REBUIDLING OF JAGENBERG VARI-TOP WINDER

MAIN DRIVE AND AUTOMATION CONTROL SYSTEM REBUILDING OF A VARI TOP JAGENBERG WINDER. AFTER THE DRIVE CABINETS REBUILDING BY REBORN® - SAVING THE EXISTING SIEMENS DRIVES AND EQUIPMENTS - SAEL REPLACED THE MACHINE TELESET SYSTEMS, TELEBOCK, LDS AND PLR WITHIN 15 DAYS OVER THE LAST STOP IN AUGUST.

SAEL… VARITOP JAGENBERG

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

The two-steps revamping of the JAGENBERG VARITOP, at Burgo Villorba, started in 2015 rebuilding the old Siemens Simadyn drives — the spare parts were no longer available -. The good results pushed the 2nd step in 2016 working on the knives positioning system (TELESET system), the arms (TELEBOCK system), the coils press curves programming system (LDS system) and the Human Machine Interface programming (PLR system). In order to provide the best, easier and user-friendly management interface, this last PLR system, has been totally re-engineered.

The main focus of the project was the replacement of the obsolete components as well as the sensors who are the solid base of the system — like the unavailable TVK absolute encoders -. At SAEL we worked on this topic several times, so it was a

BURGO GROUP – VILLORBAs PAPER MILL – VARITOP JAGEMBERG, SAEL Intelligent Drive "One Platform"

RISC 32 bit Processor with Flash-EEPROM software inside "ONE PLATFORM®" •
I/O Communication set up
8 Settable DGT Input and 6 Settable DGT Output
4 Settable Analogical Input and 2 Settable Analogical Output
2 Settable Encoder Input (the 2nd as option)
2 Settable Serial Interfaces RS232 or RS485
2 CAN Bus for refs. and enablement w/o additional external board
1 ANYBUS to additional field bus (e.g.: Profibus, Ethercat, Others)

"bread and butter" mission for us.

The complexity of the VARITOP management system required a deep investigation at the plant and careful studies to understand the hardware architecture, as well as the components placement and the inter-cons. The system was articulated on main blocks like: TELESET.TELEBOCK.LDS electrical cabinets strictly connected to the PLR; main general users machine cabinets; drive motors cabinets and pneumatic parts. The cabinets were placed far away from each other, and the input-output signals were exchanged by dedicated serial communication. The PLR was computing the knives and arms management; the measurements and positioning were made by te TELESET and TELEBOCK; the general user cabinet —equipped by inverters - was dedicated to the physical movements. The arms and the knives positioning is very fast and we particulary focus on this topic. We paid attention to the PLR pressor curves, and to provide the best solution possible, we did several studies, analysis and direct investigations at the plant.

Our target was to provide a new integrated DCS SUPERVISIOR-PLC system, replacing the old TELESET-TELEBOCK-LDS-PLR, capable to manage all the process. Also, the old main user electrical cabinet, originally managed by a 135 S5 Siemens PLC, has been replaced and integrated into the new system with remote ET200 — on pre-assembled plates -. The old inverters were replaced too, by the new SAEL profibus inverters. To integrate the motors cabinet (controlled by the Simadyn system), we worked on a similar solution using our ONE-REBORN Platform controlled by a profibus ONE-MasterCard. In this way, we stepped out all the boards,

Winder Main Drive with DCS "WINDER SAEL" — Redundancy and Touch version upon demand

VARITOP, PLC main drive with S7 300 "WINDER SAEL" - Before and After the rebuilding

serial cables originally used for the interconnections. To achieve the goal we realized a new control system managed by a S7 Siemens PLC together with our DCS SCALINK. By this tool we have integrated and revised the original system in our DCS supervisor, adding all the new required functions, using the data of the operators based on our experience gained from the many years of working on this type of machines.... The chuck arms, knives and counter-knives encoder positioning was made by new absolute profibus encoders. The encoder were mechanically pin-to-pin vs. the originals TWK are no longer available on market. Moreover, thanks to the profibus technology fit into the encoders, we were allowed to take out out many wires – which caused many problems in the past -.

