Using Simulation and Optimization in Complex Manufacturing Operations

Jim Curry, OpStat

Alvaro Brisolla, Prod. Planning & Logistics Manager – Fortune 500 Medical Device company

Disclaims

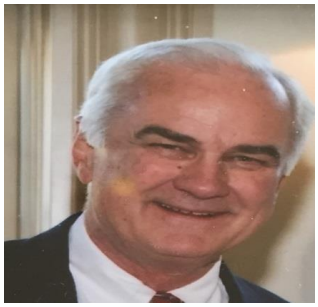
All information shared on this presentation, either written or orally communicated, should be interpreted as my own personal view and it does not necessary represents the views of the presenter's employers

The information shared on this presentation are not meant to be "Best Practices" or definitive statements of how an issue should or will be treated, as every organization is unique and the circumstances at two organizations may yield differing but equally valid responses to the same issue

Nothing shared on this presentation should be interpreted as an advice or counsel, nor legal or consulting advice, and attendees should consult with their own attorneys, tax advisors, etc. before adopting or changing a practice or policy

This presentation should not be interpreted as an endorsement to any vendor, agency, supplier, consultant or third-party partners in any shape or form.

Presenters



Jim Curry is founder of the OpStat Group. He has been a management consultant for large multi-national companies in operations and supply chain improvement for over 20 years, and has implemented supply chain simulation models for pharma, bio, consumer, medical devices, and chemical operations

Alvaro Brisolla is a Senior Manager, Production Planning & Logistics for Ethicon, a Johnson & Johnson subsidiary, responsible for the supply chain of raw materials that support billions of dollars in revenues annually

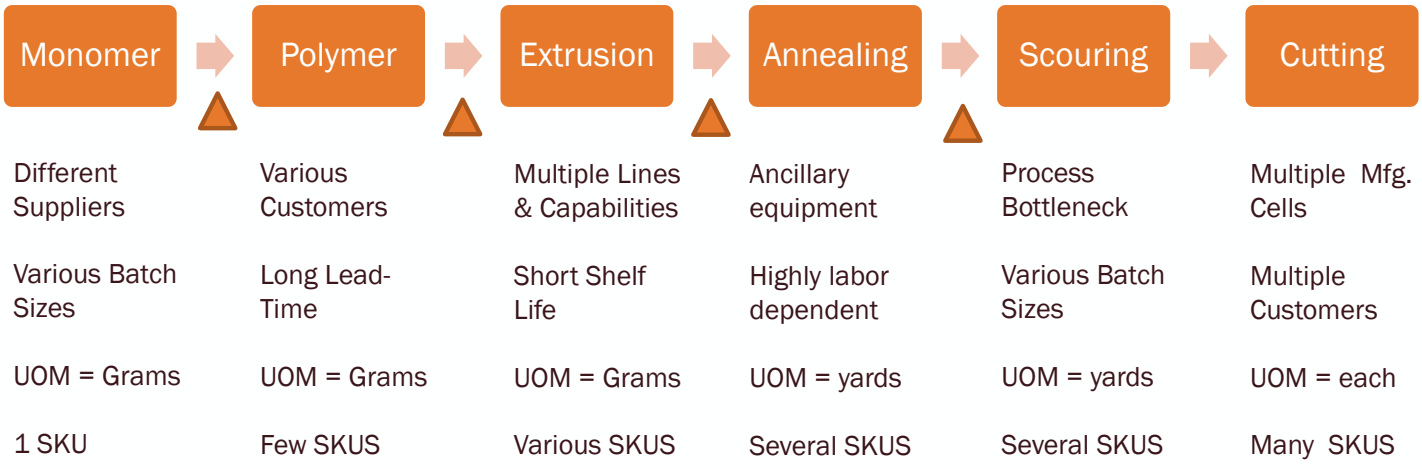
Agenda

- Case for Action – What was the problem to be solved?
  - High level overview of the operation, its complexities and challenges
- Solution Overview – Simulation & Optimization through ExtendSim
  - Opstat Modeling overview
- Lessons Learned – The Journey through multi-level advanced planning
  - Resolved Roadblocks and collateral benefits

