

# 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.

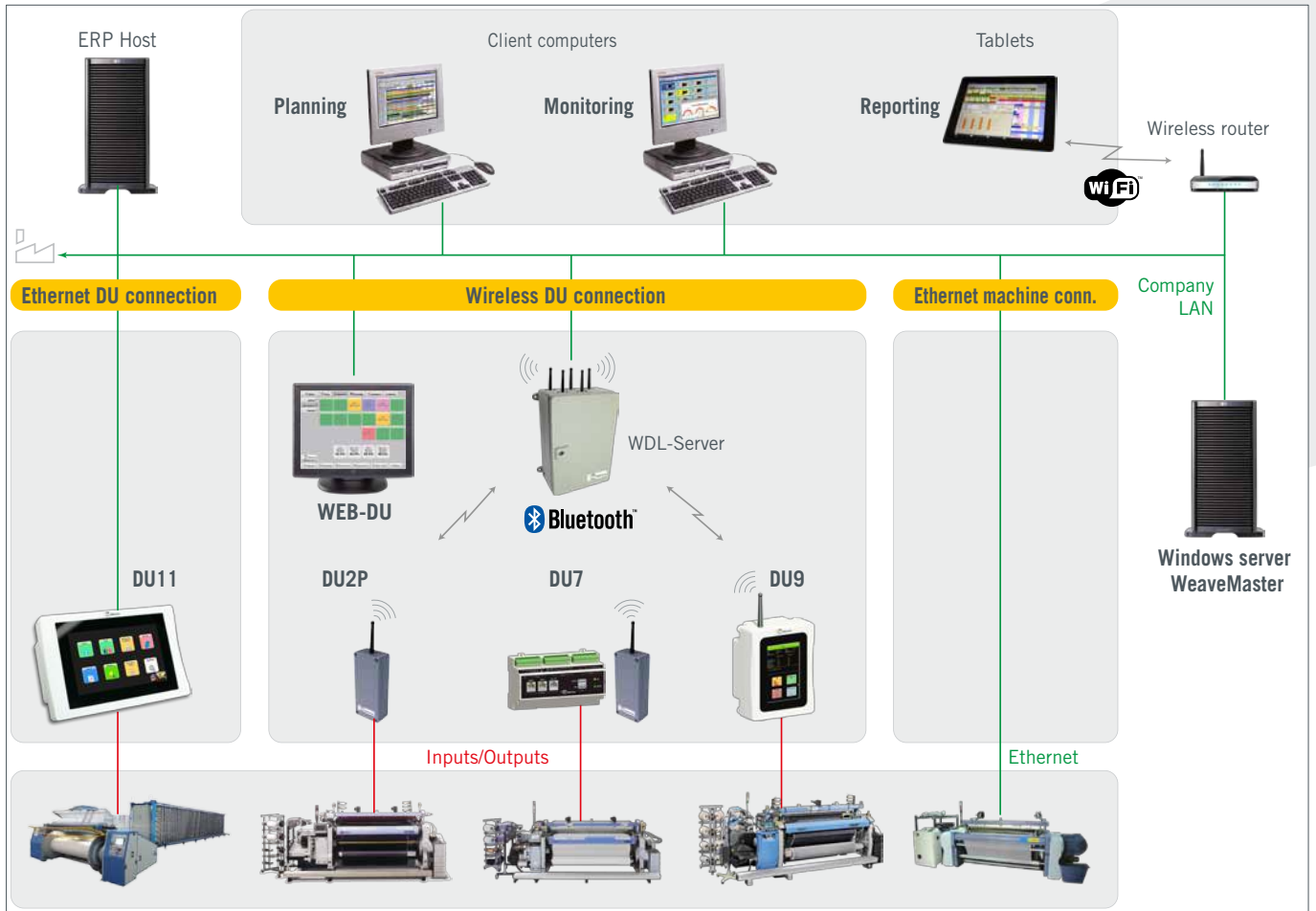
**Our offering**

- |                                   |  |                                 |
|-----------------------------------|--|---------------------------------|
| Real time monitoring              |  | Increased efficiency            |
| Scheduling                        |  | Optimized production schedules  |
| Quality control                   |  | Quality improvement             |
| Traceability                      |  | Improved product compliance     |
| Operator tracking                 |  | Less administration             |
| Yarn inventory management         |  | Reduced inventory levels        |
| Temperature & humidity monitoring |  | Optimized processing conditions |
| Energy monitoring                 |  | Reduced energy consumption      |
| Integration with ERP              |  | Transparent information flow    |

**Your benefits**



## Networking the machines



**WEAVERMASTER** 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

**WEAVERMASTER** supports the connection of multiple plants to one central server. In the remote sites, **M-SERVERS** or **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 **WEAVERMASTER** server allows integrated reporting for all sites into one single reporting environment.



