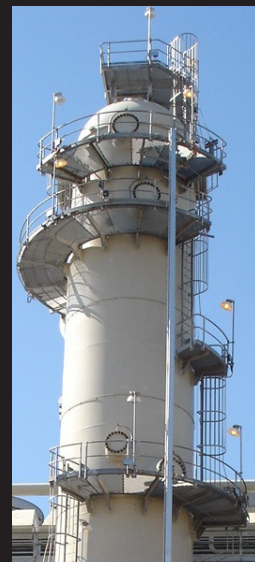


Non Intrusive Inspection (NII)

Internal Visual Inspection (IVI) has historically been used as the main method for determination of the condition of pressure equipment as part of the integrity management process. IVI can however be a hazardous, time consuming and costly exercise. Non Intrusive Inspection is increasingly being considered as an alternative to the traditional IVI approach. The benefits of NII in comparison to IVI are significant and include the following.

- Reduced production losses associated with shut-down.
- Reduced manpower requirements – this can lead to reduced shut-down cost and shorter overall shut-down times since greater capacity is available for other tasks.
- Removal of hazards associated with man entry of vessels.
- Removal of the need to clean vessels internally.



It is widely recognised that NII is different in many respects to IVI hence a different approach to planning is needed. For example, while IVI has the capability to detect a range of different defect types without specific knowledge of what to expect, the capability of NII is very much technique driven. Hence an up-front knowledge of what degradation may be present takes on added significance when planning an inspection by NII. This also means that successful NII is very much dependent on knowledge of the capabilities and limitations of available inspection techniques so that the most appropriate is selected. Definition of the inspection requirements is also linked closely to what defects are of concern and what represents a threat to integrity. In order to ensure effective NII, Sonomatic offers a multi-disciplinary approach, combining skills and knowledge in corrosion engineering, inspection technology and mechanical integrity.

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Sonomatic has offices in strategic global locations so we can respond quickly to customers' requirements wherever they may be situated. Our high quality products are matched only by our customer service. In addition to our field services, we offer training and consultancy at our sites in the UK or at clients' premises anywhere in the world.

Sonomatic is committed to improving asset performance through applied and innovative technology; to delivering these benefits to our customers in the products and services that we provide; and to working with our customers, as value-added partners, to realise the maximum benefits of inspection technology.

Identification of vessels for which NII is appropriate.

Before NII can be carried out on a vessel it is important to establish that the inspection will be capable of providing the necessary level of assurance. We offer two approaches in this respect. Firstly, the assessment can be made using the industry accepted HOIS NII Decision Guidance that is based on a comparison to IVI. Secondly, in certain situations it is appropriate to make a more quantified assessment to demonstrate that the level of assurance can be achieved. In this approach, knowledge of the degradation type, inspection technique performance and mechanical integrity are used to quantify the effects of the inspection on integrity.

Corrosion risk assessment.

An understanding of potential degradation mechanisms and their rates is essential to being able to confidently specify NII as an alternative to IVI. In many cases a significantly more detailed corrosion assessment is required prior to NII than would be the norm for management of integrity using IVI as the primary means of inspection. Sonomatic are able to provide corrosion assessments to the required level of detail. This is achieved through working closely with the client to ensure that all relevant data (including process and inspection history) is included and applying state of the art corrosion models.

Detailed NII planning.

The NII plan defines the techniques and procedures to be used and the locations for coverage by each inspection technique. Sonomatic use the findings of the corrosion risk assessment together with knowledge of technique capability and allowable defect sizes to define an effective plan for each equipment item considered. This recognises that the requirements must be closely aligned to each specific case. For example, the NII requirements in a situation in which little degradation is expected would focus on validating the assumptions of the corrosion assessment and would be different to those in a situation where there is a reasonable probability of degradation with the potential to threaten integrity. Sonomatic's NII planning team have a good understanding of inspection services and deliver NII plans that can be directly implemented by the inspection vendor.

Inspection Services.

Sonomatic offer a range of advanced ultrasonic techniques, covering inspection for corrosion, erosion and cracking, including the following.

- Corrosion mapping for detection and sizing of localised and general wall loss.
- Time of Flight Diffraction (TOFD) for detection and sizing of weld cracking and erosion. We also apply TOFD as a tool for identifying localised corrosion or erosion in plate material.
- Automated pulse echo for the detection and sizing of weld defects. Pulse echo is also effective for the identification of certain pitting mechanisms.
- CHIME for the detection of wall loss. This is an effective screening technique that allows rapid coverage of large areas.

QA and HS&E

It is Sonomatic's ongoing commitment to supply services and products, through the application of technical and engineering excellence, which complement both the customer's and our own QA and HS&E requirements.

Sonomatic's commitment to quality is maintained through continuous assessment and review of our Quality Management Systems to BS EN ISO 9001:2008. Sonomatic actively promotes the development, implementation and improvement of our QMS as a part of our ongoing drive to enhance customer satisfaction by meeting or exceeding customer requirements. In 2009 Sonomatic achieved UKAS accreditation as an Inspection Body to BS EN ISO/IEC 17020 (UKAS IB4276).

In addition Sonomatic works with others to include the full range of conventional ultrasonic inspection services and a variety of radiographic and electromagnetic techniques. This ensures delivery of the complete range of techniques that might be required in an offshore NII programme. Sonomatic understand the objectives of inspection by NII and have developed reporting formats specifically for it.

Evaluation of inspection.

On completion of an inspection by NII it is important to evaluate the work carried out to ensure that the requirements of the inspection plan have been met. In addition, evaluation is required to assess the condition of the equipment compared to expectations and previous inspections. Where degradation is found, an assessment of the implications regarding continued integrity should be made and, in certain situations additional inspection may be required. Sonomatic are able to review NII programmes including evaluation of work achieved by comparison to the workscopes specified, review of inspection reports and appraisal of results, including fitness for service assessment, where degradation is found. Sonomatic also offer statistical analysis of corrosion results as a means of justifying inspections carried out with less than full coverage and are leaders in the application of statistical methods for analysis of inspection data.

Summary.

Sonomatic works closely with customers to ensure rapid and effective communication of information. Our ability to offer the full range of services needed in carrying out an NII programme enables the benefits of NII to be maximised while retaining full confidence in equipment integrity.

Sonomatic's staff are at the forefront of development of NII approaches and are leaders in implementation. Our clients include many of the major international operators and a significant level of project experience has been built up. Our involvement - at the assessment, planning, implementation and evaluation stages - covers over 250 major process vessels in the North Sea. Projects have ranged from inspection on single vessels to large programmes in which up to thirty vessels have been inspected by NII outside of a shut-down.

We would be happy to discuss your NII requirements with you. For further information please visit our website: www.sonomatic.com

