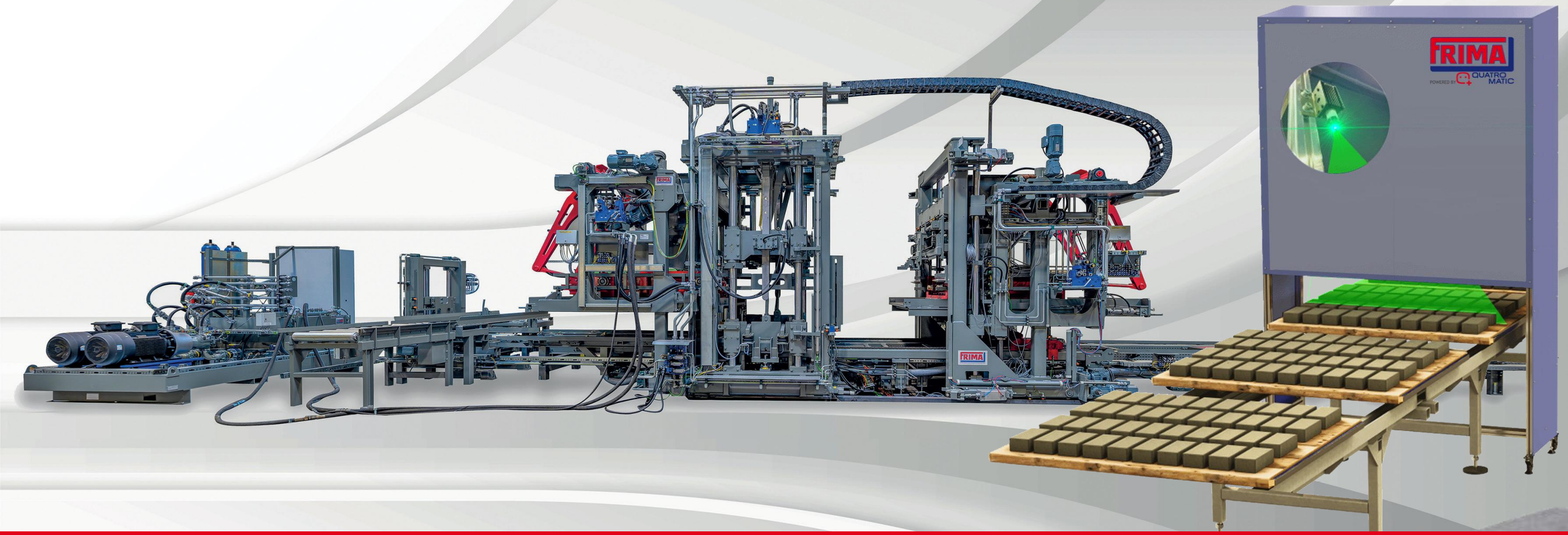
FRIMA
POWERED BY QUATRO MATIC

AI-BASED AUTOMATIC QUALITY CONTROL AQC



EFFICIENT · LOW-MAINTENANCE · USER-FRIENDLY

Manual QC today

- Impossible to setup equipment once and for all
- Strong influence of **human factor** on the production process
- Lack of tools for **automatic** continuous production control and accounting
- Low level of adoption of **Industry 4.0*** technologies

* A new approach to production based on the mass introduction of information technology into industry, automation of business processes and the spread of artificial intelligence

FRIMA AQC

Automatic quality control system for paving tile production based on artificial intelligence.

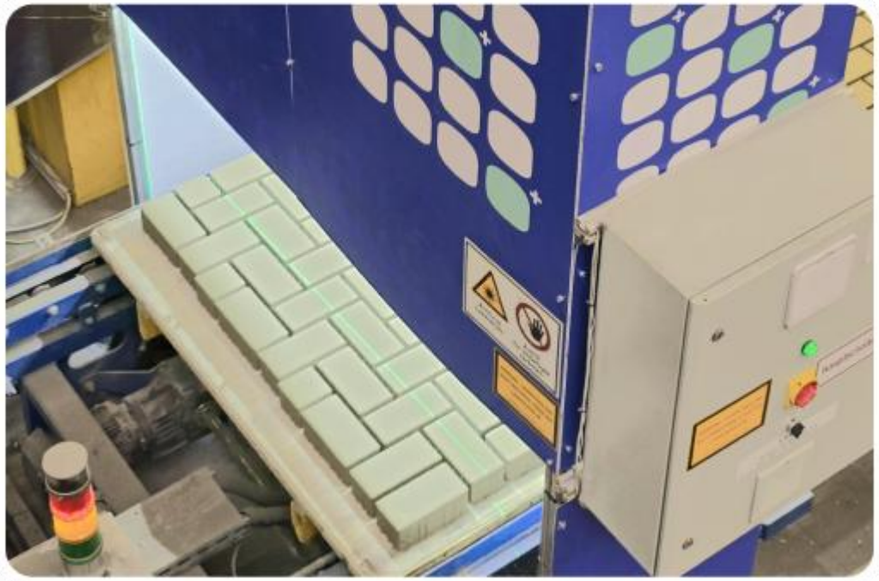
It can be installed in the **existing production** without stopping the production process.

