New truck hitch delivers safety—and extra payload

A newly developed roll coupled hitch can deliver both cut-to-length logging truck safety and a payload dividend to log haulers.

By Tony Kryzanowski

It was a dark day for many mills and their log haul contractors a few years ago when most provincial governments reduced the weight allowed on certain popular cut-to-length (CTL) log haul truck and trailer configurations because of safety issues.

Since then, however, a trailer hitch solution has been developed to overcome that safety concern, meaning that loads at full weights can now be hauled more safely due to improved trailer stability.

The solution is to roll-couple the truck and trailer together. Experts at FPInnovations, previously the Forest Engineering Research Institute of Canada (FERIC), established the effectiveness of the solution through a series of vehicle dynamic studies and in turn, the Wolf Trailer Company developed an operational product that is now commercially available.

Eric Amlin, the former program leader for transportation at FPInnovations who was involved in the vehicle dynamic testing, is now working with Wolf Trailer to help introduce the technology to trailer manufacturers as well as truckers.

In the early 1990s, experts working on the National Weights and Dimensions Task Force identified specific types of truck and trailer configurations as being “below acceptable safety performance standards.” With respect to forestry, these were tandem or tridem drive trucks hauling CTL logs pulling a three-axle and four-axle full trailer. To the layperson, these configurations look like a wagon being towed behind a truck. Also included in this list were trucks pulling pony trailers, which is a popular configuration in some parts of Canada.

As a result of the Task Force findings, a Memorandum of Understanding (MOU) was reached among the provinces to reduce the trailer payload of the identified truck and trailer combinations by three tonnes. The objective of the MOU was to have a harmonized approach across the country to make it safer to use these configurations. Most provinces except B.C. have complied with the agreement and have reduced the maximum weight amounts on the identified CTL truck and trailer configurations that continue to use conventional pintle-type trailer hitches.

Although regulations have not yet been implemented in B.C. to bring them in line with the rest of Canada on this issue, the potential still exists.

Heavy truck and trailer configurations are evaluated for their safety and stability characteristics by means of a number of vehicle dynamic measures called performance standards. The load transfer ratio is one of those measures and it quantifies the likelihood of a truck or trailer rolling over. Without roll-coupling the truck and trailer together, these configurations all fail this performance measure.

The findings of the Task Force experts who studied these truck and trailer configurations raise some major safety issues. Mainly, the physics behind these particular truck configurations mean that when the trailer begins to roll, the truck is
unable to provide any resistance to counter the situation and the trailer will roll over independently. Because of the type of hitch typically used in these configurations, the driver is often unaware that a trailer rollover is occurring, so he has little opportunity to take corrective action with the truck to try to stop the roll.

“Conventional pintle hitches do not transfer roll stability, so any instability in the trailer cannot be countered by the stability of the truck,” says Greg Gilks, engineer and former director of commercial vehicle safety enforcement in B.C.

Conversely, he says “the roll-coupling hitch is an innovative device which will improve highway safety by providing roll stability between the truck and trailer. The roll-coupled hitch not only provides a transfer of roll stability, but it also allows the driver to feel trailer instability and take corrective action before the trailer rolls over.”

Amlin adds that the roll-coupled hitch is a mechanism designed to stop any independent roll action between the truck and the trailer.

“If the trailer starts to independently roll over, it can’t because of this roll coupling hitch,” he says. “The truck acts as an anchoring device to stop that from happening.”

When a truck and trailer are roll-coupled, Amlin says the driver will definitely feel the truck react when the trailer begins to roll because of the more solid connection between the truck and trailer.

“Depending on the maneuver that the driver is going through, once he feels a roll occurring, his first reaction is probably to look in the mirror and realize what is occurring. Next, brakes may be applied and/or some steering action to counter what is happening,” says Amlin. “If there is no time for this, he’s going to rely on the truck to stop the trailer from rolling over. This technology provides the driver with a more forgiving vehicle to operate.”

