

TOYODA TEXTILE MACHINERY BULLETIN

Vol. 11



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TOYODA AUTOMATIC LOOM WORKS, LTD.



Greetings and Happy New Year to you, our valued customer. I hope that 1999 was a profitable year for you and that 2000 will be even more prosperous.

The past year saw the US economy continue its strong growth and the countries of Europe show gradual improvement. While not all countries in Asia are progressing at the same rate, there is an overall trend towards economic recovery. Japan's economy is showing signs of improvement as the country aims to boost its international competitiveness by restructuring at both the corporate and industry levels. The textile industry, however, is experiencing a worldwide recession, despite signs of improvement in Korea and Taiwan. This has naturally had repercussions in the textile machinery industry.

Against this background, we acquired Nissan's water jet loom business last year, a move aimed at strengthening and expanding our textile machinery business. We also adopted three principles that guide us in our work and that describe our commitment to making quality the heart of our business. These principles are to never produce an inferior product, to take responsibility to immediately fix the problem if a defect is found, and to listen carefully to what our customers have to say. Another important aspect of our quality commitment is having every member of the Textile Machinery Division look at things from the customer's standpoint.

Despite our successes in the past, we know that there are still many areas in which we need to work harder. Our goal this year— like every other year— is to provide greater customer satisfaction than ever before.

As we reach for greater heights in this pivotal year of the new millennium, let us keep in mind the timeless words of our founder, Sakichi Toyoda: "Open your doors to the great big world outside" and "Stay ahead of global trends through dedication to technology and creativity."

Finally, I would like to thank you for choosing Toyoda products. I wish you and your family all the best in health and happiness in 2000 and hope that this year will be your best ever.

Tatsuo Matsuura
Managing Director, Member of the Board
General Manager
Textile Machinery Division

LW 600 Series Water Jet Loom Special Feature New LW600 Model to Start Production in February

The new water jet loom Toyoda announced in 1999 is finally entering full production as of February, 2000. More than 100,000 water jet looms have been shipped to customers around the world. Based on extensive feedback provided by these customers, and with a goal of weaving high quality fabrics at high speeds at the lowest possible cost, Toyoda is introducing the new LW600 Series Water Jet Looms featuring advanced electronic controls originally developed for Toyoda's best selling JAT610 Air Jet Looms.

LW 600

Five Major Features of the LW600 Series

1 Total Commitment to Improved Quality

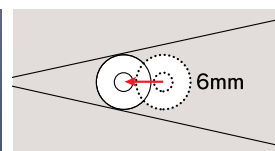
The LW600 features electronic let-off motion as standard equipment. Electronic let-off in conjunction with a newly developed automatic pick finding system achieves the optimum in warp yarn control, sharply reducing start marks and ensuring superior fabric quality. Plus, improved jetting water concentration minimizes warp yarn damage in concert with high-speed operation.



