Artificial Intelligence Revolution in Manufacturing Operations Management

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What is Artificial Intelligence?

Providing Embedded Decision Aids
How Does AI Apply to Manufacturing Operations Management?

Real-Time Situation Awareness – Orders, Jobs, Materials
  • Data Capture
  • Data Analysis and Awareness
  • Mistake Prevention

Real-Time Scheduling of Operations

Demand Driven Materials Planning

Problem Prediction and Alerting
Why are these Critical for Manufacturing Operations Management?

Most Manufacturing in USA is
- Short Run
- Quick Turn
- Make to Order

Amazon instant delivery model = More Stress
Mistakes are very expensive = Lost Customers
Manufacturing Automation = More Staff & Less Workers
Using AI to Make Data Collection Easy and to Prevent Operational Mistakes
Integrated Real-Time Situation Awareness

View Real-Time Status – anywhere, anytime over Internet

- Customer Orders
- Raw, WIP, Intermediate, Finished Inventory
- Employees, Work Orders, Operations, Equipment
- Materials Traceability and Quality Control Testing
Using AI Rules for Real-Time Scheduling

Rules Dynamically Control the Flow of Work Orders
AI based Scheduling is Advisory

### Work Order Selection

<table>
<thead>
<tr>
<th>Scheduled Date</th>
<th>Importance</th>
<th>WO Number</th>
<th>Step Number</th>
<th>Operation</th>
<th>Machine</th>
<th>Item</th>
<th>Quantity on WO</th>
<th>Quantity Complete</th>
<th>Customer</th>
<th>Order Number</th>
<th>Date Release</th>
<th>Wanted Date</th>
<th>Status</th>
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<tbody>
<tr>
<td>Apr 19 2017</td>
<td>Rush</td>
<td>EIR0001000098</td>
<td>1</td>
<td>Slit Coated Rolls</td>
<td>SGR8</td>
<td>1000</td>
<td>0</td>
<td>BellHawk</td>
<td>Apr 15, 2017</td>
<td>Apr 19, 2017</td>
<td>Ready</td>
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<td>50</td>
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<td>Smithfield Printing</td>
<td>Mar 09, 2017</td>
<td>Apr 25, 2017</td>
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<td>Smithfield Printing</td>
<td>Mar 09, 2017</td>
<td>Apr 24, 2017</td>
<td>Ready</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Specific versus General Knowledge
Demand based Materials Planning

Customer Orders Generate Demand Pull
### Advisory - Demand based Materials Planning

<table>
<thead>
<tr>
<th>Item #</th>
<th>On-Hand</th>
<th>Alloc</th>
<th>On Order</th>
<th>Avail</th>
<th>Needed</th>
<th>Type</th>
<th>Create</th>
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<tr>
<td>P101</td>
<td>220</td>
<td>110</td>
<td>100</td>
<td>10</td>
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<td>Purchased</td>
<td>Work Order</td>
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<td>119</td>
<td>50</td>
<td>Purchased</td>
<td>Work Order</td>
</tr>
</tbody>
</table>

**AI based Decision Tree Computations**
AI based Predictive Alerting - a Paradigm Shift

From after-the-fact Reporting of what went Wrong Yesterday

To Real-Time Alerts when Operational Problems are about to Occur
When will my Order Get Shipped?

Model Based Neural Network Analysis
Does AI Work for Smaller Manufacturers?

<table>
<thead>
<tr>
<th>Manufacturing</th>
<th>Construction</th>
<th>Repair</th>
<th>Metal Fabrication</th>
<th>Converting</th>
</tr>
</thead>
</table>

**YES**

AI Makes Operations Management Much Easier  
Cuts Cost - Reduces Number of Overhead Staff Required  
Increases Sales – Better Customer Satisfaction  
Affordable – Much Easier to Deploy
Next Steps

1. Visit BellHawk Systems in Booth #5647
2. See www.BellHawk.com for Product Details, White Papers and Case Studies
3. Call Us at 508-865-8070 x304 to set up a personal consultation with Dr. Green
4. Send an Email to Peter.Green@BellHawk.com