BAJAJ STEEL INDUSTRIES LIMITED
IMAMBADA ROAD, NAGPUR- 440 018. INDIA
Tel: +91-712-272 0071 ~ 80 Fax: +91-712-272 8050 / 272 3068
email : bsi@bajajngp.com website : www.bajajngp.com
SINCE 1961

NEW DEVELOPMENTS IN COTTON GINNING

(A Paper presented at the Fourth Breakout Session on Thursday, November 20, 2008 during 67th Plenary Meeting of the ICAC in Ouagadougou, Burkina Faso by Mr. M.K. Sharma, President, – Bajaj Steel Industries Limited, Nagpur-440 018 India.)

(1) Preface

The theme of 67th International Advisory Committee (ICAC) Plenary Meeting being held at Ouagadougou, Burkina Faso from November 17-21, 2008 is "Technologies for Cotton Development in order to showcase the roll of Technologies in rising yields, reducing costs and improving the competitiveness of the Cotton Industry." The purpose of the theme shall best be fulfilled when all aspects of technologies in respect of cotton from growing into the field to its final use are addressed and benefits of the same reaches to all concern. The title of this paper "New Developments in Cotton Ginning", is touching upon one of the most important aspect of cotton processing technology i.e. Ginning.

As per Mr.Roy V. Baker (ARS-USDA Lubbock Texas) and Mr. A. Clyde Griffin Jr. (ARS-USDA Stoneville, Mississippi)
"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."

When we examine cotton in its matured boll in the field, we find beautiful silky fibres free of neps, trash and other defects. By hand ginning we can get its maximum length which is ultimately desired and can be used to produce optimized yarn to make fabrics or other products. However, when we mechanically process the same in a Ginning Factory in bulk quantities after high volume harvesting, we get lower fibre length with high trash and varied moisture parameters, which ultimately produce low value final products. We all know that good fabric can be made from high quality yarn, which inturn demands excellent fibre as raw material. Further, the cost of processing of cotton plays a vital role in making it competitive and acceptable, thus every effort should be made to achieve the target of preserving inherent qualities of fibre at lowest cost in the Ginning.

Contd. .....2.

BAJAJ STEEL INDUSTRIES LIMITED
IMAMBADA ROAD, NAGPUR- 440 018. INDIA
Tel: +91-712-272 0071 ~ 80 Fax: +91-712-272 8050 / 272 3068
email : bsi@bajajngp.com website : www.bajajngp.com
SINCE 1961

(2) Historical Background

Before we go into the details of New Developments in Cotton Ginning, it would be appropriate to have a look on past developments in ginning technology, in this respect, Charles A. Bennett, former Principal Agricultural Engineer, Cotton Ginning Section, (A.E.R.D.) U.S.D.A. stated that;
"Neither history nor archeology have established when mankind first began to use cotton fibers, but fabrics of cotton are quite definitely known to have been in use as far back as 4000 years B.C. In India and probably served people long before then." he further stated that;

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

Prior to 1600 primitive methods of Ginning i.e. "Pinch Ginning", "Foot Roller Gin" and "Wooden Roller" were used. The Churkha method of ginning, a true roller gin with small diameter pinching rollers that took the fiber from the seed without crushing, has been thought to have been named from Sanskrit whence came the term "Jerky" (which has long been spelled churka). The Churkha Gin, which was used for centuries in India, employed a pair of small counter-rotating wood or steel rollers to pinch and pull fibers from the seeds.

As per details published by Mr. Charles A. Bennett, in his book 'Roller Cotton Ginning Developments'

In 1742 – In this year it was reported that M. Dubreill, a French planter in Louisiana, had invented an improved roller gin that had greater length of rollers and more capacity than other gins then in use.

In 1772 – In the Mississippi-Gulf areas, considerable publicity accrued to a Mr. Krebs of Pascagoula who invented a roller cotton gin having a daily outturn of some 70 pounds of ginned lint, while competing units could only deliver approximately 30 pounds. In a history of Florida, Captain Roman of the British Army was quoted as saying that the Kerbs roller gin had foot treadles and two well polished, grooved iron spindles set into a frame approximately four feet high.

