Optimization of Operating Parameters Governing the Tribological Behavior of Carbon-Carbon Composite Brake Material

KEYWORDS
Carbon brake disk, Carbon-carbon composite, Taguchi techniques, Analysis of variance, Wear behavior

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INTRODUCTION

Carbon-carbon composites have good properties which enable them to operate as friction materials for braking applications in aircrafts to produce friction, transfer mechanical load and absorb the kinetic energy because of its high thermal conductivity, self-lubricating capability and low coefficient of thermal expansion [1-3].

ABSTRACT

Carbon-carbon composites are used worldwide in high-end braking systems. The system is modeled as stator and rotor under contact. This paper discuss the tribological behavior for c/c composite. The parameters under investigation are reducing the weight loss, increasing service life. Design of experiment is carried out using taguchi method for optimizing the number of experiments. Response surface method is then used to obtain insight about the best combination of operating parameters. Operating parameters were optimized for reducing weight loss based on L9 taguchi orthogonal array design with three input parameters: applied load, rotational speed and time. Finding out the influence of input parameters on two responses (weight loss, coefficient of friction change). Analysis of variables was carried out using anova and regression equations for every response developed.

Wear and friction properties of c/c composite were investigated by performing a dry sliding wear using disk on disk abrasive wear test. The results showed that for weight loss the time at which contact between stator disk and rotor disk was the dominant factor on weight loss then the applied load come in second rank and finally the rotational speed. For friction coefficient the applied load was the dominant factor then speed and then the time.

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