



One more time we are the first

After having equipped the inverters with film capacitors and ONE Card, now we pass to the liquid cooling. The advantages: Reduced spaces, absence of dust contamination-humidity in acid environment, preserving the internal components guaranteeing through time an important energy saving.

SAELsrl. Saci - PM3 Papermill

by: **Paolo Andrighetti, BU paper, SAEL**

Saci Paper mill, with a continuous spirit for innovation, have reconstructed the drives of PM3 installing drives with liquid cooling conceived and realized by SAEL, found for the first time in Europe in paper mill application. Saci Paper mill, is positioned within the European leaders in recycled paper for packaging with grammature from 35-160gsm, thanks to the continuous innovation and the investments in quality research, the affitability and flexibility to serve the customers, in respect to the ecology and the environment. In order to guarantee corporate standards, after having realized with SAEL the reconstruction of the Pm1 and PM2 drives, have also awarded to SAEL the rebuilding of PM3, this time installing drives of the latest generation liquid cooled that guarantee the maximum energy savings.

SAEL AND INNOVATION: PLATFORM ONE DRIVE LIQUID COOLED

Fulfilling our mission voted to the "Spirit of Improving", we applied the

know-how achieved along the Tunnel Boring Machines experience, to our massive production drives. The working environment in which our inverters work in this sector, are among the most severe that can be encountered: very small spaces, strong vibrations and high temperatures due to the fact that they are placed in the vicinity of the eight 400Kw engines that carry out the rotation of the main drill, have driven

our research and development team to create a water-cooled drive, extremely reliable, compact and strongly immune to thermal and mechanical shock; applied in well-protected environments such as the paper mill, just a few months after start-up, it allowed us to sleep peacefully and to encourage massively the paper mills to be led towards this technology.

VW WATER COOLED SERIES with Safety Torque Off



The inverters of series "PLATFORM ONE DRIVE WATER" equipped with ONE card (same card for all the types of motors DC-AC and REBORN) and film capacitors, guaranteeing an infinite life for the inverter.

THE TECHNOLOGICAL GAP

Our liquid cooled drives, practically without tangential fans (one each inverter), also allowed us to remove all the ventilation normally mounted on every door of the electrical cabinet. The new electrical cabinets where our panels are installed, previously obligatorily and abundantly conditioned, today become normal rooms, since the system becomes independently cooled. The double-sided electrical panels, where the inverters are mounted, have closed air recirculation ensuring no contamination of dust, humidity and air acidity; they preserve over time, and in a perfect manner electronic, electromechanical and other various components. The experience gained on the subject by the Tunnel Boring Machines and the excellent performance monitored over the years due above all to energy saving, will allow the paper mill to **save about euros 60,000 a year**, eliminating the need for maintenance of the air conditioners and fans. For this reason and for the significant reduction of the dimensions that the system has obtained, driven by



the continuous research of innovation of CARTIERE SACI in the search for products and systems with high technology and energy saving, we have made the first WATER-COOLED plant in the paper mill sector. In December 2018, respecting the tight deadlines of the stop, thanks to the organization and team spirit with the technical staff of

SAEL - paper mill, we started the new paper machine sectional control along with the many mechanical transformations that have been carried out on the paper machine as well as having modified and also started-up the VARIDUR rewinder, reconditioned in mechanical and safety terms. The drive system dealt with the management of



Pope, Calander and Driers of SACI-PM3 equipped with inverter liquid cooled.



THE WINDER VARIDUR RECONSTRUCTED IN PM3 TOGETHER WITH THE DRIVE OF PAPER MACHINE

46 AC motors of about 2MW of installed power; the realization, unique in its kind and coordinated with our DCS in Drive, both in paper machine and in rewinder, was strongly desired to equip the paper mill with all the qualities that our PLATFORM ONE offers today in the market.

