# Avoiding Damage from Construction Fires

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Working together to eliminate error,
by industry, for industry.

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# Introduction

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- Background information
- Examples of Fire losses
  - Background Info
  - Fire Event
  - Areas of Concern
  - Insurance Insight
- Lessons Learned / “Getting It Right”
- Questions / Discussion

# Background Information

- 2015 to 2019, there were ~1600 construction site fires that required attendance by a local fire brigade
  - Of which, 28% were caused by hot work activities
- Fires related to hot work led to a total claim loss of £250M for Zurich alone
- Property insurance fire claims for 2018 amounted to £1.3BN

Notable Losses in the last 24 months

… but no 'record-breaking' constructior

| Loss | As at 1/1/20 |
|---|---|
| Ituango (hydro electric dam) | 1,400,000,000 |
| Inpex LNG Plant[1] | 1,300,000,000 |
| Kuwait National Petroleum Company | 600,000,000 |
| Daewoo E&C Power Plant - Morocco | 250,000,000 |
| Datteln 4[2] | 180,000,000 |
| Abu Dhabi Airport[3] | 150,000,000 |
| Macau Casino/Hotel | 147,000,000 |
| Auckland Fire | 145,000,000 |
| British Columbia Hydro[4] | 115,000,000 |
| Hard Rock Café | 100,000,000 |
| Jeddah Rail Station Fire | 100,000,000 |
| Qatar Rail | 63,000,000 |
| Glasgow School of Art | 37,600,000 |

# Example of Construction Fires

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- Background Info:
  - 10 storey existing building undergoing renovation
  - Works were being undertaken on the 7th floor
    - This floor had an open chimney void and the floor was open to the elements (i.e. exposed to wind).
    - There was no cavity barrier within the chimney in the temporary condition.
  - A ‘tar boiler’ was also being used at roof level

- Fire Event:
  - A fire started on the 7th floor around mid-morning.
  - The fire was not able to be extinguished quickly as fire extinguishers were not readily available
  - The fire travelled quickly to the upper levels through the chimney void and the speed of which was assisted by the wind.
  - It took 50+ fire fighters about 7 hours to control the fire

# Example of Construction Fires

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- Areas of Concern
  - Project did not have a hot work permit system in place
  - Project did not produce an overall project Fire Risk Management Plan for the construction condition
    - Plans were produced mid-way through the project and by individual subcontractors and lack co-ordination.
  - Lack of temporary fire barriers for voids connecting different floors
  - Lack of barriers / shields in place to prevent any wind spreading sparks/embers and exacerbating a fire event
  - Although not responsible for this fire; the use of a tar boiler on the roof is a concern.

- Insurance Insight
  - £20m loss settled at £12m.

  - Policy – Points of Discussion
    - JCOP on Protection from fire.
    - Value of works completed at time of the fire.
    - Existing structures vs Contract works.
    - Exclusion 5, Liability Section for Fines & Liquidated Damages.

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# Example of Construction Fires

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- Background Info:
  - Existing 5 storey listed building was partially being extended and also refurbished
  - Building was to remaining operational during the works

- Fire Event:
  - Works were being undertaken on a flat roof during the morning.
  - Subcontractor left the hot work area unattended
  - A fire started and started to spread to the lower floors through voids in the roof.
  - Fire was initially detected by smoke on the lower floors by members of staff working in the building (i.e. not the subcontractor).
  - Emergency services raised by member of the public
  - Required 100+ fire fighters to control the blaze.

# Example of Construction Fires

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- Areas of Concern
  - Project had a hot work permit system.
    - However, inadequate fire watch as works were left unattended
  - Fire alert not raised by subcontractor, but by members of the public.
  - Inadequate fire protection measures between existing and new building resulted in the fire spreading between the two buildings.
  - Temporary fire screens separating the two buildings had been destroyed

- Insurance Insight
  - £6.75m loss, settled at £4.7m

  - Policy – Points of Discussion
    - Existing structures vs Contract works.
    - Exc 7 “Insured Property Handed Over”
    - Exc 8 “Insured Property taken into use”
    - Documentation of handed over areas of Contract works
    - Multiple Insured Clause
    - First to collect  limited subrogation proceeds

# Example of Construction Fires

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- Background Info:
  - £20M+ Contract Works
  - Completion date had been extended by 12 months before the fire event
  - Fire Risk Assessment confirmed this project as a high fire risk site.
  - Works involved the use of a blow torch to repair a leaking section of flat roof.
  - These works took place on a section of flat roof adjacent to a sloping roof made from combustible materials.
    - There was a void in the sloping roof that contained organic combustible material.
  - Permit was open from 8am to 12pm and it confirmed that precautions had been taken to protect non-moveable combustible materials.
    - Permit required a 2h fire watch and a water fire extinguisher was present.

