

5.10. Evaluating the Forecasts

It is always expected that actual values will deviate from the forecast. Measuring this difference as a KPI and assessing it for the safety stock calculation is an important part of demand forecasting process.

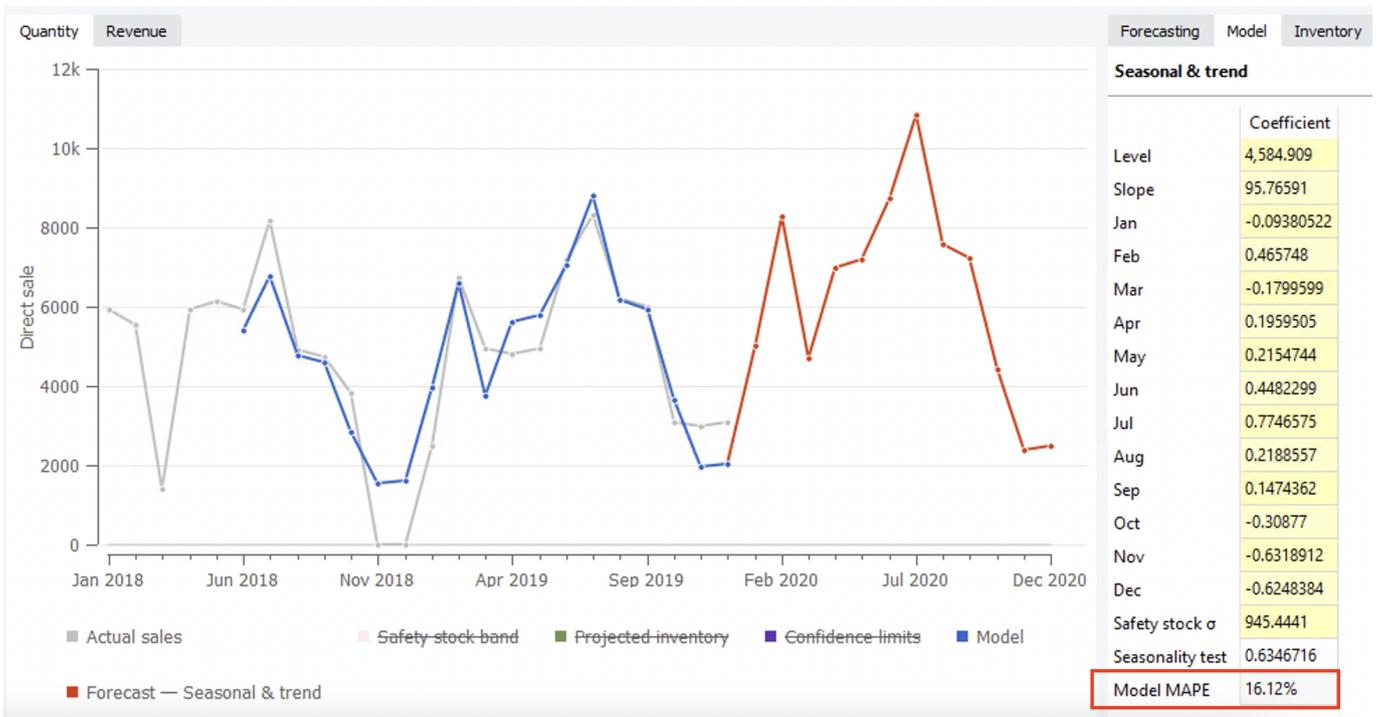
There are many error measures used to evaluate the forecast. Among them:

- Mean Squared Error ([MSE](#));
- Root Mean Squared Error ([RMSE](#));
- Mean Absolute Error ([MAE](#));
- Mean Absolute Percentage Error ([MAPE](#)).
- Weighted Mean Absolute Percentage Error ([WMAPE](#)).

Streamline evaluates forecast based on MAPE. It is obvious that in order to evaluate the forecast the actual data for the forecasted period must be imported.

Viewing Forecast Quality

The results of the forecast evaluation are represented by the **Model MAPE** in the **Model** tab of the **Panel** (see figure below).



- **Model MAPE** is MAPE calculated based on the model response for the data that was used to build the model. This response is indicated with the blue dots in the **Plot** (see figure above).

