MES **Products**





MOTIVATION





Components for a modular MES system

State-of-the-art Manufacturing Execution Systems (MES) are structured in a modular way and offer maximum flexibility and scalability. Components are MES products used in MPDV's MES solution HYDRA. Production companies with strong IT expertise and an in-house IT department or integration partners (Value Added Reseller) can utilize MES products to create their own individual MES or extend an existing MES solution.

MES products by MPDV are function components that can be combined randomly and they still interact perfectly. It is also possible to upgrade the system with alien functions and components due to its service-oriented architecture.

Profit from the advantages of a flexible standard software with an ergonomic user interface, a high degree of configurability, full modularity and scalability as well as long product life cycles. MPDV also offers a practical development environment and handy tools to simply connect machinery.

NEEDS-BASED

What can you expect?

Build your individual MES using standardized function components and still profit from the advantages of a standard software:

- Extensive documentation of individual function components
- Needs-based product support
- Training for administrators and users

With more than 1.000 installations MPDV's MES products are in daily use and proven for many years for HYDRA users from all sectors and in all sizes. Speaking for its practicality and a high degree of maturity.





Individual combination

You decide how to use MES products by MPDV:

- Build an MES from MPDV products like we do with HYDRA.
- Combine individual MES products or entire HYDRA applications with existing software components.
- Supplement applications from third-party suppliers.
- Finalize existing isolated solutions to an efficient overall system.

Focus is always on your individual requirements and situation in your business environment.

Products evolve into solutions

Normally, applications derive from MES products of different function groups that are combined based on needs and can interact without interfaces. Not always products of all function groups are required. This is dependent on the desired functional scope and possibly, existing applications.

For example, the HYDRA module Shop Floor Scheduling receives its data from interfaces from the superior ERP system and from other MES applications. Therefore, it does not require a shop floor connection as a rule. HYDRA Machine Data on the other side records mainly data from the shop floor and has not necessarily an interface to the business IT. In addition, the way data is entered or evaluated is determined by your individual needs – you decide which user interface is best for you.

BENEFITS

More efficiency in production with HYDRA

The effects which production companies want to achieve by using an MES are manifold. They range from transparency and efficiencies to increasing quality. A precise goal is of the utmost importance to select and decide on the function specification of required MES applications. Companies profit from the modular structure of such systems and an extensive product portfolio.

Powerful MES solutions are not only a must for efficiency in high wage locations but also a required basis for the future. A Smart Factory specified by Industry 4.0 can only function with an MES.



Award winning product: MES HYDRA

HYDRA is a field-tested MES system verified by more than 1.000 installations and numerous product awards.



Highlights of MPDV's MES systems

- Central production database as an integration platform for all applications
- Broad range of configuration options
- Sophisticated data security concept and powerful backup mechanisms
- Support of an uninterrupted 24/7 operating system
- Extensive system monitoring inclusive of check lists
- Online plausibility checks of data entries
- Offline capability during failure of IT components
- Integrated escalation management with lodged workflow across all MES applications
- Multi-client and multi-system capability in order to build test systems and solutions with multiple clients
- Multilevel, role-based authorization concept
- Support of different language versions by Unicode capability and multilingual tables
- Cloud capability



FUNCTION GROUPS

Central tasks of an MES application

In order to provide the required benefits, an MES application is made up of individual products with a specified function scope. The products are combined in a specific way. All these MES products can be assigned to the following function groups:

Shop Floor Integration Services: Collect data and connect machines

Interfaces to machines, facilities and test equipment ensure the data transfer with all resources on the shop floor (e.g. machines, sensors, test equipment).

Intuitive data collection dialogs and the option to request and display order information support the operator during the daily routine.

MES Applications: Process, evaluate and condense data

Application Services are the core of an MES application and process recorded data in order to aggregate and correlate, evaluate and display these.

User interfaces for office PCs build an ergonomic interface to the user in the office environment to evaluate, plan and maintain data.

Smart MES Applications (SMA): Mobile collection and evaluation of data

Data collection and evaluation with mobile devices (smartphone or tablet PC) enable data access and MES functions independent of the location.

MES-Cockpit Applications: KPIs and management dashboards

Web-based dashboards display data from HYDRA and other systems comprehensively – not only for the management.

Enterprise Integration Services: Base functions and integration into the existing IT landscape

Base functions offer general data structures for comprehensive use of master data across all HYDRA modules and comprehensive configuration tables to visualize processes specific to the company.

