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Two Phase Separation using Liquid Level Control System using PLC and SCADA

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Abstract: ***Activity of the plant requires a great deal of work and human asset and requires a ton of diligent work and persistence as the individual needs to take note of every single an incentive at various occasions by taking readings physically. With the advancement of Industrial Automation, fluid level control framework has been generally utilized in different fields. In this paper, in light of PLC a control framework is set up by PID calculation and this control framework can alter two diverse fluid levels consequently. On the off chance that there are two distinct kinds of fluids with various densities in an equivalent tank and so as to isolate those two fluids, Level control framework dependent on SCADA and PLC is actualized. This framework satisfies splendidly the need of various fluid level control framework in industry, and it brings advantageous and exact for controlling. The proposed framework gives the fluid Level control, with the assistance of Programmable Logic Controllesr (PLCs), and Supervisory Control and Data Acquisition (SCADA).***

Keywords: Control system, PLC, SCADA, PID Algorithm.

I. INTRODUCTION

Stage division is a pivotal piece of Industries. In the process business, the partition of multiphase liquids is essential to secure the different procedure hardware. Detachment likewise improves the exhibition of downstream gear. Normally the separation method involves compartments or separators in the taknk to provide the required partiion between liquid and gas-fluid mixture. This method follows the gravity principle for separation; outside power isn't utilized to support the partition

II. LITERATURE SURVEY

A suitable literature review has been carried out on liquid level separation system. Y. Kondratenko et al proposed a principle of phase separation in horizontal vessels and the prime focus is on the liquid-liquid separation. Later, a gas-liquid separation and their consequences are reviewed. After analysing the factors affecting the liquid-liquid separation,the design of liquid –liquid vessel and other parameters needed for the optimum design are considered. Finally, the substitute modelling approaches are studied and arrived at this two phase separation of liquid control system has been proposed. Separation of two dispersed liquid phases is a common unit operation in process industry.

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However, this method of separation is complex activity and it consists of multiple stages of interactions between liquid phases. Cusack al., [15]proposed the interactions and phenomena taking place between liquid-liquid systems by gravity,coalescing etc., The separation of oil from liquids phase is carried out by passing the mixture via an oil-gas water or oil-gas separator as appropriately and this was proposed by C. Richard Sivalls. [16] The Water Oil Separator is primarily meant for separation of oil or condensate from water. The separation is carried out depending on the density difference of oil and water. Baffle plates are used to channel the separated water to the outlet connection while oil is skimmed from the surface using the skimmer. The separated water can then be treated further for surface disposal or re-injected into the reservoir for secondary recovery purposes. Oil from the water oil separator is sent to the dehydrator to remove emulsified water contained in the oil.

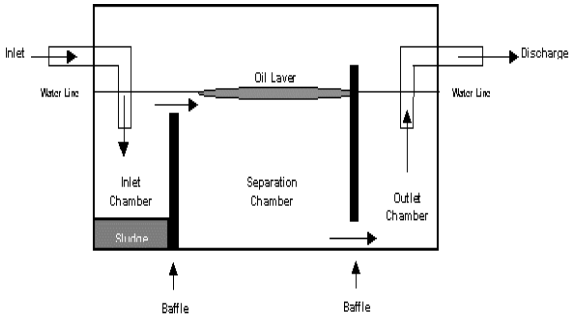

Fig 1. Schematic of the water oil separator

III. PROPOSED SYSTEM

We propose a PLC based control system using PID algorithm which controls/adjust two different liquid levels automatically. If there are two different types of liquids with different densities in a same tank and in order to separate those two liquids, Level control system based on SCADA and PLC is implemented. The controller for separating the liquid in a tank system can be achieved via SCADA and PLC.PLC controls the liquid level and valve position and all the parameters of the system. This method is easy to operate with all the parameters and have a desired output.

