FACE 9607

Welder/Ironworker Dies After Becoming Entangled In a Beltline Driveshaft--South Carolina

SUMMARY

A 55-year-old male welder/ironworker (the victim) died after becoming entangled in a beltline driveshaft. The victim was part of a crew dismantling equipment at an inactive chip mill and erecting it at a new saw mill. The fatal incident occurred during the installation of an overflow chute onto a hopper. Without warning, a previously deactivated beltline began to run. The unguarded driveshaft for the beltline was located adjacent to the hopper, at the side of the new chute, surrounded by a 3-inch angle-iron structure. The victim decided to continue work- ing; he finished welding one side of the chute, then stepped up on the angle-iron structure to weld the other side. As he did so, a lanyard, snapped to the "D" ring on his safety belt, caught on a bolt protruding from the driveshaft, and the victim became fatally entangled in the beltline driveshaft. The foreman went to the mill office to call the emergency medical service (EMS). When the EMS arrived they summoned the county coroner, who pronounced the victim dead at the scene. NIOSH investigators concluded that, to prevent similar occurrences, employers should:

- *ensure that required lockout/tagout procedures are develop- ed and utilized*
- *reaffirm the importance of employee training in the recognition of hazards, and methods to control such hazards*
- *ensure that during the planning phase of projects, the sequence of events leading to the completion of the project are charted in a manner that offers the workers the safest possible work environment.*

In addition:

- *rotating shafts should be sufficiently guarded to eliminate potential worker exposure entanglement hazards.*

INTRODUCTION

On September 8, 1995, a 55-year-old male welder/ironworker (the victim) died after being entangled in a beltline driveshaft. On September 18, 1995, officials of the South Carolina Occupational Safety and Health Administration (SCOSHA) notified the Division of Safety Research (DSR) of this fatality, and requested tech- nical assistance. On December 13, 1995, a DSR safety specialist conducted an investigation of this incident. The incident was reviewed with the SCOSHA compliance officer, employer representatives, and the county coroner. Photographs of the site taken immediately after the incident were reviewed during the investigation.

The employer in this incident was a steel-erection contractor that had been in operation for 23 years and employed 36 workers. The employer had a written safety policy and a written safety manual outlining safe-work procedures for the different tasks performed by the workers. Task training was performed on the job. Employees received additional training on hazard recognition and personal protective equipment. Tailgate meetings were held daily and each day's activities and the procedures to be followed were discussed before each day's work. The victim had worked for the employer for 11 years. This was the first fatality experienced by the employer.

INVESTIGATION

The employer had been contracted to dismantle a wood chip load- out system at an inactive chip mill and erect it at a new saw mill. The load-out system and tower measured 15-feet 11-inches high by 19-feet wide by 39-feet long. The load-out system was to be erected around the 36-inch wide belt leading from the plant. After erecting the structural steel tower for the load-out system, the men would install the chip hopper to the interior of the structure, then fabricate and erect a chip overflow chute on the side of the hopper facing away from the mill. The overflow chute would direct wood chips to the side of the trucking area in case the hopper became jammed. The chute did not necessarily have to be in place for the load-out system to operate.

On the first day at the new saw mill, the men set up their cutting torches, welders, and other necessary equipment, and prepared the concrete forms for the main-beam anchor pads.

Over the following 8 days, the men erected the main beams inside the concrete forms, erected the skeletal structure of the load- out tower, set the chip hopper in the tower, and poured the concrete around the main beams.

When work progressed to the point that the men were working in proximity to the beltline, they asked whether the beltline had been de-energized. They were assured by the foreman that a co-worker had pulled the starters and fuses in the breaker box and that the area of the mill where the work was being performed had been de-energized. The co-worker verified that he had pulled the fuses and starters from the breaker box.

On the 10th day at the site, work had progressed to the point that the men had only to install to the hopper the 10-foot-long by 24-inch-wide overflow chute they had built. The chute was attached to the crane and lifted into place. As the men were temporarily anchoring the chute into place for welding, a truck began to back under the tower for loading the following morning. As the truck backed under the hopper, it struck the flanges on the hopper, and it was determined the tower was not high enough to allow sufficient clearance for the trucks to back under for loading.

