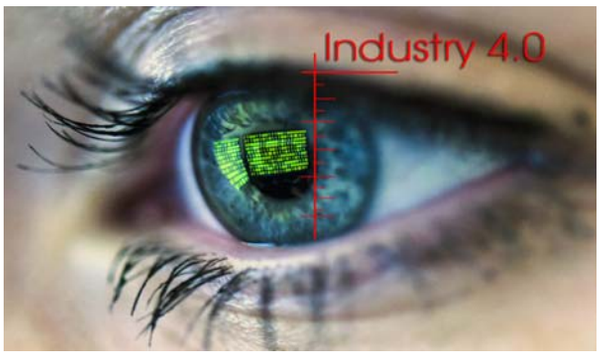
A NEW TOOL FOR PAPER MILL ANALISYS AND MAINTENANCE - Data Recording Trace



SAEL & COELME : D.R.T.

A production stop in the paper mill is always lurking....

Whenever a stop happens due to a particular event, we spend time, energies and resources, to look for the causes. Often we use improvisation tools in order to save the production, until the moment when the problem appears again and, thanks to the work done, the experience and little intuition, the triggering event is found and fixed.

Sael
automation electronic systems

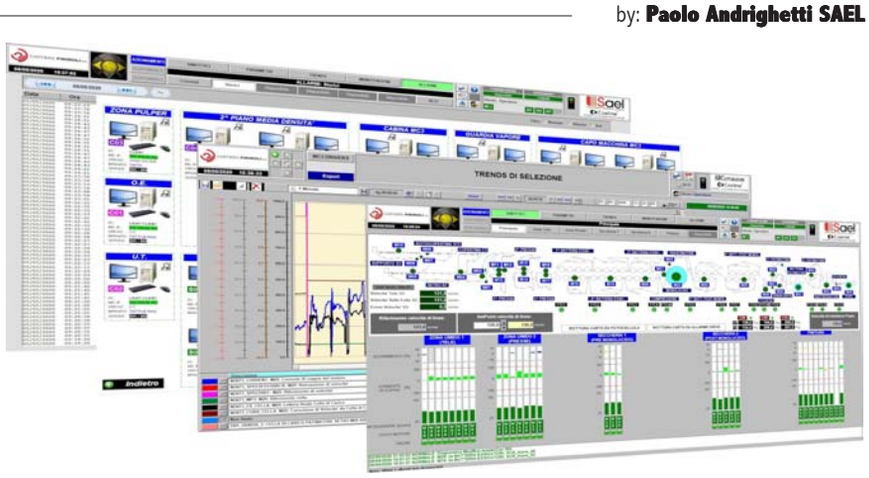
DRT .... Cartiere SACI

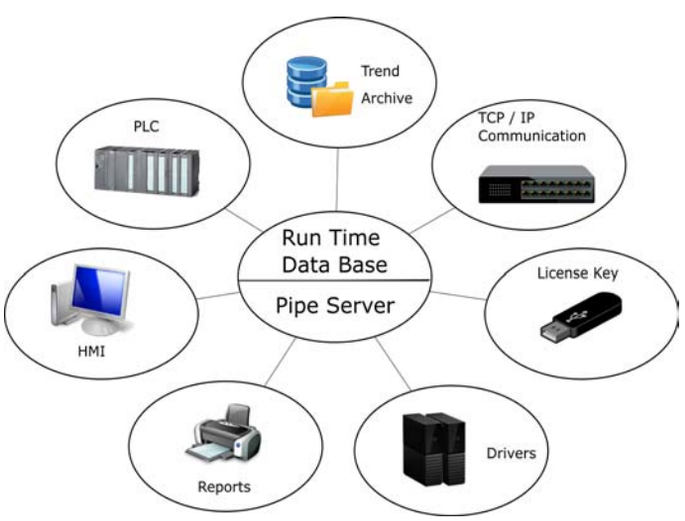
by: **Paolo Andrighetti SAEL**

The challenge got from **Saci** Papermill in Verona was to provide to the maintenance team a screening tool capable to analyze a big amount of data crossable and comparable with each other, data from energy, from steam, from logical states and production data.

For instance, after a supply shutdown, check every single problem that, in cascade, can generate stops in several areas of the Papermill in order to minimize production losses as well as electrical damages. Starting from this assumption, SAEL has accepted the engagement, studying a *Scalink*® Station, open and connected to the PLC network, who features the storage data scanned every second showing variables and trends – on easy exportable tables – without times or acquiring limits.

