Paper Folding machine

Background

A machine used for folding papers used for CR and other books. This is controlled by electronic devices applicable to older technologies. The required papers are input into the machine by the employees. It takes some time for that process to take place. The purpose of this project was to create a new control system using a PLC unit and input the paper palette into the machine one at a time.

Problems of Existing Process

- Significant time consuming due to input of papers being done in parts by the owners.
- Frequent breakdown of old electronic devices.
- Inability to properly monitor production volume.

Goals of the project

- Develop a methodology for inputting the paper palette at once.
- Modifying the mechanical operation of the machine accordingly.
- Creating a SCADA that can monitor all situations.

Project description

A separate unit was set up so that the paper palette could be input at once. It was designed to be able to connect one part to the old machine instead. Some of its functional parts have been redesigned to adapt to the changes, show in figure 53. The paper counting sensor was mounted in a new location, show in figure 57. Modified the pile lifting mechanism used earlier, show in figure 55. Previously, one motor was used to change the mode of operation and a separate motor was connected to it. Later the old wiring in the machine was removed and a new control system was installed using the new devices and a PLC device was used for that. A SCADA system was added to the machine using HMI for command and monitoring, show in figure 56. It provided an opportunity to properly analyze the amount of output produced by the machine.

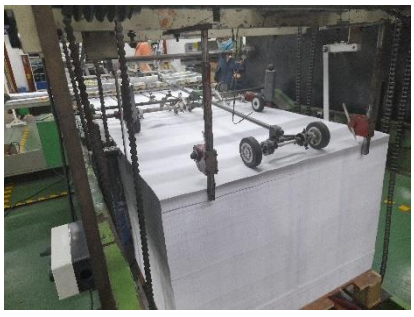


Figure 2:old paper loading unit

Figure 1:new paper loading unit

Figure 4:new arm position

Figure 3:new pallet lifting unit

Figure 6:SCADA system

Figure 5:paper counting sensor

Main Component in this Project

- T series Haiwell PLC
- Haiwell HMI
- One inductive sensor
- Tow photoelectric sensor
- Three VFD
- Three pace motor contactor
- Two pole protector
- Solenoid valve
- 24V relay
- Five induction motor
- Speed controller
- Switches
- Indicator light

CAD design

CAD design was done on “Solid work software”. Show in figure 59.

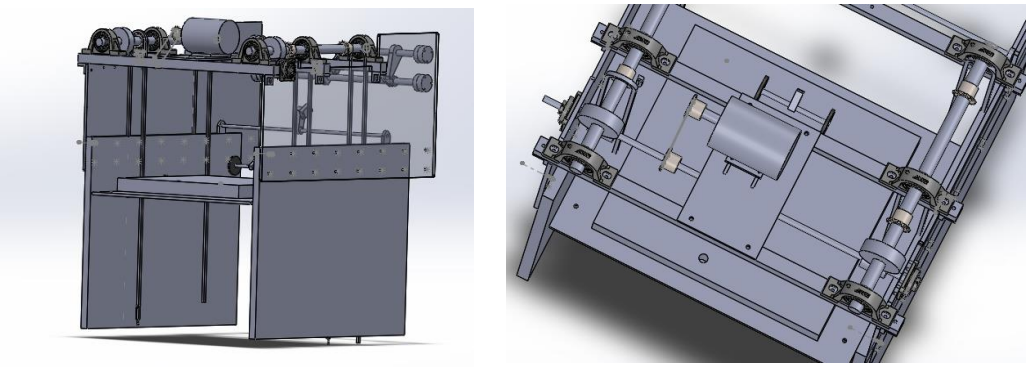


Figure 7:CAD design

Wiring Process

All old devices have been removed, show in figure 60. The control panel and other components were rebuilt using new components.

