Warehouse & Transportation Management Implementation Best Practices and Recommendations

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Agenda

- Improve the success of implementing the warehouse and transportation management modules in D365 SCM.
- Review testing best practices related to WMS and TMS
- Discuss additional considerations for large & complex implementations.
- Q&A
Configurations and Usability
WMS Best Practices - Usability

- **Do** try to minimize the number of different warehouses at a physical site.
  - A user can only be logged into a single warehouse at a time.
  - Multiple warehouses means a user will need to be logging in and out of warehouses and remembering to check which warehouse they are logged into before starting transactions. (Which leads to more mistakes and frustration)
  - Standard replenishment and stock transfers do not support multiple warehouses. Instead a warehouse movement menu item must be used.
  - Consider the use of Zone Groups, Zones, and Locations as an alternative
- **Do** try to minimize the number of mobile device menu items. Take into consideration what the warehouse worker is going to see and try to minimize the potential for error.
WMS Best Practices – Wave Processing

- **Do** utilize Min/Max Replenishments in conjunction with demand replenishments to improve wave processing time.
  - Demand replenishments are created at runtime during wave processing, whereas Min/Max can be configured as a separate batch job.
  - Note – have the min/max batch job a handful of times throughout the day, not constantly.
- Consider implementing the new replenish to max feature if stocking limits are defined for demand-based replenishment scenarios.
- **Do** utilize multiple wave processing tasks to improve wave processing performance.
  - Additional details can be found in this webinar:
    - [https://learning.eventbuilder.com/event/9262](https://learning.eventbuilder.com/event/9262)
WMS Best Practices - Performance

- **Do** configure the clean-up jobs in the PRODUCTION environment to improve system performance.
WMS Best Practices – Performance

- **Don’t** leave the work creation history logs enabled in the production environment unnecessarily. These should only be used for testing/tracking configuration changes. Once work is being created as expected, disable these parameters.
Do Enable the Deferred Put Framework

- We have seen customers have performance issues on handheld devices when there are a large # of inventory transaction records that need to process. Examples:
  - Mixed item LPs/Containers
  - Batch or Serial Tracked items on LPs/Containers
- To free up handheld devices so users don’t have to wait for large InventTrans record postings, utilize the deferred put framework.
- Currently supported transactions:
  - Put to staging or outbound dock
    - Both LP’s and Containers
  - Inbound put – including the support of audit templates for the gathering of additional product details at time of receipt
  - Inventory movement – coming fall 2020
WMS Best Practices – Latest news and how-to guides

- **Do** join the Dynamics AX WHS TMS feedback community on Yammer!

https://www.yammer.com/dynamicsaxfeedbackprograms/?show_login=true#/threads/inGroup?type=in_group&feedId=2578743
Testing Strategies
Different Types of Testing

- Unit Testing
- Process Testing
- System/Integration Testing
- Performance/Load Testing
- Mock Go-Live
- Regression Testing
Unit Testing

- Lowest level – typically developer or consultant
- Testing single workflow or functionality
- Important to consider edge cases and unexpected input (negative test case)
Microsoft Tools to support unit testing

Azure DevOps
- BPM Integration
- Task Recordings and Task Guides
- Test Suites for Tracking

Acceptance Test Libraries (ATL)

Review the following TechTalk for additional details:
Emulator vs. Warehouse Mobile App

- Test on the warehouse mobile app whenever possible vs. using the built-in emulator.
- There are differences between them.
- Don’t do all your testing on the emulator, then go-live with the mobile app!
Process Testing

- Testing an end-to-end process
- Must be done in T2+ environment
- Utilize real data
System / Integration Testing

- Complete system test – not just warehouse
- Must involve users from customer
- Scenarios should be documented in and tracked in ADO
Performance / Load Testing

- Goal is to simulate go-live usage
- Might involve tooling automation and/or realistic load
- Carefully analyze system and database performance
WMS Performance Testing

- Identify scenarios
- Determine the roles
- Document the expected transaction load and rate
- Generate data to facilitate load testing
- Execute tests at load

Support tools:
- Data management framework
- Data expansion tool
Design a “real” performance test

Current Downtime Scenario Description

If the link between corporate and the warehouse is down for several hours or the host crashes for several hours, the following is a rough description of what would happen at the warehouse in today’s world to recover.

Staffing Following a Downtime Event

When the system has been down for a long time, the focus of the organization is going to be on outbound. Most of the people will be moved to outbound during one of these events. There will be, however, a skeleton crew working on inbound. These people would be bringing in hot PO’s needed for the outbound side of the business. There would be people in receiving, prep, QC, palletization, and putaway.

Some areas would likely be shut down such as Returns and RTV. The bulk of the people would be working in outbound activities such as hemanning, picking, packing, pack audit, pick audit, and replenishment.

