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Innovations in Shiploader Technology for Wharf Environmental Management – QAL Case Study

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resources ports infrastructure asset management design

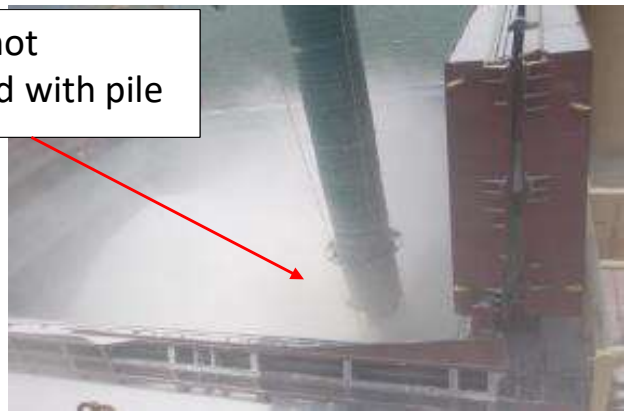
Introduction

- QAL (Gladstone QLD) exports 2.8 MTPA of alumina
- Previous Alumina Shiploader and conveying system generated excessive dust during operation but unable to upgrade due to wharf condition and utilization restrictions.
- ASPEC engaged as technical lead in owners engineer to identify and implement solution from pre-feasibility -> execution. A complete solution was required by December 2023.
- Alignment with UN Sustainable Development Goals

Problem 1
Excessive Dust

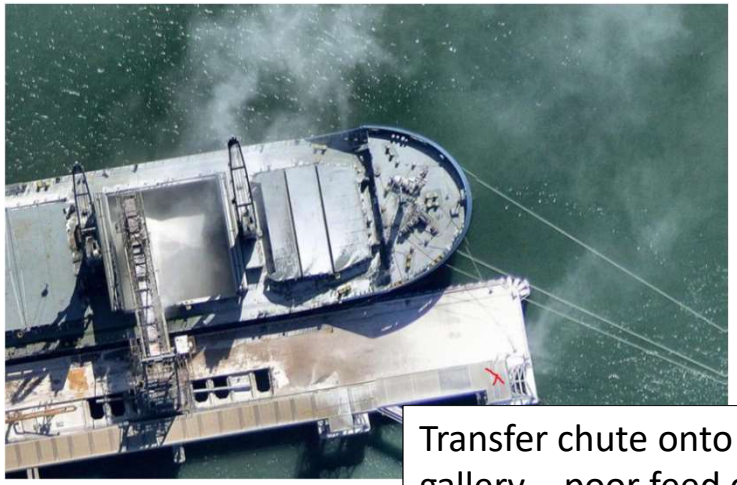
Root Causes?

