# 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

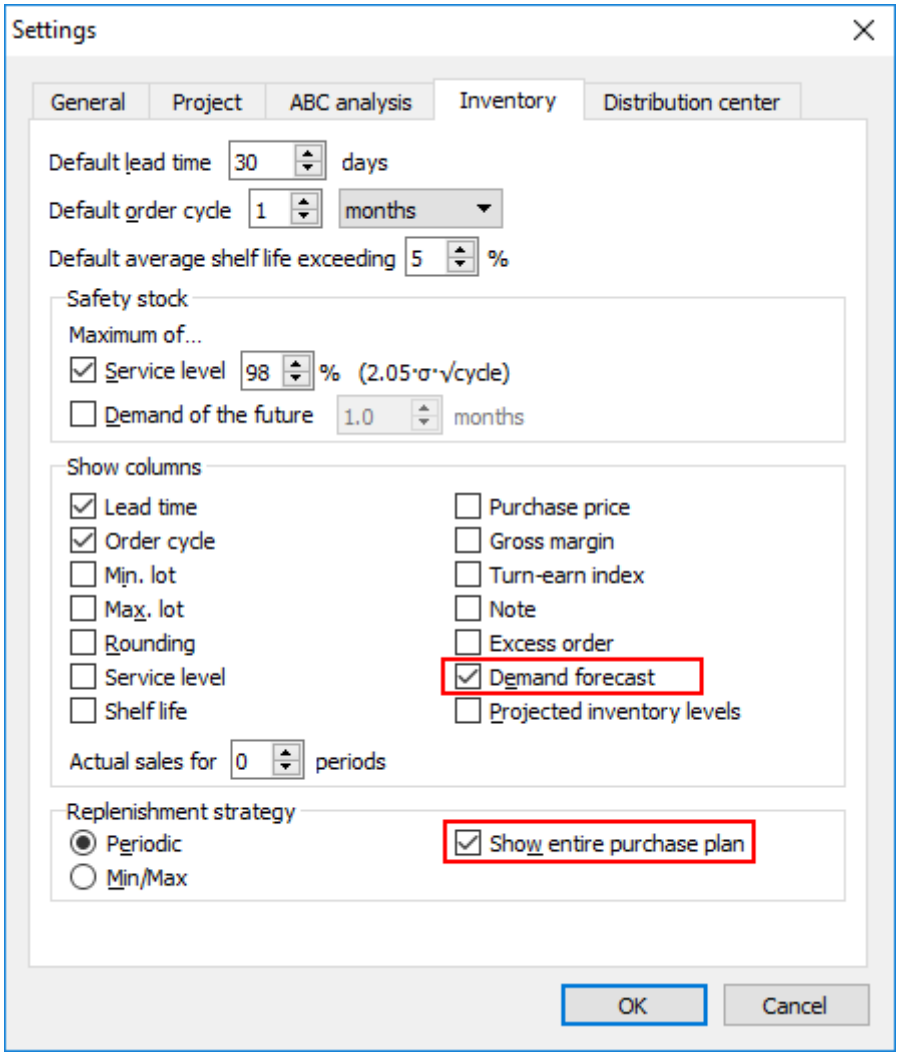
Basically, there are three situations that might happen to an item in future: 1) a stockout expected, 2) an overstock expected, and 3) no overstock or stockout is expected.

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.




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).

| Item code | Model type | On hand | Days of supply | Pending sales orders | In transition | Lead time, days | Order cycle, months | Min lot | Safety stock | Purchase plan | | | | | Demand forecast | | | | | | Stockout |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Jan 2016 | Feb 2016 | Mar 2016 | Apr 2016 | May 2016 | Jan 2016 | Feb 2016 | Mar 2016 | Apr 2016 | May 2016 | Jun 2016 | |
| 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 sales orders | In transition | Lead time, days | Order cycle, months | Safety stock | Purchase plan | | | | | Demand forecast | | | | | | Stockout | Overstock |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Jan 2016 | Feb 2016 | Mar 2016 | Apr 2016 | May 2016 | Jan 2016 | Feb 2016 | Mar 2016 | Apr 2016 | May 2016 | Jun 2016 | | |
| 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)* ≤ On hand + *InTrn(LT)* – *PndSales(LT)*, (3)

