Optimize your Process with Advanced Process Control

Richard Salliss, Honeywell
Agenda

- Why Advanced Process Control?
- Profit Suite Overview
- Customer needs for successful APC
- How is Honeywell addressing these needs with Profit Suite?
- What’s new in R430
- Profit Suite Vision and Roadmap
Why Advanced Control?

Tangible Benefits:
• Increased Throughput
• Improved Yields
• Decreased Operating Costs
• Improved Quality Consistency
• Increased Operating Flexibility
• Improved Process Stability

Intangible Benefits:
• Improved Process Safety
  – Process Watchdog
  – Earlier Identification of Problems
• Improved Operator Effectiveness
  – Focuses on key operating parameters
• Reduced Downstream Variability
  – Fewer Process Upsets
• Better Process Information
  – Increased Process Understanding

Common payback period < 6 months

Field proven solutions with high ROI
Honeywell and Advanced Control

- World Leader in Advanced Control
  - #1 Worldwide all Major Markets for 5+ Years
    Petrochemical & Chemical, Pulp & Paper, etc…
- 150+ Higher Level Optimization Applications
- 3500+ Multivariable Controller Applications
- 550+ Industrial Sites
- 300+ Customers Worldwide

Source: ARC Report, APC and Optimization Outlook 2012

Estimated >$5 Billion in Benefits since 1996
Honeywell’s Advanced Control Solutions

- Profit Controller
- Profit Stepper
- Profit Sensor Pro
- Profit Optimizer: Real-time, Dynamic Optimization

Control Performance Monitor

- Optimal Response
- Past
- Future
- CV
- MV
- Setpoint
- Optimum
- Minimum Effort Move
- Predicted Unforced Response
- Control Funnel
- Optimal Response
- Setpoint
- Current Operation
- Optimum Operation

Real-time, Dynamic

Dynamic Optimization

Optimum

Additional $ Benefits

Wait for Steady State

Steady-State Optimization

Time
Factors for APC success

• Economic justification at the outset
• Management support (‘buy-in’)
• Good implementation – technology, scope, expertise
• Ownership by site personnel (‘acceptance’)
• Good regulatory performance (valves, tuning, instruments)
• Appropriate training of key personnel
• APC ‘champion’ in the organisation – focal point for continuous improvement
• Ongoing maintenance and support policy
What do our customers demand?

• Get the applications up and running quicker
  – simpler, faster delivery
  – appropriate scope
  – quicker return on investment

• Capture more benefits
  – wider, larger, higher scope for greater benefits
  – engage the operator more – visibility & clarity
  – consider true business goals for unit/site

• Keep the benefits flowing
  – easier maintenance
  – provide tools for monitoring APC performance
  – allow visibility throughout the organisation
Or, simply put.....

- Accelerated benefits
- Enhanced benefits
- Sustained benefits
Accelerating, Enhancing and Sustaining Benefits

- Enhanced Capability
- Sustainability Value
- Accelerated Deployment Value
- Standard APC Solutions Value

$ VALUE $ vs. TIME
Building APC on a Solid Foundation

CPM identifies and diagnoses the causes of poor control at all levels of the plant control hierarchy:

- **Plant Control**
  - Advanced Process Control
  - Analyzers & Online Inferentials
  - Regulatory Control
  - Instrumentation Layer

CPM quickly identifies causes of poor control – fixing the regulatory control layer is key to a successful and sustainable APC deployment
Profit Suite Engineering Studio

- **One** engineering interface
- Workflow driven
- Integrated help and documentation
- Offline simulation & testing

- **NEW for R430** – Profit Sensor Pro and Profit Stepper included

Accelerated Benefits Capture
Automated Closed Loop ID with Profit Stepper

- Use seed MPC application to displace open loop stepping
  - Provides similar advantages of closed loop stepping
- Full MPC matrix is built during stepping procedure
- Preliminary commissioning is enabled
- Can operate closer to key economic constraint
  - Once key MV/CV models are downloaded
- Can step process without continual presence
  - Seed MPC handles most constraints and operator can pause as needed
  - Can step remotely if permitted

