

Automatic Raw Cotton Feeding System

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Abstract: In India, it was found that ginning factories do not operate efficiently with regard to the labour force employed and the amount of capital invested. In order to make a more concrete evaluation of the cotton ginning sector, it is necessary to determine the structural characteristics of the factories, costs and profitability, the level of technical efficiency, and the most important, potential for improvement in the industry. Irregular feeding of Seed Cotton to ginning machine decreases the production rate of seed and fibre. It also affects the quality of the fibre and seed. To overcome these difficulties feeding mechanism is developed. The primary function of feeding mechanism is to feed seed cotton uniformly to the ginning machine at controllable rates. Feed rollers, located at the bottom of the feeder, directly under the hopper, control the feed rate of seed cotton to the ginning machine. Stress analysis carried out by using FEA software and the results are compared with the calculated values. This paper illustrates how the chain drives are very important to carry forwards the power. In this Paper recommendations and suggestions to improve quality of cotton fibre, suggestions for ginning factories are highlighted.

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I. Introduction

In the last several years material handling has become a new, complex, and rapidly evolving science for moving material in industry. Material handling is field concerned with solving the problem involving the movement, storage and control throughout the process of manufacturing. Proper material handling gives so many advantages and benefits in profit. It has been estimated that average material handling cost is roughly 20-40% of the total production.

By saving the material handling cost, the cost of production can be reduced considerably. In cotton ginning industries, material handling can be defined as science of conveying, elevating, transporting and storing of materials. Main material handling system in ginning is raw cotton feeding system. For raw cotton feeding, convectional cotton factories uses simple belt mechanism to carry raw cotton to the processing plants like an expeller. But in present cotton industries there are so many problems related to belt conveyor mechanism. For solving this difficulties improvement in this handling system is necessary.

We Offering High Quality Automatic Cotton Trolley System in Ginning Industries. This System is Manufacture by Our Companies Best Engineers. This System is using In Fully Automatic Cotton Ginning Units/Plants. All Big Indian Cotton ginnery is use this type automatic system. It is available in different specifications and can be customized as per the application requirements of the clients within the promised time frame. The entire range of Transfer Trolley System is known for smooth operation, robust construction, easy installation and longer service life.

This System is very useful for manual ginning units, because this is a best way for fast, easy, and continuous production. We operating throughout India and various other countries like Madagascar, Now We wish to supply this Automatic system in Other countries Like Bangladesh, Egypt, Indonesia, Kenya, Madagascar, Myanmar, Nepal, Nigeria, Peru, Shri Lanka, Tanzania, Uganda, Zambia, and Zimbabwe etc.

II. History

In India Until the 1990 s, most of the roller gins (single or double roller) in India were inefficient and costly. 70% of the ginning mills did not have any method of controlling moisture content of the cotton, and half

of the ginning mills did not have any pre-cleaning facilities. 85% of the cotton was manually carried from the storage point to the ginning mills. Many roller gin installations had no cleaners and were often fed manually. Lint was also often conveyed by hand to the press. As a result, Indian cotton had the reputation of being the most contaminated origin in the world. Tiny units producing trashy and contaminated cotton and units doing pressing and baling only were incompatible with a quality-driven market for textiles. In contrast, saw gins had auto-feeder mechanisms and Feeding, drying, pre-cleaning, ginning, lint-cleaning, and pressing and baling. Significantly, the largest cotton farm in the US (J.G. Boswell, Co.) discontinued the use Lummus SG and installed 3 plants equipped with 24 RG from Consolidated pre-cleaning equipment, which contributed to the reduction in contamination, by reducing human contact and handling.

In 2000, the Government of India launched a mission called 'Technology Mission on Cotton' (TMC) to modernize and upgrade 500 ginning and pressing (G&P) factories in eight years, out of the 4,000 units in the country, in order to increase their productivity and improve the quality of cotton. One of the main purpose of mode ruination/upgrade of ginneries was to produce cottons free of trash and contamination through the automatization of cotton feeding and handling to replace manual labour operations. Ginnerys were offered a subsidy of up to Rp 2.7 million (about \$60,000). Basically, the modernization consisted in integrating the double roller gin stands into a complete ginning system with auto feeder system, pneumatic conveyors for seed cotton and lint, seed cotton pre-cleaners and lint cleaners, humidifiers, and automatic hydraulic cotton baling press. Cleaner cotton also reduces maintenance requirements. Small units have a minimal processing capacity of 3-4 bales (170 kg) per hour with 12 standard double rollers. Large units have a minimal processing capacity of 6-8 bales (170 kg) per hour with 24 standard double rollers, 18 Jumbo double roller or three 90-saw gin stands.

2.1 MANUAL RAW COTTON DISTRIBUTION BEFORE AUTOMATION IN GINNING

Undoubtedly the first method of ginning cotton was with the human fingers, a method that continued in use throughout the centuries.



