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CENTRALIZED MONITORING AND CONTROLLING OF DIE CASTING PROCESS

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Abstract - *Die casting process is highly intensive and functioning with many complex units. In die casting industries, automation plays a vital role to get a better result in quality, quantity, time consuming in manufacturing process. The process is generally deals with a Programmable Logic Controller as a digital computer used to automate in electromechanical processes. Automation system generally networked with Human Machine Interface to show die casting parameter values for all the time in graphical manner. In such process there is a need of human to monitor and control the set ranges in Human machine Interface* ***which shouldn't go varied at a period of time, if time*** *goes miss there will be a chance of machine error to occur. For this purpose the proposed system is play the vital role by viewing the step processes with set ranges* ***of entire working system's avail in industry remotely*** *using ZigBee with the monitoring technology Supervisory Control and Data Acquisition. On this basis, service engineers or operators can easily view the conditions of industry automations, diagnose problem and help engineer to monitor and control the current operation in control room itself. This system is* ***implemented to fetch graphical data's of individual*** *automations networked Human Machine Interface to single monitor and simulation result has been achieved using LabVIEW software.*

Key Words: Remote terminal unit, ZigBee transceiver, Supervisory control and Data Acquisition system.

1. INTRODUCTION

Die casting is a metal casting process that is characterized by forcing molten metal under high pressure into a mold cavity. The mold cavity is created using two hardened tool steel dies which have been machined into shape and work similarity to an injection mold during the process. Most die castings are made from non-ferrous metals, specially zinc, copper, aluminium, magnesium, lead, pewter and tin based alloys. Depending on the type of metal being cast, a hot or cold chamber machine is used. Die-casting is amongst the highest volume, mass produced items manufactured by the work industry and they can be found in thousands of consumer, commercial and industrial products.

Die cast parts are important components of product ranging from automobiles to toys. Parts can be as simple as sink factor as complex as connector used. It is one of the fastest and most cost effective methods for producing a wide range of components. However, to achieve maximum benefits from this process, it is critical that designers collaborate with the die caster at an early stage of the product design and development. Consuming with the die caster during the design phase will help resolve issue affecting tooling and production, while identifying the various trade-offs that could affect overall costs. Die-casting is an efficient, economical process offering a wide range of shapes and components than any other manufacturing techniques. Parts have long service life and

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may be designed to complement visual appeal of the surrounding parts. Designer can gain a number of advantages and benefits by specifying die-casting parts.

Die-casting provides complex shapes within closer tolerances than any other mass production process. The general die casting process of manufacturing products to a certain types have been progressed with the condition of process which is generally functioning over monitoring and control with the help of fixed human machine interface. Though it is possible whereas the function is done by displaying significantly via HMI graphically, here the each step of the process over die casting process is generally considered to show with a fixed set of ranges value. Moreover progress is working with the program according to the PLC controller.

This process is done with every individual automation of the industry. The functions of the process work accuracy in every manner to indicate the stepping process of the each manufacturing die-casting products. So this process should be monitor for all the time when it is in working condition. If suppose the operator fails to monitoring the process at a certain time to control the set process parameter ranges. Hence the automation will be moved to stop condition. The difficult task is that automation stops by occurring any error, it will take more time to regain the same condition of heat at certain level of temperature then only it gets back to the normal condition. Because of this situation there will be a chance to happen loss for all the entire industry on manufacturing products. Here we can proceed by giving an appropriate solution to avoid human error by centralizing all the automations with the help of remote terminal unit and can monitor of all status in control room itself without visiting the exact field.

2. MONITORING AND CONTROLLING PROCESS

The PLC based system using wireless technology are the main function is to use a ZIGBEE and SCADA technology on wireless automation system with Pair of ZIGBEE is used here, among that one is connected with the PLC in the industry side and another one is connected with PC in the control room. Data from the PLC side will be transferred continuously to PC via ZIGBEE by sending a bit of the process that occurs in the industry [1]. An automizing of any home appliances are to be controlled automatically by the programmable Logic Controller. As the functioning of the Appliances is integrated with the working of PLC, the project proves to be accurate, reliable and more efficient than the existing controllers. It is a combination of electrical, electronic and mechanical section where the software used is Ladder Logic language programming [2]. A remote monitoring system as part of distributed control system of process plant. Remote plant critical alarms from DCS are continuously monitored online through supervisory control and data acquisition system. A report which contains alarm details formulated through MS-Excel is sent to respective email recipients through outlook express. For system maintenance, M2M gateway and virtual private Network technology are used in remote monitoring [3]. A traditional industrial crane control system, all control devices are wired directly to each other according to how the system is supposed to operate. Here human is the main to control the crane & that passes through large drawbacks such as more wiring work, appears large mechanical faults & difficulties in troubleshooting & repair work .Due to these drawbacks industrial production decreases largely[4]. PLC is a digital computer used to automate electromechanical processes. This research is based on automation of a water tank by using Siemens PLC. Automatic control of water tanks can work continuously and can provide accurate quantity of water in less time. In such process there is no need of labor so there is no human error. Without human error, the quality of product is better and the cost of production would definitely decrease with no error in quantity required [5]. An automated setup for the measurement of temperature of any industrial environment, for example boilers, refrigerators and heaters etc. The hardware requirements are significantly curtailed using the microcontroller's modern embedded features like A/D Conversion, display interface, hardware and software interrupts, and communication protocols for interfacing cellular phones and GSM modules. This truncation in hardware requirement has led to a smarter industrial temperature automation design [6].

