

Movicon in the food industry: The dairy production plant at Parmareggio

The Parmareggio Unigrana creameries produce butter using top quality raw materials from the famous region of Parmigiano Reggiano. This famous dairy product manufacturing plant is completely automated with innovative and modern technology to guarantee certified quality.

Parmareggio established in 1983 in Montecavolo of Quattro Castella, in the hills of Reggio Emilia where Parmigiano Reggiano originated, has become a world leading company in producing and marketing Parmigiano Reggiano dairy

products. In 2004 the Granterre Consortium of Modena purchased a majority stake in the company. The Granterre Consortium is a cooperative which partnerships 60 individual



manufacturers with 36 dairies who represent about 1000 dairy farms.

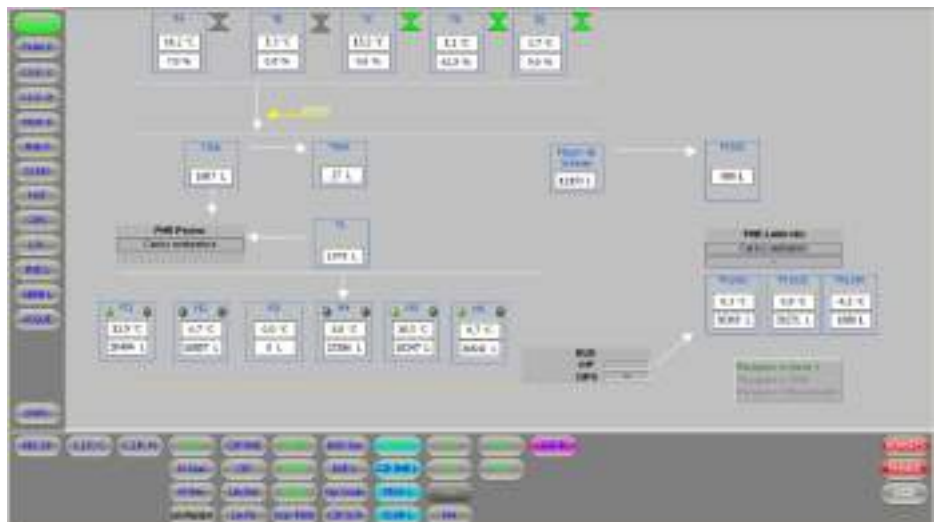
This acquisition has marked a change in the brand's marketing strategies and image with the launch of a new product range. The capacity to innovate is a determining factor that has allowed them, through intense research, to develop new food products other than Parmigiano Reggiano cheese that are all dairy products deriving from milk. With production plants in Montecavolo and Modena, today Parmareggio with their own product range has become a reference point for consumers in the dairy product market and is the first company in its sector to have commercials on television to promote the true value of their brand name.

In 2009 Parmareggio incorporated Fiordalba Srl and a Modena creamery to produce butter to become not only leader producers in Parmigiano Reggiano cheese but also one of leading companies in producing, packaging and marketing butter, which has earned them a year's turnover of 35 million euro on butter alone, totaling a 22% increase in 2011 with an average yearly turnover of 295 thousand euro. These

positive results have encouraged them to renew and automate their creamery plant by applying systems to improve production further and to become more efficient and quality certification ready.

The production plant, which was already partially supervised by Movicon, has been subject to overall revamping. This consisted of installing new systems to improve the existing ones, as well as completely renewing the supervision side with functions such as redundancy and quality certification.

The design engineering and installation was entrusted to I.T. Technologies Srl, a Movicon system integrator and solution provider company



The dairy product manufacturing plant adopts avant-garde automation systems which guarantee security and quality.

specialized in designing and realizing electrical systems, PLC and Scada/HMI design engineering.

Butter production

Fresh cream is the raw material used for making Parmareggio butter which comes directly from dairies that produce two famous PDO (Protected Designation of origin) cheeses, Parmigiano Reggiano and Grana Padano. Most of these dairies are located in the Parmigiano Reggiano cheese region. Close contact with suppliers, consolidated over the decades, permit accurate control of the initial production line stages.

Pasteurization and ripening

Cream is collected and put through the first centrifugation phase after which it is immediately sent on to the pasteurization phase. This delicate process cycle is constantly monitored and recorded by the Movicon automation supervision system that ensures the maintenance of top safety levels compliant to European standards.

Once pasteurized, the cream is left to settle naturally in vats.

