Control Systems - Agriculture

PROJECT PROFILE

OBJECTIVE

Save time and labor with automated processes.

BACKGROUND

A Midwest Grain Cooperative added a new higher capacity grain elevator. The new elevator will move grain into bins at a much faster rate.

Previously, the controls were manual, and the operator had to stay and monitor amperage with an analog gauge. The operator would start the pit conveyor, then stand in the room, monitor the load on the elevator, and adjust the opening of the gate as required to modulate the amount of grain moving into the pit.

In an effort to control the overloading of the elevator, the grain operator wanted to automate the actuator controlling the gate to the pit conveyor. The operator also wanted to monitor the amperage pull when switching from wet and dry grain without physically monitoring the gauges.

PROJECT DETAILS

Springfield Electric's application engineer met with the electrical contractor on the project and gathered some initial information. The engineer needed to understand more about the equipment used in the grain processes. The motor, for example, would need to be considered to ensure operating within its limits for the project. The engineer also gathered information about the gate-position feedback type and evaluated the restrictions on the small I/O count of the HMISCU units to cover the requirements.

Control Systems

SOLUTION

The automation team then provided a solution that would monitor the amperage of the new elevator over Modbus TCP. They used PLC outputs to drive interposing relays to control the opening of the gate feeding the pit conveyor with grain. In addition, they installed a DC-to-DC Converter so the potentiometer could provide position feedback from the actuator.

RESULT

Once the Control System was installed, it was tested with the conveyor. The operator timed the loads in the automated process and the new controls made load times much shorter. As a result, this operator is now able to unload grain trucks faster within the new elevator. In addition, the new control system no longer requires a person to stand at the elevator to monitor the gate and make adjustments as grain loads to the bin.
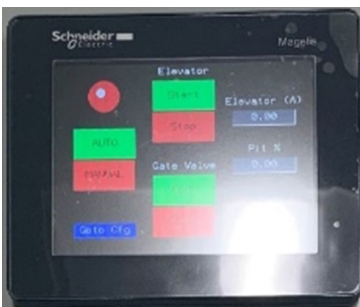
Human Machine Interface

Image 1: (outside surface of front door of the electrical enclosure): The front of the HMISCU (The Human Machine Interface or HMI portion) with system touch controls and values of operating parameters displayed
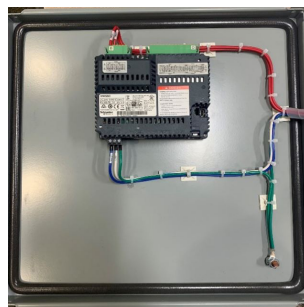
Image 2:   (inside surface of front door of electrical enclosure): The back of the HMISCU (The Programmable Logic Controller or PLC portion) where the inputs and outputs (I/O), and communication cables are wired.

Image 3: (inside electrical enclosure): Control components (circuit breaker, power supply, control relays) with the addition of the DC to DC converter for the gate position feedback device (potentiometer).
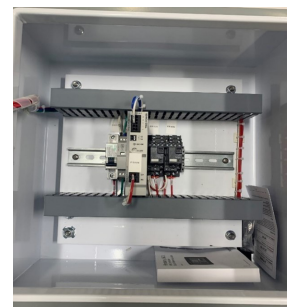
Image 4: (inside electrical enclosure): Control components prior to addition of the DC to DC converter.