MANAGING RISK

ILI Results and Best Practice

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August 11, 2005

ILI Results and Best Practice

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- **"...how to improve the use of ILI…"**
- Introduction to DNV
- What does DNV use ILI Results for
- Concerns and challenges with ILI Results
- Best Practice – suggestions

- Note:
  - Based on experience outside the United States – mainly Europe
  - Approximately 30 pipeline assessment per year

DNV worldwide

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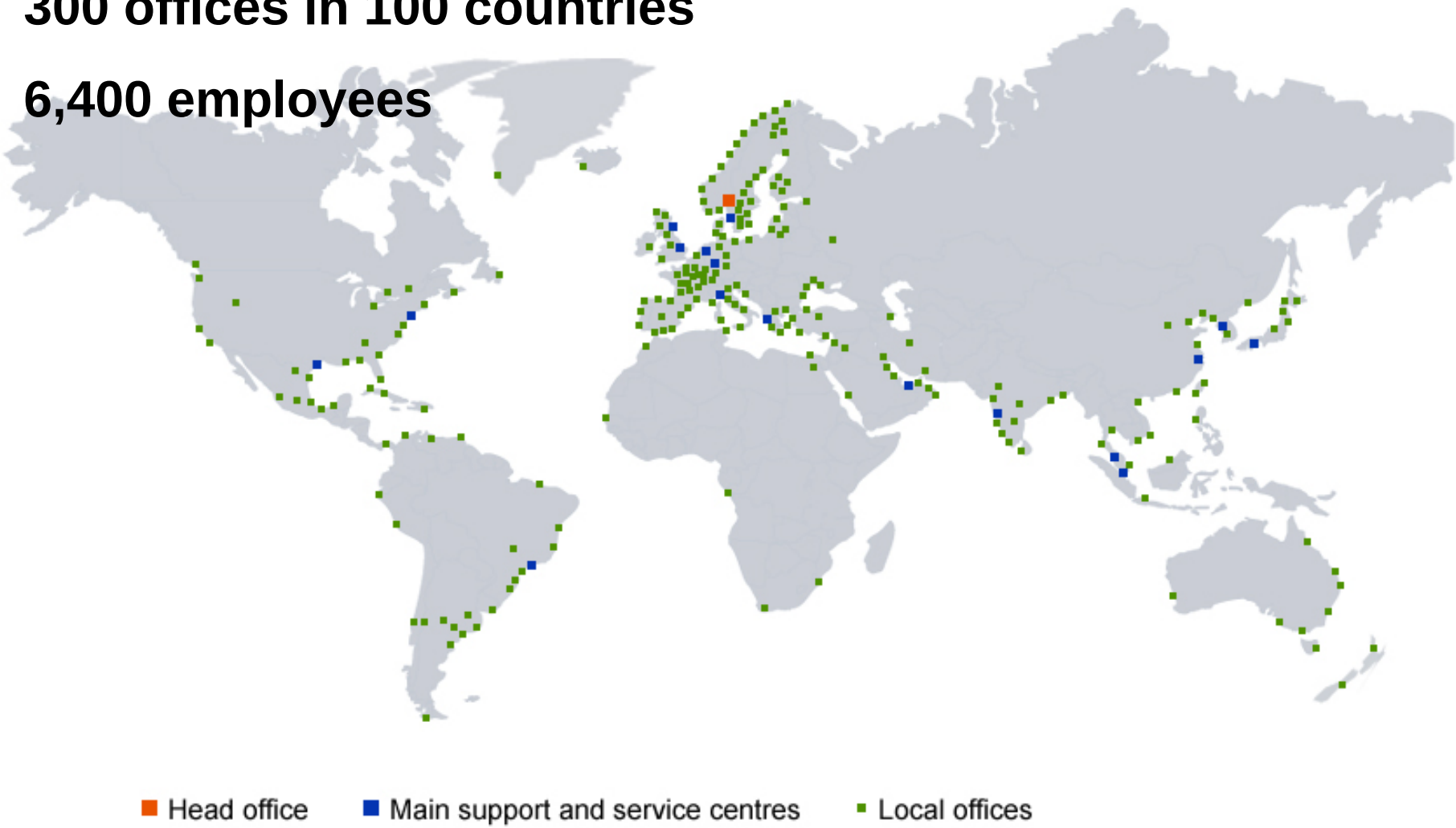
300 offices in 100 countries

6,400 employees



DNV's four business areas

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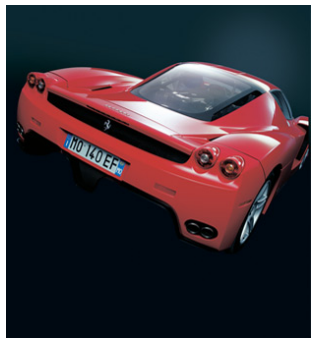
DNV Maritime



