



# STATE OF NEW YORK DEPARTMENT OF HEALTH

## FATALITY ASSESSMENT AND CONTROL EVALUATION

### Worker Fatally Injured by Steel Blade While Cleaning a Dough Machine

Case Report: 02NY096

#### SUMMARY

On December 21, 2002, a 54 year-old Taiwanese male food production worker, who was employed by a pizza dough manufacturing facility, sustained fatal injuries as a result of deep neck lacerations made by a steel blade on a dough machine. On the day of the incident, the victim and a co-worker were assigned to clean two dough machines, an “elevator” and a “divider”. The “elevator” had three major components: a lifting mechanism, a hopper, and a steel blade (“dough chunker”) that was located at the bottom of the hopper. The facility’s lockout/tagout procedure required an operator to set the control buttons of the “dough chunker” to “Off” and “Manu” before turning off the main power switches. Prior to the incident, the victim turned off and locked the power switches, but left the “dough chunker” controls set to “On” and “Auto”. The victim and the co-worker then proceeded to clean the machines. At approximately 4:15 PM, the co-worker was ready to clean the dough bowl on the “elevator”. In order to clean the outside of the bowl, he had to have the bowl raised by the “elevator”. He went to the victim and asked him for the key to unlock the main power switch to the “elevator”. At this point the victim was in the middle of cleaning the inside of the “elevator” hopper. He was standing on a metal stair, bending over and extending his head through the bottom opening of the hopper and wiping the inside of the hopper with a rag. When asked, the victim gave his key to the co-worker. The co-worker walked to the control panel, unlocked the main power switch, turned it on, and started raising the bowl. A few seconds later, the co-worker heard noises made by the victim. He immediately pushed the emergency stop button to stop the machine. The co-worker rushed to the victim and saw that the victim appeared to be partially decapitated from behind by the energized steel blade. The co-worker called the shift supervisor for help. The shift supervisor summoned the paramedics who arrived within five minutes. The victim was pronounced dead at the scene and was transported from the accident site to a local hospital morgue.

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

- ***Conduct periodic inspections to ensure that company lockout/tagout procedures are being strictly followed;***

- *Update the company's lockout/tagout program to include specific shutting down procedures for the "elevator";*
- *Modify the cleaning procedure to avoid placing the workers' body into the point of operation;*
- *Install interlocks to eliminate possible human errors during machine maintenance and sanitation;*
- *Provide immediate employee retraining to ensure that the workers understand the key elements of the lockout/tagout program.*

## INTRODUCTION

On December 21, 2002 at approximately 4:15 PM, a 54 year-old Taiwanese male food production worker, who was employed by a pizza dough manufacturing facility, sustained fatal injuries as a result of being partially decapitated by a steel blade on a dough machine. New York FACE (NY FACE) staff initially learned of the incident through a newspaper article on December 23, 2002. On January 8, 2003, a NY FACE investigator conducted a fatality evaluation at the pizza dough manufacturing facility. During the site visit, the NY FACE investigator interviewed the company's plant manager, maintenance manager, and safety coordinator, observed the dough making operations, examined the equipment that was involved in the incident, and reviewed the company's written safety and health programs and the employee training records. The witness to the incident was not available for an interview. Additional information was gathered from the Occupational Safety and Health Administration (OSHA) compliance officer who investigated the fatal incident. The Medical Examiner's report was also reviewed.

The pizza dough manufacturing facility had been in business since 1997. At the time of the incident, 35 non-union workers were employed at the facility. The plant ran a ten-hour shift starting at 7:00 AM. The daily production rate was about 50,000 pieces of pizza dough. Besides making dough, the workers also spent approximately two hours each day sanitizing and cleaning all the dough-making equipment. Workers were required to wear hard hats, safety glasses, ear plugs, gloves, steel-toed shoes, hairnets, and lab coats at work.

