

MIFACE INVESTIGATION: #03MI202

SUBJECT: Farmer Died When Crushed Between Tractor Steering Wheel and Enclosed Feed Auger

Summary

On September 5, 2003, an 87-year-old male farmer died while backing his Oliver Super 77 tractor with an attached 5-foot cut rotary mower into a storage area in a barn (See Figure 1). He placed the tractor in reverse to back the rotary mower into the barn. The sequence of events is unknown. It appears that the left rear tractor wheel tire traveled over a portion of a doorframe on the ground and raised the tractor. This caused the victim to duck his head to avoid the ceiling beam or he did hit his head on the barn beam and then had difficulty engaging the clutch to stop the tractor. At some point, the rotary mower began to jackknife, hit a car also stored in the barn, and continued to the barn wall. The tractor continued in reverse approximately another 12-15 feet. Running the length of the storage area was an enclosed round feed auger which was 71-inches from the ground. The victim, sitting in the tractor seat, was pinned between the enclosed auger and the tractor steering wheel. When he did not return as expected, his wife went to look for him in the fields. Not finding him, she called her son, who found the victim. Emergency response was called, the tractor moved forward, and the victim removed from the tractor seat. He was declared dead at the scene.



Figure 1. Storage area in barn for rotary mower

RECOMMENDATIONS

- Consider adding roughness to smooth clutch or brake pedals by using a 4-inch portable grinder or welding a bead of metal on the pedal, or cover the pedal with a non-slip surface for added foot pedal control.
- Use boots or shoes with aggressive tread to help maintain contact on worn-smooth clutch and brake pedals on older tractors with no aggressive pedal surfaces.
- Keep floor areas where equipment is stored clear of objects that might impede the positioning of stored equipment.
- Consider retrofitting an older tractor with a rollover protective structure when available.
- Agricultural equipment operators should recognize the potential human factor limitations of advanced age.
- Consider carrying a reliable 2-way communication device for emergency communication in case of injury and emergency situations.

Key Words: Agricultural,
Machine-Related, Tractor

INTRODUCTION

On September 5, 2003, an 87-year-old male farmer was attempting to park his rotary mower in a barn when he was crushed between his tractor's steering wheel and an enclosed metal auger. On July 10, 2004, MIFACE researchers interviewed the deceased's wife and son at the farm where the incident took place. After the interview, the victim's son escorted the MIFACE researchers to view the tractor and to the location of his father's death. He explained how he thought the incident might have happened based on physical evidence. In the course of writing this report, the death certificate, police and medical examiner reports were obtained. The family consented to allow MIFACE to photograph the incident site and tractor involved in the fatality.

The victim had been a farmer all of his life, born and raised on the same farm. He had raised dairy and beef cattle, and cash crops, such as corn and hay. He "quit" the farming business when he turned 75, and rented out approximately 65 tillable acres – the remaining 90 or so acres were wooded. He still performed maintenance chores on his property like mowing or cutting down weeds and tall grasses between and around his rented fields. The victim did not have a written farm safety program but had attended farm safety classes/seminars and had been active in the local Farm Bureau. The victim had the operator manual for the tractor.

The victim's wife stated that the victim had a "bad back", and had previously had hip surgery and was often in pain due to his medical conditions. He took pain medication to relieve the pain and allow him to continue activities that he enjoyed. The toxicology report from his autopsy did not indicate that he had taken any pain medication on the day of the incident.

INVESTIGATION

The victim had purchased the diesel Oliver Super 77 tricycle tractor in 1954. (See Figure 2) The victim took care of the everyday tractor maintenance and took the tractor to a local business for major work, such as engine problems. According to his son, the brakes and clutch were working properly at the time of the incident. The victim was very familiar with the tractor's operation, as this had been the tractor utilized for all of the farm work. It appears the tractor clutch pedal was worn smooth from over 49 years of use. The victim's son said the top forward speed for the tractor was 12 mph and that it had two reverse speeds. The distance from the ground to the top of the muffler was 87 inches. The height of the tractor seat was 63 inches from the ground.



Figure 2. Oliver Super 77 tractor involved in incident

The 5-foot cut rotary mower was not marked with a name brand.

