Case Study: ASCP and Production Scheduling (PS) Implementation for Process Manufacturing

Prepared by: Mahesh Naalla & Shubhobroto Saha

Meet us @ Booth # 1038
Agenda

➢ Nexinfo introduction
  ✓ Who is Nexinfo
  ✓ Services: What we do?
  ✓ Industry Experience

➢ Oracle Production Scheduling overview
  ✓ Why PS?
  ✓ PS integration with EBS and ASCP
  ✓ Production Scheduling Detailed Process

➢ Case study: Biologics Production Scheduling implementation
  ✓ Legacy scheduling process (manual)
  ✓ Why implement automated scheduling in Biologics?
  ✓ Expectations from scheduling tool
  ✓ Solution provided
  ✓ Challenges faced
  ✓ Formula, Recipe and Routing in OPM to support planning and scheduling processes
  ✓ Achievements
  ✓ PS sample screenshots
Who Is NexInfo?

**SUMMARY**

- Leading provider of Supply Chain Consulting, Security & Compliance Consulting, Product Lifecycle Management solutions, and IT Solution Development & Implementation Services
- Founded in 1999
- Managed by computer industry & supply chain professionals
- Certified ERP Partners
- Clients include emerging companies and Fortune 1000 corporations
- Featured in Gartner reports as a specialized consulting company, 50 Smartest Companies of the Year 2016 by The Silicon Review & 100 Most Promising Oracle Solution Providers 2015 by CIO Review

**PARTNERS:**

- ORACLE
- SAP
- Microsoft
- Kinaxis

**CLIENTS:**

- 3M
- Beckman Coulter
- Jack
- Motorola Mobility
- natus neurology
- Philips
- TOSHIBA

**CORPORATE INFO**

- HQ in Orange County, CA with satellite offices in Orange, CA, Redmond, WA, Chicago, IL, Bridgewater, NJ and Dublin, Ireland
- Operations across the United States and Europe
- Development & Managed Services center in India
Business environment changes make process improvements imperative for organizations. NexInfo experts objectively assess organizational processes and identify opportunities for improvement. We take a one-on-one approach to each client project, inviting team leaders from all impacted areas to get involved, reducing time and resource waste, and creating a collaborative environment.

SOFTWARE IMPLEMENTATIONS
Whether your organization is looking to expand into new markets or respond to beat out global competitors, there are software-related challenges to be faced, including new financial reporting and tax standards, increased compliance and security standards, and foreign customers with unique demands and markets.

MANAGED SERVICES
For companies that prefer to manage their own projects or for smaller projects that require specialized skills, NexInfo provides top-notch augmentation to ensure your success. As a critical component of continued and lean business processes, managed services empowers your operations and business growth when tight budgets, limited resources, and complex technology come into play.
Industry Experience

- High Tech Manufacturing & Distribution
- Life Sciences: Medical Devices & Pharma
- Biotechnology & Clinical Research
- Industrial & Equipment Manufacturing
- Discrete & Process Manufacturing
- Food & Beverages
- Engineering & Construction
- Power, Oil & Gas
- Aerospace & Defense
- Consumer Goods, Retail & Franchise
- Compliance & Security Governance
Oracle Production Scheduling Overview
Why PS?

- Quick turn around to Supply Chain disruptions, before next ASCP plan run.
- Single source of truth and organizational visibility
- Include additional constraints in scheduling process (e.g. material component supply, capacity, allocations etc.)
- To have faster simulation capabilities for analyzing business scenarios (i.e. add maintenance, understand shop floor backlog, understand true capacity)
- To optimize semi-finished inventory & medium term supply variability
- To manage by exceptions but with option of manual overwrite
PS integration with EBS & ASCP

Source ERP

- Items
- Recipes
- Routings
- Resources
- Operations
- Batches/WOs
- Sales Orders
- Purchase Orders
- On hand

Production Scheduling

- Work Order reschedules
- New Work Orders
- Firm Planned Orders

ASCP

- Planned Orders
- Planned Order Demand
- Sales Orders
- Forecast
Production Scheduling Detailed Process

Standalone – No link to ASCP

System

1. Collect data from Ebs/legacy
2. Run PS Plan

Scheduler

3. Download PS snapshot to local client
4. Run PS Solver
5. Review and adjust Production Schedule
6. Repair PS
7. Accept Schedule
8. Approve PS
9. Publish PS to Source
10. Reschedule work order start and end dates

No

Yes
Production Scheduling Detailed Process Cont.

