

For Industry 4.0

Construction for Intelligent Manufacturing Line by Implementation of Smart Machines



RESHENIE Co. Ltd

2024. 08. 05

For Industry 4.0
Construction for Intelligent Manufacturing
Line by Implementation of Smart Machines



01

Introduction



01 Company Introduction

» Introduction

- ▷ Name: RESHENIE Co., Ltd. (149-86-02229)
- ▷ Establishment: 2018. 10. 01 (Conversion to corporation: 2021.05.01)
- ▷ Representative: Kim Su-kyung
- ▷ Purpose: Develop and supply core solutions for smart manufacturing
- ▷ Items: Predictive maintenance solution (sensor, data collection, AI-based platform), process management solution (PLC/PC-based), digital twin
- ▷ Location: Room 601, Gwanggyo Flex Desian, 50, Changnyong-daero 256beon-gil, Yeongtong-gu, Suwon-si, Gyeonggi-do (Room 602, ACE Room 406)
 - Corporate research center (21.10.07)
 - Professional research business operator (22.02.10)
 - Registered as a venture business (22.08.10)
 - Selected as an excellent venture company (R&D sector, 23.07.11)
 - Innobiz certification (24.02.19)

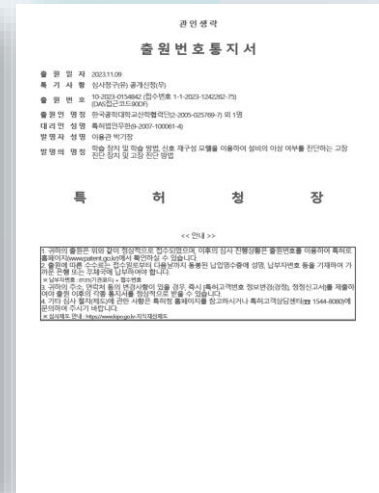
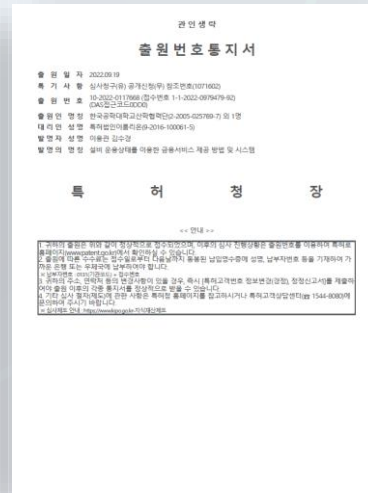
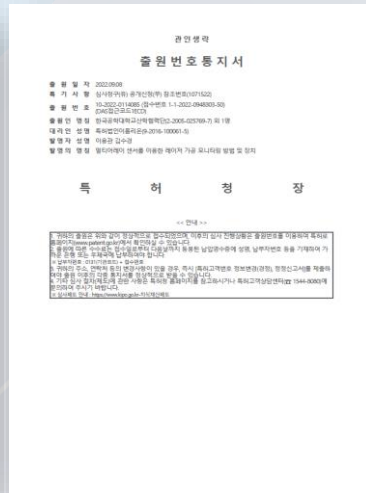
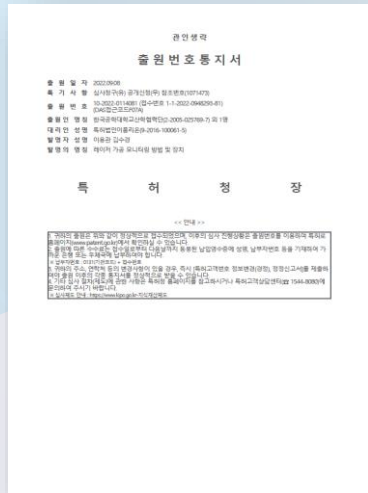


01 Company Introduction

Secure core technology (patent)

1 core patent registered, 4 applications being processed

번호	Title	Registration No.	Date
1	Steel pipe inspection system using acoustic signals	No. 10-2619802 (registration)	
2	Laser processing monitoring method and device	2022-0114081	2022. 09.
3	Laser processing monitoring method and device using multi-array sensor	2022-0114085	2022. 09.
4	Method and system for providing financial services using facility operation status	2022-0117668	2022. 09.
5	Learning device and learning method, fault diagnosis device and fault diagnosis method for diagnosing equipment abnormalities using a signal reconstruction model	10-2023-0154842	2023. 11.



