Journal of
Electrical Engineering and Electronic Technology

Abstract

Microstructure and wear behaviour of laser hardened AISI 1541 steel

Rafael Siqueira
Institute for Advanced Studies, Brazil

Abstract:

Laser surface hardening of steels is an attractive application for industry due to laser beam enabling a localized hardening to a required depth. However, local depletion in carbon was appointed as a limitation for the technique. In the present study, laser surface hardening was performed together with carburizing for the surface of AISI 1541 steel by coating with graphite layer. An Yb:fiber laser was used as the heat source and laser scan speeds of 10 and 20 mm/s, and laser power of 200W, 400W and 600W were studied. The microstructures, hardness and wear behavior of the treated surfaces using different laser parameters were studied. The hardness values increased with heat input, with the case depth showing a maximum of 700 µm for the highest laser intensity. The microstructure of the laser hardened zone consists of ferrite, a small amount of retained austenitic phase and martensite, with the amount of martensite varying gradually along the depth. A maximum hardened surface layer, with 770 HV, was obtained with the laser power of 400 W, and the scanning speed of 10 mm/s. The heat affected zone showed an average hardness value of 400 HV and the base material was 260 HV, indicating that the surface hardness was greatly increased compared with the substrate. The values of friction coefficient obtained for the hardened surfaces were lower than the friction coefficient of the base material, also indicating improvement in wear properties.

Biography:

Experienced Collaborator with a demonstrated history of working in the military industry. Skilled in Research and Development (R&D), Materials Science, Engineering, Laser Applications, and Science. Strong research professional with a Doctor of Philosophy (Ph.D.) focused in Ciências e Tecnologias Espaciais from Instituto Tecnológico de Aeronáutica - ITA.

Recent Publications:

- Rafael Siqueira, Microstructure and wear behaviour of laser hardened AISI 1541 steel , June 22-23, 2020, Osaka, Japan

15th International Conference on Laser Advanced Materials Processing , June 22-23, 2020, Osaka, Japan

Citation: Vladimir Bredikhin, Laser excitation ultrasound in light absorbing liquids imputing laser radiation through optical fiber with colloidal coating of distal tip by a single layer of transparent spheres, June 22-23, 2020, Osaka, Japan.