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# Forecasting & Monitoring Tool

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THE BEST RUN SAP

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# 1 Forecasting & Monitoring Tool

Create sales forecasts and improve their quality. Through automated simulation in the **forecasting & monitoring tool**, you will find the best forecast model for each of your materials. You can also maintain your forecasts in one mass operation.

The forecasting & monitoring tool (previously forecasting monitor) was originally intended to improve forecast accuracy by using simulations with different forecast models and parameters in the past to determine an optimum model. The SAP ECC forecast run was then able to use the results for the productive forecasts.

Meanwhile, the tool has become a productive forecast tool itself, creates and optimizes the forecasts autonomously, writes them to the necessary SAP tables (for example, PBED) or info structures for further processing, for example, for the MRP run. Integration with external systems via an MS Excel interface is also possible. The tool can use many different data sources for simulation and forecast, and thereby be used as an alternative to SAP solutions such as APO-DP. It is also possible to enter manual forecast data in addition to the system-generated forecast, for example, for promotion planning.

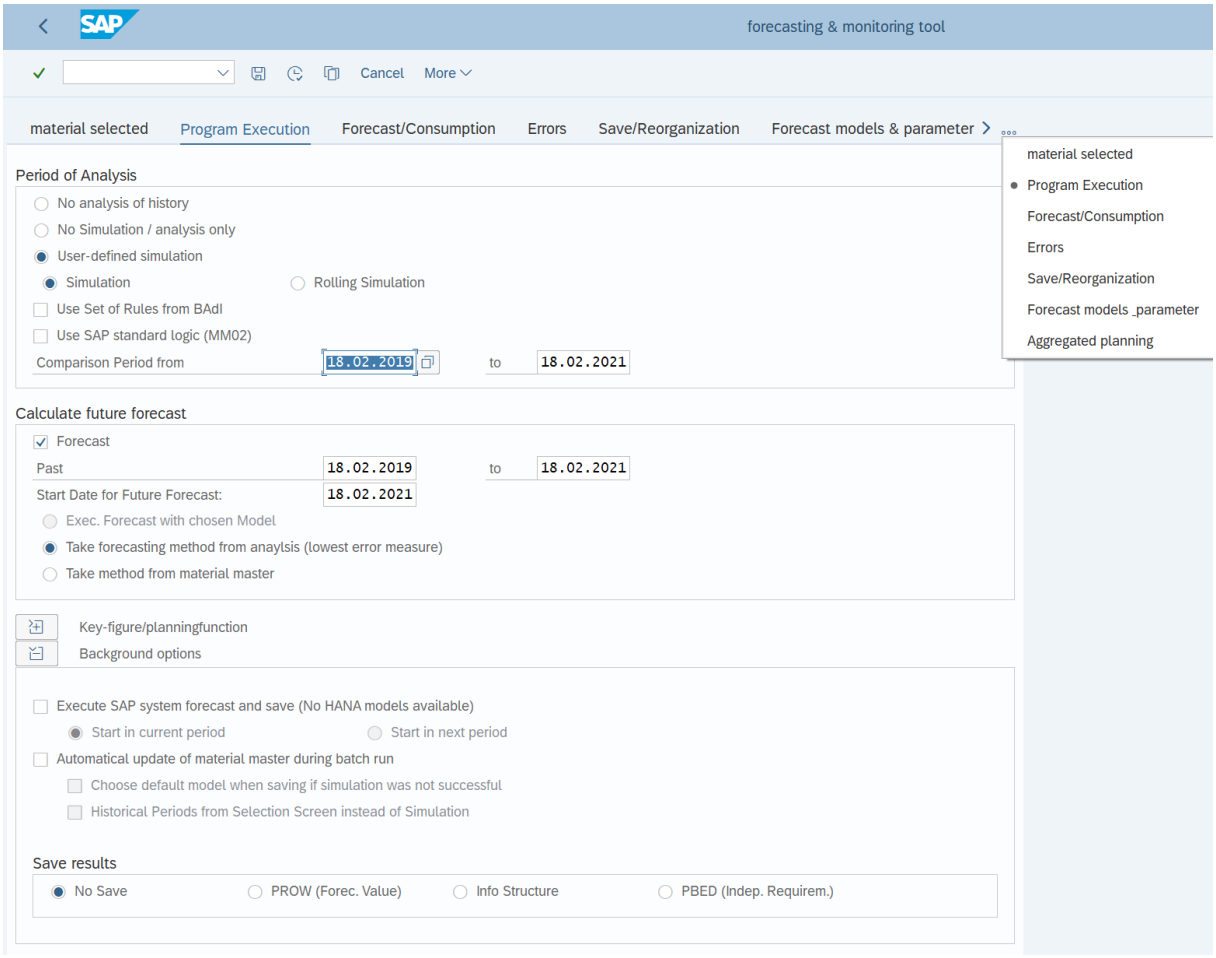
The forecasting & monitoring tool (FMO) is an SAP ERP add-on and contains functionalities not included in the standard SAP system. It supports you in measuring forecast accuracy in your company and calculates different forecasting errors for a defined historical horizon, using the deviation between the value forecast and the value that occurred.

The forecasting errors that would have resulted from a different forecasting model or different forecasting parameters can be calculated using the simulation functions based on past performance. This aids you

in selecting the best forecasting model and the best forecasting parameters for a material.

In combination with the HANA tool Forecast Optimization on HANA (FOH), the FMO tool also offers forecast methods from HANA PAL (Predictive Analytics), which are currently only used in IBP and an exclusive optimization of the forecast levels. A detailed evaluation is also possible in a graphically demanding FIORI app. The details are described in a subsection

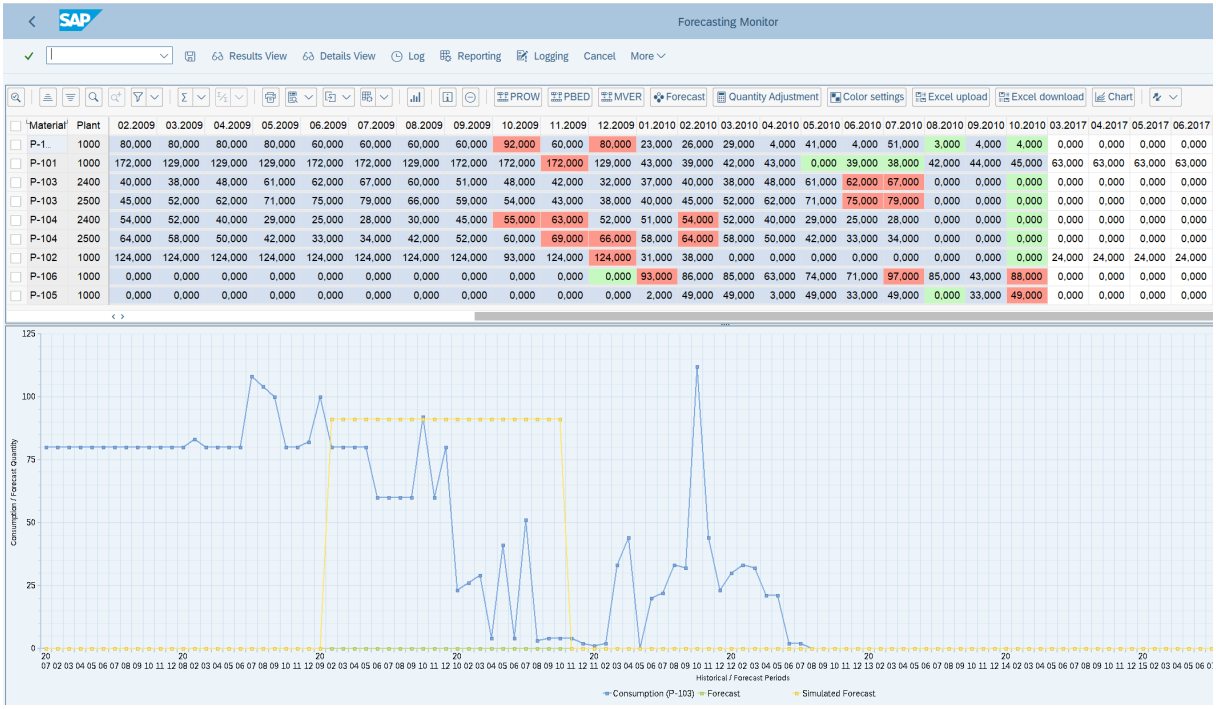
The forecasting & monitoring tool is called using transaction */n/SAPLOM/FMO*.




FMO Intro 1

Function overview:

- Create static sales forecasts based on historical data (selectable)
- Simulative execution of forecasts with up to 10 forecast models with alternative historical periods, smoothing factors, or data sources (including rolling; with graphic visualization of the results)
- Individually determine the best forecasting method by simulating and saving it in the material master, or for direct use when creating the sales forecast
- Determine various forecasting errors (many more than in the standard SAP system) for existing and simulated forecast models
- Mass maintenance of forecast and MRP master data based on the simulation results
- Mass maintenance of forecast values or planned independent requirements
- Enter additional, manual sales forecasts and save for statistical forecast in separate key figure/version in parallel, for example, for supplementary promotion planning
- Integration with external systems using the upload and download function with Microsoft Excel
- Planning at different levels (depending on the data source) such as plant and cross-plant, MRP area, sales organization, and storage location
- Different data sources and data targets selectable for history and forecast




FMO Intro 2

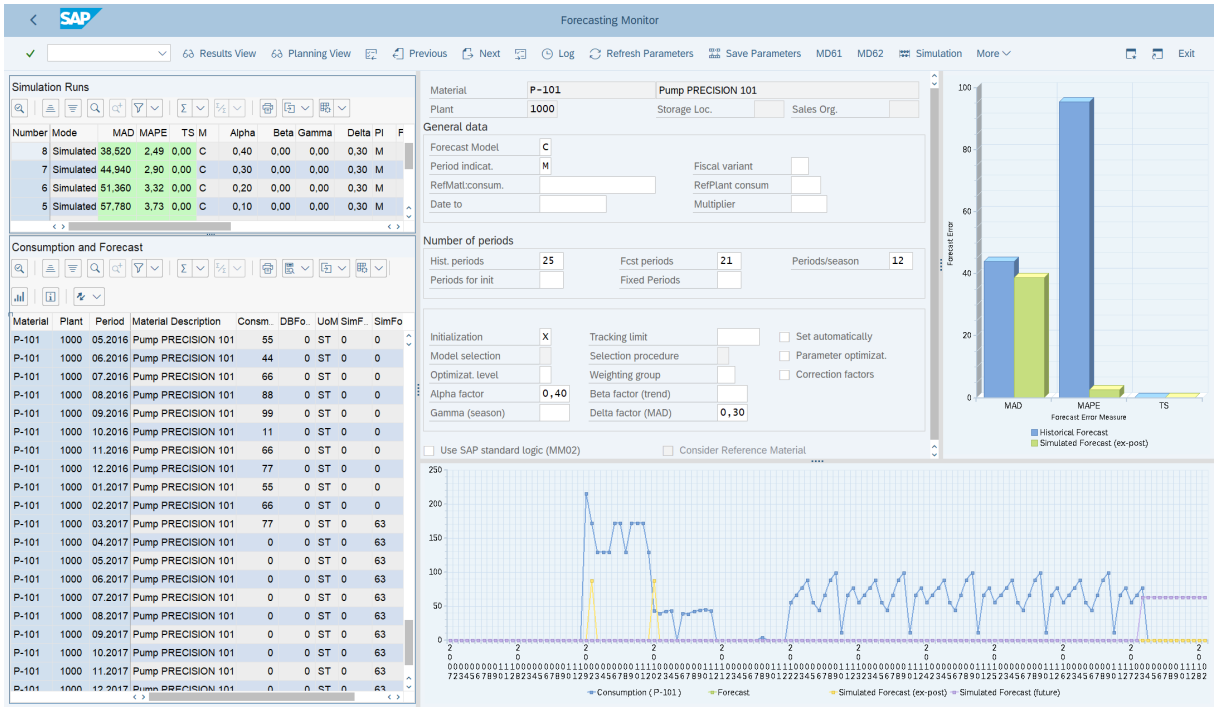
You can also use the comprehensive functions. These include the following functionalities:

- Tasks (formerly measures) and resubmissions
- Comment function
- Individual material groups
- Alerts
- Formula editor for creating your own formulas

You use the formula editor to create your own formulas to calculate your own key figures. The formulas can be used in all SCM consulting solutions.

In addition, the following SCM consulting solutions are part of the comprehensive functions:

- Material master update
- Enhanced material master view
- Material document analysis




FMO Intro 3

The comprehensive functions consist of various functions that can make your work with the SCM consulting solutions even more effective. The material master update allows you to save data in standard SAP fields and fields of the enhanced material master view. You can edit the material master data directly from the results list of your SCM consulting solutions. You can use the enhanced material master view to access the material master data fields of the SCM consulting solutions centrally in the material master. You can use the material document aggregation to create customized consumption and inventory histories that you can use for the analyses in the MRP monitor, inventory controlling cockpit, and safety stock simulation. Stock development shows you the current stock values and the future stock value development, and offers you various aggregation options.

SAP Note: 1341755

The component for messages is `XX-PROJ-CON-PM`.

Link to additional content: Materials

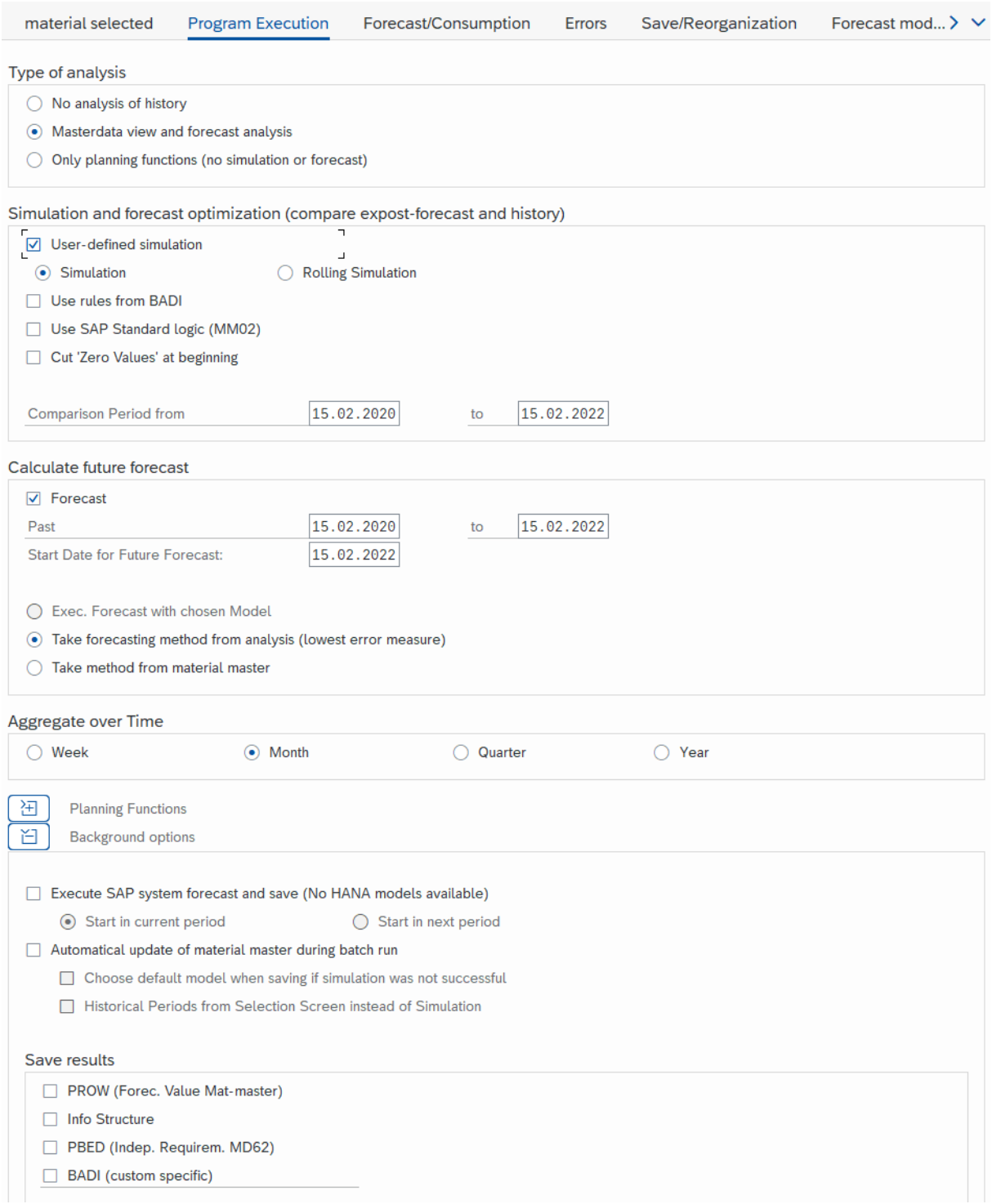
> **Note**
>
> Customizing is necessary for certain functions. See section Customizing.

> **Note**
>
> Please note that when executing **SCM Consulting Solutions**, you must enter the prefix */n/SAPLOM/* before each transaction.

# 2 Selection Options and Program Execution

The FMO tool offers a large number of functions that are not usually needed all together. In rare cases, functions cannot be used together, however, this is explained at the relevant points and the program does not allow incompatible functions to be run at the same time.

The “Program Execution” tab is available for deciding the purpose for which the tool is to be used in the current run.

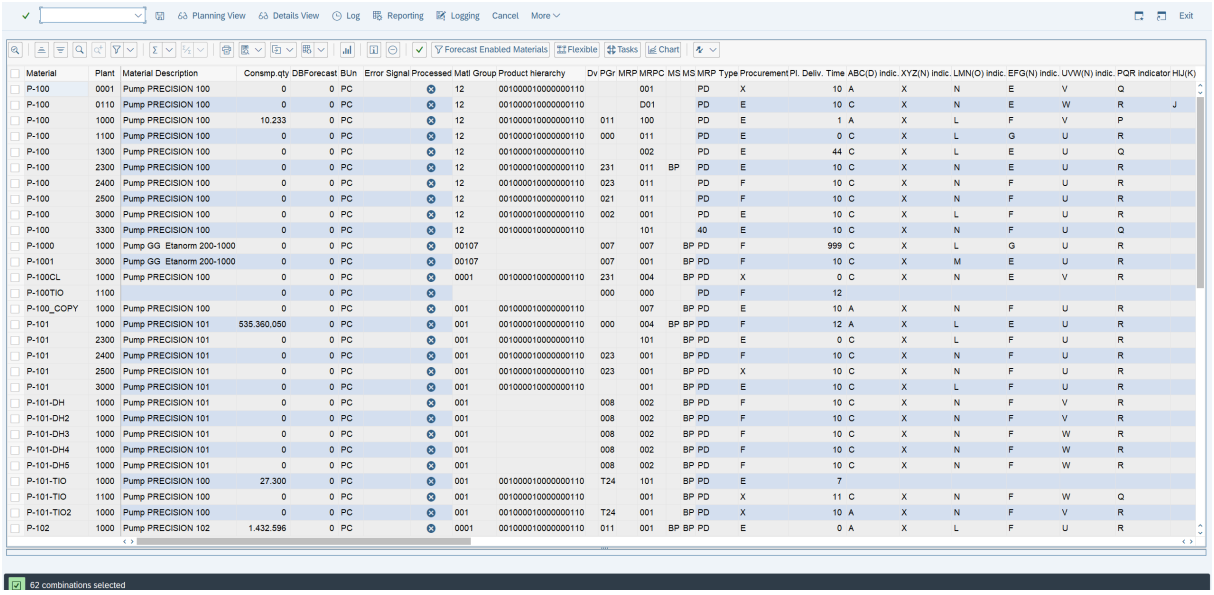



FMO Program Execution

The following table lists an overview of the most common purposes for using the FMO tool and the option to choose:

Functions Without Forecast / with Optional Forecast for Future

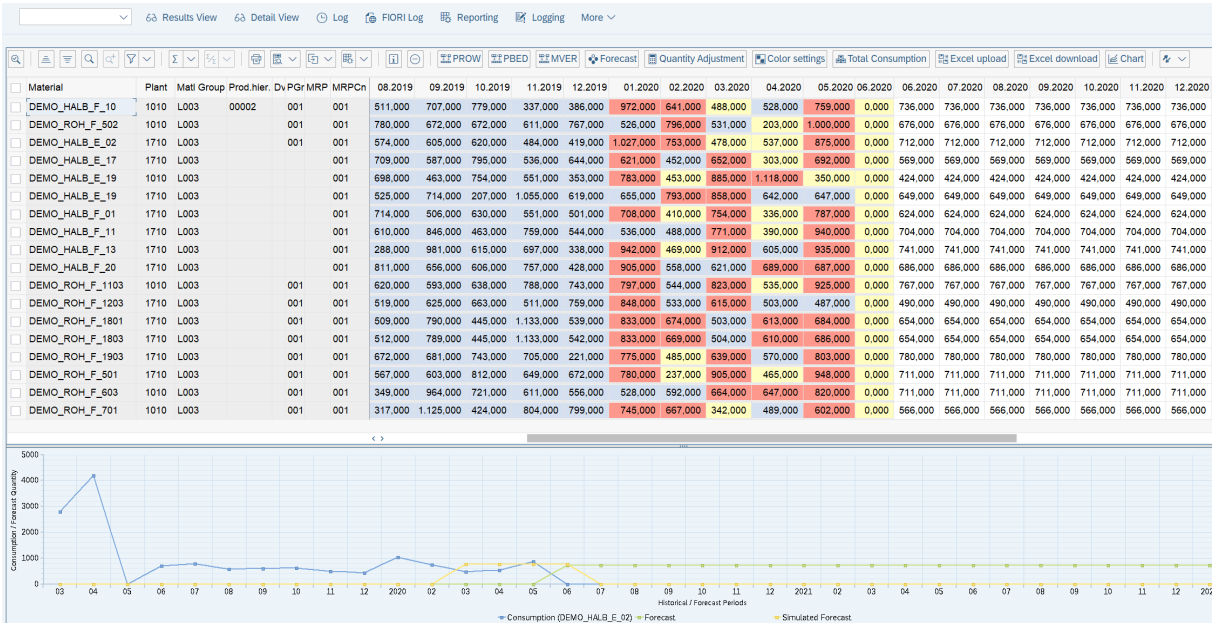
| No. | Purpose | Selection in FMO Tool | Result |
|---|---|---|---|
| 1 | View and maintain master data, tasks, and comments for materials<br>Optional: Download the list as an Excel file | No historical analysis<br>No forecast<br>No planning functions<br>No background options | The FMO tool selects all materials according to the material selection, regardless of whether historical data exists for a forecast for these materials. No forecasts are generated, the result view represents all master data available in FMO, and you can maintain tasks and comments as well as specific master data, or download the entire table as an Excel file. |
| 2 | Change and save consumptions in MVER table | As 1, additionally select MVER as the data source and enter an analysis period in which the data is to be changed. If no consumptions exist, choose the option "Display Zero Materials". | In the planning view, you can now change the historical data of the MVER for the selected time period and save it by clicking on "MVER". |
| 3 | Change and save consumptions in info structures | As 2, but select info structure as the data source and make the entries for the info structure, characteristics, and key figures in the info structure settings.<br>Optional: Generate forecast | Data can also be entered in the planning view, as in 2. By selecting the info structure as the data source, the "Info" button is now also available, with which the changed values can be saved in the info structure. This can also be combined with forecasting. |
| 4 | Analysis of historical data | As 1, but choose "No Simulation/Analysis Only" and the desired source for the historical data. | In the result view, the columns Error Traffic Light and Trend are displayed in addition to 1. |




Program Execution for Master Data Maintenance

Functions with Forecast for Future

| No. | Purpose | Selection in FMO Tool | Result |
|---|---|---|---|
| 5 | Determination of the best forecasting method | Custom simulation<br>No planning functions<br>Optional: Generate forecast<br>Optionally, as a background run<br>Historical data source<br>Required forecast methods and parameters<br>Error measure for measurement<br>Analysis period for comparison of expost forecast and historical data, and number of past months before analysis period.<br>In event of forecast: Enter historical period | For the selected materials, the FMO tool creates several forecasts according to the selected forecasting methods and parameters. The forecasts are created for the analysis period and compared with the historical data there. To create the forecast, the FMO tool bypasses as many periods in the past BEFORE the analysis period as defined in the Historical Periods parameter. Therefore, sufficient historical data must be available. Using the selected error measure, the forecast errors of all forecasts created are then calculated in comparison with the actual data and displayed together with the user. The best forecasting method can be saved directly in the material master. The option can also be selected for the background run. Optionally, you can then create and save a forecast with the best model for the future. Double-clicking on a material takes you to the detail view, where the individual results of the forecasts are displayed clearly for each material. |
| 6 | Comparison/development of past forecasts from different time periods for the same period | As 5, with “Rolling Simulation” | In the detail view, the individual forecasts for the different time periods are displayed in a table. You can double-click to switch between them and see how the forecast for a particular period has changed over time. |
| 7 | Creation of forecast for the future | As 5, select with forecast.<br>If simulation is performed, the best result of the simulation can be used as a forecast model. Alternatively, a model from the material master can be used without simulation, or a model can be entered directly. | A forecast is generated for the selected materials for the selected period. This can be changed interactively and, optionally, saved in tables PBED, PROW, and in info structures. |
| 8 | Promotion planning (entry of additional, manual requirements)<br>Optional: Generate additional system forecast | As 7, but also activate planning functions. The planning functions also run without generating a system forecast, but the analysis period must then be set in the future. | Activating the planning functions displays additional key figures. Promotion quantities can then be entered in the "Manual Forecast" key figure. It is currently possible to save data in the PBED and info structures. You can also download the entire table as an Excel file. In Excel, the data can be changed and reloaded into the planning view. This means that the "Manual Forecast" key figure can also be supplied via Excel from external systems. |




| Material | Plant | Matl Group | Prod.hier. | Dv | PGr | MRP | MRPCn | 08.2019 | 09.2019 | 10.2019 | 11.2019 | 12.2019 | 01.2020 | 02.2020 | 03.2020 | 04.2020 | 05.2020 | 06.2020 | 06.2020 | 07.2020 | 08.2020 | 09.2020 | 10.2020 | 11.2020 | 12.2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEMO_HALB_F_10 | 1010 | L003 | 00002 | | 001 | | 001 | 511,000 | 707,000 | 779,000 | 337,000 | 386,000 | 972,000 | 641,000 | 488,000 | 528,000 | 759,000 | 0,000 | 736,000 | 736,000 | 736,000 | 736,000 | 736,000 | 736,000 | 736,000 |
| DEMO_ROH_F_502 | 1010 | L003 | | | 001 | | 001 | 780,000 | 672,000 | 672,000 | 611,000 | 767,000 | 526,000 | 796,000 | 531,000 | 203,000 | 1.000,000 | 0,000 | 676,000 | 676,000 | 676,000 | 676,000 | 676,000 | 676,000 | 676,000 |
| DEMO_HALB_E_02 | 1710 | L003 | | | 001 | | 001 | 574,000 | 605,000 | 620,000 | 484,000 | 419,000 | 1.027,000 | 753,000 | 478,000 | 537,000 | 875,000 | 0,000 | 712,000 | 712,000 | 712,000 | 712,000 | 712,000 | 712,000 | 712,000 |
| DEMO_HALB_E_17 | 1710 | L003 | | | | | 001 | 709,000 | 587,000 | 795,000 | 536,000 | 644,000 | 621,000 | 452,000 | 652,000 | 303,000 | 692,000 | 0,000 | 569,000 | 569,000 | 569,000 | 569,000 | 569,000 | 569,000 | 569,000 |
| DEMO_HALB_E_19 | 1010 | L003 | | | | | 001 | 698,000 | 463,000 | 754,000 | 551,000 | 353,000 | 783,000 | 453,000 | 885,000 | 1.118,000 | 350,000 | 0,000 | 424,000 | 424,000 | 424,000 | 424,000 | 424,000 | 424,000 | 424,000 |
| DEMO_HALB_E_19 | 1710 | L003 | | | | | 001 | 525,000 | 714,000 | 207,000 | 1.055,000 | 619,000 | 655,000 | 793,000 | 858,000 | 642,000 | 647,000 | 0,000 | 649,000 | 649,000 | 649,000 | 649,000 | 649,000 | 649,000 | 649,000 |
| DEMO_HALB_F_01 | 1710 | L003 | | | | | 001 | 714,000 | 506,000 | 630,000 | 551,000 | 501,000 | 708,000 | 410,000 | 754,000 | 336,000 | 787,000 | 0,000 | 624,000 | 624,000 | 624,000 | 624,000 | 624,000 | 624,000 | 624,000 |
| DEMO_HALB_F_11 | 1710 | L003 | | | | | 001 | 610,000 | 846,000 | 463,000 | 759,000 | 544,000 | 536,000 | 488,000 | 771,000 | 390,000 | 940,000 | 0,000 | 704,000 | 704,000 | 704,000 | 704,000 | 704,000 | 704,000 | 704,000 |
| DEMO_HALB_F_13 | 1710 | L003 | | | | | 001 | 288,000 | 981,000 | 615,000 | 697,000 | 338,000 | 942,000 | 469,000 | 912,000 | 605,000 | 935,000 | 0,000 | 741,000 | 741,000 | 741,000 | 741,000 | 741,000 | 741,000 | 741,000 |
| DEMO_HALB_F_20 | 1710 | L003 | | | | | 001 | 811,000 | 656,000 | 606,000 | 757,000 | 428,000 | 905,000 | 558,000 | 621,000 | 689,000 | 687,000 | 0,000 | 686,000 | 686,000 | 686,000 | 686,000 | 686,000 | 686,000 | 686,000 |
| DEMO_ROH_F_1103 | 1010 | L003 | | | 001 | | 001 | 620,000 | 593,000 | 638,000 | 788,000 | 743,000 | 797,000 | 544,000 | 823,000 | 535,000 | 925,000 | 0,000 | 767,000 | 767,000 | 767,000 | 767,000 | 767,000 | 767,000 | 767,000 |
| DEMO_ROH_F_1203 | 1710 | L003 | | | 001 | | 001 | 519,000 | 625,000 | 663,000 | 511,000 | 759,000 | 848,000 | 533,000 | 615,000 | 503,000 | 487,000 | 0,000 | 490,000 | 490,000 | 490,000 | 490,000 | 490,000 | 490,000 | 490,000 |
| DEMO_ROH_F_1801 | 1710 | L003 | | | 001 | | 001 | 509,000 | 790,000 | 445,000 | 1.133,000 | 539,000 | 833,000 | 674,000 | 503,000 | 613,000 | 684,000 | 0,000 | 654,000 | 654,000 | 654,000 | 654,000 | 654,000 | 654,000 | 654,000 |
| DEMO_ROH_F_1803 | 1710 | L003 | | | 001 | | 001 | 512,000 | 789,000 | 445,000 | 1.133,000 | 542,000 | 833,000 | 669,000 | 504,000 | 610,000 | 686,000 | 0,000 | 654,000 | 654,000 | 654,000 | 654,000 | 654,000 | 654,000 | 654,000 |
| DEMO_ROH_F_1903 | 1710 | L003 | | | 001 | | 001 | 672,000 | 681,000 | 743,000 | 705,000 | 221,000 | 775,000 | 485,000 | 639,000 | 570,000 | 803,000 | 0,000 | 780,000 | 780,000 | 780,000 | 780,000 | 780,000 | 780,000 | 780,000 |
| DEMO_ROH_F_501 | 1710 | L003 | | | 001 | | 001 | 567,000 | 603,000 | 812,000 | 649,000 | 672,000 | 780,000 | 237,000 | 905,000 | 465,000 | 948,000 | 0,000 | 711,000 | 711,000 | 711,000 | 711,000 | 711,000 | 711,000 | 711,000 |
| DEMO_ROH_F_603 | 1010 | L003 | | | 001 | | 001 | 349,000 | 964,000 | 721,000 | 611,000 | 556,000 | 528,000 | 592,000 | 664,000 | 647,000 | 820,000 | 0,000 | 711,000 | 711,000 | 711,000 | 711,000 | 711,000 | 711,000 | 711,000 |
| DEMO_ROH_F_701 | 1010 | L003 | | | 001 | | 001 | 317,000 | 1.125,000 | 424,000 | 804,000 | 799,000 | 745,000 | 667,000 | 342,000 | 489,000 | 602,000 | 0,000 | 566,000 | 566,000 | 566,000 | 566,000 | 566,000 | 566,000 | 566,000 |

Program Execution with Forecast

# 2.1 Difference Between Simulation, Rolling Simulation, and MM02 Logic

The simulation is used to generate a retrospective forecast for the past to see how this forecast strategy would have been used. Several different forecasting methods can be used within the simulation and the results can be compared with each other. By choosing a different error measure, you can then determine the forecast procedure that would have produced the best result in the past. If you assume that this can also be the case in the future, you can save this forecast model in the material master and use it in the future. Alternatively, the FMO tool can also generate and save the forecast itself. To do this, it can check the best forecast model again for each run, or alternatively use the model defined in the material master and only perform the (CPU-intensive) simulation at certain intervals, for example, once a quarter.

For the simulation, there are three slightly different approaches in the FMO tool.

