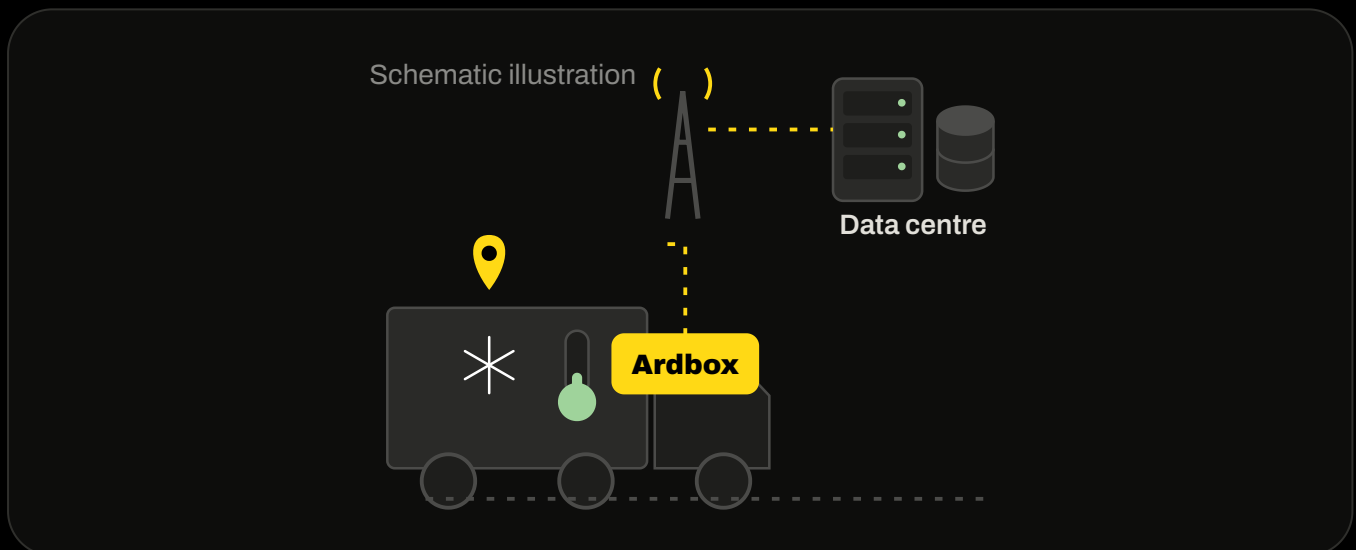


REFRIGERATED FLEET · ARDBOX ANALOG

Frozen goods on the road. One unit tracks the cold.

GPS and goods temperature on every truck, sent over GPRS to the data centre.

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

2

priorities: GPS position
and goods temperature

20

I/Os in the Ardbox family
chosen

1

standard unit for the whole
fleet

GPRS

link to the data centre

THE CHALLENGE

Guarantee the product. Improve the fleet.

The vehicle fleet of the customer grew a lot over the last decade. To keep its competitive level, the company had to guarantee the quality of the product and, at the same time, improve fleet management with new technology. Three needs came together: the business strategy, the regulations on the cold chain for this type of goods, and the control of working hours required by law.

01

Cold chain rules

Frozen goods travel under regulations on the cold chain. The fleet must follow them on every route.

02

Product quality

Quality must be guaranteed. The company keeps its commitment to the highest quality with its customers, in a sector as sensitive as food.

03

Many door openings

Local routes make many stops. Every stop can mean an opening and a closing of the trailer.

04

Working hours by law

The law requires the control of working hours. Fleet data can complement the records of the working day.



Data the customers can use

One improvement the company plans: share the real-time position of the vehicles and the temperature of the load with its own customers.

HOW IT WORKS

Three loops: measure, send, size.

Loop 1 - Watch the goods temperature

The temperature of the load, with the position of the truck.

The priority of this project is the GPS positioning and the temperature of the goods. In the first test, the cold chain was not threatened in any case. The test ran at the end of summer: temperatures may not be very severe then, but the cold margin was still very wide. In the panel, open the trailer door and change the outside temperature. A typical way to do it: an alarm when the load stays above a limit for a set time, sent with the position.

- Goods temperature and GPS position on the same unit
- Many stops and door openings on local routes
- Cold chain not threatened in the test, at the end of summer

Loop 2 - Keep the cold chain record

A temperature record for every load, and an alarm when it matters.

The project defined which data the unit saves locally and which data it sends through GPRS to the data centre, for analysis and decisions in real time. Most of the data is sent. The case does not publish the split or where the local data is kept. For a cold chain, a typical way to do it: every reading carries the time, the temperature and the position, so the record shows what the load lived on each route, and an alarm goes out at once when the load warms up. In the panel, make a long stop with the door open.

- Data saved locally on the vehicle
- Most of the data sent over GPRS to the data centre
- Example: time, temperature and position on every record

