



# Implementing Machine Remote Service and Provisioning Solutions with the PI System

John Brainard and Tom McKinney



# Agenda

- Company Overviews
- Business Challenge
- Evolution of the System and Implementation Details
- Summary of Results Obtained
- Demo

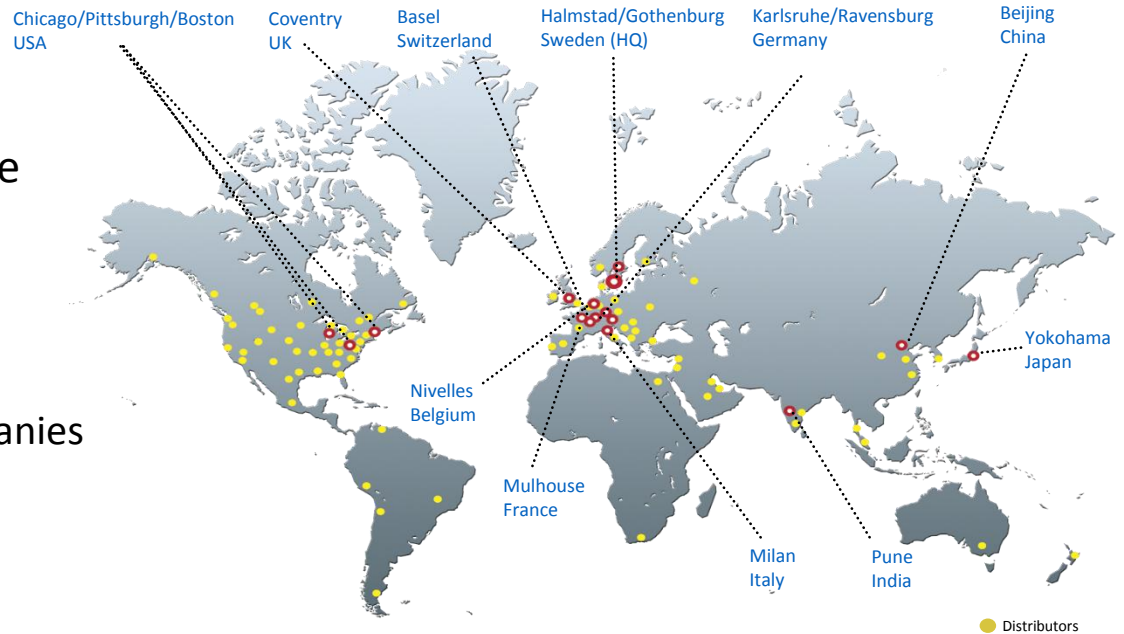
# HMS Industrial Networks

## Communications OEM

- > 600 people
- \$150M in annual revenue
- HQ, Halmstad Sweden
- Publicly traded

## Customer Base

- All major automation companies
- Machine builders
- Facility owners



# HMS Networks Communications Solutions

## Anybus Gateways

## IXXAT Solutions



## eWON Remote Connectivity

## Anybus Embedded

# Bondtech

## OEM Manufacturer

- Autoclaves
- Core Leachers
- Vulcanizers

## USA Based

- Worldwide sales
- Service agreements
- Non-technical end users



# Bondtech Pre-Connected Machine

## Data Limited Operations

- No Data on any machine outside of word of mouth
- Warranty Support issues (Pointing fingers)
- Constant technician trips for any issues (warranty / out of warranty)

## Digital Transformation Drivers

- Clear set of needs
- Custom solutions to costly
  - Small engineering staff
  - Limited investment \$\$



# Selecting the Connected Machine Platform



## OSIsoft, PI System

- Staff with past experience with OSIsoft
- Historical logging
- Data visualization with multiple access levels (internal staff, external customers)
- Flexible data ingest options

