



AUTOMATION IN TEXTILES FOR GLOBAL CHALLENGES

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**Honorable Chief Guest, Shri Nayan Parikh, Shri J.P. Singh, President, AIA,
Shri T.L. Patel, President, TAI, Distinguished Speakers & Participants, Other
Dignitaries, Ladies & Gentlemen,**

I would like to thank the Automation Industry Association of India for giving me an opportunity to speak this morning on the important subject of automation in textile industry for meeting global challenges.

BACKGROUND

The textile industry, with its extremely long and rich heritage, has had a major impact on the world economy through millenniums and the very evolution of human civilization. Weaving is believed to be one of the oldest surviving crafts in the world, the actual origins of which are thought to date back to Neolithic times 12,000 years ago. Even before that time, the same principle was used to interlace branches and twigs to form protective fences, shelters and baskets.

For centuries, both the spinning and weaving processes were traditionally carried out by hand at home on a cottage industry basis – weaving by men and spinning by women (hence the term “spinster”). The impetus for a major reorganization in textile production came in the 1700s and post-industrial revolution heralding the process of automation in the textile industry, as inexpensive, good-quality textiles imported from India, China and the Far East, gradually began replacing European



goods in international markets. The need was to increase domestic production and lower costs by substituting the laborious hand processes with more efficient machine operations. Many important inventions took place during this period, often having important spin-off effects on other parts of the overall process of manufacture.

In the England of the 18th century, five important inventions in the textile industry advanced the automation of work processes:

1. John Kay's flying shuttle in *1733*, which permitted the weaving of larger widths of cloth and significantly increased weaving speed.
2. Edmund Cartwright's power loom in *1785*, which increased weaving speed still further.
3. James Hargreaves' spinning Jenny in *1764*.
4. Richard Arkwright's water frame.
5. Samuel Crompton's spinning mule in *1779*, whereby the last three inventions improved the speed and quality of thread-spinning operations.

The twentieth century has witnessed unprecedented changes in the quality of life, abetted by rapid technological advances leading to improvement of longevity taking the global population from one billion to over six billion by the close of the century. Advent of synthetic & man-made fibre to supplement natural fibres supported by technological advances & automation across the entire value chain has made it possible to meet the clothing & textile requirements of rapidly expanding population on the planet. It is expected that global population will touch



10 billion in the next fifty years before it starts to stabilize. The continuous improvement in the quality of life, particularly in China & India and the rest of the third world and the rising global population in the face of emerging resource constraints due to depletion of energy resources, diversion of cultivable land for growing food grains & environmental preservation, has posed great challenge to the textile industry to innovate new processes and products to support the growing aspirations of the global consumer.

AUTOMATION

Before I get into the central theme of my presentation, it will be appropriate to understand the term 'Automation'. Automation is concerned with the application of machines to tasks once performed by humans or, increasingly, to tasks that would otherwise be impossible. Although the term mechanization is often used to refer to the simple replacement of human labor by machines, automation generally implies the integration of machines into a self-governing system. It is generally feared that automation will lead to unemployment. While automation can help in optimization of costs by speeding up the production process and by avoiding wastage, some jobs may be displaced in this process by technology. But time and again, it has been proven that if there are job losses in certain segments, many more jobs are created elsewhere. Automation has revolutionized those areas in which it has been introduced, and practically all aspects of modern life have been affected by it, galvanizing economic and industrial growth all over the world.

AUTOMATION IN TEXTILES



In the last couple of decades, automation has taken place in all the processes involving textile manufacture i.e. cotton picking, ginning, spinning, weaving, processing and even to some extent in garment making, resulting in enormous gains in productivity and efficiency. I would like to recapitulate some of the changes that have come about in textile industry.

SPINNING

Cotton picking, earlier a fully manual process, has been automated in most parts of this world. Ginning too has been automated to a great extent. A cotton fibre test that used to take hours to perform 20 years ago can now be done in a matter of seconds using the HVI system. This process has been achieved through constant innovation and updated automation in the plant capacities.

Yarn forming process has seen advancements and automation by introduction of newer methods of spinning apart from ring spinning like open-end spinning, airjet spinning and Murata Vortex System (MVS)

Cotton mixing in blow room has been automated so that cotton from several bales can be drawn and mixed together, forming a more homogeneous mixing of cotton, thus reducing batch to batch variation in cotton spun yarn lots.

