



THE SHEETER PROTOTYPE MADE BY JAGENBERG WAS OUT OF ORDER ONE WEEK LONG. THE COMMITMENT AND THE HIGH FLEXIBILITY OF THE SAEL'S TEAM ALLOWED TO RESTART WITHIN TWO WEEKS OFF THE FIRST INSPECTION. THE COST EFFECTIVE SOLUTION AND THE SHORT TIME REQUIRED, PUSHED BURGO TO RENEW THE ENTIRE SHEETER DRIVE – AFTER THE EMERGENCY – TAKING ALL THE MATERIAL USED IN THE FIRST STINT. **AFTER ELEVEN DAYS TO THE FAULT ONLY**, ALL THE MODIFICATIONS WERE APPLIED AND THE MACHINE WAS ENABLED TO PRODUCE AT THE MAXIMUM SPEED PERFORMING THE BEST CONDITIONS EVER.

# SAEL s.r.l. Burgo Toscolano

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**One** week of fault at the Toscolano Jagenberg sheeter was enough to push for a deep revamping of the electrical drive machine. The stop was caused by a fault of the existing drives – equipment made by an important international brand -, and the spare parts availability was too long. Due to that the management agreed with SAEL to go for a two-step job: a quick action to replace the drives and the regulations; a complete electrical equipment rebuilding as a second step to be done within the year. After eleven days to the fault, the machine was enabled to produce: this quick reaction and efficiency is the best proof of our Team's commitment. Actually our openness to evaluate other solutions of existing equipments made by other brands is the value proposition to the customer's technicians who are looking for different perspectives vs. the most known companies.

Since the beginning, and focus on the customer loyalty, SAEL listens to the input and problems coming from the Paper Mill Plants, and offers good – cost effective – solutions.

As far as the subject is concerned, we had a first meeting at Toscolano the 19<sup>th</sup> of June. The day after Burgo got our offer, with enclosed technical proposition, and the 23<sup>rd</sup> of June the

order was discussed and agreed. Materials delivery and take in place on 1<sup>st</sup> of July; full production within the 5<sup>th</sup> of July: the best efficiency result ever!

The emergency caused by a broken motor board over the rack, was solved replacing the two drives – the pulling and knives – with our “Intelligent Drive”. Originally those two motors



**Electrical cabinet of Jagenberg Synchro, Burgo Toscolano step1 emergency**



were controlled through a Jagenberg microprocessor rack – with no longer spare parts – managing all the speeds and synchronizations. The SAEL “Intelligent Drive” incorporates those functions, fitting perfectly to the application. Since the first touch, was known that with our Drives was possible to replace the existing as

much as bypass the alarms driven by the microprocessor linked to the S5 PLC. The mission was hard because the rack was linked to many PLC via I/O signals and communication data lines. To connect the system it was mandatory the rebuilding of some sheeter basis functions and signals as well. Due that a deep S5 Sw-Hw analysis of the old equipment took some time.

To save time and money, the proposition was to replace the two power units by the DC SAEL drives, using all the existing wirings.

A box with PLC and Profibus-DP CPU – linked to the SAEL Drives and the existing I/O - was mounted on top of the old equipment. This way managed the Knives signals coming from the SAEL Drive and related to the operator requirements. To the parameters management and alarm display, a Touch Panel was mounted upon customer demand. Thanks to the Hardware and Software solutions

brought, the performances have been raised up – accuracy and scrap limitation – getting the best ever machine. The new system fulfils all the safety functions: size speed limitation, knife maximum turns, and so on. Avoid mechanical problems and based on the machine manufacturer prescription, the maximum speed was fixed within 300 m/1', as much as the sizes (450/1650mm). After the successful step one - main emergency solution – we went into the step 2: the rebuilding of the old cabinets made by Siemens. To get this job done, we had two month in front of us. The old Siemens / Jagenberg equipments were equipped by connectors used to join all the machine slots. During the first step, a deep check of any single actuator was done. This hard job paid off in term of quick commissioning.

As usual the SAEL's Team does not stops itself to the strictly job committed, but always looks at



**Before and after the emergency stop -step1- we restart the sheeter in one week**





**First production testing - after only 11 days from shutdown**

chambers of improvement at any side of the machine. The study of the old cutting system, as much as the overall machine, pointed out some weaknesses. Actually the Burgos's

technicians went into a positive review and agreed to apply the modifications. A particular attention was paid to the safety. The entire coils braking system was rebuilt: a remote unit who controls

a sensor via Profibus-DP now drives every coil.

This new solution has several advantages versus the old one – who assumed an equal pressure for all the coils -. Some of the main achievements are below listed:

- The independent pull management allows any material and bending differences compensation between the coils.
- Machine programmable diameter stop.
- Automatic nr. of coils detection and braking enabling – to a proper management as much as sheets counting -.
- Over-braking management on emergency stop phase – thanks to the coil inertia calculation any paper injuries happens, as much as a quick restart of the operation -.



