

Unleashed Software AIM: Production Planning

A guide for manufacturers. August 2024.

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Introduction

AIM production planning is designed to automate a huge amount of work. Manual production planning involves visibility over numerous variables and dependencies. Issues can quickly escalate, leading to stock shortages, customer dissatisfaction, and financial impact. Through this process our goal is to consider these dependencies and create a production plan you can work off to run your production processes.

Looking at how production planning works manually, it generally involves figuring out the replenishment timeline of a finished product based on several factors. These include, the forecast demand, booked transactions, such as sales orders, purchase orders and existing production jobs to plot when replenishments are needed to arrive. Based on the replenishments of a product the quantity of components needed at a given point in time can be calculated. If the component is itself an assembled product, then the process repeats to calculate the demand of sub-components over time. Eventually once everything is calculated you will have a plan that details the dates and quantities of every replenishment assembly job or purchase order required to fulfil the demand expected for a finished product.

A major problem arises when at any moment the calculated production plan, that took hours to calculate, is voided because a minor change occurred. A stock count took place, a sales order came in, a transfer of stock was created, or the forecast sales didn't eventuate. The complexity of a production plan is compounded by the fact that it is needs to re-calculated whenever anything changes, creating a balancing act of manual work done often enough to provide meaningful information without overwhelming productivity.

Often this will lead to a small number of staff managing a complicated and possibly fragile spreadsheet.

This document will discuss the process of forecasting an assembled product and calculating a production plan using Unleashed Advanced Inventory Manager, a module of the Unleashed Inventory Management System.

The concept

Unleashed has recently added more information inside a Bill of Materials to be able to calculate how long a production job will take. This is called 'production duration.' It also details what days of the week production operates and how many hours a day it will operate for. This allows the AIM production demand system to roll back a required replenishment date to calculate when that replenishment is likely to need to be started. Entering in this information on your bill of materials is needed to use AIM production planning, unless your products can be put together in next to no time at all!

In AIM we can calculate replenishments required as you forecast your demand and set your stock holding strategy. AIM will incorporate your open transaction and plot your stock movement resulting from this. AIM will then forecast the future stock on hand and populate when replenishments are needed. This in turn means that we can apply the production duration to calculate the quantity of components and the date that they will get drawn down from stock.

If components are assembled from sub-components, then the whole process repeats with the replenishments over time predicted, the start date and quantity of components calculated, and the replenishments converted to demand on components. This finishes when the lowest level components that are likely purchased are calculated, and no further components are impacted by any replenishments.

If you have a multi-warehouse organisation you will map the demand to the warehouse where the product gets made. This will ensure that your replenishments of components are calculated where they are needed.

In AIM, the forecast demand and stock holding strategy is set on one product at a time. The server processes all the down stream effects on components once a forecast is submitted. You will see that the UI indicates that component quantities and a production plan are not available until you have submitted your forecast, and the resulting calculations are processed. This is because you will need to finalise your forecast for a product before submitting it to the server, after which it will calculate all the impacts your changes have cascaded on to other products.

Once the system has calculated your plan, you can take this document and create transactions for your next period you want to book in. You can then return to AIM to recalculate your plan as your stock on hand, bookings or forecast change.

A note on Bills of Materials configuration

AIM production planning requires details to be populated in the BOM to adequately calculate the production duration of jobs. If you want the production duration to be calculated as the same amount of time, every time, select the Duration Type to 'Per Assembly.' If you want the assembled quantity to determine the duration, then set the Duration Type to 'Per Unit.'

You can then enter in the days of the week and the hours of the day that the production occurs during. These details will enable AIM to calculate the start date, which informs AIM when the component demand will be drawn down.




Figure 1: Configuring production duration inside a Bill of Materials.

Production Planning in AIM

Planning production in is done within the Product Forecast system. Product forecast sets the forecast demand per month, giving you a 'burndown' of stock per day over the month. One of the goals of Production Planning is to connect the forecast demand and required replenishments to the forecast of components that are used to assemble that product.

Let's look at how a forecast with a production plan is created...

Setting a forecast on an assembled product

To open a forecast for a product, simply search for a product in the AIM Insights Dashboard.

You can filter the warehouses to return results for only that warehouse, or you can open the product and change the warehouse from within the forecast.

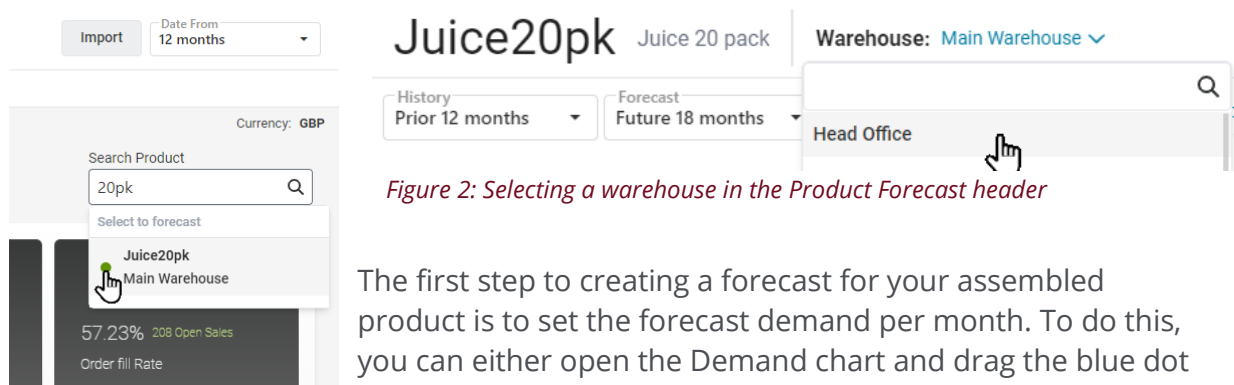


Figure 2: Selecting a warehouse in the Product Forecast header

Figure 3: Opening a forecast from the Insights Dashboard

The first step to creating a forecast for your assembled product is to set the forecast demand per month. To do this, you can either open the Demand chart and drag the blue dot for each month, or you can open the Table and type in the forecast demand for each month. Hit enter to move from one month to the next to make data entry faster.