Chute not engaged with pile



Chute opens up when luff up for hatch changes

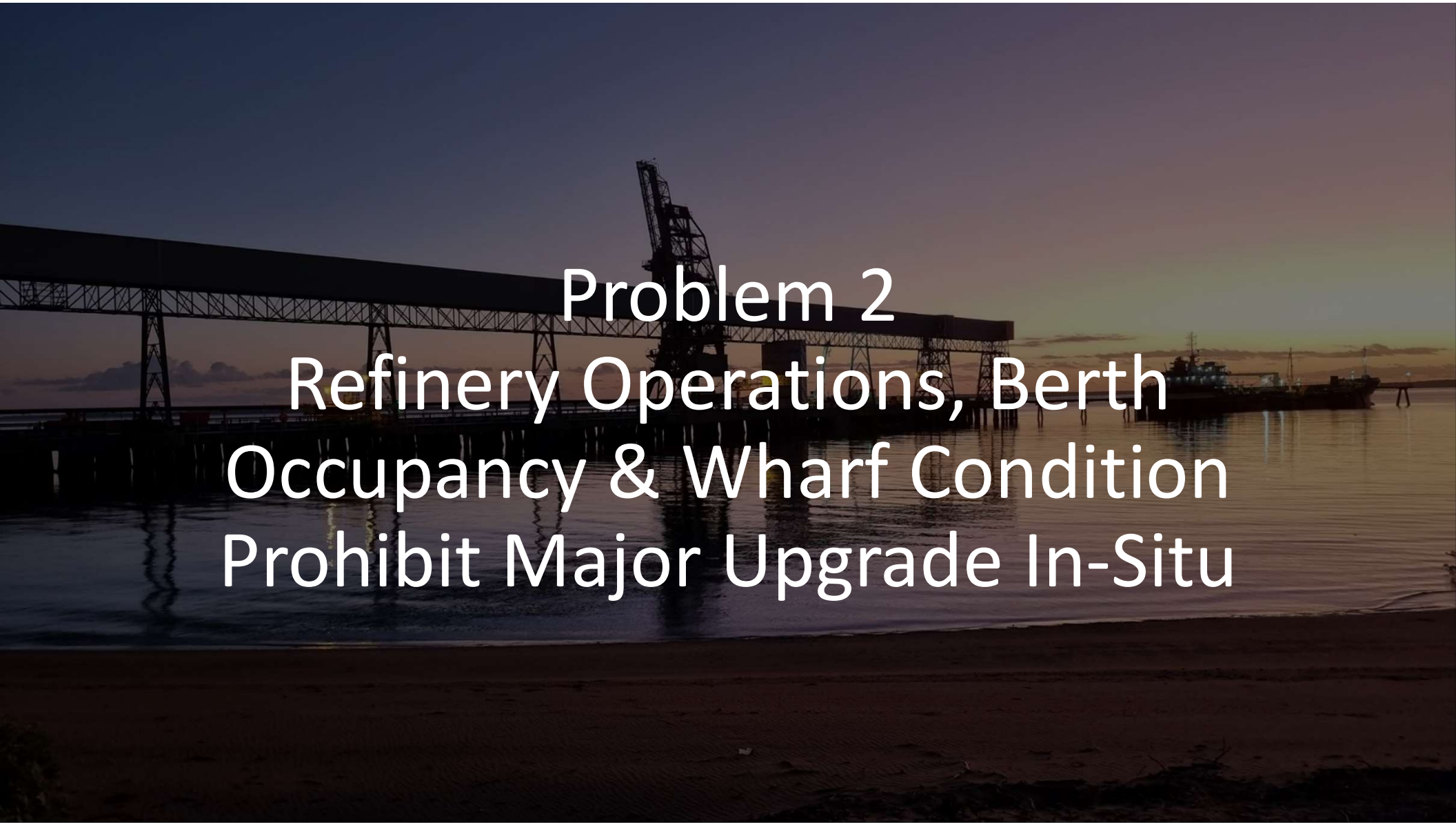
Hard to Seal Shuttle Airslide



Transfer chute onto tripper gallery – poor feed control

