

Accident in a Detonating Fuse plant in India

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Brief History

- Company:

It is a privately managed company, small to medium size

- Products:

It manufactures PETN, Pentolite Boosters, Detonating Fuse, Slurry explosives.

- Location:

Located near a big city in South India with good climate and water availability.

- Management :

Works management has persons with experience in the field of explosives acquired from other big cos.

Brief history

- Previous accident history:

Had an unfortunate severe accident in the
Pentolite booster plant few years ago

Details of accident

Date of accident: 18th July 2006 around noon

- ❖ Product involved: Detonating fuse 10g/m
- ❖ Fatalities: Five(5)
- ❖ Building damage: Total
- ❖ Location of accident: Spinning building
- ❖ Weather: 32c,70%humidity
- ❖ Equipment: 2table wall mounted spinning units,nine(9) in a row, design is a copy of standard machine used in most plants for DF manufacture,PETN funnel of capacity of 1kg is attached to the top.Machines are not separated but semi fuse reeled behind RCC barrier

Details of Accident

- ❖ Spinning speed: 12 meters/sec.
- ❖ Crushing: On line while reeling
- ❖ Layout : Spinning is done in separate building. Coating, reeling and packing done in another building
- ❖ Persons in spinning bldg: One supervisor ,at least 5 labours.
- ❖ Spinning process : Encapsulation of dry PETN

Difficulties for investigation

Difficulties encountered in the investigation

- Due to heavy damage to building, very little evidence available.
- Specialist investigator called in only after one month of accident. By then the site was disturbed, debris removed. However damaged machineries were collected and kept to one side for further study. Some photos were available.
- Absence of eye witness.

Investigation findings

After examining available evidence, the supervisor and some workers in the nearby buildings were interviewed and the following emerged:

1. At the time of the accident the production was going on, the shift's production target was almost reached.
2. The shift supervisor for the DF spinning building was absent from the shop floor at the time of explosion.
3. From the log book there seems to be no Raw material shortage or breakdown till the time of the accident.
4. No major maintenance was scheduled nor was in progress.

Investigation Findings

5. From the examination of floor damage it appeared that explosion could have started in the 4th or 7th spinning machine.
6. The above machines had suffered extensive damage to the plates, frames.
7. Quantity of PETN involved was estimated to be 10-15 kgs.

Probable Scenarios

1. The high speed spinning of dry fine PETN throws out a fine coating of PETN dust on the plates and frame as well as the floor near the machine. This has to be cleaned using compressed air on the machine and with water for the floor and the run off drained into a collection pit. If this is not done regularly hard crust of dry PETN is formed on the machine which is difficult to move by compressed air and then tendency is to scrape it off leading to danger. Also while attending to machine any impact on this crust can set off an explosion.

Probable Scenarios

2. Variation of bulk density and flow rate of PETN may lead to over filling of fuse and jamming in the die or breakage of semifuse which can impact on the frame with grave consequences.
3. Impact or friction of accumulated fine PETN, more so at the end of shift can lead to a bad situation especially if PETN being used has some sensitive needle like crystals.
4. Operator complacency due to overconfidence, leading to short cut of laid out safety procedures resulting in an unsafe situation.

Probable Scenarios

5. Extended duty hours leading to fatigue and hence lack of alertness.
6. Machines not earthed.
7. High speed of machines.
8. Presence of grit in PETN.
9. Operators wearing synthetic clothing.

Most probable cause could be any one or combination of above possibilities. In the absence of survivors, difficult to give exact cause.

RECOMMENDATIONS

1.Frequent cleaning of the spinning machine and floor as per well laid out procedures must be done to ensure that no sensitive fine dust accumulates to dangerous levels.

2.Supervisor is responsible for ensuring 1. is done especially before breakdown maintenance.

3.Preventing violation of safety regulations through supervision,education and training.This is responsibility of Works Management.Training schedule and translation of safety rules into local language is a must.

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RECOMMENDATIONS

- 4.To provide steel partition between spinning machines to prevent spreading of explosion from one machine to another
- 5.Similar partitions to be provided on the reeling side between reels to prevent transmission from one semifuse reel to another.
- 6.PETN(dry) is received in Aluminum cans and kept on a table in the spinning room.To provide separation and partition between the cans.
- 7.To reduce the no. of spinning machines from 9 to 4 thus explosive limit can be reduced from 150kg to 50 kg.

