CYBERHAWK

Aerial Inspection and Surveying Specialists

Applied Aerial Inspection –

Bridging the Gap between UAV Technology and Asset Management

Open

Contents

- Inspection without production downtime
- How is it cost-saving?
- Challenges
- Takeaways
- What’s in the future

Inspection without Production Downtime

a. Live Flare, on station FPSO

b. Shutdown planning

c. Life extension

d. Liquidate backlog hours

e. Incidents – short notice PDO sweep, structural damage, recon.

So how is it cost-saving?

a. Live Flare, on station FPSO (minimal or no production interruption, quick tanker turnaround)

b. Shutdown planning (lead time for replacement considered, no unplanned delay)

c. Life extension (targeted repair)

d. Liquidate backlog hours (Multiple NUI's, complexes, underdeck structural members)

e. Decommissioning

Live Flare Inspection

- Inspection while the flare is live and online
- Millions of $ savings by avoiding production deferment
- Better planning of TAR activities
- Improve safety - avoiding RATs, Scaffolding, helicopters
- Faster – visual and thermal of full flare (1-2 days)
- In excess of 500 flares inspected over 5 continents

Flare Inspection Savings

Oil and Gas Supermajor, Nigeria

- 5 flares inspected in <1 week, while fully operational, avoiding a shutdown
- Alternative methods of inspection such as rope access or scaffolding would have required a complete shutdown of the facility
- Saved the client >$US11 million

i**Hawk** Visual Asset Management


Area Definitions

Area 1 – Above the Clamp

This area predominately covers the riser from the shutdown valve to one inch above the +10' elevation riser clamp. The configuration of many of the risers varies greatly. The [illegible] be taken into account when viewing the area. The inspector should include flange and riser conditions as part of the inspection. If any additional information needs to be recorded, the inspector can use the comments section to support the reason of categorization of that section of riser.

Area 2 – At the Clamp (Above)

This area of inspection covers the riser one inch above the +10' elevation clamp to half way down the clamp. When viewing this area, the inspector must also view the riser conditions, as much as is visible, at the interface between the two halves of the riser clamp.

Area 3 – At the Clamp (Below)

This area of inspection covers the riser one inch below the clamp, up to the halfway point of the +10' elevation clamp. When viewing this area, the inspector must also view the riser condition, as much as possible, at the interface between the two halves of the riser clamp.

Area 4 – Below the Clamp

This area covers the riser from the +10' elevation clamp down to the waterline (excluding Area 3). The configuration and coating of the risers at this point may vary greatly. If any additional information needs to be recorded, the inspector can use the comments section to support the reason of categorization of that section of riser.

Category Definitions

Category 1 – Severe Corrosion

Defined as estimate of Wt.+1/2 of original Wt. Colour code-red

Category 2 – Advanced Corrosion

Defined as estimate of Wt. >1/2 <3/4 of original Wt. Colour code-red.

