

EVER INVOLVED IN PAPER CUTTING MACHINE RENEWING, SAEL STARTED UP IN **PKARTON PAPER MILL**, THE NEW ELECTRIC EQUIPMENT RENEWING ON JAGENBERG SYNCRO FLY DUPLEX PAPER CUTTING MACHINE. IN SIX DAYS THE OLD **PASABAN DRIVES** WERE SUBSTITUTED AND THE PLANT WAS RESTARTED ON THREE TURNS PRODUCTION. THE NEW EQUIPMENT HIGHLY INCREASED **EFFICIENCY**, CUTTING **QUALITY** AND PRODUCTION **SPEED RISED BY 20%**.



# SAEL: Jagenberg Syncro Fly

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**SAEL from Vicenza**, completed for PKarton Paper mill in Roccacione Cuneo plant, the start up of the JAGENBERG SYNCRO FLY electric equipment. The job consisted in reusing all possible electric hardware in the old electric cabinet, using our **REBORN system applied over the original drives power circuit**. The existing electronic automation, which has been completely replaced, was made with Pasaban company proprietary drives, which

in the first nineties reconstructed the control system using a customized electronic card cut control system and an S5 PLC controlling the sheet reject device, the drives speed references, the whole motor system and pallet unit management with automatic load and unload. The order was already defined at the end of October, but for problems due to a fast worsening of the situation for a number of faults in the turn of a few weeks, we were asked to perform an

emergency intervention to be carried out in very short time in the few days of the first available plant stop. In practice it was decided to divide the job in two different sections to be worked out in two plant stops. The first of which, granted reliability and cut precision while the second one, to be performed in future, included substitution of remaining microprocessor cards (that at the moment do not represent a big concern) and of the old S5 PLC with a newer S7, to



**PKarton PAPER MILL, AUTOMATIC PALLET CHANGE, SAEL Intelligent Drive**



#### SHHETS CUT BEFORE THE STACKER, PKarton PAPER MILL

control all the machine automation. The job begun with the control cabinet electric wirings, supervised by our engineers and executed by the skilled and valid PKarton Paper Mill technical staff. This well performed activity, allowed a rapid and fluid plant testing and start up. The first job step, performed in synergy by SAEL and PKarton, granted since from the first tests during start up, a great improvement of cut quality that, added to the raised reliability in time

and increased production speed, confirmed the value of the work made. With the substitution of drives control cards and microprocessor control system made in the first renewing step, a fair number of spare cards were freed to grant a sufficient operational ease waiting for step2, when the control system will be entirely renewed.

**General paper cutting machine features are:**

- year of construction 1980
- cut width: 3800 mm
- format width: 600-2030 mm
- Max. speed: 250 m/min
- Cut precision:  $\pm 0,5$  mm format  $< 1000$  mm  $\pm 1^{\circ}/^{\circ}$
- Angle precision:  $\pm 0,3$  mm for 1000 mm side length
- Sheet storage: max pile height 1700 mm
- Machine load: load stations 2 with motorized unwinding stations
- Braking: electric of depression type with servo diameter for the two payoff motors

The implementation had to take account of several unusual features that very often when you make new electrical systems for this target are transmitted directly from the mechanics designer to the electronic automation engineers. Having as an input only a working plant SAEL, **strong with the experience acquired in many renewing jobs performed on Jagemberg machines**, was able to carry out a precise reconstruction of control systems and methods used on this plant from the previous dealer, and propose an appropriate offer to limit main control problems operating in two subsequent steps. This survey was also intended to



SYNCO FLY JAGENBERG CUTTING MACHINE PAY OFF, PKarton PAPER MILL





**SYNCRO FLY JAGENBERG CUTTING MACHINE OVERALL VIEW, PKarton**

ergonomize operations that the control staff must now perform so as to avoid mistakes or oversights that frequently result in scrap. **The PASBAN microprocessor system** of this plant, which spares are no longer available, was composed by a series of microprocessor cards in different racks with displays to control cutting blades motors, automatic squaring, sheet rejection, defect detection and to end automatic fork pallet unloading (up to 35 AC motors with automatic positioning) put after the paper cutting machine. The system currently implemented, runs the command of sheet rejection so as not to create possible jams that can damage previous sheets or immediately upcoming the scrap one. This is possible taking into account the position of each sheet and the response time of the mechanical part. Similarly, when a defect is detected prior to entry into the cutter, the system will discard the bad sheet with the ability to program the number of sheets before and after the scrap. As multiple sheets could be on the carpets, it is necessary to make a sheet tracking to know where the bad one is to open the sheet reject device at the right time. The **two blades that cut different formats** are controlled by an algorithm format-speed also including the automatic squaring; the carpets and the

