A SPINNER'S PERSPECTIVE – CHANGING NEED

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Introduction

The world's textile industry has gone through structural changes and there are rapid moves toward industrial reorganization in Asian countries in pursue of the progress in the developed countries.

Globalization of the textile industry is rapidly taking place. Textile products, mainly apparel, have come to be manufactured at the most favorable places around the world because of two aspects, cost and quality. As a result, textile product trade has expanded since the second half of the 1980s.

In Europe and the U.S., trade on a processing deal basis has become the preferred alternative. By virtue of the Overseas Processing Trade (OPT) system or with the conclusion of the North American Free Trade Agreement (NAFTA), this trade is designed to export textile materials from Europe and the U.S. to their neighboring countries for apparel manufacturing there and eventually import the manufactured apparel back into Europe and the U.S. As a result, "shift to regional economies", therefore moving some Asian product exports to countries closer to Europe and the U.S.

While the globalization of the textile industry is in progress, the Chinese textile industry has expanded rapidly with a shift to a market economy, based on the reform and open-door policy. In line with the China's 10^{th} five year plan, the annual growth of textile product at 6.5%, the Chinese has achieved exports value amounting to US$ 60-65 billion in 2000. China is the world's largest man-made fiber (MMF) producer and cotton producing country and it is the world's textile processing base including textile and made-ups.

Since producers in China are reinforcing low pricing by large scale operation through integration and equipment expansion, it is essential that the Australian cotton industry to develop better and better quality cotton for the high quality yarn manufacturers targeting for the value added textile products to remain in the market; and hence our topic of the day: "Competitiveness through product excellence".

Development of Textile Machines

As we can remember

- The textile technology was an art and craft of several thousand years old. Basic development: the first mechanical, multi spindle spinning machines were recorded in 1790.

- Multiple Increase in Productivity in the Spinning Mill 4

  The development in operating speeds, the emergence of the current era of high performance, took place in the nineteenfifties.
  The following increases in performance were made at the various stages between 1950 and 1994.

Machine	from	to	increase
card	3	70 kg/h	= 25 times
drawframe	30	800 m/min	= 25 times
combing	100	300 nips/min	= 3 times
speedframe	600	1,200 rpm	= twice
ring spinning	10,000	25,000 rpm	= 2.5 times
Rotor spinning	20,000	120,000 rpm	= 6 times

  If this is compared with systems used in daily life, such as cars, railways, aircraft, refrigerators, and washing machine, performance has generally doubled since 1970.

Carding Machines 5

Carding the fibers is the main task of the spinning mill. The quality of the carding process has a direct influence on the quality of the yarn.
- Increase in card productivity

Draw Frames 6

In the spinning process, Draw Frames are used to ensure uniformity of the slivers and improve the parallel orientation of the fibers
- Rising productivity of cotton Draw Frames
  Current speed of 500–1000 m/min developed from the original delivery speed of 10-20 m/min in the 19th century.

Combing Machines

The development of the Comber speed nips/min.
In the nineteenfifties the comber has the speed of 160 nips/min – today's speed of 350 nips/min can be achieved easily.

Speed Frames and Ring Spinning Machines 7

Significant changes in the production speed of Speed Frames and Ring Spinning were noted after the 1980.
Speed frames of 120 flyers operating at 1500 rpm in 1992. Systematic development of rings and travelers resulted in a maximum spindle of 25,000 rpm.

Changes in the Number of Machines in a Spinning Mill for Combed Yarns between 1947, 1966, 1987, and 2000 8

In 1947 a Spinning Mill would require 245 machines to produce 160 kg/hr of yarn count Ne 42s but nowadays the same Spinning Mill will only need 37 machines to produce the same quality and quantity of yarns.

Fabric manufacturing: weaving, knitting and non-woven has gone through rapid improvements since the 1970. The productivity of air jet loom has been greatly improved from 500 rpm in the early 1980 to more than 1000 rpm in the year 2000.

Loom Speed and Weft Insertion Rates Shown at ITMA from 1963 to 1999 9

Picture of 1900 – 1920 – 2000 Weaving Machines 10

The weaving machine today has reached a state of perfection and to raise the performance through further increases in the speed and weft insertion rates will be the most difficult challenge for the loom manufacturer today.
All weaving machines manufacturers now stress on the improved adaptability of their machines.

The similar scenario are noted with the performance of the spinning machines, and based from the data we like to estimate the Spinning machines speed for the 2010.

