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Automatic Control of Temperature and Level of CSTR Using PLC and SCADA

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***Abstract*— This paper presents an automatic control of temperature and level of Continues Stirred Tank Reactor (CSTR) using PLC and SCADA. The CSTR is heated using heating-coil and its temperature and level are measured by RTD and float type level sensor respectively. The accurate control of temperature and level are the realistic feature of this system and balances the process. Automation required gaining the complete control of manufacturing process to achieve consistency in manufacturing with increased productivity by shortening manufacturing time. In this paper we consider both Batch and Continues process control using PLC and SCADA. The PLC and SCADA control the process parameters with good accuracy and results are found to be satisfactorily. This is a simple automated process and can be applied in many mixing processes used in industries.**

***Keywords*— CSTR, PLC & SCADA**

I . SCOPE OF WORK

A work done in this paper can be divided into several parts. First of all, the programmable logic controller (PLC) , Supervisory Control And Data Acquisition (SCADA) and its applications have to be studied on Allen Bradley Micrologix 1200 PLC.

Next, the ladder diagram has to be constructed to the desired system, and for developing SCADA mimics RS View32 SCADA software used. Then, the system need to be tested and modify the ladder diagram to the hardware

I. HARDWARE

Fig. 1. Hardware Setup

This figure shows the hardware of the process. There are no disturbances in the process. It works continuous as well as batch process which we will require.

II .PROCESS

The process consists of mixing of liquid and controlling the temperature and level of the CSTR.

Process takes following steps to complete.

Step-1: When start button is pushed pump1 is ON up to the high level of Tank1,then heater1 is ON and temperature is measured using temperature transmitter up to the desired set point.

Step-2: When temperature reaches up to the desired temperature of tank1 solenoid valve1 is ON up to the high level of Tank2.

Step-3: As soon as the low level reaches in tank2, pump2 is on up to the high level of tank 2

Step-4: When high level is reached in tank2, heater of tank2 is ON and temperature is measured using temperature transmitter up to the desired set point.

Step-5: The Transmitter detects the Font of Entire Document temperature of both tanks and float type

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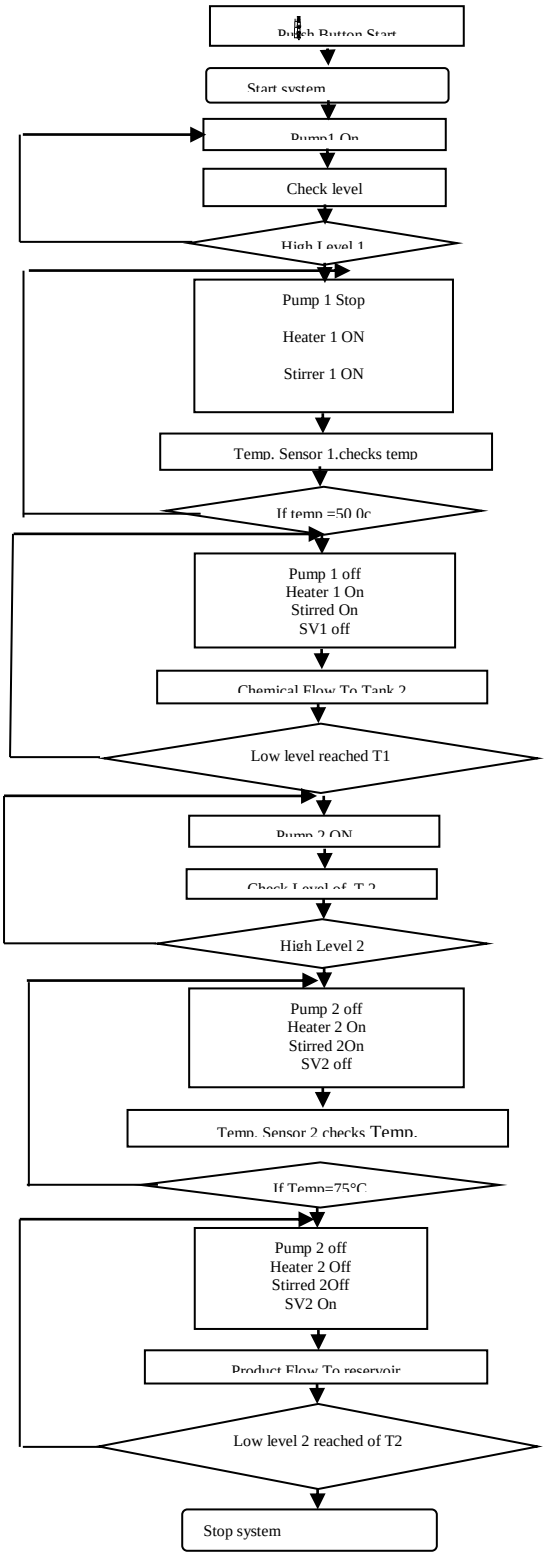
level sensor senses the levels of tanks and we get the final product.

