Automation India

Enabling Global Competitiveness

Issue 8 – October 2006 A newsletter of the Automation Industry Association of India

***Dear Friends**,*

It is a pleasure to be communicating with you once more. This is our 3rd Newsletter of 2006. The April issue was dedicated to the FoodTech event, whilst the July issue focused on a variety of subjects — notably, Operational Excellence in Captive Power Plants (CPPs). This coincided with our being the Associate Sponsor of ARC's July event on CPPs in Bangalore.

This issue of Automation India is dedicted to promoting Automation in what promises to be a sector with a prolonged Sunrise! The Textile Industry! After hibernating for over a decade, our Textile Engineering Industry is beginning to see impressive growth. Most of the major textile players are in 'expansion mode'. More than Rs 20,000 cr has been invested and another Rs 50,000-60,000 cr is expected to be invested in the next 5 years (Source: Business India — Oct 8,2006). The upsurge in demand for textile machinery, in particular,has been fuelled by the removal of 'quotas' by the United States and EU. Indian Textiles and Garments were always highly regarded in overseas markets — the lifting of quotas has opened the flood gates, so to speak. Add to that the growing focus on quality and we have another driver of demand.

Quality, consistency and high throughput are key deliverables from Automation. In every part of the Textile Chain — be it production of fiber, spinning fiber into fabric, weaving, texturising, processing or finishing- automation plays a key role. For instance, Control systems are playing an increasingly important role in maintaining production efficiency and product quality at modern textile mills. Computerized control systems control everything from recipe management, boiler surge, chemical delivery, process analysis, machine control, dye and chemical inventories, and floor scheduling. Vision Systems use algorithms based on a human visual system to inspect fabric defects as small as 0.5 millimeter. Entry frame systems with wide band sensors detect web position and exit frame with variable speed pull roll sections and plaiters are just a few examples of Automation.

In the spinning industry, automation shortens production processes and improves quality. High volume instrumented fiber testing shortens fiber testing time to 15 minutes. Automatic yarn testing machines shorten yarn testing time from more than 1 hour to 10 minutes. India, with cost of capital relatively higher than global levels, and increasing labor costs, now provides a scenario where selective adoption of higher levels of automation will yield a good payback. Benefits from automatic testing machines and the opportunities for and benefits of automation in the carding, drawing, combing, ring spinning, and winding processes are making the ROI faster.

TEXTECH 2006 brings together for the first time Automation Industry and leading Textile Industry Associations on one platform. AIA is committed to continuing this initiative so as to contribute to the Textile Industry achieving Global Scale and Competitiveness. As India's manufacturing Economy comes into its own, AIA and its members will be there to provide cutting edge — yet cost effective solutions.

Best Wishes,

JP SINGH
Hon. President, AIA

Union Minister of Textiles
Udyog Bhavan, New Delhi 110001

MESSAGE

I am happy to learn that the Automation Industry Association of India (AIA) is organizing a Seminar on Automation in Textile Industry, in the textile city of Ahmedabad. What is even more heartening is that AIA has been able to bring various stakeholders such as TAI, CITI, TMMA, ITAMMA on one platform. I am sure the deliberations will lay the foundation for synergistic learning and competency enhancement.

Ministry of Textiles is engaged with the challenge of promoting large scale technology development and envisioning a collaborative growth between various stakeholders such as the machinery manufacturers, textile technologists and the mill owners. Our Government's policies encourage all forms of entrepreneurship, from the small sector to the large industrial houses and co-operatives.

Use of Automation Technology to achieve economic viability and flexible manufacturing is now common practice in all areas of value creation - from Raw material blending, Spinning, Yarn production, Fabric Processing, Dyeing, to Finishing and conversion to Garment. Energy optimization and efficient material movement are also vital areas of concern that are being impacted by the use of Automation Technology.

The Textile Industry is one where we are witnessing Indian entrepreneurs scale up their operations. For global competitiveness, scale counts and to that end, automation can serve a salutary purpose. The opportunity and challenge of the textile industry, machinery manufacturers and the automation industry is similar. Besides scale, we are all looking at engineering innovation, rapid learning and skill sharing. I am glad that AIA is supplementing the Seminar proceedings by bringing out a special edition of its technology newsletter.

I send my best wishes to the readers of the AIA newsletter and for the success of the Automation Seminar.

(**SHANKERSINH VAGHELA**)

When the going gets tough, the tough get lean and weave a bright future

The U.S. textile industry's worst nightmare came true on January 1, 2005, when all textile import quotas were dropped and cheap foreign imports from China and other countries flooded the U.S. market. The rise of foreign competition has resulted in mills shutting down across the U.S., displacing nearly 328,000 textile and apparel employees.

In South Carolina, where the textile industry has been a mainstay for over a century, nearly 30,000 people have been laid off from textile jobs since 2002. A family-owned textile manufacturer located in Easley, S.C., since 1923, contributed to those statistics when they were forced to close two of their five mills.

