
# Digital Solutions and AI in Waste Sorting Plants

09. Juni 2026

# Our history: From blacksmith to building turnkey sorting plants

**1791**
Anton Stadler

**1960**
Wilhelm II Stadler

**1991**
Willi Stadler

**2023**
Julia Stadler

Forge

Metalworking shop

Turnkey plants for waste sorting

# STADLER at a glance


## Heritage

- Family run since 1791
- 8th generation leadership

## Core business

- Design and construction of turnkey waste sorting plants

## Market position

- Market and technology leader with 700+ plants worldwide

## Scale

- 650+ employees worldwide
- HQ: Altshausen, Germany

# We our experts for conveyers, screen drums, ballistic separators, delabelers, dewiring units and air drum sifters

# STADLERconnect: Combining machine and material data

STADLER® connect

**Machine Data** — **Material Data**

## Digital Maintenance

- Downtime Tracker
- Predictive Maintenance
- Blockage Detection
- Maintenance Task Manager
- 3D Twin

✓ Higher plant availability
✓ Reduced maintenance costs

## Adaptive Plant Control

- Adaptive Screen Cut Control
- Adaptive Material Split Control
- Adaptive Ballistic Separator Control
- Adaptive Windsifter Control

✓ Better sorting performance
✓ Stable plant operation

## Material Intelligence

- AI Material Compass
- Production Report
- Volume Flow Monitoring

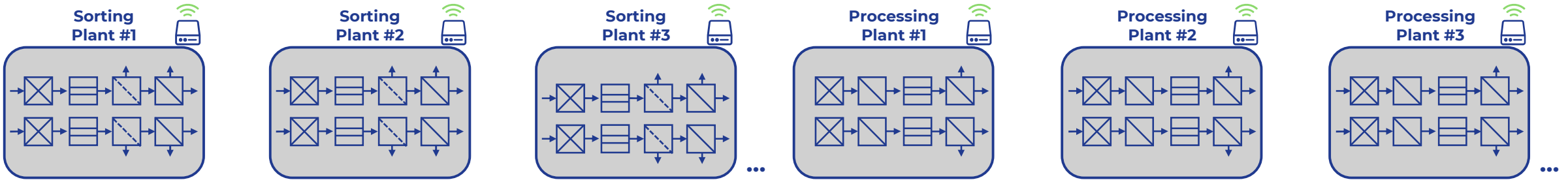
✓ Transparency and mass balance
✓ Real-time quality control

# STADLERconnect: The integrated platform for sorting plants

STADLER® connect

- **Live-Dashboards in the plant**
- **Control room**
- **Plant / HQ management**
- **Smartphone on the go**

- **Standardized reporting and access across multiple plants** in a single platform
- **Seamless data integration** from various OEM suppliers and external data sources
- **Continuous software updates** (new features and improvements shipped every 2 weeks)
- **Safe and future-proof:** State-of-the-art cloud architecture and build-in cybersecurity



# STADLER connect is sold to 40+ plants across 11 countries

Our customers include...

WM WASTE MANAGEMENT
prezero
REPUBLIC SERVICES
iren
INDAVER
SORTIER KONTOR NORD
TERNA GEK TERNA GROUP
Reiling Unternehmensgruppe
BZB BIZKAIKO ZABOR BERZIKLATEGIA
gaia
GOA
a2a
LIMASA
FCC Environment
VEOLIA
ECO URBIS
EKO FLOR PLUS
WRZ Hörger
NEMETZ

across 11 countries...

