Venture Enterprise 벤처확인기업

INNOBIZ 기술혁신형중소기업

NEXTORM

Introduction to NEXTORM

『A company that innovates manufacturing factories with AI』

Technology recognized by the government(2023)

Selected as Best AI Solution project

- KAIST Manufacturing AI Solution Demonstration Project
- Accomplished 3 of the 100 government tasks in '2023.
- 1 Selected as the 'Best assignment'
  1 Selected as the 'Excellent assignment'

KOSMO 스마트제조혁신추진단 KAIST

Ministry of SMEs and Startups

Excellent Technology Certification

- Smart Factory Supplier Capability Diagnosis
- Recognized as Level 3 (Level 0~5)
- SMEs's Average(1~2), Conglomerate's Average(3~4)

KOSMO 스마트제조혁신추진단 kpc KOREA PRODUCTIVITY CENTER

Ministry of SMEs and Startups

Selected as Best Assignment

- Complete the Initial Start-up Package Task
- Manufacturing AI Solution Prototype Development Completed
- Selected as the 'Best assignment'

S-UP KISED KOREA START UP SUNCHON NATIONAL UNIVERSITY

Ministry of SMEs and Startups

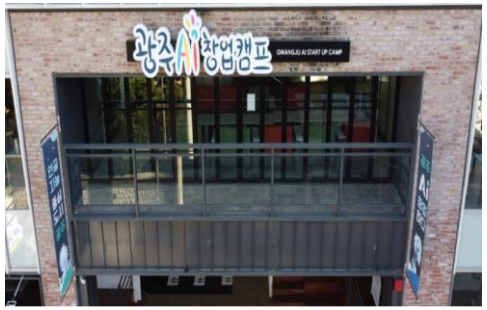
Ministry of Commerce, Industry and Energy Award

- Awarded by the Ministry of Trade, Industry and Energy
- Recognized for Contribution to Industrial Digital Transformation

Ministry of Trade, Industry and Energy

Company Overview

Company Name	Nextorm Co. Ltd.
CEO	Tony, Kim
Establishment Date	2019. 9. 11
Capital	₩200M(Won)
Employee	19 (Full-time 16명, Contract 3명)
Business Area	Manufacturing Big Data Analysis, AI Service Business
Main Product	<Manufacturing Equipment> Anomaly detection, Predictive maintenance, Virtual metrology, Optimal Recipe Prediction
Address	Head Office : Dong-Gu Gwang-Ju, Korea R&D : Gangnam-Gu, Seoul, Korea
Homepage	www.nextorm.com
Shareholder	CEO 100%

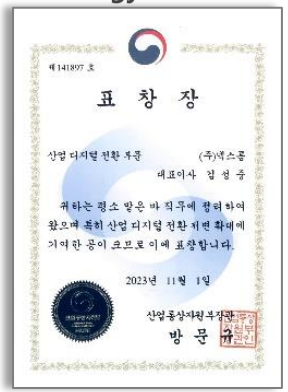


Company History

	12	Patent registration – 'Development of Virtual Sensing Devices Using Artificial Intelligence'
	11	Received the Ministry of Trade, Industry and Energy Award
		Patent Application– AI Virtual Metrology Device and Method
	10	Diagnosis of capabilities of excellent smart factory suppliers– Recognized as Level 3 (Ministry of SMEs and Startups)
	8	PCT international patent application– Development of virtual sensing device using AI
	6	INNOBIZ Certification (Small and Medium Enterprises with Technological Innovation)
	5	'2022 Initial startup package support project– Judged as the best project
2023	12	Certification as a venture company
2022	8	KEPCO E&C,Nextorm MOU signed / Manufacturing Digital Twin, AI Virtual Sensor
	11	Entered Gwangju AI Startup Camp (AI Comprehensive Support Center's first company to host)
2021	7	Gwangju Metropolitan City, Gwangju Free Economic Zone Authority, Nextorm – Three-way MOU on AI business
	7	Completed development of small and medium-sized smart factory integrated platform 2.0
2020	3	Establishment of R&D center
2019	9	Establishment of Nextorm Corporation

