

MIFACE Investigation Report: #10MI082

Subject: Worker Crushed Under Car That Dislodged from Tow Straps

Summary

In the Summer of 2010, a 19-year-old male worker at a towing and junk car removal firm died when a car slipped or fell off of a tow truck's boom arm tow straps while he was underneath the car. The night prior to the incident, one of the firm's tow truck drivers, using an extendable boom hook and chain (also known as a sling or belt lift) truck, delivered to the firm's staging area a heavily damaged 1996 Chrysler LHS, weighing approximately 3,500 pounds. The vehicle had been totaled in a motor vehicle accident. The damaged car had been towed to the staging area and lowered to the ground. The tow truck and car were positioned on an approximate three to five degree downward slope, on very uneven, rutted asphalt.



Figure 1. Incident scene showing car, hydraulic jack and chains on ground.

When the decedent arrived at work the following day, the shop supervisor directed him to dismantle the vehicle (drain fluid, remove the catalytic converter and other under-components, the tires, etc). The incident was unwitnessed. A coworker was sitting in the tow truck cab. The decedent started the tow truck to activate the hydraulic boom arm so he could raise the car approximately three to five feet above the ground. The decedent was positioned near the front the driver's side wheel of the raised vehicle. The decedent's position indicated that he may have been sitting on his haunches looking under the car when the car slipped or fell from the tow straps and struck his head/neck/back, pinning him to the ground. Witnesses stated they remembered one tow chain attached to the car. It is unknown if the decedent had hooked a second chain to the car – a second chain was found lying near the car. The decedent did not use any secondary support, such as a safety stand prior to looking under the vehicle. The coworker sitting in the tow truck cab heard a loud noise and exited the truck. He saw the decedent pinned under the vehicle and screamed for help. The decedent's coworkers lifted the vehicle using a floor jack and then removed the decedent from under the vehicle. Emergency response was called and transported the decedent to a local hospital where he was declared dead.

RECOMMENDATIONS

- Towing company employers should prohibit using tow trucks to raise vehicles for the purpose of working underneath them without the use of appropriately selected and positioned wheel chocks and secondary supports such as safety stands.
- One end of each tow chain should be secured to an appropriate tow truck attachment point not to the lift assembly.

- The employer should develop and implement a written safety and health program that includes the inspection of wrecker lifting mechanisms, tool inspection, and employee training.
- The employer should obtain an AAA Towing and Service Manual to maximize safety and minimize costs regarding vehicle towing.

INTRODUCTION

MIFACE investigators were informed of this work-related fatality by the Michigan Occupational Safety and Health Administration (MIOSHA) personnel, who had received a report on their 24-hour-a-day hotline. MIFACE accompanied the MIOSHA compliance officer to the site several weeks after the incident. The MIFACE investigator asked for and received permission by the company owners to conduct an investigation. The MIFACE investigator interviewed the company owners and the shop manager/supervisor, who was present at the time of the incident. The MIOSHA compliance file, death certificate, and medical examiners report were reviewed. Photographs used in Figures 1, 3, 5, 7, 8, 10, and 12 were courtesy of the MIOSHA compliance file. Photographs used in Figures 2, 6, and 9 were taken by the MIFACE investigator, with the permission of the employer, at the time of the site visit. Figure 11 was provided by NIOSH. All pictures of the vehicles which had the name of the employer or other identifying information were altered as necessary by MIFACE to maintain confidentiality.

The decedent's employer was a towing company and automotive dismantling service. The firm removed catalytic converters, air bags, tires and other automotive parts from a car and then sold the remaining scrap car to a scrap yard. The current owners of the towing company had been in business for five years. The business had been at its current location for seven years.

The firm had eight employees, five of whom were on site at the time of the incident. Like the decedent, there were several employees who were considered "day Workers". The day Worker work schedule was dictated by the Worker; he could show up for work when he wished and received a daily wage. The decedent typically arrived at work between 10:00 and 11:00 a.m. and left between 4:00 and 5:00 p.m. He worked sporadically at the firm. He would come to work for a few days, and then would not work for a week or two before coming to work again. Day Workers acted as general Workers and performed tasks such as cleaning the shop, taking parts off of cars, running errands, etc.

