Refineries in Ecuador

from Luca Prando

Auma Italy has realized a mixing, storage and hydrocarbon distribution plant run by the Movicon supervision system.

Auma Italy was given the mission to make the treatment and storage of processed and semi processed petroleum products simple and safe at the Esmeralda refineries in Ecuador.
Above all, Auma had to guarantee, to the benefit of the refineries, transport, mixing, storage and the distribution of these products. The solution Auma came up with is particularly interesting as all the plant's motorized pumps and valves are managed directly from a PC equipped with complete integrated supervision and control without using PLCs or any other additional management system. This has been achieved by using the AumaMatic electric actuators with Profibus interface aboard and the Movicon supervision and control system that commands and manages the whole system.

The AUMA company
Auma Italy Srl is one of the branches belonging to the Auma German company established in Ostfildern near Esslingen, in 1964. Auma started operating by producing its first actuators of the SA 4 – SA 70 range which earnt the young company great success. Further production plants were soon established gaining the company a firm stand in the international market of valves and actuators and not only, it is now also one of the leading producers in this sector and is used as a reference point for their technology know-how. Right from the beginning Auma concentrated its efforts on the emerging technologies in the valve automation field. Quick to respond with complete solutions to the needs of end-users and project designers, Auma

became the ideal universal partner in the value industry.
The Auma actuators are employed all over the world to remote control values in various types of industries, especially in the petrochemical and water industry sectors. Like a token ring between the control room and valves in the pipelines, they carry out important and crucial work and guarantee reliability and safety within the plant and in the surrounding environment.
The actuators with united AUMA MATIC control incorporated provides further advantages to the user, such as those in the application realized for the Esmeraldas refineries in Ecuador.

Motorized valves on fieldbus

In general, field bus based system applications offer efficient and cost-effective solutions where traditional ones are compared. System control data is transmitted to the actuators through a simple double-wired cable, therefore with the greatest of ease and a noticeable cost reduction in wiring. Various systems, of different trade-marks and product types can operate on the same network, each one independently from the other. Security is increased and is however guaranteed by redundancy systems, which make sure that data transmission is not interrupted by any component breakdowns or system failures. Planning, installation and maintenance have all been extremely simplified with economical benefits in saving at least 20% on the traditional wiring systems.
The highly efficient distributed actuator system is all due to the integrated control unit. When the actuator is capable of managing effective torque signals and end-line sensors independently, full advantage can be taken in enjoying the pure and simple control via field bus, with highest system safety and actuator life expectancy guaranteed.
The motorized valves on fieldbus ensure local manual control, whether mechanically or by means of a key switch and control push-buttons (LOCAL – OFF – REMOTE/AUTOMATIC).

The Esamerldas Refineries

The solution realized by Auma (in collaboration with a Movicon Solution Provider company), has given the client complete satisfaction in being able to run the plant, today, with a economical save of about 20% in management and maintenance costs with a considerable increase in safety. The processed or semi-processed petroleum products (petrol, naphtha) are mixed according to demands of the market and orders, and stored in big tanks ready for distribution.
The mixture preparation is done by storing the various petroleum components, based on settings executed by the operator from the control room. By means of the supervision workstation, the operator acts on the control parameters and, based on the product to be processed, sets the quantities of the base petroleum components and their destinations.
The plant is composed of a total of 54 motorized valves from the Auma-Matic range, connected directly to the supervision system through a redundant Profibus FMS network. The system also controls 14 pumps and a series of minor actuators and service signals (capacities, levels) connected to the supervision on a Profibus DP network. 4 Applicom Profibus communication cards have been installed on the Supervisor PC, which are all managed by the Movicon supervisor.
This particular architecture makes the control system especially simple to maintain and safe thanks to the redundancy system. The supervision screen pages created in Movicon are extremely userfriendly. The operator constantly has the process and working parameters under control and can always operate each actuator manually at any given moment through detailed

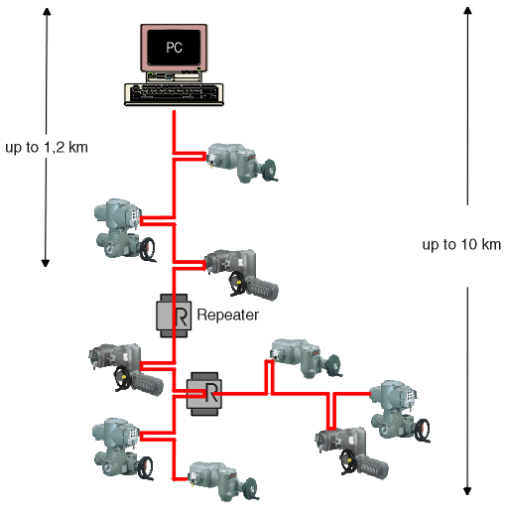

Photo B: A diagram of the Auma-Matic valves connected in a bus network, governed by the Movicon application

windows which are activated by clicking on the actuator desired. Apart from the actuators via profibus FMS, the Movicon supervisor can control the pumps and other valves distributed throughout the plant thanks to remote I/O devices connected in Profibus DP.
The increased reliability of Movicon has allowed planners to trust system management entirely to its supervision. Thanks to the features of the Progea SCADA Platform, this application is capable of controlling and positioning all the plant components directly without the use of any other control systems such as PLCs. This results very beneficial in terms of being very cost and maintenance effective.
Therefore the PC-BASED architecture has been employed, exploiting the system's potentiality that comes integrated with powerful control tools such as SoftLogic and the VBA language. Naturally, it needs to be taken in to great consideration that this specific application type does not require determinism in controlling the system. Also due to the fact Windows NT is a non-deterministic operating system, the Auma's control requirements in managing valves and pumps were bountifully covered by the supervisor's features.
The operator can control each single valve from the supervision project whether to close, open or assign it an opening percentage, or the system can execute positioning cycles creating a true and real operating system in every sense, thanks to the logic that can be created in the supervisor with a PLC concept.
The feedback from data output readings on the actuators ensures secure management and diagnosis. For instance if a valve set with a time-out does not reach the position requested, the system will immediately alert the error and will react according to the predisposed security level, by stopping the pumps or activating the appropriate emergency procedures.
The operator always has all real situations, according to the commands set, under control by means of using the animated screens. Each actuator is in fact highlighted with its current effective status, indicating whether the valve is moving and which opening percentage it is currently situated with. Furthermore the operator has at their disposition a screen showing all the information relating to the quantities being stocked in the various tanks.
The extremely advance diagnostics plays an important role in plant management.
Thanks to the functions that can be associated to each alarm (indications, help, comments), the operator can always use the right procedure suited for any anomalous intervention. This permits precious time to be saved in fixing the problem to avoid the plant from being at a standstill. The alarm historical records events on DB files in MsAccess format, allowing the operator to analyse the system's components directly from the supervisor in order to work out the best solutions for a more efficient running of the plant.
Other Movicon functions include the voice or speech synthesis of alarms and telephone calls or sending SMS messages which help to reduce management and maintenance costs and rationalize the resources of personnel on call.
Plant command Access is protected by a password system based on different access levels, which are reserved for system operators with different privileges according to the responsibilities they have been assigned with.

AumaMatic+Movicon united

Thanks to Auma and Progea's particular technologies, the motorized valves in Profibus management is all run by Movicon.
Choosing Movicon has allowed all the functions typical of Scada software and those of the PLC to be integrated into a one-only applied project.
This type of integration gives way for a more simplified redundancy management and to have all the system's data within one environment only, with a considerable reduction in costs and time.

We would to thank Dr. Brancaleoni of Auma Italy.