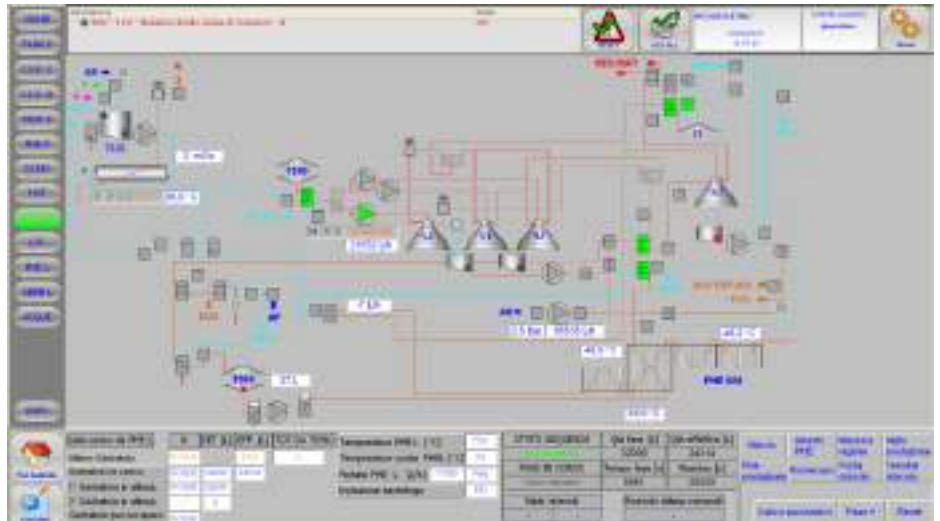
During this phase the temperatures are constantly controlled in order to obtain perfect end product spreading consistency.

The churning process

The pasteurized cream is then churned so that the fat globules in the cream come together to make butter. The sophisticated NIRS system (Near Infrared Reflectance Spectroscopy) goes into action at this stage in order to constantly control the all the product's chemical parameters and continuous adding of milk enzymes.

Packaging and shipment

The butter production flow, from the churning phase to the packaging phase, is performed within completely closed and automated and unmanned plants to prevent risk of product contamination during the whole process cycle. The high velocity production lines are able of making butter in all shapes and sizes according to market demands. The production lines have also been equipped with packaging and automatic



The Movicon graphical screen pages consent to optimum and safe management of the whole establishment.

weight control systems.

Once all the production phases have terminated and before being shipped, the butter is placed in a refrigerated environment where temperatures are constantly monitored and recorded until all the product quality controls of each batch have been accomplished with success by the Quality Control Office. Top security and food quality are always maintained at top levels during this stage.

Plant Description

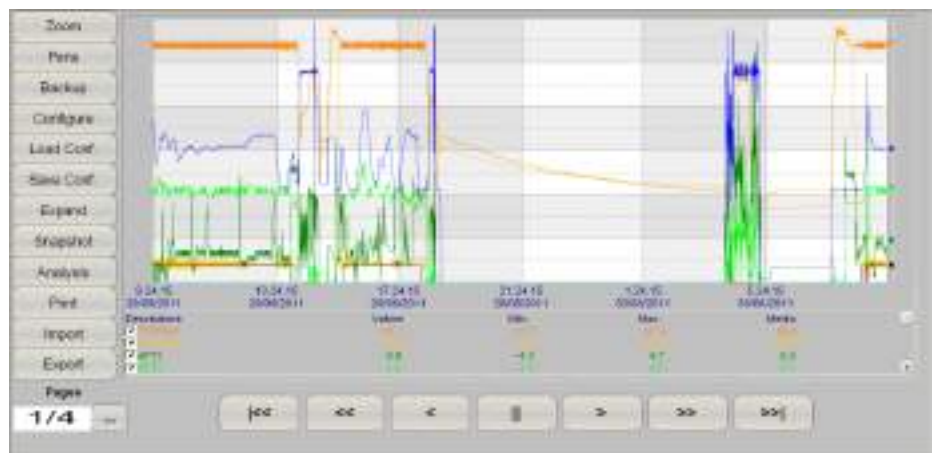
The entire production plant is primarily built of pipes and pumps which move the product through the different treatment processes according to automatic top precision sequences controlled by three PLCs located at stainless steel control panels within the establishment. This system has to guarantee maximum security, both during the different operating sequences and working and chemical parameters, which are mainly determined by specific controlled temperatures and the product's organoleptic features which are both critical for quality and hygiene maintenance.

