Demand Planning and Replenishment with Absolute Visibility

December
2022

AbsoluteValue

Objectives of Forecasting and Replenishment

- Reduce Inventory Investment
- Improve Customer Service Levels
- Have a Positive Effect on Bottom Line

Two Parts of the Forecast

Based on History (Computer)

- History ‘speaks’ to us
- Most of the forecast items
- Best-fit formula calculation

Factors outside History (People)

- Market knowledge
- A few of the forecast items
- New items, markets, customers

Design Criteria

1. Forecasting and replenishment – working together
2. Dynamic controls – adapt to change
3. Visibility – to calculations
4. The user is in full control to make & maintain:

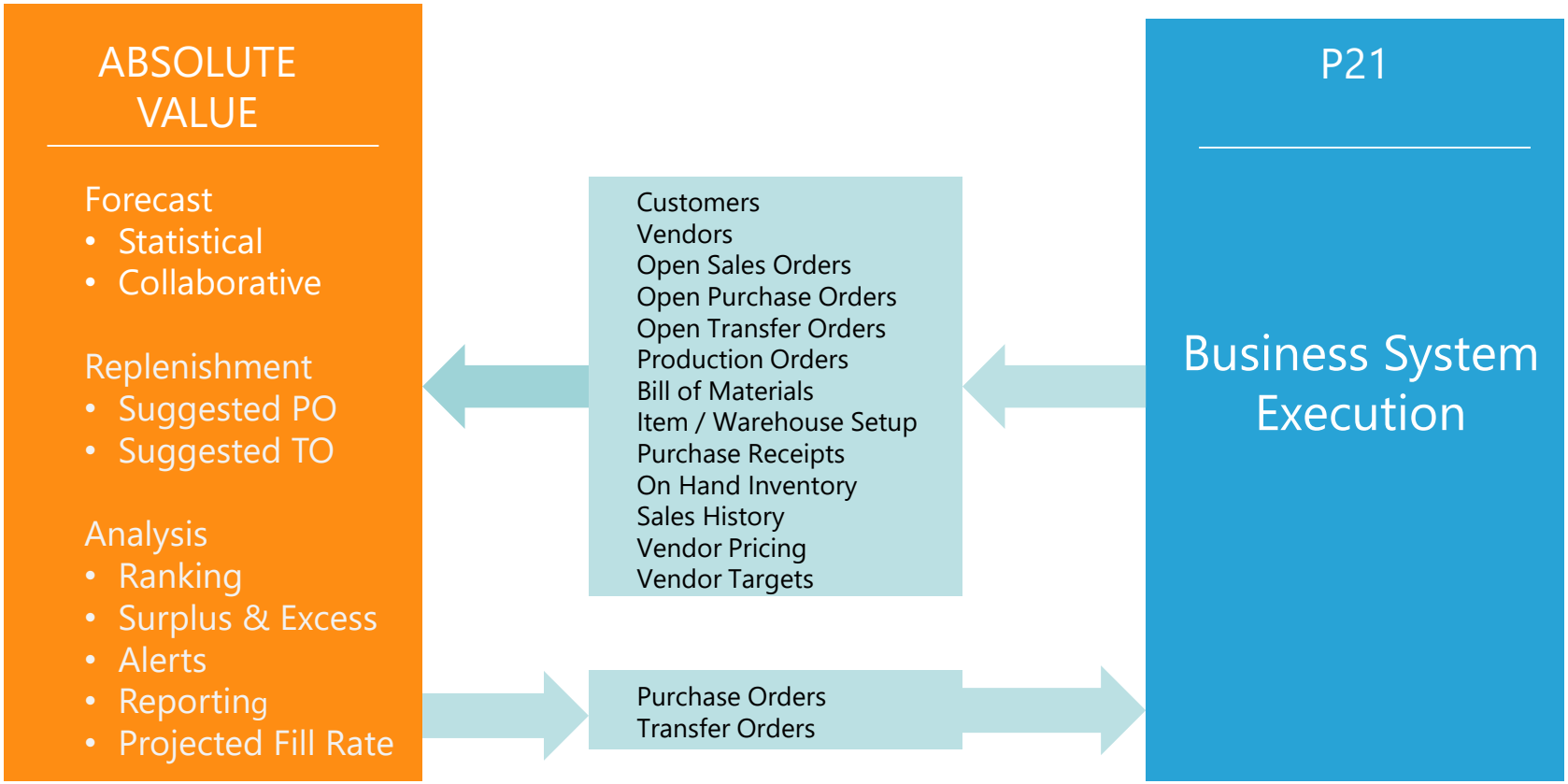
A Quality Demand Plan

Absolute Value Attributes

- Demand forecasting and replenishment
- Based on Jon Schreibfeder's best practices

  www.effectiveinventory.com

Absolute Value Integration



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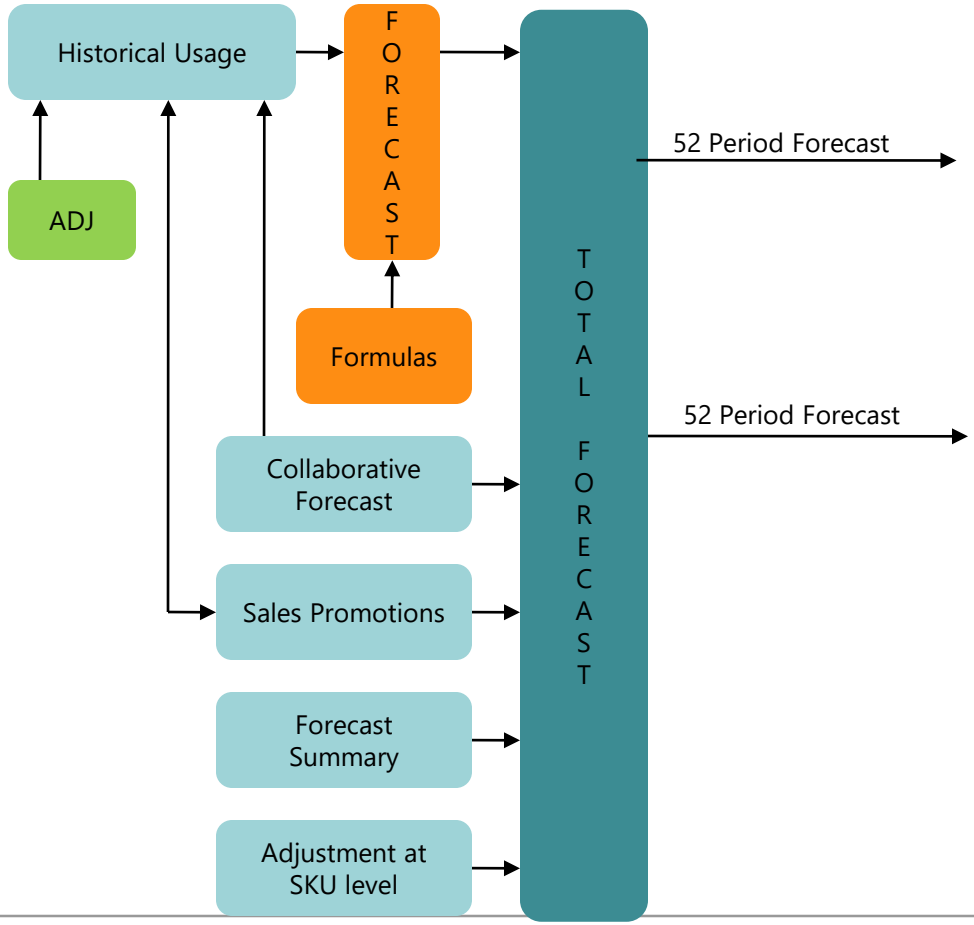
Functional Areas

- Forecasting
  - Best Fit Formula
  - Sporadic Usage Calculations
  - Customer Collaborative
  - Vendor Collaborative
- Kits / Assemblies
- Replenishment
  - Work Flow
  - Suggested Purchase Orders

