

Monitoring or Inspection

There is often some confusion between the words “monitoring” and “inspection” when used in reference to measuring metal loss and calculating corrosion rates in industrial applications such as oil and gas, water treatment, chemical plants etc.

The two words are often interchanged however there is a distinct difference between the two. Inspection implies less frequent check points to assess for changes or deviations to the anticipated or required results. Monitoring is defined as checking continuously for the purpose of control in order to react quickly to change.

When used to refer to methods of calculating corrosion rates within pipes and vessels it is important to understand the differences between the two and to select the appropriate technology to achieve the desired objectives. For instance if the objective is to evaluate or estimate when a pipe/vessel wall has corroded to the point where it has reached its maximum corrosion allowance and therefore should be replaced then inspection techniques may be suitable. If however the objective is to continuously monitor the corrosivity of the process and subsequently take steps to reduce the corrosion rate, thus extend the equipment life, maintain up time, and reduce costs then this can only be achieved through continuous high sensitivity monitoring.

There are many external inspection tools on the market which claim to monitor corrosion however to date there are none which offer the same sensitivity, and rapid response to changes in metal loss as high sensitivity internal corrosion monitoring probes such as the Cosasco[®] Microcor[®] probe.

The key factor which sets Microcor apart from other metal loss techniques is its very low signal to noise ratio which allows the corrosion engineer to detect changes in metal loss as small as 0.0006mils (0.016µm). This equates to approximately 330x the sensitivity of even the highest sensitivity external inspection technologies currently on the market. To put this in perspective a change in metal loss which Microcor can detect within 1 day would take almost 11 months by any other external pipe wall monitoring technology claiming to be high sensitivity.

Even when taking into account what would be considered large changes in corrosion rate in the magnitude of 0.5mm/year (19.68mils/year) Microcor can detect the change in metal loss in less than 20 minutes. Other external pipe wall monitoring techniques with a claimed sensitivity of 0.2mils would take almost 4 days to detect the same change.

This rapid response from Microcor allows corrosion engineers to tie in corrosion events to process changes and thus intelligently take steps to control this corrosion by methods such as chemical injection. When it comes to optimizing chemical injection and ultimately reducing chemical costs nothing on the market is as effective at providing reliable corrosion rate information as Microcor internal corrosion monitoring.



Microcor ER Wireless Transmitter and Low Pressure Probe Flange Mounted

Probes

Cosasco offers a large range of internal corrosion monitoring probes which can be sized per customer requirements in 1/8th of an inch increments. This ensures that the element is always placed in the process phase of greatest concern where the highest corrosion rates are expected. For monitoring corrosion rate at or near the pipe wall customers can select from a range of flush probes which have a flat element and can be sized to sit parallel to or flush with the pipe wall as required.

Probe elements are normally manufactured from the same material grade as the pipe/vessel wall however also offer the flexibility to be manufactured from other material grades as sometimes the objective is to measure the corrosivity of the process in relation to other equipment within the pipework such as valves etc. This cannot be achieved through the use of externally mounted pipe thickness inspection tools.

Instrumentation and Communication Options

Cosasco offers a range of instruments with varying communications methods available from handheld units for taking manual readings, data loggers (available in wired and wireless Bluetooth[®] versions), online RS485 wired systems and online real-time wireless systems using industry standard protocols including WirelessHART 7 and ISA100.

Data can either be viewed directly using Cosasco software or can be handed off to customer control systems using a variety of communication methods including 4-20mA, Modbus, OPC, PI, DeltaV etc.

Real-time corrosion monitoring as provided by Cosasco wired or wireless online systems will provide the fastest response to corrosion upsets however even when utilizing offline data loggers where the data is only being downloaded periodically the response time can still be faster and thus provide greater value than external inspection techniques due to the higher sensitivity and lower signal to noise ratio of the Microcor corrosion monitoring system.

Microcor intrusive corrosion monitoring probes provide very small changes in metal loss over short periods of time versus external monitoring techniques which can only detect large changes over unmanageable periods of time.

High Pressure Access Fittings (up to 10,000psi, retrievable online up to 6,000psi)

As the original designer and manufacturer, Cosasco access fittings became the industry standard for access under pressure and have been sold worldwide for over 60 years. Due to this Cosasco have a long standing reputation for providing high quality, robust, reliable, and safe access for the installation and retrieval of internal corrosion monitoring and chemical injection devices under pressure.

