

NEWS



August 2015

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MES helps you on your way to Industry 4.0

Even on an international scale the term „Industry 4.0“ has now become a byword for the new world of manufacturing. The term is sometimes referred to as Integrated Industry or paraphrased under the heading Industry 4.0. This movement does not only focus on new technologies and concepts for machines and logistics but it also puts emphasis on how a manufacturing company is organized. It is no longer only the performance of individual machines that matters but the performance of the entire process. MES is an indispensable element in reorganizing manufacturing. Without MES manufacturing businesses will have a hard time in future competing in the market. Even state-of-the-art MES systems need to progress. MPDV has presented the future concept MES 4.0 and extracted the most important elements.

Horizontal integration, integration of management, mobile applications are only a few buzzwords describing the MES of the future. Implementing such technologies will increase

productivity. Such gains will be essential to compete in future.



But please bear in mind when planning for Industry 4.0: optimization should precede digitalization! Digitalizing unstructured processes will not lead to the desired result. With the aid of a Manufacturing Execution System like HYDRA you make a clean sweep and lay the foundation for digitalization and, as a result, for Industry 4.0.

In this issue of our NEWS you will find various articles dealing with Industry 4.0 and demonstrating how important MES will be for the future of manufacturing.

Prof. Dr.-Ing. Jürgen Kletti
Founder and Director of MPDV



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News of the Future Concept MES 4.0

Industry 4.0: MES supports Decentralization

Manufacturers enter the Industry 4.0 era and face new challenges of increasing complexities and trying to become more efficient simultaneously. Decentralizing the organization is the right approach – but it is evident that without a Manufacturing Execution System (MES) like HYDRA it will not work!

Under the banner of Industry 4.0

We combine the requirements of Industry 4.0 to the production IT with the future concept MES 4.0. From areas of activity like mobility, flexibility, unified shop floor connectivity and management support products such as Smart MES Applications (SMA), universal machine interface UMCM and the new version of the KPI system MES-Cockpit have derived. Currently, MES experts are dealing with decentralization and analyze different aspects of organization, technology and application.

Decentralization of the Organization

Looking at a decentralized organization sheds a different light on the requirement for decentralization by Industry 4.0. It is all about increasingly intelligent processes and the freedom to make decisions – technology plays second fiddle. Decentralization often starts on a smaller scale. Contrary to the still widespread hierarchical production control, an increasing num-

ber of self-regulating systems and intelligent control mechanisms conquer state-of-the-art factory sites. These are not always intelligent machines but intelligent processes as the focal point is to provide humans with the freedom to make decisions. It is absolutely essential for all relevant information to be available locally. Authorized, local personnel can then add their own knowledge and based on that make decisions. Decentralized technologies like Cloud Computing or CPS are not mandatory in order to decentralize on a small scale.

Decentralized Applications in Intra Logistics

A simple example of a decentralized and self-regulating application is eKanban. Combining the classical pull principle with an electronic module makes the self-regulating system transparent and can therefore be synchronized with other processes. The decentralized character, meaning that the trigger for post-production comes from the shop floor and not from

a central planning body, is an important feature and guarantees an efficient method.

Also, a state-of-the-art transport system can be organized decentrally. The operator has the opportunity to generate transport orders at the machine or the workplace: i.e. a pallet should be picked up and stored. By distributing the processes intelligently and making decisions autonomously ensures that no central intervention is necessary. It is though communicated, which transport orders are currently carried out and which are open.

Combination of Decentralized Systems

As with eKanban and also with decentralized transport management, companies profit from minimum efforts in planning and coordination as both systems carry out these tasks independently.

If you combine eKanban with a transport management system, then efforts are reduced further: When a container is going to move the matching transport order is automatically generated. This also guarantees that each Kanban container remains in the same control cycle. The eKanban board shows parallel to that operation all trays in the cycle. If you spin the yarn even further, then the transport management can be connected via an interface with a driverless transport system. Then the transport orders would be put into a sequence by optimizing the route and can be processed automatically.



The operator is instantly informed on the electronic Kanban board in MES HYDRA about the status of each cycle. Central intervention is not needed.

Status	Material	Regelkreis	Serie	K2M Umlauf	Planung	State K2M	Leer
Red	4711	KK1	0000	3	10	3	
Red	4711	KK2	0001	3	8	0	
Red	4712	KK2	0002	4	8	3	
Green	4712	KK4	0003	5	10	0	
Green	4720	KK5	0000	4	3	3	
Green	4720	KK7	0000	8	8	3	
Red	4724	KK8	0001	4	00	2	
Red	4724	KK10	0002	4	20	1	
Red	4800	KK9	0000	10	3	3	
Red	4804	KK8	0004	4	8	3	
Red	4800	KK10	0000	4	8	0	
Red	7521	KK11	0000	3	20	3	
Green	7521	KK13	0001	3	10	3	
Green	7521	KK14	0002	4	8	2	
Red	8040	KK10	0000	4	10	1	

eKanban in the HYDRA shop floor client

Alternatively, mobile applications support the smooth running or increase flexibility generating transport orders. A transport order could then be generated via a mobile app if for example material or tools must be moved in the site temporarily.

Decentralized Detailed Planning

A further example of decentralization of tasks is the combination of planning in APO (Advanced Planner & Optimizer) in the ERP system with detailed planning in the shop floor scheduling module of a Manufacturing Execution System (MES).

Planned orders as per demand and market forecasts as well as call-offs from customers can be distributed via APO to sites and production areas without knowing the exact amount of orders for each site. The orders appear then in the work list in the MES systems locally. A planner knowing about availability of machines and resources is sorting the orders as per transferred benchmark data in detailed planning. The moment the planned orders are fixed, the required material is requested centrally and delivered to the relevant site. Therefore complexity is reduced in central planning by providing the freedom of decision-making. The responsible planner has a much better overview over his machinery than a central planning system taking care of several sites.



Using a decentralized transport management in MES HYDRA, the forklift driver can decide which available transport order is produced. Therefore central transport planning is omitted.

In case that the communication of several sites is not carried out via the central APO, a connection is implemented from one MES interface to the other (between sites) which can even offset fluctuation of capacities. A major aspect is the fine-tuning with the central authority (i.e. ERP) as material or tools must be transported from one site to the other. Connecting these processes with a decentralized transport management can be beneficial.

We can continue this scenario: Additionally to detailed planning in the MES, supervisors or production planners can be equipped with a mobile shop floor scheduling app. It provides a singular view of a machine or machine group. In order to react to breakdowns, standstill of production or other bottlenecks, the mobile shop floor scheduling app enables personnel to change the order sequence directly at the machine. Also short-term changes of orders to another machine are done easily. Synchronization with the shop floor scheduling module in the MES and also with the superordinate APO is essential.

Central Synchronization with an MES

Independent of the utilization and its degree of automation, a constant synchronization with a central system is indispensable – partly due to ensure transparency (calculation of KPIs) and also in order to detect and solve problems.

A system that has to synchronize many decentralized processes must have command over a vast amount of information and must also operate in real-time in order to use existing information.

As per VDI guideline 5600, a Manufacturing Execution System (MES) like HYDRA by MPDV adheres to those requirements and is suitable to function as a central information and data platform in production. Knowing facts and figures about machines, tools, material, orders and production staff enables the MES to take care of central synchronization tasks. On the other hand, such a system can also monitor and synchronize decentralized planning scenarios. In the end, all data collected in production must be consolidated in order to upload these into the ERP system. This clearly shows that it is beneficial to have a decentralized organization but from a certain point a central authority is still required.

The Way to Decentralization

The advantages and conditions of decentralization are evident:

- Decentralized intelligence and freedom of decision-making reduce planning efforts and the complexity centrally.
- Using mobile MES clients supports the decentralization process.
- Synchronization with a central authority is essential – i.e. with an MES system.
- The technology used plays a minor role and supports only the locally organized processes.

Now it is up to the manufacturing companies to analyze the current situation and define the goals. Introducing an MES system as a central information and data platform is definitely a step into the right direction – to change the processes in production and intra logistics is the next one. The MES Experts from MPDV or the Lean Experts from MPDV Campus are the right contact partners.

Comments by Prof. Dr.-Ing. Jürgen Kletti on Industry 4.0

Where is Industry 4.0 leading us and for how long?

The flood of news, research papers and interviews regarding Industry 4.0 is not diminishing. Even the general media like the evening news or breakfast TV took up the subject. Where it will lead us and for how long is explained by Prof. Dr.-Ing. Jürgen Kletti, Managing Director of MPDV Mikrolab GmbH.

Do you remember the time when you got the best insider tips for the stock markets at the bakery around the corner? That was shortly before the crash. I have a similar feeling thinking about Industry 4.0. By now, everybody with the slightest contact has an opinion and above all a message to Industry 4.0. One is saying that already existing functions like DNC are at the forefront of Industry 4.0 and another one is still philosophizing wildly about properties and capabilities of a Cyber Physical System (CPS). But I can reassure you. Functions like DNC and other innovative technologies will play their part in the era of Industry 4.0 and that we will need these technologies more than ever. But only by adding and connecting functions does not make an Internet of Things or a Smart Factory.

What is Industry 4.0 really?

Now let us have a look on what Industry 4.0 really means to production companies. A blog in the Platform Industry 4.0 talks about „a new level of organization and control of the complete value added chain“ and they carry on with „basis is the availability of all relevant information in real-time by integrating everything involved in the value added chain as well as the ability to derive at the perfect value added flow at all times based on data collected“. CPS is not mentioned in the least by the makers and shakers of that body nor do they mention technological innovations – all they are concerned with is integration and organization. In simple terms, we should be fully aware of our objectives for the current working processes and how we can increase efficiencies by intensifying transparencies or reorganization.



Prof. Dr.-Ing. Jürgen Kletti, CEO MPDV

Possible solution MES

And exactly at this point IT tools like a Manufacturing Execution System (MES) can be implemented. To collect, consolidate and correlate real-time data from production is as stated in the VDI guideline 5600 a core task of MES systems. The more information about processes are collected in the system, the more precise planning and control processes run. Good news, state-of-the-art systems like HYDRA by MPDV can already deal with all these requirements. Extending manufacturing facilities by intelligent components with sensor and communication units can serve as a means to increase transparencies. This approach is again evidence for the fact that Industry 4.0 is no revolution in the true sense but more of an evolution which is based on existing technologies and processes. Having in mind

optimization of the organization the utilization of locally organized processes like eKanban is worth a thought. But a central synchronization must be ensured in order not to interfere with transparencies. I also recommend in this context to read our new White Paper „Industry 4.0 – only with MES!“

All in due course

For a few companies and sectors like the automotive or the electronic sector, Industry 4.0 has already started – for others like mechanical engineering or industrialized building, it will take a few years or even decades to arrive at Industry 4.0. But this is nothing new: That the fourth industrial revolution comes across rather as an evolution is by now a common fact. How long the heading „Industry 4.0“ survives is not quite clear. It does not matter how we call the drive for transparency and efficiencies – the journey is the reward.