# 5 Theses: Digial Solutions and AI in Waste Sorting Plants

# These 1: Data-driven process optimization

**Data-driven adjustments of sorting parameters lead to a significant improvement in yield and material purity.**

# Adaptive Screen Cut Control: Smart balancing of sorting lines

## From uneven line distribution...

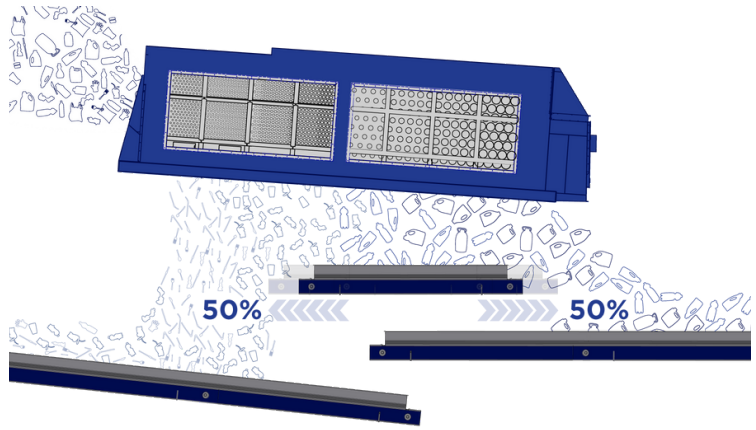
- Variance in inputs and throughput
- Reduced processing performance due to fluctuations
- Increased blockage risk
- Unequal material distribution across processing lines
- Frequent operator interventions with manual implementation

**Challenge**

Suboptimal plant performance due to missing adjustments of screen cut to changing waste streams

## ...to optimized sorting performance

- **Downstream sensor system** monitors material flow
- **Sensor-based adjustment** of the movable conveyor under the screen drum
- **Adjustment of screen cuts** by moving unit position and/or reversing the direction of conveyor belt




Patented by STADLER

**Solution**

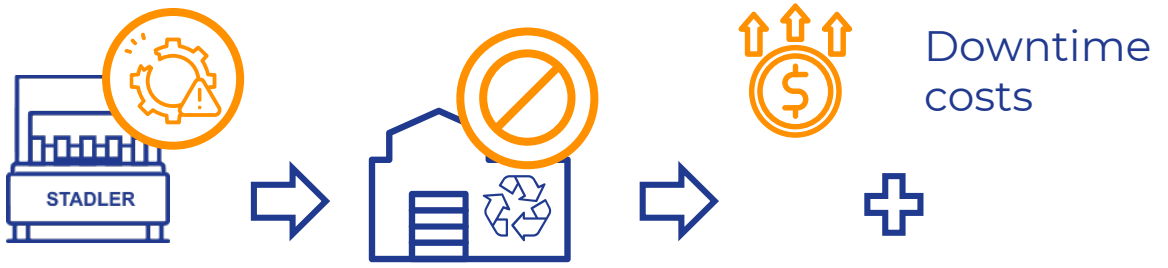
Intelligent adaption of conveyor belts to regulate discharge into two downstream processing lines

# These 2: Predictive Maintenance

**AI-supported machine condition monitoring helps minimize unplanned downtime and increase overall plant availability.**

# Predictive Maintenance: Prevent expensive emergency repairs

## From sudden equipment failures...




**Challenge**

Unplanned maintenance events due to equipment failures cause unplanned downtime and expensive emergency repairs

## ...to machines available when needed


Patent application filed by STADLER

**Solution**

Early equipment failure detection through proactive condition monitoring, enabling predictive maintenance planning

# Predictive Maintenance can save up to ~204,000 EUR per year

| Cost category | Without Predictive Maintenance |
| --- | --- |
| **Unplanned downtime** | • **~4 critical cases** per year<br>• **~17 h downtime** per case<br>• **~3,000 €/h** downtime |
| **Total** | **~204,000 €/a** |

