Entersoft MPS and MRP

Entersoft Business Suite® 4.0

User guide

Contents

Identity

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1. Master Production Schedule

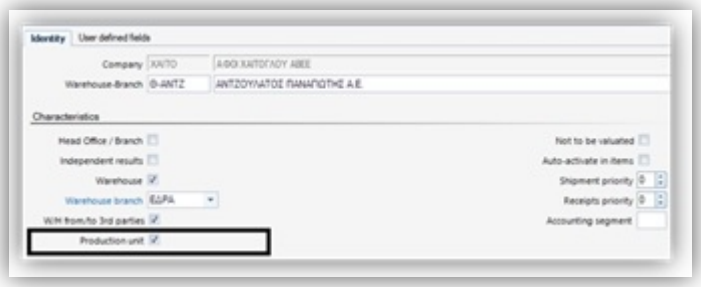
In order to form different alternative, complementary or successive production schedules, there is a series of preparatory actions that need to be completed, such as: defining the production units, the production resources, the working days of the company's production resources etc.

1.1 Preparation

1.1.1 Production units

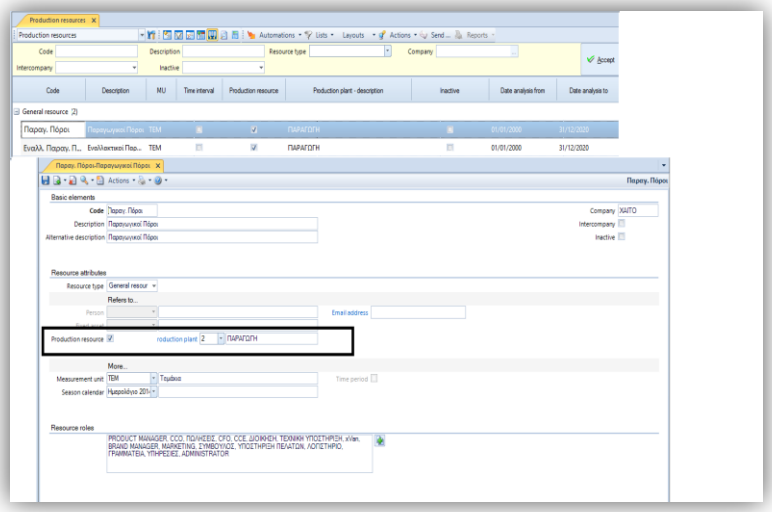
In the Entersoft Business Suite, a production unit is depicted as a company's site that has been characterized as a "Production unit". This characterization is available (a) under the company's data in Customization (Tools & Settings / Customization and General / Companies – Branches - Fiscal Years, company's administration form, tab "Addresses") and also (b) under the data of Branches and Warehouses (Warehouses & Stock / Branches – W/H)

Image 1: Branches and W/H Data | Production Unit



1.1.2 Production Resources

Image 2: Production resources



The option of defining the production resources can be found under the Production section of the application's menu, (Production / Master Production Schedule / Production resources).

The production resources are the general Resources of the Entersoft Business Suite that have been characterized as production resources and have, optionally, been assigned to a Production unit, as seen in Image 2.

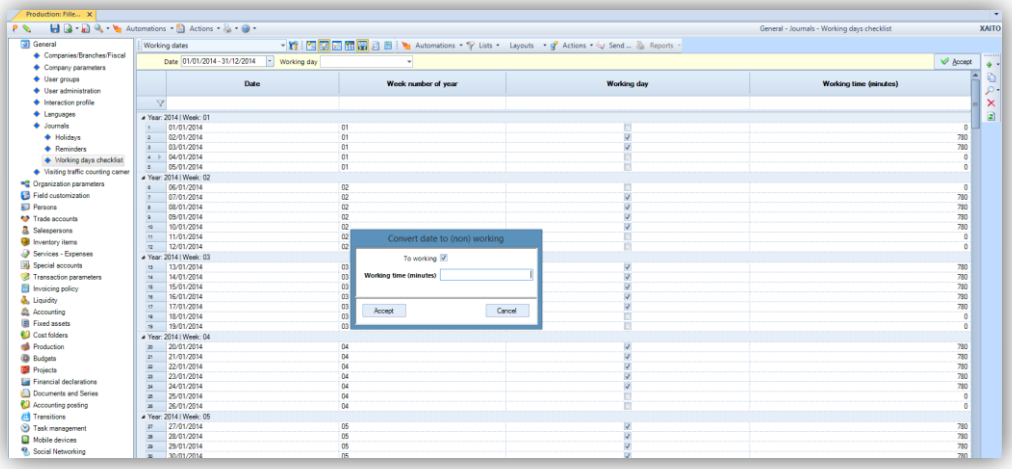
As used for the objectives of other Entersoft Business Suite subsystems, the option of defining a season calendar is available here too.

1.1.3 Working Days

The working days for the company can be checked through the list "Check working days" (Tools & Settings / Customization and General / Journals / Working Days checklist). Through an action which is available in the specific list (Automation: "Convert date to (non) working", see Image 3) it is possible to define ad hoc dates as non-working and also the corresponding working time (in

minutes). Reminder: The specific list is updated according to the season calendar that has been defined in the company parameter "Calendars: Season calendar" and through the maintenance task "Update working dates".

Image 3: Working days checklist

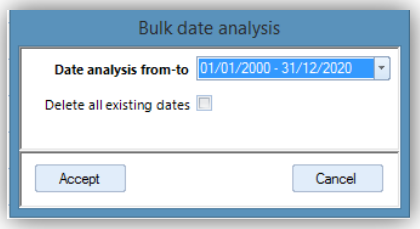


1.1.4 Production Working days

The production working days, meaning **the working days for the production Resources**, are defined as in the other Entersoft Business Suite subsystems. Firstly, as mentioned above, there is the option of selecting a season calendar in the Resource level (production or not).

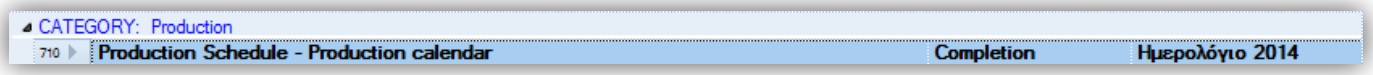
The working dates for a Production Resource for a specific date period can be calculated through the action "**Bulk date analysis**" (automation – Image 4), which is available under the Production Resources list (Production / Master production schedule / Production resources) and also through the "**Resource date analysis action"** which is available in the form of a specific resource.

Image 4: Bulk date analysis for Production Resources



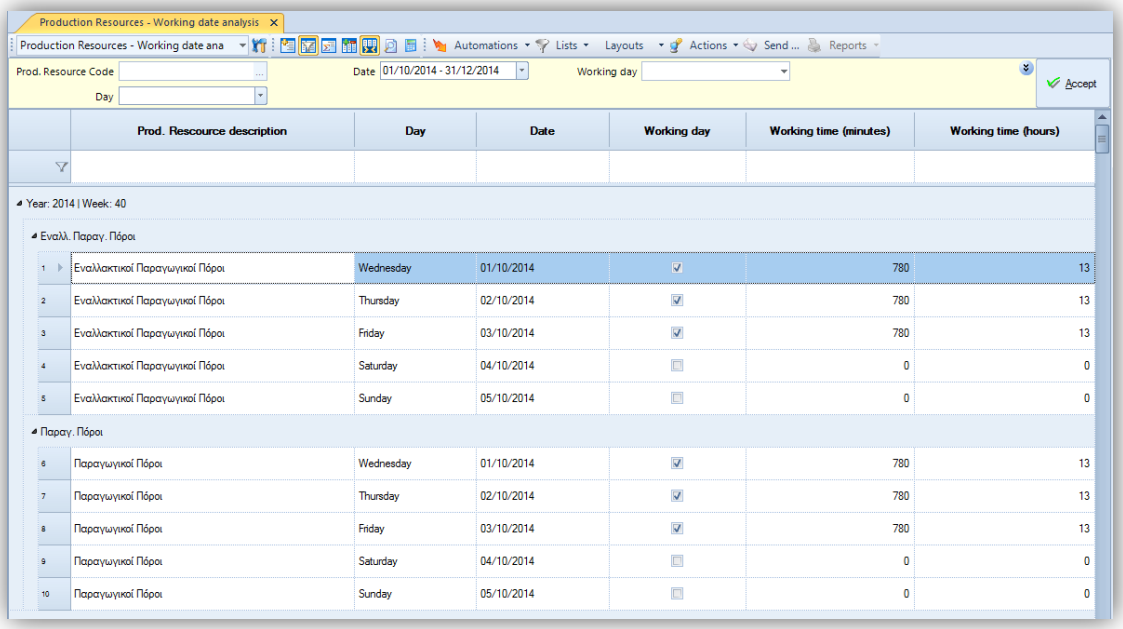
If a Production Resource has not been related to a season calendar, we need to define a season calendar as the **Production Calendar** in the corresponding company parameter (Image 5). Thus, in the event where all the company's production resources have a common calendar, this needs to be defined only once in the particular company parameter.

Image 5: Company parameters | Production calendar



The list with the non-working days and the working minutes per day for the Production Resources are available in the menu: Production / Master Production schedule / Calendar administration / Working date analysis (Image 6). As found in the company's working days list, the ad hoc definition of dates as non-working as well as the corresponding working time (in minutes) can be done via an action list (Automation: "Convert date to (non) working")

Image 6: Working date analysis of Production Resources



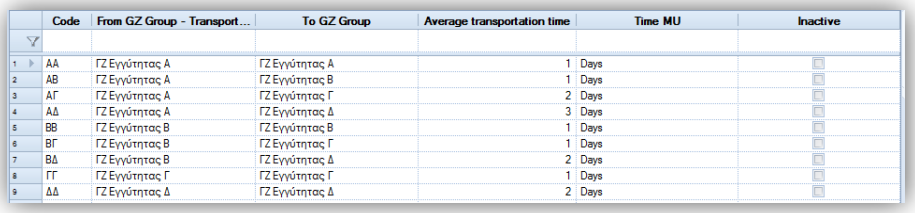
If the working date analysis of the Production Resources has already been completed, the dates from/to of the analysis (Image 2) will appear in the Production Resources list.

1.1.5 Transportation time

After completing the production of the final product, time is needed for the product's transportation to the final destination. The purchase orders and the sales budget describe the requirements towards production from different geographical zones, with specific delivery deadlines. These requirements should be ready on time and should have taken into consideration the time needed for the product's transportation from the Production Unit's Geographical Zone to the delivery's point Geographical Zone. In order for the times to be depicted in the system, the transportation time from one GZ group (GZ routing) to another can be defined.

Thus, if the transportation times need to be taken into consideration, the definition of the GZ groups and their relation with the Geographical Zones as well as the definition of the transportation time from the company's production resources GZ groups towards the other GZ groups is necessary.

Image 7: Transportation time GZ group



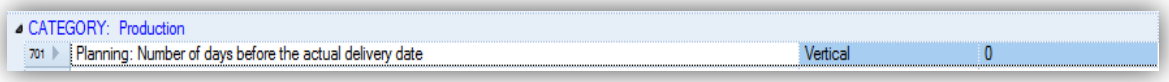
1.1.6 Standard time before the actual delivery

Alternatively which date should Production consider as the delivery one instead of the actual one.

There are cases where it is possible to define a standard time (e.g. 1 day) before the actual delivery date, in which the products should be ready in order for them to be delivered on time.

This exact number of days before the actual delivery date (of a sales order or of a budget sheet period) where the production should be ready, is defined in the company parameter showing in Image 8, below.

