Spindle Tape and Energy Conservation
スピンドルテープと省エネルギー

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Experimental

The trials have been conducted in actual mill conditions and in each case, the same ringframe is used for the investigation. Tapes of weight per unit length ranging from 3.5 gms/meter to 8.25 gms/meter have been chosen and they all have been made with the base material cotton and have the herringbone type of weave. The only basic difference between the tapes is the difference in width and consequently the difference in weight per unit length of the tape.

Individual frames were successively fixed with the different tapes and all the conditions remaining the same, the energy consumption was measured from the beginning of a doff to the end of a doff. The total amount of yarn produced per doff was also measured. The end breakage rates were monitored. Care was taken to keep the idle spindle time almost the same in all cases.

Measurement of the energy consumed by spindle tapes necessarily involves the presence of spindles and consequently the energy measurements have to be made with the spindles working. Thus the energy measurements have been made under full performing conditions of the ringframe with different tapes mounted on the same frame spinning the same count. Energy measurements for two different counts namely 40 s and 100 s have been measured. The weight per unit length of the tape is estimated and in each case and the units (KWh) per kilogram of yarn produced have been calculated as a mean of ten different observations. The spindle speeds have been maintained the same saving, small fluctuations due to the fall in line voltage and line cyclicity.

Discussion

Soliman (2) has related the power consumption by spindle tape to its bending resistance. Bending resistance depends upon the width, the thickness, the radius of curvature of bending, the mean tensile stress, the material and the weave of the tape. Since we have used the same cotton material, the same type of weave and the tapes are working in the same machine (and thereby the radius of curvature being the same) all these parameters (like width thickness and tensile strength if the construction of the tape and count of the yarn used are identical) are all directly related to the number of fibers per unit area of cross-section which in turn is related to the mass per unit length of the tape.

Table 1 and Table 2 gives the units per kilogram consumed for the two counts 40 s and 100 s. Since the only variable is the difference in weight of the tape, the difference in power consumption is due to the lightness of the tape.

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The values are plotted in Fig. 1(a) and 1(b). It is clear that lighter the tape better the saving in power. Instead of using the tape with 8.5 gms per meter if one uses the tape with weight 3.5 gms per meter the saving in power is 9% in the case of 40 s count. Similarly between tapes of weight 7.25 gms per meter and 3.5 gms per meter, the saving in energy is about 6.6% in the case of 100 counts as seen from the Tables. Further, work on energy saving is going on.
Conclusions

Energy saving in production is possible by choosing tapes of lighter weight and by proper choice, substantial savings could be achieved.

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Literature Cited


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