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IN COLLABORATION WITH CONTINENTAL EAGLE CORPORATION SINCE 1832

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(ISO 9001: 2008 CERTIFIED COMPANY)

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TECHNOLOGICAL ADVANCES IN DOUBLE ROLLER GIN PLANT MACINERIES IN INDIA DURING 2010 -2016

By Dr. M. K. Sharma – Whole Time Director & CEO, Bajaj Steel Industries Ltd, Nagpur, India

At

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Introduction

1. India is the largest producer of cotton in the world.
2. Total Quantity of cotton produced in India is ginned on Double Roller (DR) Cotton Ginning Technology based plants.
3. After the modernization of Cotton Ginning Factories in India under Technological Up-gradation Fund (TUF) etc, started in the year 2000 and completed in the year 2010 , the prime concern of cotton ginners in India had been higher cost of electricity and higher manpower cost of Ginning Plants.
4. The size of new plants has been reduced to 5 bales to 10 bales per hour in place of earlier 15 to 20 bales per hour plant for majority of the plants, due to increase in the numbers of Cotton Ginning Factories.

Introduction

Various technological advances have taken place in the machineries for DR Ginning Plants in India during the year 2010 to 2016 to address the concerns, some of which are enlisted below :

(A) FOR ELECTRICAL POWER REDUCTION :

a) Seed Cotton Suction Systems to Seed Cotton Dispenser Systems.

b) Individual DR Gin Feeding Distribution Conveyor to Central Distribution Conveyor System.

c) Lint Suction System to Intermittent Lint Suction Systems.

d) Conveying of Seed Cotton and Lint by suction to Belt Conveyors etc.

Introduction

(B) FOR MANPOWER REDUCTION :

a) Raw Cotton Suction Feeding to Tractor mounted buckets.

b) Online bagging and weighing of Cotton Bales.

c) Online bagging and weighing of cotton seed.

d) Automatic Roll Grooving Machine.

e) Atomization of various other handling processes etc.

f) Seed Cotton High Speed Trolley System to feed each Gin.

g) Fire Detection & Diversion System.

These technological advances have significantly saved the Electrical and Manpower costs while providing solution to small capacity ginning plants requirement.

ELECTRICAL POWER REDUCTION

(a) <u>Seed Cotton Suction Systems to Seed Cotton Dispenser Systems</u> :

- The seed cotton suction systems designed under TMC norms in the period 2000 to 2010 were fed manually at different suction points near the cotton heaps, where the ducting points were designed to feed the seed cotton. Higher Electrical power and huge manpower was also required to feed the seed cotton to ducting of suction system.

Manual Feed of Seed Cotton

ELECTRICAL POWER REDUCTION

- In the period 2010 onwards a new arrangement was introduced on the form of dispenser followed by stone remover wherein the manpower requirement was reduced to 1 person from almost 10 person by adopting a tractor with attachments which feeds the seed cotton in dispenser & from thee controlled feeding is done to gin machine feeding system either by single stage suction or rubber belts.

Seed Cotton Dispensing System

ELECTRICAL POWER REDUCTION

(b) <u>Individual DR Gin Feeding Distribution Conveyor to Central Distribution Conveyor System :</u>

- Earlier an Individual Distribution Conveyor was in use for feeding each Double Roller Gin which was requiring higher capital costs and higher electrical power.
- After 2010, New Central Distribution Conveyor has been designed by Bajaj Steel Industries Limited, Nagpur (MH), by which only Overhead Distribution Screw Conveyor is required to be installed with twin feeding feed regulators and sloppers to feed Double Roller Gin on each side.
- It saves the capital cost and electrical power.

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Individual Double Roller Gin Distribution Screw Conveyor with Single Feed Regulator

Central Distribution Screw Conveyor with Twin Feed Regulator

ELECTRICAL POWER REDUCTION

(c) <u>Each Gin Lint Suction System to Intermittent Lint Suction Systems:</u>

- Earlier the lint was getting sucked from each gin machine simultaneously due to which the volume of air was much more, hence the power consumption for the lint suction was much on the higher side.
- After 2010, Intermittent Lint Suction System has been developed where the lint is sucked from a set of gins at one go and in cyclic manner.
- Less Electrical Power consumption as in place of 30 HP (approx) Electrical Power only 10 HP .Electrical Power required in Intermittent Lint Suction Systems.

