Five to one PM to EM Torque Motor

This motor is currently the best of my motor designs. This is because of the following reasons.

(1.) This motor uses the Three Layer Electromechanical Movement technology. This technology performs a constantly changing reconfiguration of the stator assembly while the rotor is rotating around the stator assembly creating a travelling flux wave that creates a constant forward torque between the stator and rotor assembly through the full rotation of the rotor assembly.

(2.) The rotors are populated with 25% permanent magnets that have continual torque through the full rotation of the rotor without having any electromagnets on the rotor assembly.

(3.) Two rotors working with one stator assembly produces a torque ratio of 5:1 PM to EM magnets as compared to the 3:1 ratio that having one stator and one rotor assembly have produced in older designs of mine.

(4.) The stator assembly is populated with 50% permanent magnets, 25% electromagnets operating in circuit 1 using a 25% duty cycle and 25% electromagnets operating in circuit 2 using 25% duty cycle. This arrangement in the Three Layer Electromechanical Movement technology produces four configurations that repeat them selves over and over again. I will have drawings explaining details of how this happens but for now the torques from these movements are as follows.

  (A.) Movement 1: The power is off on both electromagnet circuits. The end of movement 4 has left the permanent magnets between the rotor assemblies and the stator assembly with a torque between them to align the permanent magnets through attraction. These permanent magnet torques in this movement are 3:0 PM:EM during this movement of travel.

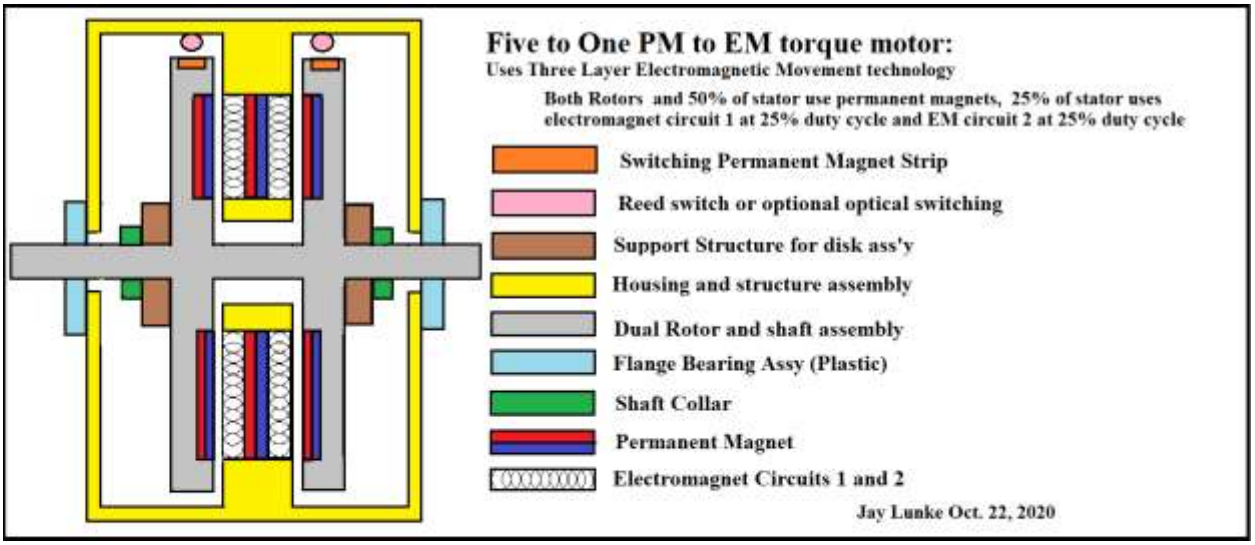
  (B.) Movement 2: The electrical energy is turned on for electromagnet circuit 1. The two permanent magnets adjacent to the electromagnets in circuit 1 are configured into a functional magnet with the electromagnet part closest to the rotor assembly. This creates an attraction with the rotor magnets to rotate the rotor some more. The Permanent Magnet torque between the two rotors and the electromagnets are 2 to 1 during this segment. When you add movement 1 and movement 2 you end up with a torque of 5 to 1 PM to EM torque ratio.

