Monitoring The Integrity Of Vessels Innovative Techniques for Hull Inspection and Operations

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Key Messages

HITS represents the ‘industry’ – and is leading change in this critical area.

The case for a ‘step change’ in inspection is compelling: global oil and gas markets, safety, cost, technological opportunities (especially digitisation)

Disruptive technologies in asset integrity - already happening, driving efficiency and delivering great outcomes.

Context

Who am I?

What is HITS? And who are its Members?.....
…….*a*nd what are its objectives?

Current status?

The HITS JIP and its Members

The Hull Inspection Techniques and Strategy (HITS) JIP includes members of all major Class Societies and Operators. What are its objectives? ……

- Disruptive technologies in managing hull asset integrity - no divers, no man entry, no cleaning
- Creating a hull inspector competency system HITS objective is to 'encourage and independently assess' – not develop) all sorts of inspection technologies: Acoustic imaging, Drones, Camera systems

Context

Global oil price, gas tariff uncertainty, and impact on cost bases.

New drilling and production contracts are being announced but we, as an industry, need to maintain asset integrity and safety standards in a new $50 environment if we are to prosper.

This means doing things differently and better. The drive for efficiency often requires disruptive step changes

The HITS JIP has focused on exactly this topic with support from operators, lease companies, class societies and regulators.

The Current Environment

Global Oil price, Gas Tariff Uncertainty, and impact on cost bases?

Production Efficiency?

Safety: diving, confined spaces?

Technology and Opportunities?

=

More for Less ……..
safety, data, cost

New ways of doing things

Need to exploit technology
…. and be disruptive

Disruptive Technologies in Hull Integrity drives Efficiency:

ODIN?		Safety
NoMan?		POB
HullGuard?	=	Cost Benefits
Long Term Asset Integrity Plans		Superior quality of Information

Disruptive Technology - Case Study 1: NoMan

Objective – Class-approved unmanned inspection of confined space

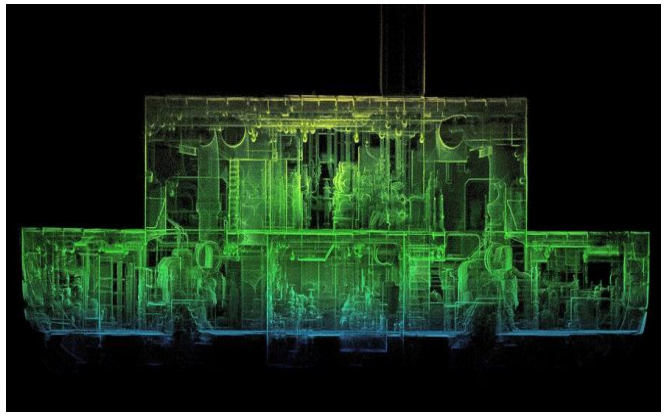
What we do: GVI / CVI camera on a manipulator, Laser Scanning (distortion check and thickness measurements)

Crucially, HITS has defined ‘ Defect Detectability Standard’ (DDS) – this standardises what is required of the inspection methods rather than on how the inspection tool is delivered (drone, remote camera, rope access, etc.)

Disruptive Technology - Case Study 1: NoMan

NoMan – Laser Scanning

- Structural survey
- Dimensional data
- Deformation / Buckling
- Dark or illuminated spaces
- Colour rendition – surface condition

