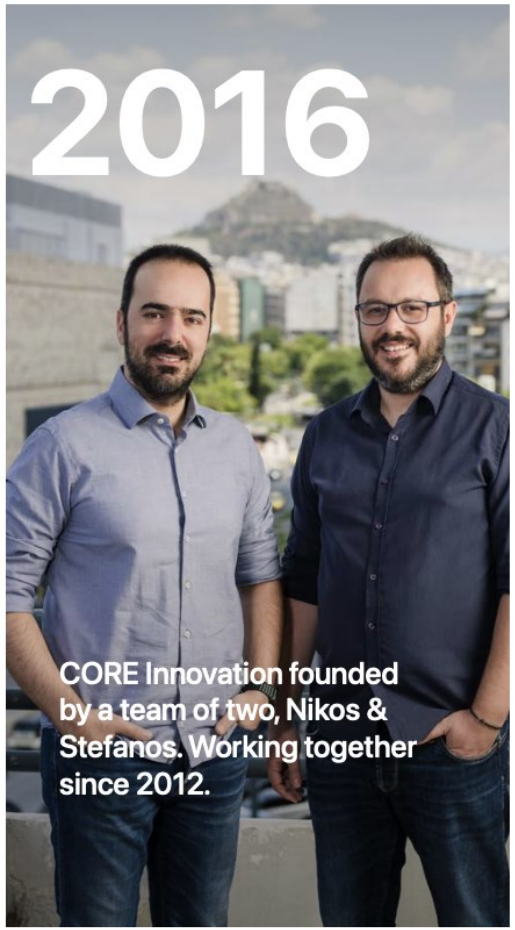
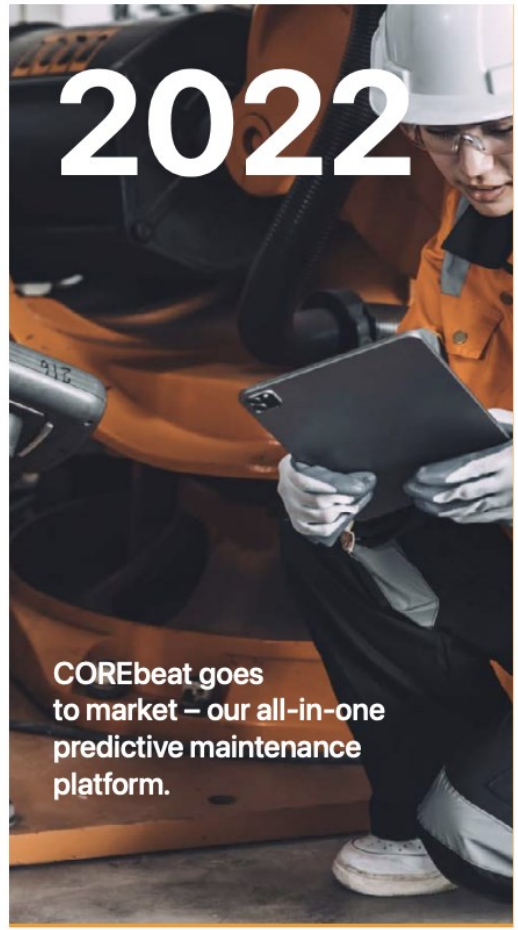
AI Unearthed: The Digital Makeover of Mining Operations

Stefanos Kokkorikos
Founder, Managing Partner
CORE Group


2016
CORE Innovation founded by a team of two, Nikos & Stefanos. Working together since 2012.

2019
Our team of 14 is growing at 50% rate annually.
10 projects and a total of 1 million € funding reached.

2021
The CORE Innovation Centre is founded to co-create and develop Industry 4.0 solutions, connecting industry and academia.


2022
COREbeat goes to market – our all-in-one predictive maintenance platform.

Founded in

2016

260+

Partners across Europe

40+
Projects

H2020+ HORIZON EUROPE
NSRF

12M+ €

EU Funding

What are the challenges the mines are facing today?