  (C.) Movement 3: The power to the electromagnets is now off and the permanent magnets in the stator assembly are reconfigured back to normal which cause attraction between the rotor permanent magnets and stator magnets again. These permanent magnet torques in this movement are 3:0 PM:EM during this movement of travel.

  (D.) Movement 4: The electrical energy is turned on for electromagnet circuit 2. The two permanent magnets adjacent to the electromagnets in circuit 2 are configured into a functional magnet with the electromagnet part closest to the rotor assembly.

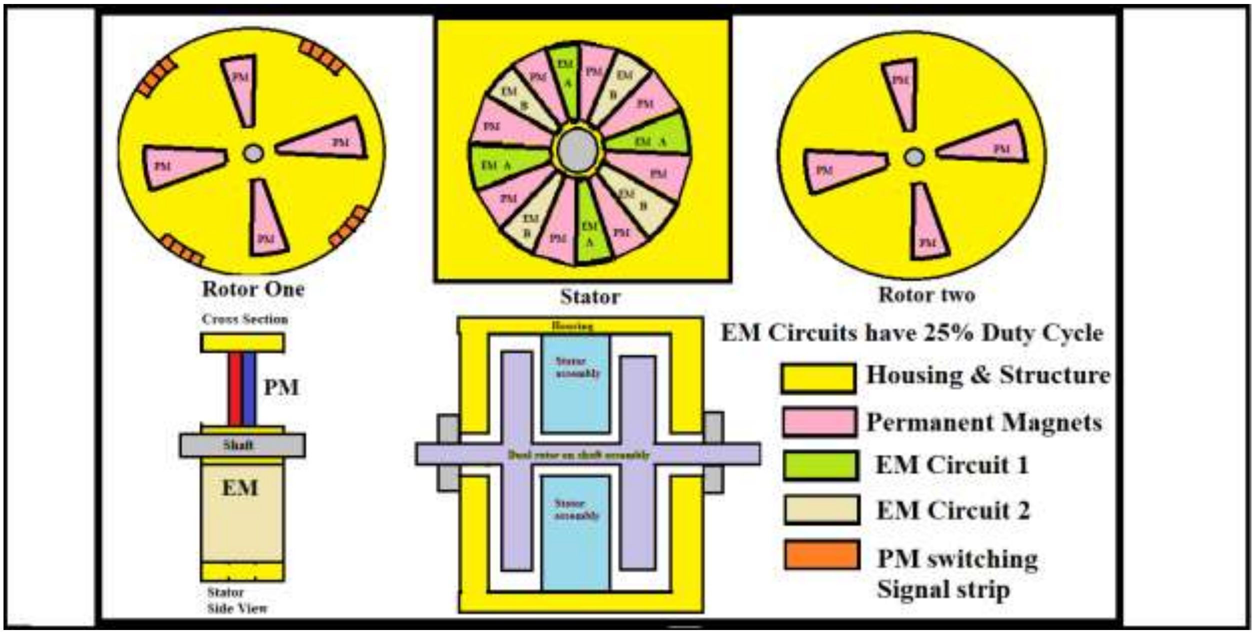
This creates an attraction with the rotor magnets to rotate the rotor some more. The Permanent Magnet torque between the two rotors and the electromagnets are 2 to 1 during this segment. When you add movement 3 and movement 4 you end up with a torque of 5 to 1 PM to EM torque ratio. So this means that the overall torque of the motor is 5 to 1.

Lets take a look at what the motor looks like:

