

# Rotary tribometer with AK Master and fixed pressure-velocity test to investigate the role of abrasives in brake pad tribology

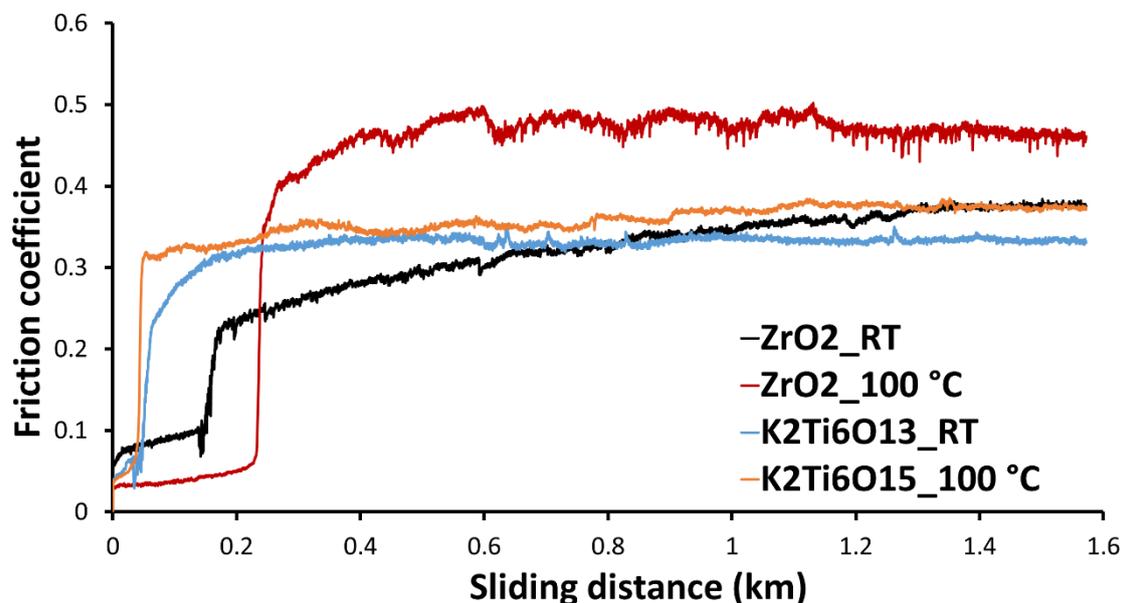
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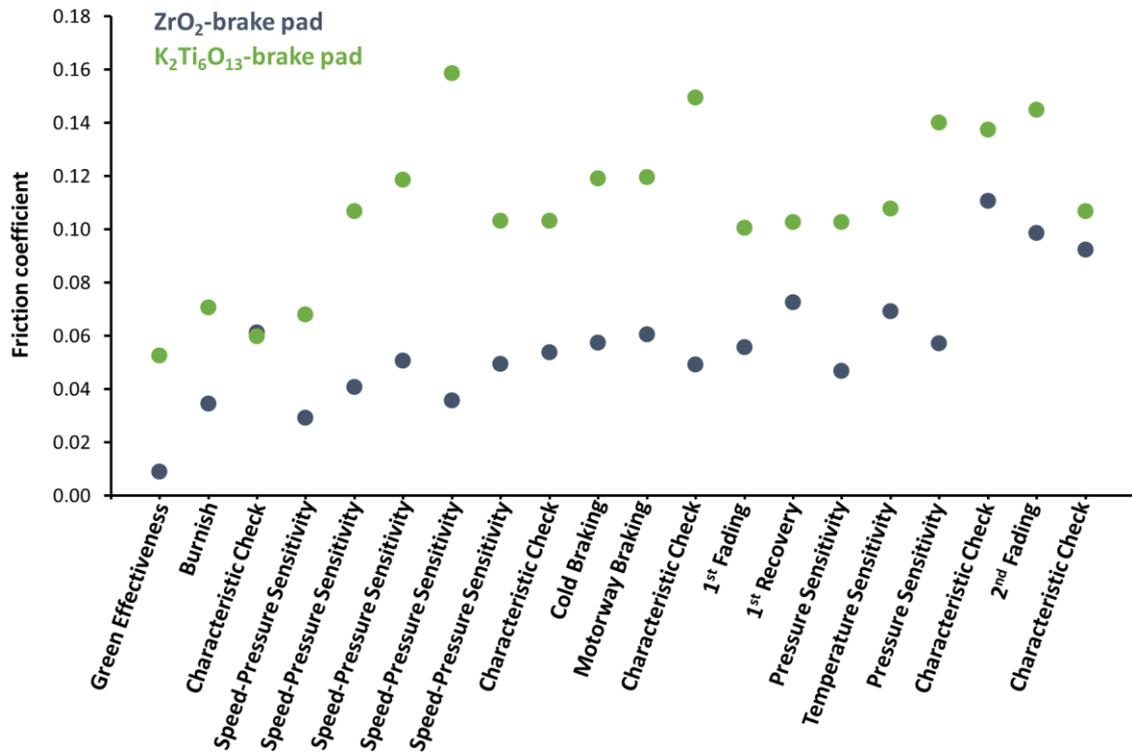
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Abrasive particles are used in brake pads to achieve stable friction, improve wear resistance and durability. In this study, we investigated two types of brake pad materials, one with Zirconium Oxide ( $ZrO_2$ ) and another with Potassium Titanate ( $K_2Ti_6O_{13}$ ) as abrasives. Friction and wear behaviour of these materials were tested in Ducom rotary tribometer using fixed pressure-velocity (PV) and the AK Master test profiles. In the fixed PV test, the  $K_2Ti_6O_{13}$ -brake pad showed stable friction profile after a brief run in period. Its friction profile was not influenced by increasing the temperature to 100 °C (see Fig. 1).  $ZrO_2$ -brake pad showed higher friction than  $K_2Ti_6O_{13}$ , but its profile was unstable. In contrast, the AK Master test showed that  $K_2Ti_6O_{13}$ -brake pad has higher and unstable friction behaviour compared to  $ZrO_2$  (see Fig. 2). Surface topography analysis, after fixed PV test and AK Master test, revealed that the  $ZrO_2$ -brake pad was more abrasive compared to  $K_2Ti_6O_{13}$ . Wear on the pads with  $ZrO_2$  was the lowest. Furthermore, wear debris deposited on the  $ZrO_2$  pad was lower compared to  $K_2Ti_6O_{13}$ . AK Master and fixed PV test methods show difference in screening the abrasive materials however both confirm that  $ZrO_2$  is more abrasive and wear resistant compared to  $K_2Ti_6O_{13}$ .



**Figure 1.** Friction coefficient of brake pad materials with Zirconium Oxide ( $ZrO_2$ ) and Potassium Titanate ( $K_2Ti_6O_{13}$ ) as abrasives during fixed PV test at room temperature (RT) and 100 °C.



**Figure 2.** Average friction coefficient of brake pad materials with Zirconium Oxide (ZrO<sub>2</sub>) and Potassium Titanate (K<sub>2</sub>Ti<sub>6</sub>O<sub>13</sub>) as abrasives during AK Master test.