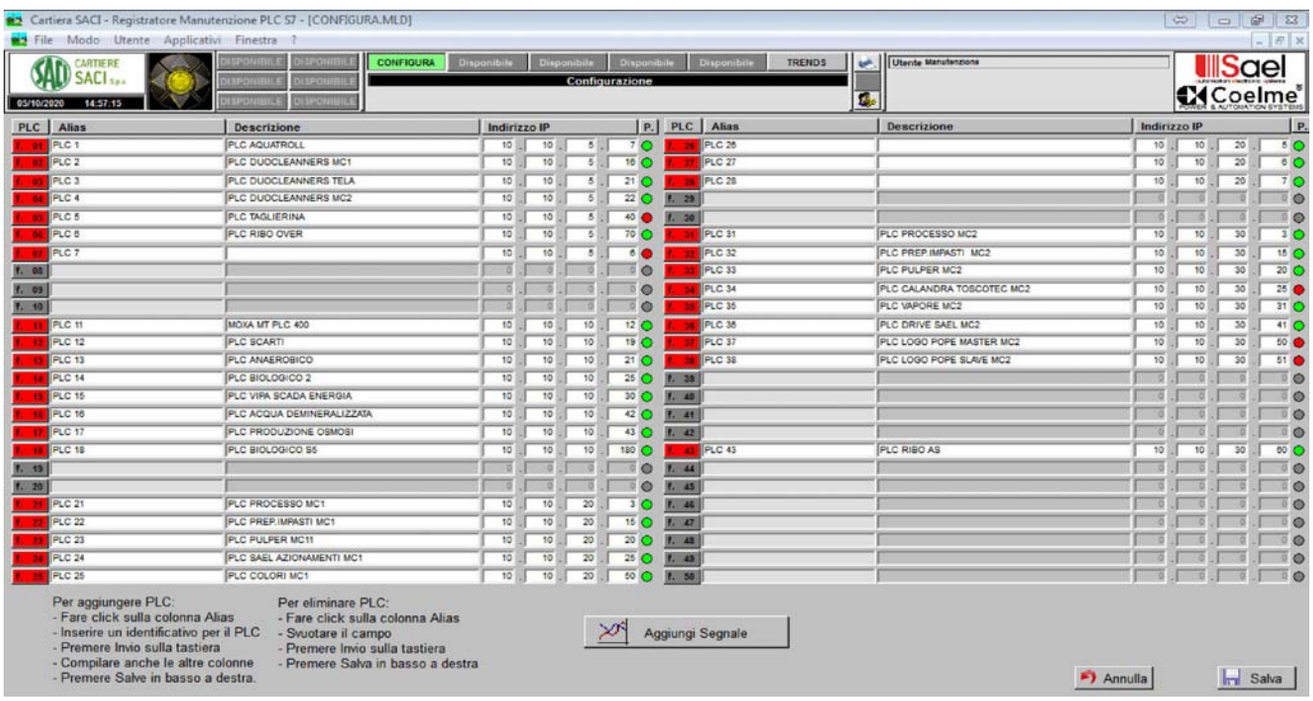
For its Plants, SACI uses an own and common automation system based on a PLC network with Speed 7 CPU (identical for every Plant, with a unique spare part easy to replace), every node manages a single Area (as one "Isle"), the Set of nodes,





Scalink: not only a Scada. The Platform is born for LEVEL 1

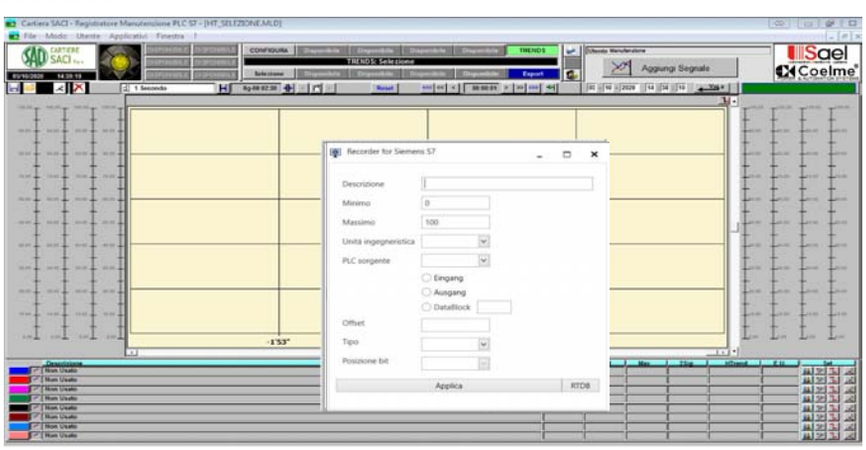
manages the entire Mill and the whole process.
This architecture avoids short circuits between the different areas of the Paper mill in case of a single area problem, e.g. Stock Preparation, in the other areas, production can continue without interruption, limiting the outages that a centralized system could create in case of failure.
The Supervisor structure is realized with operator panels and single SCADA stations, depending to the different ratio of needs. The Paper Mill is monitored and managed by a couple of PC with "hot standby" redundancy – avoiding data losses in case of hardware crashes. Every PLC is part of the Plant network, the operators can visualize and programming every CPU.



