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The History of Roller Ginning

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GUEST COLUMN

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The history of Roller Ginning is older than its recorded history. The different models of roller ginning were practiced in the world since the beginning, out of which three most advanced methods are being used at present. The history of development in the roller ginning 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 roller ginning technology upto the year 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. However this publication does not list the developments of the Double Roller Cotton Ginning which have taken place outside USA and UK, mainly the extremely successful Double Roller Ginning machine developed by M/s. Volcart of Switzerland and manufactured by M/s. Montfort Germany sometime during 1930 and manufactured in large numbers till 1950. This model was later adopted by Bajaj Steel Industries Limited (Bajaj) India as a base model for further developments in India.

The developments in the roller ginning during the period 1960-2010 were significant but never adequately summarised. Here, we will briefly discuss these and then look at the developments during the years 2011-2013 in detail.

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

This period saw significant developments. As the cost of ginning in the McCarthy Single Roller Gin became higher, its technological developments also stagnated. Whereas, the developments in Rotary Knife Roller Gin were spearheaded

in the USA by South Western Cotton Ginning Research Laboratory, Mesilla Park with machinery manufacturers M/s. Lummus Corporation, Continental Eagle Corporation and Consolidated Cotton Gin Manufacturing Co.; the developments in Double Roller Ginning Technology were initiated in India by Bajaj in tandem with Central Institute for Research on Cotton Technology - Indian Council of Agricultural Research (CIRCOT) Govt. of India

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

The major development in the Rotary Knife Roller Ginning during 1960-2010 involved increasing the capacity of Rotary Knife Roller Gin which was termed the Rotary Knife Roller Gin as 'High Speed Roller Gin'. Mr. C.B. Armijo, Mr. J. A. Foulk, Mr. D. P. Whitelock, Mr. S.E. Hughe, Mr. G.A. Holt and Mr. M. N. Gillum worked extensively to increase the speed of Rotary Knife Roller Gin. Their experiments are documented in various paper such as:

a. Fibre and Yarn Properties from High-speed Roller Ginning of Upland Cotton by C.B. Armijo, J. A. Foulk, D. P. Whitelock, S.E. Hughe, 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.

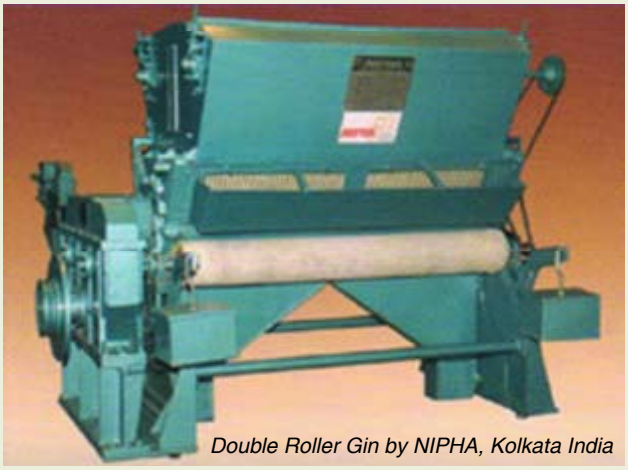
The basic mechanics of the High Speed roller gin are essentially the same as those of the High Capacity roller gin. However, improvements in the way the seed cotton is introduced to the ginning point (A), increased surface speeds of the ginning roll (C) and rotary knife (D), addition of a cooling nozzle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

All these improvements / developments increased the surface speed of the roller and other balancing parameters got strengthened. To counter the increase of temperature due to higher speed friction, a cooling fan was added to reduce the temperature of the roll surface and higher output was achieved. Do read the above referred publications for more details of the developments. Apart from significantly improving capacity, which greatly impacted the cost of ginning, Mr. Vandergriff applied for a patent (Patent No. 4153976) vide which the radial blades were replaced by spiral blades which has helped in lower overflow of unginned cotton.

