

Implementation Of Electrical Panel For Surface Grinding Machine

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Abstract - The firm or industry which is work on any machine, need electrical panel which can control or monitor various parameters of machines. Moreover, electrical panel are integral part of any industry where continuous safety of machines must be ensured irrespective of any situation. Electrical panels are used to protect corresponding machine during operation so, it can perform its role preciously. Panel consist different electrical and electronic spares in order to detect, separate and recognize fault. It is difficult to observe the operation of machine with panel and due to the instability of electrical system; there are chances of failure in panel. Problem regarding electrical panel is identified by company. The project group is working on implementation of new electrical panel with new winding diagram which can overcome the disadvantages of old panel. Also various faults regarding panel failure will be observed and modification to avoid respective fault will be done.

Keywords - Electrical panel, Industrial machines, Operational faults, Relays, Connectors.

INTRODUCTION

In the starting age of industrial revolution, especially in 1960 to 1970, automated machines were controlled by electromechanical relays. These relays were hardwired together inside the control panel. Many of the times the control panel was so huge that it would cover entire wall. Every connection in the relay logic must be connected. Wiring is not always perfect; it takes time to troubleshoot the system. This is very time consuming Process and also need an Expert to Control work. On top of that the relays have limited contacts. If modification is required, the machine has to be stopped, the space may not be available and wiring has to be traced again to accommodate changes. Relays which were used are in numbers in the hundreds or even thousands, the process for updating such relay based control panel for change-over was very time consuming and expensive, as electricians needed to individually rewire the relays to change their operational characteristics. As days passed there is a lots of changes started involving in technology in all ways including automation. In recent years people started using PLC for the automation purpose instead of Relays and contactors as PLC has many advantages over Relay based control panel.

When an electric current is passed through the coil it generates a magnetic field that activates the armature, and the consequent movement of the movable contacts either makes or breaks depending upon construction of a connection with a fixed contact.

If the set of contacts was closed when the relay was de-energized, then the movement opens the contacts and breaks the connection, and vice versa if the contacts were open. When the current to the coil is switched off, the armature is returned by a force, approximately half as strong as the magnetic force, to its relaxed position.



PROBLEM SUMMARY

After this general introduction we understand the disadvantages of old panel, its component like relays, contactors etc. Here is brief summary about Problem about Conventional Panel.

- Most frequently faced disadvantages of a conventional control panel are:
- Too much work required in connecting wires.
- Difficulty with changes or replacements.
- Difficulty in finding errors; requiring skilful work force.
- When a problem occurs; hold-up time is indefinite, usually long.

A simple electromagnetic relay consists of a coil of wire wrapped around a soft iron core, an iron yoke which provides a low reluctance path for magnetic flux, a movable iron armature, and one or more sets of contacts there are two contacts.

SOLUTION

Modification of electrical panel with new technology.

- old one are the complex, so much wired and hard to troubleshoot, while other place, new one are the simple, less wired.
- New Panel will decrease the wire connection up to 60% less, so there is also low power loss in panel.
- To increase the performance of operation of machine.
- By changing with new panel there are so many chances of high-performance.
- At situation of single phase separation, control wiring switch off power automatically.
- Elimination of operational error.
- During the changing direction of rotation wheel it will help simply.
- To make accurate and sensitive system.
- New panel with new control logic will increase the accuracy of the performance and new control wiring will decrease the chances of shock.

Comparison Of Old And New Panel Parameters

| PARAMETER | AFTER IMPLEMENTATION | BEFORE IMPLEMENTATION |
|---|--|--|
| Contacts operation | Standard | Non-standard |
| Control circuit voltage | 24 V DC | 230 V AC |
| [Ui] rated insulation voltage | 250 V conforming to IEC | 300 V conforming to IEC |
| [Uimp] rated impulse withstand voltage | 3.6 kV (1.2/50 μ s) conforming to IEC 61810-7 | 2.5 kV 1.2/50 μ s IEC 61000-4-5 |
| Contacts material | Silver alloy (Ag/Ni) | Silver alloy (Ag/Ni) |
| [Ie] rated operational current | 1.5 A (AC-1/DC-1) NC conforming to IEC 3 A (AC-1/DC-1) NO conforming to IEC | 6 A (AC-1/DC-1) NO conforming to IEC 3 A (AC-1/DC-1) NC conforming to IEC |
| Minimum switching current | 10 mA | 10 mA |
| Maximum switching voltage | 250 V DC | 250 V AC conforming to IEC |
| Minimum switching voltage | 17 V | 17V |
| Load current | 3 A at 28 V DC 3 A at 250 V AC | 1500 VA, AC circuit |
| Maximum switching capacity | 84 W network: DC 750 VA network: AC | |
| Minimum switching capacity | 170 mW | 170 mW |
| Operating rate | \leq 18000 cycles/hour no-load \leq 1200 cycles/hour under load | \leq 18000 cycles/hour no-load \leq 1200 cycles/hour under load |

Component Rating Which Are Used After Our Project

| Equipment | Voltage rating(volts) | Current rating(Amp.) |
|--------------------|-----------------------|----------------------|
| Transformer | 440/230 and 440/24 | 2-5amp , 2-20amp |
| MCB | 440-230,440-24 | 20-40, 5-10 |
| Relay | 24v DC | 3A |
| Contactora | 230-440AC | 2-40 |
| Over current relay | 230-440AC | As per motor |

ADVANTAGES

- Modification of electrical panel with new technology.
- To increase the performance of operation of Machine.
- Elimination of operational error.
- To make accurate and sensitive system
- Finally comparison of implementation of panel advantages are:

| Feature | After implementation | Before implementation |
|-------------------|----------------------|-----------------------|
| Efficiency | High | Less |

| | | |
|----------------------------|-----------|-------------------|
| Reliability | High | Less |
| Breakdown | Less | Frequently occurs |
| Life | Long | Short |
| Heating | Less | More |
| Cost | More | Less |
| Switching operation | Very Fast | Fast |

CONCLUSION

Due to protection system breakdown will never occurs. So that the machine life is long also damages in machines are less. In protection system mostly we used AC relay but if we use DC relay then the protection of man power is more and also the safety of machine is more than AC relay. This relay is using for mainly over current, over loading protection. Also this relay have electronic switch which are used for manually and automatically operated as per our requirement. With using this relay breakdown is never occurs in machine.

By this project we can conclude that the safety of our system can be increase and the safety of man can be increased.

The maintenance cost of the system will be also reduced.

The main benefit of this project is we never occurs the breakdown of the system.

REFERENCE

- [1] Veltman, D.W.J. Pulle, and R.W. DeDoncker, Fundamentals of Electrical Drives, Springer, 2007.
- [2] P.C. Krause, O. Wasynczuk, and S.D. Sudhoff, Analysis of Electric Machinery and Drive Systems, IEEE Press, 2nd ed. 2002.
- [3] Miss. Archana R. Hindalekar, Dr. Mrs. S. B. Patil, “Up-gradation of Conventional Control Panel with PLC for the Total Utilization of Machine” International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321-8169 Volume: 3 Issue: 2 461 – 465

FINAL IMPLIMENTATION OF PANEL