Above: list of the Paper Mill Automation PLC. By a simple tool – see below - it is possible to capture and historicize any Variable independently to the PLC and or different Hardware used.

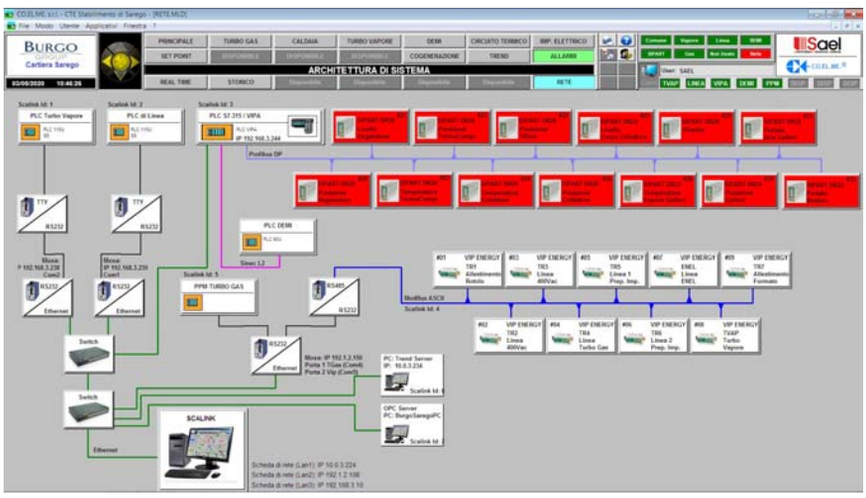
DRT: The last innovative instrument for Analisys and Maintenance

Data Recording Trace

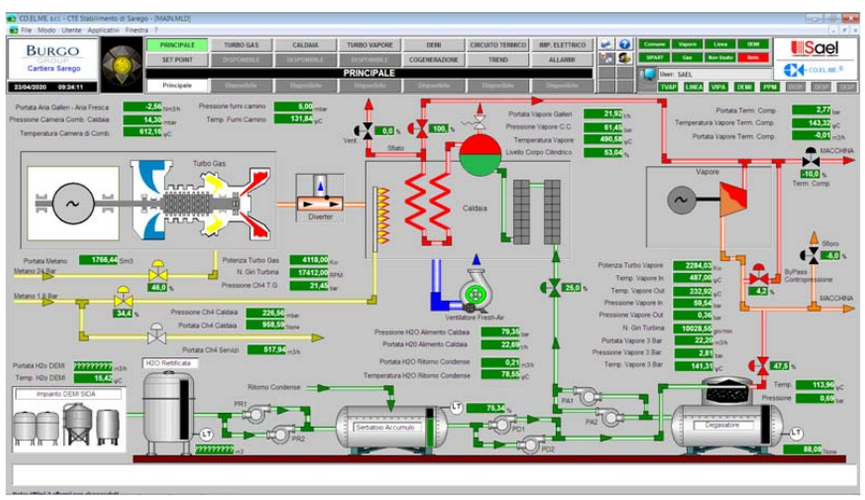


The *Scalink*® Station suite for this application - based on a specific and simple SCADA project with pop-up style – allows the maintenance technicians, whenever not expert – to choose wich process variable to export from any CPU (even from different suppliers), connected in the plant network. The process variable choosed, will be stored with a sampling per second from the confirmation by the technician. In case of fault, anomalies or problems, it is possible to select which variable must be under control – in case they are not programmed in the system yet – and store in a windows for a quick selection and presentation: just in one pop-up click. This tool was engineered and realized to fulfil specific needs of any Paper Mill, allowing to use the **SAEL** system not only as a "*bridge system*" between systems, but as a global analisys and concentrator instrument. Three years after its use, it is considered by the Mill Management as an **ESSENTIAL** tool.

