TOMAS TECH

Operation monitoring & Traceability system

Presentation by TOMAS TECH CO., LTD.

AGENDA

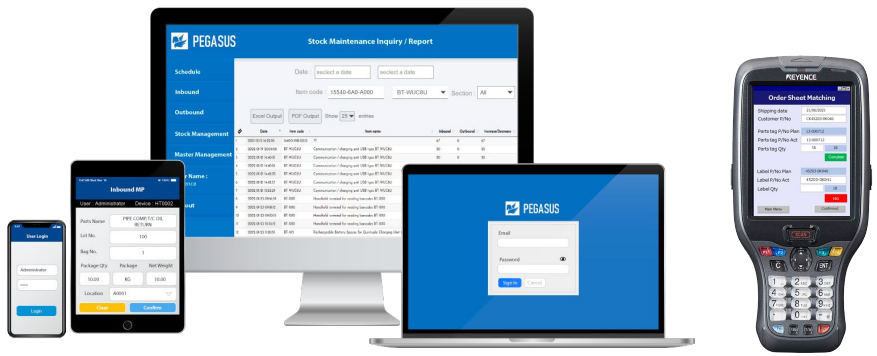
1. Overview of the Operation Monitoring System
2. Details of the Operation Monitoring System
3. Appendix

Overview of the Operation Monitoring & Traceability System

Introduction to PEGASUS

The PEGASUS Production Management System is **an application designed to streamline complex management tasks.**
In recent years, the manufacturing and logistics industries have faced increasing demands to adapt to diverse market needs through **small-batch, high-variety production and shortened lead times.** Many factories handle both high-volume production and small-lot orders simultaneously, making management tasks even more complex and **requiring meticulous scheduling and inventory control.**
PEGASUS was developed to improve operational performance in manufacturing and logistics settings.
By utilizing Handy Terminal, it digitalizes the previously cumbersome management tasks that were often handled through whiteboards and Excel, providing **complete visibility and significantly reducing costs.**

