

# Scada Based 3 Axis Crane Control Management System Using PLC in Production Industry

Gohel Pushpa<sup>1</sup> Kanzariya Vandna<sup>2</sup> Prof. Rushikesh V. Pandya<sup>3</sup>

<sup>1,2,3</sup>Department of Electrical Engineering

<sup>1,2,3</sup>DR. Subhash Technical Campus, Junagadh, India

**Abstract**— In Industrial crane control system, all control devices are wired directly to each other according to how the system is supposed to operate. Now a day, crane is controlled by human interface. This generates a large drawback of human interface error. More ever, wiring work becomes more complex which leads large amount of mechanical faults. Hence, troubleshooting and maintenance of such system become more difficult and costly. Due to this drawbacks industrial production decreases largely. We using delta plc to control the crane movement in 3 axis direction.

**Key words:** Programmable logic controller (PLC), Supervisory control and data acquisition (SCADA), 3 axis direction control, Input-Output (I/O), switch mode power supply (SMPS), Gear motor

## I. INTRODUCTION

We live in world where everything can be controlled and operated automatically automation is process to control industrial machinery and processes by replacing human operation. Mankind has always tried to use technologies in order to improve his life. From the very beginning man has always looked for a better way of life. Time after time, he has continued to improve his environment, both at work and at home.

The first automations in fact were born in the factories, where at the end of the 19th century the first applications of electricity permitted to make some automated operations, without the intervention of a human being. Slowly then there has been a shift from manual jobs to automated jobs, from simple tools relied to the ability of a person to process chains controlled by programmable controllers.

In industries for heavy equipment lifting we can use crane control using remote control. We are replacing the new system which based on plc and scada programming. It is possible to 3 axis direction crane control with help of using this system which based on fully automation in production industry.

In industries for heavy equipment lifting we can use crane control using remote control. We are replacing the new system which based on plc and scada programming. It is possible to 3 axis direction crane control with help of using this system which based on fully automation in production industry.

## II. RELATED WORK

The study of the technology is very beginning task required to be done. The selection of the technology is done as per 1111requirement of process. PLCs are mostly used controllers in the automation and industries. There are also many other controllers available in the market like microcontroller 8051 but they have some limitations which are fulfilled by the PLCs.

The designing is done using SCADA software of Wonder ware named Intouch. Intouch provides easy designing methods with lots of other functions like trends, security logging, scripting and most important is its compatibility with PLCs.

Block diagram of PLC

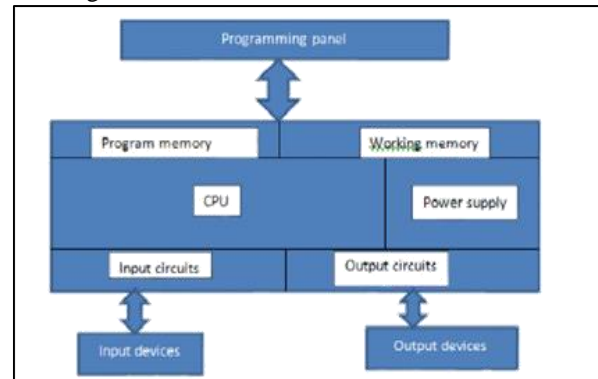


Fig. 1: block diagram of PLC

### A. PLC:

Programmable Logic Controller, or PLC for short, is simply a special computer device used for industrial control systems. They are used in many industries such as oil refineries, manufacturing lines, conveyor systems and so on. Where ever there is a need to control devices the PLC provides a flexible way to "software" the components together.

### B. Input modules:

There are many types of input modules to choose from. The type of input module selection depends upon the process, some example of input modules are limit switches, proximity switches and push buttons etc.

### C. Output module:

Output modules can be used for devices such as solenoids, relays, contractors, pilot lamps and led rea douts. Output cards usually have 6 to 32 output points on a single module. Output cards, like input cards, have electrically isolation between the load being connected and the plc.