Electronic let-off motion

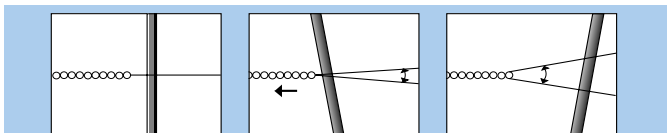


New nozzle

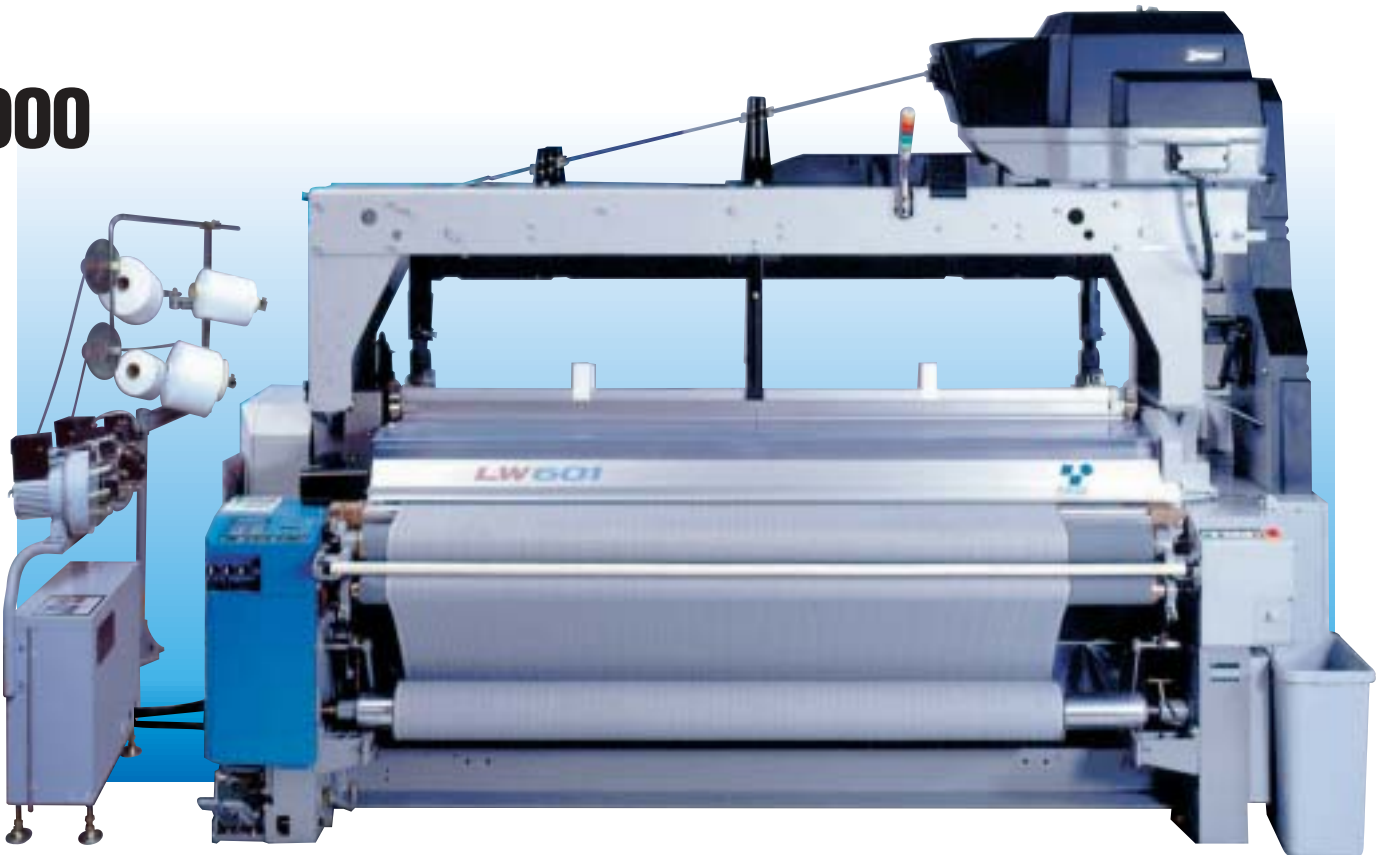


2 Easier Operation and Handling

The newly developed Automatic Pick Finder (APF) allows weavers to easily restart looms. In addition, electronic let-off and take-up motion plus an electronic feeder measuring device mean significantly improved ease of operation. A newly developed operation panel makes entering required settings simple and efficient.



rt
2000



3 Lower Operating Cost

RD measuring is improved by adopting a turboblower as its standard for faster operation. Furthermore, modified yarn routing in the RD feeder measuring device means high-quality woven fabrics even when weaving fine denier yarn or taffetas at high speeds.

In addition, an electronic feeder measuring device is optionally available on single-feeder measuring, offering significant energy savings since no blower motor is required. Precise angle control and weft length measurements facilitate lower water consumption and a reduction in weft waste for major cost savings.



Rotary drum feeder measuring device



Feeder measuring device

4 Rigid Frame Construction and Improved Paint

A new design for the frame supporting electronic motion devices reduces vibration during high-speed operation, ensuring the highest level of fabric quality. In addition, a new painting promises high quality with a long, stable service life.

5 Expanded Weaving Range

A full suite of options facilitates weaving of heavy and higher density fabrics with stability. The new LW600 Series is capable of handling a broader range of fabrics, including those woven with several different types of yarns with various yarn counts, making it possible to weave value-added fabrics.

