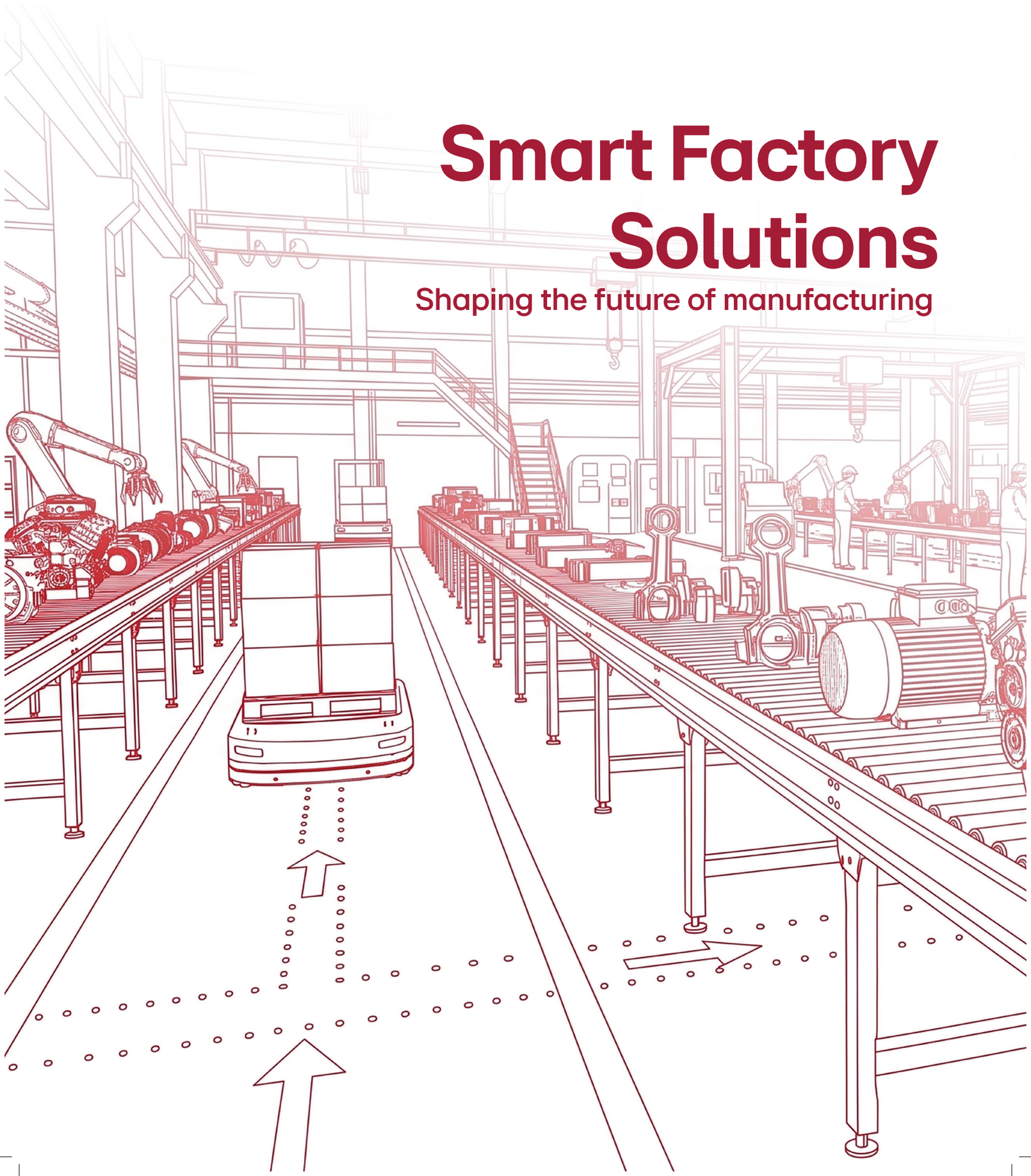
LG CNS

Smart Factory Solutions

Shaping the future of manufacturing



About LG CNS

From IT service specialists to **DX Leader**, LG CNS has been at the forefront of Korea's remarkable technological advancements.

With deep domain knowledge and hands-on project experience, we deliver end-to-end DX services—from consulting and system implementation to operations and optimization—helping our customers achieve measurable business outcomes.

IT Expertise
Established in 1987

Business Fields
AI, Big data, Cloud, CX, Smart Logistics, Smart City, Smart Factory, Web3, SaaS, IT/ Physical Security, etc.

Employees
7000+

AI & Cloud Experts
1700+

Number of Patents
426

Software Copyrights
1323

Global Partnership w/ major IT Vendors
30+

LG CNS streamlines your smart factory transformation by uniting specialized expertise with world-class technology. We integrate people, systems, and equipment to maximize productivity across the entire lifecycle—from design to operations.

30+ years of proven expertise in manufacturing IT system implementation and operations

Extensive experience in building and operating smart factories across diverse industries

Advancing manufacturing intelligence through AI, big data, and IoT technologies

Driving measurable operational improvements through AI and data analytics

Quality Level Prediction → Optimal Process Condition Recommendation → Equipment Failure Prediction

Seamless enablement from product planning to production and logistics with the proprietary Factova platform

Delivering a total solution covering the entire manufacturing value chain

Factova: Manufactoring Execution → Process Management → Design Automation → Equipment Management

LG CNS for Manufacturing

Shaping the future of manufacturing one integrated, intelligent factory at a time.

