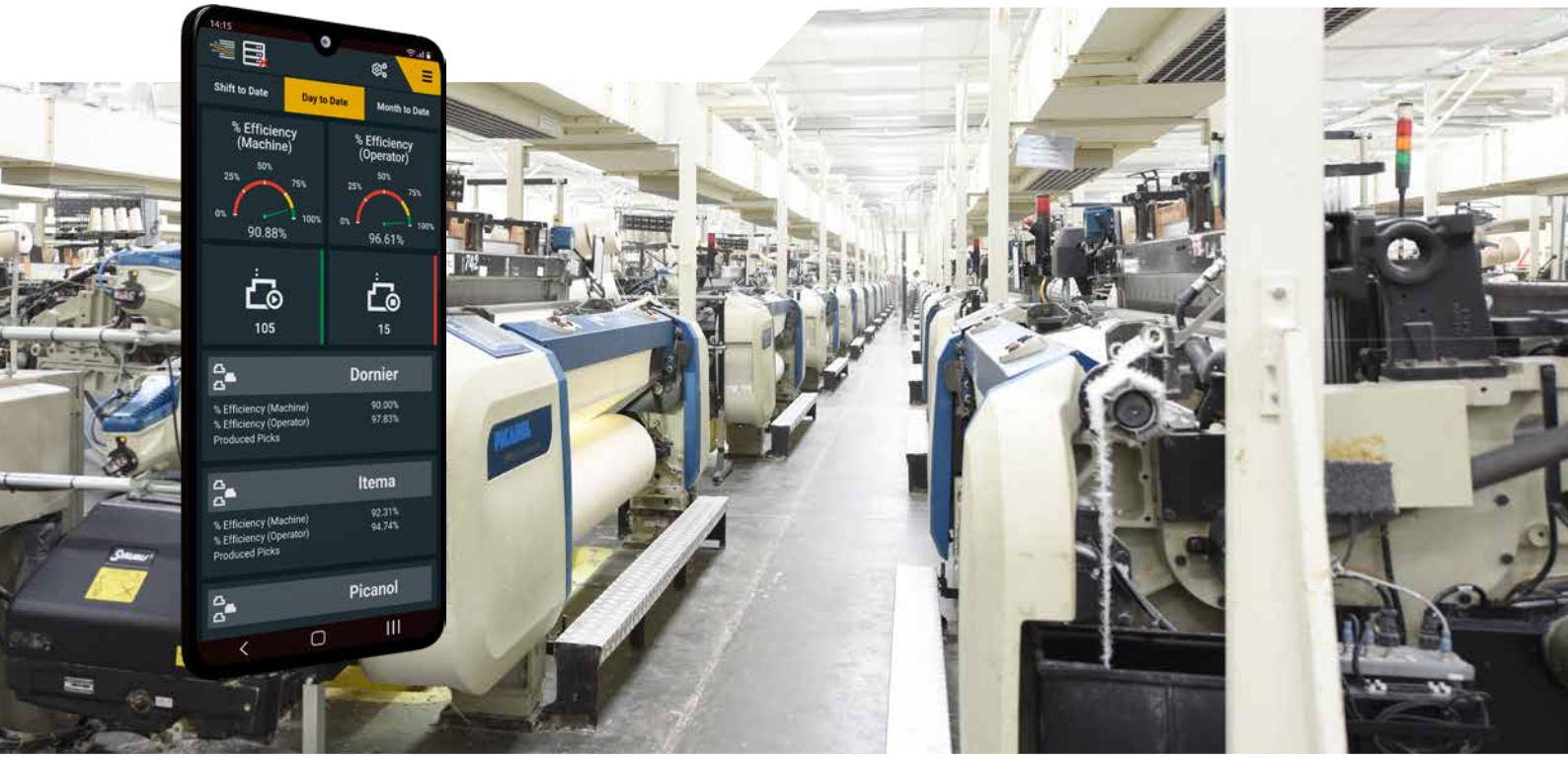
BMSvision

empowering productivity

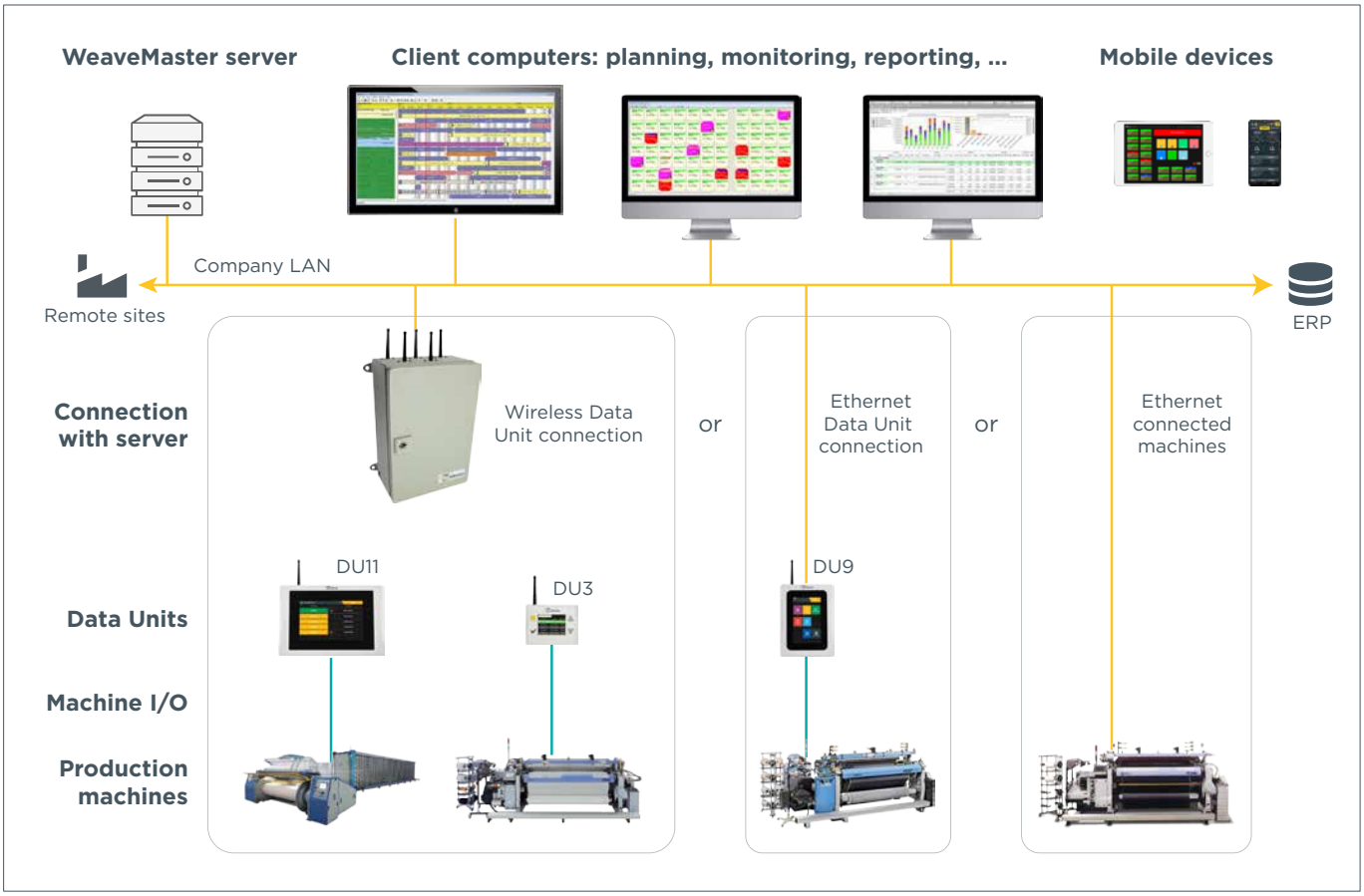
WeaveMaster

Manufacturing Execution System (MES)



WeaveMaster is the world's leading MES system for the weaving industry. It monitors and synchronizes all manufacturing and logistic processes within the weaving mill, from yarn purchasing and inventory up to the shipment of the finished fabric. It is a powerful and extensive yet flexible tool enabling managers to achieve operational excellence and rapidly respond to changing conditions. WeaveMaster is at the heart of Industry 4.0 and the Smart Factory offering a suite of MES modules with connectivity, powerful storage and secure communication.

WeaveMaster concept



Networking the machines

WeaveMaster supports both cabled and wireless networks to connect the machines to the central server. Machines are equipped with one of the BMSvision 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

WeaveMaster supports the connection of multiple plants to one central server. On remote sites, the BMSvision Data Units are connected to the WeaveMaster system via the company's multi-site LAN. A dedicated "multi-site consolidation module" on the central WeaveMaster server allows integrated reporting for all sites into one single reporting environment.

System requirements

WeaveMaster is Windows based and can be installed both on physical systems and in a virtualized environment. Application and database can run on separate servers. The database is Oracle or SQL driven. Also Terminal Services like Citrix are supported.

ERP system integration

WeaveMaster 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 WeaveMaster database.

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

Microsoft Dynamics AX
Microsoft Dynamics 365
intex
ORACLE
SAP
update
JOMAR
infor
datatex
we make IT work for you

Connecting machines to WeaveMaster

DU9

DU11

Touch screen IoT ready Data Units

The IoT ready Data Units **DU9**, **DU11** and **DU15** have been designed for maximum flexibility and optimal user friendliness. They feature a color touch screen and a graphical user interface and can be connected with wired Ethernet, with the proven BMSvision Bluetooth based wireless network interface or through the customer's Wi-Fi network. On screen language selection allows to switch between several western and Asian languages on the spot.

