



FURTHER RECONSTRUCTION IN **PAPAER MILL PKARTON**; AFTER THE IMPECCABLE RECONSTRUCTION OF MACHINE 3 IN THE PAST YEAR AND WITH THE FULL INVOLVEMENT OF OUR CENTRAL NORTH SERVICE CENTERS, WAS MADE THE **RENEWING OF ELECTRICAL SWITCHBOARDS AND CONTROL PULPITS OF PAPER MILL MACHINE 2** WITH OUR **DIGITAL CONTROL SAEL "CAN" FIELD BUS**. THE NEW **IMPLEMENTATION OF A DCS AS DRIVES CONTROLLER** WAS MADE THROUGH L'MMI-SCADA SCALINK OF CO.EL.ME. WHICH COORDINATED AND MANAGED ALL DRIVES IN PAPER MILL INCLUDING OUR REMOTE SERVICE IWSA, NOW FULLY INTEGRATED IN THE SUPERVISOR SYSTEM.

## art in rebuilding.... **PKarton**

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

**D**uring the difficult last year SAEL, instead of using copiously state aids for supporting industry in the sharp market decline, has invested in research and development involving its personnel in two projects which have long kept in the drawer and now partly already been applied in paper mill. The current state of the European economy and the paper related market, it wouldn't certainly encourage paper mill owners to invest in new equipment or in replacement of electronic equipment and control systems. There still was a company strongly believing in the next future

that decided during this year, to invest in the rebuilding of the drives of his second paper assigning us the job. According to Pkarton design philosophy, SAEL has put on the field in this new renovation, the first part of its technical revolution which for years had been in preparation and waiting for the right opportunity to be proposed. The recession of this year, particularly strong in its progress, has generated a high availability of time for SAEL engineers previously normally dedicated to plants design and start up. This led to the decision to take advantage of this pause to invest in growing of our systems and put

ourselves once again in direct competition with European sector multinationals, offering the sophisticated technology and excellent performance of our systems for the paper industry. We were so able to anticipate the delivery of these new solution on the market. The first major SAEL investment was on the drive, which has always been our main workhorse. The control board has been revolutionized and in 2010 the new one, will be available to replace all the current three control boards AC, DC, Brushless. Yes! A single control board will in future be the only necessary spare part for all of the