Loop 3 - One unit for every truck

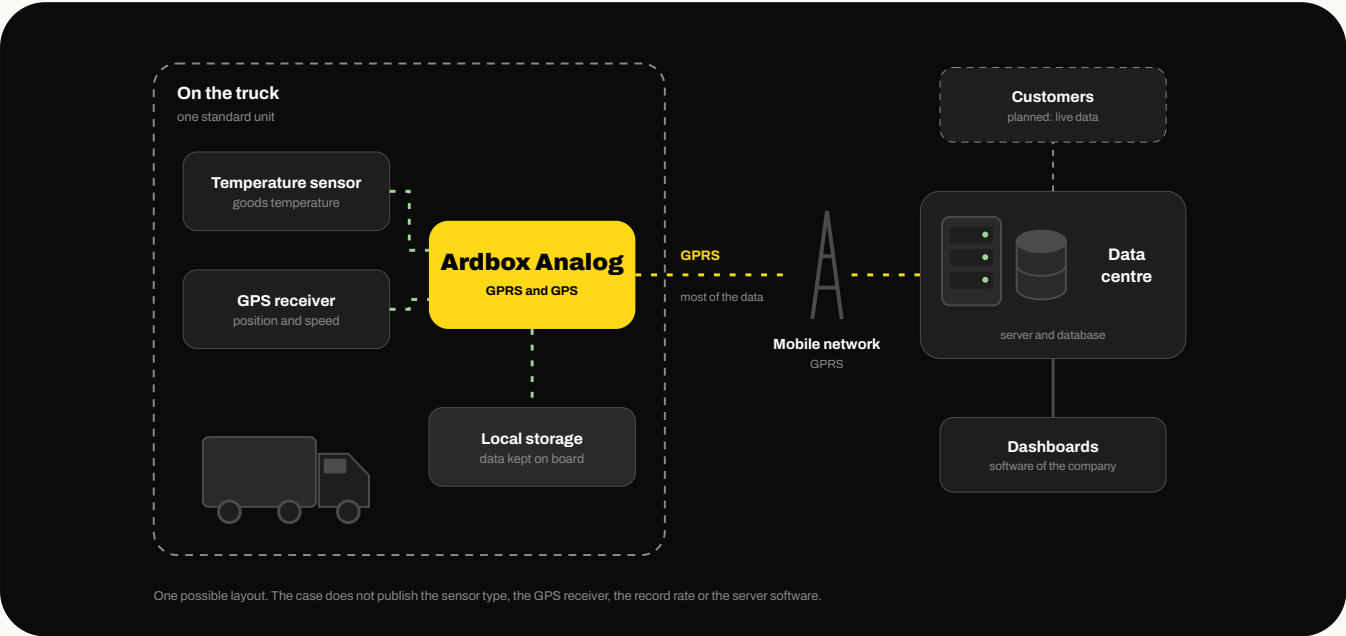
Size the inputs and outputs once. Leave room to grow.

After analysing the requirements, the team checked which Arduino PLC best suits the number of inputs, outputs and accessories, and defined one standard product for the whole fleet: the Ardbox Analog GPRS with GPS, from the 20 I/Os family. Its inputs and outputs meet the needs of the customer and allow growth later without changing the installed hardware. In the panel, add signals and see what is left.

- One standard product, installed in the whole fleet
- 10 inputs and 10 outputs on the Ardbox Analog
- Room for new signals without new hardware

How does temperature data from a refrigerated truck reach the data centre?

Each truck carries the same unit: an Ardbox Analog with GPRS and GPS. It reads the goods temperature and the position. It saves some data locally and sends most of it through GPRS to the data centre. There, the software chosen by the company shows dashboards for each need.



Signals and data

Signal	Between	Type	Purpose
Goods temperature	Temperature sensor → Ardbox Analog	Sensor	Temperature of the load, the second priority of the project. Sensor type not published
Position and speed	GPS → Ardbox Analog	GPS	Position, the first priority. Also speeds, routes and stops
Data kept on board	Ardbox Analog	Local storage	Data saved locally on the vehicle. Which data is not published
Fleet data	Ardbox Analog → data centre	GPRS	Most of the data, for analysis and decisions in real time
Dashboards	Data centre → company teams	Software	Software chosen by the company, with dashboards for each need
Customer view	Data centre → customers	Planned	Real-time vehicle data and load temperature, planned as a next step

Ardbox Analog with GPRS, on every truck.



ARDBOX Analog ARDUINO based PLC

A compact industrial PLC built on an original Arduino Leonardo, with 10 inputs and 10 outputs in a 45 mm DIN rail housing. GPRS/GSM is one of the communication versions of the family. On each truck it reads the goods temperature and the position, keeps data on board and sends it to the data centre.

Role	Goods temperature, GPS position, local data, GPRS link
Inputs	10: 8 analog/digital (0-10 V), 2 digital optoisolated
Outputs	10: 7 analog/digital/PWM (0-10 V), 3 digital optoisolated
Comms	RS-485, RS-232, TTL serial, I2C, SPI. GPRS/GSM version in the family
Power supply	12 to 24 Vdc
Mounting	DIN rail TS35, IP20, 45 mm wide

The case names the "Ardbox Analog GPRS with GPS" from the 20 I/Os family. The image and the link show the ARDBOX Analog ARDUINO based PLC; the GPRS version is in the Ardbox HF+ GPRS family datasheet. The case does not publish the GPS receiver or how it connects.

[See the Ardbox Analog ›](#)

Two priorities on one unit

Position and goods temperature come from the same controller, so every temperature has a place and a time.

Sized once, with room to grow

The I/O count of the Ardbox Analog fits the needs, and leaves inputs and outputs for later. No new hardware when a new signal comes.

Local and remote data

The unit keeps data on board and sends most of it over GPRS. The data centre works in real time.

Quick to install

The sensors and the antennas went in very quickly, with no effect on the trailer or the tractor. The vehicle had an extra installation for the power of the PLC.

Your software, your dashboards

The company chose its own software. It handles the data quickly and shows dashboards for each need.

A program you own

The Ardbox is programmed with the Arduino IDE. You can read the program, change it and add a new signal.

SIMILAR FLEET?

Tell us what you carry and what you must record. An engineer will answer.

Tell us the type of load and its temperature range, how many vehicles you have, which signals you need on board (temperature probes, doors, refrigeration unit), where the data must go, and which mobile networks you have on your routes. We will tell you which controller fits and how to connect it.

READ IT ONLINE

industrialshields.com/refrigerated-fleet-cold-chain-case-study

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