

BRUSHLESS DC MOTOR (BLDC) FUNDAMENTAL FEATURES



Brushless DC (BLDC) motors are one type of motors that have won more popularity in recent years.

Today, BLDC motors are used in industries such as: Automobile, Aerospace, Consumer, Medical, and automation equipment and instrumentation.

BLDC motors have the characteristic that they do not use brush to transfer energy; in this case the commutation is done electronically. This feature eliminates the major problem with the conventional DC brushed motors, which produce friction and decrease performance, emit heat, are noisy, periodic maintenance.

BLDC motors have many advantages compared with brushed DC motors some of them are:

- Higher speed with rated load
- Higher dynamic response
- Higher efficiency
- Longer life
- Less noise

BLDC motors produce more out-put power per frame size than brushed DC motors making them ideal for limited access areas.

By the other hand BLDC have two disadvantages:

- 1.- They have higher cost
- 2.- The control is complex and expensive

Despite the complexity of the control, MASTER INGENIEROS has over 10 year of BLDC motors experience.

	BLDC Motor	Brushed DC Motor
Commutation	Electronic commutation based on Hall position sensors	Brushed commutation
Maintenance	Less required due to absence of brushes	Periodic maintenance is required
Life	Longer	Shorter
Speed/Torque Characteristics	Flat – Enables operation at all speeds with rated load.	Moderately flat – At higher speeds, brush friction increases, thus reducing useful torque.
Efficiency	High – No voltage drop across brushes.	Moderate.
Output Power/ Frame Size	High – Reduced size due to superior thermal characteristics. Because BLDC has the windings on the stator, which is connected to the case, the heat dissipation is better.	Moderate/Low – The heat produced by the armature is dissipated in the air gap, thus increasing the temperature in the air gap and limiting specs on the output power/frame size
Rotor Inertia	Low, because it has permanent magnets on the rotor. This improves the dynamic response.	Higher rotor inertia which limits the dynamic characteristics.
Speed Range	Higher – No mechanical limitation imposed by brushes/commutator.	Lower – Mechanical limitations by the brushes.
Electric Noise Generation	Low.	Arcs in the brushes will generate noise causing EMI in the equipment nearby.
Cost of Building	Higher – Since it has permanent magnets, building costs are higher.	Low.
Control	Complex and expensive.	Simple and inexpensive.
Control Requirements	A controller is always required to keep the motor running. The same controller can be used for variable speed control.	No controller is required for fixed speed; a controller is required only if variable speed is desired.

This document has been created with the next bibliography:
 “AN885. Brushless DC Motor Fundamentals” Microchip Technology Inc.
 “Informe sobre motores” D.S.I.E. Department of UPCT University (Universidad Politécnica de Cartagena).