CHEMICAL INDUSTRY

Industrial turnkey solutions

Engineering integrated automation, digitalisation, quality control, and energy management for reliable, data-driven manufacturing.

inea.eu

Exact performance delivered responsibly

Facing ever-stricter regulation and environmental protection expectations, the chemical industry needs dependable and standards-compliant suppliers. For a complete, ESG-report-ready solution, the three pillars of modern manufacturing—automation, digitalisation, and energy—need to connect in a well-defined future-proof way.

Using the power of advanced technology, knowledge and innovation to design, build, and integrate, INEA provides end-to-end solutions that are more than the sum of their parts. Process control, quality inspection, manufacturing operations, production planning, energy management, functional safety, and an engineering-driven design philosophy sit within a single scope that supports our customers today and in the future.

Trusted by

Johnson Matthey Inspiring science, enhancing life · BASF · umicore · Kansai Paint · Ballard · PPG · Sandoz | lek

Precisely engineered

By putting in effort to understand the challenge presented, our solutions are uniquely tailored to each individual manufacturing environment. Decades of experience and thousands of completed projects in diverse industries give us the breadth required to see the big picture and the smallest details for a fully comprehensive solution.

Supremely reliable

There is no better investment than a system that lasts (nearly) forever, and many of our solutions have been running safely and efficiently for over twenty years, some becoming the standard in their field. This aspiration extends to user-empowerment to perform competently and confidently, and if maintenance is required, a qualified engineer answers the phone right away.

Future defining

Developing all solutions with a single-source-of-truth approach, we make sure that no two systems ever disagree on the state of the plant. With a pronounced shift from big data to smart data, we set the stage for predictive maintenance, digital twins, deep analytical intelligence, and a human-friendly operational environment.

Batch automation

Sourcing from decades of industrial process control experience, our batch automation solutions are state-of-the-art while focusing on safety and reliability. Batch automation based on the ISA-88 standard and following GAMP ensures consistent product quality through structured recipe management, coordinated equipment control, and precise sequencing. Automating resource allocation, execution phases, material tracking, and real-time status monitoring are essential.

Before implementation, every process is validated by functional safety specialists and digitally simulated, ensuring a secure and predictable transition to live production. Structured integration with MES, SCADA, and historian layers provides full traceability, performance insight, and compliance reporting. We build on industry-standard hardware and software platforms, enhanced with our in-house improvements for smoother integration and simple replication.

Platforms

AVEVA Batch Management

Centralised batch control system enabling precise recipe execution, unit coordination, and traceability. Integrated across layers 0-3 of the ISA-95 model with vendor-agnostic capabilities.

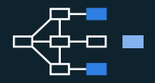
Rockwell FactoryTalk Batch

Platform for batch sequencing, material tracking, and audit-ready reporting, integrated with PlantPAx DCS and FactoryTalk Historian for reliable execution and compliance.

Siemens SIMATIC PCS 7 Batch

Batch automation within the PCS 7 process control system for recipe management, scalable architectures, and MES connectivity for tightly integrated process environments.

Beyond the ISA-95 batching standard



Our solutions treat ISA-88 and GAMP as solid foundations to build upon, so they include improvements tailored to each customer's specific needs. When replicated to a different location, the logic is easy to adapt to local variables while keeping consistent with the original implementation. Each project is an opportunity to improve processes while respecting material, space, and budget constraints. This ensures not only compliance but also optimisation for material efficiency, flexibility, and minimal waste.

Holistic project approach and flexibility

We offer end-to-end solutions, including consulting, designing, improving, maintaining, and introducing functional safety of batch processing systems using industry-leading batch management software. Our services cover both software and hardware integration, ensuring a seamless and efficient automation environment. The emphasis on knowledge transfer and training makes learning curve short and operators well-prepared to manage the new systems effectively.

Optimised workflow and resource management

In high-value operations, it is crucial to keep critical assets as well-allocated as possible. We support the setup of redundant systems with primary and secondary batch management servers for minimal downtime in case of server failure and improved overall system reliability. The system integrates with MES and ERP layers, ensuring that all materials and energy consumption are fully accounted for. This allows rational management of raw materials and accurate resource tracking, from input material to finished product, accounting for loss of material and its reuse.

No production risk before launch

Taking an approach of full digital simulation, every machine and component is precisely modelled and risk assessed. Before running the first batch, the designed production process is tested in a simulated environment, including all signals, loops, sequences, redundancies, fallback mechanisms, edge cases, and security protocols. Situations that are too dangerous to test in real life are also simulated and complex scenarios ran, so that the final product can be launched as quickly and safely as possible, avoiding any risk to production or health and safety measures

Chemical process automation

We automate processes that greatly vary in depth and complexity—from paint mixing to refining precious metals. Alongside a thorough understanding of the automation logic, cross-domain knowledge makes the integration easier and the finished solution of a higher quality.

Despite specifics of individual production and products, chemical preparation can be broken down into distinct unit operations, which can then be translated to relatively simple , automatable steps.

Following this logic, as long as a process can be deterministically defined, it can be automated. This allows us to neatly transfer one project's improvements to another, building on a compounding set of internally defined best practices.

Material charging
of solvents, reactants, and additives

Conditioning and dissolution
by heating, mixing, and composition adjustment

Reaction and transformation
by temperature, pressure, pH, and timing control

Particle formation
by crystallisation and precipitation

Solid–liquid separation
by filtration and decanting

Solvent recovery
by distillation or stripping

Forward-thinking recipe translation

Automating a single step may be simple, but mapping process logic into a procedural structure without breaking hierarchy requires broader understanding of the domain. Considering the potential future changes and replications of an individual phase means that equivalent operations will be performed with equivalent phases even at different stages or in different processes entirely. Consequently, no rewrites are needed to scale up or reimplement processes, which saves valuable time and work, speeding up deployment.

