MIFACE Investigation Report: #10MI075

Subject: Farmer Run Over By Tractor During Idle Adjustment

Summary

In the Summer of 2010, a male farmer in his 40s died when he was run over by a John Deer 4430 tractor to which he was adjusting the idle. The decedent was working in a barn; the north wall of the barn faced the road and the south wall faced a large cornfield. The tractor was facing south. The throttle and gear shift controls were both located on the right side of the tractor. When the operator was in the driver's seat, the operator pushed the throttle lever forward (away from the driver) and the gear lever backwards (toward the driver). Both levers were accessible while standing on the ground, and the lever activation reversed. The decedent was standing on the ground facing the tractor on the tractor's right side, which placed the engine area in front of him with the small front tire to his right and the large right rear tire to his left. It appears that he reached up and in an attempt to activate the throttle (pulling it toward him) he contacted the gear shift lever, pushing it back which placed the tractor into gear. Because the tractor engine was operating at a high rpm, when placed into gear, the tractor went forward at a high rate of speed. The rear tractor tires left spin marks on the concrete floor of the barn. The tractor continued out the south barn door and arced to the north, crossing the road and continuing into a field. The tractor continued its arced path of travel through the field, and then passed between two houses, crossed a north-south road, and finally came to rest against a tree approximately one-third of a mile from the barn. Several of the decedent's family members saw the tractor traveling without the operator and investigated. Seeing the decedent on the floor, they went to the house and notified another family member, who investigated and called for emergency response. Emergency response arrived and declared the decedent dead at the scene.

Figure 1. Position of decedent standing in front of rear right tractor wheel

RECOMMENDATIONS

- Engage the tractor parking brakes and block tractor movement if tractor maintenance must be performed with the engine running.
- Have a trained mechanic inspect used equipment prior to use to ensure equipment has all safety features intact and to note any equipment modifications that may affect equipment performance and function.

- Buyers of used tractors should ask the current owners if they bypassed or removed any safety switches on the tractor that is for sale.
- Develop and implement a farm safety plan.
- Routinely inspect tractors to identify potential safety issues, such as old/faded SMV emblems, missing PTO master shield, and roll-over protective structure (ROPS) availability. Install/re-install missing or damaged items.
- Manufacturers should review with their dealer network trends related to the disconnection, alteration, removal or failure of safety devices to determine possible reasons that may lead to redesign, safety notices, operator's manual notes or other actions.

INTRODUCTION

MIFACE personnel were notified of this incident by a newspaper clipping. MIFACE contacted the decedent's family and they agreed to participate in the MIFACE research program. MIFACE conducted a site visit in November 2010. During the writing of this report, the police report and pictures, death certificate and medical examiner's report was reviewed. The family permitted MIFACE to take pictures of the incident site and the tractor involved in the incident which was stored in a remote location.
The decedent was born and raised on a farm and began running his own farm operation after finishing high school. He bought the farm where the incident occurred in 2007. He farmed approximately 3000 acres (corn, soybeans and wheat).

The decedent employed five individuals. The family indicated that employee safety training was provided, but not documented. The decedent provided verbal safety training and correction of unsafe behavior to his employees. No documentation of the provided safety training and correction was maintained. The decedent required employees to demonstrate that they had the skill level to perform a task prior to their assignment to the task. The decedent's work hours were based on season. On the day of the incident, he had already worked five to eight hours.

The decedent bought the John Deere 4430 tractor at an auction approximately five months prior to his death. The John Deere had 8 forward gears and 2 reverse gears. There were 3937 hours on the gauge. At the time of the incident, the tractor was used for both traditional farming tasks as well as for tractor pulls. Since purchasing the tractor, the decedent had made some modifications to it so it could be used in tractor pulls, such as switching the hitch, cutting off the draw bar, and adjusting the fuel injector pump to gain horsepower. The decedent had purchased several of the required safety stickers for the tractor, such as the shift pattern sticker and sticker indicating no starting the tractor on the ground.

His family members indicated that the decedent recognized there was a problem with the tractor when he purchased it; the tractor did not start on a consistent basis and had stalled when used in tractor pulls. At the time of the incident, the tractor was not equipped with any attachments.

INVESTIGATION

The barn in which the decedent and tractor were located was on the southwest corner of a road. There were two large entrance doors on the barn; one on the north wall and one on the south wall. The barn floor was concrete (Figure 2).

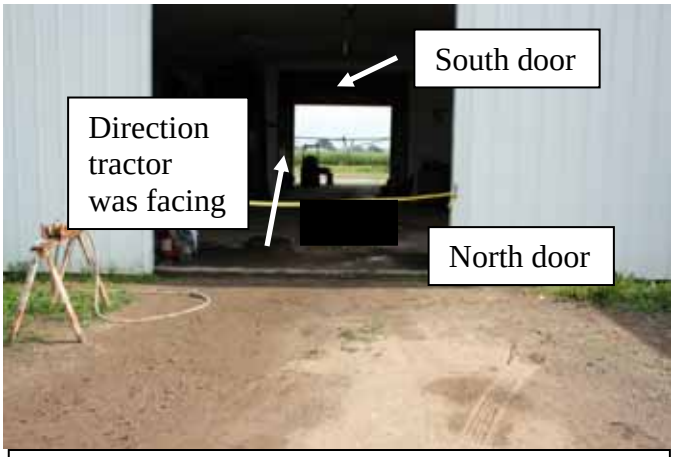

Figure 2. Overview of incident scene.

