

Design and Analysis of Milk Pasteurization by using PLC

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Abstract - Milk is essential consumer product. Pasteurized milk is good for health than Raw milk. Conventionally, Plate Heat Exchanger is used for pasteurization. In our study, Multi tank system is used instead of Plate Heat Exchanger for batch process pasteurization. Milk pasteurization using Multi tank system gives better result in reducing Bacteria than AAVIN milk and raw milk. A milk pasteurization process is a nonlinear and multivariable interacting process. It is difficult to control by the conventional controllers. Since, the ON-OFF controller and PID controller provide oscillatory response to the temperature and level profiles of the process. Now a day, PLC is used to control the profiles.

INTRODUCTION

Drain is most essential drink in day to life. Our day starts and closures with drain. Crude drain contains numerous Pathogenic Microbes Which causes Dangerous infections. The Pathogenic organisms in crude drain are bringing down utilizing purification process. Sanitization is a procedure utilized generally in the dairy and sustenance ventures for microbial control and safeguarding of the nourishment devoured. Drain is a brilliant medium for microbial development, and when put away at surrounding temperature microscopic organisms and different Pathogens soon multiply. Purified drain, a dairy item, has a timeframe of realistic usability of 8-10 days in an unopened bundle. Temperature at each phase of sanitized drain process is vital at the warmth treatment process. It is obviously characterized as over 72-degree Celsius warming temperature at the outlet of Holding tube and underneath 7-degree Celsius cooling temperature at the cooling phase of plate pasteurizer (PP). Subsequently, the control

framework has been intended to guarantee the wellbeing of sanitized drain.

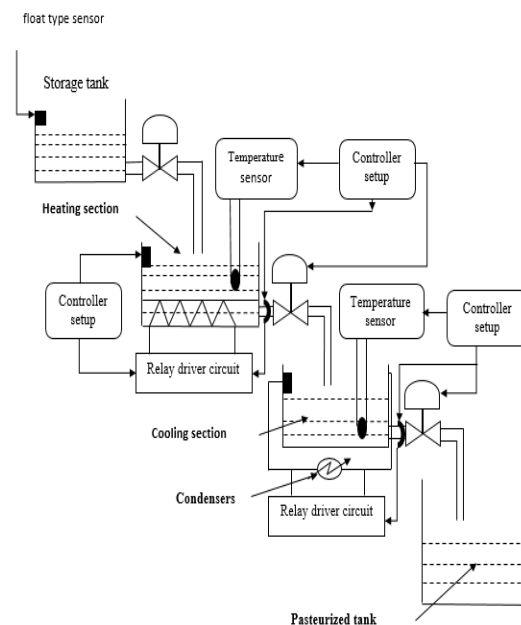
Existing System

In this current framework purification is an exceptionally old and conventional method for safeguarding, it is notable and acknowledge by the buyer. Almost every name of drain Items contain "Purification" and it is related by purchasers with great quality characteristics and security.

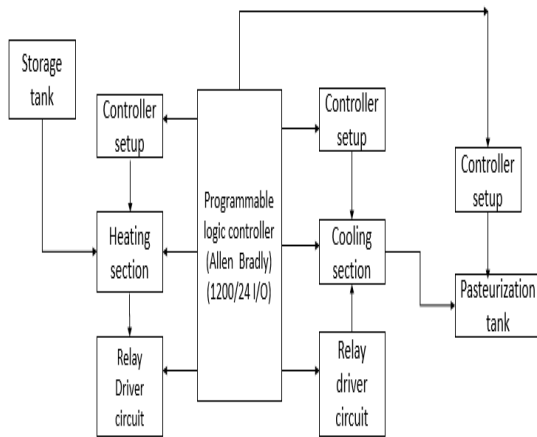
Proposed System

The exceedingly nonlinear dynamic conduct, multivariable in a nature, and connection between unit process makes this procedure be troublesome by regular controllers. Accordingly, the point and commitment of this work is at demonstrating the appropriateness of the Programmable Logic Controller (PLC) is multivariable process alluding to the genuine modern plant and Real Time Implementation of the drain sanitization utilizing Programmable Logic Controller(PLC).

Process diagram



Block Diagram:



PLC(ALLEN-BRADLEY)

