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INTERACTIVE APPLICATION FOR CALCULATING THE RELIABILITY OF PRODUCTS OF LIGHT INDUSTRY

ИНТЕРАКТИВНОЕ ПРИЛОЖЕНИЕ ДЛЯ РАСЧЕТА НАДЕЖНОСТИ ИЗДЕЛИЙ ЛЕГКОЙ ПРОМЫШЛЕННОСТИ

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ABSTRACT

PRODUCT RELIABILITY, FAILURE RATE, AVAILABILITY, COMPETITIVENESS, MACRO PROGRAMMING

The concept of "product reliability" is considered in the article. A definition of this concept is given and the classification of reliability properties is listed. The concepts of gradual and sudden failures, the causes of their appearance and general features are studied. The possibilities of calculating and analyzing the level of reliability of light industry products using the MS Excel spreadsheet processor are considered.

АННОТАЦИЯ

НАДЕЖНОСТЬ ИЗДЕЛИЙ, ИНТЕНСИВНОСТЬ ОТКАЗОВ, РАБОТОСПОСОБНОСТЬ, КОНКУРЕНТОСПОСОБНОСТЬ, МАКРОПРОГРАММИРОВАНИЕ

В статье рассмотрено понятие «надежность изделия»: дано определение этого понятия и перечислена классификация свойств надежности. Изучены понятия постепенных и внезапных отказов, причины их появления и общие черты. Рассмотрены возможности расчета и анализа уровня надежности изделий легкой промышленности с помощью табличного процессора MS Excel.

Reliability is one of the key indicators characterizing the competitiveness of light industry products. This is the ability of the product to perform predetermined functions, while preserving over time the values of the established operational indicators within predetermined limits. Due to the processes that occur during storage, consumption or operation of goods, the reliability of products is constantly changing. [1]

Reliability of goods is a complex property, which is divided into simpler ones: reliability, durability, maintainability and storage. All these properties are determined by the ability of the product to maintain its use value over time. [3]

The aim of the study is to develop interactive software that automates the calculation of the reliability of light industry products.

The object of research is the products of the Belarusian leather and footwear company Marko.

Research tools are MS Excel spreadsheet processor, macro programming technology.

The objective of the study is, using the developed software application, to calculate and analyze the probability of occurrence of a failure (malfunction) based on experimentally obtained initial data. In this case, the probability of occurrence of a failure within a certain interval of operation (consumption) of the product (product) is considered.

By the nature of the occurrence, failures can be gradual and sudden. Failures are usually caused by slow degradation of goods, wear and tear of materials. Sudden failures appear in a sharp, unexpected change in any product parameters, as well as in the presence of defects in the products. [4] Unlike gradual failures, sudden failures are usually not preceded by any signs that may indicate the possibility of their manifestation. Despite the difference in the causes of failures, they have a common feature - the randomness of occurrence, which can be explained using probability theory and mathematical statistics.

Failure rate is the ratio of the number of failed objects per a time unit to the average number of objects that are working properly in a given period of time, provided that the failed objects are not restored and are not replaced by healthy ones.

The main page of the application (Figure 1) allows the user to select the necessary type of product for calculating reliability and go to the corresponding sheet of the workbook. Macro programming technologies and a set of hyperlinks were used to automate the transition. [2]

