



Introduction to
Visual Scheduling for
Microsoft Dynamics 365
Business Central

➤ Table of Contents

➤ About this eBook	3
➤ What is visual scheduling?	4
➤ How can a visual scheduler help?	6
➤ How to best achieve visual scheduling in Dynamics 365 Business Central?	10
Visual Production Scheduler (VPS)	14
Visual Advanced Production Scheduler (VAPS)	18
Visual Job Scheduler (VJS)	21
➤ 7 visual scheduling best practices	25
➤ Conclusion and additional resources	27

➤ About this eBook

This eBook intends to introduce visual scheduling to planners and project managers, specifically when using or thinking of migrating to Microsoft Dynamics 365 Business Central.

Starting with describing what visual scheduling is and its importance nowadays. Moving to why it is a great addition to the already powerful ERP system from Microsoft, Dynamics 365 Business Central. And later on, briefly explain our extensions or how you can benefit from them.

➤ What is visual scheduling?

In a manufacturing environment, Production Planning and Scheduling is

“The systems that enable creation of detailed optimized plans and schedules taking into account the resource, material, and dependency constraints to meet the deadlines” (IWLA, 2010, p.95)¹.

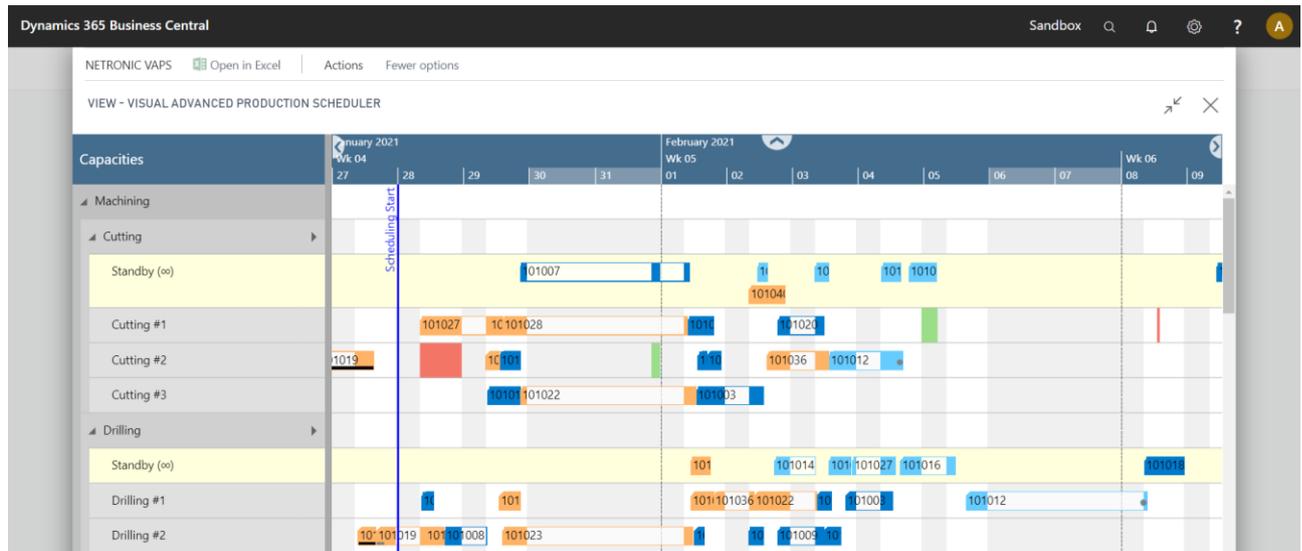
Planning is a continuous action with its periodicity depending on the industry, whether it is weekly, biweekly, monthly or even annually. Meanwhile, visual scheduling is a set up approach in which changes can be applied by moving elements in a Gantt chart.

A Gantt chart is considered the ideal representation of time-related scheduling data with dependencies and constraints making it a great option for short-term scheduling scenarios.

A visual schedule tells you what is going to happen and in which sequence. This system provides you with a clear structure, both helping to cope with incidents that appear as unexpected and enabling them to make decisions on the follow up without much assistance.

Visual scheduling requires an underlying ERP system to generate a task- and time-oriented plan, like a production plan, a project plan or a service jobs plan. Visual scheduling then represents this plan in an intuitive visual manner, highlighting dependencies and conflicts to rearrange the scheduled if needed.

The below screenshot gives an example of a visual schedule.



Another typical of scheduling system in the manufacturing industry is Advanced Scheduling. In this case, algorithms, linear programming, advanced mathematical formulas and heuristics are used to plan the best possible process for the manufacturing process, taking into consideration the allocation of raw materials, production capacity and demand.

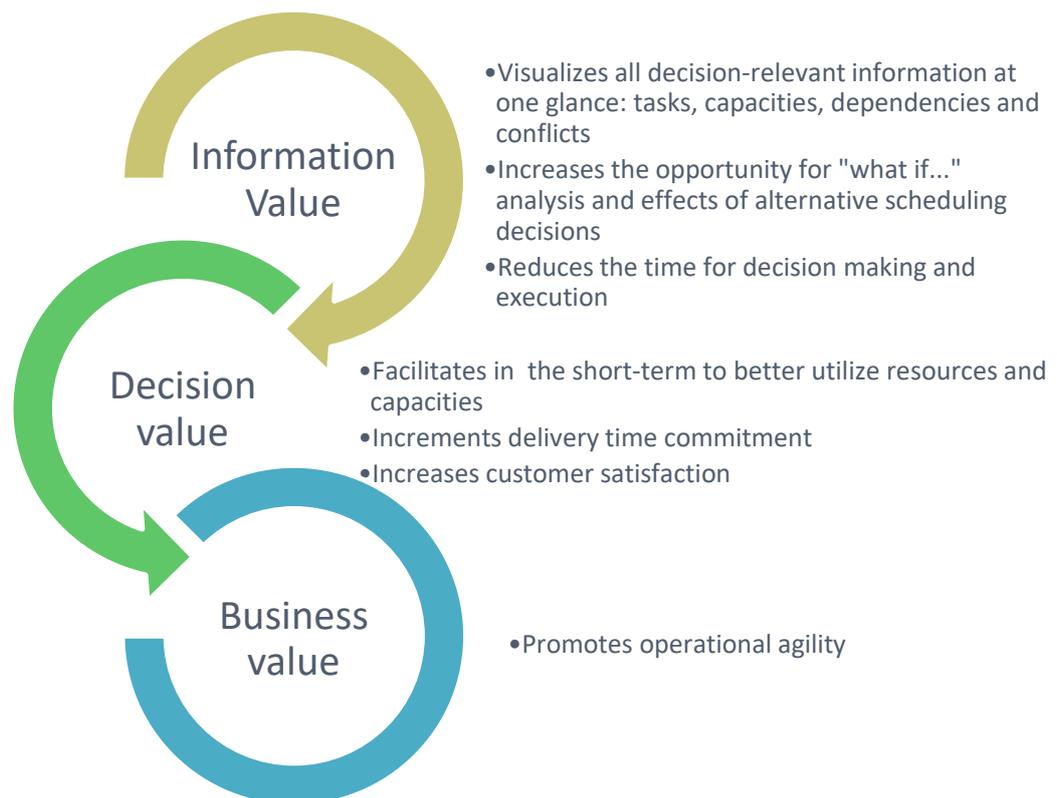
Concisely, a visual schedule helps:

- Providing a comprehensive overview of a time-related, resource-oriented schedule with dependencies
- Highlighting conflicts and helping you get decision-relevant data
- Enabling corrective actions in terms of drag & drop changes to the schedule
- Keeping you (and not the system) in the driver seat

➤ How can a visual scheduler help?

Today's business environment shows three common dilemmas that companies experience: data growth, shorter decision cycles, decentralized planning and decision-making. These three dilemmas suggest the need for a Business Intelligence (BI) tool to support working with dynamic data employing bidirectional communication.

BI can reduce the time required to make decisions as well as promote better data sharing among the organization. This need can be easily covered by interactive Gantt charts. In that regard, visual scheduling yields a threefold value: information, decision and business value, as show here:



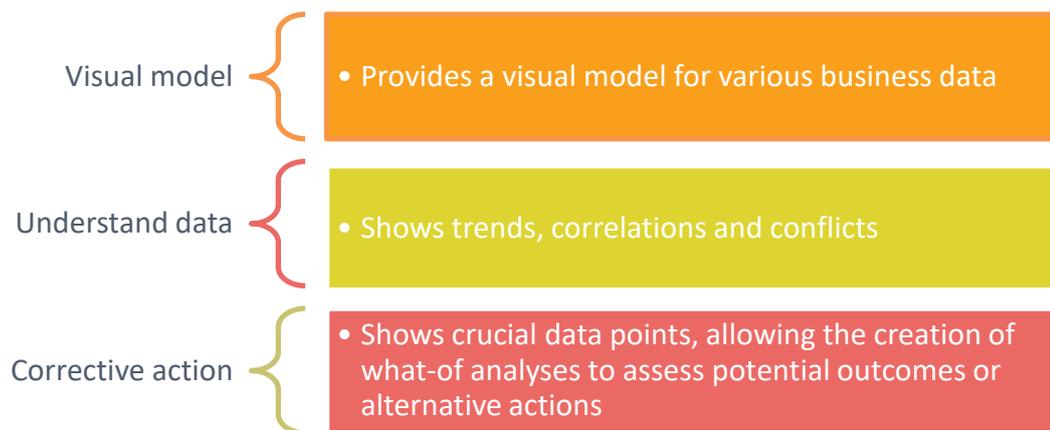
With an advanced/algorithmic scheduling system, you can create a precise model of the shop floor. You can consider all dependencies, constraints, relations, alternative product routings,

priorities, business rules, etc. Yet, for a Gantt chart to create operational agility, it's important to work with the most current data.

Why do you need visual scheduling in Dynamics 365 Business Central?

Enterprise resource planning (ERP) systems, such as Microsoft Dynamics 365 Business Central help small and medium-sized companies manage their accounting and finance processes, supply chain, and operations. ERP systems provide users with a real-time view of their entire business. Running a successful business depends on the ability to gain insight into business data and extract and present information in a meaningful manner. Recently, Microsoft enhanced the business intelligence capabilities available in Dynamics 365 Business Central to support users making informed decisions. These enhancements relate to reporting, charts and KPIs as well as ad-hoc queries and analyses.

The value of adding charts to an ERP system is manifold:



An ERP, like Microsoft Dynamics 365 Business Central is perfect for gathering the master data and information you need to start scheduling. However, we came across one problem: *Task- and time-centric scheduling data as they are used for production, resource, projects or service schedules are presented as tables within Business Central.* There's a great search field and filter functionality on top that eases the data hunt. Consequently, it's not easy to follow with relevant information. It simply takes too long to understand the data, the business and to make the right actions.

We can phrase it like this: Dynamics 365 Business Central is a data treasure, but when it comes to time-related scheduling data, it provides no fast path for you to get to the gold. We know 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.

Visual scheduling can be your shop floor assistant. It takes data from an underlying (ERP) system and visualizes the plan/ schedule calculated by the system. It helps you understand the current situation, clearly showing all issues and conflicts, for example delivery time violations, capacity conflicts, missing material, among others. With the information now evident you can now easily deal with the conflicts. In a visual scheduling system, you are the decision authority.

So – what do we need to make sure our visual scheduler helps instead of slowing down the processes? Current data.

Importance of current data

An underlying ERP system is the data source for a visual scheduler. We can't stress how fundamental it is to have present data for the visual scheduler to do its wonders. For this reason, we made the integration with the original data base as close as possible. You will only need to give two click to make sure your data is always current. *One click to the menu ribbon and the second to the Save or Update button.* With this enrichment we make sure you're covered even with constant changing of your shop floor conditions.

There are several scenarios where you may need to decide "against" the previously defined shop floor schedule. This is when current data comes in handy. Let's look at the dilemmas:

A) **Machine speed**

With the help of an ERP and/or a scheduling software you can define the delivery date, routing, material, set up and run time as well as transportation time. The tricky part appears when a change in the shop floor happens, for example speeding up a machine center.

