

# Study of composite with metallic matrix WC/W<sub>2</sub>C- 20W-20Ni realized by spontaneous infiltration of the bronze alloy Cu-30Mn-3P.

M. Gousmine<sup>1,2</sup>, D. Miroud<sup>3</sup>, M.F. Benlamnouar<sup>1</sup>, B. Demri<sup>2</sup>, A. Younes<sup>1</sup>.

1. Research Center in Industrial Technologies (CRTI) Ex (CSC), BP64, Cheraga, Algiers, Algeria.
2. Metallurgical laboratory, Rue Hacaen Badi -El Harrach- Algiers Algeria.
3. Materials science and Process Engineering Laboratory (LSGM), Department of Mechanical Engineering & Process Engineering, USTHB, BP32, El Alia 16111 Babezzour, Algiers.  
[m.gousmine@csc.dz](mailto:m.gousmine@csc.dz) / [Mokrane.goss@gmail.com](mailto:Mokrane.goss@gmail.com)

## Abstract.

The improved performance and duration of an impregnated tool for the mineral drilling requires thorough understanding of the mechanisms involved in the consolidation of powder mixtures in the liquid phase sintering cycle (FPL). The elements used for the manufacture of the active parts of these tools are usually made from mixtures of loose powders based on WC / W-Ni. The spontaneous infiltration process is the most appropriate method offers a big possibility of shapes due to molding. It lets to have considerable density of the metal matrix composite (MMC) constituting the active head and increase its resistance to erosion and abrasion.

This work consists to develop a metal matrix composite which can constitute the active part of a drilling tool impregnated by the infiltration of industrial process SILP (*Sintering by Infiltration of an appropriate mixture of Loose Powders*). The mixture of loose powders (WC/W<sub>2</sub>C-W-Ni) is infiltrated under hydrogen by a manganese bronze (Cu-30Mn-3P) and then characterized by DTA, optical microscopy, SEM coupled with EDS, HRA hardness and micro-hardness Hv0.1.

**Keywords:** Matrix Composite Material (MMC), SILP process, Matrix, Powder Free, alloying element, sintering in liquid phase (FPL), multi-material, physical chemistry.