Optimizing Inventory in Today’s Challenging Environment

Maximo Monday
August 11, 2008
Agenda

- The Value Proposition
  - Case Studies
  - Maximo/DIOS Offering
  - Getting Started
  - Q&A
Inventory levels in most companies are far from optimal due to a number of influencing factors:

- Traditional ABC classification is used rather than more progressive inventory classes.
- Production dictates the lot sizes.
- Demand forecasts are created at too high a level to drive meaningful inventory targets at the stock keeping location.
- Safety stocks are calculated using ordinary techniques.
- Management reactively focuses on shortages.
- Inventory management theories are misinterpreted by setting incorrect parameters.

The typical problem our clients experience is keeping excessive inventory while achieving low availability (Service Levels & Fill Rates).
How companies set inventory policies is evolving from general planning rules to a more sophisticated approach that balances cost and service at each SKU/location across the entire supply chain.

This change is being driven by increases in SKU complexity, pressure to deliver customer service improvements, and shareholder performance through cost controls.

**Top Drivers For Improving Inventory Management**

- **26%** Gain market share through superior service & product availability
- **7%** Customer retention issue, need to improve customer service
- **3%** Support sales growth in new channels and geographies
- **63%** Reduce inventory carrying costs and other related expenses

“Inventory Management is more than just inventory reduction. Companies have started realizing the importance of inventory as a competitive advantage.”

Source: Aberdeen Group
IBM has Developed a Body of Leading Inventory Optimization Practices based on Many Engagements

- **If your operation is not….**
  - Creating and updating demand forecasts for each part/location on a daily or weekly basis using methods that minimize forecast error
  - Measuring and maintaining service levels by asset use/part/location and using those segmentations to drive differentiated inventory policies
  - Calculating the individual safety stock, reorder quantity, and stocking location for each individual part/location on at least a weekly basis
  - Optimizing the trade-offs between stock value and order quantity and frequency
  - Considering inventory carrying costs, order processing costs, and inventory value in setting inventory targets and reorder quantities
  - Measuring replenishment cycle time and variability for each part/location and managing to minimize impact on inventory levels

- **Then**
  - It is highly likely that a rigorous analysis of your supply chain management practices, tools, and policies will result in identification of specific actions that will both reduce inventory investment and increase inventory effectiveness for supporting asset availability and efficiency
An outgrowth of our experience has been development of a tool/solution by IBM Research that incorporates and applies our leading inventory management practices.

What is Dynamic Inventory Optimization Solution (DIOS)?

DIOS identifies inventory reduction opportunities by determining the optimal inventory at the part level. DIOS can consider many factors such as service levels, demand variation, supplier lead-times, batch size, overage and underage levels and can be used to identify opportunities for Quick Hits for reducing Inventory or improving Service levels.

DIOS Optimization Goals

- Optimal **lot size** for each part
- Optimal **safety stock** for each part
- Optimal **classification** of part’s
- Optimal **replenishment policies** for each part class
- Reducing **excess** inventories
- Exceeding **service level** expectations
IBM DIOS Provides Powerful Capabilities that Complement ERP/APS and Minimize Management Risk

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<th>Requirement</th>
<th>DIOS Capability</th>
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| Accurately Forecast Demand           | • Advanced **statistical forecasting** engine capable of automatically picking the optimal algorithm for each SKU  
• Ability to predict **promotion, seasonal** and other periodic effects  
• Proven real-time system forecast performance including data cleansing  
• Ability to optimise forecast time buckets and parameters |
| Minimize Demand and Supply Risk      | • Calculate **optimal safety stock** levels using a range of different safety stock calculation schemes  
• Demand classification (effect of demand variability on safety stock levels)  
• Match forecastability to safety stock requirements |
| Optimize Inventory Replenishment     | • Determine **EOQ and optimal replenishment frequency**  
• Understand the tradeoffs between ordering frequency, inventory and service levels using the **K-curve**  
• Model constraints such as delivery lead times, vendor minimum order quantities as well as price breaks  
• Powerful simulation capabilities to evaluate alternative models |
| Replenish Inventory Using Forecast   | • Ability to **transfer optimised parameters** and forecast to replenishment systems  
• Flexibility to incorporate additional attributes in the analysis and pass these back to replenishment system  
• **Optional** use of the replenishment module |
| Analytical Excellence                | • Powerful **reporting and analytics**, selection and drill down capabilities  
• Numerous graphical representations helping to develop a deeper understanding of your business  
• Reporting flexibility with user definable fields |
Superior Inventory Management Delivers Immediate and Substantial Benefits to the Bottom Line

