THE INTERNATIONAL CONFERENCE OF THE CARPATHIAN EURO-REGION SPECIALISTS IN INDUSTRIAL SYSTEMS
6th edition

VISUAL DISASSEMBLING TECHNOLOGICAL PROCEDURES

Marek KOČIŠKO[1]., Peter BRÁZDA[2],
[1]Eng. PhD., [2]Eng
Technická univerzita Košice, Fakulta výrobných technológií, SK-080 01 Prešov, Slovenská republika.
Telefón: +421 51772379, E-mail: kocisko.marek@fvt.sk, brazda.peter@fvt.sk

Abstract: *Visual disassembling technological procedure creation in practice accelerate operation connected with renewal of stale parts in constructional nodes a make possible to execute disassembling operations event to less experienced employees.*

Key words: *Disassembly, Sysklass, technological procedures.*

1. INTRODUCTION

Concerning with duty of producers to deal with recycling of their products come to forefront also problem of disassembling. Disassembling analogous to assembling in production process significant mission. Even though this process is characterised with low level of automatization and global level of automatization in on very low development level.

Base of technological documentation creation is generating technological proceeding. These proceeding are assigned for parts production even for assembly and disassembly of final parts. Technological proceeding define production machinery, tools, fixtures, measurements, and technological environments so, that the part can be manufactorable or assembly assembled or disassembled. Technological proceeding is technologist's work outcome in frame of technological preparation of production.

Technological proceeding should consist of information about:

- Part or assembly
- Production resources
- Accessory resources (fixtures, measurements)
- Methods of used production resources
- Technological operation sequence
- Parameters of used method
- Operational time of each operations
- Tool paths (by NC programming)

- Auxiliary resources (cooling, lubrication etc.)

Basic requests on technological proceeding generating are:

- Fulfillment of functional requests given by specification, blueprints and standards,
- Production, assembly or disassembly of part with minimal arduous and minimal expenses,
- Maximization of proposed devices usage,
- follow work safety productions of technological and work proceedings,
- respect of ecological aspects

2. SOFTVARE USED FOR VISUAL DISASSEMBLING PROCEEDING GENERATING

Generation of visual disassembling proceeding is possible to divide into two steps. First step it is necessary to create model of selected constructional node, in the second step corresponding design and technological documentation. For creation of model can be used CAD/CAM systems like Unigraphics, Pro/Engineer, Catia or even smaller systems like Solid Edge, Solid Works, Autocad and so on. For creation of design and technological documentation can be used some of CAPP systems like for example Sysklass.

In our case was for creation of model used system Pro/Engineer, where TSA 031 350 gearbox, made by ZŤS Sabinov, was modeled. This system has 3D modeler on very good level, suitable for model creation assigned for visual disassembly proceeding of constructional node.

