

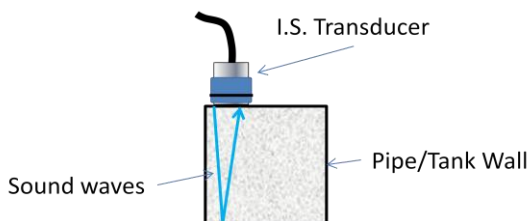


UNDERSTANDING ULTRASONIC TESTING AND THE NEED FOR CORROSION MONITORING

**An informative guide for the use of Ultrasonic Testing in
(Hazardous) industrial applications**

What is Ultrasonic testing?

Ultrasonic testing is a form of non-destructive testing in which the application of high frequency sound waves is used to measure the thickness and the internal structure of a test piece. The ultrasonic sound waves that are used are beyond hearing range, typically 20 kHz and above.



Where is the need for Ultrasonic testing?

Unprotected pipelines or tanks, whether buried in the ground, exposed to the atmosphere, or submerged in water, are susceptible to corrosion. Corrosion is the breakdown of a material due to the chemical reactions with its surroundings. Some products can withstand the harsh environments in which they are in and fight off corrosion, however most products used on pipelines or tanks will eventually start to corrode.

But what if my pipes are new, how can the UT5000 help me then?

One of the biggest problems faced with pipelines and tanks is the erosion that they face internally. The harsh weather and locations that the pipes are situated in are not always the worst that the metals surfaces face. Often the chemicals/oil inside the pipes are just as harsh if not more so due to their acidity, or texture.

Even with suitable maintenance, every pipeline system will eventually deteriorate. Corrosion and erosion can weaken the structural integrity of a pipeline and make it an unsafe medium for transporting potentially hazardous materials.

What kinds of corrosion and erosion are there?

Uniform Corrosion - Or general corrosion is the most common form of corrosion, and is caused by several individual electrochemical processes that occur consistently over the whole of the surface considered. The problems caused by this type of corrosion are;

- Loss of metal thickness
- Loss of weight per unit



Pitting Corrosion – This form of corrosion is particularly menacing. The attack is in the form of highly localized holes that can penetrate inwards extremely rapidly, while the rest of the surface remains intact. A component can be perforated in a few days with no appreciable loss in weight on the structure as a whole.

When looking at pitting and the way in which it works, it is most aggressive in solutions containing chloride, bromide or hypochlorite ions, opposed to iodides and fluorides which are significantly less harmful. Stainless steels are particularly sensitive to pitting corrosion, but other metals, such as passive iron, chromium, cobalt, aluminium, copper and their alloys are also prone to this form of damage.

Erosion-corrosion – This is caused by the flowing movement between a corrosive fluid and a metal surface. This process leads to the formation of grooves valleys, wavy surfaces and holes. Each form of this type of corrosion will have a directional appearance on the metal surface that will mimic that of the fluid. Most metals and alloys can be affected, particularly soft materials (e.g. copper, lead, etc.) or those whose corrosion resistance depends on the existence of a surface film (aluminium, stainless steels).

This form of corrosion will be particularly worse in two-phase liquids (containing suspended solid particles or gas bubbles), the impact of the particles can damage or even eliminate the protective layers or passive

films that are normally stable in the absence of particles, and the local corrosion rate is then markedly accelerated. This phenomenon is called abrasion-corrosion.

So how do you control pipeline corrosion?

The first step would be to have employees/contractors trained in corrosion control. When pipeline operators assess risk, corrosion control must be an integral part of their evaluation. Corrosion control is an ongoing, dynamic process. There are a few key aspects that you need to keep in mind in this process:

- Quality design and installation of equipment
- Use of proper technologies
- Ongoing maintenance and monitoring by trained professionals.
- Controlling the pressure, flow, temperature, and filter/control the make-up of fluids.

The benefits of an effective maintenance and monitoring programme.

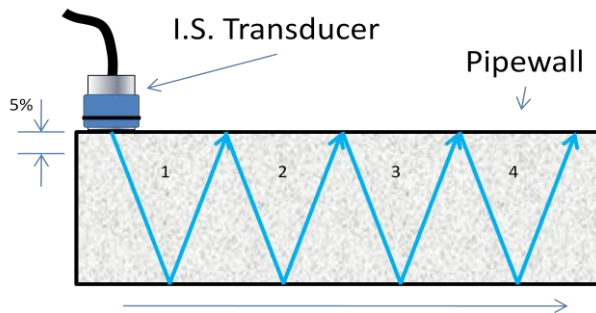
When looking at the benefits of an effective corrosion maintenance and monitoring program it must be kept in perspective that the oil, gas and chemical industries lose billions of dollars every year through unexpected shutdowns on pipelines or plants, and in reduced productivity.

Corrosion testing can be an operator's best insurance against preventable corrosion related problems. Effective corrosion control can extend the useful life of all pipelines and tanks. The increased risk of pipeline/tank failures far outweigh the costs associated with installing, monitoring, and maintaining corrosion control systems. Preventing pipelines from deteriorating and failing will save money, preserve the environment, and protect public and workforce safety.

So how does the UT5000 help to overcome these issues?

The UT5000 is the perfect solution to the problems associated with corrosion detection on an operating petrochemical facility. With its certified, intrinsically safe design it allows you to work in hazardous areas drastically reducing downtime and internal administration when applying for hot work permits. The UT5000 allows you to get on site, and get the job completed safer, faster and better.

Using the UT5000 you can pick up reduction in metal thickness using its unique MultiECHO™ technology or even uncover pitting in a pipeline using Corrosion mode; making use of constant-real time measurements giving maximum, minimum and average values.



When using MultiECHO™; four readings are required before the UT5000 displays a value. With MultiECHO™ an inspector can be confident that the reading stored is accurate and unaffected by couplant or surface interference.

UT5000 is also supported by CorDEX CONNECT™ software, designed to download the stored information from the device, allowing the user to create historical trend graphs and reports from the data collected. The software also gives you the ability to associate photos taken with your hazardous area camera to help visually aid any reports that you may create.

Conclusion

UT5000 Intrinsically safe thickness gauge in combination with CorDEX CONNECT Software helps to save you **time** by eliminating administration problems in getting 'hot work' permits, collecting data and compiling reports. It will also save you **money**, allowing you perform important inspection work in areas that would normally require plant shut-downs or downtime. And finally the UT5000 will help to increase **safety** of your workforce allowing for safe use in hazardous areas, whilst tracking deterioration of ageing assets and in turn **reducing potential risks**.



Why not visit CorDEX Instruments website for the latest news and downloads, or even come and join our CorDEX Community and learn more about the technology CorDEX Instruments provide...



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