If a machine is free, you can now glance at your visual schedule and rush in the next production order scheduled for the machine center.

2) Delivery time

Imagine you have two production orders that compete for the use of a resource to meet the same deadline. A visual scheduler would highlight this conflict allowing you to rethink the situation, to either call the customer with whom you have a trustful relationship to agree on a delayed delivery, to assign overtime on the required day or to find another machine center to process the order, whether internal or external.

3) Capacity utilization

For this dilemma imagine that, by mistake, one production order got scheduled into the same machine, at the same time as another longer production order. You'd only see this issue in the visual scheduler, offering you a visual warning. If the machine has a capacity of 1, you'll have to deal with this conflict. Like the past case, you can accept the delay, by scheduling the production orders in sequence instead. Ask a machine operator to work extra time to cover both production orders or to reassign to another machine center, if available.

These are only three examples of everyday use cases. Users of Microsoft Dynamics 365 Business Central definitively can benefit from visual scheduling solutions – these solutions help them to unleash the potential of the data treasure that BC comes with.

➤ How to best achieve visual scheduling in Dynamics 365 Business Central?

Before answering the question how to best achieve visual scheduling in Dynamics 365 Business Central, I want to quickly recap why users need visual scheduling capabilities. These capabilities are always related to time-oriented and resource-centric planning data which have dependencies. By visualizing multiple BC tables in an intuitive manner, users better understand the schedule, the constraints, the issues and the dependencies. They yield an **information value**. This information turns into a **decision value** as the visual scheduler helps the user focusing on the decision-relevant information thus enabling immediate corrective actions. The faster these corrective actions are triggered, the better the improvement of the operational agility will be. So ultimately, the decision value turns into a **business value**.

This scope of visual scheduling helps identifying **basic requirements that any visual scheduling solution should meet:**

- Data used for visual scheduling must combine relevant information from various BC tables
- Data must get filtered, aggregated, and be represented in an intuitive manner
- The data presented should be context-sensitive and come with a kind of “auto focus” on the decision-relevant information – based on the user’s current decision need
- Data must be interactive, permitting a bidirectional communication between you and your data

Unfortunately, these requirements are not fulfilled by standard BC – neither for production orders, nor for jobs and project data, nor for service orders and nor for resources and capacities. That’s why, a visual scheduler must be added to the system, typically through an Independent Software Vendor (ISV) solution.

Since the introduction of the role-tailored client, Microsoft promoted the enablement of ISVs to provide their solutions.

With so many options available, one must decide between implementing a stand-alone software or and ISV integrated extension. This in turn leads to the question of how to define the difference between an add-on and an extension solution¹:

	Add-ons	Extensions
Security	Work with their own database, sending data to third-party system, leaving the system vulnerable.	Remain entirely within Microsoft Dynamics 365 Business Central. This means, critical and sensitive data do not need to leave your environment.
Learning Curve	Usually comes with its own branding, user interface, and menu structure; providing a completely different user experience compared to BC. Training is commonly a must as the add-on can feel like a new software altogether	Due to its integration within the system it enables users to stay in the known environment. The interface is intuitive and easy to follow.
Integration	An add-on is considered a patch over the system. Patching something over a system can create system incompatibilities, confusion and general disarray.	An extension is an enhancement that increases functionality fitting in like a natural puzzle piece of the entire BC system. Sometimes a user would be unable to tell whether it came from the original software system.
Deployment	Requiring work with third-party systems and other complexities,	Allows a fast and easy deployment. It requires less to no adjustments of

¹ See a more detailed analysis in our blog post <http://blog.netronic.com/microsoft-dynamics-nav-differences-gantt-chart-addin-and-addon>

	deploying add-ons is something a bit complicated.	the standard BC, which makes it a rapid-fire solution that can be up and running for the benefit of the users in a matter of an hour after only a few clicks.
Scalability	Scalability is a bit more of a problem given the involvement of third party systems	Completely integrated to BC, and extension is easy to scale because they have no overhead codes such as menu bars, backend databases, integration and synchronization. Extensions can grow in a much more agile way.

Our findings on Add-ons vs Extensions

1. We recommend implementing a visual scheduler as an extension

In the Business Central world, you have two dimensions when it comes to adding a visual scheduler: an out-of-the-box product vs a highly customizable solution.

Deciding which path to follow relates to the general purpose of the visual scheduler as well as the specific business processes subject to visual scheduling.

The essential purpose of visual scheduling is to provide the users with an intuitive picture of their schedule so that they can see scheduling issues at one glance and can take corrective actions immediately. In this context, anyone familiar with the BC, its data structures and the meaning of the respective data will find an extension natural and easy to use.

2. The Gantt Chart should be the basis of the dashboard

As I outlined before, the best way of providing a visual schedule is to deliver the schedule's data by using the Gantt chart technique. A Gantt chart is a common technique which is not tied to a specific use case: Its base elements (time scale, resource table and graphical part) can be applied to multiple scenarios ranging from production scheduling over project management and service staff scheduling to fleet and logistics planning.

3. Personalize without taking it too far

Although the a Gantt chart may look the same at first instance, the underlying business processes, planning & scheduling workflows and decision criteria needs differentiation. A production planer has a different job description and goals than a project manager. Their specific needs are reflected in the respective Dynamics 365 Business Central modules, which are designed to best support the various tasks of people working in different functional areas. Therefore a visualization technique becomes meaningful if it relates to the specific daily required data and if it is tailored towards their specific scheduling and planning needs.

Although a Gantt chart is a common visualization technique, it is recommended that the visual scheduling solution is focused on one specific functional planning and scheduling need.

4. The less changes required from the visual scheduling extension to the Dynamics 365 Business Central standard, the more native it feels for you

We are certain visual scheduling for Dynamics 365 Business Central can best be achieved with an integrated Gantt chart extension staying as close as possible with the Dynamics 365 Business Central standard, and at the same time has a functional focus in terms of the BC module it is based on.

