



The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces  
through safety and health research



# Mill Operator Dies From Injuries Received After His Upper Torso Was Caught Between Lamination Rollers – Tennessee

FACE 9502

## SUMMARY

A 34-year-old male mill operator (the victim) died after his upper torso was caught between two rollers. The victim was operating the lamination machine at a facility that produced rubber compounds. The production process began with the loading of raw rubber through a series of rollers while fibrous material was simultaneously loaded through a separate series of rollers. The materials ran through a graduated series of machines—rough trim rollers, ply rollers, and a set of final trim rollers. Although a machine shut-off safety tripwire cable was present in the area where the victim was working, the device was inoperative. The event was unwitnessed; however, it is assumed that, as the victim was removing excess material from around the final trim rollers his hand became caught between the two rollers, which pulled his arm and upper torso between the rollers. A co-worker, walking by the area, looked over and saw the victim caught in the rollers and immediately notified the supervisor who summoned the plant nurse. The nurse arrived and checked for vital signs, found none, and called for the local ambulance. In the interim, the idler roller was disassembled, to free the victim. When he was freed, the nurse performed cardiopulmonary resuscitation (CPR) until the arrival of the ambulance. The emergency medical services personnel arrived in about 5 minutes, continued CPR, and transported the victim to the local hospital where he was pronounced dead by the attending physician. NIOSH investigators concluded that, in order to prevent similar incidents, employers should:

- **ensure that emergency shut-off devices (safety tripwire cables) are checked for proper operation prior to each shift**
- **provide machine guarding to prevent operators from having any parts of their bodies in the danger zone during the operating cycle**
- **consider the use of special hand tools for placing and removing materials in the area where work is actually performed upon the material being processed.**

## INTRODUCTION

On November 1, 1994, a 34-year-old male mill operator (the victim) died after his upper torso was caught between two rollers on the lamination machine he was operating. On November 2, 1994, officials of the Occupational Safety and Health Administration of the State of Tennessee (TOSHA) notified the Division of Safety Research (DSR) of this fatality, and

requested technical assistance. On November 16, 1994, a DSR safety specialist conducted an on-site investigation. The incident was reviewed with TOSHA officials, employer representatives, and the county coroner. A schematic of the lamination machine and the report of death record were obtained during the investigation.

The employer was a manufacturing facility that produced rubber compounds which were ultimately used in the manufacture of automobile parts. The facility was divided into three divisions; rubber, plastics, and sponge rubber. The facility's safety department was comprised of a safety director, three safety coordinators (one for each division), three nurses, and one industrial hygienist. The facility had been in operation for 39 years and employed 1,250 workers. The employer had a written safety policy and written safe work procedures, however, they did not address the specific work task that was being performed by the victim at the time of the incident. The safety orientation for that specific task was said to have been provided verbally. Monthly safety meetings were conducted by the shift supervisors at the start of each shift. Workers received training on the job, and the victim had trained other employees on the operation of the lamination machine. The company had experienced one additional fatality 4 years ago. The victim had worked for the employer for 12 years.

