

MIFACE Investigation Report: #14MI118

Subject: Farm Worker Died When Unsupported Combine Head Fell Onto Him During Repair Activities in a Bean Field

Summary

In fall 2014, a male farm worker in his 30s died when the unsupported Case International 1680 combine soybean head lowered onto his side during repair activities in a soybean field. The decedent was working alone in the field harvesting soybeans. Although the incident was unwitnessed, it was hypothesized that the sensing mechanism, which permitted the hydraulically operated head to float over the ground became “stuck” in a raised position. The decedent exited the combine and left the combine running. He did not take the combine head out of “automatic” control. He went under the raised combine head with a crescent wrench without providing secondary support (header safety stop) to prevent the head from lowering when repairs were completed. Based on the above hypothesis, the decedent could have been: 1) attempting to make an adjustment directly to the combine head to lower it from the raised position or 2) was striking the floating sensing “rod” which was stuck in the raised position to free the head. When the combine head released from its raised position, it fell onto the decedent, pinning him on his side against the dirt. His coworkers went to look for him when he did not answer his cell phone. A coworker found him, raised the combine head, and backed the combine approximately 15 feet away from him (Figure 1). Combine hydraulic fluid was not observed on the ground, indicating that there was not a leak from the hydraulic lines. He was declared dead at the scene.



Figure 1. Combine and header involved in incident in field.

MIFACE identified the following key and possibly contributing factors:

- Working under unsupported raised combine head
- Did not turn off machine prior to dismounting
- Washout area in field

RECOMMENDATIONS

- Always use cylinder locks when available to provide secondary support when working under an elevated combine head. If cylinder locks are not available, block the combine head with a material, which will not crush under the weight of the unit.
- Calibrate header for each harvest site, evaluate ground site conditions and adjust harvesting procedures accordingly.

- Use appropriate equipment shut off procedures when dismantling the equipment.
- Combine manufacturers should install a safety interlock system, such as a seat safety switch for operator seats and offer retrofit seat safety switches.

BACKGROUND

In fall 2014, a male farm worker in his 30s died when the unsupported Case International 1680 combine soybean head lowered onto his side during repair activities in a soybean field. MIFACE learned of this incident from the MIOSHA 24-hour hotline. The decedent's employer was contacted and agreed to a MIFACE site visit. The MIFACE researcher met with the owner at the company's main office. The owner traveled with the researcher to an offsite location to permit the researcher to take pictures of the combine head involved in the incident. During the course of this investigation, the death certificate and police and medical examiner reports and the MIOSHA compliance file were reviewed. Pictures used in this report are from the responding police department (Figure 1), MIOSHA compliance file (Figure 2) and the MIFACE site visit (Figure 3).

The company farmed 8000 acres in five counties harvesting a variety of products – corn, wheat, soybeans, oats, barley, etc. The firm also had a feed business (straw and hay to dairy), hauled chicken waste, had beef cattle, and grew and distributed certified seeds for farms.

The company representative who spoke with MIFACE indicated that the firm employed 20 individuals and to the MIOSHA compliance officer, the firm representative indicated the company employed four individuals. The decedent was a family member and had his own farm. In addition to his farming operation, he had worked at this business full time for the past 17 years. His work hours were a routine 8-hour day unless it was planting and harvesting season; hours would increase until the work was finished. The decedent was paid on an hourly basis.

For each new farm machine operator, the company owner demonstrated the operation of the machine and then rode with the new operator for a day to ensure operator competence. At the beginning of each season, the owner would review with employees the pertinent safety instructions for the machines they would operate and provide an opportunity for the employee to ask questions. Each year, he reviewed the importance of the hydraulic cylinder locks and had reviewed this issue with the decedent a few weeks prior to the incident. The owner did not keep training records.

The decedent was very familiar with combine operation and had operated this combine for many years.

Firm Remediation

At the time of the incident, the business owner verbally communicated safety instructions. After the incident, the firm developed a written safety program, which included training record documentation.

MIOSHA General Industry Safety and Health Division issued a Serious and one Other-than-Serious citation at the conclusion of its investigation.