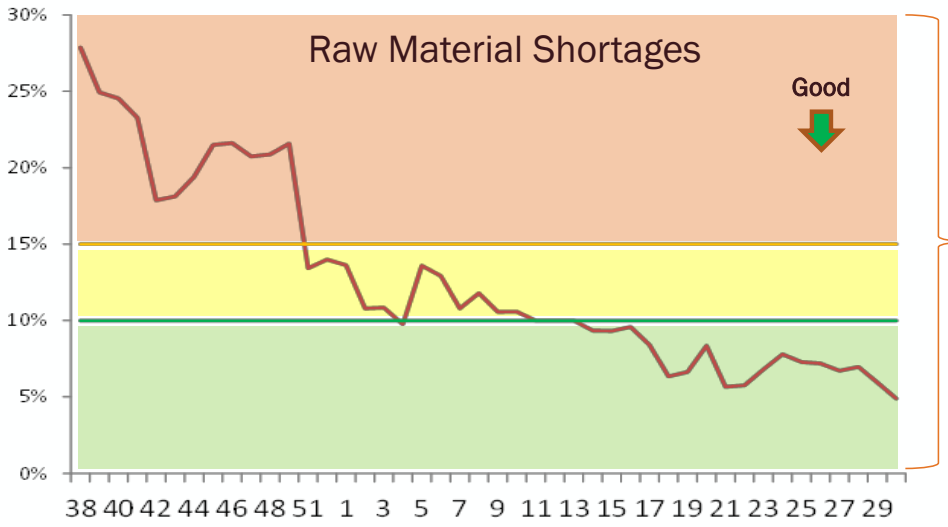
Agenda

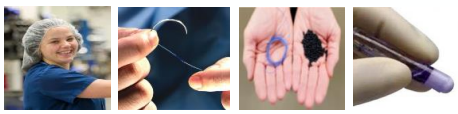
- Case for Action – What was the problem to be solved?
  - High level overview of the operation, its complexities and challenges
- Solution Overview – Simulation & Optimization through ExtendSim
  - Opstat Modeling overview
- Lessons Learned – The Journey through multi-level advanced planning
  - Resolved Roadblocks and collateral benefits

High Level Manufacturing Processing Overview



Customer Service challenges and observed results





1. Process Implementation in Needles and PDS Sutures
2. Capacity Improvements in identified bottlenecks
3. Increased understanding of process interdependencies by the planning team
4. Process Capabilities Improvements
5. “Hand Shake” meetings for Plan Attainment and Aged Work Orders

Agenda

- Case for Action – What was the problem to be solved?
  - High level overview of the operation, its complexities and challenges
- Solution Overview – Simulation & Optimization through ExtendSim
  - Opstat Modeling overview
- Lessons Learned – The Journey through multi-level advanced planning
  - Resolved Roadblocks and collateral benefits

What decision can we drive with simulation?

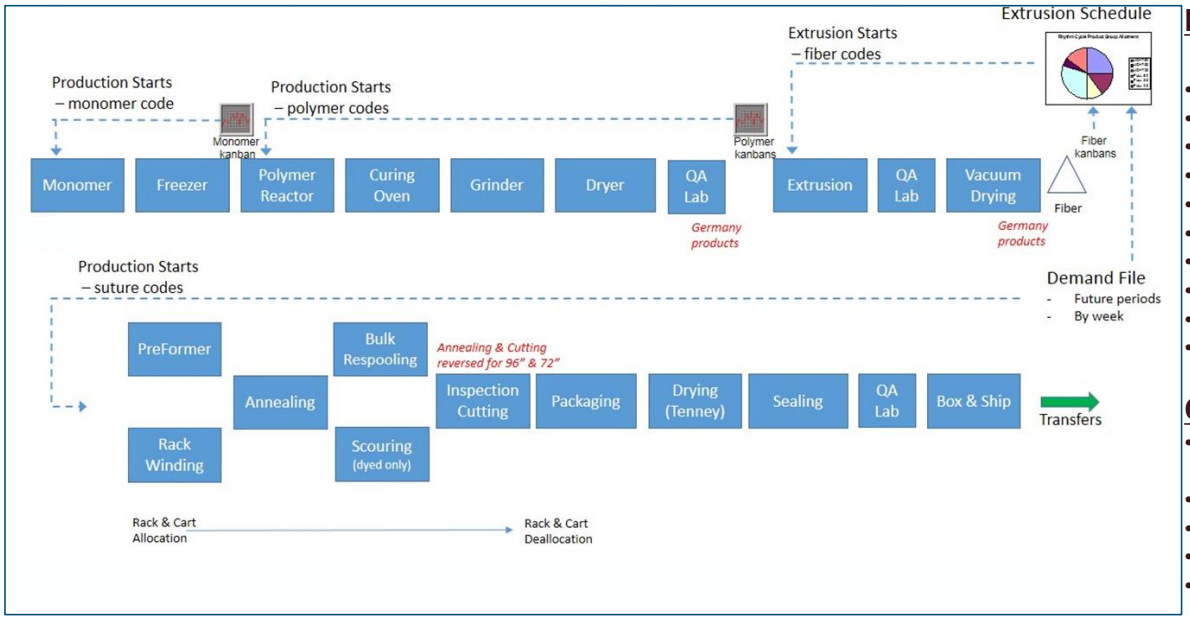
1. How the bottleneck moves?
   Direct throughput impact by adding pockets of capacity in different steps of the manufacturing process

