CONTROL TECHNOLOGY UPDATE :
“A ROAD TO PLANT PERFORMANCE IMPROVEMENT”

Presented in the event of "National Seminar & Workshop in Brawijaya University"
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Presentation Outline

Common Practices of Control Technology in Industrial Application
Most of industrial practices used basic regulatory control as the way to control and operate the plants

Industrial Challenge for Performance Improvement
In recent industrial era, most of industrial practices was challenged to operate their plant in effective way for all of aspects

Control Technology and Improvement Strategy
Current control technology and its implementation

Summary
Summary of the related topic to highlight the point of presentation / discussion
Common Practices of Control Technology in Industrial Application

Current Industrial Practices Sector in Indonesia
Sensing and Actuation Equipment

- Flow, Pressure, Level, Temperature
- Valve Positioner & Camera

Analysis and Quality Control Equipment

- Gas Analyzers (oxygen, IR gas, density, chromatograph)
- Liquid Analyzers (pH/ORP, conductivity, turbidity, residual chlorine, alkalinity, MLSS, DO, density, water quality)
Test & Measurement Business

Waveform, Power, Optical, Frequency/Time Interval, Voltage/Current, Pressure, Communications/Network, Wireless Communications

- **Digital Oscilloscopes**
  - DL9000
  - DL750P

- **Digital Power Meters**
  - WT3000

- **Time Interval Analyzer**
  - TA720

- **Wireless Communications**
  - VC200

- **Optical Spectrum Analyzer**
  - AQ6370

- **Portable Test Instruments**
  - Two-in-One
  - DL1740EL

Production Control and Safety Management System

<table>
<thead>
<tr>
<th>CENTUM CS 3000 R3</th>
<th>ProSafe-RS</th>
<th>STARDOM</th>
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<tbody>
<tr>
<td>30 years of Excellence</td>
<td>FOUNDATION is a registered trademark of Fieldbus</td>
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</table>
Most of Control System Configuration Practices

Ethernet

V net

ETHERCAT

DeviceNet

PROFIBUS-DPV1

Discrete I/O Drive

Photoelectric
device

vigoant

The clear path in operational excellence

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- 9 -

GSGW

Subsystem
Gateway

Ethernet

OPC
Server

FCJ/FCN

Safety
System

PLC

Other
System

Industrial Challenge for Performance Improvement
Current Industrial Practices Challenging

- **Quality**
  - High value of product
  - Product competitiveness

- **Efficiency**
  - Cost efficient
  - Green concept implementation

- **Safety**
  - Plant operation safely
  - Environmental safe and friendly

Challenge in QUALITY

- How does the industry produce high quality products to be offered to the market?
- How does the industry ensure the products competitiveness in the market?
**Challenge in EFFICIENCY**

- How does the industry operate the plant operation with high efficiency level?
- Does the industry operate the plant with "green industry" policy for operation?

**Challenge in SAFETY**

- How does the industry operate the plant with high safety level?
- How does the industry comply to the "green industry" policy for operation?
Control Technology and Improvement Strategy

Clear Path of Improvement Strategy
Recent Control Equipment Update ...

The new world standard controller for field-digital Era

Processing performance: 4 times faster
Application storage capacity: 2 times larger
Control network throughput: 5 times greater

<table>
<thead>
<tr>
<th>Signal Types</th>
<th>Company’s Current Controller</th>
<th>Company’s Latest Controller</th>
<th>Company’s Latest Controller</th>
<th>Company’s New Controller</th>
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</thead>
<tbody>
<tr>
<td>4-20 mA</td>
<td>1200 devices</td>
<td>250 devices</td>
<td>300 devices</td>
<td>1700 devices</td>
</tr>
<tr>
<td>FF</td>
<td>400 devices</td>
<td>350 devices</td>
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<td>1200 devices</td>
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</tbody>
</table>

Signal Types
- Yokogawa’s Current Controller
- A Company’s Latest Controller
- B Company’s Latest Controller
- Yokogawa’s New Controller

YFGW710 FIELD Wireless Integrated Gateway
YTA510 Temperature Transmitter
EJX118B Differential Pressure Transmitter
YFGW710 FIELD Wireless Integrated Gateway
ISA100 Wireless
vigilant plant

Latest Technology for Monitoring Asset

Distributed Temperature Sensor (DTS)

DTS Instrument (interrogator)

The Fiber is the sensor

Safe – No electronics – explosion proof & non-inductive
Distributed Measurement: 1m spatial resolution
Measurement of 5km fiber = 5,000 sensors!

