Wear Measuring and Wear Modelling Based On Archard, ASTM, and Neural Network Models

Authors : A. Shebani, C. Pislaru

Abstract : Wear of materials is an everyday experience and has been observed and studied for long time. The prediction of wear is a fundamental problem in the industrial field, mainly correlated to the planning of maintenance interventions and economy. Pin-on-disc test is the most common test which is used to study the wear behaviour. In this paper, the pin-on-disc (AEROTECH UNIDEX 11) is used for the investigation of the effects of normal load and hardness of material on the wear under dry and sliding conditions. In the pin-on-disc rig, two specimens were used; one, a pin which is made of steel with a tip, is positioned perpendicular to the disc, where the disc is made of aluminium. The pin wear and disc wear were measured by using the following instruments: The Talysurf instrument, a digital microscope, and the alicona instrument; where the Talysurf profilometer was used to measure the pin/disc wear scar depth, and the alicona was used to measure the volume loss for pin and disc. After that, the Archard model, American Society for Testing and Materials model (ASTM), and neural network model were used for pin/disc wear modelling and the simulation results are implemented by using the Matlab program. This paper focuses on how the alicona can be considered as a powerful tool for wear measurements and how the neural network is an effective algorithm for wear estimation.

Keywords : wear modelling, Archard Model, ASTM Model, Neural Networks Model, Pin-on-disc Test, Talysurf, digital microscope, Alicona

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