

Dual Powered Operated Tiny Cotton Ginning Machine: A Review

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Abstract— Cotton Ginning is a primary processing industry whose major function is to clean and gin the seed cotton, clean the lint and form a bale. This process of cotton lint cleaning is done with the help of electricity. Here we can make machine which will be operated dual. Machine will be small and tiny. So that worker can move anywhere it easily. Cotton lint cleaning will be done by door to door. There will be no limitations of electricity. This research paper discusses conventional ginnery using pre-cleaner for removing the contaminants like trash, stem, leaves, immature locks etc. which is not being used by Ginners. Present scenario reveals that most of the handling operations are replaced by mechanized conveying, which may probably clean the cotton in various stages of transportation of cotton.

Key words: Cotton Ginning, Seed Cotton, Cotton Lint Cleaning, Pre-Cleaner, Mechanized Conveying, Transportation of Cotton

I. INTRODUCTION

Indian Cotton Ginning Industry is the second largest in the world. Cotton ginning plays very important role of separation of fibers from cottonseed and converts field crop into a saleable commodity i.e. lint Ginning acts as a bridge between cotton farmer and textile industry. In India, cotton is ginned on double roller gins manufactured domestically. About 36.5 and 38 million bales were ginned during 2012-13 and 2013-14, respectively in about 1500 modern and 2500 semi-modern ginneries. By introduction of efficient ginning, pre and post cleaning and novel material handling machinery along with implementation of skill development programs, Indian Ginning Industry has been transformed into remunerative business enterprise and has achieved global leadership in supply of quality cotton to domestic.

In India, the present ginnery can be categorized into three major groups:-

- Conventional Ginnery - In conventional ginnery, ginning, pressing or both operations are carried out but the handling of seed cotton, lint, cottonseed and bales are done manually.
- Semi-automatic Ginnery - This is a composite unit where all the unit operations of material handling except
 - 1) Unloading and heap making of seed cotton
 - 2) Feeding of seed cotton to the gins from central platform
 - 3) Feeding of lint to press box and handling of bales in the press house are done automatically.
- Automatic Ginnery - It is either a composite unit or an integrated unit, where all the unit operations are done automatically except
 - 1) Seed cotton unloading and heap making
 - 2) Feeding to suction system and
 - 3) Unloading of bales.

The composite unit is one where both ginning and pressing activities are carried out within one premises. The

integrated ginning and pressing factory is one in which ginned lint is directly transferred to the press without storing or conditioning in Pala house.

II. LITERATURE SURVEY

Dr. P.G. Patil & Er. V. G. Arude [1], Recent Director, Central Institute for Research on Cotton Technology, (ICAR), Mumbai, India, "Advances in Cotton Ginning Technology in India." Remarkable advancement has taken place in the ginning technologies in during and post TMC era in India. It has kept the momentum of modernization of cotton ginning & pressing sector of India. Increased productivity of ginning machines, reduction of manpower and electrical power, reduction in contamination and improved cotton quality are benefits of these developments which resulted in increased export of cotton from India. Further, the developments taken in the cotton ginning & pressing technologies in India have made India a net exporter of these technologies, machinery and turnkey projects to various countries. Roller ginning technology would be a viable alternative for ginning the cotton produced in Bangladesh.

Arude, V. G., Manojkuamr, T.S., and Shukla, S. K. [2], Development and performance of self-grooving rubber roller for use in roller ginning machines. International Proceedings of Chemical Biochemical, Biological & Environmental Engineering. Self-grooving rubber roller as substitute to chrome composite leather roller for use in ginning machine was developed. Self-grooving rubber roller was made out of rubber discs of hard and soft rubber compound prepared in a specially designed die by molding technique. Roller was made with nitrile rubber having radial layers of softer rubber compound to form grooves. Compounding ingredients in appropriate proportion were added to provide sufficient hardness, tempera true resistance, and to ensure effective ginning. Self-grooving rubber roller was tested on commercial double roller (DR) gin. Roller speed of 40 rpm was found to be optimum to achieve efficient ginning without any adverse effect on fibre and seed quality as against 100 rpm for leather roller. Gear box of the conventional DR gin was suitably modified to run at 40rpm. Ginning performance of self-grooving rubber roller in terms of capacity, energy consumption, effect on fibre quality and cost economics was studied and compared with the leather roller. Use of the self- grooving rubber rollers was found to increase the productivity of the DR gin by 25 to 30%. Periodical grooving and drudgery involved in grooving operation in leather roller was eliminated in rubber roller which consequently resulted in reduction in machine downtime up to 2 hours/day. Energy consumption was found to be 15 to 18% lower and working like of the rubber roller was estimated to be 5000 hours as against 1000 hours in leather roller. Rubber roller is eco-friendly roller and there is no environmental pollution and health hazard to workers as there is no chromium contamination while ginning. It was

observed that one time investment on the modification in DR gin can be paid back within a period of 76 working days of 20 hrs.

J. F. Agrawal, P. M. Padole and P. G. Patil [3], they studied Techno-economic Feasibility of a Mini Cotton Ginnery for developing countries like India. The objective of the research work being reported is to establish techno-economic feasibility of producing contamination free lint cotton in the form of low to medium density bales at a mini cotton ginnery. This mini cotton ginnery would be installed in cotton growing areas.