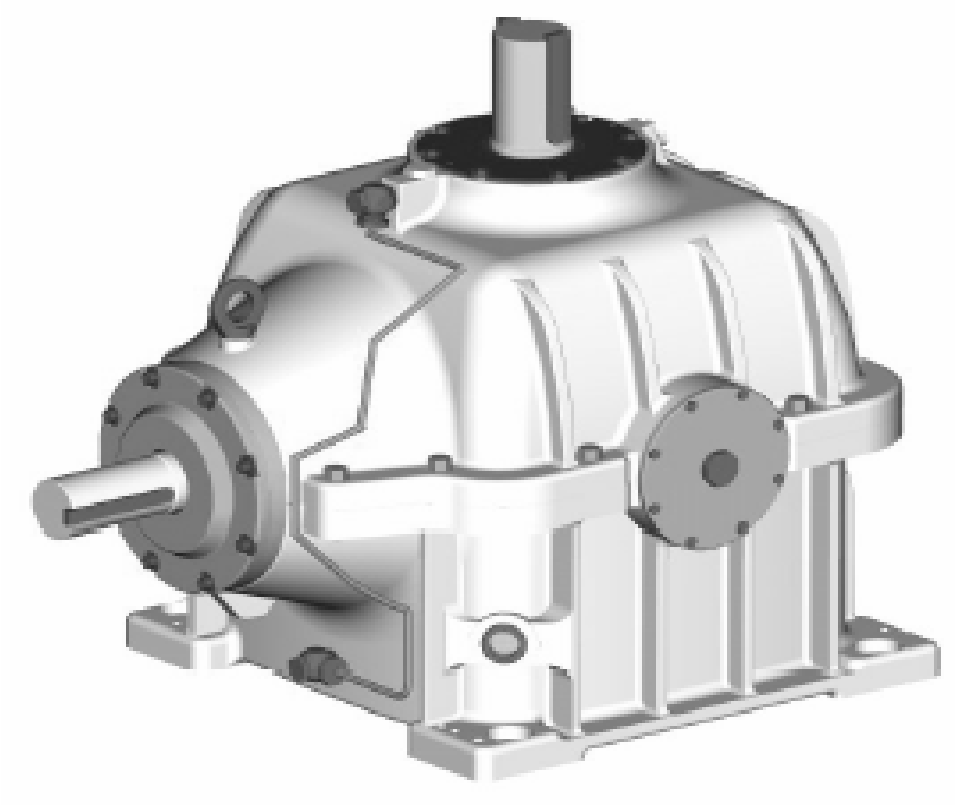


Fig. 1 Gearbox TSA 031 350

System Pro/ENGINEER is developed by PTC - Parametric Technology Corporation (VValtham, Massachusetts, USA) company, which was established in 1985 by russian emigrant, math professor Samuel P. Geisberg. First version of Pro/ENGINEER system was published in 1988 and first big customer was John Deere.

Pro/Engineer is a program pack designed for constructional and development task support in engineering and other fields. It is designed for process of proposing, analyses and production preparation of engine parts.

For constructional and technological documentation preparation was chosen CAPP system Sysklass. This system represents most used system based on group technology, which represent powerful informative system designed for complex solution of all operation in pre-producing stage of product development. Actual version of this software is 3 and it supports even the newest operation systems. System is built on client/server architecture, which uses suitable resources for data sharing via SQL server. This makes cooperation with other systems for production planning and production control, economic, stock management etc.

Sysklass system is based on method, which uses combination of graphical and data identification of production parts. This method allows automatic classification or recognition of arbitrary production item a following best possible technological documentation generating.

Main idea of system is realize arbitrary operation from design development trough constructional and technological preparation to tool production so, that the system suggest best possible type or unify solution in form of:

- constructional plan
- raw product defining
- technology defining
- documentation for fixtures and tools

First step for disassembling technology implementation into Sysklass system is suitable selection and classification of part types. Next step is classification of parts. This classification is main activity at principles of group technology usage in field of constructional and technological documentation.

Classification of part establish in production defined rules into part base of company. Main purpose is creation of digital model of part, which accurately represent properties needed for technological identification of production realization conditions. Exact classification to classes is basic key to succesfull implementation of group technology.

