

Trends of the Smart Factory

# Manufacturing IT Promoting Sustainability



## Preface

In a time when the importance of sustainable processes and solutions is increasingly coming to the fore, our focus is on the efficient and environmentally conscious design of production processes in your company. Our software solution helps you to make your production more efficient, saves resources and therefore make it more sustainable. We would like to show you that sustainability and cost-effectiveness are not necessarily at odds, but can go hand in hand. The solutions we offer are designed to improve your production processes, conserve resources, and reduce costs.

We highlight in this white paper different aspects of sustainability in the Smart Factory. With the right IT solutions, we show you how you can optimize your production processes with regard to ecology and environmental protection. We also address the economic side of sustainability and explain how you can reduce costs by using your resources efficiently.

You are invited to join us in the journey to achieve more sustainable production. We are delighted that we can support you with our solutions.

Best regards,

Nathalie Kletti

CEO at MPDV

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"Sustainability is not just a buzzword for us, but a core concept of our work. With our software solutions for the Smart Factory, we are not only making it possible for companies to produce more efficiently, but also more sustainably. We are convinced that a responsible use of resources is the basis for the long-term success of businesses."

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## Sustainability in the Smart Factory

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Few things are as sustainable as the concept of sustainability itself as it has been discussed for many years now without fail. Reason enough to take a closer look at this issue influencing all areas of our daily life. Actually, sustainability is more important than ever in 2024, also in the Smart Factory.

The use of IT solutions from MPDV promotes sustainability in manufacturing companies significantly. MPDV takes a broader view of the concept of sustainability and refers not only to the protection of the environment. We define sustainability as any action that is ecological in the sense of environmental protection, economic when it comes to profitability, and long-term in terms of continuous improvement. We have launched the label "Promoting Sustainability" for all three aspects of sustainability. The label is intended to provide orientation and suitable tools to our users. The information, know-how, and tips gained provide companies with a wide range of opportunities for optimization. MPDV products support sustainable, efficient, resource-effective, and energy-saving manufacturing.

### Ecology and environmental protection

Sustainability in an ecological sense means that only raw materials and resources are used in production that are really required. The same goes for materials and machines as well as for personnel and energy. This careful use of resources protects the environment in two ways: on the one hand, fewer raw materials are consumed and, on the other, less waste is produced.



Some of applications promote sustainability and therefore carry the "Promotes Sustainability" label. These are the following:

- **Energy Management:** Recording energy consumption creates transparency and supplies information about possible energy losses. Companies use this data to find out where it is worth taking optimization measures.
- **Digital Checklist:** Paper is traditionally used when working through checklists. The digitalization of this popular tool eliminates huge amounts of paper in production and also leads to better archiving of completed checklists.
- **Predictive Quality:** Predictive quality uses artificial intelligence (AI) to make quality predictions at an early stage, such as for products with a high level of vertical integration. The processing of presumably defective parts can then be stopped at an early stage. This saves material, energy, and processing time.

## Economy and efficiency

The costs of producing an article can be reduced in a number of ways: for example, through less scrap, shorter lead times, or better utilization of machines and other resources. Lower costs improve profitability and at the same time ensure that companies remain competitive.



Applications that promote sustainability in terms of economics:

- **Detailed Scheduling:** Planning production orders with a view to minimizing idle time and short lead times prevents machines and other resources from generating unnecessary costs. Also, a temporary storage of semi-finished products costs money. Clear planning with APS FEDRA supports companies in reducing this waste. All cost-driving factors in production are optimized thanks to AI-based planning with the **AI Planning** application.
- **Operator Guidance:** If a large number of variants of a product are to be manufactured on the same line or installation, it is important to ensure that the operator always uses the right materials and processes them in the right way. The digital Operator Guidance supports operators and enables less trained staff to work on the line. Training periods can be significantly reduced thus counteracting the shortage of skilled labor.
- **AI-based Capacity Utilization Analysis:** Machines and equipment that are not used or only used a little cause unnecessary costs – be it through the consumption of energy or due to the fact that they depreciate. The AI-based Capacity Utilization Analysis is designed to assist companies in identifying the factors that influence capacity utilization. Insights gained can be used in planning and unnecessary costs are avoided.

