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WEAR TESTING MACHINE BY LASER BEAM ABLATION

H. A. Hafez[1]

ABSTRACT

Wear testing machine by laser ablation has been considered as a new machine for wear measurement. It overcomes the problems generated by old machines and systems. In this case, wear rate has occurred due to ablation by laser beam and test sample transformed from solid state to gas state directly (sublimation) and avoid relative movement and loss of material between sample and disk or plate**.** The different operation conditions such as temperature, chemicals, environmental conditions and different types of stresses have been considered. The new machine consists of two main parts; optical and mechanical parts. The optical parts includes ultraviolet laser source, optical filter, lenses to concentrate the beam and manhole of laser beam to the tested sample in the control room. The mechanical parts include the insulated chamber, dead weight, variable speed motor, sample holder, temperature and pressure sensors and ph meter. Mechanism of operation depends mainly on ablation process which is removal of material from the surface of a tested object by vaporization. Ultraviolet laser beam is used as source of energy required for ablation process. The new technique is suitable for all kinds of materials such as metals, alloys polymers, ceramics and composites in any shape and size. The main factors affecting the new technique are divided into: i) factors related to the laser beam characteristics and ii) factors related to material properties such as surface roughness, thermal conductivity, specific heat, density and mainly latent heat of sublimation.

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[1] Dr. Eng., Consultant in material science, Egypt. Emails: Hebatalrahman11@yahoo.com, Hebatalrahman11@gmail.com.