

The quiet before the crash (test)

Despite the relative silence about their work, engineers are making strides in tank car safety research



A pressurized car used to haul chlorine (similar to this one in Indianapolis on May 28, 2012) will be rolled over in a test seeking to improve top fittings protection. TRAINS: Kathi Kube

Crash tests are cool. The unmistakable bang and the image of a railcar colliding with something and then bouncing back can't help but inspire awe — then relief when you remember it's just a test.

A great deal of railroad research, however, happens in quiet offices, in computers, in small labs, and, yes, even on conference calls. Just because the folks trying to improve tank car safety haven't destroyed a car lately doesn't mean they aren't hard at work. (Although more crash tests are coming.) Actually, work is progressing in several areas — one example might be rolling through your hometown and you might not even realize it.

In early 2007, Dow Chemical Co. and Union Pacific Railroad joined forces with Union Tank Car Co., as well as representatives from the U.S. and Canadian federal governments, and other organizations to form the Next Generation Rail Tank Car Project. Although the group has transitioned to a larger cooperative with the same focus, one result of that research is going to be tested in revenue service.

Existing tank cars have a single shell, insulation, and a jacket that's one-eighth-inch thick to hold everything in place. Now Union Tank Car is building up to 13 tank cars under special permit with the Pipeline and Hazardous Materials Administration. They will be basically the same as existing

tank cars, but the jacket will be more like another shell — sort of a tank within a tank, with the outer structure carrying the train loads, rather than the commodity tank. The car has been authorized for a gross rail load of 286,000 pounds.

The cars will not look significantly different, but must be stenciled with the Department of Transportation special permit number (DOT-SP 15036) and "SPECIFICATION PENDING." One of the cars is slated for accelerated service in order to accumulate the most miles possible in the shortest time period to determine if the new design has flaws or fatigue issues.

While researchers would obviously prefer these cars not crash, the most recent tank car crash test [see "Technology," Sep-

tember 2011] yielded data that engineers are using for further research in cyberspace. Thanks to the gauges and monitors on the tank car during impact, scientists understand the energy and forces the tank car experienced when hit with a 12-by-12-inch impactor: almost exactly as the simulations calculated it would. Now the researchers have modified their calculations with the more-precise data, and are using it for additional research.

"We're doing simulations on different size impactors and seeing what are the forces and energy required to puncture the cars," says Francisco González III, FRA project manager for tank cars and hazardous materials. "This gives us a range of different forces and energies. Now when we do the testing, we know if these new designs can withstand this much energy."

This research will also aid FRA in developing a new approach to regulations in regard to tank car safety. Currently, regulations specify how a car should be constructed, what materials must be used, and so on. Going forward, FRA wants to make the regulations performance-based, meaning that the cars and components must be able to withstand a certain impact velocity or other circumstances, and it'll be up to the builders to ensure that whatever materials and designs they use to create the car will meet those standards.

But in order to do this, FRA also needs to develop a way for the builders to test and verify whether their design will meet the performance standard.

"Once we develop the procedure to test the components, we can say, 'This is how you test it,' and we'll find out if this new design is up to standard," González says, adding that FRA is going to be working on that this summer in conjunction with Transport Canada.

UP takes training on the road

In mid-June, Union Pacific launched a fleet of four 50-foot-long and one 48-foot-long mobile classrooms built into new highway trailers. Each trailer has seven workstations, each able to instruct two employees in tasks from basic locomotive operations to (eventually) PTC. Pickup trucks haul the trailers to any UP site with mainframe access, connect to the computer system, and can begin training. Webcams enable instructors in Salt Lake City, Utah, or Omaha, Neb., to assist students.



Desktop-size simulators use gaming technology for training purposes. Union Pacific

When it comes to conducting research in a new specific area, though, the simulations are only as good as their input data, and the most accurate data comes right from those spectacular crash tests. In 2010, FRA contracted Sharma & Associates Inc. in Countryside, Ill., to design top fittings protection for non-pressure tank cars. They did, and rolled over tank cars with two designs [see "Technology," February and December 2010] to test the concepts.

Now Sharma is preparing to roll over a chlorine car (filled with water not chlorine, of course) to determine how to better protect its top fittings. Although pressure cars already have added protection on the top fittings, FRA wants to see how it might be improved.

A donated chlorine car is currently on its way to American Railcar Leasing near Joliet, Ill. Once it arrives, Sharma engineers will make models and run some preliminary tests, and ARL personnel will prepare the car and site for another spectacular crash test. González expects to conduct the test this fall.

Until then, research into tank car safety will continue in relative silence — and maybe on rails near your home.

>> TECHNOLOGY BRIEFS

DOT offers help to identify fatigue

The U.S. Department of Transportation launched a website to help reduce railroad workers' on-the-job fatigue through education, a self-test, and game to measure response time. Visit it at www.railroaderssleep.org.

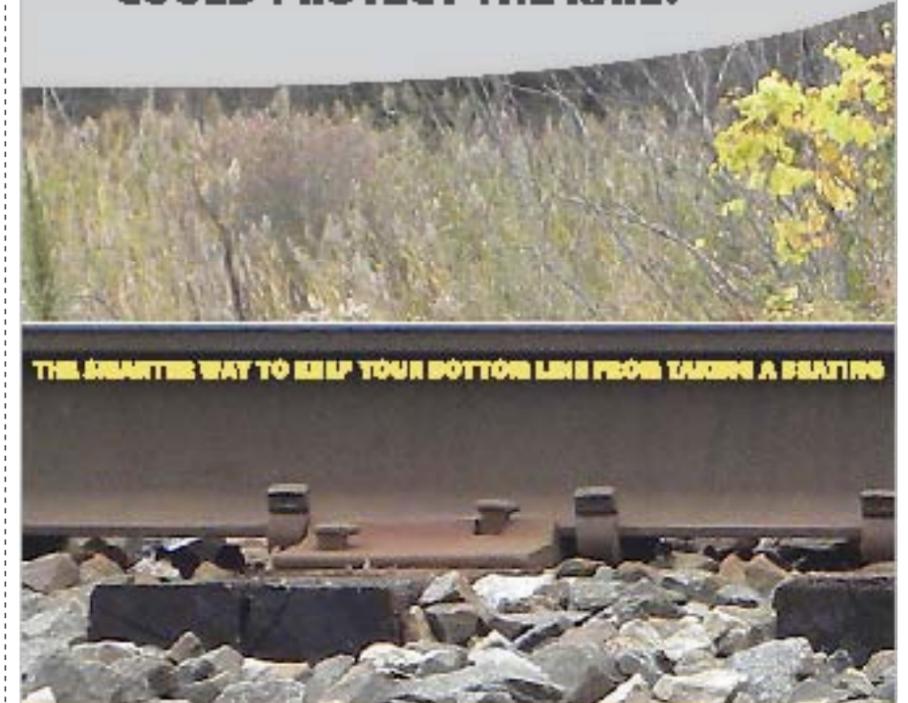
Boatright Cos. is building a 400,000-square-foot wood crosstie plant in Clanton, Ala., between Birmingham and Montgomery. The plant, which will be rail-served by CSX Transportation, will be able to season, treat, and distribute 2 million ties per year, with room to expand to 3 million.

Dieseldraft introduced a hand-held system to detect water in diesel fuel or gasoline, and send an audible and visual alarm. See www.dieseldraft.com.

Sentina Inc. has patented its reusable, vacuum-sealable, and tamper-evident covering for cargo shipments.

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