

VAPS



*Chasing efficiency with the*  
**Visual Advanced  
Production Scheduler**

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# 1 About this eBook

Back in January 2020, we launched the first version our Visual Advanced Production Scheduler (VAPS) as the first and only finite capacity scheduler extension fully integrated into Microsoft Dynamics 365 Business Central. Since then we've received more than a handful of questions concerning what the VAPS can or cannot do. For this reason, we are happy to release this eBook where we cover these frequently asked questions plus how to make the best out of your ERP.

I will begin with the VAPS definition, followed by the features that make it advanced in comparison to our own and other available extensions in the market, afterwards the description of the provided scheduling instruments and the overall benefits of using a visual scheduler. Near the end I will answer the most common inquiry: "What's the difference between the VPS and the VAPS?" accompanied by our interpretation of the similarities and distinctions.

Lastly you will get a clear illustration of a step-by-step scheduling with a finite capacity scheduler.

Disclaimer: This eBook is not a manual, but rather an aid for getting to know the benefits of working with the VAPS.

## About the Author



Hi, I'm Paulina!

I've been a Business Development Manager for NETRONIC since February 2019.

I look after our partners and customer in the beautiful Americas plus the Iberian Peninsula. I work behind the scenes for blogs and making sure my partners are business ready when it comes to our extensions.

# 2

## This is how it all started...

Scheduling is no easy job. You need to match a production order to available machine times, fitting resources, required materials, and a few other variables. An ERP, like [Microsoft Dynamics 365 Business Central](#) is perfect for gathering the master data and information you need to start scheduling. The issues being two:


1. First, Business Central displays all information as tables or within tables. There's a great search field and filter functionality on top that eases the data hunt. But it would be simpler to see it in one view. Who hasn't heard the phrase "A picture is worth a thousand words"? Well, that's basically our motto.
2. Second, Business Central offers a comprehensive and potent MRP engine, which supports the general material requirements planning process. On top of this, Business Central does a basic time scheduling for production orders. However, it truly falls short when it comes to a proper finite capacity scheduling.

With our newest extension, we solve both issues. Here is why and how we got there:

At NETRONIC, our mission is to empower every SMB organization to achieve operational agility with visual scheduling. Operational agility is the key for companies to grow and operate in unpredictable environments. It makes them robust, responsive and flexible. Visual scheduling is a proven technique to establish operational agility. As you may know, we accomplish that using Gantt charts. But we work to boost up the contributions of a Gantt chart for project, resource and production planners.

Whether you know us for a couple of years or just came across our extensions browsing on the [AppSource](#), if you're a production planner working with Microsoft Dynamics 365 Business Central or you are assessing the use of Business Central: **This is for you!**

Let me give you a quick backstory to our newest extension, the Visual Advanced Production Scheduler (VAPS):



This story starts in the last century. At that time, we provided tools for software developers to help them design powerful ‘planning charts’ as part of their application. In 1998, Microsoft invested in our product VARCHART XGantt and built a simple production scheduler with Gantt charts featured on Microsoft Dynamics NAV and Microsoft Dynamics AX.

Later on, Microsoft converted the so-called classic client to the role-tailored client, deciding to remove all external components to their software. Leaving out the production scheduler previously developed with our VARCHART XGantt.

With the end-user in mind, we decided to close this gap. We made use of Microsoft’s “client extensibility framework” and, with our own technology constructed a visual production scheduling add-in for the Dynamics NAV role-tailored client. In 2013 we launched what would now be our signature software: the [Visual Production Scheduler \(VPS\)](#).

The VPS turned out to be a major success for us leading to more than 500 customers. Which is why, when Microsoft made another technology shift turning Dynamics NAV into Dynamics 365 Business Central, we decided completely rebuild the VPS to fit with the new technology. But this time, we decided to do more. By then, we gained valuable experience from our manufacturing customers and knew that a lot of them had higher scheduling requirements that were hard to fulfill with the standard Business Central functionality and naturally with the VPS that merely mirrors it. So, in 2019 **we started the development of the “bigger brother” to the VPS**. Along with our partner [TecMan](#) from the UK, we decided to fundamentally enhance the Business Central manufacturing capabilities without changing its base and core functionality while always trying to keep it user-friendly, **creating the [VAPS – Visual Advanced Production Scheduler](#)**.

We launched the first version of the VAPS in January 2020 and published it on AppSource in April 2020.

VAPS



**MEET THE  
VAPS**

## 3 Meet the VAPS

We've repeatedly heard planners asking for the most effective way to evaluate the impact on squeezing a rush order into the published schedule. Or wondering how to accelerate the rescheduling process of production orders when a machine breaks down or an operation takes longer than expected. Some planners mentioned their struggle identifying bottlenecks.

*If you feel like you can relate, then you're on the right path to fixing it.*

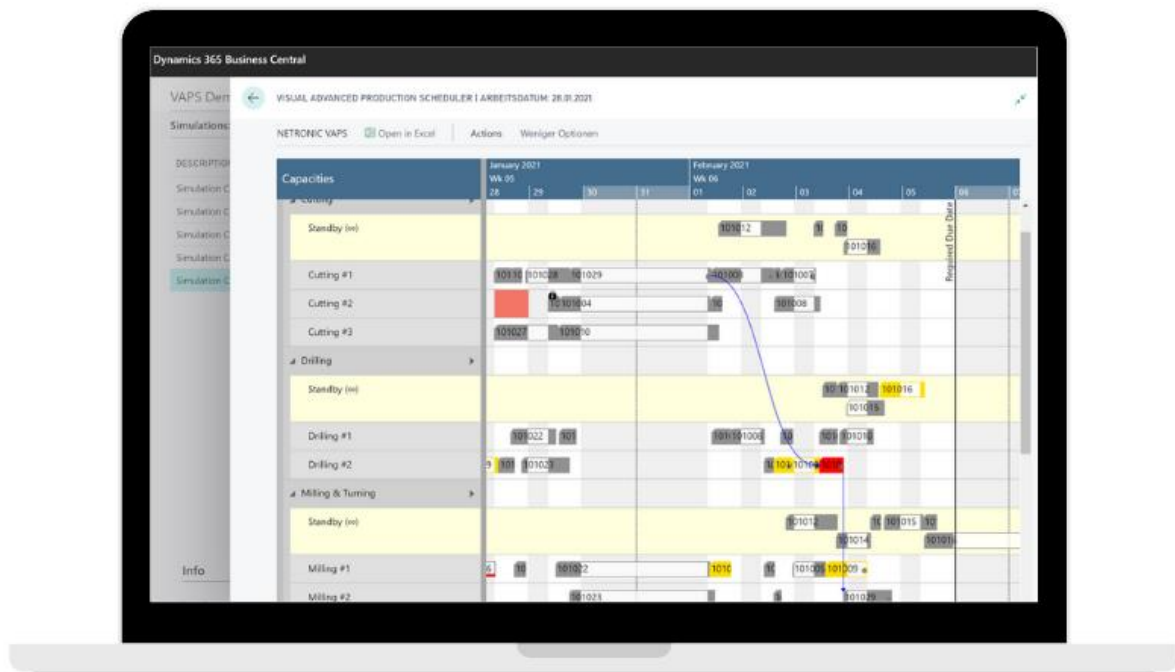
As you may know (or have heard), Microsoft Dynamics 365 Business Central is an all-in-one ERP solution. It provides customers with a vast list of manufacturing capabilities out of the box. Examples are:

- Items and item-specific settings like minimum order quantity, safety stock level, and safety lead time, etc.
- BOMs and production BOMs including multi-level production with deep subassembly hierarchy
- Production orders differentiating them by statuses, with the capability to make reservations, to set family orders, and more.
- Work and machine centers defining related information such as shop calendars or subcontracting work centers.
- MRP and MPS allowing you to create a plan to meet your demand with sophisticated production order handling
- Creation of production orders – manually, from sales orders and from MRP/MPS
- Production journal: bringing together schedule data and execution data

But, the one downside we aim our attention at is *the way of handling finite capacities within the standard system*. Business Central supports finite capacity scheduling with a function called "capacity constrained resources".

Per our customers experience, when this function is turned on its lack of accuracy creates results that in many cases felt impractical. As consequence, finite capacity scheduling with the standard functionalities of Microsoft Dynamics 365 Business Central can be perceived as a mess.

Therefore, we took care of this and minimized the controversy with our Visual Advanced Production Scheduler (VAPS).





