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PLC and SCADA based color mixing process

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Abstract— **In this color mixing machine we use three tanks which are of Red, Blue and Green. The three tanks consist of level sensor and fitted with hydraulic line. The hydraulic line consist of solenoid valve .The tank consists of color of Red, Blue and green. The water flows from the mixing tank through solenoid valve. The solenoid valve is a digital output device that is connected to the PLC The solenoid valve connected to 3rd tanks.**

The SCADA is used to monitor the system. PLC is also used for the internal storage of instruction for theimplementing function such as logic, sequencing, timing, counting and arithmetic to control throughdigital or analog input / output modules various types of machines processes.

Keywords— Color, Automated, Quality, Efficiency, Mixing, Process, SCADA, Monitor, PLC

Introduction

Over the years the demand for high quality ,greater efficiency and automated machines has increased in the industrial sector of different plants. The process control of color making which is the most important process in any color plant like Asian paints and its automation is the precise effort of this paper .In order to automate a color 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.

A. *RYB color model*

RYB(red yellow blue)make up the primary color criteria designing standard artist's color wheel. The secondary (violet orange green) makes up another tria. Triads colors(purple–orange– green) sometimes called (violet–orange–green)makes up another triad. Triads are formed by 3equidistant colors on a particular color wheel. Other common color wheels represent the light model (RGB).

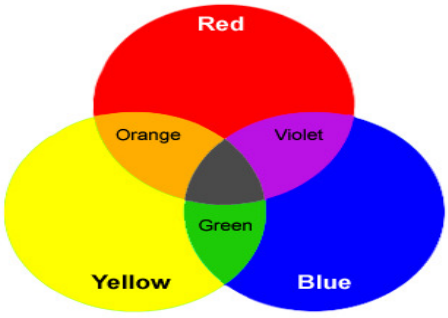

Fig1.wheel cycle

B. *Objective*

Over the years the demand for high quality ,greater efficiency and quantity has increasing this globalized world for various colors [2].The initial phase of the paper focuses on passing the inputs of color mixing with various components. With the help of mixing tanks all colors coming from the process will be mixed in the required proportion [3]. Color will be mixed using mixed motor .making color in industry which will be used for food beverage industry .Generally from three colors we are making nine colors with different proportions so it will be use different petrochemical companies .Thus what we require is a system that collect raw data process it and presents it in values which can be verified and compare with the

standard value subroutines of the coding process. thus it provides a real challenge with system involving.

*C. **Programmable logic controller:-***

In this, instead of achieving desired control and automation through physical wiring of control devices, it is achieving through program say software.

Advantages

Reduced Space, Energy saving, Modular Replacement, Easy trouble shooting, Error diagnostics programmer, Economical, Greater life and reliability, The Compatibilities of PLC'S, Logic Control, PID control, Operator control, Signaling and listing, Coordination and communication.

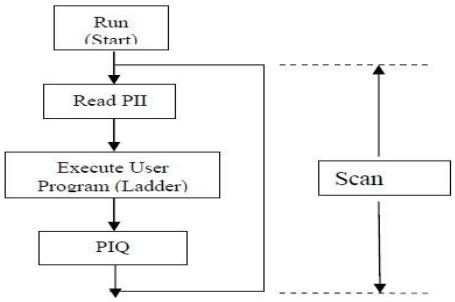

Fig. 2 working flow

How PLC works

Basics of a PLC function are continual scanning of a program. The scanning process involves three basic steps.

Step 1: Testing input status

First the PLC checks each of its input with intention to see which one has status on or off. In other words it checks whether a switch or a sensor etc., is activated or not. The information that the processor thus obtains through this step is stored in memory in order to be used in the following steps.

Step 2: Programming execution

Here a PLC executes a program instruction by instruction based on the program and based on the status of the input has obtained in the preceding step, and appropriate action is taken. The action might be activation of certain outputs and the results can be put off and stored in memory to be retrieved later in the following steps.

Step 3: Checking and Correction of output status

Finally, a PLC checks up output signals and adjust it has needed. Changes are performed based on the input status that had been read during the first step and based on the result of the program execution in step two – following execution of step three PLC returns a beginning of the cycle and continually repeats these steps. Scanning time = Time for performing step 1+ Time for performing step 2+ Time for performing step 3. Allen Bradley PLC:- Programmable Logic Controller or PLC is an intelligent system of modules, which was introduced in the control, & instrumentation industry for replacing relay based logic [4]. Over a period of time, better I/O handling capabilities and more programming elements have been added along with improvement in communication.

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PLC Working

At the beginning of each cycle the CPU brings in all the field input signals from the input signals from the module and store into internal memory as process of input signal. This internal memory of CPU is called as process input image (PII).User program (Application) will be available in CPU program memory. Once PII is read, CPU pointer moves in ladder program from left to right and from top to bottom. CPU takes status of input from PII and processes all the rungs in the user program. The result of user program scan is stored in the internal memory of CPU. This internal memory is called process output image or PIQ. At the end of the program run i.e., at the end of scanning cycle, the CPU transfers the signal states in the process image output to the output module and further to the I/O driver (SCADA) picks up PII and PIQ and transfers the image to database and this image is called driver image. This driver image available in SCADA database is used for graphical view of process monitoring from
operator station (OS) in the central control room.

