

# Tarpping Flatbed Trailers

*Recognizing and responding to fall exposures*

*By J. Nigel Ellis*

SHIPMENTS ON VEHICLES ARE TARPED for a range of reasons—to prevent product such as aggregate or trash from blowing onto the roadway (often regulation-driven); to prevent rain from damaging cargo such as drywall and plasterboard; to prevent watermarks on steel or aluminum coil and shapes; and to prevent the warping of wood products such as lumber, timber and plywood. Glazing shipments require tarps as well because the surface tension properties of water between plate glass makes the load impossible to salvage. Tarps are also required for loads where road grit and flying particles could damage the cargo.

Flatbed trailers are versatile—they can carry heavy loads, oversized shipments and odd shapes, and can be loaded by an overhead crane. Most flatbed loads have to be tarped—and in many cases, that involves manual tarping, which increases the risk of injury. Hazards associated with this task include getting on top of the flatbed without a properly designed ladder or platform (especially at transition) and no guardrails. Placing tarps on top of vehicle loads is also a challenge, since tarps weigh 80 to 150 lb. In addition, slippery plastic on pallet loads can be dangerous especially when wet. Voids in poorly packed loads can endanger a driver as well. Even the simple act of unfolding and pulling tarps over the load can be hazardous.

Dump trucks, trash trailers and high cubic waste trailers may also require tarps, but these types of vehicles and their loading bays typically have established methods of loading, tarping and cleaning that

do not require the driver to walk on the trailer to place the tarp or adjust the load. Therefore, this article focuses on fall hazards and possible solutions for flatbed trailers.

### Case Examples: Washington State

The Department of Labor and Industries in Washing-

ton State (2007) offers several case summaries that illustrate the dangers associate with falling off a load—as well as the costs of the resulting injuries.

- A 49-year-old driver on his truck tarping a load fell off when the wind blew the tarp. He landed on his right shoulder, spraining it and developing serious complications. Workers' compensation costs were \$170,000, including 227 weeks of time loss.

- A 40-year-old driver tarping a load of wood chips fell from the catwalk of a trailer and landed on his left outstretched arm, breaking his wrist. Workers' compensation costs were \$9,000, including 8 weeks of time loss.

- A 45-year-old driver on his truck tarping a load of steel tubing fell to the pavement when the heel of his boot caught on a load strap. He sprained his neck, shoulder and back. Workers' compensation costs were \$28,000, including 40 weeks of time loss.

- A 31-year-old driver taking a cord off a tarp on top of a load of plywood slipped and fell 10 ft to the ground, spraining and fracturing his right ankle. Workers' compensation costs were \$18,000, including 12 weeks of time loss.

### Accessing the Trailer

Getting onto the flatbed poses significant risk of falling if the rig does not have a firmly installed portable flatbed ladder. The ladder can be stowed in the unused spare tire metal bracket under the flatbed. This is a safer alternative to using items such as the ICC bar, a wheel or coupling areas to access the trailer.

The dangers of walking on the load and the bed have been recognized as important. Van Dyne and Christiansen (2006) cite a study of intracompany driver losses for a company with a fleet of trucks to identify ways to reduce losses from injuries suffered while tarping. The study concluded that 20% of the total injuries reported were from pulling tarps, yet only 30 to 40% of this company's total truck loads were tarped. By implementing an ergonomics program to train drivers on posture, handling and pulling techniques, injuries were reduced by 30%.

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### Effective Work Practices From Other Industries

Manufactured goods make up the bulk of items transported by flatbed trailers. The versatility of flatbed trailers makes this method of transportation attractive to shippers. Workers in other transportation industries face dangers posed by overhead access during loading or unloading. Some of the solutions from these industries may be adaptable to flatbed trailers.

For example, access and fall protection on tank trucks takes several forms such as a push-along anchorage (StandFast Corp.); catwalks along the tank with guardrails; or overhead horizontal lifelines with rails or cables from T or L posts (Hy-Safe Technology; Fall Protection Systems Inc.; CAI Safety). Catwalks welded along the tank offer easier access to the hatch, which is an approach used frequently in Canada.

In industries that use railcars, access using overhead horizontal lifelines (same as tank trucks) is good for short distances of several hundred feet. Tank cars and hopper cars are easier to address than open boxcars. Plant railcar sidings have had engineered lifelines installed for employee protection since the 1970s. The tank truck, hopper car and tank car industries have used horizontal lifeline cables for several decades.

