



Capacity Planning with SAP S/4HANA®

- › Configure capacity planning in SAP S/4HANA with step-by-step instructions
- › Perform capacity monitoring, evaluation, and leveling with new SAP Fiori apps and classic transactions
- › Leverage embedded analytics to report on capacity planning

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Chapter 4

Calculating Capacity Requirements

This chapter provides a detailed exploration of how SAP S/4HANA calculates, distributes, cumulates, and reduces capacity requirements across the production environment. Capacity requirements represent the workload that orders impose on resources such as machines, labor, and production lines. By understanding how these requirements are generated and adjusted, you can ensure that your capacity evaluations and leveling activities are based on accurate, realistic data.

So far, you've learned how to set up and configure your business process based on your needs and have a clear understanding of the standard capabilities that SAP S/4HANA has available within production planning for capacity planning. Similarly, now you're also able to create and maintain the relevant production master data to execute capacity planning scenarios.

In this chapter, you'll learn about the starting point of the actual capacity requirement calculation, the elements that serve as inputs to enable the calculation, and how to make adjustments to those elements.

4.1 Introduction to Capacity Requirement

In SAP S/4HANA, the capacity requirement is used in several areas and is generated based on the orders type definition and the load of the resources needed to process them. Commonly used order types that are relevant for production/process orders in manufacturing include the following:

- **Planned orders**
Used in material requirements planning (MRP), master production scheduling, long-term planning and repetitive manufacturing.
- **Work orders**
Used in plant maintenance.
- **Networks**
Used in Project System (PS).
- **Sales and operations planning (S&OP) data**
Used for rough-cut capacity planning.
- **Sales orders, assembly orders, or networks**
Used in sales and distribution.

In manufacturing, for production planning, the relevant order types include the following:

- **Production orders**
Used for discrete manufacturing during execution.
- **Process orders**
Used for process industries during execution.
- **Planned orders**
Used during the planning phase to identify and quantify the resources or work centers necessary to produce a material based on the required quantity and date. When dates and quantities are defined, a specific requirement shows how much capacity output is needed for an individual order in a specific time frame.

This is a critical component that provides a big benefit by enabling a bridge to fit the gap between the MRP results and the actual production execution, because MRP ignores the capacity constraints of the plants and only calculates the need based on the amount and date requirements. As mentioned on previous occasions, MRP can't know if there is sufficient capacity and always provides planned orders as though there was unlimited capacity. Now, with the calculation of the capacity requirements, it's possible to identify when a capacity overload occurs and allow leveling to reschedule or dispatch orders that are planned or even running simultaneously using the same work center at the same time. With this, unrealistic schedules won't happen, avoiding issues with delivery dates and ensuring the commitment to customers by acting in advance before firming the orders.

Calculation of the actual capacity requirement is fundamental for balancing production capacity with demand. This helps avoid overloads that lead to overcommitments, as well as underutilization of work centers and resources that can result in unnecessary costs.

Some of the key activities and objectives when identifying the capacity requirements are listed here:

- Determine which work centers overloaded during production.
- Highlight how much capacity is needed within each work center.
- Resolve capacity overloads through leveling.
- Provide an alternative for balancing and dispatching by knowing when the capacity of the work center is needed.

4.2 Sources of Capacity Requirements

In SAP S/4HANA, *work centers and routings* contain special information for scheduling and determination of the capacity requirements of orders. Those two types of production master data were explained as part of Chapter 3 and effectively analyzed to understand how their fields can impact the capacity requirements planning process.

First, let's talk about the relevance of the work center. The **Work Center** field defines the standard values and the formulas for calculating the capacity requirements and the

duration of each operation. In other words, this field describes the time or predefined activities that can be carried out at a work center. It plays a crucial role in controlling scheduling parameters as described in the configuration and the calculation of the capacity requirements of an order.

The **Standard Value Key** field determines the planned standard values of an operation in the **Standard Value Overview** table located in the **Basic Data** tab of the work center (see Figure 4.1). In our previous examples, we’ve always maintained the typical three activities—Setup, Machine, and Labor—to form the foundation of the capacity calculation. For more information, refer to Chapter 3, Section 3.3.

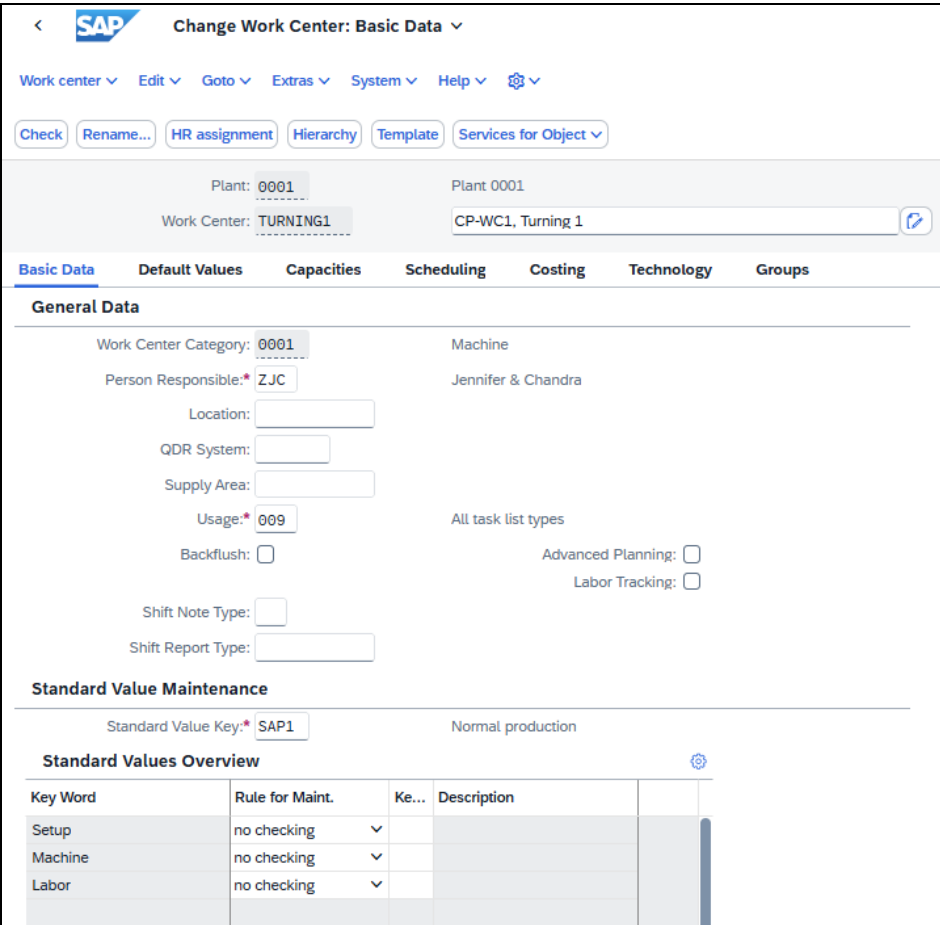


Figure 4.1: Standard Value Key and Overview Maintained in the Work Center via the Basic Data Tab

Then, when navigating the **Capacity** tab in the work center, we’ve maintained the formulas used for the operation segments and the details of each capacity category to determine the daily standard available capacity defined. The formulas help us calculate the capacity requirement of the operation for each of the segments (setup, processing, and teardown), which are basically used to break down operational activities in discrete manufacturing.

Note

The formulas must be well maintained to allow the capacity requirements calculation for the relevant operation segment or operations. If you use formulas with parameters that refer to the standard values, you must enter the standard values of individual operations either in the routing or the order; otherwise, no calculation of capacity requirements will take place.