Future-proof challenges in the mining industry

Safety concerns

Operational Efficiency

Environmental Impact

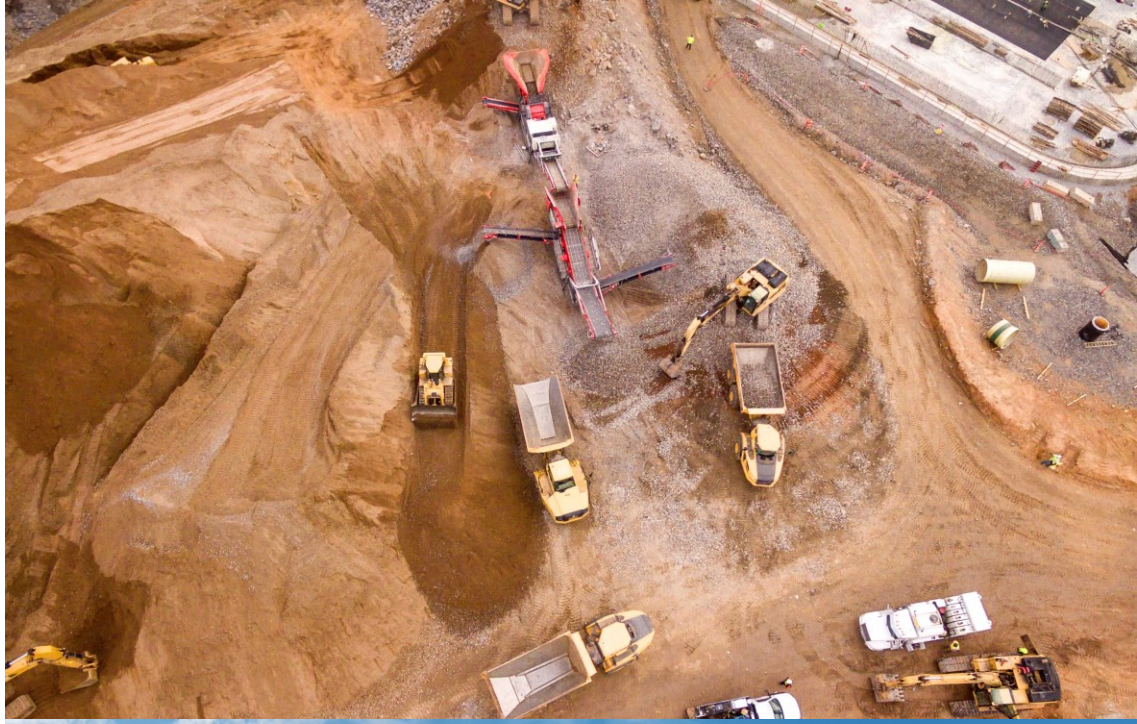
Sustainability Pressure

Adoption of innovation in mining

Enhanced Safety and Risk Management

AI-powered monitoring systems can predict equipment failures and mitigate risks by enabling smart maintenance

Autonomous vehicles and drones can perform hazardous tasks, significantly reducing workplace accidents and ensuring miner safety.



Increased Operational Efficiency

Machine learning algorithms analyse data from sensors and equipment to optimise mining operations

increased resource recovery

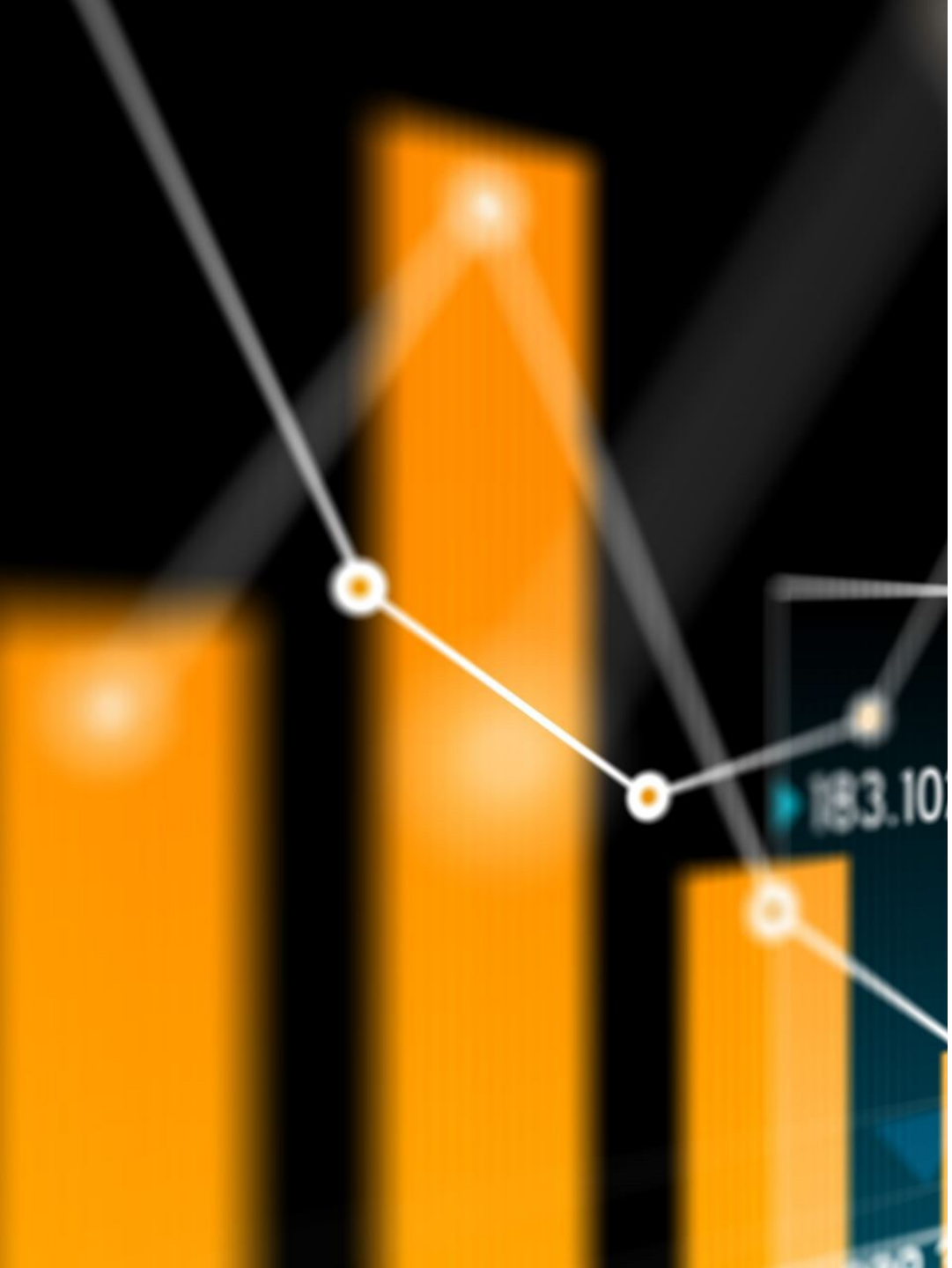
reduced energy consumption

minimized downtime

Environmental Impact Reduction

PRECISE RESOURCE MAPPING AND EXTRACTION TECHNIQUES, RESULTING IN MINIMAL ENVIRONMENTAL DISRUPTION

MONITOR ENVIRONMENTAL DATA TO ENSURE COMPLIANCE WITH REGULATIONS AND SUPPORT SUSTAINABLE PRACTICES LIKE REFORESTATION AND WATER MANAGEMENT.