Estimated Production Speed of Spinning Machines in the 2010

Estimated Production Speed of Spinning Machines 2010 11

Note: This speed is real production speed with strong emphasis placed on the quality.

Card Doffer Speed Production 12

CARDING DOFFER SPEED
PROD KG / H (100% COTTON)

YEAR / PROCESS	1970	1980	1990	2000	estimated 2010
PROD CAPACITY (KG /H)	14	22	40	60	70

The biggest improvement on the production capacity (kg/hr) was from the year 1980 to the year 1990 from 22 kg/hr to 40 kg/hr. In year 2000 production capacity has reached around 60 kg and it is estimated that an increase to 70 kg/hr will be achieved in year 2010.

Drawing Delivery Speed (meter/min) 13

DRAWING DELIVERY SPEED
METER / MIN

YEAR / PROCESS	1970	1980	1990	2000	estimated 2010
COMBED YARN (meter / min)	200	250	350	450	500
CARDED YARN (meter / min)	250	300	450	550	600

There were considerable improvements of Drawing Delivery Speed from 250 m/min in 1980 to 450 m/min for combed yarn in year 2000 and it is estimated that Drawing Delivery Speed in 2010 will be 500 m/min for combed yarn and 600 m/min for carded yarn.

Comber Speed (nips/min) 14

COMBER NIPS / MIN
100% COTTON

PROCESS \ YEAR	1970	1980	1990	2000	estimated 2010
NIPS / MIN	140	180	240	360	420

It is interesting to note that the highest increase in the Comber Speed (Nips/min) was from 240 Nips/min in 1990 to 360 Nips/min in the year 2000, the estimated Comber Speed in 2010 will be 420 Nips/min.

Ring Spinning Spindle (Rpm) 15

RING SPINNING SPINDLE RPM
COUNT NE 40s

PROCESS \ YEAR	1970	1980	1990	2000	estimated 2010
COMBED YARN (Rpm)	11,000	14,000	16,000	20,000	20,000
CARDED YARN (Rpm)	11,000	14,000	14,500	16,000	17,000

During the latest ITMA show in Singapore, Ring Spinning Spindle Speed of 25,000 rpm was not uncommon, although we believe that production speed of 20,000 rpm (for combed yarn) and 19,000 rpm (for carded yarn) would be better employed for best yarn quality and machine efficiency. In a decade from now production speed spindle of 21,000 rpm (for combed yarn) and 17,000 rpm (for carded yarn) will be demanded by the market and therefore better quality of raw cotton fiber e.g. in Strength, Uniformity, Length, etc. will be demanded.

Australian Raw Cotton Production and Quality Characteristic

In 1970 the Australian cotton production was only about 100,000 bales/year with inferior quality characteristic; low strength of 24 GPT and staple length of 1 1/16 to 1 3/32. A decade later there was considerable production increase to 500,000 bales/year with improved quality notably the Staple Length and Strength. The Australian cotton makes it debut in 1990 with production close to two million bales with a superior quality and not to mention that it is one of the cleanest cotton available. In 2000, the market Share of using Australian raw cotton in every mill / country has increased due to its superior quality, stability and cleanliness – making the Australian raw cotton to be the favorite for the high quality yarn manufacturer.

The quality of Australian Raw Cotton from 1980, 1990, 2000 16

Australian Raw Cotton vs. Other Origins (SJV, West Africa, China Xinjiang 129) 17

It is noted that SJV still dominate the raw cotton in Strength with 30 GPT where as the Chinese Xinjiang 129 and West Africa raw cotton has advantages in the high Uniformity of 83.2%, Low Short Fiber content of 5.2% and low Nep count. We would like to demonstrate that there is still room for improvement for the Australian cotton quality.

Australian Raw Cotton Characteristic in the 2010

Spinners' Requirement of Australian Raw Cotton Characteristic in 2010 18

Spinners are confident that the Australian Cotton Industry will be able to meet the above quality given that in 1998 Australian Cotton Industry had produced raw cotton with excellent quality characteristics.

Highlight of the 1998 Australian Raw Cotton

To highlight the performance of the 1998 Australian raw cotton:

Australian Raw Cotton Neps/gram from 1996 to 2002 19

The average Neps/gram of the 1998 raw cotton was only 200 (Neps/gram) although there are some raw cotton received with less than 200 Neps/gram.
Australian raw cotton has been known to have high neps; fabrics produced using a mix of Australian cotton were often critized for having too much neps.