Looms with a parallel interface, warp preparation and finishing machines are connected by means of either **DU9** or **DU11** Data Units. Production count and automatic stop signals are wired to the parallel inputs of the Data Unit. For looms equipped with the BMSvision **Cyclops** on-loom inspection system, the **DU11** touch screen Data Unit is used. 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.

On the **DU11** and **DU15**, documents can easily be downloaded from the server and visualized. This way, quality control documents, setup data, design information, ... are available right where the operators needs them. This is a major step towards "paperless production".

All Data Units except **DU2P** can be extended with Backup & Recovery, allowing a minimum of 24 hours local data storage in case of server or network breakdown.

DU15

Looms with serial VDI or Ethernet interface

Microprocessor controlled looms equipped with the serial VDI interface are connected by means of the **DU7** interface module. Automatic stops are transmitted through the microprocessor's VDI interface and weavers enter manual declarations through the keyboard and display of the loom. As such, the weaver uses the same user interface for operating the loom as for communicating with the monitoring system. Unlike with other systems, no extra keypad is required.

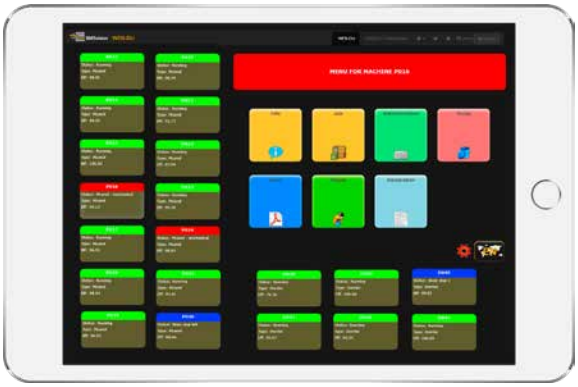
Through bi-directional communication, the **DU7** has access to all information and can activate any function within the machine's microprocessor.

Latest generation looms equipped with Ethernet interface are either connected through a standard Ethernet network or by means of the **DU7** (wired or wireless) in case full back up and recovery is required.

The **OPCconnector** is a user-friendly tool allowing easy and straightforward integration of any machine OPC server available on the network. It can be configured to interface with any OPC UA server without the need for extensive programming thus reducing the total investment as well as the cost of ownership for the MES system.