PLATFORM "ONE DRIVE" - SAEL - 4.0 INDUSTRY-

The "ONE drive" platform born for the paper industry entered in the market in 2011, and in 2018 is enriched with the solution "liquid cooling" is immediately proven to be innovative and highly performing. All our drives (AC, DC, BRUSHLESS, CHOPPER and

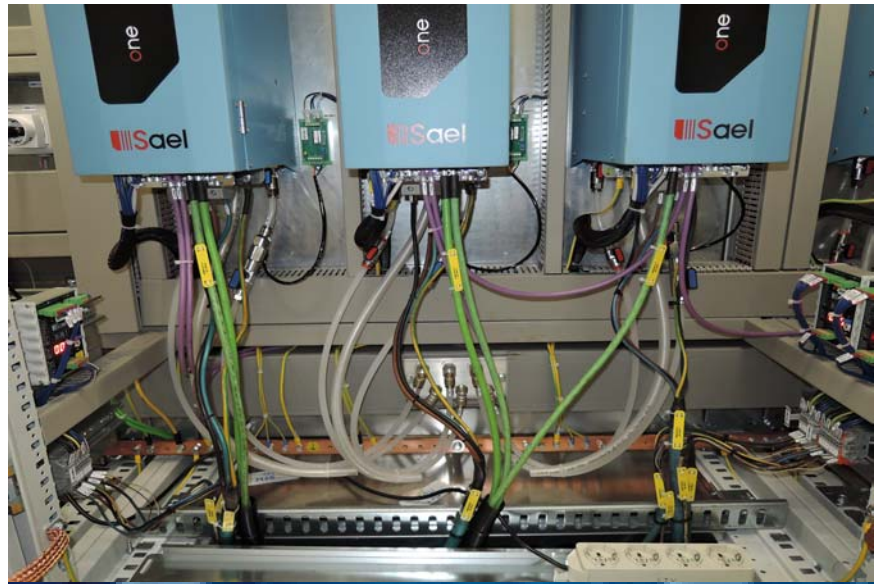
REBORN) of paper machine, winder, calander, wrapping machine and stock preparation, is always managed with "ONE" hardware card identical to the others. The "ONE" card is supported with by one ductile memory that contains the data, extractable and easily replaceable by anyone even without experience. In practice no programming, parametrization and operation like normally in the technical world with a connected PC is necessary to restart with our drive in case there is a failure. A system simple and dedicated to the auto diagnosis for helping the paper mill to conduct unparallel trouble

shooting. The platform "ONE drive" foresees the use of the latest generation drives LONG LIFE, practically with an infinite life. The drives are equipped with components that are not in fear of aging (for example all the electrolytical capacitors with which every inverter is equipped with a 60.000-90.000 hours lifetime, our drives are substituted with film capacitors) and are easily repairable in contrast to our competitors who are constructing drives in a more consumeristic model



The only one regulation card - same Hw for all our drives. DC-AC- BRUSHLESS-CHOPPER and REBORN (system that reused all the DC drives of any model) of series "PLATFORM ONE DRIVES"





Detail of the inverters series WATER COOLING , exclusive series of “PLATFORM ONE” of SAEL

as all appliances are build. In the presence of a fault they prefer to replace them. Also, the changing of models very frequently is always lurking; another nice idea to confuse the end customer that they must upgrade or get expensive spare parts. Remote assistance and the possibility to understand every single problem that happens in the drive system through the “DCS in Drive ONE”, completes our platform that except from saving of spare parts, guarantees their fast replacement and a long-life lasting system; This is the philosophy with which SAEL has responded to the drives market for paper mills since 2011.

The work in PM3 paper mill.

The drive system of PM3 showed problem related to the aging of the exiting inverters and DC drives and in their difficulty to find replacements in the market (out of production), other than having also decreased the maximum speed of the machine. The technical office of the paper mill in close collaboration with SAEL team, have drawn a modernization plan for the paper machine that allowed to increase the performance, respecting all the safety measures requested by the current legislation. All the

electrical cabinets have been replaced, the control desks of the machine, installing our control panels “DOP Touch”, one for each section of motors, and the DCS stations in the control room, with our “DCS in Drive” for the management and control of the drives; The particularity of our panels and the function Plug and Play, that in case of breakdown they only need to be replaced without requiring programming, since they can download the required SW for the area assigned, reprogramming

them as exactly assigned in the first place. Another particularity that is attached to the philosophy of “PLATFORM ONE DRIVE” is the powerful controlled “DCS in DRIVE”- in the version of PM3 provided with 2 stations in redundancy- that permits to memorize and display any operation in the form of trends, machine status and existing variables, managed by our converters. It is an engineering station, from which in addition to conducting the system it also has the complete control by programming and parametrizing each individual drive, HW