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Providing safe and reliable operations to the oil and gas industry through cutting-edge technology

DNV Technology Services

Safely and responsibly improving business performance

DNV Consulting

Introduction to DNV

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- Business Area: Technology Services

  => Pipelines; design and operation phase

  - mainly offshore
  - increasing onshore focus for the operation phase

Introduction to DNV

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- **Standards and Recommended Practices** authorship
  - Published standards that satisfy regulatory requirements
  - Developed in co-operation with the international industry
  - Results from Joint Industry Projects and Research Projects are made available to the industry and get into practical use
- Members of API, ASME, ISO, other committees
- DNV Standards and RPs are used world-wide

(Free download from: http://www.dnv.com/)

What does DNV use ILI Results for ?

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- Assuring the fitness for service and pressure carrying capacity for pipelines as part of Pipeline integrity control
  - One source of many to control the condition of the pipelines

ILI Results assessment

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- Assisting operators with
  - Review ILI report – for correctness of data and information
  - Consider ILI results in relation to other relevant information
    - Corrosion monitoring / prediction / trending
    - Process and product control
    - Past ILI/NDE inspections

ILI Results assessment

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- Assisting operators with (Cont'd)
  - Evaluate
    - Traceability – location of defects
    - Confidence in measurements – measurement error
    - Classification of defects
    - Defects (using DNV-RP-F101 or similar standards)
    - Interacting and complex shaped defects
  - Determine repair/remediation strategy
  - Determine ILI / assessment interval
    - Risk based approach
  - Assess overall pipeline condition

Defect assessment

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- DNV-RP-F101 “Corroded Pipelines” – 1999, updated 2004
  - Developed to take account of
    - **measurement uncertainties with ILI tools**
    - **benefits from accurate defect sizing**
  - Extends existing codes:
    - B31G / Shell 92 / R-Streng / BS 7910 / PCorrC
  - Joint industry development
    - Pipeline owner/operators, ILI vendors , Regulators
    - Software tool; (ORBIT Pipeline) to capture, assess and manage inspection results

Comments regarding ILI Results

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- General
  - Important source of information for the condition and integrity control of both onshore and offshore pipelines
  - Tools seem good, whereas interpretation is less consistent and reliable
    - Indirect methods – require analysis and interpretation
    - Requires experienced personnel to interpret data results
  - Turnaround time minimum 6 – 8 weeks (mostly 3 month and more)

Main concerns with ILI Results

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- ILI Report quality
  - Inconsistent and erroneous information
  - Incompatible with existing ILI data
    - Past inspection, reference positions, etc.
  - Calibration issues
    - Travel speed, temperature, pipe condition
    - Pipe dimensions
  - Inconsistencies between pigging report and operator specification

Main concerns with ILI Results

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- Confidence in ILI results
  - Validation data shows
    - Inconsistent sizing
    - Erroneous indications
    - Erroneous characterizations
  - Inconsistent ILI results for the same pipeline
  - Defect location not accurate – lack of traceability
  - Mile-point system not the same for ILI vendor and pipeline operator

⇨ **Confidence in uninvestigated anomalies needs to be higher**

Main challenges

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- Improving ILI Results
  - Inspection and interpretation of ILI signals
  - Improve confidence in the results
  - Communicating the result to the user

- Using ILI Results
  - Effective validation
  - Integration of supplementary information
  - Effective defect assessment and integrity control
    - Incorporate sizing uncertainties
  - Make informed integrity management decisions

Best Practice – suggestions

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- Integration of prior knowledge
  - Start out with clearly understood inspection objectives
  - Use past inspection data/validation results to define deliverables for current inspection
- Improve generation of ILI data and results
  - Communicate validation findings to ILI vendor
  - Request ILI vendor to explain how inconsistencies affect confidence in reported results

Best Practice – suggestions

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- Condition monitoring/assessment
  - Integrate information
    - operation, general pipeline data, monitoring activities…etc.
    - past and present ILI results, also across ILI vendors
  - More open dialogue
    - between the ILI team and the users of the results
    - discuss special anomalies, potential erroneous readings, sizing, etc.
  - Recognize that ILI includes a level of uncertainty
    - highly dependent on the ILI teams experience (and software)
  - Investigate critical anomalies and sample non-critical anomalies
    - to optimize confidence in indications not investigated

Best Practice – suggestions

- Re-assessment interval
  - Use Engineering Criticality Assessments (ECA) and probabilistic methods to optimize assessment intervals
    - May require independent validation (by independent party)
  - Qualify recommended intervals by use of risk assessments

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