Adaptive process control

Repeatably producing the so-called golden batch can be difficult even in a tightly controlled environment. Because of slight variations in input materials, variation in equipment performance, or simple process drift, the final product might be wasteful or even unusable. To avoid a batch that might need to be scrapped, adaptive process control mitigates variations by predicting the outcome. Preventing a cascading issue can be as simple as slightly overdosing an underperforming component, which can—if all other parameters are still within limit—prevent a costly intervention.

Functional safety

Modern chemical processes must manage hazards systematically. Engineers with certified functional safety competence follow the IEC 61511 lifecycle to identify potential risks, define protection layers, and specify the required risk reduction. This includes safety requirements specifications, independent interlocks, isolations, and verification through digital simulation. Where required, Safety Instrumented Systems (SIS) and ATEX-rated equipment are implemented and installed to bring risk levels down as low as reasonably practicable.

Exception handling

Due to the sheer complexity of modern industrial chemistry, exceptions and special-cause events need to be designed for. Effective automation anticipates these conditions through well-defined recovery paths, permissives, and fallback states. Each phase and operation include deterministic responses for holds, restarts, and aborts, ensuring the system transitions safely without scrapping the batch. Instead, the cause of a deviation can be identified and mitigated quickly, and a batch resumed from a defined safe point.

Material handling

The movement of materials in a production process is a common constraint in designing a factory floor. Material handling systems are designed to keep conveyors and pipes both out of the way and accessible to operators and maintenance, the need for which must always be weighed against safety and process requirements.

Product control is built-in via continuous checks and verifications: tracking, indexing, counting, and measuring. Integration with higher level systems of MES, APS, and WMS makes sure that product information is in the right place alongside the product at every hand-off.

By automating repetitive, labour-intensive tasks, these systems decrease reliance on manual labour so operators can focus on higher-value work. When material must still be handled manually, we follow modern ergonomics and safety standards to keep the workplace easy to navigate and the operator safe.

Solid parts
Conveying, pick-and-place, (un)packing, infeed/outfeed

Powders
Volumetric/gravimetric dosing, milling, blending, fluidisation

Liquids and semisolids
Vacuum/nozzle dispensing, piston/vacuum filling, pumping

Gases
(De)pressurisation, venting/off-gassing, filtration, conditioning

Containers
(De)palletising, AGV/AMR, staging/buffering, warehousing

Modularity and customisation

We design and build modular solutions to handle various material and product types or shapes, ensuring seamless interoperability and adaptability. This is achieved with custom-made grippers, specialty valves, and visual control to verify positioning. This extends to adaptability within solid-part manipulation cells, allowing automatic tool changeover to support different sizes and shapes. For expensive or dangerous fluid materials, special care is put into periodic CIP/SIP routines to prevent cross-contamination and reduce residual waste between batches.

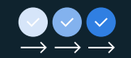
Poka-yoke and ease of use

Ensuring that people interact with the automated system in a predictable, ergonomic, and safe manner is a key part of a modern factory floor. To prevent error wherever human operators are involved, we employ poka-yoke and intuitive UX approaches. This means single-direction movement, interlocked double hatches, and the use of situational awareness principles to convey information. Visual inspection systems and other sensorics are used to verify conditions invisible to the human operator, allowing them to intervene only when the system deems it safe.

Efficiency and durability

Our systems are engineered to withstand the most demanding production environments. When appropriate, we use the highest grade of corrosion- and stress-resistant components, high load-bearing capacities, and high throughput. Rigorous testing and quality assurance protocols ensure each component meets the highest industry standards. By selecting drive components and design principles based on comprehensive performance criteria, we ensure maximum capacity and longevity, while optimising for energy efficiency.

Full horizontal automation



Throughout the process of transforming raw inputs into a finished product, materials are expected to change state several times—from powder to slurry, onto a substrate, heated and vented, and finally packaged and shipped. During the process, tanks can be transported from station to station using AGVs, materials can be recovered and reused, and final products can be kept at a precise temperature. It is therefore paramount that the systems handling the entire chain are in perfect sync and interoperable, which is best achieved by using a single supplier.

Marking and labelling

Automated marking systems with full PLC and HMI integration deliver precise printing, engraving, and labelling of text, barcodes, Data Matrix, logos, and custom graphics. Parameters can be set from the recipe/MES system, allowing PLC changeovers or adjustments of the printing content.

Vision systems, distance sensors, servo positioning, and dedicated valves keep marks consistent. By driving automatic lane or box sorting and reject handling, these systems prevent mislabelled products from leaving the cell.

For chemical use, the system supports all required regulatory and product identification data, using solvent-resistant media. Inline scanners verify each mark to code quality grading, logging reads to a central database for end-to-end traceability and compliance.

3-axis laser marker
Hi-res direct marking on metal or rigid plastic

Inkjet printer
Text, barcodes, or simple graphics on most surfaces

Pad printer
B&W/colour logos and icons on irregular parts

Labeller
Print-and-apply of labels on containers/pallets

Unparalleled precision

The automatic positioning of a laser or printer is facilitated by high-precision servo drives which control the laser's position, ensuring optimal alignment with the intended printed area. It supports curved drum/IBC surfaces and large-format marks. This precision control mechanism is critical for achieving consistent and high-quality marks, particularly in applications requiring exact placement and uniformity.

PLC, HMI, and MES integration

Complete integration with PLC communication enables rapid, error-proof job changeovers, allowing the system to quickly adapt to new marking requirements or run production without significant downtime. The system also supports manual control and diagnostics via an HMI faceplate. Recipe/MES fields (lot, expiry, GHS/CLP pictograms, UN numbers) are downloaded to devices, with positive-reject and verified lane assignment (pass/hold/rework/scrap).

Accurate part tracking

The part tracking system integrates advanced barcode and DMC printing, real-time updates, and high-precision imaging for reliable traceability. DMC, ISO/IEC code-quality grading, and serialisation, where required, are logged to a central database for fast genealogy and targeted recalls. This ensures quality control, regulatory compliance, and efficient production management.

