《Special Issue》

Retrospect of Textile Machinery in the 2nd OTEMAS '81 (1)

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Remark: Articles of the heading printed in boldface are published in this issue. Those in romanface will be published in the next issue, Vol. 29, No. 1 (1983).

GENERAL REVIEW

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1. Introduction

This year's exhibition exceeds noticeably the size of the 1st OTEMAS in 1976. The world-wide famous textile machinery exhibition, ITMA and ATME, have long histories and features.

On the other hand, OTEMAS is the largest and the most comprehensive international textile machinery exhibition in Asia comparable with the above two exhibitions.

Although barely five years elapsed since OTEMAS '76, the Japanese textile machinery has made remarkable prog-

ress in the level of machine design as a whole. In the past, ingenuity, invention and new technology were introduced only in some important mechanisms, and unrefined and poor ideas of machine design appeared in general. The Japanese textile machinery was largely inferior to that manufactured in Europe and United States. In contrast, many Japanese machines on show this year are refined as a whole and are designed by genuine engineers. The textile machinery manufacturers in Japan have begun to show attractive machines and to incorporate really original ideas. It might be owing to the depressed state of all sectors of textile machinery manufacturers in Japan. There are many major surprises in plenty of remarkable developments which depend on a number of deep and extensive basic technology supporting the Japanese leading technology in the field of various industries.

2. Highlight

In the field of **Spinning**, there is still a considerable demand for ring-spinning in general. Even if a new spinning system superior to this is developed in the future, the problem of poor yarn quality inferior to ring spun yarns will not be completely eliminated, and the ring-spinning system might continue the main current. However, progressive developments of new spinning systems other than the ring spinning is expected in consequence of finding out the suitable use of yarns spun by the new systems.

In **Textile** process, there seems to be a strong trend towards total automation by means of continuous automation, connection of individual processes rationalization of conveyor system, auto doffing, auto piecing, auto cleaning, etc., so that the labor required may rapidly decrease. Today, man's labor is merely replaced by some automatic equipments and machines. But, textile machinery manufacturers should set the final goal at highly controlled textile manufacturing system which is able to collect, analyze and treat almost instantly various informations from individual processes. It was encouraging to see a number of newly developed machines and automatic equipments this year which would make possible to realize the highly systematized textile process. Especially the Murata MJS spinning system was demonstrated for the first time and seemed to have attracted much attention. This system is a kind of open-end spinning using high speed air vortex. This principle is not new, but is significant in the point of being shown in a complete form. Yarn twisting itself usually requires extremely small energy, but this system has large energy consumption due to air vortex and seems to have its weak point.

For these ten years, three major developments and studies in the field of textile process are a new method of spinning, an automatic conveyor system and the continuous automation. One of the factors in the attainment of these goals might be the advancement of the level of medium and small enterprises to keep highly sophisticated machines in operation. If it were not for this advancement, any good ideas and new developments would not be realized and not be used extensively.

In **Weaving** process, high speed machines operation had changed into shuttleless looms, and fluiddynamic weft-insertion methods, such as air-and water-jet, have been highlighted again. These methods have an advantage of noise and vibration reduction. There still remains unchanged in a number of loom mechanisms, so drastic improvements on the unchanged parts seem to make possible to develop more refined and efficient machines: For instance, usage of oil and air pressure-sensitive sensors and control mechanisms, achievement of precise winding mechanism by means of fluid coupling, etc. On the other hand, some must be simplified by utilizing photo- or electric-signal in jacquard mechanisms.

nisms.

The weaving process might be the easiest one to automate completely in various textile processes: For example, the conveyor and storage system of materials and fabrics is easy to do so. However, it is a characteristic of the textile industry in Japan that there are many medium and small enterprises in the down-stream region where the level necessary to operate highly automatic processes is low, and therefore slow in modernization in contrast to other industries.

