



航空学报 2011, Vol. 32 Issue (5) :934-940 DOI: CNKI:11-1929/V.20110212.1357.003

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整体叶盘柔性磨头自适应抛光实现方法

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Adaptive Polishing for Blisk by Flexible Grinding Head

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摘要

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摘要 基于整体叶盘使用性能和寿命影响因素分析,以整体叶盘结构与材料特性为依据,结合整体叶盘人工抛光工艺方法,提出了适合整体叶盘表面抛光的自适应柔性磨头实现方案。对实现柔性磨头工作原理和自适应区域进行了分析计算,并对其控制技术进行了研究,对柔性抛光方法可行性进行验证,最终实现了整体叶盘自适应柔性抛光。初步抛光实验表明,较之人工抛光方法,柔性磨头自动抛光效率提高50%以上,显著缩短了整体叶盘生产周期,抛光后表面粗糙度达到 R_a 0.4以内,满足表面一致性、稳定性、型面质量等要求,并且可以减小劳动强度,降低生产成本。

关键词: 整体叶盘 抛光 自适应 柔性磨头 航空发动机

Abstract: Based on an analyses of the factors affecting the performance and life of a blisk, and in light of the theory of its structure and material features as well as the characteristics of its manual polishing process, this paper proposes an adaptive polishing implementation method. The flexible grinding head for the blisk, the working principle and the adaptive region of the flexible grinding head are studied, and the control technology is discussed. The feasibility of the flexible polishing method is verified so as to achieve the automatic mechanical polishing of a blisk. Preliminary polishing test results show that the automatic process raises polishing efficiency by more than 50 percent as compared with the manual polishing process, and the production cycle of a blisk is shortened obviously, while the surface roughness of the blisk is as low as R_a 0.4. The polishing method also satisfies the demands of consistency, stability and surface quality, reduces labor intensity and production cost.

Keywords: blisk polishing adaptive flexible grinding head aeroengine

Received 2010-09-01;

Fund:

国家科技攻关计划

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引用本文:

段继豪, 史耀耀, 李小彪, 张军锋. 整体叶盘柔性磨头自适应抛光实现方法[J]. 航空学报, 2011, 32(5): 934-940.

DUAN Jihao, SHI Yaoyao, LI Xiaobiao, ZHANG Junfeng. Adaptive Polishing for Blisk by Flexible Grinding Head[J]. Acta Aeronautica et Astronautica Sinica, 2011, 32(5): 934-940.

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