The **MAPE** shown in the figure above is the evaluation of periods (Jun 2018 - Dec 2019) for which actual data exists.

To see the forecasts evaluation for all of the items in one report, go to the **Reports** tab and select the **Forecast performance** report (see figure below).

Item ID	Supplier	Model type	Model quality	Slope	ABC analysis	Absolute percentage error												MAPE	Weighted MAPE
						Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Feb 2020	Mar 2020	Apr 2020	May 2020	Jun 2020		
1	56892-P	Seasonal & tre...	62.92%	0%	C 0.095%	47.46%	29.6%	27.25%	40.81%	45.5%	40.81%							38.57%	38.57%
2	56892-P	Seasonal & tre...	62.92%	0%	C 0.095%	47.46%	29.6%	27.25%	40.81%	45.5%	40.81%							38.57%	38.57%
3	56892-P	Seasonal & tre...	62.92%	0%	C 0.095%	47.46%	29.6%	27.25%	40.81%	45.5%	40.81%							38.57%	38.57%
4	56892-P	Seasonal & tre...	62.92%	0%	C 0.095%	47.46%	29.6%	27.25%	40.81%	45.5%	40.81%							38.57%	38.57%
5	56892-P	Seasonal & tre...	62.92%	0%	C 0.095%	47.46%	29.6%	27.25%	40.81%	45.5%	40.81%							38.57%	38.57%
6	56892-P	Seasonal & tre...	62.92%	0%	C 0.095%	47.46%	29.6%	27.25%	40.81%	45.5%	40.81%							38.57%	38.57%
7	125689	Constant level	75.84%	0%	B 0.408%	24.75%	31.74%	2.9%	23.84%	4.15%	29.75%							19.52%	19.52%
8	125689	Constant level	75.84%	0%	B 0.408%	24.75%	31.74%	2.9%	23.84%	4.15%	29.75%							19.52%	19.52%
9	125689	Constant level	75.84%	0%	C 0.408%	24.75%	31.74%	2.9%	23.84%	4.15%	29.75%							19.52%	19.52%
10	125689	Constant level	75.84%	0%	C 0.408%	24.75%	31.74%	2.9%	23.84%	4.15%	29.75%							19.52%	19.52%
11	125689	Constant level	75.84%	0%	C 0.408%	24.75%	31.74%	2.9%	23.84%	4.15%	29.75%							19.52%	19.52%
12	125689	Constant level	75.84%	0%	C 0.408%	24.75%	31.74%	2.9%	23.84%	4.15%	29.75%							19.52%	19.52%
13	5612457	Seasonal & tre...	62.92%	0%	B 0.683%	47.46%	29.6%	27.25%	40.81%	45.5%	40.81%							38.57%	38.57%
14	5612457	Seasonal & tre...	62.92%	0%	B 0.683%	47.46%	29.6%	27.25%	40.81%	45.5%	40.81%							38.57%	38.57%
15	5612457	Seasonal & tre...	62.92%	0%	B 0.683%	47.46%	29.6%	27.25%	40.81%	45.5%	40.81%							38.57%	38.57%
16	5612457	Seasonal & tre...	62.92%	0%	B 0.683%	47.46%	29.6%	27.25%	40.81%	45.5%	40.81%							38.57%	38.57%
17	5612457	Seasonal & tre...	62.92%	0%	B 0.683%	47.46%	29.6%	27.25%	40.81%	45.5%	40.81%							38.57%	38.57%
18	5612457	Seasonal & tre...	62.92%	0%	B 0.683%	47.46%	29.6%	27.25%	40.81%	45.5%	40.81%							38.57%	38.57%
19	5612457	Seasonal & tre...			C 0.0771%														
20	5612457	Seasonal & tre...			C 0.0771%														
21	5612457	Seasonal & tre...			C 0.0771%														
22	5612457	Seasonal & tre...			C 0.0771%														
23	5612457	Seasonal & tre...			C 0.0771%														

The **Absolute percentage error** section of the report represents **APE** calculated for each item, location, and period. As we do not have actual data for periods starting with **Jan 2020**, the corresponding columns are empty in the report.

The table can have gaps or even empty rows. A gap occurs when there were no actual sales in the period. Streamline can't calculate APE in this case. An empty row arises if either the item is inactive or an intermittent model is used.