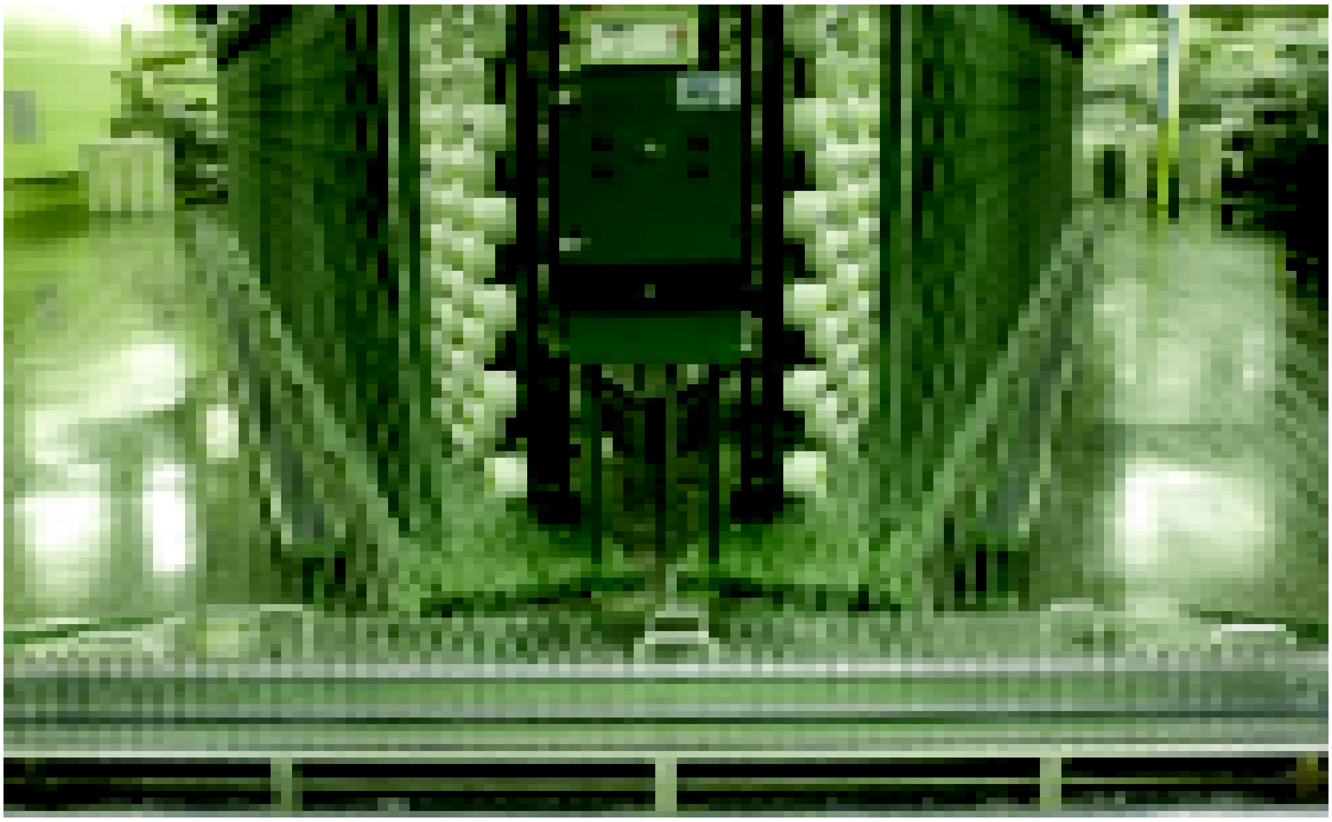
In an effort to combat the problem, textile industry leaders have complained loudly to Congress that countries like China have an unfair advantage due to their wage structures and other labor practices. However, this manufacturer decided it could no longer afford to wait until policies were changed. Instead, they were determined to find their own solution to remain competitive, even under these tough circumstances.

The company manufactures a wide range of cotton and poly/cotton greige fabrics used in home furnishings, apparel, pocketing, and institutional bedding markets, in addition to polyester and poly/cotton spun yarns for the weaving and knitting industry. The company believes their company has three distinct advantages over foreign competition: they produce a superior product that is well known in the marketplace, their location allows them to quickly reach their domestic end-users, and they have invested in state-of-the-art equipment for their three remaining mills.

But all of this wasn''t enough. Their next step was to find a way to cut costs, eliminate waste, and streamline processes-in other words, they needed to get lean. That's when they turned to an automation led initiative.

Venable explains that the company was drawn to the program because it offered more than a theory or concept. "It comes from another manufacturer that understands exactly what we're facing because they had to face the same challenges," says Venable. "We saw plants that had successfully implemented similar programs and were reaping immense benefits. Seeing those plants achieve bottom line results was what helped us make our decision to bring a crack lean management team in to be our partner."

"We have tried other programs, but none of them integrated automation with the plant floor and gave our employees the right tools to understand how to improve productivity, improve quality, and cut costs." — ***Joe Venable****, Executive Vice President of Manufacturing*



Like many other manufacturers, the company had tried other programs in the past that just didn't bring the results they were looking for. Venable believes that what makes Lean Management work is the unique approach of combining lean thinking, Six Sigma, and Maintenance Excellence. “Lean Management ties all three together for a set of tools that really works,” says Venable. “It’s the power of the whole process, plus the mentoring, and it’s something that most people have never seen before.” The Lean Management team worked hand-in-hand with the company employees, teaching them to become proficient masters of Lean Management, Six Sigma, and Maintenance Excellence. As these new Lean Masters began their lean projects, Venable says you could quickly see a culture change taking place in the plants. “As a manager, I can’t think about everything that could possibly be done in the plant to cut costs. It’s the people on the plant floor who know what can be done to make the processes smoother and to cut waste,” says Venable. “What Lean management has done is truly focus everyone on trying to save the company money so we can be competitive. We have tried other programs, but none of them took it to the plant floor level and gave our employees the right tools to understand how to improve productivity, improve quality, and cut costs.” Chris Quigley, the company corporate quality manager, agrees that the culture change has been dramatic and reports that within the first six months of the training, employees were already contributing to the company's bottom line. He cites an example of a spinning frame technician who “hypothesized” that lowering the air pressure on the process could cut energy costs without impacting the quality. “This employee conducted the proper tests and proved his hypothesis was correct,” says Quigley. “We’ve now been able to lower the air pressure throughout the plant, saving us a tremendous amount on energy costs. Lean Management teaches employees a variety of tools, like hypothesis testing, and they stick.”

Lean Management has also taught them that no idea is too small to consider, because even small successes can lead to larger savings. Quigley tells a story about another employee's project that initially saved only about $20,000, while his second idea saved just $35,000. But according to Quigley, the employee didn’t give up, and his third idea saved the company nearly $100,000. “This effort has served as a model for other employees, because we tell them that even small ideas can grow into big savings,” says Quigley. “We have all learned through our Lean Management training that if you stay focused on the process, and stay focused on the tools, you will achieve success. That is exactly what’s happening. There are a lot of programs to choose from, but if it isn’t Lean Management, you won’t get the same kind of results that we have achieved, I guarantee you that.”

The plant’s success has translated into new opportunities. While the company is known in the industry as a high-end producer of woven cloth, they are now expanding into the business of selling yarn. Venable says this is a market that demands the highest quality product and that through the Six-Sigma element of Lean Management,

“There are a lot of programs to choose from, but if it isn’t Lean Management, you won’t get the same kind of results that we have achieved, I guarantee you that.” — ***Chris Quigley****, Corporate Quality Manager*

they have actually improved their yarn quality. “By eliminating variation in our processes, the quality of not only our yarn but also our woven products has improved,” says Venable. “Having top-quality yarn is now helping us compete in a whole new market.”

With these successes, along with many others, the company has seen a definite impact on its bottom line. The company prefers not to cite exact figures, but reports they are more than halfway toward reaching the substantial goal set at the beginning of the program. “We are more than impressed with the results we have achieved through Lean Management to date,” says Venable. “We are growing profits due in large part to the Lean management program, and without talking about a dollar figure, it’s certainly impressive what we’ve accomplished. In fact we're amazed at the kinds of results we have been able to achieve in the first year of the program.”

