DISASSEMBLING AND ITS REALIZATION BY THE MEANS OF COMPUTER AIDED TECHNOLOGICAL PREPARATION OF PRODUCTION

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A***bstract::*** *The paper deals with the topic of problems derived from automating the technological preparation of production in the area of disassembling operations in mechanical engineering production.*
Key words: *Disassembling, Computer Aided Technological Preparation*

1.DISSASEMBLING PROCESS AND OPTIONS OF ITS AUTOMATION

Assembling plays essential role in mechanical engineering manufacturing process, and the similar topic is characteristic for disassembling process at the same time. Despite of increasing role played by disassembling in mechanical engineering area, disassembling is still underestimated from the point of its automation options. One of the reasons is difficulty to automate human work. Even at present time, high ratio of manual work is still characteristic for assembling and disassembling process (assembling operations represent 80% of labour content and own disassembling reaches 11% of total labour content of product manufacturing). Disassembling process, as a part of production process, is complex of disassembling operations of parts from aggregates to final number of disassembled nodes or parts in some technologically or economically effective order, which corresponds to predetermined technical conditions. Auxiliary operations supporting disassembling process are also the part of this process. Term of disassembling process is organized and synchronized in relation to the parts, which production is realized in various places and time. Disassembling represents professional area where difficult manual operations prevail to others and can not be easily substituted by machine operations [2].

Disassembling operation is basic structural unit of disassembling process and is understood as finished section of this process realized during disassembling of part by one or group of operators in one workplace without changing the setup of disassembling device. Disassembling operations are performed in disassembling workplace represented by outlined section of production workplace, workshop, operating place, etc., which is equipped by required work equipments. Content of works with realization of disassembling operations and sectors is determined during elaborating of disassembling process and is written into the technical documentation (disassembling process). Operations of individual sectors are predetermined in many cases; however most of them are performed by workers in accordance with individual approach.

Despite of knowledge that disassembling process takes only 11% of total labour content in whole assembling and production process, and if considering present wide spectrum of manufactured parts, but mainly with respect to the number of these parts is need

of automation of this process more than clear. Automation of disassembling process means decreasing the number of manual operations and implementing robotic and automated production lines for this technology. Despite of this effort, the results are not efficient in some cases, since disassembling and assembling processes are characterized by domination of manual operations. Automating the production process means also automation of preproduction phases. A set of software products enabling creation and automated creation of technological and construct documentation is for this purpose available for enterprises in mechanical engineering area. Activity and philosophy of these systems are both based on principle of repeating similar parts with similar technological procedures in production process, these systems are computer aided systems on the base of „*group technology*".

2.REALIZATION OF DISASSEMBLING PROCESS BY SYSTEM OF COMPUTER AIDED CONSTRUCT AND TECHNOLOGICAL PREPARATION OF PRODUCTION

Group technology realized by systems of computer aided systems of construct and technological documentation preparation of production represents classification and coding system for grouping the parts into the classes with similar manufacturing characteristics usually defined by their shape, size, used material, technological process, used tools, etc. Each production enterprise must define own classification system in accordance with the structure of its products in the manner that enables the most smart and efficient creation of technological procedures. Usually, it is hierarchical and classification system (rotary parts, plates, prismatic parts and similarly). System based on such rules successfully used in Slovak and Czech conditions is product known under the name *SYSKLASS.*

Since standard system does not include programs and data modules realizing topic of disassembling in mechanical engineering production, this topic is solved in our department, by completing the system Sysklass about all required instances – under the frame of published diploma and dissertation theses. The most optimal solution for stated modification of the system is the modification dedicated to concrete disassembling activity of selected enterprise, which selected this system for creation and performance of technological procedures. Such solution of the issue results in performance of detailed procedure, rapid creation of technological procedures and high degree of exploitation of Sysklass system application in factory. However, likewise filled database does not find the application in creation of technological procedures in other factories or after the change of shape representatives of disassembling process, if shape is changed about more than 60% in comparison with previous part. After realizing listed facts, the way of database filling was selected in the manner to enable easy utilization of individual information and technological procedures for all mechanical engineering companies which activities are related also to automated disassembling. Thus, the consideration was preferably focused to the area of disassembling, which is represented by unification and has highest percentage representation in total disassembling process, ergo to the disassembling of joints.

