TECHNICAL PAPER

Realization of high-efficiency and high-output characteristics of magnetic power generators using single-phase angle transformation and three-phase six-wire winding

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Abstract

Taiwan's electricity consumption during summer increases significantly owing to the abnormal climatic changes caused by the greenhouse effect. An expedient strategy to develop a high-efficiency magnetic power generator can address the existing problem of power shortage in Taiwan. The magnetic power generator uses the force between the polarity of the magnet and the induced magnetic field of the coil to generate suction and thrust forces, which are generated when a magnet enters and leaves the coil, respectively, and can reduce the motor power consumption to achieve an energy saving effect. From the viewpoint of single-phase magnetic power generators, an angle transformation arrangement is used to achieve a positive power output to maximize the power efficiency, and three-phase power generation is used to maximize the output, where 8 magnets and 12 six-wire wound coils are used in conjunction with a delta or Y connection to achieve three-phase output. Each phase is 120° out of phase and each phase has 4 coils that generate power per revolution simultaneously. The high output characteristic enables the use of the three-phase magnetic power generators in several industrial applications. Herein, for a single-phase power generator, 8 magnets and 10 wires were used in an angle transformation arrangement, which achieved an output efficiency of up to 129.7%, whereas the three-phase power generator with 8 magnets and 12 six-wire wound coils with a diameter of 0.4 mm were used in conjunction with a delta or Y connection and achieved, which achieved an output efficiency of up to 82%, indicating that both these generators can be used for emergency power generation in homes, factories, or hospitals.

1 Introduction

1.1 The trend of single-phase and three-phase magnetic assisted power generator

Currently, the traditional generators are driven by a large motor due to the large load resistance, which causes a lot of energy to be wasted. A magnetic power generator improves power generation efficiency using magnetic energy to reduce load resistance, which allows the use of a small motor. For the single-phase generator, the coils enabled a positive efficiency output through an angle transformation arrangement, whereas for the three-phase generator, the 6 wire winding method was employed to generate a large amount of energy, which could mitigate the problem of power shortage in Taiwan.

1.2 The principle of magnetic generator

1.2.1 Fleming's right hand rule

As shown in Fig. 1, the thumb gives the direction of the magnetic field and the other 4 fingers provide the coil current direction, indicating that the experimental results were in agreement with the right-hand rule.

1.2.2 Explanation of the principle of generating magnetic force by coils arranged in a lateral direction using clockwise wire winding method

Figure 2 indicates that when the clockwise wound coils were arranged in a lateral direction, the N-pole of the magnet entering the side coil was still the N-pole, which

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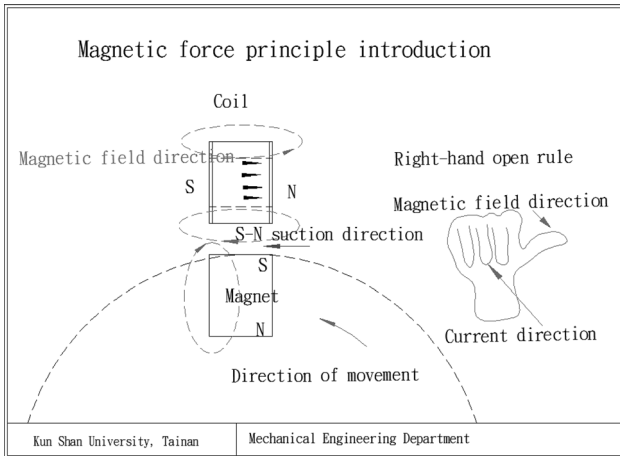
Fig. 1 Direction of current and magnetic field with Fleming's right hand rule right-hand opening law
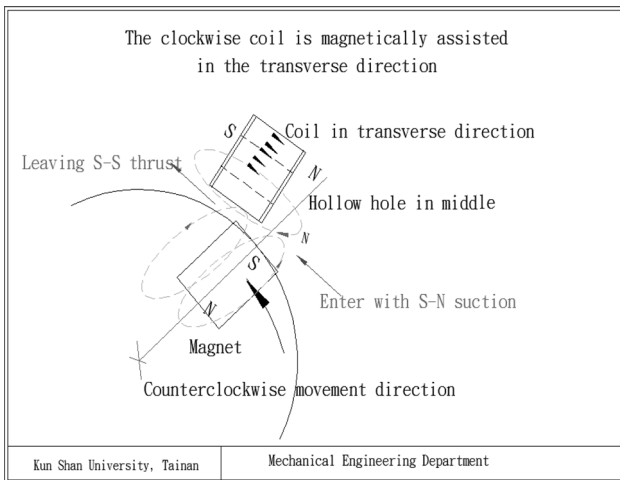

Fig. 2 Magnetic assist coil in the horizontal direction magnetic assist principle

generated SN suction with the S-pole of the magnet. When the magnet left the side coil, SS thrust is generated due to the opposite magnetic field (Siclafi 1993).
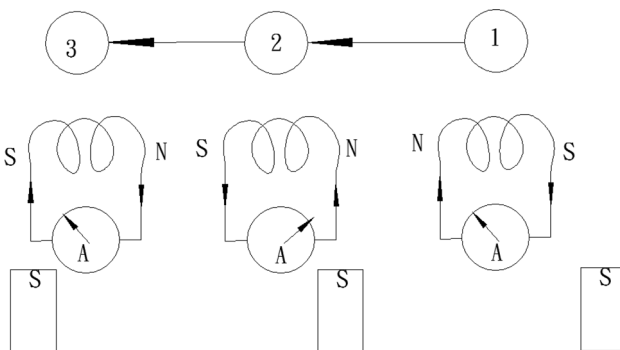

Fig. 3 Using the pointer-type galvanometer to illustrate the principle of magnetic assistance in straight direction

As can be seen in Fig. 3, for the clockwise wound coils arranged in a lateral direction, when the magnet is approaching, a potential resistance was generated due to the generation of a reverse bias, which was indicated by the pointer of the volt-ohm-ammeter (position 1). When the magnet reached the coil, suction was generated due to the generation of a forward bias, indicated by the pointer of the volt-ohm-ammeter (position 2). When the magnet was leaving, thrust (Konrad 1992) was generated due to the generation of a reverse bias, indicated by the pointer of the volt-ohm- ammeter (position 3).