On hand + *InTrn(LT+OC)* – *PndSales(LT+OC)* ≤ *D(LT)* + *D(OC)* + *SS(OC)*. (4)

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

| Item code | On hand | Days of supply | Pending sales orders | In transition | Lead time, days | Order cycle, months | Safety stock | Purchase plan | | | | | Demand forecast | | | | | | Stockout | Overstock |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Jan 2016 | Feb 2016 | Mar 2016 | Apr 2016 | May 2016 | Jan 2016 | Feb 2016 | Mar 2016 | Apr 2016 | May 2016 | Jun 2016 | | |
| 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:

$100 \le 120 + 0 - 10$,

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

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.

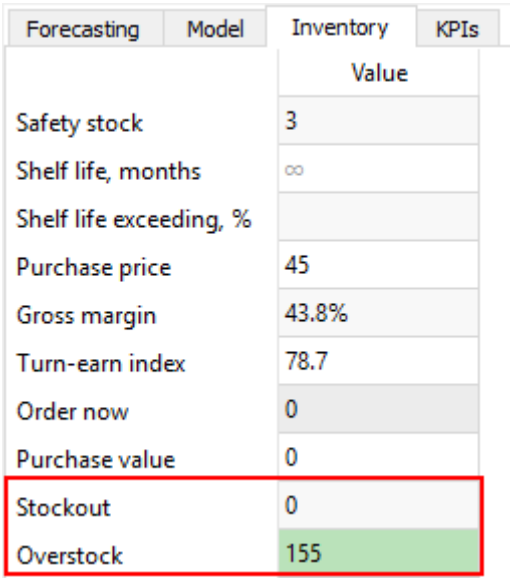
In our case, we can cover the *D(LT)* – the demand in **January**, however, there is not enough inventory to fulfill the *D(OC)* – the demand in **February**. That's why Streamline suggests ordering **56** units (which is 100 + 63 + 3 – (120 + 0 - 10)).

# Viewing Overstocks and Stockouts

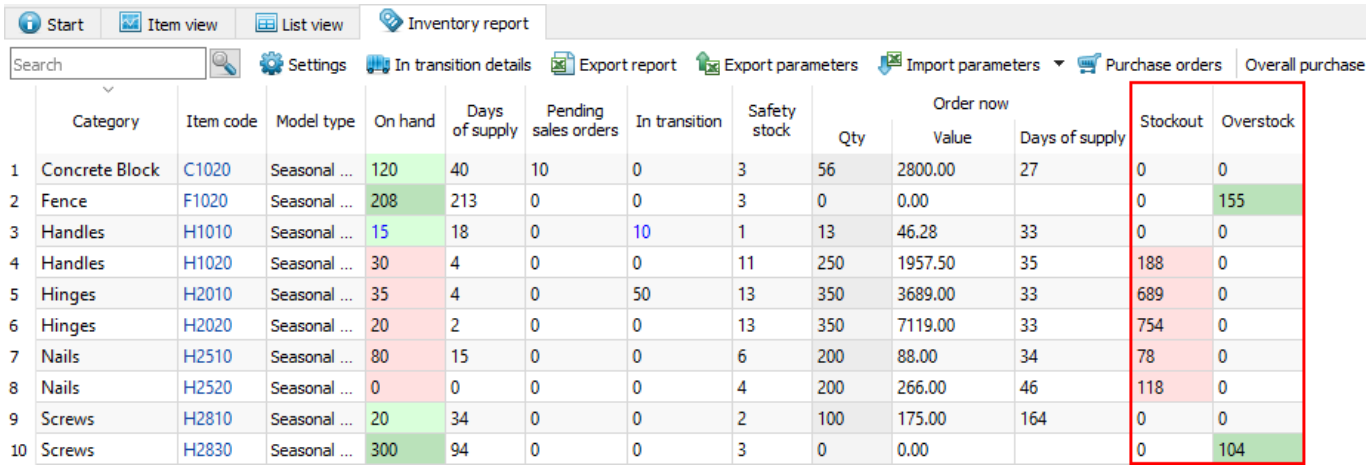
Streamline allows viewing overstocks and stockouts on an item basis or for all of the items in one report.