## HMS eWON Flexy

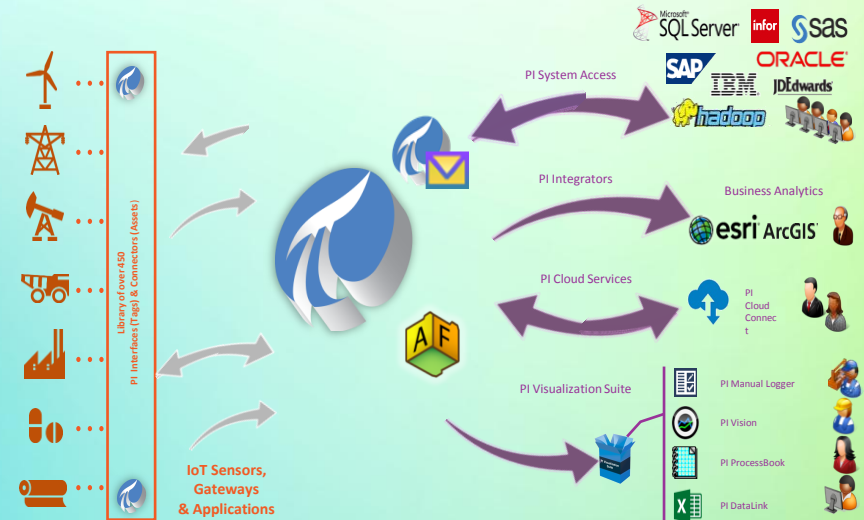
- Remote access solution
- Remote data solution





# Elements of a Remote Access Solution

- Edge communications and datalink
  - Evolution path to cloud
  - OTA updates
- Data base with high availability
- Automated data based workflows
  - Scheduling
  - Alarms, notifications, task prioritization
- Data visualization
  - Multiple access solutions
  - Multiple levels of user interaction
- Secure user management
- Integration with enterprise applications
  - CRM, ERP, quality, service, analytics





# Extending the PI System to Remote Assets

## Building on your investment in the PI System

- Employees know the PI System
- In house expertise
- Reuse asset models
- Single point of truth

## New to the PI System

- User management
- Robust visualization
- Alerts, notifications
- 3<sup>rd</sup> party connectors



# Challenges Moving Outside the Corporate LAN

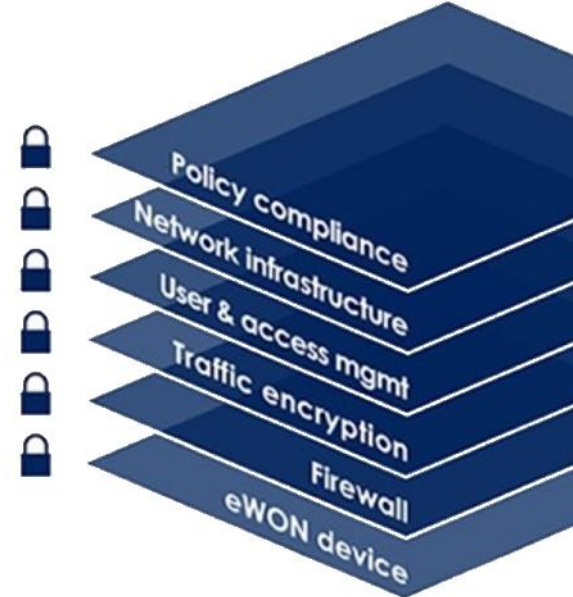
- No network or no network access
- Less physical security
- Travel costs to provision and support



- Varying IT/OT policies
- Firewalls
- ISP performance issues
- New data path requests

