www.ife.no/hammlab

HAMMLAB — Halden Man-Machine Laboratory

HAMMLAB is IFE's simulator-based research facility for studying operator crew behaviour and performance in complex operating environments.

We study human-machine interaction and crew collaboration, and integrate the knowledge gained into methods for safety analysis, new designs and support systems. This way we help industries ensure safe and efficient operation.

HAMMLAB serves two main purposes:

1. Enable realistic studies of operator crew behaviour and performance when controlling complex industrial plants or processes
2. Provide a realistic environment to develop, test and evaluate prototype control centers and their individual systems such as human-machine interfaces, alarm systems, computerized procedures or plant automation

HAMMLAB utilizes advanced research tools and methods and benefits from powerful simulator technology and flexible HMIs. To ensure industry relevance we engage professional operating crews in our studies and evaluations.

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Results from studies performed in HAMMLAB provide new knowledge into basic challenges for individuals and crews. Topics such as the collaboration between automation and humans, teamwork, operating roles, the use of procedures, alarm- and support systems, and different human-machine interface solutions are studied. This gives input to safety analysis as well as designs and support systems to optimise human performance.

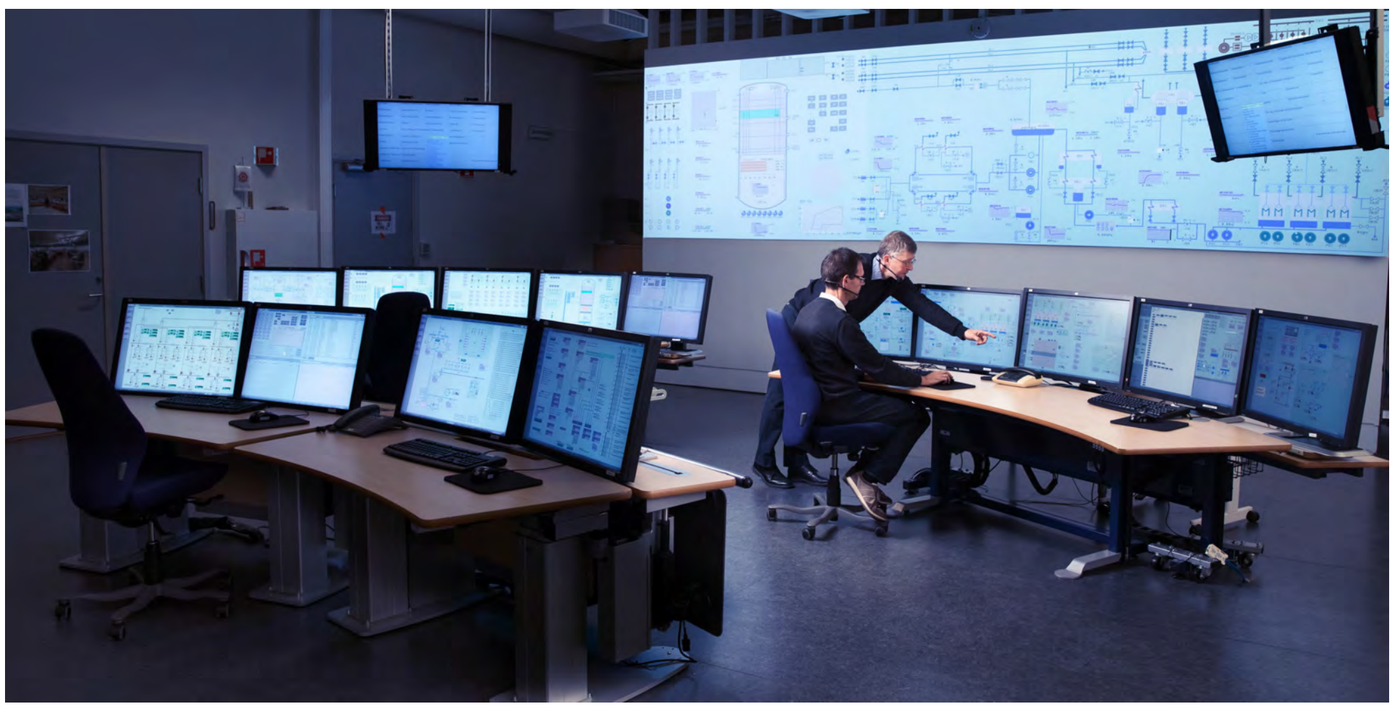
Results are used by instructors, plants, vendors and regulators and as input to national and international standards, guidelines and regulatory frameworks.

FACILITIES

HAMMLAB includes 3 full-scope nuclear power plant simulators. The simulators represent a typical Gen III PWR plant, a Swedish BWR plant, and an imagined future 12-unit Small Modular Reactor iPWR-type plant, respectively.

In the control room (photo below) professional crews operate the selected simulated plant. From the gallery (right) the experiment team controls simulator scenarios, observes crew behaviour, and evaluates performance.

Simulator HMIs can be operated remotely over the web, providing options to study the collaboration between control room crews and external parties, such as technical support centers.



COMPETENCES

HAMMLAB's research and development teams are multi-disciplinary and include people with expertise in nuclear power plant operation, industrial psychology, interaction design and computer science.

Subject-matter experts evaluate different dimensions of crew performance. Advanced tools for performance assessment and post-scenario replay allow for in-depth analysis of operator and crew performance.

PRODUCTS

- ProcSee (www.ife.no/procsee) Software to develop and display HMI for process monitoring and control
- STEAMS (www.ife.no/steams) Software to record and play back simulator sessions. STEAMS integrates audio, video, screen content, data logs, instructor-initiated malfunctions, operator actions and plant responses into a combined, synchronized stream for post-scenario replay and analysis.
- SCORE (www.ife.no/steams) Featuring structured and consistent evaluation of operating crew performance