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).




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

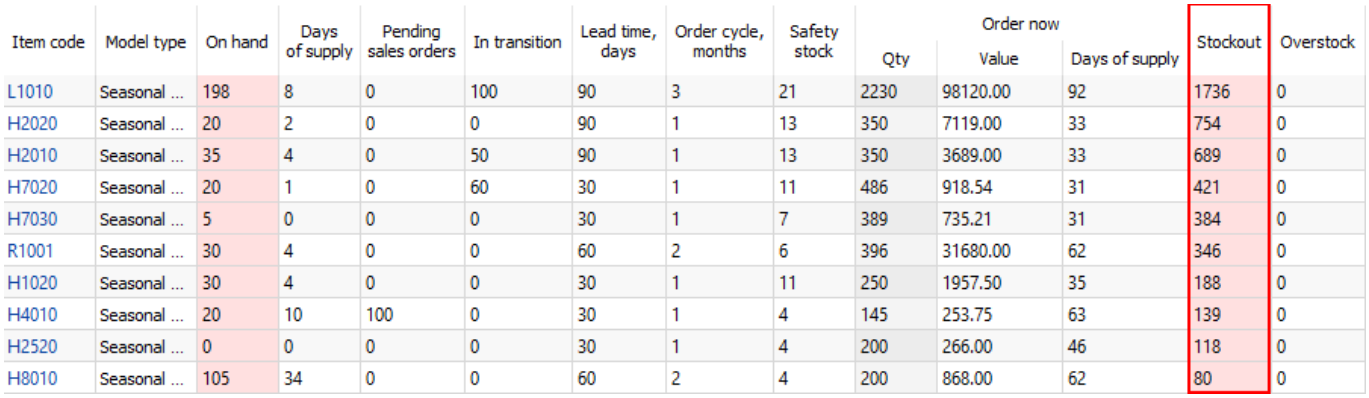


Start | Item view | List view | Inventory report

Search | Settings | In transition details | Export report | Export parameters | Import parameters | Purchase orders | Overall purchase

| | Category | Item code | Model type | On hand | Days of supply | Pending sales orders | In transition | Safety stock | Order now | | | Stockout | Overstock |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Qty | Value | Days of supply | | |
| 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 |
| 6 | Hinges | H2020 | Seasonal ... | 20 | 2 | 0 | 0 | 13 | 350 | 7119.00 | 33 | 754 | 0 |
| 7 | Nails | H2510 | Seasonal ... | 80 | 15 | 0 | 0 | 6 | 200 | 88.00 | 34 | 78 | 0 |
| 8 | Nails | H2520 | Seasonal ... | 0 | 0 | 0 | 0 | 4 | 200 | 266.00 | 46 | 118 | 0 |
| 9 | 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).



| Item code | Model type | On hand | Days of supply | Pending sales orders | In transition | Lead time, days | Order cycle, months | Safety stock | Order now | | | Stockout | Overstock |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Qty | Value | Days of supply | | |
| 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.

