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Control Strategy for Multi State Press System Using Real Time Emittance Measurement

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Abstract: **The closed loop Analysis and Diagnostics of industrial Electrical drives has received an intense amount of research interest during the recent years. Reducing Maintenance Costs is the main Objective of Electrical Drive Manufacturers and Operators. A new monitoring technique called real time emittance measurement Technique is proposed for closed loop operations and to detect the faults occurring in the main line manufacturing unit. This technique has been tested through the simulation of an IM using a closed loop operation model. In order to demonstrate the capability of the proposed tool for robust condition monitoring, these simulations are complemented by the experimental results obtained from faults occurred in the chain manufacturing industry, powered from sinusoidal supply voltages. The former technique, based on open loop control does not identify faults near the sidebands which troubles the manufacturing and causes unscheduled downtimes. The results obtained by the Faulty Operation Strategy method show the merits of the proposed approach for the detection of faults. The new technique for the diagnosis identifies the faults around the sideband frequencies around the main frequency components of a line manufacturing unit .This technique also detects typical problems such as belt Damage, Belt Looseness, Gear tooth Damage.**

Keywords: **component, formatting, style, styling.**

I. INTRODUCTION

As per the growing complexity of the control problems, the demand for reduced development time, and the possible reuse of existing software modules result in the need for a formal approach in **PLC** programming .In this paper we are going through the fault detection technique to control and monitor the chain assembly process for improving the overall efficiency of the process. The chain unit consist of semi automated assembly lines, which used to control by plc and the servo drivers.

The main objective of this project is to collect the data from machine which is interface in the sequential assembly. Each assembly line consists of various special purpose machines which are used for assembling components for together. In this paper the process is held and control by sensors and data of the process has taken manually.

In this paper the concept of the chain assembly has briefly explained in section II. The various special purpose machines which are used in assembly lines is reviewed in section III. In section IV the details on chain manufacturing unit control and monitors are discussed. Section V presents the simulation results and the future enhancement. Section VI is the conclusion of the paper that is followed by references.

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II. CONCEPT OF CHAIN ASSEMBLY

In the chain manufacturing unit all machines are interconnected with each other and the drive at the ACCM is used as the Master for controlling the production line and in that system HMI is used for interacting with the machine.

All machine data are collected for processing by the data concentrator from network through Mod Bus protocol then the data is processed. The processed data is stored in the server for further retrieval .when a person tries to view the data the data base retrieves the data and presents it in the front screen.

When evaluating a current user interface or designing a new user interface, the following are the experimental design principles:

A. Early focus on user and task:

Establish number of person required to perform the function and determine the appropriate users should be; someone who hasn't used the HMI and is going to use in future, is most likely not a valid user. In addition, define the task the users will be executing and how often the task(s) need to be executed.

B. Empirical measurement:

Test the interface early on with the actual persons who impose the function on day to day basis. Keep in mind that results may vary with the performance the actual status on the use of the typical human-computer interaction. Establish quantitative specifics such as: the number of users logging on the task, the time to complete the task, and the number of errors made during the task.

C. Iterative design

After identified the users, tasks, and empirical measurements to include, perform the following un desired design steps:

1. Interface designing
2. Validation
3. Result analysis
4. Redo

III. SPECIAL PURPOSE MACHINES

A. Link Assembly:

Link assembly consist of three phase induction motor main motor with specification of 2HP,746PRM,3 ϕ,415 V and sub motor with a specification of 0.18 KW,1440 RPM,3ϕ,415 V. Which is driving a CAM shaft through a pneumatically actuated clutch which is connected to sliding tool holder another CAM is used for moving the Carrere which has two sensor .first sensors is used for sensing the overload and second sensor will sense the position measure.

B. Chain Assembly:

Chain assembly consist of three phase induction motor, main motor with specification of 2HP,746PRM,3 ϕ,415 V and sub motor with a specification of 0.18 KW,1440 RPM,3ϕ,415 V. Which is driving a CAM shaft through a pneumatically actuated clutch? Which is connected to sliding tool holder Another CAM is used for moving the Carrere which has two sensor .first sensors is used for sensing the overload and second sensor will sense the position measure.

C. Camera Unit:

Camera unit consist of one servo motor with three hydraulic cylinders in which the servo motor moving the chain 2.7 n-m Rexroth. Here hydraulic cylinders are operated by hydraulic pumps which are controlled by using proportionate valve.

1) Proportionate valve:

Proportionate valve is a viable flow control device used to actuate the piston and cylinder assembly for controlling the position the valve consist of a actuator and a spool which governed the flow of r\the oil to ensure the position of the piston at a required speed with respect to time the motor moves the spool based on the voltage given to the motor.

2) Servo Motor:

Servo motor is used to position the components which need to be inspected and the drive controls and actuates the hydraulic system.