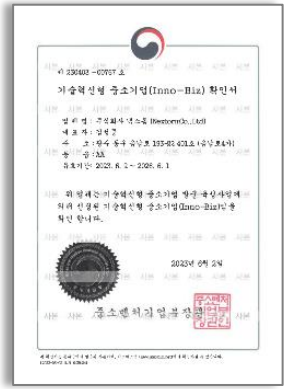
Various Certification and Test Results

Ministry of Trade, Industry and Energy Award



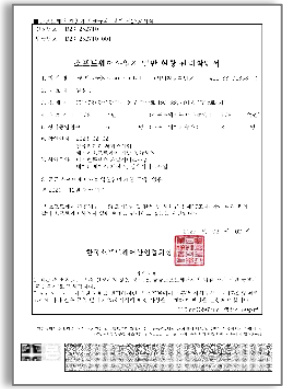
Venture Company Confirmation

INNO-BIZ Certification



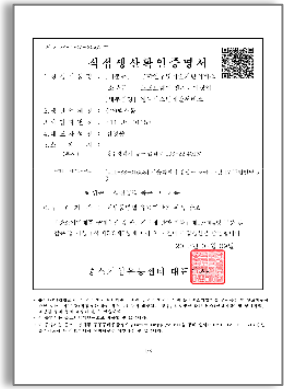
R&D Center

SW Business Identification

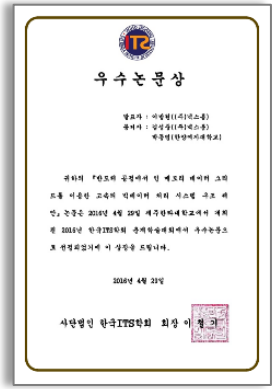


Copyright registration

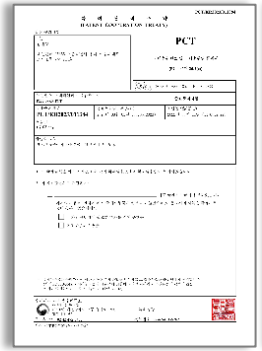
Proof of direct production verification

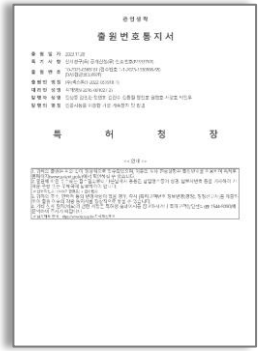


ITS Society Outstanding Paper Award

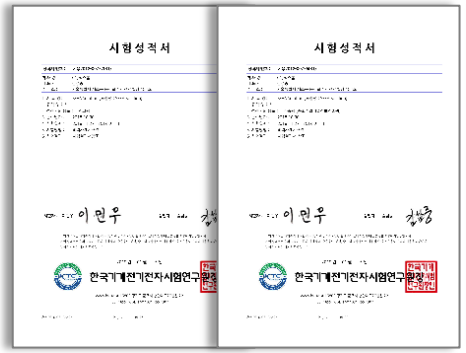


Trademark registration/patent/international patent

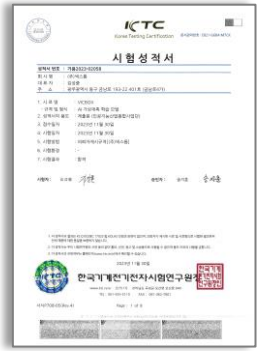




Framework Test Report



Virtual Measurement Test Report



CEO's Main History

▷ Manufacturing – AI & big data system specialist ⟷ 29yrs.

- ❖ Planning and building semiconductor AI factory solutions for 20 years
- ❖ Development of AI factory platform technology for domestic/foreign high-tech conglomerates
- ❖ Building and consulting AI factories for 300 small/medium/large enterprises
- ❖ Ministry of Trade, Industry and Energy Award Commendation –
- ❖ Contribution to Industrial Digital Transformation

국내: SAMSUNG 삼성전자, SAMSUNG 삼성디스플레이, SK hynix, SAMSUNG 삼성전기, SAMSUNG 삼성SDI, LG디스플레이

해외: TOSHIBA, SONY, BOE, GLOBAL FOUNDRIES, HG 华虹宏力, Lam RESEARCH

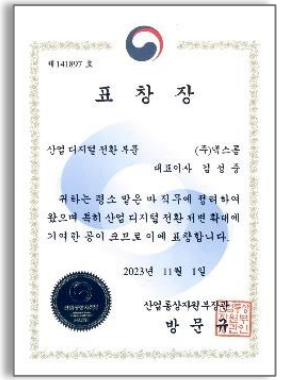


표 창 장

산업 디지털 전환 부문 (주)넥스폼 대표이사 김 정 중

귀하는 평소 맡은 바 직무에 충실하여 왔으며 특히 산업 디지털 전환 저변 확대에 기여한 공이 크므로 이에 표창합니다.

2023년 11월 1일

산업통상자원부장관 방 문

- Aju Univ. **Mechanical Engineering Major**
- **SK hynix / Production Automation**
- **Bistel / Semi-conductor AI**
- **(Current) Nextorm CEO**

- Gwangju Free Economic Zone Authority AI convergence project investment attraction advisor
- Advisor to enact the Industrial Digital Transformation Promotion Act of the Ministry of Trade, Industry and Energy
- SME Strategy Product Selection Member, Ministry of SMEs and Startups
- Evaluation Commissioner, Ministry of Science and ICT
- Member of the VR Convergence Technology Project Group for Dongmyeong University Manufacturing Robots

- Adjunct Professor, Small and Medium Business Training Institute
- Member of the Education Review Board of the Small and Medium Business Training Institute
- Incheon Metropolitan City Advisory Committee (Smart Factory, Innovation Division)
- Professional Planning Member of Milyang-type Smart Factory
- Chairman of the Smart Factory of the Sejong-ro Government Forum

Key Management and Organization Structure

※ key Management

VP JP, Kim

COO : Management Support

- LG Electronics Overseas sales planning
- Samsung Electronics strategic marketing
- VP of JOB Broadcasting station
- President of Korea Three-dimensional Education Information Center

Director MW, Kim

CTO : Technology Development

- Brooks Korea -7yrs semiconductor
- Bistel -20yrs semiconductor
- Smart factory web solution development
- Manufacturing big data/artificial intelligence solution development
- Technical Director

Director JH, Jeong

CAIO : AI Technology

- Reakosys Senior Researcher
- ETRI Researcher
- Green Cloud Representative - Mobile Game
- Korea Content Promotion Agency Certification Test Committee Member
- Content Promotion Agency Functional Game Evaluation Committee Member
- International Standards Expert MPEG Korea Representative

Director YH, Jang

Data Scientist

- 6sigma Black belt
- KCC silicon – 5yrs
- Solvay Silica Korea – 13yrs
- AI Convergence CEO Course

※ Organization and Role

Benefit all Mankind

(Management Philosophy)

Business planning Team	Product development team	New business team	Management Support Team
권정호 부장	정진호 수석	홍수미 이사	유미경 차장
조민근 차장	김진수 수석	김선미 차장	심종필 과장
조용태 과장	서강호 책임		
김지수 대리	하유영 책임		
박지현 주임	신주영 선임		
	박진우 주임		
	김유일 주임		

• Manufacturing DX • Business Planning • Solution Build • Customer Management • Sales/Technical Support	• product planning • product development • Test/Maintenance • platform development • AI algorithm development • AI service development • server development • front end development	• AI business planning • Assignment planning • Create new customers • New BM development • External cooperation • PR / Marketing	• Finance • Accounting • personnel • General Affairs • Etc.

