ANNALS OF FACULTY ENGINEERING HUNEDOARA
– INTERNATIONAL JOURNAL OF ENGINEERING
Tome IX (Year 2011). Extra Fascicule. (ISSN 1584 – 2673)

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ASSEMBLING AND VERIFICATION DESIGN CORRECTNESS OF PRESS TOOLS BY HELP OF SYSTEM CATIA

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ABSTRACT: The paper deals with application of CATIA software in press tools construction for sheet metal forming. For development trends is characteristic utilization of scientific research in area of technological forming method with output on optimization, standardization and normalization. Software CATIA enables creation of catalogue of pressed parts, parametric creation of pressed tools, quickly design of required press tool and verification of correctness press tool design.
KEYWORDS: combination press tool, verification, designing, kinematics

❖ INTRODUCTION

Information technologies are means, which provides help to users in concrete disciplines in determination of optimal problems solving out of possible variants. In the area suggestion and construction of new products means set of informative technologies in the first place abbreviation of development period and possibility of complex product description in term of its geometry and mechanical properties. Information about tool acquired on base the creation of 3D models is more complex than 2D drawing documentation. It is possible to use 3D dates in the preparation area and it makes possible consecutive immediate interconnection construction with production. It is first of all qualitative and it is quite principled change to the development of new product.

It is characteristics for developments trends application results of scientific research in the area CA technology in designing of tools with output on optimization, standardization and normalization of segments and constructive groups of tools. It makes possible to apply standardization of constructive tools systems and consecutive quick design ground of tool, with the correspondent complement of functional parts. The tools for sheet metal forming in term of construction are very individual, production of each of pressed part requires dedicated tool. Resource at tools construction is job description of production, it essentially influence on selection of operational and constructive parts of stamping dies, for design of tool are necessary construction-technological calculus, choice of suitable type of tool is realized on base request of automation.

❖ FEATURE OF PRESS TOOL MODELLING BY SOFTWARE CATIA

The base for suggestion of press tool is computer model, which is created in development places of work. At data transmission between various places of work with the same system is secured full compatibility and transmission of various parameters, technological oriented entity and alike. CAD software has function for recovery of random damaged dates.

The main reasons, which guide to decide to use 3D system in construction works:

- enhancement of productivity in construction works
- reduce of mistakes in documentation
- improve documentation, especially bigger clearness at using of axonometric views, which are easy deduced from 3D model
- parameterization of each components, tools.
- the check is rises on models, not on drawing
- consistent structure of assemblies
- excessively effective tool to eliminating crashes

The possibilities of tools construction by software CATIA:

- construction of tool with possibility of its next modification
- creation of standard tool by part choosing from several modular systems (HASCO, FIBRO, RABOURDIN, STEINEL)
- creation own database of tools, components,
- catalogization of constituent components
- creation of full parametric model.

❖ SOLUTION OF CHOSEN TYPE OF TOOL

TECHNICAL CHARACTERIZATION OF PRESS TOOL

The basic parameter for design type of tool was request of mass production of pressing, with designation as bottom. It was suggested combination press die that realizes operations blanking and drawing for one press stroke. According number of pressed parts of the same sort manufactured for one stroke it belongs in category of single-impression tools. In term of construction it is tool with guide by help of pins and guide bushings. Sheet strip will be used as semiproduct that will be manually put in tool on stepper backstop and back guiding pins. After first stroke is strip manually by operator moved and positioned on stepper backstop. Finished pressing is at the same time ejected through front chute in prepared container at shifting of strip. The scrap is removed in form of remains of strip, which operator put to palette after processing of last piece.

OPERATING CHARACTERISTIC OF TOOL

- ❖ by type of feeding and collating of semiproduct - tool with manual feeding
- ❖ by type of pressing removal - tool with backward pressing displacement and its self-acting removal
- ❖ by type removal of scratch - removed in form strip remnant or strap

SOLUTION OF TOOL KINEMATICS

On the fig. 1 is start of kinematics tool motion, when is tool in top dead centre. Than top part of tool moves down and after 30 mm it occurs touch of stripper with material and next after one mm occurs touch between cutting punch and material. Stripper is compressed through springs. The cutting punch stepwise intrudes into material and after cut compresses cutting punch blankholder and by consecutive compression draws bottom until achievement of bottom died center, when the tool returns into its initial position. End of tool motion is on the fig. 2.