1.2.3 Explanation of the principle of generating magnetic force by coils arranged in a longitudinal direction using clockwise wire winding method

As can be seen in Fig. 4, the CW wire was wound clockwise from left to right. When the CW wound magnetic assist coils were arranged in a vertical direction with the magnet entering the power induction coil, the S pole of the coil changed to the N pole, generating SN suction. When the magnet reached to middle the middle of the coil, the pole of the power generating coil was restored to the S pole due to the opposite magnetic field, thus generating SS thrust (Siclafi 1993).

Figure 5 shows that with the red and black rods of the volt-ohm- ammeter connected to the S and N poles, respectively, when the S pole magnet was approaching, a forward current bias were generated, indicating the generation of a NS magnetic field. When the S pole magnet was leaving, a reverse current bias was generated in the volt-ohm- ammeter, indicating the generation of a SS magnetic field (Konrad 1992).
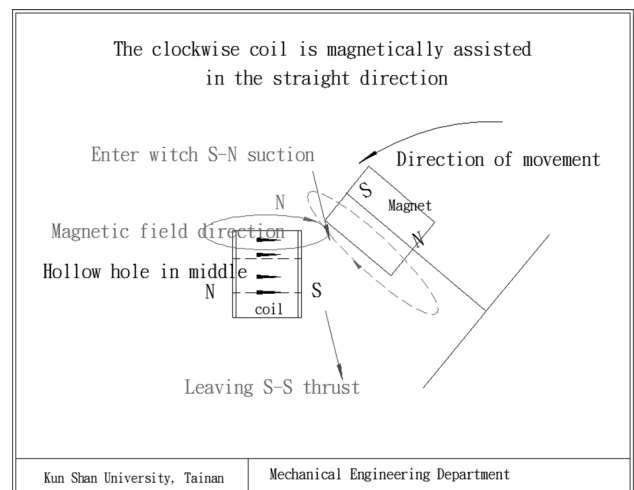

Fig. 4 Analysis of magnetic assist force generated by coils arranged in a longitudinal direction
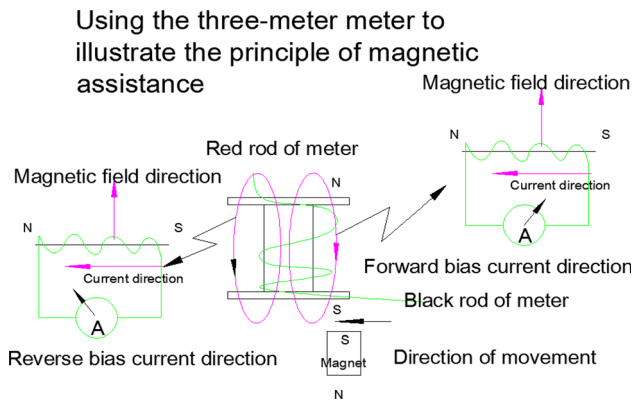
Fig. 5 Using the volt-ohm-ammeter pointer to illustrate the principle of magnetic assist force generated by coils arranged in a vertical direction

2 Experimental

2.1 High efficiency of single-phase magnetic assisted generator

2.1.1 Single-phase generator with coils arranged in a normal angle (Cheng et al. 2011; Ishak 2004)

2.1.1.1 Calculation of weight, length, and the number of turns of power coil (Cheng and Evans 1994)
Power coil having a wire diameter of 0.04 cm and each coil weighing 250 g, was denoted as D, where the enameled wire density (d) was 9 g/cm^3. The length of the wire corresponding to 1000 g could be solved by substituting 1000 g into the following equation,

$$\frac{1000g/10cm}{\frac{\pi}{4} \times 0.04^2 cm^2 \times 9g/cm^2} = 884 \ (M).$$

Currently each coil weighs 250 g. Thus the length was calculated as 221 M (884 M ÷ 4).

The number of turns corresponding to the length of 221 m was calculated (the middle value for the inner and outer diameter was taken)

The circumference of each coil = 3.14 × 0.03 M = 0.0942 M

The number of turns was calculated as 2346 (221 M ÷ 0.0942 M = 2346)

2.1.1.2 Maximum power generation estimate calculation (Saha et al. 2006)
Total impedance was 0.24 KΩ. Total coil voltage for maximum power generation can be calculated using the following formula:

$$\varepsilon_0 = 2\pi NBAf,$$

where N = the number of coil turns, B = magnetic flux density (magnetic field; unit: T), A = coil contact area

(cross-sectional area; unit:M^2), and f = frequency (Hz).

1 T = 10^4 gauss; currently N48 magnets with a magnetic flux of 0.04 T were used; a coil had a contact area of 1.5 cm^2 = 0.015cm^{2}M^2; and the number of coil turns (N) = 2346 (based on prior calculation).

Frequency was calculated as follows: it was known that each coil generated electricity 8 times per revolution. The idling speed = 2046 rpm or 34.1 r ps. Therefore, f = 34.1 × 8 = 272 Hz, which was substituted into the formula of ε_0

$$\varepsilon_0 = 2 \times 3.14 \times 2346 \times 0.04 \text{ T} \times 0.015^2 M^2 \times 272 \text{ Hz}$$
$$= 36 \text{ V AC (power generated by each power generating coil).}$$

Power generated by 8 coils = 36 V × 8 = 288 V

2.1.1.3 Test 1: Single-phase generator with coils arranged in a normal angle
Test 1: A DC 300 W brushless motor with a load of 12 V with the diameter and length of the magnets 25 × 25 N48–based single-phase magnets arranged in a normal angle and the diameter 0.4 mm-based coils was tested in conjunction with 13 W LEDs. The configuration is shown in Fig. 6.

