



**[ COMPOSABLE APS/MES  
SOLUTION STACK  
OPTIMIZES SMART  
FACTORY OPERATIONS ]**

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Execution always varies from plan. We bake inefficiencies into our planning process by buying insurance in the form of extended order lead time, safety stock, lower planned machine utilization, overtime, expedited freight and premium freight to reduce the risk imposed by this variance. In some cases, we pay penalties in addition to this insurance depending on contract terms. And we pay an opportunity cost where we could have optimized purchasing, operating, and logistics costs through capabilities such as advanced leveling.

Eyelit Technologies, a leader in composable software solutions, is driving significant business value by closing the gap between planning and execution in companies of all sizes and across most industries including high tech, semiconductors, automotive, medical devices, consumer goods and industrial equipment. Many of the world's largest companies plan, execute, and track & trace operations everyday using the Eyelit Smart Factory solution suite - including 4 of the world's 10 largest companies, 4 of the top 10 automotive companies, 6 of the top 10 semiconductor companies, and 4 of the top 10 A&D companies along with well-known global companies in both medical device and food processing.

These customers require an APS/MES solution capability that can keep up with the fast-paced complex market demands and disruptions in today's manufacturing ecosystems. With Eyelit you get the strength of configurable industry solutions coupled with the flexibility of composable applications all as part of a standard software subscription infrastructure. Eyelit equips your workforce with connected apps – leading to improved order fulfillment, higher quality work, lower inventory requirements, better OEE, improved operating expense, and end-to-end traceability across operations.

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# COMPOSABLE APPLICATIONS AND WORKFLOW ORCHESTRATION

Composability is an evolution in how both APS and MES systems are architected, implemented, and maintained over time. Rather than designing monolithic architectures, composability requires that solutions should be built such that feature sets can be seamlessly combined and recombined into effective workflow and decision-making configurations. This results in higher levels of flexibility, agility, and innovation, along with faster time-to-value. This also enables the ability to embrace and extend legacy systems with the option to seamlessly modernize those systems in the future.

The Composable Smart Factory Solution Stack which combines planning, scheduling, order management, sequencing, dispatching and execution is a foundational set of apps, modules, and solvers that make it easy to deploy a smart manufacturing solution within and across your factories. These apps are built so that they can be configured to meet the exact requirements of your operations. Whether you deploy the best practice templates, expand capabilities, or build enhanced configurations to match your requirements, these apps are designed to be fast to deploy and easy to use and adapt.

Workflow orchestration to solve specific business problems while using a standard enterprise software release has been elusive and typically drives customization. Configurable industry-based templates were a great step forward for Eyelit's customers where they could configure best practices and drive significant value across assets, materials, labor, and order management.

Eyelit has evolved this approach into a full suite of composable applications which are connected, reusable building blocks creating the right-sized solutions with speed and ease of use through low code/no code techniques. Whether your goal is to replace your current system or embrace and extend capabilities, the Eyelit composable applications platform can enable the solution.

Advantages of the Eyelit composable APS/MES include intuitive planner or operator-centric digital tools that easily adapt to both reengineered or existing processes, with fast, iterative deployments that take weeks rather than months to implement. Universal API adapters enable integration across most production systems, technologies, and IIOT devices. Eyelit customers have consistently found that deployment risk is minimized therefore achieving faster time to value given the incremental implementation approach.

# SMART FACTORY JOURNEY

The Eyelit Composable Smart Factory APS/MES solution suite provides the foundation for manufacturers to develop their digital planning and production system. Planners, schedulers, engineers, and operators can leverage Eyelit's advanced analytics, generative AI/ML, IIOT, and universal APIs to create new capabilities, extend existing capabilities, and integrate to any ERP or edge device.

The goal of a Smart Factory is to deliver on customer throughput while minimizing inventory and operating expense within a single plant and across multiple plants/plant tiers in the production ecosystem. Leveraging an integrated APS/MES solution will deliver on this goal.

APS/MES solution requirements vary greatly based on manufacturing complexity, variety, and volume. Eyelit's approach to an integrated APS/MES solution provides manufacturers with more value and adaptability while also being implemented faster than traditional solutions.

Eyelit executes a stepwise approach to implementation so that the solution can be deployed incrementally to address your most pressing production challenges first - without having to rip and replace your existing legacy systems and tools.

