6.4. Analyzing Expected Stockouts and Overstocks

Streamline is able to identify upcoming stockout and overstock situations and estimates expected lost sales or excess quantities. Shortages and overages are determined based on the generated forecasts, thus, Streamline calculates *expected* stockouts or overstocks that might happen to an item in the future.

In addition, Streamline computes expected distortion values based on the item balance value or purchase price.

In this article we:

- describe the rules that Streamline uses to determine a stockout or an overstock;
- show how you can view stockout and overstock information in Streamline; and
- analyze items based on the calculated distortion values.

Stockout and Overstock Rules

Basically, there are three situations that might happen to an item in future: 1) a stockout expected, 2) an overstock expected, and 3) no overstock or stockout is expected.

Streamline recognizes items and drops them into these categories. To explain the rules making these categories, let's introduce the following notation:

- *D*(*LT*) the demand forecast during the lead time period.
- *D(OC)* the demand forecast during order cycle period going after the lead time period.
- SS(OC) the safety stock for the order cycle period going after the lead time period.
- InTrn(LT) the in transition quantity that should arrive during the lead time period.
- *InTrn(LT+OC)* the in transition quantity that should arrive during the lead time plus order cycle period.
- *PndSales(LT)* the pending sales orders quantity that should be shipped to customers during the lead time period.
- *PndSales(LT+OC)* the pending sales orders quantity that should be shipped to customers during the lead time plus order cycle period.

In addition, Streamline implements a special color-coding for the inventory report that helps you easily to discern items with insufficient inventory or excess quantity.

To explain the rules and color-coding, let's show the **Demand forecast** and **Purchase plan** sections in the inventory report. To do this, go to the **Settings** of the **Inventory planning** tab and check the options shown in the figure below.

General Project ABC	analysis	Inventory	Distribution cent	ter
oeneral Project Noe		,	Distribution com	
Default lead time 🛛 30 🗦	days			
Default order cycle 1 🖨	months	-		
_ ,	line (r	\$ %		
Default average shelf life exc	ceeding 5	▼ %		
Safety stock				
Maximum of				
Service level 98 🖨 🤋	% (2.05.σ	√cycle)		
Demand of the future	1.0 🗘	months		
Show columns				
Lead time				
✓ Lead time ✓ Order cycle		Purchase		
Min. lot		Gross mar	-	
Max. lot		Note	muex	
			dor	
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			inventory levels	
			arrenter y levels	
Actual sales for 0 韋 p	eriods			
Replenishment strategy				1
Periodic		Show enti	re purchase plan	
○ Min/Max				I

Further, we proceed with the example project.

Stockout

To calculate a stockout, Streamline performs the event-based simulation modeling of stock movements during the lead time period. The lowest (negative) inventory level obtained during this simulation is the **Stockout** amount.

A crude version of the formula that does not account for the passage of time for stockout calculation would be the following:

Stockout = MAX(0, D(LT) - On hand - InTrn(LT) + PndSales(LT)).

Consequently, a crude rule for stockout determination is:

D(LT) > On hand + InTrn(LT) - PndSales(LT). (1)

Let's consider the item H1010. To demonstrate how the formula (1) works, we have overridden the

item **On hand** and **Qty to receive** (see figure below).