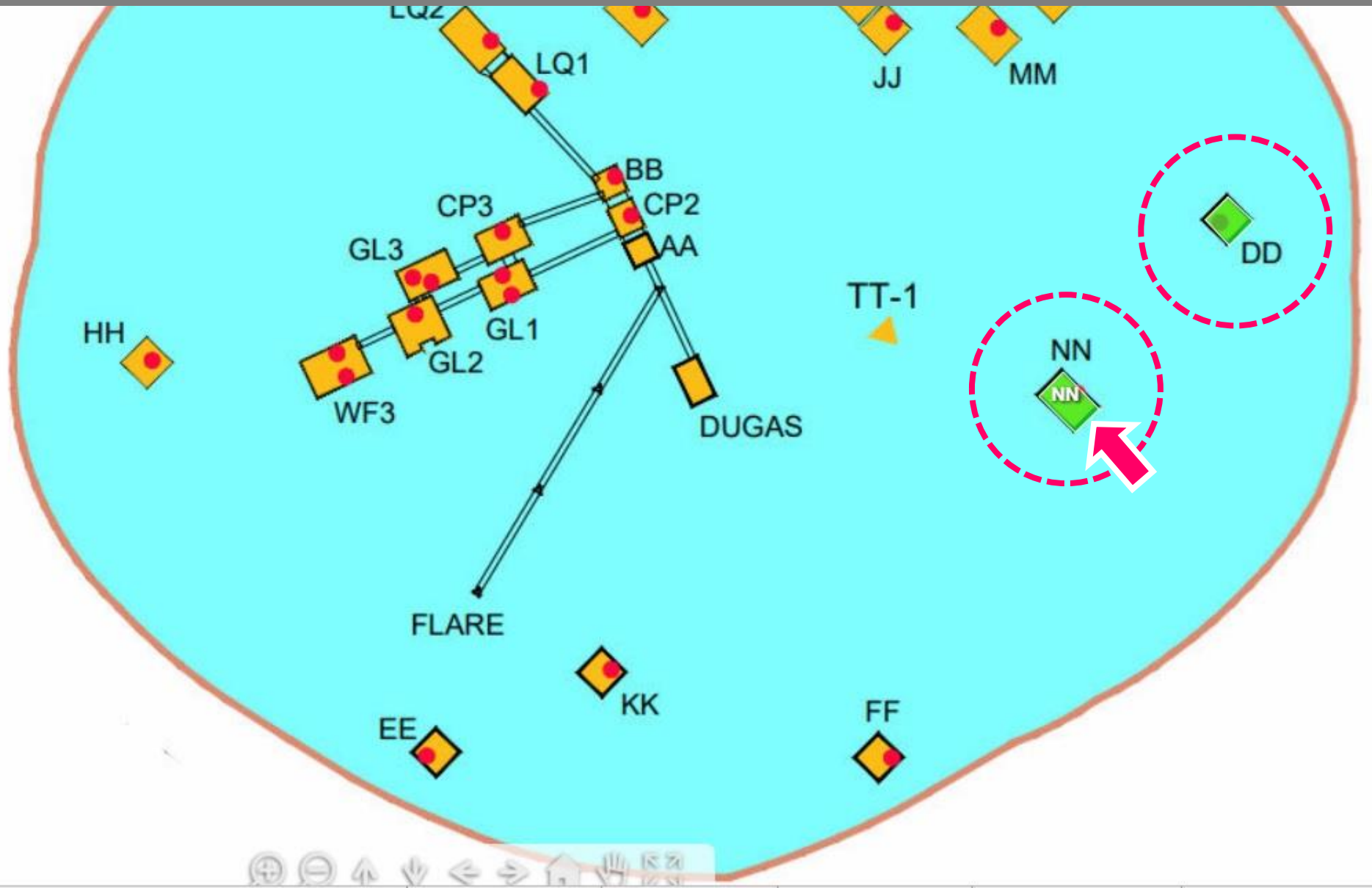
Category 3

Defined as paint breakdown and initial corrosion evident.

Colour code-yellow

Category 4

Defined as newly painted and/or no paint breakdown.



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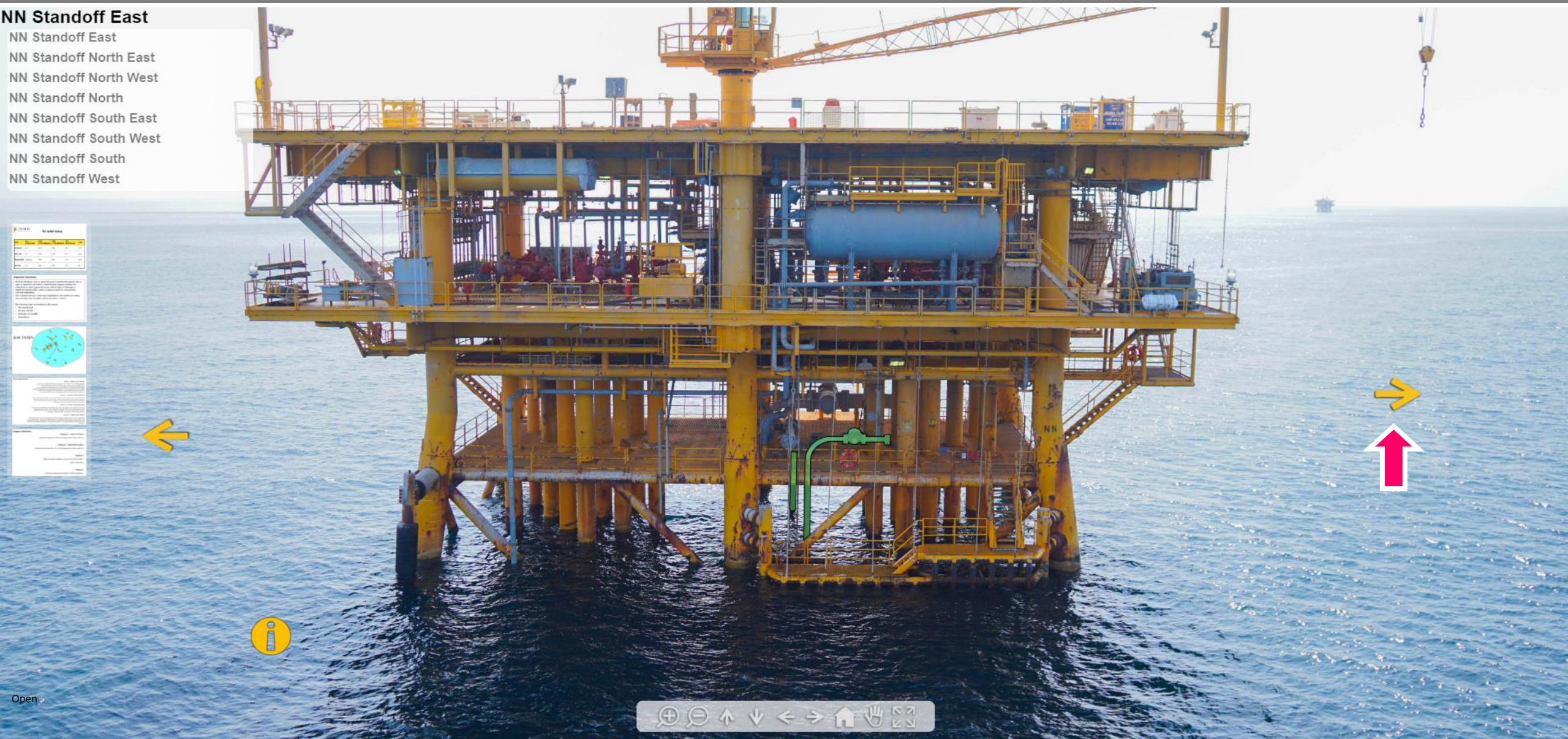