## System requirements

**WEAVERMASTER** 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

**WEAVERMASTER** 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 **WEAVERMASTER** database.

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



we make IT work for you



## Connecting machines to WEAVEMASTER



DU11



DU9



DU7



Ethernet



WEB-DU



DU2P



### Looms with parallel interface, preparation and finishing machines

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.

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.



### 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.



### 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 (pick count, and automatic stops) while all manual input and information display is handled via the **WEB-DU** application.



### Data Unit specifications

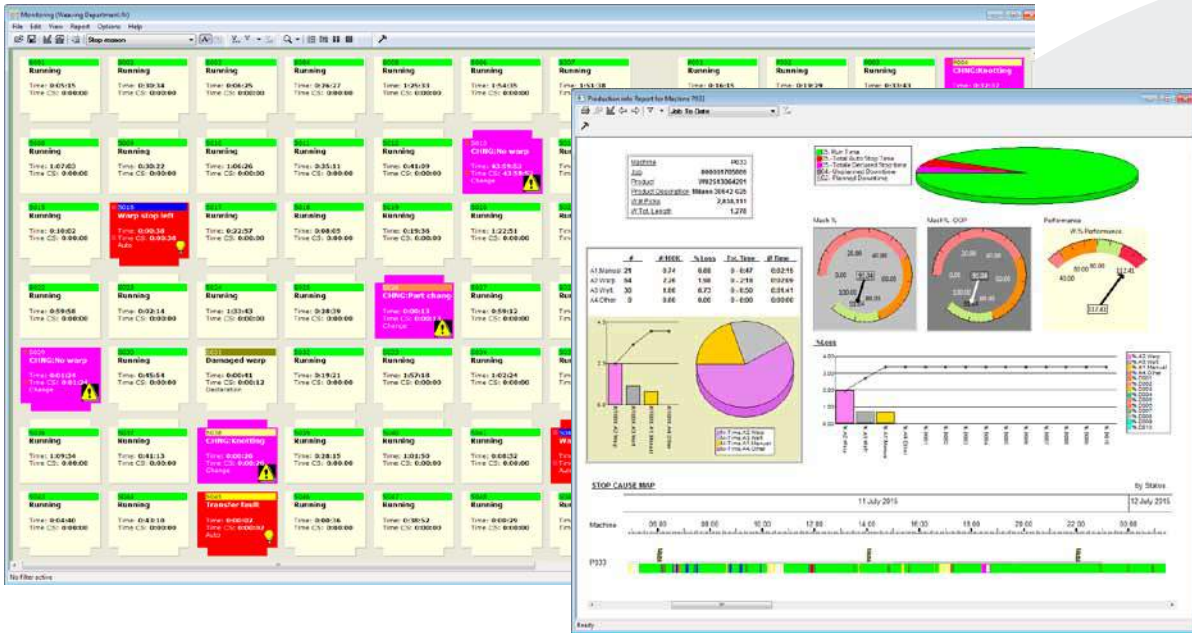
		DU11	DU9	DU7	DU2P
Inputs/outputs	Digital/counter inputs	16	8	4	4
	Analog inputs (optional)	8	-	8	-
	Relays	5	5	3	-
	Outputs (open collector)	-	-	-	1
	Serial ports	2	-	2	-
	USB ports	2	2	2	-
	Ethernet ports	3	1	3	-
Networking	Wireless (WDL)	•	•	• (ext.)	•
	Wireless Ethernet (WLAN)	-	•	-	-
	Wired Ethernet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

<sup>1</sup> This option allows a minimum of 24 hours local data storage in case of server or network breakdown.





# Production visibility and analysis



PLANTVIEW



## Real time monitoring

WEAVERMASTER'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.



