

New Vaccine Production Process Capacity and Resource Utilization Optimization

Vertical

Manufacturing	Pharmaceutical	Healthcare	Portfolio	Logistics	Financial	Government	Business
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Genre

Case Study	Project Review:	White Paper	Technology Overview
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Client

Large Pharmaceutical Corporation

Situation

A large pharmaceutical organization with which ProModel has a long standing and successful relationship, was developing a drug purification and manufacturing process for a crucial new vaccine. The organization was ramping up for multimillion dollar per month production levels of the vaccine which needed to be manufactured in at least four different ways to fight various strains of a similar disease. Many of the pieces of equipment that would be required to meet the production levels were very expensive. Therefore, it was important for them to determine if they could meet the predicted capacity with their current resources. They also wanted a method for optimizing the process as production requirements increased over time.



According to global planning groups, who provided operations and estimated annual dosage volume, they had produced 12 lots during startup and 62 lots during the first year. They needed to increase the number of lots per year to 110. For this type of product this is a huge jump in production. Manufacturing Engineering had an urgent need to determine how best to meet this goal. Because of the complexity of the process, the number of expensive resources required and the huge rise in production requirements, they knew simulation was the only possible way to accurately predict whether they could meet this quota with current resources and if they could not, what resources would need to be added, at what cost.

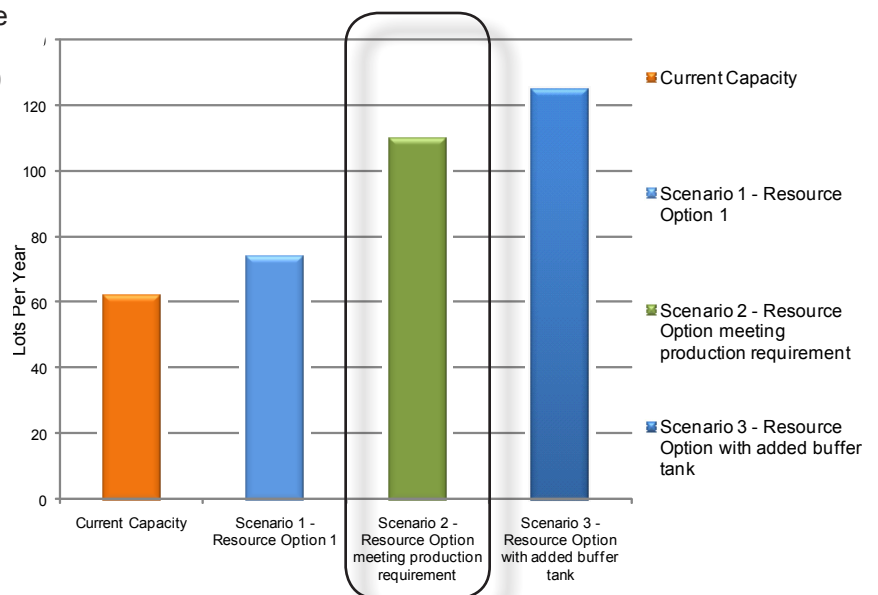
Objectives

- Determine if they could successfully meet manufacturing quota of 110 lots per year of crucial vaccine with current resources
- Identify what capacity limitations are for the current resources and accurately analyze future capacity and resource requirements

Results

Using the Process Simulator model the customer was able to determine that they could successfully make their 110 lots per year quota without purchasing any additional resources. They also identified exactly what the capacity limitations were with their current resources and what resources they needed to purchase to exceed that capacity. They developed a prioritized plan for making the changes they required to optimize the production process, including automation of certain production line steps, and an added buffer tank which is an expensive change.

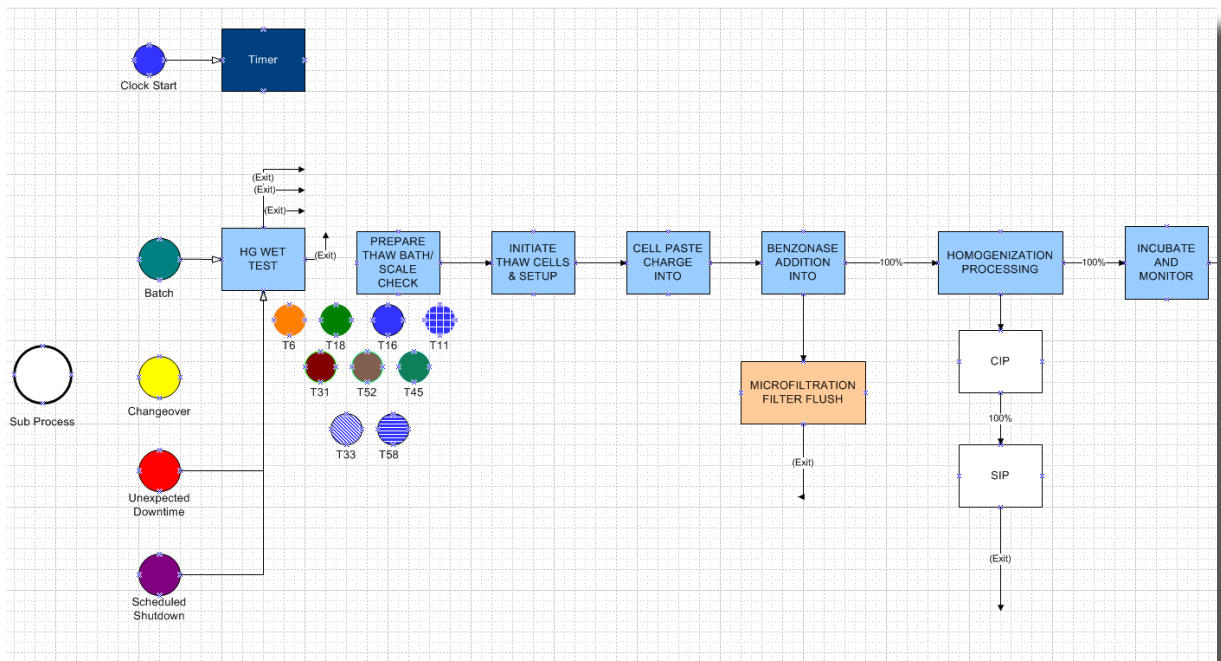
Annual Lot Capacity Based on Resource Configuration



Solution

The customer and ProModel project team developed a Visio based Process Simulator Model that consisted of over 140 activities and 14 subprocesses. With this model they determined that aggressive cycle time reduction (2.5 days per lot) over an actual year's production was possible. They successfully visualized conflicts and delays, assessed resource requirements and levels of utilization and evaluated critical path(s). The team also determined usage of Primary and Secondary Automation Resources, like CIP (Clean In Place) and SIP (Sterilization In Place) skids and Buffer Prep.

The customer increased model use by adding candidate types to show additional conflicts in using shared resources. They also added details to the model to better capture the effects of using these shared resources. They tested the expanded model with different lot batch sizes and revised changeover policies to reduce overall cycle time. The customer also integrated the Process Simulator model into the ProModel Optimization Suite to enhance the level of inputs for complex scenarios and to allow for the use of the SimRunner Optimizer.



Close-up of One of the Fourteen Subprocesses