I recommend: Do not put yourself under unnecessary stress. Analyze your current situation and decide then what Industry 4.0 means to your company. Considering existing technologies and methods like MES or Lean Manufacturing is a first step towards this direction.

Our MES experts and our consultants from MPDV Campus would gladly develop a strategy together with you to pave the way to Industry 4.0.

Update: What has changed recently?

Recently headlines like „Platform Industry 4.0 reached end of the road“, „Scramble for power over Industry 4.0“ or „Germany lost in the first half“. It seems times are not favorable for Industry 4.0. All this does not mean that companies can hide from the fact that they have to become more flexible and more efficient. Perhaps, the name of the powerhouse changes but the issue remains the same. Companies should not be concerned about all the negative news but implement their strategies. That certainly requires courage – agreed. But I am sure that a sound combination of courage and stamina will pay out rewards at the end.

Further information about Industry 4.0 (Integrated Industry) interesting facts about MES subjects and solutions are summarized in our White Papers. Trade articles, reporting trends and product information as well as interesting interviews with experts or useful checklists for everyday business can be found on mpdv.com.

White Papers by MPDV

Industry 4.0 (Integrated Industry) and MES



Request your paper(s) online: www.mpdv.info/whitepaper

Interview with Jochen Schumacher Industry 4.0 – specifically

Various Industry 4.0 research studies show increased productivity levels between 15 and 30%. Industry 4.0 assumes increased automation levels, more flexible production procedures and a comprehensive network connecting all resources and systems in production. Jochen Schumacher, Director MPDV Campus, explains in this interview the recently developed Industry 4.0 multi-stage model showing the way to a lean and networked production.

Mr. Schumacher, what is the purpose of the new multi-stage model?

We have been asked on many occasions how to prepare oneself for Industry 4.0. With our model, we are trying to specify a way to complying with Industry 4.0 and make it measurable. The multi-stage model also shows that it is not sufficient to introduce network-compatible machines and sensors in order to implement Industry 4.0.

Can you define your model in detail?

In order to achieve Industry 4.0 compliance we have separated the individual steps into stages 0 to 4. In each stage we assume a defined status of the following three criteria: organization of processes, IT support and willingness to change and qualification of staff.

Stage 0 – at the bottom – we assume instable production processes with high stock levels and

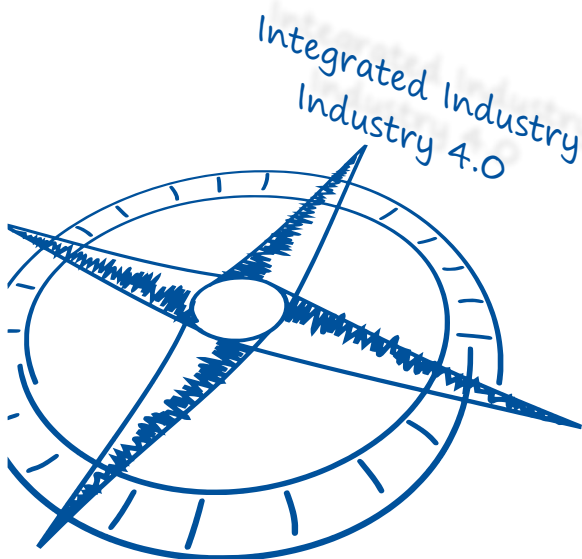


*Dipl.-Ing. Dipl.-Wirtsch.-Ing. (FH) Jochen Schumacher,
Director MPDV Campus*

long cycle times. Often, companies in that stage have an ERP system which is not fully exploited and additionally use isolated applications. Willingness of staff to embrace change is very low. Production processes can now be optimized from stage to stage gradually. After stabilizing processes (stage 1), the production is segmented in order to secure the benefits of a flexible production flow (stage 2). To progress further the perfect integration of suppliers and customers (stage 3) must be implemented before Industry 4.0 stage is achieved.

So much to Production – what about the relating IT?

Integrating MES basic modules like BDE (Shop Floor Data Collection) and MDE (Machine



Data Collection) enables to collect data in real time and calculate reliable KPIs during stage 1. Using a CAQ module (computer aided quality) can safeguard quality requirements.

In Stage 2 using detailed planning based on MES enables to drastically increase transparency and responsiveness in production and therefore utilize resources better.

Stage 3: Includes a complete horizontal and vertical integration of IT in production. Production, planning and supporting processes (i.e. tooling) are perfectly interlinked.

How can one achieve stage 4?

In order to achieve stage 4 – meaning Industry 4.0 – the previous stages 1 - 3 must be passed. Then, production companies can systematically grow into Industry 4.0. While many companies focus mainly on the production process and the material flow in the value stream mapping, it is necessary for Industry 4.0 to also target information and planning procedures as well as IT.


This is the only way to achieve target measures for the next higher stage and to specify processes and IT support.

Are there any benefits for production companies using the multi-stage model?

A company can find out using this model where it is situated with regards to production processes, IT and the staff's willingness to change. Also rough measures to achieve the next stage can be detected.

What do you recommend to a company interested in Industry 4.0? Where should they start?

The best thing to do is a status quo analysis. Within a few days, current production processes and IT can be assessed. It is important though to understand the interplay between the individual process steps, planning and information procedures and supporting processes. A status quo analysis also enables a classification into the 4.0 multi-stage model and shows existing potentials in the processes and IT.

	Processes	IT	HR
	Ongoing decentralization of manufacturing organization Flexible production systems	Linking of all resources (CPS), integrative data management based on MES	Willingness to change
Stage 3	Supply Chain Integration (suppliers/customers)	Full vertical and horizontal integration (VDI 5600)	
Stage 2	Production segmentation, Continuous flow production (FIFO, Kanban)	Reactive detailed planning based on MES (decentralized)	
Stage 1	Stable production processes, Low degree of organization	Data collection based on MES (BDE, MDE, CAQ)	
Stage 0	Instable production processes, Low degree of organization	Only ERP system and isolated solutions	

In four stages complying with Industry 4.0 – sounds unrealistic but is possible.

Future Concept MES 4.0 substantiated Management Support KPIs for efficient production

Work experience has shown businesses need reliable KPIs from running production as a control tool. The real skill is to generate from large amounts of data (Big Data) meaningful and useful information (Smart Data).

Utilization rate, OEE, scrap rates and staff productivity – these are all KPIs used to evaluate efficiencies in production. But what are the right KPIs and are they meaningful? Are the data sources reliable enough to calculate KPIs? All these questions must be answered encompassing „Management Support“. Managers and staff require reliable information in form of KPIs to make decisions and introduce suitable measures. It is only possible to intervene in processes if you can refer to up-to-date information based on underlying correlations. It must be noted that different layers of management need specific KPIs and evaluation.

The selection of KPIs is immense and therefore must be specifically chosen in order to supply critical information to the target audience. An operator in production is not interested in economic data but he or she wants performance-related data or produced scrap rates as these values can be directly influenced. On the other side, the management is interested in overall KPIs to establish current productivity rates and then draw conclusions about their competitiveness. Business targets can be split with the aid of KPIs into departments, operating areas and target groups and therefore a loop develops which can be applied for every company division.

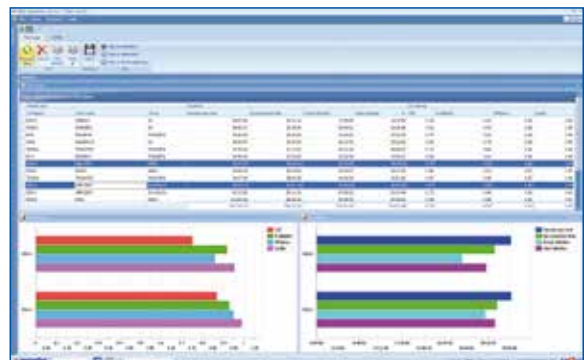
Cause and Effect

Isolated KPIs alone cannot support you in making sustainable decisions. They must be suitably presented, especially the understanding of their correlation. An example: If a production manager detects a decline in the OEE (Overall Equipment Effectiveness), the reason for the decrease may vary due to the way in which the KPIs are calculated. We need to have a look at the OEE formula: Availability – Quality – Performance. Declining



KPIs in the closed cycle of Production Control – each company level needs objectives and KPIs.

OEE can have three reasons: declining availability (machine downtimes have increased), declining quality (increased scrap) and lower performance (longer cycle times on average). MES systems display complex correlations in numbers with the aid of diagrams and in individual factors (see picture). The responsible person gets quickly an overview which causes have led to the current situation and can react accordingly.



Example of an OEE index and its elements displayed in the MES system HYDRA.

The KPI OEE is used on the one hand to control targets and on the other to compare machines, departments or different sites. It must be ensured that the basic data to calculate the OEE is identical.

Important criteria for KPIs

KPIs must be constructed on a common data base in order to communicate consistently across all levels.

The data collected (i.e. production quantities) by the MES are consolidated and combined with other data and displayed as KPIs comprehensively. The operator can check the produced quantity and the supervisor obtains the OEE calculated from relating data. The currentness of the evaluated data is of the utmost importance. It must be noted that some KPIs show a current status while others look at a defined space of time. KPIs relating to a defined period of time are only significant when the cycle has been completed (i.e. relating to availability) while the real time KPIs can be evaluated at any time (i.e. quality rate).

Important Criteria of a KPI:

- Currentness
- Traceability
- Consistency
- Clarity
- Comparability

Point of View

The utilization of different MES applications is recommended to present KPIs for different areas. MPDV offers in the HYDRA Office Client detailed evaluations referring to scrap rates, process capability (Cp) or staff productivity. MPDV offers with the Smart MES Application a suitable tool for the use on smart phones and tablets which can be employed on the go in production. It gives you a quick overview of utilization rates and production downtimes. Whereas the MES-Cockpit provides you with tools for long-term planning and review for the management.



