NIOSH

FACE

Fatality Assessment and Control Evaluation Program

Division of Safety Research • 1095 Willowdale Road • Morgantown, West Virginia 26505 • Phone: (304)285-5916

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Seventeen-Year-Old Window Washer Dies After Falling 180 Feet Due to a Rigging Anchor Failure–PA

SUMMARY

A 17-year-old male window washer (the victim) died after falling 180 feet when the rigging suspending him failed. The victim was one of four window washers cleaning windows at a 20-story condominium complex. The victim, his 21-year-old brother and 35-year-old cousin were cleaning the windows on the outside of the complex while his 12-year-old brother kept the sidewalk clear of the ropes and debris below the window washers. On the 225-foot-high roof of the building, the victim tied the ½-inch, woven, 600-foot length of nylon rope (at its length midpoint) around a suspension bracket for one of several 8-inch feed and return steam lines located on the roof. He then tied a loop into one of the lengths of rope, approximately 5 feet from the midpoint attached to the bracket, and placed the loop over a 2-inch-diameter vent pipe protruding 8 inches upward from another steam line. The victim attached a descent control device to his harness and a boatswains chair to the other length of rope. He then stepped over the roof's parapet wall, and manipulating the descent control device, lowered himself down to the 20th-story windows and began to wash them. The victim had worked his way down to the 17th floor when the bracket and vent pipe to which he had attached the rope gave way, causing him to fall 180 feet to the ground. The Emergency Medical Service (EMS) was summoned by phone from inside the complex. EMS personnel responded and transported the victim to the hospital, where he was pronounced dead. NIOSH investigators concluded that, to help prevent similar incidents, employers should

Bracket used as anchor point for rigging

Fatality Assessment and Control Evaluation (FACE) Project

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), performs Fatality Assessment and Control Evaluation (FACE) investigations when notified by participating states (North Carolina, Pennsylvania, South Carolina, Tennessee, and Virginia); by the Wage and Hour Division, Department of Labor; or when a request for technical assistance is received from NIOSH-funded state-level FACE programs in Alaska, California, Iowa, Kentucky, Massachusetts, Minnesota, Missouri, Nebraska, New Jersey, Ohio, Oklahoma, Texas, Washington, West Virginia, and Wisconsin. The goal of these evaluations is to prevent fatal work injuries in the future by studying the work environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact. The FACE program does not seek to determine fault or place blame on companies or individual workers. For further information visit the FACE website at **www.cdc.gov/niosh/face/faceweb.html** or call toll free 1-800-35-NIOSH.

- ***ensure that when employees use descent control devices, a separate fall arrest system, completely independent of the device and its support system, is also used***
- ***ensure that a competent person evaluates and inspects all anchor points to be used by window washers prior to the start of work***
- ***ensure that all employees, including part-time employees, are properly trained in all facets of the jobs they are to perform***
- ***ensure that descent control devices are used in accordance with manufacturers' specifications and that employees are trained in the proper use of such equipment***

Additionally,

- ***building owners who have routine maintenance performed on their buildings should consider the installation of permanent anchor points.***

INTRODUCTION

On November 29, 1999, a 17-year-old male window washer (the victim) died after falling 180 feet when the anchors for his descent rigging failed. On November 30, 1999, the National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), was notified of the incident by the U.S. Department of Labor, Wage and Hour Division. On February 2, 2000, a DSR occupational safety and health specialist conducted an investigation of the incident. The incident was reviewed with the Wage and Hour Assistant District Director and the Occupational Safety and Health Administration compliance officer assigned to the case. The death certificate, medical examiner's report, and photographs taken immediately after the incident were reviewed.

The employer belonged to an international window cleaning association that employed 40,000 workers, with 770 workers in the region where the fatality occurred. The company had a comprehensive written safety program that included written safe work procedures for all tasks to be performed by workers. Training was conducted on the job and in the classroom. Safety meetings were conducted on a periodic basis as needed. Tool box safety meetings were conducted at the start of each job. The victim had worked for the company on a part-time basis for approximately 1½ years, but had only worked above ground for approximately 6 months. The victim received on-the-job training periodically during his employment. The company safety program required an independent lifeline to be used as part of the fall arrest system, but it could not be determined if the victim had received this instruction. This was the first fatality experienced by the company in this region.

INVESTIGATION

The employer had been contracted for the past several years to clean the windows of the 20-story condominium complex. On the day of the incident, the victim's father (a foreman for the employer) drove the 17-year-old victim, his 12- and 21-year-old brothers, and his 35-year-old cousin to the complex. The crew unloaded their equipment, then the foreman left the site to check on another job in the area.

It was decided that the victim, older brother and his cousin would wash the window surfaces on the outside of the building. The victim's 12-year-old brother was to work at ground level, keeping the sidewalk clear of the rigging ropes and other debris that might fall from his brother's bucket to the ground during the window cleaning operation.

The window washers accessed the 225-foot-high roof of the building, bringing with them three 600-foot lengths of ½-diameter woven nylon rope, a boatswain's chair and harness, and a descent control device to attach their harnesses to the rope. The descent control device is a friction device which slides along a synthetic rope as the user slowly descends. The device can be "parked" on the line or physically manipulated for descent purposes. The device consists of a cover and a central portion. The central portion is a forged aluminum shank with a rope guide and attachment hole at each end. The cover is made of sheet steel. An Allen bolt secures the cover to the central portion at the top, while a push pin secures the cover at the bottom. The ends of the device are not reversible. If used upside down the cover may fall off, allowing the rigging rope to uncoil. The horns at the top of the device can be manipulated to "park" the device on the line.

