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# OUR Expertise

Manufacturing Integration – More Flexibility, Efficiency and Quality in Production



Trebing + Himstedt provides MES solutions in SAP environments and is a strategic partner for SAP Manufacturing. We support corporations and small and medium-sized customers in different industries with the connection and optimization of production control. This involves implementing end-to-end processes from SAP ERP to individual machines or production plants. Our long years of experience on the shop floor combined with process know-how and expertise in business requirements make Trebing + Himstedt sought-after consultants for manufacturer-independent integration concepts - from data recording all the way to production

portals in real-time. As certified „Special Expertise Partner“, we implement the SAP solutions SAP Manufacturing Execution and SAP Manufacturing Integration and Intelligence (SAP MII).

In addition to our services in the areas of concept consulting and services, we also offer our own product portfolio. This includes the MES solution TH LOOX based on SAP MII and SAP NetWeaver which provides functionalities for machine, production and quality data acquisition, as well as for KPI monitoring.





# SOLUTIONS

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# **FLEXIBLE** & Efficient Production

People, Organization and IT Working Together

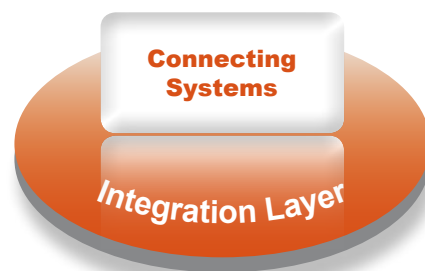
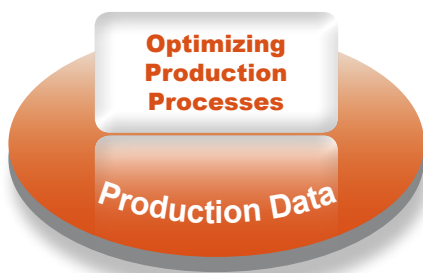


How do you meet the challenges of modern production? How can you distinguish yourself from the competition? How do you achieve an optimal result working as a team with your employees?

Today's production is engaged in constant global competition on the basis of cost, quality and flexibility. In a greatly accelerating change process, new challenges must be met, such as more complex products, shortened product lifecycles, faster launch and cycle times and higher quality requirements. Individual factors are weighted based on the industry and process. Solution strategies can also vary greatly. Ultimately, solutions must be developed which support you in ensuring high product quality, on-time delivery and a continual reduction in manufacturing costs. You have to meet new regulatory requirements for traceability or reduce product risks. You require seamless transparency at all decision-making levels across all production processes and levels. You must be able to introduce new products quickly and efficiently. At the same time, you must also

