Capacity and Labor Resource Analysis - Paint Shop

ProModel
VISUALIZE ANALYZE OPTIMIZE **VAO** >>>

Vertical | Manufacturing | Pharmaceutical | Healthcare | Portfolio | Logistics | Financial | **Government** | Business

Genre | Case Study | **Project Review:** | White Paper | Technology Overview

Client
Repair depot of the United States Army

Situation

One of the critical functions for which the Army repair depot is responsible is the Paint Shop reset of mechanical items through staging, steam clean, prep, blast and paint. Approximately 11 different items run through the depot's Paint Shop, taking varying times to reset and repaint.

The depot was anticipating increased demand due to the continued high level of troop deployment throughout the world, and needed to know the maximum capacity of items it was capable of repairing for a given month. Anticipating a demand of resetting a minimum of 200 units per month, the depot engaged ProModel to help develop a simulation solution which would give them the capability to Visualize, Analyze, and Optimize their Paint Shop Reset operations through the following objectives:

Objective

- To identify the actual maximum capacity of items the Paint Shop can reset given the current state of equipment and resources.
- If the current throughput did not meet the demand of 200 units per month, identify the primary and secondary constraints.

Results

The current state operation model indicated a maximum monthly output of 93 mechanical items reset with resources scheduled for 2 shifts, four days a week, validating data reflective of the actual process. The output graph to the right shows the cumulative throughput of items reset by the paint shop and how the operation falls short, with an output of less than 50% of the depot's anticipated 200 items per month demand.

The chart to the bottom right shows the utilization of facility equipment - the green indicates equipment in use. As can be seen the blast booth is the primary constraint. The blast booth is in operation almost 95% percent of the time with little idle or waiting time.
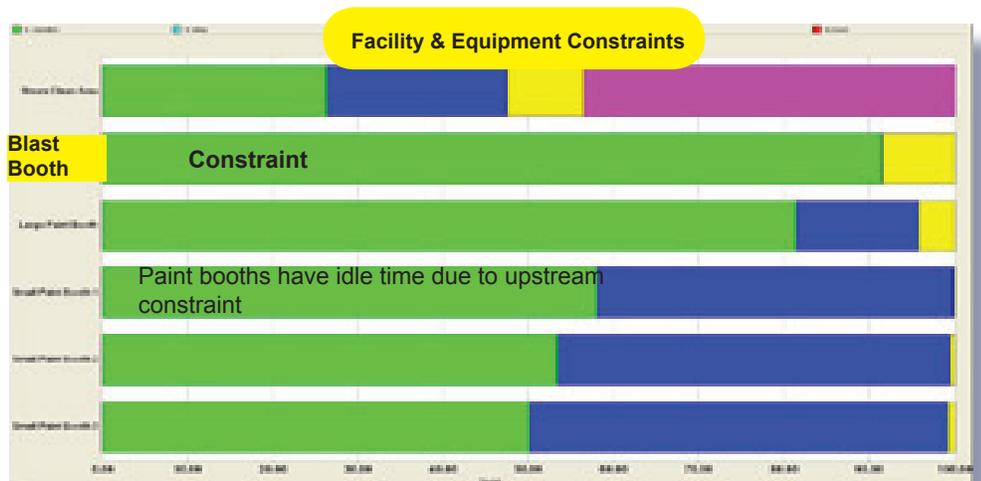
Given the results of identifying the depot's maximum throughput under current state operation, a new model was created to simulate the future state scenario to determine the system's maximum capacity with the current staffing while running two blast booths.

Cumulative Throughput

Throughput short of goal

93

Items

Simulation Time - Days

Facility & Equipment Constraints

Blast Booth **Constraint**

Paint booths have idle time due to upstream constraint

Results

Cumulative Throughput - All Items

107

Looking at the throughput chart on the left, the maximum capacity with two blast booths is actually 107 items per month, an increase of fourteen items, still only 50% of what the depot expects their demand, per month, to be in the future.

Once the blast booth process was no longer the primary constraint, it was discovered that labor was the new constraint of operating a system with two blast booths.

