

Making a Disc Mill Machine Design Using the Autodesk Inventor Application

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Abstract: Process of making animal feed at the People's Husbandry Center (SPR) Subang Regency is one of the producers of ruminant animal feed for cattle. The ruminant feed is distributed to cattle breeders in Subang Regency. Ruminant feed is made from corncob waste. The manufacture of animal feed made from corn cobs is still done conventionally, so that the fulfillment of ruminant feed needs is often hampered. This study aims to design a disc mill machine that is used to crush corn cobs. The research method starts from observing, sketching, making 2D and 3D designs, and conducting expert validation. Based on the research, it can be concluded that the design made has been declared valid with a score of 87% or is in the proper category. Further recommendations that the design is feasible to proceed to the manufacturing process.

1 INTRODUCTION

Since 2005, the Indonesian government has planned to be self-sufficient in beef, namely imports of no more than 10% of the total national consumption. However, beef self-sufficiency has not yet been achieved with various problems faced. The alternative choice to meet the needs of beef consumption is through imports, but the import price is cheaper than the price of local beef, making it a tough competitor for farmers as the main producers of local beef.

More than 90% of local beef supply comes from small-scale farms, so production efficiency is low or the cost per unit of production is high. If the amount of imports is not controlled, it will result in the price of local beef in the market being depressed with cheap import prices so that farmers lose out. If this happens in the long term and with limited capital, it will make farmers not eager to do beef cattle business (Widianti, 2014).

The development of cattle in quantity has been able to have a very real impact on increasing people's income in improving their welfare. The development, which is currently still based on the strength of people's livestock, has made this business managed traditionally. The purpose of maintenance which is still used as a side business from farming activities has caused market demand to have not become the

main consideration for livestock business. In this condition, it is very difficult to encourage the community to achieve an economic scale of business in the livestock business (Fathurohman, 2016).

The People's Animal Husbandry Center (SPR) which was launched in early 2016 is expected to make Subang district a national and regional beef supporter, according to the Decree of the Minister of Agriculture. In West Java Province, out of 27 regencies/cities only four regencies are the sites for SPR. Of the four districts, in Subang there are two SPRs and three other areas one SPR each. Two SPRs in Subang, namely Kasaliang, cover the areas of Kasomalang, Cisalak, Tanjungsang. Then SPR Cinagara Bogo covers the Cipunagara and Cibogo areas.

SPR Cinagarabogo produces ruminant feed which is then sold publicly to farmers in Subang Regency. This feed is made manually with corncobs as the main ingredient. Generally, the use of a disk mill machine can help the process of making ruminant feed. The disc mill machine has the main function of chopping and crushing grains into flour (Adhan and Roni, 2018). Added by the components of the disk mill machine has several main components, namely (1) a hopper, made of iron plate in the shape of an inverted pentagon measuring 27 x 20 x 21 cm, (2) a shell / cage consisting of four rotating blades with a size of 3 x 2 x 2 cm, eight cylindrical knives with a diameter of 1.5

cm, and 24 static knives measuring 2 x 2 x 1.5 cm, (3) one channel for dispensing flour from an iron plate measuring 15 x 6 cm, (4) a three-phase drive engine with a power of about 2.2 kw, and (5) a transmission system using a belt (Adil et al, 2012).

The use of disc mill machines is very useful in agriculture and plantations (Asep et al, 2020). Added by Oduntan and Omitoyin (2015) disc mill machines are very suitable for crushing foodstuffs in a finer form. The performance of the cutting knife can make the process of refining corncobs more effective for ruminant feed (Kruszelnicka, 2021). Fulfilling the target of making feed for all cattle breeders in the Subang area makes it necessary to design a disc mill machine to assist the process of making ruminant feed at SPR Cinagarabogo.

Irzad, Faoji, and Syarfidudin (2021) added that the design is the beginning before the tool enters the manufacturing process. added by Gede and Chintya (2020) that the design can be started from a hand sketch which is then described in the autodex inventor application so that an image with 2D and 3D schemes is found. The results of previous research, from Tri and Supriono (2019), concluded that design and manufacturing are very much needed in the process of making an effective corncob crusher machine in agriculture.

2 METHOD

This research is a type of development research. Data collected through observation and documentation methods. The data were then analyzed descriptively qualitatively. The stages of the research are as in figure 1. The research stages started from collecting data related to the disc mill machine, which was followed up with observations at SPR Cinagarabogo, then the research team made 2D and 3D sketches through the autodex inventor application, image validation was carried out by experts, then entered the data analysis stage.

3 RESULT AND DICUSSION

3.1 Study Literature and Observation

The literature study was carried out by the research team in collecting several publications regarding the design of a disc mill machine for corn cobs. Then continued with observations at the People's Husbandry Center (SPR) Cinagarabogo. Interviews

