Caltrain Modernization Program

Written by Kecia Bal

As Caltrain’s ridership numbers continue to set records, administrators at the Silicon Valley commuter rail service are innovating while complying with new federal guidelines for safety and security of passengers.

Caltrain, a commuter rail service from San Francisco to San Jose, is on schedule as it implements Positive Train Control (PTC) technology, part of the federal Rail Safety Improvement Act of 2008. At the same time, the railway is adding a Communications Based Overlay Signal System (CBOSS), which offers additional functionality to the new safety measures and will allow Caltrain to increase capacity for the growing service.

The new, $231 million project will allow Caltrain to continue to achieve its goals, says Karen Antion, program management oversight director for the CBOSS project.

“Safety is our No. 1 priority here at Caltrain,” she says. “It is about safety and service, in that order.”

The PTC technology is a train-centric computer system that involves placing technology in each train, along the wayside and in the control centers.

That technology, and the communication system that connects it, allows rail operators to prevent four dangerous situations: train collisions, over-speed derailment, incursions into work zones where workers might be on a track, and trains moving onto the wrong track from a switch left in the wrong position.
“The computer system knows the train location,” Antion says. “It knows all of the attributes of the track. It knows the schedule where the train is supposed to stop. It knows the breaking algorithm, how long it takes to stop the train or slow it down. All of that data is contained in the system.”

The system also monitors each train’s performance and will stop a train if an engineer is not operating it correctly.

“It is very sophisticated technology,” she says. “The engineer still drives the train, but if the engineer does not do something he is supposed to do, it will slow the train down and stop it. It is very exciting because it is going to greatly improve the safety of rail travel in our country.”

The federal law also requires interoperability. For tracks where multiple rail systems run trains, new safety systems have to communicate with each other, and the track operator — Caltrain in this case — is responsible for safety oversight and coordination.

But Caltrain is not stopping with the required safety steps. The rail service is adding CBOSS technology, which includes the federal mandate and adds additional functionality aimed at making scheduling and stops more efficient so the operators can put more trains on the track and meet increased demand. CBOSS has five subsystems: communications, onboard computer technology, a back-office system, an employee-in-charge system for workers on the track and a wayside system.

“By keeping the train on schedule, it will run better and we should get, ultimately, more capacity,” Antion says. “A central display unit in the train will show you the breaking curve. If you follow the breaking curve, you are optimizing the operation of the train. The more we can optimize, the more capacity we can get out of the system.”
That extra capacity is critical because the commuter service’s ridership numbers have doubled since 2004, when administrators created “Baby Bullet” service, which added passing tracks to the system and essentially allowed local and express service on the same tracks, according to Jayme Ackemann, communications manager for Caltrain and San Mateo County Transit District, the administrative body for the county’s principal public transit and transportation programs, including Caltrain. In the last 40 months alone, Caltrain’s ridership is up more than 30 percent, and that is expected to grow.

“When we reinvented the service, we really made traveling on Caltrain competitive,” Ackemann says. “In today’s congested commute climate, it is even better than driving by car. We can get from San Francisco to San Jose in an hour. You do not have to deal with parking issues, and you have a lot of good connections to municipal service, so it has really been a game changer in terms of providing people not just an option but a real, viable alternative.”

The CBOSS PTC project is one piece of an overall $1.5 billion Caltrain Modernization Project to electrify and upgrade the performance, operating efficiency, capacity, safety and reliability of commuter rail service. The program is scheduled to be operational by 2019, Antion says.

“The modernization project is driven by a number of things, but growth is certainly one of them,” she says. “Also, the modernization program allows us to switch from a diesel push-pull operation to electric vehicles, which is cleaner. Together with the CBOSS system, it will allow us to increase the capacity.”

Under a vigorous implementation and testing schedule, the CBOSS PTC is on track to be functioning by October 2015.

“It is very active,” Antion says. “We have the fiber optic cables installed on about half of the alignment, about 25 miles worth. We are building a backup control facility, set to be completed at the end of July. We have started to put in the wayside equipment and upgrade crossing equipment along the right of way. We also began installing equipment on the vehicles themselves. The design is complete and signed off on.”

The software is under development and is being factory tested. Before operators can turn on the new system, it has to be certified by the Federal Railroad Administration.

“We have to perform a series of tests, and they witness those tests — and all of that has to be documented,” Antion says. “People sometimes do get nervous about a computer system. The engineer is still operating the train. This is a system of surveillance that monitors everything that is
going on and only interrupts and stops the train if something is happening that otherwise would create an accident."