



**FATALITY ASSESSMENT AND CONTROL EVALUATION**

**Machinist Crushed by a Steel Spool while Working on a  
Hydraulic Lift Table  
Case Report: 04NY024**

**SUMMARY**

On May 3, 2004, a 49 year-old male machinist, who was employed by a machine shop, sustained fatal injuries as a result of being struck by a 1,800-pound steel spool that fell from a hydraulic lift table at a tissue paper plant. The hydraulic lift table was part of a section of a paper machine called a core extractor, or spool extractor. The machine shop had manufactured, assembled, and installed the spool extractor for the tissue paper company. On the day of the incident, a crew from the machine shop, including the victim, performed maintenance on the spool extractor. When the machine shop crew arrived at the extractor area, the spool was resting on two tracks. At the end of each track, there was a stopping mechanism (a stopper) to prevent the spool from falling off the track. In preparing to replace a damaged hydraulic hose under the table, the machine shop staff raised the lift table that was underneath the spool. The damaged hose was the main feed hose that pressurized the tilter, a device mounted on top of the lift platform for holding and stabilizing the spool. As the lift table was raised above the tracks, it raised the spool approximately 11 ¾ inches above the tracks and held it with the tilter. The hydraulic lift manufacturer required that all loads be removed and the lift blocked and supported by a maintenance “leg” prior to performing maintenance or entering the area under the platform. The machine shop staff neither removed the spool from the lift table nor lowered the lift platform to rest on the leg during maintenance. At approximately 1:45 p.m., a co-worker of the victim went underneath the lift to change the damaged hose. He used a wrench to loosen the hose and hydraulic fluid started leaking out. The tilter apparently lost its hydraulic pressure due to the release of the hose and the spool rolled off the tilter and struck the victim. According to the co-worker, the victim was adjacent to the lift, either squatting or bending towards it at the time of the incident. The co-worker did not see the spool strike the victim; he heard the spool hit the ground and saw the victim underneath the spool extractor. The co-worker yelled for help and plant personnel responded to the scene. They immediately lifted the spool off the victim with an overhead crane and called 911. Both the company nurse and the city paramedics responded to the scene within minutes. The victim was transported to a local hospital where he was pronounced dead.

New York State Fatality Assessment and Control Evaluation (NY FACE) investigators concluded that to help prevent similar incidents from occurring, employers should:

- *Develop and enforce safety policies or procedures that require workers to remove loads before beginning maintenance activities;*
- *Provide employee training and ensure workers follow manufacturer's requirements and recommendations when operating or performing maintenance on a machine; and*
- *Ensure that all energy control devices are securely locked and tagged before allowing workers to perform maintenance on a machine.*

**Additionally, the hydraulic lift table manufacturer should:**

- *Consider lengthening the maintenance leg, if feasible, to increase the amount of working space available during machine maintenance.*

## **INTRODUCTION**

On May 3, 2004, at approximately 1:50 p.m., a 49 year-old male machinist, who was employed by a machine shop, sustained fatal injuries as a result of being struck by a 1,800-pound steel spool that fell approximately six feet from a hydraulic lift table at a tissue paper plant. The hydraulic lift was part of a section of a paper machine called a core extractor, or spool extractor. The machine shop had manufactured, assembled, and installed the spool extractor for the tissue paper company. On the day of the incident, a crew from the shop, including the victim, performed maintenance on the spool extractor. NY FACE staff learned of the incident on May 4<sup>th</sup> from a newspaper article. On May 19<sup>th</sup>, a NY FACE investigator traveled to the tissue paper plant to survey the incident scene and to examine the equipment that was involved in the incident. Several days later, the investigator met with the owner of the machine shop and interviewed the co-worker who witnessed the incident. NY FACE staff also received investigative information from area offices of the federal Occupational Safety and Health Administration (OSHA), the city police investigator, and the coroner's office.

The victim's employer had been in business as a machine shop since 1984. The company employed eight full-time workers and one part-time worker who machine, fabricate, weld, paint, assemble, and install equipment by custom orders. The company manufactured paper machine parts and assembled several winding machines for paper companies.

The machine shop provided employee safety training in the form of monthly safety meetings. The topics that were discussed during these meetings included personal protective equipment use and machine guarding. Machine shop employees also attended host employers' safety meetings while working or performing service at clients' sites. According to the company owner, the machine shop had once received an on-site consultation from a New York State Department of Labor (NYSDOL) safety specialist.

