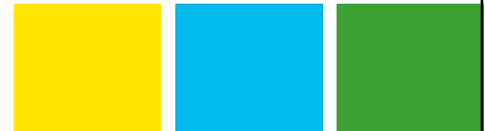




Improving safety in the plant by means of automation + How to keep operators alert in highly automated plants

Claudia Paarmann - Dow Deutschland AmbH

May 17th , 2017



Presentation content

- Target Aspects
- Development of Process Automation
- Improved features - Improving plant safety
- How to keep operators alert

Improving safety in the plant by means of automation

Work Accidents of VCI Member Company

Per 1 Million of working hours

Arbeitsunfälle in VCI-Mitgliedsunternehmen je 1 Million Arbeitsstunden*

1980	23,50
1990	14,10
2000	8,30
2014	5,30

*Quelle: Berufsgenossenschaft Rohstoffe und chemische Industrie (BG RCI).

Target Aspects:

- Safety
- Environmental
- Productivity
- Efficiency
- Asset Utilisation

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Main Objectives of the control scheme:

- Accurate and Optimized Steady-state control
 - To deliver safety and environmental protection
- Remote operation of the process
- Correct and consistent start-up
- Safe and orderly shutdown

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Level of Process Automation:

- Fully automated - high degree of field instruments and control loops
 - Minimizes manual interference
 - Increased productivity
 - High asset utilization
 - Lowest operating cost
 - Prevent events leading to process safety and environmental risk

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Plant start up:

- Assistance mode during process start up
 - Provide all necessary safeguards
 - Warning & shutdown alarms
 - Step transition criteria
- Maintenance Wait -> Process Wait -> Run Step

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Plant Run:

- Full automation mode during normal operation
 - Human intervention be minimal by design
 - All alarms active - with appropriate delay
 - PID controlled - Feedback Control Concept
 - Feedforward / Advanced Control including Operations Know How
 - Default set points - fixed / calculated
 - Key Performance Indicator track

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Plant Shutdown:

- If process control fails to run the process in a safe manner
 - Automatic shutdown initiated as defined by safety instrumented functions
 - All energy sources must be shut off
 - Other equipment could still be operating
 - Address & resolve all causes
 - Manual transition from Shutdown to Process Wait

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How to keep operators alert in highly automated plants?

- Intensive training
 - Do not lose the detailed understanding
- Follow and Review Procedures
- Simulation of events - disturbances - trips
- Emergency drills
- More focus on condition of the plant - less focus how to run
- Take action - involve the operators in the daily run
 - Outside control walks - house keeping
 - Hand analysis
 - Reporting key parameter

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How to keep operators alert in highly automated plants?

- Categories of Alarms with different colour code
 - Request Alarm
 - Warning Alarm
 - OPR Alarm
 - Operator Response (15 minutes)
 - Pre Trip Alarm
 - Emergency / Shutdown Alarm
 - Followed by shutdown step

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How to keep operators alert in highly automated plants?

- Intelligent Alarm Management
 - Monitoring
 - Alarms loading & settings
 - Process variability
 - Measure & Analyze
 - Trends, charts, top alarms
 - Pinpoint faulty hardware
 - Controlling of alarm flooding
 - Optimization of set alarm points
 - Correction of unclear alarm messages
 - EH&S Risk reduction
 - Less unplanned events
 - Improved upset investigation

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How to keep operators alert in highly automated plants?

- Control Room design
 - Ergonomic
 - Dynamic Lighting systems
 - Reduce sleepiness
 - Increase vigilance
 - Improvement of mood, vitality, energy and concentration level
- Allow Powernap
- Allow Exercises - e.g. bike cycling
- Motivation

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How to keep operators alert in highly automated plants?

- Conclusion

- Use Process Automation

- To enhance safety with intelligent alarm management
 - To ensure operational integrity
 - To use simulation software to further optimize production
 - To enhance training and retraining of operators by using more dynamic simulations
 - Keep operator training system (OTS) up to date for them to be useful

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Thank you very much

Claudia Paarmann