BMSvision

KNITMASTER

Manufacturing Execution System (MES)

KNITMASTER is the world's leading MES system for the knitting industry. It monitors and synchronizes all manufacturing and logistic activities within the knitting mill, from yarn purchasing and inventory up to the shipment of the finished fabric.

Powerful analysis tools allow quick identification of bottlenecks resulting in optimal usage of production capacities.
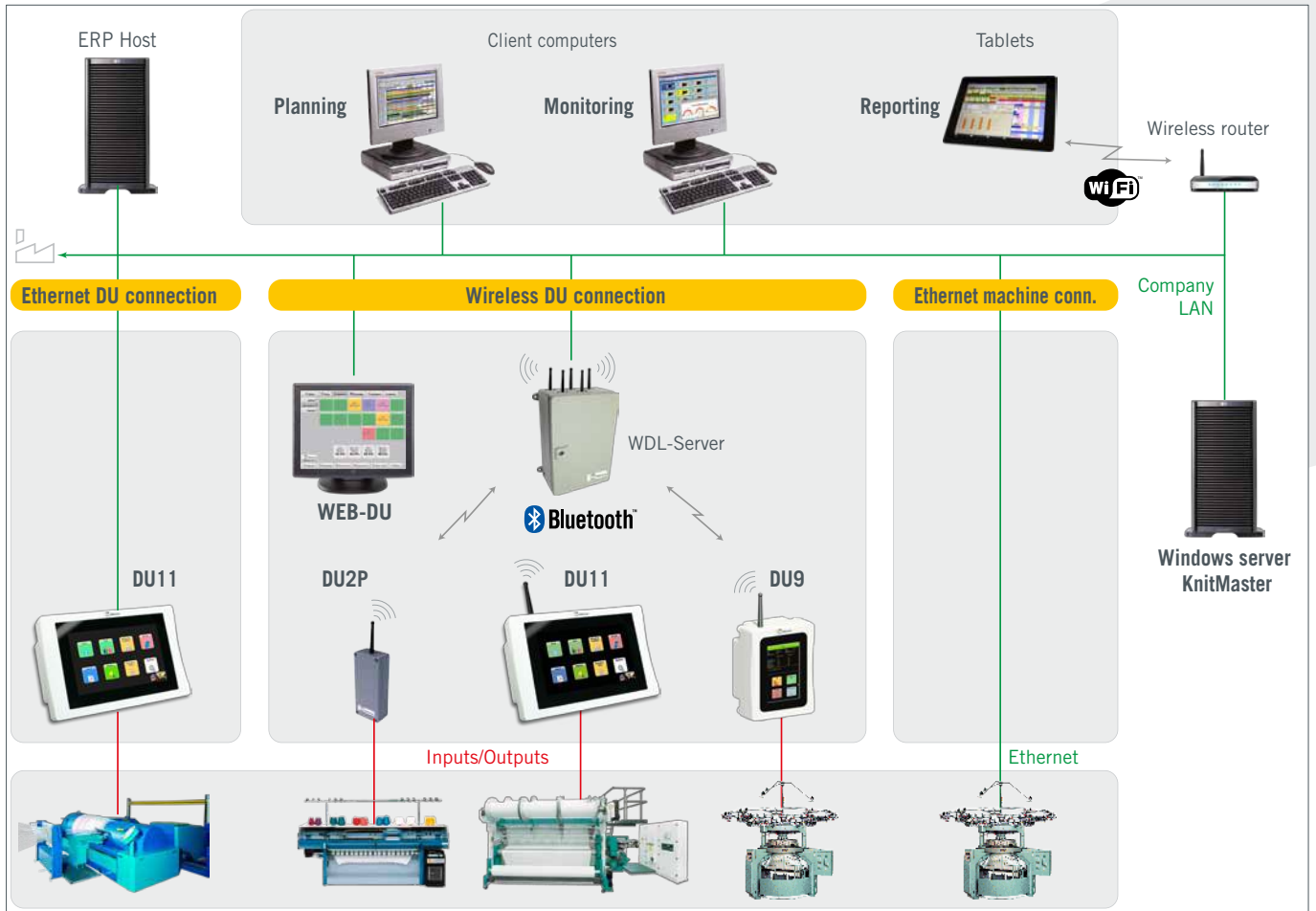
Our offering