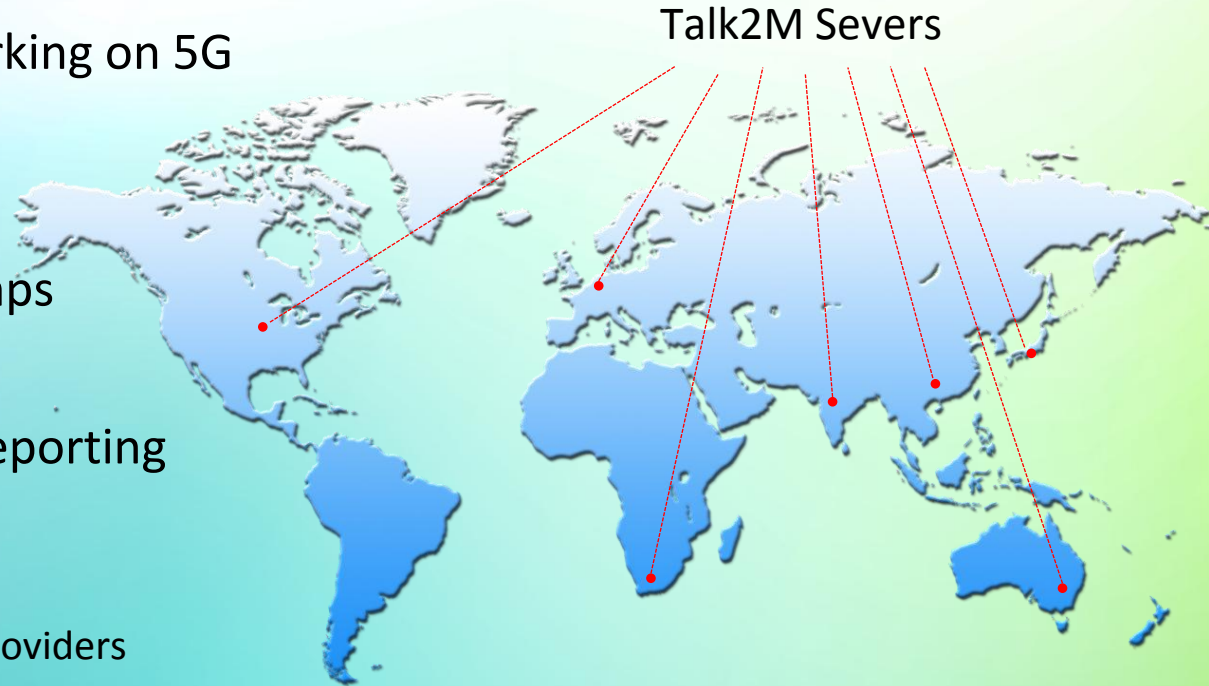
# Security

- Design for security
  - ISO 27001, ISO 27002, IEC 62443-2-4
  - NIST Cyber Security Framework
- Vetted open source VPN technology (OpenVPN)
  - Standards based encryption SSL/TLS 1.2
  - Leverage server and device certificates X.509 PKI
- Include router functions to isolate WAN
  - (NAT1:1, Filtering, Port forwarding)
- Comprehensive user management
- Independent penetration testing
- Intrusion detection
- Dedicated security team