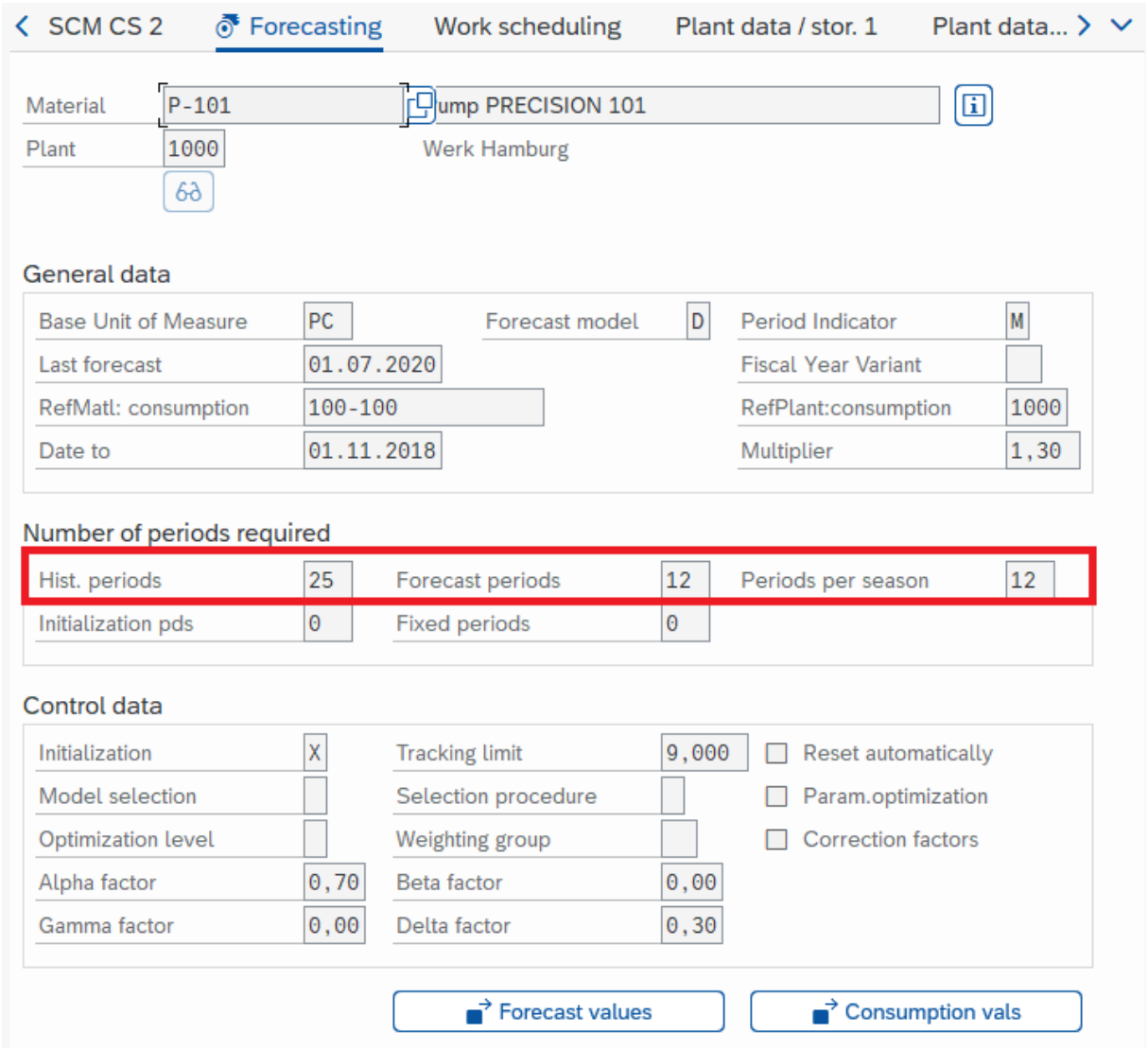
- Simulation
  - An analysis/comparison period is entered in the FMO tool. One or more forecasts are then created for this period and compared with the historical actual data. To create the forecast, the tool goes back as many periods before this period as are entered in the Historical Periods field. The tool then only reads these periods and generates a forecast that fits the analysis period exactly. This procedure simulates the creation of a forecast at the time before the start of the analysis period.
- Rolling simulation
  - The rolling simulation creates several forecasts for the analysis period and keeps working further forward in the past before the analysis period. Meaning that, in the first run, it starts with the oldest period before the analysis period according to the number of historical periods. In the second run, the forecast starts one period later, in the third, another period later, and so on.
- MM02 logic
  - The MM02 logic simulates the logic of the standard SAP system. This also has an initialization period that is used for the first forecast calculation. However, for a forecast in the analysis period, data from

the analysis period itself is also included, which "corrects" the forecast. This will certainly improve the forecast result, since recent changes also have an influence. On the other hand, we can also argue that this approach is not useful in determining the best forecasting method because it is also not possible to include future sales figures in today's forecast for a future forecast.

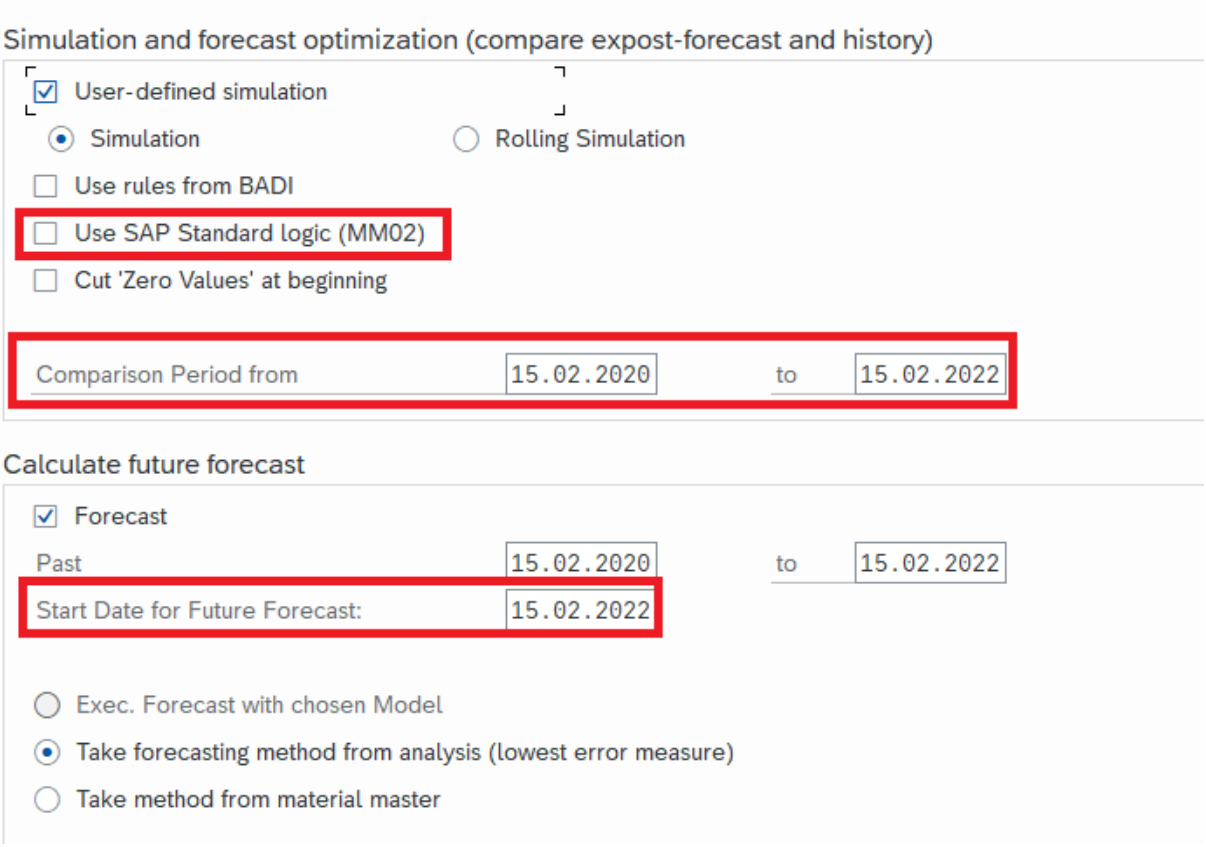
The option *Use SAP Standard Logic (MM02)* affects the simulation. Firstly, periods are not postread before the analysis period for the model initialization, rather the initialization begins with the start of the analysis period. Also, the standard SAP functionality is used for the calculation of MAD and ET (consequently, except for MAD, ET, and TS, no other forecasting errors can be selected).

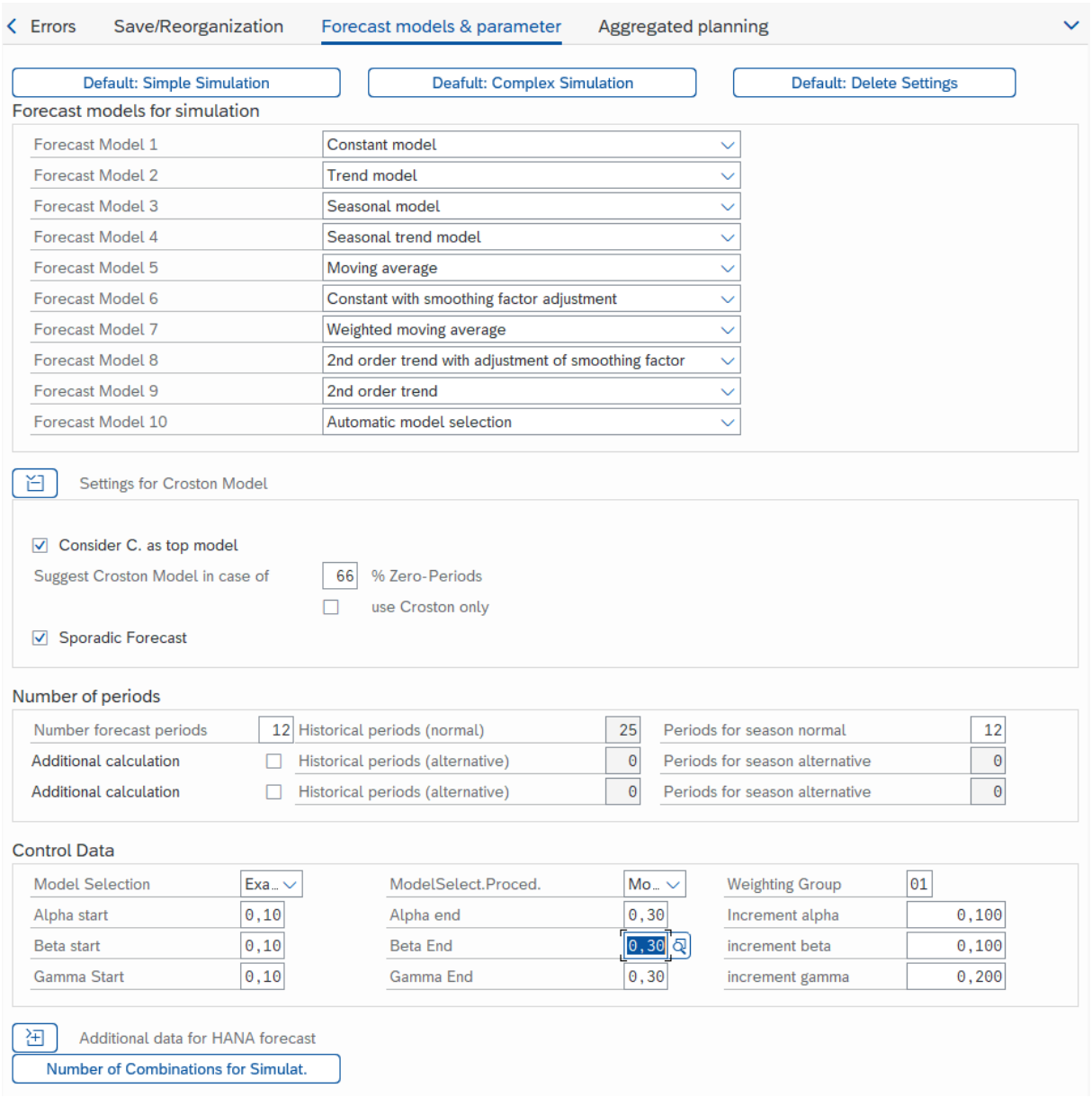
This ensures that the forecasting logic intended by the standard SAP system is used with the corresponding horizons for the individual simulations. However, the parameters of the forecast tab from the material master are not used. This means that the analysis period defined on the selection screen replaces the number of historical periods from the material master during the simulation, for example. The horizons must also be maintained accordingly on the last selection tab of the forecasting & monitoring tool. The following example explains which parameters are to be set on the selection screen in order to map the forecasting logic of the standard SAP system correctly.

The example first shows the settings in the material master, and later the same settings that you would have to make for this forecast in the FMO tool.


SCM CS 2
Forecasting
Work scheduling
Plant data / stor. 1
Plant data...
Material
P-101
ump PRECISION 101
Plant
1000
Werk Hamburg
General data
Base Unit of Measure
PC
Forecast model
D
Period Indicator
M
Last forecast
01.07.2020
Fiscal Year Variant
RefMatl: consumption
100-100
RefPlant:consumption
1000
Date to
01.11.2018
Multiplier
1,30
Number of periods required
Hist. periods
25
Forecast periods
12
Periods per season
12
Initialization pds
0
Fixed periods
0
Control data
Initialization
X
Tracking limit
9,000
Reset automatically
Model selection
Selection procedure
Param.optimization
Optimization level
Weighting group
Correction factors
Alpha factor
0,70
Beta factor
0,00
Gamma factor
0,00
Delta factor
0,30
Forecast values
Consumption vals

To receive identical results for the simulation runs of the forecasting & monitoring tool, the following settings must be made for the example mentioned above:






It is important to note that these settings are valid in general for all materials that are considered during the simulation, accordingly, no forecasting parameters are read from the material master. As the initialization periods, the minimum number depending on the forecasting model chosen will be assumed and used by the analysis period:

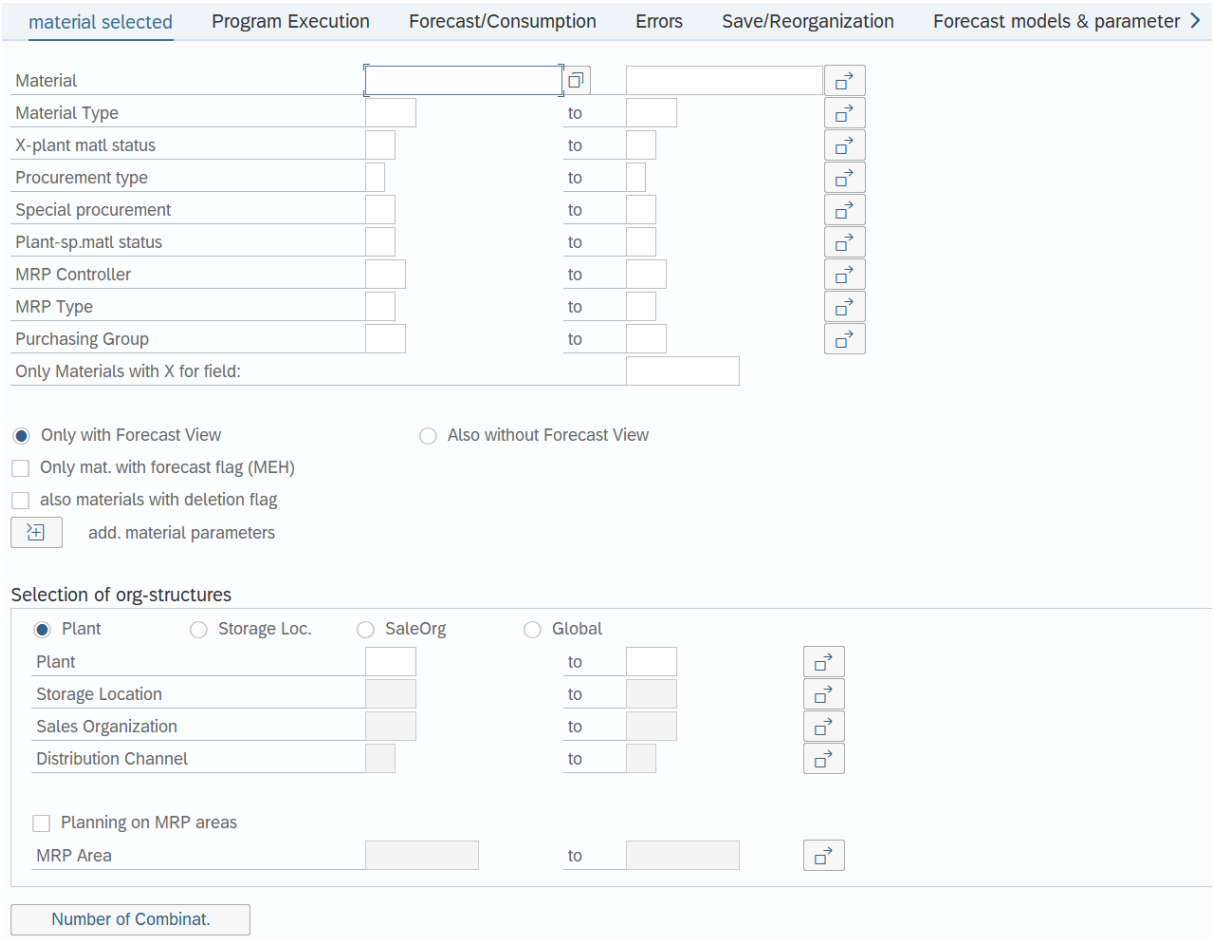
| Model | Number of Historical Values |
|---|---|
| Constant model | 1 |
| Trend model | 3 |
| Seasonal model | 1 season length |
| Seasonal trend model | 1 season length + 3 |
| Exponential smoothing of the second order | 3 |

| Model | Number of Historical Values |
|---|---|
| Moving average | 1 |
| Weighted moving average | 1 |

However, setting the option *Use SAP Standard Logic (MM02)* also results in restrictions for the error measures and the simulation mode. The selection of the error measure is hereby restricted to the MAD, ET (error total), and TS (tracking signal). No rolling simulation can be executed either.

## 2.2 Selection Options for Material

On the *Material Selection* tab, the selection options listed in the screenshot are available for restricting the worklist of materials.



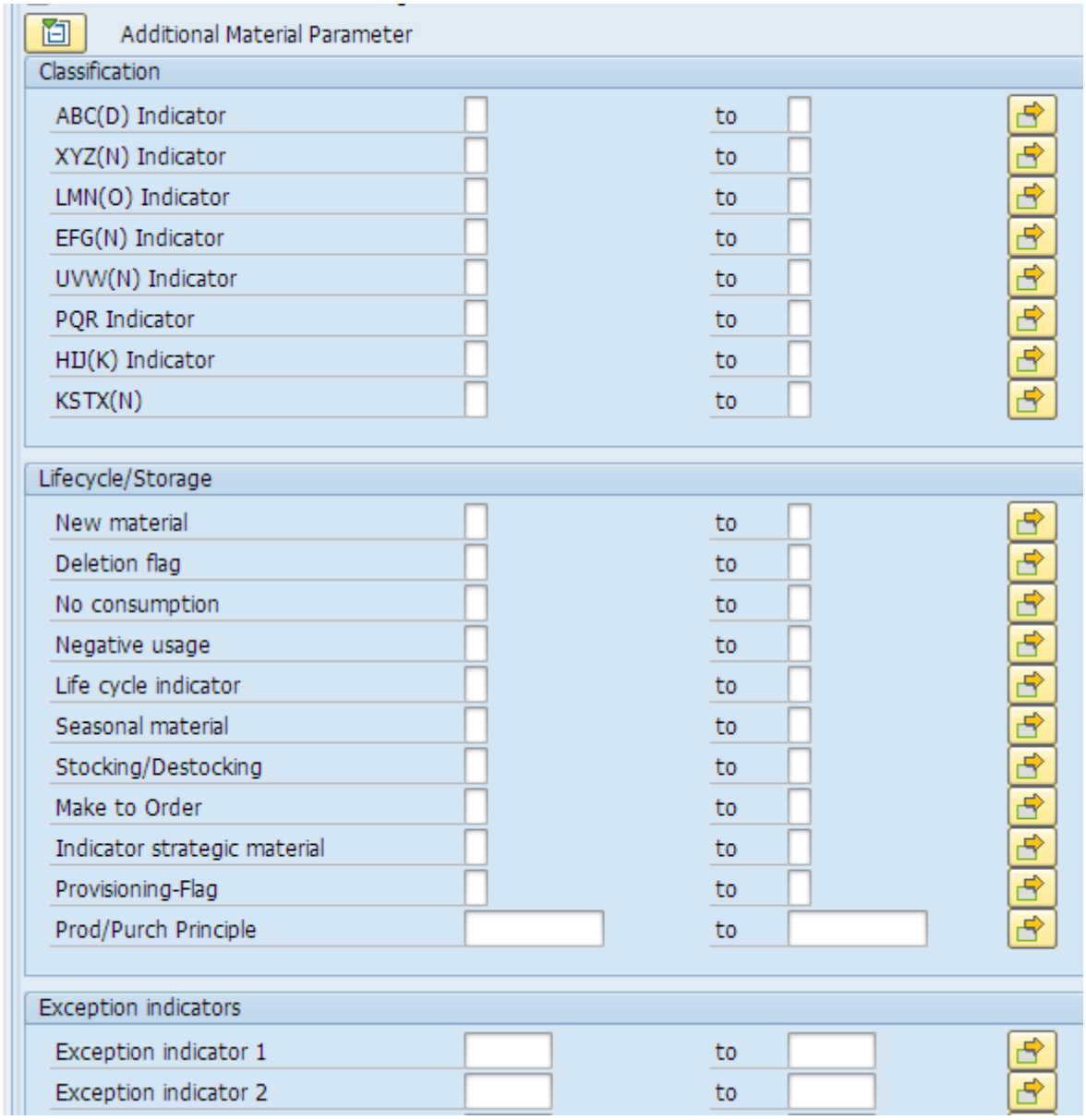

Selection: MaterialsTab Page

The *Only Materials with Forecast Ind. (MEH)* indicator allows materials to be filtered. The indicator can be maintained in the **enhanced material master view**.

In the text field for *Any Field from Table MARC for Selection by 'X'* other checkbox fields can also be retrieved and therefore the selection of materials can be restricted specifically. The fields must exist in the MARC table.

The *Other Material Parameters* button enables the **enhanced material master view** classifications to be shown and used for selection. The classifications are primarily created using the **MRP monitor**.

For more information about the other material parameters, see the “Cross-Tool Functions”, “Enhanced Material Master Views” sections.




Other Material Parameters

In the *Plant Selection* block, the worklist can be restricted further by the organizational units plant, storage location, and sales organization. The evaluation levels are also specified:

- *Global*: All data is aggregated at the level of material and the forecasting error is calculated at this level
- *Plant*: All data is aggregated at the material and plant level
- *Storage Location*: All data is aggregated at the material, plant, and storage location level
- *Sales Organization*: All data is aggregated at the material, plant, and sales organization level

Optionally, planning at MRP area level is also available. The tool then also aggregates to the MRP area, which can also take place in addition to the sales organization or storage location.

In the case of a normal combination of material and MRP area, table DVER is then also available as the data source for the historical data, but the analogous table for plant consumption data MVER is not available.

The evaluation level determines the organizational levels available for selection and the fields for material selection available for selection. For example, the selection options *sales organization* and *distribution-chain-specific status* can only be selected actively if the sales organization has been chosen as the evaluation level. The selection option *Forecast Model* can only be selected if the option *Only Materials with Forecast View* has been selected. The plant-specific selection fields, for example, *Special Procurement Key*, can be selected only if an evaluation level (plant, storage location, or sales organization) containing the plant has been chosen.

> **Note**
>
> A BAdI is available for the customer-specific enhancement of the material selection. See section Enhancement Options / User Exits.

The *Number of Combinations* button can be used to estimate the worklist. The number of evaluation combinations is calculated based on the selection options and the evaluation levels.

The number of combinations is displayed in the status bar. A new button also appears, which enables the selected combinations at the desired evaluation level to be displayed in a popup.

## 2.3 Selection Options for Periods

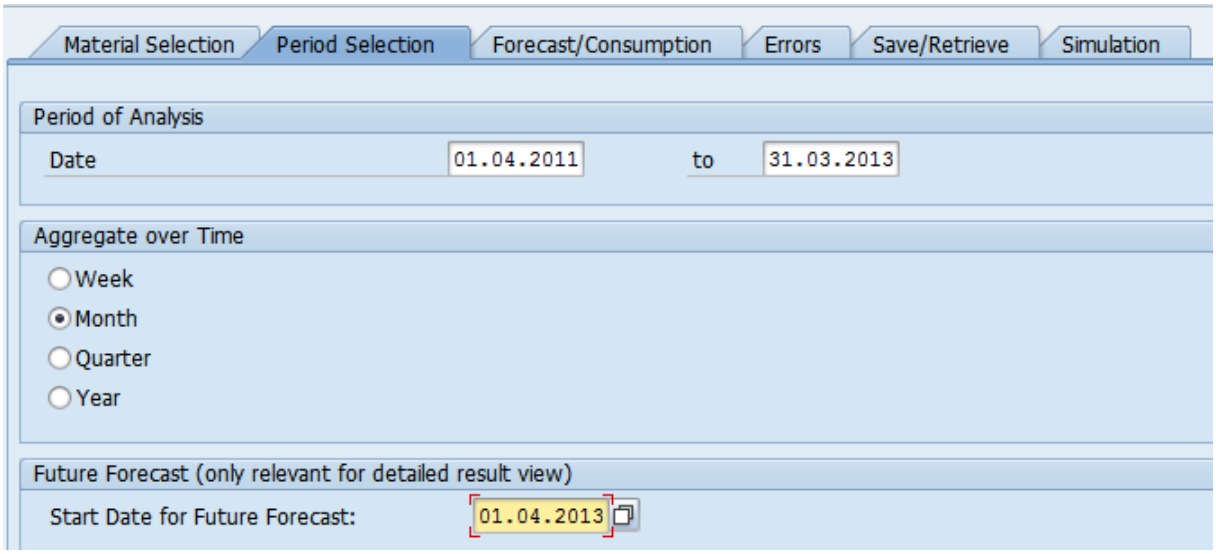
The analysis period must be restricted by the specification of a start and end date.

For the analysis period specified, consumption data and stored forecast data is read. From these two time series, depending on the selection of the error measure (see Error Measure tab), deviations between the actual consumption and the forecast data are calculated.

In Customizing, you can use the DEF_PERIOD parameter to define the default length of the analysis period. The default end date is always today's date. The start date is then based on this Customizing entry.

The aim of the monitor is now to compare the calculated (actual) error measure with the error measures of other forecasting models. This is possible via the simulation of various forecasting models. The simulation performs an ex-post forecast with the parameters of the Simulation tab within the analysis period. For each simulated forecast, a comparison with the historical values is also performed and the selected error measure is determined. This represents the basis for determining the best model.

In the selection, the time level to which the data is to be grouped for the analysis must be specified. With the setting “Month”, the consumptions and forecasts read are consolidated at month level and contrasted to calculate the forecasting errors. Note that the setting “Week” is useful only if this can be derived from the data sources. For example, the data source *MVER* can contain entries at a monthly and weekly level. If data records exist at a monthly level, but the evaluation is to be performed at a weekly level, the consumptions of an entire month are assigned to the first week of the month.




Period Selection Selection Tab

The specification of the *start date for forecast (only relevant for detailed results view)* is used for the additional execution of the forecast calculation as of the set date into the future (here 03/03/2012). To reduce runtimes, this additional forecast calculation can be suppressed. To do so, the field simply needs to be left empty.

The values that are determined using this function are visible in the *Detail View* (double-click on a material on the results screen), in the lower table, and in the lower chart.

## 2.4 Selection Options for Forecasting Data and Consumption Data

Data sources can be selected here.

The following data sources (database tables) for determining the consumptions are connected in the forecasting & monitoring tool:

- *VBAP* (sales orders),
- **Info structures**
- *RESB (Reservations)*
- *DVER (material consumptions in the MRP area)*
- *MVER* (material consumptions)
- *MSEG* (document segment material)
- *BAdI (consumption data from a customer-specific source, programmable)*

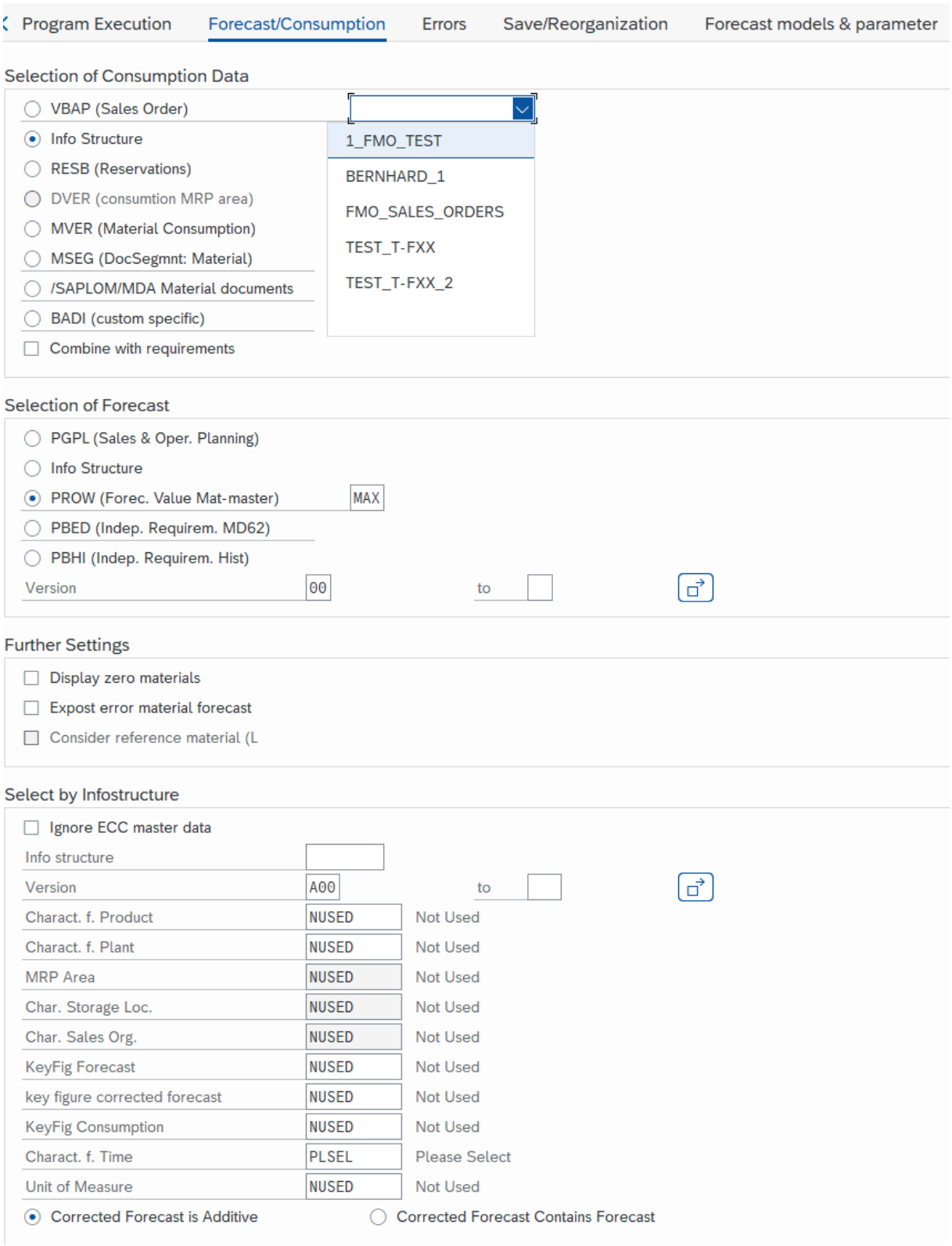
If you use the material document analysis SCM consulting solution, you can use the analyses created as a data source (*material documents*). To do this, you need to enter the key of the analysis in the input field below.

The following tables are available for determining the forecast quantities:

- *PROW* (forecast values)
- *PGPL* (Sales and Operations Planning)

- *PBED* (planned independent requirements)
- *PBHI* (PIR history)
- Any info structure can be connected here also.

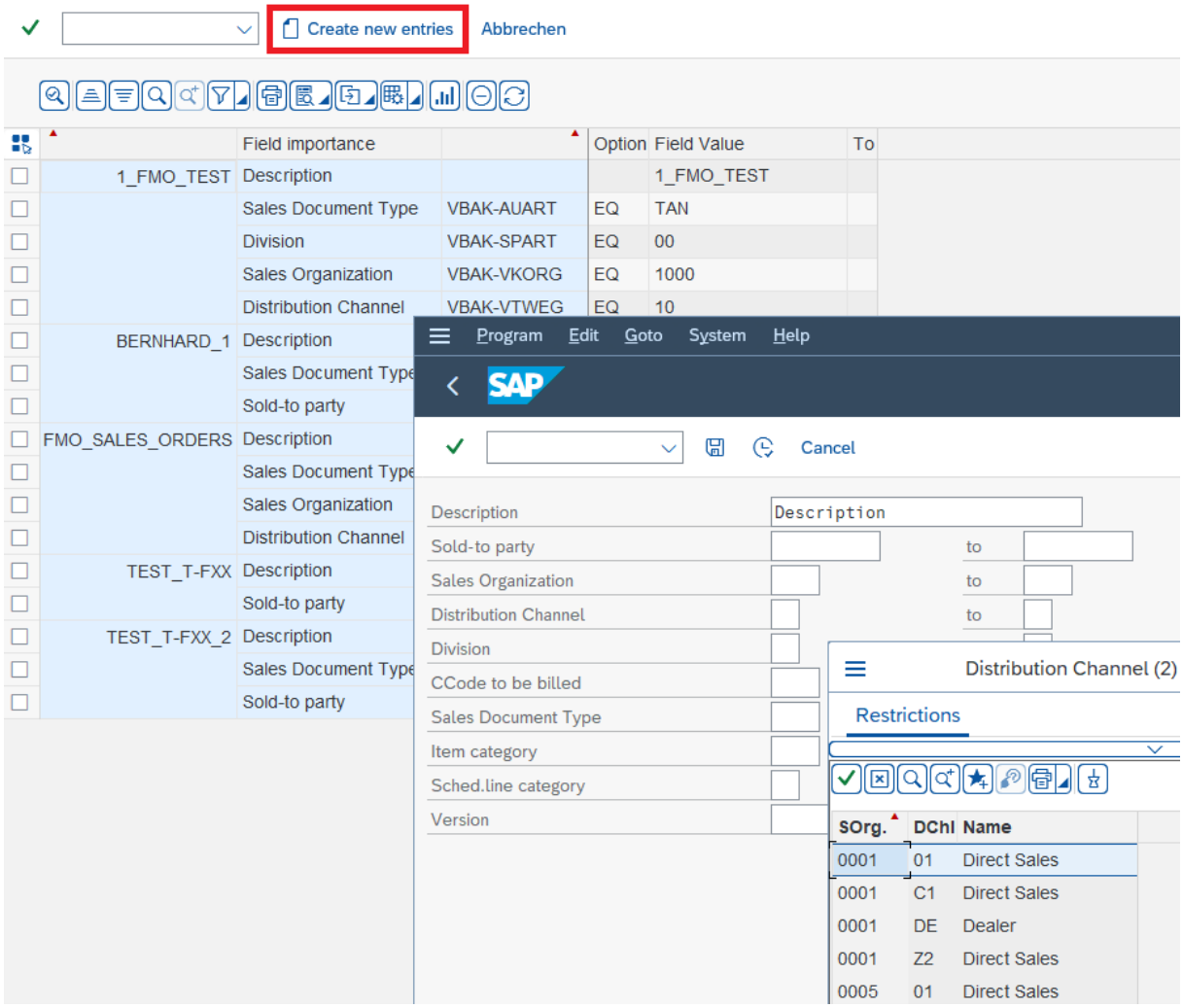
All consumption data sources can be combined with current requirements from the stock/requirements list (*MD04*). Sales documents, dependent reservations, and deliveries are available for selection.