The Parmereggio Butter production plant is managed by an automated system that handles all the different butter production phases. These phases involve a series of components and systems which prepare the raw material used for making butter then perform the different treatment processes right through to the packaging stage. The first part of the plant manages the raw cream by sending it to pretreatment vats (the creamed is mixed with water and melted butter) then the pretreated cream is pumped on to a storage tank from which it is collected and sent onto be skimmed. The skimmed fat content is pasteurized and pumped on to ripening tanks where it cooled and mixed to be then pumped on to the butter making machines; the separated buttermilk content is also sent to another pasteurizing process then stored in silos designated to collector tanks for other external processes. All the automatic sequences and working parameters are controlled by one supervision workstation based on the Movicon 11 SCADA technology.

Perfect Hygiene

Perfect cleanliness is guaranteed by the automatic CIP cleaning and sanitation system, which is the fundamental part of the plant system production. CIP stands for Clean-In-Place and is an automatic cleaning process applied in a closed circuit to clean the interior of the production line process equipment that does not require any disassembling of the system or its parts. This cleaning system offers the following advantages:

Uniform treatment of surfaces that have direct contact with product; damages to mechanical parts can be avoided because disassembling is not required; exclusion of contamination risks due to system control openness and cleaning equipment; works automatically and each phase can be reproduced and traced by retrieving the corresponding parameters from system data. The CIP uses detergent recovery, which are the chemically and biologically active components in the CIP system circuit injected into production



All production data is archive on database and can used for production process quality certification using Trends and Reports.

system through pipes and then gathered into collector tanks. In this way, when adding new detergents, the washing liquid can be regenerated and reused. Production plants implemented with CIP systems always guarantee

efficient and effective cleaning and fully meet the FDA and health and quality standards.

SCADA- PLC Architecture

Personnel manage the system through a supervision system located in the main Control Room where two PC stations reside using Windows 7 with Movicon 11 setup in a redundant configuration. The Scada system redundancy guarantees maximum and continuous running of production lines which is essential for those systems which perform 24 hours a day and need to guarantee correct management which otherwise would compromise end product quality. The Scada must also be able to record and trace all working and temperature parameters according to regulation standards. In order to satisfy all these requirements the Movicon redundancy manages Server availability (Primary Server and Secondary Server) transparently and in complete automatic, by managing operativity and historical data availability always in synchronization mode. The User interface, managed through screen pages, has been designed so that all working statuses are constantly kept under complete control. The graphical area is divided into two frames, one containing user operating statuses in the various pages, and the other containing operation commands according to context. Thanks to the redundancy system, users are provided with two workstations showing two screens and a total of four frames simultaneously for improved visualization of the whole process and personnel operativity. For example, one staff member can display a cream collection tank on screen and start a pasteurizer cleaning process, using the command menu, from one workstation, while another can control the skimmer production and print a chemical laboratory quality report on the CIP cleaning processes.

The Movicon supervision system is connected in net through Ethernet to three Siemens S7 PLCs dedicated to automation logic control: one PLC manages the production process system, the other two PLCs manage the CIP systems of the

production and storage process systems.

Communication is established by using the native and excellent performing Movicon S7-TCP communication drivers, which collect and aggregate data in the Movicon Real Time DB. The process data, apart from being managed visually and by command on the user interface screen, is collected and historically logged in relational databases, based on Ms SQL Server. This function is of vital importance for perfect production quality documentation, using both Trends and Data Analysis to produce periodical reports.

The predisposed Alarm management allows instant detection of eventual system malfunctions and provides operators and maintenance staff with step-by-step guidance on how to restore system back to full working order. All data is recorded in historical archives to enable easy error occurrence analysis where alarm events can be traced back to its originating context and the active users at that moment.

The client also requested the system to run the plant in compliance to the FDA CFR21 part 11 regulations. Even though these regulations are usually pharmaceutical sector oriented, they are also made reference to by those applications that produce products for human use or consumption such as the food and cosmetic sectors for health safety reasons. The Parmareggio butter production plant therefore uses security criteria to allow access to authorized staff only by using Movicon's simple but very sophisticated user and command access management explicitly designed to support the CFR21 Part 11 regulations. In addition to all the requirements defined by the user privileges (area and access level), the system manages 'electronic signatures' in reports and for historical data, so that each significant action executed in the plant, such as command activations in specific contexts, or working parameter modifications can be traced back to initiating area and user. Audits are recorded in DB with encrypted access and can be documented appropriately in reports.

The whole revamping process did not take long to implement and there was no need to stop production thanks to the I.T. Technologies technicians' vast experience and the rapid design engineering and configuration ability of the Movicon platform. The Movicon platform also consented to full recovery and compatibility with the "old" previously installed version. Parmareggio is now fully satisfied with the system

which has allowed them to produce at target efficiency rate in absolute safety and gain positive results for company market growth as mentioned at the beginning.

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