Recently, issues such as the number of workers, dynamic sag distance, length of lifeline and forces at the anchorages have been recognized as important factors when considering the long-term safety requirements of engineered performance horizontal lifelines with self-retracting lanyards (SRLs) and trolleys. Overhead triangular frame (Fall Protection Systems Inc.) or trussed track (SPANCO Inc.) rail bridges can reach 100 ft between supports (plus overhang of up to 25 ft further on each side). Although these solutions have been applied in other industries, they are applicable to flatbed tarping as well.

Photo 1 shows upside-down Ls with a horizontal lifeline that reaches over the tank truck. The SRL is reached with a tagline at ground level. Railroad maintenance workers have been known to step onto the catwalk on the next rail car, a procedure that may conflict with suggested practice. However, since workers will likely continue to step over rather than climb down the ladder to transfer to the next car, it is essential that the horizontal lifeline cable sag be short enough to avoid hitting the coupling between the cars in the event of a fall. An alternative is to use horizontal rails that have little or no sag.

Side kits are another way to reduce manual tarping of flatbeds (Aero Industries). These kits consist of a tarp, plywood or fiberglass boards and plastic or aluminum bows (Photo 2). Soft sides (curtain sides) are more commonly used in Europe (Photo 3). A portable ladder that locks into the outside rail with uprights that resist hand-sliding during a fall could help drivers access the tarp storage area on top, perform tie-down and other activities performed on top of the flatbed surface (tray).

Another effective work practice is to have the

overhead crane operator lift the tarp onto the load using a spreader bar (Photo 4), or to use a specially adapted forklift or overhead hoist (Carbis Inc.) (Photo 5, p. 38) to assist with tarping. At the least, drivers should ask the forklift operator to lift folded tarps to the top of the load. In addition, sliding or rolling tarps can be retrofitted to trailers.

Another strategy is to incorporate safety measures into the contract between the shipper and the trucking firm. These might include requiring that the load be placed symmetrically and as low as possible on the trailer, and that there be no hidden pockets under the load when the tarp is spread since these pockets cause many falls. In a separate bay, the driver can also be required to look for ways to perform the loading, tie-down and tarping from the ground.

### Relevant Regulations & Liability Laws

Few U.S. standards and regulations address tarping of trucks/trailer. The Department of Transportation/Federal Motor Carrier Safety Administration (FMCSA) rules for proper tie-down and load security have resulted in little or no action by OSHA on rolling stock hazards because of 4(b)(1) of the OSH Act. As a result, one agency's rules on load safety and tarp inspection have introduced increased exposure (e.g., the requirement to tarp carefully) without a corresponding action by another agency to address the increased risk of injury. The FMCSA rulemaking of March 29, 2002, addresses inclusion of rolling tarps up to 108 in. width and notes the safety enhancement of keeping drivers on the ground.

This confusion within the rules and enforcement affords little incentive to the trucking industry, transportation industry equipment manufacturers and

**Abstract:** Truck drivers face the danger of falls while climbing onto the trailer and/or especially the load. Loads often must be tarped after the flatbeds have been loaded by cranes or forklifts. When heavy tarps are unfolded and pulled into position, they can give rise to hidden voids with unstable stepping that can cause the driver to fall from the load onto the deck or ground. This article examines the options for and opportunities to protect drivers at shipping points and destinations.



Photo 1 (left): Upside-down Ls reach over tank trucks. The cable and SRL are accessed with a tag line.

Photo 2 (above): The side kit is fitted and tied down with bungee cords to the flatbed.



Photo 3 (above): With soft sides, one or both sides pull back to enable forklift loading.

Photo 4 (right): An overhead crane can assist with tarping.







(From top) Photo 5: A tarp is loaded using an overhead hoist.

Photo 6: A rolling tarp (pulled back here for loading) allows the driver to tarp or untarp quickly, and requires the driver to exert little hand force.



Photo 7: A roll-up catwalk provides safer access during tarping.

many shippers to recognize or address the fall potential risk associated with truck and trailer tarping on a broad scale. As a result, solutions are often expensive at best or completely absent on all but the largest contract fleets and among proactive shippers and companies that have experienced a fatality or serious injury or have been made aware of its potential by someone who has experienced a catastrophic fall incident.

