# 6.9. Material Requirements Planning

Streamline allows you to generate a plan of material requirements based on the demand forecasts of finished products and a bill of materials (BoM).

All SKUs can be divided into three groups when manufacturing:

- *Finished* items are the finished products or goods.
- *Intermediate* items are made during the manufacturing process and are used to create finished products.
- *Material* is used to build intermediate items and finished items. It represents the lowest level of a BOM tree.

The table below shows the cases which Streamline supports in material requirements planning.

| SKU type | Sell | Purchase | Manufacture |
|---|---|---|---|
| *Finished* | + | one of | |
| *Intermediate* | + | one of | |
| *Material* | + | + | |

According to the table:

- *Materials and intermediate items can be sold in addition to being involved in manufacturing*. There are two consumption channels in this case and Streamline calculates the total quantity you should have to cover the future needs of these. Obviously, sales history of these items should be provided as well.
- *Finished products or intermediate items can be either purchased or manufactured*. Streamline allows you to set up which items to produce, and which, to order in the current period. If you purchase them (and not produce them) from your supplier, their components are not included in the material requirements plan.

Basically, Streamline generates a production plan for finished products and intermediate items, and a material requirements plan for materials.

If the production plan quantities recommended by Streamline are over the manufacturing capacity, the decision of how much to order from your suppliers or to produce is up to the manager, not Streamline. For example, we buy some complex parts but can machine them for ourselves if needed. Or our production facilities are limited and in the case of large demand, we outsource manufacturing elsewhere.

In addition to a material requirements plan, Streamline can generate a purchase plan for those items which are not involved in the manufacturing process and are only sold.

## Assumptions and Limitations

There are several assumptions that Streamline makes when it builds a material requirements plan:

- Production facilities supply each location (stock). When the distribution center is present,

production facilities are attached to it only.
- The time to produce and deliver finished product from the factory to stock is insignificant.
- Unlimited production facilities. Production time is negligible; materials are turned into finished products as soon as they arrive.
- The components and materials that have a shelf life period are consumed by production before they expire. Component shelf life is long enough to not limit production. So, we never get a situation that the canned vegetable factory is working at full power and tomatoes are rotting because there is nothing to do with them.
- Safety stock for finished products is kept in finished products, not in materials or intermediate items.

Thus, Streamline can be of help for:

- Assemblers who take a number of pre-assembled units and join them together to meet the needs of a specific customer. For example, bicycle assembly.
- Manufacturers who procure and stock raw materials which are used to build sub-assemblies and top-level assembled items. These items are kept on hand to fulfill sales orders for standard products.
- Manufacturers who keep on hand in raw materials but have little production time, for example, bakeries.
- Any other industry that matches the assumptions and limitations listed above.

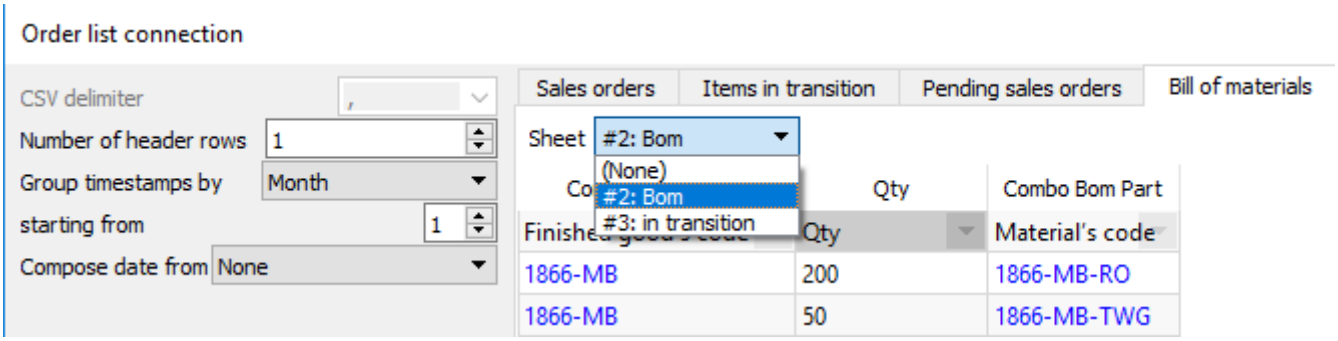
# Connecting Your Data

Material requirements planning is available if you import data using the Transactional spreadsheet connection or Database connection.

