

Managing injury risks when securing loads on trucks

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Abstract

Securing loads on trucks is a common task in the road freight industry. Anecdotal reports from the trucking industry and work health and safety inspectors suggest that a common type of equipment used – the over-centre lever load binder or ‘dog’ – presents a high risk of injury. This paper examines the risks of using this equipment, alternatives that are available and barriers to uptake of safer equipment. The paper also gives the preliminary findings of an intervention campaign by Workplace Health and Safety Queensland (WHSQ), which was aimed at identifying areas of highest risk and, at the same time, raising awareness of these risks and ways to reduce them within the road freight industry. The results show that despite safer alternatives being available, dogs and other high risk equipment and practices continue to be used throughout the road freight industry.

Introduction

The road freight industry records workers compensation claims well above the all-industry rate. Road freight industry workers are included under the general industry heading of ‘Transport and storage’. Nationally, in 2009-10, the highest incident rate of all industries for serious workers compensation claims was for Transport and storage: 24.0 serious claims per 1000 employees, nearly twice the all industries rate of 12.6. The road freight sub-sector accounted for 39% of these claims with an incidence rate of 29.5 serious claims per 1000 employees. Most of these claims were from truck drivers (Safe Work Australia 2012).

Anecdotal reports from the transport industry and Workplace Health and Safety Queensland (WHSQ) inspectors in 2010 suggested that a significant number of injuries resulted from the use of over-centre lever load binders (dogs) and lever extension bars (cheater bars). This equipment is used extensively in the road freight industry to tension chains which secure loads on trucks.

About 80% of workers in the transport industry say that they have had an incident with a dog and cheater bar or they personally know someone who has had an incident (M. Robertson, personal communication, 16 August 2011). In 2006, Bluescope Steel Logistics announced that they would eliminate the use of dogs and cheater bars in response to the number of injuries (Victorian Transport Association 2006). Workplace Health and Safety Queensland analysis shows that around 100 workers compensation claims a year are associated with load restraints, although it is not clear how many of these are directly related to the use of dogs and cheater bars. Discussions with the industry also suggest that minor and unreported injuries occur far more frequently.

A search of the academic literature reveals little mention of the risks of using load securing equipment. For example, Kramer et al (2007), van der Beek (2012) and McClay (2008) allude to the activities but do not specifically mention the equipment or risks involved.

Other load restraining equipment, such as truck gates, side-curtains and other tie-down equipment is also commonly used. Choice of equipment depends on the type of load, type of truck and the requirements under the Load Restraint Guide performance standard (National Transport Commission 2012). Equipment can be suitable for securing the load but can still present a high risk to worker health and safety.

In 2010, health and safety regulators in Australia began to focus on the issue with the formation of the Heads of Workplace Safety Authorities Load Restraint (Dogs and Cheater Bars) Working Group (HWSA LRWG)¹. In 2010, Worksafe Victoria (2010) released a guidance note highlighting the issues and providing solutions. WHSQ further focussed on the tie-down load restraints with a truncated version of the Victorian guidance note released as a “Health and Safety Solution” (WHSQ 2011a) and in 2012, using information gained from the HWSA LRWG, conducted an investigation and awareness raising campaign.

This paper will present a summary of the information about load restraints gathered through the activities of HWSA LRWG and the preliminary findings of the WHSQ campaign.

Method

An investigation of the types of load restraint equipment available in Australia was conducted in 2010 and 2011 by HWSA LRWG. Manufacturers and suppliers of load restraint equipment were invited to provide information about their products including health and safety information. The issue was also discussed with representatives of leading road transport industry associations and road freight transport operators. In depth discussion were held with the steel transport industry, as this was identified as a sector which had phased out the use of dogs. Further information was obtained through a stakeholder workshop held in Sydney in August 2011.

Using the information gained through the HWSA LRWG, an advisory campaign was conducted by WHSQ from February to June 2012. The advisory campaign used a documented procedure and checklist to assist the inspector to consider the risk of the activities being undertaken and facilitate observation of and discussions with truck drivers. Figure 1 shows the part of the checklist addressing tie-down tensioning equipment.