SCS Yarn Neps Content from 1991 to 2002 highlighting the superior nep quality of the yarn in 1998. 20
Target quality to be accepted by Japanese market in 1990 of Thin Thick Neps Count total was 200.
Nowadays target quality of total 100 thin (5), thick (32), neps (60) can be achieved and become standard quality yarn in certain markets.

Australian Cotton – Average Short Fiber Content (%) from 1991 – 2002 21

It is a huge advantage for the combed yarns' manufacturer to process raw cotton having an average of short fiber content less than 5.4% since only little fiber is lost during the process and thus a big saving in costs.

Average Noil Combing Removal (%) from 1991 – 2002 22

Normal combing noil removed during process are between 15% to 18%, but with the 1998 Australian cotton production, spinners were able to reduce the noil combing removal to 12% to achieve some standard quality combed yarn, thus a saving of 4% average.

Australian Cotton – Micronaire Reading from 1991 to 2002 23

Normally high percentage (80%) of the Australian cotton micronaire was in the range of 3.5 to 4.6, but in 1998 the micronaire range was narrowed to 3.8 to 4.6 (81.50%) which is noted to be the prime micronaire. In 2001 high micronaire were experience due to the weather related problems.

SCS Yarn Unevenness (U%) for Cm 40s 24

Outstanding yarn unevenness (U%) of only 10.43 was achieved using 1998 Australian raw cotton compared to 10.62 on average ten years.

SCS Yarn Count Variation 25

The Yarn Count Variation (CV%) for Cm 40s was 1.31, excellent yarn quality.

SCS Single Yarn Strength (Cm 40s) from 1991 to 2002 26

The high strength of the yarn was contributed from the higher percentage of strong fiber produced in 1998, note that 27.4% of production had fiber strength of 32 GPT and above, where as normally Australian cotton fiber strength is in the range of 28–29 GPT level.

Australian Cotton – Uniformity (%) from 1992 – 2002 27

Outstanding achievement, 90.30% of the raw cotton produced has uniformity of above 80%.

Average Raw Cotton Consumption / bale yarn 28

The average Australian raw cotton consumption to produce one bale of yarn on the average is 512 Lbs (varies with Mills condition), but by using Australian raw cotton 1998 the consumption of raw cotton to produce one bale of yarn were reduced to 505 Lbs, thus a saving of 7 Lbs per bale yarn – substantial cost saving.

The Effect of Low Uniformity and High Short Fiber Content (SFC) on the Waste Removed during Spinning 29

The test are carried out using:
Mixing (A): 33 bales lay down, uniformity 82.2% and average SFC 6.8%
Mixing (B): 33 bales lay down, with just insertion of one bale, uniformity 80.2 and average SFC 13.0%
To produce the same sliver quality as mixing A, additional 2% of combing noil needed or equivalent to additional waste removed of 151.8 kg

Raw Cotton Valuation

Existing Raw Cotton Valuation 30

Spinners' Raw Cotton Valuation 31

Contaminations Most Feared by Spinners 32

Enhancing Integrated Strength to Achieve Success in Decades Ahead

Enhancing Integrated Strength to Achieve Success in Decades Ahead 33

The environment surrounding us, is changing dramatically. With regard to management, companies (industries) need to seek and establish their management philosophy and styles that take into account paradigm shifts such as globalization, computerization, enhancement of environmental protection, and other issues.

Competition among other corporation (countries) is growing ever more intense → implementing a number of policies in order to succeed in the 21st century.

Sound Foundation:

1. Trust	- The prime element in every industry's business foundation is the trust fostered over the years, backed up by its business philosophy – ACSA's function.
2. Global network	- Global network (Sales network) → branches; offices → agents covering the world market.
3. Global relations	- Build close and multi faced global relations - through person to person communications and mutual understanding

4. Intellectual capital	- Valuable intellectual capital consisting of know-how, experience and information → preservation of environment through Best Management Practices

Key Expertise:

1. Expertise in Logistics	- To provide comprehensive inter modal logistic services: Central Database System for monitoring Quality and Production per area
2. Expertise in Financial Services	- To provide financial services using the latest technologies – lowering the cost of fund
3. Expertise in IT	- To support activities in building supply chain management (SCM) systems and taking advantage of internet to monitor goods – thus efficiency stock inventory
4. Expertise in Risk Management	- To obtain expertise in risk management: minimize the foreign exchange risk
5. Creativity	- To discover new products (varieties) → agricultural research; technical services → cotton awareness; promotion increasing the demand for natural fiber cotton