01 Company Introduction

» Leading the latest technology through academic exchange

• Holds 9 papers related to new technology

No.	Title	Academy	Announcement date
1	Research on predictive maintenance technology for large forging presses using smart IoT sensors and edge computers	KSNVE / Spring Conference	2021. 05.
2	Detection of laser fine hole processing defects using autoencoder and optical sensor	KSPE / Fall Conference	2021. 11.
3	Automatic defect detection in laser hole processing using artificial intelligence	KSPE/ Spring Conference	2022. 05.
4	Real-Time Defect Monitoring of Laser Micro-Drilling using Reflective light and Machine Learning Models	IJPEM/ PRESM 2022	2022. 07.
5	Real-Time Defect Monitoring of Laser Micro-drilling Using Reflective light and Machine Learning Models	IJPEM(SCIE)	2023. 06.
6	Research on unsupervised learning-based component defect detection in complex drive systems	KSPE/ Spring Conference	2023. 05.
7	Development of a virtual physical system (CPS) in manufacturing using Asset Management Shell (AAS)	KIPS / Spring Conference	2023. 05.
8	Unsupervised learning-based complex drive system abnormality detection	KSPE / Journal	2023. 11.
9	Autoencoder-based N-divided frequency domain abnormality detection for facility defect identification optimization	KIPS / Journal	2024. 03.



01 Company Introduction

Secure core solutions

- 2 software registrations held, 1 in progress
- Software registration

No.	Title	Registration Number	Registration date
1	Anomaly detection analysis pipeline	C-2022-041987	2022. 11.
2	Vibration Dataset Viewer	C-2023-017110	2023. 04.



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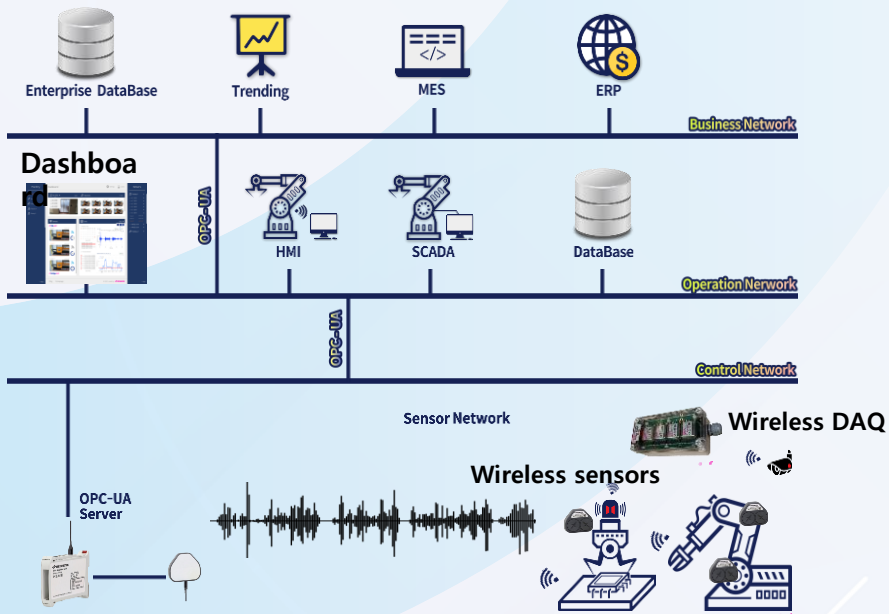
02

I4.0 Smart Manufacturing solution technology



» Condition Monitoring based on wireless vibration sensor

① Securing edge and wireless sensor-based condition monitoring: Facility PdM (data collection)



[Data extraction and AI predictive maintenance algorithm development using OPC-UA/Python]

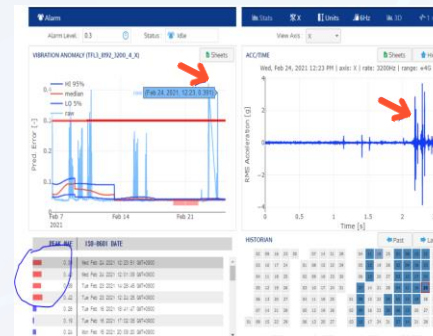
· 설비 진동데이터 : 설비에 무선 진동센서 부착 후 Edge Computer를 통해 수신



