

REPAIR TIME STANDARDS FOR TRANSIT VEHICLES

PROBLEM STATEMENT

Today, most U.S. businesses and industries are, by necessity, restructuring themselves in order to operate more effectively in an increasingly competitive world. The public service sector is not an exception. Fundamental tools required to increase productivity include methods, time study standards, and work design. According to the literature, for organizations that operate without standards, 60 percent performance is typical. When time standards are established, performance improves to an average of 85 percent. Establishing time standards is a step in the systematic development of work-centers and the improvements in methods used in existing work-centers.

OBJECTIVES

The objective of this study is to establish accurate repair time standards for brake repairs of transit vehicles in Florida public transit systems. Through the principles of industrial engineering and work measurement, this project develops standards in order to minimize the time required to perform the tasks associated with brake repairs. The resulting application will improve the reliability of services, conserve resources, and minimize costs by specifying direct/indirect materials and the tools necessary to provide repairs.

FINDINGS AND CONCLUSIONS

In examining the brake process from a top-down or systematic perspective, the Time Standard team identified several common problems that are best characterized as follows:

- lack of consistent and accurate procedures among operators and facilities
- lack of proper set up
- lack of proper arrangement of tools and parts

The primary recommendation is the implementation of the standards and process suggested by this study and shown in Appendix 3 of the final report. Further recommendations include the following:

1. **Sequential workflow:** Each process specified should be finished completely before starting the next process. Working on two processes simultaneously may affect efficiency of both. For instance, while working on the removing the left side wheel, it is more time-efficient to set up air gun and remove both wheels on left side and then move to the other side.

2. Forklifts: If arrangement can be made to transport the new shoe brake and hub & drum assembly to the working place and the old ones back to the rework bay using a forklift operated by an additional operator for about 2 minutes, there would be considerable reduction in the total job time. Approximately 12- 15 minutes were allocated to this task during the time study.
3. Set up times: The set up should be done before starting the job. That is, all required tools should be procured and kept handy for the brake job before work order is obtained and time for job is measured. This includes air guns, tool trolley, tire dolly, cleaning bath, trolleys, and all other required tools. Also, procuring all parts needed to be replaced as per FDOT/USDOT specifications must be done at the time of taking the work order so that it is not necessary to visit the materials station frequently. This considerably reduces travel time. Refer to Appendix 4 for the recommended setup.
4. Ergonomic Position: It is recommended that while working on the brake job, the bus should be lifted to waist-height. It has been observed that this position is most convenient and puts least strain on the back as the worker has to bend less. This also enhances work efficiency.
5. Lighting: The shop floor should be well lit, especially during the evening shift, so that the use of flashlights by mechanics is minimized.
6. System Time Measurement: When the Work Order is issued along with the materials, time is measured from that point until the Union Break, and then again from the time the break finishes till the end of the job. If an unusual problem emerges, i.e., a foreign element not within the scope of the Standards, the clock should be stopped and once the foreign element is resolved, time measurement must resume

BENEFITS

A wealth of information has been compiled and documented regarding brake system repairs and the related work flow. A critical review of the numerous observations and a thorough analysis of the data have been conducted. A Time Standards Database system has been developed and requirements necessary to support this service have been described in the final report. The Database and associated User's Manual may be used by Florida's transit maintenance departments to track repair times, identify areas where improvements may be made to their own processes, identify areas where training is needed, and generally manage their shops more effectively.

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