## · Visual Advanced Production Scheduler ·



### What's the VAPS?

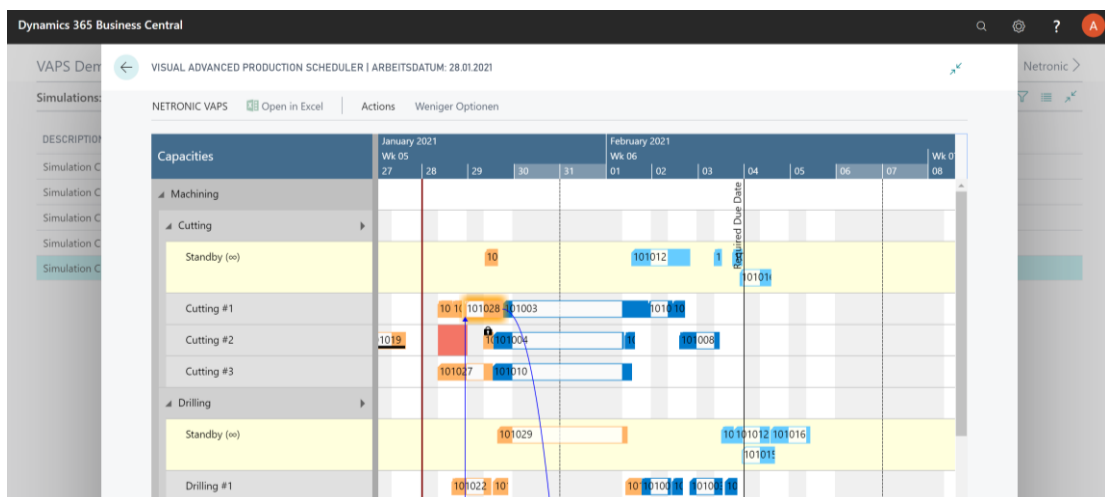
The VAPS is the first finite capacity visual scheduler fully integrated into Microsoft Dynamics 365 Business Central.

The VAPS adds functionalities to the proven manufacturing capabilities of Business Central.

### What's "finite capacity"?

Contrary to the standard Business Central scheduling that works with the assumption of infinite capacities, meaning it can easily overload your machines; finite capacity means limited machine capacities by default. Our assumption is to have a capacity of 1 per machine center. *This means:* each machine can work only on one operation at a given point of time.

Finite capacity makes sure you never overload machine centers. To achieve this, any change in the schedule triggers the automatic recalculation of the entire schedule. This principle applies to all routings: whether it's a simplex routing, a complex one, a serial or parallel routing. The VAPS may push operations in time to postpone their start according to the set up the planner has decided. Here's a quick snap:



## Functions of the VAPS

- List unassigned production orders on a virtual standby resource. From there, you can either drag & drop it to a machine center or apply a semi-automatic scheduling tool. The VAPS helps you by highlighting the allowed alternative machines.
- Squeeze in operations and have your schedule adjusted accordingly
- Automatically schedules a production order – without impacting the overall schedule
- Capability to pin operations to lock time slot
- Meaningful color schemes to focus on various scheduling aspects
- Allows you to run multiple simulations of the schedule, build scenarios, compare and publish your preferred schedule.
- Takes material availability into account when scheduling, and
- Supports working with alternative machine centers and routings.

## Who would benefit from VAPS?

- Manufacturers with high number of Production Orders
- New Business Central users who have experience with other scheduling software solutions
- PlannerOne users considering migrating from Dynamics NAV to Business Central (Contact us for a special offer! Wink wink)
- Current users of our VPS (you too!)

# 4

## Six features that make the VAPS advanced

As mentioned in the last chapter, the VAPS is a finite capacity scheduler. It enhances the standard manufacturing module of Business Central by handling all machine and work centers as if their capacity always equals 1.

Furthermore, we added solutions to other most common challenges on the shop floor and its management. We came up with five additional functions that make it “the one”.

These are the earliest material availability date, production simulations, consideration of alternative machine centers, incorporation of a standby resource, the support of subcontracting work centers and the opportunity to see your schedule in regards to your preferred information, or as we call them color views.

Let’s dive into each feature:

### 1. Earliest material availability date

This date, which we call “EMAD” for its initials in English, indicate when the material required for each production order will be available at earliest. You can compute the EMAD for every single production order by clicking on the “calculate EMAD” button, within the VAPS.

#### **How do calculate this?**

- 1) First we create a unique list of components demand for each day within a defined period. To do this, we consider the components demand per production order, per sales orders, transfer lines, job planning line, service orders, and per assembly orders for each day.
- 2) Then we create a unique a list of component supply. Also by day, we take into account the supply on inventory, purchase order, production orders, among others.

- 3) And as a third step we compare for every day the components supply to the component demand. In other words we associate what you need to produce and what you have available to do so. If the component supply on a certain day matches the demand, then we allocate the supply to the component line, defined it as the earliest material availability date for that component.
- 4) Lastly, if there are multiple components needed for one production order, we check all earliest material availability dates within that production orders and take the latest one as the EMAD for that specific production order.

It's essential to add that you can prioritize which components demand you match first. In the following screenshot you can see the priority chosen for the EMAD demand:

The screenshot shows a software interface titled "EMAD DEMAND PRIORITY". At the top, there is a reminder bar: "Reminder: your work date is 1/28/2021 Use today | Change to... | Turn off reminder". Below this is a toolbar with buttons for "Search", "+ New", "Edit List", "Delete", and "Open in Excel". The main content is a table with two columns: "Priority" and "Document Type". The table has a header row and several data rows.

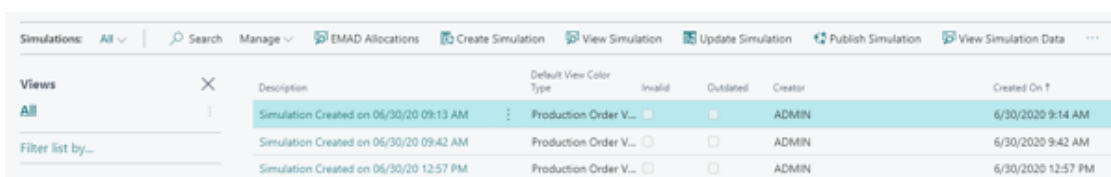
	Priority	Document Type ↑
→	0	Sales Line
	1	Sales Line
	4	Service Line
	6	Job Planning Line
	2	Prod. Order Component
	3	Assembly Component
	5	Transfer Line

## 2. Production simulations

The VAPS offers you the possibility to plan in a duplicate of your live data. That way, you don't have to worry about everything being saved automatically into your scheduling board, which may include unplanned mistakes. We make sure to keep a reasonable distance between scheduling and execution.

We understand that your scheduling efforts will result into work order lists for your shop floor workers and machine operators. And that certain degree of steadiness in their schedule is required for everyone to work better. With running your production scheduling on simulation data, your scheduling (and moving production orders around) does not disturb execution as it does not change work order lists. These lists only get changed if you are done with scheduling, hit "publish" and write back your production schedule simulation into the live database.

Whether you only want to anticipate out how one rush order would impact your current schedule or you want to rearrange all upcoming tasks, with the VAPS you can copy your data, simulate, iterate as needed, and then publish the schedule when you're happy with it.



The screenshot shows a web interface for managing simulations. At the top, there are navigation tabs: 'Simulations: All', 'Search', 'Manage', 'EMAD Allocations', 'Create Simulation', 'View Simulation', 'Update Simulation', 'Publish Simulation', and 'View Simulation Data'. Below this is a table with columns: 'Views', 'Description', 'Default View Color', 'Invalid', 'Outdated', 'Creator', and 'Created On'. The table contains three rows of simulation records, all created by 'ADMIN'.

Views	Description	Default View Color	Invalid	Outdated	Creator	Created On
All	Simulation Created on 06/30/20 09:13 AM	Production Order V...	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	ADMIN	6/30/2020 9:14 AM
Filter list by...	Simulation Created on 06/30/20 09:42 AM	Production Order V...	<input type="checkbox"/>	<input type="checkbox"/>	ADMIN	6/30/2020 9:42 AM
	Simulation Created on 06/30/20 12:57 PM	Production Order V...	<input type="checkbox"/>	<input type="checkbox"/>	ADMIN	6/30/2020 12:57 PM

You can create as many simulations as you want, since we set no limit for it. If we think about it, you can use a simulation as a training environment too. As long as no one clicks on the "publish simulation" button, your production data is always safe.

### 3. Incorporation of a standby resource

The so called standby resource is a virtual machine center that we automatically create in every work center. It contains all production order routing lines and operations that are not yet scheduled from within the VAPS, meaning they are just scheduled by the Business Central scheduling run.

This resource comes in handy when you have to schedule on the long term. The standby resource is an exception to the finite capacity rule. This resource is considered as if it had infinite capacity instead. Basically, you can look at the standby resource as your “to do list”.