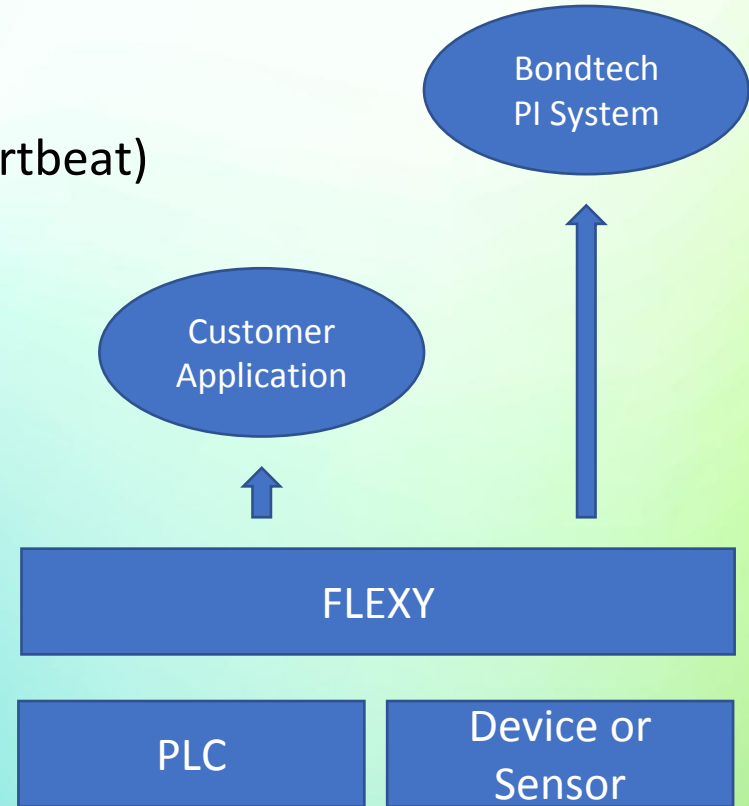
# Network QoS

- Cellular 3G, 4G and working on 5G
- Failover options
- On device buffering
- PI compatible timestamps
- UDP and TCP support
- Comprehensive error reporting
- DoS defense
  - Redundant architecture
  - 3 Independent hosting providers



# Additional Considerations

- Cellular data costs (batching data, UDP, heartbeat)
- Outbound transmissions vs inbound
- Direct to PI System vs buffering in the cloud
- End customer options
  - VPN and data access control
  - End customer PI System support
  - End customer 3<sup>rd</sup> party software support



# Bondtech History with HMS Networks

- **Needed a buffer for internet outage**
  - Compliance
  - Troubleshooting
- **Remote Connection Capability**
  - Process Change Requests
  - Program Updates
  - Remote live troubleshooting

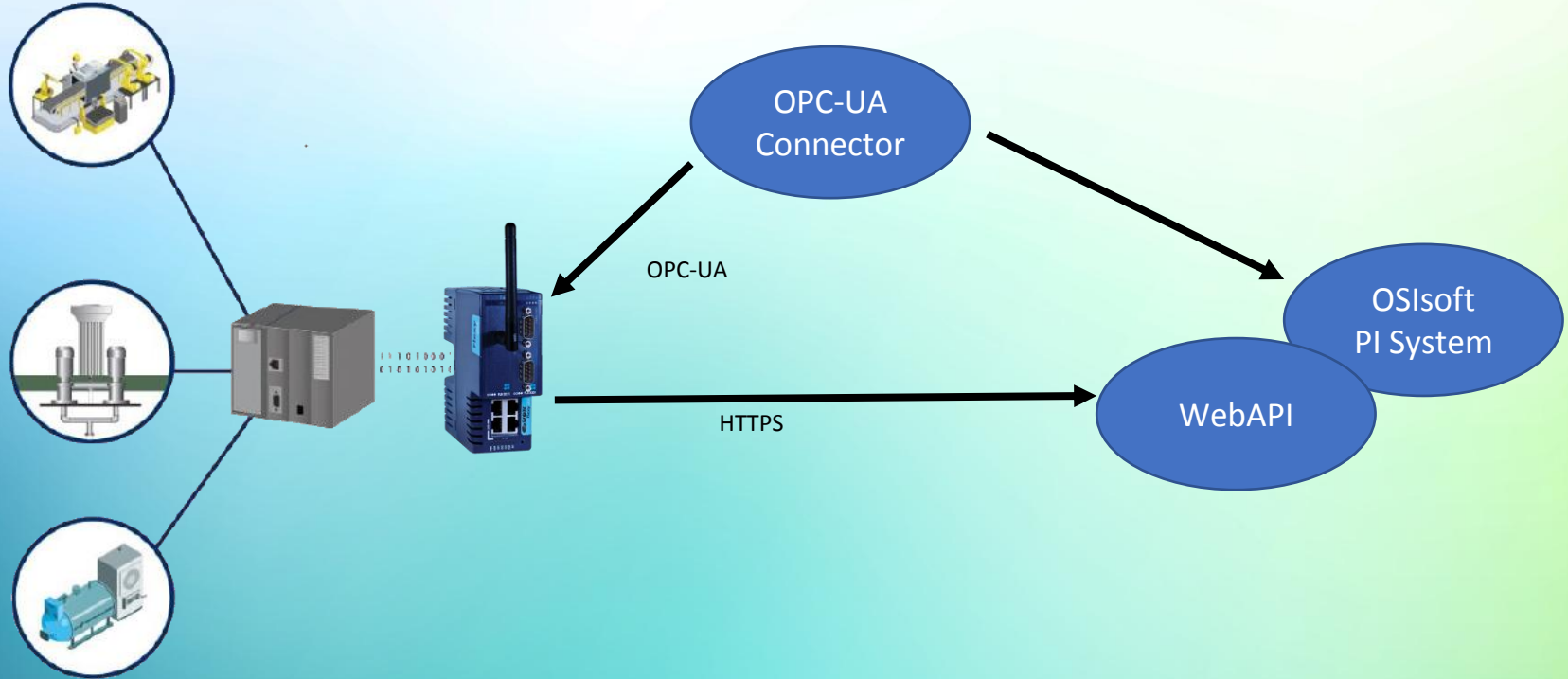
Status	Name
Offline	00001
Online	10743
Online	10891
Online	12156
Online	13708-020516-1
Offline	13875-060314-1
Online	14376-010317-1
Online	14646
Offline	15229-012717-1
Online	