- Fire Event:
  - Works ended mid-morning with the permit being closed 1h 25m after works had ceased. Workers left site ~3h later.
  - Fire was spotted by a member of the public at ~5pm
  - Mostly the cause was sparks / hot embers entering the void on the sloped roof containing combustible material.
  - Roof was completed destroyed by the fire, but substantial damage occurred to the main building from the water used to extinguish it, as well as neighbouring 3rd party buildings.

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# Example of Construction Fires

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- Areas of Concern
  - Adjacent combustible materials were not adequately protected
  - Empty cigarette packets were found on the roof
  - A foam and a CO2 fire extinguisher provided; one of which was overdue a service by several months and partially discharged, and no water extinguisher provided as required
  - No additional fire watch undertaken at the end of the working day, as would be expected with a high risk site.
  - Claim £3m, paid nil.

- Insurance Insight
  - Policy – Points of Discussion
    - Difference in Conditions Cover (DIC)
    - Memorandum 13 – JCOP on Protection from fire.
    - Obligations re JCOP apply until works handed over.
    - Condition 1 – “give all such information and assistance as Insurers may reasonably require”
    - Lack of engagement / cooperation by Contractor.

# Audience Question?

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- Do you think we do enough to prevent construction fires?
  - Yes?
  - No?

- The construction industry has made improvements over the years to improve fire safety, but we think more could be done, in particular to focus on protecting property and not just lives.

- We will look at the following:

  - Eliminate / reduce the risk where possible
  - Fire Management Plan – Construction Stage
  - Strengthening Hot Work Permit System
  - Technology
  - Fire compartmentation for Construction Stage
  - Training

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# Lessons Learned / ‘Get It Right’

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- Importance of complying with The Joint Code of Practice for Fire Prevention on Construction Sites (JCOP)
  - Non-compliance could invalidate your insurance policy

- Eliminate / reduce the risk where possible
  - Is there an alternative method avoiding the need for hot work?
  - If not, can you reduce that risk to an absolute minimum?
  - Clients should be challenging Main Contractors and Main Contractors should be challenging designers / subcontractors etc.

- Fire Management Plan – Construction Stage
  - Every project should have one and be project specific – not a company wide document
  - Not replaced by a Fire Risk Assessment
  - Address all the key areas identified within the Joint Code of Practice (JCOP) for Preventing Fires on Construction Sites
  - Produce the plan before works start on site and regularly update to reflect an evolving project

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# Lessons Learned / ‘Get It Right’

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- Importance of a robust hot work permit procedure which is followed in practice
  - Hot work permits are often seen as a tick box exercise

  - Pre-work checks:
    - Ask yourself – what could go wrong here and what could I set alight to?
      - What materials are directly beneath the hot work?
      - Are there any voids or nearby combustible materials nearby?
    - Ideally a visual inspection should be done by an independent person (e.g. the person approving the permit)
    - Take photographic evidence to demonstrate the area is safe to undertake hot work
    - Responsible person should be checking that the person undertaking the works is competent and trained
    - Are there an adequate number and type of fire extinguishers in the immediate vicinity.
    - Is the area susceptible to wind conditions? If so, either cease the works or install a suitable non-combustible wind barrier

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# Lessons Learned / ‘Get It Right’

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- Importance of a robust hot work permit procedure which is followed in practice
  - During the works:
    - Never leave a hot work area unattended
    - Pay attention to significant breaks (toilet, lunch etc.) during day, especially where permits are open all day.
    - Hot work should be stopped a sufficient time before any breaks or end of day to ensure an appropriate fire watch can be undertaken
  - Post-work checks:
    - The fire watch should be a continuous watch and not just a spot check after 60 mins etc.
    - Has a check of the immediate vicinity and nearby voids been undertaken as part of the check?
    - Ideally a visual inspection should be done by an independent person (e.g. the person closing the permit)
    - Take photographic evidence to demonstrate the area is safe

# Lessons Learned / 'Get It Right'

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- Zurich Hot Work Video
  https://www.youtube.com/watch?v=Uj3F6KidPXI&feature=youtu.be

- NRFC's Safe2Torch Scheme
  - Aim to reduce fires on roofs as a result of hot work
  - This scheme provides guidance documents and checklists

- Use of technology which could help lower the risk
  - Consider the use of thermal imaging cameras
    - Helps identify areas which could be smouldering, in particular in voids which cannot be easily inspected with the naked eye
      - NB: It is important to understand the limitations of thermal imaging cameras – they are not a replacement to current practices but an additional tool.
    - Thermal images can be appended to the HW permit and for QA purposes it can demonstrate that a fire watch was undertook