	Your benefits
Real time monitoring	Increased efficiency
Monitoring of yarn feed rate	Reduced yarn consumption
Scheduling	Optimized production schedules
Quality control	Quality improvement
Operator tracking	Less administration
Yarn inventory management	Reduced inventory levels
Energy monitoring	Reduced energy consumption
Integration with ERP	Transparent information flow

Networking the machines

ERP Host

Client computers

Planning   Monitoring

Tablets

Reporting

Wireless router

Wi Fi

Ethernet DU connection   **Wireless DU connection**   **Ethernet machine conn.**

Company LAN

WEB-DU

WDL-Server

Bluetooth™

DU11   DU2P   DU11   DU9

Windows server KnitMaster

Inputs/Outputs

Ethernet

KNITMASTER supports both cabled and wireless networks to connect the machines to the central server. Machines are equipped with one of BMSvision's Data Units (see next page) for automatic as well as manual data collection or linked directly to the server through their built-in Ethernet interface.

Connecting remote sites

KNITMASTER supports the connection of multiple plants to one central server. In the remote sites, WDL-SERVERs, connected to the company's intranet, link the machines to the central computer system. A dedicated "multi-site consolidation module" on the central KNITMASTER server allows integrated reporting for all sites into one single reporting environment.

System requirements

KNITMASTER is available for 64-bit Windows servers, both on physical systems and in a virtualized environment. For clients, Windows 7, 8 or 10 is required, or Terminal Services can be used. The database is Oracle driven.

ERP system integration

KNITMASTER is easily integrated with the customer's ERP system. Through a standard interface, order and product data is transferred from the ERP system and imported in the KNITMASTER database.

The integrated export functionality allows a straightforward upload of production data, calculated production schedules, work in progress and performance indicators from KNITMASTER to the ERP system.
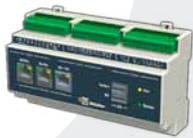

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Connecting machines to KnitMaster

Machines with parallel interface, preparation and finishing machines

Machines with parallel interface, warp preparation and finishing machines are connected by means of either **DU9** or **DU11** Data Units. Production count and automatic stop signals, such as needle breakage, yarn breakage, doffing, ... are wired to the parallel inputs of the Data Unit.

The **DU9** and **DU11** are high end members of the BMSvision data collection terminals. The **DU9** features a 5" touch screen. The **DU11** features a 7" touch screen and allows displaying various types of production documents. Both Data Units have a web based graphical intuitive user interface. On screen language selection allows to switch between several western and Asian languages on the spot. Both Data Units come with wired Ethernet as well as the proven BMSvision Bluetooth based wireless network interface.

Special versions of the **DU11** are available for direct and sectional warpers as well as for sizing and finishing machines, allowing real time monitoring of speeds, yarn breaks and eventually process parameters such as temperatures and pressures.

Machines with Ethernet interface

Latest generation machines are often equipped with an Ethernet interface. These machines can either be connected by means of a standard wired Ethernet network (UTP5 cable) or by using the **DU7** interface for wireless communication.

Examples are the Karl Mayer warp knitting machine with KAMCOS controller and Mayer & Cie circular knitting machines.

WEB-DU: HMI for multiple machines

The **WEB-DU** application is used as HMI for a group of machines and can be implemented on any browser enabled touch screen device such as PC's and tablets. The individual machines are equipped with a **DU2P** for automatic data collection (production count and automatic stops) while all manual input and information display is handled via the **WEB-DU** application.