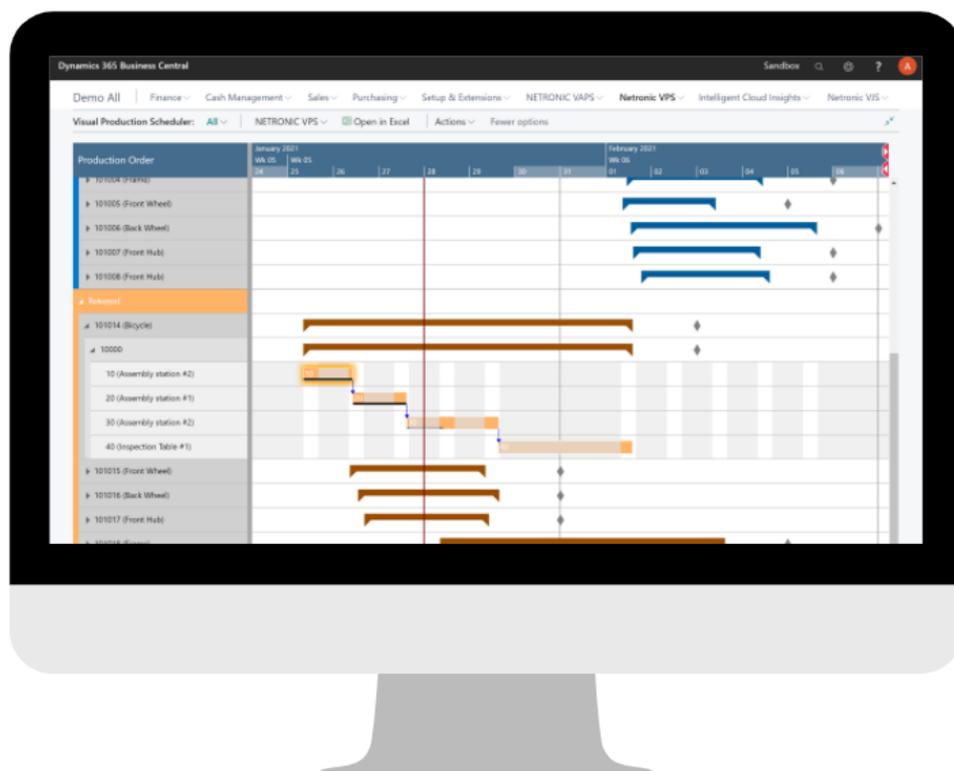
Visual Production Scheduler (VPS)



What's the VPS?

The Visual Production Scheduler (VPS) is visual drag & drop frontend to standard manufacturing module of Dynamics 365 Business Central.

The VPS allows you to work on the results of the standard Business Central material requirements planning (MRP) process but with an added Gantt Chart that lets you see the production schedule by orders, the operations, items and material requirements, its constraints and capacities.



Why should I use it?

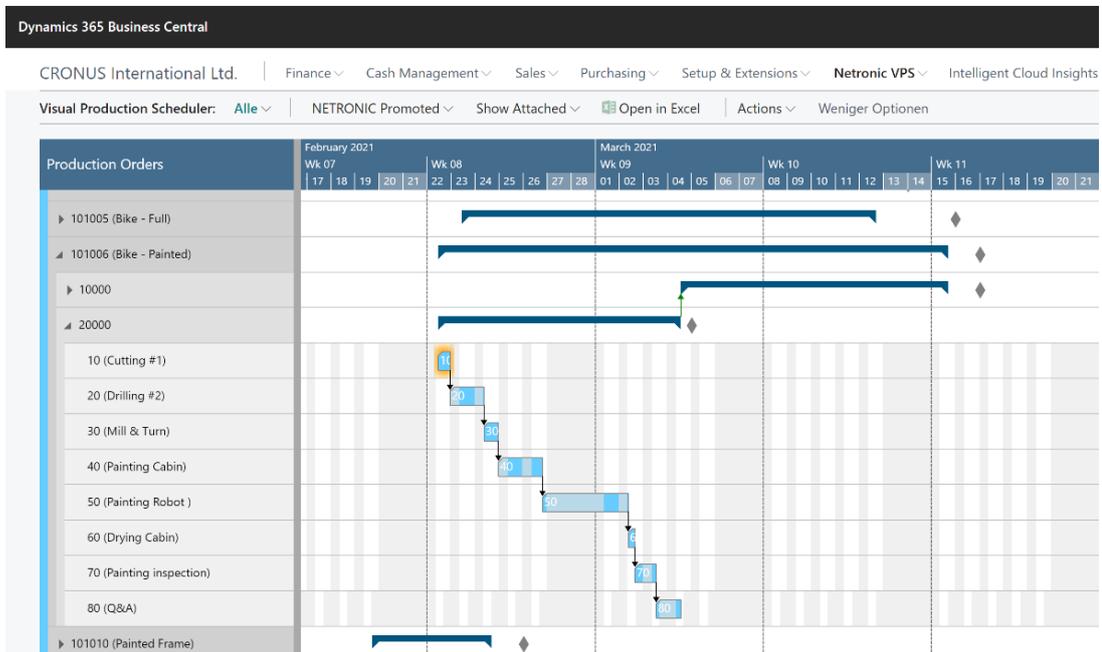
The VPS is an extension developed to address, through its complementary functions towards Dynamics 365 Business Central, the most common questions a planner must answer at any time given: what is the status of an specific order, if deadlines will be met, which work or machine centers have free capacity or which seem to be a bottleneck, and if there's enough raw material in the inventory to start production early.

