3D-enabled Training for the Workforce in Power Plant

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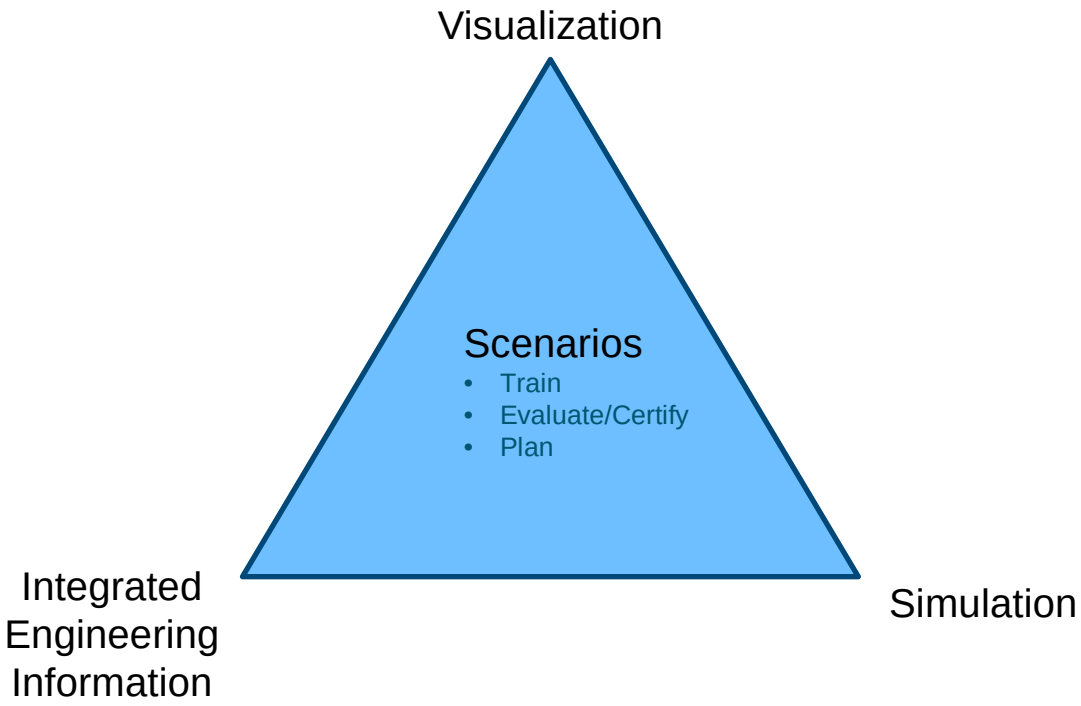
3D PACT Framework

- 3D PACT is a way to enhance your existing Smart3D assets and other SPE engineering information to add continuous operational value by allowing quick, easy compilation of flexible, interactive training and planning modules



3D PACT Framework Elements

- **Visualization Framework**
  - Engine based on the latest video gaming technology
  - Animations
  - Particle Effects
  - Dynamic Physics on full model
  - Character System with Damage
  - Advanced distance and occlusion culling for real-time navigation of large, complex models
  - Crane and Hoist builder to enable all cranes in model to become active
  - Markers, Tags and Props can be added quickly
  - Customize look and feel of scene, incl. textures on equipment, lighting, environment, sky, etc.

3D PACT Framework Elements

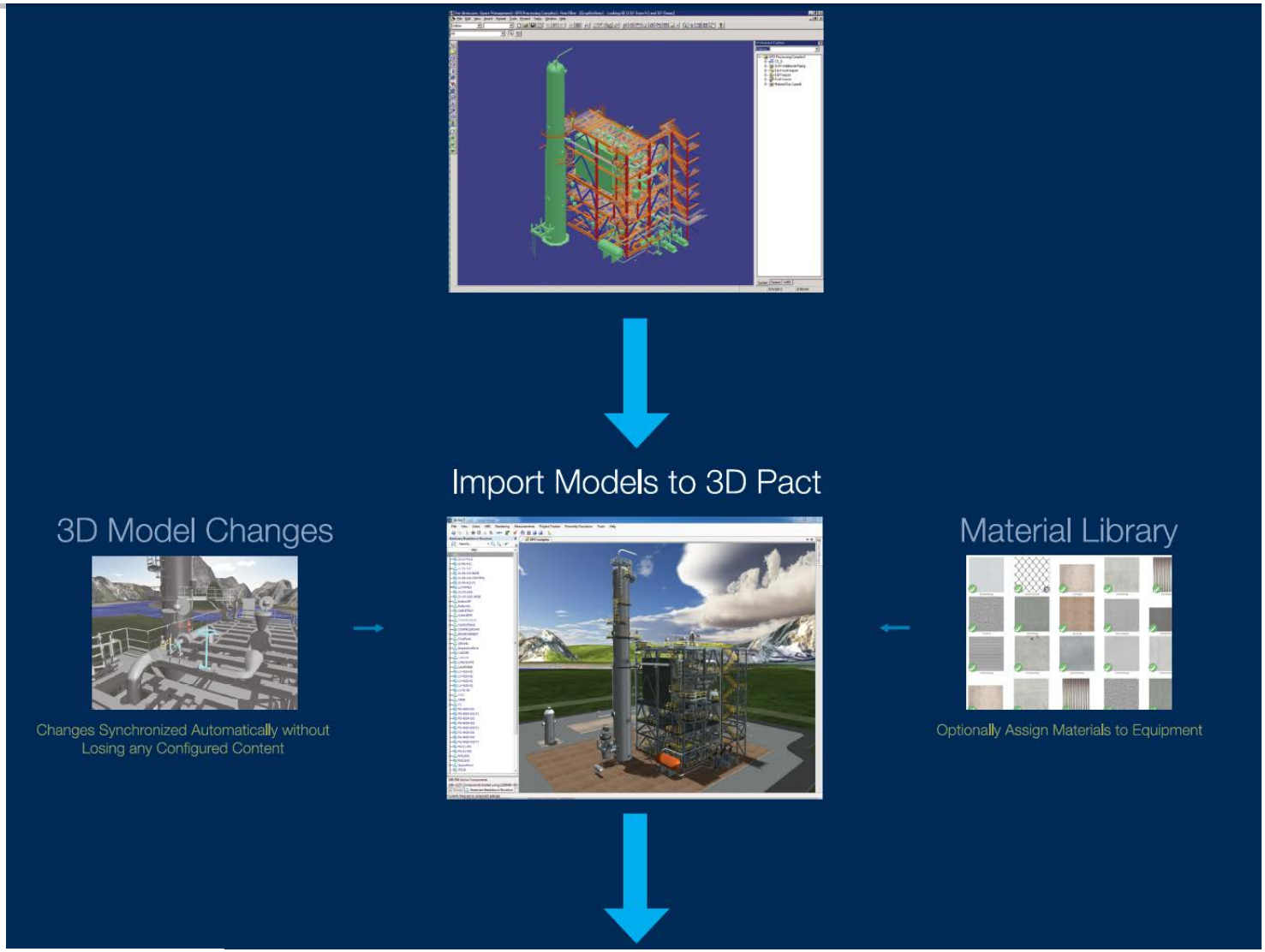
- **Integrated Engineering Information Framework**
  - Link to existing SPE and other design information and data
  - Linked information can act as building blocks for, or supplement training programs
  - Capture knowledge of experienced personnel in a variety of ways

- **Simulation Framework**
  - High Fidelity simulation of your full plant, including all process (Systems CFD), electrical and control systems
  - Seamlessly connect simulation to 3D PACT for visualization or inclusion in training program

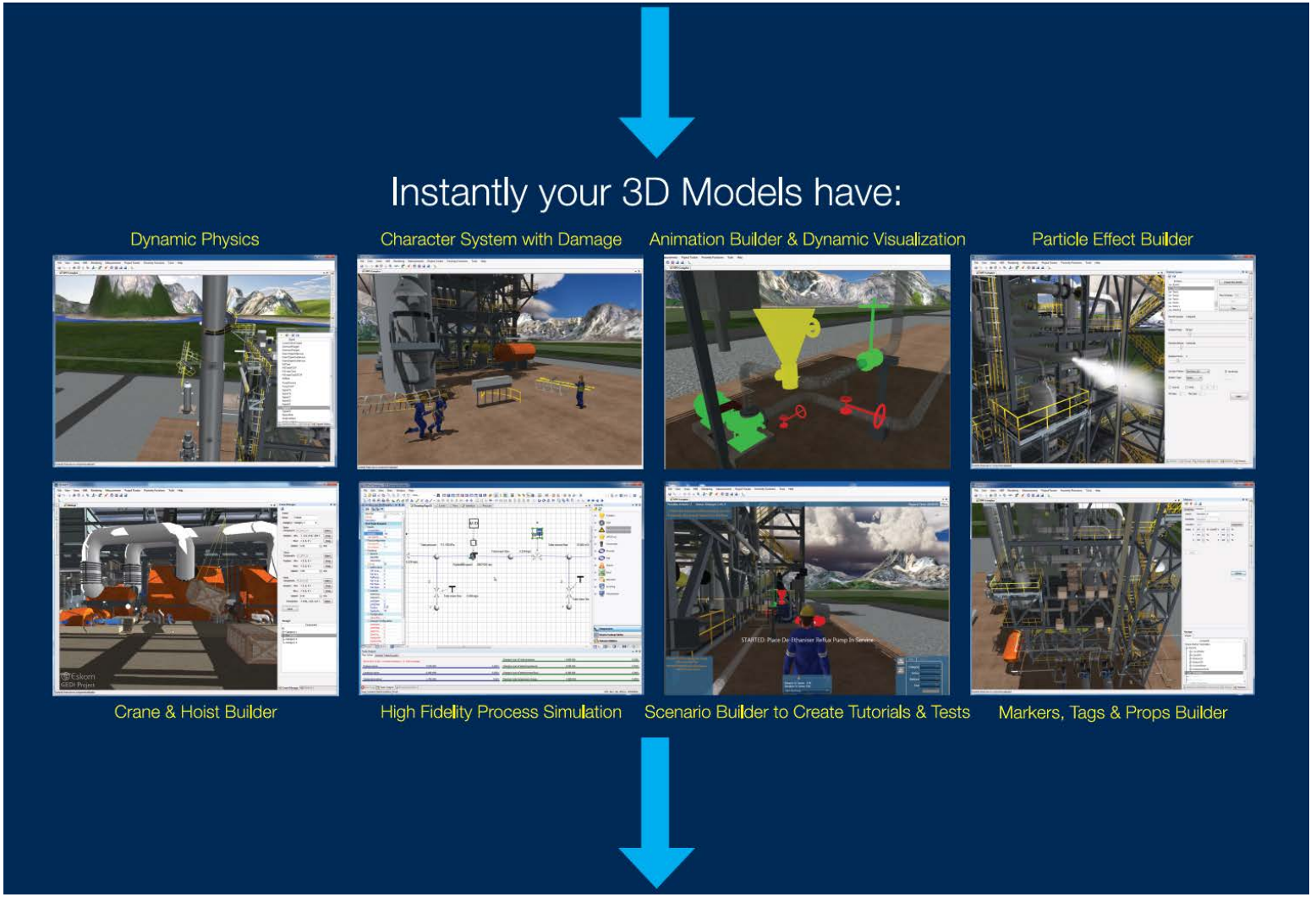
3D PACT Framework Elements

- **Scenario Framework**
  - Effectively consolidate the visualization, plant information and (optional) simulation frameworks
  - Intuitive, powerful user interface, allowing easy and efficient creation of:
    - Interactive tutorials
    - Interactive tests/evaluations
    - Training and Induction videos
    - Simulations for HAZOP review and explanation of events
  - Supports both Instructor-Led and Instructorless training and evaluation
  - Enables knowledge capture from experienced staff and automatic inclusion of this knowledge in training

