The HOIS Joint Industry Project

Improved NDT for the energy industry
HOIS Joint Industry Project (JIP)

HOIS is a major well established JIP on good practice for NDT/NDE in the energy industry

• 35+ years

Members comprise:

• Category 1 members:
  • Oil and Gas operators
• Category 2 members:
  • NDT service companies
  • NDT equipment vendors
  • The Oil and Gas Technology Centre (The OGTC)
  • Notified/appointed bodies
• A regulatory authority (UK HSE)

Managed by ESR Technology
# Membership

<table>
<thead>
<tr>
<th>Operators</th>
<th>Inspection service, equipment vendors and notified/appointed bodies</th>
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<tbody>
<tr>
<td>Chrysaor</td>
<td>Aker Solutions, HSE</td>
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<td>CNOOC</td>
<td>Applus RTD, Inspectahire</td>
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<td>DOW</td>
<td>Baugh &amp; Weedon, Lloyd’s Register</td>
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<td>Equinor</td>
<td>Bilfinger, Mistras Group</td>
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<td>Gassco</td>
<td>Bureau Veritas, Oceaneering International</td>
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<td>Petrobras</td>
<td>CAN, Olympus NDT</td>
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<tr>
<td>Repsol Sinopec</td>
<td>Cybernetix, Rosen Swiss AG</td>
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<td>RockRose</td>
<td>DNV, SGS</td>
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<td>Saudi Aramco</td>
<td>Doosan Babcock, Sonomatic</td>
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<td>Shell</td>
<td>Eddyfi, Stork Technical Services</td>
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<td>Spirit Energy</td>
<td>FujiFilm, TRAC Oil and Gas</td>
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<td>Total</td>
<td>GE Inspection Technologies, The OGTC</td>
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<td>Woodside Energy</td>
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HOIS Chair: RockRose Energy  
HOIS Deputy Chair: Total E&P UK Ltd
HOIS aims

Vision
HOIS aims to be the best forum for the energy industry to improve the effectiveness of in-service non-destructive testing.

Mission
HOIS provides independent guidance for asset integrity management to the energy industry on the capabilities and effectiveness of different non-destructive testing (NDT) methods. This guidance is based on assessments of the capabilities of the NDT methods achieved by performing blind evaluation trials on accurately benchmarked test components, many of which are ex-service.
Key HOIS activities

Improves effectiveness of in-service inspection for the oil & gas industry and promotes good practice

• More reliable in-service inspection – better detection of in-service degradation
• More accurate measurements of remaining wall thickness
• Provide asset owners with improved information on asset condition
• Reduce leaks and near misses

This is done by:

• Developing good practice documents for specific inspection applications – recommended practices and contribution to international standards which feed into company inspection procedures
• Assessment of the performance of current and developing inspection techniques by means of rigorously controlled blind trials
• Industry forum for latest developments – what’s new and what works
• Some development of novel inspection techniques for specialised applications
Benefits of HOIS for all members

Assessment of the capability of existing and developmental inspection technologies from independent, rigorously conducted blind trials.

Access to improved procedures and guidance documents on specific NDT applications
Better understanding and increased reliability of inspection.

HSE active involvement – allows an insight into regulator’s priorities.

Networking at three 2 day main meetings a year raises awareness of new techniques and technical developments.

Determination of HOIS technical programme through project proposals and voting.
Benefits of HOIS for all members

Access to HOIS test facilities:

- Warehouse with well benchmarked ex-service and manufactured components for open and blind trials
- Two ex-service pressure vessels with service induced degradation.

Access to results from ~£800,000 annual programme.

Financial gearing – each subscription is a small fraction of total budget. Additional matched funding from The OGTC for specific projects has boosted the budget further.
Benefits for Operators - category 1 members

HOIS strategy updated annually by cat 1 members, supported by OGTC and HSE. Operators can propose and support projects which address their own inspection challenges thereby aligning the HOIS programme with the Operator’s own priorities. Operators can observe the engagement of their inspection service providers to see how they are adopting and applying good practice to their operations. Networking with other HOIS members of both categories makes the operator a more informed buyer of services. Active participation within HOIS is an example of working towards the development of standards which Duty Holders must demonstrate to comply with SCR 2015 Regulation 32 – Offshore Installations (Offshore Safety Directive) Regulations 2015
HOIS key theme: Non intrusive Inspection

Industry standard HOIS-RP-103 developed by HOIS
- Initially developed by HOIS and first published by DNVGL in 2007 (updated in 2011 and 2017) as DNVGL-RP-G103
- Fully revised and updated version launched in 2020 and published as HOIS-RP-103
- Associated OGTC/HOIS guidance notes HOIS-G-103
- Download from www.hoispublications.com

Substantial benefits of performing NII instead of conventional intrusive visual inspection:
- Safety – up to 80% fewer* confined space entries with corresponding reduction in number of line breaks and subsequent leak tests
- Financial – increased production and lower maintenance costs worth circa £242million* per annum to the UK continental shelf alone.
- Also a key theme of The OGTC.

