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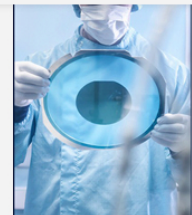
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Saving of Using Electrical Energy of Induction Motor Through Regulations of Minimum Operating Voltage

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Saving of Using Electrical Energy of Induction Motor Through Regulations of Minimum Operating Voltage

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Abstract. Many devices use an induction-type electric motor as the prime mover, such as an electric drilling machine, cutting machine, cement mixer/sand, and various kinds of machinery contained in industrial textiles, automotive industry, and others. The use of machines is closely related to the application of electric motors that will essentially consume electricity vary depending upon the size of the motors that. And generally, this equipment always operates at a nominal price of electrical voltage or full voltage of 220 volts for example per phase or 380-volt three-phase. In this condition, when the motor is not fully loaded suppose half of its full load, it would be a waste of electrical energy consumption, especially if the motor is not given mechanical load on its axis. Therefore, this paper gives a little solution in saving electrical energy consumption of the motor. Two important things are studied in this paper regarding the working arrangements, namely the motor on the state of the start and on the state of the running.

1. Introduction

Regulatory use of the energy consumed by the electric machine like an induction motorcycle is the essence of the problem is in order to save electricity. There are three main things that are most important to understand in regulating the energy consumption of an induction motor is a start state, a running state, and braking condition. In the case of motor starting, a higher current start with a long durations time deserve special concern, because if this happens it will cause considerable energy usage at the time of the motor starting. The energy used in the running conditions will depend on the load and voltage. In terms of braking, suddenly braking requires very high energy compared to the dynamic and regenerative braking method. This article will only discuss two conditions of motor operation, namely: the start state and the running state [1]-[7].

2. Result and Discussion

2.1. Energy Consumption of Motor on Start Condition

That is a major concern in terms of starting an induction motor is the current initial asut. Given that the motor current at start-up is very high, it is necessary to limit or reduce the starting current. Starting current will depend on the incoming voltage to the stator, and the frequency of the voltage source. By decrease in starting current will be able to reduce the energy or power during start-up, also



will prevent the motor from failure to start dealing with the protection system will disconnect power to the motor. One way to reduce the starting current of the motor is through voltage regulation, namely to reduce the incoming voltage to the motor stator.

Figure 1 shows the current curve starts in four ways as a comparison, namely; by directly start, by a current limiter (with slide resistor or slide inductor), by low voltage, and by the soft starter [1], [5], [6], [7].

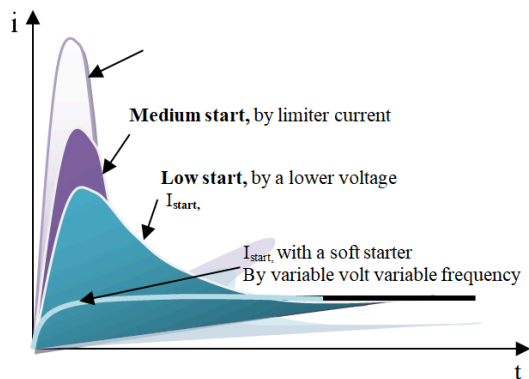


Figure 1. The motor starting current curve

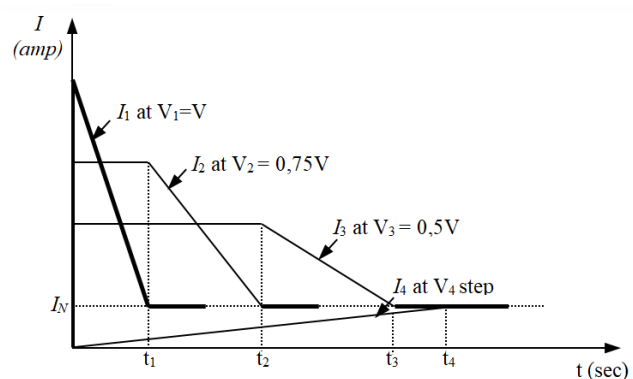


Figure 2. Time-current characteristics at the startmotors with different voltages

There are four categories of starting the motor according to figure 1 are Hard start, medium start, low start, and soft start. Each method has different characteristics as shown in Figure 9.