For **Capacity category 001 Machine**, we've maintained the **Setup Formula** as "SAP005" and **Processing Formula** as "SAP006" (see Figure 4.2), with both formulas configured using the checkboxes to indicate they are relevant for the following:

- Generate the execution of the formula
- Allowed for calculation
- Allowed for capacity requirement

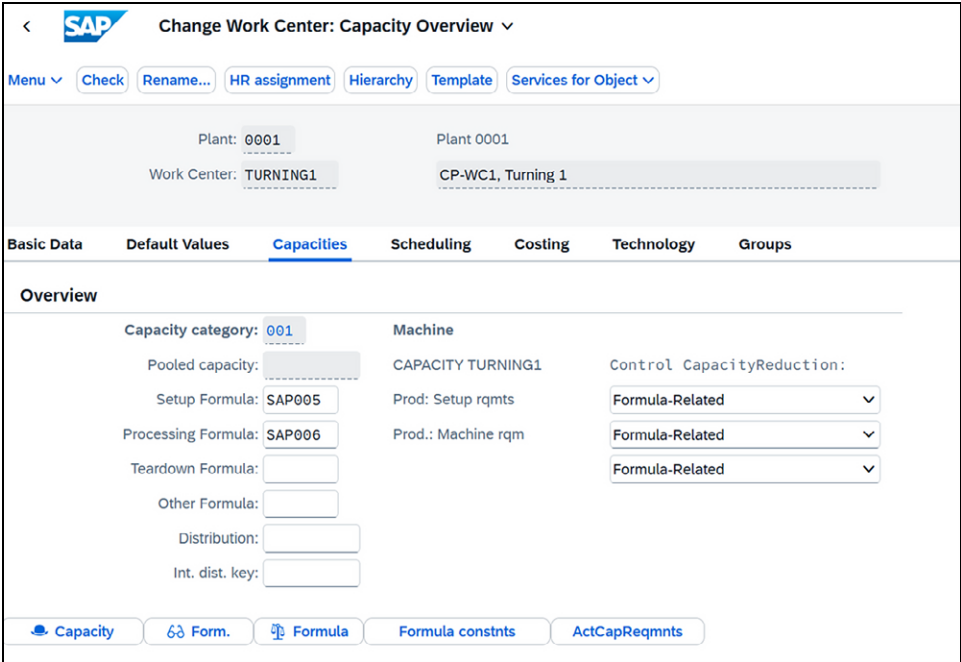


Figure 4.2: Capacities Tab of the Work Center

Note

Formula details were already explained in Chapter 2 and Chapter 3. However, you can quickly access and maintain the details of the formulas under Transaction OPK3 or by selecting the **Form.** (display formula) button at the bottom of the **Change Work Center: Capacity Overview** screen.

The formulas typically have dependencies on operation values and standard values that are declared in the routing, which is another integration point with the production master data used during the determination of the capacity requirements calculation. A work center can be used to make different materials, but the routing is the key figure to indicate how a particular bill of material (BOM) is produced. It includes the real **Operation Values**, **Standard Values**, and **Control Key** details, which will be the input for the capacity requirements calculation, as shown in Figure 4.3. Similarly, the details to maintain the control key and operation times for each operation in the routing were already explained in Chapter 2 and Chapter 3.

Op...	SOp	Work Ce...	Plant	* Control Key	Stand...	Description	Lo...	PRT	CL...	O...	Pe...	Cu...	Su...	Base Quantity	Un...	Setup	Unit	Activit...	Machine	Unit	Activit...	Labor	Unit	Activit...
<input type="checkbox"/>	0010	TURNING1	0001	PP01		Turning Machine 1								1	EA	10	MIN		60	MIN		60	MIN	
<input type="checkbox"/>	0020	TURNING2	0001	PP01		Turning Machine 2								1	EA				30	MIN		10	MIN	
<input type="checkbox"/>	0030	DRILLING	0001	PP01		Drilling machine								1	EA	10	MIN		20	MIN		10	MIN	
<input type="checkbox"/>	0040	FINICLN	0001	PP01		Finishing								1	EA				10	MIN				
<input type="checkbox"/>	0050	FINICLN	0001	PP01		Clearing								1	EA				10	MIN				
<input type="checkbox"/>	0060		0001											1	EA									
<input type="checkbox"/>	0070		0001											1	EA									

Figure 4.3: Operation Overview of a Routing

Putting it all together, the system uses the information from the work center (where the formula key is defined) and the operation relevant to each capacity category. When an order is created or released, the capacity requirements formula is executed using the configured values to calculate the setup, processing, and teardown times. Figure 4.4 shows how this information comes together.

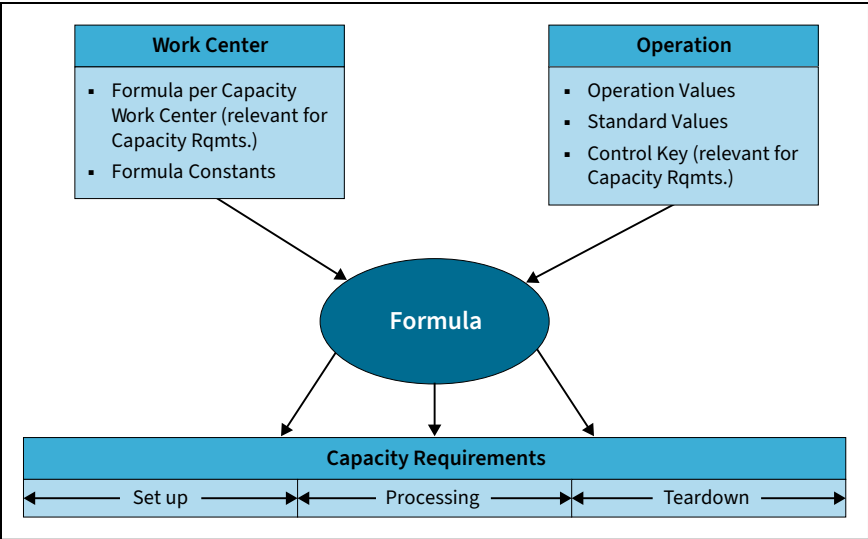


Figure 4.4: Calculation of Capacity Requirements

Now let's proceed to an example of creating a production order and reviewing how the capacity requirements are determined. For this exercise, you'll manually create a production order in Transaction CO01 or in the Create Production Order app, and then click **Add Field** in the selection criteria on the initial screen. Once you create a semifinished **Material** named "S4H_HALB_001" for **Production Plant** "0001" with **Order Type** "PP01", click on **Continue** or press **Enter**, as shown in Figure 4.5.

Figure 4.5: Production Order Create: Initial Screen

Note

The structure of the BOM, work center, routing, and production version were described in Chapter 3.

The **Production Order Create: Header** screen appears, as shown in Figure 4.6. Here, you'll set **Total Qty** to **1 EA** (1 unit to produce) and **Scheduling Type** to **Current date**. Press (Enter), and the basic dates and scheduled dates on the order are determined by adopting the values defined from the routing and carried out in scheduling. After this step, your order status is **CRTD**, which you can see in Figure 4.6. On the **General** tab in the **Dates/Times** section, the **Basic Dates** are **29.09.2025** to **30.09.2025** while the **Scheduled** dates—starting on **29.09.2025** at **6:00 am** and finishing on the same date at **8:48 am** are more specific and determined with the exact values based on the operative time defined on the routing. (This calculation will be further explained in Chapter 5, Section 5.2.)

Note

No order number is assigned yet because the order hasn't been saved at this point of the exercise.