OSHA 1926.501(b)(1) requires fall protection with a trigger height of 6 ft on walking/working surfaces but 1926.500 exempts vehicles or trailers. The agency can cite the general duty clause (GDC) for violations related to rolling stock fall hazards in situations where feasible means exist to eliminate or materially reduce the hazard. However, in an

interpretation issued March 10, 2004, OSHA noted that if fall protection is infeasible while rigging for loading or unloading materials on trailers, then no citation will be given under 1926.95(a) or the GDC. Currently, OSHA's general industry standards contain no references to tarping.

Additionally, premises liability is the body of case law which holds that a property owner or operator owes a duty of reasonable or ordinary care to an invitee (e.g., supplier, contractor, customer, guest, patron) where the invitee may ordinarily be expected to be. Premises liability can be construed as a basis for requiring safe tarping, as drivers are invitees at the load pickup sites.

Some states (e.g., Wisconsin) have safe place statutes that address freedom from danger to the life, health, safety or welfare of employees or frequenters "as the nature of the employment, place of employment or public building will reasonably permit." All states have premises liability case law that addresses the right of a visitor to a safe workplace. Tractor/trailer drivers are business invitees to whom a duty of due care is owed.

Other countries seem to have recognized the hazard of working on stationary vehicles (rolling stock) and have no apparent conflict regarding safety jurisdiction of a parked nonmoving vehicle "workplace" with the transportation agency. In fact, some occupational safety agencies abroad require the trucking firm employer to be responsible for the safety of its drivers; this typically involves conducting risk assessments and acting on them (HSE, 1999).

In the author's opinion, the U.S. Supreme Court's unanimous opinion in the *Mallard Bay Drilling* case in 2002 provides precedent for OSHA to regulate truck-trailer tie-down and tarping functions. In the

*Mallard Bay* case, the Supreme Court held that the OSH Act was applicable to worker safety in areas that the U.S. Coast Guard chose not to regulate. The court found that the act's purpose is to ensure that "every working man and woman in the nation has safe and healthful working conditions" [29 U.S.C. 651(b)]. In the author's view, tie-down and tarping are covered under the OSH Act despite 4(b)(1) because DOT has not regulated this activity that presents a hazard to drivers.

### Proposed Solutions:

#### Flatbed Trucks/Trailers With Packaged Tarps

1) Request that the tarp(s) be draped over the load by the overhead bridge crane equipped with a spreader bar be used to load the trailer at the shipper's location (Photo 5). Then, while standing at ground level, the driver can apply short tie-downs to secure the tarp to the flatbed frame.

2) Use side kits for loads that are no greater than the flatbed's width and length, with maximum load height up to 9 ft from the ground.

3) Use center I-beam trolleys installed overhead on some trailers to pull the tarp along the trailer (forklift loaded). For example, this system is used with trucks used to deliver grass sod.

4) Develop and use frame method SRLs and advanced double SRLs to provide fall protection for the driver during delivery (onboard fall protection).

5) Develop and use SRLs from crank-up overhead bracket running on outside rail(s) of the flatbed (onboard fall protection).

6) Access the flatbed using a portable ladder that locks into the side rails and has handles that reach to 3.5 ft above the deck (tray).

#### Proposed Solutions: Flatbeds With Built-In or Retrofit Fall Protection

1) Employ automatic tarping (flip-tarp).

2) Manually control tarping from ground using a rolling tarp, side roll or roller crank tarp.

3) Manually control tarping from behind the cab (in lieu of flip-tarp or pull tarp).

4) Use a retractable sliding or rolling tarp (Photo 6). These cost \$14,000 to \$16,000 (installed) and allow the driver to tarp or untarp in a few minutes. The units weigh about 2,000 lb (Cramaro Tarpaulin Systems; Aero-Kit Industries Inc.).

5) Install side kits.

6) Use soft sides. In these systems, one side (or both) is flexible and pulls back lengthwise to allow for loading by a forklift. Fall protection while standing on the load is accomplished by a roller bar system attached to the roof frame to support an SRL with tagline. A related option would be to use curtain sides that allow loading by forklift from the trailer's end or sides.