Various MES applications to visualize KPIs.

They consist of time analysis of assignment and set up rates and comparisons of different departments or sites (see illustration).

Experiences gained during optimization projects show that a selection of only a few KPIs proved to be successful. These are amongst others:

- Rate of capacity utilization
- Setup rate
- Performance level
- Machine assignment
- Staff assignment
- Scrap rate
- Output rate
- Overall Equipment Effectiveness (OEE) including performance, quality and availability

These KPIs are clearly defined in the VDMA standard sheet 66412 (ISO22400) and fulfill criteria required for standardization and comparability.

Management Support

In short: KPIs support employees to make essential decisions – in real-time and across all levels. Especially the ability of the MES systems to offer data in real time makes the difference to BI systems (Business Intelligence). While BI systems evaluate data relating to past events (Big Data), MES systems use for their calculations current data or significant KPIs (Smart Data) which are available to make short-term decisions. These KPIs are also suitable to directly control production runs. Evaluations from BI systems on the other side are more suitable when looking at

things in the long-term and can be used for optimization projects. Volker Perk, Head of Prefabrication at the machine manufacturer Bernard Krone GmbH, a long-standing MES user confirms: „HYDRA provides us with current KPIs for machine and personnel utilization. We also get the current status and piece numbers from machines in order to plan resources efficiently. With the aid of HYDRA we can build a working control cycle.“

The Big Picture

Today and in future we need sustainable management decisions, meaningful evaluations and KPI systems (Smart Data) and the basis for that are integrated MES solutions with standardized interfaces. Data can be collected decentralized

and processed across different systems. It goes to show how important MES systems are as a central information and data platform today and in future. Knowledge empowers managers and the staff to take a direct impact on productivity. With an integrated MES system like HYDRA by MPDV, production companies safeguard their competitiveness and put down the foundation for Industry 4.0.

Therefore, „Management Support“ is an important component of the future project MES 4.0 (www.mes40.de) which already covers requirements of future production strategies. No matter how intelligent and self-sufficient production facilities are becoming – in the end responsibility for the right decision lies in human hands but they need reliable information for it.

Relaunch: MES-Cockpit 3.1

KPIs in Production

KPIs are a front runner and an important instrument to measure success. For this reason, the new MES-Cockpit supports as a cross-sectorial evaluation tool management and production control.

In the production control, the new MES-Cockpit is an important tool to develop a KPI system and complements therefore the Manufacturing Execution System (MES) HYDRA. KPIs assist to break down company targets into individual levels and areas.

In order to fulfil increasing requirements of the user, the new MES-Cockpit 3.1 offers various new evaluations and different ways of presenting data. Further evaluation criteria like factories, orders, and time axis can be added on demand and new KPIs can be defined. The new MES-Cockpit 3.1 has been equipped with new functions and features.

New Functions of MES-Cockpit 3.1

In the new MES-Cockpit 3.1 the following features and functions are available:

MES COCKPIT



Shop Floor Information

With the aid of the Shop Floor Information module, the user can request data in real time. The module contains a KPI monitor, an overview

of workplaces and machines, a list of contact partners and of outstanding and running maintenance activities.



To find the right contact person – easily.



Current information of machines and workplaces.

Production Monitoring

Production Monitoring displays status information and KPIs of workplaces, orders, and

reasons for downtimes across all instances and sites.



Overview of all orders and workplaces.



Overview of workplaces and downtime ranking list.

Performance Analysis

The Performance Analysis offers the possibility to present KPIs individually across all instances and sites over time or by applying different evaluation criteria (i.e. workplace, site, ...).

For this purpose, the following objects can be evaluated: Machines including presentation of current shift, orders and operations. Highlight is the clearly arranged speedometer chart.



Speedometer chart – keeping an eye on the current shift.



Workplaces comparing OEE.

Central Configuration and Management

MES-Cockpit provides a central client to manage the KPIs, authorizations, responsibility areas and target values. Consequently, information and user rights may be managed and distributed specifically.

State-of-the-art Technology

In order to display evaluations, the innovative MES-Cockpit 3.1 uses QlikView technologies.

QlikView is an established product to graphically evaluate KPIs. It is ideally suited to the MES-Cockpit due to its independence of browsers. The product offers high flexibility with usability – especially when evaluations are designed by the user. Due to the In-Memory-Technology, QlikView is a guarantor for an excellent response time behavior.



MES-Cockpit 3.1 is the perfect solution to increase transparency: Apart from data originating from HYDRA, other systems can be sourced to generate KPIs – also across all sites. Various graphical evaluation functions of MES-Cockpit complement HYDRA perfectly to assess objectives in production and the relating processes.

Overview MES-Cockpit:

- Self-sufficient web client for evaluations
- Central and individual configuration of KPIs
- Evaluations across all systems
- Analysis on the basis of imported basic KPIs from other systems
- Benchmarking across different business divisions, clients, systems and sites
- Separate, compressed data retention

New Features in the MES-Cockpit 3.1:

- Web client independent of browser
- Individual compilation of objects for evaluation
- Improved flexible visualization and evaluation
- Direct online web views to display current data
- Extended authorization concept & active directory integration
- Improved response time
- Individual graphical visualization of data based on QlikView



Detailed Planning using HYDRA Shop Floor Scheduling From pure Planning to reactive Controlling

Production planning is one of the central elements of a modern production company. Companies can improve their efficiency using the HYDRA Shop Floor Scheduling (HLS). The digital presentation of the production itself and the transparency created enables a reactive control of production.

A lot of production companies still create week or shift plans manually. Orders are sorted chronologically and assigned to workplaces. Planning itself is carried out by a stock card system using Excel files or manual aids. Changes in the planning cause orders to be rearranged painstakingly and new order documents must be issued. Required data for planning concerning material stocks, tools, personnel or maintenance are available in other systems or files and must be maintained separately in various places and then synchronized by the production planner. The result of such a process is limited transparency, increased planning efforts and sometimes inconsistent planning, as changes have not been carried out across all systems simultaneously. An alternative is detailed planning supported by IT like HYDRA replacing old-fashioned methods and offering new options in production planning.

Detailed Planning in MES

HYDRA Shop Floor Scheduling provides comprehensive functions for workload assignment and detailed planning and takes into account (depending on configuration) production aids, material stocks, energy consumption and staff availability. HYDRA Shop Floor Scheduling creates a 360° view and supports to manage complex tasks of the production control. As HYDRA Shop Floor Scheduling is part of the Manufacturing Execution System (MES) HYDRA, current data (machine status, quantity uploads etc.) from production can be used for the detailed order planning which leads to a more realistic production control.

Perfect Presentation

The core part of the HYDRA Shop Floor Scheduling is the Gantt chart. The chronological sequence of orders and the corresponding

operations are presented as bars on a scalable time axis. Operations can be planned in or moved with drag & drop. Conflicts are shown instantly so you can react immediately. That makes the system user friendly and offers a perfect overview.

KPIs instead of Gut Instinct

It is essential in detailed planning or in workload assignment to be able to request and display information from all areas in order to keep an eye on production. The planner obtains all relevant information like workload profiles for machines (and groups). These profiles can show where workload is available or if production is working to capacity. Histograms on staff deployment create a direct link to the workforce requirement plan and outline personnel bottlenecks.

In order to avoid double allocations, production aids (i.e. tools) are displayed in the overview of assignments. Also material bottlenecks based on the current planning situation can be

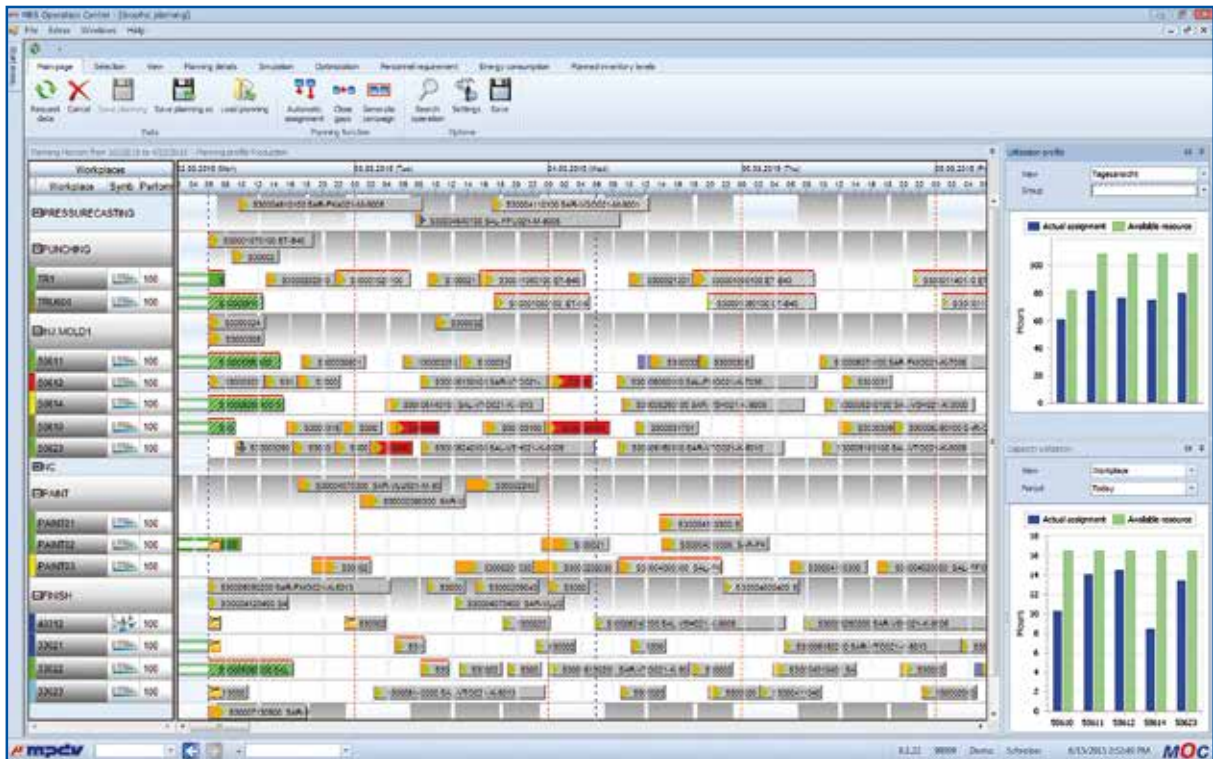
detected early and can be avoided by cleverly rearranging orders. Energy consumption is predicted so cost intensive peaks are detected and prevented. With the aid of KPIs, the planner has at all times different parameters of the current planning in sight (i.e. workload, setup efforts, idle times etc.). Potential weak links like double assignment of tools, violation of deadlines etc. are instantly shown while planning operations.

