

ELECTRIC BRUSHLESS GENERATOR

Main Technological Area —> Electrical Engineering

Keyword —> E Electrical machines | Generators | slip ring | Magnetic induction

This technical solution originates in the helicopter field and relates to the generation of electric power by using brushless generators directly on helicopter rotors or in general in the presence of rotating systems. In its original formulation, the electric power generated on the helicopter rotor could be used on the helicopter's blades to prevent the formation of ice on the edges of the attack and to avoid the degradation of aerodynamic performance.

From a conceptual point of view, the generation of electrical power in-situ (i.e. directly on the rotating system through the use of modern electrical machines e.g. axial flow type with permanent magnets) is achieved by using an inductor (e.g. permanent magnet or excitation coil) and an induced element magnetically coupled to each other and having different speeds of rotation (the inductor can also be stationary). The efficiency of the generation increases with the increase of the speed differential, which can be increased by using mechanical multipliers.

The direct advantage would be to remove the slip rings (sliding contact surfaces) which are not very reliable and subject to wear and failure. Moreover, the solution that involves the use of brushless generators allows to obtain higher power levels than those obtainable with standard solutions.

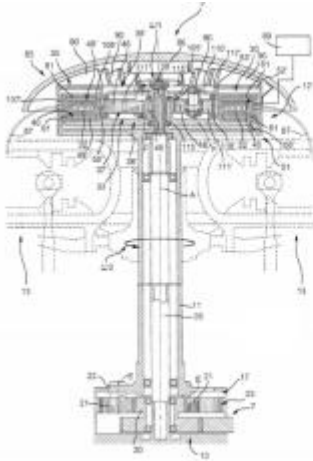


Figure 1 Implementation without gearbox

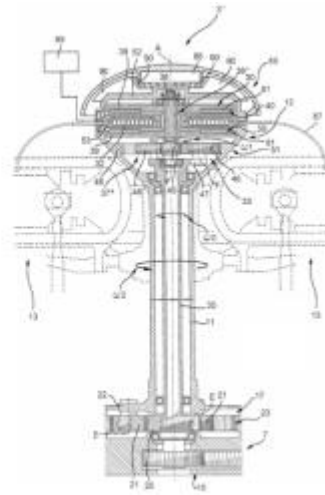


Figure 2 Implementation with gearbox

The company has protected the solution with three patents covering three specific aspects:

1. Generation "in situ" of the electricity needed to power the system
2. Disengagement of the current generator device in case of malfunction (to avoid overheating)
3. Monitoring of the correct functioning of the system by measuring the induced currents.

INNOVATION/BENEFITS

- 1) Robust design with reduced maintenance costs thanks to installation directly on rotating frames through brushless means, eliminating slip rings subject to wear and tear
- 2) Increased power availability thanks to direct generation on the rotor and without losses induced by power transfer through wiring
- 3) Greater security: the brushless solution offers natural protection against lightning thanks to the absence of a conductive path between rotating and fixed frames.

AREAS OF USE

- 1) Rotary / fixed wing aircraft
- 2) Land Vehicles
- 3) Vessels, including submarines
- 4) Machines with rotating parts that require localized energy production including wind generators
- 5) Rotary electric generators

PATENT INFORMATION

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IPC Codes Patent N° 1 – B64C27/12

Priority Number - Patent N° 2 EP3342706A1

IPC Code Patent N° 2 - B64C27/12; B64C27/605; B64C27/68; H02K16/02

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Active Worldwide Extensions

Patent N° 1 PCT – WO2018122370A1 ; Filing Date 2017/12/29

Patent N° 2 PCT – WO2018122371A1 ; Filing Date 2017/12/29

Patent N° 3 PCT – WO2018122373A1 ; Filing Date 2017/12/29

Leonardo internal code

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