# On-Prem Data Path Options to the PI System

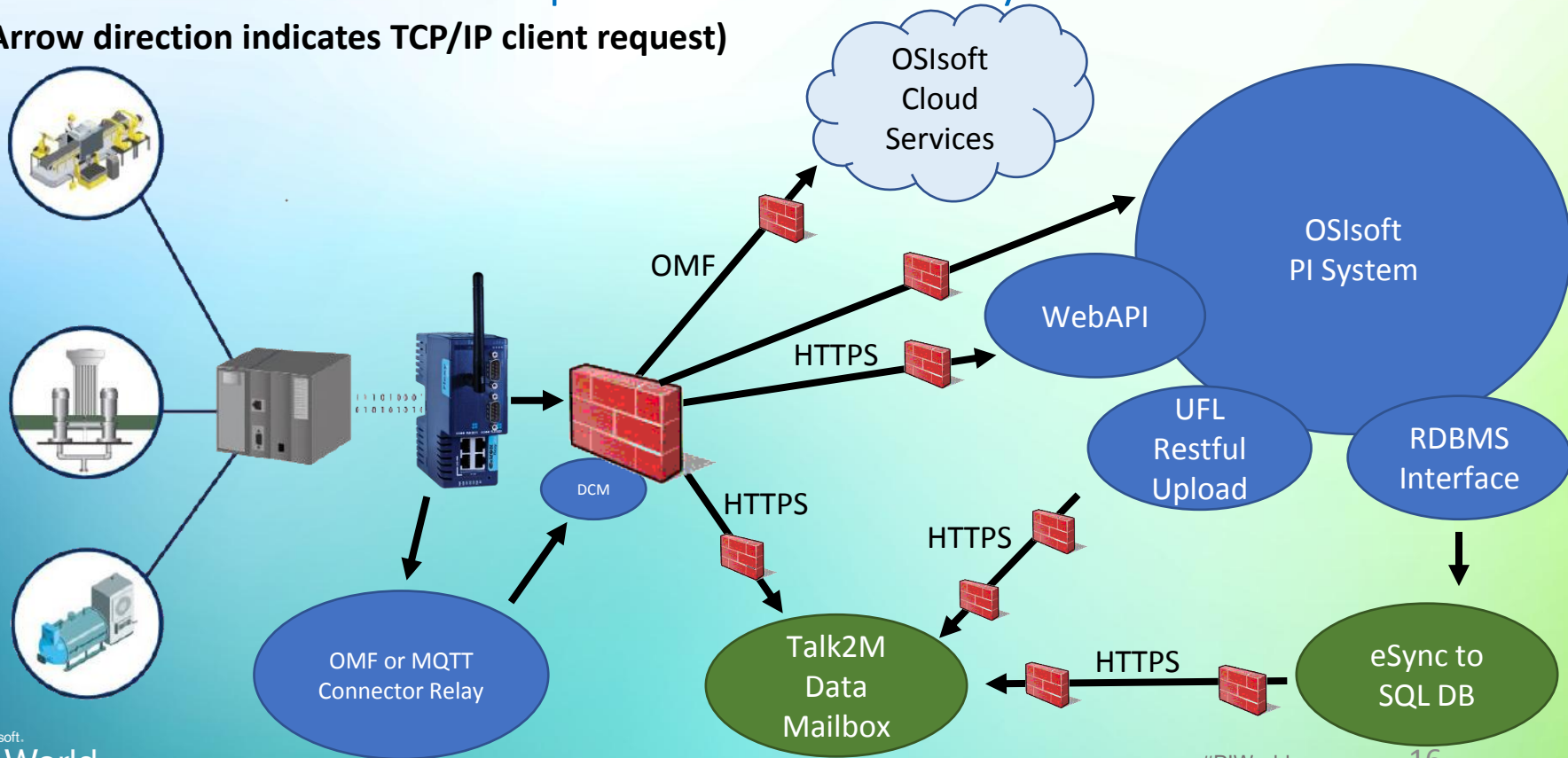
(Arrow direction indicates TCP/IP client request to server)