WEB-DU: HMI for multiple machines

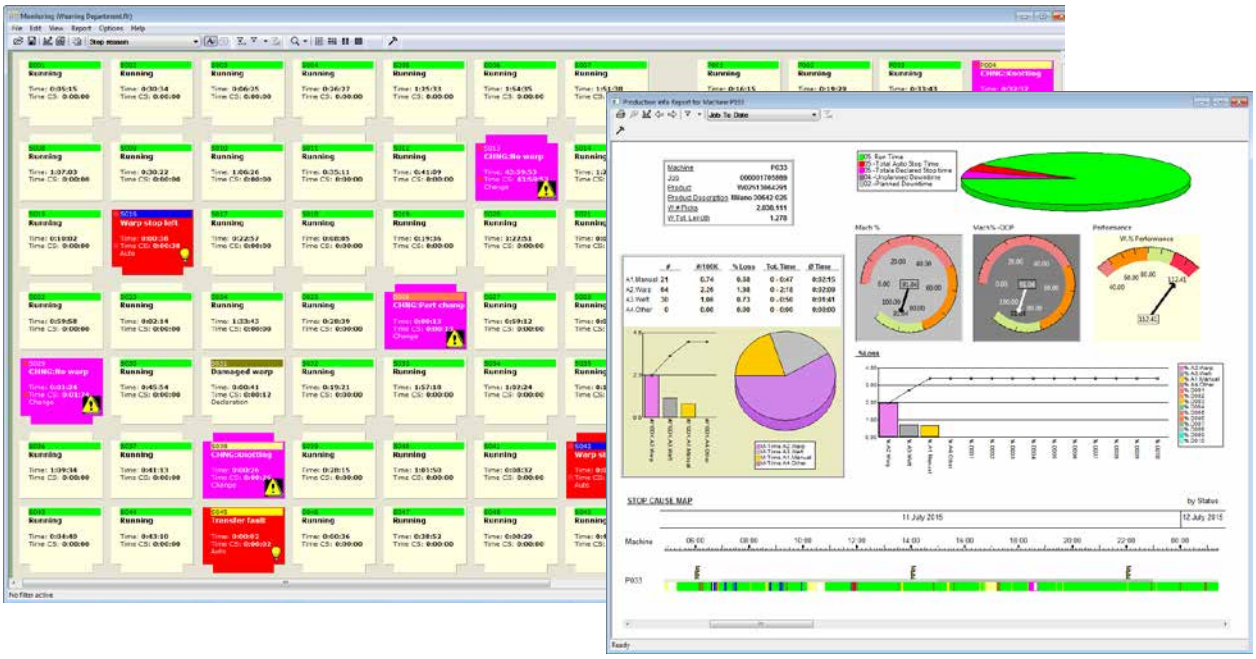
The **WEB-DU** application is used as HMI for a group of machines that are equipped either with **DU2P** or **DU7** headless devices for automatic data collection (pick count, automatic stops, ...) or that are connected via Ethernet. **WEB-DU** can be implemented on any browser enabled touch screen device such as PC, tablet and smartphone. BMSvision offers the **WEB-DU** including a Touch Panel PC with a 15.6" display.



DU7

DU2P

Real time production visibility for quick response



PlantView

Machine monitoring

WeaveMaster'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 weaving 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

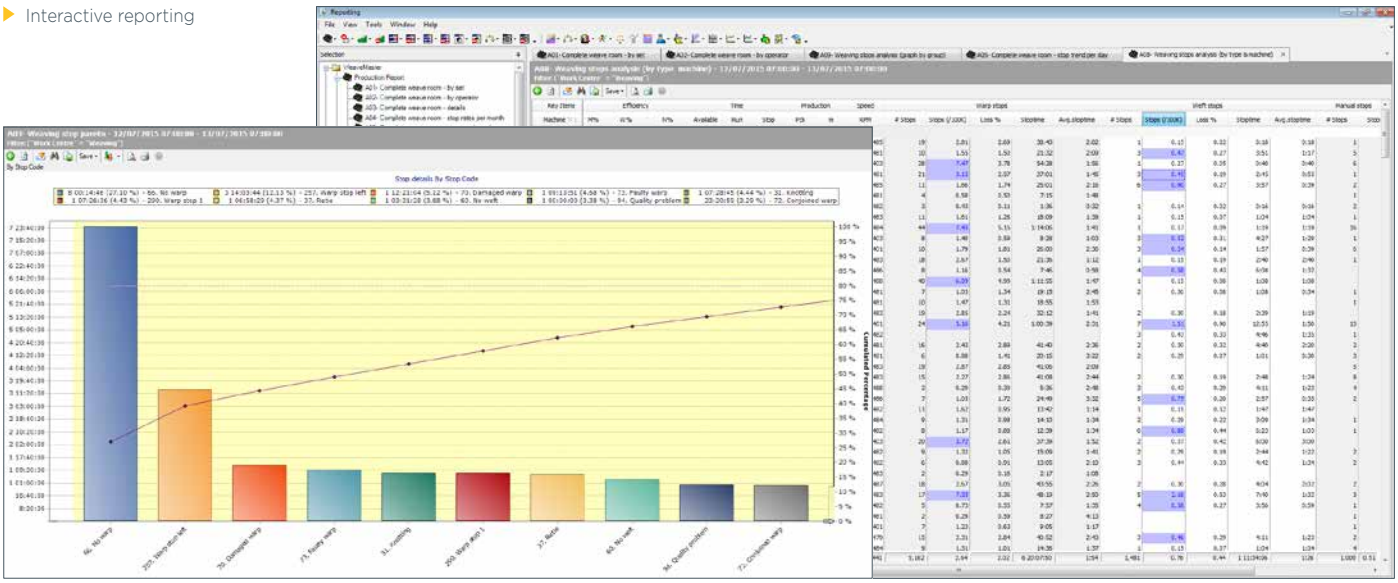
All data is stored in an Oracle or SQL relational database. By means of a powerful report and formula generator, featuring interactive reports and charts with multiple period selection, ad hoc filtering, ad hoc highlighting, users can define and configure their own calculations and reports.

For every report item selected from the database, upper and lower warning and alarm limits can be defined resulting in color coded exceptions in the report. Once a report has been defined, the user can select it for a variety of selection keys such as by machine type, by operator, by style, ... and far any time period such as shift, day, week, month or year.