In 1777 – At this time Kinsey Burden of Burden's Island, South Carolina, constructed a roller gin that was made from old round gun barrels. These rollers were fastened at the ends on suitable trunnions, and the unit claimed a daily capacity of 20 pounds. This unit was currently dubbed the "barrel gin," and was said to have been quite popular in the Carolinas, Georgia, and Florida.

In 1793 – The northern-born, Yale-educated Eli Whitney invented the cotton gin with wire teeth that pulled the fiber from the seeds while visiting a Georgia Plantation, Gin makers and planters eventually substituted fine-toothed circular saws for Whitney's wire teeth later on. Saw Gin became dominant after Southern manufacturers developed more incremental improvements.

In 1840 – A roller gin patent was issued to Fones McCarthy, Demopolis, Marengo County, Alabama, This new type of roller gin which his invention provided became as popular in most countries as the Whitney saw gin was in USA. The Birtish refer to the gin as the McCarthy gin. The McCarthy ginning roller was much grater in diameter than churkha type roller and hence had greater capacity from the start. The first McCarthy Gins used rollers that were of 4" in diameter and 3 Feet in length. By 1850, however, the roller increased in size to almost 7" diameter and their lengths shortly thereafter became standardized into 40 inches. Single Roller McCarthy Gins stayed at 40 inches in length almost universally until the 1940 Era of New Roller Ginning Practices.

Contd. .....3.

BAJAJ STEEL INDUSTRIES LIMITED
IMAMBADA ROAD, NAGPUR- 440 018. INDIA
Tel: +91-712-272 0071 ~ 80 Fax: +91-712-272 8050 / 272 3068
email : bsi@bajajngp.com website : www.bajajngp.com
SINCE 1961

Between 1840 and 1900 a surprising number of patents were granted on improvements suggested for one or more of major elements in McCarthy roller gin. These inventions endeavored to overcome some of the roller ginning troubles such as the destructive vibration of unbalanced moving knives, difficulties in adjusting and maintaining overlap and clearance settings, ginning roller bending or lack of stiffness, short life of roller covering, and seed crushing or chipping.

In 1889 – D.S. Chapin, Milford, Massachusetts brought out a roller gin designed that place the fixed knife horizontally above the Ginning Roller i.e. 90 Degrees change from standard McCarthy practice.

In 1890 – F.H. Chase, Haver hill, Massachusetts invented two significant roller gin improvement. First, he emphasized the construction of ginning roller by assembling leather or fiber disc with square holes clamped upon a shaft of rectangular cross section and Second, he made up a 4 blade stripping roller or doffer to operate adjacent to the ginning roller.

In 1894 – D.F. Goodwin, Valdosta, Georgia made a design of Double Roller Gin in which one roller was placed above the other, but employing the standard McCarthy reciprocating knife and other conventional features.

In 1895 – S. L. Johnston, Boston, Massachusetts, designed a roller gin that was up side down to the McCarthy conventional design. He reversed the position of the fixed and moving knives and added a sort of comb at right angles to the moving knife blade on the cotton feeding side so that it would stir up the seed cotton better.

During 1895 and 1922 various improvements in single roller gins and double roller gins were taken up. Double Roller Gins, other than the American Foss, have usually employed somewhat different methods of rocking their central assemblies of combined knives and grids so that both rollers are in constant operation. However, British made Mddleton gins, Platt Brothers Company Gins were widely accepted .

In 1927 - Patent No.GB276879 of Volkart improved upon Double Roller Gin made by Monforts M. Gladbach (Germany). This Volkart type Double Roller Gin has further been improved upon greatly in India by Bajaj Steel Industries Ltd., during 1963 to 2008.

In 1960 - The Rotary Knife Gin Stand (Rotobar) which operated at a capacity at 4-7 times that of the McCarthy Gin (Leonard 1970) was introduced. The Rotary Knife Gin Stand uses a large diameter roller and stationary knife to exert a pulling action on the fibres in a manner very similar to that of the McCarthy Gin. However, rather than having a reciprocating knife this roller gin stand utilizes a small diameter flighted roller to provide the necessary seed pushing action at the point of ginning.

In 2000 – Mr. Keith Thompson of Templeton Process Developments Limited, Lincoln shire U.K. tested a gin named “Templeton Rotary Gin” however due to feeding problems this gin could not be commercialized.