Double Pump System

The Double Pump System adds versatility and stability for two different wefts. This system can also be used for similar weft yarns woven at high speed. Optimum insertion conditions can be achieved on each nozzle.



Double pump

Slanted Cloth Line / S-Wrap Take-Up (LW603)

Slanted cloth line is available for un-balanced dobby fabrics. The combination of S-wrap cloth line and tension bar is effective in reducing beat-up on heavyweight or high-density fabrics. Rigidity of breast beam is enhanced.

Heavy Fabric Specification

Enhanced rigidity of let-off facilitates stable weaving of medium to heavy fabric including air bag and high-tension fabrics (up to 800 kg).

Positive Easing

Positive easing is synchronized with the shedding motion and is especially effective for heavy, high-density fabrics where strong beat-up is required.

Stretch Yarn Weaving Specifications

Reducing the distance between the gripper and nozzle prevents unthreading of the nozzle. Weft pusher grips weft yarn to prevent slack picks.

Independent Catch Cord Shedding

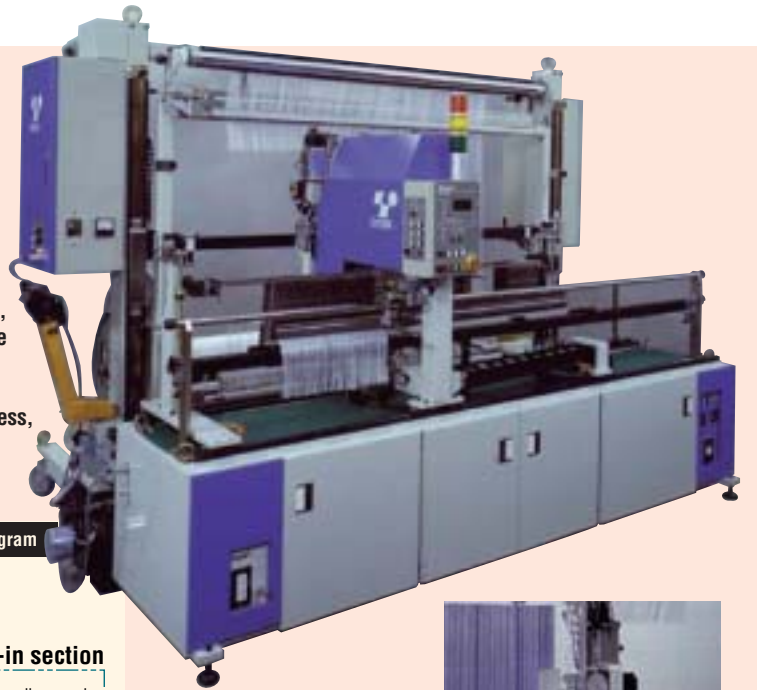
Two additional heald frames normally required to weave the catch cord are now available for weaving the body cloth. A full 16 frames are available on dobby machines for weaving body cloth.

WHAT IS NEW

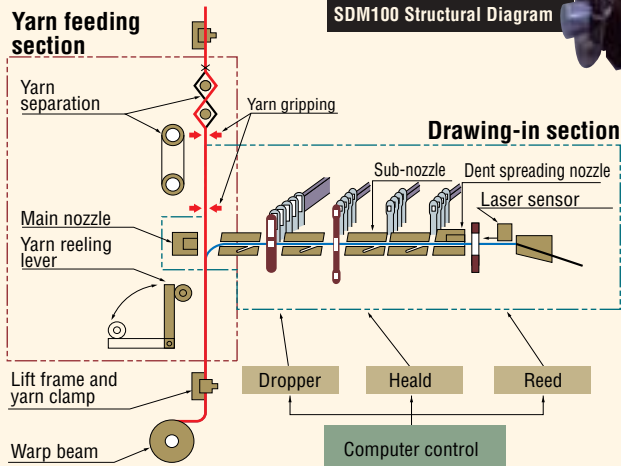
Special Feature: SDM100 Air-Jet Automatic Drawing-In Machine

SDM100, a Drawing-In Machine that Uses Compressed Air to Draw Warp Yarns into Three Different Harnesses, Now Available!