Tripper & belt profile

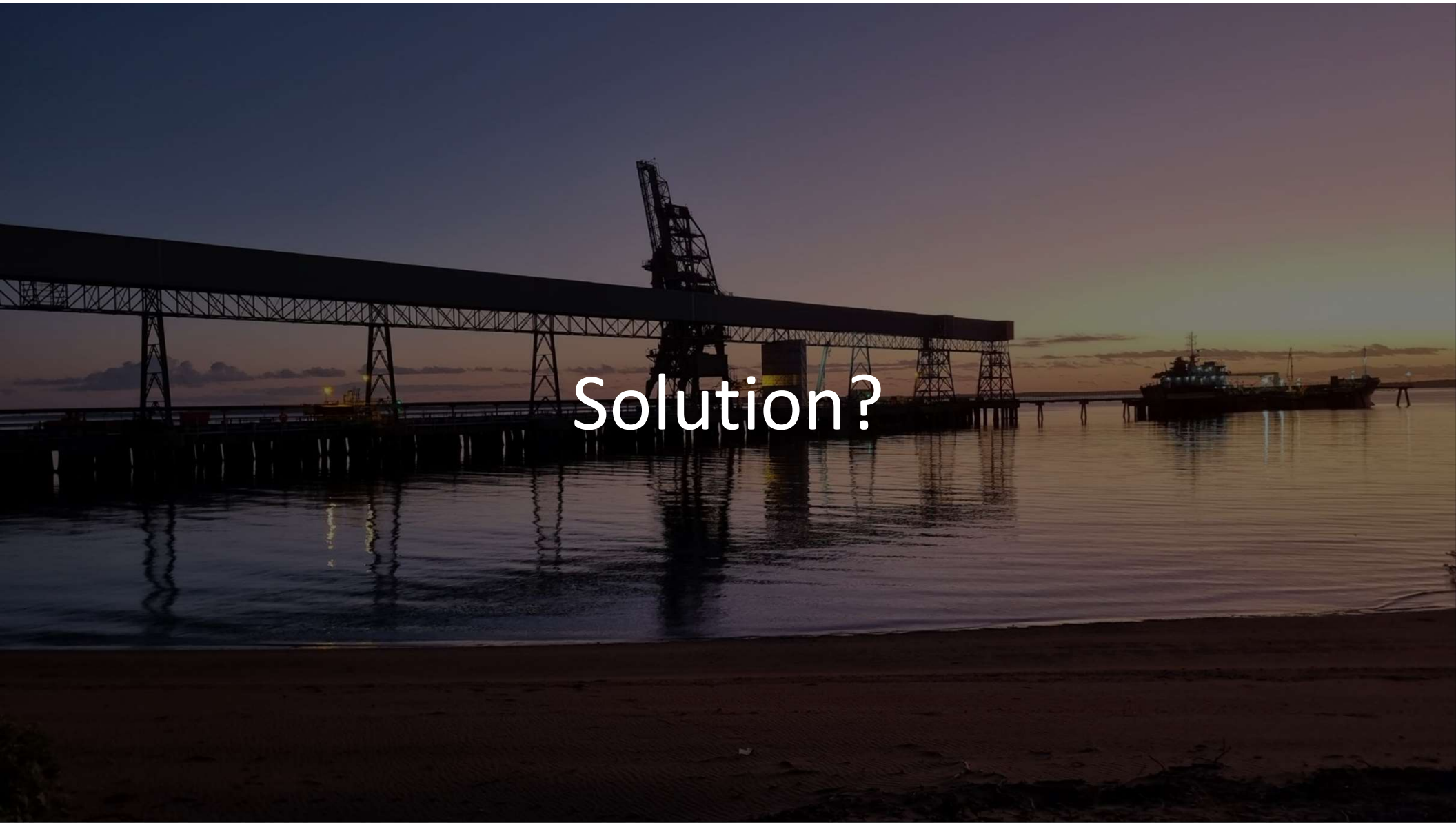
Don’t go in there!



Problem 2
Refinery Operations, Berth Occupancy & Wharf Condition Prohibit Major Upgrade In-Situ