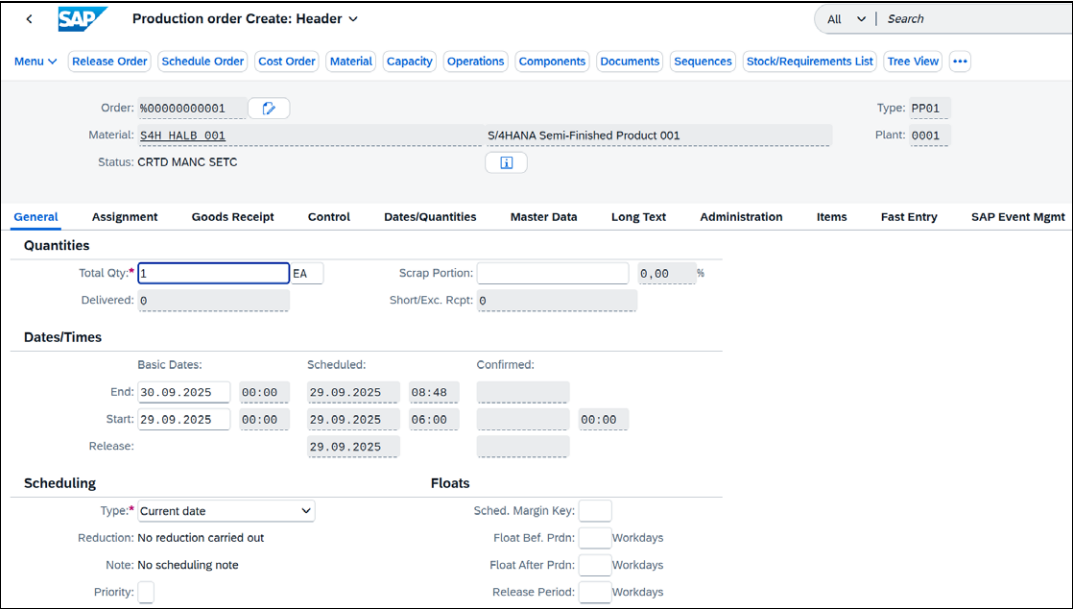


Figure 4.6: Basic and Scheduled Dates/Times Determined After Creating the Order

Now, to review the calculated capacity requirement, let’s check the **Operation** tab overview by clicking the **Operation** button on the production order. The **Production Order Create: Operation Overview** screen appears, as shown in Figure 4.7.

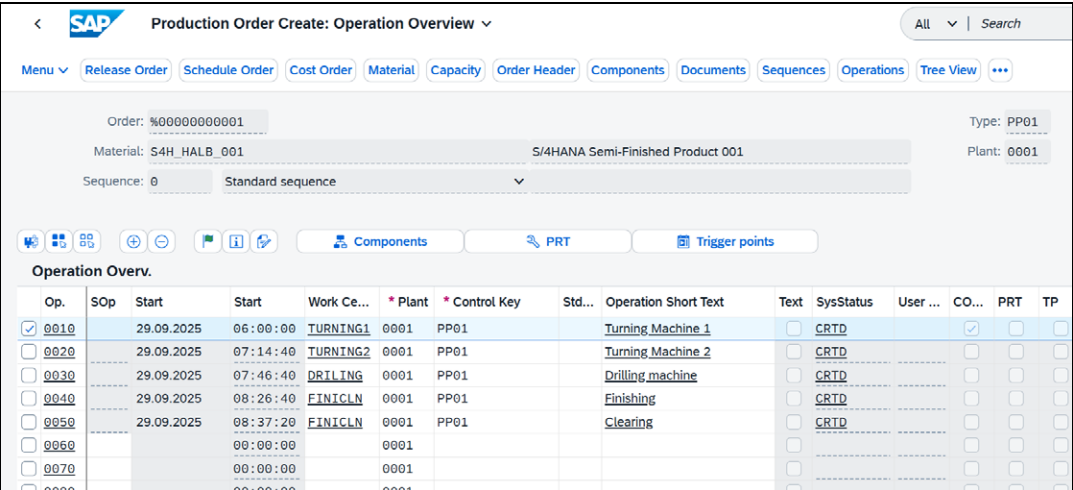


Figure 4.7: Production Order Create: Operation Overview

To validate the capacity requirement calculation, we have to deep dive on each operation. To do this, double-click on the first **Op. 0010** to open the **Production Order Create: Operation - Details** screen. From here, you must move to the **Cap Rqmt Assignment** tab and review the **Split allocation** section, as shown in Figure 4.8.

Order: %000000000001
 Material: S4H_HALB_001 S/4HANA Semi-Finished Product 001
 Operation: 0010 / Op. Short Text: Turning Machine 1
 Work Center: TURNING1 / 0001 Control Key: PP01 Operation ID: 00000001
 System Status: CRTD Confirmation: 0

Capacity splits
 For capacity category
 Capacity cat.: 001 Machine

Split allocation
 Latest dates/start: 29.09.2025 06:00 Op. Qty: 1 Rqmnt: EA 1.17 HUR

Sp1	D	Capacity	Date	Time	Split quantity	Rqmnt
<input type="checkbox"/>	1		29.09.2025	06:00		0,00
<input type="checkbox"/>	2		29.09.2025	06:00		0,00
<input type="checkbox"/>	3		29.09.2025	06:00		0,00
<input type="checkbox"/>	4		29.09.2025	06:00		0,00
<input type="checkbox"/>	5		29.09.2025	06:00		0,00
Remaining: 1						1.17

Figure 4.8: Production Order Create: Operation: - Details (Capacity Rqmt Assignment Tab)

The system has calculated that for the first operation, having maintained the **Capacity cat. "001" Machine**, the capacity requirement at the operation level is equal to **1.17 HUR** (hours). Now, let's review how this was calculated based on our selections.

The following formulas were assigned to the **Capacity cat. 001 Machine** for **Work Center TURNING1**:

- **Setup Formula:** $SAP005 = Setup \times Operation\ splits$
- **Processing Formula:** $SAP006 = Machine \times Operation\ quantity \div Base\ quantity$
- **Teardown Formula:** No values

After referring back to Figure 4.3 and Figure 4.6, we collect the following data:

- Operational times (standard values in operation 0010) – Setup: 10 MIN and Machine: 60 MIN
- Base quantity on routing (BMSCH) = Operational quantity (MGVRG)
- Operation splits = 1

When inserting this information into the corresponding formulas, we get the following:

- **Setup Formula:** $SAP005 = 10 \text{ MIN} \times 1 = 10 \text{ MIN}$
- **Processing Formula:** $SAP006 = 60 \text{ min} \times (1 \div 1) = 60 \text{ MIN} = 1 \text{ HUR}$
- **Teardown Formula:** 0

The calculation of the total capacity requirement per operation will be the sum of all the operation capacity requirements, as follows:

Operation capacity requirement = Setup capacity requirement + Processing capacity requirement + Teardown capacity requirement

Operation capacity requirement = 10 MIN + 60 MIN + 0 MIN = 70 MIN = 1.17 HUR

Note

Be aware that in capacity planning, you only see the total requirements for an operation for operations with operation segments, not the capacity requirements of individual operation segments.

Note

Even though operation 0010 has 60 additional minutes associated with labor activities, this doesn't affect the capacity calculation. This is because the work center capacity doesn't use a formula that depends on labor activities, unlike the typical formulas for capacity category 002.

4.3 Distribution of Capacity Requirements

The distribution capability specifies how the system can distribute the capacity requirement of an operation that spans several days. In this way, you can distribute the requirement across specific periods. For example, this is used during capacity evaluation, extended evaluation, when managing the capacity table for capacity leveling, when dealing with a long production time in repetitive manufacturing scenarios, and in S&OP.

The distribution key is the main parameter that distributes the capacity requirement over the duration of the operation and depends on the capacity category set in the work center. Each **Capacity category** can be assigned one **Distribution** key. Figure 4.9 displays the **Change Work Center: Capacity Overview** screen where these settings are found.

When no distribution key is selected, as in our example, the system uses distribution key SAP000 by default. With this distribution key, all the capacity requirements for an operation are loaded at the start day for the operation.

Basic Data	Default Values	Capacities	Scheduling	Costing	Technology	Groups
Overview						
Capacity category: 001		Machine				
Pooled capacity: <input type="text"/>		CAPACITY TURNING1		Control CapacityReduction:		
Setup Formula: SAP005		Prod: Setup rqmts		Formula-Related <input type="text"/>		
Processing Formula: SAP006		Prod.: Machine rqm		Formula-Related <input type="text"/>		
Teardown Formula: <input type="text"/>		Formula-Related <input type="text"/>				
Other Formula: <input type="text"/>						
Distribution: <input type="text"/>		<input type="button" value="🔑"/>				
Int. dist. key: <input type="text"/>						

Figure 4.9: Capacity Overview: Selecting Distribution Key

Note

You can also set the distribution key in the option profiles for the capacity evaluation and in the evaluation profile for capacity leveling and extended evaluation, as described in Chapter 2.