**Overview of the paper mill machine PKarton 2, August 2009, "Reborn" SAEL**

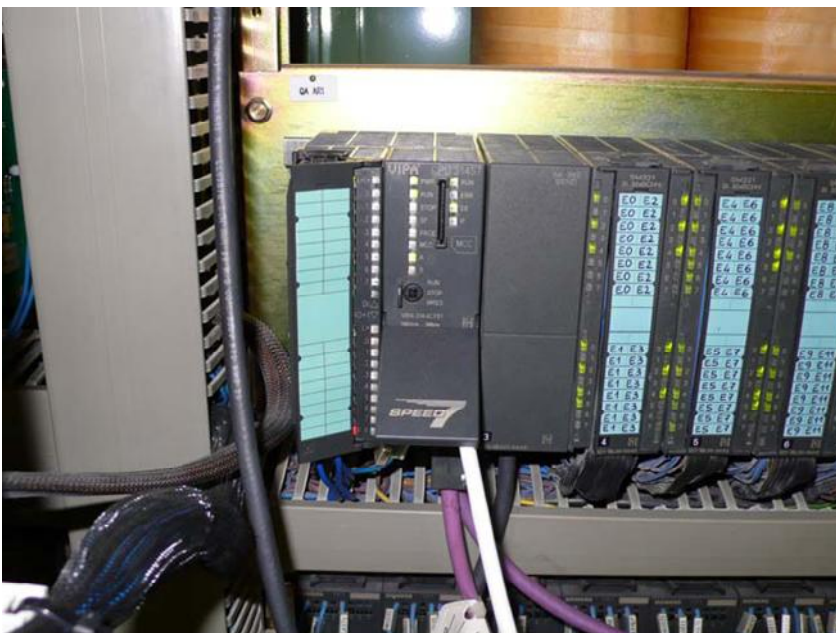


**Pulpits modified by the inclusion of the Digital Operator Panel SAEL**

paper mill drives. An onboard **memory card** will allow for its rapid replacement in case of failure. We will ensure 3 minutes re-start after a drive fault and the replacement made possible even for not skilled personnel. We are sure that now, even the most traditionally multinational companies drive fans, will now have a different view on our product customer-designed and made to last at least 15 years. The new control card is already working and being tested on some plants and will allow to implement additional board controls, even very hard ones, through a double CANBUS communication will ensure performance and network control 30 times faster than the current basic

systems that are turn higher than what can be achieved with Profibus communication used by our best competitors. The additional investment made and already applied in PKarton, was to renew the project for the supervisor that has been faced after a lengthy and careful selection on the various MMI-SCADA software currently available. For more than a while in fact we were trying to give a push to renew our supervision system to include possibility to manage global facilities in which the supervisor for paper mill machine, rewinder, calendar, cutter and paper paste preparation would talk together in a single stable high performing platform. After a deep and careful

analysis on the various market SCADA, also used by our competitors, for the new “intelligent drive SAEL” system upgrade, we realized that with their use, and depending on the different tested SCADA, many features that we had already implemented in our previous paper machine supervisor were missing. These characteristics that only multinational companies propose (not System Integrator, ie those companies that buy products for trade and then manage them with a PLC and MMI Commercial). To tell the performances of these major systems are partial and limited compared to our solution, but have always been our technology gap for comparison and we could not lose them to use a commercially advertised product. We were therefore obliged to seek an MMI-SCADA system with the qualities of a DCS and flexibility of a supervisor system.. With the choice of SCALINK we achieved targets resounding, unimaginable until now. The high flexibility of the product managed and modified in its firmware to meet SAEL drives and PLC communication philosophy (something impossible with other products), allowed us to make a high quality UPGRADE worthy our tradition constantly pushing for innovation. The first application was performed in PKarton last August, which was willing to test the new system in the reconstruction of paper machine 2. With more than 7,000 man work hours, and thanks to strong collaboration with Co.el.me. of Genoa, makers of the control card mainly used in the fields of steel industry, mixtures prepare, shipbuilding and energy, we obtained a high performance product that has no system complexity and future expandability boundaries. To give you an idea, we remind the application made in Duisburg in Germany at the Thyssen-Krupp Steel AG, where



**VIPA S7 PLC installed instead of the S7-315 ensures the replacement of the CPU machine 3**





**The Thyssen-Krupp plant, 27,000 I/O operator stations operated in 18 operator stations**

supervision of the conduct of blast furnaces 1 and 2 (with an annual production of 9.7 million tons of pig iron) is controlled from 2 control rooms with 18 networked operator stations, managing a total of approximately 27,000 I / O. In this case the automation is based on ABB DCS systems INFI90 and Harmony. The loading of the blast furnace is also provided from redundant SCALINK workstations, managing the implementation coordination level to communicate with the upper level where consumption optimization models were designed for