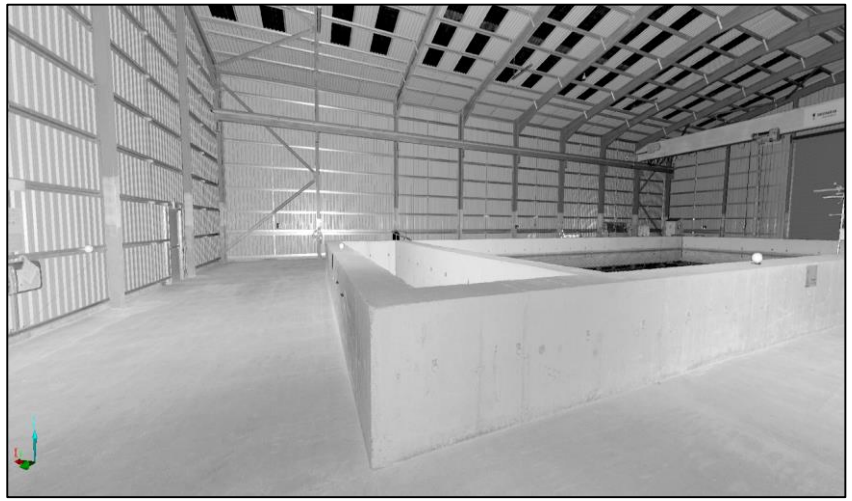


Disruptive Technology - Case Study 1: NoMan™

NoMan – Laser Scanning

Lit space

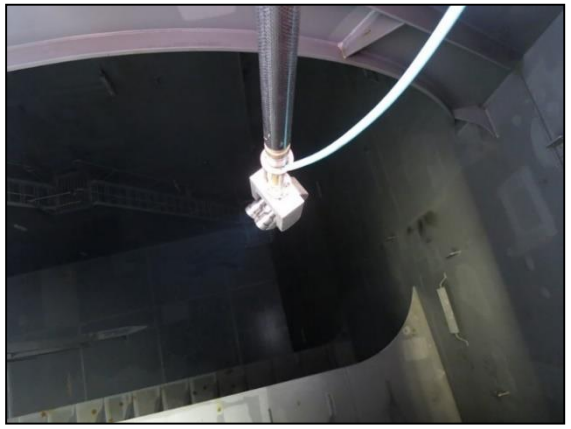
Dark space

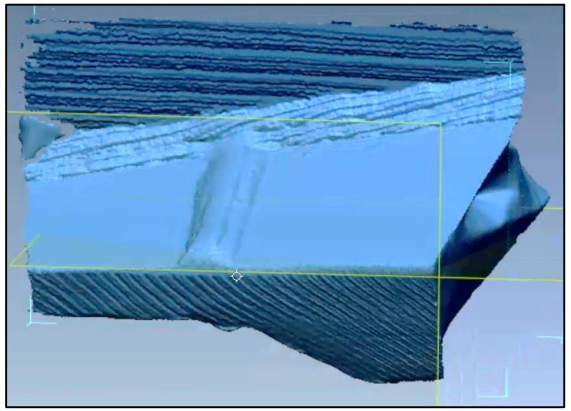


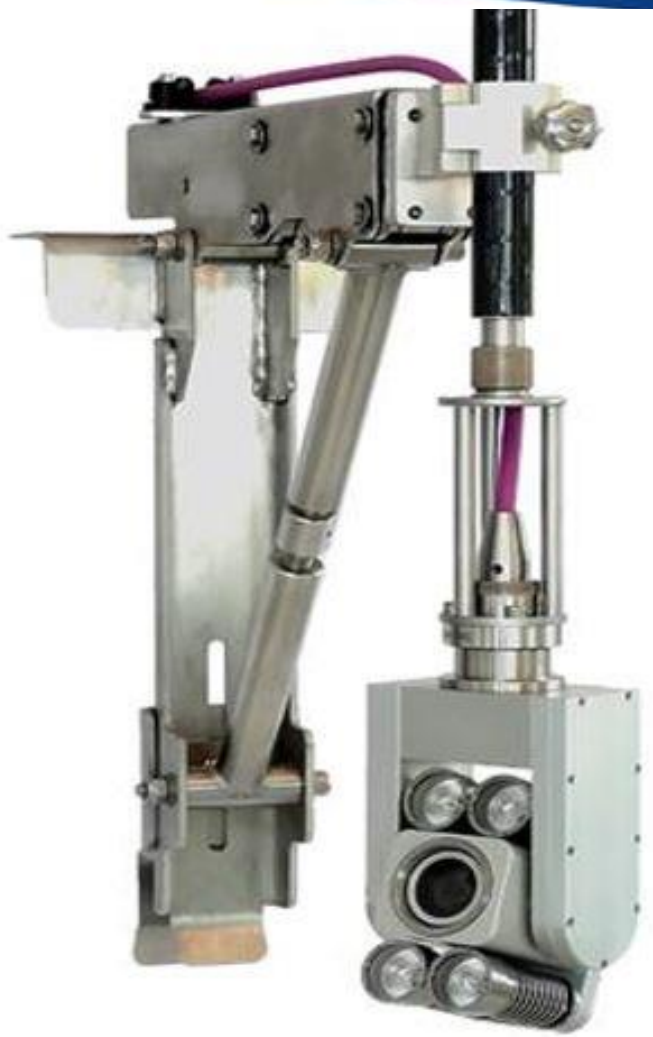
Disruptive Technology - Case Study 1: NoMan