In this print screen the standby resource has two operations pending to be assign:

Capacities	February 2021									
	Wk 06		Wk 07							
	06	07	08	09	10	11	12	13	14	
└─ Machining										
└─ Cutting										
Standby (∞)						1	1			
Cutting #1			101001	101001	101001	101001		11	101018	
Cutting #2					1	101005				
Cutting #3										
└─ Drilling					101008	101008	1		1	101011

## 4. Consideration of alternative machine centers

With the VAPS you can define alternative machine centers in each routing. This is a substitute for the machine center the routing would normally include. When dragging a production order line you'll see the options highlighted. This works as an aid to know where else the same process can be accomplished and it can help you make better use of your total machine centers.

*Let's turn it into an example.*

You have two cutting machines: One was bought last year and the other one 10 years ago. There's a strong change the new one is faster. Let's say its 25% faster. For this reason you'd like all your production orders run in the new machine. But if there's a bottle neck, you'd be happy to uncover the old machine, and use it, right?

That's our goal: To redirect production orders from a busy machine to an available one that can handle the same job. When scheduling, the length of the routing line may increase or decrease in relation to the speed production coefficient or the machine center selected. This is, the speed at which the machine functions, or as we call it, "the multiplier".

The screenshot displays the Dynamics 365 Business Central interface for the 'ALTERNATE ROUTINGS' page. The main title is 'CUTTING1-2-FACTOR'. Below the title, there is a 'Header' section with fields for 'No.' (CUTTING1-2-FACTOR), 'Version No.', 'Description', and 'Blocked' (toggle switch). Below the header is a table titled 'Alternate Routing Lines' with the following data:

Type	Center No.	Machine Center Name	Setup Time Multiplier	Run Time Multiplier
Machine Center	110	Cutting #1	1.00	1.00
Machine Center	120	Cutting #2	1.00	1.25

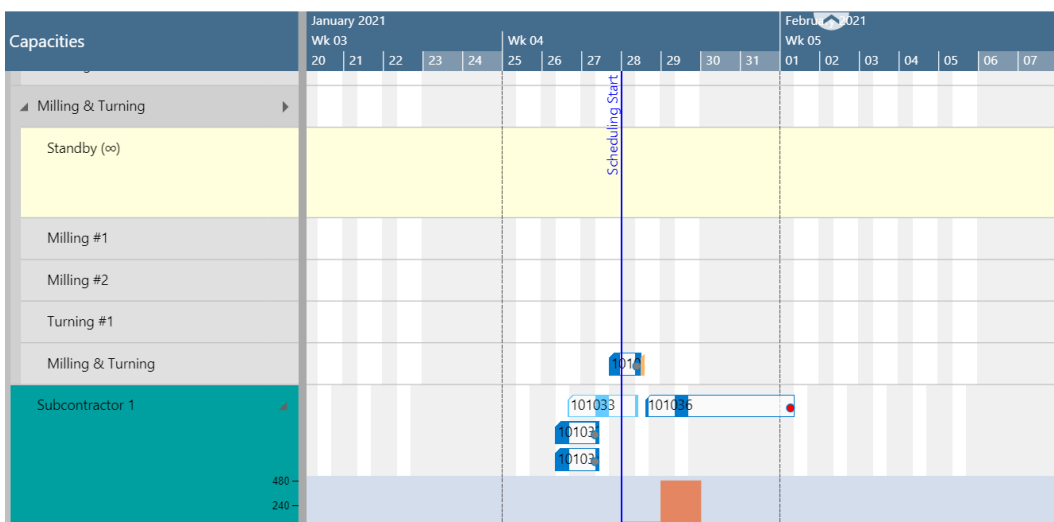
Coming back to the example we can see the first cutting machine center with a run time multiplier defined as 1.00, while the alternative machine center with a run time multiplier of 1.25.

## 5. Support of subcontracting work centers

We improved the way to schedule the work given to subcontractors by visualizing and identifying them as a work center.

You can assign as many productions orders as required since they will be excluded from the finite capacity rule. To ease the allocation, you can define them as part of an alternative routing set.

You can choose the color to show the added subcontracting work center in the schedule under the settings. In this example you can identify the subcontractors in blue.



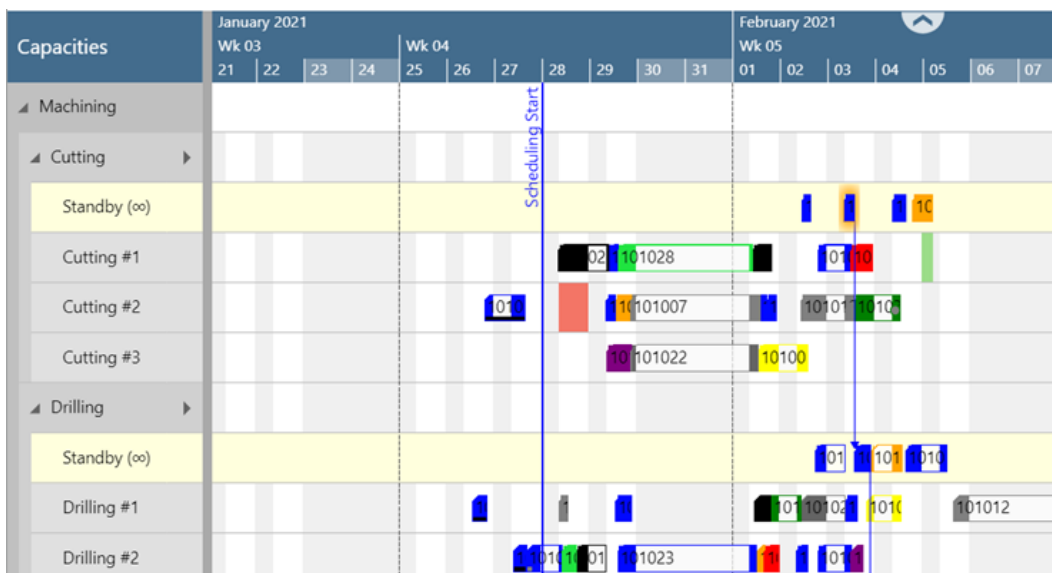




## 2. Production order view

With this view, you can define a specific color per production order or per group of orders this way you can easily identify them in the schedule.

This view may come in handy when working with critical orders or priority customers. The next screenshot shows a production schedule with the production order view applied. In this case, considering 10 colors, yet the VAPS has no limit for it.



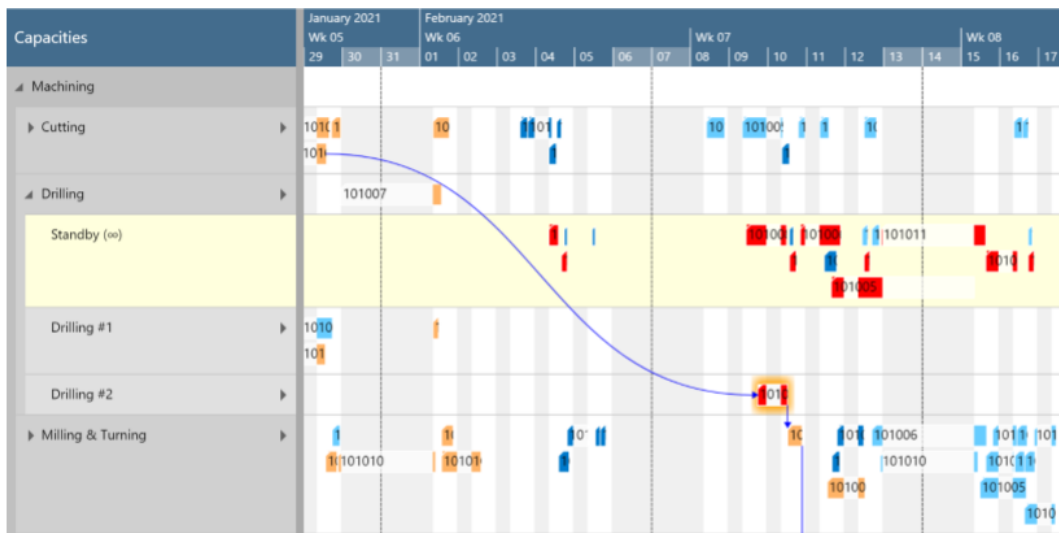
## 3. Machine or Work center view

This view highlights production orders that are processed through certain work or machine centers. The Machine/Work Center View is particularly useful if you have resources creating bottlenecks that require your special attention. In such a case, you can make them visually stand out with this view.

