Honeywell – Get Connected with QCS
Honeywell’s Investment in Connected Enterprises

**Connected Plant**
Increase profitability with connected performance monitoring

**Connected Aircraft**
Stream movies up to 100x faster. Reduce fuel costs

**Connected Supply Chain**
Voice-directed activities from the warehouse to the retailer increases productivity

**Connected Automobile**
Integrated vehicle health management helps drivers arrive safely and reduce unnecessary repairs

**Connected Home**
Comfort, convenience & security for 1.6+ million end-users

**Connected Building**
Reduce maintenance cost by by migrating from preventive to predictive maintenance

Serving Global Installed Base

- 150M Homes
- 100M Vehicles
- 130K Aircraft
- 10K Plants
- 10M Buildings
- 10K Warehouses
- Connected Home
- Connected Building
- Connected Plant
- Connected Aircraft
- Connected Supply Chain
Honeywell Connected Plant QCS 4.0

1. DEFINE & MEASURE KPI
   - Sensor Performance Repeatability, Static Accuracy, Dynamic Correlation
   - Process Performance Variation in MD, Variation in CD
   - Transition Performance Grade Change, Machine Speed Change
   - Quality Performance Sheet Breaks, Off-Spec Production

2. ANALYSE QUALITY & PERFORMANCE ISSUES
   - Drill down Dashboards and KPI Monitoring,
   - Process/Loop Performance Targeting
   - Cause and Effect Analysis
   - Reports and Notifications
   - Condition Based Alerting

3. CLOSING THE LOOP
   - Adaptive self-tuning to maintain control performance.
   - Timely notification before problems turn into catastrophe
   - Sustain process performance through plant changes & disturbances.
   - Improved Performance & Optimized Maintenance
Honeywell Connected Plant QCS 4.0: Offerings

HCP
Asset Performance Insight
Software Stack

Sentience Based HON Cloud Platform

Scanned, Sensors

MD CD loop

Honeywell Connected Plant QCS 4.0:

**Analyse**

Visual Analytics
KPI Targeting
Fault Reporting
MD / CD Loop Tuning

Reports & Notifications


Subscription Model: Annual Contract

**Optimize**

CoE Assurance

Optimize QCS performance with CoE Support for Guaranteed Performance. (A360 for QCS)

Performance Based Pricing

Observe QCS system & process performance anywhere & anytime.

Bundled Pricing with System
HCP QCS 4.0: Dashboard

CD Control Performance Analysis
Sensor Analysis
Assurance 360

• Outcome-based services with multi-year contracts aligned to your goals
• Service to augment your workforce and competencies
• Honeywell focuses on the systems so the customer can focus on their operations
• Faster response and resolution
• Incident reduction
• Performance based
  - Minimize risk of downtime
  - Reduce the total cost of ownership
  - Allow the customer to select their individual focus areas
  - Use the Balanced scorecard approach covering the **Support**, **Maintenance** and **Optimisation** of the systems
Balanced Scorecard

• The Balanced Scorecard is intended as a focusing tool to drive organizational behaviors and measure the effectiveness of the delivered Services.

• The Balance is achieved by balancing the business needs through selective KPIs in the:

  • **Support**
    - Faster response and incident resolution

  • **Maintain**
    - Maintenance best practices reduce resource needs and resolution time, improving overall plant uptime

  • **Optimisation**
    - Monitor & provide the tools through HCP QCS for assessing loop performance, identifying poor performers and providing process improvements.
    - Analyzing the QCS system performance and reliability through sensor data monitored 24/7 and alerting of any potential failure or anomaly in the system.
## Honeywell Connected Plant QCS 4.0: Assurance A360 KPIs

