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CHANGES IN COTTON GINNING AND PRESSING SCENARIO IN INDIA DURING 1998-2008

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(1) Preface

"Ginning, in its strictest sense, refers to the process of separating cotton fibres from the seeds. The cotton gin has as its principal function the conversion of a field crop into a salable commodity. Thus, it is the bridge between cotton production and cotton manufacturing. At one time the sole purpose of cotton gin was to separate fibres from seed. But today's modern cotton gin is required to do much more. To convert mechanically harvested cotton in to a salable product, Gins of today have to dry and clean the seed cotton, separate the fiber from the seed, further clean the fibres and place the fibres in to an acceptable package for commerce. The Cotton Gin actually produces two products with cash value i.e. the fibre and the cotton seed. Cotton seeds are usually sold to cotton oil mills for conversion into a number of important and valuable products, but in some cases they may be saved for planting purpose. The fibres are the more valuable products, and the design and operation of cotton gins are usually oriented towards fibre production. In essence, the modern cotton gin enhances the value of the cotton by separating the fibre from seed and by removing objectionable foreign matter, while preserving as nearly as possible the inherent qualities of the fibre." - (*Mr.Roy V. Baker (ARS-USDA Lubbock Texas) and Mr. A. Clyde Griffin Jr. (ARS-USDA Stoneville, Mississippi))*

"The ideal Ginning & Pressing Factory should mainly consist of following;

1. Proper Weighing facilities on arrival of seed cotton and on removal of ginned cotton/bales or seed.
2. Proper Seed Cotton Storage arrangements for moisture controlled contamination free storage and neat & clean surroundings.
3. Proper & well maintained Ginning Machines & conveying systems at all stages to get best out-turn & contamination free cotton.
4. Proper handling arrangements for seed cotton from storage to gin machine and for lint from gin machine to baling press to avoid contamination / deterioration.
5. Properly maintained Baling Press & desired Packing Materials for cotton bale making for contamination free suitable bale.
6. Proper testing equipments and moisture control arrangements as required during ginning and baling."

(*Mr. Rohit Bajaj & Mr. M.K. Sharma (Bajaj Steel Industries Ltd., Nagpur) Page 162, Book of papers, International Seminar on Cotton and its Utilisation in the 21st Century. Dec 10-12, 1999, CIRCOT Mumbai)*

With the globalisation and opening up of the market it has become necessary to produce best quality cotton fibre at most competitive cost to retain the advantages of Indian cotton and to achieve growth. This has necessitated the changes in the cotton ginning & pressing scenario in India

(2) Historical Background

Prior to 1998, majority of Ginning Factories in India were highly labour intensive and cotton cleaning & automatic conveying machinery were not used by them, which has put the Indian cotton at disadvantage vs. cotton from developed countries. The Indian cotton during this period was termed as most contaminated despite being hand picked. The International Textile's Manufacturers' Federation, Zurich listed Indian cotton as most contaminated in the world. The cotton fraternity and Govt. of India were in the process of evolving various schemes and methods to overcome contamination and trash problem in Indian cotton. The other challenges faced by the ginning & pressing industry were to increase productivity, minimize energy consumption, reduce cost per unit and standardized the machinery, as most of the Indian Ginning Factories were having low capacity ginning machines in manual handling setup which used to add contamination to cotton. Even though Cotton Ginning & Pressing Industry though having progressive thinking but many socio-economic and technical constraints prevailed in the country were hindering the adoption of modern technologies. High initial investments on machinery and infrastructure, small size of ginneries, low purchasing ability and higher interest rates were observed to be the socio-economic constraints. The technical constraints felt were the lack of awareness, training, higher power requirement, non-availability of standard machinery. The technological development in the Ginning & Pressing Machinery has become a necessity for competitiveness and acceptance of Indian cotton. The Govt. of India, Cotton Ginning & Pressing Machinery Manufacturers and Research Institutes started putting up serious efforts to upgrade the Ginning & Pressing Factories which has resulted in significant changes in Indian cotton ginning & pressing scenario during next decade.

