2014 Honeywell Users Group Asia Pacific

7 Reasons to Justify an Operator Training Simulator

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Seven Reasons

• Introduction
• Background:
  – What is an Operator Training Simulator?
  – Benefits for new construction and existing process units.
• Seven Reasons
What is an Operator Training Simulator?
Reason 1: Stuff Happens

“This is what we in the training department call a teachable moment.”
1: Abnormal Situations

• Operator error accounts for the highest dollar losses per incident in the process industries.
• Train for Airplane Abnormal Situations?

• Precious time: need instinctive response
• Train for probable events
• Train to minimize the number, duration and impact.
• Abnormal Situations should not be a teachable moment.. but they can become....
  – future training scenarios
2: Improve Operator Competency

Operator Performance
- Confidence
- Understand process
- Execution of procedures
- Control system use
- Upset management
- Process adjustment frequency
- Task completion

External
- Reviews by authorities
- Insurance costs
- Customer complaints

Work Environment
- Stress
- Morale
- Absenteeism
- Retention

Performance
- Number of incidents
- Product Specification
- Operating costs

Evidence of Competency Gaps – Leading and Lagging Indicators
2: Operator Competency Management

- Replicate the performance of your best operator, every day, every shift
- Converting an operator from average or below average productivity to above average productivity can improve the bottom line
- UniSim Operations Suite (OTS) supports operator competency management with:
  - ASM Consortium operator competency model integration
  - Comprehensive performance assessment (Scoring; Checklists; Competencies);
  - Scenario libraries mapped to competencies
  - Operator performance dashboards
  - New services for OTS training.
2: Competency Library

• Define and monitor the competency model (responsibilities, competencies, behaviours and proficiencies).

• UniSim Operations optional competency library: a customizable library based on ASM research seeded with data related to the following three categories:
  – Core Console and Field Operator Responsibilities
  – Foundational Console and Field Operator Responsibilities
  – Console Operator Responsibilities

• Better use of simulator – Competencies evaluated using OTS UniSim Exercises and non simulator training.
  – It’s not just about how to operator the process but how to do so confidently with all the requisite skills, knowledge and experience.
  – Airline Industry Example: Critically important “Crew Resource Management” training on time critical interactions including interpersonal communication, leadership, and decision making in the cockpit.
2: Operator Competency: What if....

• What if...
  – You did replicate the performance of your best operator every day, every shift?
  – You could count on consistent predictable operation, with optimal quality regardless of who was working the night shift?
  – You came in after the long weekend and did not have to be distracted by “What Happened and Why?”

• Great operational performance, fewer incidents, high quality, predictable performance...
  – Great work environment...
3: What Happened to Simple?

- Safety, reliability, efficiency, and technology have all combined to make operating today’s process unit a very complex activity.
- Operators control more assets using more control loops with complex safety and automation sequence.
- Operator’s function resembles the responsibility of a pilot with similar levels of consequences if a failure occurs.
Can “Fear” be a justification or motivation for an OTS?
- Due Diligence: Media, Litigation, Personal/Public Safety,
- The Unknown: Complex sequences and automation systems, process stability, confidence in operators capability under pressure or in face of multiple events.

No doubt fear is an effective motivator….
- Confidence is the goal, consequence is the justification

Why do airline pilots use simulators for training?
- Complex equipment, costly assets, catastrophic consequences…. training on what if, hoping never.

Why should operators use simulators for training?
- Complex equipment, costly assets, catastrophic consequences…. training on what if, hoping never.
- A confident operator → High Performance
4: Field

- Trained field operator?
- Use the OTS to provide credible, effective Field Operator training.
- Take a virtual tour of the plant to observe all the key process and control equipment.
- Interact with instrumentation and equipment.
- Navigate from one location to another to execute tasks like in the real plant SAFELY, RELIABLY, without usual RISK!
- Field Operator training integrated with the UniSim OTS
  - 2D Panorama (Google Earth style) using photographs
  - 3D interactive models
  - Integrate with knowledge management and operator competency management tools
4: Simulator Training for Field Operators

• 2D: High resolution photographs to produce a 360 Degree panoramic representation of what the operator would see at various key locations around the plant.

