

TO: Director, National Institute for Occupational Safety and Health

FROM: Iowa FACE Program

Case No. 04IA60

Report Date: 8 June 2005

SUBJECT: 53-Year-Old Cattle Farmer Entangled in Exposed Rotating Conveyor Shaft

SUMMARY

During the fall of 2004, a 53-year-old cattle farmer was killed while feeding silage to his herd of 182 beef cattle. He was in the midst of routine feeding chores, working in a feed shed adjacent to two silos and a feed bunk structure. This shed contained two conveyors and an auger for moving silage and feeds from the silos to the feed bunk. This mixing and feeding system had been used for the past 20+ years to supply an outdoor cattle feeding operation. The configuration of conveyors and controls in the shed required the farmer to crouch down and crawl under the feed bunk conveyor several times during each feeding cycle. There was only about 3

foot (90 cm) clearance between the conveyor and the floor. The farmer was accustomed to ducking under the conveyor and had done so for many years. There were many unguarded moving parts in this work area. The shaft for the pulley at the end of the conveyor was too long, extending about 2.5 inches (6 cm) beyond the bearings on both sides of the pulley (Photo 1). The shaft had a keyway, which created sharp-cornered entanglement points on both ends of the shaft. The injury occurred while the farmer was ducking under the conveyor belt. His coat collar was caught and wound up in the exposed rotating shaft. He became entangled and the conveyor belt stalled as the coat wrapped around the shaft. He was found dead at the scene several hours later in the afternoon by a family friend.

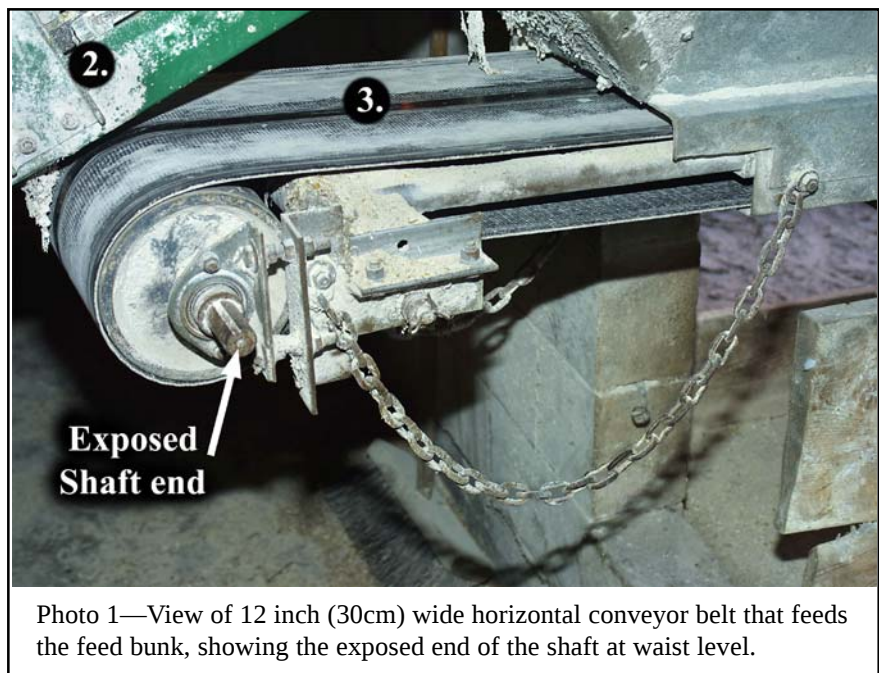


Photo 1—View of 12 inch (30cm) wide horizontal conveyor belt that feeds the feed bunk, showing the exposed end of the shaft at waist level.

RECOMMENDATIONS based on our investigation are as follows:

- *Machinery and equipment must be guarded properly to avoid entanglements.*
- *Control switches and stationary machinery should be placed so that there is no need to work close to hazardous machine parts.*
- *Farmers should carry a communication device for emergency situations.*
- *Farmers should wear appropriate, well-maintained clothing for farm work.*

INTRODUCTION

During the fall of 2004, two eastern Iowa cattle growers died in nearly identical incidents which occurred 85 miles (135km) and twelve days apart. In both cases, the neck/shoulder area of their jackets became entangled in exposed rotating silage conveyor pulley shaft ends. The Iowa FACE program was alerted to the incident in this report by a newspaper article, and an investigation was initiated, gathering information from the County Sheriff and the Medical Examiner. The family was contacted and a site visit was scheduled. Photographs were obtained from the Sheriff, and additional photographs were taken when two Iowa FACE investigators met with a relative of the family and visited the site where the injury occurred.

