AIA Middle East

A309

Session: Fire Safety Engineering

Kuwait

John Noone

Oct 30, 2013

Learning Objectives

At the end of the this course, participants will be able to:

1) Participants understand the importance of stakeholder involvement in the development of Fire Safety Strategies for buildings

2) Participants will gain knowledge about the importance of implementing the Fire Strategy through design, construction, handover and facilities management

3) Participants will have an understanding of design specifications and how they relate to fire strategies and what happens when the specification is not checked by a fire safety professional or misunderstood by the contractor/site team

4) Participants will have an understanding of fire tests as they relate to materials of construction and design specifications

5) Participants will see real project examples of the course objectives

Fire Safety –

Strategy, Design, Specification, Construction and Facilities Management

John Noone, Arup Gulf Ltd

30th Oct 2013

Safety Design in Buildings, Kuwait

www.arup.com

Summary

- **Fire Strategy to Facilities Management**
  - Design
  - Construction
  - Handover
  - FM Fire Safety Plan
- **Examples of what can go wrong**
- **Case study**
- **Conclusions**

Fire Safe Buildings?

- **Buildings come in all shapes and sizes but a fire is a fire**
- **All stakeholders should understand the fire strategy**
- **Check compliance with fire strategy during design, specification, construction, testing & commissioning, handover**
- **Prepare a fire safety plan, train and test with fire drills**
- **Regular maintenance and testing of systems**
- **A proactive approach is needed**

Fire Strategy to Facilities Management

Design

- Fire Strategy
- Approvals Process

Construction

- Installation
- Testing and Commissioning
- Inspections by Fire Department

Handover

- Building Completion Certificates
- Building Management Plan
- Handover to Client

Occupancy

- Facilities Management
- Training , fire drills
- Testing & Maintenance
- Housekeeping

Design Phase

Design Phase - Communication

- **Talk with the client, operator, end users as early as possible**
- **Develop the fire strategy with them**
- **They know how the building will be used and therefore what will work and what won't**
- **They will enforce the fire strategy if they helped develop it**