4. Tensioning chains and webbing				
Risk factors	HIGH RISK Very likely to cause injury (Enforcement action may be required)	MODERATE RISK Some potential risk of injury (Enforcement action may be required)	CONTROLLED RISK Less likely to result in injury	Evidence and Comments
(This section only needs to be completed if the actual task of tensioning chains or webbing is being conducted during the advisory)				
High or sudden force; Awkward posture; Fall from heights; Hit or being hit by objects	<input type="checkbox"/> Using fixed lever over-centre load binders (dogs) to tighten chain with or without using extension handles (cheater bar).	<input type="checkbox"/> Using webbing instead of chain. (Note: some types of webbing are not suitable for particular loads).	<input type="checkbox"/> Using highly geared manual or automatic winch	
Hit or being hit by objects	<input type="checkbox"/> Using worn or damaged load binders or winches.	<input type="checkbox"/> Using a turnbuckle or winch type tensioner instead of a dog	<input type="checkbox"/> Using purpose built load blocking containment systems eg pins, pegs, posts, racks, headboards or goose-neck on a drop deck trailer.	
Repetitive movement; Awkward posture	<input type="checkbox"/> Rapidly tightening or loosening chains and webbing using a winch or hand ratchet load tensioner with awkward wrist postures or over shoulder height.	<input type="checkbox"/> Using a stable platform or stand so that the tensioner can be used between the shoulder and knee height.	<input type="checkbox"/> Rigid side trucks or load rated curtains in combination with inward sloping floors.	
		<input type="checkbox"/> Using winches that do not need repeated handle reinsertion to operate.	<input type="checkbox"/> Containment without tiedown.	

Figure 1. "Traffic Light" Checklist

¹ Peter Thorning is the Chair of HWSA LRWG.

A target of five hundred advisory inspections of trucks across Queensland was set. Area specific proportional targets, aligned to the WHSQ regional areas, were established using WHSQ staffing numbers. Sites where a number of different transport businesses operate were selected by the WHSQ inspectors in each area so that multiple truck inspections could occur at the same site.

Forty percent (200) of the inspections were aimed at trucks with side gates and curtains and distribution centres, manufacturing sites, retail areas and warehouses were targeted for these inspections. Sixty percent (300) of inspections were aimed at tie down lashings. As well as previously listed sites, steel manufacturing or distribution centres, sawmills, timber yards, logging operations, construction sites (including road construction) and equipment hire businesses were targeted.

Sites were contacted prior to the inspections to minimise disruptions to the business and to maximise the opportunities for multiple truck assessments. Individual truck drivers and operators were not given advance warning – those that happened to be loading or unloading at the time of the site visit were those selected.

The risks assessed were those to the driver or person carrying out the task of securing the load. The approach was advisory and advice and information was provided to the drivers. The inspector could use their discretion for higher level compliance approaches if they considered the risks so poorly controlled that there was imminent risk. Inspectors completed the traffic light checklists and the findings were collated centrally for preliminary analysis.

Results and Discussion

Information about load restraint equipment

Over-centre load binders, commonly called dogs or twitches, are used to tension chain (see Figures 2, 3 and 4). The dog operates by rotating a lever which shortens the distance between hooks attached to a chain. The lever is designed to pass through a central position where there is greatest tension and snap into place in the closed position. Considerable force is required to operate the dog. An extension or “cheater bar” is commonly used to increase the lever action making it easier to open and close the dog. There is a range of extension bars used. Some are specifically manufactured to fit securely over the dog handle. Others are pieces of pipe manufactured for other purposes. It is generally considered that use of a cheater bar substantially increases the risk of striking injuries.



Figure 2. Lever Load Binder (dog)
(A Noble & Sons 2012)



Figure 3. Pivoting lever load binder
(Trident Supply 2012)



**Figure 4. Worker using a dog and cheater bar
(Photographer: S. Davis)**

The forces involved mean that if the worker loses grip or is not prepared, the lever and bar can rotate rapidly (snap or kick back) potentially striking and injuring the worker. The bar can also fly off the lever becoming a projectile which is a risk to anyone in the vicinity. The forces needed to operate the lever generally mean that it cannot be closed without risk of sprains and strains unless a cheater bar is used.

One alternative which is often promoted as being safer is the pivoting lever dog (Figure 3). It only reduces the risk from the lever snapping back while releasing the dog. This does not substantially reduce the overall risk since most incidents occur when the dog is being tightened (M. Robertson, personal communication, 16 August 2011).

Factors which have been identified by truck drivers as critical in reducing the risk when using a dog and cheater bar are: being aware of the risk and anticipating the “snap”; standing outside the path of the lever and bar; ensuring that the extension bar is a good fit for the dog lever; ensuring that a good grip is maintained; and, ensuring that a stable posture is adopted. Although controls based on these factors can be implemented through training, awareness and procedures, as administrative controls they do not control the hazard at the source. They rely on human behaviour and supervision and, as such, are least effective in minimising risks (WHSQ 2011b). Bluescope have noted that training and education programs for the safe use of dogs have not been successful (Victorian Transport Association 2006). The only way to comprehensively manage the risk is to eliminate the need for tie-down equipment or substitute the tensioning device with one which minimises risk to health and safety, in combination with safe systems of work and provision of suitable information, training, instruction and supervision.

