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The presentation will begin at 10:04 AM Berlin Time (UTC+2)

# Industrial Wireless Applications: Steam Trap Monitoring and Safety



**Christian Mallinson**

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**Honeywell**

THE POWER OF **CONNECTED**

**Diederik Mols**

[Diederik.mols@Honeywell.com](mailto:Diederik.mols@Honeywell.com)

# Agenda

1. About the speakers
2. Introduction Industrial Wireless
3. ISA100 Wireless Industry Standard
4. STAPS ISA100 Wireless Steam Trap Monitoring
  - Key Facts, Why Monitor Steam Traps
  - Application Examples and User Benefits
5. Honeywell ISA100 Wireless Case Studies
  - Time Critical Perimeter Monitoring
  - Tank Farm Safety Compliance
6. Summary
7. Q&A



# About the speaker



“Today Industrial Wireless is increasingly deployed as an integral part of the Integrated Control and Safety Systems (ICSS)”

## Diederik Mols

Vice Chairman  
ISA100 Wireless  
Compliance Institute

Business Manager  
Industrial Wireless Solutions  
Honeywell

Diederik Mols is Vice Chairman of the Governance Board at the ISA100 Wireless Compliance Institute since January 2015 and an active team member of the WCI EMEA Marketing Team. Diederik got involved with Industrial Wireless back in 2009 in a business development role for the EMEA region with Honeywell. Diederik started his career as an officer in the Dutch Navy and over the years he gained solid business skills with a number of multi-national organizations in various roles across Engineering, Sales, Marketing and General Management. Diederik holds Degrees from the Royal Dutch Naval Academy and the Technical University, Delft, the Netherlands. At Honeywell Diederik has responsibility for the global OneWireless Business for Honeywell Process Solutions.

# About the speaker



## Christian Mallinson

Product Management team leader  
Spirax Sarco

Christian Mallinson is Product Management team leader for Spirax Sarco and is responsible for a wide range of energy monitoring and management products including metering, boiler-house and steam trap monitoring.

Christian has also been an active member of the EMEA WCI marketing team since Spirax Sarco joined the WCI in 2014

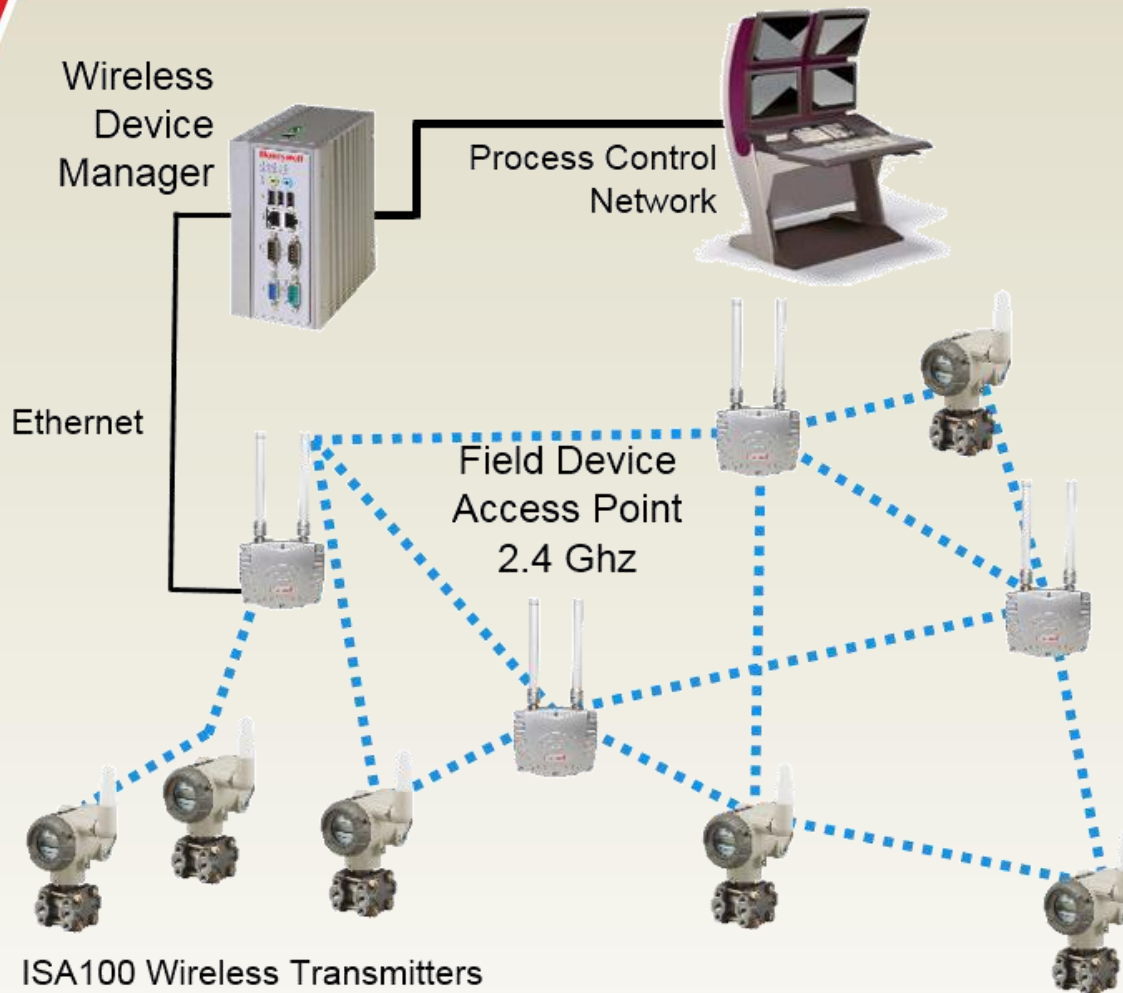
Christian has over 14 years of steam system experience working in a number of positions including technical support and internal sales as well as three years managing a range of wireless devices for Spirax Sarco.

