OPTIMALIZACIA NÁKLADOV NA VÝROBU VSTREKOVACEJ FORMY

OPTIMIZATION OF COSTS FOR PRODUCTION OF INJECTION MOULD

Ľudmila DULEBOVÁ

Abstract

A significant part in deciding and managing the production process are requirements for their profitability and economic efficiency. Major role of price of plastic part have the costs incurred in the production. Comprehensive evaluation of relationships between individual items of cost can be easily and quickly determined using CalcMaster software that allows the company to determine the price and mould production costs.

Key words

Plastic, Injection Moud, Production, Cost, Calcmaster Software.

Introduction

In the field of injection moulding there is a long way to the final product influenced often by controversial demands and needs of various involved participants. The moulder requires the precise mould costs as well as the determined cycletime at specific operating parameters. The customer highlights the final product cost price including the costs of materials, forms and injection process.

The relevant data above cannot be considered separately. Comprehensive evaluation of relationships between individual items of cost can be easily and quickly determined using CalcMaster software that allows the operator to determine the price and mould production costs on the basis of accurate internal data. Time and cost feasibility study with the CalcMaster accelerates and simplifies negotiations between the designer and mould maker while the output is the optimized cost price of the final product.

The pre-selected range of toolmakers and injection moulders simplifies choice with respect to desired technical and price levels. The client´s goal obviously is to get top quality at a reasonable price.

There is always necessary to perform a thorough analysis of the end product and production conditions. Without knowing the precise specification and the injection conditions there is possible to perform alternative calculations enabling contractor to specify their requirements and facilitate the design and production of mould. The contractor that does not proceed according to the given guidelines and emphasises a low cost too much, obtains simplified mould raising production costs and thereby reduces the profitability of the final moulding. Moreover, without proper optimization the project schedule often delays in bringing new products to the market.

CalcMaster software – the optimal variant of cost reductions in the company

Every new plastic part must be designed and manufactured of injection mould on rate. Design, specifications and dimensions of injection mould are defined different requirements. These include, for example size of plastic part, volume of production, type of plastic, the type of press, form clamping system. Design and manufacture of moulds requires the development of new technologies to achieve higher quality and lower production costs in the production of finished plastics parts. The injection mould is shown on Figure 1.

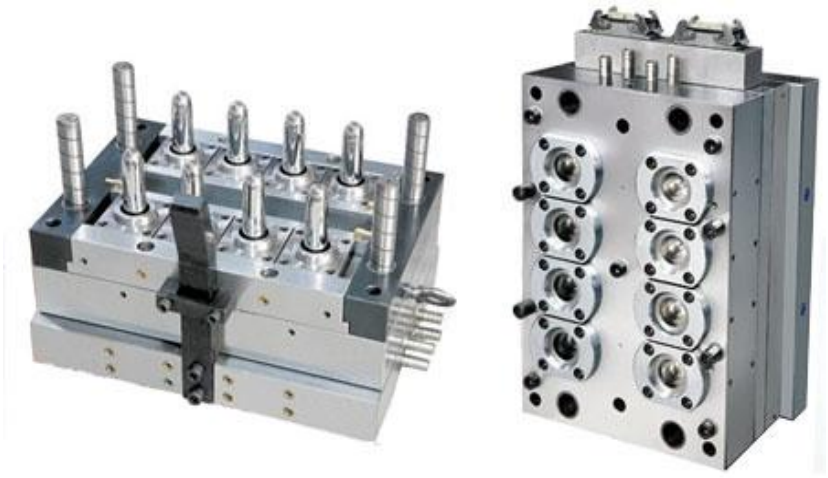

Fig. 1 Decomposed the injection mould

Nowadays, in the calculation of costs for production of plastic parts are using modern software. One of these is the CalcMaster software.

Description CalcMaster software

The System CalcMaster 7.2 software working on the reflected wave principle brings new possibilities in the offer and demand process of moulds for plastics and light metals. The system integrates the issues of price and quality in relation to both moulds and injection data even before the mould design and thus prevents loss of mould reworks. Due to its graphic visualization the inconsistent locations in the project are clearly seen, which results in direct optimizing in touch with experts focused on relevant issues.

CalcMaster structured calculation processes and analyzes the critical points of the production process, which ensures high reliability of data and minimizes human error. CalcMaster offers a precise calculation of the cost, cycletime, the number of cavities and also the price of end product. The system enables efficient processing of alternative solutions which give in the hands of the contracting authority a solid basis for tender success and consequent resale or part processing.

