RM FORUM 2024

SHARING OF KEY INSIGHTS FROM BCA INSPECTIONS

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Objectives

- Understand BCA's role in amusement ride safety
- Identify recurrent issues in amusement ride inspections
- Discuss strategies for issue prevention and safety improvement
- Learn from past incidents to avoid future occurrences

Content

1) Introduction to BCA's Inspection Regime for Amusement Rides

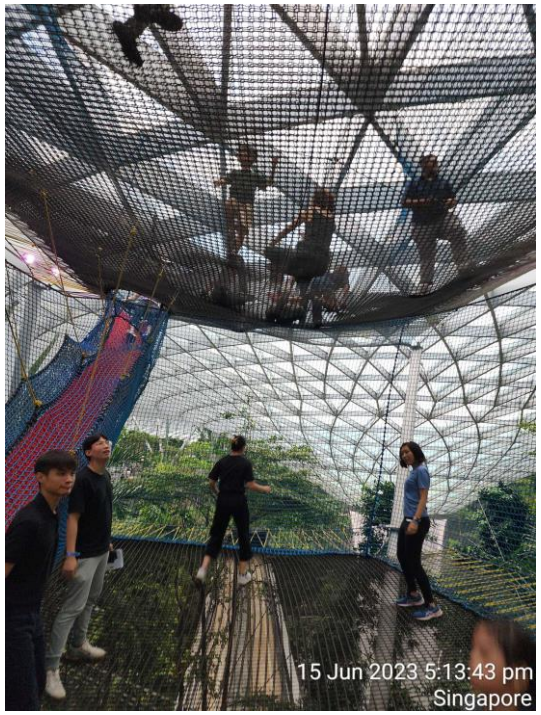
2) Inspection Insights

3) Lessons from Abroad

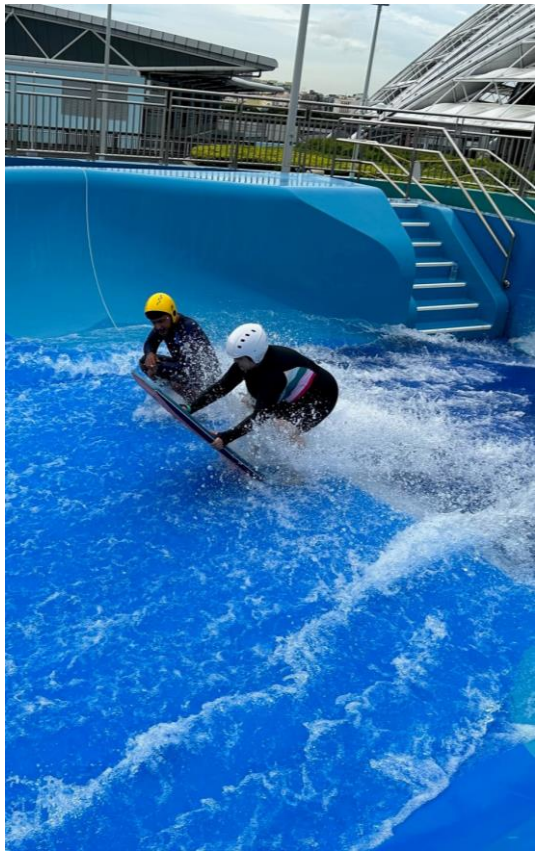
BCA's Inspection Regime for Amusement Rides

- Annual Operating Permit Inspection
- Routine Maintenance Inspection
- Routine Operations Inspection
- Mystery Shopper Inspection

1) Mystery Shopper Inspections



- Ensuring if all safety checks and briefings are conducted.



- Officers will be on the lookout for any potential hazards.

2) Inspection Insights - Common Findings

Observation:

- Some structural bolts and nuts are missing torque seal markings.

Best Practice:

- Each bolt should exhibit a single torque seal marking to ensure integrity.

Why are Torque Seals critical?

- Provides visual indication if bolts has been loosened due to vibration or tampering.
- Failure in Structural Bolts → Catastrophic Incidents

2) Inspection Insights - Common Findings

Corrosion of Support Structures – A Silent Threat

Observation:

- Visible corrosion on critical components such as flanges and support brackets.