NoMan – Camera on a Pole

- High Definition
- Filters
- Zoom
- Laser Scanner
- 3 D Print Out







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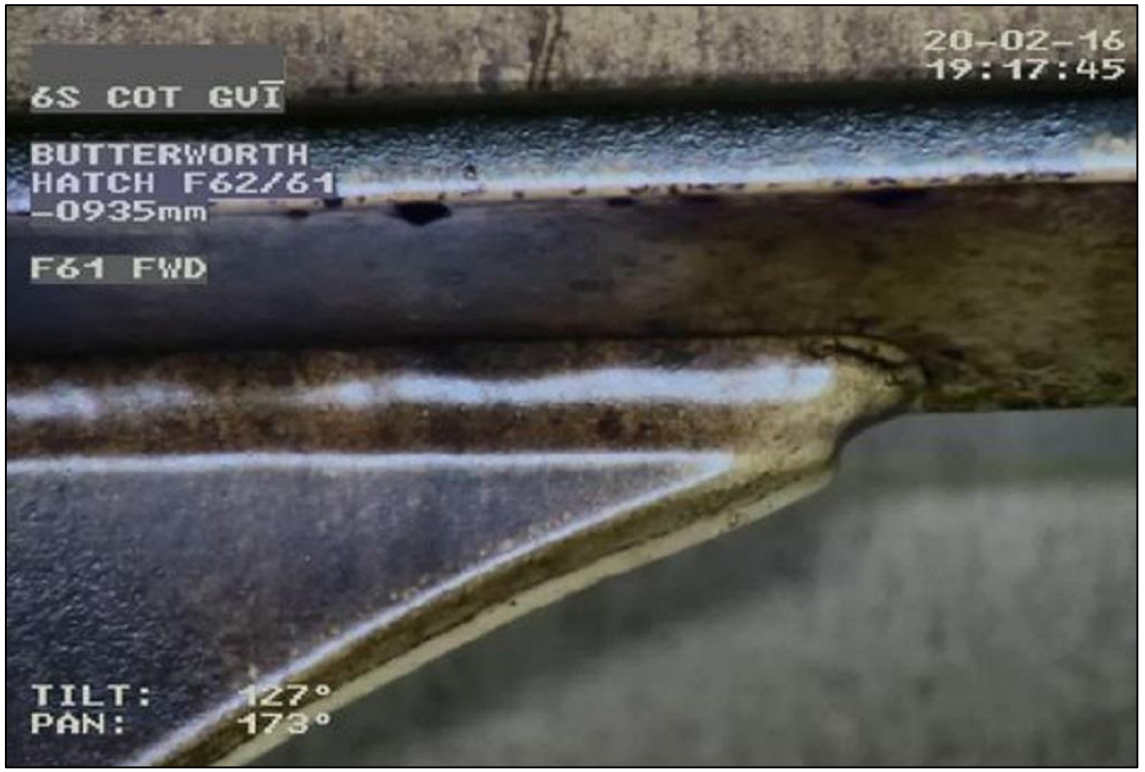

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Disruptive Technology - Case Study 1: NoMan

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Outcomes for Class and Operators: Initially GVI/ CVI / Distortion inspection without man entry, Development into thickness measurements and finally with no need to gas free with better data – RBI is key to this concept as it focuses inspection on critical / high risk areas which saves time and costs.

Other concepts being reviewed

Disruptive Technology - Case Study 2: ODIN™

Objective – Class-approved non-intrusive inspection / repair: keep producing, safely

Purpose: Valve Inspection, Valve Replacement

Valves should be thoroughly inspected and function tested. Inspection is via the sea strainers is inadequate and requires shutdown of the system.

Diver blanking and an onboard maintenance crew to remove the valve for inspection is costly.

The New Method meets the Class and Flag requirement using a specialised camera inserted into the piping via an inspection port so that the valve condition and function can be observed…without shutdown.

