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涡轮叶片精铸模具陶芯定位元件逆向调整算法

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Reverse Adjustment Algorithm of Ceramic Core Locators in Hollow Turbine Blade Investment Casting Die

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摘要

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摘要 针对空心涡轮叶片蜡型压制过程中陶芯定位元件补偿量难以量化问题,提出了基于蜡型壁厚测量结果的逆向解析算法。通过建立陶芯定位误差传递模型和逆向调整模型,确定了陶芯壁厚偏差与定位元件补偿量之间的映射关系。运用超声脉冲反射法对一组蜡型进行壁厚测量,根据测量结果逆向调整陶芯定位元件尺寸并重新压制蜡型进行对比分析。结果表明,该方法能够有效计算陶芯定位元件尺寸补偿量,对提高空心涡轮叶片蜡型定型效率以及进一步控制空心涡轮叶片壁厚精度有一定指导意义。

关键词: 空心涡轮叶片 蜡型 陶芯 定位元件 壁厚偏差 补偿量

Abstract: A reverse compensation algorithm based on measurement results is proposed in order to control the wall thickness deviation during the production of hollow turbine blade wax patterns. By setting up a location error transmission model and a reverse adjustment model, the mathematical relationship between the measurement results of wall thickness deviation and the compensation of ceramic core locators is established. Moreover, the wall thickness deviation of a batch of wax patterns is measured by using an ultrasonic pulse reflection method. According to the measurement results, the ceramic core locators are readjusted. Furthermore, a new batch of wax patterns are produced for demonstration. The result shows that this algorithm can calculate the dimensional compensation of ceramic core locators effectively and thus provide guidance for raising the setting efficiency of hollow turbine blade wax patterns and controlling the accuracy of hollow turbine blade wall thickness.

Keywords: hollow turbine blade wax pattern ceramic core locator wall thickness deviation compensation

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