Introducing Material Requirements Planning (MRP) in SAP S/4HANA®
What You’ll Learn

Understand how to calculate which, when, and how many items are required for production while seeing how classic MRP and MRP Live work in SAP S/4HANA. Understand the new ways of subcontracting and handling storage location planning, and explore new SAP Fiori apps and BAdIs. You’ll walk through the whole MRP process, from running MRP to evaluating the results, and then see how to optimize your MRP performance!

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1  Material Requirements Planning Basics

In this section, we’ll explain the basic concepts behind material requirements planning (MRP) and contextualize the variations of MRP available in SAP S/4HANA. We’ll also go through how SAP S/4HANA has simplified MRP scenarios and discuss what’s new in recent releases.

1.1  What Is Material Requirements Planning?

MRP is a concept developed in the 1960s to ensure companies have the necessary stock to produce goods, while at the same time avoiding stock shortages and surpluses. Even though this concept was not invented by SAP, MRP has been part of the SAP ERP core since its earliest releases and is the central part of SAP’s production planning and detail scheduling (PP-DS) module.

The first step in the MRP execution is to read the planning file, which stores the materials that have undergone an MRP-relevant change since the last planning run and that should be planned again. Then, MRP reads requirements (including the forecast); performs replenishment and the stocks for each material selected for planning; and, through a logic called a net requirements calculation, determines when a material shortage would occur.

Whenever a shortage is identified, MRP uses a lot-sizing procedure to calculate the replenishment quantity necessary to cover this shortage. Using the shortage date and the replenishment quantity, MRP runs the scheduling, determining when procurement should start to avoid shortages. If the replenishment proposal is for a product manufactured in-house, MRP will
also run the \textit{bill of materials (BOM) explosion}, generating requirements for all the components and, subsequently, plan those components until reaching the lowest level, usually the raw material.

Different options to run MRP are available: We can run MRP for a specific material, for a specific material and all its components, for one or more plants, for a sales order, or for a project. Most companies use a mixed approach, running MRP for all the plants overnight and planning specific materials during the day, whenever necessary.

The MRP process involves database access to read all the planning elements from the database and to run complex algorithms; therefore, the MRP execution can take several hours, depending on the number of materials to be planned and other factors.

To improve performance, SAP has redesigned MRP to run on an SAP HANA database and has introduced a new transaction to run MRP in-memory in SAP S/4HANA. Since these developments, all previously existing ABAP-based transactions are called “classic MRP transactions,” while the new MRP is known as MRP Live.

\textbf{Classic MRP}

The classic MRP transactions, such as Transactions MDO1, MD02, or MD03, have been available since the earliest releases of SAP’s ERP software. These transactions were developed using the SAP programming language, ABAP, premised on the idea that these transactions could support many different databases by containing all the business logic in the ABAP layer. During an MRP planning run in classic MRP, planning elements are selected sequentially from the database, from 52 different tables, and ABAP code processes and validates each planning element before reading the next one. This logic works perfectly fine in traditional SQL databases but does not take advantage of SAP HANA’s internal parallel processing capabilities.

To improve classic MRP performance in SAP S/4HANA, all the classic MRP logic to select the information from the database was redesigned and
encapsulated into stored procedures in SAP HANA, so that all the tables can be read at the same time from memory, using SAP HANA’s internal parallelism. This change in the internal MRP logic improves performance, but only for reading data from the database, while the rest of the MRP logic, such as the net requirements calculation or the lot-sizing calculation, is still executed in the ABAP layer. As a result, from a functional perspective, only minor changes have occurred. For example, some MRP that arise on the same day are aggregated into the MRP list, and some ABAP BAdIs for reading data from the database are no longer called because this logic no longer runs on ABAP.

**MRP Live**

The changes introduced to classic MRP has led to significant reduction in the total MRP runtime, but even more improvement in performance can be achieved in MRP when running on an SAP HANA database. Therefore, in the first SAP S/4HANA release, SAP introduced MRP Live, which provides the new Transaction MDOIN to run MRP in-memory. As a result, all the steps executed during the MRP planning run are executed with stored procedures directly on the SAP HANA database, taking a full advantage of SAP HANA’s internal parallelism and thus drastically improving MRP performance.

Since the whole MRP logic was reimplemented with stored procedures in SAP HANA, a few rarely used scenarios were not updated and still need to be planned with the classic ABAP logic. The MRP Live dispatcher is capable of identifying those restrictions automatically and triggering the classic logic, so that all the materials can be planned in the same transaction. However, the fewer materials you plan using the classic logic, the better MRP Live will perform.

From a results perspective, MRP Live’s output should be quite similar to the results from classic MRP, with a few design changes. From a performance perspective, however, MRP Live can be up to ten times faster than the classic
MRP, if a minimal number of materials with restrictions are planned in ABAP.

The main design changes in MRP Live include the following:

- MRP Live will not generate the MRP list.
- MRP Live will automatically create requisitions for externally procured materials or perform scheduling when a scheduling agreement exists.
- The planning horizon is ignored, and no net change in planning occurs within the planning horizon.
- Since the new Transaction MDOIN provides flexible selection criteria, defining the scope of planning is no longer relevant, and MRP Live can automatically determine the sequence of plants to be planned.
- You no longer need to define destinations for parallel processing in customizing because MRP Live uses SAP HANA’s internal parallel processing.
- Planning mode 2, which was used to re-explode BOMs and routing, is no longer available. Whenever a planned order or purchase requisition requires a changed in date or quantity, it is deleted and recreated, which faster than updating in SAP HANA.

Let’s briefly discuss the MRP list simplification, which is still widely used. The MRP list was created a long time ago, when MRP was introduced in the SAP ERP. At that time, performance issues could occur when running the stock/requirements list, since this list is built dynamically and reads all the planning elements from the database when it is executed. Therefore, storing the MRP results in a table was a good idea, so that these results could be read quickly. However, the information stored in the MRP list would quickly become outdated and therefore be useless until the next MRP run.

Because the performance of the stock/requirements list is much better now, MRP Live won’t generate the MRP list anymore. However, one problem is that the stock/requirements list does not store results in any table; however, the MRP list tables that were used as basis for custom reports require the MRP results.
1.2 What’s Changed with SAP S/4HANA?

Besides the new MRP Live, some existing MRP scenarios were simplified in SAP S/4HANA 1709, which also introduced a new planning method called demand-driven MRP (DDMRP). In this section, we’ll provide an overview of all these changes in SAP S/4HANA. We’ll discuss in Section 5 how each of these changes should be handled when migrating to SAP S/4HANA.

Subcontracting

In SAP ERP, the subcontracting scenario can be implemented in several ways:

- With a separated stock segment for the subcontractor
- Using subcontracting MRP areas
- With no separation between subcontractor stock and plant stock (using the BAdI MD_SUBCONT_LOGIC).

In SAP S/4HANA, the subcontracting scenario has been simplified, and now only two options are available for implementing the subcontracting scenario, as follows:

- Using subcontracting MRP areas
- With no separation between subcontracting stock and plant stock

The option of using a separated stock segment for planning subcontracting is no longer available in SAP S/4HANA. No separation between the plant and the subcontractor stock is chosen by default when no subcontracting MRP area has been created for the vendor (unless a BAdI has been implemented).

In addition, when using subcontracting MRP areas in SAP S/4HANA, you only need to create the subcontracting MRP area in customizing; MRP will automatically consider the subcontracting MRP area, and the default planning parameters will be used. The step of assigning the subcontracting MRP area to the material master, which was mandatory in SAP ERP, is now optional in SAP S/4HANA. You only need to assign the MRP area to the
material master when you want to define specific planning parameters at the MRP area level, such as an MRP type or a lot-sizing procedure.

MRP performance should be improved through the use of subcontracting MRP areas, since an independent planning file is created for each MRP area, which means that each MRP area can planned independently. Therefore, a change at the subcontractor level would not necessarily lead to a complete replanning of the material. From a user experience perspective, you’ll no longer see the subcontractor stock segment in Transaction MD04 when accessing a material at the plant level; instead, you’ll access each MRP area separately to analyze the planning results.