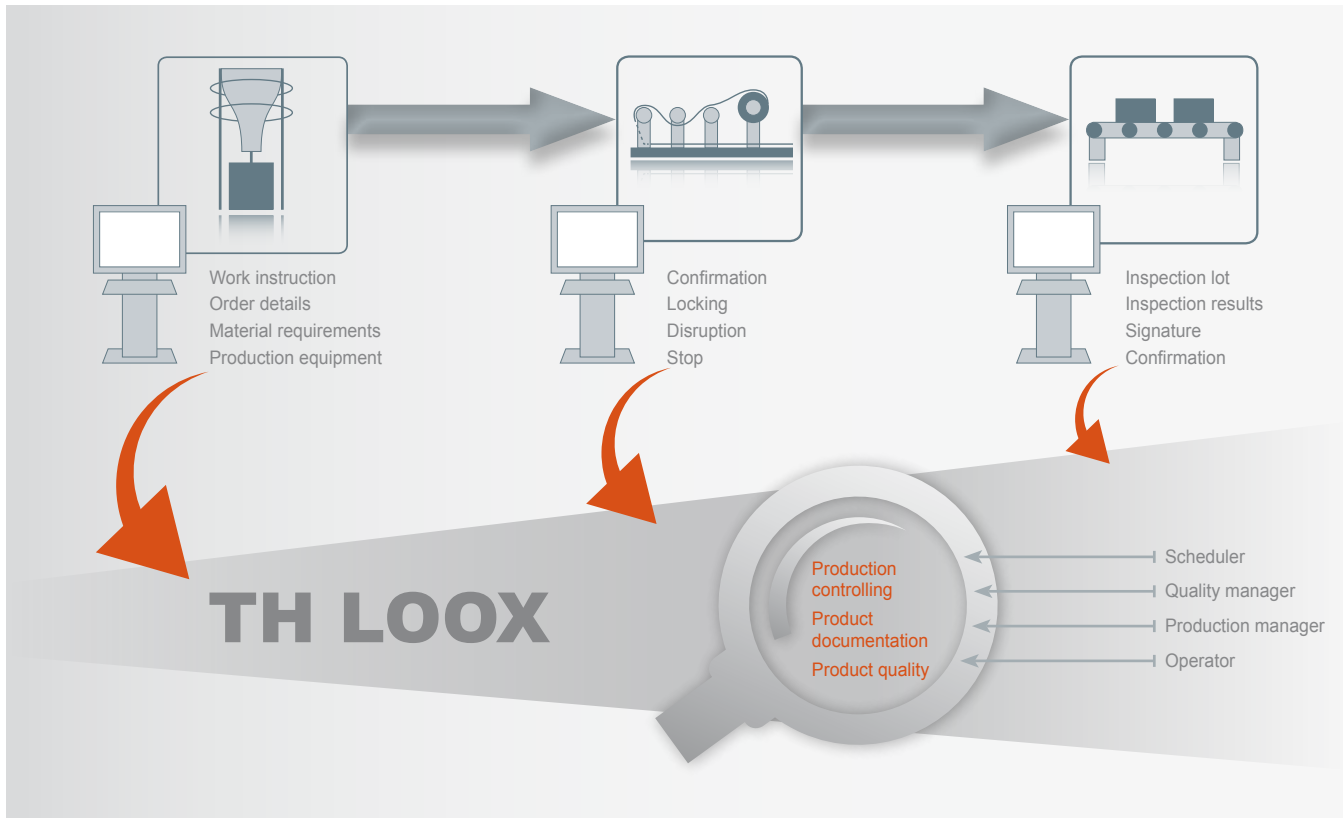
manage increasingly complex processes with an existing team. Modern production software can make an important contribution to meeting these diverse requirements.

Traditional MES products or in-house developments are often outdated or highly specialized standalone solutions. They don't fit with the global IT strategies of the enterprise, since they are based on function, business area or location details. The results are high maintenance costs, limited resources for expansion and maintenance, and poor acceptance from users. In close cooperation with SAP ERP, Trebing + Himstedt has developed an integrated MES solution based on the SAP Manufacturing portfolio. For the first time in this form, it will be possible to deliver SAP ERP production and quality assurance processes to employees at the workplace. The solution reduces the complexity of SAP ERP, provides intuitive touch screen interfaces to industry PCs and permits uninterrupted production, even when SAP ERP is unavailable. Preconfigured templates speed up the introduction and rollout of the solution to different locations.



# MES with TH LOOX

Important MES Strategy Performance Factors



The expectation on an MES is that it assists you in improving your production processes. In a largely paperless manufacturing process, TH LOOX allows you to provide job and production information from SAP ERP in time, to record confirmation in real-time and to avoid redundant data entry. Planning requirements are optimally implemented, cycle times are reduced and resources are more fully utilized. Integrated quality data management prevents production failures, permits fast product release and uninterrupted and quick traceability. The accompanying automated supply of performance figures allows a quick response to failures, transparency as the basis for required decisions, and continuous analyses and optimizations.

## Benefits

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Web-based, intuitive user interfaces for PC, industrial PC and touch screen

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Seamless integration of SAP ERP and the production level

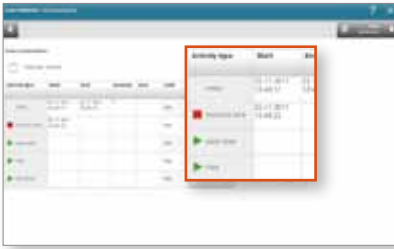
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Global production independent of location and the availability of the SAP ERP system