The depot's objectives of determining their maximum capacity with the current staffing, and identifying their primary constraints when running at maximum was discovered.
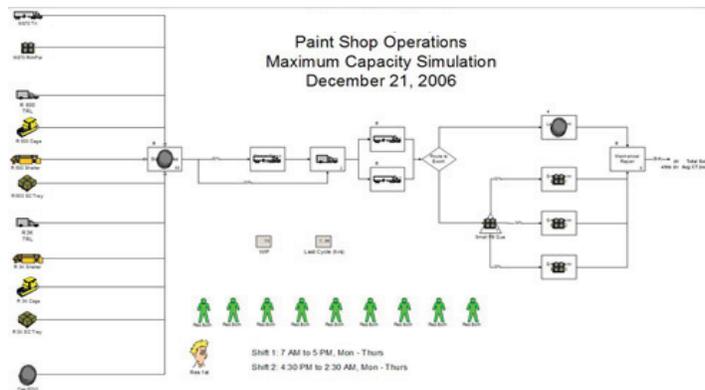
They now know that should an increase in demand become a reality – a possible initiative would be to add an additional blast booth, operated by additional labor staff.

The Labor Utilization Chart shows how labor resources would run over 90% of the time if only an additional blast booth was added to the Paint Shop operation.
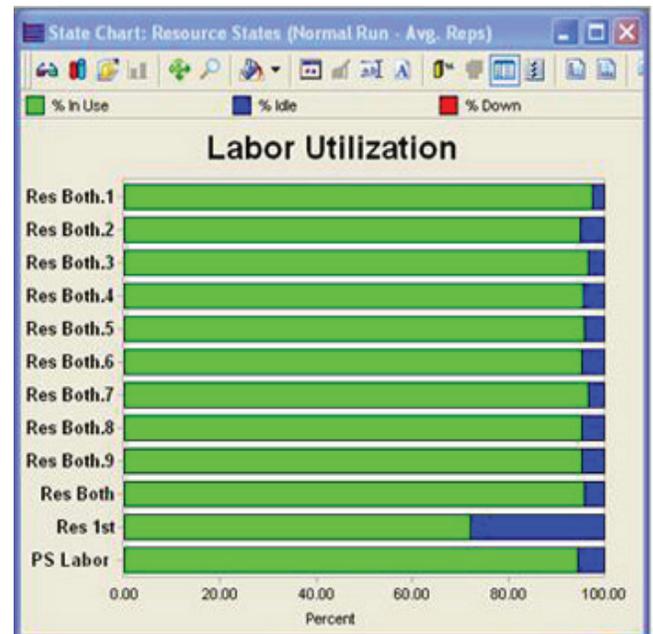
Solution

A predictive analysis solution was developed using ProModel ProcessSimulator technology. This technology is a plug-in to MS Visio which enables the creation of simulation models from value stream maps and flowcharts built in Visio. Given the ProModel ProcessSimulation technology, the depot not only achieved its objectives, but proved that simulation is a valuable technology for process analysis, Lean transformation, and continuous improvement. Using our VAO (Visualize, Analyze, Optimize) project methodology, ProModel's certified in-house consultants combined industry experience and model building expertise with proprietary simulation technology to deliver these turn-key solutions. Through methodology and technology, ProModel assisted the depot in making Better Decisions – Faster.

State Chart: Resource States (Normal Run - Avg. Reps)

■ % In Use   ■ % Idle   ■ % Down

Labor Utilization

Res Both.1
Res Both.2
Res Both.3
Res Both.4
Res Both.5
Res Both.6
Res Both.7
Res Both.8
Res Both.9
Res Both
Res 1st
PS Labor

0.00   20.00   40.00   60.00   80.00   100.00
Percent

Paint Shop Operations
Maximum Capacity Simulation
December 21, 2006

Shift 1: 7 AM to 5 PM, Mon - Thurs
Shift 2: 4:30 PM to 2:30 AM, Mon - Thurs

"Most people spend more time and energy going around problems than in trying to solve them."

— Henry Ford