The barn where the victim stored the rotary mower was previously used for his dairy cows and beef cattle. The barn was located on the north side of his residence. The victim stored the rotary mower on the lower level of the barn. The lower level was open the length of the barn. The victim used only one area to store the mower. (See Figure 3) The barn's support beam was 82.5 inches from the ground to the bottom of the beam. Approximately 12-15 feet inside the barn was a round feed auger within in steel enclosure, running along the ceiling of the lower level. The auger enclosure was 71 inches above the ground at its lowest point. Behind the auger enclosure was an old car. On the ground under the barn's support beam was an old, broken doorframe that limited the victim's maneuvering room to a nine foot wide opening to back the rotary mower into the barn's lower level. The grassy area in Figure 3 is the location of a slight incline to enter the barn.

The victim appeared to follow his normal procedure to park the mower in the barn's lower level. The victim drove the tractor/rotary mower down a hill located on the east side of the barn and made a 90-degree turn to the west. (See Figure 4) The entrance to the lower level is on the victim's left. To be able to back the rotary mower into the barn, the victim turned the tractor 90-degrees to the north to an open area so the tractor/rotary mower was oriented in a north-south direction. This open area was approximately 30 feet long from edge of the open area to the barn entrance. (See Figure 5) The tractor was too tall to enter the barn (muffler was approximately 87 inches from the ground, the barn beam was approximately 82 inches from the ground). Therefore, the victim drove in reverse until only the rotary mower was in the barn. His son thought that the victim used visual cues to determine when the mower was within the barn. It is

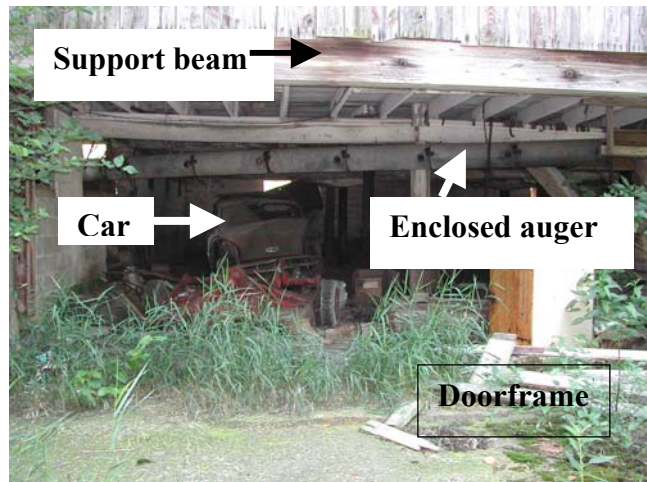


Figure 3. Enclosed auger, doorframe, car, support beam

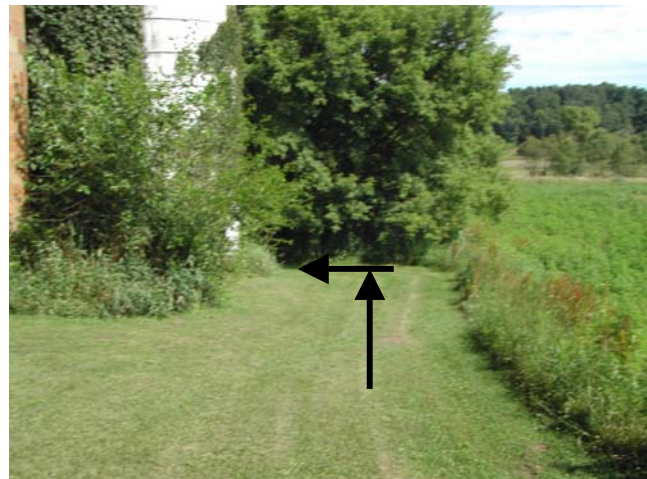


Figure 4. Path down to barn entrance



Figure 5. Open area in front of barn entrance

unknown how much flexibility the victim had to turn his body while seated on the tractor due to his back and hip. When the mower was positioned, the victim dismounted the tractor, unhooked the mower, mounted the tractor and drove the tractor up the hill to another equipment storage barn.