As a matter of fact after the civil war, the technology evolution in respect of ginning factories proceeded forward with the focus no longer being on basic ginning mechanism but on combining gin with auxiliary functions, a folding of systems in the super-system into a single integrated device. Combination feeder, gin stand and condensers with dyers became common. Elaborate lint handling systems using belts and air driven flues appeared by the end of the nineteenth century.

Above historical developments are some relevant part of the various developments taken place which will help us to know evolution of ginning technologies.

Contd. .....4.

BAJAJ STEEL INDUSTRIES LIMITED
IMAMBADA ROAD, NAGPUR- 440 018. INDIA
Tel: +91-712-272 0071 ~ 80 Fax: +91-712-272 8050 / 272 3068
email : bsi@bajajngp.com website : www.bajajngp.com
SINCE 1961

(3) Present Scenario:

At present following Ginning Technologies are being used in the world:

(a) Saw Ginning: Saw Gin stands typically have 30.5 to 45.7 cm (12 to 18 in.) diameter saws spaced from 0.5 to 1 in. apart with as many as 198 saws stacked on a single mandrel. Each of these saws project through ginning ribs, grasp the fiber and pull the fiber from the seed as they are too large to pass through the opening in the ginning ribs. The diameter of seed generally follows a normal bell shaped distribution, and occasionally a small seed escapes the gin stand and is removed by the moting sections of the gin stand or by a subsequent lint cleaner. The capacity of a single gin stand has increased from less than one bale per hour to more than 15.In the United States, gin plants typically have three or four gin stands per plant and process rates range from a few to over 100 bales per hour. (Anthony). Further, Saw Gin is used in China, Australia, Greece, Pakistan, Uzbekistan, Brazil and West Africa etc.

The major disadvantage of Saw Gin is the lower length of fibre and requirement of compulsory delinting of seeds, left out fiber contents being higher on seed.

(b) Rotobar or Rotary Knife Roller Gin : A roller cotton gin including a ginning roller and a stationary knife to which seed cotton is conveyed by the friction surface of the ginning roller for separating lint fibers from the cotton seed, and a rotary stripping blade divide adjacent the stationary knife having blades forming channel-like pockets there between for receiving the seed cotton deposited on the surface of the ginning roller and advanced to the zone of the stationary knife. The blades of the stripping blade device extend radially from a center shaft to span the width of the gin and are arranged in a one turn spiral path about the center shaft, and the stripping blade device has a diameter which is a small fraction of the ginning roller diameter and rotates at a speed causing the surface speed of the blade edges to be approximately the same as the surface speed of the ginning roller such as to restrain seeds in the channel-like pockets while the seeds are advanced over the edge of the stationary knife from the “pinch point” to a “release point” while the ginning roller strips lint from the restrained seeds and then releasing the seeds from blade restraint at the release point before they are pushed beyond the length of the fibers attached at the “pinch-point” (after they travel about ½ the staple length beyond the knife edge) to return to the knife edge before the next blade applies advancing force to the seed and thereby withdraw substantially all the fibers from the seed. An auxiliary feed control roller for providing more even feed to the blade device and comb structure to return unginned seeds to the ginning zone are also disclosed. This technology is having major disadvantages of seed cut and unginned cotton going with seeds.

(c) Single Roller Gins: The McCarthy roller gin utilizes a leather or composition roller to draw the fibers between a fixed knife and the roller. The pulling action of the roller on the fibers combined with the pushing action of moving knife are required to remove the fibers from each seed. The seed then falls through a seed grid and the fibers are removed from the roller by a rotating doffer.
Single Roller ginning has long been the preferred method for ginning extra-long-staple, fine-fibered Sea Island, Egyptian, American-Egyptian, and Pima cottons (Bennett, 1956). While it is possible to gin these types of cotton with a saw gin, the resulting quality is substantially lower than that obtained with roller gins. Saw Ginning tends to decrease the fiber length of these types of cotton and to greatly increase their nep content (Chapman and Stedronsky, 1965) while one major disadvantage of the McCarthy Roller Gin is its low ginning capacity.

Contd. .....5.