DU11

DU9

DU7

Ethernet

WEB-DU

DU2P

Data Unit specifications

Inputs/outputs		DU11	DU9	DU7	DU2P
Inputs/outputs	Digital/counter inputs	16	8	4	4
	Relays	5	5	3	-
	Outputs (open collector)	-	-	-	1
	Serial ports	2	-	2	-
	USB ports	2	2	2	-
	Ethernet ports	3	1	3	-
Networking	Wireless (WDL)	•	•	• (ext.)	•
	Wireless Ethernet (WLAN)	-	•	-	-
	Wired Ethernet	• (PoE)	• (PoE)	• (PoE)	-
User interface	Display	color	color	-	-
	Touch screen	•	•	-	-
	Keyboard	touch	touch	-	-
Data integrity	Backup & Recovery [1]	•	•	•	-

[1] This option allows a minimum of 24 hours local data storage in case of server or network breakdown.

Production visibility and analysis

Real time monitoring

KNITMASTER's most important real time analysis tool is the PLANTVIEW. On this color-coded layout of the mill, the machines are displayed in a number of colors, each color indicating a certain machine status or alarm condition.

The user selects the type of information to be displayed. User definable "filter sets" allow the user to display only these machines which correspond with a certain condition, for example all machines with an efficiency below 85%, all machines waiting for an intervention, machines producing a specific style, ...

A "mouse-click" on a specific machine opens a window with a detailed report showing all required information for the selected machine.

Reporting

All data is stored in an Oracle relational database. By means of a powerful report and formula generator, featuring interactive reports and charts with multiple period selection and ad hoc filtering, users can define and configure their own calculations and reports.

Integrated graphics allow managers to build their own personalized "dashboards' for a quick and transparent analysis and evaluation of all Key Performance Indicators (KPI).

With the "multi-site consolidation" module, managers can compare KPI's and processes between sites, allowing operations to learn and optimize from the best performers.

▼ MANAGEMENT DASHBOARD on your mobile device
▶ Interactive reporting
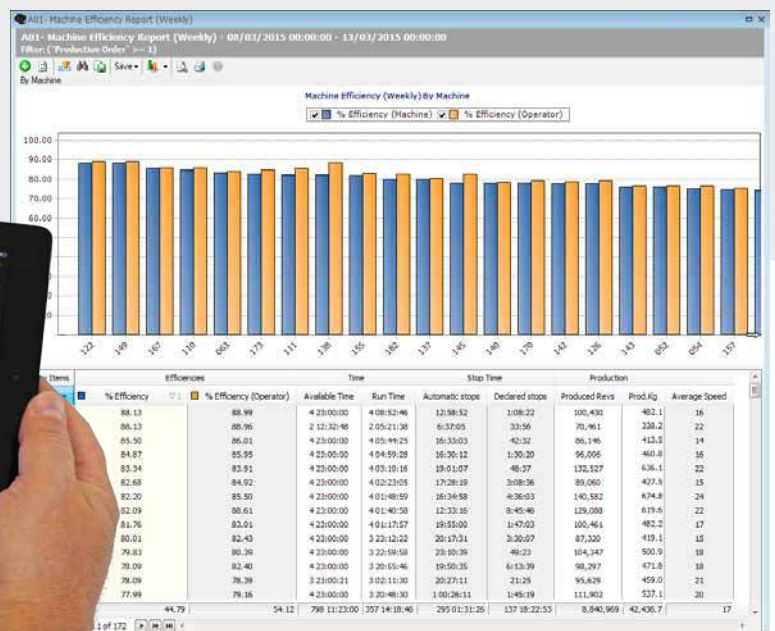
Production scheduling
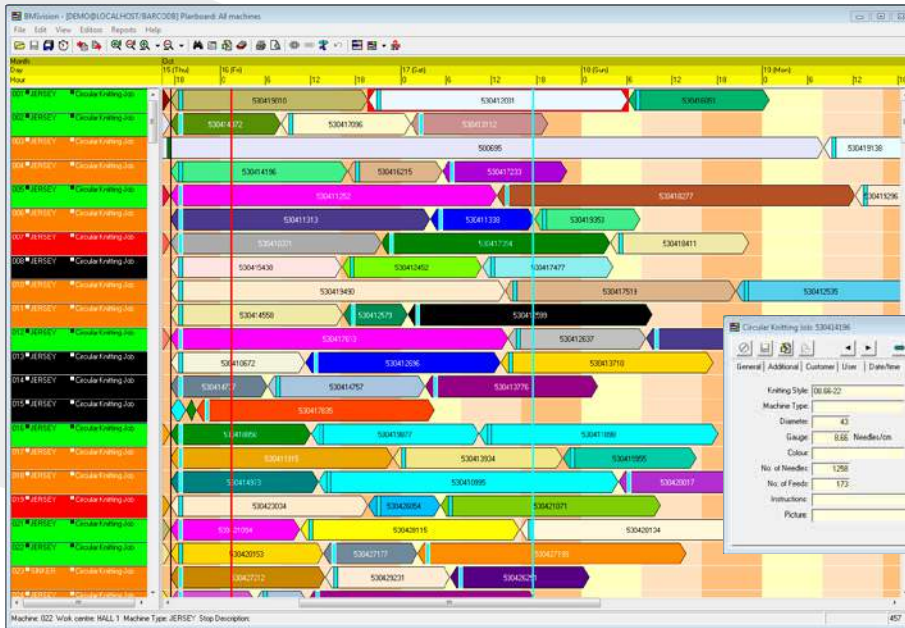
Real time job schedule