The plant safety coordinator was in charge of implementing the corporate safety and health programs. The written programs included hazard communication, lockout/tagout, forklift safety, ladder safety, emergency evacuation, and personal protective equipment. The facility had a safety committee that conducted monthly safety inspections and held monthly meetings. New hires received an 8-hour orientation training on all of the above subjects. Annual refresher training was provided to all employees.

The lockout/tagout training included viewing a 35-minute video in English, text training, and hands-on training. Each production worker was provided with multiple locks and tags that were printed with the worker's name and photo. During hands-on training, workers were taken to various machines in the plant to learn how and where to lock and tag the equipment. According to the plant manager and the safety coordinator, all the workers were taught how to shut down a machine and isolate its energy source, release any potentially hazardous stored energy, test to verify if the energy source was isolated, and lock the energy control device securely in the "Off" position.

The victim had moved to the United States in 1997 after retiring from a teaching job in Taiwan. He was hired as a food production worker by the pizza dough manufacturing facility in 2000. It was his first and only employment in the United States. The victim's co-worker had been employed by the company for five years as a food production worker at the time of the incident.

Besides the victim, there were two other Mandarin Chinese speaking workers employed at the facility at the time of the incident. During some of the training sessions, the victim's employer had hired professional translators from a local firm to translate the content of the written training material into Mandarin Chinese. There were no translating services provided during the hands-on training sessions. The interpreter who provided the translating services recalled that the victim could understand certain subjects, while he needed help in others. The plant safety coordinator felt that the victim understood English fairly well.

According to the company training record, the victim received his last lockout/tagout refresher training on December 19, 2002, two days before the fatal incident. Translating service was not provided during that training. This was the company's first workplace fatality.

## **INVESTIGATION**

The dough making line was composed of a hoist, two electric mixers, four dough machines, and a tray conveyer belt. During the dough-making process, dough flour was mixed with water by electric mixers; dough machines weighed, cut, divided and shaped the dough into pizza dough. The finished dough was loaded on trays, packaged, and transported into a cooler for storage or shipping.

The first of the four dough machines was called an "elevator". The "elevator" was electrically powered and had three major components: a lifting mechanism, a hopper, and a sharp steel blade called the "dough chunker" (see Figure 1). The "elevator" raised the dough in a mixing bowl and dumped it into the hopper. The "dough chunker", located at the bottom of the hopper opening, was powered by an electrical motor (3/4 HP). When activated, the blade moved back and forth at a speed of approximately six inches per second, cutting the dough falling from the hopper. The dough then went into a "divider" hopper underneath the "dough chunker". The "divider" was the next dough machine after the "elevator" in the dough making line.

The "elevator" control panel is shown in Figure 2. There were a total of seven buttons and switches. The main power switch was a spring-loaded mechanical lever switch that had "On" and "Off" positions. The lifting mechanism of the "elevator" was controlled by the main power switch and the two "elevator" control buttons. The "dough chunker" was controlled by the main power switch, and the three "dough chunker" buttons. If the main power switch was off, the "elevator" had no power. If the main power switch was on, depending on the different "dough chunker" control settings, the "dough chunker" could either cut automatically or have no movement at all (see Table 1).

**Table 1.** Chunker movements resulting from different combinations of control settings when the main power switch is on

<b>“Dough Chunker”  (“On” or “Off”)</b>	<b>“Dough Chunker”  (“Auto” or  “Manual”)</b>	<b>Resulting “Dough Chunker” Movements</b>
On	Auto	Activated by a sensor in the “divider” or automatic cutting cycle every 20 to 30 seconds
On	Manual	No movement unless manually handled
Off	Auto	No movement
Off	Manual	No movement

During normal production, the “dough chunker” was mostly set to the “On” and “Auto” modes, and was activated by a sensor located inside the “divider” hopper underneath the blade. The sensor would signal the steel blade to cut based on the amount of dough in the hopper. If the “divider” was turned off and the sensor was not activated, the blade would go through its automatic cutting cycle every 20 to 30 seconds.

