

NO SPECIAL GLASSES NEEDED

# Human and Operational Performance via 3D Modules

With the expanded use of 3D models for engineering design and construction, an excellent opportunity exists to leverage these model libraries into interactive platforms for a variety of operational uses.

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**RWD**®



3D is so much more than entertainment. RWD, a leader in human performance improvement, and i3D™ view this new technology as a systemic solution that can rapidly improve end-user performance and demonstrate tacit knowledge that is not often addressed in OSHA compliance requirements.

A challenge capital-intensive industries face is replacing the Baby Boomer workforce with the computer-savvy Generation X and Millennial workforce over the next four years. Industries like oil and gas, refining and power companies need to institutionalize their workforce knowledge in efficient and effective ways. Leveraging 3D models to improve time-to-competency in critical areas like safety and environment protection systems, knowledge and performance training, and reliability provides a vehicle to rapidly train the new workforce in ways that align with their interests and skills. Also, these technologies may be a way to promote their interest in pursuing industrial careers.

As a leader in operational performance improvement, RWD is always looking to find innovative ways to improve business processes, support technology implementation for operational readiness, and deliver Solutions That Perform™. We are excited about 3D modeling and the strategic opportunities it provides.

### ***Safety Performance and Environment Protection***

Safety performance and environmental protection are critical management systems in today's plant environment. 3D models provide a way to instruct employees and contractors in rich, interactive ways to speed and improve knowledge retention,

provide in-depth context to required procedures, and validate a worker's understanding of more serious incidents in a safe way. Useful applications and scenario areas include:

- Personnel health and safety decision making
- Emergency preparedness and response
- Confined space entry
- Safety awareness and compliance
- Pollution prevention and response

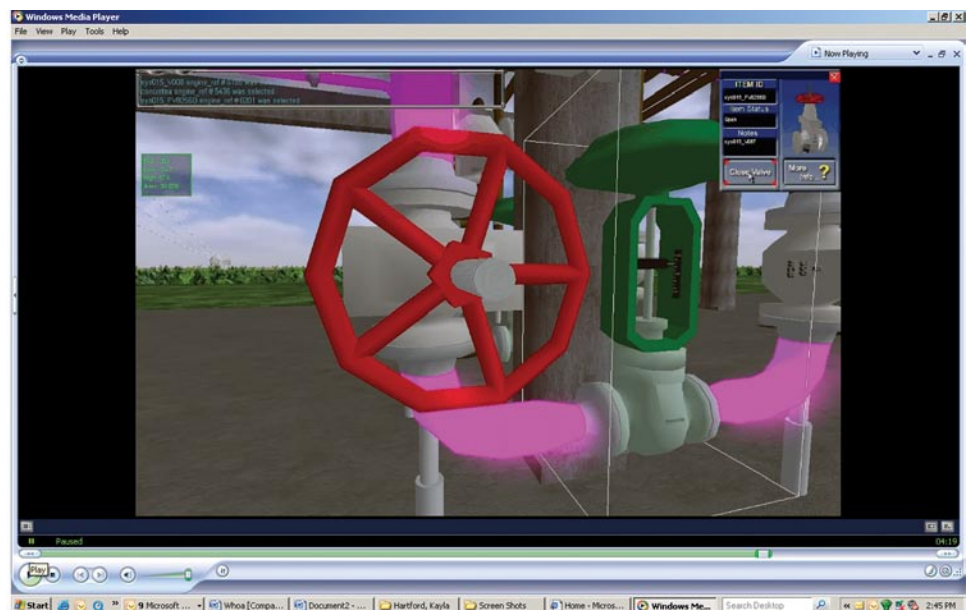
- Environment protection

With the ability to simulate a wide variety of interactive scenarios, the 3D environment enables safety and environment instruction in the context of work and the plant environment. Scenarios that would be unsafe to train on—like fire response, plant leaks, and high-angle rescue—make good candidates for the 3D environment.

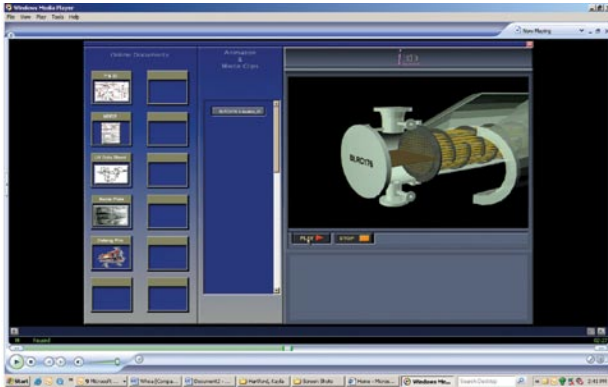
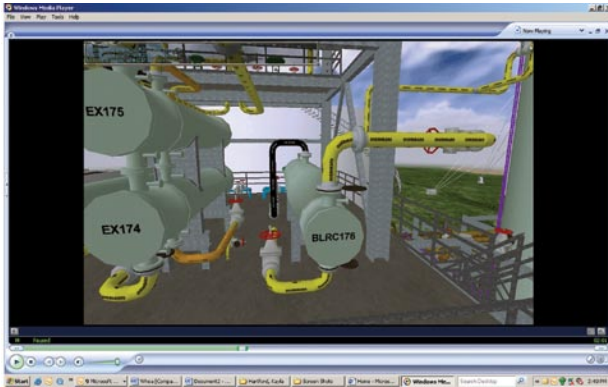
### ***Knowledge and Performance Training***

Accurate procedures and process documentation are critical elements for qualifying new hires and meeting OSHA compliance requirements. For grassroots construction projects, 3D models provide the ability to train on plant or unit commissioning and start-up procedures before the plant systems are built. For post-start-up facilities or brown-field sites, a library of 3D models can be leveraged for future planned and unplanned shutdowns/start ups and capture tacit knowledge for use in normal procedures,

The fact that 3D is becoming a standard tool—used for revamps and unit upgrades—provides an opportunity to extend the asset lifecycle from design into improving the asset performance across the lifecycle.