  - Replace paper based permits with Smart Permits
    - Enables photos and thermal images to be uploaded as part of the permit process.
    - Zurich is piloting the use of Smart Permits with some Clients and Contractors

# Lessons Learned / 'Get It Right'

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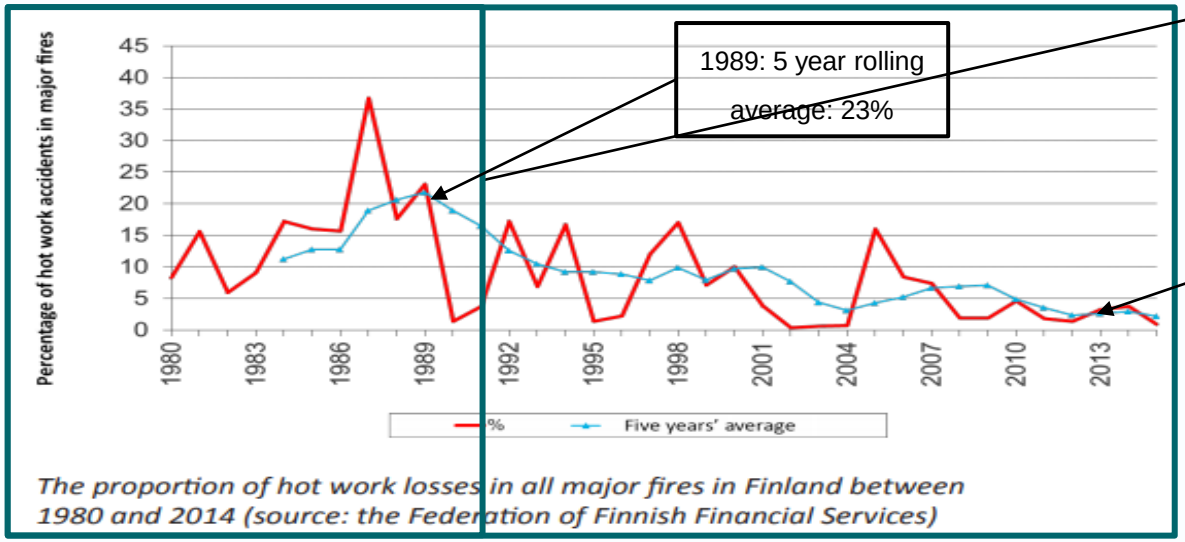
- Improving hot work operative competency
  - Scandinavia had a real issue with hot work fires in the 80's
  - QUESTION: What % of fires do you due to hot works?
    - 0 – 10%
    - 10 – 20%
    - 20 – 40%
    - 40%+
  - QUESTION: Since the introduction of making it mandatory in the 90's for all hot work operatives to require a 'Hot Work Passport', what is % currently?




*The proportion of hot work losses in all major fires in Finland between 1980 and 2014 (source: the Federation of Finnish Financial Services)*

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# Lessons Learned / ‘Get It Right’

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- Improving hot work operative competency cont.
  - The FPA and other providers run a similar course which acts as a refresher course.
  - In addition to the FPA (or similar course) it would be recommended for all hot work operatives to undergo ‘fire marshal’ training.
  - GIRI & CITB’s Supervisor & Management Skills
    - Ingraining the “Pause for 5” to assess the risks before hot work or high risk fire activity is being carried out.

# Lessons Learned / ‘Get It Right’

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- Fire Compartmentation / Protection Measures
  - Install temporary compartmentation or permanent compartmentation as early possible to prevent fire spread between and within floors
  - Consider the impact of impairment notices on existing fire alarm systems
  - Can wet/dry risers, sprinklers, smoke detection be installed earlier in the programme and be commissioned for use during the construction stage

- Smoking
  - Smoking on site is still prevalent – a zero tolerance approach is needed
  - Smoking shelters are advised where practical
    - By not providing then you increase the risk of smoking on site
    - Consider providing multiple shelters if your site is large enough
    - Follow the guidance in the JCOP – remember they should be external and a sufficient distance away; never should they be inside of a building.

# Best Practice Guidance

- FPA: Joint Code Practice for Preventing Fires on Construction Sites
- HSG168 : Fire Safety in Construction
- Zurich Risk Insight – Hot works and renovation projects
  - https://www.zurich.co.uk/news-and-insight/assessing-hot-work-and-the-risks-of-renovation
- NRFC : Safe2Torch
  - https://www.nfrc.co.uk/safe2torch

# Questions?

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