Proceedings of 4th RIT Post Graduates Conference (RIT PG Con-18)
NOVATEUR PUBLICATIONS
JournalNX- A Multidisciplinary Peer Reviewed Journal (ISSN No:2581-4230)
April, 13th, 2018

CIP FOR DAIRY INDUSTRY

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Abstract- **In recent years, of technology CIP automation system used for the cleaning process in the dairy industry. The development of this system, because of durning the cleaning process of tanker large amount of energy and resources are wasted. So there is need to develop a new system to save the energy and resources. This system is fully automatic, easy to operate, and economically Affordable.**

Keywords: *CIP, Automation, PLC, HMI, SCADA*.

INTRODUCTION

In the last 10 -15 years technique and washing of the tanker has been perfected.In Existence system in the dairy industry for cleaning of tanker is fully automatic, but during the cleaning process of the

food ,soil, complex pipe geometrics, and continuous observation. Cleaning test on a sudden expansion was compared to soil and swelling investigation as well as CFD results. It was shown that the tested cleaning configuration is controlled by the mass transfer of detached parts of soil. The dimensionless practical. Diameter of the soil fragments was calculated and showed that according to theory, no subtantional action by fluid is expected for such particle. [4]

P.schkoda, proposed system design for minerals which contributed to the stability of casein micelles when acidification of milk .the formation of casein gel by gradual acidification was the basic for producing fermented dairy products .caseins mainly contribute the development and stability of texture that was

More energy and resources are wasted. After cleaning process of tanker more liters of water is live towards derange and farm. So we have a need to develop a new system which is fully automatic and recycling and filtration process is carried out to save the energy and resources. In this proposed system delta PLC is used for controlling operation. It Take the input from sensors and generate the output signal.

RELATED WORK:-

Martin Scholer, presented that industrial cleaning process is a key role in enhanced food production. Some cleaning tests used to conduct that combine complex geometries with complex food soils using a novel test method based on the local optical detection of local optical detection of phosphorescence (LPD). It combines cohesive

specific for each product the composition and technology of producing casein gets affect those texture prosperities. that based on the microstructure of products the main aim of this specific paper established the connection existing between texture prosperities and microstructure of milk based acid. pH has an effect on the aggregation prosperities of casein in micelles .at pH 4.6 compact gel strands was found which result in low viscosity. These phenomenon were due to a minimum of repulsive forces as milk was acidification to a lower pH than the iso-electric point the proteins become positively charged reducing their attractive forces at pH 3.5 the strands seemed to be less compact and incorporate more serum then those at pH 4.6 [3]

Peter Honigeschmid, proposed a system which is for accurate prediction of intra molecular interaction from amino acid sequence that is an important perquisite for obtaining high quality proteins mem conp in which evolutionary couplings with machine learning approach. This system was developed to a chive 91.4% precision, 42.1% recall and MCC of 0.490 in preceding helix interaction based predicated contact [2]

Ephrem Ryan Alphonsus, discussed the application of PLC in our current market. They described the application of PLC in Energy control application and monitoring of plants PLC in the industries there were very efficient and synchronization of process and auxiliary element in manufacturing chemical and process industries [1]

CIP SYSTEM DIAGRAM:-

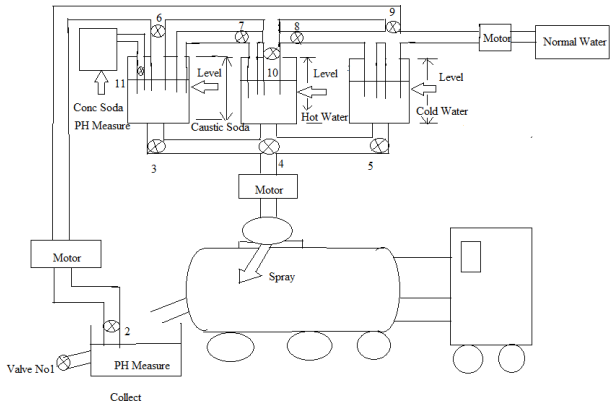

Fig.1 system Diagram

SYSTEM DESCRIPTION:-

System diagram of CIP for dairy industries is mentioned as fallows; in dairy industry transport of milk from one place to another place by using tanker during transport of milk inside wall of tanker becomes oily. This oily part is removing by using different cleaning methods such as hot water process, caustic soda process, and cold water process. In this proposed system generally milk tanker is placed on sloppy structure because of cleaning of inside wall of tanker is oily this oily part is easily move away from bottom opening tanker. In this system consist of three tanks are used the first tank is hot water tank for hot water processing operation is take place, second tank is chemical of caustic soda tank used for caustic soda processing, and third tank is cold water tank used for cold water processing. Generally this process is carried out in parallel format for opening and closing the valve automatically after cleaning process is completed take out water from tanker and store in collector tank after store the water in tank and filtration process is take place. Simultaneously measure the ph of water and when ph of water is normal then recyclining process is takes place by using recycling valve and Recycle motor. And fed the three tanks alternatively for opening and closing valve automatically. Durining this process the water level in three tanks is decrease so we add normal water in three tanks and stable the level of water. This process is carried out automatically of opening and closing the valve. Also we have measure the temperature of three tanks simentinousally.