Selection tab page Selection of Forecast and Consumption Data

To filter sales orders, you can create a filter by choosing the button Sales Order Selection in the upper toolbar. The filter profiles that have already been created are then displayed. Clicking on “Create new entries” enables

a new profile to be added. It is important to enter a description here. In addition, certain filter criteria can be created. All entries are optional, so you only have to specify the filter criteria that you want.




## 2.4.1 Further Settings

In the *Further Settings* block, the *Display Zero Materials* parameter can be used to determine whether materials that have neither consumptions nor forecast values in the system are to be displayed in the results list.

The *Truncate Zero Values at Start* option initiates a dynamic modification of the analysis periods. If the FMO determines that zero periods exist at the start of a time series, these are truncated. As a result, the analysis period can also be reduced so that the number of initialization periods necessary for the chosen model can be retained. The Customizing value *MIN_PERIOD* reflects the minimum analysis period that is allowed to be reduced dynamically. Below this, there is no simulation. First, all models are used to determine the maximum initial period, since otherwise the models cannot be compared with one another for a material. Then, for every material it is checked whether the maximum initial period and the minimum analysis period can be retained after the reduction of the historical periods and the analysis period (due to zero periods).

The option *Read Total Consumption* vs. *Read Corrected Total Consumption* is active only for the data source *MVER*. This data source contains two key figures for the consumption.

The option *Version* is only active for the data sources *PROW*, *PBED*, and *PBHI*, and refers to the forecast versions to be read. Certain forecast versions can be read, the default value is 00.

The option *History Number* is only active for the data source *PROW*, and refers to the history number to be read. 00 represents the run performed most recently, 01 for the run before that, and so on. *MAX* can be used to specify that the oldest run is to be read.

The selection option *Movement Type* is active only for the data source *MSEG*. This enables a restriction by movement types that are to be considered when reading from *MSEG*.

## 2.4.2 Rules for Importing *PBHI* Data

In the data source *PBHI*, there might be multiple entries for a planning date. The reason for this is either that the planner changed the original quantity, or reorganization runs and consumptions modify the planned quantity field in *PBHI*. The rule set listed here ensures that the following aspects are taken into account when reading *PBHI* .

**Change Rate Routing**

Withdrawal quantities (consumption) that reduce the planned quantity in *PBHI*.

**Reorganization Runs**

When reading the *PBHI*, the following logic is applied, whereby the key consists of the client, need indicator, planning date, date of change, and time of change.

**Rule Set:**

In principle: If there are multiple values for the planning date, the most recent value is always used.

Rule 1: If the value in the field Withdrawal Quantity (*ENTMG*) is = 0, the value from the field Planned Quantity_DB (*DBMNG*) is used.

Rule 2: If *ENTMG* and *DBMNG* = 0, the value from the field Planned Quantity (*PLNMG*) is used.

Rule 3: If in field *ENTMG*, the value is greater than 0, the value is calculated from the fields *ENTMG* + *DBMNG*.

If week is selected: If there are multiple date entries (*PDATU*) in a week, each of the most recent values that result from rules 1-3 are added up.

If month is selected: If there are multiple date entries (*PDATU*) in a month, each of the most recent values that result from rules 1-3 are added up.

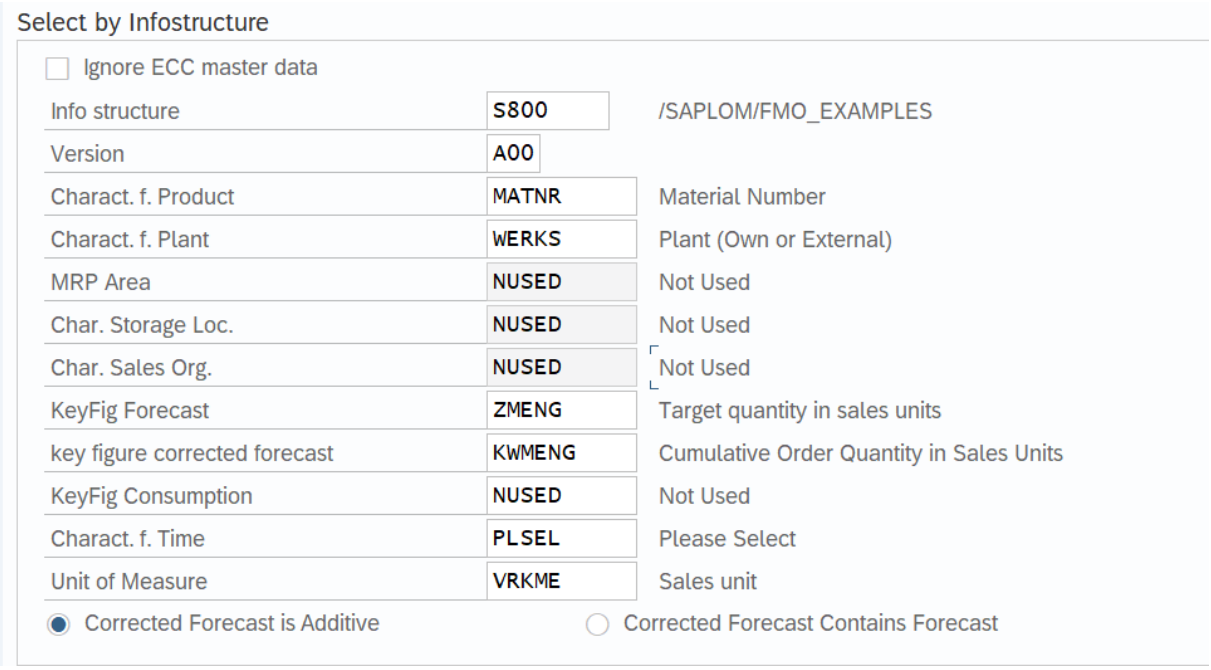
If quarter is selected: If there are multiple date entries (*PDATU*) in a quarter, each of the most recent values that result from rules 1-3 are added up.

If year is selected: If there are multiple date entries (*PDATU*) in a year, each of the most recent values that result from rules 1-3 are added up.

## 2.4.3 Info Structures

The selection parameter info structure is assigned an input help, which references all info structures available in the system.

With the additional parameters for the info structure, the info structure characteristics must be mapped to the evaluation levels of the forecasting & monitoring tool. The parameters that were specified on the *Material Selection* tab are ready for input. In the example, this is *Plant*; *Material* and *Plant* must be assigned to the characteristics of the info structure.

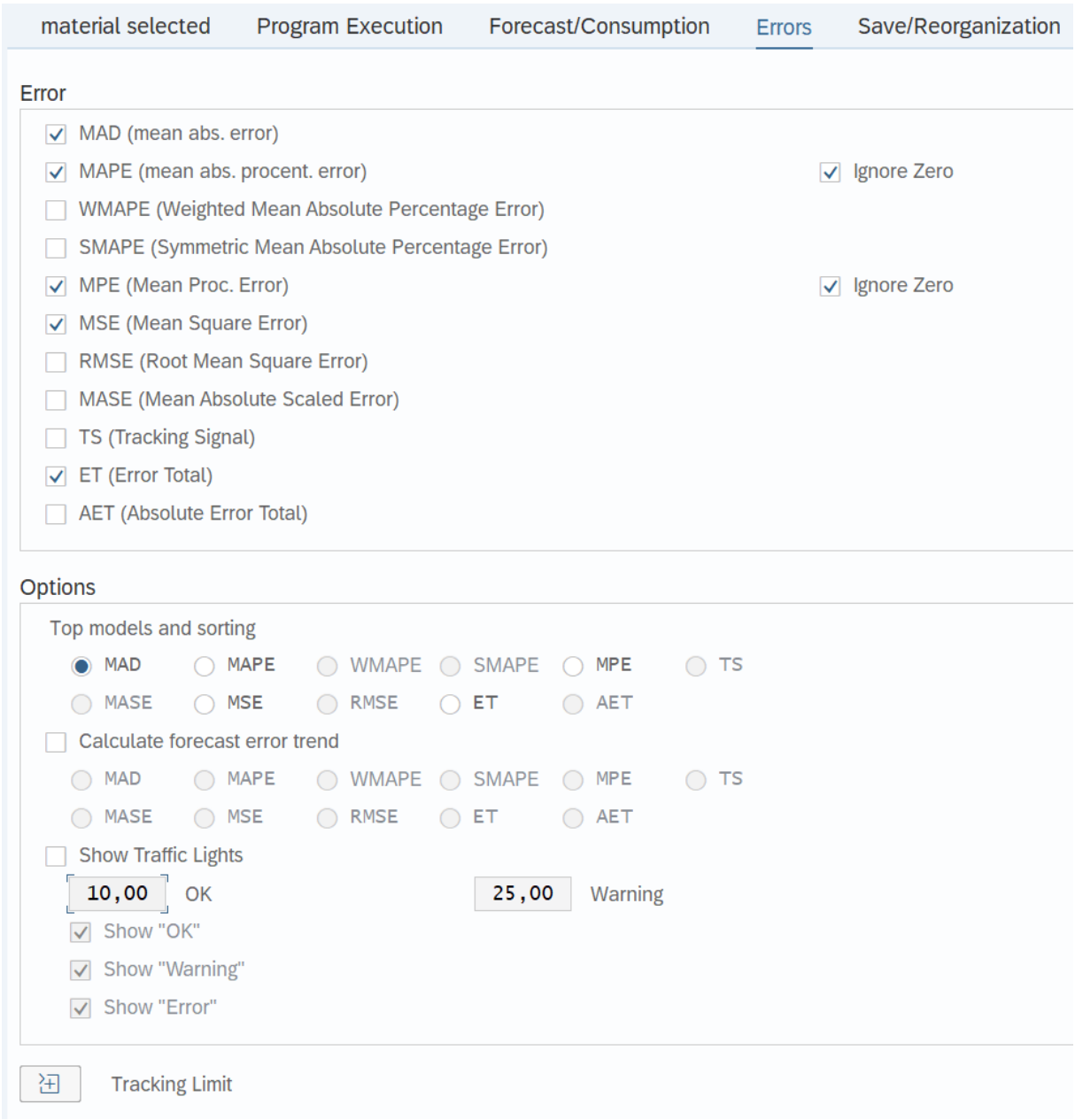



An input help is available for the parameters; it is determined dynamically from the existing characteristics of the info structure and presorted by characteristics, time characteristics, and key figures.

You can use the option "Ignore ERP Master Data" to process data in the info structure that has no equivalent in the ECC material master. This means, for example, that simulations and tests for new materials that are not in productive operation could also be performed in the info structures.

## 2.5 Selection Options for Error Measures

The forecasting errors listed and selected on the *Error Measure* tab are calculated and displayed on the results screen.




Selection of Error Measures

You can specify the error measure according to which the top model is to be calculated and the results table is to be sorted. It is not recommended to optimize using the tracking signal since this is used to identify structural problems in the time series.

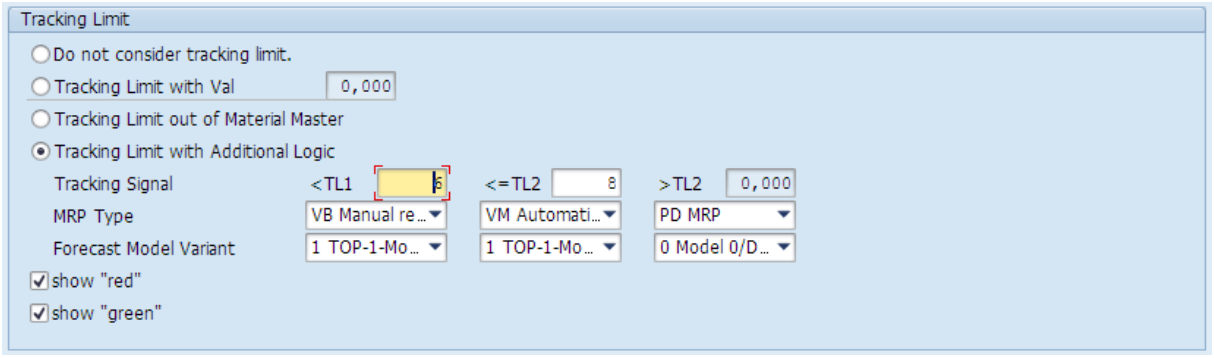
Activate the calculation of the error trend to identify the trend behavior of the forecasting error. In this case, exactly one forecasting error is to be specified, for which the trend is to be calculated.

The *Display Error Traffic Light* option controls the display of a traffic light (green, yellow, red) according to the values specified for the selected forecasting error in the threshold values “OK” and “Warning”. Also, you can filter the display of the results such that only results with a red traffic light are displayed, for example.

Following these configuration options, you can choose the basis for the statement of the forecasting ability (traffic light) and the tracking limit using additional logic. The first option is to calculate the tracking signal without taking into account the simulation data (column "Error TS" in the results overview). In the second option, you can access the tracking signal of one of the top models.

In the *tracking limit* section, you can check the simulation results with regard to the tracking signal. Exceeding a threshold value (4 in the standard system) is an indication that the forecasting technique is not suitable. This means that there is a structural interruption in a time series. The forecasting ability traffic light would be red in this case. If this occurs, you should display the material and its simulation results in detail. If necessary, you should choose a different error measure for optimization or include a different forecast model in the simulation.

In general, a tracking limit must be specified for the statement of the forecasting ability. The possible settings for this are explained in the next section.




Tracking Limit with Additional Logic

1. **Ignore Tracking Limit**
   With this option, not statement on the forecasting ability of a material is made since the tracking limit in connection with the tracking signal is crucial for this. In this case, the corresponding traffic light in the forecasting overview remains empty and no selection can be made in the block described previously.
2. **Tracking Limit with Value**
   The value entered is used as the tracking limit for all materials to be simulated. If the calculated tracking signal (error total/MAD) is less than the tracking limit, a green traffic light icon is displayed in the forecasting ability column in the following forecasting overview. In the event that the tracking signal exceeds the tracking limit, a red traffic light icon is displayed in the corresponding column. The default value suggested here is 4.
3. **Tracking Limit with Value from Material Master**
   The logic corresponds to the behavior described previously in 2, however, instead of a standardized, manually maintained tracking limit, the individual value from the material master is used here. The conditions for the traffic light decision are identical.
4. **Tracking Limit with Additional Logic**
   To achieve a gradation of the tracking limit, you can specify two different limits for this option. Depending on the size of the calculated tracking signal and the values SG1 and SG2 entered by the user, different decisions are made subsequently. The values entered are used to determine two columns in the forecasting overview.

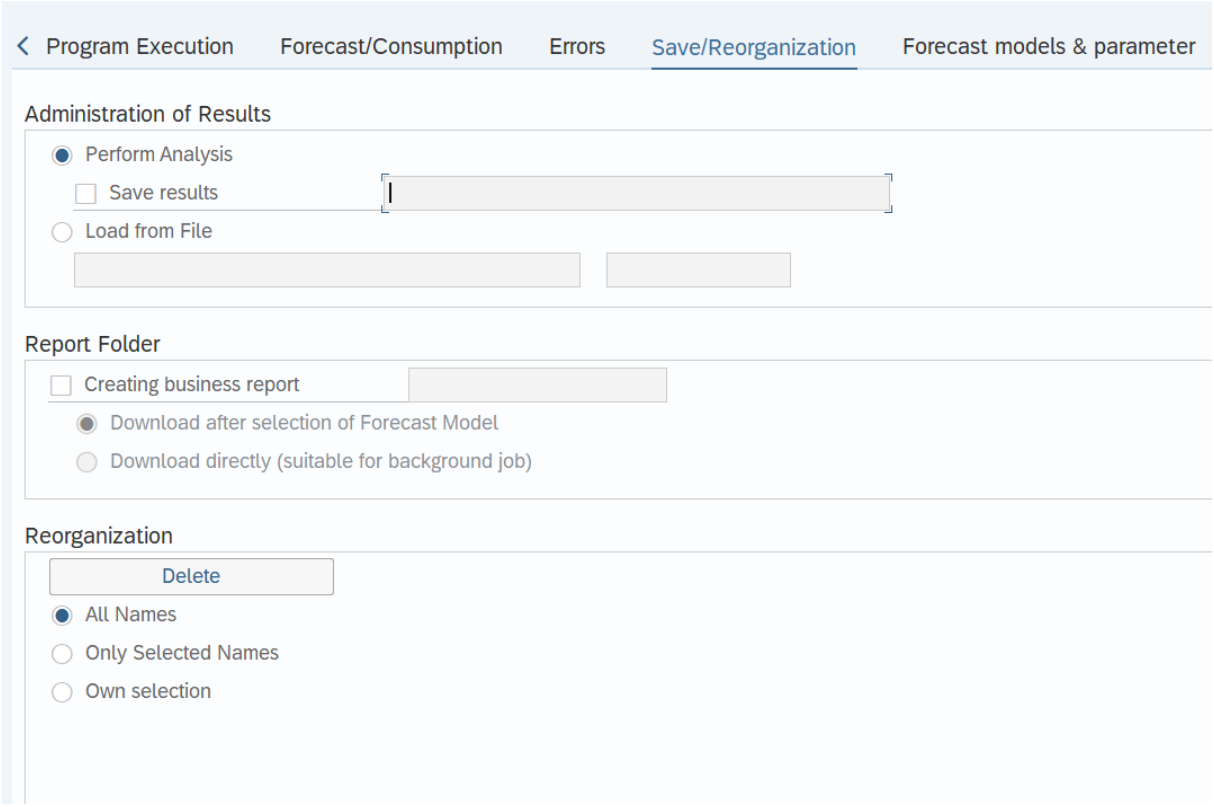
Firstly, as in options 1-3, a statement is made on the forecasting ability. If the tracking signal is greater than the value in SG2, the traffic light is set to red. If the value is less than or equal to SG2, the traffic light is green.
Secondly, a column is added to the forecasting overview, which makes a statement on the materials to be handled. If the MRP type previously configured in the material master, or the forecasting model differs from the settings made in the fields MRP Type and Forecasting Model Variant, an alert symbol is placed in the first column of the forecasting overview. This enables the user to immediately identify which material master data needs to be updated, and which data does not need to be updated. With this option, you can make any changes to all values (SG1, SG2, MRP type [dropdown menu], forecasting model variant [dropdown menu]).

The last two options allow you to deliberately display or hide materials with red or green traffic lights. You can specifically filter materials with red traffic lights to identify materials for which action is required.

## 2.6 Selection Options for Results Management

Results can be saved, loaded, and deleted.

On the *Save/Retrieve* tab, you specify whether the **Forecasting & Monitoring Tool** is to *perform analysis* or *load a previous analysis*. If the analysis is to be performed, the result can be saved if desired. A name can be specified for this. A unique database key is created automatically in the background.




If the dynamic modification option *Truncate Zero Values at Start* is used, the use of the third option is to be checked: *Number of Historical Periods from Selection Screen Instead of Simulation*. This enables you to prevent

values that are too low from being saved in this parameter that arise only due to a temporarily low number of historical periods.

If a saved forecast run is to be loaded, this can be called using the search icon.

When loading saved results, the material selection tab can be used to filter the result set. This reduces the load time and increases transparency in the results view.

You can also create Microsoft Excel books of reports. Please refer to the specific sectionMS Excel Book of Reports [page 69] for a description of this.

In the *Reorganization* block, all or individual analysis runs can be deleted from the database. A search icon is available here too. Optionally, deletion is also possible based on conditions such as specific users or specific times. This can be useful, for example, if the FMO tool is run at regular intervals for a background user that creates and saves sales forecasts. However, for this background user in particular, you want to delete older log files, but not for interactive users with special tasks.

### Related Information

Customizing

## 2.6.1 Parallelization

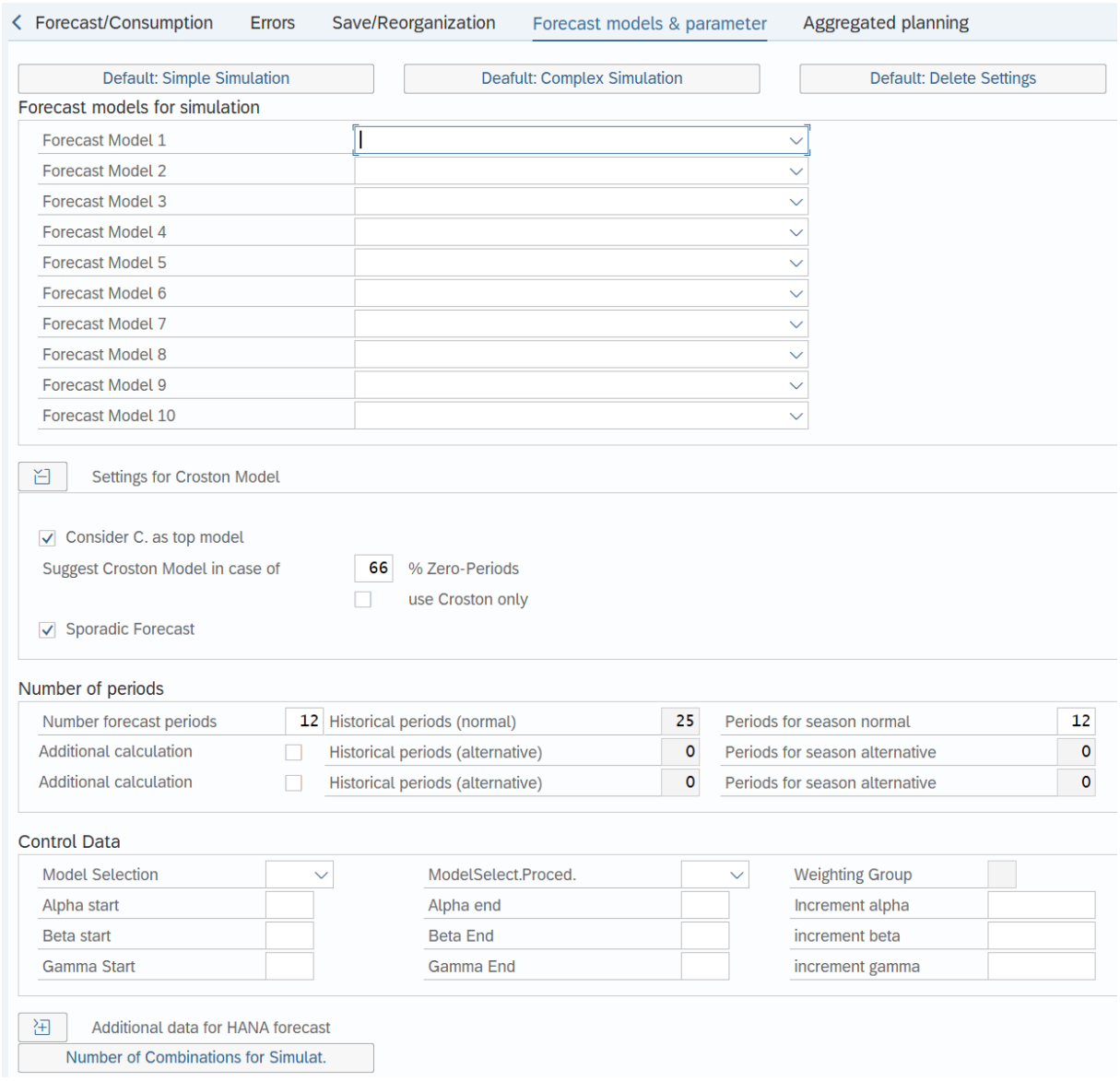
If a large number of materials is to be simulated in a run, parallelization takes place within the program to improve run time.

The prerequisite for parallelization is that the FMO is executed in the background and the *Save Results* option is activated. In the Customizing of the FMO, a *Number of Materials* threshold value is specified. If this threshold value is exceeded, the materials to be simulated are divided into packages, and these are processed in parallel.

Transactional RFC (tRFC) calls are used for the parallel processing. A server group is required for this purpose, which contains settings for the system utilization. By default, the FMO attempts to use the server group **SPACE**. Using the Customizing parameter *SERV_GROUP*, you can refer to an individual server group. This must be defined in transaction *RZ12* beforehand (note capitalization).

## 2.7 Selection Options for Forecast Models and Parameters

Up to 10 forecasting models that are to be considered during the simulation can be preconfigured on the *Simulation* selection tab page.




Forecast Models and Parameters

In the event that the user selected *No Simulation* in the section above, the **forecasting monitor** does not perform a simulation. For the *user-defined simulation*, all simulation parameters, including tracking limit, can be chosen without restriction. Whereas the *preconfigured simulation* fills the parameters with fixed values. This corresponds to the settings of a *complex simulation* as it is available as a button. This is one of two preconfigured sets of parameters that can be loaded by choosing a button.

The *Number of Combinations for Simulation* button determines the number of simulation runs using the configured parameters.

The simulation of each model behaves as if the forecast is executed at the start of the analysis period. Accordingly, the number of historical periods specifies how many periods before the start of the analysis period are reselected by the **forecasting & monitoring tool** to simulate a forecast in the analysis period. At the same time, this value is also used for the forecast in the future, as a value for the historical periods.

The number of forecast periods is relevant only for the forecast in the future. For the simulation, the number of periods is calculated from the length of the analysis period.

For the control parameters, start values, end values, and increments are configured. The combination of these specifications results in a number of simulation runs that the **forecasting & monitoring tool** will perform. The weighting group is only relevant for the model *W Moving Average*.

The *Periods per Season Normal* field also needs to be filled if no seasonal model is to be simulated. The option *Initialization* is active for each simulation run.

It is possible to use a rule set from a BAdI to determine the models and parameters to be simulated for each material. For this , a BAdI must be implemented (see section Enhancement Options / User Exits). The settings on the Simulation tab page are then not taken into account.

## 2.7.1 Croston Model

The forecasting & monitoring tool can also work with the Croston model, which can be activated subsequently in the standard SAP system.

The Croston forecasting model is not available on delivery in ECC, but it can be activated subsequently. If it is activate, it appears in the list of available models and can be simulated, like all other models.

For the Croston method to be able to be used, it is not sufficient to simply provide this as a forecasting model for simulation. For use, the option of suggesting the Croston model via a rule was also created.

In the forecasting & monitoring tool, it is possible to use different forecast models to simulate forecasts and display the best possible model. For this purpose, the top models are listed, which are determined based on the forecasting error. If the Croston model has the slightest forecasting error, it is listed accordingly in the top models, and the user has the option of making a decision on this basis.

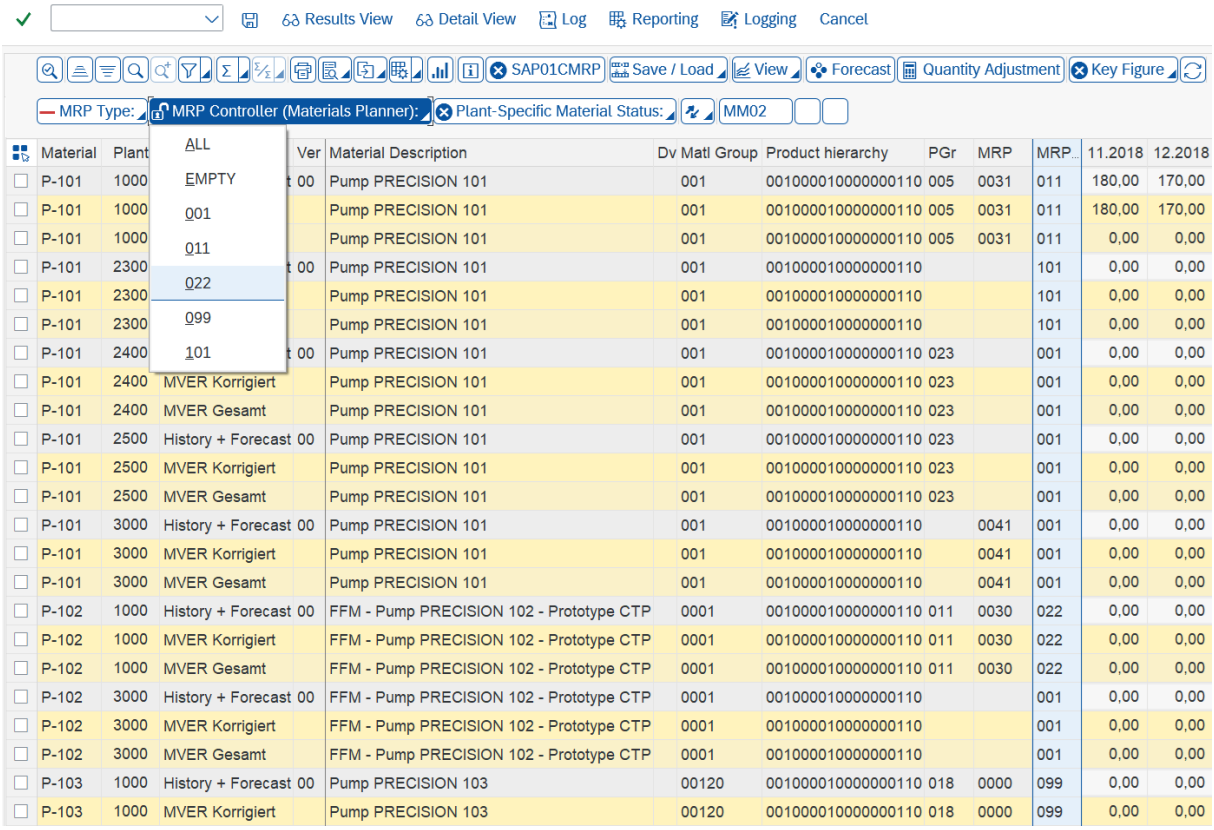
You use the Propose Croston Model function for XX% zero periods to decide whether the Croston model is proposed or used for the forecast, based on the percentage of zero periods in the time series. The user can choose to select whether and as of what percentage of zero periods the Croston method is to be suggested. 66% is defined as the initial value.

If the user selects the Use Croston Model Only checkbox, the simulation is forced to use the Croston model only if the specified threshold value is reached. No other set forecast models are taken into account in optimization. Furthermore, the user can choose between a sporadic forecast and a non-sporadic forecast – this is the same as in SAP APO. If the forecast is not listed sporadically, the forecasted values are distributed to all periods, otherwise both the requirement and the interval between the requirements are forecast.

The user also has the option of selecting only materials that exceed the specified threshold (checkbox Hide Other Materials). Provided that the user does not restrict the selection for the material selection and enters 76% for the Croston threshold, only the materials for which the selected analysis period shows more than 76% of zero periods are displayed.

## 2.8 Working with Customer-Specific Material Master Attributes

As of Version 2022, you have the option of displaying any material master attributes in FMO and using them to filter the output table. These can also be customer-specific "Z fields" from any tables, including "Z table". However, the prerequisite for this is that the tables contain information about the material and plant in the specified column names “MATNR” and “WERKS”. Ideally, the material and plant should also form the table key.