With KNITMASTER, the planner conducts his demanding job by means of an electronic planboard. Integrated with the style database and the monitoring system, the planboard software automatically calculates the time needed for every order and warp and updates it based on real time information such as actual speed, efficiency and stop level.

The KNITMASTER scheduling software supports multiple planning levels: some textile mills only require single warp planning, other companies such as terry towel and upholstery weavers require the scheduling and follow up of multiple warps as well as single pieces on every loom.

By means of simple "drag and drop" functions, the planner can allocate pieces to warps, re-schedule warps and pieces, assign to another loom, etc. Production orders can be entered manually in the system or can be downloaded from the ERP system.

▲ PLANBOARD
▼ Yarn requirements report

Target length control and yarn requirements calculation

The target roll length can be down loaded from the server to the Data Unit at the machine. Upon reaching the length, the Data Unit can stop the machine and activate a doffing lamp to inform the operator that the machine is ready for doffing.

As the style definition file contains yarn type, yarn count, number of feeds, needle density, ... KNITMASTER can calculate yarn requirements to fulfill the orders planned. Several reports are available such as a consumption report used to transfer yarn from inventory to the knitting department and reports with requirements of yarn to be dyed or to be purchased.

Integrating additional departments

Machine Information

8.01:36		**STOP I 4 5 6 7**		
	Work Order	187000,1	Product Group	Shirting
	Style	AN0021236	Width (cm)	180
	Meters Required	12000	Planned Speed	42

	Shift to Date	Job to Date
Average Speed	39	41
Meters Produced	2420	8500
Run Time	01:03	03:25
Down Time	00:12	01:32
Machine Eff. %	84	55

▲ **DU11** on a finishing machine
▶ **DU11** finishing order status screen

## Monitoring and planning preparation and finishing machines

KNITMASTER can also be extended towards the warp preparation and finishing departments. Each of the machines in these departments is equipped with a **DU11** Data Unit.

Also the planning of the preparation department is important. From the warp out prediction in the warp knitting department, the warps to be prepared are available in the system. Warp beam tickets can be printed and the correct length of the warp is automatically assessed by the system.

In combination with the company's ERP system, KNITMASTER is the perfect tool to provide visibility throughout the finishing department. Based on routing database in the ERP system, production orders are generated for each individual process step and scheduled by means of the KNITMASTER PLANBOARD.

The operator, before starting the process, identifies the batch number and the process code by scanning the barcoded routing card.

