The Honeywell Connected Plant

Honeywell Connected Plant

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Abstract: Honeywell Connected Plant

➢ Every manufacturing company is planning on, or engaged in digitalization, IIoT or Industry 4.0 programs:
   - Enhance Productivity,
   - Enhance Safety,
   - Improved Supply Chain Optimization
   - Increased People Effectiveness.

➢ Honeywell Connected Plant: Bringing together deep manufacturing domain expertise around process modeling, control, safety and human performance, cyber security and the cloud,

➢ In this session, we will introduce:
   - Honeywell Connected Plant via Connected Process / Connected Assets / Connected People
   - Real examples where manufacturing sites have achieved real performance improvements
Process Innovation v/s Information Density

**STEP VALUE**
Less cost, waste, H₂O, energy
Higher throughput, recoveries

**OPTIMISED STEP VALUE**
Competitive Advantage

**DIGITAL Innovation**

**Today**
Current Practices

**OPTIMISED**
Good practices
Prognostics
Automation
Competitive Advantage
Digital Cause & Effect

Connectivity: Physical Resources/Things

Information Density: Sensors

Digital Transformation

Digitalization

Digitization

Competitive Advantage

Altered Cost Structure
Digital Themes

**Themes**

- Automation, Robotics and Operational Hardware
- Digitally Enabled Workforce
- Integrated Enterprise, Platforms and Ecosystems
- Next-Generation Analytics and Decision Support

**Initiatives**

- Autonomous Operations and Robotics
- 3D Printing
- Smart Sensors
- Connected Worker
- Remote Operations Centre
- IT/OT Convergence
- Asset Cybersecurity
- Integrated Sourcing, Data Exchange, Commerce
- Advanced Analytics and Simulation Modelling
- Artificial Intelligence
Digital Enablers

CLOUD
Processing Power & Data Storage for rapid scaling

SECURITY
Management of risk

MOBILITY
Portability with location awareness for productivity improvements

DIGITIZATION
Simplifies processes across business activities

AGILE
Early & predictable delivery of digital developments

EDGE & CONNECTIVITY
Edge connectivity for data gathering & analytics

VIRTUAL REALITY
Enhances user experience and efficiency with processing power and data storage on demand
Core Industry Problems

Honeywell Connected Plant

- Visualization
- Machine Learning
- Predictive Analytics
- Cloud Storage
- KPI Management
- Notification
- Collaboration

Production Efficiency
- Operator Effectiveness
- Reduce Off - Spec
- Optimize Process

Process Reliability
- Asset Surveillance
- Predictive Maintenance
- Expert Guidance

Supply Chain Optimization
- Planning & Scheduling
- Inventory & WIP Reduction
- Enterprise Supply Chain Execution

Built Upon Constant Commitment to Safety and Security
Honeywell Connected Plant Evolution

Data Contextualization

Point Solutions

Connectivity & Eco System
### Connected Process | Driving Process Improvement

#### Value Proposition

Best available performance at highest safety levels

Real-time data capture, integration and insight generation

#### Honeywell Solution

**Operations Optimization**

- Max. profitability / tradeoffs
- What-if analysis
- Utilities management

**Reliability Advisor**

- Pre-empt process issues
- Root cause analysis
- Learning / best practices

Powered by proprietary domain knowledge and models

#### Example Use Case: US Independent Refiner

**Situation**

- Improve asset utilization, reliability and stability of operations

**Honeywell Solution**

- FCC Process Reliability Advisor
- Process profit optimizer tool

**Outcomes**

- Uncovered +$10M+ in < 6 Mo

**Customer Next Steps**

- Expand across the refinery and multiple sites

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Process Yields and Asset Utilization Drove $10M+ in Value
Solving Key Customer Challenges

- **Energy and Emissions**
  - Emission standards
  - Energy reduction

- **Human Capital Challenges**
  - Knowledge gaps
  - Operational excellence

- **Underperforming Assets**
  - Sub-optimal operations
  - Performance vs peers

- **Unplanned Downtime**
  - Process issues
  - Equipment failures

CPS Architecture

- **Proactive, ongoing dialogue and recommendations. UOP expert review**
- **Ongoing capture of plant (process/lab) data**
- **Gross Error Detection**
- **Data Conditioning**
- **Data Reconciliation**
- **Visualisation**
- **CPS solution-specific calculations and models UOP expert reviews**

**Secure UOP Cloud**

- **Analyze plant performance to reveal full potential through a cloud-based service**
  - Around-the-clock monitoring of plant data and rigorous simulations
  - Provides on-going, operational recommendations to close performance gaps

- **Game Changer: Scalability, Speed to Deliver, Sustainable**

- **Customer value of $0.30-$0.50/bbl in refining & $10-$20/MT in Petrochemicals**
Customer Successes To Date