In Fig. 7, the single-phase generator with coils in a normal angle arrangement and all are arranged in a horizontal direction (Ishak 2004).

Test1 mainly tests the efficiency of the single-phase normal angle arrangement magnetic assisted positive output, and compares the difference between the actual power generation and the theoretical power generator.

Table 1 shows that, with a power input of 21 W, the output of the single-phase generator with coils in a normal arrangement is 15.19 W, which failed to achieve the
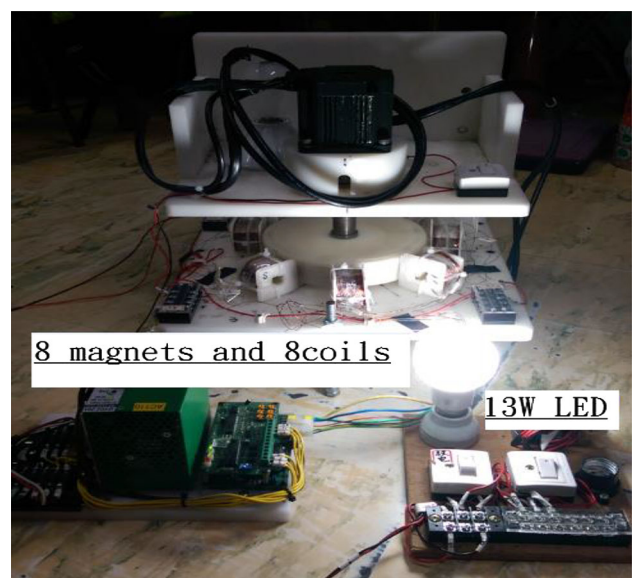

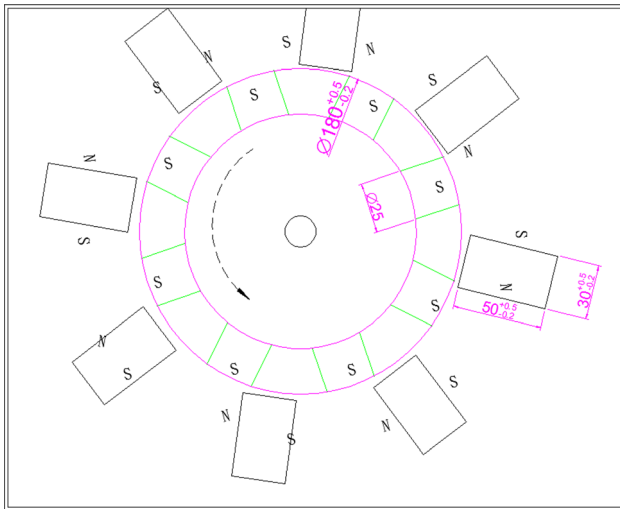**Fig. 6** Single-phase 8 magnets and 8 coil entities

Fig. 7 Single-phase generator with coils arranged in a normal angle

Table 1 Mainly test the efficiency of the single-phase normal angle arrangement magnetic assisted positive output, and compare the difference between the actual power generation and the theoretical power generator

High-power load	13 W LED
No-load 2047 rpm input	$8.7\text{VAC} \times 0.81\text{A} \times \sqrt{3} \times 0.8 = 9.76$ W
No-load output	250VAC
Load input	$8.6\text{VAC} \times 1.77\text{A} \times \sqrt{3} \times 0.8 = 21$ W
Load 1975 rpm output	$217\text{VAC} \times 0.07\text{A} = 15.19$ W
elf	15.19 W ÷ 21 W = 72%
Power consumption	21 W - 9.76 W = 11.24 W
Net power	15.19 W - 11.24 W = 3.95 W
Net output	3.95 W - 9.76 W = − 5.81 W

positive magnetic assist efficiency. Experimental results indicated that the theoretical maximum power generation voltage was 288 V AC, whereas, when the actual test speed reached 2047 rpm, the maximum power generation voltage was 250 V AC, indicating that the error value was 38 V AC (288 V − 250 V = 38 V AC). Such a small error value verified the accuracy of the theoretical power generation.

2.1.2 Single-phase generator with coils in an angle transformation arrangement

Test 2: Single-phase generator with coils in an angle transformation

In Fig. 8, the coils were arranged in an angle transformation, where 6 coils were arranged in a lateral direction, and the left and right coils were arranged in a longitudinal direction. The left vertical coil is opposite in polarity to the right vertical coil. Therefore, these coils need to advance
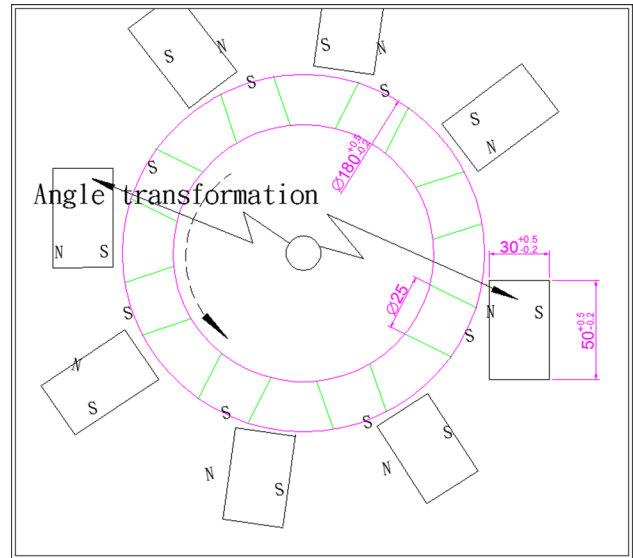

Fig. 8 Single-phase generator with coils in angle transformation

by one position to achieve the in-phase condition to simultaneously generate positive phase voltage (Zhang and Tang 2014).