Issue:

- Metal surfaces are inadequately treated against corrosion, with some merely painted over existing rust.

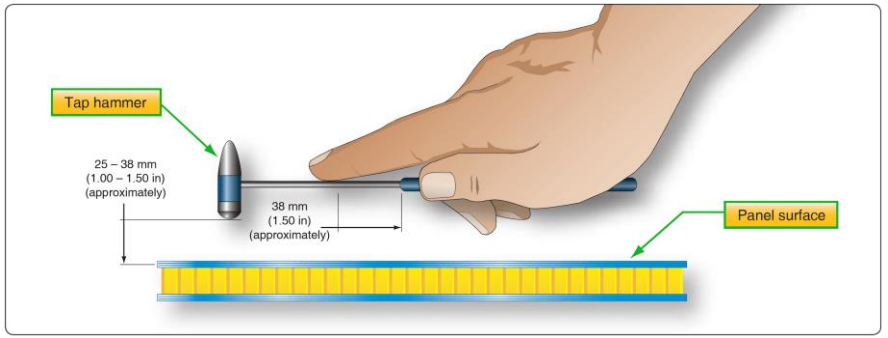
Why is Corrosion a Grave Concern?

- It undermines the structural integrity of key components, potentially causing abrupt and catastrophic failures.
- Regular inspection and maintenance are vital to prevent corrosion-related accidents.

2) Inspection Insights - Common Findings

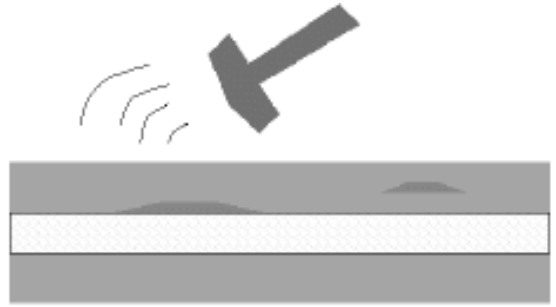
Corrosion of Support Structures – A Silent Threat

How do we check for Corrosion?



- **Non-Destructive Testing Methods**
  - Visual, Ultrasonic, Eddy Current, etc.

- **Tactile Assessments (Water Rides)**
  - Tactile assessment will involve the use of probing tools (e.g. tapping rod) to detect underlying defects (e.g. delamination and hollowness in structures, which could give an indication of early signs of failure)



Circular APPARSA-2019-02: https://www.corenet.gov.sg/document-151772.aspx

2) Inspection Insights - Common Findings

Checklists not aligned with Manuals

Observation:

- Discrepancies between daily inspection checklists and the operational maintenance manual's guidelines.

Risk:

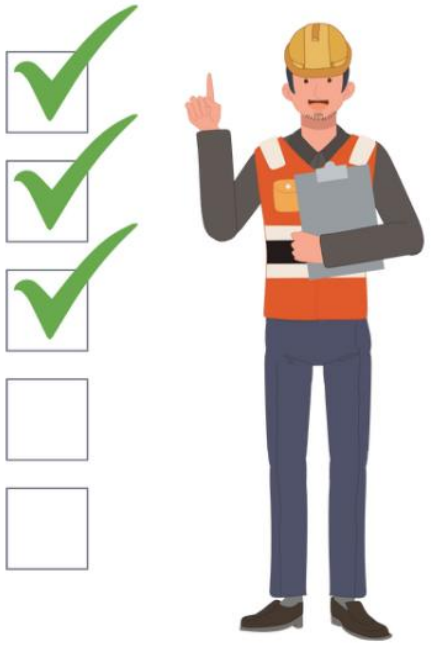
- Essential parameters may be overlooked, while complex or unclear checks may lead to non-comprehensive inspections.

E.g.
The manufacturer's manual states that the pump flow rate should be 2600 LPM to 3600 LPM, but the checklist prepared by the Operator instructs operators / technicians to verify an operating water flow rate of at least 1500 LPM.

2) Inspection Insights - Common Findings

Checklists not aligned with Manuals

Why is Accurate Alignment Essential?



- To ensure all critical parameters are inspected for operational safety.
  - Failure to conduct safety checks may result in catastrophic incidents.

- Simplification and alignment with manuals can help operators perform thorough and effective checks.

