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UTILIZATION OF INFORMATION SYSTEM FOR INJECTION MOLDING TOOLS

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ABSTRACT
This article describes utilization of the developed information system NAHOS for tool management system for use in injection molding to handle used tools (molds). This information system was developed in last years in cooperation of Faculty of Technology and Faculty of Applied Informatics of Tomas Bata University in Zlin, Czech Republic and in last period was applied in area of injection molding. There are some specific properties compare to tool management in other manufacturing processes, for example in machinery – much more technological information connected to own technological process, more graphical data etc. Described information system gives for users the possibility store all needed information and data as attributes of molds, use these attributes for finding appropriate tool (mold) and simple use stored data in injection molding process.
Keywords: tool management, information system, injection molding, tools

1. INTRODUCTION
Today, injection molding is probably the most important method of processing plastics in the production of consumer and industrial goods, and is performed everywhere in the world. Especially application of this method in automotive and electronic industry increases usage of injection molding. Most of the companies producing injection molded parts have a lot of tools (injection molds) where each of them is unique. Injection mold is very expensive and complicated assembly of hundreds parts. It is necessary to have detailed database of tools in electronic version containing all information about the mold and injection molding process. To achieve that, we must have possibility to get fast and simply exact information about the location and state of tools and about their technological characteristics. The application of such methods is possible with the use of information technologies – it is effective to form an information system for tool management (ISTM) [2]. This paper describes application of such information system, called NAHOS [1], developed in Tomas Bata University in Zlin and Technical University in Brno, into injection molding production.

2. TOOL MANAGEMENT IN INJECTION MOLDING PRODUCTION
It is very important to have detailed information about these tools because of their next usage and maintenance. The review of this information is shown in table in Table 1. The data for injection molding tools have different form – they are texts, numbers, tables, pictures, graphs. All the data types are stored in database and handled by described ISTM. This application has been tested on injection molds owned by our university. There are two injection molds for the different parts presented in this paper (Figure 1 and Figure 2).

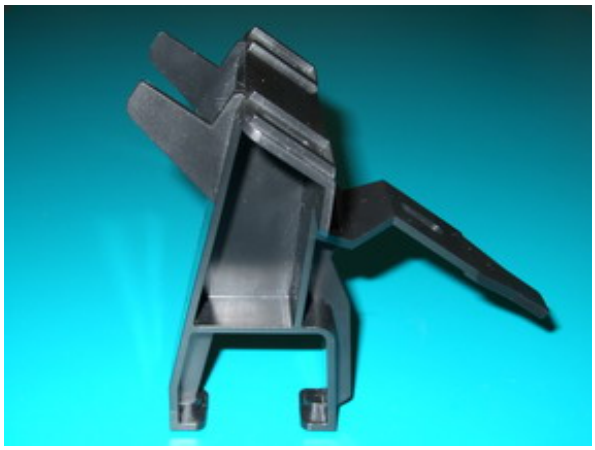

Figure 1. Injected part – "clamp"

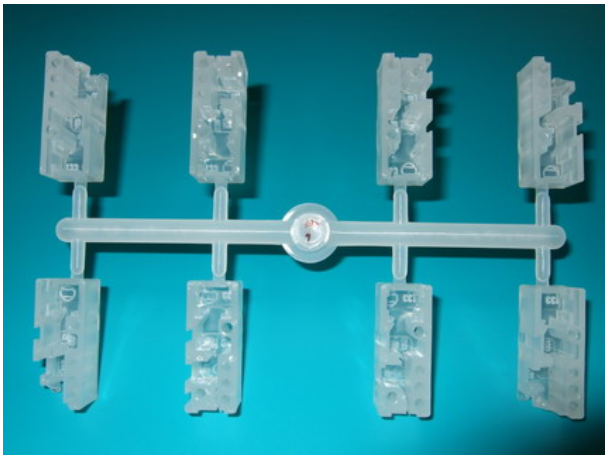

Figure 2. Injected part – "electro"