The below screenshot shows a production schedule with the machine/work center view applied. The following settings are used:

- Default machine/work center color = same as the first view (production order status view). By production order status, light blue, dark blue and orange

- Machine center color for machine center "drilling #2" = red

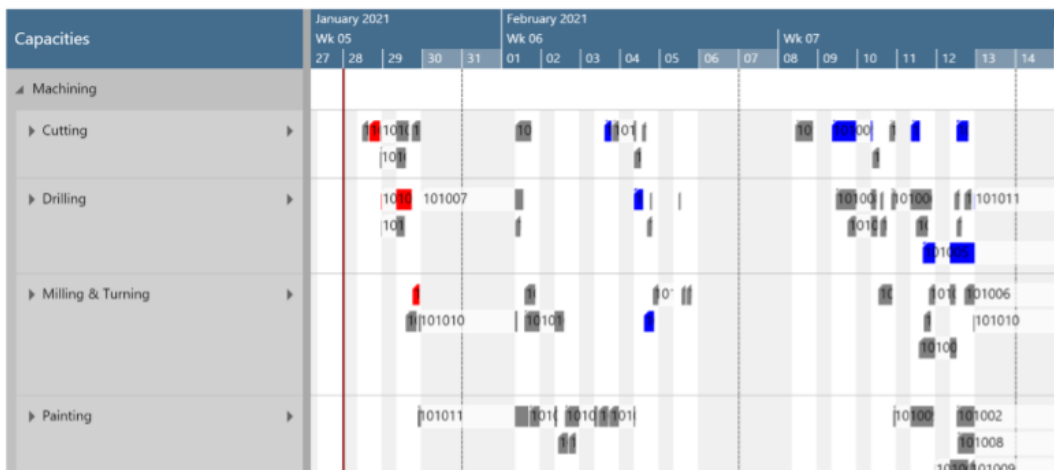


#### 4. Item view

Where your production orders are highlighted for items that you want to visually stand out. This view is useful if you have certain items that require specific attention. For example items for production orders that are very time-sensitive.

The below screenshot shows a production schedule with the Item View applied. The following settings are used:

- Default item color = grey
- Item color "frame" = blue
- Item color "rim for mountain bike" = red

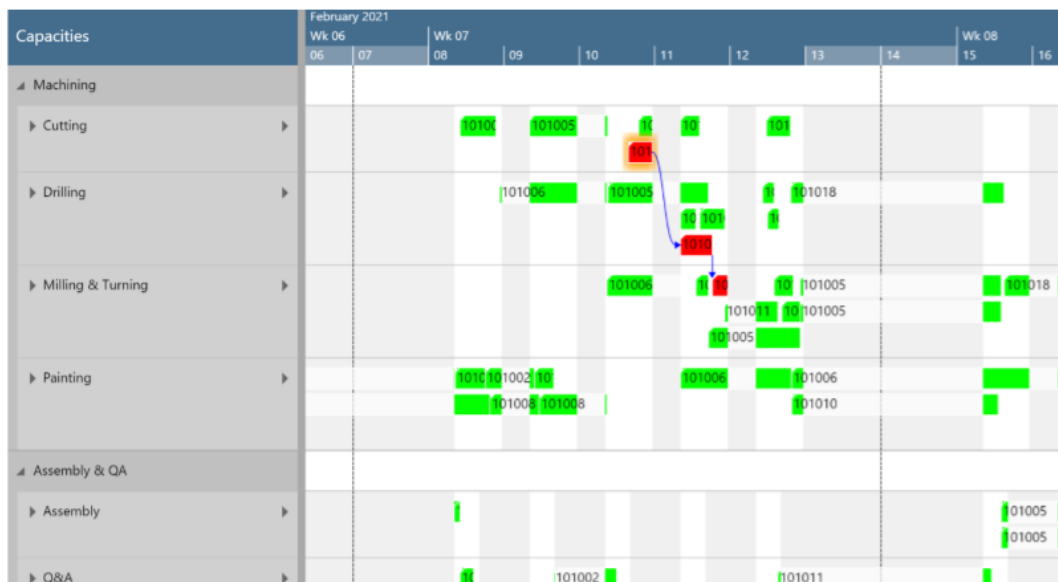


This may be useful e.g. if you have items that should be grouped one after each other on a certain machine. A common example is painting. If you define “yellow” for a yellow item and “red” for a red item, you will easily identify these differently colored items when applying the Item View.

## 5. Progress view

This view eases the recognition of late orders. The Progress View differentiates production orders by their lateness and lets you define different colors for their statuses in three stages:

- **Progress status missed.** Indicates that a production order is scheduled to be finished after the requested. Presented in red.
- **Progress status not started.** Shows production orders that should have been started already but have not. Colored orange
- **Progress status on time:** All production order that seem to be running promptly.

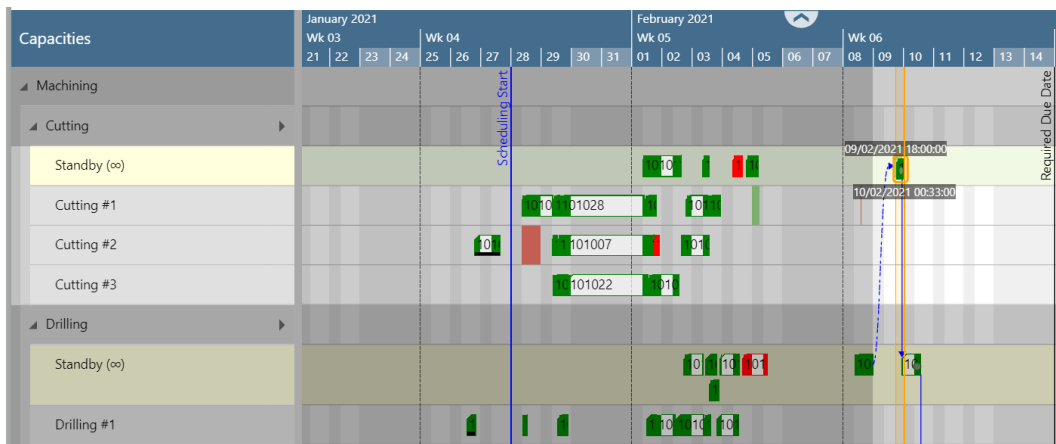


## 6. Availability view

Based on the EMAD described in the last chapter, you can color the Production orders to represent if the material required to fulfill an order will be accessible on the scheduled day.

When dragging a production line into the schedule you'll easily recognize the date where the EMAD as it gets highlighted over the schedule.

At the same time you can rapidly see distinguish the availability with color green or red. As seen here:



## 7. Wait time view

The Wait Times View helps you to recognize bottlenecks quickly

The Wait Times View gives you an overview of critical and uncritical waiting times of operations at the machines.

The idea behind this view: operations might need to wait for other operations to finish as the other operations have (an implicit) higher priority.

The below screenshot shows a production schedule with the Wait Times View applied. The default settings are:



# 5 The “How”: Included scheduling instruments on the VAPS

The idea of having scheduling instruments is key to the Visual Advanced Production Scheduler.



When thinking of production scheduling, especially when it comes to an advanced software, many people imagine a magic button, that when pressed would magically optimize the production schedule. This is not what we offer with the VAPS.

The reason is: We are convinced that this **not** ideal. Having the magic button seems like a desire, but it could be a dangerous one. **Here is why:**

*A magic button can only work, if there is a powerful algorithm behind.*

A powerful algorithm is the result of great data being feed. Otherwise the equation is simple: garbage in, garbage out.

Great data translates to lots of current information. Or as we see it: *master data plus current data*. Along with that, the algorithm would need a precise description of what is relevant for production and scheduling. All details must be included, as the algorithm doesn't have intelligence on its own but relies on deterministic data and rules.

```
0 0 1 0 1 1 1 0 1 0 0 0
1 1 0 1 0 1 0 1 1 1 1 0
1 1 0 0 0 1 1 0 0 1 0 0
1 0 0 0 1 1 1 1 1 1 0 0
0 0 1 0 1 1 1 0 1 1 1 1
1 1 0 1 1 0 1 0 1 1 0 0
0 1 0 0 0 0 1 1 0 1 1 1
1 0 1 0 1 1 1 1 0 0 1 0
1 0 1 1 0 1 0 1 0 1 0 0
0 0 0 1 1 1 0 1 0 1 0 1
1 1 1 1 1 1 1 0 1 0 1 1
1 1 1 1 1 0 0 1 1 0 1 0
```

Getting this sort of information may entail a very long and expensive project for data modeling and data gathering. A customer of ours prepared for a “magic button” software installation, by spending a high 5 digit amount for these projects.