The decedent had been hired in the Spring of 2010. The owner and shop manager stated that the decedent was a "quick study" and he was very knowledgeable about the shop and its activities. The owner provided hands-on training lasting several weeks to a month to all new employees. The owners and/or shop supervisor observed new employee work practices for two to three weeks and corrected any deficiencies or unsafe work practices noted. Additionally, continued observation of work practices was maintained, with any employee being verbally corrected when safety issues were identified. The firm did not maintain records of employee training or follow-up.

The firm did not have a written safety program or health and safety committee. The company owner indicated that he was responsible for procuring and ensuring that safety equipment was present and worn. The firm provided personal protective equipment, such as gloves, high visibility vests, and safety glasses. Also present at the site were floor jacks and safety stands.

The firm was not a member of the Michigan Towing Association and did not have an AAA towing guide which illustrated appropriate vehicle towing techniques. The firm maintained copies of vehicle inspections and service times.



Figure 2. Wrapped tow chain on tow sling anchor bar grab hook.



Figure 3. Wrapped tow chain on lifter bar grab hook

The owner indicated he instructed the operators to secure the car for towing as follows (Figures 2-4):

- Extend the boom and lower and position the tow sling against the vehicle.
- Place the “J” hook on the axle or frame of the vehicle.
- Wrap tow chain (not just placed) on the tow sling anchor bar grab hook.
- Wrap the tow chain on the lifter bar’s grab hook.
- Feed the tow chain through the “O” ring on the tow mast.
- Hook tow chain from the tow bed to the vehicle.
- Activate winch hydraulic lift to lift the vehicle from the ground.

At the conclusion of its investigation, MIOSHA General Industry Safety and Health Division issued the following Serious citations to the employer relating to the fatality.

SERIOUS: GENERAL PROVISIONS, PART 1, RULE 34(12)

Employees were not prohibited from placing their bodies beneath equipment, such as vehicles,



Figure 4. Completed tow chain securement to tow truck after chain fed through “O” ring on tow mast

machines, or materials, supported only by a jack, overhead hoist, chain fall, or any other temporary single supporting means, unless safety stands, blocks, or other support system capable of supporting the total imposed weight is used to protect the employee in case of failure of the supporting system.

(Employee underneath the carriage of the towed vehicle, held up in a raised position by the tow truck, no secondary supporting system, vehicle fell on top of the employee, 1995 Ford Super Duty tow truck and towed vehicle)

SERIOUS: AUTOMOTIVE SERVICE OPERATIONS, PART 72

- **RULE 7233(5):**

When towing a boom-supported vehicle, safety chains were not connected between the wrecker and the towed vehicle:

(No safety chains connected between the tow truck and the towed vehicle. Vehicle fell off straps, 1995 Ford Super Duty tow truck and towed vehicle)

- **RULE 7211(b):**

The work area, equipment, and tools were not maintained in a manner free of recognized hazards which could cause an injury:

(Winch boom arm supporting bracket showing cracking, broken welds and deformation, vehicle fell off the tow strap, crushing employee, winch Boom 1995 Ford Super Duty tow truck and towed vehicle)

- **RULE 7211(A):**

An employer shall: Provide training to an employee as to the hazards, safe operations of the assigned job and applicable rules of this part.

(Employee was not trained in the hazards and safeguards of the assigned job, employee underneath vehicle without the use of the safety chains. Vehicle fell on top of the employee, Ford Super Duty tow truck and towed vehicle)

Based upon observations made at the time of the MIOSHA General Industry Safety and Health Division's initial site visit for the fatality, the MIOSHA compliance officer initiated a separate inspection. The inspection found the following violations of MIOSHA standards.

SERIOUS: GENERAL PROVISIONS, PART 1, RULE 33(2)

An actuating machine control, except for an emergency device for a powered fixed or transportable machine was not guarded or located to prevent accidental actuation when unexpected motion would cause injury.

No guard for inadvertent or accidental contact of ascending or descending control levers:

- Winch boom 1995 Ford Super Duty tow truck
- Flat bed truck for transporting vehicles

SERIOUS: HAND AND PORTABLE POWERED TOOLS, PART 38

- Rule 3822(2)

Defective tools were not removed from service: Rear wheels missing, portable silver hydraulic floor jack.