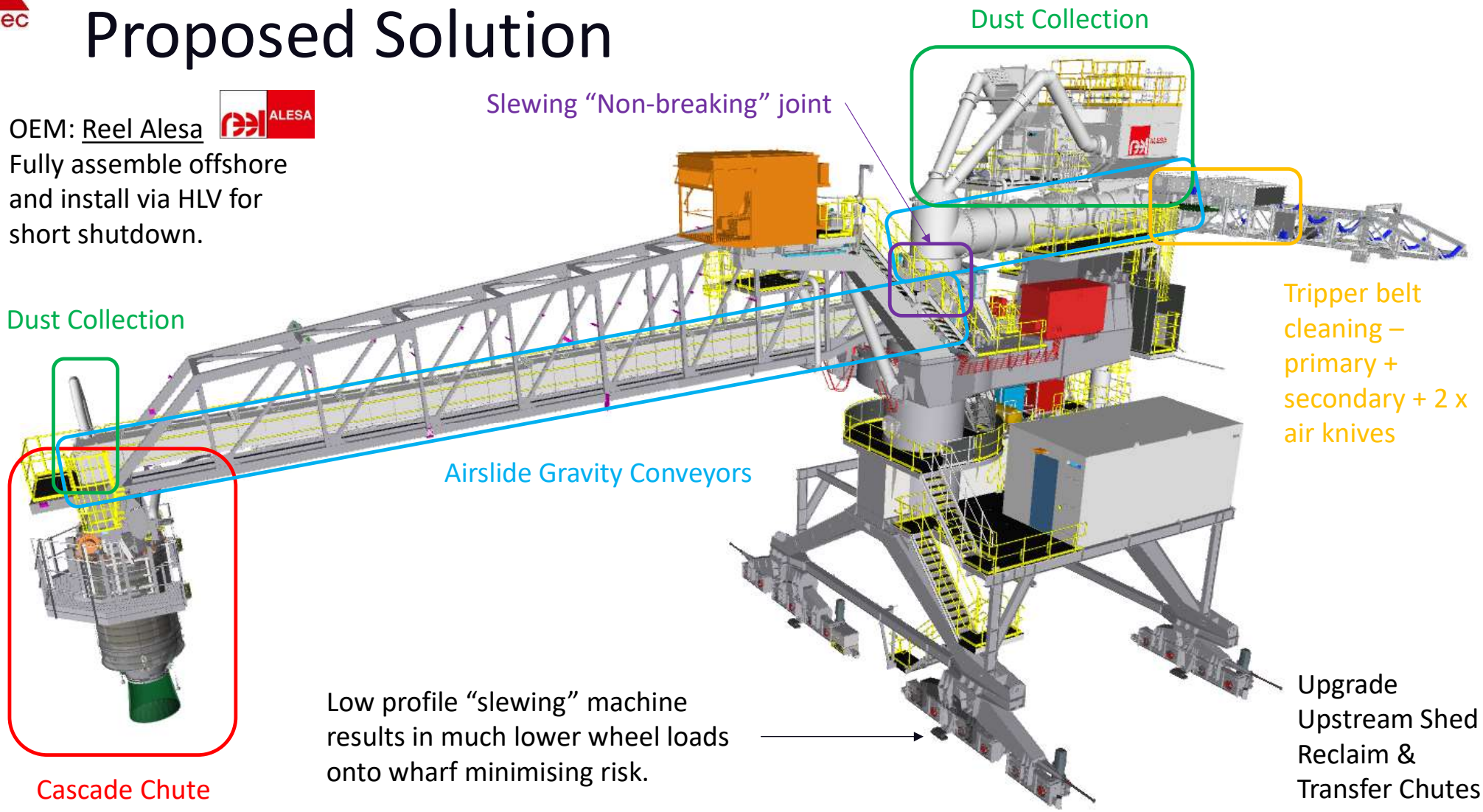
Wharf Constraints

- Berth Occupancy > 70%
- Maximum wharf shutdown 15 days or refinery shuts down
- Aging wharf now in poor condition. Cannot increase wheel loads


Solution?

Proposed Solution

OEM: Reel Alesa
Fully assemble offshore and install via HLV for short shutdown.