The system architecture is based on 40 nodes new profibus network totally managed by a S7 Siemens PLC

- 7 Profibus Absolute encoders – Top knives - (Knives)
- 7 Profibus Absolute encoders – Bottom knives - (Counter-Knives)
- 10 Profibus Absolute encoders – arms Reel –
- 5 Profibus Absolute encoders – bobbin diameter measuring –
- 1 ET200S – Interface to the ONE Drive Cabinet – (ex Simadyn)
- 1 MCAN Node – Interface to the ONE SALE drive system
- 2 ET200S – Interface to the LDS pneumatic –

VARITOP Winder Drum – detail –

- 3 ET200S – On plate to the S5 rack integration
- 4 Profibus Nodes each inverter – inside the general user cabinet

Over the time and the experience, SAEL supervisor VARITOP-VARISTEP control system today also incorporates Engineering Station functions, which allows programming either the PLC or the Drive. IWSA "Internet Worldwide Sael Assistance", is the real time remote management. This amazing tool, fully open source thanks to its Windows basis, allows any kind of assistance, programming, re-programming, adjustment job on
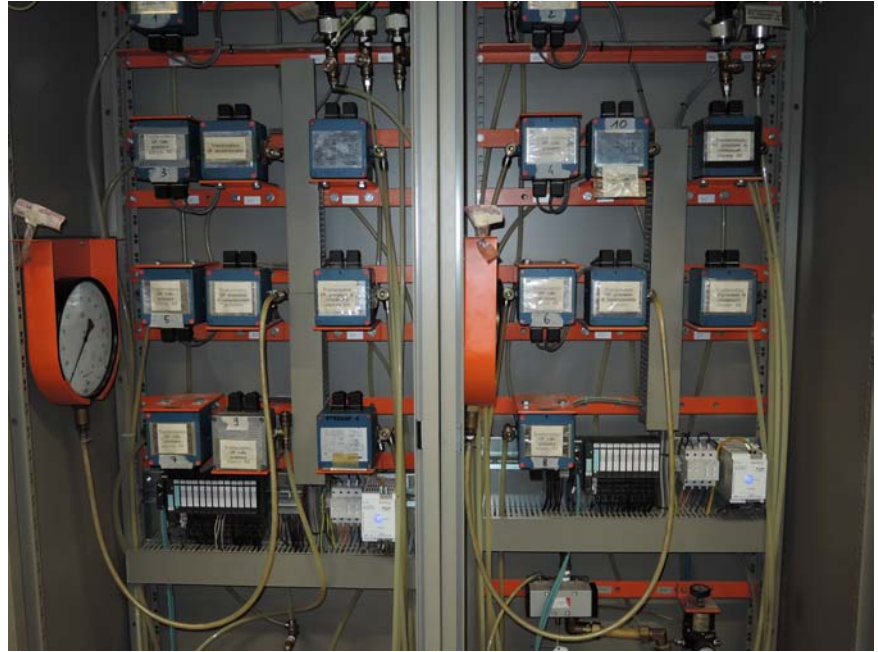
LDS. The external and internal pressor Rolls system, dumper, Jogger and Reels station; ET200S.

remote assistance. It is possible to set up the SAEL boards, the SAEL Drives, develop or modify PLC SW, and many other functions.

The new Teleset – Telebock – LDS – PLR supervisor system manages the Jagemberg VARITOP; specifically:

- Automatic positioning of top and bottom knives, as well as speed change (fast-slow) calculations.
- Positioning and speed change (fast-slow) included, also the automatic core loading and finished roll unloading;
- Controls the winding hardness by adjusting the paper roll, load pressure and the reel nip pressure;
- Automatically provides the machine state of operation through the supervisor;

LEFT:
REBORN apply in Siemens Drive, the first step in the winder for sobstitute the Simadyn control. SAEL Intelligent Drive and solution