### D. Memory Unit:

It is an external, electronic handheld device which can be connected to the processors of the PLC when programming changes are required. Once a program has been coded and is considered finished, It can be burned in to ROM. The contents of ROM cannot be altered, as it is not affected by power failure. Now a day's EPROM/EEPROM are provided in which program can be debugged at any stage. Once the program is debugged, programming unit is disconnected; and the PLC can operate process according to the ladder diagram or the statement list

E. SMPS (switch mode power supply):

A switched-mode power supply (switching-mode power supply, switch-mode power supply, SMPS or switcher) is an electronic power supply that incorporates a switching regulator to convert electrical efficiently.

Like other power supplies, an SMPS transfers power from a source, like mains power, to a load, such as a personal computer, while converting voltage and current characteristics.

Unlike a linear power supply, the pass transistor of a switching-mode supply continues switches between low-dissipation, full-off states, and spends very little time in the high transitions, which minimizes wasted energy. Ideally, a switched-mode power supply dissipates no power.

Smgs means switch mode power supllly.this is ac to dc conversion. This works on the principle of switching regulation.

The smgs system is highly reliable, efficient, noiseless and compact because the switching is done at very high rate in the order of several KHz to MHz.

The smgs system is highly reliable, efficient, noiseless and compact because the switching is done at very high rate in the order of several KHz to MHz.

III. RELAY

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

A. Relay card:

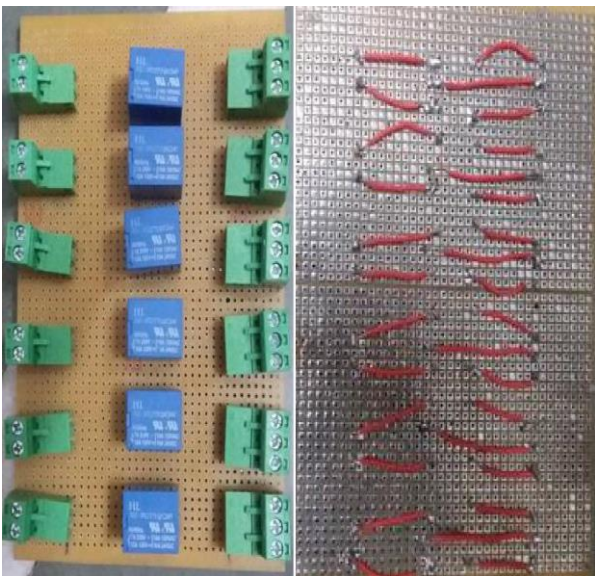


Fig. 2: self mode relay card

This is my Self-made Relay Card due to its point breakage. Various Relay Cards are represented in the following figure.

B. Block Diagram

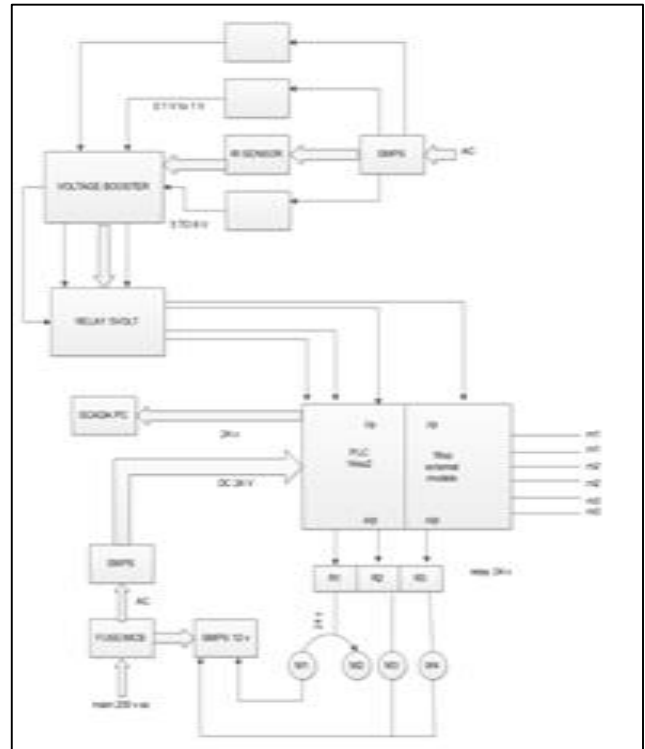


Fig. 3: Main block diagram

Main component of block diagram

IV. MCB

It automatically switches off the electrical circuit during abnormal condition of the network means in over load condition as well as faulty condition. The fuse does not sense but miniature circuit breaker does it in more reliable way. MCB is much more sensitive to over current than fuse. Another advantage is, as the switch operating knob comes at its off position during tripping, the faulty zone of the electrical circuit can easily be identified. But in case of fuse, fuse wire should be checked by opening fuse grip or cutout from fuse base, for confirming the blow of fuse wire.