Like a symphony orchestra, Eyelit maintains a full suite of solution building blocks that flow together like the instruments in a band to generate immediate time-to-value. Flexible, scalable solutions are the key to improving production. Businesses are dynamic along with the problems they encounter. Eyelit enables those closest to your operations to extend and improve the application based on targeted outcomes. Eyelit's composable application-based approach offers a solution as dynamic as your evolving business needs.

Operators and engineers expect intuitive, easy-to-use digital tools. Enterprise and silo-based systems have been difficult to leverage in deploying optimized workflows and decision making. With Eyelit you simply build out your workflow using a graphical representation of your factory/multi-factory ecosystem. Coupling this ease of use with the ability to adapt and evolve your enterprise systems to the needs of your business is critical for navigating today's variability in demand, supply, and logistics.

# SINGLE VERSION OF THE TRUTH

The Smart Factory apps are interconnected delivering a single version of the truth through a common data model. The common data model provides a starting point for organizing and collecting data in tables that drive both automated decisions as well as AI/ML based prescriptions. Application extensions are easily enabled through universal API's, helping your team scale faster, solve problems, and deliver improved outcomes.

Optimized outcomes are delivered by Smart Factories when enabled through a full stack Smart Factory MOM solution which includes optimizing production performance using both APS and MES while further optimizing outcomes by enabling a seamless workflow that integrates planning, scheduling, order management, sequencing, dispatching, and execution.



## CAPABILITIES

The Eyelit Composable APS/MES is a robust set of applications that will seamlessly assemble to create your next generation workflows. Eyelit's APS/MES solution stack covers all primary functions including Planning, Scheduling, Order Management, Production Management, Sequencing, Quality, and Inventory. All solution configurations are extensible through low/no-code capabilities which deliver ease of use and result in applications with lower cost of ownership given they continue to enjoy standard software support.

The Planning workflow configuration allocates demands to production buckets (production bucket being a concatenation of a production facility + time bin, where time bins can range from months, weeks, days, shifts and hours). The APS system will plan work orders to ensure timely completion of the complete order by calculating an optimal date to release the work order into production, as well as optimizing the flow of the individual lots/batches through the plant along their respective production processes.

The Order Management workflow configuration represents the demand side of planning & scheduling, including sales orders, work orders, demand management policies, order mix optimization, constrained order optimization, and capable to promise. A Work Order is a collection of parts/products, along with their desired quantities, to be produced in the plant. Each work order is typically tied to a single customer, with a committed delivery date. The MES provides real-time visibility and feedback to the APS to ensure timely delivery, with re-optimization occurring as required.

The Scheduling workflow configuration is time-based ordering (against a wall clock) of demands for each resource in a production facility, typically associated with feeder lines, job shops, process industries etc. Resource capacities are expressed in time units and takt times for the demands. Output schedules can be represented by Gantt Charts.

The Production Management workflow configuration enables value added use cases which improve production within and across any manufacturing operation, enabling operators to make optimized decisions while executing related actions in real time. Decision making is powered by production analytics driven by real time data from across the production ecosystem including equipment, labor, materials, work orders, customer orders and inbound supply. Use case examples include addressing station efficiency and downtime through root cause analysis or moving from equipment based OEE to holistic OEE including machine availability, performance, materials used, and quality across the production ecosystem.

The Sequencing workflow configuration enables ordering of the demands assigned to production buckets, typically associated with top level assembly lines with hour / shift / day etc. capacities specified in units. Output sequences are represented by (what we call) a Grid Browser, which is a modified Gantt chart for sequences.

The Quality workflow configuration focuses on streamlining quality audit and inspection processes. Rapid nonconformance dispositioning through MRB combined with increased visibility into key metrics such as first pass yield will drive improved productivity. Rigorous and traceable inspection processes, understanding the cost of poor quality, and empowering operators to make data-driven decisions and understanding pareto of defects by station, operator, product, and more all combine to improve outcomes.

The Inventory workflow configuration orchestrates end-to-end inventory flow across operations. Streamlined order processes and material flows will optimize working capital. Further benefits include improved material flow visibility and replenishment, a reduction in reliance on tribal knowledge to set re-order points and eliminating stock-outs in assembly.