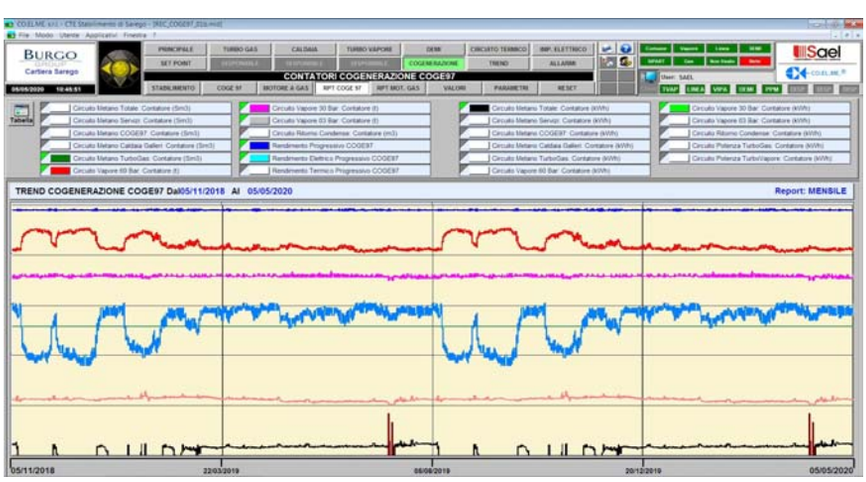
Export-preparation-configuration-data analysis: DRT and READI …. data mining … Scalink



Above: example of a data exchange and Scalink system communication in a networking participant. Below, the page made for the Thermal and Energy Station referred to the net mentioned above.



Below: Report available to data-data selection of the pointed values. Every single variable, or group can be reversed into a tab.

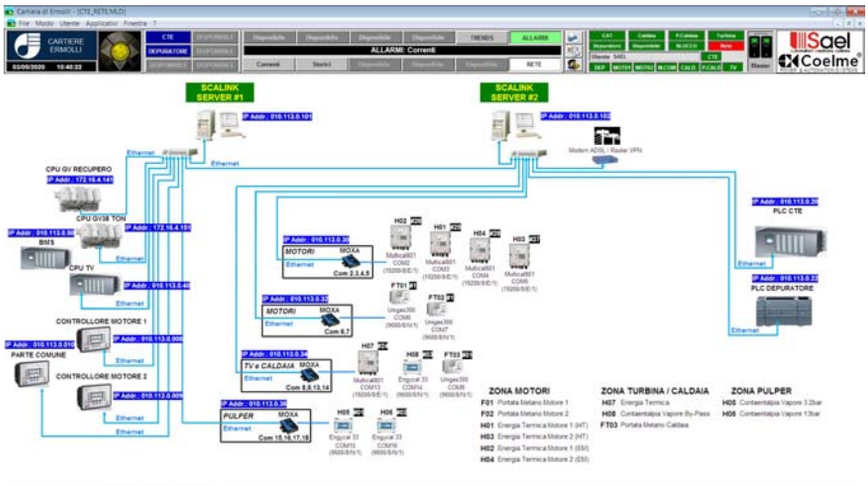


Every process value can be stored, independently from the system or the location in, the plant network, and it could be retrieved as a graphical trend as well as in table form. The sampling rate is typically one second and the period of historicization depends only by the PC Hard Disk capacity. Every single variable can be processed via Excel, Access or Windows tools: any data can be reworked and showed as a new variable after the calculation (e.g.: production data, energy, steam consumption, chemicals, etc.). This system has no limits and can fulfil any calculation requirement, verifying every machine trend in a predicting mode and showing possible anomalies, or efficiency losses, eventually.