Integrated quality control

Our quality control systems provide 100% in-line product inspection without compromising throughput or traceability. Each unit or batch is inspected automatically and non-destructively at every critical production stage, with precise measurement and redundant sensorics.

By detecting defects early, quality assurance helps maintain process stability, reduce scrap, and support continuous production flow. Fully integrated with MES/MOM and batch automation systems, our purpose-built inspection platforms adapt to production flow and test requirements, ensuring compliance with defined parameters and geometry—from intermediate steps to final validation.

In-process control
Particle distribution, turbidity, active ingredient concentration

Film, foil, and web
Additive-layer thickness, evenness, foil/blister uniformity

Visual inspection
Geometry, surface cleanliness, orientation, and cosmetic defects

Sorting
Counting, indexing, weighing, or criteria-based separation

Coating inspection
Thickness and adhesion of protective or catalytic coatings

Precision and consistency at every step

Precision and consistency are ensured across all production stages. High-resolution imaging, advanced sensing technologies, and deterministic logic minimise human error and deliver repeatable results. Self-calibration, integrated error checks, and support for large-scale production volumes—thousands of litres turning into millions of parts—maintain high-quality output.

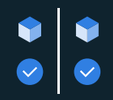
Adaptability and scalability by design

Built with modular architecture and designed for flexible integration, our systems adapt to evolving production needs. Independent modules can be added, removed, or relocated, while future-ready software allows for seamless updates without disrupting production. Multimodal inspection—optical, spectral, and deep learning—ensure comprehensive coverage for diverse product types, geometries, and states.

Uncompromised speed and throughput

Our solutions are engineered to match production cycle times, eliminating bottlenecks. In-house designed systems synchronise handling, image acquisition, processing, and data analysis for maximum efficiency. High-speed operations, including roll-to-roll inspection reaching up to 1 m/s with a linear resolution of 0.05 mm, maintain strict timing precision and ensure smooth, uninterrupted production.

Quality verification redundancy



When a system is designed for quality first, all stages must be covered. Input parameters, bill of materials, mid-process readings using redundant sensor arrays, and laboratory analyses can all be cross referenced. The governing quality assurance system inside MOM then validates the data and handles deviations. Since not all anomalies are critical to product performance, individual exceptions may still pass, increasing product output and reducing waste.

Manufacturing Operations Management (MOM)

MOM coordinates production, quality, inventory, maintenance, and planning across Levels 2–4 of the ISA-95 model. It synchronises campaigns and changeovers, aligns tank farm and bulk inventory with production plans, manages specification and master-data consistency, and orchestrates hand-offs between production, quality, warehouse, and maintenance across batch, continuous, and hybrid units.

MES manages production execution and data capture; APS performs finite-capacity scheduling with constraints and changeover rules; warehouse management controls inventory, locations, and material flows; maintenance manages assets, calibration, and condition-based interventions; quality management handles specifications, sampling decisions, nonconformances, and release processes.

MES | APS | Warehouse | Maintenance | Quality

Platforms

AVEVA MOM

Multi-site orchestration for batch, continuous, and hybrid plants; strong SCADA and Historian connectivity for campaign coordination, transfer management, and tank-farm balancing.

DELMIA Apriso

Model-driven global templates with strong logistics and WMS capabilities for raw-material and finished-goods flows, with PLM and ERP integration for consistent specifications and change propagation.

Siemens Opcenter Execution

End-to-end operations suite offering robust finite-capacity scheduling with sequence-dependent changeovers, and tight ERP and process-control connectivity for coordinated execution across units.

Platform-agnostic integration

Full vertical and horizontal connectivity across heterogeneous infrastructures, interoperable with ERP, LIMS/QMS, production scheduling, process control, and historians. Solutions can be implemented alongside legacy systems or layered on top of deprecated monitoring and control systems, while preserving validated states, audit trails, and data integrity.

Versatile production types supported

Batch, continuous, and hybrid production models are configured per ISA-88 equipment and procedural models, with campaign sequencing, changeover, and cleaning windows. Materials are tracked with lot and sub-lot genealogy, including rework, blending, and potency adjustments, so each product is tied to its source materials and process history.

Scalable, modular, and standards-compliant

Built for regulated operations across production, quality, inventory, and maintenance. Modular deployments integrate with existing systems, preserving process control, traceability, and data integrity. Systems meet regulations for electronic records and signatures, apply risk-based quality controls and GAMP. Business, plant, and lab data is kept consistent for clear analytics and ESG reporting.

Engineering-driven domain expertise

The implementation and configuration is performed by teams with deep domain knowledge. Our expertise spans across industrial automation, energy management, and process control in chemical, pharmaceutical, and bioprocess environments. By understanding every facet of manufacturing first and being hands-on during design and integration, the end system is more than a surface level overview.

Predictive production processes

Predictive production uses soft sensors, multivariate statistical process control, and hybrid first-principles/machine learning models to turn operator know-how into practical, data-driven guidance. In continuous, batch, and hybrid plants, correlated time-series from DCS, PAT, and related systems are analysed in real time to flag deviations early or “just-in time,” predict quality or equipment health, and recommend set-point changes or maintenance windows.

Predictive control keeps units stable as feeds and utilities vary. It operates close to constraints without breaching them, improving on-spec rates, reducing process upsets, and protecting assets.

Predictive applications

Maintenance

Models track equipment condition data and compare it to normal behaviour to estimate failure risk and remaining useful life. Maintenance technicians see health status and recommended action, and can trigger a planned work order.

Technology

Predictive control engine calculates set-point adjustments within constraints in real-time. Operators see the proposed move, the active constraint, and expected impact, and can act accordingly.

Quality control

In-line quality measurements and multivariate monitoring track quality attributes during production. The system detects process drift early and guides quality assurance personnel to take timely actions.