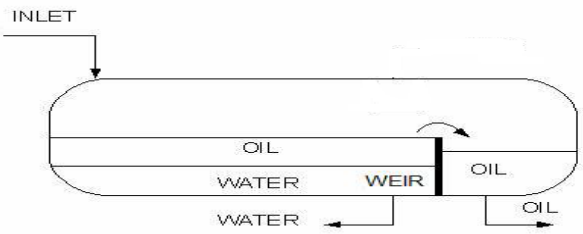

Fig 2. Level control system

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IV. BLOCK DIAGRAM DESCRIPTION

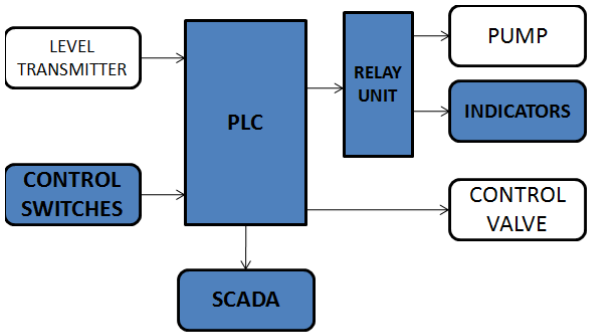

Fig.3.Block diagram for Two phase separation of liquid

This system includes PLC, RELAY units, control switches, Level transmitter, Control valve, Indicator jig, Pump, and SCADA. The main role of the PLC is used to properly control the valve opearation and level of the liquids. For inlet of liquids the solenoid valves are used. And for the outlet of liquids control valve are used.

The outlet control valve (of the OIL and WATER), and the level Transmitter of the liquids are combined through PID algorithm. Therefore when the Level Transmitter of the Liquids increase, the control valve opening will be increasing, vice versa when the level Transmitter of liquid are decreasing the opening of control valve will be decreasing.

V. RESULT AND DISCUSSION

All the components have been mounted on a cardboard. Power supply is given to PLC through MCB. Every Digital outputs is taken via RELAY outputs. All the wires are terminated through TB. Through SMPS power is given to the Digital inputs and outputs. AUTO/MANUAL mode selection is kept in hardware module. For varying the Liquids, potentiometer has been mounted. Apart from that Liquid ON/OFF switch has been mounted.

Apart from this Indicator Jig has been mounted for the indication purpose. If the Liquid level is high indication will be shown in the module.

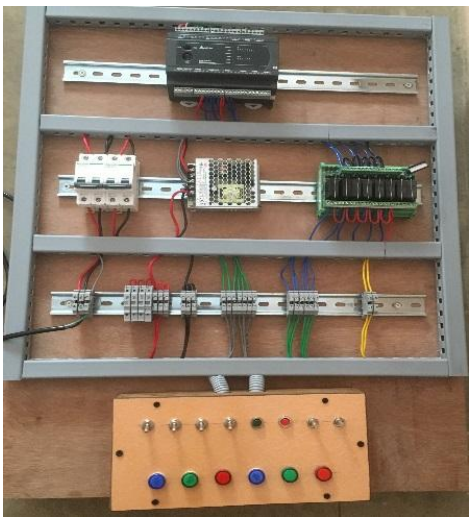

Fig.4 Hardware Implementation

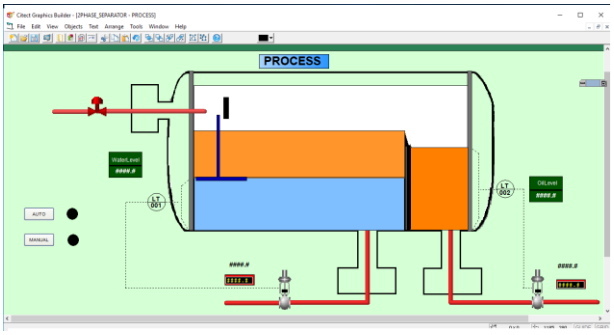

Fig 5. SCADA implementation

In the SCADA screen the level of the liquids can be monitored and controlled.

AUTO/MANUAL mode can be selected in the SCADA.

VALVEs are controlled via SCADA.

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VI. CONCLUSION

Here we have proposed a PLC based control system using PID algorithm which controls/adjust two different liquid levels automatically. The controller for separating the liquid in a tank system is achieved via SCADA and PLC. PLC controls the liquid level and valve position. PLC controls all the parameters of the system. By this proposed system we can able to separate two different liquids with different densities. And the results are visualized through SCADA. In the SCADA screen the level of the liquids can be monitored and controlled. AUTO/MANUAL mode can be selected in the SCADA. VALVEs are controlled via SCADA

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