KINAXIS®

INDUSTRY SPOTLIGHT

5 ways orchestration benefits the semiconductor supply chain

How to overcome supply chain bottlenecks, adapt to fluctuating demand, and beat fierce competition

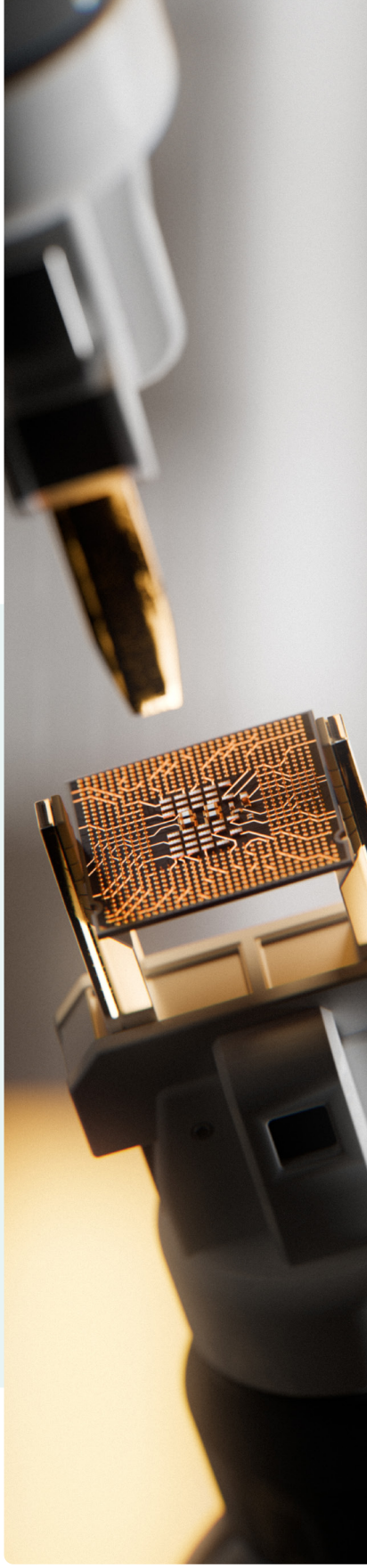
The semiconductor industry is the backbone of modern technological innovation.

In what's been deemed the "Fourth Industrial Revolution," rapid advancements in artificial intelligence, autonomous vehicles, personal computing, medical devices, and more have driven massive demand for chips. Yet, the increasingly fragmented and complex supply chain is struggling to support the skyrocketing demand.

Projected to reach a massive $1 trillion in value by 2030, the semiconductor industry is now at a crossroads. The increasingly complex and fragmented supply chain—further strained by geopolitical shifts moving manufacturing away from Asia—is complicating production and delivery processes, creating new challenges across the industry.

Even before these changes, the pace of innovation outstripped the capacity of even the most well-oiled supply chains, leaving chip manufacturers struggling to keep up. Contrary to most manufactured goods, the cycle time for an assembled chip is measured in months, and by the time it's ready, technological advancements may render it obsolete, evaporating the demand which it was originally intended to satisfy. Without the ability to adjust quickly, overproduction during periods of low demand and underproduction when demand spikes often harm profitability. Supply chain orchestration of this complex ecosystem—from raw silicon sourcing to fabrication, testing, assembly, packaging, end-user products and last-mile delivery—is critical.

With such massive market opportunities in segments ranging from consumer electronics to automotive to AI compute, competition is fierce. Being first to market is a key differentiator, and every contributor to the supply chain, including fabless companies, pure-play foundries, integrated device manufacturers, and outsourced assembly and testing companies, must reevaluate how they manage their individual operations and integrate with the broader supply chain ecosystem to remain competitive and responsive to evolving market dynamics.



ABOUT THIS GUIDE

This guide provides a bird's-eye view of the five major obstacles hindering the semiconductor industry from being able to adapt to demand and deliver at the pace of innovation. It explores what to look for in a supply chain orchestration solution to address the unique needs of this industry.

