



Discussion on how to select the compound carbide (CK materials) for YT carbides

There are mainly three kinds of compound carbides (CK materials) for YT hard metals: 3/7(4K24)、4/6(4K32)、5/5(4K40), among of them, 4/6(4K32) is the most popular. Yet considering alloy structure, solubility and solid solubility of compound carbide, and the thermodynamics of Substance diffusion, 4/6(4K32) is the one to be suspended. Without the further study on the solid alloy structure and solid solution, 4/6(4K32) is the simply average between 3/7 and 5/5 by the original designer.

Firstly, we will analyse the 3/7 solid solution. Its main characteristic is: WC dissolves into TiC under the sintering temperature, which results in the stable alloy structure and easy process. As mentioned in Technical Research and The Communication with Alloy Factories, different alloys requires the approximate value 3:7, rather than the traditional $TiC/WC=29/71$. 3/7 solid solution is not suitable for the factories with high level and advanced controlling methods, and those factories require 5/5 solid solution, even ultra-fine solution and other alloy raw materials.

As we all know, 5/5 solution is totally non-saturated, thus, it can easily form a “ring structure”, while the additional WC dissolve into the TiC solution when sintered. WC cannot fully dissolve due to the limited temperature and time of sintering. So, from the inside to outside, TiC content descend while the WC ascend, theorily, the outmost ring is total WC, which results in the color changing of the alloy metallography, so it looks like a ring.