When the company began its investment with Automation and Lean Management, they admit they didn’t fully understand what an impact it would have on their company. A year later, company officials believe, “Automation and Lean Management gave us a vision of success that we would not have achieved trying to do an adhoc investment on our own,” says Venable. “I’ve been with this company for nearly 38 years, and with all honesty, Lean Management is the best thing I have ever seen us do.”

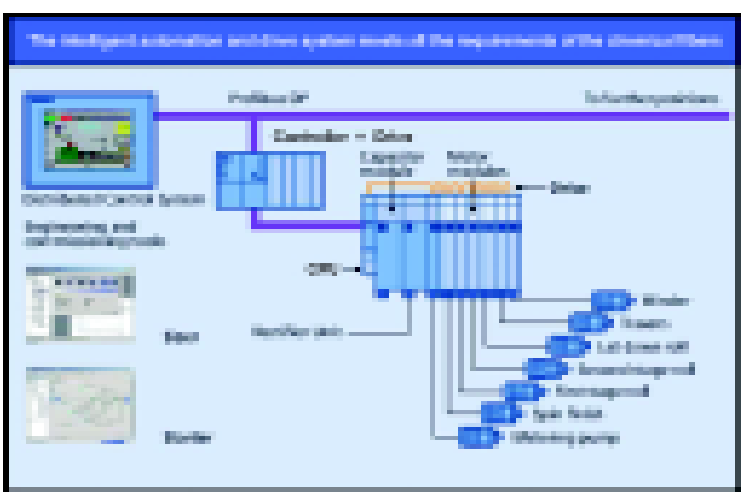
— Debasish Ghosh

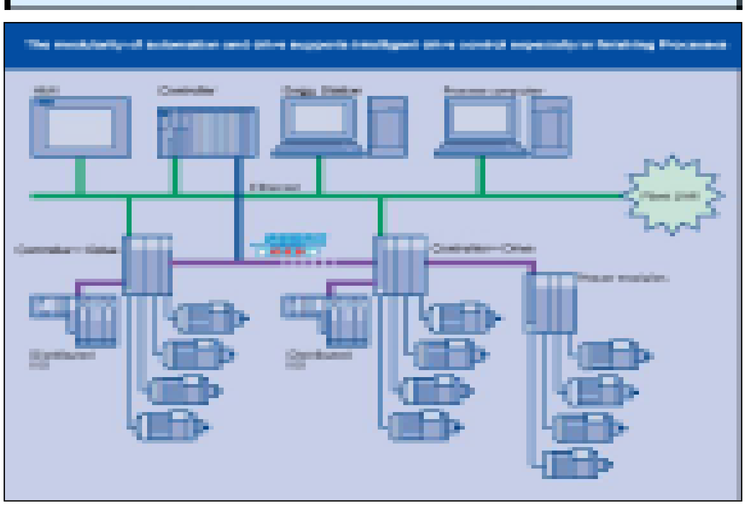
Solutions for Your Global Success

Fierce competition and an enormous cost pressure in the textile industry ask for an immense effort from machine manufactures for the textile industry. Those manufacturers will be successful who offer the required technological quality of machines and plants and meet the end customers' demands for high productivity, low "Total Costs of Ownership" and investment security. Here, the automation supplier is doubly challenged. It must support both machine and textile manufacturers with high performance products and solutions adapted to requirements with reliable services.

Historical

The textile industry is one of the more automated industries. That has a tradition because mechanization began very early in the manufacture of textiles - just consider the punched cards in weaving. Of course, the degree of automation today depends on the location and the textiles to be manufactured. In Asia, for example, the basic clothing textiles are produced in very wage-intensive and therefore hardly automated productions. In Europe on the other hand, more and more attention is being paid to high-tech textiles but also to mass articles with the fastest and most reliable market availability for the technical field.





Future Trends

Uniform solutions for the manufacturing process can help to reduce the time to market, further improve the transparency of the product quality, reduce the variety of types and parts, optimize maintenance measures or minimize training times and costs for the machine operators and are consequently in increasing demand.

Consistently modular

There is a trend towards modular machines and plants. They can contribute to a shorter project duration and higher engineering quality by using proven hardware and software modules. Here, distributed and intelligent drive components, in conjunction with tried and tested controllers and motion control systems, enable integrated concepts that guarantee the necessary flexibility in concept construction and individual combination of the mechanical machine components.

Example

The requirements for textile finishing machines are high. Since increasingly frequent article changes are the rule in the production process due to shorter yardages, the machines are required to be highly flexible. Short changeover times help the finishers to react quickly to changed requirements. In addition, the replacement of mechanical systems by mechatronic solutions has proven successful particularly in finishing. This is achieved, for example, with drives with intelligent motion control, such as virtual masters for "split warp" on stretchers in a technology package. Here, the drives replace mechanical solutions; the gear is eliminated.

Clever modularization saves costs

Profinet is becoming increasingly important. In that respect it is of course an advantage to the whole textile industry when automation manufacturers commit themselves to further development of the Profinet standard. Profinet enables not only the integration in the company system but also tele-maintenance or spare parts deliveries via the Internet are no longer a problem.

Direction

For Indian Textile to have its pie share in the world market, Volume and large-scale production will be the mantra. The above, described trends will be the major factor for the success of large-scale projects.

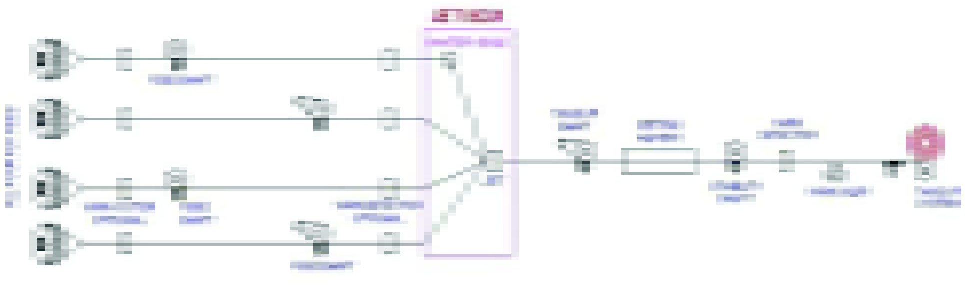
— Vipul Mehta

Texturising Machine Control with AC Drive

Texturising is a process by which required properties are imparted to Partially Oriented Yarn (POY), which then may go as direct production input to fabric manufacturing textile units.

The texturising machine is a longitudinal multi-section machine. The length of the machine is decided by number of bobbins/spindles. The yarn passes from feed end to last stage winding end through a complicated path of separate driving shafts or sections. Through a mechanical arrangement, twist is imparted to yarn for strengthening. Compressed air, steam, & heat are used in the machine. The final yarn has superior properties to the input yarn.