This means, that conflicts are avoided during workload assignment and before problems and costs arise.

Auxiliary Support Functions

In order to be able to plan efficiently and comfortably, the Shop Floor Scheduling module offers an automatic workload assignment for the following options like optimization of setup or cycle times.

That means, operations which are first of all only assigned to the machine groups, are planned



Detailed planning using the MES solution HYDRA by MPDV – planning board for workload scheduling and crucial KPIs can be presented visually.

for the respective machines using configured automatism. Then, the planner can simply move the operations if necessary via drag & drop. Gaps in the schedule can be closed with a click. In the campaign building blocks can be created which can only be moved together.

All information is always aligned for the actual situation. Therefore, the planner always has the overall control and the current status in sight. In case of conflict, the planner makes the final decision to reschedule.

Simulation and Optimization

HYDRA Shop Floor Scheduling can create via the simulation different planning scenarios and compare these. With the aid of the optimization, different assignments can be automated, calculated within seconds and compared using different KPIs (setup efforts, keeping deadlines, idle times etc.).

In simulation mode, the planner has also the option for example to see the effects if an additional shift is put on during the weekend. The planner can choose from different scenarios an assignment which caters to specific requirements more favorably.

To Control the Complexity

Different requirements often lead to a high degree of complexity which would be difficult



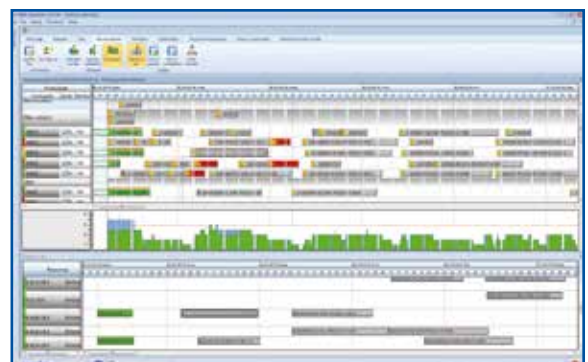
HYDRA Shop Floor scheduling guarantees smooth and efficient production – all day long.

for a planner to control without supporting software: In order to produce an item, a released machine is required which is set up with the appropriate tool for the specific order. Suitable, qualified staff to operate the machine or on-time material supply must also be available.

The HYDRA Shop Floor Scheduling module is the right tool for the planner guaranteeing in-production transparency and an overview. The planner can therefore react immediately to changes in production and control these according to general parameters. Only when all factors interact perfectly and are based on real production data, the complex structure of production can run smoothly.



Material stock development (chart in the middle) and the forecasted energy consumption (bottom chart) can be displayed in the HYDRA Shop Floor Scheduling.



Apart from machines, tools and production aids can be assigned using the HYDRA Shop Floor Scheduling.

SMA upgraded comprehensively

Control App Touch2Plan and many new Functions

Using the upgraded Smart MES applications (SMA), managers can increase their control on production – on the go.

Local Production Control

Using Touch2Plan, a mobile App to locally control production, production managers can move planned operations, cancel operations or plan new ones from the pool of orders simply with a tablet or a smart phone. Just a few clicks and the new detailed planning is arranged and after the release is synchronized with the central database.

Touch2Plan is part of the Smart MES Applications (SMA) and complements the large product portfolio for the future project Industry 4.0.

SMA adds HR and Quality Management

New HR functions have been added to the SMA which are mobile time recording and shift and absence planning. Apart from displaying planned and accounted absence in form of a list or a calendar, employees can now apply for leave or business travel in SMA. A chronological order of shifts is displayed in the calendar for employees working on shifts.

Measured values can now be recorded in SMA using the inspection result documentation for the quality management. All relevant inspection reports can be displayed and inspections can be signed off. Recording claims by assigning measures or pictures of defects is part of the mobile claims management. Photos from an integrated mobile camera can also be attached.

Summarized Evaluation and Collection

By upgrading SMA, the concept of data collection and evaluation becomes increasingly specific like collecting claims, viewing of claims or clocking in and out on the mobile device and requesting information on working hours.

General postings at a machine can also be processed on a mobile device: i.e. log in and off or interrupt operations. A supervisor receives the overview of machine groups in the Workplace Information dialog. Also change of machine status can be initiated, i.e. if a machine is set up or if a machine is idle.



New Releases MPL 8.2 and TRT 8.2

Material & Production Logistics and Tracking & Tracing

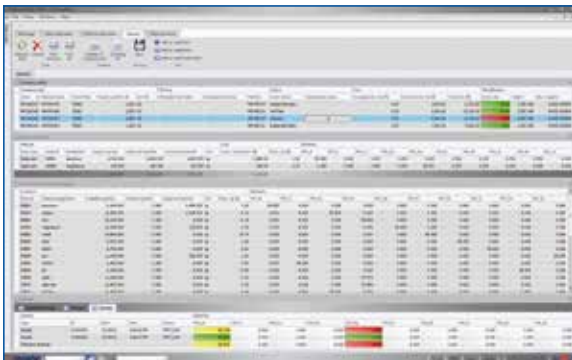
What do MPL and TRT have in common with HYDRA? Correct, both modules take up the issue of material but in different ways. Also the perception of it differs considerably. With the introduction of MPL 8.2 and TRT 8.2, MPDV extends the functionality of both modules.

Since the introduction of HYDRA 8, MPDV has been considering material for production differently: Material flow (intra logistics) and material usage (traceability). Therefore, we have two different modules: Material & Production Logistics (MPL) and Tracking & Tracing (TRT).

MPL focuses on the consumption of material, properties (i.e. expiry date), buffers and storage locations, WIP and surveillance of stocks. TRT is mainly concerned with identifying batches and serial numbers as well as documenting material use (traceability). Important innovations are amongst others transport management and handling of serialized numbers.

MPL – Material & Production Logistics

Companies, not content with collecting times, quantities and reasons for failure in production, can extend their MES solution HYDRA and decide if they take different options: Stepping up quality, looking at machines separately, collecting energy consumption, integrating personnel management or tackling the material issue. If the user decides to take on MPL, then the current situation and conditions must be analyzed.

The image shows a screenshot of a software application window. It features a multi-paneled interface with a large data table. The table has numerous columns and rows, with some cells highlighted in green and red. The interface includes a menu bar at the top and a toolbar with various icons. The overall appearance is that of a professional data management or reporting tool.

Special case composition – optimized material composition for the secondary metallurgy.

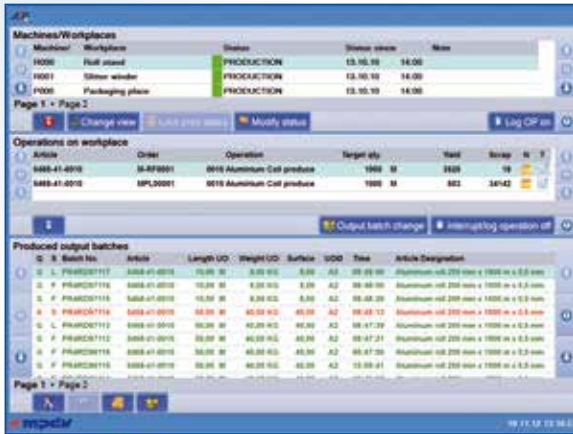
Material is commonly managed in an ERP, material management system or warehouse management system. These systems need to be connected via an interface to MES HYDRA in order to avoid maintenance efforts and to ensure that all data in the systems are consistent. If that has been done, then the functions and procedures in HYDRA must be defined.

What happens if, for example, the material type must be verified when operations are logged on to the shop floor terminal and simultaneously discrete consumption must be collected? Or if the expiry date must be checked and possible usage stopped if material is logged on? Can that be done? HYDRA-MPL offers functions for data collection and evaluation which can be combined modularly.

MPL at the Shop Floor Terminal

The big advantage using an integrated MES solution like HYDRA is, that all data is collected with one device in production. Therefore, training requirements are reduced on operator level and data can be used simultaneously for several purposes. Material data can be checked based on order data or material consumption can be assigned to individual operations.

Independent of other applications, material can be allocated to another buffer stock in the HYDRA terminal or split up into smaller consumption units. Material tag numbers are used to identify specified quantities. Like in most MES applications, information can be requested or displayed at the HYDRA terminal. Material receipts or labels can be issued with a connected printer.



Output batches can be viewed by the operator at the HYDRA shop floor client in order to find out what has been produced.

Further Functions in MPL

Apart from the basic functions to manage master data and movement of material, HYDRA-MPL offers packages to extend functions for material and buffer stocks, material monitoring, range and availability of material, transport management, eKanban, composition and escalation management.

Focus on Transport Management

In order to transport material efficiently from one place to the other, HYDRA's new Transport Management can generate transport orders directly in production. If, for example, a terminal is fixed on a forklift truck, the driver can determine which orders are due and can book these orders and produce them. The required production time is collected simultaneously with the orders and can then be evaluated. Apart from material resources (i.e. tools) can also be transported.

TRT – Tracking & Tracing

The HYDRA module Tracking & Tracing (TRT) provides you with a different perspective on material. The module is mainly concerned with batches and serial numbers – meaning certain, restricted quantities of material must be identified. Also for some industrial sectors, material use must be documented completely.

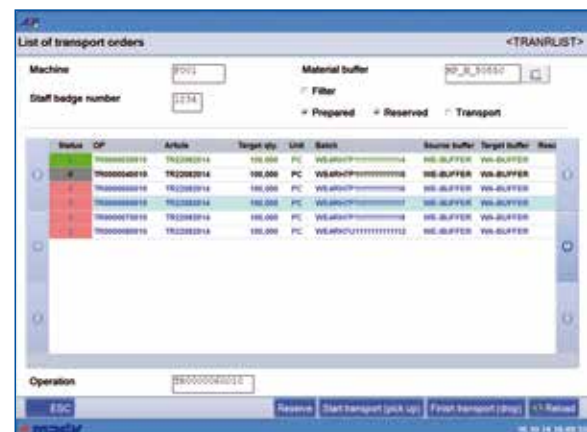
TRT on the Shop Floor

Contrary to MPL, the operator collects with TRT definite material batches. This is often coupled not only with the documentation but also with securing processes. That means, a certain batch can only be used for the corresponding order. In goods-in material can be locked and instantly a batch number is generated.

