



**AMPERON**

Technologies

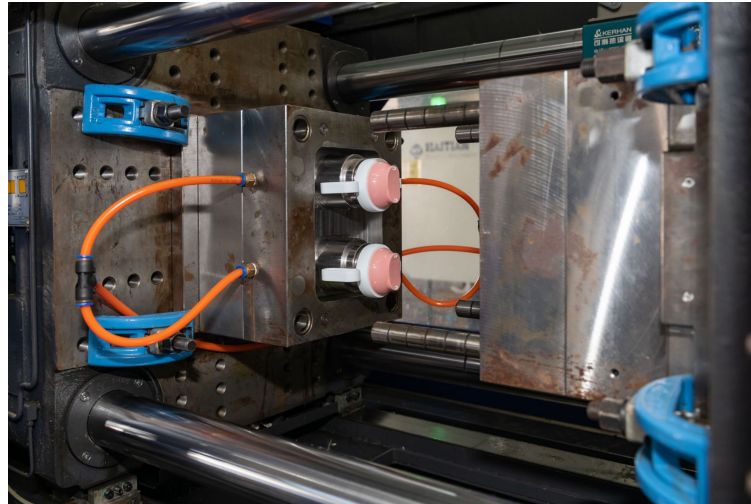
Simplifying manufacturing excellence

# Amperon's Autonomous Production for Plastic Industry

Discover your first steps in Autonomous Manufacturing using **Amperon'** innovative **FactoryOps®** which drive quick & deep improvements in your plastic manufacturing processes, from injection molding to extrusion and blow molding.



# Key Processes in the Plastic Industry



## Injection Molding

High-volume production of complex plastic parts.



## Extrusion

Continuous melting and shaping of plastic.



## Blow Molding

Fabrication of hollow plastic parts by blowing air into a mold..

Processes such as plastic injection molding, material extrusion, blow molding, rotomolding, thermoforming or combinations of these face **four main challenges: production stops, continuous manual supervision, scrap parts and material and high energy costs.**

# 4 Challenges Faced by Plastic Manufacturers



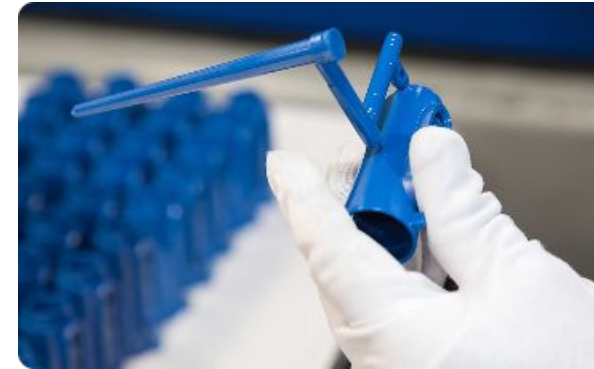
## Production stops

Machine breakdown and changeovers cost 60% of total factory losses. Tackling stops is crucial to keep with high demand and to avoid unnecessary investments in new machines.



## Continuous manual supervision

Plastic equipments require continuous supervision & tuning of process parameters by expert personnel to avoid quality issues or discards with costs pre-calculations.



## Scrap materials & parts

Ensuring minimum start-up, trimming wastes and off-specs parts is critical but difficult to achieve and is labor intensive.



## High Energy Consumption

Controlling energy consumption through smart machine-part pairing and minimizing idle time remains a key challenge.