2. The importance of planning parameters
   Direct impact (Time/Throughput or Customer Service) by changing planning parameters such as Yields, OEE, Shift Availability, Batch Sizes, etc.

3. How to best fulfill the demand
   Through an iterative process, modeling of different demand fulfillment scenarios by varying demand timing or target inventory

Where to invest company resources to maximize a given objective

Simulation & Optimization Modeling



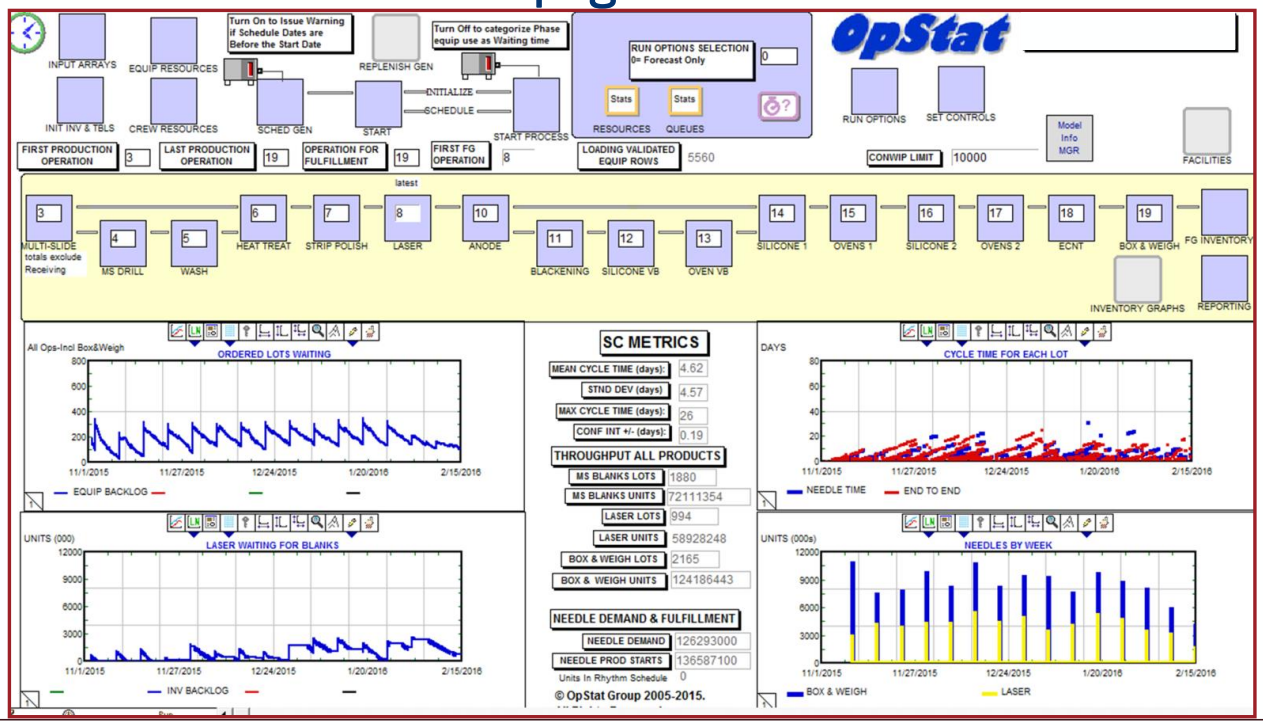
Inputs:

- Demand
- BOM
- Routes
- Processing Times
- Change Over Matrix
- Yields
- Working Schedule
- Product Attributes
- Mfg. Rules
- Rhythm Wheels

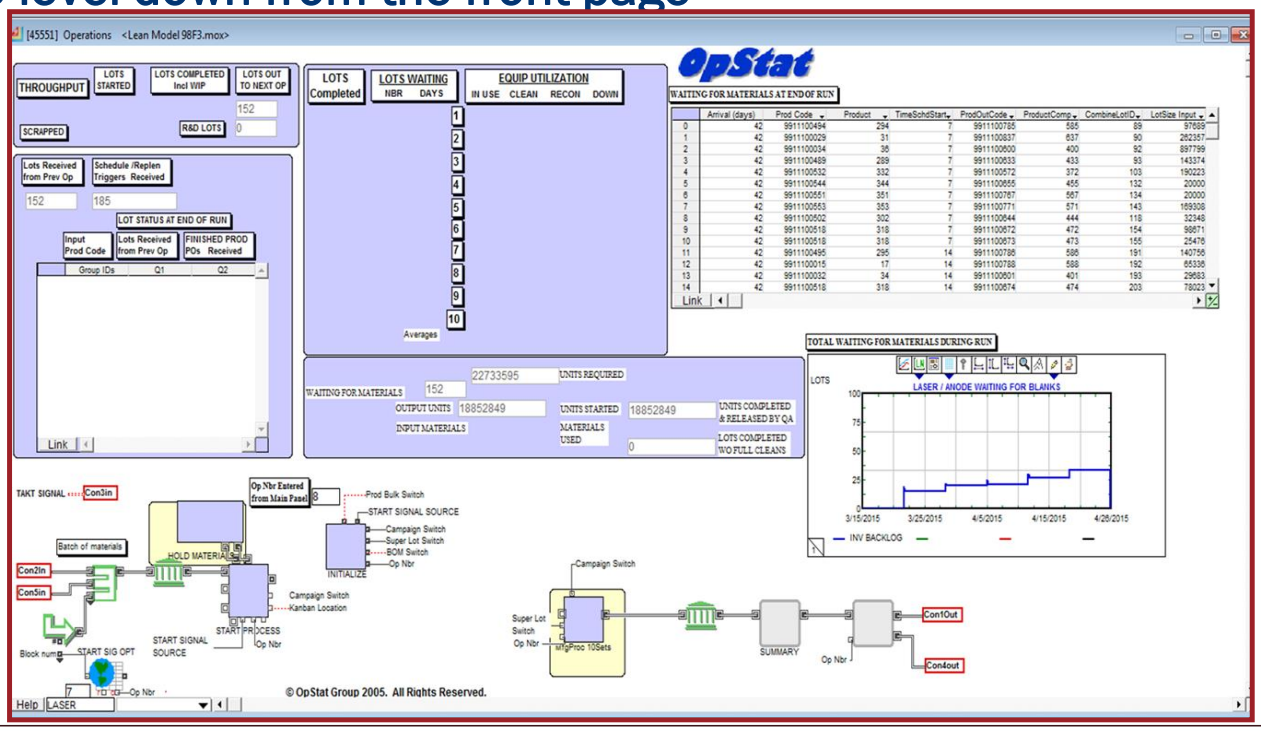
Output:

- Synchronized Schedule on a Calendar format
- Machine Utilization
- Bottleneck views
- Projected Pipeline Inventory
- "All you can think" in terms of reports…

