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Guardrails Seen as Killers Got Quiet Fix, Inventor Says

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A Trinity Industries ET-Plus end terminal off U.S. Route 70 in southeastern Arizona. Two guardrail industry professionals say units including this one represent a quiet change Trinity made to its product to address what these people say is a potentially deadly, car-spearing defect. Trinity has denied any of its units are faulty and says they are crash-tested. Photographer: Patrick G. Lee/Bloomberg

(Bloomberg) -- First came the car-impaling guardrails. Then came the coverup.

That, at least, is the assertion of two guardrail-industry professionals, a claim that suggests the confusion over U.S. roadside safety may run deeper than previously reported. Their statements,

if borne out, cast additional doubt on a top guardrail maker, raise new questions about the effectiveness of a federal highway regulator and would leave state officials with an even shakier grasp of which guardrail systems on their roads may pose a potential danger to drivers.

The focus of the two professionals, they said in interviews with Bloomberg News, is the ET-Plus end terminal, a shock-absorbing device meant to mitigate damage to a vehicle that plows into the leading edge of a guardrail.

Its maker, Dallas-based Trinity Industries Inc., has been in the spotlight already for an alleged lack of disclosure about the ET-Plus. In October, a Texas jury found that Trinity had made cost-cutting changes to its system around 2005 without first alerting the government. Trinity, facing at least \$525 million in penalties, says it will appeal.

The company is named, too, in at least 21 other lawsuits, most filed starting in 2012, alleging that its modified ET-Plus can lock up on impact, spearing cars rather than slowing them. The suits collectively allege a link between Trinity's product and at least eight deaths. Trinity has denied that its 2005 revision has a deadly flaw.

The guardrail professionals' latest assertion, which hasn't previously been reported, threatens to undercut that safety claim.

Third Version

For at least a year and a half, these people said, Trinity has quietly produced a third version of its ET-Plus with dimensions they say make it less prone to malfunctioning -- addressing the alleged car-piercing defect in the second version that Trinity has dismissed as untrue.

Trinity, in an e-mailed statement, said it has fully disclosed to the federal government "all of the fabrication adjustments" it has made to its ET-Plus system since 2005. All changes have been successfully crash-tested, it added.

One of the people who asserts Trinity quietly re-revised the ET-Plus is the man who helped invent the technology behind it. Dean Sicking, an engineering professor at the University of Alabama at Birmingham, helped to develop the predecessor to the ET-Plus and has collected millions of dollars in royalties for it. He also helped develop a competitor to the ET-Plus and was a paid consultant, against Trinity, in the Texas lawsuit.

Quarter Inch

Sicking first came across what he said is the third version of the ET-Plus on Alabama highways in April 2013. Bloomberg News measured dozens of Trinity devices installed last year in southeastern Arizona -- accompanied by Joshua Harman, a guardrail maker who was the plaintiff in the Texas suit -- finding dimensions similar to those Sicking outlined.

The dimension change Sicking saw was small, in a place few would know to look. Trinity, he asserted, expanded one dimension in its welded-steel unit by a quarter-inch. But that, he said, was enough.

“That little bit of difference makes a whole lot of difference to the world,” he said.

Sicking told safety regulators at the Federal Highway Administration about his measurements in October 2013, he said in an interview with Bloomberg News. The agency, which signs off on the crashworthiness of products, counts on manufacturers to make and deliver them as billed. Sicking’s assertion flags the question of whether the FHWA has been aware of a safer third version for about a year, during which it has defended the crashworthiness of the ET-Plus.

Measuring Guardrails

The FHWA confirmed that Sicking spoke with two agency officials in late 2013 but said they didn’t recall Sicking mentioning a possible third version.

The agency is now aware of the allegations of further changes, agency spokesman Neil Gaffney said in an e-mailed statement. Last month it sent engineers into the field to help determine whether there are more iterations of the ET-Plus in service than it has been told about, Gaffney said, adding that the agency expects to receive their measurements by January at the latest.

That may come a bit after the fact. In November, the agency approved Trinity’s plan for conducting fresh crash tests on the ET-Plus. Those trials started with a crash test on Dec. 10 and are scheduled to be completed by the end of January. What isn’t clear now, though, is whether those tests will involve a sampling of all of the ET-Plus versions recently installed on the nation’s highways.

Exceeding Tolerance

Differences in ET-Plus dimensions could, in theory, be the result of variations in production. However, the disparity between versions detected by Sicking in most cases exceeds the manufacturing tolerance that, according to court testimony, Trinity allows.

The company declined to comment on its tolerance.

There was no discussion of a third version in the Texas trial against Trinity. The company hasn’t been accused in court of making any such changes.

Sicking did play a pivotal role in the Texas trial, though. The inventor, who had been raising his concerns about a third version for more than a year, told the jury in July that a Trinity official had paid him a visit and attempted to bully him into keeping quiet about the ET-Plus. The judge, claiming potential witness tampering, dismissed the jury and called for a fresh trial in October.