Supply Chain and Market Predictability

enabling better forecasting

reducing stockpiles

ensuring a more efficient route to market

aligning production with market needs and price optimization

what is digital transformation?

Digital Transformation

- Data acquisition – Sensors
- Connectivity
- Cloud & edge computing
- Data analytics
- AI-based insights and decision support
- Smart visualisation
- Digital twin

Digital Mine

Physical Mine

A real case – A flagship project

mastermine

European Mining in the Green and Digital Era

Co-funded by
the European Union

The Mastermine consortium

Partners

South Africa

University of the Witwatersrand, Johannesburg

Cyprus

Stratagem Research · Innovation

Finland

Tampere University
Tampere University of Applied Sciences

Germany

Fraunhofer ISE
Digital Twin Technology
IOTA

Greece

Aristotle University of Thessaloniki
LIBRA
ICCS
AuroraGeo
core

Italy

terraque

Poland

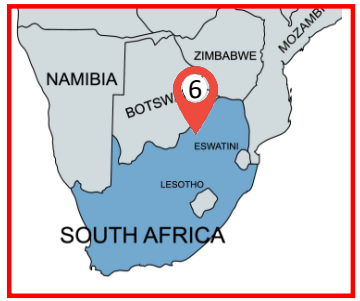
GiG Research Institute

Spain

eTICAS Foundation
DARES
Subterra

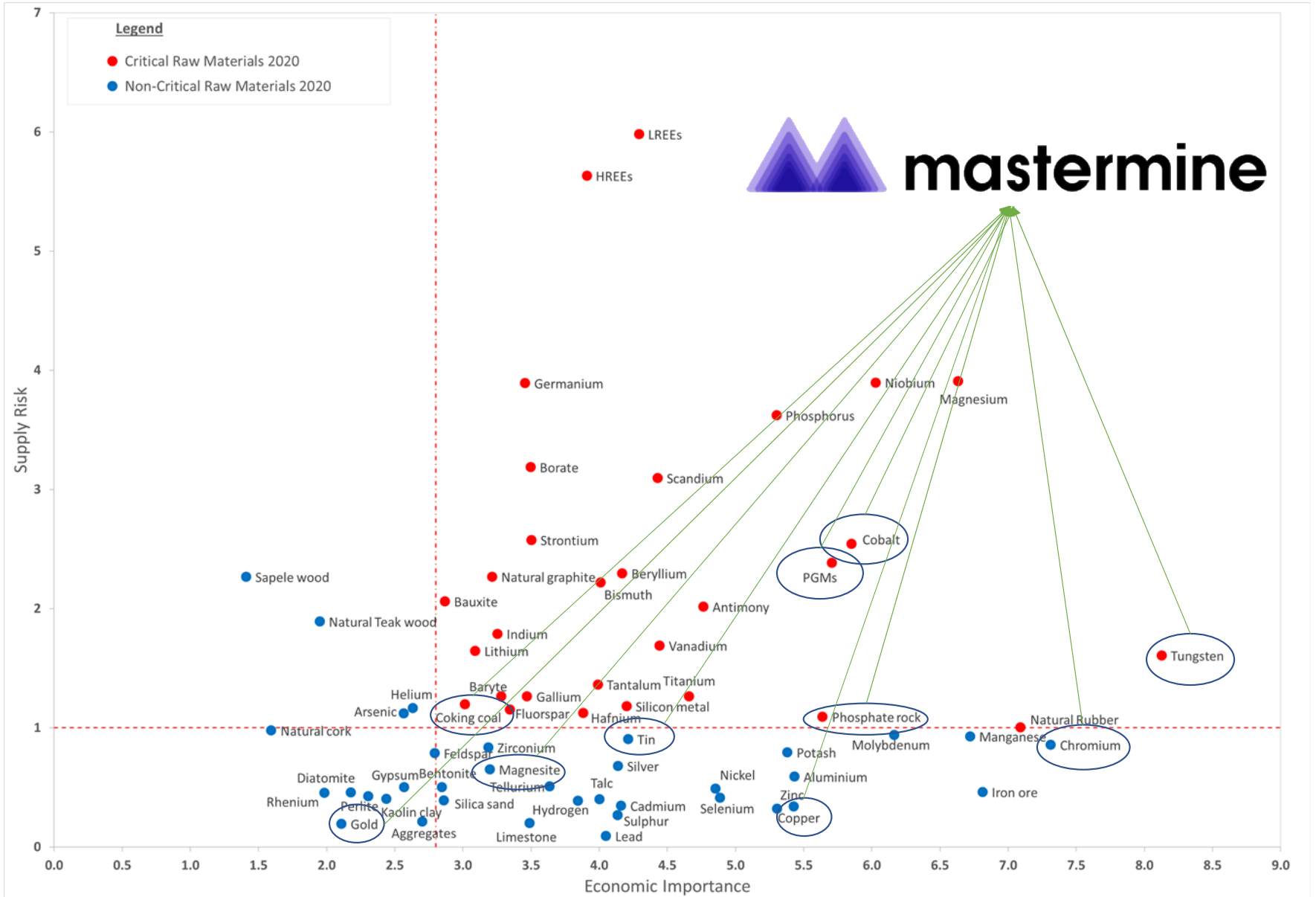
Use cases

1. Tapojärvi
2. JSW SA — We mine all the best
3. Terna Mag — GEK Terna Group
4. Tharsis Mining
5. La Parrilla
6. Sibanye Stillwater — we are one