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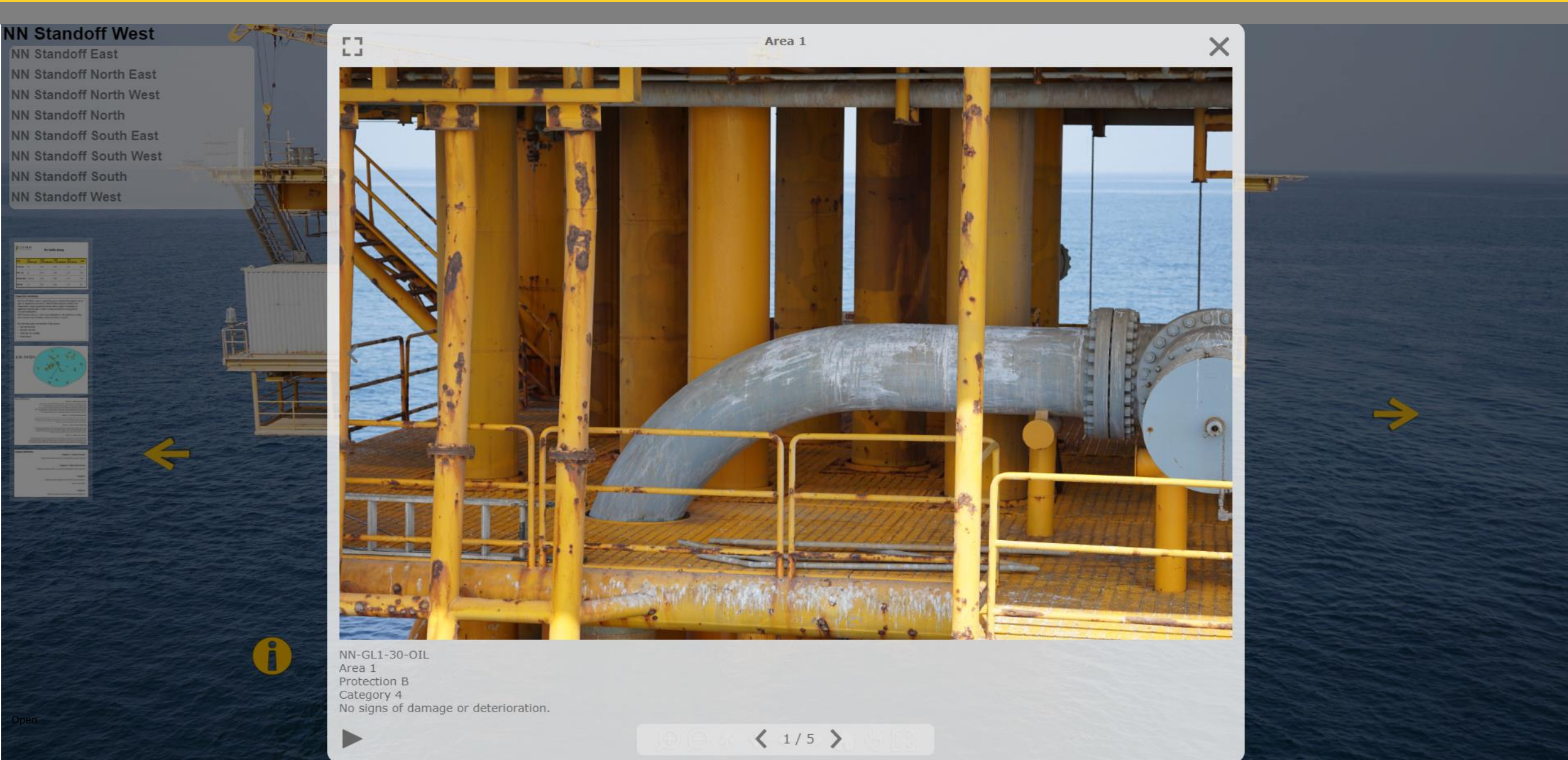

Underdeck & Splash Zone Inspections

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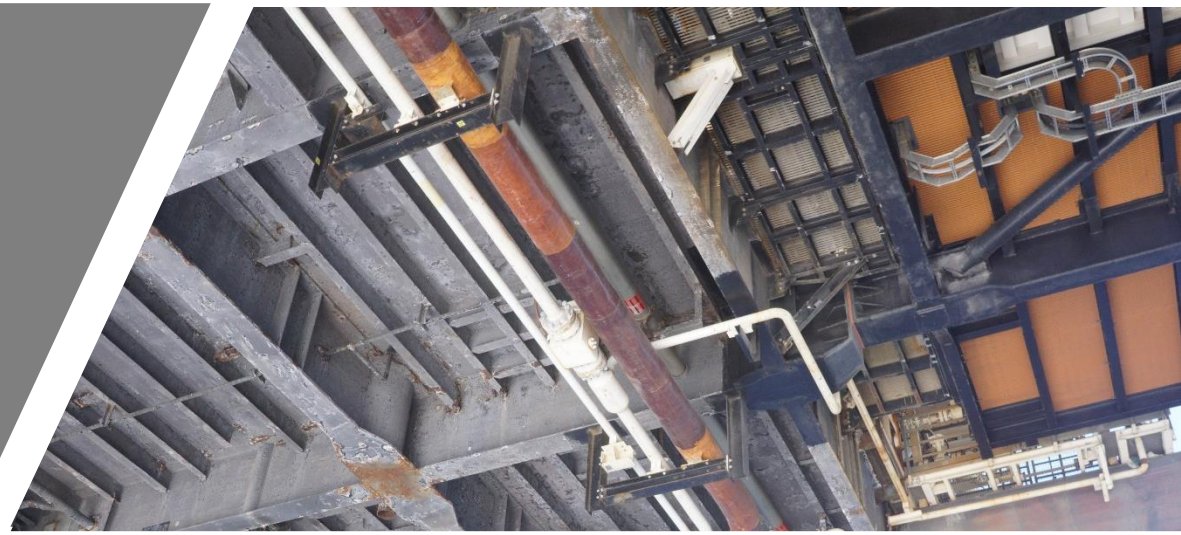
Underdeck Inspection Saving