On the day of the incident, the victim retrieved the mower from storage and cut the brush in a nearby field. He ate lunch then rested. A neighbor told the victim's son that his father fell down in the victim's front yard on the day of the incident. The son did not know what time of day this occurred. Between 4:00-4:30 pm, he stated to his wife that he was going to cut the brush between two of his rented fields. His wife suggested that he wait until the following day to cut the brush. His wife stated that he told her that he wanted to get it done that day. She observed him on the tractor heading in the direction of the next mowing area.

The victim apparently decided that he was not going to cut the brush between the rented cornfields; instead, he went to park the mower. The victim was gone longer than his wife expected so she went to look for him in the field where she thought he would be mowing. She could not find him so she called her son. She asked her son if he had seen her husband on the tractor and her son said no, but that he would go look for him. Her son found the victim in the barn on the stalled tractor's seat wedged between the tractor's steering wheel and the steel auger enclosure. The victim's leg/foot was over the clutch pedal. The tractor's steering wheel and muffler were bent. The mower had jackknifed and its final resting position was against the barn's east wall. The victim's son went up to the victim's residence and notified his mother. Emergency response was summoned and the tractor was pushed forward. The victim was removed from the tractor seat and declared dead at the scene.



Figure 6. Cracked doorframe

The event was unwitnessed. The victim's son discussed with the MIFACE researchers what he thought had happened. The victim had successfully traveled to the lower level and oriented the tractor and rotary mower so that it could be put into storage in the barn. It's possible that the victim may not have oriented the tractor/mower in a "true" north/south position; he may have been backing in on an angle. Another scenario is that the victim was "too far west" in the open area when he positioned the tractor to back the mower into the barn. Either position caused him to run over the doorframe with the left rear tractor wheel, causing the tractor to elevate slightly.



Figure 7. Mark on beam made by muffler

The victim's son pointed out a cracked piece of the doorframe to support this scenario. (See Figure 6) Because this was unexpected, he lost track of his position. His foot may have been on the clutch at this time, since he was near the entrance. Unable to react quickly enough, the victim traveled too close to the barn beam and either was able to duck under the beam or he struck his head against the beam. His foot slipped off of the clutch and the tractor continued in reverse. The tractor muffler scraped the beam as the tractor went under it. (See Figure 7) As the tractor continued in reverse, the mower struck the car parked in the barn causing the mower to jackknife. The tractor continued moving in reverse, and the victim was pinned between the steering wheel and the auger casing. The mower was against the east wall. The tractor eventually stalled.

CAUSE OF DEATH

The cause of death as stated on the death certificate was compressional asphyxia and crushing injuries. The results of all toxicological tests were negative for alcohol and other screened drugs.

RECOMMENDATIONS/DISCUSSION

- Consider adding roughness to smooth clutch or brake pedals by using a 4-inch portable grinder or welding a bead of metal, or cover the pedal with a non-slip surface for added foot pedal control.

The operation of the Oliver Super 77 tractor clutch makes backing up potentially difficult because of the clutch pedal's relationship to the operator's seat and its lack of aggressive surface. (See Figure 8) A tractor operator's left foot may slip off of the clutch pedal while turning their body when traveling in reverse due to the lack of aggressive tread on the pedal. The tractor's clutch pedal was smooth and may have been a contributing factor in this fatal incident. Newer tractors have incorporated an aggressive surface and, over the years, modified the foot pedal design and placement to increase the operator's ability under routine and/or non-routine working conditions to initiate and maintain contact with the pedal. On older tractors, a possible solution to increase and maintain contact with the foot pedals is to "rough up" (i.e. crosshatch design) the pedal contact surface with a 4-inch portable grinder (See Figure 9). Addition of a non-slip surface, or a rubber pedal cover to the foot pedal surface is another option.

