

Tool Wear of Aluminum/Chromium/Tungsten Based Coated Cemented Carbide Tools in Cutting Sintered Steel

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Abstract : In this study, to clarify the effectiveness of an aluminum/chromium/tungsten-based-coated tool for cutting sintered steel, tool wear was experimentally investigated. The sintered steel was turned with the (Al60,Cr25,W15)N-, (Al60,Cr25,W15)(C,N)- and (Al64,Cr28,W8)(C,N)-coated cemented carbide tools according to the physical vapor deposition (PVD) method. Moreover, the tool wear of the aluminum/chromium/tungsten-based-coated item was compared with that of the (Al,Cr)N coated tool. Furthermore, to clarify the tool wear mechanism of the aluminum/chromium/tungsten-coating film for cutting sintered steel, Scanning Electron Microscope observation and Energy Dispersive x-ray Spectroscopy mapping analysis were conducted on the abraded surface. The following results were obtained: (1) The wear progress of the (Al64,Cr28,W8)(C,N)-coated tool was the slowest among that of the five coated tools. (2) Adding carbon (C) to the aluminum/chromium/tungsten-based-coating film was effective for improving the wear-resistance. (3) The main wear mechanism of the (Al60,Cr25,W15)N-, the (Al60,Cr25,W15)(C,N)- and the (Al64,Cr28,W8)(C,N)-coating films was abrasive wear.

Keywords : cutting, physical vapor deposition coating method, tool wear, tool wear mechanism, (Al,Cr,W)N-coating film, (Al,Cr,W)(C,N)-coating film, sintered steel

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