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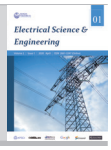

ARTICLE

Technological Analysis on Motor Stall and Its Perspective

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ABSTRACT

The brush lock is due to assembly tightly during assembling three gripper so that it curls after some time in motor and bare motors. The motor happen to have current decreasing and cause rotary too slowly is an important technique problem. At last the motor hasn't worked due to disconnection. It give company to bring assembly issue for customers. So the motor stall is main issue in motor working. We shall pay more attention to it necessarily and shall be strict quality inspection and we shall monitor the flow line for the sake of decreasing it. We shall solve the problem as soon as possible and communicate with the customer engineers. Unloaded rotation is radical in the base inspection. The engineer need to negotiate with supplying engineers for the qualified material of brush. Increasing inspection into more times is a method to decrease unqualified brushes. Some experiment method is explained to analyze for customer engineers. Two kinds of motors ie. stepping and asynchronous motor and motors used in future in car is explained to further knowledge to motor's application. Such as the experiment with torque, voice and electric voltage converter. The pseudo soldering results the slow rotary. The reverse voltage is a reason for a motor to slow rotary even stall.

1. Introduction

The motor is a mechanism can rotate to work in a certain load with rotary under the electricity. It is usually used in tool, auto, DVD, Printer and personal care etc. [1,2] It sold to customers often happen to voice, stall and low rotary etc quality & technique problem. Many of them happen in load after assembling with machine, so that the technique issues bring about serious complaint. Because they are sold to customers the motor technique issue will be substituted into new products. If the test in company is small problem they are feasible to connect with factory for substitution. Some of methods to motor will be known by technique staffs in customer companies for them to proceed a certain adoption to solve. [3,4] unloaded rotation is important in detail it refers to construction and coil that will affect the rotation. This is necessary inspection to look for the causes the motor has stall or slow rotation. Unload one is too high since it wastes energy becoming high cost too low it causes low working efficiency. The motor reverse rotation is one problem. If DC (direct current) motor meets the reverse connection the brush will reversely rotate. That is harmful to motor use even makes a pair of brush to tangle to motor install due to the reverse rotation. So we shall pay an attention to the color of connection. The red one is anode and yellow id cathode. This is assembly turn.

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2. Analysis and Discussion

2.1 Motor Process

The process of producing motors has assembly including shaft assembly, magnet, assembling shell etc, inspection, after sale & technique support. The reasons of quality is below. (1) brush lock; (2) rotary slowly due to over load; (3) disconnection; (4) life fatigue. The brush lock is due to assembly tightly during three gripper so that it curls after some time in motor. The motor happen to current increasing and cause rotary too slow is a technique issue. As last the motor hasn't worked due to disconnection. If in the situation the load is big that the motor rotates slowly. In the situation the one who is deliberate to increase load to trial the motor. So we shall investigate to be responsible to the one who does practical joke. The flow line is a big and complicated so the cost control is necessary to devices and workers. Due to the several hundreds meter flow line with several hundreds workers in the unit the cost control must be considered and calculated to scientific management and profits. Unloaded rotation can investigate the motor's technological properties, for example the manufacture technical force is qualified or not because it is design core. Engineers will design the property firstly they may evaluate the motor behavior goodly. This is a long distance auto flow line to assemble 50 workers with several very expensive machinery. The first is flow line machine. It completes three coil wire in turns automatically and at last joint three points to output currency to two metal polarities in motor plastic cover. The second is very delicate auto work to insert brushes to plasticity cover with the magnified monitor to check the delicate brush to assemble completely. Only if it is live monitored the fault can be found happen or not immediately. This work need delicate insert because the thickness of brush foil is very thin about 0.1mm. Next one is riveting brush in plastic cover with sophistical machinery in assembly heat box. And then the fourth is the permanent magnet the rubber which is inserted into motor housing with electricity and last one the sixth is automatically assembling motor house and plastic cover with machine.

