# Sweet Supervision…

## *How to guarantee perfect hazelnut roasting in one of the most important Italian confectionary company production lines*

Whether whole or chopped, hazelnuts are the perfect chocolate compliment that no one can resist.
Therefore the goodness of hazelnuts plays a crucial role in a leading confectionary company, were two factors always kept in consideration:

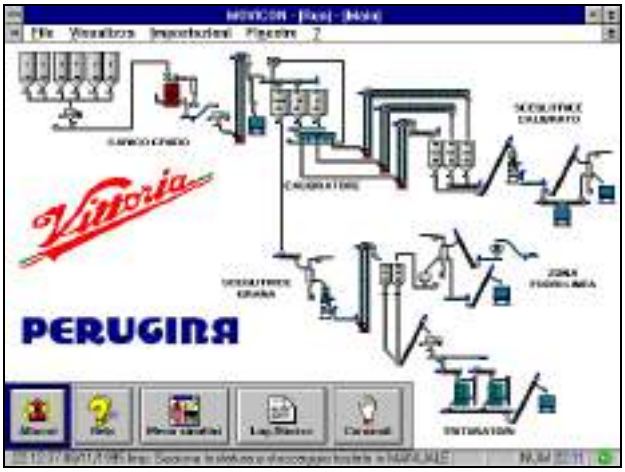
1. The quality of the raw material before being processed
2. Roast perfection

The quality of the raw material is a fundamental factor in the toasting process and indispensable to obtaining that extra touch in the final product quality: a good hazelnut may turn bad if not roasted to perfection. This is where the roasting process plays the leading role with the help of a system capable of controlling and managing the right preset roasting times and temperatures. Assigned the mission to design a project to increase productivity with explicit request to maintain the original goodness and quality of end product, VITTORIA-COMARK, from Ferrara North Italy operating in the coffee, hazelnuts, dried fruit and grain roasting sector, has come up with the perfect solution. They have designed and installed a storage, roaster and hazelnut conveyor management system for the famous **Nestlè Perugina's** 'Baci' chocolate production line, in collaboration with Coteco srl, a company from the same region and who are Movicon supervision system distributors and integrators.
By using Movicon, the well-known SCADA/HMI packet for Windows designed and produced by Progea, they are now able

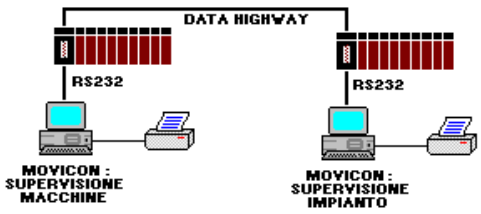
to plan and optimize production batches, analyze product output with Report printouts, historically log each toasting behaviour and evoke all the commands required to running the plant in automatic or manual mode.

**System configuration**

Even though closely linked, this system is built with two distinct parts. The toasting machine, which is the heart of the plant, is an independent unit managed by an Rockwell Allen-Bradley PLC SLC500 and an industrial PC in which the Movicon supervision system has been installed, communicating with the PLC using the Allen-Bradley DF1 serial protocol.
The Machine PLCs communicate over a "Data Highway" network with an analog PLC incorporated to manage the system.
The plant, comprised of a raw material storage and loading section, a roasted discharger and calibrator section, a chopping section and production line transfer section, is also managed by a Allen-Bradley SLC500 PLC and a standard PC with the Movicon supervisor onboard.
The standardization of the roasting machine's hardware configuration allows great flexibility of use, guaranteeing top level openness thanks to the Data Highway network expandability with which the Movicon supervisor can communicate when needed.




*The main Movicon application screen used for supervising and controlling the "Perugina" roasting system.*




*The hardware configuration of the hazelnut roaster it comprised of the Movicon supervisor in the Windows environment and PLCs from the Allen-Bradley SLC500 family.*

