



CASE STUDY

INDUSTRIAL SHIELDS

AUTOMATIZATION OF A CONCRETE PLANT

A concrete plant is an installation used to manufacture concrete from raw material which is composed by aggregate, cement and water. All these components are previously stored in the concrete plant and then they are dosed in the right proportions to be mixed.

Although there are several kinds of concrete stations classified according to the type of materials used there (dry and wet concrete), our system let us implement all of them.

SUMMARY

Replying to our customers' requests, we have been developing a solution for the construction industry.

Using industrial technics, we will be able to create a model of concrete plant that could be easily replicated and adjusted to the different kinds of concrete (dry and wet).

The aim of this project is:

- to get the most out of it,
- to save cycle time,
- not to have to act manually in the process,
- to have a monitoring and
- to send all the information to the cloud so that we can make a forecast of the raw materials that we need.



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GOAL

We need a machine capable to produce constantly with accuracy and complying with safety regulations. To reach this goal, all the components have to work in harmony controled by a PLC and a PC Panel .

CONCLUSION (HARDWARE)

Industrial Shields equipment has to control and monitor all the I/O such as hoppers or weighing systems, aggregate lifting, transport system and a kneader.

In the first place, through the TouchBerry PI (PC Panel) we can select the type of concrete, the quantity and time of mixing. We can also store the historic of production, the times of mixing, the quantities of each type of elements and send them to our PLC. All this information can be sent by LoRa (wireless technology using radio-frequency modulation) to the server. In this way we can make a forecast of production, billing and also machine failures.

Secondly, we have all the hoppers where the raw materials are stored. Inside of them, we can put, for example, three capacitive sensors to know the level of material in. We will connect these sensors to our PLC and they will return us digital values corresponding to:

- 1st sensor - if this one return us "1", it means that the level is minimum.
- 2nd sensor - if both return "1", that means that the level is medium.
- 3rd sensor - if all three sensors return "1", it means that it is full.

The next step is to take out those raw materials to the weighing system. To carry out this action, we will use the lifting and transport system composed of conveyor belts; this is the more reliable and less maintenance option that we can choose. Regarding the programming part, it would be a good idea to use one of our Mduino PLCs with relays so we can control the digital output to move the conveyor belts when needed.



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As we said, the next step is to weigh the materials and then be able can mix them. For this purpose we are going to use a programmable weighing machine. According to the type of concrete, we will weigh the exact quantity of material that we need. The PLC will receive an analogic input and when it reaches the necessary value, the system will not dump more material.

After weighing each material, the gate is opened and drops them into the mixing station. The mixing time depends on the type of concrete. For the PLC, the engine inside the mixer is just another relay output controlled by a timer.

To weigh the water for the mix, we can use a water meter to measure the volume of the water, instead of a weighing machine. Once we have the homogenized mixture, the concrete will be dropped to the truck and ready to be transported.

In the same area, we can duplicate this system and produce constantly and different types of concrete at the same time.

