Transforming the Way We Implement, Operate, and Maintain
Experion Orion Console

More Situational Awareness

Reduced Operator Fatigue

Increased Operator Mobility

More Efficient Operations
Traditional Operator Environment

Operator Fatigue Challenge

“Fatigue causes cognitive fixation and impaired judgment and could lead operators to fixate on one operational parameter”¹


Lack of Mobility, Poor Operator Workspace, and Inefficient Graphics Contribute to Operator Fatigue
Upgrading Operators to Orion Class

Ergonomic Design
More Screen Real Estate
Alarm Lighting

Dramatically Improving Operator Experience
Advanced Display Technology

Pan & Zoom
Tabbed Display
Advanced Visualization Elements

Build Better Graphics with Better Situational Awareness
Console Operator Mobility

Mobile Station

Large Screen Interaction

Unchain Operators from Console
Better Collaboration Solves Problems Faster in the Control Room

Experion Collaboration Station

**Traditional**

- Interactive Touch
- Shift Handovers, Situation Assessment
- Engage Remote Experts

**Collaboration**

Released!
Remote Operations – the New Operations Model

Orion console, mobile and collaboration stations enable efficiency

High or Low Speed

Centralize Operations and Expertise
Only Honeywell Offers True Universal Process and Safety IO
What is True Universal IO?

Traditional Cabinets

- Cabinet 1
- Cabinet 2
- Cabinet 3
- Cabinet 4

Wait for final definition of instruments and then build custom cabinets

<table>
<thead>
<tr>
<th></th>
<th>AI</th>
<th>AO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
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<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
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</tbody>
</table>

Universal Cabinets

- Cabinet 1
- Cabinet 2
- Cabinet 3
- Cabinet 4

Standard cabinet that can adapt to late wiring changes

<table>
<thead>
<tr>
<th></th>
<th>Universal IO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<tr>
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<td></td>
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<tr>
<td>3</td>
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<tr>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Eliminate Complexity and Build Standard Cabinets Sooner Based on IO Count, Not Mix
Universal Cabinets Making Projects Simpler

Traditional Cabinets

Cabinet 1

Cabinet 2

Cabinet 3

Cabinet 4

AI
AO
DI
DO

Single Model Number for Fully Populated Standard Cabinet
Simplifying IO Order, Build and Configure

### Traditional

<table>
<thead>
<tr>
<th>Type</th>
<th>Count</th>
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<tbody>
<tr>
<td>1. Analog In</td>
<td>1,500</td>
</tr>
<tr>
<td>2. Analog Out</td>
<td>1,000</td>
</tr>
<tr>
<td>3. Digital In</td>
<td>1,300</td>
</tr>
<tr>
<td>4. Digital Out</td>
<td>1,200</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5,000</strong></td>
</tr>
<tr>
<td><strong># of IO Modules with 20% Spares</strong></td>
<td><strong>273</strong></td>
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</tbody>
</table>

### Universal

<table>
<thead>
<tr>
<th>Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universal</td>
<td>5,000</td>
</tr>
<tr>
<td><strong># of Universal Cabinets</strong></td>
<td><strong>7</strong></td>
</tr>
</tbody>
</table>

Example project with 5000 IO

Standard Work Dramatically Simplifying Order Process, Supply Chain, Project Execution and Lifecycle Support
Traditional Instrumentation and IO Wiring

Significant Cost in Equipment, Labor, Documentation and Checkout

Junction box

DI
AI
DO
AO

Junction box

DI
AI
DO
AO

Marshalling Cabinet

Multi Core Cables

System Integration Cables
Universal IO in the Field

Fewer Wires, Fewer Engineering Hours, Less Space = Greater Savings

Junction box

DI
AI
DO
AO

DI
AI
DO
AO

Marshalling Cabinet

Multi Core Cables

Controllers

Fewer Wires, Fewer Engineering Hours, Less Space = Greater Savings

Controllers
Virtualization

Before

2 Experion Servers
Sim
FDM
Alm Mgm
ACE
Domain Control

18 Operator Stations
5 Engineering Stations

30-node System
Virtualization

Before

Experion Virtualization

80%+ Reduction in Maintenance, Space, Energy Use and Better Security
Blade Server

Experion Virtualization – Blade

High Reliability, Simpler, Modular, and Pre-Configured
Traditional Project Workflow