III. Working

"Automatic Raw Cotton Feeding System" Cotton Ginning Machinery. Product Description. Simple and maintenance free operation. Very low investment and low power consumption as compare to any other feeding system. 2 times Larger trolley size. Single trolley can uniformly feed 20 ginning machine. Specially designed trolley which can feed even higher moisture material uniformly. Rigid Trolley runway structure for zero vibration hence zero error in trolley PLC operation. Fully automatic PLC Panel along with touch screen HMI for process flow and fault finding. No sensors on Ginning machine hence less wiring and zero maintenance manufacture Industrial Trolley like Platform Trolley, Tray Trolley, Airport Trolley, Box Trolley, Cylinder Trolley, Drum Trolley, Luggage Trolley, Rack Trolley, Shelf Trolley, etc.

We are manufacturing as per customers requirement. These Trolleys can be customized as per our precious customer's specifications. Engaged in manufacturing, supplying and exporting a comprehensive range of Ginning Machine, Electric Panel Board, Super Cleaner, Trolley System, Pneumatic System & Air Separator, Belt Conveyor & Industrial Belt, Screw Conveyor & Elevator, Industrial Blower and Cotton Feeding Equipment. All our products are designed and developed in accordance with international quality norms & standards, using high-grade raw material and modern machinery that are obtained from the reliable vendors of

the market. Conform to international quality standards & norms, all our products are widely acclaimed by the customers for their longer service life, corrosion & abrasion resistance, sturdy construction and low maintenance. Apart from this, we have the capability to customize all the products as specifications laid down by the customers

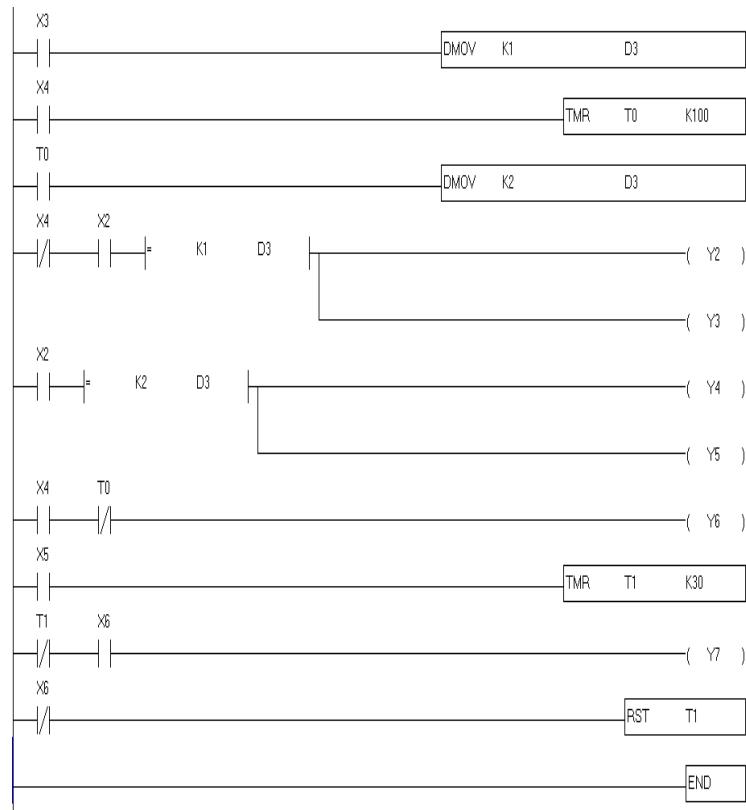
3.1 TROLLEY MECHANISM

Trolley works on structural base, made of I-section and T-section. Height of this structure is 1.5m to 2m from the ground level according to the application at the middle of all production plant. An elevating conveyor providing raw cotton to the trolley, when trolley fully load with material, it start moving on the base. Trolley divides material in to two parts of the system by dividing mechanism. From there, small conveyor takes the raw cotton up to the 'charkhas'. Metal plates are fitted on the edge of the base at where the charkhas are placed at that side. Third metal detector is fitted on the bottom side of the trolley and nearer to base. It detects the metal plates and giving the order to proxy sensor for the activation Proxy sensor is the main part of the model. Function of the sensor is to detect the cotton in charkhas, if there is already cotton in the charkha it sense and does not feed the raw cotton in it, if there is no cotton in the charkha it sense the requirement of raw cotton in each charkhas and feed material as per the requirement. This whole mechanism is operated by plc programming.

3.3 PROGRAMABLE LOGIC CONTROL

PLC is an industrial computer control system that continuously monitoring the state of input devices and makes decision based upon custom program to control state of output devices. Almost of all production line, machine function or process can be greatly enhanced used this type of control system. However biggest benefit of using PLC is ability to change and replicate the operation or process while collecting and communicating vital information. PLC is modular so advantage of PLC,to mix and match the type of input and output devices to best suit your application.

Ladder Diagram (LD) Type plc used for our project model



3.4 PROXIMITY SENSOR

Sensor proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact by using an electromagnetic radiation.

Proxy sensor is the main part of the model. Function of the sensor is to detect the cotton in charkhas, if there is already cotton in the charkha itsense and does not feed the raw cotton in it, if there is no cotton in the charkha it sense and feed required quantity of cotton.