Americas
- 2x FCC
- 1x CCR Platforming
- 2x Oleflex
- 3x Gas Plants
- 1x Aromatics Complex

Reliability Advisor
Optimization Advisor

EMEA
- 1x Oleflex
- 1x Aromatics Complex
- 5x CCR Platforming
- 1x Gas Plants
- 1x Aromatics Complex
- 2x CCR Platforming

Asia
- 1x Gas Plant
- 3x Aromatics Complex
- 5x CCR Platforming
- 2x Penex
- 2x Naphtha Complex
- 1x CCR Platforming
- 1x Aromatics Complex

35 Signed-up Units Around the World and Counting...
### Connected Assets | Delivering Actionable Insights

<table>
<thead>
<tr>
<th>Value Proposition</th>
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<tbody>
<tr>
<td>Enhanced decision making and increased reliability through integration of process data and assets models</td>
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**Honeywell Solution**

- **Asset Performance Management**
  - Real-time visualization
  - 100% first pass resolution of issues
  - Predictive forecasting
  - Reliability-centered maintenance

**Example Use Case: Major Downstream Refiner**

<table>
<thead>
<tr>
<th>Situation</th>
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<tr>
<td>• Avoidance of equipment issues that cause slowdowns and shutdowns</td>
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<table>
<thead>
<tr>
<th>Honeywell Solution</th>
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<tr>
<td>• Asset Performance coupled with process, equipment, and knowledge based models</td>
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<table>
<thead>
<tr>
<th>Outcomes</th>
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<tr>
<td>• $10M-$20M from reduction in unplanned downtime</td>
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<tr>
<td>• 15% reduction in maintenance cost</td>
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<th>Customer Next Steps</th>
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<td>• Extending connected assets to connected people</td>
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**Connected Assets Drove Reduction in Unplanned Outage & Maintenance Cost**
Driving Reliability & OEE

We combine asset and process data, use analytics and expert guidance to provide actionable insight to improve OEE, avoid critical asset failure, & unplanned shutdowns.

Industry leading software, secure IIoT platform and collaboration through an ecosystem of partnerships with industry leading OEMs & Knowledge Vendors
Asset Performance

Asset Performance Decision Support

Sentience or Customer Cloud

Enables Collaborative Support
Centralized Expertise

Customer
CoE

OEM

Onsite

Honeywell Modules
Analytics &
Prevention/Resolution
Workflow

Vendor “A” Module
Analytics &
Prevention/Resolution
Workflow

Vendor “B” Module
Analytics &
Prevention/Resolution
Workflow

Enterprise
Asset
Management

Connected People

Honeywell
Secure Data Transfer

Data
Aggregation
Honeywell

Third Party Systems
Cond. Health / SAP / Maint

Process Data
DCS

Process Data
PLC

Process Data
Asynchronous Data

Hon
Edge

Process Equipment
Generic

OEM
Edge

Process Equipment
Vendor “A”

Hon
Edge

Process Equipment
Vendor “B”

Collaborative, Centralized Decision Support, Closed Loop APM
Large IOC Managing Gulf of Mexico Assets

**Challenge:**
- Increasing technical and business complexity
- Aging workforce
- “Firefighting” instead of proactive optimization services
- Need for more integrated & remote operations

**Scope:**
- ~300 Wells across 11 Floating Structures & 2 FPSOs
- 6000 Analytics covering over 2000 pieces of equipment

**Solution:**
- Manage surveillance via centralized, remote operations center
- Real-time analytics detect & prioritize abnormal events and trigger workflows converting alarms and alerts into fast corrective action
- Equipment/process alert service linked to SOPs to easily scale up surveillance across multiple assets

**Direct Benefits:** $30M/year
- Reliability and safety
- Reduced downtime
- Reduced operational costs
- Improved staff time efficiency

**Indirect Benefits:** $50M/year
- Facilitate the transfer of surveillance best practices
- Staff and surveillance continuity
Optimized Energy Consumption Connected Asset Monitoring
Honeywell Transportation Systems Kodama turbocharger plant, Saitama, Japan

Objective:
Implement Honeywell Connected Plant Asset Performance to remotely identify, analyze and optimize energy consumption of the plant and connected field devices.