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(3) Focus of New Development in Ginning & Pressing Technology during 1998-2008 in India.

The focus of the Government was to encourage the upgradation of Ginning & Pressing Factories to optimize the cotton parameters while the research institutes focused on development suitable machinery. The Ginning & Pressing Machinery Manufacturer focused on acquiring new models of various machinery and also made their own research and development to produce higher capacity equipments for various applications, as per requirement of the industry.

The Govt. of India realized that it is essential to give some incentive to modernize the Cotton Ginning & Pressing Factories in India to overcome the problems faced by Indian cotton and promote only composite Cotton Ginning & Pressing Factories with modern mechanical / pneumatic cotton handling systems and having proper storage arrangements for seed cotton, lint and cotton seed.

The Cotton Ginning & Pressing Machinery Manufacturers' focused to achieve the various objectives on development in Cotton Ginning Technologies:

i. To reduce manpower requirement at each stage in Ginning & Pressing Factories.
ii. To obtain maximum length of fibre without seed breakage.
iii. To preserve inherent qualities of cotton fibre.
iv. To obtain undamaged clean seed.
v. To obtain lint free of trash & contaminants
vi. Lowest cost per unit of Ginning.
vii. To obtain higher production of cotton fibre per machine.
viii. To develop energy efficient machines
ix. To bring down the noise level, vibration and dust level in ginneries.

The research institutes tried to provide different options to improve the efficiency of operations and quality of cotton fibre obtained after ginning.

(4) Changes in Cotton Ginning & Pressing Scenario during 1998-2008

a. Government of India Initiatives:

i) *Technology Upgradation Fund (TUF):*
The Govt. of India announced a scheme called Technology Upgradation Fund w.e.f. 01.04.1999 under which all the Ginning & Pressing Factories can obtain a 5% interest subsidy to reduce the interest burden on the loans taken by Cotton Ginning Factories for modernization Ginning & Pressing Factories. This scheme is still operative and throughout the decade many Ginning & Pressing Factories have taken advantage of this scheme to upgrade their factories.

ii) *Technology Mission on Cotton (TMC):*
As an alternate scheme more focus on Cotton itself, Govt. of India introduced a Mission on Cotton called 'Technology Mission on Cotton" by the hands of then Prime Minister of India on February 21, 2000 wherein Mini Mission III & IV seeks to improve the infrastructure at the market yards and modernize Ginning Factories whereby contamination in the cotton could be almost eliminated and trash in pressed bales is minimized to the best extent. This mission is still operative and throughout the decade over 1000 cotton ginning & pressing factories have taken up modernization for which 25% cash subsidy with upper ceilings have been available from Govt. of India.

These initiatives by the Government of India have gone a long way in improving the conditions of ginning & pressing factories in India thereby reducing contamination and trash in cotton produced by these modernized ginning & pressing factories.

b. Institute Initiatives:

The leading cotton technology related institutes such as CIRCOT & ATIRA have taken up great efforts by organizing repeated awareness programs for ginners, operators, graders and new entrepreneurs, providing consultancy for proper layouts, training to machine operators, inspection services in respect of TUF & TMC by which the minimum and ideal standards of modernization of cotton ginning & pressing factories could be properly understood by concerned parties which has greatly accelerated the pace of modernization in the sector.

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c. Initiatives by Ginners and Change of their mindset:

Due to the continuous awareness programmes by institutes, initiatives and policies of the Government of India and demand of contamination free cotton by textile industry the mindset of the ginners changed and they realized the necessity of using the cotton cleaning equipments and modernization of Ginning & Pressing Machinery to achieve the quality of cotton demanded by textile industry. This resulted in quick adoption of modern equipments in ginneries and resultant demand of such machinery.

d. Initiatives by Cotton Ginning & Pressing Machinery Manufacturers:

Although the ginning is most important mechanical treatment to maintain the quality of cotton, the history of ginning in India up to 1998 reveals that it was probably considered as one of the least important and neglected aspect. By the time the cotton enters the gin its quality in terms of fibre properties, such as length, strength, maturity and fineness has already been decided. It is only the ginning practices and conditions at the ginning factories which can maintain the quality of the cotton fibre and the cotton seed.