3D PACT Workflow – First Steps



3D PACT Workflow – Toolboxes



3D PACT Workflow - Scenarios

Comprehensive Training, Testing and Production Support

Clearance Records
Lock-out/Tag-out Procedures

System Descriptions
Commissioning Procedures
Operating Procedures

Logistics Planning

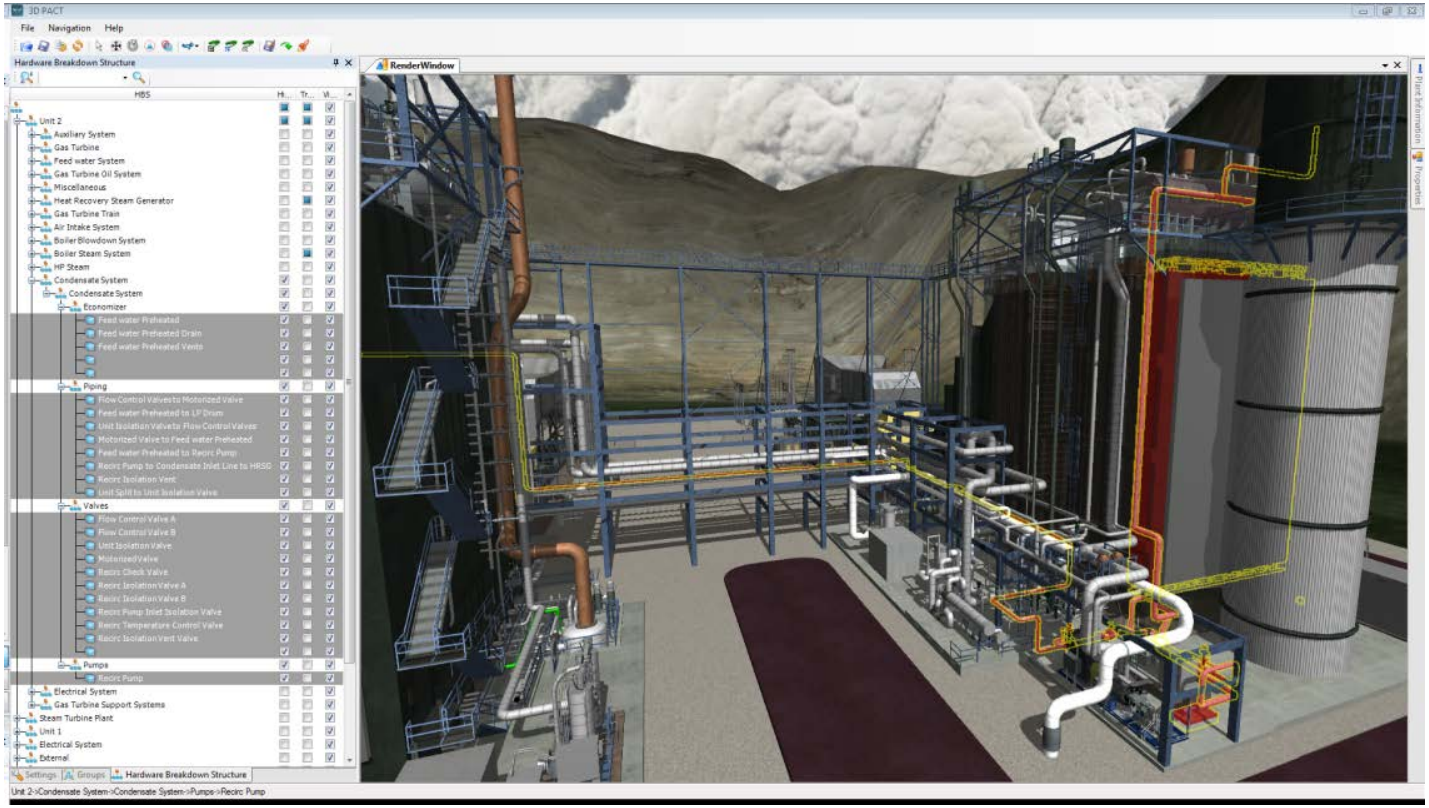
Inspection Procedures
Emergency Procedures

Maintenance Instructions
Maintenance Procedures
Maintenance/Outage Schedules

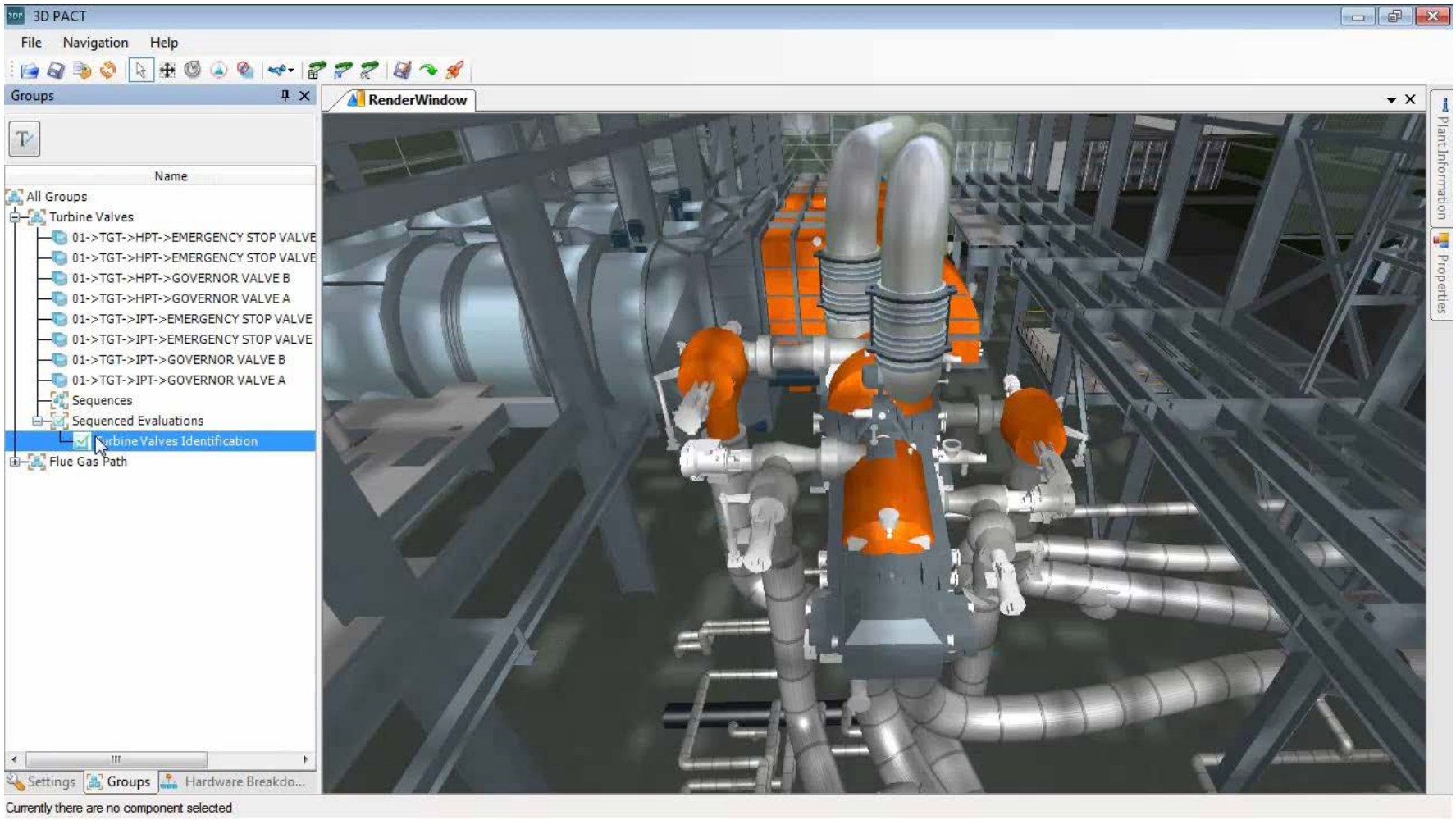
Construction Schedules

System Identification

- **Increase and Evaluate Staff's Knowledge of Plant Systems**
  - Tracing and 'walking' a system to identify it on the plant and view interconnections and dependencies between processes first hand.



System Identification

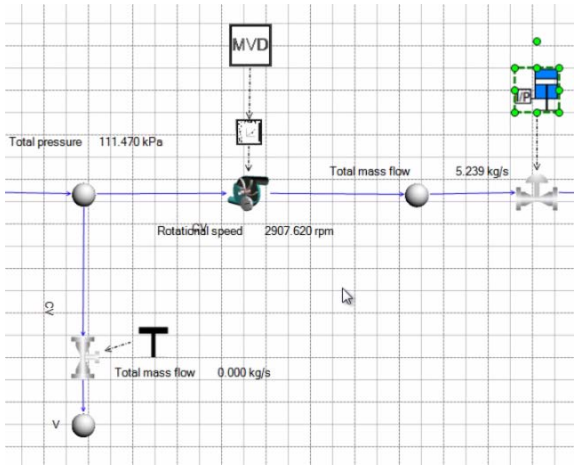


Video courtesy of Eskom GEDI Project

System Operations

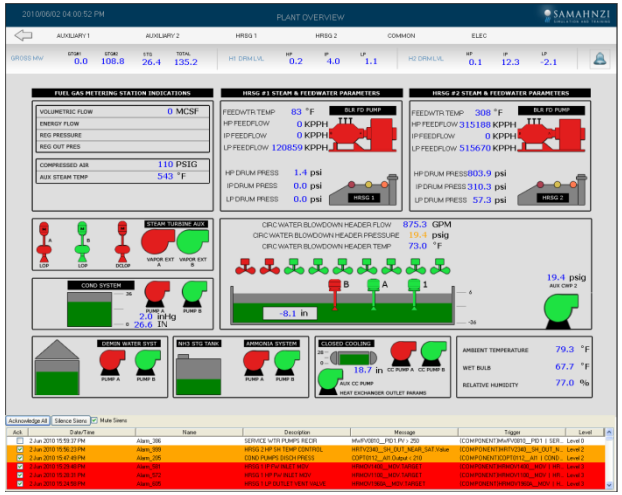
- **Increase and Evaluate Effective Teamwork & Ability to Operate the Plant**
  - Performing operating sequences on the plant (as individual or crew):
    - Commissioning,
    - Startups, Shutdowns, Abnormal/Infrequent Operations,
    - Emergency Operations, etc.

