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Fabrication of BLDC motor

ShubhamParkar*, BidhyutChoudhury **,PavanNaik***, Pushkal Prasad****, Prof. PriyankaTripathi*****, Prof.GarimaGurjar******

* (Department of Electrical Engineering, Mumbai University, Mumbai- 95
** (Department of Electrical Engineering, Mumbai University, Mumbai- 95
*** (Department of Electrical Engineering, Mumbai University, Mumbai- 95
**** (Department of Electrical Engineering, Mumbai University, Mumbai- 95
***** (Department of Electrical Engineering, Mumbai University, Mumbai- 95
****** (Department of Electrical Engineering, Mumbai University, Mumbai- 95

Abstract: *During the course of the project, we have made a* ***model th****atiseasy to modify and fast running which simplifies the work to an extent. In thisprojectwe have discuss an algorithm to fabricate BLDC motor. Various components of BLDC motor are modified for efficient application. The comparisonbetween BLDC motor and brushedmotorisshown and the reasonwhy BLDC motoris more favourable. On course of the projectthismotoris to betested for the highefficiency as the BLDC motoris the idealchoice for the application thatrequireshighreliability, high power-to-volume ratio. This BLDC motorwillact as a cost-effective replacement for brushed dc motor.*

Keywords: *Brushless motor, Cost effective, Efficient, Less maintenance, Longer life*

I. Introduction

The BLDC motoris the idealchoice for the application thatrequireshighreliability, high power-to-volume ratio. Brushless DC electric motor also known as electronically commutated motors (ECMs, EC motors), or synchronous DC motors, are synchronous motors powered by DC electricity via an inverter or switching power supply which produces an AC electric current to drive each phase of the motor via a closed loop controller. Magnetic fields generated by the stator and rotor rotate at the same frequency. The controller provides pulses of current to the motor windings that control the speed and torque of the motor.The operation of a BLDC is based on the simple force interaction between the permanent magnet and the electromagnet.

BLDC Motors have received the considerable attention throughout the industrial world since the early 1970. BLDC motors are used in computer disc drives and small fans exclusively.

II. Objective

- Increase Efficiency.
- Elimination of Spark.
- Low Noise.
- High speed range.
- Longer life.
- Easy to modify.

III. Methodology

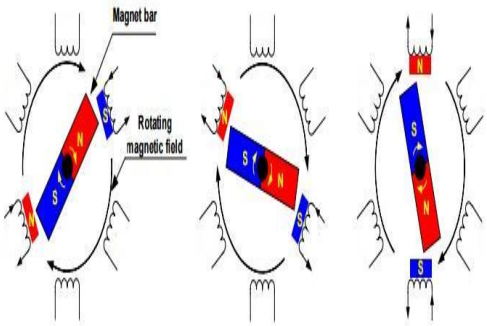
The main objective of the project is to guarantee the efficient operation of the BLDC motor.
The motor can be divided into four parts:

- DC Power Supply
- Controller
- Stator
- Rotor

IV. Working & Specification

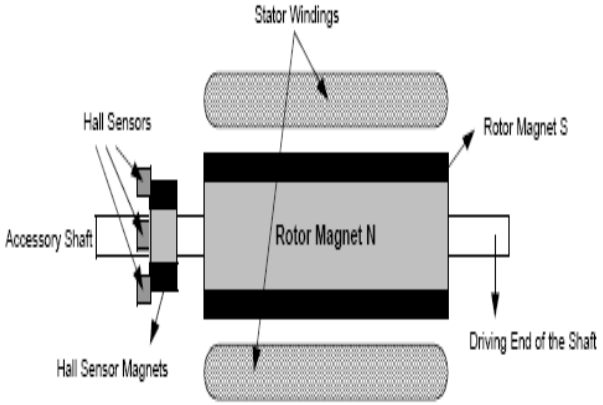
Statorconsists of stacked steel laminations with windings placed in the slots that are axially cut along the inner periphery.
Rotoris made of permanent magnet and can vary from two to eight pole pairs with alternate North (N) and South (S) poles. Ferrite magnets and Rare earth alloy magnets are used in rotor.
Unlike a brushed DC motor, the commutation of a BLDC motor is controlled electronically.
It is important to know the rotor position in order to understand which winding will be energized following the energizing sequence.

In BLDC Motor we use Hall sensors.



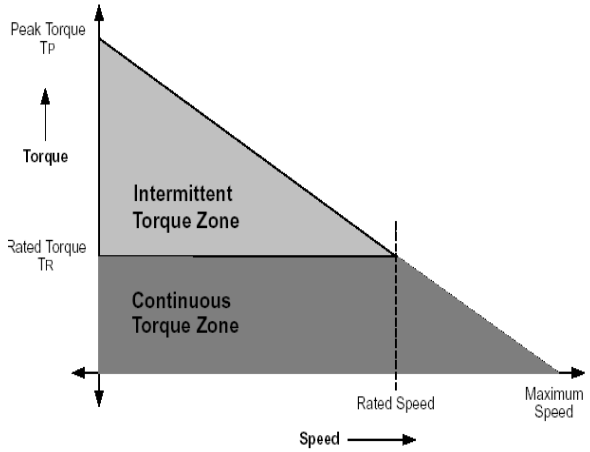
As the rotor nears coil A, coil B is energized. As the rotor nears coil B, coil C is energized.
After that, coil A is energized with the opposite polarity. This process is repeated, and the rotor continues to rotate.
Each sequence has

- one winding energized positive (current into the winding)
- one winding energized negative (current out of the winding)
- one winding non-energized



V. Graph

TORQUE-SPEED CHARACTERISTICS



VI. Ratings

Copper wire – 36 gage enamel copper wire.
Magnet – Neodymium magnet 52grid.
12-24V DC POWER SUPPLY.
Motor speed – 4000-5000rpm

VII. Conclusion

In this paper the design and fabrication of a high speed BLDC motor has been presented. The model made is simple accurate, easy to modify & fast running. Although Brushless DC motors are more expensive of the same kW rating than conventional DC motor but there are many advantages.Brushless DC motors can run when submerged in fluids.Brushless DC motors does not produce brush or commutator particles or gases as by-products of operation.

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