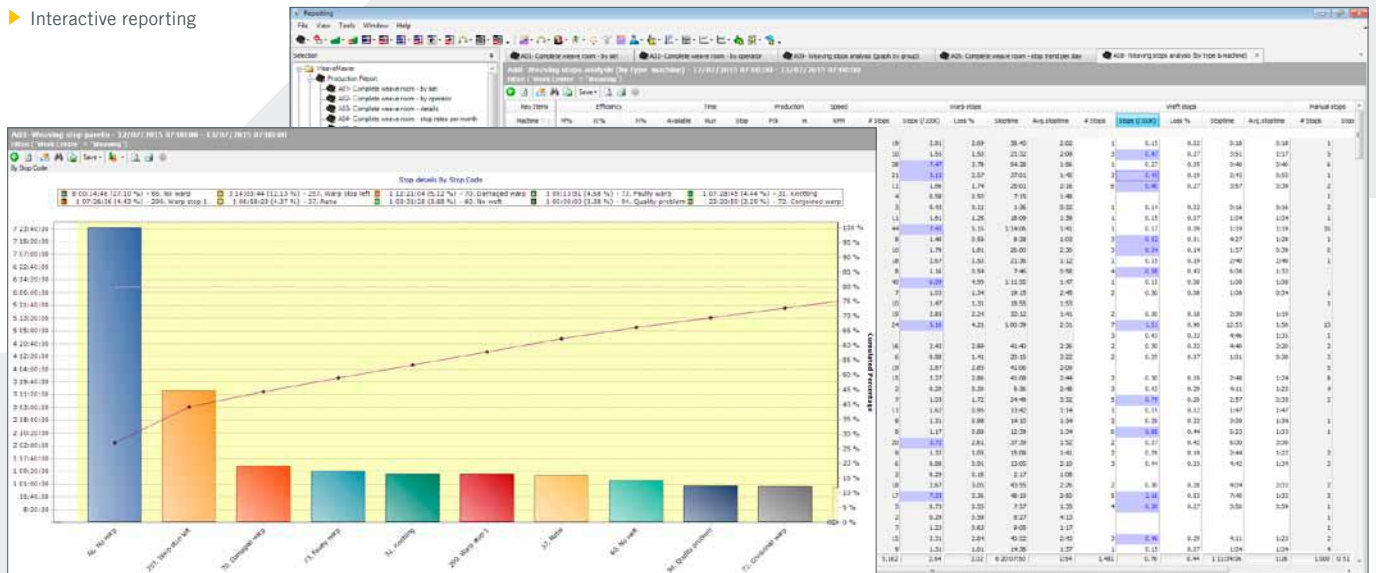
## Reporting

All data is stored in an Oracle 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. 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 for any time period such as shift, day, week, month or year.

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.

### Interactive reporting





# Management reporting



▲ 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.

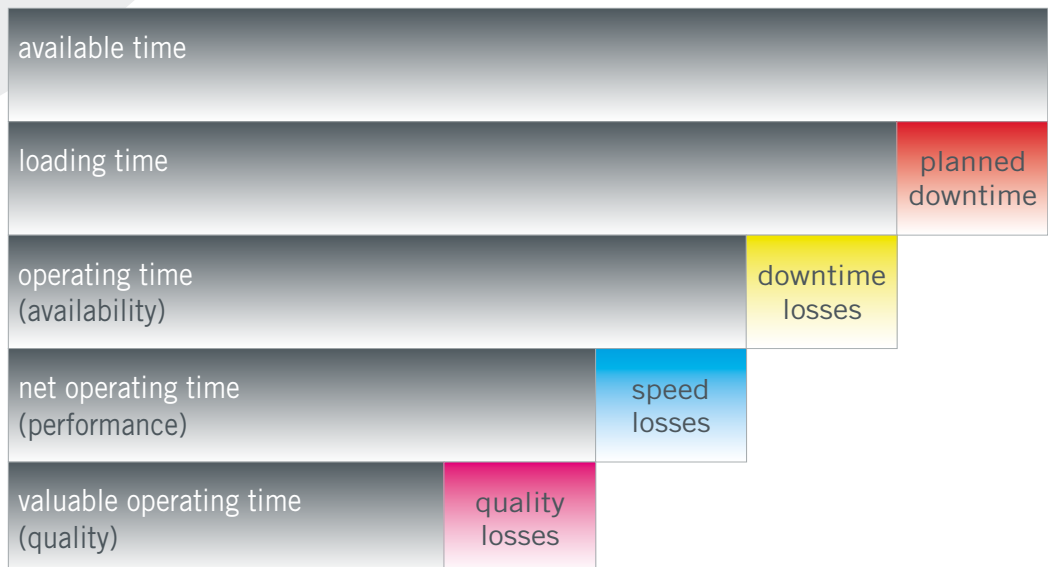
With this tool, each user can create his own dashboards showing all important KPI's at a glance. As such, the manager can have all important information regarding efficiencies, quality and energy consumption displayed in real time on one single screen. Zooming functions allow him to drill down further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



