



Average Stock Calculator

For Microsoft Dynamics NAV

White Paper

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Average Stock Calculator

Standard NAV allows for manual setup at the item or SKU (item/location/variant) level for stocking policies. These policies trigger how to plan for an item based on current supply and demand in the system. There is not a way in standard NAV to use historical data to suggest what these stock levels should be.

Average Stock Calculator was designed to allow user setup at the company, item and or SKU level to have the system calculate average usage, and suggest when and how much to re-order based on the historical average usage.

Average Stock Calculator overall concept

The concept of the Average Stock Calculator is to allow the users to setup:

- What type of item transactions to consider usage
- How many months to look at to calculate usage
- How many months worth of usage to keep in stock
 - Default setup at company level for all items
 - Editable
 - per item
 - per SKU

Standard NAV fields of the Reorder Cycle and Lead time are also used in the calculations, as well as the additional planning fields for Order Multiple, Min and Max order qty, Safety Stock and Safety Lead Time.

Based on the setup, the system calculates a Line Point (LP - when to reorder) and the Average Stock Level (ASL - how much to keep in stock on average).

The concept of ASL is designed to mimic standard NAV functionality of the Maximum Inventory, where Line Point and Reorder Point are interchangeable, and the Maximum Inventory and Average Stock Level are interchangeable, but the calculations of the Line Point and Average Stock Level are maintained by the system based on setups rather than manually entered by the user.

For this reason, we will review the basic NAV logic of the Maximum Inventory policy. See the Supply Planning Technical White Papers for more in-depth information on the standard NAV logic and the other replenishment methods.

Additional notes on a change to standard NAV logic:

- SKU card mandatory for variants/locations
 - In order to calculate or stock at a variant or location level, SKU cards are mandatory
- Suggested order date
 - When standard NAV logic finds the point in time the system is below the Reorder point, the suggestion is to purchase the needed quantity on the first day of the next reorder cycle.
 - A change has been made to this logic to look backwards over the reorder cycle to find the first day the available inventory is below Line Point or Reorder Point and to use this as the purchase order date.
- Warning messages

- In standard NAV the requisition worksheet planning warnings and errors were not visible
- Planning warnings and error messages have been added to assist in highlighting lines to be reviewed by the purchaser
- A new column has also been added to flag when a suggested line will put the item overall availability above stock levels (due to lead times, due dates of existing PO's and end date parameters of the calculation report)
- Planning Flexibility
 - Standard NAV sets all planning flexibility to "unlimited" and the users must manually change purchase orders to "none"
 - A default selection has been added to be used when creating purchase orders for the planning flexibility to allow "none" or "unlimited"
- Lead time calculation
 - Standard NAV allows for the manual setup and entry of lead time per item, or per vendor per item
 - Changes have been made to allow for the either manual entry, or system calculations of lead time based on PO receipts.
 - In addition, lead time can be maintained at the SKU level - item/variant/location level in the item vendor catalog.

Abbreviations

ASL – Average Stock Level

LP – Line Point

LT – Lead Time

RC – Reorder Cycle

RP – Reorder Point

RQ – Reorder Quantity

SS – Safety Stock

SLT – Safety Lead Time

Average Stock Calculator Logic and Setup

Logic Summary

In order for the system to calculate ordering information based on historical demand, there are new fields, tables and setup are required.

New setup allows for selection of how many months to average demand over, as well as the ability to have the system calculate the actual lead time on PO's from a vendor for an item/variant/location combination.

In order to capture detailed usage history, a change to the item posting was made to populate data from the ILE into a new table "Item Usage Ledger Entry". This table is used for the calculations of the average usage.

A new function was created to calculate average usage fields and lead time, as well as populate this information on the item or sku card, and store the summary data in a new table "Item Avg Usage History". This function should be run at the beginning of each month, as it looks backwards to the prior months based on the setup to calculate the usage and store that at the item/sku level and in the table "Item Avg Usage History" for capturing the usage history.

