

RFID Goes Underground in London

Tube Lines, one of the companies maintaining London's subway rail system, is already tagging engines and passenger cars, and hopes to tag ties and tools.

By Jonathan Collins

Apr. 12, 2006—With one month left to go in a trial designed to test RFID's ability to help ensure the proper maintenance of London's subway system, train-management company [Tube Lines](#) says the technology has already proven its value, and that the firm will seek to expand its use.

Tube Lines was one of three companies awarded 30-year contracts to maintain and operate London's underground rail system. As such, the firm is under constant pressure to meet safety and maintenance standards for the track network across the three railway (tube) lines for which it is responsible, as well as the trains that run over those tracks.

The company took over responsibility for the tube system in 2003 and has since been accountable for 101 stations and 207 miles of track. Since February, Tube Lines has been operating a trial RFID system to help it better track trains and cars through their mandated daily cleaning process. Subcontractors carry out the cleaning at Tube Lines' main depot.

By affixing passive UHF EPC Gen 1 0+ RFID tags from [Symbol Technologies](#) to each of the Piccadilly Line's engines, and installing RFID portals at the entrance and exit of the train-cleaning area, the company can now record how long it takes to clean each train.

"The third party we pay to clean the trains has a work order to carry out, and we were not confident that they were doing so," says Martyn Capes, technical asset manager at Tube Lines. "We know how long it takes to carry out the work order properly, and RFID gave us a way to track exactly when cleaning work began and finished."

The same RFID inlays have been sandwiched within one window of each passenger car so that the cleaning process inside the cars can also be tracked. Tube Lines has tagged 172 passenger cars and engines as part of the trial. The cleaning staff is employing some of the 242 Symbol Technologies MC9000 mobile computers already in use at Tube Lines, fitted with RFID reader modules for the trial.

Tube Lines' cleaning staff is required to carry out a number of tasks in each car. A list of the required duties is automatically uploaded to each cleaner's handheld computer. When a cleaner completes a task indicated on the computer, he or she marks it off as being finished. Once all tasks have been carried out, the worker places the computer within a few inches of the RFID tag in the window to signal the car has been cleaned. That RFID read also provides a trigger for the handheld computer to upload its cleaning data over a wireless LAN covering the train depot. This informs Tube Line's back-office systems that the car has been cleaned.

"Using handhelds and RFID has transformed a 13-step process of getting work carried out to just two steps, and a 10-day paper-based system into real-time notification of completed work," says Capes.

Before commencing the RFID trial, Tube Lines first required clearance from Transport for London (TfL), the governmental body responsible for the citywide transportation system. The company had to prove the tags and readers would not interfere with train operations or impair safety. The trial uses interrogators and tags communicating over the 915 MHz spectrum cleared for use in the United States, but not in Europe. Tube Lines says it used the U.S.-specification equipment with special approval, as they were the only samples available for the trial. However, Symbol's planned EPC Gen 2 EU-compliant readers and tags have been earmarked for Tube Lines RFID rollouts.

The Tube Lines RFID trial ceases at the end of April though the company hopes to be able to get permission to continue using the tags on its trains and elsewhere in its operations. This, however, depends on its obtaining the necessary approvals from TfL.

Tube Lines has been preparing applications for permission to add RFID tags to other assets in its operations. By the end of this summer, the company hopes to add RFID tags to the sleepers, or ties, to which the rails are attached. At present, plastic engraved sleeper nameplates are placed on sleepers every 100 meters (328 feet) so maintenance workers can identify damaged sleepers and later locate and repair them. With such a long distance between markers, maintenance engineers often incorrectly estimate a sleeper's exact location, which can be up to 50 meters (164 feet) from a nameplate. Because of their lower price, RFID tags can be placed at closer intervals, 10 meters (33 feet) apart.

"An engraved sleeper nameplate can cost up to £150, but an RFID tag costs just pennies," says Capes. In the future, Tube lines says it may also tag maintenance equipment and tools to manage its inventory and working practices more efficiently.

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