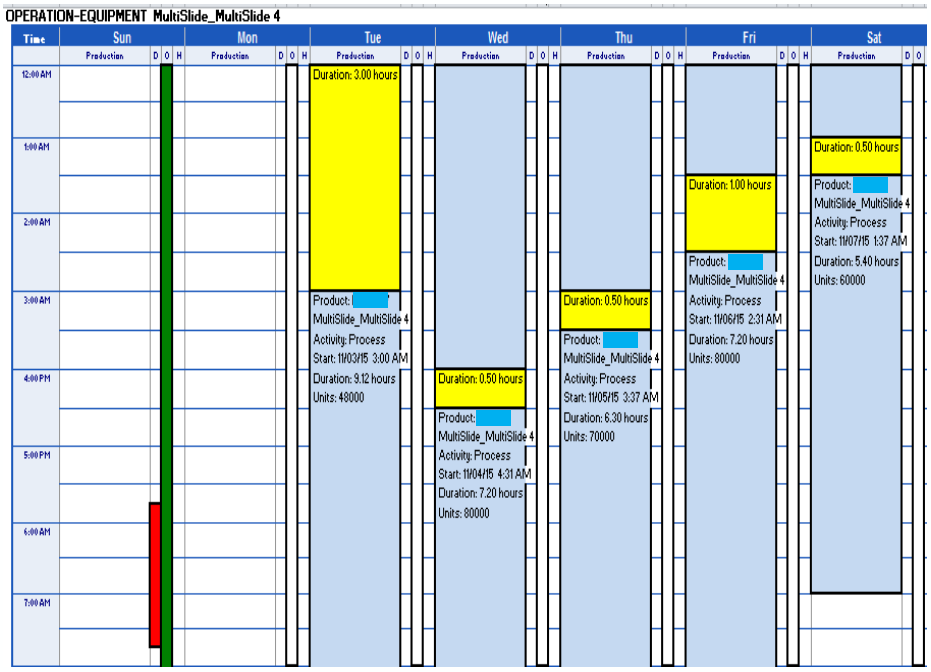
Snapshot of the model front page



One level down from the front page

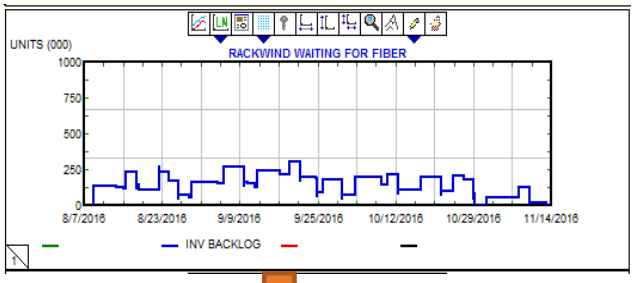


Schedule view output



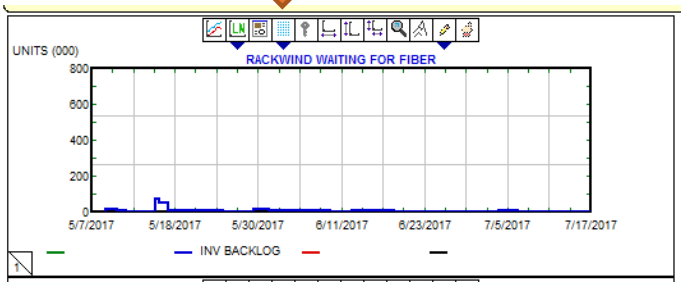
1. Schedule takes into account the best sequencing following a pre-defined rhythm wheel
2. Respect manufacturing best practices, such as MOQ's, Max number of change-Overs, etc.
3. Takes into account a change-over matrix to properly account for the timing of each operations
4. Generate a "by-the-hour" schedule in a calendar format
5. Enables the planning for preventive maintenance