But air- and water-jet looms have grown up to be well advanced machines through continuous efforts by weaving-machinery makers to improve them. Research engineers have been focusing their main themes of study on weft-insertion using jet-flow, other shuttleless weaving methods and winding, auto piecing/knotting by air-jet is a technology in the field of spinning and seems to be also a new topic in rewinding process.

A number of reciprocal motions are used in various loom mechanisms. So, it may not be difficult to replace these motions by circular motions. There are plenty of applicable technologies, such as oil- and air-pressure technology and linear motor, etc., and it seems not to be the best way to insert wefts by means of air- or water-jet. There is enough margin for improvement.

The **dyeing and finishing** processes use both a lot of water for liquid-treatment and fuel for heat-treatment. Therefore, they have the largest energy consumption in the textile pro-

cesses from spinning to sewing. Fuel cost accounts to 15–20% of all processing costs, and saving-energy is closely connected to the prosperity of these fields.

The efficiency of heat-treating machines used extensively in these fields is only 10–20%: The loss due to natural radiant heat is 40%, and the fuel loss discharged wastefully from the machines by discharged air and water is 40%. A large part of heat loss due to discharged air is in the form of latent heat. So, it is the most important item for saving-energy in dyeing and finishing processes to save 40% of fuel by preventing natural radiant heat. In the future, makers should develop new types of machines the amount of fuel/steam/water for which can be saved throughly. However, in Japan, makers do not contact with users intimately and produce by themselves overdeveloped machines. Also, users do not adjust machines at their optimum conditions. All these result in a very unefficient operation. For example, the operating efficiency of tumbler-type drying machines is just 5%.

It seems reasonable to improve first the easiest and basic items and then approach to more advanced methods, such as efficient air-discharging method from drying machines, withdrawal of latent heat, thermal insulation of winch, heat withdrawal from discharged water, automation in manual labor and automatic conveyor system using computers, etc. Trend of liquor ratio reduction has no problem, but flow-type dyeing machines as they are have some problems from the point of saving-energy. It is possible to use supersonic wave, microwave, vacuum, low temperature and so on at comparatively low cost. Dyeing and finishing machinery makers have begun to use these methods gradually. It seems now possible to control dyeing and finishing processes totally by means of computers. Such a drying machine was exhibited this year as the exhaust dampers of which can be controlled by measuring the temperature of exhaust air from drying chambers.

For these ten years, there are many papers on transfer printing and applications of other copy methods about dyeing and finishing processes, and the computer color-matching and designing systems extend their application area steadily. But, it will remain one of the most important problems to develop the saving-energy technology.

3. Highlight Seminar

Highlight Seminar at the 2nd OTEMAS'81 had a great success in quality and quantity due to the close support extended from **The Textile Machinery Society of Japan**, especially from its Planning Committee. The titles are:

(The 1st day—November 6)

Greeting

President of TMSJ, Kiyohisa Fujino

Special Lecture “Textile Machinery and New Technology”

Prof.-Dr. Osaka University, Akira Horikawa

Lecture & Panel Discussion “Development of Fiber Manufacturing Machinery in OTEMAS”

Lecture & Panel Discussion “Development of Spinning Machinery in OTEMAS”

(The 2nd day—November 7)

Greeting

Chairman of Planning Committee of TMSJ, Yoshito Miura

Special Lecture “Textile Machinery and Electronics”

Textile Research Institute of Gifu Prefecture, Hiroshi Minoura

Lecture & Panel Discussion “Development of Weaving/Knitting Machinery in OTEMAS”

Lecture & Panel Discussion “Development of Dyeing/Finishing Machinery in OTEMAS”

4. Closing Remarks

The technical level of Japanese textile machinery has grown up remarkably for these five years. This progress depends strongly on the advancement of basic technology that supports various industries. The machinery on show looked technically refined at the first sight. It is my opinion that the unrefined machinery has some technical defects in many cases.

All textile machinery manufacturers might be in the midst of new development works now and will surely show many new ideas and attractive machines at the next OTEMAS. Anyhow, the 2nd OTEMAS '81 had a great success, and offered many active topics to all of the visitors from home and abroad.