Less downtime, longer asset life

Models are trained on baseline data. When behaviour breaches tolerances, they estimate failure risk and remaining useful life, and issue risk-ranked alerts. Alert-issued workflows can generate or pre-fill maintenance work orders and schedule them into planned windows. Operators interact with the models via context-aware screens showing health scores and recommendations. Maintenance shifts from calendar-based to prediction-based, reducing unplanned downtime, extending asset life, and avoiding the costs of over- or under-maintenance.

Continuous quality assurance

With specification limits properly mapped, the in-line measurements (PAT) are combined with production history to build trusted predictors. Live analytics and multivariate monitoring detect process drift early, keep the process in a validated state of control, and, where justified, enable real-time release testing. Operators see clear quality signals and recommended actions on familiar screens, with all evidence written to batch or lot records for traceable, compliant release—driving higher on-spec and right-first-time rates, faster release, and less rework and waste.

Economic optimum, within limits

The predictive approach is designed to capture process limits, economics, and key disturbances. It then runs a real-time guidance engine that proposes safe set-point moves. As feeds or utilities change, the system holds the plant near its economic optimum without breaching constraints. Throughput is steadier, energy and raw-material use is reduced, and process upsets are less frequent and less severe. Compliance is maintained, with lower environmental impact, and cost.

Transparent, auditable decisions

From the outset, data lineage, model versions, and user actions are recorded automatically. Every prediction, recommendation, and approval is attributable and time stamped, with change control for updates. This shortens investigations, speeds inspections, and preserves hard-won know-how in a durable, reviewable form, which builds trust across operations, quality, maintenance, and compliance. Audit-ready evidence is available for regulators and customers without extra effort.

Manufacturing Execution Systems (MES)

MES provides real-time visibility and control over GAMP compliant operations by collecting detailed data from machines, sensors, and operators. It precisely executes work orders and recipes, generates Electronic Batch Records (eBR) with review-by-exception, and maintains tamper-evident audit trails and e-signatures to meet regulatory requirements.

It enforces weigh-and-dispense tolerances, sampling and in-process control checks, and material status, enabling full lot genealogy across batch, continuous, and hybrid processes. MES acts as a coordination layer between enterprise planning and shop-floor execution. Bidirectional data flow supports immediate corrective actions, monitoring, and continuous process optimisation, which keep production running smoothly.

Platforms

AVEVA MES

Recipe-driven batch execution with multi-stream and transfer management; tight automation and historian integration for hybrid chemical plants, with in-plant material genealogy.

DELMIA Apriso

Procedure enforcement with weigh & dispense, device connectivity, and clear operator guidance; flexible global templates for multisite chemical operations, with supply chain traceability.

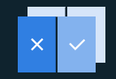
Siemens Opcenter Execution

Native eBR and Master Batch Record design with review-by-exception; built-in weigh & dispense, recipe execution, and compliance-ready batch genealogy records.

Understanding the manufacturing layers

With extensive expertise in process automation, as well as SCADA/HMI, process control, historians, and APS systems, we integrate logistics, maintenance, material control, and ERP to deliver a holistically designed MES system. This comprehensive approach optimises performance and efficiency across all production processes, adhering to unified data principles, minimising data flows, and ensuring data integrity.

Accelerating digital transformation



By embracing the human-centric principles of Industry 5.0, we combine various applications into a single interface for optimal performance and emphasise a unified user experience (UX). Integrating SCADA situational awareness with optimised MES workflows, our solutions guide users efficiently, minimise errors, and eliminate the need for extensive manuals, thereby shortening learning curves and speeding up adoption.

Delivering platform-agnostic solutions

Our platform-agnostic MES integration strategy offers flexibility and customisation tailored to clients' needs. We assess project requirements, including corporate standards, automation levels, equipment, applicable certificates and standards, licensing, and OT/IT compatibility, to select the best MES platform. Because of our ability to get involved in the lowest layers of factory automation and process control, efficiency is preserved by avoiding needless conversions, modifications, and aggregations.

Distributed Control Systems (DCS)

DCS are a step up from traditional PLCs connected with an ISA-88 batch engine and separate SCADA/HMI and historian software. Those can be integrated into one platform or interoperate with external tools. When implementing, we draw on experience from PLC-based logic, supervisory control integration, chemical process automation, and an understanding of the signal level.

While DCS are more complex systems for distributed and more complex operations, they offer unique benefits beyond unification: deterministic, high-availability control, governed change, and consistent alarms and graphics. They are the logical choice where tightly controlled batch execution and exact operating procedures are mandatory.

Platforms

Rockwell PlantPAx

Hybrid DCS built on Logix controllers and FactoryTalk services, with integrated process libraries, deterministic control, native alarm and historian integration, and optional ISA-88 batch orchestration.

Siemens SIMATIC PCS 7

Integrated DCS using SIMATIC controllers and WinCC, providing unified engineering, real-time I/O and redundancy, built-in alarm and trending, and tight integration with SIMATIC Batch.

Deterministic control

Predictability is key in finely tuned process control. DCS keep time-critical logic in the controllers, not on servers; tasks run at fixed scan rates with alignment to the millisecond or below when using Precision time protocol (PTP). Scan cycles are coordinated yet self-contained, enabling time-bounded and bumpless switchover to a redundant controller. Loops continue even during supervisory communication faults. Events are time-stamped at the source, so historians and alarm services preserve the correct sequence and real-time context for operators and upstream systems.

User experience expertise

DCS have their user interface integrated. We adapt to the needs of the process while holding to our principles of user experience from SCADA and MES—clear and usable symbols, standardised elements, plant-model hierarchy, situational awareness, and operator-involved testing. Our systems are easy to pick up and learn on, favouring intuitive navigation over dense manuals and long workshops. This makes learning curves shorter, adoption faster, and labour costs for training minimal.