Business Background

Current Manufacturing Situation

Production	Increased facility dependence	Requires maximum performance operation without fault
Facility	Automation, advancement, precision	Difficulty in solving quality problems due to facilities

Present / Unimproved		Future / Improved
Empirical management by people	Equipment Maintenance	Management based on AI and facility data analysis
Preventative maintenance at regular intervals		Using AI, predictive maintenance only when necessary
After breakdown, post-maintenance		Pre-failure, pre-maintenance
Production completed. Sampling inspection after a certain period of time	Quality Measurement / Inspection	Inspect all of them as soon as production is completed
After delivery, if a defect is found, the entire amount is returned/discarded.		Prevent returns and disposal by removing defects before delivery

Key Concepts of Nextorm Business

Manufacturing Digital Transformation

AI Data Generation

- Building IoT-based manufacturing big data
- Real-time data collection, fusion, and analysis
- Virtual data / virtual sensor creation
- Automatic processing and generation of data for AI learning

AI Data Analysis

- Prediction of measurement result data for manufacturing process
- Facility error data, anomaly data detection
- Analyzing the cause of the problem and how to resolve it
- Provides real-time visualization of analysis results

All events and actions
Dataization

+

All data
Assetization

+

Using data
Productivity improvement

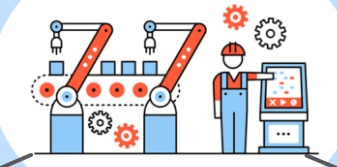
Business Area

AI manufacturing intelligence

- Line/facility real-time monitoring and anomaly detection
- Facility failure prediction and failure repair management
- Predicting virtual measurement results of process
- Predicting optimal recipe for high quality

Warehouse/Logistics Management

- Logistics tracking management throughout the production line
- Material warehouse entry and exit management
- Raw material inventory, replacement, supply and demand history tracking management
- ERP order and purchase data synchronization



Manufacturing industry

Production/Process/Quality Control

- Real-time lot tracking and management (material-production-shipment)
- Real-time production schedule and production performance reporting management
- Implementation of paperless production lines (eliminating paper documents)
- Real-time quality result tracking management

Production line automation

- Delivery of equipment, measuring instruments, robots, conveyors, etc.
- Establish automatic recognition code management such as sensors, barcodes, RFID, etc.
- Delivery of input/output devices such as large status boards and kiosks
- Consulting on line/facility automation and design

Production facilities that are valuable assets of factories...
Good equipment is the **competitiveness** to make good products!!!

Breakdown prevention

Maximum performance

Top quality

Continuous management

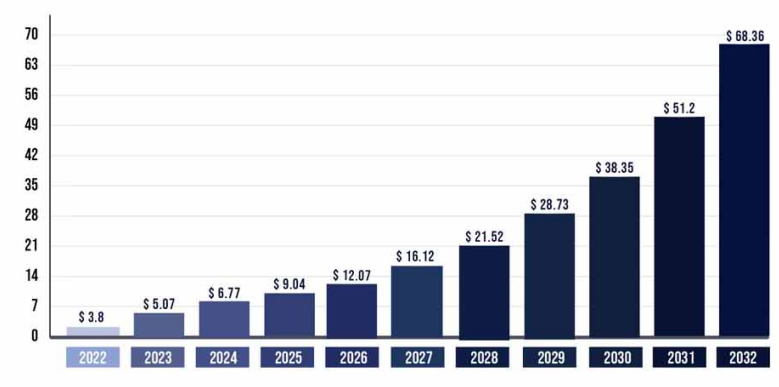
AI manufacturing system that produces the highest quality products with the best equipment conditions!!!

Manufacturing Big Data + AI Optimization + Facility control + Process tracking

Equipment (facility) AI prediction/control	Production and quality integration tracking/analysis
• Equipment anomaly monitoring and response system • Advance detection and predictive repair of equipment failure • Prediction of process result measurement values (virtual measurement) • Optimization of facility operating conditions (quality and cost)	• Logistics linkage tracking of material-production-delivery • LOT+Quality data linkage tracking management • Tracking/analysis of causes affecting quality • Design and build a carbon-neutral manufacturing system

Global Market Size and Trends

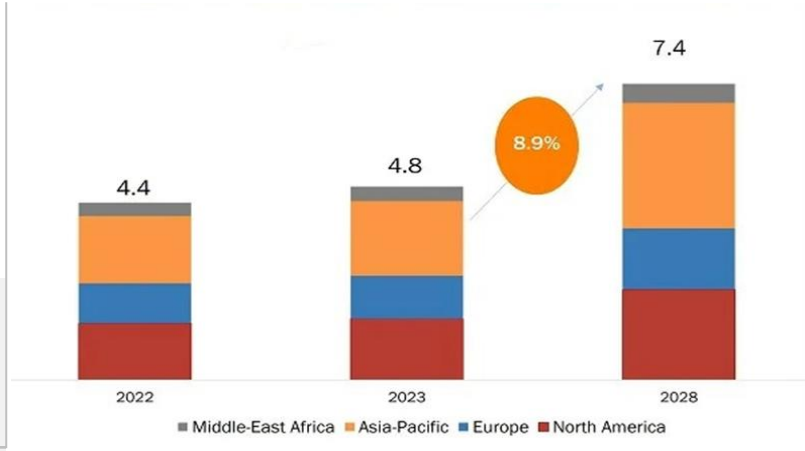
| Manufacturing AI global market size



Source : precedenceresearch.com

- 2022: $3.8 billion
  2032: Estimated to be approximately $68.36 billion
  2023-2032: Expected 33.5% Annual Growth Rate (CAGR)