The reduction of the final product total costs should be the most important goal for the manufacturer when structuring the costs. Evaluating the correct final product total costs is influenced by the wide range of input data. All these aspects are parallel analysed by CalcMaster (Figure 2). Thanks to its setting options the CalcMaster is very flexible and can be adapted for various commercial and technical assessments. All these settings are registered and saved.

Simple calculation of the costs to the production of injection mould

Entering the data there is necessary to take into account parameters that belong to the injection mode, surface treatment, requirements for tolerance or need for the use of the hot runner system. This way you can quickly get a lot of precise technical details that would otherwise remain hidden behind the assumptions and presumptions. All attributes related to the mould maker can be revised on the basis of other relevant calculations, including the final comparison of calculated and real conditions. The feedback comparison working in a semi-automatic cycle updates the offered values and supports the know-how preservation of the company experts.

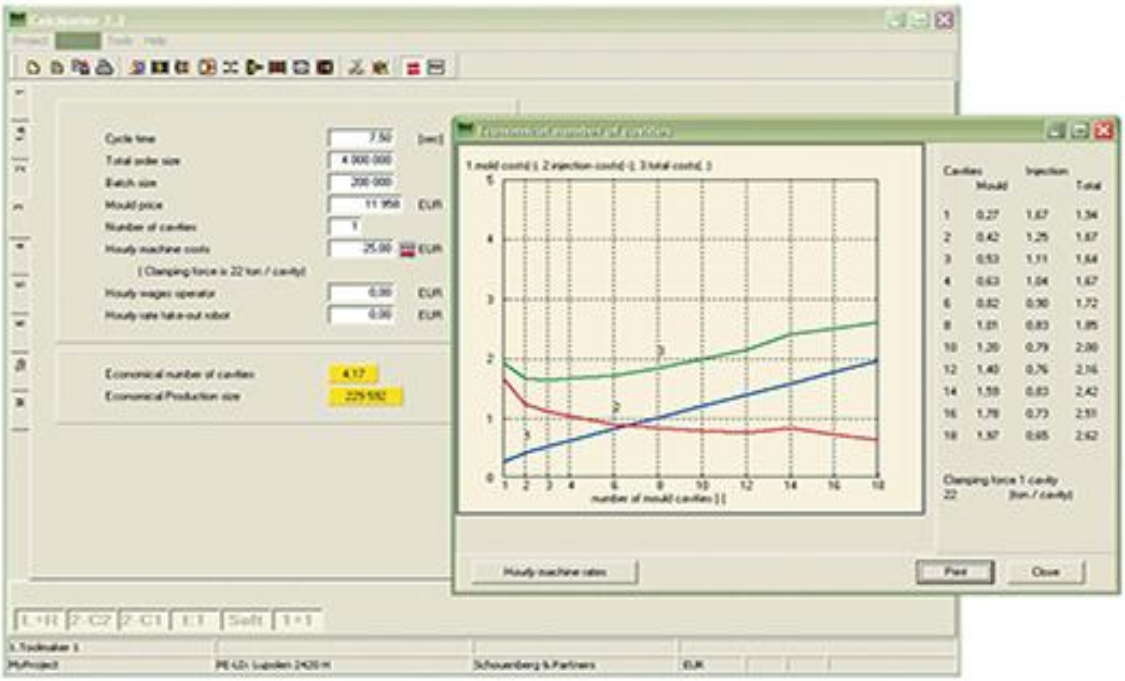

Fig.2 The analysis of the injection moulding parameters in CalcMaster 7.2 software

Calculation of the injection cycle in relation to the mould costs

Calculating the final product cost price is influenced by the expected length of the injection cycle determining the costs of the injection. The cycletime is determined by several parameters that cannot be changed after completing the mould design. The most important aspects are:

- the maximum wall thickness in any part of the product,
- cooling built into the mould.