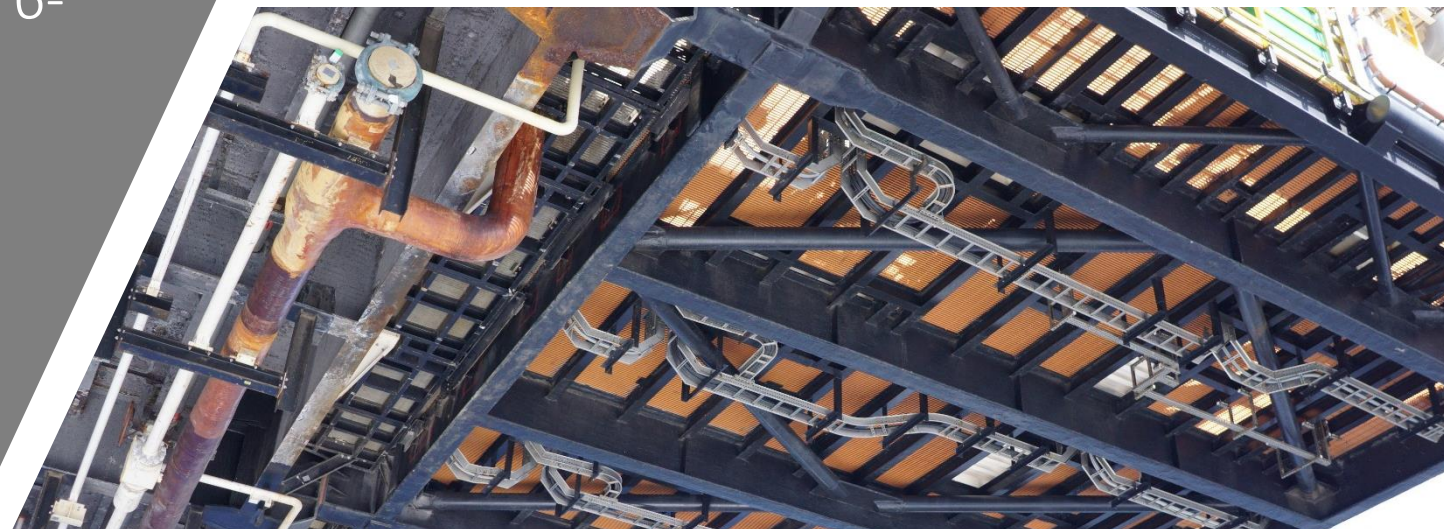
Oil and Gas Supermajor, UK North Sea

– Cyberhawk underdeck inspection in 3 days

– Previous method of inspection was a 6-man rope access team over 14 weeks

– Saved the client >£1 million





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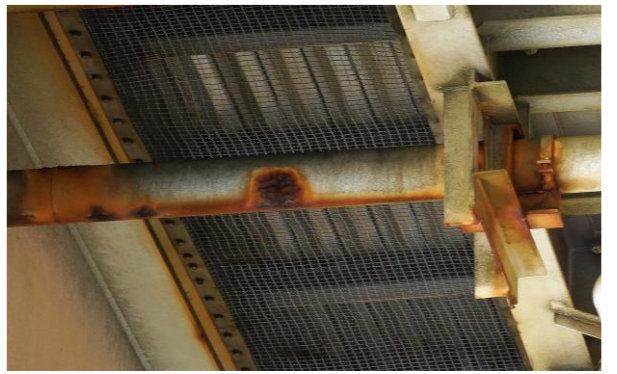

Internal COT Inspection

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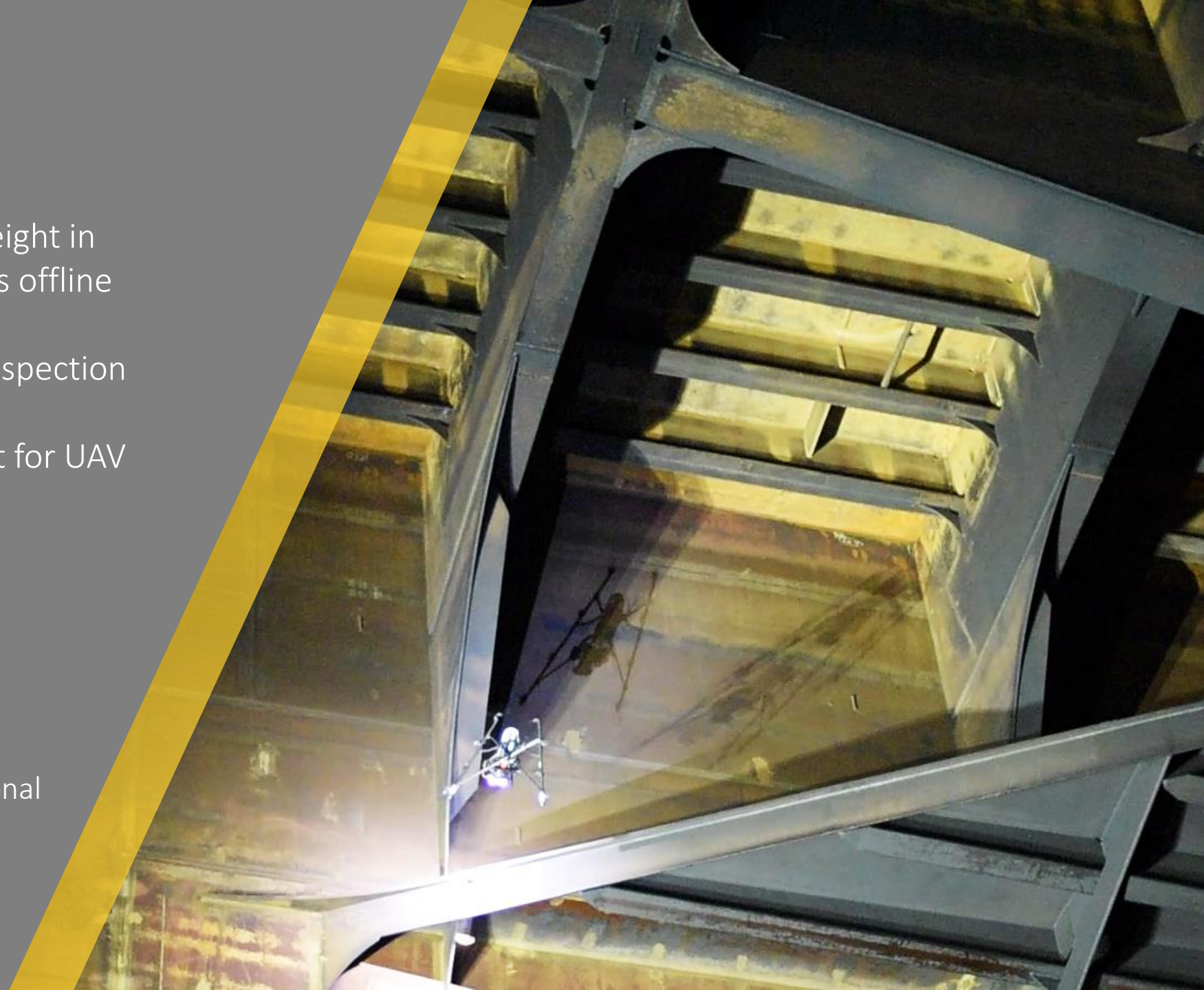
COT Inspection

