

Coolant Degassing System

Gas Separator for Primary Cooling Loop

Reduced outage times and corrosion protection of primary coolant circuit

Challenge

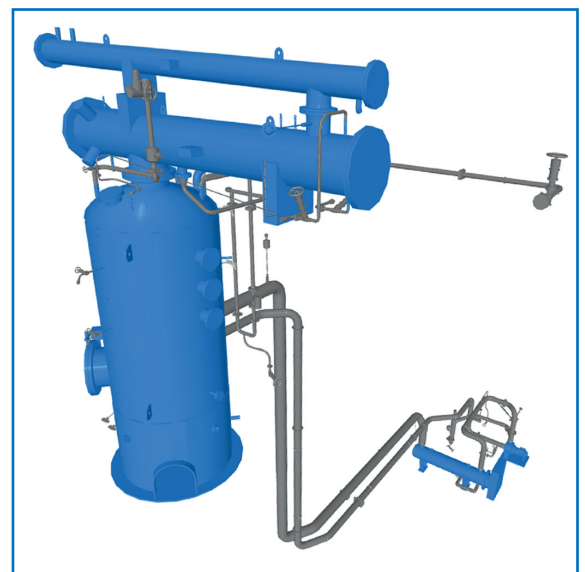
The nuclear fission process of an operating nuclear power plant continuously generates radioactive isotopes in gaseous form like argon, krypton, radon and xenon in the primary coolant. When opening the primary system for refueling or repair, these gases escape from the primary circuit. Corrosive atmospheric gases such as oxygen ingress the primary system. To prevent corrosion within the coolant circuit, the highly toxic chemical hydrazine is added. The degassing process with traditional procedures delays an outage for several days.

Solution

The Coolant Degassing System (CDS) removes gases such as the fission products, oxygen and hydrogen from the cooling system and therefore reduces outage duration by shortening loop purging time.

The CDS can be operated:

- During normal plant operation to reduce the concentration of radioactive gases (for example, in case of high radioactivity in primary coolant due to fuel damage)
- Prior the outage to reduce the concentration of radioactive gases to the acceptable limit for opening the reactor pressure vessel (RPV), reducing the outage duration significantly
- After outage to remove atmospheric gases, mainly oxygen, protecting the equipment against corrosion. Thereby the injection of hydrazine will be reduced, lowering the health risks for handling personnel and actively protecting the environment.



Degasifier column and condenser

Customer benefits

- Reduces costs by shortening loop purging time by up to four days
- Supports ALARA measures by removing radioactive gases from the primary circuit
- Reduces corrosion by removing oxygen from the primary system
- Protects the environment by reducing hydrazine consumption
- Both new and existing plants can be equipped with the system

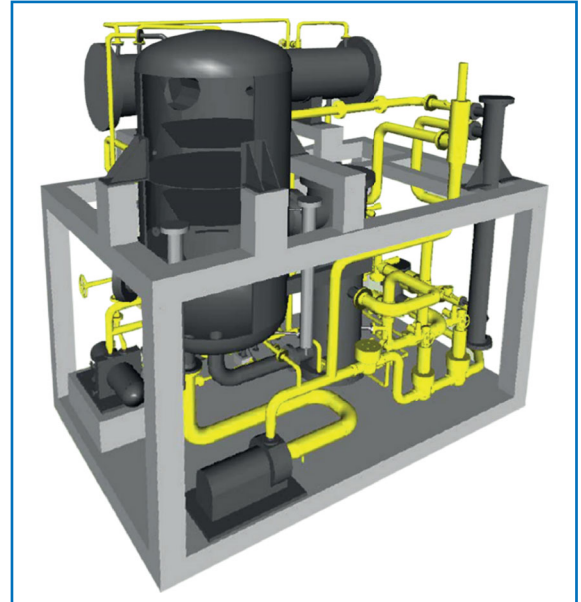
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Technical information

Degasification (gas stripping) is performed by a counter flow column with bubble trays. Vacuum in the column enables evacuation.

Main features

- Fully automatic operation
- High flow rate of primary coolant up to 100 m³/h
- Functions during normal plant operation
- Interfaces with coolant chemistry
- High decontamination (degasification) factor of over 100
- Retrofit or new build options
- In case of a fuel damage event, the decay waiting time to open the RPV is reduced by two days to four days



Example of a retrofit unit

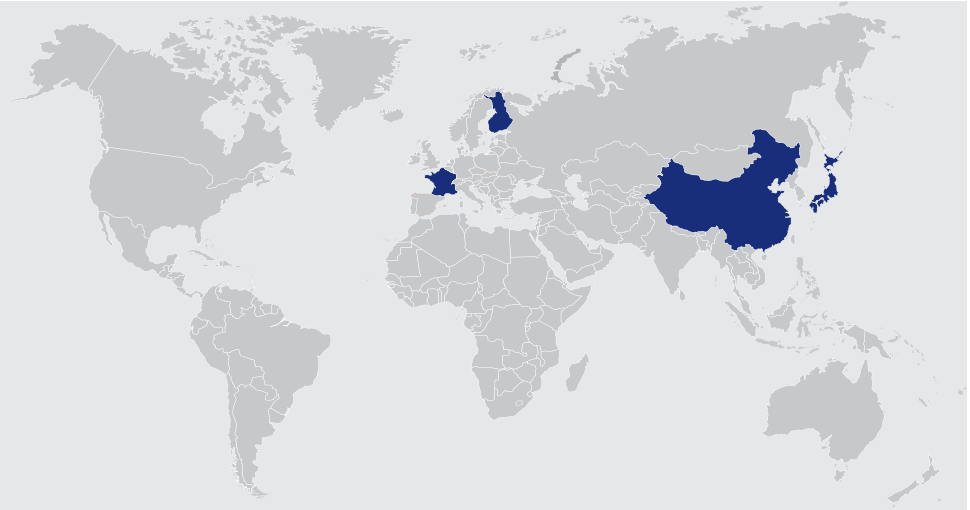
Key figures

Decontamination factor of over **100**

Up to **4** days shorter outages

References

- Japan (2 plants, PWRs)
- Finland (EPR reactor)
- France (EPR reactor)
- China (2 EPR reactors)



PWR: pressurized water reactor

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