Works with the conveyor line of **any manufacturer**, without modifications to the equipment

Functions in production:

- Reduces production losses
- Improves overall product quality
- New level of automation and control of the production process

How does FRIMA AQC work?

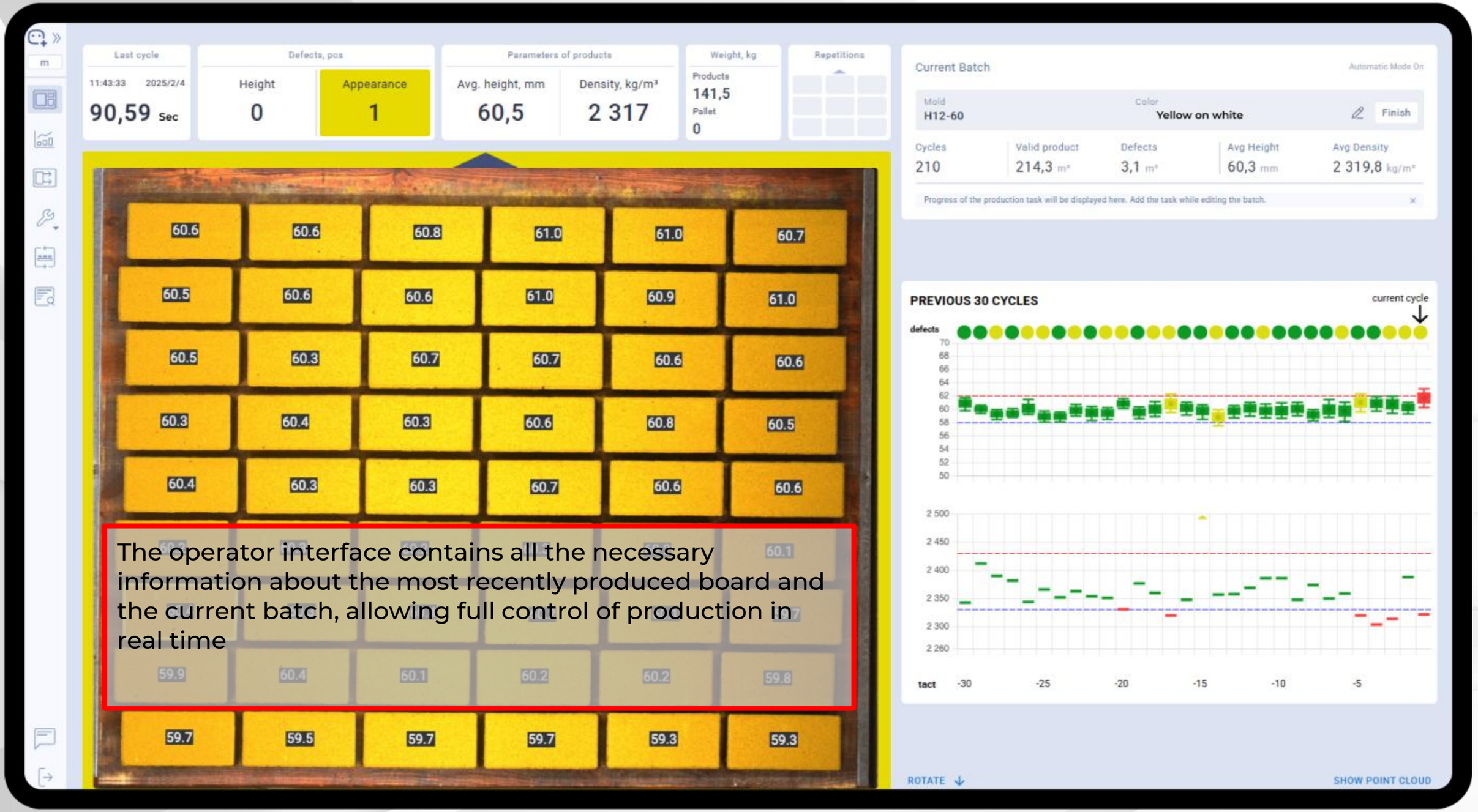


FRIMA AQC is installed on the wet side after the vibropress and before the curing chamber without interfering with the production process