### Assurance 360 Balanced Scorecard

<table>
<thead>
<tr>
<th>Performance Criteria</th>
<th>Weight</th>
<th>Actual</th>
<th>Score</th>
<th>Weight</th>
<th>Unit Result</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Support</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response Time (Hours - Telephone)</td>
<td>5%</td>
<td>&gt;= 1.5</td>
<td>1.37%</td>
<td>&gt;= 2</td>
<td>0.5&lt;</td>
</tr>
<tr>
<td></td>
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<tr>
<td>Response Time (hrs On-Site)</td>
<td>5%</td>
<td>&gt;= 4.6</td>
<td>3.2</td>
<td>&gt;= 5</td>
<td>&lt;= 6</td>
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<tr>
<td>Resolution Time</td>
<td>5%</td>
<td>&gt;= 16</td>
<td>13.24</td>
<td>&gt;= 12</td>
<td>&lt;= 20</td>
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<td></td>
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<tr>
<td>Parts Management Program [Fail/low/Ok]</td>
<td>5%</td>
<td>Fail</td>
<td>Low</td>
<td>KPI</td>
<td>0</td>
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<tr>
<td>Recordable Injuries (Count) (2-0)</td>
<td>5%</td>
<td>&lt;= 2</td>
<td>1</td>
<td>&lt;= 1</td>
<td>&lt;= 0</td>
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<tr>
<td></td>
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<tr>
<td><strong>Maintain</strong></td>
<td></td>
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</tr>
<tr>
<td>Incident Reduction (%)</td>
<td>5%</td>
<td>&lt;= 40%</td>
<td>42.5%</td>
<td>&lt;= 30%</td>
<td>&lt;= 20%</td>
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<tr>
<td></td>
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</tr>
<tr>
<td>QCS System Availability (%)</td>
<td>5%</td>
<td>&gt;= 96%</td>
<td>97%</td>
<td>&gt;= 90%</td>
<td>&gt;= 80%</td>
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</tr>
<tr>
<td>Preventive Maintenance</td>
<td>5%</td>
<td>&gt;= 90%</td>
<td>91.25%</td>
<td>&gt;= 85%</td>
<td>&gt;= 80%</td>
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</tr>
<tr>
<td>Security Patch Updates (KPI on-time)</td>
<td>5%</td>
<td>&lt;= 90%</td>
<td>91.3%</td>
<td>92.3%</td>
<td>93.8%</td>
</tr>
<tr>
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<tr>
<td>Antivirus Updates (KPI on-time)</td>
<td>5%</td>
<td>&lt;= 95%</td>
<td>96.6%</td>
<td>97%</td>
<td>97.5%</td>
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<tr>
<td><strong>Optimize</strong></td>
<td></td>
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<tr>
<td>Loop Tuning (%) [60-100]</td>
<td>5%</td>
<td>&lt;= 70</td>
<td>65%</td>
<td>&lt;= 60</td>
<td>&lt; 50</td>
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<tr>
<td>Alarm Rationalization (%) [90-100]</td>
<td>5%</td>
<td>&lt;= 90</td>
<td>91.25%</td>
<td>92.5%</td>
<td>93.7%</td>
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<tr>
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</tr>
<tr>
<td>QCS Measurement Accuracy (Static)</td>
<td>5%</td>
<td>&gt;= 96%</td>
<td>96.5%</td>
<td>97%</td>
<td>97.5%</td>
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<tr>
<td></td>
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</tr>
<tr>
<td>QCS Measurement Accuracy (Dynamic)</td>
<td>5%</td>
<td>&gt;= 96%</td>
<td>96.5%</td>
<td>97%</td>
<td>97.5%</td>
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<tr>
<td>CD Spread Cov (Control Specific)</td>
<td>2%</td>
<td>&gt;= 2.4</td>
<td>2.4%</td>
<td>&gt;= 2</td>
<td>&lt;= 1.3</td>
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<tr>
<td>MI Spread Cov (Control Specific)</td>
<td>2%</td>
<td>&gt;= 1.2</td>
<td>1.2%</td>
<td>&lt;= 1.3</td>
<td>&lt;= 2.3</td>
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<tr>
<td>Clarity of Cull Causes / Broke Reason (This Yr/La)</td>
<td>2%</td>
<td>&lt;= 0%</td>
<td>8.0%</td>
<td>16.0%</td>
<td>24.0%</td>
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<tr>
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<tr>
<td>Available for Control</td>
<td>2%</td>
<td>&gt;= 90%</td>
<td>91.25%</td>
<td>92.5%</td>
<td>93.7%</td>
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<tr>
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</tr>
<tr>
<td>CD Operator Performance</td>
<td>2%</td>
<td>&gt;= 95%</td>
<td>96.5%</td>
<td>97%</td>
<td>97.5%</td>
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<tr>
<td>Camera System Metrics</td>
<td>2%</td>
<td>&gt;= 90%</td>
<td>91.3%</td>
<td>92.5%</td>
<td>93.8%</td>
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<tr>
<td>Automatic Grade Change</td>
<td>2%</td>
<td>&gt;= 2.5</td>
<td>2.5%</td>
<td>&gt;= 1.5</td>
<td>&gt;= 2</td>
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<tr>
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</tr>
<tr>
<td>Grade Change Optimization</td>
<td>2%</td>
<td>&gt;= 1.5</td>
<td>1.5%</td>
<td>&lt;= 1.5</td>
<td>&lt;= 2</td>
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<tr>
<td>Break Recovery Optimization</td>
<td>2%</td>
<td>&gt;= 1.5</td>
<td>1.5%</td>
<td>&lt;= 1.5</td>
<td>&lt;= 2</td>
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<tr>
<td>Training Gaps fulfilled</td>
<td>2%</td>
<td>&lt;= 20</td>
<td>20.5%</td>
<td>&lt;= 15</td>
<td>&lt;= 10</td>
</tr>
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<tr>
<td>Honeywell Software at N-2</td>
<td>5%</td>
<td>&gt;= 90%</td>
<td>91.3%</td>
<td>92.5%</td>
<td>93.8%</td>
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<tr>
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<tr>
<td>Change</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Successful Changes (%) [80-100]</td>
<td>5%</td>
<td>&gt;= 90%</td>
<td>91.3%</td>
<td>92.5%</td>
<td>93.8%</td>
</tr>
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</tr>
<tr>
<td><strong>Total Assurance Score (90-110%)</strong></td>
<td>90%</td>
<td>93%</td>
<td>95%</td>
<td>98%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Honeywell Connected Plant QCS 4.0: Service Enablers