2) Inspection Insights - Common Findings

Faded Signages – Communication is Key

Observation:

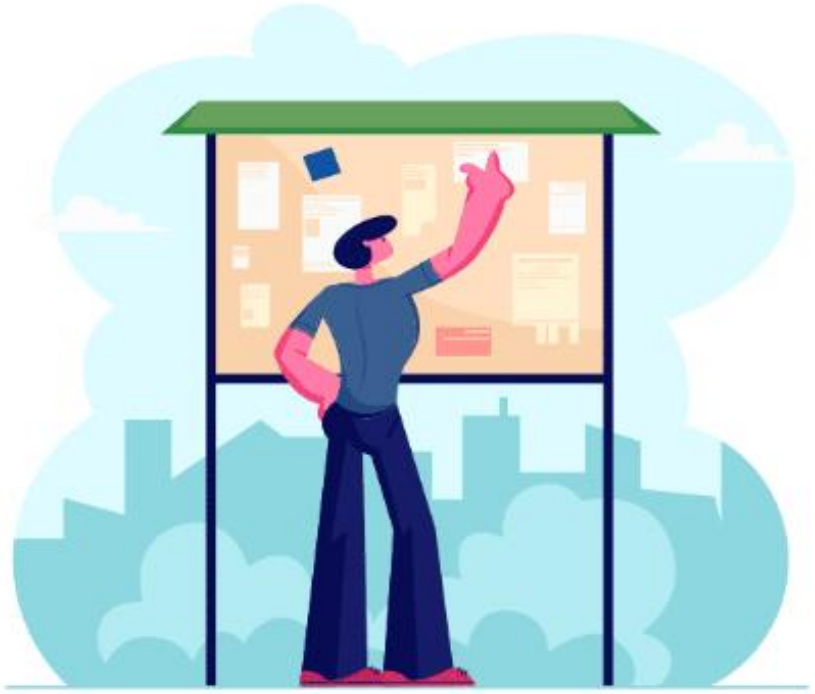
- Signages have faded due to weather exposure and have not been replaced in a timely manner.
- Floor signages faded.
- Worn anti-slip coating.
  - Could lead to potholes.

2) Inspection Insights - Common Findings

Faded Signages – Communication is Key

Consequence:

- Faded signages may lead to patrons unsuitable for the ride unknowingly participating, posing a risk to their safety.



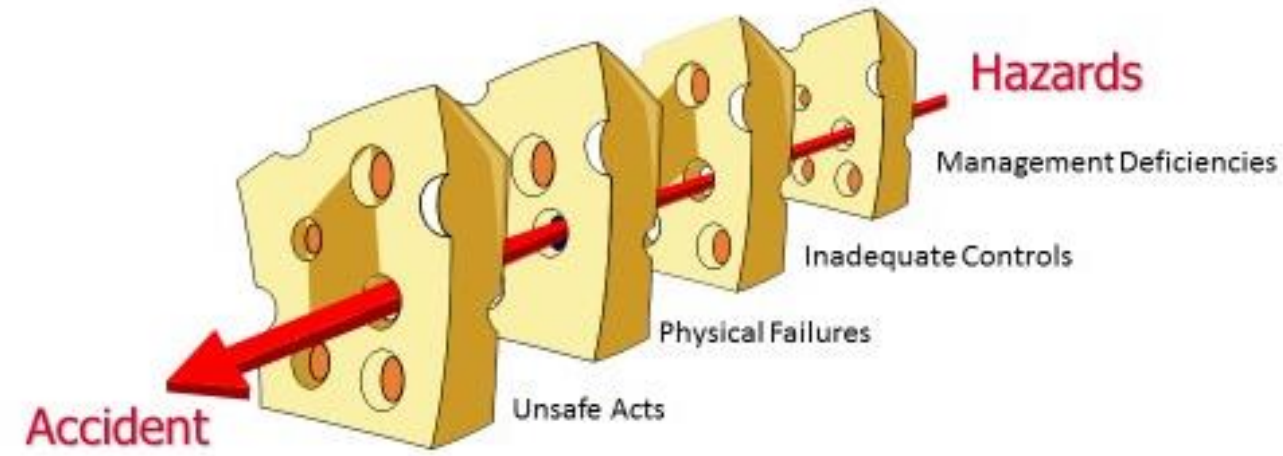
Why is Clear Signage Imperative?

