MATLAB Applications on Tribology Data Analysis

Jose A. Morales, Ashlie Martini Ph.D., Azhar Vellore M.D.
School of Engineering , University of California, Merced

Introduction

Tribology is the science that studies friction, wear, and lubrication between moving surfaces. A key instrument within tribology, the tribometer, is essential in finding many important system properties, such as wear rate and coefficient of friction. A tribometer can provide accurate and precise information about the different system properties for a given material, which is very useful for learning how to optimize energy efficiency, resistance, and durability. Tribometers need a specific software designed to collect data from a test. The process consists of selecting a material and running the test with the tribometer. Next, all the information (depth, load, and friction) is sent to the software so that a graph can be displayed. However, the data displayed tends to be very noisy.

Purpose

The purpose of this research is to develop a MATLAB program so that all the data provided by the tribometer's software can be processed to obtain a cleaner visualization of results after performing a test.

Methodology and Materials

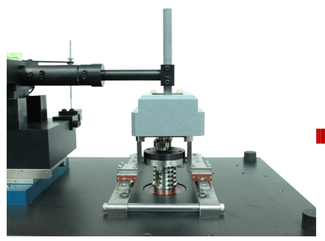


Image Source: Nanovea

Step 1: The use of a tribometer is required to set up the desired material to test. In this case, a linear wear friction testing module has been developed and analyzed.

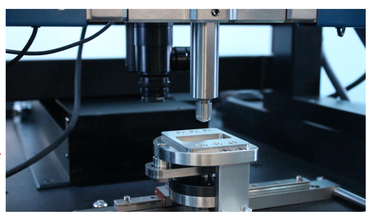


Image Source: Nanovea

Step 2: Next, a pin is placed on place and the tip starts moving in the positive and negative direction along the x-axis. This movement allows the tribometer to begin the data's collection process, where the tip of the sample will create a reciprocating linear wear pattern.

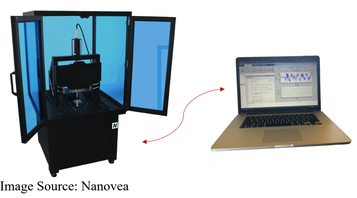
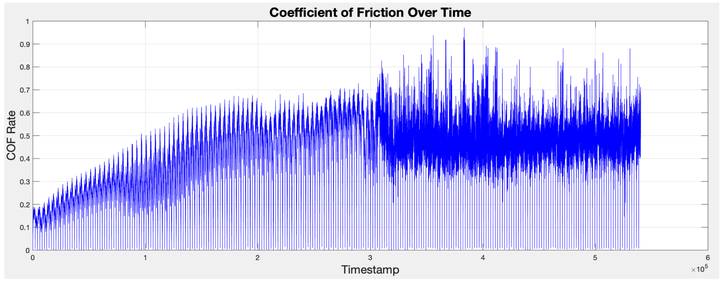


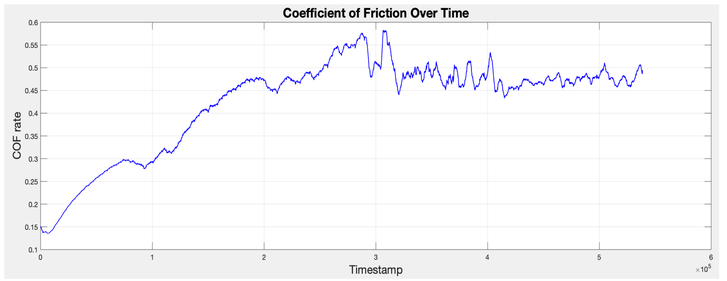
Image Source: Nanovea

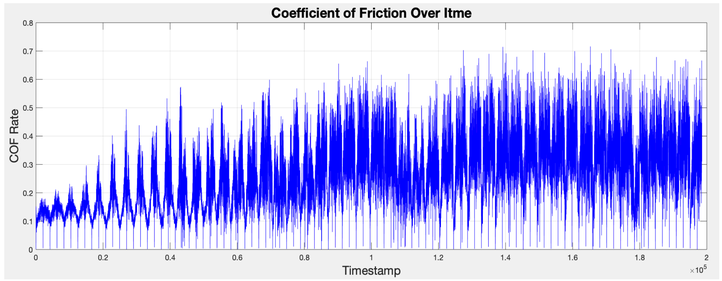
Step 3: After completing the test, all the information such as coefficient of friction, wear rate, force, etc. will be uploaded into a software and displayed as a graph.

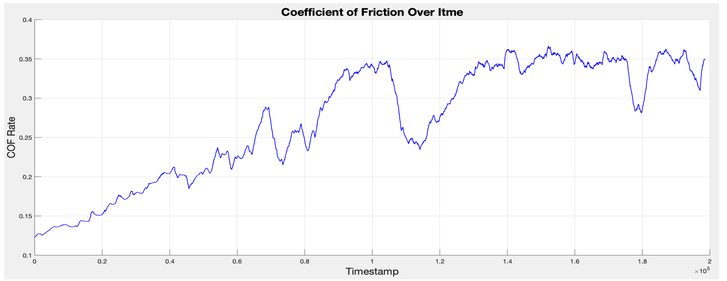
Step 4: Finally, all the collected data can be transferred and uploaded into a MATLAB code to significantly improve its interpretation and visualization.

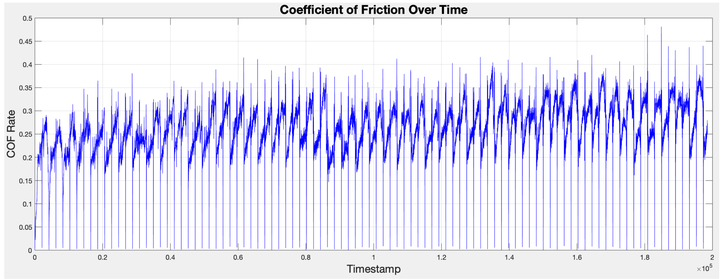
Tribometer's Data Straight From the Tribometer Versus MATLAB Processed

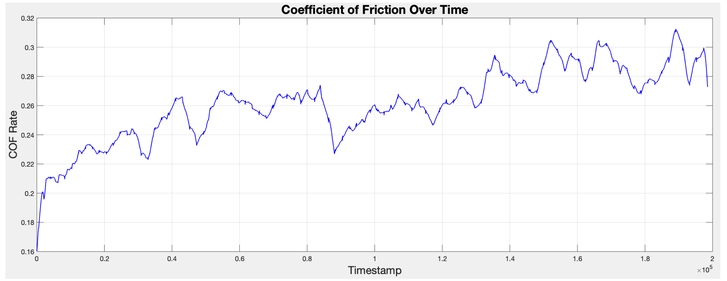












Conclusion

After developing and adjusting the MATLAB scrip, the tribometers' data was successfully uploaded and processed to obtain accurate and precise information. This method allowed the improvement of data's interpretation and visualization over the noisy graphs generated straight from the tribometer. Indeed, this project was intended to improve the analysis of tribological data and effectively report it. By using this procedure, engineers and/or companies will be able to analyze different specimens to better determine the system properties of the material tested according to their needs and expectations.

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References

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