**Storage Location Planning**

In SAP ERP, you could specify that a storage location be planned separately or excluded from MRP by using the **MRP Storage Location** checkbox in the **MRP4** tab of the material master or by defining a default value for the storage location in the customizing Transaction OMIR.

This setting is no longer available in SAP S/4HANA. Now, if you need to plan a storage location separately or to exclude a storage location from MRP, you’ll need to use storage location MRP areas.

With the old approach of storage locations planned separately, separate planning files for storage locations were not available, and a single planning file entry was created at the plant level. Thus, if a minor change occurred at a storage location planned separately, a material would have to be completely replanned at the plant level, and all storage locations planned separately would also have to be replanned.

With MRP areas, you’ll have a separate planning file for each MRP area, and each MRP area can be planned separately, which contributes to better MRP performance, since an MRP area will only be planned if a relevant change occurred at the MRP area level.

As in the subcontracting simplification we’ve just explained, you will no longer see segments for storage locations planned separately or excluded
from MRP when accessing the stock/requirements list. Instead, you’ll need to access each storage location MRP area separately.

**Simplified Sourcing**

Source determination in SAP ERP is the selection of a source of supply for a replenishment proposal created by MRP. In SAP S/4HANA, we had changes in the source determination for both internal and external procurement, and this simplification item was called simplified sourcing.

**Simplified Sourcing for External Procurement**

For external procurement, the major change is the fact that the source list is no longer mandatory for the source determination. The Automatic Sourcing flag has been introduced in the vendor info record to make the info record relevant to MRP, as shown in Figure 1.

![Figure 1: Automatic Sourcing in the Vendor Info Records](image-url)
Additionally, when the source determination occurs via a contract or scheduling agreement, creating the contract or scheduling agreement is sufficient, and you no longer need to reference it as relevant for MRP in the source list.

The standard MRP source determination logic in SAP S/4HANA is as following:

1. First, MRP looks for a quota arrangement and then distributes the replenishment elements according to the quotas established in the quota arrangement.

2. If no quota arrangement exists, then MRP first looks for a scheduling agreement and generates schedule lines.

3. If no scheduling agreement exists, then MRP looks for a contract and generates purchase requisitions.

4. If no contract exists, then MRP finally looks for an info record with the Automatic Sourcing flag checked.

Even though using the source list is no longer mandatory, MRP still considers source lists and overrides the validity of the source of supply. For example, if a source list exists and the source of supply is blocked, or if the source of supply is marked as not relevant to MRP, then the source of supply won’t be considered by MRP. Similarly, if a source of supply is marked as relevant, MRP will consider the source, even if the Automatic Sourcing flag is unchecked in the info record.

**Simplified Sourcing for Internal Procurement**

For internal procurement, using a production version is now mandatory, so that the BOM can be selected and exploded by planned orders generated by MRP. As a result, the BOM Selection indicator is no longer available in the material master, and MRP will always look for a valid production version. This requirement is also valid for phantom assemblies or in a subcontracting scenario.
From a scheduling perspective, the routing selection ID will no longer be defined in customizing, and only one scheduling level will exist. MRP will always explode the routing, rate-routing, or rough-cut planning profile defined in the production version.

Production versions have also been enhanced with the new status **Locked for Automatic Sourcing**, so that you can control whether a production version can be selected by MRP or not. SAP also offers two new reports for automatically creating production versions (see details in Section 5).

**Planning File**

Reading the planning file, which has also been simplified in SAP S/4HANA, is one of the first steps carried out during MRP, as explained in Section 1.1.

In SAP S/4HANA, the planning file logic has been optimized for better performance, and the planning file is now stored in the new table `PPH_DBVM`. You won’t find, for example, information about the low-level code or record type in the new planning file, since this information will be read directly from the material master during the MRP run. In addition, since the planning horizon is no longer relevant in SAP S/4HANA, the old processing key `NETPL`, which was used in planning to select only materials changed within the planning horizon, is no longer available in MRP Live or in the classic MRP transactions.

In addition, the old reports `RMMDVM10` and `RMMDVM20`, which were used to set up entries in the planning file before the first MRP run and to perform consistency checks in the planning file, have been replaced by report `PPH.Setup_MRPRecords`. Transactions `MDAB` and `MDRE`, which were used in SAP ERP to trigger the batch execution of these reports, have been replaced by Transaction `PPH_MDAB` in SAP S/4HANA.

The same is valid for long-term planning, and the new report `PPH.Setup_MRPRecords_SIMU` has replaced the older reports. Transactions `MSAB` and `MSAC` have been replaced by the new Transactions `PPH_MSAB` and `PPH_MSAC` in SAP S/4HANA.
Transactions MD20 and MD21, however, are still used to create and display entries in the planning file in SAP S/4HANA.

**Embedded PP-DS**

As of SAP S/4HANA 1610, the SAP Advanced Planning and Optimization (SAP APO) module production planning and detail scheduling (PP-DS) has been embedded into SAP S/4HANA. PP-DS offers advanced algorithms and features for planning that were not available in MRP, such as the consideration of capacity constraints during the planning run or the consideration of shelf life data. In addition, embedded PP-DS also offers tools for capacity leveling in both SAP GUI and SAP Fiori.

Embedding PP-DS into the SAP S/4HANA core simplifies the system landscape, and since you won’t need a separate system anymore, you won’t need to manage an interface between the SAP ERP and SAP APO. Additionally, master data duplication is avoided, and you won’t need to create integration models for materials, work centers, or PP-DS, thus reducing the total cost of ownership for this solution.

Embedded PP-DS in SAP S/4HANA directly affects MRP, since with PP-DS, schedule different planning runs is no longer necessary. MRP Live is capable of planning PP-DS advanced planning materials in the MRP run, thus resulting in a single planning run.

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**Note**


**Demand-Driven MRP**

Since SAP S/4HANA 1709, SAP has introduced a new MRP procedure called *demand-driven MRP (DDMRP)*. The new DDMRP tries to establish buffers for strategic materials to absorb the demand variability and add a protection
for lower-level components. The idea is to supply the component demand with the buffer and decouple the components’ lead time from the total replenishment lead time for the finished product.

In SAP S/4HANA, a new set of SAP Fiori apps support the classification of materials according to the lead time, variability, usage in BOMs and value, buffer calculations, buffer management, replenishment planning, and replenishment execution.

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**Note**

A detailed DDMRP implementation guide can be found in the SAP PRESS E-Bite *Introducing Demand-Driven Replenishment (DDMRP) in SAP S/4HANA* at www.sap-press.com/4569.

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2 **Running MRP**

As described in the previous section, in SAP S/4HANA, you can choose between the classic MRP and the new MRP Live. Additionally, MRP can be triggered from the SAP GUI or from the SAP Fiori launchpad. In this section, we’ll explain each of these options in detail and provide some guidance on how to choose among these options.

2.1 **Classic MRP Transactions**

Classic MRP transactions have been available in previous SAP ERP releases and can still be used in SAP S/4HANA. Even though the design of classic MRP transactions interfaces has not been changed, the following options are available to run MRP with transactions optimized for a better performance:

- Execute a total planning run for MRP materials with Transaction MD01 (shown in Figure 2) or Transaction MDBT or using Transactions MD40 or MDBS for MPS materials.
- Execute a single-item, single-level planning run for an MRP material in Transaction MD03 or using Transaction MD42 for MPS materials.
- Execute a single-item, multilevel planning run using Transaction MD02 for MRP materials or using Transaction MD41 for MPS materials.

![MRP Run](image)

**Figure 2 Running a Total Planning Run in Transaction MD01**

Additionally, the following classic MRP transactions can also be used in SAP S/4HANA, even performance will not be optimized:

- Single-item, interactive planning in Transaction MD43
- Multilevel, sales order planning in Transaction MD50
- Multilevel, project planning in Transaction MD51
2.2 MRP Live

The new MRP Live is executed in the new Transaction MD01N, which replaces most classic MRP transactions with much more flexible options for selection criteria, as shown in Figure 3.