As can be seen from Table 2, with an input of 19 W, the single-phase generator with coils in an angle transformation arrangement enables an output of 21 W, verifying that the magnetic assistance could help to achieve positive output efficiency, which indicated that the angle transformation arrangement could achieve a great effect (Fig. 9).

2.1.3 Single-phase generator with coils in an angle transformation arrangement

Test 3: Reverse-phase voltage coils incorporated into a single-phase generator with magnets in an angle transformation arrangement

Table 2 Results of efficiency and positive output of magnetic power generator with coils in an angle transformation arrangement, and comparison of power generation of generator with coils in an angle transformation arrangement and that of the generator with coils in a normal arrangement

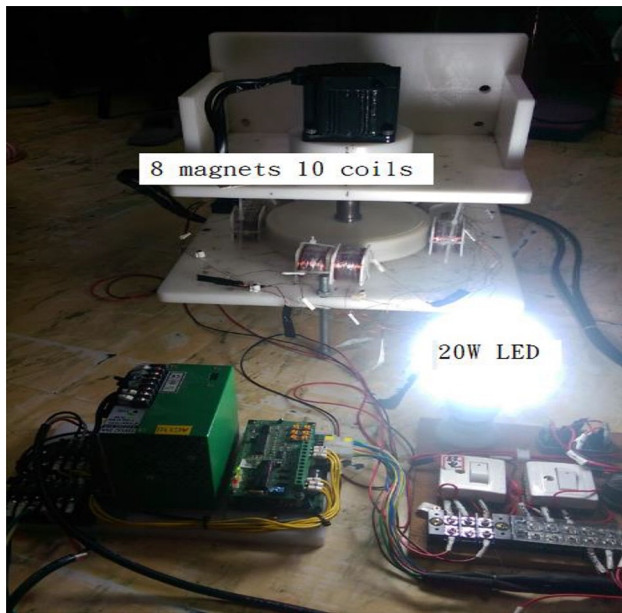| High-power load	13 W LED
No-load 2057 prpm input	$8.7\text{VAC} \times 0.66\text{A} \times \sqrt{3} \times 0.8 = 8$ W
No-load output	185VAC
Load input	$8.6\text{VAC} \times 1.6\text{A} \times \sqrt{3} \times 0.8 = 19$ W
Load 1985 rpm output	$229\text{VAC} \times 0.091\text{A} = 21$ W
elf	21 W ÷ 19 W = 110%
Power consumption	19 W - 8 W = 11 W
Net power	21 W - 11 W=10 W
Net output	10 W - 8 W = + 2 W

Fig. 9 Reverse-phase voltage coils incorporated into a single-phase generator with magnets in an angle transformation arrangement

In Fig. 10, the reverse-phase voltage coils are incorporated into a single-phase generator with coils in an angle transformation arrangement, where 8 coils were arranged in a lateral direction, and the left coil and right coil were arranged in a vertical direction. The left vertical coil is opposite in polarity to the right vertical coil. Therefore, the left vertical coil needs to advance by one position to be in phase with its right vertical counterpart to simultaneously generate positive phase voltage, and meanwhile in the next in-phase period, to increase the reverse-phase voltage (Ooiwa and Vehicle 2003).

As can be seen from Table 3, with an input of 26.9 W, the single-phase generator with reverse-phase voltage coils
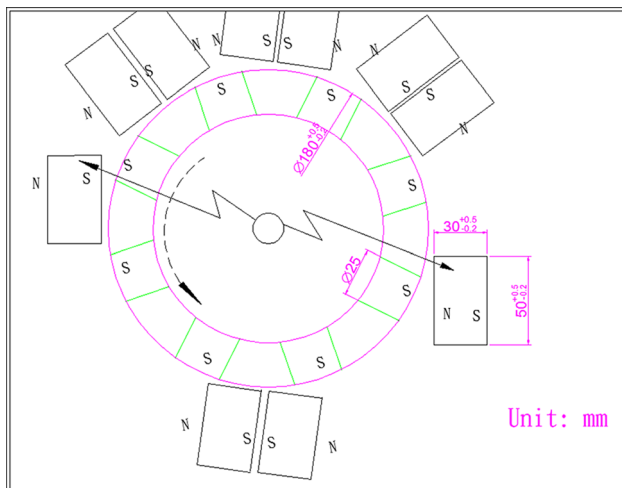

Fig. 10 Reverse-phase voltage coils incorporated with a single-phase generator with magnets in an angle transformation arrangement

was incorporated into magnets in an angle transformation arrangement achieves an output of 34.9 W, indicating that the high positive output 8 W is achieved. This device could be used in electric vehicles to increase the driving endurance.

2.2 Three-phase generator with high output power generation

2.2.1 Three-phase power generator in delta connection

Test 4: 8 magnets and 12 coils were tested, where all 12 three-phase coils in delta connection are arranged in a longitudinal direction (Fig. 11).

In Fig. 12, 8 magnets and 12 coils are in three-phase delta or Y connection, where the difference of each phase is 120° and 4 coils simultaneously generate power in each phase.

In Fig. 13, a wire head in one phase must be connected to a wire tail in another phase to generate three-phase 220 V AC voltage (Salmeron and Litran 2010).

As can be seen form Table 4, with an input of 86.2 W, the generator with 8 magnets and 12 vertical arrangement-based coils connected in three-phase delta connection achieves an output of 52.14 W, indicating an efficiency of 60%.

2.2.2 Test 5: Three-phase generator in Y connection

Test 5: The generator with 8 magnets and 12 coils in three-phase Y connection is tested, where the coils are all arranged in a longitudinal direction.