# powered **FactoryOps®** smart solution delivers you in just **One Week**



## Real-Time Visibility

- Second by second machine status
- Live OEE monitoring for improved machine utilization
- Monitoring of idle times and inefficient processes



## Automatic Anomalies detection

- Early detection of process deviation
- Predictive Maintenance
- Predictive Quality
- Smart alerts instead of continuous manual supervision



## Tracking KPIs & Operations

- Accurate post-calculations for more effective pricing and negotiations
- Tracks cycle time, OEE, and energy intensity
- Operational traceability for compliance and improvement



## Optimization Insights

- Optimization of heating phases, cycle times, and cooling
- Smart machine-part pairing for operational excellence

# 3 steps to reach **sustainable peak performance**

## Connect



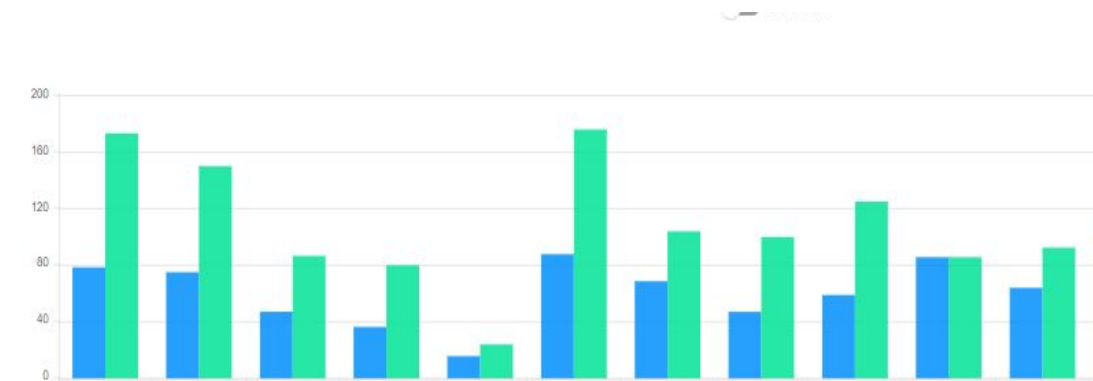
Connect to any machine through low cost, non intrusive electrical sensors