V. DC MOTOR

A DC motor is any of a class of electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields.

Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic to periodically change the direction of current flow in part of the motor

DC motors were the first type widely used, since they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field.

VI. PUSH BUTTONS

A push-button or simply button is a simple switch mechanism for controlling some aspect of a machine or a process.

Buttons are typically made out of hard material, usually plastic or metal. The surface is usually flat or shaped to accommodate the human finger or hand, so as to be easily depressed or pushed.

Buttons are most often biased switches, though even many un-biased buttons (due to their physical nature) require a spring to return to their un-pushed state.



Fig. 4: Push buttons

#### A. SCADA

The industrial control systems (ICS), which include Supervisory Control and Data Acquisition (SCADA) systems, distributed control systems (DCS), and other smaller control system configurations such as skid-mounted Programmable Logic Controllers (PLC) are often found in the industrial control sectors.

SCADA systems are generally used to control dispersed assets using centralized data acquisition and supervisory control. SCADA systems are highly distributed systems used to control geographically dispersed assets, often scattered over thousands of square kilometers, where centralized data acquisition and control are critical of system operation. □

They are used in distribution systems such as water distribution and wastewater collection systems, oil and gas pipelines, electrical power grids, and railway transportation systems.

#### VII. CONCLUSION

By this paper we will easily control and monitoring 3 axis crane using plc and scada in production industry. We can remove remote crane control using plc and scada. we can reduce man power and weight lifting is easily done with using this smart system in production industry. With help of this smart system we can easily move crane in 3 axis direction and getting fast response and time saving.

#### REFERENCE

- [1] Fatima yasmeeen, Ambreen Siddiqui, Asim Khan, Mohammad saad ' Study of industrial crane automation and monitoring based on plc and scada' vol.3, issue 3, month: july-september 2015
- [2] Rinchen Geongmit Dorjee, "Monitoring and Control of a Variable Frequency Drive Using PLC and SCADA", International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321-8169 Volume: 2 Issue: 10.
- [3] Innovative Research in Science, Engineering and Technology, ISSN (Online): 2319 – 8753, Vol. 4, Issue 1, and January 2015.
- [4] Maria G. Ioannides, "Design and implementation of PLC-based monitoring control system for induction motor" IEEE Transactions on Energy Conversion, Vol. 19, No.3, pages 469-476, September 2004. Analysis of Induction Motor Speed Control Using SCADA Based Drive Operated System(IJSRD/Vol. 3/Issue 10/2015/071)All rights reserved by www.ijsrd.com 374
- [5] S. Da'na, "Development of a monitoring and control platform for PLC-based applications" Journal Computer Standards & Interfaces, Vol. 30, Issue 3, pages 157-166, March 2008.
- [6] N. D. Ramesh, "Programmable Logic Controllers and SCADA" Seminar Projects, March 2012.
- [7] Mahir Zajmovic<sup>1</sup>, Hadzib Salkic<sup>1</sup>, Sasa Stanic, "Management of induction (asynchronous) motor using PLC" Journal of Information Technology and Applications, JITA 2(2012) 2: pages 95-102, December 2012.
- [8] Yasar Birbir, "Design and implementation of PLC-based monitoring control system for three-phase induction motors fed by PWM supply" International Journal of Systems Applications, Engineering & Development, Issue 3, Volume 2, pages 128-135, September 2008.
- [9] K Gowri Shankar, "Control of boiler operation using PLC-SCADA" International Multi Conference of Engineers and Computer Scientists, Vol. 2, ISBN: 978-988-17012-1-3, 19-21 March 2008.