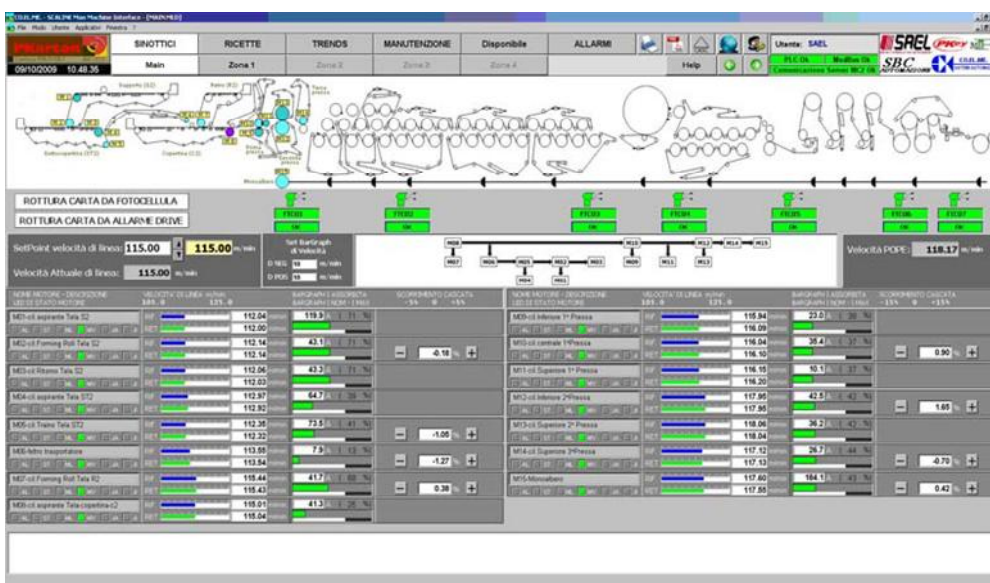
administrative purposes. The strength of SCALINK lies in the modular software structure which allows greater scalability (from simple applications with a few hundred I/O to the more complex ones) and an amazing flexibility in the implementation of application-specific functions. Integral part of the software package are all basic functions required for a SCADA, as alarms managing and filtering, historical archive, the events report or schedule and different privileges user managing. Data integration from any existing system is ensured by the presence

of acquisition modules for the most popular industry standards such as OPC, Modbus master and slave (serial and TCP / IP) and modules optimized for major automation, starting by Siemens (serial, MPI, PPI, Industrial Ethernet) and ABB (serial SCSi) to Klockner-Moeller. SCALINK was also born on a client/server TCP / IP architecture, allowing easy remote operator station and also to differentiate stations by simply viewing location of effective plant control. The work done in PKarton concerned the reconstruction of MC2 through the well known REBORN system, where it was for the first time integrated VIPA S7 PLC CPU instead of usual Siemens S7 315 (choice to give the possibility of having, through the use performing Vipa CPU, a spare part CPU to be used as a replacement for the paper machine 3 now controlled by a Siemens 319) and the Mmi\Scada SCALINK. This architecture allowed to work on a faster Ethernet platform highly increasing speed in every single communication. Through this platform and with the integration of all of our previous SCALINK monitoring and supervision options, communication drivers to drives and to all of our HW, we reached the maximum system integration. Within the new HW/SW integrated platform,

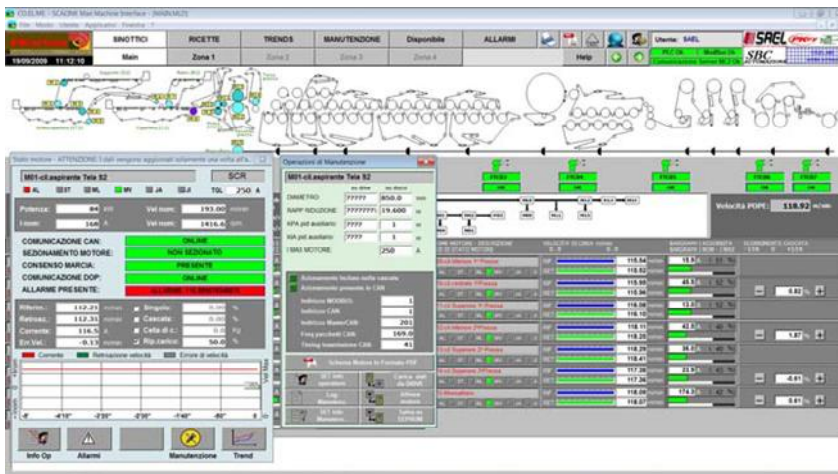
we allowed ourselves to think “beyond” and ventured in the implementation of functions and operation options in addition to those of the previous version that were now at reach, operating directly from the monitoring stations.