3. GENERAL PROCESS SYSTEM

The conventional monitoring of the automation systems via HMI graphically should be obtained for all the time in die casting industry is tough task for the industrial providers and the operators, but man power must be present at exact time to monitor whether the process is going on accurately or getting varied.

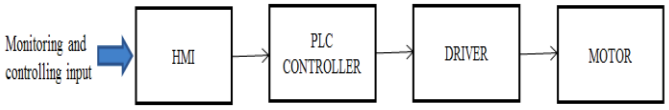

Fig 1 Block Diagram of General process system

The system proposes motor which is connected to sensory devices to work the process according to the provider of industry. Generally, the process is working over with a function of driver to drive the motor functions. It is handled with the programmed logic controller that to be done with the monitoring purpose of human machine interface which is normally fixed with the industrial automations in the industry or plant.

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This system is tough to handle at a time. The timing is very necessity here in all the way because the systems wont made to occur an ON status to OFF status at any cause, if this status happens there will be a loss definitely occurs. The Human Machine Interface (HMI) includes the electronics required to signal and control the state of industrial automation equipment. These interface products can range from a basic Light Emitting Diode status indicator to a 20-inch Thin Flat Transistor panel with touchscreen interface. HMI applications require mechanical robustness and resistance to water, dust, moisture, a wide range of temperatures, and, in some environments, secure communication. The machine interface which is normally used to monitor and control all the process steps by displaying the graphical analysis via display. Moreover these functions are gradually enacts the process easy to view whether the general programmed conditions are successfully running or not. But based on this system operators should view the process at a given specific time. If the conditions are not being placed at a time the progress of the system will get stopped the automations according to the man mistime.

Thus the general system is done for all the time in all the industries with the automations. Almost this may show the loss which is according to the machine at all time. But these errors can be done with centralization process which is grown over with the remote terminal unit, that is generally works as a communication interface and memory storage usage for fetching the data's to transfer for all the time by connecting all the automations HMI graphical part to the single unit display called Supervisory control. Hence this proposal system is not a presence in existing system to bring the controlling and monitoring effectively. Monitoring of the automation systems networked human machine interface in industry is displayed generally in graphical manner. This is handled with the programmed logic controller. Hence it should be obtained for all the time in die casting industry is the tough task for industrial providers and the operators, also the man power must be present at exact time to monitor whether the process is going on accurately or getting varied. If an operator isn't reach to view the process means the timing is very necessity here in all the way because the systems wont made happen from ON status to OFF status at any cause, if this status happens there will be a loss definitely will occur to entire industry in manufacturing products.

4. PROPOSED METHOD

The proposed system which can monitor and controlling all the automation process in die casting using SCADA by centralizing through remote terminal unit using wireless ZigBee.

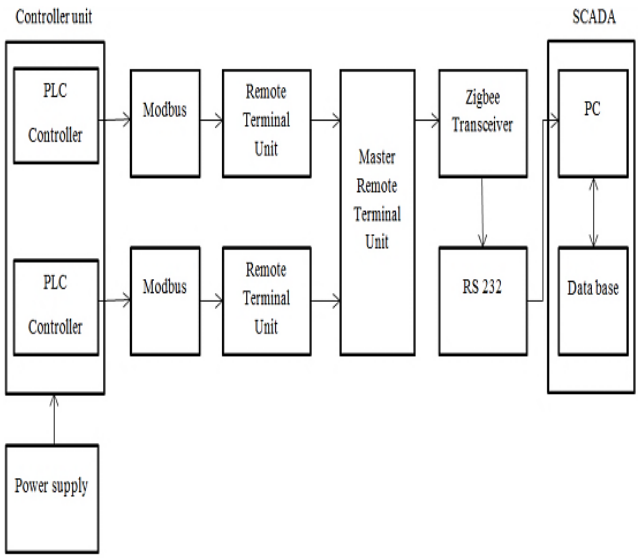

Fig 2 Proposed Block Diagram of Automation System

The system gradually monitor's the status of all controllers regularly which is connected to HMI. Also the process can be done by viewing the parameter's which indicates the specific process of the automation's step by step with fixed set range from 0 to 20sec's. Moreover we can avoid the human error by maintaining with a single operator. Hence the general operator doesn't need go to the particular automations place for monitoring every time. They can just seat in controller room itself and can monitor the entire process of the automations

4.1 Algorithm

Step1: Start the process.
Step2: To initializes the system.
Step3: Connecting over all individual automations
Step4: Enter the IP address to find the exact data's of individual machine.
Step5: If the valid address Between 1 to 5 automation, it enters to next step.
Step6: If it not valid, then get back to first process.
Step7: If valid then displays the complete data's and parameters of the system.
Step8: Stop the process.

