

Design of the Web Interface to Manage Automatically Generated Production Documentation

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Abstract – Automation of production activities allows us to create a complex product life cycle with help of CAx systems, automation of NC programmes creation being a part of it. There are some cases for which it is not necessary to create complex production procedures. In such cases making of production documentation comes into discussion. However, process documentation does not fulfil all the requests by operators of NC machines. For NC machine operators, the most appropriate form of reports is that it allows not only convenient search of information on the PC, but also a comprehensive printed form, which together with the NC program and the production drawing would constitute the accompanying documentation necessary for the production of the component. The article describes the creation of a web interface used to manage and archive data generated by creation in the PTC Creo environment supplemented by a number of additional information and data on the collected items needed for the production of components by the operators.

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1. Introduction

The issue of technical preparation of production is still a topic to be discussed. Technical preparation of production is an important and challenging part of the life cycle of component manufacturing. The technical preparation of the production can be defined as a summary of the activity and technological-organizational measures that must be done in the company before the production of the product. Technical preparation of production should be one of the elements of the science – technology – production system. [1]

Until now, technology has had to process NC components in conjunction with the generated NC program to create an additional technology that has all the other required information for machine operators defined. Here the technologists have the option of using additional CAPP systems alongside the CAD/CAM system or additional manual documentation, which in this case made it impossible to archive and re-use already created technological documentation. It is precisely because of these problems that in recent years the process of creating process documentation, which is a missing article for the transfer of information between the technology and the NC machine operator, is available. [2]

2. Creating of process documentation in PTC Creo

The first step before creating the process documentation is to clarify the required information and the resulting form of generated documentation. Furthermore, it is necessary to realize that the PTC Creo system generates process documentation based on the pre-created NC program in the output HTML format. The content of the generated documentation

can be varied according to the production data. The documentation thus generated can be customized, defined and used at any time as a simplified form of representation of the technological process. Process documentation is an excellent solution for seamless communication between technology and NC device operators, which at present replaces traditional manual procedures. The reason is mainly the speed and practicality of generating process documentation. Generated process documentation represents a summary documentation consisting of basic information about a given operation, a tool used, and production parameters with the ability to generate reports in the form of a print report. In addition, the feed information and geometric data on the safety level, the axes and their orientation, etc., are available in this template [3], [4].

3. Web layout design and layout design for managing automatically generated process documentation and additional technical data

For the sake of completeness of the data needed for the production, the idea of creating a web environment that would contain the generated process documentation in PTC Creo in HTML format and additional refinements (technical specifications, description, drawing) for completeness of documentation with the possibility of data archiving and management. [5] The overall template creation consists of the graphic and content design of the website template, and in the second step of creating the partial programs themselves, which are necessary for the final look of documentation in the web interface. Designed Website Template serves to simplify the search, processing of information and specifications for the component obtained from the automatically generated process documentation as well as the insertion of new refinements of the technical specifications of the parts into the created interface. The template is tailored to the needs and requirements of the business. The template provides the ability to write information to the component archive. [6], [7] The PTC Creo system, which generates process documentation in *.html format, was chosen as a suitable tool for creating process documentation, so it was necessary to consider just this format when creating a template in the form of a web page. When designing a template, it is necessary to take into consideration which data is necessary for the production and accordingly adapt the template. [8] The created template contains this basic information:

- technical specifications (name, ID, material ...),
- description of the component,
- component manufacturing operations (obtained by generating process documentation in PTC Creo),
- drawing of the component.

3.1 Design and creation of website templates

The first step of creating a template itself is to determine the outline format and the approximate output number of program files. The PHP, HTML, and CSS languages were chosen to create the template. Using these languages, a web template has been programmed because of the wide usability of the different systems and devices that use the internet browser. This way, anyone with a web-based connection in the company can find information on the production documentation of a component using a variety of devices, whether it is a computer or a laptop running on Windows, OSx, Linux, or a mobile phone that supports an Internet browser. For data storage purposes, a simple MySQL database has been created from which information about the component is drawn.

Programming the template into the web interface was done by embedding HTML code into PHP scripting language. Files in this language have the *.php extension. The scripting language allowed us to create a script for uploading documents from a folder. The program automatically classifies the parts between rotary, non-rotating (flanged) and box parts, according to the selected component type selection when uploading to the database. By default, the folder tree uploads documents to the custom folder under the selected category. When recording, it also writes the component into the database by name from the technical specifications and assigns a unique identification number to all files. According to the technical specifications, it is then possible to find a part in the list.

3.2 Description of the created website template

The main menu of the page is located in the left panel and contains an initial screen for uploading the data to the template. The menu is further divided into the names of "Rotary Parts", "Flange Components", "Box Parts", and "Parts" where all the parts stored in the database are located. The main menu and the initial screen of the proposed website template are marked in the red box in Fig. 1. Also, you can see an opening screen with a template for uploading data to the database.