The first winding station of VARITOP also has a regulation of the tension of heavy bobbins with motor, in practice by adding two motors in the chucks we regulate the pair of pull curves in accordance to the winding diameter.
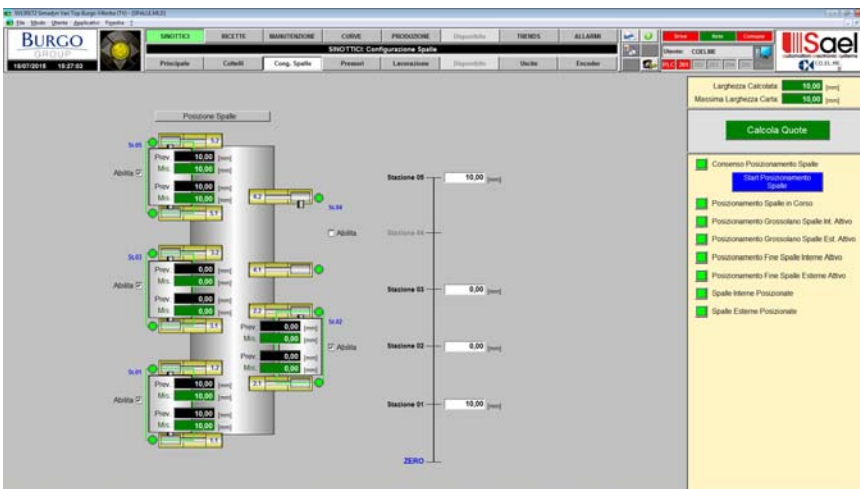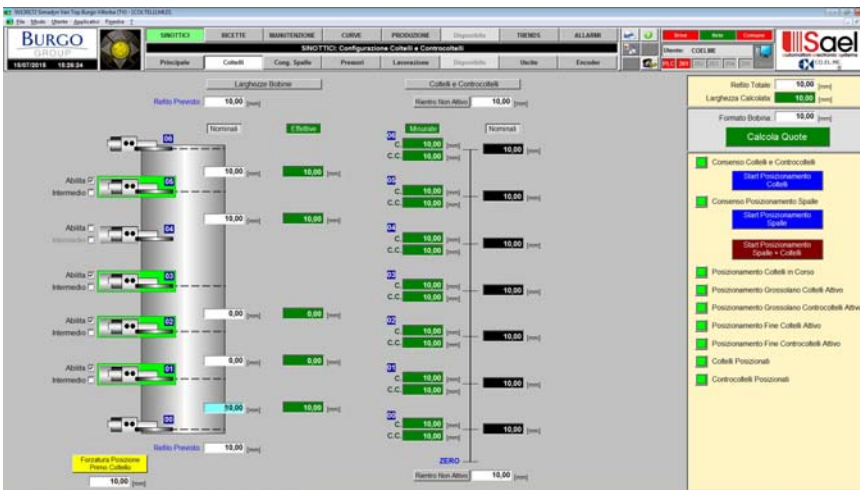
WINDER SAEL, the DCS is used to manage the whole cycle as well as get the manufacturing information back; for each step, for each operation.

- Allows the setting of many devices linked to the PLC;
- Input and Output visualization;
- Full diagnostic and with most important, provides HELP for each alarm.

The main functions are the following:
- Speed trend storage for each finished roll; pull set point; real measured pull; linear forces sum and contact press trend – with the parallel between files stored in different times -. By this tool it is possible to parallel the data and get the best adjustment.
- Table set tool, which encloses all the physical dimensions involved on the machine running process:

- Cylinder and Reel Stations Pressure = f(Max.Diam.W)
- Internal Pressor Rolls pressure = f(Max.Diam.W)
- External Pressor Rolls pressure = f(Max.Diam.W)
- Dumpers pressure = f(Max.Diam.W)
- Jogger Rolls pressure or external press rolls compensation = f(Max.Diam.W)
- Jogger Rolls pressure or internal press rolls compensation = f(Max.Diam.W)
- Nucleus drive Station nr.1 – motors regulation - = f(Diam.)
- Belt pull = f(Max.Diam.W)
- Speed = f(Max.Diam.W)

For each of those physical dimensions it is possible to edit, modify or recall any kind of table working sheet, very easy.

Based on the paper to be processed, the operator can modify the winder machine profile playing with this tool and get a real-time feedback. A working curve can be created for

each type of paper being processed; the interpolated value based on the roll diameter, it is computed by mathematic algorithms (enclosing the pressure devices geometry, the maximum pressure, the actuators linear force) obtaining the best possible result in the hardness of the finished roll. Along the time and the many field applications where we applied all our technical knowledge we are proud by the achievements, providing to the user quality, accuracy, production speed-up.