Sku cards will be required to calculate average usage on a per location and or per variant basis. There is nowhere to store per location or variant item controls for the system to use without requiring SKUs. In

addition, location mandatory will be forced when locations are used. This is because the item card will not be populated with ordering controls if skus are used.

Note: If the company is setup to not use locations, ie uses a "blank" locations, but variants are used, the system has no way to capture usage of blank location/blank variant. Users will need to setup a default variant to be used and not use blank if there is a need to stock the item with no variant and variants.

The Requisition worksheet, calculate plan, has been replaced with a new calculate plan. This plan was based on standard NAV plan functionality with modifications to the suggested purchase order date, showing warning messages, and setting the planning flexibility based on the usage setup.

Average Stock Calculator Setup and menus

A new menu has been created for all Usage related forms and reports

For screen shots and information about each setup area, please see the user manual.

Setup fields with logic to be note:

1. Usage calculation – No. of months to use for averaging usage (number field).
 - a. The system will add the usage for the number of months listed here, and then divide by the number of months to get an average monthly usage.
 - b. This is a global setup for all items
2. No. months usage to stock – (number field)
 - a. The system will default this value to the item card, and from the item to the SKU card
 - b. This field is editable at the item level and SKU level to change the number of months to keep in stock per item or item/variant/location.
3. Calculate Lead Time fields
 - a. Boolean field - Calculate Lead time
 - b. If selected, fields are enabled for user setup of how many receipts and the maximum amount of months can be used when calculating lead time for items.
 - c. If this field is selected, the lead time on the item card, sku card and item vendor table are no longer editable as the system will calculate the lead time and not allow manual entry.
 - d. Calculation is made by looking at
 - i. First, the # of receipts allowed
 - ii. Then to the # of months
 - iii. It will use up to the # of receipts allowed, but will not go beyond the # of months to find them.
 - iv. Example, if # receipts is 4, and # months is 2
 1. The system will look for up to the last 4 receipts, but no further back than 2 months
 2. If the system only finds 2 receipts in the last 2 months, it will use 2 receipts to average the lead time.
4. Unusual Usage % - number field

- a. This field is designed to specify the allowable % change in a month as compared to the prior average usage before defining a change as “unusual”
- b. A new form and functions have been developed for reviewing and adjusting unusual usage – see later section for more details on how this field is used.

Transaction Functional area overviews

Sales Order

At the sales transaction level, a boolean field has been added to header and lines for “ignore usage”
If selected in header, it will default to lines but is editable at the line level

**during item posting, lines marked with “ignore usage” = yes will not populate the entries into the usage detail , thus these entries will not be included in the usage calculations

New tables, and forms for usage and adjustments

1. Table and Form “Item Usage Ledger Entries”
 - a. Item postings populate usage entries into this table,
 - i. Populated based on usage setup for types of item entries marked yes to include in usage in Usage setup table (Sales, Consumption, Neg. Adjustments, Pos. Adjustments)
 - ii. Only sales lines where “ignore usage” is marked as false
 - b. Will also check if posting is for item/location/variant if SKU exists
 - i. If SKU exists, will continue,
 - ii. if SKU does not exist will create SKU
 - c. System captures posting date as well as created date
 - i. This is due to the ability to back date and post
 - ii. This will allow visibility to see if usage was physically posted in different month, as the calculate usage may have been run prior to the new usage postings.
 1. Ie run the calculate usage on May 5
 2. May 7 someone posts adjustments or back dates and posts sales into April
 3. When reviewing, the actual usage captured on the usage history will not add up to the actual usage in the detail usage entries
 4. By reviewing the “created date” discrepancies can be found, and the calculate usage can be run to recalculate with the adjustments.
2. Tables and form “Item Usage Journal” to allow for manual adjustments (negative or positive)
3. Table and Form, “Item Avg Usage History”
 - a. Stores the avg and actual usage per item/location/variant per month
 - b. This table is populated during the function calculate usage for the month prior to the users work date.
4. Forms, “Item Use Trendscape” and “SKU Use Trendscape”
 - a. These forms allow an overview look per item/location/variant per time frame of actual usage used to for calculations, or the average usage calculated
 - b. Shows items or item/location/variants as rows,
 - c. Option to show actual or average usage per month as columns
 - d. Has option to show per month/qtr/year
5. From, “Item Unusual Usage”