- 75% reduction in working at height in confined space and time tank is offline
- 1-2 days general/close visual inspection
- ABS certified external specialist for UAV inspections
- Avoids RATs or Scaffolding
  - Safer
  - Quicker
  - Cheaper
- Higher quality results than traditional methods

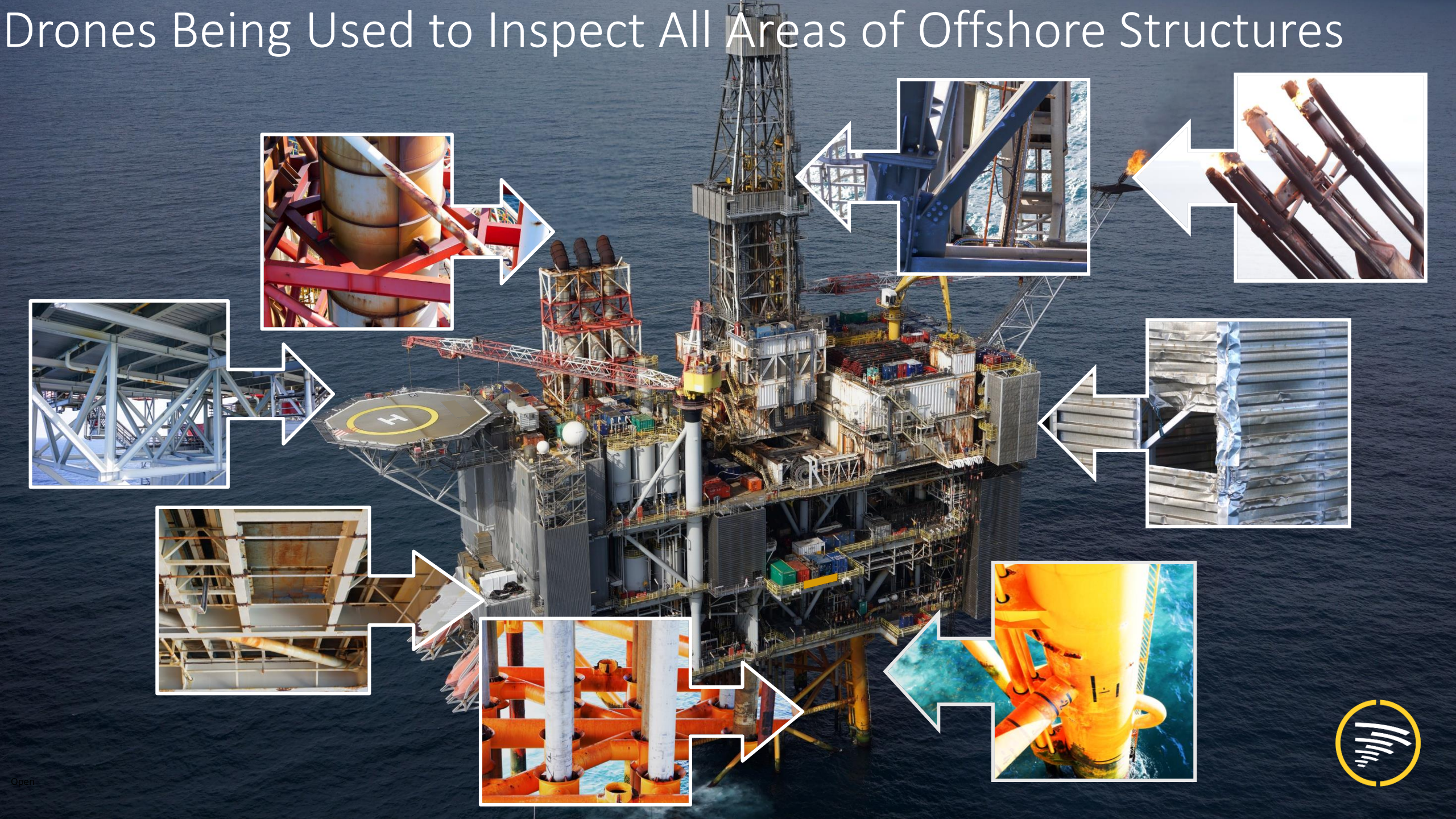


COT Inspection Saving

Oil and Gas Supermajor, West Coast USA

- 14 COTs inspected in 12 days
- Inspection approved by ABS to Class code
- No scaffolding or RATs used
- Client saved $750,000 attributed to no scaffolding costs & efficiency of the inspection allowing for quick turnaround

Drones Being Used to Inspect All Areas of Offshore Structures




Flare Tip & Flare Boom
Drilling Derrick
Exhausts & Vents
Helideck
Cranes
Risers, Caissons & Conductors
Jacket
Bridges
Underdeck
Cladding
Lifeboat Davits
Telecoms Tower

Challenges?

a. Fear of the unknown (RA, legislation, RF, pilot currency, underdeck and confined spaces, reporting format and IT jargons)

b. UAV piloting competency

c. Engineering aspect of the UAV inspection

d. Intra-organisational lobbying

e. How to measure the cost saving?