Functions of the VPS

- Based on the unchanged standard BC manufacturing module. Double-click connection to BC cards and dialogs. Integration with production orders, operations, work and machine centers tables
- Clear visualization of production order routing lines, set up and runtimes
- Scheduling instruments: (1) Manual drag & drop, (2) Schedule successors
- Provide different views from various angles on the same data: by production order, by work centers and by loads
- Work with intelligent and context-sensitive visual alerts
- Filtering options

Included views

1) Production order

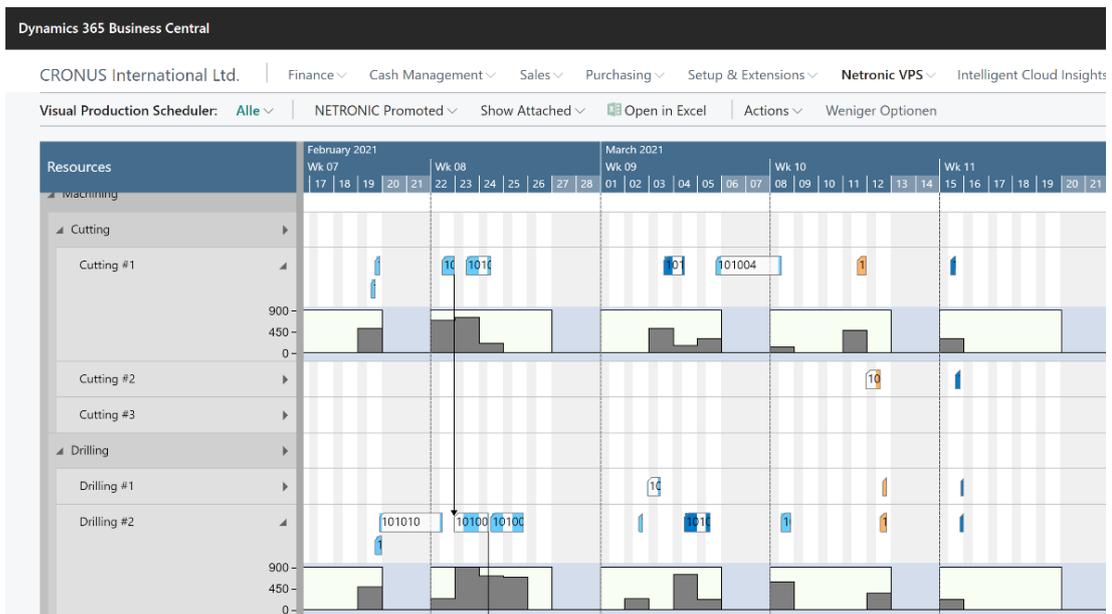


This view enables you to answer delivery date-related questions such as: *What's the status for the X, Y and Z production orders? Will they meet the deadline or not?*

It shows data by production order status, production order or production order line and works with symbols to visualize delivery dates. In addition, you can retrieve specific data production orders, such as the routing and, the work and machine centers scheduled for each order.

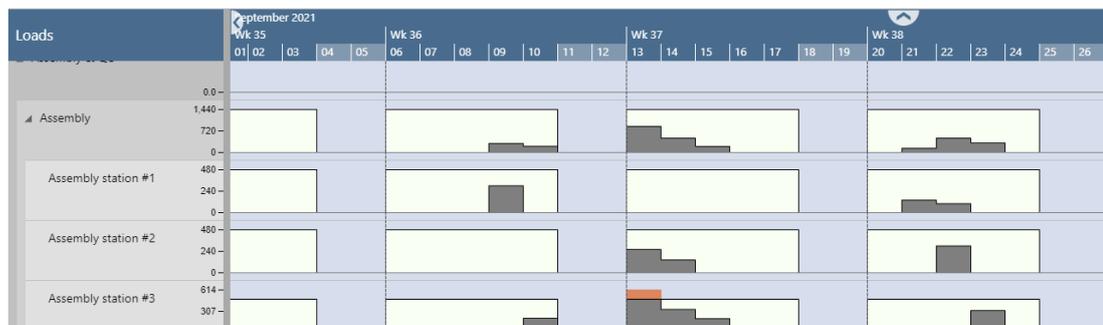
This overview can also provide information on the “critical path” or if the associated work and machines still have some “buffer” to cope with potential delays in preceding operations.

2) Capacities view



Shows all manufacturing data structured by the registered resources. The production order routing lines are colored by the status, visual alerts appear in case an operation moved past the due date. You can complement the view by showing the amount of hours or units assigned per resource, this is the histogram, or capacity load chart.

3) Loads



This view comprises all the capacity load charts at one glance. This way you can see which work and machine centers will face capacity issues based on the current production schedule.

Who would benefit from VPS?

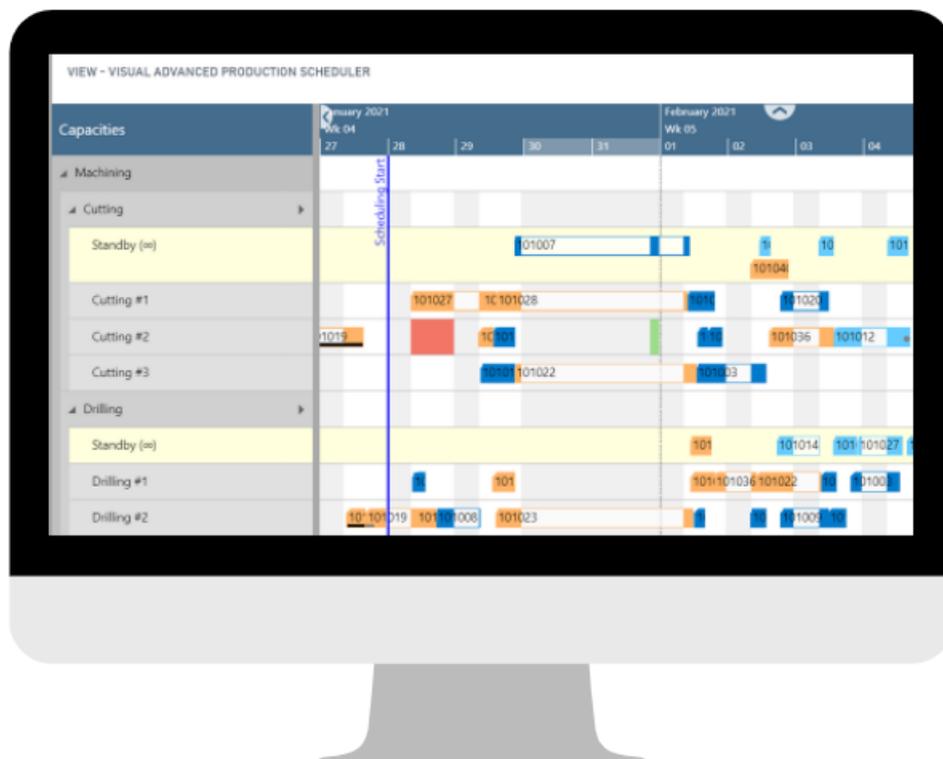
- New Business Central users

Visual Advanced Production Scheduler (VAPS)



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.