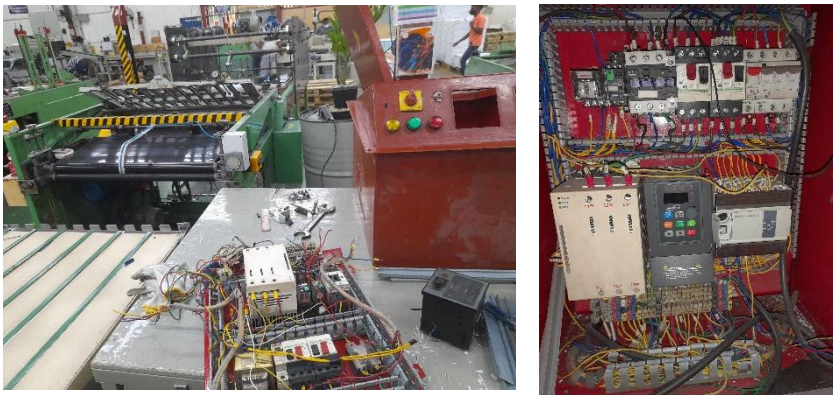
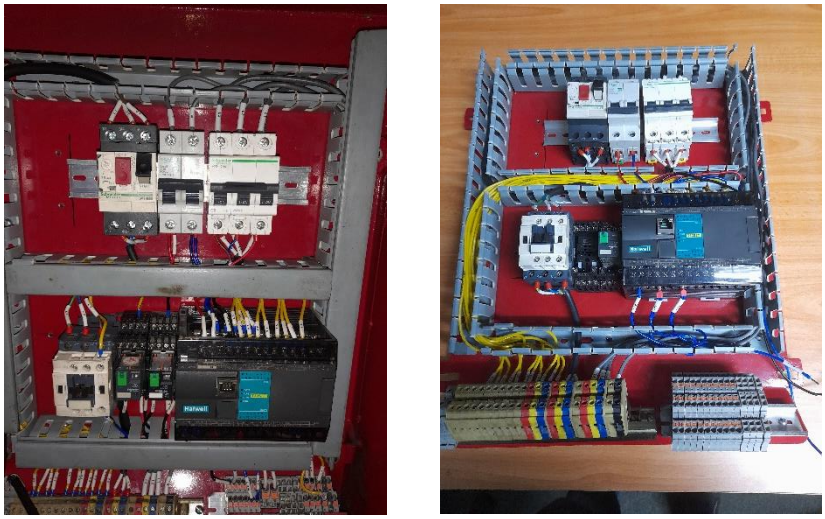
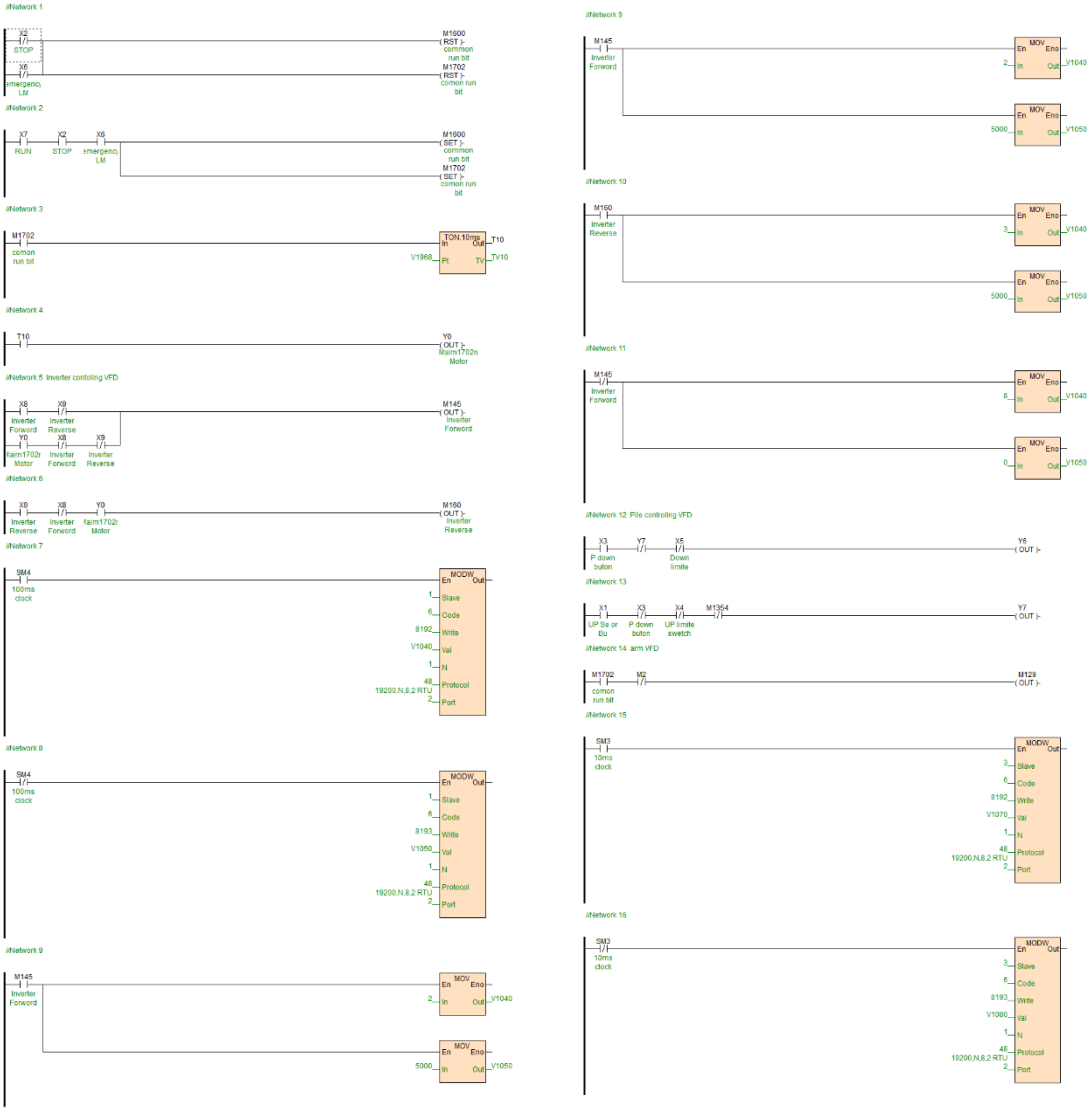


