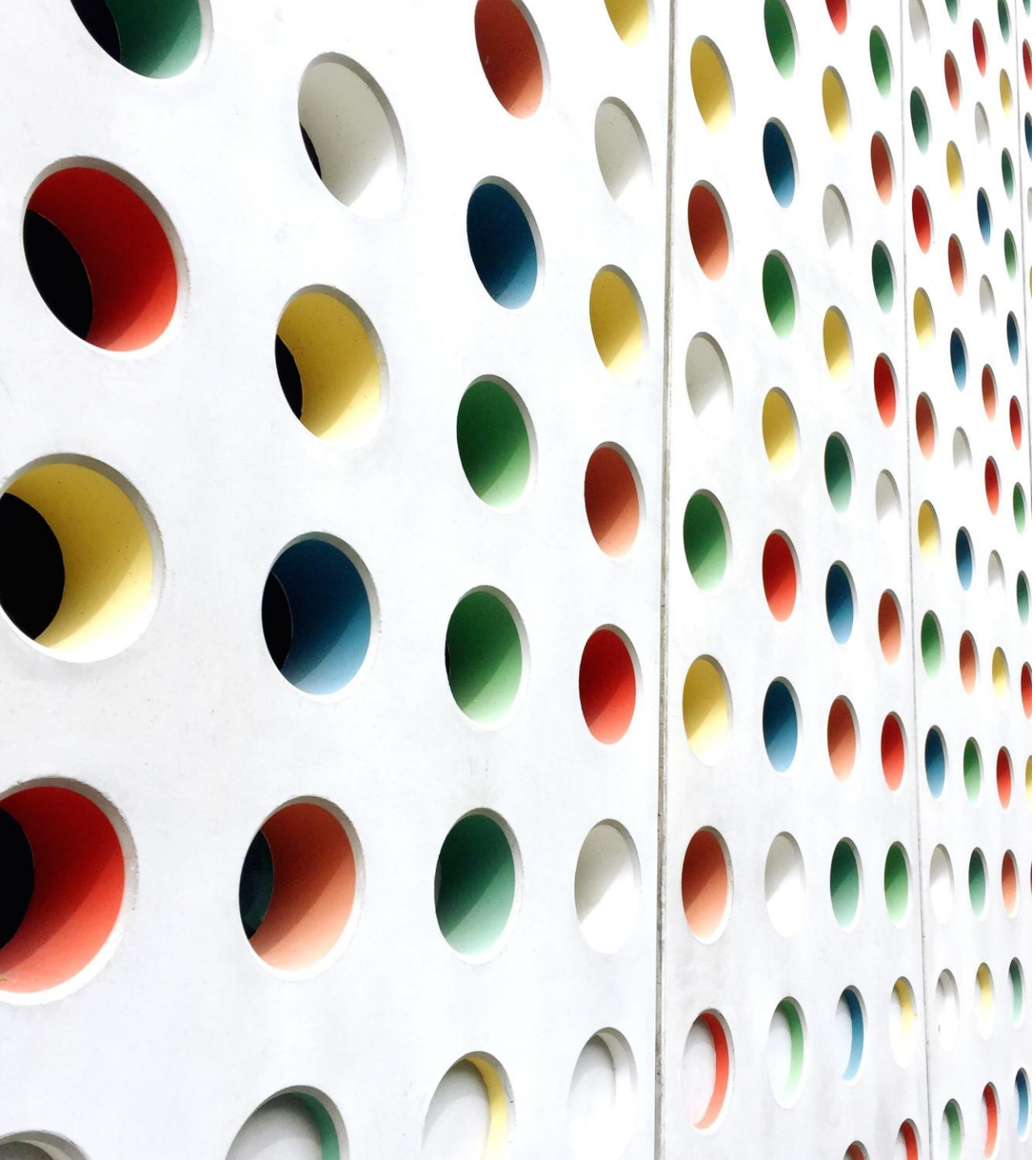


# Forensic Engineering Failure Analysis

WHEN GOOD RISK GOES BAD

ARCON
FORENSIC ENGINEERS

# What Makes an Engineer a Forensic Engineer?

Most engineers are employed in the areas of design or maintenance.

Forensic engineers are concerned with the failure of a structure, product or process. Working backwards, using a forensic methodology, their goal is to establish what happened, and why it happened, for a specific scenario.