## Long-term and continuous improvement

The continuous improvement process (CIP) is a matter of course in many companies. Nonetheless, manufacturing IT can open up further opportunities for optimization that will pay off in the short, medium, or long term. Based on reliable data from the shop floor, it is easier to take sound decisions. At the same time, manufacturing IT also provides the tools that help taking the right decisions.



Applications that ensure greater sustainability in the long term include:

- **FMEA:** As part of the Failure Mode and Effects Analysis, possible failure causes in the manufacturing of a product are identified in advance. For each failure cause, different measures are defined aiming at detecting, correcting, and eliminating failures in future. A systematic FMEA process will finally lead to zero defect manufacturing.
- **Maintenance & Service Management:** Every machine and tool must be serviced and maintained. Maintenance services directly affect the lifetime of a machine or tool. Maintenance Management of the MES HYDRA supports companies in the planning, execution, and monitoring of these tasks. Servicing ensures that resources can be used more efficiently.
- **AI Workforce Planning:** If personnel are deployed according to their qualifications, this will promote employee satisfaction and reduce staff turnover in the company. Qualified and experienced employees also deliver better quality of work. This reduces the risk of failures and scrap. AI-based workforce scheduling goes beyond qualifications and takes a wide range of influencing factors on board, thereby optimizing workforce deployment in the long term.

The mApps mentioned here are to be understood as examples. You will find further applications in the MPDV portfolio that carry the "Promoting Sustainability" label from MPDV.

If you want to tackle the issue of sustainability, we, the experts at MPDV, will be happy to advise you.

## Sustainability in the MPDV product portfolio

It is hardly news that a Manufacturing Execution System (MES) or an Advanced Planning and Scheduling System (APS) is of benefit when it comes to sustainability. Because in both cases, the aim is to reduce energy consumption, cut reject rates, reduce work in progress, and optimize personnel deployment. If you look a little closer, the particular benefits can be attributed to specific application areas or even individual manufacturing apps (mApps). That's why MPDV labels these mApps with the "Promoting Sustainability" label.



### MES HYDRA X promotes sustainability

An MES such as HYDRA X from MPDV is tasked with monitoring and controlling production and identifying potential for optimization. To fulfill these tasks, the system records data in the shop floor and puts it in a business context. The MES gets required order data from the higher-level ERP system. The MES can adopt different perspectives to analyze and optimize the processing of the specific object or subject. HYDRA X examines orders and articles in the Order Management to optimize their profitability. Resource Management focuses on machines and tools. Material Management is all about raw material and the material used. And employees are at the center of HR Management.

In each of these fields of application, which we at MPDV refer to as mApp categories, we have individual mApps that ensure greater sustainability:

mApp Category	Name of the mApp(s)	Why does the mApp promote sustainability?
Order Management	<b>Work Order Controlling (WOC)</b>	Controlling order data serves as a basis for optimizing production and thus promotes sustainability. Lean processes help uncover and reduce unnecessary waste.
Order Management	<b>Work Order Execution (WOE)</b>	Providing order-related documents digitally for the paperless factory promotes sustainability. Improving production control saves time and money. Plausibility checks to minimize errors, automatic notification when certain events occur, and an overview of the current production status provide efficient day-to-day production.
Resource Management	<b>AI-based Capacity Utilization Analysis (CUA)</b> <b>AI-based Resource Performance Account Analysis (RPA)</b>	Machines and systems that are not used or only used infrequently generate unnecessary costs – be it through consuming energy or depreciating in value. The AI-based Capacity Utilization Analysis is designed to assist companies in identifying the factors that influence capacity utilization. Insights gained can be used in planning and unnecessary costs are avoided.
Resource Management	<b>Energy Management (EMG)</b>	Recording energy consumption creates transparency and supplies information about possible energy losses. Companies use this data to find out where it is worth taking optimization measures.
Resource Management	<b>Machine Performance KPIs (MPK)</b>	The KPIs based on current production data form a reliable basis for decision-making to optimize the utilization of existing machines. Data-driven decisions on new acquisitions can then be prioritized.
Resource Management	<b>Maintenance &amp; Service Management (MSM)</b>	Every machine and tool must be serviced and maintained. Maintenance services directly affect the lifetime of a machine or tool. Maintenance Management of the MES HYDRA supports companies in the planning, execution, and monitoring of these tasks. Servicing ensures that resources can be used more efficiently.
Resource Management	<b>Process Data Management (PDM)</b>	The monitoring of tolerance and action limits improves the quality of the manufactured products and reduces scrap. At the same time, process data and defined limit values are an early warning system for possible malfunctions.