Proper record governance

While DCS is capable of keeping and validating records, most regulated enterprises opt for a dedicated and integrated MES. Layers are distinct and responsibilities are clear: the DCS executes and time-stamps while the MES handles batch records, approvals, and releases. They are connected over standard contracts (OPC UA, vendor APIs, or event streams) that carry states, parameters, exceptions, and genealogy, with MES as the system of record. This keeps records governed and changes auditable without duplication.

Streamlined deployment

The nature of DCS requires the control loops and their governing code to be distributed among dozens or hundreds of individual controllers, sometimes redundant to each other. To speed up development, streamline deployment, and simplify maintenance, we use automatically generated code blocks for repeated or analogous operations. Functional safety dictates full documentation and versioning, so even auto-generated code is reviewed and guaranteed to perform as intended.

Data historian

Specialized software system for collecting, storing, and retrieving high-frequency time-series data from DCS, SCADA, analysers/PAT, and sensors. It stores tamper-evident, time-synchronised records with asset, batch, and material context, ensuring fast retrieval and long-term retention.

Aligned with EU GMP Annex 11 and 21 CFR Part 11, historian integrates with MES, LIMS, and AI tools and enable trend analysis, root-cause investigation, golden-batch profiling, and predictive maintenance. By hosting and feeding multivariate models and soft sensors, it generates early-warning indicators, provides operator decision support, and accelerates continuous process optimisation.

Platforms

AVEVA Historian

High-performance data repository designed for collecting, compressing, and analysing time-series process data across distributed SCADA, MES, and DCS environments.

AVEVA PI System

Enterprise-grade time-series data infrastructure that unifies contextual data from diverse industrial sources, enabling deep OT integration and advanced analytics at scale.

Zenon Historian 360

End-to-end historian, from edge to plant, with native context and batch/event awareness, and open connectivity to PLC/DCS, SCADA, and MES for unified operations and analytics.

Iconics Hyper Historian

High-speed, 64-bit historian with advanced compression and OPC UA connectivity, built for reliable large-scale logging, and integration with modern data platforms.

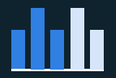
Centralised data management

Data historians streamline complex reporting and simplify analysis, capable of monitoring single processes or entire facilities, efficiently managing time-series, alarm and event data. Data is stored locally and aggregated at the corporate level, eliminating redundant data versions. Specific KPIs (yield per batch, specific energy per tonne, and off-spec rates) are computed directly from historian tags, ensuring rapid data retrieval with reduced storage space, ideal where conventional databases fall short.

Seamless integration with operations control

Data historians integrate with operations control solutions such as HMI and SCADA, as well as DCS, with open protocols (e.g. OPC UA) and time synchronisation. Historical data can also be efficiently retrieved via linked servers and incorporated into any other reporting and dashboarding system. This integration enables faster, informed decision-making and ensures comprehensive visibility into operational performance.

Predictive insights for optimised production



Historical data can be accessed and analysed to identify trends and patterns over time, facilitating predictive maintenance by forecasting potential equipment failures and scheduling proactive intervention. Multivariate models and soft sensors detect fouling, catalyst deactivation, pump or seal degradation, and off-spec risk early. This approach minimizes downtime and costs based on accurate and comprehensive historical data.

Advanced Planning and Scheduling (APS)

Automated and customisable solution for long-term planning, intelligent scheduling with dynamic adjustments, ERP/MES integration, and visibility into production details. Optimises the use of energy and other resources, materials, and labour to reduce waste, improve efficiency, and ensure on-time deliveries.

Supports finite capacity scheduling, constraint-based optimisation, and what-if scenario analysis to adapt plans in real time. Seamlessly synchronises with shop floor data for closed-loop feedback, enabling continuous plan refinement based on actual production performance. With production running constantly and supply chains tight, every minute needs to be used productively.

Production planning

Supports long- and mid-term decisions based on forecasts and long-term orders. It guides feasibility assessments, capacity planning, and resource allocation—defining what, how much, where, and when to produce. Integration with ERP systems is flexible, ranging from database connections to web services.

Production scheduling

Supports decisions on overtime, order sequencing, batch formation, due date negotiation, and execution control. It improves visibility and control, enabling higher resource utilisation, reduced inventory, and improved on-time delivery. The system integrates with major ERP and MES platforms, as well as custom systems via standard integration interfaces.

Long-term precision

Advanced long-term planning enhances enterprise-level strategic decision-making. It optimises resources such as time, energy, materials, and labour well in advance, maintaining flexibility to adjust plans as needed across the supply chain. By implementing a pilot project first, using existing ERP data, it is possible to preview outcomes and address challenges early, ensuring a seamless transition with minimal production impact. Our customised solutions can be scaled up with a product suite that evolves with your business growth.

Clear process oversight

Intelligent scheduling elevates manufacturing efficiency to the next level. The solution streamlines production flows by using multi-constraint algorithms and realistic work-order scheduling. With every phase clearly visible, it is easier to identify bottlenecks, refine processes, and keep operations running smoothly, while cutting costs and delays. Interactive what-if analyses identify potential issues and supports capable-to-promise (CTP) evaluations early, facilitating proactive adjustments and ensuring confident decision-making.

Data-driven decisions

Planning and scheduling software seamlessly integrates with ERP at the organisational level, MES at the production level, and plant historians, bridging the gap without wasting resources in execution. As a foundation of vertical integration, it combines actual cycle times, yields, downtime, and energy profiles with predictive inputs to support strategic decisions, so companies can anticipate constraints and adapt to changing market demands.

Wastewater treatment

This multi-stage process is tailored to wastewater characteristics, with design targets set by the site permit, and receiving-water objectives. It combines physical steps—sedimentation, flotation, filtration, stripping, ion exchange, and adsorption—to remove dissolved and suspended substances; chemical steps—precipitation, oxidation or reduction, and stripping of generated gases—to convert or separate contaminants; and biological steps, where microbes consume organic, and in some cases inorganic, pollutants.