The decedent and a coworker had been working at another farm location owned by the decedent. They returned to the incident scene and made a list of items needed. When the coworker departed, the decedent was working alone in the barn on the tractor involved in the incident, increasing its idle and RPM. The coworker stated at the time of his departure, the tractor was facing north.

Figure 3. Police re-enactment of work decedent was performing.

At some point after the coworker departed, the decedent moved the tractor so it was facing south. The tractor was running while the decedent was adjusting the idle with a 10 mm wrench (Figure 3). Based on the decedent's resting position, marks on his clothing and injuries sustained, the decedent position could be ascertained. He was standing on the ground facing the tractor on the tractor's right side, which placed the engine area in front of him with the small front tire to his right and the large right rear tire to his left (Figure 1).

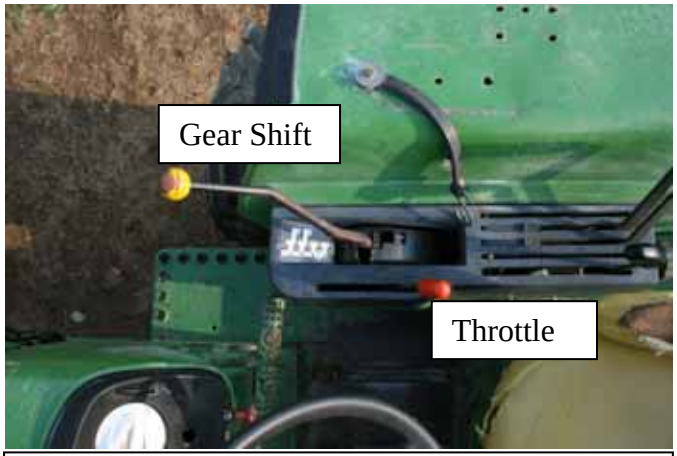

Figure 4. Gear shift and throttle identified. Picture taken from operator's seat.

The throttle and gear shift controls were both located on the right side of the tractor. A driver seated in the operator seat would push (away from the operator) the throttle lever to control engine speed. To specify

the tractor's gear level, the operator pulled the gear lever backward toward the driver. From the position where the decedent was working on the tractor it would be possible for him to access both levers from the ground. Because the decedent was standing on the ground facing the tractor, the activation direction of the levers was reversed – the throttle lever activation would be toward him and the gear shift lever activation away from him. The throttle is identified by a red, cylindrical handle and the gear shift has a yellow, round ball handle (Figure 4).

It is unknown if the tractor was in Park or Neutral. It appears that he reached up to activate the throttle. As he reached to pull the throttle back toward him, he faced the right rear tire (Figure 1). Given the configuration of the tractor, he would have been pressed against the rear tire when reaching up to the controls. At some point, he contacted the gear shift lever, pushing it back thus placing the tractor into gear. Because the tractor engine was operating at a high state of idle, the clutch would not need to be depressed to place the tractor in gear. When the tractor was placed into gear, it lurched forward at a high rate of speed leaving spin marks on the barn's concrete floor.

Figure 5. "Spin" marks left by the tractor's rear right wheel

Figure 6. Path of tractor out the south door and arcing into field

Figure 7. Path of tractor across north/south road and into/out of field

Tire tracks on the floor led out the south door and the tractor began drifting to the southwest into a cornfield, and then arced to the north, crossing the road (north barn door faced this road) and continued into the field across from the barn. The tractor continued its arced path of travel through this field, and

then passed between two houses, crossed a north-south road, and finally came to rest against a tree approximately one-third of a mile from the barn (Figures 6 and 7).

A member of the decedent's family saw the tractor leaving the barn without an operator and ran to the house to get another family member. The family members returned to the incident scene. Seeing the decedent on the floor, they went back to the house and notified another family member, who went to the barn. Seeing the decedent lying on his back on the floor, the family member called for emergency response.

Emergency response arrived and declared the decedent dead at the scene. The responding police found a 10mm wrench on his shoulder.

The decedent's father found the tractor stalled in the roadway still in gear prior to being notified of the accident. He parked the tractor on the shoulder of the roadway and went to the farm.

After the incident, the family had the tractor inspected by a mechanic. The mechanic found that the neutral safety switch had been bypassed by the previous owner. According to the family, the decedent was unaware of this safety bypass.

CAUSE OF DEATH

The cause of death as stated on the death certificate was craniocerebral trauma. Toxicological tests indicated no alcohol, prescription or illegal drugs in his blood.

RECOMMENDATIONS/DISCUSSION

- Engage the tractor parking brakes and block tractor movement if tractor maintenance must be performed with the engine running.

