

# Modification of Chaff Cutter Machine

Prof. Choudhari R. M<sup>1</sup>, Narkhede Suraj<sup>2</sup>, Koli Ganesh<sup>3</sup>, Sawale Mohan<sup>4</sup>.

<sup>1</sup>Professor Department of Mechanical Engg, Padm, Dr V B Kolte Collage of Engg, Malkapur, India

<sup>2,3,4</sup> students of Department of Mechanical Engg, Padm, Dr V B Kolte Collage of Engg, Malkapur, India

## ABSTRACT

*Chaff Cutter Machine is hay or straw cutting machine which is used for uniform chopping of fodder for livestock to agro industries. In this paper, design and development of Chaff Cutter Machine is presented. The machine is developed gradually from basic machines into commercial standard machine that can be electrical driven to achieve various length of cut of chaff as per the preference. The new chaff cutter machine is modified for its compactness and to avoid blockage of grass.*

**KEYWORDS:** *chaff, uniform chopping, fodder, cutter, machine*

## 1. INTRODUCTION

A Chaff cutter is mechanical device used to cut the straw or hay into small pieces so as to mix it together and fed to cattle. This improves animal digestion and prevents animal from rejecting any part of their food. As per today's scenario the population of buffalos is drastically increased. So to increase the productivity and reduce the physical effort required for running the machine the motorized machineries came into existence it is best for dairy farmers. Presently fodder cutting machines are electric driven as well as hand operated or engine driven.

## 2. OBJECTIVE:

- To ensure safety and make it compact.
- To provide good fodder for animal
- To save work time
- To save electricity consumption
- To provide pleasing/aesthetic look
- To get protection from dust
- To reduce noise
- To increase corrosion resistance of machine
- To Make It Portable easily

## 3. LITERATURE SURVEY

The literature survey reveals that several attempts have been already made to develop design of experimentation for establishing empirical relationship of chaff cutting phenomenon energized by human powered flywheel motor Modak and his associates had developed Human powered process machines, which could energize process units needing 3 to 6 HP. These units had intermittent power requirement. In the present work human powered flywheel motor chaff cutting process has been studied. 3. Design & develop chaff cutter by using different types of blades (Sanjay Patil, Harshkumar Jain, Raut, Kalikat, Gandhi)

## 5. NEED OF NEW CHAFF CUTTER MACHINE:

The existing machines are observed and studied properly to detect the problems faced by the user are given below.

1. Less compact design
2. High voltage required such as 3 phase
3. Less safety while using by women
4. Noisy
5. Blockage of grass creates feed interference

## 6. MECHANICAL DESIGN

Mechanical design phase is very important from the view of designer as whole success of the project depends on the correct design analysis of the problem. Many preliminary alternatives are eliminated during this phase Designer should have adequate knowledge above physical properties of material, loads stresses, deformation, and failure. Theories and wear analysis. He should identify the external and internal force acting on the machine parts.

This force may be classified as;

- 1] Dead weigh forces
- 2] Friction forces
- 3] Inertia forces
- 4] Centrifugal forces
- 5] Forces generated during power transmission etc.

Designer should estimate these forces very accurately by using design equations. If he does not have sufficient information to estimate them he should make certain practical assumptions based on similar conditions. This will almost satisfy the functional needs. Assumptions must always be on the safer side. Selection of factors of safety to find working or design stress is another important step in design of working dimensions of machine elements. The corrections in the theoretical stress value are to be made according in the kinds of loads, shape of parts & service requirements. Selection of material should be made according to the condition of loading shapes of products environments conditions & desirable properties Provision of material should be made to minimize nearly adopting proper lubrications methods.

In, mechanical design the components are listed down & stored on the basis of their procurement in two categories.

- 1] Design parts
- 2] Parts to be purchased

For design parts a detailed design is done & designation thus obtain are compared to the next highest dimension which is ready available in market. This simplification the assembly as well as post production service work. The various tolerances on the work are specified. The processes charts are prepared & passed on to the work are specified. The parts to be purchased directly are selected from various catalogues & specification so that any body can purchase the same from retail shop with the given specifications.

## 7. WORKING PRINCIPLE

In our project we are using the multi agricultural cutter for cutting the crops, sugarcane, wooden materials and etc. It consists of simple manner and the used components are motor and rotating disc arrangement. Here the motor is working using with the help of electric power supply; on the motor shaft we have fixing the arrangement of rotating disc. The rotating disc arrangements are running like a cam. The cutters are fixed on the top of the ram arrangements. When we switch ON the machine the motor start to rotate the cam arrangements which is shown in the figure. Here the rotary motion is converted in to the linear motion by using simple mechanisms. The linear motion ram is connected to the cutters as shown in fig, so that the cutter moves upward and downward direction the cutting process is carrying out through this machine



Fig no -1

## 8. COMPONENTS AND SPECIFICATIONS

- Frame
- Electric motor
- V-Belt
- Pulley

**Frame:**



Fig .2 Frame

The frame is used to support all the components. Material of frame is cast iron and height upto 1m.