# Predictive Maintenance: 22+ critical damages already prevented

## Prevented damages for 200+ monitored assets


8x Broken shaft
1x Paddle friction


1x Broken shaft
1x Motor issue


1x Broken wheel


3x Broken shaft
1x Broken motor
1x Broken bearing


5x Ventilator clogged


1x Bearing damage

**12** Broken shafts

**5** Clogged ventilators

**2** Motor damages

**2** Bearing damages

**1** Broken wheel

**1** Paddle friction

# These 3: Transparent Material Flows

**Digital platforms can create end-to-end transparency of recyclable material flows.**

# Production Report: Live monitoring of in- and output quantities

## From missing transparency…

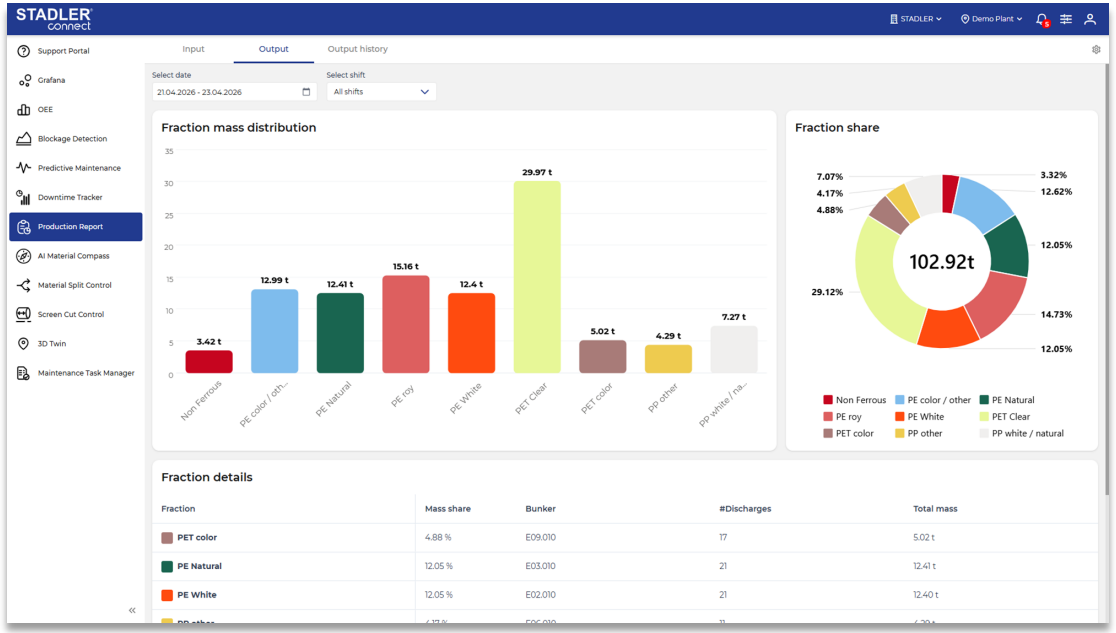
Estimation and manual recording of production quantities

Fragmented systems and formats for recording

Slow detection of irregularities in plant operations

No clear and centralized pic-ture of plant performance

## …to real-time monitoring of production KPI's in one dashboard




### Challenge

Inefficient organization of logistics and input composi-tion planning without production quantities monitoring

Patent application filed by STADLER

### Solution

Near real-time overview of bales, bunkers and distribution of material fractions

# These 4: Automatic material analysis

## Artificial intelligence enables automatic analysis of material stream quality

# AI Material Compass: Automatic analysis of material stream quality

## From manual sorting and sampling…

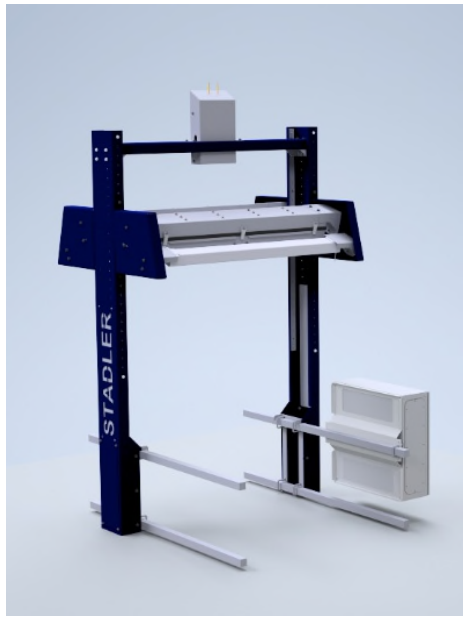
- High personnel costs
- Sampling errors
- Subjectivity
- Lack of real-time insights
- Undetected quality issues
- Missed optimization opportunities

**Challenge**

Material quality is often unknown or checked irregularly with sampling and manual sorting analysis

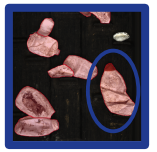
## …to automated inline monitoring of material streams