**The Roaster, the 'heart' of the system**

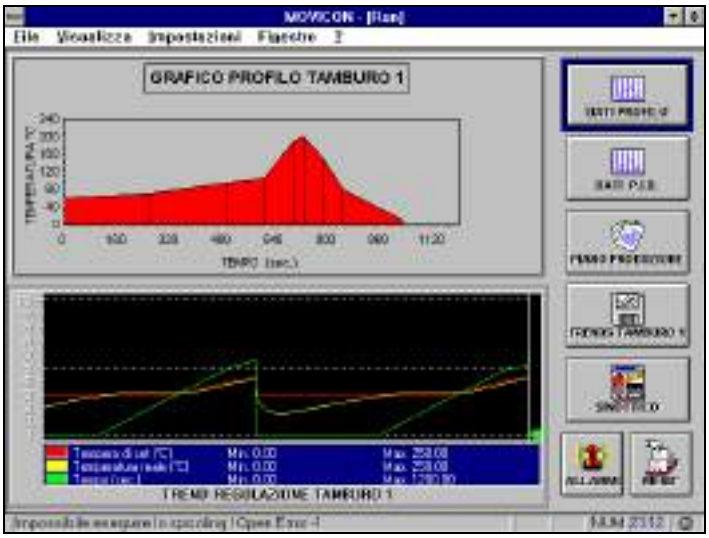
The roaster machine is the fundamental part and most delicate part of the process. In addition to supervising the situation in real-time, the Movicon management system also has the task to set and optimize production data in the best, intuitive and simplest way possible. Using the Windows environment greatly simplifies these tasks being a consolidated standard for all users, including the not so expert.
The Movicon supervision system is very easy to use allowing quick and intuitive setting of work parameters, through dialog windows, which can be activated using the appropriate buttons or with a simple mouse click on screen. For instance, a simple click on the burner will activate a window for setting its temperatures and alarm thresholds.

This procedure is also used for setting commands manually. By clicking on the desired motor or valve on screen a dropdown menu will appear for starting or stopping the device. Purposely designed with userfriendliness in mind, users can set commands in the most natural and intuitive way possible and extra support is provided in the form of help windows, which can be customized and adapted to the context as pop-ups.
Being completely configurable this system has great flexibility and adaptability to all production requirements. This configuration is setup for managing roasting profiles (in segments) and production batch plans.

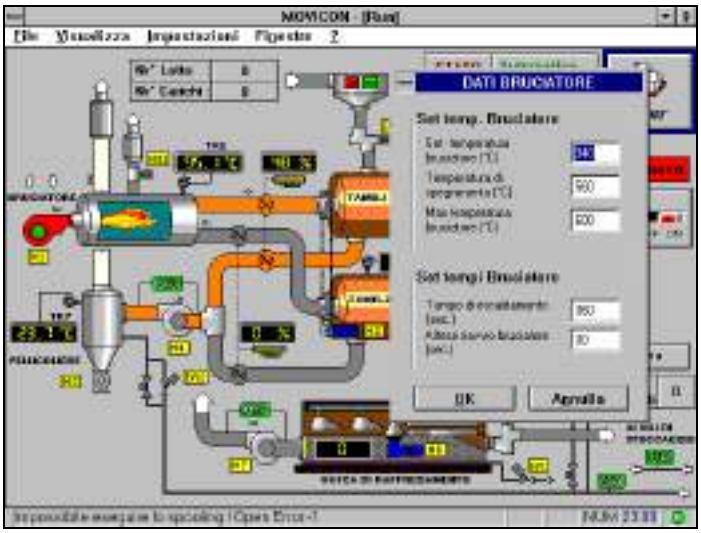
**Producton management**

By employing modern technology based on PC with userfriendly environments users can now finally set the entire production process in automatic by setting the different batch sequences to make possible to run different process sequences of products completely different from each other.
By choosing Movicon as a management system, the client has reduced development times by being able to set all the data necessary for automatic plant production processes, production profiles and batches by simply using dialog windows.
Workers can enter a set of values for each type of nut to be roasted in order to regulate temperatures in the roasting drums. A step-by-step sequence can be created whereby each drum can be set with specific temperatures, time durations and the associated P.I.D. control type. This step sequence forms the 'fingerprint' of the product roasting profile.
To get a clearer picture of each roasting profile, the operator can analyze graphs on screen showing the behavior of each roasting profile set. Each profile can be recorded on file as a normal recipe. This enables the user to create new recipes or activate and modify those already saved on file by using the appropriate dialog window, relating to the recipe, using the Windows standards. The Movicon Supervision system provides a Production Plan management that, by using the same system used by the dialog windows as a user interface, the plant manager can easily create a production plan.
A set of items has been provided and can be set and recorded on file:
Batch code / Product name / Number of roasts (Batch) / Weight in Kg. / Volume in Kg. / Sampling Silo / Roasting Profile Code / Product destination.