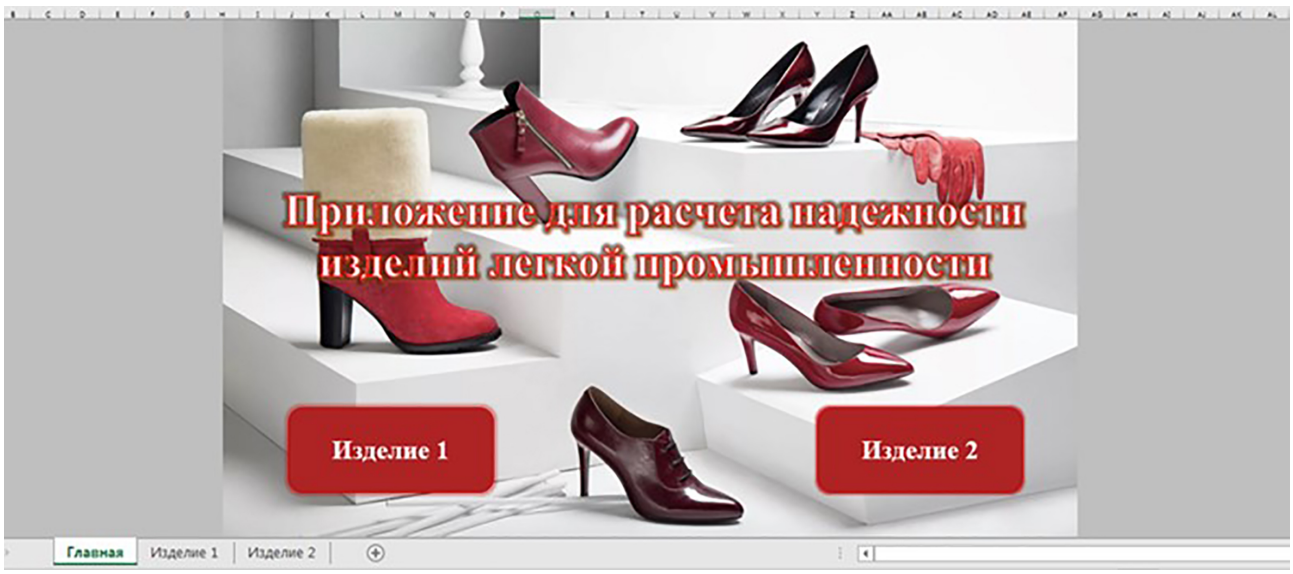

Figure 1 – The interface (main page) of MS Excel

An example of calculating the numerical characteristics of a random variable, the results of intermediate calculations of the reliability of the product, a conclusion on the likely time of failure is presented in Figure 2.

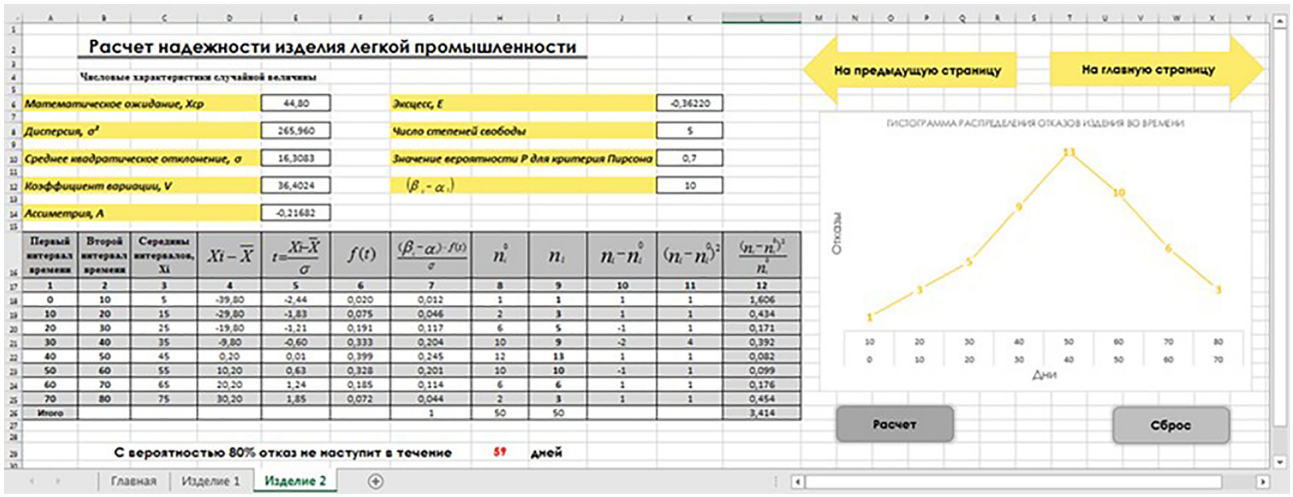

Figure 2 – The interface (main page) of MS Excel

To automate the calculation, macros are introduced that allow both to perform calculations using the appropriate algorithms and reset the original data. Each macro is activated using the corresponding control (button). To implement the algorithm for calculating reliability indicators, the built-in functions of MS Excel TP of the categories "mathematical" and "statistical" are used. Visually assess the interval distribution of product failures using the graph (Figure 2).

The developed software application has the following advantages:

1. Versatility. The ability to calculate the reliability of various types of products based on different sets of source data.

2. Ease of use. Using the application does not require additional skills.

3. Automation of calculations. The application is fully automated, the user needs to enter only the source data.

4. Social significance – improving the working conditions of specialists in the marketing department.

5. Practical focus. This application can be used to develop practical skills in professional and educational activities.

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