Figure 8:remove old unit



PLC program

PLC program was don. PLC program was written on Haiwell PLC software using ladder logic.



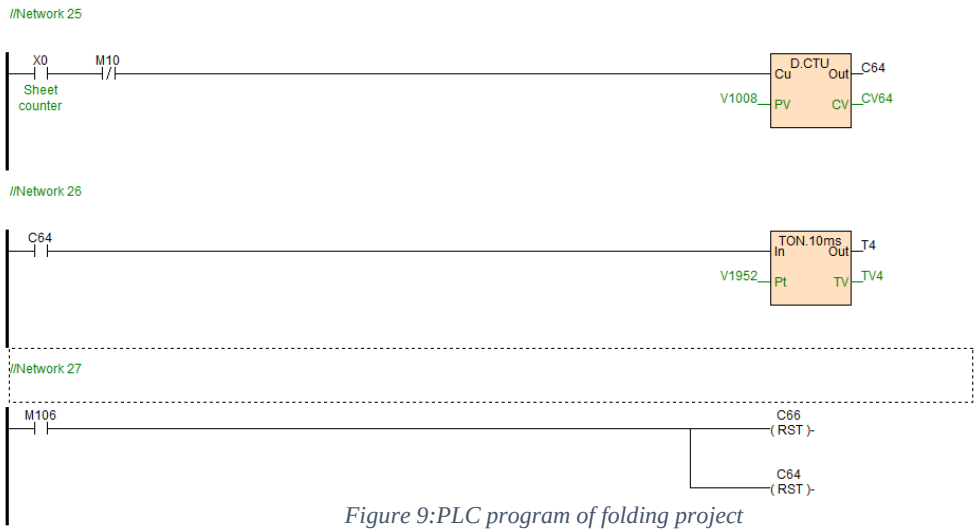


Figure 9:PLC program of folding project

HMI program and SCADA

The SCACA was set up using an HMI to control and monitor the machine, show in figure 63.

