

钒对 Ti (C, N) 基金属陶瓷微观结构和性能的影响

摘 要

Ti(C,N)金属陶瓷密度低、高温红硬性好、有稳定的化学性质、热膨胀系数低和使用寿命较长等突出特点, 极其适用于高速切削刀具材料, 未来的市场前景一片光明。我国刀片消费巨大, 汽车行业占了大半, 但是汽车制造业所使用的刀片仍以进口为主。因此研发“高精度、高寿命、高稳定性”的高端金属陶瓷刀片, 对于缓解进口压力, 提升我国自身的竞争力等有着不可小觑的作用。因此特对 Ti(C,N)金属陶瓷做了以下研究:

第一部分介绍了 Ti(C,N)基金属陶瓷复合材料的发展历程、制备方法和强韧化机制及影响 Ti(C,N)基金属陶瓷组织和性能的因素。对其制备方法做了详细介绍。指出了 Ti(C,N)基金属陶瓷的广泛应用前景及研究目的和意义。

第二部分研究了钒含量对 Ti(C,N)基金属陶瓷的影响。采用粉末冶金方法, 使用热压烧结炉制备了 VC 含量不同的 6 组 Ti(C,N)基金属陶瓷材料, 选择 X-ray 衍射分析仪 (XRD)、扫描电子显微镜 (SEM) 和金相显微镜来分析成分组成、微观形貌结构观察和孔隙度比较, 并测试记录其室温力学性能。对比结果表明: Ti(C,N)基金属陶瓷试样在 VC 含量为 2%时, 抗弯强度最高, 晶粒尺寸分布范围最窄且晶粒最细, VC 含量为 20%时, Ti(C,N)基金属陶瓷烧结体致密性最好, 硬度最高。VC 含量为 2%时, Ti(C,N)基金属陶瓷综合力学性能最好。

关键词: Ti(C, N)基金属陶瓷; VC; 力学性能

Effect of Vanadium on Microstructure and Properties of Ti (C, N) -based Cermet

Abstract

Ti (C, N) cermet has low density, high temperature red hardness, the nature of directional chemistry, low coefficient of thermal expansion, low coefficient of thermal expansion, long service life and other obvious characteristics. It is very suitable for high-speed cutting tool materials, with bright market prospect in the future China's cutting edge consumption is very large, with the automobile industry accounting for half of the total, but the cutting edge used in the automobile manufacturing industry is still mainly imported, so "high precision, high life The development of "high stability" advanced cermet knife can alleviate the import pressure and improve China's competitiveness. Therefore, the following research has been carried out on Ti (C, N) cermet.

The first part introduces the development process of Ti (C, N) fund into ceramic composite, the manufacturing method and strengthening mechanism, as well as the factors that Ti (C, N) fund affects the structure and properties of ceramic, and introduces the manufacturing method in detail. The application prospect, research purpose and significance are pointed out.

In the second part, the effect of vanadium content on Ti (C, N) - based cermets is studied. By means of powder metallurgy and hot pressing sintering furnace, six groups of Ti (C, N) - based cermets with different VC content are used, x-ray diffraction analyzer (XRD), Through the analysis of electron microscope (SEM) and gold image microscope, the composition, microstructure, pore spacing were observed, and the mechanical properties at room temperature were recorded. The results showed that when the VC content of ceramic samples in Ti (C, N) fund was 2%, the refractive strength was the highest, and the size of crystal was When the content of VC is 20%, the compactness and hardness of Ti (C, N) based ceramic sinter are the best. If the content of VC is 2%, the comprehensive mechanical properties of Ti (C, N) based ceramic sinter are the best.

Key Words: Ti (C, N) based cermet; VC; Mechanical properties

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