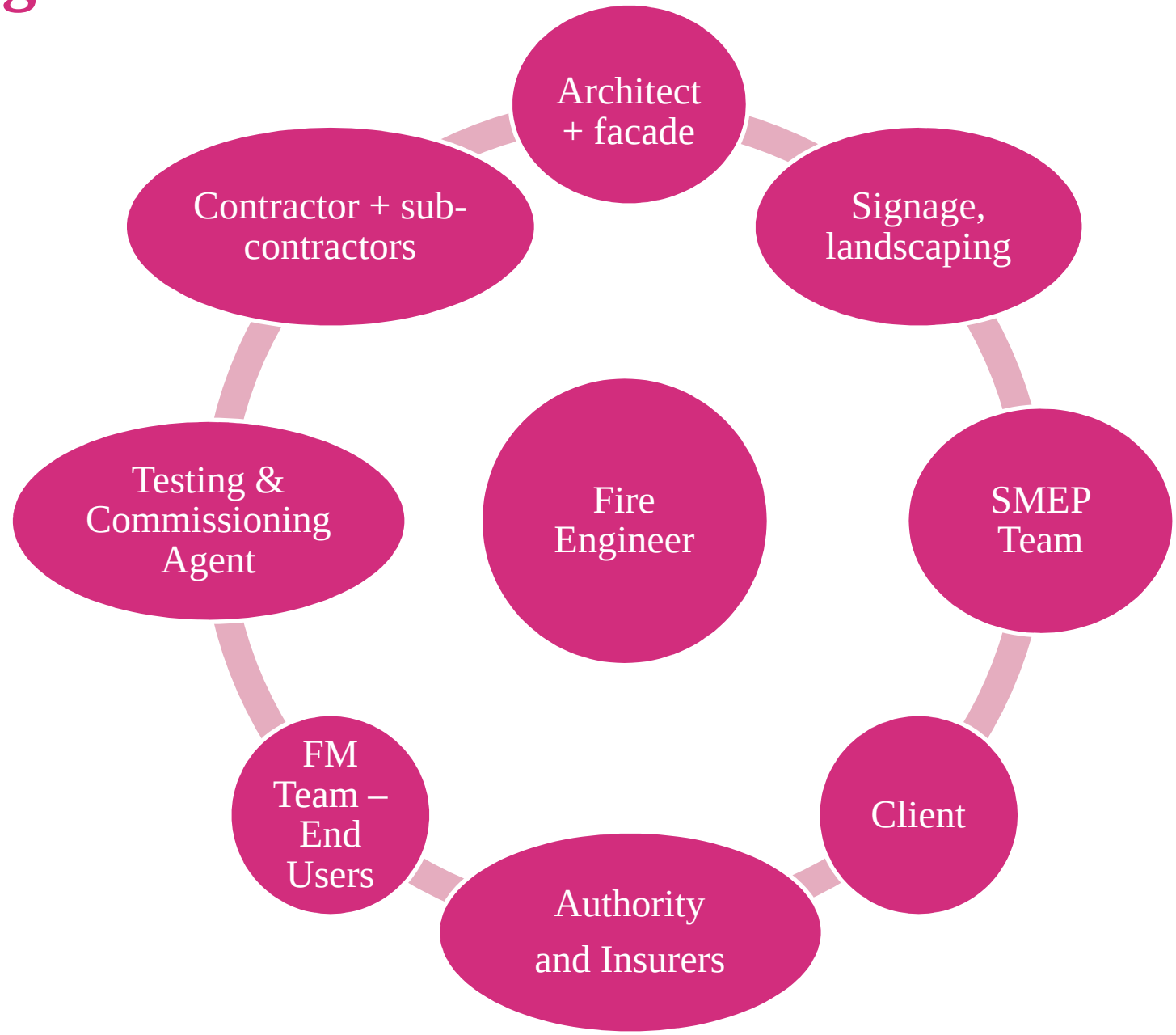
Design phase - Keep it Simple

- **Reliability, Maintenance & Testing**
  - "Do lots and lots of fire safety systems make the building safer?"
  - Sprinklers, detection, smoke control – only reliable if tested and maintained (replaced) for the entire 30-50 years of the building life
  - ***Less is often more ……keep it simple***
    - ***Protect the evacuating occupants, Fire Fighters and the asset as appropriate***
    - ***Cause and effect is simpler***
    - ***Testing and commissioning is less***
    - ***Maintenance is less***
    - ***Also – more sustainable, less space required etc etc***

Design Phase – Share Information

- **Producing a fire strategy report is 5% of the fire engineer's role**
- **Communication and liaison with stake holders and members of the team etc is 95%**

Design Phase – Share Information



Design Phase – Specifications

- **Materials of construction**
- **British versus US standards**
- **Understanding fire safety definitions**
- **Understanding fire tests**

- **Fire as a result of combustible materials of construction is a problem……..that is still an issue today**

Station Night Club Fire

- The Station nightclub fire was the fourth deadliest nightclub fire in U.S. history, killing 100 people. The fire began at 11:07 PM EST, on Thursday, February 20, 2003, at The Station, Rhode Island
- The fire was caused by pyrotechnics, **which ignited flammable sound insulation foam in the walls and ceilings** surrounding the stage. A fast-moving **fire engulfed the club in 5½ minutes.**

http://www.youtube.com/watch?v=OOzfq9Egxeo

Monte Carlo fire, Las Vegas

- **Combustible cladding materials in strips across the facade**

Al Tayer Tower, Sharjah, UAE

Fire started at around 2:30am, burned for 5 hours

Press cuttings:

“Sharjah - Contractors to prove exterior aluminium cladding will not catch fire”

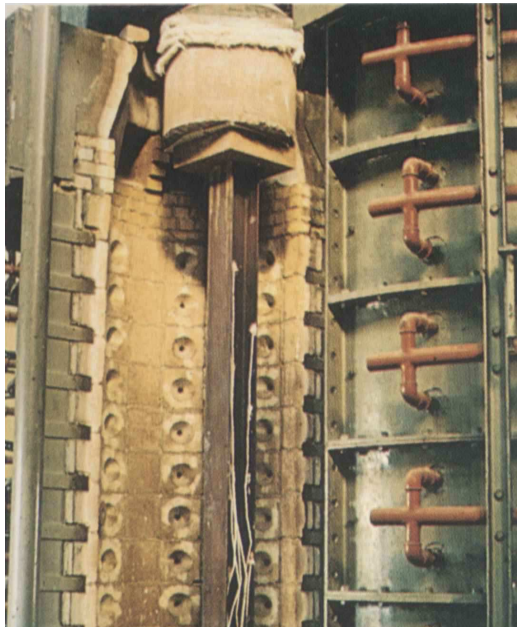
“A **hardline approach** to the widespread application of **non fire-rated** cladding in the wake of two major tower fires in recent months. “