Why should I use it?

It's finite capacity will make 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 simple 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.

The VAPS lets you squeeze in operations and always get your schedule adjusted accordingly.

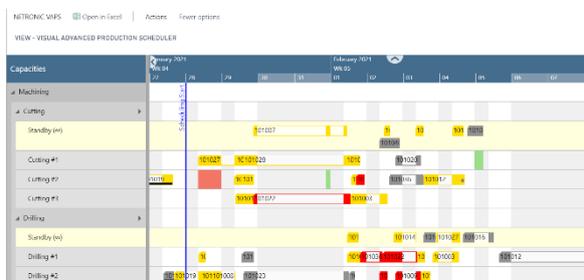
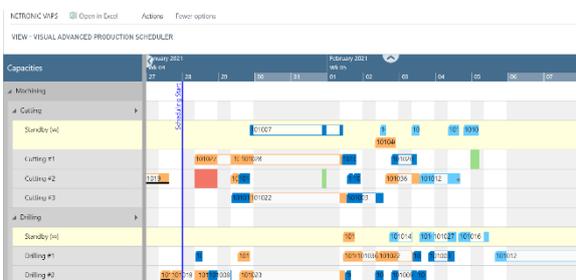
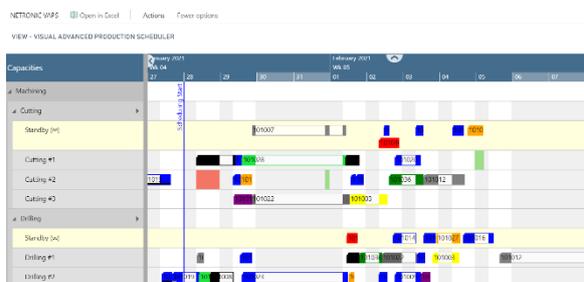
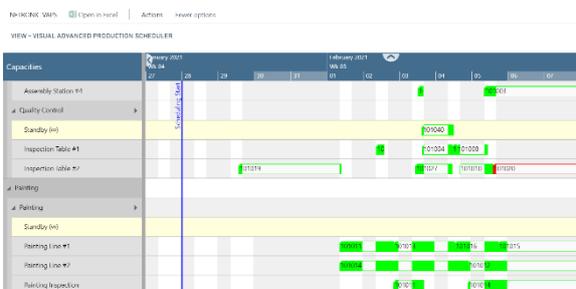
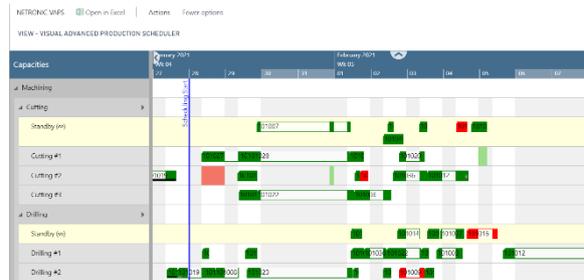
Functions of the VAPS

- Includes all function from the VPS, plus:
- 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.
- 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

Included views

Unlike the VPS, the VAPS offers the Capacities view by default but adds the possibility to color it according to your preferences with 6 available color schemes. The color views help you focus on a specific matter. In the VAPS you can select from seven different color mode views:

1. Production order status view
2. Production order view
3. Machine or Work center view
4. Item view
5. Progress view
6. Availability view
7. Wait time view



Who would benefit from VAPS?

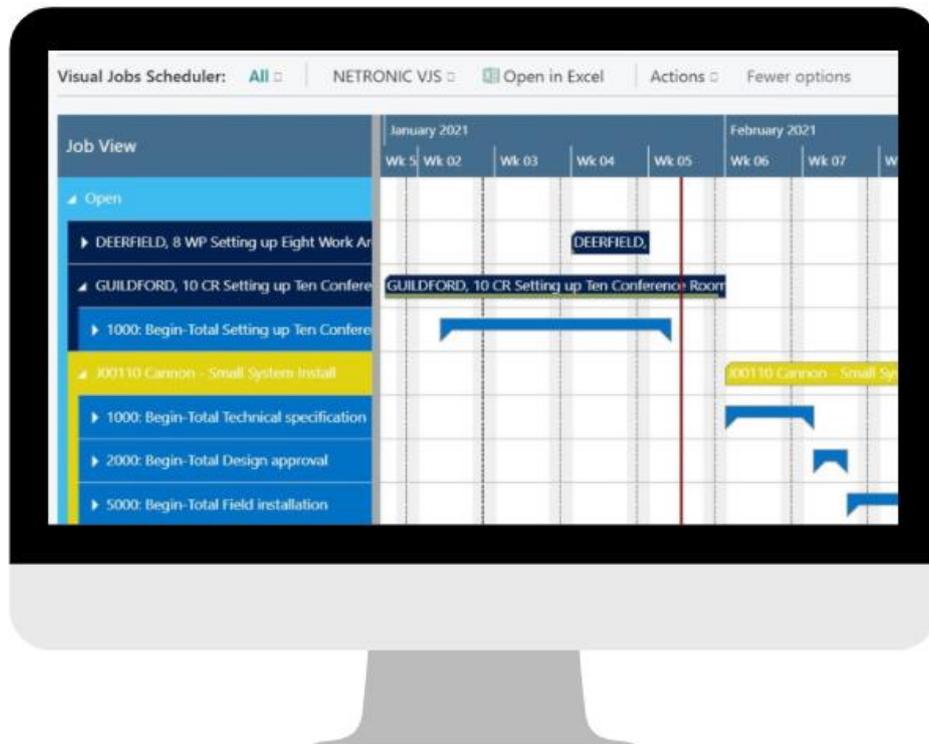
- Manufacturers with high number of Production Orders
- New Business Central users who have experience with other scheduling software solutions
- PlannerOne users considering migrating from Dynamics NAV to Business Central (Contact us for a special offer! Wink wink)
- Current users of our VPS (you too!)