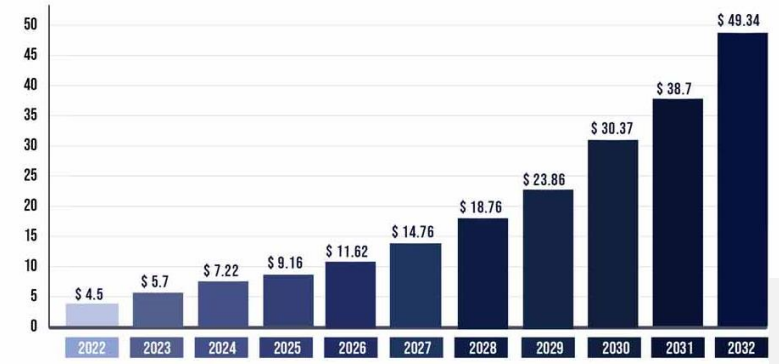
| Anomaly detection global market size



Source : chosareport-korea.com

- 2022: USD 4.4 billion
- 2028: Expected to be $7.4 billion
- 2023~2028: Compound annual growth rate (CAGR) expected to grow by 8.9%
- Software sector expected to grow the most

| Global market size for predictive maintenance



Source : precedenceresearch.com

- 2022: USD 4.5 billion
- 2032: Expected to be $49.34 billion
- 2023~2032: Compound annual growth rate (CAGR) expected to grow by 27.1%

| Industrial Metrology Global Market Size

Source : verifiedmarketresearch.com

- 2022: USD 9.7 billion
- 2032: Expected to be $20.15 billion
- 2023~2030: Expected to grow at a CAGR of 9.64%
- Factors: Mainly increasing demand for big data analysis, etc.

NEXTORM

Awareness of Manufacturing Problems

1

Recently, a large number of consecutive defects have suddenly occurred in Unit 1 of the facility.

We can find out if it is defective by going to the quality team, and since the problem does not always occur, it is difficult to find the cause and solve it.

Since we don't know when it will happen, we can't keep watching from the sidelines.

Anomaly Detection

2

Unit 2 of the facility suddenly broke down, and since we did not know the cause, we called A/S.

They say the parts have to be brought in from overseas headquarters, but it takes at least two weeks.

Since Unit 2 cannot produce for more than two weeks, I am worried about whether it will be able to meet the original contractor's delivery conditions.

Predictive Maintenance

3

It is difficult to conduct quality inspection on all products.

It is possible to buy a lot of measuring instruments and use them, but it is not easy because the cost is high.

If a defect is discovered after delivery like this, the entire product will have to be returned/discarded, and the next order quantity will also be reduced.

Virtual Metrology

4

These days, customer quality requirements have increased.

We tried producing it while changing the recipe conditions in various ways, but it was difficult to find a method because there were too many conditions to consider.

We are worried that if this continues, we may be the only ones unable to deliver.

Optimal Recipe Prediction (Golden Recipe)

Business Goal

AI facility prediction and control to maximize facility utilization

Breakdown prevention + **Maximum performance** + **Top quality**

1 Anomaly Detection

On the outside, there seems to be nothing wrong,
Could there be a problem inside the facility?

2 Predictive Maintenance

It's running well now,
When should equipment maintenance or parts replacement be performed?

3 Virtual Metrology

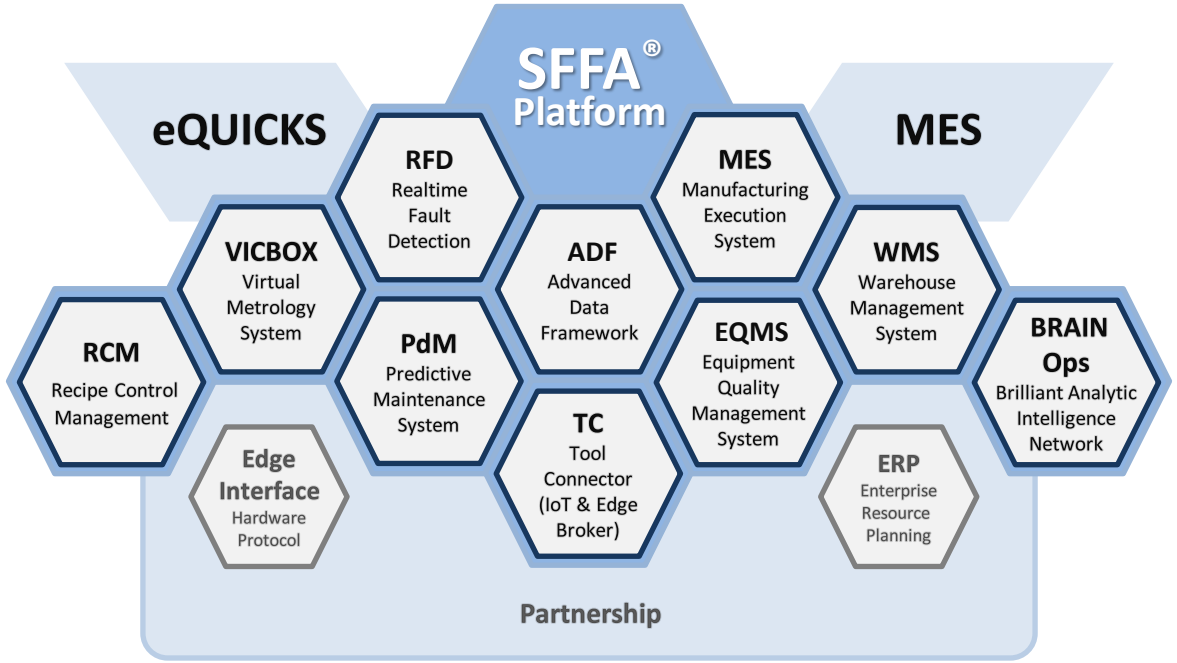
I don't have many instruments,
How can we strengthen the quality inspection?

4 Optimal Recipe Prediction

I want to reduce the defect rate by 5%.
Under what conditions should the facility be operated?

