

MIFACE Investigation Report #13MI136

SUBJECT: Dump Truck Driver Entangled in Dump Box Power Take Off Driveline

Summary

In fall 2013, a male dump truck driver in his 30s died when his clothing became entangled on his Ford LTL 9000 dump box rotating power take off (PTO) shaft driveline. The decedent was subcontracted to drop off a load of gravel at the incident location and then meet the contractor at another location to pick up some concrete. The decedent arrived at the dump site with his gravel-loaded truck and attempted to raise the dump box. Apparently, the dump box would not lift up. After looking under the hood, with the truck running and PTO driveshaft rotating, the decedent went under the truck to try to ascertain the problem. A possible scenario was that he was attempting to determine if there were loose cable connections (used to raise and lower the dump box) at the “gear box” controlling the hydraulic valves. His clothing contacted the spinning drive shaft and wrapped around it, pulling his neck up against the driveline, choking him. The individual who subcontracted his services arrived at the incident site and saw the truck. He walked over, called the decedent’s name, and tapped on the truck which had stalled. When the decedent did not answer, he looked under the truck. He immediately called 911. When emergency responders arrived, they cut the decedent’s clothing free and pulled him from under the truck. He was declared dead at the scene.



Figure 1. Decedent’s dump truck and position of decedent at incident location

CONTRIBUTING FACTORS

The following factors have been identified which may have contributed to this incident:

- Truck not turned off and PTO rotating when he went underneath the truck
- PTO driveline not shielded

RECOMMENDATIONS

- Truck drivers should be aware of the potential dangers associated with PTOs and prior to engaging in any work process that exposes them to a PTO, should ensure that the PTO is disengaged and the truck engine is shut off.

- Dump truck drivers should perform a daily pre-trip inspection that includes raising and lowering the dump box, to ensure the truck is working correctly prior to driving and/or loading.
- When working around rotating shafts, do not wear loose clothing.
- Engineering changes should be developed to include a PTO driveline guard for existing machinery – including dump trucks - to shield any open, unguarded power take-off drivelines and locate the gearbox in a more accessible location.

BACKGROUND

In fall 2013, a male dump truck driver in his 30s died when his clothing became entangled on his Ford LTL 9000 dump box rotating power take off shaft (PTO) driveline. The MIFACE program learned of this work-related death from newspaper reports. The MIFACE researcher contacted one of the decedent's family members who agreed to speak with the researcher about this incident. While writing this report, the MIOSHA compliance file, police report and pictures and death certificate were reviewed. Incident scene pictures in this report are courtesy of the responding police department and have been altered by the MIFACE researcher to remove identifying information.

The decedent was the sole owner of the trucking firm. He grew up and worked in a family-owned trucking firm until he decided to start his own business. He had three dump trucks, one of which was the Ford LTL 9000 dump truck he was using at the time of his death.

MIOSHA Construction Safety and Health Division personnel, upon investigation, determined the fatality was non-program-related because the decedent was the sole owner of the firm.

INVESTIGATION

A concrete construction firm owner subcontracted work with the decedent approximately once per week, to pick up and/or deliver materials. The contractor had subcontracted the decedent to deliver gravel to the incident location. After dumping the stone, the decedent was to meet the contractor at another location and haul away concrete.

The decedent arrived at his business's storage yard and drove the Ford dump truck loaded with gravel to the northwest corner of the incident site. He apparently attempted to raise the dump box, but the dump box did not rise. At approximately 9:15 a.m., decedent contacted the contractor and informed him he was having issues with the dump bed power take off (PTO) and that he was running late.

The PTO transfers power from the engine to the dump bed hydraulic system, and was used to raise and lower the dump bed. In the cab, the decedent activated the cables which connected to the gearbox that physically engaged the PTO. These cables controlled the valves allowing the box to move "up" and "down".

The incident was unwitnessed.

Based on scene pictures, whether prior to or after the call, he exited his cab and looked under the cab hood. The tires were blocked but it is not known whether the decedent or the responding police blocked the tires..

With the truck running and PTO activated, the decedent went under the truck to try to ascertain the problem. A possible scenario was that he was attempting to determine if there were loose cable connections (used to raise and lower the dump box) at the “gear box” controlling the hydraulic valves (See Figures 2 and 3 re-enactment).



Figure 2. Re-enactment of position of decedent as shown in the police pictures

As he was reaching up, his clothing contacted the spinning drive shaft and wrapped around it, pulling his neck against the driveline, and choking him. At some point, the truck stalled. At approximately 9:35 a.m., the individual who had subcontracted his services arrived at the incident site. He walked over to the truck, noting it was stalled, and called the decedent’s name while tapping on the truck. When the decedent did not answer him, he looked under the truck and saw the decedent. He immediately called 911.

