

Q3: How to extend the life of die-casting molds? (2) Analysis from the perspective of mold design.

A3: The main ways to improve the life of die-casting molds can be attributed to the four main analysis levels of mold materials, mold design, mold manufacturing, mold use and maintenance; among them, the quality of die-casting mold design directly and closely affects the life of die-casting molds. Therefore, when designing a die-casting mold, the designer must fully consider the factors that affect the mold life, and according to the property of the casting, rationally design the mold structure to ensure that the early stage of the casting design that affects the mold life or measures to be resolved. This article is an excerpt of several principles worthy of attention for readers to review.

- **Is the mold strength sufficient?**

Many die-casting companies pay special attention to the price of molds when purchasing molds, and even think that as long as they can die-cast qualified products, they do not pay much attention to the size and strength of the molds. In addition, the manufacturers of die-casting molds ensure obtaining an order often keeps the price of the mold down, but it can be saved when the mold is made, to reduce the cost, and it is easier to ignore the strength of the mold.

Insufficient mold strength will affect the reliability of the mold, and from the perspective of die-casting production, it is even less economical. When the mold lacks strength and its rigidity is not enough to resist the continuous impact and pressure of the production process, it will crack prematurely; in addition, because the aluminum sealing surface is too small, it will cause the mold to channel aluminum, and the mold will be crushed if it is not cleaned in time. The mold is damaged, making the life cycle of the mold end early.

- **Whether the gate speed in the mold is appropriate, it should be as low as possible**

The design of the inner gate is not only an important factor affecting the quality of castings, but also affects the life of the die-casting mold, which must be paid attention to. The faster the gate speed in the die-casting mold, the greater the impact on the mold cavity, and the greater the instantaneous temperature rise of the cavity, the more likely the mold will be surface cracks or cracks. The inner gate is generally 30-70 m/s. In the case of ensuring product quality, it should be as low as possible to reduce the impact on the mold and extend the life of the mold.

- **Is the strength of the locking block of the slide sufficient?**

The impact force of the die-casting slide is very large, and the die-casting specific pressure is generally selected at 400-900 kg/cm². Taking the slide projection of 100×100 mm for example, the force is as large as 40-90 tons. If the mold design is too small to save material when designing the mold, the locking block is not large enough and the strength is not enough, which may cause the slide to fail to lock; this will not only affect the quality of the casting, but also cause aluminum channeling. It causes the slide to jam, causing deformation or cracking of the mold locking part, which damages the mold and affects the life of the mold.

- **Is the aluminum surface of the mold cavity sufficient?**

Except for improper selection of die-casting parameters, too fast injection speed, too much pressure, insufficient clamping force, etc., the reasons for the aluminum channeling of the mold are also the important reasons for the insufficient aluminum sealing surface due to the unsuitable mold design; especially in the sliding The aluminum sealing surface of the block part must be sufficient to ensure that no aluminum is channeled, thereby prolonging the life of the mold.

The aluminum channeling of the mold directly affects the internal quality of the casting. If it is not cleaned in time or difficult to clean during the die-casting process, the mold will be squeezed, causing the mold parting surface to collapse; even more, if it is in a mold with a slide structure, When the aluminum enters the gap of the slide, the clamping force is very large when the mold is closed, which will damage the slide or the slide base, or even crack the mold base. What is worthy of our reflection is whether the concept of only considering the cost and ignoring the properties of mold reliability, yield, production efficiency and life is the key to hindering some domestic enterprises from moving forward.

- **Is the mold temperature reasonable?**

Most die-casting mold manufacturers often attach great importance to the gating system. When using the mold flow analysis software, they study a lot of the filling part, but relatively little change in the temperature field of the mold. However, in actual production, the mold is cooled, Changes in the mold temperature field are critical to production efficiency, casting quality, and mold life.

Die-casting is a process of rapid cooling and heating of the mold. If the cooling design of the die-casting mold is unsuitable, instead of relying on the cooling inside the mold to cool down steadily, it only relies on the sprayed external cooling to sharply drop the temperature from the mold cavity surface, and the temperature change rate will increase faster than the fatigue rate will not only cause waste of

paint and reduce production efficiency, but also affect the life of the mold.

- **Whether the vulnerable parts are inlaid**

In order to extend the life of the mold, when designing the mold, we should try to inlay the parts that are prone to mold cracking and mold damage. In this way, it is easy to repair and replace, and the inlay seam can block the extension of cracks, thereby prolonging the life of the mold.

- **Reduce stress concentration to the sharp corners.**

Because the sharp corners are prone to stress concentration, for die castings, the sharp corners at the corners have a great impact on the casting process, the quality of the castings, and the life of the die casting mold; therefore, in the early stage, the sharp corners of the corners have a great impact. When discussing problems, designers should pay great attention to the corners of the castings, and generally suggest that they can be as large as possible, which is very important.

- **Adopt advanced technology**

In order to extend the life of the mold, many scientific and technical personnel are actively exploring some new technologies, such as: new surface nitriding technology, titanium plating, surface micro-grid life extension technology, etc. As a die-casting mold manufacturer, as a part of die-casting mold designers, actively explore new technologies, track advanced technologies in a timely manner, and appropriately adopt new technologies to improve mold life. This is definitely the only way to improve the standard of die-casting molds and the technical level of the enterprise.

- **Die casting mold design and mold life**

Today, the die-casting industry has developed a variety of high-tech hardware and software technologies and equipment. If you want to maximize the benefits of these tools, from the initial design stage, it almost determines the key to success or failure! Grasping the criteria of mold design and reasonably simulating mold flow analysis can help us find the negative factors affecting mold life, that is, casting defects, in the early stage, and provide suggestions for improvement in time to ensure long life of die-casting molds and good die-casting quality; At the same time, there is nothing wrong that designers should have cost control concept, but they cannot blindly pursue the superficial meaning of "price". They must know the meaning of comprehensive "value" including mold quality and life, to fight for the current order and win the trust of customers at the same time.

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