In special cases, HYDRA supports the collection of a serial number in order to identify each part within a component. Also, HYDRA offers additional functions to palletize batch-managed material and to weigh batch-related components.

Features TRT

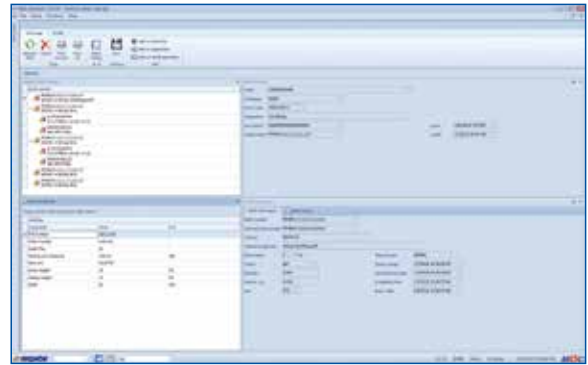
The basic module to process and manage batches can be extended by the following functions: product documentation, graphical tracing of batches, management of serial numbers, archiving and escalation management. Serial numbers to differentiate even further: When collecting and managing serial numbers, merging and separating individual parts with serial numbers is especially important. Also, the exchange of individual components is documented in HYDRA in order to completely trace to this level of detail. TRT 8.2 offers many new functions – also for the graphical batch tracing.



Transport Management with HYDRA – helps to supply material where it is needed.

Sharing but Individually

Some modules from MPL and TRT share some functions even though material is viewed differently. Most important is the master data, which is either transferred from a superordinate system or maintained in HYDRA. Some companies require MPL and TRT functions. Therefore it is even more important for HYDRA to store all collected data in a central production database. Consequently, the data is consistently available in all modules and for general evaluations.



Graphical Batch Tracing – complete documentation of material usage with traceability.

HYDRA International

Using MES internationally and across all sites

Many companies produce across various sites – sometimes even worldwide. What sort of requirements do such businesses have to production IT and especially to a Manufacturing Execution System (MES) like HYDRA?

Upon introduction of an MES system, a long-term relationship between the customer and the MES supplier commences. Therefore, future MES users evaluate the software and the right supplier when looking for a „suitable“ solution.

Requirements to an MES Supplier

In order to cover requirements of a multinational production company a reliable MES supplier is needed – after all the planned investment should be future proof. The MES supplier must be financially sound and should be of a minimum size. Also international subsidiaries or a similar network of partners is advantageous in order to guarantee sufficient support during implementation and running production.



Depending on the distribution of the production sites and organization of the shifts, a 24 hour support also makes sense. It is crucial for most companies to decide what level of support they are expecting of an MES supplier and what they want to do themselves.

MPDV – The MES Experts

For more than 35 years MPDV's MES experts have been working with IT systems close to production and since the introduction of the standard software HYDRA, the number of users has been increasing constantly – more than 880 businesses of all sizes and sectors. MPDV is an equity-financed, medium-sized company employing 260 staff across eleven sites in Germany, Switzerland, France, China, Singapore and the USA. MPDV offers especially for internationally operating businesses a 24 hour support service. A broad and varied customer base helps us to secure the future of our MES experts and hence retains the expertise within the company. At MPDV, the customer decides on the services rendered by the provider and the level of training required.

Requirements to an MES System

But there is more to it than a reliable provider – the product must be capable on the one hand to overcome the challenge of working with different cultures and on the other it must offer functions which can be applied across all sites. By now, it is standard for systems to incorporate several languages which can be switched in the GUI easily and the capability to display all sorts of characters sets. Also the availability of general and training documentation in english is of the utmost importance. It is also advantageous if the user carries out part of the roll out to other sites themselves. Additionally, building a competence team to look after the system in production is beneficial. Specific translations of the application or staff training documentation also simplify the introduction. The more alike the sites are, independent of their geographical location, the more important the functions are to standardize or customize the MES solution.

HYDRA – the fully integrated MES Solution

The fully integrated MES solution HYDRA by MPDV services medium-sized companies with a single production location as well as international players with multiple production sites. A broad range of languages is delivered with the HYDRA Language Manager which can be expanded by any additional language. The HYDRA office client as well as the shop floor client can switch

language during ongoing operation. Due to the unicode capability, character sets of all kind can be displayed – Chinese characters are especially in demand. HYDRA is documented in English and German and training materials are also available in both languages. Translation in further languages is possible.

Templates ensure that the HYDRA standard can be used across all sites. HYDRA's flexible configuration and customizing options ensure that the system can be adapted to the special requirements. The possibility to adapt various configuration scopes prevents standardization and individualization from mutual obstruction.

MES-Cockpit by MPDV complements the use of HYDRA perfectly across various locations. The KPI system brings data together from several sites for evaluation. The standardized function scope of the web-based solution enables to compare different locations.

International Success Stories

We have many examples of the international use of the MES solution HYDRA. To name a few – the world leader for interconnect solutions TE Connectivity uses HYDRA in more than 30 sites in 17 different countries. The automotive supplier Kirchhoff uses HYDRA in more than 10 countries across the globe.



Making a Contribution versus Receiving a Service

MES HYDRA tailor made

In order to produce efficiently, businesses require flexible IT tools – like a Manufacturing Execution System (MES). Using the lately released Service Pack 6, HYDRA users can now organize the system themselves to their specific needs – without programming in the classical sense.

Even if similar products emerge at the end, one production differs from the other. Therefore it is not sufficient to offer a broad software standard of production IT systems to cover all individual requirements. Users of the integrated MES solution HYDRA have now an increased possibility to configure the system with Service Pack 6 onwards. The field-tested MES, currently used in more than 880 companies, offers now further options to configure and customize the system.

Apart from various GUI settings, collection procedures can be implemented with user specific dialogs and even data structures can be modified to comply with individual requirements of a production company. Therefore, a rigid and elaborately programmed software modification is superfluous in most cases.

The new features in HYDRA enable users to individualize the system themselves. Alternatively, MPDV still offers the service to configure



To individualize MES HYDRA by configuration and customizing.

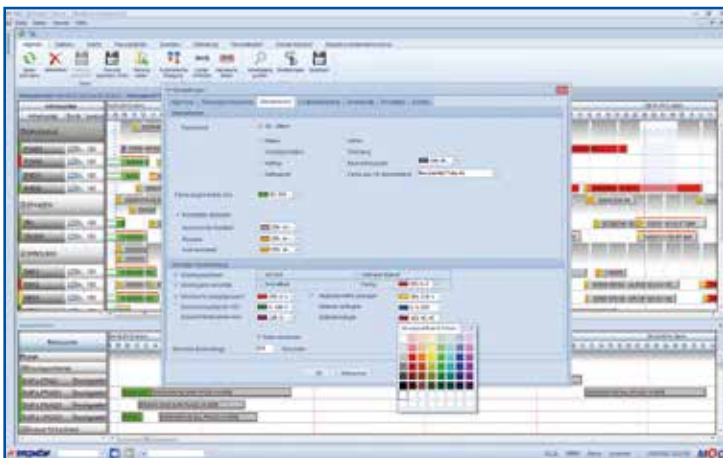
and customize the system – the user has the choice.

New MES Trainings

In order for HYDRA users to get to grips with the new options quickly, MPDV offers a great variety of user trainings matching the extended configuration options. To submerge deeper into the world of MES, customizing corresponding trainings are available.

Look into the Future

Flexibility and the option to customize the system is a central component of our future concept MES 4.0. Our slogan is „Configuration instead of Programming“. That means that implementation of changes can be carried out during runtime. It is an essential requirement for Industry 4.0.



To configure existing evaluations and presentations individually.

MES Training Concept Revised Competence with Expertise

Training always pays off – that also goes for MES applications.

This year, MPDV has tuned their MES trainings even more to the requirements of users, administrators and partners. There is a general distinction between default functions and configuration options and further individualization options provided by additional customizing tools. Therefore, we differentiate between application and customizing trainings.

Details of Application Trainings

Also the application trainings differ – is it a Basic Application Training (BAT) or an Extended Application Training (EAT)? In general, for each product family and for each module a BAT is



available and for specific issues different EATs. The previous upgrade trainings for HYDRA 7 users have been now listed into the new group Special Application Trainings (SAT).

Improving what is already good

„With our new training concept we address users who leave it to MPDV to install HYDRA and also companies that want to individualize the system by themselves. We now offer for both types of customers a broad range of targeted training“, explains Martin Geppert, Director Consulting MPDV, who is also responsible for trainings.

New Market Guide for Manufacturing Execution System Software MPDV recognized as a “Representative Vendor” in the “Best-of-Breed” category by Gartner

MPDV is cited in the latest Market Guide for Manufacturing Execution System Software by Gartner, which we believe vouches once more for the international significance of MES solutions by MPDV.

„Don’t default to your ERP or PLM provider’s MES solution do a market review and full selection process to get the right solution. Talk to current customers, and get a sense of how well the vendor executes against its technology vision“, Gartner recommends in the Market Guide dated May 2015 and refers to the listed providers.

They either only provide MES systems or derive from the ERP, PLM or automation sector. We feel being mentioned in Gartner’s „Best of Breed“ category distinguishes MPDV as solution provider but also MPDV’s MES solutions.

MES solution HYDRA spanning all industrial sectors

Based on more than 35 years of experience gained in the manufacturing industry, MPDV is one of very few manufacturers that can provide a Manufacturing Execution System (MES) with extensive standard functions covering all relevant requirements for different industrial sectors. Compliance with the VDI guideline 5600 „Manufacturing Execution Systems (MES)“ (see ISA S95) and focus on the VDMA standard sheet 66412 „MES Key Performance Indicators“ (see ISO 22400-2) make sure that HYDRA can also be used on an international scale.

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We report briefly in the Project Ticker about some of the companies having decided to use the MES solution by MPDV.

Heidelberger Druckmaschinen AG

The internationally known market leader for printing machines has decided to go for the MES solution HYDRA. Initially, HYDRA will be implemented into the electronic production and assembly. They will be using the modules for Shop Floor Data Collection and Machine Data Collection, Material and Production Logistics, Tracking & Tracing, Process Data, Shop Floor Scheduling and CAQ. Apart from ASM-SIPLACE lines, other devices and test equipment is connected to the SMD production.