Through the export mechanism, KNITMASTER continuously updates the ERP system on the status of each finishing batch.
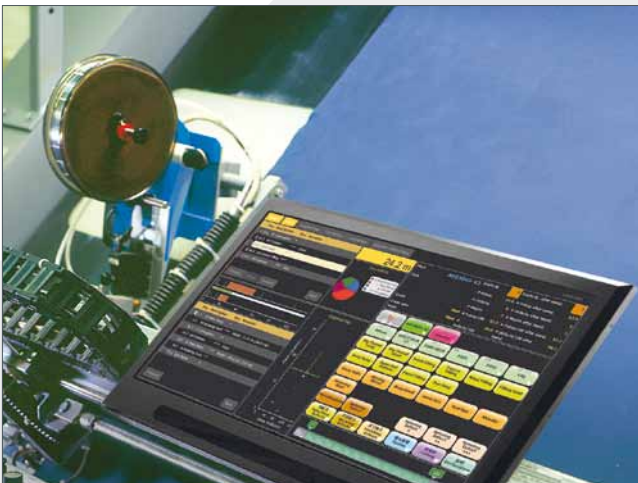
Fabric inspection

Both grey and finished inspection departments can be integrated in the KNITMASTER system. In the inspection departments, the frames are equipped with "touch screen" based data entry terminal (QT). Linked with the length meter, this terminal offers a Windows based user interface for defect entry. The "defect codes" are shown as "buttons" on the screen and the inspector enters the defect just by tapping the corresponding button. Screen layouts are configured to meet the customer's requirements and information is displayed in the local language.

While inspecting, the piece map is continuously displayed and a grade calculation is available on the inspection terminal.

◀ **QT** on an inspection table
▼ Grade overview report
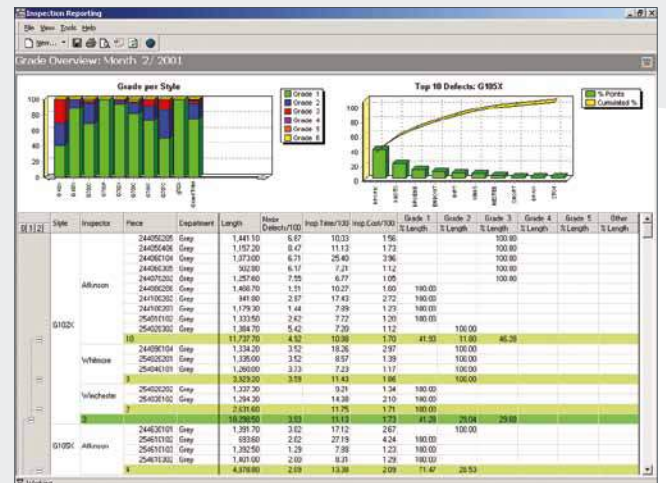
➕ Options
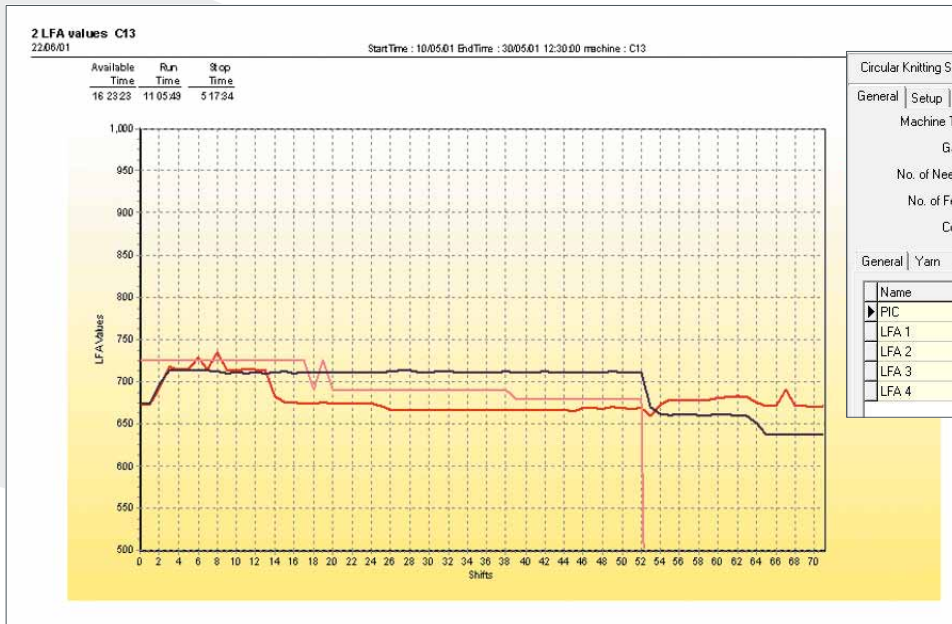
🧵 LFA Monitoring