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

Up till 1960, all the Double Roller Ginning machines were imported in to India and Africa 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 Germany. The working width of the machines was 1067 mm. In 1963, NIPHA Exports Pvt. Ltd., Kolkata, also started manufacturing Double Roller Ginning machines in India based on the design of M/s. Platt Brothers U.K. while various other manufacturers came up with different models of Double Roller Ginning machines in India, similar to that of Bajaj Double Roller Gin. The prominent models of major manufacturer are shown below:

Double Roller Gin by Bajaj, Nagpur India

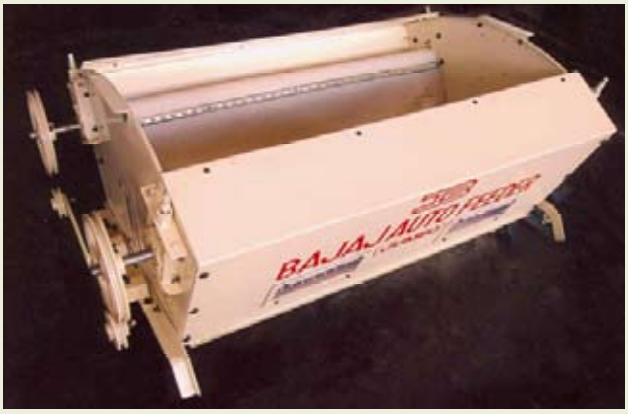

Double Roller Gin by NIPHA, Kolkata India

Double Roller Gin by National, Ahmedabad India

Up to the year 1970, the Double Roller Gins were manufactured using gun metal bushes as the bearings were in the developmental face and had higher friction. In 1972, all the gun metal bushes were converted to bearings which resulted in 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.

Till 1995, Double Roller Gins were fed manually and one person used to feed one Double Roller Gin. A lattice feeder / auto feeder was developed and used in the year 1995 which revolutionised the automation process of Double Roller Ginning plants. Due to this device, it could be possible to arrange for automatic feeding of a series of gins, with as many as 18 Double Roller Gins in one line, hence significantly reducing the manpower requirement. In the year 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 the development of various automatic feeding, 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 auto feeder / lattice feeder facilitated the modernisation of Double Roller Ginning Factories and the modernisation process progressed rapidly from 2000. By 2010, a majority of ginning factories modernised and became automated while new factories that came post 2010 were automatic Double Roller based ginning factories in India and some East African countries. The trash contents and contamination were controlled due to automation to a significant extent while manpower requirement was reduced by almost 1/4th.. A photograph of auto feeder and an automatic plant is given below:



Auto Feeder / Lattice Feeder
Courtesy: Bajaj Steel Industries Limited, India

A view of Automatic Double Roller Ginning Plant
Courtesy: Amit Cottons, Shadnagar, India

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 developments 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

Up till 2010, Rotobar Rotary Knife Roller Gin was being used for Pima varieties only where the

fibre attachment to the seed was weaker and the high speed Rotobar Gin could produce almost the same capacity as that of lower capacity saw gins. However due to upland cottons' stronger attachment force to the seed, the capacity was lower and there were some other issues as well. 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 'Fibre and Yard Properties from High Speed Roller Ginning of Upland Cotton' in the 2013 American Society of Agriculture and Biological Engineers ISSM0883-8542 Volume 29 (4)461-471.

This study has shown that in recent times, 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 type.

With respect to yarn properties, the conventional / high speed Rotobar 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 into 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 cultivar were prevalent throughout the study. In addition to differences in length, strength, and immature fibre 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 the lint cleaner type, Rotobar Roller Gin lint cleaning was less aggressive than saw type lint cleaning and had longer fibre, better uniformity and fewer neps. The 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. It was 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 available / used previously. (For details, please refer paper referred above).