Image 8: Customization for defining the number of days before the delivery



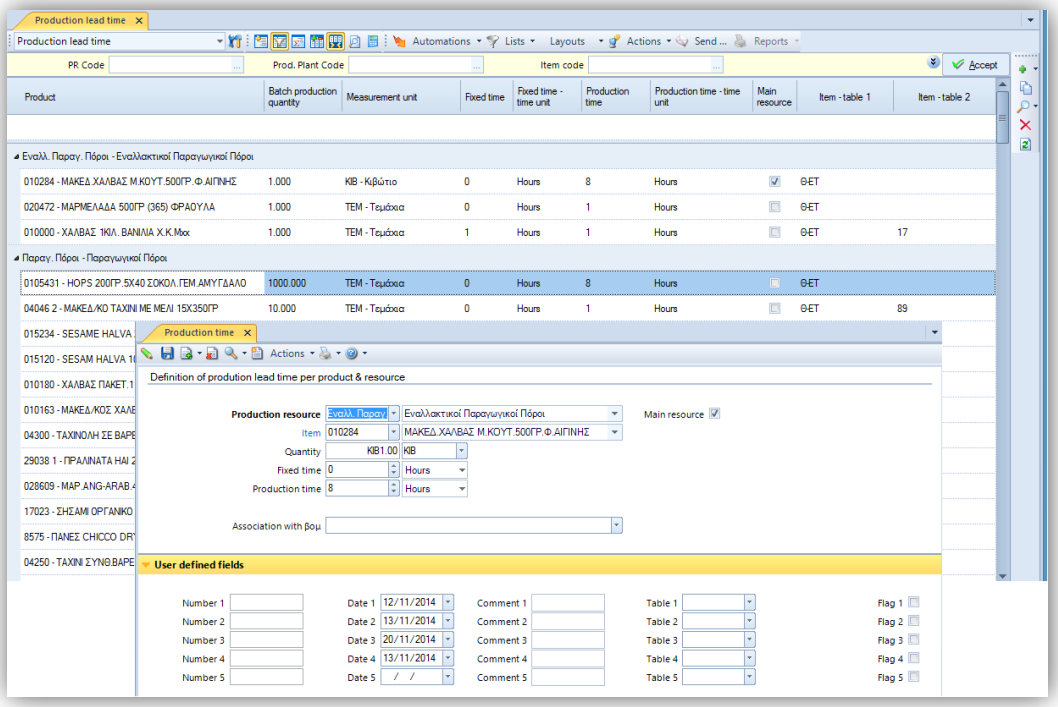
The default value of the parameter is 0 days. If we specify a value greater than zero, then during the insert of the demands in the Production Plan, the **delivery date** will be considered as the 1st **working** day minus **the number of days** that have been defined in the parameter prior to the delivery date. Thus, this standard time is estimated in addition to the required transportation time based on GZ groups that was described previously.

1.2 Production Lead time

The total production time from the initial phase up to the final production phase (per item) is defined in Production / Master Production schedule / Production lead time.

At this point, by defining the production units on a production resource level, in a subtractive way (possibly on a production line level), we have the opportunity to define in minutes or hours the **Production Time** and the **Fixed time** (e.g. startup time, machine adjustment time on the special item's requirements, transition time from phase to phase etc) needed for the total production of a specific **quantity** of the item. We can also define as **Main** one of the connected Production Resources.

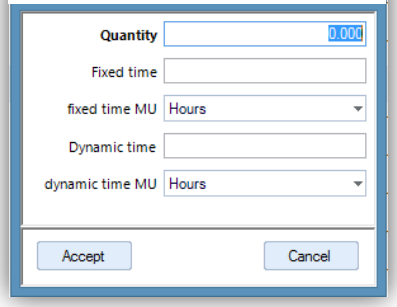
Image 9: Production time per item and production resource



As it is possible for the production of the same final product at a different Production Unit to imply not only a different time but also a **custom Bill of Materials** (e.g. regarding the dimensions of the raw materials), there is an opportunity of **matching indirectly** the production time with specific Bill of Materials. This opportunity is given through the values that can be assigned in the Zoom table: "**Match to BOM**". The same option is available in the Bill of Materials ("**Match to Production Time**")

Additionally there is an option for "Bulk editing of selected entries" through the corresponding automation. For example, the user can filter items from a specific category (available as a criterion in the list extras, along with other items categorized data) select all or a subset and then update the production time for each or all entries.

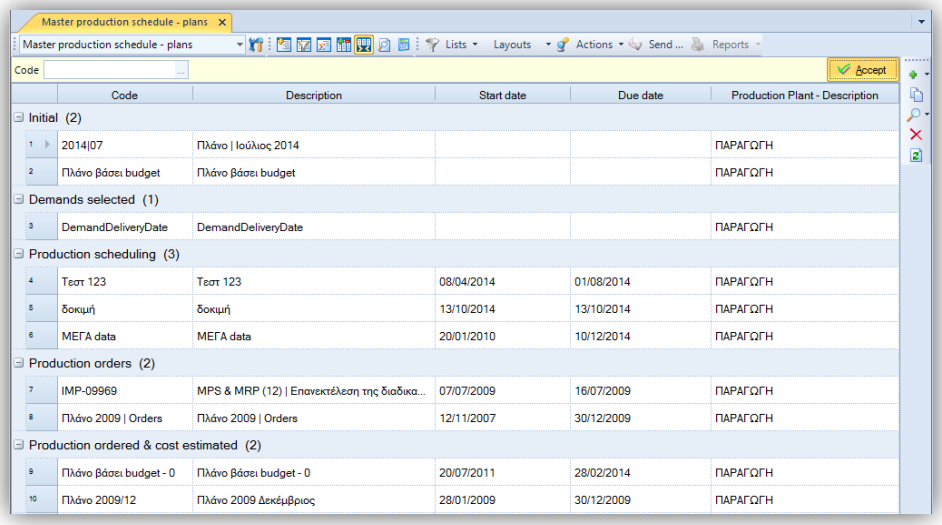
Image 10: Bulk editing of selected entries



1.3 Production planning

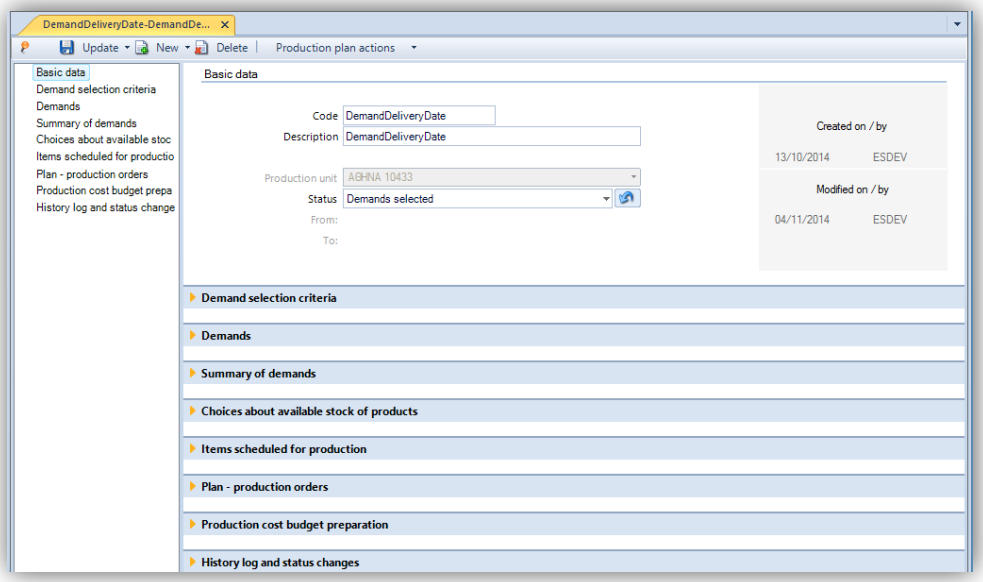
The main management of the production plan is done from the following list (Image 11) which is available in the menu: Production / Master Production schedule / Master production schedule – plans. Via this list the creation and management of plans takes place.

Image 11: List of Production Plans



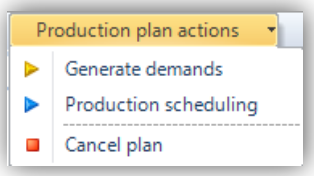
The **basic elements** of a plan (Image 12) include a Code and a Description and the Production unit it concerns (optionally and if we intend to count in the required transition times). Additionally, the status of the plan is shown along with information about the creation and the modifications of the plan and, if the planning is completed, the dates from/to of the plan.

Image 12: form | Basic Data



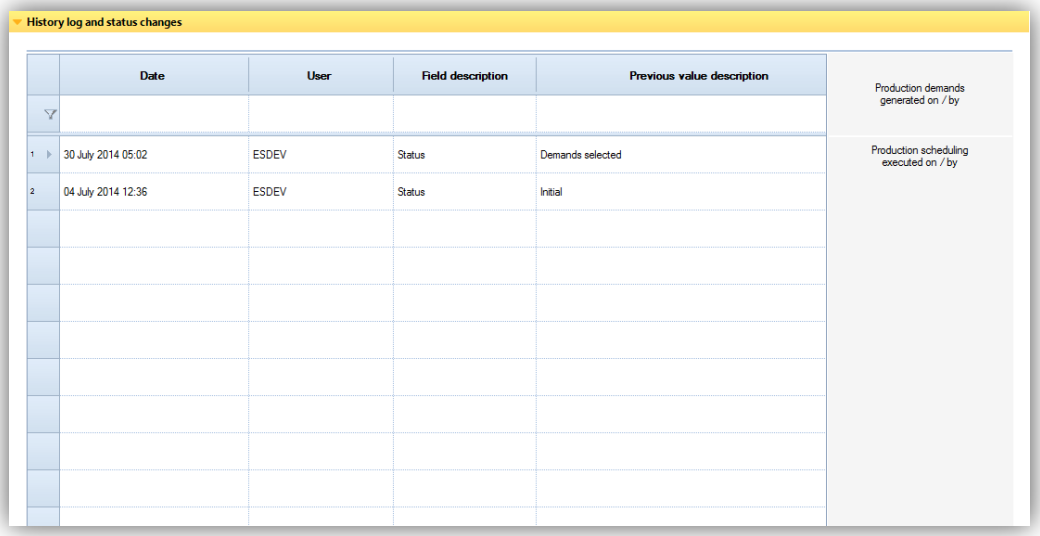
The status of the plan is updated automatically depending on the activity of the user. The actions are available in the form toolbar and in other parts of the form, which we will see later on.

Image 13: Production Plan Actions



Especially regarding the cancellation of the plan, it can be undone through the button which is on the right of the status field. The changes on the status of the plan along with the user and the history log of demands creation and production plans are shown in: **History log and status changes.**

Image 14: History log and status changes



1.3.1 Demand Selection Criteria

The Master Production Schedule – MPS is based on the identification of the future demands in final products, based on:

- Sales orders of existing clients based on the desired - agreed delivery date
- Demand forecast
- On-time stock creation

In each production schedule there is the option of taking into consideration (a) the demands for the stock creation and/or (b) the demands based on the sales orders and/or (c) the demands based on the sales budget sheets.

Demands based on the sales budget sheets

Here the user can select data from the sales budget sheets in order to promptly plan the production of the products budgeted to be demanded. The sales budget can be generated easily based on actual sales data with the use of easy bulk quantitative or qualitative change tools. Note that the "GZ Group" is also available as a possible dimension of the Sheets and the relevant information affects the generation of the demands.

Demands based on the sales orders

The user selects according to the desired delivery date, the items grouping and other criteria, which sales orders (sales orders lines concerning products) will take part in the specific schedule.

Demands for stock creation

This will lead to the creation of extra stock, sufficient for X number of days, in order for extra demand to be covered. This specific selection concerns all produced items and products; it calculates the total sales quantity and divides it by the days of the demands date range in order to find the average daily demand. The required quantity suggested is the product of the average daily demand multiplied by the stock sufficiency days.

Image 15: Budget sheets Dimensions | GZ Group

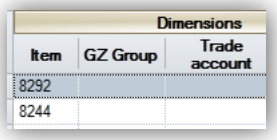
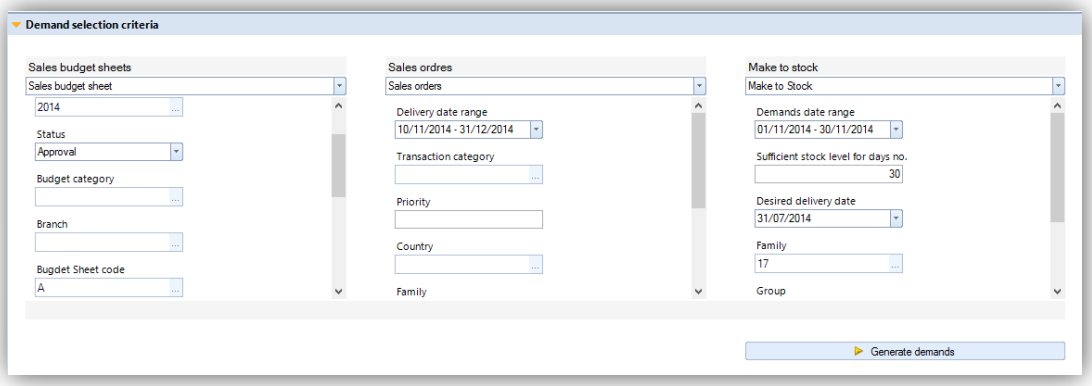


Image 16: Demand selection criteria



The user can select to include in the specific production schedule demands from all or from some available categories.