The company lockout/tagout program required a “three-point lockout” for the “elevator” and the “divider”: the main power switches of the “elevator” and the “divider” and a lubricating pump for the “elevator” and the “divider” had to be turned off and locked. One important step before turning off the main power switches was to turn off the “dough chunker” and set it to manual mode. According to the plant’s management, all workers received hands-on training on this specific shut down procedure. However, the company did not have this procedure in writing in the “elevator” lockout/tagout manual.

On the day of the incident, production stopped around 3:30 PM and the workers started daily sanitation of the dough equipment. The victim and the co-worker were assigned to clean the “elevator” and the “divider”. Before starting the sanitation, the victim turned off and locked the power switches of the two machines. However, the first two “dough chunker” buttons were left on “On” and “Auto”. The two workers then started routine sanitation of the machines. They first pushed the “divider” hopper back so that they could clean the “elevator” hopper from underneath. They removed all the plastic liners from the hoppers and brought them to a sink for rinsing and cleaning. At approximately 4:15 PM, the co-worker was about to clean the dough bowl. In order to clean the outside of the bowl, he had to have the bowl raised by the “elevator”. He went to the victim and asked him for the key to unlock the main power switch of the “elevator”. At this point the victim was in the middle of cleaning the inside of the “elevator” hopper. He was standing on a metal stair, bending over and extending his head through the bottom opening of the hopper and wiping the inside of the hopper with a rag. When asked by his co-worker, the victim handed out his key. The co-worker took the key, walked to the control panel, unlocked the main power switch, turned it on, and started raising the bowl. A few seconds later, the co-worker heard noises made by the victim and immediately pushed the emergency stop button to stop the machine. The co-worker rushed to the victim and found that the victim appeared to be partially decapitated from behind by the energized chunker blade as it went through its automatic cutting cycle. The co-worker called a shift supervisor for help. The shift supervisor summoned the paramedics who arrived within five

minutes. The victim was pronounced dead at the scene and was transported from the accident site to a local hospital morgue.

After the incident, the plant immediately disabled the steel blade's auto function. The management decided that the machine would remain in manual mode until they could come up with better solutions to make the machine safer.

## **CAUSE OF DEATH**

The cause of death was listed by the Medical Examiner as massive blood loss, exsanguination due to or as a consequence of a deep laceration to the upper left neck.

## **RECOMMENDATIONS/DISCUSSION**

**Recommendation #1:** *Conduct periodic inspections to ensure that company lockout/tagout procedures are being strictly followed.*

**Discussion:** Because lockout/tagout procedures are performed daily, workers may become complacent about the procedure, and not appreciate the potential hazards of placing their body into a point of operation. The employer should increase supervision to ensure that workers strictly follow the company's lockout/tagout requirement and do not take short cuts. Both periodic scheduled and random non-scheduled inspections should be conducted. The results of each inspection should be documented and shared with managers and workers to raise awareness and alertness levels.

**Recommendation #2:** *Update the company's lockout/tagout program to include specific written procedures for each machine.*

**Discussion:** The company lockout/tagout program at the time of the incident did not have the specific "elevator" shut down procedure in writing. The employer should evaluate all dough making machines and develop specific lockout/tagout written procedures for each machine. The written procedures may include orderly shutting down, testing to ensure that the equipment is isolated from its energy source, releasing potential stored energy, and locking and tagging out the energy isolation device. Certain machines, such as the "elevator" have multiple control buttons and switches that are to be properly set during an orderly shut down. A chart showing the lockout positions of all the control buttons and switches may be placed next to each control panel.

**Recommendation #3:** *Modify the cleaning method for the "elevator" to avoid placing the workers' body into the point of operation*

**Discussion:** The standard "elevator" sanitation procedure should be modified to avoid placing the workers' body into the point of operation. For example, cleaning may be performed from above the top hopper opening using a brush with a handle. Workers should receive training on the modified cleaning procedure.

