![Mühlbauer High Tech International]

MB PALAMAX®
TOTAL PROCESS TRANSPARENCY

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MÜHLBAUER GROUP AT A GLANCE

MÜHLBAUER'S BUSINESS UNITS AND SITES

Founded in 1981 in the heart of Bavaria, the Mühlbauer Group has ever since grown to a leading global player in the fields of Parts & Systems, Semiconductor Related Products, Document Solutions & Equipment for Security Systems, and innovative Technologies for Electromobility and Flexible Solar Solutions. With around 4,000 employees, technology centers in Germany, Malaysia, Slovakia, the U.S. and Serbia, and 35 sales and service locations worldwide, Mühlbauer created a strong competence network around the globe.

Our global corporation continuously invests in the most modern innovations and creative ideas in order to enhance our competences and to provide you with optimized solutions. We aim to protect the environment with our advanced technologies and make life easier for countless people.

Our in-house precision part production **MPS** – Muehlbauer Parts & Systems – guarantees unlimited flexibility and highest customer satisfaction.
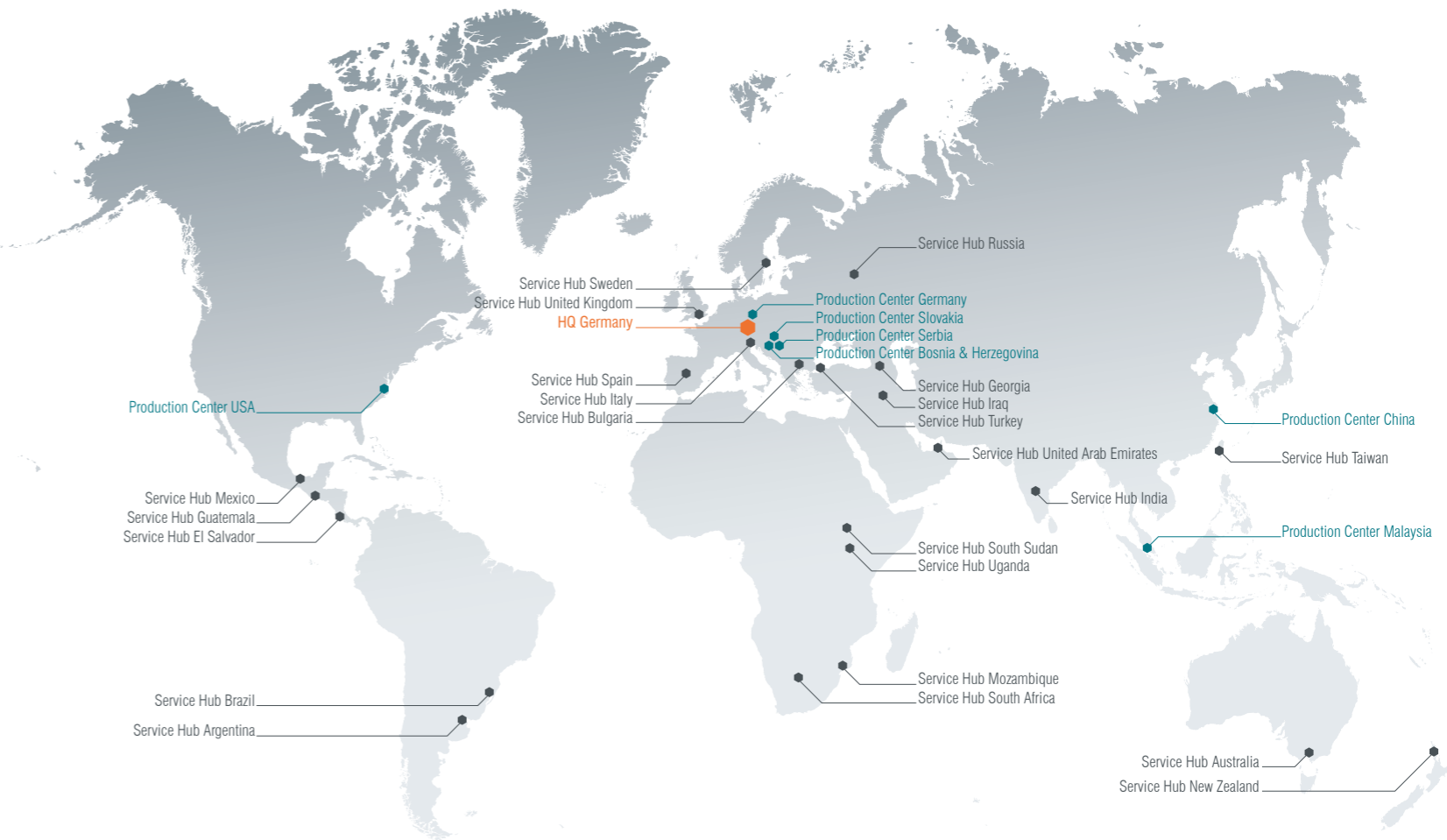
Our business unit **AUTOMATION** does not only develop and assemble individually customized production systems, but also offers intelligent software solutions for production automation (Industry 4.0). Vision inspection technologies as well as semiconductor and RFID applications complete our comprehensive portfolio.