Rollout at Phoenix Contact GmbH & Co. KG

Installing the modules Shop Floor Data Collection and CAQ at their American site in Harrisburg, Pennsylvania the longstanding HYDRA user has pushed their worldwide rollout even further.

Playmobil Malta GmbH

The well-known toys Playmobil are now being produced with the aid of the MES system HYDRA in Malta. Initially, the German sites Diethofen and Zirndorf worked with the system and it has now been extended to their facilities in Malta. Modules used are Shop Floor Data Collection and Machine Data Collection as well as Configuration Data/DNC.

Trumpf Werkzeugmaschinen GmbH & Co. KG

The distinguished producer of tools will in future use the MES HYDRA at their site in Gerlingen. The HYDRA functions for Shop Floor Data Collection and Machine Data Collection will support the manufacture of punching and forming tools.

J.H. Tönnes GmbH & Co. KG

The plastics production company will in future rely on HYDRA. The modules Machine Data Collection and Energy Management will initially be used at their site in Delmenhorst.

Norse Oilfield Services AS

HYDRA MES has finally landed in Norway being used at a supplier for parts for oil rigs and shipping lines. The detailed planning of repairs on the oil rig will be implemented in future with the aid of the HYDRA Shop Floor Scheduling tool.

Rollout Johnson Controls

Another two sites belonging to the Johnson Controls Group producing foam cores for car seats have decided to use HYDRA as well. At their site in Lučenec in Slovakia, the company has introduced the HYDRA functions for Shop Floor Data Collection and Machine Data Collection, CAQ and Process Data. The British site in Wednesbury will use in future the HYDRA module Tool and Resource Management.

Atlas Copco Construction Tools, Germany

The company based in Essen make hydraulic hammers and demolition tongs and now use the BDE and MDE (Shop Floor and Machine Data Collection) modules during production and in their pulverizing process.

Akatherm BV

The specialist for drainage systems and plastic pipes has decided to take HYDRA on board. They are going to use the modules for Shop Floor Data Collection and Machine Data Collection, Tool and Resource Management and Shop Floor Scheduling. This is now the third business division in the Aliaxis Group using an MES solution by MPDV.

Rollout at Grohe AG

The worldwide leading manufacturer of sanitary fittings now uses the MES solution HYDRA in their production site in Thailand. They will use functions of the modules Shop Floor Data Collection and Machine Data Collection and Shop Floor Scheduling.

Isselguss GmbH

The company now uses the modules Machine Data Collection, Shop Floor Data Collection and Shop Floor Scheduling to produce components made of gray, vermicular and spheroidal graphite cast iron.

Armbruster

The medical production company making instruments and implants have introduced the MES system HYDRA using the modules Time & Attendance, Personnel Scheduling and Access Control.

Rollout at AMTEK Engineering Ltd.

The rollout of the MES HYDRA is pushed even further: After the introduction at their site in Shanghai, a roll out of a further two factories in Suzhou and Hangzhou and at Pisek in the Czech Republic will take place. They will use the HYDRA modules Shop Floor Data Collection and Machine Data Collection, Shop Floor Scheduling, Material and Production Logistics, Tracking & Tracing, Tool and Resource Management, Quality Management and Escalation Management.

Magna Automotive Mirrors (Tianjin) Co. Ltd.

The production and assembly process in their site in Tianjin (China) will be controlled, documented and monitored by the MES system HYDRA using Shop Floor Data Collection, Machine Data Collection, Material and Production Logistics and Tracking & Tracing.

POLOPLAST GmbH & Co. KG

By implementing the HYDRA Shop Floor Scheduling module, the Austrian supplier of plastic pipe systems, compounds and polymer engineering is going to use a state-of-the-art solution to control their production. Additionally, the production process will be made more transparent by integrating the MES application for Shop Floor Data Collection.

Armstrong

Independent of each other, two sites of the Armstrong group have decided to use the MES system HYDRA. Armstrong World Industries Canada Ltd, located in Montreal, will use the HYDRA functions BDE, MDE, Shop Floor Scheduling, PZW, PEP and ZKS to manufacture ceiling panels. At their German site in Delmenhorst, HYDRA will assist the Armstrong DLW GmbH with the modules BDE, MDE, Shop Floor Scheduling, MPL, TRT, CAQ and EMG to produce floor tiles made of linoleum.

Stahlwerk Unna

Using the HYDRA Shop Floor Scheduling module, the leading manufacturer of cold rolled, tensioned and hardened quality and stainless steel will in future plan material availability at their site in Bönen, Germany more efficiently.

Jackon Insulation GmbH

The manufacturer of high quality insulation and building slabs made out of polystyrene hard foam (XPS) produces successfully with 300 staff all over Europe. The site in Arendsee is going to use the modules Shop Floor Data Collection and Machine Data Collection of the MES solution HYDRA.

SOLA-Messwerkzeuge GmbH

At their site in Austria (Götzis), the market leader and manufacturer of high performance plastics is implementing HYDRA as their encompassing MES solution. They will use the modules Shop Floor Data Collection, Machine Data Collection and Process Data, Shop Floor Scheduling, Tool and Resource Management, Material and Production Logistics, Tracking & Tracing, Energy Management, Time & Attendance, Personnel Scheduling, Personnel Time Management and CAQ.

MEYER SEALS GERMANY

The leading manufacturer of seals for plastics and aluminum caps (i.e. drink bottles) has extended their MES system installing the HYDRA modules Shop Floor Data Collection, Machine Data Collection and Process Data, Energy Management, Material and Production Logistics and Tracking & Tracing.

Häfele Berlin GmbH

The subsidiary of the internationally operating Häfele group produces furniture fittings at their site in Berlin. They will use the modules Shop Floor Data Collection and Machine Data Collection, Shop Floor Scheduling, Tool and Resource Management, Energy Management, Time & Attendance and Personnel Time Management.

Solutions With Innovation (SWI)

SWI, based in Naugatuck, Connecticut, is a leading producer of sensors for level, position, flow, pressure and temperature applications. SWI is implementing the HYDRA modules BDE (Shop Floor Data Collection), HLS (Shop Floor Scheduling) and FEP (In-Production Inspection). SWI is part of the global industry leading flow and level sensor company Magnetrol, headquartered in Illinois, USA.

TAKATA Safety Systems Hungary Kft.

In a newly built Takata production site in Miskolc, Hungary, the integrated MES system HYDRA is now deployed to assist the production of airbags. They are going to use the HYDRA modules for Shop Floor Data Collection and Machine Data Collection, Shop Floor Scheduling, Tool and Resource Management, Process Data and Material and Production Logistics.

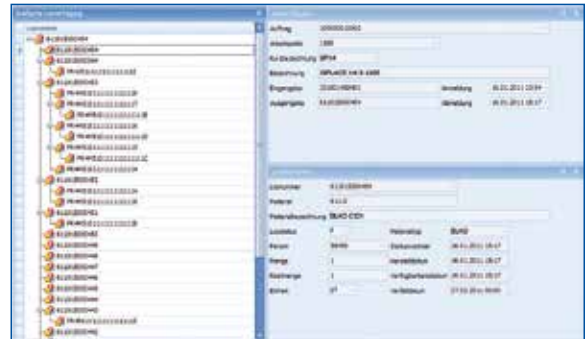
Benteler Steel / Tube

Benteler has built a new factory in Shreveport Louisiana, USA to produce high precision pipes and will be using the HYDRA applications for BDE, MDE, HLS, MPL, TRT, CAQ and PDV. It is planned to roll out the MES solution to six other sites of the Benteler Group.

HYDRA working in Printed Circuit Boards assembly Efficient Electronic Production

In order to support electronic production perfectly, a Manufacturing Execution System (MES) must apart from standard tasks also consider special processes in the assembly of printed circuit boards (PCBs).

In general, an MES should be used in every sector of industry. Using an MES is beneficial as the PCB assembly is a central process in the electronic production but often runs parallel with other production steps (i.e. injection molding or metal processing). Therefore, the use of an MES system like HYDRA by MPDV which covers all sectors of industry is preferable to a niche solution. This ensures a control and monitoring across the whole production process.



Graphical traceability of batches in the MES HYDRA: It can be detected instantly where certain PCB components have been installed of a certain batch.

Focus on PCB Assembly

Typical for PCB assembly is, that several components of different suppliers are automatically assembled in high speed onto the board (often more than 100,000 components

per hour). High volume of data is expected, as data must be collected for each component in the exact slot and also for traceability. Also material inventory management is elaborate as



A total of three SMD lines produce a high volume of data at HEKATRON. 300 million components are installed onto 3 million flat modules annually.

electronic parts are subject to dynamic expiry dates (moisture sensitive level – MSL). As the components are constructed vapor-permeable they react very sensitively to humidity which must be considered during processing. The MSL states, in which period of time the components must be installed after opening airtight packaging, which is associated with high planning and monitoring efforts. After all, these components must be scrapped if they absorb moisture. An efficient assembly of PCB is almost impossible without the support from a piece of software. Also, only a few suppliers of these niche products have their automated assembly robots connected to an MES.

For the display of dynamic expiry dates, assembly of commissioning trollies down to traceability it is essential to identify, manage and evaluate material in the electronic industry. An integrated MES solution like HYDRA combines overall standard functions and requirements of the electronic sector in order to support PCB processes perfectly.

Success Story HEKATRON

During a reference project at HEKATRON Technik GmbH to connect SIPLACE SMD assembly lines (surface mounted devices), MPDV proofed that the MES solution HYDRA copes with all requirements of the electronic production. Implementing an interface to SIPLACE assembly lines is the start of a multiphased introduction of the MES for the complete production process (flat modules and device assembly) in their site at Sulzburg. In order to adhere to the ever increasing legal requirements of traceability and to optimize their own production processes, HEKATRON Technik GmbH decided to go for HYDRA in the summer of 2013. Working with the integrated MES system should remove varied isolated applications and complex interface structures. With HYDRA, a standardized platform to control and monitor the total value added chain has been implemented. All

“ Josef Kohmann, head of industrial engineering at HEKATRON Technik:

„The successful implementation of the complex connection to the first SMD line showed us, that we have chosen the right system with HYDRA. We will now use HYDRA for the complete production process in the electronic assembly.“ ”

collected data (orders, material batches, quality measures, process parameters etc.) are stored in a central database, made available for evaluation and archived. Proof of the enormous data volume is the recently installed SMD line which assembles up to 60,000 components per hour.



