

## ABSTRACT

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Title : Design of Radial Flux Permanent Magnet Synchronous Generator Using Coils of Copper Wire and Aluminum Wire at Low Turns*

*A permanent magnet synchronous generator is an electrical device that converts mechanical energy into electricity. The generator uses a permanent magnet in the rotor to produce magnetic flux so that it produces an electric force in the coil. Generators are divided into radial flux and axial flux. The generator specifications are outer rotor type with a gear-shaped coil with a 3-phase iron core with a total of 36 coils with 1 x 12 wiring consisting of 95 turns on each coil with a wire cross-section size of 0.8 mm with two types of copper and aluminum with concentrated windings. . The rotor has 12 magnetic rods made from Barium ferrite ( $BaO\ 6Fe_2O_3$ ). The copper coil generator produces the highest neutral-phase voltage of 217.1 volts at a speed of 1400 rpm, then the lowest voltage of 41.3 volts at a speed of 250 rpm, for the highest phase voltage of 375.06 volts at a speed of 1400 rpm, then the lowest voltage of 71, 5 volts at a speed of 250 rpm. Aluminum coil generator for the highest neutral-phase voltage of 185.46 volts at a speed of 1400 rpm, then the lowest voltage of 36.43 volts at a speed of 250 rpm, for the highest phase-phase voltage of 319.6 volts at a speed of 1400 rpm, then voltage the lowest was 61.76 volts at a speed of 250 rpm. In the load test, the copper coil generator produced the highest neutral-phase power, namely 111,925 watts and the lowest power 19,485 watts. Generators with aluminum coils produce the highest neutral-phase power, namely 93.81 watts and the lowest power, 13.09 watts. From the tests that have been carried out, it is clear that the speed of a generator will influence the voltage generated linearly and the load used will influence the rotational speed of the generator. The load used is a resistive load in the form of a 25 watt incandescent lamp, input power to the resistive load = 121 watts, voltage regulation = 8.1% efficiency = 92% on the copper coil. Then on the aluminum coil the input power to the resistive load = 116.6 watts, voltage regulation = 2.4%, efficiency = 80%.*

**Keywords:** *full load , generator, short circuit, open circuit*