

Design and Fabrication of Pedal Operated Shredder Machine

Chandan sahuo, Ajay vikash kumar behera, Abinash mallick,
Ananta Prasad sethi, Dr. Mamata kumari padhy
Department of Mechanical Engineering,
Gandhi Institute For Technology (GIFT) ,Bhubaneswar, India

Abstract- The scope of this project was to design and development of Shredder machine focus on chopping of vegetables, areca leaves, this chopped powder to prepare the vermin compost. The project began with collection of information and data on user lifestyle and current process by which they perform their job. Concepts were developed with reference of four different shredder machine and operating processes. Concept was developed considering the safety factor users operating environment and maintenance. Considering the users' needs and buying capacity, spur gear, bearings, structural frame, cutter and dual shaft. The machine frame is built using mild steel and tungsten carbide is used for cutter tip preparation. Two Blade are mounted on Singal shafts, which rotate parallely driven by a spur gear. The power from the by cycle is transmitted to cutter shaft through a chain drive. Cut is made inside the chopping house due to the effect of tensile, friction, and impact effect in chopping process. The vegetables get chopped and powder is collected at the bottom.

Index Terms- Shredding machine; Cutter; spur gear, shaft, Compost

I. INTRODUCTION

The conventional vegetable waste disposal is a traditional and oldest method of waste disposal in which agriculture wastes are dumped as it is to degrade in a particular place for decomposing. As the wastes are dumped as such, it takes more time to degrade and it causes environmental pollution. The waste shredder machine aims to reduce the agro waste and convert it into useful nourishing fertilizer. Agriculture is one of the most important sectors in the Indian economy. Coconut palm cultivation is one of the major livelihoods of farmers of Kerala and Karnataka. It has been realized that large quantity of agricultural wastes remains being unutilized because handling, storage and management related difficulties. The reasons are their low bulk density, large area/volume for storage. The farmers on the field burn most of these wastes after the harvesting of crops. Thus the agricultural waste burning phenomena is being repeated every year. In order to use these wastes for some economic benefits, so the necessary of such machine was felt to utilize all kinds of agricultural waste after shredding, which could be economical and practicable.

II. LITERATURE REVIEW

P.B.K hope et al., Proposed the Design of experimental set-up for establishing empirical relationship for chaff cutter energized by human powered flywheel motor. This machine

used to chop the for age into small pieces for easy consumption by the animals. In the human powered flywheel motor concept, the bicycle mechanism for converting and transmitting human energy through padding to rotational kinetic energy of flywheel is hereby proposed. The energy stored in the flywheel can be used for actual cutting process. Human powered fly wheel motor

Ajinkya s. Handeet al., in their research work carried out project on Methodology for Design and Fabrication of Portable Organic waste chopping Machine. Organic waste is fed uniformly through feeding drum and tray. Then the shaft rotated at 1440 rpm through electric motor by means of pulleys makes the chopping drum to cut the waste by the effect of impact shear obtained from the shearing blades. Then the cut pieces pass through the concave holes of the sieve & come out of the machine. Portable organic waste chopping machine

Mohamad Khatib Iqbal, proposed "Development of coconut leaves cutter "A shredder machine mainly consists of cutter, mounted on dual shaft, motor is attached at the base, smaller pulley at the motor end gives drive with the help V belt to bigger pulley which is connected to gear. One gear will give drive to other gear, and Barrel rotates in opposite direction with the help of these gears. Shaft it rotates at 520 rpm at this time coconut leaves fed into the hopper for high rotational speed of cutter assembly coconut leaves get convert into powder.

III. METHODOLOGY

The below figure shows the assembly procedure of Vegetables leaves shredder. Quality of the material has been checked at purchase level to meet the design needs. In this step a skeleton of the section is fabricated according to dimensions mentioned as per the design Hopper can be mounted on the cutter assembly to feeding of coconut leaves properly. Then mount the pulleys and v- belt to set the belt proper tensioning otherwise slipping of belt occurs. Finally all the assembly work is done in this step a skeleton of the section is fabricated according to dimensions mentioned as per the design. Frame is fabricated according to specified design and material. Then move on to cutter assembly here first to prepare the cutter container after that inset the shaft then cutter are mounted on shaft with key and spacer to ensure all the cutter tightened.

IV. DESIGN

Several factors were put into consideration in the design of the vegetable shredding machine. They include drudgery reduction, simplicity, capacity, strength of materials to be used for fabrication and flexibility of the machine. The hopper, rotary blades, power drive mechanism, shaft design, bearings, supporting frame and the capacity of the machine are the components of the machine designed for.

V. PROBLEM STATEMENT

In this Shredding machine, the Organic waste like Agriculture waste, Kitchen Debris, cooked foods etc are fed into the machine vertically through hopper on to the cutters. Cutters are mounted on shaft supported by bearings which is mounted on the machine frame. One shaft driven by motor and another shaft driven by spur gear both shaft rotated in opposite direction. The motor is rotated at certain speed 1440 rpm and with it coupled with gear box to reduce the speed and to increase the torque. When the crop or waste come in contact with the rotating cutters or blades then the shearing action takes place. Due this shearing action, the large size waste converted into small micro size. This small size wastage will decompose faster than the macrosize. The clearance between the rotating blades depends up on the size of the organic waste used for chopping. The chopped organic waste comes out of the machine and undergoes decomposition. Possible Points of Failure



Fig 1: Pedal operated Shredder

VI. CONCLUSION

The developed model is simple, efficient, requires less time and cost effective when compared to the existing available model. Importance is given towards user friendly in operation and mainly towards safety. The rotating elements like belt and pulley and gears are covered, so it is fully safety to operator. The assembly was checked for its sturdiness and was found to be reliable. The overall performance of shredder machine was satisfactory by considering the quantity of powder produced with respect to time. Pedal operated vegetable cutter is useful at homes and medium and small scale hotels. By the using this equipment, vegetable cutting speed is more compare with manual vegetable cutting. It can be operate with one hand and one leg also. So, it is useful for physically handicapped people. A small scale pedal powered cassava grating machine was designed, fabricated and tested. It was found to be effective and efficient enough. This machine can be used at home scale for domestic application and it is affordable since the cost of production is low compared to the automated one.

REFERENCES

1. G. Boothroyd, P. Dewhurst, and W. Knight, Product Design for Manufacturing and Assembly, Marcel Dekker, New York, 1994.
2. G Dieter, Engineering Design - a materials and processing approach, McGraw Hill, NY, 2000.
3. Mohamad Khatib Iqbal "Development of coconut leave scutter" Vol.3, No.12. (June,)