# PLATFORM DESIGN FOR COMPOSABILITY

Composability is a design principle that has recently gained attention in the manufacturing industry. Eyelit's full stack APS/MES platform offers the capability to compose solutions based on pain points and business requirements. The inherent platform flexibility is essential given that in some cases customers want to replace an existing app, in other cases they want to embrace and extend that application, and in most cases, they want to orchestrate a new workflow across legacy apps. The ability to take a modular approach and compose applications to fit business needs coupled with ease of use and deployment has been and always will be core to the Eyelit Technology framework.

Eyelit's composable APS/MES solution suite consists of configurable best practice apps to tackle planning, scheduling, order management, sequencing, production management, quality, inventory, compliance, and traceability. All apps in the suite are built on a common data model, a flexible human-readable data schema that enables a single version of the truth for your operations. The common data model gives admins and engineers full control of their data through its extensible structure. This data structure makes Eyelit's production systems easily configurable and extensible enabling citizen developers or engineers to easily extend capabilities and develop the right solution for their specific needs. By leveraging resources from Eyelit's ecosystem of API's, IIOT/connected devices, and educational content, manufacturers can deploy purpose-built solutions based on their specific business pain points and requirements.

# INDUSTRY BEST PRACTICES

Industry best practice templates are an integral part of the Eyelit platform complementing the flexible process designs enabled through the composable application architecture. Purpose-built software applications must be configurable based on individual company and industry requirements, with an in-depth business process and functional knowledge. A recent customer example for this would be the level of compliance and form of documentation needed as part of Eyelit's medical device deployments. Eyelit's medical device industry template extends beyond the average QMS systems providing data collection in the right formats to effective CAPA modules as well as automating the validations required at multiple levels to ensure qualifications for material, machines and labor.

Configurable industry templates coupled with a composable application design delivers modularity, autonomy, and orchestration both within and across factories. For APS/MES applications this enables customers to either replace their legacy systems or embrace and extend them as part of their evolving process design. This empowers a digital strategy that delivers the ability to incorporate advanced technologies from containers to AI/ML to LLMs within an existing architecture. The digitally enabled processes are better, faster and more dependable. The applications are designed to be more intuitive and autonomous, being driven by facts while also adapting to changes in the marketplace as well as demand, supply, and logistics to contain possible losses and predict future action items.

# CLOUD NATIVE AI APPLICATION ARCHITECTURE

Eyelit's cloud-native modular applications are IIoT connected in real time. The AI/ML capabilities are driven by a rich data source which is populated with high fidelity process operations data as well as data driven at the edge. GenAI also plays a big role in the provisioning of operator work instructions.

The application platform provides an industry specific, fully stacked functionality range across APS and MES. The entire platform is composable and ready for deployment to enable the fastest roll-out and implementation within any industry segment. The ability to deploy AI based insight across the supply chain, without having to worry about additional investment in hardware and application hosting means operations and IT teams can focus on their company's core value delivery system.

The Eyelit platform leverages AI to better enable operating decisions resulting in reduced maintenance costs and downtime. Training and qualification are performed interactively in real-time leading to faster resource productivity on the factory floor. Industry specific templates, modules and functions enable best practice configuration and deployment.

Through composable applications advanced practitioners will evolve and extend their industry best practice workflows to create competitive differentiation in the marketplace. Eyelit's Universal API integration framework will activate a single version of the truth across all data sources. Advanced workflow will activate across business functions enabling a level of decision making and improved operating outcomes not possible with prior technologies.



# IMPACT OF AI/LLMS

LLMs enable a new level of workflow automation that the previous generation of tools could not. Full stack smart factory applications require access to a “single version of the truth” data set which is consistent in content and structure. Eyelit LLM based automated workflow applications will innovate factory operations through a single platform integrated to legacy systems through the Eyelit universal API or LLM based ETL capabilities. This stands in stark contrast to current methods of trying to integrate or interface multiple apps or spreadsheets to coordinate decisions and production operations across dozens of apps owned by different vendors.

Best practice process descriptions will continue to be defined within the industry templates along with guardrails for AI based autonomous decision making with interactive workbench guidance and prescriptions for any parameters outside the guardrails which require human intervention.

As LLM’s evolve they will be able to extend the guardrails driving increased process autonomy and automated decision making by navigating decision branching points and providing reasoning which wasn’t possible with past technologies. The reason many RPA efforts failed in the past was the inflexibility related to rules-based decision making. With the addition of LLMs it is now possible to get closer to autonomous operations based on goals and targeted outcomes.