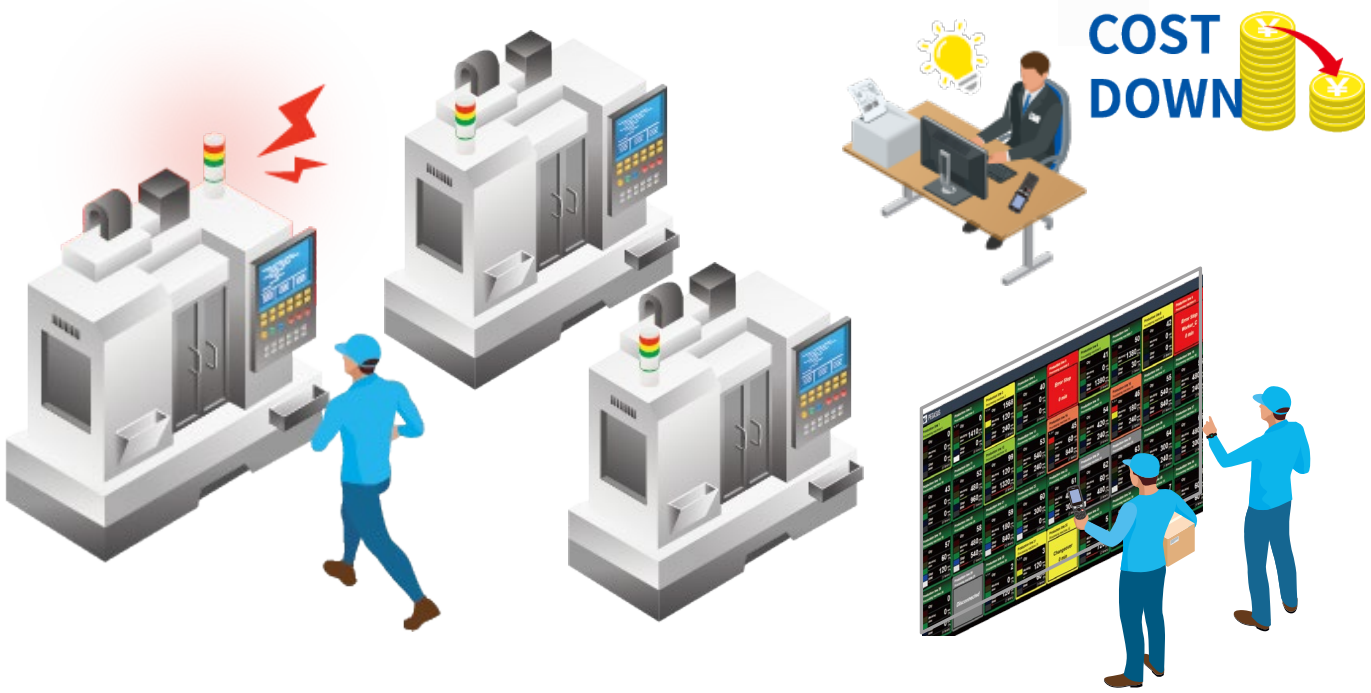
PEGASUS

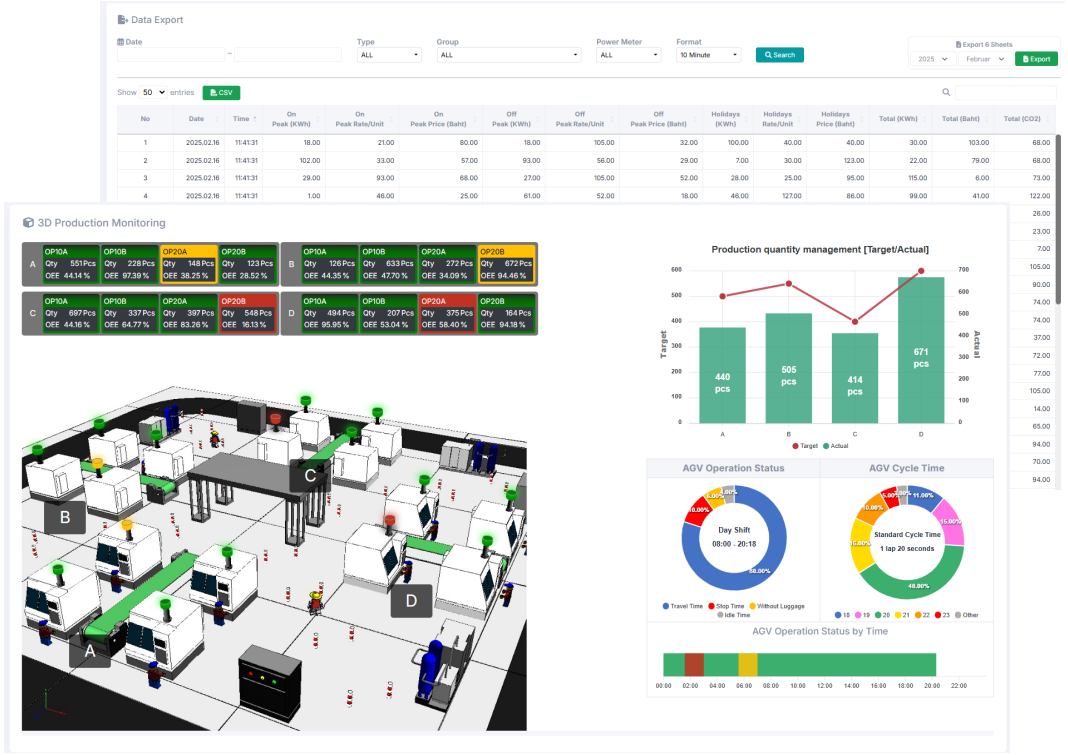


- Stock Management
- Process Management
- Sales Order Management
- Fixed assets management
- Stocktaking system
- POKA Inspection system
- Traceability system
- Unlock system
- Operation monitoring system
- Weight checker system
- Label printing system
- RFID system

Overview of the Operation Monitoring & Traceability System

This system can be applied as both an Operation Management System and a Traceability System on the manufacturing floor. By collecting on-site data, it becomes **possible to gather traceability data such as equipment operation status, abnormal signals, NG factors, and measurement values.** In addition to operation management, the integration of various sensors makes it possible to **manage a wide range of information, including power consumption, temperature and humidity, as well as flow rate and water pressure.**
The PEGASUS IoT System **visualizes on-site conditions, transforming what was once a "black box" into transparent and actionable insights.**





Benefits of the Operation Monitoring & Traceability System

1

Inability to Monitor the Situation in Real Time

Because information such as operating time, downtime, idle time, setup time, OK counts, NG counts, and stoppage factors was recorded manually by operators or entered into Excel, the records lacked both accuracy and immediacy. Even when equipment abnormalities or stoppages occurred, it often took time for managers to notice, causing delayed on-site responses and prolonged downtime.

2

Difficulty in Identifying Bottlenecks

Because comprehensive data covering the entire process was not available, it was impossible to objectively determine which process was the bottleneck. Improvement activities were carried out without clearly understanding NG factors or stoppage causes, resulting in countermeasures that depended on individuals and limited effectiveness. As a result, improvement speed was slow, and there was always a time lag in providing feedback to the on-site team.

3

Inefficient Efforts to Improve Operating Rate

Operators had to spend significant time recording information in daily reports or check sheets, and the recording tasks themselves became a burden. Because detailed data on equipment downtime or idle time was not available, it was difficult to establish concrete measures to reduce downtime or improve operating rates. In addition, there was little time left to analyze operating data, causing improvement activities to fall behind.

▼

Real-Time Monitoring

It becomes possible to automatically collect data such as operating time, downtime, idle time, setup time, OK counts, NG counts, and stoppage factors.

When an abnormality occurs, managers can immediately rush to the site, enabling a significant reduction in equipment downtime.

▼

Identifying Bottlenecks to Improve Productivity

By collecting data across the entire process, it becomes possible to identify bottlenecks and implement targeted improvements in those specific processes, leading to higher productivity.

In addition, NG factors and stoppage causes can be quickly fed back to the on-site team, enabling faster and more effective improvement activities.

▼

Achieving Cost Reduction through Improved Operating Rate

Since data can be automatically collected from on-site, operators are relieved from the burden of manual recording and can instead dedicate their extra time to analyzing operating data.

By shortening downtime, the operating rate can be increased, leading directly to cost reductions.

Details of the Operation Monitoring & Traceability System

Details of the Operation Monitoring & Traceability System

Facilities

- Production Line
- Air Conditioning
- MDB/MCCB
- Lighting
- Chillers
- Boilers
- Air
- Gas・Water・Oil

Operation Data

Electric Power

Air (Gas)

Water (Liquid)

Collection Unit

Server

Dashboard

Data Collection for Operation Monitoring & Traceability System

Method 1 : PLC Integration

By integrating the central PLC with the equipment PLCs, it becomes possible to collect detailed information such as equipment status, operation signals, stoppage signals, production quantities, and error signals. Since data stored within the equipment-side PLC can be retrieved directly, the collected information can be translated into concrete improvement measures and countermeasures aimed at increasing the operating rate.

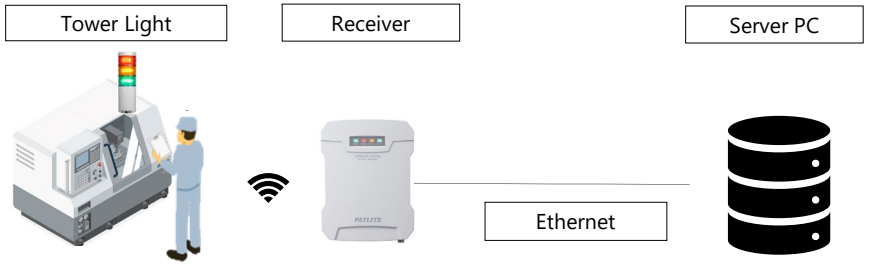
*Recommended Approach for the Traceability System

Method 2 : I/O Integration

By using remote I/O units, information can be obtained directly from the equipment's electrical signals. This enables the collection of data such as operation signals, stoppage signals, and production quantities. If analog signals, such as equipment specifications, can also be collected, more advanced analysis becomes possible. In addition, when combined with a tablet system, it is possible to capture more detailed information, including error details.

