

Die Casting Moulds

introduction to the world of development and manufacture of moulds for aluminium die casting. The transformation of metals into finished parts through the die casting procedure is a very old practise which was already known by the Egyptians.

The most used materials are:

Aluminium and its alloys;
Copper and its alloys (bronze, brass);
Magnesium and its alloys;
Zamak;

Tin and its alloys.

The word “die casting” indicates the casting procedure in which the filling of the mould occurs through the pressure which a press executes on the melted metal.

The form of the piece is gained through the mould therefore the manufacture of moulds for aluminium die casting has to be carefully executed.

For a correct manufacture of moulds for aluminium die casting it is essential to choose the right type of steel and the most suitable heat-treating. There are basic elements that give the mould the technical-mechanical features of a heat pump.

Development of die casting aluminium moulds

To analyse the procedure for the manufacture of moulds for aluminium die casting it is important to mention both parts of a die casting mould:

- the fix part which is installed on the fix plate of the press;
- the mobile part which is installed on the mobile plate of the press.

In some case it is necessary to build proper slides/inserts in order to obtain particular figures or back drafts of the part.

In the manufacture of moulds for aluminium die casting following elements have always to be considered:

- form and dimension;
- mechanical and thermic shock;
- cooling;
- features of the press that has to be used.

The phase of development of moulds for aluminium die casting starts when the producer receives the manufacture order together with the final drawings and the technical specifications of the project.

The producer engineering staff prepares a draft of the 2D project which is sent to the customer for the approval.

Once the customer has approved the whole project the producer has to prepare the bill of materials. If there are improvement proposals, modifications or unclear dimension the producer's engineering staff contacts the customer to agree the best solution.

The manufacturing phase is now beginning: the 3D project (matrixes, inserts, pins and blades) is prepared and the drawings are 100% checked.

The engineering staff has also to draw a bill of the normalized materials that have to be ordered and the 3D project of the electrodes has to be prepared.

Aluminium die casting Moulds

Once all the ordered materials are in the production phase begins with the manufacture of the most important components of the moulds for aluminium die casting: the die holder and the electrodes are built, the forging parts are rough-machined.

These works are always done under the direction of the project manager and in strict liaison with the production manager and the quality manager.

The quality control dept. checks all the dimensions on a 3D measuring machine.

Once the die holder, the forging parts and the electrodes are ready the material is sent to the supplier for the heat-treating.

Afterwards the certified hardness are checked and the forging parts are finished through manual polishing. The mould is then assembled and closed and its functionality is tested through a machine with the injection of a particular resin.

Once all the parameters are tested the first sampling is done. At the first sampling often occurs that incorrect dimensions are detected. This could require some modifications on the mould and a new sampling has to be done.

When the quality of the casting is good the customer has to give his written approval of the complete project.

Moulds for aluminium die casting have always to be delivered together with all the documentation regarding the project (certificates of the materials, heat-treating certification, copy of the CD containing all the project data).

The diesinker guarantees the routine maintenance of the tooling whereas the extraordinary servicing has to be agreed each time.

Design of tools for die casting

Mechanical machinings

In some cases the supplier has to deliver the finished part. It means that after the casting procedure the pieces have to be machined. The mechanical machinings of the pieces include drilling, milling, threading, deburring, washing, sandblasting and painting.

The mechanical machinings are executed on CNC horizontal or vertical machines, on transfer machines and on the cabinet bench.

Following the modern qualitative standard all the die casted pieces are checked either during the machining phase or before the delivery (these tests are done on the basis of DIN ISO checking rates).

Often a more precise inspection is required: in that cases it is used a 3D measuring machine and corresponding inspection documents are then prepared and sent together with the good.

The supplier who has applicable machines and can produce the die casted pieces up to the execution of the mechanical machinings has more possibilities to increase the number of his customers.

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