framatome

Epoxy-Based Adhesive Technology

Leakage Mitigation for Spent Fuel Pool Liners and Undrainable Tanks Applied Under Water

Proven adhesive bondings qualified to provide solutions for underwater repairs

Challenge

The integrity of liners used in spent fuel pools (SFPs) or other undrainable water-filled tanks has to be maintained throughout the whole lifetime.

Stress corrosion cracking (SCC), mechanical or thermal stress, weld failures and mechanical impact are causes for leakages. Operational experience proves that SCC is the main reason for leakages; usually SCC occurs in the heat-affected zone near the weld.

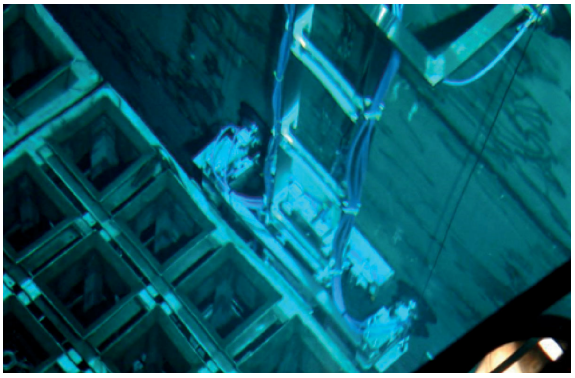
Leakages causes radioactive contamination of concrete structures and groundwater resulting in high decommissioning and dismantling costs.

Remotely repaired SFP corner

Solution

Our leakage mitigation technology seals leaks, prevents further leak propagation, is nuclear qualified and meets the requirements for undrainable stainless steel pools and tanks. During adhesive bonding application, the existing liners are not affected by additional heat input, which is essential in order to avoid new heat-affected zones.

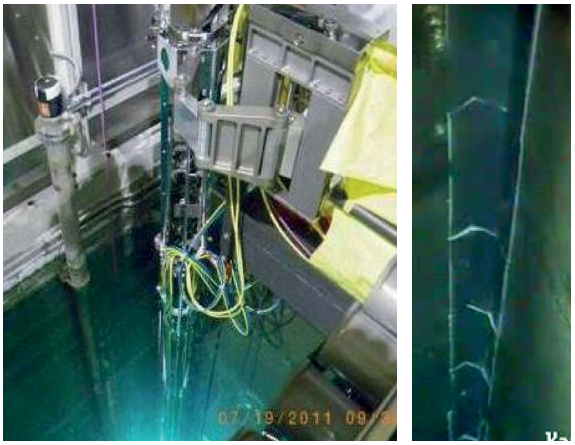
The so-called “sandwich construction” is deployed for leakage repairs. The sandwich consists of an adhesive material and a stainless steel cover sheet. The adhesive material seals the leaks, does not affect the base material, is not affected by SCC, is highly radiation resistant and does not cause new SCC. The stainless steel cover sheet protects the adhesive material against mechanical damage.



Remote application with manipulator technology

Customer benefits

- Permanent repair
- More cost- and time-effective repair method than welding
- Application by diver or remote-controlled manipulator
- Nuclear qualified repair method
- Refurbished areas are resistant to future corrosion
- Limited access and high radiation areas can be repaired



Left: installed rail system in SFP corner
Right: final result of repaired SFP corner

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

Technical information

- Epoxy-based adhesive
- Radiation resistance: up to 10 MGy
- Temperature resistance: up to 60°C or up to 80°C (for about one week)
- Media: air, demineralized water, coolant and sea/river water
- Adhesive material does not leach detrimental substances to the surrounding fluids
- Existing material structure is not affected by the repair
- Good decontaminability
- High adhesive force
- Product has been approved by European and Japanese authorities