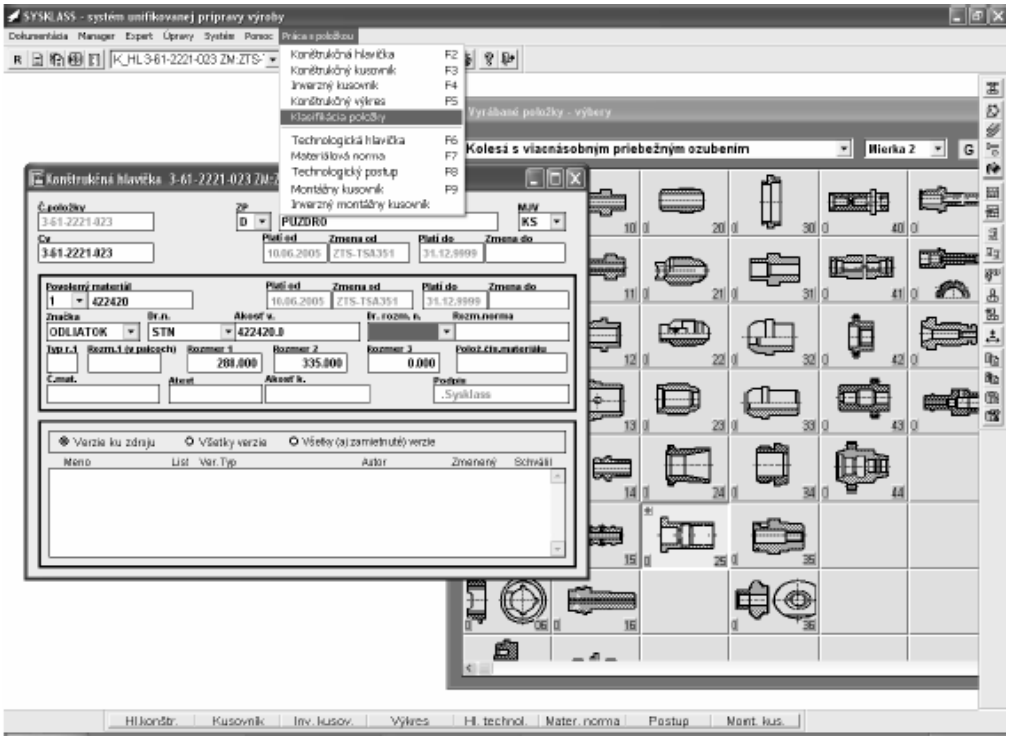


Fig.2 Sysklass system environment

Classification can be divided into 3 parts:

1. shape classification
2. data classification
3. advanced classification (auxiliary technological information)

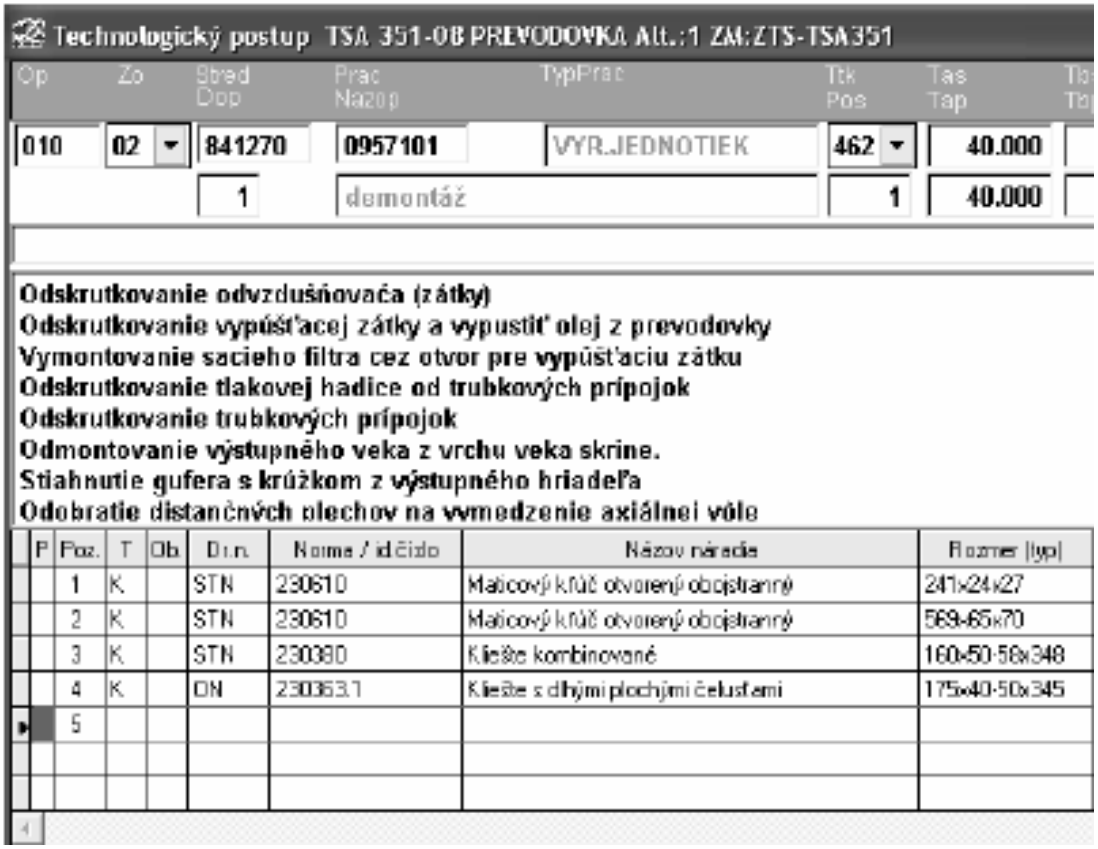
Shape classification is made by visual comparison of part shape characteristics and describing of shape representative. Classification allows allocating parts with similar or same shape.

