

ЗНАЧЕНИЕ НА ТЕХНОЛОГИЧНАТА ДОКУМЕНТАЦИЯ ЗА УСТОЙЧИВОТО РАЗВИТИЕ НА ПРЕДАЧНОТО И НА ТЪКАЧНОТО ПРОИЗВОДСТВО

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IMPORTANCE OF THE TECHNOLOGICAL DOCUMENTATION ON THE SUSTAINABLE DEVELOPMENT OF SPINNING AND WEAVING PRODUCTION

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ABSTRACT

The whole process of yarn formation by twisting is concentrated in a miniature space whose volume does not exceed 5 ml. The mass of fibrous material also generally does not exceed 3-5 mg. In the case of ring spinning machines, this space is located immediately after the outgoing drafting pair, and in the rotor spinning - in the camera's canal. The essential phenomenon consists in the final transformation of the fibrous sheaf of parallel stacked fibres into spiral wound fibres. This is the moment, that separates ultimately and irreversibly the spinning technological flow. First, the yarn can no longer recover the embedded fibres with preserved initial properties and quality. This means that any technological error or incorrect machine setting degrades the quality of the yarn ordered and reduces its market value. Secondly, any rejected yarn, due to poor quality, damages previous technological processes. The preparation of the twisted bundle begins with the dissolution of the fibrous raw materials and undergoes numerous processes and operations. In this sense, from the initial formation of a uniform fibrous flow to its conversion into yarn, the fibres are subjected to the action of various machine parts and working organs. The setting and observance of the nominal operating mode of the spinning gear maintain the quality of the varn and the efficiency of the production. In our day, this requirement requires the development and maintenance of an information system for technological management of spinning production.

Keywords: spinning, sustainability, information system.



Introduction

The technological efficiency of textile production makes the connection between the supply of fibrous raw material and the sale of textile products on the free market. Any omission or error leads to deflection of the specified characteristics and user properties of the ordered items and causes irreversible losses due to a reduction in the agreed prices. Moreover, the lack of adequate and optimal organization of the technological flow leads to a distortion of the achieved productivity and distorted connections in the production relations. Any disruption causes long-lasting negative effects on the technology of the spinning or weaving process and worsens the public and professional environment in the workshops.

Aims

The objectives of the technological efficiency sub-program of spinning and weaving are dividing into three directions:

- Maintenance of machine equipment, cleanliness and ergonomics at workplaces;

- Building of own database with technological documentation;

- Increasing the educational level, qualification and skills of textile workers, technicians and specialists.

Deliveries

A few of the deliverables that this project will provide are as follows:

- a list of identified hazards at each facility

- potentials for productivity increase

- a list of suggestions to reduce the risks at the facility

- a list of training needs targeting employers and employees separately

2. Overview of the assessed sites

The activities of the preliminary evaluation of spinning and weaving enterprises were carried out during the summer of 2017 in the area of Southern India. The major enterprises in which the assigned valuation observations and conversations were carried out are the Armstrong Spinning Mills (P) Ltd and the weaving factory Sri Desikanathar Textiles Private Ltd.

The manufacturing processes in the spinning factory are: (Storing of Cotton) - Carding -

Combing - Drawing - Spinning - Packing - Dispatch

There is also a knitting unit within the same premises.

There is a hostel attached to the factory - where most of the woman employees reside.

The flow chart of the ring spun yarn production in the Armstrong spinning mills is shown on the *figures 1* and 2.

The manufacturing processes in the weaving factory are entirely pertaining to weaving of fabric of different qualities. These are then packed into bales and dispatched to CMT factories.

In both companies, the FTI team was well received and the visits were made in a collegial and friendly environment. All the questions and the interest shown by us on the respective proceedings were welcomed with the help of the respective workshops. There were no signs of tension or distrust.

The first visit was made to Armstrong's spinning mill.

The peculiarity of the enterprise consists in combining the two basic systems in cotton spinning: carded and combed.

The spinning sectors are as follows:

- Preparation of spinning fibrous mixtures;

- Forming a uniform fibrous stream and obtaining a roving;

- Spinning and rewinding yarns.

Throughout the visiting process, our observations found that the three phases in the processing of cotton fibre materials were segregated into separate production facilities. All production facilities are isolated from each other. This is a good prerequisite for maintaining optimal climatic conditions according to the type and condition of processed fibrous raw materials and semi-finished products.