AI Material Compass Bridge

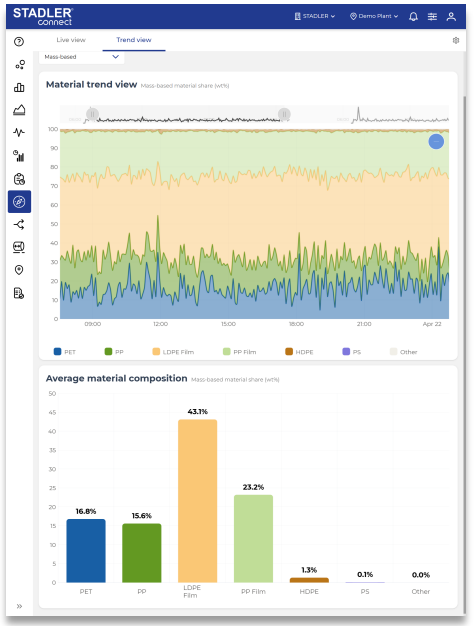



NIR

RGB



Dashboard and Analytics




Patent application filed by STADLER

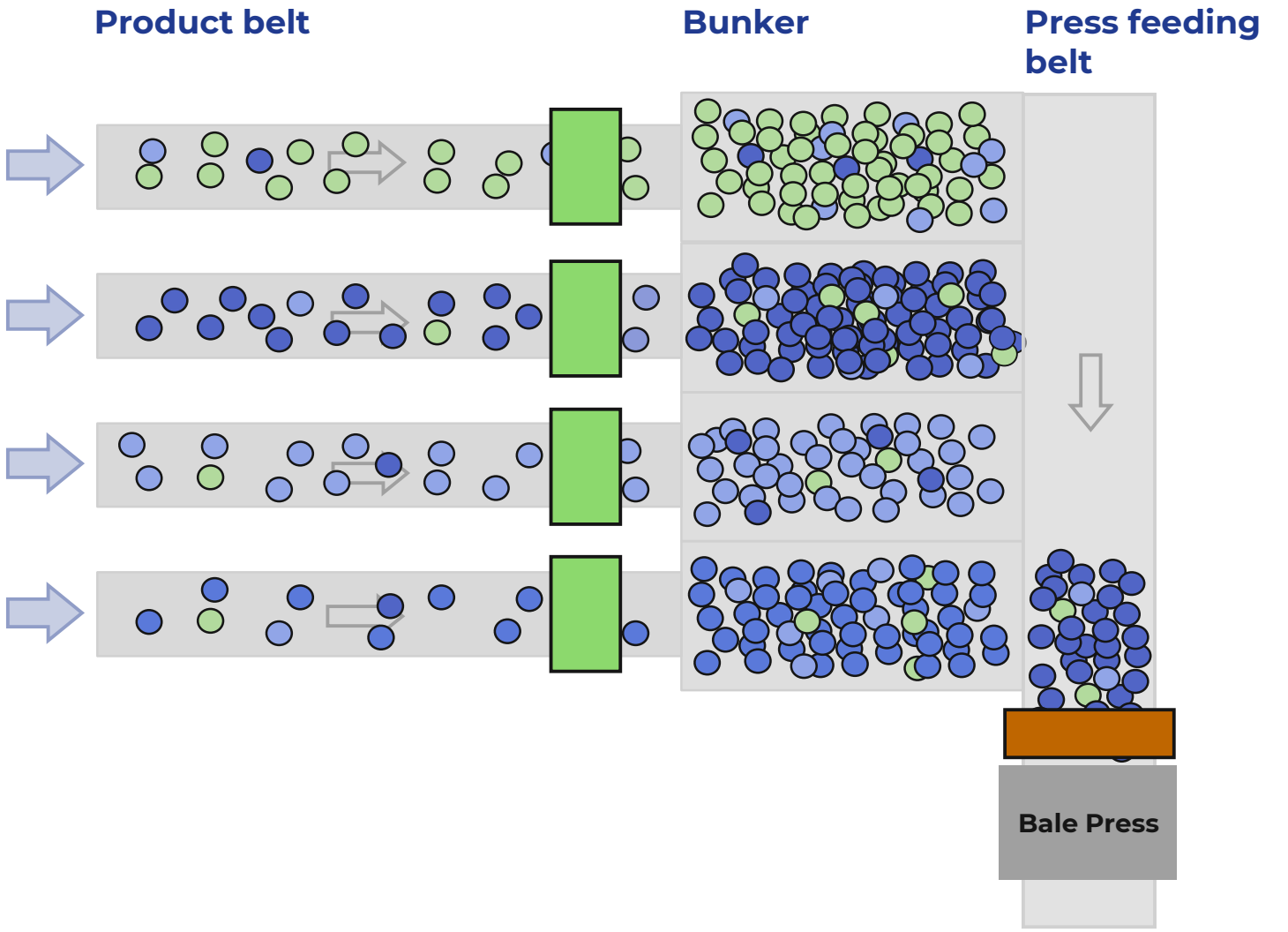
**Solution**

Automated inline monitoring of material regarding its mass-based composition and purity

