

Aging Management

Ensuring Availability of Required Safety Functions throughout the Service Life of the Plant including Long-Term Operation

Combining global experience, comprehensive aging management (AM) know-how, highest competence, methodologies and tools provides optimum pre-conditions for long-term operation (LTO) regulatory authorization.

Challenge

Most nuclear power plants (NPPs) operating today are designed for 30 to 40 years of operation. In case of LTO, which means operation beyond the design life, most systems, structures and components (SSCs) are adequate for service far beyond the original design life. However, in some cases aging effects have been underestimated according to today's state of science and technology. For this reason, an effective aging-management strategy needs to be developed to establish surveillance programs for possible aging effects.

Solution

By combining global experience, comprehensive aging management know-how, highest competence, methodologies and tools based on international rules and standards, we at Framatome support utilities in getting optimum pre-conditions for LTO authorization. With the objective to systematically monitor, assess and control degradation effects that might compromise safety functions of the plant, a comprehensive plant status assessment and aging-management program implementation provides the basis for LTO authorization. To support economical planning and long-term profitability of the plant, recommendations for aging-effects mitigation measures, identification of modernization potentials, and LTO investment estimations are provided.

Customer benefits

Optimum pre-conditions for long-term regulatory authorization achieved by:

- Elaboration of reliable roadmaps to LTO with first-level technical and financial evaluation
- Accurate evaluation of aging effects through state-of-art models and application of the aging-management software platform COMSY and local-load monitoring system **F**atigue **M**onitoring **S**ystem-i with progressive fatigue-assessment methods
- Optimized mitigation solutions and development of AM programs, optimized maintenance concepts, and prioritized inspection programs.

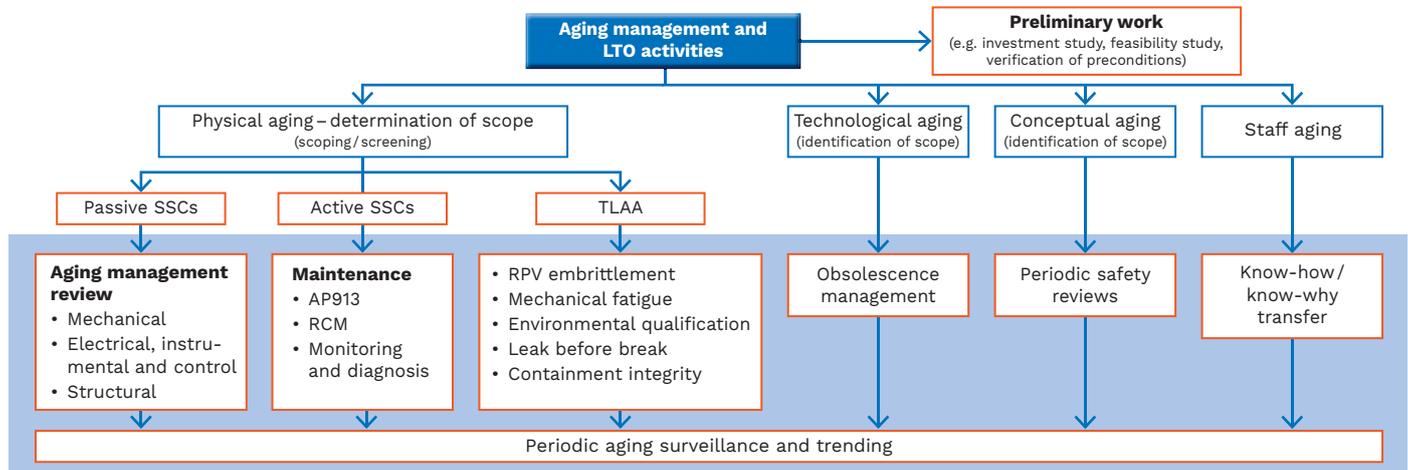
Legend:

AP913: "maintenance rule"

RCM: reliability centered maintenance

RPV: reactor pressure vessel

TLAA: time-limited aging analyses



AM and LTO: activities provided by Framatome

Your performance is our everyday commitment

Technical information

From strategic preparation for LTO feasibility to implementation of a corresponding AM program, we provide dedicated services such as:

- Workshops, benchmarking, and investment studies to facilitate strategic preparation for LTO
- Systematic and effective scoping and screening to determine SSCs to be included in the scope of LTO evaluation
- AM reviews to demonstrate that the effects of aging will be adequately managed. This process is effectively supported by the tool COMSY using its systematic data collection and degradation-assessment functionality
- Time-limited aging analyses to quantify the effect of the extended operation period on the structural integrity of major systems
- AM program implementation to optimize and adapt plant activities related to specific aging effects. This includes activities like maintenance, in-service inspection, testing and surveillance, as well as operational conditions and technical support programs
- Obsolescence-management services including spare-parts supply, obsolescence status tracking, commercial-grade dedication, cross-qualification, and re-engineering
- Periodic safety reviews of all important aspects of safety, carried out at regular multi-year intervals.

Key figures

More than **35** utilities worldwide have been supported with AM and LTO activities

The condition-oriented aging-management system COMSY is applied in **50** NPPs worldwide, of which **30** are non-OEM plants (OEM: original equipment manufacturer)

50 **F**atigue **M**onitoring **S**ystem-i systems and related fatigue assessments sold, of which **12** are non-OEM plants

References



- Worldwide references for LTO application and implementation
- Support for numerous reactor designs including pressurized water and boiling water reactors as well as VVER and pressurized heavy water reactor plants

Framatome

- OEM of 92 operating reactors worldwide
- Serves more than 250 reactors worldwide
- Covering all reactor technologies and designs
- Component manufacturer

Expertise

- All required competencies like:
 - Aging experts
 - Obsolescence services
 - Component repair and replacement
 - Non-destructive examination
 - Chemistry
 - Monitoring and diagnosis

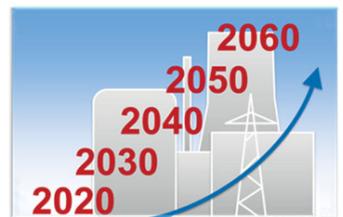
Experience

- Worldwide LTO project participation:
 - Europe
 - USA
 - South Africa
 - China
- Strong support to former German LTO application projects
- Partner for EDF's "Grand Carénage"

Solutions

- All required LTO activities according to IAEA guidelines or national requirements
- COMSY
- Monitoring and diagnostics solutions
- Advanced fatigue solution AFS including **F**atigue **M**onitoring **S**ystem-i

LTO



Framatome – your partner for AM and LTO

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