Products and Solutions : SFFA® Platform

- RFD : Equipment error, anomaly data detection and predictive maintenance
- PdM : Equipment failure prevention and predictive maintenance system
- VICBOX : Edge-based virtual metrology and analysis system
- RCM : Facility recipe optimization and remote management and control
- ADF : AI learning data automatic collection and creation framework
- MES : Lot tracking and production automation management
- EQMS : Production/quality management based on facility data
- WMS : Material/product warehouse in/out inventory logistics management
- BRAIN Ops : Big data AI analysis pipeline
- TC : Equipment/sensor data interface protocol



Factory | Energy Grid | Transportation | Military | Medical | Personal

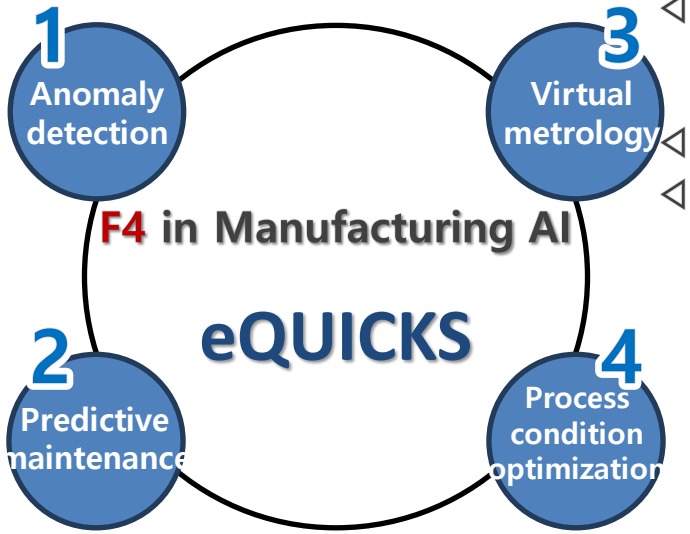
Key product : SFFA® eQUICKS(Equipment Condition Keeper System)

Integrating 4 AI technologies essential for the facility into one solution!!!

Real-time detection of equipment errors and anomalies ▷

Early detection and action on anomalies ▷

Reduction in equipment failures, improved operational efficiency ▷



◁ Virtual measurement of process results with AI measuring instrument

◁ Cost savings on physical measuring instrument purchases

◁ Energy savings, continuous defect prevention

Analysis and action on causes of equipment failures ▷

Predictive maintenance for failure prevention ▷

Cost savings on equipment maintenance ▷

◁ Analysis of optimal equipment recipe conditions

◁ Energy savings, reduction in process time

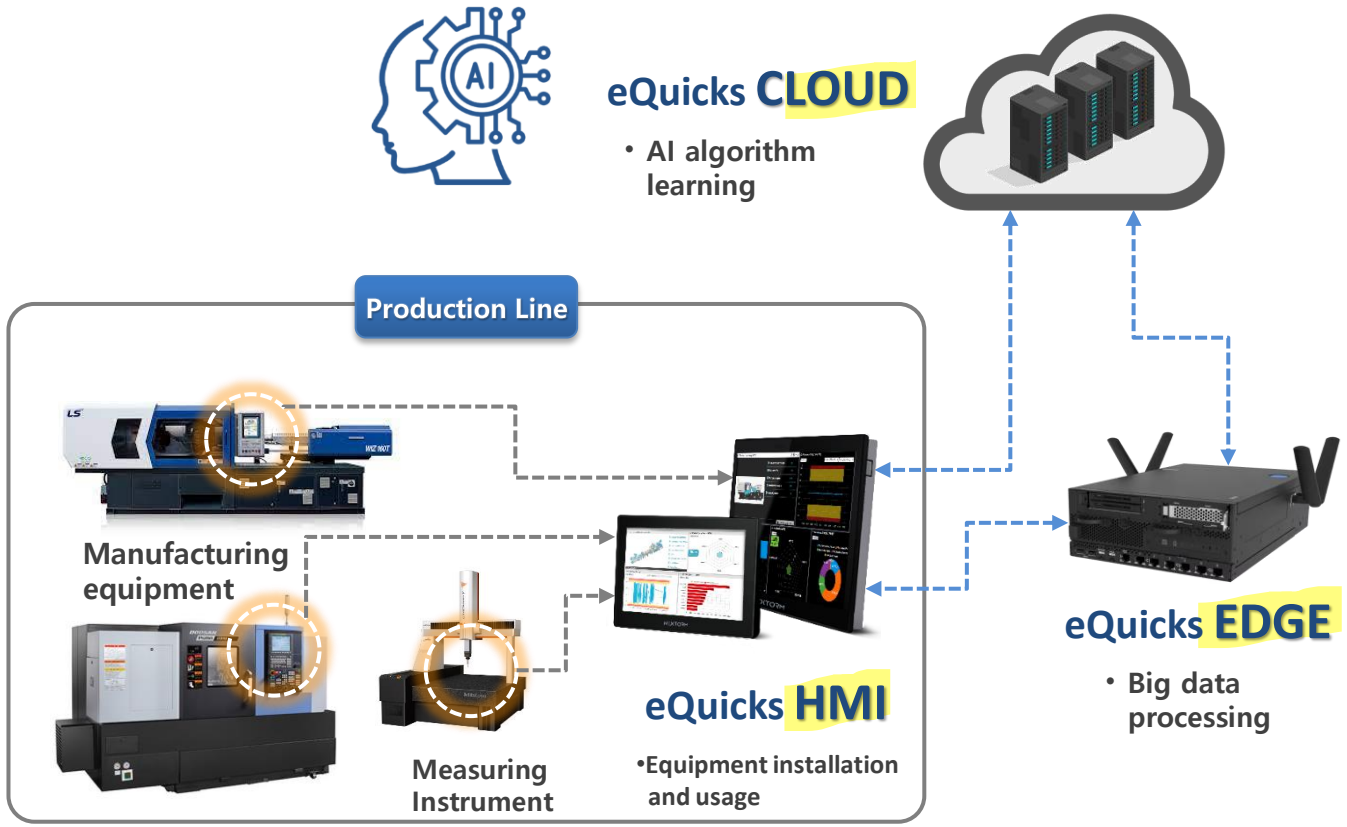
◁ Maintenance of top quality

Innovative AI New Products

The world's first, combining 4 AI technologies into one 'eQuicks' solution!!

