framatome

Nuclear Human Factors Engineering, Consulting, and Training Services

Optimize Human Performance and Plant Productivity

Rely on our best practices to avoid design-induced human error, leverage human-machine cooperation, and enable your products achieve their full potential

Challenge

Plant systems and equipment monitoring, control, and maintenance depend on the reliable performance of plant personnel tasks. Human strengths shall thus be considered and enhanced, use(r) error risks mitigated, and human factors (HFs) engineered during the design phase of the plant, its systems, and their human-machine interfaces (HMIs).

Utilities and manufacturers are repeatedly challenged by the need to integrate HFs into their design processes and the need to stay up-to-date on

- regulatory requirements and changing demands as specified in NUREG 0711, IEC 60964, and the IAEA Safety Guide DS-492,
- human factors engineering (HFE) best practices, and
- plants personnel's reported operating and maintenance experiences (for example, operators' mismatched expectations).

The prohibitive costs of late re-design and delayed licensing are project risks effectively mitigated by our services.

Solution

With our methods and skills we identify HF issues early on in the engineering process, assess each issue holistically, prioritize it by significance, and guide its interdisciplinary resolution throughout the engineering process. This is how we reduce project risks, enhance human reliability, increase usability, and meet plant safety requirements.

The time and cost-effective application of HF principles and methods throughout the design of plant systems and equipment is structured along

- the definition of intended use(s), users, tasks, HMIs, and workspace,
- the identification of the reference design, anticipating and tracking how changes in function and form will affect user experience and regulatory compliance,
- the identification of critical tasks,
- the assessment of the effectiveness of measures to make systems operation and maintenance free of human error, including the exploration of design alternatives and the tradeoffs between task design, HMIs, instructions, and training.

Your performance
is **our** everyday **commitment**

Participatory HMI design: interdisciplinary collaboration at work

Fullscope simulation for the integrated validation of operators' workplace HMIs

Customer benefits

- HF issues are identified early on in the engineering process, assessed holistically, and resolved time- and cost-effectively
- Enhanced human reliability and increased usability of the plant's HMIs
- Optimized plant operation and maintenance

Technical information

Our team of HF engineers offers HFE, consulting, and training services for the mitigation of use(r) error risks in systems operation and maintenance, the design of HMIs, the staff development of HF professionals, or the short-term closure of skill gaps or personnel shortage.

HF / HMI engineering services

- Stepwise modernization of control rooms, engineered operator-centered in collaboration with our engineers in charge of plant modernization, instrumentation and control and automation
- Design of conventional and computerized HMIs, usability engineered to optimally meet operators' and supervisors' task-specific needs
- Design of local control systems, co-engineered with the manufacturers of devices whose dedicated HMI is supplied with the procured device and installed locally outside the control room

HF consulting services

- Management consulting on HFE strategy, planning, organizational structures, and processes: reducing technical, schedule, and regulatory risks and associated costs
- Support to teams of engineers of various disciplines: Supporting the interdisciplinary resolution of HF-related design and safety issues
- Expert design review, pairing prioritized findings with concrete recommendations for improved adherence to user requirements and expectations
- Remotely moderated usability testing of HMIs, ideal for geographically dispersed participants

HF training service

- TÜV-certified professional qualification programs for engineers as
  - HMI Designer or
  - Human Organizational Factors Designer
- HF training courses, talks, and workshops on HFE / HMI fundamentals, strategies, plans, methods, practices, and skills. The courses and workshops are designed for managers or engineers new to HFE or nuclear engineering

Key competencies and expertise

- We apply experience from numerous plant modernization and new-build projects – always yielding authority-approved HFE deliverables – and draw on the methodologies and tools thereby used.
- We are trained in the nuclear process principles behind plant systems and equipment and clearly understand the safety and operational rationale behind the technical specifications and procedural steps governing the monitoring, control and maintenance tasks in all plant conditions.
- We deeply understand operators' activities and work practices and pay heed to not only the information indicated for the assessment of plant conditions but also to the need to facilitate operators' understanding of these conditions. We can demonstrate the concrete benefits of proposed operator aids.
- We guide the development of regulatory compliant operator aids, for example, condition monitoring, event detection, fault identification, fault diagnosis, identification of cause-consequence relations, alarms filtering and suppression.
- We apply deep knowledge to complex problems yet communicate the solution to a range of stakeholders with varying backgrounds.
- We collaborate with the OECD Halden Reactor Project, the IEC, and the PersCert TÜV Rheinland.

Contact: ic@framatome.com
www.framatome.com