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IMPACT OF THE DESIGN AUTOMATION OF PROGRESSIVE TOOLS FOR AUTOMOTIVE COMPONENTS

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ABSTRACT

This work aims to develop a methodology to automate the design of progressive tools to reduce the time and costs associated the development phase while maintaining the quality of the project. The target of this study is an automotive industry, which is supplier of major car manufacturers.

Keywords: progressive tools, parametric design, tool design automation.

INTRODUCTION

In the present economic scenario, companies need to develop new strategies for their products to stay competitive. As general issue and particularly in the automotive industry, reducing design and development time and costs and optimizing the components is a major contribution to the increase both in productivity and competitive in the automotive industry (Proctora, 2016). Since long time that technologies and tools for the design and development have evolved in different directions, providing solutions for the different enablers of competitiveness (Yue Hin, 2015). One can mention the evolution of CAD systems allowing the virtual modelling of products. On top of these one can find different type of solutions ranging from structural analysis, simulation of plastic behavior of materials, thermal analysis, and technological analysis and support in different areas (Jauregui-Beckera, 2013). Concerning this work, tools integrated in CAD systems with the capability of supporting the design of stamping (Bin, 2016), blanking and drawing tools are of major importance.

Evaluation and analysis of the different integrated CAD system in the market (CATIA, NX, Solidworks/Logopress, CREO, etc), in different aspects, modelling capabilities according to the type of components of the company (Proctora, 2016), the supporting programming capabilities was one of the main focus of this study. This allowed the correct selection of the system to be adopted in the company. In a preliminary study CATIA, NX and CREO were preselected because all of them passed the evaluation criteria concerning the desired functionalities in the company (CENIT, 2017; Siemens, 2015). For the final selection, the company imposed additional criteria based on investment costs, service and training. As the company had some earlier experience using Pro-E software, the predecessor of CREO, the conditions offered by this system were considered the winner. After this phase the study was focused in selection the proof-components and the development of the different modules allowing the creation of progressive stamping tools for the selected components from the scratch.

RESULTS AND CONCLUSIONS

As an example of the developed methodology, Fig. 1 shows a base of a tool created automatically, after supplying the specifications in a dialogue box.

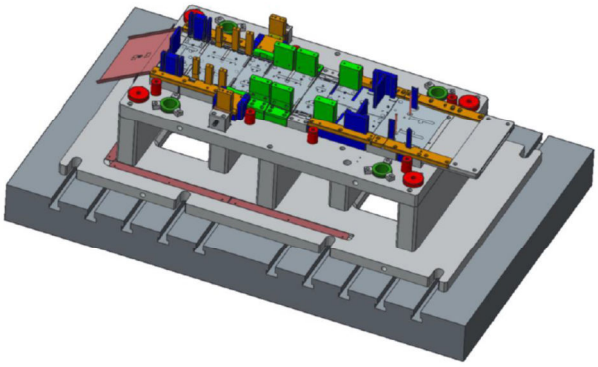

Fig. 1 - Illustration of the Base of the tool created automatically

The results showed that for the set of tools necessary for the component under study, the current traditional methodology took 28 weeks. Using a similar component, in which was possible to start from an existing design, the overall time for the set of tools was reduced to 15 weeks (47% reduction).

The proposed methodology for a non existing components (starting from scratch) allowed the development of the set of tools in 6/7 weeks (76.5% reduction). In term of cost for the company involved in this study, the annual impact taking a sample on the different projects developed, the reduction in the design costs was close to 1.1 million euros.

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