**NOT JUST FOR GAMES.** Interactive i3D model of a refinery unit.



Inherent in 3D models is the ability to understand the geometry, layout, and/or battery limits of process units and their supporting utility infrastructures. Integrated 3D modeling platforms use database technology, equipment libraries, and plant models, and can be linked via electronic content management systems.

**CLOCKWISE FROM TOP LEFT.** Heat exchanger network showing internal process flow. i3D equipment such as valves, blinds, and motors are interactive. Internal i3D model of a steam boiler cutaway.

revamps and subsystem design changes. 3D walkthroughs can be used to familiarize operators and maintenance personnel with equipment locations, understanding what material is flowing through piping and equipment, and how to isolate and repair high-pressure systems that are inherently dangerous to work on during construction.

With the ongoing industry migration to centralized control rooms and procedures automation, the use of 3D models and scenarios enhances precise communication and eliminates miscommunication between the control room and field personnel, who are often geographically separated. On-shift training and response drills using 3D environments reach a realism that cannot be achieved with P&IDs and other drawings or screen captures. In addition, responses to power outages, fires, and spills—where pulling feed or isolating damaged equipment—can be played out safely and effectively.

Internationally, a site or location may lack an experienced workforce or have language barriers with which to contend. The benefit of visual simulations provides a way to improve communication, time-to-competence, and the sustainability of the plant and plant systems over its lifecycle.

### ***Reliability***

Autonomous maintenance is a best practice that requires a team-based approach, where operators perform certain equipment maintenance activities and maintenance crafts work closely in the daily operation of equipment. Capturing instrument calibration and lubrication activities within a 3D model provides a means to integrate and align operations and maintenance activities. Integrating operations and maintenance activities and checklists using 3D models can provide a means to establish joint ownership and improve division-of-labor challenges.

Inherent in 3D models is the ability to understand the geometry, layout, and/or battery limits of process units and their supporting utility infrastructures. Using a physical representation of an operator or maintenance personnel can be used to optimize gauging and inspection rounds. Model areas can be color coated to represent areas of the plant that require inspection as well as establish safety and integrity risk boundaries. Other areas of benefit include:

- Coordinating inspection methods and risk assessment strategies
- Training on proper leak detection and repair tasks
- Safe out procedures training for emergencies or turnaround repair
- Internal views of equipment design for design and troubleshooting understanding

### ***Content Management***

Because the integrated 3D modeling platform uses database technology, equipment libraries, and plant models, scenarios can

be linked via electronic content management systems. This provides the ability to link model objects and scenarios to their supporting P&IDs or procedures for relevant content search and retrieval. Because scenarios can be stored as flash files and embedded, operations and maintenance personnel have the ability to access content in real time for point-of-service and decision-support needs. With the ability to automate procedures through DCS systems and automation tools, 3D objects can act as communication and alignment vehicles as well.

### ***Value of Human Performance***

Due to the investment required to develop 3D models, the value proposition needs to be understood in context of the asset lifecycle, which in many cases is 15-20 years. Recurring value areas from the use of 3D models includes:

- Improving uptime or reducing loss production from optimal startups, shutdowns, and turnarounds—yielding millions of dollars in refining margins.
- Mitigating safety incidents and exposure to hazardous chemicals,

reducing costly lawsuits and regulatory fines.

- Preventing production losses, damaged equipment, and process upsets using standardized work practices, for savings of millions of maintenance dollars annually.
- Extending equipment meantime-to-failure, improving return on capital employed.
- Reinforcing good safety behavior or preventing poor choices, when responding to emergency and spill response, for better understanding and measurement.
- Increasing operator productivity from reduced conveyance or routine rounds.
- Retention of personnel, improving training costs from worker turnover.

RWD can work closely with you to establish clear business cases to help support the investment these solutions require and the value they deliver.

### ***Summary***

While 3D models are common for engineering design and construction activities, these model libraries can be extended to

improve human performance. RWD and i3D welcomes working with its clients to mine the value these solutions offer and help address the need for improving time to competence for operations and maintenance personnel.

If you are interested in learning more, please contact RWD Technologies Energy Performance Division in Houston, Texas at 1-800-820-9493 and ask to speak with a representative from our Business Development team.

**WHO IS BILL ROBERTS?** Bill Roberts is a Business Development Manager for RWD's Energy Performance Division. Bill has worked at RWD for 5 years, with 15 years experience selling technologies and human performance improvement solutions to the Oil and Gas, Refining, and Chemical Industries. He brings a client-focused, consultative sales approach to RWD's business development activities. Bill is a graduate of Texas A&M University and has a MBA from Houston Baptist University.



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