Axial Flux Permanent Magnet Disc Machines: A Review

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ABSTRACT: ***Hub motion lasting magnet or permanent magnet (PM) machines are being produced for some applications due to their alluring highlights. A broad writing exists concerning the plan of an assortment of kinds of hub motion PM machines. A diagram of hub motion, slot less and opened different PM machines are introduced in this paper. Machine structures, points of interest and highlights of the Axial Flux PM machine (AFM) are explained. A few fascinating novel hub motion machine structures are likewise covered from an assortment of viewpoints.***

KEY WORDS: ***Soft iron, hard iron, permanent magnet, temporary magnet, Axial flux PM***

INTRODUCTION

The non-opened rendition of the traditional outspread motion PM machine has likewise been broke down in the writing. The two significant contrasts between the opened and non-opened renditions of the spiral motion PM machine are the presence of spaces and the sort of poly phase winding[1]. The stator structure is non-opened and comprises of a heap of covered steel. Consecutive associated poly phase windings are folded over the stator in a toroidal style and named air gap windings since the windings are not set into spaces. The spots in the middle of the windings are loaded up with epoxy pitch to expand power and give better conductor heat move. The rotor structure is shaped by surface mounted NdFeB magnets, rotor center furthermore, shaft. It ought to be noticed that lone the windings confronting the rotor PMs are utilized for force creation in RFMs. The segments of the windings outwardly surface of the stator and the bits on the two sides are viewed as end windings in this geography. Hence, this geography has long end windings when the perspective proportion D/L (breadth over pivotal length) is little. All things considered, little viewpoint proportion could bring about high copper misfortune. Also, the transition thickness is decreased because of the enormous air gap. Nonetheless, one significant bit of leeway of this machine is that the structure moves the warmth from the stator outline very easily. Therefore, machine electrical loading can be relatively high[2].

Axial Flux Surface Mounted Pm Machines:

Pivotal transition machines are characterized dependent on the rotor structure. It is named a pivotal transition acceptance machine if the rotor structure is a squirrel confine; a pivotal transition surface mounted perpetual magnet machine if the rotor is shaped by surface mounted lasting magnets[3]; and a pivotal motion inside PM machine if the rotor has an inside magnet structure. In this paper, the attention will be on pivotal transition surface mounted PM machines with various rotor arrangements yet there will be a short survey of a few other kind of AFMs and applications too. The fundamental and most straightforward hub motion structure is the single rotor-single-stator structure as it is found in this paper. The stator comprises of a ring type twisting inserted in epoxy like material and an iron circle which is produced from a basic tape wound iron center. The rotor is shaped from a strong steel circle on which the magnets are installed.

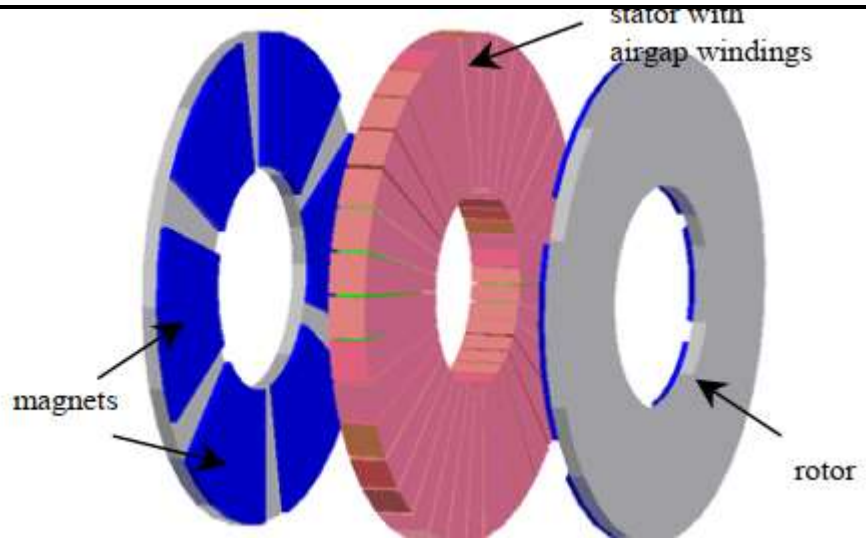

Fig. 1: Axial flux TORUS type non-slotted surface mounted PM motor configuration (TORUS-NS)[4].

The primary obstacle to defeat in pivotal motion plans counting the single-stage structure is the huge pivotal power applied on the stator by the rotor magnets. This magnet power could contort the structure without any problem. The pivotal power is less serious if the stator teeth are eliminated since this power is applied on the iron not the copper windings. Non-opened TORUS machine (TORUS-NS) is a run of the mill twofold rotor-single-stator, hub motion, PM, slot less, disc type structure. A glorified form of the machine structure is appeared in this paper. The machine has a single stator sandwiched between two PM rotor circles. The stator of the machine is acknowledged by tape twisted center with poly phase AC air gap windings which are folded over the stator center with a consecutive association[5].

REVIEW OF LITERATURE

There have been many paper published in the field of axial flux permanent magnet disc machine among all the papers a paper having titled "Axial Flux Permanent Magnet Disc Machines: A Review by Aydin, M., S. Huang*, T.A. Lipo discusses the PM machines are progressively getting prevailing machines with the cost seriousness of high energy lasting magnets. These machines offer numerous interesting highlights[6]. They are normally more productive on account of the reality that field excitation misfortunes are dispensed with coming about in critical rotor misfortune decrease. Subsequently, the engine productivity is extraordinarily improved and higher force thickness is accomplished. Also, PM engines have little attractive thickness which brings about little attractive measurements. With respect to the hub motion PM machines, they have various unmistakable preferences over spiral transition machines (RFM). They can be intended to have a higher ability to-weight proportion coming about in less center material. In addition, they have planar and effectively flexible air gaps. The commotion and vibration levels are not exactly the customary machines. Likewise, the bearing of the fundamental air hole motion can be changed and numerous discrete geographies can be inferred. These advantages present the AFMs with specific preferences over regular RFMs in different applications. The goal of this paper is to inspect the AFMs canvassed in the writing and examine a few new and promising AFM structures. Hub motion surface magnet PM machines including slot less and opened geographies with distinctive number of rotor and stators are broadly checked on. An overall glance at the AFMs other than surface magnet PM structures is additionally introduced. Measuring and plan approach is momentarily summed up also. Some motion debilitating PM geographies from a machine configuration purpose of see are additionally explored easily. Therefore, machine electrical loading can be relatively high[7].

CONCLUSION

Hub motion PM machines announced in the writing and a few new and promising AFM structures have been inspected in this paper. Machine structures, standards, principle contrasts, highlights and a few preferences of the AFM are explained. A portion of the alluring pivotal transition PM

novel machine structures are inspected from an assortment of points of view. At long last, an itemized and complete reference area has been given.

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