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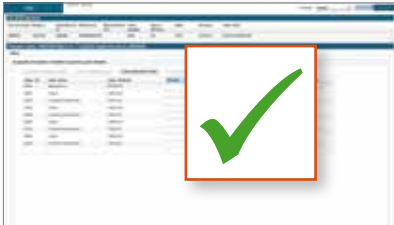
Flexibility in regard to industry-specific or local requirements

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### Optimizing Production Processes

Reduced cycle times, optimal utilization, reduced material stock, which means efficient order processing requires real-time production data. TH LOOX provides the required order information such as work plans, parts lists or inspection instructions at the workplace and in a timely manner. It also allows the collection of amounts, times and quality data for real-time comparison with plans. Data can be added automatically from the equipment, via barcode or entered on a touch screen. Double data management is eliminated, data quality in SAP ERP increases and employees are relieved of unproductive activity. In this way, transparent production and optimal process integration is achieved.



### Ensuring Product Quality

It is important to maintain an overview, even within complex and varied production processes. For this reason, the respective valid product specifications and work plans drawn from SAP ERP are displayed by TH LOOX at the workplace. The ability to exercise in-process controls accompanying production supports zero failure production and quick product release in SAP ERP for the next work steps or delivery to the customer. Another aspect is the uninterrupted traceability for audits – for both, the individual work steps, inspection parameters and results, as well as for materials used during production, including batch and serial numbers.



### Supporting Decisions with Performance Figures

Improvement processes require transparency to objectively identify a need for action, represent it in a closed loop, and finally to assess each measure. TH LOOX automatically provides performance figures for cycle times, set up times, stops, and disruption causes, quality performance figures, as well as many other analyses, each related to orders, materials or machines. With this information, target times in SAP ERP can be optimized and reasons for production faults evaluated to reduce rejects and the use of raw materials, while strategic investment decisions based on reliable performance figures for machine usage can also be made.

Material	Lot
TH_008	0
TH_008	0
TH_008	0
TH_008	0
TH_008	0
TH_008	0
TH_008	0
TH_008	0
TH_008	0
TH_008	0

### Connecting Systems – Integrated Production

Integrated production requires an uninterrupted information flow, by the connection of data sources and applications. This includes automated data acquisition and import, quick and secure data availability in SAP ERP, but also data buffering upon loss of connection. As an integration layer, TH LOOX improves data quality and consistency, and prevents double data storage. It permits continuous data availability both, on site and in global installations.



