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INVESTIGATION OF THE ENVIRONMENTAL FACTORS' INFLUENCE ON THE MECHANICAL PROPERTIES OF PLASTICS

Abstract: A statistical method for the analysis of the experimental results obtained by tensile test on specimens made of high-density polyethylene is presented in this work. The two-factor experiment with three levels was used for statistical analysis of data. Specimens were tested at low temperatures at different tension speeds. By applying this method it can determine which factors have the greatest influence on the tensile strength of the tested specimens.

Keywords: statistical method, factor experiment 3ⁿ, tensile testing, polyethylene

1. INTRODUCTION

In engineering practice, the experiment is a research method or performing of professional work. Factor experiment is a statistical method for analysing of the experimental results when the test subject is affected by several factors with multiple levels [1]. A large part of research in science and engineering and especially in the industry is empirical. The usage of statistical methods of experiments planning can significantly increase the efficiency of the experimentation process itself and lead to better and more reliable conclusions.

When researching the determined phenomenon, the greatest importance is single-factor experiment. In addition to the many phenomena that depend only on one factor, single-factor experiment, in the classical approach, is also used as the basis in experiments with multiple factors. The difference between the conventional and single-factor experiment is only in a randomization of factor level, which is required at single-factor experiment. This causes that the external factors' effects, as random variables, are

encompassed by an experiment's error. Factor experiment is denoted by the product of factor's level, which precisely shows how large is the total number of combinations of factor levels.

Polymeric materials are today among the most important technical materials. They are no longer used as a substitute for traditional materials (metal, wood, ceramics and glass), but are also used to create objects that have previously been produced from these traditional materials [2]. These materials are characterized by their mechanical properties, which are a combination of properties of solids and liquids. They are strong and capable of great mechanical elastic deformation. Properties of the polymer are conditioned by their internal structure.

Polyethylene is a macro-molecule hydrocarbon, and represents a very important material today. Industrially is produced by polymerization of ethylene, and in a laboratory's conditions can be also obtained from diazomethane [3].