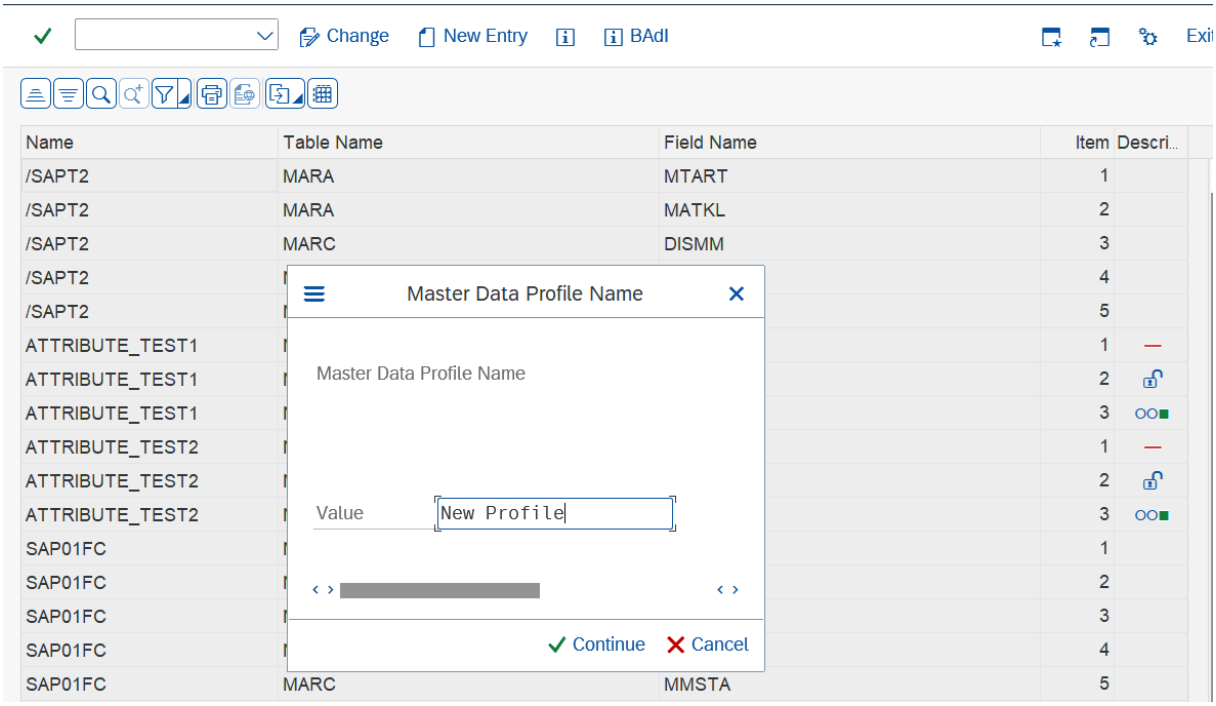



| Material | Plant | Ver | Material Description | Dv | Matl Group | Product hierarchy | PGr | MRP | MRP... | 11.2018 | 12.2018 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| P-101 | 1000 | 00 | Pump PRECISION 101 | | 001 | 001000010000000110 | 005 | 0031 | 011 | 180,00 | 170,00 |
| P-101 | 1000 | | Pump PRECISION 101 | | 001 | 001000010000000110 | 005 | 0031 | 011 | 180,00 | 170,00 |
| P-101 | 1000 | | Pump PRECISION 101 | | 001 | 001000010000000110 | 005 | 0031 | 011 | 0,00 | 0,00 |
| P-101 | 2300 | 00 | Pump PRECISION 101 | | 001 | 001000010000000110 | | | 101 | 0,00 | 0,00 |
| P-101 | 2300 | | Pump PRECISION 101 | | 001 | 001000010000000110 | | | 101 | 0,00 | 0,00 |
| P-101 | 2300 | | Pump PRECISION 101 | | 001 | 001000010000000110 | | | 101 | 0,00 | 0,00 |
| P-101 | 2400 | 00 | Pump PRECISION 101 | | 001 | 001000010000000110 | 023 | | 001 | 0,00 | 0,00 |
| P-101 | 2400 | MVER Korrigiert | Pump PRECISION 101 | | 001 | 001000010000000110 | 023 | | 001 | 0,00 | 0,00 |
| P-101 | 2400 | MVER Gesamt | Pump PRECISION 101 | | 001 | 001000010000000110 | 023 | | 001 | 0,00 | 0,00 |
| P-101 | 2500 | History + Forecast 00 | Pump PRECISION 101 | | 001 | 001000010000000110 | 023 | | 001 | 0,00 | 0,00 |
| P-101 | 2500 | MVER Korrigiert | Pump PRECISION 101 | | 001 | 001000010000000110 | 023 | | 001 | 0,00 | 0,00 |
| P-101 | 2500 | MVER Gesamt | Pump PRECISION 101 | | 001 | 001000010000000110 | 023 | | 001 | 0,00 | 0,00 |
| P-101 | 3000 | History + Forecast 00 | Pump PRECISION 101 | | 001 | 00100001000000110 | | 0041 | 001 | 0,00 | 0,00 |
| P-101 | 3000 | MVER Korrigiert | Pump PRECISION 101 | | 001 | 00100001000000110 | | 0041 | 001 | 0,00 | 0,00 |
| P-101 | 3000 | MVER Gesamt | Pump PRECISION 101 | | 001 | 00100001000000110 | | 0041 | 001 | 0,00 | 0,00 |
| P-102 | 1000 | History + Forecast 00 | FFM - Pump PRECISION 102 - Prototype CTP | | 0001 | 001000010000000110 | 011 | 0030 | 022 | 0,00 | 0,00 |
| P-102 | 1000 | MVER Korrigiert | FFM - Pump PRECISION 102 - Prototype CTP | | 0001 | 001000010000000110 | 011 | 0030 | 022 | 0,00 | 0,00 |
| P-102 | 1000 | MVER Gesamt | FFM - Pump PRECISION 102 - Prototype CTP | | 0001 | 001000010000000110 | 011 | 0030 | 022 | 0,00 | 0,00 |
| P-102 | 3000 | History + Forecast 00 | FFM - Pump PRECISION 102 - Prototype CTP | | 0001 | 00100001000000110 | | | 001 | 0,00 | 0,00 |
| P-102 | 3000 | MVER Korrigiert | FFM - Pump PRECISION 102 - Prototype CTP | | 0001 | 00100001000000110 | | | 001 | 0,00 | 0,00 |
| P-102 | 3000 | MVER Gesamt | FFM - Pump PRECISION 102 - Prototype CTP | | 0001 | 00100001000000110 | | | 001 | 0,00 | 0,00 |
| P-103 | 1000 | History + Forecast 00 | Pump PRECISION 103 | | 00120 | 001000010000000110 | 018 | 0000 | 099 | 0,00 | 0,00 |
| P-103 | 1000 | MVER Korrigiert | Pump PRECISION 103 | | 00120 | 001000010000000110 | 018 | 0000 | 099 | 0,00 | 0,00 |

In FMO, you can select a master data profile on the "Program Execution" tab in the "Planning Functions" area. The creation of maintenance is described in the subchapter.

### 2.8.1 Maintenance of Master Data Profile

To maintain the “master data profiles”, you can start FMO and click on “Master Data Profile” at the top of the toolbar. Alternatively, you can also start transaction /SAPLOM/FMO_MD_ATTR.

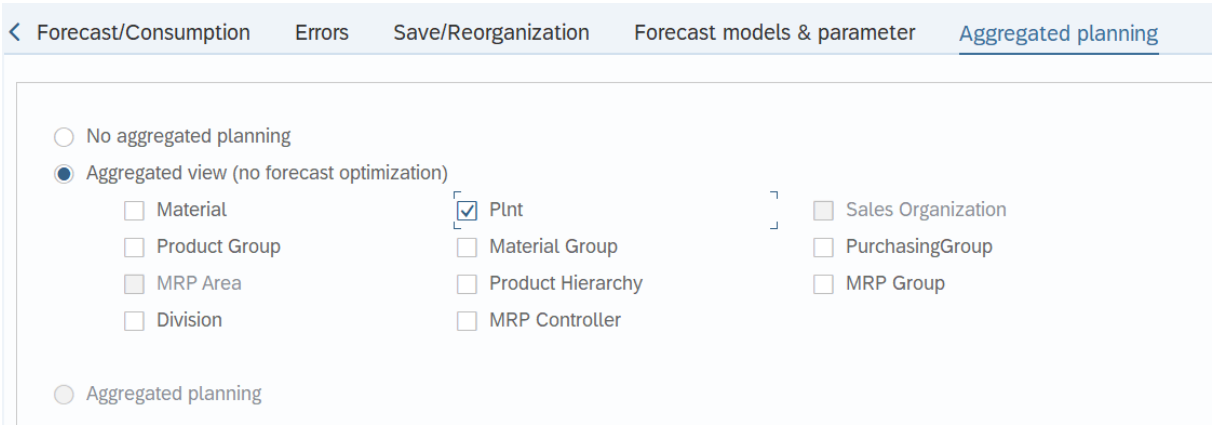



Clicking “New Entry” opens a dialog box, in which a new name of the master data profile is entered. You can then edit the table. You can use the functions in the ALV Grid (Append Row) to add new rows and enhance existing profiles by selecting a row and copying it with "Duplicate Row".

You can then specify the table name and field in the new rows. Optionally, a symbol can also be defined, which is later displayed in the FMO tool for this attribute. This makes it possible to find the master data button quickly.

## 2.9 Aggregated Planning

Aggregated planning allows you to combine individual requirements at a desired level, for example, to view all requirements for a material across all plants. The FMO itself only supports the display of the aggregated totals in addition to the individual totals in the planning view. In connection with the additional tool FOH, however, it is also possible to perform planning at aggregated levels and thus an additional forecast optimization. For more information, see the section “Forecast Optimization with SAP HANA”.

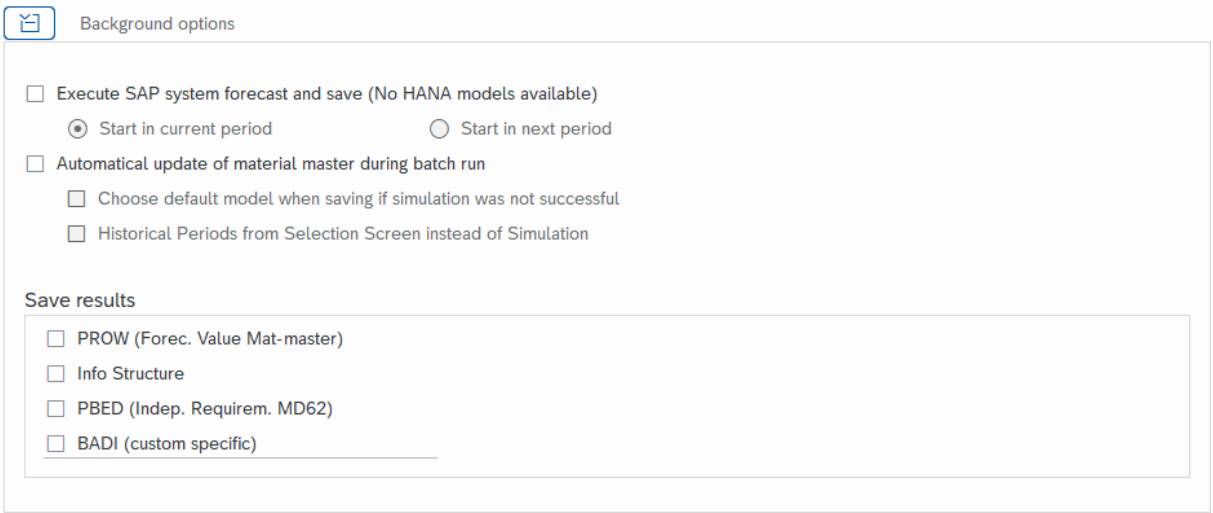



Selections for Aggregated Planning

## 2.10 Additional Background Options

For the background run, there are additional options for executing the tool in the background on the Program Execution tab page. In background processing, you can do the following:

- Execute a forecast and save the results in the targets PROW, info structure, PBED, and/or a customer-specific table using the programming of a BAdI
- Run a simulation to find the best forecast model. This can be saved in the material master (automatic material master update), and in addition, the forecast results can also be saved in the database.
- Execute a simulation without saving the forecast results productively, but saving the simulation results for evaluation by the planner in FMO
- Execute a simulation and saving of the best forecast result in the material master; then execute a standard SAP report for generating the forecast. This report uses the result previously saved in the material master. In this case, no forecast generated by FMO is saved and the standard SAP report can also be started exclusively for the current period or the next period.



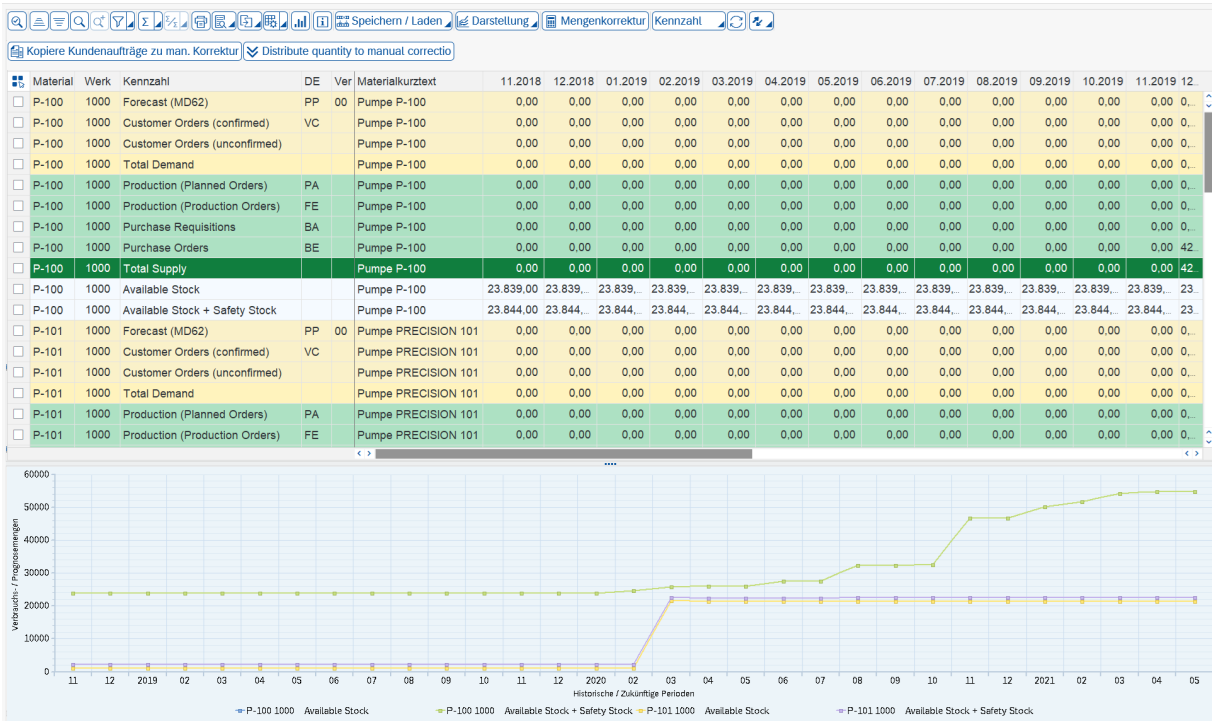

As an option, a material master update can be performed in the background. Whether the individual top model is saved here, or the top 1 model, can be configured using the Customizing parameter *DEF_MODEL*.

Furthermore, as an option, a standard model can be saved if no successful simulation run is available. This model can also be configured in Customizing.

If the option to save the best model has been selected, you have the option of starting a forecast run directly after. There are two options available for this, which are known from the material master: Starting the forecast in the current or in the subsequent period.

# 3 Planning with Key Figures

With the 2022 release, a very extensive enhancement has been introduced in the tool: Planning with flexible key figures. The advantage of using key figures is that additional rows are available per planning unit (for example, material and plant), in addition to the normal forecast result. Here you can, for example, enter manual corrections for the forecast, as well as perform calculations. Users can create simple calculations with a formula module; for complex calculations, a BAdI is also available, with which calculations can be programmed. It is also possible to display different historical and forecast values in the key figures. All sources that are also supported by FMO are possible here.




## 3.1 Purpose of Key Figure Profiles

The use of key figures has infinite possibilities. First, professional demand planning can be achieved, in which the forecast generated by FMO is changed by manual corrections to provide planners with a collaborative function. In addition, you can use the key figures to display additional information that can be used to improve planning. Among other things, the sales orders that have already been received can also be displayed in the future, or planning figures for promotion planning can be displayed in a separate key figure.

Another option is to check whether forecast results have been saved correctly in the database and how a forecast has changed over time. Here, the result of a new forecast run can be taken and compared with stored forecast values in the database, which are displayed in a separate key figure.

**Example 1: The forecast for a material has changed over time as follows**

The key figure profile contains key figures for the individual historical periods.

| Material | Plant | Material Description | Key Figure | Ver | 04.2020 | 05.2020 | 06.2020 | 07.2020 | 08.2020 | 11.2020 | 12.2020 | 01.2021 | 02.2021 | 03.2021 | 04.2021 | 05.2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P-101 | 000 | Pump PRECISION 1... | History + Forecast | 00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| P-101 | 1000 | Pump PRECISION 1... | PROW_00 | 00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| P-101 | 1000 | Pump PRECISION 1... | PROW_01 | 01 | 0 | 0 | 2.517 | 2.517 | 2.517 | 2.517 | 2.517 | 2.517 | 2.517 | 2.517 | 2.517 | 2.517 |
| P-101 | 1000 | Pump PRECISION 1... | PROW_02 | 02 | 0 | 1.316 | 1.316 | 1.316 | 1.316 | 1.316 | 1.316 | 1.316 | 1.316 | 1.316 | 1.316 | 0 |
| P-101 | 1000 | Pump PRECISION 1... | PROW_03 | 03 | 2.048 | 2.048 | 2.048 | 2.048 | 2.048 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| P-101 | 1000 | Pump PRECISION 1... | PROW_04 | 04 | 0 | 2.545 | 2.545 | 2.545 | 2.545 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| P-101 | 1000 | Pump PRECISION 1... | PROW_05 | 05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| P-101 | 1000 | Pump PRECISION 1... | PROW_06 | 06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Example 2: Display of forecast values for a material in different tables**

In this example, the key figure profile contains 3 key figures. The first one displays the forecast values stored for the materials in the PBED table (MD62) for simulation version 05. The second key figure shows the forecast values from the material master of the PROW, and the third key figure shows forecast figures that have been stored in an info structure in version A05. All three results are compared with the forecast currently generated. The planner can now see where the values have been saved and where they have not.

Key-figure profile | Save / Load | Forecast | Quantity Adjustment | Color settings | Chart

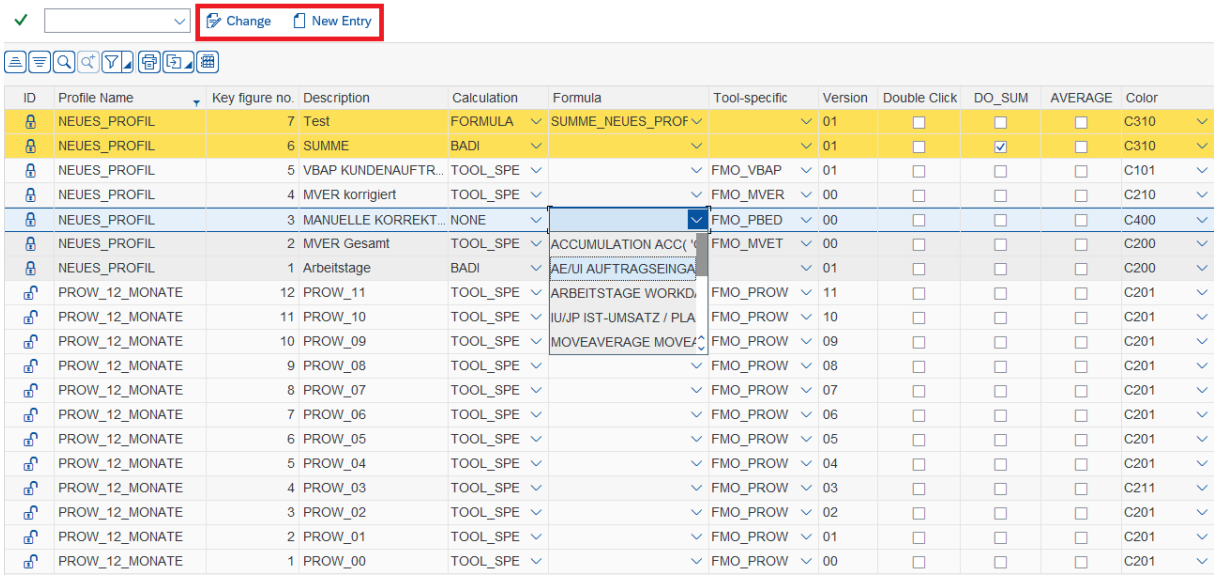
| Material | Plant | Material description | Key Figure | Ver | 05.2021 | 06.2021 | 07.2021 | 08.2021 | 09.2021 | 10.2021 | 11.2021 | 12.2021 | 01.2022 | 02.2022 | 03.2022 | 04.2022 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1FG_MH_001 | MH01 | Finish, production | History + Forecast | 05 | 271.000 | 181.000 | 219.000 | 121.000 | 543.000 | 71.000 | 158.000 | 172.000 | 172.000 | 172.000 | 172.000 | 172.000 |
| 1FG_MH_001 | MH01 | Finish, production | PBED | 05 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 172.000 | 172.000 | 172.000 | 172.000 |
| 1FG_MH_001 | MH01 | Finish, production | PROW | 00 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 165.000 | 165.000 | 165.000 | 165.000 | 165.000 |
| 1FG_MH_001 | MH01 | Finish, production | INFO | A05 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 172.000 | 172.000 | 172.000 | 172.000 | 172.000 |
| 1FG_MH_002 | MH01 | DD Finish, production | History + Forecast | 05 | 698.000 | 91.000 | 43.000 | 157.000 | 82.000 | 111.000 | 105.000 | 103.000 | 101.000 | 99.000 | 96.000 | 94.000 |
| 1FG_MH_002 | MH01 | DD Finish, production | PBED | 05 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 101.000 | 99.000 | 96.000 | 94.000 |
| 1FG_MH_002 | MH01 | DD Finish, production | PROW | 00 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 97.000 | 90.000 | 84.000 | 78.000 | 72.000 |
| 1FG_MH_002 | MH01 | DD Finish, production | INFO | A05 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 103.000 | 101.000 | 99.000 | 96.000 | 94.000 |
| 1FG_MH_003 | MH01 | Finish, production | History + Forecast | 05 | 89.000 | 105.000 | 60.000 | 119.000 | 454.000 | 347.000 | 191.000 | 256.000 | 281.000 | 306.000 | 332.000 | 357.000 |
| 1FG_MH_003 | MH01 | Finish, production | PBED | 05 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 281.000 | 306.000 | 332.000 | 357.000 |
| 1FG_MH_003 | MH01 | Finish, production | PROW | 00 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 253.000 | 285.000 | 317.000 | 350.000 | 382.000 |
| 1FG_MH_003 | MH01 | Finish, production | INFO | A05 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 256.000 | 281.000 | 306.000 | 332.000 | 357.000 |
| 1FG_MH_004 | MH01 | Finish, production | History + Forecast | 05 | 1,099.000 | 69.000 | 66.000 | 108.000 | 727.000 | 59.000 | 176.000 | 145.000 | 97.000 | 50.000 | 2.000 | 0.000 |
| 1FG_MH_004 | MH01 | Finish, production | PBED | 05 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 97.000 | 50.000 | 2.000 | 0.000 |
| 1FG_MH_004 | MH01 | Finish, production | PROW | 00 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 138.000 | 87.000 | 36.000 | 0.000 | 0.000 |
| 1FG_MH_004 | MH01 | Finish, production | INFO | A05 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 145.000 | 97.000 | 50.000 | 2.000 | 0.000 |
| 1FG_MH_005 | MH01 | Finish, production | History + Forecast | 05 | 122.000 | 321.000 | 165.000 | 263.000 | 123.000 | 114.000 | 92.000 | 180.000 | 167.000 | 154.000 | 141.000 | 128.000 |
| 1FG_MH_005 | MH01 | Finish, production | PBED | 05 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 167.000 | 154.000 | 141.000 | 128.000 |
| 1FG_MH_005 | MH01 | Finish, production | PROW | 00 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 209.000 | 214.000 | 218.000 | 222.000 | 226.000 |
| 1FG_MH_005 | MH01 | Finish, production | INFO | A05 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 180.000 | 167.000 | 154.000 | 141.000 | 128.000 |

## 3.2 Creation of Key Figure Profile

Create a key figure profile if one does not yet exist, or if you want to create another key figure profile. This is done using transaction `/SAPLOM/XKF_MAINT - /SAPLOM/X – Kennzahlprofile`, or in FMO directly, by clicking on *Key Figure Profile* at the top of the switch strip.

On the entry screen, you can now click *New Entry* to create a new profile. This opens a small window in which you enter the name of the new key figure profile. Later, this name is also on the left in the *Profile Name* column, and you must also select this name on the FMO selection screen if you want to work with this key figure profile.

The new name is then saved and, above the table, you can click on the icon for creating a new line to add the first key figure to the profile. You can do this until there are sufficient key figures in the profile.




| ID | Profile Name | Key figure no. | Description | Calculation | Formula | Tool-specific | Version | Double Click | DO_SUM | AVERAGE | Color |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | NEUES_PROFIL | 7 | Test | FORMULA | SUMME_NEUES_PROF | | 01 | ☐ | ☐ | ☐ | C310 |
| | NEUES_PROFIL | 6 | SUMME | BADI | | | 01 | ☐ | ☑ | ☐ | C310 |
| | NEUES_PROFIL | 5 | VBAP KUNDENAUFTR... | TOOL_SPE | | FMO_VBAP | 01 | ☐ | ☐ | ☐ | C101 |
| | NEUES_PROFIL | 4 | MVER korrigiert | TOOL_SPE | | FMO_MVER | 00 | ☐ | ☐ | ☐ | C210 |
| | NEUES_PROFIL | 3 | MANUELLE KORREKT... | NONE | | FMO_PBED | 00 | ☐ | ☐ | ☐ | C400 |
| | NEUES_PROFIL | 2 | MVER Gesamt | TOOL_SPE | ACCUMULATION ACC( | FMO_MVET | 00 | ☐ | ☐ | ☐ | C200 |
| | NEUES_PROFIL | 1 | Arbeitstage | BADI | AE/UI AUFTRAGSEINGA | | 01 | ☐ | ☐ | ☐ | C200 |
| | PROW_12_MONATE | 12 | PROW_11 | TOOL_SPE | ARBEITSTAGE WORKD | FMO_PROW | 11 | ☐ | ☐ | ☐ | C201 |
| | PROW_12_MONATE | 11 | PROW_10 | TOOL_SPE | IU/JP IST-UMSATZ / PLA | FMO_PROW | 10 | ☐ | ☐ | ☐ | C201 |
| | PROW_12_MONATE | 10 | PROW_09 | TOOL_SPE | MOVEAVERAGE MOVE | FMO_PROW | 09 | ☐ | ☐ | ☐ | C201 |
| | PROW_12_MONATE | 9 | PROW_08 | TOOL_SPE | | FMO_PROW | 08 | ☐ | ☐ | ☐ | C201 |
| | PROW_12_MONATE | 8 | PROW_07 | TOOL_SPE | | FMO_PROW | 07 | ☐ | ☐ | ☐ | C201 |
| | PROW_12_MONATE | 7 | PROW_06 | TOOL_SPE | | FMO_PROW | 06 | ☐ | ☐ | ☐ | C201 |
| | PROW_12_MONATE | 6 | PROW_05 | TOOL_SPE | | FMO_PROW | 05 | ☐ | ☐ | ☐ | C201 |
| | PROW_12_MONATE | 5 | PROW_04 | TOOL_SPE | | FMO_PROW | 04 | ☐ | ☐ | ☐ | C201 |
| | PROW_12_MONATE | 4 | PROW_03 | TOOL_SPE | | FMO_PROW | 03 | ☐ | ☐ | ☐ | C211 |
| | PROW_12_MONATE | 3 | PROW_02 | TOOL_SPE | | FMO_PROW | 02 | ☐ | ☐ | ☐ | C201 |
| | PROW_12_MONATE | 2 | PROW_01 | TOOL_SPE | | FMO_PROW | 01 | ☐ | ☐ | ☐ | C201 |
| | PROW_12_MONATE | 1 | PROW_00 | TOOL_SPE | | FMO_PROW | 00 | ☐ | ☐ | ☐ | C201 |

Make the following settings in the key figure profile:

| | |
|---|---|
| **Description** | This description is later displayed as a key figure description in FMO. It helps the user understand the purpose of the |
| **Calculation** | You can enter the following values here:<br>• Formula calculation with /SAPLOM/XMM_FORMULA (FORMULA)<br>  • In this case, the key figure is to be calculated using a formula. You can use transaction /SAPLOM/MD04 to<br>  entered in the column “Formula”<br>• Calculation using BAdI (BAdI)<br>  • In this case, the key figure content is calculated using a BAdI, which must be programmed by the customer<br>• Tool-specific display/calculation of contents (TOOL_SPE)<br>  • Key figures can also display additional historical or forecast data. For example, in FMO a forecast could be c<br>  wants to view the sales orders in the past and the future in an additional key figure.<br>• No calculation, free input, and saving (NONE)<br>  • No key figure is calculated place here, but manual entries are possible. These are also saved in a database t<br>• No calculation, only read from the database (READ_ONL)<br>  • No entries are possible here and nothing is calculated. The key figure is useful if an independent customer p<br>  displayed here. |
| **Formula** | Here you can specify a formula for calculating the key figure. This is only necessary if the calculation logic is set to "Fo |
| **Tool-Specific** | Here you can select which historical or forecast data is to be displayed. An entry is only necessary if the calculation o<br>calculation of key figures, the tool-specific values are only taken from the database once and then displayed. If there<br>executed again to display them. |
| **Version** | If the calculation logic is set to TOOL_SPE, and if you have selected a data source in the column “Tool-Specific”, for w<br>here. This is necessary, for example, for info structures, or for requirements in PBED (MD62), or for history numbers |
| **Double Click** | If you select the field, if it exists and has been programmed, a BAdI is called when you double-click on the key figure, t<br>what should happen in the BAdI. For example, a popup with information about sales orders for the selected material<br>the subsection “Calculation of Key Figures – Programming the BAdI Interface for Key Figure Calculation”. |

| | |
|---|---|
| **DO_SUM** | If you select this, the values of this key figure are added together in a separate totals column at the end. |
| **AVERAGE** | If you select this, the average of the values of this key figure is displayed at the end in a separate average column. |
| **Color** | Here, you can select different colors that the key figure will have later. |

## 3.3 Working with the Formula Editor

If you want to include key figures that are calculated mathematically, you have the option of using predefined formulas with a formula editor. Alternatively or in addition, a BAdI can be programmed. Both options can be used simultaneously within a key figure profile, but you must restrict yourself to one option for each key figure. The FMO tool first processes the calculations using the formula editor, then the calculations using the BAdI.

The calculations are performed after each entry in the planning table, for example, by choosing the "Enter" key.

You can use transaction /SAPLOM/XKI_KPIMAINT to call the formula editor.

| Description of key figure | Formula |
|---|---|
| ACCUMULATION | ACC( 'CONSUMPTION' ) |
| AE/UI | AUFTRAGSEINGANG / IST-UMSATZ * 100 |
| ARBEITSTAGE | WORKDAYS( 'ZJ' ) |
| Accumulation | YEARTOYEAR( 'CONSUMPTION' ) |
| COPY | COPY( 'IST-UMSATZ' , 'MARC-DISPR' ) |
| COPY( 'IST-UMSATZ' , 'MARC-DISPR' ) | MARC( 'PLIFZ' ) |
| DB-TEST | ( MARA( 'MATKL' ) + MARC( 'PLIFZ' ) ) / MARD( 'LFMON' ) |
| IU/JP | IST-UMSATZ / PLANUNG * 100 |
| MARA | MARD( 'LFMON' ) |
| MOVEAVERAGE | MOVEAV( 'FORECAST' ) |
| MOVEAVERAGES | MOVEAV( 'FORECAST' ) + CONSUMPTION |
| MVER GESAMT | CONSUMPTION + FORECAST |
| Moving Average | MOVEAV( 'FORECAST' , 1 , 2 ) |
| Releasemenge Variante | AUFTRÄGE + KUNDENAUFTRÄGE |
| SUMME | CONSUMPTION + FORECAST |
| SUMME_NEUES_PROFIL | WORKDAYS( 'ZJ' ) |
| TEST_SUMME | HISTORY + FORECAST |
| VORJAHR_AE | MOVE_KPI( 'AUFTRAGSEINGANG' , '12' ) |
| Year to Year | YEARTODATE( 'CONSUMPTION' ) |
| •Accumulation | YEARTOYEAR( 'CONSUMPTION' ) |

You can now enter new formulas or change existing ones. The following points must be taken into account:

**Basic Semantics:**

- Space between arithmetic operators and statements and formulas
- Basic arithmetic operations are allowed
- Numbers can be written normally, but with spaces before and after
- Addressing a single cell: KPI line in apostrophes
- If parentheses are used, leave a blank space before and after the parenthesis

Example: 5 + 10 – 8

Example: 15 * 'CONSUMPTION' - 3

Example: 10 * ( MOVEAV ( 'FORECAST' , 1 , 2 ) + 5 * 'CONSUMPTION' )

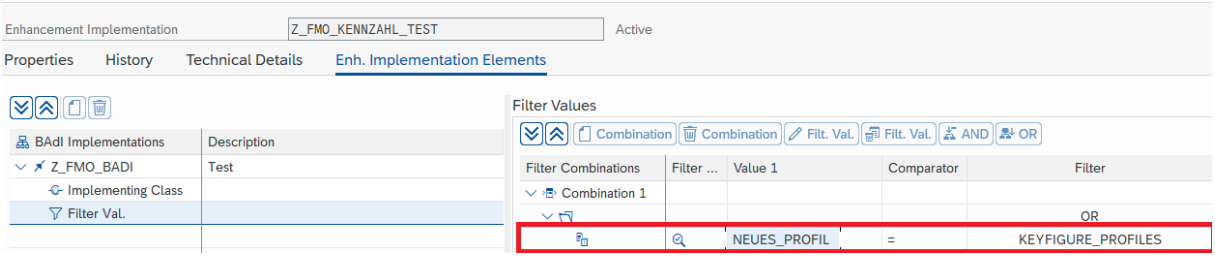
### Formula Semantics:

| | |
|---|---|
| **Moving Average:**<br>Moveav ( KPI Row, Number of Columns Looking Back, Number of Columns Looking Forward )<br>MOVEAV ( 'FORECAST' , 1 , 2 ) | The moving average of the selected KPI is calculated; the first number indicates the number of past periods to be included and the second number indicates the periods in the future that are to be included |
| **Year to Date:**<br>YEARTODATE ( KPI Column )<br>YEARTODATE ( 'CONSUMPTION' ) | All periods of the mentioned KPIs of a year are summed up until the current period is reached |
| **Year to Year:**<br>YEARTOYEAR ( KPI Column )<br>YEARTOYEAR ( 'CONSUMPTION' ) | All periods of the last 12 months of the KPI are summed up |
| **Accumulation**:<br>ACC ( KPI Column )<br>ACC ( 'CONSUMPTION' ) | All periods of the KPI are totaled, up to the current period |
| **Negation**:<br>NEW ( KPI Column )<br>NEG ( 'FORECAST' ) | Negation of KPI column |
| **MARA**:<br>MARA ( Column name from MARA )<br>MARA ( 'MATKL' ) | The system checks whether the 'MATNR' of the KPI exists in MARA. If so, the column specified in the formula is inserted into the formula |
| **MARC**:<br>MARC (Column Name from MARC )<br>MARC ( 'PLIFZ' ) | The system checks whether the 'MATNR' of the KPI exists in MARC. If so, the column specified in the formula is inserted into the formula. |
| **MARD**:<br>MARD (Column Name from MARD )<br>MARD ( 'LFMON' ) | The system checks whether the 'MATNR' of the KPI exists in MARD. If so, the column specified in the formula is inserted into the formula |
| **WORKDAYS**:<br>WORKDAYS ( ID of the factory calendar followed )<br>WORKDAYS ( 'ZJ' ) | The working days of the current period are to be counted and a factory calendar of choice can be selected for this |

| | |
|---|---|
| **MOVE KPI:**<br>MOVE_KPI ( KPI column to be shifted, by how many periods it is to be shifted )<br>MOVE_KPI ( 'FORECAST' , '12' ) | A selected KPI row is copied to the new KPI and shifted by the specified number of periods |
| **COPY**<br>COPY ('Key figure to be copied if its KPI is in the following field', 'Name of the database and the field for the comparison')<br>COPY ( 'ACTUAL SALES' , 'MARC-DISPR' ) | The content of a KPI is copied to a new KPI, provided that the KPI name exists in the specified database column. |

## 3.4 Programming the BAdI Interface for Key Figure Calculation

If you want to perform a calculation using a BAdI, a separate BAdI implementation must be written for each key figure profile. This has the advantage that key figures that happen to have the same name in different key figure profiles can still be calculated differently. In some cases, more factors may have to be taken into account for the calculation in one profile than in another. The BAdI is called /SAPLOM/XKI_BADI_KEYFIGURE_CAL and an implementation can be created using transaction SE18 or using FMO Customizing. It is important to set the filter for the parameter `KEYFIGURE_PROFILES`, and to select the profile name of the desired key figure profile as the filter value. This is the only way to make an assignment.




