

Passive Cooling Technology

Reliable Heat Removal without the Need for Power

An efficient and qualified system with lower maintenance costs and higher reliability than equivalent conventional cooling systems

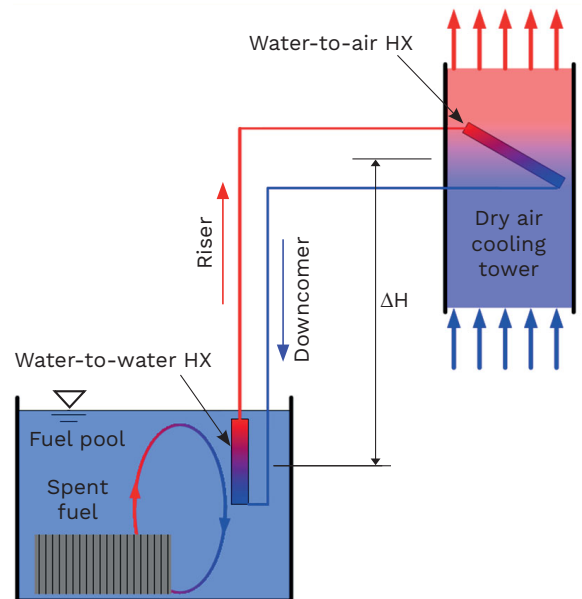
Challenge

Cooling the spent fuel pool of a nuclear power plant is a continuous task during both the operational and post-operational phase. Active cooling systems are dependent on continuous and steady pump operation to keep fuel pools at a safe temperature. Ensuring the uninterrupted operation of active cooling systems necessitates a backup power supply. The backup systems as well as all active components not only require regular maintenance effort but have to operate consistently, even under accident conditions.

Solution

Our passive cooling system fulfils all cooling requirements without the need for a power supply to ensure the system works effectively. The system relies on natural convection, and therefore, the cooling system's efficiency increases with rising temperatures in the fuel pool. The simple yet sophisticated design enables fully passive operation without the need for operator actions, additional energy or backup power supply.

The low operating and maintenance costs of the passive cooling systems remain applicable even during the post-operational phase of a power plant.



Schematic diagram of a passive heat removal system (HX = heat exchanger)

Customer benefits

- Increases plant safety, as no human intervention is necessary during operation
- Low operating and maintenance costs compared to radioactive systems
- No expensive back-up power systems needed
- Modular and phased increase of cooling capacity possible

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

Technical information

The passive cooling system removes heat from storage pools using natural circulation (convection), even if electrical power is lost and does not require an operator to intervene. By eliminating all components in the cooling system requiring external power sources (active components) the risk of system failure is reduced drastically.

Fully passive operation during abnormal and accident conditions requires no electrical power, no moving or rotating parts. Optionally, fans can support the cooling function during hot weather conditions or for an optimized footprint area.

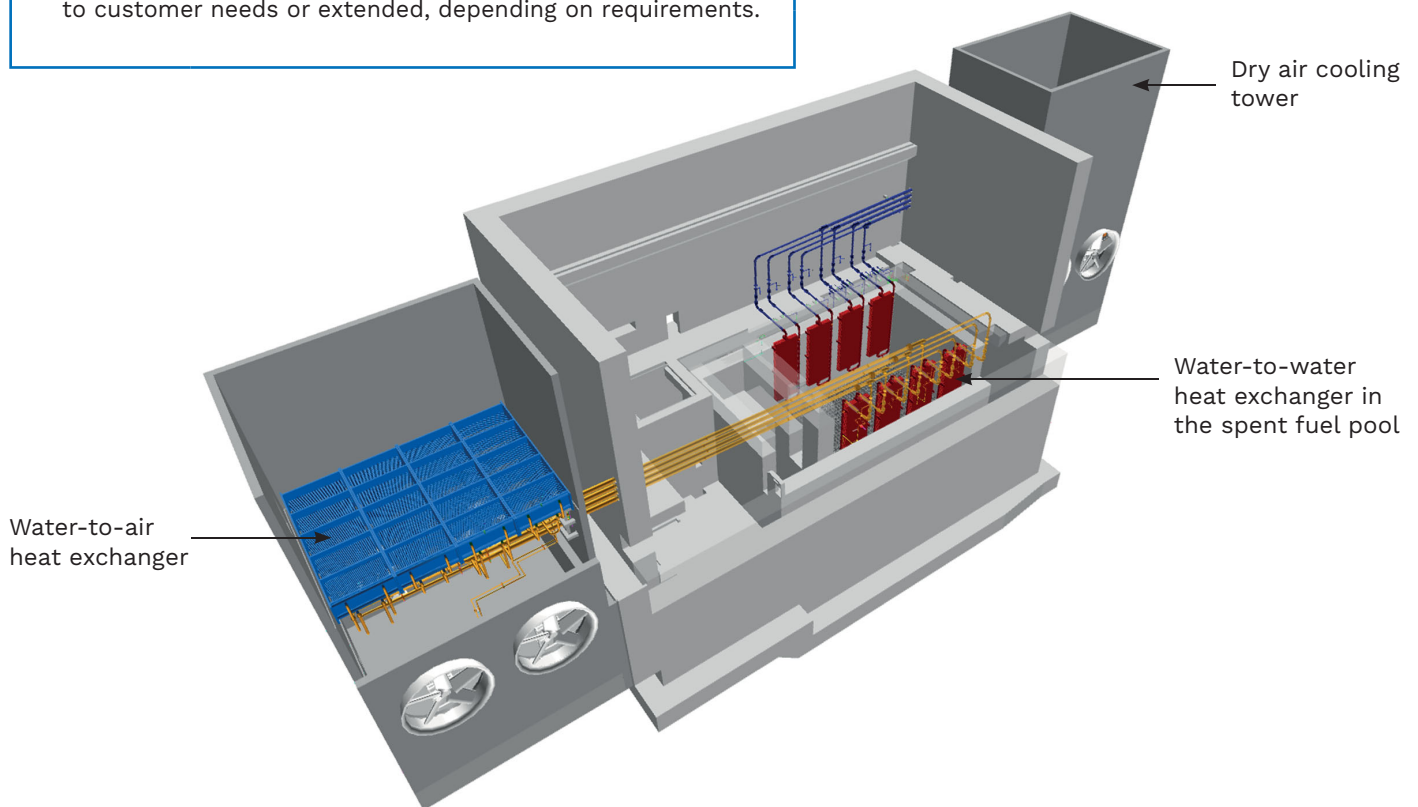
The cooling system is modular and can therefore be scaled to customer needs or extended, depending on requirements.

Key figures

1,25 MW heat removal achieved in implemented projects

Feasibility of a **10 MW** passive cooled interim spent fuel storage confirmed by an internal study

Efficiently working in ambient air temperatures between **-30°C** and **+40°C**



Cutaway view of a passively cooled spent fuel storage building

References

- Extensive experience from previously realized projects and tests in different test-facilities
- Switzerland, Goesgen: Passively cooled spent fuel pool storage – approved and successfully operating since 2008
- Switzerland, Goesgen: Implementation of a second stage passive cooling system – approved and in operation since 2017

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