Case Study 1

Drilling Machine

Drill

Left thumb severed
CS1-Synopsis of Accident

- Injured worker (IW) was tasked to fit up a vehicle’s fuel tank in the workshop. While fitting up the tank, he was short of one grounding cable.

- Unable to find a terminal lug of correct size for the grounding cable, IW decided to use an existing lug of nearest size and enlarge its hole with a round file.

- After filing for 10mins without any progress, IW decided to use a bench drilling machine to enlarge the hole. IW used a self–gripping plier to hold the grounding cable. IW was wearing cotton gloves on both hands.

- During drilling, IW’s left hand’s glove was caught by the rotating drill bit, thereby resulted in his left thumb being severed.
CS1-Synopsis of Accident

Drill bit

Torn gloves

Drilling Machine
CS1-Observations and Findings

- Before the accident, IW’s employer had only conducted induction briefing on generic safety and health rules to new employees, but not any job-specific RA and SWP related to their works.

- IW’s employer had established RA and SWP for the workshop activities, including drilling task.

- However, IW was not aware of the RA & SWP. He had not been briefed about the hazards, risks and control measures of the bench drilling machine, which had been identified in RA and SWP.
CS1-Observations and Findings

- Most of the other engineers were also not aware of the RA and SWP in the workplace, and how the risks of injuries could be controlled or mitigated.

- At the time of the accident, the rotating spindle and chuck of the drilling machine were not securely guarded.
CS1-Lessons Learnt

- Employer should ensure secure guarding of the dangerous parts of machines in the workplace.
  - The drilling machine’s spindle and chuck should be securely guarded.

- Employer should ensure employees’ awareness and knowledge of WSH hazards and control measures.
  - There should be a proper communication or briefing of relevant RA and SWP to all personnel who are liable to be exposed to the risks posed by the work activities carried out in the workplace.
  - The briefing on RA and SWP should be documented.
CS1-Lessons Learnt

- Warning notices or signages, where reasonably practicable, should be clearly displayed at or near the machinery to warn of the presence of dangerous part(s), and the ‘dos & don’ts’ for machinery safety.
CS1-Examples of safety guards

The guard should be below the tip of the drill when the drill is in the raised topmost position.
CS1-Resources

Free-to-download safety guide available in HSE’s website:

Drilling machines: guarding of spindles and attachments
Guidance Note PM 83

This is a free-to-download, web-friendly version of PM 83 (Fourth edition, published 1996). This version has been adapted for online use from HSE’s current printed version.

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This guidance looks at drilling machines, in their various forms, and some of the accidents resulting from their use as well as steps you can take to minimise the risk of such accidents occurring.

It is aimed at all those who would have a drilling machine(s) installed on their work premises and/or would use one. This could be within the manufacturing industry, other workshops, educational establishments, hospitals and other service industries, although this list is not exhaustive.

The guidance will help employers to meet their obligations under the Provision and Use of Work Equipment Regulations 1992 and will also be of assistance to manufacturers, suppliers and safety representatives concerned with safeguarding these machines.
Case Study 2

Portable Cut-off Saw

Rotating abrasive wheel

Left thumb severed
CS2-Synopsis of Accident

- IW operated a portable cut-off saw to cut some iron rods.

- IW cut the iron rods to required lengths, and also grinded the sawn ends of the iron rods against the flat surface of the saw’s abrasive wheel to remove the sharp burrs from the rods’ sawn ends.

- In the process, IW had slipped the iron rod he was exerting against the rotating abrasive wheel, and caused his left thumb to come into contact with the fast rotating abrasive wheel, thereby resulted in his left thumb being severed.
CS2-Synopsis of Accident

Grinding of iron rod

Portable Cut-off Saw
CS2-Observations and Findings

- The factory’s Occupier had purchased the iron rods from an overseas supplier but iron rods of incorrect length were supplied instead.

- Due to an urgent need for the iron rods for production, the Occupier decided to undertake the cutting of the rods with a cut-off saw to the required lengths. This was a one-off task done for the first time by the Occupier. The Occupier had no prior knowledge on safe use of the cut-off saw.

- The Occupier had designated its product executive to carry out the rod-cutting task, and had also assigned two workers (including IW) to assist him.
CS2-Observations and Findings

- The said product executive had borrowed the portable cut-off saw from his ex-employer, and had taught IW to saw and grind the iron rods with the portable cut-off saw’s abrasive wheel.

- On next working day, IW resumed the work alone to cut and grind the remaining iron rods till the accident happened.

- Before the accident, the Occupier assumed its product executive knew how to carry the task safely, as he had worked in an engineering piping company in the past.
CS2-Observations and Findings

- The use of cut-off saw for grinding purpose was not in accordance to the manufacturer’s design and intended manner of use for the said equipment.

- The self-adjusting safety guard of the cut-off saw was missing when it was borrowed from its owner.
CS2-Lessons Learnt

- Occupier/employer should assess the equipment used in the workplace, so as to ensure safe and correct use of the equipment:
  - Proper/suitable equipment should be selected and used for the required task;
  - Any equipment used should be safe and without risks to health to every person, including secure fencing of the dangerous part.