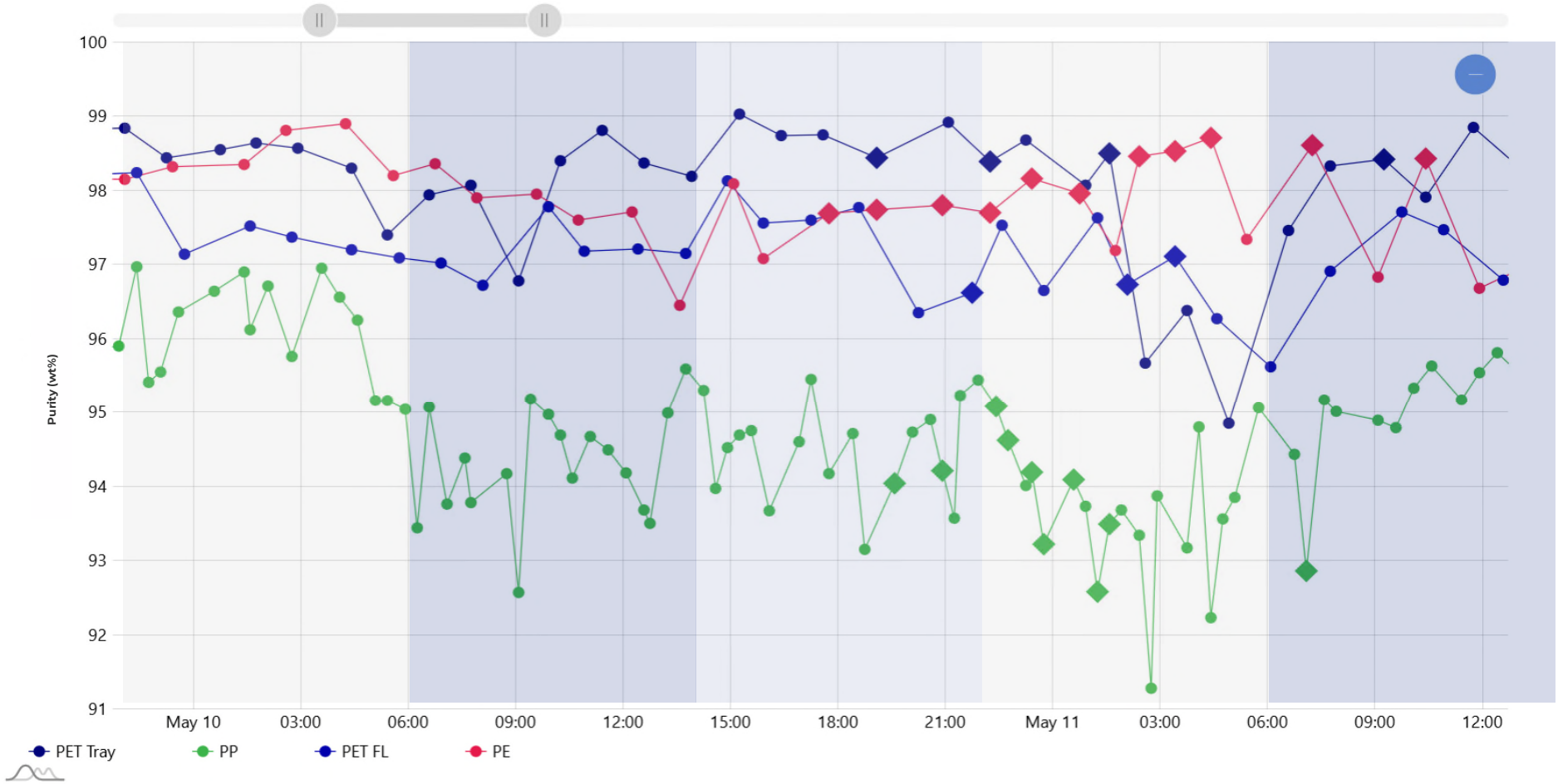
# AI Material Compass: Sensor bridges to check fraction quality

## Features

- **Monitoring of each product stream** (material + colour) with very high accuracy
- **Live determination** of article- and mass-based material and colour composition (combin-ing with plant data)
- **Hyperspectral near-infrared and high-resolution RGB sensors combined with AI** for robust and accurate material/colour detection