Let's now take a look at how and when to use distribution keys. A common scenario is when managing **Capacity Category 002 PERSON**. In this case, a setup person is required but just at the beginning of the operation, and the machine operator may only be needed a certain number of hours just to check the progress instead of remaining on-site the entire time. In this scenario, **Capacity Category 001 Machine** is requested continuously for the full duration of the operation, but it can't be treated the same way when calculating **Capacity Category 002 Person**, which is required only at certain intervals.

A distribution key is a combination of a distribution function and a distribution strategy, and it's defined via these paths in the following sequence:

1. SPRO • Production • Capacity Requirements Planning • Operation • Capacity Requirements • Distribution • Define Distribution Function (or via Transaction OPB2)
2. SPRO • Production • Capacity Requirements Planning • Operation • Capacity Requirements • Distribution • Define Distribution Strategy
3. SPRO • Production • Capacity Requirements Planning • Operation • Capacity Requirements • Distribution • Define Distribution Key

First, let's define the *distribution function*. The distribution function is defined using basic values, where you specify what percentage of the capacity should be used after what percent of the operation's duration. By default, distribution of the system is defined as follows: After 0% of operating time, 0% of the capacity requirements are loaded. When opening the configuration using Transaction OPB2, the screen shown in Figure 4.10 is displayed. Here, you'll maintain the **Function** names and their **Description**.

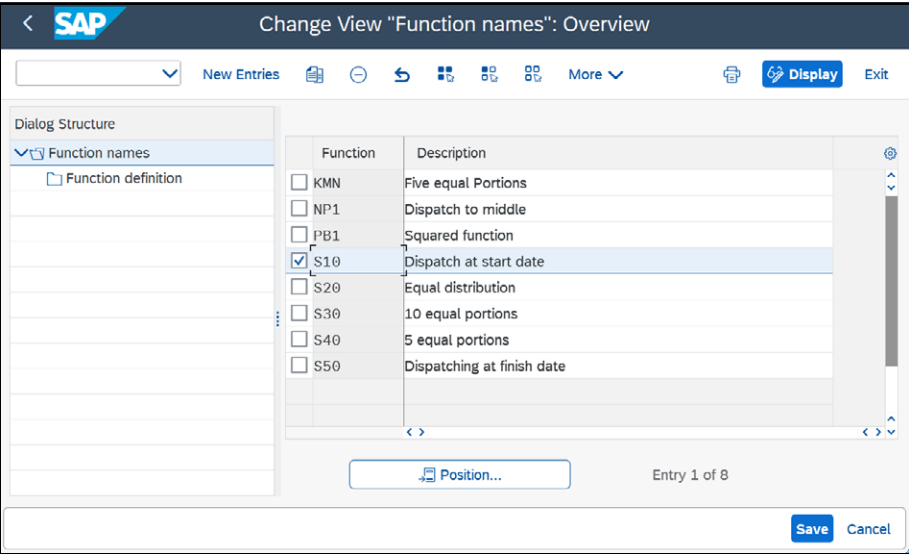


Figure 4.10: Change View “Function Names”: Overview

Figure 4.10 shows the list of existing functions in our example system. Now, by showing a couple of examples, we’ll explain how to set up the function definition to indicate a particular distribution, as follows:

1. Review entry **S10: Dispatch at start date** by selecting the entry and double-clicking on the **Function definition** folder in the **Dialog Structure**, leading to the screen shown in Figure 4.11. This entry is capable of dispatching the effort just at the beginning of the operation and indicating when the **% Dur.** (duration) is **0** and the **% Req.** (required) is **100** (meaning that full effort is required at the beginning).

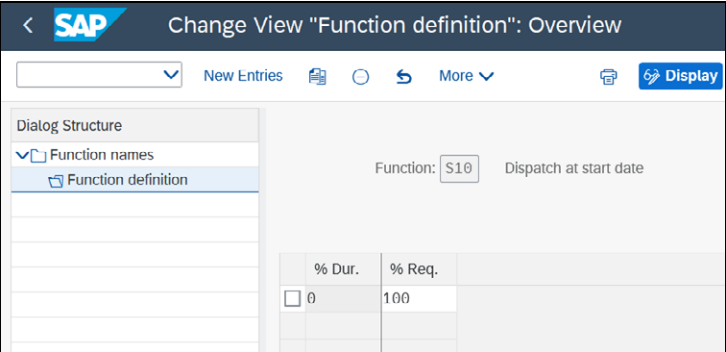


Figure 4.11: Change View “Function Definition”: Overview: Function S10

2. Repeat these steps, but this time, select the **KMN: Five equal Portions** function. Here, the function distribution is used to split the requirement into five equal portions, displaying five distributions where each is 20% of the total capacity requirement and should be dispatched after the elapsed 20% of the operation duration (see Figure 4.12).

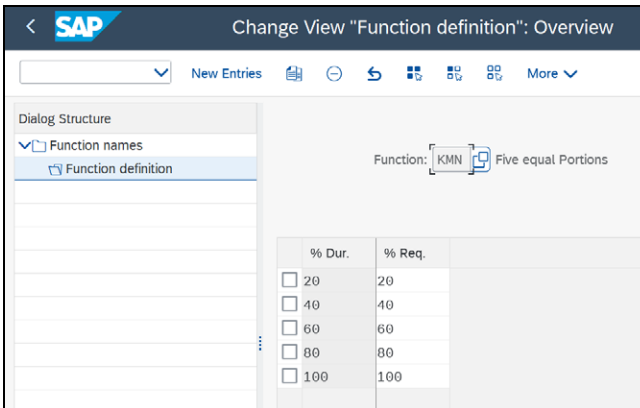


Figure 4.12: Change View “Function Definition”: Overview: Function KMN

Now, once the distribution function is specified, the *distribution strategy* must be maintained. There are three parameters to consider when generating or using a distribution strategy:

■ **(E/L)**

Distributes the capacity requirement from the earliest to the latest start/finish date of an operation. The possible values are as follows:

- **01:** Distribution between earliest dates
- **02:** Distribution between latest dates

■ **Type**

Defines whether the type of distribution is discrete or continuous, by selecting one of these values:

- **01:** Carry out distribution continuously through time
- **02:** Carry out distribution according to discrete points

For discrete cases, each basic value defines a specific day on which the partial capacity requirement is loaded. However, when using a continuous distribution, the partial capacity requirement is distributed over the days between a continuous period, where two basic values are indicated (**Initial** and **Finished date**). For example, let’s compare a discrete and a continuous distribution. For a discrete distribution, you know the daily capacity required (the capacity loaded), such as Week 1: 10 HR/MINS, Week 2: 20 HR/MINS, Week 3: 30 HR/MINS, and Week 4: 10 HR/MIN. On the other hand, when defining per continuous distribution, all you know is a total accumulated requirement of 70 EA over the full month.

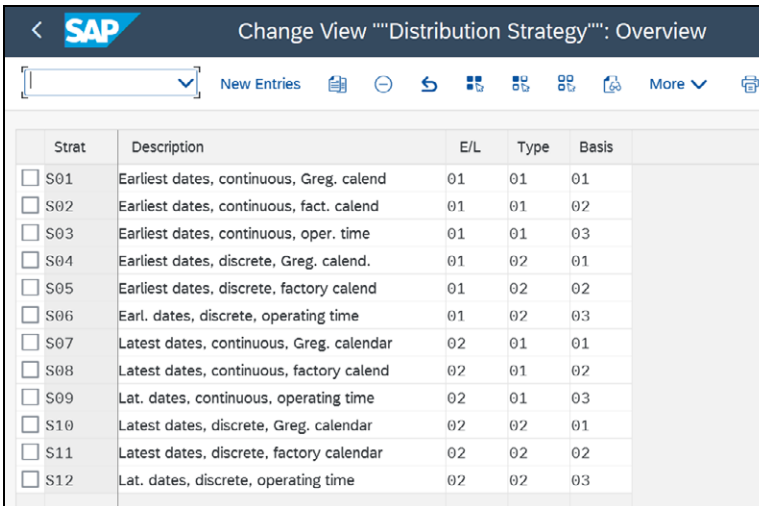
■ **Basis**

Specifies which of the following strategies to follow:

- **01:** Distribution according to the Gregorian calendar
All the calendar days, including weekends and holidays, are taken into account for distributing capacity requirements.