The last two columns of the report represent MAPE and Weighted MAPE calculated across all of the periods for each planning item.

The **Overall MAPE**, shown in the toolbar, is MAPE weighted across all the items in the project. If the products' prices are given this is a price-weighted MAPE measure that represents overall revenue percentage error. Otherwise, it is calculated based on the volume of sales. You can read more about **WMAPE** on Wikipedia.

You can also switch the measure of the forecast quality between *error* and *accuracy* (which is **100% - error**). To do this, we click the **Settings** button found on the toolbar and select the **Accuracy** option for the **Measure of forecast quality** (see figure below).

The screenshot shows the 'Settings' dialog box with the following sections and options:

- General**
 - Update data**
 - Quick update (no history overlap)
 - Keep model coefficients overrides after new period appeared
 - Keep approved periods after new period appeared
 - Forecast**
 - Horizon, months: 12
 - Model is seasonal when test \geq : 0.30
 - Use price elasticity when test \leq : -0.30
 - Enable confidence intervals
 - Confidence levels**
 - Upper confidence level: 97.5 %
 - Lower confidence level: 2.5 %
 - Project**
 - Enable inter-store optimization
 - Default inter-store lead time: 1 days
 - Enable ordering availability
 - Add quantity-to-arrive to on-hand for KPI calculations
- Container grouping**
 - Use supplier code as container ID if not specified
 - Default container capacity**
 - Volume: 33
 - Weight: 25000
 - Qty: 1000
 - Ordering cost: 1000
- Inventory holding costs**
 - Annual interest rate (reduces margin): 0 %
 - Enable EOQ calculation
- Measures**
 - Measure on hand in:
 - Days of supply
 - Months of supply
 - Measure of forecast performance:
 - MAPE
 - Accuracy = 100% - MAPE
 - Period aggregation starts from: January
- Combine Display qty with Safety stock as:**
 - Maximum
 - Sum

Now, the report shows the percentage accuracy of the forecasts for each period in the **Percentage accuracy** section and the average accuracy across the available evaluations in the last column (see figure below).

The **Overall accuracy** of the toolbar equals to **100% - Overall MAPE**.

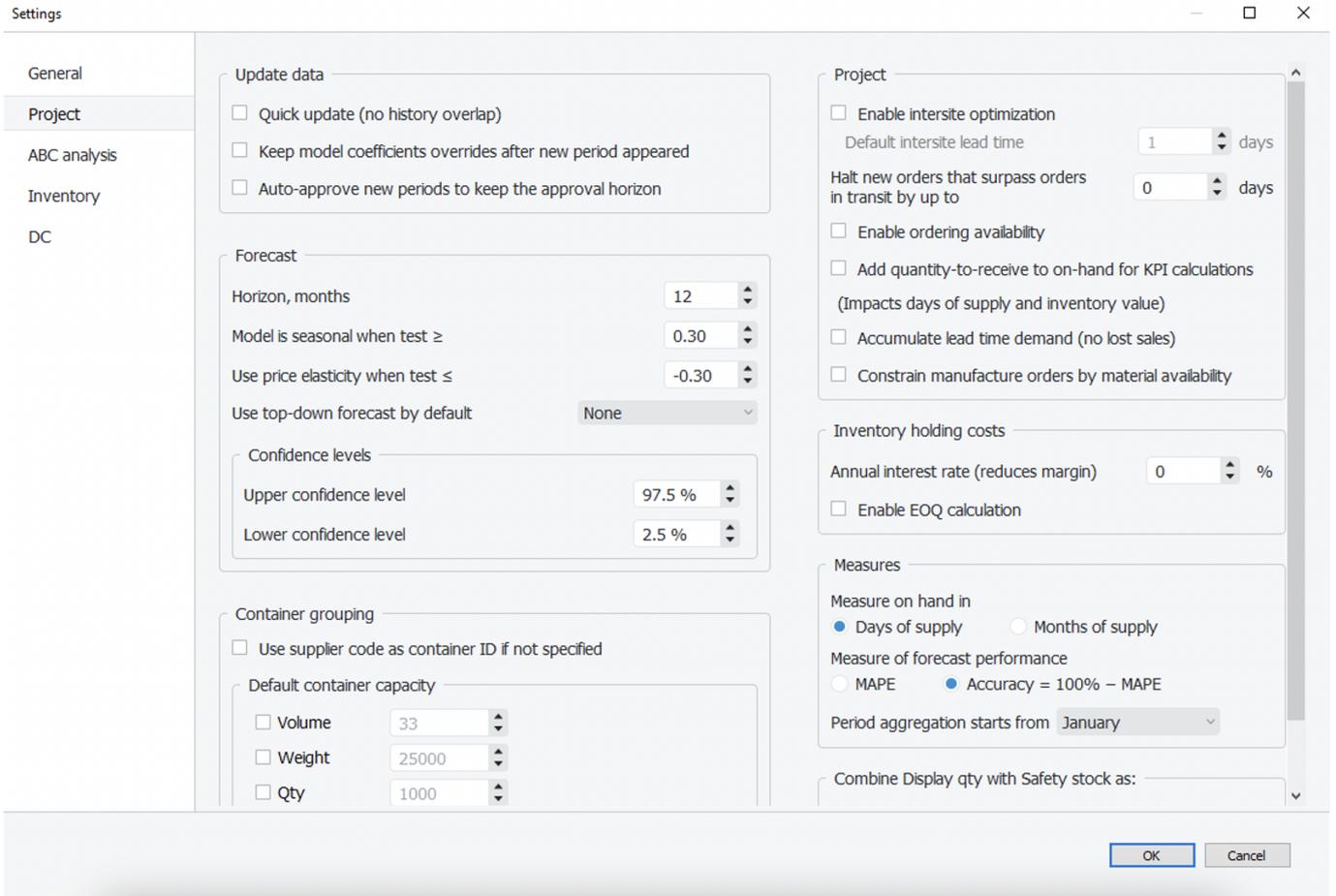
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Forecast Quality Measures

