

FSM Perspective on False Alarms and Practical Approach to Fire Alarm Activation

By David Goh

**Vice President, Fire Safety Managers' Association Singapore
Convener of Working Group for CP 10 : 2005**

CONTENTS

- 1. What is False Alarms**
- 2. Limitation of False Alarms**
- 3. Categories of False Alarms**
- 4. Causes of False Alarms**
- 5. Preventive Maintenance**
- 6. Practical Approach in investigating and responding to Fire Alarm Activation**

What is False Alarm?

A fire alarm signal resulting from a cause(s) other than

FIRE



FSMs' Perspective?

SIMPLE DEFINITION, FULL OF PROBLEMS and CHALLENGES TO MANAGE FALSE ALARMS:

1. Owner / Client Issue

Owner / Client do not understand the important of fire alarm system and try to cut cost and refuse to approve quotation for fast rectification of any faulty detectors.

Companies may not provide any budget for the maintenance personnel to attend any relevant upgrading or specialist training or upgrade the system

FSMs' Perspective?

2. Cost Factor

It can be quite costly to identify nuisance alarm and rectify any faulty detector(s)

Operator would simply repeatedly reset the false alarm until it can not be reset anymore – and just isolate until more isolation before they replace at one go



FSMs' Perspective?

3. Obsolesce

Could not obtain spare parts to replace faulty detectors or components that causing the false alarms and has to 'temporary' isolate the faulty parts.

4. Old Fire Alarm Systems

Old system likely to cause more false alarms. There is no requirement for system to be replace under such condition.

FSMs' Perspective?

5. Manpower Constraint

FSM may be shortage of manpower to exercise practical approach to investigate First Fire Alarm Activation

☞ take it as False Alarm, check later

Some service provider may be shortage of manpower and unable to attend promptly to rectify any false alarm, meantime the detector(s) will be isolated or worst being masked.

FSMs' Perspective?

6. Competency

Nowadays, Managing Agents, M&E contractors, Fire Systems maintenance contractors have poor understanding of the fire alarm systems especially for addressable fire alarm systems

This is the results of always trying to award maintenance jobs base on 'Price' instead of value.



Knowledge of operators handling Fire Alarm Systems.

FSMs' Perspective?

6. Competency

In the advancement of fire alarm technology, facility maintenance personnel and servicing contractor may not possess the relevant experience and knowledge in checking the fault of false alarm or trouble shoot



Limitation of False Alarms

False alarms can be a major hazard to any fire alarm system since they lead to a loss of confidence in the system. It is important that any alarm from the system be treated as an alarm of fire until it can be proved to be false, rather than being treated as false until proven to be a fire.

It is a common misconception that most false alarms arise from faults in equipment. In fact, most false alarms arise from

- a combination of environment influences,
- fire-like phenomena,
- inappropriate action by people in the building and
- accidental damage.

Categories of False Alarms

In order for any investigation of false alarms to be successful and for appropriate action to be taken on false alarms, **four categories** of false alarms are being termed.



Categories of False Alarms

a. Unwanted Alarms

In which a system has responded, either as designed or as the technology might reasonably be expected to respond, to any of the following:-

- i. A fire-like phenomenon or environment influence (e.g. smoke from a nearby bonfire, dust or insects, processes that produce smoke or flame, or environment effects that can render certain types of detector unstable, such as rapid air flow)

Categories of False Alarms

a. Unwanted Alarms

- ii. Accidental damage

- iii. Inappropriate human action (e.g. operation of a system for test, A&A works or maintenance purposes without prior warning to building occupants and/or an alarm receiving centre)

Categories of False Alarms

b. Malicious False Alarms

In which a person operate a manual call point or causes a fire detector to initiate a fire signal, whilst knowing that there is no fire.

Tend to occur with most frequency in certain premises - the public resort, shopping centres, places of entertainment, sports centres and schools etc

Consider to relocate the manual call points and use of two-action devices hinge cover on call points

With Terrorist Imminent Attack, this category become important and required special attention for large public premises

Categories of False Alarms

c. False Alarms with Good Intent

In which a person operates a manual call point or otherwise initiates a fire signal in the belief that there is a fire, when no fire actually exists. Little can be done to prevent false alarms with good intent, unlikely to present a significant problem

Important that people are never discouraged from operating manual call point if they suspect that there might be a

The word 'Fire' is written in a large, bold, orange font. The letters are stylized with jagged, flame-like edges and small yellow and orange flames rising from the top of the letters, giving it a fiery appearance.