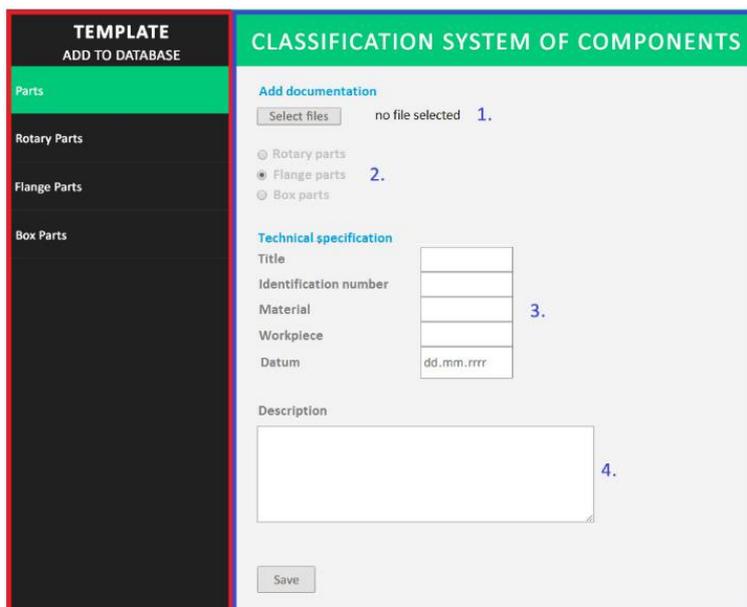


Figure 1. The main menu and the initial screen of the proposed website template

The main menu of the page is located in the left panel and contains an initial screen for uploading the data to the template. The menu is further divided into the names of "Rotary Components", "Flange Components", "Housings", and "Components" where all the parts stored in the database are located. The main menu and the initial screen of the proposed website template are marked in the red box in Fig. 1. Also, you can see an opening screen with a template for uploading data to the database.

A template is displayed on the Home screen (blue box). The procedure for filling in the template is described in steps 1 through 4:

Step 1: uploading files to the database. PDF drawing and generated HTML document process documentation. Process documentation has been obtained from the CAD/CAM/CAE creation of the PTC Creo system, which contains appropriately selected information about the tools used, the sequence of the technological operations and the production parameters obtained from the pre-created NC program.

Step 2: choice of type of component; selectable from rotary, flange or box options, for the need to upload and sort the item to the right category in the menu to increase search clarity and speed.

Step 3: defining specific technical information; Additional product information:

- Title – name of the component
- Identity number – unique part number
- Material – marking the material according to the standard
- Workpiece – dimensions of the blank in millimeters (mm)
- Datum – date of uploading the product to the database

Step 4: inserting a supplementary copy of the record; contains a short description or a note about the added component. It is possible to write more detailed and complementary information for possible communication between workplaces and thus avoid misunderstandings in production. With the Save button, the uploaded files are sent in *.img, *.html, *.pdf formats and filled in text in the folder of the appropriate class.

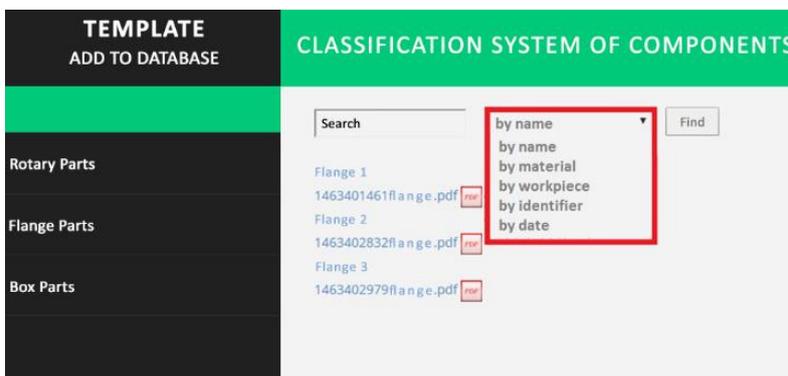


Figure 2. Page preview with a list of parts and search

Selecting "Flange Parts" displays a list of all flange components. Each item in the list displays a link to open a drawing of a component. At the top there is a field for selecting the parameter you want to look for. Enter the name appropriate to the selected parameter in the search field. After you submit a search request,

the generated items are generated and displayed. Categorization is more convenient for more accurate search and enhancement of the list of parts stored in the database. The search sorting option is: by name, material, workpiece, identifier and date (Fig. 2.).

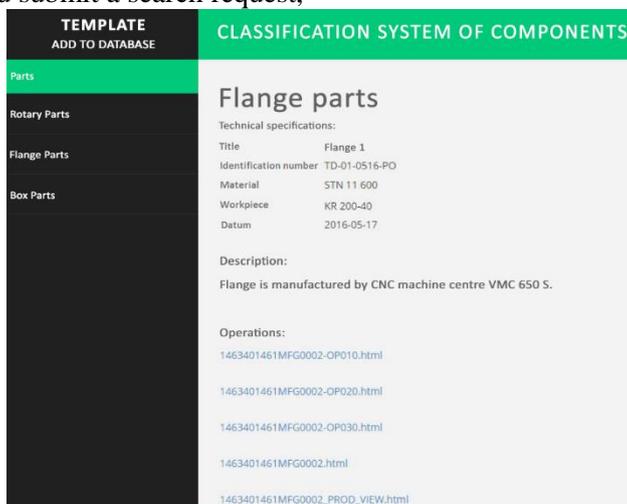


Figure 3. Page preview with the found items

The title of the item serves as a link to redirect to the next page. Selecting a link to a component opens a page that displays the uploaded documents in the database. The top of the page includes the name of the component, the technical specifications, the description and the operations in the form of links. These specifications are retrieved from the folder by the identification number. Paths for other files and

links in the form of links under the technical specifications are also loaded. These links direct us to a specific manufacturing operation in the process documentation generated in the PTC Creo system that was uploaded along with the other files into the database. A preview of the process documentation page generated in PTC Creo can be seen in Fig. 4.

