



9000 ton. Calendering Supervision

Total openness towards field, both with native drivers and OPC-Server and great database interfacing flexibility (for statistical data processing), are the elements that make the Movicon 11 software the best choice for realizing calendering machine system management.

The steel foil calendering is a process used for bending steel foils into a pre-defined shape. This process is carried out by a calendering machine composed of a series of hard pressure parallel axis rollers, with adjustable spacing, which rotate slowly; usually these machines have three or four parallel cross axle rollers appropriately positioned

to guide steel foils through along a circular trajectory. The radius of curvature of the steel foils is determined on how far apart the rollers have been adjusted to in order to obtain a determined cylindrical or conical shape. This bending process can be done with heated or unheated rollers.

The Italian Walter Tosto Spa company has been awarded fifteen international ISO9001-14001 certificates for quality and operates at an international level (with an export rate of 80%, equal to 90 million euro, 45% of which represents exports to the USA), guaranteeing them impressive orders and contracts.

Over the last ten years the company has invested more than 25 million euro in research and development, of which 8 million has gone into engineering the world's largest calendering machine now up and running in the company's production plant in Chieti.



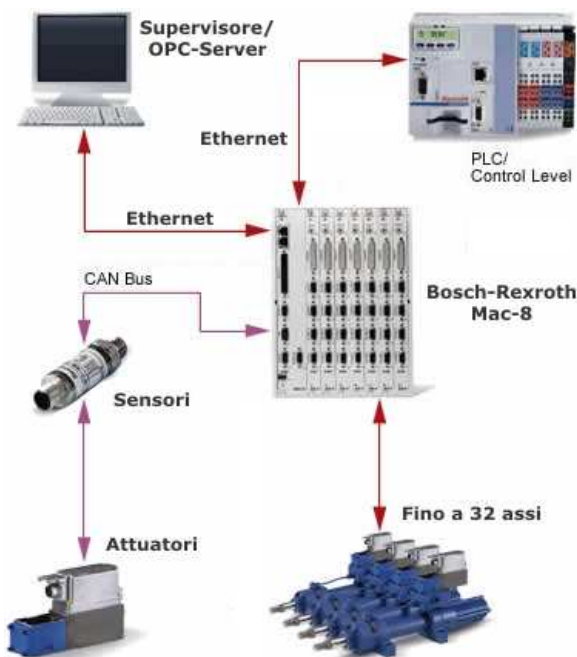
The supervision system which controls the world's biggest calender machine is based on Movicon 11.

This massive calendering machine, the only one of its kind worldwide built on location, had been designed to guarantee non-stop work for highly specialized personnel for the next 40 years. Research and innovation are the key concepts which characterize the owner company, backed by 60 years in consolidated operation not only in in Abruzzo but on a worldwide level in the calendering sector.

The project

In the ambient of this prestigious project, the Software Solution technicians in synergy with the Walter Tosto Spa technicians have worked towards developing a numeric control and automation software and HMI interface using the Progea technologies built within the Movicon 11 SCADA system. It is the first time ever that an 'Open' software has been deployed in such a complex system with the full capacity to meet all the machine's process requirements. The choice of using the Movicon Software was made by Walter Tosto Spa, after having diagnosed other SCADA systems of this type. Their choice was motivated by two particular principles and probably being the most advanced on the market as a whole.

The first is Movicon's total openness towards the



field using native drivers and OPC-Servers (the latter chosen as required for interfacing with BOSCH systems).

The second is Movicon's great flexibility to interface with databases that historically log data using trends, native VBA language, APIs and the diverse classes provided in order to keep the entire process under control and to perform analysis on real-time or backdated process data. The system is based on BOSCH PLC Intradrive and a Bosch Mac-8 to 20 hydraulic axle numeric control system (with tenth millimeter precision) that communicate with each other through an Ethernet network and with the supervisory PC as shown in the figure.

Total power involved is about 1.2 MW" with a 350 bar hydraulic circuit that empowers 16 motors controlled both in closed and open loop.

The electric power management is continuously monitored through third party modules in constant communication with Movicon using Modbus protocol. One of the target objectives to optimize electric energy consumption has been achieved by obtaining data deriving from the field and using script calculations managed in Movicon.

This has also enabled the calculation and recording of manufacturing costs for each calandered piece.



The immense calender machine, the only one in the world, was built by Walter Tosto Spa to guarantee specialized personnel work for the next 40 years at least.