Laser scans and photographs the board with the product, detecting height deviations and defects of the face layer: cracks, pits, stains, inclusions

Displays a real-time photo of the board on the operator's screen, highlighting with a colored border the different types of deviations for each item, allowing the operator to prevent the production of faulty products

Saves and accounts for all pallets produced for further batch analysis


Last cycle
11:43:33 2025/2/4
90,59 Sec
Defects, pcs
Height
0
Appearance
1
Parameters of products
Avg. height, mm
60,5
Density, kg/m³
2 317
Weight, kg
Products
141,5
Pallet
0
Repetitions
Current Batch
Automatic Mode On
Mold
H12-60
Color
Yellow on white
Finish
Cycles
210
Valid product
214,3 m²
Defects
3,1 m²
Avg Height
60,3 mm
Avg Density
2 319,8 kg/m³
Progress of the production task will be displayed here. Add the task while editing the batch.
PREVIOUS 30 CYCLES
current cycle
defects
70
68
66
64
62
60
58
56
54
52
50
2 500
2 450
2 400
2 350
2 300
2 260
tact
-30
-25
-20
-15
-10
-5
ROTATE
SHOW POINT CLOUD
The operator interface contains all the necessary information about the most recently produced board and the current batch, allowing full control of production in real time

FRIMA AQC
Key Features

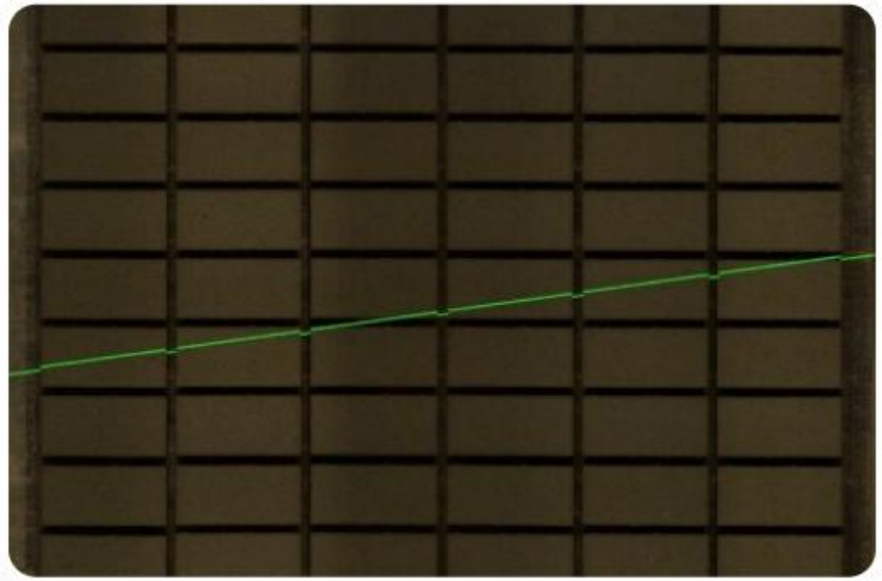
- Measurement of product height and density
- Detection of defects in the face surface
- Classification of paving tile colors
- Collection and analysis of production statistics
- Active feedback to the factory
- Remote monitoring **24/7** from anywhere in the world

Height measurement

Using a high-precision laser, **FRIMA AQC** measures the height of all products on the board with an accuracy of **0.5 mm**