SERIOUS: 1928.57(a)(6)(iii): GI PART 53, FARM FIELD EQUIPMENT REF 408.45301

At the time of initial assignment and at least annually thereafter, shall instruct every employee in the safe operation and servicing of all covered equipment with which he is or will be involved, including at least the following safe operating practices:

Stop engine, disconnect the power sources, and wait for all machine movement to stop before servicing, adjusting, cleaning, or unclogging the equipment, except where the machine must be running to the property serviced or maintained, in which case the employer shall instruct employees as to all steps and procedures which are necessary to safely service or maintain the equipment.

(Employee did not stop or turn off equipment while trying to repair the Case International 1680 combine.)

OTHER-THAN-SERIOUS: 408.22139(1): GI PART 11, RECORDING AND REPORTING OF OCCUPATIONAL INJURIES AND ILLNESSES

Basic requirement. Within 8 hours after the death of any employee from a work-related incident or the inpatient hospitalization of 3 or more employees as a result of a work-related incident, you must orally report the fatality/multiple hospitalization by telephone or in person to the Michigan Department of Consumer and Industry Services, Bureau of Safety and Regulation, State Secondary Complex, 7150 Harris Drive, Lansing, Michigan, phone 1-800-858-0397.

(Firm did not report fatality within 8 hours to MIOSHA.)

INVESTIGATION

Machine

The machine involved in the incident was a 1990 Case International combine, Model 1680. Attached to the combine was an approximately 30-foot long header with an automatic floating cutter, which allowed the head to raise and lower by sensing ground height while preventing the sickle guards from digging into the ground and picking up debris. The combine head had a control button that could be operated by the driver from inside of the cab.

On the day of the incident, the decedent worked in the shop and then in the afternoon, was one of four combine operators who traveled to their respective fields. This was the first day of combining; the previous week the decedent did not work because of weather issues.

Three combines were in one field and the decedent was working alone in a nearby soybean field, out of visual distance from his coworkers. He was making his first pass. Rain had washed out an 8-10 inch deep portion of the field near a ditch. The combine head rammed this washout, causing the head to move upward and stick in the raised position, approximately 4 feet above the ground.

The decedent exited the combine and left the combine running. He did not take the combine head out of “automatic” control. He went under the raised combine head with a crescent wrench without providing secondary support (header safety stop) to prevent the head from lowering when repairs were completed. There was a pair of work gloves on the ground by his body along with a bungee-type strap. Although the event was unwitnessed, two hypotheses were developed: 1) He may have been attempting to make an adjustment directly to the combine head to lower it from the raised position (Figure 2) or 2) he was striking the floating sensing “rod” which was stuck in the raised position to free the head (Figure 3). When the combine head released from its raised position, it fell onto the decedent, pinning him on his side against the dirt.

Several of the combine operators working in the nearby field tried several times to contact him by 2-way radio but could not reach him. Another employee, a truck driver, was asked to go to the decedent’s work location and check on him. The driver found the decedent under the combine and called the owner, but couldn’t reach him. The driver called another family member. Emergency response was called. While awaiting EMS arrival, one of the family members raised the combine head from the decedent and backed the combine approximately 15 feet away from him.

CAUSE OF DEATH

The cause of death as listed on the death certificate was traumatic asphyxia. Toxicology was negative for illegal, prescription and non-prescription drugs.



Figure 2. Sensing adjustment to the combine head.



Figure 3. Arrow pointing to sensing rod he may have been trying to unjam.

RECOMMENDATIONS/DISCUSSION

- Workers should always use all safety devices, such as hydraulic cylinder safety stops, that machines are equipped with to prevent injury and exposure to hazards. If cylinder safety stop is not available, block the raised combine head with a material, which will not crush under the weight of the unit.

Modern machines, including farm equipment are designed and equipped with a variety of effective safety devices, such as hydraulic cylinder safety stops. These devices protect workers while the machines are being used and during maintenance and repair of the machines. In this incident, the hydraulic cylinders that controlled the height of the combine header were equipped with a hydraulic cylinder safety stops. When moved and locked in its lowered position the safety stop would prevent the header from lowering due to a release of the bar, which controlled the adjustable floating head. Before crawling under the raised header the decedent did not lower and lock the safety stop or provide other secondary support, such as placing material under the raised head which will not crush under the weight of the unit should it come down. In this case, if the safety stop had been locked in place or secondary support provided this fatality would have been prevented.

- Calibrate header for each harvest site, evaluate ground site conditions and adjust harvesting procedures accordingly.