# Off-Prem Data Path Options to the PI System

(Arrow direction indicates TCP/IP client request)



# Evolution of Bondtech Remote Solution

- Production Solution

- Single test customer remote connection setup
- eSync Data connection
- RDBMS Interface data pull into PI
- AF Framework / templating
- Custom Reports, PiVision, Notifications

## Next Steps

- Remote Live Dashboards from on eWon Flexy
- Local Data logging storage to user add-on memory
- Site aggregation within AF for Upper Management

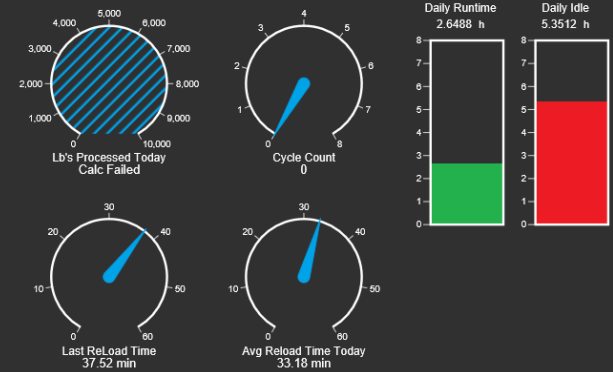
# Bondtech PI Vision Customer Dashboard

KPI's

Actual  
Cycles  
Run

Weekly,  
Monthly,  
Previous  
Month stats

## Machine Overview: Unit #1 - 15370



Event Name	Asset	Start Time	End Time
15370-3/7/2019 9:54:57 AM	15370	3/7/2019 9:54:57 AM	3/7/2019 11:05:43 AM
15370-3/7/2019 11:22:05 AM	15370	3/7/2019 11:22:05 AM	3/7/2019 12:28:53 PM
15370-3/7/2019 1:12:32 PM	15370	3/7/2019 1:12:32 PM	3/7/2019 2:17:22 PM
15370-3/7/2019 2:54:53 PM	15370	3/7/2019 2:54:53 PM	3/7/2019 4:01:49 PM
15370-2019-03-07-Medical-DailyStatist ics	15370	3/7/2019 11:56:00 PM	3/7/2019 11:56:00 PM

## Machine Statistics

Description	Value	Units
Accumulated Weight Processing today	Calc Failed	
Accumulated Weekly Waste Processed	14,200	lb
Accumulated Monthly Waste Processed	16,214	lb

Description	Value
Cycles Today	0
Cycle This Week	17
Cycles This Month	20
Cycles Last Week	21
Cycles Last Month	73.5

Description	Value	Units
Hours in Run Mode Today	2.6488	h
Hours of runtime this week	17.901	h
Hours of runtime this month	21.104	h

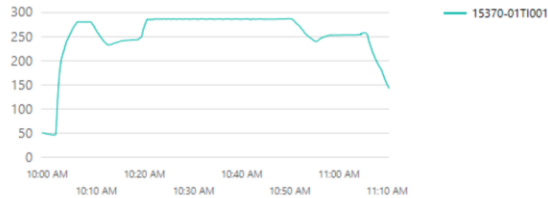
# Bondtech – PI Notifications & Reporting