As can be seen from Fig. 14, in the three-phase Y connection, the N-pole wire tails are connected with one another to achieve a three-phase voltage balance, thus generating 220 and 440 V AC voltages (Sreenivasarao et al. 2012).

Table 3 Results of positive output efficiency of the single-phase magnetic power generator with reverse-phase coils and coils in an angle transformation arrangement, and comparison of power generation of the reverse-phase voltage-based generator with coils with and without an angle transformation arrangement (0.26 KΩ)

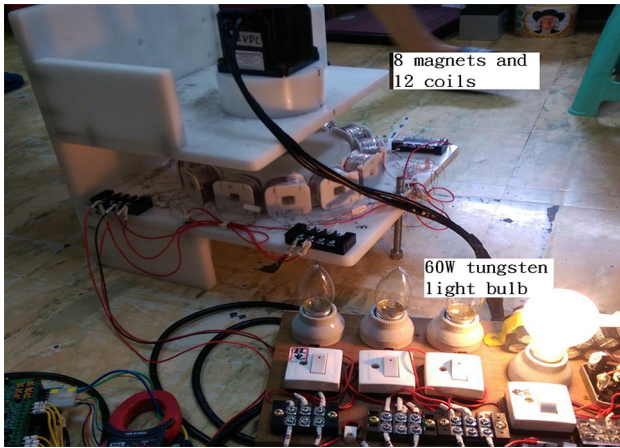| High-power load	20 W LED
No-load 1916 rpm input	$8.1\text{VAC} \times 0.74\text{A} \times \sqrt{3} \times 0.8 = 8.3$ W
No-load output	190VAC
Load input	$8.5\text{VAC} \times 2.29\text{A} \times \sqrt{3} \times 0.8 = 26.9$ W
Load 1923 rpm output	252VAC × 0.138A=34.9 W
elf	34.9 W ÷ 26.9 W = 129.7%
Power consumption	26.9 W - 8.3 W = 18.6 W
Net power	34.9 W - 18.6 W = 16.3 W
Net output	16.3 W - 8.3 W = + 8 W

Fig. 11 Use 8 magnets and 12 coils for three-phase power generation entity
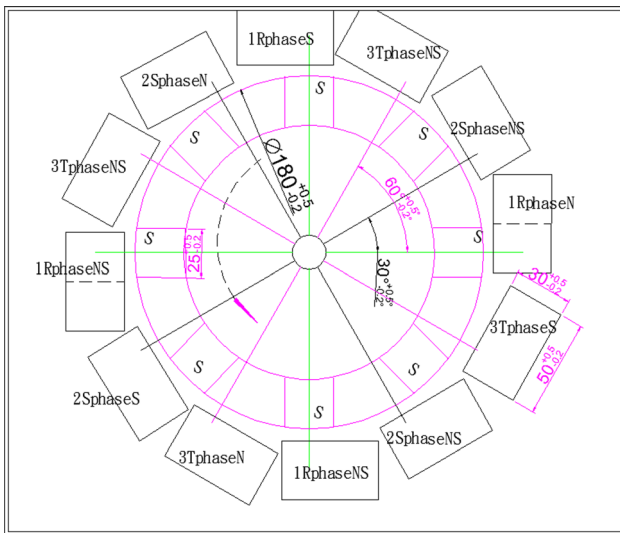

Fig. 12 Arrangement of three-phase power generation coils

As can be seen from Table 5, with an input of 86.1 W, the generator with 8 magnets and 12 longitudinal arrangement-based coils in three-phase Y connection achieves an output of 51.23 W, indicating the three-phase delta connection and three-phase Y connection generate the same amount of power.

2.2.3 Difference in benefit between single-wire wound and six-wire wound coils in three-phase magnetic power generators

As can be seen in Fig. 15, the six-wire wounds S1–S6 are grouped with N1–N6, respectively. First, N1, N2, N3, N4, and N5 are connected with S2, S3, S4, S5, and S6, respectively, where S1 is connected with the otherN6, and N6 is connected with the other S1 (Shoji et al. 2003).
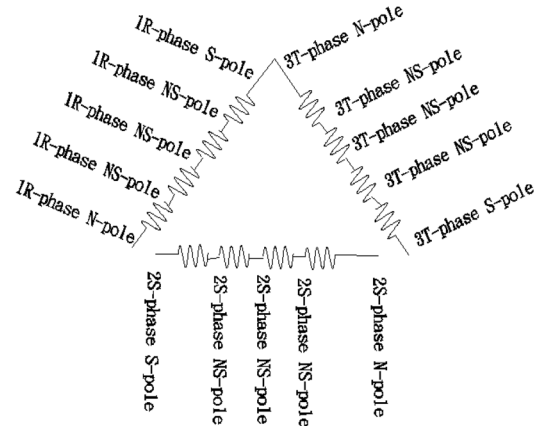
Three-phase 8 magnet 12 coil triangle connection method

Fig. 13 8 magnets and 12 coils in three-phase delta connection

2.2.4 Test 6: Three-phase generator in delta connection

Test 6: A generator with single-wire wound coils in three-phase delta connection is tested for rectification efficiency.

As can be seen from Table 6, with an input of 81 W, the generator with single-wire wound coils in three-phase delta connection and with a rectification function enables an output of 56 W. The efficiency is 69%, indicating that efficiency of a generator with rectification is higher than that of a generator without rectification.

2.2.5 Test 7: Three-phase generator in delta connection

Test 7: Six-wire wound coils in three-phase delta connection are tested for rectification efficiency.

As can be seen in Table 7, with an input of 74.9 W, the generator with six-wire wound coils in three-phase delta connection and with a rectification function enables an output of 61.56 W. The efficiency is up to 82%, indicating that the six-wire wound coils could achieve higher efficiency than the single-wire wound coils.

3 Results and discussion

3.1 What is difference between a magnetic power generator and a conventional generator? How to prove that the magnetic power generator has higher efficiency?