Field



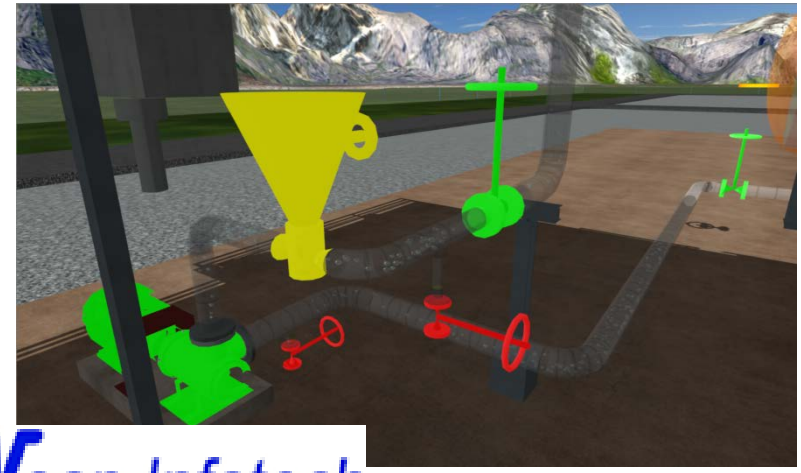
Simulation

Control Room



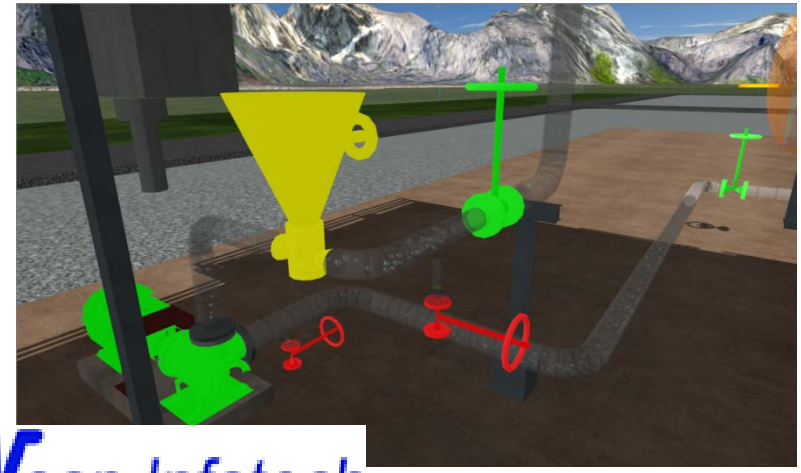
System Operations

- **Field Operations**



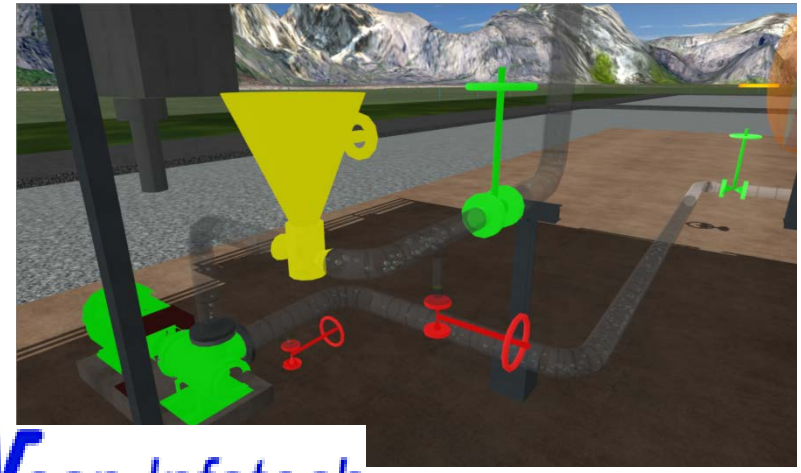
System Operations

- **Field Operations**



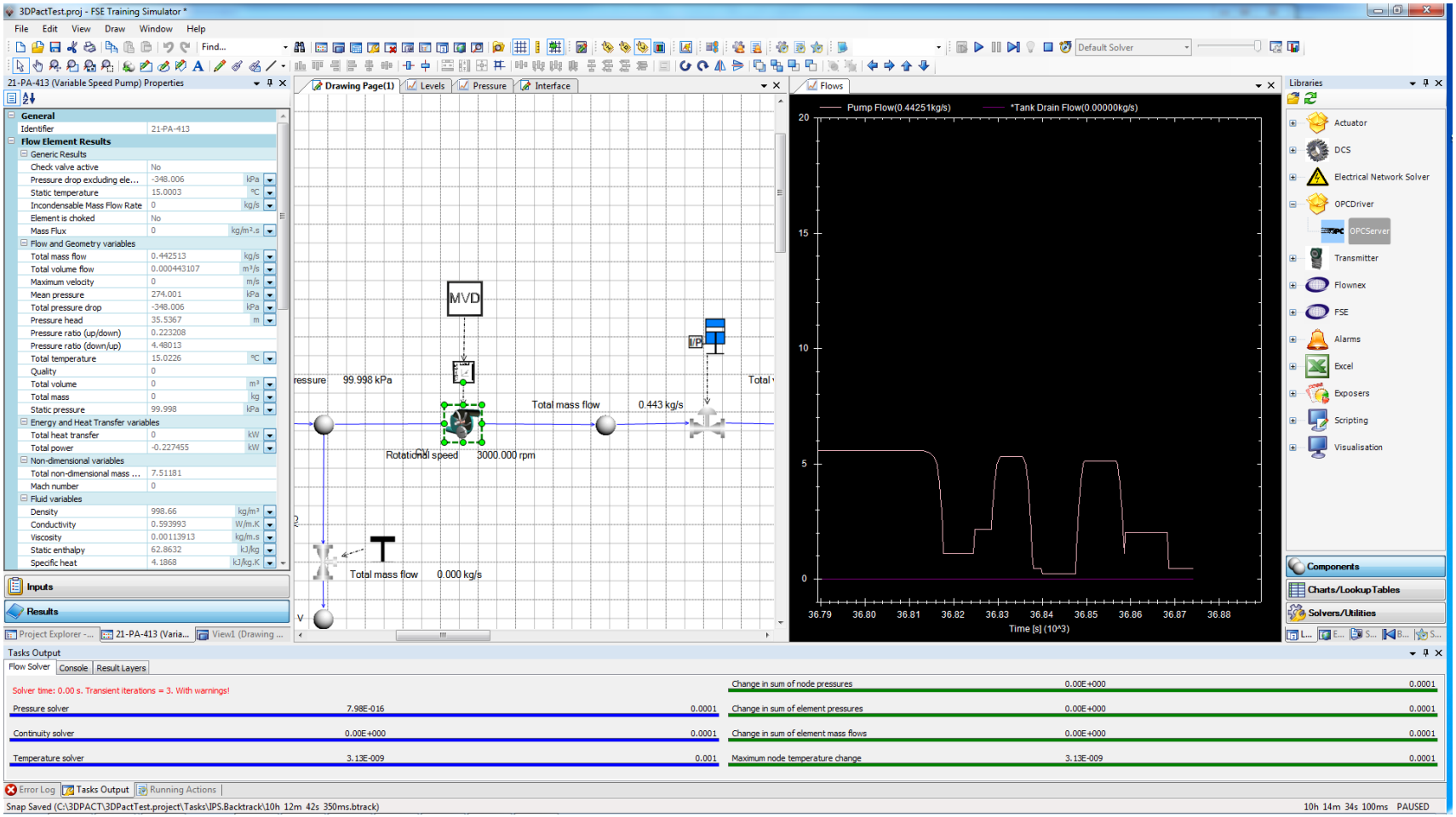
System Operations

- **Field Operations**



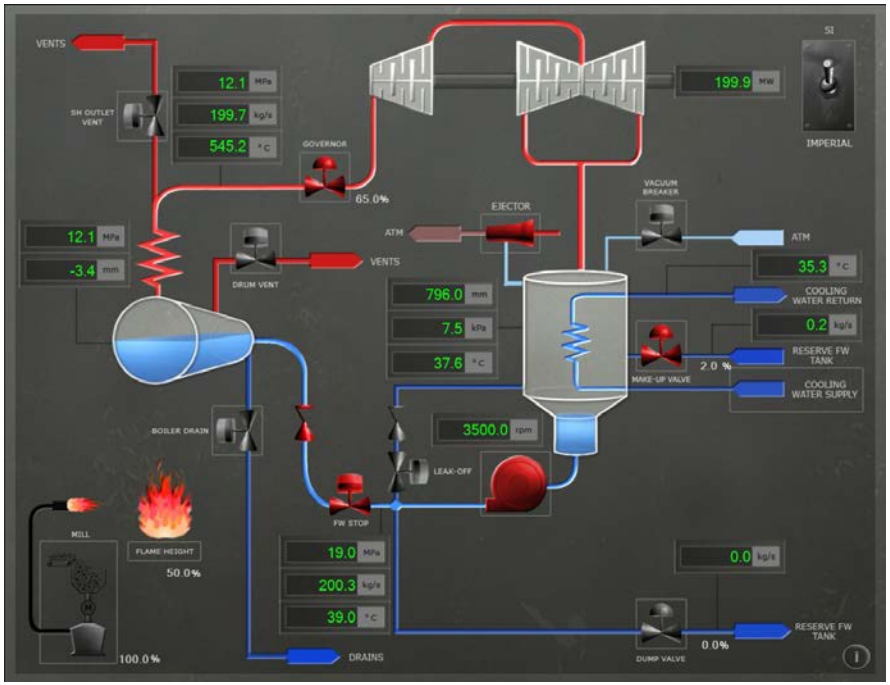
System Operations

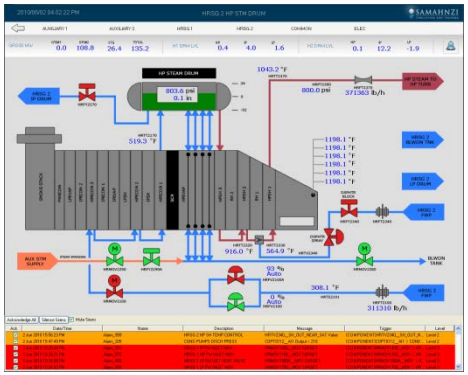
- **Integrated 3D PACT or 3rd Party Simulation of Plant (Optional)**