Carding machines using chute feed systems, auto levelers for improvement in quality/productivity and reduced handling have helped in increasing evenness in the yarn.



Advancement in ring and rotor spinning has taken place by way of increase in speed, auto doffing and computerization by way of which idle spindle data is made available leading to better utilization of machinery. Linking ring spinning to winding is now catching on even in our country, although it has been very popular in other parts of the world.

Autoconers with splicing and yarn fault detection have been devised to obtain yarns with lower unevenness and better quality.

The ring spindle speeds have gone upto 20,000 and high-speed rotors upto 1,00,000 rpm are available. Today, spinning machines can produce yarns upto 20 times faster than what they used to produce 20 years ago.

WEAVING

Weaving technology has seen advancements, automatic shuttle looms and automatic shuttle-less looms (e.g., Methods of holding the yarn such as rapier and the gripper) with advantages of higher productivity, to water jet and air jet looms that use water or pressurized air to transport the yarn with multiple colour weft insertion.

Implementation of electronic control such as computer control in automatic looms has simplified operations as only the conditions such as yarn type and weave, width need to be input in order for the optimum operations to be performed.



Automation has resulted in control of machines electronically from user friendly interfaces, produce intricate jacquard fabrics at the speed of commodity fabrics, inspect fabrics on loom, use optical and laser detection of warp break, reduce downtime due to higher levels of automation and quick style and warp beam change. The machine speed upto 1000 rpm is possible, 5 to 10 times faster than 20 years ago.

DYEING & PROCESSING

Automation in textile dyeing and printing means one or more (or all) of the following steps:

- a. Programmable process control (by microprocessors) of the machinery;
- b. Dissolving and dispensing of the dyes, pigments and chemicals in a central colour kitchen;
- c. Computer-controlled weighing of solid material with automatic stock control and the printing of recipe and process cards;
- d. Colour measurement, computerized colour matching;
- e. Central computer (network), computerized management system

Automation in processing of textiles has resulted in machines being designed to use less water, chemicals and energy, hence economical to use and less polluting, apart from other more evident benefits of automation.

APPAREL MANUFACTURING



The pace of technological innovation in the garment industry has been slow until the beginning of the 1980s. The main innovations prior to 1980's were in sewing technology, with faster and more durable machines and the development of attachments for specialized tasks, which later resulted in the emergence of task-dedicated machines. The major technological changes occurred in the 1980s, when microelectronics penetrated all stages of garment production to some degree. The most significant innovations took place in the pre-assembly stage, where computer-aided design (CAD), computer numerical control (CNC) cutting systems, and computer-aided manufacturing (CAM) led to material and labor savings. Over the years, a technological gap has occurred between the apparel and the textile sectors. While the textile sector has progressed in automation, machine design, process control and production rates to achieve better product consistency and minimum labor complement, the apparel sector has continued to face problems such as intense labor and skill dependency, high wages, market restructuring and slow reaction to consumer behavior and market demand

GLOBAL CHALLENGES

In the last couple of decades, textile companies have accomplished a certain level of process automation by upgrading older machinery & equipment with newer microprocessor based machines. These islands of automation have had a positive impact on quality, productivity, overall machine efficiency and costs.

However, with the breaking of trade barriers and integration of the world trade followed by advancement in the communication technology in the last decade,



have changed the rules of the game. In a globalised business environment led by information enabled technology, it has been possible to cut out inefficiencies and enhance productivity, further pushing down costs deeper and faster. Needless to say, prices are shrinking across the board bringing benefits to both business and the consumers. It will be observed that in the last decade price points at the retail level in the US and Europe for women's clothing have come down in the range of 20-37% and men's clothing from 15-25%. It is predicted that this trend is likely to continue in the next decade. Further price reduction of the order of around 25% can be expected because of competitive cost structure, high level of efficiencies and productivity by application of IT enabled technologies and microprocessor based improvements in the plant and equipment.

