

**COTTON FIBRE MATURITY:
ITS MEASUREMENT AND EFFECTS ON PROCESSING**

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SUMMARY

Fibre maturity is regarded as a central characteristic of a cotton fibre through its direct and indirect correlations with a number of chemical and physical properties important in the industrial processing of cotton [1].

Increasing processing efficiency depends on more intimate and objective knowledge of the raw fibre. Current methods for measuring fibre maturity are too slow, too inaccurate or both. This project had two parts therefore: (i) The assessment of new methods for measuring fibre maturity and (ii) an investigation of the effects of fibre maturity on yarn quality and dye uptake.

Central to the investigation was the direct measurement of fibre wall thickening from magnified cross-sections. Wall thickening was expressed as the degree of thickening which is calculated as the ratio of the cross-sectional area to the area of a circle with the same perimeter as that of the cross-section. Theoretically, any test for fibre maturity should give values that vary with the degree of thickening alone. In addition, because measurements are made on individual fibres the between fibre variation in maturity can also be measured. Methods currently used in industry and commerce give average or bulk values only.

The values of fibre wall thickening were used to investigate potential new methods for measuring fibre maturity. These methods included near infrared reflectance spectroscopy, optical extinction methods and automated image analysis.

In a second part to the investigation the relationship between processing ability and fibre maturity was investigated. To do this, selected cottons were ring-spun into yarn and the yarn subject to various standard tests including those for yarn evenness, yarn tenacity and number of yarn imperfections. The relationship between maturity and dyeing ability was also assessed in a series of dyeings on both loose fibre and knitted cloth. Dye uptake was assessed by making reflectance measurements on the fibre and fabric.