Forecasting



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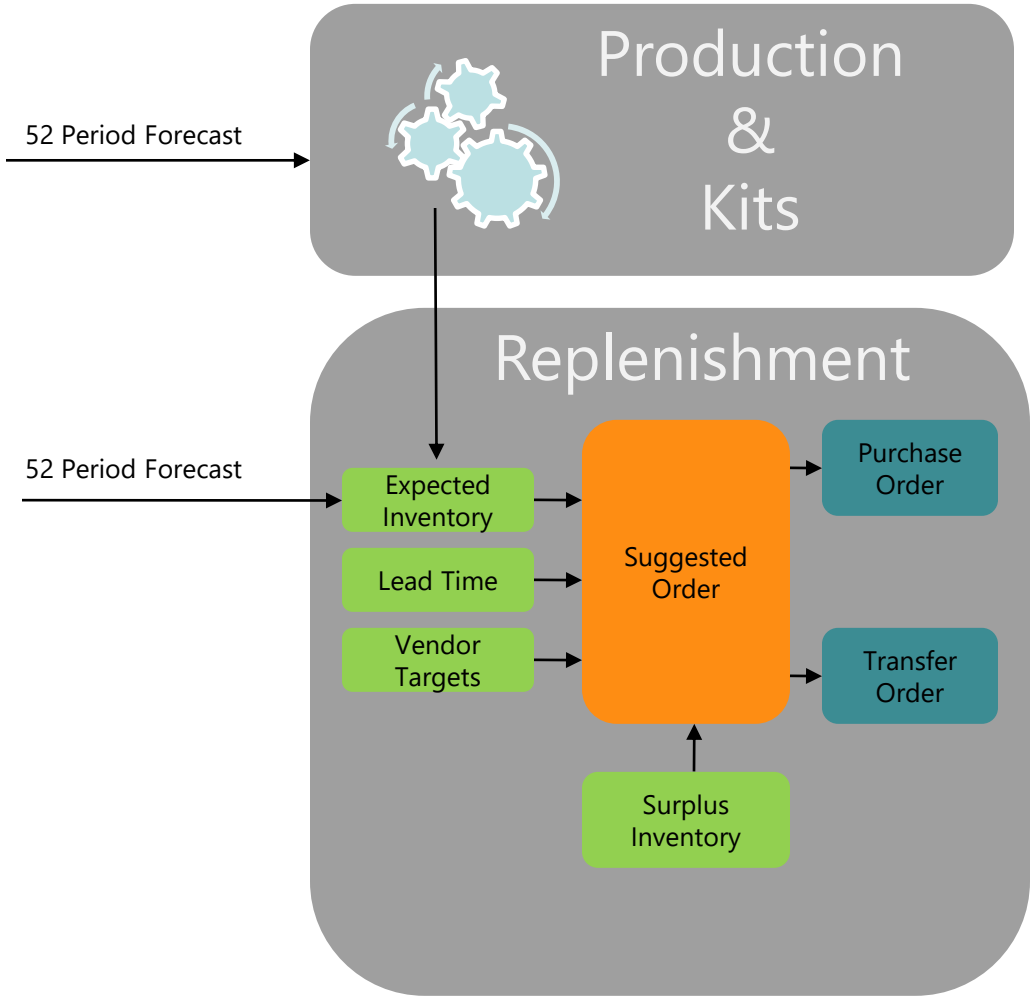
Replenishment



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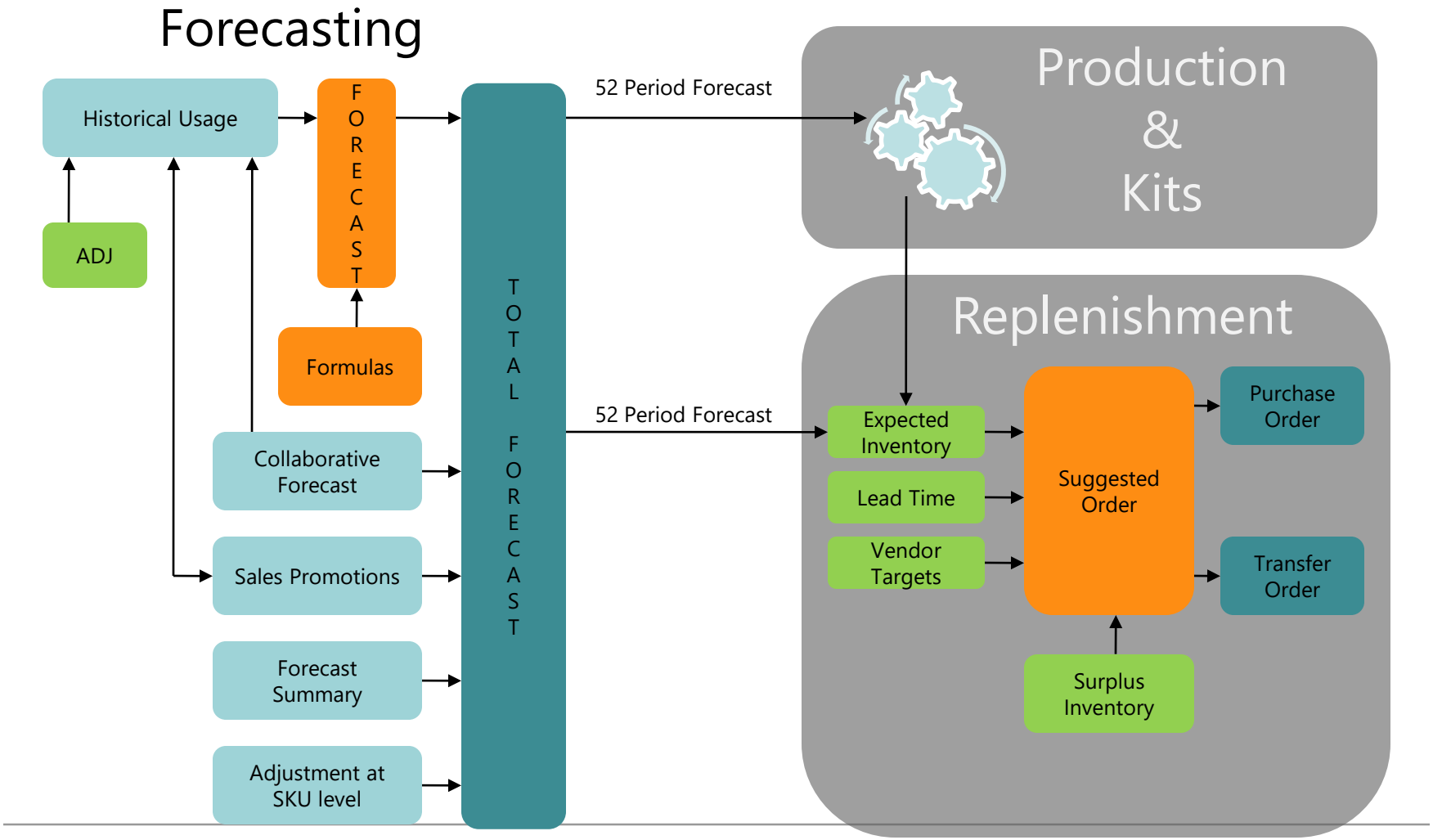
Forecasting and Replenishment



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Planning

- Manage Historical Usage
  - Accuracy, Accuracy, Accuracy
    - Use Demand Date
    - Consider Usage at Warehouse that Should Have Shipped Product
    - Redirect Usage to Replacement Item
    - Clone Usage from an Existing Item to a New Item
    - Exclude One-Time Sales
    - Automatic Smoothing
    - Usage Adjustment
    - Capture Sales Hits – How many times did I have demand?
    - Classify items as A,B,C, D or X

