The International Journal of Advanced Manufacturing Technology

Volume 119, Issue 5, 2022, Pages 4031-4041

Influence of dry friction on the wear behavior of X52steel—experimental study and simulation using response surfacesmethod

Soumaya MEDDAH, Mounira Bourebia, Kaddour Gherfi, Laouar Lakhdar, Amel Oulabbas, Sihem ACHOURI, Latifa KAHLOUL

Abstract: Friction and wear phenomena alter the behavior of the material surface, where certain relevant parameters which characterizethe surface are influenced. Therefore, the objective of this work is to identify the parameters most influencing the frictioncoefficient (f), the wear rate (Ws), and the volume parameters (Vmc and Vvv) during the friction test. The friction tests werecarried out by adopting the methodology of 23complete planes with three factors (D, V, and Py), at two levels each. Theresults show a decrease in the wear rate when all three factors are at their highest level and a decrease in the friction coefficientwhen using minimum load on speed long distances. In addition, the mathematical models developed allow to reveala correlation between the test parameters (D, V, and Py), and the responses studied (f, Ws) in their study field. Moreover,the volume parameters Vmc and Vvv were evaluated during the tests, and the morphology of the worn surface shows thatthe friction under a load of 1 N leads to the predominance of an abrasive wear mechanism, while a load of 10 N promotesan adhesive wear mechanism.

Keywords : Complete plans, modeling, friction coefficient, Wear rate, volume parameters