Bottlenecks can move – Equipment and Inventory

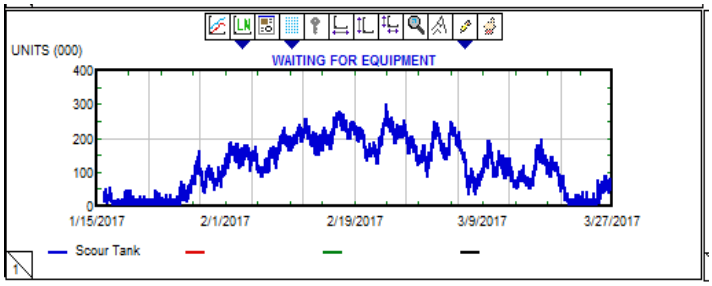


1. Original key issue was availability of Fiber from Extrusion operation constraining the flow.

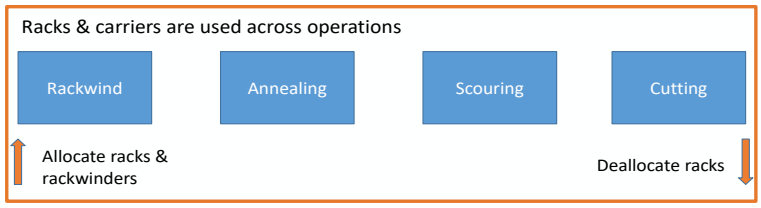
2. Solved the Extrusion problem with scheduling



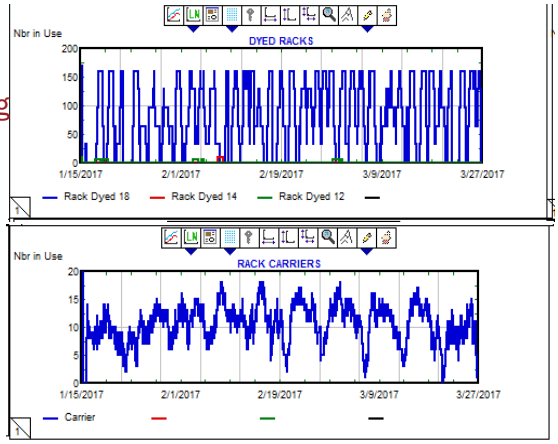
3.The Scouring constraint became clear.



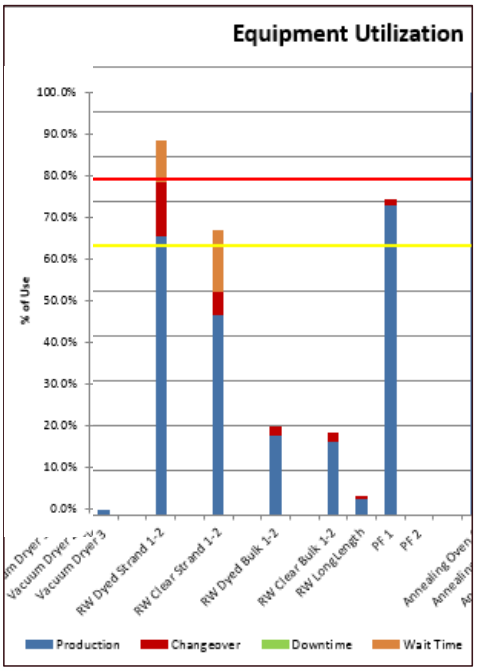
Equipment backlog and utilization tracked



Each piece of equipment is tracked during run



Utilization projections include:
-Production,
-Changes,
-Waiting,
-Downtimes



Agenda

- Case for Action – What was the problem to be solved?
  - High level overview of the operation, its complexities and challenges
- Solution Overview – Simulation & Optimization through ExtendSim
  - Opstat Modeling overview
- Lessons Learned – The Journey through multi-level advanced planning
  - Resolved Roadblocks and collateral benefits

Lessons Learned

1. <u>The model is as good as the quality of the master data loaded into it</u>
   For certain areas, time studies were necessary, while for other, a good estimate was enough

2. <u>Planners significantly increase their understanding of manufacturing complexities</u>
   Manufacturing interdependencies and the trade-off of parameters become extremely clear for planners

3. <u>Don't underestimate the importance of change management</u>
   The models enables clear exposure of operational gaps by comparing actuals vs. plans. Manufacturing must see the value of such initiative and partner during the solution implementation to minimize resistance

APICS2017

Questions?

APICS2017

APICS 2017 Session Evaluation

Visit www.apics.org/Sunday
or
download the APICS2017 app

APICS2017

THANK YOU