Forecasting Tools

- Best-Fit Formula
  - Forecast past results for a defined number of periods
    - Every Item/Location Combination
    - Every Formula
- System Pre-loaded with 18 formulas
  - Seasonal and non-seasonal
    - Determine difference between Sporadic and highly Seasonal
  - Ability to Add or Modify

Forecasting Tools

- Sporadic Items:
  - Sporadic Rules
  - Check for Seasonality
  - Target Stock Levels
  - Dynamic Controls for Replenishment

- New items:
  - Redirect Historical Usage from previous item
  - Clone Usage from like item

Forecasting Tools

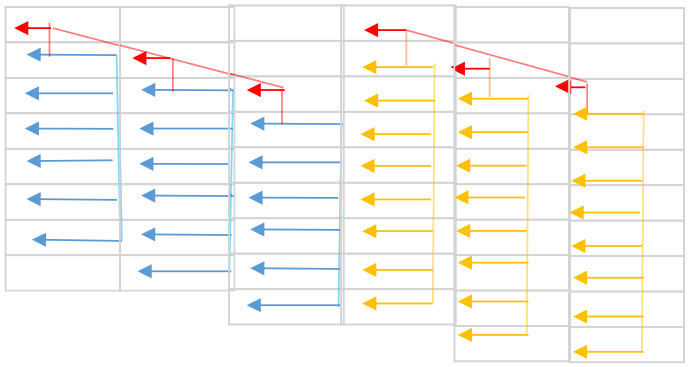
- Choosing a Formula
  - Re-Forecast Past for a User Defined Number of Periods
    - Each Item/Location
    - Each Formula
  - Calculate a Median Error Percent for Each Formula
  - Choose Lowest Median Error Percent as Best Formula
- Forecast Future
  - Use Selected Formula

Example: Re-Forecasting for 3 Periods

Best-Fit Formula

Last Closed Period (LP-1)
LP-2
LP-3
LP-4
LP-5
LP-6
LP-7
LP-8
LP-9
LP-10
LP-11
LP-12
LP-13
LP-14
LP-15
LP-16
LP-17
LP-18
LP-19
LP-20
LP-21
LP-22
LP-23
LP-24

Formula 1 **Formula 2**



Median Error % Median Error %

Choose Best Formula

- Reforecast x Periods
- Establish Error %
- Establish Median Error %
- Choose Formula With Lowest Median Error %

Formula Selection and Usage Months

Code	Formula Group Code	Non Seasonal Trend Per. Limit	Formula Periods	Minimum number of Usage Months
3MO	NS	0	3	8
3MOW/T	NS	3	3	8
60DAY	NS	0	6	11
6MO	NS	0	6	11
6MOW/T	NS	3	6	11
AVE-EH/EL	NS	0	12	17
AVE-EZ	NS	0	12	17
EXPSMTH1	NS	0	5	10
EXPSMTH1W/T	NS	3	5	10
EXPSMTH2	NS	0	3	8
NS-S1	SEASONAL	0	13	18
NS-S2	SEASONAL	0	13	18
SEA1-3	SEASONAL	0	17	22
SEA2/1-0	SEASONAL	0	12	17
SEA2/1-3	SEASONAL	0	17	22
SEA3-0	SEASONAL	0	12	17
SEA3-3	SEASONAL	0	17	22
SEA4/1-3	SEASONAL	0	17	22
Periods To Re-Forecast		**4**	**Plus 1**	
			Plus Formula Periods	

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Auto Smoothing Usage

- Only applies to non-seasonal items
- Uses average of last 12 months to compare
- Months below minimum unusual adjustment % set to average
  - Typically 20%
- Months above maximum unusual adjustment % set to average
  - Typically 200%
- User turns this on and sets %

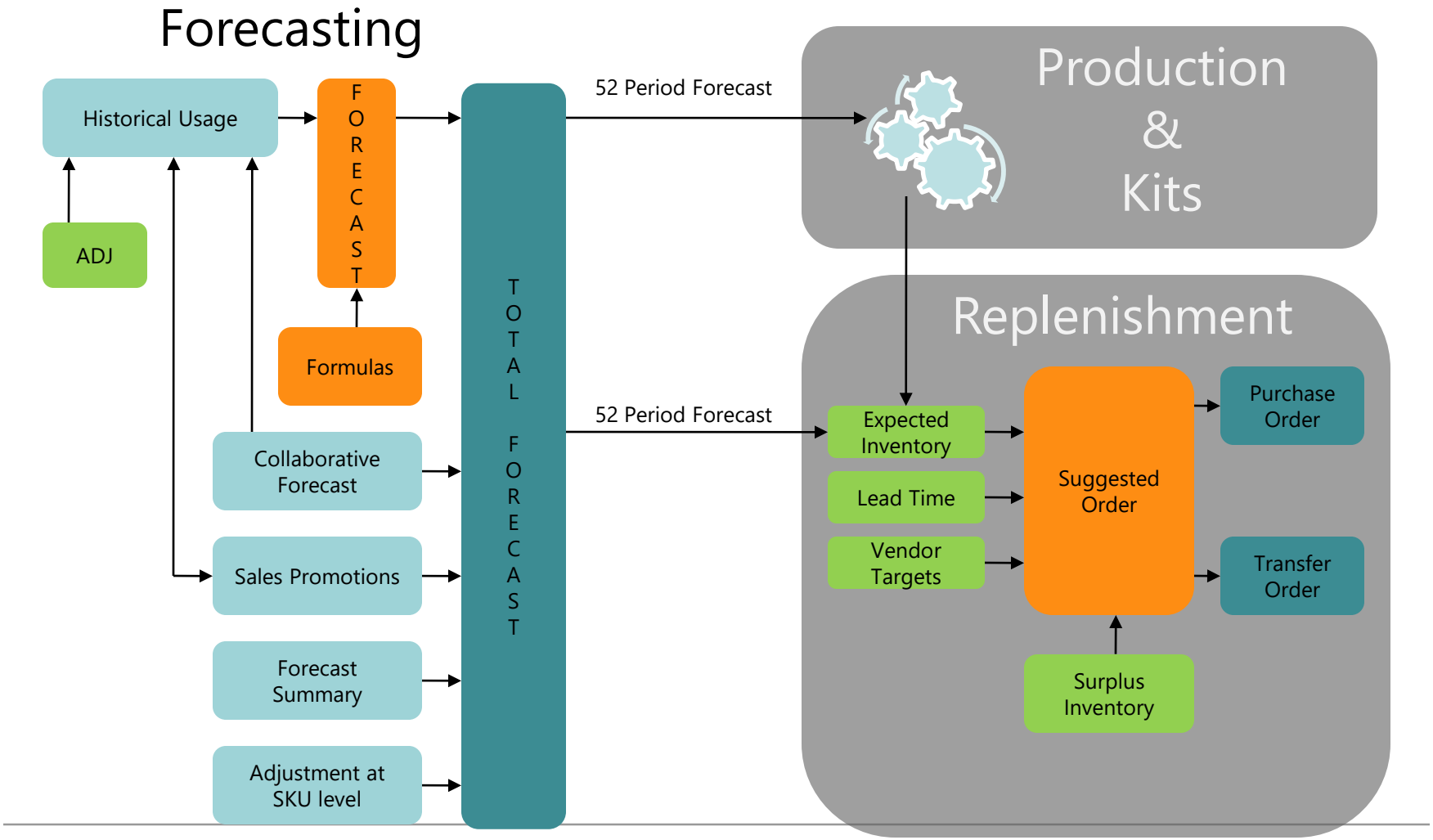
Auto Forecast Adjust

- Month Forecast vs Total Month Customer Orders
  - Increase the forecast up to total customer orders
  - Optionally add X % times the daily forecast time days left in the month
  - Applies to any month (where customer orders exceed forecast)
- Daily usage rate is more than the daily forecast rate
  - Only check after X days into the month
  - Add amount over daily forecast times the number of days into the month
  - Applies only to current month