## 15370 Cycle Report

Start Time: 03/11/2019 12:00:00 AM

End Time: 03/13/2019 12:00:00 AM

Event Frame	Attribute	Value
15370-3/11/2019 9:57:56 AM	Load Time	0 Minutes
	Vacuum Time	17.9 Minutes
	Serial Number	15370
	Start Time	3/11/2019 9:57:56 AM
	End Time	3/11/2019 11:05:14 AM
	Duration	67 Minutes



3/20/2019 12:27:57 PM

1 of 10

Compliance  
Reporting

Thu 9/6/2018 5:50 PM  
EnSight  
Over Pressure at Autoclave Location: United States\Hawaii\15229

To: BART  
This message was sent with High importance.

The autoclave located at United States\Hawaii\15229 has generated an over pressure event. This means the pressure in the vessel rose above the predefined normal operations of that machine. The normal max operating pressure of that machine is set to 55, and it has gone over that limit.

**Local Site Contact:**  
[REDACTED]

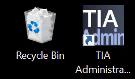
**Autoclave Location:**  
[REDACTED], Honolulu HI, 96819

**Event:** Over Pressure 2018-09-06 17:49:04.000  
**Name:** Over Pressure  
**Server:** PIDA  
**Database:** Medical  
**Start Time:** 09/06/2018 - 05:49:04 PM - GMT(-04)  
**Target:** United States\Hawaii\15229  
**Severity:** None  
**Send Time:** 09/06/2018 - 05:49:36 PM - GMT(-04)

Out-Of-Normal  
Operation  
notifications

# DEMO

Bondtech Autoclave Remote Access Via Flexy  
Bondtech Remote Data to PI System Via Flexy



# Bondtech

## Remote Service Solution



### CHALLENGE

Reduce support costs and employee travel time.  
Improve end customer service.

- Worldwide customer base
- Heavy travel burden for technicians
- Phone/email support challenge
- Cost effective solution needed

### SOLUTION

Remote service and provisioning solution based on PI System and eWON Flexy.

- PI System service solution and differentiated income stream
- Incremental solution investment
- Flexy secure data
- Flexy remote access (VPN)

### RESULTS

Reduce employee travel by 50%, Higher customer ratings.  
Positive ROI in 3 months.

- Reduce travel cost >\$250K in first year
- Improve employee morale
- Higher customer satisfaction
- More customer insight → sales
- Key sales feature



# Speaker Contact Information



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- Business Development and Engineering Services
- HMS Networks
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- John Brainard
- Process Control Engineer
- Bondtech
- [jbrainard@bondtech.net](mailto:jbrainard@bondtech.net)

# Questions?

Please wait for  
the **microphone**

State your  
**name & company**



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 TAPADH LEIBH 고맙습니다  
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 OBRIGADO شكرًا  
 DANKON TANK TAPADH LEAT SALAMAT  
 DZIEKUJĘ CI NGIYABONGA TEŞEKKÜR EDERIM GRACIES  
 DANKIE TERIMA KASIH KÖSZÖNÖM  
 СПАСИБО PAKMET CIZGE  
 GO RAIBH MAITH AGAT  
 БЛАГОДАРЯ GRACIAS  
 ТИ БЛАГОДАРАМ МАНАДСАНІД  
 TAK DANKE  
 RAHMAT MERCI  
 HATUR NUHUN  
 CẢM ƠN BẠN  
 WAZVIITA  
 FALEMINDERIT  
 GRAZZI PAKKA PÉR  
 PAXMAT CAĞA  
 DANK JE EΥΧΑΡΙΣΤΩ GRATIAS TIBI  
 AČIŮ SALAMAT MAHALO IĀ 'OE TAKK SKALDU HA  
 ありがとうございます  
 SIPAS JI WERE TERIMA KASIH  
 UA TSAUG RAU KOJ  
 ТИ БЛАГОДАРАМ  
 СИПОС  
 MULTUMESC  
 FAAFETAI  
 ESKERRIK ASKO  
 HVALA ХВАЛА ВАМ  
 TEŞEKKÜR EDERIM  
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