- Occupier/employer should ensure competency of all equipment users.
CS2-Example of a saw guard

Portable cut-off saw with both fixed and self-adjusting safety guards:
Case Study 3

Power Press Machine

Punch-and-die

Left hand’s middle, index and ring fingers crushed
CS3-Synopsis of Accident

- On accident day, IW was operating a full-revolution type power press to stamp metal work-pieces.

- Method adopted:-
  - Place the work-piece onto the press’ die;
  - Depress 2-hand control buttons to actuate and descend the tool to stamp the work-piece;
  - Retrieve the work-piece after stamping action.

- During operation, IW decided to shift his chair nearer to the power press. He rested his left hand on the die, and jerked his chair towards the power press. During jerking, he accidentally stepped on the power press’s electric foot-switch, thereby causing the punch to descend and crush his left fingers.
CS3-Synopsis of Accident

Power Press Machine

Thumb-switch control box
Plug of electric foot-switch
Electric cable of electric foot-switch
Electric foot-switch
Mechanical foot-pedal
CS3-Synopsis of Accident

2-hand control buttons

Foot-switch

Power Press Machine

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CS3-Observations and Findings

- The power press machine was modified with its mechanical foot-pedal disconnected from its linkage, and thereafter to be activated in other multiple modes. One of which is 2-hand control mode for small work pieces, and another mode is operated via a electric foot-switch for large pieces.

- On the day of the accident, the foreman had switched the power press machine to 2-hand control mode, however, he had forgotten to disconnect the electric foot-switch.

- The electric foot-switch was accidently activated when IW shifted his chair forward.
CS3-Observations and Findings

- The power press’s electric foot-switch was not shrouded to prevent accidental activation from any cause.

- No safety guard was provided to prevent the worker’s hands from coming into contact with the power press’s moving punch and the stationary die during operation.

- The power press’s flywheel, pulley and belt were not adequately guarded.
CS3-Observations and Findings

- IW was not instructed on the hazards arising from the operation of the power press and the appropriate precautions to be observed.

- The foreman and IW had not attended the “Basic Industrial Safety and Health Course for Supervisors” and “Safety Orientation Course for Workers (Metalworking)” respectively.
CS3-Lessons Learnt

- Occupier/employer should assess the machinery used in the workplace and ensure its safe use:
  - The machine’s dangerous parts must be securely guarded.
  - The electric foot-switch was properly shrouded to prevent accidental activation.
  - The electric foot-switch was disconnected from the electrical control box when the power press was operated by the 2-hand controls.
CS3-Lessons Learnt

- All modifications to existing machines should be approved by the manufacturer.

- Employer should ensure its employees are instructed on the dangers in connection with the machine operations and the precautions to be observed before commencement of operation.

- Employers should ensure its employees have attended the mandatory safety and health training.
Case Study 4

Oven’s motor

Motor’s pulleys and belt

Right hand’s index finger crushed, third finger broken and fourth finger severed
CS4-Synopsis of Accident

Motor
CS4-Synopsis of Accident

- On accident day, IW, a printer, was running a metal printing line which included an industrial oven to dry the printed sheets.

- As there was a problem regarding the uneven temperature in the oven, the IW went up to the oven’s top to check whether the oven’s motors were running smoothly. IW was wearing a pair of cotton gloves at that time.

- While checking, IW’s right hand’s glove, which was not tightly worn, was caught by the in-running nip point between the motor’s belt and the pulley, pulling in his right hand. As a result he sustained crushed index finger, broken third finger and severed fourth finger on the right hand.
CS4-Synopsis of Accident

- Employer had conducted risk assessment for the oven’s operation and maintenance, but it did not identify the safety risk posed by the motor’s moving parts.

- The motor’s pulleys and belt, and transmission shaft were not securely guarded.
CS4-Lessons Learnt

- Occupier/employer should assess the machinery used in the workplace and ensure safe operation and maintenance of the machinery:

  - Any machinery used or worked upon should be safe and without risks to health to every person, including secure fencing of all dangerous parts;

  - Risk assessment should identify all foreseeable risks posed by the operation and maintenance of the machinery.
The fencing must be securely constructed to prevent persons from coming into contact with any dangerous parts.
In Summary

For all machinery/equipment operations:

✓ Ensure proper selection of machinery/equipment for required tasks, and safe and correct use of machinery/equipment
✓ Ensure that machinery/equipment used or worked upon is safe and without risks to health to every person, including secure fencing of all dangerous parts and adequate maintenance regime
✓ Ensure all modifications to existing machinery/equipment are approved by the manufacturer
✓ Conduct a comprehensive risk assessment
✓ Institute and implement safe work procedures
✓ Ensure competency of users and operators of machinery/equipment
✓ Provide proper instructions for the conduct of workers when carrying out the work
✓ Provide training and instruction to workers on the hazards identified and the precautions to be taken.
In Summary

For all machinery/equipment operations:

✓ Display clear warning notices or signage, where reasonably practicable, at or near the machinery to warn of presence of dangerous part(s), and the ‘dos & dons’.

✓ Ensure the employees attend and successfully complete the mandatory safety and health trainings.
Every unsafe machine present in a workplace may have the potential to injure or kill a person, causing pain and suffering to this person and/or the next-of-kin. This could be YOU and YOUR LOVED ONES.
Thank You