• Address all your service needs with HCP QCS Service packages
  - Skill for Productivity
  - Skill for Competency
  - Mitigate the shrinking pool of expertise and the aging workforce
  - Develop skill levels faster with Skills Insight- Intelligent wearables, Immersive Competency training.
  - Maintain optimal operations

• Skills Insight
  - HoloLens – See and Do
  - Intelligent Wearables – over the shoulder support
  - 3D Immersive Competency programmes
  - Carry out tasks in virtual environment prior to tackling in physical environment
HCP QCS 4.0: Skills for Productivity
Intelligent Wearables with workflow and mobility / productivity apps

Hardware
• 16MP camera for hi-res photo capture and real-time video chat
• Multiple digital microphone and active noise cancellation
• Sunlight readable display appears the size of 7-inch tablet at arms length

Software and Connectivity
• Self-contained Android 6.0 operating system
• Wi-Fi + Bluetooth LE, USB dongles for cellular access
• GPS, gyroscopes and digital compass for positioning

Usability
• 100% hands-free with local speech recognition in loud areas
• Boom arm with 6 degrees of freedom for ease of use
• Rechargeable, swappable 12+ hour battery

Certifications
• IP67 – dust proof and water proof, MIL-SPEC 810G
• Class 1 Div I/ATEX Zone 1 intrinsically safe models available — only one in the market

Unlocking Extensive Opportunities
Similar to an App Store with a purpose to develop applications that have incremental value to customer

1. Active Worker Assistance with ‘over the shoulder support’
2. Ideal solution for Self Maintaining mills
3. Assists in addressing the aging and loss of experienced workforce
4. GTAC access for troubleshooting incidents
5. Access to Subject Matter Experts for all aspects of the system
**HCP QCS 4.0: Skills for Competency**
Level-up reliability and uptime using state-of-the-art technology (AR/VR)

