expected to have a lesser amount of fibre fly in each length group when the linear density is lower. Also in coarser yarn we have a lot of protruding fibres and thus more hairiness.

Correlation between hairiness and fibre fly

In this study we calculated the correlation between the hairiness (H) of the Premier machine and the amount of the total length of flies (1 - 4 mm). As is known, hairiness is the total length of hairs (cm) in one centimeter of the yarn length. The total length of flies in cm in one hundred meters of yarn, regarded as the total fly length, was calculated from the following equation:

$$Total\ fly\ length = \sum_{i=1}^{n} i \times n_i$$

where i is group length in centimeters and n is the number of flies in an i^{th} group length. For all cases of twist and yarn count the values of hairiness and total fly length, as explained above, were measured and then the linear correlation between the two quantities were calculated. ***Figure 10*** (see page 61) shows plots of the total fly length (1 - 4 mm) versus hairiness. A linear regression coefficient of $R^2 = 0.905$ was found between these two quantities, which can be regarded as an acceptable linear correlation. We can conclude that the hairiness (H) can be used as a significant criterion to predict the amount of flies generated during cone-winding

Conclusions

The main aim of this study was to calculate the fly length generated during con-winding. The image processing technique was used to calculate the length of fibre flies. Calculating individual fibre flies allows us to obtain the number of fibre flies in each group length as well as the fibre length distribution. 100% acrylic yarns with different twist and linear densities were produced and re-wound on a con-winding machine. The fly fibres generated during the process were collected. Using the image process technique, the length of flies and fibre length distribution were calculated. The results showed that both the twist and linear density of the yarn have a significant effect on the amount of fly fibres generated during con-winding. The fly length parameters were also compared to the hairiness and hair count of the yarn, measured by an evenness testing machine. The results showed an acceptable linear regression between the number of flies and the hairiness index of the yarn. It can be concluded that the twist of yarn can be a reasonable criterion to predict the hairiness and fly generated during the con winding

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