- **02:** Distribution according to the factory calendar
Only working days are considered for distributing capacity requirements.
- **03:** Distribution according to the operating time
The daily operating times of the affected capacity category are considered for distributing capacity requirements. Discrete distribution isn't relevant in this context.

Figure 4.13 shows the standard entries. You can also create your own distribution strategies per your business needs by following the Customizing path defined at the beginning of this section.



Strat	Description	E/L	Type	Basis
<input type="checkbox"/> S01	Earliest dates, continuous, Greg. calend	01	01	01
<input type="checkbox"/> S02	Earliest dates, continuous, fact. calend	01	01	02
<input type="checkbox"/> S03	Earliest dates, continuous, oper. time	01	01	03
<input type="checkbox"/> S04	Earliest dates, discrete, Greg. calend.	01	02	01
<input type="checkbox"/> S05	Earliest dates, discrete, factory calend	01	02	02
<input type="checkbox"/> S06	Earl. dates, discrete, operating time	01	02	03
<input type="checkbox"/> S07	Latest dates, continuous, Greg. calendar	02	01	01
<input type="checkbox"/> S08	Latest dates, continuous, factory calend	02	01	02
<input type="checkbox"/> S09	Lat. dates, continuous, operating time	02	01	03
<input type="checkbox"/> S10	Latest dates, discrete, Greg. calendar	02	02	01
<input type="checkbox"/> S11	Latest dates, discrete, factory calendar	02	02	02
<input type="checkbox"/> S12	Lat. dates, discrete, operating time	02	02	03

Figure 4.13: Change View “Distribution Strategy”: Overview

Example

The S01 entry's strategy is based on the following values:

- **E/L:** 01 (Distribution between earliest date)
- **Type:** 01 (Carry out distribution continuously through time)
- **Basis:** 01 (Distribution according to the Gregorian calendar)

Let's analyze how this strategy works. With an operation duration of 10 days and a capacity requirement of 100 EA, the system will initiate the requirement on the earliest start date, distribute the capacity requirement evenly over the full 10-day period defined from the basic values, and will ignore the non-working days defined in the calendar, meaning that weekends and holidays will be relevant when calculating the available capacity.

Finally, as initially mentioned based on the distribution function and the distribution strategy, the system determines the operating time that's relevant for the distribution, and combining these two parameters, the **Distribution Key** is defined. Figure 4.14 shows the standard list of entries to define types of distribution keys.



Distrib.	Description	Strat	Function
<input type="checkbox"/> SAP000	Overall load for latest start date	S11	S10
<input type="checkbox"/> SAP010	Overall load for earliest start date	S05	S10
<input type="checkbox"/> SAP020	Equal distrib. earliest dates, fact.cal.	S02	S20
<input type="checkbox"/> SAP030	Equal distrib. latest dates, fact. cal.	S08	S20
<input type="checkbox"/> SAP040	Equal distrib. latest dates, discrete	S11	S30
<input type="checkbox"/> SAP050	Equal distrib. earliest dates, oper.time	S03	S30
<input type="checkbox"/> SAP060	Equal distr. latest dates, operat. time	S09	S20
<input type="checkbox"/> SAP070	Overall load at latest finish date	S11	S50

Figure 4.14: Change View “Names of Distribution Types”: Overview

4.4 Cumulation of Available Capacities and Requirements

To assess the capacity situation for groups of work centers or entire production areas, rather than individual production per work centers, you must set the option to cumulate available capacities and capacity requirements. To do so, you must define a *work center hierarchy*. When evaluating capacity planning, for example, from Transaction CM01, you’ll end up on the **Capacity Planning: Selection** screen. Here, you can select **Settings • General**, and a new popup window will appear where you can set whether the cumulation can take place during the cumulation of capacity. Figure 4.15 shows where you can check the **Cumulation of Capacity** box and enter a **Hierarchy** and the relevant **Plant** to plan accordingly.

The screenshot shows the 'Capacity Planning: Selection' screen with a 'Settings: More' popup window. The 'Hierarchy' tab is active, showing the following settings:

- Cumulation of Reqmts
- Cumulation of Capacity
- Hierarchy: HIERARCHY
- Plant: 0001

Other visible settings include:

- Cumulate over periods
- Capacity Unit: HUR Hours
- Unit of Measure from Capacity
- Reqmnts type: 2 Rem.reqmts
- Interval to be evaluated: Entry type: G, Number of calendar days, Start: 0 (04.11.2025), Int.finish: 60 (03.01.2026)
- From work center/operation
- Periods: Day, Factory calendar day, Week, Month
- Available capacity: Capacity Version: []

Figure 4.15: Capacity Planning: Selection: Hierarchy

In the next sections, we'll explain how a work center hierarchy can be used and how to maintain the cumulation function.

4.4.1 Work Center Hierarchy

SAP allows work centers to be organized into hierarchical structures known as work center hierarchies. Within these hierarchies, each work center, except for the one at the very top (known as the hierarchy root), is a subordinate to another work center. This structure allows for a clear and organized distribution of work and resources. It's important to note that a single work center can be part of multiple work center hierarchies, and a work center hierarchy can span several plants (with cross-plant maintenance). This flexibility ensures that the organization of work centers can adapt to the specific needs and complexities of different production environments.

Note

Although we won't showcase all the detailed capabilities of maintaining these hierarchies, we'll explain the key features and the relationships within the process. If you'd like more details, review the SAP Learning documentation (<https://learning.sap.com/>) on production planning and work center master data maintenance.

The primary purpose of work center hierarchies is to facilitate capacity planning. They enable the aggregation of available capacity and capacity requirements, providing a comprehensive overview of resource allocation and needs. This means that you can determine the total available capacity for a higher-level work center by summing up the capacities of the work centers beneath it in the hierarchy. For managing perspective, you can display a hierarchy in work center maintenance or hierarchy maintenance as a list or a graphic.

You can create, change, and display work center hierarchies in their respective transactions (Transaction CR21, Transaction CR22, and Transaction CR23). Figure 4.16 shows a hierarchy of a work center group named RR-1, which contains the work centers RR-1, RR-2, and RR-3, relevant for the category code 0007 (Production Line) and plant 0001.

Note

Be aware that there are no SAP Fiori apps available to manage work center hierarchies, but the capability is still available in the SAP GUI backend. As an alternative to using SAP Fiori launchpad, you can use the Manage Work Center Groups app described in Chapter 3.

With this app, you can create a work center group, assign or remove work centers/work center groups, and later delete work center groups as well, if the group is no longer in use. By assigning multiple work centers under one work center group, you can immediately view the capacity demands and remaining capacities of the work centers aggregated to a work center group.