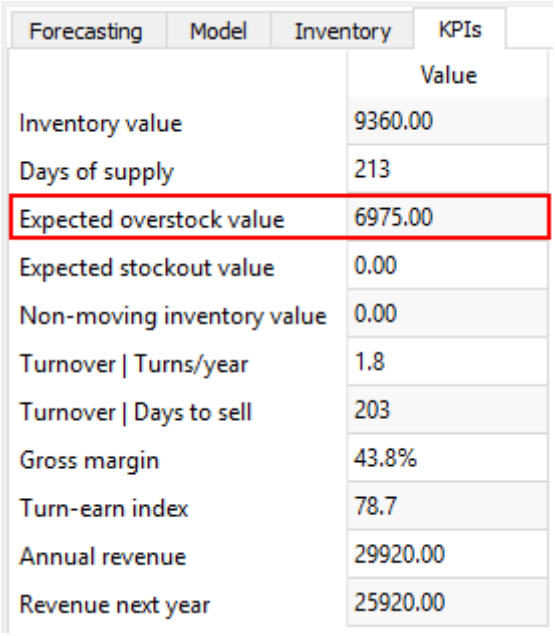
# Analyzing Items Based on Overstock and Stockout Values

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.

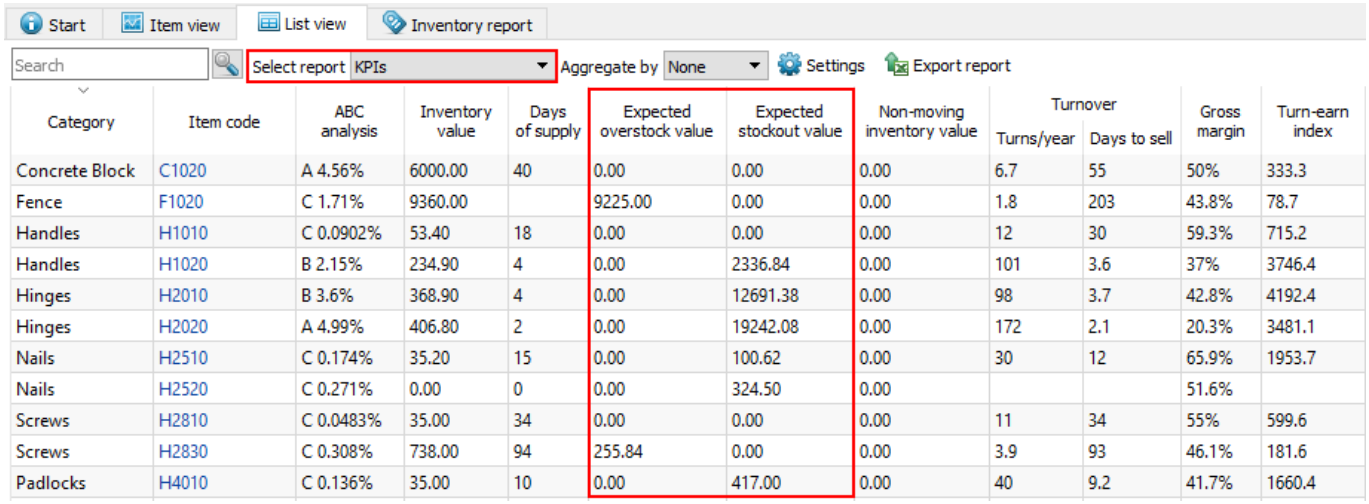
To view the expected overstock or stockout value on an item basis:

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).




