“Increasing business volumes coupled with impending yard capacity constraints required immediate action to prevent the Nashville trailer yard from limiting customer fulfillment operations. That action was to simulate.”

Ameet Ravetkar
Manufacturing Engineer at Dell

DELL OPTIMIZES YARD AND DOCK CAPACITY WITH BROOKS SOFTWARE SIMULATION SOLUTION

Nashville Distribution Center Could Potentially Move Triple the Amount of Products Each Day

Challenged with a finite amount of space in its yard and dock and projections of additional capacity demands, Dell faced three choices: improve processes to extend the life of the Nashville facility, move volume to another facility/outsource, and build a new facility.

Ameet Ravetkar embarked on a simulation project, employing Brooks Software’s AutoMod™ simulation and analysis software, and led facilities, logistics, operations and materials teams in an effort to examine the center’s inbound and outbound yard and dock activities to identify process improvement opportunities.

“Yard and dock activities are dynamic, involving many processes and complex interactions,” said Ravetkar. “The key bottlenecks where we needed to focus our resources and capital were not very easily evident. That’s where simulation was a great tool to capture this complex environment and lead us in the right direction.”

The software provided Dell with customized 3-D modeling of the Nashville yard to simulate current activities, identify problem areas and experiment with solutions.

“The strength of the simulation tool is in its ability to help us analyze a complex problem, break it down into small components, evaluate each component individually and provide a feasible and viable solution,” said Ravetkar. He explained that since the problem had many components, “A base analysis would not have been as robust as a simulation. Brooks’ simulation and modeling software captures more details and handles more complex problems.”

Ravetkar and his team used the simulation and analysis software to model the yard and determine its current capacity. The analysis clarified the yard’s “pinch points,” each with a varying degree of impact on the total throughput of the operation.

The team modeled solutions based on projected volumes, such as determining when more yard dogs would be needed to complete work orders, and examining orders for inbound products to see whether fewer trailers could be summoned.

KEY HIGHLIGHTS

Challenge
Determine the best solution to meet demand and to maximize capacity at the Nashville distribution center.

Solution
Brooks Software’s AutoMod™ simulation and modeling software.

Studied dock and yard operations to determine current capacity, identified the impacts of pinch points and bottlenecks, and designed solutions to improve capacity.

Result
The AutoMod simulation and modeling analysis was used to develop a multi-year investment plan capable of increasing capacity throughput up to 300%. Dell successfully created a “virtual yard” capable of providing real-time insight into capacity and flow analysis and of prototyping viable solutions.
Based on the simulation and modeling exercise, Dell decided that there was enough potential for process improvement to extend the life of the facility. The team created a six-phase, three-year action plan organized around volume milestones to address bottlenecks with direct impact on the throughput of operations. AutoMod helped Dell identify critical improvements and timed implementation for optimal returns.

**Capacity Improvements**
In Phases One and Two of the yard capacity improvement plan, Dell:

- Increased trailer parking spaces by 14 percent, from 123 to 140.
- Doubled the number of yard dogs from two to four.
- Reduced the amount of time between orders for printers. The high-volume product was ordered in smaller quantities but more frequently throughout the day.
- Added two new dock doors dedicated to high-volume products such as printers. Trailers with the high-volume products are allowed to move directly to the dedicated dock doors, eliminating the time required for parking and decreasing the burden on yard dogs.
- Increased yard capacity by 50 percent.

Potentially, by fiscal year 2008 the capacity improvement plan could:

- Increase trailer parking spaces by 52 percent.
- Triple the number of yard dogs.
- Cut the high-volume printer reorder time in half.
- Add additional receiving dock doors for high volume products, nearly doubling the original number of receiving doors.
- Create an additional entry/exit point to the yard.
- Triple the original yard capacity to more than 150,000 units per day.
- Double or triple the capacity for number of trailers serviced per day.

**Financial Benefits**
Had Dell been unable to find solutions for increasing its Nashville yard and dock capacity, the company would have been forced to outsource or move the volume to another facility, or to build a new facility. Either of these options would have required intensive capital expenditures. The capacity improvement plan:

- Allowed Dell to meet demand for emerging high-volume products
- Extended the useful life of the existing facility, delaying the need for investment in a new distribution center.
- Outlined optimal timing for plan element execution, financially protecting the Nashville center's "best operating level" and allowing for maximum returns since no investments were called for before absolutely needed.

**Looking Forward**
Ravetkar reported that Dell would continue to look two to three years ahead, performing the simulation exercise each year. Changes in volume projections, added or eliminated products are just a few of the unforeseeable conditions that could challenge the assumptions that formed the basis for the original capacity analysis. By revising the analysis every year, Dell will be able to make course corrections as needed in order to optimize the yard capacity of the Nashville distribution center.