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RELATIVE DENSITY OF QUALITY INDICATORS WITH NORMAL AND POISSON DISTRIBUTIONS IN ASSESSMENT OF WOVEN FABRICS

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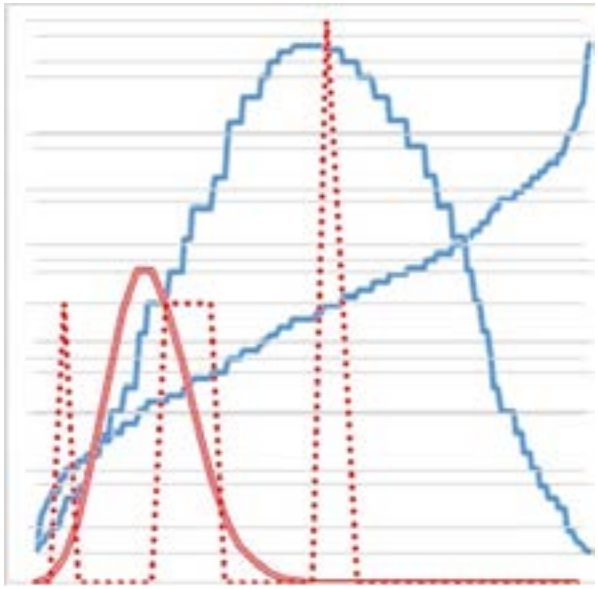
Just as fabrics are manufactured under conditions of deterministic machine settings and sporadic failures, quality indicators are divided into two main groups: results of laboratory measurements with a normal distribution of numerical values and organoleptic observations of rare events with a Poisson distribution. The method of measuring properties through laboratory tests is characterized by objectivity, accuracy and numerical values of the established results. The properties to be measured follow the designed and specified fabric structure. Measurements are single statistical events that are reflected in the numerical value obtained by the laboratory apparatus. The set of numerical data from laboratory measurements of the determined properties has a normal distribution. The probability density of properties with the normal distribution is characterized by a bell-shaped change in the exponential function and by established statistical indicators, of which the mathematical expectation and the confidence interval of the mean value are of particular application.



$$f(x) = \frac{1}{\sigma\sqrt{2\sigma}} \cdot e^{-\frac{1}{\sigma^2}(x-m)^2}$$

While the physical properties remain hidden in the fabric's construction, even the smallest defect on the surface is visible and repels the consumer. These defects are rare but clearly profiled discrepancies such as: dirty spots, color differences, broken weaving threads, knots and the like. Defects are the result of a sudden change in one of the machine modes, due to an accident or other similar event. The emergency origin and their rare occurrence (less than 1/10,000) categorizes them as rare events with the corresponding specificity of statistical processing and analysis. Unlike measurement methods, the organoleptic method is applied to the entire general population of the batch of fabric and in this case, a representative sample is not drawn up. Enumeration of defects of the same type for a single piece of fabric and for the entire batch leads to the compilation of sets of numerical data that reflect rare events and have a Poisson distribution. The essential feature of the statistical processing of numerical data with a Poisson distribution is the single extremum of the relative distribution and the equality between the mathematical expectation and the standard deviation.

$$\bar{x} = n \cdot p = \frac{n \cdot m}{n} = m$$

Subject of this study is the density and distribution of quantitative indicators with normal and Poisson distributions originating from the measuring and organoleptic method for grading woven fabrics.

Keywords: *textile fabrics, quality evaluation, Gauss / Poisson density*