Linked to ASCP

System

1. Collect data from Ebs/legacy
2. Run ASCP Plan linked to PS
3. Run PS snapshot
4. Create new Work Orders
5. Rescheduled work order start and end dates

Planner

1. Review ASCP Plan
2a. Release Planned Orders to create WOs
2b. Review and adjust Schedule
3. Repair Schedule
4. Release Planned Orders to create WOs
5. Run PS Solver
6. Review and adjust Schedule
7. Repair Schedule
8. Accept Schedule
9. Publish firm PLO to ASCP
9a. Approve PS
10. Select WOs to reschedule
11. Publish WOs to Source

Scheduler

1. Download PS snapshot to local client
2. Run PS Solver
3. Review and adjust Schedule
4. Repair Schedule
5. Release Planned Orders to create WOs
6. Accept Schedule
7. Approve PS
8. Select WOs to reschedule
9. Publish firm PLO to ASCP
10. Publish WOs to Source
Legacy Scheduling Process (Manual)

Create Workorder Schedule Process Flow

Planning Team

1. Create MPS
2. Load MPS as demand in monthly buckets
3. ASCP
   - ASCP runs (following morning)
4. ASCP
   - ASCP runs (following morning)
5. Prod Op
   - >20L
6. ASCP
   - Review planned orders
7. ASCP
   - Firm & Release planned orders
8. EBS
   - Generate/Assign lot # for all pending WOS
9. EBS
   - Update resource on WO (as needed)
10. EBS
    - create WOs in EBS

WO & Resource Teams

11. Integrated Schedule
Legacy Scheduling Process (Manual)

Create Integrated Schedule Process Flow

WO Scheduling Team

1. Create WO Schedule
2. Resource Maint. Team
3. Create Maintenance Schedule
4. Excel
5. Maximo
6. Excel
7. Production Floor

- Consolidate, Sort, Review conflicts (5 weeks horizon)
- Adjust WOs per integrated schedule
- Adjust maintenance orders per integrated schedule
- Publish Integrated Schedule
- Prep for Production
Why Implement Automated Scheduling In Biologics?

1. Current scheduling process is manual and require huge effort from Planning, scheduling and resource maintenance groups.

2. Scheduling is done independently for production and maintenance, then merged manually in excel sheets.

3. No visibility to production plan in the system.

4. No integration between EBS and Asset management system (Maximo)

5. Planning & scheduling is less than optimal for current state and will not support increased run rate/cadence without extensive manual efforts applied by personnel across various groups.

6. Current state increases risks for production delays, heightens the compliance risks, and will impact ability to consistently supply commercial product.

7. Manufacturing process is complex
   1. Batch Records: ~75-90 per mfg. run
   2. Duration: ~8-9 weeks from thaw to BDS
   3. Resources: >50 used per run
   4. High frequency of equipment calibration & maintenance activities on mfg. resources.
Expectations From Scheduling Tool

1. Scheduling operations, resources, and capacity to a finite level (to the hour) per defined sequence of operations
2. Automated integration of production scheduling tool and Maximo
3. Plan and Schedule both capacity and materials with constraints (not infinite capacity/materials)
4. Graphical displays (Gantt chart view) – Easy to see constraints/bottlenecks
5. Capability of integrating QC and QA operation steps into production schedule/work orders
6. Relationships Scheduling: Reschedule one = reschedule all (per manufacturing run)
7. Simulations – Running what if scenarios integrating capacity and materials
Solution Provided

- Implemented Oracle Production Scheduling
- Built integration between Maximo and Oracle ASCP for PS to have information of resource downtimes so that it can generate feasible schedule for manufacturing floor
Challenges Faced

• **Resources downtime from external (Maximo) system to PS**
  - Developed WebADI form for user to upload downtime data from Maximo and then run ASCP and PS

• **Changeover in Biologics Industry**
  - In biologics industry it is needed to clean (CIP or SIP or both) the equipment before it is used next even for same item and same operation from different WO.
  - Changeover cannot be setup here as it is same item and same operation.
  - CIP and SIP steps are added as operations into routings so that PS can schedule these cleaning activities before resource is used for next WO.

• **Resource sharing across WO**
  - PS schedules resources such a way that similar operations from all WOs are completed first and then schedule different operation that resource can perform. So, to make sure cleaning activity is performed after resource is utilized we added step dependency with proper min and max delays.
Formula, Recipe and Routing in OPM to Support Planning & Scheduling Processes

- **Routing step dependencies**
  Step dependencies have to be defined between all routing steps.