With the reporting scheduling feature, reports are generated at fixed times, after shift end, etc. and be transferred to different outputs, e.g. printer, file folder, e-mail, HTML page.

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

Interactive reporting



Data analysis for continuous improvement

▲ MANAGEMENT DASHBOARD on your mobile device

Management Dashboard

This module allows the combined presentation of any data available in different BMSvision application modules, such as WEAVEMASTER, QUALIMASTER, ENERGYMASTER, ... into a single web based report.

With this tool, each user can create his own dashboards showing all important KPI's at a glance. As such, the manager can have all important information regarding efficiencies, quality and energy consumption displayed in real time on one single screen. Zooming functions allow him to drill down further in details if required.

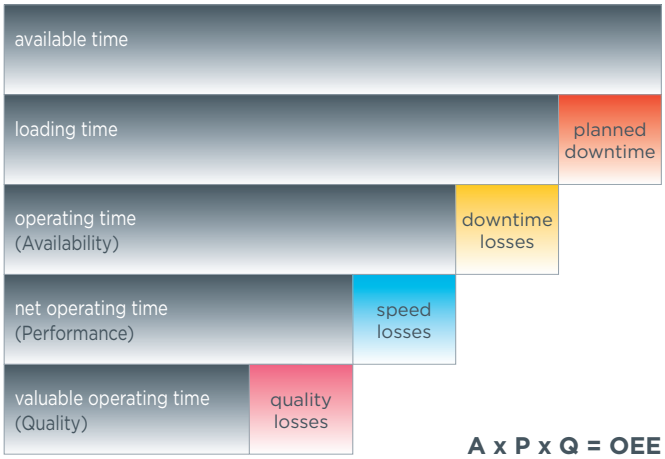
BI Connect

With this optional extension, all data is put available for use in standard business analysis tools such as Qlik Sense and Power BI. With these tools, the user can freely search and explore across all data, instantly pivoting his analysis when new ideas surface. Innovative visualizations put all data in the right context allowing fast and smart decisions.

OEE (Overall Equipment Effectiveness)

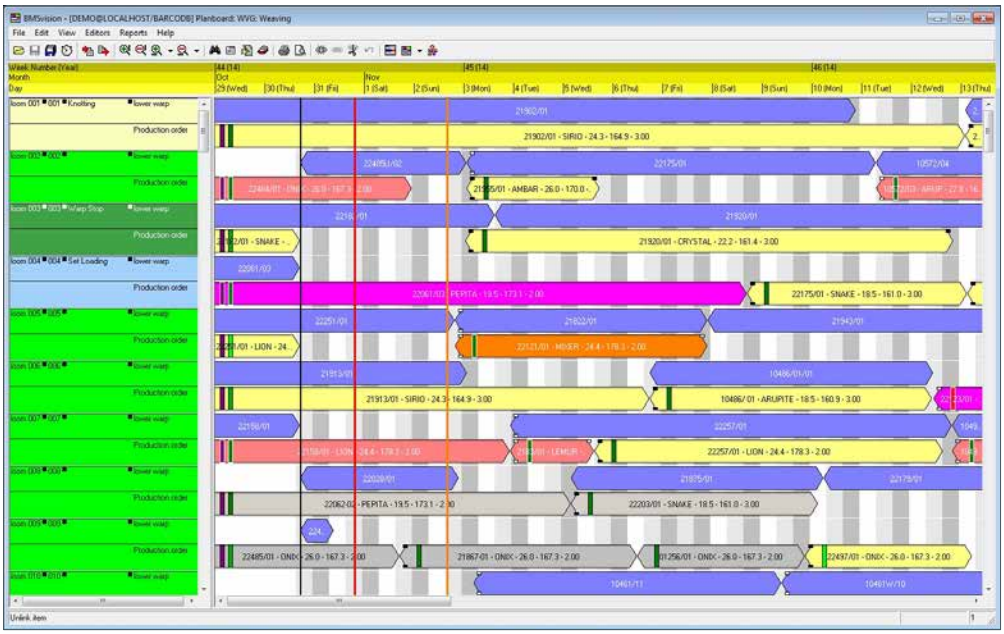
WEAVEMASTER includes all elements required for OEE reporting: equipment availability, performance and production quality is collected automatically from the machines. Analysis of these important KPI's drives efficiency improvements resulting in considerable cost savings.

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



A x P x Q = OEE

Managing job schedules



◀ PLANBOARD
▼ Yarn requirements report

Real time job schedule

With **WEAVEMASTER,** the planner conducts his demanding job by means of a graphical 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.

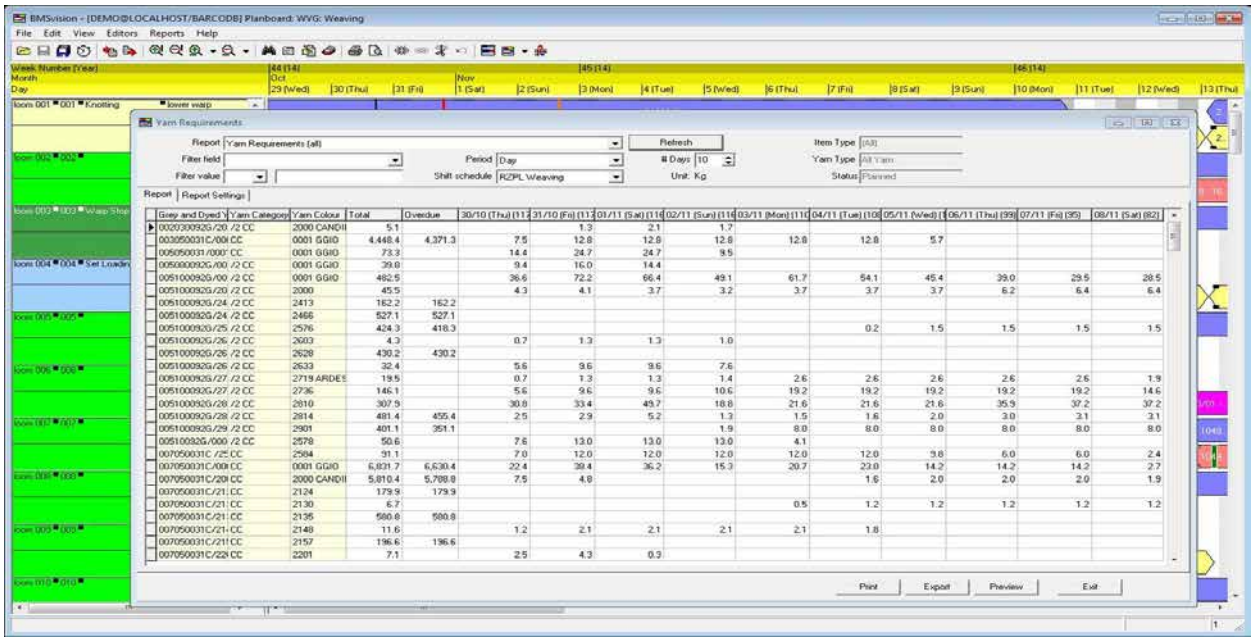
The **WEAVEMASTER** scheduling software supports multiple planning levels: some textile mills only require single warp planning, other companies such as terry towel and upholstery weavers require the scheduling and follow up of multiple warps as well as single pieces on every loom.