For my product, I have a few months of no demand and then the product launches with a peak of demand over the new year, an off-season lull and then a higher peak at the end of the following year.

Figure 4: Drag to set the forecast demand per month

Setting a stock holding strategy

It's now time to think about our stockholding strategy for this product.

Apply Forecast: ⓘ

Strategy: Stock Days ▼

Min Days of Stock: Days

Max Days of Stock: Days

Note: Lead Days not used in calculation.

You can choose between using a 'Just-In-Time' strategy or a 'Stock Days' strategy. Just in time will start with the lead days value which is useful if you are purchasing a product, and it always takes a set number of days to arrive. In my case, the amount of time stock takes to arrive will depend on the size of the job, using our production duration calculation. Therefore, setting a fixed lead time isn't useful and isn't used by the server when calculating a production plan. If you plan on purchasing a product, you can use this to help you

Figure 5: The strategy panel set to 'Stock Days'

figure out the required purchase date though.

I've opted for a Stock Days strategy, which simply sets the number of days I want to hold in stock as a minimum and a maximum. Every day in the forecast, the system will check if the SOH is enough to cover the following number of days equal to the minimum days of stock set. If the demand exceeds the stock on hand, then a replenishment is created which equals the demand forecast over the maximum days of stock. It's a little more complicated than this, as you can have pending replenishments that need to be considered, but this is a basic description of how the system will calculate whether a replenishment is required and what the size should be.

The third strategy is 'Manual' where you simply enter a min and max quantity of stock, and the system will replenish when it falls below this limit. This is not recommended for use with Production Planning as the size of replenishment is fixed and will trigger replenishments when demand may not be present. In comparison, the Stock Days strategy will defer replenishments that aren't required, leading to a leaner and more cost-effective solution.

We'll talk about the option to 'Apply Forecast' when we look at the future stock-on-hand chart.

Setting a replenishment strategy

Because I am making packs of juice, I have decided to setup a replenishment based on set intervals. Every 7 days the stock will be replenished up to a quantity equal to the demand calculated across the following max days of stock. In this case I am going to

replenish up to 30 days of stock. Whenever a replenishment is triggered, the system will look at the forecast demand of the following 30 days and set the quantity equal to that demand. This will include open transactions and forecast demand, so you may have a large sales order be entered and affects your future stock on hand and triggers a replenishment to compensate.

Reviewing future stock on hand

Switching the chart selector to 'Supply' will display the future stock on hand, indicating how your forecast demand, booked open transactions and forecast replenishments will come together to give you a view across the forecast period.

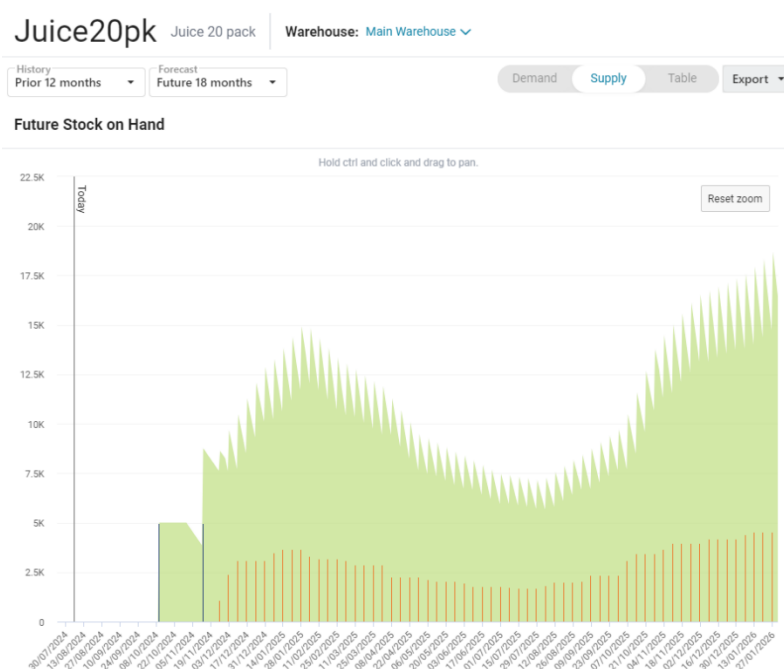


Figure 6: Future Stock on Hand chart

on hand reacts to your changes.

Using the export button, you can get a replenishment plan CSV file to help you plan your purchases. Another interesting option is a SVG graphic that allows you to zoom in to all the fine detail.

In the legend of the chart, you can click to enable and disable different series of data. Use this if you want to overlay the forecast demand per month for reference.

You can also click and zoom and scrolling sideways to look at the detail in a more reasonable time scale, such as a month at a time.

Edit your strategy for days of stock you wish to hold as either a minimum buffer or a maximum setting and view how the future stock

Understanding the Product Forecast table

History		Forecast									2025	
Prior 12 months		Future 18 months									Jan	
Date	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar		
Demand												
Actual (Allocated)	0	0	0 (0)	0	0	0	0	0	0	0		
Assembly Demand ⓘ												
Forecast ▾			--	--	0	2,855	10,228	13,753	14,646	14,030		
Linear	0	0	0	0	0	0	0	0	0	0		
Seasonal				0	0	0	0	0	0	0		
Supply												
Open (Incoming)			0	0	5,000	5,000	0	0	0	0		
Required ⓘ			0	0	0	1,104	14,845	14,487	12,814	14,562		

Figure 7: The forecast table, detailing monthly facts and allowing forecast data entry.