Fire

Categories of False Alarms

d. Equipment False Alarm

In which false alarm has resulted from the fault in the system

Minimized by choice of good quality equipment

Proper maintenance and regular service with prompt action in replacing and trouble shooting faulty equipment

Causes of False Alarms

In many premises, most false alarms take the form of unwanted alarms.

Recognized causes of unwanted alarms (although, in some cases only from certain types of automatic fire detector - especially smoke detectors) are as follow.

Causes of False Alarms

Unwanted Alarms from Smoke Detectors

- ☞ fumes from cooking process (including toasting of bread)
- ☞ steam (from bathrooms, shower rooms and industrial processes)
- ☞ tobacco smoke
- ☞ dust (whether built up over time or released from an industrial process)
- ☞ insects, incense and candle
- ☞ cutting , welding and similar “hot work”
- ☞ cosmetic smoke (e.g. in discotheques and theatres)
- ☞ aerosol spray (deodorants and cleaning fluids)
- ☞ high air velocities
- ☞ smoke from sources other than a fire in the building (e.g. from an external bonfire)



Causes of False Alarms

Unwanted Alarms from Smoke Detectors and other Types of Auto Fire Detectors/Call Points

- ➡ high humidity
- ➡ electromagnetic interference
- ➡ accidental damage (particularly to manual call point)
- ➡ water egress
- ➡ testing or maintenance of the system without proper disablement
- ➡ pressure surges on water mains serving automatic sprinkler systems through flow switches

Event Log Record – Kept for minimum of 12 Months

Events other than false alarms or maintenance work

| Date | Time | Event ^{A)} | Zone ^{B)} | Device ^{B)} | Action required ^{B)} | Date completed ^{B)} | Initials |
|------|------|---------------------|--------------------|----------------------|-------------------------------|------------------------------|----------|
| | | | | | | | |

^{A)} For example test, fire alarm signal, fault

^{B)} Where applicable

False alarms

| Date | Time | Zone | Device that Triggered alarm signal | Cause (if known) | Brief circumstances ^{A)} | Maintenance visit required? (Yes/No) | Findings of maintenance technician ^{B)} | Category of false alarm | Further actions required ^{B)} | Action completed ^{B)} |
|------|------|------|------------------------------------|------------------|-----------------------------------|--------------------------------------|--------------------------------------------------|-------------------------|----------------------------------------|--------------------------------|
| | | | | | | | | | | |

^{A)} Where cause is unknown, record activities in this area

^{B)} Where applicable

Maintenance Work

| Date | Time | Zone ^{A)} | Device ^{A)} | Reason for work | Work carried out | Further work required | Signature |
|------|------|--------------------|----------------------|-----------------|------------------|-----------------------|-----------|
| | | | | | | | |

^{A)} Where applicable

Preventive Maintenance

Objectives

To ensure continuous reliability of the fire alarm system, false alarm problems are identified and suitably addressed



Responsibility

Building Owner or Owner Representatives

- to engage manufacturer's representative or competent contractor
- owner representative with suitable experience and special training

Preventive Maintenance

The number of false alarms that can be anticipated is virtually proportional to the number of automatic fire detectors installed.

The constant of proportionality will normally be highest where the fire detectors are smoke detectors.

Systems incorporating only manual call points or manual call points in conjunction with heat detectors do not normally produce many false alarms.

Preventive Maintenance

Sprinkler/Flow Switches

- use flow switch with Timer Delay



Call Point

- additional hinged cover



Heat Detectors

- Mechanical type
Fixed Temperature
Heat Detectors



Flame Detectors

- Triple Infra Red



Preventive Maintenance

Smoke detection systems with signal processing incorporating techniques specifically intended to discriminate between certain unwanted alarms and real fires, are likely to offer better immunity to false alarms.

Systems with pre-alarm warning feature enable investigation of conditions that would lead to an unwanted alarm if no action is taken.