**IMMERSIVE COMPETENCY: SCANNER 5080**

<table>
<thead>
<tr>
<th>Basis Weight Sensor Window</th>
<th>The Source:15 Basis Weight Sensor source and receiver windows protect the assemblies from accumulating debris, which can interfere with the sensor operation. This module demonstrates how to inspect and replace the windows to ensure consistent and accurate measurements.</th>
<th>Preventive maintenance/Troubleshooting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finding the Cause of a Bad Standardize/Identity Sensor Fault</td>
<td>Finding a bad standardizer isn’t always easy. There may be an obstruction in the sensor gap, or it might result from an electronics issue. Our goal in this module is to point out some displays and provide some tips that will make it a little easier. We’ll be using the Scanner Sensor Status Display for this process. You must be logged in as a Manager or Engineer to access the sensor reporting display. Troubleshoot “Nuclear sensor Safety fault” or “X-Ray Sensor Safety fault”</td>
<td>Troubleshooting</td>
</tr>
<tr>
<td>Accessing the endbell mechanics/head separation and safety awareness</td>
<td>This module will help to understand the end bell components and how to split the sensor heads for troubleshooting</td>
<td>Preventive Maintenance/Troubleshooting</td>
</tr>
<tr>
<td>Identify, Troubleshoot and replace EDAQs in the endbell</td>
<td>This module will help to identify the location of EDAQs and how to troubleshoot. There is a possibility for maximum 3 EDAQs in the electronics end. Communication tests between MXProLine server and MSS/EDAQs using also Linux level.</td>
<td>Preventive Maintenance/Troubleshooting</td>
</tr>
<tr>
<td>Document Current System Configuration</td>
<td></td>
<td>Configuration/Preventive Maintenance/Troubleshooting</td>
</tr>
</tbody>
</table>

- **Simulation-based scenarios**
- **Learn through doing**
- **Virtual and Augmented environments**
- **Apply critical thinking**
HCP QCS 4.0: Expert Guided Optimization Services

- 10+ years of QCS Remote Monitoring and Alerting
  - 50+ Paper Machines
  - 20+ Companies

- Deep Optimization Expertise
  - Machine Direction Control
  - Cross Direction Control
  - Grade/Recipe Change
  - Machine Control Diagnostics

- Standalone Service

- Complementary to HCP QCS
HCP QCS 4.0: Expert Guided Optimization Services

**Optimization Service**
- Evaluate control performance
  - Cross-Direction (CD)
  - Machine-Direction (MD)
  - Grade Change
- Provide control performance assessment and recommendations
- Provide remote expert-guided tuning and optimization support to implement improvements
- Provide before/after performance report

**Benefits**
- Up to 25% improvement in 2-Sigma spreads for conditioned weight, moisture, and caliper
- Reduced energy and raw materials costs
- Increased yield and production efficiency
- Improved control utilization and performance at optimum
- Site skills improvement to sustain control performance
Experion MX
Scanner and Sensor Portfolio Roadmap

Single Sided MXIR Coat Weight & Moisture, Q4 2018
- Single Sided MXIR Coat Weight & Moisture
- EDAQ based architecture
- Improved electronics
- Improved detectors & Improved optics

Q6088 U-Beam, Q3 2019
- Small footprint scanner, support one or two sensors.
- 6m trim width, Extruded aluminum u-beam
- Upgraded drive system
- For tissue applications using IR fiber weight and crepe sensors or traditional BWT and IR moisture sensors

Q4022-35 I-Beam, 2019 Developement
- Update to 4022-34 scanner with EDAQ based MXIR moisture and fiber weight sensors.
- New Ethernet Power Track

Q6031 Single Sided Scanner, 2019
- Single Sided MXIR Coat Weight & Moisture
- EDAQ based architecture
- Improved electronics
- Improved detectors & Improved optics

• Modified Q4000 MXIR sensors for use with PrecisionPak Infrand quartz plates

MXIR Moisture & Fiber Weight Sensors for Q4022 scanner, Q3 2019
- Update to 4031 scanner.
- Compatible with new Single Sided MXIR Coat Weight & Moisture Sensors
- New single sided head
- EDAQ compatible head
- New Ethernet power track
- Simplified electronics cabinet