테스트 대상 단조프레스

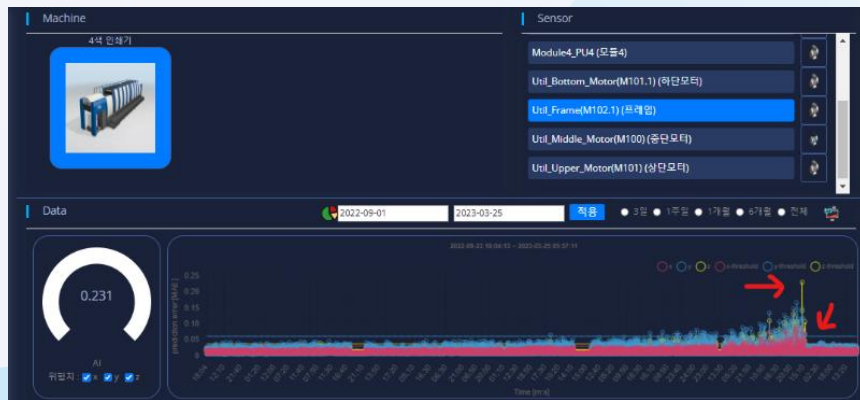


센서 부착 (좌우 메인 모터, 크랭크)



» Condition Monitoring based on wireless vibration sensor

② Securing edge and wireless sensor-based condition monitoring : Facility PdM (Operation)



[Predictive maintenance of large-format printer utility facilities using AI]



Damage of the entire motor due to bearing faults



Normal operation due to preliminary replacement of parts (air filter)