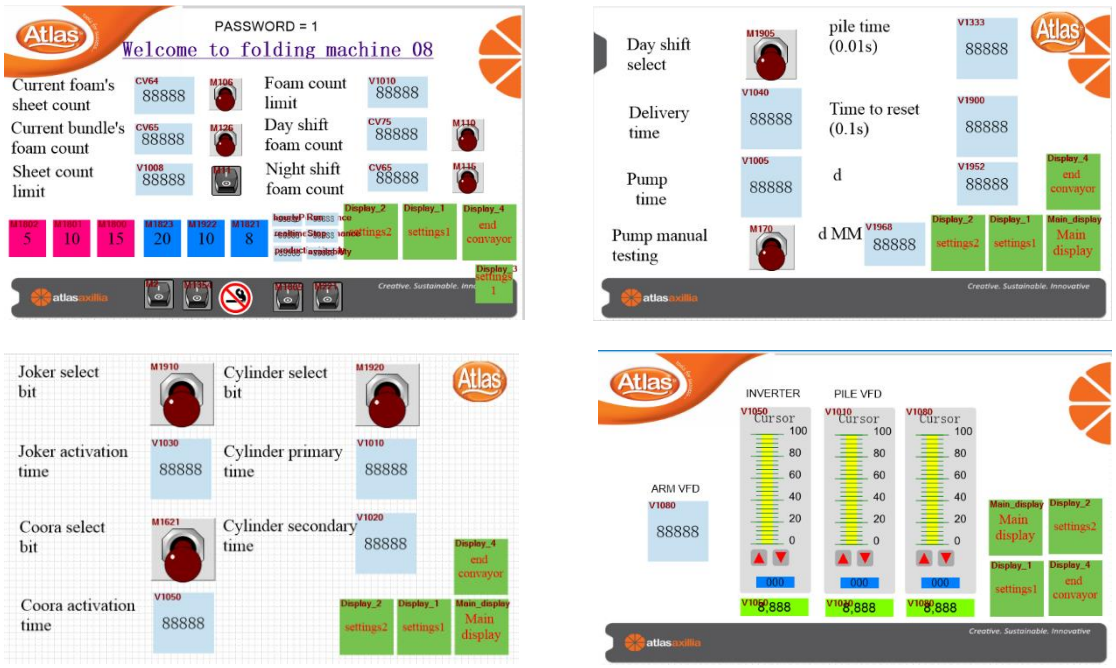


Figure 10:SCADA system for folding machine

Final output

After all the processes, the project was completed by inputting the paper pallet at once, making it suitable for production. It is currently in the process of manufacturing. The company hopes to add this unit to other similar older machines as well.

Figure 11:before don project

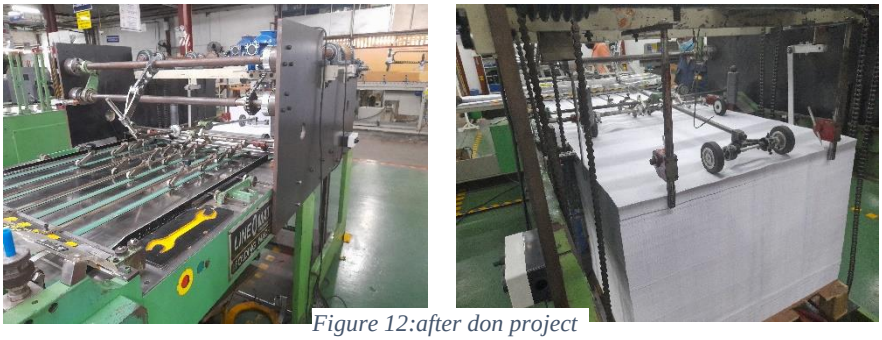


Figure 12:after don project