D. Greasing Machine:

Greasing machine is used for lubricating the assembled chain which is heated by a Thermo electric coil and the temperature is maintained constantly with a fluctuation of ±5ºc.with the help of 1.4.1 Electric heater. Heating is required for domestic purposes as well as industrial purposes.

In this mode of transfer of heat, one molecule of the substance gets heated and transfers the heat to the adjacent. Rate of ransfer of along a substance depends upon temperature gradient.

E. Riveting:

The riveting machine consist of one servo motor, pneumatic cylinders with lead switch and a main motor for pressing.

1) Lead switches:

In addition to their use in limit readers, limit switches are often used for electrical circuit control, particularly in the intimations. magnetic read switches are commonly used in mechanical systems as sensors Hall effect devices have very limited frequency of outputs and generally do not control a final device such as a lamp, solenoid, or motor.Read sensors can withstand higher voltage than typical Hall devices

F. Preloading:

Through a mechanical structure, the force being deforms a strain gauge. The strain gauge account the deformation as a change in voltage, which is a measure of the strain and the actual forces. A load cell usually consists of four strain gauges in a bridge circuit. Load cells of one strain gauge or two strain gauges are also available. The voltage output is typically in the order of a few mill volts and requires amplification by a scaler before it can be used. The output of the transducer can be scaled to find the force acting on to the transducer.

G. Length Measuring:

LVDTs are robust, absolute linear position/displacement transducers;. As AC operated LVDTs do not contain any electronics, they can be designed to operate at cryogenic temperatures or up to 1200 °F (650 °C), in extream environments, under high vibration and shock levels. LVDTs have been widely used in power turbines, hydraulics, automation, aircraft, satellites, nuclear reactors, and many others.

H. Pitch Cutting:

This machine is used to cut the required numbers of link in a chain and the servo drive acts as master controller for the line. All machines are interconnected with each other through SERCOSE communication a proprietary communication of REXROTH .The data to the system is fed in through a Human machine interface Production line monitoring using equipments like programmable logic controllers, servo controllers & sensor as inputs to the data monitoring system. A data from the production line .The collected data will be processed at the data concentrator and stored in a server, whenever required the data will be recalled from the server based on the time frame selected in the display. When a programmed condition is over looped the over looped machine gets shut down and generates alerts to the administrator highlighting the system violation. On each shift end the production data with consolidated error report and system violation has to be sending to the concern coordinator.

IV. DETAILS ON CHAIN MANUFACTURING UNIT CONTROL AND MONITOR

A number of diverse methodologies outlining techniques for human–computer interaction design have emerged since the rise of the field in the 1980s. Most design methodologies stem from a model for how users, designers, and technical systems interact. Early methodologies, for example, treated users' cognitive processes as predictable and quantifiable and encouraged design practitioners to look to cognitive science results in areas such as memory and attention when designing user interfaces.

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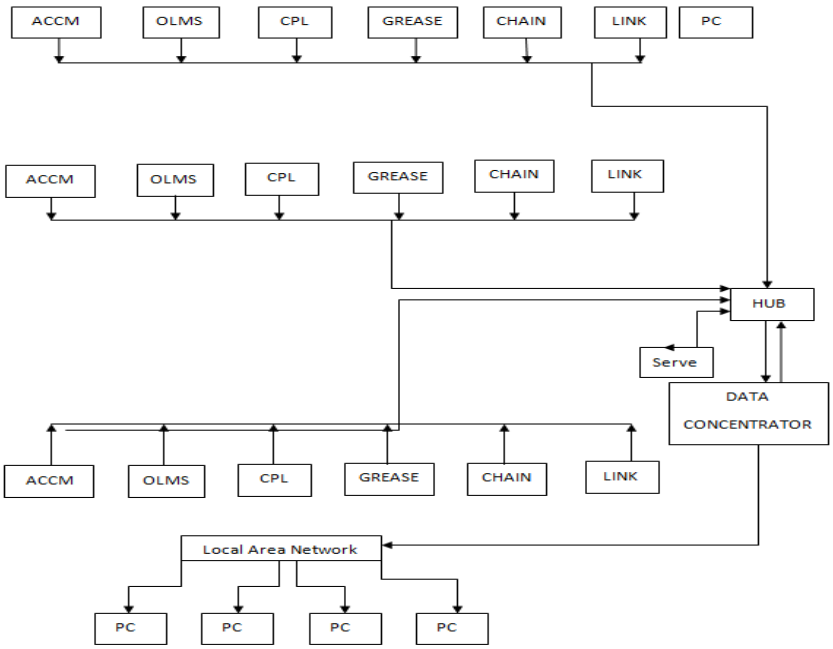

Figure 1: Diagram for chain manufacturing unit control and monitor

Modern models tend to focus on a constant feedback and conversation between users, designers, and engineers and push for technical systems to be wrapped around the types of experiences users want to have, rather than wrapping user experience around a completed system.