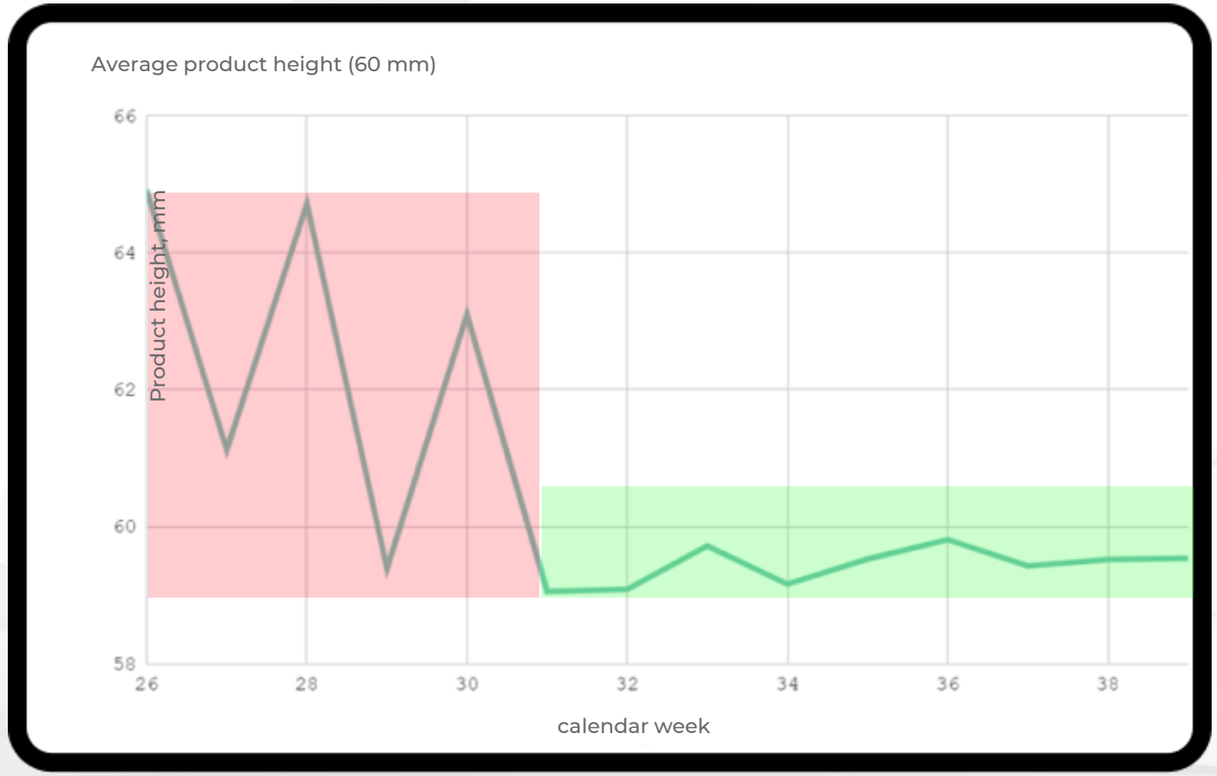
This precision allows you to control the average height of the items and produce at the lowest permissible height, which significantly reduces raw material costs

Savings on raw materials **3-5%**



A real example of FRIMA AQC implementation

Calendar week	60 mm products	
	average height	number of cycles
26	64,92	2 448
27	61,12	5 309
28	64,71	10 771
29	59,39	13 661
30	63,10	9 857
31	59,05	13 966
32	59,08	12 396
33	59,72	7 206
34	59,16	9 228
35	59,53	9 894
36	59,81	13 376
37	59,43	18 643
38	59,52	10 108
39	59,54	1 926
Total cycles:		138 789