Download Orders – 30 Minutes

First, once the connection is back up a large # of orders would be sent to the warehouse (23k) with rush orders in the lead of this downpour. It would take about 30 minutes for Legacy to import these.

Generate Replens [Restock / ReplenNeed]

Once the orders were down at the warehouse, someone would generate the restocks/replenishments for these orders. (Note: Legacy cannot generate Replens while importing orders like NEWWMS can) We estimate that for a 23k order download there would be 25500 units needing to be picked. If the average # of units per case is 15 during a peak outbound day, this would represent approximately 1686 replen cases. It would take Legacy about 15 minutes to generate all of these.

Peak Load Scenarios

Determine each role & transaction rate

<table>
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<tr>
<th>Role</th>
<th>Unit</th>
<th>Peak Day Rate Per Hour</th>
<th>Xaction Time in Stress Test (Secs)</th>
<th>Last # of Users in Stress Test</th>
<th>Act # of Users in Stress Test</th>
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Design a “real” performance test

SHORTCUT FOR PALLETIZATION

To begin this process you will need “check in labels” and “generic L.P.’s.” See Bonnie or Steve, if you do not.

YOU ARE NOW READY TO BEGIN

1. From the “Main Menu” select “Quality Control,” “Script Dialogues,” and then “Script Execution.”
2. Once you’re in “Script Execution” scan your L.P. from your “check in label,” and then “page down.”
3. Read the “instructions” block, then click on “next.”
4. When it asks you to “Scan group number (receiving) or Tote ID (returns)” scan a generic L.P.
5. The next screen will say, “Processing is complete.” Click on “next.”
6. You are now back at the beginning screen. The process will continue until the pallet is full.

Instructions for each role

Initial Unprocessed Active Data

The following paragraphs describe the downloads that need to be prepared to support setting up the Stress Test environment with work for each of the Stress Testers to perform. Some of this work will be partially processed into the system, e.g., a few PO’s will be received in order to create enough work for the gateway operators to work at full rates for the duration of the test.

Purchase Orders (James)
The following download file(s) containing orders need to be built:

PO Set #P0001

PO Set #P0001 will be used to receive all the cartons that we will need during the test for QC. These cartons will actually be received and staged BEFORE the test begins in order to keep everyone busy. We need to receive enough PO’s to process 200+ cartons through QC. The table below describes the SKUs and quantities per PO in PO Set #P0001:

<table>
<thead>
<tr>
<th>PO Set</th>
<th>PO #</th>
<th>SKU</th>
<th>Description</th>
<th>Units/Box</th>
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<td>T SHIRT</td>
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</table>

Unprocessed Work for each role

PO Work for each role
Design a “real” performance test

Stations for each role
Design a “real” performance test

Actual Stress Test

Inbound 1 Trial A Activities

8:50 If everything looks like it is a “Go”, Steve will contact Sue and tell her to tell corporates to downloaded order set #R85 which is used to generate the 116 Replens during this scenario. (Sue)

8:58 Record the sequence # of the last replen task created using the script provided by Julie for doing this. (Sue)

8:58 HQ downloads rush order set #R885

9:00 GO! Steve will announce over the radio that Inbound 1 Trial A has started. The participants should begin performing their jobs. Alternates should observe the roles they may have to play should they be needed in the next Trial. (Steve)

9:00 HQ downloads Order Set N1 containing 30 minutes of regular orders (HQ)

9:01 HQ will download the POs associated with PO Set #P1 (HQ)

9:02 Sue will kick off Region Lead to create Replens from the RICU1B file. (Sue)

9:03 Sue will kick off IMPOR to process the POs that were downloaded. (Sue)

9:15 After 15 minutes each Timer should report their EARLY results on a TIMING DATA ENTRY SHEET to the Timing Lead who will convey it to Steve (Timing Lead)
Mock Go-Live
Execute a Mock Go Live(s)

- Configuration Deployment
- Data Migration / Upgrade
- Certification Testing
- Day in the Life Test
- Final Performance Validation
Get out there!

- Make sure you get out in the warehouse and production floor during final system testing!
- This ensures everything is accurate and ready for go-live
- Things to check for:
  - Location labels applied
  - Inventory in the expected locations
  - Verify LP/box labeling is accurate
  - Wireless network coverage for handheld devices in all areas of the warehouse
Regression Testing
Regression Testing

- Reduce manual testing efforts
- Regression Suite Automation Tool (RSAT)
- Warehouse App Task Validation Tool for Warehouse regression testing

https://aka.ms/ValidationTechTalk
Complex Implementations
Reduce risk as much as possible

- Look for ways to reduce risk
- Pilot warehouses and users vs. “big-bang” go-lives?
- Able to start with a sub-set of business processes?
- Business seasonality?