Let's consider an example of importing a bill of materials from an Excel file using the **Transactional spreadsheet connection**. The sales history and inventory information should be prepared as described in the data format section. *Bill of materials information* should be on a separate spreadsheet, as in the case of the *In-transition information* and *pending sales orders*.

To connect your data:

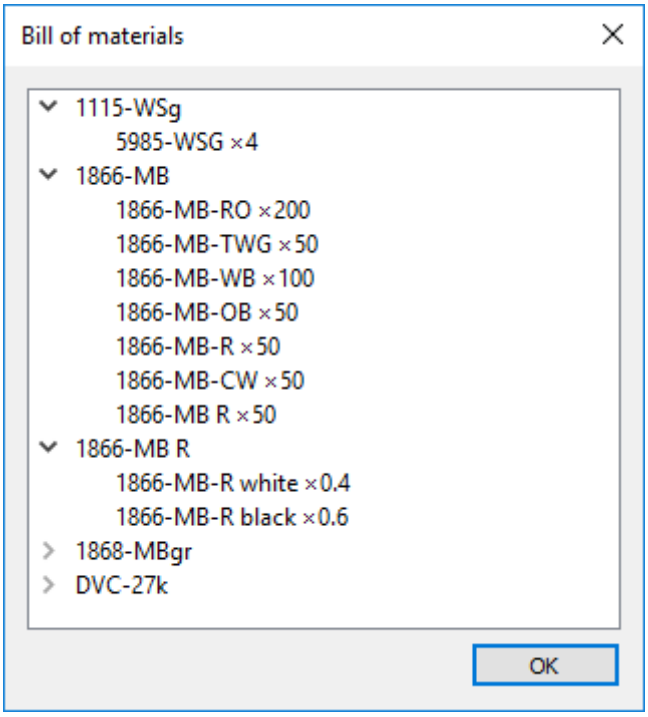
1. Go to the **File** > **New** > **Spreadsheet connection** > **Transactional data**.
2. Choose your data file and click the **Open** button.
3. Configure the **Sales orders** tab by matching the meaning of your data table columns with the choice in the corresponding combo-box option.
4. Go to the **Bill of materials** tab and choose the Excel sheet containing the bill of materials information by using the **Sheet** control.



5. Set the meaning of the columns.
6. Click **OK**.

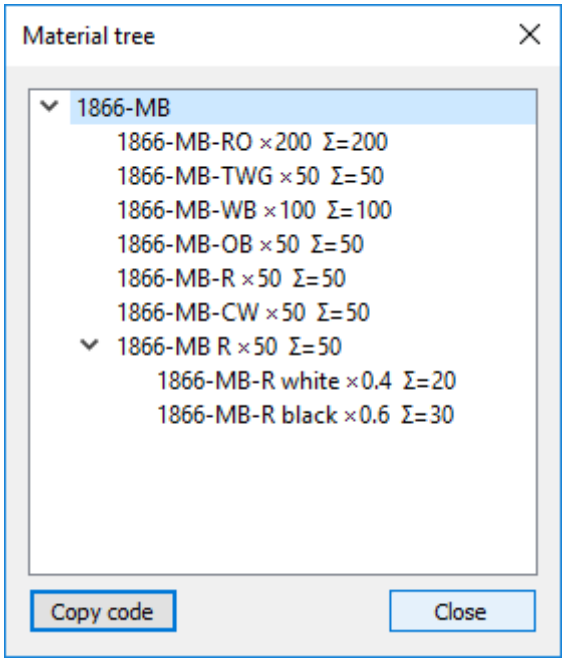
# Viewing Bill of Materials

To view the imported bill of materials, go to the menu **Item** > **Bill of materials** > **Entire bill**.




The first level of the tree shows codes of finished products, and the indented ones, the codes of their components and the quantity required to build the products (the quantity is indicated after the × symbol).