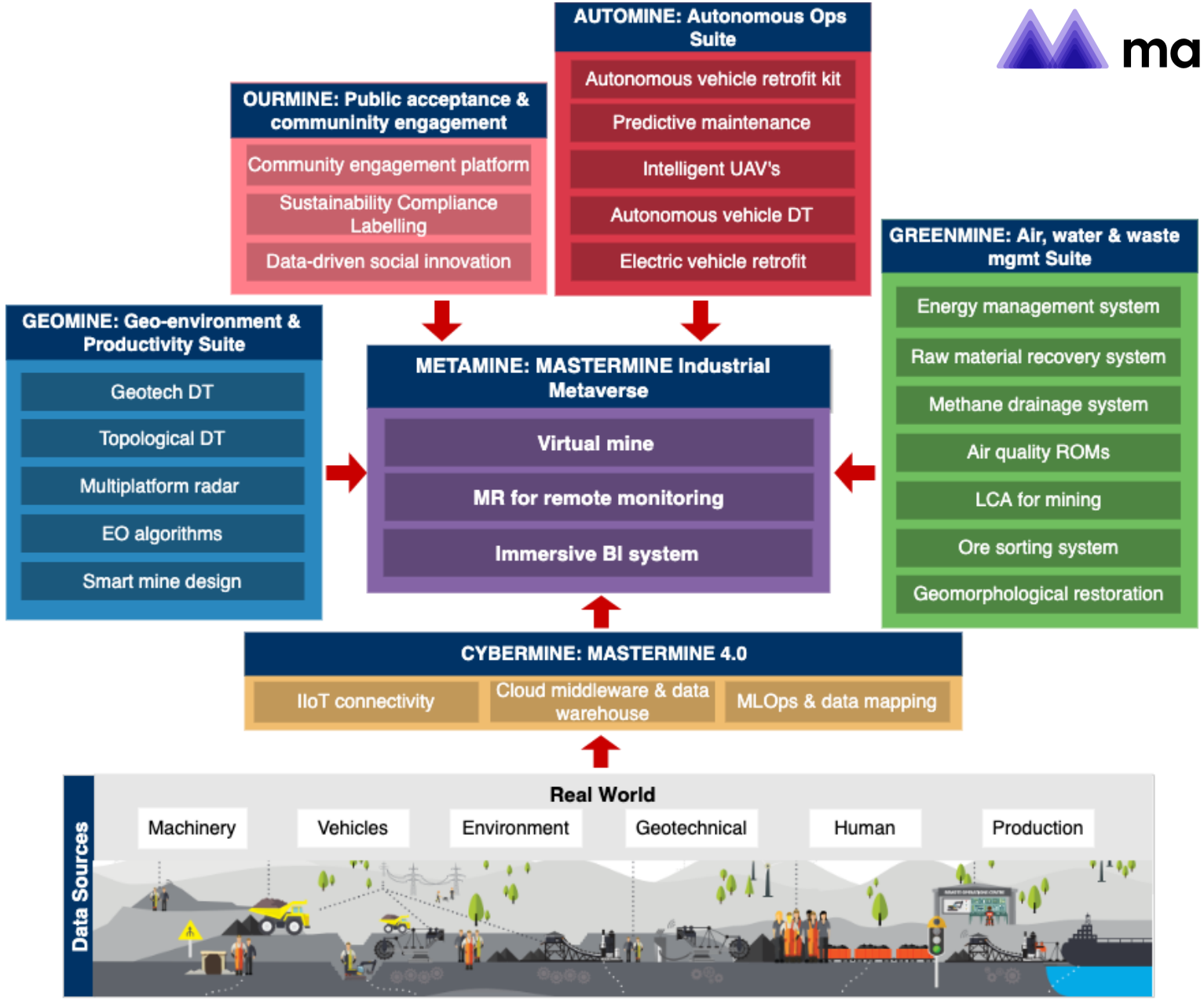


MASTERMINE aspires to become the go-to ecosystem for mines that envision digitalisation, environmental sustainability, productivity monitoring and public acceptance within their strategic goals.

Mastermine and Critical Raw Materials



The Mastermine concept



The Mastermine platform

CORE IC responsible for the digital transformation of TERNA MAG mines in N. Evia, Greece

- What is the current status?
- What data can we use? How do we extract more data?
- What are the challenges due to topology, operations, resistance to change?

Mastermine cloud-based platform using smart sensors, IoT, edge/cloud computing and user-friendly UI

Predictive maintenance for critical assets

Heavy equipment monitoring for preventing failures, vibrations and other issues leading to downtimes

Reliability of dewatering systems for leakages prevention

Predictive maintenance on critical scaling machine components, ventilators, and vehicles

Energy management

Energy Management Systems for high energy consuming equipment, assets and processes to track and analyse energy usage to identify areas for improvement in terms of costs and resource optimization

Forecasting of fuel consumption in transport vehicles for better planning and more efficient operation

Which is the technology behind this?

All-in-one Industry 4.0 platform

An interactive visualisation of your machines' health.

core beat

Predictive Maintenance made simple

Our own proprietary waterproof hardware with sensing and computing capabilities.