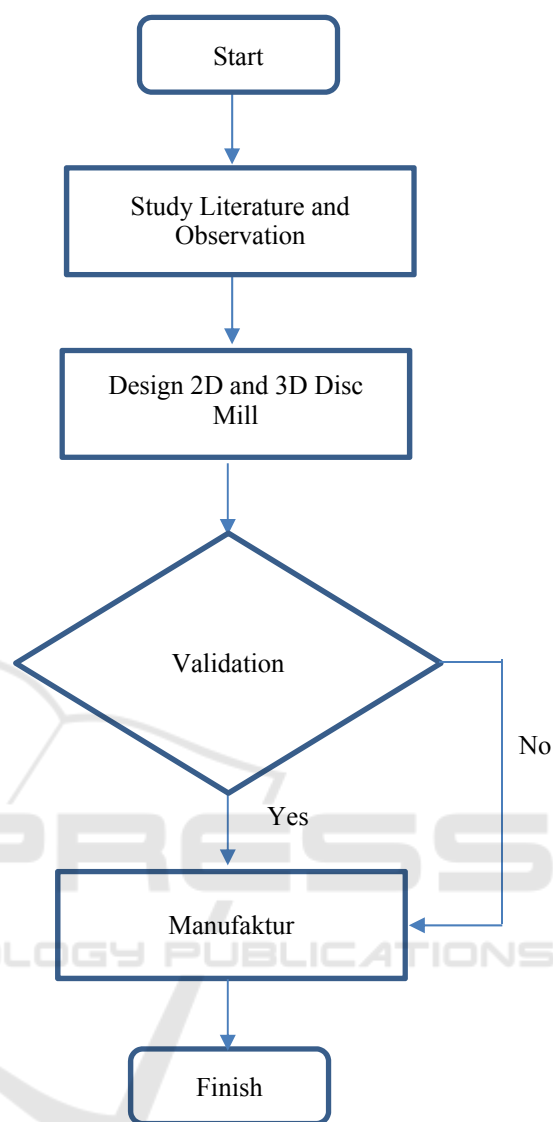


Figure 1: Research Stages.

were conducted with the head of the SPR to seek information regarding the need for tools that can assist the process of making ruminant feed there.

3.2 Study Literature and Observation

This stage is the first step in making tool designs which will later provide a clear picture for the manufacturing department in making the conceptualized machine. This design describes the size, type of material and working procedures. The design process uses the autodex inventor application. This design is in accordance with the needs obtained during an interview with the head of the People's Livestock Center (SPR) Cinagarabogo.

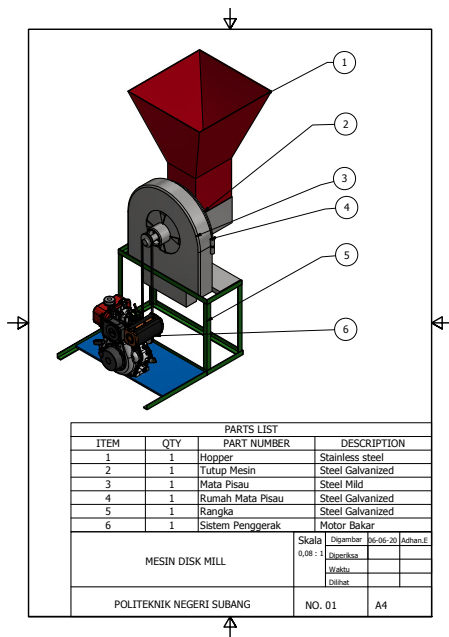


Figure 2: Disc Mill Design 2D.

In the process of making 2D sketches, it was found that some components were made of stainless steel. This is because based on the needs analysis, the machine will be used to crush corn cobs in ruminant feed, so a strong machine is needed in the process.

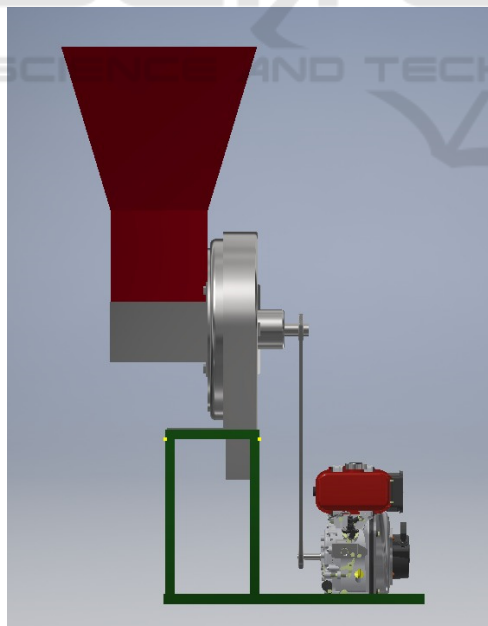


Figure 3: Disc Mill Design 3D.

In the next stage, the research team created a 3d image of the disc mill machine. Also made a detailed description of each component in the disc mill

machine. Drawings of components and types of materials used will facilitate the manufacturing process in making machine prototypes.

3.3 Validation

Validation was carried out by Mr. Agus Haris Abadi, M.Pd. as a lecturer who has a BNSP competency certificate at the Subang State Polytechnic Campus. Validation adjusts the drawing rules, selection of materials and sizes, as well as the suitability of punctuation in 2D designs. The validation results state that the image gets a score of 87% or is in the proper category

3.4 Manufacturing

In this stage, researchers carry out the manufacturing process. This process begins with the process of measuring, cutting, welding and assembling. Making machines based on validated drawings. The tool making process guide uses work preparation as a reference in the stages of making a disk mill machine.



Figure 4: Disc Mill Machine.

Performance tests showed that the machine can crush corncobs for the manufacture of ruminant feed with a capacity of 25 kilograms corncobs/1 hour.

4 CONCLUSION

Based on the research, it can be concluded that the design made has been declared valid with a score of 87% or is in the proper category. Further recommendations that the design is feasible to proceed to the manufacturing process.

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