**View of the complete cabinet after the emergency restart -Step1-**





**New cabinet after the complete reconstruction -step2-**

- Old pneumatic circuits elimination.

Thanks to the SAEL's know-how on sheeter, an important innovation has

been applied. Better cutting accuracy at low speeds: the best achievement ever for this machine.

The technical evolution and the new machine management sequences to the pallet changing, allows a tremendous scrap reduction and a better machine driving as well.

The software graphical interface is nice and very friendly user. It allows to anyone the quick data exchanging, computing the production change, and programing some jobs to do eventually.

Thanks to the automatic control settings, the custom made software prevents any fault at the normal condition. This makes the operator job easier, permitting to focus on the quality production controls.

To a full independency form the cycle computing; each synchronized drive is made via hardware. This is the best job condition.



**View of unwinding station of the sheeter Jagenberg**





**Degressive breaking implementation for each reels**

The equipment delivery occurred on mid of December and the sheeter take-over during Christmas time. The plan activity before the game,

allowed the Paper Mill team to replace the cabinets and all the other side jobs in a very short time. After six days to the take in place all the tests and the

paper simulations were done, and the machine was ready to produce full time.

The following two days were focused on productivity implementation; fine tunings, and operators training. All those jobs happened few days in front of the planned dates.

The Paper Mill Management and the operators too, were happy of the achievements:

Production speed increased; Short time to production changings; Less jumps up thanks to specific tools; Easier driving; Tremendous scraps reduction due to a better condition at the lower speed 20-25m/min – the old system caused the entire production scrap below 60-70m/min speed, and a too fast acceleration / deceleration ramp about two minutes -; Quality improvement due to an accurate cutting precision and a better breaking system; New



**View of rebuilt Jagenberg sheeter with new electrical cabinet - Burgo Toscolano papermill**



**View of cutting area – Jagenberg Synchro sheeter rebuilt with new cabinet, drive and automation**

hardware and safety tools who do not allow any machine over-range use; Better diagnostic system who detects all the troubles; Simplified and well documented hardware architecture; Easy software tools.

The “INTELLIGENT” Drive series by SAEL are linked to each other’s via a second CANBUS network. This provides a faster data communication between the Cut, the Knife and the Rolls; more over the pull motor and the knife motor synchronization – with high size accuracy and a fast shift. When linked to the PLC Profibus network, each our DRIVE acts as a remote I/O with a lot of back and forth motor/drive alarm information to the PLC. Each DRIVE Board has 4 analogical input and output, 8 Digital I/O and 2 encoder input up to 200khz, and sends the data to the PLC avoiding periphery hardware – cost savings – and providing a lot of elements for the best management ever.

Another plus of this system is the DRIVE algorithm inside capability – without CPU and PLC overloading -. Inside the DRIVE it is possible the Positioning; the Servo-diameter;

Signals filtering by having algorithms up to the 3<sup>rd</sup> degree; Counting; Electrical Axes; Cams; Load Cells regulation; Loads splitting; Speed adjustments and send to the PLC all the results. The data provided by the DRIVES can be used to manage other motors or any external device. Having all the “INTELLIGENT DRIVE” products – Inverter and d.c. Drives -, tough, rough and easy to drive, many applications fit to S/ SIEMENS PLC are available with a direct Can Bus BRIDGE Board. Thanks to the easy “word script” mode, all our Drives can talk to the standard market PLC without extra costs.

Every job made is based on a standard PLC.

The original strength of our DRIVE is to be based on a single common BOARD for any power section. This is a great benefit to the Paper Mill Stock management because of the less spares required: Just one board, an IGBT stack or Thyristor. That’s all!

This is our way to show the “customer orientation” as much as “the spirit of improving”. Our Competitor are far away from our Paper Mills, Calanders;

Sheeters; Rebo applications. An objective benchmark shows that simply using standard market drives the performances are fare behind.

To achieve good results the main international brands must use own closed systems with their drives.

This is why SAEL went to an own system, and the most important Paper Mill customers award our brand as the best so far.

Our system, based on a digitally “sectional drive”, is the top of the market because do not have cascade MASTER computing. The intelligence is inside the AC or DC DRIVE. This system has a lot of supporters within the Paper Mills maintenance people, because fulfil any technical need of their application.

The refs are managed by the AC or DC DRIVE and supported by a High Speed 1 Mbit/sec CAN BUS MULTIMASTER network. This is a real benchmark for all the competition who normally use Profibus MASTER-SLAVE networks – having slow speed when multiple users are linked to the network -.