Typical Inventory Overage/Underage Chart

Example Benefit Calculation
($22.4 Base Inventory)

Net Inventory Reduction (32.5%) $ 7.28M
One time cash savings at 75% salvageable stock $ 5.46M
Carrying Cost = 15% * $7.28M
Annual Carrying Cost Savings $ 1.09M

Total 5-Year Net Present Value of ~ $8,000,000
(discounted at 10%, including cost of software and services)

Note: No value attributed to improved service level
An Overwhelming Majority of IBM DIOS Engagements have Identified Significant Inventory Reduction Potential

- In all these recent **21** projects there was only one client who was previously approaching real optimal inventory levels

**Note:** Annual Usage Value (AUV) = annual value of the goods distributed from the warehouse.
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Large European Utility Company

Improving inventory management in an MRO environment

Challenge

European Utility, a major electricity generator and nuclear power station operator, wanted to implement a wide-ranging Supply Chain Strategy. The company had a target of reducing inventory, as well as reducing the risk of lost revenue due to the unavailability of spare parts. With 369,000 SKUs and inventory increasing at the rate of $4M per year, European Utility needed to quickly identify ways to optimize its inventory levels to support high service levels.

Solution

European Utility selected IBM to install and integrate the Dynamic Inventory Optimization Solution to help improve the management of their inventory. In addition to optimizing the inventory policies, a variety of process, organization and IT improvements were made to sustain the benefits.

The client’s materials and planning manager said "...this tool is the best I’ve seen for my needs."

Benefits

- Contributed to client’s target of reducing inventory by £20M
- Planned reduction on the loss of revenue due to the unavailability of spare parts
- Improved inventory management enabled higher up-time of power station assets through the use of category specific, risk-informed best practices
Global Automotive OEM

Optimizing inventory despite erratic customer demand patterns

**Challenge**

OEM wanted to reorganize and optimize their world-wide spare parts business. The challenge was to model the cost structure of their logistics processes in great detail and to determine optimal replenishment strategies for each part in order to minimize these costs while guaranteeing a prescribed global service level. Calculating safety stock levels for parts with highly sporadic demands was one of the biggest problems to be solved.

**Solution**

Based on the IBM Dynamic Inventory Optimization Solution the IBM team designed and implemented a customer-specific optimization kernel around an SAP APO implementation filling the functional gaps of SAP.

**Benefits**

The solution allows the customer to run its spare parts business at minimum costs while ensuring to keep a target service level. The replenishment planning system implemented provides a high degree of automation and allows the planners to quickly focus on problematic parts. By using one of the various simulation scenarios the customer is able to compare different planning strategies and analyze what-if scenarios efficiently.
The analysis of a large transit authority’s sample data showed an opportunity to reduce inventory while increasing part availability

- Creating a segmented inventory strategy …
- Combined with better demand forecasting …
- And setting of optimal inventory and replenishment policies …

... Is estimated to yield savings* of ... at an average service level of

<table>
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<tr>
<th>For Sample Data Set (172 items, $7.1M)</th>
<th>$0.7M**</th>
<th>99.5%</th>
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<tbody>
<tr>
<td>Extrapolated To Total Inventory (20,000 items, $80.0M)</td>
<td>$9.0M**</td>
<td>99.5%</td>
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* 5-year NPV, excludes costs
** Assumes the entire expected inventory reduction can be realized
*** Assumes a maximum of 20% inventory reduction
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What is “Inventory Optimization with Maximo”

- An “integrated module”
  - Leverage proven Inventory Optimization solution (DIOS)
  - Implement against Maximo data
  - Configure and execute within Maximo

- Extending standard Materials and Procurement Management modules
  - Data source is standard Maximo inventory and procurement data
  - Optimised inventory configuration feeds back into standard Maximo data

- Analysis and “Lights-Out” operation
  - Background (daily) optimization
  - On-line analysis, simulation and configuration
What is Maximo Inventory Optimisation?

