

## **ABSTRAK**

### **RANCANG BANGUN DAN PENGUJIAN AWAL ALAT UJI TRIBOLOGI TIPE *PIN-ON-DISK* UNTUK EVALUASI SIFAT KEAUSAN DAN KOEFSISIEN GESEK MATERIAL TEKNIK**

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Gesekan dan keausan merupakan fenomena yang mempengaruhi kinerja dan umur pakai komponen mekanis. Keterbatasan alat uji tribologi, khususnya tipe pin-on-disk, menjadi kendala dalam pengujian di laboratorium. Penelitian ini bertujuan merancang dan membangun alat uji pin-on-disk serta melakukan pengujian awal untuk mengetahui karakteristik gesek dan keausan material teknik. Metode yang digunakan adalah eksperimental, meliputi perancangan, pembuatan, dan pengujian alat. Alat dilengkapi sistem pembebanan, motor dengan kecepatan variabel, serta sensor load cell berbasis Arduino untuk mengukur gaya gesek. Pengujian dilakukan dengan variasi beban dan kecepatan, serta pengukuran massa untuk menentukan laju keausan. Hasil menunjukkan alat dapat bekerja dengan baik dan menghasilkan data koefisien gesek serta laju keausan secara konsisten. Laju keausan meningkat seiring bertambahnya beban, sedangkan pelumasan mampu menurunkannya. Hasil validasi menunjukkan alat cukup akurat dan layak digunakan untuk pengujian tribologi di laboratorium.

**Kata Kunci :** Tribologi, Pin-on-disk, Laju keausan, Koefisien gesek, Desain eksperimen.

## ABSTRACT

### DESIGN AND PRELIMINARY TESTING OF A PIN-ON-DISK TRIBOLOGY TESTER FOR EVALUATING WEAR AND FRICTION COEFFICIENT OF ENGINEERING MATERIALS

By

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*Friction and wear are phenomena that affect the performance and service life of mechanical components. The limited availability of tribology testing equipment, particularly the pin-on-disk type, poses challenges for conducting independent laboratory testing. This study aims to design and develop a pin-on-disk tribology tester and to perform preliminary testing to evaluate the friction and wear characteristics of engineering materials. The research method is experimental, including the design, fabrication, and testing of the device. The developed tester is equipped with a loading system, a variable-speed motor, and a load cell sensor integrated with an Arduino for measuring friction force. Testing was conducted with variations in load and rotational speed, as well as mass measurements to determine the wear rate. The results show that the developed device functions properly and is capable of producing consistent data for the friction coefficient and wear rate. The wear rate increases with increasing load, while lubrication reduces the wear. Validation results indicate that the data obtained are within the acceptable range compared to references, indicating that the device is sufficiently accurate and suitable for tribology testing in laboratory applications.*

**Keywords:** Tribology, Pin-on-disk, Wear rate, Friction coefficient, Experimental design.