NEW DIRECTIONS IN ROLLER GINNING INDUSTRY

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Abstract:

The Roller Ginning of Cotton to separate fibres from the seed is one of the most ancient of processes. The simple handheld roller gins have been used in India and other countries at least since 500 A.D. In recent times, the importance of roller ginning is increasing rapidly as evidenced by the fact that only 15% of the world cotton was ginned on roller gins in the year 2000, and by the year 2013 the quantity of the world cotton ginned on roller gins has surpassed 35%. It is further on the increase as the advantages of roller ginning over other technologies, such as saw ginning, are attracting more and more ginners to roller ginning.

There are presently three types of Roller Ginning Technologies being used worldwide.

1. Single Roller (McCarthy)
2. Single Roller Rotobar Rotary Knife Roller
3. Double Roller (close type)

These vary significantly in the method in which they remove the fibre from the seed. Each type of roller gin has design and performance parameters that are suitable for ginning different varieties of cotton based on fibre and seed characteristics and capacity requirements.

The term "Roller Ginning" is used commonly for all of the three technologies described above, hence in the absence of complete descriptions, it may be confusing, as in one region the people may know only one type of roller gin technology and they may think that roller ginning means only what they know. This may result in some misleading conclusions, therefore it is necessary to know about the complete descriptions and characteristics of each type of roller gin.

There is a myth that roller ginning is suitable for only long and extra-long staple varieties; however experiments and results have shown that some of the roller ginning technologies are equally good for upland medium staple varieties with adjustment in settings of operational parameters. Even for short staple varieties some of the roller ginning machines can be used with modifications. Throughput capacity requirements will be an important factor in determining the method of ginning.

It is also a myth in some areas that roller gins can be used only for hand picked clean cotton while the subject of pre-cleaning and ginning are totally different subjects and machine picked cotton**,** once cleaned**,** can be beneficially ginned on roller gins.

In North and South America the term "Roller Gin" usually refers to the Rotobar Rotary Knife Roller Gin and some misleading conclusions are drawn based on this. Whereas out of the total cotton ginned on roller gins, the highest percentage is ginned on Double Roller Gins which is totally different technology than Rotobar Rotary Knife Roller Gin. Out of the total quantity of approximately 45 million bales of cotton being ginned with roller ginning technology, around 42 million bales are ginned on Double Roller Gins in India, Africa and some other countries. Over 90% of Roller Ginned cotton is processed on Double Roller Gins. Single Roller (McCarthy) Gins are used for about 2 million bales and Rotobar Rotary Knife Roller Gins are used for only about 1 million bales.

Research on Rotobar Rotary Knife Gins is being conducted in the United States of America and the use of high speed Rotobar Rotary Knife Roller Ginning is increasing. Extensive research on Double Roller Ginning machines is being done in India. New versions of Double Roller Gins were introduced recently with higher

production capability and lower per unit cost of processing in automatic setup where the manpower requirement is very near to that of Saw Gin or Rotobar Rotary Knife Roller Gin plants of equal capacity which makes it a most economical ginning technology.

In the words of Carlos B. Armijo "New markets may open due to the improved fibre quality of roller ginned upland cotton. As processed roller ginned upland cotton receives a premium, numerous roller gin stand conversions are planned in the future. A better evaluation of roller life will ensue as more high speed roller gin stands are used."

In recent times Double Roller Ginning is the fastest growing ginning technology, increasing at a very high rate every year. The major reason for the increase in share of roller ginning from 15% of the world cotton to over 35% at present is mainly because of the increased demand for higher quality fibre and the premium realized for the higher quality.

Overview of World Cotton Ginning

Cotton is a crop produced around the globe, driving the world's textile industry. The history of cotton is older than recorded history, it fueled the industrial revolution and it is the world's most popular natural fibre. To prepare it for use, ginning is the first post harvest process by which the fibre is separated from the cotton seed.

As stated by 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 into 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 into 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 lower value final products. We all know that good fabric can be made from high quality yarn, which in turn 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 process.