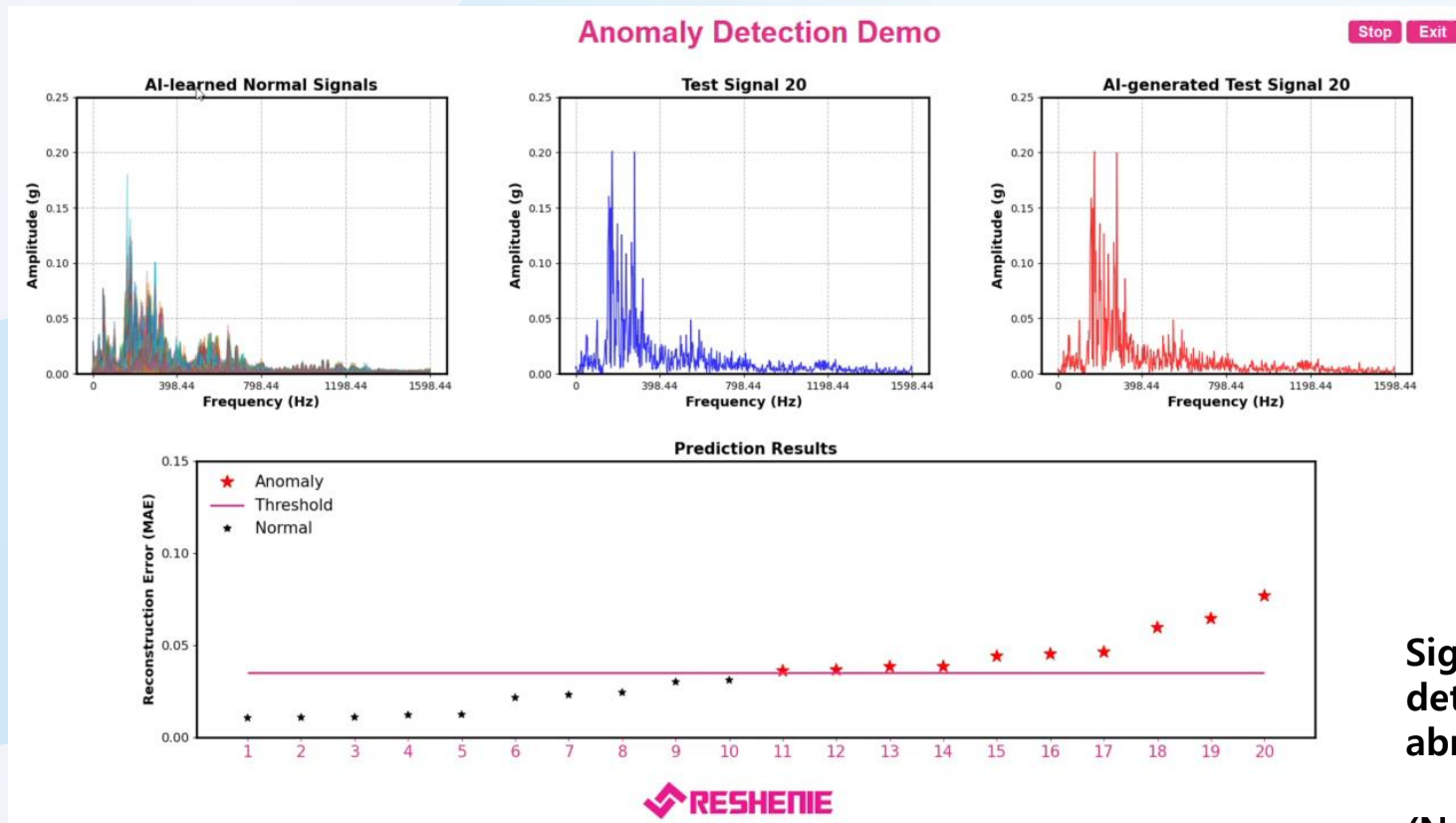


Realization in the field using implementation technology!!

[Actual maintenance cases based on facility monitoring and predictive maintenance]

» Condition Monitoring based on wireless vibration sensor

② Securing edge and wireless sensor-based condition monitoring : Facility PdM (Operation)



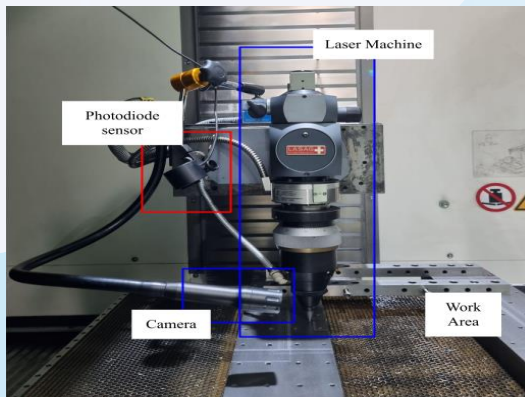
Signal change when detecting equipment abnormality using AI

(Normal → Abnormal)

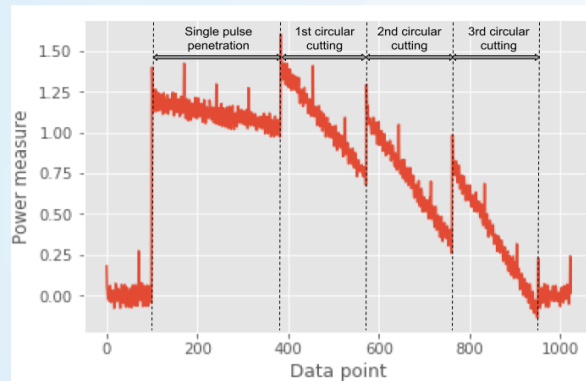
» Condition Monitoring based on optical sensor

③ Secure edge and optical sensor-based **condition monitoring** : process monitoring system

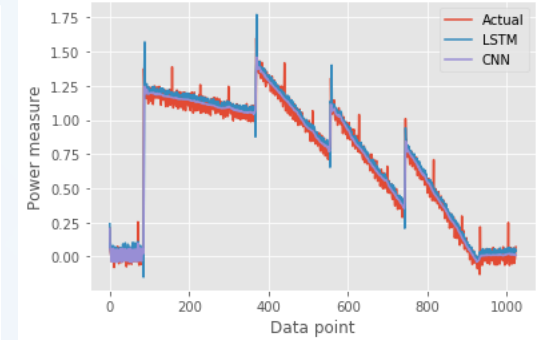
- Development of a real-time process defect detection system for ultra-precision laser processing using optical intensity probe and AI



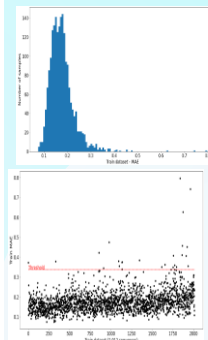
The 1064 nm Nd:YAG Laser : Photo of the experiment set up with Photodiode sensor