Disruptive Technology - Case Study 2: ODIN

ODIN Method Valve Inspection Video

Disruptive Technology - Case Study 2: ODIN

ODIN – Valve Isolation

Main Isolation Valves are Safety Critical.

ODIN can thoroughly inspect and witness function tests.

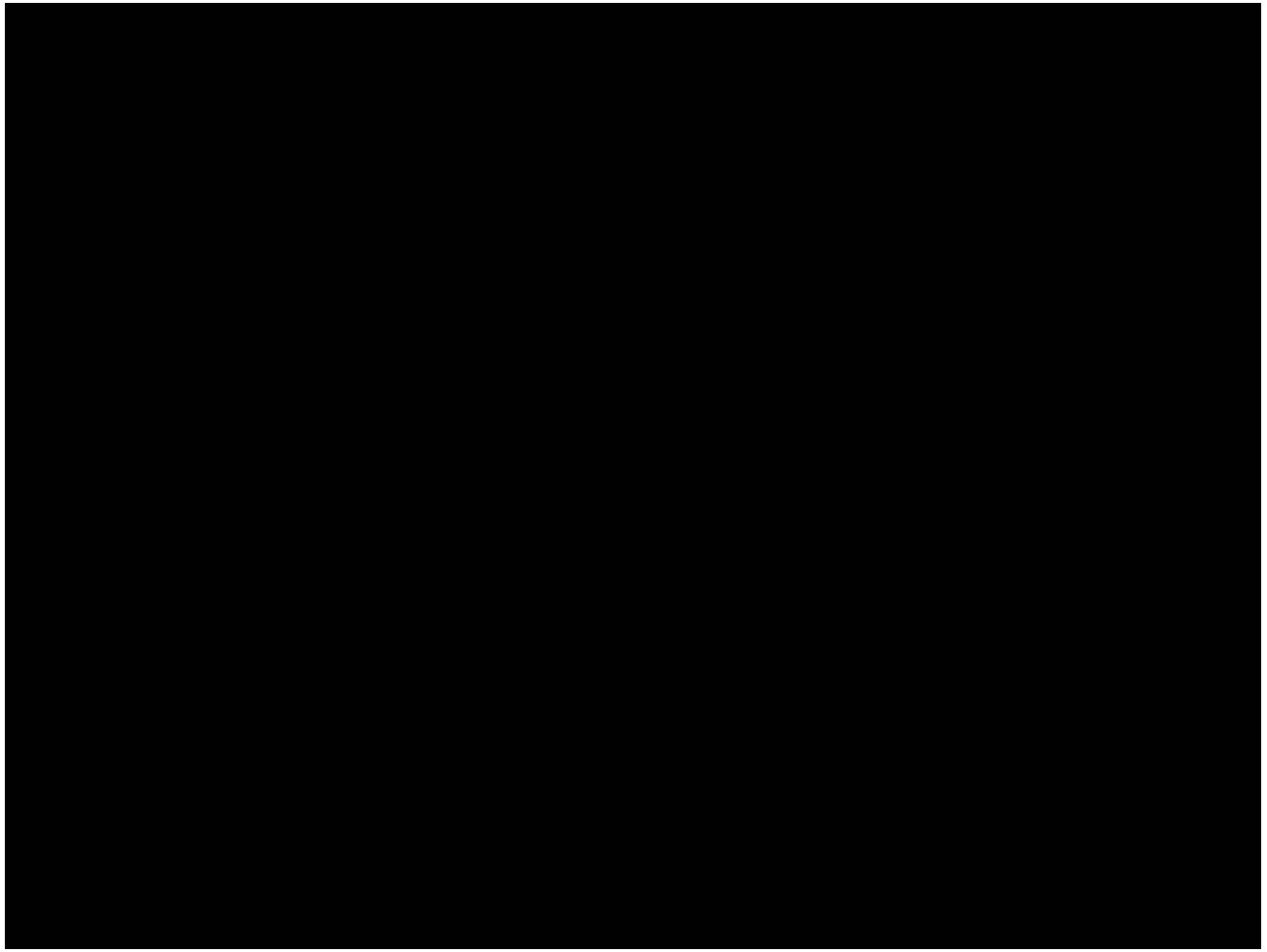
ODIN can cope with internal marine growth

Damaged valves / piping fixed by divers fitting blanking plates for maintenance

So how do we fix a faulty valve without divers…..?