Developments in Double Roller Ginning during 2011-2013

Double Roller Ginning segment has also seen significant in India and the working width of the Double Roller Gin was further increased to 1524 mm in the year 2011. The foundation based was changed to eight bolts for sturdy foundations and control for vibrations. Moreover, several developments took place in respect of uniform feeding in the system by introduction of the Dispenser Feeder which enabled controlled and uniform feeding to the Double Roller Gins.

Photo of Seed Cotton Dispenser System

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 the same electrical power of 5 HP. Thus the productivity of the Double Roller Ginning plants has improved significantly.

Photograph of Central Screw Conveyor Distribution System
Courtesy: Bajaj Steel Industries Ltd., India.

The development of the Central Overhead Distribution Conveyor to feed two parallel lines of Double Roller Ginning machines has also been a significant development which 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. A photograph of the system is given below:

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

Now that the High Speed Rotobar Rotary Knife Roller Ginning has been found suitable for ginning of upland cotton, there is the possibility that the use of this technology will increase further. New plants based on this technology have already come up in different part of the world apart from the USA and some of the plants are totally dedicated to the ginning of upland varieties of cotton apart from some plants working on Pima or similar varieties. The high speed Rotobar Rotary Knife Roller Ginning with almost the same capacity as compared to a saw gin, has made the cost of production on Rotobar Rotary Knife Roller Ginning affordable and may ginners may opt for use of this technology extensively in the near future due to better fibre parameters obtained on this technology and preference of the spinning mills for use of cotton ginned on roller ginning.

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 lowest cost of ginning per unit with best fibre parameters, this technology is being preferred more and more in India, East Africa and some other countries and rapidly spreading.

It appears that the share of Rotobar Roller Ginning and Double Roller Ginning will significantly increase where as the share of Single Roller McCarthy Roller Ginning and Saw Ginning may decline in the near future. The manufacturing of roller ginning is increasing rapidly in the countries like India, China and Turkey and may see growth in the USA also.

Technical Analysis

Price outlook for Gujarat-ICS-105, 29mm and ICE cotton futures

(The author is Director of Commtrendz Research and the views expressed in this column are his own and the author is not liable for any loss or damage, including without limitations, any profit or loss which may arise directly or indirectly from the use of above information.)

We will look into the Gujarat-ICS-105, 29mm prices along with other benchmarks and try to forecast price moves going forward.

As mentioned in the previous update, fundamental analysis involves studying and analysing various reports, data and based on that arriving at some possible direction for prices in the coming months or quarters.

Some of the recent fundamental drivers for the domestic cotton prices are:

EXPERT's Column

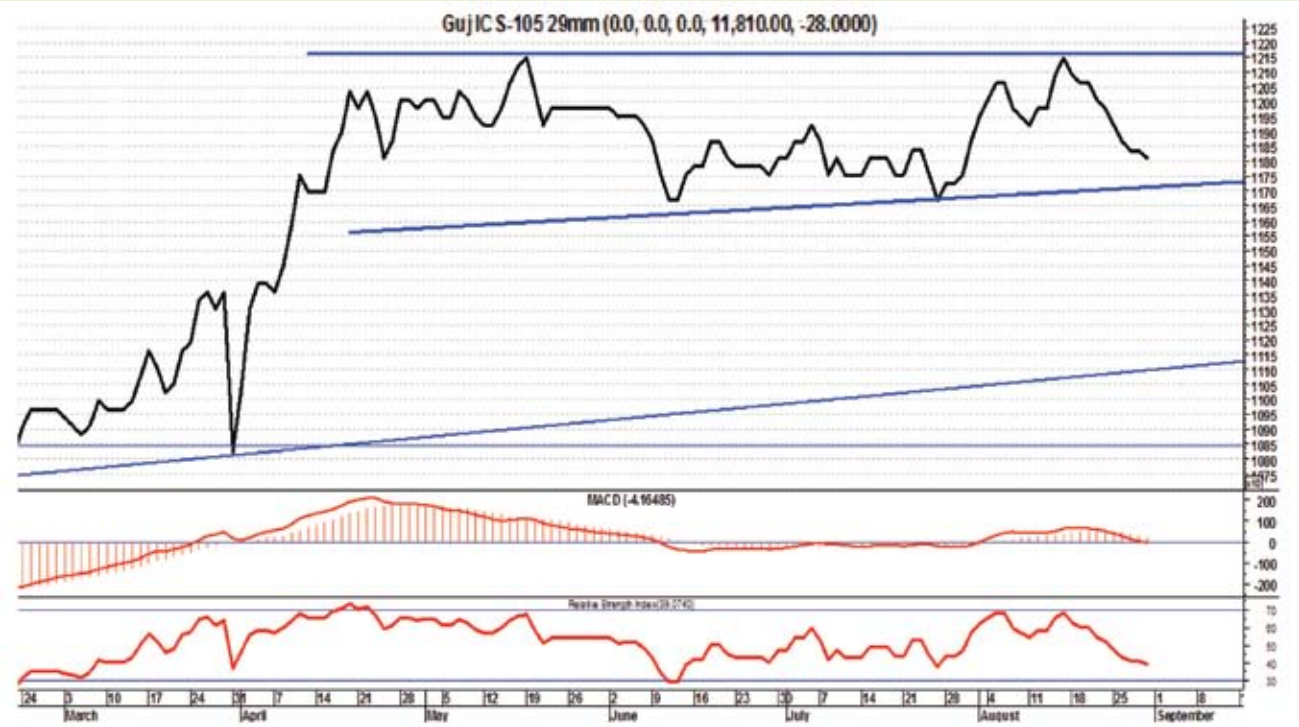
Shri Gnanasekar Thiagarajan

- Cotton prices plunged to a yearly low amid higher domestic production for 2013-14. Cotton Association of India (CAI) revises its crop estimates to 38.3 million, bales, compared to earlier revision to 38.1 million bales and from 35.67 million in 2012-13.
- Indian Cotton Federation has revised cotton output higher at 37.6 million bales from a previous forecast of 36.1 million bales.
- India's arrivals of cotton declined to 32.18 million bales until May 4 from 32.61 million bales a year ago as data from Cotton Corporation of India (CCI) showed.
- Cotton demand from textile industry is strong due to better sale prospects of clothing in the midst of the marriage season and as schools re-open by June, thereby cushioning the downside.

Some of the fundamental drivers for international cotton prices are:

- Cotton futures on Thursday tumbled to their lowest since early March, as long liquidation and expectations of rains in drought-plagued Texas dragged prices lower. Rains across the Midwest and Texas should bolster spring crops, including cotton, a U.S. weather forecaster said on Thursday.
- Global demand will increase more than 2 per cent due to projected global economic growth. However, cotton is poised for a third straight weekly loss, on worries over waning demand and large world inventories.
- ICE cotton speculators cut net long positions by 8,929 contracts to 41,046 in week to May 20, the CFTC reported, indicating the prevailing weakness in the complex.

Let us now dwell on some technical factors that influence price movements.



As mentioned in the previous update, prices are unable to follow-through higher on the back of weakening fundamentals. Technical picture is now hinting at weakness going forward. Near-term support is at 11,700/qtl and a decisive break below 11,600/qtl could trigger a sharper decline to 11,300/qtl immediately from where a minor recovery can be seen. Prices could eventually get supported near 11,125-200/qtl levels. Only a rise above 12,000/qtl will revive bullish hopes again.

We have been hoping for prices to reverse to continue the uptrend, but prevailing negative conditions hint at further weakness to come. As cautioned in the earlier update, mild overbought conditions hint at a possible technical downward correction to 11,700/800/qtl levels before moving higher again. Critical level is at 11,100-200/qtl. A fall below this could lead to a sharper downside below 10,000/qtl. However, our favored view expects prices to find support in the above mentioned range a rise higher again.