Core Competencies

- Smart Factory consulting (PI / ISP, diagnostics, roadmap)
- IT/OT Data Integration (shop floor ↔ enterprise systems)
- Digital Twin (factory, process, product)
- AI-based quality, equipment, and process optimization
- Manufacturing infrastructure & platform engineering

Solutions

Digital Twin
- Factory Twin
- Process Twin
- Product Twin

Production
- Production Execution
- Equipment Managment
- Process Managment
- Quality Managment

Equipment Automation
- SDA*
- Equipment Engineering

R&D
- Research
- Development
- R&D Infrastructure

Manufacturing ESG
- Environmental Safety
- Energy

Services

Solution Planning & Consulting
- Analyze customer pain points
- Map solutions and establish implementation roadmaps
- Assess compatibility across heterogeneous environments

Customized Implementation & Optimization
- Design site-specific architectures
- Build integrated infrastructure and edge systems
- Enhance and refine systems with a user-centric (UX) approach

Value Realization & Service Enhancement
- Optimize system performance and upgrade functionalities
- Provide SaaS-based updates and lifecycle management

**SDA: Software Defined Automation*

Reference

Home Appliance

LG Electronics

Korea - 8 | Global - 34
Vietnman Telematics ('22) | Mexico Telematics (~'23)

LG-MAGNA

Display

LG Display

Panel: Korea - 25 | Global - 5
Module: Korea - 13 | Global - 12

Chemical

LG Chem

LX MMA

Korea - 14 | Global - 6

Battery

LG Energy Solution

Korea - 6 | Global - 29

Automotive

HYUNDAI MOBIS

HYUNDAI

Alabama HMMA ('04)

Mando

America | China ('05)

PROTON

Tanjong Malim, Malaysia ('03)

Iran ('07)

Pharmaceutical

YUHAN

BORYUNG

ILDONG

Hanmi

Semiconductor | Wafer | Solar

SK hynix

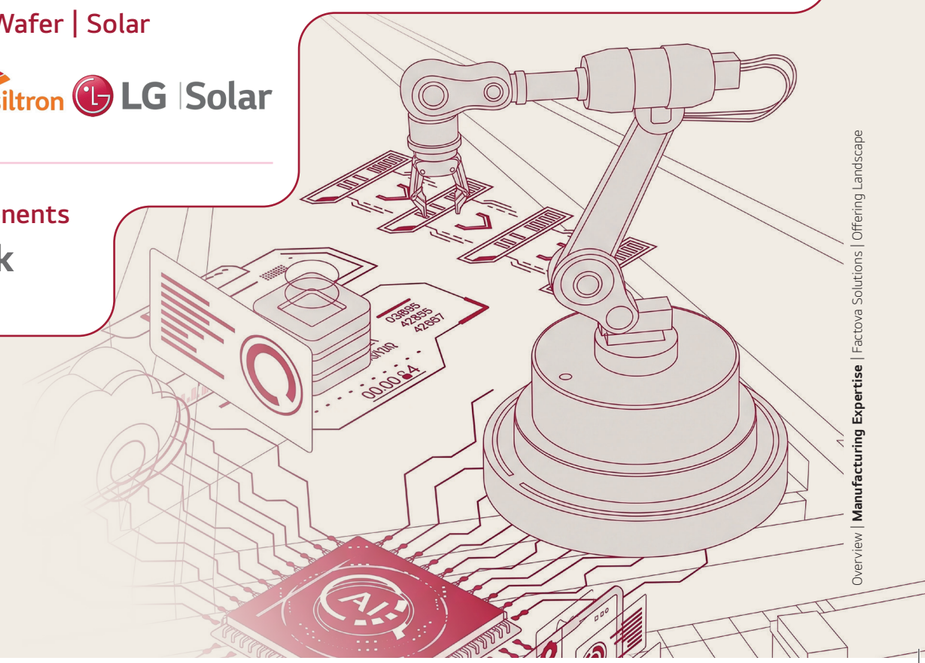
SK siltron

LG Solar

Electronic Components

LG Innotek

Korea - 14 | Global - 9



Why LG CNS

Rapid Initial Setup

Predefined SOP templates and a guided setup wizard accelerate implementation.

Flexible Shop-Floor Adaptation

Structured master data management and Factova Control enable seamless integration without replacing existing equipment.

Modular & Scalable

Start with core functions and easily expand as operational needs evolve.

Factova MES

An Integrated MES Solution for Data-Driven Manufacturing Operations

Manufacturers often struggle with fragmented data and limited shop-floor visibility—leading to inefficiencies, quality issues, and delayed decision-making.

Common Challenges

- Manual, error-prone data collection
- Limited end-to-end traceability from raw materials to finished goods
- Data mismatches between ERP, planning, and execution systems
- Lack of real-time insight into inventory, process changes, and bottlenecks

Factova MES bridges ERP systems and shop-floor equipment, unifying production data into a single execution layer that enables reliable, efficient, and transparent manufacturing operations.

Why It Matters

- Improves operational visibility and control
- Reduces wasted time, rework, and data inconsistencies
- Enables faster, data-driven decision-making on the shop-floor

Best Fit For

Industries

Automotive OEMs, Medical Devices, Food & Beverage, and other manufacturing industries where:

- Frequent process changes occur
- High levels of product and process traceability are required
- Real-time production control and quality management are critical

Companies

- Small and mid-sized manufacturers (SMBs)
- Companies considering a new MES implementation or upgrading an existing system

Proven Impact Across Industries

Automotive Parts Supplier

15 - 20%
Increase in Shop-Floor Productivity

70%
Reduction in Scrap Rate

Medical Device Manufacturer

50%
Reduction in Data Collection Time

50%
Reduction in Compliance-Related Operating Costs

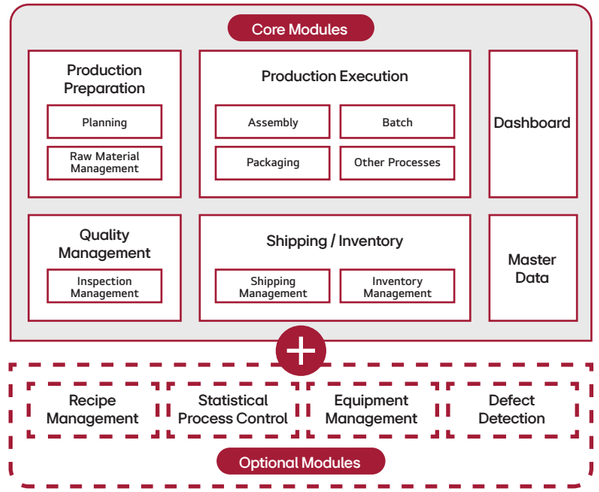
F&B Manufacturer

28%
Increase in Inventory Turnover

10 - 30%
Reduction in Equipment Downtime

Key Capabilities

Factova MES offers a core set of essential capabilities, with optional modules that can be added as your business needs evolve.



Key Expected Benefits

Improved Operational Efficiency

Standardized work processes are established through digital work instructions and real-time process management. Real-time monitoring enables rapid identification of process changes and bottlenecks, ensuring stable and efficient production operations.