	Madalation	Orberd	Days	Pending	In transition	Lead time,	Order cycle,	Min lot	Safety		1	Purchase pla	n				Demand	forecast			Charlenat
Item code	Model type	On nand	of supply	sales orders	In transition	days	months	Min lot	stock	Jan 2016	Feb 2016	Mar 2016	Apr 2016	May 2016	Jan 2016	Feb 2016	Mar 2016	Apr 2016	May 2016	Jun 2016	Stockout
C1020	Seasonal	120	40	10	0	30	1	0	3	56	75	71	81	82	100	63	75	71	81	82	0
F1020	Seasonal	208	213	0	0	30	1	0	3	0	0	0	0	0	25	25	29	29	35	35	0
H9010	Seasonal	230	512	0	0	60	2	0	2	0	0	0	0		11	13	13	13	16	16	0
H1010	Seasonal	10	12	0	10	30	1	50	1	50	0	0	0	50	25	12	12	11	14	15	5
H1020	Seasonal	30	4	0	0	30	1	50	11	250	250	250	350	300	218	207	263	269	325	305	188
H2010	Seasonal	35	4	0	50	90	1	50	13	350	400	350			240	231	303	320	392	353	689
H2020	Seasonal	20	2	0	0	90	1	50	13	350	400	350			240	231	303	320	392	353	754
L2010	Seasonal	50	121	0	10	30	1	0	1	0	0	0	4	13	11	12	14	13	13	13	0
L2020	Seasonal	5	3	0	0	60	2	0	3	91	0	99	0		42	39	46	42	49	50	76
L2030	Seasonal	73	317	5	0	60	2	0	1	0	0	0	0		6	6	7	7	8	8	0

In our case, the inequality (1) is true:

25 > 10 + 10 - 0.

The stockout quantity is shown in the **Stockout** column of the report. In our example, it is **5** units.

Streamline does not take into account safety stock when calculates stockouts.

Streamline indicates such items in the inventory report as follows (see figure above):

- Corresponding cell of the **On hand** and **Stockout** columns has a red background.
- The future periods which demand can't be covered by the **On hand** + *InTrn(LT) PndSales(LT)* quantity have a red background in the **Demand forecast** section.

As you see, there is currently a purchase recommendation. Streamline suggests to order **50** units by 1 of **January** to cover the demand of **12** units in **February**. The over-order is because of the minimum lot size of **50** units.

Overstock

To determine an overstock, Streamline also performs the event-based simulation modeling of stock movements during the lead time plus order cycle period. The inventory level at the end of the simulation is the **Overstock** quantity.

The rough, static version of the overstock formula would be:

Overstock = MAX(0, On Hand - PndSales(LT+OC) - D(LT+OC) + InTrn(LT+OC) - SS(OC)).

Consequently, a crude rule for an overstock determination is:

On hand + InTrn(LT+OC) - PndSales(LT+OC) > D(LT) + D(OC) + SS(OC). (2)

To calculate an overstock quantity, Streamline uses the following formula:

Let's consider the item **L2010** (see figure below).

Item code	On hand	Pending	In transition	Lead time,	Order cycle,	Safety			Purchase pla	an				Demand	forecast			Charliout	Overstock
Item code	On hand	sales orders	In transition	days	months	stock	Jan 2016	Feb 2016	Mar 2016	Apr 2016	May 2016	Jan 2016	Feb 2016	Mar 2016	Apr 2016	May 2016	Jun 2016	Stockout	Overstock
C1020	120	10	0	30	1	3	56	75	71	81	82	100	63	75	71	81	82	0	0
F1020	208	0	0	30	1	3	0	0	0	0	0	25	25	29	29	35	35	0	155
H9010	230	0	0	60	2	2	0	0	0	0		11	13	13	13	16	16	0	178
H1010	10	0	10	30	1	1	50	0	0	0	50	25	12	12	11	14	15	5	0
H1020	30	0	0	30	1	11	250	250	250	350	300	218	207	263	269	325	305	188	0
H2010	35	0	50	90	1	13	350	400	350			240	231	303	320	392	353	689	0
H2020	20	0	0	90	1	13	350	400	350			240	231	303	320	392	353	754	0
L2010	50	0	10	30	1	1	0	0	0	4	13	11	12	14	13	13	13	0	36
L2020	5	0	0	60	2	3	91	0	99	0		42	39	46	42	49	50	76	0
L2030	73	5	0	60	2	1	0	0	0	0		6	6	7	7	8	8	0	41

The inequality (2) is true:

50 + 10 - 0 > 11 + 12 + 1.

The overstock quantity is shown in the **Overstock** column of the report. In our example, it is **36** units.