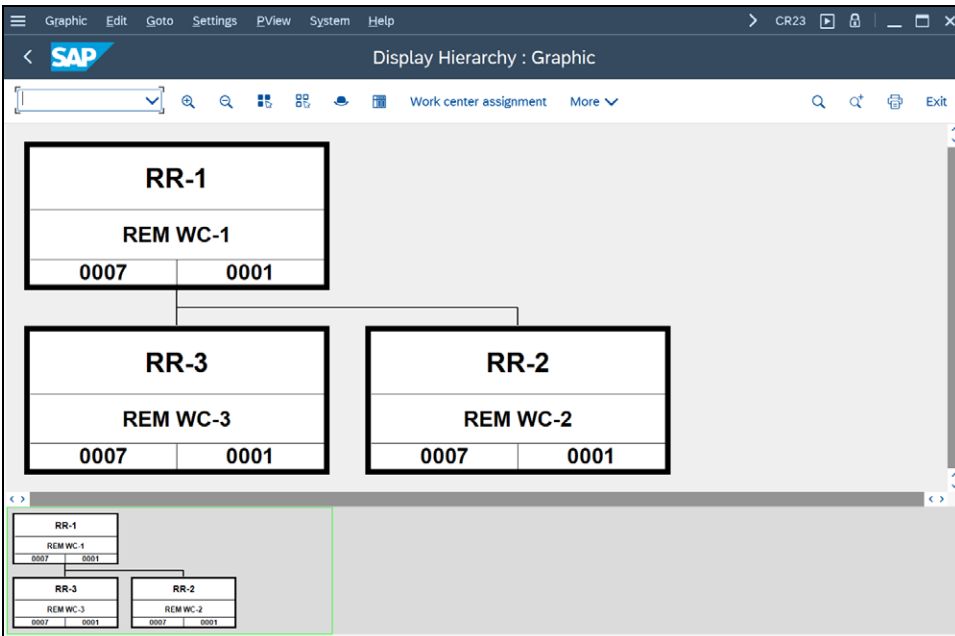


Figure 4.16: Display Hierarchy: Graphic

4.4.2 Available Cumulation Functions

When you want to group the work centers to evaluate the capacity situation in a cumulative capacity and capacity requirement instead of checking on it by individual resources/work centers, SAP provides a different cumulation function. Here, we'll explain the static and dynamic accumulation and the importance of maintaining the period pattern key.

Static Cumulation

Static cumulation accumulates the available capacity of lower-level work centers in a hierarchy and assigns that capacity to a superior work center node when a new version of available capacity is processed or assigned.



Note

This capability is only relevant for available capacity. If a work center belongs to several hierarchies, then you can store the cumulated available capacities using the hierarchies in various versions of available capacity in the work center.

The processing of a version for available capacity determination is maintained in a date range, as explained in Chapter 2. Once you execute the static cumulation, this function will overwrite the maintained version.

You can define on which level within the hierarchy beneath the work center the available capacity should be aggregated. On this hierarchy level, the system groups together the available capacities of the active versions with the same capacity category. The operating times of the work centers on the hierarchy level can be different; in this case, the longest operating time will be used.

Let’s look at an example of how to maintain a new static cumulation when changing the capacity data maintained for **Work Center RR-1**, which is already predefined with active **Version 1 Normal available capacity**. Figure 4.17 shows the **Change Work Center Capacity: Intervals of Available Capacity** screen. From here, you’ll navigate to the **Menu • Extra • Available Capacity via Hierarchy**.

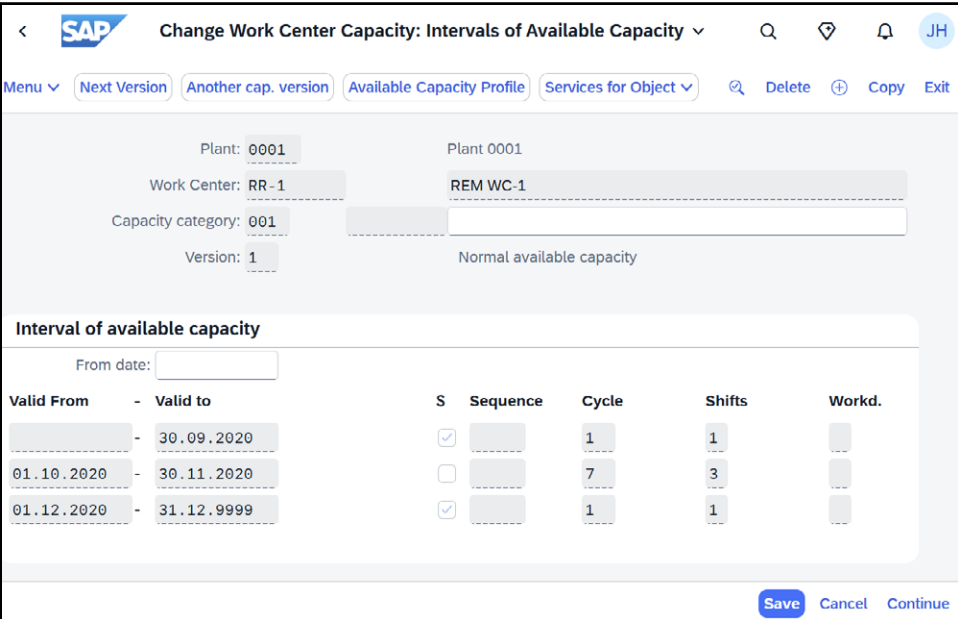


Figure 4.17: Change Work Center Capacity: Intervals of Available Capacity

This opens a new popup window, as shown in Figure 4.18. As part of this example, enter the **Plant** as “0001”, **Hierarchy Name** as “RR-1”, **Number of levels** to be exploded in the hierarchy as blank, **Period pattern key** as “SAP_1”, and valid **From date** as today’s date. Then, click **Continue**.

Note

Period pattern key is a preconfigured parameter that will be explained in detail in the next section. If you don’t enter a value here, the available capacities of the lowest level are cumulated by default.



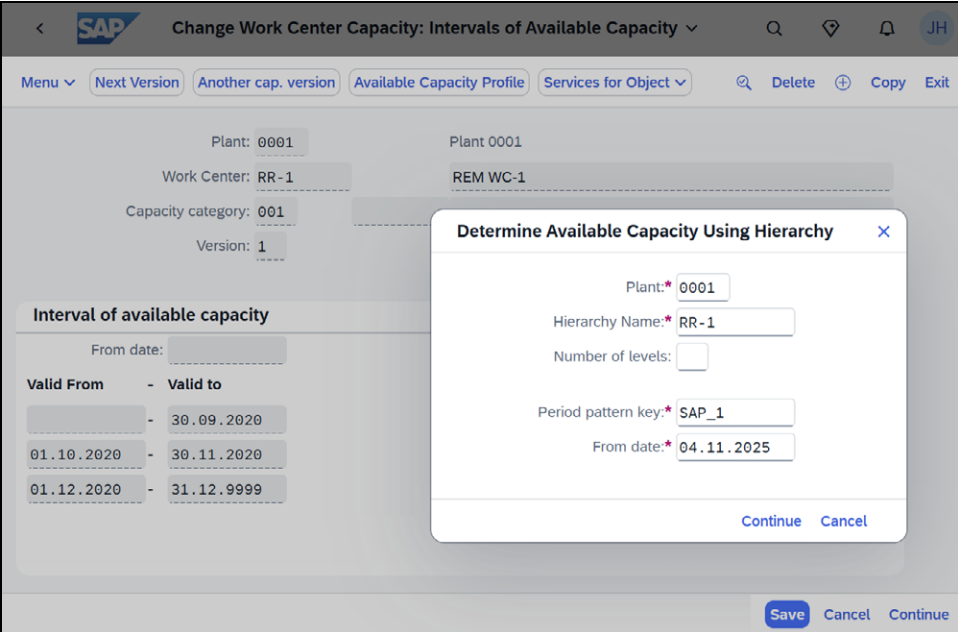


Figure 4.18: Determine Available Capacity Using Hierarchy

If a previously available capacity was maintained, the warning message shown in Figure 4.19 appears. Click the **Continue** button to overwrite it using the hierarchy.

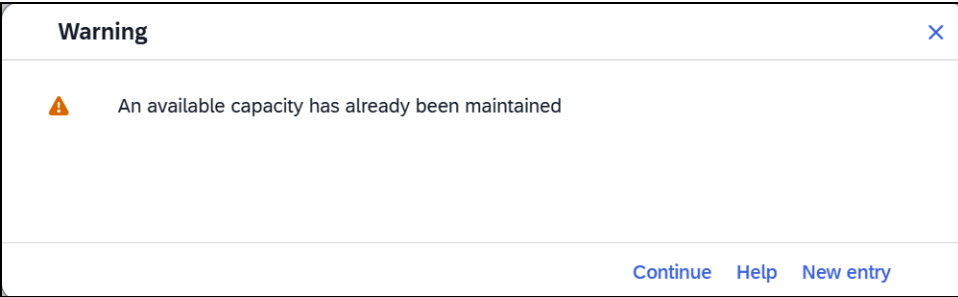


Figure 4.19: Warning Message

If the changes are acceptable, you can now click **Save** to save the work center data. Figure 4.20 now shows the adjustment of the available capacity using the hierarchy based on the cumulation per period for the period of time in question.