Loads can be secured by alternative means. These include re-designing the containment so that blocking rather than tie-down secure the load; replacing chain with webbing; or, replacing dogs with safer chain tensioners.

Enclosed trailers, with fixed or panel sides, rather than flatbeds, can be used for many types of freight. Where the freight task only involves a single type of freight, purpose built decks with racks and stanchions can be used.

Webbing and webbing tensioners can often replace the use of chain and chain tensioners. However, hand winches which require sustained repetitive movements or awkward postures are considered high risk. Figure 5 shows two types of hand tensioned webbing winches. The one in the foreground is operated by pulling down on the lever while the one at the rear by

pushing up. The pull down winch has a longer handle and requires less force. The pull down action is also less awkward and allows a better posture.



**Figure 5: Two types of hand webbing winches
(Photographer: J. Chellew)**

The simplest type of truck mounted winches require the winch handle to be reinserted repeatedly. This increases the risk of handle coming out and striking the worker or causing the worker to suddenly lurch off balance. However, the risk tends to be moderate rather than high. Figure 6 shows this type of winch and a typical type of winch bar (not to scale).



Figure 6. Left - simple truck mounted webbing winch (Tie-downs Direct 2012) and Right - Winch Bar (FB Supply 2012)

Advanced type winches, which are highly geared and do not require the handle to be reinserted each time, require less force for tensioning and reduce awkward postures. Air or electric powered winches are also available which eliminate the forceful exertion manual task completely. Figures 7 and 8 show some advanced winch types.



**Figure 7. Advanced webbing winches: Ancra EZ Torque Winch (left);
Transking Tightwinder (right) (Worksafe Victoria 2010)**



Figure 8. Advanced webbing winches: Elphinstone (left)(Elphinstone 2012); Luftman EXTE (right)(Forest Centre 2012)

Turnbuckle or ratchet binders (Figure 9) substantially reduce the risk and obtain higher pre-tension than dogs, which improves load security. Additional leverage is not needed with turnbuckle binders and, therefore, cheater bars provide no advantage. The handle does not snap back when released during tightening or loosening. These binders take longer to use, which is an issue for freight activities where frequent loading and unloading occurs. Thread failures are reported in cheaper models and cost is significant for the high end versions.



Figure 9: Ratchet binders: Left - Simple (Tie-downs Direct 2012); Right - SCC Quickbinder Plus (Flexible Drive Agencies 2012)

Winch type binders have also been developed which can be quickly attached to the chain and tensioned. These are capable of achieving the required chain pre-tension with less force than dogs. The handle does not snap back when released during tightening or loosening. Cheater bars cannot be easily used with this equipment nor are they needed. Although less force is required, some forceful exertion is still required. Overall, these types of binders control the risk of striking injury and reduce the manual task risk from high to moderate. There are currently three main types on the market: Web-Dog, AusBinder and EV-Cam (Figure 10).



Figure 10: Winch chain tensioners: Left – Web-dog; Top Right: Ausbinder; Bottom Right - EV-Cam (Worksafe Victoria 2010)

The main reasons given by the transport industry for continued use of dogs are: lack of availability of alternatives at a reasonable cost; and, lack of suitability or robustness of alternatives under harsh operating conditions. These reasons lack plausibility given the range of alternative equipment which is available.

Changing the culture of the workforce to adopt safer equipment and practices is another significant barrier. Toll Global Logistics (2010), in their changeover from dogs to Ausbinders and EV-Cams, identified that a comprehensive change management process was required.

Consultation with workers is required when identifying hazards, assessing risks to health and safety and making decisions about ways to eliminate or minimise those risks (Queensland Government 2011). Suitable and adequate information, training and instruction must be provided to workers about all equipment and practices that they will be using, whether they are new or existing (Queensland Government 2011). Effective consultation with workers is essential for the successful introduction of new equipment and work practices.

The advisory campaign

Workplace Health and Safety Queensland inspectors carried out 569 advisory inspections of trucks in Queensland. This paper reports on 477 inspections - the remaining data was not yet available at time of writing. These inspections occurred across Queensland: North Brisbane and Sunshine Coast area (140 or 26%); South Brisbane and Gold Coast area (183 or 43%); Ipswich and Toowoomba area (54 or 11%); Central Queensland area (56 or 12%); and, North Queensland area (44 or 9%).

Load restraint practices involving gates, curtains or a combination of the two were considered by 148 or 31% of the inspections. Load restraint practices involving chains, webbing or controls to replace chains or webbing restraints were considered by 329 or 69% of the inspections. The focus of this paper is on tie-down load restraints and the remaining data in this paper only considers the latter 329 inspections.