Streamline can also calculate the amount of each material and intermediate item needed to build the finished product. To view this information, select the finished product in the **Tree view** and go to the menu **Item** > **Bill of materials** > **Material tree**.




As you see, to produce **50** units of **1866-MB R**, we need **20** units of **1866-MB R** white and **30** units of **1866-MB R** black.

Alternatively, you can view which finished products use a particular material. To do this, select the material in the **Tree view** and go to the menu **Item** > **Bill of materials** > **Product tree**.

### Changing bill of materials

When you create a new project, Streamline establishes a connection to your data source. Thus, to change the bill of materials, modify the BoM in your ERP, database, or Excel file, then click the **Update data** button.

## Material Requirements Planning

A material requirements plan is calculated based on the demand forecasts of finished products. Here is the basic workflow you can follow when planning material requirements:

1. Generating the forecasts.
2. Viewing the forecasts.
3. Approving the forecasts.
4. Analyzing the material requirements plan.
5. Adjusting the material requirements plan.

### Generating the forecasts

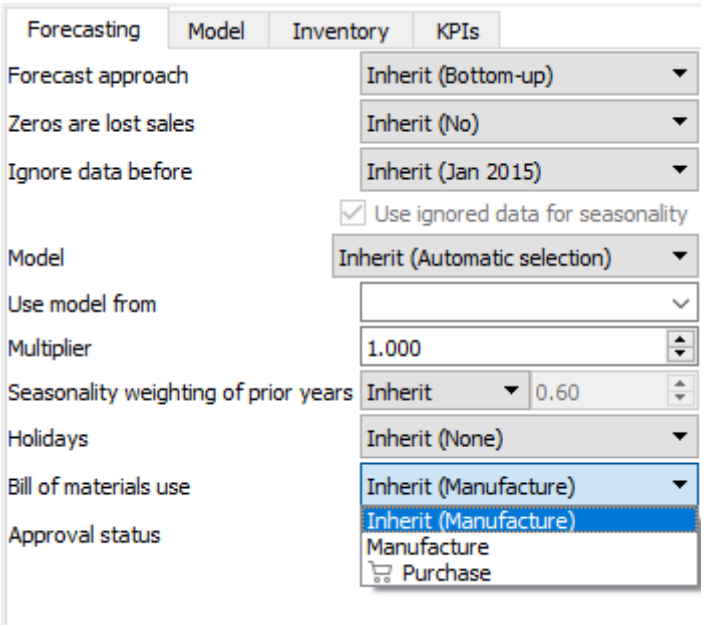
Streamline creates the material requirements plan once the forecasts have been generated. To generate the forecasts and plan:

1. Set the forecast **Horizon** to the number of time periods to forecast.
2. Configure the **As of** parameter.

3. Click the **Forecast** button.

To learn more about the parameters and options impacting the forecast generation process, please refer to Generating and viewing the forecasts. Here we will focus on the forecasting settings that affect the material requirements plan.

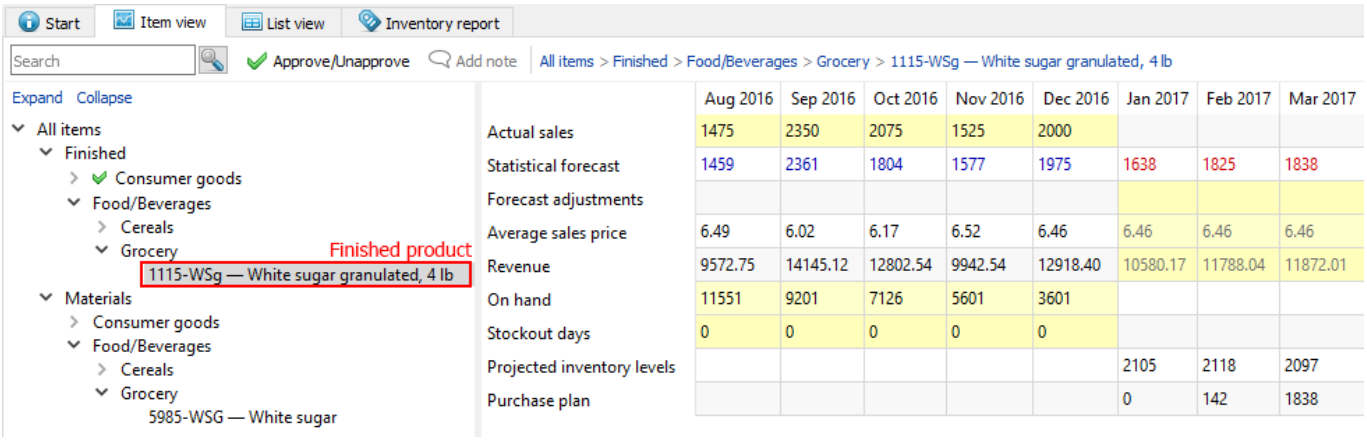
If an intermediate item or finished product is not constantly produced, for example, it was being purchased for a month in the past, then it was produced the month after, but should be purchased currently again, Streamline allows you to control which items to purchase and which to produce, in the current period. To do this, select the item in the **Tree view** and choose the appropriate option of the **Bill of materials use** setting in the **Forecasting tab** of the **Panel**.