Efficient interfaces to the business IT guarantee data exchange with superior IT systems (e. g. ERP, HR, PLM, SCM).

Development environment

MPDV offers for all products comprehensive development tools to individualize your HYDRA application or even develop your own applications. They enable simple changes or upgrades of existing components and applications. In addition, it is possible to create brand new components and applications.

You decide which MES products you require from MPDV, which software components you provide yourself and which ones you buy from other suppliers.



DATA COLLECTION

Numerous requirements for MES in the shop floor

Ergonomics

MES dialogs in the shop floor must be structured clearly and easy to use in order to promote motivation and acceptance by the operator. MPDV offers for each task the right dialog as they can be configured individually. Devices with touch screen technology suitable for industry are the basis for efficient operation.

Secure collection procedures

During collection, HYDRA checks the correctness of the entered data and points out false entries to the operator. Online plausibility checks guarantee a high data quality.

High availability and offline capability

Production may not be blocked or even interrupted by the failure of IT systems. The Shop Floor Integration Services ensure that data are also collected during failure. Suitable mechanisms buffer data and therefore avoid loss.

Manual data collection

The HYDRA Shop Floor Client AIP (Acquisition and Information Panel) provides numerous and configurable operator dialogs for standard posting procedures. Examples are:

- Logging on and off as well as interrupting and partly confirming orders and operations
- Posting organizational standstills like lack of orders, material or personnel
- Input of interruption and standstills like repair, tool failure or maintenance
- Recording of clock-in, clock-out and break times
- Collection of attributive characteristics or measured values during an in-production inspection
- Posting of lot and batch IDs as a base for tracking & tracing
- Collection and posting of material consumption

SHOP FLOOR

Automated data collection and machine connection

The production environment consists normally of a heterogeneous landscape with different machines, facilities, controls and systems where machine and process data has been stored already. It is possible to connect machines and facilities in no time using the Shopfloor Connectivity Suite. Thereby, the user is supported by powerful wizards. The HYDRA Process Communication Controller (PCC) plays a central role with its extensive libraries and communication modules:

- Interfaces based on the OPC standards DA and UA
- Communication using specific protocols (e.g. Euromap 63 or 15) for standardized data exchange with injection molding machines of all significant machine manufacturers like Netstal, Battenfeld, Engel, Krauss-Maffei, Demag
- Interfaces to servers, e.g. Arburg Control System (ALS)
- Interfaces to transfer weighing results from scales by Mettler, Soehnle, Bizerba, etc.
- Communication using bus systems like Arcnet or Profibus
- UMCM (Universal Machine Connectivity for MES): A universal interface defined by MPDV to easily collect machine statuses, quantities and process data
- Serial data interface to communicate with machine controls via proprietary protocols

HYDRA Process Communication Controller

Alternatively, machine or process data can be accepted from the MES via external modules. These interface components offer especially for older machines a great option to automatically collect data:

- Recording of cycles and digital signals using a direct connection to machine sensors
- Transfer of analog measured values, e.g. temperature, pressure, revs or speeds

The inexpensive devices are integrated via LAN or serial interfaces into the MES. They can be modularly expanded and have an easy mounting system and connection options.

MES APPLICATIONS

Individual function scope of an MES system

The VDI guideline 5600 specifies the function scope of an MES in form of ten MES tasks. In addition, the individual demands of a production company require certain MES applications. MPDV offers numerous HYDRA applications which can be combined randomly with each other or with alien MES applications.

MES Applications

HYDRA covers a broad field of applications and works completely integrative. In order to guarantee an integration with alien MES components, MPDV offers standardized interfaces.

The following HYDRA applications offer businesses exactly the support needed for their daily production routine.