Flare Inspection

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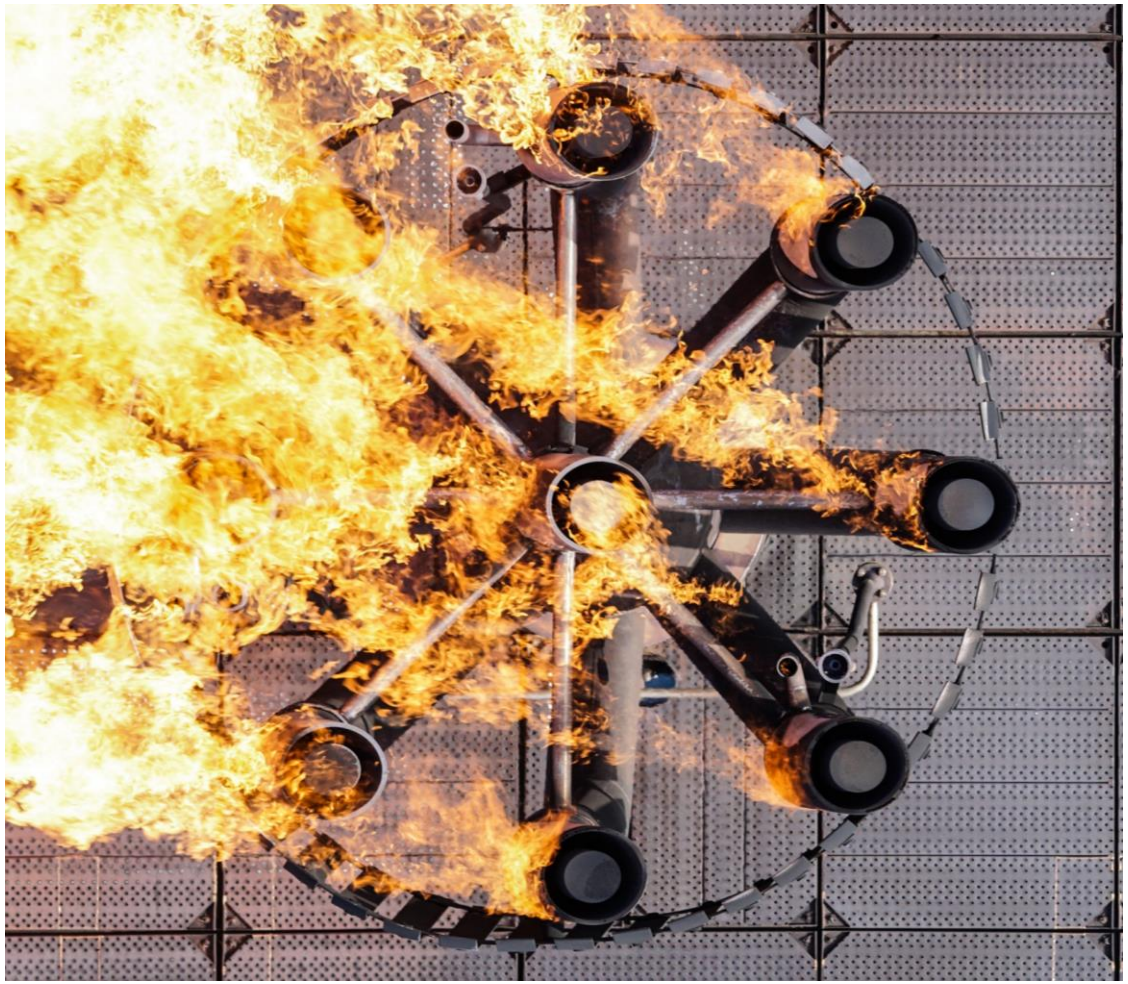
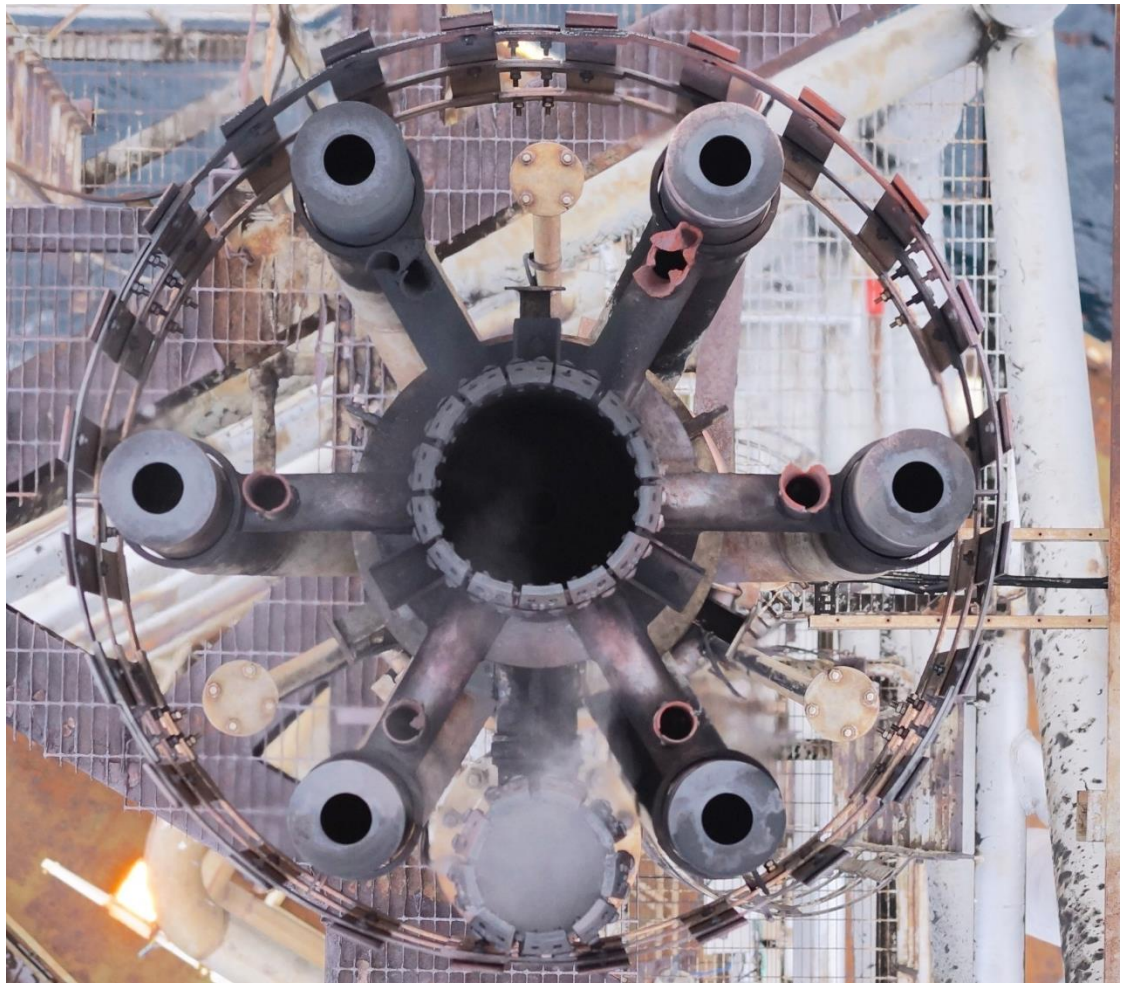
What is the difference here?