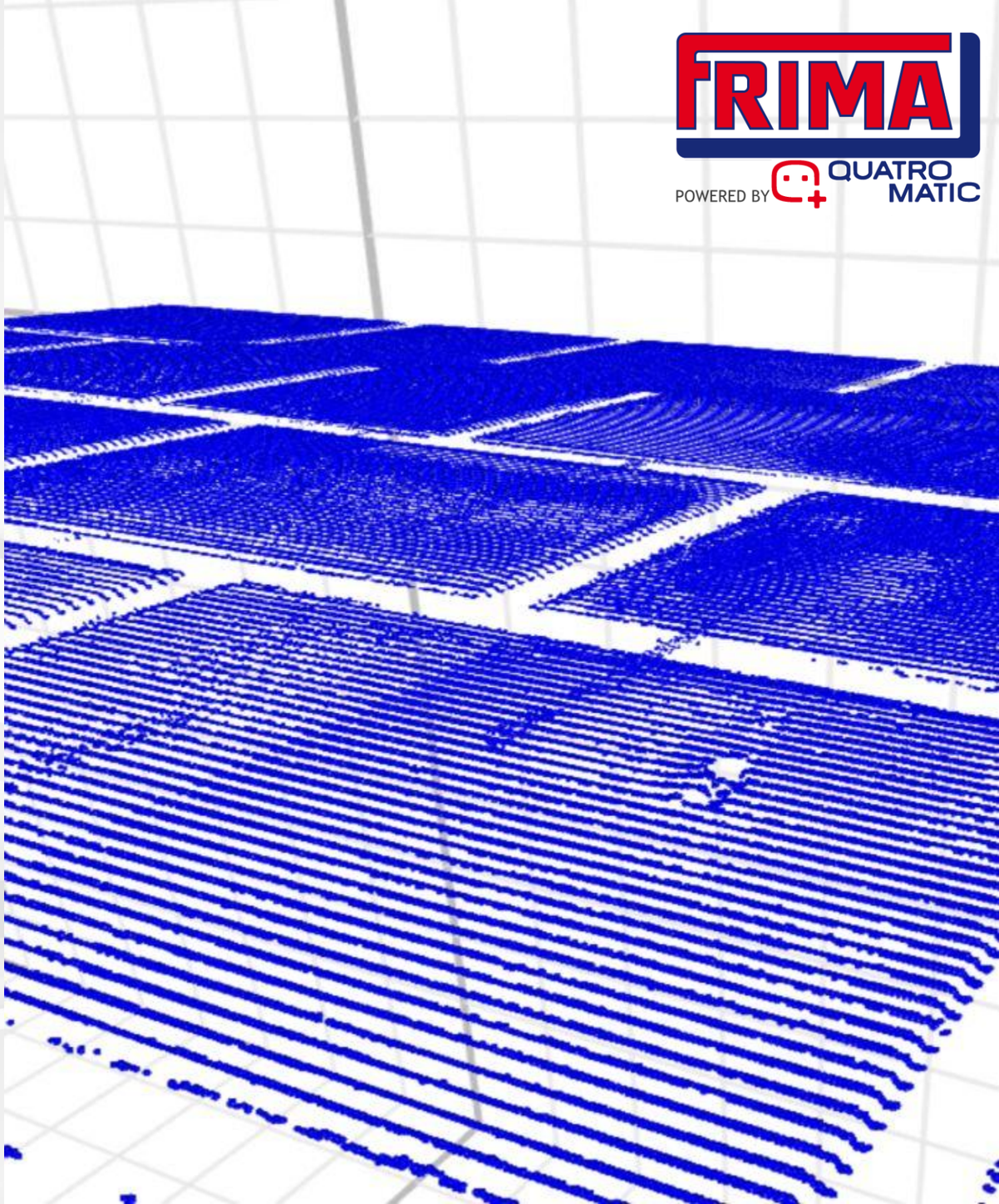
Reduction of the average height of the products by 8% !

Density calculation

FRIMA ACQ measures the height of huge number of points on each tile

Calculates the volume of each tile and all products on the board with high accuracy

Determines the exact density by dividing the mass by the resulting volume (scales must be installed on the conveyor)



A real-life example from a customer's plant

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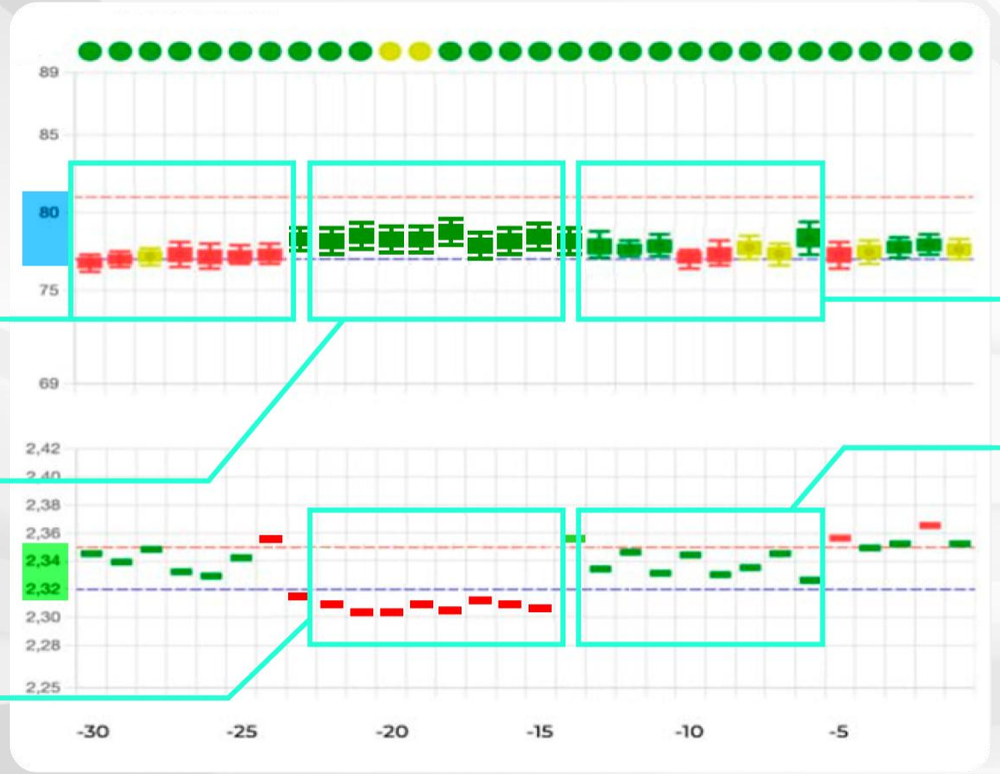
1. The operator noticed **the height was too low**