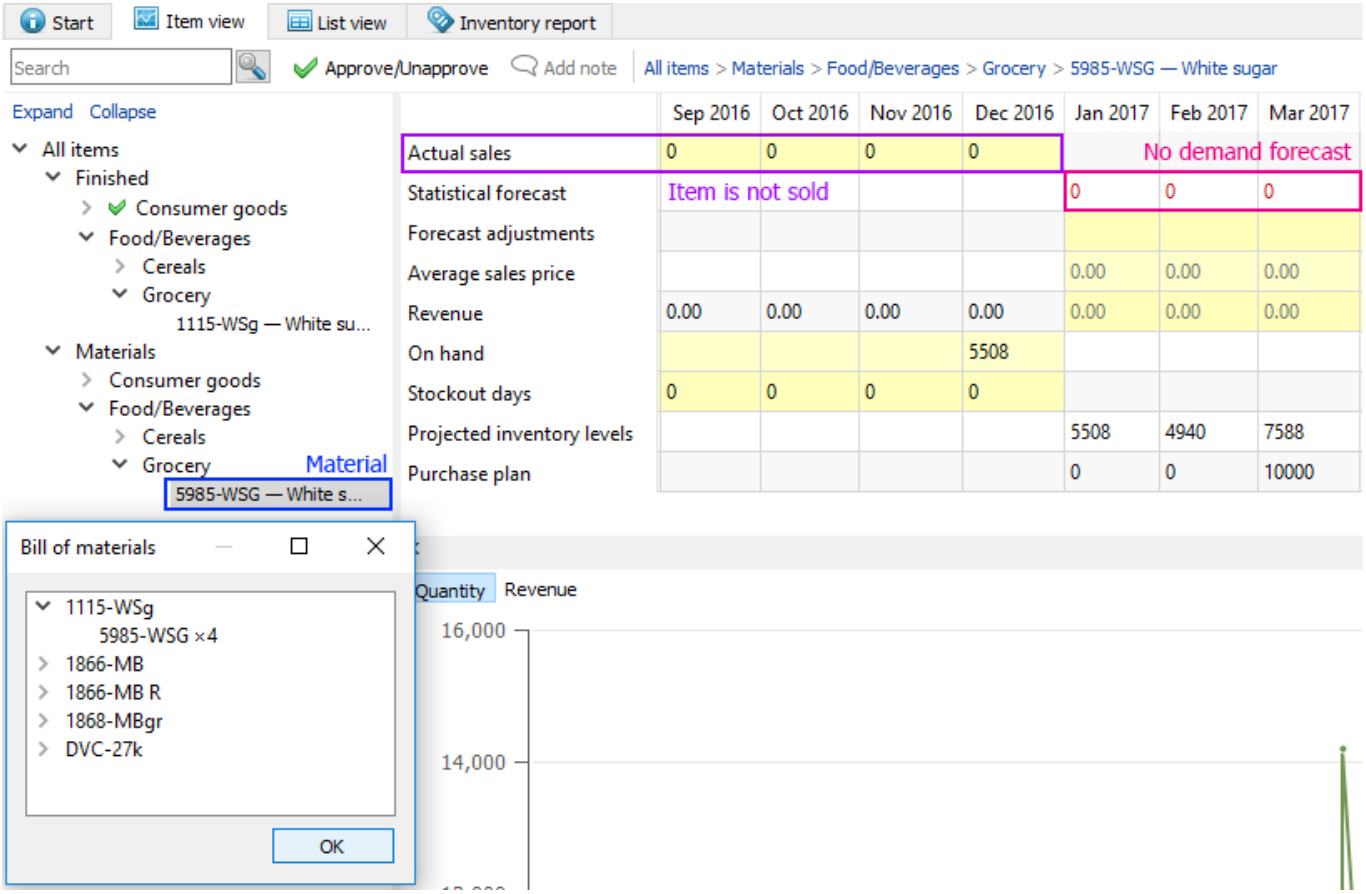

The option can be applied at any level of the tree. After the control has been changed, re-forecast the project by clicking the **Forecast** button, to update the forecasts and material requirements plan.

## Viewing the forecasts

The forecasts are shown on the **Demand forecasting** tab. Streamline builds forecasts for *Finished* items (see figure below).



If a *Material* or *Intermediate* item is not sold as a single item and is only involved in manufacturing, Streamline shows no demand forecast for such an item on the **Demand forecasting** tab (see figures below).




If a *Material* or *Intermediate* item is sold additionally to manufacturing, Streamline shows its actual sales and forecasts in the **Table** on the **Reports**. In this case, the **Order now** column and **Purchase plan** section shows the sum of item demand forecast and item consumption quantity required for manufacturing. You can also view these forecasts:

- In the **Demand forecast** section of the **Inventory planning** table. By default this section is hidden. To show it, go to menu **File** > **Settings** > **Inventory** tab and check the **Demand forecast** option of the **Show columns** group.
- In the **Final forecast report** on the **Reports** tab.

Streamline does not show past and current consumption of *Material* or *Intermediate* item. Future consumption for such an item is shown in the material requirements plan.

## Approving the forecasts

As long as the forecasts have been generated, it's time to approve them.

## Analyzing Material Requirements Plan

To view the material requirements plan, go to the **Inventory planning** tab. The tab shows a table that contains the material requirements plan, production plan, and (optionally) purchase plan. To see them located one under another, sort the table by the **Type** column as shown in the figure below.

