



Experimental Investigation on Roughness Parameters of 42CrMo4 Steel Surface During Nitrocarburizing Treatment

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ABSTRACT

To evaluate the performance characteristics of various surfaces, a detailed and precise description of the surface's micro-geometry properties is required. In this context, roughness is a reliable indicator of the possible behavior of mechanical piece performance, since distortions on the surface can form a direct cause for cracks or corrosion. As a result, characterization of surface roughness is very important for zero-defect fabrication. This paper investigates the 2D roughness parameters of a 42CrMo4 steel surface before and after nitrocarburizing treatment. The latter was accomplished at 580 °C for 10 hours in a salt bath containing sodium cyanates and potassium carbonates. A surface profilometer was used to analyze the influence of nitrocarburizing treatment on the material's surface roughness parameters behavior. The parameters that comprehensively describes the surface structure, namely the amplitude, spacing, hybrid parameters, and material ratio parameters were highlighted. The results of the experiments indicated that the nitrocarburizing treatment was effective in increasing almost all the 2D roughness parameters of the 42CrMo4 steel surface.

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1. INTRODUCTION

Surface roughness is among the fundamental properties of the surface of industrial components when they are used. Surface roughness in the manufacturing industry must be compatible with both job requirements and quality standards [1]. Surface roughness evaluation is required for

describing functional behavior and monitoring product quality [2]. Furthermore, it is a crucial characteristic in many fundamental industrial concerns, such as friction [3], adhesion [4], electrochemical potential [5-6], aesthetic appearance [7], as well as positional accuracy [8]. As an outcome, many experimental and theoretical studies have been conducted on surface roughness.