WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Design and Optimization of Chaff Cutter Blade Assembly

Digvijay M. Shinde[a] , Prof. N.V.Hargude[b]

[a] ME Student Mechanical Design Department,PVPIT Budhgaon, Sangli.

[b] Guide Professor Mechanical (Design) Department,PVPIT Budhgaon, Sangli.

ABSTRACT:

India is mostly depending on agriculture sector. In India a ruler area plays an important role in economy. Farming and animal husbandry both are depends each other. This paper is on the optimization model cutting blade and the increasing force in driving blade geometrical configuration to the expected performance specifications. The mini chaff cutter machine is most commonly used in small-scale applications. A cutting blade engineered to operate at optimum efficiency would vastly improve cutting efficiency while dramatically lowering the amount of electricity required to drive it. There are a variety of chaff cutters available in India, but the size and quality of this blade decreases raw material wastage, resulting in increased milk production and improved cattle health.

Keyword: Optimized chaff cutter model, Cutting force, Blade parameter, Improved performance efficiency.

Introduction

Agricultural and associated activities employ over 80% of the population in India. For some, it is their primary source of income as well as a means of covering day-to-day costs. Milk production is one of the auxiliary sources of revenue for farmers, allowing them to supplement their incomes. However, the profitability of milk production is mostly determined by the quality of cattle feed. Farmers have spent alot of money on cow feed, but they aren't getting the results they want. To feed cattle, little pieces of grass must be chaffed. The chaff cutter was designed to make cutting fodder easier for humans. Chaff cutter has the ability to cut straw, sugarcane tops, and other feed that is necessary for the animal digestion. Chapping is the technique of cutting fodder into small pieces before mixing it with other feed using mechanical equipment. Both manually and electrically operated machines can be used to cut chaff. It is done manually, which is physically demanding because to the energy and physical demands, and is generally considered as a source of labor, with many farmers reporting back, shoulder, and wrist pain as a result of this work. It may also result in clinical or anatomical abnormalities, as well as a negative impact on the health of the workers. Due to the labour shortage and drudgery associated in manually operated chaff cutter operation, it is vital to introduce the power operated chaff cutter. With the given facts in mind, the current investigation has attempted to investigate the performance evaluation of a power driven chaff cutter. It is a machine that can be used for a variety of tasks. Apart from cutting chaffs, it may also be used to cut grub, fodder, straw, and other materials.

Objectives

1. To development of chaff cutter blade assembly.
2. To manufacturing and testing of chaff cutter blade assembly.

Literature Survey

ANNA SARAK ET AL. [1]discovered chaff cutter was created to reduce the amount of labour required by humans to cut the fodder. Which is capable of properly cut animal food. They create and alter chaff cutters that don't use electricity and require fewer manpower. It was made out of a torsion spring that stored energy and sent it to the flywheel via a chain drive, and the fodder that came out of the machines was consistent in size.

NILESHSANKPAL ET AL. [2] concluded Chaff Cutter Machines were hay or straw cutting machines used in the agricultural industry. In this work, he discussed the concept and development of the Chaff Cutter. The machine was created using ordinary equipment. The new chaff cutter machine was designed to be more compact and avoid grass blockage.

SANJAY PATIL ET AL. [3] found various types of fodder can be processed in chaff cutter machine are forage grass, green grass, dry corn straw, and wheat stalk. The final products can be used to feed cattle, goats, deer, and horses. It can also process cotton stalk, bark, small branches, they can also be used to generate electricity, and to make paper. Chaff cutter machines consists of portable tractor driven chaff cutter.

U.S. KANKAL ET AL. [4] studied increasing energy demand, unemployment in developing countries like India. The experimentation has been carried

out on a fodder cutter energized by electrical power. Fodder-cutter machines are used every day by farmers and their families in India for preparation of fodder for the livestock they own. This paper discuss about the procedure of the testing of fodder cutter machine.

MANE PRITHVIRAJ ET AL. [5]found a simple but innovative mechanism for cutting straw, chaff, hay, and oats into small pieces before being blended with other food and fed to horses and cattle was discovered chaff cutter. This was a low-cost and easy-to-build project. In comparison to other chaff cutters, this one requires less energy and time.