Accelerated Benefits Capture
## Faster deployment with Profit Stepper

<table>
<thead>
<tr>
<th>Stepping Method</th>
<th>Project Duration (small application)</th>
<th>Project Duration (large application)</th>
<th>% Time Spent on Stepping, ID, Validation, Commissioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>Up to 6 months</td>
<td>Up to 24 months</td>
<td>Up to 75%</td>
</tr>
<tr>
<td>Automated Sequential</td>
<td>Up to 4 months</td>
<td>Up to 18 months</td>
<td>Up to 67%</td>
</tr>
<tr>
<td>Automated Simultaneous</td>
<td>Up to 3 months</td>
<td>Up to 14 months</td>
<td>Up to 60%</td>
</tr>
<tr>
<td>Automated Open Loop w/ auto ID</td>
<td>Up to 2 months</td>
<td>Up to 10 months</td>
<td>Up to 40%</td>
</tr>
<tr>
<td>Enhanced Automated Closed Loop w/ auto ID and seed MPC</td>
<td>Under 2 months</td>
<td>Up to 8 months</td>
<td>Up to 30%</td>
</tr>
</tbody>
</table>

- Ability to update models with MPC online reduces model maintenance effort by up to 75%

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**Accelerated Benefits Capture**
Deploy the *right* control solution to meet the business need
Enhancing APC Benefits

- Enhanced Capability
- Accelerated Deployment Value
- Standard APC Solutions Value

$ VALUE $
New Benefits Estimation Functionality

- New in R430
- Projects justified by a sound business case ensure maximum benefit capture and long term success
- Profit Suite provides tools to systematically estimate the potential benefits of APC at the outset
- Profit Sensor Pro allows statistical analysis of historical process data
- Embedded techniques based on Honeywell benefits analysis experience
Profit Controller with Robustness built-in

- Profit Controller is designed “from the ground up” to be ROBUST
- Core technology: the Range Control Algorithm
- That means the ability to stay on control longer
- Dealing with real-world problems
- Delivering more benefits
Profit Suite Operator Station

- Engages operator in proactive monitoring and control
- R430 – major focus on Operator Understanding and Guidance
- Visualization at all levels
  - SMART PSOS CLIENT (L2/L3)
  - THICK CLIENT (L3.5/L4)
  - WEB CLIENT (L3.5/L4)
  - Experion HMIweb shapes (L2)
- Easy to deploy and configure
Engaging and Informing the Operator

Tips Messaging
– Displays notifications and advice for CV/MV

Horizontal Bar Charts
– Shows gain relationship

Ideal Limits
– Shows relationship between current and ideal operating limits

Enhanced Benefits Capture
Honeywell Layered Optimization Solution

Expanding the RTO Scope – Profit Optimizer

Challenges
- Intermediate stream pricing
- Downstream unit constraints
- Cross unit opportunities

Solution
- Profit Optimizer continuous dynamic optimisation
- Uses MPC model base in higher level optimisation
- Manages final product pricing
- Links downstream constraints

Multi-Unit Dynamic RTO Capability

Enhanced Benefits Capture
Multi Unit RTO with Profit Optimizer

- Most cost effective RTO solution
  - 3-6 month project delivery time (25% of traditional implementation time)
  - Leverages existing APC models in unit based APC applications

- More Benefits Over Time:
  - More uptime – operators understand what the controller is doing
  - Optimization without waiting for steady state to make a move

- Best Operations accepted RTO solution
  - Simple extension of MPC concepts, so easy for Operators to understand
Business Level Optimization

- Mega-Scale Optimization Support
  - Proof of Concept in R430
  - Site-wide and/or Multi-site
  - Tiered Optimization ("Super DQP")
    - Discrete Optimization
    - Planning Integration & Schedule Management
  - Bridge the gap between Real Time Control and Planning/Scheduling

Enhanced Benefits Capture
UOP Integrated Solutions

Together we enable refiners to meet the challenges - lowering costs, reducing risks, improving efficiency, and maintaining the newest and best infrastructure to support customer business and operational needs.