By means of simple “drag and drop” functions, the planner can allocate pieces to warps, reschedule 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.

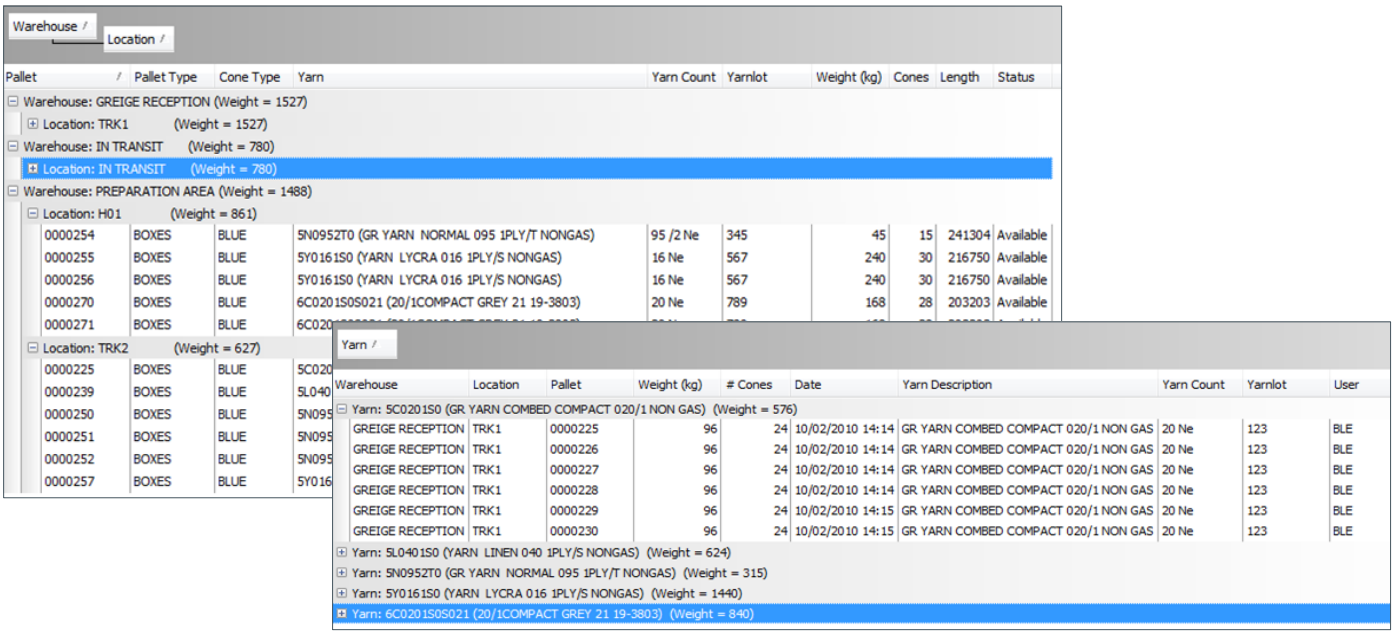
Warp out prediction and yarn requirements calculation

Based on the loom loading and the real time information, **WEAVEMASTER** knows exactly when each warp has to be ready. This information allows the system to calculate backwards to generate a production schedule for the warp preparation department.

As the style definition file contains yarn type, yarn count, number of ends/picks per yarn type as well as all contraction and waste factors, **WEAVEMASTER** can calculate yarn requirements for warp as well as filling yarn. Several reports are available such as a consumption report used to transfer yarn from inventory to the weave room and reports with requirements of yarn to be dyed or to be purchased.



Tracing from yarn to finished product



▲ Yarn inventory reports

▼ Trace back report

Yarn inventory management

The software module for yarn inventory management is fully integrated with the WeaveMaster planning software.