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# Introduction to industrial Wireless



## Applications examples

- Machine health monitoring
- Basic process control
- Monitoring of well heads
- Remote process monitoring
- Leak detection monitoring
- Diagnosis of field devices
- Condition monitoring of equipment
- Environmental monitoring
- Tank level monitoring
- Gas detection
- Fuel tank gauging
- Steam trap monitoring
- Open loop control
- Stranded data capture
- And more

# Commonly Cited Benefits of ISA100 Wireless Instrumentation

|                             |                                                                                                                                                                                                                                                                                               |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Cost Savings</b>         | <ul style="list-style-type: none"><li>• Up to 90% of installed cost of conventional measurement technology can be for cable conduit and related construction.</li><li>• Typically: 1/5 the time, 1/2 the cost.</li><li>• New and scaled applications are now economically feasible.</li></ul> |
| <b>Improved Reliability</b> | <ul style="list-style-type: none"><li>• Wired sensors may be prone to failure in difficult environments.</li><li>• Wireless can add redundancy to a wired solution.</li></ul>                                                                                                                 |
| <b>Improved Visibility</b>  | <ul style="list-style-type: none"><li>• Condition monitoring (equipment)</li><li>• Process monitoring</li></ul>                                                                                                                                                                               |
| <b>Improved Control</b>     | <ul style="list-style-type: none"><li>• Add wireless to existing processes for more optimal control.</li></ul>                                                                                                                                                                                |
| <b>Improved Safety</b>      | <ul style="list-style-type: none"><li>• Safety related alarms</li></ul>                                                                                                                                                                                                                       |



# ISA100 Wireless Fast Facts

- International standard IEC 62734 since 2014
- Complies with ETSI EN 300 320 v1.8.1 (LBT)
- Broad Multi-Vendor Portfolio of ISA100 Wireless Devices
- ISA100 Wireless enables SIL-2 Certification
- Ensured Interoperability and best-in-class solutions
- Readily available ISA100 Wireless Modules and Stacks to enable fast-track development and go to market for new vendor members



