

Types of Expendable and Permanent Casting

Casting is a manufacturing process in which a liquid material is poured into a mold and allowed to solidify. There are two main categories of casting processes: expendable and permanent casting. In this guide, we will explore six types of these casting processes in detail.

Expendable Casting Processes

Expendable casting processes use molds that are destroyed or consumed during the casting process. Here are three common types:

1. Sand Casting

Sand casting is one of the most traditional and widely used expendable casting methods. In this process, a pattern is made of the desired part, and sand mixed with a binding agent is packed around the pattern to form a mold. The pattern is then removed, and molten metal is poured into the mold. After cooling, the sand mold is broken to retrieve the casting.

2. Investment Casting

Also known as lost-wax casting, investment casting involves the creation of a wax model of the part, which is then coated in a ceramic material. Once the coating hardens, the wax is melted away, creating a mold cavity. This method is ideal for intricate designs and produces high-precision parts.

3. Shell Molding

Shell molding is a variation of sand casting that uses a resin-coated sand. A heated metal pattern is used to form a thin shell of sand around it. Once set, the shell is removed from the pattern, and the halves are assembled to create a mold. The advantages of shell molding include higher dimensional accuracy and a smoother surface finish.

Permanent Casting Processes

Permanent casting processes involve molds that can be reused multiple times. Here are three prominent types:

4. Die Casting

Die casting involves forcing molten metal under high pressure into reusable steel molds (dies). This method is suitable for mass production of small to medium-sized parts. Die casting offers excellent dimensional accuracy, smooth surfaces, and the ability to produce complex shapes.

5. Permanent Mold Casting

Similar to die casting, permanent mold casting uses metal molds that can be reused. The molten metal is poured into the mold and allowed to cool. This technique is typically used for casting aluminum and magnesium alloys and provides better mechanical properties than sand casting.

6. Centrifugal Casting

Centrifugal casting involves pouring molten metal into a rotating mold, which forces the metal towards the outer edges due to centrifugal force. This method is often used for producing cylindrical parts, such as pipes and tubes, and offers excellent density and microstructure control in the finished product.

Conclusion

Understanding these types of expendable and permanent casting processes is crucial for engineers and manufacturers. Each method has its advantages and applications depending on factors like material, desired intricacy, and production volume.