Forecasting Tools

- Collaborative Forecasting
  - Customer/Item Combination
  - Create Customer Forecast
  - Collaborate With Customer – Adjust
  - Import Forecast from Customer
  - Most Importantly
    - Measure accuracy of Collaborative Forecast
- Promotions
  - Future Period Promotion Plan
  - Item/Warehouse
- Measure Forecast Accuracy

Forecasting and Replenishment



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Procurement Lead Times

- **User Defined Average Lead Time Calculation**
  - Use Receipts from X Periods
  - Use X Receipts
  - Exclude Receipts
  - Typical - select the last 6 receipts from the last 6 periods, drop the high & low, & average the remaining 4 periods
- **Frozen Lead Time**
  - User Specified Frozen Lead Time by Item
  - Expire Date to Revert Back to Average Lead Time
- **Lead Time by Vendor**
- **System Default Lead Time**

Procurement Lead Time Hierarchy

- **Frozen lead time on procurement unit**
- **Vendor Buying Calendar**
- **Average lead time ***
- **Imported lead time on procurement unit**
- **Inventory Management Setup default lead time**

- ***Upper limit max lead time days on Inv. Mgmnt Setup/Vendor tab**

Net Time Phased Expected Inventory

+ Inventory On Hand
+ Quantity on Purchase Orders
+ Quantity on Transfers In
+ Quantity on Customer Returns
+ Quantity on Planned Production Order (Finished Goods)

- Quantity on Sales Order
- Quantity on Transfers Out
- Quantity on Vendor Returns
- Quantity on Service Orders
- Quantity on Component Lines

Procurement -Should I Replenish & How Much?

- **Stock Items**
- Target Stock Level
- Lead Time Horizon (Lead Time + Review Cycle + Safety Stock Days)
  - Reorder Quantity is Determined by Expected Inventory on Lead Time Horizon Date (Order Negative Expected Inventory Quantity)
- **Non-stock items**
  - Demand is customer orders only

- EOQ/Min./Mult. - Determines Re-order Quantity

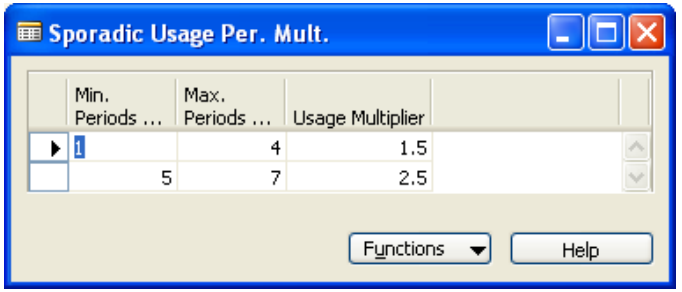
Target Stock Level (Sporadic Inventory)

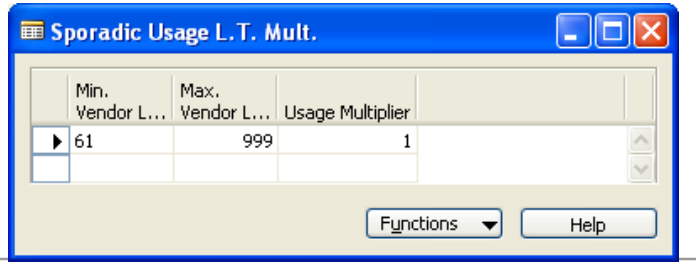
Periods of Average Usage _____

Periods	1	2	3	4	5	6	7	8	9	10	11	12
Usage	10	0	0	0	8	0	0	0	0	6	0	0

Average Usage = 24 / 3 = 8
Target Stock Level = Ave * Usage Multiplier
Target Stock Level = 8 * 1.5 = 12

Another Average Usage (8) would be Added if Lead Time were greater than 60 Days
Expected Inventory = 8
Order Quantity = 12 – 8 = 4
Above Parameters are User Defined





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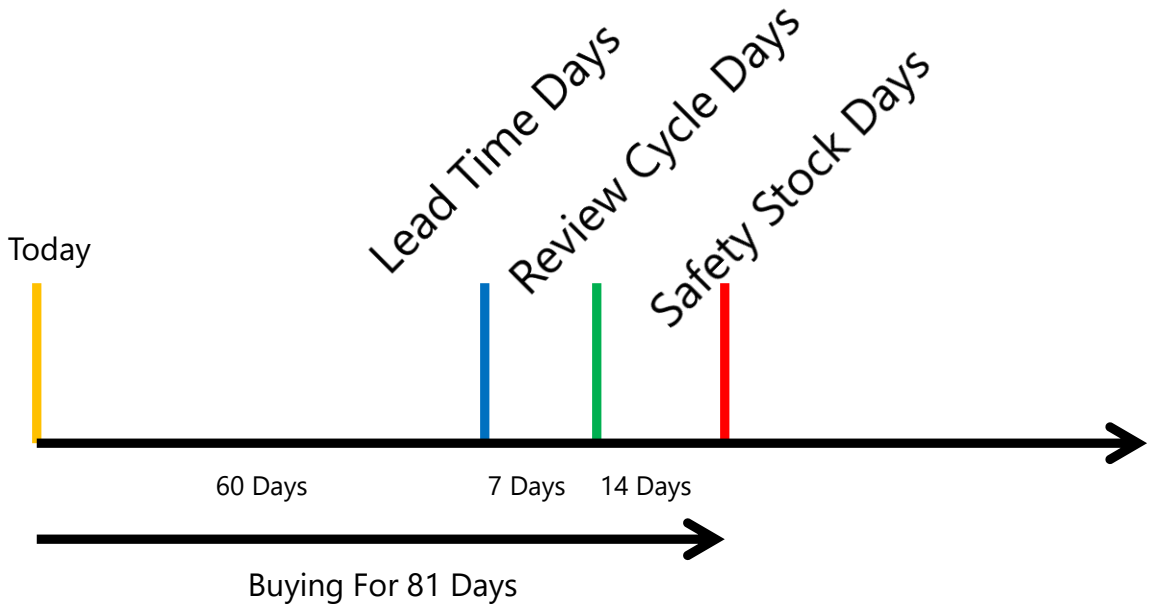
Lead Time Horizon

- Lead Time Horizon (Lead Time + Review Cycle) + Safety Stock Days
- Example
  - Lead Time 48 Days
  - Review Cycle 7 Days
  - Safety Stock 15 Days
  - Total days 48 + 7 + 15 = 70 Days
  - Lead Time Horizon Oct 26th + 70 Days = Jan 4th
  - Time Phased Expected Inventory
    - 100 Inventory + 50 PO – 250 Forecast = -100
  - Recommended Purchase 100

Long/Variable Lead Times

- Lead Time Horizon Calculation
  = Lead Time + Review Cycle +Safety Stock



Order Quantity

- Suggested Order includes minimum quantity needed
- Automatic amendment of order quantity (PUC)
  - Minimum purchase quantity
  - Multiple purchase quantity
  - EOQ (Economic Order Quantity)

EOQ – Economic Order Quantity

$$\sqrt{\frac{24 * \text{COST OF ORDERING (R)} * \text{AVERAGE USAGE}}{\text{COST OF CARRYING INVENTORY (K)} * \text{UNIT COST}}}$$

Avg. Mo. Usage	240
R Cost	$5.00
K Cost	20%
Unit Cost	$1.50

EOQ Quantity = 309.83 or 310

Avg. Mo. Usage	240
R Cost	$5.00
K Cost	20%
Unit Cost	$5.50

EOQ Quantity = 161.81 or 162

Result – The Suggested Order

- Recommended Replenishment Quantities
- Drill Down to all Information from Suggested Order Line
  - Detailed Forecast
  - Historical Usage Patterns
  - Formulas and Data that caused Recommended Replenishment
  - Surplus Inventory and Where
  - Time Phased Expected Inventory
  - Order Statistics
    - Comparison to Vendor Targets