“Panels to be **fireproof”**

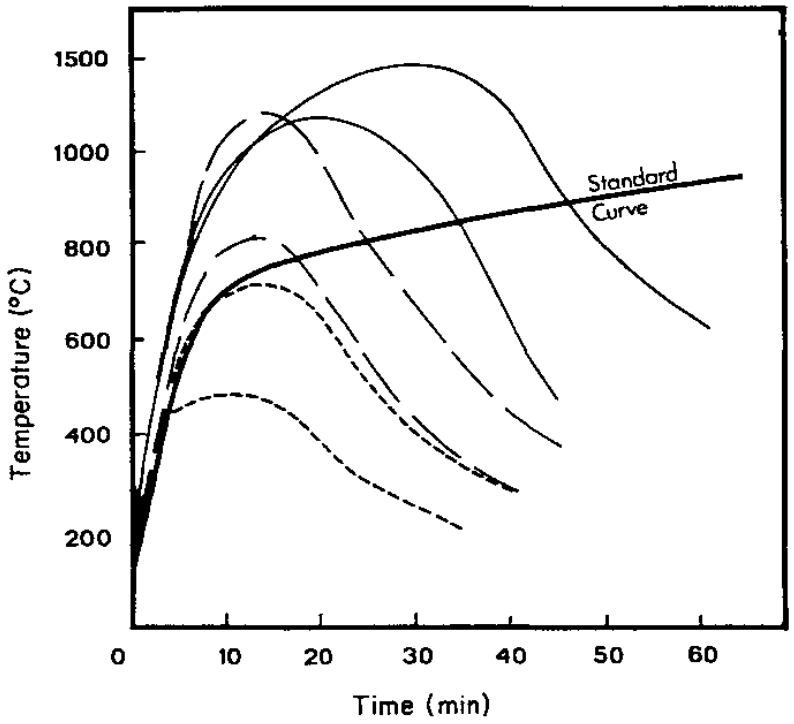
“Panels to **fire resistant** and withstand high temperatures”

Why?

