

Managing Dynamic Demand in Electronics

The revenues of a global leader in semiconductor manufacturing had stalled over the last decade. The company wanted to increase its market share, especially in the area of high-volume logic chips. One way to do this was by improving its ability to deliver chips more quickly than the competition. Explains Pallab Chatterjee, chief delivery officer at i2 Technologies, “In the high-volume semiconductor market, the ability to deliver the right chip when the customer wants it is key to getting the order and gaining market share.”

This was no easy task, however. The company made tens of thousands of different varieties of logic chips, and demand was hard to predict, since few customers provided forecasts. A customer might suddenly request 1 million chips—and want them delivered in two days. In the past, the company had negotiated delivery times, counter-offering five days instead of two, for instance. It had always been a leader in on-time delivery for these negotiated, deliver-to-promise dates, but now the goal was to sharply increase on-time delivery to customer-request dates, without increasing inventory. Performance in this area stood at almost 80 percent—not bad, but not good enough to gain a more dominant market share.

i2's analysis revealed that while the overall volume of demand was quite predictable, constant changes in how demand was distributed among products and regions challenged the company's forecasting efforts. For instance, changes in the demand mix meant shifting to products with different costs, production constraints or cycle times. Or demand shifts among regions rendered previous stocking decisions hopelessly outdated. The changes themselves were often small—perhaps a customer wanted a different part version, or to have more items delivered to one location than another—but keeping up with these many small changes was too much for the semiconductor manufacturer's planning and inventory management capabilities.

Taking a demand-driven approach to inventory management

i2 quickly understood the root of the problem: that no fixed plan can accommodate dynamic demand. Manually correcting mistakes as demand fluctuated, however quickly, was not a viable, long-term solution. Instead, this company needed a more flexible, demand-driven approach to inventory management that would continuously update the plan. i2 worked with the company to put in place an inventory management system that would automatically adapt to changing customer demand on a continuous basis—not just once a year. i2 analysis showed that the semiconductor manufacturer's delivery performance was satisfactory on fixed, predictable customer orders, but building to stock—for inventory or in anticipation of demand—

was a different story. Here, any forecasts were quickly outdated, resulting in unavailability of needed parts. Despite the complexity of the company's business, its inventory control depended on just two main factors: the stage of completion to which products were built, and the locations where they were stocked.

Adopting a postponement strategy

The solution was to postpone the last stages of product manufacturing so that the company could delay making decisions about the final form of work-in-process products until demand trends were clearer. There are trade-offs to this strategy, however. Postponement is a compromise solution. While it is quicker than build-to-order, it has higher inventory costs. It is also cheaper than build-to-stock, but not as fast on order fulfillment. Moreover, postponement puts limits on the second inventory-control factor—stocking location. While finished goods may be shipped to distribution centers near customers, “postpone” work-in-process must be assembled and tested at upstream facilities that are usually farther away, adding shipping costs and slowing delivery performance.

Despite these drawbacks, the postponement strategy would provide far greater flexibility and bring the company closer to an optimal, demand-driven approach to inventory management. After implementing i2 Inventory Optimization, the company was able to calculate the many complex factors involved in managing its inventory. Working closely, i2 and this manufacturer simulated different postponement and stocking strategies. This involved segmenting products in different ways—ranging from manufacturing constraints to demand profiles—until the company found an inventory management approach that optimized these factors. Mindful that any performance gains would evaporate as soon as demand shifted, the company scheduled weekly check-ups and adjustments to the strategy to ensure that segmentation always tracked current demand.

Results exceeded expectations. Delivery performance surged by 25 percent, almost double the simulation's estimate for one-time gains. Notes Chatterjee, “The original process had them negotiating with customers on delivery dates. Today, the semiconductor manufacturer is able to meet the customer request date without negotiation more than 90 percent of the time, without increasing inventory levels.” Better still, the gains were immediate—unmistakable after one month—and reached new steady states only four months later. Success metrics were off the charts. Inventory savings alone made the project's ROI virtually incalculable. Inventory Optimization delivered the speed and agility the company needed to keep up with changing customer demand.

— Martha Craumer