At the same time, it should be pointed out that in the intermediate sector of drawing and duplication of the card slivers there is a mixture of lines and machines from the carded and combed spinning system of cotton fibres, *figure 1*. The simultaneous movement (mixing) of technological flows from heterogeneous semi-finished products requires both a rigorous and advanced technological organization as well as a highly skilled level of workers and professionals. Seemingly, it is not difficult to promote simultaneously different lots of



cotton yarns in the same work salle between different machines. However, and because the semi products are with the same white colour, they can be mixed. This a specific production solution in the considered mill. Obviously, it is not a problem for the trained and experimented workers and specialists. However, in order to hold up the general level and the sustainability of the spinning mill, the perspective development requires organising long life learning and training among the technology staff.





In all production premises, there is maintained cleanroom cleanliness as well as ceilings, lighting fixtures and air conditioning.

Another good impression leaves the stockholding of fibrous raw materials. The stored materials are separated in different and isolated premises depending on their origin and purpose.

The enterprise is processing: bio-cotton of guaranteed origin with the label of FTI, cotton of conventional origin, regenerated polyester and kapok. The last cellulose fibre is unique to cotton yarn manufacturers and consumers. Similar to cotton fibres, the kapok comes from a fruit cup and covers the seeds of the Kapok tree, which reaches up to 5 m in height. A characteristic feature of the kapok fibres is their finesse, the glossy surface and the small staple length. Due to their small length (15-20 mm), their share does not exceed 20% of the total spinning mixture. The resulting cotton yarns bear the trade name "silk cotton".

The largely heterogeneous raw materials are a condition for a diverse assortment with the same two basic requirements: technological organization and qualification of the staff.

An important place in the production premises is dedicated to the presentation of samples of defective semi-finished products, as well as samples of foreign impurities in the raw materials: sisal, nylon, etc.

Another good impression is the documenting of the enterprise.

All main directions:

- human resources and employment contracts;

- technological batches and laboratory certificates;

- warehouse receipts,

are kept carefully and responsibly.

The functional structure of the enterprise is also well composed: warehouse, production, and mechanical maintenance, technology department with laboratory, human resources and management. No workers and technicians are out of work. This is an indicator of good organization, discipline and traditions. From the discussion held with the executive manager of the enterprise, the expert team identified the main current problem: the turnover among the spinning machine operators and especially the spinners.

The peculiarity of the professional skills of the spinners requires long-lasting tactile manual

actions when spinning the ring-spinning machine or when a broken yarn is restored. This means that the management of the enterprise and the FTI program should focus on this profession. On the one hand, careful selection and quality training is needed. On the other hand, additional attention should be paid to this category of workers: payment, social benefits and personal prospects.

In summary, for the established facts about the spinning mill, the following need may be indicated to improve technological efficiency:

- Assembling each lot with a process batch of all processes. The batches accompany the lots from machine to machine.

- Continuous training of technicians and technologists.

- Establishment of a procedure for selection, training and retention of spinners in the mill enterprise.

The second visited plant is cotton-weaving mill.

The weaving mill is specialized for an assortment of 100% cotton fibres. The surface mass of the fabrics varies from 60 to 350 g/m^2 . The weaves of the fabrics comprise a variety of weaving patterns with a repeat of 2 to 24 warp and weft threads.

The current production sectors in the enterprise include weaving halls with 56 looms, a technical control room and grading, fabric packaging and warehouse. The enterprise has separate offices for administration and technologists. At the time of the observation, the weaving mill does not have its own warping and sizing department. Weave warps are prepared in another plant.

In the quality control room, there are mounted inspection tables, equipped with UV light for detecting foreign impurities from the yarns in the fabrics.

At different places in the machine room of the weaving looms, there are transport devices for inhouse transportation of weaving warps and the components of the harness kit: frames, lamellas of the warp brake and reed.

During the visit, the following gaps in the organization and technological equipment of the enterprise were identified.

At first, there is no aspiration in the weaving halls and the level of dustiness in the air is high.

Secondly, there is a lack of a separate room for preparing and preserving the weaving beams and the harness kits.

The threading of the weaving warps is making manually on the looms. This leads to stables of the camps, reduced performance of the threading workers, due to early fatigue by the noise and dust in the weaving room.

Third is the state of the quality control room. Checkout tables do not work. The premise has been transformed into a raw cloth warehouse.

