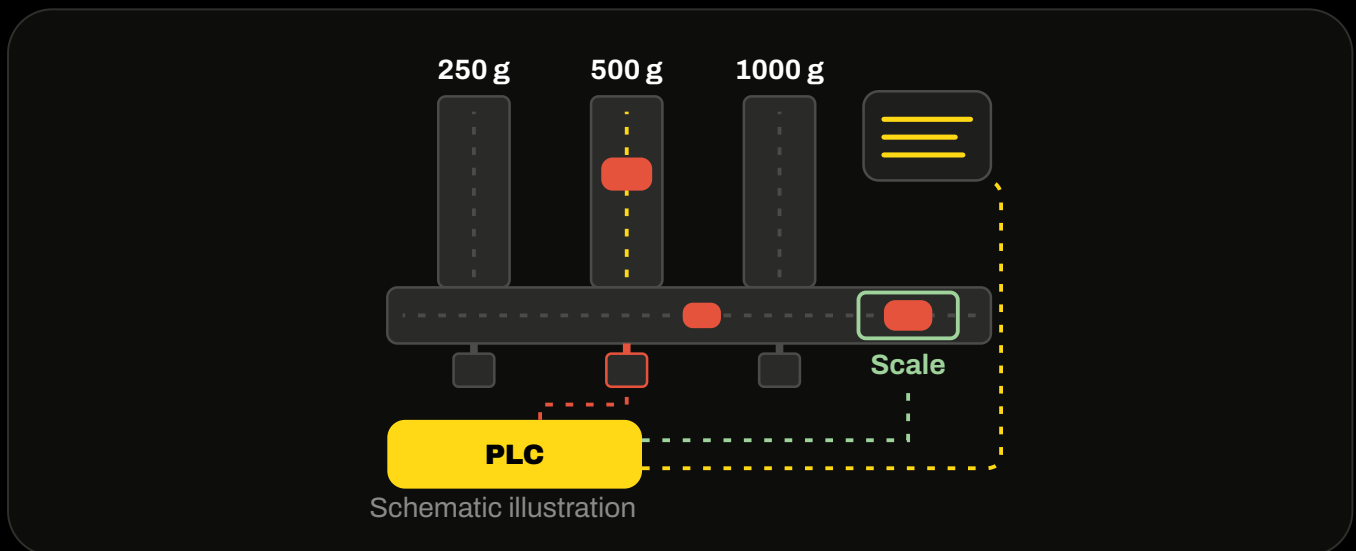


MEAT SORTING · M-DUINO 19R

Weigh each piece. Push it to its belt.

An M-Duino PLC sorts meat into three weights and runs the room climate.

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


3

weight grades: 250 g, 500 g and 1000 g

4

conveyor belts: one main belt and one for each grade

3

pneumatic pistons, each on a solenoid valve

2

room sensors: temperature and humidity

THE CHALLENGE

Sort every piece by weight, with no hands on the meat.

Pieces of different sizes arrive together on one belt. Each piece must go to the belt of its grade. People should not handle the meat, the room must stay in good conditions, and production wants to know how many pieces of each grade are ready.

01

Three grades on one belt

All the pieces come together on the main belt. A digital scale weighs each one, and the weight sets its grade: 250 g, 500 g or 1000 g.

02

The push at the right moment

A pneumatic piston on a solenoid valve pushes the piece to its belt. An infrared sensor tells the PLC when the piece is in front of the piston.

03

Belts that run only when needed

The main belt runs all the time, for a constant flow of meat. Each grade belt starts only when its piston fires, so it does not waste energy.

04

The right climate in the room

A temperature sensor and a humidity sensor control the air conditioning and a dehumidifier, so the meat is handled in good conditions.



A real-time inventory

The PLC keeps one counter for each grade and sends the counts to a server over Ethernet. Production sees the stock of each grade while the line runs.

HOW IT WORKS

Three stages: sort, keep the room, count.

Stage 1 · Weigh and sort

The scale sets the grade. The infrared sensor sets the moment.

The pieces enter on the main belt and pass over a digital scale, which is an analog input of the PLC. The weight sets the grade. When the piece passes in front of the piston of its grade, an infrared sensor tells the PLC, the PLC opens the solenoid valve and the piston pushes the piece onto the grade belt. That belt starts only then.

- Digital scale on an analog input
- One infrared sensor and one solenoid valve for each piston

Stage 2 · Keep the room

Two sensors, two machines: the air conditioning and the dehumidifier.

A temperature sensor and a humidity sensor are analog inputs of the PLC. From their values, the PLC turns the air conditioning and the dehumidifier on and off with two relay outputs. A typical way to do it: a set point with a hysteresis for each one, so the machines do not start and stop all the time.

- Temperature and humidity on analog inputs
- Air conditioning and dehumidifier on relay outputs

