BAHX Core performance monitoring using ISA 100.11a compliant wireless Temperature Transmitters

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AGENDA

- Objective
- Background
- Action Plan
- Cost Savings & Benefits of wireless Technology Selection
- System Architecture
- Wireless Network Topology
- Why Chose ISA100.11a?
- Why Yokogawa?
- Summary
Brazed Aluminum Heat Exchanger is a critical component of LNG production and hence its reliability & availability is of prime importance.

Inlet & Outlet individual core temperatures of the BAHX were to be monitored to determine the performance of the core and subsequently its life cycle.
- Brown field location
- Thermo wells could not be installed on BAHX Hot & Cold outlet piping due to high costs
- Cable trenching, laying, termination was not economical
- Several spare points in the DCS had to be used
Action Plan

Project Details

• 80 Nos (40+40) of Temperature Measurements for (5 + 5) BAHX of LNG Super Trains 6 & 7 were to be taken

Instrument Requirements

• Temperature Sensors
• Temperature Transmitters
• Data Availability in existing DCS / RTIS
Cost Savings & Benefits of wireless

- No usage of cables between field transmitter and DCS
- Modbus TCP integration with DCS
- Ease of installation, commissioning & testing
- Ease of maintenance & trouble shooting
Technology Selection

Temperature Transmitter

- Being a brown field project it was cost beneficial to adopt Wireless Technology
- Available Wireless Standards were reviewed
  - *ISA100.11a (Selected)*
  - Wireless HART

Temperature Sensor

- Due to cost & technical complications involved in installing thermo well, Skin Type Clamp On RTD was selected

DCS Connectivity

- Integration with Existing DCS / RTIS via the Wireless Gateway through Modbus TCP
System Architecture

Brazed Aluminum Heat Exchanger

16 I/O device

20 I/O device
4 Router device

Hot Gas
Cold Gas

Network A
Network B

ISA100.11a

YFGW710
DCS
HMI

SIH

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the power of the drop
THE ENERGY TO TRANSFORM
Wireless Network Topology

ISA100.11a Network B
- 16 YTA510 I/O
- YFGW710

ISA100.11a Network A
- 20 YTA510 I/O
- 4 YTA510 I/O + Router
- YFGW710

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Why Chose ISA100.11a?

• **Adaptive Network Topology**
  • Network Topology Selection (STAR, MESH, Star-Mesh etc.) with ISA100.11a

• **Fast Update Time**
  • Fast Update Time with ISA100.11a Protocol, In addition multiple update timing from multiple devices.

• **Unified Application Interface**
  • Ensures an open and interoperable application environment provided a common integration point for multiple-host systems.

• **Robust Security**
  • Wireless Data protected with AES 128 block-cipher secure communication and device authentication enabled by exchange of secret keys and unique device identifiers.

• **Reliable Low Power Communication**
  • Based on IEEE 802.15.4 radio operating at 2.4 GHz ISM band time synchronized, Channel Blacklisting and hopping to sidestep RF interference and minimizing the power consumption.
Why Yokogawa?

- Robust in Dense Plant Environment.
  - Yokogawa’s Wireless equipment are robust in dense plant environment with low Packet Error Rate.

- Fast Update time
  - 1 Sec to 3600 Sec

- Open Battery Concept
  - Batteries are available world-wide, and can be procured by Ras Gas directly.

- On-line Battery Replacement
  - Battery pack is replaceable in Hazardous Area

- Long Battery Life
  - More than 10 year with Scan time of 30 Sec.

- Long distance Communication with Low PER
  - 600 Meters with 0% Packet Error rate
• The first wireless application – BAHX core performance monitoring using ISA100.11a compliant wireless TT was successfully implemented and all operational objectives were met

• ISA100.11a as a plant wide Wireless Standard adopted for all future wireless applications

• Based on the LNG super Trains 6 & 7 wireless installation results, Several major wireless application projects are currently underway
QUESTIONS.

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