1. Collaborating with suppliers during geopolitical shifts
2. Long lead times for raw materials
3. Constrained capacity
4. Profitably allocating supply to demand
5. Managing inventory and safety stock

1

Collaborating with suppliers during geopolitical shifts

As geopolitical tensions escalate and the need for more resilient supply chains becomes urgent, semiconductor companies are racing to move production closer to key markets. While nearshoring helps reduce reliance on foreign manufacturing, it presents immediate financial and operational challenges. Building a new semiconductor plant costs over $10 billion and can take years—time many companies don't have in the face of rapidly shifting demand and competition. At the same time, businesses are under intense pressure to align these investments with sustainability goals.

Friendshoring offers a solution by diversifying the supplier network, but it also amplifies the need for rapid collaboration across a more complex supply chain. The lack of integration between systems and platforms is a critical barrier. When manufacturers and suppliers rely on siloed processes and disconnected data, it becomes nearly impossible to achieve the transparency and agility needed to respond swiftly to supply chain disruptions.

Solution: Integrated business planning tools allow companies to manage this balancing act, aligning long-term investments in local capacity with immediate operational needs. Semiconductor manufacturers supporting vast supplier networks can leverage common data and a common software platform to collaborate effectively and minimize latency at every stage in the value chain.

> ***"Kinaxis makes all three of the areas I manage more efficient. I can get the data my employees need, or they can get it on their own directly out of the tool, so everybody's more productive."***
>
> **DEMAND MANAGEMENT**
> MASTER SCHEDULING AND PRODUCTION CONTROL MANAGER, SEMICONDUCTOR MANUFACTURER

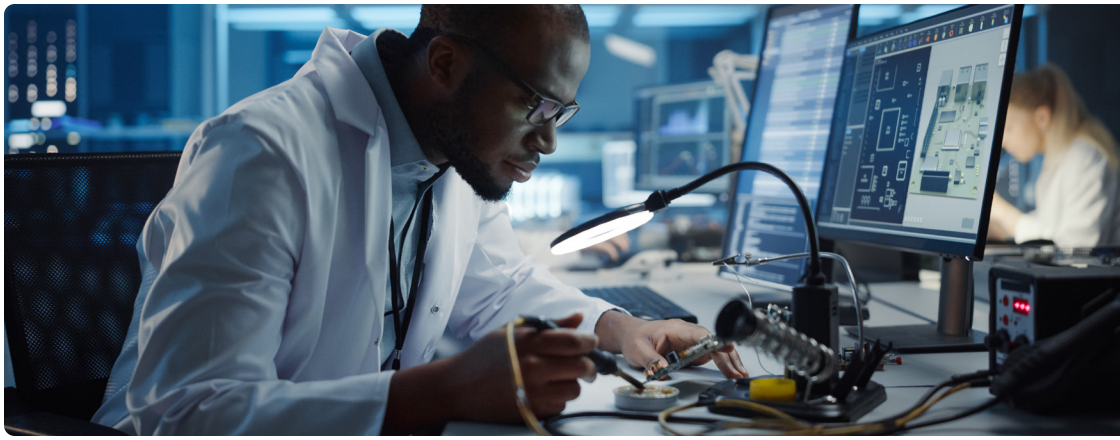
2

Long lead times for raw materials

Unlike other industries, where raw materials can be easily replenished, in the semiconductor sector, they are a hard constraint. Geopolitical tensions, like U.S. sanctions on Chinese silicon suppliers, have worsened wafer shortages and sent costs soaring. With long lead times, wafers must be ordered years in advance—one major Japanese supplier has already sold out through 2026. Companies are now forced to make every wafer count, using them as efficiently and strategically as possible. Any missteps can severely limit fab capacity and lead to missed market opportunities.

The stakes are high. Companies that fail to accurately forecast demand and optimize wafer purchases risk costly overstocking or crippling production delays. To stay competitive, semiconductor businesses must act now to fine-tune their procurement strategies and ensure their supply chains are agile enough to respond to shifts in demand.