Graphical classification system is used as tool for shape classification. For better orientation in map of shape representative in is divided on arbitrary levels. That means by raw selection of shape representative from the first level show up map from second level, which for selected representative allow finest dividing. This proceeding can be replicated for every representative from same level.

Next step in shape representatives classification is creation of data classification. This can be divided into parameter classifications, accuracy and quality. Classification of these entries help to increase system ability to recognize best suitable item or derived knowledge information

For data classification we can use internal graphical editor of Sysklass system and classifier of parameters and groups. Important attribute of internal editor at graphical representative describing and creation is possibility of basic measure of part and assemblies creation. Following identification of each parameter is realized in parameters a groups classifier. After classification constructional piece list was built, which is used by following disassembly piece list creation.

For disassembly piece list creation it is necessary to create technological proceeding for gearbox disassembly.


Technologický postup TSA 351-08 PREVODOVKA Alt.:1 ZM:ZTS-TSA351

Op	Zo	Sbred Dop	Prac Nazop	TypPrac	Ttk Pos	Tas Tap	Tb Tb
010	02	841270	0957101	VYR.JEDNOTIEK	462	40.000	
		1	demontáž		1	40.000	

Odskrutkovanie odvzdušňovača (zátky)
Odskrutkovanie vypúšťacej zátky a vypustiť olej z prevodovky
Vymontovanie sacieho filtra cez otvor pre vypúšťaciu zátku
Odskrutkovanie tlakovej hadice od trubkových prípojok
Odskrutkovanie trubkových prípojok
Odmontovanie výstupného veka z vrchu veka skrine.
Stiahnutie gufera s krúžkom z výstupného hriadeľa
Odobratie distančných plechov na vymedzenie axiálnej vôle

P	Poz.	T	Ob.	Dr.n.	Norma / id.čísdo	Názov náradia	Rozmer [typ]
	1	K		STN	230610	Maticový kľúč otvorený obojstranný	241x24x27
	2	K		STN	230610	Maticový kľúč otvorený obojstranný	569-65x70
	3	K		STN	230380	Kliešte kombinované	160x50-56x348
	4	K		ON	230363.1	Kliešte s dlhými plochými čelusťami	175x40-50x345
▶	5						

Fig. 3 Disassembly technological proceeding

After import of model from Pro/ Engineer was created visual disassembly procedure.