# ISA100 Wireless Product Portfolio

Energy Efficiency,  
HSE + Life cycle

## Infrastructure



### Independent Gateway

- Honeywell, Yokogawa



### Access Point (AP)

- Honeywell, Yokogawa



### Integrated Gateway/AP

- Honeywell, Yokogawa, CDS, Nexcom



### GW/AP + Recorder

- Yokogawa



### Adapter (HART, etc.)

- Honeywell, Yokogawa



## Measurement & Control



### Temperature

- Honeywell, Yokogawa



### Presser / Flow

- Honeywell, Yokogawa



### Level

- Honeywell, Yokogawa



### DI/DO, AI

- Honeywell, Yokogawa



### Valve Position

- Eltav, Flowserve, Honeywell



### Corrosion

- RCS, Honeywell



### Steam Trap

- Spirax Sarco, TLV, Armstrong, Bitherm



### Vibration

- GE, SKF, Honeywell



### Gas

- Gas Secure, Scott Safety, New Cosmos, Riken Keiki



### pH

- Honeywell, Yokogawa

# Online resources



website [www.isa100wci.org](http://www.isa100wci.org)

- Learning Center with White Papers, Articles, End-user stories, Forum and more
- Receiving over 20,000 web views per month
- Full list of certified/registered ISA100 Wireless devices
- And more useful content for you and your business

**Linked**  [ISA100 Wireless Interest Group](#)

- Latest news, end-user and expert discussions, insights
- > 450 members
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# STAPS ISA100 Wireless

## Key Facts

It takes typically 42 kg of steam to refine 1 barrel crude oil

(can vary between 28 kg to 85 kg)

Steam generation accounts for over 50% of the total energy consumption in a typical refinery.

9,415 bpd reported by EIA = 395000 tonnes/day of steam

# STAPS ISA100 Wireless

## Key Facts

Approximately 650,000 process traps installed in refineries worldwide

Typically 10 – 15% will fail each year

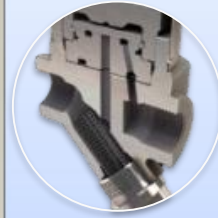
Trap performance now seen as a key opportunity to improve plant efficiency

# STAPS ISA100 Wireless

## Trap Types



Float



Thermodynamic



Inverted Bucket



Balanced Pressure



Bimetallic

# STAPS ISA100 Wireless

## The need to monitor steam traps

- Steam leaks from traps are costly in both a financial and environmental sense and therefore need prompt attention to ensure that a steam system is working at its optimum efficiency. With the reduction in upstream investment many end users are now investigating ways to improve process efficiency downstream.
- A global focus on carbon emissions has resulted in many organisations being more proactive in reducing their energy usage as part of a wider environmental policy.
- A far more significant concern is the loss of production time. Blocked or failed-closed steam traps, if ignored, can lead to the eventual failure of the entire asset damaging equipment or pipeline infrastructure.
- In some cases, blocked steam traps have caused the solidification of entire product lines, such as sulphur or bitumen transfer lines. In this case the whole affected section may require removal and replacement; shutting down the process for significant lengths of time at huge cost in terms of lost production output.



# STAPS ISA100 Wireless

- In many companies, steam traps are checked manually by a specially trained engineer listening to each trap individually on an annual basis.
- Due to the large trap population on many oil and gas facilities there is a potential that failed traps could go unnoticed for an extended period of time.
- This increases the potential for unexpected equipment or pipeline failure leading to significant energy loss or more importantly lengthy process downtime.



# STAPS ISA100 Wireless

- A continuous trap monitoring system allows you to take proactive and preventative action to replace or repair traps as soon as a problem is reported.
- A steam trap which is reported as failed or passing steam above acceptable levels can quickly be identified and replaced before any detrimental effects occur.
- Intelligent monitoring also allows maintenance to prioritise critical steam traps during scheduled downtime ensuring high priority processes are protected from potentially avoidable interruptions.
- Removes the need to send manpower in to potentially hazardous process areas.

# STAPS ISA100 Wireless

- Wired devices can be costly to install, restrict access to certain parts of the process and increase the burden on already stretched maintenance resources. Wired devices also require long periods of downtime to install and commission, often involving off-site personnel having access to an entire site.
- Many manufacturers have found wireless communications and devices to be more convenient, flexible, and easy to use than their wired counterparts. Wireless networks enable a cost effective installation and future expansion of field instrumentation devices to monitor a wide range of process variables.