1. The traditional generator is composed of two sets of coils to form an AC loop, which causes two resistances to enter and pull away during the power generation process; but the magnetic power generator has one coil

Table 4 Results of high-efficiency output three-phase delta connection of magnetic power generator

Low power load	Tungsten light bulb		
Phase type	RS-phase	ST-phase	RT-phase
Load watt-age	40 W	40 W	40 W
Load speed	1571 rpm		
No-load voltage	183VAC	182VAC	178VAC
Power output	70.4VAC × 0.26A = 18.3 W	71.0VAC × 0.24A = 17.04 W	64.7VAC × 0.26 = 16.8 W
Total	18.3 W+17.04 W + 16.8 W = 52.14 W		
Power input power	8.34VAC × 7.46A × $\sqrt{3}$ × 0.8 = 86.2 W		
elf	52.14 W ÷ 86.2 W = 60%		

Three-phase 8 magnet 12 coil Star type connection method

Fig. 14 8 magnets and 12 coils in three-phase Y connection

Straight Line Six Line Connection
Connect the N6 side of his line

S1 is beginning of the line
N6 is ends of the line

Fig. 15 Three-phase coils in six-wire winding connection

fprming an AC loop, so the entry resistance and the exit tension can be reduced.

2. The traditional generator has a maximum efficiency of 70%, but the magnetic power generator has 82% of the low power load test in three-phase power generation
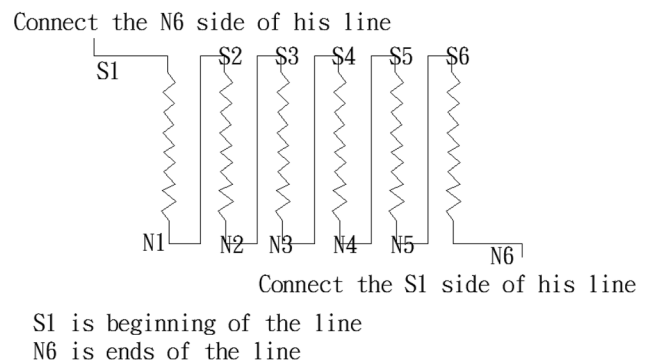
test7, so the magnetic power generator is more efficient.

3.2 Difference in benefit between single-phase magnetic power generators in and not in an angle transformation

Figure 16 shows that the single-phase magnetic power generator with coils in an angle transformation

Table 5 Results of high-efficiency output three-phase Y connection of magnetic power generator

Low power load	Tungsten light bulb		
Phase type	RS-phase	ST-phase	RT-phase
Load watt-age	40 W	40 W	40 W
Load speed	1577 rpm		
No-load voltage	183VAC	179VAC	181VAC
Power output	69VAC × 0.26A = 17.94 W	71VAC × 0.24A = 17.04 W	65VAC × 0.25A = 16.25 W
Total	17.94 W + 17.04 W + 16.25 W = 51.23 W		
Power input power	8.37VAC × 7.43A × $\sqrt{3}$ × 0.8 = 86.1 W		
elf	51.23 W ÷ 86.1 W = 59.5%		

Table 6 Results of high-efficiency output of three-phase single-wire wound magnetic power generators, and comparison of difference between generators with and without three-phase rectification

Low power load	Tungsten light bulb
Load wattage	60 W
Load speed	1600 rpm
No-load voltage	248VDC
Power output	112VDC × 0.5A = 56 W
Power input power	8.2VAC × 7.13A × $\sqrt{3}$ × 0.8 = 81 W
elf	56 W ÷ 81 W = 69%

Table 7 Results of high-efficiency output of three-phase six-wire wound magnetic power generator, and comparison of power generation of single-wire wound and six-wire wound generators

Low power load	Tungsten light bulb
Load wattage	60 W
Load speed	1639 rpm
No-load voltage	219VDC
Power output	108VDC × 0.57A = 61.56 W
Power input power	8.2VAC × 6.6A × $\sqrt{3}$ × 0.8 = 74.9 W
elf	61.56 W ÷ 74.9 W = 82%

arrangement requires a lower input and enables a higher output, representing an increase of efficiency of 40%.

3.3 How the single-phase power generation does uses the best combination of angle transformations with an efficiency of 129.7%. How does it measure? Is it a violation of energy conservation?

1. The eddy current generated by the generator is interrupted by the angle change of the coil in each turn to reduce the drag, so the single-phase power generation can reach 129.7%efficiency.
2. The voltage value is measured in parallel with the voltmeter, and the current value is measured in series with the ammeter, and test load using high power Led lights.
3. The single-phase angle transformations magnetic power generator uses the special arrangement of coil to make the force of the magnet to generate the thrust and to achieve the energy-saving effect. Therefore, the highest efficiency of 129.7% includes the force of the magnet itself and the input of the motor does not violate the energy conservation.
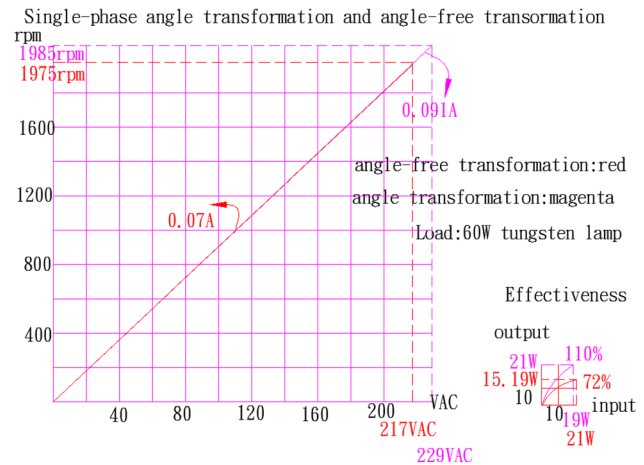
Fig. 16 Curve analysis of single-phase magnetic power generators in and not in an angle transformation arrangement

3.4 Difference the maximum efficiency between the single-phase magnetic power generator with reverse-phase coils and coils in an angle transformation arrangement with domestic and foreign generator manufacturers

As can be seen in Table 8, the single-phase magnetic power generator with reverse-phase coils increase efficiency by 30% compared to domestic or foreign generator manufacturers.