Shop Floor Data: Total transparency of your production orders

- Collect and monitor orders and workflows
- Monitor order progress and delays
- Objective analysis and controlling of shop floor data

- Monitor machinery and increase availability
- Visualize performance in real time
- Support maintenance

Shop Floor Scheduling & Detailed Planning: Perfect production control

- Transfer of orders from the superior ERP system
- Graphical multi-resource planning (Gantt chart)
- Assignment based on real time data and against real capacities

- Digital managing of tools and other production resources
- Electronic tool book to reduce paper at the machine
- Precise planning of maintenance with an integrated maintenance calendar

Material and Production Logistics: Perfectly control and monitor material flow in production

- Monitoring of material stocks in the shop floor (WiP)
- Monitoring of inventory range and expiry dates
- Proactive material availability planning

- Takeover of NC programs and setup data
- Automatic down- and upload directly at the machine
- Online plausibility and integrated NC editor

Energy Management: Detect energy waste and reduce production costs

- Systematically collect and evaluate energy consumption
- Mapping of hierarchical structures of meter readings
- Correlative evaluation of energy consumption

- Continuous collection and monitoring of process values
- Individual tolerance and action limits incl. escalation management
- Process parameters based on continuous quality assurance

Tracking & Tracing: Maximum integrity during product manufacturing

- Reliable logging of all steps in the manufacturing process
- Overall traceability
- Tabular and graphical evaluation, e.g. batch tree

Dynamic Manufacturing Control: Model, control and monitor your multi-variant production processes

- Connection and control of production lines
- Needs-based guidance for operators and process interlocking
- Collection, visualization and documentation of real time data

- Modeling of multi-leveled and ramified production processes
- Definition of quality inspection and rework loop as needed
- Offline capability and seamless integration into the HYDRA infrastructure

In-Production Inspection: Quality inspection and production processes in one system

- Order-oriented inspection planning and operator self-inspection
- Individual inspection intervals based on real time data
- Intuitive navigation and connection of digital test equipment

Incoming Goods Inspection: Perfect goods for production guaranteed

- Flexible dynamic sampling procedures based on the inspection history
- Integrated evaluation management for external and internal suppliers
- Detailed evaluations and control charts

- Collect, process and analyze complaints
- Integrated workflow management for standardized processes
- Flexible evaluation to calculate, for example, costs of complaints

Test Equipment Management: Carry out measurements with the right and ready test equipment

- Central management of all test equipment
- Consideration of test equipment during detailed order planning
- Integrated calibration calendar to ensure always ready test equipment

- Create and manage FMEAs of different kinds, e.g. adhering to VDA
- Define system or process elements, functions, characteristics, failures and measures

Time & Attendance: Say good-bye to the punch card and hello to electronic time recording

- Transfer of HR master data from other HR systems
- Clock-in, clock-out and recording of absence times
- Central list of all present and absent employees

- Individual configuration options to calculate wage types
- Flexible leave workflows and comprehensive evaluations
- Interfaces to all common HR systems

Personnel Scheduling: Provide qualified personnel in the right place at the right time

- Assign personnel capacities depending on the order situation
- Consider staff qualifications and availability
- Clear display of personnel scheduling and assignment to workplaces

	and the second se
Construction of the local division of the lo	The second second second second
	Stranger and the
the second se	the second could be an end of the
	The statement of the second st
	and the second se
	and inclusion of the
the second se	And the second s

Premium and Incentive Wages: Reliable basis for performance-based payroll

- Correct and objective calculation of performance-based wages and bonuses
- Individual display of complex calculation rules and the use of collected data from the shop floor
- Flexible evaluation and interfaces to all common payroll systems

Access Control: Protection for buildings, sites and operational areas

- Time- and profile-based access control
- Monitoring and logging of access and attempt to access
- Individually configurable security control center

MOBILITY

An ingenious combination: Collect and evaluate data on a single device

In times of high demands in flexibility and mobility, Smart MES Applications (SMA) offer a broad range of functions to collect and evaluate production data. A major aspect is to use standardized mechanisms to access a central production database and an intuitive operating concept following known design rules for tablet PCs and smartphones.

Platform-independent display, also in the web

No matter what device Smart MES Applications are running on – the user keeps an eye on everything due to flexible displays. SMA have always the same appearance independent of the device (e. g. tablet PC or smartphone) or operating system (iOS or Android). Alternatively, SMA can be requested as a true web application using a common Internet browser.

4.6.4		1		The second second	1000
248	0454		25	ACRES 1	19 A
2.8.4	1000		20 m	2.4	821-1
100	1.000		and the second		100

The state of the s		
	and the second se	

MES-COCKPIT

Keep an eye on production with KPIs

What the cockpit is for a pilot, KPIs are to a production company. They are a powerful tool supporting management to lead the company. MES-Cockpit Applications display relevant KPIs individually and comprehensively. This enables you to create a control cycle for production.