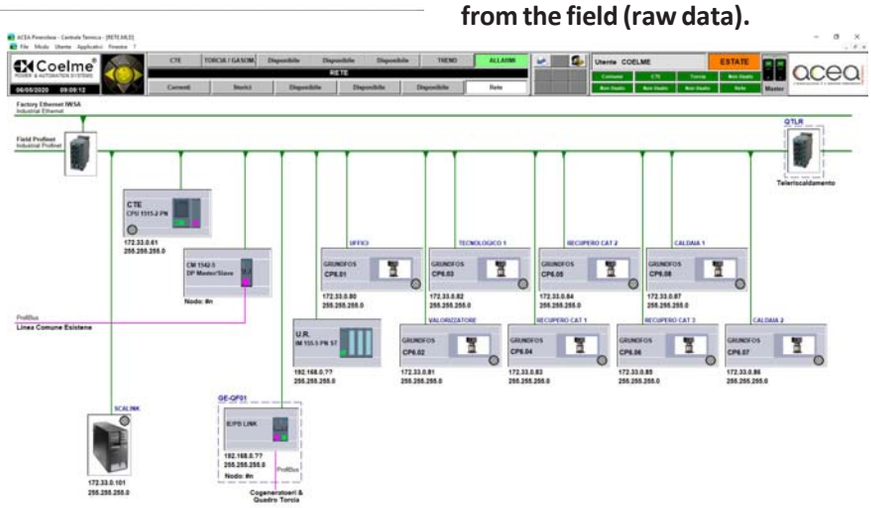
ASSUMPTION: WHAT A DCS IS …

The DCS – ***Distributed Control System*** – is an automatic control system based on subsets, as well as the data acquisition and computing, able to exchanges information with the process or with the plant managed by the distributed architecture: that is not centralized. In other words, it does not exist a single computer for the entire system, but local units dislocated in many areas of the plant. The information exchanged by the subsets are collected by specific supervisor centralizers. The loss of a centralizer does not compromise the system, avoiding incidental stops in case of fault.

The different DCS used in the Paper Mill, normally configured with several redundancies like power supply, communication, CPU (I/O boards are redundant, in some case too); are structured to manage a huge quantity of signals. All managed by a central HW station with redundant CPU, avoiding the Paper Mill stops in case of faults. This has a tremendous impact on the installation and maintenance costs of the system, and binds the



To the left and below, some details. It is possible to see some *Scalink*® modules available on different jobs and different HW installed in some Paper Mill. For every existing HW, *Scalink*® opens up a communication – there are no limits in terms of numbers and protocols -. About scripts and procedures, we can deliver reports, calculations of the users, as well as signal validations whenever they are not available from the field (raw data).



customer to the original producer, obviously (due to licenses, upgrades, and so on). **"*Another history*"** is the control platform developed for **Cartiere SACI**. At the beginning they went through a 360deg systems and technologies evaluation process, comparing all the applications made in the Paper Mill market. Considering the technological gap between CPU, PLC and DCS is progressively reduced (in comparison to the 90's), it is easy to understand why many Manager of different Factories are pointing to solutions like Cartiere SACI made. In the last decade we can see a significant migration to *SCADA-PLC* architectures. The choice of Cartiere SACI was made looking at the future: the opportunity to use an Integrate Fail Safe CPU (The Safety today is a highly sensitive and mandatory theme), easy to be handled by different technicians, because products commonly used for such applications. The flexible system by Scalink® of **SAEL**, based on the last *Scada* technology, is developed to interface with many devices (e.g.: PLC-HW - Boards and DCS), drawing the data from them without specific I/O. Since that it was the best choice for **Cartiere SACI**: easy to drive, fully programmable, is perfectly integrated, and takes the full advantage of the Windows platform, for a fast communication with each node of the network: the right tool to manage from level 1 up to level 4. Starting from the assumptions above,

and supported by the native characteristics of Scalink® that communicates on multi-tasking mode, our solution was the right answer to Cartiere SACI (for some specific applications, we had to develop few not standard drivers. E.g.: the communication protocol for GE Turbo Gas regulator installed in Burgo Paper Mill). In the applications recently developed for **RdM** Reno De Medici Group - **to reach 4.0 Industry and ISO 50001 certifications-**, Scalink® has been connected to PLC, DCS and AS400 installed in the Paper Mill; furthermore the system has been equipped with a user-friendly interface to allow the Mill Analyst to collect and send data from each machine/ area of the Plant.

The flexibility of this interface allows to re-work the data sent to the ERP very easily. This is a win-win tool that shows–*Scalink*® powerful features and useful for any data analysis and reporting. The system, born and raised in Magenta's Plant – initially made to collect data from three Sheeters – was upgraded and installed on several Plants of the RdM Group, also with different communication protocols (PLC, DCS, …).