Table 1.Data structure and contents for injection molding tools

MAIN DATA				
name, number	*weight*	*dimension*	*product description*	
DESIGN OF INJECTION MOLD				
multiplicity of injection mold	*runner and gate system*	*ejection system*	*normalized parts*	
	cold runner	cylindrical ejector pin	yes (producer)	
	hot runner (producer)	prismatic ejector pin	no	
	combination	stripper plate mold		
		three plate mold		
		screw mechanism		
		combination		
TECHNOLOGICAL PARAMETERS				
injection molding cycle	*injection unit*	*cooling system*	*closing unit*	*clamping*
course of pressure	melt temperature	water	clamping force	screws
course of temperature	temperature zones	oil	feed speed	clamps
pvT diagram	injected volume	temperature unit (type)		
	injection rate	temperature		
	injection pressure			
OPERATION PARAMETERS				
number of cycles	*repairs and corrections*	*storage rules*	*transport and installation*	
		place		
		lubrication		
		corrosion prevention		

The user interface is based on the forms used for data presentation and for inputs. The forms are created in the Form Editor (a part of the NAHOS). Examples of used forms are in Figure 3 (data overview for mold for part from Figure 1) and Figure 4 (list of injection molds)

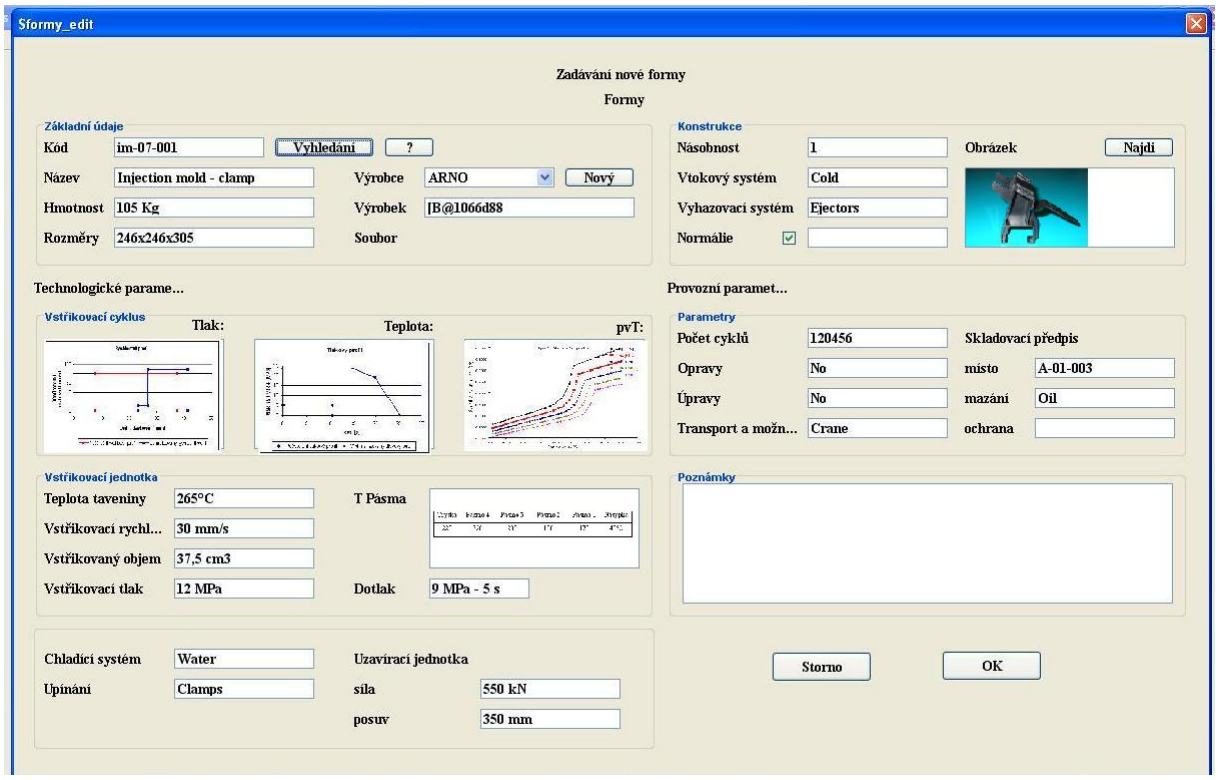

Figure 3. Page form for injected part and its mold – "clamp"