Depending on the grade of the feed yarn and quality of finish desired, different draw/stretch have to be maintained between various sections. This means the ratio of angular speeds of different driving shafts in a given machine have to be decided depending on line-speed, grade of incoming yarn and quality of finish to be imparted. A typical yarn path is shown below:



To meet this basic requirement, two co-existing machine technologies are available:

(1) Line shaft drive systems

(2) Sectional drive systems

In the machine driven by line shaft, a single AC induction motor drives the machine master shaft. Speeds of various other machine shafts in the machine are decided by operator based on pulley belt /gearing arrangement to achieve speed either higher or lower than that machine master.

The limitations of this design are:

a) The line-speed is fixed and hence not too many different grades of incoming yarn can be handled.

b) Since pulley belt /variable mechanical gearing can be adjusted in fixed finite steps, different combination of ratiometric speed adjustment between various machine — shafts are difficult to be achieved. This means a restriction on available variety of finished yarn for a given machine.

c) Any change of speed ratio implies mechanical changes, longer changeover time and hence loss in production.

d) Machine line speed varies due to variations in input voltage supply, frequency and machine load.

Use of ac drive for the main motor does take care of some aspects mentioned above.

Owing to relative inflexibility of such line shaft machines, sectional machines have now gained popularity. Independent squirrel cage motors drive each driving shaft of the machine. AC drives are used for each of the motors.

The requirements of sectional machine are described below:

1. Each shaft has to be run at a predetermined speed. This necessitates use of A.C drives on each shaft for speed variation.

2. High speed holding accuracy is required to prevent speed errors eventually leading to increased tension in the yarn between shafts and hence yarn breakage.

3. During machine start up, all shafts should reach top speed simultaneously and during shut down, all shafts must slow down to zero speed simultaneously to prevent yarn breakage.

4. On power failure, all shafts must come down to zero speed simultaneously to avoid yarn breakage.

5. Use of external power source for prolonged deceleration time expected under power failure.

6. Since environmental conditions, where these machines are installed, are harsh the control system used has to be tropicalised to withstand the elevated temperatures, humidity and oil mist.

Advantages of using sectional texturising machine with inverter control:

1. Higher productivity
2. Improvement in yarn quality
3. Minimum changeover time for different yarns
4. Increased life of machine mechanicals.

— S.Y. Shelar

Flexible Automation in T

In most sectors of textile manufacturing, automation is one major key to quality improvement and cost competitiveness. Early modernisation and technical developments in textiles concentrated on the automation of individual machines and their processes. Here, all process and machine variables were identified and placed under the surveillance of monitors or microprocessors. The machine and operating parameters of acceptable change were studied and programmed to control the quality and reproducibility of materials being produced.

The next step involved the inter-linking of sequential machinery processes. Progress has been made in connecting operations such as yarn spinning systems, but considerable technical improvements are required to achieve fully automated textile mill operations. Table 1 depicts the history of technological evolution in the textile industry.

A look at the 1990s gives evidence of where it is going. Throughout the 1990s, Computer Integrated Manufacturing (CIM) and Flexible Manufacturing Systems (FMS) has been the dominant production philosophies of the textile and clothing industries, both in developing and in developed countries. The ultimate goal seems to be the fully automated textile mill. On the whole, the industry has moved from the era of computer applications in textile operations to the era of computer integrated textile manufacturing.

The main objectives of Computer Integrated Manufacturing (CIM) are first to provide accessible information for every sector of a plant for the efficient management of the various stages of production, second, to provide facilities for planning and control at strategic points, available for the directors, managers and supervisors to make decisions and third to have compatible sophisticated high technology systems - particularly software — so that computers can talk to one another within the network, and modules can be linked with other modules, accepting additional work stations as the business grows.

(1) FIBER MANUFACTURING:

A major direction for evolutionary change in extrusion technology is the continuing integration of extrusion with downstream processes. Today, it is possible to find commercial examples for spin-draw-wind, spin-draw-warp and spin-draw-textile processes. These technologies place a different emphasis on material handling requirements; robotic technologies for package doffing and transport are increasingly available and yet because of the linking of processes, need be placed only at critical points in the overall process.

The emphasis on flexible manufacturing, even in the fiber industry, has led to the development by some fiber producers of robotic techniques for the rapid change and replacement of spin packs and spinnerettes. In these examples, robots are called upon to do what humans cannot do - change hot parts before they have cooled.

Automated inspection of yarn packages for broken ends, poor package building, and improper tensions and misidentified packages is a goal being pursued by a number of fiber producers.

The history of the man-made fiber industry has emphasized process control more than any other segment of the textile operation. Increasing emphasis on product uniformity and adherence to quality standards continues to require fiber diameter monitoring, temperature and tension control, and monitoring of the solution properties of the polymer. These requirements are especially critical in micro-denier fiber extrusion, a process that produces fibers and eventually fabrics of truly different properties.

(2) YARN MANUFACTURING:

Computer Integrated Manufacturing Systems are available that monitor and/or control practically all yarn production processes from opening and blending to spinning, winding and twisting as shown in Fig.1. Applications include inventory control, order tracking, maintenance control, budgeting, mill management and

TABLE 1: TECHNOLOGICAL EVOLUTION IN TEXTILE MACHINERY

PERIOD	MANAGEMENT GOALS	EXAMPLES OF APPLIED TECHNOLOGY
1960-69	Increased Machine Speeds, High Productivity.	High Speed Cards, Shuttleless Looms, 96 Feed Circular Knit Machines.
1970-79	Reduced Labour Content.	Chute Feed Cards, Open End Spinning, Larger Packages, Automatic Piecing up, Automatic Knotting.
1980-89	Reduced Operator Skill Dependency.	Automation Using Microprocessors, Computer Controls, Automated Materials Handling.
1990-99	Automated Manufacturing.	Robotics, Integrated Processing, Artificial Intelligence.