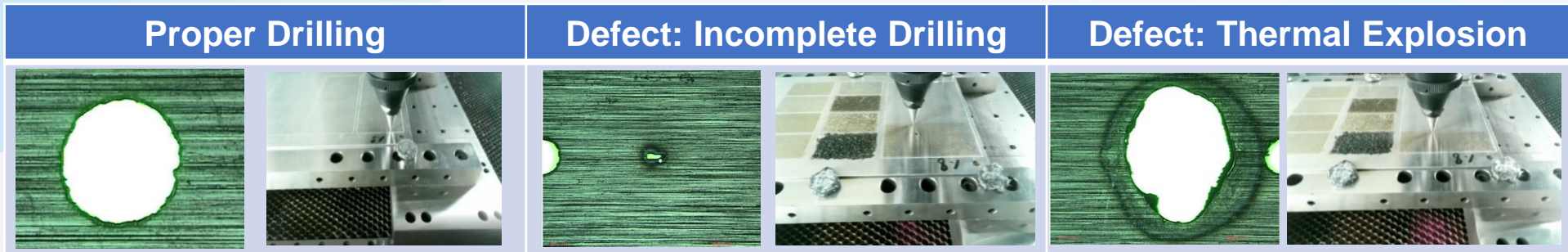
Plot of one period of simulated data of the trepanning method



Actual, and CNN and LSTM reconstruction of one period of simulated data



AI anomaly detection



» Condition Monitoring based on PLC equipment

④ Securing real-time process data for Edge and OPC-UA-based PLC : **process monitoring system**

- Web-based real-time process monitoring technology through PLC-Edge computer interface



Squeegee X, Y, Z positions

squeegee pressure

[SMT-Screen Printer Mock-up Target PLC-Edge Real-time Monitoring Screen]

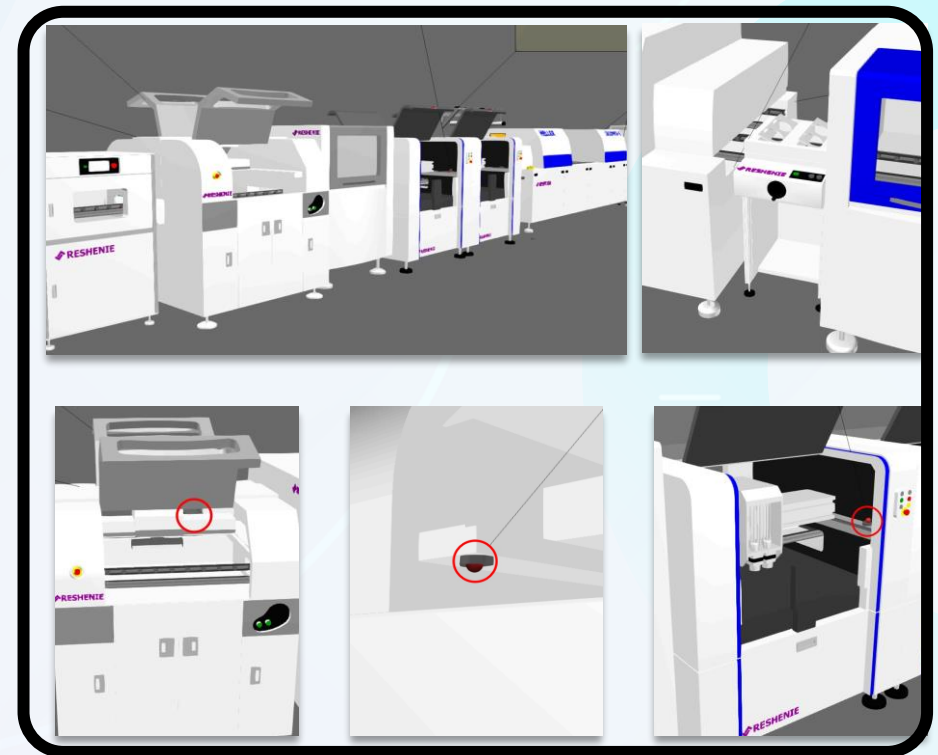
» AAS-based CPS digital twin technology

⑤ Implementation of CPS digital twin based on Edge and AAS

- Securing AAS & CPS implementation technology through PLC-Edge computer interface



