



Corning Display Technologies Supply Chain Success Through Demand Pull

Corning Incorporated's Display Technologies (CDT) division has grown with the TFT-LCD (thin film transistor-liquid crystal display) industry (figure 1). Total TFT-LCD glass demand has grown at a historically fast rate. Within one decade, total demand for glass will have increased from less than 100 million ft² to more than 2 billion ft² annually. Corning has maintained a leadership position throughout the TFT-LCD industry's development.

Background

A simplified view of CDT's manufacturing process is that raw materials are mixed, melted and fused to generate high quality full sheet glass inventory. Then in discrete finishing processes, full sheets are reduced to the finished sizes used by Corning's customers, the LCD panel manufacturers who subsequently supply the LCD set makers who create laptops, monitors, and televisions.

CDT operates manufacturing facilities in the U.S. and in Asia. The facilities in Asia also do the finishing processes and ship to their customers in the region.

The Situation

Order management and supply chain processes were becoming overwhelmed by the explosive growth in demand.

- Product volumes and shipment schedules for each customer were established in a monthly forecasting process, but the actual order quantities and delivery dates were frequently changed as each month progressed.
- Order variability also appeared to be driven by factors other than true demand changes:
 - Price negotiations
 - End-of-month, end-of-quarter sales
 - Stockpiling inventory

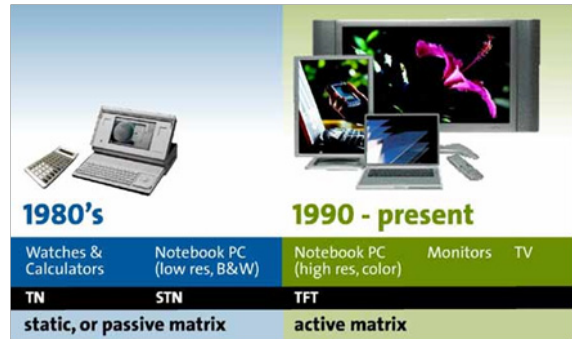


Figure 1. TFT-LCD Glass Industry

- Aggregating orders into weekly buckets, but asking for daily delivery
- Logistics policies, etc.

Consequently, they experienced extreme variability in daily demand, as shown in figure 2.

Daily Shipments for a typical customer.

Total customer production capacity

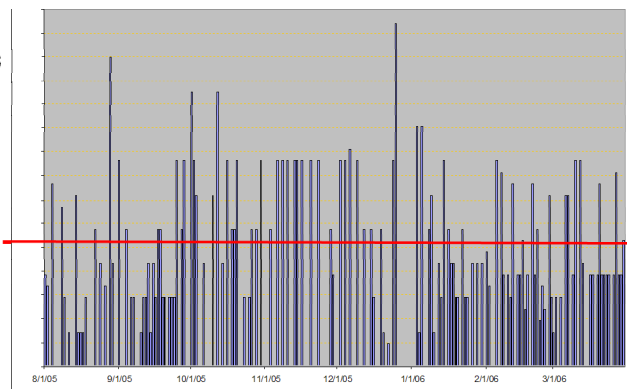


Figure 2. Daily shipments for a typical customer.

One customer approached CDT to discuss how they might develop an integrated view of production, deliveries and requirements to reduce these variations, reduce inventory and still ensure consistent supply. Corning's first response was to propose a customer business-to-business (B2B) information technology (IT) application, with the goal of synchronizing their respective Enterprise Resource Planning (ERP) systems.

VELOCITY—a powerful business approach combining speed with direction—consists of three pillars: **Theory of Constraints**, the system architecture; **Theory of Constraints Lean Six Sigma** (TOCLSS), the focused improvement process; and **SDAIS** (Strategy-Design-Activate-Improve-Sustain), the deployment framework.

