

Cooling on Demand. Cooling Generators with Less Water



With 'Cooling on Demand' Voith Hydro has developed an intelligent management system for the amount of cooling water needed for generators. The system reduces the water and energy consumption of the cooling process.

The rotor and the stator of a generator must be cooled, in order to prevent the unit from overheating. Heat dissipation occurs indirectly via air-water heat exchangers that are located around the stator. Normally, the energy-intensive cooling process kicks in simultaneously with the start of the generator and then remains constant throughout the entire operating time. The cooling water originates from the main cooling water supply system of the power station. This system also feeds cooling water to any other power station components that are prone to heating up rapidly.

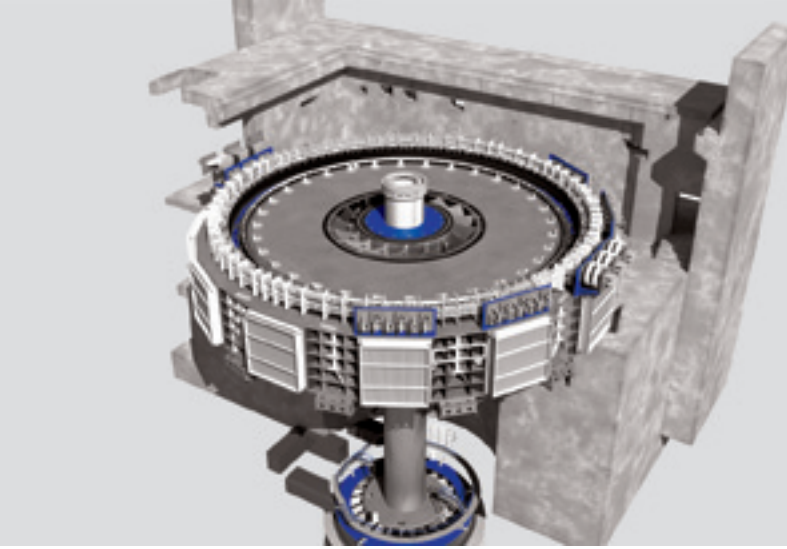
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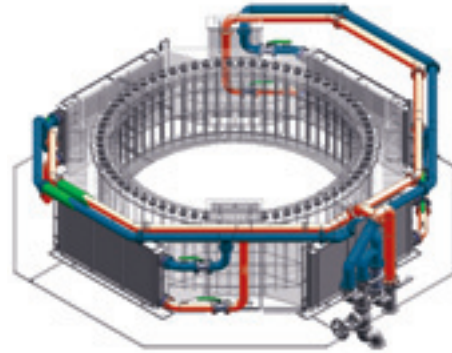
Energy

Water

Environment



Generator with Air Heat Exchangers



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The highest amount of cooling water is nevertheless used up by the generator. For this reason the innovation of the 'Cooling on Demand' principle begins here.

Instead of supplying each plant generator simultaneously with a full flow of cooling water, the cooling system - thanks to 'Cooling on Demand' - directs water to the right place in a targeted and economical manner. This means optimum cooling performance at all times. The amount of water is perfectly adapted to the prevailing operating condition.

Utilizing Water More Efficiently

Today the water flow through all consumers is constant and corresponds to the maximum flow at unfavorable cooling conditions, such as maximum machine load, maximum cooling water temperature and lowest available water pressure. The water flow of the individual consumers is manually adapted by throttles.

A possibility of optimally controlling the cooling water flow would be to regulate the rotary speed of the water pumps by a variable speed governor. In order to increase the efficiency even further, the cooling water supply is divided into separate

circuits. In this case, 'Cooling on Demand' also separates the generator cooling system from the general cooling water supply of the power station and feeds water from an independent system.

Perfect Cooling

But Voith Hydro does not just rely on isolated water circuits. An essential part of the principle is also the temperature-controlled operation of the generator cooling system. The system starts to keep the generator at its optimum operating temperature only once the generator components have reached this specific temperature level. Additionally, when the machine is switched off, the cooling is also switched off even before the generator has stopped. This saves water during the start-up and the stopping phase of the generator and reduces energy consumption. Moreover, 'Cooling on Demand' extends the service life of the generators, because temperature fluctuations are avoided.

The water and energy savings potential of 'Cooling on Demand' comes into maximum effect while the plant is in normal operation. Example calculations have shown that the water consumption in 100 MW-units can be reduced by up to 17 percent.

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