Apart from fibre length, various other parameters such as micronaire, moisture content, trash content, and transportation practices prevailing in different countries or areas can play an important role in machinery selection and system design. Government policies for processing of cotton, methods of ginning cotton by gin owners such as custom ginning, producer owned or government owned ginning as well as financing patterns will influence the choice of ginning equipment. The best way to select ginning equipment however is to consider the technical requirements. Based on this criteria roller ginning has proven to be extremely beneficial for long and extra-long staple cotton because it retains natural fibre parameters to the maximum and causes the least damage to fibre compared to saw ginning.

At present there are broadly two types of ginning technologies being used for cotton ginning:

1. **Saw Ginning**: Around 65% of the world cotton is being ginned on saw gins. In Saw Ginning, fibres are pulled away from the seeds at high speed by saws projected slightly between ribs that are spaced to prevent the seeds from going through with the lint. The seeds fall through a grid into a collection box or seed conveyor. The lint is wiped off the teeth of the saws by high speed brushes or an air blast. Individual saw gins can turn out lint at varying capacities ranging from 500 kg to 6,800 kg per hour. However, saw gins give about 1% to 3.5% less ginning percentage than single and double roller gins. Although the ginning output of saw gins is very high, these gins are not suitable for ginning extra-long staple (ELS) varieties and the lint is more nappy than roller ginned lint. The maintenance of saw gin is very costly because there are many moving parts which are of special construction and many times are not readily available. Further, a qualified and experienced technician is required to operate saw gin stand to get the optimum output and to replace the worn out parts and adjust the gin for uniform processing of seed cotton. In view of limitations, in respect of ginning short and medium staple cotton only, fibre length cutting and higher neps, in the countries like India where different varieties of different fibre parameters are grown, the saw gin has been phased out completely by double roller gins.

   Various models having different width, production capacity and saw diameter ranging from 2 bales per hour to 30 bales per hour, per machine are in use. Saw gins are prominently manufactured in the USA, India, China, Pakistan and Uzbekistan.

2. **Roller Ginning:** A Roller Gin consists of rollers to carry the seed cotton to a stationary knife and reciprocating knife or rotary knife. In this process the cotton fibres are separated from the seeds by adhering to the ginning rollers with a surface of leather or other suitable material which holds the cotton fibre on the surface and carries it between the stationary knife and roller in such a way that the fibres are partially gripped between them. The oscillating knife or rotary knife beats the seed so that the fibres are separated by a stretching action. The process is repeated for number of times and due to a push-pull-hit action the fibres are separated from the seeds continuously and carried forward to be dropped out of the machine. This process is gentle as compared to saw ginning and is most suitable for ginning medium, long and extra long staple cotton varieties. Roller gins typically produce less short fibre content, fewer neps and deliver all around more impressive fibre length. Roller gins are mainly of three types i.e.

   (i) Single Roller Stationary & Reciprocating Knife Roller Gins

   The working principle of single roller gins is popularly known as the McCarthy principle, named after its proponent and shown in Figures (1) and (2) below:

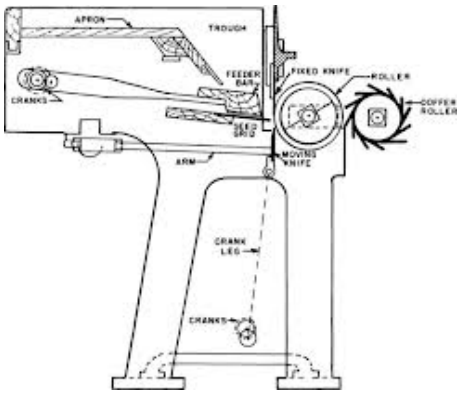

Figure (1): Single Roller Gin manufactured by Platt Brothers Oldham UK

The McCarthy roller gin utilizes a leather or composite roller to draw the fibers between a fixed knife and the roller. The roller rotates counter-clockwise (below) while touching the Stationary / fixed knife and the cotton is coming out from the top. The stationary knife is fixed with the sharp edge down while

reciprocating knife is moving from below the seed fingers up toward the stationary knife. The pulling action of the roller on the fibers combined with the pushing action of moving knife are required to remove the fibres from each seed. The seed then falls through a seed grid and the fibres are carried over the top of the roller and removed from the roller by a rotating doffer. Principle of the McCarthy 1840 Single Roller Gin is shown below:

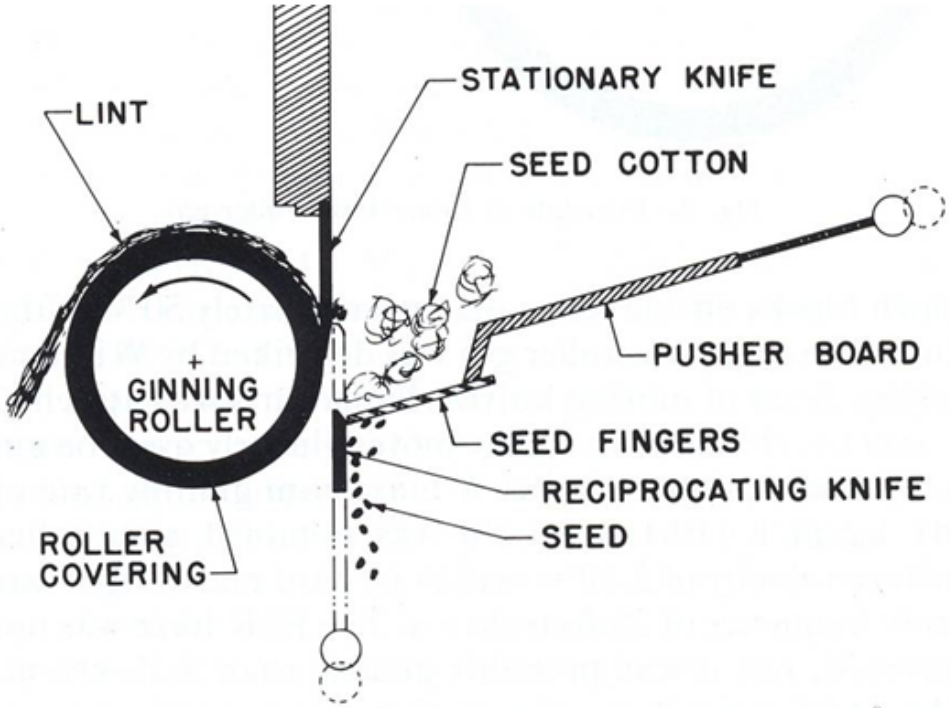

Figure (2): Principle of McCarthy Roller Gin (1840) - Courtesy USDA-ARS Mesilla Park Web-site

The Single Roller gin has long been the preferred method for ginning extra-long-staple, fine-fibred 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.

The Single Roller McCarthy Gin technology is most suitable for handpicked, low trash cottons of medium, long and extra long staple length. This technology retains maximum natural fibre parameters of the cotton during the ginning process; hence the treatment of the cotton is best with the Single Roller Gin.

(ii) Double Roller Stationary and Reciprocating Knife Roller Gin,

The Double Roller Gins currently available are either an improved version of the Volcart design (manufactured by Montfort in Germany) or the Platt Brothers UK design gins. They are now manufactured in large quantities only in India.

Working principle of Double Roller Gin

In a double roller (DR) gin, two spirally grooved leather rollers, pressed against two stationary knives with the help of adjustable dead loads, are made to rotate in opposite directions at a definite speed. The three beater arms (two at end and one at the centre of beater shaft) are inserted in the beater shaft and two moving knives are then fixed to the beater arms. 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 motion, fibres adhere to the rough surface of the roller and are carried between the fixed knife and the roller and the fibres are partially gripped between them. The oscillating knives (moving knives) beat / drag the seeds from top in the opposite direction causing separation of fibres from the seed end by pull-push process. This process is repeated a number of times until all spinnable fibres are separated from the seeds. The fibres, so detached from the seeds, are carried forward on the roller, under the fixed knife, and doffed out of the machine. The ginned seeds drop down through the slots provided on the seed grid and the gap between the end of seed grid and the rail. The grid is part of beater assembly and oscillates along with the moving knives helping quick removal of the seeds.