Textile Manufacturing

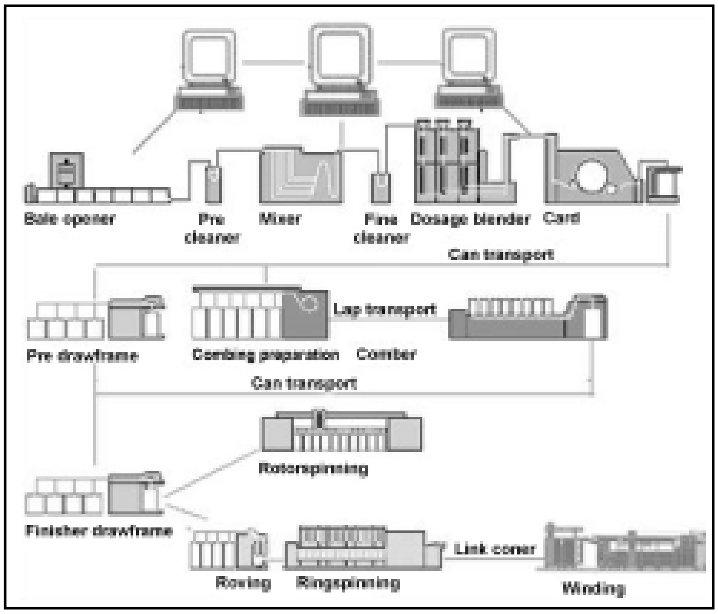


Fig. 1: CIM Spinning Mill

many others. Most companies now offer advanced controls on opening, blending, carding and other fiber preparation equipment, which are compatible with CIM. Ring spinning machines with individual spindle drives are available and these offer great flexibility and will readily fit into the CIM concept. Sliver weights can be controlled and the levels changed by on-machine electronics that can readily be connected to a computer network.

On-line quality control in carding and drawing can perform spectral analysis and determine the cause of problems based on the frequency analysis of the defects. Yarn spinning is now so automated that a large spinning mill can be operated by a very small number of people since automatic end piecing and automatic doffing is performed by robotic mechanisms.

One of the world's most advanced examples of CIM applied to a spinning mill is Kondobo-Murata CIM mill at Horigane in Japan. The nucleus of Horigane plant is Murata's Link Coner Spinning/winding link system, while their `Sky-Rev' automated inter-process transportation system operates between the post-carding sliver and ribbon-lapping and combing and again takes over to provide the automated transport link between combing and drawing.

(3) FABRIC MANUFACTURING:

Weaving and knitting machine builders have been leading the way in utilizing computer technology in textile manufacturing for many years with their use of CAD, bi-directional communication and artificial intelligence. With the availability of electronic dobby and jacquard heads, automatic pick finding, and needle selection etc. these machines are the most easily integrated into computer networks of any production machines. Bi-directional communication systems can be used to control many functions on a weaving machine. As Fig.2 shows a CAD system can be used to develop the fabric to be produced and the design can then be transmitted over the network to the production machines to produce the desired fabric. Now, the design instructions can even be sent by modem from one country to a weaving machine located anywhere else in the world. A weaving machine capable of receiving and responding to instructions in this way can therefore be operated in a developing country while the designs it is weaving are originated and controlled, long-distance from a developed country. These technologies can greatly reduce the time needed to produce a fabric and give true meaning to the term `quick response'. Weaving also is the area where artificial intelligence is progressing the fastest with developments such as expert systems to assist in troubleshooting looms.

In the 1990s, due to remarkable progress in computer technology, the application in sizing machines has increased to a greater extent such as multi-point thermo sensors for energy saving, automatic control of squeezing pressure, size pick-up detectors, multi-functional counters etc. Sizing machine control systems provide a tool for management to insure that all warps are sized identically under standard operating conditions. These monitoring and control capabilities can be included in a computer network of a weaving mill as shown in Fig.3.

For years knitting machine manufacturers have been making excellent use of electronics to provide machines that are more automatic and versatile and many refinements of these advances have been made. These automatic machines are already `islands of automation' that can be incorporated into a CIM network.

Automated weaving plants are on the drawing boards. None is yet in operation but should be a reality within a few years. The six production steps winding, warping, sizing, weaving inspection and packing include 16 points of automation. Of these, 12 deal with materials handling or transport. Only four applications deal with automating

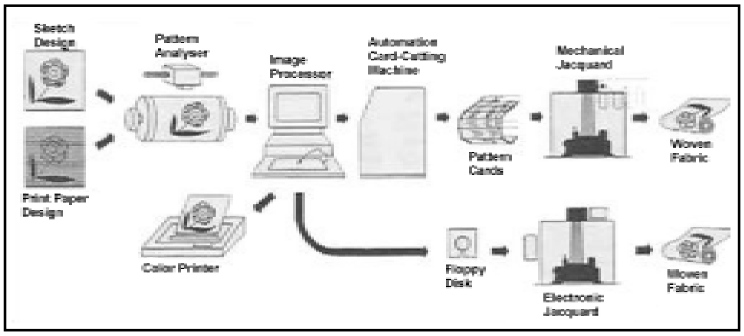


Fig. 2: Computer Jacquard Weaving System

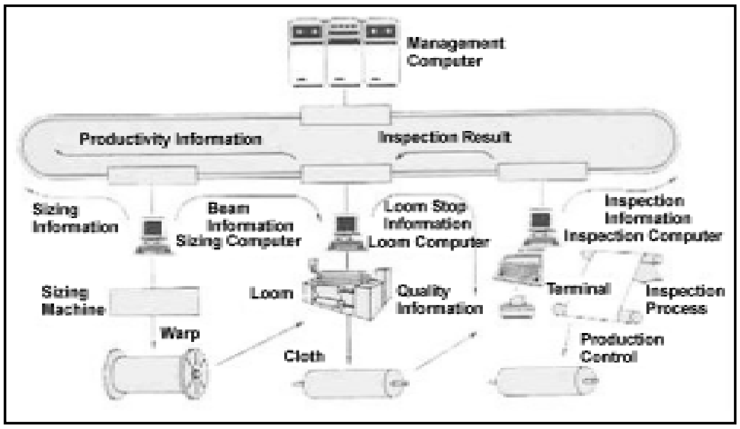


Fig. 3: Computer Network in a Weaving Mill

the machine operations themselves. This includes automated process control on the slasher and the weaving functions of (1) Automatic Pick Repair (2) Automated Warp breakage Locator and (3) Computerised Machine control. Manual assistance is still required for beam replacement and repair of warp breaks.

(4) TEXTILE DYEING:

The automatic control of dyeing machines dates well back into the 1960s, and each succeeding year has shown miniaturization and enhancement in the management of information on a timelier basis. The automation started with the introduction of a system that controlled a set temperature by switching heaters on or off. A short time later these were replaced by systems that controlled the dyeing cycle according to a time/temperature sequence. The processes of dye and auxiliary chemical addition as well as loading and unloading of textile materials were also automated to result in automated dye-house management. A monitor displays scheduling for any machine and allows the operator to arrange the next lot. Batch weighing updates inventory each minute and give inventory of each dye by bulk and container. Any errors later in the process can be traced to a particular container if it should become necessary.

