The Supply Chain Company®

Managing Inventory at Texas Instruments

With manufacturing operations all over the world, Texas Instruments (TI) needed a process for managing its inventory more effectively. Because of the nature of the semiconductor industry, TI faced several challenges in its supply chain, including long lead times, short product life cycles and inadequate customer service levels.

TI has more than 55,000 stock keeping units (SKUs) and processes upwards of 145,000 orders each month. Because there are multiple stages in the semiconductor supply chain, there are several places where inventory could be held to produce the necessary finished goods.

"We have a capacity-constrained model, and our major challenge is the fact that we are governed largely by the laws of physics," said Ken Bean, director of business support systems at TI.

The manufacture of semiconductors can take several days, and depending on the product, that process can incorporate anywhere from 6 to 36 levels of complexity. Based on the varying manufacturing cycle times and often short product life cycles, TI needed an inventory optimization solution that could provide the flexibility required for its complex supply chain.

There were multiple reasons why TI kept substantial amounts of inventory on hand. First, varied product manufacturing cycle times lead to supply chain variability. In addition, TI was unable to consistently develop accurate demand forecasts. The company also had a financial incentive to build up certain inventory. For example, even though a specific product may have low demand, combining that group with a larger manufacturing lot made it more economical to build the product.



TEXAS INSTRUMENTS

Challenges

- Gain market share through improved customer service
- Improve portfolio profit margin
- · Make effective use of existing inventory

Solutions

- Create an integrated S&OP process
- Improve forecast accuracy
- Segment products based on shipment volume, margin, and revenue

Results

- Increased profit margins by 40%
- Improved customer service performance by 25%
- Reduced the gap between requested delivery date and actual delivery date

Company Description

Headquartered in Dallas, **Texas Instruments** provides pioneering semiconductor technologies which allow its customers to create the most advanced electronics. A global semiconductor company, Tl innovates through manufacturing, design and sales operations in more than 25 countries. Tl has annual revenue of \$12.5 billion and employs about 29,500 people worldwide. "We are pleased with the results of our strategy to position the inventory ahead of demand so that we are able to meet the needs and timeframes of our customers. This has been instrumental in our market share gains over the last five years."

— Kevin March Senior Vice President and Chief Financial Officer



As a result, TI was trying to determine the best way to make the most effective use of the inventory it was carrying. "You want to optimize the amount of good inventory that you have and diminish the amount of bad inventory that you have," Bean said.

To solve this problem, TI sought to implement an integrated sales and operations planning (S&OP) process that would focus on both demand management and inventory management.

Why i2?

A long-time i2 customer, TI first started using i2 Supply Chain Planner[™] in the late 1990s as it was looking to improve its custom supply chain solutions. More recently, TI has implemented i2 Demand Planner,[™] i2 Demand Manager,[™] i2 Transportation Manager[™] and i2 Master Data Management.[™]

Because of its previous successes, TI looked to i2 to help further improve its supply chain processes through the implementation of i2 Inventory Optimization.™

"That is a continuous improvement cycle that I would encourage every company to do, and this tool has some features that essentially lend itself to operating in that fashion,"

— Ken Bean Director of Business Support Systems Texas Instruments

i2's Contribution

TI found i2 Inventory Optimization to be a very flexible tool that allowed it to quickly change its inventory strategy. i2 Inventory Optimization features various segmentation rules that can be applied across all products.

"All products are not necessarily created equal; you may have certain products on which you wish to carry more inventory than others," Bean said. By using i2 Inventory Optimization to evaluate several different sensitivity analyses—essentially "what-if" scenarios—TI was able to choose the best one and move it into production almost immediately.

One business unit in particular had a goal of improving its customer service performance, thereby increasing its overall market share. The business unit decided to segment its products based on shipment volume. The products with the highest volume would maintain higher inventory at the product distribution center and those with the lowest volume would be strictly built to order. i2 Inventory Optimization is used to calculate the quantity of each product required at each of the inventory staging locations. A second strategy implemented by TI was to segment products by profit margin and revenue. The company was able to divide products into classes ranging from those with the highest margin and highest revenue to those which yielded the lowest margin and the lowest revenue.

Once the inventory targets were optimized, TI prioritized the budget toward the inventory with the highest margin, allocating the remainder to its other products based on segmentation level. TI was able to achieve an approximately 40 percent gain in margin with this inventory strategy. Although the business unit also adopted additional methods to improve margin, Bean said that the manager of this organization indicated there was no way TI could have realized this kind of gain without the use of i2 Inventory Optimization.

TI has now had i2 Inventory Optimization in place for several years, and continues to constantly review and revise its processes and strategies based on changes within its internal and external environments.

"That is a continuous improvement cycle that I would encourage every company to do, and this tool has some features that essentially lend itself to operating in that fashion," Bean said.

Texas Instruments' Results

By using i2 Inventory Optimization, TI is able to manage a larger portfolio with a smaller amount of people and effort. Utilizing the segmentation attributes, one business unit, which has over 20,000 SKUs, was able to reduce the number of materials it had to manage. In addition, one person is able to manage the entire portfolio in approximately 30 minutes a week.

The ultimate goal of TI's shipment-volume-based inventory strategy was to improve the inventory mix against customer demand, and in the end, to gain market share through improved customer service. Through the implementation of this new strategy, the business unit utilizing this strategy was able to improve customer service levels by 25 percent.

Another method that TI used to measure the results of this strategy was to observe the on-time delivery of customer orders. If TI was not able to deliver the order on the requested delivery date, it looked at when the order was actually delivered and the gap between the requested and actual delivery dates. With the new product segmentation in place and i2 Inventory Optimization providing the required data, TI was able to improve on-time delivery of customer orders.

With the help of i2 solutions, TI can run its entire operating plans several times a week. In a given situation, the company can realign its supply chain, if necessary, in about 72 hours. Additionally, they do sales and operations planning on a monthly frequency, and make the required updates as a result.

TI's strategy of positioning inventory ahead of demand has allowed it to improve its service levels and grow its business over the past five years.

"Essentially what you're doing is prioritizing your portfolio in terms of ways that make sense to achieve your business goals," Bean said.

This case study is based on a web seminar presented by Texas Instruments and i2 entitled "Inventory as a Competitive Weapon."



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