2.2 Motor Stall or Rotate Slowly

There are video magnified system to inspect the qualified rush assembly in work line. If there is no problem it will pass the products. If there is slight strain eg twist they will limit and exclude those unqualified. If the elastic and hardness has issue they will cause rush shaft twist and abandon due to the contact over big between rush and shaft knot with some contact metal ring. It may be formed scratch in assembly course and cause rush strain. So the worker in assembly need to find the unqualified early and also purchase division to inspect the figure and elasticity strictly. The sample shop need to find the unqualified and inform to engineering division and quality division to adapt method to decrease the unqualified. Former is easy to find and latter is difficult to find. Step in first is key otherwise it will reproduce and abandon material. Person effects the firm efficiency and benefit due to reproduce and form complaint. So that that complaint effect staffs emotion and produce. The unloaded rotation needs check with device to find the important values then loaded one is to be known eg slight loaded rotation etc and at last the current is to be known to find its maximum life. The train to staffs is necessary of speciality and quality. Let them know the operation skill to promote their quality so as to produce high quality products. Sony etc Japanese company propose cost decreasing project to obtain high efficiency. In order to high efficiency they increasing high quality to product line. The aim of project is high quality and efficiency to increase competition. The efficiency is high then the quality is high too due to reasonable management. if the unloaded rotation is normal the motor cause internal problem. For example coil has some problem or internal construction has problem. Due to decreasing harmful and unhealthy radiation from Smart Phone or i-pad the EMI is applied to inspecting the eletro magnetic interference situation. EMI is mean of electo magnetic interference which is used to inspect the motor to prevent from radiation of electro magnetic field.It happens to in electro circuit usually and in higher energy state like big informative output from transformation. Engineer checks the number according to connecting with circuit through this device. The number is high when interference is big so that we regulate the parameters to fit to low radiation for customer usage healthily. The first method is to distribute copper etc. to electric brushes through changing composition to cut down the big interference radiation. The second method adds the voltage dependent resist in some frequencies. pseudo soldering is the one reason for slow rotary. This is a important factor to slow rotary and stall as well. many faults will happen in manufacture so that it is inspected carefully to ensure its finish. Regulating machine is necessary process that will guarantee the solder to cover two poles correctly. It increases current to benefit rotation.

2.3 Experiment Method

Don't let voltage is bigger than maximum voltage in order to burn the current plate. As for the designer they control the voltage. If it is small precise need to be big, and it let the motor small. It is easy to produce precise problem. If it is neglected the plate is burned and stall. In the flow line the worker inspect the currency to be mag-

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nified to check the normal motor. Moreover the quality staff check the complaint motor with voltage or flow line device which is highly magnified through regulating the size of currency with oscilloscope etc. So to resolve the motor stall etc. non-technological exquisitely property many experimental methods to be used to have searched for as rapidly as possible when a quality issue occurs. The unloaded rotation need to be investigated to find essential factor and designer correctness or not. If there is certain deviation the responsibility will be checked and resign responsible persons evenly. So the monitor technique engineer is necessary duty in factory. They have lot number written the date, line etc. So issue is known through lot number by the direct and secondhand, then the responsibility is asked and give penalty seriously.

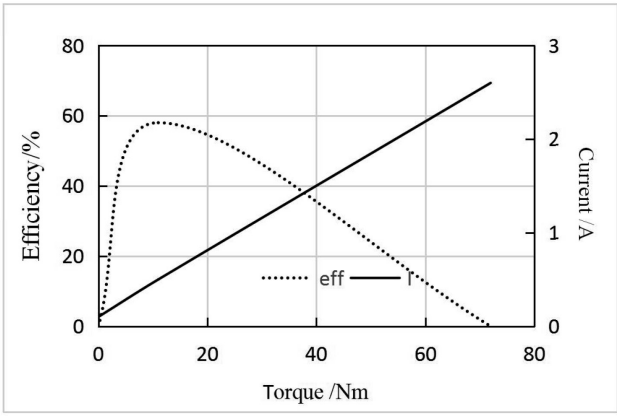

Figure 1. Performance curves for Fuel pump motors

2.3.1 Motor Torque & Current

In terms of load motor is measured to decide it. As for the samples and complaint we adopt the working load and maximum one to inspect where to be issue. If load is low and voltage is over low we judge the structure and coil winding problem. If structure is small the motor isn't issue. Coil winding is over big and winding small it need to negotiate with sample shop to look for the over high and load small. The load test use a strip attaching to motor and then switch on power in order to rotate it. In terms of load size motor is confirmed through rotary. This experiment is sophisticated so it is used necessarily. eg new kind design and customer complaint to inspect torque situation. Another simple method is to use a tool limit motor shaft then in terms of current judge the motor life. This time the current become high until the motor is failure. Latter see the value of current to judge the coil winding etc inner problem. Due to oversize load or formed motor structure the stall or slow rotary will occur too. It will prove the unloaded rotation additionally. As shown in Figure 1 the fuel pump motor's current and efficiency are shown with the torque. Efficiency is the highest at 11 Nm of torque. It will increase steeply from zero before the value and then decrease sluggishly after this value. So this is the rate torque. If the torque is higher than it the efficiency will become low. The current increases generally as the torque becomes high. If big torque even stall happens the current will increase continuously. At last the current will ascend until the open circuit takes place.