The victim in this case was a 53-year-old active cattle grower, who was managing three farms. He had been farming full-time at the same location since high school, working with his father and later with his wife and children. The incident occurred on his home farm which had 120 acres (48 hectares) of crop land and a custom feeding operation for about 180 cattle. He also raised some feeder pigs. In the past, this had been a dairy farm with up to 50 dairy cows. This was a family farm and had no formal safety programs or written policies in place.

INVESTIGATION

This cattle feeding operation had two silos as seen in photo 2. One was a conventional concrete silo and the other was a larger, oxygen-limiting silo. A feeding control shed was built between the silos from which feed was conveyed to the adjacent feed bunk that extended to the outdoor feedlot area. When the farm was a dairy, the concrete silo was filled with corn silage and the oxygen-limiting silo was filled with hay silage. Since the milk cows were sold 5-6 years ago, the concrete silo was abandoned, and the oxygen-limiting silo was used for ground, high-moisture ear corn. Between the two silos was a feeding control shed containing an auger and two conveyor belts, which were used daily to mix and distribute feed to the feed bunk (Photo 3).



Photo 2 – Outside view of silos showing the attached shed and adjoining feedlot.

The farmer's normal feeding chores would take about 30 minutes early in the morning. As ground corn was moved from the silo by the auger, he would add cracked corn by bucket from a pile near the doorway of the shed. Photo 4 shows his normal work position at this time to the left of the switch panel. This task required the farmer to crawl under the exposed end of the horizontal conveyor belt a few times each day to access the switches, open and close the oxygen-limiting silo, and add corn to the feed. The farmer had become accustomed to doing this every day.

On the day of the incident, the farmer had gotten up early, about 4:30 am. He had been plowing all morning and proceeded to feed cattle about 10:30 am. During feeding, while ducking under the conveyor belt, the collar of his jacket was caught and wound up in the exposed end of the shaft for the horizontal feed bunk conveyor (Photo 5). He was strangled by his clothing and his entangled clothing stalled the conveyor belt.

CAUSE OF DEATH

The cause of death according to the Medical Examiner's report was strangulation.

RECOMMENDATIONS / DISCUSSION

Recommendation #1

Machinery and equipment must be guarded properly to avoid entanglements.

Discussion: Conveyors and feeding equipment have many moving and rotating parts. The farmer had to work in close proximity of the conveyor which had several entanglement points. There were many other unguarded belts, pulleys, shafts, and augers in the immediate work area. The end and bottom side of the main bunk conveyor was particularly exposed and the farmer had to duck under it through a three-foot (90cm) space

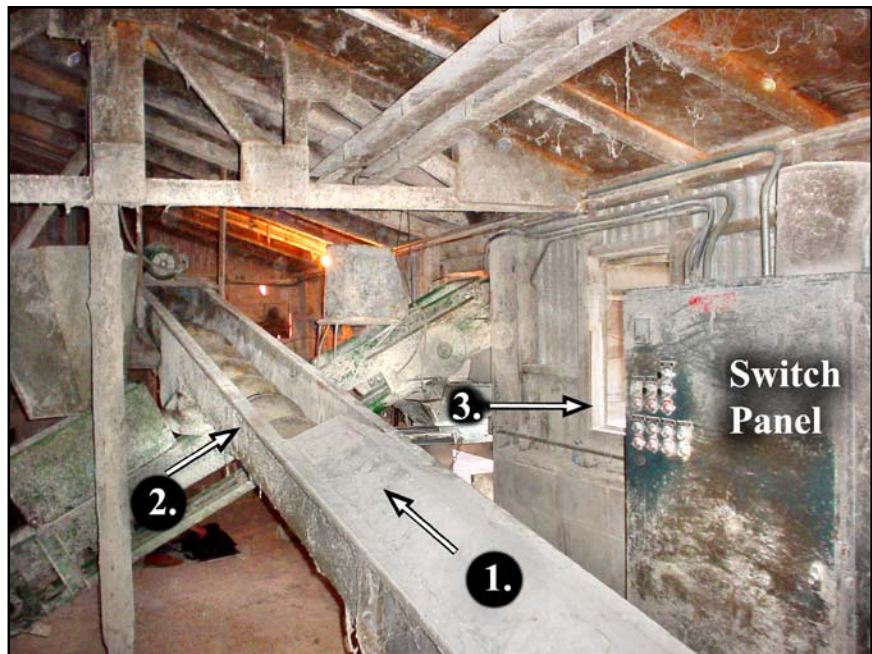


Photo 3 – View of the shed from the west end showing auger (1) bringing ground corn from the oxygen-limiting silo, conveyor (2) bringing silage from the concrete silo, and the horizontal conveyor belt (3) taking mixed feed to the feedlot on the right. The normal working position was to the left of the switch panel.