It is, therefore, of paramount importances that automating and integrating the business processes are the key for survival to compete in the global market place. It is clearly recognized that to continuously compete, the textile industry must produce high quality products cost effectively and to accomplish their global marketing objectives, companies are beginning to extend automation from the machine level to the plant floor, to the entire enterprise. The objective of automation, therefore, has to be the following:

- Reduced labour cost
- Reduced raw material cost
- Reduced energy cost
- Improved quality
- Reduced wastage



- Reduced reworks
- Reduced capital equipment & engineering costs.

A properly implemented process automation will provide significant benefits in one or more of these areas leading to competitive edge in the global markets.

INDIA IN GLOBAL CONTEXT

Friends, despite the fact that Textile and Clothing Industry is the largest manufacturing activity in the country providing direct and indirect employment to about 100 million persons, there is no denying the fact that this centuries-old industry will have to integrate modern technologies not only in production but also in inventory control, supply chain management, distribution and other areas, in order to enhance its competitive strength in today's markets. With a majority of units confined to unorganized sectors, level of Technology in the Indian Textile and Apparel industry is still a matter of concern. For example,

- Only 2% of the looms in the country are shuttle less as compared to 8% in even Pakistan.
- Only 4% of India's total fabric production happens in Organized Sector.
- In apparel India has much lower investments in special purpose machines.
- Only about 5% of all processing is in large organised Process Houses. Rest is either in small-medium sized IPHs or Hand processors.
- Only a few garment manufacturers have above US\$100 Million turnover.



Tremendous scope exists for Indian T&C industry to improve manufacturing efficiencies. Indian apparel industry operates at efficiency levels of 40-45% on an average. In comparison, countries like Bangladesh (52%), Sri Lanka (48%), Vietnam (65%), China (65%) and Mexico (75%) work at much higher efficiency levels. The level of automation in the apparel sector in industrialized countries has reached a stage where human interventions are very limited in some of the hi-tech units. While we need to continue utilizing our strength in our tradition based craftsmanship and our labour force, we must graduate into hi-tech and mass production segments of this sector only if we are able to utilize technology and automation more efficiently.

Lower scale of operations has affected India's capability to fulfill large orders. In addition India's inability to produce specialized fabrics like warp knit fabrics for lingerie, fine woolen fabrics for suits and corduroys has resulted in India's low share in related categories. Indian imports of fabrics have also increased tremendously in the last few years. As per a Technopak study, Indian fabric imports have shown a CAGR of 33% in last 4 years. Most of the fabrics are being imported from China due to lower prices and lead times and inability of Indian manufacturer's to fulfill demand of garment companies, especially for large lots and specialty products.

WAY FORWARD – INDIAN TEXTILE INDUSTRY



This calls for bold initiatives on the part of the industry and the Government, particularly in areas such as upgradation of technology, improvement in productivity and availability of raw materials, enhancement of quality of products, incorporation of Information Technology (IT) for improving design and enlarging business and commerce. It is in the context of modernization that I believe IT has a significant role to play in the industry. IT can be used by small as well as large enterprises because many of the IT tools are scale neutral.

The Indian Textile Industry should not under-estimate the magnitude of the challenge posed by global competition. For one thing, replacing the existing machines with machinery incorporating state-of-the-art Control, Instrumentation and Automation systems will require huge investments. Cost-effective solutions would need to be devised for the industry to survive in the face of globalization. Replacing existing production machinery with microprocessor based electronic systems may help in achieving the desired level of automation at affordable costs. IT can find a range of applications in the textile industry. Management Information System (MIS) packages and Enterprise Resource Planning (ERP) solutions are now available for adoption by small, medium as well as large units. MIS packages for optimizing the product-mix in fabrics will be helpful in reducing costs and improving productivity, ERP solutions can be utilized for achieving efficiency and improving quality of production. IT tools also facilitate flexibility in production which has become more important as consumers are increasingly becoming more demanding in styles and designs. Even handloom & power loom weavers could have access to CAD-CAM aided designs and colour combinations with on-line information on the latest fashion trends in India and abroad.



The question now is, can the traditional sectors of the textile industry sustain and enhance our market shares on a long-term basis. In my opinion, the uniquely Indian T&C products will continue to have a niche segment in the world markets always. But for tapping the huge potential in the mass markets, we need to seriously address R&D issues and achieve a transition to the information era. This alone will help this industry to become a truly high-tech sector, capable of harnessing contemporary technological innovations and competing in all the segments of the international markets.
