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Microstructural and tribological characterizations of a Hard material composite: WC-WMn-Ni/Cu-Sn/assembled with cermet (WC-Co) by brazing process.

N.Bouzegzi, D.Miroud, Z.BOUTAGHOU 1, I.Daoud, K.Khenfer, F.AHNIA

Abstract : This study focuses in microstructural and tribological characterizations of an assemblage. This assemblage is a Hard Materials composite obtained by infiltration process of loose powder (WC/WC- W-Cu-Mn-Ni) using bronze alloyed with Ni as binder, assembled with cermet (WC-Co) by brazing process using filler metal of Ag basic (Ag₂₁Zn₁₆Cu₈Mn₅Ni). Hard Materials composites or Cemented carbides are heterogeneous materials [1]; they are a class of metal matrix composites (MMCs) [2]. The main feature of the hard metals composites is the combination of a tough metal binder with a hard material phase. This arrangement of phases offers an enhanced performance of certain material properties such as an excellent wear resistance [3_5]. This assemblage used in our study is similar to the Diamond tools with PDC (Polycrystalline Diamond Compact) obtained by infiltration and brazing process, used in the field of oil and mining. Microstructural characterizations show a strong interaction between the binder phase and compounds of powder in the infiltration process. The interface formed by the brazed joint is due to the wide diffusion between the two assembled materials and there is formation of an inter-diffusion zone. Tribological characterisations show, the wear behavior of materials is a complicated phenomenon due to many variables governing it, such as sliding parameters, materials properties, abrasive effects etc.

Keywords : powder, infiltration, Brazing, diffusion, interfaces, wear.