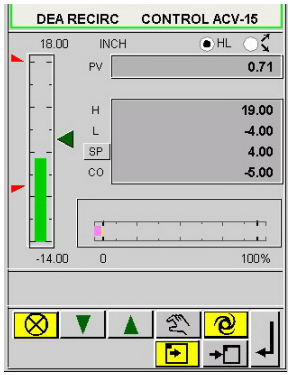


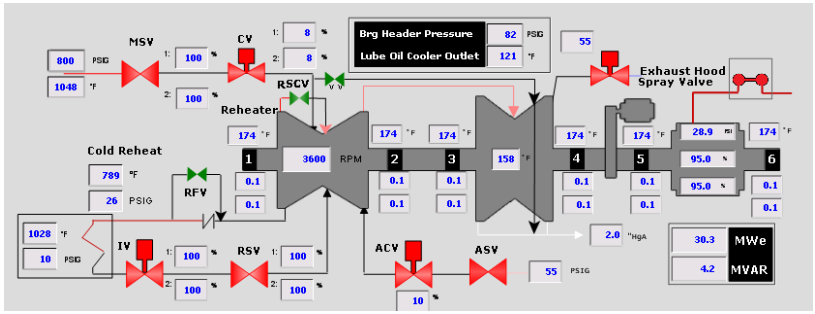
System Operations

- **Control Room Operations**
  - If Plant Simulation is available, all control room operations can be included in training programs, enabling effective, multi-disciplinary crew training

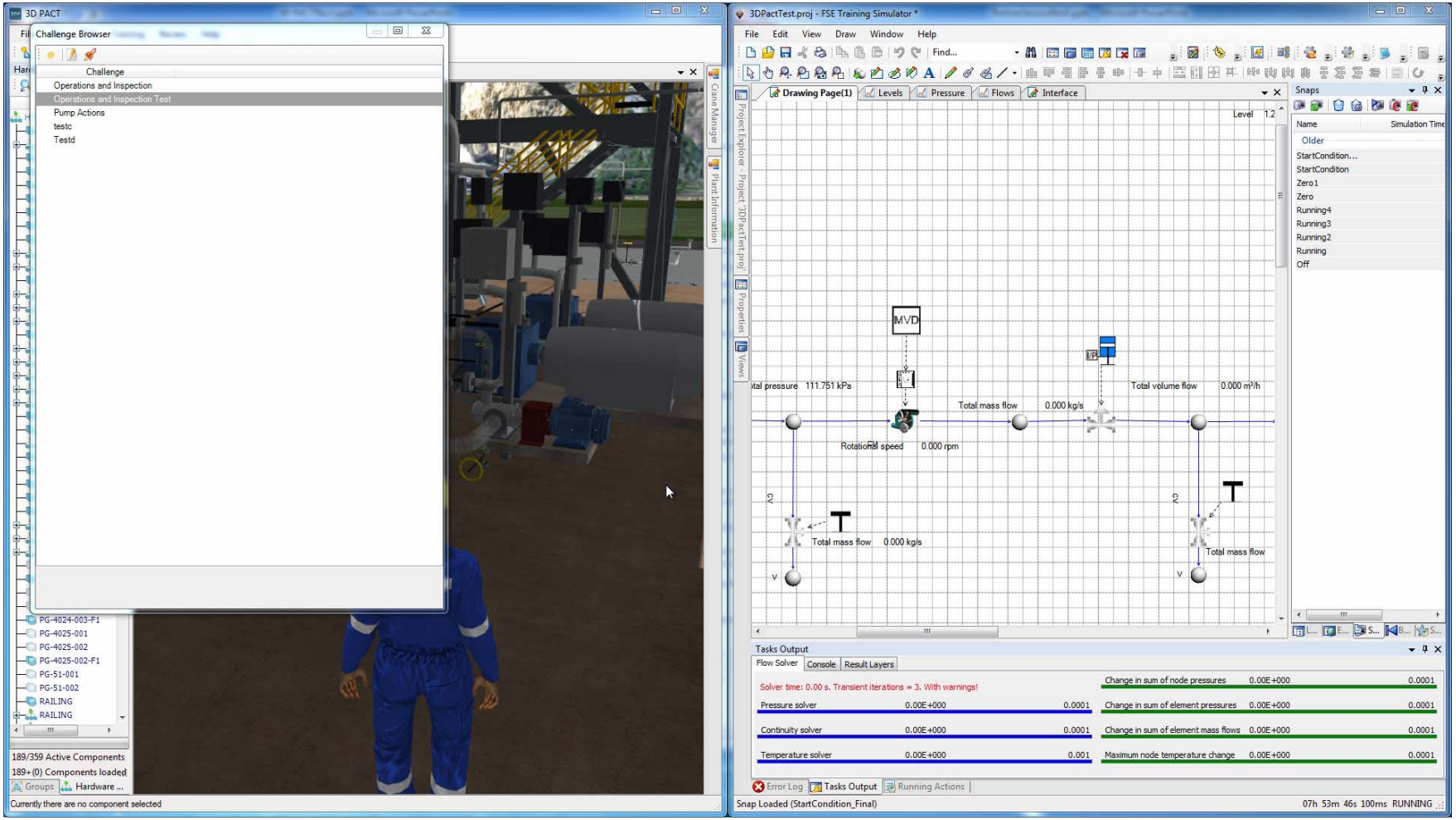






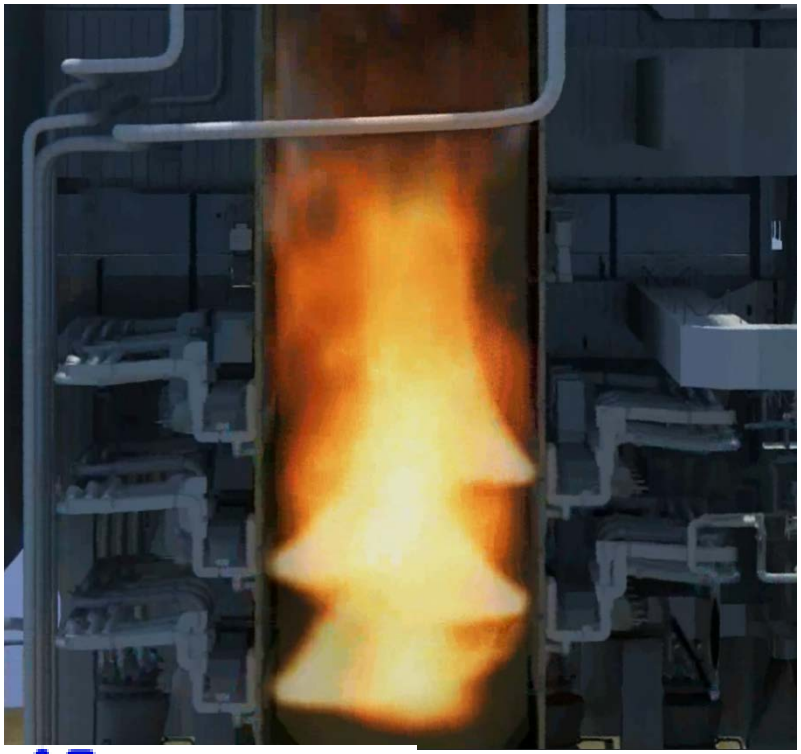


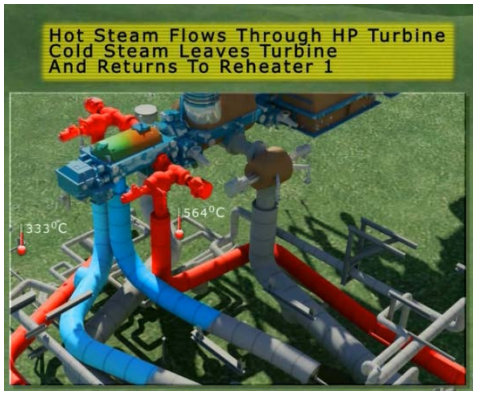
System Operations



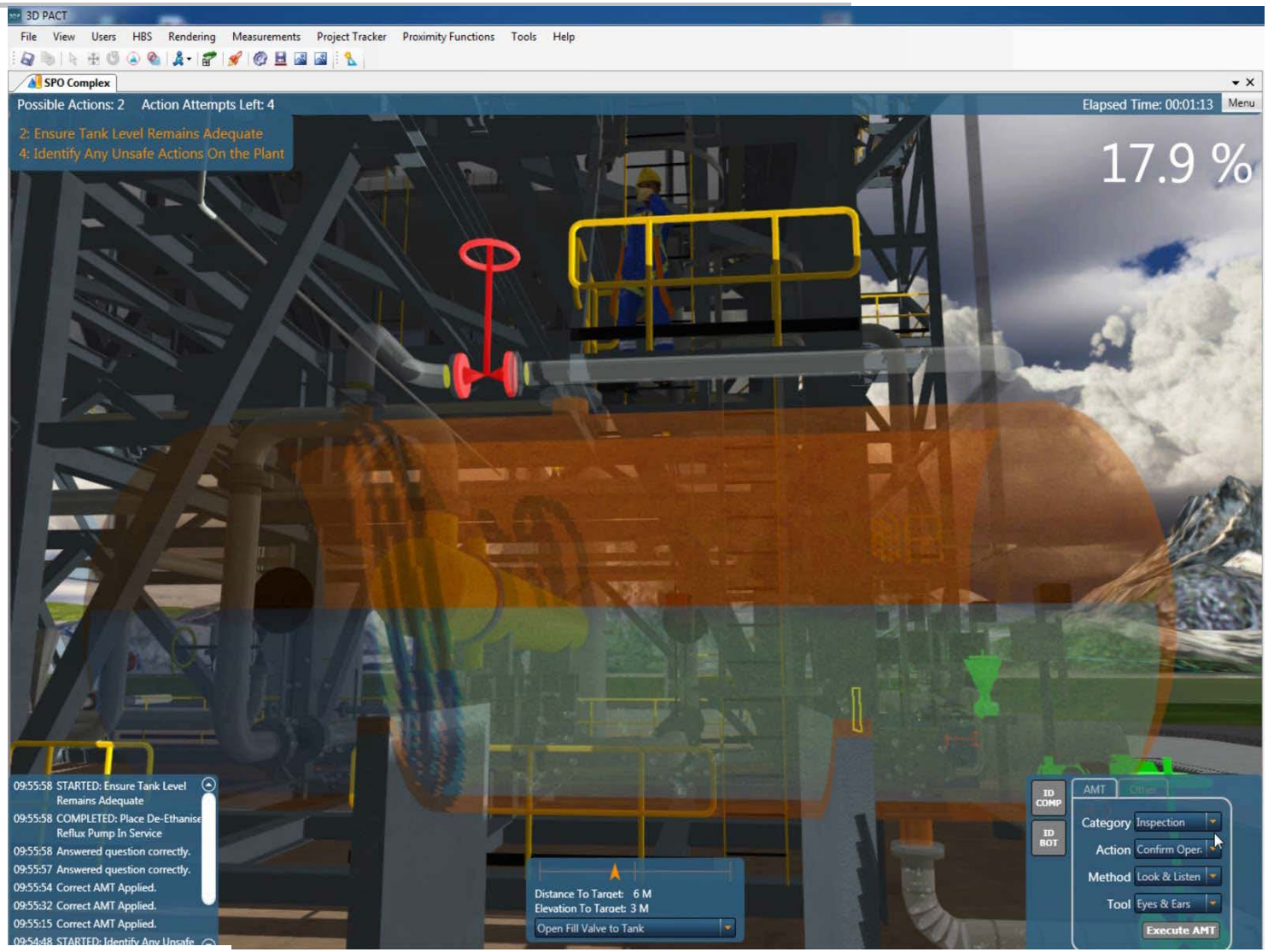
Equipment Operations

- **Increase Staff's Understanding of Process Phenomena**:
  - Viewing and navigating the internals of equipment and going to areas and spaces which is impossible to access under normal conditions on the actual plant, such as internals of boilers, turbines, generators etc.