Fourth is the state of the fabric packaging and labelling sector. The premise is in direct connection with the outside environment and is at the entrance to the building. The raw woven fabrics are enveloping in pleat state in bundles. During the pleating, the fabrics are not passing properly in the corresponding devices and apparatus. As a result, bends, crinkles on fabrics are remaining, which are difficult to remove in the finish and it is secondary damage to the quality of the fabrics.

Fifth is the technological provision of weaving. There is an appointed technologist and production organizer of the mill. He is responsible for the development of new articles and the loading of weaving machines. At the same time, there is no archive and maintained technical documentation of the produced fabrics. In the prospect, the lack of technology documentation makes it difficult and slower to reproduce old items or new orders.

The overall impression is that the enterprise is in a transition period of ownership conversion. At the same time, the varied assortment and the almost complete arrangement of the looms testify to the willingness and ambition of the hired personnel to maintain the production regime. This means that in the upcoming period the owners of the enterprise must focus their attention on production and restore the balance between workers' discipline and the technological organization of production conditions.

Conclusion:

3. Findings in context of the concept for Fairtrade interventions.

4. Plan for training and other interventions, with man-days, teams allocation etc.

Possible support for the visited enterprises is different for each of them, but the organized procedure passes into two common forms: 4.1. Direct intervention in the production organization:

4.1.1. Activities in spinning mill:

- Develop a schedule for preventive maintenance of machines;

- Development of technology batches for accompanying the lots;

- Developing a project to switch from production mode: of 3 teams in 3 shifts to production mode: 4 teams in 3 shifts with continuous production without scheduled weekends on Saturdays and Sundays. Basic idea of this proposal concerns predominantly the machine operators, and especially - the ring spinning frame's workers. Because their professional requirements include mainly hand skills, this kind of textile workers become valuable for the production organization. From other hand, they the most numerous in the mill. Daily production needs of regular number of specialized machine operators. Possible transition from three teams to four teams has two aims: to deliver the necessary workers with skills, and to give the continuous technology process of spinning. Moreover, this is a possibility to reduce the time of the night shift to 7 hours, which is a good social solution, etc. Really, problems to resolve are in the weekly time schedule of accepted collective agreement between government, industrials and the trade unions. This one and many other problems have to be resolved by the specific project.

4.1.2. Activities in the weaving mill:

- Development of a project for construction of aspiration and air-conditioning installation in the weaving mill;

- Development of a project for differentiation and assembling of weaving production: warping, sizing, threading, weaving, qualifying, wrapping and rewinding of residual yarns;

- Development of a project for technological documentation and archive

4.2. Training of specialists and workers

4.2.1. In the spinning mill:

- Refresher course on compilation of spinning plans and technological batches of spinning lots;

- Training of mentors and trainers of spinners and pre-spinners

4.2.2. In the weaving mill

- Training of management staff on a common organization of weaving;

- Training of quality controllers;



- Training of technologists and mechanics.

4.3. Schedule for training and other interventions

4.3.1. In the spinning mill:

Intervention Methodology Man Days/Factory

Develop a schedule for preventive maintenance of machines;

Development of technology batches for accompanying the lots;

Developing a project to switch from production mode: of 3 teams in 3 shifts to production mode: 4 teams in 3 shifts with continuous production without scheduled weekends on Saturdays and Sundays.

Projects preparation 2.0 days

Refresher course on compilation of spinning plans and technological batches of spinning lots;

Training of mentors and trainers of spinners and pre-spinners Training

Education

Demonstration

Discussion 2.0 day

Technology efficiency Assessments Observations

Record Reviews 1.0 day

4.3.2. In the weaving mill:

Intervention Methodology Man Days/Factory

Development of a project for construction of aspiration and air-conditioning installation in the weaving mill;

Development of a project for differentiation and assembling of weaving production: warping, sizing, threading, weaving, qualifying, wrapping and rewinding of residual yarns; Projects preparation 2.0 days

Training of management staff on a common organization of weaving;

Training of quality controllers;

Training of technologists and mechanics. Training

Education

Demonstration

Discussion 2.0 day

Technology efficiency Assessments Observations

Record Reviews 1.0 day

5. Recommendations for the overall program

5.1.Development of a list of enterprises subject to the activities of the FTI

5.2. Making contact and interacting with local educational institutions

5.3.Development of program for joint projects between the FTI and the controlled enterprises

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