The signals from each of the yarn consumption measuring devices are wired into one of the fast counter inputs of the Data Unit on the machine. Combined with the machine speed (RPM), the KNITMASTER software calculates the LFA values in real time and compares them with the standard values in the style database. In case of too high deviation from standard, the machines are automatically flagged or even stopped by the system.

This feature guarantees continuous quality monitoring and prevents the production of too heavy or too light pieces.

🛢 Automatic oiling

KNITMASTER can be extended with an optional module to automate the oiling functions of the machine. Based on user definable rules, oiling can be activated by means of a declaration on the Data Unit or automatically based on pre-defined criteria, such as oiling when the machine restarts after it has been stopped for a certain time period.

🔧 Preventive maintenance

On circular knitting machines, particular actions and checks need to be carried out on a regular basis. These include checks on fabric quality, oilers, jets and drives, cleaning, ... For each of these actions, the user defines the time in between two interventions. Based on the monitoring information, the system reports the machines which are due for a next intervention.

💡 Energy Monitoring

With the ENERGYMASTER module, the KNITMASTER system is extended with a powerful tool to optimize the use of energy in the plant. Both power meters and compressed air sensors on the machines can be connected to the Data Units on the machines and consumption data is passed on to the server using the KNITMASTER data collection network. Correlating the production data with energy consumption data allows the evaluation of the energy component in the overall production cost of the order or style.