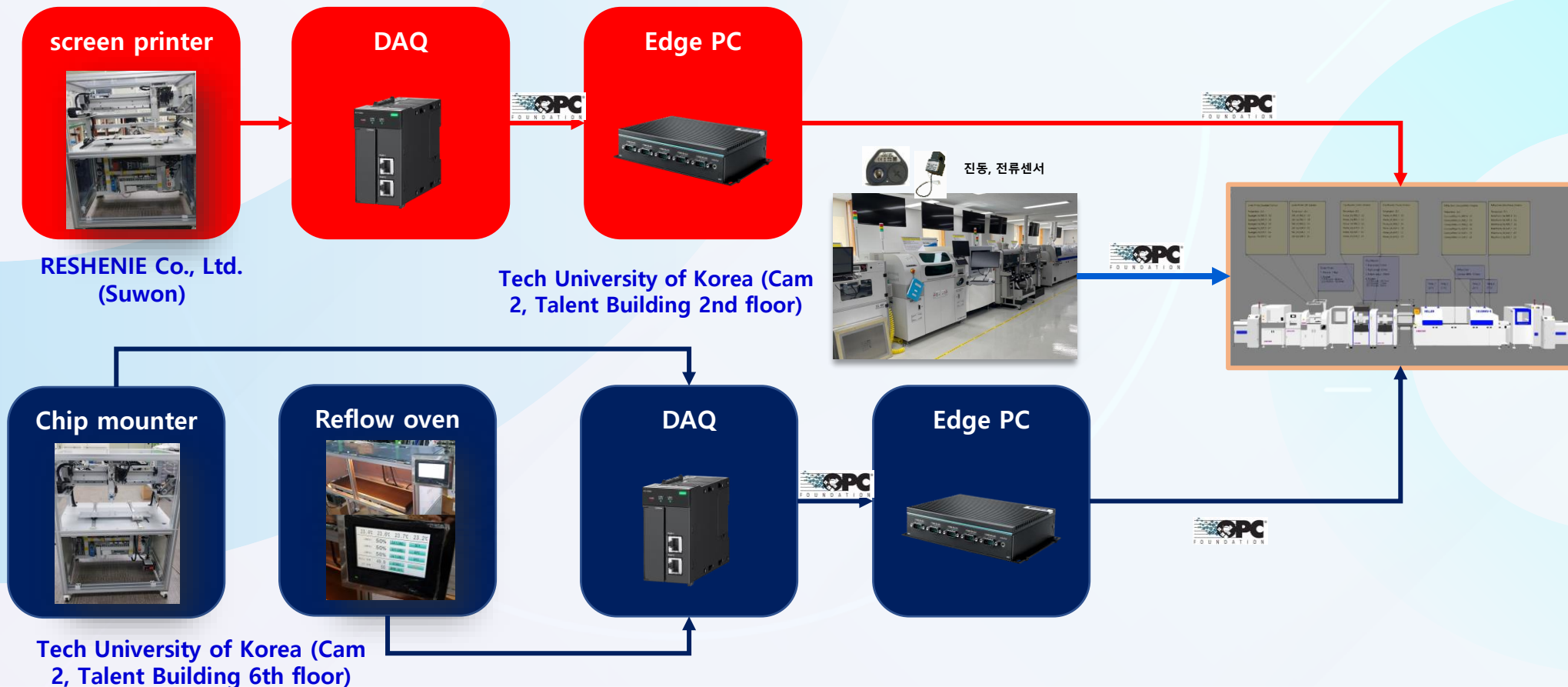
Physical World



Cyber World

» AAS-based CPS digital twin technology

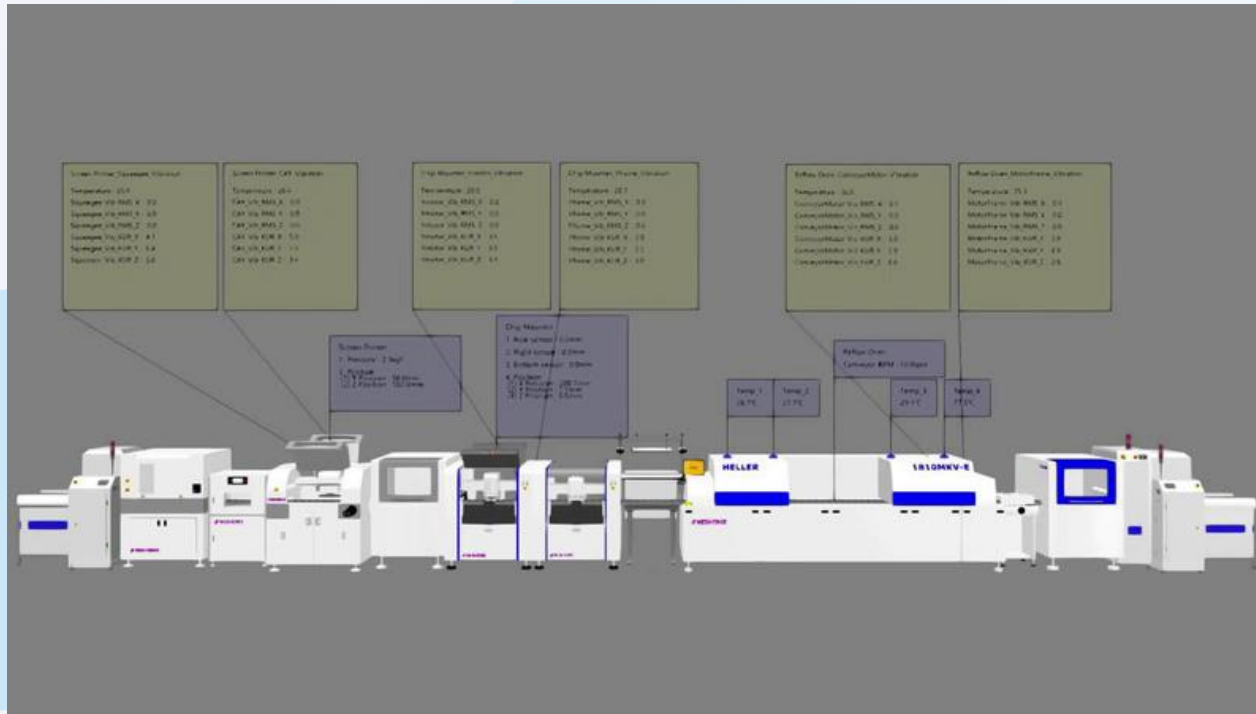
⑤ Implementation of CPS digital twin based on Edge and AAS (distributed data collection architecture)



» AAS-based CPS digital twin technology