Nowadays, everything is faster and almost nothing seems to be stable. Technology enhances at an incredible speed and change is no longer the exception, but the norm. As a result, if change is the norm, one can build this expensive data model, get a tremendous algorithm in place, and then, something change. Specs, routines, routings among other factors, can vary. These change would make your algorithm run on the old reality, whereas you and your shop floor are already in the new reality. This takes us back to the inefficient equation: garbage in, garbage out.

With all changes, your algorithm will produce doubtful and unreliable results. Making it easier to get back to manual scheduling after the abundant effort to start using the magic button in the first place.

Our experience has taught us that the magic button brings more charm to the vendor than it brings to the user. This is not what we aim for. And for this, we say **“No to the magic button, and welcome to our scheduling instruments”**

## What are scheduling instruments?



**Scheduling instruments intend to reduce the scheduling time for a certain scheduling task. They help to achieve that task in a quicker, proficient and more effective way.**

Since the release of our second version of the VAPS, in June 2020, we are presenting 6 different scheduling instruments. It's important to understand them to figure out which one will work better with your scheduling manners.



Here is an initial overview of the current scheduling instruments:

<i>Instrument</i>	<i>Applies to</i>	<i>Can change sequence on machine center?</i>	<i>Purpose</i>
<i>Drag &amp; Drop</i>	One operation	Yes	Squeeze in an operation and/or a rush order
<i>Apply standard routing</i>	A chain of linked operations (e.g. a production order; all operations of production orders that are linked via reservations, etc.)	No	Add one production to the schedule without changing previously scheduled production orders, and assign all operations to the standard machine/work centers
<i>Apply alternative routing</i>	A chain of linked operations (e.g. a production order; all operations of production orders that are linked via reservations, etc.)	No	Add one production order to the schedule without changing the current order of the production orders. Assign all operations to that specific allowed machine center that can get that specific operation done at earliest
<i>Schedule successors</i>	A chain of linked operations (e.g. a production order; all operations of production orders that are linked via reservations, etc.)	Yes	Minimize the lead time of one specific production order
<i>Fill idle times</i>	All operations that have been assigned to a work or a machine center	Yes	Improve the utilization of all machine and work centers without negative impact on delivery times
<i>Add all</i>	All operations that still are on the standby resource	No	Efficiently add all new production orders to the schedule

Now, let's take a closer look at them:

## 1. Drag and drop

Similar to the VPS, this is a manual drag & drop movement that lets you change the schedule per operation. This means, you can select one Production Order routing line and make changes to timing, start or end date, or the assignment of resources and machine centers.

You can change the sequence of operations within a machine center and see the impact on other machines as the successors might get moved too.

This instrument tells the VAPS "I want to move this operation here". Although intuitive, it is rather dangerous as any drag & drop triggers an automatic reschedule of many other operations due to the finite capacity scheduling applied. Drag & drop literally is a way to make priority decisions.

## 2. Apply standard routing

This scheduling instrument focuses on one production order or at multiple operations starting from the one operation on which you trigger this instrument. By applying the standard routing you change the assigned machine center of the selected operation and all successors. This means the operations will move from the standby to a concrete machine center.

The underlying principles of "Apply Standard Routing":

- Changes the assigned machine center of the triggering operation and all successors (move from standby to a concrete machine center).
- Changes the timing (start date; hence: end date) of all successors.

- Adds this production order to the schedule with the lowest priority.
- Will not change the sequence on any machine.
- Will not violate the routing structure.

This instrument is considered a soft force as it tells the VAPS “I want to add this production orders to the default machine centers without making changes to the existing schedule”

### 3. Apply alternative routing

With the VAPS you can define alternative machine centers in each routing. This is a substitute for the machine center the routing would normally include. When scheduling you can select the initial operation of the production order routing line and change the assigned machine centers of the selected operation and all successors considering the alternatives machine centers.

This instrument will not change the current sequence on any machine nor violate the routing structure.

This instrument tells the VAPS “I want to assign this production order to the default or alternative machine centers to complete it as soon as possible without making changes to the existing schedule”.

### 4. Schedule successors

This instrument gives the selected production order the highest priority starting from the operation from the one operation on which you triggered the option. This option should be started once you dragged and dropped the first operation of the production order to your desired starting point. From there, the VAPS will move all successors to start as soon as each operation ends. Scheduling the successors will impact other machine centers without violating the routing structure.

This instrument tells the VAPS “I want to prioritize the following operations of this production order”.

## 5. Fill idle time

This function intends to bulk reschedule already planned operations with one clear prioritization rule: to reduce idle times on machine centers.

When scheduling with this instrument you have the opportunity to define from when you want this instrument to run, decide whether you want to take into account alternate machine centers or not; if you want to take into account the EMAD or not, and to set number of iterations to be run.

## 6. Add all

With this instrument, a button called “add all”, you can schedule in bulk production orders with a clear prioritization rule: from standby resource to their respective machine centers.

Just like the “fill idle time” instrument, you can define the schedule start date, decide whether you want to take into account alternate machine centers or not, and if you want to take into account the EMAD (earliest material availability date) or not.



**10** GREAT  
BENEFITS  
OF A VISUAL  
SCHEDULER



# 6 Ten great benefits of a visual scheduler

The Visual Advanced Production Scheduler is part of our visual scheduling solution offer for Microsoft Dynamics 365 Business Central. A visual scheduler on its own extends the capabilities of the ERP. As such, the VAPS greatly leverages the general benefits of any visual scheduler.

Here we have ten advantages to enjoy when you upgrade your Business Central environment to include a visual scheduler, whether that is the VPS or the VAPS.

## 1 **A Gantt chart is the 2-dimensional representation of a multi-dimensional scheduling challenge**

Instead of shifting between a production order card, a machine center card, production order routings, capacity entries and item cards (just to name a few), we collect all related data into your visual schedule. With a visual scheduler, we follow the idea of a picture being worth a thousand words. On the other hand, almost everywhere you click on the scheduler will open the corresponding card in Business Central.

## 2 **All our Visual Schedulers allow drag & drop interactions**

Without opening any production order card, resource card or production order card, you can easily interact with your scheduler. Select a task, drag it and drop it elsewhere. Whether you need a new resource assignment or postponing an activity we have you covered.

With this benefit we make sure you are in full control of what will happen next in your schedule. Leaving aside the dependency towards an unclear algorithm taking place in the background.

3

### **Due dates are always on sight**

We understand the importance of delivering on time, and hence we display the due date for your production order in all views. You can identify this with a line across the date or with a diamond. More importantly, we will visually notify you if your scheduling will affect the delivery.

4

### **We added dependency links for your sub-assemblies**

One of the advanced features from Business Central's manufacturing capabilities out-of-the-box is the way to handle complex product & item structures via dependent production BOMs. With this feature you can manage complex sub-assembly structures and elegantly combine make-to-order production with the make-to-stock production of the components needed for various customer orders.

Our visual scheduler reflects the sub-assembly's structures. That means we display the dependencies (which can go well beyond a single production order) while taking them into account when rescheduling and when changing component orders or operations. At the same time, we respect parameters like the safety lead time.



**5**

**You can recognize the planning and the execution status immediately**

Your visual scheduler show the Production Order according to their status: Planned, Firm planned and released. You can use a filter to leave only the status you'd like to work on.

Additionally, once your production order is released to the shop floor and your operators start to book progress on the order, you will see a progress bar in the visual scheduler. Besides, we added a “time now” line in order to help you spot issues right away, for example if your execution is behind your initial schedule.

**6**

**The calendar reflects your shop floor agenda and your machine centers' availability**

Weekend, holidays, rest day, sick days, machine time off, or any reason a machine center may be out of order can be registered in the corresponding card and therefore shown in the scheduler's calendar.

**7**

**Greater data viewing options**

With our extensions you can swiftly move across the views, from production orders to capacities, and with the VAPS sales orders as well. This way, you can take a better look on the data according to the perspective you need.





### **You can monitor the usage of your capacity with the histogram**

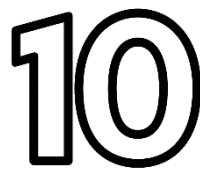
On the VPS, estimated by second, day, week or month, you can keep an eye on how your capacities or resources are being utilized. Understanding the operations helps identify bottlenecks, thus the fixing of them.

When working with the VAPS you can get a clear picture of how your standby resource and your subcontractor operates.



### **Each planner gets its own view**

Our extensions have space for customizable according to the user's preferences. Filtering to only the production orders, machine centers or work centers they are responsible for. If you're interested in reading more on personalization on the scheduler check this [blog](#).



### **Our VAPS supports working with multiple scenarios**

With this enhancement you can work around figuring out the best route for a production order without modifying the live data. You can drag & drop as many times as you want and later publish the simulation as your new schedule.