Visual Job Scheduler (VJS)



What's the VJS?

The Visual Jobs Scheduler (VJS) is the drag & drop front-end to the standard Microsoft Dynamics 365 Business Central's Project and Resources module.

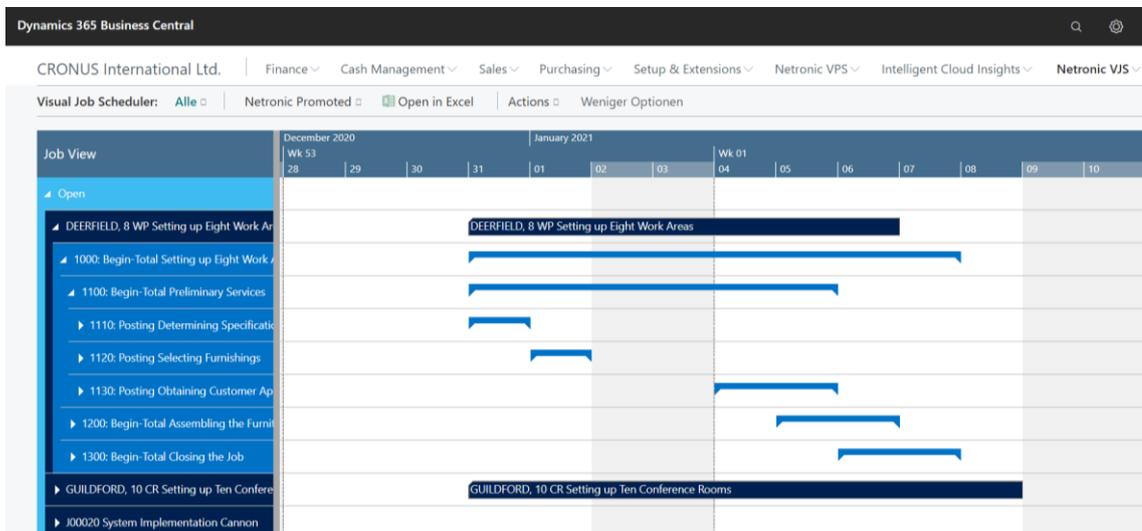


Why should I use it?

The VJS is based on the unchanged standard BC visualizes the project structure and data model of jobs, job tasks, job planning lines and resource allocations making it easy to use, change, adapt and resolve. This extension can help you answer a lot of questions on the project status at glance, for example: What is the timeline of my project? How much will a delay in a task affect toward my milestone? How does my team's calendars looks like? Who can I assign to a task? And much more.