(d) <u>Double Roller Gin (DR Gin)</u>: In a double roller (DR) gin, two spirally grooved leather rollers, pressed against a stationary knife with the help of adjustable dead loads, are made to rotate in opposite direction at a definite speed. The three beater arms (two at end and one at the center of beater shaft) are inserted in the beater shaft and two knives (moving knives) are then fixed to the beater arms with proper alignment. This assembly is known as beater assembly, which oscillates by means of a crank or eccentric shaft, close to the leather roller. When the seed cotton is fed to the machine in action, fibres adhere to the rough surface of the roller and are carried in between the fixed knife and the roller such that the fibres are partially gripped between them. The oscillating knives (moving knives) beat the seeds from top and separate the fibres, which are gripped from the seed end. The process is repeated a number of times till all spinnable fibres are separated from the seeds, which are carried forward on the roller and doffed out of the machine. The ginned seeds drop down through the slots provided on seed grid, which is part and parcel of beater assembly, which also oscillates along with the moving knife. (P.G. Patil, GTC, CIRCOT). In this ginning mechanism fibre comes out from the bottom side and falls either below on the floor for manual collection or in the Lint Flue Chute for Pneumatic Conveying for a series of Double Roller Gins or falls on a Lint Slide for conveying by Belt Conveyor fitted along a series of Double Roller Ginning Machines in the modern ginnery. There are various models of double roller ginning machines available, however two models, one based on British Middleton Model and second based on Volkart and Monforts M. Gladbach model, are commercially used in India. The Vol kart and Monfort M. Gladbach model is the most popular among the ginneries. Out of about 70000 Double Roller Gins about 65000 are that of Vol kart and Monforts M. Gladbach model type improved Double Roller Ginning Machines and majority of them are manufactured by M/s.Bajaj Steel Industries Ltd. Nagpur India. Against about 32 million bales produced in India around 30 million bales are produced on Double Roller Ginning Machines only. Further, Double Roller Gins are extensively used in Tanzania, Uganda, Zambia, Zimbabwe, Myanmar, Egypt, etc. At present over 40 million bales of cotton are ginned on Double Roller Ginning Machines, in these countries which constitutes about 30% of total world cotton production. This technology is having various advantages i.e. higher production as compared to McCarthy Gin, retention of all fibre properties similar to McCarthy Gin, possibility of setting up a smallest size ginning factory i.e. half bale per hour to largest size ginning factories i e. 60 bales per hour. In India, at present, large volume i.e. 2000 bales per day plants are setup using multiple modules of 35 bales per hour capacity while smaller ginneries are also setup conveniently using this technology in large numbers i.e. over 5000 ginneries.

(4) <u>Need for New Developments in Ginning Technology</u> :

The sole purpose of all developments in the ginning technology is aimed to obtain optimum fibre parameters at lowest cost. The main objectives of the development in cotton ginning technologies may be summarized, as below:

(i) To obtain maximum length of fibre on Seed without breakage.
(ii) To preserve inherent qualities of fibre.
(iii) To obtain undamaged clean seed.
(iv) To obtain lint free of Trash and contaminants.
(v) Lowest cost per unit of Ginning.

These objectives have to be achieved considering the constraints of different practices prevailent in the cotton growing countries for different varieties of cotton, where fibre parameters are different. Therefore, Cotton Ginning Technology should be such which is adjustable for different varieties of cotton and compatible with various practices, such as machine picking, manual picking etc. Moreover, volumes of cotton available at different places vary, hence the technologies should have capabilities to provide optimum output at lowest cost for different needs of higher or lower volumes available.

BAJAJ STEEL INDUSTRIES LIMITED
IMAMBADA ROAD, NAGPUR- 440 018. INDIA
Tel: +91-712-272 0071 ~ 80 Fax: +91-712-272 8050 / 272 3068
email : bsi@bajajngp.com website : www.bajajngp.com
SINCE 1961

Contd. .....6.

While examining various Ginning technologies being used, it may be observed that:

i. The Saw Ginning Factories are having advance automatic setup wherein manpower requirement is minimal but electrical requirement is higher. The capital cost of setting up a Saw Ginning Factory for low volume is uneconomical. Further, it is not suitable to gin different cotton varieties which is normally required to be ginned by the same ginning factory due to requirement of doing business in the various varieties of short, medium, long and extralong stapple cotton. In the words of Mr. Vandergriff Arvel L. in the U.S. Patent No.4153976

"The saw gin has been the dominant type for ginning the fuzzy seed Upland Cotton while the saw gin has not been acceptable for use on the Black Seed Cotton which generally has a longer staple. When ginning the extra long staple Black Seed Cottons, which are commonly referred to as a variation of Egyptian Cottons, on saw gins fiber breakage results in a shorter staple and generally a less desirable fiber for the high-quality products for which this fiber is normally used."

