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Quantitative Grading of Spun Yarns for Appearance

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Abstract: The general appearance of a yarn is one of the primary qualities affecting its commercial value. The method of grading spun yarns by subjective visual examination has long been recognized as a practical quality assessment tool in yarn manufacturing and fabric forming industries.

In this paper, we want to report an objective and quantitative method for grading spun yarn appearance derived from optical yarn diameter measurements. Our study found that quantitative yarn characteristics derived from the optical yarn diameter measurement are determining factors for a human vision system to differentiate a good yarn from a bad one in terms of appearance. These characteristics are the optical yarn diameter, the yarn diameter CV%, thick place size, thin place size, nep size and yarn diameter distribution. We obtained a robust numerical metric (objective discriminatory appearance index) for yarn appearance grade, which is a linear combination of the numerical characteristics derived from the optical yarn diameter data of the USDA graded Ne 20 (29.5 Tex) Grade A, B, C and D yarns described in ASTM D2255-90.

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