(from the UAV flying point of view)





Drones – When It Goes Wrong

3D Point Cloud Model

- 3D models for Engineering and FEED studies
- Accurate representation of asset's current condition
- Point Cloud Data can be imported into ACAD, Navisworks and others
- 10+ times faster than Laser Scanning (on large areas)
- +/- 10mm accuracy achievable depending on available reference points
- Data capture archived in 1-2 days

Solutions For Major Construction & Decommissioning Projects

Cloud Based Visual Asset Management

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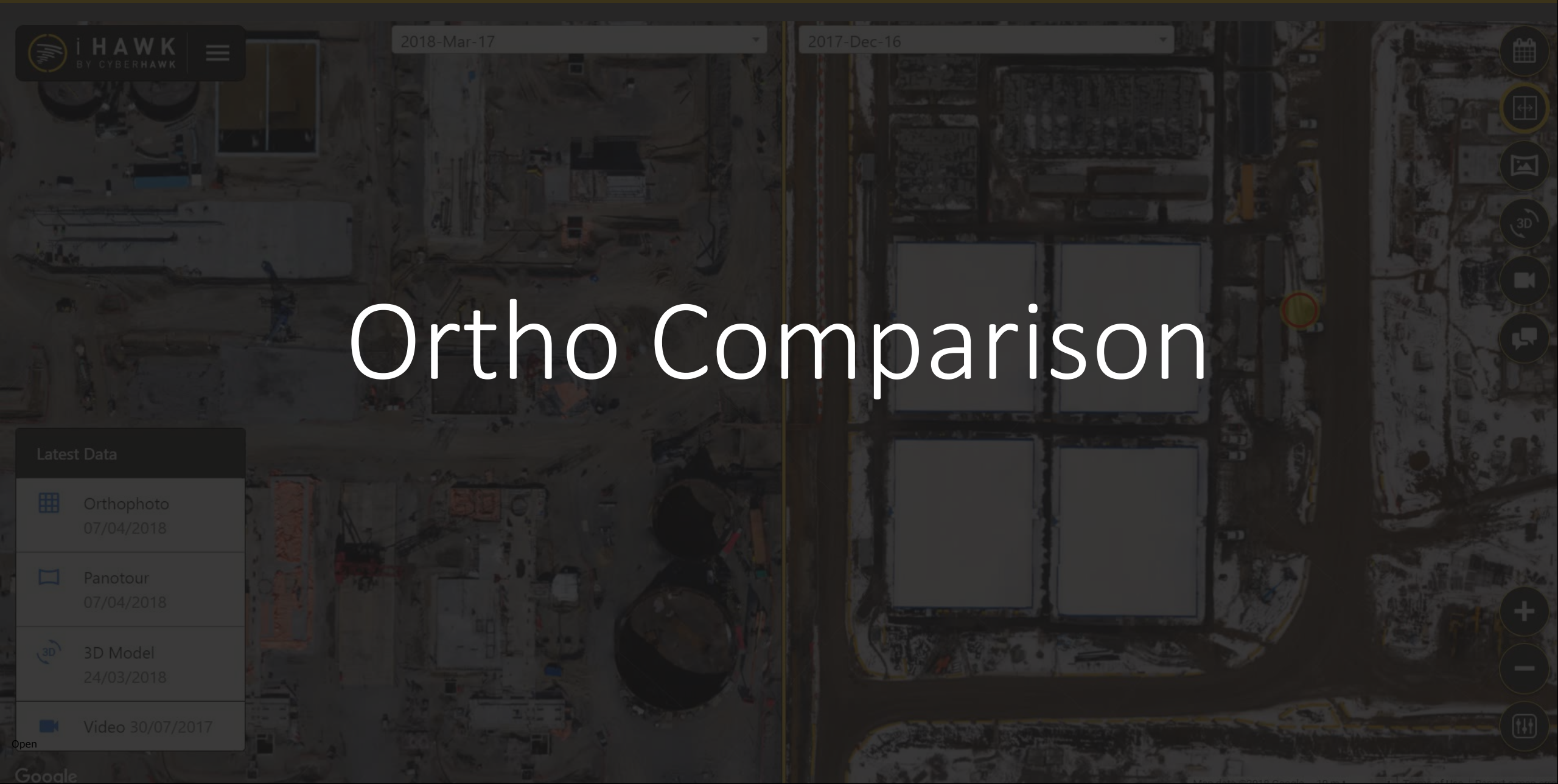