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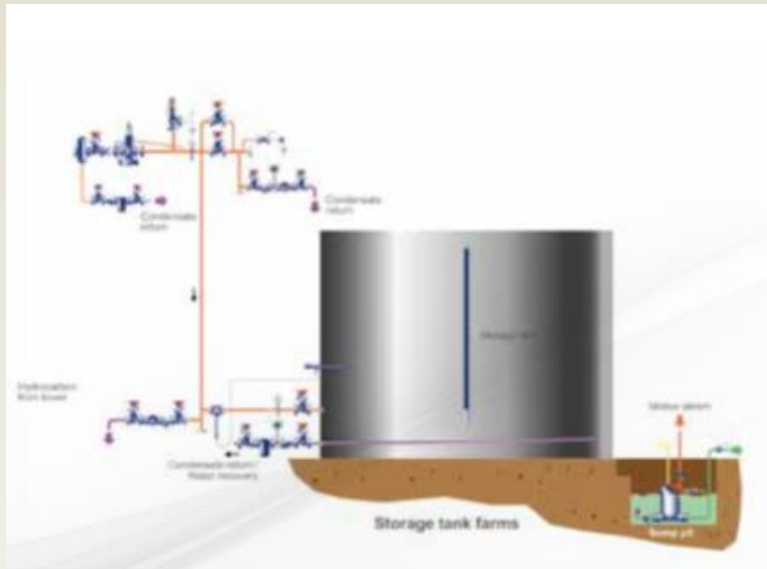
# STAPS ISA100 Wireless



## Why ISA100

- Most refineries can often have large steam trap populations with numbers exceeding 1000 devices. The scalability and Duocast features that ISA100 provides ensures that steam trap monitoring can easily be installed in all areas of the plant providing a robust wireless network.
- Cyber security is now a high priority for our customers. Two layer AES128 cryptography within the ISA100.11a protocol provides our customers with peace of mind that their wireless networks are safe and secure.
- Compliance to ETSI300.328 and IEC62734 as standard removes the need for costly re-compliance and further development time.

# Focus Opportunity – Tank Farms



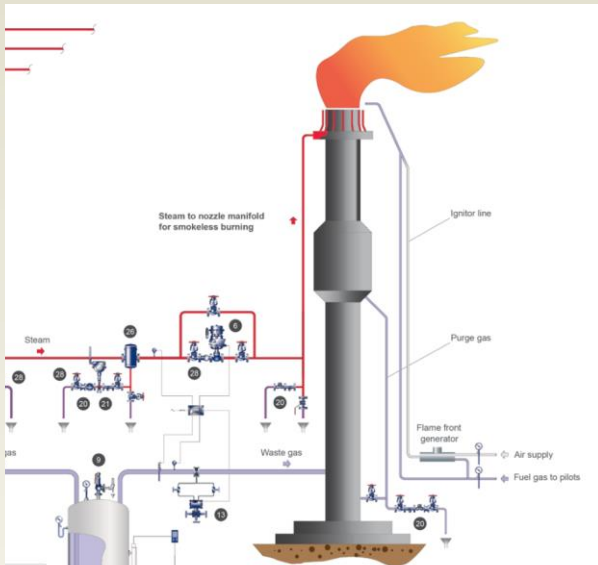
- Often have other wireless devices installed monitoring pressure, temperature and level
- Generally have a large number of traps installed

Examples include:

Reliance Refinery - <http://isa100wci.org/en-US/Documents/PDF/Reliance>



# Focus Opportunity – Flare Stacks



- Have to operate within strict guidelines to meet environmental legislation
- Generally have a number of traps installed as part of steam feed to nozzle manifold

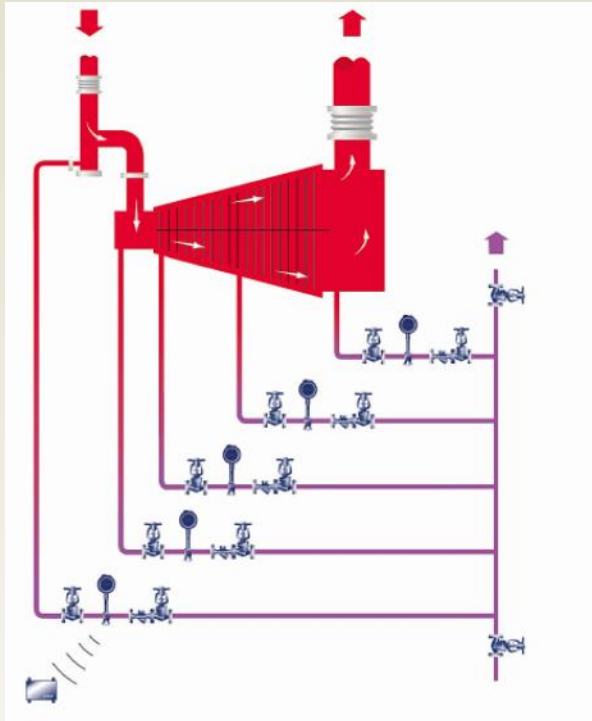
Examples include:

- <http://isa100wci.org/en-US/Documents/PDF/Frontier>



# STAPS ISA100 Wireless

Applications – Steam Turbines





# Introducing STAPS ISA100 Wireless



# STAPS ISA100 Wireless

## Features

### Head assembly

- Including ISA100 approved 2.4Ghz wireless communication
- Long-life Lithium Battery
- Copper free aluminium housing
- NEMA 4X rated housing
- Stainless Steel Glands
- External antenna

### Sensor assembly

- Including vibro-acoustic sensor, temperature sensor

### Clamp assembly

- For mounting to condensate lines up to 4"



# STAPS ISA100 Wireless

## Benefits

- Accurate and rapid leak detection – no need for manual inspection, saving you time and money.
- Accurate diagnostic algorithm provides users with trap performance information and steam loss data
- All data is sent directly to the DCS removing the need for costly IT equipment and third party licensed software
- Lower installation costs than a wired solution
- Long-life battery – trap requires little maintenance.
- Robust construction to meet the requirements of the oil and gas industry
- Supports both IR and over air provisioning methods

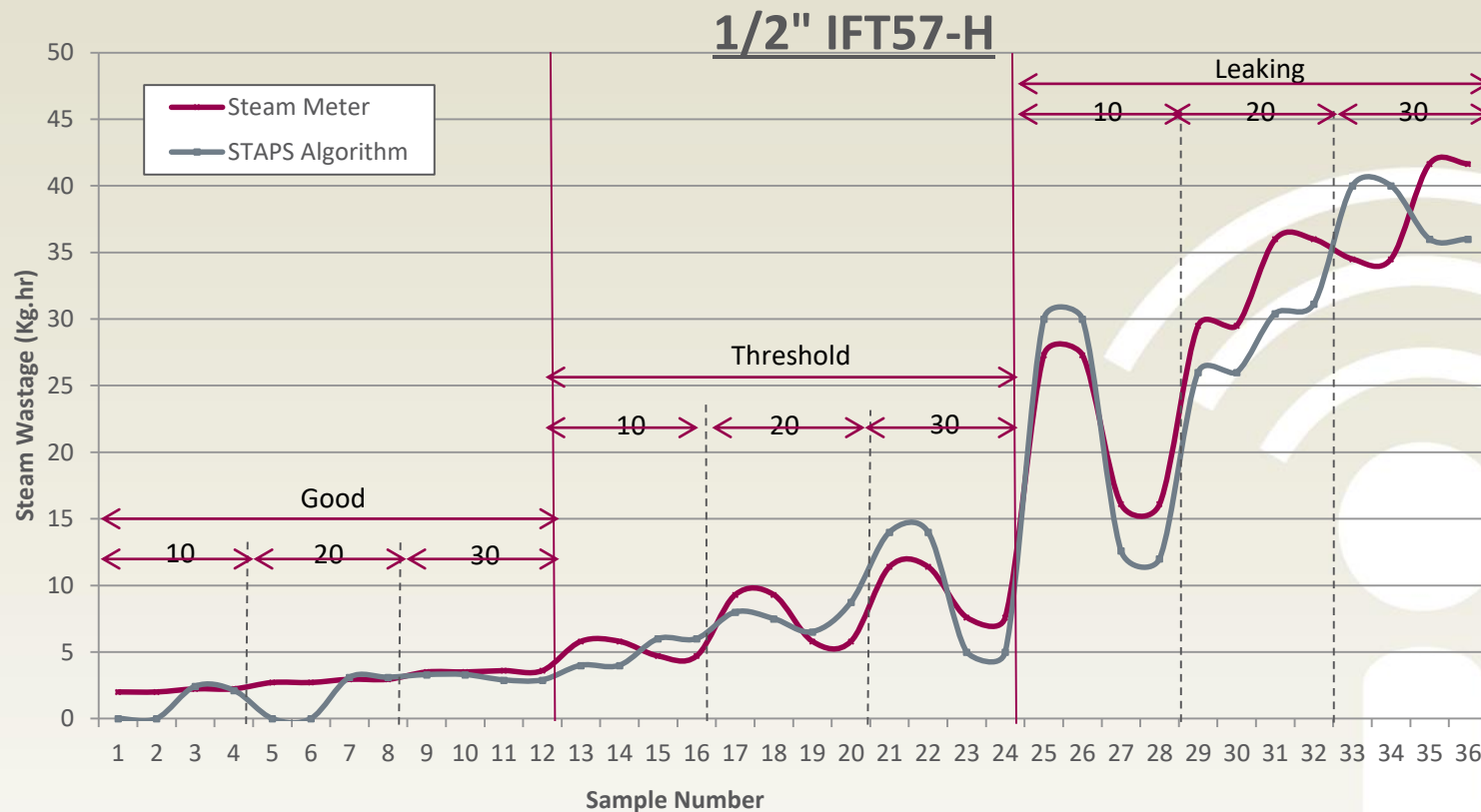


# Steam Wastage Testing



20 - 60 Bar Steam Meter test set up

# Steam Wastage Testing

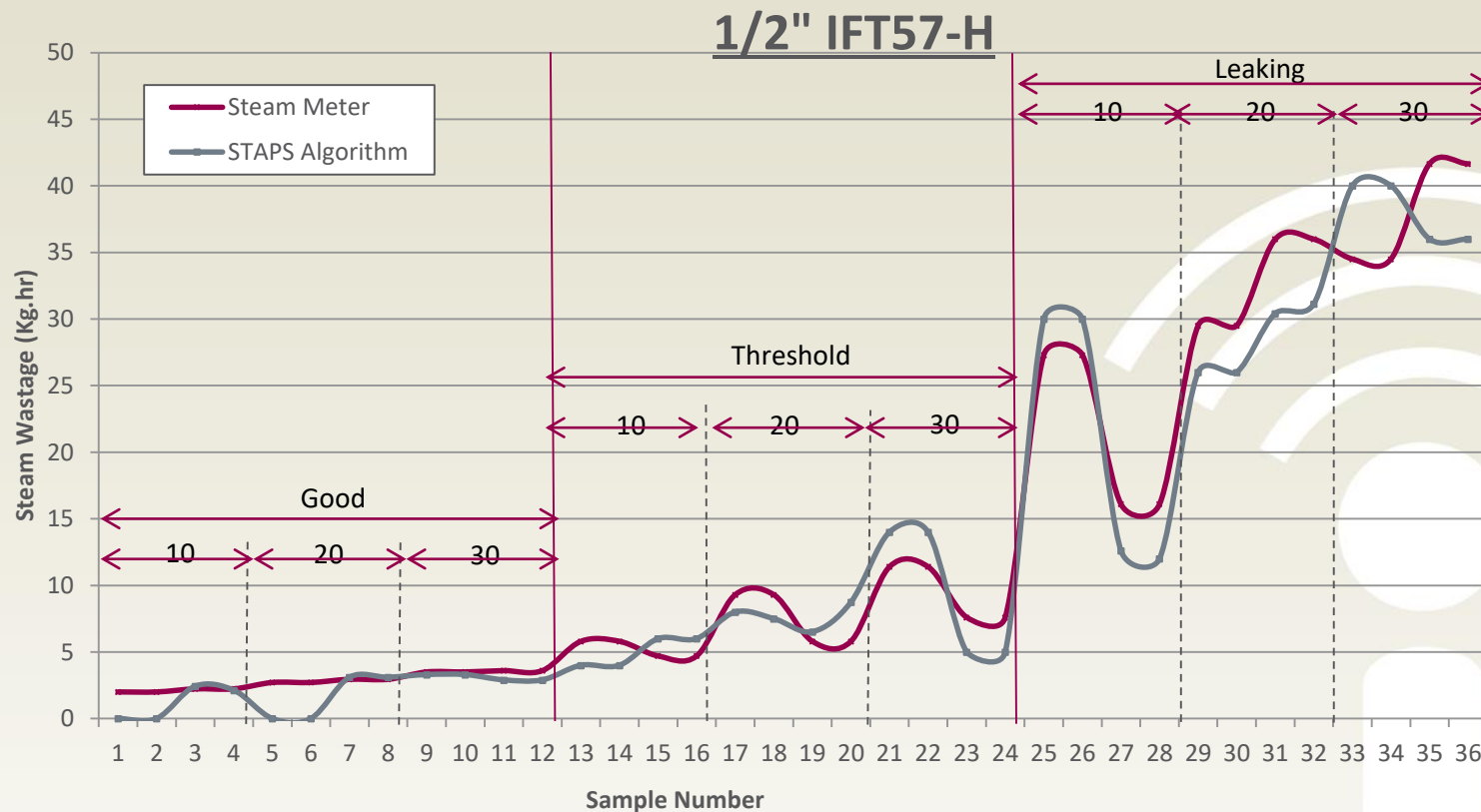


# Steam Wastage Testing



20 - 60 Bar Steam Meter test set up

# Steam Wastage Testing





# STAPS ISA100 Wireless

Honeywell ISA100 network testing





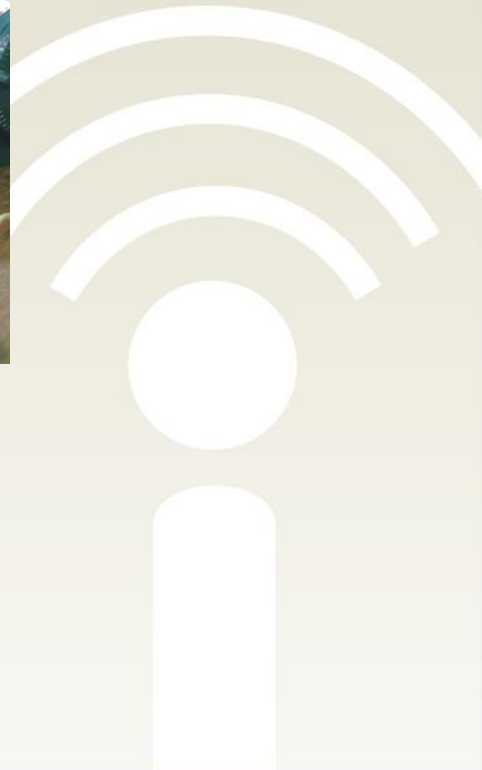
# STAPS ISA100 Wireless

Yokogawa ISA100 network testing - No Leakage



# STAPS ISA100 Wireless

Yokogawa ISA100 network testing – Steam Leak



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Bucket



Balanced  
Pressure



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# Case Study 1

## Perimeter Monitoring – Time Critical

LNG Facility in Middle East - Brownfield

### Challenges

- Alarming system for detection of gas leaks without extensive cabling.
- Meet 3 seconds alarm requirement.

### Solution

- FDAP based ISA100 Wireless network with XYR6000 Universal Transmitters and solar power panels.
- Fully redundant system end to end.

### Results

- Improved site safety system within budget.
- 3 seconds alarming requirement met.
- Compliance to government regulations for HSE.







Remote antenna

Honeywell XYR 6000  
Universal I/O wireless  
transmitter featuring  
both DI and DO

“...requirement for the end to end cycle of the moment of detection of fire and gas until the moment of activation of the sounders and beacons, as well as *with absence of line power.*”



**ISA100**  
Wireless  
COMPLIANT

# Project FAT Results

- FAT successfully completed March 2014.
- The wireless solution consistently delivered an activation time of 2.9 seconds with the horns and beacons activating simultaneously.
- The system met and exceeded the stringent customer requirement of 3 seconds.
- The customer put the system through rigorous tests that were beyond the scope of the FAT, to display redundancy, fail-over and network stability.
- The wireless system withstood all their tests and attempts to show flaws and displayed its resilience and ruggedness.
- The system has been installed and commissioned at the customer site in June 2014