We will also look at the ICE Cotton futures charts for possible direction in international prices.

As mentioned in the previous update, the price action suggests downside pressure and resistances at 93-94c capping upside attempts initially for a test of 88c. Daily close below 87c will open the downside for a sharper decline to 81-82c in the coming weeks. Our expectation has materialised and prices are coming close to the target area of 82-83c, also being a Fibonacci retracement point as seen in the chart above.

CONCLUSION:

Both the domestic and international prices are under pressure. The potential exists for prices to further decline in the coming weeks. For Guj-ICS support is seen at 11,600/qtl and 11,300 /qtl and for ICE March cotton futures at 84.65c followed by 83.50c. Only an unexpected rise above 12,000/qtl could change the picture to bullish again in the domestic market and a move above 90c could turn the picture neutral.

Cotton Yarn Production in China

In the Nov-Dec 2013 edition of the Review, the Secretariat published an article analyzing the relationship between cotton mill use and cotton yarn production in selected countries. A sticking point of the analysis was the distortion that Chinese numbers introduced to global figures, and the implied structural change in the composition of cotton yarns.

In short, cotton yarn production in China exceeds cotton mill use (by volume) since the early 2000s, and the implied cotton content in Chinese cotton yarns in 2010-2012 averaged 32%, which would disqualify those yarns as "cotton" yarns.

One proposed hypothesis was that the ICAC Secretariat was substantially underestimating mill use in China. The other proposed hypothesis was that data reported by United Nations in the Monthly Bulletin of Statistics (MBS) were substantially higher than actual cotton yarn production in China.

An international poll of fiber analysts conducted by the Secretariat during the first quarter of 2014 concluded that cotton yarn production data for China reported by the MBS over the last decade significantly overestimates actual production. There seems to be a consensus that there is not enough cotton in China to produce that much cotton yarn, which requires a minimum cotton content of 50% by weight. By Alejandro Plastina, ICAC

The Industrial and Energy Statistics Section (IESS) of the United Nations Statistics Division responded to an inquiry from the ICAC Secretariat that cotton yarn data reported in the MBS are sourced from the China National Bureau of Statistics and yarns include "cotton yarn, cotton blended yarn, pure chemical fiber yarn, excluding cotton thread, alternate fiber yarn and hand-spun yarn." As a result of the inquiry, the IESS will add an appropriate footnote to Chinese yarn production data on the MBS.

Given the preponderant position of China as the top cotton user, the lack of reliable data on cotton yarn production in China creates several pitfalls in understanding the workings of the global textile market. A number of articles (Colby and Gruere; MacDonald; Skelly, Colby, and Johnson) address the major resulting difficulty for fiber analysts: mill use in China is estimated as a residual of production plus net imports minus changes in stocks, and without a solid cotton yarn production figure, there is no direct way to check the robustness of the mill use estimate. Some analysts with solid knowledge of the chemical fiber sector approximate cotton mill use in China as the difference between yarn production as reported by the China National Bureau of Statistics and their own estimates of mill use of man-made fibers.

As a result of the above findings, the Secretariat will review historical data on cotton yarn production in China before the next edition of World Textile Demand in November 2014.

Source: COTTON: Review of the World Situation, March-April 2014

UPCOUNTRY SPOT RATES (Rs./Qtl)