The foreman instructed the men to lower the chute to the ground. He told them no work was to be performed until he and the company president met with mill representatives the following morning to determine whether to raise the entire tower or to level the ground in front of the

tower and pour concrete to provide sufficient clearance for the trucks. The foreman then instructed the men to report to work the following morning, but not to start work until he arrived after the meeting.

The following morning the victim and a co-worker arrived at the site and began to clean up the work area. After approximately 15 minutes, the victim told the co-worker that they would install the chute. The men again rigged the crane cable to the chute and lifted the chute into place with the truck-mounted crane. After the chute was temporarily anchored, the victim began to weld it to the side of the hopper. As the victim finished welding the first side of the chute, the beltline unexpectedly started; however, the victim decided to continue welding.

The victim had to step up on the housing of the beltline driveshaft to weld the other side of the chute to the hopper. The 2½-foot-square housing was constructed with 3-inch angle iron and was open on all sides. As the victim was welding, his lanyard, which was hooked onto the "D" ring of his safety belt, became entangled around a bolt protruding from the driveshaft and pulled the victim around the shaft.

As the foreman arrived at the site, he stopped to talk to the driver of a concrete truck. He heard the co-worker scream and looked up to see the co-worker running along the tower and the victim rotating around the driveshaft. The co-worker went to the control shed to de-energize the beltline while the foreman went to the mill office to call the emergency medical service (EMS). When the foreman returned to the site he climbed the tower to the victim. When he discovered the extent of the victim's injuries, he climbed down the tower to wait for the EMS. When the EMS arrived at the scene, they summoned the county coroner, who pronounced the victim dead at the scene.

CAUSE OF DEATH

The coroner listed the cause of death as massive head and trunk trauma.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure that required lockout/tagout procedures are developed and utilized.

Discussion: Basic lockout/tagout procedures were contained in the employer's safety manual. Employers should develop compre- hensive lockout/tagout programs that comply with OSHA standards. OSHA standard 29 CFR 1910.147 requires the control of hazardous energy through the use of lockout/tagout procedures. If workers are exposed to the potential release of hazardous energy, the energy source should be locked and/or tagged out in a manner that would prevent the inadvertent activation of the energy source. Lockout/tagout procedures should include: (1) de-energization of potentially hazardous energy; (2) locking and/or tagging of the energy-control source; (3) dissipating or blocking any stored energy; (4) verification that the hazardous energy has been controlled; (5) procedures for the safe re-energization of the energy

source once work has been completed. Once these procedures are developed, all workers who could be involved in work that would involve lockout/tagout procedures should be trained in the proper use of these procedures. In this instance, a worker for the contractor removed the electrical starter and fuses that controlled the circuit for the belt drive without applying any mechanical locks or tags to the circuit. Workers from the mill replaced these devices and activated the circuit for the belt drive. Had the circuitry been locked and tagged, it may have alerted the mill workers that work was still being performed on the load-out tower and caused them to check the tower before energizing the belt drive circuit.

Recommendation #2: Employers should reaffirm the importance of employee training in the recognition of hazards and methods to control such hazards.

Discussion: Even though employees had received training in hazard recognition, work continued in proximity to an exposed rotating drive shaft. Employers should continually stress the importance of hazard recognition, avoidance, and control. When the belt-drive motor was activated unexpectedly, exposing the victim to the rotating shaft, work should have ceased until such time that the shaft could have been de-energized or properly guarded.

Recommendation #3: Employers should ensure that during the planning phase of projects, the sequence of tasks leading to the completion of the project are charted in a manner that offers the workers the safest possible work environment.

Discussion: In this instance, the belt drive was activated, without warning, while contractor employees were working on the load-out tower in proximity to the rotating drive shaft and the running belt. To prevent worker exposure to potential hazards, a sequence of tasks leading to the completion of the project could have been established during project planning that would have assured that all workers were clear of the tower before activation of the belt drive.

Recommendation #4: Rotating shafts should be sufficiently guarded to eliminate potential worker-exposure-entanglement hazards.

Discussion: When the belt drive was activated, the victim was exposed to the entanglement hazard presented by the rotating drive shaft. Guards should be attached to the drive shaft's angle-iron housing on all sides to eliminate the entanglement hazard.

REFERENCES

29 CFR 1910.147, Code of Federal Regulations, Washington, D.C.: U.S. Government Printing Office, Office of the Federal Register.

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