- Hard start the start the motor at a nominal voltage (full voltage). In this condition, the flow reaches 5 s / d 10 times the price of full load current.
- Medium start is the start condition medium, wherein the flow reaches 3 s / d 5 times the price of full load current.
- Low start is start low, where the current reaches 1 s / d 2.5 times the price of full load current.
- Soft start is the soft start, where the flow can be smaller than the full load current or even zero and rises gradually until the normal flow rates.

2.1.1. Regulation Of Starting Energy By Minimized Input Voltage

By reducing the incoming voltage to the stator will produce a smaller current. The motor is in start-ups with different voltages will give the performance of different currents, curve shape of high of initial currents and current versus time curve. The length of time necessary to start up at any given voltage value also be different, meaning also depends on the torque that occurs when the motor started-up. Application of lower voltage, causing initial current and starting torque will be very low, so the start time will be longer, and the use of a voltage below the minimum voltage value, causing the motor can not rotate. Approaches characteristics that may occur can be described as ideal as in Figure 2. The initial current at the start condition by using nominal voltage is very high. The equation of the motor current reference to the stator is [1], [2], [5].

$$I_r' = \frac{E_r'}{\sqrt{(a^2 R_r / S)^2 + (a^2 X_r)^2}} \quad (1)$$

At the start state of standstill, the price slip s is 1 (one), and the frequency of the rotor is zero (remember the equation $f_r = f_s - s f_s$). so that the initial current value corresponding to equation 1 above is [4].

$$I_{Start} = \frac{V_2'}{a.R_2'} \quad (2)$$

Where: V_2' is rotor circuit voltage reference to the stator,
 R_2' is the rotor resistance reference to the stator
 a is the ratio between the stator and rotor windings

Torque on the rotor that occurs by giving nominal voltage is the largest in terms of torque start the engine. In general, the torque required by the motor has the form of the equation:

$$T_{st} = \frac{P_{st}}{\omega} = \frac{\sqrt{3} \cdot V_2 \cdot I_2' \cdot \cos \varphi_{st}}{\omega} \quad (3)$$

$$= \frac{\sqrt{3} \cdot (V_2)^2 \cdot R_2'}{\omega \cdot ((R_2')^2 + (X_2')^2)}$$

Where: $\cos \varphi_{st} = \frac{R_2'}{\sqrt{(R_2')^2 + (X_2')^2}}$
 V_2 = voltage in to the rotor (V)
 R_2 = rotor resistance reference to stator (Ω)
 ω = $2\pi f$ = radiant frequency (rad/sec)
 f = frequency of volage source (Hz)

Frequency of rotor at start condition is zero, thus the rotor torque equation is

$$T_{Start} = \frac{V_2'}{m} \quad (4)$$

Where: m is a unknown value

From the equation above, then by lowering the incoming voltage to the rotor V_2' , the initial electric current and starting torque will become lower. Therefore the torque is proportional to the power so that the power consumed at the start will be smaller, while the value of energy at the start will depend on the duration of the motor start, the equation [1], [4], [9].

$$W_{st} = P_{st} \cdot t_{st} = T_{st} \cdot \omega \cdot t_{st}$$

$$= \frac{\sqrt{3} \cdot (V_2)^2 \cdot R_2' \cdot t_{st}}{((R_2')^2 + (X_2')^2)} \quad (5)$$

Where: t_{st} is starting time (sec)
 P_{st} is power absorbed by the motor during the start (kW)

2.1.2. Energy Consumed by the Motor at Each Start State

Energy calculations based on the image above characteristics is through the calculation of the area bounded by the respective functions of the curve and start time then multiplied with an operating voltage which is as follows [5], [9]:

For category 1, if the current curve decreases linearly (straight line), the area of trapezium 1 is

$$(i_1 + i_N) \cdot \frac{t_1}{2} \quad (6)$$

Energy for this condition is

$$\begin{aligned}
 W_{st,1} &= \sqrt{3} \cdot V_{st,1} \cdot (i_1 + i_N) \cdot \frac{t_1}{2} \cdot \cos \varphi_1 \\
 &= \sqrt{3} \cdot V \cdot (i_1 + i_N) \cdot \frac{t_1}{2} \cdot \cos \varphi_1
 \end{aligned} \tag{7}$$