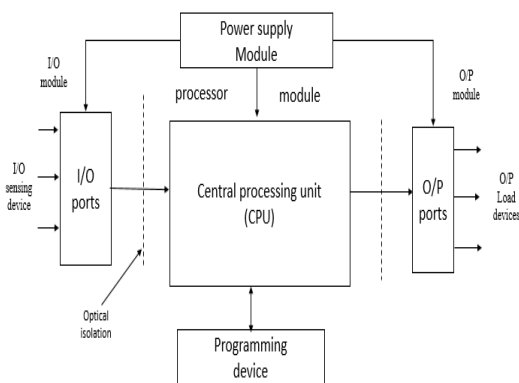
24 I/O ports



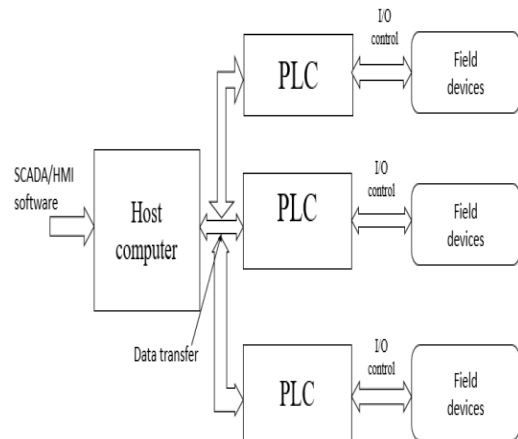
Hardware description

PLC (Programmable Logic Controller)

Programmable Logic Controller (PLC), or Programmable Controller is a mechanical computerized PC which has been ruggedized and embraced for the control of produced forms, for example, sequential construction systems, or any movement that requires unwavering quality control and simplicity of programming and procedures blame finding. They created in the inner frame of realistic usability of 8-10 days in an unopened bundle. Temperature at each phase of sanitized drain process is vital at the warmth treatment process. It is obviously characterized as over 72-degree Celsius warming temperature at the outlet of Holding tube and underneath 7-degree Celsius cooling temperature at the cooling period of plate pasteurizer (PP). In this way, the control car industry to give adaptable, ruggedized and simple programmable controller to replays hard wire transfers



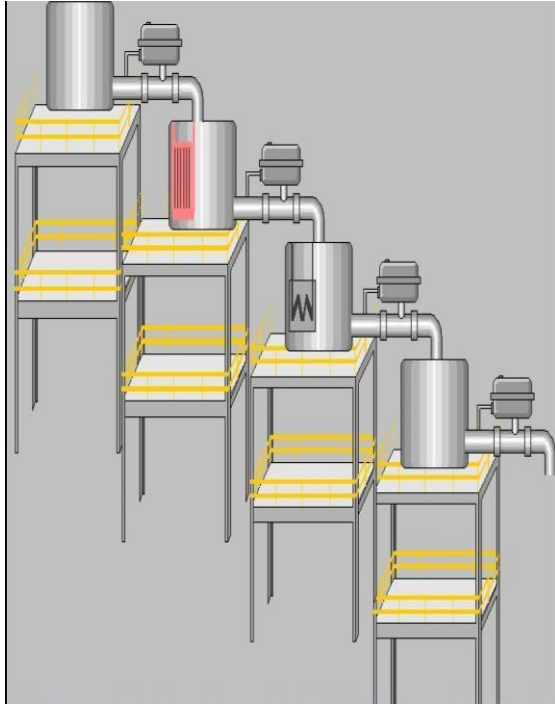
Supervisory Control and Data acquisition (SCADA)



Information gathering is rearranged by utilizing a SCADA framework. The capacity typical control work, the PLC in charge of gathering information, playing out the vital handling, and structure the information for the creating report.

Trading information from the plant floor to a supervisory PC permits information logging, information shows, slanting, downloading of formulas, setting of those parameters, and accessibility of general generation information. The extra supervisory control abilities.

Simulation of SCADA



Controller setup for Heating segment

You can overhaul or introduce warming controls without supplanting your kettle, and it's an especially smart thought to consider... diminish the stream of water through the radiator which they are fitted to when the temperature goes over a specific setting.

Hand-off driver circuit

In this Electrical hand-off we are simply worried about the key working standards of "light obligation" electromechanical transfers we can use in engine control or then again robotized circuits. Such exchanges are used as a piece of general electrical supply.

Temperature Sensor

There are two separate Temperature sensors utilized for warming and cooling segments. Thermocouple is utilized to gauge Temperature in warming segment and RTD PT 100 is utilized to quantify temperature in cooling area.

Protection Temperature Detectors (RTD)

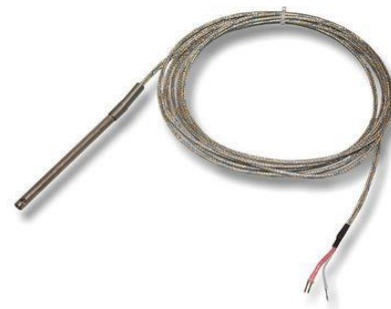
Insurance Thermometer, also called as assurance temperature marker (RTD). Are sensors used to check temperature by partner the security of the RTD segments with temperature. Most RTD segments involves the length of fine twisted wire contorted around masterful or glass focus. The part is regularly extremely fragile, so it is much of the time set inside a sheathed test to secure it. The RTD part is delivered utilizing the unadulterated material, typically platinum, nickel or copper. The material has a foreseen change in assurance as the temperature changes and it's this expected change that is used to choose temperature.