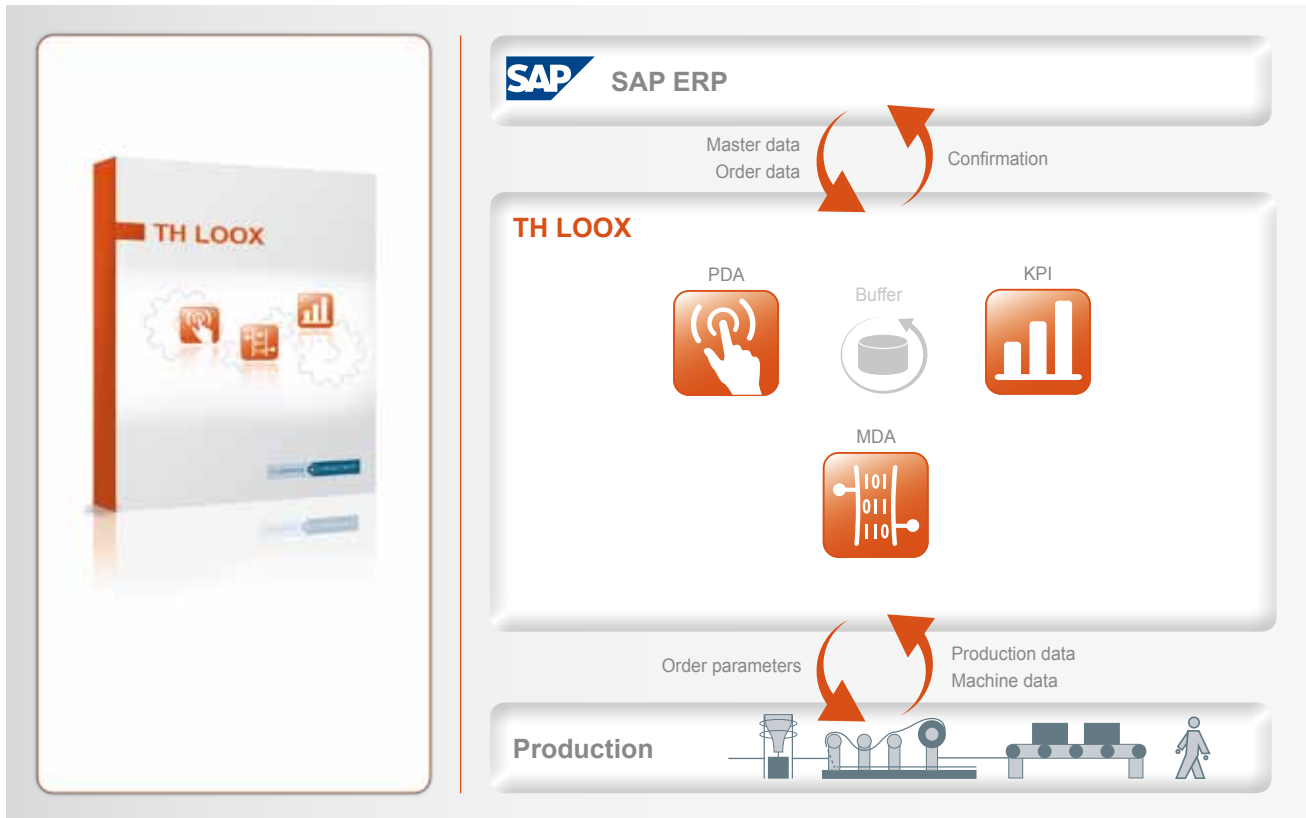
# PRODUCT

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# TH LOOX

Integrated MES Solution



TH LOOX is a modular MES software for machine, production and quality data acquisition, the analysis of production data and the calculation of performance figures. TH LOOX provides you with the tailored production data from SAP ERP during production. Information generated during production is continuously combined with the order data and confirmed to SAP ERP. TH LOOX allows the decoupling and thereby the independence of production from SAP ERP through a local order queue. The product is based on the integration platform SAP NetWeaver extended by SAP MII (SAP Manufacturing Integration and Intelligence).

## Benefits

Integration of production and SAP ERP based on existing SAP technology

Simple acquisition and presentation of the data in touch interfaces

Interruption-free production through local order queue

## Functionalities TH LOOX – Infrastructure

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### Data Exchange with SAP ERP

- Receipt of released orders from SAP ERP
- Download of order documents and additional information for the display of material and types of service
- Download of inspection lots and inspection characteristics from SAP ERP
- Download of catalog information from SAP ERP for selection lists
- Use of the QM IDI interface to SAP QM
- Transmission of efficiency and production confirmation, as well as the evaluated results of inspection characteristics to SAP ERP
- Automatic transmission of stored messages when the connection to SAP ERP is reestablished
- Message monitor for reworking incorrect messages to SAP ERP

### Data Storage

- Import of master data from SAP ERP
- Local buffering of order data and inspection information during processing, i.e. possibility of SAP-independent processing after the information has been downloaded from SAP ERP
- Local storage of messages when SAP ERP is unavailable

### Authorization Concept, Role Concept

- Support for local or central user accounts through the use of NetWeaver UME (User Management Engine)
- Acquisition of efficiency, production and quality data only possible after user login
- Control of access to equipment and functionalities of TH LOOX through a role concept

### Message Monitor

- Display of messages which have been or will be sent to SAP ERP, as well as incorrect messages
- Rework and retransmission of incorrect messages by authorized users (in the administrator role)

### Multi-Language Capability

- Standard support for the languages English and German

## System Requirements

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### Server Software

- Software:
  - SAP MII 12.1 on SAP NetWeaver

### Client Software

- Web browser
- Adobe Flash Player plug-in for web browser
- Adobe Acrobat Reader min. version 7.0.7