- a. This form is used to review and adjust when actual item usage for the month is considered unusual usage.
- b. The usage setup allows the % to be used to allow a range for the current month as compared to the average from the prior month
- c. Entries from the "item Avg. Usage History" will be marked as "unusual" during the calculate average usage function when:
 - i. No prior month entry exists to compare usage to
 - ii. Current month usage = 0 and average usages is not zero
 - iii. Current month usage is "negative"
 - i. If actual usage in the current month is outside of the setup % for unusual usage of the average usage of the prior month
 - 1. Ie, usage setup % = 25 %
 - 2. Prior month average usage = 10
 - 1. Current month actual is allows to be 10 +/- 25%
 - a. $10 \pm 2.5 = 7.5 \text{ to } 12.5$
 - b. If usage is below 7.5 or above 12.5 it will be flagged as unusual
- d. Fields on the form exist
 - i. to allow review of prior 6 months actual usage
 - ii. Usage adjustment – number field for manual entry of usage adjustment for the current month
 - iii. Reason code – lookup to reason code list to select reason for usage adjustments
 - iv. Accept Usage – Boolean field to allow check mark to select to allow calculated usage
- e. Accept/Update function
 - i. Once lines are reviewed, accept/update will update lines and create adjusting entries as entered
 - ii. If Usage adjustment is populated,
 - 1. item usage adjustment will be created and populated with the reason code to adjust usage
 - 2. Item Usage History line will be marked as reviewed
 - 3. If Accept Usage is populated, Item Usage History line will be marked as reviewed
- f. Form filters to only show unusual usage lines that are not reviewed
 - i. Once accept/update is carried out,
 - 1. any lines that were adjusted or reviewed are no longer displayed
 - 2. only line remaining to be reviewed are displayed
 - ii. If any adjustments were made, the calculate usage should be processed again to recalculate with the new adjustments.
 - 1. This can be done per item or sku from the item or sku card
 - 2. This can be done from the report in batch for all items/skus or with filters set

Report, calculate usage

A new report has been developed in order to calculate the lead time and usage for items. The report should be run with no filters in order to calculate all items and SKUs. Filtering is available and can be used as needed in order to calculate for specific items, or batches of items. Filters are available at the item card level, including item no, vendor, inv post group etc. Below is more details of each area of the report and logic:

1. Check for locations
 - a. If locations are used,
 - i. Check if a location exists in the location table,
 - ii. If yes, check location mandatory is selected
 1. If no, error and stop process
 2. If yes, continue below
 - iii. If no, continue below
 - b. If locations are not used, continue
2. Calculate lead time
 - a. How it calculates
 - i. Looks to setup for # of receipts and # of months
 - ii. Looks for the last X receipts, but no further back than the X months
 - iii. Looks at posted purch. receipt line, original order date vs. posting date to get # of days lead time
 - iv. Adds lead times, divides by # of receipts found within the # months and # receipts to get the average
 - b. What to calculate
 - i. Looks to item vendor records
 1. Calculates average lead time for that vendor for that item for that variant for that location
 2. Populates the item vendor table lead time field
 - ii. On SKU card or item card
 1. If no vendor selected,
 - a. Populates item based on all vendors for an overall average LT
 - b. Populates SKU based on that item/variant/location for all vendors for an overall LT
 2. If Vendor selected
 - a. Use value from vendor based on the item vendor catalog
 - i. On item, for item/vendor
 - ii. On sku card for item/variant/location/vendor
 - b. If vendor selected, and no item vendor record exists, lead time is populated as zero
 - c. This means that all vendors used on item or sku card should be setup in the item vendor catalog to allow the calculation of the lead time
3. Calculate average usage – will look to
 - a. Work date, to get current month, then subtract one month
 - b. Usage setup to find number of months to add together
 - i. ie, current month is Jan, if 3 mos usage, will look to Dec, Nov, Oct
 - c. Lines in the item usage ledger entry table to be added together, per item and per item/variant/location
 - i. note, usage entries show “negative” number (ie sales and negative adjustments)
 - ii. Add usage entries
 - iii. then divide by no. of mos to get the average usage
 - iv. then multiply by -1 to populate item or SKU card
4. Calculate Line Point (LP) – when to reorder
 - a. $LP = \text{average usage over lead time} + \text{average usage over reorder cycle} + \text{average usage over safety lead time}$