Our youngest and currently most dynamic division **ATECH** – **Advanced Energy Technologies** – brings unique machinery requirements to series production. For the eMobility industry, we have been offering highly efficient production lines for the manufacture of pouch- and prismatic cells for lithium-ion batteries, as well as MEA's & stacks for fuel cells since 2022. Another promising area in this business field is our expertise in precise reel to reel material handling, which enables us to provide innovative production concepts for flexible solar cells and panels.

Our business unit **TECURITY®** is established as a competent partner for the implementation of security systems for identifying and verifying both documents and individuals. Our clients benefit from more than three decades experiential value which we have gained during the realization of over 300 ID projects worldwide.

There is no "can't do" at Muehlbauer. We tailor your solution!

Service Hub Russia
Service Hub Sweden
Service Hub United Kingdom
HQ Germany
Production Center Germany
Production Center Slovakia
Production Center Serbia
Production Center Bosnia & Herzegovina
Production Center USA
Service Hub Spain
Service Hub Italy
Service Hub Bulgaria
Service Hub Georgia
Service Hub Iraq
Service Hub Turkey
Production Center China
Service Hub United Arab Emirates
Service Hub Taiwan
Service Hub India
Service Hub Mexico
Service Hub Guatemala
Service Hub El Salvador
Service Hub South Sudan
Service Hub Uganda
Production Center Malaysia
Service Hub Brazil
Service Hub Argentina
Service Hub Mozambique
Service Hub South Africa
Service Hub Australia
Service Hub New Zealand

Mühlbauer Bosnia & Herzegovina

Mühlbauer China

Mühlbauer Germany

Mühlbauer Malaysia

Mühlbauer Serbia

Mühlbauer Slovakia

Mühlbauer USA

MPS
Precision Parts & Surface Engineering

AUTOMATION
Production Equipment & Systems

MB ATECH
Battery & Fuel Cell Technologies

WORLD OF TECURITY®
Government & Technology Solutions

MANUFACTURING EXECUTION SYSTEMS

MB MCES
PERSONALIZATION MANAGEMENT SYSTEM

MB MCES is a personalization management software, which integrates incoming data with product definitions and controls the associated physical and electrical personalization processes. MB MCES handles personalization data from a variety of different input methods and formats.

MB INCAPE
INTEGRATED PRODUCTION MANAGEMENT SOFTWARE

MB INCAPE is Mühlbauer's Production Management Software for the production and personalization of electronic cards and documents (e.g. ID cards, ePassports, Driver's Licenses, EMV or GSM cards). Combining data management, production control and material management, the system allows for highly automated processes. It processes customer- and application-specific production, personalization, quality control and document delivery scenarios with highest solution flexibility.

MB PALAMAX®
TOTAL PROCESS TRANSPARENCY

MB PALAMAX®, Mühlbauer's Smart Factory solution, is developed for card, tag or booklet productions, personalization factories and semiconductor backend shop floors to set and collect process data to monitor and improve the efficiency of production and personalization for later processing, visualization and statistical analysis.

MB TOOL LEADER
CONNECTOR BETWEEN SYSTEMS

MB TOOL LEADER is a software package which consists of several applications and serves as a reliable link between the individual systems involved in the production process. By means of MB TOOL LEADER, the entire process chain – from the incoming order to the final precision part – can easily be monitored and controlled. This real-time machine monitoring guarantees an automated production process. Production errors can be detected and solved at an early stage. Thus, MB TOOL LEADER reduces the machine downtimes, which in turn leads to an increase of the machine's productivity by up to 20 percent.