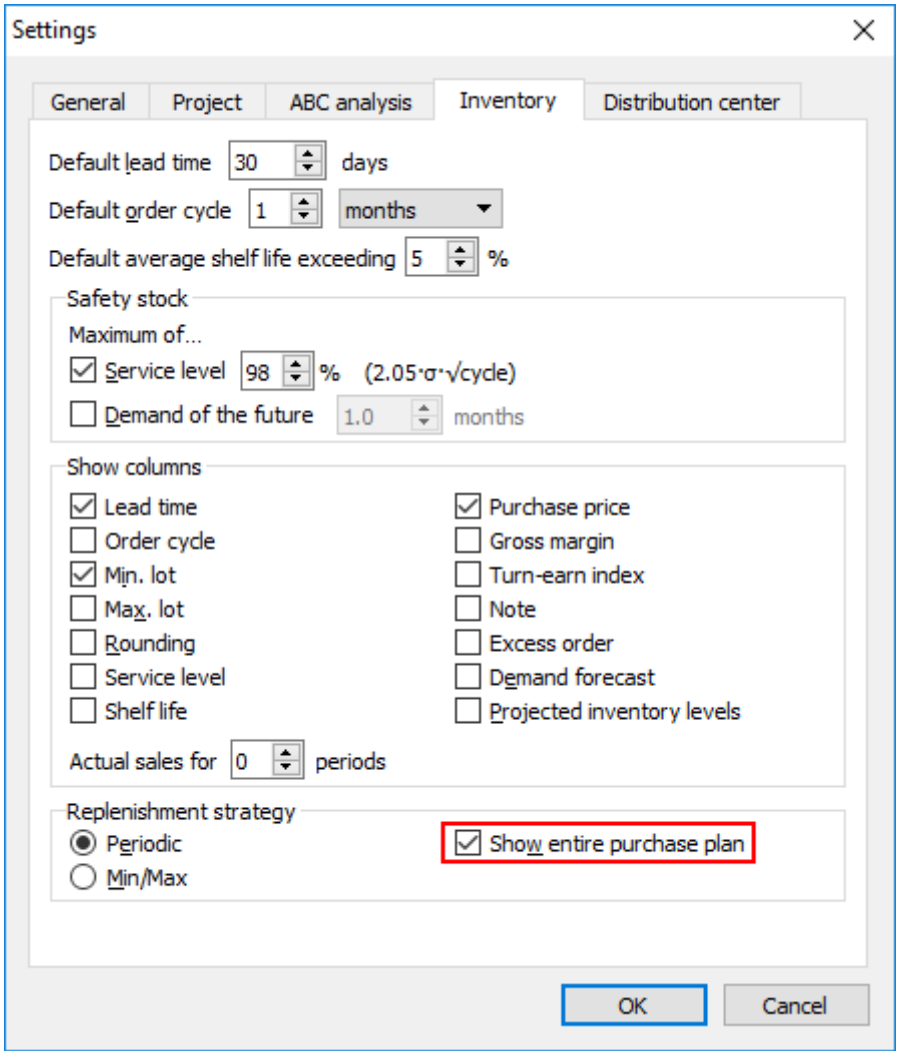
| Item code | Description | Type | On hand | Days of supply | Pending sales orders | In transition | Lead time, days | Safety stock | Safety stock debt | Purchase price | Order now | | Demand forecast | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Qty | Value | Jan 2017 | Feb 2017 | Mar 2017 | Apr 2017 |
| 1115-WSg | White sugar gra... | Finished | 3601 | 63 | 0 | 0 | — | 280 | | 5.98 | 0 | 0.00 | 1638 | 1825 | 1838 | 1817 |
| 1866-MB | Muesli box, 500 g | Finished | 30 | 32 | 0 | 0 | — | 11 | | 7.99 | 9 | 71.91 | 28 | 33 | 69 | 49 |
| 1868-MBgr | Muesli box + 25... | Finished | 60 | 33 | 0 | 0 | — | 16 | | 9.99 | 11 | 109.89 | 55 | 64 | 135 | 97 |
| DVC-27k | Drone with 2.7K ... | Finished | 103 | 9 | 0 | 0 | — | 16 | | 409.00 | 263 | 107567.00 | 350 | 359 | 369 | 379 |
| 1866-MB R | Raisins mix | Intermediate | 750 | 36 | 0 | 1000 | — | 0 | 0 | 1.10 | 0 | 0.00 | 0 | 0 | 0 | 0 |
| 1866-MB-CW | Chopped walnuts | Material | 850 | 23 | 0 | 0 | 90 | 0 | 1558 | 1.12 | 10119 | 11333.28 | 0 | 0 | 0 | 0 |
| 1866-MB-OB | Oat bran | Material | 700 | 19 | 0 | 0 | 60 | 0 | 1558 | 1.23 | 13513 | 16620.99 | 0 | 0 | 0 | 0 |
| 1866-MB-R bla... | Raisins black | Material | 200 | 38 | 0 | 0 | 30 | 0 | 0 | 1.25 | 2500 | 3125.00 | 0 | 0 | 0 | 0 |

The **Type** column indicates the item type described earlier. If an item has an empty cell in this column, it is considered as a regular SKU which is not involved in manufacturing and is only purchased and sold. Streamline generates a purchase plan for such items.

A part of all the plans is represented by the **Order now** section. The **Qty** column of this section tells how much you should:

- place as a work order today for the *Finished* and *Intermediate* items (*Production plan*);
- order today from your suppliers to cover the material needs of *Materials* (*Material requirements plan*); and
- order today to respond to the future demand for the regular items (*Purchase plan*).