- To effectively communicate restrictions and warnings, ensuring the well-being of all patrons.

- Regular maintenance of signage is essential for clear communication and safety compliance.

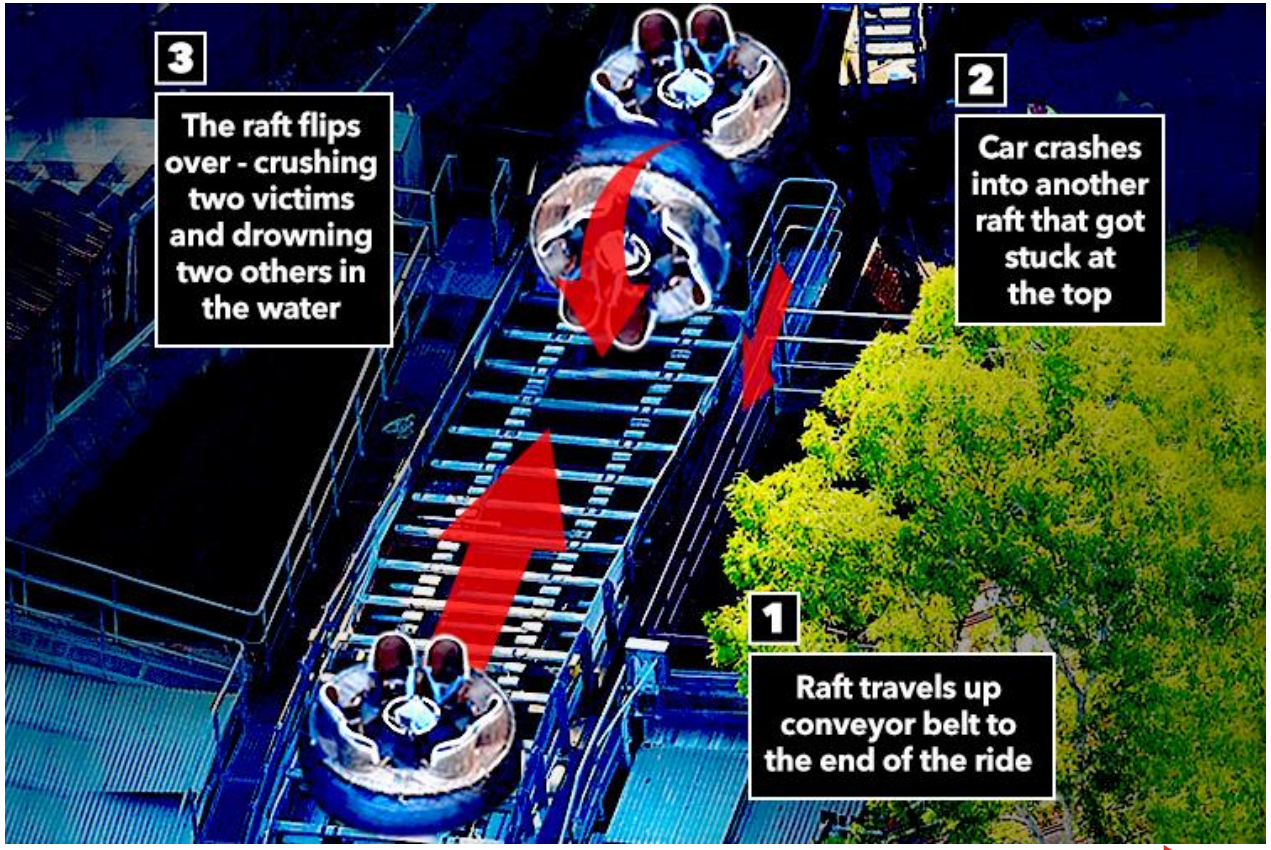
Simple mistakes can sometimes lead to Disaster!!!