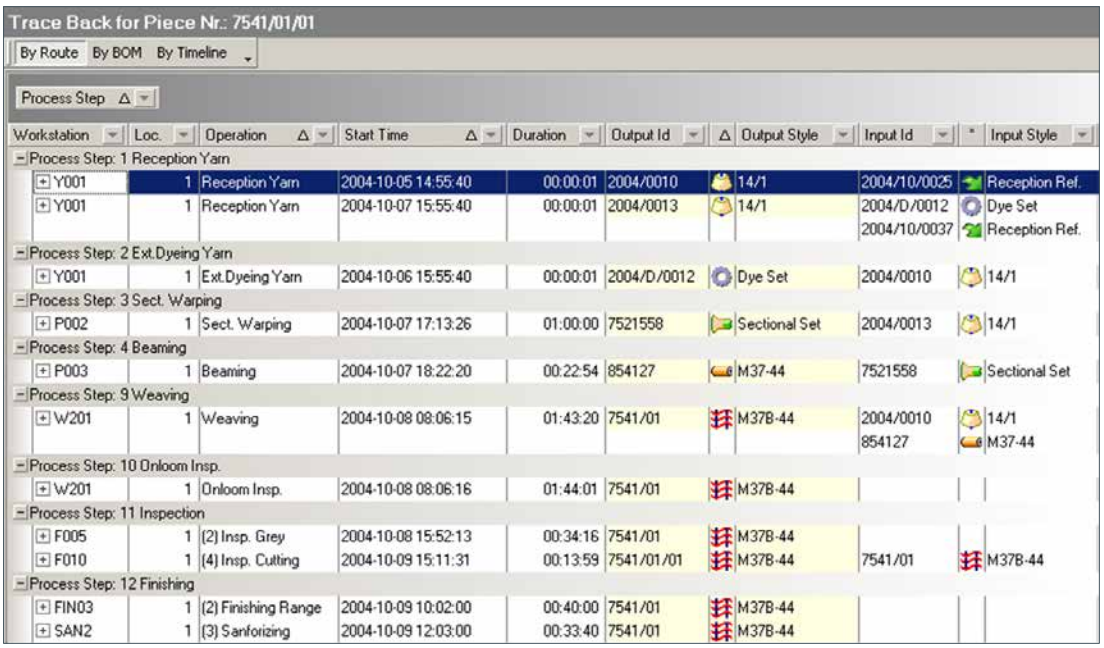
The first function of this module is the management of the yarn delivery contracts with all its technical and commercial details. For each delivery of yarn to the mill, the quantities are booked against the contract and are added to the grey yarn stock. The system prints the barcoded identification labels with yarn identification, lot number and warehouse location.

As WeaveMaster calculates the requirements for grey and dyed yarn, reservations can be made for warp yarn, grey weft yarn as well as for dye lots.

Consumption of the yarn is registered by reading the barcoded labels on the cartons as the yarn enters in preparation or in the weaving department.

Traceability

Combining machine monitoring with yarn inventory management allows the system to assign warp stops and weft stops to the yarn origin, the yarn lot and the yarn supplier. Since the WeaveMaster system knows which yarns were used to produce the warp or were taken for weft, the system can offer a full yarn traceability. For each cloth roll coming out of the mil, the system reports about yarn lots used, stop levels and quality information.



Communication in the plant

Large display (DID) in the plant

Digital signage

WeaveMaster can be extended with a DID (Digital Information Display) for quick and effective communication in the plant of actual performance, quality level, warp out and doffing prediction: The DID driver software allows flexible configuration of the displays, such as:

- Data to be displayed.
  (selectable from the BMSvision PlantView data items).
- Text font/size/color.
- Machine group/department.
- Update interval.

Alarm handling & messaging

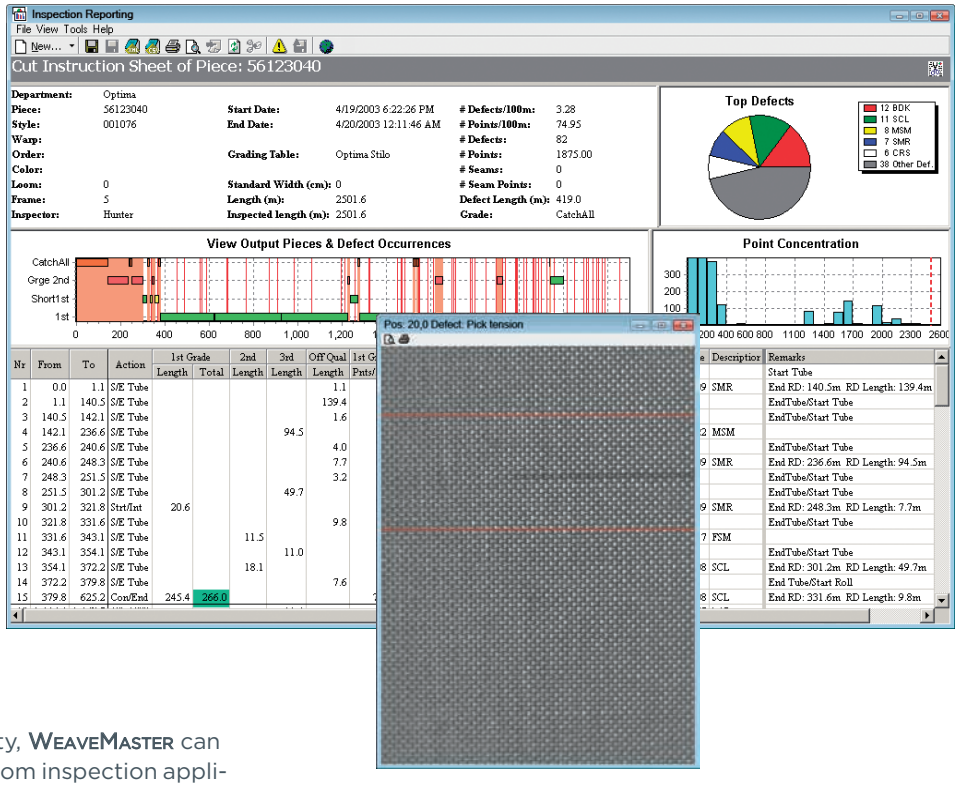
The “alarm handling” software continuously compares selected parameters or KPI’s with predefined exception limits.

As soon as an “alarm condition” is detected, the software triggers one or more actions, such as sending a message to the MyMES app on a smartphone or to the Smart Bracelet, transmitting an alarm message to the machine’s Data Unit, where a lamp can be activated and a message displayed on the Data Unit screen.

“Escalation scenarios” can be defined, for example if one person does not react to a message within a certain amount of time, a message will be sent to another person.

For more information, read the MyMES and Smart Bracelet brochures on our website.

On loom and grey fabric inspection



▲ Piece map with defect picture (Cyclops)

◀ Cyclops scanner on a batching motion

On loom inspection

In order to reduce the risk for off-quality, WeaveMaster can be extended with the QualiMaster on-loom inspection application. With this extension, a roving inspector uses the Data Unit to enter the defect code or declare the fabric "defect free". Each entry is automatically related to the pick counter, allowing the generation of a piece map during weaving.