Industrial loads fluctuate with batch production and Cleaning-in-Place (CIP); systems manage this by segregating challenging streams and using equalisation to smooth flow and pH before downstream treatment. Closed-loop control of temperature, flow, pH, pressure, and volume is supported by diagnostics, interlocks, and alarm management. Live sensor data stabilise performance and energy use, and records are retained for regulatory purposes, with historian-backed trends and audit trails.

Treatment levels

Primary treatment

Removal of visible and fast--settling solids by screening, sand and grease traps, and primary settling, with optional chemicals to help fine particles clump and settle.

Secondary treatment

Removal of dissolved biodegradable pollution by biological oxidation, then separation of the resulting biomass from the water.

Tertiary treatment

Removal of fine particles, nutrients, salts, and trace contaminants to meet discharge or reuse targets, using filtration, activated carbon, advanced oxidation, disinfection, and ion exchange.

Optimised energy recovery via CHP

The interdisciplinary expertise helps us optimise energy usage in wastewater treatment, specifically through combined heat and power (CHP). Biogas produced in secondary biological treatment is captured and reused to generate electricity and heat, lowering operating costs and emissions. Electrical and thermal integration recovers engine waste heat, stabilises engine performance, and delivers predictable kWh per cubic metre of biogas, with high availability.

Safety and reliability in hazardous environments

Our solutions perform reliably in challenging environments, from harsh industrial settings to explosion-prone zones. We carefully evaluate process requirements to develop solutions that meet stringent safety and operational standards. Designs comply with ATEX and IEC 61511, with bunded chemical storage (level and overfill protection), gas detection and ventilation interlocks, independent protective trips, and environment-rated materials, sealing, and redundancy to sustain uptime.

Industry 5.0 standards in UX development

We leverage Industry 5.0 standards to unify SCADA interfaces, creating a seamless user experience. Prioritising situational awareness, we present real-time data and alerts clearly to aid informed decision-making and error prevention. Optimised workflows guide users efficiently, minimising the need for extensive manuals, and reducing learning curves. Where site standards or high-availability requirements apply, the SCADA/PLC layer integrates with the plant DCS. Configuration and testing follow GAMP 5, with Annex 11 controls when systems support compliance.

Industrial utility automation

Industrial utility automation controls and optimises systems such as process water, compressed air, HVAC, and clean utilities in production environments. Aligned with GAMP 5 principles, it uses field instrumentation and analysers, PLC/DCS, SCADA, and predictive models to maintain stable operating conditions, protect equipment, reduce energy and media losses, and support consistent product quality.

The end-to-end automation solution covers design and engineering, installation, and maintenance, resulting in transparent monitoring, real-time data visibility, early-fault detection, and integration with plant-wide control systems.

Compressed air management
Stable, energy-efficient, oil-free delivery

Process water management
Flow, temperature, and pressure control

HVAC and air filter systems
Airflow, temperature, and humidity control

Steam/condensate systems
Boiler, distribution, and condensate recovery

Clean and pure media utilities
WFI, clean steam, and process gases automation

Industrial effluent treatment
Neutralisation and heavy-metal removal

Optimal device utilisation

Optimal equipment usage is achieved by advanced scheduling algorithms to stage compressors, chillers, pumps, and boilers only as needed and at necessary capacities, preventing deviations from set process limits. Using frequency converters improves efficiency, while automatic rotation of redundant equipment based on operating hours ensures even wear and extends device lifespan.

Advanced process control

Using sophisticated control algorithms, we achieve precise tracking and management of critical set-point values, including temperatures, flow rates, and pressures. This advanced methodology guarantees efficient, stable, and high-performance operations, maintaining all processes within optimal parameters.

Energy efficiency enhancement

The system synchronizes operation schedules with production schedules to minimise energy costs. By implementing reduced capacity modes and utilising recuperation systems, we enable the effective reuse of excess energy. Time-of-use tariffs and demand-response windows are considered, while integrated consumption measurements and statistical calculations further optimise energy use.

Diagnostic tools for consistent reliability

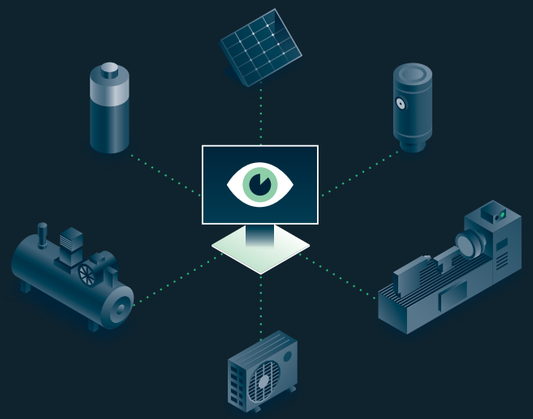
Consistent operation is ensured with robust industrial equipment for precise machine control and monitoring. Condition monitoring, such as vibration, bearing temperature, motor current signature, and leak detection for compressed air/steam, plus advanced diagnostics quickly identify and rectify disturbances. Additionally, device redundancy is added where necessary to enhance reliability and prevent downtime.

INGENIOUS VIEW

User-centric energy monitoring

inGenious View is an intelligent energy information system with a modern user interface that can monitor all types of energy sources and flows. It provides insight into hidden information for more efficient energy management through custom indicators and smart alarms.

For advanced energy accounting, detailed analyses and automatic report generation are available within any desired time frame. Understanding energy use as it changes state is complex, but integration of production data with energy monitoring makes it quicker and easier.



Streamlined monitoring of any energy carrier

The system can monitor various energy carriers, such as electricity, gas, water, steam, and others. It can also process any type of process variable from production devices for energy efficiency comparisons along the entire cycle. Universal alarms can immediately alert users to deviations, allowing quick identification of inefficiencies, anomalies, and areas of energy waste, such as small pressure drops due to a leak. Monitoring itself can identify these underperformances, which, when improved, directly lead to better efficiency and notable cost savings.