Ortho Comparison

iHawk Visual Asset Management

Spherical Imagery

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3D Mesh Model

Takeaways

a. CAA/DCA approval of PfCO does not guarantee incident-free UAV operation.

b. Multi-disciplinary work scope for the best results.

c. Good data means better preparation and informed decision making.

d. Digitized aerial inspection data is an invaluable tool for effective communication. (Virtual tours and cloud management)

e. It can also fly in confined spaces!

What’s in the future?

a. Certified UAV assisted NDT

b. Effective Ex-rated UAV

c. Repeatable man-less entry inspection

d. Autonomous flying (LiDAR-, GPS-assist)

e. AI-assisted change-detection

Change Detection– Flare Tip

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Before: Viewpoint “A”

After: Viewpoint “A”

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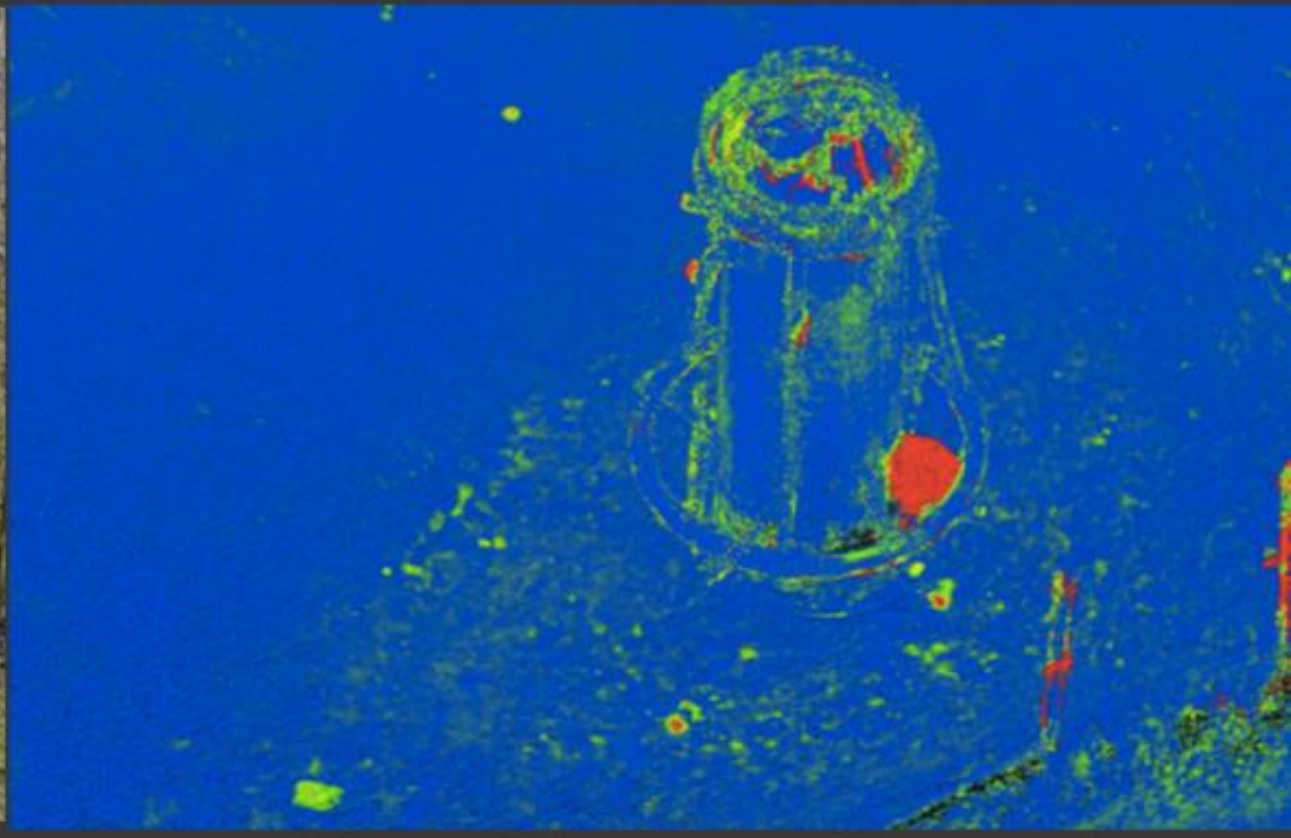
Change Detection– Areas of change highlighted in Red

Before: Viewpoint “A”



After Change Detection: Viewpoint “A”

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