Material Management	<b>Material &amp; Inventory Management (MIM)</b>	High inventories are not only a cost driver, but they also carry the risk that material is stored for too long and cannot be processed anymore. A consistent monitoring of stocks can prevent waste of material.
Assembly Management	<b>Operator Guidance</b>	If a large number of product variants are to be manufactured on the same line or installation, it is important to ensure that the operator always uses the right materials and processes them in the right way. The digital Operator Guidance supports operators and enables less trained staff to work on the line. Training periods can be significantly reduced thus counteracting the shortage of skilled labor.
Quality Management	<b>AI-based Scrap Analysis (SCR)</b>	A consistent and AI-based analysis of scrap helps uncover interrelationships and save material, energy, and other production resources.
Quality Management	<b>Complaint Management (COM) Measure Management (MMA) Workflow Management (WFM)</b>	Detected failures and deviations can be tracked systematically and eliminated permanently. To this end, the applications draw on a wide range of shop floor and quality data.
Quality Management	<b>FMEA</b>	As part of the Failure Mode and Effects Analysis, possible failure causes in the manufacturing of a product are identified in advance. For each failure cause, different measures are defined aiming at detecting, correcting, and eliminating failures in future. A systematic FMEA process will finally lead to zero defect manufacturing.
Quality Management	<b>In-production Inspection (IPI) Incoming Goods Inspection (IGI)</b>	Both, the recording of inspection results and the archiving of documents is carried out digitally. This helps save paper during in-production inspections and in goods receipt.
Quality Management	<b>Predictive Quality</b>	Predictive Quality uses artificial intelligence (AI) to make early quality assessments for products with a high vertical range of manufacture, for example. The processing of presumably defective parts can then be stopped at an early stage. This saves material, energy, and processing time.
HR Management	<b>Incentive &amp; Premium Wage</b>	If you digitalize the calculation of incentive wages, it saves a lot of paper, because wage slips need no longer be printed. Incentive & Premium Wage also motivates employees to achieve good and therefore sustainable results.
Information Management	<b>Digital Checklist (DCH)</b>	Working through checklists usually requires paper. The digitalization of this popular tool eliminates huge amounts of paper in production and also leads to better archiving of completed checklists.
Information Management	<b>Digital Production Meeting</b>	Documents need no longer be printed for meetings in production. All required evaluations or charts can directly be linked and digitally displayed.

## APS FEDRA promotes sustainability

Sustainability is also of great importance in planning. Even at this early stage, it is important to use resources efficiently and exploit untapped potential. The focus of an APS such as FEDRA from MPDV goes far beyond mere order planning. All resources and capacities involved in production are considered. The aim of this broadly optimized planning is to minimize lead times, optimize personnel deployment, save energy costs, and maximize the utilization of available machines and tools. Ultimately, efficiency and cost-effectiveness in production processes are key factors.

The complete APS planning solution as well as individual mApps therefore promote sustainability:

mApp Category	Name of the mApp(s)	Why does the mApp promote sustainability?
Detailed Scheduling Advanced Scheduling and Optimization	<b>Detailed Scheduling (DSC)</b> <b>AI Planning (FAI)</b>	If production orders are planned with little idle times and short lead times, machines and other resources do not cause unnecessary costs. Also, a temporary storage of semi-finished products costs money. Clear planning with APS FEDRA supports companies in reducing this waste. All cost-driving factors in production are optimized thanks to AI-based planning with the <b>AI Planning</b> application.
Workforce Planning	<b>Workforce Management (WFO)</b> <b>Workforce Planning (WPL)</b> <b>AI Workforce Planning (AIW)</b>	If employees are deployed according to their qualifications, this promotes their satisfaction and reduces staff turnover in the company. Qualified and experienced employees also deliver better quality. This reduces the risk of failures and scrap. AI-based workforce scheduling goes beyond qualifications and takes a wide range of influencing factors on board, thereby optimizing workforce deployment in the long term.
Advanced Resource Planning	<b>Energy Demand Planning (EDP)</b>	Energy-efficient production starts with planning. The application visualizes the planned energy consumption. This helps avoid peak loads and adhere to load limits. Companies save costs and reduce the environmental impact because energy producers do not need to provide unplanned quotas.
Advanced Process Modeling	<b>Setup Optimized Planning (SOP)</b> <b>Campaign Planning (CPL)</b>	Resource-efficient production can be achieved by carefully planning sequences. Setup processes are minimized, and the use of environmentally harmful cleaning agents is reduced. Also, material consumption during startup can be decreased to a minimum because less startup processes or color changes are required.
Advanced Scheduling and Optimization	<b>Simulation (SIM)</b>	You can test different planning scenarios without using resources to find the perfect plan.



