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R&R STUDY FOR VALIDATION OF THE MEASUREMENT SYSTEM OF A PROCESS FOR THE MANUFACTURE OF WIRE COILS IN A TEXTILE INDUSTRY

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ABSTRACT

The present paper proposes to analyse the measurement system in a textile company, in which 15% of the yarn reels of the total production of the factory use the measuring equipment studied. The article aims to validate the measurement system, making the information passed to the process control more reliable. First, a repeatability and reproducibility study was carried out in order to assess the current situation of the measurement system, analyzing the measurements of mass (kg), diameter (cm) and density (g / cm³). After obtaining the results, there was a performance in the squids and, thus, the studies were repeated. In both studies, a sample of 10 reels, 3 equipment and 3 repetitions were used and the highest gain of the presented work occurred in the measurement of the density parameter (g / cm³): 19.06% in the first study to 3.97% in the second study. Thus, it was possible to validate the measurement system of the company, bringing greater confidence of the disqualifications that occur and at the ideal moment for the performance of the process control.

Keywords: analysis of the measurement, repeatability and reproducibility, textile dyeing.

INTRODUCTION

Quality improvement searches are continuously focused on production, seeking to reduce the number of defects, minimizing variability. Improvement actions are implemented to improve the process capability, but in an already capable process, the measurement error is still unacceptable when compared to process variability. Thus, to verify the variability of the measurement process and the variability of the manufacturing process, it is crucial to make decisions (Peruchi, 2014, AIAG, 2010, Woodall and Borrór, 2008).

The study used to measure the variation components of a measurement system (MSA) analysis is called the Gage Repeatability and Reproducibility (GR&R) Study. This study compares if the variation of the measurement system is relatively smaller than the variation of the monitored process (Peruchi, 2011).

According to Pedott and Fogliatto (2013), in R&R studies, the measuring instrument is used to measure samples of a product repeatedly. Repeatability refers to the characteristic variability of the measuring instrument and stems from its ability to provide repeated close readings under the same conditions. Reproducibility refers to the ability of a measurement system to present the same results in the case of changes in measurement conditions, such as changes in evaluators, different shifts or changes in process.

This paper aims to conduct an R&R study to evaluate the measurement system of a textile company, which controls the dimensions of its products (mass, diameter and density). The relevance of this study is justified by the existing possibility of the measurement system of the company not being satisfactory, which generates incorrect actions by the control of processes. In addition, products are classified according to their density ranges and an incapacitated measurement system can generate product mix, directly affecting the company's relationship with its customers.

RESULTS AND CONCLUSIONS

Given the three responses studied, the density is the most critical for the beneficiation companies that perform the dyeing, and this feature is responsible for possible complaints from the company's customers. Thus, density was the main factor of this analysis. In the first study considering this parameter, we obtained a% R & R = 19.06% and $ndc = 7$, values in an acceptable range. After the performances, we obtained% R & R = 3.97% and $ndc = 35$. These results were obtained from the improvement of the focus of the camera and the sharpness of the image read by the equipment, thus allowing validation of the Measurement System.

Two other parameters studied and also presented results within acceptable limits: the mass and the diameter measured by the equipment. After the first studies and subsequent performances, subtle increases in repetitiveness and reproducibility responses were provided, but in a less relevant way than in the study considering the density.

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