This ginning technology is very gentle on the cotton and can gin all types of cleaned cotton. The best productivity however is obtained on medium, long and extra long fuzzy as well as black seeded cotton. As per Mr. Gerald Estur and Mr. Nicolas Gergely - consultants in their report to World Bank named "The Economics of Roller Ginning Technology and Implications for African Cotton Sectors" - June 2010 it is mentioned "Roller Gin preserves fiber length whereas Saw Gins have the inherent disadvantage of breaking fibre, increasing short fibre content and creating neps which are detrimental to lint spinability". The chart shown on page no. 63 of the report is given below:

Comparison of Quality Parameters for Saw and Roller Ginning (US upland)

HVI	**Roller Gin**	**Saw Gin**
Length (UHML, mm)	31.0	29.6
Uniformity	84.6%	82.9%
Short Fibre Content	7.4%	8.9%
Reflectance (Rd)	78.0	76.8
AFIS		
Length (mm)	27.0	25.9
Upper Quartile Length	32.1	31.5
Short Fibre content	6.4%	8.5%
Immature fibre content	11.3%	11.9%
Neps/g	166	261
Seed coat neps/g	42.5	43.2
Total trash count/g	981	790

The test carried out by Bajaj Steel Industries Ltd., India on one Indian variety ginned simultaneously on Double Roller Gin, Rotobar Gin and Saw Gin are given below:

HVI	Double Roller	Rotobar	Saw Gin
Length (mm)	32.59	31.52	30.27
Neps /g	90	165	225

Among all roller gin technologies, the electrical power consumption per unit of production is lowest in Double Roller technology, as the production with the same 5 HP (3.75 kW) motor produces almost three times the fibre as compared to McCarthy roller gin with same fibre parameters. Double Roller Ginning even consumes less power per unit of production than the Rotobar Rotary Knife Roller Gin; hence the use of this technology is rapidly increasing in South Asia, including India, Africa and other countries which have resulted in the rapid share increase of roller ginning in the world market.

The Double Roller Gin is also tolerant of higher moisture to a great extent and can gin cotton at higher moisture content where drying is not available.