⑤ Implementation of CPS digital twin based on Edge and AAS (PCB production SMT line)

- Securing AAS & CPS implementation technology through PLC-Edge computer interface

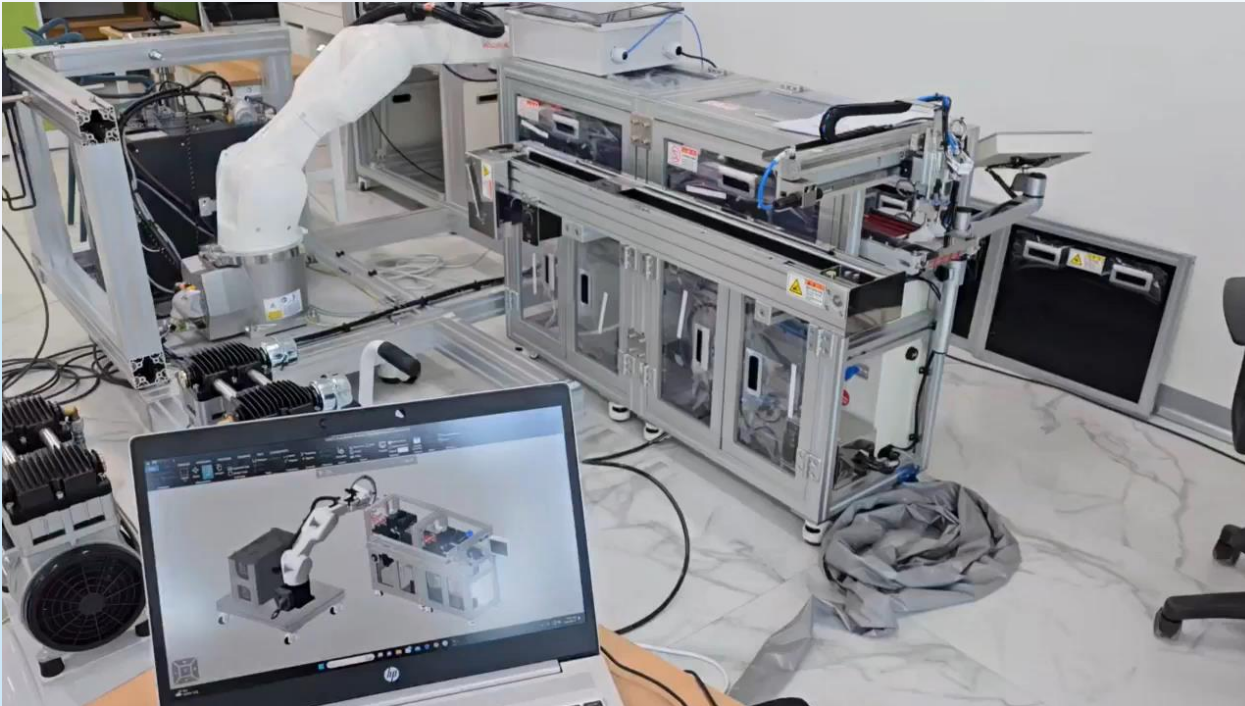


[CPS digital twin implementation example with physical and spatial separation]