'eQuicks' : AI integrated solution for manufacturing equipment

1. **Anomaly Detection** — Early detection of abnormal phenomena in equipment
2. **Predictive maintenance** — Equipment failure prediction, pre-maintenance
3. **Virtual Metrology** — Quality prediction of process results with AI measuring instruments
4. **Optimal Recipe prediction** — Operating conditions for the highest quality equipment



SFFA® eQUICKS System Concept

Facility/Process Optimization ▶

Increased operation rate, reduced breakdown, shortened delivery period, improved quality, cost reduction, energy saving ··· !!

Anomaly Detection
- Signs of facility/process anomaly
- Suspension of work/response measures

Predictive Maintenance
- Facility Condition Analysis
- Breakdown/ Maintenance/ Prediction

Optimal Recipe Prediction
- Optimal recipe condition
- Standard recipe condition

Virtual Metrology
- Process Result Prediction
- Measurement Result Prediction

Real-time Data + AI/Analysis + Big Data

Real-time Facility Data

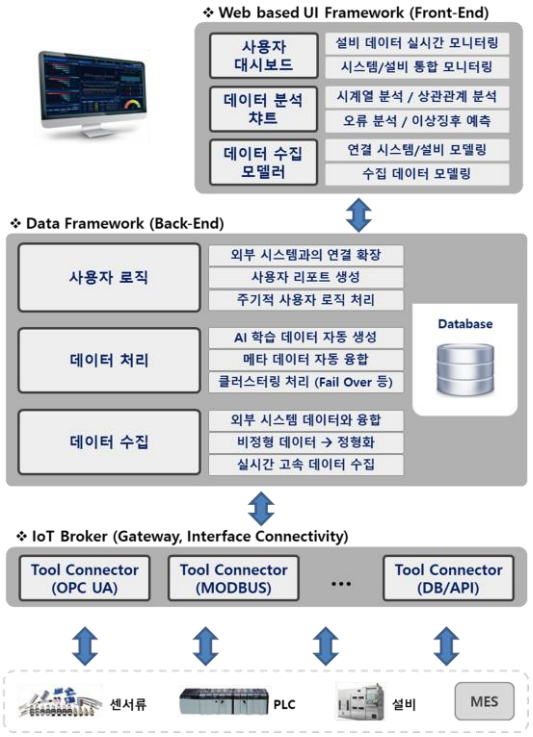
Lot Information | Raw Material Information | Quality Results

Production Line

SFFA® eQUICKS : Anomaly Detection ・ Predictive Maintenance

❖ Features of the solution

- Automatic labeling of data for AI learning
- Simultaneous monitoring and analysis of multicomposite sensor data
- Intensive monitoring of major problems, early warning, and establishment of a response system
- Monitoring and Analysis of Facility Production Status
- Status and monitoring of facility errors/failures/abnormal signs
- Facilities health condition analysis and predictive maintenance management
- Facility Comprehensive Efficiency/Operation Rate/Leadtime Analysis



※ Application case: Injection process / mid-sized company

◆ Multiple alarms occur in specific equipment → 57 alarms occurred in 72 hours

◆ Continuous production of Defective products during that time

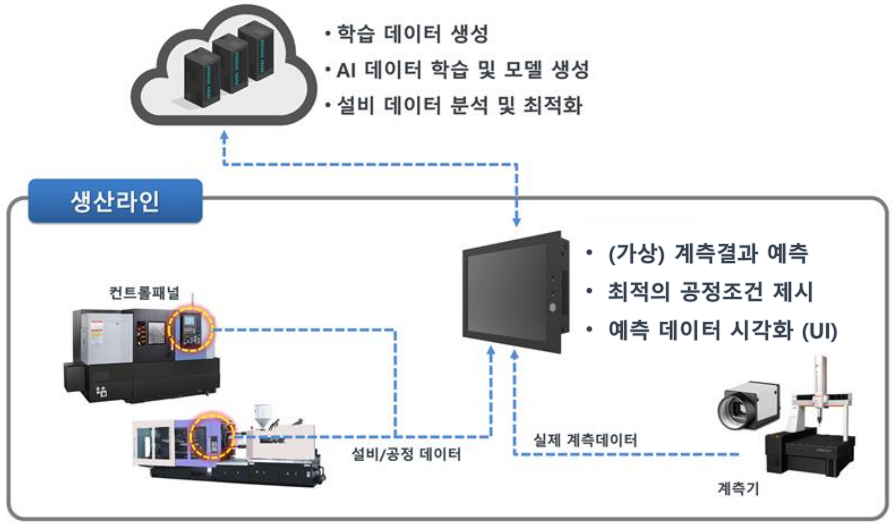
Quick action → Reduction of defects
Alarm/Sensor Relationship Verification → Prevent future recurrence

SFFA® eQUICKS : Virtual Metrology · Optimal Recipe Prediction

Let AI learn the facility data,

Quality result prediction!!

Optimal Recipe conditions prediction!!



