

Virginia State University

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Krishan Agrawal*, Department of Mathematics & Computer Science, Virginia State University, VA 23806, **Ronald Moore**, Performance Polymers, Honeywell, 15801 Woods Edge Road, Colonial Heights, VA 23834, and **Eugene Evans**, (. *Determination of the Probability Distribution of strength of a Polymer Fiber Bundle Using Statistical Analysis.*

The purpose of this research is to analyze the randomly selected 21 samples out of 500 samples provided by Performance Materials Technologies Division of Honeywell to investigate relationship between polymer single fiber strength and its bundle. This analysis is done by assuming two parameter Weibull distribution for single fiber strength and the same Weibull distribution for the bundle strength following hierarchical theory. The parameters are estimated using linear regression. It is well known that strength of bundle reduces because of equal load sharing phenomenon as predicted by Daniel's Theory. However, our experimental data shows slight increase in the bundle strength. It seems that this contradiction in theoretical and experimental data results is probably due to high variability in sample data which was confirmed in this study by Tukey's test. This high variability in sample data may be due to chemical process, human error, machine error etc. Therefore in order to find meaningful relationship on the transfer ratio between the strength of single fiber and bundle, more data has to be tested with this approach, also Excel based user friendly program is developed to calculate two parameters of Weibull distribution. (Received September 15, 2014)