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

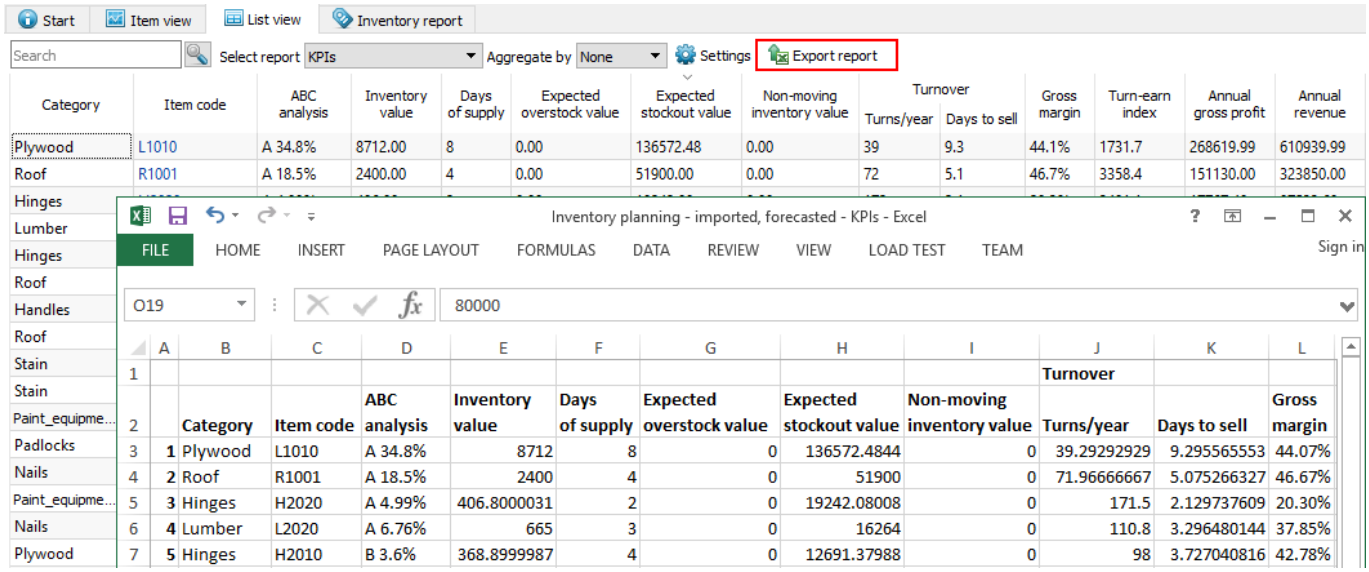
To view expected overstock and stockout value for all of the items in one report, go to the **Reports** tab and select the **KPIs** report (see figure below).




| Category | Item code | ABC analysis | Inventory value | Days of supply | Expected overstock value | Expected stockout value | Non-moving inventory value | Turnover | | Gross margin | Turn-earn index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Turns/year | Days to sell | | |
| 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).




| Category | Item code | ABC analysis | Inventory value | Days of supply | Expected overstock value | Expected stockout value | Non-moving inventory value | Turnover | | Gross margin | Turn-earn index | Annual gross profit | Annual revenue |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Turns/year | Days to sell | | | | |
| Plywood | L1010 | A 34.8% | 8712.00 | 8 | 0.00 | 136572.48 | 0.00 | 39 | 9.3 | 44.1% | 1731.7 | 268619.99 | 610939.99 |
| Roof | R1001 | A 18.5% | 2400.00 | 4 | 0.00 | 51900.00 | 0.00 | 72 | 5.1 | 46.7% | 3358.4 | 151130.00 | 323850.00 |

| | | Category | Item code | ABC analysis | Inventory value | Days of supply | Expected overstock value | Expected stockout value | Non-moving inventory value | Turnover | | Gross margin |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Turns/year | Days to sell | |
| 3 | 1 | Plywood | L1010 | A 34.8% | 8712 | 8 | 0 | 136572.4844 | 0 | 39.29292929 | 9.295565553 | 44.07% |
| 4 | 2 | Roof | R1001 | A 18.5% | 2400 | 4 | 0 | 51900 | 0 | 71.96666667 | 5.075266327 | 46.67% |
| 5 | 3 | Hinges | H2020 | A 4.99% | 406.8000031 | 2 | 0 | 19242.08008 | 0 | 171.5 | 2.129737609 | 20.30% |
| 6 | 4 | Lumber | L2020 | A 6.76% | 665 | 3 | 0 | 16264 | 0 | 110.8 | 3.296480144 | 37.85% |
| 7 | 5 | Hinges | H2010 | B 3.6% | 368.8999987 | 4 | 0 | 12691.37988 | 0 | 98 | 3.727040816 | 42.78% |

## Next: Creating Purchase Orders

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