

As Low As Reasonably Achievable (ALARA) planning

Digital human work planning in radioactive environments

Benefits

- Improve employee health and safety programs
 - By employing advanced tools for ALARA planning
 - By communicating plan to workers so it is clear and easy to follow
- Improve work efficiency, allowing more planning with the same resources
 - By leveraging a virtual and visual environment for faster decision making
 - By automating planning tasks and reporting
 - By eliminating lengthy searches for information
 - By leveraging templates for standard practices
 - By leveraging past plans as a starting point for new plans
- Tighter compliance by narrowing the gap between plan and execution
- Engineering knowledge capture to rapidly ramp up new planners and workers

Features

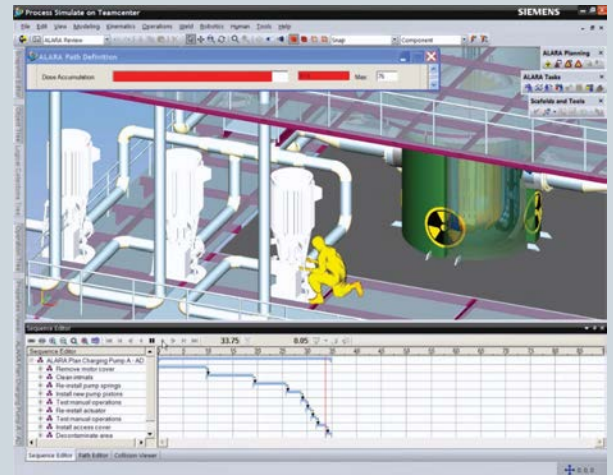
- Interactive 3D simulation of human work in hazardous environment
- Project-oriented, or task-oriented 3D planning environment

Summary

Both fossil and nuclear power operators face many challenges during an outage. They must accomplish hundreds of tasks within critical schedule, budget, safety and regulatory constraints. ALARA, an acronym for As Low As Reasonably Achievable, is a radiation safety principle for minimizing radiation doses and releases of radioactive materials by employing all reasonable methods. ALARA is not only a sound safety principle, but it is also a regulatory requirement for all radiation safety programs. It gives employers an absolute duty "to ensure the safety and health of workers in every aspect related to the work." The ALARA concept imposes lower operational dose limits that are even more restrictive than the maximum legal dose limits. This ensures an enhanced safety factor for what are already considered to be safe annual doses for radiation workers.

These maximum limits are set such that workers who are exposed to this dose level will not experience occupational risk greater than that in other occupations which are deemed to have high safety standards.

Today the planning process is done on paper by the expert planners and maintenance personnel. The plan is then approved by the ALARA safety committee. Siemens PLM Software, in collaboration with the Electric Power Research Institute (EPRI) and Fiatch, created the next generation ALARA planning system to provide a digital environment to support ALARA human work planning.



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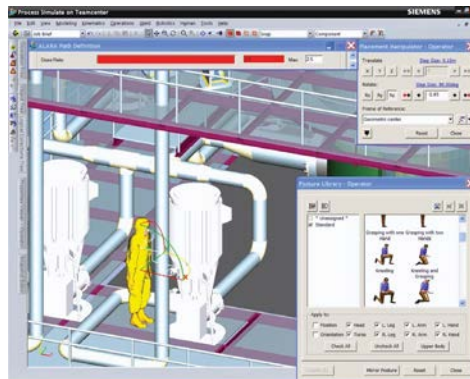
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Features *continued*

- 2D and 3D cartography (color map) display of dose rate
- Interactive feedback of total and individual dose for various scenarios
- ALARA reports with visual charts, images and work plan
- Robust information management platform for record retention, template management and re-use
- Team oriented planning environment for collaboration and accurate communication between ALARA planners, maintenance staff, radiation protection technicians and plant personnel



Left: Before plan – initial work location – high dose rate is visually indicated by red bar. Right: After plan – alternate work location and posture with lower dose rate.

by utilizing information technology to assist with human work planning and radiation exposure calculations. You can use a state-of-the art solution that allows for “what if” scenarios and “on the fly” planning of work tasks in a visual interactive planning environment.

Outage planning and scheduling

You can optimize task schedule and sequencing by using as-built configurations. You can use information from PLM and EAM systems to better understand the work process, determine crew size, craft, material, equipment, staging resources and service allocations. The simulation capabilities in the solution support the development of master task schedule and outage management strategies based on an accurate visual environment.

Safety training, emergency planning

The solution provides 3D realistic views of the environment and work tasks by utilizing “digital humans” in the work environment. You can simulate, evaluate and develop accurate safety procedures and emergency plans. Contractors and other personnel not familiar with a facility can use this 3D information to virtually walk through the plant and explore the

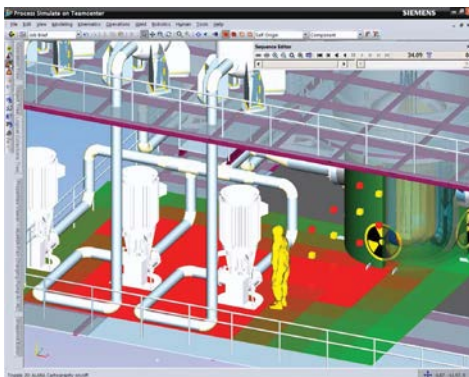
work area and tasks prior to starting the work.

Health physics

You can improve ALARA by planning in the PLM 3D virtual environment allowing a better understanding of dose rate distribution in reference to the work location. You can update the system with the final ALARA plan for future usage during project planning and health physics briefings.

Work management

You can use the system to coordinate tasks during an outage. You can use the interactive planning application to demonstrate how to perform tasks and view accumulated radiation which allows you to visually confirm work plans and adjustments.



Siemens PLM Software’s Tecnomatix® software solution supports the following tasks.

ALARA planning and compliance

The ALARA planning solution provides the optimal tools to help you create, validate and demonstrate ALARA compliance plans

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