The victim had been employed by the machine shop for four years as a machinist. His job duties included machining, installation, assembly, and providing customer service. The co-worker, who was working with the victim at the time of the incident, was also a machinist and had been employed with the machine shop for ten years. This was the company's first fatality.

## **INVESTIGATION**

Installation of the spool extractor was completed on March 28, 2004. Since then, the machine shop staff had gone back to the paper plant several times to provide services covered under product warranty, such as trouble shooting and preventive maintenance.

Located at the end of the tissue making line, the spool extractor unloads finished tissue rolls. It has three major components: a pair of tracks with stopping mechanisms at the ends, a hydraulic lift table and an extractor (Figure 1). A finished tissue roll on a spool travels downstream on the tracks that are 57 ½ inches high and is stopped at the end of the tracks by the stoppers. The hydraulic lift table, installed in a 17 ¾ inch-deep pit, lifts and raises the tissue roll to the height of the spool extractor so the spool can be retrieved by the extractor. The hydraulic table then lowers the tissue roll to ground level and releases the roll with a tilting device, or tilter.

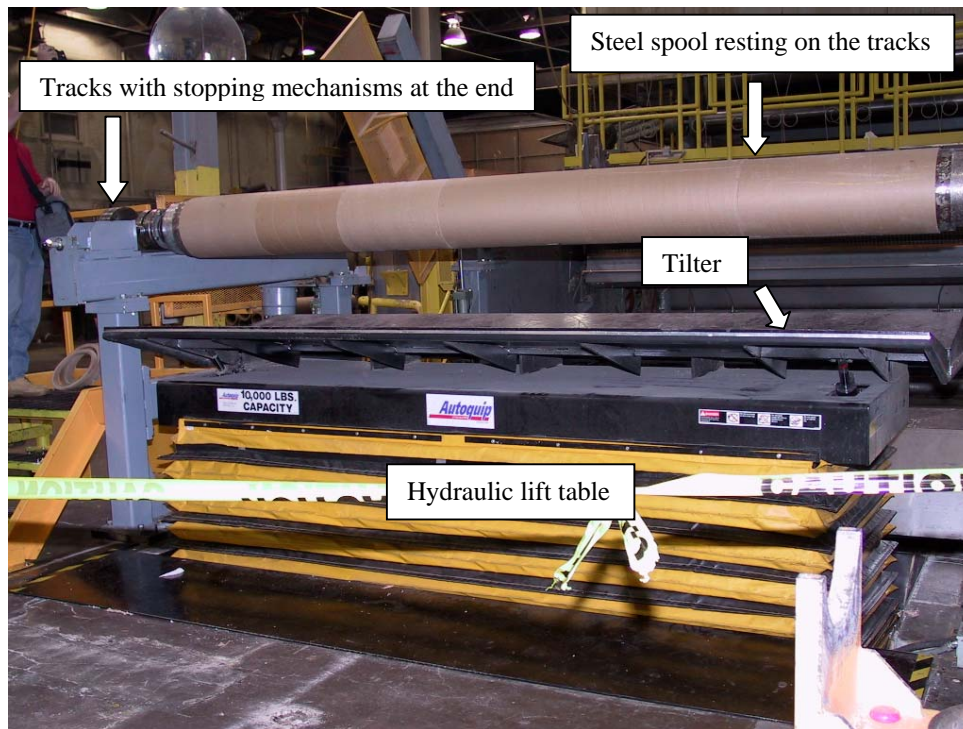


Figure 1. Frontal view of the core extractor (the extractor is at the right of the hydraulic lift and not shown in the picture) including the spool and the lift position prior to the incident. The spool was resting on the tracks with the stopping mechanisms, and the lift platform was below the tracks.

The equipment that was directly involved in the fatal incident was the hydraulic lift table. It was manufactured by a material handling equipment manufacturing company. The machine shop purchased the lift and assembled its hydraulic and electronic parts following the manufacturer's Installation, Operation and Service Manual. The hydraulic table has a lift capacity of 10,000 pounds and can rise to a maximum height of 87 inches. The platform (table) size is 42 by 112 inches. The tilter that is mounted on top of the platform has a fixed plate and a tilting plate (Figure 2). When picking up or holding a roll, the tilter forms a "V" to hold and stabilize load. During unloading, the tilting plate turns downward to form a slope of approximately 5° (degrees) so that a tissue roll can roll off the tilter to the floor.

