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ionix ADVANCED TECHNOLOGIES

Online wall thickness monitoring of multiple refinery process units

多套炼油工艺装置的壁厚在线监测

In-service, high-temperature corrosion monitoring to maximise productivity, safety and plant availability.

在线高温腐蚀监测，以最大限度地提高生产力，安全性和工厂在线率。

Overview 概述

An automated solution for online monitoring of 8 refinery process units, including CDUs, FCCU, HVU and SRMGC, was sought by PT Pertamina, the Indonesian national oil company. The deployment was required to cover multiple process units spread over a 2km^2 area and included primarily monitoring locations over 200°C and some as high as 520°C.

印尼国家石油公司寻求一种自动化解决方案，用于在线监测8套炼油工艺装置，包括常减压、催化裂化、重油装置和蒸汽裂解装置。监控面积需要覆盖2平方公里范围内的多个工艺单元，主要是超过200℃的监测位置，有些高达520℃。

PT Pertamina required an online monitoring solution based on the following drivers:

基于以下驱动因素，印尼国家石油公司需要一套在线监测解决方案：

1. Maintain the availability of aging refining assets.
   保持老化的炼油设备的可用性。
2. Minimise the exposure of staff to hazardous location during increased inspection frequencies.
   在增加检查频率的同时，尽量减少工作人员暴露于危险地点。
3. Maximise product by making real-time corrosion and asset integrity data available for both maintenance and operation teams.
   通过为维护和操作团队提供实时腐蚀和设备完整性数据，最大限度地提高产量。

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The Challenge

The primary challenges for the deployment were focussed around the extreme environment of the deployment
系统部署的主要挑战在于集中于极端环境下：

- Transducers were required to **operate continuously up to 380°C under insulation** to monitor corrosion and wall loss in pipes carrying various fluids including crude, water, residue, distillate, NH_3, naphtha, slurry and gas.

  传感器需要**在保温层下安装，连续运行至380℃，**以监测携带各种流体 (包括原油、水、渣油、馏分油、NH3、石脑油、油浆和气体)的管道的腐蚀和壁损。
- Locations on the FCCU were required to operate at **continuous operating temperatures up to 520°C.**

  催化裂化装置上的位置需要在**高达520°C的连续工作温度下工作。**
- An intrinsically safe solution with **Class 1 Div 1 certification** was required to ensure deployment across the entire site.

  需要具有Class 1 Div 1认证的本质安全解决方案，以确保在整个现场实施。
- The plant had **no scheduled shut down periods** and so the installation needed to be conducted while the plant was operational and running at high temperature.

  工厂**没有计划的停车时间安排**，所以安装需要在工厂在高温运行时进行。

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The Solution解决方案

- HotSense™ 380 sensors and HotSense™ UHT sensors were deployed along with the Mistras CALIPERAY WirelessHART enabled monitoring solution.

  HotSense™ 380传感器和HotSense™ UHT传感器与Mistras CALIPERAY WirelessHART一起实现监测解决方案。

- HotSense™ sensors were chosen because of their wide operating temperature range: -55°C to +550°C and their FM Class 1 Div 1 certification. The low profile HotSense™ 380 sensor could also be installed under insulation and weatherproofing to prevent water ingress, CUI and damage to the sensors. Another key benefit of the HotSense™ sensor system is their clamp deployment system which can be used to deploy the transducers onto hot, live assets whilst providing a robust and reliable signal.

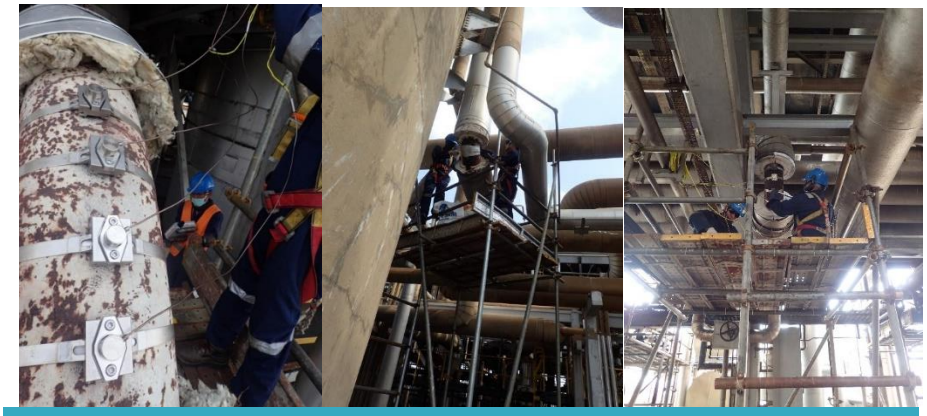
  HotSense™传感器被业主选择是因为其广泛的工作温度范围：-55℃到+550℃和FM 1级Div 1认证。小外形尺寸HotSense™ 380传感器可以安装在保温层下，以防止水进入造成保温下腐蚀及损坏传感器。HotSense™传感器系统的另一个关键优点是其卡箍安装系统，该系统可用于将传感器部署到热的在线设备上，同时提供稳定可靠的信号。