- Rule 3838(1)

The rated capacity was not permanently marked on the jack: no rated capacity, portable silver hydraulic floor jack

SERIOUS: AUTOMOTIVE SERVICE OPERATIONS, PART 72, RULE 7234(2)

Safety stands having a yield point of not less than 1 ½ times its rated capacity were not used to support a vehicle when an employee placed his or her body under the vehicle. Inadequate support means, employees using tires and rims to support under carriage while tires are removed from the vehicle, flat bed truck (Figure 5) (for transporting vehicles).



Figure 5. Tires used as improper primary support

OTHER-THAN-SERIOUS: PERSONAL PROTECTIVE EQUIPMENT, PART 33, RULE 3308(2)

There was no verification through a written certification that the required workplace hazard assessment had been performed.

OTHER-THAN-SERIOUS: AUTOMOTIVE SERVICE OPERATIONS, PART 72, RULE (7211(d))

A copy of Part 72, “Automotive Service Operations” was not maintained for employee review.

INVESTIGATION

The incident involved a 1995 Ford Super Duty winch boom tow truck and a wrecked 1996 Chrysler LHS that weighed approximately 3,500 pounds. The Ford Super Duty had a hydraulically controlled extendable boom hook and chain (also known as a sling or belt lift). The tow truck had been inspected by a mechanic to comply with the annual inspection, maintenance and repair requirements under 49 CFR 396, Federal Motor Carrier Safety Association (FMCSA). The inspection included such items as tires, exhaust system, windshield wipers, brakes, etc. The

tow truck involved in the incident had been inspected in May, 2010 (Figure 6). The mechanic did not document any inspection of the hoist/winch/sling lifting mechanism.

The evening before the incident, one of the firm's tow truck drivers, using the Ford Super Duty tow truck, hauled a totaled 1996 Chrysler LHS to the firm's staging area. The tow truck and vehicle were positioned on an approximate three to five degree downward slope on very uneven, rutted asphalt. The car was lowered to the ground for overnight storage. It is unknown how the tow truck driver who brought car into the staging area attached the vehicle. The driver removed the tow truck key.

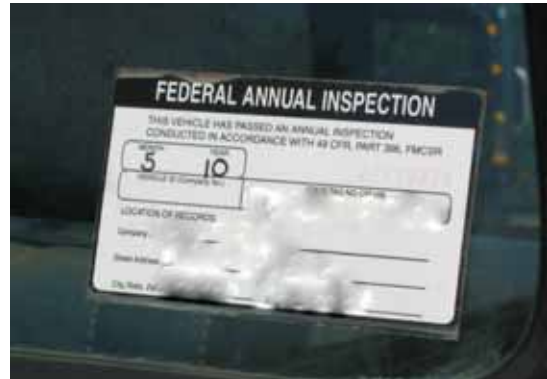


Figure 6. Vehicle sticker (identifiers removed by MIFACE) on tow truck involved in incident

When the decedent arrived at work the following day, the shop supervisor directed him to dismantle the vehicle (drain fluid, remove the catalytic converter, exhaust system, the tires, etc). The decedent obtained his tools and the tow truck key and walked to the staging area.

The event was unwitnessed. The decedent started the truck to activate the hydraulic boom lift using the controls at the rear of the tow truck. He raised the vehicle to approximately three to five feet above the ground. His method of securing the wrecked vehicle to the tow straps/"J" hook tow chains was unknown. From MIOSHA photographs taken at the scene, the decedent attached one "J" hook tow chain to the driver's side frame near the driver's side tire. The second chain is seen lying on the ground next to the passenger side tire – it is unknown if the second "J" hook tow chain was attached or if it fell from the vehicle when the vehicle fell to the ground.



Figure 7. Location of "J" hook tow chains on ground near front tires

The decedent was positioned near the front driver's side wheel of the raised vehicle. The resting decedent's position indicated that he may have been sitting on his haunches looking under the car when the car fell and struck him on his head/neck/back and pinned him to the ground. The decedent did not use any secondary support, such as a safety stand prior to looking in under the vehicle. The owner indicated that employee training included placing safety stands under the vehicle if the employee planned to go under the vehicle.