Beside the Demand and Supply chart is the option to display the forecast Table. Here you'll see rows of numbers by months in columns. Here's a quick list of definitions to help you interpret the table:

Demand

Actual (Allocated): For months in the past, or current month, then the actual demand that has occurred is displayed. Allocated demand is the quantity that is added a transaction that will create demand as soon as it is completed. For example, you may have a pending sales order with a due date to ship in a few months' time. The allocated stock quantity will show under that month as an allocated quantity. For the current month we are in, it is possible to have both actual and allocated stock, so the two numbers are displayed with actual and (allocated) in brackets.

Assembly Demand

Production Demand (not pictured): Only shown if the forecast you are viewing is for a component product. Production demand is the quantity that is forecast to drawn down in stock for that month.

Forecast: This is your forecast per month. Enter your cursor into the first month and type the quantity you think will be sold/used. Hit enter to move to the next month and repeat. When you are done, click out of the forecast entry box and the forecast will be calculated. This is done once at the end of data entry to improve the user experience and reduce lag due to calculations as you type.

Linear: Where the linear trend line derived from the actual performance of the product in the past intersects with the future month. The linear trend line will be a straight line on the forecast demand chart, and it will change depending on the amount of actual demand in the past and the length of history you select in the header of the forecast.

Seasonal: As above. Indicates the quantity forecast of the seasonal trend line at each month. In the forecast demand chart, the seasonal trend line will deviate from the linear trend by factoring in how the difference that same month in past years was compared to the linear trend. So if every August your actual performance for August is one third lower than the linear trend, then you'll notice that the forecast for next August will also be a third lower than the linear trend. Even if the forecast linear trend is going up, then you'll see August has a dip to it still. This will recreate a seasonal adjustment of some months being higher or lower due to seasonality. If you find the seasonal trend useful, you'll want to use a longer history range, such as 18-36 months instead of just 12 months to consider more data.

Note: For our new juice product pictured above, we have no history as this is a new product. Therefore, we have no linear or seasonal trend line to help us set our forecast. If your product does, then you can use the drop down 'Fill forecast' option to set your forecast to one of these trend lines to help you get started with a forecast.

Supply

Open (incoming): The open supply row will indicate how much stock is coming in from open transactions, such as assemblies or purchase orders. The quantity will appear in the month set by the required date or expected delivery date.

Required: The required stock row shows the quantity of replenishments that the forecast is generating each month. This indicates how much I will need to replenish if my forecast demand occurs.

Configuring component demand

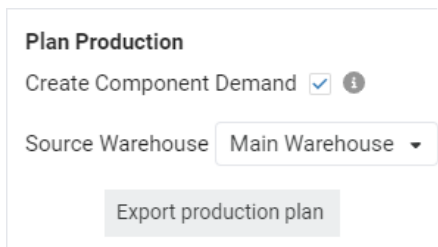


Figure 8: The production demand control panel

Under the stock strategy settings are the production demand controls. By default, the option to calculate component demand is off. Before we create a forecast for our finished products, we'll turn this option on which will enforce this option on for all components and sub-components under this product. The calculation will kick off on the server

once we submit our forecast.

You can also select a 'Source Warehouse.' This determines where the component demand will be sent. This is useful for organizations that are multi-warehouse and want a spoke and hub structure to replenishing stock. If you have forecasts for sales locations, you will want to send the component demand to the factory that will be housing the components and assembling the product. Otherwise, AIM will plan for component stock to be located at sales locations directly.

We also have a button here to export our production plan, which is disabled if the forecast has not been submitted. The link will also disable as soon as we edit a forecast, as the previously calculated plan on the server will be invalidated. Even a slight change in strategy or forecast demand will mean that every dependent replenishment will need to be recalculated down through the bill of materials tree.

Submitting a forecast for an assembled product

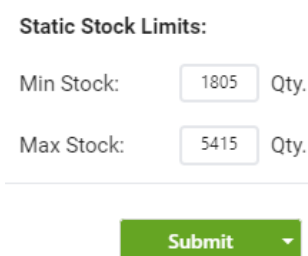


Figure 9: Submit a forecast button

Once you have forecast your demand, set a strategy and enabled 'calculate component demand', you are then ready to submit your forecast. Give your forecast submission a name and confirm the submission.

This will start the production demand calculation process on the server as indicated by a blue notification in the Plan Production panel.

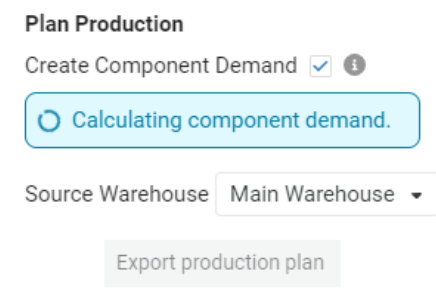


Figure 10: Production plan processing notification after submitting a forecast

You can safely navigate away from the product as this process is occurring on the server. You'll also see a notification on component products that their demand is being recalculated.

When the process has finished the assembled product notification will disappear. A component product will have a new notification saying that the production demand has been updated, with a refresh link to reload the charts with the new information.

The Export Production Plan and Production side panel calculations will now be active.

A note on stock limits

The replenishment calculation in AIM is based on your strategy of how many days of stock you wish to hold. This does not rely on the stock limits which are calculated based on the average amount of demand across your forecast. If you used the Reorder Report in Unleashed to replenish your stock, you may run into a few issues.

Firstly, the stock alert system simply checks if your stock level is below a minimum quantity and then stocks up to a maximum limit. This limit might be too much stock for the off season, and too little stock for the peak season. There also might not be any demand forecast and the stock alert will get you to replenish anyway.

