



The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces
through safety and health research



Welder Dies After Being Struck By A Three-Ton Steel Roof Truss—South Carolina

FACE 9611

SUMMARY

A 27-year-old male welder (the victim) died after being struck by and pinned under a 3-ton 65-foot-long section of a steel roof truss. The victim was a member of a crew welding halves of the steel roof trusses together, then lifting them with a truck-mounted crane and placing them on support columns in an airplane hangar under construction. The crew used a two-leg sling and chokers to lift the trusses. At the time of the incident, four trusses had been set up on wooden blocks to be welded, and the halves of the fifth truss were being positioned. Half of the fifth truss had been set upright on the ground and the victim and a coworker were repositioning the chokers outward before the other half was set up on blocks. When the chokers were unhooked for repositioning, the truss began to lean toward the men. Before the victim could get out from under the truss, he was struck across the chest and pinned against a pile of tubular steel. The crew immediately reattached the chokers and lifted the truss off the victim while the foreman called the emergency medical service (EMS) from the company truck. When EMS personnel arrived at the scene, they summoned the county coroner, who pronounced the victim dead at the scene. NIOSH investigators concluded that, to prevent similar incidents, employers should:

- ensure that materials being lifted or positioned by a crane or other lifting machine are supported at all times
- ensure that access and egress routes at a worksite are free from unnecessary materials
- evaluate alternative ways to perform tasks during pre-job planning to ensure the safest work environment for workers.

INTRODUCTION

On February 29, 1996, a 27-year-old male on-ground welder died after being struck by, and pinned under, a 3-ton, 65-foot-long steel roof truss. On March 5, 1996, officials of the South Carolina Occupational Safety and Health Administration (SCOSHA) notified the Division of Safety Research (DSR) of this fatality, and requested technical assistance. On March 21, 1996, a DSR safety specialist and medical officer conducted an investigation of the incident. The incident was reviewed with company representatives, the SCOSHA compliance officer, and the county coroner. The site was photographed during the investigation.

The employer in this incident owned two companies. The first was a fabrication plant for steel beams and steel roof trusses. The plant received steel angle, plate rods, and bar stock and then welded, ground, and painted the steel components to customer specifications. The second company erected the fabricated steel. The fabrication company had been in operation for 11 years and employed 25 workers. The erection company had been in operation for 6 years and employed 35 workers. Both companies worked with SCOSHA 5 years prior to the incident, to develop the comprehensive safety programs that were in place. Training was accomplished on the job, and worker capabilities were tested in the shop or on site before workers were permitted to perform more complex tasks on their own. Job hazard analyses were performed at each jobsite by the owners and the job foreman for that site. The job foreman was responsible for safety at each jobsite. The victim had worked for the fabrication company for 12 weeks prior to the incident. This was the first on-site fatality experienced by either company. Prior to this incident, the erection company experienced two fatalities in a single motor vehicle incident in a company truck.

INVESTIGATION

The companies had been contracted to fabricate and erect steel roof trusses for the roof of a privately-owned airplane hangar. The hangar measured 130-feet wide by 100-feet long by 322-feet high. The steel trusses, which measured 130-feet long by 5-feet high by 10-inches wide and weighed 6 tons each, were to be placed on, and welded to, 10-inch support beams at the top sides of the hangar by a company-owned, truck-mounted crane.

After the trusses were manufactured at the fabrication plant, they were cut in half for shipment to the site, where the halves were stacked in front of the hangar. The crane then lifted the truss halves upright on the ground with a two-leg sling and chokers. Once both halves were upright, the chokers were unhooked and readjusted outward before each half was set up on 4-inch by 4-inch and 2-inch by 4-inch wooden blocks, and the two ends were butted together and welded. The truss halves were unsupported during the repositioning of the chokers and during the welding operations.

A crew of five welders (including the victim) and a crane operator (foreman) were performing the work. The crew had been at the site for 5 days, and 12 trusses had been welded and placed on the support beams for the hangar roof. Four welders were on the ground positioning and welding the truss halves. The fifth welder was on top of the hangar welding the trusses to the support beams. Although the victim was an employee of the fabrication plant, he had been assigned to work with the erection crew welding the trusses because of his welding proficiency.

At the time of the incident, four trusses (8 halves) were blocked up and butted together on the ground, ready to weld, and the fifth truss was being prepared. The first half had been lifted into place and leveled on the wooden blocks. The second half was lifted from the stack and set upright in front of a stack of tubular steel. As the crane cable became slack, the truss half began to tip over. It was lifted and placed on the ground again, and again it began to tip. It was lifted and placed a third time before it seemed stable. When the crane cable contained enough slack, the victim loosened the chokers and slid them outwards toward the truss ends. As the victim stepped back, the truss half tipped and then fell toward him, pinning him against the tubular steel. The crane operator immediately lifted the truss half off the victim, then called 911 from the company truck. When EMS personnel arrived at the site, they summoned the county coroner, who pronounced the victim dead at the site.

CAUSE OF DEATH

The county coroner listed the cause of death as massive crushing injuries to the chest.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure that materials being lifted or positioned by a crane or other lifting machine are supported at all times.

Discussion: In this instance, the truss half had to be set on the earthen surface three times before the crew thought it was stable enough to reposition the chokers. As slack was received in the crane cable the truss tipped and crushed the victim, because the truss was unsupported. Workers should never work under or near a suspended load unless the load has been safely landed, and blocked and supported on the ground. Possibly, the truss halves could have been positioned between two upright steel members embedded in the ground, or against some other means of support that could provide adequate lateral support during the repositioning of the chokers. During steel-framing operations above ground where trusses are utilized, 29 CFR 1926.751 (c)(1) requires that steel joists be framed in two directions, or field bolted to columns, to provide lateral support. This regulation does not apply in this instance; however, lateral support of the truss in this instance might have prevented it from tipping over and pinning the victim.

Recommendation #2: Employers should ensure that access and egress routes at a worksite are free from unnecessary materials.

Discussion: In this instance, the victim was pinned and crushed between the 3-ton truss half, and a pile of tubular steel located immediately behind his work area. In order to ensure that egress from a work area is unimpeded should an emergency arise, all unnecessary materials should be kept clear of all access and egress routes at job sites.

Recommendation #3: Employers should evaluate various ways to perform all tasks during pre-job planning to ensure the safest work environment for workers.

Discussion: The method by which the lifting and welding tasks were performed was based on a job hazard analysis conducted by the owner and jobsite foreman. All alternative means to perform tasks should be reviewed by a competent person or persons¹ to determine the safest possible way to perform tasks. Had various alternatives been reviewed in this instance, it may have been determined that there was a safer way to position and support the truss halves prior to and during the welding operations.

REFERENCES

29 CFR 1926.751 (c)(1) Code of Federal Regulations, Washington, D.C.: U.S. Government Printing Office, Office of the Federal Register.

Construction Safety Association of Toronto. Rigging Manual, Tenth Printing. Pg. 176 1990.

¹ Competent person: One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authority to take prompt corrective measures to eliminate them.

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