## OEE (Overall Equipment Effectiveness)

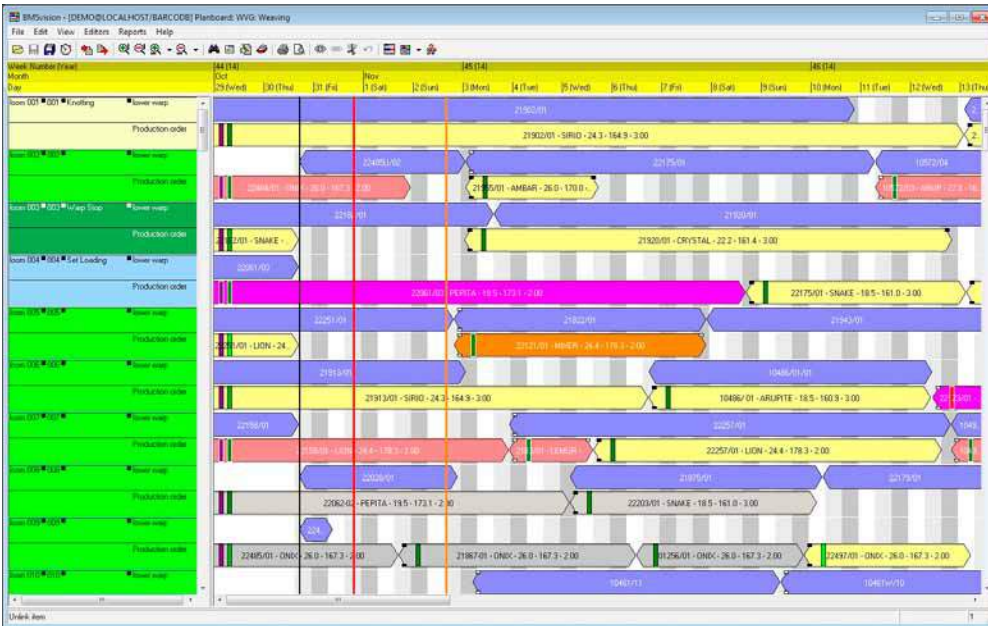
**WEAVEMASTER** includes all elements required for OEE reporting: equipment availability, performance and production quality is collected automatically from the machines. Analysis of these important KPI's drives efficiency improvements resulting in considerable cost savings.

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





# Managing job schedules



## 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.

- ▲ **PLANBOARD**
- ▼ Yarn requirements report



## 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.

Yarn Requirements

Report: Yarn Requirements [All]    Refresh    Item Type: [Fab]    Yarn Type: [All Yarn]    Status: [Planned]

Filter value:    Period: [Day]    # Days: [10]    Unit: [Kg]

