Q6: When is the Sticking issue finished and do you know the origin?

A6: The 4 common factors that cause the phenomenon of sticky. Here DITSA Office report to you.
The defects of die-casting mold sticking directly affect the appearance and strength of the product, especially for castings with sealing requirements. Serious sticking molds will cause partial leakage and cause unnecessary waste. And what factors cause the sticking phenomenon? We can analyze the causes from four factors: metal interface reaction, mold design, influence of mold release agent, equipment, and process parameters:

- **interface reaction：**

The sticking is caused by chemical reaction and mechanical bonding. Because aluminum alloy has a strong affinity for iron, the contact between molten aluminum and the mold will produce a compound, which causes the mold and the alloy to be tightly packed together. The temperature of the molten aluminum or the mold becomes higher, and the more intense the thermal vibration of the atoms, the greater the probability that the atoms will be activated and move, the molten aluminum will corrode the mold more and more, and finally form the sticky area on the mold surface; and when the sticking occurs , Workers use grinding tools to clean, the nitride layer on the mold is easily damaged, and the corrosion of the mold is accelerated.

- **mold design：**

Castings are mostly caused by mold structure design or improper follow-up treatment. Insufficient nitriding or carbonitriding heat treatment leads to too thin or uneven nitride layer, manual grinding leads to damage to the nitride layer, resulting in rough wall surface, excessively small draft angle of the mold, reverse slope of the core or wall, and unsuitable design of the gate system are all likely to cause sticking.

- **influence of mold release agent**

The release agent is in direct contact with the mold, and it forms a dense isolation layer between the molten metal and the mold to ensure that the molten metal can be released smoothly after cooling. In the process of changing from the liquid phase to the solid phase, the interface of this layer will produce a series of physical and chemical reactions. In order to reduce the casting defects, the quality of the release agent is particularly important under the premise that other process conditions are the same. The property of high-quality mold release agents include: the need to

ensure that the diluent in the water-based solution can quickly evaporate without increasing the gas in the cavity; it has strong affinity with the mold, does not produce accumulation, and ensures even coating; The casting does not produce corrosion effect; the demulsification effect is good, the COD emission value is reduced, and the environmental pollution source is reduced.

- **equipment, and process parameters:**

High-speed injection can greatly improve the filling capacity of castings, and even break up some condensed hole defects, which can easily solve some defect problems; the same for the high-pressure principle, the castings are dense, the surface quality is good, and within the required range of holes or shrinkage defects. However, this also often brings more unfavorable defects. Flash is the most obvious type of defect. It not only makes it difficult to clean the castings, but also results in the delamination of the surface of the castings and the processing to solve the delamination. The size of the casting exceeds the specified range, and the mold slide enters aluminum causes problems such as difficulty in cleaning, and at the same time aggravates the bonding force between the molten metal and the mold, increases the sticking phenomenon, and greatly shortens the life of the mold and the die casting machine.

This article is excerpted by Cao Jinwei, a graduate student of the Department of Mechanical Engineering, National Taiwan Ocean University, and is extracted from: Methods and Measures for Improving Die Casting Surface Adhesion Defects, Gao Zhengyu, from Global Casting Magazine.