Advanced analysis and effortless reporting

The comprehensive data analysis and adaptable visualisation tools are designed to meet any requirements. They make complex data easy to understand. Key metrics like refrigeration duty and energy state transitions, as well as the creation of custom KPIs, allow for thorough understanding at any level. This customisation extends to generation of detailed reports on compliance-critical information, such as energy intensity ratios and GHG emissions. Thousands of signals are thus transformed into clear, actionable insights with intuitive dashboards.

Seamless remote and process integration

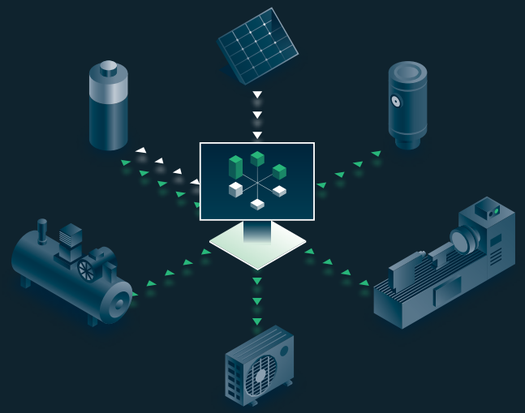
Data is acquired robustly across dispersed locations of different types with integrated communication interfaces to controllers, meters, and other data sources, such as the DCS itself. The system gathers data on the edge, which is ideal for environments with dislocated operational sites, including remote areas. Even if communication malfunctions, data is preserved and synchronised as soon as possible. The flexibility of cloud-based or local installation with remote access allows the effective management of a large enterprise from any location.

INGENIOUS FLEX

Industrial demand response EMS

The technology for large-scale energy management, demand response multiplies the benefits of several small changes. By adapting the power draw of primary and secondary manufacturing equipment with respect to each other, their total energy consumption is optimised to reduce costs without sacrificing productivity.

Each prosumer (consumer and producer) and potential energy source are treated as a separate user in the system, going as far as adapting electrical and gas sources under the same process, understanding the cost benefit of both. Mutual adaptation of machines in separate processes allows energy consumption to be optimised based on all available information—such as production demands, forecasts, time-of-use charges, and energy price—and the use of sources of flexibility that may not be immediately apparent.



True local energy flexibility

Unlike demand response on the grid, where the priority is balancing the distribution network, the goal of demand response in industry depends entirely on the company's priorities. Since everything occurs behind the billing meter, industrial implementation of demand response is independent of the distribution or transmission network operator. The system can operate on its own in a local installation, thus simplifying the energy contracting and removing a common bureaucratic hurdle to decarbonisation.

Using the potential of existing resources

Electrification increases the power drawn from the grid, which can be more complex than simply changing the contract. It can lead to multi-year infrastructure projects that may involve municipal and national regulators, slowing down progress on-site. Demand response uncovers the hidden reserves in often overlooked secondary processes, whose power draw goes ignored due to their small relative size. Adapting those loads to each other and to the power profile of critical loads, however, can bridge the gap between making a long-term decision and seeing short-term improvements.

Complete control with no production impact

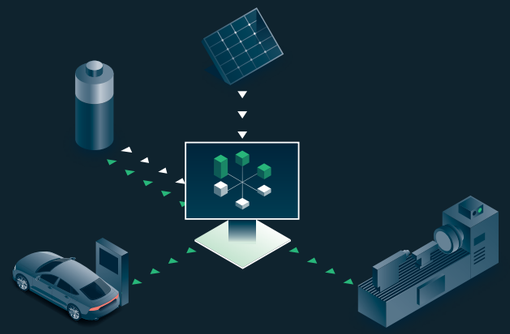
By integrating with existing process control and production scheduling systems, demand response can act in accordance with process needs. Knowing batch timings, heat balances, and future steps, hard constraints are placed on energy flexibility so that production remains as defined. Flexibilities are often found in auxiliary processes and utilities, so while a compressor charging cycle can be delayed, a curing chamber is treated like a constant—when the process requires it to run at precise parameters, its energy draw is accounted for but never adjusted.

INGENIOUS LINK

Local RES and battery management

inGenious Link acts as a central coordination system between local RES, the battery storage system, and the metering point. Through the metering point connection, it monitors consumption and generation in real time. Using local forecasts (weather and solar radiation) and historical data, it predicts on-site generation. It also analyses power draw history to identify time intervals with high net import from the grid, which is the difference between locally generated and total consumed energy.

This enables excess renewable energy to be stored at the right time and used later during high-price periods. Doing so increases the on-site utilisation of locally generated energy, which directly improves the economic efficiency of both new and existing solar power plants, wind turbines, biogas engines, cogeneration units, and other local RES.



Faster return on solar investment

Large industrial companies are incentivised to cover their roofs with solar power plants, which often generate insufficient or even negative returns depending on market conditions. As the power of a solar power plant alone can be unstable enough to not cover the load of a single furnace, their impact on the final energy bill ends up insignificant compared to the investment needed. With a smart management system, the returns can be stabilised and increased. By optimising network charges or executing energy arbitrage, it can speed up the ROI by several years.

Full support and complete autonomy

inGenious Link is built on decades of experience in industrial process control, making it a user-first system that puts energy under their control. By working only with verified suppliers of RES and battery systems, support and maintenance is always within reach. On-site energy specialists are empowered to understand the system and supervise it themselves while it runs automatically. This drastically reduces the risk of automating energy supply compared to grid-connected battery systems that are often contracted for trading on a proprietary platform operated by the manufacturer.

Contracted power optimisation

Where contracted power is negotiated based on peak demand, having an on-site battery installation with a power rating of 20% is recommended to mitigate unexpected peaks. inGenious Link automatically sets the optimal limits for power draw in each time-of-use period. It identifies the power profile and its peaks, using that data to best operate the battery over time, charging it either locally or from the grid. This prolongs its lifespan by reducing charging cycles and ensures a price-focused optimum between battery cost and network charges.