**Fig no- 2**

**ELECTRIC MOTOR:** This motor is used to rotate the roller by using belt and pulley.



**Fig.3** Electric motor

Output = 230 volt Current = 3.5 amps Power = 0.75kw/1 HP

**V-Belt:** V-Belt is used to transmit rotary motion of shaft of motor to the shaft of roller. Material of the belt is rubber or polymer for strength and reinforcement.

**PULLEY:** Pulley is used to transmit the torque of motor to the roller. One pulley is directly mounted over the motor shaft and another pulley mounted on the shaft of roller. And both the pulleys are connected with the help of V-belt. Pulley Dia. = 75mm.



**Fig.6** Pull

**Cutter Blade:** Cutter blade is main part in chaff cutter machine which is used to cut forage into small pieces and as per requirements. which is made from mild steel so no more tear and wear and also it is corrosion resistant.



**Fig 7-Cutter Blade & Feed Roller**

Feed roller is the device which is used to pull the forage from hopper and fed it to the cutting blades and after it cuts into small pieces and roller is driven by worm and worm wheel which is connected to the flywheel shaft.



**Fig 8 –Feed Roller**

**Supporting Frame:** The whole assembly is mounted on this frame. The complete frame is made up of mild steel.

## 6. CONCLUSION AND RESULTS

- The machine is simple in construction as there is not so much complication in design. It is also important that velocity ratio can easily be determined measuring number of teeth on gears, p.c.d of pulleys.
- The machine is designed in such a way that it will require minimum space to install. As the motor is placed inside the machine stand not outside the machine, the space is considerably saved. As there are no sharp edges in the m/c for m/c frame and machine stand, it can be handled safely without injury. Blades are provided with double sharpening edges.
- The m/c is provided with motor sliding arrangement and the cutting blades can be easily detached by operator for sharpening purpose.
- We provided the powder coating casing to whole assembly of m/c for safety and aesthetic look.
- And for corrosion resistance.
- Machine has reduced noise and weight due to gears arrangement and compact design.
- Machine has casters for portability.
- Machine has 300kg/hr fodder cutting rate
- Fodder size is 20mm in length
- Forward and reversed rotation arrangements for blades

## 10. REFERENCES

1. P.B.Khope, J.P.Modak, Establishing empirical relationship to predict the chaff cutting phenomenon energized by human powered flywheel motor (hpfm). Volume 3, Issue 2 (May- June 2013) Page 158-164
2. P. B. Khope, J. P. Modak, Development and Performance Evaluation of a Human Powered Flywheel Motor Operated Forge Cutter, International Journal of Scientific & Technology Research, Volume 2, Issue 3, (March 2013). Page 35-39
3. M. V. Gudadhe, J. P. Modak, Design of Experimentation for the Formulation of an Approximate Experimental Model for HPFM driven Kadba Cutter, International Journal of Research in Engineering Science and Technologies, Volume 1, Issue 1, (May 2015). Page 1-8
4. K. S. Zakiuddin, J. P. Modak, Formulation of Data Based ANN Model For The Human Powered Fodder-Chopper, Journal of Theoretical and Applied Information Technology, Volume 15, Issue 2, (May 2010). Page 104-108.
5. S.V. Pandit, Kunal J. Padalkar, J. G. shinde, "Development of Half Cutting, Creasing and Perforating Machine", International Journal of Innovative Research in Science, Engineering and Technology ISSN(Online) : 2319-8753, ISSN (Print) : 2347-6710 Volume 6; Issue 3; March 2017 ; Page No. 3222-3229.
6. S.V. Pandit, S. J Kadam, AvinashKharat, Chetan U Nayakawade, "Productivity Improvement by Application Of Line Balancing", ISSN: 2319-8753, Vol.3, Issue 4, pp.11495-11502 April

### Author Details

	Prof. Ramakant M. Choudhari Mechanical Engineering Department Padm Dr.V.B. Kolte College of Engineering Malkapur <a href="mailto:rmchoudhari196@gmail.com">Email- ID=rmchoudhari196@gmail.com</a>		Mr. Ganesh R. Koli Final year student of Mechanical Engineering. Padm Dr.V.B. Kolte College of Engineering Malkapur Email id: <a href="mailto:ganeshkoli@gmail.com">ganeshkoli@gmail.com</a>
	Mr. Suraj P. Narkhede Final year student of Mechanical Engineering. Padm Dr.V.B. Kolte College of Engineering Malkapur EmailID: <a href="mailto:narkhede.suraj92@gmail.com">narkhede.suraj92@gmail.com</a>		Mr. Mohan D. Sawale Final year student of Mechanical Engineering. Padm Dr.V.B. Kolte College of Engineering Malkapur Email Id: <a href="mailto:mohansavale10@gmail.com">mohansavale10@gmail.com</a>