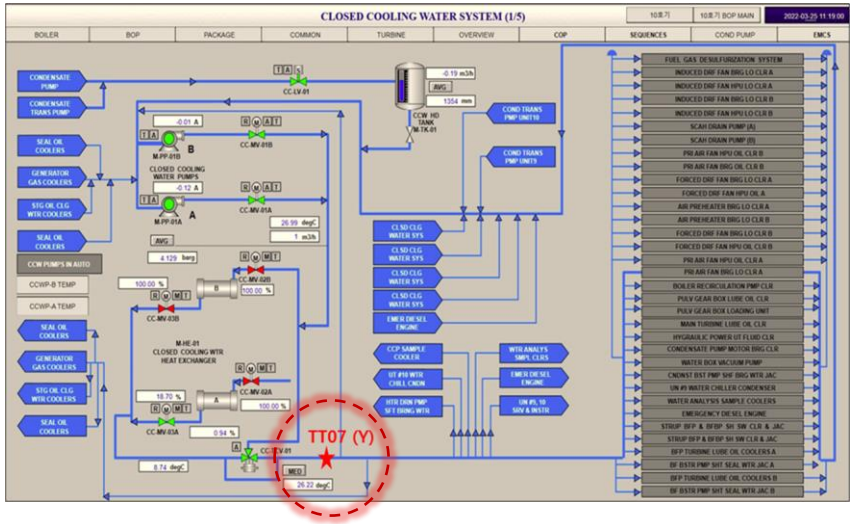
※ Example of application: Power plant heat exchanger system

- Target Plant: Closed Cooling Water (CCW) for OO Power Generation X Unit CCW System (CCW)
- Closed circuit process : Cooling water supply
- Coolant pump → Coolant heat exchanger → Cooler and bearings for various devices

