

DEVELOPMENT OF REPAIR TIME STANDARDS FOR ENGINE AND TRANSMISSION REPLACEMENT OF TRANSIT VEHICLES

BACKGROUND

This project is the third phase of the successful Repair Time Standards research initiative started five years ago to establish accurate repair time standards for vehicles in public transit systems. During phase one, researchers reported and validated time standards for each element in the process for repairing the braking system. In phase two, they established time standards for preventive maintenance and developed and tested a database to compile information related to the systems analyzed. A third phase was needed to investigate and evaluate the engine removal and replacement system.

OBJECTIVES

The objectives of this project are twofold:

- (1) Visit other agencies nationwide to benchmark the proposed time standards methodology (developed in previous phases) and preliminary results against current practices from other leading agencies. The purpose of this benchmark activity is to share and validate results related to repair time standards for transit buses.
- (2) Evaluate the engine removal and replacement system. Based on the evaluation, create standards that optimize the time required to perform tasks, continually improve reliability of services, and conserve resources at a minimum cost. The developed standards would serve as the basis for developing a validation methodology.

FINDINGS AND CONCLUSIONS

To develop the benchmarking data, the researchers visited agencies in Atlanta, New York, Puerto Rico, and San Francisco that have been working on the standardization of repair processes. They met with representatives of each of the agencies to discuss and exchange information and data related to maintenance departments and standard repair times. One of the agencies has a process to develop standard data; the others base standards on historical information or data estimation rather than using a methodology that combines best practices.

To evaluate the engine removal process, the research team (1) applied principles of industrial engineering and work measurement to develop the proposed time standards methodology, and (2) used tools such as time study standards, the MODular Arrangement of Predetermined Time Standard (MODAPTS) technique (which is used to develop production standards), and work design to validate the proposed standards.

Three transit facilities in Florida (i.e., in Orlando, St. Petersburg, and Tampa) also participated in this study. Technicians at each of these locations followed their own process—i.e., no systematic process was in place at any of the facilities. However, the researchers presented the methodology to these facilities, which consequently have established best practices and standard times. Researchers used MODAPTS to validate their observations of the Florida facilities and to further develop reliable standards, which have resulted in improved productivity.

BENEFITS

Time standards and operational procedures affect a variety of areas, including but not limited to purchasing, cost accounting, control and process design. Thus, effective time standards have a general and broad effect. More particularly, accurate time standards for repairing transit vehicles can (1) increase productivity and result in a reliable and safe service, (2) lower costs, allowing for more effective use of resources, (3) be used to accurately estimate labor requirements, and (4) be used to measure technician performance levels against validated baseline criteria for compensation or training purposes.

FDOT will be able use these standards to determine labor efficiency, improve maintenance process control, and improve facility layout. The time standards methodology is comprehensive and incorporates relevant factors such as maintenance procedures, work bay components, and design, which are particular to the transit industry. A major component of the methodology involves restructuring procedures not only to improve workflow, but to normalize the operative assignments across transit shops. This will facilitate productivity control and allow managers to better assess training needs across Florida. This study suggests that implementation of the methodology will result in a significant reduction in the time required (i.e., allocated) to complete system tasks.

Finally, it is worth noting that the American Public Transportation Association (APTA) and the Society for Automotive Engineers (SAE) are expected to use the time standards developed through this project to develop and implement their certification programs.

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