DATASHEET

Accelerate Nuclear Design Assessments and Reduce Certifications and Engineering Costs with Jama Connect® for Nuclear Reactor Design and I&C Development

Designing and constructing nuclear systems and facilities, with instrumentation and control systems, is one of the most intricate and regulated endeavors any organization can undertake. The process of managing, defining, and tracing functional, safety, security, design, performance, independence, reliability, and special treatment requirements for complex nuclear reactors, along with its facilities, systems, subsystems, structures, and components, is compounded by strict, country-specific regulatory guidance and standards. The design process is iterative and driven by continuous risk, safety, hazard, accident and security analysis, and mitigations. Revisions during and post-design and construction based on safety/risk assessments and regulatory feedback lead to rework and reengineering, increasing costs and elongating timelines.

Effective requirements management, end-to-end traceability across the entire systems engineering process, continuous risk analysis and mitigations across the entire design cycle, and a single source of truth for systems engineering data aggregated across the digital thread are critical for project success. Failure to accurately categorize safety and security functions, classify structures, systems, and components (SSCs) and assess the criticality of initiating events and hazards in compliance with the applicable regulations (IEAE, ONR etc.), can delay certifications and project completion, dramatically increase costs, and jeopardize the safe state of the nuclear plant.

KEY BENEFITS

Streamline safety design assessments

Jama Connect offers a single source of truth for the digital safety assessment of a nuclear system, including qualitative hazard evaluations, probabilistic safety assessments, design failure, accident and dose consequence analysis, FHA, security analysis and combined risks mitigations.

Enhance collaboration across development teams and supply chain

Jama Connect natively enable co-development within the supply chain and external subcontractors and improved communication and alignment between cross-functional teams and with external safety assessors.

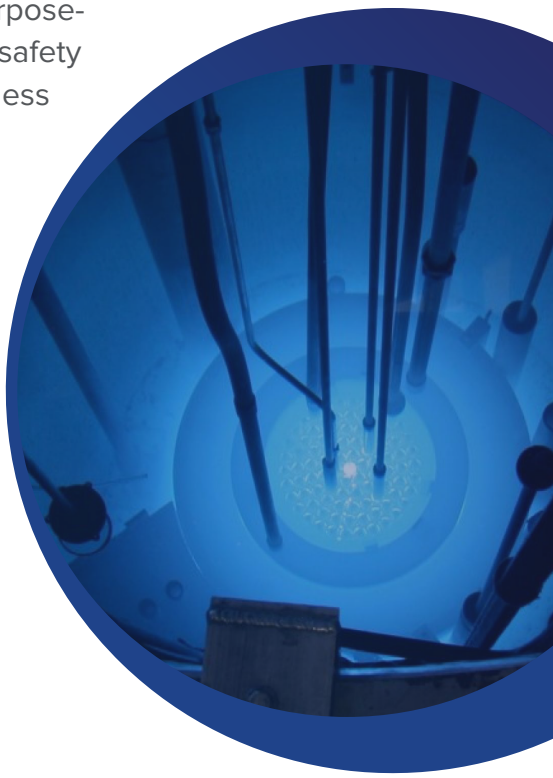
Achieve end-to-end traceability across your development toolchain

Jama Connect's Traceability Information Model™ outlines an end-to-end process for the requirements and design definition and decomposition, V&V, risk/safety/security analysis, and system implementation. With Live Traceability™, exchange system implementation specific data like models, architectures, parts/assemblies, tasks continuously with MBSE, PLM, work management, and P&ID tools.

Automate risk categorization and classification

Replace manual, error prone categorization of risks and classes by letting Jama Connect automatically assess and calculate the criticality, categorization and classification of events, functions, and SSCs.

Jama Connect for Nuclear Reactor Design and I&C Development is purpose-built to guide engineers through the systems development and digital safety assessment of a nuclear system, automatically measure the completeness and quality of traceability across the entire digital thread, and enable the automated creation of digital safety reports.



Jama Software's nuclear framework is oriented towards and based on the guidance of the NRIC for the usage of digital engineering tools for nuclear DSAs (digital safety assessments), the guidance of IAEA and ONR for the Categorization and Classification of Functions and SSCs, and IEC 61513, and IEC 61508 for the development of I&C systems.

Here's how Jama Connect can help your team streamline processes, improve safety outcomes, and meet regulatory requirements:

End-to-End Traceability Across All Levels

With Jama Connect, you can ensure complete traceability across the design and engineering process – from product definition and design to V&V, safety and security classifications, categorizations and analysis, and product implementation. Our platform connects every design element — from mission-level objectives down to individual components, assemblies, and parts. Live Traceability not only satisfies regulatory demands but also provides critical insights into how changes at any level and any stage impact the entire system.

Traceability at every level:

From mission needs and platform designs, to systems, subsystems to individual components, Jama trisks, requirements, V&V, and implementation elements are connected in an iterative, risk-driven process.