Disruptive Technology - Case Study 2: ODIN

ODIN Method – Valve Isolation



Disruptive Technology - Case Study 3: HullGuard

Objective – Class-approved, keeping the hull clean, efficiently

HullGuard is a new ICCP method designed specifically for Floating Assets.

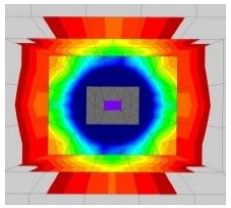
It is entirely diverless

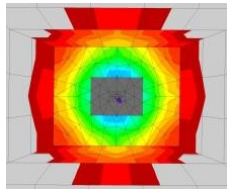
It provides better protection at lower CAPEX and OPEX than conventional ICCP or sacrificial anode systems

It is modular - you can add to the number of anodes needed as the asset ages

It is more efficient and uses less energy than conventional ICCP

…how does it work?





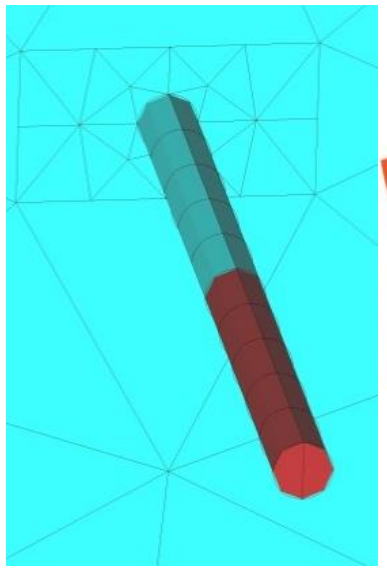
CONVENTIONAL ANODE

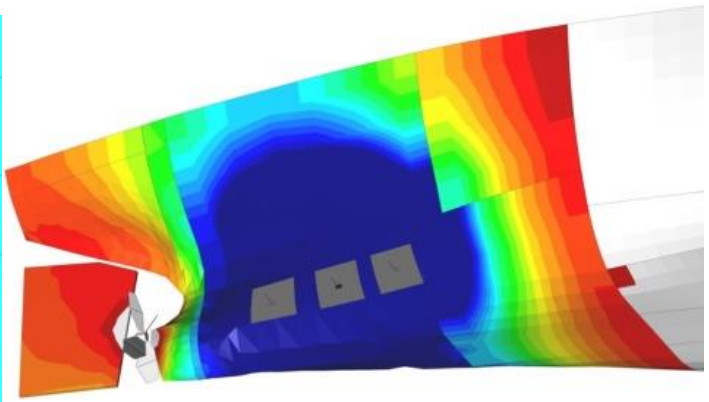
HULLGUARD ANODE

BEHAVIOUR IS NOTICEABLY BETTER WITH HULLGUARD (WHICH EXHIBITS NO OVER PROTECTION IN THIS SCENARIO)

Disruptive Technology - Case Study 3: HullGuard

- A computer model of the ICCP requirements is created (we use Beasy)
- This is used to design the HullGuard requirements (anode type, size, location, etc.) for each stage of the asset's life
- An Engineering Plan is prepared for Client and Class approval
- The anodes are installed through an ODIN type port using a pneumatic installation tool
- HullGuard is available as a turnkey system with a 'Hull Life Cycle Protection' package which includes maintenance, compliance management, life extension etc. on a purchase or leased basis (to eliminate CAPEX cost)





What are the Key Outcomes for Operators and Classification Societies?

From the Operator perspective:

- Improved safety
- Lower cost and budget certainty
- Reduced POB – now available for brownfield projects (life extension and production upgrades)
- Better data to optimise maintenance
- Improved asset integrity and reliability
- Compliance

Improvements expected by Operators:

- Mooring chain inspection capability
- Reduced costs for repeat surveys

From the Classification Society perspective?

- Improved safety
- Better hull integrity information
- Compliance

Key Messages

HITS represents the ‘industry’ – and is leading change in this critical area.

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Disruptive technologies in asset integrity - already happening, driving efficiency and delivering great outcomes.

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