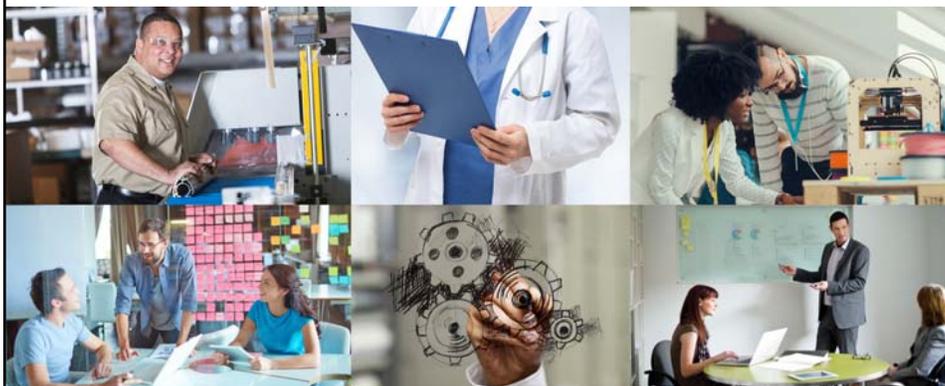


DIOSH DAY



February 27, 2019



Identifying the Root Cause in an Incident Investigation:

Going Beyond “Retraining”



Agenda

- Room safety
- Case Study to explore investigation challenges
- Improvement steps

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Case Study

**WORKER SEVERELY INJURED IN
WELDING ACCIDENT**

Case study provided by: United States Mine Rescue Assn



Scenario

You are a supervisor and have been notified to report to the maintenance department to conduct an investigation of an accident. A worker has been taken to the hospital with severe burns and heart arrhythmia from contact with an electrical source.



Here is what took place

7:00am: Maintenance technician Madeline Hurt arrives to work
 7:02am: Hurt unlocks tool chest
 7:02am: Hurt turns on arc welder without area safety check
 7:05am: Hurt notices and ignores water on floor in department
 7:05am: Hurt searches for welding gloves, can't find them
 7:09am: Hurt resumes work on a welding job from previous day
 7:09am: Table is not adjustable, part cannot be reoriented
 7:10am: Hurt stoops over and attempts to weld at odd angle
 7:10am: Hurt cannot properly weld hard-to-get-at section
 7:11am: Hurt lowers to left knee and contacts water on floor
 7:15am: Hurt resumes welding and is knocked unconscious
 7:21am: Bill Smith (co-worker) finds her unconscious, calls 911
 8:03am: Ambulance arrives, cares for, and transports victim
 8:10am: Bill Smith notifies you



Immediate Corrective Actions (Contain the problem)

- Turn off water to leaky water fountain
- Block off section of wet floor
- Remove arc welding machine from service
- Conduct checks on all other welding equipment
- Make sure safety equipment is available and is being used by all other welders
- Halt production of part until you understand what happened



Now it's time to investigate.

This is what you learned....



Details

Date/Time of Incident: 11/30/96 (Month/Day/Year), 7:15 a.m.

Name: Madeline B. Hurt

Assigned Job: Maintenance Technician

Length of Service: 14 years 11 Months
11 Years 10 Months on this job

Location of Accident: Maintenance department, Adjacent to Arc Welding Machine (Serial - 011212) SW corner of room.

Part of Body Injured: Sustained severe electrical burns (2nd degree) to the left knee and left hand (palm, thumb and 1st digit). Minor heart arrythmia (confirmed by emergency room) also sustained because of electrical discharge.



How Accident Occurred

Investigators Comments: Maintenance Technician (Bill Smith) notified me (11/30/96 - 8:10 a.m.) that a severe electrical injury had been sustained by Madeline B. Hurt. I arrived at the accident scene at approximately 8:15 a.m. The victim had already been transported by ambulance to No Hope Hospital. This report is the result of my investigation.

The employee received a high voltage electric shock (220v) which incapacitated her. At the time of the accident she was welding a T-Joint on mild steel with the voltage regulator set at 110 amps. She knelt on her left knee to obtain a better angle for the weld not realizing that water was leaking from a drinking fountain on the other side of the partition separating the maintenance department from the general facility. The working surface was poured cement. Arc Welding Machine (Serial - 011212) was being used at the time, the nonconductive handle grip was cracked which caused an electrical short causing the injury. The water leak was a contributing factor.



What was the Cause of this incident?

Do you think there is only **1** cause?