Eyelit’s data models for both APS and MES are very high fidelity given the real time capabilities in the applications. These “single version of the truth” models are intuitive where customers can easily compose new applications using a low/no-code graphical interface, but are also detailed enough to power domain specific industry templates. The best practice templates are usable out of the box and fully extensible if a customer needs to modify process designs to meet their business needs. Common data definitions, LLMs and real time messaging work to merge the gap between planning and execution resulting in a “smart” factory.

The long-term capabilities and value of LLM-based automation will drive companies to select composable applications based on a combination of workflow automation and data leverage. These solutions will deliver higher levels of factory performance through improved functionality and decision making while leveraging the data insights which create a unique competitive advantage in the marketplace.

# SMART FACTORY ACTIVATION

In smart factories, the movement of data across business functions, machines, and systems is just as important as the movement of goods.

Large factories typically deploy ERP systems like SAP and Oracle or must maintain legacy ERP systems, all of which are expensive, complex, slow to upgrade and difficult to extend into factory execution. And making changes to core ERP infrastructure or workflow requires months of custom work. EDI interfaces used to share data across factories, suppliers, and customers is non-standardized at best. Companies continue to exchange information through emails, PDFs, and comment fields.

With Eyelit's composable software platform, an Orchestrator within a factory can define workflows and processes that enable highly performant business processes specific to their operations. A single version of the truth is created by integrating both structured and unstructured data across business functions, customers, and suppliers. There is a significant early mover advantage in play for companies to establish a competitive advantage in manufacturing given the history of legacy systems, integration, and data schema.

Eyelit's APS/MES composable application platform is sophisticated in the sense that all capabilities are modular and can be deployed with state given the Eyelit MES execution system is transactional. Most so-called smart factory solutions are stateless given they tend to be more planning oriented and do not have the integrity to apply state to transactions. Managing transactional state is essential in MES and providing a seamless smart factory workflow combining APS and MES such that it closes the planning execution gap requires that the workflow be designed with state. As execution varies from plan and schedules need to be updated in real time based on execution, planning can better optimize for infeasible situations based on variance if the state of production is fully understood. This capability drives optimization across orders, materials, assets, and labor. Most APS/Planning/Scheduling systems do not support state and thus may position composability but won't drive to the potential value. While enabling for state is difficult in design, it is simple in usage with an intuitive graphical workflow and factory integration design in a low/no-code format.



# COMPOSABLE APPLICATION BUILDING BLOCKS

Eyelit's composable apps enable customers to both optimize operations and configure workflow across the following capabilities;

APS – Enterprise Level Allocation, Ability to Promise, Order Selection, Order Slotting, Order Moves, Order Substitution, Buffer Management, Capacity Planning, Warehouse Planning, Sequencing, Re-Sequencing, Purchase Order Planning, Batched Sequencing, CICO (Carry In Carry Out), Volume Roll, In-Plant Sequencing, Multi-zone Sequencing, Feeder Line Scheduling.

MES – Demand Management, Capacity Management, Inventory Management, Routing, Bills of Material, Rework, Operator Skills, Timesheets, Tooling, Downtime, Documentation, Scheduling, Integration, Label Printing, QMS, SPC, Production and Scrap Counts, Issue Tracking, Pay Hours Management, Asset Management, Operator Certification, Dispatching, IOT connect, Constraints Library, Planning (LP/IP) Solvers, Sequencing (position based), Solver, Scheduling (time-based) Solver, Batching Solver, AI/ML prescriptions.

Platform – Factory integration, Equipment integration, Cloud Native AI Application Architecture, Admin/Configurator, Constraint Library, Database, Feature Management, Mapping Layer, Report Generator, Resource Library, Solver Library, UI/Visualization.

Our composable app story is built around the fact that we have a platform that can be configured to provide effective solutions across both the demand and supply side planning & execution space (so, true no-code). The configuration orchestrates various application and platform capabilities to create the solution. Whether we are solving enterprise planning / order allocation across multiple sites, or we are scheduling a single machine on the factory floor, the platform is extendable thus solving for both today's problems as well as being extensible to solve for any future problems.

## SUMMARY

The pain caused by execution varying from the plan can be totally eradicated while simultaneously optimizing for demand, assembly, manufacturing and supply. What are you waiting for?