Increasing Demand for Natural Fiber "Cotton"

Increasing Demand for Natural Fiber "Cotton" 34

By nature the properties of cotton is:

Breathable:	The natural porous structure of cotton lets it transmit moisture away from the skin and into the air more efficiently
Absorbent:	Cotton is hydrophilic – like a sponge
Textured:	Cotton fiber are naturally convoluted or bulked. This saves to trap air within the fabric structure – acts as thermal insulation: protection from heat in summer and cold in winter
Static free:	Cotton's freedom from static charge is well known – acts as protection
Hypoallergenic:	This means a low tendency to cause allergic reactions – uses in the medical arena; sanitary products, cosmetics, towels, beddings, baby clothes

By design:

Stretch:	Although stretch is an inherent property of knitted cotton fabric – value added fabric containing 2% or 5% of spandex yarns. By design / value added finish will provide 50%-100% stretch for knits and 20%-35% stretch in woven fabric
Weatherproof:	Resistance to wind and rain can be achieved in cotton fabric by a combination of construction and finish e.g. tight dense construction with the finish include fluorochemicals: Teflon, Scotchgard, etc.
UV protective:	Cotton fabric can be treated with UV blocking agents to provide excellent sun protection
Flame resistant:	Durable flame retardant finishing of cotton fabric has been common for protection clothing, military application and children's sleepwear
Anti microbial:	Cotton fabric can be treated with anti microbial finishes – prevention of odors, mold and mildew uses underwear and recreational apparel; golf shirts

End Products

End Products 35

People demand textiles not only for fashion but also with higher functions. High function textiles enhance people's living comfort, convenience and safety. Their demand will not stay limited to apparel application but expand to much wider applications. Australian excellent raw cotton quality will be more suited for the value added: high function textile, sophisticated textile, smart textile, etc.

Apparel: Jeans 36
The Levi's jeans that we are familiar with.
Value added jeans include: - stretch jeans, embroidery jeans,
- light weight jeans, corduroy, etc.

Bathroom: Towel 37
The familiar towels.
High function towels:
- With anti microbial material "microbar" offers protection from harmful and odor causing bacteria, the towel remain fresher and more hygienically clean during use
- "Spin air" – 100% special cotton yarn with a hollow core portion exhibit light weight feel, bulkiness and softness (developed by Kurabo)
- Blended with vitamin C – "V-up" – to improve the skin performance.

Home Furnishing 38
"Cotton's at home in every room in the house".
For high end market: cotton / wool and cotton / wool / mohair area rugs were developed – in addition to the attractive styling and construction, these rugs showed excellent result for flammability and wear testing.

Knit and Woven 39
"Cotton has a natural sense of style with countless moods".
This luxury fabric collection consisted of cotton / wool blend for structured and refined suiting. Cotton / lyocel fabrications for the blouse and shirting areas.

Industrial Fabric 40
Special design and construction fabric for the offset printing industry. Protective clothing includes uniforms for the petroleum and petrochemical industries, metal wakes, and flight uniform for space shuttle astronauts.

Non-woven
Global consumption of non-woven products, particularly personal hygiene products has built a US$ 36 million bill in industry – high potential for increased cotton usage.

Conclusion

With the abolishment of the import quota system under the Multi Fiber Arrangement (MFA) at the end of 2004, textile product export from Asia, mainly China to Europe and the U.S. will increase. Fierce competition between the textile exporting nations will result from this free competition. Stiff competition in price and quality will provide an increased demand for Australian excellent fiber to make the higher value added textile materials.

Imports from Asian low cost countries will increase and the share of "intra regional products" – North American Free Trade Arrangement and Carribean Basis Initiative (NAFTA and CBI) – will decrease because of the decisive difference in labor cost between Asian developing countries such as Vietnam and Bangladesh and the Mexico and CBI.

The expansion of Chinese textile industry is likely to continue for the time being and likely in the future as well. Chinese-made products have already flowed into every parts of the world, this will provide opportunities for Australian excellent fiber to be exported to Europe and the U.S. by utilizing China's large scale competitive apparel manufacturing capacity; also targeting at China's huge final market.

In Europe, the U.S. and Australia enhanced consciousness of global environment issue is noticeable. Particularly in Europe, a system (Oeco-Tex, SCM 2000 series) to certify that products are properly processed and manufactured from the view point of environmental and health protection, is in the process of being established. In Australia, the program of Best Management Practices will help cotton growers to improve the farm management and to minimize the environmental and health risk with pesticide use.

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