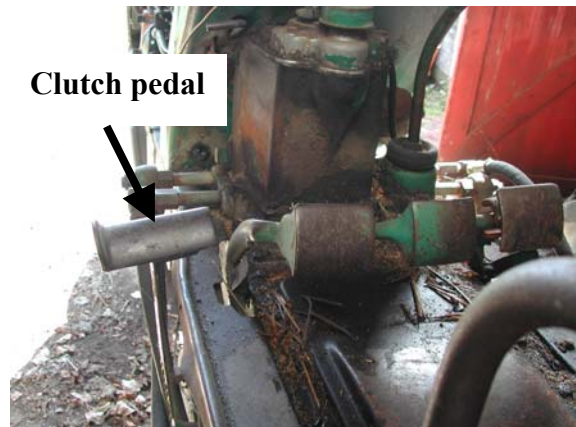


Figure 8. Oliver Super 77 clutch pedal



Figure 9. Crosshatch design on clutch pedal

- Use boots or shoes with aggressive tread to help maintain contact on worn-smooth clutch and brake pedals on older tractors with no aggressive pedal surfaces.

The victim's wife stated that the victim was wearing oxford-style shoes while he was working. The smooth sole of the oxford could have made it more difficult for the victim to maintain contact with the clutch pedal, especially when trying to react to an emergency situation. MIFACE recommends that operators of foot pedal-operated equipment wear appropriate work boots or shoes with an aggressive tread, especially when those foot pedals are worn smooth by use.

- Keep floor areas where equipment is stored clear of objects that might impede the positioning of stored equipment.

The broken doorframe limited the maneuvering room the victim had to park the cutter. Keeping storage areas clean, entrances and exits clear, properly storing tools, other items and equipment or materials in their proper storage area, and discarding broken containers and damaged materials are work practices that eliminates clutter and ultimately can reduce the risk of accidents, both to an individual and equipment.

- Consider retrofitting an older tractor with a rollover protective structure (ROPS) when available.

Although the tractor did not overturn, a ROPS mounted on the tractor would have prevented the tractor from entering the barn, thus preventing the victim from being pinned between the auger enclosure and the tractor steering wheel. The Oliver Super 77 tractor can be retrofitted with a 4-post ROPS at a cost of approximately \$2600 plus installation. Contact a local farm equipment dealer in your area who may be able to order and correctly install the ROPS. This brand of agricultural tractor is no longer manufactured, however if desired, a ROPS to fit this model is listed as available from a source listed in the reference section of this report.

- Agricultural equipment operators should recognize the potential human factor limitations of advanced age.

Farmers often continue to work on their farms well past "retirement" age. Cognitive and/or functional impairments are often associated with advanced age. Cognitive impairments can affect the following areas: attention, judgment and problem solving, increased reaction time, lapses of consciousness or control, and memory lapses. Functional impairments, including sensory impairments, can affect vision, peripheral sensation of the extremities, strength, flexibility and coordination. Older workers should recognize these limitations, and seek help from relatives and/or friends to accomplish a work activity when required.

- Consider carrying a reliable 2-way communication device for emergency communication in case of injury and emergency situations.

Farm owners should consider carrying a reliable 2-way communication device (portable radio, portable cellular phone, etc.) especially when working alone or in remote locations. A portable

radio with a Family Radio Service (FRS) Federal Communications Commission (FCC) certification may be operated without a FCC license. The communication distance for a FRS unit is usually a couple of miles and they have a lower price range than a portable radio certified for use as General Mobile Radio Service (GMRS) unit or a combination unit that has both FRS and the GMRS capability. A GMRS unit or a “dual-service” unit has a greater communication range and is also more expensive than a FRS unit. If a “dual-service” radio is operated exclusively under FRS, you are not required to have a license. If you operate a radio under the rules that apply to GMRS, then a FCC license (mail order form with fee) is required.

Although the victim did not carry a communication device, it is unknown if he could have used it to summon his wife and/or emergency medical assistance because the sequence of events are unknown.

REFERENCES

A Guide to Agricultural Tractor Rollover Protective Structures, National Farm Medicine Center, Marshfield Clinic, 1000 North Oak Avenue, Marshfield, WI 54449. Internet Address: <http://www.marshfieldclinic.org/nfmc/rops/default.htm>

Federal Communications Commission (FCC), Family Radio Service (FRS). Internet Address: <http://wireless.fcc.gov/services/personal/family/>

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MIFACE

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