What benefits does it bring?

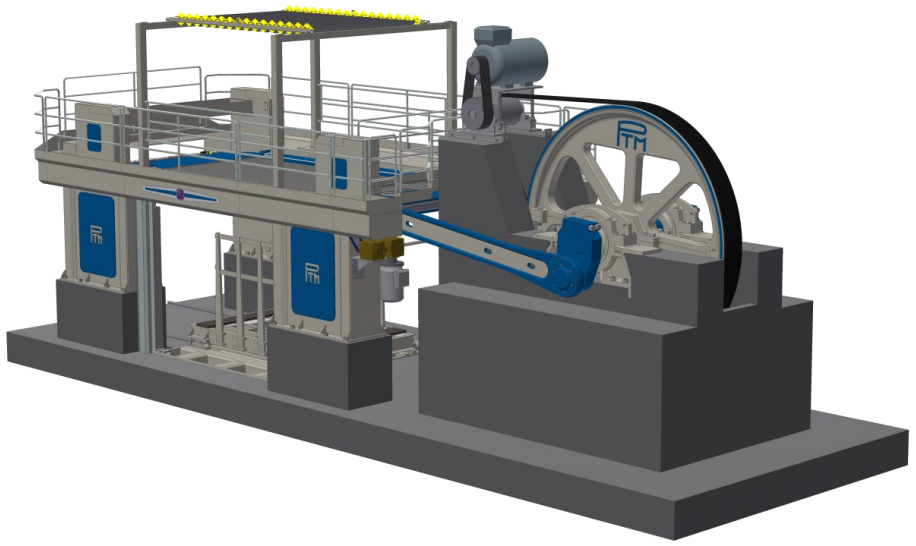
Maintenance & production cost minimisation