Monica W. Nagardhane and Dr. C. C. Handa [4], they studied Failure Analysis of Beater Shaft of Double Roller Ginning Machine using FEM. In the cotton ginning machine there is a fixed knife and moving knife. This moving knife is called as beater and it oscillates about its central longitudinal axis of made of leather linings. The distance between the roller and the fixed knife is adjusted according to the quality of the raw cotton. Using this fixed knife and rollers cotton fibers are captured and the beater beats the held cotton to remove seed from it. During the operation the shaft fails at particular point due to wet cotton and after some duration (fatigue failure). In order to remove these failures two approaches will be used i.e. changing the dimensions of the shaft or changing the material of the shaft which will remove the failure at greater extent. So first we will design and analysis the beater shaft using Pro E and ANSYS 12.0 software respectively and finding the failure at particular point and also redesign the shaft and analysis of the same.

Bhagirath Choudhary and Gaurav Laroia [5], they developed Technological developments and cotton production in India and China. The textile and apparel industries of India and China play a pivotal role in the economy of both countries. This sector accounts for 30% of India's and 25% of China's total export volume. Unfortunately, sluggish exports, high costs and poor domestic demand are plaguing the Indian Textile industry. In this paper we illustrate the various indicators that highlight the abysmal state of cotton industry in India and provide detailed analysis, identifying the underlying causes as well as the possible remedial measures.

Sachin W Gajghate and Vaibhav H Bankar[6], they have been developed Vibration Analysis Of Double Roller Auto feeder Ginning Machine Seed Channel By Global Stiffness Matrices : Vibration Measurement & Its Effects. The principal sources of environmental noise are surface motor vehicles, aircraft, trains and industrial sources. These noise sources expose millions of people to noise pollution that creates not only annoyance, but also significant health consequences such as elevated incidence of hearing loss and cardiovascular disease. There are a variety of mitigation strategies and controls available to reduce sound levels including source intensity reduction, land use planning strategies, noise barriers and sound baffles, time of day use regimens, vehicle operational controls and architectural acoustics design measures.

Arvind B. Bodhe and J.F. Agrawal [7], they studied on Recent Trend in Cotton Ginning. Genetically developed B.T. Cotton increase the productivity of the cotton in last decade. Most of the farmer in our country and the world are producing B.T. Cotton and supplying to the Cotton Ginnery. As the production increases the conventional methods of

Ginnery are replaced by automatic Ginnery. This research paper discusses conventional ginnery using pre-cleaner for removing the contaminants like trash, stem, leaves, immature locks etc. which is not being used by Ginners. Present scenario reveals that most of the handling operations are replaced by mechanized conveying, which may probably clean the cotton in various stages of transportation of cotton. The drawbacks in system are that the crop producer or farmer is not fetching the reasonable price from the ginners. If farmer installed pre cleaner at storage place either in village or at farm can fetch better price. Further this papers also discusses the details of recent trend and economic feasibility of cotton pre-cleaner in details.

Mr. Hitesh M. Tupkari and A. V. Vanalkar [8], they have studied the Design and development of non-continuous type pneumatic conveying systems for Ginning industry. This concept of conveying lint from intermittent ducting from various source of point has lot of present problems in ginning Industries, such as jamming of lint collection box/hopper, power consumption is more due to high CMH requirement. The main advantage of pneumatic conveying system is that material is transferred in close loop, thereby preventing the environmental effect on the material and vice versa. No standard procedure is available for the design of pneumatic lint conveying system. As the configuration of the system changes, variable involved also changes, and one has to change the design considerations based on the applications. So there is wide scope for experimentation in the field of pneumatic conveying system.

Bhushan S. Umarakar and Prof. P. G. Mehar[9], they studied Design and Fabrication of Mini Saw Cotton. Ginning Machine Cotton from time immemorial has held the highest place amongst the family of fibers - natural or man-made. Owing to the several rich and exceptional properties it has (including comfort and drape), cotton is also known as the King of Fibers and will continue to hold this place for centuries to come. In India large numbers of cotton ginning machines are available such as Saw ginning machine, roller ginning machine, double roller ginning machine etc. but they are of very high cost and large in shape and weight. Our aim is to design and developed a low cost saw cotton ginning machine which will help farmers and small scale entrepreneurs to remove the seeds from the cotton at their home level instead of going to big ginning factory. This review describes about the design of various components of Mini Cotton Ginning machine. Hence in this design of various parts are necessary, and design of various parts due to which the design quality of those parts will be improved. Overall, this project involves processes like design, fabrication and assembling of different components etc. The fresher and small farmer or business man can start business by investing less capital.

III. PROPOSED WORK

Propose work to propose new drive mechanism and to improve the productivity of cotton ginning through dual operated machine. Machine can be worked on manually and electricity supply.

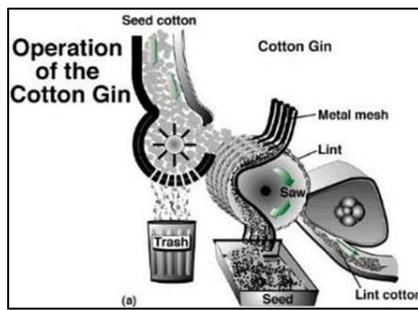


Fig. 1: (Dual Powered Operated Tiny Cotton Ginning Machine)

IV. CONCLUSIONS

After implementing Dual Powered Operated Tiny Cotton Ginning Machine the main conclusion is that this developed system really provides a great solution for reducing the running power consumption with low CMH & eliminates the jamming of lint in the hopper & hose pipe. This project is implemented & running successfully in ginning industry. Also the future scope we can do CFD analysis of this design, also it can be identified as a new development.

Even this system not only has application in ginning industries but also has wide important in various field because of its following benefits

- Completely dust free operation
- Flexibility in routing
- Careful and gentle handling of product
- Low maintenance and low manpower cost
- Minimum floor space.
- Ease of automation and control.
- One pipeline can be used for variety of products.
- High operational reliability due to few moving machine parts.

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