- **Step material association**
  All the ingredients in formula are assigned to routing steps.

- **Formula ingredient attributes**
  When ingredient is repeated multiple times within the formula, following attributes have to be setup in the same way: Contribute to yield, Contribute to step and Scale Type

- **Step dependency standard delay**
  Have to use positive numbers for standard delay. Oracle EBS allows to use negative standard delay, but PS doesn’t honor negative numbers.

- **Item pegging information**
  Assign all the ingredients in the formula to operations that are in main line and yielding to final product step. This will make sure pegging information is available for all the ingredients in the formula.
### Formula, Recipe and Routing in OPM to Support Planning & Scheduling Processes Cont.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity names or descriptions will not be displayed on PS workbench for both planned orders or work-orders.</td>
<td>Operation description will be displayed on PS workbench for pending orders, WIP orders and planned orders.</td>
</tr>
<tr>
<td>Cannot define delay times between activities. Hence activities cannot be run in parallel it is always start at end of earlier activity.</td>
<td>Step dependencies (Finish to start or start to start) with standard delay and max delays can be specified between operations.</td>
</tr>
<tr>
<td>Activities will always be scheduled alphabetically. This can be avoided by setting up offsets.</td>
<td>Operations will be scheduled based on the way step dependencies are specified.</td>
</tr>
</tbody>
</table>

![Production Pegging](ProductionPegging.png)

*Order Tree*

- **IP-11741:4793**
  - **386256386**
    - **GS-6624 R-1320 Medium Batching:10:100:IP-11741:4793**
    - **GS-6624 R-1330 Medium Batching:30:100:IP-11741:4793**
    - **GS-6624 R-1340/R-1350 Medium Batching:50:100:IP-11741:4793**
    - **120L Medium Batching Operation:15:100:IP-11741:4793**
    - **332 120L Growth Operations:20:100:IP-11741:4793**
    - **500L Medium Batching Operation:35:100:IP-11741:4793**
    - **332 500L Growth Operations:40:100:IP-11741:4793**
    - **2750L Medium Batching Operation:55:100:IP-11741:4793**
    - **332 2750L Growth Operations:60:100:IP-11741:4793**
    - **332 Centrifuge Harvest Operations - 1x2k:70:100:IP-11741:4793**
Achievements

1. Achieved automated scheduling process which requires minimal effort from Planning, scheduling and resource maintenance groups.
2. Full visibility to production plan in the system.
3. Semi automated integration between EBS and Asset management system (Maximo) is established.
4. Planning & scheduling is now more optimal and will support increased run rate / cadence without extensive manual efforts applied by personnel across various groups.
5. This new system reduces opportunities for production delays, compliance risks, and provides ability to consistently supply commercial product.
6. Adhoc maintenance requests can be handled and what is scenarios can be performed.
PS Sample Screenshots
### PS Sample Screenshots Cont.

#### Resource Gantt

<table>
<thead>
<tr>
<th>Resources</th>
<th>December 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>332.C-1500.2</td>
<td>GS-5745 WbSelect SUPRE Column Packing 10 L...</td>
</tr>
<tr>
<td>332.C-1500.3</td>
<td>GS-5664 WbSelect SUPRE Column Packing 10 L... C... C...</td>
</tr>
<tr>
<td>332.C-1560.4</td>
<td>10:10</td>
</tr>
<tr>
<td>332.C-1500.1</td>
<td>10:10(60)</td>
</tr>
<tr>
<td>332.C-1500.2</td>
<td>10:10</td>
</tr>
<tr>
<td>332.CN-1405</td>
<td>10:10</td>
</tr>
<tr>
<td>332.DOWNSTREAM</td>
<td>10:10</td>
</tr>
<tr>
<td>332.DSREVERFEIGH</td>
<td>10:10</td>
</tr>
<tr>
<td>332.LABOR</td>
<td>10:10</td>
</tr>
<tr>
<td>332.HALGENE</td>
<td>10:10</td>
</tr>
<tr>
<td>332.P-80001</td>
<td>10:10</td>
</tr>
<tr>
<td>332.P-8010</td>
<td>10:10</td>
</tr>
<tr>
<td>332.R-1300</td>
<td>10:10</td>
</tr>
<tr>
<td>332.R-1305</td>
<td>10:10</td>
</tr>
<tr>
<td>332.R-1310</td>
<td>10:10</td>
</tr>
<tr>
<td>332.R-1315</td>
<td>10:10</td>
</tr>
<tr>
<td>332.R-1320</td>
<td>10:10</td>
</tr>
<tr>
<td>332.R-1330</td>
<td>10:10</td>
</tr>
<tr>
<td>332.R-1340</td>
<td>10:10</td>
</tr>
<tr>
<td>332.R-1350</td>
<td>10:10</td>
</tr>
</tbody>
</table>