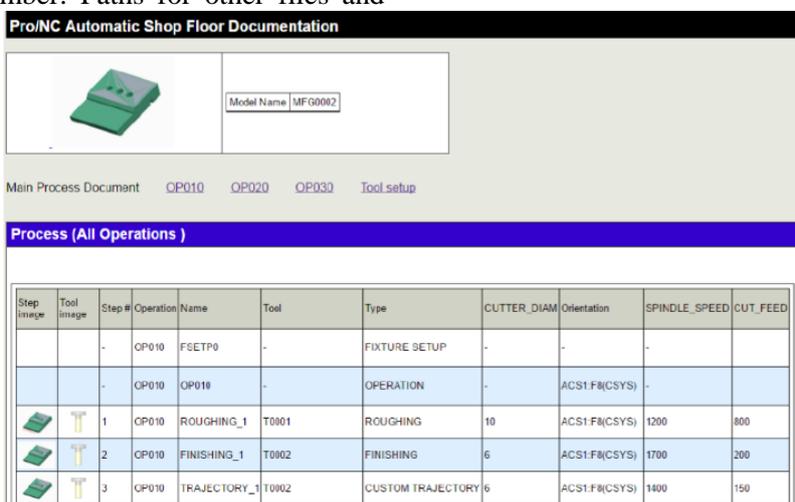


Figure 4. Page preview of the process documentation generated in PTC Creo

The process documentation (Fig. 4.) consists of a component view, a table of operations, parameters, and the individual steps of a component's machining sequence. The content and the number of data displayed in the process documentation environment are selected by the user before generating it in the PTC Creo environment. The selected data is obtained from the previous design of the machining program in the Manufacturing environment. These are data related to the tool used, tool size, operation name,

operation type, speed, cutting speed, component clamping orientation, and a variety of other available data.

In Fig. 5. it is possible to see the bottom part of the page where the drawing of the component is depicted. The drawing of a component is uploaded as an image into the database. For every name in the list of components there is a *.pdf file that can be downloaded or viewed directly in the browser.

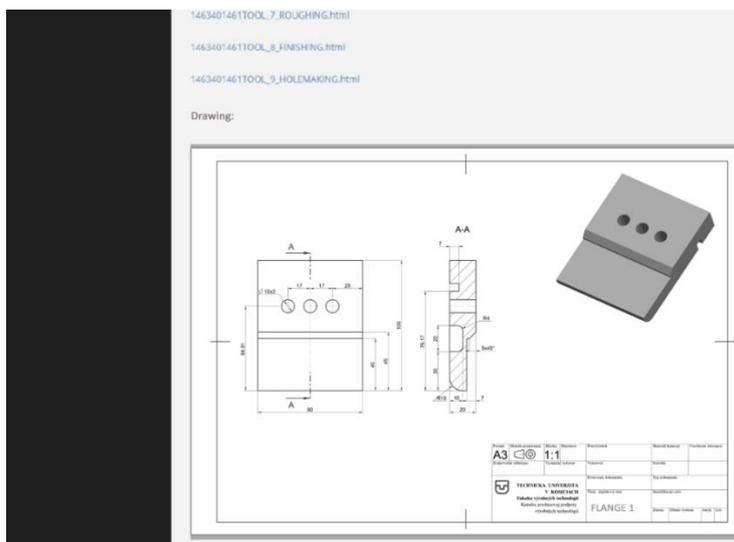


Figure 5. Page preview with drawing documentation

4. Conclusion

The PTC Creo system was chosen to create process documentation. This system allows creation of process documentation with graphical representations of machining sequences, tools, and so on. The proposed web page documentation template has been adapted to the requirements of NC machine operators and provides output in the form of a web page consisting of the necessary supplementary information and an output printing assembly that can be considered as a full-fledged form of workshop documentation. The documentation thus produced represents complete documentation and, along with the generated NC program, provides NC machine operators with all the information they need for trouble-free production of components. [9]

The article focuses on the importance of technological preparation of production, implementation and use of computers to simplify and facilitate the work of technology in communicating with workers using a web interface with a data-base of data archived on created servers. Templates can be created based on different programming languages and databases.

The design part consists of developing a documentation template in the form of a web page using HTML, PHP, CSS with a MySQL database. The technician can simply write the data about the component in the created template, whether in text or image form. By designing such a template and programming it can be assumed that in the future, the requirement for creating templates will be current for the company's routine business and will gradually integrate into the environment of smaller production facilities.

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