Current active HOIS work with NII theme:
- NII at elevated temperatures
- Flange face corrosion inspection

Case study: Business benefit of application of NII in one shutdown in 2016

28 Vessels due for inspection; shutdown scheduled for 21 days
Estimated intrusive inspection cost £1.4 million.
Following NII review - 1 required intrusive inspection.
Cost for NII inspection £450k for 12 vessels inspected.
Remaining vessels to be inspected later
Shutdown reduced from 21 days to 14 days (and pressure vessels no longer critical path).
Helped UK business unit achieve annual shutdown day target.
Increased uptime / production (c. £1M per day)
HOIS key theme: CUI and external corrosion

Major project to assess capability of NDT methods for detecting and sizing external corrosion with and without insulation

Benefitted from collaboration with The OGTC to enlarge and accelerate the project

Deliverables have comprised:

- Reports on results of independently assessed blind trials of many current methods
- Guidance documents for in-situ inspection of scabs, with & without insulation – publicly available from www.hoispublications.com
<table>
<thead>
<tr>
<th>Title</th>
<th>Date</th>
<th>Publicly available?</th>
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<tbody>
<tr>
<td>HOIS-G-023: HOIS/OGTC Guidelines for in-situ inspection of corrosion under insulation (CUI)</td>
<td>Mar 2020</td>
<td>Yes</td>
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<tr>
<td>HOIS-G-028: HOIS/OGTC Guidance on inspection of uninsulated external corrosion scabs</td>
<td>Mar 2020</td>
<td>Yes</td>
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<tr>
<td>HOIS-G-027: HOIS Guidance on inspection of composite repairs</td>
<td>Mar 2020</td>
<td>Yes</td>
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<tr>
<td>HOIS-RP-103: HOIS Recommended Practice for Non-Intrusive Inspection of Pressure Vessels</td>
<td>Feb 2020</td>
<td>Yes</td>
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<tr>
<td>HOIS-G-103: HOIS/OGTC guidance notes for HOIS-RP-103</td>
<td>Feb 2020</td>
<td>Yes</td>
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<tr>
<td>HOIS Human Factors guidance for manual UT, visual inspection and IVI</td>
<td>Sept 2019</td>
<td>No</td>
</tr>
<tr>
<td>HOIS-G-017: HOIS Guidance on inspection of corrosion under pipe supports (CUPS)</td>
<td>Jun 2019</td>
<td>No</td>
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<tr>
<td>HOIS-G-005: HOIS Guidance on Image Quality for UAV/UAS based external remote visual inspection in the oil &amp; gas industry (Open version)</td>
<td>Jul 2018</td>
<td>Yes</td>
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<tr>
<td>HOIS-G-010: HOIS guidance for effective pipework inspection</td>
<td>Apr 2018</td>
<td>No</td>
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<tr>
<td>HOIS-RP-003: HOIS recommended practice for precision thickness measurements for corrosion monitoring</td>
<td>Nov 2017</td>
<td>No</td>
</tr>
<tr>
<td>Recommended Practice for the in-service inspection of wall loss in pipes by digital radiography. See also ISO 20769:2018 parts 1 and 2</td>
<td>Apr 2015</td>
<td>Yes</td>
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<tr>
<td>HOIS Guidance on in-service inspection and integrity management of caissons</td>
<td>July 2014</td>
<td>Yes</td>
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</table>
New projects for 2020/21

- Optimisation of PEC Technique for CUI – by open trials and modelling
- Corrosion mapping for small bore pipework
- Development of a RDVI RP for unmanned pressure vessel IVI (akin to HOIS-RP-103)
- HOIS Inspection Manual – a summary of key points from selected recent HOIS guidance & RPs
Other active projects

Determination of remaining thickness under external corrosion scabs: Scab characteristics and advanced NDT methods

Digitalisation in Oil and Gas

Assessment of NDT Techniques for Carbon and Low Alloy Steel Heat Exchanger Tubing Inspection

Ultrasonic NDT for NII at Elevated Temperatures.

Flange face corrosion RP: Update and extension to include RTJ flanges
Collaborations

**OGTC** has provided significant resources to allow HOIS to accelerate and expand its projects in areas that align with OGTC Asset Integrity Roadmap

**HSE** – defined life composite repairs, trunnion pipe support inspection

**Energy Institute** – corrosion under pipe supports

**Sprint Robotics** – Remote digital visual inspection recommended practice for unmanned pressure vessel internal visual inspection

Improved links with the **British Institute of NDT**
Member types and subscriptions

Full member (oil/gas company) (cat 1):
- £33,000 per annum

Inspection service/vendor company member (cat 2):
- £11,000 per annum

Members gain access to all information/results generated since 1999
- In return, members need to commit to 3 years membership to avoid an up-front joining fee.

Subscription year is April 1st to March 31st

HOIS member meetings:
- Technical presentations on current progress at three 2 day meetings per year
- Opportunity for all members to review work & make recommendations on future projects and strategy
- Additional working group meetings on specific projects as and when needed to discuss individual project in greater depth
HOIS summary

HOIS is a long standing JIP. Currently has almost 40 members
- Cat 1: Oil & gas operators
- Cat 2: UK HSE, the OGTC, NDT service providers, two major equipment vendors & notified/appointed bodies

Annual budget of ~£800,000 (including OGTC matched funding on selected projects)

Wide range of current projects:
- Development of Recommended practices/guidance documents
- NDT Technology evaluation by means of independent blind trials
- Addressing many current industry inspection challenges, including
  - Pressure vessel NII
  - Digitalisation in NDT and Asset Integrity Management
  - Inspection for CUI, CUPS
  - Inspection of composite repairs, trunnions, un-insulated scabs, external degradation in uncoated stainless steel, HX tubes, small bore pipework
  - Human factors