Reduced planned and unplanned downtime

Inventory & production availability optimisation

Increased lifespan of machinery

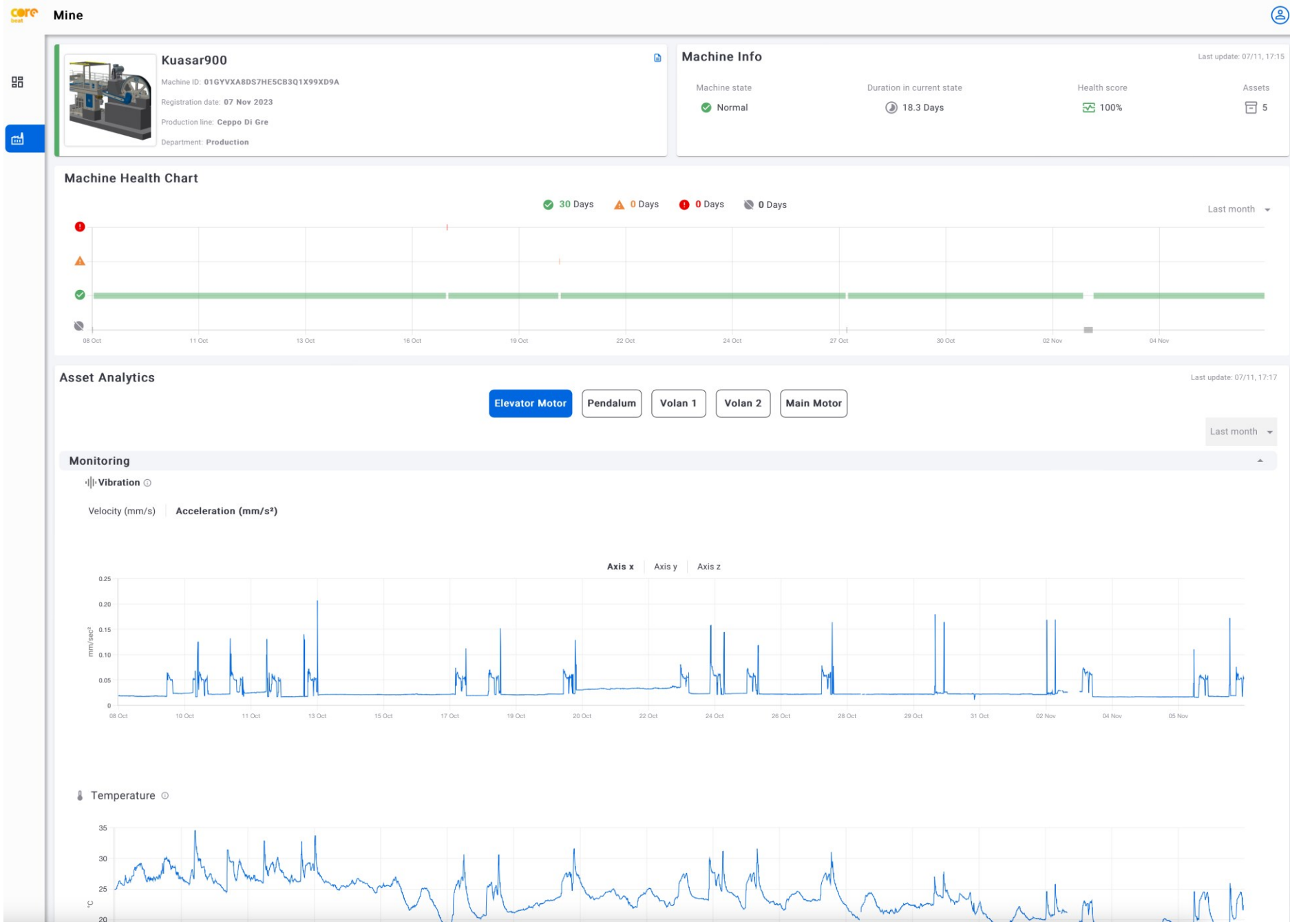
Real world case studies



Marini Marmi quarry

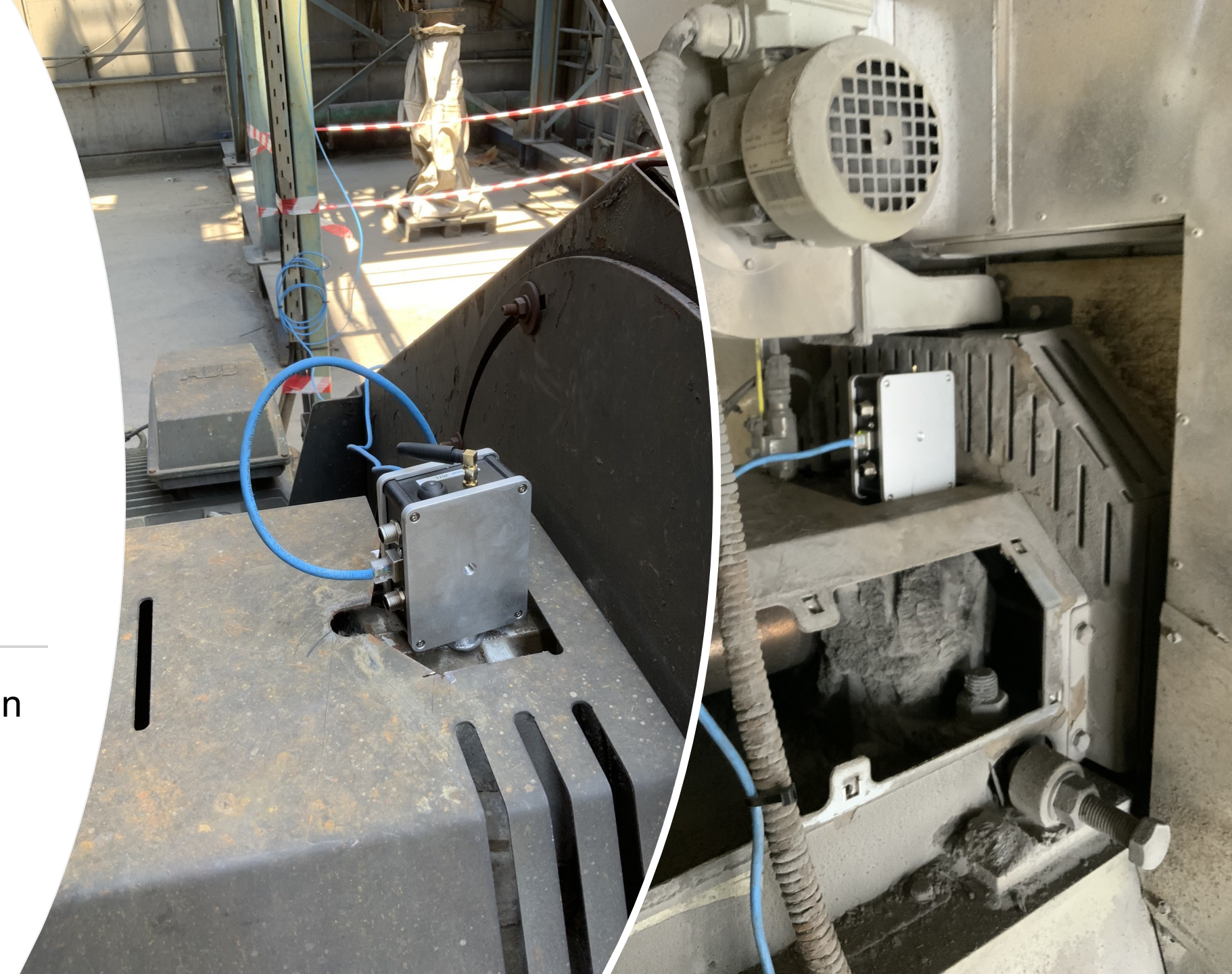
Installation of COREbeat on a Kuasar900 gang saw

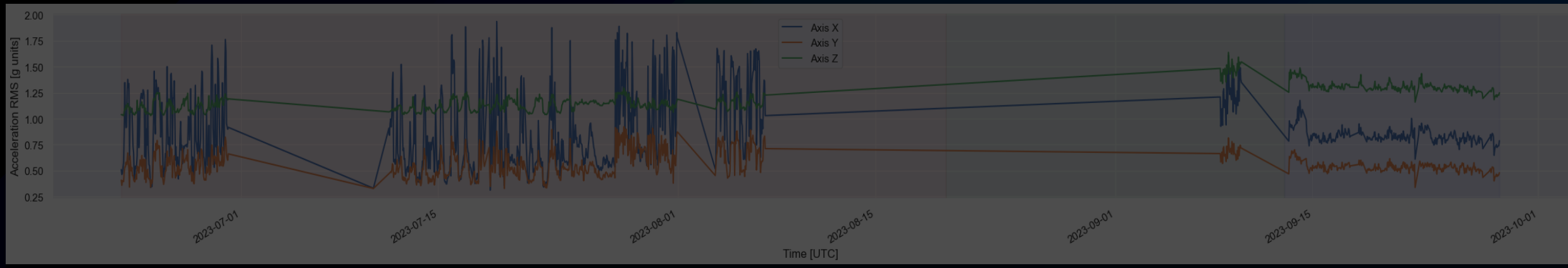
Last month monitoring in gang saw use case