The BAdI has two calculation methods.

### CALC_WHOLE_TABLE

The method is used to calculate all key figures in the selected key figure profile that have been assigned the calculation method "BAdI". The following values can be transferred to the method:

| Parameter | Type | Content |
|---|---|---|
| IM_TOOL | Importing | Abbreviation of the SCM Consulting Solution. Here "FMO" |
| IM_STRUCTURE | Importing | Structure of the output table in FMO, here `/SAPLOM/FMO_S_DISPLAY` |

| Parameter | Type | Content |
|---|---|---|
| IM_PERIODS | Importing | Contains the period information of the columns, here type /SAPLOM/XT_PERIODS_IN_COLUMNS |
| T_TABLE | Changing | Contains the complete output table with all values. All values can be used and changed in the BAdI. However, only the values for which the key figure calculation was set to "BAdI" are transferred in FMO. |

**ON_DOUBLE_CLICK**

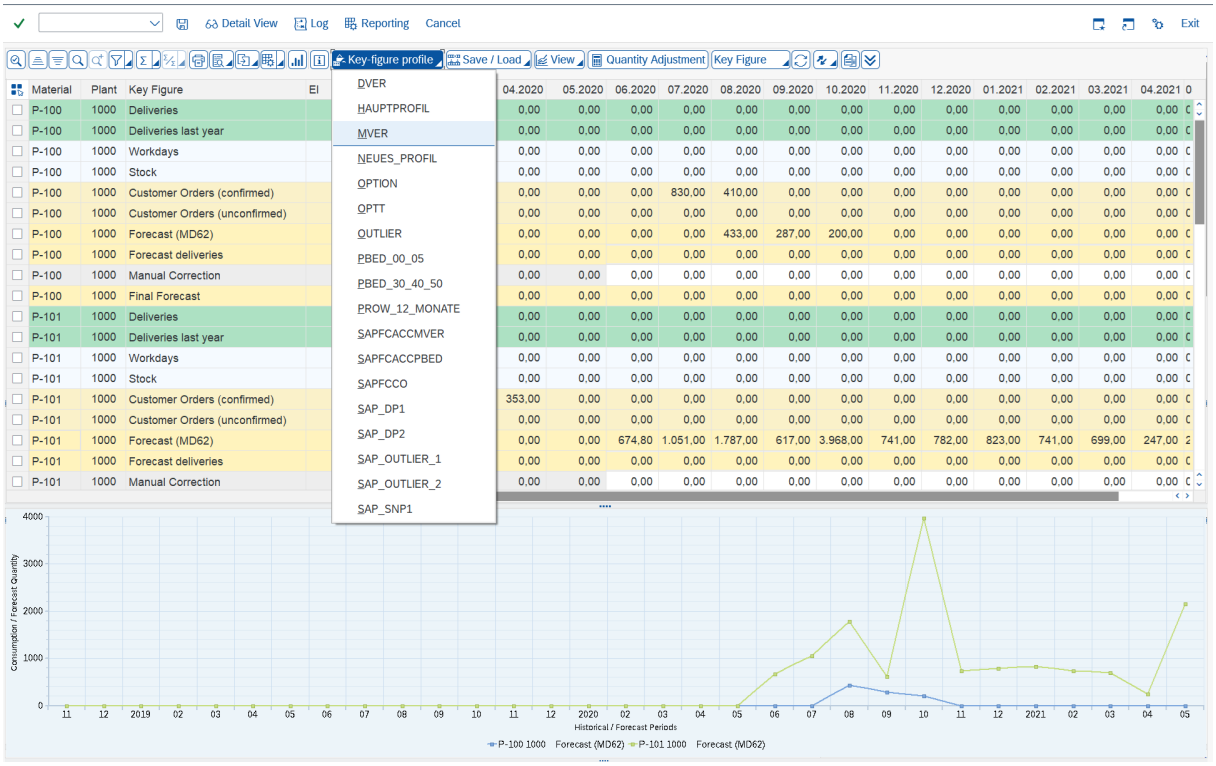
You can use the method ON_DOUBLE_CLICK to program a method for if someone double-clicks on a line. In the key figure profile, you can define for which key figure this double-click is to have an effect.

| Parameter | | |
|---|---|---|
| IM_TOOL | Importing | Abbreviation of the SCM Consulting Solution. Here "FMO" |
| IM_STRUCTURE | Importing | Structure of the output table in FMO, here `/SAPLOM/FMO_S_DISPLAY` |
| IM_PERIODS | Importing | Contains the period information of the columns, here type /SAPLOM/XT_PERIODS_IN_COLUMNS |
| IM_ROW | Importing | Contains the line number in which the double-click was made |
| T_TABLE | Changing | Contains the complete output table with all values. The BAdI can then be programmed individually, to, for example, read the material number of the selected line, select the corresponding sales orders for the period, and display them in a dialog box. |

## 3.5 Settings and Output in FMO

To be able to work with the key figures, you must select the key figure profile on the selection screen of FMO, on the "Program Execution" tab, at the bottom of the "Planning Functions" area, and also select the checkbox "Planning with Key Figures".

If you want to switch the key figure profile interactively later during the results output, you can also select the additional option. However, depending on how many materials were selected, how many key figures are in the profile, and how time-consuming the calculation is, changing the profiles interactively may also take some time. This needs to be tested.




# 3.6 Working with an Additional Aggregation Level

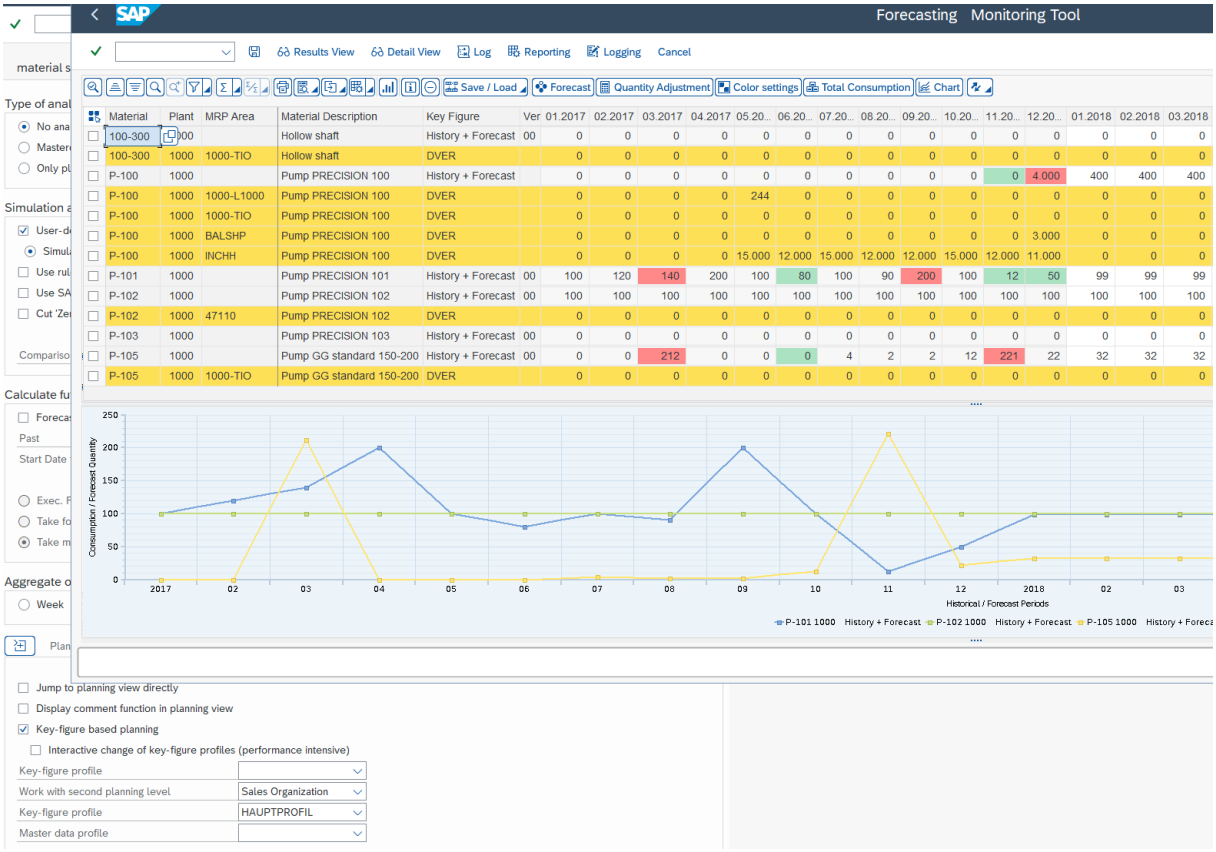
Version 2022 also includes the option of working with two aggregation levels at the same time. This allows you to display specifics at a detailed level or correct them manually, while on the upper level you can only see summarized information. The following levels are available as a second aggregation level:

- MRP area
- Sales organization
- Storage location

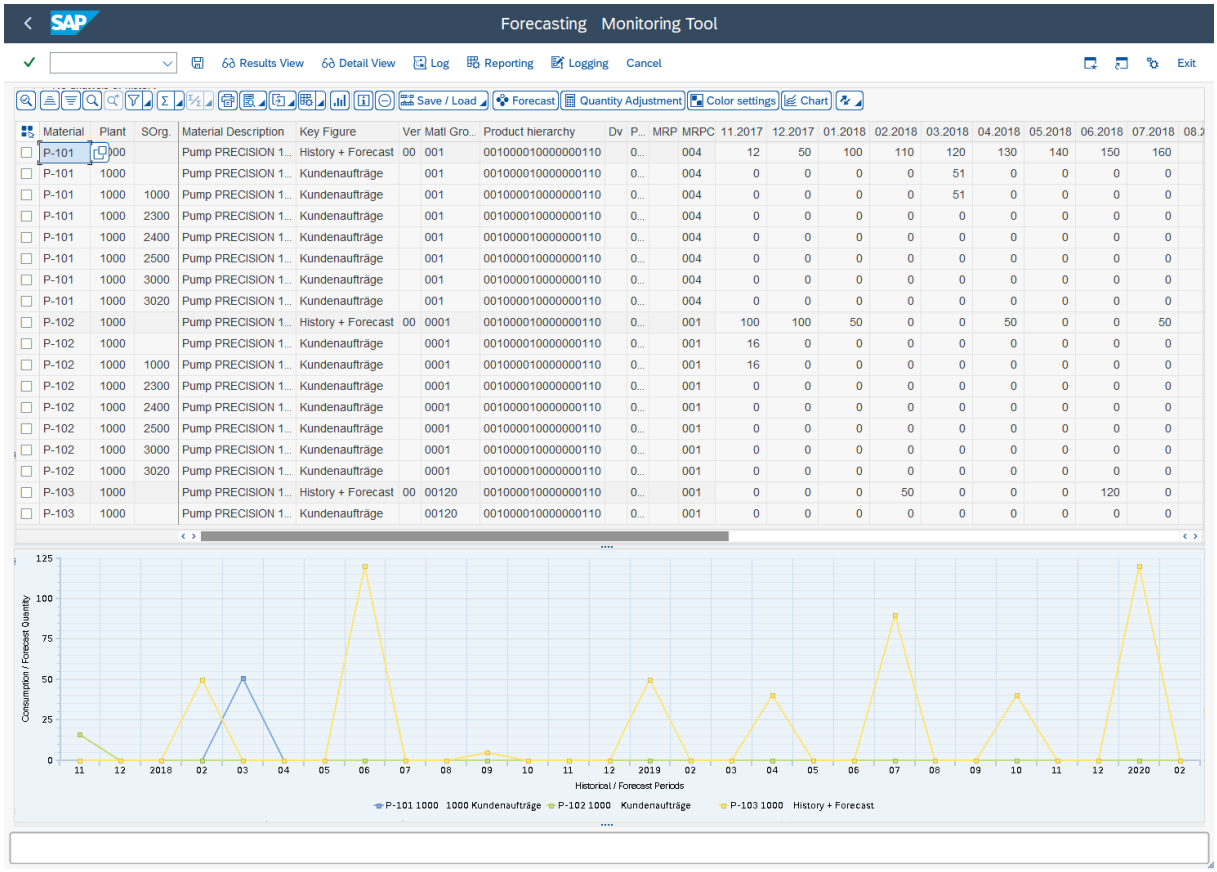
On the second level, it is only possible to work with key figure profiles. It is not possible to have your own forecast or simulation as on the main level. If you want to execute a forecast for the detail level, the FMO would first have to be executed with the normal settings for simulation or forecasting at the relevant level (without a key figure profile) and the forecast result saved. You can then call the FMO in a second run, and choose the level at which you generated and saved the forecast results in the first run as the second aggregation level.

The following functions are not possible for the second level or do not have the desired result:

- Jump to the detail view (since simulation is not possible)
- Perform an interactive forecast (since no forecasting technique was determined previously)
- Save in PBED, MVER, and PROW because the second level contains the material and plant and the third characteristic that does not exist in the specified tables.




The main level and detail level can use different key figure profiles. This makes the tool very flexible. In the example, the MRP area was used as the detail level and the self-configured key figure profile “DVER” was assigned, with which the consumption data from the MRP areas (table DVER) is displayed. No key figure profile was assigned for the main level, rather, the normal forecast function was executed.




In the second example, the same key figure profile was chosen for the main level and the detail level, which represents the sales orders. However, for the main level, the consumptions were read from the MVER table as the data source for the forecast. This allows the user to compare the share of the consumption from the sales orders and the sales units to which the sales orders are distributed.

# 4 Results

This section covers the results of the forecasting & monitoring tool.

In Release 2021, the tool has undergone extensive enhancements so that the result view varies considerably depending on the parameters configured in the initial view (selection view).

## 4.1 Results View

The results view is the first of three views in the forecasting & monitoring tool.

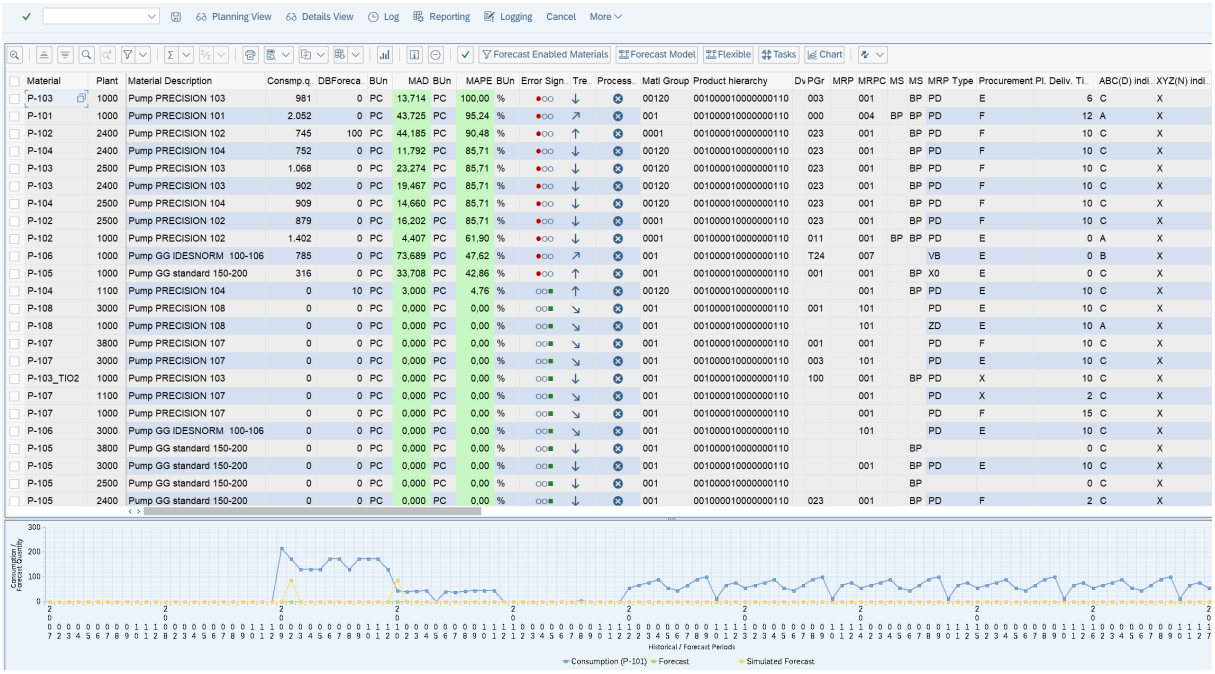
Depending on whether the FMO tool is to perform a simulation, the view changes. This and the following subsections describe the various views.

When you click on *Execute* on the selection screen, the **FMO tool** analyzes the past and, if desired, performs a simulation. Consumption and forecast data is read, and forecasting errors are calculated.

The results view is an ALV table, which contains the following information:

- Selected materials at the desired organizational aggregation level, for example, material, plant
- Material description
- Cumulated consumption and forecast quantities including unit in the selected period
- Selected forecasting errors including their unit for the selected time period (for details on calculating the error, see section Calculation of Error Measure [page 58]).
- Error traffic light that is a result of the extent of the forecasting error and the configured threshold values (the errors that are used as a reference here can be configured on the *Error Measure* tab)
- Error trend including icon, if the calculation of the error trend was desired on the selection screen.
- Processing status as visual aid for the user showing which records have already been processed actively
- DMRP and forecasting parameters, as well as classifications of **enhanced material master view**
- Indicator for open measures, if available, as well as the resubmission indicator with resubmission date
- Forecasting ability measured using tracking signal in relation to the tracking limit (green: tracking signal < tracking limit, red: tracking signal > tracking limit, gray: tracking signal is not taken into account or row has zero values)

The data records are sorted by the forecasting error, as configured on the selection screen under *Error Measure*.




**Results View**

The following functions are supported on the overview screen:

- Sorting, filtering, and summation, as in standard SAP system.
- A double-click on the row takes you to the detailed analysis.
- A double-click on the row in the column *Processed* sets the processing status. If the status is empty, it is set to “Processed”. If the status is “Processed” it is initialized.
- A double-click on the *Processed* column enables all rows to be indicated as "Processed” at once.
- A double-click on the *Selection* column enables the corresponding model to be selected for all materials.
- A double-click on the *Top 1 to Top 3 Model* column enables the parameters and forecasting errors of the corresponding model to be displayed in a popup.
- *Delete Row* as an alternative to using the processing status. The deleted row is only deleted from the **forecasting monitor** database tables on saving.
- Set processing status, same as double-clicking on the *Processed* column.
- Save the selected forecast model and the corresponding parameters using the *Forecast model* pushbutton in the material master.
- If you choose the *Flexible* pushbutton, you have the option of manually changing or initializing different fields of the material master. A dialog box whose appearance is adapted to the layout of the material master is displayed. You specify which fields can be selected in Customizing for **comprehensive functions**.
- *Tasks* (previously measures) can be displayed and changed. For more information on managing tasks, see the documentation for **comprehensive functions**.
- For selected materials, a *graphic* for the development of consumptions and forecasts over time can be displayed.
- The *Save* button in the standard SAP menu enables changes to be saved, including processing status and deleted rows.
- The *Log* button enables the processing log to be displayed.

## 4.1.1 Results View After Simulation

The following describes the results view after the **FMO tool** has performed a simulation.



The included top and top 1 to top 3 models are calculated for all products contained in this analysis. The individual best forecasting model for these materials is determined by comparing the simulations of the chosen forecasting models with their parameters. The top 1 model is the one that provided the best result for the selected materials as a whole, in terms of the selected statistical error measure.

For example, the error total of a model for all selected products is totaled (the average is formed for the tracking signal). Top 1 is the model for which the overall error total is closest to zero. For the top 1 to top 3 models, the forecasting error that would have resulted from this model is specified for each product.

The top 1 to top 3 models are compared with the individual top model of a product and its resulting forecasting errors. This enables the reduction of the range of forecasting models/parameter combinations and the selection of a forecasting model that forecast the known past well and can be used for as many products as possible, or even for all products.

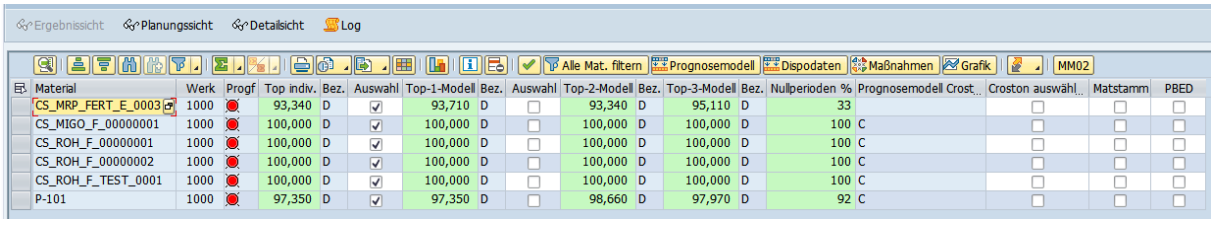
The quality of the top 1 model can be determined by comparing the individual top 1 model. Now the planner can decide whether to forego greater accuracy in favor of less variety.

Double-clicking on the column header displays the respective top 1 to top 3 model with its parameters and all selected forecasting errors.

## 4.1.2 Results View After Simulation with Tracking Limit with Additional Logic

If the option *Tracking Limit with Additional Logic* is selected on the *Error Measure* tab, the results view contains additional information.

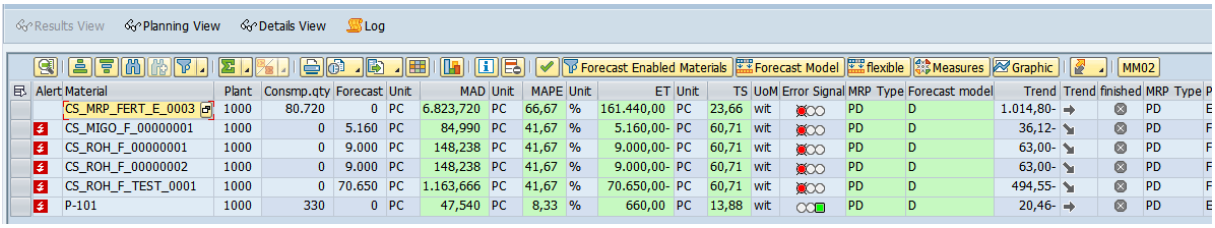
Starting from the configuration of the tracking limit on the selection screen, the following results overview is displayed, depending on the chosen materials:




| Material | Werk | Progf | Top indiv. | Bez. | Auswahl | Top-1-Modell | Bez. | Auswahl | Top-2-Modell | Bez. | Top-3-Modell | Bez. | Nullperioden % | Prognosemodell Crost... | Croston auswähl... | Matstamm | PBED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CS_MRP_FERT_E_0003 | 1000 | | 93,340 | D | ☑ | 93,710 | D | ☐ | 93,340 | D | 95,110 | D | 33 | | ☐ | ☐ | ☐ |
| CS_MIGO_F_00000001 | 1000 | | 100,000 | D | ☑ | 100,000 | D | ☐ | 100,000 | D | 100,000 | D | 100 | C | ☐ | ☐ | ☐ |
| CS_ROH_F_00000001 | 1000 | | 100,000 | D | ☑ | 100,000 | D | ☐ | 100,000 | D | 100,000 | D | 100 | C | ☐ | ☐ | ☐ |
| CS_ROH_F_00000002 | 1000 | | 100,000 | D | ☑ | 100,000 | D | ☐ | 100,000 | D | 100,000 | D | 100 | C | ☐ | ☐ | ☐ |
| CS_ROH_F_TEST_0001 | 1000 | | 100,000 | D | ☑ | 100,000 | D | ☐ | 100,000 | D | 100,000 | D | 100 | C | ☐ | ☐ | ☐ |
| P-101 | 1000 | | 97,350 | D | ☑ | 97,350 | D | ☐ | 98,660 | D | 97,970 | D | 92 | C | ☐ | ☐ | ☐ |

Results View with Simulation

The additional logic enables the MRP type and the chosen calculated forecasting model to be assigned, measured by the tracking signal of each material. In accordance with the settings made by the user, in the example above, all materials with a TS of less than 6 are displayed with the MRP type M0 and the top 1 model as the forecasting model. For materials with a TS between 6 and 10, the MRP type is P1 and the forecasting model is the top 2 model, which was set to B in the calculation. Materials with a TS above 10 are assigned the MRP type VM and the forecasting model 0. If the forecasting model 0 is suggested and the forecast view does not yet exist, it is not created.



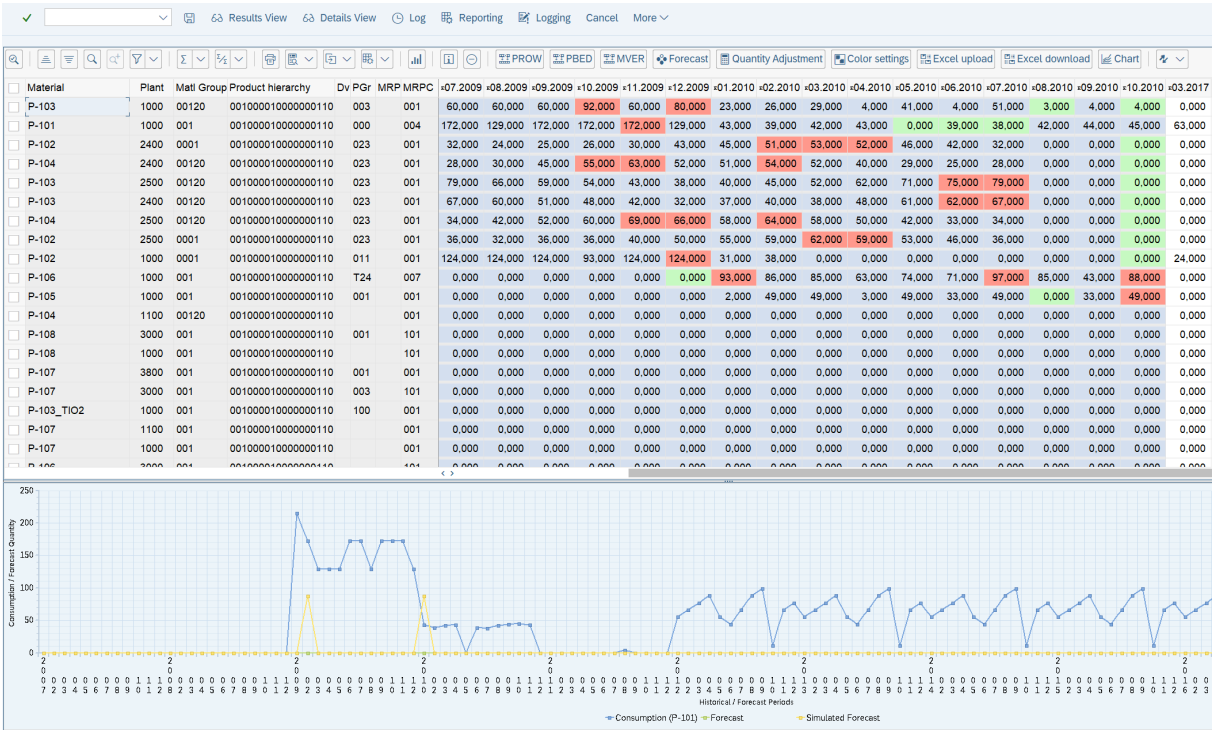

| Alert | Material | Plant | Consmp.qty | Forecast | Unit | MAD | Unit | MAPE | Unit | ET | Unit | TS | UoM | Error Signal | MRP Type | Forecast model | Trend | Trend | finished | MRP Type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CS_MRP_FERT_E_0003 | 1000 | 80.720 | 0 | PC | 6.823,720 | PC | 66,67 | % | 161.440,00 | PC | 23,66 | wit | | PD | D | 1.014,80- | | | PD |
| | CS_MIGO_F_00000001 | 1000 | 0 | 5.160 | PC | 84,990 | PC | 41,67 | % | 5.160,00- | PC | 60,71 | wit | | PD | D | 36,12- | | | PD |
| | CS_ROH_F_00000001 | 1000 | 0 | 9.000 | PC | 148,238 | PC | 41,67 | % | 9.000,00- | PC | 60,71 | wit | | PD | D | 63,00- | | | PD |
| | CS_ROH_F_00000002 | 1000 | 0 | 9.000 | PC | 148,238 | PC | 41,67 | % | 9.000,00- | PC | 60,71 | wit | | PD | D | 63,00- | | | PD |
| | CS_ROH_F_TEST_0001 | 1000 | 0 | 70.650 | PC | 1.163,666 | PC | 41,67 | % | 70.650,00- | PC | 60,71 | wit | | PD | D | 494,55- | | | PD |
| | P-101 | 1000 | 330 | 0 | PC | 47,540 | PC | 8,33 | % | 660,00 | PC | 13,88 | wit | | PD | D | 20,46- | | | PD |

Results View with Tracking Limit and Additional Logic

Since the MRP types and forecasting models from the additional logic do not match those in the material master, an alert symbol (to the left) is set for the materials in question. This enables materials that need to be changed to be identified quickly.

## 4.2 Planning View

The planning view is the second of three views in the forecasting & monitoring tool.




| Material | Plant | Matl Group | Product hierarchy | Dv | PGr | MRP | MRPC | 07.2009 | 08.2009 | 09.2009 | 10.2009 | 11.2009 | 12.2009 | 01.2010 | 02.2010 | 03.2010 | 04.2010 | 05.2010 | 06.2010 | 07.2010 | 08.2010 | 09.2010 | 10.2010 | 03.2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P-103 | 1000 | 00120 | 001000001000000110 | | 003 | | 001 | 60,000 | 60,000 | 60,000 | 92,000 | 60,000 | 80,000 | 23,000 | 26,000 | 29,000 | 4,000 | 41,000 | 4,000 | 51,000 | 3,000 | 4,000 | 4,000 | 0,000 |
| P-101 | 1000 | 001 | 001000001000000110 | | 000 | | 004 | 172,000 | 129,000 | 172,000 | 172,000 | 172,000 | 129,000 | 43,000 | 39,000 | 42,000 | 43,000 | 0,000 | 39,000 | 38,000 | 42,000 | 44,000 | 45,000 | 63,000 |
| P-102 | 2400 | 0001 | 001000001000000110 | | 023 | | 001 | 32,000 | 24,000 | 25,000 | 26,000 | 30,000 | 43,000 | 45,000 | 51,000 | 53,000 | 52,000 | 46,000 | 42,000 | 32,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| P-104 | 2400 | 00120 | 001000001000000110 | | 023 | | 001 | 28,000 | 30,000 | 45,000 | 55,000 | 63,000 | 52,000 | 51,000 | 54,000 | 52,000 | 40,000 | 29,000 | 25,000 | 28,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| P-103 | 2500 | 00120 | 001000001000000110 | | 023 | | 001 | 79,000 | 66,000 | 59,000 | 54,000 | 43,000 | 38,000 | 40,000 | 45,000 | 52,000 | 62,000 | 71,000 | 75,000 | 79,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| P-103 | 2400 | 00120 | 001000001000000110 | | 023 | | 001 | 67,000 | 60,000 | 51,000 | 48,000 | 42,000 | 32,000 | 37,000 | 40,000 | 38,000 | 48,000 | 61,000 | 62,000 | 67,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| P-104 | 2500 | 00120 | 001000001000000110 | | 023 | | 001 | 34,000 | 42,000 | 52,000 | 60,000 | 69,000 | 66,000 | 58,000 | 64,000 | 58,000 | 50,000 | 42,000 | 33,000 | 34,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| P-102 | 2500 | 0001 | 001000001000000110 | | 023 | | 001 | 36,000 | 32,000 | 36,000 | 36,000 | 40,000 | 50,000 | 55,000 | 59,000 | 62,000 | 59,000 | 53,000 | 46,000 | 36,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| P-102 | 1000 | 0001 | 001000001000000110 | | 011 | | 001 | 124,000 | 124,000 | 124,000 | 93,000 | 124,000 | 124,000 | 31,000 | 38,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 24,000 |
| P-106 | 1000 | 001 | 001000001000000110 | | T24 | | 007 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 93,000 | 86,000 | 85,000 | 63,000 | 74,000 | 71,000 | 97,000 | 85,000 | 43,000 | 88,000 | 0,000 |
| P-105 | 1000 | 001 | 001000001000000110 | | 001 | | 001 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 2,000 | 49,000 | 49,000 | 3,000 | 49,000 | 33,000 | 49,000 | 0,000 | 33,000 | 49,000 | 0,000 |
| P-104 | 1100 | 00120 | 001000001000000110 | | | | 001 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| P-108 | 3000 | 001 | 001000001000000110 | | 001 | | 101 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| P-108 | 1000 | 001 | 001000001000000110 | | | | 101 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| P-107 | 3800 | 001 | 001000001000000110 | | 001 | | 001 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| P-107 | 3000 | 001 | 001000001000000110 | | 003 | | 101 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| P-103_TIO2 | 1000 | 001 | 001000001000000110 | | 100 | | 001 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| P-107 | 1100 | 001 | 001000001000000110 | | | | 001 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| P-107 | 1000 | 001 | 001000001000000110 | | | | 001 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |

Planning View

The analysis period configured on the selection screen on the *Period Selection* tab is considered to be the history; the forecast period follows directly. History data is displayed in blue, forecast data in white. The number of forecast periods is indicated in the *Number of Forecast Periods* field on the selection screen tab *Simulation*.

