# 学位論文内容の要旨（英文）
# Thesis Abstract (English)

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１．論文題目（英文）

Thesis Title (English)

Friction Characteristics of Microstructured Surface Created by Whirling Electrical Discharge Texturing

２．論文要旨（英文 300 語程度）

Thesis Abstract (In approx. 300 English words)

Whirling Electrical Discharge Texturing (WEDT) was developed for creating microstructures on inner surface of small cylinder with high efficiency using whirling phenomenon and electrical discharge texturing method. It was clarified that the surface characteristics of textured surface could be controlled by machining conditions of WEDT. It was considered that finishing process with lapping-film and honing was required after texturing with WEDT since it was thought that microstructures with low surface roughness could reduce friction coefficient. The surface qualities which were surface roughness, microstructure and composition, and residual stress of textured surface were studied to evaluate the qualities of textured surface after texturing with WEDT and after finishing process with lapping-film. It could be clarified that a good surface quality of textured surface could be obtained by WEDT.

The tribological characteristic in term of friction coefficient was studied through friction test devices which are ball-on-disc friction test, pin-on-disc friction test, and reciprocating friction test. The suitable conditions of surface characteristics which were texture-area ratio and crater diameter as well as friction test conditions were considered to reduce the friction coefficient during the sliding conditions for each testing method. It was clarified that the low friction coefficient could be obtained

with the suitable conditions of surface characteristics and surface roughness of textured surface compared to non textured surface.

In summarize, it was clarified that microstructures could be created by single pulse discharge of WEDT. In addition, low friction coefficients could be obtained with microstructured surface that was generated by WEDT. It was investigated that the texture-area ratio of approximately 6% and a mean crater diameter 50 μm were suitable conditions to reduce friction coefficient in ball-on-disc friction disc. In addition, in pin-on-disc friction test, a mean crater diameter 35 μm with texture-area ratio of approximately 6% and 4 % with were considered as suitable conditions for reducing the friction coefficient under the mixed lubrication condition near the boundary condition and mixed lubrication condition near the elastohydrodynamic lubrication condition, respectively. Moreover, in reciprocating friction test, low friction coefficient could be obtained under normal load 500 gf with a mean crater diameter of 40 μm and texture-area ratio of approximately 2 %.