Solution: With the high cost of wafers and the pressure to meet minimum order quantities (MOQs), it's essential to reduce wafer purchases and make better use of work-in-progress (WIP) inventory. By treating wafer availability as a critical constraint in supply chain planning, companies can immediately optimize material usage and accelerate WIP through the system. This ensures that even during severe shortages, more orders can be fulfilled, preventing costly delays and missed opportunities.



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Constrained capacity

In the semiconductor industry, the biggest cost for fab owners is depreciation on specialized equipment, making it crucial to keep factories running at full capacity. To avoid financial losses, manufacturers often produce chips ahead of demand, storing inventory rather than letting factories sit idle. Running at capacity spreads fixed costs across more units, improving efficiency. However, any disruption between wafer fabrication and packaging can stall production, creating costly delays and WIP bubbles that slow the entire process.

The pressure intensifies with "hot lots"—urgent orders that bypass normal production. While essential for meeting customer deadlines, hot lots disrupt production flow, causing bottlenecks and compounding WIP at critical stages. This delays standard orders, strains the supply chain, and risks profitability, leaving companies vulnerable in a competitive market.

Solution: An effective supply chain orchestration tool can swiftly align production resources with demand spikes. When a "hot lot" disrupts the normal flow, the right platform balances priorities, manages WIP build-ups, and keeps other orders on track. It also enables planners to quickly spot bottlenecks and take immediate action to relieve pressure at critical points, preventing costly delays.

> ***"We look forward to Kinaxis providing us with real-time reporting and what-if simulations that factor in data analysis of market trends. It will also play a role in helping our supply chain governance evolve, including business continuity planning, which will enhance our flexibility and resilience capabilities to deliver increased customer value."***
>
> **SOICHI TSUKAKOSHI**
> DIRECTOR AND SENIOR EXECUTIVE OFFICER, ADVANTEST

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Profitably allocating supply to demand

Semiconductor fabs produce chips of varying grades—some high-performance, others middle or lower. Before chips are fully differentiated for specific applications, they can be allocated to multiple products, making it critical to assign each grade to the most profitable use. The challenge is that demand can fluctuate unpredictably, making it essential to allocate chips quickly and efficiently based on the yield in which they are rendered.

For example, if fabs produce more high-grade chips but the immediate demand is stronger for medium-grade ones, fabricators can "down-bin" higher-grade chips to meet that demand and avoid revenue loss. Failure to make these adjustments in real time can result in missed opportunities, excess inventory, and reduced profitability. Timely and precise planning is crucial to staying competitive in a rapidly shifting market.

Solution: Supply chain orchestration platforms are critical for optimizing chip allocation to the most profitable uses—fast. Leveraging real-time data, these platforms empower planners to immediately adjust supply in response to shifting demand and production yields. With a unified, end-to-end system, both upstream and downstream teams gain the instant visibility they need to make rapid, informed decisions, preventing costly missteps and maximizing profitability.

OPTIMIZING CHIP ALLOCATION FOR MAXIMUM PROFITABILITY

A leading manufacturer in wireless technology and semiconductors produces basebands—complex, multi-functional chips used in everything from smartphones to IoT devices. However, allocating different chip grades across diverse product lines as business units compete for priority creates challenges. With Kinaxis, the company manages this complexity, ensuring each chip grade is allocated to its most profitable use. This maximizes resources, drives profitability, and meets the demands of all business units.

