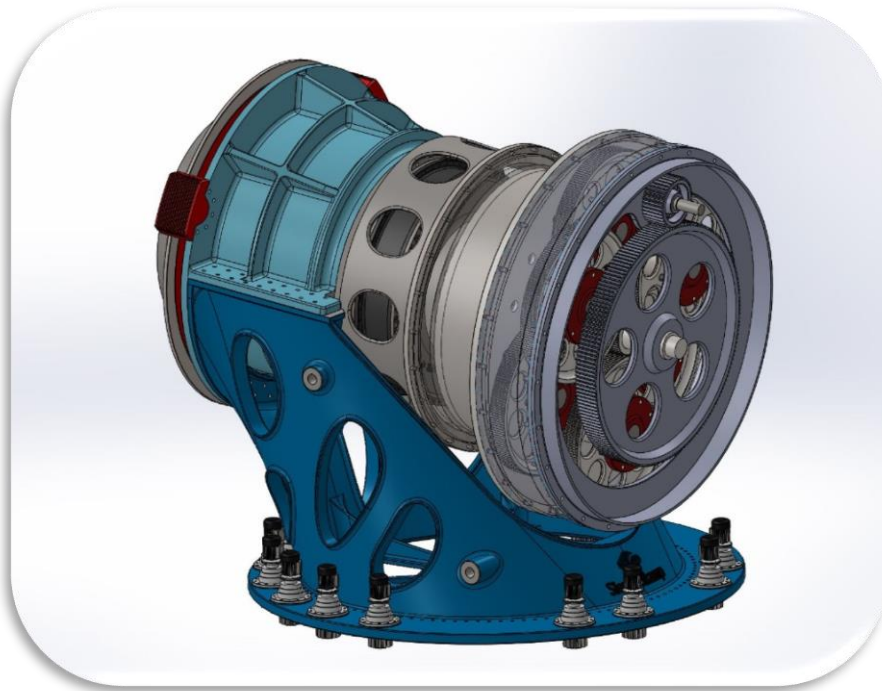


MergedGear by VerVent



November 2021

Ready for the MMW Wind Turbines of the Future

The MergedGear 20 gearbox concept is a dedicated double-digit MW design that was designed and developed by VerVent B.V., a Dutch wind energy technology company that was founded in 2013. Their mission is to support large-scale offshore wind through minimizing risks and maximizing LCOE performance. Offshore wind energy has seen growth of turbine size to 15MW+. To further reduce the LCOE, growth to beyond 20 MW will happen in the next few years. Drive train technology has been split between direct-drive and gearbox-driven. While direct drive eliminates the gearbox, weight considerations and the availability of rare-earth materials form potential barriers to further growth. Gearbox technology has seen limitations in design, reliability, and maintenance costs.

MergedGear reduces the typical gearbox concerns while allowing for the use of more conventional generator technology. On offer is Vervent's IP portfolio, to include the MergedGear patents.

Design Highlights

Unique Gearbox Concept

The MergedGear 20 Gearbox can be divided into two parts: The first part is the innovative stepped planetary gearbox, the second a parallel step that is connected to the generator.

The first planetary step minimizes the negative impact of deflections and deformations, damping axial and radial vibrations, preventing the gearbox and generator for damage, failures and too much maintenance. It means preventing non-torque



loads entering the gearbox from the low-speed rotor side and avoiding negative impacts on the high-speed generator side. The second parallel step in the MergedGear design, whose parallel ratio can vary between 50 and 1200 rpm, allows easy connection to a medium speed permanent magnet generator, such as by means of a flange connection. The output of the gearbox can be connected to a standard medium speed generator, from 400 – 1,500 rpm. The table below lays out the design data up to nominal powers up to more than 20 MW.

Summary	MergedGear				
	200	215	230	250	
Diameter rotor incl. blades (m1)		200	215	230	250
Rotational Speed Rotor (rpm)		8,4	7,8	7,3	6,7
Power at reference wind speed (kWh)		14.947	17.273	19.767	23.355
Torque at reference wind speed (kNm)		16.575	20.591	25.208	32.373
Output Torque Planetary SAtep Gearbox (kNm)	18,37	902	1.121	1.372	1.762
Rotation Planetary Step Gearbox / Generator	ratio	154	143	134	123
Output Torque Parallel Step Gearbox (kNm)	4,34	208	314	396	804
Rotation Parallel Stap Gearbox / Generator (rpm)	ratio	669	511	463	270
Overall Ratio Gearbox		79,80			

Patents and Principal Claims

The designs of the Megatorque and MergedGear 20 concepts are proprietary intellectual property of VerVent B.V. The design, technical specifications and innovation are described in three patents. The first of these is EP 3 027 902 B1: Wind Turbine VerVent 1.0, where the innovation and main claim is the bevel gearbox. Second, there are P100349PC00: Wind Turbine VerVent 3.0 and P100381PC00: Wind Turbine Vervent 3.1.

Leap Frogging Industry Practices

New and entrants and existing WTG makers can leapfrog other technologies and practices and aim for the next frontier in capacity and costs.

More Information?

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