UNIVERSITI TEKNOLOGI MARA

DESIGN, ANALYSIS AND FABRICATION OF MINI 2 IN 1 METAL BENDING MACHINE

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ABSTRACT

The goal of this project is to solve problems that consumers have when using a metal bending machine. This project contains various studies on the already available metal bending machine, as well as documentation of the design and development processes for the most promising sheet metal bending machine design. The challenges that consumers face is gleaned from a survey that was distributed to a large number of people. In order to arrive at the final design, various techniques were used. The machine's design seeks to give the highest level of safety while ensuring that the machine's performance is not compromised. To improve the machine's performance, it makes use of chemical and engineering concepts. The machine also utilises the highest strength of material currently available within the current budget range. The machine's final design is assessed alongside other design concepts generated throughout the concept design phase of the project research. Using the machine correctly and maintaining it properly will ensure that the metal bends to the desired angle while also avoiding incident thanks to many safety features.

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INTRODUCTION

1.0 Background of Study

One of the processes performed during metal processing that is done to obtain a desired shape of a material is the process of bending the metal itself. However, to obtain a desirable result, it is required that whatever material that are being worked on needs to be in perfect shape and form with no defects at all. In the process of moving the materials around to the operating area, accidents may occur. By creating a sheet metal bending machine that is portable, this problem can be solved since moving the materials would not be necessary. Not only can it help prevent damage being done on the material, but the machine can also be stored away easily, saving space in the workshop. Making the machine manually operated also allows the user to use the machine without any reliance to power source, thus portability is relevant in this case. Other than that, mounting another type of bender tool which is the metal bar bender onto the machine itself allows this machine to be used for various uses.

This project involves the process of designing the most suitable design within the existing limitations and analyze the core element when designing a sheet metal bending machine as well as fabricating the project in MEC300 course program.

1.1 Problem Statement

During the survey conducted to numerous small workshop owner for subject MEC299, it is found that those owners encountered several problems with the current specifications of metal sheet bending machine. In this section we will be discussing all of the findings regarding the problems encountered by them. Firstly, when looking at the current metal bending machine available in the market we can see that most of the design applied on those machines are of the heavier weight. These can make storing away the metal seems like a chore. This is especially important as the target workshops are of the smaller size meaning its working area are limited to a certain extend.

Another problem encountered by those workshops owners is the size of the machine itself. From the surveys handed out, when asked what improvement appeals to them, respondents agreed with the size of the machine should be made smaller. They also added that the size of machines available in the market does not appeal much to their liking. Once again, since the target workshops are of smaller size, this is an important matter to keep in mind as storing away the machine can be made easier.

One other problem faced by them is that the cost for owning one can be made a lot cheaper. The machines of medium quality available in the market at the moment cost more. Only those of the lower quality are seen sold at a lower price.

1.2 Design Objectives

The three (3) objectives of this project are as follows ;

i. To design a metal bender machine that has the most suitable design that allows it to be transported around the workshops.
ii. To analyze the reasonable cost of a metal bending machine.
iii. To fabricate design integrity and the most suitable design of the metal bending machine.

1.3 Scope of Project

Before the project is fabricated, several work scopes must be followed and are as follows ;

i. Designing of the early designs using the SOLIDWORKS program.
ii. Literature review on the design from existing project studies and research.
iii. Commercially priced at a slightly lower price range than most medium quality sheet metal benders.
iv. Maximum size of machine to not exceed 1m x 1m x 1m.