The new functions introduced and today available are:

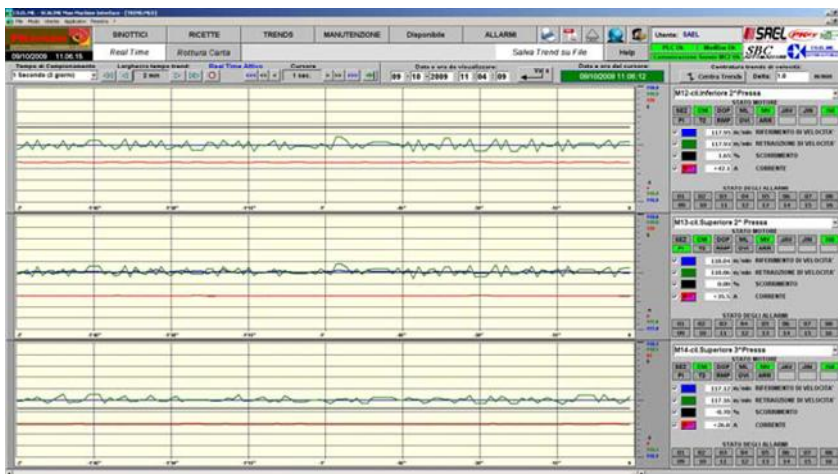
- PLC and drives programming in transparent mode



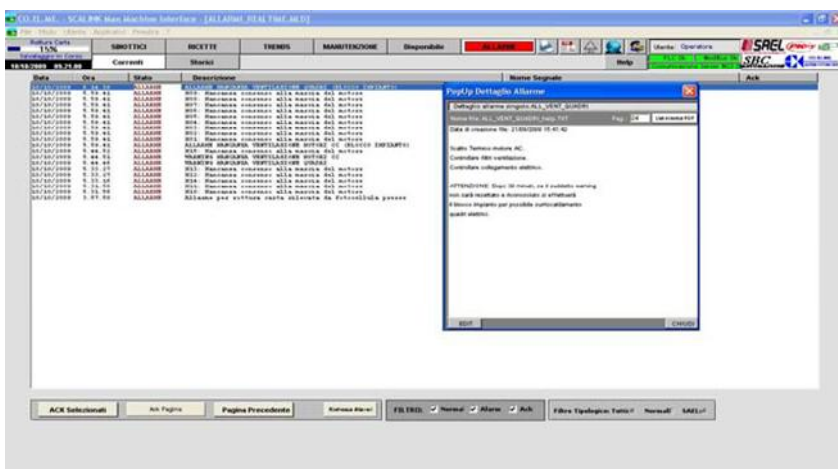
**Supervisor main page, allows to keep all drives under control in only one display.**



Through motor pop-up, motor maintenance and alignment each drive settings may be set up and check directly interacting with it in real time. Therefore it each calibration adjustment becomes simple and intuitive having everything under control.



Motor trends, without any setting and in just a mouse click, display the visualization of three engines, each of which has all the values recorded in brief, you get a chance to see back in 45 days every adjustment made by plant operators , all the historical alarms and drive PLC I/O.



“Alarm Help” on each alarm with possibility to be recorded and edited directly by staff of the paper mill. All the comments and the operations made to solve a fault can be saved to be used in future. Less skilled staff can be guided to solve common faults.

directly from machine supervisor

- Historical trends up to 45 days (extendable) of all motor variables divided into three different types of sampling time (1s-5sec-15sec). Motor trends were enriched with more new variables as drives I/O and alarm status that reading the historical trend let analyze the drive controls over its performance. The Motor Trend information is displayed directly, with no other step, all single motor variables (no search or parameter track is needed) and you can watch three engines at a time, selectable via a simple drop-down menu.

