

Development and Design of Control Rooms in Nuclear Power Plants

Operator-Focused Control Room Solutions

Control Room solutions designed to meet operator needs and to increase safety, reliability and productivity

Challenge

The control room is the most important room in any nuclear facility – it is where 365 days a year, 24 hours a day, the goal of safe and economical operation must be ensured. The variety of decisions to be made by the operator, at any time and in any plant scenario, has a significant impact on safety and productivity. Maintaining the attention and well-being of the operating staff to ensure maximum task performance is therefore of utmost importance.

The timing of the control room design poses a challenge. Most classical engineering disciplines such as the definition of room sizes, generic operation principles, I&C architecture as well as system and safety architecture are already defined before control room design has been started and do not take into account the interfaces in the overall control room design.

Furthermore, the requirements and results of the analyses, performed during the Human Factors Engineering (HFE), as well as the needs of the operator team, must be implemented into the control room design.

Solution

Framatome's control room solutions are based on an iterative process guided by our experienced experts. Based on a thorough requirement analysis and conceptual design study, this approach involves all stakeholders and ensures that requirements elaborated with the operators are taken into account at every stage of the project.

The HFE process provides system-wide design criteria for the control room engineering, which will be verified and validated at the end of each engineering phase. Our experience in testing layout options in 3D or virtual reality at an early stage helps to avoid many common errors associated with the ergonomic design of control rooms and thereby saves time and costs.

Framatome's solutions ensure an error-free design and put people, safety and productivity first. Our operator-focused control room design optimizes processes as well as human performance. Working closely with our partners, we guarantee the highest quality and a consistent nuclear-qualified supply chain throughout the entire project to provide control room designs that are built to last.



3D Study Main Control Room

Customer benefits

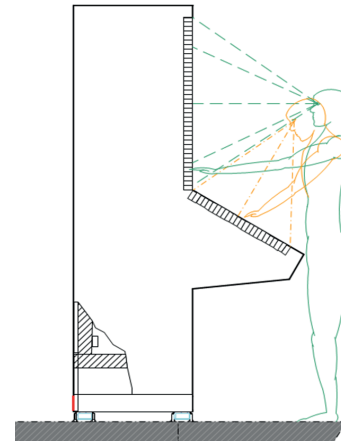
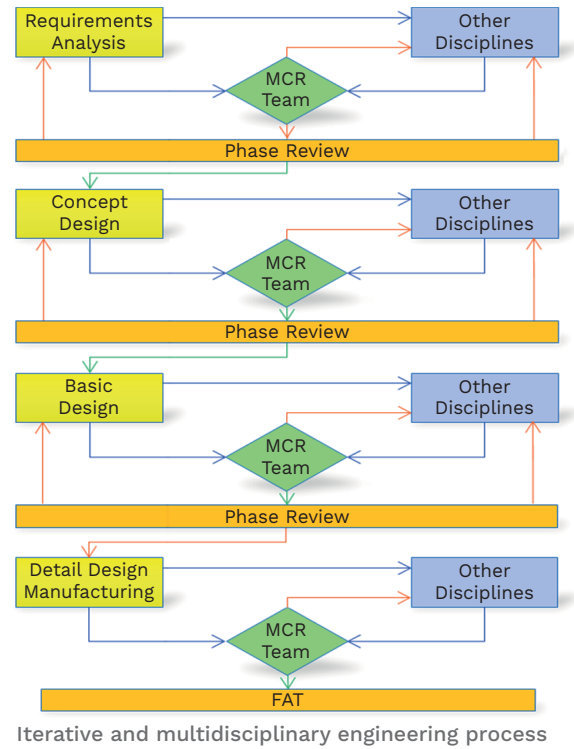
A work environment tailored according to user needs creates an operation-resource that gives the operator maximal support to optimally handle and safeguard mission-critical processes

- Improved plant safety and prevention of productivity losses due to operating errors
- Optimized ergonomic design of the workstations to avoid wrong or forced postures of the operator
- Early detection of design errors using 3D or virtual reality tools to avoid costly and time-consuming changes
- Consistent, nuclear-qualified supply chain
- Consistent type and product qualification in the areas of:
 - Aging
 - Electromagnetic compatibility (EMC)
 - Vibration and seismic integrity

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

Technical information

- Requirement management**
 Identification of all requirements of the control room providing a profound basis for final implementation into the control room design
- Engineering**
 An iterative, cross-system and centrally managed engineering process, depending on the respective design phase and sequence
- Interface and communication management**
 Determines the interfaces and the interaction between all involved disciplines and the user
- Technical controlling**
 Technical controlling eliminates interface problems and ensures optimal project execution and high quality of design performance
- Schedule**
 All design steps and activities are presented in a project schedule in order to ensure the completion of the project on time and to budget
- Engineering tools**
 Various integrated engineering tools exclude the sources of error in the interaction with other disciplines in the respective design phases
- Visualization of results**
 Results from each design phase are visualized in a photo-realistic manner by using 3D-modeling tools.
- Verification and validation tools**
 By using VR tools and their implemented verification and validation modules in an early stage of design, we are able to detect and counteract sources of error that result in costly and time-consuming changes.
- Integration of equipment**
 We ensure highly robust equipment and hard-wearing HMI furniture based on extensive ergonomic data which are user-oriented integrated in the working environment.



Ergonomic study safety panel

References

New build projects

Modernization projects

South America

- Brazil complete scope of MCR

Western Europe

- Finland complete scope of MCR and Simulator
- France complete scope of MCR and Simulator
- Sweden complete scope of MCR and Simulator

Eastern Europe

- Slovakia complete scope of MCR and Simulator

Asia

- China complete scope of MCR and Simulator

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