# AI Material Compass: Example use cases for output




Night shift | Morning shift | Afternoon shift

## These 5: Human-Machine Interface

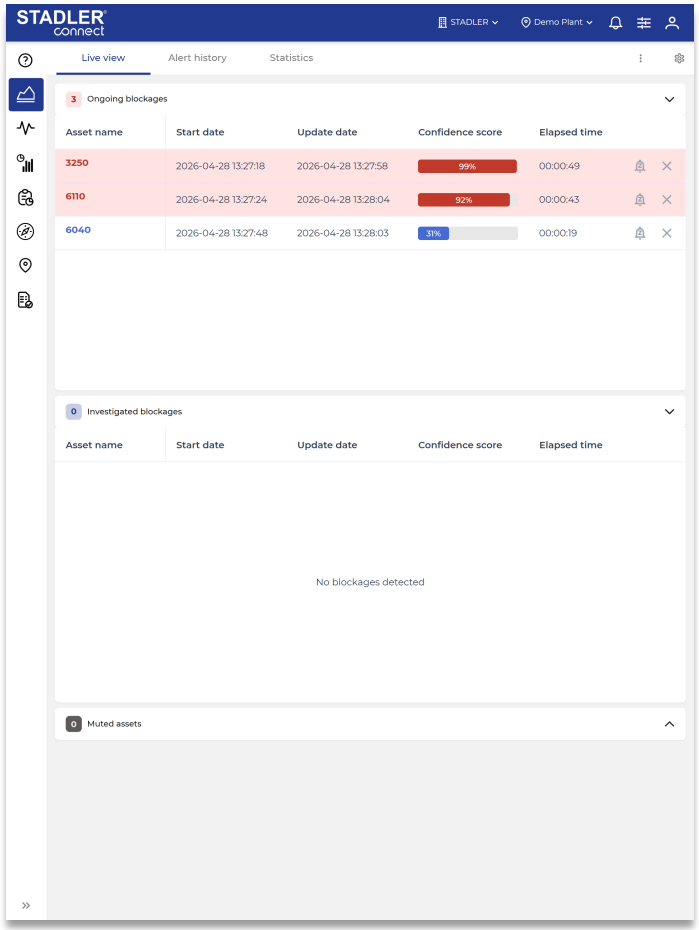
**Plant operation can be improved through intuitive digital human-machine interfaces.**

# Blockage Detection: With live alerts operators can react faster

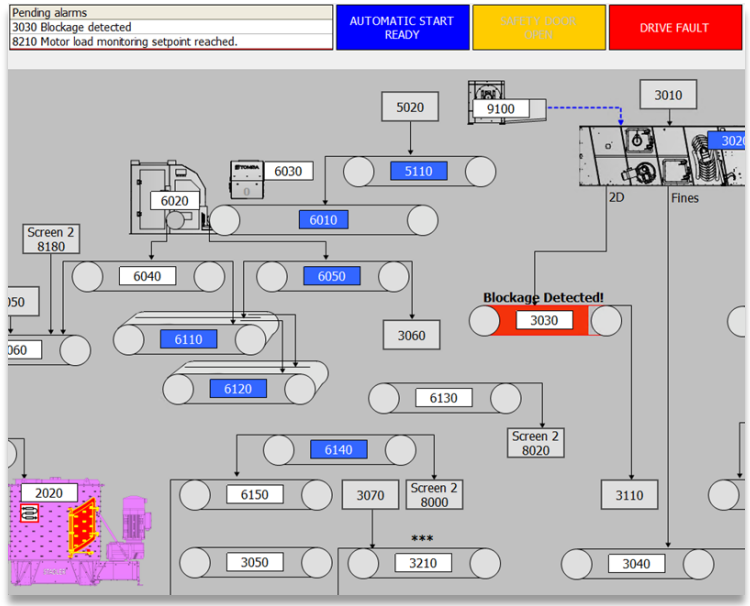
## Features

- **In-house-developed smart blockage algorithm** for accurate and early detections
- **Automatic real-time monitoring** of all conveyors
- **Live dashboard** with notifications for direct operator notification
- **Confidence score** to indicate urgency for operators