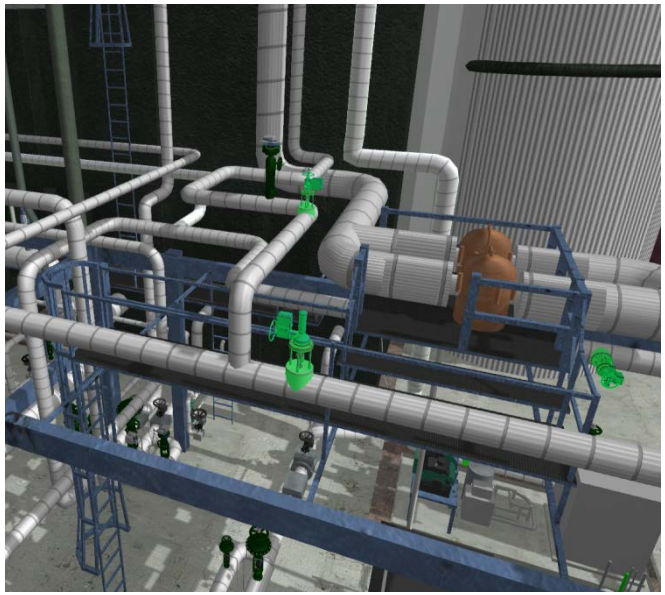


Equipment Operations

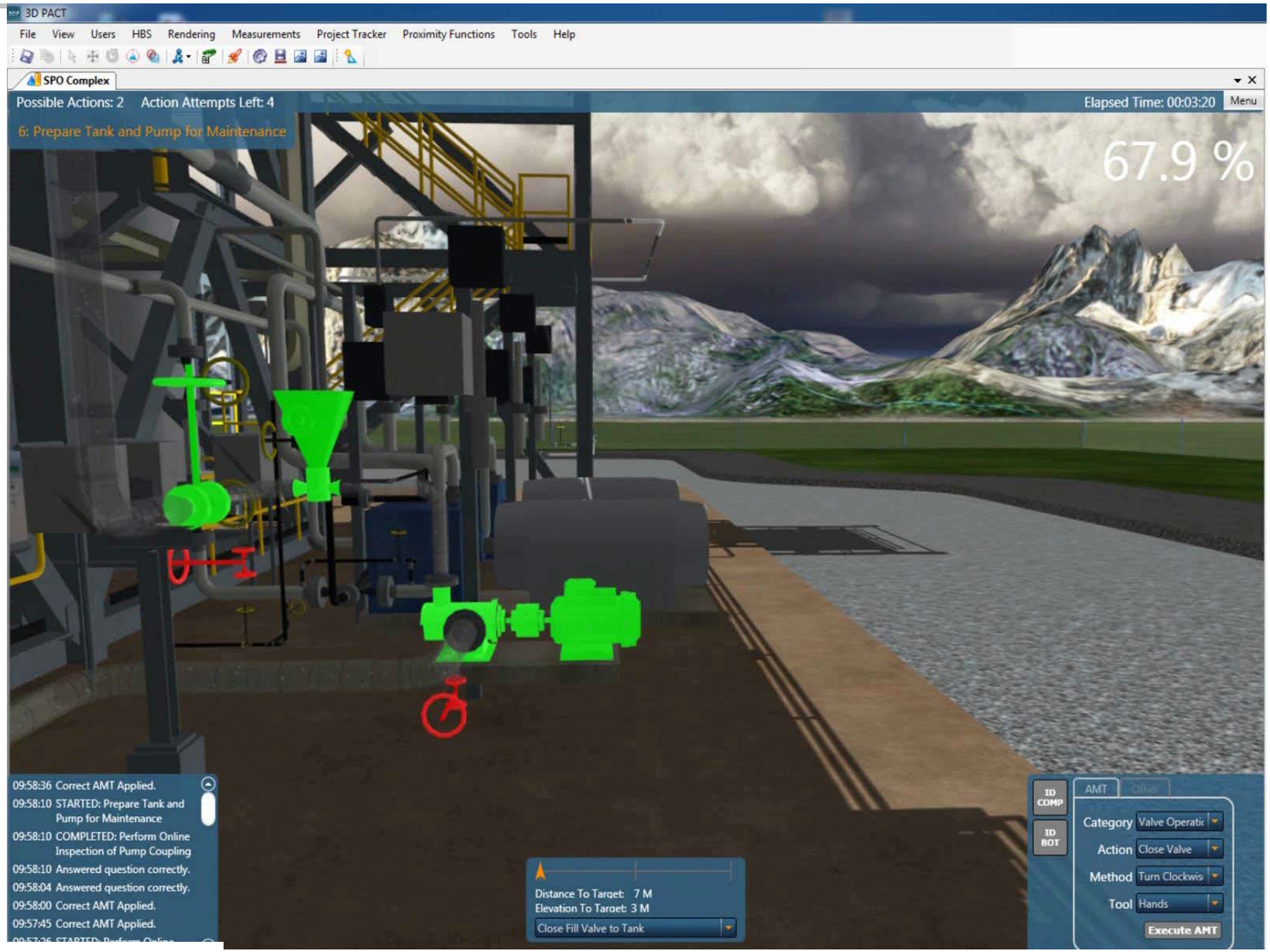


Clearance and Isolation Procedures

- **Ensure Staff can Execute Lock-Out/Tag-Out Procedures and Render Equipment Safe to Work on**:
  - Equipment isolation procedures can be efficiently trained, reviewed and evaluated before executing such isolations and work on the actual plant.
  - Also, the process to register a defect/deficiency, implement modifications, filling out check sheets/reports and updating drawings can be incorporated

