

Frictional Coefficient and Hydrodynamic Lubrication
of Synthetic Fibers

-Effects of Chain Length of Fatty Acids and Fatty
Alcohols on the Lubricating Friction of P.E.T Fiber-

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Textile yarns pass over guide surfaces in spinning operations and rub against each other during drafting, weaving and knitting operations.

When one body slides over another, friction always resists the motion.

Therefore, the friction must not only be reduced, it has to be kept uniform to render an even products.

In order to investigate the frictional behaviors of hydrodynamic lubrication of the synthetic fibers, various chain length of straight chain fatty acids, fatty alcohols and polyethylene glycol fatty acid esters were employed as lubricants.

The frictional coefficient of polyester fibers were measured by Rothschild Friction Meter at the velocity range from 0.5 to 100m/min.

The effects of chain length of lubricant, speed and temperature are presented.

The conclusions obtained from this study are as follows.

1. For each homologous series, the frictional coefficient decreases with increasing lubricant chain length up to approximately twelve and/or fourteen carbon atoms, after which the frictional coefficient remains essentially constant.
2. At any given hydrocarbon chain length, fatty acids are more effective on the frictional coefficient than fatty alcohols.
3. The frictional coefficient always increases with the increase of sliding speeds.
4. The frictional coefficient initially decreases with increasing temperature of friction pin and shows the minimum values at the near melting point of lubricant, and then sharply increases their values as the temperature increases over the melting point.