Of course, also the BMSvision Cyclops and Argus fully automatic on-loom inspection systems perfectly integrates with the WeaveMaster system.

Based on the concentration of defects and loom stops, the system predicts the quality of the fabric. Alarm messages are generated in case of "off-quality" fabric and at doffing, the system formulates a quality advice.

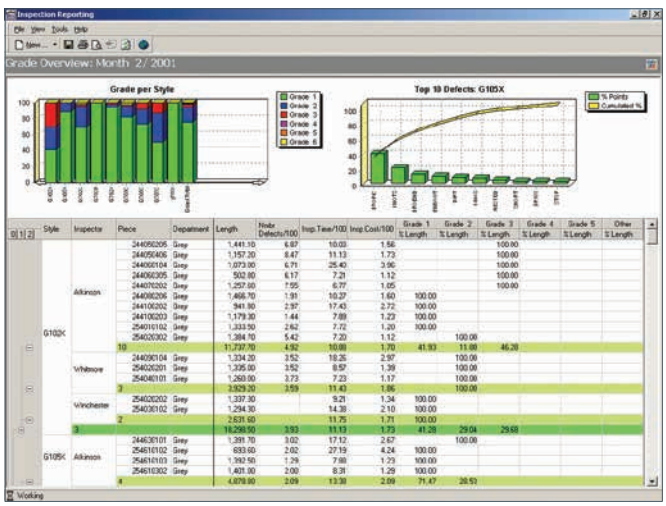
Grey fabric inspection

In grey inspection, the frames are equipped with "touch screen"-based data entry terminals (**QT**). Linked with the yardage clock, 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.

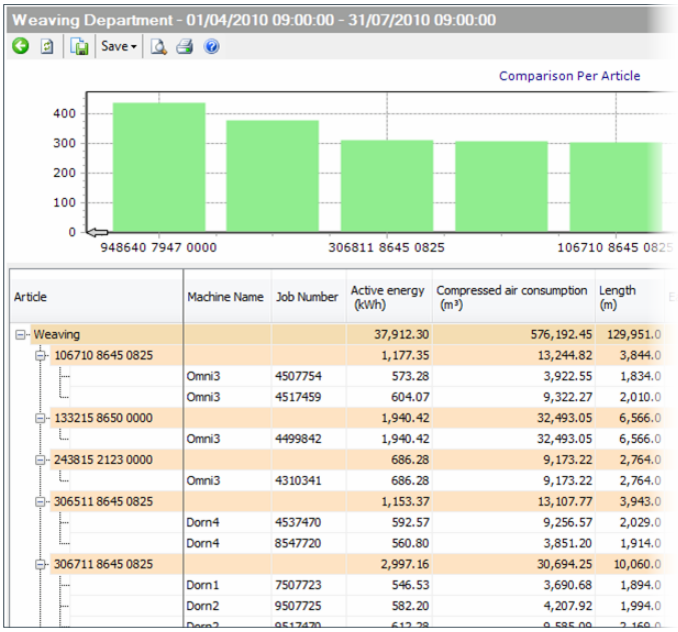
While inspecting, the piece map is continuously displayed and a grade calculation is available on the inspection terminal.

▼ **QT** on an inspection table

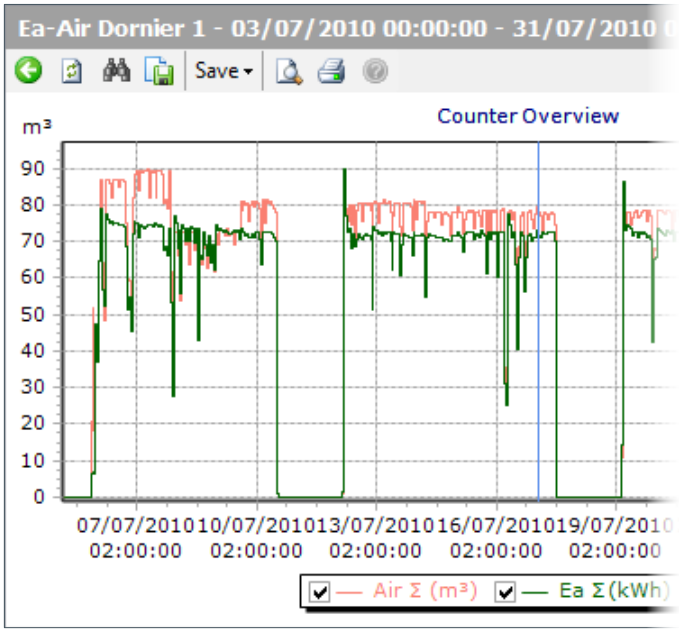
▶ Grade overview report



Energy monitoring



Article	Machine Name	Job Number	Active energy (kWh)	Compressed air consumption (m³)	Length (m)
Weaving			37,912.30	576,192.45	129,951.0
106710 8645 0825			1,177.35	13,244.82	3,844.0
	Omni3	4507754	573.28	3,922.55	1,834.0
	Omni3	4517459	604.07	9,322.27	2,010.0
133215 8650 0000			1,940.42	32,493.05	6,566.0
	Omni3	4499842	1,940.42	32,493.05	6,566.0
243815 2123 0000			686.28	9,173.22	2,764.0
	Omni3	4310341	686.28	9,173.22	2,764.0
306511 8645 0825			1,153.37	13,107.77	3,943.0
	Dorn4	4537470	592.57	9,256.57	2,029.0
	Dorn4	8547720	560.80	3,851.20	1,914.0
306711 8645 0825			2,997.16	30,694.25	10,060.0
	Dorn1	7507723	546.53	3,690.68	1,894.0
	Dorn2	9507725	582.20	4,207.92	1,994.0



▲ Trend of electricity and compressed air consumption for a selected loom

◀ Electricity and compressed air consumption by style

Monitoring and reporting energy consumption

With the **EnergyMaster** module, the **WeaveMaster** MES-system is extended with a powerful tool to optimize the use of energy in the plant. Following the principle of Monitoring & Targeting, it maps the various energy consumptions (electricity, gas, compressed air, water, steam) for full analysis and optimization.

