Odourness Monitoring and Supply of Grey Water Using Plc& Scada

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Abstract - *Wastewater from homes and industries, without proper treatment, when released into water source can cause harm to aquatic life and disturb the pH of water causing water pollution. In India, water treatment plants are located across various cities. Water is basic necessity of life used for many purposes one of which is industrial use. . Industries generally take water from rivers or lakes but they have to pay heavy taxes for that. So it's necessary for them to recycle that to reduce cost and also conserve it. Proper control and monitoring of these plants can help us improve the productivity thereby limiting scarcity of water as proficient use of water can be achieved. Automation in various separation techniques like bar screening, sedimentation, grit removal, chlorination, ph level sensor etc. is being carried out by using programmable logic controller. In this paper, the use of PLC and SCADA in sewage water treatment plant is implemented. The obtained purified water is used for domestic and agricultural purpose on the basis of ph. The main intent of the paper is to treat the waste water which can be in turn used for many other purposes and can be cost effective as well.*

Key Words: **PLC (Programmable Logic Controller), CV (Control Valve), Automation, pH Sensor, SCADA.**

1. BLOCK DIAGRAM

   The block diagram is shown in Fig.1.The input action consists of a reservoir tank consisting of the waste water to be treated. The pump controlled by PLC pump and the water is passed through a filter which consists of macro particle macro particle like sand, stones etc. The next stage consists of the filter membrane which filters the minute or dissolved particle present in the water. The system also allows the sedimentation to take place as the heavier particles settle at the bottom of the tank. The next stages consists of the coagulation which gets proceeded with a string process . As water treatment processes and the disinfection of water takes place by adding maple and chlorine. The solenoid valves open and close according to the controlling action of PLC to allow the water treatment in different stages. Level sensors are placed in final tank to check the total amount or level of the waste water treated. The pH value of the treated water is checked if it lies in usable range the water is stored in the storage water tank and then it is supplied .The components required are as follows:

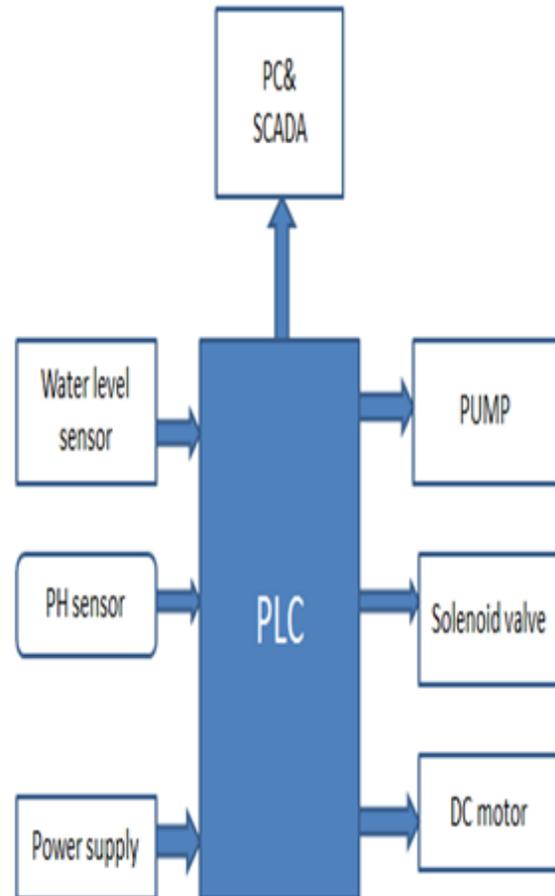   Filter, Water Pump, pH meter, maple & Chlorine , Level Sensors, Control Valves, PLC and SCADA.

Fig -1: Block diagram of Recycling Process

Pump:

It is acting as booster which will boost the flow of liquid through it. It is acting as an output parameter for PLC. Pump helps us to pump the water from one tank to the another tank.

Submersible Pump Solenoid Valve:

A solenoid valve or solenoid actuated valve is basically an electrical valve that controls the flow of media either open/closed or diverting my means of an electro magnet or solenoid. The principles are based around a thin copper wire wound around a bobbin or core (The solenoid) in such a way that when electrical energy is applied a sufficient magnetic field is generated to provide a lifting force to a ferromagnetic stainless steel armature within the solenoid valve armature assembly which in turn will directly or indirectly change the

position of the valve. It is acting as an output parameter for PLC.A solenoid valve is an electromechanically operated valve. The valve is controlled by an electric current through a solenoid: in the case of a two-port valve the flow is switched on or off; in the case of a three-port valve, the outflow is switched between the two outlet ports. Multiple solenoid valves can be placed together on a manifold. Solenoid valves are the most frequently used control elements in fluidics. Their tasks are to distribute or mix fluids. They are found in many application areas. Solenoids offer fast and safe switching, high reliability, long service life, good medium compatibility of the materials used, low control power and compact design.