---

April 2-6, 2017 in Las Vegas, NV USA   #C17LV
## Item Graph

<table>
<thead>
<tr>
<th>Items</th>
<th>December 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8 B</td>
</tr>
<tr>
<td>FP-12679</td>
<td>7K</td>
</tr>
<tr>
<td>ICN-144</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11723</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11724</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11725</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11726</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11727</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11730</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11731</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11732</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11733</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11734</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11735</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11736</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11737</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11738</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11739</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11740</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11741</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11742</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11743</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11744</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11745</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11746</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11747</td>
<td>6K</td>
</tr>
<tr>
<td>IP-11748</td>
<td>6K</td>
</tr>
</tbody>
</table>

### Notes

- **FP-12679** has shown a significant increase in activity from 8th to 11th December.
- **IP-11738** also shows a notable rise in activity during the same period.
- Other items have remained relatively stable.
## Operation Gantt

### December 2016

<table>
<thead>
<tr>
<th>All Operations</th>
<th>9 Dec</th>
<th>11 Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 N HCl in WFI</td>
<td>O.N</td>
<td>O.N</td>
</tr>
<tr>
<td>0.1 N HCl in WFI</td>
<td>O.N</td>
<td>O.N</td>
</tr>
<tr>
<td>0.1 M NaCl in WFI</td>
<td>O.N</td>
<td>O.N</td>
</tr>
<tr>
<td>0.1 M NaCl in WFI</td>
<td>O.N</td>
<td>O.N</td>
</tr>
<tr>
<td>0.1 N NaOH in WFI</td>
<td>O.N</td>
<td>O.N</td>
</tr>
<tr>
<td>0.1 N NaOH in WFI</td>
<td>O.N</td>
<td>O.N</td>
</tr>
<tr>
<td>0.1 N Phosphoric Acid in WFI</td>
<td>O.N</td>
<td>O.N</td>
</tr>
<tr>
<td>0.1 M Glycine, pH 8.0 (WFI)</td>
<td>O.N</td>
<td>O.N</td>
</tr>
<tr>
<td>0.1 M Glycine, pH 8.0 (WFI)</td>
<td>O.N</td>
<td>O.N</td>
</tr>
<tr>
<td>0.5 M NaOH in WFI</td>
<td>O.N</td>
<td>O.N</td>
</tr>
<tr>
<td>0.5 M NaOH in WFI</td>
<td>O.N</td>
<td>O.N</td>
</tr>
<tr>
<td>0.5 M Tris Base, pH 10.0</td>
<td>O.N</td>
<td>O.N</td>
</tr>
<tr>
<td>0.5 M Tris Base, pH 10.0</td>
<td>O.N</td>
<td>O.N</td>
</tr>
<tr>
<td>0.5 M Tris Base, pH 10.0</td>
<td>O.N</td>
<td>O.N</td>
</tr>
<tr>
<td>0.5 M Tris Base, pH 10.0</td>
<td>O.N</td>
<td>O.N</td>
</tr>
<tr>
<td>0.5 M Tris Base, pH 10.0</td>
<td>O.N</td>
<td>O.N</td>
</tr>
<tr>
<td>0.5 M Tris Base, pH 10.0</td>
<td>O.N</td>
<td>O.N</td>
</tr>
<tr>
<td>0.5 M Tris Base, pH 10.0</td>
<td>O.N</td>
<td>O.N</td>
</tr>
<tr>
<td>0.5 M Tris Base, pH 10.0</td>
<td>O.N</td>
<td>O.N</td>
</tr>
<tr>
<td>1% Acetone</td>
<td>O.N</td>
<td>O.N</td>
</tr>
</tbody>
</table>

### Screenshots

- 10 mM Sodium Phosphate, 1 M NaCl: 1000 ppm
Please Complete Your Session Evaluation

Evaluate this session in your COLLABORATE app. Pull up this session and tap "Session Evaluation" to complete the survey.

Session ID: 10297
Q&A