Sr. No.	Growth	Grade Standard	Grade	Staple	Micronaire	Strength /GPT	Spot Rate (Upcountry) 2013-14 Crop MAY 2014 19th	20th	21st	22nd	23rd	24th
	Standard Descriptions with Basic Grade & Staple in Millimetres based on Upper Half Mean Length [By law 66 (A) (a) (4)]											
1	P/H/R	ICS-101	Fine	Below 22mm	5.0-7.0	15	11220 (39900)	11220 (39900)	11220 (39900)	11220 (39900)	11360 (40400)	11220 (39900)
2	P/H/R	ICS-201	Fine	Below 22mm	5.0-7.0	15	11360 (40400)	11360 (40400)	11360 (40400)	11360 (40400)	11501 (40900)	11360 (40400)
3	GUJ	ICS-102	Fine	22mm	4.0-6.0	20	7255 (25800)	7255 (25800)	7199 (25600)	7142 (25400)	7171 (25500)	7171 (25500)
4	KAR	ICS-103	Fine	23mm	4.0-5.5	21	8520 (30300)	8520 (30300)	8464 (30100)	8464 (30100)	8464 (30100)	8464 (30100)
5	M/M	ICS-104	Fine	24mm	4.0-5.0	23	10208 (36300)	10208 (36300)	10151 (36100)	10151 (36100)	10151 (36100)	10151 (36100)
6	P/H/R	ICS-202	Fine	26mm	3.5-4.9	26	12457 (44300)	12429 (44200)	12429 (44200)	12429 (44200)	12401 (44100)	12345 (43900)
7	M/M/A	ICS-105	Fine	26mm	3.0-3.4	25	9786 (34800)	9786 (34800)	9786 (34800)	9701 (34500)	9617 (34200)	9561 (34000)
8	M/M/A	ICS-105	Fine	26mm	3.5-4.9	25	10292 (36600)	10292 (36600)	10292 (36600)	10292 (36600)	10264 (36500)	10236 (36400)
9	P/H/R	ICS-105	Fine	27mm	3.5.4.9	26	12626 (44900)	12570 (44700)	12570 (44700)	12570 (44700)	12541 (44600)	12485 (44400)
10	M/M/A	ICS-105	Fine	27mm	3.0-3.4	26	10011 (35600)	10011 (35600)	10011 (35600)	9926 (35300)	9842 (35000)	9786 (34800)
11	M/M/A	ICS-105	Fine	27mm	3.5-4.9	26	10714 (38100)	10714 (38100)	10714 (38100)	10714 (38100)	10686 (38000)	10686 (38000)
12	P/H/R	ICS-105	Fine	28mm	3.5-4.9	27	12879 (45800)	12851 (45700)	12851 (45700)	12851 (45700)	12823 (45600)	12738 (45300)
13	M/M/A	ICS-105	Fine	28mm	3.5-4.9	27	11276 (40100)	11276 (40100)	11276 (40100)	11276 (40100)	11248 (40000)	11248 (40000)
14	GUJ	ICS-105	Fine	28mm	3.5-4.9	27	11670 (41500)	11670 (41500)	11670 (41500)	11670 (41500)	11670 (41500)	11670 (41500)
15	M/M/A/K	ICS-105	Fine	29mm	3.5-4.9	28	11698 (41600)	11698 (41600)	11698 (41600)	11698 (41600)	11670 (41500)	11670 (41500)
16	GUJ	ICS-105	Fine	29mm	3.5-4.9	28	11810 (42000)	11810 (42000)	11810 (42000)	11810 (42000)	11810 (42000)	11810 (42000)
17	M/M/A/K	ICS-105	Fine	30mm	3.5-4.9	29	11923 (42400)	11923 (42400)	11923 (42400)	11923 (42400)	11867 (42200)	11867 (42200)
18	M/M/A/K/T/O	ICS-105	Fine	31mm	3.5-4.9	30	12232 (43500)	12232 (43500)	12232 (43500)	12232 (43500)	12176 (43300)	12176 (43300)
19	A/K/T/O	ICS-106	Fine	32mm	3.5-4.9	31	12598 (44800)	12598 (44800)	12598 (44800)	12598 (44800)	12541 (44600)	12541 (44600)
20	M(P)/K/T	ICS-107	Fine	34mm	3.0-3.8	33	16731 (59500)	16591 (59000)	16591 (59000)	16591 (59000)	16506 (58700)	16450 (58500)

(Note: Figures in bracket indicate prices in Rs./Candy)