## Observe



Empowers your operators with RT machine status and AI powered predictive alerts

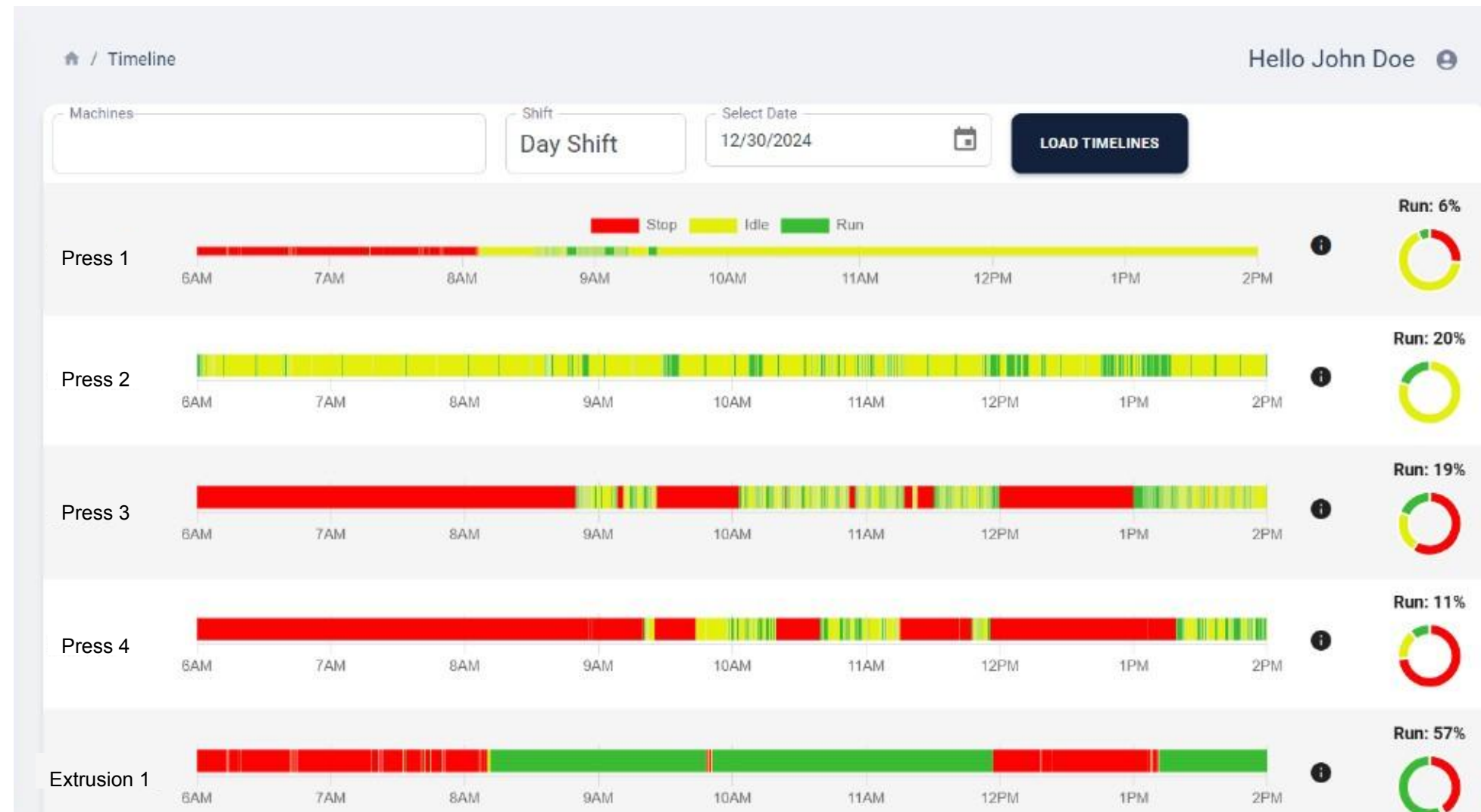
## Analyze



Track and improve manufacturing and energy efficiency KPI through traceability and losses root causes analysis