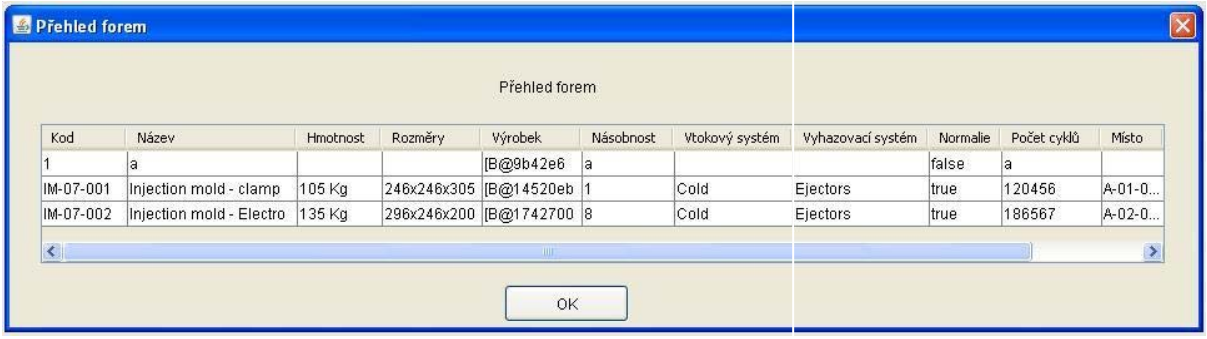

Figure 5. List of injection molds recorded in database

3. STRUCTURE OF THE INFORMATION SYSTEM FOR TOOL MANAGEMENT IN INJECTION MOLDING

Information system for tool management is build as a modular system - see Fig. 6. Individual modules are determined according to the functional requirements for tool management in injection molding production. Descriptions of functions for individual modules are as follows:

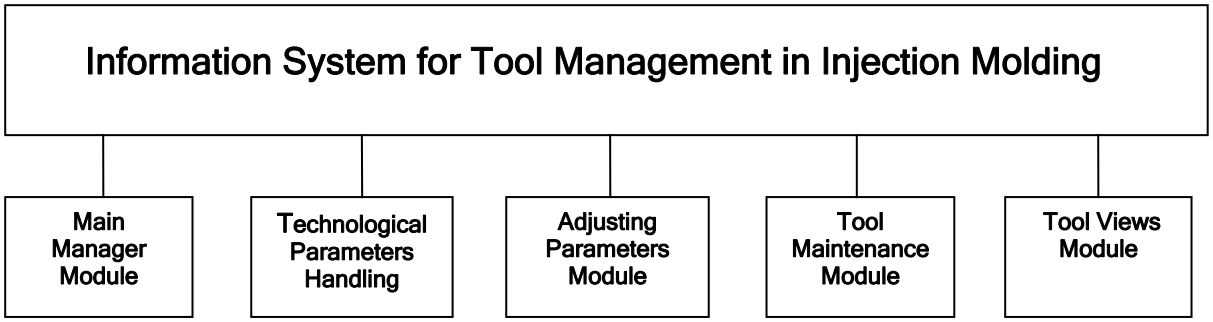

Figure 6. Structure of Information system for tool management

Main manager module and Tool views module
These modules are intended for main functions of information system (f.e. create new data records, edit existing, drop not more useful records, search objects by specific parameters, show results etc.).

Module for technological parameters handling
Injection molding is very complex process from the technological point of view. There is amount of technological parameters (f.e. melt temperature, injection pressure, holding pressure, etc.) that are dependent on injected material and form of mold tool. Because there are thousands of the different materials and each of them needs special adjustment for their processing to the final product, it is very useful have all needed data in database and prepare parameters for production with aid of this tool management system.

Module for adjusting parameters
Injection molding is process containing different variety of the adjustments. Especially injection molding machine parameters set up is one of the most important stages during preparation and start of production plastic parts. There are two basic groups of the set up. The first is connected to technological parameters, the second group is connected to clamping unit which clamping and handler the injection mold (for example: clamping force, speed of mold movements, ejectors movements). All these data could be saved in the database including pictures. There is an also possible archive the setup files directly from the injection molding machine and then sequentially load this data in machine which could make final adjustment of the process faster.

Module for tool maintenance
The maintenance of the molds is very important and necessary item of quality mass production. There are usually a lot of parts needing different periodic maintenance in the mold (for example: lubrication of the guide parts). Two types of the period maintenance could appear. One is the time period of the maintenance and the second is the maintenance after specified amount of the cycles.

4. CONCLUSIONS
Described information system for injection molding tools was developed and tested in laboratory of Institute of Production Engineering of Faculty of Technology, Tomas Bata University in Zlin. From the testing come some recomendation for improvements of the system. After they will be fully realised, the system will be implemented in industrial injection molding production.

5. ACKNOWLEDGMENT
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6. REFERENCES
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