furnace.