Enhanced Quality Stability and Yield Improvement

Process errors are detected and prevented in real time, reducing rework costs. Minimized line changeover time and equipment downtime lead to improved production yield.

Strengthened Traceability and Regulatory Compliance

Systematic product and process history management, along with electronic signatures and automated audit trails, support compliance with stringent regulatory requirements. In the event of a recall, rapid traceability and root cause analysis help minimize legal risks and brand impact.

Improved Inventory Visibility

Eliminating data discrepancies between shop floor operations and systems improves inventory accuracy. Enables precise tracking of raw materials and work-in-progress, while minimizing losses for items with strict shelf-life and expiration requirements.

Why LG CNS

Proven at Scale

Over 20 years of deployment experience and 100,000+ licenses across global sites.

Unified Integration of Multi-Vendor Equipment Data

Collects and standardizes multi-vendor, heterogeneous equipment data that exists but is difficult to access.

Seamless Integration Across Systems

With a plug-and-play architecture, new equipment can be easily integrated, significantly shortening integration lead time compared to other solutions.

Seamless Integration Across Systems

- Standardized data and modeling enable easy integration with higher-level systems (MES, SCADA, IoT platforms)
- Enables data-driven decision making for business leaders using real-time shop floor data

Factova Control

A control solution that consolidates fragmented equipment data into a unified standard

Modern factories rely on diverse equipment—from legacy machines to the latest automation. Factova Control simplifies equipment data collection, control, and utilization across this complexity.

Why It Matters

- Standardizes equipment protocols to enable full connectivity
- Enables real-time data integration across legacy and modern equipment
- Equipped with remote, real-time visibility into all equipment

Best Fit For

Industries

- Manufacturing environments requiring rapid response to equipment anomalies
- Highly regulated industries such as pharmaceuticals and medical devices, where compliance and traceability are critical

Companies

- Manufacturers seeking proactive equipment monitoring and failure prevention
- Organizations aiming to improve equipment data visibility and reduce unplanned downtime

Beyond Data Collection

An Equipment Control Solution Ecosystem

Equipment Control System

- Supports loaders, robots, and process equipment
- Handles diverse and hybrid equipment configurations

Material Control System

- Real-time material flow orchestration
- Optimized control of material movement across all equipment

AMR/AGV/OHT/Conveyor Control

- Control architecture tailored to different material handling equipment types
- High scalability and efficient operational algorithms

Stacker Crane & High Picker Control

- Integrated operation with logistics automation systems
- High-precision control and enhanced equipment safety

Unified control and visibility across all equipment — legacy to latest

Key Capabilities

Standardized Heterogeneous Equipment Communication

- Unifies diverse PLCs, robots, and industrial protocols into a standardized framework
- Automatically maps data tags and signals into a common format
- Ensures full compatibility across equipment from different brands and generations

Real-Time Data Collection and Processing

- Enables ultra-low-latency data acquisition and preprocessing from PLCs, robots, and sensors
- Performs noise filtering, anomaly detection, data compression, and cleansing
- Delivers data in optimized formats for upper-level systems, including data hubs, digital twins, and AI analytics platforms

Application Development and Configurable UI

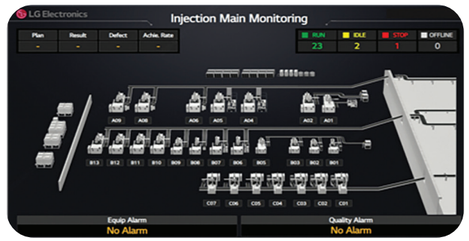
- Enables low-code application development with minimal coding requirements
- Supports configuration of monitoring dashboards and operational user interfaces
- Accelerates rapid PoC development and service deployment

AI-Enabled Extended Framework

- Embeds lightweight machine learning capabilities for training and inference
- Performs training, storage, and inference internally without external ML servers
- Enables real-time anomaly prediction using stored models

Integrated Production Monitoring

(Factova View)



Why LG CNS

Heterogeneous Equipment Data Integration

Standardizes and integrates data from equipment and sensors across multiple vendors and models, ensuring data reliability through robust validation.

Seamless Integration with Related Systems

Integrates with MES, OCAP, and EMS to enable process control and downstream actions in response to equipment or process anomalies.

Proven Industry Expertise

Delivers tailored FDC solutions based on extensive experience across both discrete and continuous process industries, including displays and chemicals.

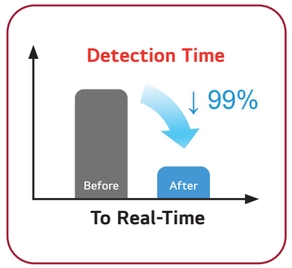
Factova FDC

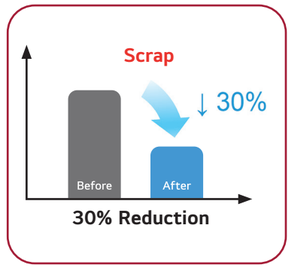
Real-Time Process Control for CTP and CTE**

Small deviations in process parameters can lead to major quality losses and equipment issues. Factova FDC continuously monitors equipment and process conditions to detect anomalies early.

Why It Matters

- Prevents quality loss caused by unnoticed process drift
- Enables proactive maintenance and failure prevention





Best Fit For

Industries

Industries such as chemicals and refining, semiconductors and displays, medical devices, and aerospace, where:

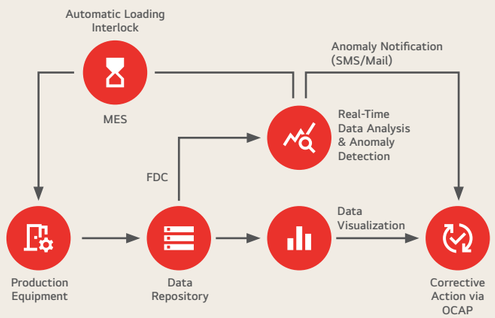
- Complex process parameters must be tightly controlled
- Equipment conditions directly impact product quality

Companies

- Manufacturers collecting data but not fully leveraging it
- Operations at high risk of failure or downtime

**CTP: Critical to Process *CTE: Critical to Equipment*

Key Capabilities



- Real-time data collection from processes and equipment
- Data visualization for analysis and identification of key factors
- Anomaly detection models based on advanced statistical methods
- Real-time anomaly detection with process and equipment interlocks
- Integration with related systems and execution of actions based on predefined action plans

Factova SPC

A Statistical Process Control System for CTQ Management

Inspection alone only reveals problems after defects are produced. To improve yield and reduce cost, manufacturers must statistically control **Critical-to-Quality (CTQ)** parameters in real time. **Factova SPC** automatically collects inspection and metrology data and applies statistical process control to detect variation early—before defects occur.