Navigational hotspots give the operator choices on how to navigate through the virtual plant.
4: Realistic Field Operator Training

- Hotspots to call up faceplates to permit interaction with equipment and the simulator model.
- Field measurements from simulation model.
- Minimize mistakes via credible experience.
4: Field and Console Operator Training

- This solution of integrated field and console operator training provided additional benefits compared to traditional methods:
  - Allows field operator to visually interact with the process, increasing the realism of the exercise and generating near real world experiences quickly and safely.
  - Uses standard technologies for easy execution, update and maintenance reducing cycle time and life time costs.
  - Increases operator knowledge of plant topology
  - Links the real plant to the simulation in a compelling and engaging way
5 Experience for the Inexperienced

- Experience … obtaining it takes a long time.
- Experience … importing it is expensive and not always viable.

- New Construction Business Drivers:
  - Equipment, Process and Personnel Safety; Orderly, efficient start-up and commissioning with steady ongoing operations at peak performance.

- Enabler: Custom OTS:
  - Evaluate, select and develop experienced competent operators.
  - Validate, correct and improve, prior to commissioning, the process design, process controls, logic and safety systems, and operator interface. (Many simulation model investments have paid for itself here)
  - Develop procedures using OTS.
5 Benefits of Experience

• Familiar process behaviours deliver safer, faster, more stable commissioning and start-up.
• Accredited commissioning and start-up benefits in terms of days and weeks of production.
• Additional sources of benefits from experience:
  – reduction in severity and impact of malfunctions, abnormal events, and improved capability to operate towards optimal conditions against key performance indicators
  – reduction in start-up and shutdown time and related incidents.
6 On-going Operations

• Operator performance is critical to process safety, reliability and operating profit.

• Looking back (Unit operating performance)....
  – Minimizing impact by knowing how to react to abnormal events....
    “Stuff Happens”
  – Fast, instinctive, right the first time, responses to minimize degree and propagation into a chain of events.
  – A confident operator .... high performance

• What else…
  – Experimentation… a tool to explore process improvements without risking equipment or production is very compelling.
  – Reliability… a steady and stable process unit is a reliable process unit, extending catalyst life, time between maintenance outages, etc.
  – APC… when a unit runs in ‘Automatic’ a simulator provides missing experience without impacting daily operations and profitability
7 Retirements and Less Operators

• Shrinking pool of experienced & competent operators due to retiring workforce
• Need to do more with new employees
• Competition for experienced competent workers.
• Don’t let in-house experience walk out the door….  
• Avoid hiring them back as consultants
• Use knowledge based training with the OTS as a tool to capture, retain and propagate experience and knowledge.
  – Capture knowledge and experience via a knowledge based application capable of detailing plant operating ranges, excursions, prediction, prognosis, cause and effects and diagnostics.
  – Utilizes pattern recognition, situational awareness.
  – Develop, practice and evaluate troubleshooting skills.
7 Capture knowledge for the future

• Provides a training focus on small problems which involve specific operations knowledge and cognitive skills in contrast to the larger scope of an OTS model exercise.
• Provide a more human factor focus on the training objectives against specific knowledge and experience.
• As the knowledge base grow… so grows the capabilities of the knowledge management and training system.
• As a supplement for the OTS, an effective systematic tool for capturing and passing on knowledge and experience reinforced by the OTS.
• Evaluate similar to the OTS, Score, record and analyze the results of training
• Confidently secure your future.
Simulation Benefits for Commissioning

- Procedure Development
- Design verification
- Control system verification
- Loop tuning
- HAZOP Studies

- Start up and shut down evaluation
- Operator Training
- Advanced control
- ESD Testing before start up
Seven Reasons

1. Stuff Happens, Abnormal Situations
2. Competency Management
3. Complexity
4. Field
5. Experience for the Inexperienced
6. Benefits accrued to on-going operations
7. Retirements and efficiency requests. Knowledge and Experience propagation

Competent and experienced operators, intimately familiar with the process unit, confident in their capabilities for the job at hand will reliably and safely deliver superior performance.
Remember.....

• Obtaining Experience takes a long time
• Cannot afford to let mistakes be teachable moments.
• Errors hurt profits, production, lives, equipment, and environment.
• Lessons learned, practiced and taught are the ones best remembered.
• Practice creates more instinctive responses.
• Responsible stable Operation. You can’t buy it … you capture it, teach it and practice it.
• A confident operations team is a high performing operations team