### SAP ERP

- min. SAP R/3 4.7

# TH LOOX PDA

Display of Order Data and Acquisition of Production and Quality Data



Order: 8000428 - 118 picking list

Order confirmation

Operation finished

Activity type	Start	End	Quantity	Sum	UMM	Produced quantity	Quantity	Sum	UMM
Setup	23.11.2018 13:48:17	23.11.2018 13:48:18	1		UMM				UMM
Machine idle	23.11.2018 13:48:23				UMM				UMM
Production					UMM				UMM
Stop					UMM				UMM
Completed					UMM				UMM

Reason reason	Produced quantity	Produced sum	UMM
			UMM

TH LOOX PDA provides you with order data and the necessary master data from SAP ERP in production as you need them to process orders. The information is presented in the easy-to-use interface accurately, pre-selected and targeted to the workplace. The ability to print labels and other in-process documents further supports order processing. This makes you highly efficient in your access to the information necessary for production. The acquisition of data generated during production is made easier through touch interfaces and the ability to use barcode scanners. Through direct entry at the location and time of creation, and the combination of the acquired information with the order data from SAP ERP, a very high data quality is achieved. The acquired information is confirmed to SAP ERP and is then available for analysis and documentation.

## Benefits

Real-time acquisition directly when and where it is created

Simple interfaces tailored to production conditions

Support for quality assurance and increasing efficiency

## Functionalities PDA – Production Data Acquisition

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- Display and acquisition of task and production data for a job for SAP ERP orders
- Support for barcode scanners and touch screens for ease of use
- Printing of labels and production information (accompanying documentation)

### Information

- Display of the processes of all released SAP ERP orders from TH LOOX PDA, assigned to the displayed workplace (order queue)
- Display of headers of the job in the order queue, e.g. order number, material, planned quantity, produced quantity, planned completion time
- Filter function to narrow the display of jobs in the order queue
- Display of detail information and documentation of the job

### Process Execution

- Unlimited selection possibilities for display and acquisition of information for a job from the order queue
- Processing of parts of a job
- Processing of a job in time-independent partial steps
- Display of detail information and documentation of the job

### Acquisition of Performance and Production Data

- Acquisition of performance confirmation, for example set-up times, personnel times, machine times and production confirmation such as yield, scrap, rework with acquisition of rework reason
- Acquisition of goods movements (goods receipt, goods issue)
- Acquisition of serial numbers or batches for goods movements (optional)
- Acquisition of unplanned withdrawal (optional)

### Compatibility with Multiple Workplaces

- Processing of work from multiple workplaces with one terminal
- Access to the application by different people (users) at one terminal
- User-specific allocation of workplaces including user and workplace-specific display of the order queue

### Role Model

- See role model for TH LOOX on page 15

## Functionality QM – Quality Data Management

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### Information

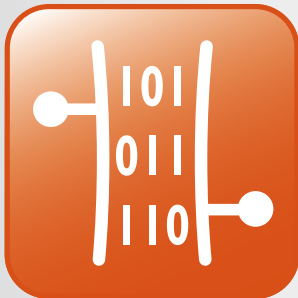
- Display of inspection operation in order queue of TH LOOX PDA
- Display of inspection characteristics of an inspection lot with information such as designation of the characteristic, short text, inspection method, threshold, comments, information on inspection point, scope of samples

### Acquisition of Inspection Results

- Entry fields for numerical values, texts, serial numbers, selection lists (catalog information) dependent upon the acquisition category defined in SAP ERP
- Summary acquisition or individual value acquisition dependent on the acquisition category defined in SAP ERP
- Entry validation against limits of the inspection characteristic and the dimension (decimal places)
- Automatic request of an inspection comment upon negative validation
- Acquisition of multiple inspection points
- Conclusion of the acquisition with the signature of the user (optional)