Application
- Some Generic Controls and Display Templates

Application
- Develop Control Strategies, Displays

Physical
- Upgrade PCs

Instrument Freeze

Physical
- IO Cabinets, Servers, PCs

Physical
- Development System

FAT
Traditional Project Workflow Transformed

- No Development System
- Freeze Not Needed
- Can start engineering sooner & without travel
- Can work without having physical equipment
- Big bang testing eliminated
- Don’t need system upgrade

Instrument Freeze
Experion Orion Project Workflow

Application
Honeywell Data Center
EPC
Customer

Physical
Servers
Standard Cabinets

Direct to Site!
Minimal Checkout
Eliminates big bang testing with virtual FAT

Work in Parallel, Eliminate FAT and Ship to Site Earlier
Traditional approach is often back end-loaded

Reduce Schedule with Lower Risk
Security = Safety

Universal IO

Project Execution

Virtualization

Lifecycle Cost

Collaboration

Improve Operations
Do You Trust a System That Isn’t ISA Secure?
Protecting Open Systems

Whitelisting

Secure Services & Dashboard

Securing your critical infrastructure is an evolving process with four distinct phases.

Secure Products and Secure Processes; Secure Services
Encrypted and Authenticated Communications Between Experion PCs and C300 Controllers

Protection Against:
- Man in the Middle Attack
- Unauthorized Nodes on Network
- Tampering with Communications

Fault-tolerant Ethernet

Experion Secure Communications

Experion R430
Orion-Enabled Solution
Experion SCADA

Project Efficiency
Wellhead Templates, Autogenerated Displays

Operations Efficiency
Pan & Zoom

Applications
Linepack, Flow Calcs, Compressor Modeling, Leak Detection

Enhanced Experion SCADA
RTU Development

Low Power, Flexible Communications

- HART Enabled
- DNP & Modbus
- -40C to 75C; Zone 2
- IEC61131-3 Languages
- Flow Calculations

RTU for Wellhead or Pipeline Applications
Safety, Reliability, Efficiency Solutions

Continuous Evolution

New Field Instrumentation
Honeywell Delivers the Lowest Lifecycle Costs

Honeywell
40+ years of life – avoids costly rip and replace

HPM, LCN

Stepwise Migrations That Protect Investments in Control, Graphics, Wiring
A Walk Through Time

Revolutionary Technology…Delivered in an Evolutionary Way
Experion Station TPS Introduction

Fault-tolerant Ethernet

IP protection: US, GUS, and Experion HMI all in one

New Operational Benefits with Modern Human Interface and Alarming
Experion Station TPS and New C300

Unified Human Interface for TDC/TPS and Experion

Fault-tolerant Ethernet

Experion Station TPS

LCN

HM | NIM | HPM

C300 and Series C

2007
The Evolution Continues: EHPM

EHPM Released!

Experion Station TPS

Fault-tolerant Ethernet

Preservation of displays and controls:
- US graphics – work as-is
- AM controls – work as-is
- HPM controls and IO – work as-is

C300

HPM Evolves to Modern Ethernet Network – Eliminating UCN
Unifying Multiple Generations of Control

Fault-tolerant Ethernet

EHPM, C300, and Safety Manager Peer-to-Peer Control
TPS Merges into Experion

Fault-tolerant Ethernet

Experion Station

EHPM

C300

Safety Manager

Vision

LCN Components Gradually Melt into Experion
Honeywell Delivering Longest Lifecycle

50+ years of life – avoids costly rip and replace

Year 0

Year 20

Year 50+

EHPM

2035!

- Upgrade to EST
- Upgrade to EHPM/SM
- Lifecycle Contract

Ten Additional Years of Life with Upgrade to EST, EHPM/SM and Lifecycle Contract
Hiway Evolution

Fault-tolerant Ethernet

Experion Station TPS

LCN

AM

Hiway Boxes

HG

46 Years of Life in 2020 – Exciting New Migration Capabilities
Universal IO – Hiway

Honeywell

Experion R430

Fault-tolerant Ethernet

Mount in Hiway Cabinets
- Preserve Hiway Wiring
- Integrated HART

C300

Universal IO – Hiway

HART

HART FIELD COMMUNICATION PROTOCOL

Simple Zero Footprint Basic
and Extended Controller Cutover to Experion Orion
Hiway Migration

Full Integration Between TDC3000 and Experion Orion

Fault-tolerant Ethernet

Experion Station TPS

LCN

AM

HG

Decommission HG?