- Confusion over definitions and fire testing



- Non combustible
- Limited combustible
- Fire Retardant (wood)
- Fire Resistant



Boom time construction – procurement times

Boom v bust - price

Type I
Large/tall
High fire resistance
Non-combustible

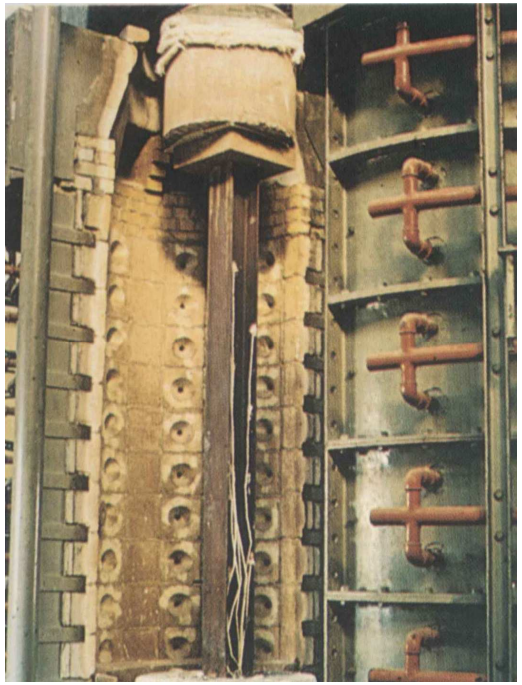
Risk

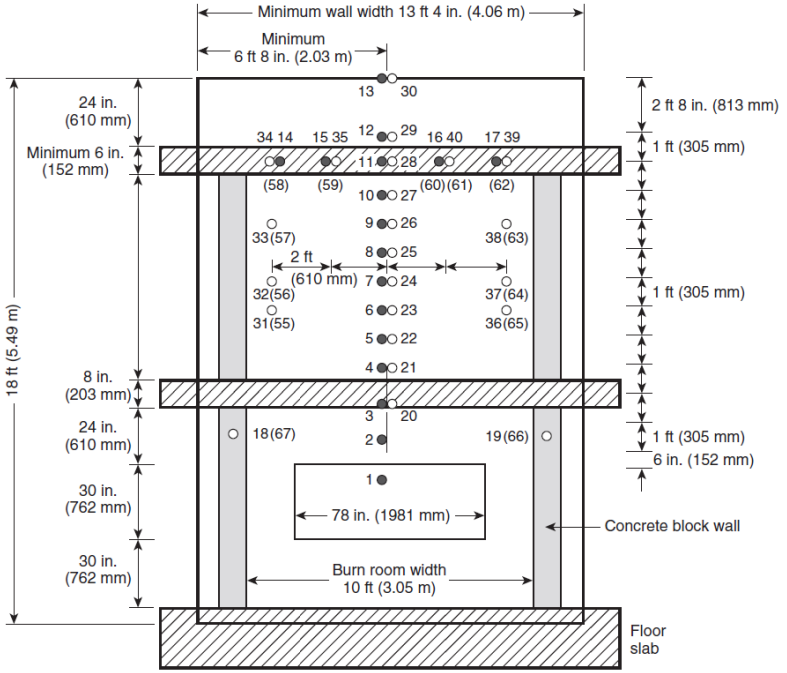
Type V
Small/low rise
No fire resistance
Combustible materials ok

Fire Tests

- **They are not intended to represent reality**
- **They are intended to be an industry benchmark and provide a comparison between the fire performance of different materials**
- **You have to specify the correct test for the application as not all tests are equally severe**
- **US, BS or EU are permitted in the Gulf**

Fire Tests




Minimum wall width 13 ft 4 in. (4.06 m)
Minimum
6 ft 8 in. (2.03 m)
24 in.
(610 mm)
Minimum 6 in.
(152 mm)
8 in.
(203 mm)
24 in.
(610 mm)
30 in.
(762 mm)
30 in.
(762 mm)
18 ft (5.49 m)
2 ft 8 in. (813 mm)
1 ft (305 mm)
1 ft (305 mm)
1 ft (305 mm)
6 in. (152 mm)
2 ft
(610 mm)
78 in. (1981 mm)
Burn room width
10 ft (3.05 m)
Concrete block wall
Floor
slab

Fire Tests

Fire performance	Fire test	British Standard Test for Similar Products (not equivalent)
Fire resistance	ASTM E119	BS 476 – Parts 20 to 24
Flame spread	ASTM E84	BS 476 Parts 6 and 7
Smoke production	ASTM E84	No BS
Potential heat	NFPA 259	
Fire propagation of exterior walls	NFPA 285	BS 8414-Part 1 and 2
Non combustible	ASTM E136	BS 476- 4:1970 Non-combustibility test for materials or BS 476-11:1 82 Method for assessing the heat emission from building products
Limited combustible	See NFPA 5000 definition	BS 476 Parts 11

Certification

- **All products that have been fire tested to achieve a certain fire performance should also be certified to be sure of the quality and consistency of the product**
- **Always ask for the certification as well as evidence of fire testing**

Construction Phase

Construction Phase

- **Fire strategy drawings in addition to the fire strategy report are key**
- **Original design team may have been replaced by local consultants**
- **Fire Engineer is often no longer involved in project**
- **What can happen?**

Stop it…..

- **Spot the errors !!**

Stop it…….

- **Spot the errors !!**

Interior Designers vs Sprinklers

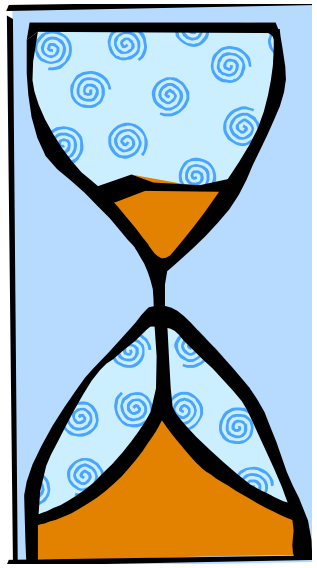
Materials – interior linings, facades, etc..