# TH LOOX MDA

Flexible, Real-Time Data Exchange with Devices, Machines and Plants



ID	DateTime	Module	Log Level	Category	Result
186	2011-11-09T16:11:40	TH_CSB	0	TransactionStart	Success
186	2011-11-09T16:11:40	TH_CSB	0	TransactionStart	Success
186	2011-11-09T16:11:40	TH_CSB	0	TransactionStart	Success
187	2011-11-09T16:11:44	TH_CSB	0	TransactionStart	Success
187	2011-11-09T16:11:44	TH_CSB	0	TransactionStart	Success
187	2011-11-09T16:11:44	TH_CSB	0	TransactionStart	Success
188	2011-11-09T16:11:45	TH_CSB	0	TransactionStart	Success
188	2011-11-09T16:11:45	TH_CSB	0	TransactionStart	Success
179	2011-11-09T16:11:45	TH_CSB	0	TransactionStart	Success
178	2011-11-09T16:11:45	TH_CSB	0	TransactionStart	Success
177	2011-11-09T16:11:40	TH_CSB	0	TransactionStart	Success
176	2011-11-09T16:11:40	TH_CSB	0	TransactionStart	Success
176	2011-11-09T16:11:40	TH_CSB	0	TransactionStart	Success
174	2011-11-09T16:11:40	TH_CSB	0	TransactionStart	Success
173	2011-11-09T16:11:40	TH_CSB	0	TransactionStart	Success
172	2011-11-09T16:11:40	TH_CSB	0	TransactionStart	Success
171	2011-11-09T16:11:40	TH_CSB	0	TransactionStart	Success
170	2011-11-09T16:11:40	TH_CSB	0	TransactionStart	Success
169	2011-11-09T16:11:39	TH_CSB	0	TransactionStart	Success
168	2011-11-09T16:11:39	TH_CSB	0	TransactionStart	Success
167	2011-11-09T16:11:39	TH_CSB	0	TransactionStart	Success

TH LOOX MDA supplements TH LOOX PDA through the integration of your device, machine and plant data – real-time, flexible and detailed. The order parameters and recipes provided by TH LOOX PDA are supplied to the machines through TH LOOX MDA. Through the coupling, times for tasks, quality data and machine states, disruptions, and stops and their causes are automatically acquired and transmitted to TH LOOX PDA. These data are combined with the order data and made available for further analyses.

Function blocks programmed in the language Simatic Step 7 from Siemens are available for the easy coupling with machine controls, giving PLC programmers a simple way to use the interface. A solution for coupling other machines is available through the bus connector.

## Benefits

Quick and secure data availability in connected systems

Preconfigured blocks for easy machine coupling

Support for open standard interfaces like S95 B2MML, OPC and web services

## **Functionalities MDA – Machine Data Acquisition**

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- Automatic acquisition of tasks, quality data and machine states by coupling machines or other production systems with TH LOOX PDA

### **Download of Parameters to Machines**

- Download of parameters before a job begins, such as recipes, material information, production specifications and inspection features
- Import of values from TH LOOX PDA

### **Automatic Acquisition of Information**

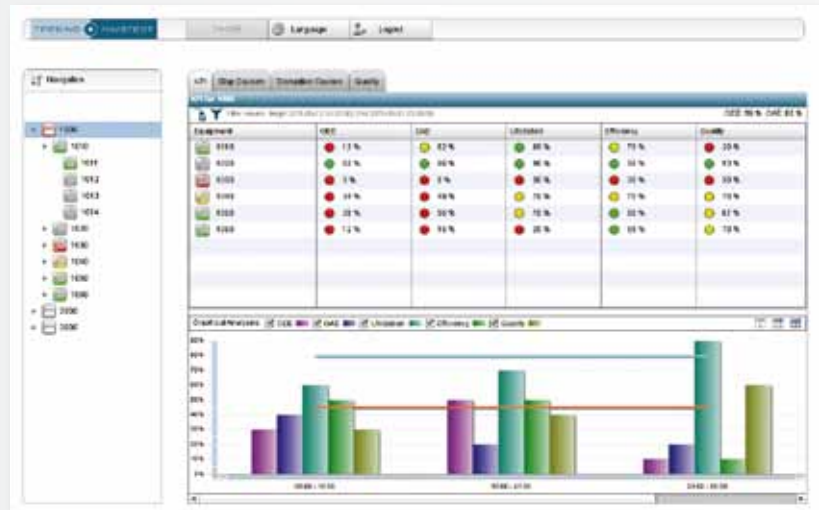
- Automatic acquisition of amounts, times, machine states and inspection results
- Transformation of the machine states and times in tasks for further processing in TH LOOX PDA
- Transfer of the transformed values to TH LOOX PDA