Also, the knives positioning, the counter-knives and the arms philosophy is the same: very open minded, allowing different practical settings. Actually, for each roll, the system automatically computes the best configuration of the knives and arms, providing the parameters to the user who still has "the last word". The flexibility of the system allows any kind of modification at any time whenever the cycle is running. Theoretically it is possible to handle eight different bobbins over the four machine reels by using all the available knives.

The obsolete dismantling parts, and the new connections made by our people, allowed to save a lot of time as well as problem solving who typically pops-up during those processes. The machine takeover happened before the original agreed date.
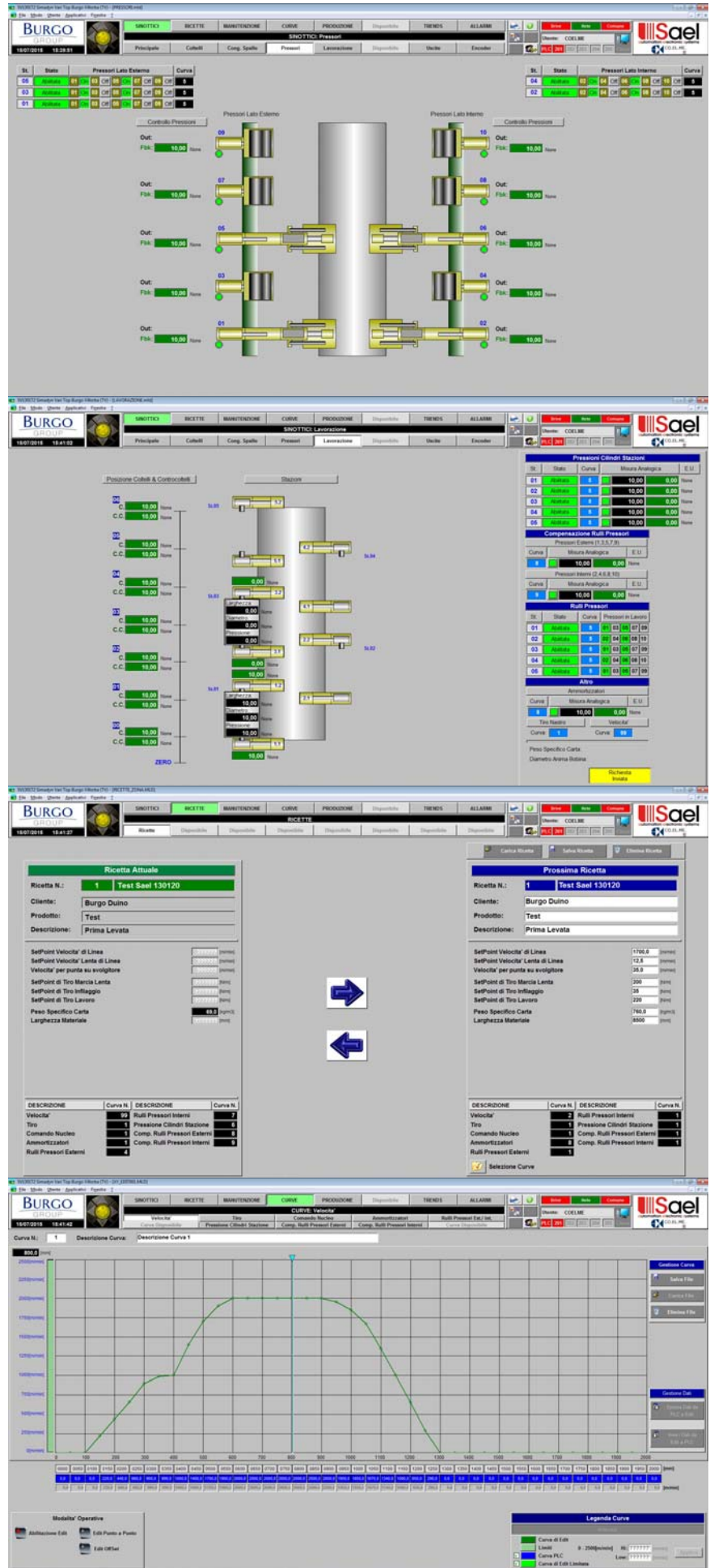
Some shots of the video system. Telebock-Teleset-LDS and PLR positioning parameters, working curves. Lightening and pressures, single menu, stored curves for each coil produced and all the main values for accurate parallels