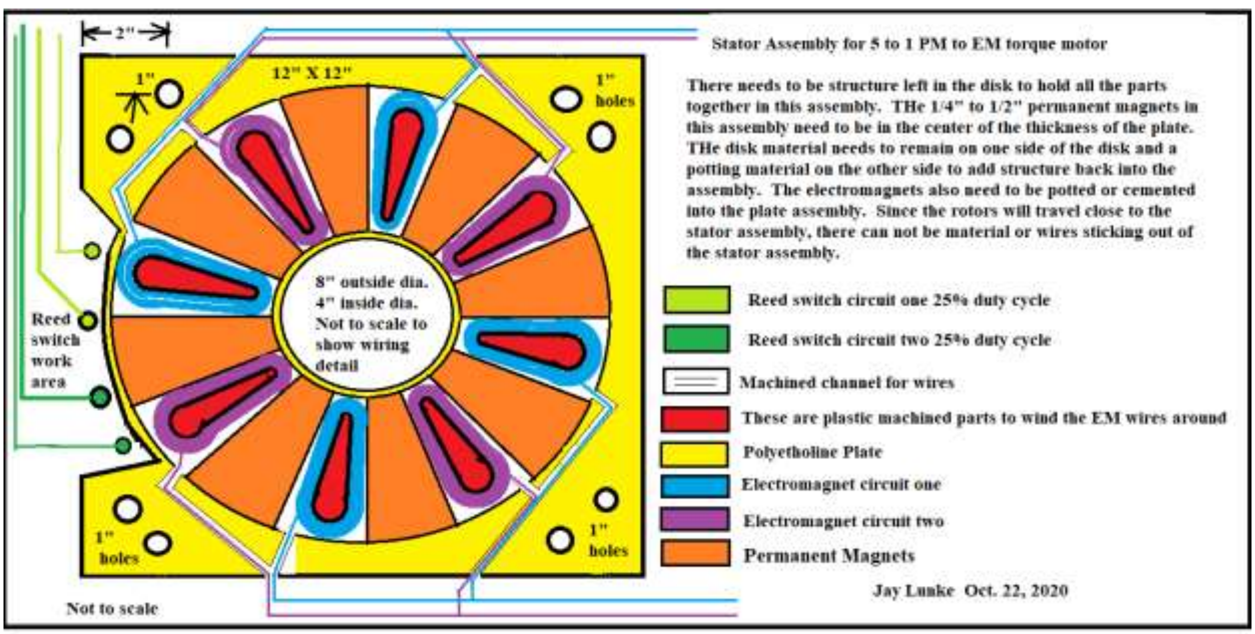


Now the stator permanent magnets alternat with one of the electromagnet circuits and the electromagnet circuits 1 and 2 alternat with each other.

The stator has 8 each permanent magnets, 4 each circuit 1 electromagnets and 4 each circuit 2 electromagnets. The orientation of the reed switches will likely be turned 90 degrees in the actual motor with cutouts in the housing assembly as needed. The reed switches should be able to be adjusted during the operation of the motor to optimize the motor performance during the operation of the motor. The following drawing gives a better look at the components of the motor.



This drawing shows how the permanent magnets and electromagnets are laid out on their sub-assemblies. The stator assembly is the most populated sub-assembly and needs a closer look at it as it is shown in the drawing below.