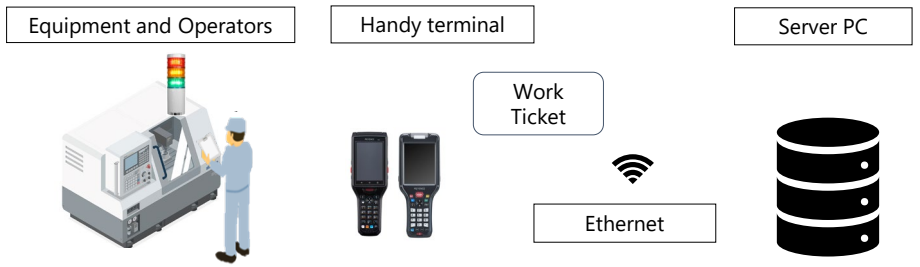
Method 3 : Tower Light Integration

By utilizing Patlite signal towers, simplified operation monitoring can be achieved. Attaching a data collection unit to existing signal towers allows information to be captured directly. With only minimal setup required, the system can be put into use immediately.



Method 4 : Device Integration

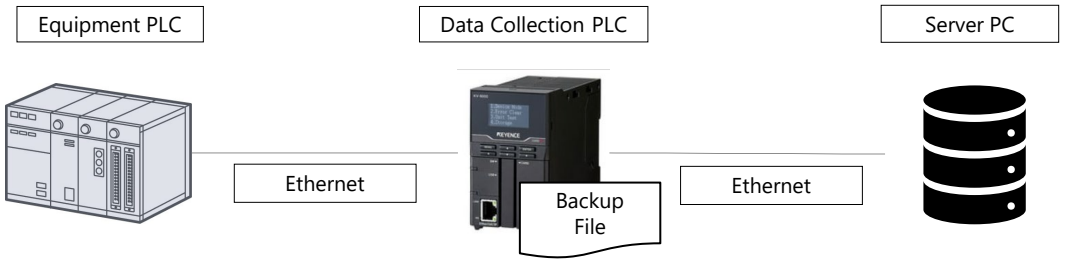
By integrating with devices such as handy terminals, the operating status can be visualized. By scanning work tickets at each process, it becomes possible to manage work time, IN/OUT timing, and cycle time.



Functions of Operation Monitoring & Traceability System

Traceability Data Collection Function

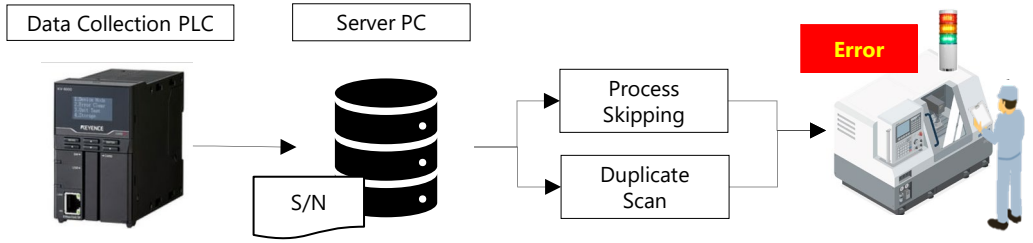
Based on the work S/N, processing, inspection, and assembly results are collected from each piece of equipment using PLCs. The acquired data is updated and stored in the database in real time. Backup data can also be stored on an SD card in the collection PLC, ensuring data integrity even in the event of server or network failures.
* A database request is required for skipped processes.



*Traceability System Functions

Operator Error Prevention Function

Based on the work S/N, processing, inspection, and assembly results are collected and stored in the database. Each time equipment communicates work S/N data, the system queries the database to check for skipped processes or duplicate scans. If such errors are detected, an error signal is sent back to the machine, which then stops the next process. This handshake mechanism with the equipment prevents operator errors.



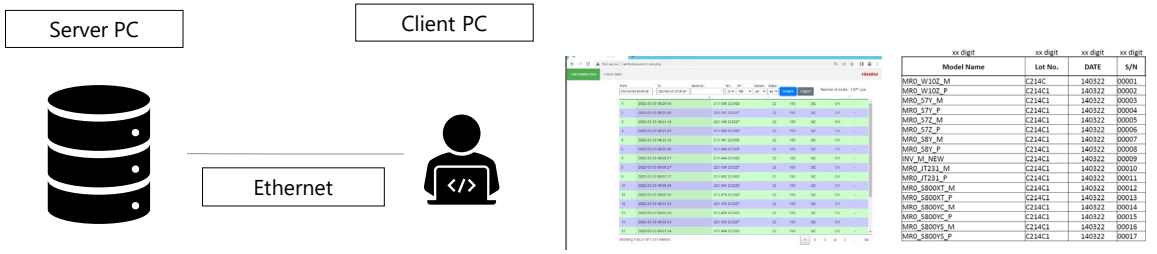
*Traceability System Functions

Notification Function

The system can be integrated with smartwatches and LINE for notifications. By linking with equipment operation data (machine tools, robots, PLCs, etc.), signals such as short stoppages (choko-tei) can be detected and notifications sent to responsible personnel. This “reduces response loss” and enables “on-site visualization and analysis”.