The **SAEL** "DRT Management" is based on simple pop-up. It is easy to be used by any technician that can decide, and visualize, which variable must be exported from PLC or HW, as well as analyze and going for data storage.

Some control stations and Plant Supervisor

Beside: PIRINOLI PM3 – ROCCAVIONE PLANT (CUNEO)
Below: CARTIERE SACI – VERONA PLANT

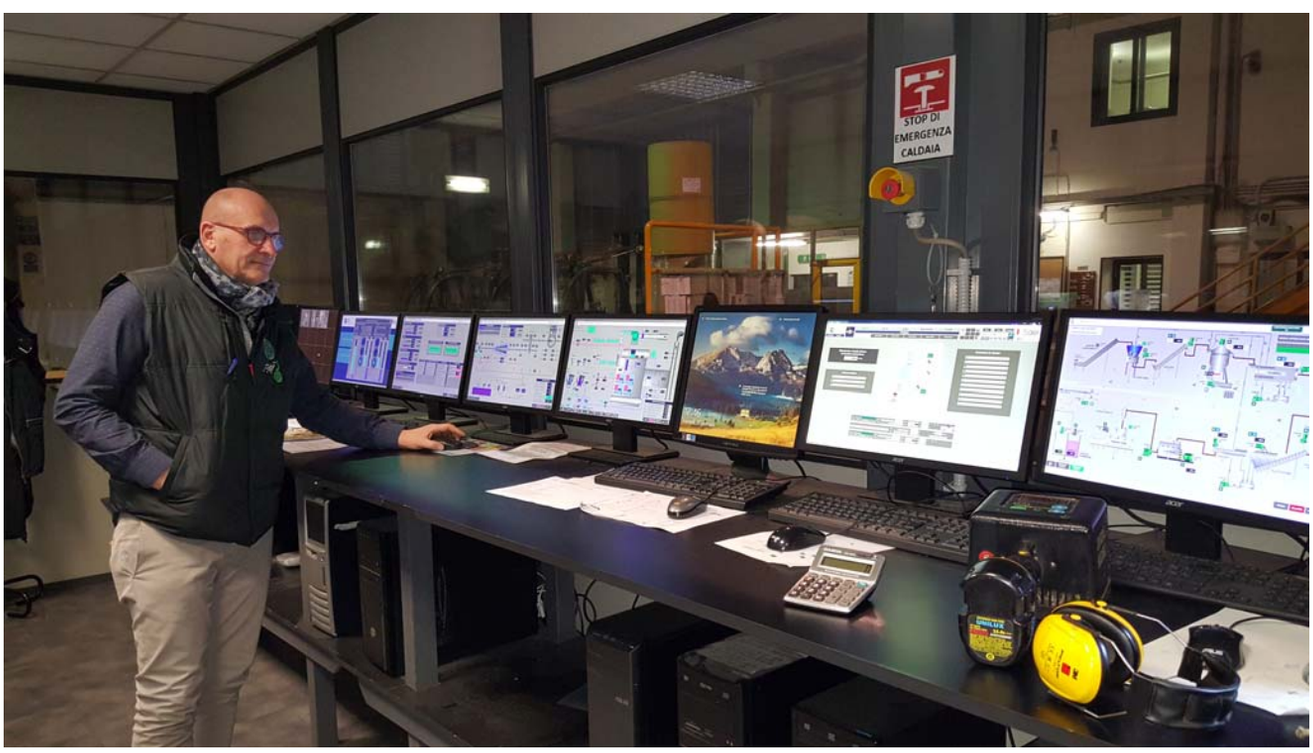


ABB 800 M -XA

ELSAG BAILEY

HONEYWELL

METSO/VALMET

DCS FAMILY

AND MORE

S5 - RG AND 115 -100 - 95

S7 300 - 400

S7 1500

SIEMENS
WHOLE FAMILY

OPC UA SEVER-CLIENT
OPC DA SERVER-CLIENT
MODBUS TCP SERVER-CLIENT
ETHERNET PLC SIEMENS S7
RS 485
RS 422
MODBUS RTU-ASCII
1000P