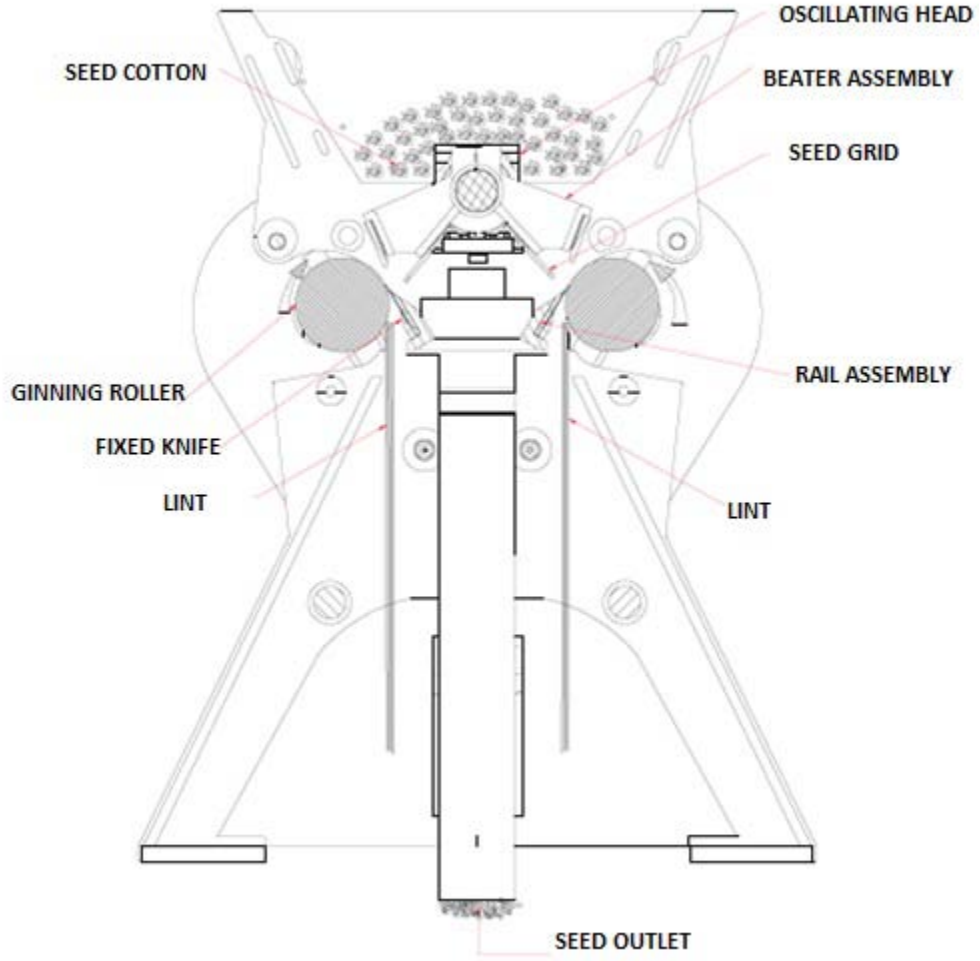

Figure (3): Working Principle of Double Roller Gin

Double Roller Gins have rapidly replaced McCarthy Single Roller Gins and Saw Gins in India and Eastern Africa in the recent past.

(iii) Rotary Knife Rotobar (Spiral or Straight) Single Roller Gin.

In the Rotobar Rotary Knife Roller Gin the roller rotates in clockwise direction (see the diagram - Figure 4: below) similar to Double Roller Gin while touching to the Stationary (fixed knife). The fibre is pulled under the stationary knife and dropped from the lower portion of the roller. This gin has a rotating knife rather than an oscillating beater bar. The rotary knife vibrates less due to rotary motion and is more efficient than the reciprocating knife, which loses effective time during its backstroke. The ginning rate and carryover (un-ginned seed cotton that accompanies the seed) increase with feed rate. A re-claiming machine is required to remove the excess seed cotton from the seed flow and return it to the gin.

The main components of rotary knife roller gin stand include the stationary knife, rotary knife and ginning roller. The ginning roller is the most important and expensive component in the roller gin stand. The material covering the roller is made of 13 layers of woven cotton fabrics cemented together with rubber a compound. The seed cotton slides down the feeder apron and enters the gin between the ginning roller and the rotary knife. The ginning roller, which rotates constantly, is held tightly against the stationary knife. The lint is pulled under the stationary knife and the seeds, too big to pass under the stationary knife, are swept away by the rotary knife which spins in the opposite direction of the ginning roller.

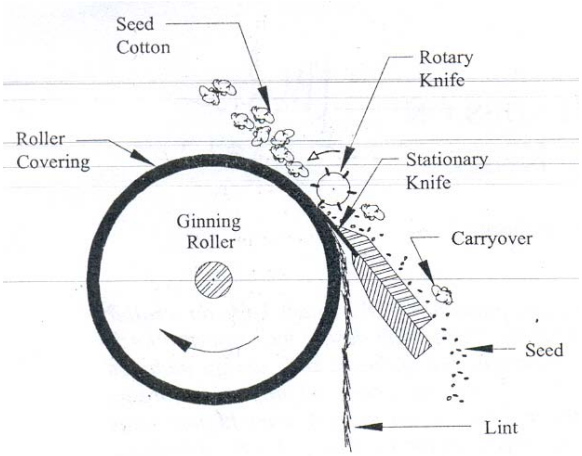

Figure (4): Courtesy- USDA-ARS Mesilla Park

History of Roller Ginning:

The history of Roller Ginning is older than recorded history. Different models of roller gins were used throughout the cotton producing regions of the world since beginning. From these, three of the most advanced methods are being used today. The history of the development of roller gins has been chronologically recorded by Mr. Charles A. Bennett, Principal Agricultural Engineer, Cotton Ginning Section, Agricultural Engineering and Research Division, USDA, who has listed the developments in the roller ginning from beginning to 1959 in his collection 'Roller Cotton Ginning Developments'. The collection is sponsored by The Cotton Ginners Journal and The Cotton Gin and Oil Mill Press, Dallas Texas and the paper is available on http://www.cotton.org/ncga/techpubs/upload/1823-roller_ginning_developments.pdf. This publication does not list the developments in Double Roller Ginning that took place outside of the USA and the UK, especially the very successful Double Roller Gin developed by M/s. Volcart of Switzerland and manufactured by M/s. Montfort in Germany sometime during 1930 and were manufactured in large numbers till 1950. This model was later adopted by Bajaj Steel Industries Limited (Bajaj) India as a base model for further development in India.

The advancements in the roller ginning during the period of 1960-2010, though significant, have not been previously summarized, therefore we will briefly discuss them herein below. The developments during the year 2011-2013 will be discussed in detail thereafter.

Brief Details of Development in Roller Ginning during 1960-2010:

During this period the developments in McCarthy Single Roller Gins stagnated as the cost of ginning with this method became higher compared to the other two roller ginning technologies. The developments in Rotary Knife Roller Gin were taken up in USA by the United States Department of Agriculture, South Western Cotton Ginning Research Laboratory in Mesilla Park, New Mexico in conjunction with machinery manufacturers M/s. Lummus Corporation, Continental Eagle Corporation and Consolidated Cotton Gin Manufacturing Co. The developments in Double Roller Ginning Technology were taken up in India by Bajaj Steel Industries Ltd. with the Central Institute for Research on Cotton Technology - Indian Council of Agricultural Research (CIRCOT) Govt. of India.

1. **Brief Overview of Developments in Rotobar Rotary Knife Roller Ginning during 1960-2010**

   In the late 1970's a patent was applied by Mr. A.L. Vandergriff (Patent No. 4153976) in which the radial blades on the rotary knife were replaced by spiral blades which helped in reducing overflow of un-ginned cotton into the seed flow.

The major development in Rotary Knife Roller Ginning during 1960-2010 however, was the increase in throughput capacity causing these machines to be referred to as 'High Speed Roller Gins'. Mr. C.B. Armijo, Mr. J. A. Foulk, Mr. D. P. Whitelock, Mr. S.E. Hughs, Mr. G.A. Holt and Mr. M. N. Gillum worked extensively to increase the capacity of the Rotary Knife Roller Gin. Their experiments are documented in several papers including the following:

a. Fiber and Yarn Properties from High-speed Roller Ginning of Upland Cotton by C.B. Armijo, J. A. Foulk, D. P. Whitelock, S.E. Hughs, G.A. Holt and M. N. Gillum
b. New Developments in Cotton Ginning from Lummus by Ross Rutherford, Product General Manager, Lummus Corporation, Lubbock, Texas.
c. High Speed Roller Ginning (A Little Bit of History and Recap of One Season's Commercial operation) by Joe W. Thomas, DeWitt, Darrell Isbell, Daniel Riggs, Robert Santiago, Don Van Doorn, Lummus Corporation - Savannah, GA USA

The basic mechanics of the High Speed roller gin are essentially the same as those of the conventional Rotary Knife roller gin. However, improvements in the way the seed cotton is introduced to the ginning point, increased surface speeds of the ginning roll and rotary knife, addition of a cooling nozzle to minimize the impact of gin roll covering temperature rise and a highly responsive gin feed control combined to allow for the higher throughputs experienced in 2005 and 2006 field operations.

The primary focus of these modifications was toward the increase of the surface speed of the roller and the counter measures to address the increase of temperature due to increased friction on the roll surface. A cooling fan was added to reduce the temperature and higher output was achieved. To avoid repetition it would be advisable to refer to the publications listed above for the details.