Why It Matters

- High-precision processes amplify the cost of even small variations
- Manual data handling delays response and increases error
- Pass/fail inspection detects defects too late

Factova SPC shifts quality from reactive inspection to proactive control.

Best Fit For

Industries

Semiconductor and Display, Medical Devices, Batteries, Chemicals & Advanced Materials, and other industries where:

- Highly precise processes make even minor variations critical
- High production costs amplify the impact of defects
- In-process quality inspection is essential

Companies

- Companies shifting from inspection-based quality control to data-driven process control
- Production and quality teams seeking cost reduction through lower defect rates and improved yield

Why LG CNS

Data Integrity Framework

Integrates data from diverse inspection and metrology equipment using standardized communication protocols, with built-in validation to ensure data consistency, reliability, and readiness for analysis.

Seamless Integration

Enables interoperability with MES and OCAP systems, supporting a closed-loop workflow—from real-time interlocks triggered by anomaly detection to downstream corrective actions.

AI-Enabled SPC

Supports control chart monitoring and process capability analysis (Cp/Cpk), with automated insights and summaries provided by the SPC AI Assistant.

Key Capabilities

Automated Data Collection

Automatically collects, standardizes, and validates data from inspection and metrology equipment.

Real-Time Anomaly Detection

Detects process abnormalities in real time using SPC-based statistical rules.

Closed-loop Process Control

Enables effective process management through automated adjustments and control limit monitoring.

Seamless System Integration

Integrates with related systems to trigger interlocks and execute predefined actions when critical issues occur.

Why LG CNS

Unified Anomaly Monitoring

Integrates anomaly data from SPC, FDC, and other systems into a centralized dashboard, enabling comprehensive visibility and coordinated response across the plant.

Seamless Cross-System Navigation

Connects with systems such as FMCS to reduce operational friction, allowing users to execute corrective actions directly within an OCAP-centric workflow.

Automated Action Execution

Automates predefined response steps, enabling the system to execute actions without manual intervention where applicable—improving speed, consistency, and efficiency.

Factova OCAP

A Process Anomaly Management System with Standardized Response Guidance

When process anomalies occur, responses often rely on individual operator experience—resulting in inconsistent outcomes. **Factova OCAP** standardizes response execution through predefined procedures, guiding operators step by step to ensure consistent and timely actions—regardless of individual expertise. By reducing reliance on tribal knowledge, it improves operational consistency, accelerates response time, and minimizes process risk.

Why It Matters

- Reliance on tribal knowledge increases operational risk
- Inconsistent response leads to repeat issues and compliance exposure
- Manual coordination slows resolution

OCAP turns best practices into executable, repeatable actions.

Best Fit For

Industries

- Manufacturing environments requiring rapid and consistent response to in-process anomalies
- Highly regulated industries (e.g. pharmaceuticals and medical devices where compliance and traceability are critical

Companies

- Organizations driving standardization and maturity of anomaly response processes
- Companies seeking to integrate existing detection systems (e.g., SPC, FDC) into a more efficient and unified anomaly management framework

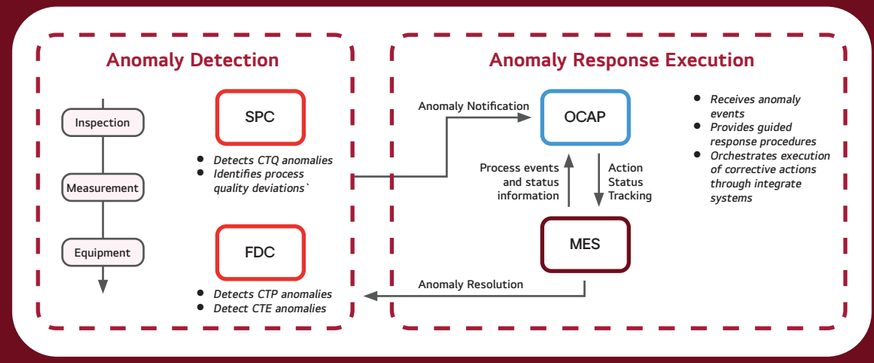
Value Delivered

- Standardizes and guides anomaly response procedures, reducing missed or delayed actions while improving consistency and execution
- Serves as a centralized portal connecting multiple detection systems—linking detection, procedures, and actions into a unified workflow
- Automates predefined response rules, enabling autonomous execution of selected activities and improving response speed and efficiency
- Captures response history and outcomes, creating a reusable knowledge base for continuous improvement and faster resolution

From Detection to Resolution

One Closed-Loop System

Factova SPC, FDC, and OCAP work together as a single operational flow. Together, they deliver **faster detection, better decisions, consistent execution, and reduced risk.**



AI-Powered Capabilities

SPC AI Assistant

Enables intuitive data analysis through natural language queries, supporting root cause analysis, process capability evaluation, actionable insights, and period-based process summaries.

AI Super Agent

Leverages data from SPC, FDC, OCAP, and MES—including recipe changes, equipment events, and lot history—to support advanced root cause analysis.

Proven Impact Across Industries

Display

60%
Reduction in Raw Material Defects

30%
Reduction in Scrap Rate

Battery

90%
Improved Yield

99%
Reduction in Anomaly Detention Time (10s of minutes to Real-Time Detection)

Chemicals

90%
Improvement of Real-Time Inventory Accuracy

90%
Achievement of End-to-End Traceability

Factova Logistic Simulation

An Automated Factory Layout Design System

Designing factory layouts for new plants or line expansions is time-consuming and complex. As the number of processes, equipment types, and constraints increases, identifying an optimal layout through manual planning and trial-and-error becomes increasingly difficult—and risky. **Factova Logistic Simulation** automates factory layout design, enabling manufacturers to quickly generate and evaluate optimal layout scenarios—even in highly complex, automated environments.