And again next process is started. Thus the batch and the continues process carried out. This process is done in industrial level also

III. FLOW CHART



VI. RESULTS

This are real time results .

For process 1

Set point at 35 ºC: Temperature measurement between Low Level 1 and High Level 1

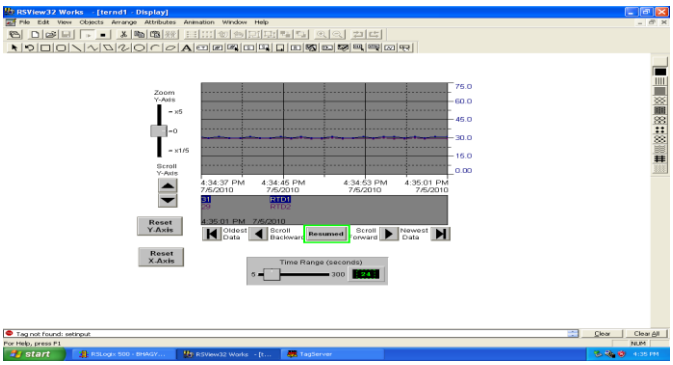


Fig 2.1: Temperature at 31 ºC for Tank 1

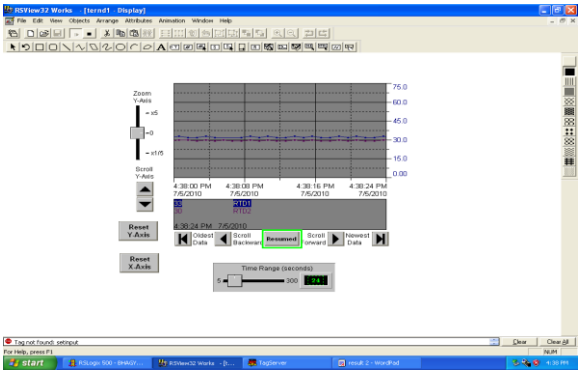


Fig 2.2 :Temperature at 33 ºC for Tank 1

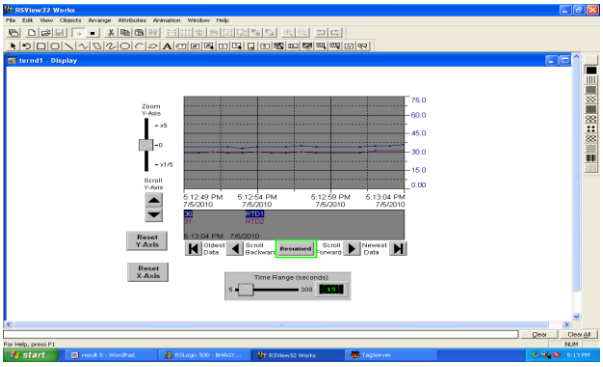


Fig 2.3: Temperature at 36 ºC for Tank 1

For process 2 Results:

Set point at 40 ºC

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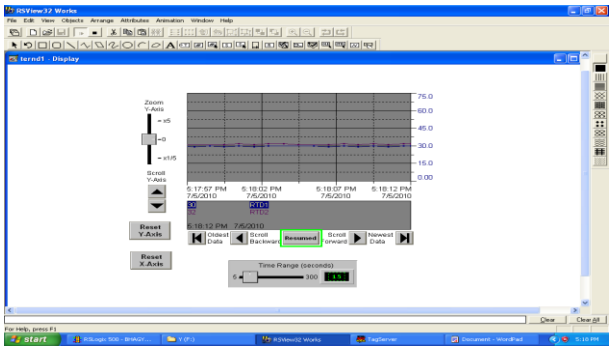

Fig 2.4: Temperature at 32˚C for tank 2

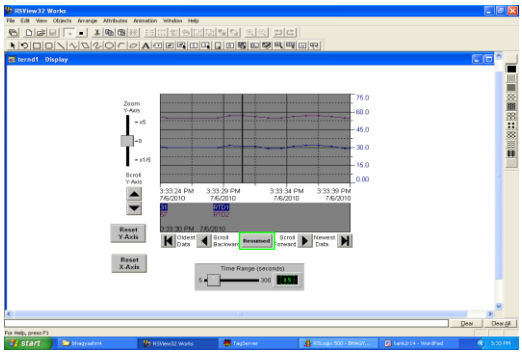

Fig 2.5 : Temperature at 57˚C for Tank 2

The systems can successfully gave results without problem regarding the controller and software performance. The system graphics showed a result with too minor faults in system immediately indicates on the graphic display by using the PLC and SCADA communication. All the figures 2.1 to 2.5 shows the linear graph of the process. Using the RTD Temperature sensor. From that graph we can control the temperature and level using automation.

IV. CONCLUSION

In this paper we have discussed the realization of PLC and SCADA based industrial control system for CSTR . And can be concluded that the temperature and level control using Automation. This work can also be extended by realizing the same using DCS and Matlab .The PLC carried out the sequential batch process and continuous process control. The Allen Bradley PLC/SCADA and the logic circuitry provide a safe, reliable and versatile system for temperature and level control.

IV. REFERENCES

[1] A Continuous Stirred Tank Heater Simulation Model With Applications, Nina F. Thornhill Sachin C. Patwardhan , Sirish L. Shah *Centre for Process Systems Engineering, Department of Chemical Engineering, Imperial College London, London SW7 2AZ, UK Department of Chemical Engineering, I.I.T. Bombay, Powai, Mumbai 400 076, India Department of Chemical and Materials Engineering, University of Alberta, Edmonton, Canada T6G 2G6* Received 18 December 2006;recived in revised from 2july 2007;accepted 11July 2007.

[2] Madhuchandan Mitra, Samarjit Sen. Gupta. "*Programmable Logic Controller and Industrial Automation An Introduction".*

[3] Keith Stouffer, Joe Falco, Karen Kent. *"Guide to Supervisory Control and Data Acquisition (SCADA) and Industrial Control Systems security".*

[4] Gary Dunning. "*Introduction to Programmable Logic Controllers* 2nd *edition".*

[5] D.E.Seborg, T.E.Edgar, Process *dynamic And Control, second ed*., John Wiley, Hoboken, NJ, 2004.

[6] M.L.Luyben, B.D.Tyreus, W.L.luyben, Plant wide control design procedure ,AICh Journal 43(1997)3161-3174.

[7] J.J.Downs, E.F.Vogal, A plant wide Industrial –Process control Problem, computer and Chemical Engineering 17(1993),245-255.

[8] L.A.Bryan, E.A.Bryan"*programmable controllers theory and implementation second ed.."*