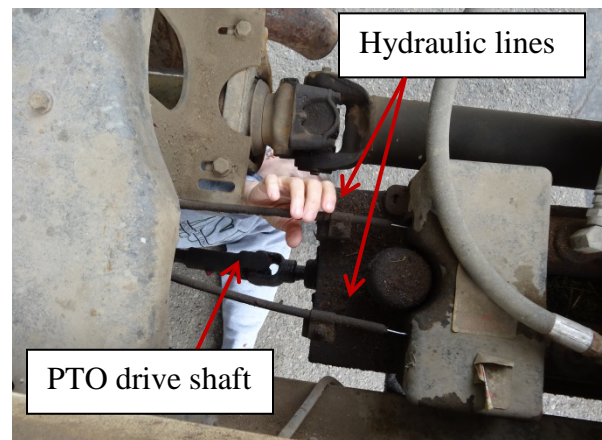


Figure 3. Re-enactment scenario of decedent’s activity

When emergency responders arrived, they found the decedent underneath the truck with his clothing wrapped around the PTO driveshaft. The decedent was lying on his left side with his right arm up in the framework. Emergency responders cut the decedent’s clothing free and placed him on the ground. He was declared dead at the scene.

CAUSE OF DEATH

The cause of death as listed on the death certificate was asphyxia by entrapment strangulation. An autopsy was performed. Three requests for the medical examiner’s report were made; the report was not received.

RECOMMENDATIONS/DISCUSSION

- Truck drivers should be aware of the potential dangers associated with PTOs and prior to engaging in any work process that exposes them to a PTO, should ensure that the PTO is disengaged and the truck engine is shut off.

The decedent may not have understood the dangers posed by the operational PTO shaft. Truck drivers should be aware of the potential dangers of an operational PTO and ensure they recognize the hazards and the proper safe operating procedures when working around a PTO shaft. Anytime a driver must conduct work that exposes them to a PTO, the PTO should be disengaged and the truck engine turned off, even if it requires getting out from under a truck and re-entering the cab to start the engine, build up the air pressure and engage the PTO to determine if the problem was fixed.

- Dump truck drivers should perform a daily pre-trip inspection that includes raising and lowering the dump box, to ensure the truck is working correctly prior to driving and/or loading.

It is unknown if the decedent performed a pre-trip inspection and/or attempted to raise the dump box prior to loading. Also unknown was if the dump box operated correctly prior to loading and/or if the problem with the dump mechanism occurred enroute. Dump truck drivers, in addition to the Michigan DOT pre-trip inspection requirements (e.g. 360-degree walk-around to look for damage, tire inflation and lug nuts; windshield and mirror cleanliness; headlights, tail lights, backup lights, flood lights; tail gate and restraint chains; backup alarm; brakes and brake air pressure; seat belt) should include ensuring the functionality in the lifting and lowering of the dump bed prior to driving and/or loading.

- When working around rotating shafts, do not wear loose clothing.

The risk of entanglement in rotating shafts and machine components can be reduced if operators do not wear loose fitting clothing. Work clothing should be well-fitting and zippered or buttoned, not open. Clothing should be free of flaps and other potential grab points for a rotating PTO shaft. Frayed or loose fitting clothes, jackets and sweatshirts with drawstrings, and boots or shoes with long shoelaces should be avoided. Long hair should be tied back or under a cap.

- Engineering changes should be developed to include a PTO driveline guard for existing machinery – including dump trucks - to shield any open, unguarded power take-off drivelines and locate the gearbox in a more accessible location.

The Ford LTL 9000 dump truck was manufactured in the 1980s and did not have a shielded PTO driveline. Manufacturers should develop a guard that can be retrofitted to these older trucks that would prevent inadvertent contact with moving parts of these PTOs. Although the primary prevention strategy for this fatality should be separating drivers from the hazard by eliminating

unnecessary exposures, guarding would provide an added level of protection for mechanics and/or truck drivers, who cannot entirely avoid exposure to rotating PTO's. A simple metal covering could act as an effective shield for exposed parts of the PTO, thereby reducing the potential for PTO-related injuries. Since the year this truck was manufactured, dump truck PTO shaft design has been changed and is now located where it is shielded and more difficult to be an entanglement hazard.

The gear box is located under the truck and near the PTO line. A more accessible gear box would allow drivers to check connections in a safer manner.

KEY WORDS: Dump truck, PTO driveline, gear box, entanglement, Construction

RESOURCES

- *Dump Truck Safety – Leaders Guide*. ERI Safety Videos. Accessed July 24, 2015. <http://www.eri-safety.com/Documents/1307lg.pdf>
- *Truck Driver Dies From Asphyxiation After Entanglement in Dump Truck Power Take-off (PTO) – Alaska*. <http://www.cdc.gov/NIOSH/FACE/stateface/ak/92ak061.html>
- *Dump Truck Driver Dies After Being Entangled In Power-Take-Off Drive Shaft*, Kentucky Case Report: 06KY079. <http://www.cdc.gov/niosh/face/stateface/ky/06KY079.html>
- *Mechanic Killed when Collar Caught on PTO Driveline*, Oregon Case Report: 06OR005 <http://www.cdc.gov/niosh/face/stateface/or/06or005.html>
- Michigan Center for Truck Safety. <http://truckingsafety.org/>
- Tool Box Talk: Dump Truck Safety, Work Safe Center. <http://www.worksafecenter.com/safety-resources/PDF/tutorial/municipality/Dump%20Truck%20Safety.pdf>
- Ford L-Series, Wikipedia. https://en.wikipedia.org/wiki/Ford_L-Series_Trucks

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September 2, 2015