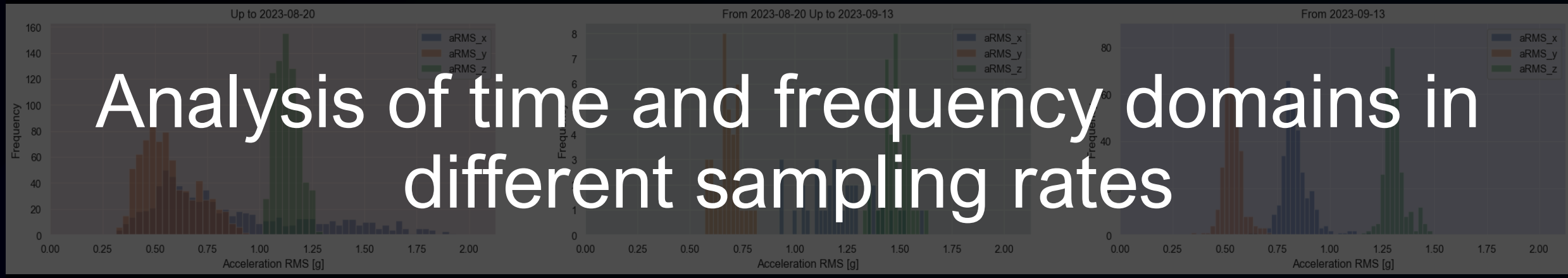


EP.AL.ME. – Aluminium recycling

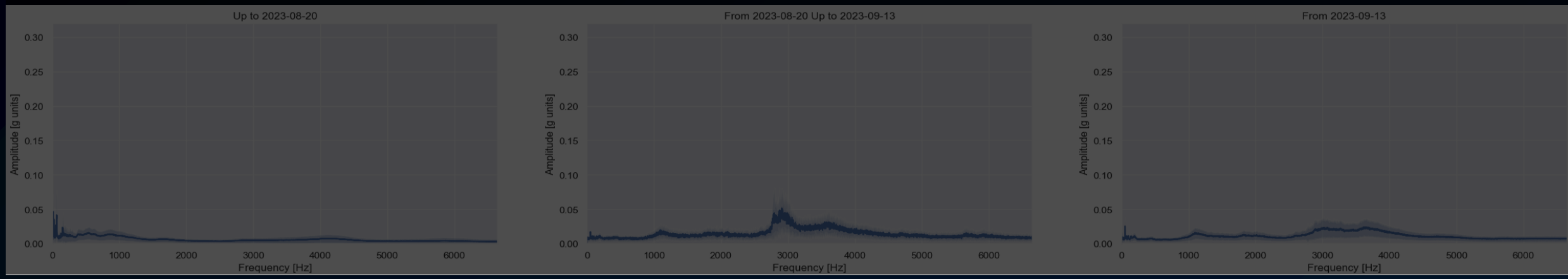
Installation of COREbeat in 2 fan systems