1.3.2 Demand generation

After setting the criteria on which the demands included in the production schedule will be selected, we can proceed to the **demands generation.** This action is available in the form toolbar (Image 13) and also in the part of the form that includes the selection and the definition of the criteria for the demands creation.

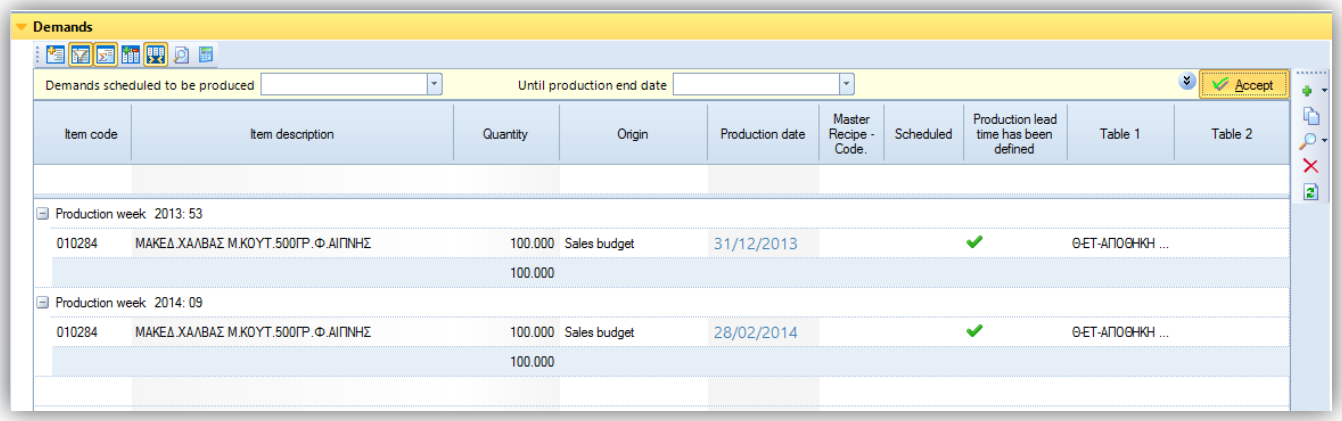
- The action "Generate demands" transforms the sales orders, the sales budget and the ad hoc needs for demand creation to demands for production.
- Every line order, need for demand creation and sales budget in a specific period affects the creation of a specific demand.
- Based on (a) the delivery date, (b) the GZ group and (c) the company's working days it calculates the date by which the production has to be completed.
- It transfers the Bill of Materials (BOM) information, if this has been defined on an order level.

The demands that are generated are available in the part of the form called "**Demands**".

The default information appearing on the list (Image 17) is:

- Item code and Item description
- The demand Quantity,
- The GZ Group,
- The desired delivery date,
- The required transportation time,
- The production end date,
- The BOM code (if it has been defined at this stage),
- Information about the definition or not of the production lead time for the item,
- An indication if this has been planned. This indication is updated after the relevant action has been executed

Image 17: Demands list

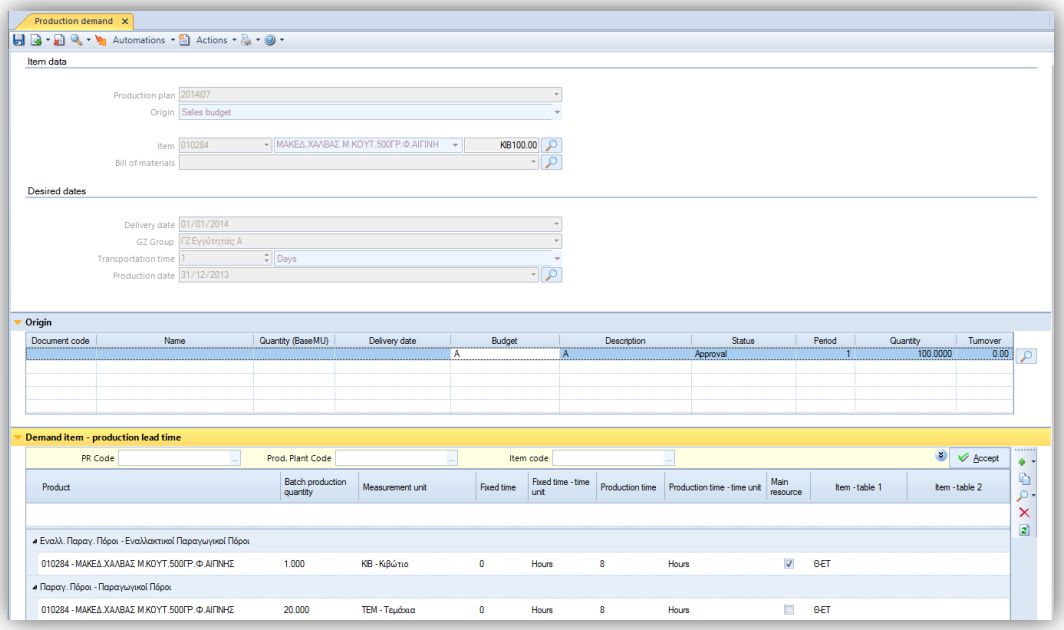


The user can focus on the non-scheduled demands up to a specific date via the criteria of the specific list, in order to control on which demands the next production schedule will run. The user can also add or remove demands manually.

The demand form (Image 18) gives access to the following information:

- The associated production plan
- Item, quantity requirement and Bill of Materials, if defined on this level
- Delivery date and, based on GZ Group and transportation time, production Date. The button on the right of the production date gives immediate access to the relevant schedule entry if this has been created.
- Origin (sales order, stock creation, sales budget) and basic information related to the order or the budget origin. Through the button of this list immediate access is given to the original document/budget sheet.
- Production time for a unit in order to make the user's check easier.

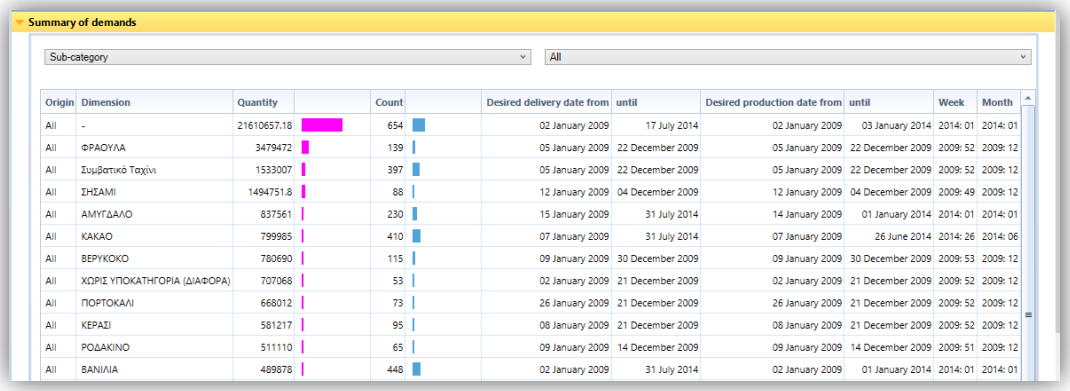
Image 18: Production Demand



In the Summary of demands section, the user can see the demands that have been created for the selected item group (Item, Sub-category, Category, Group, and Family) and per GZ Group, focusing on a specific origin type.

Right click on "Parameters" on the dashboard and two filters with specific date periods will appear: (a) based on the desired delivery date and (b) based on the desired production end date.

Image 19: Summary of demands



Origin	Dimension	Quantity	Count	Desired delivery date from	until	Desired production date from	until	Week	Month
All	-	21610657.18	654	02 January 2009	17 July 2014	02 January 2009	03 January 2014	2014: 01	2014: 01
All	ΦΡΑΟΥΛΑ	3479472	139	05 January 2009	22 December 2009	05 January 2009	22 December 2009	2009: 52	2009: 12
All	Συμβατικό Τσίχνι	1533007	397	05 January 2009	22 December 2009	05 January 2009	22 December 2009	2009: 52	2009: 12
All	ΣΗΣΑΜΙ	1494751.8	88	12 January 2009	04 December 2009	12 January 2009	04 December 2009	2009: 49	2009: 12
All	ΑΜΥΓΔΑΛΟ	837561	230	15 January 2009	31 July 2014	14 January 2009	01 January 2014	2014: 01	2014: 01
All	ΚΑΚΑΟ	799985	410	07 January 2009	31 July 2014	07 January 2009	26 June 2014	2014: 26	2014: 06
All	ΒΕΡΥΚΟΚΟ	780690	115	09 January 2009	30 December 2009	09 January 2009	30 December 2009	2009: 53	2009: 12
All	ΧΩΡΙΣ ΥΠΟΚΑΤΗΓΟΡΙΑ (ΔΙΑΦΟΡΑ)	707068	53	02 January 2009	21 December 2009	02 January 2009	21 December 2009	2009: 52	2009: 12
All	ΠΟΡΤΟΚΑΛΙ	668012	73	26 January 2009	21 December 2009	26 January 2009	21 December 2009	2009: 52	2009: 12
All	ΚΕΡΑΣΙ	581217	95	08 January 2009	21 December 2009	08 January 2009	21 December 2009	2009: 52	2009: 12
All	ΡΟΔΑΚΙΝΟ	511110	65	09 January 2009	14 December 2009	09 January 2009	14 December 2009	2009: 51	2009: 12
All	ΒΑΝΙΛΙΑ	489878	448	02 January 2009	31 July 2014	02 January 2009	01 January 2014	2014: 01	2014: 01

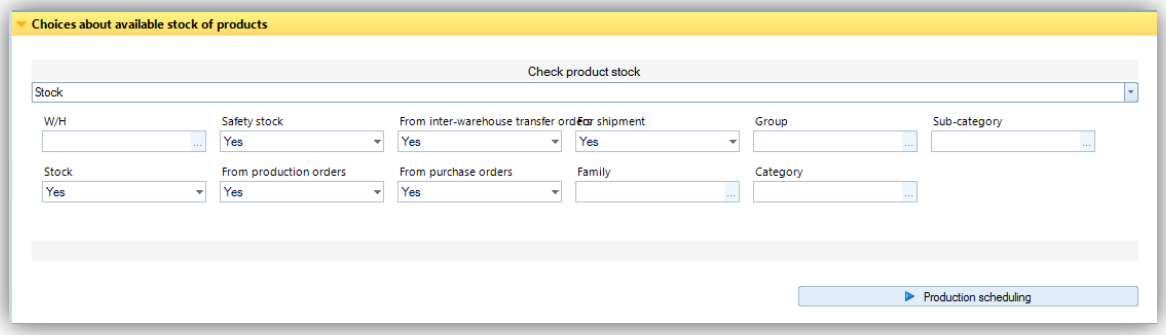
1.3.3 Choices about available stock of products

Depending on the Production type (make-to-order vs. make-to-stock etc), the previous selections regarding the Production volume, the possible returns etc, it is possible to define if the algorithm of the production scheduling should consider as available, for specific kinds of categorization, the stock of particular Warehouses. Specifically, it can (or cannot) consider:

- The stock of selected WH or of all
- The safety stock
- The expected stock from inter-warehouse transfer orders

- The stock on-load
- The actual stock
- The expected stock from production orders
- The expected stock from orders to suppliers

Image 20: Choices about available stock of products

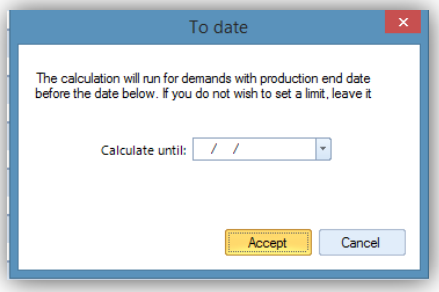


When executed, the Production scheduling checks if according to the above parameters, there will be an available stock on the date this should be available from the factory, in order to subtract the future stock from the quantity that should be produced and thus on one hand to schedule the production quantity that will cover the demands and on the other hand to successfully utilize the available stock.

1.3.4 Production scheduling

After defining the criteria on which the available stock will be considered, we can proceed with the execution of the **Production scheduling.** The action is available in the form toolbar (Image 13) and also in the part of the form that includes the options and the selection of the criteria related to stock availability (Image 20).

