

Supply Chain Excellence at Agilent

Agilent Technologies used the SCOR Lean Six Sigma frame work to successfully streamline supply chains shipping \$2 billion of products annually

Company Background

Agilent Technologies is the number one provider of bio-analytical and electronic measurement solutions to the communications, electronics, life sciences and chemical analysis industries. With 19,300 employees serving approximately 30,000 customers in 110 countries worldwide, Agilent is a powerful force in the global economy. In fact, operations outside of the U.S. account for approximately two-thirds of company sales. Agilent ranks 443 in the Fortune 500 and posted revenue of \$5.4 billion in fiscal year 2007.

The Santa Clara, Calif., company operates in two segments: Electronic Measurement Group (EMG) and Bio-Analytical Measurement Group (BMG). As a global market leader in measurement equipment that helps companies design and run electronics such as fiber optic networks and wireless communications, Agilent's EMG constantly searches for tools and techniques to maintain its position at the front of the competitive pack.

One such project involved a massive transformation of both its manufacturing processes and its supporting global supply chain. Known as the War on Waste (WoW) program, EMG used the Supply-Chain Council's Supply-Chain Operations Reference-model (SCOR) in conjunction with Lean Manufacturing and Six Sigma tools to streamline and standardize widely disparate global supply chains supporting a single manufacturing site.

WoW has been recognized by the SCC with a 2008 Award for Supply Chain Operational Excellence.

The Business Challenge

When Agilent EMG looked at its many manufacturing sites scattered over the globe and the inefficient supply chains servicing them, it saw waste--wasted time, money and effort. The company solved the site fragmentation by consolidating most of its manufacturing locations into a mega site in Malaysia called the Asia Manufacturing Centres (AMC).

But though the consolidation was an important first step, the AMC still had to support numerous complex and unique supply chains as it delivered \$2 billion of shipments annually across multiple divisions. A 19-day order delivery lead time posed on-time delivery and consequently, customer satisfaction challenges. Asset management was also an area of focus -- in 2006, Asia AMC carried inventory amounting to **53 days of supply**. Meanwhile, AMC also faced the challenge to support revenue growth with existing resources and hence, the focus on worker productivity improvement (measured as revenue per employee). Clearly, there was an opportunity to increase its return on invested capital and improve worker productivity.

The supply chains involved were quite complex. The product portfolio contained eight product categories ranging from fabricated parts to box instruments and systems, each with unique

supply chains. All three types of SCOR Level 2 supply chain configurations (Make to stock, Make to order and Engineer to order) exist in the Asia Manufacturing Centre. Delivery logistics were equally complex, as the customer base was scattered globally: 39 percent of the centre's products were shipped to the Americas; 28 percent to Asia; 19 percent went to Europe-Middle East--Africa and 14 percent was distributed in Japan.

On the supply side, EMG dealt with many outsourced fabricated parts and sub assemblies creating long lead times on some components, as they required materials only made within Agilent's technology process center at Santa Rosa, Calif.

In short, EMG's Asia Manufacturing Centre was faced with the challenge of creating a world class order fulfillment system by completely streamlining and optimizing the Plan, Source, Make and Deliver processes of its supply chain. In November 2006, the AMC launched WoW to streamline the various supply chains being supported out of the Asia operation.

How They Solved It

Faced with this tangle of disparate and complex operations, AMC leadership turned to the SCOR framework in conjunction with Lean and Six Sigma methodologies to help create a common platform for data acquisition and analysis.

Using fourth quarter 2006 supply chain data as the baseline, Agilent used the SCOR framework to build visual stream maps comparing the different divisions' supply chain metrics against those of competitors to uncover areas ripe for streamlining and improvement and create a common supply chain platform for processes. Value stream maps were done for all the individual divisions as well as for functions such as planning, procurement and logistics.

The SCOR-based analysis found three major areas of concern: responsiveness, supply chain costs, and asset velocity. Lean Six Sigma tools were then used to analyze each area of

constraint found in the value stream maps to dig out the root cause.

The AMC then used SCOR best practices and Lean Six Sigma tools to build improvement projects designed to address constraints found within each of SCOR's key business flows: Plan, Source, Make and Deliver.

The company also prioritized and aligned each improvement initiative within one of the following five WoW key strategies:

- Culture and Workforce Transformation
- Process Re-engineering
- Redesign for Lean
- Yield Improvement
- Collaborative Planning, Forecasting and Replenishment with Customers and Suppliers.

For example, as part of process re-engineering strategy, analysis of the value stream map for the Make process found assembly processes were slowed by unavailability of raw materials, which were not systematically stored with any control or retrieval process. AMC reorganized and centralized material storage and kitting upfront, prior to assembly. They also instituted controlled access to the area, assigning specific personnel for material control and issuance and created a storage system with standard control, tracking and picking procedures. The project led to improved inventory accuracy and availability, and shortened production cycle time as well.

Another key example, as part of the Collaborative Planning, Forecasting and Replenishment strategy, the Lean delivery system was a result of value stream map analysis of the Pick, Pack and Ship processes. Non-value adding, manual and time consuming processes were identified and streamlined through process re-alignment and automation as well as re-layout of its 3PL warehouse operations. This improved turnaround time helped to improved revenue conversion significantly.

The result was an AMC-wide initiative to completely transform AMC's supply chain processes.

Benefits/Results

While WoW will not be completed until the end of 2009, Agilent has already achieved significant improvement in terms of responsiveness, asset velocity and productivity. More than 100 projects were identified from the converged SCOR /Lean Six Sigma models, helping AMC to achieve the following early results:

- **Lead time reduction:** AMC reduced order fulfillment lead time from 19 days to 13 days, a 32 percent improvement. It also saw an order to revenue conversion improvement of 5 percent, generating an incremental \$50 million of revenue for fiscal year 2007.
- **Lower inventory levels:** The company reduced inventory by \$16 million, from \$104 million in the fourth quarter of 2006 to \$88 million in the fourth quarter of 2007, essentially paring inventory by six days' worth of supplies. This was done while supporting 11 percent revenue growth.
- **Productivity improvement:** AMC improved productivity by 21 percent year on year.

With the first year of the three year project showing such a record of success, AMC looks forward to reaping further rewards as the WoW transformation extends to supply partners in the next phase.

About Agilent Technologies

Agilent Technologies is a \$5.4 billion global manufacturer providing bioanalytical and electronic measurement solutions to the communications, electronics, life sciences and chemical analysis industries.

About the Supply-Chain Council and SCOR

The Supply-Chain Council (SCC) is a global not for profit association whose methodology, diagnostic and benchmarking tools help organizations dramatically improve supply chain processes. The SCC has established the Supply-Chain Operations Reference-model (SCOR) as the supply chain world's most widely recognized framework for evaluating and comparing supply chain activities and their performance. SCOR, which is continually upgraded, allows companies to determine and compare the performance of supply chains within their company or those of other companies.