Now, the jiggers have been fully computerized with total control over process. In the pad-batch dyeing system, the most outstanding development is special dye dispensing system, on-line color monitoring and dye pick-up control.

The knowledge-based methods are becoming increasingly significant in the field of dyeing process automation. Essentially Neural Network and Fuzzy Logic are frequently being used. The Glen Raven's new automated dye-house near Burlington, N.C. is among the most robotized plants in U.S. textile industry. In the plant automated system directs the entire manufacturing process from dyeing to loading and unloading yarns. It knows what color and how much dye to add, when to mix it and when and where to route the yarn for the next step in the dye process. The system creates a highly effective and extremely efficient facility. Also, in India, a State-of-the-Art Indigo Dyeing Plant can be remotely operated and diagnosed for any maintenance across the globe.

(5) ON-LINE QUALITY CONTROL:

An important factor in the success of automated textile mill is on-line quality measuring, monitoring and controlling. More and more instrument companies have devices to perform these tasks while they were applied externally when introduced several years ago, today they are being incorporated internally.

The importance of on-line monitoring and quality control cannot be over emphasised. With the high rates of production now achievable, any off standard condition can produce large quantities of second grade material. This can represent non-recoverable value added production costs as well as the loss of full priced, first grade products. Should the off standard material remain in the production line, further deterioration in product quality such as, foreign-matter, broken filaments, slubs or unevenness can be expected in down-stream processing. Additionally, machine stoppages can occur. It is essential to incorporate on-line quality detectors that can measure quality on a continuing basis, adjust machine settings within prescribed tolerances to maintain nominal quality parameters, or stop production if automatic corrections cannot be made.

Recent advances in imaging technology have resulted in inexpensive, high quality image acquisition and advances in computer technology allow image processing to be performed quickly and cheaply. This has given rise not only to a number of developments for laboratory quality testing equipments for fibers, yarns and fabrics but also to developments of on-line equipments for continuous monitoring of quality in textiles such as Fiber Contamination Eliminator, Intelligent Yarn Grader and Automatic Fabric Inspection.

The above article is an extract from ITCTI (Information Technology Centre for Textile Industry) Monograph, and published under authorization from ATIRA.

— PB Jhala & RM Sankar

Innovative power automation solution saves Indian polyester firm US$3.6 million annually

Teamwork between automation technology supplier and the system integrator provides a high-quality, uninterrupted power supply, allowing the customer to operate smoothly and achieve the highest quality polyester filament yarn production.

Background

Often taken for granted, cloth is a fundamental product of necessity worldwide. Within this huge market polyester filament yarn, or PFY is the main raw material used in the manufacture of cloth. As an industry, PFY is fiercely competitive and global. Several factors drive value within the industry. One of which is the ability to manufacture PFY through high-speed spindles, while providing final product with a minimum of yarn breakage. In this pursuit, the most competitive plants are also run continuously, so downtime has an immediate impact on productivity and profitability. Assuring uptime takes a mixture of the right manufacturing infrastructure and, most important of all, the ability to rely on a high quality, uninterrupted electric power.

Challenge

Electricity in India is a highly valuable but extremely limited commodity. Its supply is also inconsistent and not always of the highest quality. Because of this, most competitive industries here have invested in their own cogeneration power plants.

When a major manufacturer of PFY in India began planning for an expansion with a new production line, a cogeneration power plant seemed logical. But in order to protect their investment and maintain gross annual revenue levels of approximately US$100 million, the company wanted to avoid problems associated with previous cogeneration experiences.

Although cogeneration plants solve many power problems, they also provide their own unique sets of challenges. For one, the cogeneration plants must synchronize the power they produce with the power in the local utility grid, a process that is managed by on-site diesel generating sets [DG sets]. Also, properly managed active and reactive load sharing among these DG sets and the local grid must be attained to maximize the plant's fuel efficiency. Finally, the DG sets themselves must be mechanically and electrically safe.

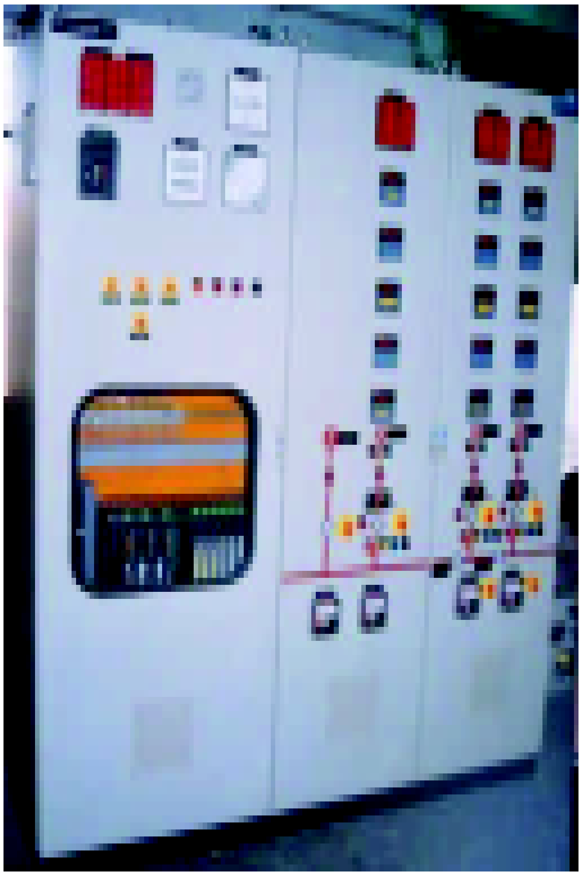
This company, for competitive market reasons, prefers to remain anonymous, had utilized a cogeneration solution in a previous plant, but experienced several problems, including daily power supply dips caused by improper plant-grid synchronization. These events always resulted in two-hour production losses, therefore extremely high revenue losses occurred while the plant was being re-established.

