WHITE PAPER

Meeting Rising Manufacturing Demand With Integrated Project Delivery Models

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Engineer-procure-construct (EPC) and integrated design-build delivery methods are reshaping how capital projects in manufacturing are executed, helping owners produce faster, control product quality and improve reliability. Early alignment among design, construction and owner teams ties decision to cost, safety and performance. This alignment is critical given labor constraints and supply chain risks.

EPC places engineering, procurement and construction under a unified commercial and execution framework. Integrated design-build also functions similarly, with a single entity leading the work and using its construction insights to guide design and procurement. For both delivery models, the constructor sits at the table from the outset, so scope is developed with means, methods, logistics and awareness of procurement timelines for long-lead items. Owners experience the difference through earlier price clarity, fewer late-stage design changes, and a schedule based on executable strategy and logic rather than assumptions.

All Disciplines Under One Roof

Manufacturing facilities house complex processes to keep pace with shifting consumer demands. Process requirements define the requirements for building systems, utilities, structures, foundations, drainage and wastewater, electrical distribution, and controls. When the same team is responsible for both the process and the facility, the building is designed around the actual operating requirements of the process, not generic design assumptions. Decisions about structural loads, rooftop equipment, segregation of utilities, cleanability and maintainability happen concurrently instead of sequentially. That concurrency prevents the familiar pattern of designing a building before the process is fully defined, only to discover later that the facility cannot support its operational needs without costly rework. Bringing procurement and construction into the same room changes the texture of design conversations. Vendor realities such as lead times, documentation, testing requirements and installation tolerances influence layouts and specifications before equipment is bought. Site logistics, outage windows, tie-in connections between new and existing systems, and lifting plans influence access, clearances and sequence. Safety and quality are not afterthoughts; they inform design decisions that make the facility safer to work in, easier to maintain and less prone to rework.

Together, these disciplines create an integrated project ecosystem where design, procurement and construction function as an interconnected network rather than independent tasks. Information flows continuously among engineering, field teams and suppliers, allowing design adjustments, procurement decisions and installation plans to adapt in real time. This ecosystem enables

consistent communication, faster issue resolution and better alignment between the physical and operational aspects of the facility. In practice, integration allows teams to resolve challenges directly with designers without waiting for multiparty negotiations, resulting in a smoother path from concept through commissioning.

Safety and Quality as Critical Requirements

In EPC and integrated design-build delivery, safety and quality are treated as core project requirements rather than outcomes to be verified after project completion. These priorities are built into every phase of planning, design and execution, influencing how systems are arranged, how work is sequenced and how teams mitigate risks before construction begins.

When safety is integrated early, it informs equipment positioning, placement of access points and platforms, and planning for temporary construction supports and heavy lifts. The same principle applies to quality. It shapes submission expectations, vendor oversight, inspection hold points and testing procedures before fabricating or installing the first component.

When the same team is responsible for design, procurement, construction and turnover, every decision is made with accountability for the end result. Design details that reduce work at elevation, minimize confined-space entries, and simplify cleaning and inspections receive focused attention during early development. The outcome is measurable, with fewer field changes, fewer requests for information, and faster, more predictable commissioning.

Embedding safety and quality at the core of project delivery also translates to lasting operational benefits. Facilities designed and built under this integrated approach reduce exposure to high-risk activities, improve accessibility for maintenance and sustain reliability across the asset's life cycle. In this way, safety and quality are not parallel goals — they are the foundation of how EPC projects are executed.

A Single Source of Accountability

A single, accountable partner minimizes scope gaps and the finger-pointing that often consume time and goodwill during challenging moments. Escalation paths are clear, and decisions move quickly because responsibility and authority reside within one organization. For brownfield projects such as facility expansions, line conversions and live-plant tie-ins, this clarity protects production by aligning outage planning, temporary construction systems and commissioning with business priorities. The same integrated approach also benefits greenfield projects, condensing the path from concept to revenue service because construction, procurement and permitting requirements are incorporated into design decisions rather than discovered after drawings are complete.

Owners also gain clearer visibility into risk. When the same team manages design, purchasing and construction, risk registers reflect actual conditions rather than assumptions. Risk mitigations, including alternate equipment selections, sequencing adjustments, modularization options and subcontracting plans, can be evaluated and implemented quickly because design, procurement and construction are managed within one organization. The result is a faster, more coordinated response that protects critical project and business outcomes.