Streamline indicates such items in the inventory report as follows (see figure above):

- Corresponding cell of the **On hand** and **Overstock** columns has a dark-green background.
- The future periods which demand are covered by the **On hand** + InTrn(LT+OC) PndSales(LT+OC) quantity have a light-green background in the **Demand forecast** section.

As you see, there is no purchase recommendation if an overstock happens.

No Overstock or Stockout

This is the ideal situation, which Streamline designed to reach. In this case,

 $D(LT) \leq \text{On hand} + InTrn(LT) - PndSales(LT), (3)$

On hand + InTrn(LT+OC) - $PndSales(LT+OC) \le D(LT) + D(OC) + SS(OC)$. (4)

Let's consider the item **C1020** (see figure below).

Item code	0 h	Days	Pending	In transition	Lead time,	Order cycle,	Safety		1	Purchase pla	an				Demand	forecast			Observation of	0
Item code	On hand	of supply	sales orders	In transition	days	months	stock	Jan 2016	Feb 2016	Mar 2016	Apr 2016	May 2016	Jan 2016	Feb 2016	Mar 2016	Apr 2016	May 2016	Jun 2016	Stockout	Overstock
C1020	120	40	10	0	30	1	3	56	75	71	81	82	100	63	75	71	81	82	0	0
F1020	208	213	0	0	30	1	3	0	0	0	0	0	25	25	29	29	35	35	0	155
H9010	230	512	0	0	60	2	2	0	0	0	0		11	13	13	13	16	16	0	178
H1010	10	12	0	10	30	1	1	50	0	0	0	50	25	12	12	11	14	15	5	0
H1020	30	4	0	0	30	1	11	250	250	250	350	300	218	207	263	269	325	305	188	0
H2010	35	4	0	50	90	1	13	350	400	350			240	231	303	320	392	353	689	0
H2020	20	2	0	0	90	1	13	350	400	350			240	231	303	320	392	353	754	0
L2010	50	121	0	10	30	1	1	0	0	0	4	13	11	12	14	13	13	13	0	36
L2020	5	3	0	0	60	2	3	91	0	99	0		42	39	46	42	49	50	76	0
L2030	73	317	5	0	60	2	1	0	0	0	0		6	6	7	7	8	8	0	41

In this case, both inequalities are true:

 $100 \le 120 + 0 - 10$,

 $120 + 0 - 10 \le 100 + 63 + 3.$

Streamline indicates such items in the inventory report as follows (see figure above):

- Corresponding cell of the **On hand** column has a light-green background.
- The lead time period is highlighted with a light-green color in the **Demand forecast** section.
- Zero values and no color background in the **Stockout** and **Overstock** columns.

In our case, we can cover the D(LT) – the demand in **January**, however, there is not enough inventory to fulfill the D(OC) – the demand in **February**. That's why Streamline suggests ordering **56** units (which is 100 + 63 + 3 - (120 + 0 - 10)).

Viewing Overstocks and Stockouts

Streamline allows viewing overstocks and stockouts on an item basis or for all of the items in one report.

To view the expected overstock or stockout on an item basis:

- 1. Go to the **Demand forecasting**.
- 2. Select the item in the **Tree view**.
- 3. Go to the **Inventory** tab of the **Panel** and scroll down the properties list (see figure below).

Forecasting Model	Inventory KPIs
	Value
Safety stock	3
Shelf life, months	00
Shelf life exceeding, %	
Purchase price	45
Gross margin	43.8%
Turn-earn index	78.7
Order now	0
Purchase value	0
Stockout	0
Overstock	155

To view expected overstocks and stockouts for all of the items in one report, go to the **Inventory planning** tab (see figure below).