The coworker sitting in the tow truck cab at the time of the incident indicated he had been texting using his cell phone and had not touched any vehicle controls. The coworker sitting in the cab

and the coworkers in the yard heard a loud noise. The coworker exited the truck cab, saw the decedent pinned under the vehicle, and screamed for help. The coworkers in the yard found a defective hydraulic floor jack and placed the jack toward the front of the vehicle to lift it from the decedent. After the vehicle was raised, a coworker pulled the decedent from under the car. Emergency response was called and the decedent was transported to a local hospital where he was declared dead.

The shop supervisor and owner indicated that the decedent had been observed in the past lifting a vehicle without the “J” hook tow chains properly secured and was re-instructed to do so. His coworkers who lifted the car from him stated they remembered one chain attached to the frame of the car.



Figure 8. Defective floor jack used to lift car from decedent.

During the site visit, the company owner instructed a tow truck driver to position the wrecker involved in the incident in the position it was in when the incident occurred. The company owner demonstrated how employee training regarding attaching a tow chain was conducted and how the truck’s safety features worked. The owner demonstrated that the wrecker’s hydraulic controls were operational only when the wrecker was running and the safety switch located inside of the truck cab was not activated. The company owner demonstrated that when the truck was running and the safety switch was activated, the hydraulics would not operate. He also demonstrated that when the truck was off, the hydraulic controls to raise and lower the vehicle were not operational.

During the demonstration, the company owner explained the importance of using two tow chains with “J” hooks to attach to the car frame. He demonstrated that if two hooks were not used, the angle of the chain and hook change, which could cause the car to dislodge. The owner demonstrated that improperly hooking the tow chains could cause the boom components to twist or have a turning effect, causing the “J” hooks to dislodge and fall from the frame. The owner stated that the tow chain had to be wrapped around the sling strap’s grab bare and then locked in between the stationary hooks on the booms arm. The owner stated that he had verbally trained the decedent regarding the proper use of the tow chains and the boom apparatus equipment.



Figure 9. Safety switch in tow truck cab

The incident vehicle’s bumper was detached from the car and was lying on the ground adjacent to the vehicle. It was unclear if the tow truck’s boom sling straps were attached to the bumper

and the bumper became dislodged from the vehicle or if the bumper had already had been removed before the vehicle was lifted up on the boom arm sling apparatus.

CAUSE OF DEATH

The cause of death as listed on the death certificate was craniocerebral injuries. Toxicology was negative for alcohol, illegal, and prescription drugs

RECOMMENDATIONS/DISCUSSION

- Towing company employers should prohibit using tow trucks to raise vehicles for the purpose of working underneath them without the use of appropriately selected and positioned wheel chocks and secondary supports such as safety stands.

It is unknown if the vehicle was placed in Park and the emergency brake activated when the vehicle was parked in the storage area the previous night. The vehicle was not on a level surface and the rear wheels were not chocked/blocked when the decedent began to raise the car to look under it. The incident occurred on a slight downward slope, which may have been a contributing factor. To prevent rearward movement, wheel chocks should be placed behind the vehicle's rear wheels.

This incident demonstrated the need for appropriate secondary supports to minimize the risk of a raised vehicle falling and pinning someone underneath it. After the vehicle is raised (either by a floor jack at the lifting point recommended by the car manufacturer or the tow slings), at least two properly labeled vehicle support safety stands, such as safety stands, of the same size should be placed on opposite sides of the vehicle. Safety stands must be used in pairs. The vehicle should be slowly lowered to determine if the safety stands are in the correct position and will support the vehicle. When all of the vehicle weight is on the safety stand, the vehicle should be shaken to ensure that it is securely supported. Safety stands should be placed on a hard, level surface capable of sustaining the load. The safety stands may cause indentations in an asphalt pavement, so a supportive surface, such as a piece of wood that can dissipate the weight should be used.