The bullying allegation is “completely untrue,” Trinity has said.

Bureaucratic Snarl

The upshot of all this is a potential bureaucratic snarl on America's roadsides that may take state officials years to untangle. There are some 200,000 ET-Plus systems installed around the country, the FHWA has said. There's likely no way to say which are the allegedly defective ones, short of states measuring them one by one.

At least 15 states are planning to do just that, state officials said in interviews. One, Missouri, has already taken measurements and found size variations that it intends to analyze more fully, according to Joseph Jones, the state's engineering-policy administrator, who will review the data.

"We want to know what we have out there," Jones said.

Shifting Allegiances

The story of the alleged third version is one of industrial sleuthing and shifting allegiances among insiders in the guardrail trade, a business worth hundreds of millions of dollars in taxpayer-funded purchases.

Sicking got his start in roadside safety in the 1980s. Before then, many guardrails had exposed ends that could skewer vehicles that ran into them. Others had buried ends that could double as car-flipping ramps.

In 1986, Sicking and a few colleagues based at Texas A&M University began developing a way to transform the end of a guardrail, an immovable object, into a forgiving shock-absorber.

They invented a piece to mount onto a guardrail's end -- a steel plate to receive a vehicle's blow and, behind that, a slot into which the guardrail was threaded. When hit under the right conditions, the end terminal would be forced down the length of the W-shaped rail.

As the guardrail pushed through the narrow slot, it would flatten, in an energy-absorbing instant, into a ribbon deflected away from the car. Guardrail posts would fall away. Several feet or yards later, the car would come to a less catastrophically abrupt stop.

Rail Royalties

In 1989, the FHWA certified their invention, the ET-2000, as crashworthy. Soon, a company called Syro Steel Co. started selling it. Trinity bought Syro a few years later.

In 2000, Trinity introduced the ET-Plus, a lighter version of the ET-2000. That January, the federal agency vetted the ET-Plus, allowing states to seek federal reimbursements for some of their spending on it.

By then, Sicking had already invented a competing end-terminal and was collecting royalties from it, too. He says he received about \$4 million in royalties for the ET-2000 and ET-Plus until

they expired after 2008. He has received about the same amount in royalties from the competing system and will continue to collect them for at least another decade, he said.

There's no independent measure of the market for the ET-Plus and similar energy-absorbing end terminals. Sicking estimates that Trinity currently accounts for about 60 percent of the market while the competitor he developed -- sold by Road Systems Inc. -- has about half that. Models sold by Barrier Systems Inc. account for the rest, he said.

The Road Systems figure is reasonable, a company spokesman said. Trinity and Barrier declined to comment on market share.

2005 Changes

Scrutiny of Trinity's system began in 2011. Harman, who runs a small guardrail manufacturer and installer, said that late that year, he discovered the company had made undocumented changes to its system around 2005. In early 2012, he told the FHWA about his finding. That March, he sued Trinity in Marshall, Texas, on behalf of U.S. taxpayers who had helped pay for the devices.

Trinity then said it had revised the dimensions of its ET-Plus system around 2005, saying that details of the change were "inadvertently omitted" in paperwork sent to the FHWA. The changes didn't hurt the ET-Plus's performance, Trinity said, and the modified unit had been successfully crash tested.

In November 2012, as word of Harman's allegations spread and Trinity was named in several personal-injury suits, Sicking began looking at accident sites involving the ET-Plus.

Guide Channel

Sicking documented 20 crashes in a row where he thought the Trinity terminals he measured hadn't performed as designed, he said in a September 2014 deposition for the Texas trial, a transcript of which was provided by Harman's lawyers.

In April 2013, Sicking said, he noticed something different. That month, he stopped by the sites of three accidents near Birmingham, Alabama, that involved recently installed ET-Plus systems, he said in the deposition. Those units had appeared to work as intended, he said.

He measured them. In the deposition and interview, he said he found that the rectangular guide channel -- which feeds the rail into the slot -- was a quarter inch taller than in the ones he said had malfunctioned.

Several months after Sicking's Alabama measurements, Harman was in Arizona surveying guardrails as part of his own research. There, he said, he measured versions with taller guide channels that matched those Sicking had seen. In an interview, Harman said the revision appeared to address what he says is the safety problem with the 2005 version.

Since then, Harman said he has seen versions with similar measurements in Texas, Tennessee and California. Sicking has seen them in Texas as well as Mississippi, he said.

Calls to FHWA

Sicking told Jeffrey Paniati, the FHWA's executive director, about his discovery in an October 2013 phone call, he said in the interview. Paniati referred him to Tony Furst, the agency's associate administrator for safety, who Sicking said called him a few days later.

"Nothing came of this," Sicking said.