About HEKATRON

HEKATRON Technik GmbH produces, as an electronic service provider (EMS), devices for security systems, fire alarms, burglar alarms and flat modules for different industrial applications. In a state-of-the-art production, HEKATRON manufactures a broad range of electronic components from minimum quantities (50 pieces p.a.) to large-scale production of more than one million pieces p.a.. HEKATRON has an annual turnover of around 55 million Euros and employs more than 270 people.



www.durr.com

Dürr is a worldwide leading supplier of products, systems and services mainly for automotive manufacturing. As a supplier of complete systems, Dürr plans and builds paint shops and final assembly plants. Dürr is present in 26 countries employing 8,300 staff and produced an annual turnover of 2,4 billion Euros in 2013.

The target of restructuring and reorganizing their processes in a multi-levelled production planning and control was to improve quality and delivery times, to plan in future against limited capacities, to reduce efforts in order sequence planning, reduce cycle times and to obtain reliable data to calculate production KPIs. Simultaneously to reduce manual efforts. After analyzing the market thoroughly, Dürr decided to introduce the integrated MES solution HYDRA in 2013.

Production orders transferred from the SAP system are planned in detail and booked into

individual machines or workplaces by HYDRA's shop floor scheduling module. The planner now has the option to optimize the sequence of orders and operations within the benchmark data to reduce setup times.

In the HYDRA shop floor client (BDE terminal), the operator logs a status change (i.e. machine interruption) and part quantities manually in order for the system to record the order progress. The CNC machine can collect the yield automatically. Overall, unforeseeable delays can be detected and allowances can be made in the shop floor scheduling for further planning.

All collected data and times are instantly available for calculation of production KPIs (i.e. OEE index and utilization rate). In future, Dürr is planning to use HYDRA personnel scheduling (PEP) and the DNC module to transfer NC programs at machines. Also the introduction of CAQ functions in HYDRA are considered.



Quote by Benjamin Degebrot, Production Planning and Logistics at Dürr Systems GmbH:

„Since the introduction of HYDRA, cycle times have been reduced by up to 40%. Also increased transparency improved productivity. We are now able to identify and reduce non-value added activities.“



www.melitta.de

Melitta has now been involved over 100 years in producing and providing products and services to make life more enjoyable and comfortable. What comes into one's mind is the pioneering Melitta filter bag made out of paper which goes back to the original idea by Melitta Bentz in 1908. Today, Melitta Europe GmbH & Co. KG produces in the business division household products „Coffee“ filter bags of all types in Minden.

Melitta relies on the MES solution HYDRA using the modules Machine Data Collection, Shop Floor Data Collection and maintenance calendar. Production orders generated in the SAP system are planned for the machines via a MES module for detailed planning. In the shop floor, HYDRA automatically collects the time to produce orders, produced quantities and the machine status. If a cycle time is violated, HYDRA detects an interruption automatically and requests from the operator to select a reason for the malfunction in a pre-defined list.

Reliable evaluations of data collected in real time enable the shift manager and production manager to have an overview over the current situation or the last shift. In the Graphical Machinery, the shift manager can see what more than 30 machines are doing, a malfunction in a machine and where orders are assigned to.

With introduction of an integrated maintenance calendar, maintenance intervals take now place after a pre-determined number of cycles. This improvement ensures that machines are maintained orderly and increases their availability. Also maintenance costs are drastically reduced.

With the introduction of HYDRA-EMG (Energy Management) energy consumption is going to be reduced gradually. HYDRA collects consumption as well as performance rates and evaluates the results with machines and order data. Melitta knows in future how much energy is consumed to produce certain items.



“ Quote by Michael Weber, Production Manager at Melitta, Minden:

„We have managed to convince our staff to accept MES as an important tool in our daily working routine. We would be blind without HYDRA and could not produce that efficiently. To survive in a fiercely competitive market, we need high productivity levels and also the cooperation of our staff.“ ”



www.argo-hytos.com

The ARGO-HYTOS group is an important part in the international supply chain being a components and system supplier for the world market leaders in the area of mobile machinery and mechanical engineering. As a medium-sized family enterprise employing 1,300 staff, ARGO-HYTOS has more than 65 years' experience in the control and regulation technologies as well as in the filtration of mobile and industrial hydraulics.

To increase transparency in their production in Kraichtal-Menzingen, ARGO-HYTOS has introduced the Manufacturing Execution System (MES) HYDRA. ARGO-HYTOS hoped for new findings as to machine breakdowns by collecting and analyzing data and therefore improve efficiencies.

Connecting the first three HYDRA modules (Shop Floor Data, Machine Data and Shop Floor Scheduling) enables the evaluation of processed orders including uploading compressed data to the superordinate SAP ERP system and

optimizing the machine assignment. The assignment of orders to the individual machines is carried out mainly automatically and based on specifications (machine group, deadlines ...) from the ERP system. Automatically collected and regularly recorded times, status and quantities guarantee transparency. Large monitors in production display the collected information for the employees.

In a further step, ARGO-HYTOS extends the function scope of HYDRA by adding modules like Time & Attendance, Personnel Time Management, Incentive Pay and Access Control. Order processing times, machine status, production quantities, attendance of staff is now collected without having to manually record these. HYDRA calculates the basic data for the incentive pay for the respective groups. HYDRA is running already in Kraichtal-Menzingen and at the Czech site in Vrchlabi and is planned to be rolled out to further locations in India, USA, China and Poland.



Quote by Jörg Stech, Chief Operating Officer at ARGO-HYTOS group:

„We were able to improve our performance in the long term with HYDRA, providing order and machine data and making the production transparent. Also, HYDRA enables us to define standardized operative KPIs across the group which are then used worldwide in all our subsidiaries to apply and roll out our lean initiatives.“

Cooperation of two market leaders Balluff and MPDV

To efficiently use injection molding tools, it is crucial for many companies working in the plastics sector to stay competitive and profitable. In order to overcome this challenge, the leader for industrial automation Balluff and MPDV, leading supplier of integrated Manufacturing Execution Systems (MES), combine their competence to find an innovative solution.

In the plastics industry, efficiency is closely connected with the perfect utilization of expensive injection molding tools. Only impeccable tools produce high quality products. Perfect maintenance guarantees that the tools are serviced before scrap rates increase.

Transparent Tool Maintenance

With the product Mold ID, Balluff offers a simple start-up solution to monitor expensive injection molds using limited investment levels and limited amendments to tools and machines. This is made possible by individually identifying tools via inexpensive RFID data carriers which are directly installed at the tool. This enables a quick and local evaluation of data. The system works independently of the machine control

and is easily upgradable for older machines. Also data can be collected via the Mold ID solution and made available via web services to superordinate systems (i.e. an MES).

Connecting to an MES System

First of all, tool related data is taken from the Mold ID to the database of the MES HYDRA. Therefore, creating conditions where existing HYDRA functions like preventative maintenance or maintenance calendars can use tool data in form of various overviews, evaluations and statistics.

In the following phase, existing HYDRA functions for tool and resource management (WRM) can be used to centrally manage tools. Master data created in the HYDRA-WRM can also be transferred to the Mold ID and then added to the collected actual data. Completing the second phase, all requirements are met in order to use the functionality of the MES solution HYDRA with all its applications including shop floor scheduling for a very precise production control in combination with the Mold ID.

Scalable Solution

By combining expertise from Balluff and MPDV, the Mold ID together with HYDRA is presenting a flexible solution: From a simple connection to the MES system to full integration. Especially in the era of Industry 4.0, scalable solutions are of the utmost importance.



Thanks to Mold ID and HYDRA, expensive injection molding tools can be managed more efficiently. (Photo: Balluff, MPDV)

Industry 4.0 boosts MPDV internationally MPDV continues to grow

Although Industry 4.0 is often not taken seriously and even pronounced dead – it is a real catalyst for MES providers like MPDV. Thanks to an increasing number of new projects and extending standard MES installations, the MPDV system house in Mosbach is growing continuously.

The owner-managed MPDV Mikrolab GmbH has embraced Industry 4.0 and has closed 2014 with a total turnover of 36 million Euros. In order to cope with the work volume, MPDV, the medium-sized market leader, currently employs 260 people across 11 sites in Germany, Switzerland, France, Singapore, China and USA. Further growth is anticipated. MPDV looks back to more than 35 years' experience in the production environment. Since the foundation in 1977, MPDV has come a long way. From the humble beginnings of a small engineering office, MPDV has fledged into a thriving medium-sized company with a worldwide activity radius.

Co-operative Leadership Style

„The secret of our success lies on the one hand in the extensive range of our MES portfolio and on the other one how we deal with our employees,“ Prof. Dr.-Ing. Kletti, Managing Director MPDV Mikrolab GmbH explains. The pragmatic combination of promoting young talents at an early stage, training and continuous development brings continuity and provides a good working atmosphere. Many



The MPDV management board goes confidently towards the future.



MPDV present worldwide – always close to the customer.

awards – for example by the employer rating platform kununu or as the TOP 100 Innovator show that MPDV is on the right track.

Most Gratifying Outlook

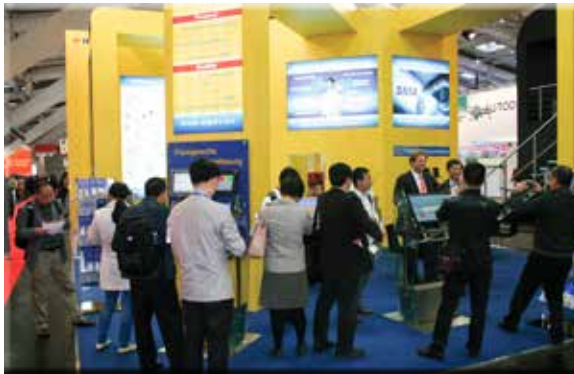
MPDV is expecting to grow in the future. „The MES market potential has not yet been exploited,“ according to Prof. Dr.-Ing. Kletti, „some companies still manage their production with the aid of paper and Excel. There is plenty of growth – with or without Industry 4.0.“ The field-tested MES solution HYDRA supports already more than 880 companies to produce more efficiently.

International Expansion

Recently, the MPDV subsidiaries in Singapore and Shanghai moved to new office premises. The new offices offer more space for more employees and boost the general upward trend. Upgrading the MPDV homepage also supports our efforts: Having packed regional contents into www.mpdv.com, USA, Singapore and China will now be integrated into the web site. Objectives are to develop a consistent image.