- b. Lead time number to be used in calculation
 - i. Lead time value from the item or sku card
 - ii. As noted above, if vendor selected on item or sku, vendor needs to be setup in item vendor catalog
 - iii. Example of calculation
 - 1. 4 usage per month
 - a. 2wk lead time - 2 usage over lead time
 - b. 1wk safety lead time = 1 usage over safety lead time
 - c. 1mo reorder cycle = 4 usage
 - 2. $LP = 2 + 1 + 4 = 7$
 - 3. Theory is that 7 will be used over the course of reorder cycle and lead times so this is the level when new orders should be placed.
- 5. Average Stock Level – how much to keep in stock to cover usage
 - a. # mos usage to keep x avg usage
 - b. ie usage of $4 \times 3 \text{ mos} = 12$
- 6. Populate Item card, or if SKU's exist, the SKU cards
 - a. Regardless of the ordering policy, fields will be populated for
 - i. Average usage
 - ii. Usage date
 - 1. Date of usage calculation
 - 2. last day of the prior month – ie, current month is Jan, when calculate, use 12/31 as the usage date
 - iii. Lead time (if setup to calculate lead time)
 - b. For Item/SKU with ordering policy of Average Usage, fields will be populated for
 - i. Line Point
 - ii. Average Stock Level
 - c. Note, if use location/variants, data is only populated at the SKU level.
 - i. During usage calculation, system checks for SKU's
 - ii. If a sku does not exist, one is created
- 7. Populate data in new table Item Avg. Usage History for each item and the usage calculated for the prior month.
 - a. Calculate usage can be run as needed to recalculate for usage adjustments
 - b. If an entry already exists for the item/variant/location and date combination, the report will delete or update the existing entry.
 - i. ie if date is Jan, Dec entries are to be created,
 - ii. if an entry already exists for that item/variant/location, then either update the existing line, or delete it and then add the new line.
 - c. If an entry does not exist, the report creates one
 - d. Fields calculated
 - i. Actual Usage for the prior month
 - ii. Average Usage for the prior month
 - iii. Unusual Usage Boolean field

Calculate Plan

The new calculate plan is based on standard NAV calculate plan logic where the Average Usage logic mimics the Maximum Inventory logic. We will review the main principles behind the standard logic before reviewing the changes made and added to the logic. See the Supply Planning Technical White Papers for more in-depth information on the standard NAV logic and the other replenishment methods.

Overall Basic NAV logic

Projected Inventory

Projected Inventory is defined as the quantity of gross inventory, including supply and demand in the past, even if not posted, when the planning process starts (as of “starting date” in the calculate plan batch job). In the future, it becomes a moving projected inventory level maintained by future supply and demand along the timeline. The projected inventory is used to monitor RP and RQ when using the Maximum Inventory. .