In AIM, we're looking to enhance the process beyond what stock alerts, stock limits and the Reorder Report can do for you. The future stock on hand chart can be exported to a CSV directly, or the Production Plan can be used for assembled items to produce a smarter plan that defers replenishments that aren't needed, improving cashflow.

As AIM is further developed, you'll see how it allows you to easily execute a replenishment plan in more automated ways.

Reviewing Component Demand and navigating the production tree

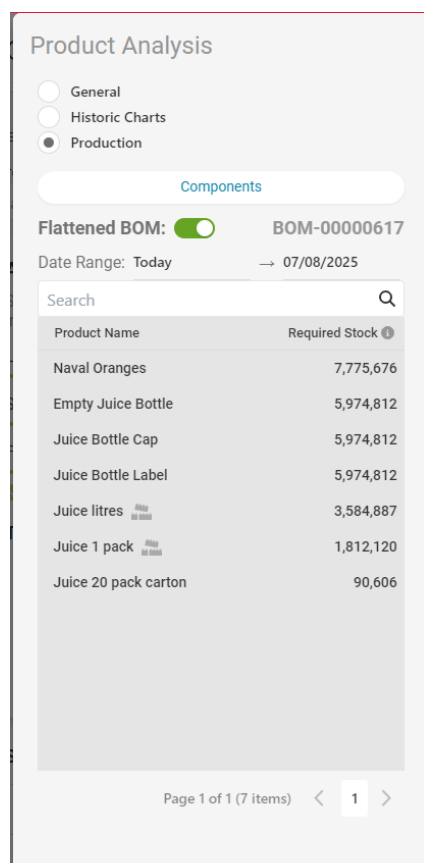


Figure 11: The Production panel

One aspect of the forecast interface we haven't touched on is the left-hand Product Analysis panel. You can switch pages on this using the radio buttons. Let's look at the details available under the Production radio button.

If the forecast you have open is an assembled item, you will have a 'Components' section, while a component product will have an 'Assemblies' section. A product that is both assembled and a component will have both. The list of details will show the components that are under or the assembled items that are above the current product respectively. Clicking a product here will switch the forecast to that product, so you can navigate up and down the BOM tree inside the Product Forecast interface.

You also have the option to enable or disable a 'flattened BOM' view. If enabled, then you will see all components or assembled items across all levels. If disabled, then you will only see a single level at a time. Below this, there is a date range selector that filters the demand calculation on the components. If you are planning replenishments for a window in time, set the

filter here to see how much of a product you will need. The demand calculation will display the 'required stock,' which is the additional amount of stock the forecast is estimating will be needed in addition to any open transactions that are created.

Once again, if you edit the forecast, the demand calculations in this panel will become n/a. You'll need to submit your forecast to trigger a recalculation of the component demand.

Creating a production plan

Once you have a production plan link in your forecast, click it to download a CSV file, and open it as a spreadsheet. The file will be sorted by product and then by suggested creation date of replenishments.

Here's what my juice production plan looks like:

Production Demand Forecast Transactions	Description	Type	Quantity	Suggested Creation Date	Expected Completion Date	Warehouse Source	Warehouse Destination
Oranges	Naval Oranges	Purchase	82740	23/08/2024	25/08/2024		Main Warehouse
Oranges	Naval Oranges	Purchase	205668	10/09/2024	12/09/2024		Main Warehouse
Oranges	Naval Oranges	Purchase	393347	24/09/2024	26/09/2024		Main Warehouse
Oranges	Naval Oranges	Purchase	236749	16/10/2024	18/10/2024		Main Warehouse
Oranges	Naval Oranges	Purchase	389036	28/10/2024	30/10/2024		Main Warehouse
Oranges	Naval Oranges	Purchase	552490	11/11/2024	13/11/2024		Main Warehouse
Oranges	Naval Oranges	Purchase	655679	29/11/2024	1/12/2024		Main Warehouse
Oranges	Naval Oranges	Purchase	611701	21/12/2024	23/12/2024		Main Warehouse
Oranges	Naval Oranges	Purchase	383337	16/01/2025	18/01/2025		Main Warehouse
Oranges	Naval Oranges	Purchase	445149	30/01/2025	1/02/2025		Main Warehouse
Oranges	Naval Oranges	Purchase	437711	19/02/2025	21/02/2025		Main Warehouse
Oranges	Naval Oranges	Purchase	407830	13/03/2025	15/03/2025		Main Warehouse
Oranges	Naval Oranges	Purchase	343386	4/04/2025	6/04/2025		Main Warehouse
Oranges	Naval Oranges	Purchase	343795	26/04/2025	28/04/2025		Main Warehouse
Oranges	Naval Oranges	Purchase	309092	20/05/2025	22/05/2025		Main Warehouse
Oranges	Naval Oranges	Purchase	315063	7/06/2025	9/06/2025		Main Warehouse
Oranges	Naval Oranges	Purchase	344322	27/06/2025	29/06/2025		Main Warehouse
Oranges	Naval Oranges	Purchase	469154	15/07/2025	17/07/2025		Main Warehouse
Oranges	Naval Oranges	Purchase	794903	29/07/2025	31/07/2025		Main Warehouse
Oranges	Naval Oranges	Purchase	925859	14/08/2025	16/08/2025		Main Warehouse
Oranges	Naval Oranges	Purchase	988510	3/09/2025	5/09/2025		Main Warehouse
Oranges	Naval Oranges	Purchase	961200	25/09/2025	27/09/2025		Main Warehouse
Oranges	Naval Oranges	Purchase	923715	17/10/2025	19/10/2025		Main Warehouse
Oranges	Naval Oranges	Purchase	880673	6/11/2025	8/11/2025		Main Warehouse
Oranges	Naval Oranges	Purchase	469193	8/12/2025	10/12/2025		Main Warehouse
Oranges	Naval Oranges	Purchase	171387	1/01/2026	3/01/2026		Main Warehouse
Oranges	Naval Oranges	Purchase	16260	27/01/2026	29/01/2026		Main Warehouse
JuiceLtr	Juice litres	Assembly	46800	30/08/2024	3/09/2024	Main Warehouse	Main Warehouse
JuiceLtr	Juice litres	Assembly	114260	17/09/2024	20/09/2024	Main Warehouse	Main Warehouse
JuiceLtr	Juice litres	Assembly	218526	30/09/2024	8/10/2024	Main Warehouse	Main Warehouse
JuiceLtr	Juice litres	Assembly	131527	22/10/2024	28/10/2024	Main Warehouse	Main Warehouse

Figure 12: A production plan CSV file

You may want to sort the sheet by 'Suggested Creation Date' to see overall what purchases or assemblies the system wants done first.

