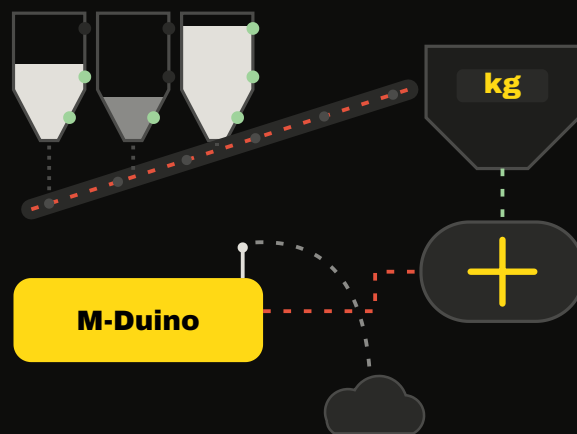


CONCRETE PLANT · M-DUINO WITH RELAYS

Weigh each material. Mix to the recipe.

Hopper levels, a scale input, relays for belts and mixer, recipes on a Panel PC.

[Read the interactive case study online ›](#)



Schematic illustration

3

capacitive level sensors
per hopper, in the example

2

analog inputs: the scale
and the water meter

Relays

for the conveyor belts and
the mixer motor

LoRa

production data to the
server

THE CHALLENGE

The aim: the right dose in every batch, with no manual action.

A concrete plant makes concrete from aggregate, cement and water. The plant stores each material, doses it in the right proportions and mixes it. The goal of this model: a machine that produces constantly, with accuracy, and complies with safety regulations. All the components work together, controlled by a PLC and a Panel PC.

01

Any type of concrete

There are dry and wet concrete plants. The model must be easy to replicate and to adjust to each kind of concrete.

02

Shorter cycle time

Get the most out of the plant and save cycle time in each batch.

03

No manual action

The aim is not to act by hand in the process. The operator selects the concrete, and the PLC runs the dosing and the mixing.

04

Data for a forecast

Monitor the plant and send all the information to the cloud, to forecast the raw materials that the plant needs.



Production, billing and failures

The production data goes to a server by LoRa. With it, the plant can make a forecast of production, billing and also machine failures.

HOW IT WORKS

Three loops: store, dose, mix.

Loop 1 · Watch the hoppers

Three sensors tell the PLC how full a hopper is.

The raw materials wait in hoppers. The case gives an example: three capacitive sensors at three heights in each hopper, each one on a digital input of the PLC. Sensor 1 at "1" means the level is minimum. Sensors 1 and 2 at "1" mean medium. All three at "1" mean full.

Loop 2 · Weigh and dose

The scale stops the feed at the recipe weight.

Conveyor belts lift and carry each material to the weighing system. The PLC moves them with relay outputs. A programmable weighing machine sends the weight to an analog input. When the weight reaches the value of the recipe, the system stops dumping material. Then the gate opens and drops the material into the mixer. A water meter measures the water by volume.

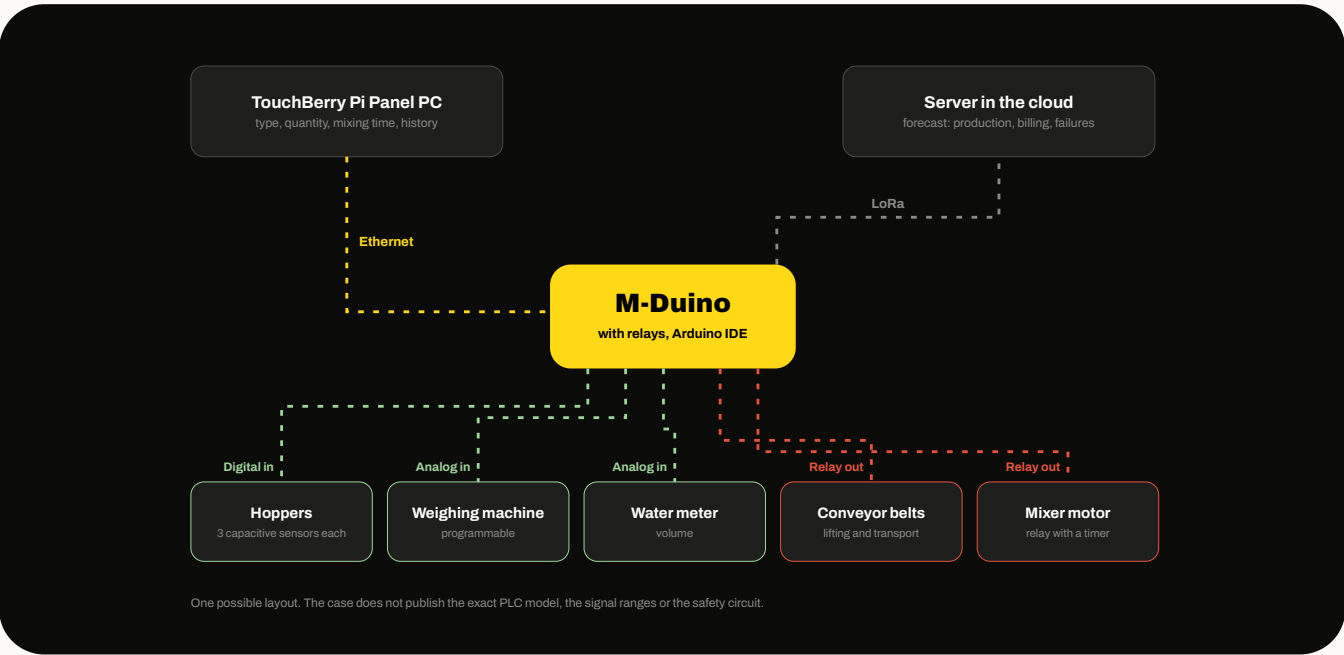
Loop 3 · Mix and record

A timer runs the mixer. The record goes out by LoRa.

