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ACCA6020
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A Safety Interlock System Designed for the process of moving Molten Iron within Blast Furnace 4 Tata Steel Port Talbot

1. INTRODUCTION -

Moving molten iron from the furnaces to the BOS plant required the iron to be directed into an iron tilter. The tilter poured the iron to the right or left into trains beneath the furnaces. The system has nothing in place to stop anyone from being beneath in the pouring zone or to indicate a train is even in place. Designing a safety interlock system (SIS) will ensure set measures are in place. Traffic lights can be used to indicate the driver when they can leave and enter the pouring area and when the operator can operate the tilter. The safety system is required to meet Category 3 and Performance Level D (PLd) of machinery safety.

2. AIMS & OBJECTIVES -

Aims

- Design a Safety interlock system that meets performance level D and Category 3 of machinery safety
- Create a Safer working environment for employees in the area
- Provide the client with all documentation to support the installation work and requirements

Objectives

- Research and compare components that meet PLd
- Ensure safety system meets category 3
- Design a full design package using AutoCAD including Cable block diagrams, loop drawings and cable schedules
- Writing & Carrying out a full commission of the system before final handover

3. DESIGN –

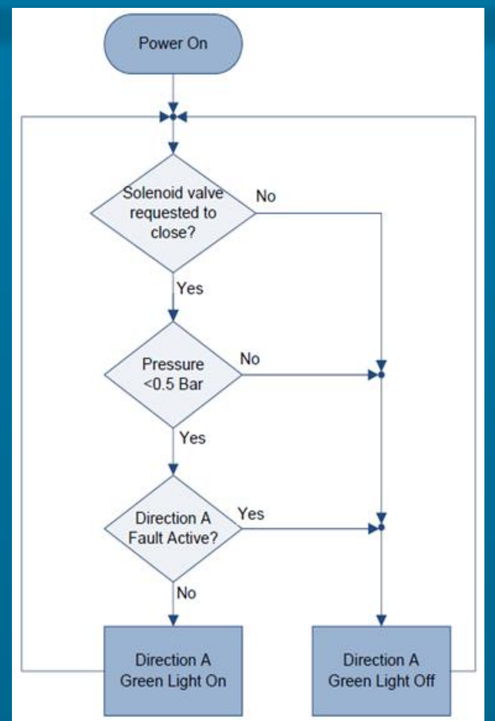
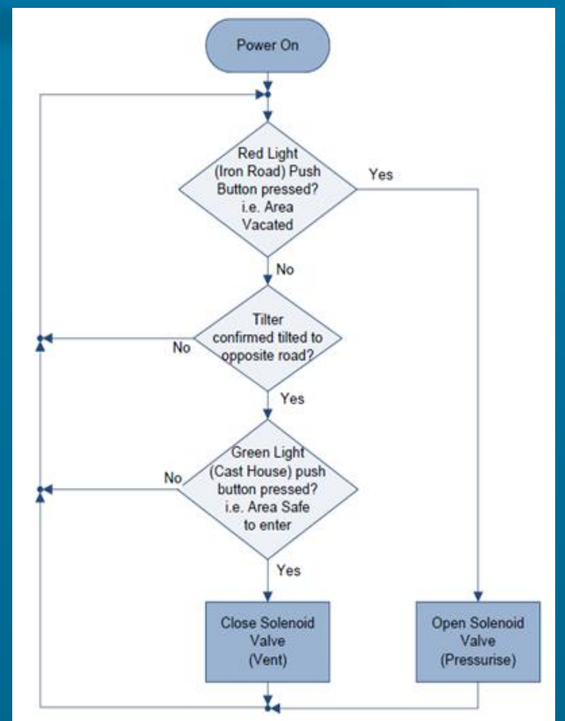
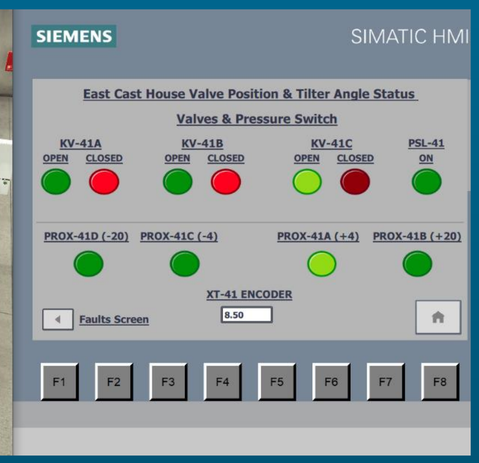
Components –

2x Pressure Switches
8x Proximity Switches
2x Inclinometer's
8x Pushbutton's
8x Traffic Lights
6x Limit Switches
6x Solenoids

PLC Program designed within Siemens TIA to create a simulation of the SIS on Factory I/O.

When air is present the tilter can be operated and the red light is on. When a green light is requested by the operator the safety valve enclosure will isolate the air to the tilter. The basic controls for the Safety valve enclosure and Green light request are shown in the flow charts to the right.

HMI was designed to show the operator statuses of the components within the system And to flag any faults if they were to arise.

4. EVALUATION –

- System was fully commissioned in a controlled environment before being commissioned on-site
- Design worked as it should and ensured the green light couldn't be displayed until the correct statuses of equipment in the SIS
- Client requirements were met and the system met the machinery safety requirements