Why It Matters

- Manual layout planning slows time-to-production and increases design risk
- Suboptimal layouts create long-term inefficiencies and bottlenecks
- Late design changes drive rework and cost escalation

Factova Logistic Simulation reduces layout design time while improving confidence in layout decisions.

Best Fit For

Industries

- Manufacturing environments with complex, automated production systems
- Facilities with multiple production lines and diverse equipment types

Companies

- Companies planning new factories
- Manufacturers expanding production lines or redesigning layouts
- Operations seeking to validate layout decisions before execution

Why LG CNS

Unified Anomaly Monitoring

- Factory layout design is an NP-hard problem, making it difficult to find optimal solutions. Factova applies metaheuristic algorithms to efficiently derive optimal or near-optimal layouts.
- Parallel processing enables simultaneous generation of multiple layout scenarios, significantly reducing design time.

Complex Constraint Optimization

Considers multiple constraints in an integrated manner, including spatial limitations, process sequences, equipment characteristics, and material flow, to ensure feasible and practical designs.

Automated Action Execution

Simulation results are automatically generated as DXF files and can be directly converted into CAD drawings, simplifying downstream design activities.

Key Capabilities

LLM - Enabled Simulation

- Enables creation and modification of scenarios using natural language
- Provides a user-friendly and intuitive simulation environment

AI-Driven Bottleneck Analysis and Optimization

- Identifies bottlenecks and resource imbalances automatically
- Generates optimized scenarios and reports
- Provides real - time calculation of key metrics (throughput, cycle time, etc.)

Unified Anomaly Monitoring

- Enables testing of a wide range of process scenarios
- Validates improvements in productivity, efficiency, and bottlenecks

What-If Simulation

- Enables testing of a wide range of process scenarios
- Validates improvements in productivity, efficiency, and bottlenecks

Why LG CNS

Proven Industry Expertise

- Since deploying AI vision inspection at LG Display in 2016, we have systematized our AI vision solutions through extensive projects with leading global customers
- Strong capabilities in high-speed image processing across diverse product types

Remote Inspection Capability

- Supports cleanroom-separated and physically isolated inspection environments
- Enables stable and reliable remote inspection operations

Integrated Solution from Optics to Algorithms

- Delivers a vertically integrated vision inspection solution spanning optics, mechanics, control, and AI algorithms.
- Rapid deployment through data augmentation and synthetic data generation technologies.

Factova AI Vision

AI-Powered Vision Inspection Solution

Manual visual inspection struggles to keep pace with modern manufacturing demands. As products become more complex and tolerance windows shrink, even minor defects can lead to significant quality risk and cost. **Factova AI Vision** delivers high-accuracy, standardized vision inspection using AI—reducing human dependency while improving consistency, speed, and traceability.

Why It Matters

Consistent Quality & Risk Reduction

- Manual inspection limitations can lead to missed detection of micro defects and foreign particles
- Operator variability makes it difficult to maintain consistent quality
- Quality variation increases the risk of claims and product recalls

Improved Productivity & Operational Efficiency

As production volume increases, manual inspection drives continuous growth in labor costs

Data-Driven Operations & Traceability

Inspection data collection and history management enable process improvement and quality analysis

Best Fit For

Industries

Semiconductor, Display, Electronics (PCB), Automotive, Logistics & Distribution, and more

Companies

- Organizations requiring ultra-precise quality control where even minor defects are unacceptable
- Companies facing high quality risks that demand high inspection accuracy and robust response capabilities

Key Benefits

- Standardization of inconsistent inspection criteria
- Reduced operator fatigue and shorter inspection time
- Rapid response to variations in production environments
- Reduced human error and operational costs
- Remote inspection enabled through inspection load balancing in cleanroom environments
- Data foundation for process optimization and quality improvement
- Inspection history management to support regulatory compliance and build customer trust

Key Capabilities

- Delivers customized, end-to-end AI vision solutions tailored to customer-specific products
- Enables accurate detection of anomalies, even with minimal defect data
- Achieves high inspection accuracy through standardized and consistent evaluation criteria
- Improves process quality previously dependent on inspector skill and experience
- Replaces manual visual inspection and supports classification of complex, non-standard products

Expanded Inspection Coverage
(Assembly, dimensions, internal and external inspection, etc.)

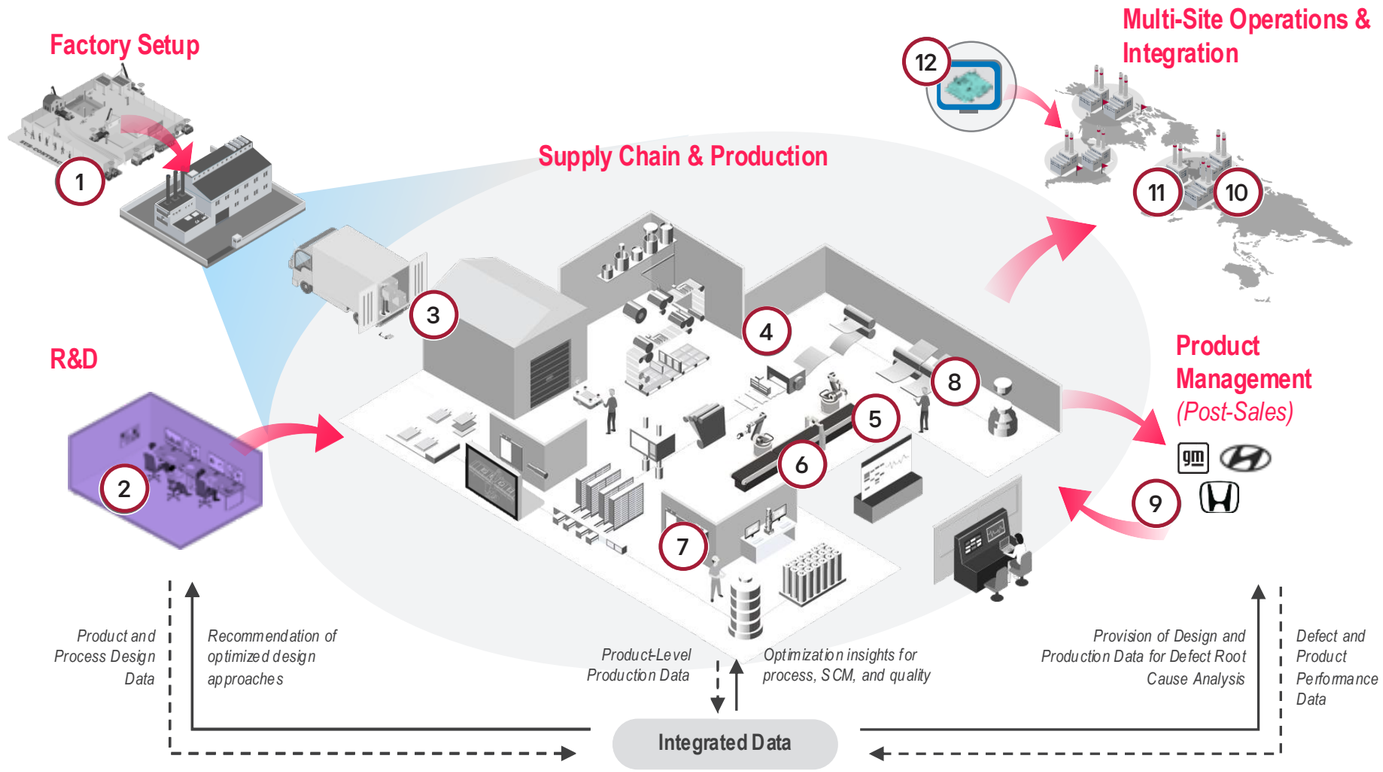
Increased Speed, Productivity, and Efficiency