Image 21: Execute production scheduling

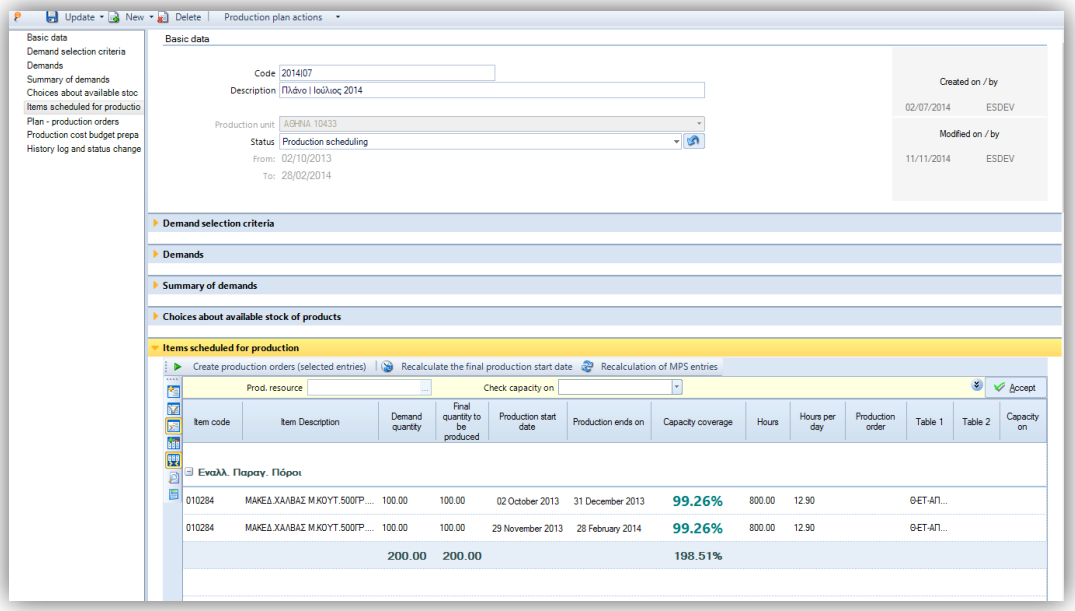


Through the dialog box presented in Image 21, the user can select up to which date he wishes the production scheduling to run for. This gives the opportunity for a segmental planning of the demands included in the plan and therefore better control of the scheduling results. The production plans are prepared i.e per week for a certain timeframe, with revisions and updates every one or two weeks (short-term, medium-term plan) and the segmented planning helps for revisions even if these are short-term.

The Production Scheduling action is executed progressively per date starting from the first demand date and in order to create the Production Plan entries it does the following:

- **Groups** the demands per **item**, **production date** and **Bill of Material,** if this has been defined in a demand level. Via the production plan's entry form, immediate access is given to the demands from which it has resulted.
- Suggests a **Bill of Materials** and **Production Resource.** The way in which these values are suggested is the following:
    - The application starts with the Basic Bill of Material that has been defined on an item level and suggests it. Based on this and on the value of the field **Match with Production Time** (if this has been defined) the production Time entry and the relevant Production Resource are selected. If more than one entry is found regarding the Production Time, the one with the main production resource is selected. If a main production resource has not been defined, a random entry (from the available ones) and the associated production resource are selected.
    - These rules apply on a form level, which means that depending on the Bill of Material the user has selected, specific Production Resources become available and vice versa.

Image 22: Production Plan entry



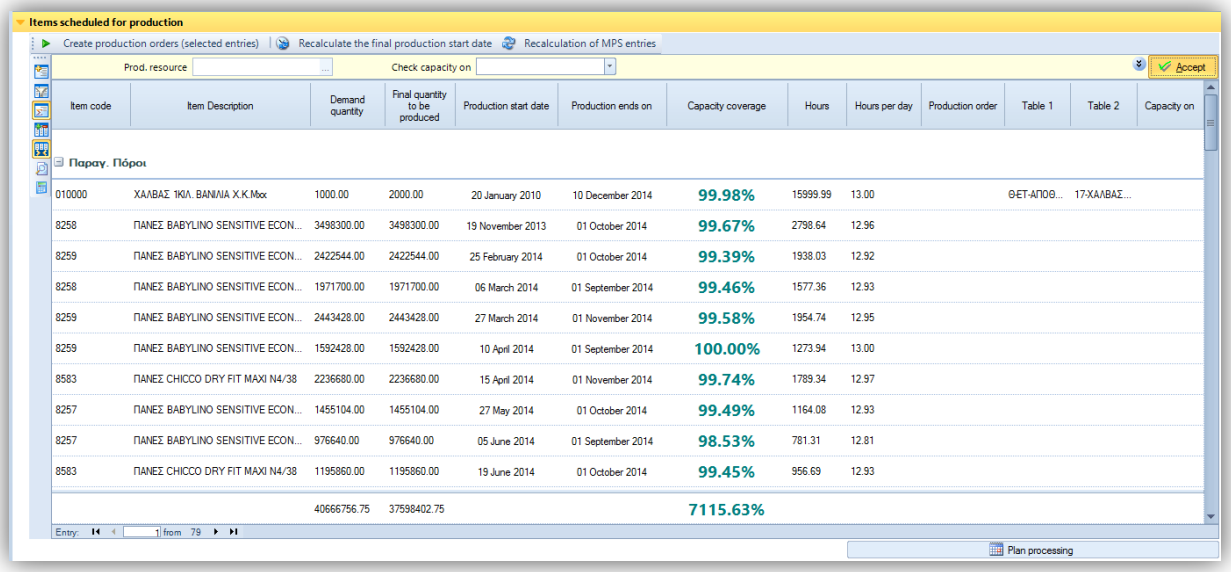
- **Calculates the quantity for production.** In order for this to happen:
    - Totals the related required quantities, in the field "**Demand quantity**"
    - Based on the options for checking the materials and goods availability (Section 1.3.3) it locates the available balance for the item on the desired production end date and it uses as far as possible this available balance. In another production resource entry for a future date for the same item this quantity, which according to the plan has been used, will be subtracted from the available balance.
    - The surplus quantity that is produced (meaning the quantity exceeding the demand quantity) will update the Progressive

- The spare quantity that will be produced (meaning a quantity that exceeds the required quantity) will update the **Progressive calculated balance** of the future production entries for the same item. The spare quantity can be a result of a rounding on the **Minimum production Quantity** [1](BOM Quantity) and the **batch quantity** [2](the quantity of the production time) or it can be due to a user change on the **Final production quantity.** Thus, if for example the user selects the production of 10 extra items, when the Production scheduling continues in future dates for the planning of the same item, it will consider those 10 items as available for use (**Progressive balance used**)
- Based on the above, the **Suggested Quantity** for production is formed and the **Final** one is suggested. The user may change this quantity.

- Based on the suggested Quantity, the desired production end date, the production lead time and the working days of the selected production resource, the **Suggested production start date** is calculated and the Final one is recommended.

Based on the above, the sum of production schedules of a plan is created (Image 23)

Image 23: List of production plans



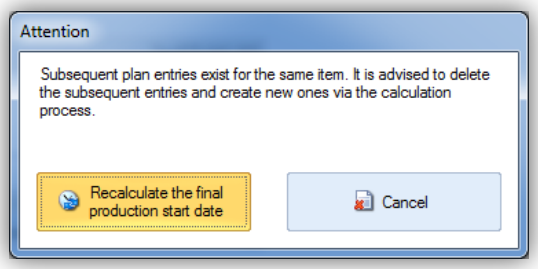
1.3.5 Recalculation of MPS entries

As aforementioned, the user can, per entry, **change the Final quantity.** In this case two things might be affected: (a) the start date and (b) the progressive scheduling balance of the next scheduling entries for the specific item. The application will inform us accordingly, in order to proceed to the necessary actions (Image 24). Even if the user does not proceed with the automatic update, he can continue with the recalculation of the final production start date through the button, which is available next to field Final quantity to be produced.

[1] At this point, the minimum production quantity is not utilized from the production plan

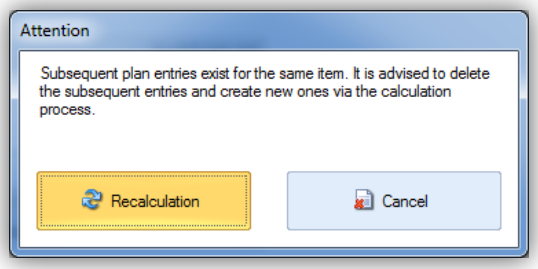
[2] At this point, the batch quantity is not utilized from the production

Image 24: Modification of final production quantity



The **change of the final start date** does not imply the need for some sort of automated update. On the other hand, the modification of the final production end date requires the total recalculation of the entry as it is possible that the available stock, the progressive scheduling balance etc will be different on another end date. The recalculation of MPS entries can be done through the relevant message or through the button that is available on the right of the field: final production end date.

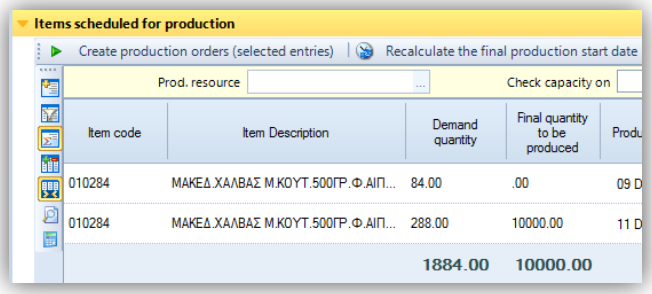
Image 25: Modification of final production end date



It is apparent that the application does not run automatic updates without the user permission, since the user modifies the original suggestion, as it is possible that the quantities and dates will be also formed from ad hoc factors that have not been depicted in the application.

Alternatively, the option of bulk recalculation of selected entries is available (Image 26).

Image 26: Bulk recalculations



1.3.6 Daily capacity coverage (%)

In the list (Image 23) all relevant information is shown along with the **daily capacity coverage (%).**

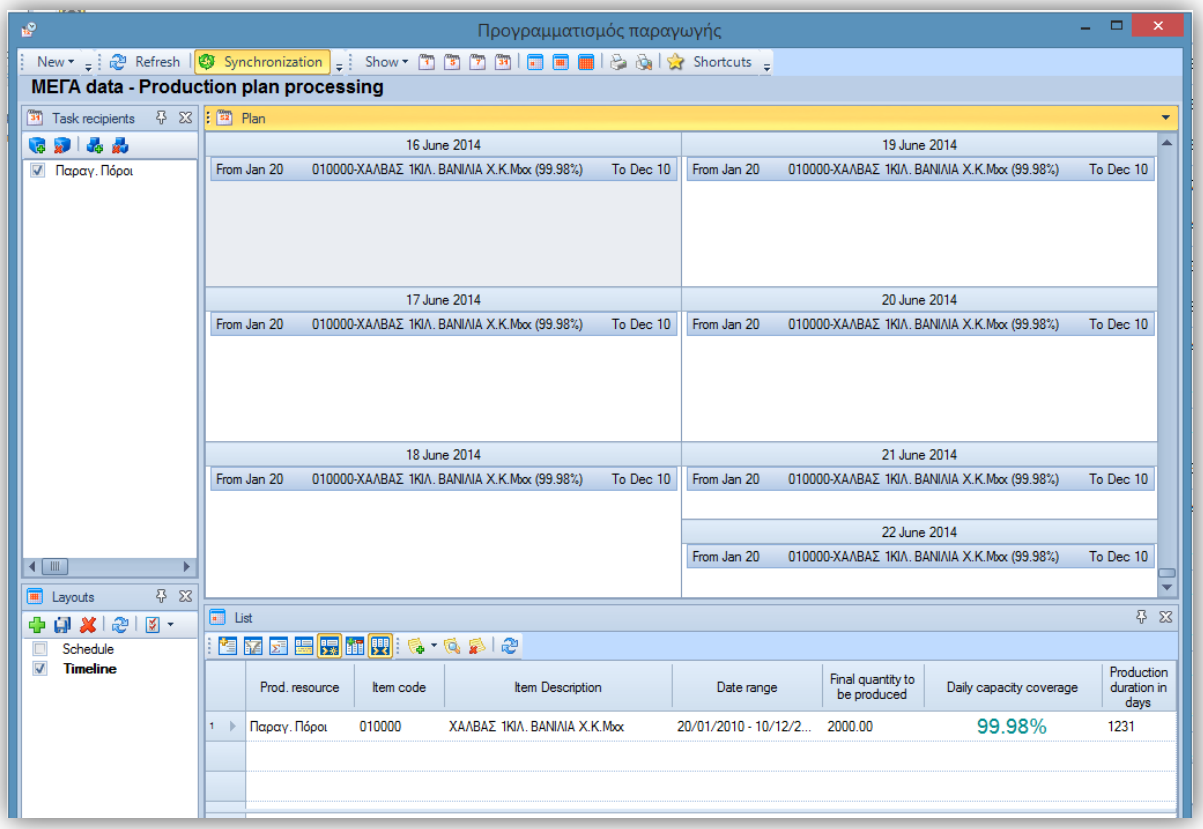
By selecting from the filters of the list a **specific Production Resource** and a **specific date**, we can check if the daily capacity coverage percentage is more than 100%, If this is the case, certain adjustments need to be made in order to ensure that the

production plan is viable. At this point, we need to clarify that the daily capacity coverage is calculated from the Production Time and the assumption that each resource is available during the production Time (in minutes), on the production working dates.