Secondary supports, such as an additional set of safety stands or wooden blocking should be used. The wood should be in good condition, free of rot, cracks, etc. The employees, it appears, did not routinely use appropriate secondary supports, although they were available (Figure 5 and Figure 10).

All equipment used to raise, lower and support the vehicle should conform to the American National Standard Institute /American Society of Mechanical Engineers Portable Automotive Lifting Devices standard, ANSI/ASME PALD-1993 (Parts 1 through 15 & 17).

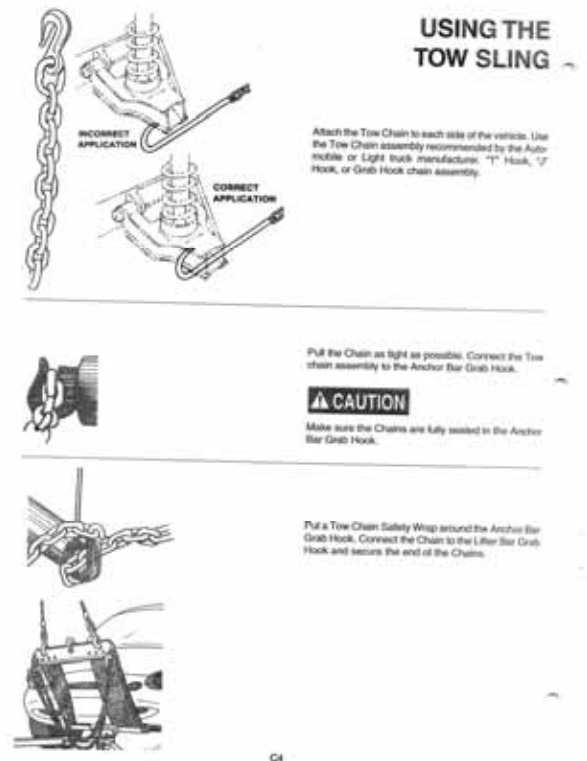


Figure 10. Use of tow vehicle to raise vehicle and improper secondary support for a different vehicle on the employer's worksite

Loads placed on safety stands should not exceed 50 percent of the rated capacity of the safety stand (i.e. if a safety stand rating is indicated by the manufacturer as 8 tons, the maximum permitted load is limited to 4 tons).

- One end of each tow chain should be secured to an appropriate tow truck attachment point not to the lift assembly.

The company owner correctly instructed employees to use two tow chains secured to the towed vehicle, but he was incorrect as to how to secure the tow chains to the tow truck itself. He correctly trained his employees to wrap the tow chain around the lower grab bar. He was incorrect in instructing them to loop the end of the chain through the “O” ring on the tow mast. The ends of each tow chain should be attached to the tow truck at a sturdy point, such as a D-ring or T-slot on the truck frame, not to the tow mast. Figure 11 shows the tow chain hooked tightly into the anchor bar grab. Next the chain is wrapped around behind and to the inside by the rubber tow strap. In the third picture, the right side of the chain should be attached to the towed vehicle and the left end of the chain should be attached to the truck frame.



- The employer should develop and implement a written safety and health program that includes the inspection of wrecker lifting mechanisms, tool inspection, and employee training.

Figure 11. Tow sling and tow chain attachment instruction

The Ford Super Duty tow truck had its required annual maintenance inspection. The maintenance inspection did not include the winch boom arm and the lifting components such as the slings and cables. The winch boom arm supporting bracket showed cracking, broken welds and deformation. The tow slings were very worn (Figure 12). The portable hydraulic jack used to lift the vehicle from the decedent was missing two steel wheels on the rear section. The portable hydraulic jack was defective and should have been taken out of service when it was found to be defective.

Although the company indicated that the decedent had been trained, and again reminded of the need to use the “J” hook tow chains, there was no documentation made by the employer of either event. At the time of the MIOSHA site visit, at least two vehicles on the worksite had tires with rims being used as primary (Figure 5) and secondary (Figure 10) supports, in contradiction to MIOSHA standards and stated employer training. Enforcement of the correct procedures was not taking place, in contradiction to employer statements for correcting unsafe work practices.

MIFACE recommends that the employer re-instruct the workers and shop supervisor about the correct use of safety stands as secondary supports.

