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CONTRIBUTION TO IMPROVING THE MECHANICAL CHARACTERISTICS OF MATERIALS USED IN THE STRUCTURAL COMPONENTS OF INDUSTRIAL ROBOTS BY BOROCARBONITRIDING TREATMENT

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Abstract

Knowledge of the mechanisms by which contact surfaces deteriorate is necessary in order to improve the wear behavior of industrial robots. Reducing friction and wear in mechanisms of all kinds is still a sensitive design issue, and remains crucial in cutting-edge technologies where energy savings and reliability must go hand in hand. Determining the tribological behavior of materials would enable us to increase the efficiency and lifespan of industrial robots, etc., which would result in better operation without the risk of equipment damage or breakdown. The robust design of a mechanism aims to ensure that its performance is optimal and unaffected by variations. Hence the economic impact on the user. This paper presents a state of the art review of the methods used in robust mechanism design. Conventional technological solutions involve the formulation of a pair of materials and a contact geometry adapted to the tribological constraints of the mechanical system (pressures, speeds). Thermochemical treatment is a very effective way of remedying the static and dynamic errors caused by the operation of industrial robots. In this research work, we thought of improving the reliability of our industrial robot structure by improving the mechanical characteristics of the tribological systems that make it up. We would therefore apply thermochemical treatments with a rational choice of materials for the various contact surfaces with the aim of ensuring the quality of the robot's operation and obtaining the lowest possible cost price.

Tests were carried out on various ferrous alloys. The results obtained were used to validate the improved additive elements in the base alloys proposed for the construction of robot modules. A comparison of the results obtained with those reported in the literature shows good agreement.

Keywords : Borocarbonitriding treatment ; image analyses ; microhardness profile ; wear ; contact surfaces, and industrial robots.