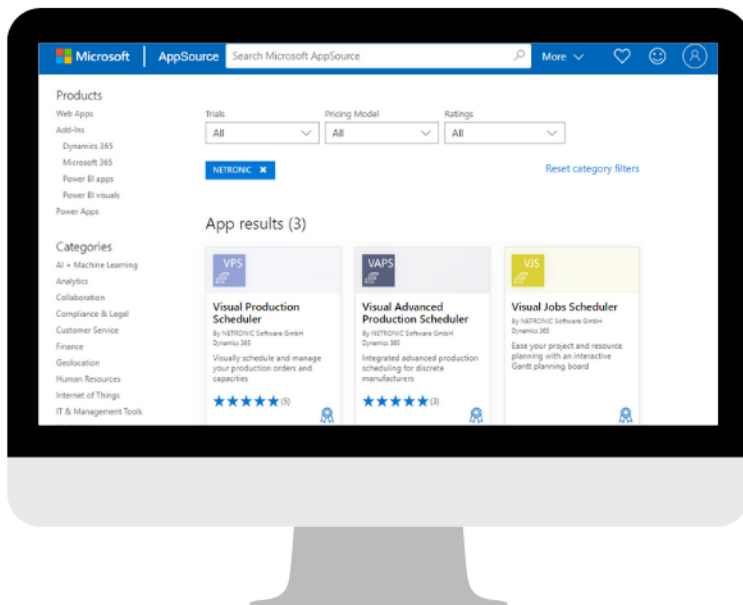
These are just ten of all the functions our Visual Schedulers can offer to improve the Business Central experience.



# VAPS VS VPS

# 7 VPS vs VAPS

## Where bottomless resources meet boundaries



As of today, you can find all our extensions available on [AppSource](#): the Visual Production Scheduler (VPS) and the Visual Advanced Production Scheduler (VAPS) integrating with the Manufacturing module; along with the Visual Jobs Scheduler (VJS) taking part with the Jobs and Resources module of Business Central.

The VPS and VAPS were developed for Dynamics 365 Business Central addressing to improve the same module: [Manufacturing](#).

In other words, **they have the same goal in mind**. Namely, to manage and to put a schedule into action in the most effective way possible; in order to help organizations gain operational agility.

However, despite sharing a goal, both products vary significantly in the methods used to attain that goal and in the types of manufacturing companies that they are meant for.

In this chapter we will describe the VPS, the benefits of using either and then list the similarities and differences between both extensions.

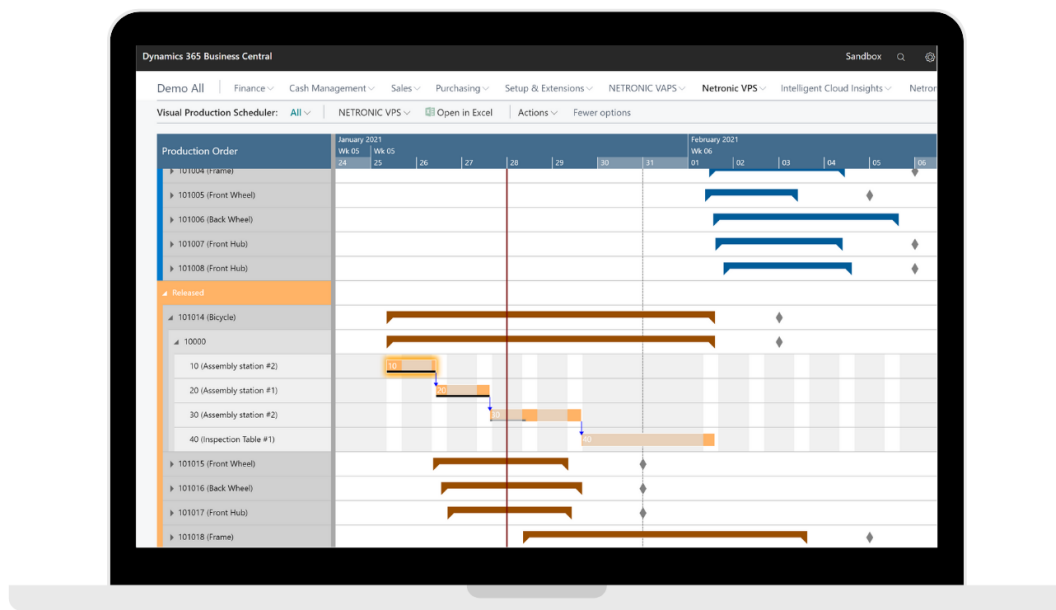
## · Visual Production Scheduler ·

Introduced in 2013, *the VPS is – in a nutshell - the visual interactive front-end to the standard Business Central manufacturing module.*

The VPS will ease the management of your production orders, machines and work centers.



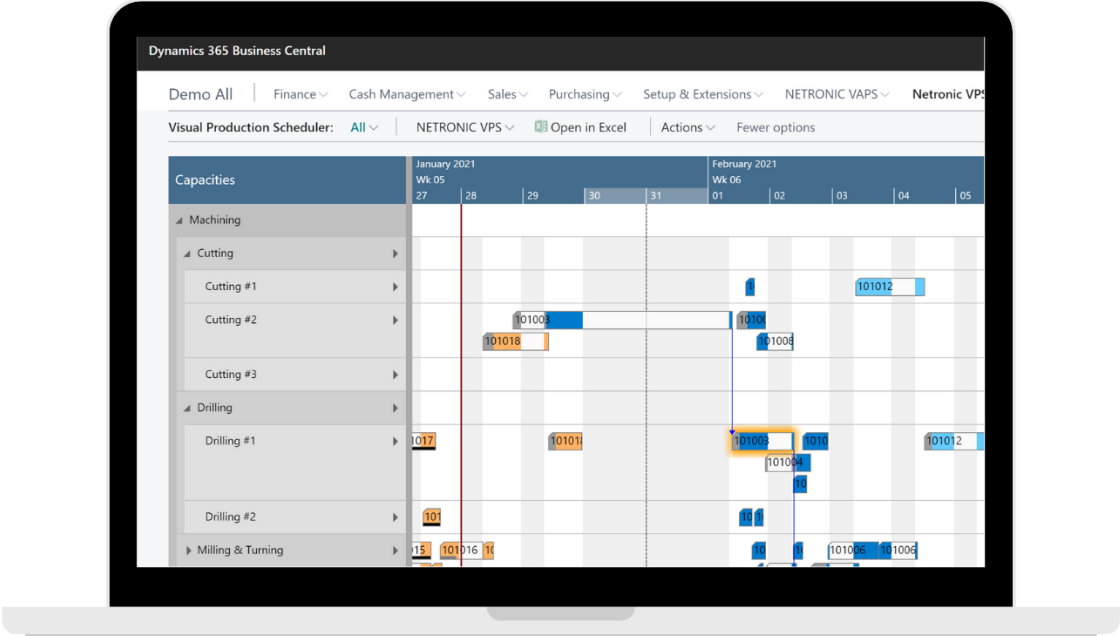
We give you a comprehensive view of all the tables and dialogs you would normally look out. From this all-in-one view, you can drag and drop production orders and operations on the schedule. Every change you make in the chart will load into the underlying database of BC. You can schedule with an emphasis of your production orders or your resources and their capacities.

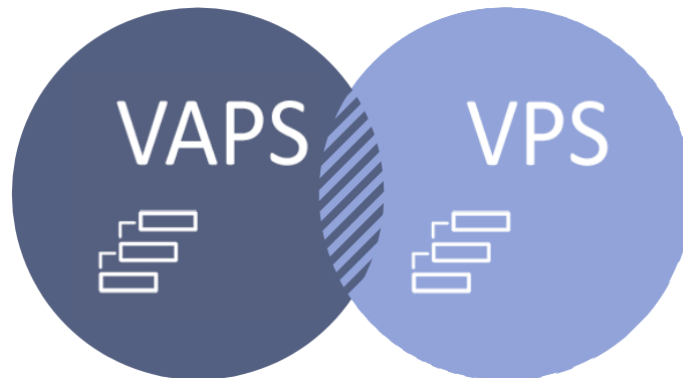


It's important to point out that, we limited ourselves to develop the VPS with the same guidelines as Business Central manufacturing. Hence, we do not interfere with the original scheduling logic. As such, *the VPS is the ideal entry-level product into scheduling.*

We recommend you to start with the VPS if your company is making fundamental leap in their digitation journey by integrating a powerful business management system such as Dynamics 365 Business Central. With the VPS, you and your team will get a faster and better understanding of how Business Central works as well as getting a realistic production schedule that you can embrace and drive.

From experience, our typical VPS customer is rather new to Business Central and previously ran their scheduling on a whiteboard or with Excel.