Report | Report Settings

[Grey and Dyed] Yarn Category	Yarn Colour	Total	Dyeused	30/10 (Thu)	11/2 (Fri)	01/11 (Sat)	01/11 (Sun)	03/11 (Mon)	04/11 (Tue)	05/11 (Wed)	06/11 (Thu)	07/11 (Fri)	08/11 (Sat)
00200090G/20 /2 CC	2000 CANDII	5.1			1.3	2.1	1.7						
003090031C/008 CC	0001 GGIO	4,448.4	4,371.3	7.5	12.9	12.9	12.9	12.8	12.8	5.7			
005090031/000 CC	0001 GGIO	73.3		14.4	24.7	24.7	9.9						
00500090G/00 /2 CC	0001 GGIO	29.0		9.4	16.0	14.4							
005100090G/00 /2 CC	0001 GGIO	482.5		36.6	72.2	66.4	49.1	61.7	54.1	45.4	35.0	29.5	28.5
005100090G/20 /2 CC	2000	45.5		4.3	4.1	3.7	3.2	3.7	3.7	3.7	6.2	6.4	6.4
005100090G/24 /2 CC	2413	162.2	162.2										
005100090G/24 /2 CC	2466	527.1	527.1										
005100090G/25 /2 CC	2576	424.3	410.3										
005100090G/26 /2 CC	2603	4.3		0.7	1.3	1.3	1.0			0.2	1.5	1.5	1.5
005100090G/26 /2 CC	2628	430.2	430.2										
005100090G/26 /2 CC	2639	32.4		5.6	9.6	9.6	7.6						
005100090G/27 /2 CC	2719 ARDEE	19.9		0.7	1.3	1.3	1.4	2.6	2.6	2.6	2.6	2.6	1.9
005100090G/27 /2 CC	2736	146.1		5.6	9.6	9.6	10.6	19.2	19.2	19.2	19.2	19.2	14.6
005100090G/28 /2 CC	2810	307.9		30.8	33.4	49.7	18.8	21.6	21.6	35.9	37.2	37.2	
005100090G/28 /2 CC	2814	481.4	455.4	2.5	2.9	5.2	1.3	1.5	1.6	2.0	3.0	3.1	3.1
005100090G/29 /2 CC	2901	401.1	351.1				1.9	8.0	8.0	8.0	8.0	8.0	8.0
005100090G/000 /2 CC	2578	55.6		7.6	13.0	13.0	13.0	4.1					
007090031C/25 CC	2584	91.1		7.0	12.0	12.0	12.0	12.0	3.0	6.0	6.0	6.0	2.4
007090031C/008 CC	0001 GGIO	6,801.7	6,630.4	22.4	30.4	36.2	15.3	20.7	23.0	14.2	14.2	14.2	2.7
007090031C/208 CC	2000 CANDII	5,810.4	5,798.8	7.5	4.8				1.6	2.0	2.0	2.0	1.9
007090031C/211 CC	2124	179.9											
007090031C/211 CC	2130	6.7							0.5	1.2	1.2	1.2	1.2
007090031C/211 CC	2135	580.8	580.8										
007090031C/211 CC	2148	11.6		1.2	2.1	2.1	2.1	2.1	1.8				
007090031C/211 CC	2157	196.6											
007090031C/220 CC	2201	9.1		2.5	4.3	0.3							





# Tracing from yarn to finished product

Warehouse / Location /	Pallet /	Pallet Type	Cone Type	Yarn	Yarn Count	Yarnlot	Weight (kg)	Cones	Length	Status
Warehouse: GREIGE RECEPTION (Weight = 1527)										
Location: TRK1 (Weight = 1527)										
Warehouse: IN TRANSIT (Weight = 780)										
Location: IN TRANSIT (Weight = 780)										
Warehouse: PREPARATION AREA (Weight = 1488)										
Location: H01 (Weight = 861)										
0000254	BOXES	BLUE	5N0952T0 (GR YARN NORMAL 095 1PLY/T NONGAS)		95 /2 Ne	345	45	15	241304	Available
0000255	BOXES	BLUE	5Y0161S0 (YARN LYCRA 016 1PLY/S NONGAS)		16 Ne	567	240	30	216750	Available
0000256	BOXES	BLUE	5Y0161S0 (YARN LYCRA 016 1PLY/S NONGAS)		16 Ne	567	240	30	216750	Available
0000270	BOXES	BLUE	6C0201S0S021 (20/1COMPACT GREY 21 19-3803)		20 Ne	789	168	28	203203	Available
0000271	BOXES	BLUE								
Location: TRK2 (Weight = 627)										
0000225	BOXES	BLUE	5 Warehouse							
0000239	BOXES	BLUE	5 Warehouse							
0000250	BOXES	BLUE	5 Warehouse							
0000251	BOXES	BLUE	5 Warehouse							
0000252	BOXES	BLUE	5 Warehouse							
0000257	BOXES	BLUE	5 Warehouse							

Warehouse	Location	Pallet	Weight (kg)	# Cones	Date	Yarn Description	Yarn Count	Yarnlot	User
Yarn: 5C0201S0 (GR YARN COMBED COMPACT 020/1 NON GAS) (Weight = 576)									
GREIGE RECEPTION	TRK1	0000225	96	24	10/02/2010 14:14	GR YARN COMBED COMPACT 020/1 NON GAS	20 Ne	123	BLE
GREIGE RECEPTION	TRK1	0000226	96	24	10/02/2010 14:14	GR YARN COMBED COMPACT 020/1 NON GAS	20 Ne	123	BLE
GREIGE RECEPTION	TRK1	0000227	96	24	10/02/2010 14:14	GR YARN COMBED COMPACT 020/1 NON GAS	20 Ne	123	BLE
GREIGE RECEPTION	TRK1	0000228	96	24	10/02/2010 14:14	GR YARN COMBED COMPACT 020/1 NON GAS	20 Ne	123	BLE
GREIGE RECEPTION	TRK1	0000229	96	24	10/02/2010 14:15	GR YARN COMBED COMPACT 020/1 NON GAS	20 Ne	123	BLE
GREIGE RECEPTION	TRK1	0000230	96	24	10/02/2010 14:15	GR YARN COMBED COMPACT 020/1 NON GAS	20 Ne	123	BLE
Yarn: 5L0401S0 (YARN LINEN 040 1PLY/S NONGAS) (Weight = 624)									
Yarn: 5N0952T0 (GR YARN NORMAL 095 1PLY/T NONGAS) (Weight = 315)									
Yarn: 5Y0161S0 (YARN LYCRA 016 1PLY/S NONGAS) (Weight = 1440)									
Yarn: 6C0201S0S021 (20/1COMPACT GREY 21 19-3803) (Weight = 840)									