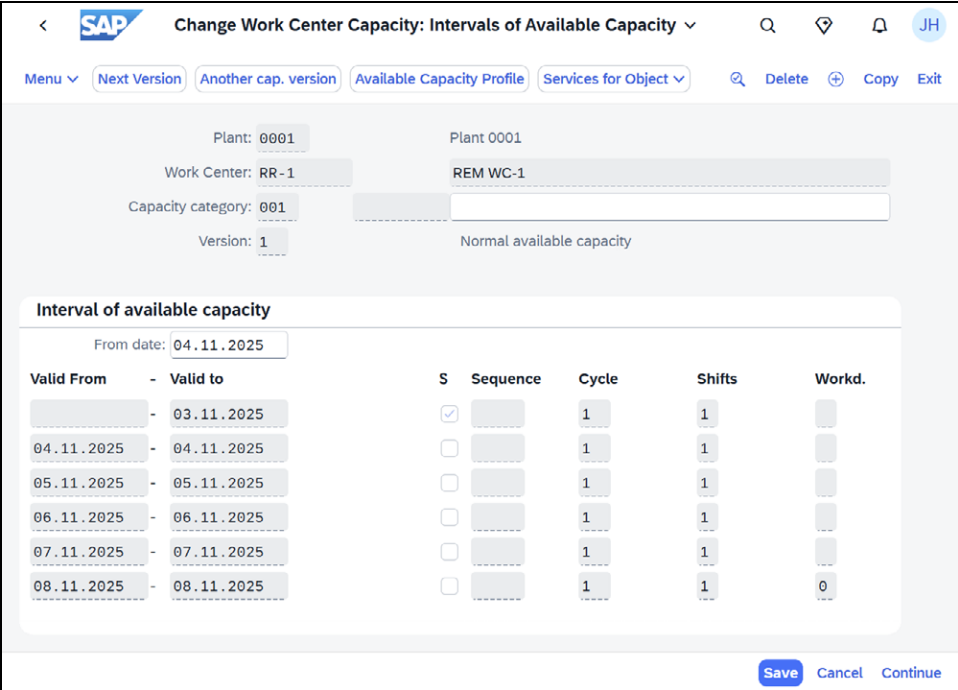


Figure 4.20: Interval of Available Capacity Adjusted Using the Hierarchy

Period Pattern Key

The **Period pattern key** parameter identifies the length of time that comprises X number of consecutive time segments. To define the segment, you need to think about periods because the duration of a time segment is defined by the period type and the number of periods. Typically, this is calendar days or weeks. The Customizing path to maintain **Period pattern key** is **SPRO • Production • Basic Data • Work Center • Capacity Planning • Available Capacity • Define Period Pattern Key** (or use Transaction OP11). The system opens the **Change View: Period Pattern Key: Overview** window, as shown in Figure 4.21.

You'll see the only entry maintained by the standard and used in the previous example, **Per-Pattern SAP_1** with **Text of Example 1: 7 * 1 day; 3 * 1 week**. To review the details, you can select the entry and double-click on the **Segment** subfolder in the **Dialog Structure**. Now the system will open the **Change View "Segment": Overview** screen, as shown in Figure 4.22.

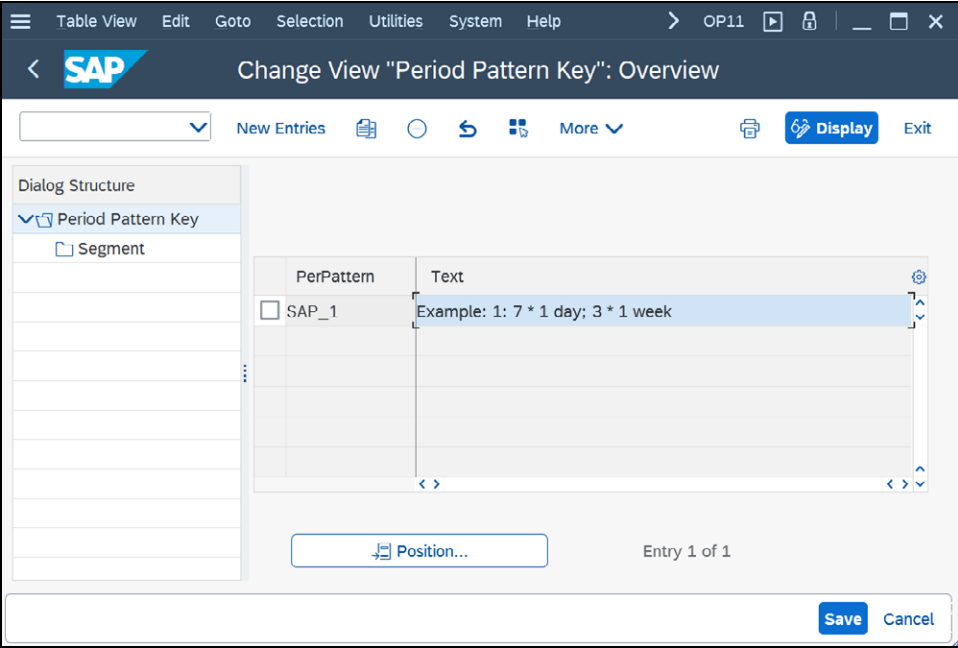


Figure 4.21: Change View "Period Pattern Key": Overview

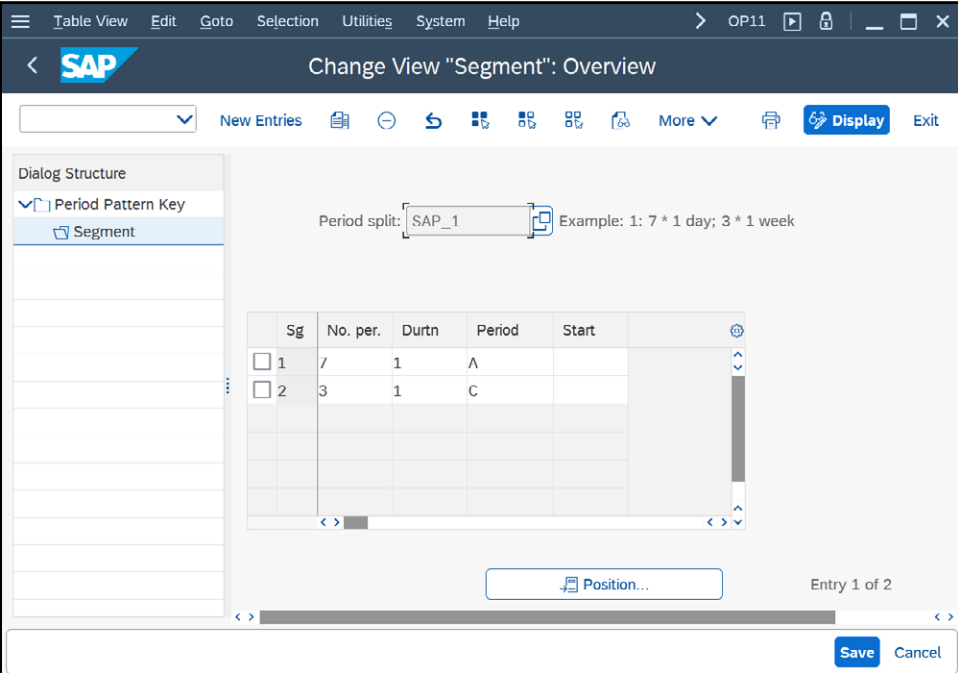


Figure 4.22: Change View "Segment": Overview

Here, you'll see both related segments, as follows:

- **Sg (segment) 1**

Describes a time segment with seven periods each (**No. per. 7**) composed of **Durtn 1** (duration of one day) that is used by the system to cumulate available capacity for every one "day" in the period (**Period A**).