Strategic Review and Direction

CDT's supply chain process group reviews all ERP-related IT project proposals. They discovered that in this case, B2B was secondary to retooling the order management process. Direct participation of their supply chain group in the initial customer discussions was the key to making sure that the right process was developed and implemented. By taking a system-level view of their operations as they interacted with their customers, the *strategic* direction was more clearly identified for the solution.

volume (+10%). The gap between the before and after was only the number of days needed to reduce the customers' on-hand inventory.

Improvement

The reduced variation in daily replenishment led directly and rapidly to a 60% reduction in inventory between Corning and its customers (figure 4). This improvement also had other benefits: Improved

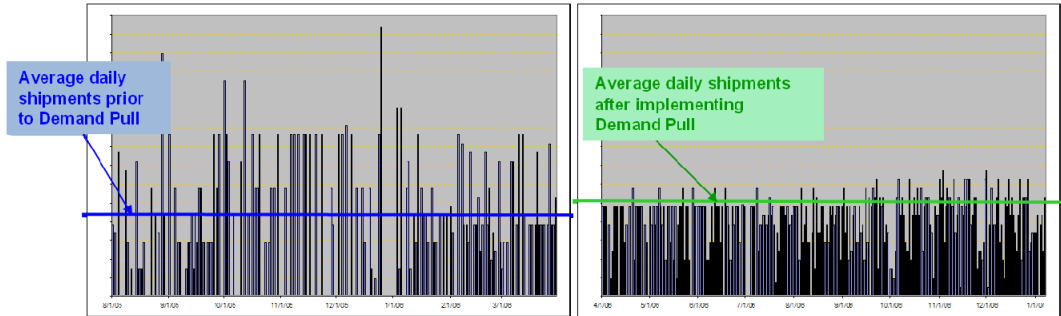


Figure 4. Average daily shipments prior to and after implementing Demand-Pull

Designing the Solution

Corning, facilitated by AGI, *designed* a two-buffer Demand Pull system (figure 3) using the customer's consumption of material as authorization to ship that exact quantity to replenish their inventory. They defined target inventory buffer sizes based on maximum customer line rates and the Time to Reliably Replenish.

cash flow, faster quality feedback, and less warehouse space required.

The Impact of the VELOCITY Approach

By following a "strategy first" approach to set the proper direction for the improvement effort, Corning avoided a large investment in a software solution to allow their respective ERP systems to communicate data that now is exchanged by automated daily e-mails. Potentially, the greater risk would have been the exposure of proprietary information to their clients. With their documented successful results, the early "big win" was widely publicized and gained support for further expansion. In addition to *sustaining* its improved performance, Corning is continuing their focused system improvements internally and with other suppliers and customers.

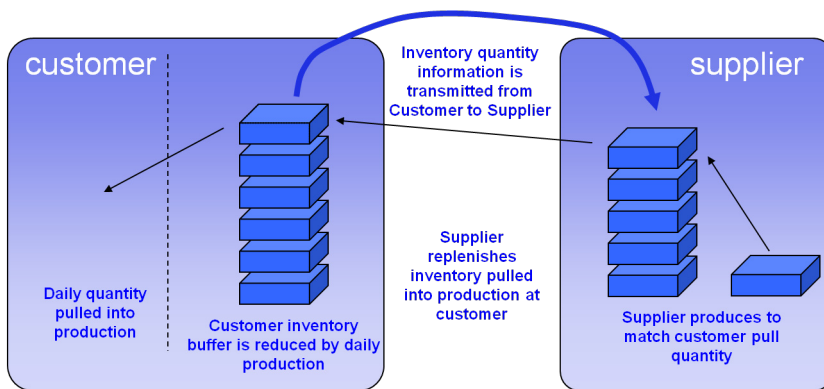


Figure 3. Two-buffer Demand-Pull System

Activating Demand Pull significantly reduced the demand variability (-86%) in the supply chain, while *simultaneously* supporting higher sales

Source: Presentation by Robin Ploss at Velocity WorldSM Conference, 15 April 2008, Uncasville, CT

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