Improved Operation Through Advanced Operator Interfaces

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The Abnormal Situation Management® (ASM) Consortium

Innovating and Fielding ASM® Solution Concepts
ASM Guidelines: Effective Operator Display Design

- Operating Display Content
  - 20 Guidelines on display types, display style, etc.

- Operating Display Features
  - 35 guidelines on display layout, navigation, use of colors, etc.

- Alarm system
  - 14 guidelines on auditory & visual annunciation, etc.

- User Guidance and Training
  - 5 guidelines

- Display Development Process
  - 7 guidelines on human factors and MOC
ASM Operator Interface Concepts

- Multi-windowing with controlled window management
- Multi-level, simultaneous views of increasing plant detail
  - Level 1 Area Overview, Level 2 – Unit, Level 3 – Equipment, Level 4 – Group
- Tabbed navigation
- Yoked navigation between levels
  - e.g., between Unit-area summaries and their associated equipment details
- Integrated Trending
ASM Operator Interface Concepts

• Right-mouse click access to online documentation
  – e.g., Alarm Objective Analysis documents, procedures, etc.

• Integrated alarm management into graphics and navigation tabs

• ASM Graphics design
  – e.g., Color-coding only for critical information – like alarms, No 3D graphical objects, etc.
Operator Performance Improvements

- In a side-by-side comparison against a “traditional” native windows console, operators using the ASM Operator Interface
  - Responded faster and more consistently to abnormal situations
    - 6.5-9.7 minutes faster
    - a 35%-48% improvement over the traditional console
  - Recognized, before the first alarm, that an abnormal situation was present in 48% of the scenarios
    - 38% improvement over the traditional console
Operator Performance Improvements

• As a result, they successfully dealt with 96% of the abnormal situations
  – 26% improvement over the traditional console
Economic Impact Assessment

- Conducted a Monte Carlo simulation for the Traditional console
  - Used the operator performance improvement values and ranges as input into this simulation
    - Improved solution times
    - Higher solution success rates
  - Generated an annual baseline from 6 years of incident data from the traditional console unit
  - The “assumed” input ranges for the incident data in the Monte-Carlo analysis were supplied by ASM member site’s process experts
Economic Impact Assessment

- The total economic impact for the unit with the traditional console (a 1.8 Blb/year ethylene plant) was
  - On average, $870K USD/year
  - The median (considered most likely) was $800K USD/year
An “Operator Cockpit” Concept

- Provide Honeywell customers integrated operating environment and tools to help the operator proactively manage the process in order to:
  - Meet your business goals
  - Reduce incidents
  - Improve product quality
  - Reduce operator workload
- Design the console to better support the operators’ workflow and operating tasks
- “Institutionalize” best practices in the console design for…
  - Console operator “rounds”, Shift handover, Routine operations (e.g., furnace swings), & Best response to alarms or events via “recommended actions”, etc.
An “Operator Cockpit” Concept

- **Console Organization & Layout**
  - Span of control overview
  - Trends for critical variables
  - Operating schematics
  - Diagnostics
  - Documentation & procedures
  - Alarms & notifications
  - Logbook
  - Planning information
  - Alarm help
  - Alarm enforcements
  - Managing tasks (Proc Ops, tasks, etc and other scheduled activities)

- **Information Management for the Console Operator**
  - Task-relevant information when it is needed, where it is needed