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Original title on 712 A/B: Peak Policy for Reparable Parts

If the title was revised please list the original title above and the revised title here:

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WORKING GROUP: 19, 21  
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SPECIAL SESSION 1:  
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Peak Policy for Reparable Parts

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Peak Policy for Reparable Parts

Carol DeZwarte
Tovey Bachman

Presented at 75th MORS Symposium
Agenda

• Peak Policy Background
  – What is Peak Policy?
  – Consumable Item Analyses

• Applying Peak Policy to Reparable Items

• Preliminary Results

• Next Steps
What is Peak Policy?

• New rules for managing sporadic demand items that:
  – Set reorder points based on peak (highest in trailing # periods) demands and price-based multipliers
  – Set order quantities based on item price
  – Change the threshold between replenishment and NSO
  – Forecast *how often* future demands occur instead of *how much* demand occurs

• Above activity threshold, keep baseline policy for frequently-demanded items
What is sporadic demand?
Peak Policy Background

• Developed by LMI to improve service on sporadic demand items
• Enables tradeoffs between wait time, investment, and procurement actions
  – policies tailored to customer goals
  – service level vs. investment curves aid development
• Successful pilot at DLA on initial item population
• Further implementation activities ongoing
Consumable Item Analyses

- Analyses on over 20 consumable item populations show significant potential
  - 25-50% wait time reduction
  - Up to 15% reduction in inventory investment
  - Up to 35% reduction number of orders placed
- Benefits shown at wholesale AND end-user levels of supply chain
- Pilot program showed benefits quickly
  - Long lead times typically delay improvements
Two Policies’ Projected Performance  
Sample Item Population

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<th>% Difference from Baseline</th>
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**Same cost, better performance**  
Better cost, same performance

Baseline data
Unit wait time = 19 days  
Req. wait time = 15 days  
Unit fill rate = 86%  
Req. fill rate = 86%  
# orders = 755/yr  
$ on hand = $4.0M

- Purple: Unit Wait Time (Days)  
- Blue: Req Wait Time (Days)  
- Red: # of Orders Placed  
- Light blue: Time Average of $ Value of On Hand  
- Brown: Unit Fill Rate  
- Light brown: Requisition Fill Rate
Trading Off Fill Time vs. $ On Hand
Sample Item Population

Curve shows Peak policy options

Current policy

Improves both metrics
Near Term Impacts
Sample Item Population

Peak policy:
Same cost, better performance

Baseline Yr 1 orders = 2608
Baseline Yr 1 $ on hand = $17.6M
Agenda

✔ Peak Policy Background
  ✔ What is Peak Policy?
  ✔ Consumable Item Analyses

• Applying Peak Policy to Reparable Items
• Preliminary Results
• Next Steps
Peak Policy for Reparable Items

- Two areas where policy may be applied
  - Setting procurement levels
  - Setting repair levels
- Activity threshold for reparables may be different from consumables
- Several echelons of supply chain can be analyzed
  - Wholesale procurement only
  - Depot-level repairs
  - Local repairs
Pilot Study with Army

- Use depot-level reparables only: 12,152 parts
  - Data collection for field-level reparables too involved for initial studies
- Initial simulations ignore effect of migration, so limited to the 1,372 NSO-2 items
  - Prevent movement across activity threshold between NSO-2 and demand-supported items
- Apply several computational simplifications to make policy emulation easier at early stages
- “Peak” demand considers condemnations only
Simulated Reparable Results

- Unit fill rates improved up to 8% (30% reduction in non-fills)
- More difficult keeping dollars in inventory under control compared to consumable items
  - Item prices much larger than for consumables
- Procurement actions reduced by up to 30%
- Unable to reduce wait times
  - Long lead time items driving high average WTs
- Next: can we address reduce wait times by treating long lead time items differently?
Baseline data
Unit wait time = 24 days
Req. wait time = 17 days
$ on hand = $97.5M
Requisition fill rate = 85%
# orders = 642/yr

Unit Wait Time (Days)
Req Wait Time (Days)
# of Orders Placed
Time Average of $ Value of On Hand
Requisition Fill Rate
Unit Fill Rate
Addressing Long Lead Times

• Tried several variations of scaling factor*ROP for lead time > x
  – ROP = 1.4*PeakROP for LT>12 months,
  – ROP = 2.0*PeakROP for LT>24 months,
  – Otherwise keep PeakROP

• Reduced unit and requisition lead times, but very expensive compared to equivalent Peak policy with no LT adjustments

• Create new peak policy settings to lower cost
LT-Adjusted Peak Policy
Reparable Item Population

Baseline data
Unit wait time = 24 days
Req. wait time = 17 days
$ on hand = $97.5M
Unit fill rate = 79%
Req. fill rate = 85%
# orders = 642/yr
Trade-Off for LT-Adjusted Peak Policy
Reparable Item Population
Challenges

- All services have condemnation vs. rottable demand data available, BUT
  - Some data not recorded in national databases
  - Condemnation data not always collected at NSN level
- Army computations complex with many exceptions
  - Needed to simplify some rules; figure out where duplication was necessary to retain integrity of emulation
- Interaction of repair pipelines and levels with procurement pipelines and levels complex
Next Steps

• Further explore handling of lead times
• Implement migration for Army policy across NSO/demand-supported threshold
• Discuss what policy simplifications should be removed (i.e. make simulation more accurate)
• Expand exploration to other organizations
  – Air Force
  – Navy
  – FAA
• Expand exploration to repair policies
Credits

- AMSAA team
  - Mike Johnson, Eric Wehde, Meyer Kotkin, Tom Hagadorn
Backup – Population Data

- 1372 NSO-2 items
- $69.3M annual demand
  - total demand qty * unit price for each item
    - NSO items treated as if repair is not an option so all demands are modeled as condemnations
    - Treating all demands as repairs instead, annual demand @ 15% repair prices = $10.4M
- Item price percentiles
  - 25% = $713.62
  - 75% = $6963.18
  - 50% = $2079.00
  - 90% = $26399.38
Backup: Computation Simplifications

- Wilson EOQ calculation used for order quantities
- War reserves and below-depot assets excluded
  - Below-depot activity not modeled
- Repair safety level calculation uses same shadow price as procurement safety level
- Shadow prices static