The employer should develop, implement and enforce a written safety and health program to address the safety and health issues encountered in the differing aspects of his business – the tow business and the dismantling business. Each business has its own safety and health issues. Employees who work in both businesses should be trained in the respective hazards and how to protect themselves from injury. The program should include documentation of the employee training and training checklists to ensure training consistency and employee competency in performing a task safely.



Figure 12. Worn condition of tow slings

- The employer should obtain an AAA Towing and Service Manual to maximize safety and minimize costs regarding vehicle towing.

The AAA Towing and Service manual provides detailed instructions for cars, light trucks, motorcycles, SUVs and vans, including hybrid vehicles. This manual includes towing, specific hook up, tie down, and jump-starting procedures. Additionally, curb and axle weight information for domestic autos, import autos, and light trucks is included to determine the correct equipment to dispatch. A Service Information section has been added to the front of the manual for vehicles with specific or unique service requirements. Manuals are available for purchase to the public from AW Direct (<http://www.awdirect.com/2010-aaa-manuals-tm10/manuals-education/>), AAA's Preferred Supplier for \$29.95

REFERENCES

MIOSHA standards cited in this report may be found at and downloaded from the MIOSHA, Michigan Department of Licensing and Regulatory Affairs (MDLARA) website at: www.michigan.gov/mioshastandards. MIOSHA standards are available for a fee by writing to: Michigan Department of Licensing and Regulatory Affairs, MIOSHA Standards Section, P.O. Box 30643, Lansing, Michigan 48909-8143 or calling (517) 322-1845.

- MIOSHA General Industry Safety Standard, General Provisions, Part 1.
- MIOSHA General Industry Safety Standard, Automotive Service Operations, Part 72
- MIOSHA General Industry Safety Standard, Personal Protective Equipment, Part 33
- MIOSHA General Industry Safety Standard, Hand and Portable Powered Tools, Part 38
- Mine Safety and Health Administration (MSHA) Accident Prevent Program, Miner's Tip: *Blocking Raised Equipment*.
http://www.msha.gov/accident_prevention/tips/blocking.pdf
- *Use of Blocking and Safety stands*. Thompson Rivers University.
<http://www.tru.ca/hsafety/workinglearningsafely/work/blocking.html>

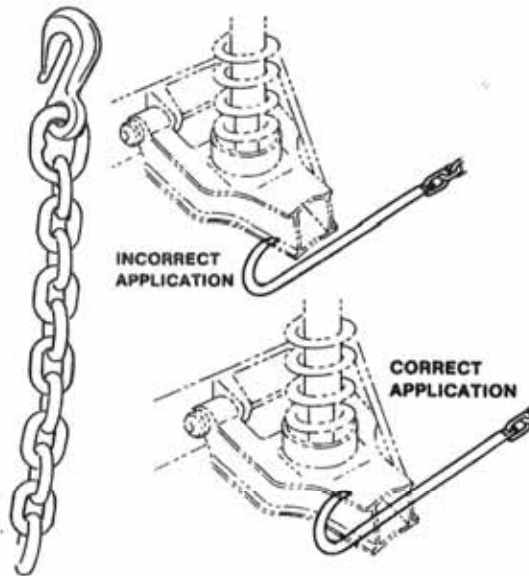
- AAA Service Manuals.
<http://partner.aaa.biz/portal/site/auto/menuitem.8b833a647a6226e816c82c70089fd3f8/>

Key Words: Tow truck, struck by, safety stands, automotive service operations, tow chains, Transportation/Warehousing

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USING THE TOW SLING



Attach the Tow Chain to each side of the vehicle. Use the Tow Chain assembly recommended by the Automobile or Light truck manufacturer. "T" Hook, "J" Hook, or Grab Hook chain assembly.



Pull the Chain as tight as possible. Connect the Tow chain assembly to the Anchor Bar Grab Hook.

CAUTION

Make sure the Chains are fully seated in the Anchor Bar Grab Hook.



Put a Tow Chain Safety Wrap around the Anchor Bar Grab Hook. Connect the Chain to the Lifter Bar Grab Hook and secure the end of the Chains.