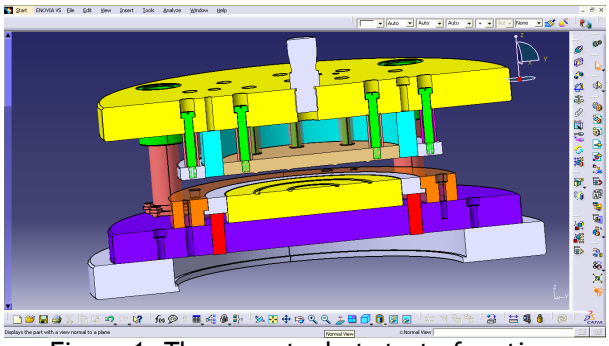

Figure 1. The press tool at start of motion

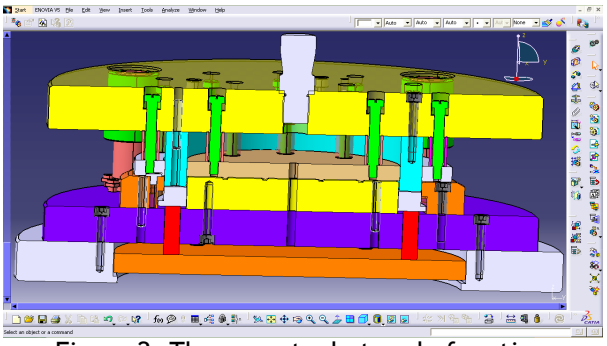

Figure 2. The press tool at end of motion

It was possible to trace tool motion from top die center to bottom die center after simulation running. It was utilized for description tool kinematics module Digital Mockup.

The module has appliances for design and control of digital prototype of press tool and for simulation of its functionality, it draws possible kinematics collision.

VERIFICATION OF TECHNOLOGIC PARTS OF TOOL BY HELP OF ANALYSIS

It was required from constructional aspect allowance between cutting punch and stripper 0,5 mm. This request was checked by collision analyze, which establishes collision between components, eventually touch of components. On the fig. 3 is displayed contact between cutting punch and stripper with orange color, and at table on the right side is value of clearance equal 0 mm. The analyze mention on necessity of dimensions modification.

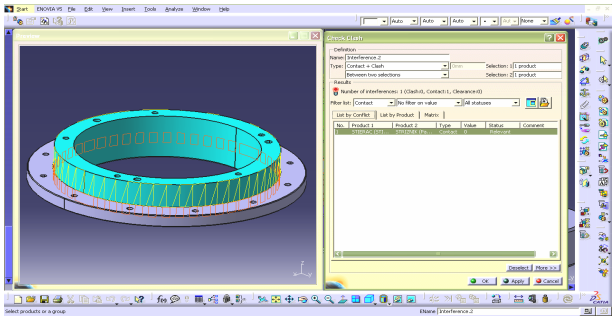

Figure 3. Contact representations between cutting punch and stripper

Analysis of overhangs is on fig. 4. It results from analyze, that value of allowance corresponds to required value, in due window is value 0,25 mm and status Relevant, the allowance is displayed by green color. For creating analyze of overhangs and various collisions it was used modules Compute a Clash and Compute Clearance.

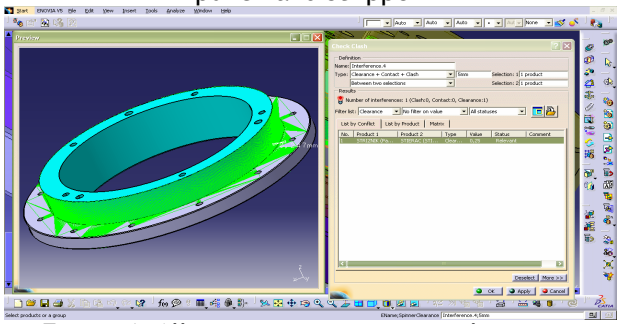

Figure 4. Allowance representation between cutting punch and stripper

❖ CONCLUSION

In respect of demand production of various shapes of pressed parts, the press tool represents very often the complicated kinematics system. By help of specialized functions of CATIA software constructer can in whichever state of production to analyze kinematics functions and to search possible clashes. It is possible to move with kinematics parts of tool and to check false clashes between various parts. The tool is possible to check by dynamic section by moveable plane and so it is possible quickly control 2D section. After verification precision of digital model it is possible automatic generation of NC programs for production. Such manner is saved time and material in preliminary stage of feeding production.

❖ ACKNOWLEDGEMENTS

The paper was created with thanks of national grant VEGA 1/0060/08

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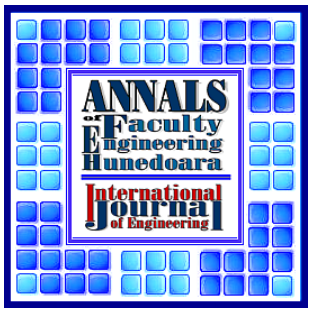

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