

Productivity in the power-loom industry

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Indian textile industry is one of the largest industries in the country. It supplies clothing, home furnishings and other products to the big population in India; at the same time, it exports fabrics to many countries.

The textile industry is constituted by the spinning of yarn, weaving of fabrics, processing of fabrics and garmenting and home furnishing of the fabrics. The yarn has to be woven to make it a fabric that is used in many areas, mainly for human consumption, home, furnishing, industrial uses, and also in agriculture. Weaving is a prominent sector in Textiles done in handlooms and power looms.

The Power Loom was one of the most significant inventions of the early industrial revolution. It brought about a radical transformation in the textile industry, eventually leading to the establishment of cotton mills and large-scale textile factories.

Power loom marked a major shift from traditional cottage industries to large-scale factory production with increasing efficiency and productivity and broader market reach.

The power loom is operated on the principle of automation and mechanical power. It comprises a series of integrated mechanism that replaces the need for specially trained operators to manually examine the fabrics.

The first power loom was introduced in the late 18th century with British technology used in English textile mills and consisted of several key components. Fabric is made of a group of warp and weft yarn. The warp is the set of yarns held under tension on a beam that is attached to the loom. The weft is the crossway yarn and is inserted through the warp, pushed by a shuttle or other mechanisms. The loom is operated by a series of mechanical devices and power sources such as belts, pulleys, and gears, which control the movement of the warp and weft threads.

Yarn is rolled in a pirn and inserted in a shuttle which is travelling between the warp yarn either by hand or by machine. If it is done by hand, it is called handloom and if it is done by machine, it is called power loom.

The production of the fabrics will be very scarce if done by handloom. When it is produced by a power loom, then the production will be higher. In the plain power loom, the shuttle has to be changed whenever the pirn with yarn is empty, the automatic power loom shuttle is inserted automatically without stopping the loom by a mechanism. In this case, production will be higher.

Higher productivity can be achieved in all types of looms - handlooms, plain power looms, shuttle automatic loom, and shuttle-less automatic looms. In all these machines production capacity differs and productivity as well.

Achieving higher productivity in power looms is based on many aspects. For example, the larger yield of production is based on the following bearings in the power-loom industry.

- Skilled manpower
- Maintenance of the loom
- Working conditions of the loom
- Modernized technology
- Supply of power
- Supply and quality of the yarn

- Working capital

All the above have to be met to achieve higher productivity in power loom. If everything is available, except the raw material, production will be stopped. Likewise, even if all the criteria are fulfilled and the supply of power is not regular, then productivity cannot be achieved in the loom.

Out of all the sectors in the textile industry, prominent and important is the power loom as it drastically increases the speed of production. The change from manual labor to power-operated labor enables factories to produce fabrics at a high rate.

Fabrics produced in the power loom by one person will require many more people to produce the same fabrics in hand looms.

The volume of production is very much required for countries like India to feed its large population. It is impossible for hand-operated looms to produce large quantities of fabrics to feed the entire population.

Even though the power-loom industry produces more fabrics, the volume of production is low based on its productivity. This is low-rate of productivity is the result of non-compliance of requirements. Productivity in India is less than 50% of its installed capacity. If efforts are taken to improve facilities such as the supply of power, skilled manpower, quality of yarn, and maintain good working conditions of the looms there are good possibilities of increasing the production many times without even installing an extra loom.

How to Improve Productivity in Power Looms?

The productivity of the loom is governed by the speed, efficiency, and quality of the yarn during the weaving process. Lower productivity not only reduces production, but also affects fabric quality.

In woven fabric manufacturing, warp ends are sized in the warping process by using starch making it possible for them to survive the various stresses encountered in the weaving process. The main object of the sizing is to improve the weaving ability of the warp and make it sustainable for weaving. The breakage rate of the cotton-sized warp yarn is susceptible to humidity and shows large differences with changes in relative humidity in the weaving industry. It is challenging to find the optimum relative humidity level to get minimum warp yarn breakage. A study was done to analyze the effect of relative humidity to warp, and breakage in weaving and to optimize relative humidity with minimum warp yarn breakage rate.

The reduction of breakages of both warp and weft yarn not only increases the production and quality of the warping, sizing, and weaving process but also reduces wastage of yarn. This reduces the overall cost of the fabrics manufactured and improves the profitability of the fabric and that of the company. The efficiency of weaving is the most important factor considered in terms of productivity. The loom efficiency is mainly decided by the speed as well as the downtime of the machine. The efficiency of the loom can be improved by effective control of the breakages of the warp and weft, the mechanical condition of the machine, and poor quality of the atmosphere conditions in the weaving shed were identified as the main reasons for the breakages during the weaving process.