- **Specification is misunderstood or not correct**
- **Material has been fire tested but is it the correct test?**
- **Does it meet the fire strategy?**
- **Is the material certified by an independent body**
- **Does the cheaper alternative or the locally available material provide the same performance?**
- **Is BS 476 Part 7 the same as ASTM E84?**
- **Is BS 476 Part 7 or ASTM E84 appropriate?**

Handover

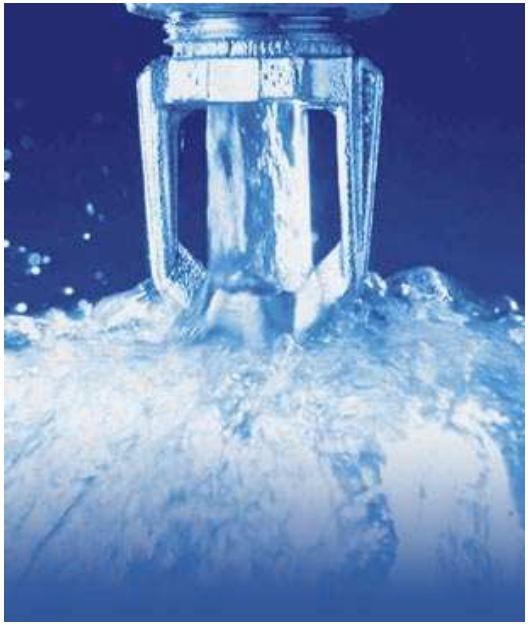
Handover

- **Again fire engineer is often not involved**
- **Engineer of record reviews testing and commissioning by contractor + signs off project**
- **Civil Defence Inspection -**
  - Relatively short time on site
  - Has many other buildings to inspect
- **PRESSURE TO DELIVER ON TIME**
- **Facilities Manager develops fire safety plan**



