

## ABSTRACT

The microstructure and mechanical properties of sintered 94WC-6Co hardmetal powders were investigated. In this work, sub-micron ( $< 1\mu\text{m}$ ) of tungsten carbide (WC), cobalt (Co) and paraffin wax powders were wet mixing in a tubular mixer at a mixing speed of 50 rpm for 3 hr compared with 24 hr in wet milling process. Powder mixtures were uniaxially pressed, cold isostatic pressing (CIPped) and sintered at 1200-1500C for 1 hour in a nitrogen-based atmosphere using liquid phase sintering (LPS) mechanism. The fine WC grain particles ( $\sim 300\text{ nm}$ ) were led to uniformity in microstructures at optimum sintering temperatures, 1450C and showed a relative sintered density above 95% of theoretical. The sintered samples obtained higher density, hardness and strength due to their fine microstructures, which are suitable for use in cutting tool application. The tool life of sintered WC-Co cutting tool insert on tool steel workpiece bar also was reported.

**Keywords:** powder metallurgy, hardmetals, cold isostatic pressing, cutting tool