Easy access to all relevant information

MES-Cockpit Applications are flexible web clients that can be requested with an Internet browser without additional installation. In addition, they can be integrated into existing or new company portals. Every user can individually design their own dashboard depending on required information and store it for later reuse.

MES-Cockpit Applications can also access imported data from different databases.

KPIs in the Control Cycle of Production Control

Benefits through independence

Two qualities in the MES-Cockpit Applications are very different from classical MES applications like HYDRA: The MES-Cockpit Applications are a true evaluation tool and, in addition to common MES applications, can evaluate data from all sites. They even can integrate data from other systems. MES-Cockpit Applications enable compressed data to be evaluated over several years, even though they are no longer included in the productive MES system as they have been exported or archived.

Apart from independently configurable dashboards, MPDV offers pre-defined functions for shop floor information, production monitoring and performance analysis.

INTEGRATION

Base functions and MES integration into the corporate landscape

You cannot view an IT system separately in our networked world. The emphasis is on integration into the existing business IT. The Enterprise Integration Services (EIS) take on this task in HYDRA.

These services offer on the one hand diverse functions to manage MES master data and comprehensive configuration tables that are an essential requirement to map business specific processes in the MES. On the other, they include powerful interfaces to guarantee data exchange with the ERP, QS and warehouse management, payroll or other systems to avoid redundant and inconsistent data management. Sophisticated monitoring of interfaces including meticulous logging of inbound and outbound transactions prevent difficulties during data exchange.

MPDV can access numerous, existent interfaces developed during prolific projects which can be configured, depending on the application, flexibly and individually. There are certified interfaces available especially for SAP systems.

Closer to production with an MES

Business systems like the ERP are pushing boundaries if they have to take on large data volumes from machines and facilities. Also, it can be a challenge to supply the data into information suitable for production in real time. Here MES systems are at their best: As a central data hub, the MES ensures for the collection of information from the shop floor, which is subsequently prepared and forwarded in an aggregated format to the ERP. Data is therefore increasingly up-to-date. Additionally, MES functions focusing on machine and process applications enhance the functionality of the ERP.

FLEXIBILITY

More than products

If we look at the IT landscape of production companies, there are two obvious categories: On the one hand production companies that basically operate without IT support. On the other hand businesses that introduced IT-based systems in the past but only covering parts of the MES portfolio. This often led to self-programmed solutions. At the same time, companies gained valuable experience in supporting production processes using IT applications.

Independent of the category your business falls into, the MES experts from MPDV have the right offering for you. It is your choice whether to source products, services or solutions from MPDV.

MES **Products**

State-of-the-art MES components used by MPDV's customers and integration partners to design their individual MES solution

MES Services

Services supporting manufacturing businesses on their way to achieving their perfect MES solution, well-founded user training and worldwide support for existing systems

MES Solutions

Products and services combined with customized MES solutions, professional project management and implementation services according to individual requirements In addition to MES Products that are described in detail in this brochure, MPDV also offers:

MES Services - consulting and services in the MES environment

MPDV offers individual, needs-based services. They can be added to MES products or detached from it. MES experts from MDPV support you in the introduction of an MES or implementing your machine connection. They also provide support, carry out training and assist you in operating your HYDRA system. Our consultants can rely on 40 years of experience and knowledge from projects in the production environment.

MES Solutions - all from one source

We can accompany production companies wishing for a complete MES from beginning to end. Experienced project managers coordinate closely with you, the future user, when certain activities are required and which services you have to carry out yourself. You create the premise for an MES introduction - the MES experts by MPDV shoulder the overall responsibility of the MES project.

MPDV Mikrolab GmbH

headquartered in Mosbach/Germany, is developing modular Manufacturing Execution Systems (MES) and can refer back to 40 years project experience in the production environment. MPDV also offers services to implement and complete MES solutions. MPDV currently employs more than 330 people at ten sites in Germany, Switzerland, Singapore, China and the USA. Customers come from all sectors of industry, from metal processing, plastics industry to medical engineering and benefit from more than 1.000 installations of MPDV's MES solutions which have received numerous awards. HYDRA users come from medium-sized companies and also from internationally operating groups.

www.mpdv.com info@mpdv.com

© 2017 MPDV Mikrolab GmbH | Doku-Ident: MESProd_EN 03/2017. The mentioned product names are trademarks of the respective producers or suppliers. HYDRA® is a registered trademark of MPDV Mikrolab GmbH.