To rig the device, the cover is removed, the rope is run through the attachment hole at the bottom of the shank, and the proper number of rope wraps are made around the shank. Then the rope is run through the attachment hole at the top of the shank before the cover is placed back over the shank. The manufacturer of this particular device recommends 1 rope wrap for each 50 lb of descending weight. The victim's 200-lb body weight would have required 4 rope wraps. Instructions were printed on the cover of the device recommending the proper number of wraps.

The victim then tied the rope at its midpoint around a bracket supporting one of several 8-inch feed and return steam lines located on the building's roof. The bracket was mounted on a concrete pillar approximately 24 inches above the roof's surface. A roller was located on the interior of the bracket that allowed the steam line to move back and forth on the bracket as it expanded and contracted.

Evidence indicated that the victim then tied a loop in the rope approximately 5 feet from the point where it was attached to the bracket and placed the loop over a 2-inch-diameter vent pipe protruding 8 inches upward from another steam pipe. The victim stepped into the leg straps of his boatswain's chair and fastened the waist strap, rigged the descent control device, and attached his boatswain's chair. The other two window washers, working east of the victim on the same side of the building, rigged their ropes in a similar way. No independent lifeline or fall arrest system was utilized by the window washers.

The victim stepped over the parapet wall of the roof, lowered himself to the 20th-story windows, and began washing. The victim had washed windows down to the 17th-story level when the bracket the rope had been attached to gave way (Photo1) and the vent pipe snapped off, allowing the victim to fall 180 feet to the sidewalk below. The Emergency Medical Service (EMS) was summoned by phone from inside the complex. EMS responded and transported the victim to the hospital where he was pronounced dead on arrival.

When the bracket gave way, pieces were pulled from under the steam line and the steam line's insulation was pulled away. Inspection of the rope revealed the loop in the rope. The only additional anchor that the victim could have used was the vent pipe which was located 5 feet from the steam line bracket. It had been torn from the steam line and was discovered approximately 4 feet from the steam line and 24 inches from the parapet wall of the roof.

Inspection of the descent control device revealed only two rope wraps around the shank, two less than recommended by the manufacturer.

Photo 1 Bracket used as anchor point for rigging

CAUSE OF DEATH

The medical examiner listed the cause of death as multiple blunt force injuries.

RECOMMENDATIONS

Recommendation #1: Employers should ensure that when employees use descent control devices, a separate fall arrest system completely independent of the descent control device and its support system is used.

When descent control devices are used during window washing operations, workers are required to be protected from falls by a fall arrest system (including a full body harness with a rope grab or similar device, lifeline, and anchorage) completely independent of the descent control device and its support system. The fall arrest system should be utilized in such a manner that failure of any component of the descent control device or its support system (boatswain's chair or harness, support line, or anchorage) will not affect the ability of the fall arrest system to operate. Letters of interpretations of OSHA regulations regarding the use of descent control devices can be found on the OSHA website.[1]

Recommendation #2: Employers should ensure that a competent[a] person evaluates and inspects all anchor points and rigging to be used by window washers prior to the start of work.

Discussion: To ensure that adequate anchor points and required rigging are utilized by workers, employers should ensure that a competent person evaluates and inspects all anchor points and rigging prior to the start of work. The victim had been working on a part-time basis for the company for 1½

[a]A competent person, as defined by OSHA, is 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 authorization to take prompt corrective measures to eliminate problems.

years, but had only been working above ground on a part-time basis for approximately 6 months. The victim may not have had the experience or knowledge that would have allowed him to identify and evaluate adequate anchor points. Additionally, it could not be determined if the victim had the knowledge that a lifeline, completely independent of the descent control device and its support, was required by OSHA to be used.[2]

Recommendation #3: Employers should ensure that all employees, including part-time employees, are properly trained in all facets of the jobs they are to perform.

Discussion: Employers should ensure that all workers receive training in safe work procedures for all facets of the tasks that they perform, including the selection of anchor points and use of equipment. This is especially important for part-time workers that might not perform these tasks on a routine basis. Workers should be routinely evaluated to determine their adherence to safe work procedures.

Recommendation #4: Employers should ensure that descent control devices are used in accordance with manufacturers' specifications and that employees are trained in the proper use of such equipment.

Discussion: Manufacturer's specifications recommended four rope wraps (one rope wrap per every 50 lb of descending weight) around the center shank of the descent control device for a medium speed descent for the 200-lb weight of the victim. When examined after the incident, it was found that only two rope wraps were present around the center shank. All employees should be trained to properly utilize this type of equipment according to manufacturers' specifications as required by OSHA.[3]

Additionally, building owners who have routine maintenance performed on their buildings should consider the installation of permanent anchor points.

Discussion: The owner of the condominium complex contracted the employer to wash the windows of the building twice a year. Additionally, routine maintenance and inspection of the steam lines on the roof were conducted periodically. When maintenance will be performed on a building that will require workers to utilize anchor points on the building's roof, building owners should consider the identification or installation of permanent anchor points that would be evaluated by a professional engineer. Any anchor points identified or installed should be able to withstand a minimum load of 5,000 lb, as is considered adequate by the OSHA interpretation of the standard.

REFERENCES

1. Http://www.osha-slc.gov/OshDoc/Interp_data/I19981109.html

2. Code of Federal Regulations 29CFR 1926.502 (b), 1999 edition. U.S. Government Printing Office, Office of the Federal Register, Washington, D.C.

3. Code of Federal Regulations 29CFR 1926.20 (b) (4) and 1926.21 (b) (2), 1999 edition. U.S. Government Printing Office, Office of the Federal Register, Washington, D.C.

INVESTIGATOR INFORMATION

This investigation was conducted by Virgil Casini, Team Leader, Fatality Assessment and Control Evaluation Team, Surveillance and Field Investigations Branch, Division of Safety Research, NIOSH.