**Recommendation #4: *Install interlocks to eliminate possible human errors during machine maintenance and sanitation.***

**Discussion:** The employer should explore and research options for installing interlocks on the dough equipment to eliminate human errors during the lockout process. For example, the “divider” hopper could be interlocked with the “elevator”. Therefore, when the “divider” hopper is pushed back during cleaning or maintenance, there would be no power to the “elevator”. Only when the “divider” hopper is back to its normal production position, which means that the sanitation or maintenance is complete, can the power to the “elevator” be restored.

**Recommendation #5: *Provide immediate employee retraining to ensure that the workers understand the key elements of the lockout/tagout program.***

**Discussion:** Immediate employee retraining should be provided in the event of an incident, a near miss incident, or changes in the lockout/tagout program, production procedures, or the equipment to ensure that the workers understand the key elements of the lockout/tagout procedure. The training should be presented in a language and literacy level that all employees comprehend. For workers whose native language is other than English, translating services should be provided during both text training and hands-on training. Refresher training courses should be provided regularly. Tests, in the form of both written and hands-on demonstration, may be administered to evaluate whether a worker has mastered the key elements of the lockout/tagout procedure.

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

**REFERENCES**

CFR. Code of Federal Regulations [2002]. 29 CFR 1910.147, Control of Hazardous Energy (Lockout/Tagout). Washington, D.C.: U.S. Government Printing Office, Office of the Federal Register.

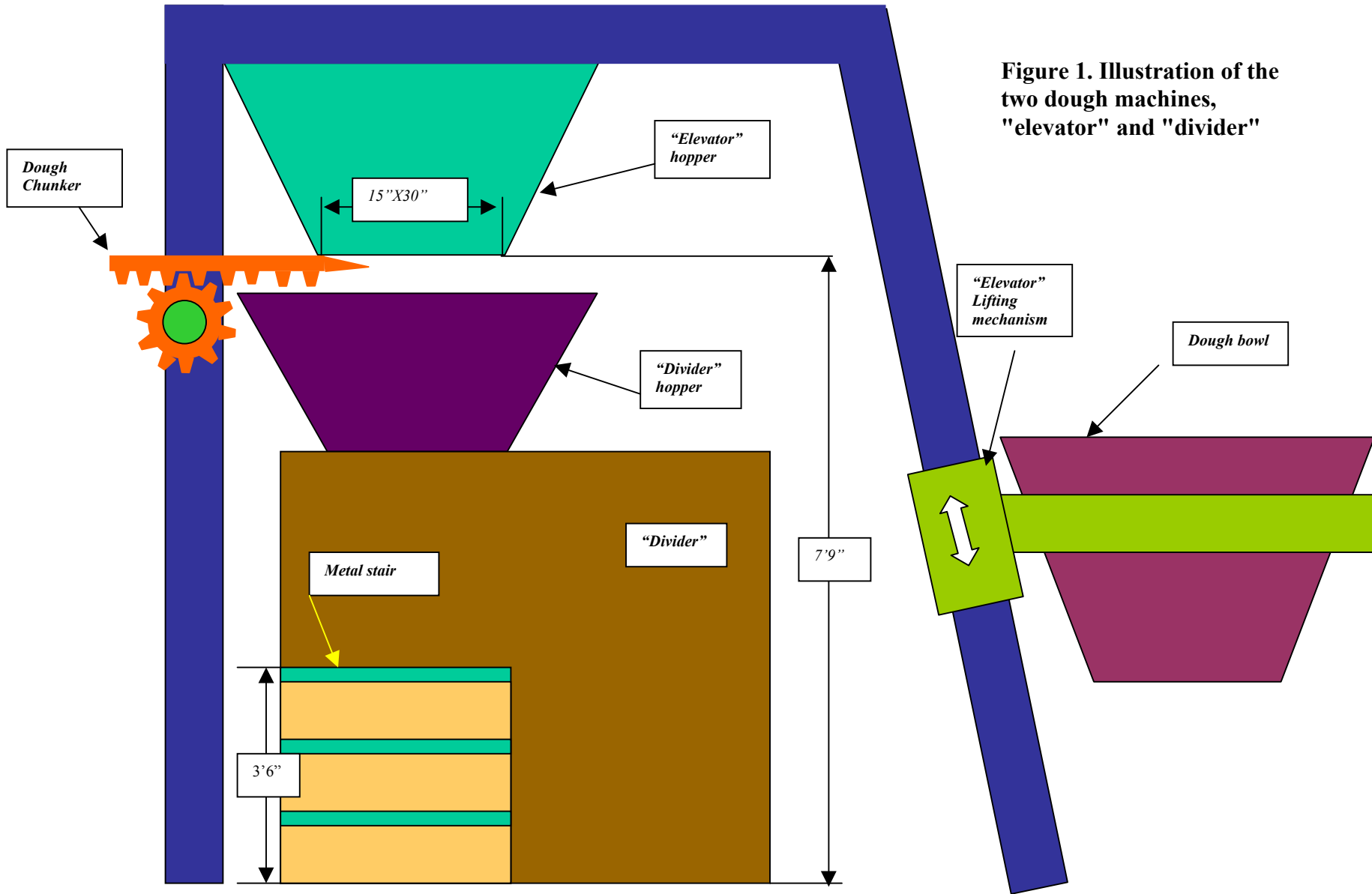
The Fatality Assessment and Control (FACE) program is one of many workplace health and safety programs administered by the New York State Department of Health (NYS DOH). It is a research program designed to identify and study fatal occupational injuries. Under a cooperative agreement with the National 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:

New York State Department of Health FACE Program  
Bureau of Occupational Health  
Flanigan Square, Room 230  
547 River Street  
Troy, NY 12180

1-866-807-2130

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



**Figure 1. Illustration of the two dough machines, "elevator" and "divider"**





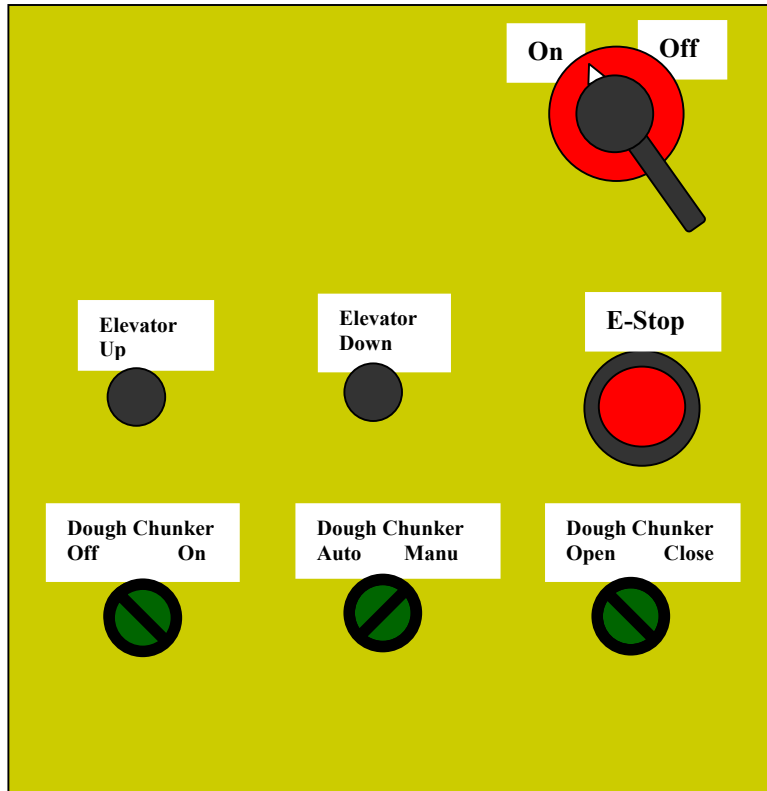


Figure 2. Illustration of the “elevator” control panel