

ACETYLENE GAS SAFETY SEMINAR 2009



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Asia Industrial Gases
Association



Council of Labor Affairs
Executive Yuan



Taiwan High Pressure
Gas Industrial Association

SAHTECH 財團法人
安全衛生技術中心

Safety & Health
Technology Center

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Acetylene Cylinder Fire Incident at Industrial Gases Plant

Presented by:
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Acetylene Plant Background

1. **Raw Material** : Supply of refinery based acetylene gas through pipeline to the plant.
2. **Main facility** :
 - a. 600M³ gas holder *1 ◦
 - b. 52M³ /HR Compressor *6 、 168M³ /HR Compressor*1 ◦
 - c. 100-cylinder filling rack*12 、 250-cylinder filling rack*2 ◦
3. **Main safety & fire protection system** :
 - a. Water hose reels 、 flame arrestors 、 isolation and safety valves, emergency automatic shutdown system ◦
 - b. Fire extinguishers 、 Fire hydrants 、 Water storage tanks ◦

Incident Background

Date & Time : September 2005, 05:10 am

Location : Acetylene Plant – Filling Rack No.7

Workers : Shift supervisor, 4 Operators

**This is the first acetylene cylinder fire
incident in the plant**

Event chronology - 1

Time: 05:10 - At No.7 row of Filling Rack, one cylinder caught fire, burst opened, causing filling pigtail to break. Acetylene discharged burned and caused other cylinders to burn and explode.

Shift Supervisor took the following immediate actions.

1. Stopped compressors ◦
2. Activate fire protection system ◦
3. Close isolation valve on pipeline ◦
4. Order evacuation of all workers ◦
5. Inform Fire Brigade ◦
6. Inform Plant Manager and General Manager ◦

Event chronology - 2

- 05:25 Fire Brigade arrived ◦
- 05:30 No more cylinder explosion ◦ Water deluge was applied to the area to prevent further cylinder fires.
- 05:45 All management staff on site , Plant manager assumed role of emergency response controller ◦
- 08:00 Issued Press Release ◦
- 12:00 No more fire on the site ◦
- 14:00 All cylinders cooled down , Stopped fire hose water ◦
- 14:30 Plant Manager & supervisors provided information to neighbouring residents and extended apology to them.

Losses incurred

1. No personnel injury ◦
2. #7 filling rack totally damaged , #8 filling rack partially damaged.
3. 90 cylinders affected by fire , 8 cylinders exploded.
4. Damages to: Chill water system 、 test equipment piping, ex-proof lightings, factory roof.
5. Plant stopped for 19 days ◦

Incident Pictures - 1



Incident pictures -2



Incident pictures - 3



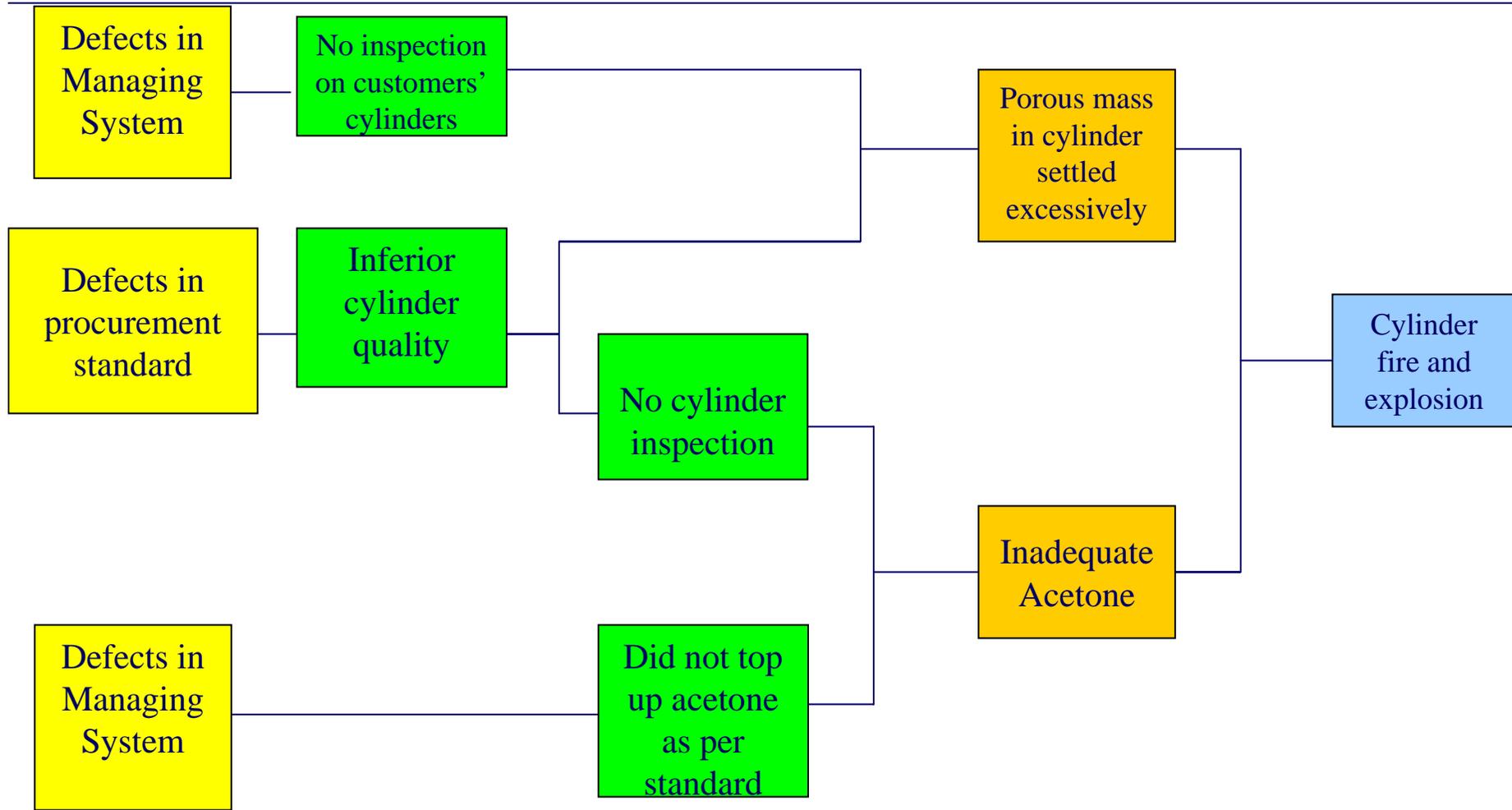
Incident pictures - 4



8 cylinders - exploded



Causal Tree Analysis



管理的不足 Lack of Control	基本原因 Basic Causes	直接原因 Immediate Causes	事件 Incident
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Lessons learned

- Excessive gaps in the cylinder mass.
- Acetone topping up done incorrectly.
- Other factors:
 - poor residual gas measurement to determine acetone shortage
 - ineffective high pressure drying
- Deluge system saved the plant, enabling it to get quickly back in to operation.