Some dates may appear in the past which is by design. This indicates that if a replenishment of a product needs stock on a certain date, and the replenishment will take a certain amount of time, then the start date may be pushed into the past. To make things more complex, an assembled item may need more components at the start date of a replenishment which in turn creates a required replenishment of components be created earlier to supply that assembly, which may push sub-component replenishments earlier and earlier. In effect, this lets you plan the dependent sub-steps needed to launch a new product on time, or at least be alerted of a likely crunch in time.

Taking this information, it is entirely up to you to interpret the suggestions and create open transactions for purchase orders and assemblies. These open transactions will be pulled into AIM and plotted in the timeline with forecast replenishments generated according to any shortfalls that are identified.

Interpreting a component forecast

In the production panel on the left side of the forecast, you can navigate to a component product forecast. This forecast is now pre-populated by the production demand of our assembled item.

In my 20 pack of juice example, I can navigate down to the packaging product code and see my production demand is forecast in blue/grey bars, and there is a note that the forecast includes demand from assembly forecasts:

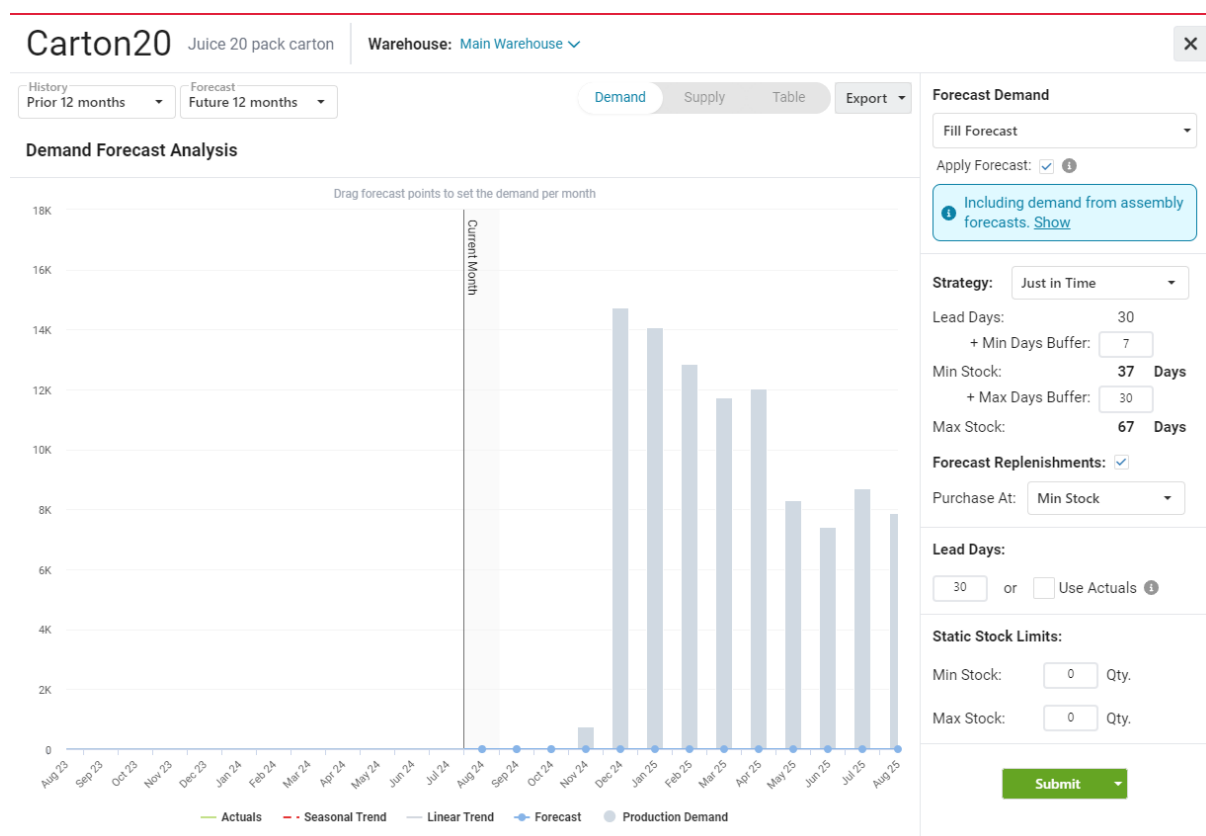


Figure 13: Pre-populated forecast of a component

The production demand is not editable here as it is determined by the replenishment of assembled products. I can edit the forecast of this product, which will be useful if I forecast that I will sell this product separately. I don't plan on selling these empty boxes though.

I have set a strategy to hold 7 days of stock at a minimum, plus a month of stock to over the delivery time. The max buffer is set to 30 days, which indicates that we'll buy a months' worth of stock at a time.