Success story 1

Batch automation of washcoat production

Challenge

A global leader in catalyst production needed to scale catalyst coating line for emission-control filters to 40+ units and tanks, with high-precision control for costly materials.

Solution

The team modelled the batch process (units, connections, equipment, phases) and implemented it in PLC code. We built a full-process simulator that reduced commissioning risk and now serves for training and trials. In parallel, we configured AVEVA InBatch with the model and test recipes, built SCADA screens, and authored functional specifications, delivering a system that manages recipe parameters, allocates resources, and monitors batch status to ensure correct, consistent execution.

Impact

Batch automation gives precise control of timing, sequence, and conditions. Real-time data and guidance help operators optimise performance and maintain quality throughout each run. The standards-compliant setup improves material efficiency, flexibility, and reduces waste.

Success story 2

User-centric SCADA and MES for MEA production

Challenge

A leading MEA manufacturer needed plant-wide visibility with ERP integration and fewer manual touchpoints. Requirements included cycle-time tracking, complete part traceability, standardised work procedures, and alignment with regulated quality expectations. Paper-based workflows and manual data entry slowed operators and introduced error risk.

Solution

We designed a single-application solution on AVEVA System Platform with unified UX. Operators and supervisors work in one interface with context views, summary panels, progress cues, screen-grid navigation, and quick actions. Near-real-time MES–ERP integration, a normalised data layer, and unified device/label integration cut manual entry and speed onboarding, while keeping genealogy and KPIs consistent.

Impact

Deployed on the MEA pilot line, covering about 8% of the production capacities , then scaled across entire plant; automation and improved visibility delivered more than 240,000 € in savings, and instant feedback enabled on-the-fly adjustments without disruption. Early outcomes included 70% less manual entries, 65% shorter training time, 35% higher OEE, and significant paperwork reduction.

Success story 3

Automating fermentation broth collection

Challenge

A global pharmaceutical concern aimed to increase global antibiotic output while shortening the overall production cycle. This required added fermentation capacity and a new facility for fermentation broth collection, delivered fast, with minimal disruption to ongoing production, and in line with pharmaceutical quality standards.

Solution

We delivered an automated Fermentation Broth Collection system in the existing confined space. The system integrated with the central control system, enabled complete monitoring, control, and management of the collection process, and was delivered during the annual shutdown window. Validation followed ISPE GAMP guidelines.

Impact

The production cycle was shortened, antibiotic output increased, and no additional operating personnel were required. Product quality improved through the availability of additional monitored process parameters, and operators gained tighter control of critical parameters via a centralised interface.

Success story 4

Multi-level batch and discrete material handling

Challenge

Johnson Matthey planned to build a three-level greenfield plant: first and second floor with batch automation, and ground floor 3 with a discrete production line and downstream packaging.

Solution

Fully automated material-handling system links slurry preparation, dosing, and intralogistics. On the top level, powders, acids, and liquids are charged to mix/mill tanks, processed under controlled conditions, then transferred to cooled storage tanks and further to mobile tanks. On the middle level, an AGV fleet services 81 base stations and delivers finished mixtures to dosing stations with automatic coupling. On the lower level, dosing stations feed precise depositors, handing off to the catalyst coating line with robotic packing, and palletising.

Impact

End-to-end traceability strengthened regulatory readiness; dosing precision and repeatability rose, and resource use was optimised. After the first deployment, the architecture rolled out globally across new builds and retrofits under a co-developed batching standard unifying design and batch governance.

Success story 5

Precious metal recycling automation

Challenge

A global fine chemicals leader needed a new precious-metal recycling plant to offset rising costs of platinum group metals. They process both production scrap and end-of-life catalytic converters, from which over 95 % of the platinum can be recycled at a fraction of the cost and environmental impact of mining.

Solution

We designed and automated the production plant on Rockwell PlantPAx DCS. Scope: ~12,000 I/O, 450+ sequences, 400 control loops, redundant servers and networks, and a safety instrumented system compliant to IEC 61511, led by our in-house certified functional safety engineers. A full digital process simulator enabled 100% testing in a digital FAT.

Impact

Closed-loop reuse of non-conforming substrates and returned converters reduced dependence on primary mining, lowered cost and environmental footprint. The safety design meets target SIL requirements, reducing major-accident risk and strengthening compliance.

Success story 6

Modernising energy and process control

Challenge

An energy-intensive chemical producer (titanium dioxide, sulphuric acid, zinc metallurgy) needed modern process control for production, plus unified energy monitoring to improve transparency and optimisation.

Solution

Standardised DCS (Siemens SIMATIC PCS 7 with SIMATIC BATCH) deployed across multiple sites, unifying continuous and batch control with anthropocentric alarming, secure architecture, and a common HMI for interchangeable operator stations. Supervises 40+ processes as coordinated groups for consistent control strategies, data exchange, and plant-wide optimisation. Centralised energy monitoring consolidates previously disconnected sources for consistent metering, reporting, and oversight.

Impact

Operations and applications became accessible from a single environment with hierarchical navigation to assets, configurations, and resources. Operating costs fell, maintenance became simpler, and energy-use visibility revealed optimisation opportunities, accelerating SCADA–MES integration and laying a foundation to create a common data and control foundation.

We build and integrate

vertically from machine building to ERP integration, horizontally from design to maintenance, and diagonally from research and feasibility studies to continuous improvement.

We support and empower

with a feel for your needs and the understanding of industry specifics we serve as a cornerstone of your shopfloor endeavours—driven to empower your production and your team for the long run.

We care and commit

with an integrity, passion, and unstoppable determination we inspire trust every step of the way—for your peace of mind and unparalleled stability you look for in your long-lasting partner.

We know.

The team inspired excellence by delivering training, ongoing support, and continuous improvements based on operator feedback. Their emphasis on situational awareness and clear screen layouts—focused on the most relevant information and controls—proved essential for successful software adoption.

— Martin Chow, Ballard Power Systems

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