



PILOT 2

Thermoplastics Forming Excellence



Reduction of the manufacturing defects in thermoforming lines and minimization of plastic waste, by the implementation of thermal inspection equipment that mitigates process variability using AI models based on Finite Elements Analysis (FEA).



THERMOPHORMING LINES

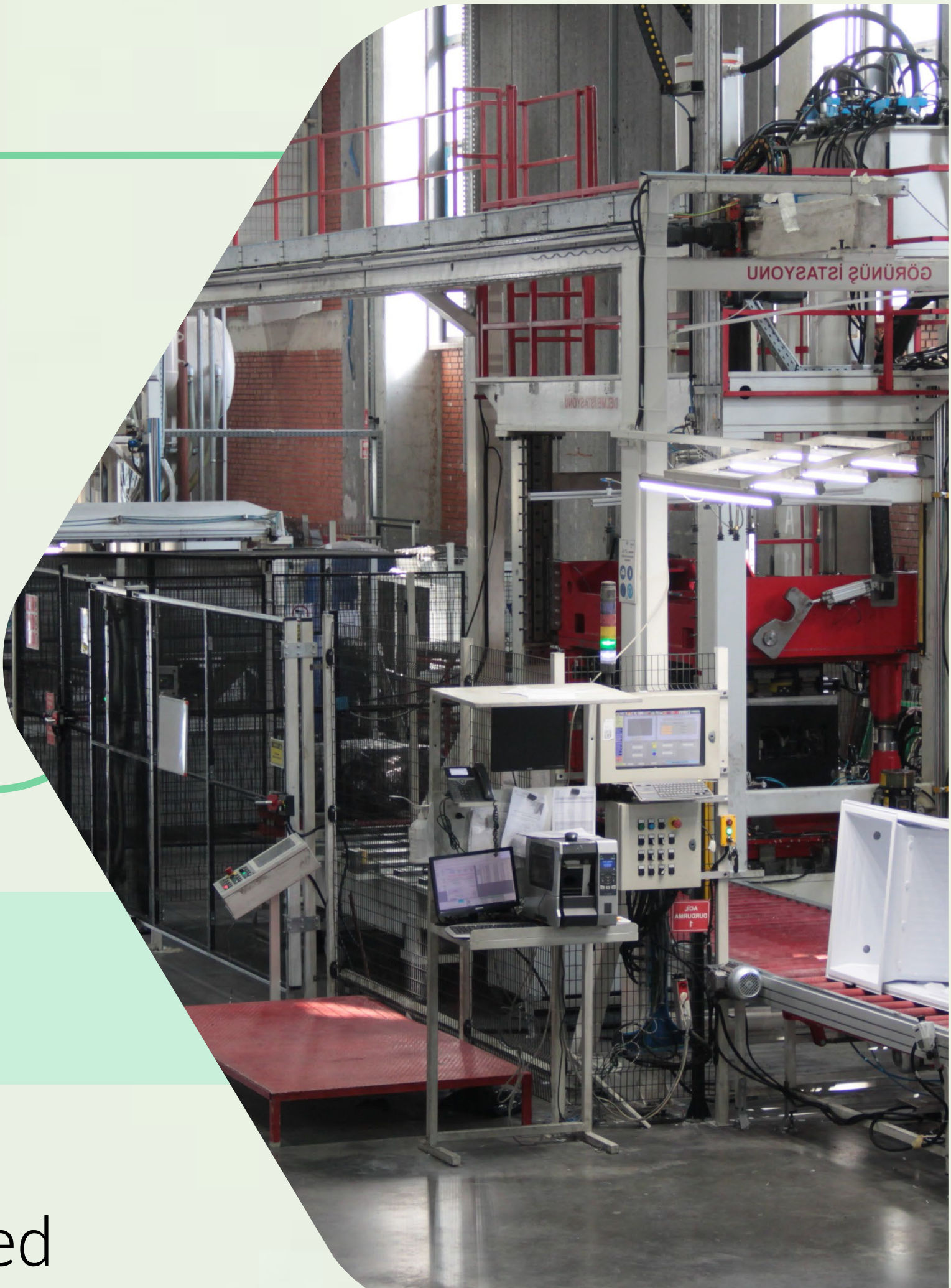


Refrigerator inner body is produced via thermoforming under heat and pressure.

Finished surfaces and dimensional precision of the refrigerator's interior body are **crucial for product quality**. The problems in the thermoforming lead to visible in the final product and directly affect customer satisfaction.