![MRP Live](image)

*Figure 3 MRP Live Transaction MD01N*

In Transaction MD01N, the following options are available for executing MRP:

- Execute a total planning run, selecting one or more plants
- Execute single-level planning run for one or several materials
- Execute multilevel planning run for one or more materials with the selection of the *BOM Components* flag
- Plan the material in the supplying plant, for example, for stock transfers, by selecting the *Stock Transfer Materials* flag
- Plan any combination of plants and materials
Plan MRP materials, MPS materials, or both by selecting the **Material Scope**

- Use the **MRP Controller** or the **Product Group** fields as additional selection criteria; these fields are only available in the classic MRP transactions when a user exit has been implemented

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**Tip**

The **BAdI MRP_DISPATCHER_BADI** allows the selection screen to be extended with the inclusion of additional fields as selection criteria, if necessary.

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If you compare Transaction MD01N with the classic MRP transactions, you’ll notice some parameters are missing, for example, the creation indicator for purchase requisitions and scheduling agreements, which allowed you to choose whether MRP should generate planned orders, purchase requisitions, or scheduling agreements for external procurement. In Transaction MD01N, creation indicators are no longer present, since MRP Live by default creates purchase requisitions for materials with external procurement or creates schedule lines whenever a scheduling agreement exists for a material.

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**Tip**

The creation indicator for purchase requisitions is missing in Transaction MD01N; however, in some situations, you may want to have planned orders created for materials procured externally. In this case, you can use the **BAdI PPH_MRP_SOURCING_BADI** to force MRP Live to generate planned orders for materials procured externally.

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Another missing indicator is the creation indicator for MRP lists, which was removed, since MRP Live no longer generates MRP lists. Further, no indicator for choosing parallel processing exists because MRP Live uses SAP HANA’s internal parallel processing by default.

Finally, the processing indicator has been replaced by the **Regenerative Planning** flag because the processing key for net change within the planning horizon (NETPL) is no longer necessary in SAP S/4HANA. Therefore, by
default, MRP Live runs the net change planning (NETCH) processing key or
the regenerative planning (NEUPL) processing key when the relevant flag is
checked.

<table>
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<tr>
<th>Note</th>
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<tr>
<td>The program behind Transaction MD01N is PPH_MRP_START can be used to trigger background execution of MRP Live.</td>
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After executing MRP Live, the system will show the MRP run statistics, as shown in Figure 4, including the total number of materials planned, the number of materials with errors, the number of materials planned on SAP HANA, the number of materials planned with classic MRP, and the execution time.

![MRP Live Statistics](image)

**Figure 4** MRP Live Statistics

With these statistics, clicking the **MRP Level** button will show you an overview of MRP Live performance per low-level code, which is generally useful to troubleshoot performance issues.

You can click the **Materials with Messages** button for an overview of materials that were planned and that couldn’t be planned with classic MRP.

Figure 5 shows an overview of materials with messages in MRP Live. You can also click the **Solve Issue** button to remove the restriction and allow this material to be planned by MRP on SAP HANA to improve performance.

![Info and Settings for Materials in MRP on HANA: Display](image)

**Figure 5** Materials with Messages in MRP Live
2.3 Running MRP in SAP Fiori

SAP Fiori offers the Schedule MRP Runs app for scheduling and monitoring executions of MRP Live. Figure 6 shows the initial screen of this app, which displays MRP runs already executed, in process, or scheduled for future execution.

![Schedule MRP Runs](image)

**Figure 6 Schedule MRP Runs**

You can click the **New** button to schedule a new MRP execution. Figure 7 shows the scheduling details for a new MRP Live execution. Notice that the selection fields are basically the same fields available in Transaction MDOIN. The main difference is that now you have the option of triggering the MRP immediately by checking the **Start Immediately** flag, you can define a date and time for future execution.

If you click on **Add More Scheduling Options**, you can also schedule a periodic MRP Live execution, as shown in Figure 8. You can define the recurrence (daily, weekly, monthly, etc.); define how many times MRP Live should be executed; and even restrict executions to workdays only.
Figure 7 Scheduling a New MRP Live Execution

Figure 8 More Scheduling Options
In addition to the SAP Fiori app for scheduling MRP runs, most of the MRP Cockpit SAP Fiori apps we'll describe in Section 3 provide the option of triggering MRP Live for the material being evaluated. Figure 9 shows the **Start MRP Run** option in the Manage Material Coverage app, which would execute MRP Live.

![Start MRP Run in the Monitor Material Coverage App](image)

**Figure 9** Start MRP Run in the Monitor Material Coverage App

**Note**

MRP Live, as triggered by the MRP Cockpit SAP Fiori apps, is a single-level run for the selected materials, with planning mode 1, including both MPS and MRP materials, and without lead-time scheduling. These settings are hardcoded, but SAP Note 2482315 suggests a modification that will allow you to change these parameters.
2.4 Choosing an MRP Method: Classic MRP Versus MRP Live

Both MRP Live and classic MRP can be executed in the same system, without causing conflicts or problems. When using the SAP GUI, you can choose between using one or the other as convenient. When using the SAP Fiori launchpad, however, MRP Live is the only option in the MRP Cockpit SAP Fiori apps. You'll need to use the old SAP transactions in the SAP Fiori launchpad to run classic MRP.

From a performance point of view, MRP Live was designed to process high volumes and, in a total planning run, can significantly faster than the classic MRP. However, classic MRP can still be faster when planning a single material. (We'll discuss MRP performance in detail in Section 4.)

The flexible selection criteria of the new Transaction MD01N are another advantage of MRP Live. With Transaction MD01N, you can use a single transaction to choose many different combinations of materials and plants for planning, besides additional selection criteria, whereas the selection criteria available classic MRP transactions is limited to the plant or material.

With these considerations in mind, we generally recommend using MRP Live for total planning runs and when planning large volumes of materials, because of its better performance, or when planning specific combinations of materials and plants, because of the flexible selection criteria available in Transaction MD01N.

Using classic MRP is still required when you need to have MRP lists generated, since these lists are not generated by MRP Live. Also, sales order planning and project planning is not available in Transaction MD01N; you'll need to use the classic MRP Transactions MD50 and MD51 to plan a specific sales order or project.

Keep in mind, however, that the classic MRP is not a technology for the future. The simplification list for SAP S/4HANA 1511 states the following:
Classic MRP is still available as an interim solution (functionality [is] available in [the] SAP S/4HANA on-premise edition 1511 delivery but [is] not considered as [a] future technology). [The] functional equivalent is available, which at the moment has to be used for creating MRP lists.

You can also force a specific material to be planned using the classic MRP logic in MRP Live by using Transaction MD_MRP_FORCE_CLASSIC. We generally don’t recommend this option, as performance will not be optimal, but some specific cases may require forcing classic MRP logic. The most common case is when an ABAP BAdI was already implemented before the migration and should be executed for some specific materials. To avoid reimplementing this BAdI as an ABAP Managed Database Procedure (AMDP) BAdI, you would simply mark the materials to be planned in the classic logic in the ClassMRP column, as shown in Figure 10.

![Info and Settings for Materials in MRP on HANA: Change](image)

**Figure 10** Forcing a Material to Be Planned with the Classic MRP Logic

We should reinforce that this procedure is only recommended as a short-term solution. As a long term-solution, the custom logic should be moved to the respective AMDP BAdI, so that those materials can be planned in SAP HANA for better performance.

**Note**

Even when forcing a material to be planned with the classic MRP logic in Transaction MD01N, an MRP list will not be generated. If you need an MRP list, you’ll need to plan a material with classic MRP transactions.
3  Evaluating Your MRP Results in SAP Fiori

In this section, we'll explain how SAP S/4HANA customers can analyze the MRP run results using SAP Fiori applications and the new SAP GUI transactions designed for MRP Live.

3.1  Getting Started with the MRP SAP Fiori Apps

SAP S/4HANA offers a set of SAP Fiori apps for evaluating and managing the MRP results called the MRP Cockpit. The MRP Cockpit includes apps to monitor and manage MRP results from different perspectives, since the various apps offer an overview of the material coverage as well as details about production orders, sales orders, and also production order reservations.

Even though each app has a specific focus area, they are all based on the concept of the shortage; that is the point in time where requirements will be uncovered.

The monitoring SAP Fiori apps (such as Monitor Material Coverage) basically provide an overview of the situation for several materials, and the management SAP Fiori apps (such as the Manage Material Coverage) provide more details about the planning situation for a specific material.