## INVESTIGATION

On the day of the incident, personnel at the facility were, as usual, engaged in the production of fabricated rubber compounds. The facility operated on two 8-hour production shifts, and eight workers were performing separate tasks in the lamination work area of the rubber division, on the 7 to 3 p.m. shift. The process of laminating rubber compounds with a fibrous material started with the feeding of raw rubber into a set of rollers while fibrous material was simultaneously fed into a separate set of rollers. The two materials would first run through rough trim rollers and then through ply rollers, where they would be combined to form a laminated sheet. After processing through the ply rollers, the laminated sheet would pass under an idler roller and lastly through a final trim roller, which would cut off any excess material (Figure). At that point, the lamination machine operator would have to bend over, or crawl, under the final trim roller, which was 35 inches above the floor, and remove the excess material by hand and deposit it onto a conveyor which transported it back into the system. The final trim roller was about 5 inches from the idler roller, and material was being processed at about 30-feet per minute (9 RPM) through the system. Two emergency-stop safety tripwire cables (metal wires attached to stationary supports which ran through a series of eye bolts and attached to the handle of the machine's electrical circuit box) were positioned about 16 inches above and slightly to the left of the final trim roller, and about 21 inches from the center line (CL), which was between the idler and final trim rollers and directly beneath the two ply rollers. The tripwire cable above the final trim roller was inaccessible while the victim was under the final trim rollers, and the other tripwire, although accessible, was inoperative. At the time of the incident, although unwitnessed, the victim was apparently under the final trim roller removing excess material when his right hand became caught between the final trim roller and the idler roller which pulled his arm and upper torso between the rollers. A co-worker, walking by the area, noticed the machine was not running and upon closer observation he saw the victim caught in the rollers. He immediately notified the supervisor who summoned the plant nurse. Note: it is unclear at this time whether the machine was stopped by another employee, or the machine's electrical system became overloaded and the circuit breaker tripped, shutting off the machine. The nurse arrived and checked the victim for vital signs; she found none, and called for the local ambulance. In the interim, the idler roller was disassembled to free the victim. When the victim was freed, the nurse performed cardiopulmonary resuscitation (CPR) until the arrival of the ambulance. The emergency medical services personnel arrived in about 5 minutes, continued CPR, and transported the victim to the local hospital where he was pronounced dead by the attending physician.

## CAUSE OF DEATH

The attending physician listed the cause of death as severe upper torso crushing injuries.

## RECOMMENDATIONS/DISCUSSION

**Recommendation #1: Employers should ensure that emergency shut-off devices (safety tripwire cables) are checked for proper operation prior to each shift.**

Discussion: The machine was equipped with two emergency shut-off devices (tripwire cables) that were connected to the machines' electrical circuit box. Although only one wire was accessible to the victim because of its proximity to the rollers, that tripwire device was inoperable. Emergency shut-off devices should be checked prior to each work shift to ensure their dependability. If such devices are found to be inoperable, the machine should not be started until the appropriate personnel are contacted and necessary repairs made.

**Recommendation #2: Employers should provide machine guarding to prevent the operator from having any part of the body where work is being performed upon the material being processed.**

Discussion: Because of the ever-present danger of entanglement when working near moving machinery components, employers should continually strive to protect employees by providing machine guarding in the areas where work is actually performed upon the material being processed. The laminating machine was put into operation around 1979 and is still operating as originally set up. Advances in engineering technology may be such that machine guarding may be applicable to this particular machine. Employers should contact machine manufacturers and retrofit, if applicable, guards that prevent any part of the body from contacting the machines moving parts.

**Recommendation #3: Employers should consider the use of special handtools for placing and removing materials in the area where work is actually performed upon the material being processed.**

Discussion: The victim was apparently removing excess material from around the final trim roller when his right hand became caught between the final trim roller and the idler roller. Employers should explore the application of special hand tools (e.g., gripping devices) for jobs requiring personnel in proximity to moving machine parts.

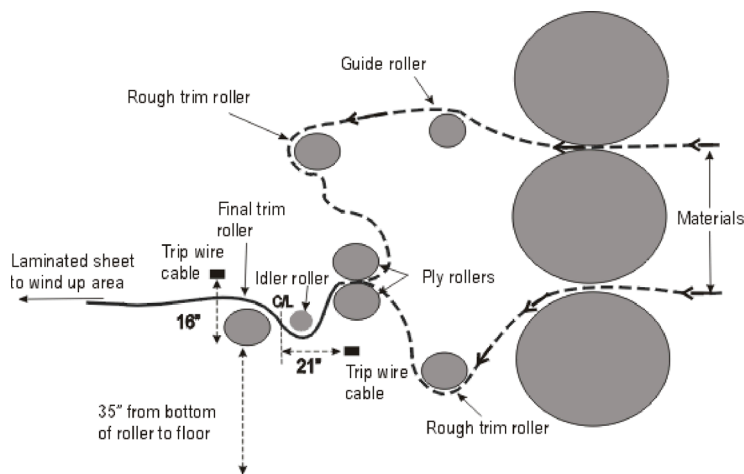


Figure.

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