James Reason's "Swiss Cheese" Model of Accident Causation (1990)



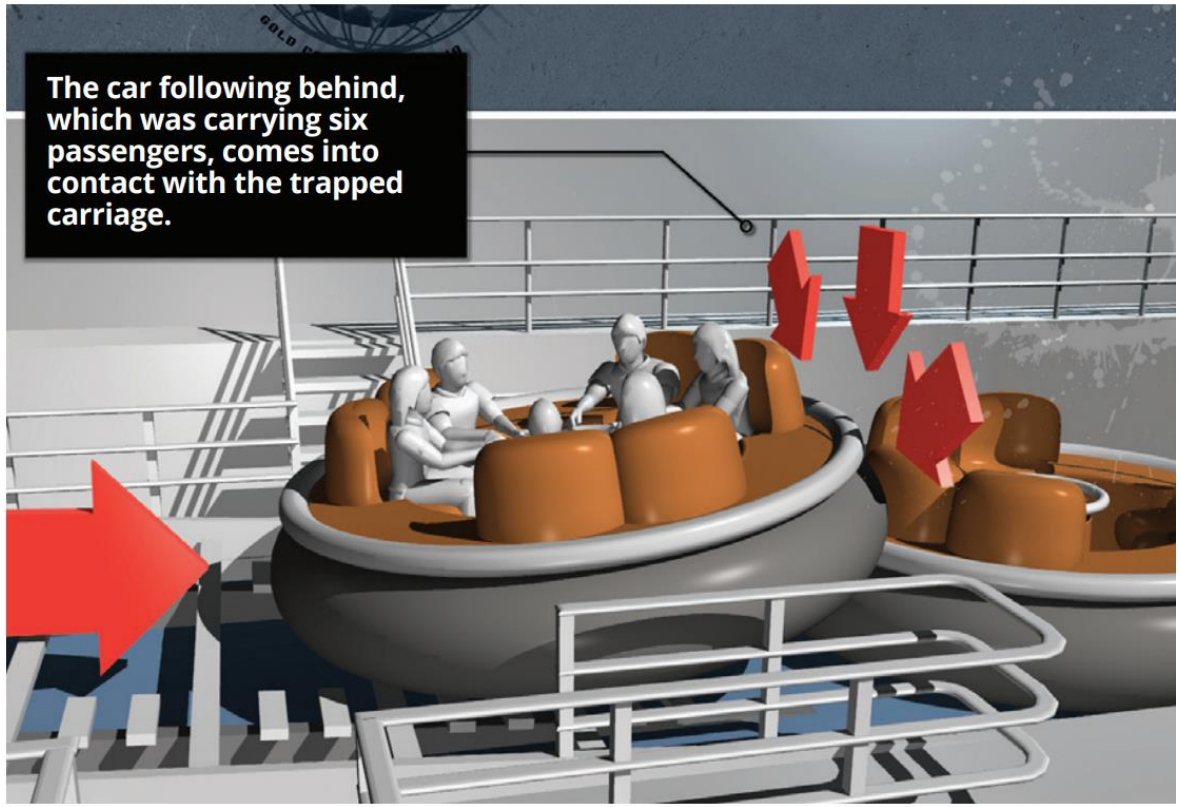
3) Lessons from Abroad- Thunder River Rapids Ride (TRRR) at Dreamworld Theme Park, Australia (2016)

