EFFECT OF WEIGHT FRACTION AND COMPACTION PRESSURE TO HARDNESS AND WEAR ON THE Mo/Al₂O₃ COMPOSITE FOR CHISEL INSERT TYPE APPLICATION BY POWDER METALLURGY METHOD

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Abstract

Chisel is a cutting tool, it important role in the manufacturing industry, especially in the process of making a component tooling/machine. Chisel insert are used and developed is HSS. This study aims to obtain cheaper and better alternative materials for manufacture of a chisel type inserts. Composite Mo/Al₂O₃ expected have hardness, wear resistance and thermal resistance higher than HSS chisel.

Manufacturing process of cutting tool insert type using powder metallurgy method. Powder metallurgy method is chosen beacause more effisiensi material than casting. Mo as matrix because it has high hardness, modulus of elasticity and wear-resistant, cheap and easily obtainable so suitable for chisel. Al₂O₃ as filler because it has high hardness and thermal resistance. The reseach used Al₂O₃ powder by 4, 6, 8 and 10 % weight and cold compaction pressure at 75, 125 and 175 MPa. Sintering process at temperature 1000 °C and holding time 1 h.

Based on the test results, optimum green density on 4 wt% Al₂O₃, P = 175 MPa are 4.779 g/cm³. Optimum sintered density on 4 wt% Al₂O₃, P = 175 MPa are 6.904 g/cm³. Optimum hardness test results on 6 wt% Al₂O₃, P = 175 MPa are 20.1 HV. Best wear resistant on 6 wt% Al₂O₃, P = 175 MPa are 12.92 mm/minutes. Interface is diffusion but not perfected.

Key words : Chisel, Composite, Powder metallurgy, Mo, Al₂O₃
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