1.3.7 Schedule and Timeline

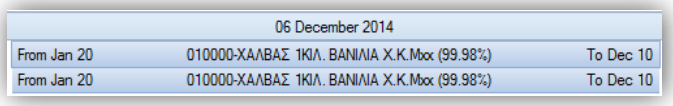
The monitoring of the daily capacity coverage becomes easier with the help of a calendar (Image 27). In order to view the plan in a calendar view / timeline, we need to click on the Plan processing button which is available on the form section: "Items scheduled for production" (Image 23). At the lower part of the calendar the list parameters appear along with the production schedules of the plan. The viewable entries on the tab "List" can be filtered by Production Resource and date. When clicking on one entry, the calendar is synchronized and we are transferred to the relevant calendar entry. The view can be per day, per working week, per week or per month: . It is possible to show the entries that relate to specific production resources through the corresponding option on the top left.

Image 27: Bulk plan processing | Calendar



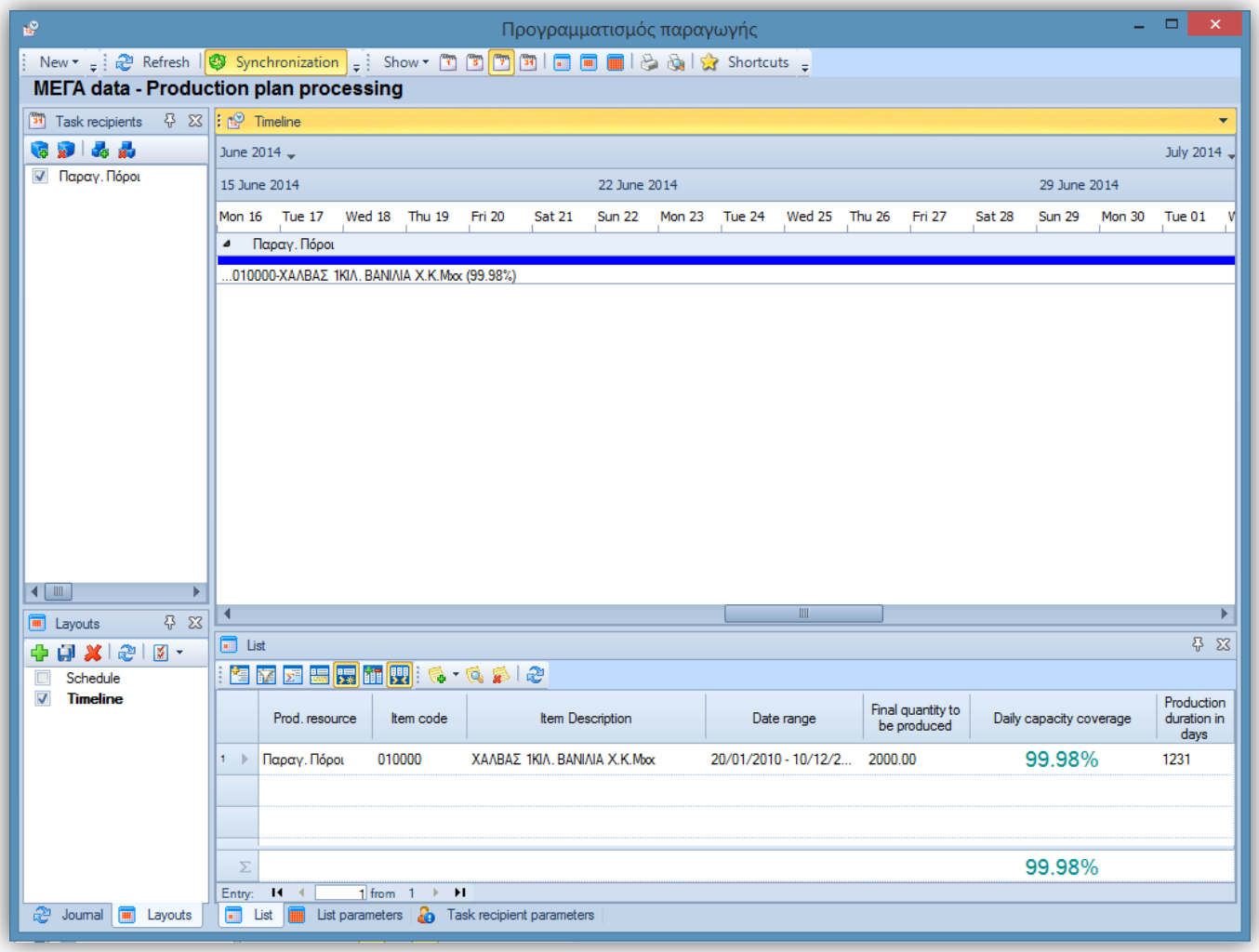
By focusing on a specific date and production resource we can check the total coverage capacity in order to make the necessary plan adjustments.

Image 28: Calendar | Check daily capacity coverage



Through the Layout selector (bottom left) we can switch to the timeline view (timeline, Image 29). The timeline can be very useful for a preview. Here too the view can be per day, per week or per month: .

Image 29: Bulk plan processing | Calendar

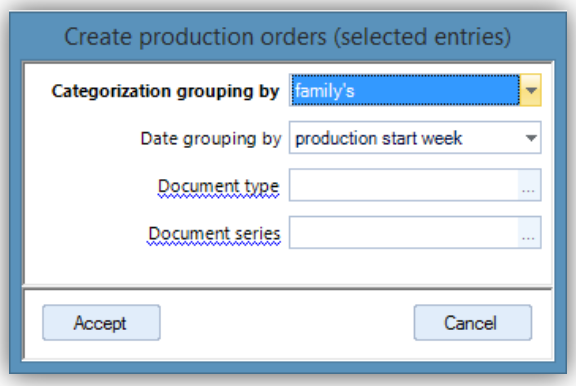


1.4 Create production orders

In the "Items scheduled for Production" list there is an option for creating production orders for selected entries: 

. This action gives the option of **grouping** the production orders (Image 30) based on (a) categorization grouping by Family, Group, Category, Sub-category or Item and (b) date grouping by production start date, smaller production start date or production start week. Additionally, the user can select the document type that will be used for the creation of the order.

Image 30: Parameters for creating production orders

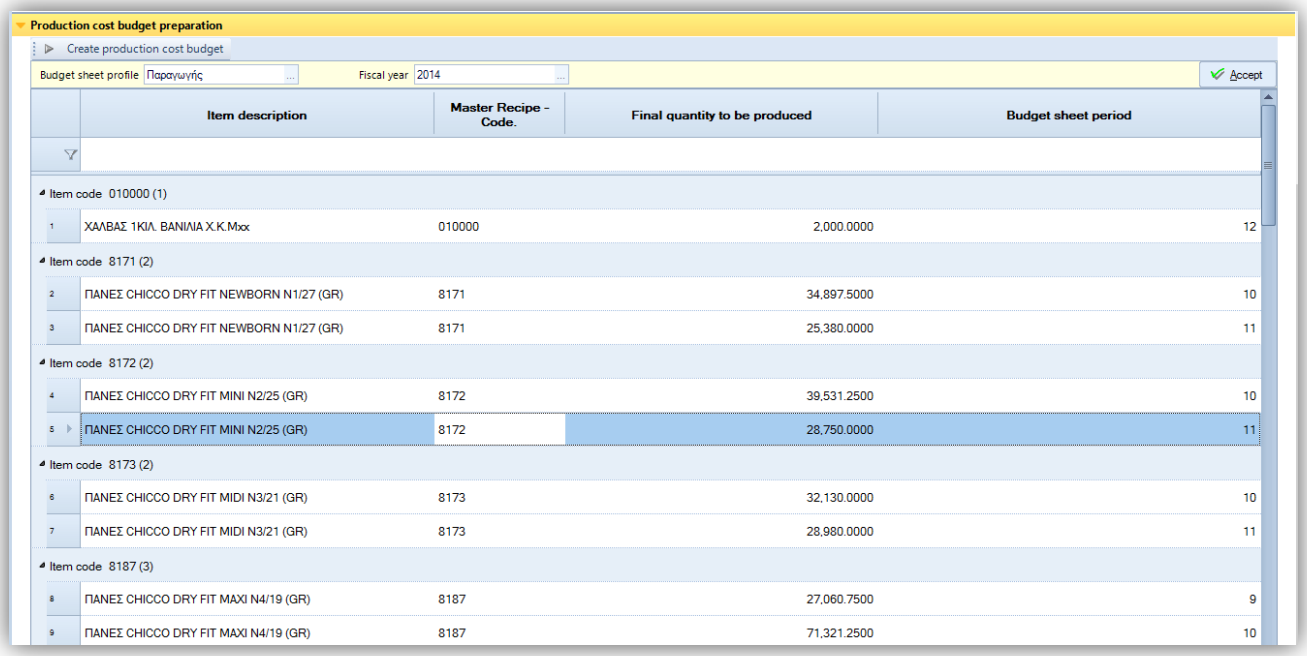


This action is **also** available on the production schedule entry form, in the section: "Production Order". In this case, a production order will be created for the current entry (if of course it doesn't exist already). Thus the user only selects the document type. The production order that is created is not saved automatically; it can be adjusted by the user before being saved.

1.5 Production cost budget preparation

The production schedule entries can be an input for the production cost budget. Through the production plan, the application gives us the opportunity to prepare the items & quantities scheduled for production. In the "Production cost budget preparation" list (Image 31) the user is asked to select the **budget sheet profile** and the **fiscal year** in order for the application to group the plan entries per item, master recipe (the two dimensions the budget sheet must have) and the budget sheet period. Through the action "**Create production cost budget**" which is available on the list, a budget sheet for all entries can be created.

Image 31: Production cost budget preparation



1.6 Customization: Adjusting the application to specific needs

1.6.1 Demand selection criteria

Every group of criteria corresponds to scroller parameters.

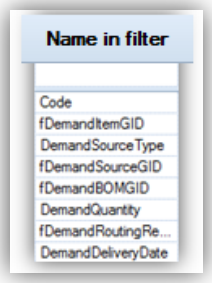
- **Demands based on sales budget sheet:** This concerns scrollers that are in the section MPS-Budget sheet view (ESMMMPSDemandForecast)
- **Demands based on sales orders:** This concerns scrollers that are in the section MPS-Sales orders view (ESMMMPSInOrder)
- **Make to stock Demands:** This concerns scrollers that are in the section MPS-Stock creation view (ESMMMPSStockCreation)

During the creation of alternative scrollers for each one of the above demand categories, the following actions should take place:

Scroller columns

Each scroller has specific columns regarding the **name in filter.** The columns appearing in Image 32 are mandatory. Specifically:

Image 32: Name in filter



- fDemandItemGID: The item's GID
- DemandSourceType: The demand's source where 1 → sales order, 2 → budget sheet, 3 → Stock creation.
- fDemandSourceGID => the source's GID
- fDemandBOMGID => the Basic Item GID
- DemandQuantity => the demand quantity expressed in the main MU
- fDemandRoutingRegionGroupCode => the Geographical Zone Group where the demand needs to be delivered to.
- DemandDeliveryDate => the desired delivery date

If when creating a view, a column is not needed, you should set the content to null. (Attention! Not an empty space)

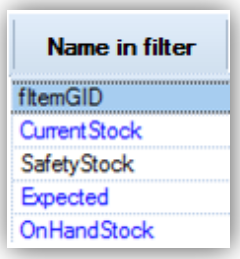
Checking for previous demand inclusion in planning

It should be checked that the entries each view returns are not already included in the specific production plan. The application "keeps" the current's plan GID as a parameter in the executed view and thus this check is possible.

1.6.2 Choices about available stock of products

Every group of criteria corresponds to scroller parameters. It concerns scrollers that are in the section MPS-Product stock on-hand views (ESMMMPSOnHand). Each view has to have specific columns regarding the **name in filter.** The columns appearing in Image 33 are mandatory. Specifically:

Image 33: Name in filter



- fItemGID: the Item's GID
- CurrentStock: Current stock
- SafetyStock: Safety stock
- Expected: Expected stock (i.e. from orders, production and selected WH)

- OnHandStock: Current stock (CurrentStock) + Expected stock (Expected) – Safety stock (SafetyStock)

If when creating a view, a column is not needed, you can set the content to zero.