Ways and Means to Improve Productivity in the Power-loom Industry

Yarn Breakages Should be Controlled

Thousands of yarn are inserted in the warp beam and one single yarn is traveling to both sides to make the fabrics. The quality of the yarn should be good so that breakage will be reduced. When the yarn is broken, the loom will stop and production will be affected. These breakages are essential to be reduced by controlling the manufacturing process and

atmospheric conditions at every stage of manufacturing of the fabrics in the weaving industry. One of the most important and considerable problems is the breakages of both warp and weft. Breakages not only reduce the production rate but also deteriorate the quality of the fabric. The quality of the yarn is mainly determined by the CSP (Count Strength Product) of the yarn. CSP of the yarn count should be good so that breakage will be reduced.

Introduce Modern Technology

Usage of computerized systems and automation technology to improve the speed and production in the weaving process.

Modern machines can be programmed to view complex designs, switch patterns quickly, and monitor various parameters to ensure high-quality fabric production. They are commonly used in large-scale textile manufacturing where they are employed to examine a wide range of fabrics, including cotton, synthetic fabrics, and bulks.

These looms can handle high production volumes and are capable of producing fabrics of varying patterns, textures, and widths. The continued use and improvement of power looms enabled textile manufacturers to meet the demand of the global market by producing fabrics in bulk quantities.

In India, there are around 2.5 million looms producing fabrics out of which modernized looms account for less than 10 percent, and the rest are plain power looms which do not produce as efficiently. Even in the plain Power-loom sector, a semi-automatic system can be introduced and production can be made higher and at the same time with good quality. There are some schemes announced by the government to convert the plain power looms into semi-automatic power looms.

Production of the modernized looms facilities is very low in India. Many looms are imported from countries like China, Belgium, Italy, and Germany. If the production facilities of modern machines are made in India, there are good possibilities of converting the plain power looms into modernized power looms.

Quality of Raw Material

The right quality, the right quantity and at the right time is very much necessary for the weaving process. CSP of the yarn is the main criterion of yarn quality. It is a measure of yarn's strength. The product of the yarn count and its strength is known as Count Strength Product (CSP). The commercial value of the cotton variety is related to its spinning performance, which is dependent on the yarn count that can be spun with the given cotton and the CSP obtained for the count. If the CSP is low, the quality of yarn is not good and many breaks will happen. While purchasing the yarn from the spinning mills, the weaver should verify the CSP. The tensile strength of the yarn is also important and influences productivity.

Working Conditions of the Factories

The working conditions in the power-loom factories are often harsh and challenging with little regard for workers' welfare. Factory owners, prioritizing, maximizing production and profits, lead to unsafe and exploitative conditions for the workers. Long working hours prevail in the power-loom industry. Weavers work for 12 hours a day and six days a week. The demanding nature of the work took a toll on their physical and mental well-being. Safety regulations are virtually non-existence, resulting in accidents, working conditions, and environment are becoming increasingly complex and pose significant risks. Accidents and injuries are frequent and workers face the constant threat of getting caught in moving parts of suffering, burns, cuts, or falls. Child labor is another issue in the power-loom industry in India.

Take Advantage of the Government Schemes

Utilize government support by taking advantage of the schemes rolled out. The Government offers financial assistance, technical support, labor training, and market linkages to weavers.

Uninterrupted Power Supply

Apart from the yarn, power is the main input in the power waving. In India, power interruption is becoming a normal practice. Many factories install diesel generators to produce power when electricity is not available. Productivity is affected when the power is cut. The cost of the fabric is also increased when the weaving is enabled by using diesel generator.

When the loom is stopped, it also affects the quality of the fabrics produced.

Conclusion

Weaving is largely operated in many countries like China, India, Taiwan, Pakistan, Indonesia, Vietnam, Taiwan, Turkey, Germany, Italy, France, USA, and more. China and India are the most prominent countries that produce fabrics extensively - for domestic consumption for their huge population and also export to many countries.

Next to agriculture, the power-loom industry is the prominent industry in India and it provides the country with more employment, more production, and more foreign exchange earnings through export. The power-loom industry in India contributes greatly to the social and economic stability of the country. Value addition in products made by the power-loom industry is very much necessary for the economic development of India. Productivity is the key area in adding value to the products and also adding value to its operation. By improving the yield of production, the industry will certainly grow very much economically at the same time it will contribute to the financial development of the factory, and of course of the country as a whole.