Owner's representative, competent contractor or servicing organisation shall inspect the signal processing data available from the smoke detection systems regularly and investigate any pre-alarm warning

For smoke detection systems without signal processing, regular cleaning or replacement of smoke detectors is necessary.



Preventive Maintenance

Current analog values

Optical system value (display of the current contamination value):

0 . . . 170 Initial set-up value for a new detector

0 . . . 350 Normal working range

350 . . . 450 Slight contamination: Exchange detector soon

450 . . . 510 Heavy contamination: Exchange detector immediately

From 511 O fault: optical sensor is deactivated!

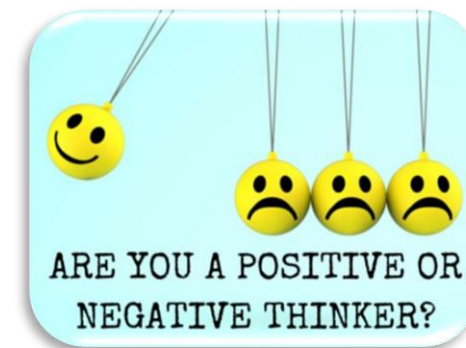
Contamination

The optical initial set-up value of a new detector is stored in the integrated EEPROM during the final inspection. The contamination value specifies by how much this analog value has increased in comparison with the delivery state.

Practical Approach in investigating/responding to Fire Alarm Activation

Negative Approach upon alarm activation

- ◆ False Alarm again, I only have 2 minutes?
- ◆ Call DECAM and inform is false alarm
- ◆ Can reset the alarm zone, lucky is a real false alarm, later have time than check.
- ◆ Cannot reset, 'stupid detector', no choice, go and check
- ◆ Cannot reset, likely false activation, isolate first, later have time than check



Practical Approach in investigating/responding to Fire Alarm Activation

Negative Approach upon alarm activation

Examples of Building Catastrophe resulting from **Negative Approach** upon alarm activation

Marina Bay Suites Fire
Light Industrial Building Fire



Practical Approach in investigating/responding to Fire Alarm Activation

Negative Approach upon alarm activation - Marina Bay Suites Fire



CASE STUDY

Fire at Marina Bay Suites on 13 Jan 2014

FIRE STATISTICS
CASE STUDY: MARINA BAY SUITES FIRE




Sources: Shin Min Daily, The Straits Times

Copyright © David Goh

All rights reserved by David Goh, whether in part or whole of this material concerned.

Practical Approach in investigating/responding to Fire Alarm Activation

Negative Approach upon alarm activation - Marina Bay Suites Fire



FIRE STATISTICS
CASE STUDY: MARINA BAY SUITES FIRE

Fire at Marina Bay Suites on 13 Jan 2014

The technician's action at the firefighting lobby may have accidentally created favourable conditions for such a smouldering fire when he discarded a cigarette butt into the trash bag of sawdust or when he disturbed the other non-fully extinguished cigarette butts which may already be present in the trash bag.

The fire alarm, which sounded at 21:34:58 hrs, was believed to have come about as a result of the fire at the 65th storey. This is approximately 2 hours after both technicians departed from the 65th storey.

Smouldering fires are known to be capable of smouldering for a long time before ignition.

Discussion And Comments

Practical Approach in investigating/responding to Fire Alarm Activation

Negative Approach upon alarm activation - Marina Bay Suites Fire



Fire at Marina Bay Suites on 13 Jan 2014

Fireman Lift 3 was installed with a CCTV camera (CAM 68).
The footage from this camera showed:

- At 22:00:31 hrs, two Security Officers entered the lift at the 1st storey



FIRE STATISTICS
STUDY: MARINA BAY SUITES FIRE

Copyright © David Goh

All rights reserved by David Goh, whether in part or whole of this material concerned.

Practical Approach in investigating/responding to Fire Alarm Activation

Negative Approach upon alarm activation - Marina Bay Suites Fire



Fire at Marina Bay Suites on 13 Jan 2014

- At 22:00:33 hrs, Security Officer 1 pressed the lift button for the 65th storey.



- At 22:01:53 hrs, the lift door opened at the 65th storey and fire can be seen to be well alight in the firefighting lobby. The lift door remained jammed in this position thereafter.