Attention to the existence of non-visible, defined parameters for the date calculation of the OnHandStock and of the item's GID that is being used by the application.

2. Material Requirements Planning

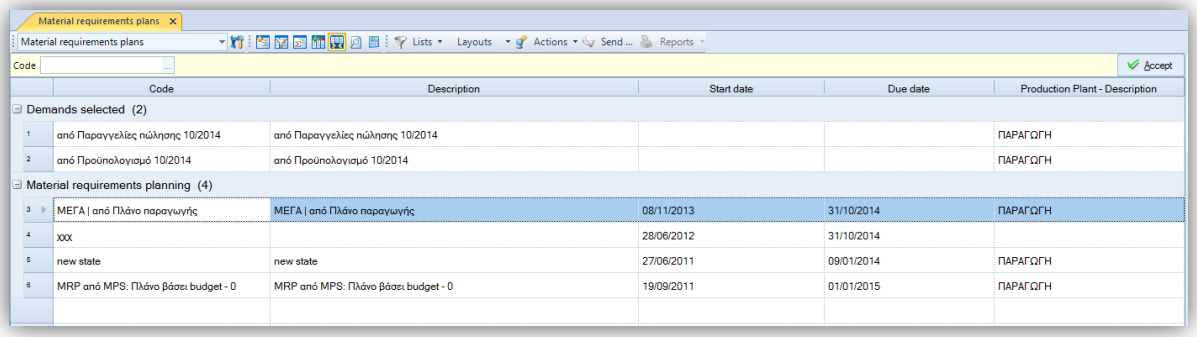
The MRP is mainly based on the association between the required final products scheduled for production and the materials being consumed, in order for the final products to be produced. Therefore, it concerns the calculation of the required materials quantity at the moment these will be needed, in order for the final product to be created on time.

For this to be accomplished, the following should be kept as accurately as possible:

- An overall production plan, meaning the production plan entries that have been created, as described in section 1.3 Production Planning.
- Bill of Materials that describe the required quantities in materials, allowed scrap etc.
- Materials and other goods stock and also delivery times for suppliers etc.

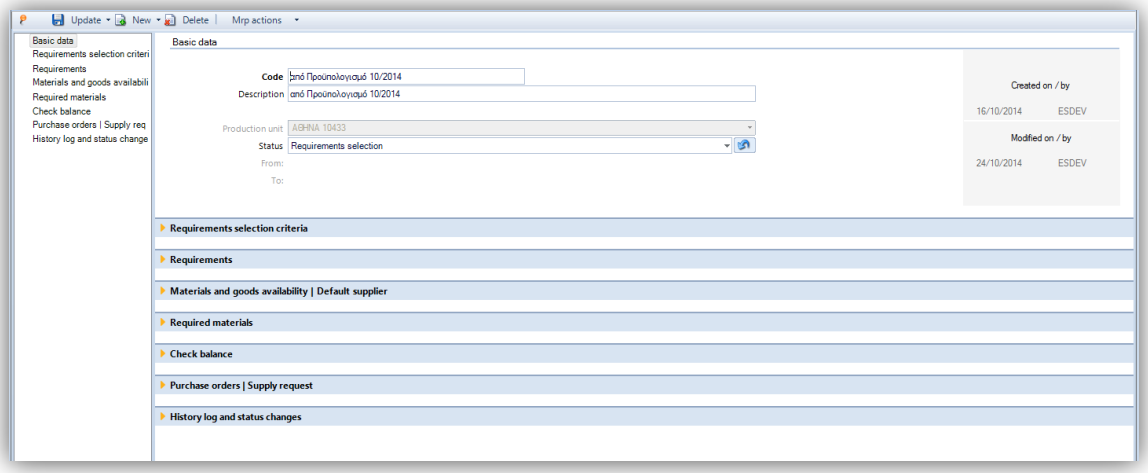
The main management of the material requirements plans is done via the following list (Image 11) which is available in the Menu: Production / Master Production schedule / Material requirements plans. Through this list the creation and management of plans takes place.

Image 34: List of material requirements plans



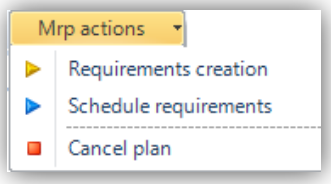
The basic data (Image 12) of a plan include a **Code** and a **Description** and the associated **Production unit** (informative). Additionally, the **status** of the plan is shown, along with information about the **creation** and the **modifications** of the plan and, if the requirements planning has been completed, the **dates From/to.**

Image 35: Administration form | Basic data



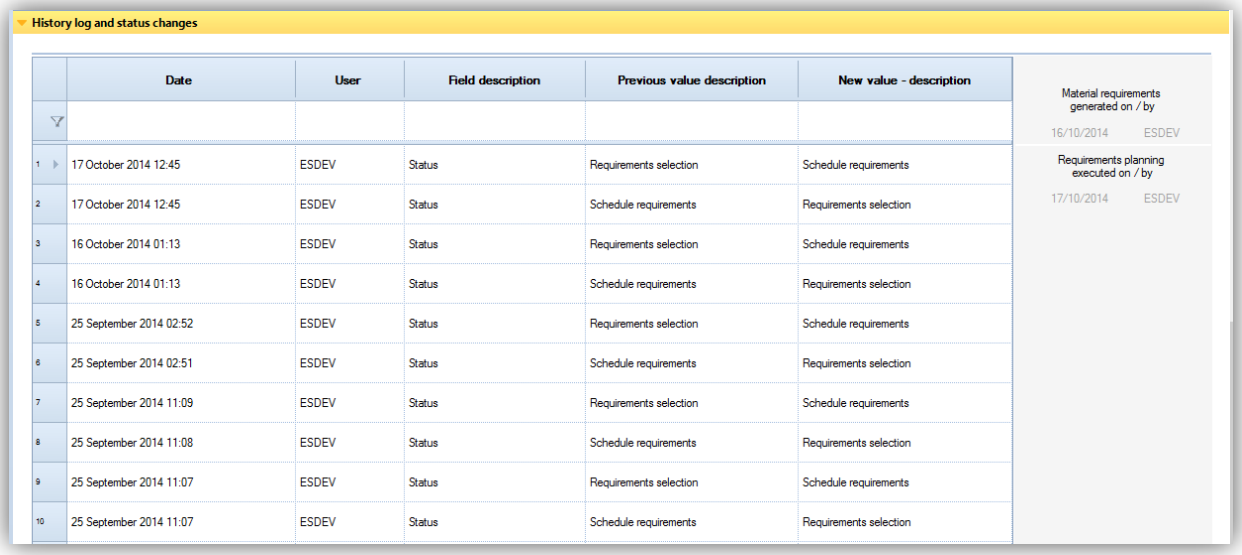
The status of the plan is automatically updated depending on the user's actions. The actions are available in the form toolbar and also in other parts of the form, as we will see later on.

Image 36: MRP actions



Especially regarding the cancellation of the plan, it can be undone through the button that appears on the right of the Status field. The plan's status modifications, along with the user and the last creation date of demands and production schedules, also appear in: **History log and status changes.**

Image 37: History log and status changes



2.1 Schedule requirements

2.1.1 Requirements selection criteria (materials & goods)

Just as in production planning, so too in requirements selection, the user selects material requirements from three criteria groups:

Production Plans

The user selects the production schedule entries of one or more production plans that correspond to specific item categorization, time intervals etc. These entries predefine the Bill of Materials that will be used and also the desired date of material availability. Regardless if a material will be used at the beginning of the production or at a later stage, the application considers that all materials should be available at the beginning of the product's production. This assumption is based on the production lead time which was described in section 1.2.

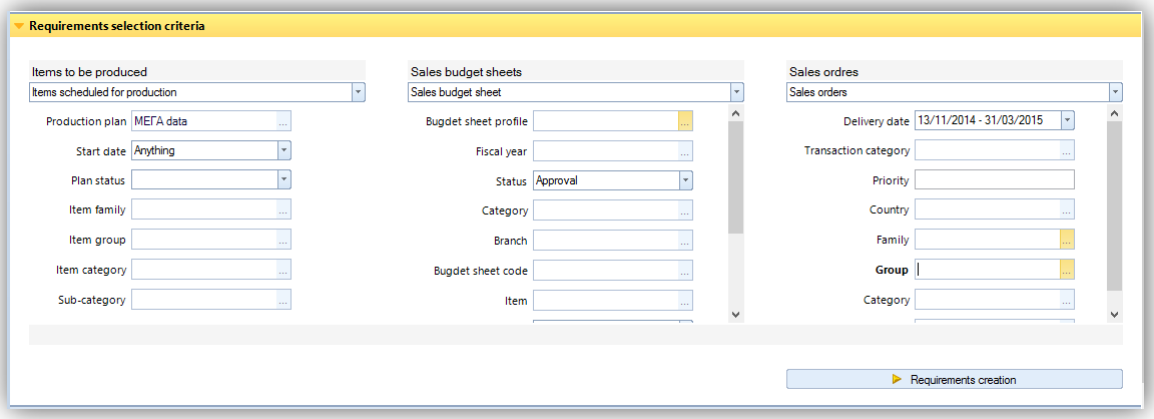
Sales budget

In order for the requirement plan to be used by purely business firms as well, the material requirements can alternatively be catered from a sales budget where the items are GOODS.

Sales orders

In order for the requirement plan to be used by purely business firms as well, the material requirements can alternatively be catered from sales orders where the items are GOODS.

Image 38: Requirements selection criteria



In total, four different sources can be used for the material requirements creation: The three sources mentioned above and also a manual one. Based on these sources, the **material requirements** are created. The user can choose and define which categories will be included in the requirements plan (Image 38).

2.1.2 Requirements creation

After setting the selection criteria for the requirements that will be included in the particular plan, we can proceed to the **Requirements creation.** This action is available in the form toolbar (Image 36) and also in other parts of the form related to the selection of the criteria for the requirements creation.

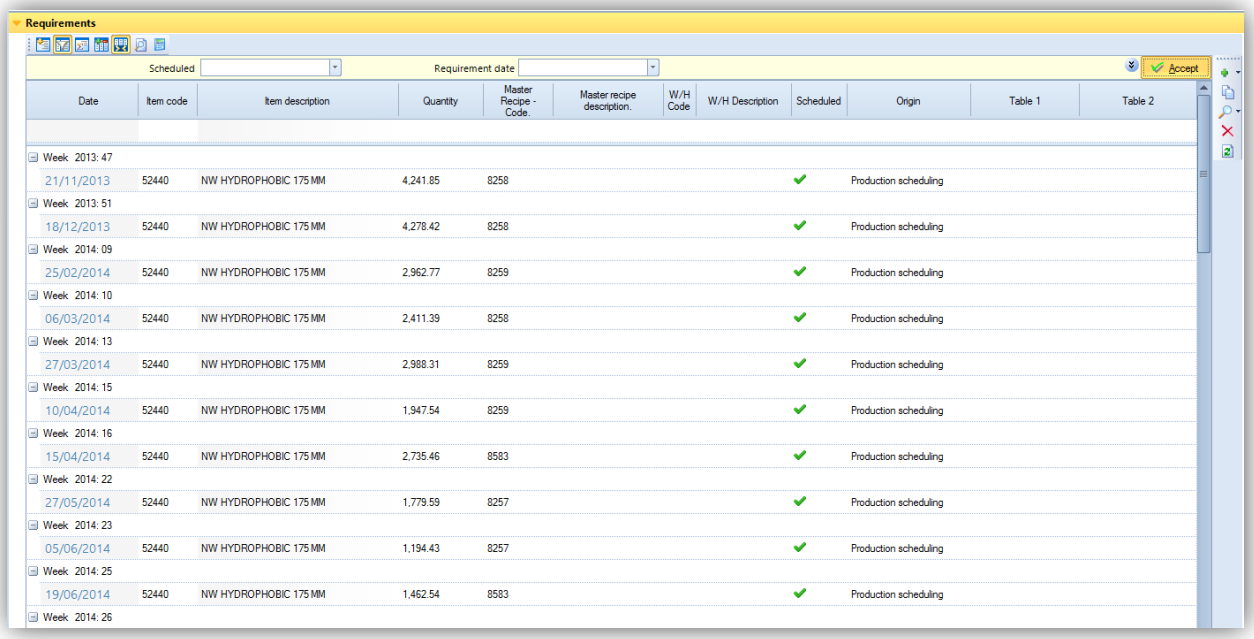
The "Requirements creation" action converts the sales orders, the sales budget data and items scheduled for production, to materials and goods requirements. Especially regarding the scheduled productions, the application uses the Bill of Materials information (defined on each item entry scheduled for production), in order to proceed to a complete BOM explosion and result in the materials required (what), the production start date (when) and the quantities (amount). Moreover, and in the case where a

WH has been associated with a BOM, this information will be transferred to the requirement, in order to be clearly specified that the quantity of the specific material for the specific production is needed in a specific WH. The created requirements are available in: "**Requirements**".

