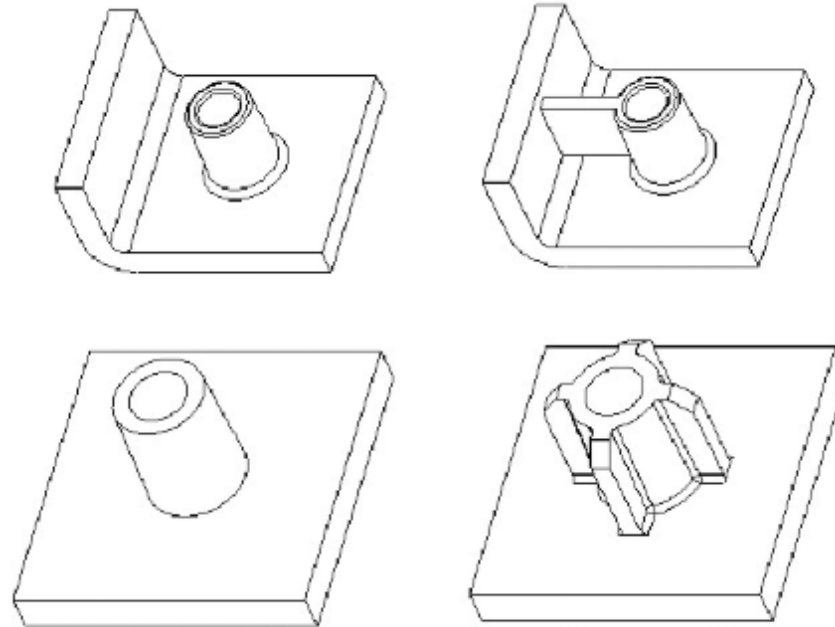


Die Casting Parts Design Guide & Tips - How to Design a Part for Die Casting | Diecasting-mould

Die casting is a manufacturing process that employs high-pressure hot chamber or cold chamber technology, forcing the molten metal to reusable mold and eject it until it solidifies, to obtain the final part with required shapes and profiles. The design of **die casting parts** will affect the difficulty of the cast process, cost, and more. How to design a part for die casting? Some tips and rules for that you should know.



Die Casting Parts Design Tips

How to Design a Part for Die Casting - Die Casting Parts Design Guide & Tips

There are some considerations and factors of **die casting** design that will be critical to the cast process and results.

1. Wall thickness

- For aluminum alloy castings, the thin-wall part has higher strength and better compactness than the thick wall. Die castings with thinner walls can reduce the volume of parts and shorten the cycle time. However, when the wall of the die casting part is too thin, the fusion of the metal is not good and the strength of castings will be affected, it also brings difficulty to the filling and forming. If the wall of the part is too thick, it's easy to produce shrinkage and crack. With the increase of wall thickness, porosity and other defects in the casting also increase, which also reduces the strength of the casting. Generally, the wall thickness of die casting parts should be 2.5-4mm, and the parts with a wall thickness of more than 6mm should not be die-casting.
- The wall thickness should be uniform under the condition that the casting has enough strength and rigidity, to ensure smooth metal flow during filling and uniform cooling, minimize deformation due to cooling and shrinkage, reduce the risk of cold shuts without any sharp corners and reduce other defects during the casting process.
- Design uniform wall throughout where variations occur.

2. Corners

- All parts of the die castings should have round corners (except the parting surface), so that the flow of metal is stable in filling, the gas is easy to be discharged, and the crack caused by sharp angle can be avoided. For the die casting parts that need electroplating and finishing, the fillet can be evenly coated to prevent coating accumulation at the sharp corner.
- Round corners (fillet) can reduce high-stress concentrations and fracture at the juncture of die casting die and die casting part.
- Round corners can reduce the concentration of heat in the mold and the part.
- Round corners can reduce the cost of die maintenance and increase the service of the tool.
- Shallow castings tend to have smaller fillets, deep pockets and other inside corners need larger fillets.
- To maintain continuity for the edges and smoothness of the parts, constant-radius fillets are required.
- Generally, the fillet radius of die castings should not be less than 1 mm, and the minimum fillet radius should be 0.5 mm.

3. Radius

- The radius and fillet can increase structural integrity.
- The inner radius of the die casting part should be at least the wall thickness.

4. Undercuts

- Minimize the number of external undercuts require side-cores to reduce tooling costs.
- Remove all internal undercuts that require lifters, which often causes jamming in die casting.
- Minimize the number of side-action directions that limit the quantity of possible cavities in the mold.

5. Parting line

- Parting line will split the part and produce a contact surface between two or more components. When the cost is the priority, a straight parting line is the first option.

6. Draft

- The draft refers to the taper or slope assigned to cores and other parts of the die cavity. It can prevent the casting from getting trapped in the mold or tool when ejecting the part, and make it easier to open the die and eject the component. The direction of the slope must be consistent with the demoulding direction of the casting. Introduce the draft on an inside wall, outside wall, and/or holes early. The external wall requires the least amount of drafts, untapped holes require the most draft.
- Add draft for the fillet projected in a location that is perpendicular to the parting line.
- The adhesion between the aluminum alloy and the die casting die is large, and the draft angle of the inner surface is generally 1°

- The adhesion between the zinc alloy and the die casting die is the smallest, and the draft angle of the inner surface is generally 0.5°

7. Holes

- If the hole is too small, the core is easy to be deformed and broken by impact, which shortens the die life.

8. Ribs

- Add ribs on thin walls to increase the stiffness and strength of the part. Place the ribs at proper locations to make the ejector pin be placed on the ribs to raise the ejection strength.
- Plate type parts have low strength and easy deformation. The reasonable setting of ribs can improve the strength of parts and reduce the deformation of parts.
- The thickness of the root of the ribs is generally not greater than that of the wall here.
- The fillet should be added at the root of the ribs to avoid the sharp change of the cross-section of the part, assist the flow of molten metal, reduce the stress concentration of the part and improve the strength.
- The height of ribs shall not exceed 5 times of its thickness
- The direction of ribs is consistent with that of molten metal
- The position distribution of reinforcing ribs should be reasonable and symmetrical and even as far as possible.

9. Thread

- The full thread design should be avoided for the external thread, it is difficult to align the parting line of the full thread design.
- The internal thread should not be cast directly, and a special structure is needed for direct casting, which increases the cost of the die.

10. Tolerance

Under the condition of meeting the service performance of parts, the tolerance of die casting should be reduced as much as possible. Strict tolerance means strict die tolerance, which will increase the cost of die casting. The service life of die casting die will be shortened due to too high tolerance requirements. In addition, in order to maintain the strict part tolerance, the die casting die needs regular maintenance and replacement.