**TECHNOLOGY**

**Crash course in passenger safety**

Research into crash energy management shows promise in making rail travel safer than ever

In January, representatives from the Volpe Center gave a presentation on crash management at the Transportation Research Board’s annual meeting in Washing-

ton, D.C. Their report demonstrated that a passenger rail car using crash management technology and meeting alternate FRA standards could hold up to as long as a one designed to meet current Tier I regula-
tions: 800,000 pounds applied in one direc-
tion along a car coupler-to-coupler without permanent damage. Alternate standards enable researchers to apply the force at dif-
f erent angles on the passenger rail car, as might occur in a derailment or if the car is struck from the side, what researchers call “collision load path.”

The alternate standards (800,000, 1 mil-
hon, or 1.2 million pounds in a single collin-
sion load path) would allow a car manufac-
turer design flexibility to meet changing needs and situations. As the weight of the force increases, so does the allowable dam-
age, from not permanently deformed at all, to a car “crumpling” the car with a 1.2 million-pound impact — as long as the interior, where passengers are, is still “safe.”

“Collision load path is still very much a por-
tion of the curve,” Tyrell says, mentioning fu-
ture projects in California. “All these sup-
ports need answers … someone is going to have to bid on, understand what we need, and what this country needs, to move for-
ward. The engineering task force has 10 car-
builders involved trying to answer ques-
tions and if passenger seats stay in place when a car’s roof will come apart in a colli-
sion and if passenger seats stay in place well enough to be safe during and after a crash. For Tyrell and fellow engineers, evi-
dence that alternate crash-test methods and standards are OK enables better re-
search into shock absorbers, interior de-
sign, and use of innovative materials.

For FRA, Lauby says, the research is another barrier crossing. He cites U.S. high-speed rail. The administrator said alternate Tier I passenger rail car standards that define safe train coupler-to-coupler construction up to 125 mph will set the state stage for Tier III or high speed rail passenger cars traveling up to 225 mph.

“We’re working really hard to get ahead of the curve,” Lauby says, mentioning fa-
tile and injurious 80. In June 1998, an Inter-
City Express train crashed in Germany, killing 101 people when a fatigue crack in a wheel caused the train to derail at a switch. — a condition PTC could not have predict-
ed or prevented. Slow-speed movements, like the kind near a passenger depot or in switch yards, are also outside the useful scope of PTC, he says.

Despite having alternate rail car safety rules, the U.S. doesn’t have equipment meeting the alternate rules for revenue ser-
vice. He says just one manufacturer, based in Europe, expressed interest in building to the alternate Tier I standards on a U.S. light-rail network. And even if that passen-
ger car manufacturer follows through on its plans, the standard will apply only to sets of like passenger cars strung together. The talk of mixing cars of different standards is far down the road.

Computer simulations could prove most useful in the short run. Tyrell, along with alternate approaches, enable him and his co-workers to do “fewer tests — less ex-
pensive tests and a broader range of design.”

Tyrell says, “What we’re doing is a lot more than just a computer simulation and much less de-
structive testing.”

Elliot Goodman

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proach a standing locomotive at slow speed in an over-under video produced by the John A. Volpe National Transportation Sys-
tem Center in Cambridge, Mass. On im-
pact, one train crumpled with the lead car, but stayed in place (mostly on the track).

“PTC works great until you have a sys-
tem failure. You still need to have a strong structure to protect passengers and opera-
tors,” Lauby says, adding that the U.S. stan-
dards will start where others have left off.

Call it, “European standards — plus, say, for the Australians, we’re taking [Europe-
an] work and trying to improve upon it."

Tyrell cites a Washington, D.C., Metro-

rail crash in June 2009 that was the result of a PTC system failure that allowed two trains to collide head-on, killing eight peo-
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