V. THE ACCM IS DESIGNED FOR THE AUTOMATIC CUTTING AND/OR GRINDING OF COMPONENTS COMPOSED OF OPTICAL GLASS, FERRITE, QUARTZ, BARIUM TITANATE, CERAMIC MATERIALS AS WELL AS ALUMINUM OXIDES, SILICON CARBIDES AND VARIOUS OTHER COMPOSITIONS. CONCEPT OF CHAIN ASSEMBLY

In the chain manufacturing unit all machines are interconnected with each other and the drive at the ACCM is used as the Master for controlling the production line and in that system HMI is used for interacting with the machine.

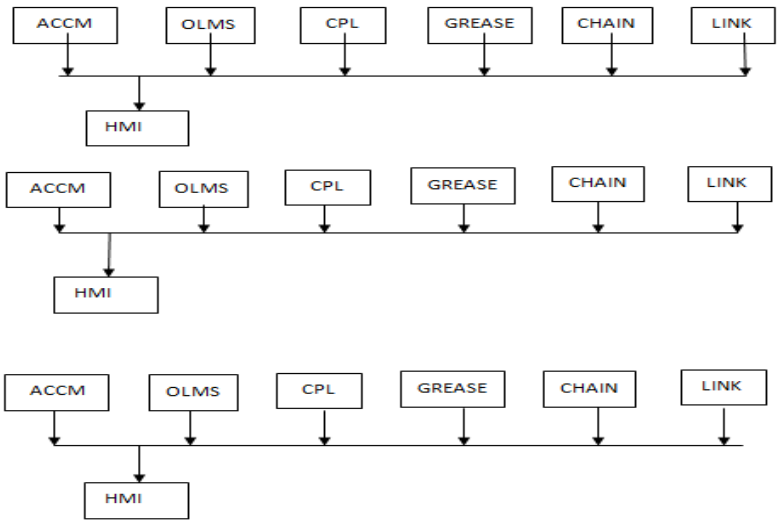

Figure 2: Diagram of the whole chain manufacturing unit

All machine data are collected for processing by the data concentrator from network through Mod Bus protocol then the data is processed. The processed data is stored in the server for further retrieval .when the remote PC accessed the data the live date the Data Concentrator transmits the live data and Monitor using PLC.

When evaluating a current user interface or designing a new user interface, it is important to keep in minds the following experimental design principles:

A. Early focus on user and task:

Establish how many users are needed to perform the task(s) and determine who the appropriate users should be; someone who has never used the interface, and will not use the interface in the future, is most likely not a valid user. In addition, define the task the users will be performing and how often the task(s) need to be performed.

B. Empirical measurement:

Test the interface early on with real users who come in contact with the interface on a daily basis. Keep in mind that results may vary with the performance level of the user and may not be an accurate depiction of the typical human-computer interaction. Establish quantitative usability specifics such as: the number of users performing the task, the time to complete the task, and the number of errors made during the task.

C. Iterative design:

After determining the users, tasks, and empirical measurements to include, perform the following iterative design steps:

1. Design the user interface
2. Test
3. Analyze results
4. Repeat

Repeat the iterative design process until a sensible, user-friendly interface is created.

VI. SIMULATION RESULTS AND FUTURE ENHANCEMENT

A. Automatic Component Cutting Machine:

The ACCM is designed for the automatic cutting and/or Grinding of components composed of Optical Glass, Ferrite, Quartz, Barium Titanate, Ceramic Materials as well as Aluminum Oxides, Silicon Carbides and various other Compositions.

Figure 3: Diagram of ACCM

The ACCM is specifically designed to automatically cut and/or grind above materials in high volume while maintaining maximum precision levels. For operator safety the ACCM is equipped with a particle suction unit to maintain a healthy environment both inside the machine as well as in it's surroundings.

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B. On Line Length Measurement Scale:

The LVDT or Linear Variable Differential Transformer is a well established transducer design which has been used throughout many decades for the accurate measurement of displacement and within closed loops for the control of positioning. In its simplest form, the design consists of a cylindrical array of a primary and secondary windings with a separate cylindrical core which passes through the centre. The primary windings (P) are energized with a constant amplitude A.C. supply at a frequency of 1 to 10 kHz. This produces an alternating magnetic field in the centre of the transducer which induces a signal into the secondary windings depending on the position of the core.

Movement of the core within this area causes the secondary signal to change. As the two secondary windings are positioned and connected in a set arrangement (push-pull mode), when the core is positioned at the centre, a zero signal is derived. Movement of the core from this point in either direction causes the signal to increase. As the windings are wound in a particular precise manner, the signal output has a linear relationship with the actual mechanical movement of the core.