3.5 Whether the three-phase magnetic power generator is suitable for the angle transformation? How to improve the driving force of the driving again in the future if the single-phase angle transformations magnetic power generator is applied to an electric vehicle?

1. Since each phase in three phases is a single phase and the independent of each phase, so the angle conversion method is applied to improve the efficiency in three-phase magnetic power generator.
2. Single-phase angle transformations magnetic power generator can be used with the flywheel and with small motor as the power of the electric vehicle, the principle is that a lithium battery is used to provide DC small motor power, the DC small motor drives the flywheel, the flywheel drives the magnetic assisted generator and electric vehicle provides the power, because the high-frequency synchronous power generation generated by the magnetic power generator can be supplied to the power of a power coil added inside the magnetic power generator. The power generation and power functions

Table 8 Maximum efficiency performance analysis

Object comparison	This paper experiment	Domestic manufacturers http://www.jihdah.com/showinvestors.asp?investorsId=I013040001211212	Foreign manufacturers https://www.cadmen.com/page/iFrame/Preview.aspx?tp=News&im=51&ns=148
Efficiency	Single-phase magnetic power generator efficiency 129.7%	JIH-DAH,LTD maximum efficiency 98%	INDAR Electric maximum efficiency 97.7%
Test motor type	300 W DC brushless motor and magnetic power generator	SEMA-T468 motor 3600 RPM max power 160 HP	Permanent magnet generators (PMGs)
Control method	Brushless Speed regulation	Segmented electromagnetic array construction	Low frequency An soft Maxwell

of the magnetic power generator can reduce the load driven by the DC small motor, and the power generation is rectified and recharged to another battery, which improves the higher endurance of the vehicle.

3.6 Difference in benefit between three-phase single-wire wound and three-phase six-wire wound magnetic power generators

Figure 17 indicates that the six-wire wound generator achieves efficiency that is 13% higher than its single-wire wound counterpart when using low power loads.

3.7 What is the function of the three-phase magnetic assisted generator in the six-line tangling? How is it different form using three or more lines?

1. The function of the three-phase magnetic power generator reduces the cutting resistance by reducing the number of turns per single line by six-wire winding method and to reduce the input when using low power loads for example using a tungsten light bulb as a load.
2. It has been tested that the odd number six-wire tangling method is more efficient than the even-numbered line or the three-line or twelve-line number, so odd number six-wire tangling efficiency is highest under low power load.

3.8 How to improve single-phase and three-phase magnetic power generators in the future

3.8.1 Improvement of single-phase magnetic power generators

As shown in Fig. 18, in the single-phase magnetic power generator with coils in angle transformation arrangement,
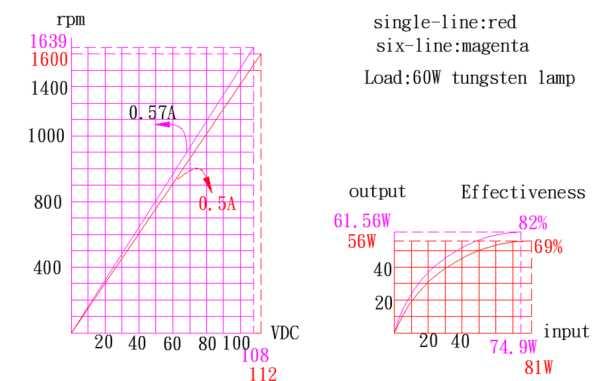

Fig. 17 Curve analysis of three-phase magnetic power generators in the single-wire wound and six-wire wound configuration

the diameter and length of the magnets are increased from 25 to 30 mm to increase the cutting area and magnet strength (Mizutani et al. 2004).

3.8.2 Improvement of three-phase magnetic power generator

Figure 19 shows that increasing the number of magnets from 8 to 16 results in an increase in the magnetic field strength (Lateb et al. 2006).

As shown in Fig. 20, increasing the number of magnets from 8 to 16, increasing the number of coils from 12 to 24, and using three-phase or six-phase connection configuration can increase the magnetic field strength and power generation (Che et al. 2014).

As shown in Fig. 21, the power generation of the generator with 8 magnets 12 coils is increased by using the double-sided vertical cutting method (Jansen et al. 2006).

Outlook: Currently the efficiency of a single-phase magnetic power generator with coils in an angle transformation arrangement has been 129.7%. With both the magnet diameter and length increased to 30 mm,

respectively, the efficiency could be increased to 140%. Currently, a three-phase six-wire wound power generator could output power of 61.56 W, where the diameter of the wire is 0.4 mm. In future, the power could be increased to over 100 W using wires with a diameter of 0.5 mm in conjunction with using the said 3 methods (Fig. 21).

4 Conclusion

4.1 Using thin wire in power generation coils is likely to cause high impedance and generate low current

Therefore, it needs to determine the load voltage before the maximum power generation current is determined.

4.2 A large magnetic force increases the power generation

The magnetic field strength determines wire diameter, wire diameter determines the impedance value, and the impedance value determines the power generation voltage. Large impedance requires a high power generation voltage but causes a low power generation current, which causes a large motor load.