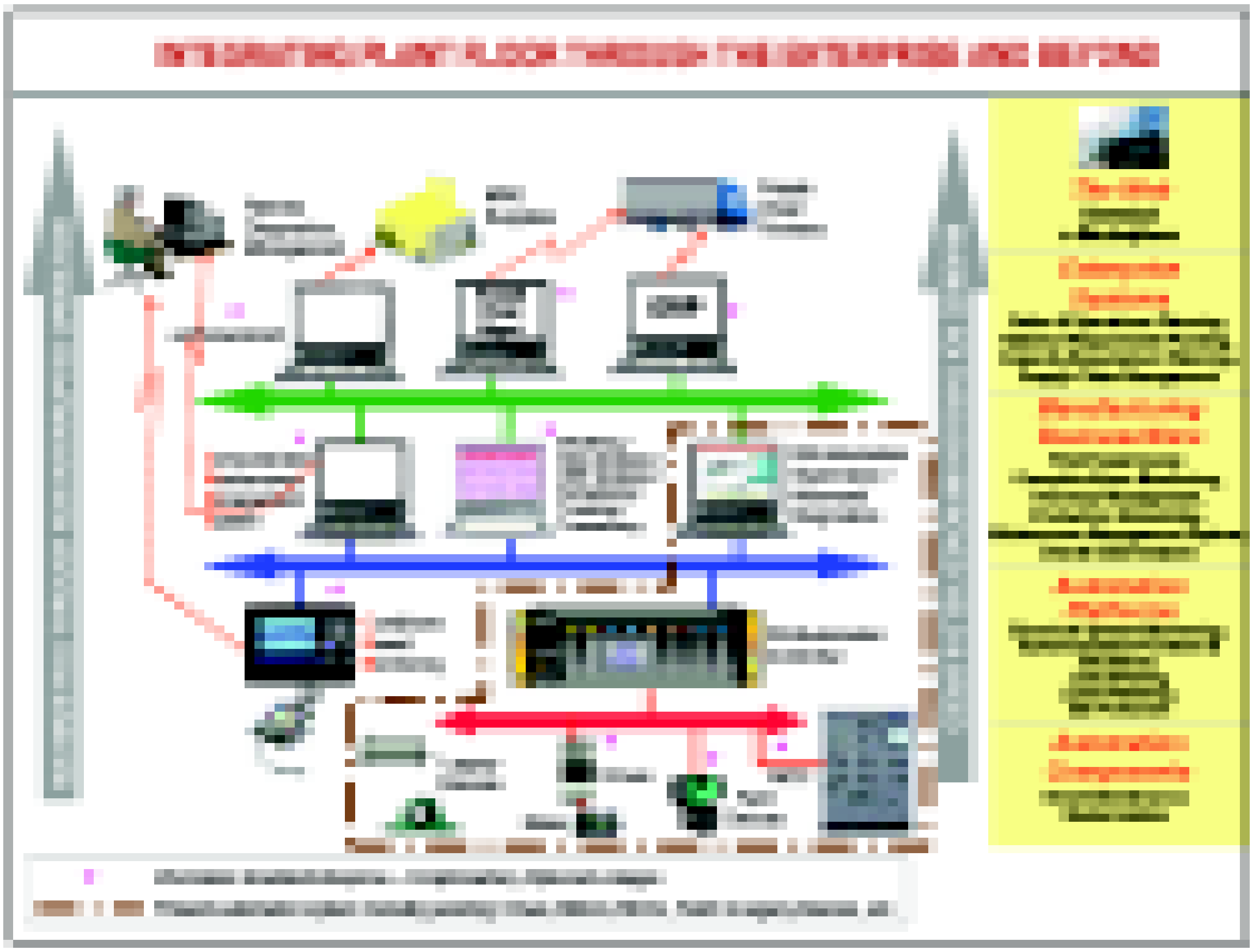
Solution

The complete solution provides a single human machine interface [HMI] display to monitor, operate and troubleshoot the entire power plant automatically. As required, the DG sets start/stop or synchronize among themselves and the grid in order to provide high-quality, uninterrupted power.

A central operator station pinpoints any fault within the DG sets, in addition to providing and managing maintenance schedules. This station also restricts grid supply power consumption within specified limits, thereby avoiding local utility penalties. And the automation system ensures that system engines function smoothly and within proper electrical and mechanical safety parameters.

The load-management system ensures optimal utilization of DG sets as required per load. To that end, the system's continuous load-sharing features ascertain adequate loading on the DG sets and avoids nuisance tripping, resulting in more power generation per ounce of fuel burned. The automation products involved include PLCs, along with the heart of the system, the line synchronization subsystem, and the HMI for monitoring and controlling the powerhouse.





From a functional standpoint, the line synchronization subsystem converts the potential transformer and current transformer signals from the alternator to derive different electrical parameters. A programmed process also coordinates active and reactive load sharing among the DG/Grid sources.

DG sets may be started simultaneously through operator interface to handle sudden plant demand during normal or emergency startup. The load management system also ensures optimal initialization of the DG sets by automatic starts and stops, depending on the predefined load setting in the PLC.

Tripping of less important loads in the plant can occur in isolation as well as in a synchronized mode. Finally, an alarm summary for each fault occurrence tracks incident dates and times for data tracking and maintenance needs.

Results

The automation solution has provided a high-quality, uninterrupted power supply, allowing the customer to operate smoothly and achieve the highest quality PFY production ever in a continuous operating environment. With assured, steady throughput and agile manufacturing, supply and turnaround commitments are being honored and continue to grow. Because production losses are no longer a problem, the company operates consistently, achieving additional revenue generation of approximately US$10,000 per day, or approximately US$3.6 million annually. Emergencies during plant tripping and starting have also been eliminated.

The architecture shown above depicts the automation concept of an Information Enabled Enterprise. The area outlined with a brown dash line represents the present automation level under discussion

in this document. The remaining portion illustrates a host of solutions that are available today to integrate the plant floor to the enterprise and beyond.

— Anshu Singhal
& Jatinder Hans

Online pH measurement in Waste Water Treatment Plant in Textile Industry

Wastewater from textile plants is as diverse as the processes used in the industry. Still, one can make some general statements about the wastewater

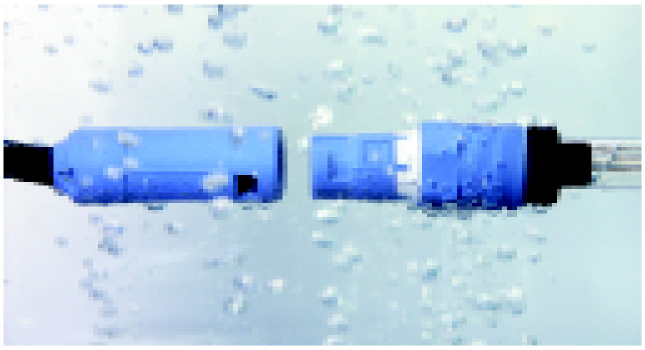
- It contains few bacteria
- The proportion of organic nitrogen is small
- Heavy metals occur only with the use of metallic dyes
- Temperatures are high, raw water being between 20°c and 30°c, sometimes even higher
- Wastewater is generally alkaline
- The proportion of phosphates depends on the process used

An important criterion for estimating the efflux of wastewater is the extent to which dyes are diluted. The greater the dilution, the more material will enter the wastewater