When running an MRP SAP Fiori app for the first time, the system will need to define an area of responsibility (AOR), which is basically one or more combinations of plant and MRP controller. Figure 11 shows the popup window for defining an AOR. The AOR can be also changed at any time, by clicking the MRP Settings button in the user profile. Here, in addition to the AOR, you can also define whether the system will generate change requests, which we'll discuss in Section 3.6.

The area of responsibility will be automatically used for selecting the materials assigned to MRP controllers when we first run one of the monitoring SAP Fiori apps.
In the monitoring apps, the system will automatically calculate the shortages based on the shortage definition when the apps are launched. SAP provides standard shortage definitions, but you can also create new shortage definitions in customizing, as we'll see in Section 3.8. In all these apps, you can define filters to restrict the selection, save variants with different filters, and create new tiles to launch the SAP Fiori apps with a specific filter.

**Warning**

A maximum of 20,000 entries is selected by the MRP Cockpit SAP Fiori apps to ensure acceptable performance, so don't select too many plants and MRP controllers in an area of responsibility.

The management SAP Fiori apps will provide an overview of the stock/requirements situation, similar to the SAP GUI Transaction MD04. You can also switch to a graphical view of the shortage and let the system propose and simulate solutions to cover the shortages.

**Tip**

Use Transaction MD_MRP_FORCE_CLASSIC if you need to exclude one or more materials from being displayed in the MRP Cockpit SAP Fiori apps.

### 3.2 Monitor/Manage Material Coverage

The MRP SAP Fiori apps Monitor Material Coverage and Manage Material Coverage can be compared with the SAP GUI transaction stock/requirements list, which all provide an overview of the planning situation. The
The biggest difference is that, while the SAP transactions are based on the concept of exceptions, these SAP Fiori apps are focused on the concept of the shortage.

**Note**

In the first SAP S/4HANA release, this app was only capable of managing shortages in the net segment. However, as of SAP S/4HANA 1610, a new version of the app can manage shortages in both individual and net segments.

When the app is launched, materials under the AOR are listed and prioritized according to the shortage criticality, with a chart showing a graphical overview of the stock availability, as shown in Figure 12.

*Figure 12  Monitor Material Coverage App*
In this screen, you can add more filters to select only a subset of materials, restrict the time horizon, use a different shortage definition, and change the time horizon of the chart.

When you click a material number, a popup window provides an overview page of this material, including stock availability, details about the shortage, and details about the material master settings, as shown in Figure 13. From this popup window, you can open the material fact sheet or jump into the Check Material Coverage app.

![Material Overview Page](image)

**Figure 13  Material Overview Page**

If you mark one or more materials and then click on **Manage Materials**, as shown in Figure 12, you’ll jump into the Manage Material Coverage app, where you’ll see a detailed overview of the material coverage, as shown in Figure 14. On the left sidebar, you’ll see all the materials selected from the previous screen, and on the right, you’ll see an overview of the stock/requirements list for the highlighted material, including the available quantity, shortages, and receipts for this material. By switching tabs, you can review the material information or even add notes for this specific material.
**Figure 14** Manage Material Coverage App

For materials procured externally, you can select a specific shortage and try to solve it by generating new replenishment proposals or by changing an existing one. When you select one of those shortages, you’ll see different suggestions for new replenishment proposals for the sources of supply defined for this material as well as suggestions for changes in the closest existing replenishment proposal, as shown in Figure 15. Each suggestion receives a rating indicating how well it will solve the issue, including whether it can completely solve the issue or only partially solve the problem on the shortage date.
You can simulate shortage solutions and apply changes when one solution meets our requirements. Alternatively, if no proposed solution is good enough, you can simply accept the shortage, so that this material is no longer displayed as a shortage in the Monitor Materials Coverage app. The acceptance of shortages can be revoked at any time in both apps, so that those materials will appear again on the list of shortages.

![Figure 15 Solving a Material Shortage](image)

On this app, you also have the option of starting an MRP Live run for the selected material, or you can open the stock/requirements list or material fact sheet.

Additionally, by clicking the buttons highlighted in Figure 16, you can switch to the chart view of the material coverage, which provides a visual overview of the requirements and replenishment. The chart view is perfect for solving a material shortage, since you can simulate changes and use the chart to analyze the results.
3.3 Monitor/Manage Internal Requirements

The SAP Fiori apps Monitor Internal Requirements and Manage Internal Requirements focus mainly on the management of production and process order reservations with shortages. In the initial screen, you’ll see a list of the production and process order reservations for which a shortage has been identified, according to the shortage definition. By default, this app uses the ordered requirements Shortage Definition, which was designed specifically for this purpose; other standard shortage profiles cannot be used here.

As shown in Figure 17, each line represents a shortage for a different order reservation. The Quantity Overview column provides a graphical outlook for the reservation shortage, where gray represents the issued quantity, green represents the covered quantity, and red represents the actual shortage.

If you select an item and click Manage Components, you’ll jump into the Manage Internal Requirements app, where you’ll initially see the stock/requirements list, as shown in Figure 18, where you’ll see details about the shortage and possible replenishment elements.
3 Evaluating Your MRP Results in SAP Fiori

Figure 17 Monitor Internal Requirements

Figure 18 Manage Internal Requirements
The overall design of the Manage Internal Requirements app is similar to the Manage Shortages app; the main difference is that an additional tab, **Order Information**, is available and shows information about the reservation quantities. Additionally, you can open the parent production order directly from this app.

### 3.4 Monitor/Manage External Requirements

The Monitor External Requirements app is similar to the Monitor Internal Requirements app; the main difference is that the former focuses in shortages for sales orders, instead of reservations. The initial screen (see Figure 19) shows a list of sales orders with shortages within a given area of responsibility as well as a graphical overview of the sales order quantity, where gray represents the issued (delivered) quantity, red represents the shortage, and green the quantity available. On this screen, you can click the sales order number for an overview of the sales order details.

![Monitor External Requirements](image)

**Figure 19 Monitor External Requirements**

When drilling down into details of the items, the SAP Fiori app Manage External Requirements is opened. Similar to the Manage apps previously discussed, the main difference with this app is an additional tab with the sales order item information, with the ability to open the sales order itself.
Figure 20 shows the details found in the Manage External Requirements app.

The system cannot propose solutions for materials produced in-house.

<table>
<thead>
<tr>
<th>Date</th>
<th>MRP Element</th>
<th>Additional Information</th>
<th>Quantity (EA)</th>
<th>Available (EA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.04.2018</td>
<td>PlOrd 1011250-1</td>
<td>Standard production order</td>
<td>10</td>
<td>384</td>
</tr>
<tr>
<td>09.04.2018</td>
<td>PlOrd 1011250-1</td>
<td>Standard production order</td>
<td>96</td>
<td>96</td>
</tr>
<tr>
<td>09.04.2018</td>
<td>PlOrd 1011250-1</td>
<td>Standard production order</td>
<td>22</td>
<td>22</td>
</tr>
</tbody>
</table>

3.5 Monitor/Manage Production and Process Orders

Besides the SAP Fiori apps focused on order reservations, SAP S/4HANA also includes apps for monitoring and managing production and process orders. These apps are slightly different than the apps we’ve already seen, since they cover shortages as well as order delays and component availability.

When you open the Monitor Production Orders SAP Fiori app, you’ll have a list of production orders related to our area of responsibility. In the Status column, three icons will represent the material availability, missing
components, and date milestones, respectively. If all the icons are gray, everything is fine with our order (i.e., the material is on time, no components are missing, and the operations are on schedule). If a problem has arisen in one of these areas, however, the relevant icon will be displayed in red. Figure 21 shows the Manage Production Orders app; notice the icons in red for orders with problems.

![Monitor Production Orders](image)

**Figure 21 Monitor Production Orders**

Besides the icons, the app also shows us important information about the order, such as the order dates, quantities, status, delays in days, number of missing components, and components coverage.