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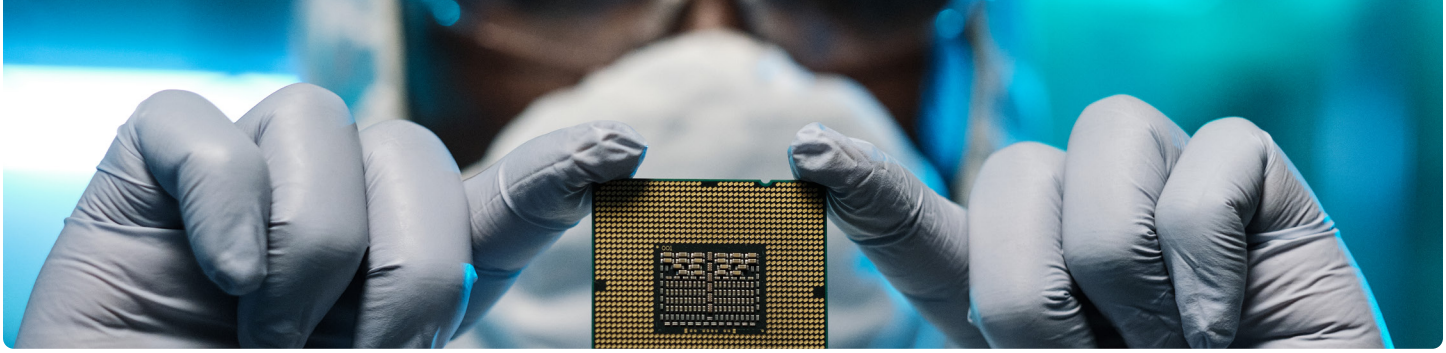
Managing inventory and safety stock

Inventory management in the semiconductor industry is rife with obstacles, driven by short product lifecycles and volatile demand. Companies must navigate the fine line between stockouts, waste, and future market readiness, all demanding precise planning. Raw materials, like blank silicon wafers, must be carefully managed to avoid shortages while ensuring their viability. Some materials, like said blank wafers, also have limited shelf life, further complicating the constraint considerations. Any misstep at this stage can trigger costly shortages or write-offs, crippling production schedules.

Semi-finished goods, stored in die banks, offer flexibility to customize products quickly based on market shifts. But if held too long, these goods risk becoming outdated, missing the window for newer, more profitable designs. Meanwhile, finished goods are highly dependent on accurate demand forecasts, and rapid technological advances can render them obsolete almost overnight. Without precise inventory control, companies must walk a tightrope between dual threats of overstocking and being caught unprepared for market shifts.

Solution: With product lifecycles shrinking, particularly for advanced chips, inventory management demands precision and agility. A powerful supply chain orchestration platform, equipped with advanced analytics and real-time data, is essential to accurately forecast demand. This allows companies to set optimal safety stock levels at each stage—raw materials, semi-finished, and finished goods—minimizing the risks of excess inventory or stockouts, while keeping production flexible enough to seize profitable opportunities as they arise.

> ***"Through Maestro, we will gain the ability to concurrently plan and trial unique scenarios in near-real-time. This allows us to more accurately forecast our consumption of inventory based on a variety of demand-based scenarios."***
>
> **RAJA PETRAKIAN**
> FORMER VICE PRESIDENT OF OPERATIONS, POWER INTEGRATIONS



Chip away at your competition

Streamline and increase efficiency in your semiconductor supply chain to power through bottlenecks. In an industry where complexity and fragmentation are constant challenges, supply chain orchestration is the key to moving from chaos to control. With Kinaxis' end-to-end orchestration platform, you can streamline operations, eliminate inefficiencies, and accelerate your supply chain to the speed of innovation.

With real-time data synchronization and instant collaboration, Kinaxis enables semiconductor planners to react immediately to disruptions and demand shifts, even as supply chains are redrawn due to protectionism or diversification. Our AI-powered, always-learning algorithms keep your supply chain responsive and agile. Using concurrent planning and real-time what-if scenarios, you can rapidly adjust for hot lots or other critical changes without sacrificing speed or accuracy.

Unlike competitors that slow you down by focusing solely on time-consuming optimization solves, Kinaxis blends optimization with heuristics, allowing you to readjust supply plans, optimize wafer buys, and manage co-products in real time. Seamless integration with ERP systems and custom apps provides instant insights, slashing planning cycles and decision times. This flexibility ensures your organization stays ahead of disruptions and captures opportunities siloed companies miss.

Semiconductor leaders trust Kinaxis to differentiate their supply chains and gain a competitive edge. **Request a demo today** and see how Kinaxis can push your supply chain into the future.

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