

PCA for Processing Tank Using PLC

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ABSTRACT

In this work we are going to implement the automation for a process tank to control the power variable like temperature, level and product mixing by measuring and controlling the flow ratio. Here we are going to arrange the magnetic flow meter for flow measurement and gauge type level transmitter for level measuring purpose. RTD sensors are used for temperature measurement purpose. Their will be two fluids which will flow through the respective valve to the open tank according to the predetermined ratio, up to the predetermined liquid level measured by level transmitter. Once this level is reached the supply to the heating coil will be ON and the fluid is heated up to certain desired temperature which is sensed by RTD. When the fluid reaches the predetermined temperature slushing will start and the command will go to agitator and then it is pumped out by the VFD operated motor. All these operation sequence logics will be programmed in ABB PLC and the programming tool is ABB Automation Builder. The total operation can be monitored, controlled through ABB SCADA

Keywords: PLC, RTD sensors, Level transmitter, VFD fed IM, ABB Automation builder, CoDesys

I. INTRODUCTION

Over the years the demand for high quality, greater efficiency and automated machines has increased in the industrial sector. So that processing tanks require continuous monitoring and inspection at frequent intervals. There are possibilities of errors at measuring and various stages involved with human workers and also the lack of few features of microcontrollers. Thus this project takes a sincere attempt to explain the advantages the companies will face by implementing automation into them. The process control which is the most important part of any processing plant, and its automation is the precise effort of this project. In order to automate a processing plant and minimize human intervention, there is a need to develop a SCADA (Supervisory Control and Data Acquisition) system that monitors

the plant and helps reduce the errors caused by humans. While the SCADA is used to monitor the system, PLC (Programmable Logic Controller) is also used for the internal storage of instruction for the implementing function such as logic, sequencing, timing, counting and arithmetic to control through digital or analog input/ output modules various types of machines processes. Systems are used to monitor and control a plant or equipment in industries such as temperature, liquid level, and ratio of product mixing.

II. METHODOLOGY

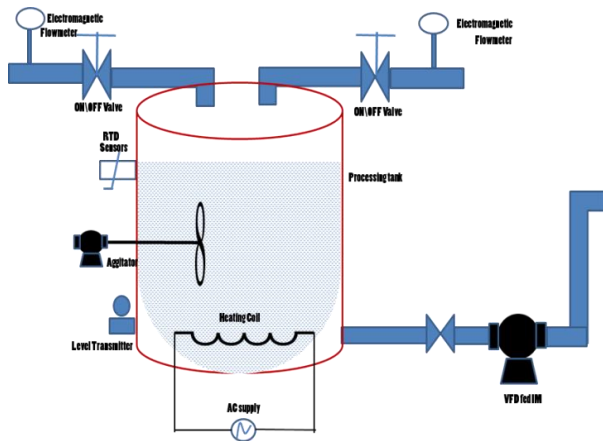


Fig 2.1: Block Diagram of PCA for processing tank using PLC

Fig 2.1 shows the Block Diagram of Fire Fighting robot. Over the years the demand for high quality, greater efficiency and automated machines has increased in the industrial sector. So that processing tanks require continuous monitoring and inspection at frequent intervals. There are possibilities of errors at measuring and various stages involved with human workers and also the lack of few features of microcontrollers. Thus this project takes a sincere attempt to explain the advantages the companies will face by implementing automation into them. The process control which is the most important part of any processing plant, and its automation is the precise effort of this project. In order to automate a processing plant and minimize human intervention, there is a need to develop a SCADA (Supervisory Control and Data Acquisition) system that monitors the plant and helps reduce the errors caused by humans. While the SCADA is used to monitor the system, PLC (Programmable Logic Controller) is also used for the internal storage of instruction for the implementing function such as logic, sequencing, timing, counting and arithmetic to control through digital or analog input/ output modules various types of machines processes. Systems are used to monitor and control a plant or equipment in industries such as temperature, liquid level, and ratio of product mixing.

HARDWARE & SOFTWARE DETAILS

HARDWARE USED:

1. Magnetic Flow Meter



Fig 3.1 Electromagnetic flow meter

Fig 3.1 shows Electromagnetic flow meters, or magnet meters, are comprised of a transmitter and sensor that together measure flow. The magnetic flow meter's sensor is placed inline and measures an induced voltage generated by the fluid as it flows through a pipe.

The transmitter takes the voltage generated by the sensor, converts the voltage into a flow measurement and transmits that flow measurement to a control system.

2. RTD Sensor

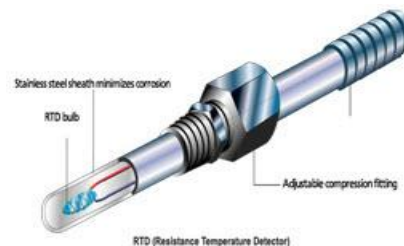


Fig 3.2: RTD Sensor

The main advantages are less expensive, more rugged and vibration resistant.

An RTD (resistance temperature detector) is a temperature sensor that operates on the measurement principle that a material's electrical resistance changes with temperature.