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# Case Study 2

## Meeting Safety Compliance

Tank Farms across India - Brownfield

### Challenges

- Secondary level tank gauging to meet safety compliance - M B Lal recommendations
- 49 locations spread out around the country
- Require end to end solution within budget

### Solution

- Honeywell Enraf FlexLine ISA 100 Wireless with OneWireless Network using FDAPs
- Total 90 FDAPs, 98 WDMs and over 550 Enraf FlexLine ISA100 Wireless radar gauges being deployed across the 49 locations



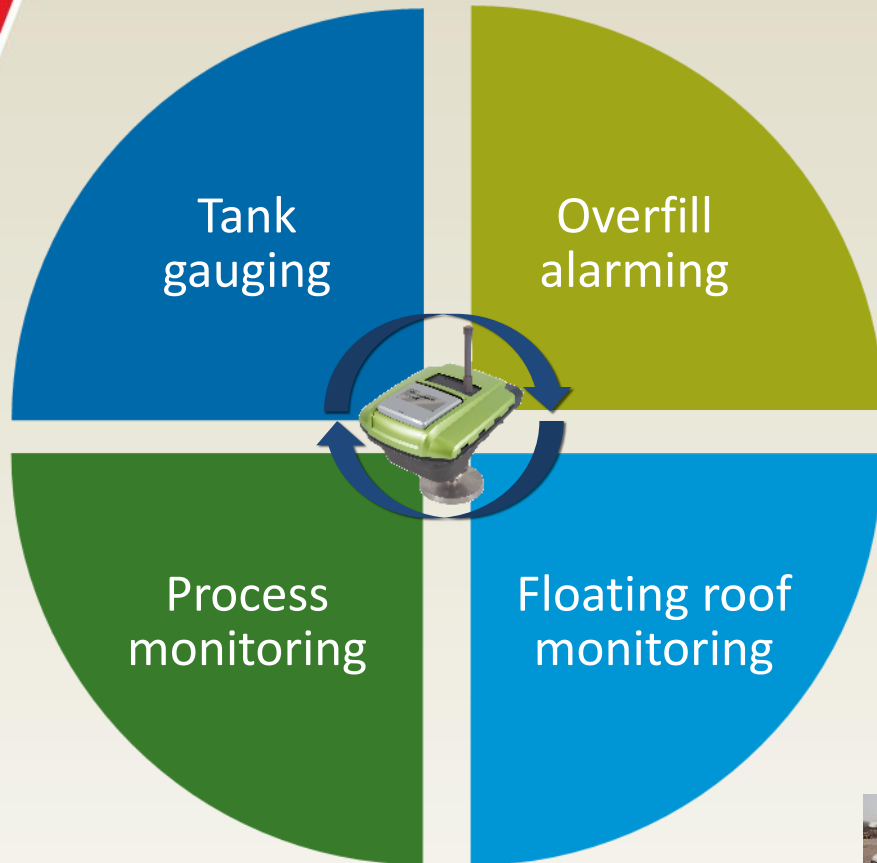
### Results

- Compliance within budget and project schedule
- Consistent deployment across all sites
- Comprehensive solution to meet requirement

# OneWireless Terminal Solution

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Gas Leak Monitoring



Safety Shower Monitoring



Vibration Monitoring



Valve Position Monitoring



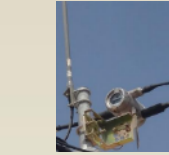
Personnel Safety Monitoring



Mobile Applications



Remote Area & Perimeter Video Monitoring



**Wireless applications beyond tank gauging**

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# Summary

- STAPS Wireless Steam Trap Monitoring suits multiple applications and creates recurrent value to end-users.
- OneWireless Solutions are able to meet stringent near real time requirements to enhance plant safety, typically at half the cost relative to wired projects.
- Thanks to the ISA100 Wireless Industrial Standard, vendors are able to cost-effectively meet end-user needs by integration of a wide range of devices of multiple vendors in an ISA100 compliant wireless network.

**spirax**  
**sarco**



**Honeywell**

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**THANK  
YOU**

**For Your Attention!**

**spirax**  
**/sarco**

**Honeywell**

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# Questions?



**Christian Mallinson**

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