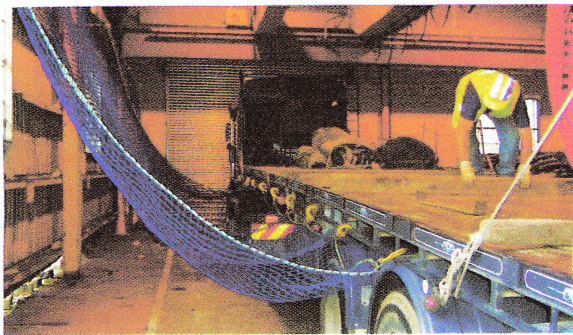
7) Use fold-over cover (mesh tarp lid).

8) Use a system that lifts a manual tarp over the truck load at the shipper's location.

### Operator & Driver Training

Shippers typically train their own employees on





**Photo 10 (above):**  
A fall arrest net system can be attached to the flatbed frame to form a trough to fall into on either side of the trailer.

**Photo 11 (right):**  
A ladder that can be rigidly attached to the flatbed edge frame can be used for accessing the flatbed.



c) A fall arrest net

system erected on a wall structure next to the trailer can be attached to the flatbed frame to form a trough to fall into on either side of the trailer (Photo 10).

### Recommended Controls for Flatbed Deck/Tray Access

The need to access the flatbed by climbing should be eliminated. This is also true because edges (usually 5 to 7 ft high) are a recognized fall hazard. Chaffin (1978) refers to the likelihood of head injury starting at 4 ft elevation falls. It is suggested that drivers use a push-in and locked catwalk to reach the trailer and spread the tarp. Drive-through bays and/or wheel guides can help control damage caused by reversing.

If it is not possible to eliminate this hazard, then the next best choice is to access the (empty) flatbed (preferably using fall protection) with an underdeck stowable ladder (Photo 11) that can be rigidly attached to the flatbed edge frame when used and with temporary guardrails around the flatbed (Flash Inc.). This type of ladder can be securely stored on the trailer and is more stable than a stepladder [29 CFR 1926.1051(a)].

### Conclusion

Tarping flatbed loads is a dangerous task, one that often involves manual tarping, which increases the risk of injury. The hazards associated with securing loads to a flatbed trailer as well as possible solutions deserve greater attention from the trucking industry, the SH&E community and regulators. ■

## What Drivers Say

The anecdotal opinions of flatbed drivers on fall hazards are illustrative. Based on a small number of informal interviews conducted at a New Jersey truck stop and elsewhere, it appears that some younger drivers have little or no awareness of fall hazards related to tarping. However, experienced owner/operators are acutely aware of these hazards. They cite concerns such as the effects of load size and shape, loading schemes with empty pockets, climbing onto the deck, plastic-covered packages that are slippery when wet, moving edge protectors into place while tying down, carrying heavy tarps on top of the load, working in the dark and/or adverse weather conditions, working without assistance and FMCSA inspection requirements. Drivers are often in less-than-ideal physical condition and as they get older have concerns about the lack of protection they have and how a fall would affect their quality of life. More information can be gained from further interviews of drivers in various industries. Additional information is also available from the author at [efss@fallsafety.com](mailto:efss@fallsafety.com).

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how to control tarping hazards, yet these same organizations can be concerned about the legal ramifications when asked to consider training contract drivers who carry their shipments or deliver product. One option would be to include a requirement for site-specific training in the contract between the shipper and the trucking company. DOT, FMSCA, OSHA and the trucking industry need to do their part as well. These groups must recognize tarping hazards and have greater awareness that basic fall prevention and protection training should be part of the training and qualification requirements for drivers.

In all cases, deviation from safe methods of work should prompt immediate communication with the driver, his/her employer, insurance carrier (in the case of independent drivers). In such cases, a company should also assess whether the driver should be permitted to return to the site.

### The Hierarchy of Fall Protection

As noted, shippers can help truck drivers spread tarps using an overhead crane and spreader bar or adapted forklift. Side kits are also an effective control. Future flatbed designs should include onboard fall protection that is deployed by the truck driver and can be used as necessary at receiving locations.