2. Changed the settings of the vibropress:

The height is normal

but the density is too low



3. The operator changed the settings again:

Height is normal

Density normal

within the optimally permissible limits that allow to produce products without defects in accordance with standard, saving on raw materials

– height limits

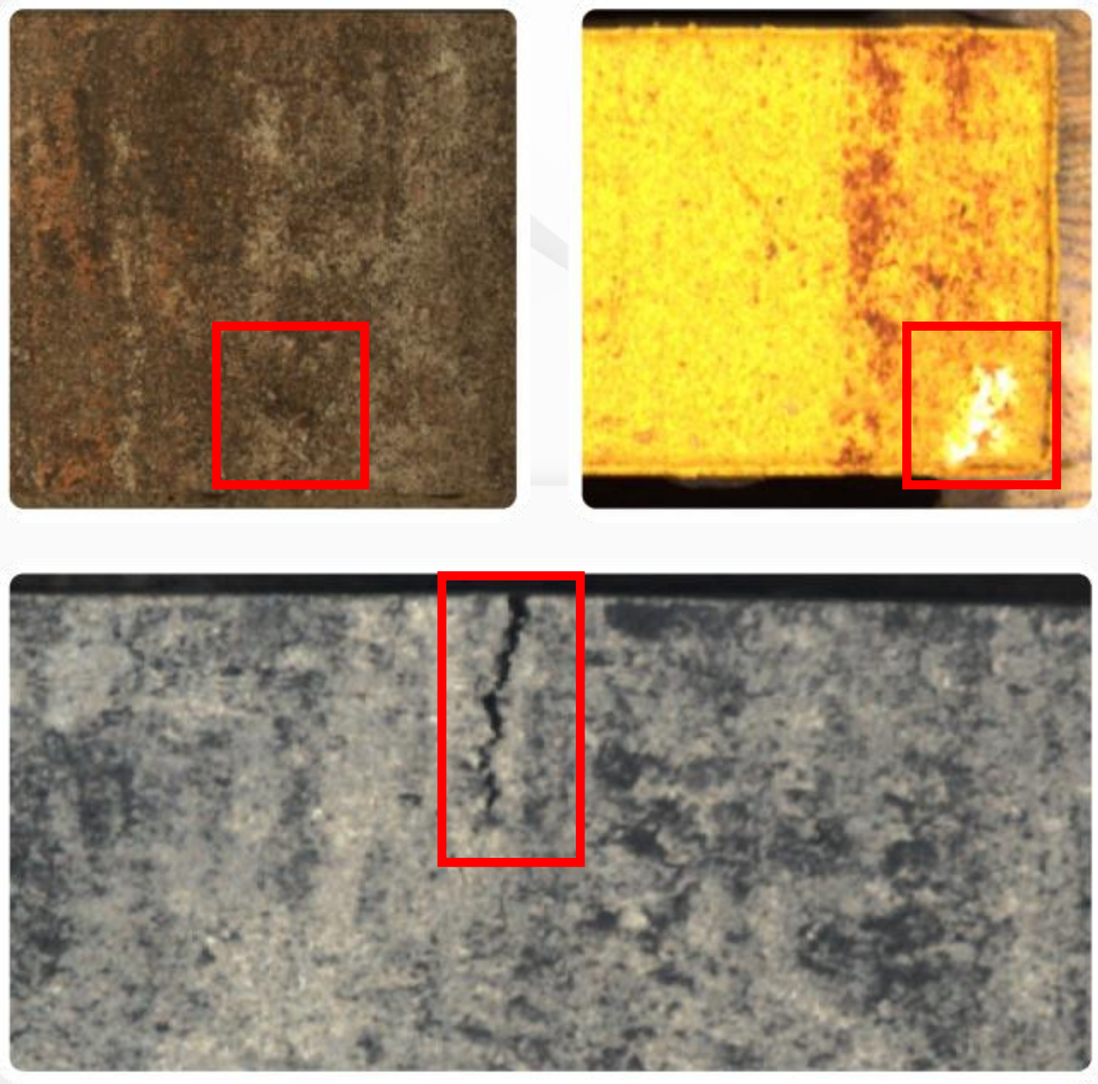
– density limits

Defect detection

FRIMA AQC recognizes **95%** of defects in the face surface of products, such as:

- Stains
- cracks
- Pits
- inclusions

Detected defects are displayed in the operator interface in real time



Timely detection of defects reduces the share of defective products **by 50%**

Active feedback to the factory

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Wet side

Signal to the operator interface when problems are detected: face layer defects, height and density deviations, recurring defects

Reporting recurring molding problems to the chatbot

Sending a signal to the conveyor controller to stop the conveyor and prevent the production of defective products

