

**Title:** Fuel-Efficient Power Plant Featuring Variable Speed Generation Systems for DP Drilling Units

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**Abstract**

Variable speed power generation can be achieved in several ways, and this article will discuss and present new solutions that can be applied for DP class drilling units. For other smaller types of offshore DP vessels DC distribution technologies already exist, as for example the ABBs Onboard DC Grid concept, enabling variable generator speed operation. The main motivation for this is the fuel saving potential that lies within the possibility to run diesel engines in a fuel-optimal condition even at lower load by reducing the speed.

Further, two methods for applying variable speed generation will be presented and discussed:

LV DC grid system for mid water vessel segments with installed power up to about 25MW. This technology exist today and can be expanded to drilling vessel of this range.

MV variable AC systems with variable frequency switchboard operation for MV applications on larger vessels with installed power capacity above 25-30MW.

Techniques for operating and AC power plant with variable frequency (40 to 60 Hz) does exist, as most of the main power consumers like thrusters and drilling are supplied via frequency converters and thereby independent of input frequency. Other consumers requiring fixed 60 Hz (or 50Hz) network will be supplied via static converters keeping a constant voltage and frequency. All of these solutions can be combined with energy storage, and closed ring operation.

A case study showing the potential savings (from 10 to 30%) by applying variable speed generation for a drilling vessel operational profile example.