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TC4钛合金电火花诱导可控烧蚀复合车削技术研究

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Technical Research of Combined Machining of TC4 Titanium Alloy by EDM Induced Controllable Combustion and Turning Dressing

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摘要

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摘要

利用钛合金的可燃性,在电火花诱导放电和氧气助燃作用下,提出了对TC4钛合金进行放电诱导可控烧蚀并同时通过车刀对烧蚀层和软化层进行在线机械修整的新型加工方法。建立了电火花诱导可控烧蚀复合车削加工极间双介质放电模型,分析并验证了诱导烧蚀放电电极间气、液两相流电介质击穿机理。对TC4钛合金进行常规电火花车削、电火花诱导可控烧蚀车削和电火花诱导可控烧蚀复合车削对比试验,并分析了复合车削的工艺特点。结果表明,电火花诱导可控烧蚀复合车削具有加工速度快、表面质量好和电极损耗低等优点。

关键词: 电火花 钛合金 可控烧蚀 效率 复合加工

Abstract:

Based on the flammability of titanium alloy, a new processing method for TC4 is proposed by combining the induction of electrical discharge with comburent oxygen and machining. The machining principle is that the controllable combustion induced by electrical discharge between the workpiece and combustion inducing electrode at the same time enables the turning tool to dress the combusted and softened layer of the workpiece formed by controllable combustion on-line. It establishes an inter-electrode dual dielectric discharge model of controllable combustion and turning dressing combined machining, analyses the gas and liquid dual dielectric liquid discharge mechanism between the combustion inducing electrode and workpiece, and compares the new method with electrical discharge machining and controllable combustion induced by electrical discharge machining. The test results show that the combined machining of controllable combustion induced by electrical discharge machining and turning dressing has the characteristics of high processing speed, good surface quality and low electrode wear.

Keywords: electrical discharge titanium alloys controllable combustion efficiency combined machining

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