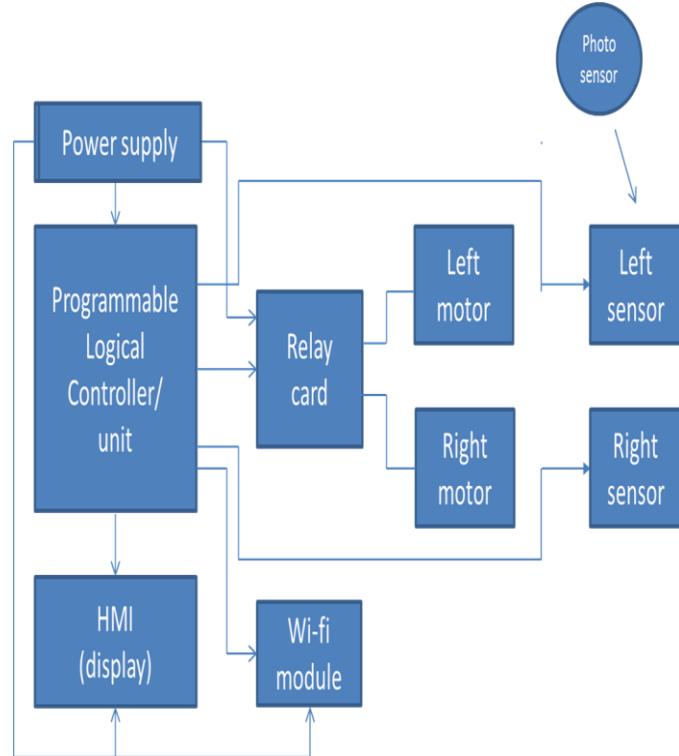
3.5 METAL DETECTOR

A metal detector is a portable electronic instrument which detects the presence of metal nearby. Three metal detectors are used in model. Tw metal detectors are fitted on both end of the base. They sense the trolley from both the end and giving the forward and backward movement to the trolley.



Metal plates are fitted on the edge of the base at where the charkhas are placed at that side. Third metal detector is fitted on the bottom side of the trolley and nearer to base. It detects the metal plates and giving the order to proxy sensor for the activatio

IV. Block Diagram



V. List Of Images

Trolley Photos:

1)





VI. Specifications

- 1) Simple and maintenance free operation. Very low investment and low power consumption as compare to any other feeding system.
- 2) 2 times Larger trolley size. Single trolley can uniformly feed 20 ginning machine.
Specially designed trolley which can feed even higher moisture material uniformly.
Rigid Trolley runway structure for zero vibration hence zero error in trolley PLC operation.
- 3) Fully automatic PLC Panel along with touch screen HMI for process flow and fault finding.
- 4) No sensors on Ginning machine hence less wiring and zero maintenance.
- 5) Lowest power consumption
- 6) Fully machined fly wheel / machine pulley
- 7) All rotating parts are precision machined using advanced manufacturing process on CNC machines providing best finish & tolerances to provide enhanced life of the machine & lowest down time.
- 8) Only one can manage this system by manual and automatic both system.
- 9) Available for (10, 12, 22, 32, 42, 52,...) more double roller ginning machine.
- 10) Engineering experiences and expertise combined to ensure lowest operational and maintenance cost.
- 11) Easy working, reduces cost and adds to profitability.
- 12) Equally Feeding raw material in Double Roll Gin Machine.

VII. Advantages Of Trolley System

1) TO REDUCE NOISE:

In case of long belts number of rollers and motors are used, it makes too much noise. This problem is solved in trolley because of less equipment are used.

2) TO REDUCE LABOUR, OPERATING AND INSPECTION COST :

Trolley is fully automatic system for material feeding so that labour and inspection cost is reduced. Less number of operators are needed so operating cost is also reduced.

3) TO INCREASE SPACE UTILISATION :

Due to less equipment's are used in trolley compare as belt mechanism.

4) TO REDUCE ELECTRICITY:

In belt mechanism compulsory all motors are working at a time where as in trolley at a time only one or two motors are in work.

5) TO INCREASE PRODUCTIVITY:

By the trolley system material is feeded as per the requirement manner so efficiently in less time.

VIII. Conclusion

Different seed cotton distribution systems in modern Indian gineries exhibited productivity loss from 2.7 to 9.6% due to unavailability of sufficient seed cotton for processing in gins. No loss of productivity was observed with trolley feeding single side because of sufficient seed cotton available for processing in each gin. Trolley system consumes less power than the other conventional system, feeding the material in a required manner, long belt slipping problem reduced, heat generation problem solved, productivity increases. Feeding timing of the cotton at the exact to the charkha is improving so that the wastage of seed cotton reduced. Feeding

rate of seed cotton increases. Power requirement gin for different kind of distribution systems varied from 52984kw. Trolley feeding system required minimum power 19267kw, from the cost analysis according to power consumption as compare to conveyor system trolley system saves RS. 265694.69 Per year.

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