INTO THE PAPER ELECTRONIC AUTOMATION EVER, SAEL REBUILT A BIELOMATIK SHEETER IN 15 DAYS AT CARTIERE DEL GARDA. THE OLD CABINETS HAVE BEEN RENEWED ALLOWING A THREE SHIFT/DAY PRODUCTION. THIS PROJECT WAS AN ELECTRO-MECHANICAL UPGRADE – MADE IN COMINATION BETWEEN THE PAPER MILL TECHS AND THE SAEL AS WELL – FOCUSED ON BETTER EFFICIENCY, CUTTING QUALITY AND HIGHER SPEED: **ACTUALLY, THE SPEED HAVE BEEN INCREASED BY 10%.** THANKS TO THE SOFTWARE IMPLEMENTAITON THE MANAGEMENT LINE GOT A GREAT BENEFIT IN TERM OF CONFIGURATIONS AND VERASILITY.

SAEL s.r.l. Garda Papermills

by: **Paolo Andrighetti SAEL s.r.l.**

Engaged by LECTA group, SAEL made the BIELOMATIK sheeter – P1089/DD-S - revamping at Riva del Garda Plant. The main Lecta objective was to solve the production stops caused by the old automation system as well as the unavailability of the spare parts. Beside this goal, together with MILLTEX, Sael implemented the longitudinal cut format numbers. The Sael/Milltex partnership ensured the on time delivery as well as the warranties required by Lecta.
The whole supply involved:

- Old DC main motors electrical cabinet substitution with a new one by Sael having: end line; AC distribution and link with the existing cabinets; DC-Bus and new AC motors Inverter

- Original wirings modification inside the cabinets (controls placed above the machine) – re-used – and the logic PLC S5 N.1 replacement vs. a new PLC S7 (supplied and properly wired with interface options – plates pre-wired; ET200S remote stations; interfacing relays and terminal box.

- Internal components and wirings modification inside the existing cabinets (controls placed under the machine) – re-used – and

Bielomatik P1089/DD-S Sheeter – end part. Rebuilding at Garda

ONE Drive

the logic PLC S5 N.2 replacement vs. a new PLC S7 (supplied and properly wired with interface options – plates pre-wired; ET200S remote stations; interfacing relays and terminal box.

- Complete wirings dismantling inside the existing cabinets (controls placed above the machine) – re-used as support, and SMP microcontroller unit substitution vs. the new PLC S7 supplied and properly wired with interface options – plates pre-wired; ET200S remote stations; interfacing relays and terminal box for a "pin-to-pin" to the original SMP unit.

- Complete wirings dismantling inside the existing cabinets (controls placed above the machine) – re-used as support, and "HXE" unit substitution vs. the new PLC S7 supplied and properly wired with interface options – plates pre-wired; ET200S remote stations; interfacing relays and terminal box for a "pin-to-pin" to the original HXE unit.

- Main Drive control unit partial modification (+P10) – a new pre-wired plate with a 15" LCD touchscreen panel, will replace the original controls. Actually this pc panel will have a PROFINET interface for CPU master and the new PLC S7 installed.

Complete view of the sheeter rebuilt at Cartiera del Garda, LECTA Group.

- Main Drive control unit partial modification (+P11) – a new pre-wired plate with a 15" LCD touchscreen panel, will replace the original controls. Actually this pc panel will have a PROFINET interface for CPU master and the new PLC S7 installed.

- New Knives positioner system – STEP Drives for the STEP motors control – mounted on two pre assembled plates. The two plates will be installed into the existing SMP (+H10) cabinet.

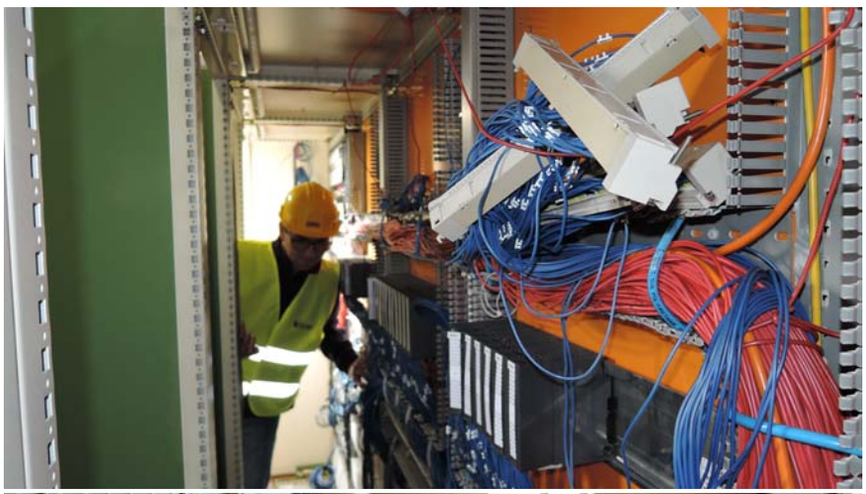
- Main pull drive by AC motors, as well as knives and belts – mechanical engineering, installation and supervision included -.

