IMPROVEMENT OF THE PREDICTION OF YARN QUALITY USING HIGH VOLUME INSTRUMENT (HVI) FIBROGRAM

M.A. Sayeed
B.R. Kelly
E.F. Hequet
Texas Tech University
Lubbock, Texas

Abstract

Complete fiber length distribution is considered as an essential fiber quality parameter for predicting yarn quality. However, the entire cotton industry depends on High Volume Instrument (HVI) for fiber length measurements which do not provide the fiber length distribution. Other fiber length measurement systems, such as the Advanced Fiber Information System (AFIS), provides the complete fiber length distribution. However, AFIS is too slow to be used in large breeding programs or in commercial cotton classification. Fiber length measurements with HVI are based on the fibrogram principle. HVI reports two length parameters, Upper Half Mean Length (UHML) and Uniformity Index (UI), using only two points from the fibrogram curve. The results from 529 commercial samples show that the fibrogram holds additional fiber length information than what is captured by UHML and UI. A set of commercial-like samples were used to design four Partial Least Square Regression prediction models to quantify the importance of the fibrogram compare to the typical HVI lengths and AFIS length distribution by number. The first model contains all the HVI properties except length. For second model, UHML and UI were added to the first model. For the third and fourth models, UHML and UI were replaced by the fibrogram and the AFIS length distribution respectively. The predictive power of these models was then evaluated by the leave-one-out cross-validation. The results show that the fibrogram model performs better than the model with typical HVI length parameters and is comparable to the model with AFIS length distribution by number.