Event-function-SSC traceability:

Map initiating events, safety, and security functions, and SSCs seamlessly, helping ensure safety-critical events are covered at every level.

Dynamic risk-response integration:

Feed critical information like initiating events, identified hazards, safety, security and reliability requirements, and special treatments directly into the design, ensuring risks are evaluated and mitigated throughout the lifecycle.

Streamlined Safety Design Assessments

Regulatory requirements for nuclear reactor certification differ from country to country, but the principles of risk/safety/security analysis, safety and security classification, and categorization remain universal. Jama Connect simplifies this process by guiding teams through compliance-specific workflows.

Safety and security classification and categorization:

Automate initial and final classification of safety/security functions, SSCs, and events. Automatically assign safety categories using calculated fields and lookup metrics based on global or country-specific nuclear standards.

Iterative compliance support:

Conduct preliminary safety assessments early and refine security functions as the design evolves. Ensure that every regulatory stage is met with precision, from early safety categorizations to final licensing approvals.

Digital export for documentation:

Generate detailed certification ready documentation of classification assignments, risk analyses, and hazard outcomes for key documentation items like safety and security cases or preliminary and final design safety reports.

Seamless Integration Across Digital Engineering Tools

To ensure every aspect of the development process stays connected and enable the DSA (Digital Safety Assessment), Jama Connect integrates with industry-standard tools used for model-based systems engineering (MBSE), product lifecycle management (PLM), and after simulation:

- **MBSE:** Collaborate effectively by connecting Jama Connect with tools like Cameo Systems Modeler (aka CATIA Magic) or Enterprise Architect to exchange architecture, models, and design data.
- **PLM:** Sync parts, assemblies, and change requests with PLM tools like PTC Windchill, Aras PLM, or Siemens Teamcenter to manage parts and mechanical implementations efficiently.
- **P&ID:** Diagram synchronization (either direct or via PLM) with tools like PTC Creo or Siemens NX.
- **Software development and work management:** Easily sync tasks, stories, and epics with tools like Jira or Azure DevOps to ensure software requirements are implemented.
- **Digital threads:** Create and manage a fully integrated digital thread that ties all relevant data from requirements and designs, V&V, MBSE, PLM, simulation and visualization, safety assessment, and risk management enabling end-to-end traceability, completion measurements, change impact analysis, and the automatic detection of gaps and risks.

Risk Analysis and Hazard Management

Risk analysis is the backbone of safety in nuclear reactor design. Jama Connect supports rigorous risk, safety, and security analysis throughout the iterative design lifecycle, from the initial qualitative hazard evaluation to the analysis of initiative events, classification and categorization of functions and SSC, DID analysis to the probabilistic safety assessments, SSA and DCA.

Initiating events from qualitative hazard evaluation:

Identify events that could jeopardize the safe state of the nuclear power plant. operation, including those rooted in design, external hazards, or past regulatory findings.

Hazard analysis and mitigation – probabilistic safety assessment:

Collect and analyze identified hazards, assess severity, and create safety requirements that feed directly into system updates. Out of the box HARA and HAZOP data models.

SAA, FHA, DQA, and combined risks:

Conduct severe accident analysis, fire hazard analysis, dose consequence analysis, combine/enveloped risk assessments, and derive mitigations and special treatments as part of Jama Connect's end-to-end traceability.

Enhanced Efficiency and Collaboration

By centralizing all information within a single source of truth, Jama Connect eliminates inefficiencies, reduces rework, and fosters alignment between teams.

Agile-compatible iterations:

Adapt requirements and designs iteratively as new risks or design details emerge.

Collaborative team environment:

Share updates and insights in real time, ensuring stakeholders, engineers, and regulators remain aligned at every stage. Easy to initiate and complete reviews and approvals.

Automated workflows:

Save time by automating time-intensive, repetitive tasks like hazard categorization and safety classification.

AI-enabled Intelligent Engineering

AI analysis and automation with Jama Connect Advisor™ improves productivity and product development outcomes.

Requirements quality intelligence:

Enhance the quality and clarity of requirement language to significantly reduce a major cause of defects.

Test case intelligence:

Streamline verification by automatically generating test cases derived from requirements.

For additional AI initiatives under consideration, go to www.labs.jamasoftware.com

Organizations at the forefront of nuclear innovations — including those overseeing and developing small modular reactors (SMRs) — recognize Jama Connect as a transformative tool in navigating the unique challenges of the industry.

From guiding teams through compliance workflows to empowering iterative risk analysis, Jama Connect for Nuclear Reactor Design and I&C Development is reshaping how the nuclear industry approaches design and certification. Its ability to combine traditional systems engineering approaches with modern digital iterative processes and digital safety assessments are redefining what's possible in a nuclear reactor development.

To learn more about managing your nuclear requirements, tests, and risks with Jama Connect, visit www.jamasoftware.com