Chains were used by 48 (15%), webbing used by 134 (41%), a combination chains, webbing and other restraints were used by 121 (37%), 14 (4%) did not use chains or webbing at all and 12 (4%) did not specify. Table 1 shows the cross-tabulation of the load type and the load restraint type.

Table 1. Load type by type of load restraint.

	Chains	Webbing	Chains, webbing and other restraints	Chains or webbing not used	Did not specify	Total
General freight	3	25	74	7	3	112
Steel	17	37	17	3	3	77
Timber	0	33	6	0	0	39
Machinery	20	8	4	0	2	34
Logs	0	5	1	0	0	6
Concrete	3	2	3	0	0	8
Other	5	24	16	4	4	53
Total	48	134	121	14	12	329

The inspections classified the observed practices as high risk, moderate risk and controlled risk. The practices of securing loads involve a range of techniques and equipment. This means that the risks identified are not mutually exclusive and could note any combination of practices across the three categories.

Sixty-six (20%) inspections, noted that high risk practices were used:

- Using fixed lever over-centre load binders (dogs) to tighten chain with or without using extension handles (cheater bars) – 43 (13%)
- Using worn or damaged load binders or winches – 11 (3%)
- Rapidly tightening or loosening chains and webbing using a winch or hand ratchet load tensioner with awkward wrist postures or over shoulder height – 34 (10%)

Two hundred and sixty-nine (269 or 82%) inspections noted that moderate risk practices were used:

- Using webbing instead of chain - 221(67%)
- Using a turnbuckle or winch type tensioner instead of a dog – 162 (49%)
- Using a stable platform or stand so that the tensioner can be used between the shoulder and knee height – 87 (26%)
- Using winches that do not need repeated handle reinsertion to operate – 89 (27%)

Ninety-two (92 or 28%) inspections noted that practices which controlled risk were used:

- Using highly geared manual or automatic winch - 36 (11%)
- Using purpose built load blocking containment systems – 51 (16%)
- Rigid side trucks or load rated curtains in combination with inward sloping floors – 9 (3%)
- Containment without tie-down – 21(6%)

The proportion of inspections which noted the use of high risk practices and, specifically the use of dogs, for each load type is shown in Table 2.

Table 2. Load type, high risk practices and use of dogs

	Number inspected	Number (Percentage) high risk	Number (Percentage) using dogs
Concrete*	8	5 (63%)	4 (50%)
Logs*	6	3 (50%)	2 (33%)
Steel	77	23 (30%)	19 (25%)
Machinery	34	7 (21%)	6 (18%)
Other	53	11 (21%)	8 (15%)
General freight	112	13 (12%)	3 (3%)
Timber	39	4 (10%)	1 (3%)
Total	329	66 (20%)	43 (13%)

* Insufficient numbers inspected for reliable data

This data shows that high risk practices, including the use of dogs, are evident across all types of freight tasks and especially in steel and machinery transport. The two main steel producers, Bluescope and OneSteel, have banned the use of dogs when transporting steel from their sites. Therefore, it is hypothesised that the use of dogs must be occurring further down the supply chain or for steel products from other manufacturers. Since these two companies have

clearly shown that it is "reasonably practicable" to eliminate the use of dogs, it is difficult to see how other companies can allow the use of dogs and fulfil their work health and safety duties.

Conclusion

A person conducting a business or undertaking (PCBU) must eliminate or minimise risks to health and safety, so far as is reasonably practicable. This includes the provision of safe plant, safe systems of work and provision of any information, training, instruction or supervision that is necessary to protect all persons from risks to their health and safety arising from work carried out (Queensland Government 2011).

The risks of using dogs and cheater bars are known in the transport industry. Incidents occur frequently and some cause serious injury. Information about the risks and ways to control those risks are available from all work health and safety regulators in Australia. Other suitable ways to secure loads and equipment, which eliminate or minimise the risk from load tensioners, are widely available and at a cost which is not grossly disproportionate to the risk reduction provided. It is notable that the Load Restraint Guide website states (National Transport Commission 2012):

“After advice from Occupational Health and Safety agencies, the NTC would like to recommend that “chain and dogs” are not used for safety reasons. Following work by the Load Restraint Working Group, it has realised that fixed or pivoting lever dogs, (with or without an extension or “cheater” bar) can cause serious injury to the operator when applying or releasing the chain.”

It would be difficult for a PCBU, who uses or allows the use of dogs and cheater bars for work associated with their business, to justify that they are fulfilling their duty to eliminate or minimise risks to health and safety, so far as reasonably practicable.

Control of risks from the task of securing loads on trucks can be achieved by using safer equipment, providing appropriate information, training, instruction or supervision and effectively consulting with workers.

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