A best practice for those loading/unloading or tarping truck loads is to wear a hardhat that offers top and lateral protection and which is recommended for use with a chin strap per ANSI Z89.1-2003, Type 2 (Bullard). Wearing a hardhat that stays on the head will better protect the user; some hardhat manufacturers have recommended hardhat use during flatbed work performed up to 12 ft from the ground (M. Lloyd, personal communication, Feb. 10, 2008). Fall protection must be used for exposures over 4 ft in general industry applications.

The search for an acceptable solution to driver fall and ergonomic hazards should follow a process that relates to work sequence or tools to avoid the hazard by staying on the ground. Next is preventing the fall off an edge and, finally, catching the falling driver before impact with the trailer deck or ground. The well-established hierarchy proceeds as follows:

- 1) Eliminate the hazard by using procedures and systems designed to keep the driver on the ground without a foreseeable need to climb onto the flatbed or its load.

- 2) Prevent the hazard by using roll-up catwalks (Photo 7), railings and floors.

- 3) Arrest the fall through the use of horizontal lifelines and fall arrestors.

A fourth step, warning a driver to "watch your step," is not acceptable in a properly organized safety program with adequate training.

### Elimination

- a) Install a rolling tarp (Photo 6). Overhead loading is easy and tarping is accomplished in minutes. Concerns include the fact that tarps can be damaged by collisions and can be time-consuming to repair.

- b) Use soft sides or curtain sides. These are already used extensively in Europe and are becoming more

## Understanding Tarps

Individual pull tarps are available in heavy-, medium- and light-duty versions. Light-duty is lightweight and, therefore, easier to spread across the load; however, it has limited durability and can easily be torn and punctured. Medium- and heavy-duty tarps are much heavier and, therefore, are difficult to lift and spread; however, they have longer service life.

Water-resistant or sealed vinyl is appropriate for most goods subject to rain deterioration while wind-resistant polyester mesh is best for gravel and waste.

Many types of tarps are available. Most are 12 to 28 oz/sq yard with an average of 18 oz/sq yd, including:

- machinery tarps: general shapes to suit varying size of load;
- lumber tarps: waterproof for kiln-dried cut lumber, with universal tail tarp;
- steel tarps: durable waterproof vinyl for steel shapes with rows of D-rings;
- coil tarps: steel or aluminum coils of various sizes require waterproofing;
- smoke tarps: for products that discolor near the truck diesel exhaust;
- top tarps: for waterproofed flatbed loads that are tarped with universal flap tail for back end;
- polyethylene tarps: known as poly tarps for pickup trucks or household light-duty use;
- vinyl or neoprene asphalt tarps: for hot loads.

As noted, a heavier tarp is more durable, but handling it requires greater forces. Greater forces equate to more significant ergonomic stressors that can disable a driver over time. They also pose an increased likelihood of serious impact—such as from falling backward off the trailer because of a misstep or loss of grip while pulling the tarp over the load. Reducing the fall hazards posed by climbing the load also reduces the ergonomic hazards.

popular in the U.S. It should be noted that strap down of tall loads may require fall protection within the shell of the trailer (Photo 8) (Meridian Safety).

- c) Load the tarp using the shipper's overhead crane (Photo 5). The driver stays on the ground, which eliminates the fall hazard. However, since the tarp may become snagged or torn—conditions that might prompt a driver to climb on the trailer—back-up plans are needed and drivers should be trained regarding systems to reduce fall hazards.

### Prevention

Side kits or guardrails (Garlock Equipment Co.) clamped temporarily to the flatbed are controlled by the shipper (Photo 9). As noted, these are good for 4-ft high loads when standing on space on the flatbed or mobile catwalk scaffolds designed to be pushed up to a trailer on one or preferably both sides. The best design is if the truck can pull into a drive-through scaffold frame and pull out without having to back up.

### Arrest

- a) On-board systems are proposed for use at remote delivery locations. The double SRL is deployed by means of a crank-up frame (Meridian Safety); it is good for a situation in which there is no protected access to the flatbed tray—including no protected access to the load or directly with an SRL for soft sides. This requires trucking firms to invest in the equipment and provide adequate training to drivers.

- b) A fall arrest system provided by the shipper and/or receiver typically consists of T-posts or upside down Ls with cable or rail with sheaves or trolleys and SRLs.



**Photo 8:** Strap down of tall loads inside a soft side trailer may require fall protection within the shell of the trailer.



**Photo 9:** Temporary guardrails are a measure that can reduce falls from the trailer.