FIRE DURING THE MANUFACTURE OF DETONATING SEMIFUSE

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DATE AND TIME OF INCIDENT

MONDAY, December 17th 2012

INCIDENT LOCATION

Company Name:

ORICA

Company Facility:

GOMIA IS/PE MANUFACTURTING FACLITY INDIA

Process Outline:

Gomia has 6 spinning compartments for the manufacture of detonating semifuse in building DO-1.

The operations carried out in these compartments are

- PETN bottle replacement on Spinning machine
- Loading/replacing/tensioning cotton bobbins
- Remotely starting/Stopping spinning machine
- Manually tensioning drive belts to maintain consistent speed
- Monitoring operation from remote window,.
- Changing Semifuse reel when full
- Cleaning machine and cubicle

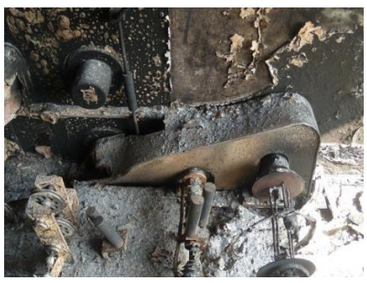
DESCRIPTION AND IMPACT OF THE INCIDENT

On 17th December 2012 during the manufacture of detonating semifuse, a fire in spinning compartment 1 completely destroyed compartments 1 & 2. It is believed that there was a total of 8 kg of PETN and 1800 metres of semi fuse spread across both machines. There were no injuries and there was no explosion. The resulting fire consumed both spinning compartments and destroyed both machines however the fire was confined to that area only. The rest of the plant suffered smoke and soot damage.

The operator, on discovering the fire, immediately shut down the machine, notified the Supervisor, attempted to open the deluge control valve and proceeded to raise the site alarm (he was unable to successfully open the overhead deluge system valve). Following the alarm, all Site personnel assembled at their respective muster points and a head count was conducted. Security locked the area down and all access roads were barricaded and remained that way until the investigation team arrived on the 20th December.

Examination of the Site of the Incident:

- Examination of the site showed
    - Localised heat scouring on the spinning machine
    - Rub marks on the drive pulley guard
    - Worn through area at end of aluminum pulley guard
    - Slippage marks on drive belt with metal joiner
    - Burnt and melted drive belt



LIKELY CAUSE OF INCIDENT

The Investigation Team consisting of Technical, Safety, Engineering personnel and the operator, made an analysis of the possible causes of the accident. The analysis was done using Apollo Root Cause and the findings are detailed below;

1. Sabotage: This scenario was considered and discounted as there is no evidence to support.

2. Heat/Fire: There is no evidence suggesting the existence of a source of heat or flame however combined with a friction event would suggest the generation of heat leading to the fire.

3. Spark from electrical short circuit: As part of the investigation all wiring and connections were checked and no anomalies' found.

4. Electrostatic discharge: This was considered and discounted as the operator was not in the room at the time the fire started. Systems are in place for discharge of static before entering the building.

5. Impact: This possibility was considered and discounted as the investigation determined that the machine was intact and no parts found out of place or missing from the spinning machine.

6. Friction: The investigation and RCA concluded that this was the most likely cause of the fire based on;
    - Rub through area of pulley guard
    - Slip marks on the drive belts
    - Metal joining clips on belt drive
    - Localised heat marking on spinning machine directly above pulley guard damaged area

From these hypotheses it was concluded that the loose guard rubbing on the pulley for 30 minutes caused a friction event that that generated enough heat to ignite detonating semifuse up through the spinning machine to the PETN.

ACTIONS TO PREVENT RECURRENCE

1. Drive systems to be located outside of manufacturing cubicles.
2. Install tension system without manual intervention or slippage controlled.
3. Drive belts to be fused leather.
4. All guards to be in a fixed position.
5. Automated deluge systems.

LESSONS LEARNT

1. This incident highlighted the increased risk when not continually monitoring manual systems.

2. Separated manufacturing cubicles with plastic roof and walls, allowed heat to disperse, reducing the likelihood of confinement therefore detonation.

3. Deluge systems need to be automated to reduce the need for manual intervention.