"Saw Gin break and tangles these fine fibers which lowers their quality"

Therefore, Saw Ginning has some inherent disadvantages of fibre breakage and higher neps and does not give flexibility to gin different varieties in the same setup advantageously. Further, for the small volume as required in some of the African countries and other countries its capital cost is restrictive.

ii. Rotobar or Rotary Knife Gin is having disadvantages of seed breakage and unginned cotton going with seeds hence this technology could not be accepted extensively beyond Pima ginning.

iii. The Single Roller Ginning has given the best fibre properties and was acceptable for all types of cotton varieties however, slow rate of production has made this uneconomical.

In view of various disadvantages, some of which are indicated above the use of all the three technologies are fast reducing from various cotton growing countries in Asia and Eastern Africa and the same are being replaced by Double Roller Ginning Technology due to developments taken place in this technology during last 10 years. The brief details of the developments taken place in the Double Roller Ginning Technology in last 10 years and its advantages are presented herein below:

(5) <u>Technological Developments in Double Roller Ginning Technology</u>.

The Double Roller Ginning Technology is least known in the countries like U.S.A., China, Brazil and Uzbekistan etc. as in the earlier days double roller ginning technology was treated to be manpower oriented low capacity cotton ginning. Most of the factories working on this technology in India were manually operated and each double roller ginning machine required one workman to feed and stir the cotton at the time of ginning, which was making it labour oriented. Thus, despite having various advantages this technology was not adopted by the countries where large volumes were required to be processed with lowest manpower. However, during the last 10 years scenario has totally changed due to fast developments in this ginning technology and it has helped various countries in Asia and East Africa particularly India to write a success story in the field of cotton ginning and obtained competitive edge in the cotton sector.

In the year 2000, Government of India launched a mission called 'Technology Mission on Cotton' to increase the cotton production and to improve the processing of cotton which has given a boost to cotton sector in India. The major cotton ginning machinery manufacturing companies in India together with leading cotton technology research institutes, such as "Central Institute for Research on Cotton Technology" Indian Council of Agricultural Research, Government of India took up a challenge to produce the cotton ginning machinery to process the cotton in large volumes in a gentle way to preserve the inherent properties of cotton involving lowest manpower similar to manpower requirement of saw ginning factoris and at the lowest cost per unit of production. Various scientists, designers and researchers from leading manufacturing companies and research institutes designed various layouts & machineries to achieve the target of optimization of fibre properties with lowest cost. The major changes occurred during this period are listed below:

BAJAJ STEEL INDUSTRIES LIMITED
IMAMBADA ROAD, NAGPUR- 440 018. INDIA
Tel: +91-712-272 0071 ~ 80 Fax: +91-712-272 8050 / 272 3068
email : bsi@bajajngp.com website : www.bajajngp.com
SINCE 1961

Contd. .....7.

i. **Automization of Cotton Feeding Process**: The manual feeding of seed cotton into the Double Roller Ginning Machines were replaced by well designed suitable capacity, electrical power efficient pneumatic suction systems to pull the cotton from length upto 750 feet with multiple points. This has resulted in reduction of a 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.

ii. **Online Precleaning**: Single or multi stage inclined as well as horizontal pre-cleaners were designed and put to use online without any involvement of manpower depending upon cleaning requirement for hand picked or machine picked seed cotton, which has helped to reduce the trash contents and Double Roller Gin Machine maintenance requirements.

iii. **Automatic Individual Gin Feeding Systems**: 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.

iv. **Use of 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 refeeding 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%”

v. **Improved Higher Capacity Double Roller Gins**: Earlier Double Roller Gins used to be 40” width which have been increased gradually to 54” width without any change in electrical power requirement of 5 HP (3.7 KW) per double roller gin and many changes were made in eccentricity of the beater to improve the setting parameters to suit various varieties of cotton. Moreover, a device called “Sail Feeder” was incorporated in the Double Roller Ginning beater area to control the feeding of short staple Bengal Desi Cotton to improve the productivity of the same. In the present Jumbo Model of the Double Roller Gin is most commonly used.