Up to 1998 the majority of the ginning factories were conventional with low productivity gins and entire material handling operations were carried out manually. The poor infrastructure and complete reliance on human labour was producing inferior quality cotton bales due to which the textile industry faced an inevitable challenge of lack of quality consciousness of the market and exposure to onslaught of foreign competition and were forced to import cotton bales sometime from outside. This poorly processed cotton had no export market.

Thus, after the initiatives of Govt. of India and various institutes it was a challenge before Indian cotton ginning & pressing machinery manufacturers to provide suitable world-class machinery required by the ginning & pressing sector in India to upgrade themselves. The Indian Cotton Ginning & Pressing Machinery Manufacturers have done a remarkable work in this direction and provided best of the machinery within India to meet the requirement of modernization as well as expansion in view of increase in production of Indian cotton. The larger ginning groups like MEP (capacity: 2000 Bales a day) and Amit compared the advantages of cotton ginning machinery available in India from M/s. Bajaj Steel Industries Ltd. Nagpur with the American and Chinese Machineries and finally decided in favour of M/s. Bajaj Steel Industries Ltd. to buy the machinery for their Ginning & Pressing projects which may be termed as largest ginning & pressing projects in the world. This way the Indian Cotton Ginning & Pressing Machinery Manufacturers saved significant amount of foreign exchange by not allowing any scope for import of cotton ginning & pressing machineries for modernization and provided localized best solutions. The significant changes made by Indian Machinery Manufacturers particularly M/s. Bajaj Steel Industries Ltd., Nagpur who have also been awarded as “Largest and Modern Cotton Ginning & Pressing Machinery Manufacturer in India” by The Textile Association (India), Ahmedabad Unit and others, are listed below.

i) High efficiency Double Roller Ginning Machine:

Uptill 1998, Double Roller Gins were of lower capacity i.e. about 50-60 Kgs. Lint/Hr. thereby operating cost was higher and the ginning was uneconomical. After year 1998, high capacity, Jumbo Model of Double Roller Gins is having a capacity of about 90 Kgs. Lint/hr. The modifications have improved the working of ginning factories significantly.

ii) High efficiency Pre -cleaners:

Absence of proper pre-cleaning machines were an impediment in obtaining cotton with lower trash and contamination. These equipments were designed to suit the Indian cotton in different sizes and capacities which are used now by the cotton ginning & pressing industry to obtain clean cotton.

iii) Pneumatic / Mechanical Cotton Conveying Systems:

The manual conveying of seed cotton into the ginning hall was replaced by well designed, suitable capacity, electrical power efficient, pneumatic suction system.to pull the cotton from length up to 750 feet with multiple points. This has resulted in reduction of substantial number of manpower and dependent inefficiencies due to erratic working / non-availability of manpower. Moreover, regular supply of seed cotton has resulted in uniform and sufficient feeding to Double Roller Gins thereby increasing productivity. This has also helped in reducing the contamination and trash.

iv) Automatic Individual Gin Feeding System:

Sensor based individual Gin feeding auto regulators and Overhead Distribution Conveyors over a series of Double Roller Gins in one row and parallel rows has eliminated complete requirement of manpower for feeding each gin and ensured continuous and controlled feeding as per requirement of gin which has helped higher production and reduction of manpower requirement greatly.

v) ***Improved Auto Feeder / Lattice Feeder on Double Roller Gin:***

Earlier each gin was required to be continuously fed and cotton was to be stirred to avoid chocking of beater area. Now improved Auto Feeder / Lattice Feeder provides a reservoir for about 10 minutes feeding to each gin and level sensors signals re-feeding as soon as cotton level in the feeder goes below minimum level hence continuous feeding of cotton is ensured while the rotating lattice spikes removes excess material as well as stirs the cotton in the beater area, thus manual involvement is fully eliminated. As per paper “Performance evaluation of Lattice Feeder for Double Roller Gin” published in journal of The Indian Society for Cotton Improvement – Volume 28, December 2003 (03) “The Lattice Feeder assists in continuous feeding and even distribution of seed cotton to Gin” “Use of Lattice Feeder led to an average increase in Ginning output of 7%”.

