

# CASE 2

## WORKER'S PALM GETS CRUSHED

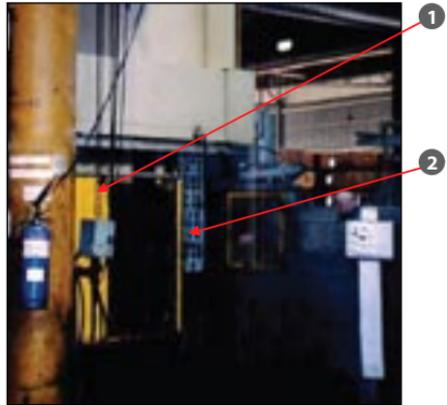
### Agent/Process

Die-casting machine.

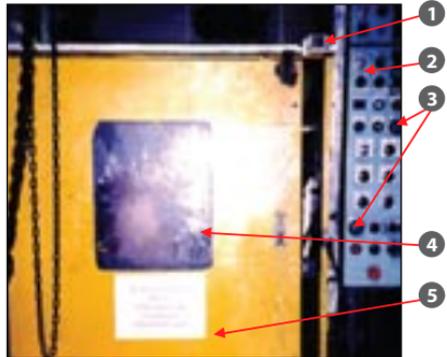
### Description of Accident

A worker closed the sliding door of a machine and started the machine in the "automatic" mode of operation via two-hand control buttons. As the die-casting process was about to complete its first cycle of operation, the worker saw through the looking glass that a piece of overflow chip was stuck on the ejector pin of the moving die. While the machine was still in the automatic mode of operation, the worker opened the sliding door.

At that time, the dies were in the "open" position. Using a spanner held in his right hand, he knocked off the overflow chip from the moving die. Suddenly, the moving die closed onto the fixed die prior to the commencement of the machine's second cycle of operation. The injured was not able to retract his hand in time and his right palm was caught in between the die and was crushed.



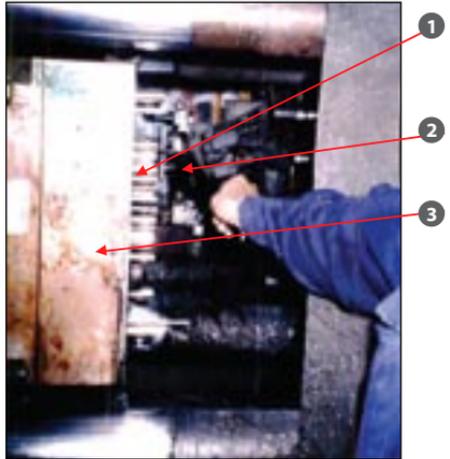
1. Sliding door
2. Control panel



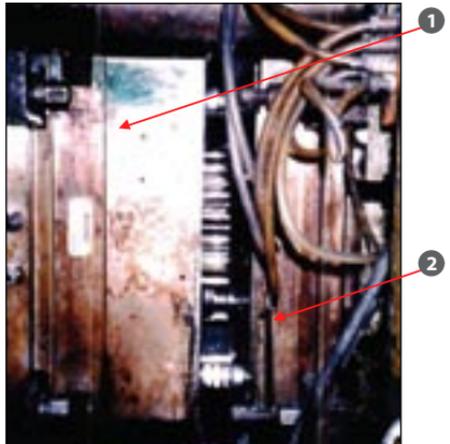
1. Limit switch  
\* Installed after the accident
2. Control panel
3. Two hand control buttons
4. Looking glass
5. Sliding door

## Observations and Findings

- The sliding door was not fitted with any interlock which would have stopped the machine when the door was opened during the automatic mode of operation.
- Need for the safety interlock on the sliding door was highlighted before the accident but the installation was not carried out due to the different electrical control circuitry from the other die-casting machines.
- The worker had been trained to stop the machine first before attempting to access the die area. The worker bypassed the procedure of placing the machine on the manual mode of operation prior to opening the sliding door to access the die.



1. Ejector pins
2. Spanner
3. Moveable die



1. Moveable die
2. Stationary die

## Lesson Learnt

Risk Assessment	<ul style="list-style-type: none"><li>• Risk assessments must be carried out prior to work operations.</li></ul>
Safe Work Procedure	<ul style="list-style-type: none"><li>• Safe work procedures must be developed and implemented.</li></ul>
Equipment and Tools	<ul style="list-style-type: none"><li>• The machine should be fitted with safety interlocks to stop the machine whenever the door is opened during an operation.</li><li>• Preventive maintenance of interlocking devices should be put in place to ensure that such devices do not breakdown.</li></ul>
Others (Process design, etc.)	<ul style="list-style-type: none"><li>• The operator should have stopped the machine before opening the door to access the die.</li></ul>

# CASE 5

## WORKER GETS KILLED BY A STEEL MESH MACHINE

### Agent/Process

Grouting work at a steel mesh machine.