▼ Preventive maintenance
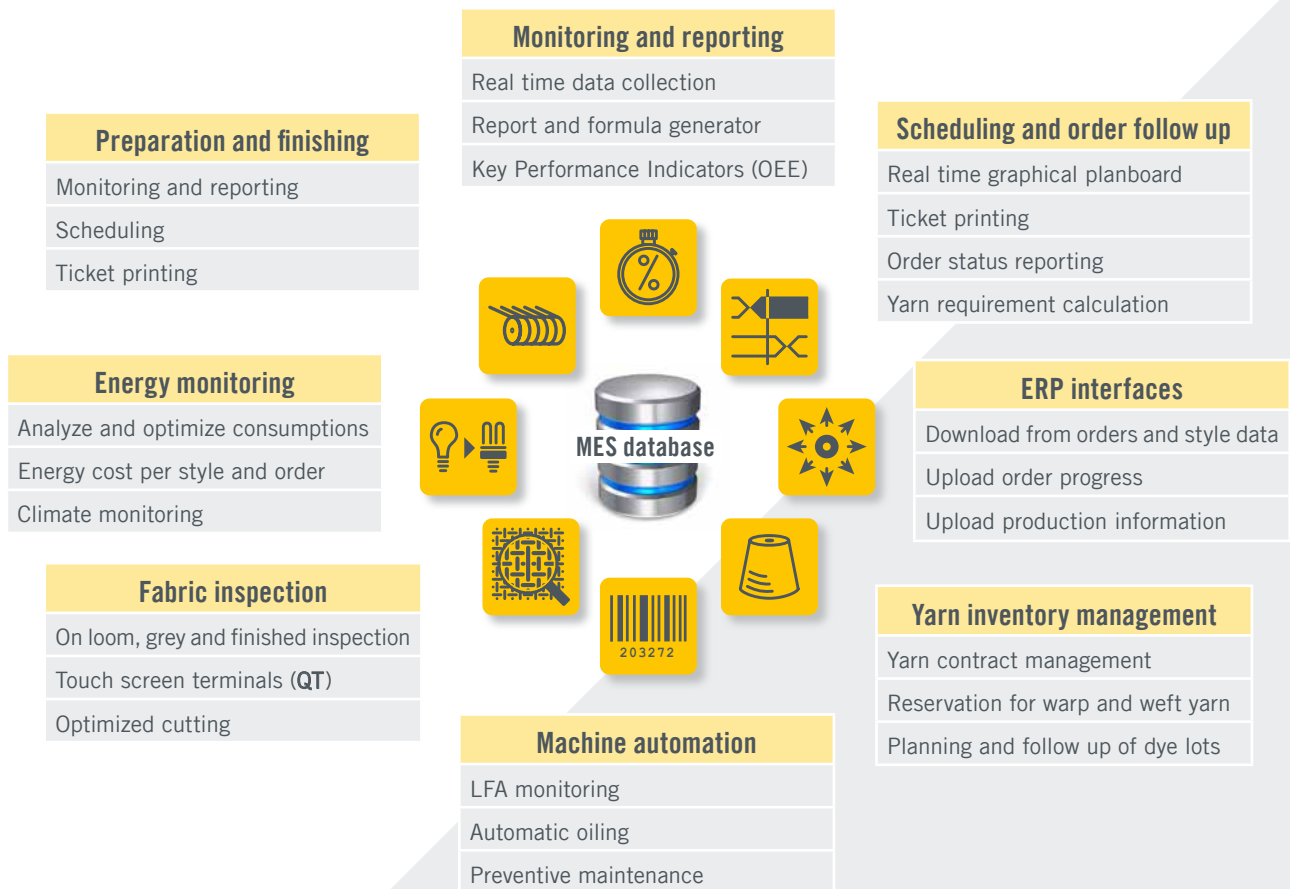▶ Trend of electricity and compressed air consumption for a selected machine
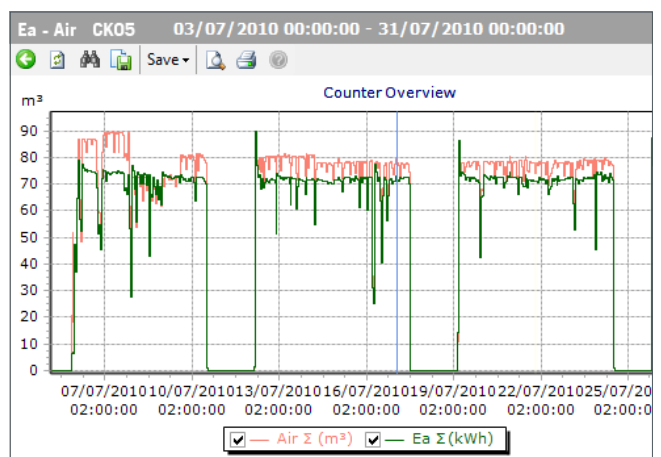
References

KnitMaster modular concept

Preparation and finishing
Monitoring and reporting
Scheduling
Ticket printing

Energy monitoring
Analyze and optimize consumptions
Energy cost per style and order
Climate monitoring

Fabric inspection
On loom, grey and finished inspection
Touch screen terminals (QT)
Optimized cutting

Monitoring and reporting
Real time data collection
Report and formula generator
Key Performance Indicators (OEE)

MES database

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Machine automation
LFA monitoring
Automatic oiling
Preventive maintenance

Scheduling and order follow up
Real time graphical planboard
Ticket printing
Order status reporting
Yarn requirement calculation

ERP interfaces
Download from orders and style data
Upload order progress
Upload production information

Yarn inventory management
Yarn contract management
Reservation for warp and weft yarn
Planning and follow up of dye lots

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