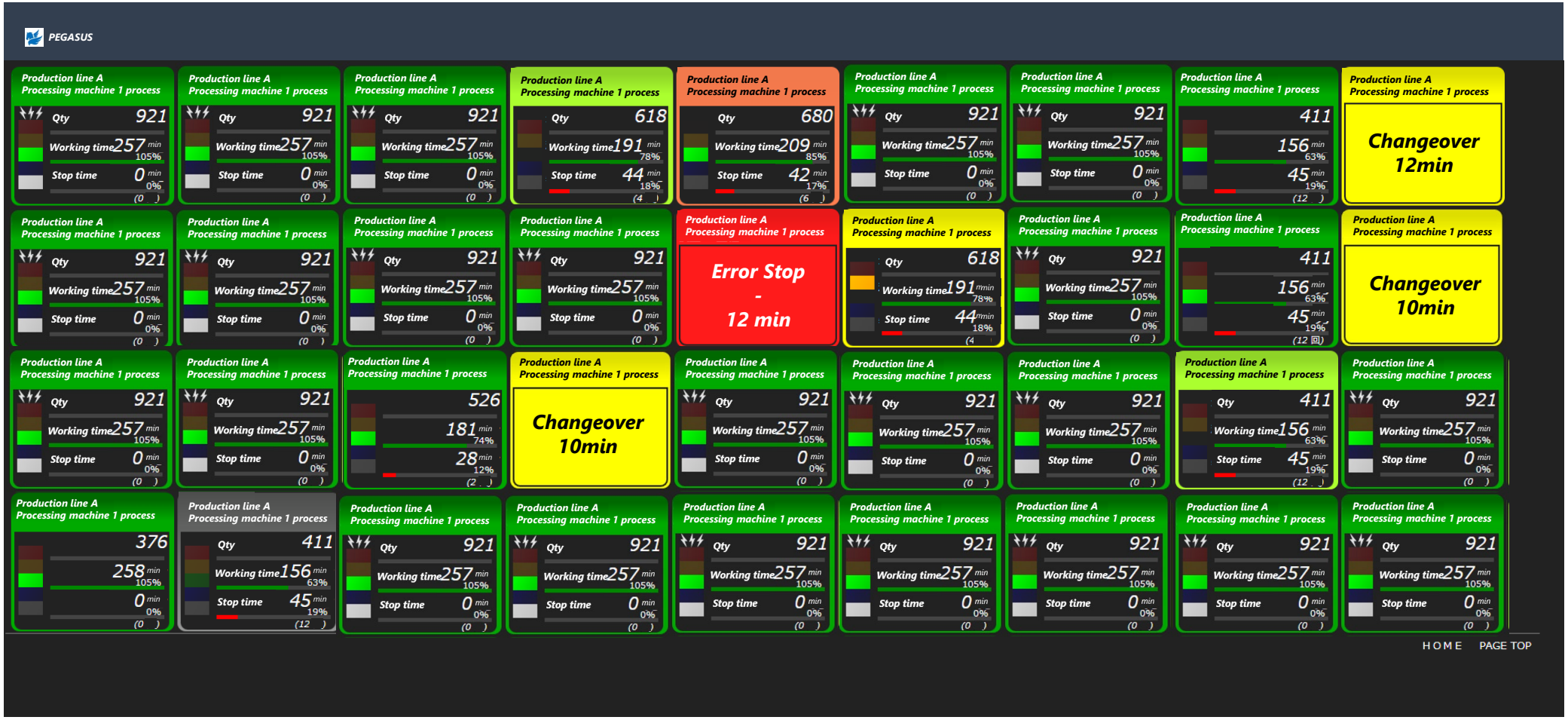
Data Reference Function

Based on the work S/N, processing, inspection, and assembly results are collected and stored in the database. If the database is accessible within the same network, data can be referenced via a browser application. In addition to viewing processing and inspection results, reports can be generated, including graphical representations of processing time and quality data trends over time that are updated accordingly.



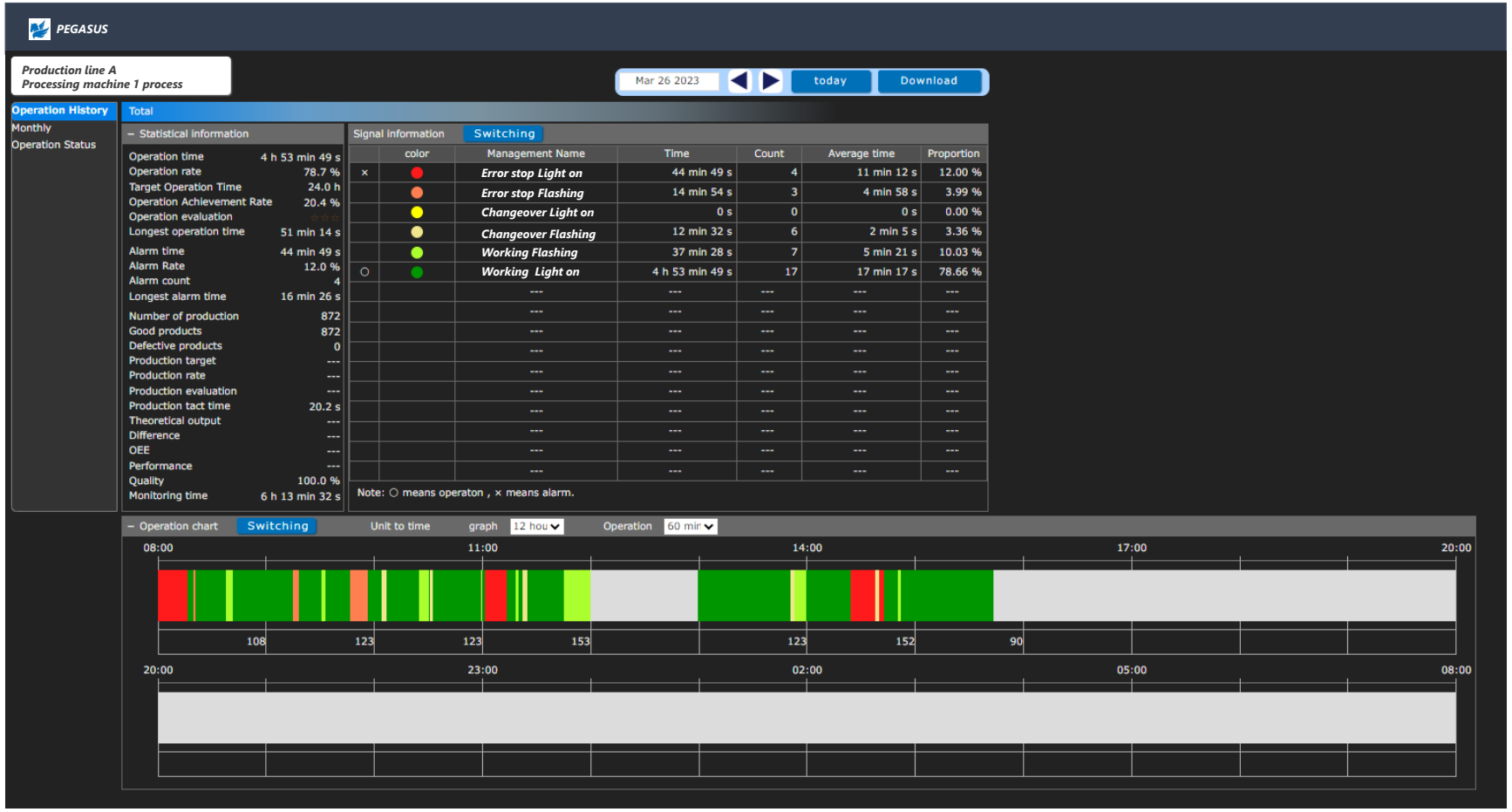
Functions of Operation Monitoring & Traceability System

The operating status of each piece of equipment can be shown on an Andon display. In addition to equipment status, production quantities, cumulative operating time, downtime, and the number of stoppages can also be displayed. Both operators and managers can check this data via TV displays or PCs.