Both Paniati and Furst remember speaking with Sicking in late 2013, but only about Sicking's concerns related to Trinity's 2005 changes, the agency said in its statement. They didn't recall any mention of further alterations by Trinity, according to the agency.

Around the same time, Sicking got involved in the Texas lawsuit against Trinity, as a consultant for Harman's side. He said he agreed to a \$350 an hour rate and hasn't yet tallied his hours.

'Industry Rumors'

In February 2014, Sicking spoke to members of a panel reviewing end-terminal performance and shared his assertion that there was a third version, he said in his deposition. On that phone conference were several state and federal highway officials, he said in the interview.

Shortly after, Sicking got a call from Gregg Mitchell, the president of the Trinity unit that makes the ET-Plus, both Sicking and Mitchell testified in October.

Mitchell requested a meeting with Sicking because he had heard "industry rumors" that the inventor had been sharing his concerns about the ET-Plus's performance with states and the FHWA, Mitchell testified. In March, Mitchell traveled to Birmingham to meet with Sicking, both testified in October.

In July, during the first trial in the Texas lawsuit, one of Harman's lawyers asked Mitchell whether he had told Sicking during the meeting that he would "smear him and make sure that he never worked in the industry again" if he testified against Trinity.

"Absolutely not," Mitchell testified.

'That's a Threat'

That evening, Sicking -- who hadn't been planning to appear -- traveled to Marshall from Birmingham to testify that Mitchell had said he would try to ruin the reputation of any witness who spoke against Trinity. "That's a threat if I ever heard one," Sicking said in his deposition.

U.S. District Judge Rodney Gilstrap met with Sicking in his chambers. He later declared a mistrial.

“Serious concerns exist with respect to Trinity’s conduct and the veracity of testimony” by Mitchell, Gilstrap wrote.

Trinity declined to make Mitchell available for comment.

Sicking, who had talked about a third version in his deposition, wasn’t asked about it at the trial: His testimony was mostly limited to speaking about the alleged bullying.

On Oct. 21, a day after a retrial resulted in the jury’s verdict against Trinity, the FHWA demanded that the company crash-test its modified ET-Plus. The agency backed the company’s test plan in early November.

California Terminals

Eight terminals were pulled from California’s maintenance inventory for the tests, according to the federal regulator. The state ordered them in June, and they were among two dozen that arrived in September, said Mark Dinger, a spokesman for California’s transportation department.

Both Trinity and FHWA officials measured the units before shipping them to the test facility, according to the FHWA.

The FHWA provided Bloomberg News with measurements of three dimensions for each of the test systems. They all match those of the 2005 version. Trinity declined to share the complete design measurements of the units it says are under review, citing trade secrets. The company also said reporters, who were allowed to view the Dec. 10 crash-test, wouldn’t be allowed to measure the test unit.

Taking such measurements requires technical expertise, according to a statement from Jeff Eller, a Trinity spokesman, who added that the test units’ measurements will be released when the testing is complete.

Arizona Roadside

The existence of a different model was confirmed during a field examination in Arizona by Bloomberg News.

On a stretch of U.S. Route 70 that cuts across desert scrub near the Apache Gold Casino Resort, there are six dozen ET-Plus systems that an Arizona official said were installed sometime from May to August of 2013.

Measurements of these units -- taken in November with Harman, the Texas plaintiff -- revealed at least two dimensions that in the majority of cases didn’t match Trinity’s official measurements

for the 2005 version, which were disclosed at the Texas trial. These changes include the taller guide channel noted by Sicking.

Trinity's manufacturing tolerance -- the maximum variation from stated dimensions that a maker allows -- is one-eighth of an inch, experts from both sides testified in July.

Of the 72 recently installed guardrails examined in Arizona, 14 had a guide-channel height right at the upper tolerance for the model Trinity says it sells. Another 56 were higher than that maximum tolerance, including more than two dozen that had the same quarter-inch increase that Sicking observed in Alabama.

In 51 of the Arizona systems, the slot's width was at one point wider than Trinity's official measurement by more than a quarter-inch. While Sicking says those gaps have varied in size for years, Harman points out that they are well outside Trinity's tolerance.

'Old School'

A few dozen feet down the same Arizona highway were older ET-Plus models. Their measurements matched those of the original design that federal officials certified in 2000. Also nearby were systems with the measurements of the 2005 version.

At least 42 states and the District of Columbia have suspended new installations of Trinity's systems, as many assess what's already on roadsides.

"We're dealing with an old-school steel product that nobody seemed to be paying attention to until recently," said Sean Kane, president of Safety Research & Strategies Inc., an independent group that investigates potential product hazards. "The states are going to be left holding the bag, and motor safety is going to be affected by these decisions."

Sicking, for his part, said he worries that a potentially lethal version of the technology he helped invent is still out there.

"Everybody is proud of their biggest accomplishment. This was my biggest," he said. "They tarnished it."

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