## Live view of ongoing and investigated blockages




## Live alarms integrated in SCADA for faster reaction

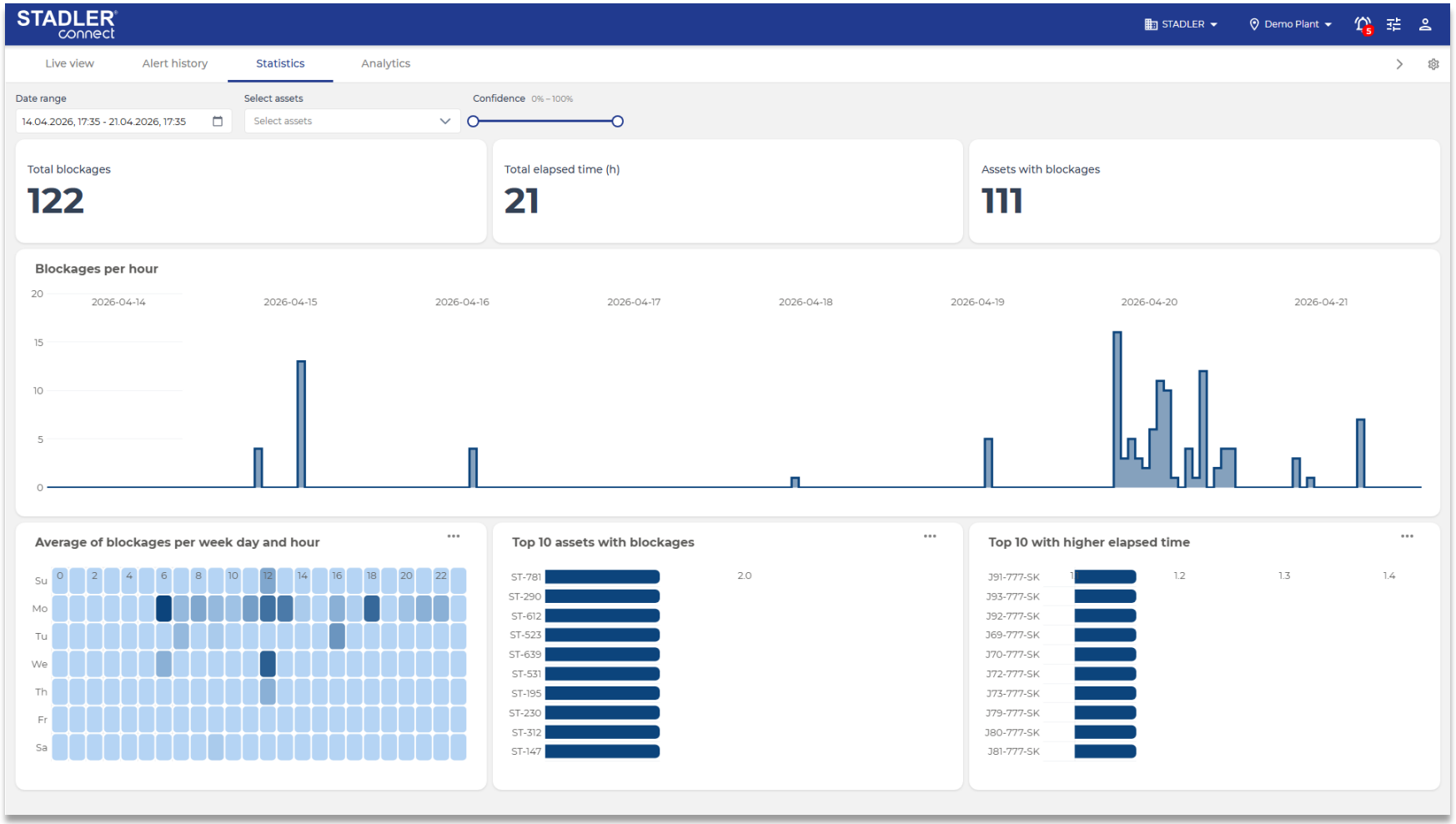


# Blockage Detection: Statistics support strategic plant optimization

## Features

- **Automated reporting of**
  - all detected blockages per time and asset
  - hot spots for strategic plant optimization
- **Heatmap** for detecting critical shifts

## Statistics view



# Summary: AI in sorting plants

1. Optimize sorting processes in real time using AI-supported analytics.
2. Minimize unplanned downtime through predictive machine condition monitoring.
3. Create end-to-end transparency of material flows from input to output.
4. Enable automatic analysis of material stream qualities.
5. Improve plant operation through intuitive digital human-machine interfaces.

# Thank you

For your kind attention