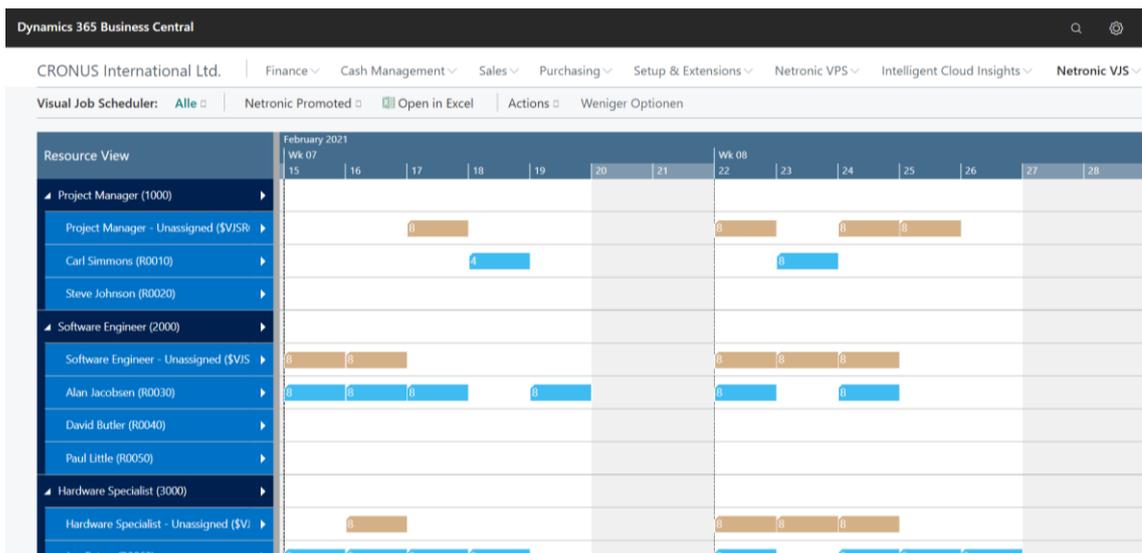
Included views

1) Jobs view



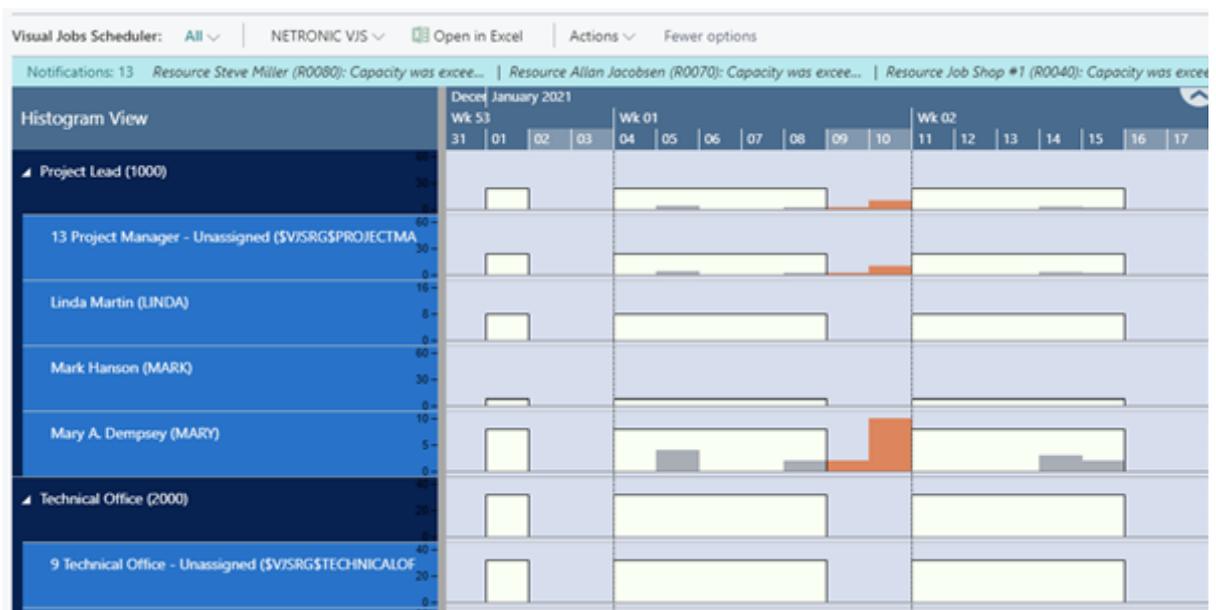
Show the data by job status, jobs, job tasks, job planning lines and resource allocations. Provides you the capability to drill down from a high-level view to a detailed view understanding both the project structure and the dependencies between single job tasks or even planning lines. This view enables you to change the schedule by simple mouse interactions, i.e. drag & drop of jobs, jobs tasks and job planning lines.

2) Capacities view



This view lists the project data by resource groups and resources. You can identify the project task line by color in regards to the status of the project as well as the length per task. The number in each bar or “card” represents the number of hours allocated. The resource view portrays the resource utilization in a chart or as we call “the histogram”.

3) Histogram view



This third view displays all the resource utilization charts or histograms at one glance. The histogram presents the workload of a resource or resource group over time and it has the objective of highlighting the resource conflicts. In this view, you can alter the allocation of an operation, from one resource to another or the assigned date via drag & drop. The histogram will update automatically: If moving a job task results in an overload, an optical warning will appear, to suggest immediate solution.

Functions of the VJS

Summing this up, a comprehensive visual scheduling solution to better plan and manage jobs and projects within Microsoft Dynamics 365 Business Central should:

- Be based on the unchanged standard BC jobs and resource planning module.
- Provide different views from both a project and a resource perspective on the same data, along with their capacities
- Enable users to interactively create, define and save dependencies between job tasks
- Allows you to define dependencies between job tasks or job planning lines Deliver immediate answers to the typical milestone- and resource-oriented questions of a project manager's day-to-day work.
- In order to achieve this, apply intelligent and context-sensitive visual alerts.

Who would benefit from the VJS?

- Project managers
- New BC users

➤ 7 visual scheduling best practices

This last chapter comprises seven basic principles to get the most of visual scheduling best practices. These practices have been discussed from various angles and used throughout this book. They are kind of cornerstones or basic principles of any visual scheduling approach. The practices are:

1 Stick to visual scheduling

Visual scheduling extensions relate to the ease-of-use and ease-of-implementation, they provide you with a solution you can understand intuitively, can get running instantaneously and that keeps you in the driver seat with the help of applying context-sensitive intelligent visual alerts. Once implemented you have to sustain and promote the habit of using the visual scheduler in all its extent.

2 Revise data as necessary

Any scheduling scenario faces frequent changes. It's important to define how often to update the model. A proper visual scheduling solution is centered on the idea of keeping data current. With such an approach, you'll require to update set up and run time averages to decrease the error range.

3 Let the planner have the last word

A visual scheduler will help you achieve your goals, by giving you visual warning and alerts, getting you to information faster and promoting better informed decisions. In other words, the visual scheduling tool should understand the underlying business processes and be designed to help you focus on the decision-relevant information.

4 Focus on a specific use-case

By common rule, a Gantt chart shows a timeline at the top, the resources on the left and the allocated tasks and their duration at the center of the chart. However, a Gantt-centric visual scheduling should support the business processes and its use cases. It makes to have an MRP engine that produces the schedule and then being able to manually

modify it if required, then having have to manually organize and calculate unplanned service orders for the technicians. Having your visual scheduler follow your underlying business logic it's as easy as it gets.

5 **Closely integrates as an extension to an ERP system**

A visual scheduler works better as an enhancement of an existing ERP system. The scheduler will work with the included data e.g. production orders, resource calendars, routings, BOMs and more. This connection will help you understand the data quicker and manage the related operational processes.

In today's fast paced environment, the closer you can integrate a visual scheduling enhancement into the system, the better for the users as you will be familiar with the visual scheduler from day one and require little to no training to effectively use it. Instead of loosely attaching as add-on solution.

6

Use a product that adds to BC without ruling it out

Microsoft announced its route-to-repeatability approach for all channel partners: if you work in an environment, where you are asked to sell repeatable products on the always latest technology platform rather than individualized solutions based also on legacy versions of the same platform, make sure that complementary products to Dynamics 365 Business Central do not work against this efficiency strategy: If they require massive changes to the Dynamics 365 Business Central, they will prevent you from fully unleashing the efficiency tools that Microsoft provides to you.

7

Do not create static reports, work with current data

A visual schedule delivers a bi-directional communication with the data so you can make changes to the schedule, get visual feedback about the impact of the changes and as such improve the overall schedule.

➤ Conclusion and additional resources

This eBook aims to help the reader understand how to best add visual scheduling capabilities to Microsoft Dynamics 365 Business Central. However, knowing is not enough and we all know the proverb: **“Seeing is believing”**

Hence, we highly recommend that you apply your new knowledge. We have worked hard trying to implement all described best practices how to achieve visual scheduling capabilities for Microsoft Dynamics 365 Business Central into our visual scheduling extensions:

- Visual Advanced Production Scheduler
- Visual Production Scheduler
- Visual Jobs Scheduler

So: have a look and schedule your online demo now. After the meeting, we are happy to provide you with a complementary demo version so that you can test our extensions in your own Microsoft Dynamics 365 Business Central demo environment.



**Book a
demo!**