- Good process design is the core of any processing unit.
- Process control and advanced solution packages are critical to ensure effective operation of the unit.
- Advanced Solutions to optimize the performance of the unit.
- Tools to enable the operators to operate the technology that is both efficient and safe.
- Leveraging process expertise to complete “the package”

Enhanced Benefits Capture
UOP Integrated Solutions for APC

- Platforming
  - UOP Models
    - Heater Tube Wall Temperature
    - Reactor Severity (RONC / % Aromatics)
    - Coke Management
    - Regenerator Operations
    - Hydraulic limits
- Aromatics
  - Tatoray
  - Isomar
- LAB
- Oleflex
- Unicracking

Enhanced Benefits Capture
Sustaining APC Benefits

Enhanced Capability

Sustainability Value

Standard APC Solutions Value

Accelerated Deployment Value

$ VALUE $

TIME
The APC Challenge/Opportunity: Sustainability

APC Scenario: In many plants today, controllers “run to failure”

- Majority of companies investing in APC monitoring are trying to move from the blue line to the green line
- Profit Suite and CPM provides the tools monitor, diagnose and enhance APC performance
Keeping Operations Engaged and Informed

- New in R430: PSOS performance index
  - a weighted sum of seven established attainment metrics plus three possible user entered metrics.
Retaining Knowledge

• Auto-documentation feature NEW in R412
• Information in the “As Built Doc”:
  • Customer Information
  • Controller Objectives
  • Optimization Objectives
  • Controller Variables
  • Controller Model Images
  • Calculations
  • Annotations
  • Tuning Parameters
  • BLC Information
  • Connections
• Ensure accurate, fast, reliable design documentation throughout APC life cycle

Sustained Benefits Capture
Sustain and Maxmimise performance with CPM

• From problem detection to root cause analysis and maintenance, all supported with a strong suite of visualization tools.

Sustained Benefits Capture
Control Performance Monitoring Evolution

**Control Performance Monitor**
Comprehensive monitoring solution for multiple control systems across the enterprise

**Loop Scout**
Service-driven solution for monitoring regulatory

**Profit Expert**
Comprehensive solution for monitoring Honeywell’s Profit Suite

**Evolution**
- Efficient controls
- Best use of skilled process control resources
- Enterprise control asset monitoring
- Control technology independent
- Improved identification and resolution
- Unique Experion integration
- Unique Profit Suite Integration

**Sustained Benefits Capture**
Keep APC at Peak Performance with Profit Stepper

Deploy Profit Stepper to improve APC model quality without loss of benefits

Core MPC allows stepping while keeping variables close to optimal

Core MPC allows moderating the aggressiveness of the optimizer to improve richness of step test data by changing a single tuning parameter
Sustained Benefit Capture: BGP Performa

Change
Understanding future requirements and the safeguards to future-proof your investment

Maintenance
Keeping advanced software up-to-date, secure and reliable during day-to-day operations

Optimize
Ensuring configurations respond to changes in the process or plant so the applications continue to provide benefits

Support
Services and troubleshooting over the lifetime of the application to respond to and resolve unexpected incidents and problems

Sustained Benefits Capture
Profit Suite Vision

- One consistent technology platform spanning the control continuum
- Putting the Operator at the centre of things
- Simplifying the engineering process
- Embedding UOP know-how
- Providing tools to ensure APC benefits are sustained

Profit Loop → Profit Controller in CEE (C300/ACE) → Profit Suite → Multi-Asset Optimization

Continuum of Control Solutions

Single Variable Linear Control

Multiple-Variable Non-Linear Control and Optimization

Seconds Hours/Days
Profit Suite R430 Key Areas

- **Overall**: First Honeywell User Experience Release, Reduce cost to Deploy, Migrate & Sustain Solutions
- **Enabled by**:
  - Extensive customer OVOC
    - Enhanced User Interfaces
    - Operator Guidance
  - Improved Engineering Ease of Use
    - Profit Stepper in PSES
    - Profit Stepper transformed variable support
    - Profit SensorPro in PSES
    - Benefits analysis enabled through Profit SensorPro
Why standardize on Honeywell’s Profit Suite?

- **Unified Technology**
  - Single platform from Experion-embedded to plant-wide control & optimization

- **Faster Realization of Benefits**
  - Designed for minimal effort to achieve the first dollar of benefits and build to larger benefits as ROI is justified

- **More Benefits Over Time**
  - The *most* comprehensive offering to transform business needs and objectives into real-time operations

- **Flexible Licensing**
  - Honeywell’s flexible approach to software licensing ensures maximum returns and protection of your investment