stacker are set automatically according to the formats of the two blades cut directly from the supervisor. The system is fully automatic and does not require any adjustment by the operator. A further problem not easily solved, has also focused on repetition, precise and interlocked of all pant movements. Every single movement and the automation combination, especially in the pallet unit was designed with predict function to be executed with no time delay during the start up. All motors settings, the algorithms and machine sequences, will be integrated and presented anew through the Siemens S7 PLC, coordinated by our supervisor, makes

good interface between operator and machine providing the usual tele-service IWSA on the whole control cabinet. Automation is run by a CPU 317 which holds the PROFIBUS network, interacts directly with the drives and peripherals remote I/O system. The adjustment of the blade angles, is assured by interpolated control directly managed by the PLC which detects the cut path via an absolute encoder read in PROFIBUS. The drives of the series **"INTELLIGENT DRIVE"**, also communicate with each other through a second CANBUS network that allows a fast and direct data transfer between draw roll, knives, carpets and conveyors. Through this network is also made synchronization between draw roll motors and the blade ensuring size accuracy and fast speed change. Our drives, which maintain their communication quality even through different converters kind (AC and DC), proved to be strategic in the realization. Each of our drives, once connected to the Profibus PLC, as well as receive and inform the PLC on converter/motor alarms and speed rate, allow to reduce the amount of needed PLC I/O acting as a remote I/O unit. Each DRIVE card features on board 4 analog inputs, 4 analog out, 8 digital I/O and 2 encoder inputs up to 200kHz, can transmit this data to the PLC, enriching the system with control facilities and allowing to eliminate expensive devices. Another additional possibility that a so elaborate



**AUTOMATIC FORKS PALLET CHANGE SYSTEM, SYNCRO FLY**



### **SYNCR FLY DUPLEX, ELECTRIC CONTROL CABINETS PASABAN TIRES**

architecture can offer, is the development of various algorithms directly in the drive, without overloading the PLC CPU. Inside the drive it is possible to control positioning, servo-diameter, filter the signals using third degree algorithms, perform calculations, gearing, cams, cell regulators, load split, rate adaption and then send the results of these counts to the PLC. In this way the results can be used to control motors or other external devices. Relying more and more on SAEL products (inverters and DC drives "Intelligent Drive" series), simple, reliable and specifically designed for this sector, many applications were made in conjunction with the Siemens S7 PLC with which it was created through a direct dialogue the construction of a Can Bus bridge card. With no extra cost all our

inverters and DC drives, can communicate with the market PLC being able to exchange a series of words in reading and writing mode. Each product has been developed to meet the needs of users while minimizing the items of the control cabinet. All jobs designed using these drives limit the external devices required to only commercial PLC. The peculiarity of the Drive, either DC or AC inverter is to allow the use of a single same card for all powers with the possibility to replace thyristor or IGBT, a spare card and a IGBT branch or Thyristor constitutes the whole package of replacement parts. DC power capability is more than 1MW while AC power is up to 1,5MW. The study and research for the realization of these products have become necessary in order to offer our customers

technical architecture to move with the times. SAEL commitment to in research & design of their products rewarded our efforts, avoiding side effects of continuous and rapid product changes, making devices OBSOLETE in a few years of use. The electronics market in fact, as we see in information technology and household appliances in general, is in fast and continuous evolution. Firms who sell their drives all around the world, must continuously develop products that are categorically less expensive to run after its competitors, a heavy penalty for customers whose drives after a few years are already out of production. Our international systems builders competitors, although certainly unwillingly, are forced to align themselves to this rule being obliged to install parent brand products. SAEL always stands in designing their own DRIVES for the fact that their products, linked to the business philosophy of being primarily a manufacturer of complete systems rather than components, are made to be the longest possible lasting. Another peculiarity of the "Intelligence SAEL" drive AC or DC, is each component reparability; characteristic quite different from producers of commercial drives who provide the complete replacement of any drive in case of breakage. Our system allows you to save significant figures in spare parts. During the start-up operations several checks have been made on the mechanical engineering through our hardware and software, making various mechanical adjustments of the facility that now guarantees serenity and service continuity.



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REBUILDING**