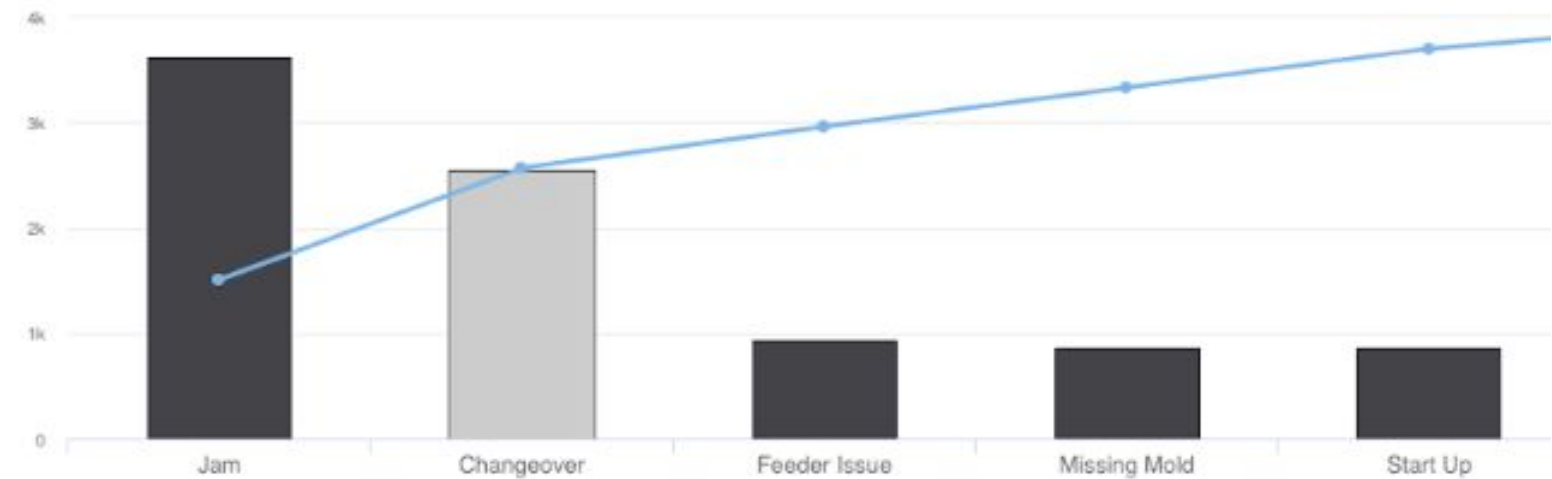
# Real Time Machine status

- **Low-cost data capture**, with high reliability and immediacy, which, processed with digital intelligence, allows knowing **the real machine status** and the elaboration of **patterns** for each machine/operator.
- Evaluation by the end of shift of the **real productive time and the lost production time**.
- Start **unlocking the "hidden factory"** by identifying current machine utilization.
- Make informed CapEx investment through knowing current utilization



# Reduce downtime due to changeover / cleaning / no operator...

Through providing context to **automatically detected downtime durations** (no human intervention), Changeover, Cleaning and other operations can be improved by identifying abnormal durations related to a **specific machine, a specific operator, a specific tool and a specific article.**





# Detailed tracking of operations per Cycle



- Our technology enables **identifying each operation during a complete cycle** in order to detect deviations in time duration / power levels which reflect anomalies.

- ① Closing & Injection
- ① Holding / Idling
- ③ Plastification & Opening/ Ejecting



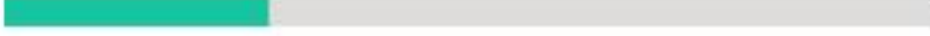


- Cavity 1 filling
- Cavity 2 filling

# Real time comparison of Production performances with pre-calculations



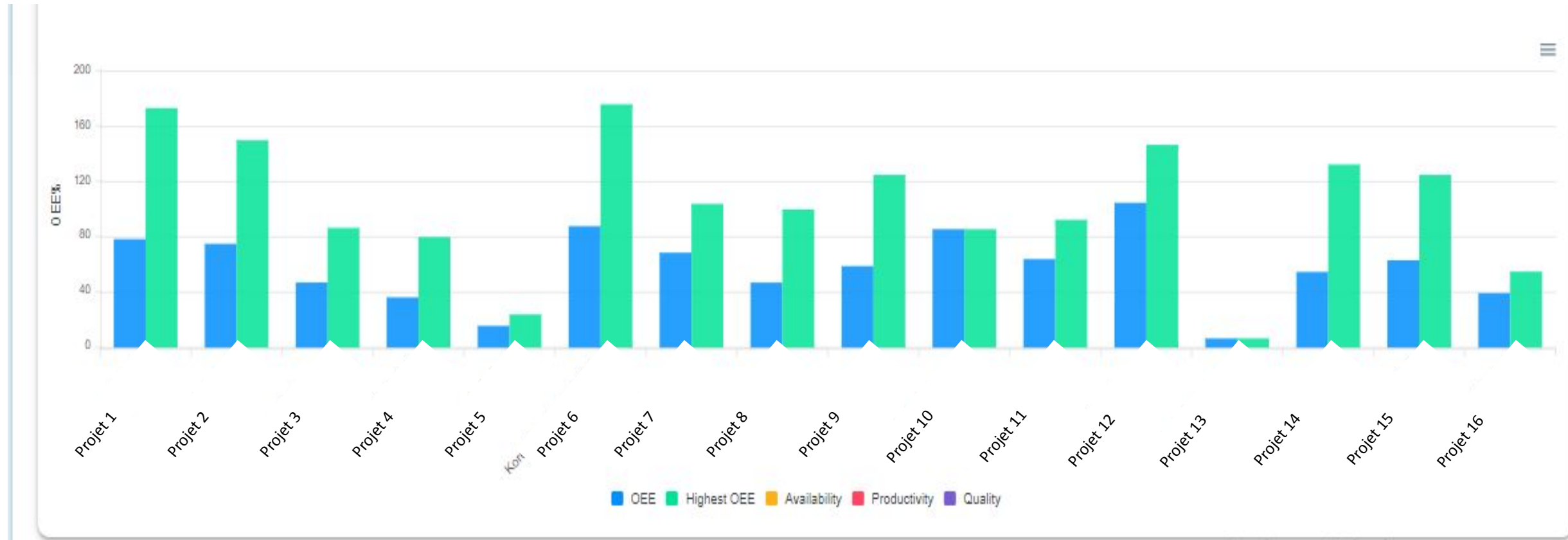
- **Identify easily the best settings / operators / molds / machines** that generates **the best results** in term of OEE and Energy Intensity
- **Establish comparisons with pre-calculations** (unit cycle, energy costs per part) **during the production run.**