Streamline is able to evaluate forecast quality using two measures:

- **Error** (MAPE) or
- **Accuracy** (100% - **Error**).

The default measure is **Error**. You can switch between the measures by going to the menu **File > Settings > Project** tab > **KPIs** group and changing the **Measure of accuracy** parameter (see figure below).



The figure below shows the **Forecast performance** report when the measure is set to **Accuracy** in the **Settings**.

		Supplier	Model type	Model quality	Slope	ABC analysis	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Feb 2020	Mar 2020	Apr 2020	May 2020	Jun 2020	Accuracy	Weighted accuracy
1	nel	56892-P	Seasonal & tre...	62.92%	0%	C 0.095%	52.54%	70.4%	72.75%	59.19%	54.5%	59.19%							61.43%	61.43%
2		56892-P	Seasonal & tre...	62.92%	0%	C 0.095%	52.54%	70.4%	72.75%	59.19%	54.5%	59.19%							61.43%	61.43%
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7		125689	Constant level	75.84%	0%	B 0.408%	75.25%	68.26%	97.1%	76.16%	95.85%	70.25%							80.48%	80.48%
8		125689	Constant level	75.84%	0%	B 0.408%	75.25%	68.26%	97.1%	76.16%	95.85%	70.25%							80.48%	80.48%
9		125689	Constant level	75.84%	0%	C 0.408%	75.25%	68.26%	97.1%	76.16%	95.85%	70.25%							80.48%	80.48%
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12		125689	Constant level	75.84%	0%	C 0.408%	75.25%	68.26%	97.1%	76.16%	95.85%	70.25%							80.48%	80.48%
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22		5612457	Seasonal & tre...			C 0.0771%														
23		5612457	Seasonal & tre...			C 0.0771%														

Weighted Accuracy is equal to accuracy until we aggregate the report. Once the report is aggregated it is weighted by the price of an item.

This option also affects the evaluation shown in the **Model** tab of the **Demand forecasting** (see

figure below).

Forecasting		Model	Inventory	KPIs
Seasonal & trend				
	Coefficient			
Level	4,584.909			
Slope	95.76591			
Jan	-0.09380522			
Feb	0.465748			
Mar	-0.1799599			
Apr	0.1959505			
May	0.2154744			
Jun	0.4482299			
Jul	0.7746575			
Aug	0.2188557			
Sep	0.1474362			
Oct	-0.30877			
Nov	-0.6318912			
Dec	-0.6248384			
Safety stock σ	945.4441			
Seasonality test	0.6346716			
Model accuracy	83.88%			

Next: Revenue Forecasting

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