BAJAJ STEEL INDUSTRIES LIMITED
IMAMBADA ROAD, NAGPUR- 440 018. INDIA
Tel: +91-712-272 0071 ~ 80 Fax: +91-712-272 8050 / 272 3068
email : bsi@bajajngp.com website : www.bajajngp.com
SINCE 1961

A photograph of improved Double Roller Gin with Auto Feeder / Lattice Feeder

Contd. .....8.

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.

A photograph of DR Gin with Lint Suction System from Each Gin.

vi. **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.

vii. **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.

viii. **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.

ix. **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.

x. **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

BAJAJ STEEL INDUSTRIES LIMITED
IMAMBADA ROAD, NAGPUR- 440 018. INDIA
Tel: +91-712-272 0071 ~ 80 Fax: +91-712-272 8050 / 272 3068
email : bsi@bajajngp.com website : www.bajajngp.com
SINCE 1961

requirement has come down to 4 persons only.

Contd. .....9.

The above are the few of the changes out of the various changes / developments taken place in the Double Roller Ginning Technology during last few years which have placed Double Roller Gin much ahead of other ginning technologies as it retains fibre properties to the optimum while manpower requirement has been reduced to minimum similar to that of Saw Ginning or Rotobar technology plant, further capital cost as well as per unit cost of production has come down lowest. A study shows that the manhour requirement per bale in the Automatic Double Roller Ginning Plant has come down to two hours per bale from earlier of 21.5 manhour per bale for entire ginning process from seed cotton feeding to taking out a bale from cotton baling press.

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.

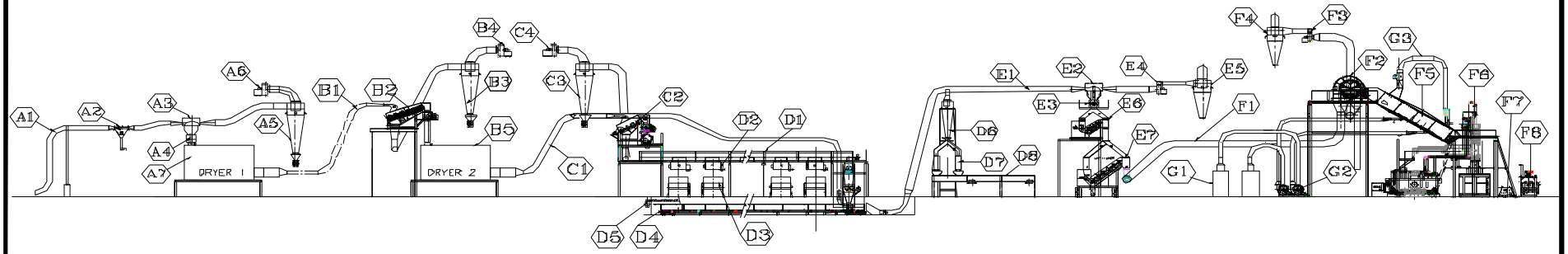
To illustrate an inside view of modern ginnery is give below:

Contd. .....10.

BAJAJ STEEL INDUSTRIES LIMITED
IMAMBADA ROAD, NAGPUR- 440 018. INDIA
Tel: +91-712-272 0071 ~ 80 Fax: +91-712-272 8050 / 272 3068
email : bsi@bajajngp.com website : www.bajajngp.com
SINCE 1961

Further, for machine picked cotton the double roller ginning technology is now being accepted and necessary changes have been designed to achieve desired

