

**摘要:** 为了实现特大型齿轮精密测量, 介绍了作者提出的特大型齿轮激光跟踪在位测量原理, 重点阐述了其中的几项关键技术。特大型齿轮激光跟踪在位测量系统整合了激光跟踪仪的大尺寸测量能力和三坐标测量机的高精度, 采用激光跟踪仪建立齿轮工件坐标系和三维测量平台坐标系, 通过激光跟踪仪坐标系将齿轮工件坐标系与三维测量平台坐标系关联起来, 并建立了相应坐标系的拟合模型及算法。同时, 建立了三维测量平台的姿态调整模型, 通过姿态调整机构完成了三维测量平台的姿态调整, 进而确保三维测量平台与齿轮轴线的位置关系满足要求。最后, 给出了该在位测量系统的实测结果。实验结果表明: 特大型齿轮激光跟踪在位测量系统原理正确可行, 满足6级以下特大型齿轮的精密测量。

**关键词:** 特大齿轮 齿轮测量 激光跟踪仪 在位测量 姿态调整

## Principle and Critical Technology of In-site Measurement System with Laser Tracker for Mega Gear

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**Abstract:** To perform precise measurement on mega gears, the principle of mega-gear in-site measurement system with laser tracker and corresponding key techniques are originally introduced. Considering the mega-gear in-site measurement system with laser tracker integrates the large-scale measurement capacity of laser tracker and the high accuracy of coordinate measuring machine, the laser tracker is used to establish the coordinate system both for mega gears and the Three-coordinate Measurement Platform (TMP), thereby, their coordinate systems are associated by the coordinate system of the laser tracker, and the module and algorithm of coordinate system fitting are proposed simultaneously. Meanwhile, a novel module of attitude adjustment of TMP is established, which can be accomplished by the system of attitude adjustment to ensure that the position relationship between TMP and the axis of gear can meet the measuring requirements. The results illustrate that the principle of mega-gear in-site measurement system with laser tracker is correct and feasible, and in consequence it can meet the six grade precision measurement requirements of mega gears.

**Keywords:** Mega gear Gear measurement Laser tracker In-site measurement Attitude adjustment

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