BLOCK DIAGRAM OF PROPOSED SYSTEM:-

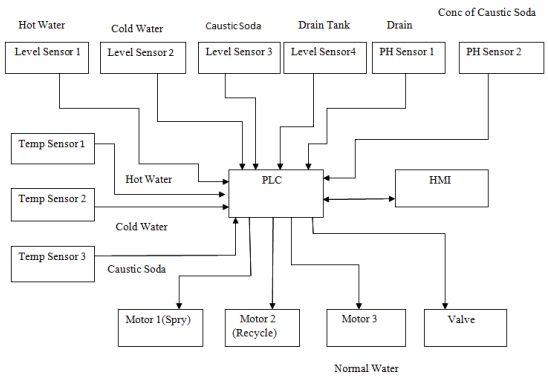

Fig.2 Block Diagram of Proposed system

Fig.2 shows block diagram of proposed system Delta PLC is used as controlling device. It is interfaced with different component such as level sensor, pH sensor, solenoid valve, ac motor, temperature sensor and HMI. In CIP system has consist of three tanks are used such as hot water tank, cold water tank, chemical of caustic soda tank. each tanks are connected with different component such as solenoid valve, temperature sensor, level sensor. In this system three ac motors are used and each motor have different operation such as spraying, recycling, and feed the normal water in three tanks. in this proposed system three different types sensor are used for different operation the level sensor are used for measure the level of three tanks, the function of temperature sensor is to measure the temperature of three tanks, and the function of ph sensor is to measure the ph of drain tank and concentrated caustic soda. The function solenoid valve is opening and closing operation automatically.

PH MEASURIMENT: -

PH is defined as negative logarithm of hydrogen ion concentration, mathematically expression as,

$$PH = -\log [H^+]$$

$[H^+]$ is hydrogen ion concentration in mol/L.

In natural solution the $[H^+] = 1*10^{-7}$ mol/L then calculate the PH?

$$PH = -\log [H^+]$$
$$= -\log [1*10^{-7}]$$
$$= -[\log 1 + \log 10^{-7}]$$
$$= -[0.0 + (-7)]$$
$$= 7$$

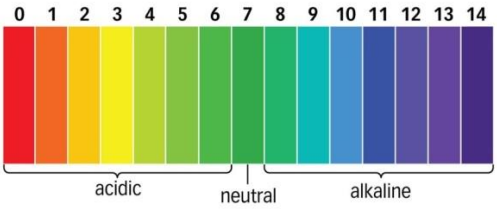

Fig.3 PH Range

As shown in fig.3 ph range will indicate in this case three condition will display in the form of acidic,netural and alkaline suppose the ph of water below 7 range then it become acidic and when the ph of water rang above 7 then it become alkaline.also when ph of water is 7 then it become netural.

FLOW CHART OF SYSTEM :-

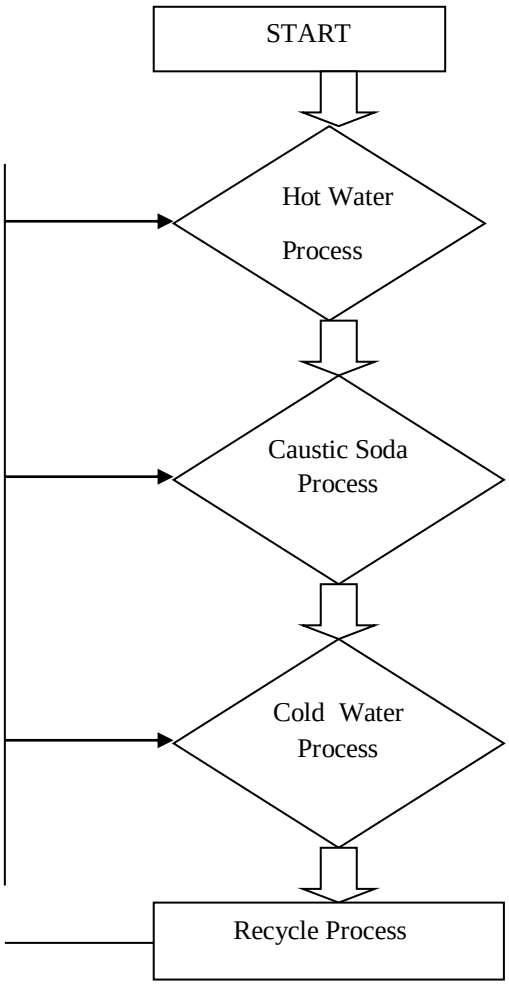

Fig .4 Flow Chart of System

As shown in fig .4 flow chart of system in this system the three tank process is carried out when start the process the first process is hot water process in this process hot water is spray inside the wall of tanker after this process is complited the recycling and filteration process is start. After some time second process will start i.e. caustic soda process in this process caustic soda is spray inside the wall of tanker after this process is complited the recycling and filteration process is start.after some time third process will start i.e.cold water process in this process cold water is spray inside the wall of tanker after these process is complited recycling and filteration process is carried out.when stop switch is press then system become off.