The Toyoda SDM100 Air-Jet Automatic Drawing-In Machine, which already enjoys an impressive record of performance with glass fibers, can now handle a wide range of yarns. In addition to delivering remarkable improvements in productivity, quality and labor savings in the drawing-in process, the SDM100 meets today's weaving demands such as the ability to handle multi-variety/small-lot orders and short delivery periods.



SDM100
Air-Jet Automatic
Drawing-In Machine



SDM100 Structural Diagram



Yarn separating unit



Drawing-in section
(photo shows a machine configuration without droppers)

Outstanding Features of the SDM100

1. Improved fabric quality and weaving efficiency thanks to a compressed-air draw-in system

Using this non-contact system to draw in the warp yarns, the SDM100 eliminates damage to the healds or reed. Irregular warp streaks do not show up in the woven fabric and warp breaks are significantly reduced. No other looming machine spreads dents slits using only compressed air, which is effective in preventing damage to the dents and breakage of the reed.

2. Significant labor savings in the drawing-in process

The SDM100's advanced automation makes it possible for a single operator to handle the entire drawing-in process, allowing him/her to prepare for the next drawing-in step in parallel. Battery-powered electric lift frames are adopted, while setup work such as removing and reloading the harness after drawing-in is simplified for additional labor savings.

3. Space-saving design

The machine's new compact design significantly saves space. The yarn beam, droppers, heald frames (carrier rods) and reed remain fixed in place as the drawing-in mechanism moves along the beam. For added safety, the heavy components of the SDM are secured so that there is no danger of them falling off and injuring an operator.

4. Faster operation

- ① Drawing-in can be performed while the healds are on the carrier rods or in the heald frames, and while droppers are mounted on the dropper bars. This eliminates the need to rearrange the healds and droppers, thus decreasing pre- and post-setup work.
- ② Problems associated with heald and dropper feed have been eliminated. Furthermore, operators no longer need to eject the healds or droppers after drawing-in, or need to replenish the healds or droppers with the magazines. Thanks to these achievements, drawing-in can be carried out in parallel with yarn preparation on the reserve lift frame.

5. Reliable drawing-in

Warp ends are drawn in one at a time, while sensors monitor each step of the process. This assures for extremely reliable drawing-in and makes yarn repair in case of misdraws easier.

6. Simplified maintenance

Thanks to the SDM100's air-jet system, part breakage is reduced and consumable components do not need to be replaced as often. The machine's simplified design, which has eliminated the need for heald or dropper transfers in the drawing-in section, also helps lower the chances of mechanical problems.

7. Easy drawing-in pattern setting

Using a dedicated computer, the operator can easily set the drawing-in sequence for the droppers and healds as well as set the number of warp ends to be drawn into the reed. And because drawing-in data is stored in the computer, it can also be used for production control and for reducing misdraw rates.

From the Designers

Thoroughly researching customer needs for a drawing-in machine during the initial development stage of the SDM100 has enabled us to achieve the following:

- Development of an air nozzle to spread the reed between dents in order to draw the yarn through the narrow reeds.
- Proper air balance so that the yarn can travel smoothly through the sub-nozzle.

We are confident the SDM100 can boost the productivity of the drawing-in process as well as significantly improve the work environment and the quality of the overall weaving process.

Technical Information

Toyoda Electronic Shedding –The Ultimate Shedding Motion – Available Soon!

The Toyoda Electronic Shedding Motion, which got high ratings from visitors at ITMA99 in Paris last year, will be available in April of this year. Toyoda Electronic Shedding is designed to further improve the quality of value-added fabrics and high-density weaves that have traditionally been woven using positive cams. We are proud to introduce the Toyoda Electronic Shedding Motion, which gives performance far superior to conventional shedding devices.