Challenge:
- Significant plant energy usage and limited real-time monitoring
- Optimize air compressor operation and improve reliability
- Connect information from numerous, disparate data sources including: power meters, flow meters, air compressors, weather service information, and energy supplier database data

Results:
- Honeywell Connected Plant Asset Performance implemented, collecting data from nearly 70 different field devices
- Provides dashboards for visualization of power consumption, and compressor performance
- Advanced analytics enables accurate prediction of future energy consumption and integration with third-party ISO 50001 energy management solution
- Solution provides calculation of compressor KPIs and insights into actions to improve performance
- **GOAL:** reduce energy consumption by 15%
Connected Worker / Safety | Real-Time Risk Assessment

Value Proposition

Enterprise wide real-time assessment & competency management delivering closed loop actionable insights

Honeywell Solution

Real-time Safety Assessment
- Critical process monitoring
- Real-time visualization
- Behavior correction instructions

Competency Management
- Real-time knowledge access
- Virtual reality simulations
- Intelligent wearables

Example Use Case: Major Upstream Producer

Situation
- Workers underutilized, safety and reliability issues impacting asset performance

Honeywell Solution
- Digitization of worker enabled:
  - Predictive and proactive analytics
  - Right person for the job
  - Flawless execution enabled by centralized experts

Outcomes
- 30% reduction in off-shore manpower
- 50% reduction in maintenance staff

Customer Next Steps
- Transition from pilot to full deployment to enable the First Global Unmanned FPSO

Streamlines information flow to the right place, at the right time – to the right people

Proven Pilot Outcomes Leading to Enterprise Roll-Out
Skills & Safety Overview

Competency Solutions

- Virtual Reality simulator
  VR training for high volume assets or high consequence / low frequency situations

- Video Analytics
  Procedures recording and sharing and vision analytics for compliance

- Competency programs
  Workforce Training and certifications

Productivity & Safety Solutions

- Augmented Reality
  On the job training and operation support

- Analytics
  Productivity mgmt. and Continuous competency assessment

- Knowledge access
  RT Access to DCS data and technical documents

- Operation Support
  Remote Expert

- Operation guidance
  Operator task automation

- Connectivity prerequisite: WiFi, Intrinsically safe, access to cloud, integration to Experion station

- Intelligent Wearables

- Mobile Devices (inc gas detector)

- Databases access: Historian, SAP, Excel

“Making any knowledge and competency accessible in any shape or form to the operator in real time for better decision making and higher execution capability”
Remote Expert Support for Offshore Assets

Objective:
▪ Minimize offshore personnel across EMEA assets
▪ Provide expert support from onshore for distributed assets

Challenge:
▪ Scarce resources willing to work in an offshore environment (3 weeks alternate)
▪ Limited platform footprint; limited number of workers allowed on platform
▪ High cost to move resources to/from platform ~ $10,000/trip
▪ High cost of maintenance: 2 to 3 people for each job
  • One to do the maintenance
  • One to monitor & report progress
  • One expert when required for assistance

Solution:
▪ Intelligent wearable helmet
▪ Intrinsically safe
▪ Real-time access to step-by-step procedures
▪ Real-time remote expert access

Benefits:
▪ 50% reduction of resources on platform to support maintenance
▪ Reduction of operating and incidental expenses associated with reduced resources
Intelligent Workforce Management

Worker Safety & Productivity

- Operational Integrity Compliance
- Active Worker Protect

Competency Management

- Connecting People and Assets with Mobility Solutions
  Drive Productivity and Collaboration

- Experiential learning (AR/VR)
  Comprehensive competency program (individual assessment to training and certification)
Enterprise Operations Excellence

Enterprise level perspective

Focus on Opportunity

Quantification of benefits across the enterprise

Facility based benchmarking to focus efforts, enables drill-down to drive action

Identification of Enterprise wide risks / required actions
Enterprise Benchmarking

Enterprise level perspective

Facility based benchmarking of plant performance

Facility based asset performance

Focus on Benchmarking
Enterprise Process Performance

- Long term performance – APC Value
- Long term performance – Cost of Lost Opportunity
- Performance data by shift
- Constraint Violations
- Lost Opportunities
- Expert Guidance
Integrated Asset Performance

Asset level perspective

Key operating data for expert analysis

Key operating data for expert analysis

Expert guidance and digital workflow
Honeywell Connected Plant

- OT-Specific set of digital tools to solve key Industrial Challenges
- Connected Plant provides a solid outcome-based platform to deliver industrial digitalization
- Industry standard tools and connectivity have been designed in (not a black-box)
- Industrial-strength cyber security – to enable use of cloud / remote operations without compromising data integrity
- See it for yourselves in the demo area

ENTERPRISE
OPERATE AT INDUSTRY BEST PERFORMANCE

PEOPLE

EVERYONE PERFORMS AS A LEADING EXPERT
Step change in worker competency, productivity and safety

ASSETS

STOP REACTING… START PREDICTING
Connect, collaborate and proactively manage asset and process performance to optimize your operations and maintenance

PROCESS

PROCESS RELIABILITY AND OPTIMIZATION
improved equipment and process monitoring. Optimize production against feed and energy costs