- The CALIPERAY WirelessHART enabled system was coupled with the HotSense™ sensors to provide a wireless automated, battery powered monitoring solution. The CALIPERAY is intrinsically safe to match the FM Class 1 Div 1 certification of the HotSense™ sensors.

  CALIPERAY WirelessHART系统与HotSense™传感器结合，提供了一种无线自动化、电池供电的监测解决方案。CALIPERAY本质上是安全的，与FM 1类 Div 1认证的HotSense™传感器匹配。

- A full WirelessHART backhaul was also established to provide robust and reliable data collection across all 8 process units. Combined with the Mistras WAMP software, data was made available at all the required control centres and also exported directly to the client PIMS. All data processing was performed at the CALIPERAY nodes and data never left the site.

  此外，还建立了一个完整的WirelessHART回程系统，为所有8套工艺装置提供可靠的数据收集。结合Mistras WAMP软件，数据可以在所有需要的控制中心获得，也可以直接输出到客户PIMS。所有数据处理均在CALIPERAY节点进行，数据从不离开现场。



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Execution 执行

- An initial site survey was conducted with PT Pertamina to identify and document the transducer install locations. A WirelessHART survey was also conducted to confirm any repeater requirement.
  印尼国家石油公司进行了初步现场调查，以确定并记录传感器的安装位置。并进行了一项WirelessHART调查以确认中继器的需求。
- Over 100 HotSense™ sensors were installed on live plant by Ionix subcontractor and Indonesian representative PT Melanton.
  超过100个HotSense™传感器由Ionix分包商及印度尼西亚代表PT Melanton安装在运行中的装置上。
- Pipe sizes varied from NPS 3" up to NPS 18". Custom NPS 28" deployment systems were also use for the UHT sensor deployments.
  管道尺寸从NPS 3"到NPS 18"不等。定制的NPS 28"安装系统也用于超高温传感器的安装。
- Whilst the HotSense™ sensors were installed at the pipe surface and under insulation, the CALIPERAY systems were mounted on nearby walkways to provide eases of access for battery replacement and to maximise wireless signal range. Cable trays were installed to protect the routed cables.
  HotSense™传感器安装在管道表面，并且处于保温下，CALIPERAY系统安装在附近的人行道上，方便更换电池，并最大限度地扩大无线信号范围。安装了电缆槽，用于保护电缆。

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Highlights亮点

- **Online installation saved over 10 days of lost plant operation saving an estimated $10m from lost production.**
  在线安装免去了超过 10 天的工厂运行损失，估计 1000 万美元的生产损失。
- Online monitoring enables data to be automatically collected twice per day from hazardous locations avoiding the requirement for scaffolding, hot work permits and exposure of staff to high temperature and explosive environments – **increasing PSM and GCG compliance and improving HSSE participation and excellence.**
  在线监测可以每天从危险地点自动收集两次数据，避免搭建脚手架、热作业许可以及工作人员暴露在高温和爆炸性环境中—**增加 PSM 和 GCG 的合规，提高 HSSE 的参与度和卓越性**。
- Using HotSense™ installed sensors with CALIPERAY monitoring nodes allowed for **automated, robust and reliable wall thickness measurements to be collected from live high temperature assets.**
  使用带有 CALIPERAY 监测节点的 HotSense™传感器，**可以从高温设备中自动、可靠地实时采集壁厚数据。**
- Increased data collection frequency and an increase in data quality enabled maintenance teams to **maximise plant availability and plant utility** and make informed decisions on repair and replacement.
  数据收集频率的提高和数据质量的提高使维护团队能够**最大限度地提高工厂可用性及使用**，并做出明智的维修及更换的决定。
- Up-to-date integrity and corrosion data is now available to maintenance and operations teams **enabling informed business and operational decisions.**
  维护和运营团队现在可以获得最新的完整性和腐蚀数据，**从而做出明智的业务和运营决策。**