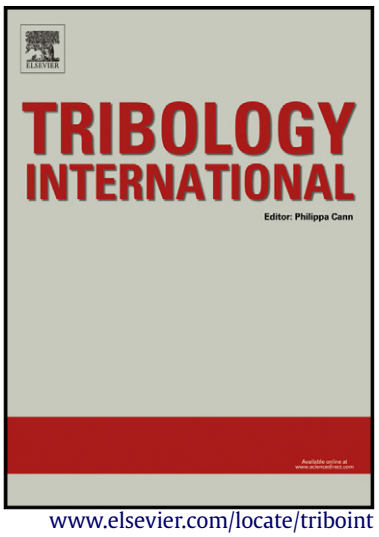

A comparison of measured and simulated friction, wear, and particle emission of disc brakes

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A comparison of measured and simulated friction, wear, and particle emission of disc brakes

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Abstract
Airborne wear particles originating from disc brakes are among the main contributors to non-exhaust emissions. The macroscopic wear behaviour of disc brakes can be explained by the growth and destruction of mesoscopic contact plateaus. The pad wear and temperature has earlier been simulated using a cellular automaton mesoscopic approach. The present paper seeks to refine the simulation approach to include disc wear and temperature, and to investigate the validity of this approach by comparing simulated brake events with a dyno bench test. The comparison shows a promising qualitative correlation between the simulated and the experimental results.

Keywords: Disc brake, Wear, Mesoscopic, Cellular automaton, Dyno bench

Highlights:

- A numerical approach for simulating disc brake friction, wear, and emission.
- Friction, wear, and emission input data are determined using tribometer tests.
- Simulated results correlate qualitatively with data measured in a dyno bench test.

Abbreviations
CoF – Coefficient of friction
CA – Cellular automaton
FEA – Finite element analysis
MCA – Moving cellular automaton
PoD – Pin-on-disc tribometer
XRFS - X-ray fluorescence spectroscopy