4.3 The connection configurations of the three-phase magnetic power generator should be selected according to the load voltage

If the three-phase Y connection configuration is selected, line voltage is higher than phase voltage and line current is
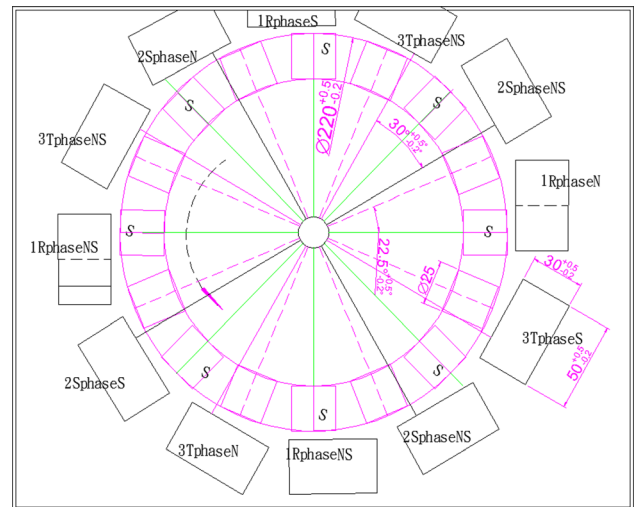

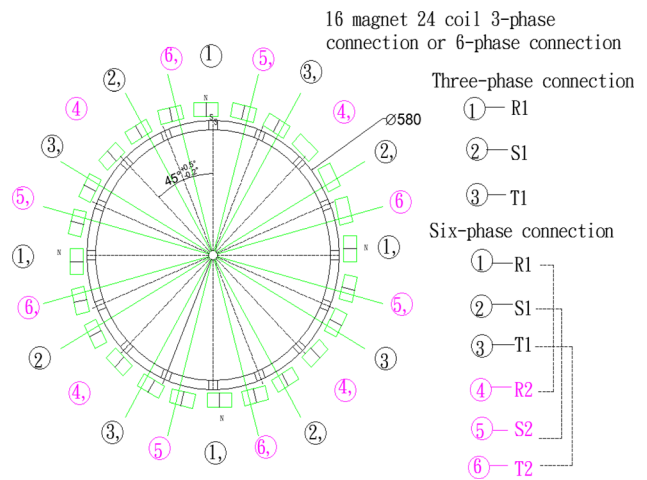**Fig. 18** Increase of cutting area and magnet strength for the single-phase magnetic power generator

Fig. 19 Increasing 8 magnets to 16 magnets

Fig. 20 Power output of a six-phase generator with 16 magnets and 24 coils

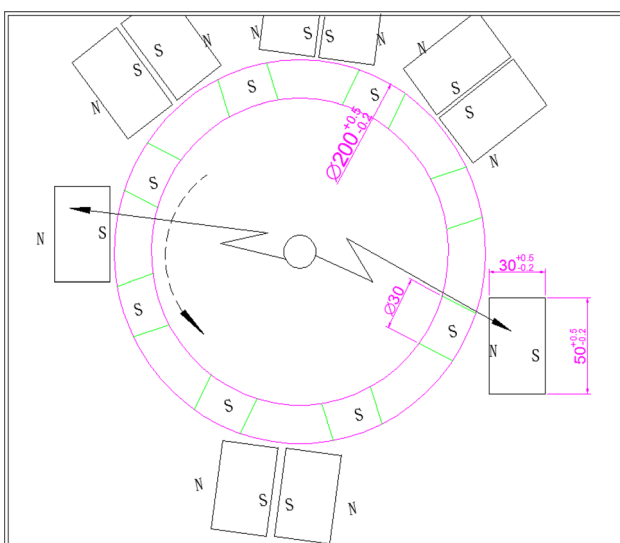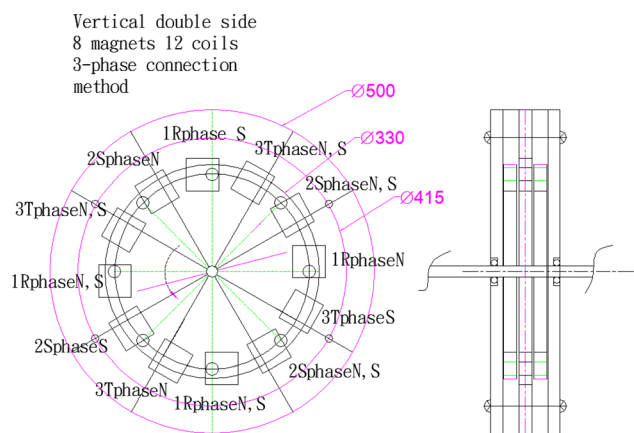**Fig. 21** Using a double-sided vertical cutting method to generate power for three-phase generators

equal to phase current. Due to a high working voltage, thick line is suitably used. If the three-phase delta connection configuration is used, line voltage is equal to phase voltage and line current is larger than phase current. Thus thin-wire wound coils can be used to generate electricity.

4.4 Advantages of single-phase magnetic power generators with coils in an angle transformation arrangement

1. Single-phase magnetic power generators with coils in an angle transformation arrangement achieve higher efficiency and are more suitable for general household use.
2. They can be used in conjunction with power generated by electric vehicles to increase driving endurance.
3. They can be used in conjunction with wind power. A force 2 wind can enable a full-load power generation, which increase the popularity of single-phase magnetic power generators with coils in an angle transformation arrangement.

4.5 Advantages of three-phase six-wire wound magnetic power generator

1. The three-phase Y-connection configuration can simultaneously generate three-phase 220 V AC and 440 V AC current, and the three-phase delta connection configuration can generate three-phase 220 V AC current, which is suitable for general industrial use.
2. The three-phase magnetic power generator adopting the 6 wire winding configuration can enable a small load input and a high power output under low power load.
3. With only 4 coils generating power in each phase, the coils cause less interference with each other. Thus the three-phase magnetic power generator achieves a high power output.

4.6 How does the publication of this paper give inspiration to the researcher and contribute to society?

1. For those who want study the high efficiency generator, they can understand the principle and data analysis through the experimental process, and can quickly go to a higher level development.
2. Currently the worldwide faces power shortages, and hopes that this study can reduce the problem of power

shortage and create social happiness with low-cost electricity.

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