G.A. OF DOUBLE ROLLER GIN BASED AUTOMATIC PLANT TO GIN MACHINE PICKED COTTON



DOUBLE ROLLER GIN

COTTON SUCTION STAGE-1	COTTON SUCTION STAGE-2	COTTON SUCTION, FEEDING & FIBRE SEPARATION	LINT SUCTION & CLEANING	LINT CONVEYING,BALING & HUMIDIFICATION
A1) SUCTION DUCTING	B1) SUCTION DUCTING	C1) SUCTION DUCTING	E1) SUCTION DUCTING	F1) LINT SUCTION DUCTING
A2) STONE & BOLL CATCHER	B2) PRECLEANER 6 CYLINDER	C2) PRECLEANER 4 CYLINDER	E2) LINT SEPARATOR	F2) LINT BATTERY CONDENSOR
A3) AIR SEPARATOR	B3) CYCLONE WITH ROTARY AIRLOCK	C3) CYCLONE WITH ROTARY AIRLOCK	E3) VACUUM WHEEL	F3) SUCTION BLOWER
A4) VACUUM WHEEL	B4) CENTRIFUGAL SUCTION BLOWER	C4) CENTRIFUGAL SUCTION BLOWER	E4) LINT CLEANER, 3 CYL, 2100 WIDE	F4) CYCLONE
A5) CYCLONE WITH ROTARY AIRLOCK	B5) DRYER-2		E5) CENTRIFUGAL SUCTION BLOWER	F5) LINT SLIDE
A6) CENTRIFUGAL SUCTION BLOWER		D1) DISTRIBUTION CONVEYOR	E6) CYCLONE	F6) COTTON BALE PRESS
A7) DRYER-1		D2) AUTO REGULATOR	E7) LINT CLEANER, 6 CYL, 2100 WIDE	F7) BALE HANDLING TROLLEY
		D3) DOUBLE ROLLER GIN & AUTOFEEDER		F8) ONLINE BALE BAGGING & BALE WEIGHING.
		D4) LINT SUCTION/CONVEYOR		G1) HUMIDIFIER
		D5) SEED CONVEYOR		G2) SUCTION BLOWER
		D6) SEED CYCLONE WITE ROTARY AIR LOCK		G3) RECYCLING DUCTING
		D7) SEED WIEGHING HOPPER		
		D8) SEED BAGGING CONVEYOR		

BAJAJ STEEL INDUSTRIES LIMITED
IMAMBADA ROAD, NAGPUR- 440 018. INDIA
Tel: +91-712-272 0071 ~ 80 Fax: +91-712-272 8050 / 272 3068
email : bsi@bajajngp.com website : www.bajajngp.com
SINCE 1961

results. A General Arrangement of a Ginning & Pressing Factory to gin machine picked cotton is shown herein below to illustrate:

Contd ….11

BAJAJ STEEL INDUSTRIES LIMITED
IMAMBADA ROAD, NAGPUR- 440 018. INDIA
Tel: +91-712-272 0071 ~ 80 Fax: +91-712-272 8050 / 272 3068
email : bsi@bajajngp.com website : www.bajajngp.com
SINCE 1961

Conclusion: With the new developments in Double Roller Cotton Ginning Plant & Machinery, it has become preferred ginning technology as it has following advantages:

1. Retention of inherent fibre parameters similar to that of single roller but with more than double production per machine.
2. All size of plants from 5 bales per hour to 35 bales per hour (Per bale of 500 £ or 228 Kgs.) can be installed in automatic setup while half bale per hour requirement can also be met by manual feeding. Thus, all the areas where volumes are small or big can setup most economical ginning plants.
3. Due to automation of the Double Roller Ginning Factories manpower requirement of these factories has come down up to two manhour only per bale of cotton as against 21.5 hours in the old factories.
4. All types of cotton i.e. short, medium, long, extralong staple can be ginned on same Double Roller Ginning Machine with the change in machine settings easily, thus increasing the flexibility and utility of the ginning plants thereby making higher profits possible.
5. The Double Roller Gin takes out maximum fibre length hence a very small quantity of fibre i..e. below 8% of ginned seed weight as against over 12% in Saw Gin, is left on seed which provides higher outturn of fibre and clean seed usable in the oil mill without delinting, thereby reducing a substantial cost of delinting and giving higher returns for extra fibre weight and clean seeds.

With new developments the Double Roller Ginning Technology has become most advantageous particularly in context of Africa and Asia and in the future may be used by many other countries in the other part of the world, which is evident from the fact that most recently some ginning factories in the PERU & EGYPT have started using Double Roller Ginning Technology based ginning factories. Due to wide spread acceptance of this technology after various developments as indicated above, the production of Double Roller Gins has increased from around 3000 prior to 10 years back to now about 12000 Double Roller Gins per annum in year 2008, thus this technology is the fastest developing ginning technology in the present times.

Disclaimer: Mention of a trade name, proprietary product or specific equipment does not constitute a guarantee or warranty by the paper presenter and does not imply approval of the product to the exclusion of other products that may be available and are mentioned in this paper solely for the purpose of providing specific information.

****