



TECHNIQUES TO IMPROVE THE PERFORMANCE OF AXIAL FLUX GENERATORS

Ghent University, is seeking industrial partners interested in licensing technology related to “High efficient Axial Flux Generators”.

Introduction

This technology offer relates to the design and manufacturing of a stator for axial flux permanent magnet electrical machines.

This offer allows to make stators that yield electrical machines with:

- low cogging torque
- high Efficiency

Technology

An axial flux permanent magnet machine is an electrical machine where the flux runs in parallel to the shaft from a first rotor at one end of the stator to a second rotor at the other end of the stator.

Researchers at Ghent University have found that a variable air gap (an air gap that is not constant along the radial direction) between the stator and the rotor allows to optimally use the material of the stator by introducing a uniform flux distribution. It also reduces the magnetic flux perpendicular to the stator iron laminations that gives rise to additional eddy currents and losses. Researchers at Ghent University furthermore developed two manufacturing techniques in order to allow the above technological advances to be cost-effective: one involves using a limited set of laminates which are punched, the second using a serpentine which is laser-cut.

Applications

Axial flux permanent magnet machines within applications requiring low cogging torque and high efficiency, such as wind turbines, automotive, ...

Advantages

Some of the advantages of our technology are:

- Low cogging torque in wind turbines allows to operate the wind turbine at lower wind speeds, improving the yield.
- High efficient generators provide more electrical output.
- The manufacturing techniques allow to make the axial flux generators in a cost-effective way.

State of development

The technology has been proven via theoretical analyses and in simulation. First test results on the proof-of-concept are available and show the excellent efficiency of the generator.

Partnership

We are looking for an industrial partner to include the proposed technology in its design of electrical machines. We seek a license deal.

Intellectual property

International patent application “Axial flux permanent magnet machine”. WO2010146175, filing date 18/06/2010. Granted patents EP2443727, EP2618466, US8878415

Figure

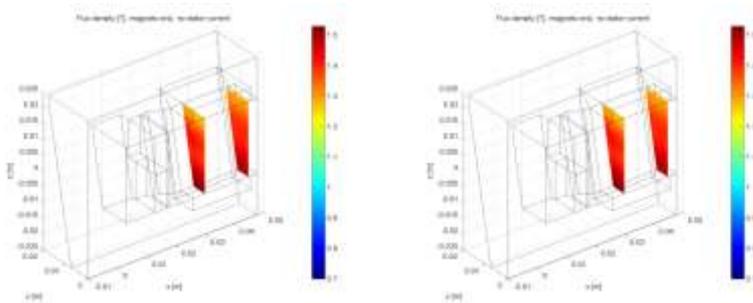


Figure 1 Only magnet flux, no stator current, (a) constant air gap (b) variable air gap

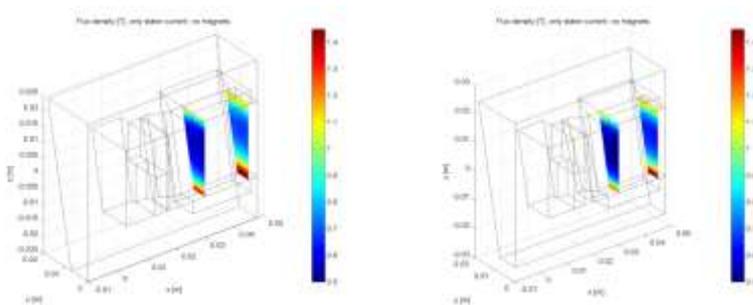


Figure 2 Only stator current, no magnet flux, (a) constant air gap (b) variable air gap

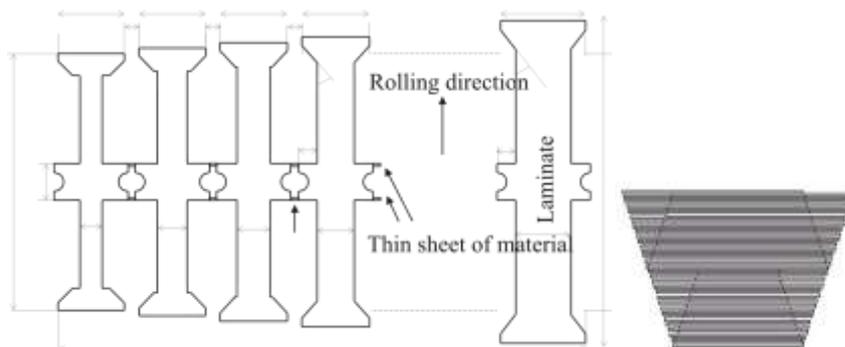


Figure 3: left: A possible production technique for the variable air gap: laser cutting a serpentine-like shape and folding it to a stack of laminations. Right: A possible production technique for the variable air gap: punching two sets of laminates and then stacking the laminates with partial overlap.

The Scientists

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More references: <https://biblio.ugent.be/person/801001545286>

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