## Yarn inventory management

The software module for yarn inventory management is fully integrated with the **WEAVERMASTER** 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 **WEAVERMASTER** 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.

- ▲ Yarn inventory reports
- ▼ Trace back report



## 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 **WEAVERMASTER** 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 mill, the system reports about yarn lots used, stop levels and quality information.

Trace Back for Piece Nr.: 7541/01/01										
By Route   By BOM   By Timeline										
Process Step										
Workstation	Loc.	Operation	Start Time	Duration	Output Id	Output Style	Input Id	Input Style		
Process Step: 1 Reception Yarn										
Y001	1	Reception Yarn	2004-10-05 14:55:40	00:00:01	2004/0010	14/1	2004/10/0025	Reception Ref.		
Y001	1	Reception Yarn	2004-10-07 15:55:40	00:00:01	2004/0013	14/1	2004/D/0012 2004/10/0037	Dye Set Reception Ref.		
Process Step: 2 Ext.Dyeing Yarn										
Y001	1	Ext.Dyeing Yarn	2004-10-06 15:55:40	00:00:01	2004/D/0012	Dye Set	2004/0010	14/1		
Process Step: 3 Sect. Warping										
P002	1	Sect. Warping	2004-10-07 17:13:26	01:00:00	7521558	Sectional Set	2004/0013	14/1		
Process Step: 4 Beaming										
P003	1	Beaming	2004-10-07 18:22:20	00:22:54	854127	M37-44	7521558	Sectional Set		
Process Step: 9 Weaving										
W201	1	Weaving	2004-10-08 08:06:15	01:43:20	7541/01	M37B-44	2004/0010 854127	14/1 M37-44		
Process Step: 10 Onloom Insp.										
W201	1	Onloom Insp.	2004-10-08 08:06:16	01:44:01	7541/01	M37B-44				
Process Step: 11 Inspection										
F005	1	(2) Insp. Grey	2004-10-08 15:52:13	00:34:16	7541/01	M37B-44				
F010	1	(4) Insp. Cutting	2004-10-09 15:11:31	00:13:59	7541/01/01	M37B-44	7541/01	M37B-44		
Process Step: 12 Finishing										
FIN03	1	(2) Finishing Range	2004-10-09 10:02:00	00:40:00	7541/01	M37B-44				
SAN2	1	(3) Sanforizing	2004-10-09 12:03:00	00:33:40	7541/01	M37B-44				



## Communication 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.
- Text font/size/color.
- Machine group/department.
- Update interval.

- ▲ Large display (DID) in the plant
- ▼ Text message from WEAVEMASTER



## 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 an e-mail message to selected people, transmitting an alarm message to the machine Data Unit, where a lamp can be activated and a message displayed on the Data Unit screen or on the loom terminal. “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.







# On loom and grey fabric inspection



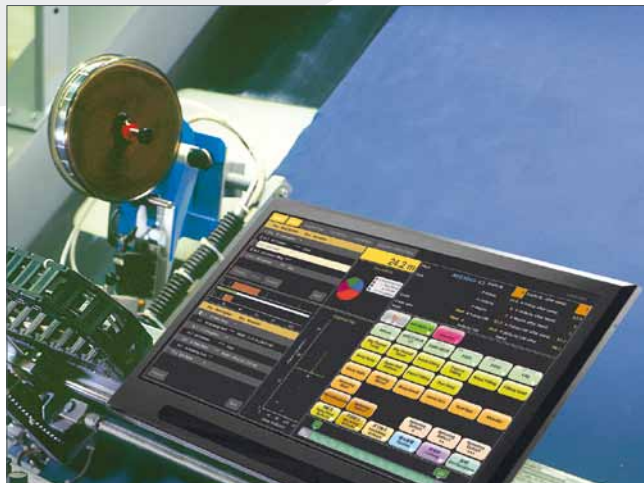

## On loom inspection

In order to reduce the risk for off-quality, **WEAVERMASTER** 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** fully automatic on-loom inspection system perfectly integrates with the **WEAVERMASTER** 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.

