SOLENOID LAMINATED IRON MATERIAL COMPARISON EXPERIMENT

* BACKGROUND

Electromagnetism results from the passage of electric energy through a conductor circuit which is associated with magnetizable iron material. The electric energy enters the conductor circuit at one terminal, travels through the circuit, and exits at the other terminal, resulting in a magnetic force being developed as the electric energy passes through the conductor circuit.

By the process of magnetic induction, a magnetic north pole and south pole is developed from the magnetic eddy current energy radiating outward from the electrified inductance conductor circuit.

Magnetic force developed in an electromagnetic circuit is associated with a proportional amount of work. An increase in magnetic force and a corresponding increase in work output can be accomplished by increasing the amount of electric energy to the inductance conductor circuit.

* LAMINATED IRON MATERIAL IN ONE PLANE ONLY

Electromagnetic induction structures generally are designed using an inductance conductor circuit associated with a magnetizable iron material laminated in one plane only, as illustrated in Fig. 2 and Fig. 4. When the magnetizable iron material is, for example, solid iron as shown in Fig. 1, with no laminations, the conductor's radiating magnetic eddy current energy has no pathways to enter. The solid iron material deflects the conductor's eddy current energy and causes the iron material to waste the conductor's magnetic eddy current energy potential.

Laminated iron material, in one plane, is utilized for electromagnetic structures because the laminations provide pathways that reduces input energy consumption, hysteresis losses and heat, while increasing magnetic force.

Therefore, solid iron material associated with magnetic induction structures underutilize and waste the conductors circuit's radiating magnetic eddy current energy.

* IRON MATERIAL CROSS LAMINATED

Iron material associated with a conductor circuit that is laminated in one plane, as shown in Fig. 2, has pathways on two of the four surfaces. The remaining two uninterrupted surfaces have no pathways, therefore, the conductor's eddy current energy is deflected and underutilized as a result of these two uninterrupted surfaces.

When the four surfaces of the iron material, as shown in Fig. 3, have pathways, a further decrease in input energy consumption, hysteresis losses, and heat occur, and a further increase in magnetic force is realized.

* CONSTRUCTION CONSIDERATION

By cross laminating the iron material, consideration must be given to methods or techniques that will retain the laminated iron material pieces. Each product application will, therefore, require a particular design to accomplish retention.

* TEST EXPERIMENT

The following experiment was performed on a conventional solenoid measuring 1" wide x 3" long x 3" high, as illustrated in Fig. 4. The stator 10, had twenty seven (27) lamination paths (A), one shown and the armature 15, had twenty seven (27) lamination paths (A), one shown. Formed around the armature 15, was an inductance conductor circuit of 6.5 ohm resistance, which was removable, so it could be used for the modified solenoid, as illustrated in Fig. 5.

When the conventional, Fig 4 solenoid was energized with a 3 volt, 300 milliamp DC source, it lifted a 4¼ oz. weight. The same solenoid was then modified by sawing it in half, which created the cross lamination pathway (B). This pathway was the width of the saw blade, 0.025".

Utilizing the same inductance conductor circuit and the same 3 volt, 300 milliamp DC source, an increase in magnetic force was noted. The solenoid was now able to lift a 6½ oz. weight. The two half sections created by cross lamination pathway (B) were held together and retained by an adhesive means.

* CONCLUSION

The introduction of additional pathways by cross laminating the iron material, changed established values for a conductor circuit's weight to iron ratio. Iron material properties and the physical dimension of laminations, establish how much electric energy, an inductance conductor circuit can utilize, before magnetic saturation of the iron material occurs. By experimentation, an optimum cross lamination pathway geometry can be determined.

The test experiment suggests that rotary motion machinery which manufactures electric energy and machinery which uses electric energy to accomplish work, will be improved by modifying the ferromagnetic iron material geometry, so that maximum benefit can result from the electro-magnetic process. In rotary motion machinery, wasted or underutilized magnetic eddy current energy becomes a by product in the form of heat, vibration and deflected stray magnetic energy radiation.

LAMINATED IRON MATERIAL COMPARISON SCHEMATIC

Fig. 1 SOLID IRON MATERIAL

Fig. 2 LAMINATED IRON MATERIAL

Fig. 3 CROSS LAMINATED IRON MATERIAL

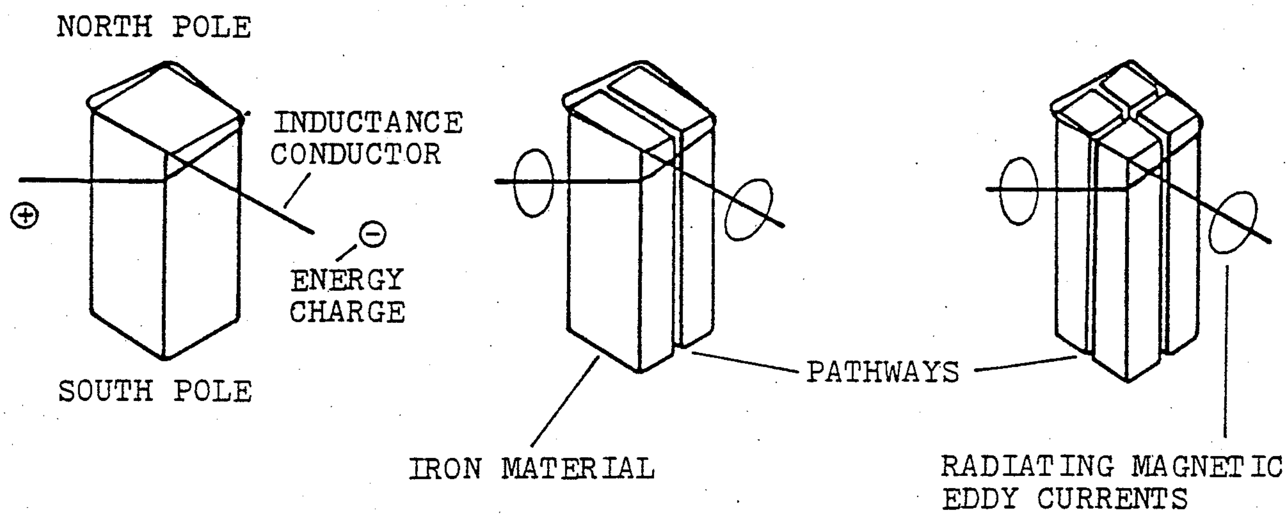

Fig. 4 LAMINATED SOLENOID

FORCE = $4\frac{1}{4}$ oz.

Fig. 5 CROSS LAMINATED SOLENOID

FORCE = $6\frac{1}{2}$ oz.