Projected Available Inventory

Projected Available Inventory is the part of projected inventory that at any given point in time is available to fulfill demand. This is defined as Inventory + Scheduled Receipts + Planned Receipts - Gross Requirement. Projected Available Inventory is used by the planning to monitor safety stock levels.

Time Buckets

The reorder cycle is the time bucket that is used to monitor if the system is negative, above LP or at or below LP. The system looks at “the day before”, then uses the reorder cycle time frame to find the next day to review. (ie, today is 10/2, reorder cycle is 1 week, system checks availability 10/1, 10/8, 10/15 etc based on the starting and ending dates in the calculate plan)

Calculate Plan Details

The calculate plan uses the starting and ending dates, reorder cycle and lead time in the calculations. The standard calculate plan has been replaced to allow for the use of the new fields ASL and LP, as well as re-validation of the suggested line order date. Below is an overview of the standard and modified logic in the report.

1. Looks first for any negative availability before the “starting” date
 - a. If negative, Creates suggested Req. Worksheet lines with
 - i. due date = negative available date
 - ii. order date based on lead time
 - b. If positive, or once line is created to cover negative, checks projected inventory
2. Looks at Projected inventory (posted inventory and transactions with due dates in the past) as of the day before the start date
 - a. Below LP, then looks over lead time to see if
 - i. item will go negative before lead time
 1. If yes,
 - a. sets due date to negative inventory date
 - b. sets order date based on lead time
 2. if no, compares LP or RP to Max or ASL
 - ii. existing supply
 1. If yes, does supply bring above LP
 - a. yes, no suggested line, moves to next RC

- b. no, deducts supply from suggested qty, then sets order as start date and due date based on LT
 - 2. if no, creates line for max or ASL – available, sets order date as from start and due date based on LT
 - b. Above LP, checks availability at next RC
 - i. If still above LP, moves to next RC within the start/end date of the report and repeats
 - ii. If below LP, goes through same logic as above when below LP, except when calculating purchase order date
 - 1. Standard code would set order date = first date of next reorder cycle
 - 2. Custom code looks backwards in the reorder cycle to find the first day below LP
 - a. Sets Order date = first date of the RC that the availability is below LP
 - b. Due date based on lead time
 - 3. Process and logic repeats for each “time bucket” on the day before the RC starts per the reorder cycle based on the start and end date of the calculate plan.
 - a. Example, item is setup with 1 wk reorder cycle, start date 10/2 end date 11/2
 - b. Will check item availability and create suggestions for 10/1, 10/8, 10/15, 10/22, 10/29
 - c. It will not look at availability on 10/30 – 11/2 as the next RC date would be 11/5 which is after the end date of the plan
 - 4. Supply outside of lead time
 - a. If the system finds projected available inventory is below the LP or RP,
 - i. if there is expected supply within the lead time of the item, this supply is deducted from the suggestion.
 - ii. if the supply is outside of the lead time of the item, the supply is ignored and a new suggestion is created
 - iii. This is because the logic is that a new PO can be placed, and based on the lead time, the new PO can come in within the needed time frame to meet stock levels and demand.
 - b. This means that purchase orders created, then updated with expected receipt dates that are longer than the normal lead time can lead to suggestions to create additional stock orders
 - i. A new column has been added to flag suggested purchase orders that will make the overall item availability above the ASL or Maximum inventory levels
 - ii. In addition, a new report has been designed to allow review of items with projected surplus inventory.
- ** More information on planning warnings and reports is provided below.**

Requisition worksheet and Calculate Plan Avg. Use

In addition to new calculation logic to allow for ASL and LP fields, and the above mentioned recalculation of the suggested PO line Order Date, the report also populates additional fields on the Requisition Worksheets. These additional fields can be used to give an overview of the item or SKU, system setups, supply and demand. This provides the users an easy on screen snap shot to see while reviewing the suggested order lines.