To show the entire plans which include all forecasted periods, go to the report settings and check the **Show entire ordering plan** option.




| Item code | Type | Order now | | Purchase plan | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Qty | Value | Feb 2017 | Mar 2017 | Apr 2017 | May 2017 | Jun 2017 | Jul 2017 | Aug 2017 |
| 1115-WSg | Finished | 0 | 0.00 | 142 | 1838 | 1817 | 1408 | 1359 | 1510 | 1463 |
| 1866-MB | Finished | 9 | 71.91 | 33 | 69 | 49 | 37 | 13 | 83 | 34 |
| 1868-MBgr | Finished | 11 | 109.89 | 64 | 135 | 97 | 74 | 26 | 167 | 68 |
| DVC-27k | Finished | 263 | 107567.00 | 359 | 369 | 379 | 388 | 398 | 408 | 417 |
| 1866-MB R | Intermediate | 0 | 0.00 | 1350 | 2450 | 2450 | 1850 | 650 | 4150 | 1700 |
| 1866-MB-CW | Material | 10119 | 11333.28 | 6512 | 2288 | 14671 | 5984 | 8926 | 5456 | 4513 |

The **Purchase plan** section of the table shows how much you should order (*purchase plan* and *material requirements plan*) or produce (*production plan*) **by the first day** of each period. To quickly recognize the *Production plan* in the table, the **Type** column and **Order now** section are colored blue for produced items.

In addition, the table shows:

- the current state of your stock by the *On hand*, *Days of supply*, *Stockout* and *Overstock* columns;
- information on orders by the *Pending sales orders*, *In transition*, and *Purchase price* columns;
- inventory replenishment parameters such as *Lead time*, *Order cycle*, and *Service level*; and
- inventory calculations by the *Safety stock* and *Safety stock debt* columns.

**Safety stock** column shows the reserve stock for the items that are sold (no matter the item type). Its calculation depends on the replenishment strategy. In our example only *Finished* products are

sold, that is why **Safety stock** for *Materials* and *Intermediate* items is zero, according to the previously detailed assumption.

**Safety stock debt** shows the quantity of material or intermediate item that is required to keep the **Safety stocks** of all finished products that use this item at the recommended level. It is calculated for all items that are used to create finished goods.

A complete definition of all the table columns can be found in the inventory report reference.

### Adjusting Material Requirements Plan

**Inventory planning** has a set of parameters that can be adjusted. Each item type has its own set of parameters that can be changed. The table below shows this information.

| Type | Parameters |
|---|---|
| *Finished* | On hand, qty to receive, delivery date, pending sales orders, service level, shelf life, shelf life exceeding, safety stock |
| *Intermediate* | |
| *Material* | All of the parameters |

Note, that *Finished* and *Intermediate* items do not have:

- *Lead time* because they are produced in accordance with the previously detailed assumption.
- *Order cycle* because they are produced as required.
- *Min lot*, *max lot*, and *rounding* because Streamline does not assume any production constraints.

To learn the ways the parameters can be changed, refer to the Setting the replenishment parameters.

## Exporting Material Requirements and Production Plan

Streamline is very flexible when it comes to exporting reports. Actually, you can export any table that is shown in the **Inventory planning** tab to an Excel file. The table can be customized to include only necessary columns in the inventory report settings before the export.

Let’s export the plans by clicking the **Export report** button of the toolbar.

| E | F | G | H | I | K | L | N | Q | R | V | W |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Order now | |
| Item code | Description | Type | On hand | Days of su | In transition | Lead tim | Min lot | Safetystoc | Safety stoc | Qty | Value |
| 1115-WSg | White sugar gr | Finished | 3601 | 63 | 0 | — | — | 280 | | 0 | 0 |
| 1866-MB | Muesli box, 50 | Finished | | | | | | 11 | | 9 | 71.90999603 |
| 1868-MBgr | Muesli box + 2 | Finished | | | | | | 16 | | 11 | 109.8899994 |
| DVC-27k | Drone with 2.7 | Finished | 103 | 9 | 0 | — | — | 16 | | 263 | 107567 |
| 1866-MB R | Raisins mix | Intermediate | 750 | 36 | 1000 | — | — | 0 | 0 | 0 | 0 |
| 1866-MB-CW | Chopped waln | Material | 850 | 23 | 0 | 90 | 500 | 0 | 1558 | 10119 | 11333.28027 |
| 1866-MB-OB | Oat bran | Material | 700 | 19 | 0 | 60 | 1000 | 0 | 1558 | 13513 | 16620.99023 |
| 1866-MB-R bla | Raisins black | Material | | | | | | | 0 | 2500 | 3125 |
| 1866-MB-R wh | Raisins white | Material | | | | | | | 0 | 2500 | 2375 |
| 1866-MB-RO | Rolled oats | Material | 1000 | 7 | 8500 | 60 | 1000 | 0 | 6200 | 53750 | 33325 |
| 1866-MB-TWG | Toasted wheat | Material | 500 | 13 | 0 | 65 | 1000 | 0 | 1558 | 12947 | 13205.93945 |