- **Sg 2**

Describes a second time segment in the period pattern with three periods (**No. per. 3**), each one (**Durtn 1**) week (**Period C**) in length, that the system uses to cumulate available capacity for three chronological weeks.

Now you know how to manage and maintain your own period pattern key for your business needs.

Dynamic Cumulation

SAP provides dynamic cumulation to add up the available capacities from hierarchy work centers to pass on to superior hierarchy work centers. Dynamic cumulation is only possible in those parts of capacity planning where capacity requirements and available capacities are represented per period on the basis of a period pattern, for example, in the capacity evaluation or in the tabular version of the planning table in capacity leveling. When comparing the static cumulation, the main differentiator is that dynamic cumulation is applicable not only for available capacities but also for capacity requirements.

To maintain the dynamic cumulation, you can go to the evaluation profile for capacity leveling and the extended evaluation (explained in Chapter 2 via Transaction OPD3) and/or the options profile for the capacity evaluation.

As SAP S/4HANA continues to evolve, the new capacity planning scheduling apps (Capacity Scheduling Board and Capacity Scheduling Table) and the Manage Work Center Capacity app are easier than the traditional transactions. When managing capacity leveling based on relevant overall profile settings, the new apps allows you to detect overload situation along with the cumulative overload and check cumulative capacity utilization rates across the horizon set. Beside using the Manage Work Center Group app, as described in Chapter 3, you can group the work center as needed without maintaining the hierarchy. We'll cover more about how the new applications and the traditional transactions are used in Chapter 6 and Chapter 7.

4.5 Reducing Capacity Requirements

Reducing capacity requirements is a crucial step to optimizing resource utilization, lowering operational costs, and improving efficiency by managing the capacity requirements to ensure that work centers and resources are released on time and effectively. Reduction is triggered by the following actions:

- Confirming completion
- Selecting the **TECO (Technical Complete)** status on the order
- Selecting the **Locked** status to lock an order
- Selecting the **Deletion** checkbox

Confirmation is a step in production execution used to formally acknowledge in SAP S/4HANA that a specific operation of a production order or process order has been processed. The confirmation is managed by fulfilling the actual values of the quantity produced, quantity consumed, scrap, labor hours, and so on of each operation. When the operations are finally confirmed, the remaining capacity requirements are immediately set to zero, meaning that the step is completed. But what happens if we're partially confirming an operation? In the manufacturing world, when using production orders or process orders, the system recalculates the *remaining capacity requirements* using the remaining quantity as reference.

When forecasting the standard values, the system calculates the formulas within these values by following the **Control Capacity Reduction** maintained for the work center/resource on the **Capacity** tab of the overview screen. The right-hand side of Figure 4.23 shows the controls that can be assigned to each formula.

In this example, the control to calculate the remaining requirements/remaining duration after confirmation is the **Formula-Related** option, as briefly mentioned in Chapter 3 when maintaining the work center master data. Let's look at all the possible calculations and their definitions:

- **Formula-Related**

The remaining requirements and remaining duration of a partially confirmed operation will be determined when the formula defined in the work center is evaluated. It's the remaining quantity and not the operation quantity that is considered after executing the confirmation.

- **Completely for Partial Confirmation**

The remaining requirement and remaining duration is fully reduced when there is a partial confirmation.

- **Completely for Final Confirmation**

The remaining requirement and remaining duration are reduced completely just during the final confirmation, meaning the adjustment through partial confirmation won't be considered.

- **Proportional to Service**

The remaining requirement/remaining duration of a partially confirmed operation is reduced proportional to the service that's assigned to the relevant capacity segment in the work center in your record type group.

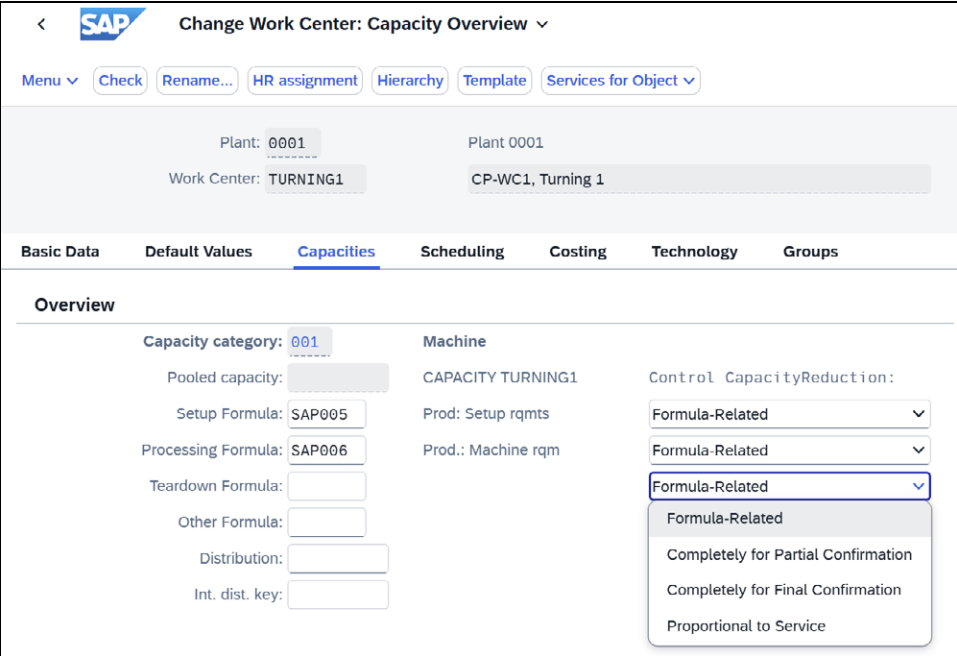


Figure 4.23: Control Capacity Reduction Options When Managing Work Centers

Note

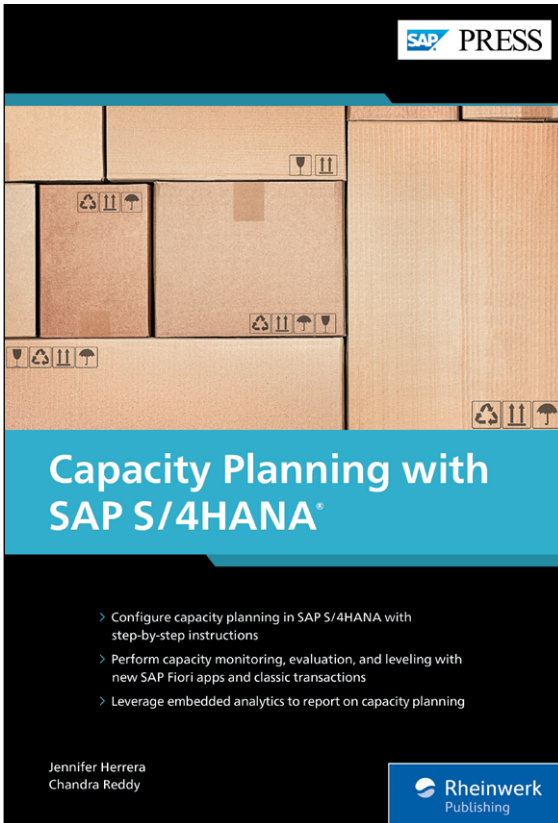
You might face issues after confirmation and note that the capacity reduction doesn't work as expected because there's a dependency when using the **Proportional to Service** option from the costing perspective. Whenever this control is defined, the **Record Type Group** should be assigned to the activity on the **Costing** tab of the work center.

Please review SAP Note 1789680 with a controlling expert for further information. This note is applicable for all SAP versions, such as SAP ERP, SAP S/4HANA Cloud Public Edition, SAP S/4HANA Cloud Private Edition, and on-premise SAP S/4HANA.



4.6 Summary

Now that you've learned about the various aspects of capacity requirements calculation in SAP, you can effectively guide organizations to configure the data to enable a calculation based on their own need. This chapter underscores the significance of understanding and managing capacity requirements to ensure smooth operations and efficiency. By knowing the sources of capacity requirements calculations and how to distribute them using different functions and strategies, you can help organizations realistically distribute the work center load.



Jennifer Herrera, Chandra Reddy

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