The wastewater must usually be neutralized before discharge. Sometimes collecting and allowing it to mix can do this simply. Wastewater from textile mills rarely has the right proportions of organic material to act as feedstock for bacteria in a biological treatment stage. Treatment often uses liquor from communal drains. Treatment is easier if buffer tanks can store the sporadic discharge of large quantities. If further treatment is necessary for specific substances, these may have to be treated specifically by precipitation, flocculation, filtration or adsorption

Use of DIGITIZED pH Measurement

pH measurement is a critical measurement in wastewater plant in Textile industry. In pH analysis, the connection between sensor and cable has so far been the weakest point. Until today, pH instrument had the problems such as tightness, corrosion and handling. Measurement variables with very small currents make high demands on the connection between sensor and transmitter. Leaks and corrosion impair the measurement value transfer. In this case, particularly high-resistance measurements in a dirty or damp environment quickly become a problem. In order to minimise the voltage drop as far as possible, the use of expensive MIL connectors with gold contacts, complicated special cable and complex measuring amplifier has until now been necessary. However, the systems remained prone to failure.



New Digitized pH measurement solve all these problems by their inductive, contactless plug-in connection with bayonet lock.

The new Digitized pH measurement sensors are based on an inductive plug-in connection with bi-directional signal and energy transfer. The 'built-in ,intelligence' allows to save and evaluate process-and sensor-relevant data. The result is a revolutionary simplification of process measuring technology.

The unique sensor intelligence in the form of an integrated circuit board offers many possibilities: Manufacturing data and current sensor properties as well as sensor histories can be recorded. The sensor load is logged and used as a basis for look-ahead maintenance. Another trend-setting feature is the electronic signature, a requirement from the pharmaceutical industry. The main benefit is the storage of calibration data. Digitized pH measurement sensors can be precalibrated under optimum conditions in the laboratory. After calibration, they are simply replaced in the measuring point.

With precalibrated sensors, measuring points that are difficult to access are no longer problematic. The sensors identify themselves within the application so that each measuring point recognises its individual sensor. Measuring point down-time is dramatically reduced which is especially important for sensitive processes. Further safety aspects are obvious. A sensor cannot be screwed out of a process connection inadvertently when removing a cable for example. Digitized pH measurement sensors also offer cost saving potential. Sensors that had to be thrown away in the past can now be checked and regenerated, e.g. by suitable cleaning, under optimum conditions in the laboratory. Sensor lifetime in the process is thus considerably increased. Thanks to the comfortable precalibration in the lab, calibrations under soiled or moist conditions are no longer necessary. This reduces work time in hazardous areas to a minimum.

Thanks to the significantly increased reliability, operational safety and availability of digital sensors with Digitized pH measurement technology, improved environmental protection is ensured. This digitized measurement can also be used for conductivity, ORP and dissolved oxygen along with pH measurement.

The danger of unnecessary loads due to rejects is reduced, which safeguards resources and saves energy which is one of the most important need in the Textile industry.

— Kedar Tillu

Challenges in Weaving Automation

The Indian textile industry is currently being transformed from a "sunset" sector into a "sunrise" sector. It is being hailed as "the growth engine of the Indian economy" (ref. www.txcindia.com). Recent changes in the global scenario herald excellent growth prospects for the industry for the next few years.

In terms of the technology status of the various sectors of the industry, spinning has always been hailed as being technologically on par with the best in the world. However, it has been recognized that the weaving and processing sectors have been lagging behind and efforts are being made by the various stakeholders (government, textile industry and textile engineering industry) to upgrade and modernize these sectors.

The weaving sector has about 19 lakh shuttle looms. A large part of these shuttle looms (almost 15 lakh) are obsolete. The number of shuttleless looms is about 50,000, most installed during the last three years, largely encouraged by incentives provided under the TUF scheme, offered by the Ministry of Textiles. However, a large percentage of these (almost 70%) are imported and of these too, a large percentage comprises of used machines.

Why is automation important in the weaving sector? Global competition ensures that only the fittest survive. Today's weaver needs to ensure that he/she is able to manufacture and supply the finest quality of fabric, at the lowest cost, in the shortest possible time-frame. Automation is the only option which will allow the weaver to attain this objective.

What are the challenges faced for automation in weaving for the Indian Textile Industry?

The nature of the weaving industry is changing. Around the early 80s, the **focus moved from composite mills to decentralized units and new clusters** such as Bhiwandi, Surat, Ichalkaranji, Erode, etc. began to develop. Because the resultant units are smaller, the focus on having a trained workforce, established work-practices, data collection and utilization has diminished. It is only very recently that the trend has started to reverse and decentralized units are successfully adopting a mill-like approach to their business.

The focus of the global majors is **higher machine speeds** and **wider widths**. Today's machines can offer weft insertion rates of more than 2,000 to 2,500 metres per minute and widths of upto 3.8metres. Most of the machines from the Indian manufacturers offer weft insertion rates of around 350 to 650 metres per minute and widths upto 2.3metres. In order to ensure that they are able to compete with established brands, machinery manufacturers need to offer machines with higher speeds and wider widths.

In order to perform under such demanding conditions, we need **yarn of better quality**. However, spinners have risen adequately to the occasion and today yarn of the required quality is available, albeit in smaller quantities and at a higher cost. In fact, yarn is being exported to countries where it is being used on the most modern weaving machines.

Operating under such conditions also requires **precision manufacturing and metallurgical skills**. Most of the infrastructure of the domestic machinery manufacturers is as outdated and obsolete as the machines that they manufacture. **Entrepreneurs in the decentralized sector need to be educated about the benefits of investment in modernization** and that such investments can actually bring down the cost of production, reduce fabric defects and help them compete with low-cost, obsolete weaving machines. Incentives and education also needs to be provided for investments in auxiliary systems such as environmental control and material handling within the loomshed.

Development and local and economic availability **of auxiliary devices such as high-speed dobbies, cams and jacquards** needs to be encouraged so that they are not a weak link in the chain of weaving and that the machines are not forcibly slowed down due to the limitations of these devices.

Weaving machines **need to incorporate more of electronics and control hardware and software**. Such systems are essential for higher productivity of our weaving machines and for minimizing fabric defects due to yarn breakage or machine malfunctions. Monitoring software can also help better data-collection as well as inventory-management functions.

Various stakeholders involved have now recognized the fact that growth in this sector will bring about an **unprecedented demand for trained technicians** (machine operators, jobbers, engineers, etc). The industry needs to share their global aspirations by encouraging students to participate in live projects so that they perceive textile industry as an attractive and viable career option.

— Ketan Sanghvi
President, ITAMMA

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