C300

Universal IO – Hiway

Migrate Graphics to Experion Station, Migrate AM Controls to C300
Experion Hiway Bridge

Phase 1: Experion R430 – Offline

Fault-tolerant Ethernet

Phase 2: 2015 – Online

Hiway Gateway Becomes Hiway Bridge to C300

Migrate Hiway But Preserve TPS US Graphics and AM Controls – Simple
What’s Your Roadmap?

Honeywell
50+ years of life – avoids costly rip and replace

Define multi-year automation plan
Justify upgrades with operational benefits
Flexible finance approaches

Creating New Benefits and Evolving Equipment – At Your Pace
Assurance 360 Service Program

- Proactive Support Model
- Maintain and Manage all Aspects of your Automation Systems
- Defined Metrics and Assured Results

Focus on Your Process and Not Your System
Safety, Reliability, Efficiency Solutions

Safety
Preserve Operations

Reliability

Efficiency
Improve Agility
Many Root Cause Similarities With Safety Incidents

The State of Process Safety in the Unionized U.S. Oil Refining Industry

A Report on the USW Refinery Survey
October 2007

a. Eliminate all atmospheric vents on process units that could release untreated explosive, flammable, or toxic materials to the atmosphere.
b. Manage instrumentation and alarms in a manner that ensures that they are sufficient and functional for all anticipated potential conditions and that there are no start-ups without tested and documented functioning of these systems.
c. Create a definition of “safe siting” that when followed will ensure that refiners locate all trailers or other unprotected buildings in areas that could not expose occupants to harm from explosions, fires, or toxic exposures. Work in creating this definition is currently under way through the American Petroleum Institute.
d. Ensure that all non-essential personnel are outside of hazardous areas (vulnerability zones), especially during start-ups, shutdowns, or other unstable operating conditions.

Non-Essential Personnel: Seventy percent (70%) of respondents (35 of 50) reported their sites engaged in process start-ups or shut-downs with non-essential personnel in vulnerable areas in the past three years (22% reported no, and 8% don’t know). Fifty-four per-

Where to Focus?
42% of process incidents are linked to improper operation or action.

- Equipment: 36%
- Process: 22%
- People: 42%

Source: ASM Consortium

Components of Effective Simulator-based Training (SBT)

- Learning Objectives
- Performance Metrics
- Training Exercises
- Performance Feedback

Operator Competency Model

Reproduce the performance of your best operator...

- Learn from others’ mistakes
- Train on best practices
- Prepare for upcoming operations

...every day, every shift

Training and Practice are Fundamental to Top Performance in Any Industry
Operators Were Overwhelmed by Alarm Floods

Alarms are Frequently Cited

The 1994 explosion and fires at the Texaco Milford Haven refinery injured twenty-six people and caused damage of around £48 million and significant production loss. Key factors that emerged from the Health and Safety Executive’s (HSE’s) investigation were:

- There were too many alarms and they were prioritised.
- Many alarms and they were not recognised, acknowledged, and acted upon.
- The explosion occurred within seconds following an internal gas release that was not detected by any alarms.
- The management team was not informed.
- The plant operators were overburdened by the constant flood of alarms.

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Systematic Approach to Improve Alarm Management

Benchmark

Rationalize & Document

Enforce & Change Management

Alarm Management

Manage Alarms Throughout the Lifecycle
### Compliance With Alarm Guidelines

#### EEMUA Alarm Guidelines

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Average alarms per day</td>
<td>144</td>
</tr>
<tr>
<td>Average standing alarms</td>
<td>9</td>
</tr>
<tr>
<td>Peak alarms per 10 minutes</td>
<td>10</td>
</tr>
<tr>
<td>Average alarms per 10-minute interval</td>
<td>1</td>
</tr>
<tr>
<td>Distribution % (low/med/high)</td>
<td>80/15/5</td>
</tr>
</tbody>
</table>

**Alarm Dashboard**

Monitor Your KPIs

Do You See More Than 9 Standing Alarms on Your Consoles?
Benchmarking indicates 70% of reliability issues are operations related.