- Enhance existing Maximo capabilities for purchasing, inventory, and work management
- IBM DIOS optimisation algorithms and scenario capability
- Provides actual Maximo data for optimisation
- Derive direct value through DIOS optimization (cost reduction etc.) and improved Maximo value realisation (inventory availability to increase asset service levels/utilisation with reduced inventory costs)
1. Batch extraction from Maximo database (JDBC) to flat files (tab delimited) .. Scheduled using Maximo cron task utilities
2. DIOS launched with parameters to read transaction files and generate demand file
3. DIOS launched with a start up Macro to read stock node, transaction files, and generated demand file, and generate the output file (optimised parameters)
4. Inventory optimisation parameters (safety stock and economic order quantity) loaded to Maximo database (JDBC)
Solution Architecture

- Works within IBM Maximo standard framework
  - Cluster compatible
  - Windows server only (for DIOS compatibility)
- Dedicated application server recommended for Inventory Optimisation
- Simple installation process
- Short downtime required (for redeployment of application)
Solution Architecture

- Integrates standard IBM Maximo tables to DIOS
- Leverages standard ‘lean’ file integration with DIOS
- Loads results into new (dedicated) DIOS statistic objects in IBM Maximo
- Optimisation configuration at store level
What is in IBM Maximo?

- **Integration Cron Task (NEW)**
  - Allows configurable scheduling of optimisation
    - Daily, Monthly, Quarterly etc
  - “Lights-Out” execution of IBM DIOS against pre-configured setup
  - Sequential execution of all enabled store optimisation configurations
The Integrated Maximo-DIOS Solution Immediately Addresses Critical Business Challenges and Delivers Substantial Value

- Provides thought leadership with established solutions
  - An integrated, closed-loop planning and execution system
- Directly addresses immediate challenges
  - Sporadic demand and immature processes lead to high forecast error
    - Powerful and patented statistical forecasting techniques, and variable time bucketing capabilities drive improved accuracy for each SKU by recognizing its individual demand characteristics
  - High excess and obsolete inventory levels
    - Optimized inventory policies to establish right inventory levels for each SKU taking into account required service levels, demand plans (planned maintenance) and variability (unplanned events), supply lead time, variability and constraints, and lifecycle stages
  - Budget pressures to reduce inventory investment
    - Budget optimization capability to maximize service levels within a budget constraint, or minimize investment to attain target service levels
  - Limited storage space not sufficient to keep all of the required MRO inventory
    - Cost optimization across multiple storage locations taking into account space constraints and alternate supply modes to ensure right level of availability
- Can deliver significant value in less than a year
  - The integrated planning and execution system uniquely provides a potential inventory reduction opportunity of 30-50% while maintaining service levels at 95%+
  - Can start seeing inventory reduction happen in 3 months with a significant reduction achieved within 12 months
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We have designed a short 4 week blueprint engagement that allows our clients to build the business case and detailed plan for leveraging their inventory investments.

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<tr>
<th>1-2 weeks</th>
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<th>1 week</th>
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<tbody>
<tr>
<td><strong>Kick-off, Interviews &amp; Data Gathering</strong></td>
<td><strong>Initial Process and Data Analysis</strong></td>
<td><strong>Detailed Analysis &amp; Process Review</strong></td>
<td><strong>Recommendations &amp; Management Summary</strong></td>
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- **Project Kickoff**
  - Understand business objectives and characteristics
  - Understand key business and inventory management challenges
    - E.g., growth projections, financial metrics, customer ordering behavior, product lifecycle, supplier characteristics

- **Process Analysis**
  - Understand current demand management, inventory management, logistics and procurement practices, and IT landscape (interviews)
  - Benchmark against industry best practices and identify improvement opportunities
  - Data Analysis (depends on data being available at the start of project)
    - Gather sample inventory data and establish baseline model
    - Evaluate alternate inventory management scenarios, and identify benefit range of improvement (inventory reduction, service level improvement)

- **Recommendations**
  - Create high-level business case and implementation plan that provides rapid time-to-value
  - Create and deliver final executive presentation (deliverable)
  - Document and deliver supporting materials (deliverable)
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Thank You!

Gary J. Cross

Contact Information:

E-mail cross@us.ibm.com

Phone 216-370-5078