RECOMMENDATIONS

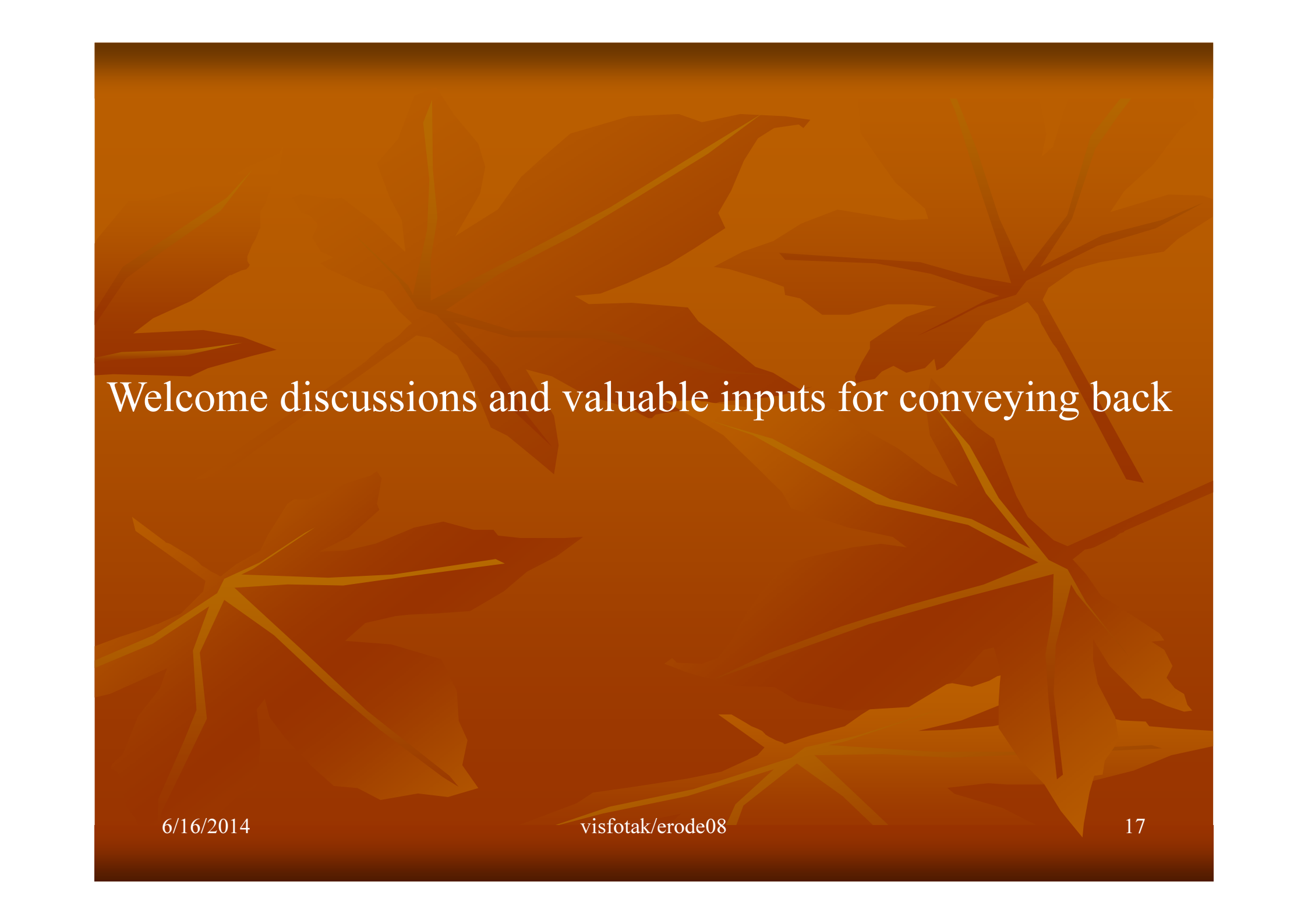
8. To make 2 buildings instead of one for spinning
9. Compressed air should not be used for cleaning, instead soft brushes to be used.
10. Separate the feed hoppers to a floor above the spinning machines, so as to reduce the quantity of PETN in the spinning area.

Acknowledgement

Grateful to investigating expert for the above information

Visfotak input

1. Instead of steel barrier use RCC structure between spinning machines and between semifuse reeling machines.
2. Provide detonation traps for preventing transmission of explosion along the fuse.
3. Look at PETN before use for spinning more closely (including single crystal) for unusual friction and impact sensitivity and take decision to use or not.
4. More efforts for prevention of dust and grit contamination since location is in dry area and buildings have open structure.



Welcome discussions and valuable inputs for conveying back