API AVAILABLE FOR DRIVER DEVELOPMENT

SQL INTERFACE

IEC 61850
IEC 60870-5-104
IEC 62056-21-C (IEC 61107)
SIEMENS AG LINK S5
SIEMENS 3964R

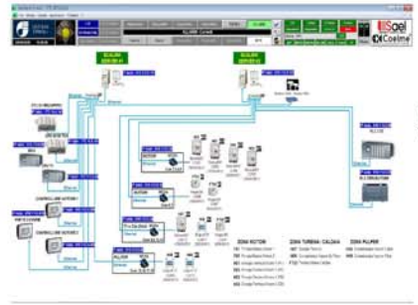
ALLEN BRADLEY
WHOLE FAMILY

GE -VIPA- YASKAWA
WHOLE FAMILY

THERE ARE NO LIMITS FOR HARDWARE BRAND

AND KIND OF COMUNICATIONS:

WE ARE ABLE TO DEVELOP THE PROPER DRIVER



OFFICE PC inside the Papermill

Any computer in Intranet can be CLIENT for
TWO HOURS, FREE without any SW installation

IBM
AS/400

SERVER 2

AUTOMATIC REDONDANCY DATA RECOVERY

CLIENT

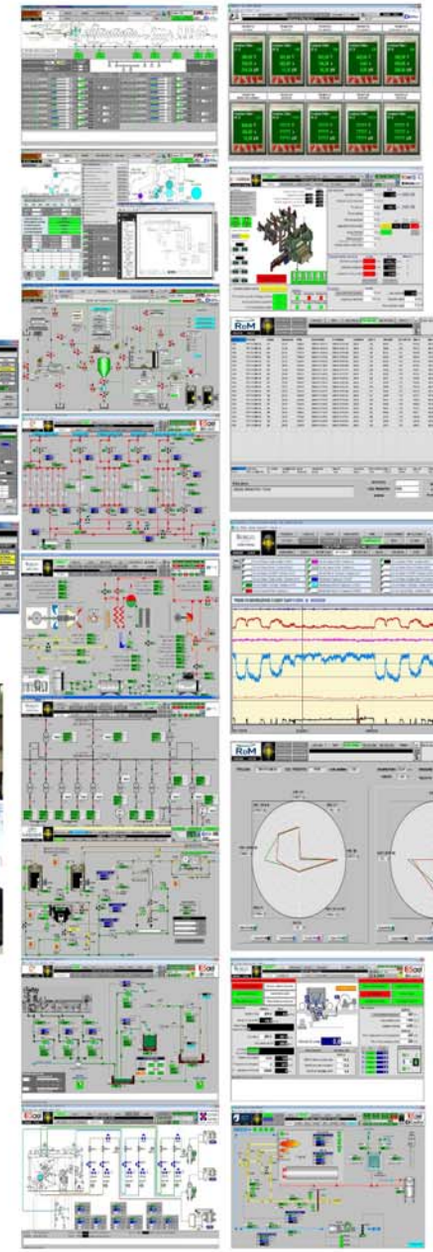
ILLIMITATE NUMBER

SERVER SCALINK - L1 to L4 SCADA

EXAMPLE OF CONTROL ROOM

ENERGY SURVEY

DATA FROM DRIVES



DATA ANALYSIS

PLANT SUPERVISORY
PRODUCTION CONTROL
PRODUCTION REPORTING
TREND COMPARISON
BIG DATA COLLECTION
DATA PROCESSING
DATA MINING
MODEL ELABORATION
OPTIMIZATION CAPABILITY
ELABORATION BY OFFICE SUITES
BRIDGE THROUGH DIFFERENT SYSTEMS
SCADA FROM L1 TO L4

DATA FROM STOCK-APPROACH

DATA FROM THERMAL POWER PLANT

SAEL BOX:

Paper Mill specializations:

Born in 1987, Sael offers Integrated Systems and Process Controls for Industrial Automation. Within the mission Customer First SAEL awarded the title of tailor maker for any automation system. SAEL is now a leader on Paper. The big technical imprinting allows to offer custom solutions: from Heavy Duty up to the General Purpose.
For the Paper Mill Industry, especially, SAEL offers high sophisticated and innovative technical solutions. Hardware and Software custom solutions for any customer need. Beside the complete new equipment production, there is a focused Team who works on rebuildings – most of the time saving a lot of existing components like the original power section or electro mechanic parts and so on -. The main application they are working on are: Sectional Drives with DC, AC and Mixed Technology; Motors implementations; In-line / Off-line Coating machines; Analogical to Digital cascades conversion; Stock preparation by PLC or SAEL technologies; Rewinders and Slitters with cutting units and frame position; Winders and Unwinders; DCS and QCS controls close our experience in paper Industry

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.