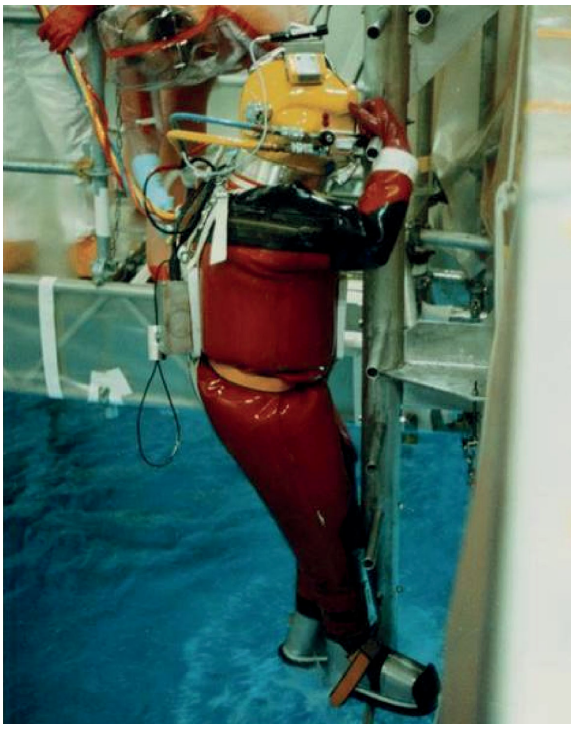
Key figures

6,500 linear meters of welded joints have been treated in reactor cavities, SFPs and transfer channels

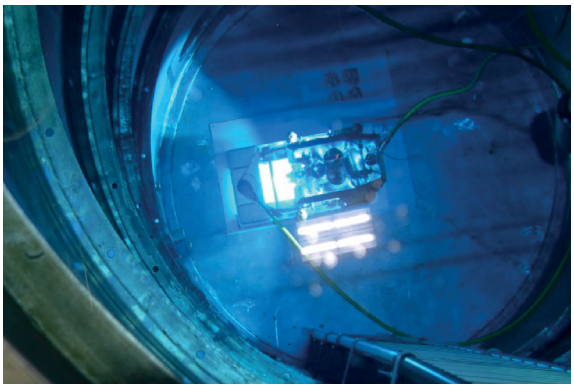
0 leakages have been reported after application of our adhesive technology

More than **70** applications worldwide

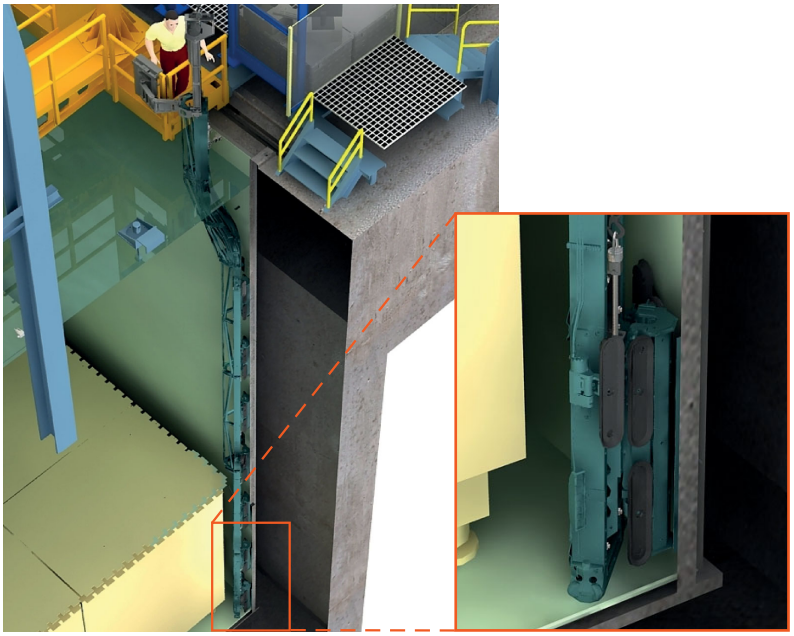
Almost **30** years of global experience



Manual application: diver in SFP



Repair on the floor, 12 m under water



Schematic of the underwater manipulator system in a SFP corner

Manipulator head at repair position

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