## Similarities

- **System availability**

**VPS:** Microsoft Dynamics NAV from 2009 R2 to 2018; Business Central: all versions on-prem and cloud, available in AppSource for trial too.

**VAPS:** Dynamics 365 Business Central starting on v14. For on-prem and cloud, available in AppSource

- **Integration module**

Technically speaking, both **VPS** and **VAPS** are “plug and play” as they swiftly connect to the Manufacturing module of Business Central.

- **Database**

Both the VPS and VAPS display information directly from Business Central’s database without any third party interface. The extensions equally read from the manufacturing related tables: productions orders, routings, work centers, machine centers and capacity utilization. The VAPS however, *also* considers custom tables such as the alternative routing and coloring set up.



- **Visual Interface**

At first sight both extensions look alike. The planning board, calendar and data display is very similar out-of-the-box. The differences will come with the more personalization the user arranges.

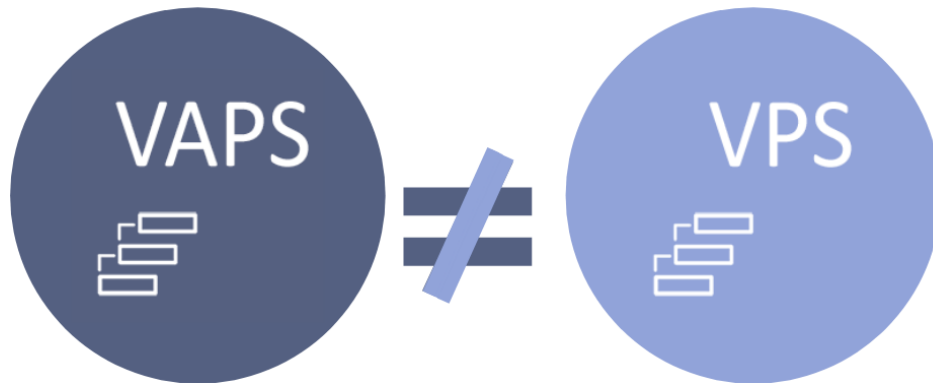
- **Scheduling control**

While providing different options for scheduling, both products recognize the user as the ultimate decision maker. In other words, the user is in the driver's seat.

- **Development approach**

As part of our continuous enhancements we deliver new versions at least once a quarter.

## Differences



- **Algorithms**

**VPS:** Its scheduling logic is entirely adhered to the standard manufacturing module of Business Central. Calling for the user to make changes via manual drag and drop to optimize the schedule.

**VAPS:** Uses underlying finite capacity scheduling algorithms to generate an efficient schedule. Allows manual and semi-automatic scheduling options.

- **Material availability**

**VPS:** With the VPS for NAV, the material availability can be checked through a visual representation of the BOM. However, no explicit material availability is shown on Business Central.

**VAPS:** An earliest material availability date (EMAD) is calculated for each production order by matching component supply and component demand for every day during the planning horizon.

Based on this data, a specific view colors each order according to the material availability on routing line level.



- **Color views**

**VPS:** By default, your production orders and their routing steps are colored according to their status: from planned, firm planned or released

**VAPS:** In addition, to the default coloring, you pick from four more coloring views: regarding material availability, progress status, machine or work center, and more.

- **Work and machine centers**

**VPS:** You can manually change an operation to be produced elsewhere by using the drag & drop function.

**VAPS:** you can predefine which work or machine centers could work as an alternative for the usual work for each item routing.

Once the routing includes a default machine center and an alternative machine center you can select a semi-automated scheduling instrument to consider the substitutes when scheduling a new order or rescheduling an order that is already part of the plan.

- **Scheduling decisions**

**VPS:** As most activities are manual, you're always in charge of making decisions, what goes first, what comes after, etc.

**VAPS:** Here, you can predefine rules to follow. Therefore, you can semi-automate a lot of the scheduling decisions, saving you time and money.

- **Scheduling instruments**

**VPS:** You are equipped with two instruments to ease the scheduling, to Drag and drop manually or to schedule the routing operation successors with one button click.

**VAPS:** You're supplied with great scheduling boosters. The underlying algorithms allow you to schedule manually, to associate alternative machines center along the routing or to expedite production orders with a button click.

- **Training and Implementation Time**

**VPS:** As soon as you understand the scheduling logic of Business Central, you're good to go.

**VAPS:** like the VPS you need to learn the scheduling logic of your ERP, but also to comprehend the new capabilities. An implementation service is required to get the most out of the software.

Moreover partners who want to offer the VAPS as part of their portfolio must undertake a certification course.

- **Costs**

**VPS:** Visual scheduling by comparison is cheaper but limits performance.

**VAPS:** More expensive with more functionalities

Now that we've gone through the list of similarities and differences between the VPS and the VAPS we can address the question of which would work best for you. The best way to determine which is right for you is to evaluate your planning environment. For this, drop us a message to schedule a demo and consulting session. *We will be happy to guide you through this process!*



# **STEP-BY-STEP TO FINITE CAPACITY SCHEDULING**

# 8

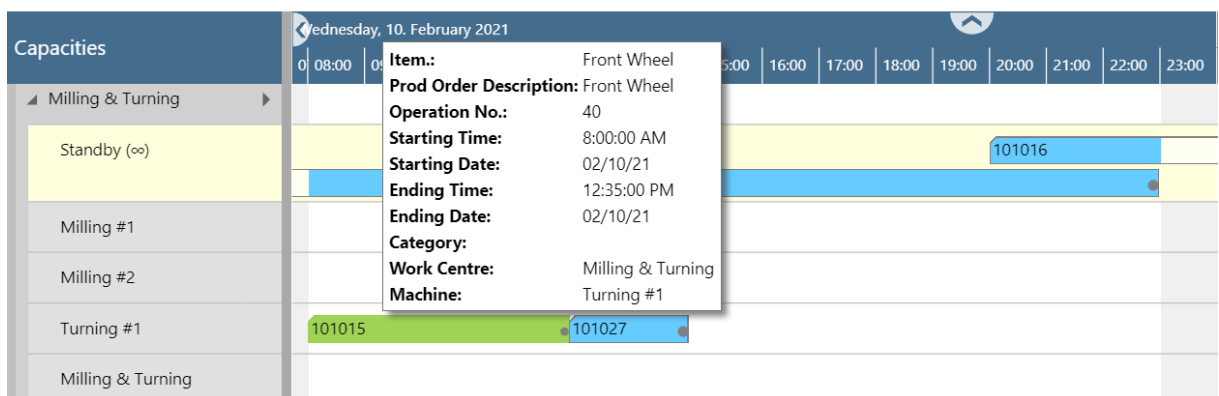
## Finite capacity scheduling basics– explained

Finite capacity scheduling means to schedule with limited capacities. By default, our assumption is to have a capacity of 1 per machine center. *This means:* each machine can work only on one operation at a given point of time.

For this example, we will delay the start of one operation to see how this impacts other operations on the same machine.

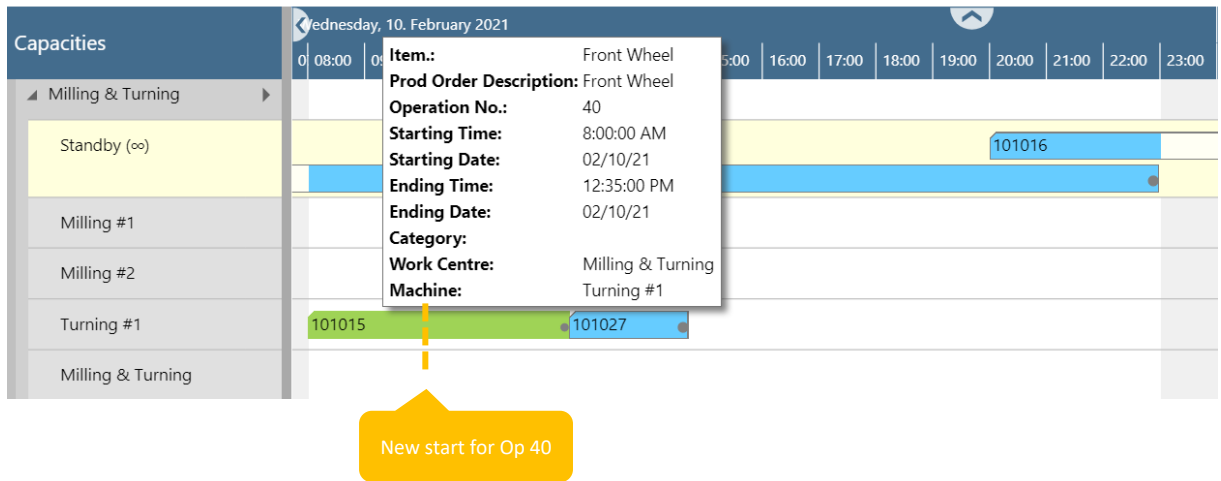
1. We will start with two production orders 101015 and 101027. And will focus on only one operation of the routing.