Cosasco manufactures a range of access fittings, all designed to last the lifetime of the pipe or vessel they are installed on and include Flarweld, Butt weld, Socket weld, NPT and Flanges to suit customer's individual requirements.

Flanged fittings are designed to mate to all common industrial flange types and can be mounted onto new mating flanges or to existing flanges within the customer's pipework thus removing the requirement for welding on existing pipes and vessels. For instances where a customer has a less-common mating flange they would like to utilize the Cosasco engineering team can design an access fitting to suit their requirements.

Flanged access fittings quite often only require a small section of pipework to be isolated for the flange to be installed which is a one-time operation. After the fitting has been installed all future monitoring device retrievals can be carried out online under normal operating conditions.



Microcor ER Transmitter and Probe mounted on a Cosasco High Pressure Flanged Access Fitting

Welded access fittings can be retrofitted to pipes or vessels whilst the plant is online by welding the fitting onto the line then hot tapping through the access fitting and installing the intrusive monitoring device. Hot tapping services can be offered by Cosasco.

Low Pressure Access Systems

In addition to the high pressure system Cosasco also offer a low pressure alternative which can be used in systems up to 1,500psi and is ideally suited to refinery and pipeline applications.

Servicing COSASCO[®] Access Fittings

Cosasco offers a range of retrieval equipment and service valves for the installation and retrieval of devices under normal plant operation up to pressures of 6,000psi. These tools have been used throughout the industry for many years and have built a solid reputation for reliability, ease of use, and safe access under pressure. Cosasco have developed a full set of in depth Work Instructions and Risk Assessments based on many years of field experience and offer these documents to any customer purchasing Cosasco retrieval equipment.

Cosasco also offers a full range of onsite services via their global network of offices using factory trained technicians with extensive field experience and can perform all facets of service work related to internal corrosion monitoring from online retrieval and installation of monitoring devices to full commissioning of online corrosion monitoring systems.

Corrosion Coupons

Weight loss corrosion coupons are still a widely used method of detecting corrosion and are used by many corrosion engineers to compliment other forms of monitoring as they can provide useful information which cannot be gathered by other external inspection techniques. By analyzing a corrosion coupon the Corrosion Engineer can gain valuable insight on issues such as pitting, erosion effects, scaling build up, microbiological concerns etc. as the coupons have been directly exposed to the process. External inspection techniques cannot provide this information.

Conclusion

- The words “Inspection” and “Monitoring” are often interchanged when referring to corrosion detection however there is a distinct difference:
 - Inspection refers to the use of lower sensitivity techniques in order to estimate and evaluate when equipment has reached the end of its usable life.

- Monitoring refers to the use of high sensitivity techniques in order to closely track changes in metal loss for the purpose of taking corrective action to control the corrosion through techniques such as chemical injection and thus reduce cost and extend asset life.
- High sensitivity intrusive probes such as Microcor can be considered true corrosion monitoring whereas external pipe wall monitors should be considered inspection tools as they lack the sensitivity and speed of response to intelligently take steps to control corrosion.
- With the current oil price and operators looking to cut costs Microcor high sensitivity probes can be utilized to provide rapid response to corrosion upsets and allow accurate chemical injection to be optimized, reducing costs whilst extending equipment life.
- Cosasco access fittings can be installed during the construction phase of new projects or retrofitted to pipework and vessels within existing plant. A variety of mounting options are available from welded fittings to flanges all of which can be retrieved using the Cosasco range of retrieval equipment.
- Cosasco offers a full range of Cosasco Care services including online retrieval and installation of corrosion monitoring devices at pressures up to 6,000psi and has developed in depth Work Instructions and Risk Assessments based on many years of field experience. Other services from initial site survey, through final commissioning and after sales support can be offered to ensure continued system performance.
- Cosasco can provide many communication options in terms of instrumentation from handhelds, dataloggers through to online wired and wireless systems using industry standard communication options.

For further details on internal corrosion monitoring please contact your nearest Cosasco representative visit our website, http://www.cosasco.com/locate_a_representative.php or contact us by e-mail at sales@cosasco.com.