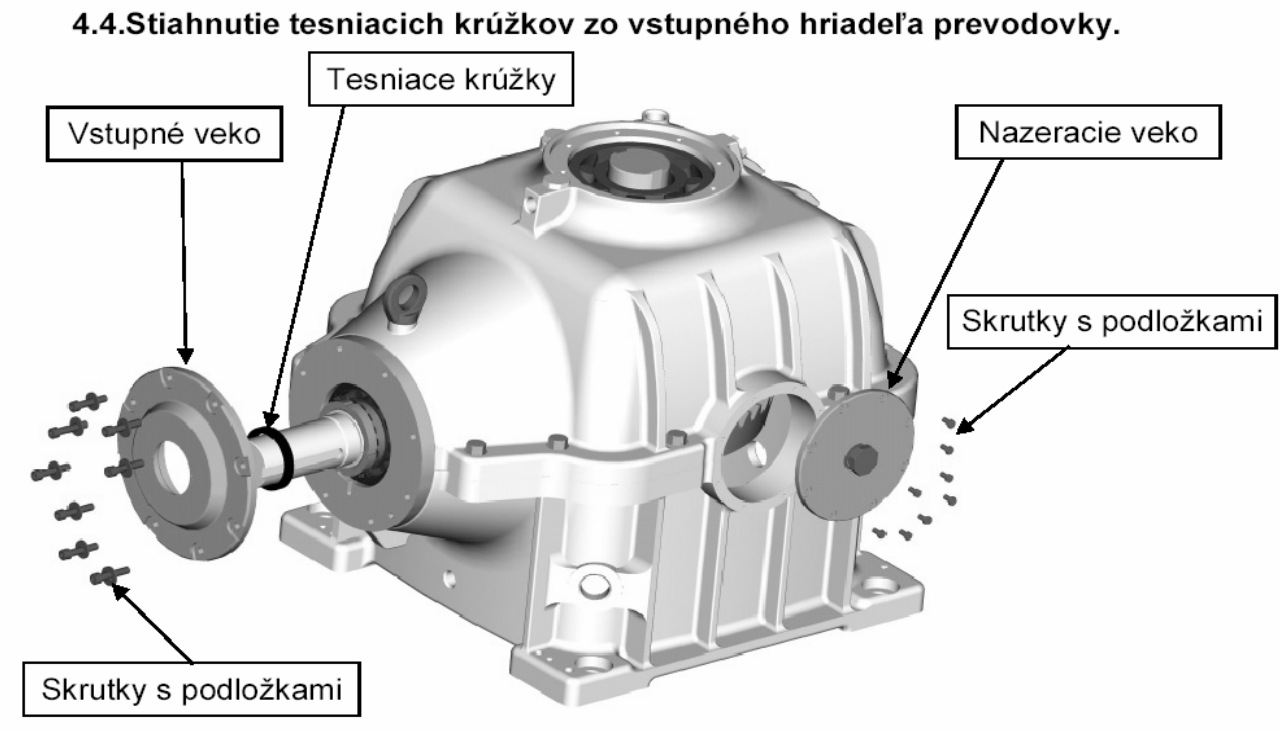


Fig. 4 Operation from visual technological proceeding

3. CONCLUSION

By combining of these two strong system we get tool for visual technological documentation creation, based on which can be done disassembling process even by less skilled workers.

This junction of technological proceeding creation problem allow more schematically and better understanding of technological operation. It is also an example how can be more effectively execute creation of technological documentation in company and by this help to reduce time by equipment disassembling.

4. REFERENCES

[1] BARON, P. – KOČIŠKO, M.: Integrácia technológie demontáže do CAPP systému Sysklass. In: Medzinárodný doktorandský seminár, SjF ŽU, Súľov, 2003, s. 41 – 44.

[2] KUBA, J.: The Brief View of Component Parts Preliminary Cost Estimation. 1th International Workshop "Advanced methods and trends in production engineering".Baia Mare. May 21-22, 2004. ISSN: 1224-3264

[3] MARCINČIN, J. N.: Technická príprava výroby. FVT TU Prešov, 2002.

[4] MARCINČIN, J. N. - KOČIŠKO, M.: Application of Dissasembly Technology to CAPP System SYSKLASS. In: Manufacturing Engineering, 2004, č. 1, s. 30 – 33, ISSN 1335-7972.

[5] MARCINČIN, J. N. - KOČIŠKO, M.: Automated Disassembling and its Position in the Process of Product Recycling. In: Proceedings of the 5th International Multidisciplinary Conference, North University of Baia Mare, Romania, 2003, s. 367 – 374, ISSN 1224-3264.