The process

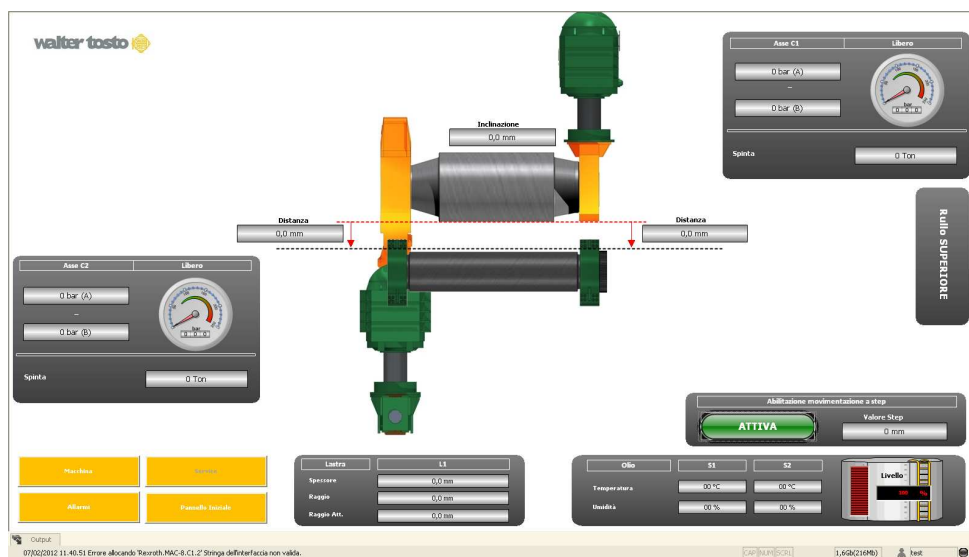
The calendaring process is monitored through MOVICON with complex procedures and algorithms developed in native VB language which have made complex calendaring operations simpler. The number of Tags used is extremely high (literally thousands used) subdivided between alarms, recipes, trends and display values. The major added value provided by the Supervisor is the step-by-step recording of all the calendaring phases and in particular those values which concern pressures (which may exceed 9000 tons) used on the steel sheets, (thicknesses up to 80 cm) and temperatures regulated by setting the necessary parameters for each phase using complicated wave algorithms so that material does not reach or go over its yield point. All this data, once collected, follows through the lifecycle of each calendared piece.

Conclusion

Open to technology innovation but with a steady eye focused on optimizing investments, the Walter Tosto Spa company asked Software Solution collaboration for developing the software project.

This was implemented through Movicon using procedures relating to the algorithm calculation functions for the bending procedures of metal pieces and for managerial purposes. The latter have been interfaced with management software enabling total interoperability for tracing pieces using APIs provided by Movicon. The control and recipe side was developed by using complex algorithms with the Movicon native VB language which allows errors to be corrected during the steel sheet bending process caused by deformability of the bending machines when material is fed through.

The use of algorithms are implemented to

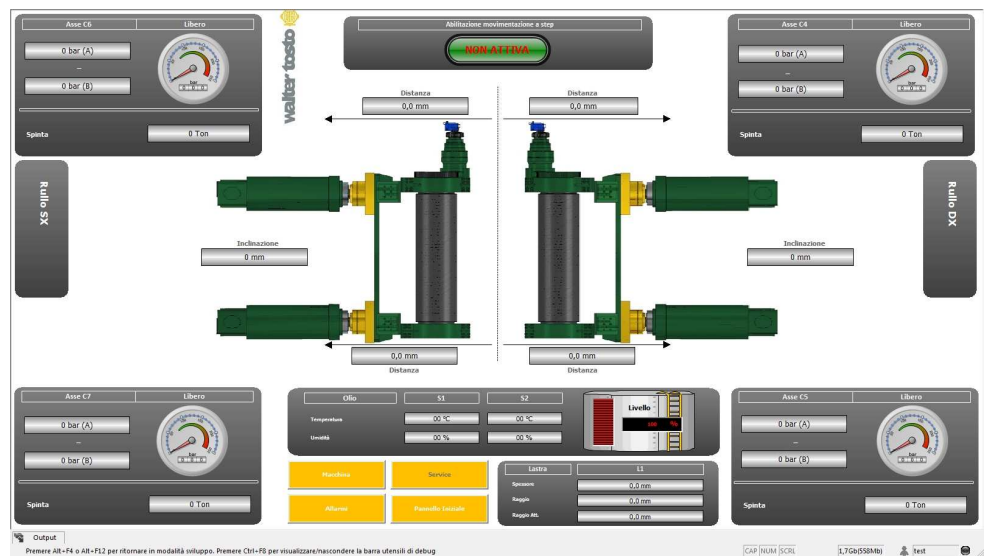


The operator is able to manage and control the whole process using the Movicon supervision system.

automatically recognize the characteristics of the sheets being bent by means of an on-line identification process using data deriving from the management software. The bending process is performed in a closed loop, where Movicon communicates with the PLC/CNC through a Ethernet network to obtain information transmitted by the cylinder hydraulic circuit position and pressure sensors. This procedure runs parallel to the bending process and terminates when the desired bended angle has been reached.

To conclude, it can definitely be said that the following benefits have been gained thanks to the system supervisory software designed and engineered for automating the calender machine:

- improved quality: material is bent to top precision angles as preset even by the most demanding parameters;
- Cost reductions: time reduced in equipping and loading machine, calibration phase for pieces to be bent is now fully automatic;
- Productivity increase: the number of pieces produced has increased;
- More flexibility: less time spent in setting and adjusting the different working processes for each piece or for small batches as well as those settings associated to the different types of materials and relating oscillations.



It is the first time ever that an 'open' software has been deployed in such a complex system and fully capable of meeting all process needs.

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