1. A new calculate plan report has been created and replaced on the Req. Worksheet
 - a. See details above about the calculate plan
 - b. The plan calculates for all ordering policies
 - i. The main logic change is the addition of the use of LP and ASL
 - ii. The Reordering policy of Average Stock Calculator mimics Maximum Inventory
 - c. In addition, the report finds the first date inventory is at or below LP or RP to place the order, instead of at the end of the reordering cycle
2. New Fields added
 - a. Standard NAV planning warnings are now shown on the Req. Worksheet
 - b. Overstock Boolean flag column added
 - i. Compares Total Projected Inventory to ASL/MAX
 1. See below for calculation of Total Projected Inventory
 2. If Total Projected > ASL/MAX marks overstock as true
 - ii. This shows that other supply exists to cover demand and stock, but the timing of the supply and demand does not match.
 - iii. These lines should be reviewed to determine if
 1. existing supply is sufficient, or additional purchases are needed
 2. demand dates need to be updated
 3. supply dates need to be expedited
 - c. From item or SKU card
 - i. Reordering policy
 - ii. LP/RP (when to reorder)
 - iii. ASL/MAX (stock level)
 - iv. RQ – Reorder Qty for Fixed Reorder policy
 - d. Total Proj. Avail (calc) of the item or SKU
 1. The overall item availability with no date filters
 2. On hand + all supply – all demand
 3. Plus qty on prior requisition lines
 4. Plus qty on this requisition line
 - e. Calculated fields, as of the “due date” of each suggested line
 - i. Projected Available (calc.)
 1. Uses formula above, with the addition of the “due date” as the availability date
 - ii. Gross Requir. (calc) – all demand
 - iii. Qty On Hand (calc.) – actual on hand inventory
 - iv. Schedule receipts (calc.) – all supply

Reports and Data Reviews

Inventory - Reorder/Surplus

A new report (37014155) has been created to allow review of item status and show if a reorder is needed, or if there is surplus. The report goes through the item cards, and if a SKU exists, it displays the SKU, otherwise, it displays the item. The data is displayed as the “overall” status of the item, regardless of any due date parameters.

1. Columns
 - a. Item/ variant /location

- b. Lead time
 - c. Qty on PO
 - i. This is a separate number in case of surplus to know if the surplus is on PO
 - ii. vs. on Requisition lines (total supply)
 - iii. vs. in stock already (qty on Hand)
 - d. Total Supply
 - i. Includes existing lines in the Requisition worksheet
 - ii. in addition to open PO's
 - e. Qty on Hand
 - f. Total Demand
 - g. Net available – calculation of all supply/demand
 - h. Target stock level
 - i. The target stock level is based on the reordering policy
 - ii. The calculate is as follows per reorder cycle:
 - 1. Fixed = RP + RQ
 - 2. Lot = SS
 - 3. Order is always zero
 - 4. Max = Max
 - 5. ASL = ASL
 - i. Reorder (surplus)
 - i. Is calculated as “target stock level” – “net available”
 - ii. Positive quantities are what needs to be purchased
 - iii. Negative means there is an overall surplus
2. Options tab, Boolean field “show surplus only”
- a. If yes, will only display items where “Reorder (Surplus)” is calculated as a negative number
 - b. If no, displays all items

Create Item Usage Detail Entries

This report allows filtering of items to create Item Usage Detail Entries based on posted Item Ledger Entries. The report allows for filters at the item card level, and the entry of a posting date or range. The report then looks to the Usage Setup to determine types of ILE transactions to be populated into the Item Usage Detail table.

Additional flexibility is built into the report so it can be run multiple times and not duplicate entries. When creating the Item usage ledger entries, it checks, based on the ILE number, to confirm the entry does not already exist, and only creates new entries.

Delete Usage History

Over time, there may be a desire to clean out old Item Usage Ledger entries or Item Average Usage History entries on items or SKUs. A report has been created to allow users to set filters for the item/location/variant, and also select a date to delete all entries that occur on or before the date entered. There is an option to delete History or Usage Ledger entries.