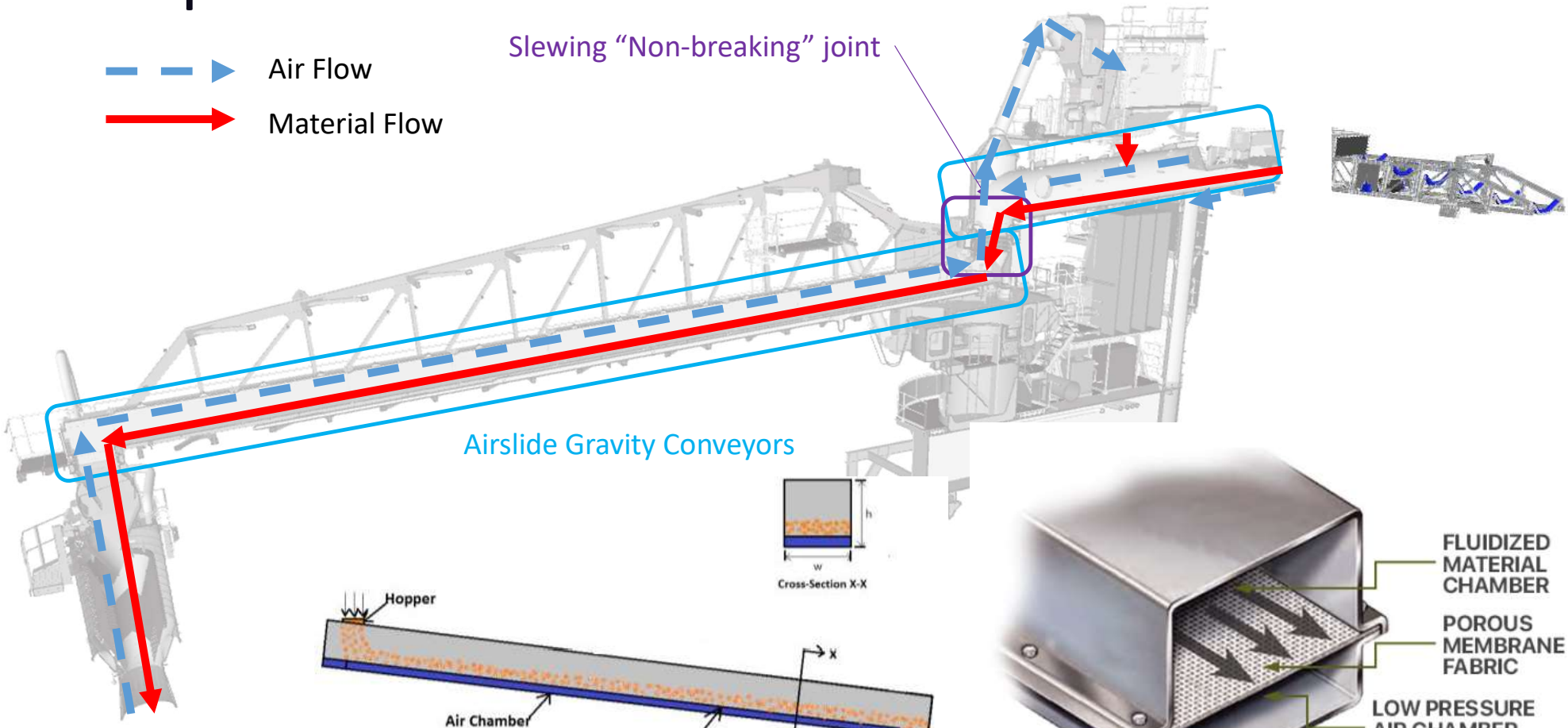


Proposed Solution

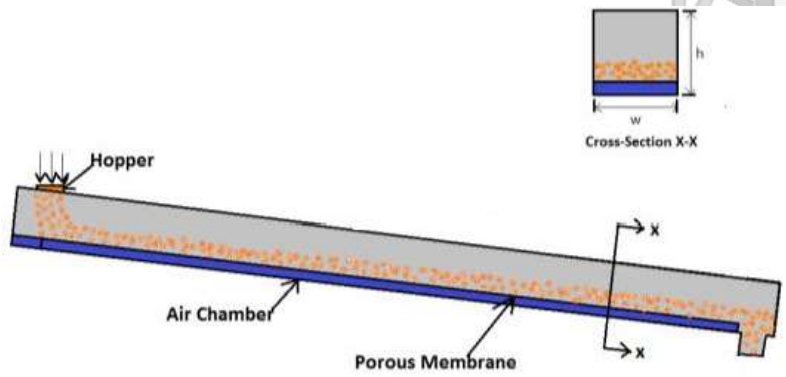
Air Flow

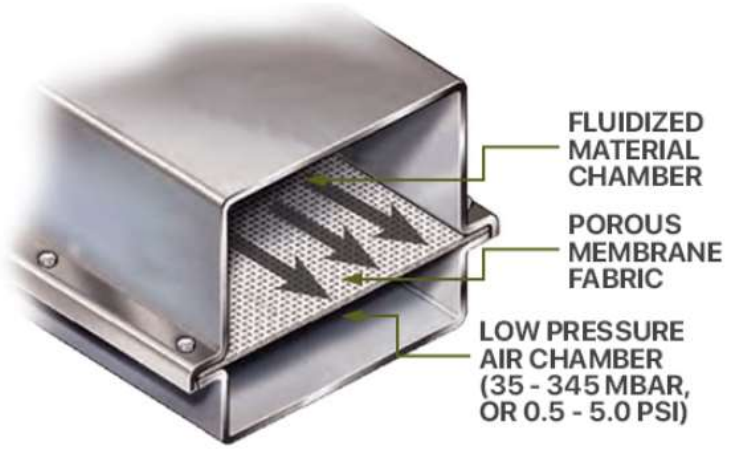
Material Flow

Slewing “Non-breaking” joint



Airslide Gravity Conveyors





Project Timeline

ASPEC Scope

Evaluation

Implementation

Order of Magnitude

Pre-Feasibility
April - July 19

Feasibility
May – Dec 21

Execution
Feb 22 – Oct 23

Commissioning & Ramp Up
Oct - 23

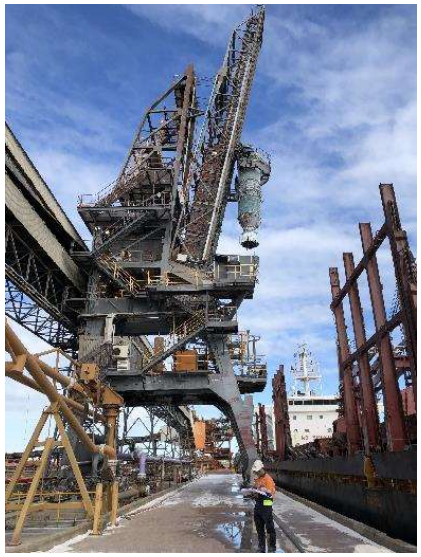
Project Closeout
Jan - 24

Studies, Specification, Interfaces & Tender – 20 months

Design – 12 months
Fabrication & Assembly (UAE) – 8 months
Heavy Lift Ship to Site – 1 month
1 x 3 Day Unload Shutdown

Commissioning – 1 month
1 x 14 day shutdown

Success!