※ 9 Months Data Learning → 3 Months Data Forecast

※ Actual value and forecast almost match

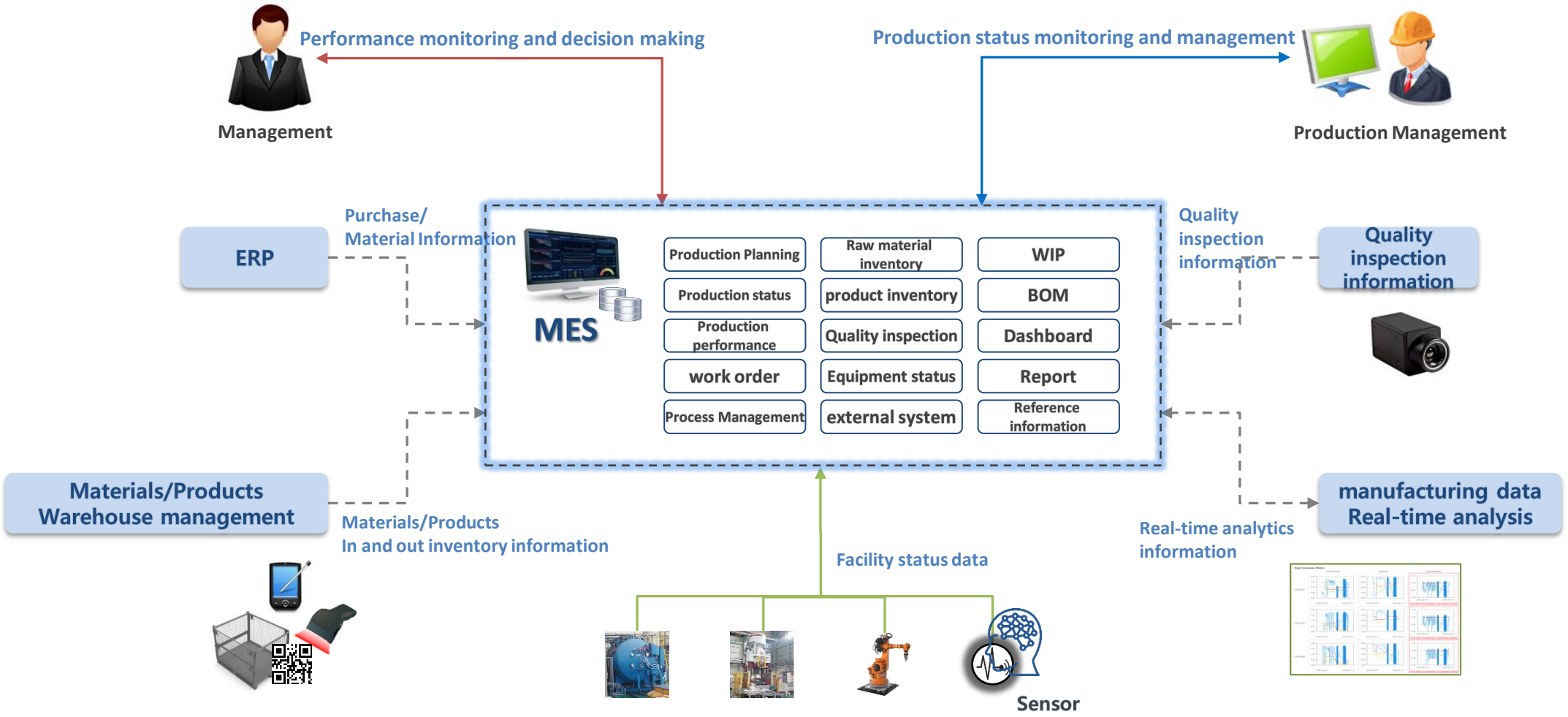
※ Prediction accuracy: 99.996%



Strengths of the eQUICKS Solution

Classification	Characteristic	Example
Provides AI integrated solutions for facilities	▷ **Abnormality detection + predictive maintenance + virtual measurement + Recipe condition optimization** ◆ Competitors: Offering individual features as a single solution ◆ Nextorm: An integrated solution that combines all 4 AI functions ▷ **Easy to solve problems that cannot be solved with individual solutions alone** ▷ **Demonstrate maximum systemic synergy effect**	▷ **Recently, abnormal phenomena have been detected in equipment, and product defects are increasing...** ◆ Will there be any problems with the quality of the product if it is produced like this? ◆ Which parts of the equipment need to be maintained or replaced? ◆ How should we change the recipe conditions to maintain quality?
Big data framework provided	▷ **Integration of data from multiple types of equipment into one system** ▷ **Provides various types of facility data connection functions** ▷ **Capable of real-time collection/processing of big data at ultra-high speed (1/100 second)**	▷ **There are various types of equipment in the production line...** ◆ Is it possible to integrate and manage different types of facilities into one system? ◆ Can various data be easily connected and expanded?
Utilization of virtual sensors/virtual data	▷ **Generates non-existent virtual sensor data** ▷ **Virtually generates insufficient sensor data and facility data** ▷ **Infinite expansion of data with virtual data generated by AI**	▷ **In the following cases, can we supplement the analysis results by creating virtual data with AI?** ◆ When it is physically impossible to install a sensor in a specific part of the facility... ◆ When it is difficult to secure and collect sufficient equipment data...
Material-production -quality linkage tracking	▷ **Function linkage with Nextorm's lot tracking system** ▷ **When quality problems occur, various causes are tracked.** ▷ **Analysis of raw materials/workers/process conditions/equipment status/other factors**	▷ **A complaint was received about a defect in a product delivered to a customer a month ago...** ◆ I would like to check the equipment that produced the delivered product lot, the raw materials used, and the process condition settings. ◆ What factors caused the defect, and what should be done to prevent recurrence?

MES/WMS System Overview



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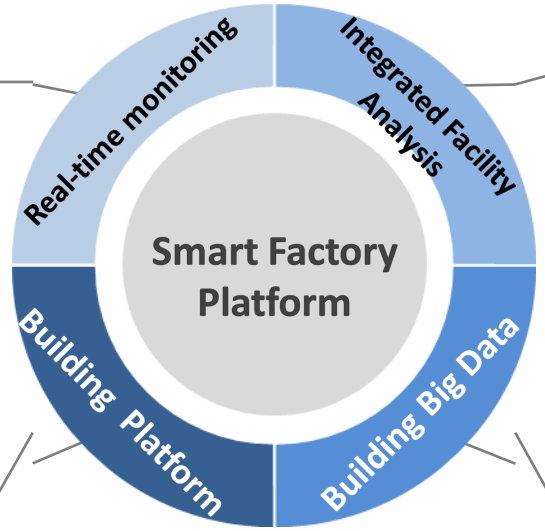
Expected effects of building a SFFA platform

- Facility malfunction, anomalies detected in real time
- Facility Alarm Real-time Monitoring, History Management
- Statistical Quality Analysis of Facility Data

- Analysis and derivation of the cause of quality defects
- Reduce manufacturing costs with virtual metrology
- Comparison of highest and lowest capacities between facilities



- Easy to deploy the same form to other production lines
- Gain flexibility in advancing system capabilities
- Establishment of Smart Factory Integration Platform

- Establishment of enterprise facility big data DB
- Configuring an integrated DB with MES, ERP, etc
- Based on enterprise big data analysis systems

Business and Build Performance

Smart Factory
AI Factory

- Smart Factory – 66 (9 Advanced, 57 Basic)
- AI data Processing, analyzing, optimizing– 20 cases
- AI solutions Demonstrate– 3 out of 100 government challenges (1Splendid, 1Excellent)

※ Facility AI (anomaly detection, predictive maintenance, optimal recipe prediction, virtual metrology) / MES (production management)

2019	Smart Factory Establishment: 1 basic
2020	Smart Factory Establishment: 2 advanced, 5 basic, 1 university, 1 institution
2021	Smart Factory Establishment: 1 advanced, 7 basic
2022	Smart Factory Establishment: 4 advanced, 20 basic AI data processing: 17 cases
2023	Smart Factory Establishment: 1 advanced, 23 basic AI solution demonstration (prediction, optimization): 3 (government/KAIST 100 projects selected)

※ Establishment of systems by major organizations

2022년 KEPCO E&C / KOWEPO (KOREA WESTERN POWER CO., Ltd.)

- Joint R&D: Development of Intelligent Virtual Logic Sensor Application Technology
- Co-patent: Virtual sensing devices and methods using AI
- Demonstration Project : Demonstration (PoC) for western power generation data is carried out

2020년 KOEN (KOREA SOUTH-EAST POWER CO.) / KIST (Korea Institute of Science and Technology)

- Power generation facility big data processing and AI analysis construction
- Analysis of Problems in Power Generation Facilities and Improvement of Productivity in Operation of Power Generation Facilities
- Consortium with KIST

2021년 TP JEONNAM TECHNOPARK

- MES (Production Management) + AI (Facility Big Data Analysis System)
- Organization dedicated to process technology and business support for ceramic manufacturing companies

2020년 INJE UNIVERSITY

- Establishment of an educational smart factory for enrolled students
- Complete with a separate mock production facility on campus

※ Business Network: Have the best references such as public institutions, educational institutions, partners, and manufacturing companies (300 sales networks)

Public Institutions

광주광역시 GWANGJU CITY · AICA 인공지능산업융합사업단 · KPIA 한국광융합산업진흥회 · 광주광역시 경제자유구역청 · TP 전남테크노파크 JEONNAM TECHNOPARK · KTC 한국기계전기전자시험연구원 · 경상남도 GYEONGNAM · 인천광역시 · KIST 한국과학기술연구원 · KOEN 한국남동발전

Partner

한국전력기술 · K-CGC · ECOPEACE · KIET 한국단자공업주식회사 KOREA ELECTRIC TERMINAL CO., LTD. · KOSME 중소벤처기업연수원 · 한국서부발전㈜ · KOIIA 한국산업지능화협회 · BLUECAPSULE · M2 Corporation Man·Machine·Interface

Manufacturer

하나프로테크 HANA PRO-TECH · 한국와이다 · TOBIS HYDRAULIC Co., LTD. · 에이엠티산업(주) · 삼양금속열처리

Educational Institutions

부산대학교 PUSAN NATIONAL UNIVERSITY · 인제대학교 INJE UNIVERSITY · 동명대학교 · 금파공업고등학교 KUMPA TECHNICAL HIGH SCHOOL

THANK YOU

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