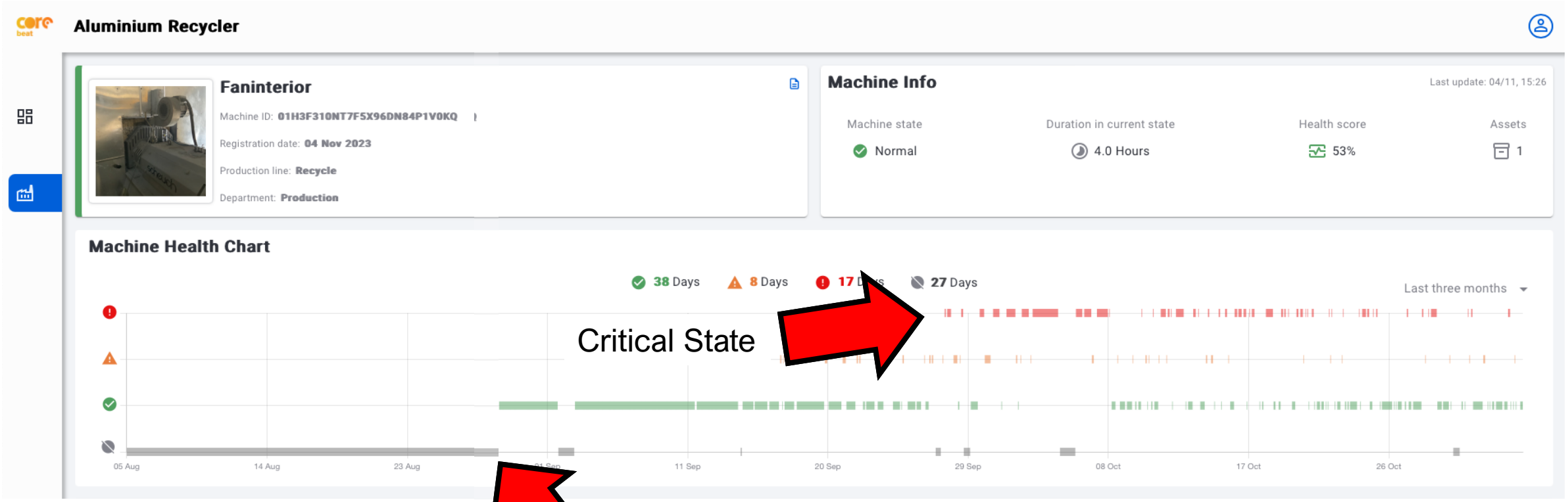




Analysis of time and frequency domains in different sampling rates

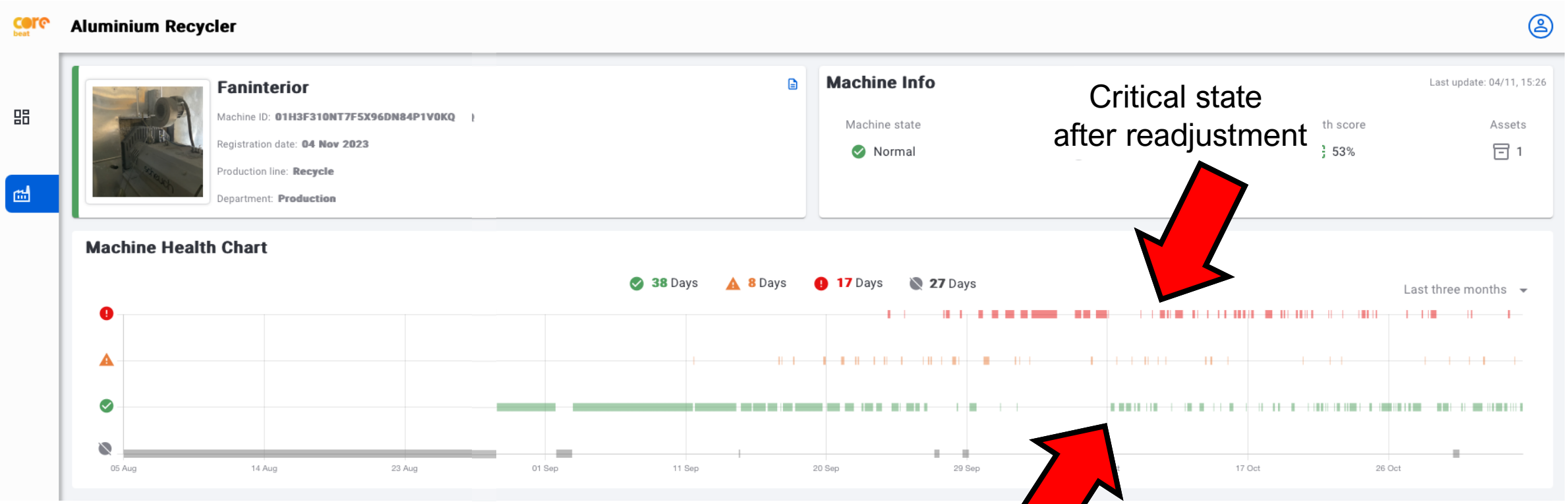


Critical issue revealed



Summer Maintenance

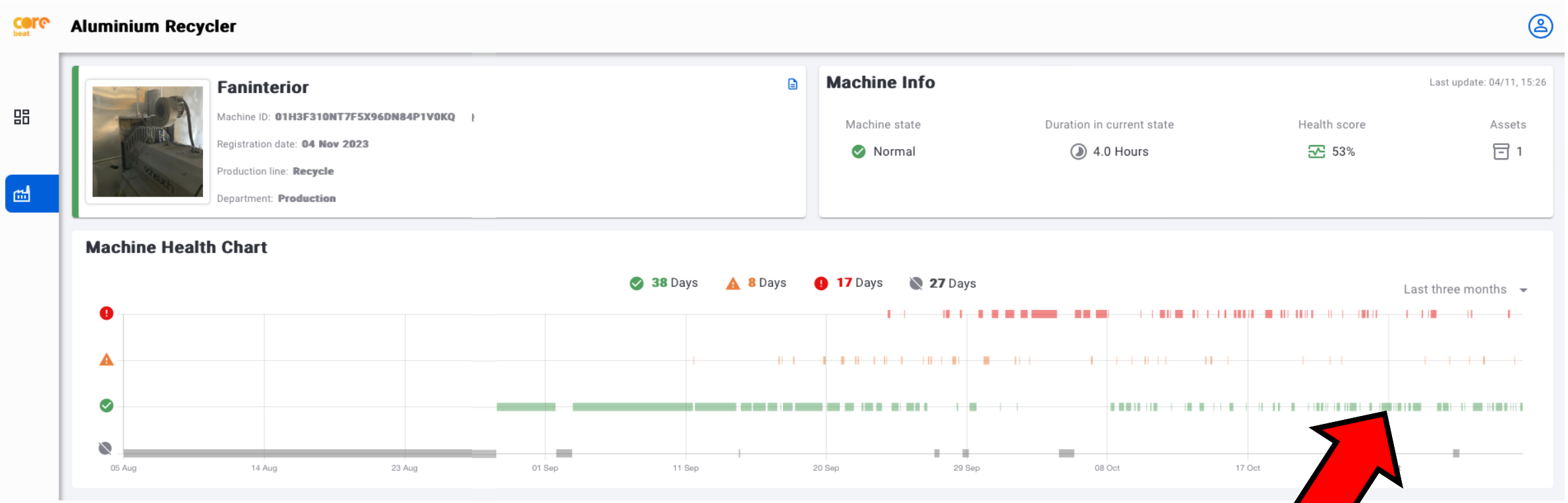
Critical after declared normal



Critical state after readjustment

Readjustment of model based on end-user's feedbaack

Critical after declared normal



User confirms problem

COREbeat always identified the actual state, even after adjustment

In the landscape of innovation, data is the new gold, and digital transformation is the mine.

Let's harness this wealth to shape the future of mining.

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