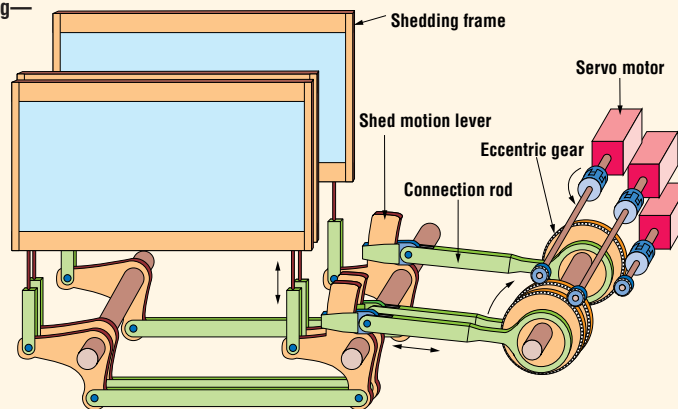
< The Outstanding Features of Toyoda Electronic Shedding Motion >

The dwell angle and the cross timing can be set and changed for each individual frame. This makes it possible to weave fabric for which shed-opening is difficult or in which the warp yarn tends to slacken. In addition, Toyoda Electronic Shedding Motion offers superior beating-up for high-density fabrics and dramatically improved weft insertion performance. Dwell angle and cross timing settings can be changed on the function panel, making it easier to weave small amounts of a wider range of fabrics.

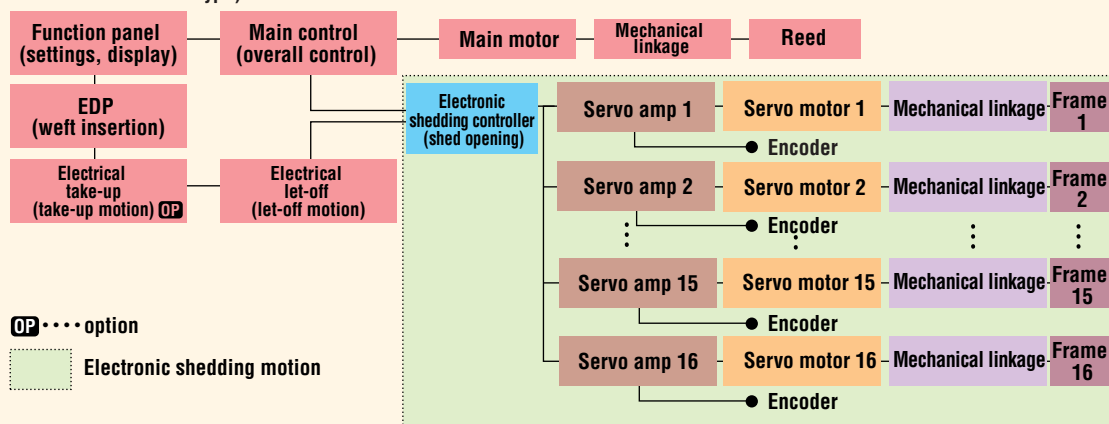
- Each heald frame is driven by a servo-motor on each frame.
- A proprietary Toyoda controller ensures stable, consistent performance, and facilitates easy operation.
- Toyoda Electronic Shedding Motion matches conventional dobby shedding in number of frames, shed-opening angle, and operating speed.

Parameter	Toyoda Electronic Shed	Positive Cam Shed	Positive Dobby Shed	Negative Dobby Shed
Number of frames	Up to 16	Up to 10	Up to 16	←
Frame pitch	12 mm	←	←	←
Shed lift	Up to 157 mm	Up to 132 mm	Up to 157 mm	←
Unbalance limits	None	None	Yes (8 frames max)	Yes (6 frames max)
Reed space	150 to 230 cm	150 to 390 cm	150 to 390 cm	150 to 280 cm
Dwell angle types	flexible settings	4 types: (0/0 to 0/120)	3 types: (50/50), (70/70), (105/105)	None
Dwell angle change	Can be changed for each frame Setting is done from function panel	Can be changed for each frame (requires replacing cams)	Cannot be changed for each frame (requires modifying loom)	← Cannot be changed
Cross-timing change for each frame	Can be changed for each frame Setting is done from function panel	Can be changed for each frame (requires shifting cam) Timing pulley adjustment	Cannot be changed for each frame ←	←
Inching operations limits	No areas where forward/reverse motion is prohibited	←	Areas exist where forward/reverse motion is prohibited	←

Toyoda Electronic Shedding—
Structural Diagram



Toyoda Electronic Shedding—System Block Diagram
(In case of the 16 frame type)



A Look at Toyota's Global Service Center

-Part 5: India-

India Service Center

KIRLOSKAR TOYODA TEXTILE MACHINERY LTD.