2. **Brief Overview of Developments in Double Roller Ginning during 1960-2010**

Before 1960 all Double Roller Gins were imported into India and African countries from the United Kingdom or Germany. In 1961 Bajaj started manufacturing Double Roller Gins in India based on the design of Volcart, Switzerland earlier manufactured by M/s. Montfort in Germany. The working width of these machines was 1067 mm. In 1963 NIPHA Exports Pvt. Ltd., Kolkata, also started manufacturing Double Roller Ginning machines in India based on design of M/s. Platt Brothers U.K. while various other Indian manufacturers came up with different models thereafter similar to that of the Bajaj Double Roller Gin. The prominent models of major manufacturer are shown below:

Until 1970, Double Roller Gins were manufactured using gun metal bushings as the bearings were in the developmental phase. These bushings caused higher friction. In 1972 all the gun-metal bushings were converted to bearings which have resulted in improved electrical power efficiency. In 1995 the working width of the Double Roller Gin was increased to 1191 mm to increase the productivity and commensurate changes were made in all other components successfully. Before 1995 Double Roller Gins were fed manually and one person would feed one Double Roller Gin. A lattice feeder (auto feeder) was developed and used in 1995 which revolutionized the automation process of Double Roller Ginning plants. This device made it possible to arrange for automatic feeding of a series of up to 18 Double Roller Gins in one line; hence a significant reduction in the manpower requirement took place. In 1998 the working width of the Double Roller Gin was further increased to 1391 mm to increase the productivity and commensurate changes in all other related components were made successfully.

After development of the Auto feeder, various automatic feeding and online cleaning systems such as Seed Cotton Suction System, Inclined and Horizontal Pre-cleaners, Automatic Distribution Conveyors, Feed Control Hoppers, Lint Cleaners, Humidification System, Automatic Baling Presses etc were designed by Indian manufacturers and CIRCOT. The development of the auto feeder (lattice feeder) facilitated the modernization of Double Roller Ginning plants and the modernization progressed rapidly beginning in the year 2000. Until 2010 a majority of the existing ginning plants modernized and became automated while new plants installed in India and some of the East African countries during the years 2000 to 2010 were

automated Double Roller based ginning plants. The trash content and contamination could be controlled due to automation to a significant extent while manpower requirements were reduced almost to 1/4$^{th.}$.

Some operations remained semi-automatic requiring additional manpower and having extra operational fatigue even after year 2010.

Development in Roller Ginning during year 2011-2013

The period of 2011-2013 has seen very important development in the field of Rotobar Rotary Knife Ginning as well as Double Roller Ginning, however the stagnant position of Single Roller McCarthy Gin continues and no further development is taking place on this on the contrary it is being phased out.

Developments in Rotobar Rotary Knife Roller Ginning during 2011-2013

Until 2010 Rotobar Rotary Knife Roller Gins were being used primarily for Pima varieties, where the fibre attachment to the seed is weaker and high speed Rotobar Gins could produce almost the same capacity as that of lower capacity saw gins. However, due to upland cotton's stronger attachment force to the seed the capacity was lower and there were some other issues.

To address these issues and to make Rotary Knife Roller Gin suitable for ginning upland cotton, a test and study was carried out by Mr. C. B. Armijo, Mr. J. A. Foulk, Mr. D. P. Whitelock, Mr. S. E. Hughs, Mr. G.A. Holt and Mr. M. N. Gillum and published with the title 'Fiber and Yard Properties from High Speed Roller Ginning of Upland Cotton' in 2013 American Society of Agriculture and Biological Engineers ISSM0883-8542 Volume 29 (4)461-471. This study has shown that, in recent time, selective breeding has improved upland cotton fibre properties and the samples of upland cotton ginned on high speed roller gin tasted on HVI and AFIS have shown that the Rotary Knife Roller Gin (conventional and high speed) produced fibre that was longer, more uniform, had less short fibre and fewer neps than the saw gin stand. Turnout, colour grade, and leaf were not different among gin stand types. With respect to yarn properties the conventional / high speed Rotary Knife Roller gin had fewer thick places but was higher in vegetable and foreign dark matter, seed coats and neps. The composition of neps changed as fibre was processed in to yarn. The conventional/high-speed roller gin had fewer raw stock and card mat neps than the saw gin stand, but more neps in finished yarn.

