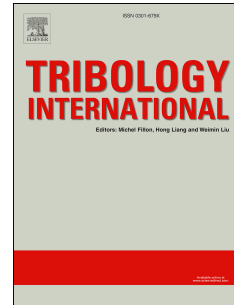


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The wear and fatigue behaviours of hollow head & sodium filled engine valve

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Abstract:

Increasing performance requirements of IC engines often leads to higher combustion chamber temperatures that cause premature failure of exhaust valves. This paper presents a tribological assessment of hollow head & sodium filled valves (HHSVs) produced using a new manufacturing process. Tests were conducted using bespoke bench-top wear and fatigue apparatus, and the HHSV specimens survived defined durability tests. When compared to traditional solid valves, the highest temperature of the hollow stem & sodium filled valves decreased from 745 °C to 590 °C. It was established that the new process did not adversely affect the wear mechanisms (oxidation accelerated adhesion) and the material loss magnitude when compared to solid valves. The design of HHSVs tested gives a 16.1% reduction in mass.

Key words: hollow head engine valve; wear testing; fatigue behaviour; wear mechanism

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