The Commercial Vehicle Safety Enforcement (CVSE) branch of the B.C. Ministry of Transportation has delayed the weight reductions a number of times over several years. Like log haul contractors using these configurations in other provinces, the outcome of compliance will be that B.C. log haul contractors using pintle-type trailer hitches will have to reduce trailer payload on their full-trailer combinations. So this axe continues to hang over industry’s head.

However, this is where FPInnovations’s work related to the development of the roll-coupled hitch comes into play.

“You can appreciate that a three tonne reduction represents a significant loss of payload,” says Amlin. On a typical 42 tonne load, that represents about seven per cent. “When CVSE put out its circular notifying industry that this was going to happen, FPInnovations launched a project to identify a method that would improve the stability of the trailer.”

The result was the roll-coupled hitch. Wolf Trailer built the prototype for FPInnovations’s field trials with a logging truck in the north Okanagan. It was a tri-axle truck with a four-axle trailer driven by Ray Allan for Roga Contracting. He drove the truck for an entire season from late summer to spring break-up. He says that he was able to lock and unlock the roll-coupled hitch from a device inside his cab, which was helpful for navigating rough logging roads where there was more sway in the trailer. Once he reached the highway, however, he engaged the roll-coupled hitch.

“It handled very well and sort of stabilized the truck,” Allan says. “It behaved like a semi-trailer. With a regular trailer hitch, you get that swinging back and forth, but with the roll-coupled hitch that’s taken right out of there.”

He noticed it particularly on the highway when he needed to cross a railway track. Normally, he had to cross the track at
about 60 kilometers per hour when using the pintle-type hitch. With the roll-coupled hitch engaged, he could take it at 80 kilometers per hour with a lot less worry about navigating the bridge and curve right after the track.

“I would recommend it because of the safety aspect to it,” says Allan. “On the highway, it helps to stabilize the truck.” He adds that it was as easy and fast to hook up as a pintle-type hitch.

It is possible to retrofit an existing full or pony trailer, and typically requires beefing up the drawbar and installing the hitch to roll-coupling standards. Retrofitting is considered on a case-by-case basis, with an engineering analysis done on the existing equipment to determine if and where it needs to be reinforced. Payback on installation varies because it depends on the truck’s utilization. However, a quick analysis conducted by Amlin for a dump truck roll-coupled installation showed payback in about 160 days with the truck working on a single shift. The gain is not quite three tonnes of payload because the roll-coupled hitch adds about 200 kgs to the tare weight.

The ability of the roll-coupled hitch to improve roll stability means that log haul truckers using the identified CTL truck and trailer configurations should be able to transport full log loads on an ongoing basis.

Researchers have been able to prove to CVSE that the roll-coupled hitch addresses safety concerns as it relates to trailer rollovers on CTL truck and full trailer configurations. Given the solution it has developed by commercializing FPInnovations’s concept, Amlin says that Wolf Trailer Company hopes for the sake of improving the stability of these trailers that CVSE will soon decide to follow the lead of other provinces and be in compliance with the MOU.

Wolf Trailer continues to work with new management at CVSE to demonstrate the performance advantages from a safety standpoint of the roll-coupled hitch, which has included putting a few hitches into service under a special CVSE permit. Based on the success of field trails, the roll-coupled hitch is approved for use in B.C., and Amlin is working on Wolf Trailer’s behalf with regulators in other provinces where the hitch is applicable to have it approved for use.

Among the 20 or so different log haul truck configurations in use throughout Canada, these four types of problematic CTL log haul configurations are used to varying degrees in other provinces. However they are particularly popular in B.C. because in that province, transport of CTL logs is on the rise. Outside of B.C., the payload restrictions on the trailer not only apply to log haul trucks, but also to trucks and trailers with the same axle configurations used in other industries such as the oil and gas sector. Consequently, Amlin says that the roll-coupled hitch is particularly popular with companies engaged in the oil and gas sector in places like Alberta and Saskatchewan. A pilot project is also being discussed for Nova Scotia, which could involve as many as 20 trucks.

Wolf Trailer’s dealer in British Columbia is Anser Manufacturing of Vernon, B.C. (website: www.ansermfg.com) and Wolf Trailer can be contacted through their website, www.wolftrailer.com