Let's review the Future Stock on Hand chart by clicking 'Supply' in the chart selector:

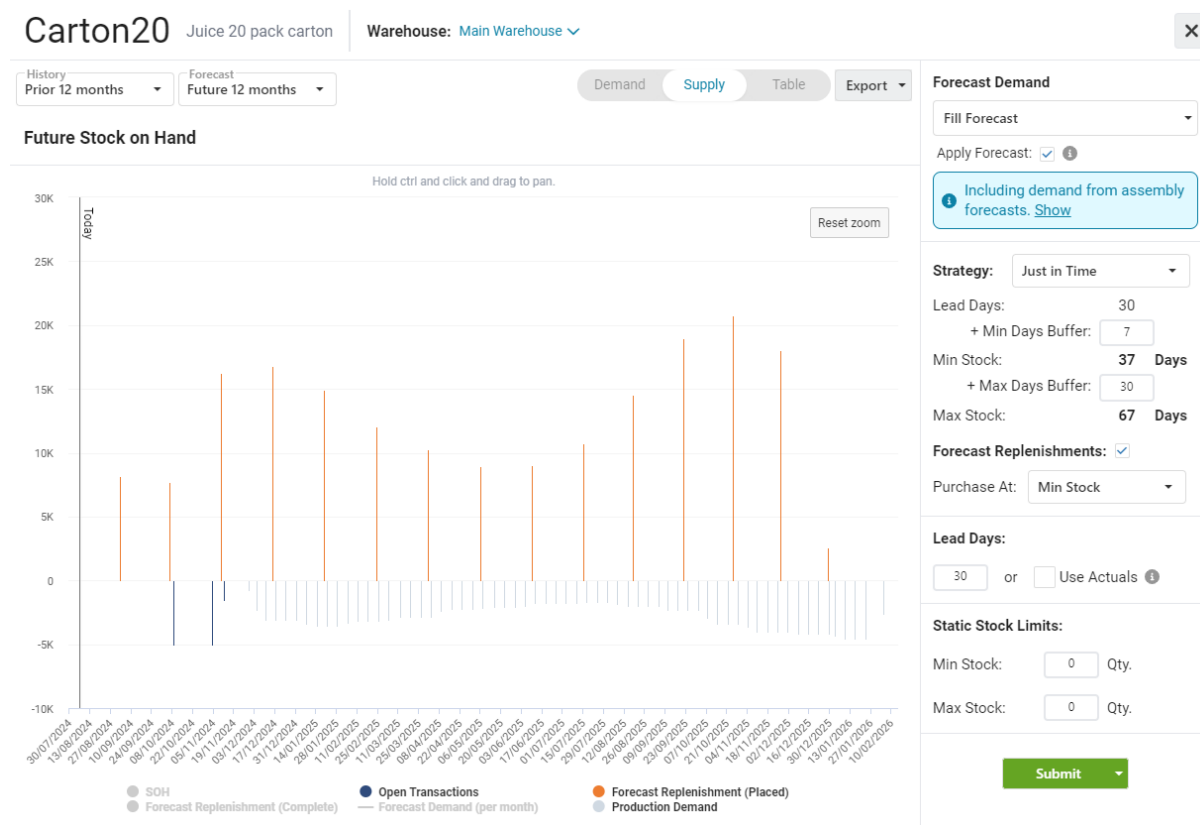


Figure 14: Component future SOH (with the SOH series disabled)

In the example above, I've clicked in the legend to disable the SOH from being shown. You can toggle on and off this data to help you interpret the information. You can also drag on the chart to zoom and hold CTRL to pan sideways.

Here we see the negative blue/grey bars production demand and the orange bars of forecast placed replenishments (taking the 30-day lead time into consideration). The dark blue bars represent open assemblies that have been loaded into AIM.

This product is only used to make one assembled item, so it's a simple example with a clear seasonality to it. Editing the strategy will update the replenishments in real-time and allow you to strategize how to you want to bring in and hold this product.

Let's add in the stock on hand and zoom in:

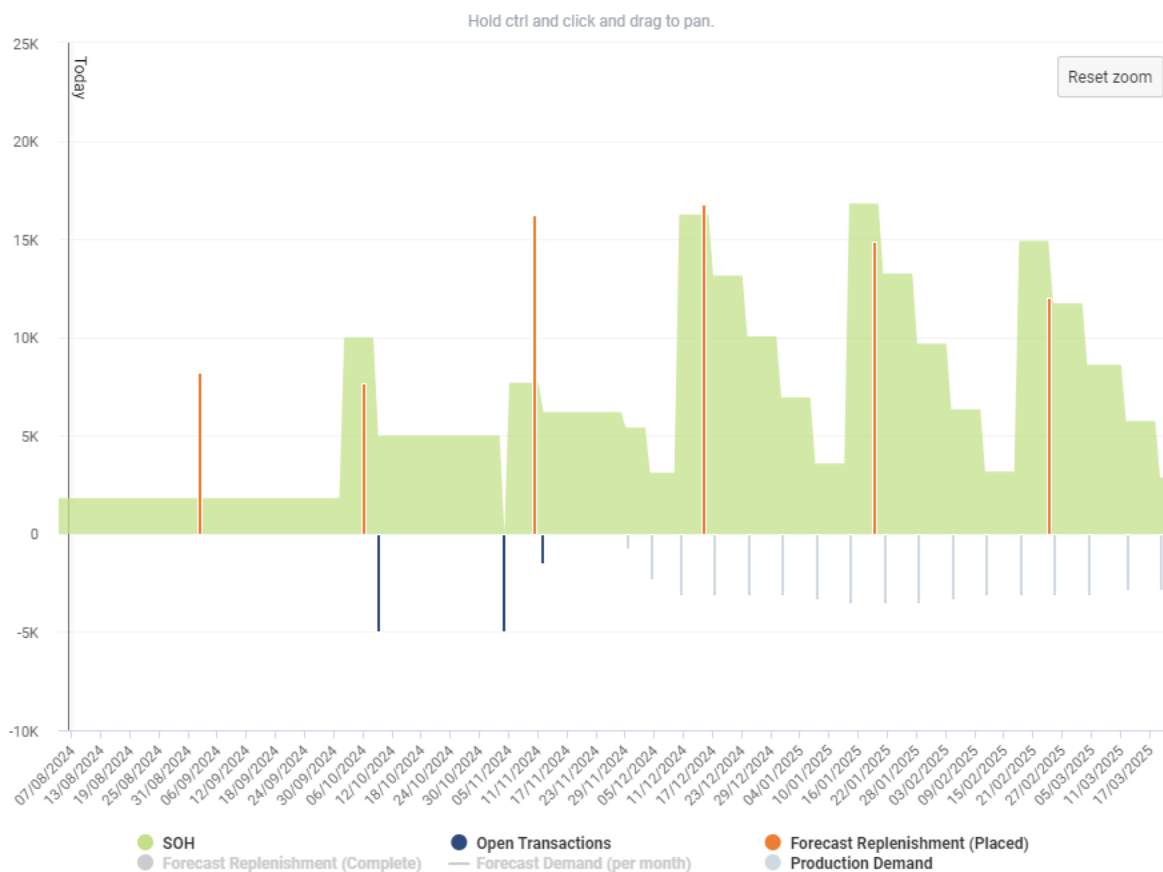


Figure 15: Future SOH of a component (SOH enabled)

In the example above, we can now see that the stock on hand (green) is depleted by the grey/blue production demand of our assembled product. That products strategy was to replenish on a set interval of every 7 days, while the strategy of this component is to bring in about 5 weeks' worth of stock.

Let's look at one more example of a strategy that is entirely blank. If we don't set any days of stock to be held, the system will replenish stock as it is needed:

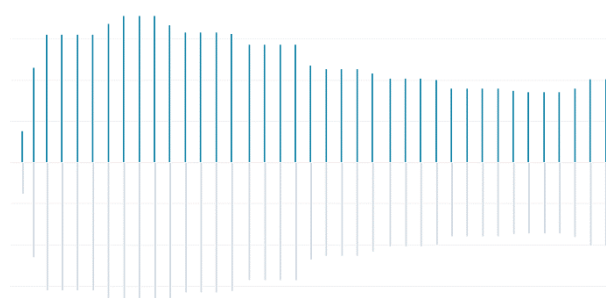


Figure 16: Component replenishment with no strategy

Some extra options to help interpret a forecast

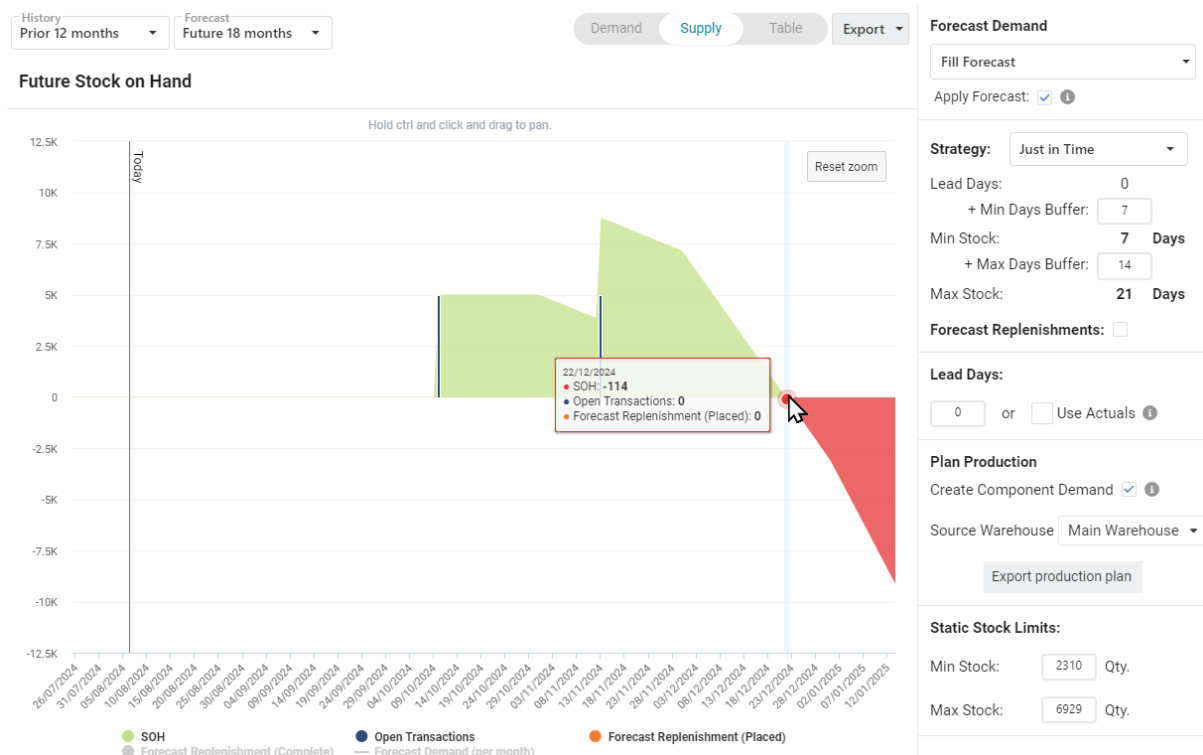


Figure 17: Future stock on hand chart with forecast replenishments disabled to show when stock is likely to be depleted.

There's a couple of extra controls to help you gain insights into your forecast. Looking at our juice example, I can see that a couple of assemblies have been created to make stock for our initial product launch. I can see when this stock is likely to be depleted by disabling the option 'Forecast Replenishments' in the strategy panel:

This stops the chart from placing replenishments in the forecast, so we can see when the forecast demand burns down our stock. I'm going to have a stock out on the 22nd of December according to this forecast.