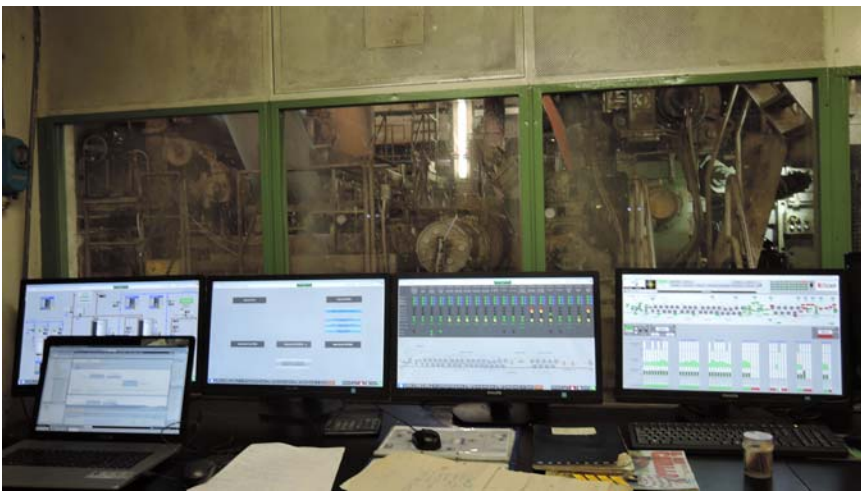
Electrical cabinet dry section with inverters cabled in double side and with water cooling.



All the motors AC we included in the scope of supply, cartiera PM3- Press



Wet zone of paper machine, PM3 paper mill



Control room of paper machine; the automation was realized by our service point AISCON

and PLC connected to it. Immediately the customer, previously without this control, was able to appreciate the depth of this operating station, able to memorize all that happens inside the electrical panels of SAEL, also

memorizing every single operation that they conductors perform in the filed or whatever the maintenance people change in the system. The technical management of the paper mill have communicated: “- the new

system “REBORN ONE” integrated with “DCS in DRIVE SAEL”, other than having immediately provided an increase in the efficiency and easiness in the driving of the machine, has also provided us with grater knowledge in the transient phenomena of the paper machine, stabilizing quality and guaranteeing productivity. Thanks to the functions of the DCS in DRIVE, there is the possibility to monitor and analyze the process, intervene also remotely via the IWSA system, combined with the DCS. Another important point is the support and the technical assistance continuously offered by SAEL, from the phase of the engineering to the fine tuning and training of the personnel in the field, that has allowed to change the system in a short period of time.

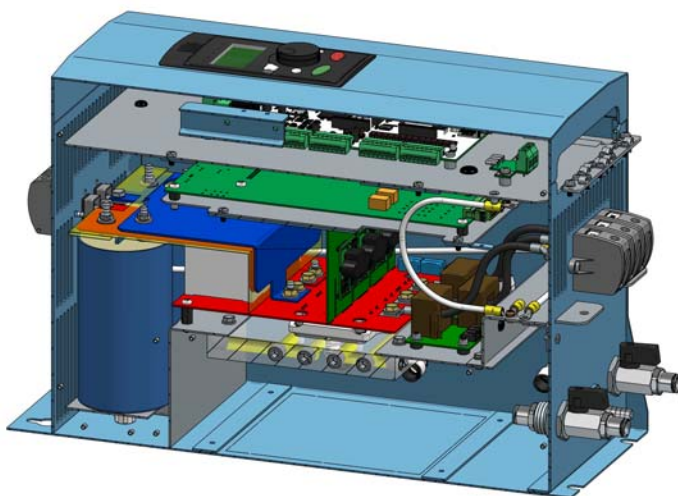
The realized DCS, without tags limit being virtually infinite, memorizes every second all the variables of the system and des not have time limit, as long as there is space in the Hard Disk. With this platform DCS now the paper mill can extend the controls to the rest of the PLC and memorize variables in infinite time. Further refinement of the DCS is the management of alarms with related movies, automatic opening of electrical drawings and the function “MAIL”, effectively also extendable with “SMS alert”. In practice any malfunction of the system, apart from being visualized and saved in the trends, is send by mail or SMS to the paper mill’s technical team that is ready for 1st aid, in order to activate them in a very short time to search the possible faults or malfunctions. In any part of the world you can find the maintenance people connected to one PC with the function “Lite Time Client” (exiting in default in our DCS) being able to connect and coordinate the operations of restarting, having completely all the plant in his hands. All the operations and visualization