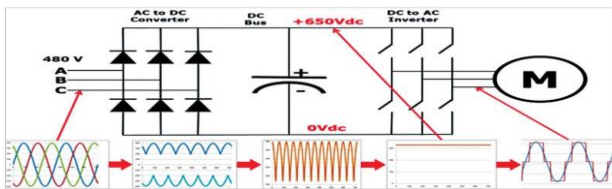
3. Level Transmitter



Fig 3.2 Level Transmitter

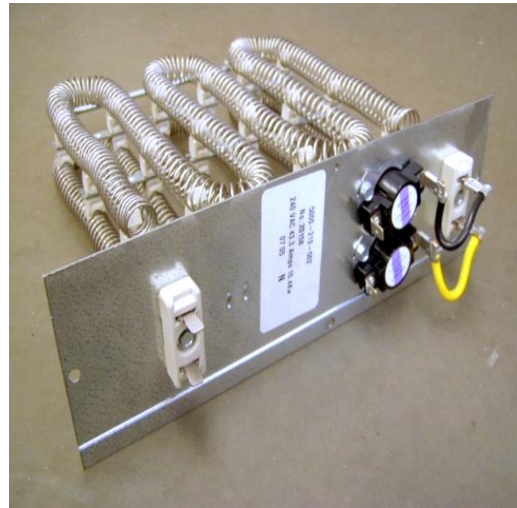
A level sensor is a device for determining the level or amount of fluids, liquids or other substances that flow in an open or closed system. Continuous level sensors are used for measuring levels to a specific limit

3. VFD Fed Induction Motor



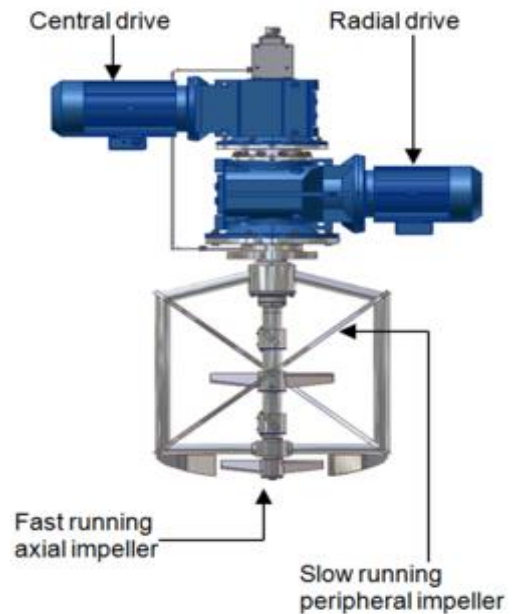
VFD is a power electronics based device which converts a basic fixed frequency, fixed voltage sine wave power (line power) to a variable frequency, variable output voltage used to control the speed of motor. It regulates the speed of a three phase induction motor by controlling the frequency and voltage of the power supplied to the motor.

4. Heater:



Electric heater is a device which converts heat energy into electrical energy by using metal as an heating element. Metals allows flow of current through them and produces heat.

5. Agitator:



Industrial agitators are machines used in industries that process products in the chemical, food, pharmaceutical and cosmetic industries, in a view of: mixing liquids together, promote the reactions of chemical substances, keeping homogeneous liquid bulk during storage, increase heat transfer (heating or cooling).

SOFTWARE REQUIREMENTS

1. Automation Builder

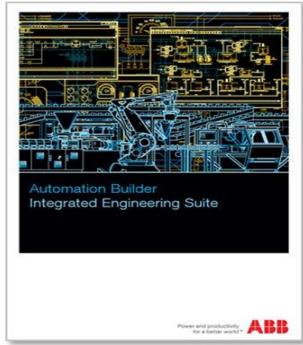
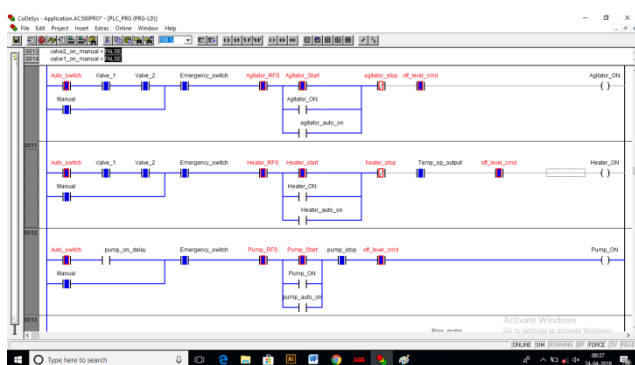


ABB Automation Builder is the integrated software suite for machine builders and system integrators wanting to automate their machines and systems in a productive way. Combining the tools required for configuring, programming, debugging and maintaining automation projects from a common intuitive interface, Automation Builder addresses the largest single cost element of most of today's industrial automation projects: software

2. CoDeSys

CoDeSys is a complete development environment for your PLC. (CoDeSys stands for Controlled Development System). CoDeSys puts a simple approach to the powerful IEC language at the disposal of the PLC programmer. Use of the editors and debugging functions is based upon the proven development program environments of advanced programming languages (such as Visual C++).

III. RESULTS AND CONCLUSIONS



The most important aspect of any processing plant is the processing control. Several techniques can be

implemented to control the processing tank in processing plant. The method that has to be used relies on varied objectives like superior quality, increased efficiency, high profit and other such points depending upon the purpose of the company that implies it. With the prime objective of catering to these necessities and the needs of the industrial sector, significance has been given here to automation

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