# Improve the planning of machine loading

Production Progress	Remaining Time	Production Speed
 12/25	17.1 Hours	3.00 Pieces/h
 60/100	17.1 Hours	15.00 Pieces/h
 20/70	17.1 Hours	5.00 Pieces/h
 5/30	5.0 Hours	2.50 Pieces/h
 10/15	Expired	Expired
 26/150	5.0 Hours	13.00 Pieces/h

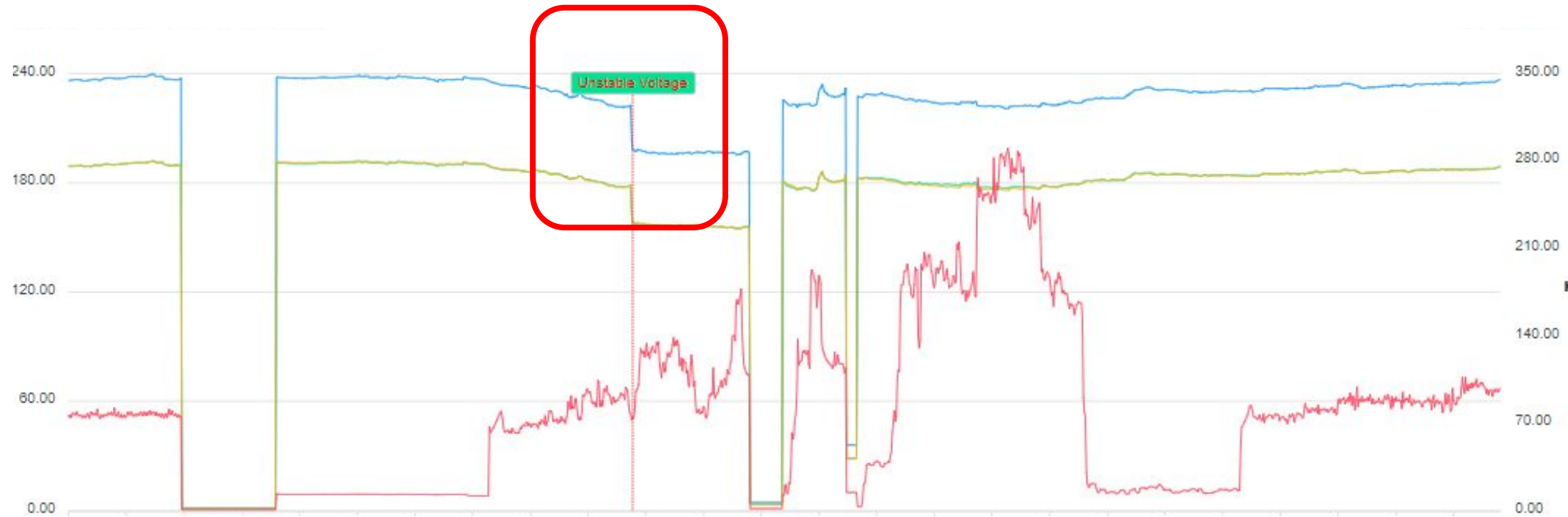
- RT production progress allows managing the sequencing and planning of **machine loading** for better machine utilization, taking into account resource constraints.