The recording of these parameters, using




*Movicon supervisor screen page containing the set roasting profile values and values in real-time and historical mode.*



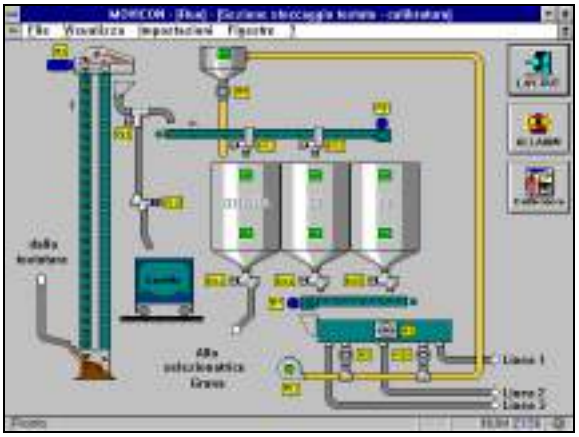

*A Movicon's screen showing the plant's roasting section.*

a simple recipe management-like technique, allows production batches to be created based on planning and

optimizing the plant production output in function with each specific need.
The production plan can be paused or modified in realtime in order to systemize unforeseen events or amend different production requirements.
Movicon issues Production Output Report printouts upon each product unload so that differences in production by product type, raw and roasted product weights can be examined.

**System management**

The system's architecture has a second P.C. situated in the Control Room, linked to the system management PLC. By using the roasting machine section's previous P.C.-PLC system, the system receives the necessary information relating to the raw product dispatch and the roasted product



*A Movicon dropdown window containing manual plant actuator command s*

line transfer.
The system's task, subdivided in sections, is to satisfy the roasting machine requirements as set in the production plan.
The "raw section" is designated the task of storing the raw nuts in the right silos according to product type. The product is then sent, in batches, from the raw storage silos to the drums, upon machine request for roasting according to the preset roasting profile activated. When completed, the roasted product is then transferred to the "calibrator section", preset with the nut selection type, then to be stored in the appropriate silos in the "roasted section" according to nut type.

**Monitoring and Control**

The various plant sections are controlled and supervised with video screen pages. By using these screens the operator is guided throughout the whole production process with simple and good looking animated graphics. The plants realtime situation is captured by illuminated or colour changing tubes and motor or value (ON, OFF, Alarm) status indications. Particular care has been taken in making the graphics look realistic by optimizing them with animated conveyor belts, agitator, feeder and burner movements in real time. The operator can clearly observe the products progress through each stage of the process cycle.

The operator can also command each single plant component, directly from the screen pages, using drop-down menus activated by clicking on the desired component. The client benefits on not only being very easy to do but costs saved in no longer needing various manual push-button panels positioned all over the plant floor.

Both supervision systems allow easy diagnosis, machine and system maintenance by using a complete alarm and message management in accordance to the ISA normative.

Screen pages have been purposely provided for displaying alarms and their relevant data concerning occurrence times, acknowledgement, reset, on and off. Each single alarm can be associated with a pop-up comment to guide operators or maintenance personnel and comments can be entered as memos. The operator messages are separate from the alarm management and supply the operator with valuable information on the realtime situation only.
All the significant alarms and events (messages or self-diagnosis) are recorded on database files, which can be displayed and viewed in the Historical Log window or printed on request.
The historically logging of variables in a modern system is absolutely necessary to execute an effective analysis on system behaviour. The Movicon supervisor permits customizable historical management, to allow recording to take place only when needed (on event or established by the logic) in order to optimize analyzing without wasting memory space. The userfriendly Trend window interface, with video recorder type commands, is very intuitive to use, easy to understand and read variables.

*Alarm and system message screen page*

*Movicon trend page for analysing variables*

**Conclusions**

The Union of VITTORIA-COMARK, equipped with a decade of experience in the roasting sector, the design capacities of Coteco support, has made it possible to accomplish a unique integrated system for managing systems based on P.C.–PLC, capable of increasing system quality, employment flexibility with cost effectiveness, offering the end user advanced technological automation solutions at their best.
The choice of the Movicon supervision and control system was influenced by the fact that it doesn't take long to develop due to its simple-to-use and programming easiness – a main point of the packet. Native to Windows, the system's reliability is also guaranteed by direct technical support from its worldwide distributors.

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