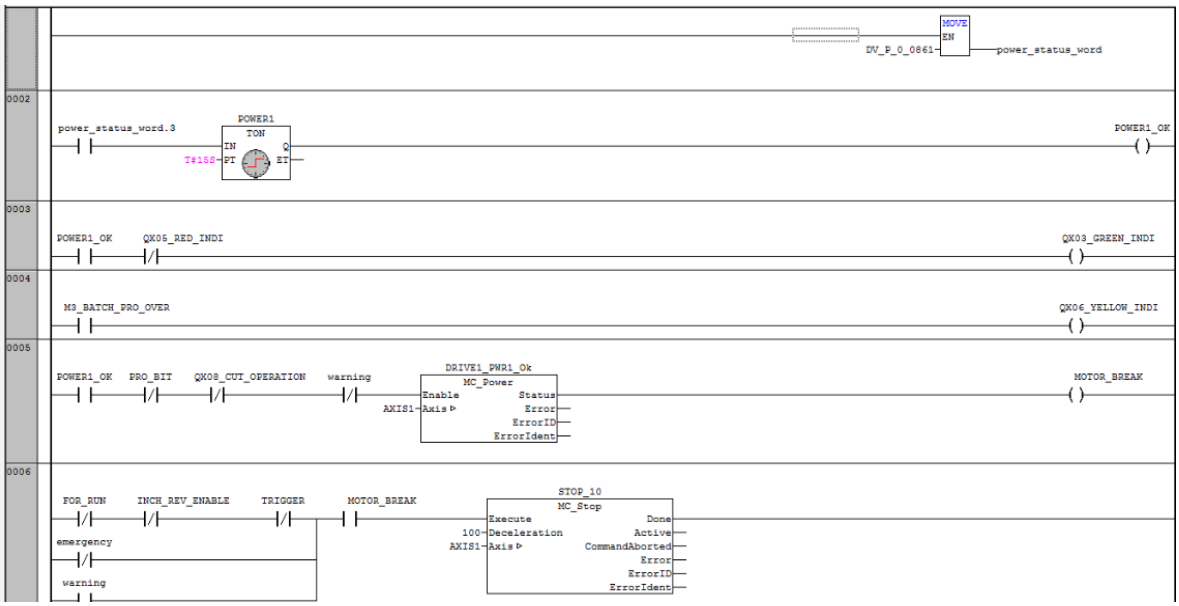
The secondary output signal is then processed by a phase-sensitive demodulator which is switched at the same frequency as the primary energizing supply. This results in a final output which, after rectification and filtering, gives D.C. or 4-20mA output proportional to the core movement and also indicates its direction, positive or negative from the central zero point .

The distinct advantage of using an LVDT displacement transducer is that the moving core does not make contact with other electrical components of the assembly, as with resistive types, as so offers high reliability and long life. Further, the core can be so aligned that an air gap exists around it, ideal for applications where minimum mechanical friction is required.

C. ***Continuous Preloading Machine:***

After assembly, applies an initial load to the chains, called preload. This preloading approximates the recommended maximum loading in service. Preloading can be done either statically or dynamically. Preloading is done as a final alignment of the various chain components such as pins, bushings and link plates.

Preload Applied Preloading helps to greatly eliminate the initial elongation often found in lower quality chains. Elimination of this initial elongation can increase usable service life. The Preload chart illustrates the benefits of preloading by gaining additional wear life. The chain that has no or little preload applied will experience a significant amount of elongation during initial start-up of the drive before leveling off. The chain will then elongate at a steady rate until the case hardness on the wear components is gone and the chain experiences rapid elongation. The chain that has been properly preloaded has very little elongation during initial start-up, which ultimately results in additional wear life.



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VII. CONCLUSION

In this project the chain manufacturing hub was runned, controlled and monitored with the help of SCADA and manual work. This will leads to the manual correction and fault detection and overcoming of fault will be the tedious process to overcome the problem. We are using PLC which are connected to pc this will controls and monitors the Whole process of chain production ,which all improves the efficiency of production, which will improves the efficiency of production and fault can be easily recognized and cleared automatically. Here we are not using SCADA software. where PLC acts as monitoring unit. So the cost of implementation is also low and process is also efficient.

REFERENCES

[1] Abersfelder, Sandra; Heyder, Andreas; Franke, Joerg "Optimization of a servo motor manufacturing value stream by use of "Industrie 4.0" Electric Drives Production Conference (EDPC), 2015 5th International Year: 2015 Pages: 1 – 5.

[2] Baharin, M.K.; Saad, N.; Ibrahim, T.; Munir, H.A. "Modeling and simulation of PLC-based PWM-Driven Variable Speed Drive via state-space approach" National Postgraduate Conference (NPC), 2011 Year: 2011, Pages: 1 – 6.