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vi) ***Automatic Lint Suction System from each DR Gin****:* A well designed Lint collection chutes, Lint Collection Boxes and incremental lint suction ducting has automized lint collection up to lint cleaner. This has eliminated total requirement of manpower for lint collection from each Gin and its carrying up to Lint Cleaner.

vii) ***Fibre Friendly Lint Cleaners****:* Use of fibre friendly Lint Cleaner with improved Grid and Spike systems has helped to remove trash from lint without damaging the fibre.

viii) **Use of Scanners for Contamination Removal**: Camera and sensor based contamination removal systems have been introduced after the lint cleaner to remove the colour contaminants, which take out all coloured contaminants thereby providing the contamination free cotton to spinning industry.

ix) **Multipoint Suction System to connect to the Bale Press**: Multipoint suction systems or single point suction system from the end of lint collection conveyors fitted below series of lint cleaners for each module of ginning machines, has facilitated the high volume single ginning factories based on double roller ginning technology and plants upto a capacity of 2700 bales per day using multiple bale presses of 35 BPH each, on three shifts basis being setup in India making them world's highest capacity ginning & pressing factories.

x) **Use of Humidification Systems** : Modified Humidification systems to suit Double Roller Ginned lint coming out in blanket form have been incorporated in the lint feeding slide or lint feeding belts which can add moisture in controlled manner thereby providing all the benefits of humidification before baling. This has been well accepted by the ginning factories based on Double Roller Ginning Technology. M/s. Bajaj Steel Industries Ltd., Nagpur have provided world-class online Humidification System in collaboration with M/s. Samuel Jackson USA.

xi) **Use of Down Packing Automatic Baling Presses with online Bagging Arrangements**: Earlier Double Roller based ginning & pressing factories used to have up packing old fashioned manual cotton baling presses requiring a pit of about 40' below the ground level and using large number of manpower being double stage. Now fully automatic, down packing baling presses with online bagging arrangements are being installed in most of the new factories after year 2001. This has resulted in full covering of the bales which finally saves it from contaminants and manpower requirement has come down to 4 persons only.

xii) **Growth of Manufacturing Industry:** The standard machinery suppliers registered manifold growth in their turnover while a number of small scale sub-standard machinery suppliers also came into existence, however with the standardization of machinery being achieved these sub-standard suppliers are fast disappearing as the ginners are moving towards standardized machinery from reputated standard suppliers.

A photograph of down packing most modern cotton baling press manufactured by M/s. Bajaj Steel Industries Ltd., Nagpur is shown below:

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The developments discussed above are in brief only. Many other developments have not been touched upon in a view to submit only brief details based on which an idea can be drawn as the subject is very wide hence it may not be appropriate to describe each and every detail, when a brief presentation is only desired.

The challenges ahead are to find out ways and means to reduce the energy consumption of per kg. lint produced, to bring down the processing costs, to further improve fibre quality, to further increase productivity and efficiency of machines and to standardize the machinery used for each level of operation in the Ginning & Pressing Factories.

To illustrate an inside view of modern ginnery is give below:

(5) Conclusions:

In India, technological developments in Ginning & Pressing Machinery has acted as an driving force in structural shift from old outdated to more productive advanced machinery. By and large the good pace of technology development and dissemination has been witnessed in last 10 years. This has helped to produce good quality cotton and also met the need to gin and press additional quantities of cotton produced by the country in a better way. This has also helped the acceptance of Indian Cotton in the world market and about one million bales of cotton were exported in the year 2007-2008 from India. The Indian Textile Industry is now getting better cotton, thus can produce world-class fabrics and resultant benefits are accruing. It will strengthen further and in all probable the ginning industry would emerge out of its inglorious past and march ahead with pride, by providing world standard cotton lint. This is now visible in near future through the joint efforts of Indian Government, Research Institutes and Cotton Ginning & Pressing Machinery Manufacturers in India.

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