Plot No.10-13, Phase II Jigani Industrial Area,
Anekal Taluk, Bangalore District 562 106, INDIA
Tel: +91-8110-26201~ 205
Fax: +91-8110-26207
E-mail: kttml@satyam.net.in

Kirloskar Toyoda Textile Machinery, Ltd. (KTTM) is a joint venture between Toyoda Automatic Loom Works, Ltd. and the Kirloskar Group, and was established in India in 1995 as a manufacturing and sales company for textile machinery. KTTM is located in Bangalore, a city in the southern part of India on a plateau at an altitude of 900 m with a population of 5 million people. In recent years, it has become an important industrial center with the influx of many Toyota-related companies, including Toyota Kirloskar Motors, which manufactures Toyota automobiles, and is being referred to as "Kariya city (a city in Japan where many Toyota group companies are located) in India."



KTTM began production in June of 1997, and is currently manufacturing the RX1240 Spinning Frame (the Indian version of the RX240, which is now being produced in Japan). In addition, it is engaged in service-related activities. KTTM not only offers service for equipment produced in India, but also for machines imported from Japan.

Currently, KTTM has approximately 300 full-time employees, including three Japanese staff members. A total of 18 service engineers, including three specialists who provide service on units

Toyoda has established seven international service centers to supply spare parts and provide after-sales service, and is developing a system to respond rapidly to customer needs. In this section of each issue, we will be introducing one of these service centers around the world. This issue, we present Kirloskar Toyoda Textile Machinery, Ltd., our Indian service center.



India Service Center (at KTTM)

imported from Japan, are on hand, and many of them have completed training in Japan. KTTM is developing a system designed to respond to any customer need—from installation to after-sales service.

In addition to its headquarters in Bangalore, KTTM has three branch offices as follows, efficiently covering the great expanse of the Indian nation, warehousing emergency spare parts and dispatching service engineers wherever needed.

- North and eastern India — New Delhi
- West and central India — Mumbai
- South India — Coimbatore

KTTM has also set up a training center complete with textile machinery at its headquarters in Bangalore in response to requests for training from its customers.

In the future, KTTM will also provide service activities for neighboring countries, and is expected to make a significant contribution to the expansion of Toyoda's textile machinery business.

Successful Spinning of Ne 300 Yarn!

Mr. Ketan Rathod
Service Engineer



I joined KTTM in October 1997. This is the first company I've worked for. I had a great interest in textile machinery as a university student, so I think I was lucky to have the opportunity to work at KTTM with such good timing. I wanted to take up the challenge of spinning Ne 300 yarn. And since KTTM allows its service engineers to pursue a specialized task, I was able to spend one year practicing spinning Ne 300 yarn using Indian cotton, and finally succeeded. I was really happy when the spinning was successful. Plus, I felt my superiors and colleagues at the company were wishing me the best. In the future, I will attempt new challenges, working hard to refine my spinning techniques and keep my customers satisfied.

If It's a Roving Frame, Leave It to Me!

Mr. Jayesh Sivan
Service Engineer



I came to work at KTTM as a service engineer in June 1996. Before that, I was working as a maintenance technician in another spinning mill, but after joining KTTM, I got involved in installing roving frames and other textile machinery in a number of customer mills under the guidance of Toyoda engineers. I gained field experience in troubleshooting and ways to improve quality from Toyoda's spinning engineers, and now, I have enough confidence in installations and after-sales service to be able to say, "If it's a roving frame, leave it to me!" Recently, I've begun to handle installation of spinning frames, and I'd like to contribute to improving our company based on guidance from the many experienced workers here.

User Report

-Part 10-

Republic of Korea

Shin Heung Textile Co., Ltd.