High Inspection Accuracy and Consistency

Minimized Assembly Errors and Ensured Specification Compliance

Our Offering Landscape

Best-in-class technologies and services across the entire lifecycle- from planning and design to implementation and operations



1 — Agile · Quality · Cost

Simulation-Based Factory Design

Replicates battery plant scale and process layouts in a virtual environment to simulate demand and CAPEX, enabling optimized investment decisions.

2 — Agile · Quality · Cost

Product Simulation and Testing w/o Physical Prototypes

Utilizes product and process data to design and validate products in a virtual environment, optimizing performance and manufacturability.

3 — Cost · Delivery

Data - Driven Logistics Optimization

Collects and analyzes end-to-end logistics data, including location and loading, to enable real-time route control and optimization.

4 — Quality · Cost

Intelligent Manufacturing Execution

Controls equipment, logistics, and workforce based on real-time shop floor data to achieve planned production targets with minimal deviation.

5 — Quality · Cost

Traceability-Based Quality Management

Analyzes quality data by production stage to predict defects, enable interlocks, and utilize history for traceability.

6 — Quality · Cost

Automated Process Control Optimization

Applies in - line inspection and analytics to detect issues in advance and automatically adjust process parameters to improve yield.

7 — Greener · Safer · Cost

Digital Evironment, Health & Safety (EHS) Management

Monitors and controls environmental, energy, and safety indicators in real-time to prevent incidents.

8 — Quality · Cost · Delivery

Predictive Maintenance Based on Equipment Data

Uses equipment data to predict failures and enable automated maintenance scheduling and preventive maintenance.

9 — Quality

Digital Thread-Based Quality Root Cause Analysis

Collects product data from sales and performs quality and performance analysis to derive improvements in process and product design.

10 — Agile · Quality · Cost

Multi- Site Integrated Control

Replicates multiple sites in a virtual environment to monitor production, quality, and equipment status, and enables centralized operational control.

11 — Agile · Quality

Analytics-Based Quality Early Ramp-Up

Uses existing factory operation parameter databases and analytical models to simulate and accelerate ramp-up.

12 — Agile · Quality · Cost

Simulation-Based Factory Standardization

Uses simulation in a virtual environment to accelerate the derivation of standardized factory designs for mother factory implementation.

Pre-Manufacturing Stage

R&D (2)

Project & portfolio management

Project Management

- Project Management System
- Product Road Map
- Tech Sensing Platform

Design automation for prototype production

Design

- Design Navigation
- Simulation Product Data Management
- Product Data Management System

Product simulation & testing

Modeling & Validation

- Project Management System
- Product Road Map
- Tech Sensing Platform

Factory Construction (1)

Digital twin-based design simulation

Design

- Production Capacity Simulation
- Logistic Simulation
- Virtual Factory Platform

Procurement & construction visibility for accelerated delivery

Procurement / Construction

- Construction Project Management

Pre-testing for equipment protection & schedule risk reduction

Commissioning

- Process Virtual Validation Simulation
- Logistics Virtual Validation Simulation

Product and process design data

Recommendation of optimized design approaches

Product-level production data

Process, procurement & quality system optimization strtegy

Integrated Data

Design and production data for defect root cause analysis

Defect and product performance data

Manufacturing Stage

Production Execution (3) (4)

Process simulation-based production Scheduling Optimization

Production Scheduling

- Advanced Planning Scheduling
- Manufacturing Master Data
- Process Design System

Autonomous production control & simulation-based optimization at process and product levels

Production Execution

- Factova MES Plus (large enterprises)
- Factova MES (SMEs)
- Petro MES (continuous processes)
- iPharm MES (pharmaceuticals)
- Plant Information System

Location data-driven material tracking & route optimization

Logistics (In-line)

- Real Time Dispatching
- Material Control System
- Auto Guided Vehicle Controller
- Stocker Controller
- Conveyor Controller

End-to-end logistics management for raw materials, WIP, and finished goods

Inventory Management

- Warehouse Management System

Process Control & Quality (5) (6)

Real-time process anomaly detection & standardized response for yield and quality optimization

Line Process Control

- Recipe Management System
- 4M Change Control
- Fault Detection & Classification
- Statistical Process Control
- Out of Control Action Plan
- Run to Run System
- Formation Control System

Autonomous production control & simulation-based optimization at process and product levels

Inspection & Quality Control

- Quality Management System
- Formation Diagnostic Algorithm System
- Defect Engineering System
- Virtual Metrology
- Vision Inspection
- Auto Defect Judge/ Review & Repair
- Image Reinspection System
- Virtual Computed Tomography
- Inspection Collection Agent

Real-time centralized control for autonomous factory operations

Monitoring

- Global Facility Monitoring System
- Fab Monitoring Visualization System

Factory Management (7) (8)

Energy usage pattern optimization based on factory energy consumption data

Energy

- Factory Energy Management System
- DC Power Distribution
- Cycler

Real-time environmental & worker safety monitoring with automate response

Environment, Health & System (EHS)