- When things fail in warehouse management implementations customers don’t get their orders
  - Issues tend to snowball (meaning they begin to grow and compound rapidly)
  - There is not always a quick or easy answer to a problem – sometimes a resolution takes weeks or months
A common mistake – only focusing on the software

- It is not enough to know the software for these implementations, partners need to bring industry knowledge and best practices to these complex implementations.
- Warehouse business processes need to reviewed and optimized against system functionality.
- Don’t be afraid to reach out for additional warehouse consultant expertise if needed.
- Example of what they can bring to an implementation are on the following slides
Train users on exception management

- Don’t just train users how to handle the “happy path” scenarios. Also make sure you have documented and tested:
  - Un-picking
  - What to do with “stuck” work
  - How to move and consolidate loads and shipments
- We are much better at stopping data inconsistencies, but they can still sometimes happen.
- Ensure you have processes in place when an order goes nuclear.
  - Additional details on the “order hospital” concept in following slides
Need for an increased focus on reporting

- Ensure management can monitor the health of the warehouse.
- Everyone should have the ability to see what needs to ship and when throughout the day, and if they are on target to hit these times.
- Labor planning is a requirement that is often missed. Ensure you have a strategy in place to help warehouse supervisors and managers hit their delivery metrics.
  - A few examples in the following slides
- A good starting point is setting up data entities to get work line details to reporting systems
Conduct time studies

- Baseline current warehouse processes
- Track testing times utilizing D365 SCM
- Extrapolate the results to determine if there are potential issues
- Re-design the solution or business processes to hit your target times if needed.

- Don’t wait until go-live to find out the warehouse can’t keep up in D365 SCM!!
Large warehouses need these 4 processes

Common warehouse processes

Pre Receiving → Receiving → Putaway

New SKU Setup → IB VAS → QC → Waving → Replen

Labor Mgt → Flow Mgt

Inventory Control → Packing → Staging → Loading/Shipping

Returns

OB VAS

Order Hospital

"Industrialize"
Flow Control

**Daily Schedule By Store**

**Hourly Schedule By Process**
Company X

Outbound Facility Picking Status

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Minutes to Complete

Lines Remaining

Create Task Data

19601 Picks Remaining

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% Complete: 100.00% 98.40% 96.40% 90.10% 43.90% 29.20% 25.70% 19.20% 18.00% 22.40% 18.50% 21.80% 24.00% 24.10% 21.40% 18.20% 14.30%

Active Zones: 0 2 4 5 9 10 10 10 10 10 10 11 9 12 11

Miles Of Work: 15.8 16.8 24.7 16.2 17.7 21.1 24 22.2 35.3 24.6 18.6 32.5 27.3 14.2 31.9 38.2 49.9

Goal

For Store: 74 Zone: C - No pickers there now and this store is over 50% complete and it will take more than 15 minutes for 1 person to finish this.

For Store: 74 Zone: D - No pickers there now and this store is over 50% complete and it will take more than 15 minutes for 1 person to finish this.
Utilize the new outbound workload visualization tool*

*Available via flighting starting in 10.0.13 (flight name ‘WHSOutboundWorkLoadVisualizationFeature’)*
Example of Labor Management Tools

Daily Associate Productivity Reports

D365 has a rich activity history that you can mine to report associate productivity on various tasks.

Example of spreadsheets that calculated performance against standards and utilization.
### Example of Labor Management Tools

#### Labor Planning Spreadsheet Model

The labor model spreadsheet allows a customer to estimate how many people do they need to have on hand each week and each day.

### Outbound Labor Planning Tool

#### Week of: 11/12/2018

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<tr>
<th>Labor Assumptions</th>
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<tbody>
<tr>
<td>Replen Pulls / Daily Order</td>
<td>0.19 Pulls / Order</td>
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<tr>
<td>Restock</td>
<td>0.19 Pulls / Order</td>
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<tr>
<td>Picking</td>
<td>4.3 Lines / order</td>
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<tr>
<td>Working Mhrs / FTE</td>
<td>7.5 Manhours</td>
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#### Daily Order Volume

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<tr>
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<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
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<td>Forecasted Orders</td>
<td>3234</td>
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#### Daily Labor Needed

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<td>3.2</td>
<td>2.8</td>
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<tr>
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<td>49.0</td>
<td>47.6</td>
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<td>44.6</td>
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<td>86.8</td>
<td>75.9</td>
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What does an Order Hospital do?

- Holds orders that are deemed incomplete by picking
- Verifies the product is not in the pick face
- Requests “hot” replens if necessary
- Tracks those replens until they are in the pick face
- Picks the order complete once the product is there or shorts the order.

- In short – it dedicates resources to fixing problems

If the hospital is working properly the average time to fix a problem order that does NOT need a replen is 30 minutes and if it does need a replen it is an hour.
Questions?
Contact information – aaron.murch@microsoft.com