

In-service High Temperature UT Inspection Survey by MISTRAS at a U.S. Oil Refinery

Mistras在美国某炼油厂进行在线高温超声波检测测量

In-service, high-temperature corrosion surveying to maximise productivity, safety and plant availability.
在线高温腐蚀测量可最大限度地提高生产率，安全性和装置利用率。



Overview 概述

A solution was sought by Mistras, one of the largest suppliers of integrity and inspection services, for an inspection project at a US West Coast oil refinery that involved Ultrasonic Testing (UT) measurements of on-stream process pipework and equipment at high temperatures, in the range 350 °F to 700 °F (177 °C -371 °C). UT is a critical activity in the maintenance and up-time of this high value processing unit at the refinery. Measurements were scheduled to be made at a number of identified corrosion monitoring locations (CMLs) during normal production, and this required the use of UT transducers which were able to make high temperature thickness measurements.

最大的完整性和检验服务供应商之一Mistras为美国西海岸某炼油厂的一个检验项目找到了一个解决方案，该项目涉及对350 °F至700 °F(177 °C -371 °C)的高温工艺管道和设备进行超声波检测(UT)测量。超声波检测是炼油厂此高价值处理装置维护和正常运行重要工作。在正常生产过程中，需要使用能够进行高温厚度测量的超声波探头对多个已确定的腐蚀监测位置(CML)进行壁厚测量。

The Challenge 面临的挑战

Before adopting the Ionix HS582i high temperature UT probe mid-way through the project, the main challenge articulated by the Mistras inspectors at the oil refinery was:

在项目中途采用Ionix HS582i高温超声波探头之前，炼油厂的Mistras检验员明确提出其面临的主要挑战是：

- The time consumed by having to wait for transducers to cool between each reading (duty cycling)
在每次读数之间等待传感器冷却消耗大量时间(工作循环周期)。
- The ensuing lack of repeatable thickness data
随之而来的是缺乏可重复的厚度数据

The Solution 解决方案

Ionix' HS582i dual element 5 MHz transducers, based on the HotSense™ ultrasonic platform, were deployed with Mistras' own standard UT flaw detectors making for immediate implementation.

Ionix的HS582i双晶5 MHz传感器基于hotsense™超声波平台，与Mistras自己的标准超声波探伤仪可即时配合使用。

- The HS582i transducers were chosen for their wide operating temperature range; -67 °F to +1,022 °F (-55 °C to +550 °C), minimising the need for intermittent cooling (duty cycling) and re-calibrating to reduce the inspection time and prevent the need for shutdown or isolation of equipment.
HS582i 探头的工作温度范围广；从-67°F到+ 1022°F (-55°C 到+550°C)，最大限度地减少了间歇冷却(工作循环周期)和重新校准的要求，从而大大降低检测时间，并防止要求停机或设备隔离。

- Increased wear resistance / longer probe life maximized continuous usage and measurement collection. 增强的耐磨性/更长的探头寿命，最大限度的连续使用和测量结果收集。
- Probe accessories including high temperature couplants and handles made measurements fast, repeatable and safe. 探头配件包括高温耦合剂和手柄，使测量快速，可重复和安全。
- Manufactured in compliance with international standards to easily fit directly into the prevailing project UT inspection procedures. 按照国际标准制造，便于直接融入主流项目超声波检验程序。
- Compatible with commercial high temperature couplants. 与商用高温耦合剂兼容。



Fig. 1 (Left) Ionix HS582i probe in use at US Oil Refinery by a Mistras Inspector. Pipe temperature readings at time of this inspection were 582°F (305°C). (Right) The thickness measurements were able to be repeated several times with minimal cool down periods.

图1(左)Mistras检验员在美国某炼油厂使用Ionix HS582i探头。检验时管道温度读数为582 °F(305 °C)。(右)厚度测量可以最短的冷却周期重复多次。

Execution 执行

- The Ionix HS582i probe was deployed as a replacement for the incumbent transducer. Wall thickness measurements at the designated CMLs were undertaken with the HS582i using conventional UT flaw detectors, and required no additional training or setup. Ionix的HS582i探头被用为正在使用的探头的替代品。使用HS582i在指定的腐蚀监测点进行厚度测量时，使用常规的超声波探伤仪即可，无需额外的培训或设置。
- Many wall thickness measurements were made with a single probe without causing damage to the probe from heating or excess wear. 许多壁厚测量都是用一个探头进行的，不会因加热或过度磨损而对探头造成损坏。

Testimonial 推荐书

"Our Mistras team at the Refinery have been working on projects for process piping ranging from 350°F to 700°F. It was very time consuming having to wait for our transducers to cool between each reading and not getting repeatable thickness data. We started using the Ionix HS582i 5MHz transducer and it made a significant difference in time between readings and accuracy. In conclusion, the Ionix transducer worked exactly as advertised for the higher range that we utilized it on."

"我们Mistras在炼油厂的团队一直致力于350到700的工艺管道的检测项目。使用我们的探头，在每次读数之间，我们必须等待探头冷却，而且无法获得可重复的厚度数据，这是非常耗时的。我们开始使用Ionix HS582i 5MHz探头，与我们的探头相比，它在读数之间的时间和精度有显著的差异。总之，Ionix探头的工作效果与广告宣传的完全一致，我们将其用于更高的工作范围。"