The forecast data is indicated in the forecasting model (*Selection* columns next to the top 1 to top 10 models) selected in the view *Evaluation*. Alternatively, you can set the checkmark in the “Mat. Master” column, then forecasts are made based on the forecasting model currently used in the material master. Alternatively, you

can also set the checkmark in the column *PBED*. Then no new forecast is performed, rather the forecast is taken from table *PBED* exactly as is.

The first time that you switch from the *results view* to the *planning view* the forecast is performed automatically. Each additional time that you switch, the data is retained and no automatic forecast is performed. The *Forecast* button enables the forecast to be performed manually, taking the selection in the *results view* into account.

The history data can be manipulated. You can overwrite values and clicking on the *Save* button transfers the changed history data to the database table */SAPLOM/FMO_HIST* if the option *Save Results* or the option *Load Results* has also been chosen on the selection screen tab *Save/Retrieve*. Each time the planning grid is called again, first the real history data is read from the respective source tables and is overwritten if a history correction exists. You can identify a changed history by the green background.

The forecast can be executed in the planning grid only if simulation combinations exist, meaning if the Simulation tab has been filled with parameters required for forecasts.

The forecast values can be manually overwritten. The options *PBED* (planned independent requirements) and *PROW* (material master forecast) are available for saving the forecast (they can be accessed via buttons in the toolbar, from the table). When you select the option *PBED*, first a dialog box appears asking whether you want to update the planned independent requirements. If you respond with *Yes (Modify)*, another dialog box containing configuration options appears. Here, the requirement type, version, consumption indicator for planned independent requirements, and the active indicator can be maintained. In Customizing for the forecasting monitor, you can also configure whether existing planned independent requirements are initially deleted, or if only the values to be updated are overwritten. Existing entries with other requirement types and requirements plans are not changed. See also section Customizing.

If you create or change planned independent requirements using the *PBED* button, the planning calendar is also supported (period indicator K). The prerequisite is a maintained planning calendar in the material master of a material (“MRP 2” tab page). The planning calendar is defined in Customizing (IMG > Production > Material Requirements Planning > Master Data > Maintain Planning Calendar). If the FMO recognizes a planning calendar in the material master, the requirements are saved using the period indicator “K”. If no calendar is maintained, the period indicator from the selection screen is used. If, after clicking *PBED*, you choose the option *Yes (Modify)* in the dialog box, you have the option to override specific parameters. It is also possible here to ignore a planning calendar maintained in the material master and save the planned independent requirements with the set period indicator.

You can modify the historical values manually and save them as corrected historical values in table `MVER` by choosing the *MVER* pushbutton.

To do this, on the *Forecast/Consumption* tab, you must specify that the corrected total consumption is to be read, whereby the period indicator of table `MVER` (for example, “W” for week) must match the period indicator of the analysis.

When you choose the Forecast pushbutton, first a dialog box appears asking whether you want to update the planned independent requirements. If you respond with Yes (Modify), another dialog box containing configuration options appears.

When you choose the *Sporadic Forecast* button, the system displays a dialog box in which you can select whether you want to perform a manual forecast or a forecast using the Croston method. To do this, you must select at least one row. In the case of a manual forecast, you enter the forecast value, the interval, and the starting period (1 corresponds to the first period of the forecast horizon). If you have only selected one row, the system proposes values. You can also execute the Croston method with either sporadic or constant results. The smoothing parameter alpha, which is preset to 0.3, can be overwritten.

You can use the *Quantity Correction* pushbutton to increase or reduce the historical values by a user-defined percentage. This opens a dialog box with a corresponding input field.

You can perform an optical outlier correction using the *Color Settings* pushbutton. You can select the number of periods to be included in the analysis period as well as the number of periods that are to be colored. A mean and median are available as the basis for the correction. All cells with a deviation from the mean or median value that is greater than the configurable percentage are colored. You can set the colors for the top and bottom outliers separately.

If you execute theFMO tool with the corrected consumption quantities, you can use the *Total Consumption* pushbutton to display the total consumption for the materials in separate rows.

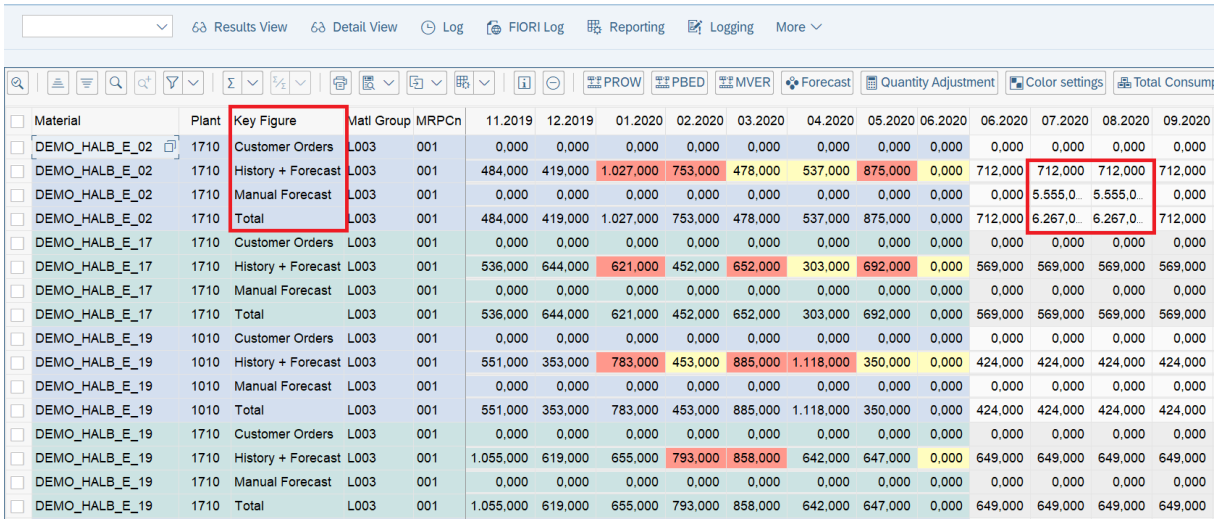
### Related Information

Customizing

## 4.2.1 Planning View with Planning Functions Enabled

The planning functions are a new feature in Release 2021. In addition to the forecast generated by the FMO tool, which is based on historical data, it is therefore possible to enter an additional manual forecast that is written in a separate version (PBED, info structure).

For example, this allows you to map promotion planning or to increase or decrease the forecast as a whole if unpredictable things occur without any comparable event in the past (for example, the rush to purchase bathroom tissue that occurred during the coronavirus crisis, which is unique in recent history).

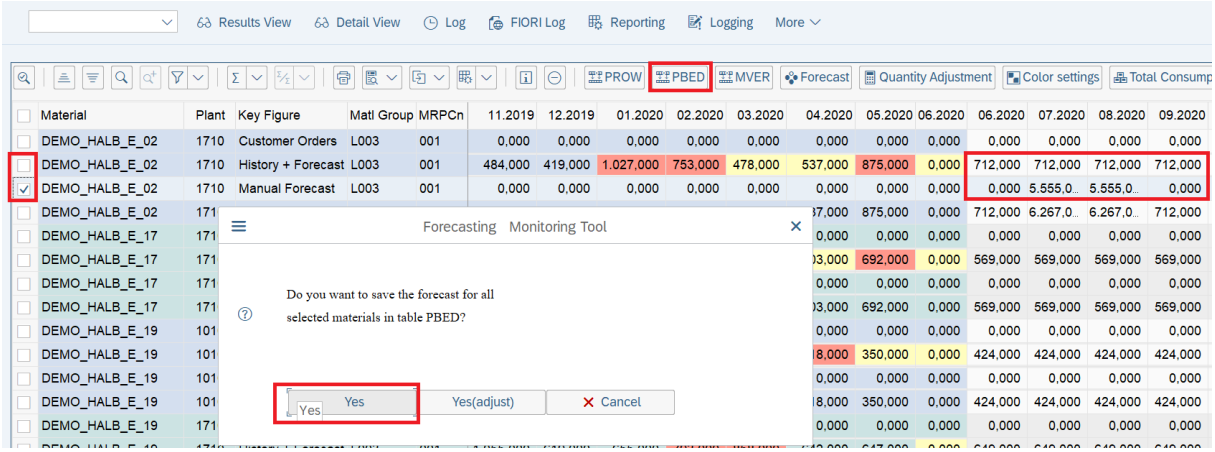



| Material | Plant | Key Figure | Matl Group | MRPCn | 11.2019 | 12.2019 | 01.2020 | 02.2020 | 03.2020 | 04.2020 | 05.2020 | 06.2020 | 06.2020 | 07.2020 | 08.2020 | 09.2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEMO_HALB_E_02 | 1710 | Customer Orders | L003 | 001 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| DEMO_HALB_E_02 | 1710 | History + Forecast | L003 | 001 | 484,000 | 419,000 | 1.027,000 | 753,000 | 478,000 | 537,000 | 875,000 | 0,000 | 712,000 | 712,000 | 712,000 | 712,000 |
| DEMO_HALB_E_02 | 1710 | Manual Forecast | L003 | 001 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 5.555,0... | 5.555,0... | 0,000 |
| DEMO_HALB_E_02 | 1710 | Total | L003 | 001 | 484,000 | 419,000 | 1.027,000 | 753,000 | 478,000 | 537,000 | 875,000 | 0,000 | 712,000 | 6.267,0... | 6.267,0... | 712,000 |
| DEMO_HALB_E_17 | 1710 | Customer Orders | L003 | 001 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| DEMO_HALB_E_17 | 1710 | History + Forecast | L003 | 001 | 536,000 | 644,000 | 621,000 | 452,000 | 652,000 | 303,000 | 692,000 | 0,000 | 569,000 | 569,000 | 569,000 | 569,000 |
| DEMO_HALB_E_17 | 1710 | Manual Forecast | L003 | 001 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| DEMO_HALB_E_17 | 1710 | Total | L003 | 001 | 536,000 | 644,000 | 621,000 | 452,000 | 652,000 | 303,000 | 692,000 | 0,000 | 569,000 | 569,000 | 569,000 | 569,000 |
| DEMO_HALB_E_19 | 1010 | Customer Orders | L003 | 001 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| DEMO_HALB_E_19 | 1010 | History + Forecast | L003 | 001 | 551,000 | 353,000 | 783,000 | 453,000 | 885,000 | 1.118,000 | 350,000 | 0,000 | 424,000 | 424,000 | 424,000 | 424,000 |
| DEMO_HALB_E_19 | 1010 | Manual Forecast | L003 | 001 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| DEMO_HALB_E_19 | 1010 | Total | L003 | 001 | 551,000 | 353,000 | 783,000 | 453,000 | 885,000 | 1.118,000 | 350,000 | 0,000 | 424,000 | 424,000 | 424,000 | 424,000 |
| DEMO_HALB_E_19 | 1710 | Customer Orders | L003 | 001 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| DEMO_HALB_E_19 | 1710 | History + Forecast | L003 | 001 | 1.055,000 | 619,000 | 655,000 | 793,000 | 858,000 | 642,000 | 647,000 | 0,000 | 649,000 | 649,000 | 649,000 | 649,000 |
| DEMO_HALB_E_19 | 1710 | Manual Forecast | L003 | 001 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| DEMO_HALB_E_19 | 1710 | Total | L003 | 001 | 1.055,000 | 619,000 | 655,000 | 793,000 | 858,000 | 642,000 | 647,000 | 0,000 | 649,000 | 649,000 | 649,000 | 649,000 |

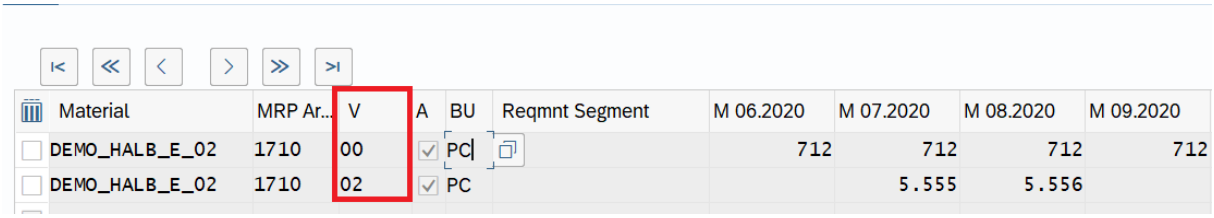
Planning View with Planning Functions Enabled

After entering the desired manual forecast data in the "Manual Forecast" key figure, the desired entries can be saved. Table PBED (database table for transaction MD62) or an info structure are available for this purpose.

You must select the required lines or material numbers and then save the values by selecting “PBED”. Two popups can be confirmed.




You can see the result in transaction MD63. You can clearly see that the system forecast has flowed into version 00 and the manual enhancements have gone into version 02.



| Material | MRP Ar... | V | A | BU | Reqmnt Segment | M 06.2020 | M 07.2020 | M 08.2020 | M 09.2020 |
|---|---|---|---|---|---|---|---|---|---|
| DEMO_HALB_E_02 | 1710 | 00 | ✓ | PC | | 712 | 712 | 712 | 712 |
| DEMO_HALB_E_02 | 1710 | 02 | ✓ | PC | | | 5.555 | 5.556 | |

## 4.2.2 Aggregated Display

The FMO tool enables you to display aggregated planning data, for example, cross-plant for a material.

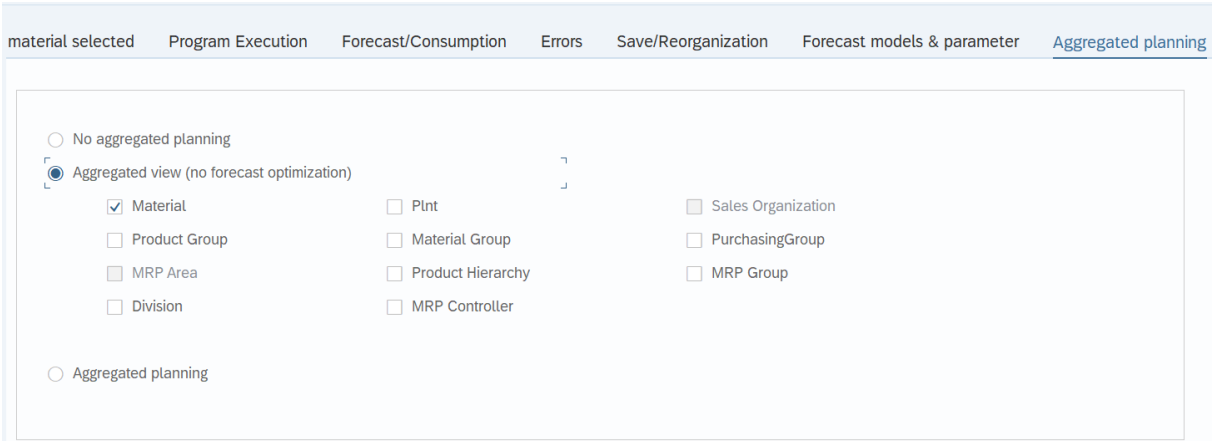
In addition, in conjunction with the additional tool “Forecast Optimization on HANA” (FOH, only available for SAP HANA systems), it offers the option of aggregated planning or performing a forecast optimization, not only to determine/use the most suitable mathematical forecast procedure, but also to determine the best individual aggregation level for each individual object in connection with the best forecasting procedure, to create a forecast there and to disaggregate it to the level required for further processing, e.g. Material + Plant. The precise options in conjunction with FOH are explained in a separate section. This section describes the aggregated display that is already contained in the FMO tool for all systems. The advantage of aggregated display is that, on the one hand, the forecast is created normally at the known levels. The levels are:

- Material (cross-plant)
- Material + Plant•Material + Plant + Sales Organization
- Material + MRP area•Material + plant + storage location

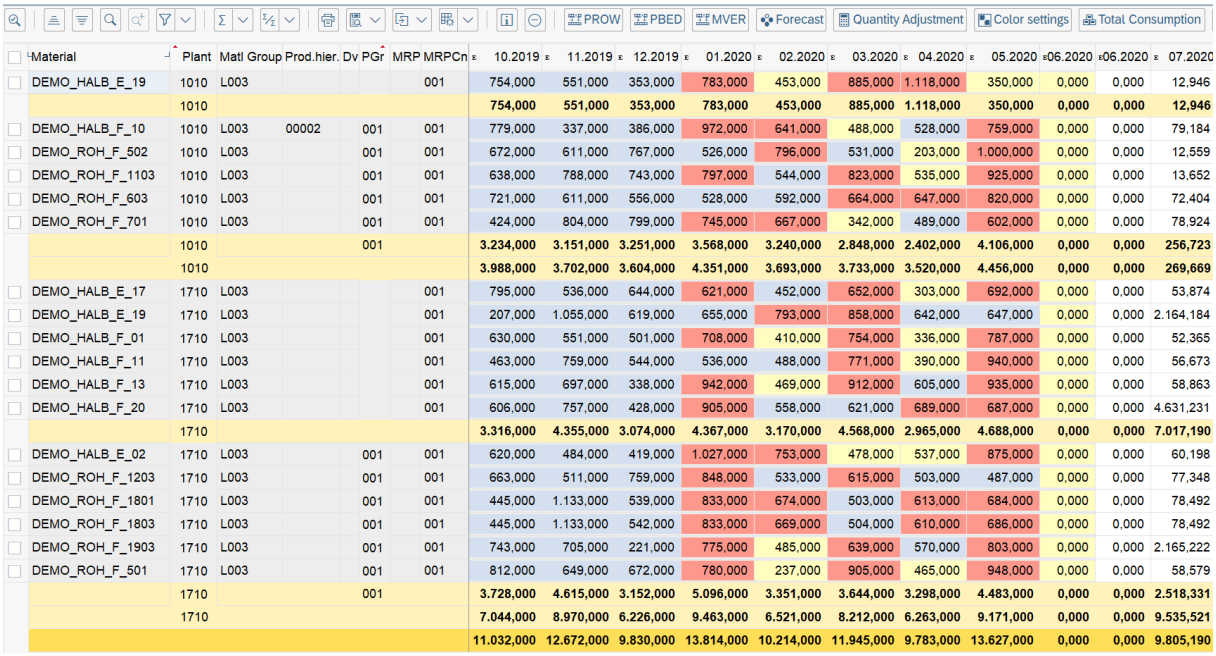
In many cases, however, the planner wants to see the planned total of a material across all plants or sales organizations, for example. Or the total for an MRP controller. To do this, you can specify one or more characteristics on which (partial) totals are to be displayed. The following characteristics can be selected directly, while other characteristics can be selected interactively in the planning view:

- Material
- Plant
- Sales organization (only if the data source also contains this)•Product group (if a material occurs in several groups, only the first one is taken)

- Material Group
- Purchasing group
- MRP area (only if the data source also contains it)
- Product Hierarchy
- MRP group
- Division
- MRP Controller




In the planning view, the selected characteristics are now taken and planning is displayed both in detail and (partially) totaled. The example contains partial results for each purchasing group per plant. Then there is the total for each individual plant and the overall total.




| Material | Plant | Matl Group | Prod.hier. | Dv | PGr | MRP | MRPCn | 10.2019 | 11.2019 | 12.2019 | 01.2020 | 02.2020 | 03.2020 | 04.2020 | 05.2020 | 06.2020 | 06.2020 | 07.2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEMO_HALB_E_19 | 1010 | L003 | | | | | 001 | 754,000 | 551,000 | 353,000 | 783,000 | 453,000 | 885,000 | 1.118,000 | 350,000 | 0,000 | 0,000 | 12,946 |
| | 1010 | | | | | | | **754,000** | **551,000** | **353,000** | **783,000** | **453,000** | **885,000** | **1.118,000** | **350,000** | **0,000** | **0,000** | **12,946** |
| DEMO_HALB_F_10 | 1010 | L003 | 00002 | | 001 | | 001 | 779,000 | 337,000 | 386,000 | 972,000 | 641,000 | 488,000 | 528,000 | 759,000 | 0,000 | 0,000 | 79,184 |
| DEMO_ROH_F_502 | 1010 | L003 | | | 001 | | 001 | 672,000 | 611,000 | 767,000 | 526,000 | 796,000 | 531,000 | 203,000 | 1.000,000 | 0,000 | 0,000 | 12,559 |
| DEMO_ROH_F_1103 | 1010 | L003 | | | 001 | | 001 | 638,000 | 788,000 | 743,000 | 797,000 | 544,000 | 823,000 | 535,000 | 925,000 | 0,000 | 0,000 | 13,652 |
| DEMO_ROH_F_603 | 1010 | L003 | | | 001 | | 001 | 721,000 | 611,000 | 556,000 | 528,000 | 592,000 | 664,000 | 647,000 | 820,000 | 0,000 | 0,000 | 72,404 |
| DEMO_ROH_F_701 | 1010 | L003 | | | 001 | | 001 | 424,000 | 804,000 | 799,000 | 745,000 | 667,000 | 342,000 | 489,000 | 602,000 | 0,000 | 0,000 | 78,924 |
| | 1010 | | | | 001 | | | **3.234,000** | **3.151,000** | **3.251,000** | **3.568,000** | **3.240,000** | **2.848,000** | **2.402,000** | **4.106,000** | **0,000** | **0,000** | **256,723** |
| | 1010 | | | | | | | **3.988,000** | **3.702,000** | **3.604,000** | **4.351,000** | **3.693,000** | **3.733,000** | **3.520,000** | **4.456,000** | **0,000** | **0,000** | **269,669** |
| DEMO_HALB_E_17 | 1710 | L003 | | | | | 001 | 795,000 | 536,000 | 644,000 | 621,000 | 452,000 | 652,000 | 303,000 | 692,000 | 0,000 | 0,000 | 53,874 |
| DEMO_HALB_E_19 | 1710 | L003 | | | | | 001 | 207,000 | 1.055,000 | 619,000 | 655,000 | 793,000 | 858,000 | 642,000 | 647,000 | 0,000 | 0,000 | 2.164,184 |
| DEMO_HALB_F_01 | 1710 | L003 | | | | | 001 | 630,000 | 551,000 | 501,000 | 708,000 | 410,000 | 754,000 | 336,000 | 787,000 | 0,000 | 0,000 | 52,365 |
| DEMO_HALB_F_11 | 1710 | L003 | | | | | 001 | 463,000 | 759,000 | 544,000 | 536,000 | 488,000 | 771,000 | 390,000 | 940,000 | 0,000 | 0,000 | 56,673 |
| DEMO_HALB_F_13 | 1710 | L003 | | | | | 001 | 615,000 | 697,000 | 338,000 | 942,000 | 469,000 | 912,000 | 605,000 | 935,000 | 0,000 | 0,000 | 58,863 |
| DEMO_HALB_F_20 | 1710 | L003 | | | | | 001 | 606,000 | 757,000 | 428,000 | 905,000 | 558,000 | 621,000 | 689,000 | 687,000 | 0,000 | 0,000 | 4.631,231 |
| | 1710 | | | | | | | **3.316,000** | **4.355,000** | **3.074,000** | **4.367,000** | **3.170,000** | **4.568,000** | **2.965,000** | **4.688,000** | **0,000** | **0,000** | **7.017,190** |
| DEMO_HALB_E_02 | 1710 | L003 | | | 001 | | 001 | 620,000 | 484,000 | 419,000 | 1.027,000 | 753,000 | 478,000 | 537,000 | 875,000 | 0,000 | 0,000 | 60,198 |
| DEMO_ROH_F_1203 | 1710 | L003 | | | 001 | | 001 | 663,000 | 511,000 | 759,000 | 848,000 | 533,000 | 615,000 | 503,000 | 487,000 | 0,000 | 0,000 | 77,348 |
| DEMO_ROH_F_1801 | 1710 | L003 | | | 001 | | 001 | 445,000 | 1.133,000 | 539,000 | 833,000 | 674,000 | 503,000 | 613,000 | 684,000 | 0,000 | 0,000 | 78,492 |
| DEMO_ROH_F_1803 | 1710 | L003 | | | 001 | | 001 | 445,000 | 1.133,000 | 542,000 | 833,000 | 669,000 | 504,000 | 610,000 | 686,000 | 0,000 | 0,000 | 78,492 |
| DEMO_ROH_F_1903 | 1710 | L003 | | | 001 | | 001 | 743,000 | 705,000 | 221,000 | 775,000 | 485,000 | 639,000 | 570,000 | 803,000 | 0,000 | 0,000 | 2.165,222 |
| DEMO_ROH_F_501 | 1710 | L003 | | | 001 | | 001 | 812,000 | 649,000 | 672,000 | 780,000 | 237,000 | 905,000 | 465,000 | 948,000 | 0,000 | 0,000 | 58,579 |
| | 1710 | | | | 001 | | | **3.728,000** | **4.615,000** | **3.152,000** | **5.096,000** | **3.351,000** | **3.644,000** | **3.298,000** | **4.483,000** | **0,000** | **0,000** | **2.518,331** |
| | 1710 | | | | | | | **7.044,000** | **8.970,000** | **6.226,000** | **9.463,000** | **6.521,000** | **8.212,000** | **6.263,000** | **9.171,000** | **0,000** | **0,000** | **9.535,521** |
| | | | | | | | | **11.032,000** | **12.672,000** | **9.830,000** | **13.814,000** | **10.214,000** | **11.945,000** | **9.783,000** | **13.627,000** | **0,000** | **0,000** | **9.805,190** |

# 4.3 Detail View

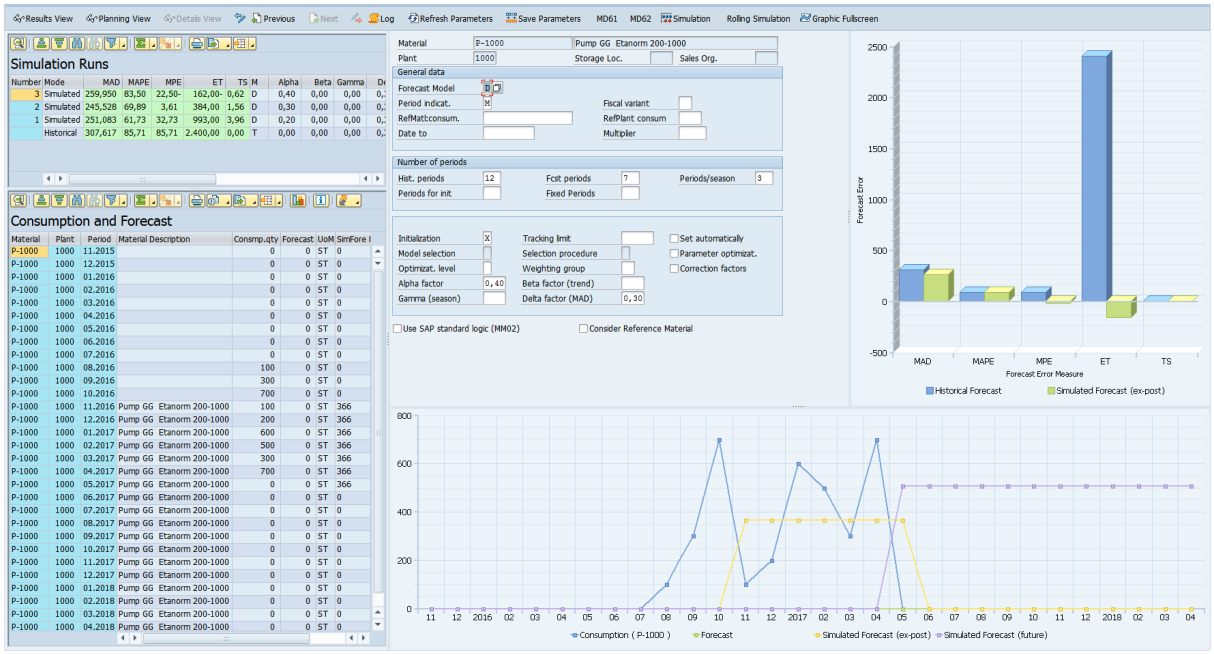
The detail view is the third of three views in the forecasting & monitoring tool.

Jumping from the results view, which contains the results for all selected materials, calls the detailed analysis, which facilitates a deeper analysis of a selected material. On a split screen, detailed information is provided for the user, which is formatted graphically and made available for forecast simulation. When you call the view, the data of the best model is displayed in a table and a chart.

The simulation runs executed are visible in the upper left hand area, along with the parameters used and the forecasting errors calculated. The list is sorted by the error measure, which was selected as a criterion on the selection screen. The final entry is a row "Historical" with the parameters currently configured in the material master, and the forecasting errors that would result from a forecast using these parameters.

In the lower left area, the consumptions are compared with the forecasts per period. In the lower right area, these values are displayed graphically. In the upper right area, the severity of the forecasting error is displayed graphically.

In the center of the detail view, the forecasting parameters from the forecasting view of the material master are displayed. This area enables an additional simulation to be started in the dialog box, in which the parameters can be changed. Therefore, it is possible to change the settings from the material master in simulative mode and to execute a forecast.




Detail View

The simulation is possible in two modes. For the fixed forecast, starting from the first period of the analysis period (04/2013 in the example), a forecast is executed for the entire analysis horizon. For the rolling forecast, a forecast is executed for each period, while each forecast horizon moves by one period. For example, first forecast for 04/2013 based on histories up to 03/2013, second forecast for 05/2013 using the histories up to 04/2013, and so on.

The simulative forecast is displayed in the graphic (yellow line). The resulting forecasting errors (green) of the simulation are also displayed. This enables a direct comparison of the real forecast with the simulative forecast using the forecasting errors.

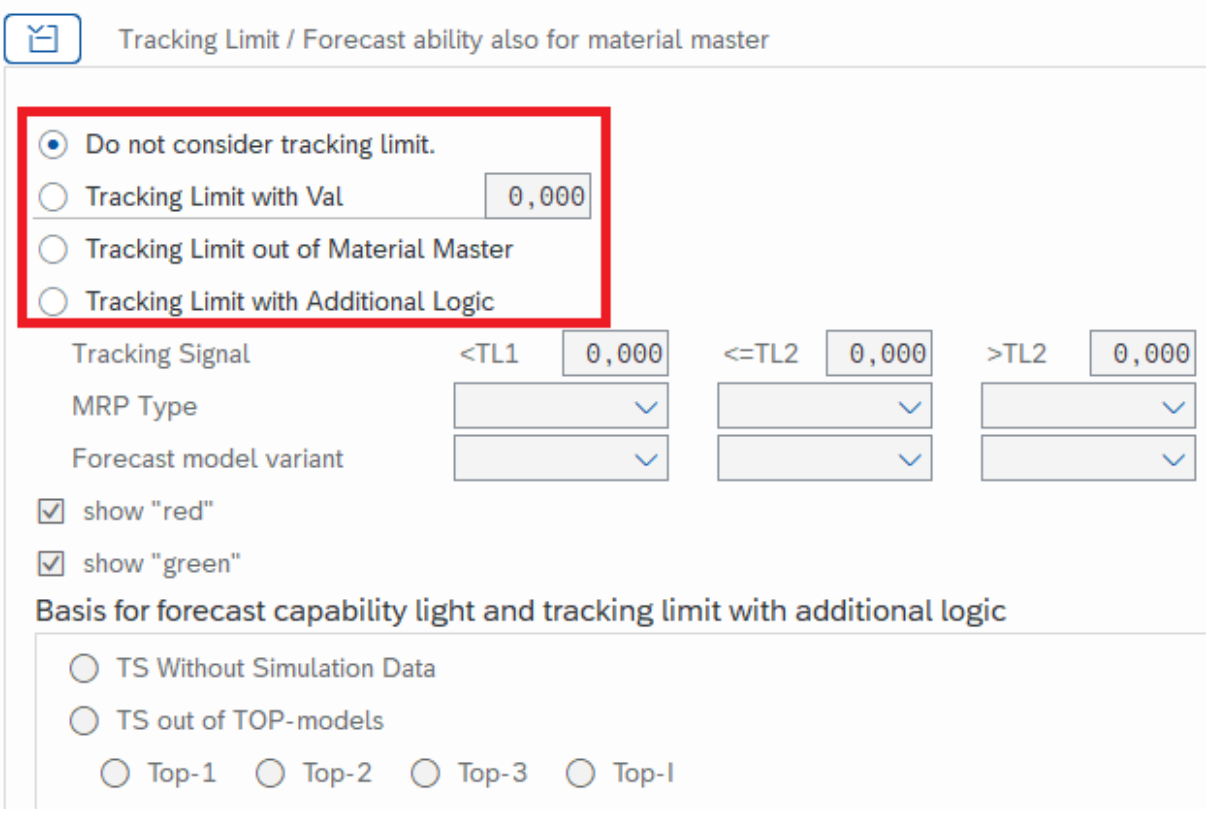
The *Save Parameters* button transfers changes to the forecasting parameters to the material master. The settings from the material master can be restored using the button *Read Parameters Again*, provided that the material master has not yet been saved. The error measures MAD and MAPE of the selected model are also saved. These are stored in the **enhanced material master view**.

