

DESIGN AND ANALYSIS OF BLANKING AND BENDING DIE
FOR THIMBLE OPEN SMALL BY USING ANSYS

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2015



**DESIGN AND ANALYSIS OF BLANKING AND BENDING DIE
FOR THIMBLE OPEN SMALL BY USING ANSYS**

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering (Manufacturing Design)

by

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FACULTY OF MANUFACTURING ENGINEERING

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ABSTRAK

Disebabkan oleh kesukaran gabungan daya yang berkuasa tinggi yang mengakibatkan perubahan bentuk pada bahan dan kecacatan benda kerja telah berpunca daripada beberapa faktor. Dalam projek ini, kaedah digunakan yang telah digunakan dalam mengkaji perubahan bentuk bahan, kecacatan benda kerja dan daya penekan ialah dengan menggunakan kaedah perisian ANSYS. Penggunaan kuasa penekan yang tidak mencukupi atau tidak sesuai juga melalui proses pembengkokkan dan pengosongan telah menyebabkan bahan kerja berkerut dan terkoyak. Selain itu, sekiranya kuasa penekan yang digunakan terlalu tinggi juga menyebabkan kecacatan pada bahan kerja. Antara matlamat projek ini ialah untuk merekabentuk satu set pembengkokkan dan pengosongan serta menganalisa sama ada proses pembengkokkan dan pengosongan dapat mengurangkan kecacatan bahan kerja di dalam menghasilkan produk “Thimble Open Small” yang berkualiti. Dengan menggunakan Analisis Dinamik yang eksplisit daripada perisian ANSYS, hasil Analisa Unsur Terhingga (FEA) bagi reka bentuk set pembengkokkan dan pengosongan akan diperolehi. Hasil daripada analisa tersebut, daya penumbuk maksimum dalam proses pembengkokkan dan pengosongan telah dapat diketahui iaitu sebanyak $43.29 \times 10^3 \text{N}$ untuk pengosongan dan $1.35 \times 10^3 \text{N}$ untuk pembengkokkan. Selain itu, analisa ini juga mampu mengurangkan kerosakan pada bahan kerja pembengkokkan dan pengosongan untuk menghasilkan produk “Thimble Open Small”. Dalam erti kata lain, rekabentuk set yang baru bagi pembengkokkan dan pengosongan dapat mengurangkan kerosakan pada bahan kerja memalui proses pembengkokkan dan pengosongan dalam menghasilkan produk ini dengan produktiviti tertinggi, kitaran masa terkecil, tenaga kerja yang kurang dan kos yang paling rendah berbanding penggunaan rekabentuk pembengkokkan dan pengosongan yang sedia ada dengan nilai daya penekan yang sedia ada.

ABSTRACT

The difficulty of force relations, workpiece deformation can be caused by a combination of factors. The most common method used in analyzing workpiece deformation and fixturing forces is by using ANSYS. Insufficient punch force will result to burr and tearing of the workpiece during the blanking and bending. Application of too much punch force also would result in unnecessary defects and high contact deformation to the workpiece. The aims of this project are to design a blanking and bending die and determine whether a blanking and bending is able to reduce burring and tearing in producing a thimble open small. By using Explicit Dynamic Analysis from ANSYS software, the result of the Finite Element Analysis for new design of blanking and bending die will be obtained. From the result, the maximum punch force of blanking and bending die is obtained which are $43.29 \times 10^3 \text{N}$ and $1.35 \times 10^3 \text{N}$ and able to reduce the defect on blanking and bending process to produce the thimble open small. As a result, the new design of blanking and bending die presents the shortest process of bend and blank in producing the thimble open small with highest productivity, lower cycle time, less manpower and lowest cost compared to existing design with the same value of punch force.

DEDICATION

For My Father, Hashim Bin Yunus & all my family especially my sister, Nor Hidayah binti Hashim who is always beside me either in a difficult situation or in easy situations. She will very happy if he knows his name is in this report.

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LIST OF ABBREVIATIONS

AISI	-	American Iron and Steel Institute
ASTM	-	American Society Testing and Material
CES	-	Canbridge Education Selector
DIN	-	Deutsches Institut fur Normung, German Institute for Standardization
FEA	-	Finite Element Analysis
JBSB	-	Jati Beringin Sdn.Bhd.
TNB	-	Tenaga Nasional Berhad
TMB	-	Telekom Malaysia Berhad
UTS	-	Ultimate Tensile Strength
3D	-	Third Dimensional

CHAPTER 1

INTRODUCTION

This chapter describes the introduction of bending and blanking die for producing the thimble open small of TM product at Jati Beringin Sdn. Bhd. (JBSB). In this part, begin with the introduction of the background, followed by translation of problem statement objectives, scope, and structure of the research are discussed.

1.1 Background of Company

1.1.1 Jati Beringin Sdn. Bhd

This company was formed in 2 september 1997 by Mr. Asmadi bin Wahid with his partners Mr. Daud bin wahid that have experiences into the engineering field. The company was operated at the Pantai Belimbing, Krubung and Telok Mas, Melaka. Begin with a factory regarding the 0.5 acres of land in Pantai Belimbing, the 2.5 acres of land in Krubong, and 1 large amount of SME Bank in Teluk Mas that they are loaded with loads of modern machinery and tool to guarantee the good operation to be able to produce good quality of product. The major operation is the metal fabrication in order to supply to their vendor which is Tenaga National Berhad (TNB) and Telekom Malaysia Berhad (TM). This company also provides the service system such as supply lab furniture, office, custom made of the steel product. The machine that have used at this company is relating with metal forming such as milling machine, stamping machine, drilling machine, and welding machine. Today, along with the dynamic, progressive, high education and experience JBSB has become a really competitive and strong company.