ELECTRICAL POWER REDUCTION

Intermediate Ducting arrangement for lint suction from Individual Double Roller Gin Machine

Intermittent Lint Suction System from Individual Double Roller Gin Machine

ELECTRICAL POWER REDUCTION

(d) <u>Conveying of Seed Cotton & Lint by Suction to Belt Conveyors etc:</u>

- Earlier the seed cotton & lint was being conveyed by Pneumatic lint conveying system consisting of suction fan, air separator & a cyclone connected with a ducting pipeline in case of seed cotton from storage place to discharge point in the individual distribution conveyor, which was requiring very high electrical power.
- Now, the inclined rubber belts have been designed to carry the seed cotton from storage area to discharge point for seed cotton to feed individual gin.
- Similarly, the lint was conveyed from each gin to line cleaner & baling press by suction systems has now been replaced by rubber belt conveyors & resulted in electrical power savings.

ELECTRICAL POWER REDUCTION

Manual Feeding of Seed Cotton

Seed Cotton Conveying by Belt Conveyor

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Lint Conveying by suction from each gin

Lint conveying by Belt from each gin

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Lint Conveying by suction to Press

Lint Conveying by Belt to Press

MANPOWER REDUCTION

(a) <u>Seed Cotton Suction Feeding to Tractor Mounted Buckets</u> :

- Earlier the seed cotton was being fed to several individual ducting points manually requiring huge manpower.
- During 2010 to 2016 , seed cotton feeding systems has been changed to tractor feeding systems in which the tractors are fitted with tractor attachments & only one operator can do this job successfully.
- Irregular feeding was being observed in the manual feeding due to manpower fatigue which results uneven gaps of feeding.
- In Tractor Feeding System a minimum quantity of seed cotton always remains in the dispensing system therefore a regular controlled flow of cotton to the feeding systems of individual gins, which results in higher productivity.

MANPOWER REDUCTION

(a) <u>Seed Cotton Suction Feeding to Tractor Mounted Buckets</u> :

- Now a days majority of ginning factories in India used Seed Cotton Dispensing System i.e. Seed cotton feeding from single point, which eliminates improper feeding & also can be controlled using PLC Panels.
- Similarly, the unloading of seed cotton was being done manually earlier, now tractor based unloading system has been introduced for Seed Cotton from Vehicles and further for heap making and feeding to other mechanical conveying systems.
- The Cotton bales, which were earlier loaded on trucks manually now Tractor mounted attachments have been adopted to do the loading operation of lint bales on the truck.

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Seed Cotton Feeding by Tractor Attachment

Cotton Bale Loading by Tractor Attachment

MANPOWER REDUCTION

(b) <u>Introduction of 5 BPH Cotton Baling Press :</u>

- Earlier it was difficult to get small capacity automatic baling presses.
- The small ginners were compelled to buy higher capacity presses at higher cost for their small ginning factories.
- Five (5) BPH Automatic Cotton Baling Press has been developed and now being used by various Ginning Factories as per their requirement.
- Bagging & Weighing arrangements have also been introduced in smaller capacity presses apart from higher capacity presses.

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Single Box 5 BPH Down Packing Press

MANPOWER REDUCTION

(c) <u>Online Bagging & Weighing of Cotton Seed :</u>

- Till now Cotton Seed is being filled into bags manually from the heaps and the weighing also is done manually which results variation in the weight.
- Adjustments of weight is being done manually be taking out the seed or putting in some extra seeds, as it required a lot of manpower.
- After introduction of Online Bagging Scale 50 kgs or other capacity bags can be filled automatically & the weight of each bag is within a very close range i.e. 20 gms per 50 kgs.
- The process of seed bagging has become simpler and manpower requirement has been reduced.

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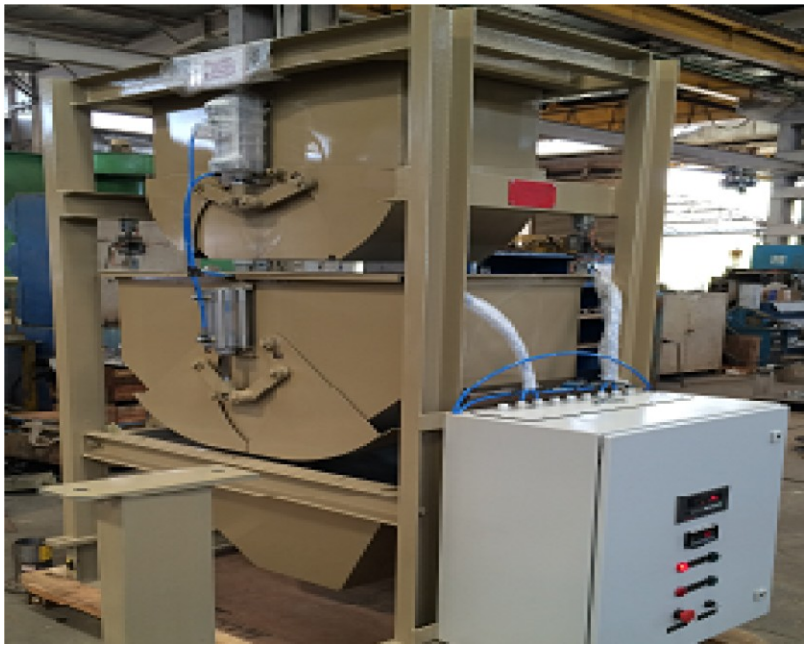