You can use the button *Previous* and *Next* to navigate in the results list and display the next or previous material.

Additional buttons allow branching to the forecast view of the material master and the maintenance of planned independent requirements.

## 4.4 Creation of Forecast View in Material Master

To be able to enter parameters in the forecast view of the material master via a background job, it must first be ensured that this view exists. If the forecast view does not yet exist, for example, for a newly created material, it is created automatically by the forecasting & monitoring tool when the material master is updated. Depending on the selection of the tracking limit, the forecasting & monitoring tool behaves differently. For this, you can set the options for setting the tracking limit on the “Errors” tab. This tab is only available if you run a simulation and/or analyze the quality of the forecast. You can find both options on the “Program Execution” tab.




*Selection of Tracking Limit Option a)*

If the user selects this option, the forecast view is always created, regardless of the forecasting ability.

*Selection of Tracking Limit Option b) or c)*

If one of these two options has been chosen, the forecasting ability traffic light is used as the decision-making basis. If the traffic light for the material is green, when the button with the cog icon is chosen, a forecast view is created in the material master. If the traffic light is red, no new view is created. If a forecast view already exists, the forecasting model is filled with 0 since the material can no longer be forecast.

*Selection of Tracking Limit Option d)*

The behavior varies depending on the selection made for the forecasting model variant on the "Error Measure" selection tab (tracking limit area). If "0 Do Not Create Model/Forecast View" is selected, no forecast view is created. If this view already exists, the model 0 is chosen and the view remains. In the event that one of the top variants was chosen, the respective forecasting model is also transferred to the material master during the update operation. If the forecast view does not yet exist, it is created automatically.

*Set Forecasting Model 0 for Materials No Longer Able to Be Forecast*

If a material is no longer able to be forecast and the forecast view already exists, the forecasting model 0 is chosen during a material master update.

## 4.5 Change MRP Data in the Material Master

From the **forecasting monitor**, various MRP data can be mass maintained. For this, the desired materials need to be selected first. The user then needs to choose the *Update MRP Data* button, which opens a popup.

Different values can be entered here, which are then transferred for all selected materials.

# 5 Restrictions of Functions

For a global analysis, no forecasting parameters can be transferred from the material master to the detailed analysis since the forecasting parameters are plant-specific. However, simulation is still possible; but the forecasting parameters must be entered manually. For the reason mentioned above, it is not possible to save to the material master.

When using the data source PGPL (product group planning), for simplification purposes it was assumed that the product group corresponds to the product; the use of hierarchies is not supported.

Certain combinations of selection criteria are not useful and are not permitted. For example, when selecting the evaluation level sales organization, only those data sources that contain the sales organization can be selected.

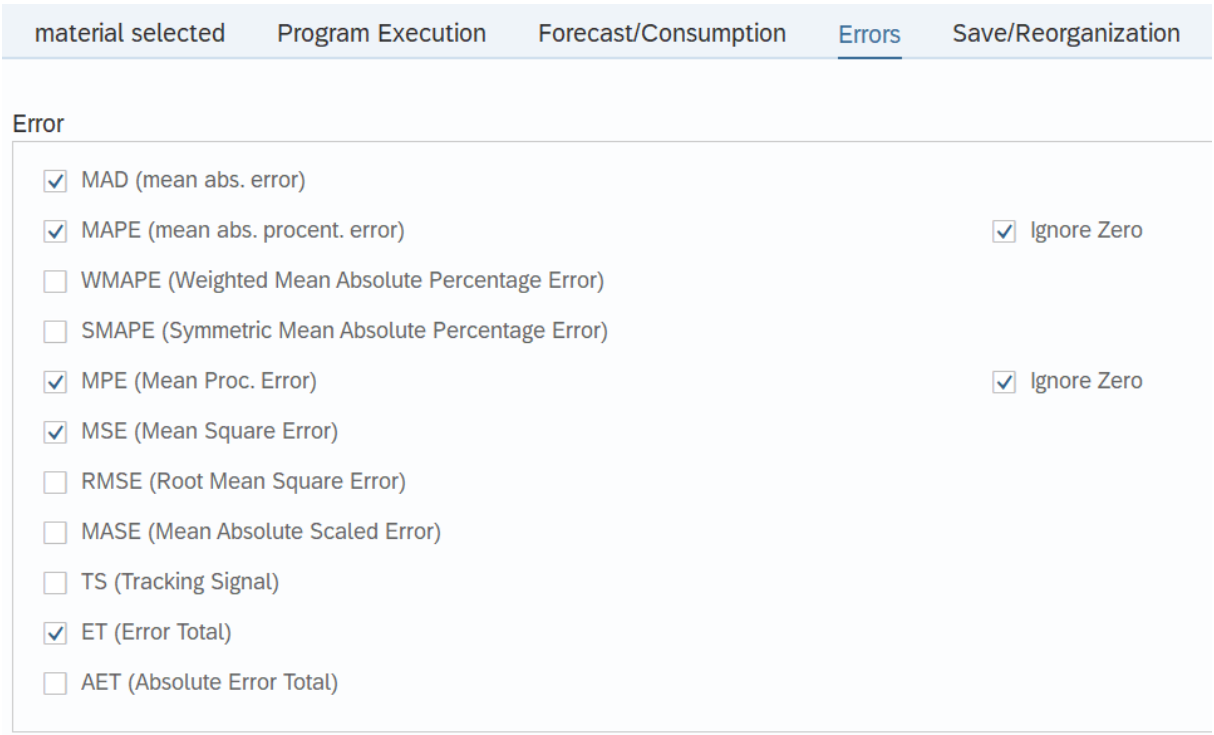
For time cumulation based on the week, there are restrictions if the data sources contain only the month. In this case, the consumption/forecast is assigned to the first week of the month completely.

# 6 Calculation of Error Measure

The calculation of the error measure is the central function for determining the best forecast method.

The basic idea is that the FMO tool goes into the past before the *analysis period* to use the historical data available there to create a forecast (expost forecast) for the analysis period, which in turn is compared with the available historical actual data. Different forecast methods are used in the process, and different forecast results are created for the analysis period. The method whose forecast in the analysis period is the closest to the historical data is the best.

But what are the criteria that make a forecast the best? There are numerous different error indices for determining this mathematically. In the new version 2021 11, the FMO tool supports error measures as well as two additional modifications that the user can choose freely. The tool thereby goes far beyond the standard SAP version (including SCM APO-DP and IBP).




ACTUAL data and forecast data are required as input data for error measure calculation. Which is why the forecasting & monitoring tool uses the last period for the current date when a start date in the future is specified. This is to ensure that existing consumption data can be used as ACTUAL data for the calculation.

## 6.1 MAD (mean absolute deviation)

Mean absolute deviation (MAD) is defined by the following formulas. For the initialization phase:

$$MAD = \frac{1}{n}\sum_{t-1}^{n}|P(t) - V(t)|$$

N = Number of periods for the initialization

(Source: http://help.sap.com/saphelp_46c/helpdata/en/7d/c27285454011d182b40000e829fbfe/frameset.htm)

The following formula applies to all other periods. The delta factor ensures the weighting of the MAD of the previous period in comparison with the current period (principle of exponential smoothing of the first order).

$$MAD(t) = (1 - \delta) * MAD(t - 1) + \delta * |V(t) - P(t)|$$

(Source: http://help.sap.com/saphelp_46c/helpdata/en/7d/c27285454011d182b40000e829fbfe/frameset.htm)

Legend for MAD formula:

V(t) = Actual value

P(t) = Forecast value

Delta = 0.3

Delta is assumed to be 0.3 if no value is defined in the material master, or if the forecast view is not active.

The MAD in the results table is the value of the last period in the analysis period.

Sample calculation:

| A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | |
| 2 | | Period | AC-TUAL | PLAN-NED | MAD | Delta | 0.3 |
| 3 | | 0 | | | 0.0 | | |
| 4 | Most recent period | 1 | 20 | 13 | 6.6 | | |
| 5 | | 2 | 20 | 13 | 6.5 | | |
| 6 | | 3 | 20 | 13 | 6.3 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 7 | | 4 | 20 | 13 | 6.0 | |
| 8 | | 5 | 20 | 13 | 5.5 | |
| 9 | | 6 | 13 | 13 | 4.9 | =(1-$H$2) * F10 + $H$2 * ABS(E9-D9) |
| 10 | | 16 | 20 | 13 | 7.0 | |
| 11 | | 17 | 20 | 13 | 7.0 | |
| 12 | Oldest period (initial) | 18 | 20 | 13 | 7.0 | =ABS(E12-D12) |

## 6.2 MAPE (mean absolute percentage error)

The mean absolute percentage error (MAPE) is calculated using the following formula:

$$MAPE = \frac{1}{n}\sum_{t=1}^{n}\left|\frac{V(t) - P(t)}{V(t)} * 100\right|$$

V(t) = Actual value

P(t) = Forecast value

n = Number of ex-post periods

(Source: http://help.sap.com/saphelp_scm70/helpdata/de/ac/216b92337b11d398290000e8a49608/content.htm)

Sample Calculation 2:

| | Forecast P(t) | ACTUAL V(t) | e(t) = V(t) - P(t) | PE(T) = e(t) / V(t) * 100 | Sum | Result: Sum x 1/n |
|---|---|---|---|---|---|---|
| 1 | 100 | 50 | -50 | 100.00 | 100.00 | |
| 2 | 100 | 50 | -50 | 100.00 | 200.00 | |
| 3 | 100 | 50 | -50 | 100.00 | 300.00 | |
| 4 | 100 | 50 | -50 | 100.00 | 400.00 | |
| 5 | 100 | 60 | -40 | 66.67 | 466.67 | |
| 6 | 70 | 50 | -20 | 40.00 | 506.67 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 7 | 100 | 50 | -50 | 100.00 | 606.67 | |
| 8 | 100 | 50 | -50 | 100.00 | 706.67 | 88.33 % |

Mathematically, it is possible to calculate the result of a MAPE as greater than 100%. In this case, the **forecasting monitor** outputs 100%.

Ignore Zero

Using MAPE and MPE only makes sense if the historical time series with which the expost forecast is to be compared has sales throughout. As soon as there are “zero periods”, the MAPE becomes exorbitantly high for the affected periods and is no longer reasonably proportional to the other periods. It then no longer makes sense to compare the result with other results. For example, a single zero period would cause such a severe error in a good forecast that the entire result would be unsuitable if only the forecast error were to be analyzed.

This is the reason for the introduction of the "Ignore Zero" option. As a result, zero periods are simply skipped during the MAPE calculation. Of course, this only makes sense if there are very few zero periods that you can ignore. However, if the time series is characterized by a large number of zero periods, it is better to use a different measure of error for comparison.

## 6.3 WMAPE (Weighted Mean Absolute Percentage Error)

$$\mathrm{WMAPE} = \frac{\sum_{t=1}^{n} |A_t - F_t|}{\sum_{t=1}^{n} |A_t|}$$

## 6.4 SMAPE (Symmetric Mean Absolute Percentage Error)

$$\mathrm{SMAPE} = \frac{100\%}{n} \sum_{t=1}^{n} \frac{|F_t - A_t|}{(|A_t| + |F_t|)/2}$$

## 6.5 MPE (Mean Percentage Error)

$$MPE = \frac{1}{n} * \sum_{i=1}^{n} \frac{AbsHist_i - Progn._{Ex\text{-}post\text{-}Progn.}}{AbsHist_i} * 100$$

Ignore Zero

Using MAPE and MPE only makes sense if the historical time series with which the expost forecast is to be compared has sales throughout. As soon as there are “zero periods”, the MAPE becomes exorbitantly high for the affected periods and is no longer reasonably proportional to the other periods. It then no longer makes sense to compare the result with other results. For example, a single zero period would cause such a severe error in a good forecast that the entire result would be unsuitable if only the forecast error were to be analyzed.

This is the reason for the introduction of the "Ignore Zero" option. As a result, zero periods are simply skipped during the MAPE calculation. Of course, this only makes sense if there are very few zero periods that you can ignore. However, if the time series is characterized by a large number of zero periods, it is better to use a different measure of error for comparison.

## 6.6 MSE (Mean Squared Error)

$$MSE = \frac{1}{n} * \sum_{i=1}^{n} (Progn._{Ex\text{-}post\text{-}Progn.} - AbsHist_i)^2$$

## 6.7 RMSE (Root-Mean-Square Deviation)

$$RMSE = \sqrt{\frac{1}{n} * \sum_{i=1}^{n} (Progn._{Ex\text{-}post\text{-}Progn.} - AbsHist_i)^2}$$

## 6.8 MASE (Mean Absolute Scaled Error)

$$MASE = \frac{1}{n}\sum_{t=1}^{n}|q(t)| \qquad q(t) = \frac{V(t) - P(t)}{\sum_{i=2}^{n}\frac{V(i) - V(i-1)}{n-1}}$$

## 6.9 TS (tracking signal)

The tracking signal helps identify structural interruptions by putting the error total in relation to MAD. If the error total rises or falls sharply in relation to MAD, this means that the consumption and forecast are moving further apart.

It is calculated using the following formula:

$$TS = \left|\frac{ET}{MAD}\right|$$

(Source: http://help.sap.com/saphelp_46c/helpdata/de/7d/c27285454011d182b40000e829fbfe/frameset.htm)

## 6.10 ET (Error Total)

The error total describes the total of the deviations across the periods, taking the plus/minus sign into account. Positive and negative deviations of equal size cancel each other out and the error total is 0.

The following formula is used:

$$ET = \sum_{t-1}^{n} V(t) - P(t)$$

(Source: http://help.sap.com/saphelp_46c/helpdata/de/7d/c27285454011d182b40000e829fbfe/frameset.htm)

Legend:

V(t) = Actual value

P(t) = Forecast value

## 6.11 AET (Absolute, Total Error)

The error measure is the same as ET, but an amount is always formed so that the value will never be negative. This allows absolute deviations from the mean value to be determined and compared.

$$\mathrm{AET} = \sum_{t=1}^{n} [|V(t) - P(t)|]$$

# 7 Comprehensive Functions

Within all SCM consulting solutions there is a standard that makes certain functions available in all tools. These functions are called comprehensive functions.

Separate documentation exists for these, which can be found here:

https://help.sap.com/viewer/a63d77035f78419383116283e995e0a2/2020.1/de-DE/f15779970ab64b29b4de0328991eea4d.html

Therefore, the following provides only an overview of the functions available in the FMO tool. The following functions are now available:

- Tasks (formerly measures) and resubmissions
- Comment function
- Material master update
- Enhanced material master views / additional fields
- Individual material groups
- Alerts
- Enhanced navigation profile functions
- Formula editor for creating your own formulas
- MS Excel book of reports
- MS Excel upload/download in the planning view

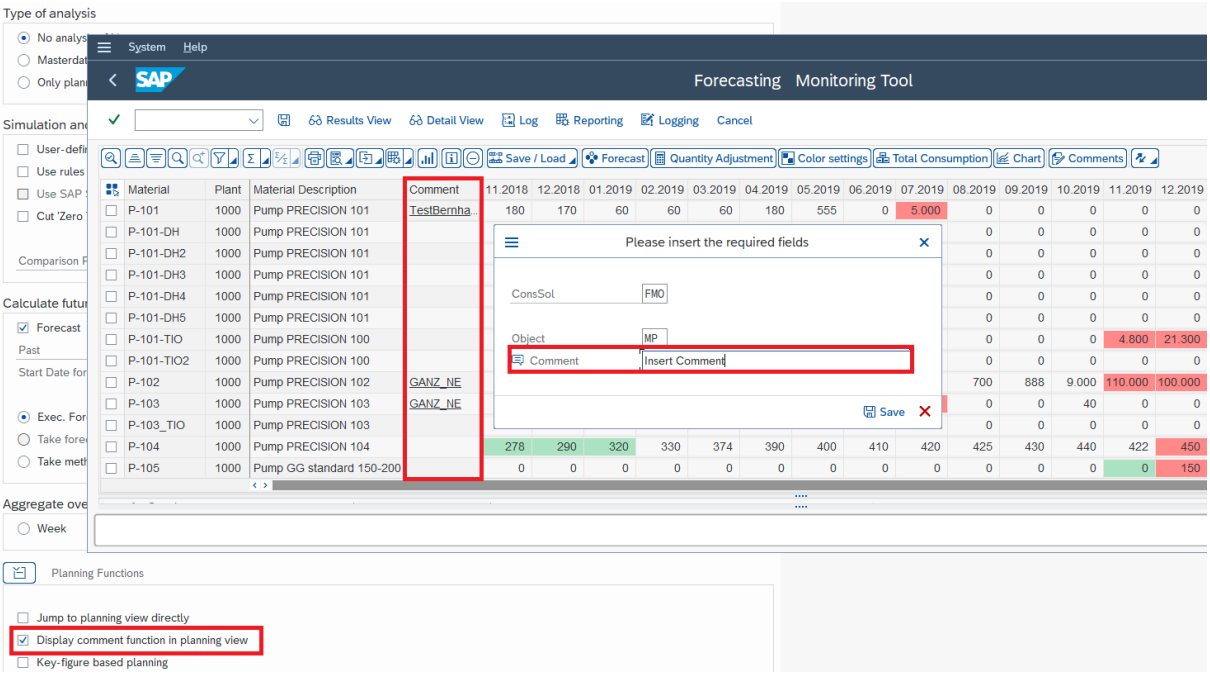
### Comments

The comment function can be used to create any texts for each line in the FMO. Comments can help to note something down or share with colleagues digitally during planning, without the need to write emails. You can also define a reason why something was planned or what was taken into account during planning.

The comment function is always available in the result view. If you cannot find the column, you need to show it. To do this, you can either change the current layout or simply right-click the top left corner of the table and choose “Show”. There, you search for the column Comment and add it to the displayed columns.

If you want to use the comment function in the planning view as well, you must display the field "Also Display Comment Function in Planning View" under "Planning Functions" on the "Program Execution" tab of FMO.

Comments are very easy to create, you simply click on the required line in the column “Comments”. A dialog box opens immediately, in which you can enter the text.



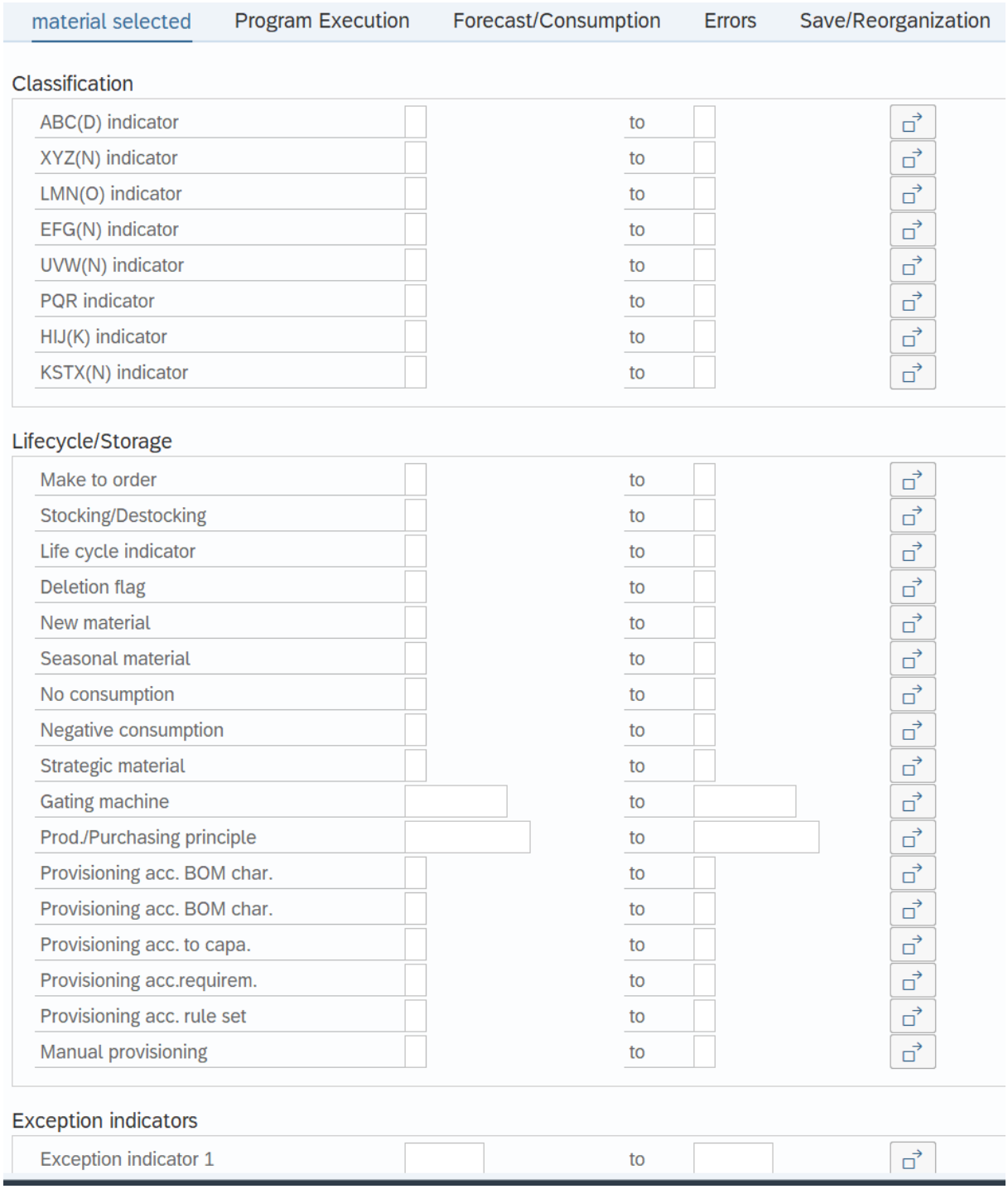

To be able to display comments flexibly in FMO, you must set the following user parameter for all users who use the tool. Users can do this themselves using transaction SU3, or it can be done centrally.

/SAPLOM/MEA_FMODE = 2

# 7.1 Enhanced Material Master Views / Additional Fields

With the SCM consulting solutions, there is a large catalog and additional material master fields for various purposes, for example, XYZ analyses, DDMRP optimization, stocking, and so on. Some of these fields are filled in conjunction with other SCM consulting solutions. The FMO tool also has its own material master fields, for example, for storing SAP HANA forecast models that are not available in SAP ECC.

However, it is also possible to fill material master data using other tools (for example, perform an XYZ analysis with the MRP monitor) and then use the result in the FMO tool to build variants that, for example, only calculate constant or trend models for X articles, whereas only Croston models are used for Z articles. You can find the selection of the additional fields on the first page of the selection screen.

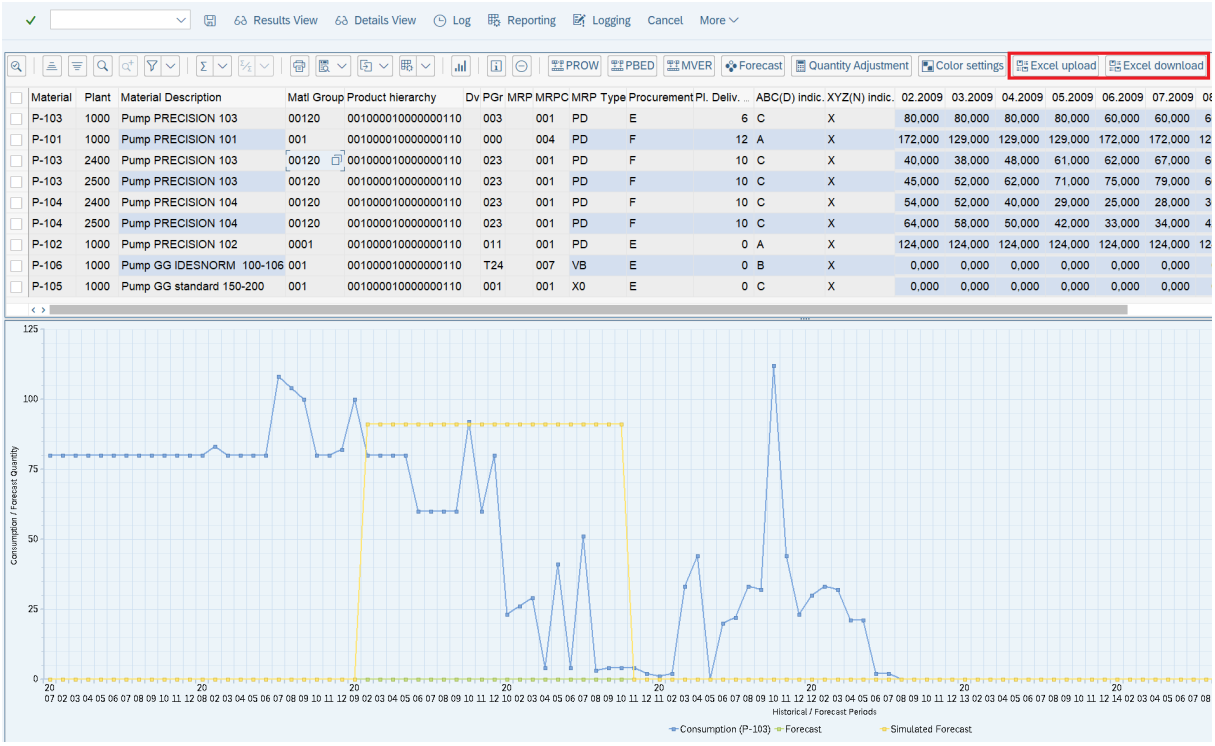



Selection of Additional Fields

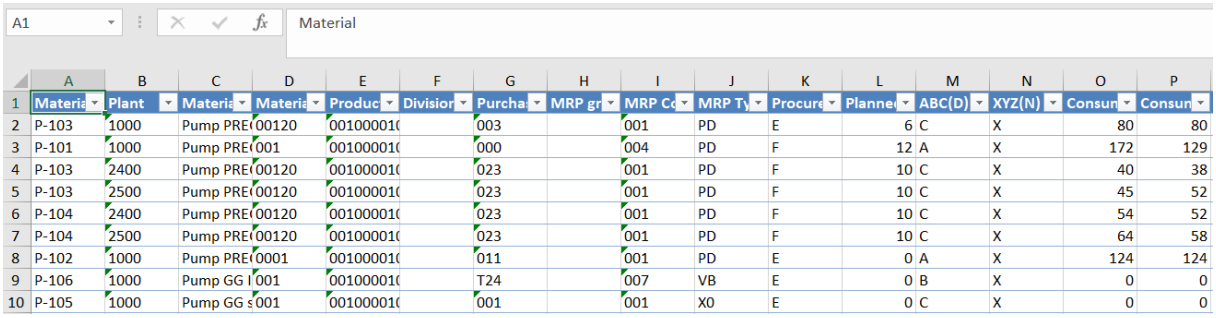
## 7.2 MS Excel Upload/Download in the Planning View

In the planning view, you can download the entire planning table in Microsoft© Excel format, change the data locally, and upload it again. You can use this function to map scenarios such as the following:

- Loading forecast data from a non-SAP system without a historical data basis in SAP
- Creation of a forecast in FMO, Excel download, and further processing in the external system
- Loading planning data from an external system into FMO and from there into an SAP ECC info structure, with or without an existing SAP material master
- (Mass) download of material master attributes if FMO is used to display material master data




MS Excel Upload/Download in the Planning View




Result of Excel Download

## 7.3 MS Excel Book of Reports

In addition to the classic MS Excel upload/download, there is also the Excel book of reports function. The book of reports are automatically generated Excel files that contain both data in table form and predefined graphics. These can be used directly to present certain key figures in meetings, in the case of the FMO tool, for example, the planned total sales of the next 12 months compared with the past 12 months.

With the book of reports it is possible to maintain customized profiles with the desired columns key figures that are to be transferred from the results view to the book of reports for each consulting solutions tool. This is done once only. Afterwards you can run the FMO tool by specifying the book of reports profile, and the Excel file is generated automatically in the background.





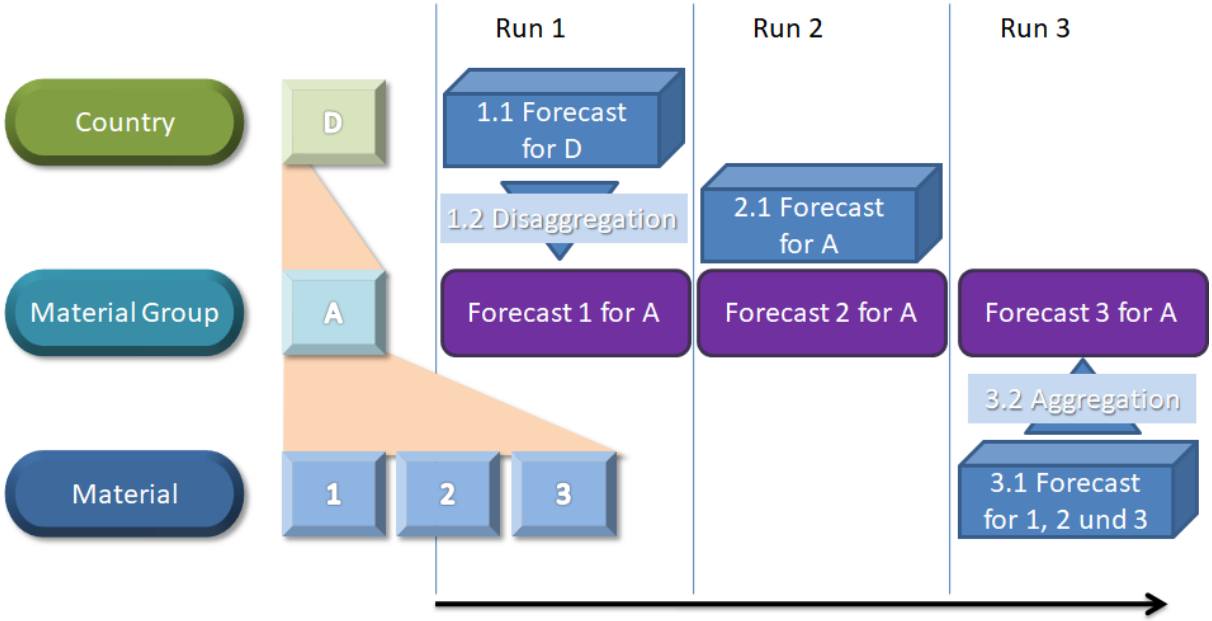
# 8 Forecast Optimization with SAP HANA

The FMO tool can be run on every SAP ECC (ERP) installation as of Release 6.0, Basis 7.01. Compatibility with older installations must be checked on a case-by-case basis. For an installation on an SAP HANA version with HDB v2 or higher, in addition to the FMO tool there is the consulting solution "forecast optimization on HANA (FOH)".

This tool can run on an SAP HANA system independently and enables historical sales data to be uploaded via Excel and a forecast to be created that, like the FMO tool, uses error measures to determine the best forecast method. However, it is not the standard SAP ECC forecast methods that are used, but modern forecast methods from the SAP HANA database (PAL). For more information, see the FOH documentation.

However, the main advantage of FOH is the option to aggregate and disaggregate the forecast at levels to be stipulated for individual characteristic values (for example, materials, material+plant combinations, and so on), to also calculate forecasts that are (dis)aggregated at basis level and compared with the historical data. This makes it possible to not only calculate the best mathematical forecast method, but also the best aggregation level.

Thus, the tool can be used, for example, to calculate forecasts for a non-SAP system, or to optimize an existing SAP IBP or APO-DP, since these do not offer aggregation optimization.




| Target Aggregation Level: | | Material Group |
|---|---|---|
| **Error measur:** | **Characteristic Combination:** | **Best result:** |
| MAPE | Material Group A | Forecast 3 Forecast on Level Material |
| MAD | Material Group A | Forecast 1 → Forecast on Level Country |

Forecast Optimization Schema with Different Aggregation Levels

However, the main advantage of the FOH tool is in conjunction with the FMO tool. Both tools are connected via an interface (invisible to the user). When the FMO tool is started, it checks whether FOH is also in the system. If this is the case, additional functions are activated in FMO and the FMO users can also benefit from the aggregation optimization of FOH, transfer the results in FMO and transfer them to the logistics process, for example, by saving the optimized forecast results in the PBED table (MD62) or info structures.

The following subsections deal exclusively with the additional functions in the FMO tool that are available if FOH exists. Independent functions of the FOH tool must be looked up in the documentation there.