Where: $\cos \varphi_1$ is power factor at start state for category 1
 $V_{st,1}$ is the value of nominal voltage

For category 2, If the curve of current decreases linearly (straight line), the area of trapezium 2 is

$$(i_1 + i_N) \left(\frac{t_2 - t_1}{2} \right) + (i_2 \cdot t_1) \tag{8}$$

The energy for this condition is

$$\begin{aligned}
 W_{st,2} &= \sqrt{3} \cdot V_{st,2} \cdot \left\{ (i_1 + i_N) \left(\frac{t_2 - t_1}{2} \right) + (i_2 \cdot t_1) \right\} \cdot \cos \varphi_2 \\
 &= \sqrt{3} \cdot (0,75 \cdot V) \cdot \left\{ (i_1 + i_N) \left(\frac{t_2 - t_1}{2} \right) + (i_2 \cdot t_1) \right\} \cdot \cos \varphi_2
 \end{aligned} \tag{9}$$

Where : $\cos \varphi_2$, is power factor for start condition for category 2,
 $V_{st,2} = 0,75 \cdot V$

2.2. Energy Regulatory at Running state

In the state the motor is running, the amount of energy used may vary and will depend on the state of the mechanical load on the motor shaft and the operating voltage [6], [7], [9].

2.2.1. Operation on Minimum Working Voltage

An induction motor has torque-slip characteristics, and the voltage range is between the nominal value and the lowest value where the motor can still work normally if the voltage is lowered to its lowest limit. In figure 3, namely in the i-v graphs at full load condition at a minimum current $I_{\min, \text{Full load}}$ and the maximum current I_{FL} value; the Low-load condition at a value of minimum current $I_{\min, \text{Low}}$, and the maximum current $I_{M \text{ Low-load}}$; as well as the straight-line graph is the current characteristics of the system or equipment is categorized as a linear load. Power and energy that will be produced in each state of the load can be formulated as follows [2], [3], [5].

On Full load condition

Power consumption at nominal voltage V_N is

$$P_{FL} = \sqrt{3} V_{N,FL} \cdot I_{FL} \cdot \cos \varphi_{FL} \tag{10}$$

Power consumption at minimum voltage $V_{\min,FL}$ is

$$P_{FL} = \sqrt{3} V_{\min,FL} \cdot I_{FL} \cdot \cos \varphi_{FL} \tag{11}$$

The energy used on minimum voltage condition is

$$W_{(min,FL)} = P_{(min,FL)} = \sqrt{3} V_{(min,FL)} \cdot I_{(min,FL)} \cdot \cos \varphi_{(min,FL)} \tag{12}$$

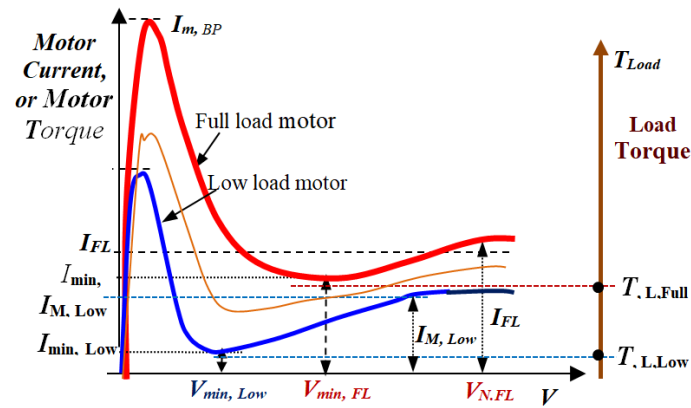


Figure 3. Curve of Torque/current vs voltage Motor at Low-load and full-load condition, and Load torque

When compared with when the motor operating at nominal voltage, the operation of the motor at the minimum voltage at any loading condition will be very profitable, the first, currently taken by motorcycles decreased quite large; the second heat which occurs in the motor will also be lower; the three does not result in a strong hum of the motor; fourth, the energy used by the motor to be greatly reduced; especially motorcycles with varying loading conditions during operation [1], [5].