Problems & needs

- ↑ Volume plastic scrapping
- ↑ Energy consumption
- Excessive plastic usage
- ↑ Financial and environmental costs



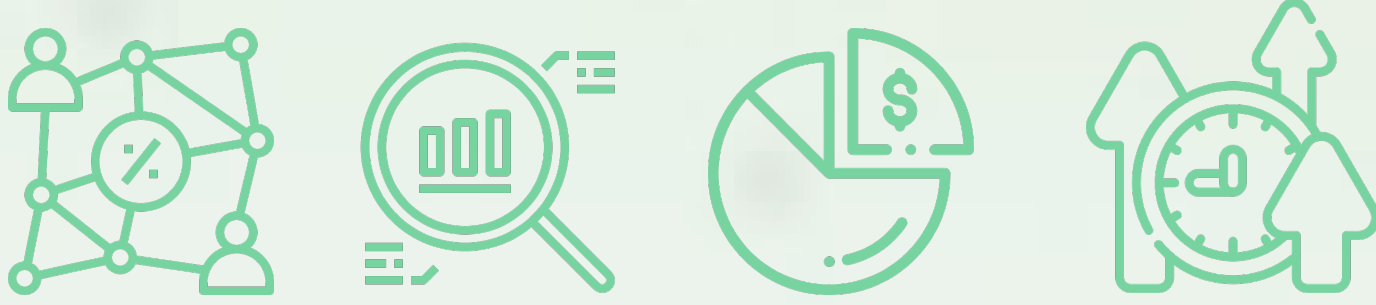
NON-DESTRUCTIVE INSPECTION TECHNIQUES

- Fully optimization of thermoforming process by AI-enhanced thermal imaging and processing features with advanced digital twin models.
- Availability of real-time process parameters → Control during the production process.



ZDZW solutions

ZDZW INTEGRITY, THERMAL and VISUAL INSPECTION SUITES



EXPECTED SCENARIO

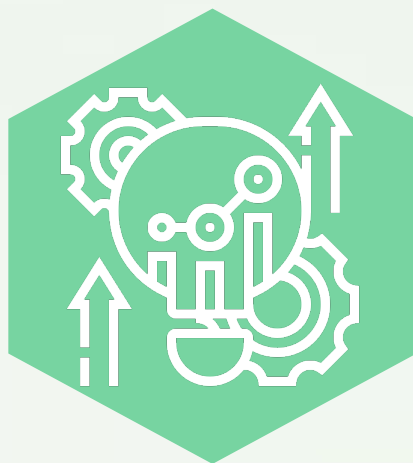
Automatic Control of the Inner Body Thermoform Process

ZDZW platform will implement 100% thermal inspection equipment in the thermoform process to avoid quality failure against the variability.