# Identify inefficiencies in Cells



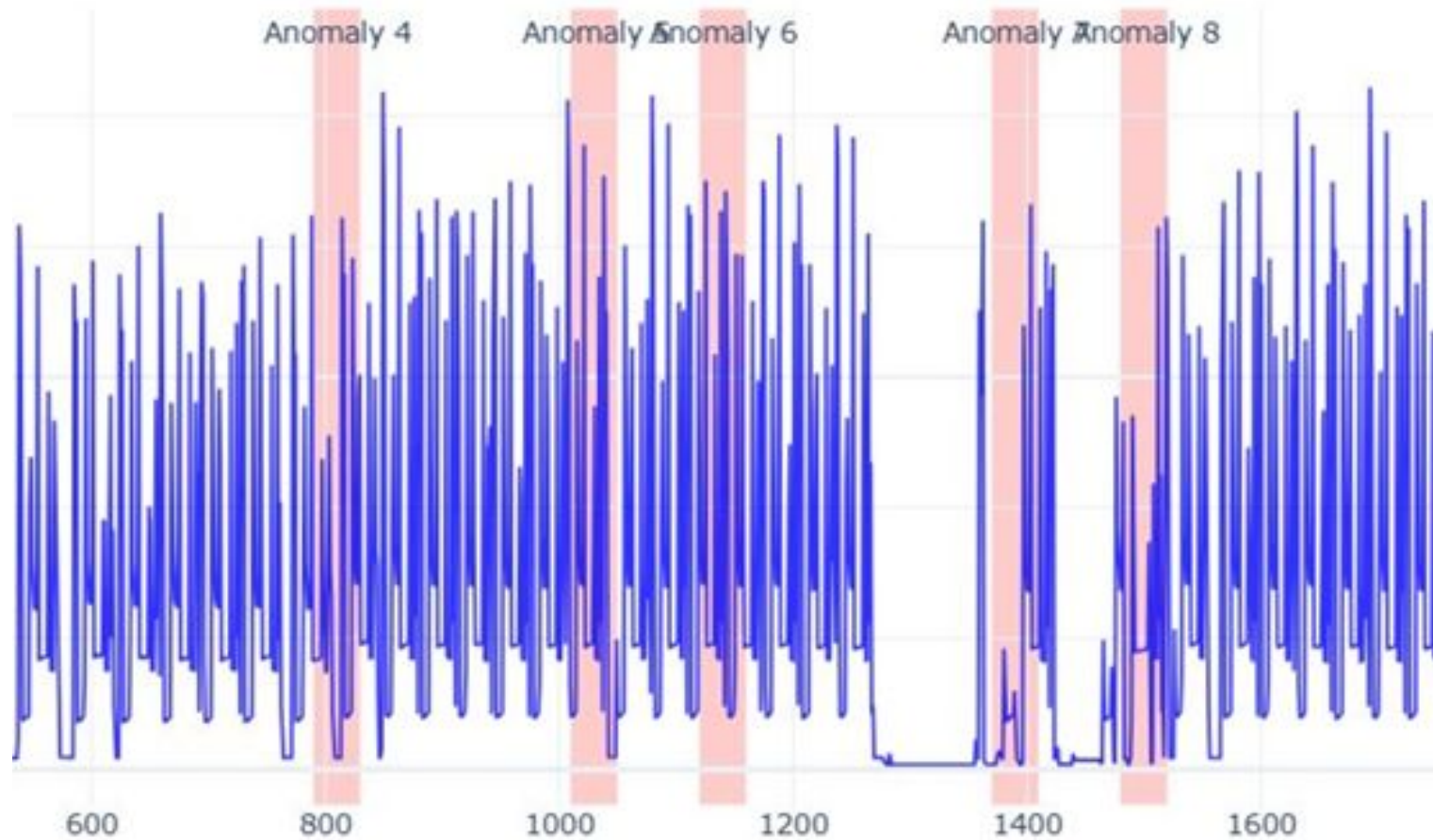
- Tracking KPIs in long lines where we have different cells or machines connected to understand who originates the highest inefficiencies in the overall line.