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	Category	Item code	Model type	On hand	Days of supply	Pending sales orders	In transition	Safety stock	Qty	Order now Value	Days of supply	Stockout	Overstock
1	Concrete Block	C1020	Seasonal	120	40	10	0	3	56	2800.00	27	0	0
2	Fence	F1020	Seasonal	208	213	0	0	3	0	0.00		0	155
3	Handles	H1010	Seasonal	15	18	0	10	1	13	46.28	33	0	0
4	Handles	H1020	Seasonal	30	4	0	0	11	250	1957.50	35	188	0
5	Hinges	H2010	Seasonal	35	4	0	50	13	350	3689.00	33	689	0
;	Hinges	H2020	Seasonal	20	2	0	0	13	350	7119.00	33	754	0
,	Nails	H2510	Seasonal	80	15	0	0	6	200	88.00	34	78	0
3	Nails	H2520	Seasonal	0	0	0	0	4	200	266.00	46	118	0
)	Screws	H2810	Seasonal	20	34	0	0	2	100	175.00	164	0	0
10	Screws	H2830	Seasonal	300	94	0	0	3	0	0.00		0	104

To bring items with overstocks or stockouts to the top of the table, sort the table by the **Stockout** or **Overstock** column by clicking the corresponding column header (see figure below).

These and a	Madalahara	On band	Days	Pending	In transition	Lead time,	Order cycle,	Safety		Order now		Charlingt	Overstock
Item code	Model type	On hand	ofsupply	sales orders	In transition	days	months	stock	Qty	Value	Days of supply	Stockout	Overstock
L1010	Seasonal	198	8	0	100	90	3	21	2230	98120.00	92	1736	0
H2020	Seasonal	20	2	0	0	90	1	13	350	7119.00	33	754	0
H2010	Seasonal	35	4	0	50	90	1	13	350	3689.00	33	689	0
H7020	Seasonal	20	1	0	60	30	1	11	486	918.54	31	421	0
H7030	Seasonal	5	0	0	0	30	1	7	389	735.21	31	384	0
R1001	Seasonal	30	4	0	0	60	2	6	396	31680.00	62	346	0
H1020	Seasonal	30	4	0	0	30	1	11	250	1957.50	35	188	0
H4010	Seasonal	20	10	100	0	30	1	4	145	253.75	63	139	0
H2520	Seasonal	0	0	0	0	30	1	4	200	266.00	46	118	0
H8010	Seasonal	105	34	0	0	60	2	4	200	868.00	62	80	0

Basically, you can sort the inventory report by any column in two directions.

Analyzing Items Based on Overstock and Stockout Values

Streamline allows you to analyze items based on the calculated expected overstock and stockout values. To enable the calculations the item value should be imported.

You can view expected overstock or stockout value on an item basis or for all of the items in one report.

To view the expected overstock or stockout value on an item basis:

- 1. Go to the **Demand forecasting**.
- 2. Select the item in the **Tree view**.
- 3. Go to the **KPIs** tab of the **Panel** (see figure below).

Forecasting	Model	Inver	ntory	KPIs
				Value
Inventory valu	e		9360.	00
Days of supply	/		213	
Expected over	stock valu	e	6975.	00
Expected stoc	kout value	2	0.00	
Non-moving	inventory	value	0.00	
Turnover Tur	rns/year		1.8	
Turnover Day	/s to sell		203	
Gross margin			43.8%	5
Turn-earn ind	ex		78.7	
Annual revenu	Je		29920	0.00
Revenue next	year		25920	.00

You can view the distortions value at any level of the tree.

To view expected overstock and stockout value for all of the items in one report, go to the **Reports** tab and select the **KPIs** report (see figure below).

