

# **Investigations on Mass Change and Surface Morphology of Contacts in Electromagnetic Contactor**

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*Abstract*—Electrical contacts are widely used for telecommunication and electric power as a device directly making and breaking electrical current. In the future, those will be more indispensable. The aim of this paper is to reveal the characteristics of the mass change and the surface morphology of contacts used in electromagnetic contactor. First, we focused attention on the mass change of contacts because the process of contact erosion and material transfer has not been completely understood. Contact surface was observed with a laser microscope and we evaluated surface morphology quantitatively. The experiment was performed under the different conditions. The load current is 5A, 10A and 20A respectively. In this paper we investigate the characteristics of contact resistance and arc duration. Moreover, the effect of the arc energy on the mass change and the characteristics of the change of surface morphology were discussed. As a result, the mass change is affected by the cumulative arc energy. The total mass change is found to be proportional to the cumulative arc energy rather than the operation number. Furthermore, the change of the surface morphology was quantitatively verified by the laser microscope observation.

*Index Terms*—*mass change, surface morphology, contact resistance, arc duration.*