Stage 3 · Count

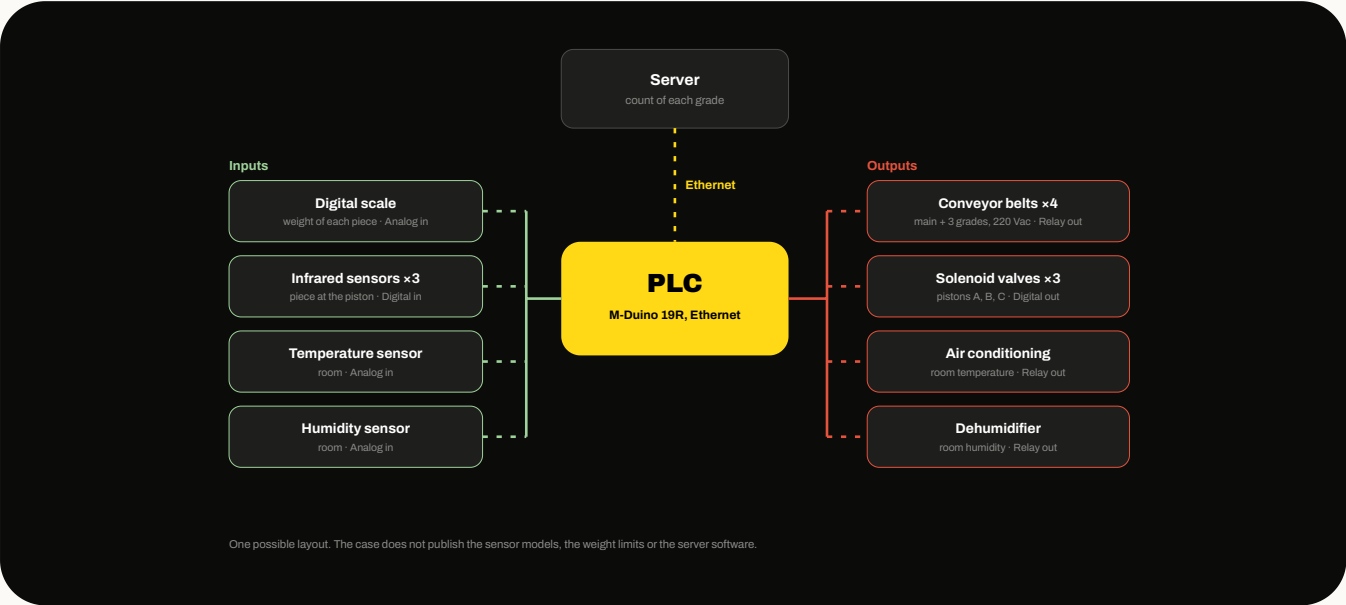
Three counters in the PLC. A real-time inventory on the server.

The PLC counts the pieces of each grade in three registers and sends the numbers to a server over Ethernet, all the time. The server has a real-time inventory of the production.

- One counter for each grade
- Ethernet to the server

How does a PLC sort meat pieces by weight?

An Ethernet PLC based on Arduino reads a digital scale, a temperature sensor and a humidity sensor on analog inputs, and three infrared sensors on digital inputs. Relay outputs switch the four conveyor belts (220 Vac), the air conditioning and the dehumidifier. Three digital outputs drive the solenoid valves of the three pistons. Over Ethernet, the PLC sends the count of each grade to a server.



Signals and data

Signal	Between	Type	Purpose
Weight of the piece	Digital scale → PLC	Analog in	Sets the grade of each piece
Piece at piston A, B, C	Infrared sensors (x3) → PLC	Digital in	The moment to push the piece
Room temperature	Temperature sensor → PLC	Analog in	Turns the air conditioning on and off
Room humidity	Humidity sensor → PLC	Analog in	Turns the dehumidifier on and off
Main belt	PLC → conveyor (220 Vac)	Relay out	Runs all the time, for a constant flow of meat
Grade belts 1, 2, 3	PLC → conveyors (220 Vac)	Relay out	Each one runs only when its piston fires
Pistons A, B, C	PLC → solenoid valves (x3)	Digital out	Push the piece to the belt of its grade
Air conditioning	PLC → AC unit	Relay out	Keeps the temperature of the room
Dehumidifier	PLC → dehumidifier	Relay out	Keeps the humidity of the room
Count of each grade	PLC → server	Ethernet	Three counters: a real-time inventory of the production

One Ethernet PLC with relays for the sort, the room and the counts.



M-DUINO ETHERNET PLC ARDUINO 19R

An industrial PLC built around an original Arduino Mega 2560, with Ethernet, RS-485 and RS-232, for DIN rail. It is programmed with the Arduino IDE.

Role	Sort by weight, room climate, counts to the server
Inputs	6: 4 analog/digital (0-10 V analog, up to 24 Vdc digital, 10-bit), 2 digital optoisolated (5 to 24 Vdc)
Outputs	11: 8 relays (230 Vac 4 A / 24 Vdc 2 A, resistive), 3 analog/digital/PWM (0-10 V analog, up to 24 Vdc digital, 20 mA)
Communications	Ethernet (W5500, RJ45), 2 x RS-485, RS-232, I2C, SPI

The case names an Industrial Shields PLC based on Arduino with Ethernet. The PLC in its connection scheme is the M-Duino 19R, still in the catalogue (current version 19R+). This line uses all 6 inputs: the scale and the two room sensors on three analog/digital inputs, two infrared sensors on the isolated inputs and the third one on the fourth analog/digital input in digital mode.

[See the M-Duino 19R+ ›](#)

No hands on the meat

The scale weighs each piece and the program sets its grade. Nobody has to handle the meat to sort it.

One push, at the right place

The infrared sensor at each piston gives the exact moment. The valve opens when the piece is in front of the piston.

Energy only where there is meat

The grade belts stop when they have nothing to carry. Only the main belt runs all the time.

The room in the same program

The PLC that sorts the meat also reads the temperature and the humidity and switches the air conditioning and the dehumidifier.

SIMILAR LINE?

Tell us your grades and your belts. An engineer will answer.

Tell us what you sort, how many grades and belts you need, how many pieces per minute, and what the room must keep. We will tell you which controller fits and how to connect it.

READ IT ONLINE

industrialshields.com/case-study-meat-sorting-line-by-weight-m-duino

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