- ▶ QT on an inspection table
- ▶ Grade overview report



- ▶ Piece map with defect picture (**CYCLOPS**)
- ▶ **CYCLOPS** scanner on a batching motion



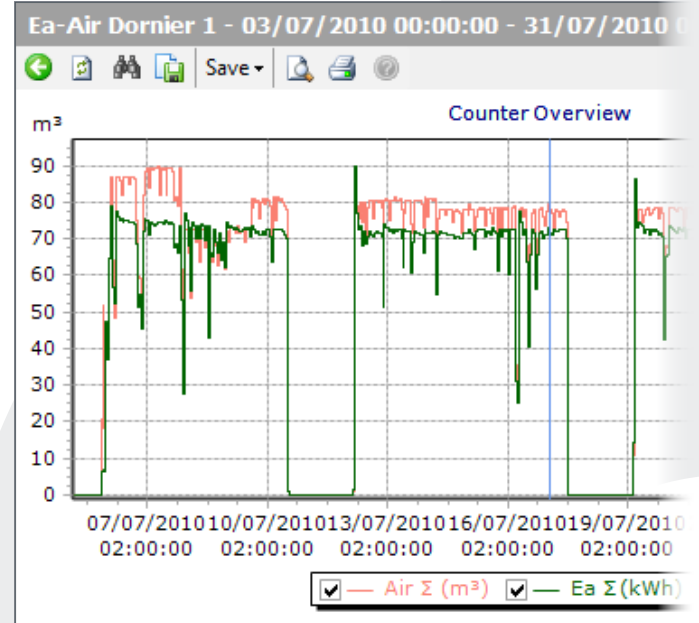
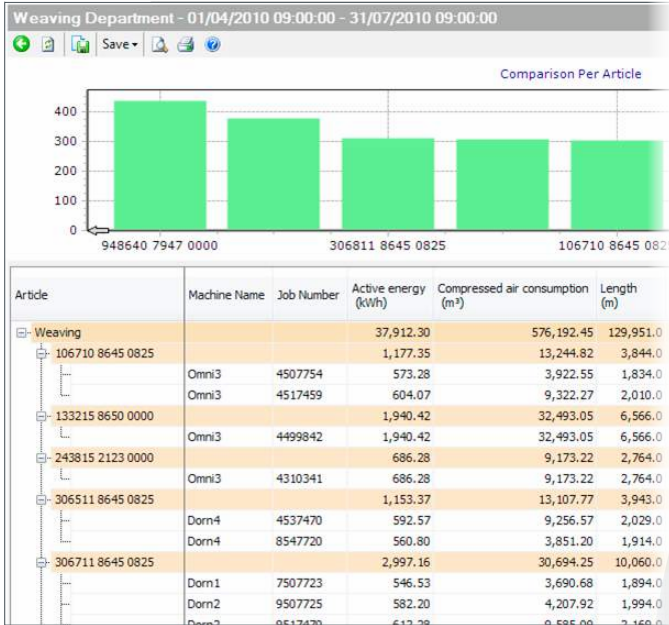
## Grey fabric inspection

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.



