"CLEANING OF METAL FOR ELECTROPLATING USING PLC"

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ABSTRACT

Industrial automation is widespread today as it helps to increase produce, quality and profits and in turn minimizes wastage and losses. Hot water sprays are in widespread use in industries and it is necessary that the material (or metal) to be worked on is thoroughly cleaned with a hot water spray to wash off dust and other physical impurities and get the piece ready for further work. We are developing this project by using both analog/digital circuits and PLC will be heart of this project by using central processing system. Temperature, level and position are the three different parameters monitored and controlled in our project and they are interlocked each other. Our goal is to develop a system which could be used for the purpose of automating and managing this process by using SCADA system.

Keyword: - *PLC, SCADA,SENSORS,CONVEYOR BELT,HEATER,*

I Introduction

In an extremely mechanized world such as today's it is necessary to make our plants automatic, convertible and economical. This project proposes the development of a hot water spray system with the added advantage of interlocking which is used when excess parameters can damage the industrial plant [1]. In industries such as paint, automobile, electroplating, paper industries etc, it is necessary that the material to be worked on is thoroughly cleaned with a hot water spray to wash off dust material present on metal, and other physical impurities and get the piece ready for further work.

As far as now it was all manually operated till by that time, the invention of Programmable Logic Controller took place. This PLC can be programmed to control any process and can be interfaced to a computer [2]. In 1997 by John B. Durkee United kingdom, method of cleanliness is based on wetting behavior of the surface being tested. If it has an oily or greasy layer it will get wet poorly. In "Management of Industrial cleaning technology and processes." In order to avoid this issue, there is a need of cleaning metal after electroplating. For the reduction of risk in handling of huge objects there is conveyor which is driven by DC motor which can be controlled by PLC.[3] The entire process can be observed by control room operator and the variation in the process parameter can be changed with software and using SCADA system. This invention of automated system surely helps for the good production quality as well. Hence there is a large reduction in manpower required as well as increase in production. objects are placed on conveyor belt one by one in sequence with one object separated from other with safe distance. the system once activated runs automatically using SCADA system .

II Objectives

The main objective of the project is to clean the dust particles present on metal after electroplating.

III. AIM

As we all know the main requirement in the industry or any firm is man power. So the main objective of our project is to reduce the need of man power and make it automatic.

IV. RELATED WORK

In 1997"Management of Industrial cleaning technology and processes."[1]
From this paper we refer by John durkee.

The paper deals with a more stringent quality standards and environmental safety regulation as well as new process and chemical technology have changed industrial cleaning from a "wet and wipe" application to be a value and demanding operation.

In 1999"Use Of Ethylene Glycol As Corrosion Inhibitor During Cleaning After Metal Chemical Mechanical Polishing"[2]

From this paper we refer by MJ Berman, J Kalpathy
A post metal mechanical chemical polishing cleaning process that effectively inhibits corrosion of metallic plug is described. The process includes providing a partially fabricated IC form by subjecting a metallic surface on IC and a mixture including ethylene glycol and hydrofluoric acid to remove a portion of contaminated dielectric layer and to effective inhibit corrosion of the metallic plug. The mixture has a ethylene glycol in an amount that is between about two times and about seven times the amount of hydrofluoric acid.

In 2002 "Electrolytic Plasma Processing For Cleaning And Metal-Coating Of Steel surfaces." [3]

From this paper we refer by EI Meletis, X Nie, FL Wang
Electrolytic plasma processing involves electrolysis and electrical discharge phenomenon and it is an emerging, environmentally friendly surface engineering technology. Electrolytic plasma material surface interaction during processing can be used for cleaning. Cleaning of metal surfaces, formation of diffusion layer and deposition of metal, ceramic and composite coatings. The present work was concerned with cleaning and deposition of metal coating on steel surfaces for corrosion protection

V. PROPOSED SYSTEM ARCHITECTURE

Explanation-

The primary contributions of this paper are as follows:

PLC:

We are using SIEMEN 7200 as PLC, which is heart of project.

SENSORS:

This task is performed by accessing three parameters i.e. temperature, level, and position sensors. This sensors are used for converting physical quantities into electrical signal.
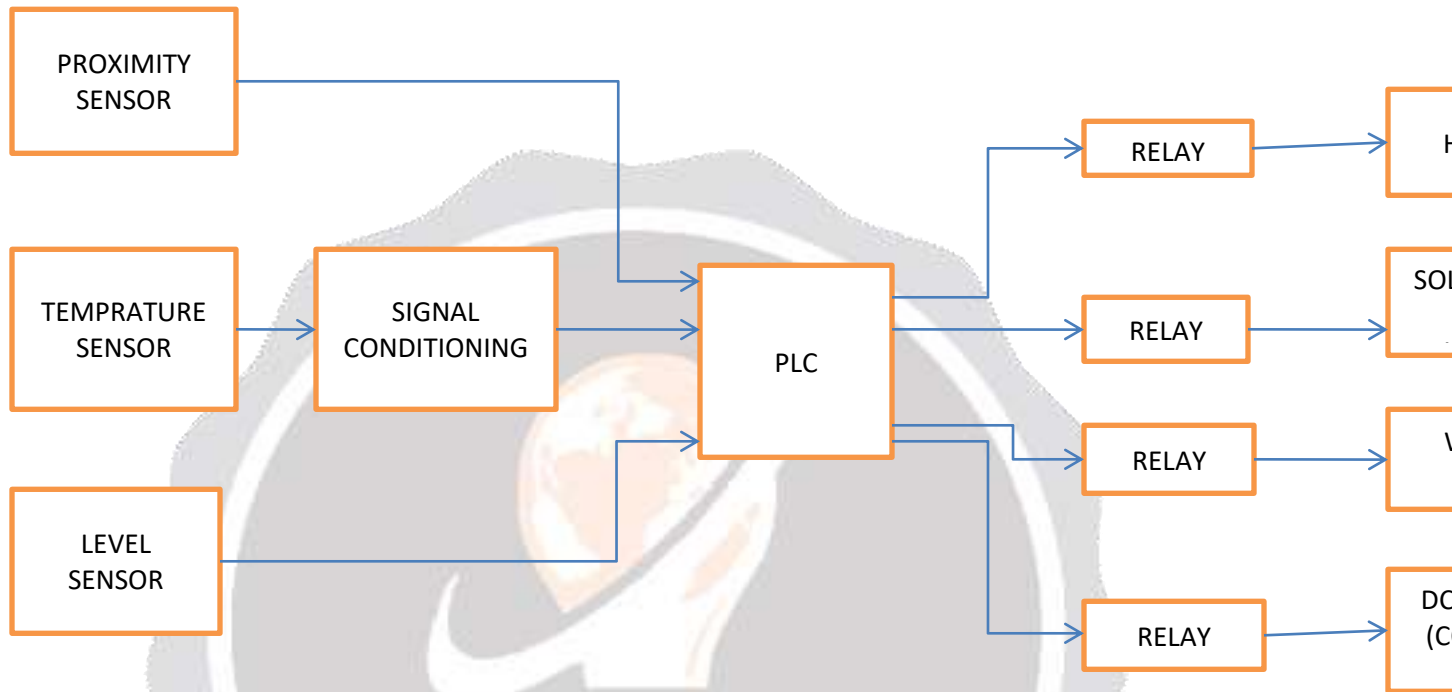
Conveyor Belt:

conveyor belt system is used for conveying bulky items from one place to another. Conveyor systems may be designed to transport a certain volume of material in bulk per hour, or for a manufacturing process where each object on the belt is handled sequentially.

Relay module:

A special relay card circuit is used in this project to control the switching in case of the control components such as the heater, solenoid valve, conveyor belt motor etc. Relays are also used to control and drive components with high power requirements such as the heater for water pump.

Solenoidal valve:

   A solenoid valve has two main parts: the solenoid coil and the valve. The solenoid converts electrical energy into mechanical energy which, in turn, opens or closes the valve mechanically.

Working

PLC:

   We are using SIEMEN 7200 as PLC, which is heart of project. A programmable logic controller (PLC) is an industrially hardened computer-based unit that performs discrete or continuous control functions in a variety of processing plant and factory environments.

SENSORS:

   This task is performed by accessing three parameters i.e. temperature, level, and position sensors. This sensors are used for converting physical quantities into electrical signal.
   1. Level sensors: For level measurement we propose the use of a Multi-point capacitance type level switch. The operating principal of multi point capacitance type level switch is that capacitance will be formed between the top wire and the other four electrodes.
   2. Temperature sensor: For the purpose of measurement of temperature, a k type thermocouple is used. It has excellent accuracy over a wide temperature range (from -200°C to +1350°C). It also provides a steady output signal which is conditioned using the appropriate signal conditioning circuit and is displayed on the screen for real-time monitoring.
   3. Position sensor: A proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact. A proximity sensor often emits an electromagnetic field or a beam of electromagnetic

radiation and looks for changes in the field or return signal. The object being sensed is often referred to as the proximity sensor's target,

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Solenoidal valve:

A solenoid valve is an electromechanical valve for use with liquid or gas controlled by an electric current through a solenoid, which is a coil of wire, changing the state of the valve. Their tasks are to shut off, release, dose, distribute or mix fluids. A solenoid valve has two main parts: the solenoid coil and the valve. The solenoid converts electrical energy into mechanical energy which, in turn, opens or closes the valve mechanically.

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