MB EXPERT SYSTEM
RESOURCE PLANNING

MB MCES is a personalization management software, which integrates incoming data with product definitions and controls the associated physical and electrical personalization processes. MB MCES handles personalization data from a variety of different input methods and formats.

FEATURES & ADVANTAGES

Configurable workflow steps regarding personalization, quality assurance & issuance

Fully-automated processing & production management

Scalability regarding different documents, machines & personalization locations

Flawless integration of Mühlbauer's material management system (MB INCAPE WAREHOUSE)

Connection to card / document management systems via web service, database, file-based interface

Standard interface to personalization machines with integration of third-party machines possible

Integration of MB USER MANAGEMENT

Full coverage of production control requirements (security industry & EMV standards)

Seamless connection to MB PALAMAX® & MB DATA PREPARATION

Simplified administration due to web-based operator clients

Monitoring of real-time performance of the production

Seamless tracking of documents from point of production to issuance

Statistical tool analyze collected data & deliver customized statistics on OEE

Tool which enables the remote operation of machines on the shop floor from a control centre

Tool which increases effectiveness & efficiency so that production becomes more profitable

Enables production engineering to prepare & test a repeatable factory set-up. Factories can switch between products within minutes.

MB PALAMAX®
TOTAL PROCESS TRANSPARENCY

MÜHLBAUER'S SMART FACTORIES
FOR SEMICONDUCTORS RFID, SMART CARD & ID DOCUMENTS

MB PALAMAX® is Mühlbauer's reliable software solution for measuring and improving the performance of production facilities such as card, tag, label or security document productions, personalization bureaus or semiconductor backend shop floors. MB PALAMAX® automatically and continuously collects machine and process data and stores them for further processing, visualization and analysis.

Mühlbauer's PALAMAX® Smart Factory software provides a highly-efficient interface for managers, supervisors, process engineers, maintenance technicians and operators who are tasked with process monitoring and the statistical analysis of the production process. Furthermore, MB PALAMAX® reliably supports the optimization of production planning and the improvement of controlling.

SMART PRODUCTION MANAGEMENT

SMART MATERIAL MANAGEMENT

TRANSPARENCY OF YOUR PRODUCTION
- Real-time monitoring during production
- Tracking & tracing of each individual product
- Minimized maintenance

Productivity +50%

Efficiency & Speed +30%

Cost Reduction +20%

- Securing Future Competitiveness
- New Business Models
- New Services

MAIN BENEFITS AT A GLANCE

- Automatic, accurate & unbiased data collection
- Monitoring of live performance
- Real-time analysis of OEE data
- Continuous visualization which allows for faster reaction
- Historical data analysis
- Seamless configuration, usage & leverage
- Active system support by means of notifications & reports
- More effective & cost-saving production
- Integration of MB and third-party equipment

MB PALAMAX® FEATURES

To communicate with users, MB PALAMAX® utilizes a responsive web design user interface. In this way, no expensive application software has to be installed on the individual device. Furthermore, all kinds of common web-enabled devices – from standard PC browsers, to tablets and even smart phones – can be used to communicate with the server system via a secure browser.

INSTANT VISIBILITY

- All relevant real-time KPIs at a glance:
  » Overall Equipment Effectiveness (OEE)
  » Yield
  » Performance
  » Availability
- Real-time visualization of all relevant machine data from any web-enabled device or PC
- Generation of informative reports
- Provision of insights to improve operations (on the line manager side) and make better fact-based decisions (on the management side)

RETURN ON INVESTMENT

- Real-time monitoring to identify trends and opportunities for improvement
- Immediate intervention to avoid major defects
- Improved security standards & optimally employed production staff

SECURITY & COMPLIANCE

- Total control of production data
- Local & safe storage of all data on customer's private servers
- Compliance with ISO & PCI standards

ACCESSIBILITY

- Responsive web design
- No expensive installation of application software on the individual devices
- Accessibility from any web-enabled device