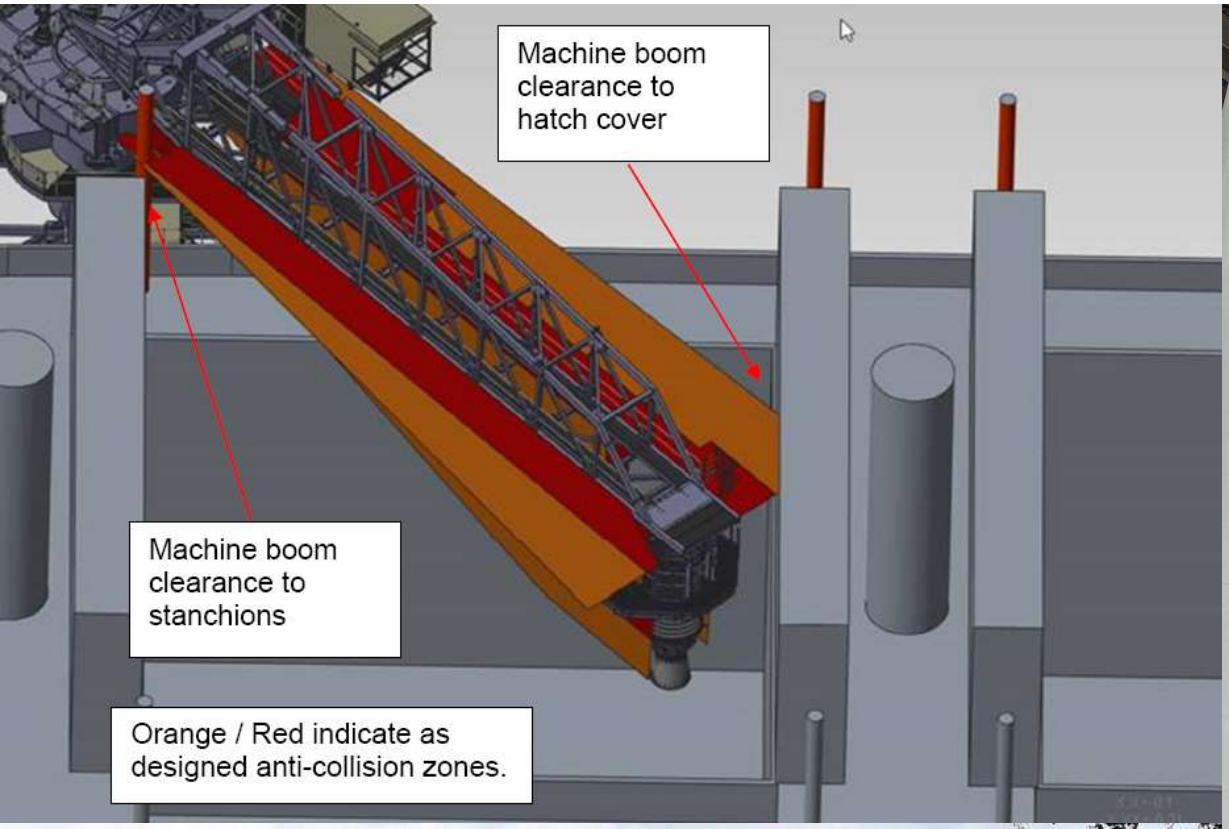
Challenges & Successes

Challenges

- **Quality Assurance.** Offshore fabrication & painting quality issues.
- **Hatch Coverage.** Difficult maneuvering past “stanchions” and hatches on “Logger” Handymax vessels due to luff restrictions.
- **Communication.** Generally good, however contract based on “standard” design and minimal handover of documentation. Design is good but lack of handover documentation made interfaces challenging.
- **Acceptance Criteria:** Quantifying “dust free” operation difficult.

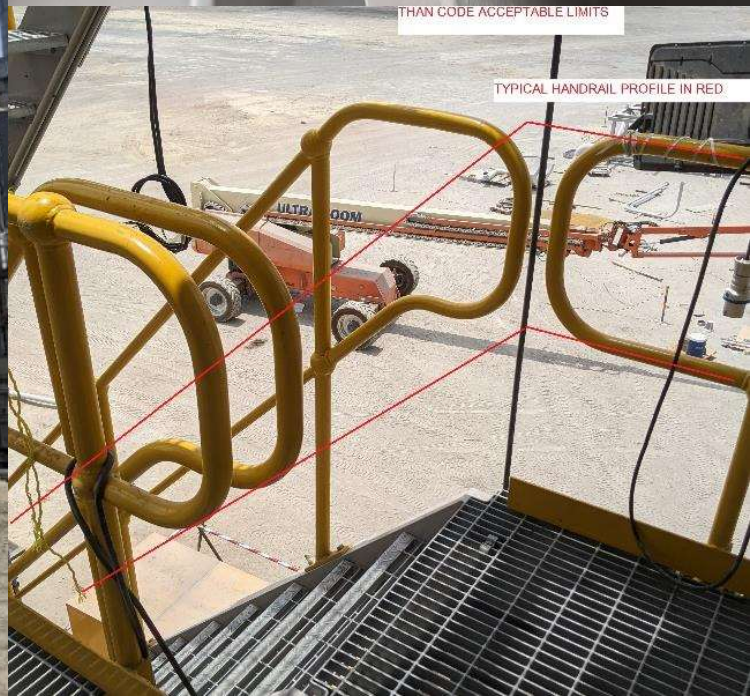
Successes

- **Fast Execution.** Successfully installed and commissioned new machine on time and within tight shutdown windows. Offshore fabrication & Heavy Lift Ship strategy crucial.
- **Wharf Loading Respected.** Low profile, slewing shiploader substantially reduced condition risks, providing options for repairs.
- **No “Visible” Dust from System During Loading!** (some from ships hold …)


Machine boom clearance to hatch cover
Machine boom clearance to stanchions
Orange / Red indicate as designed anti-collision zones.

Pacific Basin

3-2
1-3


THAN CODE ACCEPTABLE LIMITS
TYPICAL HANDRAIL PROFILE IN RED

SAL

Thank you.

aspec engineering