MPDV Software and Technology Services (Shanghai) Co., Ltd. in China

The team now works in our new premises in Shanghai, covering tasks like sales, installation, development and support of the MES solution HYDRA.



The Chinese delegation at the MPDV booth at the Hannover Messe.

In cooperation with partners like E-WORKS MPDV reaches a large group of decision makers. Highlights were a convention with around 300 participants in China as well as a trip by 20 delegates to Germany including a visit to HYDRA users and the Hannover Messe.



Part of our Chinese MPDV team.

Apart from servicing European customers with sites in Asia, MES experts look already forward to handling several local projects in China. Unknown requirements lead to the HYDRA standard being upgraded, which continuously increases the international compatibility. For example, Chinese companies do not use ERP systems commonly. Therefore, HYDRA needed to be upgraded with simple ERP functions for stand-alone operation.

MPDV USA Inc. in Chicago, USA

The American MPDV team was reinforced significantly last year. A new sales person and a consultant were employed and several German employees (from project management, sales and consulting) were sent to Chicago to assist in the short term. Also the employment of further sales people and consultants is envisaged. Therefore, the team in the States will grow shortly to ten people. MPDV USA is now in the position to offer HYDRA trainings and local MES workshops. In September 2014 the first day of the open house for American HYDRA users took place.



MPDV customers in North America

HYDRA installations are spreading across the States. In North America, MPDV has now more than 25 customers, some with even several production locations. Apart from rollouts of European companies to sites in the USA, some locally acquired projects can be accounted for. Well-known companies amongst our customers are for example IPEX (4 sites), Armstrong, Johnson Controls, Hirschvogel, Gerresheimer, HYDRO, tyco electronics and Phoenix Contact.



Advertisements for MES events in the USA.

Last but not least, the HYDRA integration partner Atos, IT service provider, is at our disposal world-wide.

MPDV International

Sequel of the Success Story in the USA

MPDV continues to grow – also in the USA. The MES webinar series comes also into fruition after having successfully participated in specialized trade fairs.

MPDV @ IMTS 2014

The International Manufacturing Technology Show (IMTS) in Chicago is the biggest trade show for production and production technology companies in North America. In September 2014, the show was visited by more people than ever. In the space of six days, the trade show was visited by 114,000 people and 2,000 exhibitors from 112 countries showed their products.

MPDV was represented this year with additional personnel and with a larger exhibition booth. The IMTS 2014 has been for MPDV so far the most interesting trade show in North America with regards to numbers visiting the booth. Apart from HYDRA users, many prospects visited the booth to inform themselves on the MES solution „Made in Germany“. Volker Kren, Senior Account Manager MPDV, reports: “Competitiveness in production is also a driving factor in the USA. Therefore, our MES solution HYDRA hits a nerve. Many visitors and intensive discussions with prospect clients confirm that we are on the right way.”



MPDV @ FABTECH 2014

In November 2014, MPDV showed again at FABTECH to production companies how to utilize resources, machines and whole plants more efficiently with a Manufacturing Execution System (MES). State-of-the-art software tools like an MES cover the total value added chain and assist to produce more efficiently. Visitors from all over the world visiting the FABTECH informed themselves about the benefits of the MES solution HYDRA at the MPDV exhibition booth.

FABTECH is one of the biggest annual trade shows and conventions in North America concerning metal processing. Over 30,800 visitors from 70 countries came to the Georgia World Congress Center in Atlanta, Georgia. 1,477 companies exhibited new technological innovations and live demonstrations – including the MES solution HYDRA. Visitors had ample opportunities to compare what is on offer and obtain information about suitable solutions. Covering more than 50,000 sq. the FABTECH is an important specialist trade show – also for the leading MES provider MPDV.

MPDV @ NPE 2015

At the biggest international plastic showcase, the NPE in March 2015, the MES experts from MPDV demonstrated that MES systems are an absolute must-have in the plastic industry in order to stay competitive. William Carteaux, President of the Society of Plastics Industry (SPI), organizers of the NPE, stated that one reason for the success of the NPE is that the US plastics industry is again on the up. That revival drew participants from all over the country and the whole world. But long term success is down to a flexible and efficient production. An MES system like HYDRA supports companies to optimize their processes and save resources.



The NPE 2015 is worldwide the biggest trade show and specialist convention in the plastic sector. The trade show takes place every three years and over 60,000 specialists from the plastics industry from over 37 countries meet up. The show covers more than 10,000 sq.. The NPE was hosted this year in Orange County Convention Center in Orlando, Florida and 28% of the visitors came from countries outside the USA.

Further Conferences in 2015



MPDV USA participated in the IndustryWeek Best Plants Conference & Expo, co-located with the Manufacturing Enterprise Solutions Association (MESA)

North American Conference at the Charlotte Convention Center in Charlotte, North Carolina on May 4 – 8. The Conference is dedicated to helping manufacturing facilities improve their operations and provides manufacturing professionals with ideas they can take back to their facilities and implement to improve their operations. Many of the over 700 key manufacturing executives took the opportunity to visit the booth to learn about the state-of-the-art MES HYDRA. Besides meeting customers and making new contacts, the conference was a means for potential new partners to discuss how they might develop a mutually beneficial relationship with MPDV.



MES Webinars in the USA

In 2015, twelve MES webinars are planned covering different subjects. Communicating information with the aid of webinars is very popular as great distances have to be covered in the United States.

100 participants from 90 different companies have registered for the first four webinars. Some of the participants asked for an appointment at our premises, others joined an MES workshop to see for themselves what can be achieved with the MES solution HYDRA.

The large number of participants shows that webinars are an effective way to get the target groups interested in the benefits using an MES system like HYDRA and to demonstrate optimization potentials in their company.



MES 4.0 goes Asia

„Industry 4.0“ gains momentum – also in China!

All but every Chinese manufacturer feels the heat of increased competition, rising labour cost and rising customer expectations towards manufacturing excellence. The 2nd China International Industrial Intelligence Summit, organized by Borscon, was held in Shanghai in June 2015, to fully focus on “Industry 4.0”.

To further increase productivity, efficiency and quality, “Industry 4.0” is being looked at in China as the new innovative approach to achieve these goals, by merging markets and production shop floors even closer via the Internet and to achieve decentralization, making sure that the right information is at the right place at the right time.

2nd China International Industrial Intelligence Summit

MPDV contributed to the summit as a key note speaker amongst other industry brand names such as General Electric (GE), SAP and Siemens. The message of MPDV was simple and clear: “For manufacturers, Industry 4.0 can only work with MES 4.0!”



MPDV Shanghai General Manager Sascha Gräf greeted the audience and introduced the successful MPDV Group worldwide, with focus on their Asia operations on the basis of MPDV Asia Pte Ltd. in Singapore and MPDV Software & Technology Services (Shanghai) Co., Ltd. in China.

Thereafter, Mingfeng Li, Asia Business Development Manager from MPDV Germany head-

quarters continued in his native Chinese language to introduce MPDV’s comprehensive MES solution portfolio specifically dedicated for “Industry 4.0 with MES 4.0”.



A special focus was put on MPDV’s developments for mobile data collection solutions on tablet basis, and how a decentralized information management can be achieved through meaningful integration of the right information with the right IT infrastructure.

Lively debate

The Q&A session at the end of the presentation revealed a significant interest in the Chinese audience for MES as being the backbone for Industry 4.0.

Excited discussions between the audience and the MPDV speakers immediately evolved, some of them leading to further follow-up consultations by MPDV at the Chinese customers premises in the days after.

For MPDV, the positive “Industry 4.0” awareness of the Chinese audience was a clear indicator for going into the right strategic direction by driving “Industry 4.0 with MES 4.0” in China and Asia further.

Serving economy, young talents and expert committees

The German State of Baden-Württemberg awards Prof. Dr.-Ing. Jürgen Kletti the business Medal 2014

Prof. Dr.-Ing. Jürgen Kletti, Managing Director MPDV Mikrolab GmbH, was awarded the Baden-Württemberg Business Medal 2014 for his outstanding professional and entrepreneurial contributions. The German Minister of Finance and Economics Dr. Nils Schmid handed out the award in Stuttgart.



Prof. Dr.-Ing. Jürgen Kletti receives the business medal of Baden-Württemberg from Dr. Nils Schmid, Minister of Finance and Economics.

Mr. Schmid, Minister of Finance and Economics, praised Mr. Kletti's and the other winners' contribution ensuring Baden-Württemberg remains a strong economic entity and county worth while living in. The medal was presented in a festive setting and Mr. Schmid carried on: "Your

willingness to get involved, progress and take risks makes you all an icon and motivates us in our county." In Prof. Kletti's eulogy Mr. Schmid emphasized his pragmatic approach of life: "You do not hesitate – you go and do it. The force to shake things is demonstrated beyond your company and is shown by your drive to make things better", which is one of the pivotal criteria to award this business medal. Prof. Kletti was moved indeed and was delighted to receive this award.

VDI awards the badge of honor to Prof. Kletti

MPDV Managing Director promotes MES

Prof. Dr.-Ing. Jürgen Kletti, Managing Director MPDV, received the badge of honor for his „outstanding voluntary services“ from the VDI (Association of German Engineers) during this year's conference „Effective Factory“ in Hockenheim. Prof. Kletti initiated and chairs the VDI expert committee „MES – Manufacturing Execution Systems“. He also participates in additional task forces.

Under his wing, the guideline VDI 5600 for production management systems developed five sheets which have been published. It was the first time that several providers and users of production IT systems have agreed on a common definition of MES tasks. Prof. Kletti reports regularly about the progress of expert committees on occasions such as trade fairs, conventions and press conferences and works successfully in the advisory board „Information Technology“. The chairman of the advisory committee „Information Technology“ of the VDI association for „Product and Process Design“ Dr. Olaf Sauer working at the Fraunhofer Institute for Optronics, System Technology and Image Evaluation, presented the award and empha-



Prof. Dr.-Ing. Jürgen Kletti (center) with Dr. Wolfgang Müller of the VDI Expert Committee Product and Process Design (left) and Dr. Olaf Sauer of the Fraunhofer Institute for Optronics (right).

sized the outstanding merits of Prof. Kletti. Thanks to his extensive voluntary work in the VDI and other, partly international committees, a common understanding of MES in the production industry has evolved worldwide.



Worldwide next to our customers



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