### Description of Accident

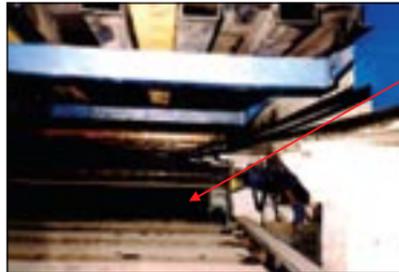
A worker and his co-worker were sent to work on a steel mesh machine. On their third day, work had to be done in the fenced part of the machine. After some time, the co-worker left the work area to restock on cement. When he returned, he found the worker lying beneath the steel mesh machine. The worker was sent to the hospital and subsequently succumbed to his injuries. His cause of death was recorded as “acute respiratory distress syndrome” and “fractured ribs and pulmonary contusions”.

### Observations and Findings

- The steel mesh machine was fenced and various parts of the machine within the fencing could move in various directions when activated.
- Two sliding gates were part of the fencing. The gates were provided with interlocking sensors. However, the interlocking sensors were not connected and hence not in working order.



1. The accident happened here



1. The deceased was found on the floor underneath the machine here

- Testing and commissioning of the wire mesh machine was being carried out when the accident happened. There was no instruction given that testing and commissioning of the machine should only be carried out when there was no other work being done at the machine.
- Workers testing the machine could not see workers involved in grouting work.
- The factory owner had failed to lock out/tag out the machine while grouting work was carried out at the machine.

### Lesson Learnt

Risk Assessment	<ul style="list-style-type: none"> <li>• Risk assessments must be carried out prior to work operations.</li> </ul>
Safe Work Procedure	<ul style="list-style-type: none"> <li>• Safe work procedures must be developed and implemented; i.e. Procedure for Testing and Commissioning and Procedure for Lockout/Tagout.</li> </ul>
Work Planning	<ul style="list-style-type: none"> <li>• Testing and commissioning should not be carried out at the same time as grouting work.</li> </ul>
Equipment and Tools	<ul style="list-style-type: none"> <li>• Safety interlocking sensors should be working at all times.</li> </ul>
Training and Awareness	<ul style="list-style-type: none"> <li>• All workers involved must be briefed on and understand the hazards and risks involved and the contents of safe work procedures.</li> </ul>
Coordination and Communication	<ul style="list-style-type: none"> <li>• All workers should be cleared away from the machine before conducting testing and commissioning of machine.</li> </ul>

# CASE 7

## WORKER'S TWO FINGERS GET SEVERED

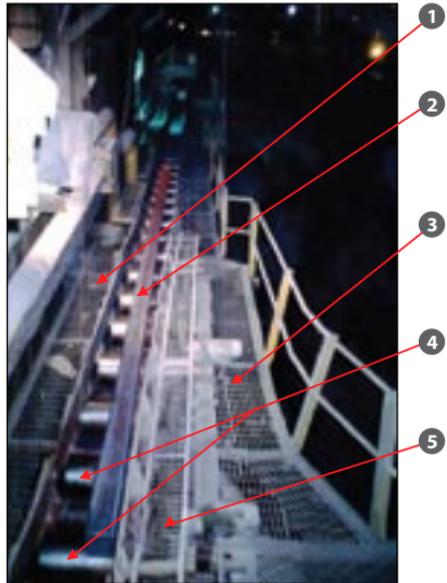
### Agent/Process

Inspection of a billet roller conveyor system that transported billets manufactured from a continuous casting machine to a rolling mill. It primarily consisted of rollers driven by motors via a belts-and-pulleys transmission system.

### Description of Accident

The worker was inspecting the billet roller conveyor system when he heard an abnormal sound coming from one of four rollers driven by a motor. He climbed onto the inner walk platform to identify the roller which generated the abnormal sound with his left hand holding a torchlight.

While moving along the inner walk platform to detect the source of the abnormal sound, the worker hit against a cable tray at his right buttock cheek. He lost his balance and fell forward. As he fell, his left lower arm hit against the top side protective cover while his right hand went under the protective cover and was caught in between the nip point of the v-belts and two-sheaves pulley of the roller. He suffered severance of his right index finger and right middle finger. He also suffered laceration on his right ring finger.