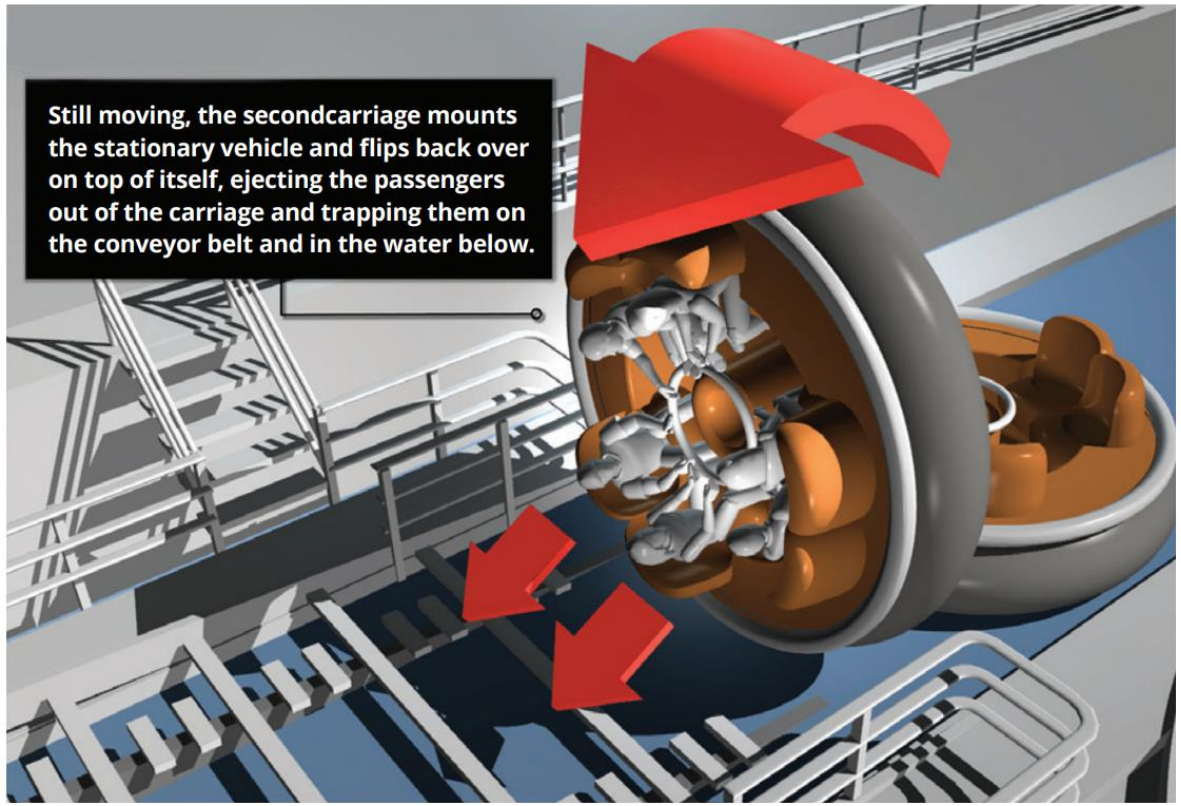
- The direct cause of the incident was a failed water pump, which resulted in the water levels reducing significantly, causing the raft to become caught on the rails.



4 individuals got trapped and lost their lives.

3) Lessons from Abroad- Thunder River Rapids Ride (TRRR) at Dreamworld Theme Park, Australia (2016)





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Learning Lessons

- The young ride operator had only been trained on the TRRR the morning of the incident and did not know that there was an emergency stop button within her reach and had been told "not to worry about that button, no-one uses it".

- Operators were required to conduct over 36 pre-operation checks in less than a minute, which were described as 'impossible' to manage by the Operators.

- The water pump had malfunctioned twice on the day of the incident and was reset by a technician rather than an electrician due to resource constraints.

3) Lessons from Abroad - Thunder River Rapids Ride (TRRR) at Dreamworld Theme Park, Australia (2016)

After the Incident

- Dreamworld's parent company, Ardent Leisure was charged for failing to comply with health and safety legislation and exposing individuals to a risk of serious injury or death.

- Coroner's concluding remarks,

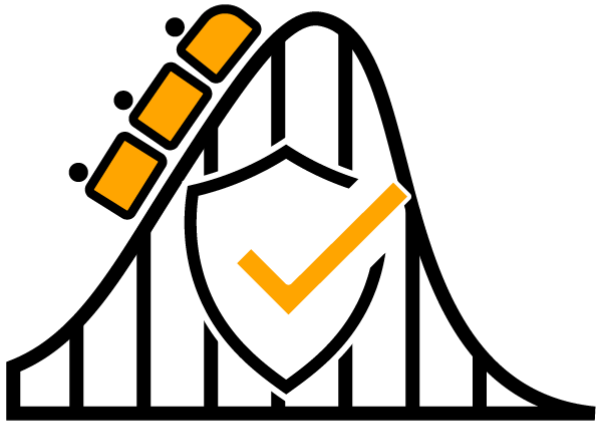
"It is surprising, given the state of the safety management systems in place at Dreamworld, that a tragedy of this nature had not occurred before now. It was simply a matter of time. That time came on 25 October 2016."