Shin Heung Textile Co., Ltd. was established in 1973, and is located in Gumi City, Kyonbuk, one of Korea's foremost textile producing areas. Operations initially began from a mill that used shuttle-change looms. In 1990, the company purchased its first 40 air jet looms (Investa models made in Czechoslovakia). In 1992, they started replacing these with Toyoda JAT500 (24 units in phase 1, and 16 units in phase 2). In the following year, 1993, they introduced the JAT600 (20 units), and in 1995, they brought in an additional 60 JAT600 looms.

In 1999, the company built a new mill on land adjacent to their existing facility and installed 80 JAT610 units. Now, all of the air jet looms that the company owns—a total of 200—are Toyoda products. The Toyoda air jet units boast an efficient total working rate of 97%. Their superb know-how enabled them to complete the installation of the 80 looms in just two weeks at the end of last year.

In 1997, at another location, Shin Heung Textile began operation of a dyeing and finishing mill for Shin Heung Industrial Co., Ltd., another company in the Shin Heung group. They are



Office exterior of Shin Heung Textile Co., Ltd.



totally committed to quality control in both weaving and dyeing. Shin Heung Textile's products are centered on woven goods, including micro-filament, cotton/nylon and suedes. They mainly export overseas under the MonoTex brand name.

We had the chance to talk with President Mr. D. S. Lee, Representative Director of Shin Heung Textile Co., Ltd., about Toyoda and his business.

Q: What do you think about Toyoda's after-sales service?



President
Mr. D. S. Lee

A: I am deeply grateful for the quick service Toyoda always provides us. In particular, I sense a clear difference in attitude and level of service compared to European manufacturers. Our association with Toyoda began with the purchase of JAT500 models in 1992. Since then, I think the trust between Toyoda and ourselves has become even deeper with our purchase of the JAT600 and JAT610 units. In the future, I'm sure we'll receive just as rapid a response to our service requests as we have up to now.

Q: How do you see the future of your company?

A: Customers have been demanding not just better fabric quality but also faster delivery these days. There are quite a few customers who come to visit our mills to see for themselves whether we have sufficient production capacity and equipment to meet their delivery schedules. This being the case, I think we have to try even harder in order to meet the diverse needs of our customers, including those outside the country although I'm not worried much about the future of Korea's textile industry.

As for myself, I make the rounds between the dyeing plant in the morning and the weaving mill in the afternoon. I am happy that I have so much work to do even though I've been neglecting my golf game these days.

Q: Do you have any requests for Toyoda?

A: Toyoda is gradually moving into new business areas, and working to expand its product line even more. We look forward to the development of new models of Toyoda textile machinery.



JAT610's up and running on the mill floor



Mill exterior

The Toyota Production System—Imbued with Resourcefulness

6 The Final Installment

I began this series of articles in January of 1998, and even since then the Japanese economy has not shown signs of recovery, and a “survival of the fittest” situation prevails among companies. Due to this situation, many companies have announced severe restructuring plans, which is changing traditional Japanese corporate culture.

For better or worse, the traditional style of Japanese corporate culture has been based on lifetime employment, which gave birth to a sense of being entitled to a job in which one can work with security. Working for the sake of one’s self and one’s family ultimately transformed into working for the sake of the company. Therefore, hiring and firing had to be done discreetly. Managers who had to fire employees or close divisions to make a profit were thought to be unworthy of a managerial position.

Traditional work ethics, such as “hunger for work” and the sense of gratitude for having a job, seemed to disappear after the Second World War. In their place came such attitudes as “you work to earn money,” “only work if you are told to do so,” and “go home when the day is over whether you have finished your work or not.” Such thinking not only wrecks a company but also decreases one’s own potential. If you were manager, what kind of staff would you hire? Who would you want working for you?



Mr. Rikizo Naruse, Lecturer
General Manager
Sales Planning Office
Sales Department
Textile Machinery Division

Let’s summarize what we’ve learned up to now.

The goal of a company is to make a profit.

Selling price and costs

Selling price is determined by the market and costs are generated by the company. Therefore, the only way for a business to make a profit is to pay strict attention to costs.

Reducing Costs

There is no absolute factor to determine whether a cost is appropriate. The definition of costs varies depending on whom you ask. Therefore costs are significantly influenced by the way one perceives them. Accordingly, one must be trained in how to view and understand things, and by aligning values on costs within the company, one must be able to separate costs into essential and non-essential.