**Tip**

Some relevant fields may not be shown in the standard layout, such as the **Late Quantity**, **Requirement Date**, and **Delay in Process** fields, for example. We can include those additional fields, save them in our own view, and set this view as the default.
If you select one or more orders and then click on Manage Orders, you’ll jump into the Manage Orders SAP Fiori app. This app also shows you the stock/requirements list on the initial screen; however, additional tabs provide access to details about the order’s components, milestones, materials, and other details. Icons will be shown in red if a date milestone has been missed or a shortage of components. Figure 22 shows the details of a production order with delays on the milestones; notice that the relevant icon is red. As shown in Figure 22, the actual release date was before the planned release, but the milestones for start, finish, and goods receipt were missed, and that’s why this icon is red.

![Manage Orders App](image)

**Figure 22 Manage Orders App**

This app also allows us to start MRP Live for this material, to open the stock/requirements list or the material fact sheet, or to display the order in the relevant transaction.
3.6 Manage Change Requests

Whenever you are changing an existing external replenishment proposal form one of the MRP Cockpit SAP Fiori apps, you have the option of first requesting this change to the vendor and then only applying the change after their response. To support and manage all your change requests, you can use the Manage Change Requests SAP Fiori apps. We have one app where we’ll see all the change requests, another that shows the new change requests, one that shows already-requested change requests, and a final one that shows already-answered change requests.

Figure 23 shows the Manage Change Requests SAP Fiori apps tiles. The basic design of those SAP Fiori apps is essentially the same; the main difference among these apps is that they show change requests with different statuses.

![Manage Change Requests SAP Fiori Apps](image)

Figure 23 Manage Change Requests SAP Fiori Apps

When you change an existing purchase order in the MRP Cockpit SAP Fiori apps, you’ll see the popup shown in Figure 24. Notice that you have three options for changing the document:

- **Change date/quantity now**
  Used when the change will be implemented immediately, without a change request.

- **Requested, waiting for answer**
  Used when the change was already requested of the vendor, and you are waiting for an answer. The change request will be created with the status Requested.

- **Request later**
  Used when you’ve identified a change, which will later be requested of the vendor. The change request will be created with status New.
When you open the Manage Change Requests SAP Fiori app, you’ll see a list of the change requests within the area of responsibility, as shown in Figure 25. For a new change request, you have the option of composing and sending an email to the vendor to request the change, or you can simply change the status to Requested, if you’ve already requested the change.

For a change already requested, you can define the vendor’s response as accepted and apply the changes, or you define the response as rejected and discard the change request. If the change request was rejected by the vendor, as a result, you still have to deal with a potential shortage; therefore, you also have the option of creating a new replenishment proposal to avoid the shortage. Figure 26 shows the details of a requested change request.
Figure 25  New Change Requests in the Manage Change Requests App

Figure 26  Change Request Details
3.7 Display MRP Material Issues

The SAP Fiori app Display MRP Material Issues shows a list of the materials for which an error occurred during the last MRP run. Since we no longer have the MRP list, which showed materials with errors during the MRP run, periodically checking the MRP run for errors using this SAP Fiori app is particularly important.

As shown in Figure 27, the app’s tile in the SAP Fiori launchpad will show the number of materials with errors, so we can quickly see if materials have errors, without even launching the app.

![Display MRP Material Issues Tile](image1)

**Figure 27** Display MRP Material Issues Tile

The SAP Fiori app displays a list of the issues, including the master data details, date and time of the last MRP run, and the message type, as shown in Figure 28. By selecting any one of these lines, you can see more details about the issue, such as the message text, message number, and message ID.

![List of Issues](image2)

**Figure 28** List of Issues
3.8 Customizing and Extensibility

When accessing the MRP customizing tree in SAP S/4HANA, you’ll see a new node called **Apps for Material Requirements Planning**, as shown in Figure 29. In this node, you can create a new shortage profile and assign the profile to specific users, so that the profile is used by default in the MRP Cockpit SAP Fiori apps.

![Display IMG](image)

*Figure 29 Apps for Material Requirements Planning Customizing*
The first customizing activity is **Define Supply and Demand Profiles**, where you'll define groups of supply and demand elements to be used later in the shortage profile. Basically, the elements defined in this customizing activity will be used in the shortage calculation. You can, for example, exclude a specific MRP planning element from the shortage calculation. Supply profile SAP0000000001 and demand profile SAP0000000001 are predelivered by SAP and don't usually need to be changed.

With the supply profile and the demand profile, you can create a new shortage profile in the customizing activity **Define Material Shortage Profiles**, as shown in Figure 30.

![Figure 30 Shortage Profile Customizing](image)

By double-clicking on the shortage profile, you'll jump into the **Define Shortage Material Definition** screen shown in Figure 31, where you can create or change profile shortage definitions. In this screen, you'll refer to the supply groups and demand groups created in the previous customizing activity. You may have several shortage definitions, each with different groups.

![Figure 31 Define Material Shortage Definitions](image)

By default, the SAP Fiori apps Monitor Internal Requirements and Monitor External Requirements will use the ordered requirements **Shortage**
**Definition.** The **Uncovered Demand** and **Check Components** flags will only be set with this shortage definition.

The **Material Flow** flag is generally relevant when using planning strategy 10. When using this planning strategy, the system considers only the planned independent requirements for the shortage calculation; however, if this flag is set, sales orders will be considered for the shortage calculation.

Finally, after creating a shortage profile, you should assigned the profile to users via the customizing activity **Assign Material Shortage Profile to Users**, so that the profile can be used by the MRP Cockpit SAP Fiori apps. The default standard profile delivered by SAP is used when no profile has been assigned to the user in this customizing step.

---

**Warning**

The MRP Cockpit SAP Fiori apps cache is updated automatically once a day, and a customizing change won’t take effect until the cache updates. However, the cache can also be manually updated with report PPH_MRP_SET_CACHE. You can also schedule this report to be executed once a day to avoid the cache update when the apps are launched.

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Besides the customizing activities related to the shortage profile, you’ll also find, in this new customizing node, a list of BADIs that you can use to extend MRP Cockpit SAP Fiori apps, including new columns. These BADIs can be quite useful for including custom fields or even adding a standard field that is not already available in the SAP Fiori apps.

The following BADIs are available for MRP Cockpit apps:

- **BADI_MRP_COCKPIT_PUR_PO**: User-Defined Field Transport for Purchase Orders
- **BADI_MRP_COCKPIT_PUR_PR**: User-Defined Field Transport for Purchase Requisitions
- **PPMRP_ENHANCE_SDIV_DETAILS**: Extensibility of Stock/Requirements and Shortage Lists
- **PPMRP_MAP_MATSHORT**: Extensibility of Material List
4 Improving MRP Live Performance

- PPMRP_MAP_MFGORD: Extensibility of Manufacturing Orders List
- PPMRP_MAP_UNCODEM: Extensibility of Uncovered Requirements List
- PPMRP_MAP_MFGORDCOMP: Extensibility of Manufacturing Order Components List
- PPMRP_MAP_MFGORDMILESTONES: Extensibility of Manufacturing Order Milestones List
- PPMRP_MAP_MFGORDOPER: Extensibility of Manufacturing Order Operations List
- PPMRP_ENHANCE_QUICKVIEW: Extensibility of Quickviews
- PPMRP_MAP_MATERIALORDER: Extensibility of Material Order List
- PPMRP_MAP_SUPPLIERMATERIAL: Extensibility of Vendor-Specific Material List

4 Improving MRP Live Performance

The main idea behind the creation of MRP Live was to use all the power of SAP HANA to improve the overall performance of MRP. In fact, MRP Live can be much faster than the classic MRP, but sometimes you’ll still need to make some adjustments and fine-tune performance. In this section, we’ll describe how to analyze MRP Live results from a performance point of view and how to optimize performance in MRP Live.

4.1 Analyzing MRP Live Performance Logs

The first step to optimize the performance of MRP Live is to understand how to analyze MRP Live performance logs. Understanding and analyzing the log results are key to bringing about improvements in performance through changes in the MRP Live technical settings, which we’ll discuss later in Section 4.3.
When you run MRP Live, you have the option of defining a name for the performance log, as shown in Figure 32. The name you provide can be used later to access the log via Transaction MD_MRP_PERFLOG (or report PPH_MRP_PERF) or in the SAP Fiori app Display MRP Key Figures. The performance log name is not a mandatory field, and a performance log is created even when the field is left empty. Instead, the log will be created with the user name and timestamp.