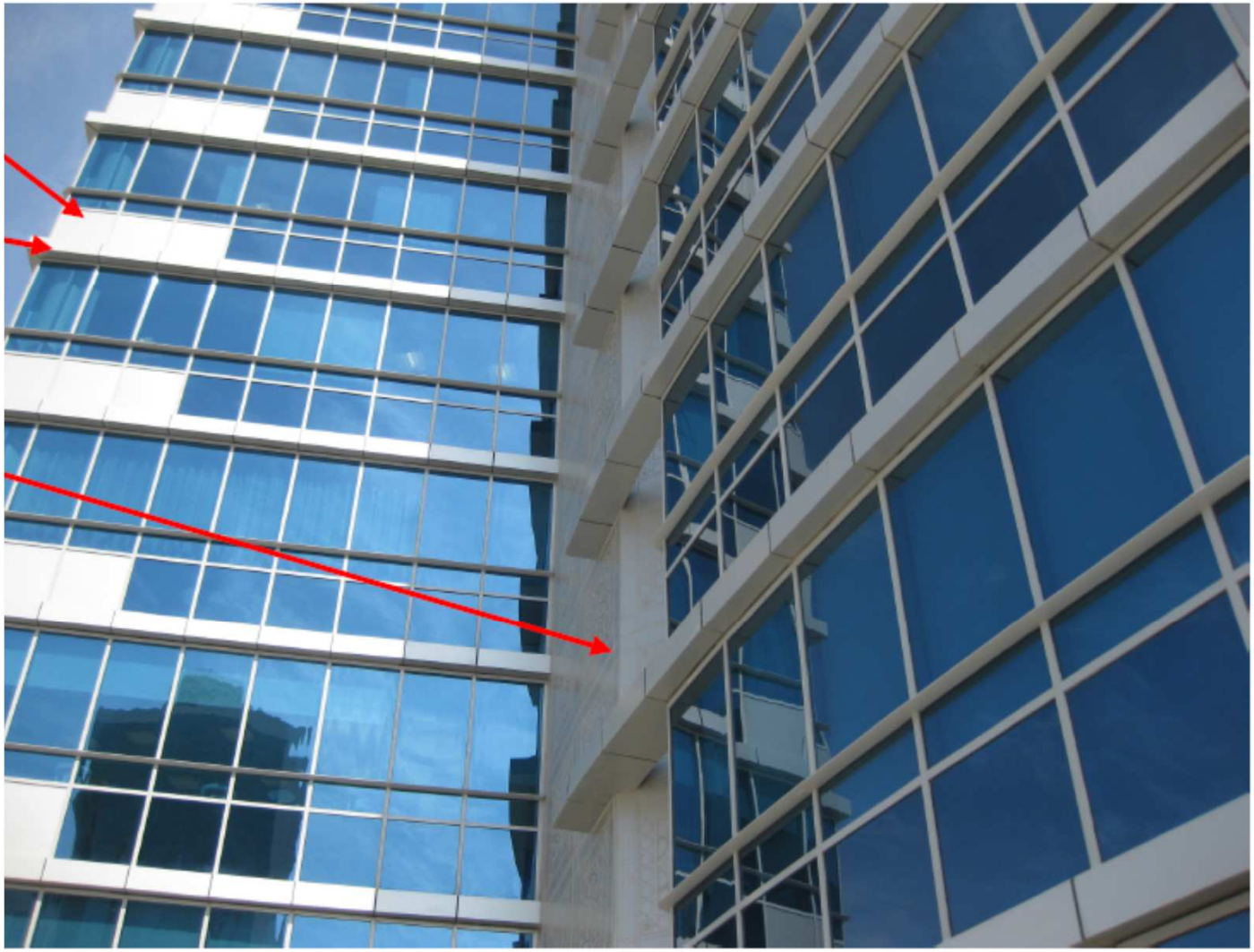
Fire Safety Plan

- Training
- Emergency Management and Staff Structure
- Staff Duties
- Routine Fire Precautions
- Extensions and Alterations
- Fire Incident Routine
- Emergency Staff Response
- Evacuation Scenarios and Zoning
- Maintenance and Testing

