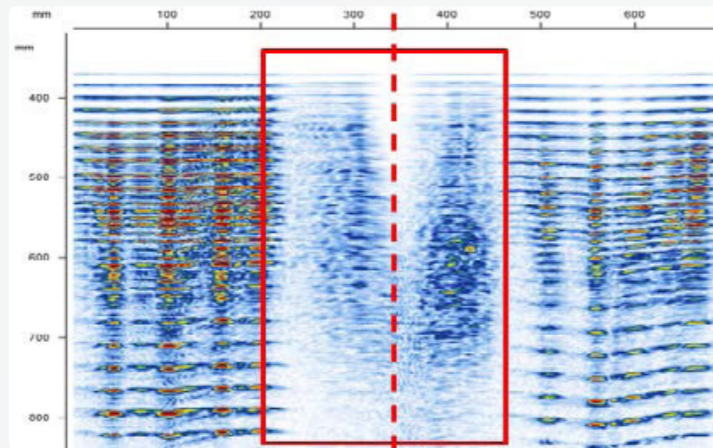


CHIME INSPECTION

All owners and operators have a requirement to extend the useful life of their plant, and the early detection of corrosion is a significant consideration in the long term management of equipment integrity. There is often a requirement to inspect large areas, such as on production vessels or long pipelines and achieving the desired coverage using conventional ultrasonic approaches can be time-consuming and costly. In addition, inaccessible regions such as pipes on pipe supports or under clamps generally cannot be inspected unless the entire assembly is dismantled, often involving expensive shutdowns and significant effort and cost. The CHIME technique solves these problems by offering large area, single pass screening, which inspects the full volume between the probes (which may be separated by up to 1m).



CHIME can be used on both pipes and plate, and is suitable for inaccessible geometries such as clamps, saddles and pipe supports. This eliminates the need for expensive shutdown but provides sufficient information to indicate areas of corrosion, thereby allowing for effective decision-making in ensuring long term integrity of equipment. CHIME offers a very efficient approach for initial screening, providing a percentage wall loss value for which regions where degradation is identified can be followed up with detailed wall thickness mapping if required. Sonomatic offers a full service to customers in carrying out CHIME inspections for a range of situations.

CHIME was developed within the HOIS joint industry project. It has been proved successful in field trials in upstream and downstream applications, and is now gaining in acceptance in all kinds of plant, especially for rapid, large area screening for sites of corrosion. The system employs a combination of ultrasonic head-waves and creeping waves, hence its name:- Creeping Head-wave Inspection Method. Bulk, creeping and head waves are generated using a piezoelectric transducer mounted on an angled shoe. The complex mode of propagation provides complete inspection of plate or pipe, effectively utilising the internal and external surfaces as a wave guide which creates little attenuation. The basic CHIME technique involves discrete transmitter and receiver probes separated by up to 1m operating in through-transmission. A series of characteristic responses are detected by the receiver, typically grouped separately as BULK and CHIME waves. The spacing of these signals is determined by the material thickness. The geometry of corroded surfaces affects the amplitude and characteristic pattern of the received signals.

The effects become more pronounced with increasing depth of corrosion and it has been possible to apply a qualitative ranking of signals into the categories of <10% corrosion, 10% to 35/40% and >35/40%.

Sonomatic have carried out development work to enhance the technique. The enhancements include use of pulse echo modes to provide additional information for defect characterisation and application of advanced digital signal processing of the data to aid interpretation. CHIME can be deployed in both manual and automatic inspection set-ups for topside applications.

The technique has been shown to be effective in meeting the requirements as a primary technique for Non-Intrusive Inspection (NII) of certain types of pressure equipment. It is being used increasingly by Sonomatic in this application and we can assist clients in identifying when and how it can be used in this role. Sonomatic will often use CHIME in conjunction with Multiskip or SH-EMAT as complementary methods.

This ultrasonic technique has the capability for high coverage inspections of pipe or plate and can also be applied to the inspection of under-clamp or under-support corrosion:

- ✔ Large area, single pass corrosion, pitting and crack detection.
- ✔ Probe separation up to 1m.
- ✔ 100% coverage of material between the probes.
- ✔ Suitable for steel pipes and plate.
- ✔ Sensitive to both internal and external surface degradation.
- ✔ Signal response gives information on defect severity.
- ✔ Tolerant to typical field surface conditions and thin coating.
- ✔ Recommended for wall thickness - 6 to 100 mm.
- ✔ Pipe diameters from 4" upwards.

QA AND HS&E

Sonomatic operate under an integrated QHSE management system and are committed to the highest quality and safety of service provision | ISO 9001: 2015: 00007140 | ISO 14001:2015:00037371 | ISO 45001:2018:00037372 | ISO 17020: 2012: 4276 | Achilles FPAL Verified: 076712 | SEQual 1988 | British Safety Council Member: S0388440 |



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