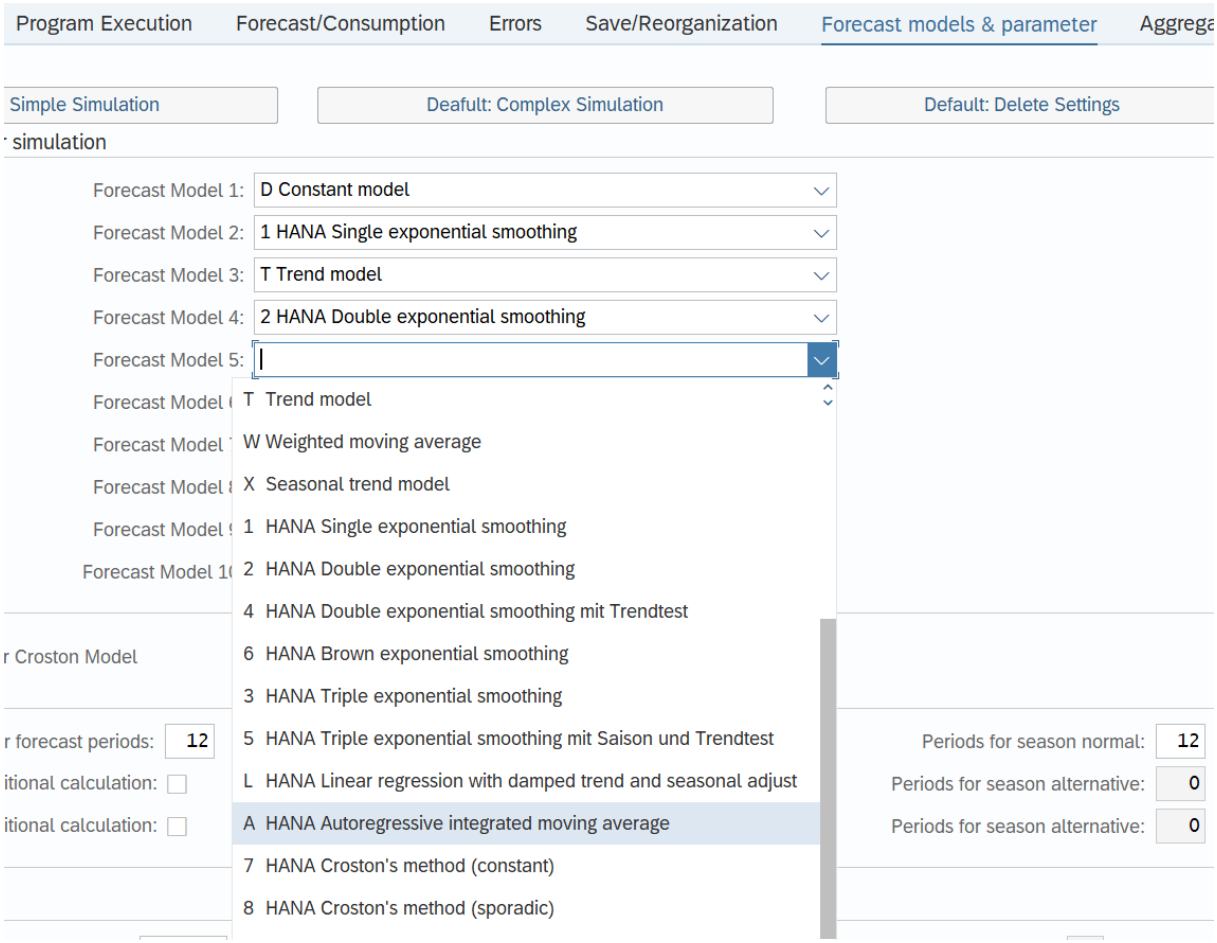
## 8.1 Additional Forecasting Techniques in HANA PAL

The SAP Predictive Analysis Library (PAL) is usually also delivered with HANA. This contains new mathematical forecasting methods that were not previously available in SAP ERP, SAP SCM-APO, or SAP BW. These procedures are only available in SAP IBP.

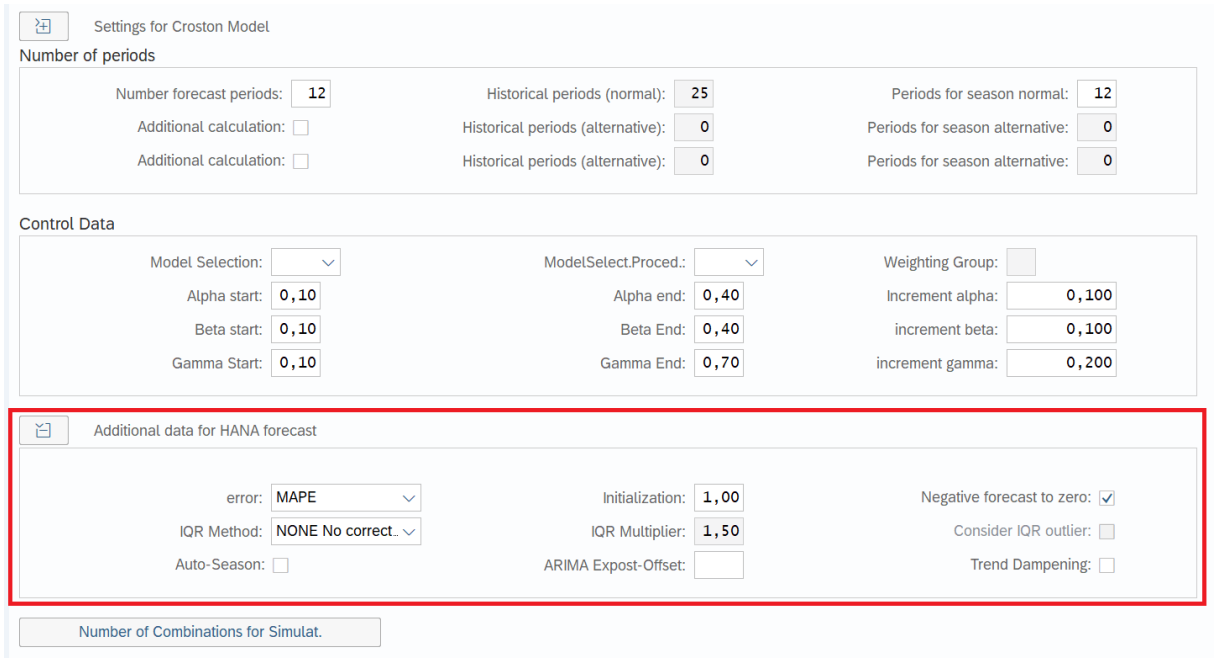
The following methods are used by FOH:

- Single exponential smoothing (SESM)
- Double exponential smoothing (DESM)
- Triple exponential smoothing with additive or multiplicative seasonality (TESM)
- Brown's method (Brown)
- Linear regression with damped trend and seasonal adjust (LRDTSA)
- Croston with sporadic results (Croston sporadic)
- Croston with constant results (Croston constant)
- Autoregressive integrated moving average (ARIMA)
- Autoregressive integrated moving average with season (SARIMA)

Detailed information on the models can be found in the official PAL documentation.




Additional HANA Forecast Models



In the case of a "normal" forecast optimization (simulation) in FMO (without aggregation optimization), the SAP HANA models can be used in exactly the same way as the existing ECC forecast models. For example, the results of the normal constant model and the newer SAP HANA constant model can be compared with each other. However, an absolute novelty of the PAL forecast models is the ARIMA model, for which there is no equivalent in SAP ECC.

**Trend Dampening**

Technical field: DAMPED

Activated for supporting models, enables the parameter for damped trend (for example, for DESM and linear regression with damped trend). Details about the parameter can be found in the respective official PAL documentation.

**Outlier Correction**

Technical fields: IQR_METHOD, IQR_MULTIPLIER, IQR_INCLUDE_OUTLIERS, OUTCORR_LEVEL

There are two ways to perform outlier correction: the IQR and the variance test. In both cases, these are PAL functions whose calculation methods are described in detail in the official PAL documentation.

In general, both procedures are not suitable for time series with trend or seasonality.

Outlier correction can be performed at the aggregated level or the input level. If it is performed at aggregated level, an outlier correction is performed for each aggregation level with the aggregated figures (before a forecast is created). The input level, on the other hand, is the most detailed level and executes outlier correction immediately at the start.

Outlier correction and the level can be set differently in the forecast profile for each forecasting model.

## 8.2 Aggregated Planning / Forecast Optimization

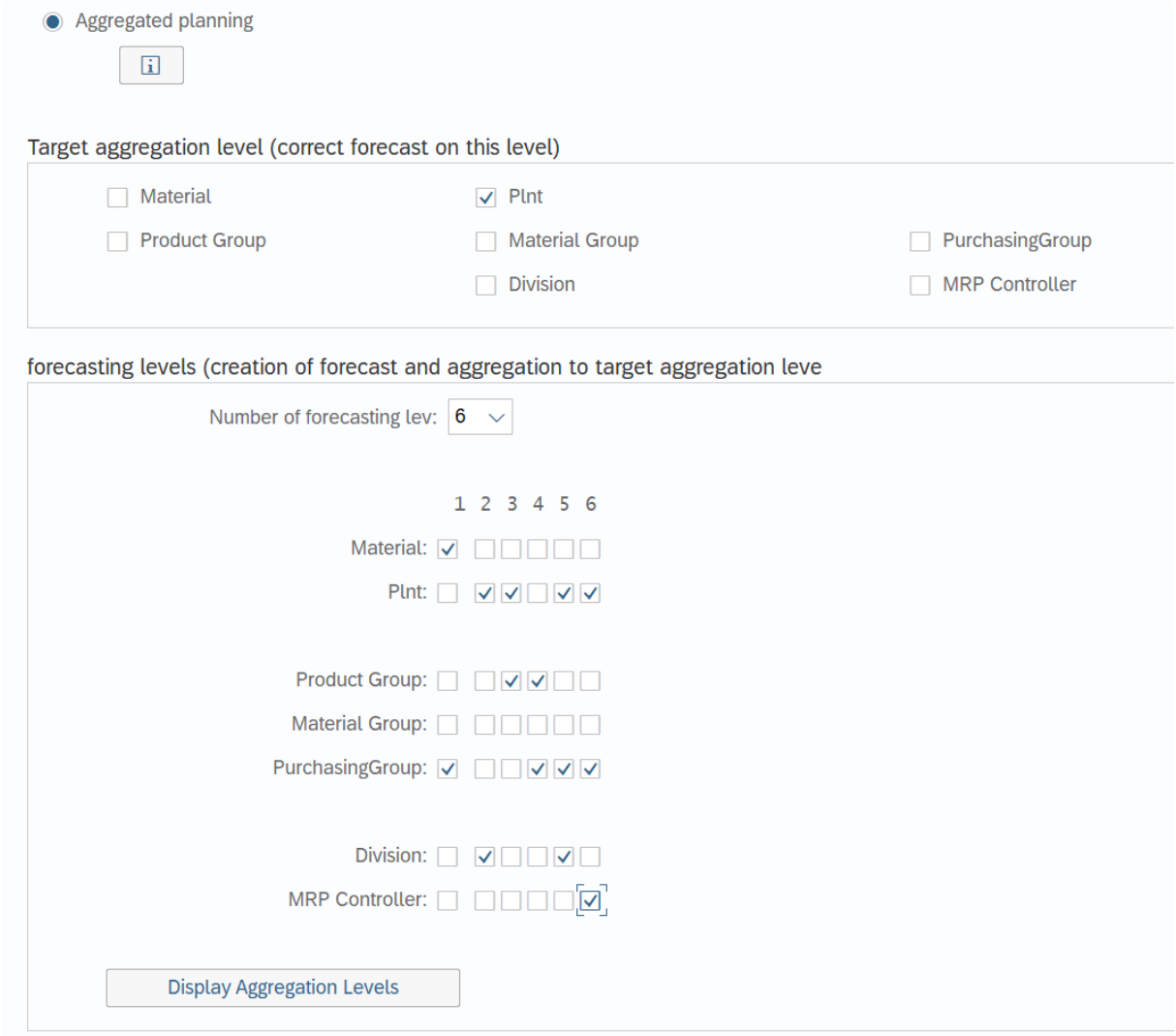
The most important innovation of the FOH tool is optimizing the forecast not only based on the mathematical method and parameters, but also based on the aggregation level (consolidation level) used. For example, it may be the case that the forecast provides bad results at the level material+plant since the historical data occurs very sporadically here. This can be explained well using the example of porcelain production. The standardized plates are printed differently, the finished product is the printed plate. However, the pattern changes regularly, converting the machine for printing is quick and uncritical. What is critical however is manufacturing the SEMIFINISHED product, the unprinted plate. This must be available at all times, as must the raw materials for this. At the level of SEMIFINISHED product the sales figures are also significantly more consistent, because the total number of plates sold is relatively consistent, only the pattern changes. This simple example shows that the best level for the forecast is not necessarily the material, but sometimes it is also better to plan across plants. The FOH tool automatically identifies which level is the best level by applying both the level and several forecast methods and smoothing parameters to be selected at the same time for the forecast, and then calculating the results against the historical data. The best result is then passed to FMO, which displays the results both aggregated (at the desired target aggregation level), but also automatically retains the results disaggregated to the standard planning levels (usually material + plant) where the results can be stored and used further in the logistics process (for example: PBED table, info structures, Excel download).

## 8.2.1 “Target Aggregation Level” vs. "Forecast Level"

As already mentioned, the program is intended to help the demand planner of a company develop a forecast strategy for a specific planning level (aggregation level). To do so, the tool - based on historical data - is to calculate different mathematical forecast methods with varying smoothing factors as part of an ex-post forecast, and to use different aggregation levels for the calculation.

The user selects which planning level (aggregation level) is relevant for him or her, i.e. the one that is to have the lowest error (for example: Planning Level Product Group). Ex-post forecasts with different, selectable forecast methods and smoothing factors are then carried out for all available aggregation levels. The result is projected from more detailed aggregation levels (for example: product) to the target aggregation level (aggregated) and from aggregation levels with a higher total (for example, Country) to the target aggregation level (disaggregated). The system saves forecast combinations that have delivered the best value in the ex-post forecast for the forecast errors (MAD, MSE, RMSE, MAPE, MPE) supported in SAP APO. This allows the planner to receive a note for the future planning strategy of his/her products. The fact that the target aggregation level is not necessarily the product level is shown by the following example: "A ceramic manufacturer produces different types of table, but these only differ in terms of their characteristics. The raw product is always the same. For this reason, for the target aggregation level: Product group, the planner wants to know how many raw plates to produce for the next period. “The target aggregation level is therefore where the forecast needs to be ideal the further logistical process, such as the timely procurement of raw materials or capacity in the production lines, is the basis for this level. The forecast levels, on the other hand, are the levels on which the FOH tool carries out the ex-post forecasts and then brings them to the target aggregation level on the basis of proportional factors (the historical data is decisive), where they are compared with the actual historical data. The target level can also be part of the forecasting levels. Essentially, this is also recommended as there will of course also be the case that the forecast already works best at the target level.

In this example, a forecast is to be created at three different levels, which are then projected on the basis of distribution factors (ratio of historical data to one other) to the target aggregation level, where comparison with historical data takes place. The forecast level that generated the smallest forecast error on the target level (here, plant and purchasing group) is the optimal level. This analysis takes place individually for each combination of plant and purchasing group, so that forecast level 1 can be the best level for one purchasing group and level 2 for another group. The results are therefore individually formatted and returned to the FMO.



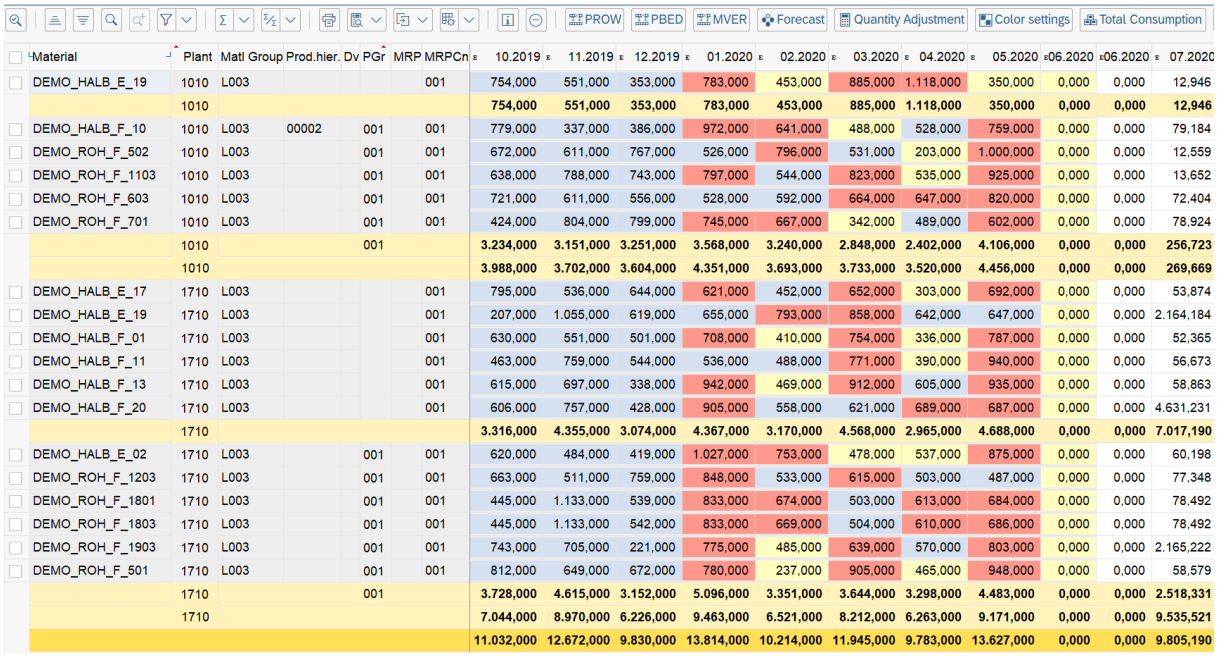

## 8.2.2 Result of Aggregated Planning in FMO

The result of aggregated planning is already disaggregated to the most detailed planning level in FOH and transferred to the FMO. For each selected forecast model, the best result is transferred depending on the smoothing parameters and the aggregation level. The absolute best result (considered across all forecast models) is displayed in the planning view. You can view the other results for each characteristics combination in the detail view.

In the planning view, the disaggregated, optimal forecasts at material level are displayed (or material + plant, material + MRP area, and so on, depending on how the selection was made in the FMO tool). On the other hand, the results are also totaled at the target aggregation level on which the FOH tool optimized the forecast. These totals lines represent the optimized result, which can also be evaluated in the FIORI app for the FOH tool.

The disaggregated results at material level, on the other hand, can be used to further process the forecasts directly. For example, they can be saved directly in the PBED table (MD62) or an info structure in which the user selects the required rows for saving and clicks the corresponding button above the planning view.

The combination of optimization of forecasting techniques, smoothing parameters, and aggregation level is unique, and can be used in practice through automatic disaggregation at material level.



| Material | Plant | Matl Group | Prod.hier. | Dv | PGr | MRP | MRPCn | 10.2019 | 11.2019 | 12.2019 | 01.2020 | 02.2020 | 03.2020 | 04.2020 | 05.2020 | 06.2020 | 06.2020 | 07.2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEMO_HALB_E_19 | 1010 | L003 | | | | | 001 | 754,000 | 551,000 | 353,000 | 783,000 | 453,000 | 885,000 | 1.118,000 | 350,000 | 0,000 | 0,000 | 12,946 |
| | 1010 | | | | | | | **754,000** | **551,000** | **353,000** | **783,000** | **453,000** | **885,000** | **1.118,000** | **350,000** | **0,000** | **0,000** | **12,946** |
| DEMO_HALB_F_10 | 1010 | L003 | 00002 | | 001 | | 001 | 779,000 | 337,000 | 386,000 | 972,000 | 641,000 | 488,000 | 528,000 | 759,000 | 0,000 | 0,000 | 79,184 |
| DEMO_ROH_F_502 | 1010 | L003 | | | 001 | | 001 | 672,000 | 611,000 | 767,000 | 526,000 | 796,000 | 531,000 | 203,000 | 1.000,000 | 0,000 | 0,000 | 12,559 |
| DEMO_ROH_F_1103 | 1010 | L003 | | | 001 | | 001 | 638,000 | 788,000 | 743,000 | 797,000 | 544,000 | 823,000 | 535,000 | 925,000 | 0,000 | 0,000 | 13,652 |
| DEMO_ROH_F_603 | 1010 | L003 | | | 001 | | 001 | 721,000 | 611,000 | 556,000 | 528,000 | 592,000 | 664,000 | 647,000 | 820,000 | 0,000 | 0,000 | 72,404 |
| DEMO_ROH_F_701 | 1010 | L003 | | | 001 | | 001 | 424,000 | 804,000 | 799,000 | 745,000 | 667,000 | 342,000 | 489,000 | 602,000 | 0,000 | 0,000 | 78,924 |
| | 1010 | | | | 001 | | | **3.234,000** | **3.151,000** | **3.251,000** | **3.568,000** | **3.240,000** | **2.848,000** | **2.402,000** | **4.106,000** | **0,000** | **0,000** | **256,723** |
| | 1010 | | | | | | | **3.988,000** | **3.702,000** | **3.604,000** | **4.351,000** | **3.693,000** | **3.733,000** | **3.520,000** | **4.456,000** | **0,000** | **0,000** | **269,669** |
| DEMO_HALB_E_17 | 1710 | L003 | | | | | 001 | 795,000 | 536,000 | 644,000 | 621,000 | 452,000 | 652,000 | 303,000 | 692,000 | 0,000 | 0,000 | 53,874 |
| DEMO_HALB_E_19 | 1710 | L003 | | | | | 001 | 207,000 | 1.055,000 | 619,000 | 655,000 | 793,000 | 858,000 | 642,000 | 647,000 | 0,000 | 0,000 | 2.164,184 |
| DEMO_HALB_F_01 | 1710 | L003 | | | | | 001 | 630,000 | 551,000 | 501,000 | 708,000 | 410,000 | 754,000 | 336,000 | 787,000 | 0,000 | 0,000 | 52,365 |
| DEMO_HALB_F_11 | 1710 | L003 | | | | | 001 | 463,000 | 759,000 | 544,000 | 536,000 | 488,000 | 771,000 | 390,000 | 940,000 | 0,000 | 0,000 | 56,673 |
| DEMO_HALB_F_13 | 1710 | L003 | | | | | 001 | 615,000 | 697,000 | 338,000 | 942,000 | 469,000 | 912,000 | 605,000 | 935,000 | 0,000 | 0,000 | 58,863 |
| DEMO_HALB_F_20 | 1710 | L003 | | | | | 001 | 606,000 | 757,000 | 428,000 | 905,000 | 558,000 | 621,000 | 689,000 | 687,000 | 0,000 | 0,000 | 4.631,231 |
| | 1710 | | | | | | | **3.316,000** | **4.355,000** | **3.074,000** | **4.367,000** | **3.170,000** | **4.568,000** | **2.965,000** | **4.688,000** | **0,000** | **0,000** | **7.017,190** |
| DEMO_HALB_E_02 | 1710 | L003 | | | 001 | | 001 | 620,000 | 484,000 | 419,000 | 1.027,000 | 753,000 | 478,000 | 537,000 | 875,000 | 0,000 | 0,000 | 60,198 |
| DEMO_ROH_F_1203 | 1710 | L003 | | | 001 | | 001 | 663,000 | 511,000 | 759,000 | 848,000 | 533,000 | 615,000 | 503,000 | 487,000 | 0,000 | 0,000 | 77,348 |
| DEMO_ROH_F_1801 | 1710 | L003 | | | 001 | | 001 | 445,000 | 1.133,000 | 539,000 | 833,000 | 674,000 | 503,000 | 613,000 | 684,000 | 0,000 | 0,000 | 78,492 |
| DEMO_ROH_F_1803 | 1710 | L003 | | | 001 | | 001 | 445,000 | 1.133,000 | 542,000 | 833,000 | 669,000 | 504,000 | 610,000 | 686,000 | 0,000 | 0,000 | 78,492 |
| DEMO_ROH_F_1903 | 1710 | L003 | | | 001 | | 001 | 743,000 | 705,000 | 221,000 | 775,000 | 485,000 | 639,000 | 570,000 | 803,000 | 0,000 | 0,000 | 2.165,222 |
| DEMO_ROH_F_501 | 1710 | L003 | | | 001 | | 001 | 812,000 | 649,000 | 672,000 | 780,000 | 237,000 | 905,000 | 465,000 | 948,000 | 0,000 | 0,000 | 58,579 |
| | 1710 | | | | 001 | | | **3.728,000** | **4.615,000** | **3.152,000** | **5.096,000** | **3.351,000** | **3.644,000** | **3.298,000** | **4.483,000** | **0,000** | **0,000** | **2.518,331** |
| | 1710 | | | | | | | **7.044,000** | **8.970,000** | **6.226,000** | **9.463,000** | **6.521,000** | **8.212,000** | **6.263,000** | **9.171,000** | **0,000** | **0,000** | **9.535,521** |
| | | | | | | | | **11.032,000** | **12.672,000** | **9.830,000** | **13.814,000** | **10.214,000** | **11.945,000** | **9.783,000** | **13.627,000** | **0,000** | **0,000** | **9.805,190** |

Unlike the planning view, the result in the detail view is unchanged. Only the material master does not contain any data and it is not possible to create interactive forecasts.

## 8.2.3 Restrictions When Optimizing the Aggregation Level

Aggregated planning cannot be used in conjunction with the following functions. They are automatically unavailable when aggregated planning is selected:

FMO functions that cannot be used when optimizing the aggregation level

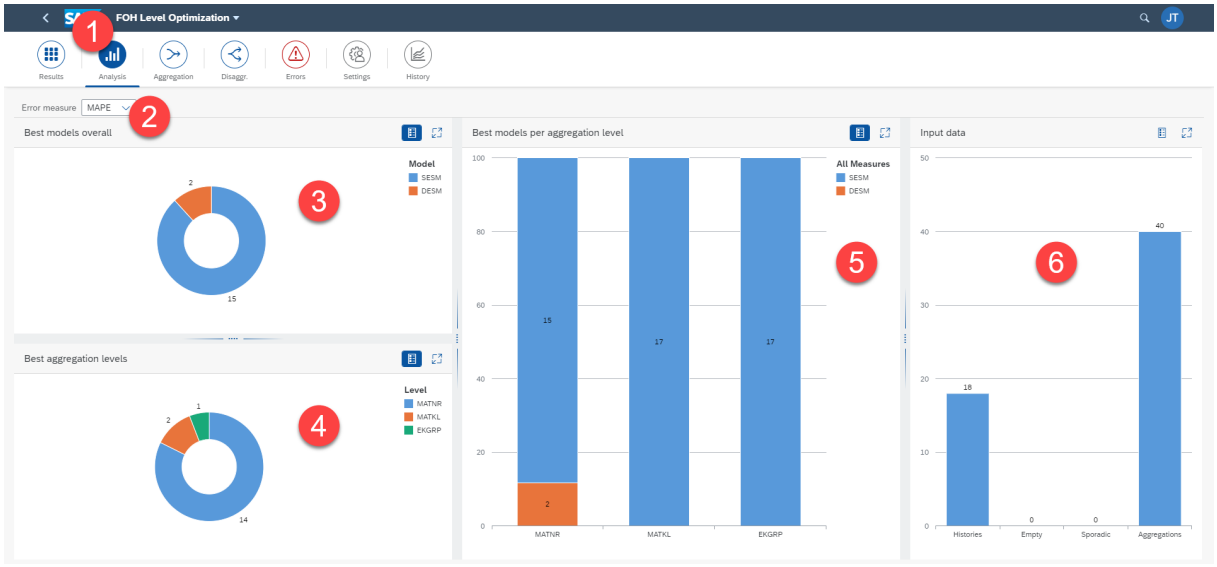
| *Function* | **Reason** |
|---|---|
| *Combined forecast with HANA and non-HANA forecast models* | The FOH tool supports only PAL models and aggregation optimization runs exclusively in FOH, the results are imported back into FMO, which displays the results only. Therefore, no non-PAL model may be used. |
| *Material master update* | During aggregation optimization it is often the case that the best forecast level is generated at a level other than material and plant. But the forecast method there has no connection to the forecast method defined in the material master for the level material and plant. |
| *Planning functions* | The planning view is already very full due to the totals rows of the aggregated view, while the number of rows would multiply by four if the planning functions are activated. Furthermore, the totals rows would be incorrect and the display would be illogical. |
| *Interactive forecast / rolling forecast* | The detail view does not have a function for executing a forecast based on the material master data entered and comparing this with the values created in the simulation. This would be like comparing apples and pears, since the aggregation optimization values might come from a different level and displayed only disaggregated. |
| *Quarter and year* | Currently, the FOH tool can only plan based on week and month. |

## 8.3 Display of Results in the FIORI App

The FMO tool does not directly provide a detailed display of the individual results and analyses. You can only display the completed forecast results for each best forecast level there and the results of the different forecasting techniques. If you wish to compare the results with all calculated variants, you can use the “FIORI” button to access the FIORI app from FOH, where all analyses are possible. The function is only available if the use of FIORI apps has been set up in the SAP system and the link to the app has been defined in FMO Customizing.

### 8.3.1 Analysis

The results are evaluated and visualized on the Analysis tab page (1). You can select an error measure that is used as a comparison criterion (2). Alternatively, the results can be calculated and totaled across all error measures.




The chart at the top left (3) shows how often which model was the best overall (across all aggregation levels). The chart below (4) shows how often which aggregation level was best. These two charts correspond to the model/level list from the results table with result filters for the best results overall.

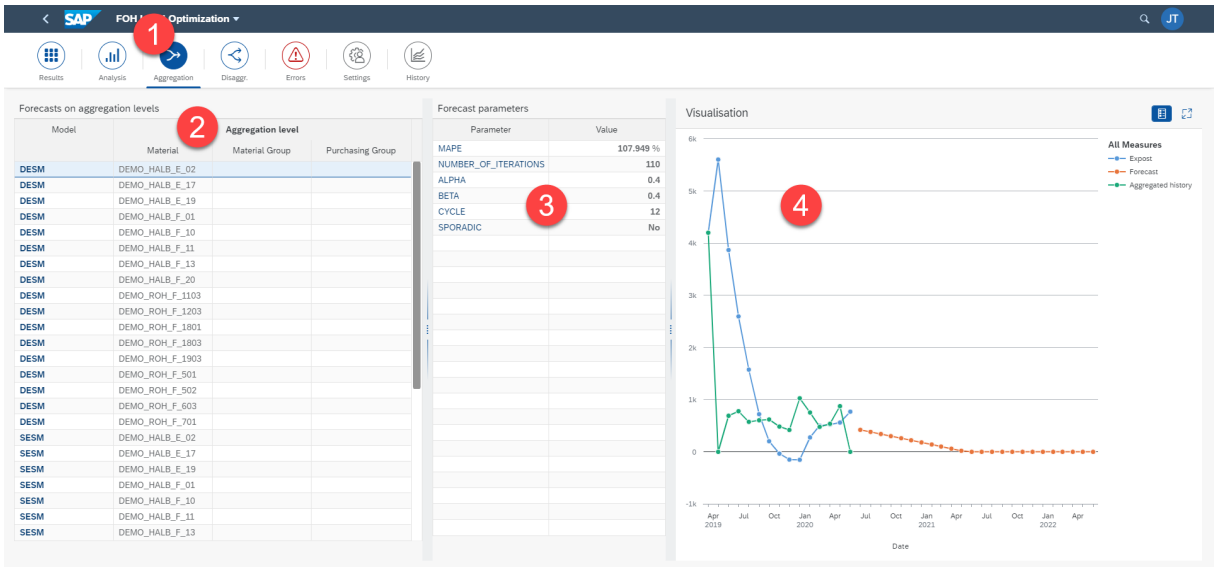
The chart in the middle (5) shows the best models per aggregation level. In combination with the previous chart (4), this provides a good estimate of which combination of aggregation level and forecast model produces good results for the data record.

The chart on the right side (6) displays key figures on the input data:

- Number of time series
- Number of empty time series
- Number of intermittent time series
- Number of aggregations

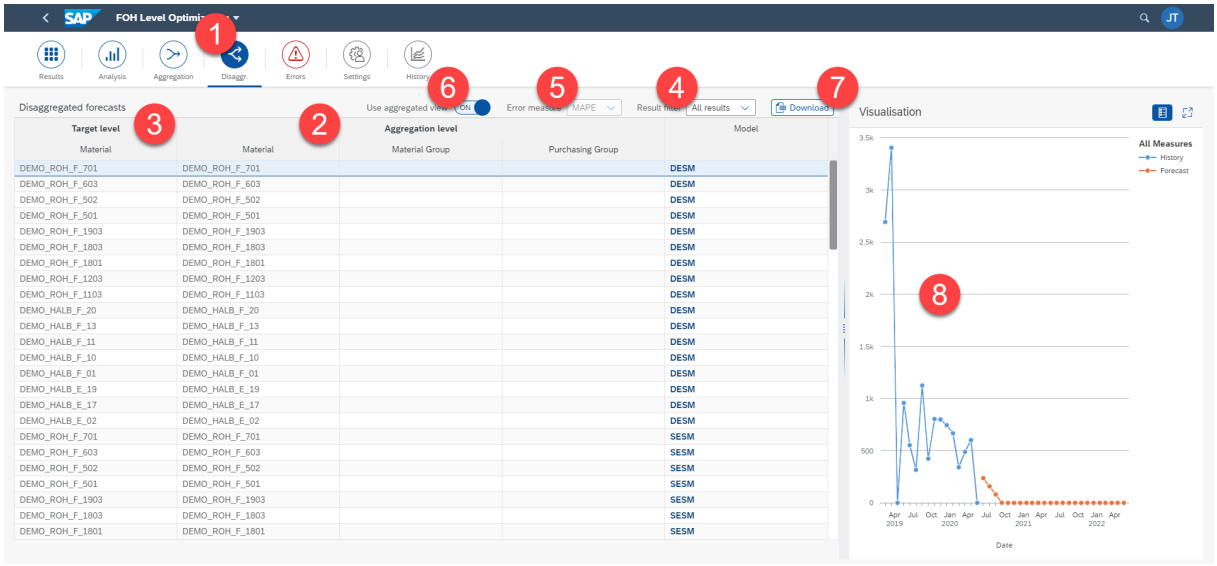
## 8.3.2 Aggregation

On this tab page (1), the aggregated time series (2, 4) and the forecasts at aggregation level (4) are displayed. The parameters of the forecast can also be viewed here (3).




## 8.3.3 Disaggregation

This tab (1) displays the forecasts disaggregated to the target level (3, 8). A disaggregation can be created for each suitable aggregation level (2) and each model. You can use the result filter (4) to restrict the selection to the best aggregation levels (in this case, the comparison is created using the selected error measure (5)).



In the aggregated display (6), only the characteristics and models are displayed. If deactivated, the time series are also displayed in the table so that they can be downloaded directly (7).

# Important Disclaimers and Legal Information

## Hyperlinks

Some links are classified by an icon and/or a mouseover text. These links provide additional information.
About the icons:

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