上海轨道交通列车自发电车载式轴温检测系统研究与应用

陶佳杰
（上海地铁维护保障有限公司车辆分公司，200237，上海∥工程师）

摘　要　上海轨道交通新车型均已配备车载式轴温检测装置，而老车型列车无轴温检测预警设备，主要通过人工方法进行轴温检测，需要为老车型列车配置自动化的轴温检测装置。在分析常用的城市轨道交通列车轴温检测方法的基础上，提出了比较适合上海轨道交通老车型列车的自发电车载式轴温检测系统。该系统通过吸收车辆振动能量产生电能，为传感器供电，并通过射频通信方式无线传输所采集的轴温数据，具有轴箱温度不间断采集、数据实时发送、通信无线传输、网页端同步传输和异常数据报警等功能。介绍了该系统的研究历程、系统原理及组成、设备安装方式。试验结果表明，该系统的轴温检测值与新车车载轴温检测系统的更接近，也即更接近设备本身的温度。该系统已安装于上海轨道交通6号线06C01型列车上，应用效果良好。

关键词　上海轨道交通；轴温检测；自发电；车载式
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Research and Application of Auto-generating Vehicle-mounted Axle Temperature Detection System for Shanghai Rail Transit Train

TAO Jiajie

Abstract　On-board axle temperature detection devices have been installed on new model Shanghai rail transit trains. The old model trains have no axle temperature detection and early warning devices, and the axle temperature detection is mainly carried out by manual methods. Old model trains need to equip automated axle temperature detection devices. Based on the analysis of the commonly used urban rail transit train axle temperature detection methods, a self-generating vehicle-mounted axle temperature detection system suitable for the old model is proposed. The system generates electric energy by absorbing

synchronous transmission and alarm of abnormal data. The research principle, composition and device installation mode are introduced. Test results show that the detected axle temperature of this system is closer to that of the vehicle-mounted axle temperature detection system on new vehicle, meaning closer to equipment actual temperature. The system has been installed on the 06C01 model train of Shanghai Rail Transit Line 6, and the application effect is good.

Key words　Shanghai rail transit; axle temperature detection; self-generating electricity; vehicle-mounted

Author's address　Vehicle Branch of Shanghai Rail Transit Maintenance Support Co., Ltd., 200237, Shanghai, China

1　轴温检测方法

目前，常用的城市轨道交通列车轴温检测方法主要有人工轴温检测、车载式轴温检测和红外线轨旁轴温检测3种方法。

1）人工轴温检测方法：工作人员在车辆轴箱上安装接触式轴温指示贴或者温度传感器标签，当车辆回库后由检测人员读取轴温指示贴的数据并记录轮轴温度信息。

2）车载式轴温检测方法：是通过直接安装在列车上的温度传感器采集轴箱轴承、齿轮箱及牵引电机的温度，经温度处理单元处理后，将各个轴箱轴承、齿轮箱及牵引电机的传感器状态和温度值通过列车通信网络发送至TCMS（列车控制和管理系统），并实时显示温度数据，若温度超出预设范围则发出预警或报