Replenishment

- Visibility, Visibility, Visibility
  - How was the buying decision made
  - What factors influenced the buying decision?
  - View
    - Forecast
    - Sales Demand
    - On-Hand Inventory
    - Calculation Lines
    - Expected Receipts
    - Kit/Assembly Component Demand
    - Time-Phased Net Expected Inventory
  - Quantity Break Pricing
    - Economic Order Quantity (EOQ)
  - Surplus in other warehouses

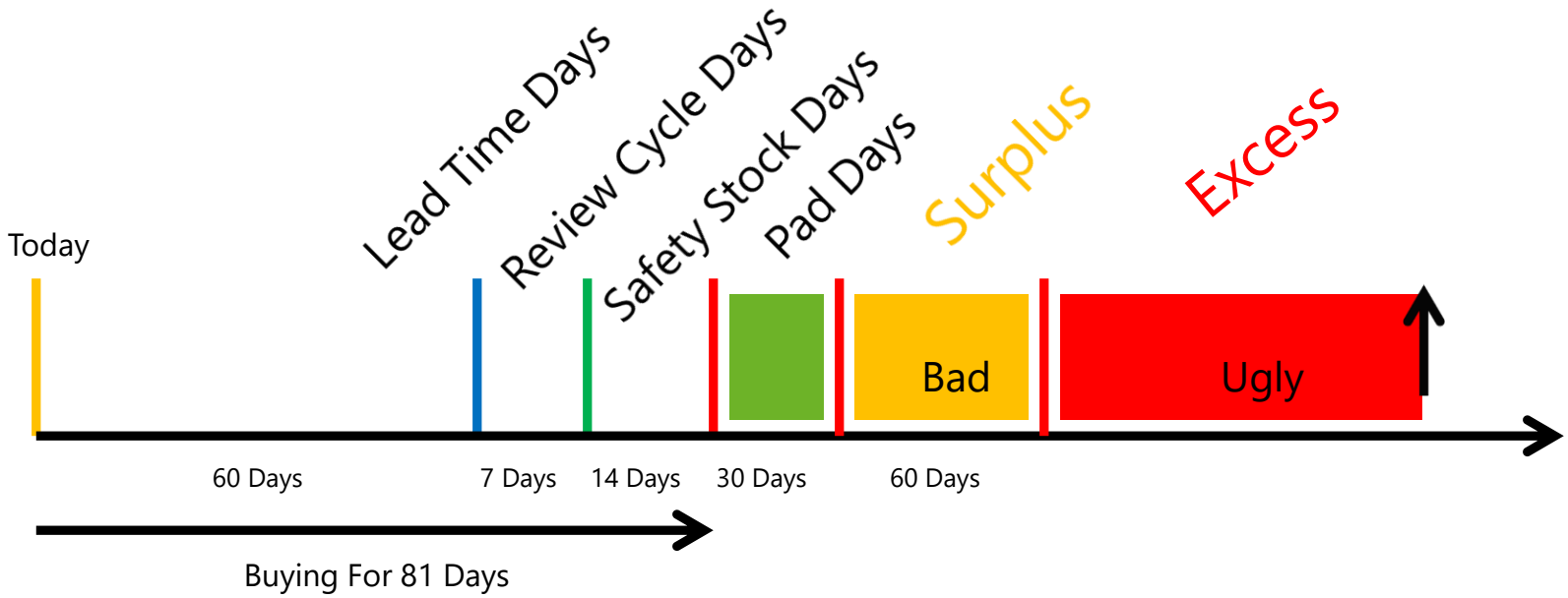
Replenishment

- Order Minimums/Multiples controlled at item level
- Vendor Order Targets at the vendor level
  - Net Weight
  - Gross Weight
  - Volume
  - Dollar Amount

You are in Full Control

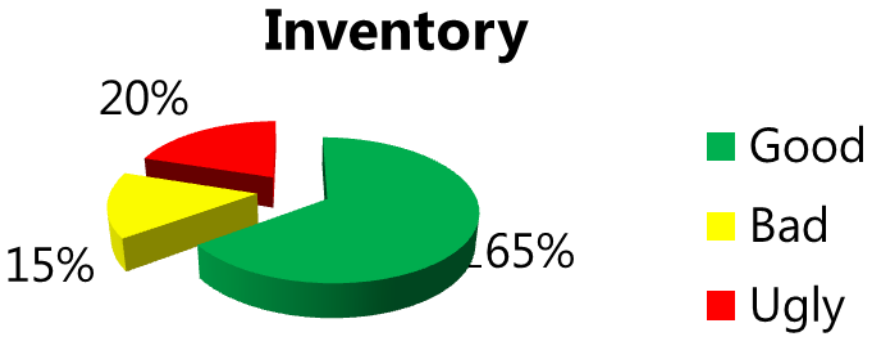
Surplus & Excess Inventory

- Lead Time Horizon Calculation
  = Lead Time + Review Cycle +Safety Stock
- Lead Time Horizon + Surplus Days
- Lead Time Horizon + Excess Days



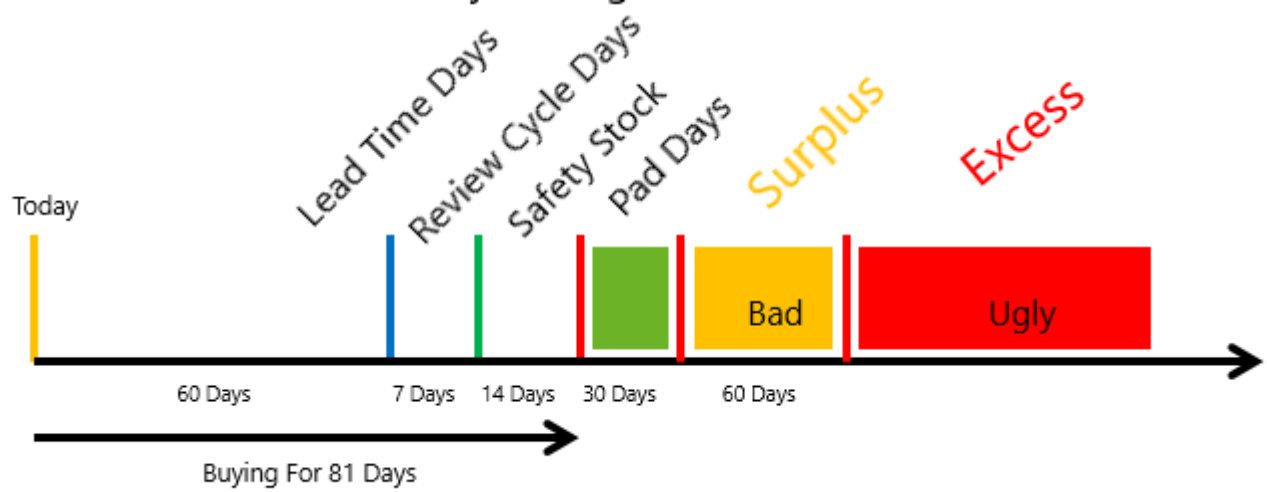
Surplus & Excess Inventory

- Surplus Inventory is More Than is Needed
  - User Defined Number of Days Greater Than Lead Time Horizon
  - Defined by Warehouse
- Excess Inventory Probably Won't Sell before it is Obsolete
  - User Defined Number of Days Greater Than Lead Time Horizon
  - Defined by Product
- The Good, Bad, and The Ugly



Surplus & Excess Inventory

- Lead Time Horizon + surplus days + excess days
- Lead time = Procurement Unit Card, Vendor Buying Calendar, or Inventory Management Default
- Surplus = Location Card (pad days)
- Excess = Inventory Management Card/ Excess Tab



Additional Absolute Value Tools

- Vendor Collaborative Forecasting
- Assembly Forecast
- Alerts
- Mass Modify

Customer Collaborative Forecast

- Need more than historical usage to generate a forecast
- Customer dominate items
- Customer forecast vs actual

Vendor Collaborative Forecast

- Extract forecasted usage after netting inventory & POs
- Excel spreadsheet for each vendor
- Opportunity to jointly manage ‘shared’ business
- Being a better customer makes for having better vendors

Aggregate Plans

- Inventory – Surplus & Excess
- Forecast Summary

New Item Strategies

- Frozen daily forecast
- Clone existing item
- Re-direct usage from old item to new item
- Promotion sales plan
- Forecast adjust
- Freeze an unreleased Formula
- Sporadic Usage Rule for new items
- Wait for 8 months of sales usage to select best fit formula

Stocking Decision Review

- Non-stock items – not forecasted/ not sporadic
- Items with less than 8 months usage are sporadic
- Should it be stock or nonstock?
- You set the criteria or rule for what is stock vs nonstock
- For example, for each item/location:
  - Over the last 6 months,
  - Did we have 3 shipments?
  - Did we ship 24 units?

