Identifying Cost Reduction and Performance Improvement Opportunities Through Simulation

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Agenda

- Client Dynamics
- Project Team Constraints
- Manufacturing process overview
- Process complexities requiring modeling
- Defined key hypotheses for modeling
- Demonstration of the model
- Results of the simulation
- Benefits of using Simio
- Modeling challenges within consulting engagements
- Lessons learned
Client dynamics

- Client was facing higher costs and large amounts of capital tied up as inventory
- Production line was struggling to produce current required volumes and showed signs of being unable to produce targeted levels of projected volume
- Operating expenses were increasing due to constant overtime requirements
- Client desired a way to reduce cost from the process, reduce inventory, but increase the production capacity to eliminate overtime and position the company to attain future production goals
Project team constraints

- New manufacturing environment and industry
- Four week duration from start-to-finish to:
  - Understand the business
  - Identify opportunities to improve the process
  - Learn a new simulation package and model the current process and potential improvements
- An “alpha” version of the Simio software package
Manufacturing process overview

- Brazing Stations (Line 1)
- Fin Presses & Lacing Stations
- Expanders (Line 2)
- Expanders (Line 1)
- Brazing Stations (Line 2)
- Line 1 Assembly
- Line 2 Assembly
Process complexities requiring modeling

- Multiple production schedules are utilized
- Kitting units
- Assembly line moved at the pace of the slowest unit
- Some resources were shared between equipment
- Differing processing times
- Varying hours of operation
Defined key hypotheses for modeling

Hypotheses to improve throughput and reduce WIP:

1. **Operations baseline**: developing a functional model that mimics the process

2. **Schedule Integration**: aligning / streamlining the schedule

3. **Kitting Availability**: increased kitting frequency to reduce WIP on the line and to reduce the frequency of kits being delayed or delivered incomplete

4. **Part Presentation**: improving how parts were kitted to the line to improve the speed of picking / using the part

5. **Workforce reduction**: that fewer people were required than were currently utilized on the line
Demonstration of the model
Results of the simulation

The four modeled improvements resulted in ~40% increase in throughput and ~35% decrease in WIP inventory.

<table>
<thead>
<tr>
<th>Modeled Improvement</th>
<th>Avg. Throughput</th>
<th>Avg. WIP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Volume</td>
<td>Change</td>
</tr>
<tr>
<td>Baseline performance</td>
<td>202</td>
<td>N/A</td>
</tr>
<tr>
<td>Schedule Integration</td>
<td>247</td>
<td>↑ 22%</td>
</tr>
<tr>
<td>Kitting Availability</td>
<td>271</td>
<td>↑ 10%</td>
</tr>
<tr>
<td>Part Presentation</td>
<td>285</td>
<td>↑ 5%</td>
</tr>
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</table>
Benefits of using Simio

- Free-form structure of Simio
- Powerful Standard Library
- Customization with Add-on processes
- “No code” object enhancements
- Capability to define any mathematical KPIs
- Advanced Ribbon” GUI
- Experiments with multi-processor support
- Model within model functionality
- Integrated 3D Animation
Modeling challenges within consulting engagements

The use of simulation in a consulting environment posed several challenges:

- Providing an accurate baseline of the process in order to gain confidence in predictive simulations
- Identifying / modeling improvement initiatives within the shortened window of consulting engagements
- Developing a model that is impenetrable to inquisitive review
Lessons learned

We identified several actions that could increase the speed / probability of acceptance:

- **White-board the model and walk client participants through the approach**
- **Incorporate local programming talent**
- **Utilize formerly constructed client simulation models**
- Complex is not always better
Questions?