Q4022-35 I-Beam, 2019 Development
- Update to 4022-34 scanner with EDAQ based MXIR moisture and fiber weight sensors.
- New Ethernet Power Track

• Single Sided MXIR Coat Weight & Moisture
• EDAQ based architecture
• Improved electronics
• Improved detectors & Improved optics
Experion MX Roadmap

Experion MX R700, March 2017

• Reduced setup and configuration time for QCS
  • Implementing Security Hardening
  • Qualifying Experion PKS R431 security model
  • Enhance CWS templates
  • Universal PMP support
  • Reduce PAR Backlog

Experion MX R702, Plan: Feb 2019

• DSA Support in QCS.
• Extended History Support for Two years.
• Support for LIB Special Productization
• MXIR for LIB, Tissue Scanner Support
• Security Enhancements

Experion MX R701, April 2018

• Browser Based Displays for all Scanner & Sensor Platform
• Extended History Support for one year.
• Enhanced Color Map for Analysis
• Compatibility with EPKS R501
• Security Enhancements

Experion MX R615, Dec 2015

• New platform
  • New OS – Windows 10 & Server 2016
  • SQL Server 2014, Labview 2015 SP1
• Interoperability
  • Experion PKS R500
  • Experion PMD R900
• MD Controls
  • MDMV Controls R700
  • Common control engine with CDMV
• Browser based displays for Zipline (HTML5)
  • Home- Display, Profiles Display, Roll Report
  • Dashboard for Control, MD Controls
• Zipline diagnostics displays

Plan: 2019 - 2020

• New Tissue Scanner
• Connected QCS Platform Enhancements
• QCS Measurement Only Platform.
• Non-nuclear weight / thickness Sensor
• Digitized Scanner, Digital powertrack, Sensor Diagnostics, etc

Experion MX R700, Plan: Feb 2019

• Implementing Security Hardening
• Qualifying Experion PKS R431 security model
• Enhance CWS templates
• Universal PMP support
• Reduce PAR Backlog

Experion MX R700, March 2017
Experion MX R701: Web Displays, New HMI Option

• Zero Install HMI
  - Access displays from Web Browser –Chrome, IE without any installation required on client machines.

• Multiple Screen and Device Support
  - Auto Scale to big size monitors. (55 inch)
  - Supports normal monitors / PC station. Touch / Non-touch Screens.
  - Support 11” and above Tablet and Pads.

• Potential Customers: (Fixed / Locked Configuration Requirements)
  - Measurement Only Systems (Paper & CWS)
  - Simple MXProLine Applications
  - OEMs

• Support for all Paper and CWS segments.
Experion MX R701: Color Map, Enhanced Analysis
Experion MX R701: Enhanced History

• QCS Extended History is
  - **Simple** to Configure
  - **Integrated** with QCS Platform
  - **Usable** for Operators and Engineers

• One Year History Supports
  - Trend Variables (Scalar Parameters)
  - ACM Variable (Array Parameters)
  - MIS Reports

• It Enables
  - Data for engineering and process analysis
  - Foundation for quality management system.

<table>
<thead>
<tr>
<th>EHDB</th>
<th>Total number of Trend Variables (Scalar Values)</th>
<th>120*</th>
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<tbody>
<tr>
<td></td>
<td>Total number of ACM Variables (Array)</td>
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</tr>
<tr>
<td></td>
<td>Total Number of virtual Trends</td>
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<tr>
<td></td>
<td>Minimum Sampling Period in seconds</td>
<td>5</td>
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<tr>
<td></td>
<td>History Support Duration in Year</td>
<td>1</td>
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<tr>
<td>MIS</td>
<td>Minimum Reel Turn-up Time (In minutes)</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Total Rolls in a Year</td>
<td>30,000</td>
</tr>
</tbody>
</table>

* Can be extended to support more variables.
EPKS – QCS Platform Convergence

QCS Application Platform
- QCS Displays
  Operator, MIS, Analysis
- QCS Execution +
  MD, MDCS, CD, CDMV
- LabView based
  HMI + Applications