# Reduce Scrap and uncontrolled process



- **Critical process variables** such as temperatures, pressures, times, are essential to achieve the required quality in each part, so their control in real time is fundamental. **Traceability** is ensured for every variables 1 Sample/s.
- Managers can be **alerted in RT** if there's **any deviation (accidentally or intentionally)** from preset parameters.
- Anomalies can be linked to process variables, So it can be used to **train AI based Quality detection models**.

# Real-Time anomalies detection during plastic transformation



- **Power profiles** reflects anomalies during the process of plastic transformation. Operators can detect in time issues related **to a defect in the mold, a malfunction of the actuator or an incorrect plastic melt.**
- Having immediate knowledge of overconsumption, scrap, defective parts, abnormal feeding etc., allows avoiding big losses

# Master energy consumption per part

- Thanks to the automatic features of calculating both **produced parts and energy consumption**, our solution is able to ensure that **energy consumption is controlled for each part** manufactured.
- Ready to export Energy Intensity per article data for a **rapid Carbon emission reporting**.
- Identify specific **article / operators / machines/ mold** that generates **abnormal energy consumptions**.

## Energy Intensity




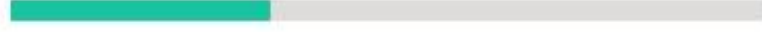
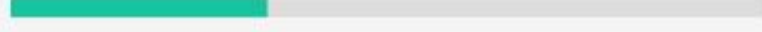