Plants with Best Process Control Have Fewer Slowdowns and Shutdowns

Eliminate Process Variability

Correlation Between Uptime and APC Implemented

Profit Suite
- Analyze constraints and operate within them
- Reduces operator manipulation by 80%

Profit Suite Making it Simple

### Traditional
- Modeling is an art
- Requires steady state

### Profit Suite
- Modeling is a process
- Dynamic optimization

Profit Suite Delivers Benefits Faster and Stays Online Longer
Control Performance

Identify & Fix Control Performance Issues

Sign Up for a FREE TRIAL

Increase Process Performance

Linear Control

Non-linear Control

Collaborative Remote Services Programs

Sustain

Control Performance Monitor

Improving Your Plant Control

Monitor
Manage Instruments, Valves, and Complex Equipment

Field Device Manager
- HART, Fieldbus, Profibus
- DTM support for popular valve applications

Asset Manager
- Condition-based monitoring
- Compressor, pump, heat exchanger models

Portal for Managing Your Instruments, Valves, and Equipment
Uniformance – Collecting Data and Events

- PHD Enterprise Historian
- Experion Integration
- New System Management
- New Enterprise Event Journal

New Integrated Analysis Tools
Correlate Trend Data with Events

Millions of Tags, Decades of Data, Thousands of Users
Intuition Executive Visualization & Collaboration

Unlocking the Value of Your Data

Anticipate

Collaborate

Act

Making Data More Transparent and Decisions More Clear
Intuition Operations Monitoring

Running Your Process in the Most Profitable Zone

- Alarms define safe operating window
- Monitoring defines profitable operating window

Released

Tighter operational constraints
Intuition KPI Dashboard

Anticipate

Electrical Production
- Value: 93.5
- Limit: 100
- Released

Cost Per Unit Production (Net Margin)
- Value: 178.9
- Limit: 250
- Released

Electrical Production
- Value: 98.6
- Limit: 96

Cost Per Unit Production (Net Margin)
- Value: 52.5
- Limit: 30

Proactively Monitor Process Performance and Equipment Metrics
Continuous Evolution

Safety, Reliability, Efficiency Solutions

New Field Instrumentation
SmartLine
Our SmartLine Transmitter Just Got Smarter

Setting a New Standard

- Leading Performance
- Lowest Total Cost of Ownership
- Smart Connection Suite
Leading Performance

Traditional options – unstable and random accuracy

SmartLine – stable and predictable

Improved Accuracy Stability = Spend Less Time Calibrating
Our SmartLine Transmitter Just Got Smarter

How does it deliver the best value?

- Lowest Total Cost of Ownership

Released!
Modular Transmitter

Upgrade or Replace Components in Field; Stock Only What You Need

Traditional
Stock full device
Repair in shop, upgrade?

SmartLine
Stock parts
Repair / upgrade in field

Ultimate Flexibility, Faster Maintenance and Lower Inventory Costs
Advanced Display

Traditional
Limited information

SmartLine
Graphic and intuitive – full information

Graphic Display Lets You See Your Process the Way You Want
Unique Polarity Insensitivity

Save Time on Start-ups and Avoid Maintenance Errors; Only Supplier to Support This for HART

Either Connection will OPERATE Correctly

Field Wiring

or

Either Connection will OPERATE Correctly

Field Wiring

Automatically Corrects Polarity
Our SmartLine Transmitter Just Got Smarter

How does it deliver the best value?

- Smart Connection Suite
Send a Message to the Display
Indicating Device is Available for Maintenance

Traditional
Is it safe?

SmartLine
Confidence

Available for Maintenance.

Ensures the Right Device,
Right Action and Right Mode for Safe Maintenance
Transmitters just got smarter – SmartLine.
Gas Ultrasonic Flow Meters

- Global certifications
- 120 and 200 kHz
- High pressure 1500 psi
- Gas metering software

High Accuracy Gas Custody Transfer
Fusion 4 Multistream **Additive** Controller

- Up to 12 additive injectors
- Simple wiring and configuration
- Tight control avoids quality giveaway
- Integrated audit trail

Most Intuitive Field Controller on the Market
Safety, Reliability, Efficiency Solutions

Continuous Evolution

New Field Instrumentation