🕤 Start 🛛 🖾	Item view	List view	Inventory re	port							
Search	Sele	ct report KPIs		▼ Agg	pregate by None	🔻 🎇 Settin	gs 🛛 🏠 Export rep	port			
Category	Item code	ABC analysis	Inventory value	Days of supply	Expected overstock value	Expected stockout value	Non-moving inventory value	Turr Turns/year	nover Days to sell	Gross margin	Turn-earn index
Concrete Block	C1020	A 4.56%	6000.00	40	0.00	0.00	0.00	6.7	55	50%	333.3
Fence	F1020	C 1.71%	9360.00		9225.00	0.00	0.00	1.8	203	43.8%	78.7
Handles	H1010	C 0.0902%	53.40	18	0.00	0.00	0.00	12	30	59.3%	715.2
Handles	H1020	B 2.15%	234.90	4	0.00	2336.84	0.00	101	3.6	37%	3746.4
Hinges	H2010	B 3.6%	368.90	4	0.00	12691.38	0.00	98	3.7	42.8%	4192.4
Hinges	H2020	A 4.99%	406.80	2	0.00	19242.08	0.00	172	2.1	20.3%	3481.1
Nails	H2510	C 0.174%	35.20	15	0.00	100.62	0.00	30	12	65.9%	1953.7
Nails	H2520	C 0.271%	0.00	0	0.00	324.50	0.00			51.6%	
Screws	H2810	C 0.0483%	35.00	34	0.00	0.00	0.00	11	34	55%	599.6
Screws	H2830	C 0.308%	738.00	94	255.84	0.00	0.00	3.9	93	46.1%	181.6
Padlocks	H4010	C 0.136%	35.00	10	0.00	417.00	0.00	40	9.2	41.7%	1660.4

You can also sort the report by the **Expected overstock value** or **Expected stockout value** column from largest to smallest and vice versa by clicking the column header.

The report can be exported to Excel by clicking the **Export report** button found on the **Reports** toolbar (see figure below).

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Search		Se Se	ect report KPIs		 Aggregation 	ate by None	🔻 🎡 Setting	s 🗽 Export	report				
Category		Item code	ABC analysis	Inventory value	Days of supply ov	Expected verstock value	Expected stockout value	Non-moving inventory val		nover Days to sell	Gross Turn margin ind	earn Annual ex gross profit	Annua revenu
Plywood	L1	010	A 34.8%	8712.00	8 0.0	0	136572.48	0.00	39	9.3	44.1% 1731.	268619.99	610939.9
Roof	R	1001	A 18.5%	2400.00	4 0.0	0	51900.00	0.00	72	5.1	46.7% 3358.4	151130.00	323850.0
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Roof Handles Roof Stain Stain							G	Expec		I n-moving	J Turnover	K	L
Handles Roof Stain Stain			C	D	E	Days			ed No		J Turnover	K Days to sell	
Handles Roof Stain Stain Paint_equipme	1	A B	C C ry Item coo	D ABC	E Inventory value	Days of supply	Expected	lue stocko	ed No	entory value		Days to sell	Gross margin
Handles Roof Stain Stain Paint_equipme Padlocks	1	A B	C C ry Item coo	ABC analysis	E Inventory value 87	Days of supply 712	Expected overstock va	lue stocko	ed No ut value inv	entory value	• Turns/year	Days to sell 9 9.295565553	Gross margin 44.07%
Handles Roof Stain Stain Paint_equipme Padlocks Nails	1 2 3	A B Catego 1 Plywo	ry Item coo od L1010 R1001	ABC analysis A 34.8%	E Inventory value 87	Days of supply /12	Expected overstock va	lue stocko 0 136 0	ed No ut value inv 572.4844	entory value	e Turns/year 0 39.2929292	Days to sell 9 9.295565553 7 5.075266327	Gross margin 44.07% 46.67%
Handles Roof Stain	1 2 3 4	A B Catego 1 Plywo 2 Roof	ry Item coo od L1010 R1001 H2020	D ABC analysis A 34.8% A 18.5%	E Inventory value 87 24 406.80000	Days of supply 212 200 31	Expected overstock va	lue stocko 0 136 0	ed No ut value inv 572.4844 51900	entory value	Turns/year 0 39.2929292 0 71.9666666	Days to sell 9 9.295565553 7 5.075266327 5 2.129737609	Gross margin 44.07% 46.67% 20.30%

Next: Creating Purchase Orders

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