Condenser is an imperative part of any refrigeration framework. In a run of the mill refrigerant condenser, the refrigerant enters the enter condenser in a superheater state. The refrigerant may leave the condenser in an immersed or a sub cooled fluid relying on the temperature of the outside medium and plan the condenser.

Platinum security thermometer (PRTs) offer magnificent precision over a wide temperature run (from - 200 to +850 degrees Celsius). Standard sensors are open from different producers with different exactness unobtrusive components and distinctive bundling differentiating choices to suit generally applications. Not in the least like thermocouples, it isn't basic to utilize phenomenal associates with interface with the sensor.

The govern of undertaking is to measure the security of a platinum part. The most generally perceived compose (PT 100) has an insurance of 100 ohms at 0 degree and 138.4 ohms at 100 degrees. There are in like manner PT 100 sensor that have a security of 1000 ohm at 0 degrees. Ultra-sonic level sensor.

The connection amongst temperature and protection is roughly straight finished a little temperature go: for instance, if expect that its direct finished the 0 to 100-degree run, the blunder at 50 degrees Celsius is 0.4 degrees Celsius. For exactness estimation, it is important to linearize the protection from give a precise temperature. The latest definition to connection amongst protection and temperature is International Temperature Standard(ITS-90).



PT 100 RTD

Thermocouple

A thermocouple is an electrical contraption involving the two particular channels confining electrical convergences at different temperature. A thermocouple makes a temperature-subordinate voltage on account of the thermoelectric effect, and this voltage can be meant measure temperature. The estimation of amount under these instruments isn't influenced stray attractive fields. Thermocouple are self-controlled and fuelled and require no outer type of excitation. Thermocouple are normally chosen due to their minimal effort, high temperature limits, wide temperature ranges, and strong nature. The thermocouple kind of instruments precisely shows the root mean square estimation of current of scope of the thermocouple instruments are accessible in the market.

Ultrasonic sensor transmits ultrasonic pules, and by evaluating the period of ultrasonic pulse accomplishes the articles and back to transducer. The sonic waves transmitted by the transducer. In the wake of having emanated the sound waves, the ultrasonic sensor will change to gets mode. The time snuck past among transmitting and tolerating is with respect to the partition of the inquiry from the sensor.

It offers mind boggling non-contact run disclosure with high precision and stable readings in an easy to use package. It errands isn't impacted by sunshine or dull material. The supply voltage to the sensor is 5vDC. The sensor has two sticks to be particular trig resonate which is related with the controller to give mechanized info. Warming loop

Its changes over the power into warm through the procedure of resistive or Joule warming (electric current going through the component experience protection, bringing about warming of the component, this procedure is autonomous of the course of the present stream).



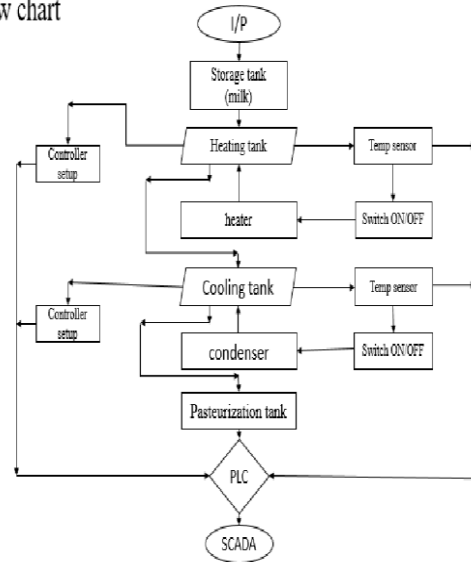
Thermocouple

Transfer Driver

A transfer is an electromagnetic switch which is helpful in the event that you need to utilize a low voltage circuit to change to turn on and off a light a light (or whatever else) associated with the 220V mains supply. Controller Setup

PLC is based on 24 input and output ports. It has 14 input ports and 10 output ports through the plc we are controlling the control setup by using the automatic process with very high speed. Here control setup is connected to sensor like temperature sensor and level sensors.

Flow chart



Hardware design





CONCLUSION

The reason for the examination was to build up a successful controller for Milk Pasteurization. The reproduced comes about demonstrate the temperature level control and PID controller. These leads us to conclusion that gives that superior to different controllers. The bacterial include drain is slightest in sanitization drain utilizing Multi tank framework than AAVIN MILK.

REFERENCE

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- [5] 5.'The microbial content of raw and pasteurized cow milk as determined by molecular approaches'. this paper reviews different methods to identify the harmful pathogenic present in milk.
- [6] 6.'Pasteurization Process Energy Optimization for a Milk dairy plant by energy Audit Approach'. This paper reviews layout of milk plant clearly. It also explains the methodology for milk dairy plant process.
- [7] 8.'Modelling and predictive control of milk pasteurization in a plate heat exchanger'. This paper presents a tuning for PID controller. It also explains the detail study of plate heat exchanger.