2.2.2. Experiments and Results

In experiments conducted in the laboratory of electric machines STTMandala we use a set of single-phase induction motor-generator of ½ HP, 4.2 A, 220 V; 300 W incandescent lamp 220 V as the resistive load. The equipment used is, slide regulator, voltage, current, power factor, KWH meters.

a) The results of the Experiment in Table 2

Table 2. Is current value data, voltage and power, and power factor from the minimum work voltage setting results on a single-phase induction motor with varied loads: During voltage settings, round prices relatively constant at 1430 rpm

No	Vs (V)	I _m (A)	PF	Disc rotary of KWH (second/rotation)	P (Watt)
Fully Load Condition					
1	220	4.2	0.74	8	683.76
2	197	3.9	0.81	8.5	598.272
3	192	3.8	0.82	9	606.366
4	190	3.9	0.83	8	613.548
Load three-quarters full load (3/4)					
5	220	3.5	0.68	10,8	523.6
6	185	2.7	0.9	12.5	434.565
7	180	2.85	0.93	11.7	477.1
Half of the full load (1/2 Load)					
8	220	3	0.68	18,75	448.8
9	190	1.8	0.89	22,8	311.22
10	170	1,5	0,945	23.5	240.975
Low load (Lower)					
11	220	3.1	0.84	29	572.88
12	180	1.5	0.92	52	248.4
13	140	1	0.98	70	137.2
14	100	0.88	0.995	80	88.99
15	70	0.79	0.999	68	55.24

b) Analysis from table 2 can be explained as follows

Under full load in a voltage of 220V, the motor needs a power of 683.76 W is greater than the power consumption at a voltage of 197 V is 598.27 W, At $\frac{3}{4}$ full load in a voltage of 220 V, power use by the motor is 523.6 W, is greater than operating at a voltage of 185 V, is equal to 434.565 W ; At $\frac{1}{2}$ load, in a voltage of 220 V, power use by the motor is 448.8 W, is greater than operating at a voltage of 170 V, is equal to 240.975 W;

At low loads, in a voltage of 220 V, power use by the motor is 324.5 W, which is greater than operating at a voltage of 100 V, which is equal to 87.56 W; It can be observed in the rotation of the disc KWH-meter is very slow. Where the power is reduced by

$$\Delta P_{low} = P_{low} - P_{low}^* = 324.5 - 87.56 = 236.94 \text{ W}$$

3. Conclusion

From the discussion it can be concluded that with the application of the minimum working voltage: (1) a large saving of electrical energy is obtained, the power used by the motor is reduced considerably, especially in low load conditions; (2) Power-factor system resources will be good; (3) the hum and vibration of the motor will decrease and, (4) the relative rotation speed remains unchanged

References

- [1] A.E. Fitzgerald, C. Kingsley Jr, S. D. Umans 2003 *Handbook on the Electric Machinery* ed T. Michael Slaughter and David A. Damstra, McGRAW-HILL International Book Company, International Student Edition (Auckland: Bogota), vol 6, chapter 1 pp 1-37
- [2] S. L. Herman, W.N. Alerich, 1985. *Industrial Motor Control*, by Delmar Publishers.
- [3] R. Hidayat, Y. Liklikwatil, H. Setiawan, S. Santoso, N.S. Lestari, "Antena Cerdas untuk Mitigasi Interferensi dengan Algoritma Least Mean Square." *Setrum: Sistem Kendali-Tenaga-Elektronika-Telekomunikasi-Komputer*, vol.6, pp. 97–105, 2017.
- [4] M. Havas, "Safe Proximity to Power Lines & EMFs in your Home" (Power Lines ©2015) ed and upload published by Christina Neferis Mei 12 2015
- [5] Y. Liklikwatil. 2013. *Electrical Machinery* (Publisher Deepublish Yogyakarta)
- [6] M. Grover, B.L. Kumar, "The Free Energy Generator," *International Journal of Scientific and Research Publications*, vol.4, December 2014
- [7] H.P. Singh, H. Upadhayay, U. Srivastava, O.P. Yadav, "Free Energy Generator," *IARJSET*, vol. 2, special issue 1, 2015.
- [8] Permanent Magnet Motors Free Energy, Youtube.com
- [9] Y. Liklikwati, Syafruddin, G.D. Ramady, N.S. Lestari, Herawati YS, and R. Hidayat, "Electrical Energy Alternative of Magnetic Field Around Wire of Power Line," in 2021 *J. Phys.: Conf. Ser.* 1764 012159. <https://doi.org/10.1088/1742-6596/1764/1/012159>