![Figure 32 Name for Performance Log in Transaction MD01N](image)

**Analyzing the MRP Live Logs in SAP Fiori**

The SAP Fiori app Display MRP Key Figures is particularly relevant when you need to analyze the MRP results from a technical point of view, in other words, focusing on performance and consistency of execution. The app shows a list of the current and past MRP Live executions, including the start date and time, total planning time, the number of materials planned, the number of materials with errors, and more details, as shown in Figure 33.
Figure 33 Display MRP Key Figures

By selecting one of these lines, you’ll jump into the MRP run details, which will include the selection criteria and parameters defined for the MRP run variant, along with more detailed information about the total execution time and numbers of materials planned.

For periodic MRP executions, you can also use a graphical overview (see the chart shown in Figure 34) in comparison with previous executions, including the number of materials planned and the elapsed time. This information is important and can help you compare the performance of previous MRP runs and identify possible performance issues before they become critical.

Figure 34 MRP Run History
If you select the **Low-Level Code Steps** option, the app will also show you, in detail, how many materials were planned in each low-level code with advanced planning (PP-DS), with MRP on SAP HANA, and with classic MRP, including how much time was spent in each step. This kind of information is particularly relevant for identifying possible performance bottlenecks during the MRP execution, since you can see exactly on which low-level code and step MRP spends the most time. Figure 35 shows an example of the low-level code steps executed by MRP during the planning run.

![Figure 35 Low-Level Code Steps](image)

You can also use the **All MRP Live Steps** option to see the details of each step executed by MRP Live. Using this option, the steps won’t be aggregated by low-level code, and instead, you’ll see, for example, details of every classic MRP parallel processing package.
Analyzing the MRP Live Logs in SAP GUI

In the SAP GUI Transaction MD_MRP_PERFLOG, you can filter previous MRP executions by User Name, performance Log Name, and Date, as shown in Figure 36.

![MRP Key Figures Selection Screen](image)

**Figure 36** MRP Live Performance Log Selection Screen

The results screen will show you a list of previous MRP executions, including the number of materials planned; the number of materials failed; the number of materials that could not be locked; and additional information related to performance, such as the time spent on SAP HANA, the time spent planning PP-DS materials, and the time spent in classic MRP, as shown in Figure 37. The icon shown in the Alert column means that MRP Live is still being executed or was aborted, either manually or because of an error. This information is similar to the information provided in the SAP Fiori app Display MRP Key Figures.

![MRP Live Performance Log](image)

**Figure 37** MRP Live Performance Log Results Screen

On this screen, you also have the option of seeing the MRP Live execution steps aggregated by low-level code by clicking the Details button. Or, you can see every step within a low-level code by clicking the All Steps button.
Figure 38 shows the detailed view of all the MRP Live steps where you can see several lines for each low-level code. By default, MRP splits the planning run into packages to avoid memory consumption issues, and each step involves a package of materials.

In Section 4.3, we’ll describe how you can influence, for example, the number of materials that should be planned on each step and how you can define a minimum number of materials to plan in SAP HANA, for example.

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**4.2 Optimal Performance with MRP Live**

The main advantage of MRP Live, when compared with classic MRP, is improved performance. Because MRP Live can be significantly faster than classic MRP, a background execution that used to take all night can now be finished in less than an hour. However, let’s review some points to consider, from a performance point of view, when running MRP Live.
First, you must understand that MRP Live was designed for mass processing. Often someone using an SAP S/4HANA system for the first time may be disappointed when trying to compare, for a single material, the MRP Live performance with the performance of classic MRP running. However, when comparing MRP Live and classic MRP runtimes for a whole plant, MRP Live should be much faster.

This difference occurs because, during the MRP Live execution, the SAP HANA optimizer takes some time to optimize the MRP code to be executed before the actual materials planning. The time spent with this process is fixed (does not depend on the number of materials to be planned) and takes place before calling the stored procedure in SAP HANA, which will execute the MRP planning. After the optimization, MRP using stored procedures in SAP HANA is much faster than in ABAP. This setup time before the actual materials planning has a high impact when planning a single material but is irrelevant when planning a whole plant.

**Example**

To compare classic MRP and MRP Live, consider a production line. Imagine that you have machines A and B in your production line. Machine A takes 1 minute to produce a piece but has no setup time, while machine B takes 10 seconds to produce a piece but requires 10 minutes of setup time. When producing a single piece, machine A will be faster, but if we want to produce a large number of pieces, using machine B makes more sense. In this case, classic MRP would be machine A, which is slower but has no setup time, and MRP Live would be machine B, which is faster but requires setup time.

Since MRP Live was designed for mass processing, you’ll see real performance improvement when processing huge chunks of data and thousands of materials. In fact, when processing a single material or a small number of materials, classic MRP can be even faster than MRP Live. SAP estimates that MRP Live performance becomes significantly faster than the classic MRP performance when planning involves more than 100 materials.

Another important factor to consider is the number of low-level codes to be planned. During the MRP Live execution, the MRP dispatcher is responsible
for defining which materials will be planned in ABAP and which materials will be planned in SAP HANA. The MRP dispatcher will call the stored procedures on SAP HANA and the classic MRP separately for each low-level code to ensure that parent materials will be planned before child materials.

Figure 39 shows the planning sequence during the MRP Live, and for each low-level code, the optimizer will take some time to optimize the SAP HANA code before the actual materials planning. As a result, if you can reduce the number of low-level codes, MRP Live will achieve better overall performance.
Another measure that can help you improve performance in MRP Live is to reduce the number of materials selected for planning. Materials for which the deletion flag has been set or whose material status forbids the MRP run will initially still be selected for planning. During the MRP execution, their planning file is read, the material is selected for planning, and only once the master data is read will MRP identify a restriction and discard a material for planning.

Having too many materials in this situation may have an impact on overall performance, which we can avoid by setting the MRP type ND (No Planning) for materials with the deletion flag or a status that forbids inclusion in the MRP run.

**Tip**

The low-level code is calculated when a material is inserted as a component in the BOM. However, if the same component is deleted from the BOM or if MRP type ND is set, the low-level code is not reduced. By running the report RDISCALC, low-level codes will be recalculated, which may improve performance in MRP Live by reducing the number of low-level codes. After running report RDISCALC, report PPH_SETUP_MRPRECORDS should be used to update the planning file.

Finally, the most important measure to improve performance in the MRP Live is to reduce the number of materials to be planned in ABAP with the classic MRP logic. As mentioned in the “MRP Live” section, materials using some specific settings cannot yet be planned in SAP HANA during the MRP Live execution, and the MRP dispatcher automatically identifies those restrictions, triggers the classic MRP logic, and plans those materials in ABAP. On one hand, this procedure has advantages, since you can plan all materials in the same transaction; on the other hand, however, planning too many materials with the classic MRP logic is undesirable from a performance point of view.

Of course, situations exist where you need to have a material planned with the classic MRP logic, but whenever possible, you should aim to reduce the
number of materials being planned in ABAP to achieve optimal performance in MRP Live. As mentioned in Section 2.4, Transaction MD_MRP_FORCE_CLASSIC can play an important role by showing a list of materials for which messages were triggered during the MRP. This transaction can also tell us if a material was planned in classic MRP or in MRP Live. As shown in Figure 40, a flag in the Restriction column indicates that a material had to be planned in ABAP due to a restriction.

![Image](image.png)

**Figure 40** Transaction MD_MRP_FORCE_CLASSIC Showing Materials with Restrictions

A best practice is to also run Transaction MD_MRP_FORCE_CLASSIC periodically after the MRP execution and analyze which materials could not be planned due to an error and which materials had to be planned with classic MRP. By minimizing the number of errors, you can ensure that all materials are being properly planned, and by reducing the number of materials planned with the classic MRP logic, you can improve the performance of MRP Live.

### 4.3 MRP Live Technical Settings

In the previous section, we analyzed several options to achieve optimal performance in MRP Live by implementing functional changes. However, you can also fine-tune performance in MRP Live with changes in the technical settings.