### **Machine Coupling Ability**

- Data buffering to the machine when connection is unavailable
- Automatic retransmission of data when the connection is reestablished
- Support for coupling through OPC, B2MML, web services with XML and database
- Function blocks for Siemens Simatic S7 programmed in the language Step 7
- Bus connector with acquisition of total amount, waste amount (optional), machine status (processing, set-up, disruption)
- Connection of disruption and stop signals to the bus terminal
- PCo or UDS

# TH LOOX KPI

Monitoring of Production and Analysis of Production Data



TH LOOX KPI permits the monitoring and analysis of the production effectiveness. Production data from various sources is collected for KPI calculations, failure analyses and production monitoring. These historical data are presented both as aggregate performance figures and evaluated in detailed analyses in regard to stops, disruptions and quality deviations. Current information about production, such as machine and order status is presented clearly. With only a few clicks, the user gets an overview of the current state of the production plant being monitored and analyses of the availability, efficiency and quality of his production. Through the use of selection criteria, individual plant parts can be targeted for analysis.

## Benefits

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Support for decisions with real-time and detailed performance figures and analyses

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Improved plant utilization and prevention of production faults

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Analysis of quality deviations to increase product quality

## Functionalities KPI – Key Performance Indicators

### Analyses

- Performance figure calculation:
  - OEE (Overall Equipment Effectiveness)
  - OAE (Overall Asset Effectiveness)
  - Partial: Degree of utilization, efficiency and quality
- Detailed stop, disruption and quality analyses
  - Top 10 stops, Top 10 disruptions added according to duration of disruptions (absolute and in percentages)
  - Top 10 frequency analyses of stops and disruptions added according to the number of occurrences of the disruption (absolute and in percentages)
  - Top 10 frequency analyses of quality deviations for each error cause added according to the defective amount (absolute and in percentages)
  - Listing of stops, disruptions and quality deviations
  - Drill-in function for all additional stops, disruptions and quality deviations
- Amount and time-based total vs. target analyses
- Overview of orders and machines

### Data Storage

- Automatic import of production data through TH LOOX PDA and TH LOOX MDA
- Manual acquisition of data through the interface
- Local storage of master data:
  - Multi-level plant model
  - Stop reasons and categories
  - Disruption causes and categories
  - Quality deviation causes and quality categories
  - Thresholds for the presentation of performance figure analyses

### Selection Criteria

- Narrowing of the data to be analyzed based on
  - Observation period
  - Plant components
  - Material
  - Person responsible
  - Categories for stop, disruption and quality drivers

### Role Model

- See role model for TH LOOX page 15

### Calculation Model Performance Figures

- Calculation based on a standard calculation model, developed within the TPM (Total Productivity Maintenance)

Total operating time				Planned non-production
A Planned production time			Stops	
B Operating time		Disruptions		
C Target quantity				
D Produced quantity		Scrap	Stop losses	
E Yield	Quality losses			Productivity losses

$$OEE = \frac{B}{A} * \frac{D}{C} * \frac{E}{D}$$

Utilization factor
Efficiency factor
Quality factor

# CONTACT

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Trebing + Himstedt is an international supplier of products and services for the optimal use of IT in the production environment. With easy-to-use concepts, we support our customers in their manufacturing processes and allow targeted access to production and process information. Our core competence is the continuous integration across different communication levels – from automation level to the ERP system. In the Industrial Communication business unit our products ensure the availability of industrial networks. The Manufacturing Integration business unit encompasses solutions for production IT, particularly for MES in SAP environments.

Innovative products, high-level problem-solving skills and dedicated employees are key to the success of Trebing + Himstedt. It is what the world's leading corporations as well as medium-sized industrial enterprises trust in. As a reliable partner we accompany our customers into new markets, technologies and applications. With our trend-setting and user-friendly concepts, we are often pioneers in our industry. Since the company was founded in 1992 the managing partners Stefan Trebing and Steffen Himstedt have pursued a solid and steady course of growth in their Schwerin-based company. Being rooted in the region means Trebing + Himstedt takes its corporate responsibility seriously and is actively committed to its employees and the public good.



# TH LOOX Overview

Manufacturing Integration and Execution – PDA, MDA and KPI

MANUFACTURING INTEGRATION