DC Motor:

A dc motor is being controlled by PLC. It will operate the stirrer. A DC motor is any of a class of electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor. Most types produce rotary motion; a linear motor directly produces force and motion in a straight line. DC motors were the first type widely used, since they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but it is lightweight motor used for portable power tools and appliances. Larger DC motors are used in propulsion of electric vehicles, elevator and hoists, or in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

2. PROCESS EXPLAINATION

Grey water storage: It is initial stage of the waste water getting collected in the storage tank.

Screening: It is the second stage of the reservoir tank to the source of sewage. So the tank contains of wastewater.The tank is provided with grit chamber and filter assembly to remove large objects such as stones, plastic etc. After some time delay, a pipe transfers the sewage water from tank 2 to tank 3. Here we are using net filter to eliminate small solid particles, plastic, covers etc. from sewage water. In this process water is allow to stay for some time.
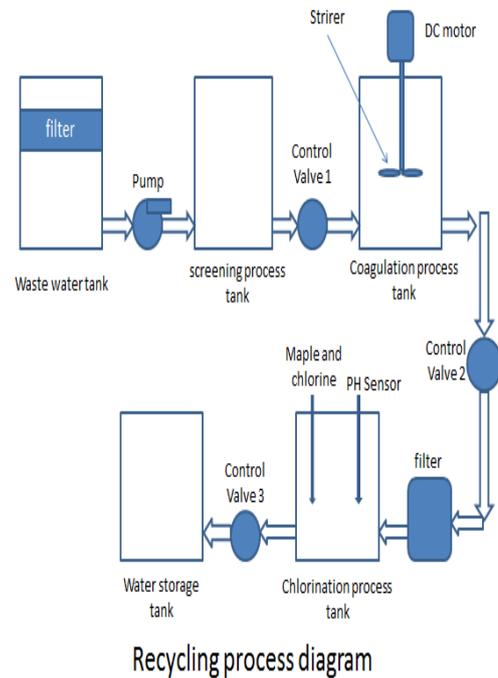

Fig -2: Recycling Process Diagram

Coagulation:

Coagulation is a complex process but generally refers to collecting of larger mass and the minute solid particles dispersed in a liquid. Chemical coagulants added to wastewater to improve the attraction of fine particles so that they come together and form larger particles like cluster. Coagulation requires gentle mixing of particles which is done with the help of stirrer operated by dc motor. The processes of primary stage are physical and chemical in nature.

Chlorination:

Water in tank 4 is kept stable until chlorination is completed. In tank 4, it is treated with chlorine water. There are two small tanks above the tank 4 which contains of maple and chlorine. They are controlled by pump 3. According to the value of pH of the water, particular amount of maple and chlorine is added into tank. Maple helps to settle the sludge at bottom so water gets clean and chlorine is used as purifying agent which kills the bacteria in the water and removes the odourness . As soon as the maple and chlorine are added, stirrer in tank starts rotating. Stirrer is used in order to mix the mixture properly. Once the pump 3 is opened, Stirrer stops rotating.As water moves, sludge into tank 4 is removed by the manually operated tank. Tank 5 is also provided with limit switches which controls the limit of the tank with respect to the ph level sensor.

pH Control: It is necessary to adjust the pH in the treatment process to make the wastewater pH neutral. Various chemicals are used for pH control. pH maintained water pass

through the valve i.e. CV-2 in which process of coagulation takes place which is another process of primary stage.

3. CONCLUSIONS

Water is used for a number of purposes, but it is used mainly for drinking. Apart from household uses, it is also use for several industrial purposes.Though water is found in abundant in nature, yet most of it is contaminated, and therefore it needs to be treated so that it can be recycled. The waste water has a great role to play in discharging the contaminated and polluted water before releasing it back to the environment. Without these water treatment plants, we would not be able to get clean and odourness water for domestic uses. By using PLC and SCADA the cost effective automation system for residences can be developed and it is eco- friendly for the operator or control engineer to trouble shoot the process if any errors occurs and can also be kept track of what is happening in the process.

This kind of implementation has many advantages. Some of them are:

- Increased level of comfort and time saving.

- Time and money saving during maintenance.

- Effective monitoring of the processes.

- Improved plant Reliability and life.

- Flexibility on change of building use.

- Remote monitoring of plants like water treatment plant or electrical supply, etc.

- Ease of storing reports of the systems. By using PLC and SCADA based automation in and around residences or apartments, we can lead to a better, comfortable life by reducing costs and improve the quality of life.

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