100% **Reducing the impact of the human factor**

Active feedback to the factory

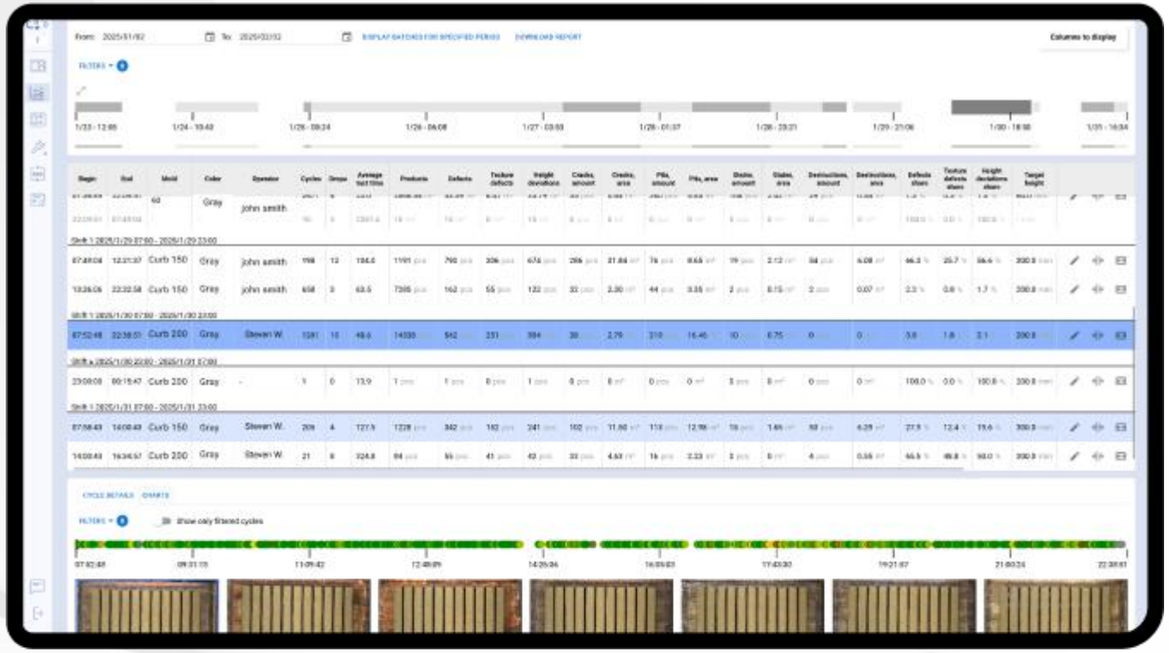
Dry side

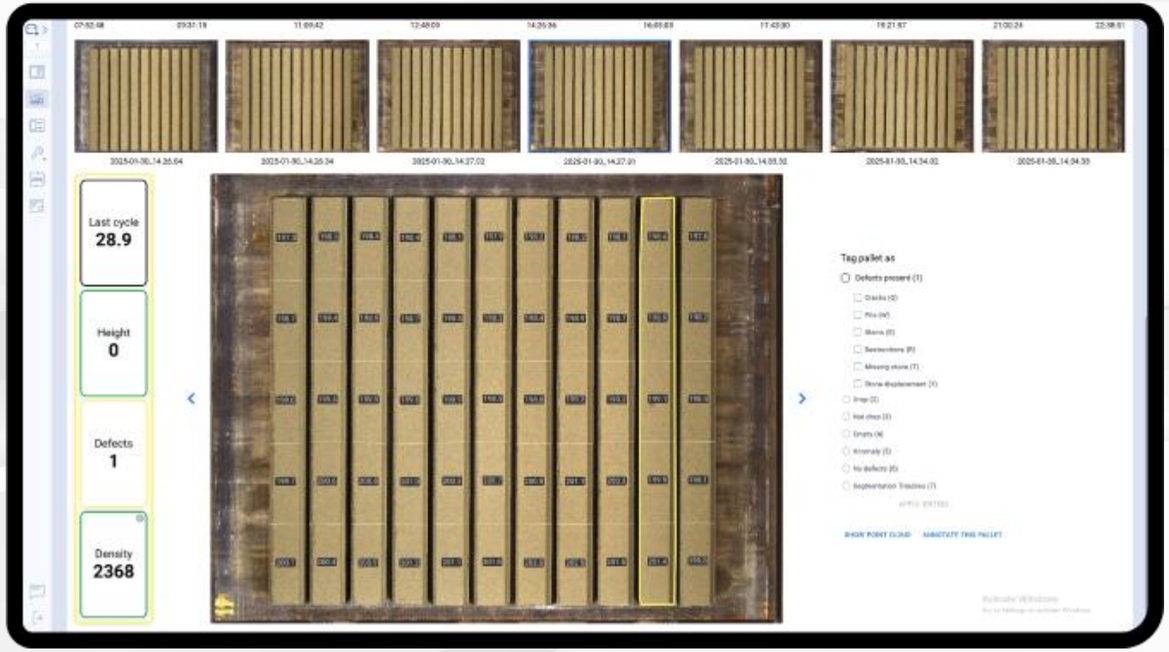
- Possibility to stop the conveyor when a defective product comes out
- Hint to the sorterman indicating the item needs to be replaced
- Predicting the time after which the pallet with the defective product will be released
- Possibility to transmit the coordinates of the defective product to the sorting robot

Production statistics

- Automatic accounting for all batches produced with comprehensive information on each batch
- Filtering the entire batch history by operator, mold, color
- Photo archive of each batch containing all detected defects with the possibility of filtering by any parameter
- Display of all idle times in the batch

100% **Accuracy in production indicators**





Online remote monitoring

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A simple and easy to use user interface is available for any type of device in a regular web browser.

FRIMA AQC allows you to always be aware of what is happening in the plant at any time from anywhere in the world - you can monitor the entire production in real time

FRIMA AQC reduces production costs

Reduction of losses from production of defective products	**by 80%**	FRIMA AQC detects face layer defects on the wet side in **95% of cases**
Material savings	**3-5%**	FRIMA AQC measures the height of all products with an accuracy of **0.5 mm**, can be molded to the **lower tolerance limit**
Reduction of overproduction	**by 80%**	FRIMA AQC detects deviations and **alerts the operator in real time**, so that the required number of mixes can be predicted more accurately
Automatic collection of production statistics and report generation	**by 100%**	FRIMA AQC classifies **colors and molds**, and automatically keeps track of products by batch

Production task control

Now at factories overproduction of products by **5-7%** is considered the norm.

With **FRIMA AQC**, the operator sets the quantity to be produced and tracks it in real time:

- Number of products including defects
- How many more products need to be produced
- Excess molding

FRIMA AQC helps the operator accurately meet production targets and the plant minimize costs from overproduction

No unnecessary movements

FRIMA AQC improves productivity:

- Measurements are performed automatically, the operator is constantly at the workplace, he doesn’t need to frequently go to the conveyor to check the products, especially when setting up a new batch
- Setup time of new batch is reduced by **5-10 minutes**
- A full work shift of **10 hours** per month is released when changing product type 2 times a day

Stable operation in harsh conditions

The smooth operation of **FRIMA AQC** is ensured by:

- Industrial fanless computer
- **IP54** protection of electronic components
- The camera lenses are protected by filters and the special arrangement prevents dust from accumulating

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