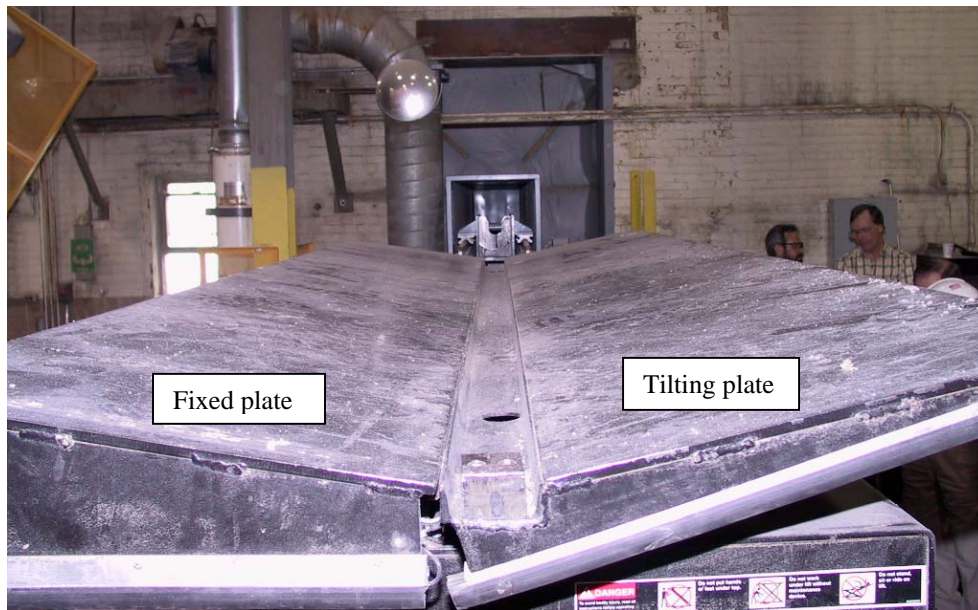


Figure 2. Tilter that was mounted on top of the lift platform.

On the day of the incident, a crew of four people from the machine shop, including the victim, the co-worker, a welder, and the owner, went to the paper plant at approximately 10:00 a.m. to provide service at the request of the plant. When the crew arrived at the unloading area, the spool extractor was shut down and there was a spool resting on the tracks. The machine shop owner locked the spool extractor's power control devices and the crew proceeded to work. They added a steel walk plate in the area to prevent tripping, rotated cylinders on the tracks, and fixed a pressure sensitive switch under and around the lift skirt. The crew performed diagnostic testing to troubleshoot an extractor problem reported by the plant. It was determined that the cause of the problem might be in the lift table. The lift platform needed to be raised to allow a worker to get under the platform.

The Service Manual provided by the lift manufacturer required that all loads be removed from the lift platform prior to anyone going under the lift platform or performing any maintenance on the lift. The lift also had to be blocked and supported by a maintenance "leg", which was a steel pipe.

There was an overhead crane available in the unloading area and the machine shop staff had been authorized by the plant to use the crane. However, the machine shop crew did not use the crane to remove the spool from the table since it would be needed for testing the extractor later. The crew raised the lift table to approximately 74 inches above ground level. As the lift table rose above the tracks, it picked up the spool and held it with the tilter. The spool was raised approximately 11 ¾ inches above the tracks (Figure 3).

The maintenance leg was set up, but the lift was not lowered to rest in the leg socket as required by the manufacturer. The length of the maintenance leg was 48 inches. If the lift had been lowered to fully rest in the leg socket, the height of the workspace underneath the platform would have been approximately 43 inches. According to the machine shop staff, the space would have been too cramped to perform the task.



Upon looking underneath the platform, the owner observed a damaged hydraulic hose. The damaged hose was the main feed hose to the two cylinders that pressurized the tilting plate. Realizing that the work was more expansive than he had originally thought, the owner decided to let the crew take a break. He unlocked the machine power switch after the rest of the crew left the unloading area. The welder left the plant during the break.



Figure 3. During the incident, the steel spool was above the stopping mechanism on the tracks and only held by the tilter.

At approximately 1:45 p.m., the victim, the co-worker and the owner resumed working after the break. The extractor power switches were not locked after the lunch break. The lift table setting was not changed until after the incident. Prior to the incident, the owner left the plant to get a flashlight for the crew and did not return until 15 minutes after the incident. The co-worker proceeded to replace the damaged hose while the victim provided assistance.

While the co-worker was under the platform, he asked the victim to hand him a wrench to release the hose and a bucket to catch the hydraulic fluid. According to the co-worker, when the victim was handing him the wrench and the bucket, he asked the victim: “Is the spool secure?” The victim answered “Yes”. The co-worker discovered that the wrench was the wrong size and asked the victim to hand him another wrench. At that time, the co-worker asked the victim a second time whether the spool was secure, and the victim answered “Yes” a second time.