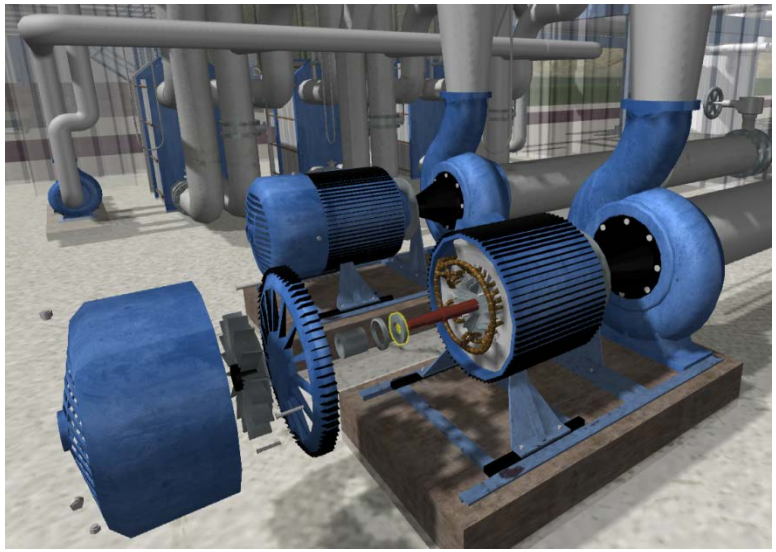


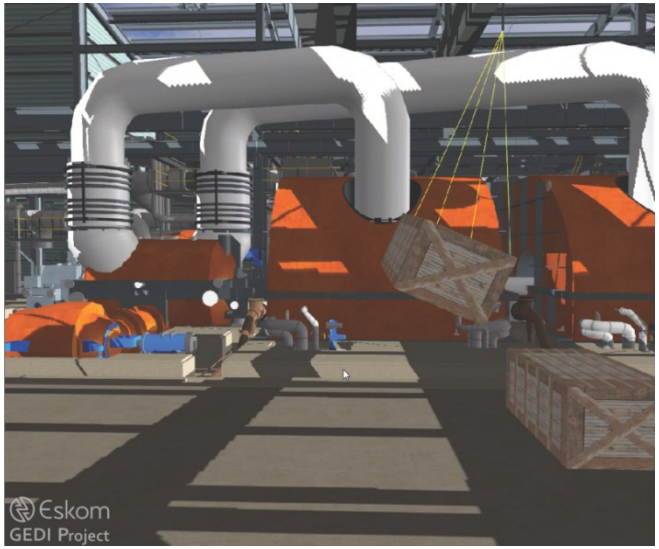
Clearance and Isolation Procedures



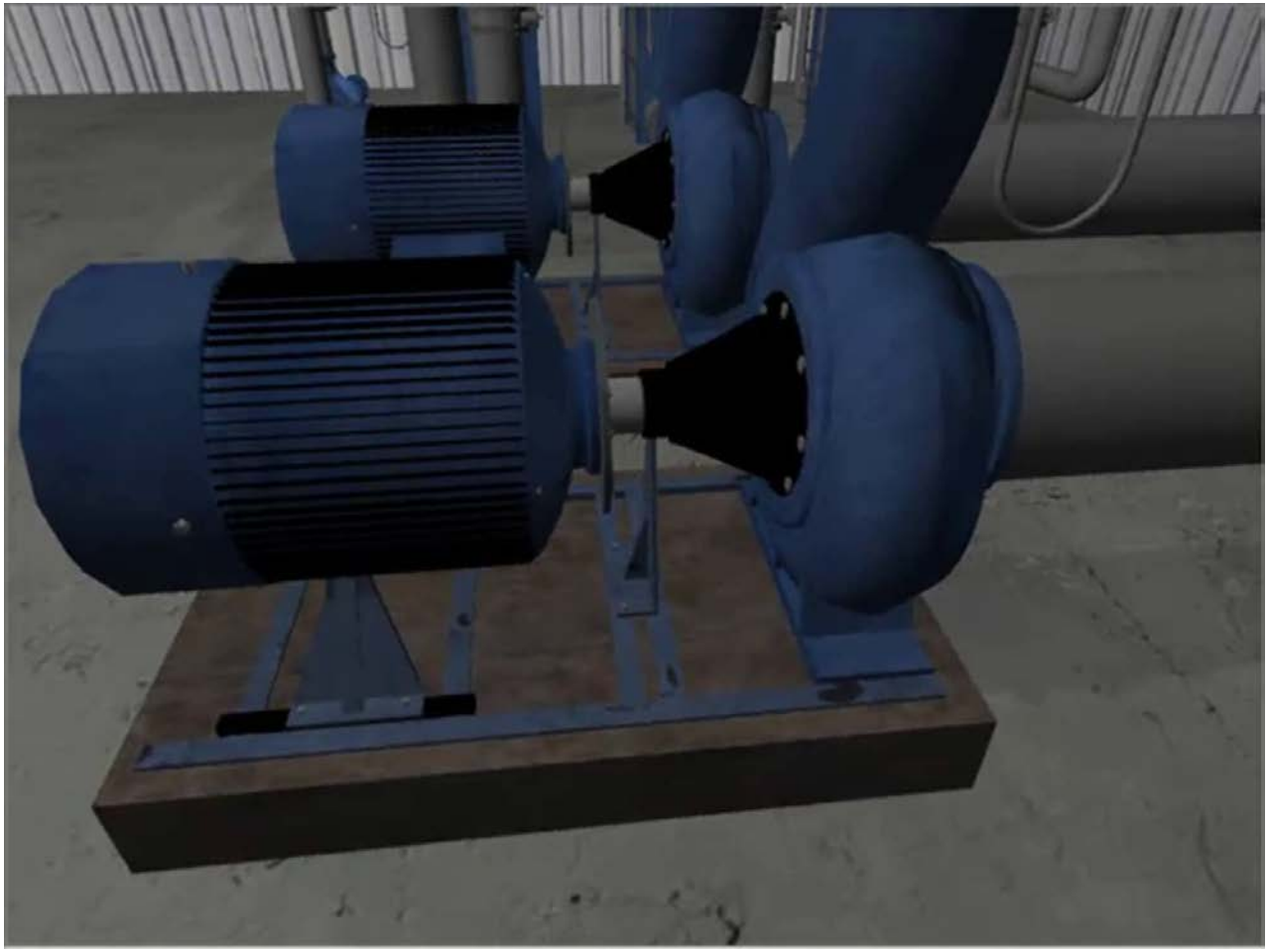
Maintenance Training and Planning

- **Train and Evaluate Staff on a Range of Maintenance Tasks and Activities**
  - Planning complex and time critical maintenance tasks to perform them as safely and quickly as possible to limit production loss to a minimum
  - Detailed instructions, visualization and evaluation of disassembling/ assembling equipment, including tools and PPE to be used
  - Includes crane/hoist movement and space management

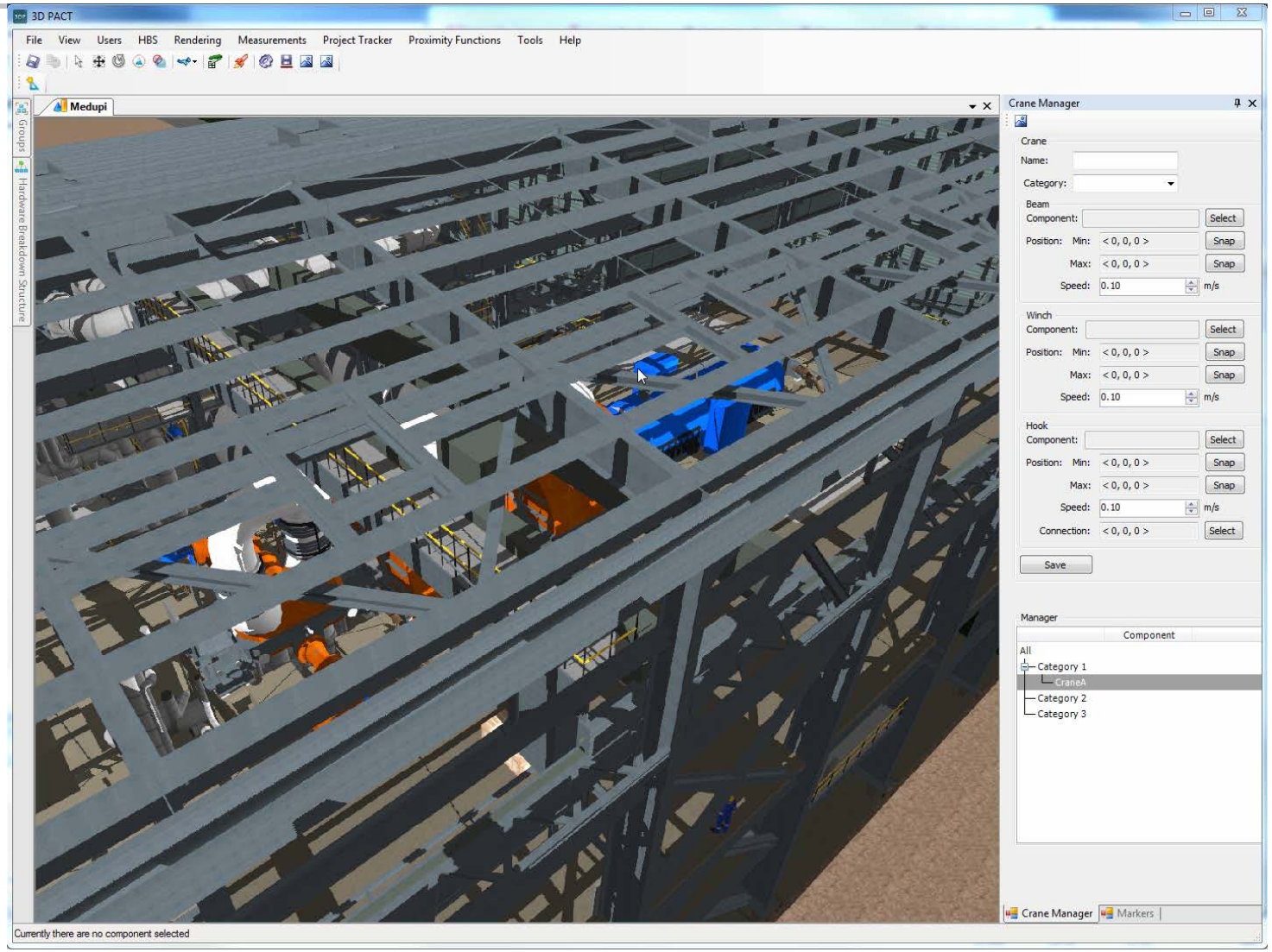




Maintenance Training and Planning (Disassembly/Assembly)



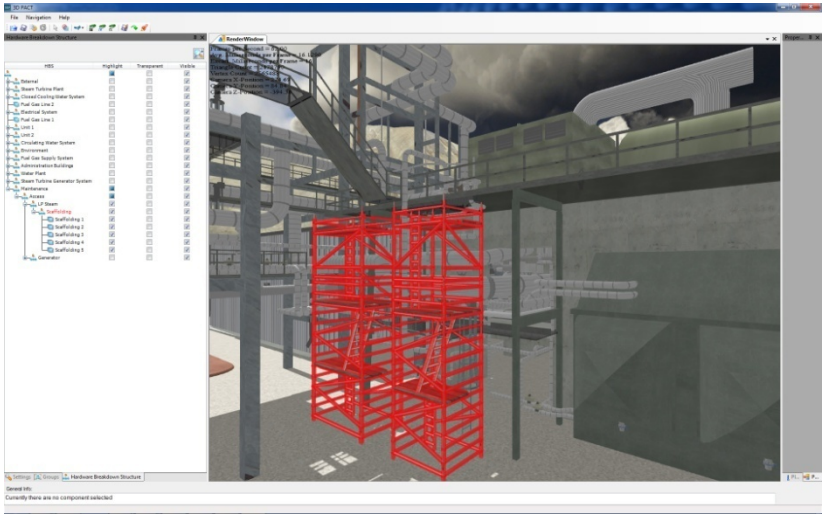
Maintenance Training and Planning (Cranes)