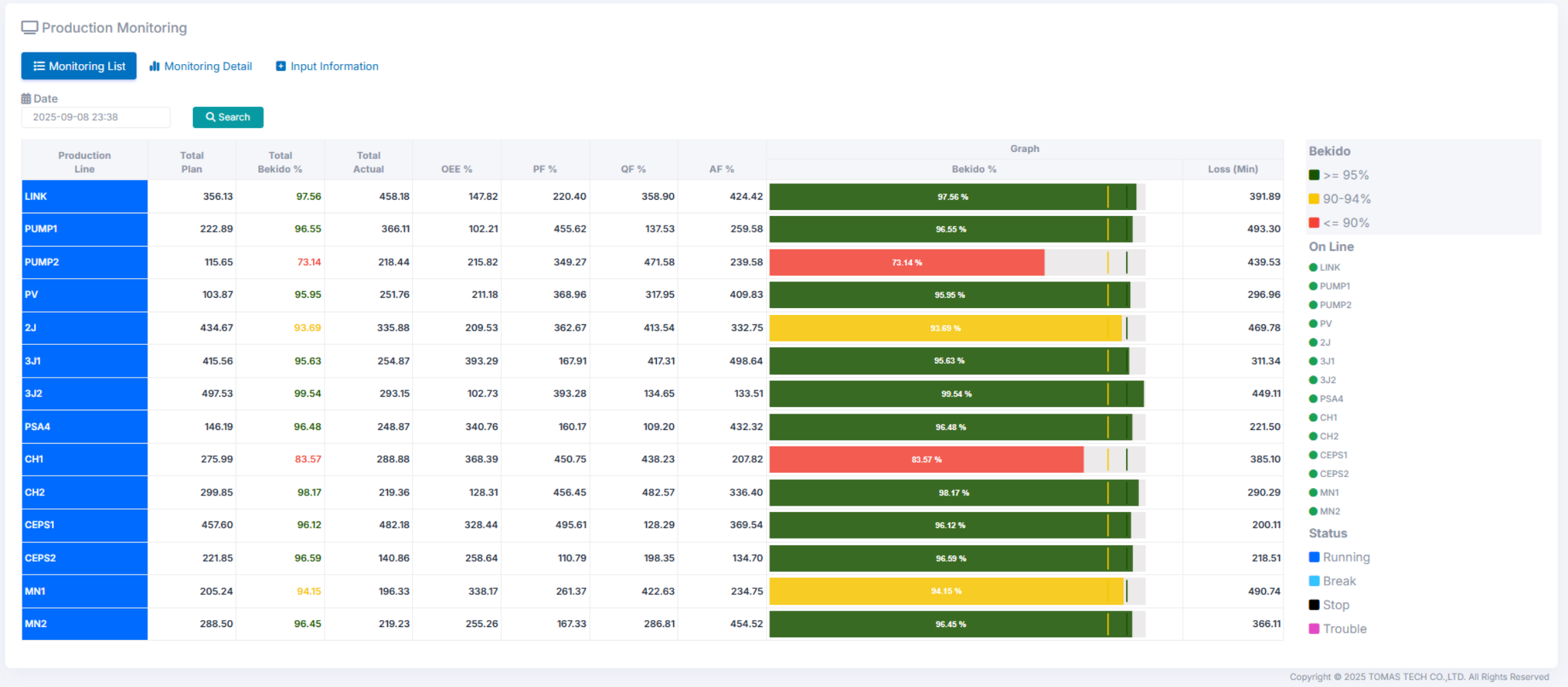
Functions of Operation Monitoring & Traceability System

By clicking on each equipment's information from the Andon display, detailed data can be viewed. It is possible to analyze lighting time and activation count per lamp. By selecting a target date, past data can also be reviewed.



Functions of Operation Monitoring & Traceability System

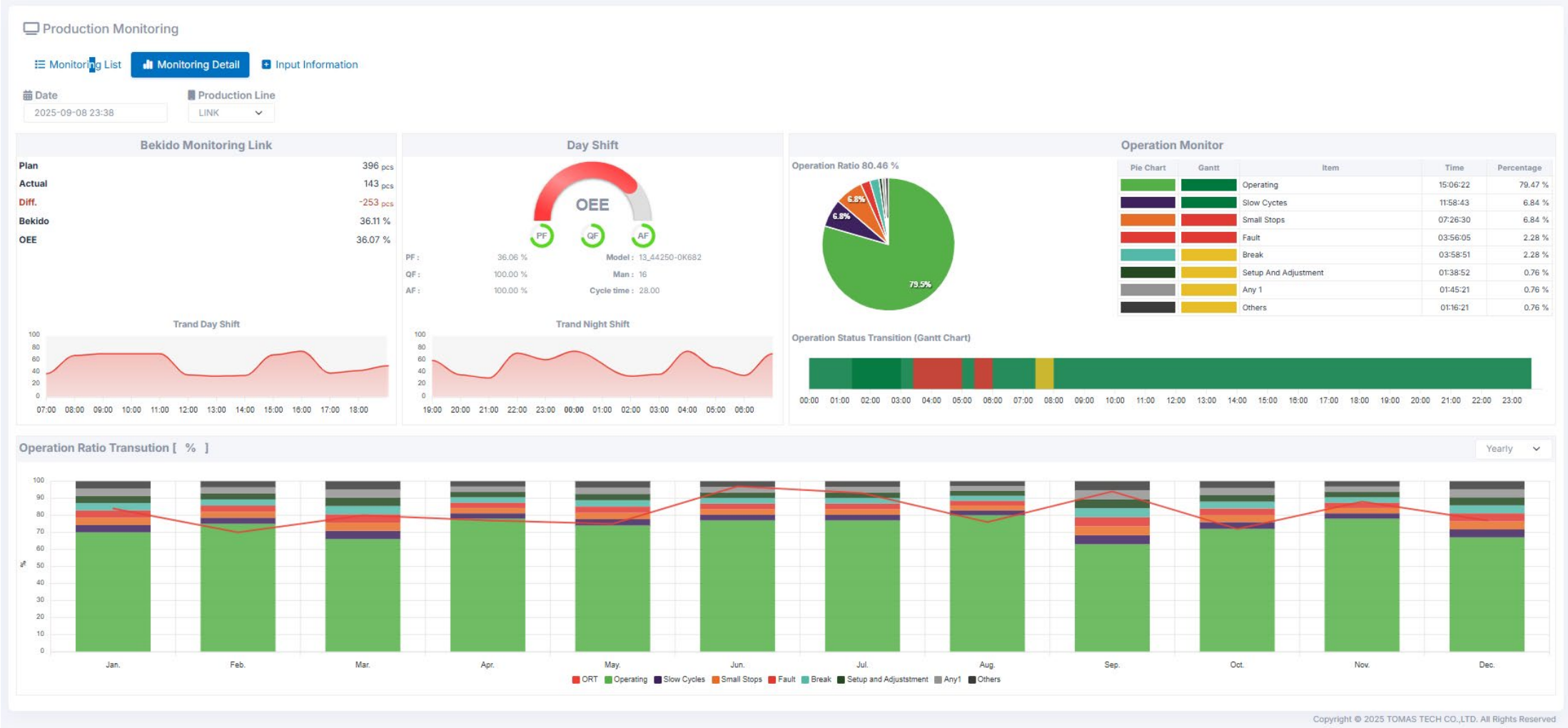
OEE (Overall Equipment Effectiveness) is calculated based on operating time, downtime, and production quantity.
The status of each production line can be displayed in a list view.