1ST STEP

Real-time measurement of the thickness of the inner body



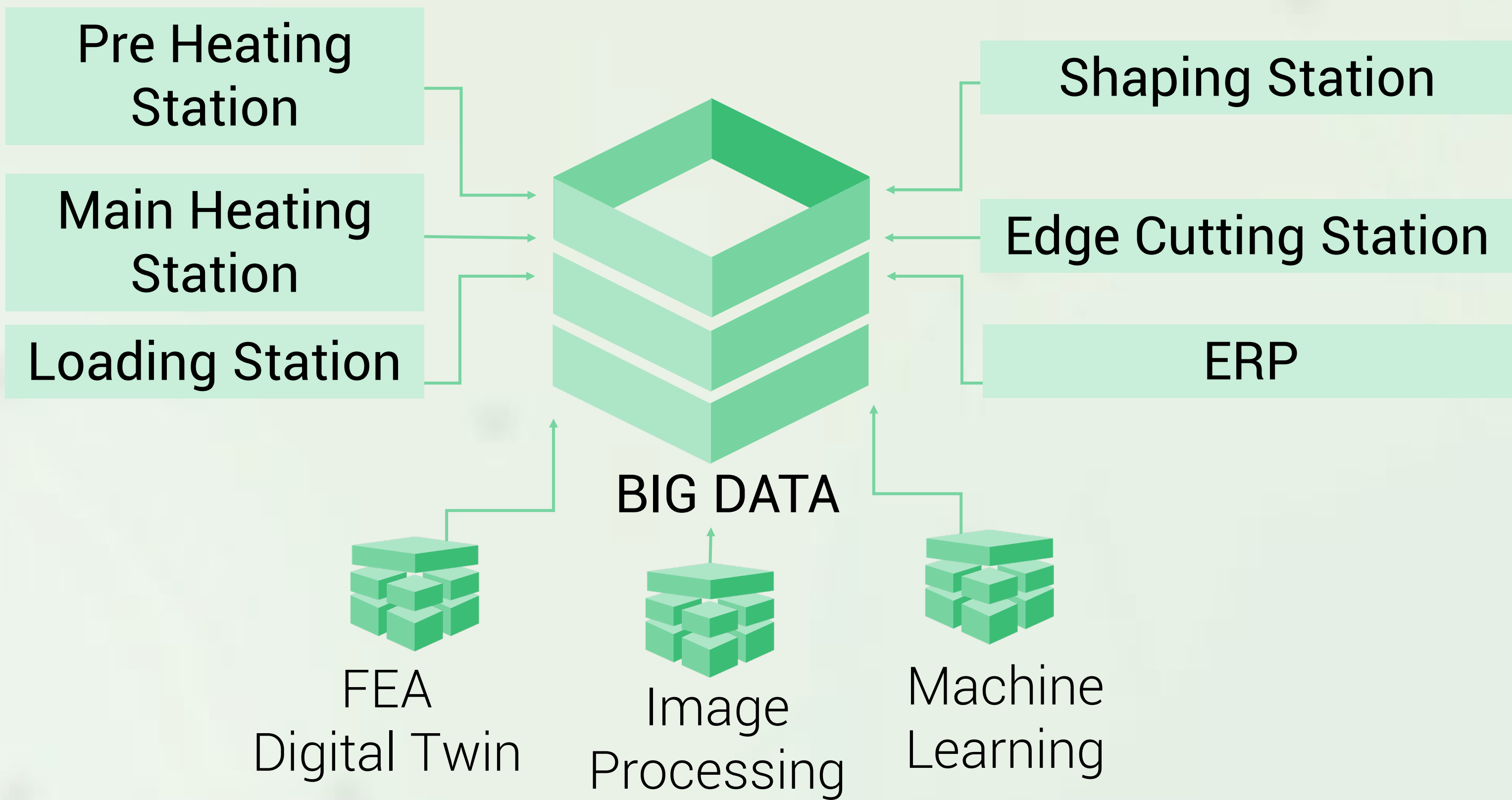
2ND STEP

Testing and implementation of the FEA-based AI model in the production line under different conditions.



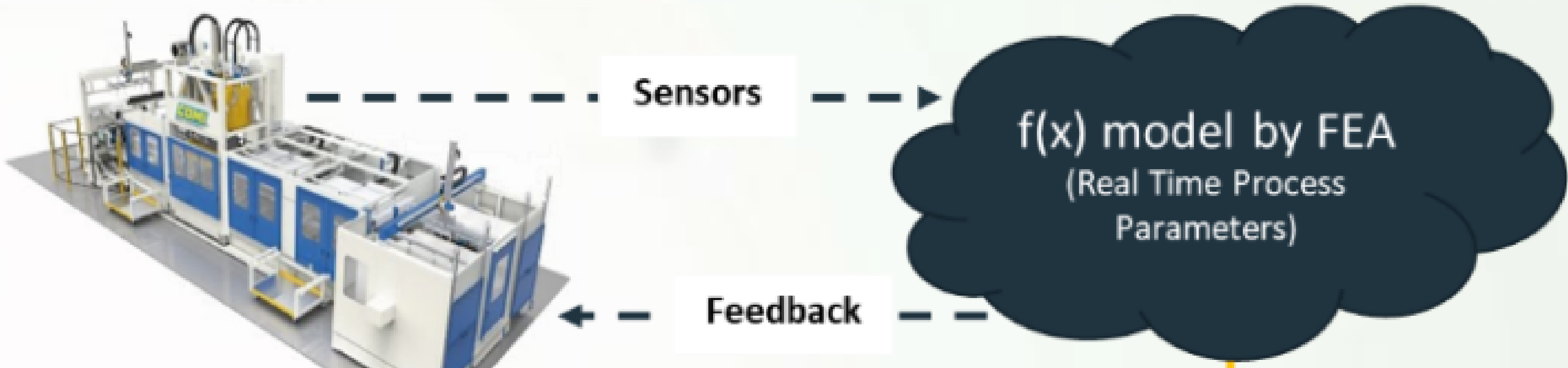
3RD STEP

Scrap detection with image processing and tracking of KPIs.



Shop Floor Termoform Proses - PLC

Edge



EXPECTED IMPACT ON KPIs

Reduction of raw material usage
↓0,6mm thickness/sheet

Decrease in scrap ratio
↓3,5% (about 15.750 parts per year)

Increase of overall equipment effectiveness
↑ 6%



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