P.B. KHOPE1 ET AL. [6] concluded using a whole theoretical strategy for the creation of the manula chaff cutting machine proved challenging and unreliable, hence an experimental technique was used. There are three subsystems in this setup. I Flywheel motor energy unit powered by humans. (ii) Torque amplification gears and clutch unit, and (iii) chaff cutter process unit. They describe the experimental setup used to conduct experiments in order to create an empirical connection for a chaff cutter powered by a human-powered flywheel motor.

KANHAIYALAL ET. AL [7]designed and fabricated ‘straw size cutting machine for mushroom production' Any power equipment, such as DC motors, is used by the machine. The use of this equipment speeds up the cutting process, reducing the amount of time spent cutting and the amount of labour necessary to operate the machine. The use of a power driven equipment can help you save money.

ZAKIUDDIN ET AL. [8]carried out study on a pedal-operated flywheel motor as a fodder chopper's energy source. This gadget was eco-friendly and assisted in power conservation. The flywheel was powered by manpower. The fly wheel accelerates to 600 revolutions per minute (rpm).

AKKISATHISH ET. AL.[9]evaluated better animal food cutting, they looked at force requirements, hand cranking capabilities, cutting length, and moisture content. Because of the high moisture content and large diameter of the fodders, the force demand was gradually raised. By increasing the cutting force, weight, and life of the blades, the quality of the chaff was improved.

Proposed Work:

Theoretically to examine current trends in the chaff cutting machine and its blade assembly by reviewing existing literature. Assemble the blades according to the specifications. Preparation of a three-dimensional model for optimization. Analysis work done by ANSYS software. To create the components and subsequently build the test set-up, appropriate manufacturing processes will be used. Fabrication will be done according to the layout depicted below.