Standard multi-mode optical fiber
Backscattered light provides temperature at every 1m.

Fiber Sensor Cable (3P)
Control System Strategy for QUALITY Improvement

QUALITY aspects for improvement objects:

- **Raw Materials**
  - The raw material quality will impact to the entirely product output, both of quality in spec and market acceptable/competitiveness

- **Operation Method**
  - Operation method may significantly impact to the quality performance. The strategy to optimize an operation method could enhance the maximum benefits within cost effective

- **Products**
  - As an output of series of process, its was definitely depend on the result. Final products handling was still need to be addressed to maximize its quality
Sample – Maximizing operation method with PID Tools

Control Loops Dryers - Problem

Zone temperature controls are fluctuating due to line speed changes.

Average zone temperature is set 6% higher than preferable condition to keep required heat capacity.

Control Loops Analysis

Control Loops Dryers - Solution

Solutions
- InsightSuiteAE’s "Control loop diagnostician" and "Control valve diagnostician"
- "TuneVP" tuning simulator
- For fine tuning of control loops

Effect
- Drying steam saving by lowering zone temperature pattern
- Air compressor power saving
  (Indirect effect: Less product quality variance)
Control Loop Performance

Control Loops - Dryers - Results

Disturbance: Line speed change
(+ interference from up stream zones to down stream zones.)

Control loops tuning (Before)

Control loop tuning (After)

Dryer temperatures
Zone 1, Zone 2
Zone 3, Zone 4
Zone 5, Zone 6

Efficiency aspects for improvement objects:

- **Production Cost Management**
  - Effective production cost management will improve the economical benefit for entirely plant operation. Maintenance cost as one of the component can be a focus point of efficiency factor

- **Resource (Energy) Saving**
  - International standard required the industrial practices to manage the energy usage which may impact to the global warming. Energy saving program with emission controlling is now an issue for most of industrial practices
Sample – Maximizing Energy Usage with STA/WP

Core solution package of Yokogawa’s Onshore Gas Wellhead Portfolio.

Architectural

OPERATION CENTER

WELL SITE

Standard Utility Tool

CONFIGURATION
- Tuning parameters
- Operation settings
- Plunger liftnom
- Timer
- Auto-adjust timer
- Intermit observes
- Plunger setting

MAINTENANCE
- Controller Utility
- Controller Logs

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YOKOGAWA
Wellhead Configuration for Wireless Instrument

Standard Enclosure Hardware Pack

- Arrestor (for serial)
- FCN-RTU SA0 model
- 20A 12V Solar Charger
- FCN-RTU FTA Board
- Grounding bar
Control System Strategy for SAFETY Improvement

SAFETY aspects for improvement objects:

- **Plant safety level**
  - Plant safety is designed to secure and safe the production process during operation stage. Any of safety risk factor has to be analyzed for protection system.

- **Environmental friendly**
  - Any of safety risk and its impact has to be analyzed for plant operation protection only. It was required to ensure the protection system for environment surround on operated plant.

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Risk Reduction

<table>
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<th>Hazard Rate</th>
<th>Consequence</th>
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<tr>
<td>Risk without any Protection</td>
<td>Tolerable Risk ??</td>
</tr>
<tr>
<td>Reduction</td>
<td></td>
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DCS

Demand
Sample – Maximizing safety operation with SIS

The Prosafe-RS Safety System

EJX

ProSafe-SLS

YTA
Summary session

Recent control system technology has widely developed and involved several aspects of industrial application concerning to the process knowledge, safety, IT and others.

Recent industrial practices has had a challenging to improve their performance in order to get a widely benefits in both aspects, economical and plant reliability.

Control system latest technology is one of the aspect to do an improvement in industrial practices in term of quality, efficiency and safety.
Thank You For Your Attention