The firm harvested 8000 acres in five counties. The number of acres and the diversity of crops and field conditions can make it challenging for machine operators to safely operate in fields due to changing conditions, unfamiliarity of terrain, etc. MIFACE recommends that the company develop a topographical diagram of each field. The company should survey each field during planting (when they perform planting or ask whoever plants the crop to do so) and note potential hazards on the corresponding diagram. During spraying activities or during other crop maintenance activities, the changes to terrain or other hazards (e.g. sagging overhead power lines, washouts, etc.) should be noted on the diagram.

Weather events may also change field terrain during the course of the growing season. When harvesting the crop on that particular piece of farmland operators should check the site and consult the diagram to adjust harvesting activities accordingly. Perhaps if the operator was aware of the potential for a washout to occur, his harvesting approach may have been altered and the header would not have been jammed to the raised position.

- Use appropriate equipment shut off procedures when dismounting the equipment.

The operator's manual should be consulted to determine the safe operating practices and procedures for the combine and any attached implements. Machine operators should shut down both the machine and the engine before inspecting or working on harvesting equipment. Operators should always disengage all power, shut off the engine and take the key. If the

combine had been turned off and the header's automatic control shut down, when the decedent freed the head from its "stuck" raised position, it most likely would not have fallen onto him, assuming there was not a problem with the hydraulic system.

- Combine manufacturers should install a safety interlock system, such as a seat safety switch for operator seats and offer retrofit seat safety switches.

Farm equipment, such as tractors and skid steer loaders, have a safety interlock system; tractors have a seat safety switch and many skid steer loaders have a seat bar, which prevent the machinery from being started and operated unless the operator is in the operator's seat and progressing through an approved machine start procedure and automatically shuts down the equipment if it is left running when the operator leaves the seat. MIFACE recommends that combine manufacturers install a safety interlock system and develop and offer a retrofit seat safety switch for existing machines to interlock the machine's operational functions to minimize the potential for operator injury and exposure to machine hazards.

KEY WORDS: Combine, Combine Header, Soybeans, Cylinder Lock, Machine, Struck By, Agriculture

REFERENCES

MIOSHA standards cited in this report 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 by writing to: Michigan Department of Licensing and Regulatory Affairs (LARA), MIOSHA Regulatory Services Section, Stevens T. Mason Building, 530 W. Allegan Street, Lansing, Michigan 48933, calling (517) 284-7740, or by FAX (517) 284-7735.

- MIOSHA General Industry Safety Standard, Part 53, Farm Field Equipment REF 408.45301. http://www.michigan.gov/documents/CIS_WSH_part51-53_83015_7.pdf
- MIOSHA General Industry Safety Standard, Part 11, Recording And Reporting of Occupational Injuries and Illnesses http://www.michigan.gov/documents/CIS_WSH_part11ad_37844_7.pdf

RESOURCES

- *Harvesting Soybeans*. Harvesting, Drying and Storing, Chapter 14. G. Huitnik. <http://www.uaex.edu/publications/pdf/mp197/chapter14.pdf>
- *Farmer crushed by corn head when disengaging it from combine*. Iowa FACE Program. Case Number 2008 IA 081 <http://www.cdc.gov/niosh/face/pdfs/08ia081.pdf>

- *Farmer Dies After Being Pinned Beneath The Header Of A Combine in Minnesota.* Minnesota FACE Program. Minnesota FACE 00MN014
<http://www.cdc.gov/niosh/face/stateface/mn/00mn014.html>
- *Laborer Killed After Being Run Over by the Tractor and Mower He was Operating.* Michigan FACE Program. MI FACE Investigation Report #07MI072.
<http://www.oem.msu.edu/MiFace/07MI072.pdf>
- *Farmer Dies After Being Crushed Beneath The Header Of A Combine.* Minnesota FACE Program. MN FACE Investigation 01MN054.
<http://www.cdc.gov/niosh/face/stateface/mn/01mn054.html>

MIFACE (Michigan Fatality Assessment and Control Evaluation), Michigan State University (MSU) Occupational & Environmental Medicine, 909 Fee Road, 117 West Fee Hall, East Lansing, Michigan 48824-1315; <http://www.oem.msu.edu>. This information is for educational purposes only. This MIFACE report becomes public property upon publication and may be printed verbatim with credit to MSU. Reprinting cannot be used to endorse or advertise a commercial product or company. All rights reserved. MSU is an affirmative-action, equal opportunity employer.

April 25, 2018