- ESH Portal
- Product Carbon Footprint
- Integrated Safety & Emergency Management
- Net Zero Portal
- Chemical Management System

Equipment data-driven predictive maintenance scheduling

Equipment (Maintenance)

- Equipment Management System
- Machine Cycle and Signal Chart
- Enhanced CIM
- Cluster Tool Controller
- Inline Transfer Controller
- Formation Control System
- Equipment IoT
- Factova Control
- Factova Teston

Post-Manufacturing Stage

Product Management (Post-sale) (9)

Continuous collection of product operational & usage data

Data Collection

- Customer Quality Claims

Remote maintenance & product design enhancement

Design

- Service Lifestyle Management

Factory Expansion & Integrated (10) (11) (12)

Virtualized factory design standardization

Standardized Design

- Virtual Factory Platform

Automation equipment ramp-up optimization for production lines

Ramp-up

- Engineering Analysis System
- Process Virtual Validation Simulation
- Logistics Virtual Validation Simulation

Centralized multi-site operations through virtualized control centers

Control / Operations

- Remote Operating System

Factory Construction - VX ①

Design

Production Capacity Simulation

Predicts optimal operating conditions by reflecting real-time process data and enables integrated optimization at individual factory level.

Logistics Simulation

Pre-validates optimization modules and reflects equipment operating conditions without disruption, enabling optimization of logistics flows in a virtual environment.

Virtual Factory Platform Visualization

Enables real-time monitoring and historical state replay through real-time and historical data streaming, supporting virtualization of production lines, processes, logistics operations, and automated warehouses.

Virtual Factory Platform Optimization

Connects physical and virtual systems through real-time streaming to enable quality prediction, failure prediction, equipment optimization, and proactive identification of operational issues.

Procurement / Construction

CPM

(Construction Project Management)

A management framework that integrates schedule, cost, quality, and resource control across all phases of construction—from planning to completion—to accelerate timelines and optimize profitability.

Commissioning

Process Virtual Validation Simulation

Validates process logic and identifies potential errors in advance through simulation in a virtual environment before deploying actual production equipment, enabling performance optimization.

Logistic Virtual Validation Simulation

Simulates logistics systems in a virtual environment prior to physical implementation to identify bottlenecks and validate equipment layout for optimized logistics flow.

R&D ②

Project Management

PMS

(Project Management System)

A system that provides integrated support for goal and performance management, scheduling, cost management, and resource management.

PRM

(Product Road Map)

A system that structures product strategy, portfolio, and goals into executable initiatives, and supports integrated prioritization and roadmap planning.

PDM

(Product Data Management System)

A system that centrally manages product data—including technical documents, drawings, development parts, and bills of materials (BOM).

Tech Sensing Platform

A platform that classifies and analyzes global patents by technology and competitor and provides trend analysis and visualization.

Analysis / Prediction

Design Navigation

An integrated design and research library that organizes outputs from various R&D activities—such as experiments and analyses—and enables classification and unstructured data analysis.

SPDM

(Simulation Production Data Managment)

An AI-enabled virtual product validation system that supports R&D optimization, recommendation, and simulation-based prediction of experimental outcomes.

Modeling & Validation

LIMS

(Laboratory Information Management System)

A system for integrated management of laboratory requests, execution, and results across the full workflow (Request → Registration → Execution → Results).

LAS

(Laboratory Automation System)

A system that automates simple and repetitive laboratory tasks through automation equipment and robotic control.

Production Execution ③ ④

Production Execution

APS
(Advanced Planning and Scheduling)

An intelligent decision-support system that generates optimal production schedules and sequencing considering real-time constraints such as equipment, labor, and materials.

MMD
(Manufacturing Master Data)

A system that centrally manages core master data for manufacturing processes, including items, routings, bill of materials (BOM), and equipment.

PDS
Process Design System)

A system that supports production readiness by designing and standardizing manufacturing processes, work methods, and equipment layouts based on engineering knowledge.

Inventory Management

WMS
(Warehouse Management System)

A system that manages the entire warehouse operation in real time—including receiving, storage, inventory tracking, and shipping—to maximize efficiency and accuracy.

Production Execution

Factova MES Plus
(for Large Enterprises)

An MES solution that collects and analyzes real-time shop floor data to control and optimize the entire production process, from work order execution to finished goods shipment.

Factova MES Light
(for SMEs)

A cost-effective manufacturing execution solution that simplifies complex functionalities and focuses on real-time digitalization of shop floor data and process visibility.

Petro MES
(for Continuous Processes)

A production execution solution designed for continuous process industries, enhancing manufacturing competitiveness through data connectivity.

iPharm MES
(Pharmaceuticals)

An MES solution for the pharmaceutical industry that supports compliance with GMP and 21 CFR Part 11 regulations.

PIS
(Plant Information System)

A system that integrates and manages technical data generated across plant lifecycle stages—including design, construction, operation, and maintenance—to optimize asset value.

Logistics (In-line)

RTD
(Real-Time Dispatching)

Optimizes material flow on the shop floor by structuring complex logistics based on rule-based logic and predictive algorithms.

MCS
(Material Control System)

Controls and manages the movement of products and materials within the production environment by operating automated transport systems (OHT and AGVs) in real time.

AGVC
(Automated Guided Vehicle Controller)

A control system that centrally manages and controls automated guided vehicles (AGVs).

STKC
(Stocker Controller)

A lower-level control system that directly controls and manages automated storage systems (stockers).

CNVC
(Conveyor Controller)

A lower-level control system that directly controls and manages conveyor belt systems.

Process Control & Quality ⑤ ⑥

Line Process Control

RMS
(Recipe Management System)

A system that centrally manages process and equipment parameter changes to prevent process issues caused by incorrect recipe application.

4MCC
(4M Change Control)

Manages 4M (Man, Machine, Material, Method) changes during mass production

through a structured and traceable control process, enhancing change traceability via integration with production systems to improve validation, control, and reduce defect rates.

FDC
(Fault Detection & Classification)

A process control system that monitors variations in process and equipment parameters in real time, providing early anomaly warnings and supporting root cause analysis.

SPC
(Statistical Process Control)

Collects and analyzes inspection and measurement data in real time, enabling rapid response to anomalies and supporting root cause analysis and corrective actions.