2.3.2 Fatigue Experiment

To apply to the fatigue experiment is wanted to do. The metal plate is joined to motor and put it into slotted magnetic device then power on the motor will rotate. Regulate the depth of metal plate can change the motor's load. Generally several weeks even several months are wanted to this test for the property. Every type uses several ten. Technique look the rotary state in this period. When there is stall or slow rotary pick off to inspect additionally. Cause analysis is needed and regulates to test again till the qualification even stop this type products severely. If the qualification is gained the lot product will write out specification to delivery together. To investigate unloaded rotation and fatigue ability is the important aim. We may model and measure additionally.

2.3.3 Voice

The voice of motor is main specification of valuing the qualification. So the voice Inspection is very important. We put several ten small motors to a room and close their doors and in other room to inspect their dB. According to the GB10069.2-88 5dB is rotary motor minimum value in terms of discrete frequency composition. Due to the voice produced in load the lowest motor voice is needed according to new situation and standard. It makes the shaft scratch stalls seriously due to over size burr. We went to customer to deal with the voice complaint and recall the lot motors to investigate. This issue has generally occurred

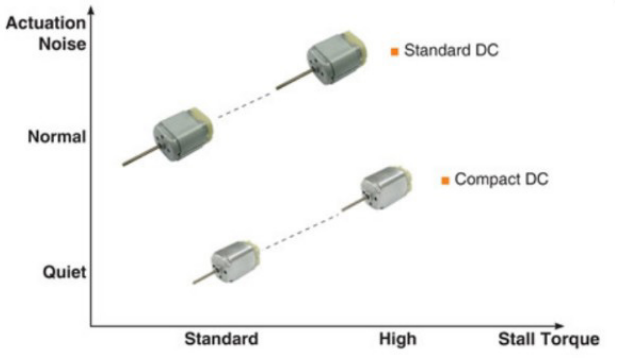

Figure 2. Advantages of new compact motor in electric steering column lock product line for good unloaded rotation

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in the customer assembly and experiment, so we shall pay attention to it. To review the unloaded rotation voice is the most foundation condition.

2.4 As for Unloaded Precise New Stepping Motor & Asynchronous Motor and Use in Future

The stepping motor is a kind of one of precious controlling speed and torque distance according to unloaded precise. It usually divides two groups, three groups and five groups. It is used in automatic toll switching system firstly and no need alternating current ship later etc. It is promise and vision one in the future. It is depended on the pulse signal frequency and amount. It is called as Pulse motor. It isn't depended on load. That single chip micyoco controls it is necessary in the future and fits digital tendency of time too. synchronous motor is a simple structure & easy to make motor, the disadvantage is poor power factor which is cos ϕ, Here the phase difference in voltage and currency is used with ϕ, ratio of active power and apparent power P/S . It has rotary magnetic field and rotary rotor which uses alternate current power. The induction motor is generally called asynchronous motor in some countries. All the motors have the same problem of stall etc. To promote unloaded rotation the lamination voltage and currency and graphite rush force etc will be the possible reason for.

As shown in Figure 2 the new compact motor is good at some properties. In future for unloaded rotation、low weight and high torque motor will be prospective applications such as electric steering lock and window in car etc vehicle. There is market in future for advanced reflectors to use for five degrees of freedom. They can regulate the reflector with motor to see better and clear for running off accidence. One is forwards and backwards, one is up and down and another is along vertical and two horizontal axises. They are highlight to be used in luxury personal cars widely in future. As shown in Figure 3 the reflective mirror has five freedoms which promote the flexible function to the most exhibiting multiplied regulation through motors.

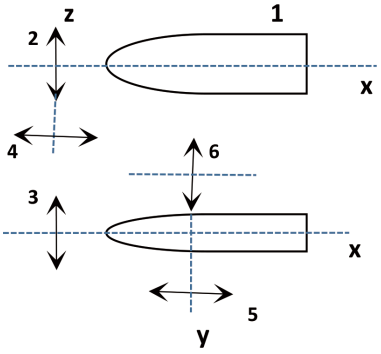

Figure 3. The five freedoms in reflective mirror. 1 is the mirror; 2~6 is the freedoms; 4~6 is rotational ones; z is vertical axis, x and y is horizontal axis

3. Conclusion

Motor stall produced by flow line and inspection isn't strict. So increasing the flow line quality and inspect carefully can control it. Technique and quality division shall monitor producing tightly. Meantime the material inspection do more times to find the issue. Some experimental methods and device is introduced besides new high technology stepping motor and asynchronous motor & use on cars in future. eg. Motor torque and device & voice for the stall or slow rotation. The unloaded rotation is radical.

The pseudo soldering results the slow rotary due to the small current. This is a factor to slow rotary and stall as well. The reverse voltage is a reason for a motor to slow rotary even stall due to brush's reverse rotary. So it is paid attention to and grasped anode and cathode to guarantee the forward set of DC motor because of its correct use and decreasing unqualified of slow rotary even stall.

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