The default information that appears on the list (Image 17) is the following:

- The Item code and Item description,
- The quantity,
- The Master Recipe code and description,
- The specific requirement date and week,
- The origin
- And an indication if this has been scheduled. This indication is updated after the relevant action is completed.

Image 39: Requirements list



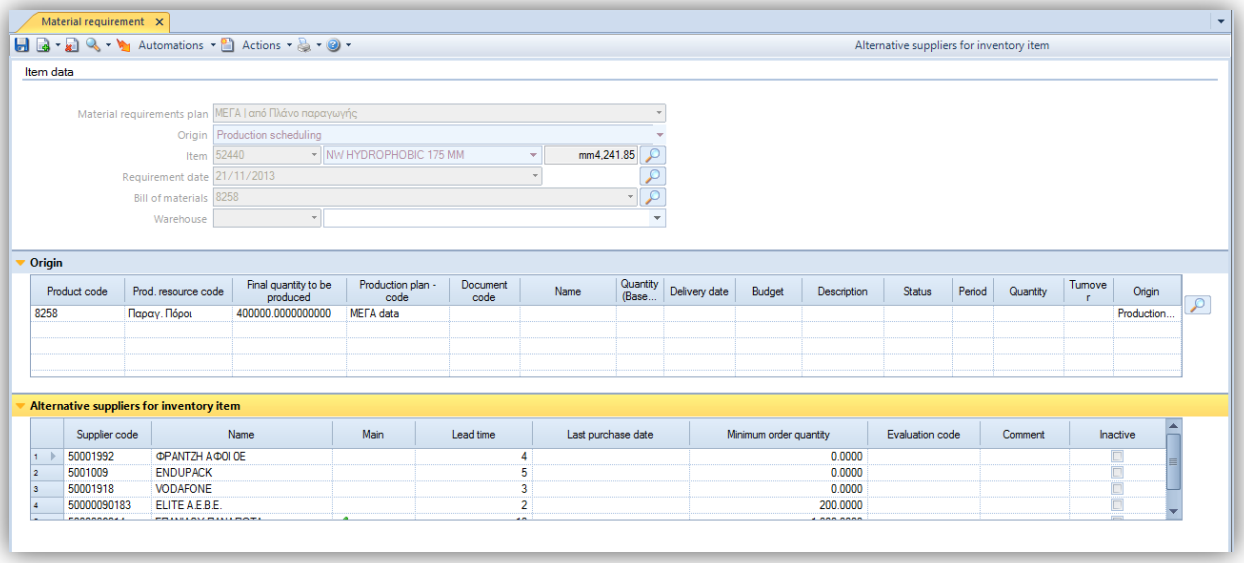
The user is able to focus on **non-scheduled requirements up to a specific date,** via the criteria of the specific list. This will enable the user to control the requirements on which the next requirements scheduling will run. Additionally, the user can add or remove requirements manually.

The requirement form (Image 40) gives access to the following information:

- Associated Material requirements plan
- Item, required quantity, WH and Bill of Materials (if it regards a material based on BOM). The button on the right of the item field, gives immediate access to the relevant entries.
- Requirement date. The button on the right of the date field, gives immediate access to the relevant scheduled material requirement entry, if this has been created.

- Origin (sales order, production schedule, sales budget or the user) and basic information about the order or the budget origin. Via the button of the specific list, immediate access is given to the original document/budget sheet or production schedule entry.
- Alternative suppliers for inventory items

Image 40: Material requirement

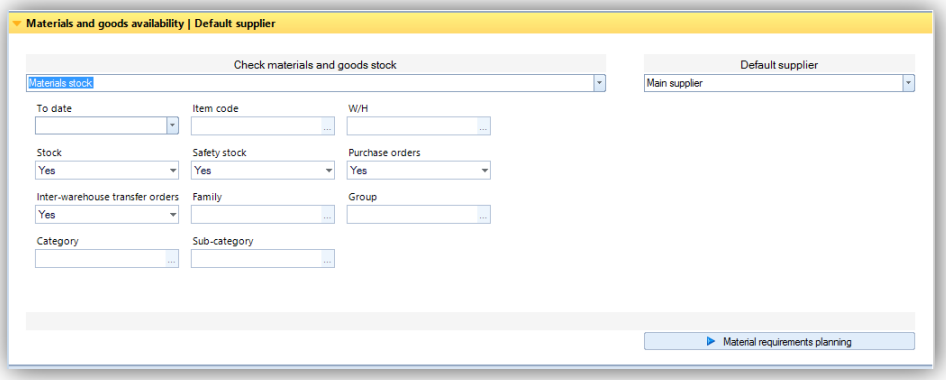


2.1.3 Material and goods availability / Default supplier

We are able to define if the scheduled requirements entries algorithm should consider the stock of **specific Warehouses**, for items with **specific categorization,** as available. Specifically, it may (or may not) take into consideration:

- The stock of specific WH
- The safety stock
- The expected stock from inter-warehouse transfer orders
- The actual stock
- The expected stock from the orders to suppliers

Image 41: Materials and goods availability / Default supplier



During this procedure, and based on the above parameters, a check is made on stock availability on the date that the product should be for disposal at the factory or for the execution of the order. So, on one hand the replacement quantity required is scheduled and on the other hand there will be the optimal utilization of available stocks.

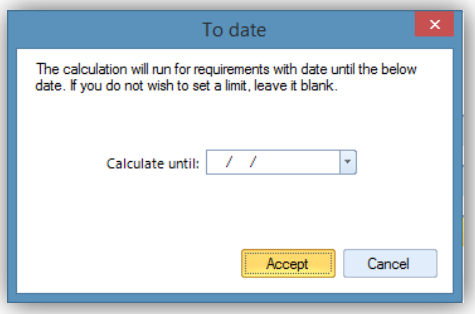
Additionally, the user can select who will be the default supplier. The default application suggestion is based on the selection of the **Main Supplier** of the item.

2.1.4 Material requirements planning

Subsequently, the user executes the material requirement planning. This action is available in the form toolbar (Image 36) and also in the section of the form related to the selections and definitions of the criteria associated with the stock (Image 41).

- The scheduled material requirements are the result of the **grouping** by item, by WH and by requirement date.
- The **quantity** results from the sum of individual requirements taking into consideration the stock availability, as defined from the selected criteria.
- The execution of this action also results to the **supplier** determination. A main supplier is suggested but the user may choose an alternative supplier.
- Based on the **selected supplier's lead time** (delivery days) the required time for the issue of the purchase order is calculated, in order for the item to be available on time. The calendar used is the company's default calendar and the calculations are based on ESGODateAnalysis (see section 1.1.3 Working days)
- The minimum order quantity is counted in.

Image 42: Material requirements planning

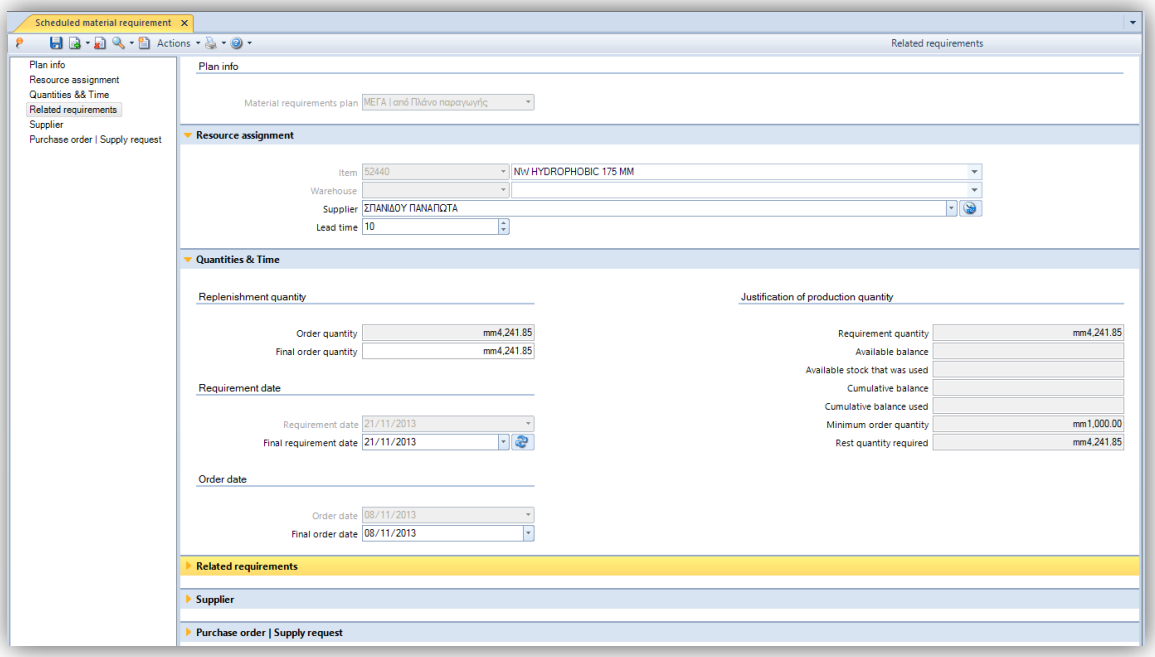


Via the dialog box shown in Image 42, the user can select the date up to which the requirement planning will run. Optionally, this action offers the possibility for segmental requirement planning and therefore may lead to better control on the results of the planning. The segmental planning helps in the revisions even if they are short-term.

The scheduling action is **executed progressively per date** starting from the first requirement date, and in order to create the **material requirement entries** it does the following:

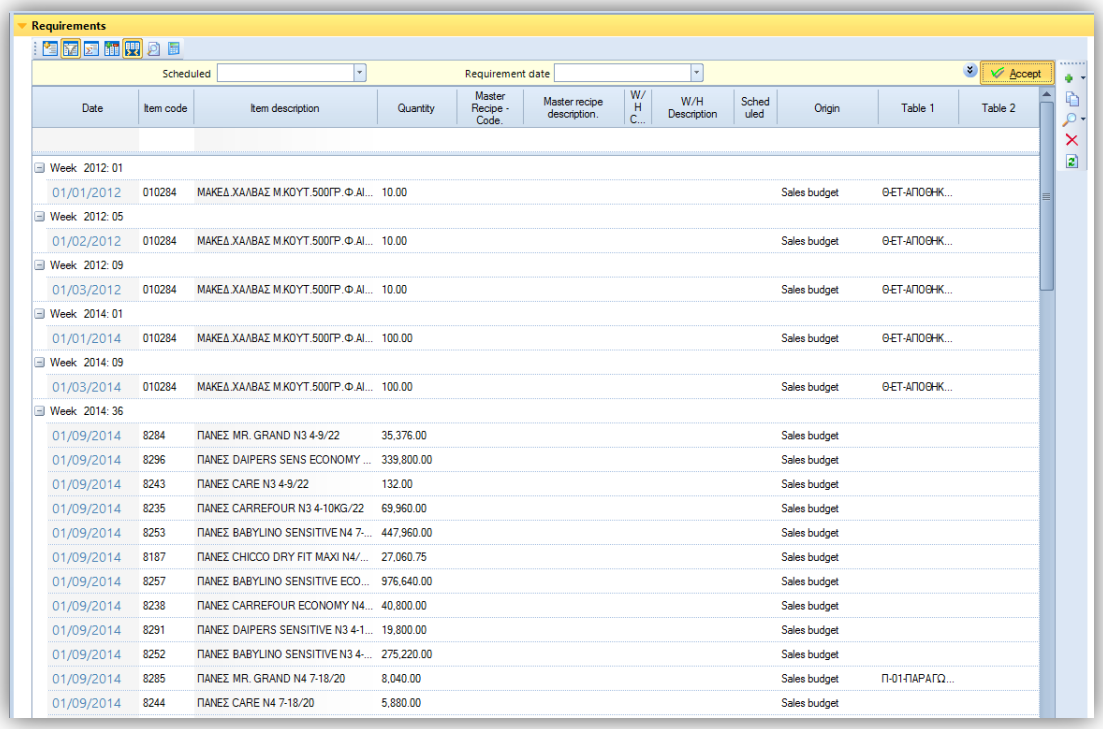
- **Groups** the requirements per **item**, **required date** and **WH**. Via the production scheduling form, immediate access is given to the requirements it has resulted from.
- Suggests a **Supplier** based on the user's previous selection