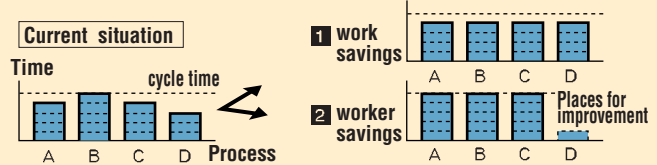
Toyota Production System

The Toyota Production System is one technique for this purpose. The outstanding feature of this system is a “rough-and-ready” (simple, straightforward and fast) approach based on experience rather than theory. Rather than taking a great deal of time to come up with the best plan, take a shorter amount of time and come up with a plan that’s better than the current situation. If this happens to be the best plan, so much the better. The key to whether or not you can quickly devise appropriate measures is hard work and practice on a daily basis.

scoreboard) system and *kanban* (demand pull) system enable you to judge whether something is normal or abnormal. It is necessary to take management action, which means working to restore anomalous situations to normal ones. Reducing anomalies lessens the burden on the management side and reduces the personnel needed.

3. Use the “2 S’s” to not only reduce labor, but reduce personnel

- 1 Shoryokuka (work savings)
- 2 Shojinka (worker savings)



Shojinka means reducing personnel at the beginning of the planning and design stages to eliminate time wasting.

Cycle time is the calculated base of the number of units required. In JIT (“Just-In-Time”) there is no need to produce over and above the number of units required (see the 3rd article in this series). *Shoryokuka* often boosts superficial efficiency (see the 5th article in this series) but has no financial advantages. We must constantly be aware of financial considerations, not just about sustaining motivation in order to improve work efficiency.

Shojinka does not mean to simply reduce personnel. The goal of *Shojinka* is to develop flexible workers. It encompasses a variety of methods to make the most of human resources in a manner similar to improvement, such as shifting workers to value-added tasks and processes, forming an improvement team and applying their experience and results to reducing the costs of purchased components by directing guidance to cooperating manufacturers, launching new start-up businesses, etc. If these methods are not adopted, it will become necessary to implement *Shojinka* at the very beginning so as not to create surplus personnel.

Finally, I want to emphasize that the Toyota Production System was developed by and for Toyota. Therefore I urge you, the reader, to use your creativity and originality to come up with your own production system. This series of articles will now come to a close. I hope you enjoyed reading them and found them of value.

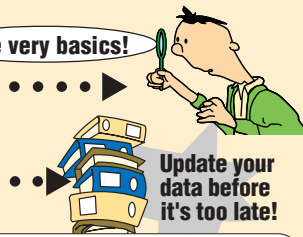
Three Sets of Key Words

1. Practice the “3 G’s”

- 1 Genchi (the “actual site”)
- 2 Genbutsu (the “actual thing”)
- 3 Gensho (the “actual phenomenon”)

The very basics!

Inferences and assessments based on written data are necessary. However, the data may be out of date by the time we use it.



Take immediate steps to correct problems by using the “3 G’s” to grasp the actual situation.

2. Manage with your eyes to eliminate the “3 M’s”

- 1) Muda (waste)
- 2) Mura (inconsistency, uncertainty)
- 3) Muri (excess; anything irrational)



The 3 M’s is a cause of stagnation of a workplace, and unsafe practices and work losses. Managers and operators need to observe one another to prevent this. The mechanisms such as the *andon* (electrically lighted



TOYODA AUTOMATIC LOOM WORKS, LTD.

Public Affairs Department

2-1, Toyoda-cho, Kariya-shi, Aichi 448-8671 Japan

Tel: 0566-27-5317 Fax: 0566-27-5307

E-mail: m.asai@public.toyota-shokki.co.jp

URL: http://www.fcc.co.jp/toyoda/

Person in charge: Mika Asai

Please send your comments or questions regarding the *Toyota Textile Machinery Bulletin* to any of the above addresses.

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About the cover

The 51st Sapporo Snow Festival, which began in 1950 with six snow sculptures created by local high school students, is now famous as Japan’s largest snow festival with over 300 snow sculptures. The photograph shows a snow sculpture of Shuri Castle in Okinawa, where this year’s World Summit will be held.

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