These technical settings allow you to change, for example, the maximum number of locks, the parallelization, the number of processes in SAP HANA, or the package size.
Unfortunately, no customizing transaction is available for changing MRP Live’s technical settings; instead, these settings are changed directly in table PPHMRPSET. If no entry exists for a technical setting in this table, then a new entry should be created; however, if an entry already exists, this entry should be updated, since only one entry for each setting should exist in the table. An ABAP report can be created to update the entry in this table. Also, when creating an entry in the table, you don’t need to set a value for each field, since the default value will be used for empty fields. Therefore, you only need to set values for the fields you would like to change.

The following fields should exist in table PPHMRPSET:

- **MAXLOCKS**
  MRP Live needs lock material/plan combinations during MRP. When planning a small set of materials, locks can be created at the material level; however, if too many materials are locked, the enqueue server will be overloaded, causing a general drop in system performance. Therefore, by default, if MRP Live needs to lock more than 200 materials, the system locks at the plant level. This parameter allows you to increase or reduce this limit.

- **NUM_PROC_HANA**
  By default, MRP Live runs in one SAP HANA process; however, this parameter allows you to increase the number of SAP HANA processes that will be used, thus increasing the CPU load and improving the performance of MRP Live. Any changes in this parameter should be discussed with your system administrator to avoid shortages of system resources in other areas.

- **PACK_SIZE_HANA**
  This parameter controls the size of each package, that is, how many materials will be included in each package. MRP Live will try to create packages larger than this number, whenever possible.

- **MAX_HANA_MRP**
  This parameter can be used to limit the number of materials to be used in a single package to avoid memory consumption issues. The default value for this parameter is 100000.
THRESH_2 and THRESH_4

MRP Live uses SAP HANA internal parallel processing, either 2-fold or 4-fold. These fields will define the minimum number of materials to trigger SAP HANA internal parallel processing.

Note

SAP Note 2003405 provides more information about each of these parameters, including examples that explain system behavior when changing these parameters.

Table PPHMRPSET also includes the following parameters that can be used to influence the parallelization of classic MRP, when materials need to be planned in ABAP in Transaction MDOIN:

- **NUM_PROC_ABAP**
  This parameter defines the maximum number of parallel tasks that can be used by classic MRP in Transaction MDOIN, similar to the customizing activity **Maximum Number of Tasks** used by the classic MRP transactions. The default value is 8.

- **ABAP_PACKAGE_SIZE**
  This parameter defines the maximum number of materials in ABAP MRP packages. The default value is 20, and before making any changes, remember that a large package may lead to memory consumption issues, especially for materials with too many planning elements.

- **MIN_HANA_MRP**
  As discussed earlier, SAP HANA is quite good at processing large packages of materials, but ABAP can be faster for processing a small package. Therefore, you can use this parameter to define a minimum number of materials to plan on SAP HANA. You can determine if changing this parameter is necessary by analyzing the MRP Live performance logs and comparing the runtime of small packages in ABAP and in SAP HANA.
- **HANA_ABAP_PARALLEL**
  By default, the system plans first on SAP HANA and then in ABAP because usually only a small number of materials is planned in ABAP. If too many materials are planned in ABAP, however, you can use this parameter to trigger SAP HANA and ABAP tasks in parallel. Using this parameter may introduce overhead into the MRP runtime.

- **PURREQ_POSTPROC_PACK_SIZE**
  When purchase requisitions are created by MRP Live, a postprocessing task is created to finalize the purchase requisitions. To avoid creating a huge number of locks, this postprocessing task is triggered in packages, but you can use this parameter to increase or reduce the default value.

- **NUM_PROC_POSTPROC**
  This parameter determines the number of parallel tasks to be used for postprocessing.

---

**Note**

Each of these parameters will be valid for the entire MRP Live execution. In some specific situations, however, you may need custom logic to define these parameters for each low-level code. A classic example is when a finished product involves complex configurable materials. In this case, you may need to define smaller packages to low-level code 0 to avoid performance issues. You can use method DISPATCH_GET_PARAMETERS of enhancement spot ES_PPH_MRP_DISPATCHER_BADI to define smaller packages.

No specific configuration for these parameters can be optimal for all situations. The optimal settings will vary according to the number of materials to be planned in SAP HANA and in classic MRP, the system resources available, your hardware, and so on. Also, no simple way exists for defining the best combination of parameters for a system; the only way to determine the best combination of parameters and values is to change those values and then analyze the MRP Live performance logs to evaluate their impact on the overall MRP performance.
5 Migration at a Glance

This section describes what you should consider when migrating to SAP S/4HANA, from an MRP perspective. We'll touch upon all the mandatory master data and customizing changes as well as the reports that can be used to make the migration process less complicated.

5.1 Migration Roadmap

When migrating to SAP S/4HANA, customers don't necessarily need to start using MRP Live. Classic MRP can still be used to minimize the changes, and the adoption of MRP Live can start gradually, since both classic MRP and MRP Live can coexist and be used in the same SAP S/4HANA system. From the many differences observed in MRP Live, the most relevant is the fact that MRP Live won't generate MRP lists, which may be missed by a few customers who have custom reports based on the undelaying MRP list tables.

In a similar way, the old SAP GUI transactions can still be used, even in the SAP Fiori launchpad, while users get used to the new MRP Cockpit SAP Fiori apps. In a long term, however, users will find the value in the SAP Fiori apps, since they provide additional features and benefits that cannot be found in the SAP GUI transactions, such as simulations for solving shortages, apps focused in specific roles, and an intuitive design for a better user experience.

The MRP simplifications, however, are mandatory, and there will be changes in processes like subcontracting and storage location planning, where MRP areas are now mandatory and the sourcing logic has also changed.

In the long term, embedded PP-DS can be implemented to work together with MRP Live, providing more advanced algorithms for planning and advanced features for scheduling and capacity leveling.
Demand-driven MRP is also an additional feature that can be implemented in the long term, but this feature requires close alignment with business users, as a drastic change in the planner mindset will be implemented.

5.2 Migration Guide

As discussed in Section 1.2, several simplifications related to MRP are found in SAP S/4HANA, and you'll need to implement some customizing and master data changes during the migration. This section describes in detail the steps to carry out during the migration, such as master data changes and customizing changes as well as reports that you can use to reduce the manual work when migrating to SAP S/4HANA.

Storage Location Planning

Storage locations planned separately or excluded from MRP should now be converted to storage location MRP areas; therefore, one migration step is to create MRP areas for all the relevant storage locations in customizing.

SAP offers the report MRP_AREA_STORAGE_LOC_MIGRATION to support the conversion to storage location MRP areas when migrating to SAP S/4HANA. The SAP S/4HANA conversion pre-checks will trigger an error if the MRP Storage Location checkbox has been selected in any material. Then, you should run the report MRP_AREA_STORAGE_LOC_MIGRATION for a more detailed check of the system. This report will first check if the necessary configuration is in place in the system, such as the MRP types, lot-sizing procedures, and MRP areas. If all the customizing exists, the report automatically creates the MRP area assignments for materials with storage locations planned separately or excluded from MRP.

Otherwise, if any customizing is missing for the conversion, the report will point out what is missing and which materials need to be examined. After making the necessary adjustments in customizing, the report should be executed again to create the MRP area assignments. Figure 41 shows the output of the report when MRP area customizing is missing.
**Subcontracting**

The subcontracting process should also be managed with subcontracting MRP areas in SAP S/4HANA; otherwise, from an MRP perspective, no separation between the stock provided to the vendor and the plant stock exists.

Therefore, creating subcontracting MRP areas for all vendors involved in the subcontracting process is a necessary step during migration. In the subcontracting scenario, no report can be executed for converting master data, and creating MRP areas in customizing is enough for this process to work. Assigning each subcontracting MRP area to the material master is no longer mandatory, and instead, the materials will be planned using the default planning parameters to simulate the old subcontracting logic, when no assignment in the material master exists.

Subcontracting MRP areas are created in the customizing Transaction OMIZ, and areas should be created with MRP area type 03, as shown in Figure 42. One, and only one, subcontractor should be entered for each subcontracting MRP area. All subcontracting requirements and replenishment proposals for this specific subcontractor can be shown under this MRP area via MRP Cockpit apps or SAP GUI transactions.
Warning

MRP areas are created in customizing with reference to the business partner, which is master data. When business partners are created with internal number range assignments, the business partner number may be different in development and productive systems. Therefore, you may need to open the customizing transaction in the productive system and manually adjust the MRP area customizing.