Production Line	Total Plan	Total Bekido %	Total Actual	OEE %	PF %	QF %	AF %	Bekido %	Loss (Min)
LINK	356.13	97.56	458.18	147.82	220.40	358.90	424.42	97.56 %	391.89
PUMP1	222.89	96.55	366.11	102.21	455.62	137.53	259.58	96.55 %	493.30
PUMP2	115.65	73.14	218.44	215.82	349.27	471.58	239.58	73.14 %	439.53
PV	103.87	95.95	251.76	211.18	368.96	317.95	409.83	95.95 %	296.96
2J	434.67	93.69	335.88	209.53	362.67	413.54	332.75	93.69 %	469.78
3J1	415.56	95.63	254.87	393.29	167.91	417.31	498.64	95.63 %	311.34
3J2	497.53	99.54	293.15	102.73	393.28	134.65	133.51	99.54 %	449.11
PSA4	146.19	96.48	248.87	340.76	160.17	109.20	432.32	96.48 %	221.50
CH1	275.99	83.57	288.88	368.39	450.75	438.23	207.82	83.57 %	385.10
CH2	299.85	98.17	219.36	128.31	456.45	482.57	336.40	98.17 %	290.29
CEPS1	457.60	96.12	482.18	328.44	495.61	128.29	369.54	96.12 %	200.11
CEPS2	221.85	96.59	140.86	258.64	110.79	198.35	134.70	96.59 %	218.51
MN1	205.24	94.15	196.33	338.17	261.37	422.63	234.75	94.15 %	490.74
MN2	288.50	96.45	219.23	255.26	167.33	286.81	454.52	96.45 %	366.11

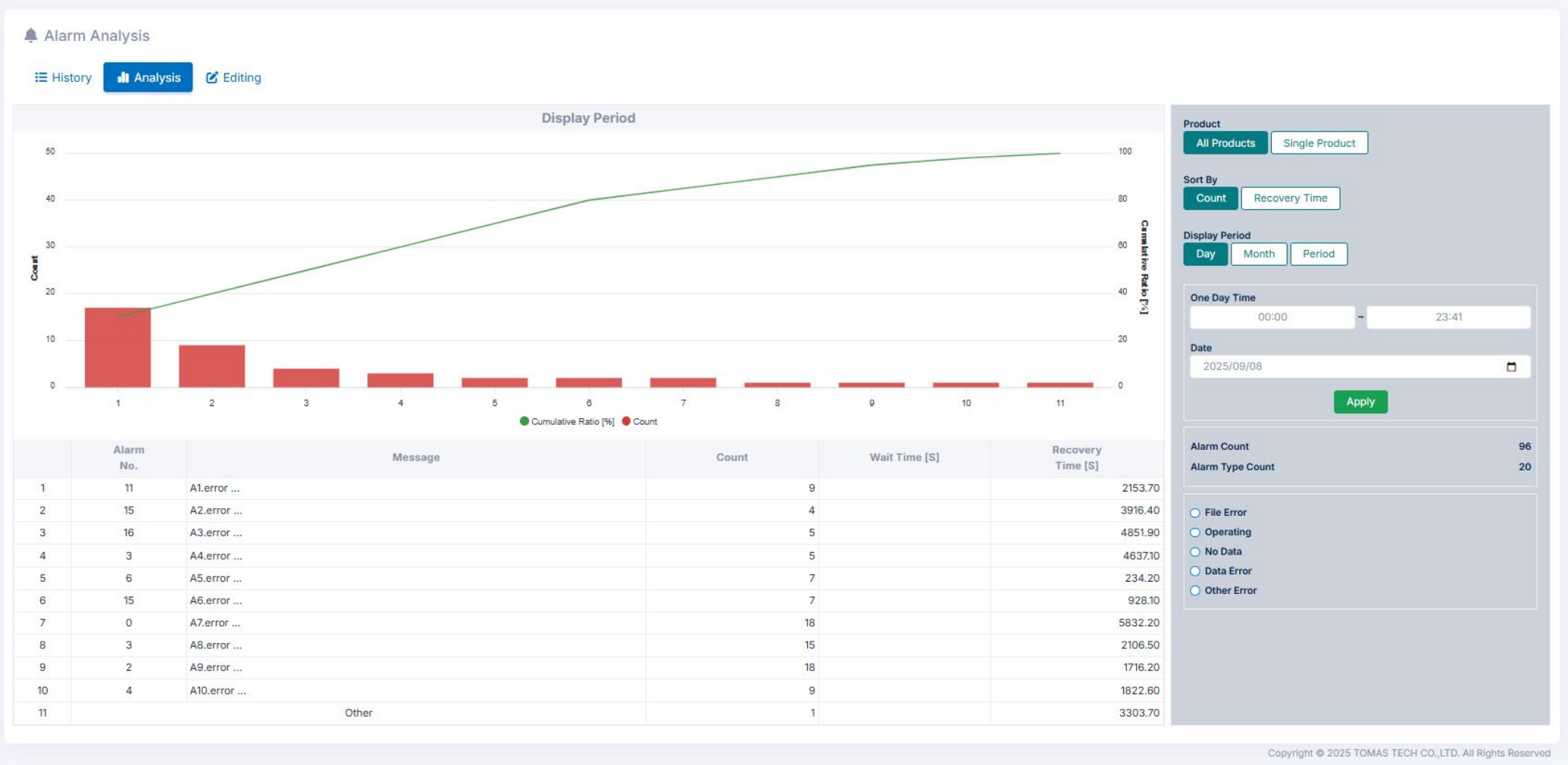
Functions of Operation Monitoring & Traceability System