Image 43: Scheduled material requirement



- **Calculates the order's quantity**. In order for this to happen, it:
  - Totals the relevant requirement quantities, in the field "**Requirement quantity**"
  - Based on the selections made about the available stock of products (Section 1.3.3), it finds the **available balance** for the item on the final requirement date and utilizes this stock as far as possible (**available stock that was used**).
  - Based on the options for the available stock of products (Section 1.3.3) it locates the available balance for the item on the final requirement date and it uses as far as possible this available balance (**available stock that was used**). In another replenishment entry for a future date for the same item this quantity, which according to the plan has been used, will be subtracted from the available balance.
  - The spare quantity that will be ordered (meaning a quantity that exceeds the required quantity) will update the **Progressive balance** of the future entries for the same item. The spare quantity can be due to a user change on the **Final quantity**. Thus, if for example the user selects to order 10 extra items, when the Production stock scheduling continues in future dates for the requirement planning of the same item, it will consider those 10 items as available for use (**Progressive balance used**)
  - Based on the above, the **Suggested Quantity** for order is formed and the **Final** one is suggested. The user may change this quantity.
- Based on the suggested Quantity, the desired requirement date, the supplier lead time and the working days, the **Suggested order date** is calculated and the Final order date is recommended.
- Based on the above, the sum of material requirements planning entries is created (Image 44)

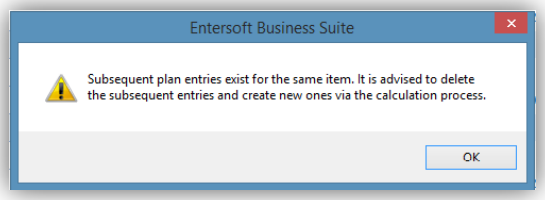
Image 44: List of material requirements entries



2.1.5 Recalculation of MRP entries

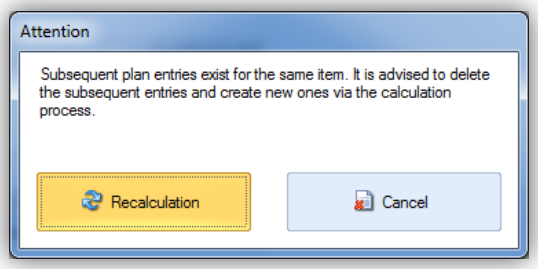
As aforementioned, the user is able to modify, per entry, **the final order quantity.** This modification may affect the available progressive balance of future entries for the item. For this reason, the application will suggest the recreation (or else recalculation) of future entries (Image 45). Similarly, the modification of the final order date will result in the same suggestion.

Image 45: Recalculation of future entries



The **change of Supplier** may affect the supplier lead time, the order minimum quantity and thus, the order quantity and the order date. Therefore, if the user selects another supplier, the application will inform us accordingly, in order to proceed to necessary actions (Image 46)

Image 46: Modification of main supplier



Even if the user does not proceed with the automatic update, he can continue with the recalculation through the button, which is available next to the **Supplier** field.

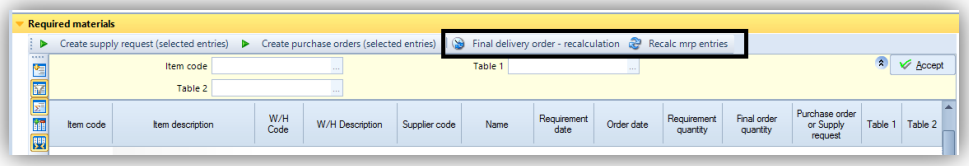
The **modification of the final date** means that the entire entry has to be recalculated, since it is possible that on the new date the available stock, the progressive scheduled balance and so on, will be substantially different. The recalculation is feasible via the message box and also via the button, which is available on the right of the field: final requirement date.

Obviously, the application does not run automatic updates without the user permission, since the user modifies the original suggestion, as it is possible that the quantities and dates will be also formed from ad hoc factors that have not been depicted in the application.

Due to the severe effect the above changes may have on the data planning of future entries, the deletion of future entries and the re-execution of the requirements planning are suggested.

Alternatively, the option of bulk recalculation of selected entries is available (Image 47).

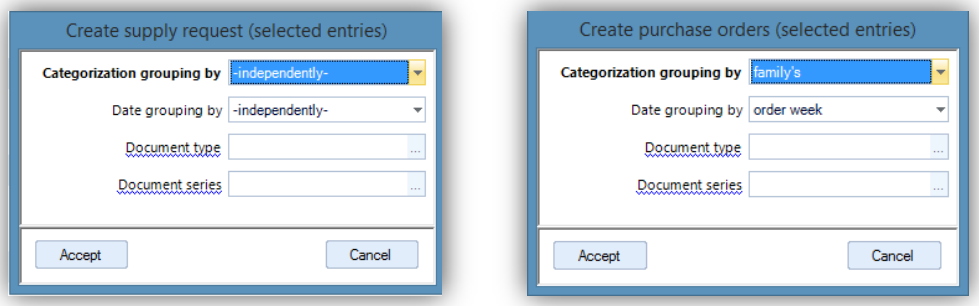
Image 47: Bulk recalculations



2.2 Issue purchase orders and supply requests

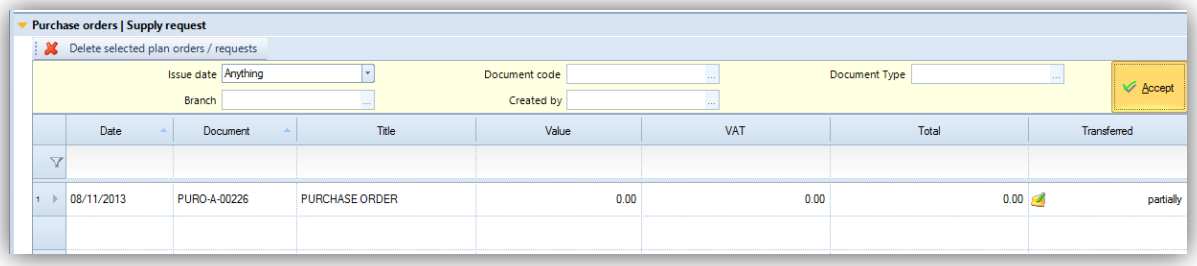
The required materials entries can be used for the bulk creation of supply requests or purchase orders, via the corresponding available actions. Via these actions, the user is able to **group** the production requests (Image 48) by (a) **categorizing** the selected entries by family, group, category, sub-category, item (or independently for supply requests) and (b) **by date**, on a date order level, on an order week level and on a smaller order date level (or independently for supply requests). Additionally, the user can select the document type and the series he wishes to use for the supply request or order creation.

Image 48: Create supply requests / purchase orders | Parameters



The created purchase orders / supply requests are viewable in the relevant form section. The option of deleting these requests is also available (Image 49).

Image 49: Viewing and deleting selected purchase orders / supply requests

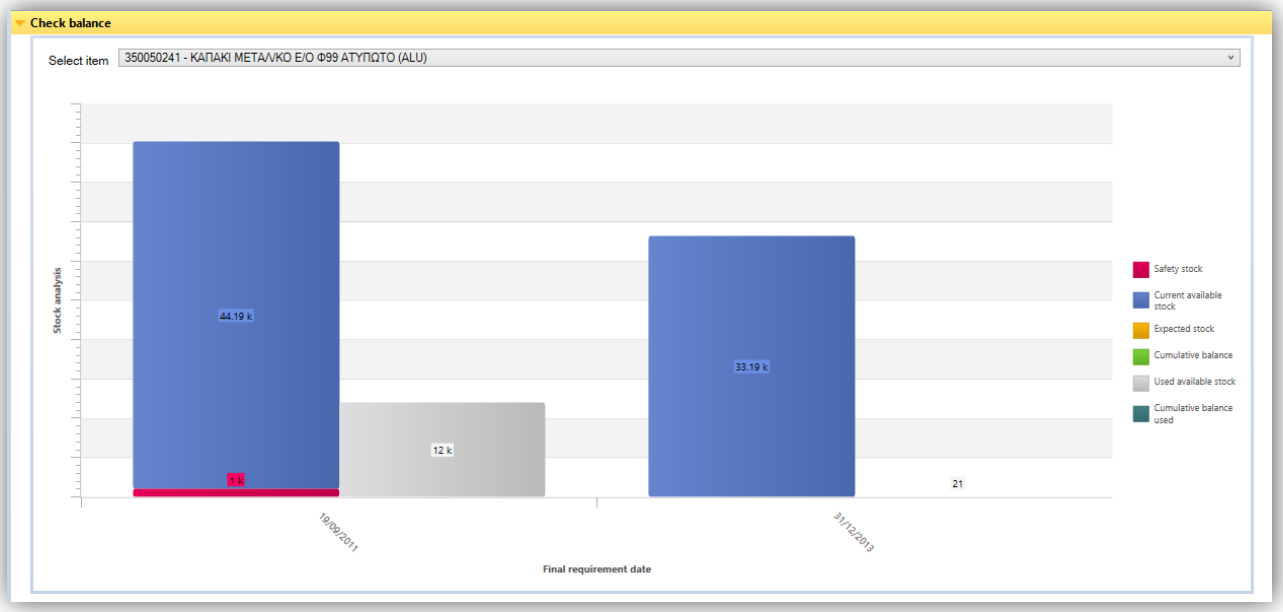


2.3 Check balance

Via the "Check balance" section, we are able to track the stock for an item based on the final requirement date. The stacked chart depicts the synthesis of the available stock (expected, actual, progressive, safety) and shows how much of the stock has been used to cover the demand. By clicking on the expected stock, the application returns a list with the relevant expected orders to suppliers for the particular item.

This diagram allows us to check when the available stock reaches the safety stock level and therefore helps us to proceed on time to the necessary actions, regarding the purchase orders and the supply requests.

Image 50: Check balance per item



2.4 Customization: Adjusting the application to specific needs

2.4.1 Requirements selection criteria

Every group of criteria corresponds to scroller parameters.

- **Requirements based on production scheduling**: This concerns scrollers that are in the section MRP-Master production schedule views (ESMMMRPPlannedProducts)
- **Requirements based on sales budget sheets**: This concerns scrollers that are in the section MRP-Budget sheet views (ESMMMRPTradeGoodsForecast)
- Requirements based on sales orders: This concerns scrollers that are in the section MRP-Sales orders views (ESMMMRPInOrder)

During the creation of alternative scrollers for each one of the above requirement categories, the following actions should take place:

Scroller columns

Each scroller has specific columns regarding the **name in filter.** The columns mentioned below are mandatory. Specifically:

- fRequirementItemGID: the Item's GID
- RequirementSourceType: the requirement's source where 1 → sales order, 2 → budget sheet, 3 → production planning.
- fRequirementSourceGID => the source's GID
- fRequirementBOMGID => the Bill of Material GID
- RequirementQuantity=> the requirement's quantity expressed in the main MU
- RequirementDate => the requirement date
- fRequirementRoutingRegionGroupCode => the Geographical Zone Group where the requirement needs to be delivered to. This specific information is not further utilized.

If when creating a view, a column is not needed, you should set the content to **null**. (Attention! Not an empty space)

Checking for previous requirement inclusion in planning

It should be checked that the entries each view returns are not already included in the specific requirements plan. The application "keeps" the current's plan GID as a parameter in the executed view and thus makes this check possible.

2.4.2 Choices about availability of materials and goods

This concerns scrollers that are in the section MRP-Stock on-hand views (ESMMMRPOnHand). Each view has to have specific columns regarding the **name in filter.** The below columns are mandatory. Specifically:

- fItemGID: the Item's GID
- CurrentStock: Current stock
- SafetyStock: Safety stock
- Expected: Expected stock (i.e. from orders, production and selected WH)
- OnHandStock: Current stock (CurrentStock) + Expected stock (Expected) – Safety stock (SafetyStock)

If when creating a view, a column is not needed, you can set the content to zero.

Attention to the existence of non-viewable, defined as parameters for the date calculation of the OnHandStock and of the item's GID that is being used by the application.

2.4.3 Default supplier

This concerns scrollers that are in the section MRP-default supplier views (ESMMMRPDefaultSupplier). Each view should concern alternative suppliers for the item, and should have specific, mandatory columns regarding the **name in filter.** Specifically:

- fItemSupplierGID: the alternative supplier entry GID (defined as parameter)
- fItemGID: the item's GID (defined as parameter)
- MainSupplierGID: the main supplier's GID
- DeliveryDays: supplier delivery days for the item
- MinOrderQty: minimum supplier order quantity for the item
- fItemSupplierMUCode: supplier Measurement Unit for the item
- fItemMUCode: item's Measurement Unit