PLC Programining Output Result:

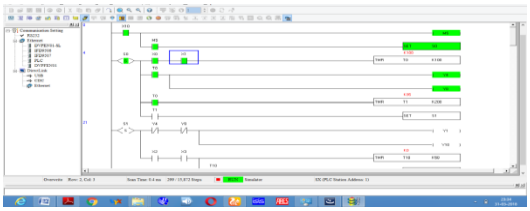

Fig.5 PLC Output Result

As shown in fig.5 The result of PLC program in this program each tank process carried out in parallel format.we can consider for first hot water tank process in this process two level sensor are used one level sensor is placed in top level of tank and second level sensor is plced in bottom level of tank.the condition is that suppose when tank is full and and two sensor are on in this case hot water drain valve and motor spray become on and spraying process is take place and its requires 10min. simentinously in this process the level of water in tank is decreases when this situation is occurs then normal water valve and normal water motor is on and spray motor and drain valve is off this process is requires 20min.these process is continuously on and off because of latiching.similarly these logic is used for other two tanks.after cleaning process thse water is collected in drain tank and measure the ph of water when ph is normal then recycling valve and recycling motor is on otherwise is remains off and drain valve of drain tank is remains on after this process is complited three recycling valve is on and off automatically because of latching process.

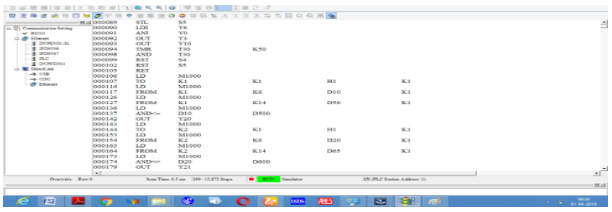

Fig.6 Instruction List Mode

As shown in fig.6 Instruction list mode this instruction is automatically generate after PLC ladder programining in the form of assembly language.

HMI PROGRAMINING OUT PUT RESULT:-

Fig.7 Control panel of CIP system

As shown in fig.7 control panel of CIP system in this control panel we can control the system in the form of two switches and two indicator.when on switch is press then system become on and green indicator will enable.also when off switch is press the system is off and red indicator will enable.

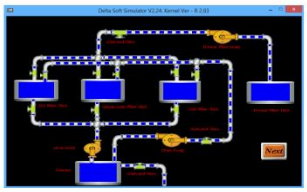

Fig.8 CIP system is ON

As shown in fig.8 when on switch is press then system become on and we can see the flow of water direction in three tanks, on and off process of valve,motor etc.

Fig .9 Display Temperatures of Three Tanks

As shown in fig.9 when the temperature sensor sense the temperature of three tanks then its directly display the temperature of three tanks in the form of normal temperature and present temperature of water wthin three tanks.

Fig .10Level Indicators of Three Tanks

Fig.10 when the level sensoris detect the level of three tanks then its directly display the level of water in the form of indicator i.e. when red indicator is enable then level of water in tanks is low level and when green incator is enable then level of the water in tank is higher level.

Fig.11 PH Measuriment

As shown in fig.11 when the Ph sensor is sense the Ph of water in drain tank and concentration of caustic soda tank then its result is directly display on HMI.

CONCLUSION

In Moderen CIP technology is implemented in dairy industry. Because of when cleaning process is carried out more liters of water is westage and this water is provided to dranage or farm.this situation are occur in dairy industry. Also in dairy industry motor are continusually operate so its directly effect on energy . so we have a design a new system to save the energy and resources durining cleaning process of tanker. This system is easy to operate, economally affordable .Also this CIP system method is also usful in food industry,chemical Industry,phramacytical industry for washing pipeline,equipement.

ACKNOWLEDGEMENT

I take pleasure in presenting my work done in the CIP for Dairy Industry. I would like to express my deep sense of gratitude to my guide Prof. Mrs. S. S. Patil and Prof. Mr. M. P. Takale for their valuable suggestion. I am deeply indebted to him for giving me the chance to do this innovative project providing constant guidance throughout this work. I acknowledge with thanks, the assistance provided by department staff, electronics faculty, staff, finally I would like to thank my colleagues, friends and at last but not least my lovely family who helped me directly or indirectly for the same.

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