OEE (Overall Equipment Effectiveness) is calculated based on operating time, downtime, and production quantity.
Historical information for each piece of equipment can be viewed, including past conditions and performance trends.



Functions of Operation Monitoring & Traceability System

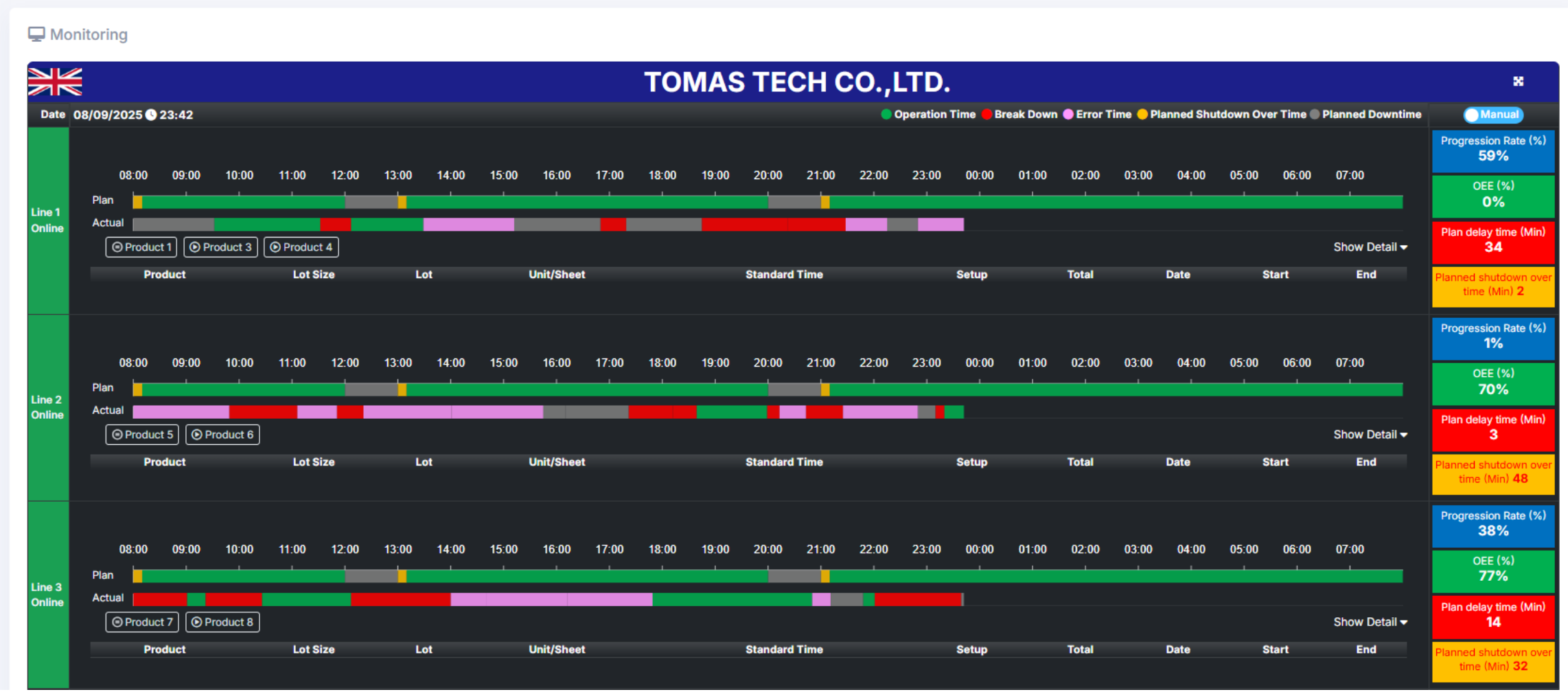
Analysis using Pareto charts based on the number of alerts and downtime is possible.
It can be utilized to determine which top alerts have the greatest impact.



	Alarm No.	Message	Count	Wait Time [S]	Recovery Time [S]
1	11	A1.error ...	9		2153.70
2	15	A2.error ...	4		3916.40
3	16	A3.error ...	5		4851.90
4	3	A4.error ...	5		4637.10
5	6	A5.error ...	7		234.20
6	15	A6.error ...	7		928.10
7	0	A7.error ...	18		5832.20
8	3	A8.error ...	15		2106.50
9	2	A9.error ...	18		1716.20
10	4	A10.error ...	9		1822.60
11		Other	1		3303.70