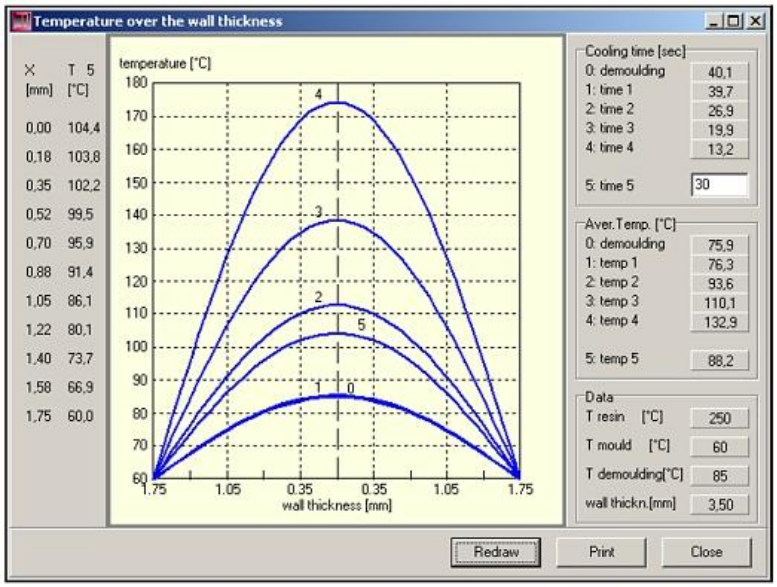

Fig. 3 Dependence of wall thickness and temperature of moulding part

The wall thickness is determined by the product developer. The discussion is possible in order to modify the product design (i.e. decrease the thickness of the wall using a larger number of reinforcements or use a different material). The mould cooling is to be discussed with the mould designer and the contractor must insist on the requirement of optimal (and efficient) cooling. Dependence of wall thickness and temperature of injection moulding is shown on Figure 3. Both of the above parameters, increasing the tasks in the mould design and costs for making of cores and cavities, result in shorter cooling time and thus the injection cycletime.

The above conclusions imply that the contractor should negotiate the costs with the mould maker instead of simple price offers comparing - as well as to supervise the whole project and achieve the effect optimized mould and product costs.

These above examples show that every part of the supplier chain has to be familiar with their own field as well as consult with other professionals and maintain the level of mutual communication.

It is the only way to get a detailed overview of the cost structure and possibilities for their reduction and prevent the unwanted expenditure growth arising from inadequate information and additional changes of the mould.

Conclusion

CalcMaster software significantly helps in optimizing of the moulds thanks to the quick evaluating of mould costs, injection parameters, the number of cavities and the final product cost prices. Quick changing the parameters enable easily compares the obtained alternative solutions and to specify the lowest product cost. The program is suitable for all corporate departments monitoring the impact of changes in input data to the final cost. Variable or vague assumptions can always be consulted. The software simplifies the first cost calculations when the customer is no longer totally dependent on the supplier and gets in advance more detailed knowledge about the product. Finally, it also allows a significant increase in quality of moulds and the entire process of production of plastic parts. Due to its potential of gradual input clarifying the achievement is the advanced professional estimate of real costs.

Key words
Plastics, injection mould, production, costs, CalcMaster software.

Acknowledgements
This paper is the result of the project implementation: Technological and design aspects of extrusion and injection moulding of thermoplastic polymer composites and nanocomposites (PIRSES-GA-2010-269177) supported by The international project realized in range of Seventh Frame Programme of European Union (FP7), Marie Curie Actions, PEOPLE, International Research Staff Exchange Scheme (IRSES).

Literature

[1] OSSWALD, T.A. – TURNG, T. - GRAMANN P.J.: *Injection moulding handbook.* Hanser publisher, Mníchov 2001, ISBN 1-56990-318,

[2] GREŠKOVIČ, F.- DULEBOVÁ, Ľ. – VARGA, J.: *Technológie spracovania plastov.* Vstrekovanie. SjF TU v Košiciach, 2010, ISBN 978-80-553-0369-7,

[3] FONSECA M. et al.: *Assisting Mould Quotation Through Retrieval Of Similar Data.* 2007, Digital Enterprise Technology, SESSION 5, p. 527-534,

[4] MALEGA, P.: *Hodnotenie ekonomickej efektívnosti pri vstrekovaní plastov ako cesta k úspechu.* Transfer inovácií 9/2006, p. 132-136, ISSN 1337-7094.

[5] www.plasticportal.eu.

Contact

Ing. Ľudmila Dulebová, PhD.
Faculty of Mechanical Engineering
Department of Technologies and Materials
Mäsiarska 74, 040 01 Košice
e- mail: ludmila.dulebova@tuke.sk