## Energy monitoring



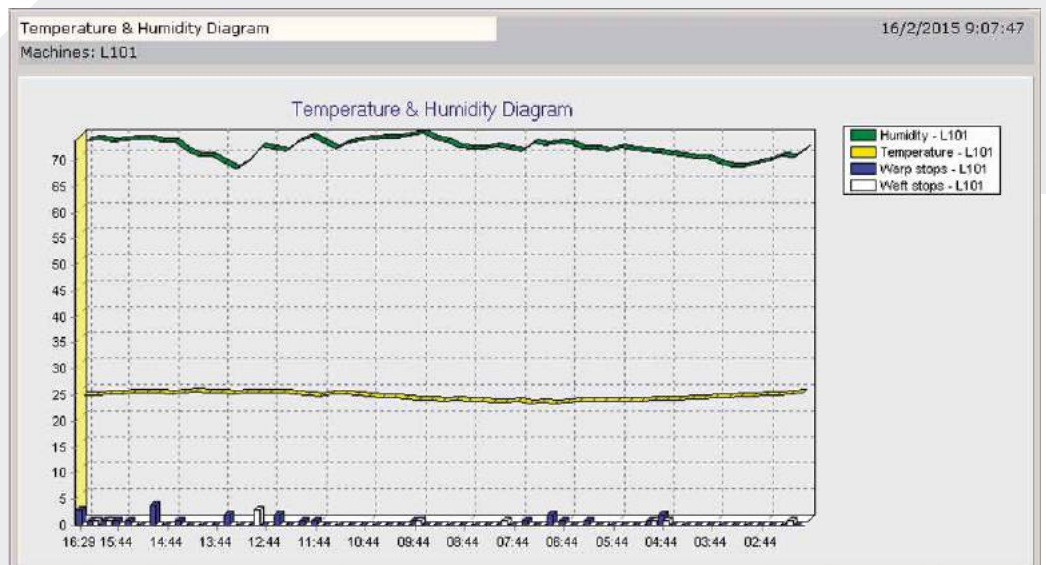
## Monitoring and reporting energy consumption

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.

- ▶ Climate evolution in the plant
- ▼ Temperature and humidity sensor



- ▲ Trend of electricity and compressed air consumption for a selected loom
- ▶ Electricity and compressed air consumption by style



## 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.





# Monitoring preparation and finishing departments



Machine Information

**6.06:00**

**RUN**

Rope Number	ABC67/04	Rope Style	C7713R
Work Order	ABC67	Card Color	Dark Blue
Yarn Code	RS0081-1DA	Cylinder	3043
Yarn Lot	CS0200-1DB	Planned Length	13500
Yarn Blend	Tencel	# Ends	461
	Shift to Date	Job to Date	Warp to Date
Meters Produced	2420	3783	2936
# Stops	17	62	69
Machine Eff. %	84	55	
RPM (m/min)	152		

- ▲ DU11 warp order status screen
- ▼ DU11 on a warp preparation machine



## Warp preparation department

**WEAVERMASTER** 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, **WEAVERMASTER** 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, **WEAVERMASTER** continuously updates the ERP system on the status of each finishing batch.

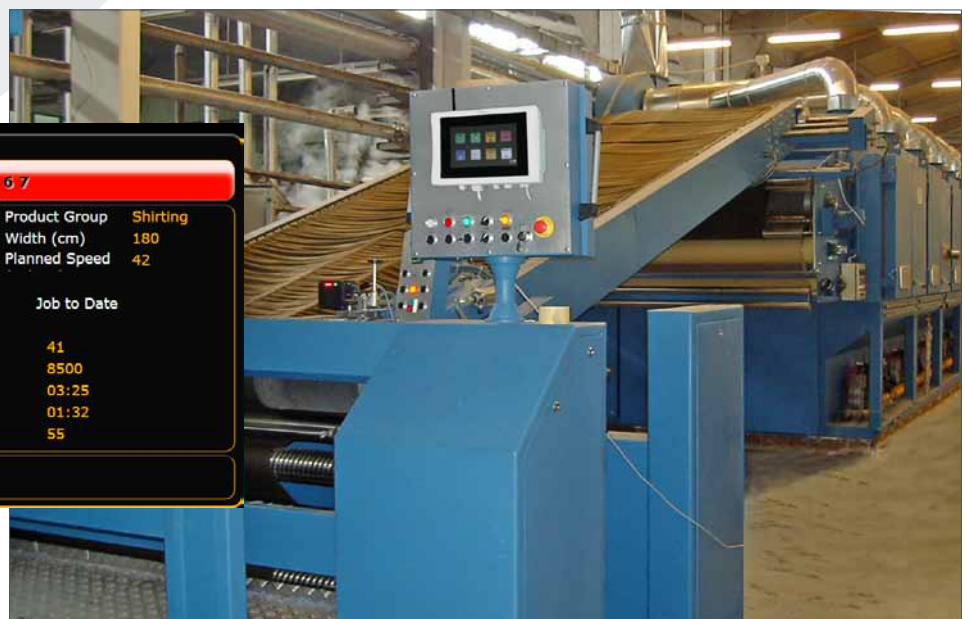
- ▶ DU11 on a finishing machine
- ▼ DU11 finishing order status screen

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	







## References



## WEAVEMASTER modular concept



**BMSvision**

In Pursuit of Productivity



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