Experion Platform
- Controller
  Platform
- HCI
  OPC, CDA
- Alarm
- HMI

Platform
- Operating
  System
- Database
- Platform
  Software's

Infrastructure
- Server,
  Workstation
- Monitor,
  ThinClient
- FTE, Switches,
  Network Card

Virtualization
- ESXI,
  vCenter
- Platform,
  Storage

Security
- Security
  Review
- SUIT Media
- Security
  Policy
- Secured
  Infrastructure

Common
EPKS
/QCS
QCS
Specific
QCS – DCS Integration Options

• **Common Control Room**
  - QCS – DCS HMI side by Side
  - QCS Station in EPKS Control or Vice Versa.
    ▪ KVM black box extender with remote Keyboard & Mouse

• **Data Communication**
  - OPC Vs. CDA

• **Alarms**
  - Standalone Vs Integrated

• **HMI Display Options:**
  - Independent & exclusive QCS/EPKS Operator station:
  - Integrated QCS Operator stations for QCS & EPKS HMI
  - EPKS Operator Station : Hybrid, Custom QCS EPKS HMI

• **DSA – Version independent Integration**
  - Planned for Q1 2019

**DSA Version Independent Integration: QCS R702**

- Using DSA, QCS Interoperability will be maintained with multiple EPKS Versions. ( EPKS N-3 to EPKS N+3.)
  - QCS R70X Platform is based on EPKS R50X platform, (EPKS R50X, version "n" for QCS R70X)

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- EPKS R41X
- EPKS R43X
- EPKS R430, R431, R432
- EPKS R50X
- EPKS R500.X, 501.X
- EPKS R51X
- EPKS R510, 51X
- EPKS N+2
- EPKS N+3
```

**QCS R70X**
Control Package Updates
Quality Control Applications Roadmap

Plan for 2018
- Release of AlphaMPC – based R701.1 multivariable MD control
- Online CD&MD control performance monitoring
- Adaptive enhancement on multivariable MD control
- Adaptive enhancement on multivariable CD control
- MD and CD consolidation on multivariable controls

Plan for 2019 and ahead

Already Released
- Plan for 2018 Release
New Experion MX Machine Direction (MD) Control

• Based on patented AlphaMPC model predictive controller technology specifically designed for papermaking processes
• Simple traditional tuning concepts have been applied to complex multivariable MPC
• Designed to provide reliable performance for all papermaking processes and control strategies
  - Process characteristics such as strong couplings, variable gains and long, variable time delays
  - Control strategies such as coordinated speed/production changes, steam biasing, throughput maximization, fiber cost minimization, etc
• Build-in, intuitive configuration and tuning tools for easy maintenance to ensure low cost of ownership
Experion MX Multivariable Cross Direction (CD) Control

• A true multivariable, array based, model predictive controller for Cross Direction optimization
  - Controls high resolution profiles so no controllable profile data is lost through filtering
  - Actuator and process constraints are taken into account
  - Simplified process identification and tuning of complex, highly coupled, processes using award-winner IntelliMap tool

• Optimal coordination of multiple CD actuator beams optimizing multiple sheet properties simultaneously based upon economic priorities
  - Increases the actuator’s control range and improves overall sheet quality and speed of recovery from upsets
  - Potential energy savings and production increases
  - True Advanced Finishing Technology for supercalenders

• Adaptive alignment provides long term control performance and reduces maintenance costs
MxProLine
MxProLine Evolution

World's first digital measurements for Plastic Extrusion

1972
1976
1982
1986
1992
1998
2001/25
2002
2000
2015
2018

46 years in the gauging business- Several Thousand Installed systems
Launch 2018: 5080-00 Super Clean Scanner

- Ethernet based Intelligent Data Acquisition
- Compact Design
- Full Width Profile measurement at high scan speeds
- Proven High Performance Sensors
- Precise Streak Detection and Resolution
- Same spot measurement capability
- Max two Sensors / Scanner

New Intelligent 5080-00 Scanner
THANK YOU