PALAMAX.MONITOR

The PALAMAX.Monitor module allows for a real-time monitoring of the production status, a number of key metrics, as well as further production-relevant messages. All information is collected from the entire shop floor and bundled in one or optionally several central points.
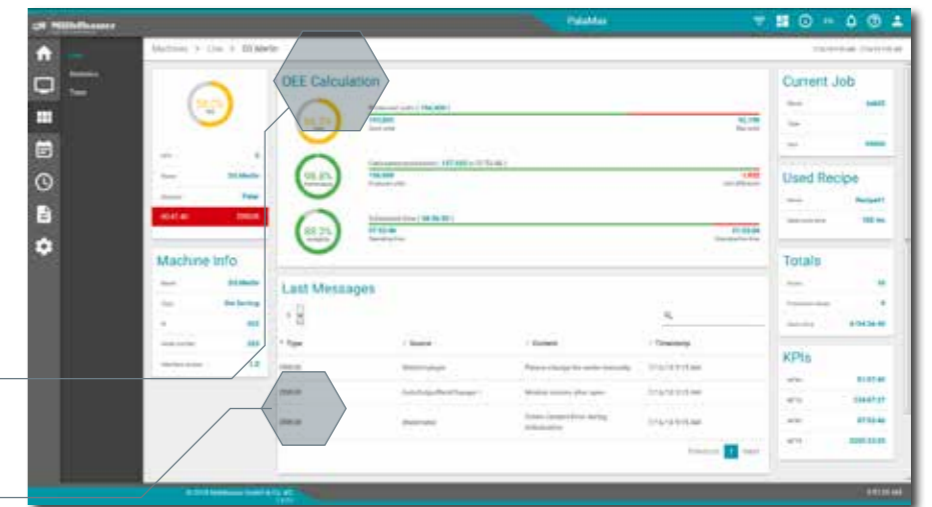

Snapshot of the current system status, which is displayed on the monitoring module.

The main goal of "Real Time Monitoring" (RTM) is it to make all real-time production data visible to users, so that they can react fast and efficiently whenever production optimization is required.

Real-time calculation of KPIs

Errors can be detected in real time and fixed immediately.

VISUALIZATION OF REAL-TIME PRODUCTION DATA INCLUDING:

- Real-time monitoring of KPIs
  » OEE (Overall Equipment Effectiveness)
  » Yield
  » Performance
  » Availability
- UPH (Units Per Hour)
- MTBF (Mean Time Between Failures)

- MTBA (Mean Time Between Assists)
- MTTA (Mean Time To Assists)
- MTTR (Mean Time To Repair)
- Compact overview of all machine states:
  » Running/Stop/Idle/Error/Service/Off
- Time in current state

- Operator
- Material (active product, recipe)
- Lot, lot size & percentage of completeness
- Counters, total parts (output) & good parts
- Failures, alarms & idle reasons

PALAMAX.FACTORY OVERVIEW

This module provides a complete production overview for a monitored device. The display of this page follows a simple tile design: a tile's background color represents the general status of a machine. The text fields within the tile contain the machine's most important metrics and meta-data. Thus, everyone involved in the production process can retrieve the system's current status.

- Key Performance Indicators (KPI) such as:
  » OEE (Overall Equipment Effectiveness)
  » Yield
  » Performance
  » Availability
- Status display on large TV screens & monitors in production or office area
- Immediate positive effect on productivity
- Improvement of communication between departments

PALAMAX.STATS

This module provides a reliable interface to management and to system operators to monitor and visualize the production process more efficiently. PALAMAX.Stats displays different statistics of the available process data which are collected and stored in the database. The time intervals are freely selectable.

The Unit Counter displays the good and bad units produced, as well as the error distribution across the different stations.

The Machine Timeline completely tracks machine states, operators, lots & recipes.

The error report immediately displays the TOP 5 errors.

DISPLAYING TRENDS FOR KEY STATISTICS FOR SINGLE MACHINES & GROUPS OF MACHINES:

- Selection of different time scales day, weeks, shift, lot times
- Capturing of historical data:
  » State, Product & Recipe
  » UPH & Utilization
  » Yield, total parts (output)
  » Good parts, rejects
  » Uptime & downtime
- Detailed analysis of processes such as
  » Yield loss by root cause
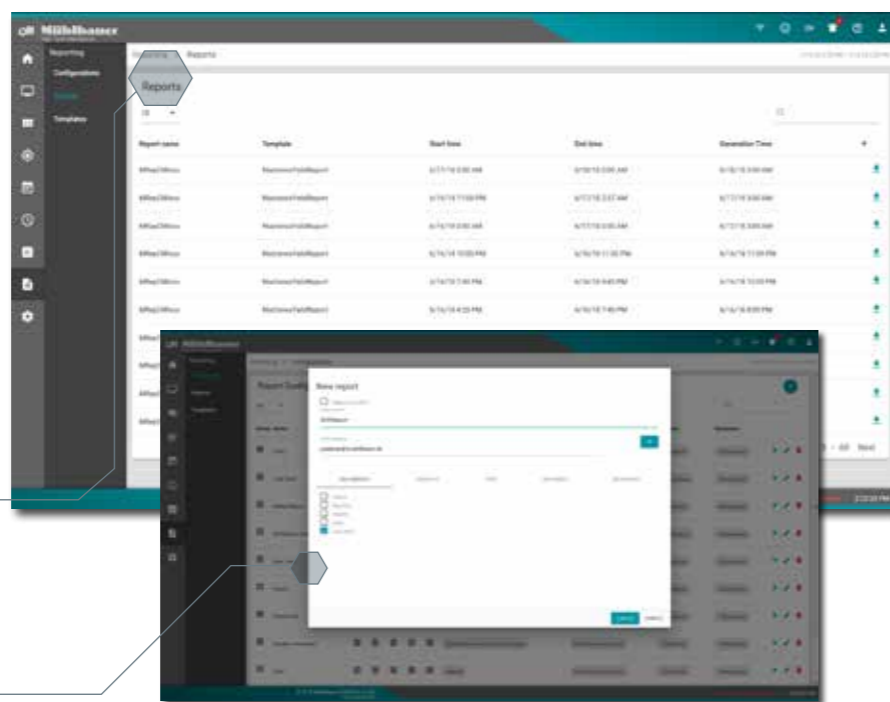 » Bottle-neck identification

PALAMAX.REPORT

This MB PALAMAX® reporting module tracks and documents the productivity. The automated data collection delivers unbiased and accurate reports. Manual data entries are not necessary, anymore. The reporting module generates Microsoft Excel files containing all data. It is fully customizable and provides the possibility to use one of Mühlbauer's various standard report templates or create an individual report template which can be uploaded to the system.

DISPLAYING OF UPDATES BY MEANS OF AUTOMATIC GENERATED REPORTS & NOTIFICATIONS:

- Tailor-made reporting to display individual requirements
- Creation of custom reports
- Creation & upload of customized Microsoft Excel templates
- Configuration of MB PALAMAX® with individual schedules, notifications, alerts & recipients lists

Reports are automatically distributed and forwarded by mail. They also stay available for later downloading.

Creation of reports based on requirements: individual templates, machine selection, defined time of creation.
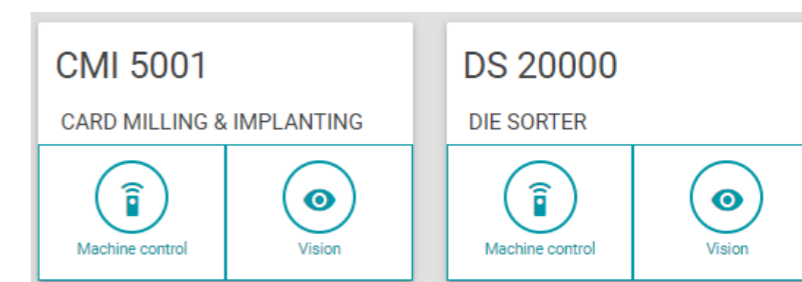
PALAMAX.REPORT PROVIDES THE FOLLOWING FUNCTIONS:

- Flawless & accurate reporting
- Report generation based on:
  time (day, week or month) respectively production time, production week, production month, lot, carrier
- Machine list (single machine or machine group)
- Machine state analysis
- KPI Analysis
  » OEE
  » Yield
  » Performance
  » Availability

GENERATION OF LOT REPORTS CONTAINING

- Production Meta Data as
  » Operators
  » Lot & recipe information
  » Times: start time, end time & duration
  » Machine serial number & machine name
- Process station results: performance data, number of good and rejected units, yield calculation for each process module
- Used Material: input material, output material & total numbers

PALAMAX.REMOTE

Thanks to MB PALAMAX® Overview, you know exactly what is happening with machines on your shop floor, with MB PALAMAX® Remote feature, you can also control your machines. See what your operators see to help them solve an issue or control any machine from your control center. This unique feature, therefore, reduces staff requirements on the shop floor and saves time to resolve any issue.

