

**TESTING ANALYSIS OF BRAKE PADS MADE FROM WARU LEATHER  
AND BAMBOO COMPOSITES ON WEAR RATE AND HARDNESS AND  
COEFFICIENT OF FRICTION TESTS**

Zusrul Mohamad Ilham

*Automotive Engineering Study Program, Department of Engineering*

**ABSTRACT**

*Improving the capability of the brake lining can be done by modifying the friction material of the brake lining. One of the non-asbestos brake lining materials is made from bamboo and waru. Bamboo and Waru contain materials that can be improved into environmentally friendly technology products, including as composite materials. The matrices used in this research are Polyurethane A and B resin types. In the research, hardness, friction coefficient and wear rate were tested. In hardness testing, it was found that original, bamboo, waru and mixed brake linings obtained values of 80.55 HD, 62.75 HD, 61.25 HD and 69.3 HD. Testing the coefficient of friction on original, bamboo, waru and mixed brake linings obtained values of 0.361, 0.327, 0.345 and 0.334. The brake lining specimens with the highest wear testing were mixed brake linings at  $1.84 \times 10^{-6}$  gr/s.mm<sup>2</sup>, bamboo brake linings at  $1.71 \times 10^{-6}$  gr/s.mm<sup>2</sup>, waru brake linings at  $1.61 \times 10^{-6}$  and with the lowest wear value is original brake lining at  $1.02 \times 10^{-6}$  gr/s.mm<sup>2</sup> d. This result is related to the violence value as well. Where brake linings that have the highest level of hardness can minimize brake lining wear.*

**Keywords :** *Bamboo, Waru, Mixed, Gesek*