OCAP
(Out of Control Action Plan)

Standardizes process anomaly response procedures, providing immediate operator guidance for faster response, shorter resolution time, and improved productivity.

R2R
(Run to Run System)

Uses CTQ (Critical to Quality) and CTP (Critical to Process) data to automatically adjust process conditions in real time, ensuring stable and optimized process performance.

Analysis / Prediction

QMS
(Quality Management System)

A system that integrates and manages quality policies, procedures, resources, and execution processes to achieve product and service quality objectives.

FDS
(Formation Diagnostic Algorithm System)

An algorithm-based inspection system that analyzes charge/discharge data generated during battery formation processes to diagnose and classify quality anomalies in real time.

DES
(Defect Engineering System)

A system that collects and analyzes defect data generated during manufacturing processes to identify root causes and improve yield.

VM
(Virtual Metrology)

A virtual metrology system that predicts and validates measurements where full inspection is not feasible, helping maintain optimal process conditions.

Line Process Control

GFMS
(Global Facility Monitoring System)

Visualizes logistics and production data, enabling real-time communication between operators and engineers to quickly resolve issues and minimize downtime.

FMVS
(Formation Diagnostic Algorithm System)

A monitoring system that provides real-time visualization of equipment status and production flow within semiconductor or display fabs for integrated oversight.

DAP Vision Inspection

An intelligent vision inspection service that uses ML/DL-based image analysis to automatically detect defects and perform precise quality classification.

ADJ+/ADR
(Auto Defect Judge / Auto Defect Review & Repair)

A system that automatically distributes inspection tasks and classifies defects during vision inspection.

IRS
(Image Reinspection System)

A secondary quality verification system where operators review defect images identified by automated vision inspection to filter false positives and improve final accuracy.

VCT
(Virtual Computed Tomography)

An engineering validation system that virtually analyzes internal structures and defects in 3D through simulation, without physical X-ray imaging.

Factory Management ⑦ ⑧

Energy

FEMS
Factory Energy Management System)

Analyzes energy consumption data to eliminate inefficiencies, maximize operational efficiency, and reduce carbon emissions, supporting low-carbon operations.

DC Power Distribution

A power distribution method that delivers electricity generated at the power plant directly to end users in DC form without AC conversion, improving energy efficiency.

Cycler
(Battery Performance, Lifestyle, and Pattern Analysis)

A solution for analyzing battery performance, lifecycle, and usage patterns.

Environmental, Health & Safety

EHS Portal

Provides integrated management of ESG-related indicators and automatically shares ESG-related insights and trends.

PCF
(Product Carbon Footprint)

A system that systematically manages and reduces greenhouse gas emissions generated by enterprises or factories.

Integrated Safety & Emergency Management

Provides GIS-based integrated monitoring of environmental and safety-related information, including workers, work environments, equipment, and incidents such as fire, smoke, and falls.

Net Zero Portal

Manages planning and execution of initiatives to achieve carbon reduction targets.

Chemical Management System

Identifies environmental regulatory risks related to chemical substances in products and automates certificate issuance.

Equipment (Maintenance)

EMS
(Equipment Management System)

A system that centrally manages equipment registration, inspection, maintenance, and preventive maintenance history to maximize equipment availability and optimize maintenance costs.

MCSC
(Machine Cycle and Signal Chart)

A system that analyzes and visualizes equipment operations, signals, and conditions to optimize equipment performance and proactively prevent downtime caused by failures.

ECIM
(Enhanced CIM)

Collects real-time data from manufacturing equipment without loss through interfaces with diverse production systems, provided in modular forms such as ECS, FMS, and EIF.

CTC
(Cluster Tool Controller)

A PC-based integrated control solution that standardizes and manages line control, transfer, and various logistics equipment for fast deployment, easy maintenance, and reliable data collection.

ITC
(Inline Transfer Controller)

A direct control solution optimized for inline equipment, enabling efficient equipment and robot control.

FCS
(Formation Control System)

A system that controls charge and discharge equipment during the battery formation process and collects and manages real-time process data.

eIo T
(Equipment IoT)

Enables the collection and retrieval of equipment sensor data, supporting user-driven analysis to improve production efficiency.

Factova Control

A PC-based development platform for equipment data collection and control.

Factova Teston

A system for managing equipment communication specifications and automating equipment interface testing, with automatic result validation and reporting.

Product Management & Post- Sales Operations ⑨

Data Collection

Customer Quality Claims

A post-market quality assurance system that collects customer complaints during product use and manages the entire process—from root cause analysis to corrective actions and recurrence prevention—through data-driven tracking.

Analystics / Utilization

SLM
(Service Lifecycle Mangement)

A system that manages the lifecycle of product service and maintenance.

Factory Expansion & Integrated Operations ⑩ ⑪ ⑫

Standardized Design

Virtual Factory Platform Visualization

Enables real-time monitoring and historical state replay through real-time and historical data streaming, supporting virtualization of production lines, processes, logistics operations, and automated warehouses.

Virtual Factory Platform Optimization

Connects physical and virtual systems through real-time streaming to enable quality prediction, failure prediction, equipment optimization, and proactive identification of operational issues.

Ramp-up

EAS
(Engineering Analysis System)

A system that performs engineering analysis of technical data generated during product design and manufacturing processes to validate performance, safety, and reliability.

Process Virtual Validation Simulation

Validates process logic and identifies potential errors in advance through simulation in a virtual environment before deploying actual production equipment, enabling performance optimization.

Logistics Virtual Validation Simulation

Simulates logistics systems in a virtual environment prior to physical implementation to identify bottlenecks and validate equipment layout for optimized logistics flow.

Control / Operations

ROS
(Remote Operating System)

An event- and alert-based remote-control system that enables real-time remote operation and response for manufacturing equipment.

The Future of Smart Factories —Together with LG CNS

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Diverse eXperiences, Various Know-hows, High Confidence

"Built on diverse experiences, LG CNS is a digital transformation (DX) specialist with unique expertise.We are confident in earning the trust of every client we serve.We will continue to grow as a Digital Growth Partner that customers trust and recognize above all."

We are confident in earning your trust.

Shingyoon Hyun, CEO of LG CNS

LG CNS America
Smart Factory Team
smartfactoryteam@lgcns.com