

Moulds: manufacturing with added value, specialization and practical improvements

The mould manufacturing branch responds to the requirements of the manufacturing industry by achieving improvements both in the moulds themselves, as well as the process of their production.



In recent years the functions of the moulds manufacturers have broadened, so that they can offer to their customers even larger added value.

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The mould manufacturing branch has undergone profound changes in recent years. Until recently the functions of the mould manufacturer were confined to manufacturing a mould, which was to satisfy the requirements of the customer. At present he/she participates actively in the development of the product, thus contributing to the larger accumulation of added value against better regulated prices. The manufacturer adapts to the new situation, by taking a stand, regarding the mould itself, its

development and the materials for its manufacturing, as well as the manufacturing process itself. In order to have a position in the market and to grow, in order to resist the competitiveness of the Asian manufacturers, we need to adopt a new approach in mould

The manufacturers adapted to the new situation by modifying not only the moulds, but also the process of their pro-

duction, different from the traditional, which is applied in most workshops at an almost craftsmanship level.

The automation or operation is something which many manufacturers did not include in their production until some ten years ago. Lately, however, the companies make use of modern tools, equipment, processes and methods, as well as high technologies, which have a great impact on the different manipulations and comply with the growing requirements for high quality and the completion of orders within short deadlines.

Apart from this, by paying attention to the condition of their own workshops and their optimization, which unconditionally went through automation, the mould manufacturers implemented the best managing practices, with the aim of not only adapting to new technologies, but also to innovative practices in the organization and management.

Added value and specialization on the market

This change in goals necessitated a certain reevaluation of the major customers. Many manufacturers become specialized, which means

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they directed themselves to a smaller number of customers, but global ones.

Moreover, in order to increase the efficiency of manufacturing processes, the mould manufacturers apply the strategy of directing themselves to specific markets and geographic zones. In this sense, the

industry branches to offer many opportunities for opening up of markets for the European mould manufacturers are the medical, automobile, package production and wrapping material and defense one. For the European branch in mould manufacturing, the competitive factor is the value added production; complex or specific moulds production, which requires determined production power, or the experience and knowledge on the functioning of vertical markets. Such can be, for example, the moulds with many cavities (grooves) or moulds for micro details. The mould manufacturers

The material used for mould production may become a distinguishing factor

should offer products which satisfy the wide spectre of needs in the manufacturing industry in a reliable and economical way. Among these needs, we should point out the productions where great precision is required as well as high repeatability in producing small and complex details, including mini and macro components, in casting with multiple injection, putting together in a mould, and more efficient control on resin injection.

In fact, for most of their applications the moulds are produced in such a way, as to widen their main purpose within the framework of the pieces production itself and it is more and more frequent to encounter casting by means of mul-

tip injection along with putting together into a mould, which allows the OEM (Original Equipment Manufacturer) manufacturers to manufacture complex details with minimal intervention of man. One of the tendencies which illustrates the increasing complexity of the moulds, for instance in the medical branch, are the pieces for multiple spraying (injections), in which thermoplastic and rubber from fluid silicon (LSR) are combined, as well as the elastomer, which is often applied to visible surfaces. The challenge is to produce a mould, where the hot thermostat together with the cold LRS can be combined. The separation of these two components requires isolation borders, water cooling and their disengagement within the framework of the mould itself.

Warm channels

A significant part of component production are the warm channels, which contribute to improving the quality of the end product, decreasing production costs and the quantity of the raw materials used. Such for example are the valve systems, which contributed to the significant enhancement of production, both in the finishing operations in the production of a given piece, as well as the control on the overall production process.

Some companies already offer leading servo-mechanism for warm channels systems with valves, which affect considerably the precision and reaction span, since they enable the regulation of water quantity and pressure. By injection with electrically dri-

ven valve, the speed of the needle movement may be regulated with greater precision, as well as the force and speed of its opening and closing, which improves the control on filling and supplements the functions of the injection device.

With this system resin injection is precise, and there are no leftover materials from the production of pieces - an important requirement with components such as the pipettes, whose application is strictly determined depending on the variety of their size.

Manufacturing material

The material which must be used in mould manufacturing is also an object of research and it may become a distinguishing factor in future. The type of material determines the projection of the mould, similar to the projection of warm channels, if any.

In the projection/design of some tips/caps/ferrule (openings, apertures, nozzles/orifice) metals are deliberately sought to improve the operation itself and the durability of the detail. The aim is to work with metals which ensure combination from thermo-conductivity and resistance against wearing and deformation. One of the ways to satisfy these demands is the constructions, consisting of manifold materials.

Thus some caps (openings, apertures, nozzles) are made from three materials: the first one is diathermanous and a relatively soft metal; the second is a material for the inner part, resistant to wearing and may endure the

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friction of the resin, which contains a great quantity of fibre-glass or mineral, and the third one is an outer material, which gives solidity to the inner part. The benefits from all this are expressed in the value and the manufacturing process itself. A cap, which preserves its shape

and characteristics, enables the production of durable pieces.

As far as the mould itself is concerned, the new technologies for surface laying (isolation, coatings) enable the use of aluminium instead of steel in some processes for plastic processing. In this way, technology, which requires the use of plasma, turns aluminium surface into solid, thick and resistant to wearing ceramics, which can also be used for injection. Another method, which is currently being developed, uses the electric precipitation of titanium oxide, in order to achieve a ceramic surface with increased solidity and resistance to erosion and impact of chemical products.

Direct Production

In order to cope with the numerous orders which are small in size, but require a lot of time and resources, the mould manufacturers sought quick and efficient alternatives and for many of them digital production turned out to be the key to success. Under 'digital or direct production' we mean the direct and economical production of plastic pieces, without a mould being necessary. From the digital electric provision of a certain piece we proceed directly to the end product by means of "add" production, i.e. making the physical object by means of selected merging, agglomeration and polymerization of a certain material.

Until recently because of the limited number of resin, which could be used, the applicability of this method was limited to the manufacturing of products, which were not to be used for a very long time. At present, the new resin, which possess better qualities make it possible to widen the spectre of opportunities.

Digital production allows this branch to achieve quick production of small serial pieces and to specify their geometric characteristics, before proceeding to mass production, and this kind of activity may also be commercialized as added value and a kind of consultant services.