- New longitudinal knives Dines TOP to TOP drive and cabinet supply. This drive is used for the changing size – by adding a fifth knife with all the mechanical options -. Also in this case the engineering, the mounting and the supervision are included.

- Q.ty 12 new programmable multiturn slip ring transducers, used for the open/closing tail stock position.

- Q.ty 6 new load cell amplifiers – PROFIBUS interface – used for the real unwinding paper pull measurement at each unwinding station. This system implemented the paper pull management of every single unwinder via PLC S7 automation control – by a dedicated main screen option for the pull setting -.

Up view: Electrical wirings, Knives by Dines + SMP-HXE electronic and the old Bielomatik DC motors aborted



SX: new AC motors vs. old DC motors, before the rebuilding
TOP: Operations during the Cabinets Drive wirings. Old cabinets re-used.

· Old main drive DC motors replacement by AC motors and gear motors whenever required. First belts motor displacement – sized according to the machine needs – in emulation of the existing DC motors. Beside the new AC motors, the SAEL supply also included the options as well as the engineering and the mounting; the mechanical and electrical supervision; the new fixing baseframes.

- Turnkey team supply for all the mechanical and electrical operations like:

o Existing transducers replacement and positioning.

o Diameter reading transducer replacement.

o Machine main display replacement.

o New engineering station composed by: PC; 22" LCD monitor; keyboard and trackball; ETHERNET double interface – for Intranet and LAN/WAN remote assistance –paired to the new drive for:

o DRIVES/Mastercan ONE SAEL Programming/Diagnostic (SAELs AZ Runner licence included).

o PLC S7 and PROFIBUS/PROFINET nets Programming/Diagnostic. Temporary operator panel emulation in case of maintenance and documentation management (PDF diagrams; hand books; S/ Manager licence, and so on).

o IWSA Remote assistance (LAN/ Router INTERNET connection upon the customer)

o New 32" LCD Wide screen monitor (OPT. 3) Programming/ Diagnostic with future possible customizations upon demand (Programming licence included).

Recipe management integration

Made via the main operator panel, by production recipes and pre-set automatic recall. Below the main data to be entered:

· Unwinding coils/material type.
· Production sizes.
· Line speed.
· Unwinding material pull
· Rectifiers positioning.
· Unwinding groups automatic positioning.
· Overlap trolley automatic positioning.
· Longitudinal knives and wing automatic positioning.
· Reams sizes.
· Working pressures / loads.

Production reports

A SQL database will manage and

compute several data from the PLC. The computing will provide data in a similar way to the original version benchmarked by the customer.
Below some data form our SQL database, to be read by the customer SW system. The merge of the two system will provide:

- Stops report (root-causes, quantity, times, percentage).
- Daily production report (times, quantities, scrap causes, production data).
- Monthly production report (times, quantities, scrap causes, production data).
- Shift production report (times, quantities, scrap causes, production data).
- Single Order production report (times, quantities, scrap causes, production data).

IWSA – Internet Worldwide Sael Assistance – REMOTE ASSISTANCE

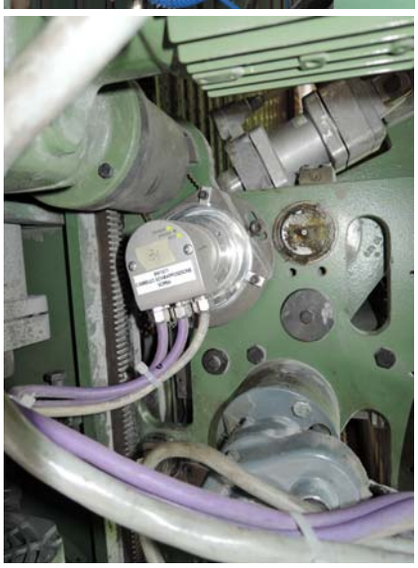
The system includes the IWSA (Internet worldwide Sael Assistance). Via internet, in a real time, it is possible to support any kind of software trouble or simply install new software, updates, modifications up to the PLC. Supervisor and SAELs Drives. IWSA has been used for the commissioning as well: thanks to its architecture we linked the supervisor system to a plant Host, or other devices, via Ethernet net.