When performing tractor maintenance with the engine running, safe work practice should include setting the tractor parking brakes and block potential tractor movement. To block the tractor movement, two options include: (1) chocking the wheels or (2) raising the back axle and placing the axle on substantial blocking high enough so the rear tires are suspended. Chocking can prevent accidental or unintended equipment movement by providing a physical stopper to the wheels. MIFACE recommends the use of wheel chocks of the appropriate size and material to securely hold the tractor based upon the tractor tire size and weight. Most chocks have the manufacturer's recommended tire size identified on the chock. MIFACE found chock suppliers on the internet that had chocks available for 8-foot tall tires for mining trucks. MIFACE recommends placing a chock against all of the tractor's wheels.

MIFACE does not recommend the use of lumber, cinder blocks, rocks, or other make-shift items to chock a tire.

- Have a trained mechanic inspect used equipment prior to use to ensure equipment has all safety features intact and to note any equipment modifications that may affect equipment performance and function.

The decedent bought the tractor at an auction without an inspection. He recognized there was a problem with the tractor, but did not have a qualified individual conduct a safety check/inspection to pinpoint the problem. After the incident, a mechanic found that the neutral safety switch was bypassed, thus allowing the engine to be started while the transmission was in gear, instead of allowing the engine to be started only when the transmission was in neutral or park. Prior to using a newly purchased piece of used equipment, MIFACE recommends that the owner have the equipment inspected by a qualified mechanic or dealership mechanic and repaired as required.

- Buyers of used tractors should ask the current owners if they bypassed or removed any safety switches on the tractor that is for sale.

Sellers of used equipment, including tractors, usually sell the equipment in an "as is" condition. Buying from a name brand dealer adds some possibility that a safety check of all safety switches on that specific tractor was performed, especially if it is the brand of used tractor sold and serviced by the selling dealer.

Ideally, sellers should have the equipment inspected by a qualified individual and/or provide a detailed equipment report to the buyer identifying the equipment's condition, such as equipment modifications and repairs needed. The seller should provide this information to the prospective buyer prior to purchase. Buyers could utilize a simple checklist such as the one developed below to ask the sellers some basic information about the tractor prior to purchase:

Brand		
Model		
Serial #		
	Circle one	**If Yes, Specify**
Was this tractor modified during your ownership?	Y/ N/ NA	
Specific parts removed and not replaced?	Y/ N/ NA	
Disabled or removed safety switches or safety features?	Y/ N/ NA	
Any non-mfg parts or after market attachments?	Y/ N/ NA	
Any defects or needed repairs that you are aware of?	Y/ N/ NA	
If Dealership sale, any repairs performed prior to sale?	Y/ N/ NA	
Any other items I should be aware of?	Y/ N/ NA	
Name, Address, Phone number of current owner		

- Develop and implement a farm safety plan.

There are no legal requirements in Michigan for a written safety plan in agricultural industries. We recommend a written safety plan. This plan will identify the safety and health hazards for the farm, so hazard controls can be developed. A safety plan, that is communicated to all who work on the farm will help raise awareness of safety issues, promote safe work practices, and have additional benefits of increasing work efficiency, and minimizing costs (a written safety plan may reduce worker compensation premiums). A safety plan should include work rules, such as safe tractor operation and signage.

MIOSHA has many resources, including standard guidance, sample plans for safety and health issues such as respirator use, and training material handouts. Michigan Farm Bureau, with funding from the MIOSHA Consultation, Education and Training (CET) Division grant has developed a sample farm emergency preparedness safety plan as well as checklists for farm hazards. The information can be accessed at http://www.michfb.com/safety.

- Routinely inspect tractors to identify potential safety issues, such as old/faded SMV emblems, missing PTO master shield, and roll-over protective structure (ROPS) availability. Install/re-install missing or damaged items.

Figure 8 shows the unguarded PTO stub, faded SMV emblem, and lack of a ROPS on the decedent's tractor. Although the lack of and/or condition of these safety features were not a factor in this incident, tractor owners should ensure that shields are re-installed, faded SMV emblems are replaced, and determine if a tractor can be retrofitted with a ROPS.

Figure 8. Incident tractor showing lack of PTO master shield and ROPS and faded SMV.

- Manufacturers should review with their dealer network trends related to the disconnection, alteration, removal or failure of safety devices to determine possible reasons that may lead to redesign, safety notices, operator's manual notes or other actions.

Tractor owners do and will continue to modify tractors to meet the individual owner's operational requirements. Manufacturers can minimize the risk to these owners by continuing to implement industry consensus standards related to safety features and typical post production equipment adaptations. Reviewing a trend of disabling or removal of particular safety equipment may provide the manufacturer with an understanding of the issues that led to the modification or removal. Future designs should consider these issues to maximize the full use of safety features. Operator's

manuals and training materials should continue to stress the importance of safe operating and maintenance procedures.

RESOURCES

MIOSHA standards may be found at and downloaded from the MIOSHA, Michigan Department of Licensing and Regulatory Affairs (LARA) 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.

- *Power Take-Off (PTO) Safety*, Murphy, Dennis J. National Ag Safety Database. http://nasdonline.org/document/905/d000745/power-take-off-pto-safety.html

Key Words: Pulling tractor, Tractor Runover, Idle Adjustment, Machine, Agriculture

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