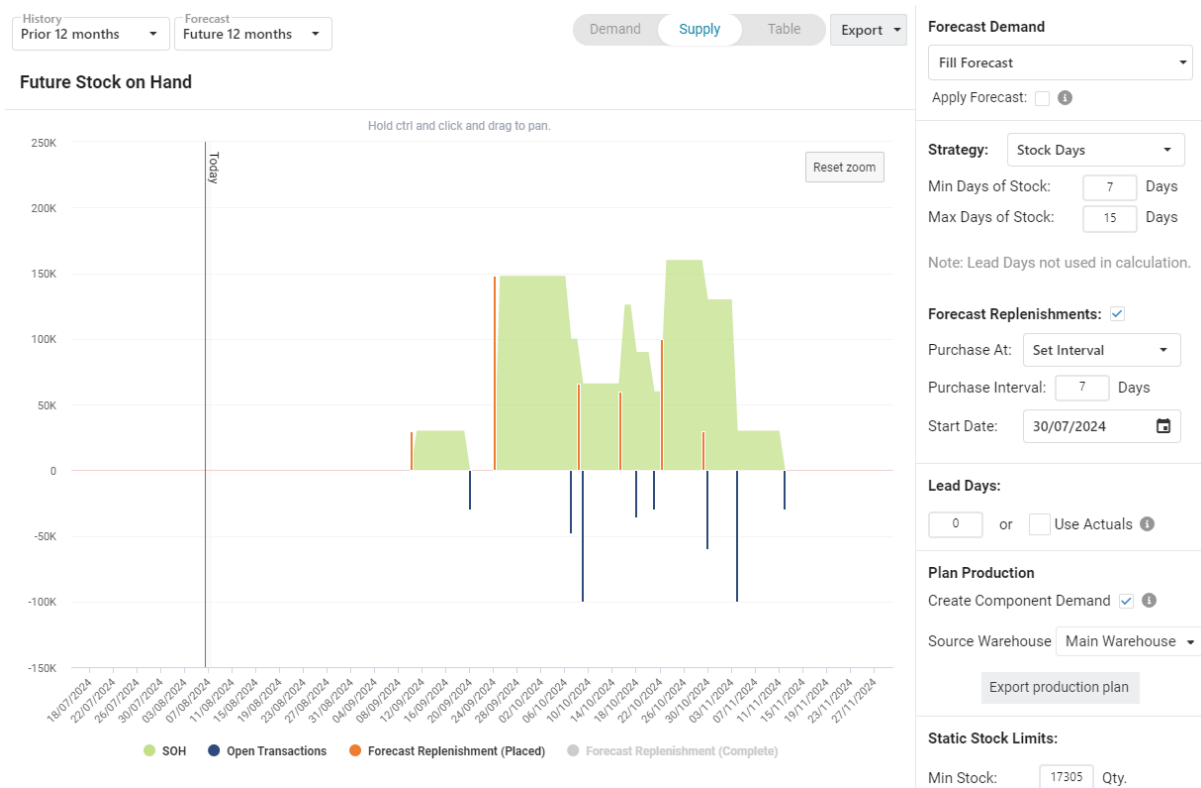


Figure 18: Future stock on hand chart with forecast demand disabled to show only the required replenishments to fulfil existing transactions.

You can also toggle off the option 'Apply Forecast' under the section 'Forecast Demand' which will stop the chart from plotting how demand will burn down your stock on hand. Using this option, we can see what required replenishments are needed to fulfil the open transactions that are booked in. At a minimum, I really need to book these replenishments in, or I won't be able to complete the dependent jobs on these days. Because the forecast isn't applied, there are no further replenishments beyond the open transactions.

If you need to extract the details of this chart, use the export button next the chart selector and export to CSV to get a list of dates and quantities that is displayed in the chart.

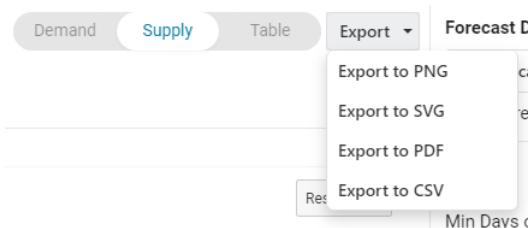


Figure 19: Export your chart to an image or spreadsheet

You can also export to an image file to help with your planning or in your next meeting!

	A	B	C	D
1	Category	SOH	Open Transactions	Forecast Replenishment (Placed)
408	10/09/2024	0	0	30000
422	24/09/2024	0	0	148000
436	8/10/2024	100000	0	66000
443	15/10/2024	66000	0	60000
450	22/10/2024	60000	0	100000
457	29/10/2024	160000	0	30000

Figure 20: Exporting the future stock on hand to CSV and then filtering out the days that have 0 replenishments creates a quick replenishment plan.

Closing remarks

We hope that this guide has been useful in explaining how to plan production by simply forecasting the demand of finished products and letting the system calculate all the of the dependencies that result.

It's important to ensure you have the system setup correctly. Add components to a bill of material and setup a realistic production duration and purchasing lead times. You'll then be able to export a production plan that factors in enough time for a product launch.

The replenishment calculations will comply with your stock holding and replenishment strategy. Using a forecast, you can plan for the pre-production and launch of a new product, the seasonal shifts in demand and the end of life and depreciation of stock.

Once outputting a plan to CSV, you can choose to enter in open transactions for a period into the future. Perhaps you book in jobs a month in advance and then look at the forecast weekly? Consider what works for you.

Rest assured that AIM will recalculate the production plan each time a new stock level is updated, or a forecast is updated, so you can check back often to see the impacts.

We hope you enjoy using AIM: Production Planning!