The co-worker began loosening the hose with the wrench and the hydraulic fluid started leaking out. The co-worker heard the lift creaking. At that time he could partially see through the lift skirt that the victim was facing the lift, either bending or squatting with one hand on the lift. The co-worker did not see the steel spool strike the victim. He heard the spool hit the ground and saw the victim underneath the extractor. It appears that the tilter lost its hydraulic pressure as the damaged hose was released and the tilting plate came downward. The spool rolled off the tilter and hit the victim.

The co-worker got out of the lift table pit and yelled for help. The plant personnel responded to the scene. They immediately lifted the spool off the victim with an overhead crane and called 911. Both the company nurse and the city paramedics responded to the scene within minutes. The victim was transported to a local hospital where he was pronounced dead.

## **CAUSE OF DEATH**

The cause of death was listed on the death certificate as trauma arrest due to or as a consequence of multiple internal trauma.

## **RECOMMENDATIONS/DISCUSSION**

**Recommendation #1:** *Employers should develop and enforce safety policies or procedures that require workers to remove loads before beginning maintenance activities.*

Employers should establish a safety policy or procedure that requires workers to remove loads that may endanger them prior to beginning equipment maintenance. This policy should be incorporated into the company's machine operation and maintenance safety manual. Companies should ensure that workers follow these safety procedures through proper training and close supervision.

**Recommendation #2:** *Employers should provide employee training and ensure workers follow manufacturer's requirements and recommendations when operating or performing maintenance on a machine.*

**Discussion:** In the lift service manual, the lift manufacturer warned of the danger of going under a loaded lift platform and required users to remove all loads and securely support the platform with the maintenance leg. Neither of the requirements was followed in this case. Prior to allow employees to operate or perform maintenance on a new piece of equipment, it is important to train the workers to follow manufacturer's requirements and recommendations. The training should cover the following subjects:

- operating instructions, warnings, and precautions specified by the manufacturer in the operation and maintenance manual;
- locations and functions of electrical and hydraulic controls, instrumentation, safety switches and interlocks;
- equipment capacity;
- any required equipment inspection and maintenance;
- operating limitations; and other unique or potentially hazardous conditions associated with each maintenance task that could affect the safe operation of the equipment.

If using a safety device such as the maintenance leg hinders a worker's ability to perform a task, the manufacturer should be consulted for alternative solutions.

**Recommendation #3:** *Employers should ensure that all energy control devices are securely locked and tagged before allowing workers to perform maintenance on a machine.*

**Discussion:** At the time of the incident, the core extractor's energy control switches were not locked when the machine shop workers serviced the machine. Although the breach in

lockout/tagout procedure did not directly contribute to this incident, it could have caused severe injury or death due to accidental energization of the equipment. Employers should ensure that a written lockout/tagout procedure is developed and strictly implemented. Workers should receive refresher training periodically.

**Recommendation #4:** *The lift manufacturer should consider lengthening the maintenance leg, if feasible, to increase the amount of working space available during machine maintenance.*

**Discussion:** When the lift platform was lowered and set in the leg socket, the height of the working space under the platform was approximately 43 inches. Some workers may be reluctant to use the safety device because the cramped space may make it difficult for them to perform certain tasks. The lift manufacturer should consider increasing the length of the maintenance leg to create a larger workspace under the platform.

**Keywords:** *machinery, manufacturing, lockout/tagout, struck by*

The Fatality Assessment and Control (FACE) program is one of many workplace health and safety programs administered by the New York State Department of Health (NYS DOH). It is a research program designed to identify and study fatal occupational injuries. Under a cooperative agreement with the National Institute for Occupational Safety and Health (NIOSH), the NYS DOH FACE program collects information on occupational fatalities in New York State (excluding New York City) and targets specific types of fatalities for evaluation. NYS FACE investigators evaluate information from multiple sources. Findings are summarized in narrative reports that include recommendations for preventing similar events in the future. These recommendations are distributed to employers, workers, and other organizations interested in promoting workplace safety. The FACE program does not determine fault or legal liability associated with a fatal incident. Names of employers, victims and/or witnesses are not included in written investigative reports or other databases to protect the confidentiality of those who voluntarily participate in the program.

Additional information regarding the New York State FACE program can be obtained from:

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[www.health.state.ny.us/nysdoh/face/face.htm](http://www.health.state.ny.us/nysdoh/face/face.htm)