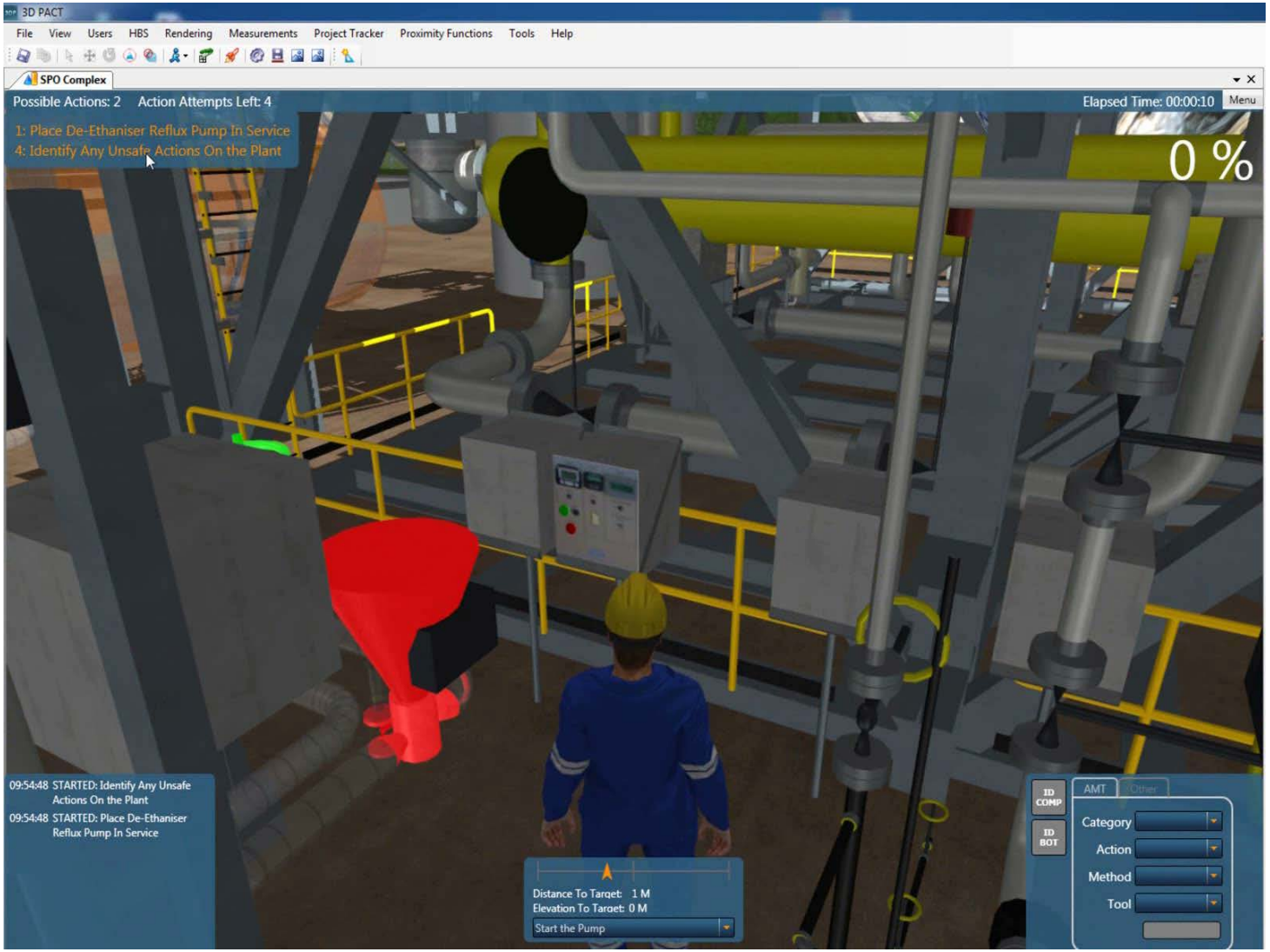
Video courtesy of Eskom GEDI Project

Maintenance Training and Planning

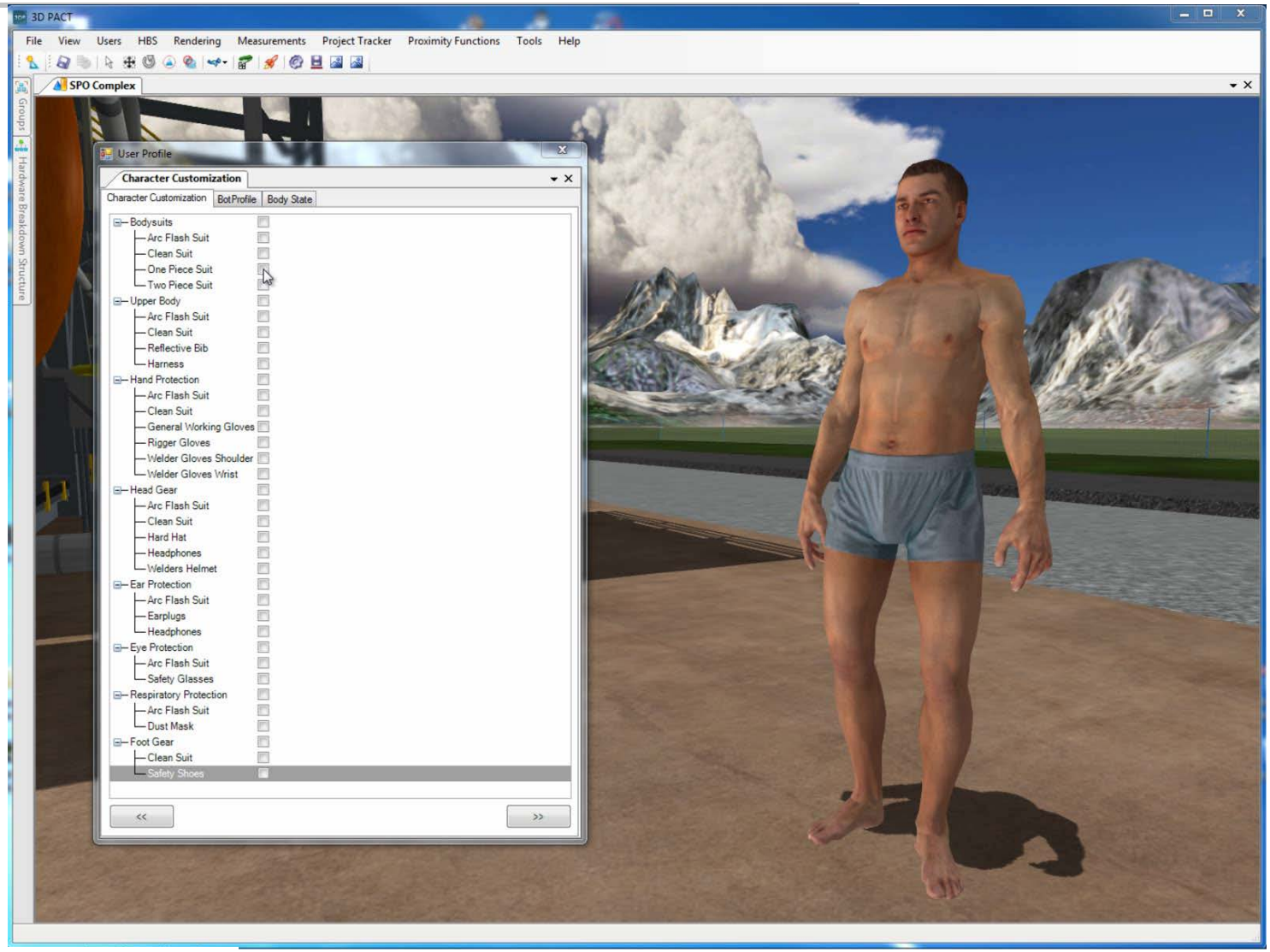
- **Ensure Staff is Aware of Correct Protective Gear and Safety Procedures**
  - Trainees need to equip and are evaluated on using the correct Personal Protective equipment and Safety Gear for Operational and Maintenance tasks
  - Markers/Props can be placed in the scene at points where tasks need to be performed and specific actions associated to each marker/prop
  - During an evaluation as prerequisite to actions being performed, trainee needs to wear correct PPE and use correct tools



Maintenance Training and Planning (Props)

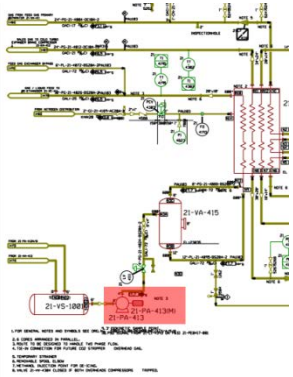


Maintenance Training and Planning (Avatar and PPE)



Inspection Training and Planning

- **Train and evaluate Staff to execute Inspections and Interpret Results**
  - Planning complex and time critical inspection tasks to perform them as safely and quickly as possible to limit production loss to a minimum
  - Trainees need to equip and are evaluated on using the correct Personal Protective equipment, Tools and Safety Gear for Inspection tasks
  - Trainees need to follow procedure, including filling out check sheet/report
  - Trainee is evaluated on following the safest path and approach to perform an inspection, especially on equipment located in hazardous areas



PUMP INSPECTION INSTRUCTION

INSTRUCTIONS: Run pumps weekly and record results in the appropriate column. Promptly correct any deficiencies found. The jockey pump stop point should equal the pump churn pressure plus the minimum static supply pressure. The jockey pump start point should be at least 0.68-bar (10-psi) less than the jockey pump stop point. The pump start point should be 0.34-bar (5-psi) less than the jockey pump start point. Use 0.68 bar (10-psi) increments for each additional pump. Leave the pump in automatic start mode after testing. Impairments should be managed via a formal procedure. Operate pumps for 30-minutes after repairs to insure proper operation.

LOCATION

ITEMS LISTED FOR TESTING **CORRECT READINGS** *USE SPACES BELOW TO RECORD TEST RESULTS*

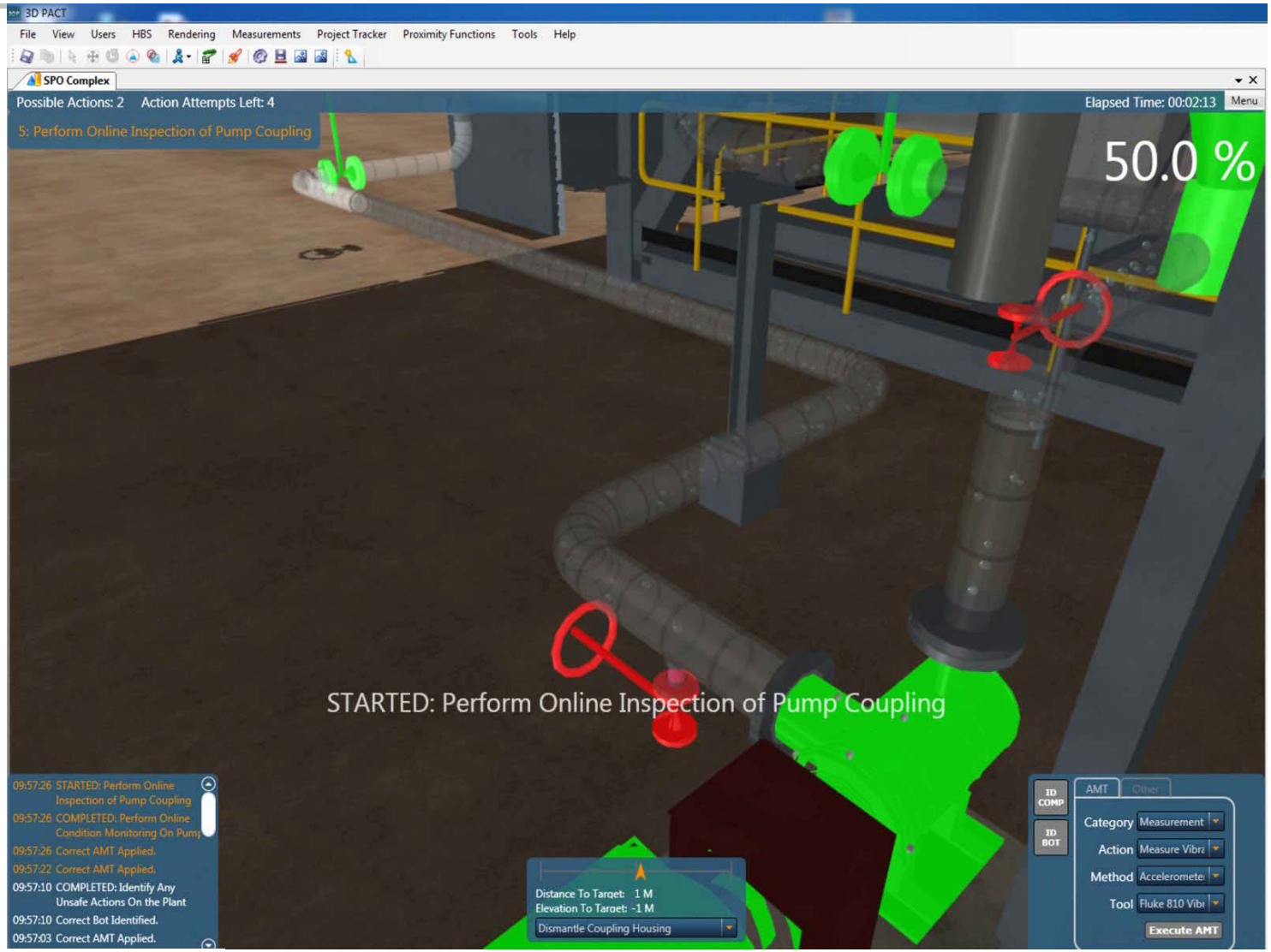
1ST WEEK 2ND WEEK 3RD WEEK 4TH WEEK 5TH WEEK 6TH WEEK