3) Lessons from Abroad - Thunder River Rapids Ride (TRRR) at Dreamworld Theme Park, Australia (2016)

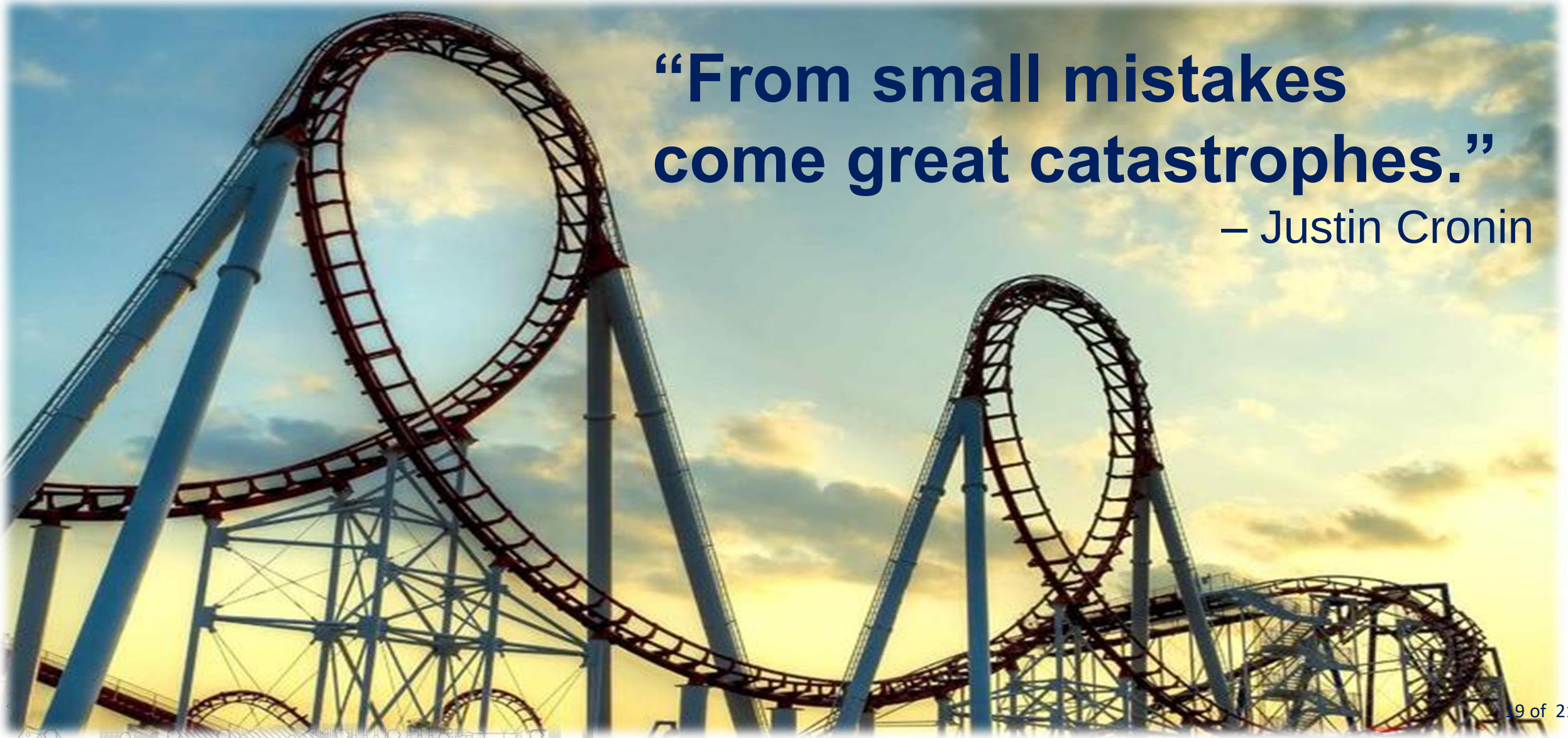
Key Takeaways

- A robust safety management system could have prevented this incident from happening.
  - Operators would have been better trained and equipped to handle emergencies effectively.
  - Good Communication with the management would have highlighted manpower constraints and unreasonable checks.
  - A thorough risk assessment would have identified hazards, analyse its risks and determine control measures.

Amusement Rides Safety Management System (ARSMS)



Summary


“From small mistakes
come great catastrophes.”
– Justin Cronin

Thank You!

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