    - Yes--→ this is a stock item
    - No-→ this is a nonstock item

    ❖ Can have multiple stocking rules

Item Usage Review Batch

- Review of items exceeding a set forecast error
- View of recent history and current forecast
- Ability to adjust history and/or forecast quantities

Seasonal Item Selection

- Separate sporadic from seasonal
- Identify truly seasonal and non-seasonal
- Objective not subjective rule

Freezing Seasonal Forecast

- Compare total usage in X periods against Y% of annual usage.
- Count ‘hits’ in last two years usage.
- Freeze forecast formula for those items that meet criteria
- Purpose is to avoid using sporadic or other formula for ‘seasonal’ items

Seasonal Item Selection

Location Code	Item No.	Source No.	Starting Date	Usage Hits	Usage Quantity																
100001	174-PT30P		1/1/2010	37	745		NS														
100001	174-PT30P		2/1/2010	60	1,653		3650	NS													
100001	174-PT30P		3/1/2010	64	1,559			2091	NS												
100001	174-PT30P		4/1/2010	77	909				1184	NS											
100001	174-PT30P		5/1/2010	71	1,055					133	NS										
100001	174-PT30P		6/1/2010	20	126						37	NS									
100001	174-PT30P		7/1/2010	1	1							153	NS								
100001	174-PT30P		8/1/2010	0	0								852	NS							
100001	174-PT30P		9/1/2010	1	2									3351	NS						
100001	174-PT30P		10/1/2010	1	4										4906	SEA					
100001	174-PT30P		11/1/2010	2	30											5785	SEA				
100001	174-PT30P		12/1/2010	6	117												6723	SEA			
100001	174-PT30P		1/1/2011	35	699		NS											6150			
100001	174-PT30P		2/1/2011	83	2,501		3164	NS											7003	<-12-Mo-Tot	
100001	174-PT30P		3/1/2011	87	1,450			1714	NS										5602	<-80%-of-Tot	
100001	174-PT30P		4/1/2011	55	785				929	NS											
100001	174-PT30P		5/1/2011	46	914					15	NS										
100001	174-PT30P		6/1/2011	2	15						100	NS									
100001	174-PT30P		7/1/2011	0	0							286	NS								
100001	174-PT30P		8/1/2011	0	0								1924	NS							
100001	174-PT30P		9/1/2011	0	0									4383	NS						
100001	174-PT30P		10/1/2011	0	0										5833	SEA					
100001	174-PT30P		11/1/2011	1	100											6518	SEA				
100001	174-PT30P		12/1/2011	10	186												7246	NS			
100001	174-PT30P		1/1/2012	57	1,638													5623			
100001	174-PT30P		2/1/2012	75	2,459														7547	<-12-Mo-Tot	
100001	174-PT30P		3/1/2012	16	301	<--Current Period, Ignore													6038	<-80%-of-Tot	
							NO	NO	NO	NO	NO	NO	NO	NO	NO	SEA	SEA	NO			

Seasonal if any consecutive

5 periods has 80% of Total Usage

in same periods for 2 Years

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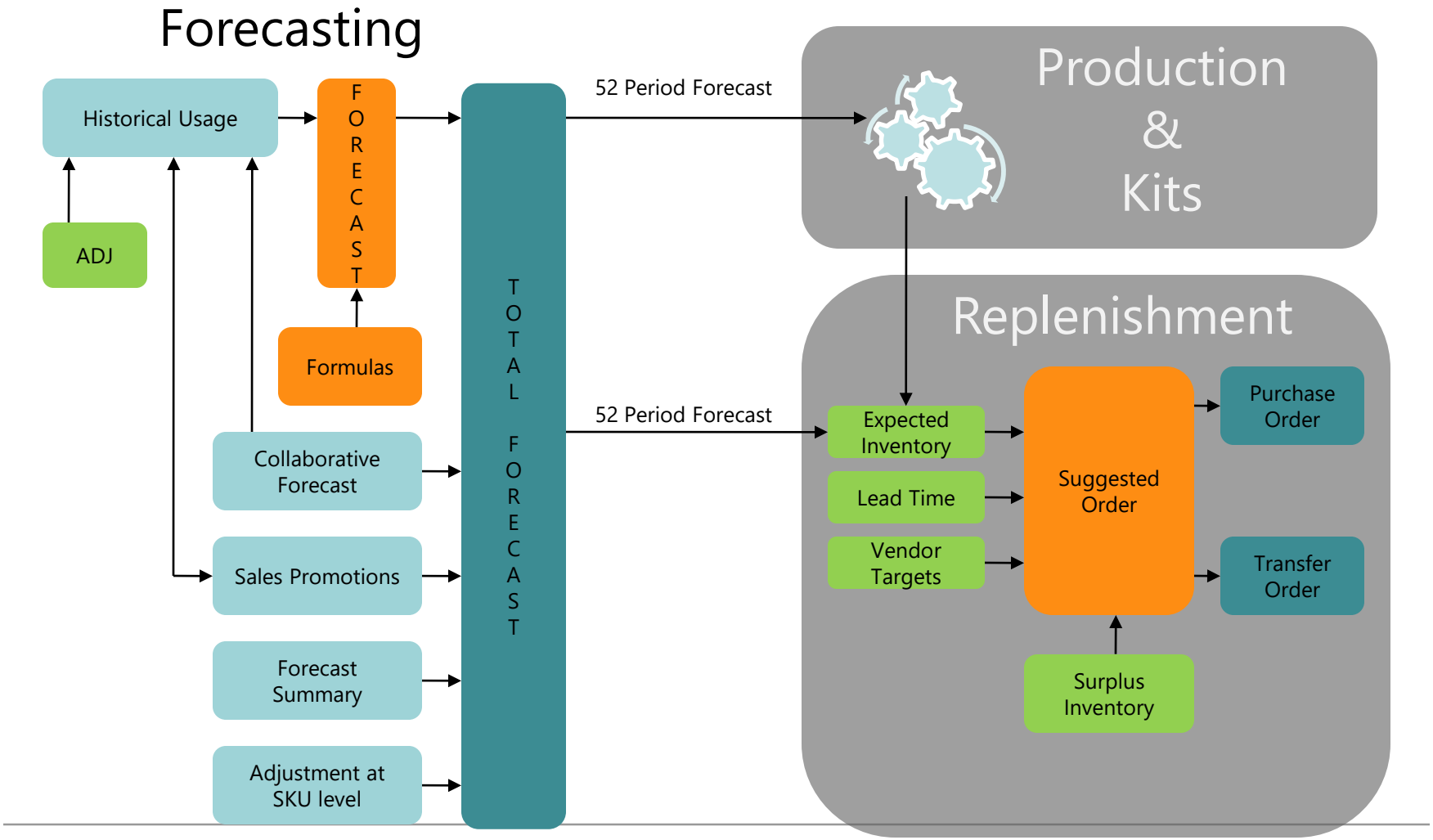
Forecasting and Replenishment