Online Bagging & Weighing of Cotton Seed

MANPOWER REDUCTION

(d) Automatic Roll Grooving Machine :

- Till now the Gin leather roll groove has to be cut by hand saw or grinding cutter after every 60 hours.
- One person holds the leather roller with spherical groove and other person grooves the roll & the depth obtained is about 2 mm only & time taken to groove one roll is over 30 minutes & the grooves are not uniform.
- Introduction of newly developed Roll Grooving Machine by Bajaj Steel Industries Ltd, Nagpur (MH), India by which one leather roll can be grooved only in 4 minutes automatically.
- Depth of the groove can be obtained up to 10 mm which will give much longer life to the roll instead of 60 hours.

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Leather Roll Groove marking by Hand

Leather Roll Groove cut by hand saw

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Automatic Leather Roll Grooving Machine

MANPOWER REDUCTION

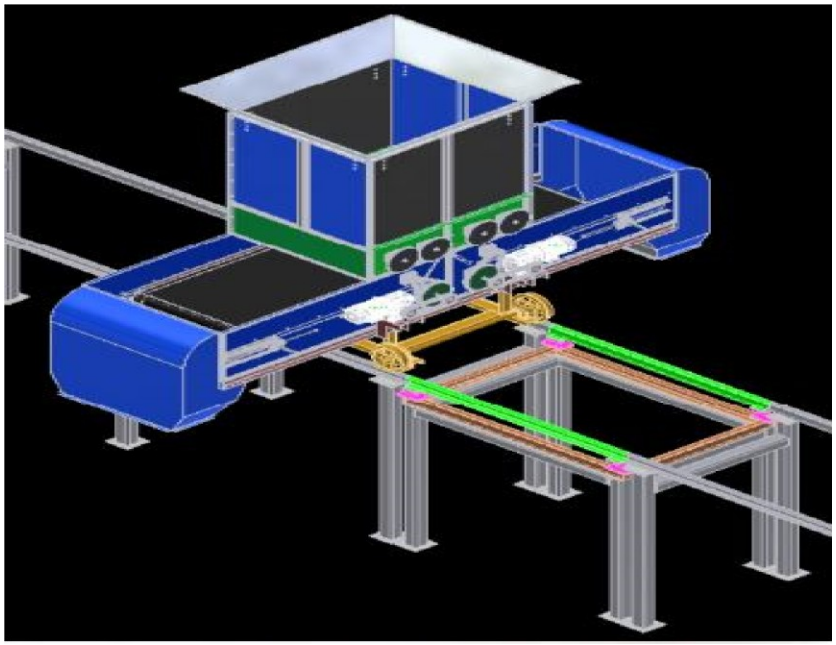
(e) <u>Atomization of various other handling processes etc. :</u>

- Several other cotton and cotton bale handling processes have been atomized such as use of ERP systems for Gin Management keep records of bales, seeds & seed cotton accurately. Online moisture measurement Automatic sampling of each bale etc. have been introduced in many modernized ginneries.

(f) Seed Cotton High Speed Trolley System to Feed Gin :

- Up till now the trolleys, which were used to feed the each gin were having slow movement
- Introduction of newly designed trolley by Bajaj Steel Industries Ltd, Nagpur (MH) India with automated panel & weighing systems having features of HMI & Wireless system are more efficient with all types of setting are possible now.

MANPOWER REDUCTION



Schematic of Trolley Feeding System

Seed Cotton Trolley Feeding System in Gin Hall

MANPOWER REDUCTION

(g) Fire Detection & Diversion System :

- Catching Fire in the lint coming from ginning machines & going to cotton bales was a trouble issue for ginning factories prior 2010.
- A Fire Detection System using German sensors & Fire Diversion Systems using a diverter finally landing in a water tank was designed & now extensively used in Cotton Ginning Factories in India.
- It has eliminated requirement of manpower which was required to douse the fire and do the cleaning to restart the working apart from losses.

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Fire Detection Sensor

Fire Diverter

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Fire Detection & Diversion System View

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Thanks !

Call us for More Details:

Dr. M.K.Sharma
Mobile : **+91 9325132305**
Email : **mks@bajajngp.com**
Web : **www.bajajngp.com**