Evidentiary Factors

FIRE STATISTICS
CASE STUDY: MARINA BAY SUITES FIRE

Practical Approach in investigating/responding to Fire Alarm Activation

Negative Approach upon alarm activation - **Marina Bay Suites Fire**

- ✗ From 2134 hours to 2200 hours - 26 minutes later to start investigation.
- ✗ Assume reported False Alarm to DECAM
- ✗ Likely isolate / bypass lifts signal from Fire Alarm Systems
- ✗ Likely operate lifts in Normal mode to investigate

Practical Approach in investigating/responding to Fire Alarm Activation

Negative Approach upon alarm activation

Light Industrial Building Fire Report of false alarm before verifying incident

Practical Approach in investigating/responding to Fire Alarm Activation

Negative Approach upon alarm activation

| | |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1325 hrs | Security Officer heard fire alarm bells ringing. He received a call from DECAM - Chubb but reported that it is false alarm. He then isolated the fire alarm panel 4th Floor Zone 1 |
| 1326 hrs | Fire alarm bells started to ring again and went to investigate. At the passenger lift area, Level 1, he met Mr. A and was informed of the fire. He then immediately went back to Guard House to call DECAM CHUBB |
| 1329 hrs | SIC effected the Evacuation Message via PA |
| 1329 hrs | 2x Fire Wardens per level evacuated their respective level |
| | Mr. B (Level 4 supervisor) was at level 1 when he heard the fire alarm and PA. He quickly went up to 4th floor using the emergency staircase. He saw black smoke and tried to use fire extinguisher but cannot reach the point of fire due to the smoke. |
| | A CERT member who went to Level 4 saw Mr. B and pulled him out of the black smoke and asked him to evacuate. On reaching Level 1, he vomited and had a headache. |
| 1332 hrs | Security Officer had trouble getting through to DECAM CHUBB. SMC contacted SCDF immediately at 1332 hrs. |

Practical Approach in investigating/responding to Fire Alarm Activation

Negative Approach upon alarm activation – Light Industrial Building Fire

- ✗ From 1325 hours to 1332 hours - 7 minutes
- ✗ Assume Fire Engines arrive 8 minutes later - 15 minutes
- ✗ 5 minutes of delay in respond to DECAM, what happen to the warehouse ???
- ✗ 2 minutes is too short to investigate and report ???
- ✗ Lifts only take 1 minute to any floor (Vertical Travel)
- ✗ Horizontal Travel another 1 minute ???

Practical Approach in investigating/responding to Fire Alarm Activation

Some good practice upon alarm activation:

- 👍 Make full use communication equipment / CCTV for quick investigation remotely.
Remarks: CCTV is solely to be used to complement the verification process.
Physical verification will still have to be conducted
- 👍 Identify types of detectors activated
- Sprinkler, Heat Detectors?
- 👍 Never inform DECAM it is a false alarm before any Immediate investigation
- 👍 Never attempt to Isolate any zone in Alarm when first alarm activated



Practical Approach in investigating/responding to Fire Alarm Activation

Precautions and good practice for system isolation:

- ✓ Inform DECAM for any portion of the system is isolated (SS CP10)
- ✓ Never Isolate/disable the alarm bell sounding by any technical means
- ✓ For routing maintenance/testing, proper operation procedure to inform occupants alarm bell is sounding for testing
- ✓ Fire watch service, close monitoring for area and services that is isolated/disable especially after working hours

Practical Approach in investigating/responding to Fire Alarm Activation

Precautions and good practice for system isolation:

- ✓ Self contain smoke detectors - alternative means to facilitate early detection of fire
- ✓ Fire extinguishing appliance shall be held in special readiness for immediate use
- ✓ Restored isolated zone area/services as soon as possible and inform DECAM

Practical Approach in investigating/responding to Fire Alarm Activation

Conclusion:

- ☑ FSMs shall not have the negative perception that **2 minutes is too Short** for fire alarm reporting to DECAM and Authority is imposing unreasonable time line for FSMs to comply with
- ☑ Proper operation procedure and adequate manpower can achieve the 2 minute time line
- ☑ Treat any alarm as **Alarm of Fire** until it can proved to be false
- ☑ Always remember all the above can save two lives and a building



A vertical, low-angle photograph of a modern skyscraper with a glass and steel facade is positioned on the left side of the slide, extending from the top to the bottom edge.

Thank You
for your attention