.....THE JOB AT THE PLANT.....

The supply is a "turn e key" who encloses the placing of the new electrical cabinets, modifications of the existing cabinets and the rebuilding of the electrical connections; the mechanical mountings – made in partnership with INDEXA ITALIA 2 -. Since the first tests during the star up, the customer got a quality implementation in terms of cut, machine speed: numbers who can easily drive to a short term Return Of Investment!
The daily making went through many aspects normally discussed between the mechanical engineer/supplier and the Electronic engineer/supplier. Standing in front of a running machine, Sael – with 30 years of experience – made a deep investigation of the Bielomatik management system. This recognition allowed to re-study some actions that the operator has to do avoiding production scraps. All the motor settings, the algorithms and the sequences have been integrated and offered by a new Siemens PLC S7 – with a Siemens MP277 video-keyboard – gave a better interface between the operator and the machine. The automation is managed by a 314C CPU – with a profibus net – is on line with the Drives and the remote I/O. The "INTELLIGENT DRIVE" Drives communication is also made via CANBUS, with a robust and fast transmission of the data to the Pull, Knife, Belts and Rolls. Through this net is managed a synchronization between the Pull motor and the Knife motor too – with the best accuracy and short time during the change -.

UP: PLC S7 300 used vs. the old 115U

SX: all the sensors and transducers have been replaced with standard products (Profibus based).



The original DC motorization have been replaced by AC laminated motors driven by SAELs VD inverters. Our drives use the same communication independently to the application – AC and DC – and this was a main strength for this job. As soon as the drive joins the PLCs Profibus net, it receives and sends speed and alarms information about the converter/motor. More over it expands the PLCs I/O becoming an I/O likely. Each DRIVE board, which has 4 analogical input, 4 analogical output, 8 digital I/O and 2 encoder input up to 200khz, sends all those data to the PLC, getting the system better, richer for any regulation and less expansive in terms of less periphery needs. Another important feature of this rich architecture is the algorithm computing inside the drive without overloads of the PLCs CPU. Positioning, servo diameter, signal filtering using 3rd degree algorithms, computing, electrical trees, cam, load cell regulation, speed adaptations, are possible. All the results are sent to the PLC: This allows the regulation of many other motors or external devices.

Many realizations were made using Siemens PLC S7 and SAEL own products ("Intelligent Drive" inverters and dc converters), easy to use, reliable and engineered for the paper mill industry – by a custom bridge board based on CAN-bus communication. Without extra costs our inverters and dc converters can work with any PLC available on the market by exchanging reading and writing words.

Every SAELs product is engineered and made to meet the customers needs, using less components possible. Every application realized with our drives requires a simple PLC only. Each drive – AC or DC – is equipped by the same main board: it means less spare parts on stock (just one regulation board, IGBT or Thyristor and that's it). Our AC or DC drives are up to 1MW. To be on line with our customers need, as well as the technology evolution, we have a committed Team working on R&D and Software developments. By an objective benchmark vs our competitors, there are main differences on Paper Mill main drive, Calander, Winder or whatever else: The performances got with a specific, fully dedicated drive as the SAEL "Intelligent Drive" are fare above compared anything else available on the stand alone market. Beside the own drives, the international majors, use closed systems: in other words, it wont be possible for any system integrator to parallel his offer to ABB ®, or SIEMENS® using stand alone products. That's why, at SAEL, we decided to develop our own complete package, and trying to make it better and better! This is the key to compete against the international brands. Based on the "digital sectioning drive" our system is the first without the cascade MASTER process: actually the intelligence is inside the AC or DC

The new monitor 40" to show the production data of the sheeter, Cartiera del Garda.

itself. Our solution is highly appreciated by the customers, the operators and the technicians of the paper industry, because it perfectly fits to their applications. Supported by 1Mbit CAN BUS high speed MULTIMASTER net, the regulation is made inside the AC or DC Drive. The classical PROFIBUS MASTER/SLAVE systems are fare behind our solution, because too many nodes in the network slow down the communication speed, tremendously! The cascade offered by our system offers 6Msec speed per 60 AC or DC motors. More over, beside that, SAEL offers its "REBORN" device: the best solution to re-use your old drive and saving 50% off at least! We have been pushed to this incredible solution because all drives get older, and we do care about customers and their savings! REBORN is highly efficient, great quality, tough and rough. We replace the ole regulation board with our ONE "intelligent drive", re-using the existing old components possible (eg: SCR bridge, Fuses, Reactance, etc)