Certificate of Inspection of 21-PA-413

21-PA-413-0003

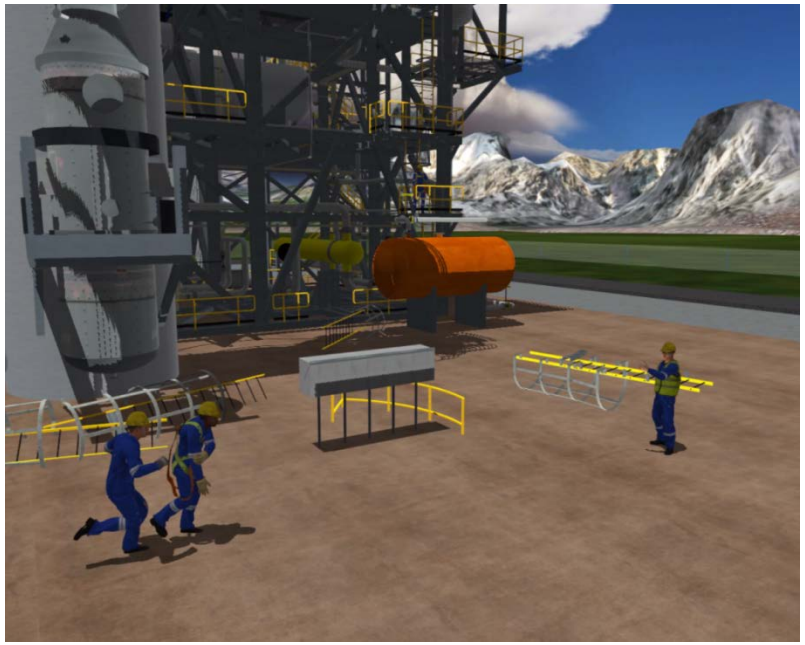
Item Tag:	21-PA-413	Plant:	SPO Processing Complex
Description:	DEETHANISER REFLUX PUMP	Area:	Natural Gas Liquids
		Unit.:	21

Inspection Training and Planning

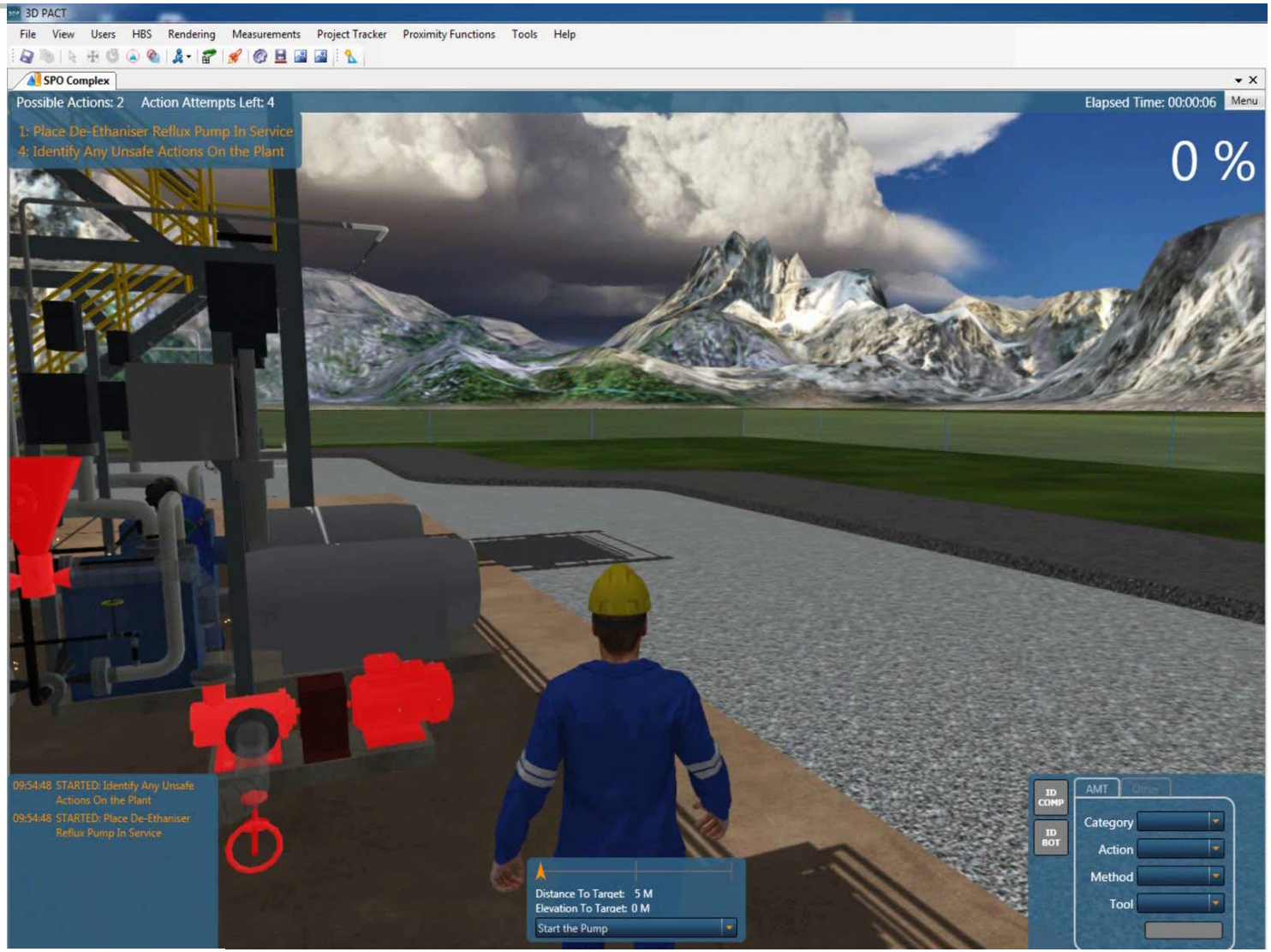


Emergency Response and Safety Training/Planning

- **Train and Evaluate Staff on Effective Handling of Emergency Situations**
  - Create awareness for potential threats or unsafe situations, including workers performing dangerous actions or performing work in an unsafe manner
  - Evaluate whether emergency response personnel knows which equipment to use and which procedures and routes to follow during emergencies

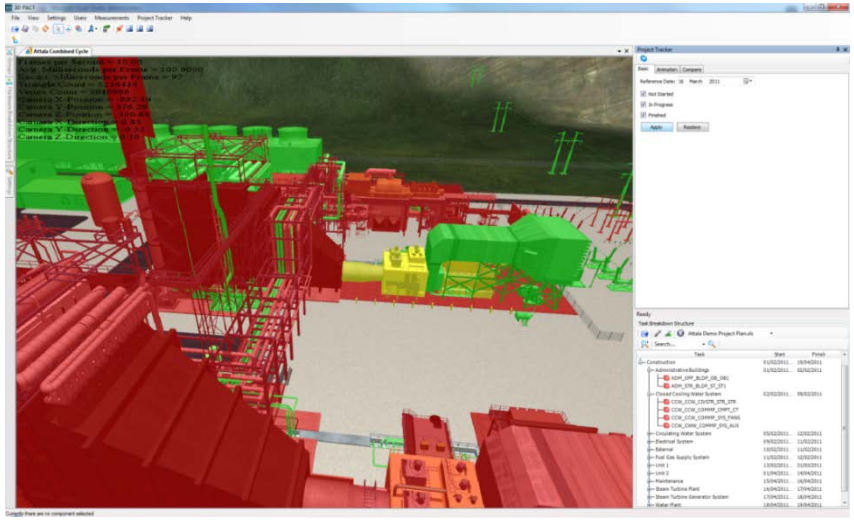


Emergency Response and Safety Training/Planning (Unsafe Action)



Schedule Tracking and Simulation

- **A Project Plan can be imported and equipment linked to tasks in the project plan**
  - Incorporate schedule as part of training to ensure critical path awareness
  - Indicate the status of the project at any given date/time
  - Simulate the project progress over time
  - Compare updated project plans with base plan and visually see changes



Scenario Builder

- Allows instructors to easily incorporate all 3D PACT features on top of SPE's integrated engineering information to compile training programs for comprehensive Instructor-led or Instructorless staff training and evaluation

Time and Motion Studies and Other

- Simulate the time it will take an employee to perform a task
- Simulate the amount of time it will take employees to evacuate a site or area
- Simulate the time it will take to perform an assembly/disassembly operation via crane/hoisting simulation
- Plan/evaluate site layout for outages
- Visualize real-time plant status and operational data remotely

Value Proposition

Business Problem	• Can plants permanently improve all technical staff training and skills by cost-effectively leveraging integrated engineering information?
Solution	• *3D PACT allows you to use existing integrated engineering information and capture know-how of experienced staff to permanently enable more efficient and enjoyable training and evaluation of staff at lower cost in a safe environment*
Benefits	• *Staff is more aware and knowledgeable of the plant systems and equipment and can perform tasks more efficiently and safer than before, increasing both productivity and profitability*
Future Plans/Strategy or Summary Statement	• *We plan to continuously evolve the software with the latest technology to enable a wider variety of tasks to be trained more efficiently without adding additional overhead and cost to the system*

Summary

- 3D PACT allows you a unique and powerful way to use existing integrated engineering information to easily build comprehensive, interactive and enjoyable training programs for technical staff training
- It allows you to capture knowledge of experienced staff in a way that not only automatically becomes part of all technical training but will always remain part of it
- It evolves technical training from mainly classroom and textbook training to mainly high-quality, hands-on, plant-based training while costing less and not compromising on safety
- It allows you to physically plan, evaluate and run through critical tasks before executing them on the actual plant to ensure time and cost is kept to a minimum while also ensuring that safety and quality is not compromised
- In contrast with other solutions that are mostly proprietary, limited and costly to maintain and upgrade, 3D PACT offers you an open, realistic environment with your plant as the canvas and a multitude of toolboxes where the training and planning scenarios you compile are only limited by your imagination and changing or maintaining content is intuitive and easy and can evolve and mature with the rest of your plant information and data

Thank You!

Neon Infotech