

环面蜗轮滚刀测量机

石照耀, 于渤, 叶勇, 闫璐

北京工业大学 北京市精密测控技术与仪器工程技术研究中心, 北京 100124

Hourglass hob measuring machine

SHI Zhao-yao, YU Bo, YE Yong, YAN Lu

Beijing Engineering Research Center of Precision Measurement Technology & Instruments, Beijing University of Technology, Beijing 100124, China

摘要 图/表 参考文献 相关文章 (1)

全文: PDF (1710 KB) RICH HTML ^{NEW}

输出: BibTeX | EndNote (RIS)

摘要 基于圆柱坐标系测量原理,采用电子展成法研制了一台环面蜗轮滚刀测量机用于环面蜗轮滚刀的快速测量。该测量机通过对3个运动轴的闭环控制,使测头沿着被测误差项的路径运动来获取数据并完成测量。介绍了测量机的工作原理与构成,其为卧式结构,由花岗石床身、精密密珠主轴、滑动导轨和闭环控制系统构成。开发了环面蜗轮滚刀测量软件,实现了环面滚刀各项误差的快速精密测量。实验显示:该仪器可以对切削刃螺旋线误差、刃口齿形误差和容屑槽周节误差进行测量,测量的合成不确定度分别为2.35、2.45和2.94 μm ,均小于圆柱滚刀标准GB/T6084-2001中对应误差项公差值的1/3,满足AA级精度的环面滚刀各项误差的测量要求,验证了该测量机的功能与可靠性。该测量机也可以用于环面蜗杆、圆柱蜗杆及圆柱滚刀的测量。

关键词 : 环面蜗轮滚刀, 滚刀测量, 螺旋线误差, 齿形误差, 周节误差

Abstract : By using electronic generative metrology, an hourglass hob measuring machine is developed based on the measuring principle of cylindrical-coordinate system. In the control of three moving axes, the machine allows a probe to move along the measuring path controlled by a closed loop system to obtain the data and implement the measurement. The working principle and constitution of the machine are introduced. The machine is based on a horizontal structure and consists of a granite base, a precision spindle, sliding guides and a closed-loop control system. An hourglass hob measuring software is developed to measure each deviation of the hourglass hob precisely. The practical measurement results indicate that the machine can inspect the cutting edge helix deviation, cutting edge tooth profile deviation and the circular pitch deviation, and the measurement uncertainties are 2.35 μm , 2.45 μm and 2.94 μm , less than one third of the tolerances of the deviations in GB/T6084-2001, respectively. It satisfies the requirement of hourglass hobs with accuracy class AA for high precision measuring of each deviation and verifies the function and stabilization of the measuring machine. The machine can measure the hourglass worm, cylindrical worm and the cylindrical hob as well.

Key words : hourglass hob hob measurement helix deviation tooth profile deviation circular pitch deviation

收稿日期: 2015-04-23

中图分类号: TG87

TG501

基金资助: 高等学校博士学科点专项科研基金资助项目(No.3B001013201301)

作者简介: 石照耀(1964-)男,湖南岳阳人,博士,教育部长江学者特聘教授,博士生导师,1984年于合肥工业大学获得学士学位,1988年于陕西机械学院获得硕士学位,2001年于合肥工业大学获得博士学位,主要研究方向为齿轮工程及精密测试技术与仪器。E-mail: shizhaoyao@bjut.edu.cn 于渤(1987-)男,辽宁阜新,博士研究生,2011年于北京化工大学获得学士学位,主要研究方向为精密测试技术及仪器。E-mail: dr_yubo@126.com

引用本文:

石照耀, 于渤, 叶勇, 闫璐. 环面蜗轮滚刀测量机[J]. 光学精密工程, 2015, 23(10): 2827-2834. SHI Zhao-yao, YU Bo, YE Yong, YAN Lu. Hourglass hob measuring machine. Editorial Office of Optics and Precision Engineering, 2015, 23(10): 2827-2834.

链接本文:

<http://www.eope.net/CN/10.3788/OPE.20152310.2827> 或 <http://www.eope.net/CN/Y2015/V23/I10/2827>

服务

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ E-mail Alert
- ▶ RSS

作者相关文章

- ▶ 石照耀
- ▶ 于渤
- ▶ 叶勇
- ▶ 闫璐

访问总数: 6352839

版权所有 © 2012《光学精密工程》编辑部

地址: 长春市东南湖大路3888号 邮编: 130033 E-mail: gxjmgc@sina.com

本系统由北京玛格泰克科技发展有限公司设计开发