Progression of total works during realization of given topic had following structure:

- Selection and classification of basic joint types
- Creation of 1st graphic and data level of disassembling system
- Creation of 2nd graphic and data level

- Classification of parts – joints
- Creation of construct documentation
- Creation of technological documentation

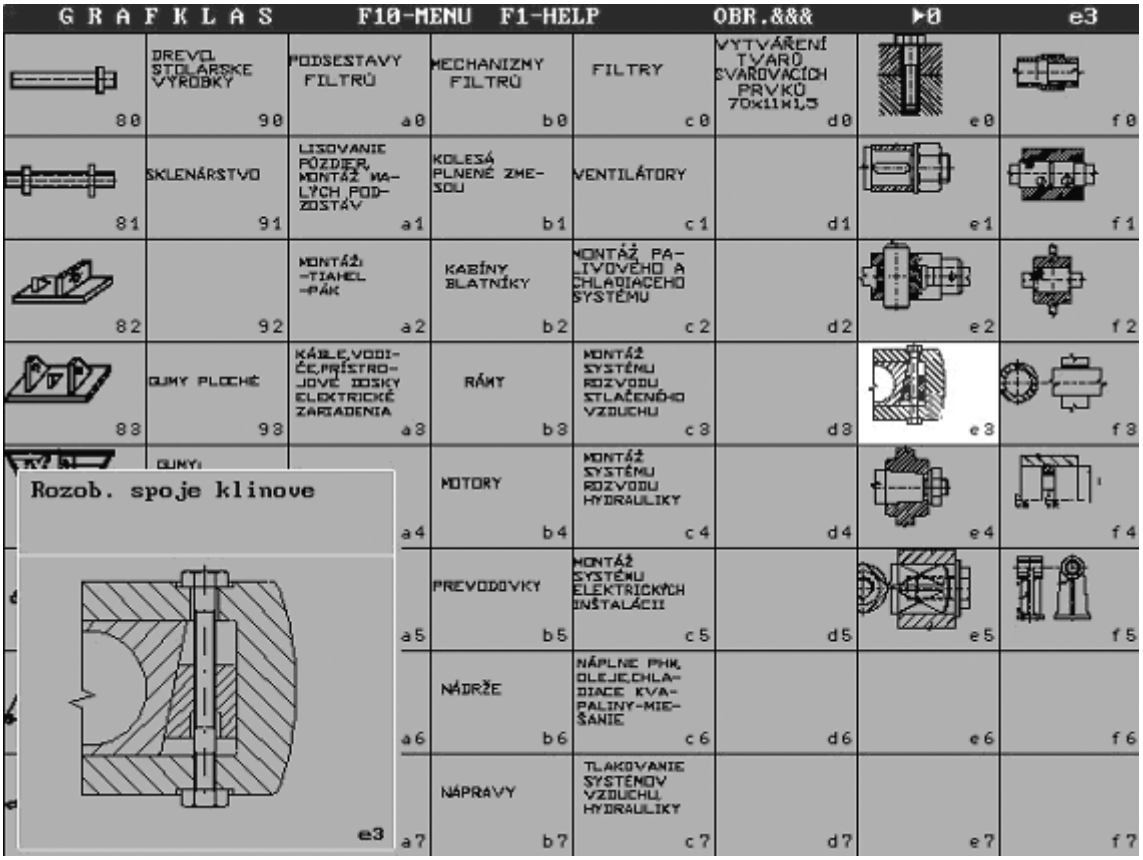

Fig. 1 Environment of classification system Sysklass application

Topic of disassembling jointed parts was divided into classes of dismountable joints and undismountable joints. Generally, the classification of dismountable and undismountable joints is listed in following division (its concrete realization is shown in Figure 1):

Group E – dismountable joints	***Group F –undismountable joints***
E0 – bolt joints	*F0 – glued joints*
E1 – straight sunk key joints	*F1 – cold squeezed joints*
E2 – pin joints	*F2 – squeezed joints*
E3 – key joints	*F3 – soldered joints*
E4 – clamped joints	*F4 – joints with material contact*
E5 –polygonal joints	*F5 – welded joints*

For each category of dismountable and undismountable joints, it was required to fill their databases from shape classification, through creation of material and performance standards, to performing of individual technological procedures and piece-lists.

System Sysklass emanates from variant approach of automated performance of technological procedures, which allows options for modification and editing of already

created technological procedure of similar part. After part classification, user can create its totally new technological procedure or inherit the technological procedure of some already existing part that was found and suggested by system Sysklass as most optimal solution.

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