- Paper break photocell: automatic storage of all motor variables 3 minutes before and 10 seconds after the paper break, triggered by photocells sensing the paper presence, stored in a readable file showing the name of the photocell, the date and time of the last happened break occurrence.

- Drive paper break: automatic storage of all motor variables 3 minutes before and 10 seconds after the paper break, triggered by drive alarm, stored in a readable file showing the name of the photocell, the date and time of the last happened break occurrence.

- Motor management POPUP window, showing all major variables set point of selected motor. Possibility to change variable values from inside the window (diameter, reduction ratio, cell adjustment, load sharing, etc.).

- Motor alignment POPUP window, to allow a very precise so as to speed up the initial start up of the control.

- Motor service POPUP window, displaying motor control variables values and set up.

- Advanced diagnostics with on line Help for each alarm directly editable by paper mill staff in order to have a report of electrical activity performed (described separately for each alarm) makes it extremely easy to resolve the anomalies and also less skilled staff can stand-alone document.







**control room after SAEL REBORN modify**

responds to all needs related to the conduct of a modern paper mill, a rewinder or a calender. It processes AC or DC drive fully managed reference regulation, and is supported by 1 Mbit/sec MULTIMASTER high-speed CAN BUS network. This leads to a qualitative difference compared to other systems that normally take master-slave type as PROFIBUS networks in which, in case there are many participants in the network, would slow down dramatically the BUS speed increasing communication delays. The architecture we used ensures extremely fast processing speed: 6 msec. 60 AC or DC motors. The system has been implemented and tested in all its parts catiera Smurfit Kappa Ania, Cordenons, Georgia Pacific, Val Posina, Ovaro, Favini group, S. Lida, Sanitex, Domtar

(America), Grillo, Sacca, Gic, Toscopaper, Papyrus Sarda, Cassina, Puglisi, Rivalta, Ermolli, PKarton, Giacosa, Cartiere Burgo of: Duino-Mantua-Avezzano-Sarego-Chiampo-Villorba-Treviso - Lugo-Toscolano, was immediately appreciated for its strong adaptability and flexibility with which it was designed and started up. In a media rebuilding, that is managing the reconstruction of 44 existing drive to an installed controlled power of about 6 MW DC from which the old and outdated digital card is explanted and replaced with the new REBORN rack, the rack regulatory cascade microprocessor is eliminated and an S7 instead dell'S5 PLC with some 1600 machine I/O management provided, it is possible to reach an estimated saving approximately about

60%, compared to a control redone with new commercial AC drives (AC motors that would necessarily to be acquired excluded). REBORN recovering all the drive power stages, power electromechanics, motors and wiring to the field, it saves a considerable amount of funds. Ania Smurfit Kappa paper mill in the application has enabled us to achieve amazing goals both in plant start up and in technical servicing. Three working days Organized in two scheduled stops we renewed all drives and digitized all control system. The remake treated some 20 DC motors with an installed overall power of 3 MW. The work was organized on three daily shifts, one for wiring of two for electric testing, during which were about 8 people were involved for the wiring and 3 people to start the engines in both stops. The system was then monitored directly from our headquarters in Vicenza, through the remote service system "IWSA" Internet World Sael assistance. Through the new IWSA it was possible to watch the supervision of the machine through extremely fast refresh displays and, to program the drive, the PLC and whatever else needs to be software controlled. No further day of start up over those 3 named before, has retained our engineers at the plant giving us the opportunity to control directly from our facilities any function it seemed necessary to be changed. In the second trance even when the wet zone plant was started, it was considered unnecessary to use the SW supervisor engineer who worked in touch with his colleagues, directly from his office without need to go on site to make the adjustments necessary during every normal start up.



**View of PKarton 2 paper machine, drying zone, coating, and Pope.**