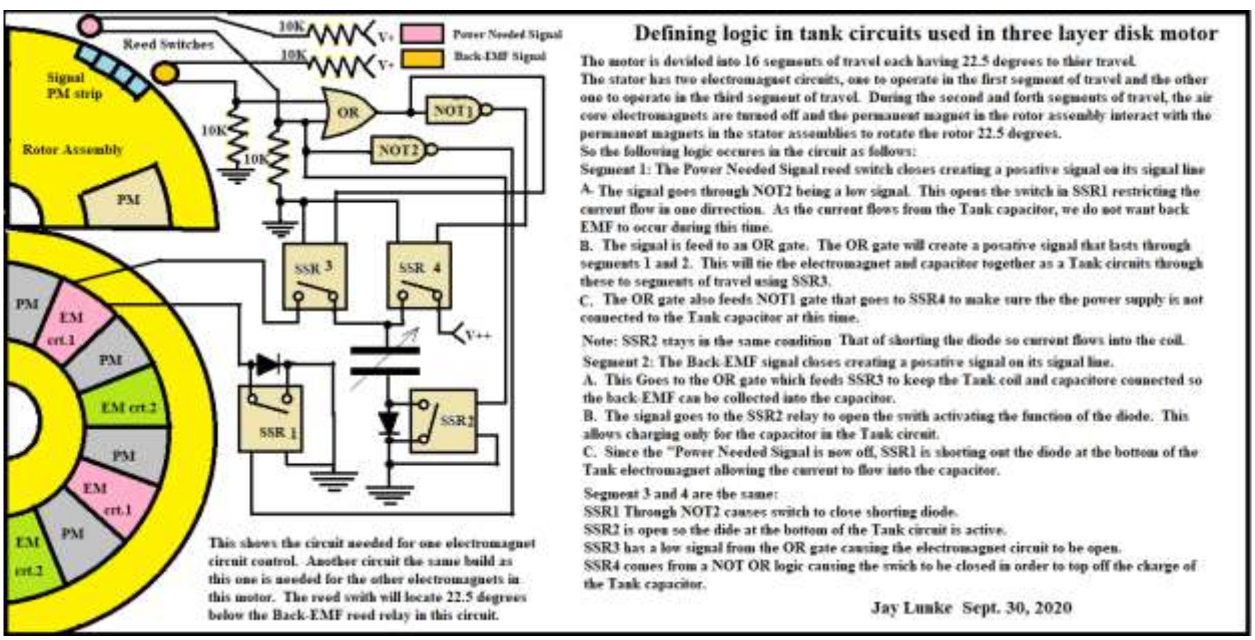


The timing of the turning on and off of the electromagnets is critical in this motor design. That is one reason that having the switching circuit designed in a way to either mechanically or electrically the switching timing needs to be able to be adjusted during the operation of the motor assembly. Since there are so many options in how this can be done, I will not get into details of how to do that in this file.

The structure integrity is also critical and the build of this sub-assembly needs special attention to make sure that the parts built into this assembly does not degrade the structural strength of it.

Now what the 5 to 1 PM to EM torque ratio is saying that this new Three Layer Electromechanical Movement technology can use the torque in the movement of a motor as if it were a battery operating an electrical circuit. This is very controversial. So I want to add another way to operate the motor in case those people are correct. So if having a ratio of 5 to 1 PM to EM torque can only produce 95% efficiency, then I will incorporate a circuit that captures and re-uses the electrical energy that powers the electromagnets.

So the electrical energy is converted into magnetic flux to create the torque in the motor to move the rotor. When the power is removed from the electromagnet, then the collapsing magnetic field generates an electrical current in the electromagnet. I have this current collected into a capacitor so that it can be re-used the next time the electromagnet needs power again. I designed a circuit that has the electromagnet in one of the legs of a tank circuit. A capacitor is in the other leg. Each of the legs have a diode in series with them along with a switch to short out that diode. In this way I can control the currents with the timing of the motor in order to simulate a resonant condition of a tank circuit. The following drawing shows how this tank circuit can be used with this motor assembly. There actually needs to be two tank circuits, one for each electromagnet tank circuit.



So if energy is conserved, then as the energy of the electromagnet is converted into the magnetic field, the energy coming back as back EMF being captured will be the starting energy minus the losses in the circuits and conversion losses that have taken place.

Now a tank circuit operates the best at the resonant point of the circuit. So the capacitor of the circuit needs to be close to the resonant circuit. I show a variable capacitor in the circuit and it is true that with a variable capacitor, that circuit would have the most efficiency. Now I have added steering diodes into the legs of the tank circuit in order to have the option of having a capacitor close to the optimal value in the circuit. The steering diodes will insure that the back EMF does not start to occur until it is time to move the current into the capacitor. This will simplify the tank circuit from needing a computer to monitor and constantly adjust the value of the capacitor used in the tank circuit. Now it is my thought that the faster the motor rotates, the more efficient the circuit becomes because the power is a switched DC power supply used to drive the tank circuit.

Now if the energy that is captured and reused in the circuit is 25%, than the motor efficiency of 95% with the re-captured 25% of energy would produce 120 % efficiency. Now this motor would have to drive a generator that has better than 80% efficiency in order for the motor/generator system to break even. A 90% efficient generator would produce 110% efficiency which would produce 10% of additional power to the power that is driving it. Now I think this can be achieved with current physics reasoning. But I do personally believe that the new Three Layer Electromechanical Movement technology does tap into the power that they already have in them. Now since the magnet will not retain its magnetic fields forever, then this is not a perpetual motion machine.

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