

## Remote Power Control for Pumping Station of Petroleum Products Using Plc-Scada

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**Abstract:** In petroleum industry most of its products are transported using pipelines which cover over a large geographical area. Several valve stations are built between the area it covers. Motor operated valves(MOV) are used in each of these stations. These MOV are operated from the control room using supervisory controllers like SCADA.Remote terminal units like PLC is installed in every control stations.PLC sends in the details regarding MOV present status and all other valid information to SCADA.Every station is remotely operated and the power supply is always live.N ow this method of always keeping the power line live leads to unwanted shut down of valve during power surges.MOV which closes during power surges will now be operated manually, but this is practically hard due to the vast area it covers. This problem should be solved, so we make the power line live only when we need to change the MOV position. The intended solution is to drive the power through contactor and relay combination and this contactor will be controlled by PLC. acquisition -motor operated valve, remote control, programmable logic controller, supervisory control and data

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### I. Introduction

Automation is the use of various automatic control equipment's, machinery, devices in a process or in a manufacturing firm. Automation has changed the face of industries all over the world .Introduction of automation in industries have increased the efficiency of the plants and also helped in reducing human errors. Thus helped to improve the quality of the products. To increase productivity and reliability, new plants are now being built with intelligent on-off valves featuring microprocessors and digital communication, while existing plants are being modernized with wireless technology and automation for manual valves.[1] .Motor Operated Valve (MOV) is an important item of Plant & Piping system. Motor

Operated Valves are often called as On-Off valves as the motors serve the purpose of fully opening or fully closing valves in pipelines.[2]. It's the PLC which sends a signal to MOV of the required valve position. Industrial.It uses various programmed robots to perform activities in an industry. Various sensors, controllers, indicators, valves are used in the process. Programmable logic controllers are used to control various instruments used. Computers are used to display the whole process and any fault anywhere in the system is displayed on the screen. The fault can be cleared using the computer itself. Continuous monitoring of the process can be done through the SCADA software which could update us continuously about the process parameters.[3] It can provide a high level of reliability through the fail safe principle with continuous status monitoring. Due to the remote control, hazardous areas don't have to be entered during a calamity. The notable thing about this project is its high degree of flexibility and its remote control.

In this project the output from the PLC is given to the relay. The relay will actuate when it is triggered by PLC,due to this the contactor will change its state. As a result MOV connected to the contactor gets powered and force the plug of the valve to allow or block the passage of supply through the line. By this unwanted shutdown in the control valve during power surges can be avoided without affecting the whole plant process.

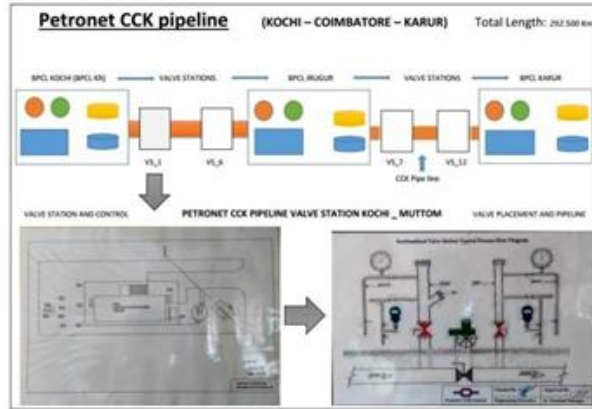


Figure 1.1 Block Diagram

## II. Implementation

In our project we implemented a system for power control for pumping station of petroleum products using PLC and SCADA. It will avoid unwanted shutdown in the control valve during the power surges. This is done mainly using a contactor and a relay. The control information is given to the SCADA from HMI. SCADA convert it into control signal in order to process in it in PLC. PLC gives a 24v dc as a control signal to operate the final control element.



Fig 2.1 power station

Relay is connected to PLC. The relay used here is 24volts, 5ampere. It will actuate when it is triggered by PLC. The relay has two terminal normally open (NO) and normally closed (NC) terminal. When relay is actuated the NO terminal of relay will be changed to NC. Relay is connected to the contactor. The contactor used here is 48volts, 120ampere. Contactor has also two terminals that is NO and NC. So when relay is actuated the contactor will also change its contact from NO to NC.



**Fig 2.2** Motor operated valve

The MOV is connected to the NO terminal of the contactor gets powered and the required action will take place. That is the motor operated valve will force the plug of the valve to allow or block the passage of supply through the line

### **PLC**

PLC or programmable logic controller is an intelligent system of modules replacing relay based logic. Over a period of time, better I/O handling capabilities and more programming elements have been added along with improvement in communication. They are used for the automation of various electro-mechanical processes in industries[4].

PLCs consist of input modules, a Central Processing Unit, and output modules. The input module accept digital or analog signals from various field devices and converts them into a logic signal that can be used by the CPU. The CPU makes decisions and executes control instructions based on program instructions stored in the memory. Output modules convert control instructions from the CPU into a digital or analog signal that can be used to control field devices such as actuators.



**Fig 2.3** plc

### **SCADA**

SCADA stands for supervisory control and data acquisition. The major function of SCADA is for acquiring data from remote devices such as valves, pumps, transmitters etc. and providing overall control remotely from a SCADA Host software platform. This provides process control locally so that these devices turn on and off at the right time. SCADA systems are used extensively throughout the Oil & Gas market due to the fact that assets are spread over large geographical areas. A SCADA system mainly consists of a number of components. The RTU's which is the Remote terminal units, the central SCADA master system and field Instruments.

The SCADA RTU is a small computer, which provides intelligence in the field, and allows the central SCADA master to communicate with the field instruments. It is a standalone data acquisition and control unit. Its function is to control process equipment at the remote site, acquire data from the equipment, and transfer the data back to the central SCADA system.

### **III. Results**

The system developed by this design can control the MOV and can also save the plant from accidents caused during the power surges. It also provides indications and faults regarding the status of the working.

### **IV. Conclusion**

The main objective of this paper was remote control of MOV using PLC and SCADA. This was successfully implemented. The implementation of Programmable Logical Controller (PLC) makes the entire system far more efficient. Implementation of SCADA has been very useful in maintaining the system remotely. By the implementation of this system we can avoid unwanted shutdown in control valve during the power surges by keeping the powering process remotely and safely. It can provide a high level of reliability through the fail safe principle with continuous status monitoring.

### **V. Future Scope**

As a future expansion powered connection can be provided which helps us to do the controlling even from the geographical areas.

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