**57.94 kWh/Piece**

Energy = 521.45 kWh

EI = 57.94 kWh/Piece

(A x P x Q) : 45.00 %

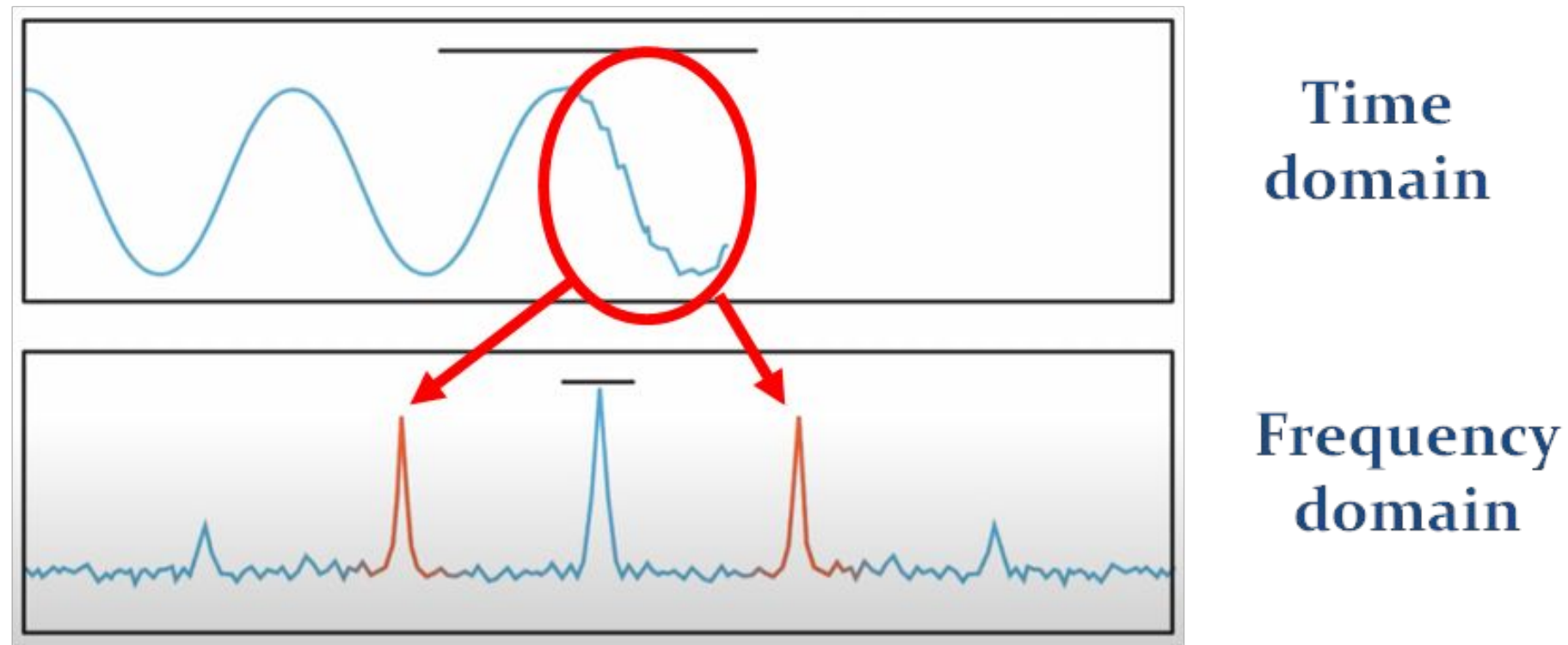
# Machine / Mold maintenance tracking

Designation	Machine	Status	Progress	Days Remaining	Report Services
DC motor Check	Small_External_Coating	Pending		1 day, 6 hours	+
Extruder Full maintenace	Small_External_Coating	Pending		62 days, 12 hours	+
DC motor Check	Big_External_Coating	Expired		-1 day, 9 hours	+
Extruder Full maintenace	Big_External_Coating	Pending		59 days, 20 hours	+
V Belt check	Medium_Outside_Blast	Pending		19 days, 18 hours	+
V Belt check	Big_Outside_Blast	Pending		30 days,	+

- Ensure that cleaning operations, autonomous maintenance by operators are **done at time**.
- Improve **scheduling of machine / mold maintenance** tasks through the **knowledge of the exact day** based on **automatic cycles count**..

# Avoid Hydraulic units / Electric drives breakdown

developing fault appearance in the electrical signals



- Identify early signs of fault within Hydraulic units / Electric drives.

# What to expect from FactoryOps®

## Expected impact with ROI in “2 months”

- **-40% to -70% Stops reduction** through early detection of breakdown / bottlenecks and killing downtime causes.
- **-30% reduction on scraps costs**
- **+15% production speed** by uncovering hidden performance losses.
- **-20% reduction of labor costs** related to quality inspection and machines supervision
- **-30% energy consumption** by avoiding unproductive consumption.
- **Financial control** of production runs according to pre-calculations
- **90% pricing accuracy** during negotiations

# Potential Savings:

**avg 45k\$ / year per machine**

- Downtime reduction (40%)
- Scrap reduction (20%)
- Workforce optimization (15%)
- Energy Efficiency (15%)
- Financial control of runs (10%)

# Key Takeaways

- Real Time machine data visibility at the lowest costs creates many opportunities for quick wins

- Quality defect identifications and cycles count are easily obtained in Real Time

- Machine/ Molds breakdowns are avoided with Digitized Maintenance

- During production knowledge of cycles characteristics enables huge savings

- Significant cost savings are now possible by part related energy consumption

- Workforce costs are reduced by smart early alerts on process inefficiencies





**Wondering if**  
**Amperon' FactoryOps<sup>®</sup>**  
**will work for you ?**

**Book a 30 min Free Demo**

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