MRP System Overview

- Firm Orders (known)
- Forecast Demand (uncertain)

1. MPS
2. BOM
3. IRF
4. MRP Program

Output Reports
- Purchase Orders (“planned order releases”)
- Rescheduling Orders (expedite, cancel, etc.)

1. Master Production Schedule

- Calendar of Production
- Specifies planning period when items are needed:

<table>
<thead>
<tr>
<th>Item</th>
<th>Planning Period (in weeks, usually)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>1</td>
</tr>
<tr>
<td>Skateboards</td>
<td>25</td>
</tr>
<tr>
<td>Roller Skates</td>
<td>40</td>
</tr>
</tbody>
</table>

- Any item can be put on the master schedule
- Capacity & resource constraints must be checked
  - e.g., 80 skates may need to split up into, say, 30 & 50

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2. Bill of Materials

- Cookbook of product recipes (in more computer readable form)
  - Lists materials requirements for all products
  - Indent when a new level of product structure tree is reached

- Level 0 1 2 3
  - Skateboard
    - Deck (1)
    - Truck (2)
  - Bolt (4)
  - Wheel (2)
  - Bearings (2)
  - Large Nut (1)
  - Small Nut (4)
  - Grip Tape (1)
  - Roller Skates …

3. Inventory Records File

Big inventory database, with 1 record per item

<table>
<thead>
<tr>
<th>Master Data Segment</th>
<th>Item Name</th>
<th>Description</th>
<th>ABC Class</th>
<th>Lead Time</th>
<th>Lot Size Rule</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ID Code</td>
<td>Level</td>
<td>Pd. 0</td>
<td>Pd. 1</td>
<td>Pd. 2</td>
</tr>
<tr>
<td>Inventory Status</td>
<td></td>
<td></td>
<td>Pd. 3</td>
<td>Pd. 4</td>
<td>Pd. 5</td>
</tr>
<tr>
<td>Segment (MRP Table)</td>
<td></td>
<td></td>
<td>Pd. 6</td>
<td>Pd. 7</td>
<td></td>
</tr>
<tr>
<td>1. GR</td>
<td></td>
<td></td>
<td>Pd. 0</td>
<td>Pd. 1</td>
<td>Pd. 2</td>
</tr>
<tr>
<td>2. SR</td>
<td></td>
<td></td>
<td>Pd. 3</td>
<td>Pd. 4</td>
<td>Pd. 5</td>
</tr>
<tr>
<td>3. OH</td>
<td></td>
<td></td>
<td>Pd. 6</td>
<td>Pd. 7</td>
<td></td>
</tr>
<tr>
<td>4. NR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. OR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. PO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subsidiary Data Segment</th>
<th>Order Details</th>
<th>Item Costs</th>
<th>Vendor Name</th>
<th>Contact</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

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MRP Table Definitions – 1

1. **GR = Gross Requirements**
   - Level 0 items: GR come directly from MPS
   - Level 1+ items: GR derived from parents’ purchase order

2. **SR = Scheduled Receipts**
   - Amount to be received due to prior purchase order
   - Use SR to help meet the current period’s GR

3. **OH = Projected On Hand**
   - Inventory available after using SR & last period’s OH
to meet GR. It may be 0. Complementary with NR.

MRP Table Definitions – 2

4. **NR = Net Requirements**
   - Amount still needed to meet GR after using SR & last period’s OH. It may be 0. Complementary with OH.

5. **OR = Planned Order Receipts**
   - Amount planned to be received so as to meet NR.
   - Eventually, this becomes SR once the PO is released.

6. **PO = Purchase Orders** (or Planned Order Releases)
   - Same as OR but offset (moved back) by item’s lead time
   - Action item: how much & when to order (or assemble)
4. MRP Program

• Demand for top level items drives all else
  – Work down the Product Structure Trees
• Develop MRP tables for all items at a given level before moving to an item at next level
• In each item’s MRP table, work forward in time, taking account of any OH and SR
• Move back in time only when considering an item’s lead time (to get the PO)

Lot Sizing Strategies

• Fixed lot sizes are o.k. for basic components, but not a good idea otherwise
• EX: Component X requires 2 Ys. Each Y requires 4 Zs. Suppose X can only be ordered in lots of 100, and in some period NR of X = 60. Assume no OH for any item.
  ✓ PO of X = 100
  ✓ Order 200 Ys (but how many are really needed?)
  ✓ Order 800 Zs (but how many are really needed?)
• Excess inventory grows as you move down tree
• Most people use LFL = Lot-for-Lot Rule