

Design study of the geometry of a punching/ blanking tool

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Industrial Summary

The cost of tooling in sheet metal industries contributes a considerable part to the overall cost of manufacturing a component. It is therefore imperative to keep down this cost by ensuring that the tool works for a long period in production without interruption. One way of achieving this objective is to reduce the stress on the tool during punching/blanking.

This paper deals with the study of this problem by using the finite-element technique. 3-D finite-element models of various type of punching/blanking tools have been developed, these models enabling the analysis of the effects of variations in tool geometry on the punching/blanking force and on the deformation of the punch, a parameter highly relevant to the assessment of tool performance in terms of the accuracy of the manufactured components. The model caters also for variation in the characteristics of the tool material, in the sense that a highly wear-resistant tool is normally composed of carbide tips around its cutting profile. Computed results by FE models are checked against design standards by American Society of Manufacturing Engineers (SME). Some suggestions are offered as to how the efficiency of a punching/blanking tool can be improved.

1. Introduction

Experience shows that cost of tooling in sheet metal industries contributes a substantial part to the overall cost of manufacturing a component, so that it is essential to keep down this cost by ensuring that the tool works for a long period without interruption. To achieve this objective a production engineer has the following options: (i) to minimize the deflection of a forming machine tool to be employed in the punching/blanking operation; or (ii) to minimize the deflection of the die-set to be employed on the forming machine; or (iii) to reduce the stress on the punching/blanking tool; or (iv) to effect a combination of the foregoing three options. The options in items (i) and (ii) have been

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**International Machine Tool Design and
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Journal of Engineering for Industry ,1994 *Metals Abstracts* ,1993 **Proceedings** ,1993 **International Journal of Vehicle Design** ,2005 *Sheet Metal ...* ,2007 **Manufacturing Processes for Design Professionals** Rob Thompson,2007-11-30 An encyclopaedic guide to production techniques and materials for product and industrial designers engineers and architects Today s product designers are presented with a myriad of choices when creating their work and preparing it for manufacture They have to be knowledgeable about a vast repertoire of processes ranging from what used to be known as traditional crafts to the latest technology to enable their designs to be manufactured effectively and efficiently Information on the internet about such processes is often unreliable and search engines do not usefully organize material for designers This fundamental new resource explores innovative production techniques and materials that are having an impact on the design industry worldwide Organized into four easily referenced parts Forming Cutting Joining and Finishing over seventy manufacturing processes are explained in depth with full technical descriptions analyses of the typical applications design opportunities and considerations each process offers and information on cost speed and environmental impact The accompanying step by step case studies look at a product or component being manufactured at a leading international supplier A directory of more than fifty materials includes a detailed technical profile images of typical applications and finishes and an overview of each material s design characteristics With some 1 200 color photographs and technical illustrations specially commissioned for this book this is the definitive reference for product designers 3D designers engineers and architects who need a convenient highly accessible and practical reference *Proceedings of the Twenty-eighth International MATADOR Conference* B. J. Davies,1990 **Proceedings of the CIRP Seminars on Manufacturing Systems** ,1993 *Material Forming* Lukasz Madej,Mateusz Sitko,Konrad Perzynski,2023-04-25 These proceedings present papers on Additive Manufacturing Composites Forming Processes Extrusion and Drawing Forging and Rolling Formability of Metallic Materials Friction and Wear in Metal Forming Incremental and Sheet Metal Forming Innovative Joining by Forming Technologies Lionel Fourment MS on Optimization and Inverse Analysis in Forming Machining and Cutting Material Behavior Modelling New and Advanced Numerical Strategies for Material Forming Non Conventional Processes Polymer Processing and Thermomechanical Properties Sustainability on Material Forming and Property Controlled Forming *Proceedings of the 34th International MATADOR Conference* Srichand Hinduja,2012-12-06 Presented here are 73 refereed papers given at the 34th MATADOR Conference held at UMIST in July 2004 The MATADOR series of conferences covers the topics of Manufacturing Automation and Systems Technology Applications Design Organisation and Management and Research The 34th proceedings contains original papers contributed by researchers from many countries on different continents The papers cover both the technological aspect of manufacturing processes and the systems business and management features of manufacturing enterprise The papers in this volume reflect the importance of manufacturing to

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European Journal of Mechanical Engineering, 1991 [International Conference on Manufacturing Engineering](#), Melbourne, 25-27 August 1980, 1980 **Sheet Metal Forming** Taylan Altan, A. Erman Tekkaya, 2012 This practical and comprehensive reference gives the latest developments on the design of sheet forming operations equipment tooling and process modeling Individual chapters cover all major sheet forming processes such as blanking bending deep drawing and more Process modeling using finite element analysis is described in one chapter and discussed in all appropriate chapters Other chapters cover sensors and die materials which are critical for practical sheet forming applications Other topics include relatively new technologies such as warm forming of magnesium and aluminum alloys forming of advanced high strength steels AHSS and hot stamping Chapters also address special sheet forming operations like spinning incremental forming and mechanical joining and processes related to sheet forming such as sheet and tube hydroforming roll forming and high velocity forming **Advances in Production Management Systems. Competitive Manufacturing for Innovative Products and Services** Christos Emmanouilidis, Marco Taisch, Dimitris Kiritsis, 2013-08-13 The two volumes IFIP AICT 397 and 398 constitute the thoroughly refereed post conference proceedings of the International IFIP WG 5.7 Conference on Advances in Production Management Systems APMS 2012 held in Rhodes Greece in September 2012 The 182 revised full papers were carefully reviewed and selected for inclusion in the two volumes They are organized in 6 parts sustainability design manufacturing and production management human factors learning and innovation ICT and emerging technologies in production management product and asset lifecycle management and services supply chains and operations

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