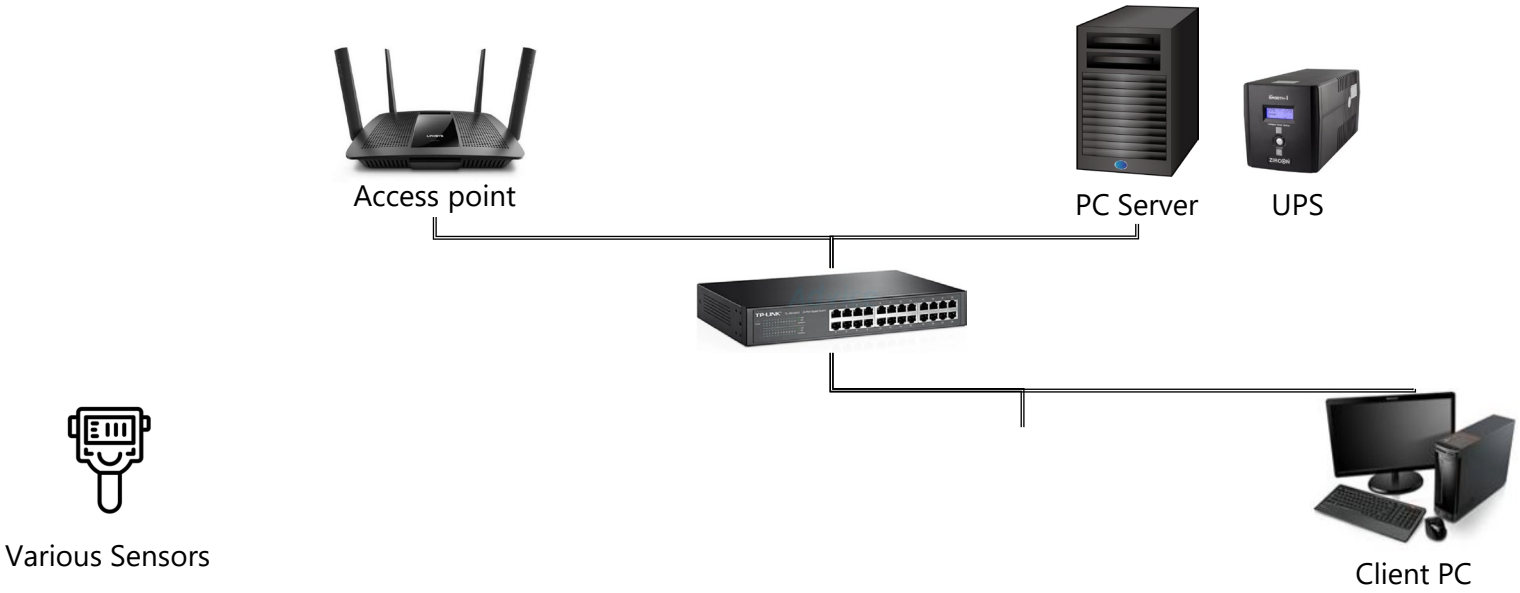
Functions of Operation Monitoring & Traceability System

The line operation status is displayed in a bar chart comparing the plan and the actual results.
By updating the actual results against the schedule based on the production plan, the situation can be visualized.



Appendix

System configuration



No	Item	Recommended specifications and models
1	PC Server	OS: Windows Server 2019R2Standard / Memory: 8 GB or higher /Hard disk: Free space of 50 GB or higher / Display: Resolution 1366 x 768 or higher / Browser: Google Chrome (latest version) ⁎Server machine with recommended model specs or higher
2	Client PC	OS: Windows7/8.1/10 / Memory: 4GB or more / Display: Resolution 1366×768 or more Browser: Google Chrome (Latest version) ⁎PC machine with recommended model specifications or higher
3	UPS	UPS shutdown signal type
4	Various Sensors	Selection on a Case-by-Case Basis

Schedule

1. Current Situation Analysis	We will conduct interviews to gather information about the current business operations and the systems in use. This will allow us to confirm requirements and analyze the customer's current situation. Based on these requirements, we will prepare a quotation.	**Within sales**
2. Requirements Definition	Based on the results of the current situation analysis, we will conduct a detailed requirements definition. We will verify the detailed requirements to ensure that the system can be implemented in line with actual operational needs.	**1-8 weeks**
3. Design	We will conduct design activities, including basic design, detailed design, and migration preparation, based on the requirements while holding progress meetings.	**1-3 weeks**
4. Development and Testing	We will develop the system to fit your business needs and proceed to testing. To ensure a smooth implementation, we will also consider migration methods.	**1-12 weeks**
5. Implementation Support	During the implementation, we will conduct training sessions while operating in parallel with the currently used system or processes. After confirming the user experience, we will proceed with the final acceptance inspection.	**1 week**
6. Go-Live	The system will officially start operation. We will provide long-term support for safe and comfortable system usage through operational maintenance support, helpdesk services, information provision, and updates.	**Min : 4 weeks** **Max : 24 weeks**

System maintenance

#	Software Maintenance		Standard / Option
1	Operation Support and Recovery Assistance	We will establish a support contact to provide operational support via phone and email, as well as recovery assistance in the event of software malfunctions.	Standard*1
2	Providing updated software versions	Upgraded software versions will be provided at no cost when improvements are made, ensuring compatibility with the latest operating systems. This eliminates software costs for server updates, reducing lifecycle expenses.	Standard*1
#	**Hardware Maintenance**		
1	Hardware Maintenance	In the event of a server failure, our company or the hardware manufacturer will carry out on-site repairs, including parts replacement.	Option*2
#	**Software Reinstallation**		
1	Software Reinstallation	In the event that software reinstallation is required after server repair, we will carry out the restoration process. (Please note that stock data recovery is not included in the software reinstallation.)	Standard*1

*1) Services will be provided at the system purchase price for the first year of the contract.
Starting from the second year, contracts will be on an annual basis.
*2) Services will be provided only if hardware is purchased from our company.

Benefits of System Implementation

1. Data Collection
Based on knowledge of equipment and processes, the necessary data is selected and collected. Drawing on the engineers' extensive experience and expertise, data essential for solving on-site issues is gathered and accumulated.

Factor Analysis, Data Selection, Data Collection

2. Visualization
The current situation can be quantitatively understood, leading to new insights. The collected data is displayed in a clear and easy-to-understand format, visualizing production status and on-site conditions.

Data Visualization

3. Analysis
Factors necessary for on-site improvement and problem-solving can be identified. Based on the collected data, analysis is carried out to uncover causes and insights that lead to solutions.

Data Analysis

4. Kaizen (Continuous Improvement)
Improvement activities and evaluations of problem-solving measures can be carried out, enabling the improvement cycle to turn continuously. Diagnostic rules are created from analysis results, and the collected data is diagnosed in real time, with the results fed back to the production site.

Data-driven Diagnosis & Kaizen

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