Energy meters can be connected to the Data Units on the machines and energy data is passed on to the server using the MES data collection network. As such, no additional investment in data collection infrastructure is required.

Combining production data with information about energy consumption is a powerful tool that allows evaluating the energy component in the overall production cost of each order and product.

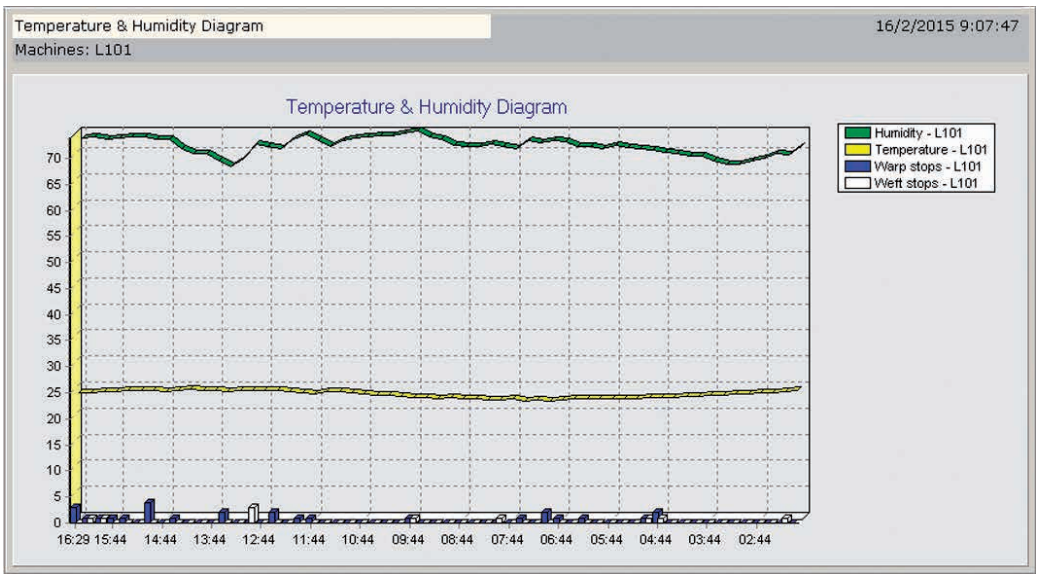
Temperature and humidity monitoring

As the environmental conditions are very important for the quality of the weaving process, **WeaveMaster** can be extended with hard- and software for climate monitoring in the weave room.

The BMSvision climate monitoring solution consists of temperature and humidity sensors connected to one of the BMSvision Data Units and a software module. With this software, actual temperature and humidity values are displayed in the **PlantView** and in trend reports, efficiency and stop levels are compared with the temperature and humidity levels as function of time.

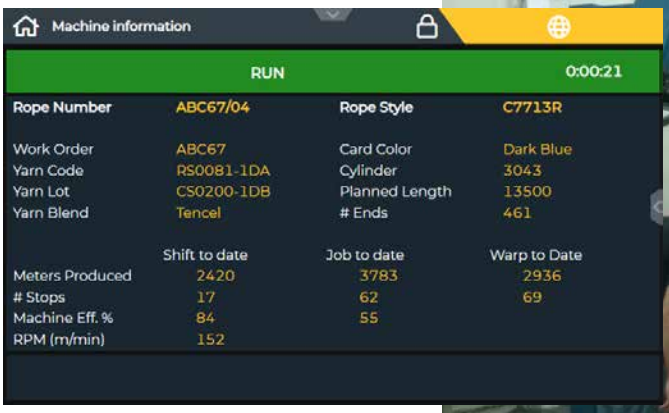
▶ Climate evolution in the plant

▼ Temperature and humidity sensor



For more information, read the EnergyMaster brochure on our website.

Monitoring preparation and finishing departments



▲ DU11 warp order status screen
▶ DU11 on a warp preparation machine

Warp preparation department

WeaveMaster can also be extended towards the warping and slashing department. Monitoring the warp preparation machines allows the generation of some specific reports such as yarn breakage analysis report for direct and sectional warpers and the sizing speed diagram for sizing machines. The data resulting from the yarn breakage analysis together with that from the sizing machine enables the monitoring system to generate a “warp history” report.

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

Finishing department

In combination with the company’s ERP system, WeaveMaster 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 Planboard.

Each individual finishing line is equipped with a Data Unit with barcode scanner. The operator, before starting the process, identifies the batch number and the process code by scanning the barcoded routing card. The machine number is automatically added to the batch record as well as date and time.

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

▶ DU11 on a finishing machine
▼ DU11 finishing order status screen

References

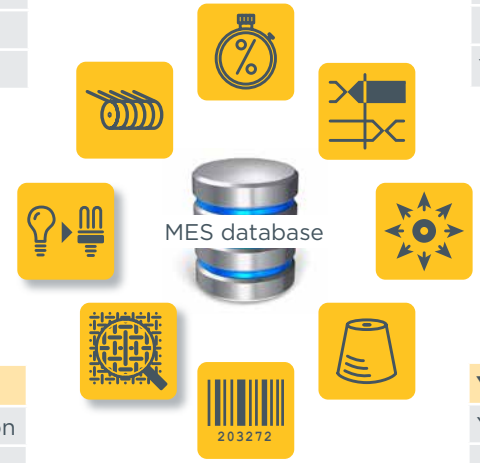
Beaulieu International Group · MOHAWK · SAGE Automotive Interiors · KALTEX · ETTLIN Textiles · gelvenor TEXTILES · CHOMARAT · Autoliv · Arville · BEKAERT DESLEE · frontier Spinning mills · BIRLA CENTURY · Milliken · ADFORS SAINT-GOBAIN · Cormar CARPETS · GLEN RAVEN · porcher industries CONFIDENCE MAKES THE DIFFERENCE · itg · Kohinoor Mills · SANTISTA · MatteX · SANYANG · CEDRO TEXTIL

WeaveMaster modular concept

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

Preparation and finishing
- Monitoring and reporting
- Scheduling
- Ticket printing

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



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

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

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

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

Traceability
- From yarn lot to finished fabric
- Trace back and forward
- Where used

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