# What Does A Forensic Engineer Do?

In most forensic engineering investigations, the starting point is to establish “what happened” before proceeding to “why did it happen”.

While these may appear to be one and the same, there are many scenarios where first impressions may be incorrect.

Let’s look at the following example…

# What Does A Forensic Engineer Do?

# What Does A Forensic Engineer Do?

In the process of establishing what happened and why, forensic engineers are also establishing what couldn't have happened.

There are a number of thresholds for narrowing down potential causals:

- is the failure mechanism possible scientifically, 
- is it plausible based on the scenario, 
- is it probable or likely. 

# Using Failure Analysis to Improve Underwriting

Typical failure mechanisms associated with property and equipment losses can be grouped into four categories:

- Design,
- Installation,
- Use &
- Maintenance.

# Risk Considerations – Civil & Structural Failures

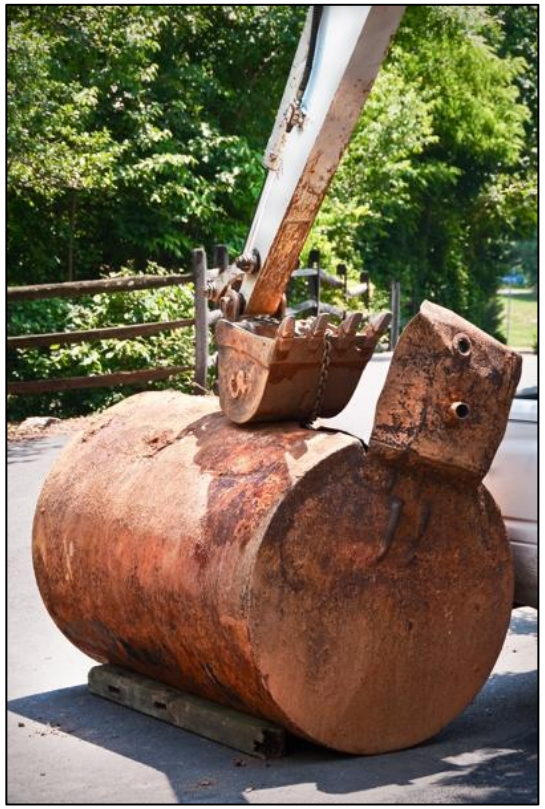
- Alterations – are there permits, plans
- Prior Use / Future Use / Appropriate Use
- Drainage – internal & external (site plan)
- Roof materials and age
- Current condition of external cladding
- Construction materials suitable for the use
- Construction materials suitable for the geography and weather conditions

# Risk Considerations – Civil & Structural Failures

- Hydrogeology
- Evidence of prior failures
- Published product recalls
- Does it meet current OBC requirements

# Risk Considerations – Mechanical Failures

- ❑ Type of piping (copper/plastic/pex)
- ❑ Age of piping (asbestos wrap)
- ❑ Adequacy of piping capacity
- ❑ Signs of deterioration / leakage
- ❑ For equipment – evidence of maintenance schedule
- ❑ Back-up systems for critical processes
- ❑ Evidence of prior failures
- ❑ Published product recalls



# Risk Considerations – Electrical Failures

- Change of use requiring upgraded service
- Back-up power sources – capacity & testing
- Location of main service closet – waterproof
- What is the electrical service – is there a rooftop solar panel array in place, battery power cells?
- Published product recalls
- Location of generators - are they rooftop
- Degraded/inoperative overcurrent protection

# Risk Considerations – Fires & Explosions

- ❑ Type of suppression system
- ❑ Storage of flammables/combustibles
- ❑ Capacity of fire suppression system
- ❑ Presence and age of alarm system
- ❑ Most recent testing & certification results
- ❑ Published product recalls

# Risk Considerations – Fires & Explosions

- Recent electrical work – evidence of ESA approval
- Maintenance records for vehicles
- Training program and certification for specific equipment and/or processes

# Key Takeaways

Meet regularly with claims staff to discuss losses.

Buildings & equipment can & will fail, it comes down to when and how.

Failures typically occur as a result of a design or specification issue, faulty installation or lack of maintenance & improper use. Failure can occasionally occur due to an act of god.

Expect the unexpected.

Where age and condition are unknown, or for unique settings, do a visual inspection (barns, outbuildings, docks, recreation facilities).

Consider exclusions or riders.