## MPDV White Paper

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Find below a selection of our white papers:

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#### The Autonomous Factory

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#### Four Stages to the Smart Factory

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## About us

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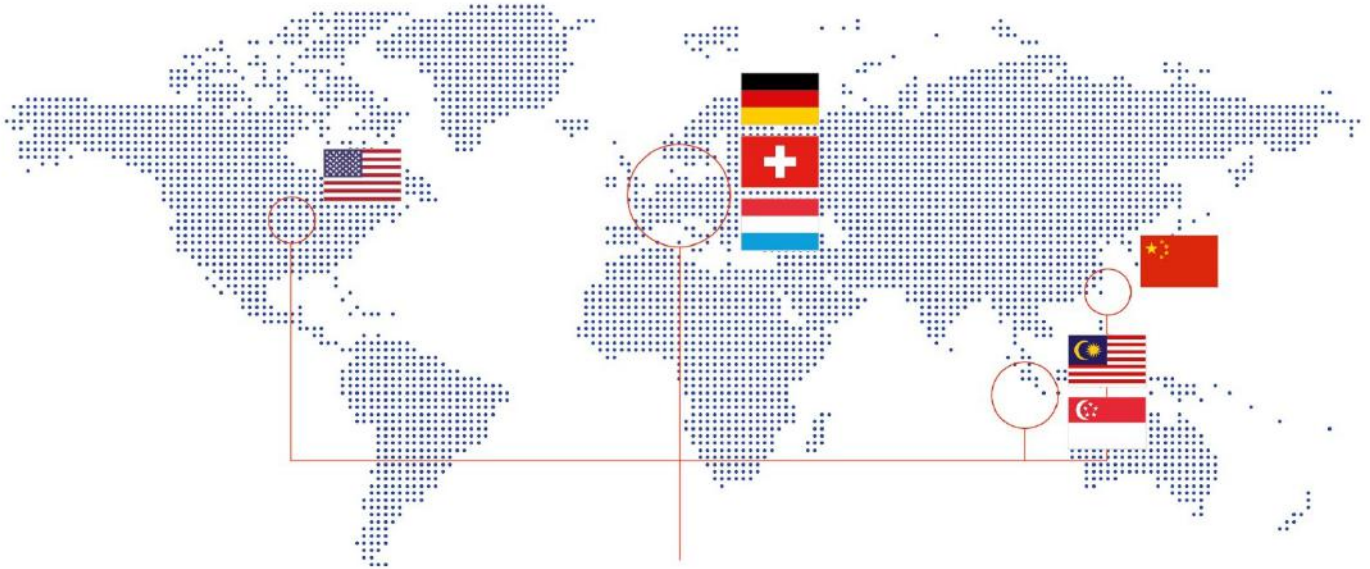


### MPDV Mikrolab GmbH

headquartered in Mosbach/Germany, is the market leader for IT solutions in the manufacturing sector. With more than 45 years of project experience in the manufacturing environment, MPDV has extensive expertise and supports companies of all sizes on their way to the Smart Factory.

MPDV products such as the Manufacturing Execution System (MES) HYDRA, the Advanced Planning and Scheduling System (APS) FEDRA or the Manufacturing Integration Platform (MIP) enable manufacturing companies to streamline their production processes and stay one step ahead of the competition. The systems can be used to collect and evaluate production-related data along the entire value chain in real time. If the production process is delayed, employees detect it immediately and can initiate targeted measures.

More than 1,100,000 people in over 1,750 manufacturing companies worldwide use MPDV's innovative software solutions every day. This includes well-known companies from all sectors. The MPDV group employs around 520 people at 13 locations in Germany, China, Luxembourg, Malaysia, Singapore, Switzerland, and the USA.



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