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Casting Defect

Casting defect are undesirable irregularities that can occur during the metal casting process categorized into gas porosity, shrinkage objects, molds material defect pouring metal defects & metallurgical defects.

There's more detailed breakdown of common casting ~~objects~~ defects.

1) Gas porosity

Causes → Blowholes Entrapped gases (like hydrogen, ~~nitrog or~~ nitrogen or oxygen) during solidification.

Types → Blowholes (large, visible holes), pinhole (small scattered holes) & open porosity.

Prevention → Proper mold ventilation, controlling pouring temperature & use gas free metal.

2) Shrinkage Defect

Cause → Uneven cooling & solidification leading

to shrinkage during the cooling process.

Types→ Shrinkage cavities (large internal voids) & shrinkage porosity (small, interconnected void) and shrinkage cracks.

Prevention→ Proper gating & risering design controlling cooling rates & using alloys with good shrinkage characteristics.

3) Mold Material Defect

Cause- Problem with the mold material itself including of sand quality, compaction, & moisture content.

Types→ Metal penetration (molten metal seeping into the mold), washes (irregular surface marks) & swell (mold expansion).

Prevention→ Using high quality mold material proper compaction technique & controlled moisture content.

4) Pouring Metal Defect

Cause→ Problems with the molten metal itself

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Casting defect are undesirable

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including temperature, cleaniness & fluidity.

Types → Cold shuts (interrupted metal flow), Missruns (incomplete mold filling) & slag inclusions (trapped slag particles).

Prevention → Controlling pouring temperature using clean metal, & designing proper gating system.

5) Metallurgical Defect

Causes → Problems with the metal's microstructure including solidification pattern & impurity segregation.

Types → Hot tears (cracks ~~during~~ occur during solidification) cold shuts (~~intrup~~ interrupted metal flow) & slag inclusion (trapped slag particle).

Prevention → Controlling solidification rates, using proper alloy compositions & ensuring good, clean metal cleaniness.

6) Casting Shape Defect

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Causes → Improper mold design, gatting system or core placement.

Types → Mismatch (part of the casting misalign), flash (excess metal around the casting) & distortion of the casting shape.

Preventions → Careful mold design, proper gatting & ensuring accurate core placement.

Welding Defects

Welding defects are imperfection in a weld that can compromise its strength & integrity & can be classified as external (surface) or internal (hidden) common example including cracks, porosity, lack of fusion, undercut, slag inclusions & incomplete penetration.

Here's a more detailed break down of common welding defects.

External (Surface) Defects.

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Cracks → This are discontinuities that can occur during or after welding & can be classified as hot cracks (occurring during welding) or cold cracks (occurring after cooling).

Undercut → A groove or recess formed along the edge of the weld bead, caused by excessive heat or insufficient weld metal.

Overlap → A condition where the weld bead extends beyond the intended joint, resulting in a buildup of weld metal on the surface.

Porosity → The presence of gas bubbles or voids within the weld metal, which can weaken the weld.

Spatter → Small droplet of molten metal that are ejected from the welding process & deposit on the surface.

Internal (Hidden) Defects:

→ Lack of fusion → A failure of the weld

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Metal fail to fully penetrate the joint leaving an unfused area at the root of the weld.

Incomplete penetration → When the weld metal fails to fully penetrate the joint, leaving on base metal, resulting in a weak or incomplete joint.

Slag Inclusions → The trapping of non-metallic material (slag) within the weld metal, which can weaken the weld.

Gas Inclusions → The trapping of gases within the weld metal, which can lead to porosity or other defects.

Causes of Welding Defects

1. Incorrect Welding Parameters.
2. Poor Welding Technique.
3. Material Issue.
4. Environmental factors.