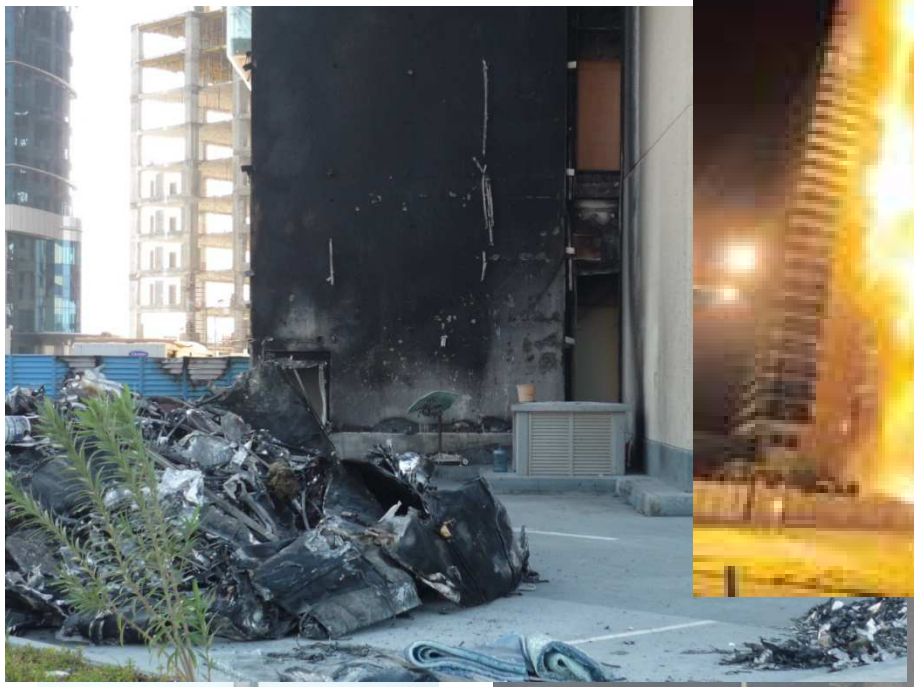


Case Study 1 –
High Rise with Combustible Facade

Typical Facades in Gulf

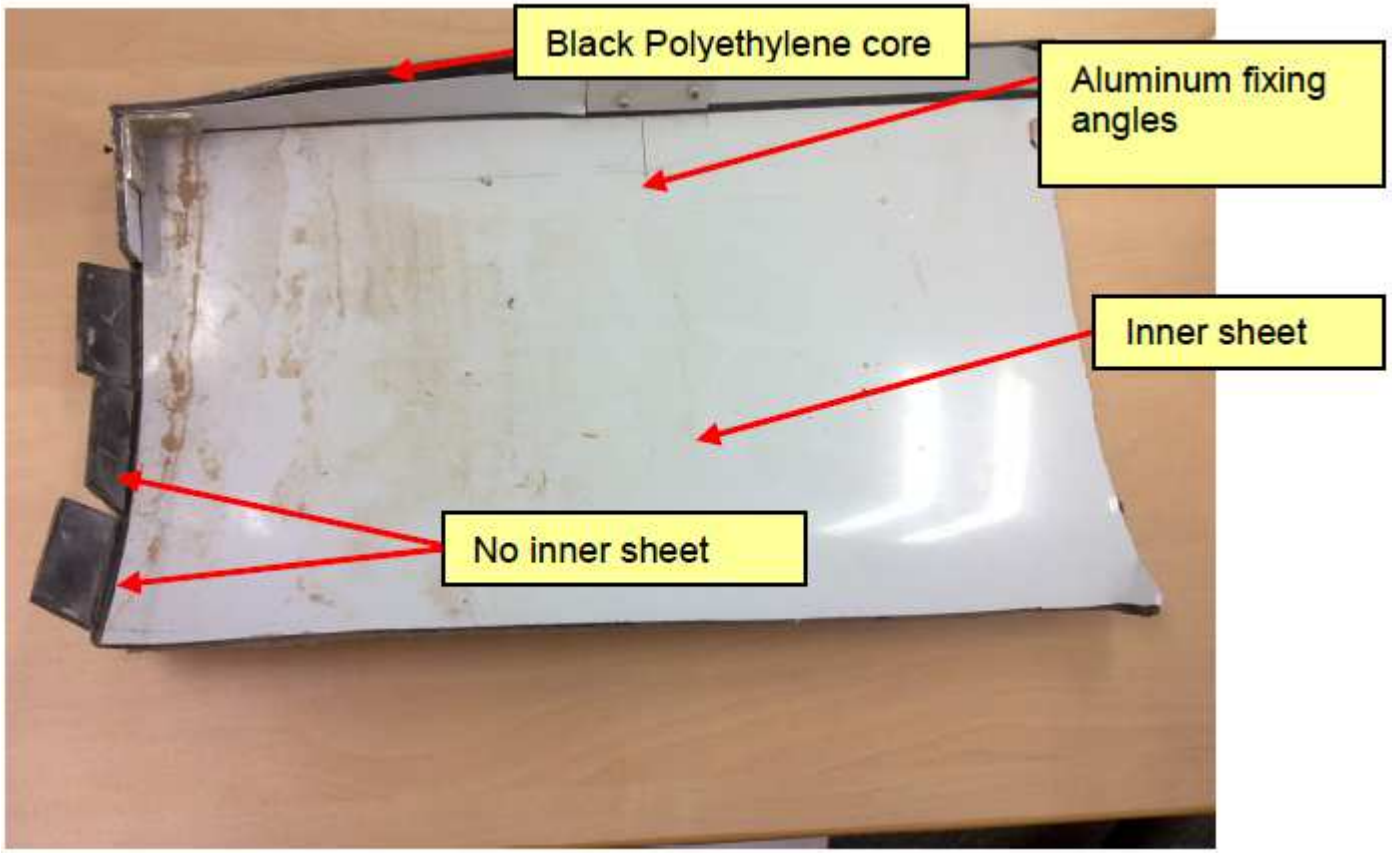


Case Study



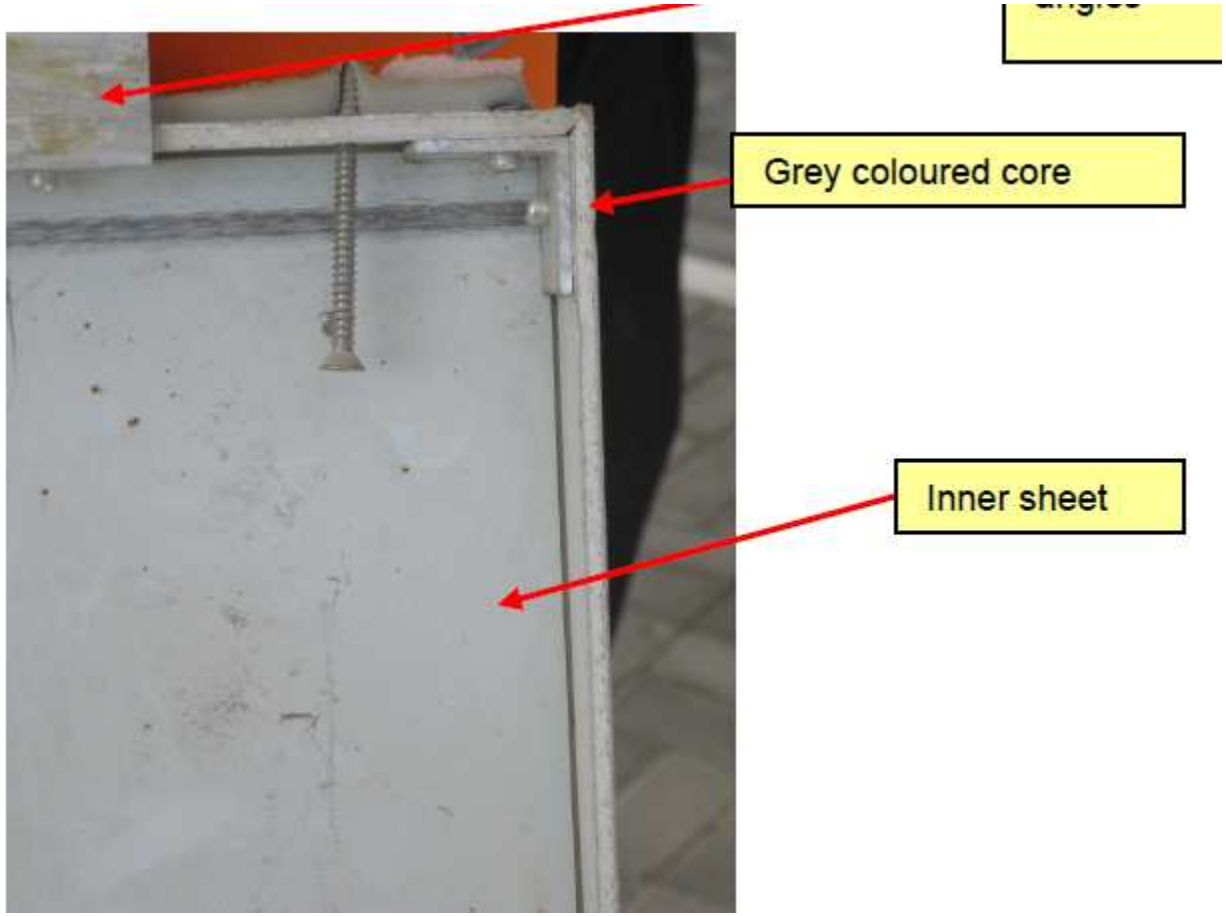
ACP – Combustible Plastic Core

- Does not comply with NFPA 5000
- Would not pass NFPA 285 fire test
- Would probably pass BS 476 -7 or ASTM E84



ACP – Limited Combustible Mineral Core

If mineral content is high enough then it will pass NFPA 285



Conclusions

- **Writing a fire strategy report and producing drawings is not enough**
- **The fire engineer should be alongside the design/site team and interacting at each stage on a regular basis**
- **A thorough review of specifications and material submittals by a fire safety professional would seem sensible**
- **For some buildings, it is important that the fire engineer interfaces with all stakeholders through to building completion and beyond**


Questions?

This concludes The American Institute of Architects
Continuing Education Systems Course

John Noone
ARUP
John.Noone@arup.com