A. Features of Allen Bradley PLC

Using Allen Bradley 1000PLC Micrologix 1000PLC has20 digital outputs. The relationship with bit address to input and output devices is shown in the figure

below .I/O Pin Configuration of AB PLC The left side of the screen shows that eh project tree while the right side of the screen is the programming area. Either area can be increased in size, minimized, or closed by left clicking the mouse on the appropriate symbol.

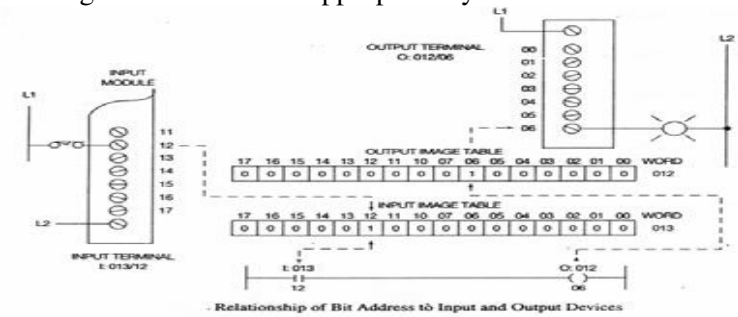

Fig. 3 Relationship of bit address to input & output

SCADA:-

SCADA stands for Supervisory Control and Data Acquisition. As the name indicates, it is not a full control system, but rather focuses on the supervisory level [2].What is SCADA? It is used to monitor and control plant or equipment. The control may be automatic or initiated by operator commands. The data acquisition is accomplished firstly by the RTU's scanning the field inputs connected to the RTU (it may be also called a PLC– programmable logic controller.). This is usually at a fast rate. The central host will scan the PTU's (usually at as lower rate). The data is processed to detect alarm conditions, and if an alarm is present, it will be displayed on special alarm lists.

8. OPERATION

The project work consists of distribution of any kind of liquid or semi-liquid into different plants from a main buffer storage tank. This distribution takes place automatically using the Programmable Logic Controller (PLC).[5] The main reservoir and the plant, where the process is taking place are situated far apart physically .All the process of this system is automatically done, like this sensing of the raw color material, opening and closing of the valve (in tank), process taking in the plantlike heating and churning, and removal of the raw color material. The successful operation with PLC have opened possibilities for adapting automation commercially in all available plants The implementation of the process should provide the user with two options: 1-User can select one of the six colors which are shown on the HMI. 2-Usercan create his own color with his own ratio of the three main colors. This process shown in block diagram and flow chart For the first case :selecting one of the six colors on the HMI, Precise ratios of the three main colors are required in order to form one of the colors to be chosen by user. The colors will be selected in proper proportion through the ratio control process. The mixture of colors will be mixed in the reactor tank by mixer motor. Level will be controlled by ultrasonic type level.

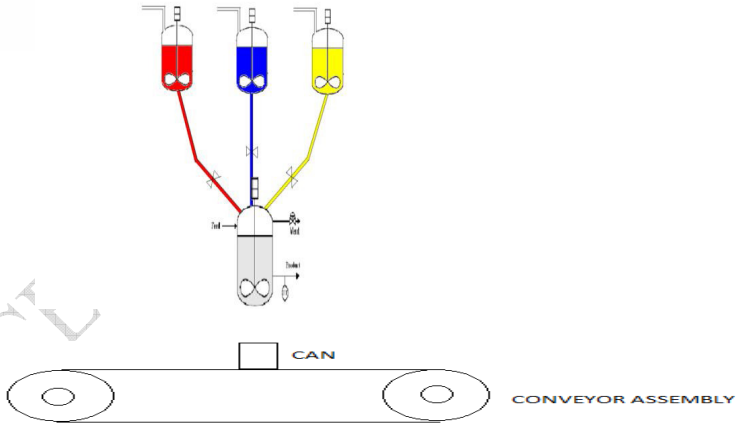

Fig .4Assembly of mounting

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Acknowledgment

The most important aspect of any color industry mixing which is main part which is controlled using PLC. 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 This paper presented here has kept in mind, the ceaseless changes that are relentlessly taking place in the contemporary scenario of the industrial segment. Emphasis has been given to the automation process that is now rapidly taking its place in all plants across the globe. The Paper has furnished itself to study the integral parts of the entire process involved, their implementation and the problems that may show up have also been given their due importance. The future work deals with the purification of water to the boiler and the air

circulation for the boiler to burn the fuel using same automation technique. Making of product in industry is easy with the help of PLC.

Conclusion:

The most important aspect of any color industry mixing which is main part which is controlled using PLC. 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.

The future work deals with the purification of water to the boiler and the air circulation for the boiler to burn the fuel using same automation technique. Making of product in industry is easy with the help of PLC.

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