

Potential cost savings and process optimization of a drawingless manufacturing

Degree programme : BSc in Industrial Engineering and Management Science

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As part of the digital transformation, the switch from drawing-based to model-based production offers great potential for cost and time savings along the entire process chain. Based on qualitative and quantitative analyses, the study concludes that the investment costs of CHF 84,000 in the sub-area of internal cubic production are amortized in 2.3 years. After that annual savings of CHF 136,000 are realistic. This clearly shows that the changeover is worthwhile.

Introduction and Objective of the Thesis

The internal machinery of Fritz Studer AG - a leading producer of cylindrical grinding machines - has been modernized. Now, the processes also need to be updated. The goal is to use cost calculations to identify the savings potential of the sub-process from engineering to the manufactured part, and to use a process analysis to show the process changes and optimization potential. Drawingless manufacturing indicates that production-relevant information is attached directly to the 3D model. The 2D drawing is no longer required and the labelling is now model based.

Research Design

To record the current situation and the requirements for the new process, twelve interviews were conducted with internal stakeholders and one interview with an external expert. The interviews were evaluated using qualitative data analysis with MaxQDA. The results were reflected in an iterative process. For quantitative analysis and to determine the potential time savings, manual time measurements were carried out using reference parts. The time taken to create the model, the drawing, and the PMIs were measured. The processes were drawn according to the BPMN 2.0 standard.

Results

The complex current process shows the causal relationships between the 80 stakeholders involved. For the project to be implemented successfully, it

is essential to evaluate the needs of the stakeholders and incorporate them into the implementation. After the changeover, the high-level process remains the same. However, the changes affect individual sub-processes and working methods. The potential time saving of the design engineer are at 32.5%. The changes in the following positions are mainly because the information is now available in the 3D model (Figure 1) in Teamcenter-Web and no longer in the 2D drawings from SAP. This optimization can lead to significant savings and increased efficiency. The investments in the first year are CHF 84,000. After that, the company will face annual costs of around CHF 3,000. As the hardware has to be replaced after seven years, the investment then amounts to a further CHF 21,000 in addition to the annual costs. After an amortization period of only 2.3 years, CHF 136,000 can be saved annually.

Recommendations

The next step is to analyze the positioning of the hardware in production, which is essential for ergonomics at the workplace and therefore for an efficient way of working. In addition, it must be determined how the viewer interface makes the most sense for each employee. Fritz Studer AG is also recommended to start with a step-by-step implementation. Cubic production is recommended for this, as the workpieces produced today are already CAM-programmed.



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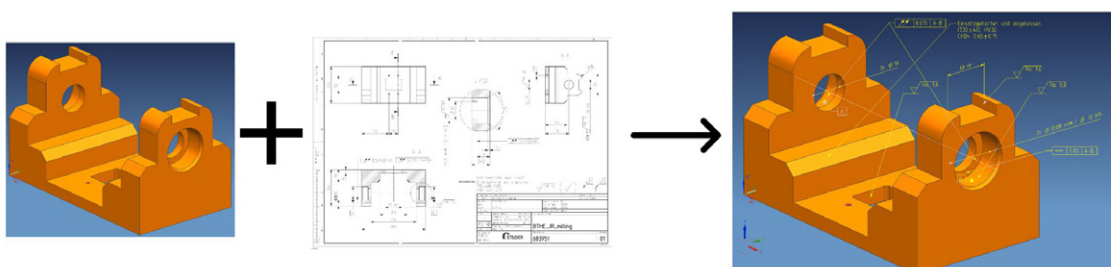


Figure 1: Picture of the as-is-state (drawing-based) to the target-state (model-based)