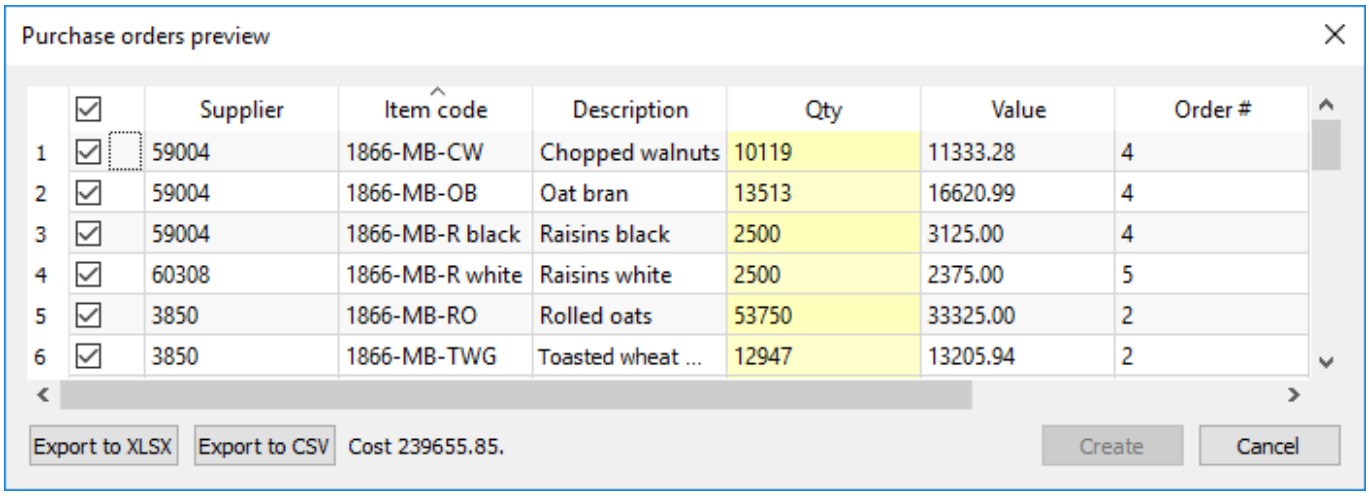
Production plan

Material requirements plan

# Exporting Material Requirements Plan as Purchase Orders

The **Order now** column of the material requirements plan can be exported as purchase orders into an Excel/CSV file or your inventory management system as newly created purchase orders (exporting to a third-party system requires that you have imported data from this third-party system).

Let's export the plan by clicking the **Export purchase orders** button found on the toolbar.




The **Purchase order preview** allows you to select which items to export and change the recommended quantities by editing the **Qty** column. Let's export all of the lines to an Excel file by clicking the **Export to XLSX** button.

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| | | **Supplier** | **Item code** | **Description** | **Qty** | **Value** | **Order #** |
| **1** | | 1125 | 1866-MB-WB | Wheat bran | 25750 | 12359.99972 | 1 |
| **2** | | 3850 | 1866-MB-RO | Rolled oats | 53750 | 33325.00026 | 2 |
| **3** | | 3850 | 1866-MB-TWG | Toasted wheat germ | 12947 | 13205.93975 | 2 |
| **4** | | 54002 | DVC-AB | Arm Boom | 790 | 8468.800211 | 3 |
| **5** | | 54002 | DVC-AE | Arm Elbow | 790 | 3673.500075 | 3 |
| **6** | | 54002 | DVC-AH | Arm Holder | 790 | 16724.30006 | 3 |

The **Export to CSV** button is specially designed to export very large tables.

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