Addressing Common Misconceptions

A frequent misconception is that an EPC approach can be expensive. This often assumes a theoretically low bid in design-bid-build without accounting for the cost of late price discovery, extended value-engineering cycles, increased change orders, and delays that push back facility startup and revenue. When evaluated across overall project cost, schedule reliability and operational performance, integrated delivery typically offers greater value and reduces total cost to the owner.

Another common misconception is that owners lose control over their project in this environment. Integrated delivery relies on disciplined governance in which scope decisions, user requirements, standards and budgets are reviewed and approved at defined project milestones with full transparency. Owners maintain decision rights, while the project benefits from a unified team executing those decisions.

Some worry that an EPC approach skips critical project steps. In practice, EPC integrates multiple phases so that work progresses in a coordinated sequence rather than in isolation. Front-end planning, basis-of-design, hazard reviews, 3D model reviews, procurement quality surveillance, commissioning plans and validation protocols all take place, but they are deliberately overlapped to shorten delivery time without compromising due diligence.

Where the Models Excel in Manufacturing

The advantages are not confined to any one sector. Advanced manufacturing benefits from coordinated clean utilities, segregated spaces, and maintainable layouts that reduce contamination risk and downtime. Advanced facilities like specialty chemical plants leverage repeatable design packages and concurrent workstreams to accelerate construction and expand production capacity. Aerospace and defense operations benefit from layouts that account for heavy equipment handling, tight tolerances and specialized inspection requirements built into the structure and utilities. Pharmaceutical facilities see improved commissioning and validation pathways when process, building and automation are developed by one team. Integrated delivery can increase confidence in outage planning, accelerate ramp-up and simplify future modifications.

Digital Transformation Readiness

Integrated delivery positions manufacturers for the next wave of digital transformation, as facilities become more data-driven and automation expands across production lines. The need for connected infrastructure and synchronized systems continues to grow. An EPC or integrated design-build approach brings together the disciplines required to plan, design and implement this connected digital infrastructure from the start, integrating mechanical, electrical, process and information systems within a unified operating environment.

Utility integration is an essential part of this effort. By coordinating electrical distribution, process utilities and building systems within a single project framework, teams can design facilities that accommodate smart equipment, advanced controls and predictive analytics. This approach supports the seamless flow of data across operations and provides the insight needed to optimize energy use, track performance and reduce downtime.

Artificial intelligence (AI) and automation technologies are transforming every stage of modern manufacturing. From production scheduling and quality control to predictive maintenance and materials handling, these technologies depend on a flexible, well-integrated infrastructure. EPC and integrated design-build delivery models make this possible by embedding digital systems and control architecture early in the design process. The result is a facility that can adopt new technologies as they emerge, avoiding costly retrofits or redesigns.

Digital transformation readiness extends beyond installing new technology. It is built on coordination, transparency and continuity of data throughout the project life cycle. When design, procurement and construction teams operate as one, the digital systems supporting the facility — including sensors, control networks and asset management platforms — align with how the plant is built and operated. By linking physical and digital environments, teams enhance operational reliability, safety and long-term adaptability.

What Owners Should Expect From Integrated Project Delivery

Owners who engage an EPC or integrated design-build approach should expect earlier visibility into cost and schedule, faster decision cycles and stronger alignment between design choices and business outcomes. These delivery models also provide a clearer view of project timelines, budgets and risk exposure, especially when supported by a partner managing all aspects of design, procurement and construction from start to finish.

The relationship is most effective when owners define the project's primary drivers, such as capacity, quality, compliance and speed, and when governance processes support timely decision-making at key milestones. This alignment keeps projects moving forward even as market conditions shift. It allows teams to respond quickly to new product demands, supply chain changes or emerging technologies without losing momentum.

The payoff can be significant. Integrated delivery compresses design and construction schedules, reducing the time between concept and operation. Speed to market increases, enabling manufacturers to meet customer demand faster and capture new opportunities ahead of competitors. Even under pressure, scope and cost remain aligned. The facility that emerges is easier to operate and maintain because it was designed for current operations and future growth.

For capital projects in manufacturing, success is measured by speed, certainty, safety and adaptability. EPC and integrated design-build models deliver these results by aligning process and facility design with procurement realities and construction execution from the start. With every discipline working as one team, the project is designed to a target, procured to a plan and built to that same design intent. This structure replaces handoffs and rework with coordination and agility, giving owners confidence that the facility will perform as expected. In an industry where predictability is scarce and time is the most valuable resource, integrated delivery remains one of the most effective ways to achieve reliable outcomes and sustain competitive advantage.

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