

LC Drives

Advantage for medium speed generators

- 4T machine in place of 12T competitive machine
- Minimized deflection on gearbox with direct connected application
- Easier service with small crane
- Higher efficiency at partial load
- Allows smaller Nacelle bed plate (less weight)
- Allows taller towers without thicker steel (due to less weight of bedplate and generator)
- 1.8m diameter vs 2m with competitor
- 98%-98.5% efficiency

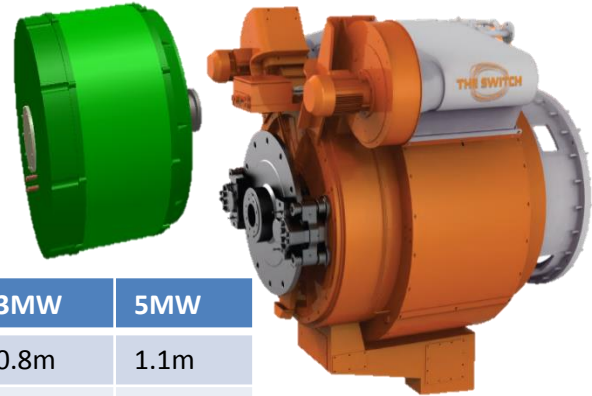
What we offer

- LC Drives machines are permanent magnet machines that are designed for rugged environments .
- These machines are typically half the size and weight of what they replace – sometime more.
- Smaller size and weight also improve efficiency at part load and lower speed. Since there is less iron losses with less iron, the part load efficiency with be dramatically better.
- Our machines are typically 10kW to 10MW in power rating and can be operated as generators or motors. In reality, machine size is determined from the torque requirement so it would be more accurate to say we can build machines from 40Nm to 200,000Nm. These machine range in size from 180mm(7inches) in diameter to 1,800mm(72inches) in diameter.

Standard feature for ruggedness

- FORM WOUND windings
- Class N insulation, machine wound, Kapton system
- alloy shaft
- Insulated bearing on non-drive end
- IP56 motor enclosure
- Winding RTDs, 100 ohm platinum; 2 per phase

Powering Change



	3MW	5MW
Length	0.8m	1.1m
Weight	4 metric Tons	5 metric Tons

12T-15T competitor

Dramatically smaller

LC Drives 20 hp, 1800 rpm machine



Convention induction 20 hp, 1800 rpm

Conventional 20Hp TEFC motor

- 256/286 frame, 160kg, 320mm dia x 525mm

LC Drives 20Hp motor

- 182 frame, 40 kg, 190mm dia x 250mm long
- Higher part load efficiency

LO Drives

Powering Change

How we make your machine ½ the size

- LC Drives machines use in-slot liquid cooling so heat is removed directly adjacent to where the heat is generated – the windings.
- All traditional liquid cooling approaches require heat to pass through the steel in the stator – steel is a poor thermal conductor.
- LC Drives uses a patent pending approach to accomplish in-slot cooling using a fully brazed manifold for high reliability.
- Higher slot current density allows the machine to be smaller – higher current → shorter machine.
- New materials allow heat to move easier from windings to cooling manifold without compromising electrical insulation.
- Stator design are covered by 7 patent applications

High efficiency at part load

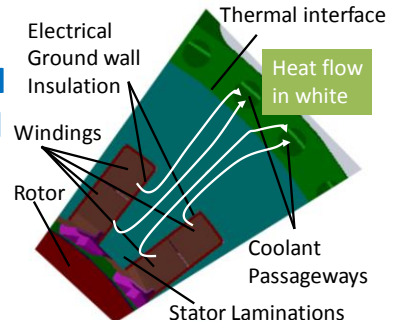
- Part load efficiencies of many machine types are very low due to iron losses not scaling down as fast as copper losses.
- LC Drives machines that have fundamentally less iron in them and therefore have less iron losses. This can have a dramatic affect on part load efficiencies – often ½ the losses of a conventional machine.

Motor Cooling System

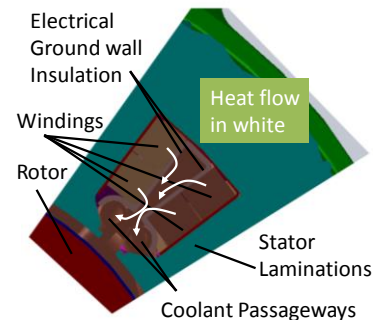
- Our units are typically liquid cooled machines that use standard ethylene glycol / water mixture for coolant – much like your automobile.
- We can build the units with an integrated radiator so you don't need to worry about the coolant, or we can supply pipe connections for integration into your overall system.
- If you choose to integrate your own radiator, we can take warm coolant at 60C-100C depending on the application to simplify your system.



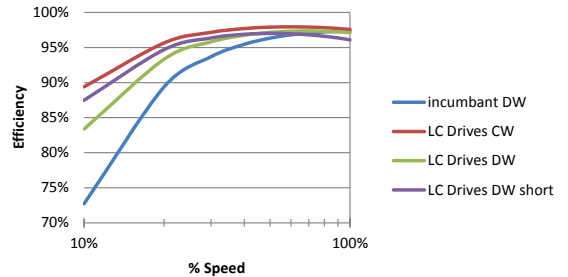
Conventional water cooled stator cross section.



LC Drives stator cross section.



Efficiency comparison with propeller load



Who we are

- The management team is a unique group of individuals with experience in the motor business, but with the track record of bringing revolutionary products to market.
 - Russel Marvin has built a revolutionary wind turbine company.
 - Nigel Shepherd has been selling into the large motor industry for years.
 - Our team includes multiple technical folks with one individual that is a world renowned expert in large rotating machines.