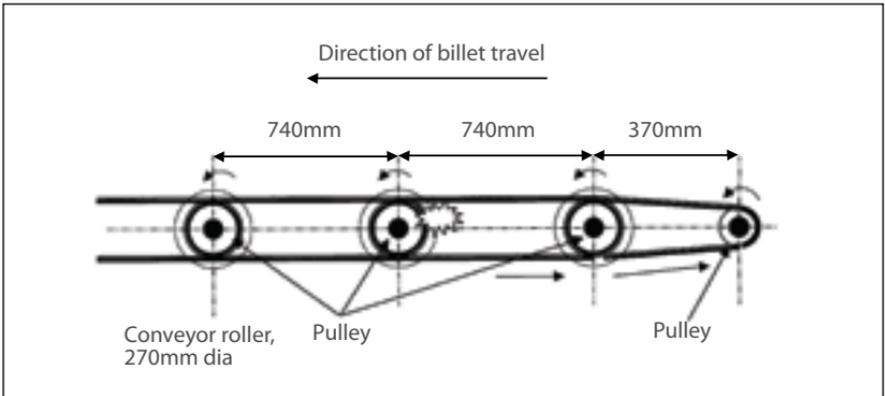


1. Inner walk platform
2. Billet
3. Outer walk platform
4. Rollers
5. Protective cover

### Observations and Findings

- There was inadequate fencing provided on the belts and pulleys system driven by the motor.
- The worker was walking along the inner walk platform that was about 450mm wide with cable tray

carrying cables running along the inner walk platform at about 400mm high. After taking into account the space used by the cables and cable tray, the effective space for walking along the inner walk platform was about 250mm.



## Lesson Learnt

Risk Assessment	<ul style="list-style-type: none"><li>• Risk assessments must be carried out prior to work operations.</li></ul>
Safe Work Procedure	<ul style="list-style-type: none"><li>• Safe work procedures must be developed and implemented.</li><li>• Lockout/Tagout procedures should be implemented before any inspection, adjustment or repair is carried out.</li></ul>
Work Planning	<ul style="list-style-type: none"><li>• Present cable tray location is a hindrance to conveyor adjustment and repair works and should be relocated.</li></ul>
Equipment and Tools	<ul style="list-style-type: none"><li>• All exposed moving parts should be adequately covered.</li></ul>

# CASE 8

## WORKER'S TWO FINGERS GET CRUSHED

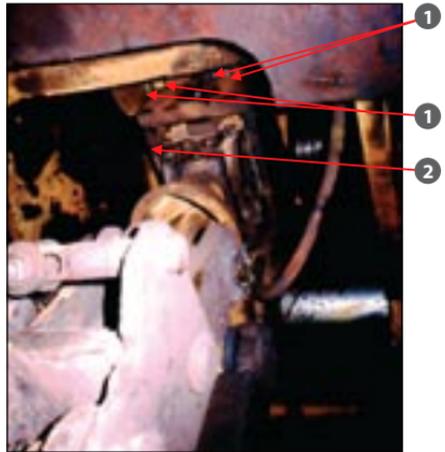
### Agent/Process

A billet rolling line, used in the manufacture of rebars, consisted of Roll Stands lined in a series. Hot semi-finished steel bars, known as billets, were extruded from the oven at 1000 °C through the roller passes on each set of rollers at the Roll Stands. The hot billets were then gradually reduced to the size of rebars required.

### Description of Accident

The entire billet rolling line had been switched off to facilitate the change of roller passes. Upon switching off the billet rolling line, all the rollers at the Roll Stands would rotate momentarily before coming to a standstill. At the time of the accident, the worker did not follow his team to Roll Stand A. On his own accord, he went to Roll Stand B to check the condition of the roller guide. His intention was to save the machine down time by speeding up the checking of the condition of the other roller guides at the billet rolling line while his team mates worked at Roll Stand A.

After a visual check of the rollers at Roll Stand B, the worker put his right hand on the guide sheave of the roller guide to feel for the condition



1. The rollers with four pairs of roll passes found here
2. The roller guide that had to be shifted to a new pair of roll passes



1. The roller guide
2. A brand new pair of roll passes
3. The two rollers with four pairs of roll passes
4. The guide sheave that the injured was feeling with his right hand

of the guide sheave. While doing so, his right hand was caught between the rotating rollers and the roller guide. The worker shouted for help and his co-workers came to help. On retrieving his right hand from the rollers, the worker found that the distal phalanges of his right middle and ring fingers were badly crushed.

The worker claimed that when he was checking the exterior of the roller guide at Roll Stand B, he had noticed the rollers moving slowly to a standstill. He had presumed that by the time he put his right hand to feel the guide sheave of the roller guide, the rollers would have come to a standstill.

### Observations and Findings

- The worker had misjudged the time taken for the rollers to come to a standstill when he put his right hand in to feel the guide sheave.
- The worker had disregarded the instructions from his supervisor to work at Roll Stand A and had instead gone on to check the roller guide at Roll Stand B.

### Lesson Learnt

Risk Assessment	<ul style="list-style-type: none"><li>• Risk assessments must be carried out prior to work operations.</li></ul>
Safe Work Procedure	<ul style="list-style-type: none"><li>• Safe work procedures must be developed and implemented.</li></ul>
Training and Awareness	<ul style="list-style-type: none"><li>• Constant reminders of safe work methods should be given.</li></ul>
Coordination and Communication	<ul style="list-style-type: none"><li>• All relevant workers should adhere to stipulated work instructions and avoid taking short cuts.</li></ul>