Remote feature offers two valuable functions: Machine control and Vision

CMI 5001
CARD MILLING & IMPLANTING
Machine control   Vision

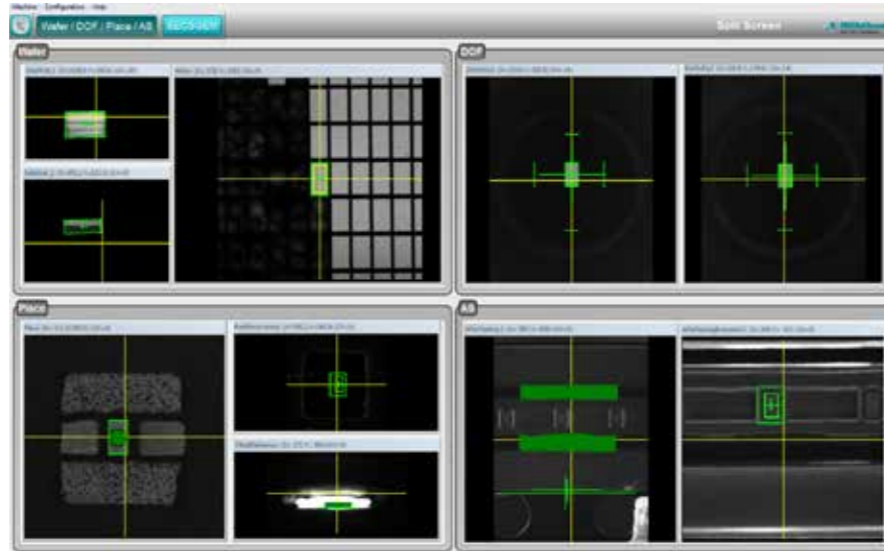**DS 20000**
DIE SORTER
Machine control   Vision

Machine control function allows you to directly see the machine control panel and also to control the machine just as you were standing in front of the machine. Different types of security measures can be applied as well as various types of access limitations – this means that only selected users have rights to see the Machine remote control and/or use it.

Vision function brings a camera's view on the screen helping to check the correct location of a product and also check the quality.

- Direct access to all machines from one central place – you can see and do everything, just like you stood directly in front of a machine control panel
- Allows significant time savings of valuable employees
- Improves staff effectiveness and security
- Possibility to limit accessing Remote feature to selected users or limit the feature only to "view mode" without possibility to effect anything

SUMMARY

- Better data: automatic collection of accurate and unbiased data
- Monitoring of live performance
- Analyzing OEE data in real time
- Continuous visualization allowing fast reaction
- Historical data analysis
- Active system supporting you with notifications and reports
- Easy to configure, easy to use, easy to leverage
- Runs everywhere
- Integration of MB and 3rd party equipment
- Run more units, save rejects and money!

OPTIONS & OUTLOOK

MB PALAMAX® is delivered with the core modules Monitor, FactoryOverview, Statistics and Report. The feature modules Remote, Maintain and Trace are available on request and the feature modules Recipe and Cost will be available soon.

PALAMAX.MAINTAIN

This module manages the maintenance tasks on the shop floor. It keeps track of run-time and power-on-time and sends automatic notifications whenever a machine is due for maintenance. This allows the switch from random stoppages to scheduled and preventive maintenance.

- Planning of scheduled production down times
- More efficient maintenance planning & execution
- Saving of maintenance costs due to precise determination of actual need

PALAMAX.RECIPE

This module manages recipes and their versions and enables production engineering to prepare and test a repeatable factory setup. Factories can switch between products within minutes. PALAMAX.Recipe can set up production and verification systems in a repeatable manner, providing comparable quality performance indicators.

- Reduction of products' setup times
- Repeatability of produced & qualified qualities is ensured
- Production becomes more comprehensible & specific

PALAMAX.TRACE

This module traces a product throughout the entire production process.

- Comparison of single manufacturing runs among each other
- Detection and definition of reasons for production faults
- Improvement of information on the production process

PALAMAX.COST

This module collects process timings and allocates machine costs to generate unit costs.

- Comparison between different production routes for the same product
- Increase of profit resulting from a tighter cost control
- More profitable production

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