Photo 4 – View of conveyors from the doorway end of the shed, showing the farmer's normal work position, with the exposed ends of the horizontal conveyor at waist level.



Photo 5 and 6 - Shows the height and location of the rotating shaft. Photo 6 shows how the farmer had to routinely duck under the conveyor from side to side to access the switch panel.

several times each day, in many cases when the conveyor was running. There are well established standards for agricultural machinery guarding which would apply for properly protecting moving parts in this work area (ANSI/ASAE S493).

Recommendation #2 - Control switches and stationary machinery should be placed so that there is no need to work close to hazardous machine parts.

Discussion: The overall layout of the conveyors and augers in this feed shed created unsafe working conditions. The electrical controls for this feeding system were consolidated, but to access them the farmer often had to crawl under the main feed bunk conveyor. For mixing other feeds into the conveyor, he would have to go back to the other side again to manually move corn and/or other supplements to the conveyor. It is difficult to place conveyors, augers, and controls in a feeding system so that there is no need to work close to moving machine parts. However, with careful planning most hazardous work circumstances can be avoided.

Recommendation #3 - Farmers should carry a communication device for emergency situations.

Discussion: In many entanglement and injury cases the injured person may be able to call someone for help if he/she has a cell phone or a two-way radio. It is unclear and perhaps doubtful whether a communication device would have helped in this injury case. However if the injured person is conscious and has the ability to reach and use a communication device immediately, it can make a difference in the outcome. Farmers often work alone and have long periods between meals or other situations where their absence would be noticed. Capability to communicate is particularly important for farmers working long hours alone.

Recommendation #4 - Farmers should wear appropriate, well-maintained clothing for farm work.

Discussion: It is not certain that snagged clothing initiated this entanglement incident. However, it was clothing that contributed to the injury. In general, the selection of appropriate, well-maintained clothing can help prevent injury while working on the farm, especially near parts of moving machinery. Frayed or loose-fitting clothing and dangling draw strings or jewelry can catch on machinery. Clothing should fit close to the body and be tucked

inside pants and boots. Clothing with a hood or draw strings should be avoided and all frayed sleeves or cuffs should be trimmed and sewn securely.

REFERENCES

ANSI/ASAE S493. Guarding of Agricultural Equipment.

NASD. Choosing Safe Clothing for Farm Work. Atlanta, GA: Centers for Disease Control. National Agricultural Safety Database at www.cdc.gov/NASD. Accessed 9 June 2005.

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Fatality Assessment and Control Evaluation

FACE

Fatality Assessment and Control Evaluation, FACE, is a program of the *National Institute for Occupational Safety and Health* (NIOSH), which is part of the *Centers for Disease Control and Prevention* of the *U.S. Department of Health and Human Services*. Nationally, the FACE program identifies traumatic deaths at work, conducts in-depth studies of select work deaths, makes recommendations for prevention, and publishes reports and alerts. The goal is to prevent occupational fatalities across the nation.

The NIOSH head office in Morgantown, West Virginia, carries out an intramural FACE case surveillance and evaluation program and also funds state-based programs in several cooperating states. In Iowa, *The University of Iowa* through its *Injury Prevention Research Center* works in conjunction with the *Iowa Department of Public Health* and its *Office of the State Medical Examiner* to conduct the Iowa FACE program.

Nationally, NIOSH combines its internal information with that from cooperating states to provide information in a variety of forms which is disseminated widely among the industries involved. NIOSH publications are available on the web at <http://www.cdc.gov/NIOSH/FACE/> and from the NIOSH Distribution Center (1-800-35NIOSH).

Iowa FACE also publishes its case studies, issues precautionary messages, and prepares articles for trade and professional publication. In addition to postings on the national NIOSH website, this information is posted on the Iowa FACE site, <http://www.public-health.uiowa.edu/FACE/>. Copies of FACE case studies and other publications are available by contacting Iowa FACE, too.

The Iowa FACE team consists of the following specialists from the University of Iowa: Craig Zwerling, MD, PhD, MPH, Principal Investigator; John Lundell, MA, Co-Investigator; Murray Madsen, MBA, Chief Trauma Investigator; and Co-Investigator/specialists Risto Rautiainen, PhD, and Wayne Sanderson, PhD, CIH. Additional expertise from the Iowa Department of Public Health includes Rita Gergely, Principal Investigator, and John Kraemer, PA, from the Office of the State Medical Examiner.

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