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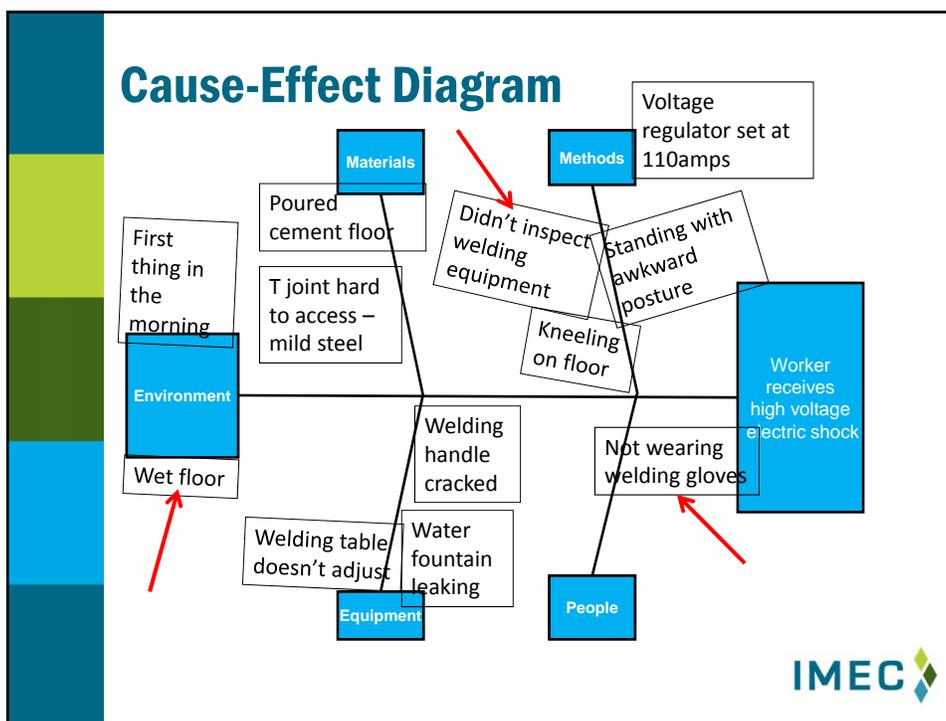
Importance of the Problem Statement

If I had an hour to solve a problem, I'd spend 55 minutes thinking about the problem and 5 minutes thinking about solutions. Formulation of a problem is often far more essential than its solution, which may be merely a matter of mathematical or experimental skill.

- Albert Einstein

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We could argue that...

- So the best solution is training, right?*
- Had the worker inspected the area and noticed the cracked handle
 - She wouldn't have used the welder – NO Injury
 - Had the worker paid attention to the wet floor
 - Maybe they wouldn't have welded in that area, not used the defective welder – NO Injury
 - Had the worker used her gloves
 - Perhaps she would have been protected from the live electrical – NO Injury

Possible Solution

Retrain worker

- *inspect equipment,*
- *wear gloves*
- *don't stand in wet areas while welding*

Or, is something else going on here?



What if...

- The worker had been complaining about the water on the floor, but nothing was being done?
- The worker had put in several work orders to fix the welder, but the work was continually being delayed due to other priorities?
- The worker had been observed many times by her supervisor that she wasn't wearing gloves, but the supervisor never corrected her?
- The worker had been told by her boss that the part was behind schedule and she needed to rush to complete it?

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Direct Causes

- **Non-conductive handle grip cracked**
- Water on the floor
- No gloves

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What led up to those issues? Indirect Causes

- Why did it happen? Why did we have this problem?
- Why was it not detected? Why did the problem reach the worker?
- Why did the system allow this to occur?

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So, let's dig deeper: Non-conductive handle grip cracked

- Why did we have the problem?
 - *Machine was old and the operator didn't inspect the equipment.*
- Why did the problem reach the customer?
 - *Operator was told to inspect the equipment but wasn't instructed on how to do it and what would make the equipment unsafe and what to do if it was unsafe*
- Why did the system allow this to occur?
 - *There was no standard inspection process and no one monitored whether or not it was taking place.*

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Corrective Actions

Update inspection training

- *What to inspect*
- *Problems that require the machine to be taken out of service*
- *Knowledge check*
- *Validation that inspections take place*



Recommendations

- The “no blame” environment is critical
- Most human errors are due to a process error
- A sufficiently robust process can eliminate human errors
- Placing blame does not correct a root cause situation
 - *Is training appropriate and adequate?*
 - *Is documentation available, correct, and clear?*
 - *Are the right skillsets present?*



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We need to know our employees

- We must listen to their thoughts and feelings
- We must gain their trust
- We must be willing to probe to understand the underlying issues



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Employees must feel comfortable speaking up and not feel blamed

- Capabilities
- Mental and physical state
- Human relations
 - *Doesn't know*
 - *Cannot do*
 - *Doesn't care* ←
 - *Doesn't do* ←

Not the place to focus first. Usually not the actual cause.

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Ways to uncover thinking and feelings

- Don't argue
- Encourage individuals to talk about what is important to him or her
- Don't interrupt
- Don't jump to conclusions
- Don't do all the talking yourself
- Listen

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Check Your Assumptions

There is a difference between what you know and what you think you know. Keep an open mind.



Questions