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4.2 Flowchart

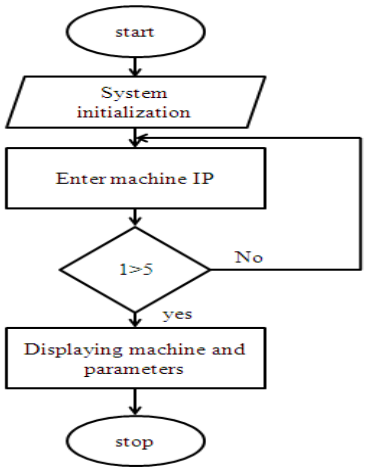

Fig 3 Flow Charts

4.3 Simulation result

4.3.1 LabVIEW Software

This block diagram fig 4 indicates that the display monitor has been connected to the all automations section. Here the case is interfaced to the process to received and display all the step process by giving each value code to found the individual automation process in a single display. This figure indicates that the cases for every individual automation which is centralized to one process. By having this process we can identify the selected code automation at any moment.

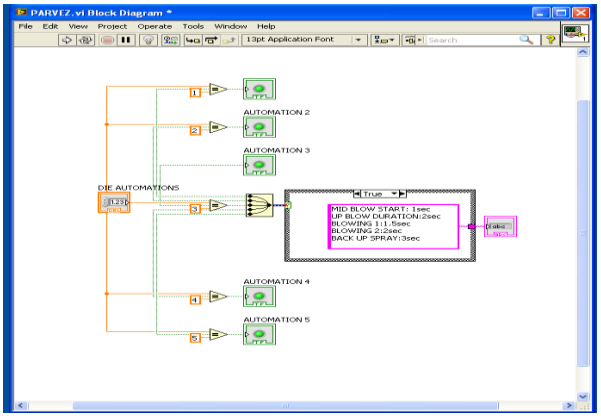

Fig 4 Block diagram of display step process

Front Panel

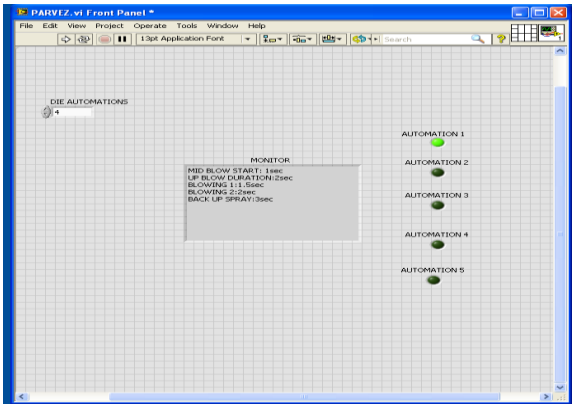

Fig 5 Simulation result of needed automated step process

Front panel figure shows the detail of individual automations step processes have to be view according to the needed view of selected automation. If goes with automation 2 then can exactly get the graphical details of that exact controller.

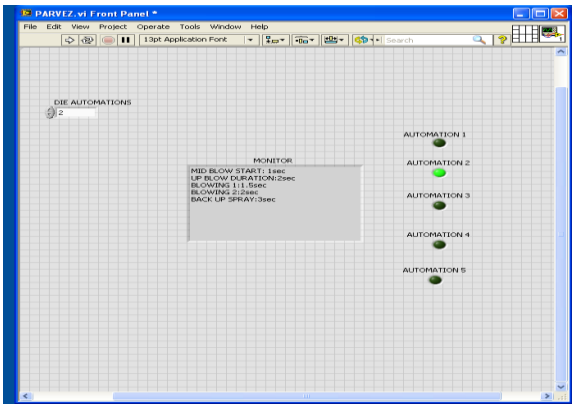

Fig 6 Simulation result of automation 1 step process

Thus the figure shows the another exact detailed process of an automation process, If goes with automation 1 then can get easily the step process of that valid controller.

5. CONCLUSION

A fully predefined program of monitoring for each industrial automations has been monitored and controlled using an LabVIEW. Here the functions of the system can monitor without huge man power. As per the result it can view the outcome for each automation in control panel display whereas it is said to be HMI. The process parameters can be gradually displaying as different steps section such as Back spray,up blow,mid blow etc.,These are mainly categorized under the set ranges which is

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manually fixed during the change of Die for the manufacturing products. Now after this process it can notified with less man power helps to preventing from human error, this shows the regular work has been minimised with single operator by seating in control room itself. The simulation results have been successfully achieved using LabVIEW software.

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BIOGRAPHIES

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