

# Trends in offshore generation

Several factors are driving the development of offshore gas generator sets. There is a trend for fewer but larger turbine sets, turbine inlet cooling and higher reactance demand.



ABB supplies 4-pole generators for mid-size gas and steam turbines up to frame size 1400, enabling a maximum output of 85 MVA. Both 50 and 60 Hz versions are available.

In offshore platforms, OEMs, packagers and end users are increasingly demanding higher generator power. “The trends driving this include a demand for more power using fewer larger turbines instead of many smaller ones,” says **Anders Stiger**, product manager, generators, for steam and gas turbines at ABB. “This helps keep capital expenditure (CAPEX) down, while ensuring the package has the smallest footprint to make the most efficient use of the minimal space available. This trend is leading to larger 4-pole generators, with powers reaching the 80 MVA class.”

## More power

The desire to draw more power from the same-sized turbine, by cooling the gas turbine’s inlet air or by replacing it with an upgraded engine design, requires

generators with higher power. Another issue is that of short circuit peak current increasing in importance with higher total power. This causes demand for higher reactance to limit the current, again resulting in the need for larger generator.

Some of these trends will lead to dimensioning the generator for a higher power than is actually required. When this de-rating is needed, such as for high power applications in hot environments using air-to-air cooling, a 2-pole configuration was previously the only technical solution available. Advanced 4-pole technology is now feasible to increase not only the actual maximum power levels, but also the power in hot ambient environments.

### Cost-effective water cooling

To address a need for more efficient and cost-effective heat exchangers, ABB has developed the CAWA cooler, which stands for cooling from air to water to air. This is a compact integrated water cooling package that offers weight reduction of more than 60 percent compared with air-to-air (CACA).

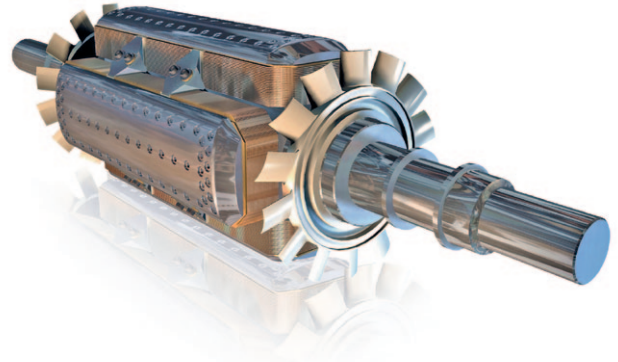
The above trends – the demand for fewer but larger turbine sets, turbine inlet cooling, higher reactance demand – give more reasons to select the newly available 4-pole configuration. “Compared to a 2-pole configuration, the main benefits of a 4-pole solution are compact size, lower cost of the generator-gear package, better efficiency and simplified maintenance,” says Stiger.

The 4-pole solution cuts the weight by about 20 percent and offers a quiet and compact turbine package, with lower running and maintenance costs and up to a 30 percent reduction in the need for cooling water and lubrication media.

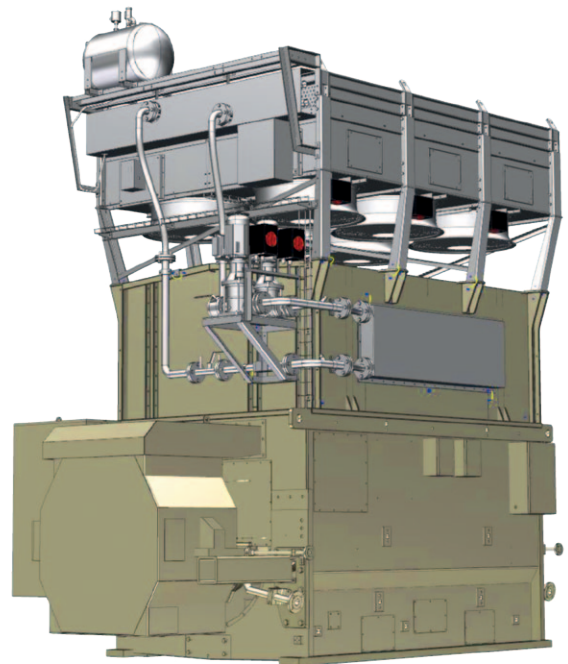
### Reliable 4-pole solution

The higher power levels available mean that the number of turbine units can be reduced, meeting the need for minimal space requirements and lower total investment cost. Power plants are increasingly being run in a frequent start-stop mode, posing higher stresses on generators. This is a particular problem for 2-pole units, which need to run over the critical speed area. The more rigid 4-pole solution offers better reliability to cope with these stresses.

The major benefit of ABB’s approach is the lower CAPEX needed, typically 20 to 30 percent lower investment costs. The smaller footprint provides a unit that is 20 to 30 percent shorter than the alternative 2-pole approach, and also around 20 percent lighter.



The solid, salient 4-pole rotor design operates below the first critical speed, which help to improve the generator’s vibration characteristics.



The CAWA cooler is a ‘plug and play’ closed-circuit cooling system installed on top of the generator. The drawing shows the CAWA subsystems.

For more information, visit:

<http://new.abb.com/motors-generators/generators/generators-for-steam-and-gas-turbines>