Differences among cultivars were prevalent throughout the study. In addition to differences in length, strength, and immature fiber content, the cultivar that was stripper harvested had double the trash content at the harvest. There were differences in most fibre properties but not in yarn properties.

Among lint cleaner types, the Rotobar Roller Gin lint cleaning was less aggressive than saw type lint cleaning and had longer fibre, better uniformity and fewer neps. Saw type lint cleaning had better colour and leaf grades, and less lint trash. There was no appreciable difference between two types of Rotobar Roller Gin lint cleaning used but one saw type lint cleaner as opposed to two was less damaging to the fibre.

It is felt that in view of the better fibre properties obtained on Rotobar Roller Gin for upland cotton and the value given by the textile mills for higher quality obtained from Rotobar Roller Gin, newer upland cultivar may make roller ginning a viable option in parts of the United States where Rotobar Roller Ginning has not been introduced previously. (For details please see the paper referenced above).

Developments in Double Roller Ginning during 2011-2013

The Double Roller Ginning segment has also seen significant improvements in India. The working width of the Double Roller Gin was further increased to 1524 mm in 2011. Moreover, several developments took place in respect of uniform feeding into the system by the introduction of the Dispenser Feeder which enabled controlled and uniform feeding to the Double Roller Gins.

This development has improved the production efficiency of the plants by about 15-20%. Further, the increase in the working width has added about 25% higher production for each Double Roller Gin for same electrical power of 5 HP, hence the productivity of the Double Roller Ginning plants have improved significantly.

The introduction of a Central Overhead Distribution Conveyor to feed two parallel lines of Double Roller Gins has also been a significant development that has reduced the electrical power consumption and made handling of overflow cotton very easy. In this system two Double Roller Gins installed on two sides are fed in a regulated manner by controlling the quantity of cotton in the feeder with the help of level sensors.

These developments have reduced the capital cost as well as power consumption and reduced the cost of production per unit of cotton and made Double Roller Cotton Ginning more attractive.

New Direction of Rotobar Rotary Knife Roller Ginning

In view of High Speed Rotobar Rotary Knife Roller Ginning now being found suitable for ginning of upland cotton, there is a likelihood that the use of this technology will increase further. Some new plants, based on this technology, have already come up in different parts of the world, apart from the USA and some of the plants are totally dedicated to the ginning of upland varieties apart from some plants working on Pima or similar varieties. The high speed Rotobar Rotary Knife Roller Gins, with almost same capacity as some saw gins, has made the cost of production on Rotobar Rotary Knife Roller Gins affordable. Many ginners may opt for use of this technology extensively, giving preference over Saw Ginning in near future, due to better fibre parameters obtained on this technology and thus receiving a premium price from the spinning mills for roller ginned cotton.

New Direction of Double Roller Ginning

Due to the developments of higher capacity Double Roller Ginning, automatic material feeding systems, uniform controlled cotton feeding systems and resultant advantages of the lowest cost of ginning per unit with best fibre parameters, this technology is preferred more and more in the India, East Africa and some other countries and it is rapidly spreading. Similarly, the high speed Rotobar Rotary Knife Gin now being tested on upland cotton with favorable results with capacity almost matching to Saw Gin may find uses in upland cotton and may see rapid growth in its use.

To summarize, it appears that the share of Double Roller Ginning and Rotobar Rotary Knife Roller Ginning will significantly increase where as the share of Single Roller McCarthy Roller Ginning and Saw Ginning may decline in not too distant future. The manufacturing of roller ginning is increasing rapidly in the countries like India, China and Turkey and may see growth in the USA as well.

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