» AAS-based CPS digital twin technology

⑤ Implementation of CPS digital twin based on Edge and AAS (PCB production DES line)

- Securing AAS & CPS implementation technology through PLC-Edge computer interface



[CPS digital twin implementation example with physical and spatial separation]

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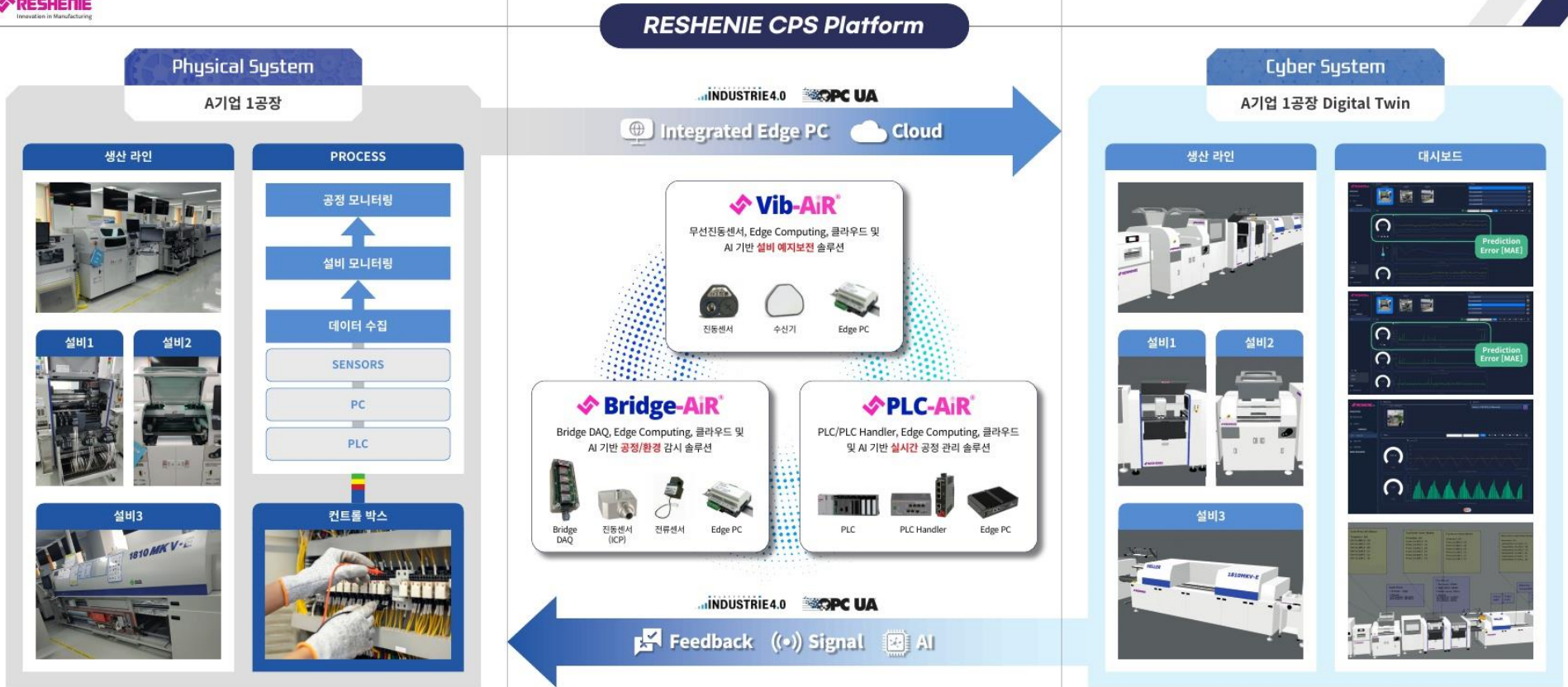


03

Supplying solutions



Autonomous factory solution through physical factory – digital factory linkage





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Thank you

RESHENIE Co., Ltd. will take the lead.