For the PLC, the mixer motor is one more relay output, controlled by a timer. The mixing time depends on the type of concrete. When the mix is homogeneous, the concrete drops into the truck. On the TouchBerry Pi Panel PC, the operator selects the type of concrete, the quantity and the mixing time. The Panel PC stores the production history, the mixing times and the quantities of each material, and sends them to the PLC. The data goes to the server by LoRa.

How does a PLC run a concrete batching plant?

An M-Duino with relays reads the capacitive level sensors of the hoppers on digital inputs, and the weighing machine and the water meter on analog inputs. Its relay outputs move the conveyor belts and the mixer motor. A TouchBerry Pi Panel PC talks to the PLC over Ethernet. The production data goes to a server in the cloud by LoRa.



Signals and data

Signal	Between	Type	Purpose
Hopper level	Capacitive sensors → M-Duino	Digital in	Three sensors per hopper in the example: minimum, medium, full
Weight	Programmable weighing machine → M-Duino	Analog in	The feed stops when the weight reaches the recipe value. Range not published
Water volume	Water meter → M-Duino	Analog in	Measures the water by volume, instead of on a scale
Conveyor belts	M-Duino → belts	Relay out	Lift and carry the raw materials to the weighing system
Weighing gate	Weighing system → mixer	Output	Opens after each material is weighed. The case does not say how it is driven
Mixer motor	M-Duino → mixer	Relay out	Runs for the mixing time of the type of concrete, with a timer
Recipe and history	TouchBerry Pi ↔ M-Duino	Ethernet	Type of concrete, quantity and mixing time. History, times and quantities
Production data	M-Duino → server	LoRa	Data for the forecast of raw materials, production, billing and machine failures

HARDWARE USED

M-Duino with relays to dose. Panel PC to choose.



M-Duino Ethernet PLC Arduino 57R

Role	Hopper levels, weighing, water, belts, mixer timer
Inputs	18: 12 analog or digital (0-10 V), 6 digital optoisolated
Outputs	31: 23 relays (230 Vac 4 A, resistive), 8 analog, digital or PWM (0-10 V)
Comms	Ethernet (RJ45), RS-485, RS-232, TTL, I2C, SPI. LoRa: with the LoRa version of the M-Duino (see the LoRa family datasheet)
Power supply	12 to 24 Vdc
Mounting	DIN rail TS35, IP20

The case says "one of our M-Duino PLCs with relays" and does not fix the model. The old page shows an M-Duino 19R. With the example of this page (three hoppers with three sensors each, the scale and the water meter), the PLC needs 11 inputs, and the 19R+ has 6. This page shows the 57R+: 18 inputs and 23 relays. Choose by the number of hoppers and loads. For the radio link, see the [M-Duino LoRa family datasheet](#).

[See the M-Duino 57R+ >](#)



TouchBerry Pi Panel PC 10.1" FLEX

Role	Recipe selection, production history
Screen	10.1"
Computer	Raspberry Pi 4
Link to the PLC	Ethernet

The case names the TouchBerry Pi, and the old page links the 10.1" model. The image and the link show the TouchBerry Pi Panel PC 10.1" FLEX. The family also has 7" and 18.5" models.

[See the TouchBerry Pi 10.1" >](#)

Replicate and adjust

The case presents the plant as a model: easy to replicate and to adjust to dry and wet concrete. In the same area, you can duplicate the system to make different types of concrete at the same time.

Recipes on a screen

The TouchBerry Pi Panel PC holds the type of concrete, the quantity and the mixing time, and keeps the production history.

The weight ends the dose

Each material stops on the reading of the weighing machine, at the value of the recipe. The water stops on the volume of the water meter.

Data for the forecast

The production data goes to a server by LoRa. The plant can forecast raw materials, production, billing and machine failures.

Relays for the loads

The relay outputs of the M-Duino switch the belts and the mixer. Each relay switches up to 4 A at 230 Vac with a resistive load. For motors, the relay drives the coil of a contactor; add an RC snubber.

Code you can change

The M-Duino is programmed with the Arduino IDE. The level logic, the recipes and the timers are code that you can read and change.

SIMILAR PLANT?

Tell us your materials and your recipes. An engineer will answer.

Tell us how many hoppers and materials you dose, how you weigh them, how you measure the water, and where the data must go. We will tell you which controller fits and how to wire it.

READ IT ONLINE

industrialshields.com/concrete-batching-plant-automation-case-study

EMAIL

info@industrialshields.com

PHONE

[\(+34\) 938 760 191](tel:+34938760191)