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A Day in the Life…

- Role Center
- Buying Calendar
- Suggested Orders
  - Drill into Calculation and Forecast Lines
  - Push Vendor Lead Time
- System Alerts
  - Forecasted Out-of-Stocks
  - Late POs
  - Surplus with Open PO

Role Center - Buyer

DGI - US | Standard | Planning | Review | Posted Documents | Setup & Extensions

Vendor Buying Calendar | Replen. Transfer Calendar | Surplus Transfer Calendar | Assembly Forecast | Production Plan | Procurement Units | Processing Log | Period End Processing | More

Actions

- Alerts
- Replenishment Path Alerts
- Lanham Solutions
- Stocking Decision Review
- Inventory Turns
- Forecast Accuracy
- Surplus and Excess Inv. Value
- Customer Forecast vs Actual
- Lead Time Comparison
- Export Forecast to Excel

Activities

Replenishment

Buying Calendar	Transfer Calendar	Inbound Transfers	Outbound Transfers
999+	17	168	168

Purchase Orders

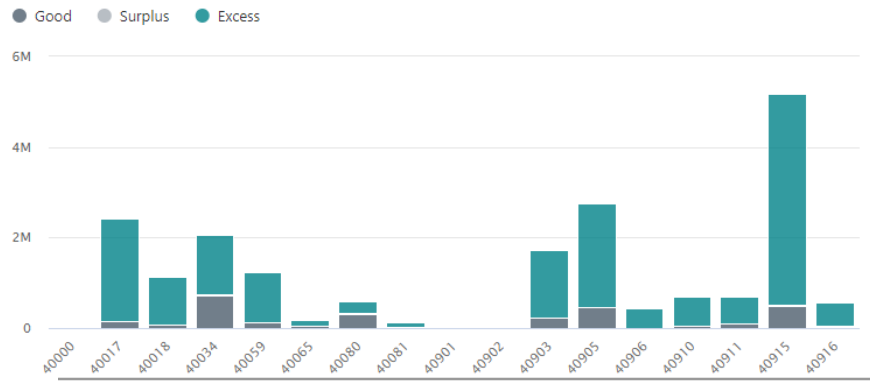
Open Purch. Orders	Released Purch. Orders	Late Purch. Orders
999+	0	999+

Notifications

Alerts	Procurement U... Review	Usage Review	Repl. Path Alerts
0	999+	999+	60

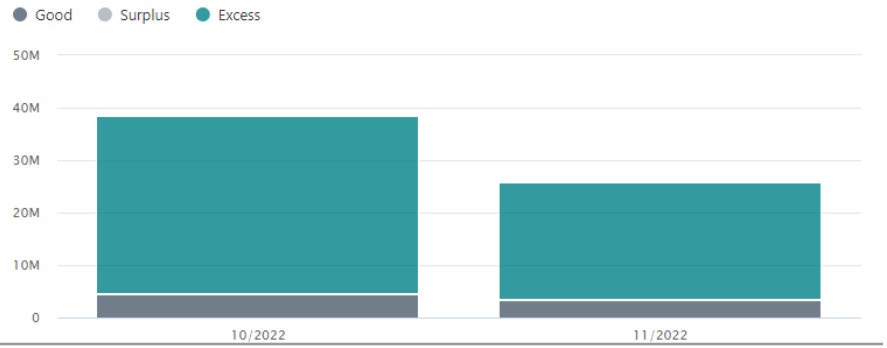
Insights

Current Inventory Level



Historical Inventory Value

Location Filter



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Suggested Order

Suggested Order

✓Saved

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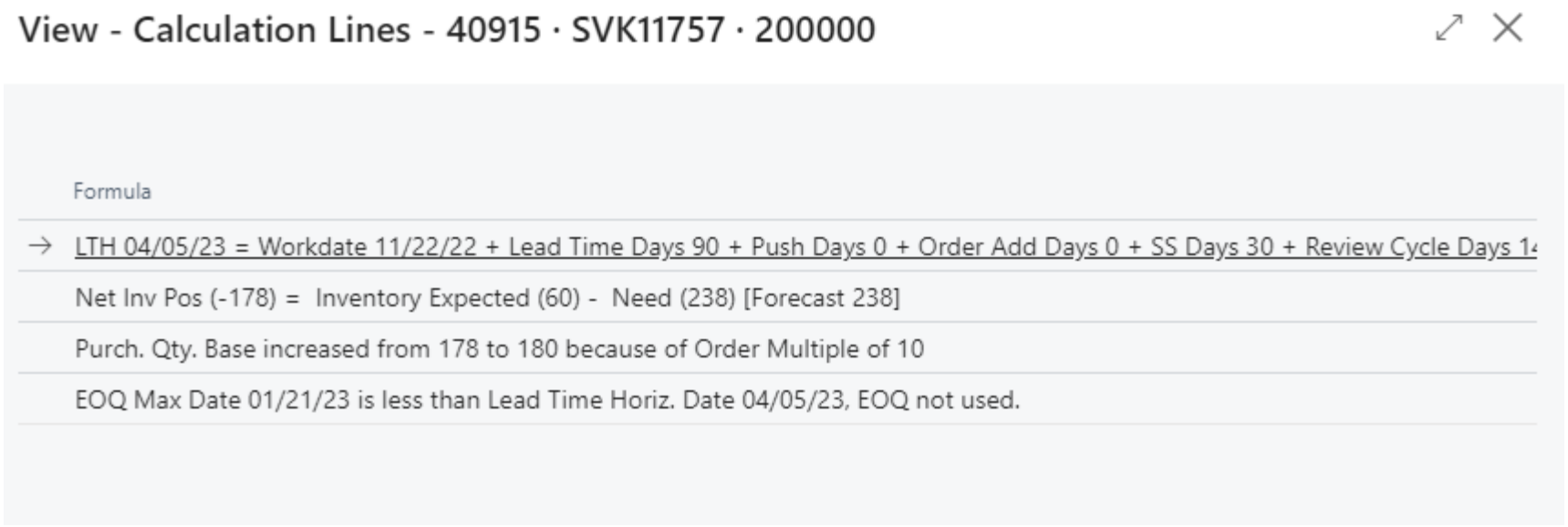
Actions Related

Suggested Order Subform | Manage More options

No.	Purchase Reason	Description	Unit of Measure Code	Critical Need	Periods With Sales	Quantity	Surplus Available	Purchase Line Exists	Line Amount Excl. Tax	Planned Receipt Date
→ SVK01702	Lead Time Horizon	VNMG 331-MF 1025	EA	☑	0	10	No	No	322.40	2/20/2023
SVK08231	Lead Time Horizon	R390-11 T3 08M-PM 1025	EA	☐	11	80	No	No	1,792.00	2/20/2023
SVK11757	Lead Time Horizon	CCGT 3(2.5)0-UM 5015	EA	☐	12	180	No	No	5,418.00	2/20/2023
SVK11758	Lead Time Horizon	CCGT 3(2.5)1-UM 5015	EA	☐	11	70	No	No	1,834.00	2/20/2023
SVK12486	Lead Time Horizon	N151.2-300-5F 2135	EA	☐	9	60	Yes	No	1,266.00	2/20/2023
SVK15990KES	Lead Time Horizon	N123H2-0400-0003-GM 2135	EA	☐	11	30	No	No	1,179.00	2/20/2023
SVK26274	Lead Time Horizon	CXS-05T098-20-5210R 1025	EA	☐	9	12	No	No	470.40	2/20/2023
SVK26276KES	Lead Time Horizon	CXS-05T098-20-5220R 1025	EA	☐	11	20	No	No	950.00	2/20/2023
SVK26278KES	Lead Time Horizon	CXS-05T098-20-5225R 1025	EA	☐	10	11	No	No	576.40	2/20/2023
SVK26718KES	Lead Time Horizon	CXS-04T098-15-2710R 1025	EA	☐	8	3	No	No	141.00	2/20/2023

