Abstract—This paper outlines the various stages of operation involved in the conversion of a manually operated color plant towards a fully automated color making plant. Over the years the demand for high quality, greater efficiency and quantity has increased in this globalized world for various colors. The initial phase of the paper focuses on passing the inputs of color mixing and making process with various components. With the help of mixing tanks all colors coming from the process will be mixed in our required proportion .color will be mixed using mixed motor .making color in industry which will used for food beverage industry,generally from three colors we are making nine colors with different proportions so it will be used in different petrochemical companies.

Index Terms—Automation, PLC , SCADA, color making and mixing

1. INTRODUCTION
Over the years the demand for high quality, greater efficiency and automated machines has increased in the industrial sector of different plants. Many plants require continuous monitoring and inspection at frequent intervals. There are possibilities of errors at measuring and various stages involved with human workers and also lack of few features of microcontrollers. Thus this paper takes a sincere attempt to explain the advantages the companies will face by implementing automation into them.

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 control a plant or equipment in industries such as telecommunications, water and waste control, energy, oil and gas refining and transportation.

2. DRAWBACK OF CONVENTIONAL SYSTEM
Conventional equipment systems are prone to errors due to the involvement of humans in the data collection and processing using complicated mathematical expressions. Thus what we require is a system that collects raw data, processes it and presents it in values which can be verified and compared with the standard values.

In the coding process of this implementation with microcontroller, it requires a fast and efficient processing which on the other part depends on the length and sub-routines of the coding process. Thus it provides a real challenge with systems involving

3. METHODS
To making the different colors in the industry we are using different methods they are given following-

1- User can select one of the six colors which are shown on the HMI.
2- User can create his own color with his own ratio of the three main colors.
3- User can be operated that plant by using machine and human efforts or both.

4. CRITICAL CONTROL ARAMETERS INCOLOR MAKING PROCESS

A. Level Control
To control the level of mixing tank with the help of ultrasonic transducer.
B. Speed Control
To control the speed of the conveyor belt.

5. AUTOMATION
Delegation of Human Control to technical Equipment aimed towards achieving.

Advantages
Higher productivity, Superior quality of end product, efficient usage of raw materials and energy, improved safety in working condition.

History of Control and Automation
1. PLC
2. Electrical Control with Logic gates
3. without Logic Gates
4. Manual Control

Manual Control
In this, the Control and Automation are done by Manual Operations.

Drawbacks:
• Human Errors subsequently affect quality of end product.
• Hard Wired Logic Control
• In this, Contractor and relays together with timers and counters were used in achieving desired level of automation.
• Bulky and complex wiring, Involves lot of rework to implement changes in control logic, the work can be
started only when the task is fully defined and this leads to longer project time.

**Electronics Control with Logic Gates**

In this, Contactor and Relays together with timers and counters were replaced with logic gates and electronic timers in the control circuits.

**Advantages**

• Reduced space requirements, energy saving, less maintenance and hence greater reliability.
• The Major Drawbacks
• Implementation of changes in the control logic as well as reducing the project lead-time was not possible.

**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.

**A. 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.

**6. 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.

**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 l.

![Figure 1: PLC working](image1)

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 has 20 digital outputs. The relationship with bit address to input and output devices is shown in the figure below.

![Figure 2: I/O Pin Configuration of AB PLC](image2)
A. Basics
A SCADA system consists of a number of components [7]. The RTU’s. Remote telemetry or terminal units. The central SCADA master system.

Field Instrumentation
The SCADA RTU is a (hopefully) small ruggedized computer, which provides intelligence in the field, and allows the central SCADA master to communicate with the field instruments. It is a stand-alone 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. FIX32 software enables you to configure a system environment that provides: [3] Supervisory control, batch processing, data acquisition, continuous control, and statistical process control for industrial applications.

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). 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 plant like 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-User can 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.

9. 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.

C. Connecting to the PLC
• Open a SCADA application
• Create a tag of type I/O discrete, select the type as discrete
• Select read only if you don’t want to force values to PLC. Selecting read and write allows to the SCADA to read and force values to the PLC.
• Type an access name. The access name can visualized as a gateway for a group of resources.
• Most of PLC drivers communicate with SCADA package using DDE, DDE requires three parameters namely name of the DDE server, topic name and item name. In case of reading a number of items from a particular PLC driver application name topic name are common, so this application name that is name of the DDE server and topic name combine to form an access name. Access name is required to be defined only once then other items of driver can be accessed by using the Access name and item name. These details will be provided by the driver vendor or developer.
• Click ok, the access name will be listed finally click done, then type the item name, click save to save the I/O tags. Go to run time to communicate with PLC.

7. 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 a slower rate). The data is processed to detect alarm conditions, and if an alarm is present, it will be displayed on special alarm lists.
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.

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Figure 7: Flow chart

START

NO

SAFETY CHECK

YES

COLOR SELECTION (RED, YELLOW and BLUE)

COLOR FLOWS FROM TANK AS PER REQUIREMENT

COLORS FLOW FROM 2ND TANK IN MIXING TANK

START MIXING MOTOR IN MIXING TANK

START CONVEYOR SYSTEM

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COLOR SELECTION (RED, YELLOW and BLUE)

COLOR FLOWS FROM TANK AS PER REQUIREMENT

COLORS FLOW FROM 2ND TANK IN MIXING TANK

START MIXING MOTOR IN MIXING TANK

START CONVEYOR SYSTEM

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