The MRP area can be assigned to the material master; however, you can also define specific MRP settings at the MRP area level, such as a different MRP type or a different lot-sizing procedure for the MRP area. SAP offers the standard reports RMMDDIBE and RMMDDIBEO2, which can be used for mass processing of MRP areas. With these reports, you can create, change, copy, or set the deletion indicator for MRP areas at the material master level.

Simplified Sourcing

In the first SAP S/4HANA release, migrating to simplified sourcing was a relevant step, since the new Automatic Sourcing flag should be set at the info record level to make a source of supply relevant to MRP. This logic can be reviewed later. If you’re migrating to SAP S/4HANA now, don’t worry about
the logic, since the source list is again relevant to source determination, with a higher priority than the info record. As a result, in the latest releases of SAP S/4HANA, MRP will select a source of supply if a valid source list exists that is relevant to MRP.

In new SAP S/4HANA implementations, however, you'll need to determine if creating a source list is really necessary or whether having business users set the Automatic Sourcing flag in the purchasing info record would be easier. While setting the flag in the info record is a simpler solution, the source list allows you to prioritize a source of supply on a restricted time horizon, thus allowing more control over the source determination logic.

**Production Versions**

Creating production versions is now mandatory so that the BOM and the routing are selected during the MRP run. To facilitate migration, SAP now provides the reports CS_BOM_PRODVER_MIGRATION and CS_BOM_PRODVER_MIGRATION02, which can automatically create production versions in an SAP S/4HANA system.

Report CS_BOM_PRODVER_MIGRATION was delivered in the earliest SAP S/4HANA releases to create valid production versions for each valid BOM; however, this report does not consider routings.

Report CS_BOM_PRODVER_MIGRATION02 was delivered by SAP Note 2463759 and is available in the latest releases. This report can create a production version for each valid BOM and routing combination, which means that production versions will be created not only with the BOM, but also with the routing. Figure 43 shows the selection screen for this program. Some available options include creating a production version only if a valid routing exists, only if the BOM and routing alternatives match, only when a BOM allocation exists for the routing, based on production orders, or if unchanged production versions should also be considered.
**Warning**

To create a large number of production versions, the report should be executed in the background to avoid a timeout.

**Planning File**

The planning file was also enhanced to work with an SAP HANA database and is now stored in the new table PPH_DBVM. Therefore, when converting to SAP S/4HANA, a mandatory step is to migrate the planning file to the new table.

You should use the standard report PPH_SETUP_MRPRECORDS to set up all the planning file entries in the new table; Figure 44 shows the report selection screen.
Tip

When running this report for the first time to set up planning file entries, the Regenerative flag should be selected to ensure that all materials will be planned in the first MRP run. If this report is only executed for a consistency check after the conversion, then this flag should not be selected.

Custom Code

One of the important steps during the conversion to SAP S/4HANA is to review the custom code related to MRP. If classic MRP will be used, then the data of a few BAdIs, such as MD_MRP_CHANGE, can no longer be called, and BAdI MD_ADD_ELEMENTS should be implemented instead.

If MRP Live will be used, however, all ABAP-based MRP BAdIs should be reviewed and converted to their respective AMDP BAdI.

BAdIs

In SAP S/4HANA, the MRP code was optimized for running on an SAP HANA database, which means that some code was pushed down into SAP HANA for better performance.
**Classic MRP**

In classic MRP, the code for reading planning elements from the database was pushed down into SAP HANA, which means that all ABAP-based BAdIs for reading planning elements from the database can no longer be called. **For example, the BAdI MD_CHANGE_MRP_DATA, which was called for each MRP element after it was read from the database has been replaced by the BAdI MD_ADD_ELEMENTS, which is called after all the elements are read from the database.**

**MRP Live**

In MRP Live, all the MRP logic has been pushed down into SAP HANA, which means that all ABAP BAdIs are no longer relevant. To replace preexisting ABAP BAdIs, SAP has provided new AMDP BAdIs, which are executed directly in SAP HANA.

Therefore, if you have any ABAP BAdI implementations for MRP, you’ll need to migrate them into an AMDP BAdI, so that they can be executed in MRP Live. SAP Note 2268085 provides a list of all the classic ABAP BAdIs and their corresponding AMDP BAdIs.

If desired, you can run Transaction MD_MRP_FORCE_CLASSIC to force a material to be planned in ABAP when running MRP Live. From a performance point of view, we don’t recommend this option, but you can use this transaction to ensure that an ABAP-based BAdI will be called for a specific material and avoid the conversion to AMDP BAdI.

The AMDP BAdIs most frequently used during an MRP Live implementation include the following:

- **MRP_DISPATCHER_BADI**
  
  Can be used to include additional fields as selection criteria for the MRP Live execution in Transaction MDO1N.

- **PPH_MRP_SOURCING_BADI**
  
  Can be used to influence the results of source determination. With this BAdI, you can change the system’s behavior to generate planned orders
for externally procured materials. Also, SAP provides an example implementation that deactivates simplified sourcing.

- **PPH_MRP_RUN_BADI**
  Can be used to change purchase requisitions or planned orders created by MRP.

- **PPH_MRP_RUN_BADI**
  Can be used to change MRP elements for the MRP Live execution.

- **PPH_MRP_NETTING_BADI**
  Can be used to select a specific set of materials to be planned by MRP, replacing enhancement M61X0001 which was often used in classic MRP. This BAdI can also be used to influence the MRP run parameters.

- **PPH_MRP_LOTSIZING_BADI**
  Can be used to influence the MRP run parameters.

**MRP Lists**

The MRP list was created in the earlier SAP releases, while running the stock/requirements list could take a long time for some materials with long lists of MRP elements. In the MRP list, the results from MRP were saved into a single table. Reading this table was much faster than reading each MRP element from its own table.

With the evolution of hardware and databases, however, performance is no longer a problem for running the stock/requirements list, which is now usually preferred, since it is dynamically updated.

MRP lists will be no longer be created by MRP Live, which could pose a problem for some customers who are accustomed to analyzing MRP results using the MRP list or if custom reports have been based on the underlying tables MDKP, MDTB, and MDTC.

Custom MRP reports that read data from the MRP list tables can be adjusted to read the information dynamically using BAPI_MATERIAL_STOCKREQ_LIST.
Note
By default, BAPI_MATERIAL_STOCKREQ_LIST doesn’t read data from the database using optimizations for SAP HANA. However, SAP Note 2122700 describes how to use the pre-read function module PPH_STOCK_REQ_LISTS_PREREAD to improve the performance of the custom report.

Total Requirements
MRP Live and classic MRP will no longer use total dependent requirements and total sales order requirements.

Total dependent requirements are not common and are generally used in repetitive manufacturing, when the Aggregate Requirements flag is set in the repetitive manufacturing profile. In SAP S/4HANA, this setting no longer exists; therefore, we won’t worry about this kind of aggregated requirement during the conversion.

Total sales order requirements are created when the total dependent requirements per day setting was defined in the availability check checking group (Transaction OVZ2). This setting can no longer be changed in SAP S/4HANA, and the value is set to use single requirements. If you’re converting a system with total sales order requirements and records exist in table VBBS, you should run report SDRQCR2I, which performs a consistency check in sales order and delivery requirements; you shouldn’t see any records in table VBBS after executing the report.

Note
If you’d like to learn more about MRP, the following SAP Notes were used as references for this E-Bite and may be of use to you:
- 1914010 – MD01N: Restrictions for Planning in MRP Live on HANA
- 2023766 – MRP Live/MRP Classic: Performance Information
- 2268045 – S4TWL – Storage Location MRP
- 2268088 – S4TWL – Planning File
- 2268044 – S4TWL – PP-MRP – Subcontracting
6 What’s Next?

Now that you understand MRP in SAP S/4HANA, you’re ready to take a closer look at the other logistics functionality SAP S/4HANA can offer. Whether you’re brand new to the SAP S/4HANA world or looking to see what’s new in 1709, there’s so much to learn!

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Caetano Almeida is a Center of Expertise support architect at SAP. He has ten years of experience in manufacturing and supply chain management, with a focus on production planning and MRP.
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