9 inverters of 400KW cooled with water in cabinet of 3 mt, cabinet of Tunnel Boring Machine - ONE DRIVE WATER.



Water-water heat exchanger - direct supply from the well of papermill for cooling inverters and electrical panels



Exploded view of liquid-cooled inverter - ONE DRIVE series - film capacitors

carried out by the 2 PC's controlling the plant in the paper mill, can be also carried out from a station outside the paper mill for a maximum of 2 hours.

For these reasons and for the fact that in the European market SAEL for 32 years constructs drives guaranteeing spare parts and reparability (a difference from the multinationals that are used to change the products in extremely short times and additional costs in availability of spare parts) Saci Paper mills have selected the proposal of SAEL and and have completed the reconstructions works of their drive systems in all three of their paper machines. The free training previously offered to the paper mill staff, giving them the knowledge of our systems, DCS and inverters, have made our partnership even more important, already allowing the start up to have internal staff trained and able to maintain the system as much as possible. No other company operating in automation and drive forms and shares solutions with its clients in such an open and global way. The commitment of SAEL in the design and development of the right products, saves its customers from the side of continuous and sudden changes in products, making obsolete in a few years those previously used. The electronics and drives market, as happens in computers and appliances in general, are in strong and continuous evolution. Those who construct and market Drives in all the world, must develop products less expensive to chase their competitors, with a consequent have penalization for customers, who after only a few years have already outdated drives. Even though our international competitors are reluctantly obliged to comply with this rule, SAEL on the other hand is distinguished in the design of its own drives for the fact that their construction, loyal to the corporate philosophy of being a producer of complete systems and not a system integrator, are made to be as long-life as possible". Another particularity of the intelligent drive AC or DC SAEL is the reparability of all their components: a feature that allows to save significant number of spare parts, that is distinctly different from its international competitors of commercial drives, that prefer to completely change the drives in case of fault.

Box SAEL:

Specialization in the Paper Industry

SAEL operates from 1987 in the sector of industrial automation, as a designer and manufacturer of electronic control and regulation products and equipment for machines and plants in various sectors. The sectors in which has more experience and numerous applications are: Paper Industry, steel industry, wire industry, plastic and tires, machine tools, special machines. In particular the paper and related industries are for SAEL fields of strategic intervention. Strong experience and high technological solutions and innovations, offers to its customers Hardware and Software architectures directly linked to the requests proposing diversified solutions aimed at optimizing costs, management and quality. The activity is based, in addition to the new, on the rebuilding of all the electronic automations in which, in some cases, it is possible to reuse also the power of the existing converters and the electromechanical drive part. The specializations in this



sector are: sectional controls with DC, AC and mixed technology; additions of motors on existing drives; Coaters in line and offline; conversions of analogue cascades to digital; calenders and supercalandres; Stock preparation with PLC or SAEL technologies; winders and slitter rewinders; synchronous or fixed blade sheet cutters; pope reels and unwinders.



The "PLATFORM ONE DRIVE" Inverter is made for Paper Mill Industry. They are the most innovative solution in the market. Their mission is the long life, and easy to be repaired; flexible and easy to drive. All our drives are equipped by the ONE Card – A Single board fits all the drives: DC, AC, Brushless and Reborn -, Film capacitors for a long life inverter.