VIEW - VISUAL ADVANCED PRODUCTION SCHEDULER

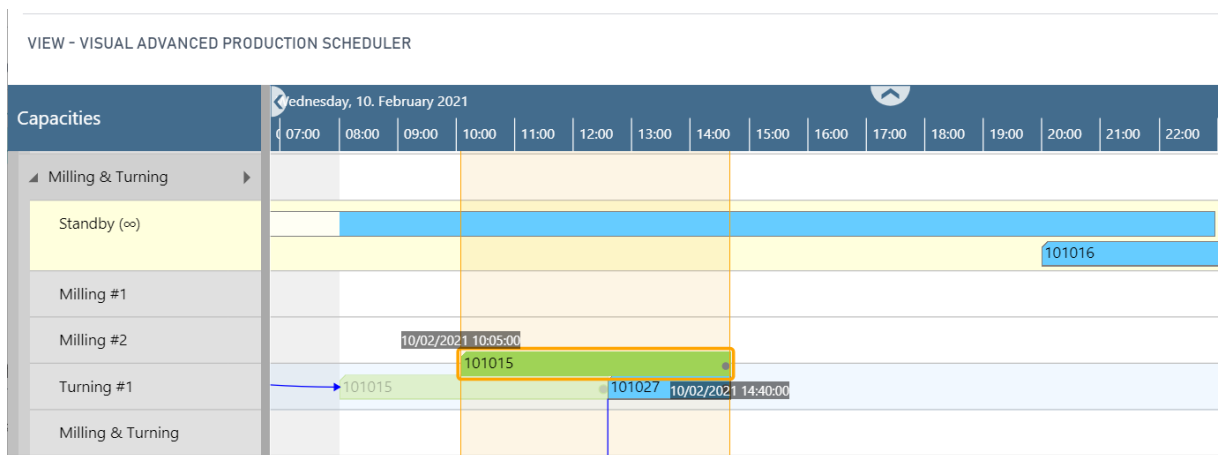


- Production Order 101015 (in green) requires the Turning machine center for an operation that would take 4:35 hours starting at 8:00 and finishing at 12:35pm
  - Production Order 101027 (in blue) also requires the Turning machine center for an operation on the same day. The current schedule suggest the Turning to start right after the production order 101015 is finished on that machine center. Running from 12:35 to 14:40pm. They are completely independent from each other.
2. Due to the material of the production order 101015 arriving a little late, this order won't be started on time, but instead 2:05 hours late. We can see the new start with the dotted line.

VIEW - VISUAL ADVANCED PRODUCTION SCHEDULER



In standard Business Central where machine centers have infinite capacity, your operations would overlap each other. You'd see two operations working at the same time. Looking something like this:



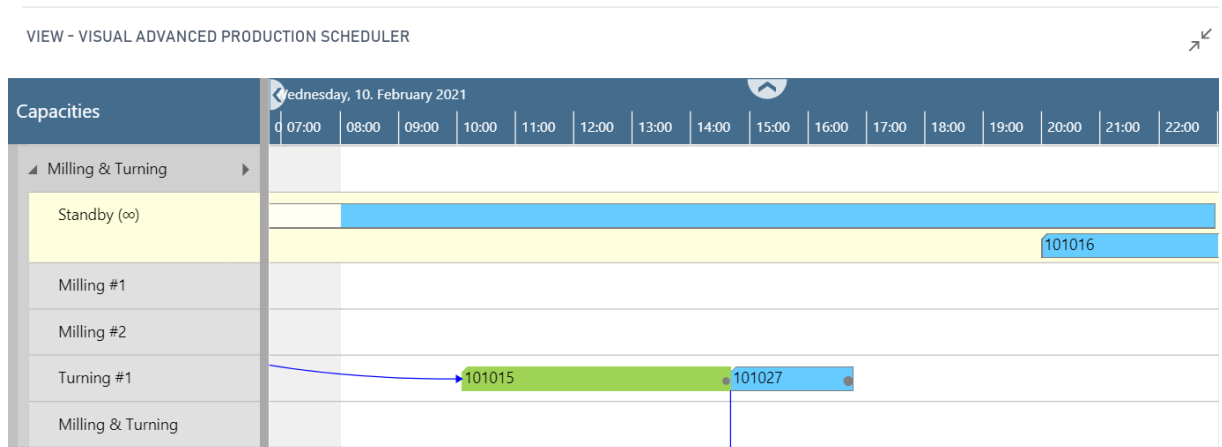
However, as the VAPS only allows one production order per machine center at any point of time, this will not happen. The VAPS will consider the following:

- Dependencies between operations on each production order
- Reliance between production orders when made through reservations, and
- By default one order per machine.
- For this example there is no dependency between the operations, therefore they can be moved individually.

And with this, as there's not enough time to finish the turning for the P.O. 101015 and start the turning for the P.O. 101027. You'll have two options:

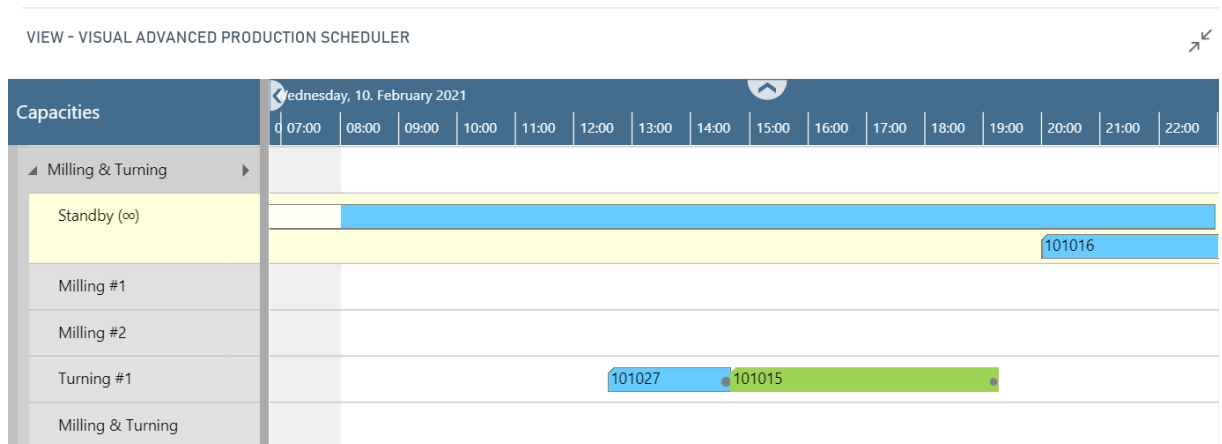
a. *You can push both operations by 2:05 minutes into the future.*

This will allow you to work on them in the same order, just later. With this option you'd be finishing the turning for the P.O. 101015 at 14:40 and the turning for the P.O. 101027 at 16:45.



b. Or, you can manually leave the turning operation for the P.O. 101027 where it is, and drag the turning for the P.O. 101015 to start after the original end of the P.O. 101027. This works better in the case there's a time limitation for the P.O. 101027. By doing this the turning of operation 101027 would end at 14:40hr and the turning for the P.O. 101015 at 19:15hr.

You can pin operations to prevent them from moving in time.



## 9 Conclusion

We hope this eBook gives you a better insight of the key functionalities and major advantages of the Visual Advanced Production Scheduler.

So, what's the takeaway?

Visualization of time and resource orientated data of Microsoft Dynamics 365 Business Central is not only a nice-to-have but almost a must-have for any manufacturing company today.

Therefore, it is in our best interest, as well as the interests of our partners (your consultants) to work with visualization tools to support their underlying Business Central system fully and seamlessly.

We strongly believe implementing the Visual Advanced Production Scheduler into your ERP will bring a necessary value to your overall experience. The sooner you implement it, the better.

We are always open and willing to take a quick call or to demonstrate our extensions.

Lastly, if there's anything you think we should add to our extensions, let us know. There's no better feedback than yours.

### Complementary resources

- If you're a Microsoft consultant and have interest in reselling the VAPS make sure to [check our certification here](#),
- If you're an end customer thinking of implementing the VAPS you can book a non-binding demo with us,
- We covered on this eBook in depth in [our recent webinars](#),
- You can take part of an upcoming webinar, by registering [here](#),
- You can also read more on visual scheduling on [our blog](#), or
- Listen to [our podcast "Business Central Manufacturing Show"](#).