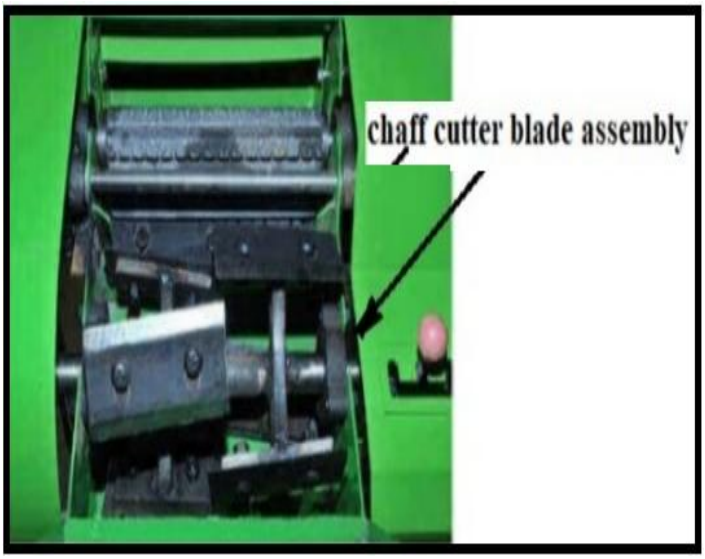

Fig. 1 Chaff Cutter

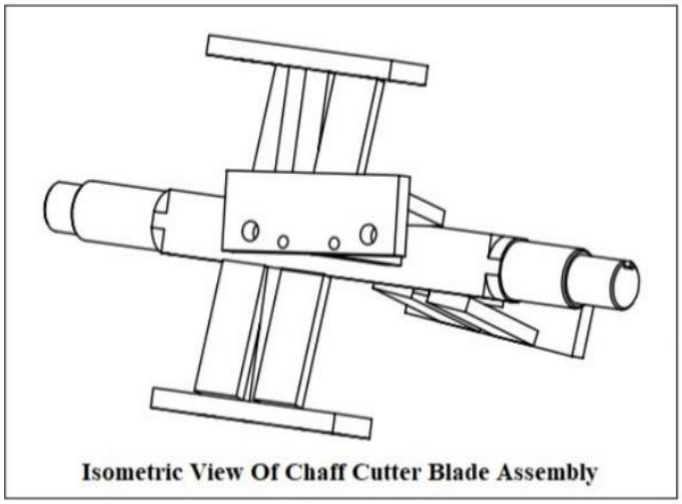

Fig. 2 Isometric view of the chaff cutter assembly

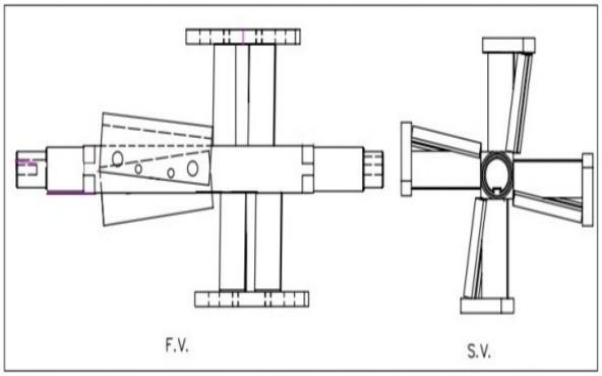

Fig. 3 Orthographic view

CONCLUSION:

- According to the literature, this machine differs from other chaff cutters in that it is smaller and lighter.
- There is no provision for fixing the chaff cutter, so it can be moved wherever it is needed.
- In this project, new ideas will be implemented, and a new chaff cutter will be designed.

REFERANCES:

1.Anna Sarak, AniketShinde, RohanKondval, Sanjay Salgar, ParthMirjkar, A.R. Matkar (2018), "Design and Modification of Chaff Cutting Machine" International Research Journal of Engineering and Technology (IRJET), e-ISSN: 2395-0056 Volume: 05 Issue: 04 (Apr-2018)

2. NileshSankpal, VaibhavPowar, ShubhamPatil, KuldeepSalunke, S. V. Pandit(2017), "Design and Modification of Chaff Cutter Machine" International Journal of Innovative Research in Science, Engineering and Technology (An ISO 3297: 2007 Certified Organization) ISSN(Online) : 2319-8753 , Issue4, (April 2017)

3. Sanjay Patil, Harshkumar Jain, Jayshree Raut, TusharKalikate, Viraj Gandhi (2016), "Design & Modification of Chaff Cutting Machine" International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056, Volume: 03 Issue: 04 (April-2016)

4. U.S. Kankal, D.S. Karale, V. P. Khambalkar , S.H. Thakare (2016), "Performance evaluation of power chaff cutter" Engineering and Technology in India; Volume 7 | Issue 1 | April, 2016 | 18-25 ; ISSN-2230-9284 (April, 2016)

5. Mane Prithviraj Jayendra1 GajgeshwarYuvraj Suresh (2020), "Design and Modification of Chaff Cutter" IJSRD - International Journal for Scientific

Research & Development| Vol. 8, Issue 2, 2020 | ISSN (online): 2321-0613 (2020)

6. P.B. Khope and J.P. Modak (2013), "Design of Experimental Set-up for Establishing Empirical Relationship for Chaff Cutter Energized by Human Powered Flywheel Motor" International Journal of Agricultural Technology 2013 Vol. 9(4): 779-791, ISSN 2630-0192 (2013)

7. KanhaiyaLal,et.al, (2018), "Design of straw size cutting machine for mushroom production", Journal of Pharmacognosy and Phytochemistry 2018; 7(2): 1638-1640, E-ISSN: 2278-4136 (2018)

8. K. S. Zakiuddin, J. P. Modak (2010), Formulation of Data Based Ann Model For The Human Powered FodderChopper, Journal of Theoretical and Applied Information Technology, Volume 15, Issue 2,(May 2010)

9. AkkiSathish et.al (2020), "Measurement of Force Requirement for Manually Operated Chaff Cutter Measurements of Mechanical Parameters" International Journal of Current Microbiology and Applied Sciences ISSN: 2319-7706 Volume 9 Number 10 (2020)

10. V. B. Bhandari(2014), "Machine Design Data Book", 2014, Tata Mcgraw Hill publishing company Ltd. New Delhi.

11. IS: 11459-1985 (Reaffirmed in 2000)-Specification for Power Operated Chaff Cutter;

12. IS: 7897-1975(Reaffirmed in 2001)-Test Code for Chaff Cutter;

13. Mohan, D. and Kumar (2014), A. "Development of safer fodder-cutter machines: a case study from north India. Safety Sci." 42(1): PP. 43-55, (2004).