SAEL s.r.l. *Via dei Genieri, 31 36040 TORRI DI QUARTESOLO (VI) Italy*
Tel. 0039 (0)444-582499 Fax 0039 (0)444-582262
http:www.sael.it Email: *commerciale@sael.it*

EXPERIENCE IN SHEETERS ELECTRONICS REBUILD

NEW ENTRY SAEL SERVICE POINTS 2008-2009

medpaper *MEDPAPER Lormont, FRANCE* Tel : +33 556 402 994 Fax : +33 547 382 994	B.R.I *Tunis, TIUNISIE* *Bureau de Representation Industrielle* Tel : 0021679494 660 Fax : 0021679494608	PROLEC GROUP S.A.R.L *PROLEC group Beirut, LEBANON* Tel: 00961366 61 48 Fax: 009611564049	ElMechana L.L.C. Technical Equipment Company *EL Mechana L.L.C* *P.O.BOX 181216 DUBAI, U.A.E.* Tel: 00971043385141 Fax: 00971043385142

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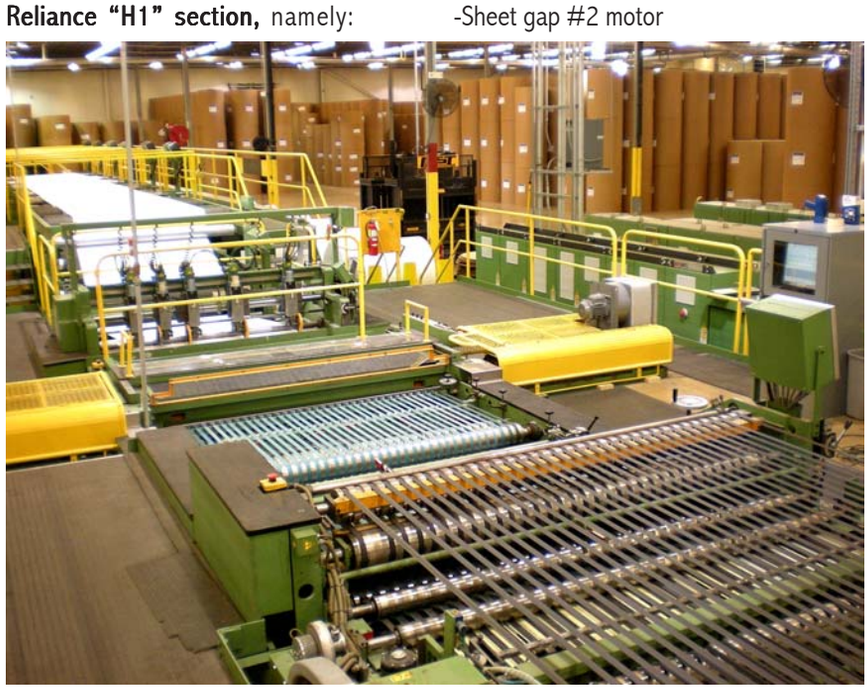
The history of SAEL in the field of sheeters is linked with Milltex S.p.a., one of world level company to which SAEL supplies electronic design, panels, commissioning and assistance service for a great number of sheeters and paper processing systems installed worldwide. In parallel to the company's main mission focused on new systems, **SAEL has gained significant experience in rebuilding and modernizing old systems** in need of changes or renovation to solve old electronic spare part procurement problems and to increase and improve machine production rate and accuracy. The description below relates to a recent technical intervention carried out at the Chicago branch of a major US paper mill. The operation consisted in **upgrading a Bielomatik sheeter** made in the early 1990s. The machine consisted in six unwinders with automatic reel loading system, automatic web guide, automatic faulty product reject function, electrically synchronized knife-drum group with a double motor outputting a top speed of 350 m/min, sheet gaps and stackers for collecting the sheets on pallets and automatic top speed stack exchange sequences, and additional outlet for packs (reams). The sheeter worked in combination with other automatic pallet/ream handling systems leading to the final storage area.The original automation system included systems called SMP and HXE (racks formed by obsolete Siemens boards) and a Siemens series S5 PLC. The single blade was managed by a Reliance unit which included DC motor control choppers and a rack formed by proprietary boards for processing analog references and interfacing with the rest of the line. The total lack of spare parts and a major breakdown convinced the customer that the system needed to be modernized. The intervention was planned as follows:

Complete replacement of the entire Reliance "H1" section, namely:

-Master and slave blade "Direct Drive" motor control
-Interface with Bielomatik part
-Line input management and power and auxiliary distribution to all other cabinets
-Serial interface with SMP part for data communications
-User interface for work, system and debug settings

Additional control implementation for:

-Draw roll motor
-Sheet gap #1 motor
-Sheet gap #2 motor



Bielomatik sheeter after rebuild

on left: old Reliance cabinet and control rack

on right : new SAEL cabinet

all previously residing in Bielomatik cabinet # H2

Replacement of existing DC motors with new vectorial, asynchronous, high-performance AC motors

The supply therefore consisted in replacing the entire Reliance section. By exploiting the efficiency and compactness of the components, even the drives of the draw roll, sheet gap #1 and sheet gap #2 could be fitted in the new SAEL section maintaining line input and power distribution to the other sections in the original position. All in the same dimensions as the original Reliance panel. The new SAEL section was equipped with a suitably powered Allen Bradley PLC for managing and replacing all the SMP and HXE + S5 system functions:

-Control Logic series CPU

-Ethernet and Switch HP interface

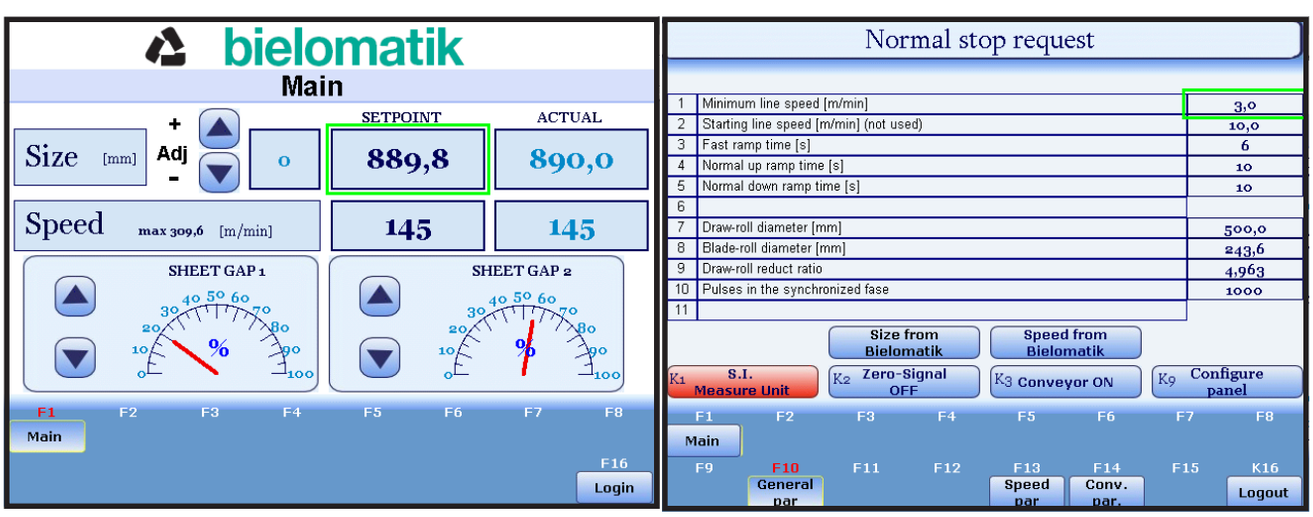
-DI-O boards

-10" touch screen with Ethernet interface installed on main machine control panel

Our Master CAN board with Ethernet interface was used to establish very high efficiency communications between the PLC and the CAN to which all the SAEL Intelligent Drives were connected. We exploited the flexibility and potentials of SAEL inverters to rebuild and improve the required machine functions, including:

-Blade speed profile management with ramp optimization: The old system used nearly exclusively hardware technology and worked with fixed gradient ramps. The new ramp optimization functions of our system confer outstanding fluidity of movements, drastically reduce mechanical stress on blades and on mechanics, and ensure excellent cutting quality, quiet operation and a remarkably longer blade life.

-High cutting size accuracy: The use of very high resolution transducers combined with the cutting performance of SAEL inverters provide a cutting size accuracy in the order of tens of a millimeter on the entire range of use of the machine, i.e. from size 400mm to size 1650mm, at the top speed allowed by the manufacturer. Machine performance was limited to the original rates declared by the manufacturer to prevent damage to mechanical parts.



HMI supervisor screen - main pages

Above:
New knife AC motor after rebuild

On left :
New HMI panel installed in existing control desk

-Millimeter sheet spacing management: The old sheet gap #1 motor was controlled by a V/F controlled inverter, that the customer said has always created jamming problems due to space changes between sheets at sheeter outlet not allowed by the machine, with consequent problems of rejection and overlapping. The new electronic axis vectorial control of the motor ensures perfectly constant spacing, and is easily settable from the operator panel. One of the most delicate problems to be solved in machines of this type concerns obtaining very high control performance and eliminating processing time delays to the maximum possible extent. This used to be generally possible only by using analog control systems. Studies based on experience and the results gathered from various machine types has allowed SAEL to develop an all-digital architecture control system with performance comparable to that of an analog system. This means that all analog signals can be eliminated, providing huge benefits in terms of reliability and operations in addition to total interference immunity.

The customer also solved servicing problems with this supply:

we organized training courses to introduce the new system to operators and to instruct them on the procedures needed, for example, to implement minor changes. Furthermore, the panel was equipped with a fully independent computer interfacing with the PLC and with the drive network. The computer monitors all machine functions and remote servicing from the SAEL headquarters is possible via the **Internet using I.W.S.A.**

The following variables were set up on the operator panel:

-Preset cutting size display (acquired by Bielomatik via serial line), with possibility of setting data enabling if the communication is down.

-Current machine speed display (acquire via analog line by Bielomatik), with possibility of switching reference to internal ramp generator and set-point definitions if the SMP system is down

-Real cutting size display

-Possibility of size up-dn set-point correction with machine working in 0.1mm steps, max +/-2mm

-Sheet gap #1 space setting at sheeter output

-Sheet gap #2 space setting

-Possibility of switching all variable readouts: SI standard or US

-Display of alarms and warning messages concerning new machine management

-General operating parameter settings and control system adjustment.