Calculation Lines



View Forecast

SVK11757 CCGT 3(2.5)0-UM 5015

Saved

Search Actions Related

Horizon

Horizon Date: 4/5/2023

Title	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8	Period 9	Period 10	Period 11	Pe
→ 40915	11/01/22	12/01/22	01/01/23	02/01/23	03/01/23	04/01/23	05/01/23	06/01/23	07/01/23	08/01/23	09/01/23	
Forecast	53	58	50	54	54	53	54	53	53	53	53	
Forc. Adj.	0	0	0	0	0	0	0	0	0	0	0	
Cust. FC	0	0	0	0	0	0	0	0	0	0	0	
Demand	0	0	0	0	0	0 P(0)	0	0	0	0	0	
Consumed	40	0	0	0	0	0	0	0	0	0	0	
Auto Forc. Adj.	0	0	0	0	0	0 P(0)	0	0	0	0	0	
Total FC	53	58	50	54	54	53 P(9)	54	53	53	53	53	
Consumed FC	40	0	0	0	0	0	0	0	0	0	0	
Accum FC	13	71	121	175	229	282 P(238)	336	389	442	496	549	
Inventory	60	_	_	_	_	_	_	_	_	_	_	
Transfers	0	0	0	0	0	0	0	0	0	0	0	
Pur. Orders	0	0	0	0	0	0	0	0	0	0	0	
Assy./Prod. ...	0	0	0	0	0	0	0	0	0	0	0	
Assy./Prod. ...	0	0	0	0	0	0	0	0	0	0	0	
Sales Ret. Or...	0	0	0	0	0	0	0	0	0	0	0	
Net Inv. Pos.	47	-11	-61	-115	-169	-222	-276	-329	-382	-436	-489	
Horiz 04/05/23	_	_	_	_	_	-178	_	_	_	_	_	
Prior Yr	40	80	80	40	100	80	40	80	40	40	80	

Forecast Info

Replenishment Source	SANDVIK COROMANT-...
Calculation	3MO
Calculated Trend	No Trend
Average Order Qty.	39
Lead Time Days	90 Minimum
Vendor Review Cycle	14
Safety Stock	30 Days at 46
Spor. Target Stock	0
Min Shelf	0
Additional Stock	0

Net Inv Pos (-178) = Inventory Expected (60) - Need (238) [Forecast 238]

Procurement Unit

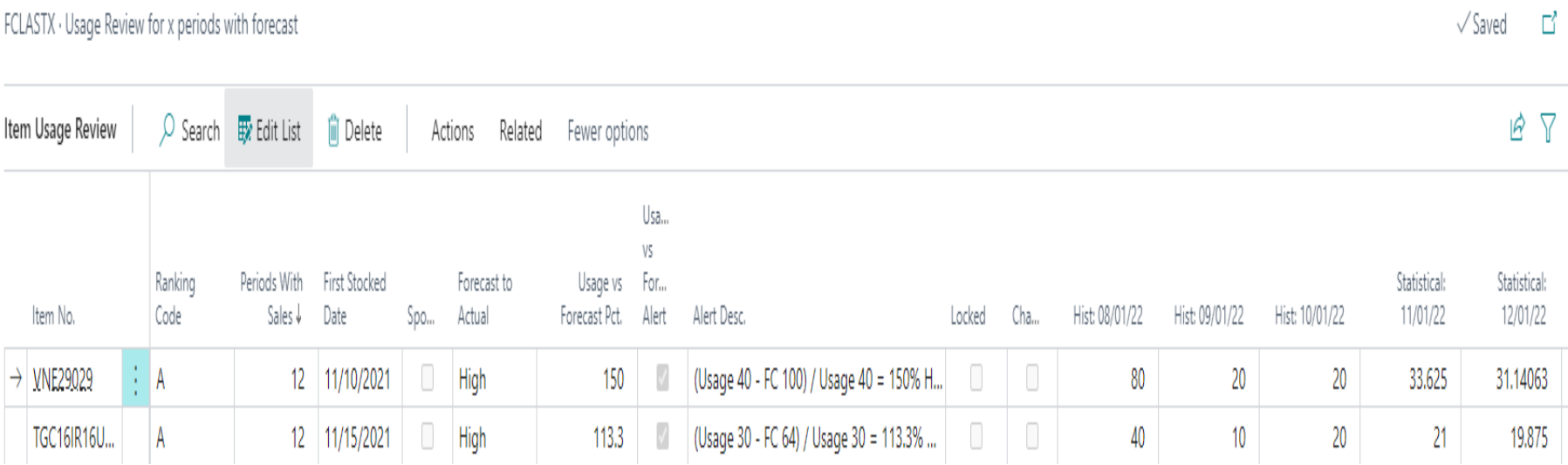
Nonstock	No
Review	Yes
Alert	No
Surplus	No
Replenishment Alert	No

AbsoluteValue

Item Usage Review

- Review of those exceeding a set forecast error
- View of recent history and current forecast
- Ability to adjust history and/or forecast quantities

Item Usage Review – Checking Usage



Item No.	Ranking Code	Periods With Sales	First Stocked Date	Spo...	Forecast to Actual	Usage vs Forecast Pct.	Usa... vs For... Alert	Alert Desc.	Locked	Cha...	Hist: 08/01/22	Hist: 09/01/22	Hist: 10/01/22	Statistical: 11/01/22	Statistical: 12/01/22
→ VNE29029	A	12	11/10/2021		High	150	☑	(Usage 40 - FC 100) / Usage 40 = 150% H...	☐	☐	80	20	20	33.625	31.14063
TGC16IR16U...	A	12	11/15/2021		High	113.3	☑	(Usage 30 - FC 64) / Usage 30 = 113.3% ...	☐	☐	40	10	20	21	19.875

AbsoluteValue

Alerts

Item No.	Alert Date	Alert Type	Action Taken	Snooze Days	Snooze Date	Comment	Expected Date	Quantity (Base)	Measure Code	Purchaser Code	Formula Status	Vendor Code
AAGAW502128	11/22/2022	Expected Stock Out	None	0		(12/20/22 -1 -3 -5 -6 -6 -7...	12/20/2022	0	EA		Reoccuring	HIL
AAGGF40000	11/22/2022	Expected Stock Out	None	0		(11/22/22 -1 -2 -4 -6 -7 -9...	11/22/2022	0	EA		Reoccuring	HIL
AAGPMG7728	11/22/2022	Expected Stock Out	None	0		(11/22/22 -1 -1 -2 -3 -4 -6...	11/22/2022	0	EA		Reoccuring	HIL
AAGPMG7728	11/22/2022	Auto Forecast Adjust	None	0		Auto. FC Adj. = 0.25 (FC = 17.636...	4/5/2023	1				HIL
AAGSK24FB00	11/22/2022	Expected Stock Out	None	0		(11/22/22 -4 -11 -17 -24 -3...	11/22/2022	0	EA		Reoccuring	HIL
AAGSK700F	11/22/2022	Expected Stock Out	None	0		(11/29/22 -5 12/06/22)(12/13/2...	11/29/2022	0	EA		Reoccuring	HIL
AAGTL385F10	11/22/2022	Late Purchase Order	None	0		Exp. Rec. Date 11/14/22 - Quantit...	11/14/2022	3				GUILD
ACC25072	11/22/2022	Expected Stock Out	None	0		(01/31/23 -3 -7 -11 -16	1/31/2023	0	EA		Reoccuring	HIL

Demand Planning Setup

- **Inventory Management**
- Item Ranking
- Item Classes
- **Advanced Forecasting**
- Formulas
- Forecast Inventory Periods
- Sporadic Rules
- Target Customer Service Level
- Seasonal Item Selection
- Collaborative Forecasting
- Container Definitions
- Procurement Group
- Stocking Rules
- Alert Setup
- Safety Stock Modifiers
- Location Transfer Rules
- Production Setup
- Production Templates
- Production Item Groups