Fieldbus Foundation – India Committee

Fieldbus Foundation
Asset Management and Diagnostics

Date: 22nd September 2010
Time: 10:00 am to 05:00 pm.
Venue: Automation 2010 Conference Hall
Bombay Exhibition Centre (NSE)
Goregaon East, Mumbai, INDIA

Host Diagnostics and Asset Management
Murali Krishnan T
Emerson Process Management Asia Pacific
Intelligent Field Devices - A Rich Source of Diagnostics

- Travel Deviation
- Cycle Counter
- Valve Signature
- Step Response
- Dynamic Error Band
- Drive Signal
- Output Signal
- And More

- Electronics Failure
- Sensor Failure
- Process Condition
- Configuration Warning
- RTD Drift
- RTD Life Estimation
- And More

- Electronics Failure
- Sensor Failure
- Process Condition
- Configuration Warning
- Empty Pipe
- Calibration Error
- Process Condition
- Configuration Warning
- And More

- Pump Cavitation
- Motor Overheating/Defects
- Severe Bearing Faults
- Rotational Faults
- Bearing Lubrication
- And More

- pH Electrode Aging
- Glass Electrode Failure
- Reference Electrode Failure
- Reference Electrode Coating
- Reference Electrode Poisoning
- And More

22-Sep-2010
Remote Diagnostics for Predictive Intelligence and Troubleshooting

- During the Plant Start up and normal Plant Operation, use Asset Management Software
- Verify device problems are real before going to the field
  - Tell the difference between process alarm and device alert
- Device tells maintenance people when there is a device issue or performance is degraded
NAMUR NE107: Self-Monitoring and Diagnosis of Field Devices

Diagnosis results must be reliable

Diagnosis results must always be viewed in the context of the application.

Internal diagnosis must be categorized into 4 standard “status signals”

Configuration must be free, as reactions will depend on the user's requirements

Detailed information can be read out by the device specialist
New Field Diagnostic Alarms

Diagnostic Categories

<table>
<thead>
<tr>
<th>Parameter Name (*)</th>
<th>NE107 Status Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD_FAIL_ALM</td>
<td>Failure</td>
</tr>
<tr>
<td>SD_OFFSPEC_ALM</td>
<td>Out of Specification</td>
</tr>
<tr>
<td>SD_MAINT_ALM</td>
<td>Maintenance Required</td>
</tr>
<tr>
<td>SD_CHECK_ALM</td>
<td>Function Check</td>
</tr>
</tbody>
</table>

Additional supporting parameters

- Enable/Disable of diagnostic detection
- Enable/Disable Simulation
- Configure Priority
- Configure Alert Suppression (Detect, but not alert)
- Recommended Actions

* Parameter names will have localized text labels. e.g. “Failure Alarm”
Role Based Diagnostics

Process Control Engineering Station

Plant operators

Asset Management Maintenance Station

Plant maintenance engineering

HSE Control Network

H1 Process Network

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Smart Diagnostics
- Integrated Device Diagnostics

- Normal operation...
- Device failure...
- Faceplate...
- Diagnostics
  - No device configuration by operator

Detailed diagnostics in two clicks
Help on the third
Active Alerts Screen

- Available by clicking on “Troubleshoot” button on the Device Dashboard
- Lists Alert Severity
- Lists all Active Alerts for the device
- Recommends actions to resolve alert
- Offers visual diagram to support the recommended actions
Condition Monitoring - Alert Monitor

- View all diagnostic alerts in one location
EDDL and Field Diagnostics

- EDDL visualizes device diagnostics to assist in maintenance troubleshooting
Enhanced EDDL Provides Full Support for Device Functionality

- Radar Level
- Temperature
- Valve Positioner
- Machinery Health
- Pressure
- Mass Flow
Enhanced Graphics for Advanced Devices

- Content designed by device manufacturer
Device Diagnostics

- Quickly view the device status
- Status conditions include hardware and software malfunctions or parameters with values beyond the device’s specifications
- All device types and communication protocols have a common interface
Clear Indication of Device Health
Conditional Graphics

Graphics indicates problem areas
Manufacturer help text guide troubleshooting

Field Device status information relating to: Failures, Warnings, or Status of the sensor(s).
The device software detected a failure in the attached sensor. Check the connections and verify the sensor integrity.
An I/O problem is generated because a sensor bias value is not in the expected range of operation. If this condition exists without the presence of an I/O failure alert, the most likely cause is a bad sensor (not wiring). If both I/O Failure and I/O problem are indicated, it is more likely the wiring. Click on the Details button to see the affected sensors.

Manufacturer know-how in the form of plain EDDL text to guide user.

Recommeded Action:
Replace/repair the affected sensor

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Advanced Diagnostics

Vibration spectrum from pump health monitor
Chart internal auxiliary measurement with EDDL trend.
Ease of Use - Integrated Control System

- **Engineering station**
  - System configuration
  - FF device commissioning
  - Device configuration

- **Operator station**
  - Process operation
  - Process alarms
  - Device diagnostics – Inform Maintenance people

- **Maintenance station**
  - Device management
  - Process visibility

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Diagnostics Status for Closed Loop Control

Status Propagation

- Validated information
  - Quality and limits
- Windup protection
- Bumpless transfer for valves
- Fault-state for valves
Integrate Predictive Diagnostics to Enterprise Level

- Drive maintenance based on criticality of assets
- View predictive diagnostics across plant assets
  - Mechanical equipment, instrument, valves, and process equipment
- Compare health of facilities in enterprise
- Streamline maintenance activities by automating work
Asset Management Software - Core Capabilities

- Predictive Diagnostics
- Condition Monitoring
- Configuration
- Calibration Management
- Documentation
- Optional Enhanced Application Software Packages
Enhanced Application Software Packages

- Alert Monitor Track Application
- Advanced Valve Diagnostics Application
- Calibration Assistant Application
- Engineering Assistant Application
- Meter Verification Application
Asset Management Software Initial Database Definition

- Build instrument hierarchy that reflects the logical areas within a facility.
Create the Initial Database Structure
Review Basic Software Functions, Navigation

- Explain device templates, user configurations, future device additions.
- Use device connection view, explorer view, and other windowed views.
Fieldbus Training is a MUST

- **Design engineers**
  - Design Considerations
  - Fieldbus segment design software

- **Installation team**
  - Lay cable and terminate
  - Segment Checkout

- **Device commissioning Team**
  - Asset Management Software training
  - Check bus parameters
  - Connect devices & commission
  - Troubleshooting using tools

- **Operations/Maintenance Team**
  - Use of Asset Management Software and actions to be taken