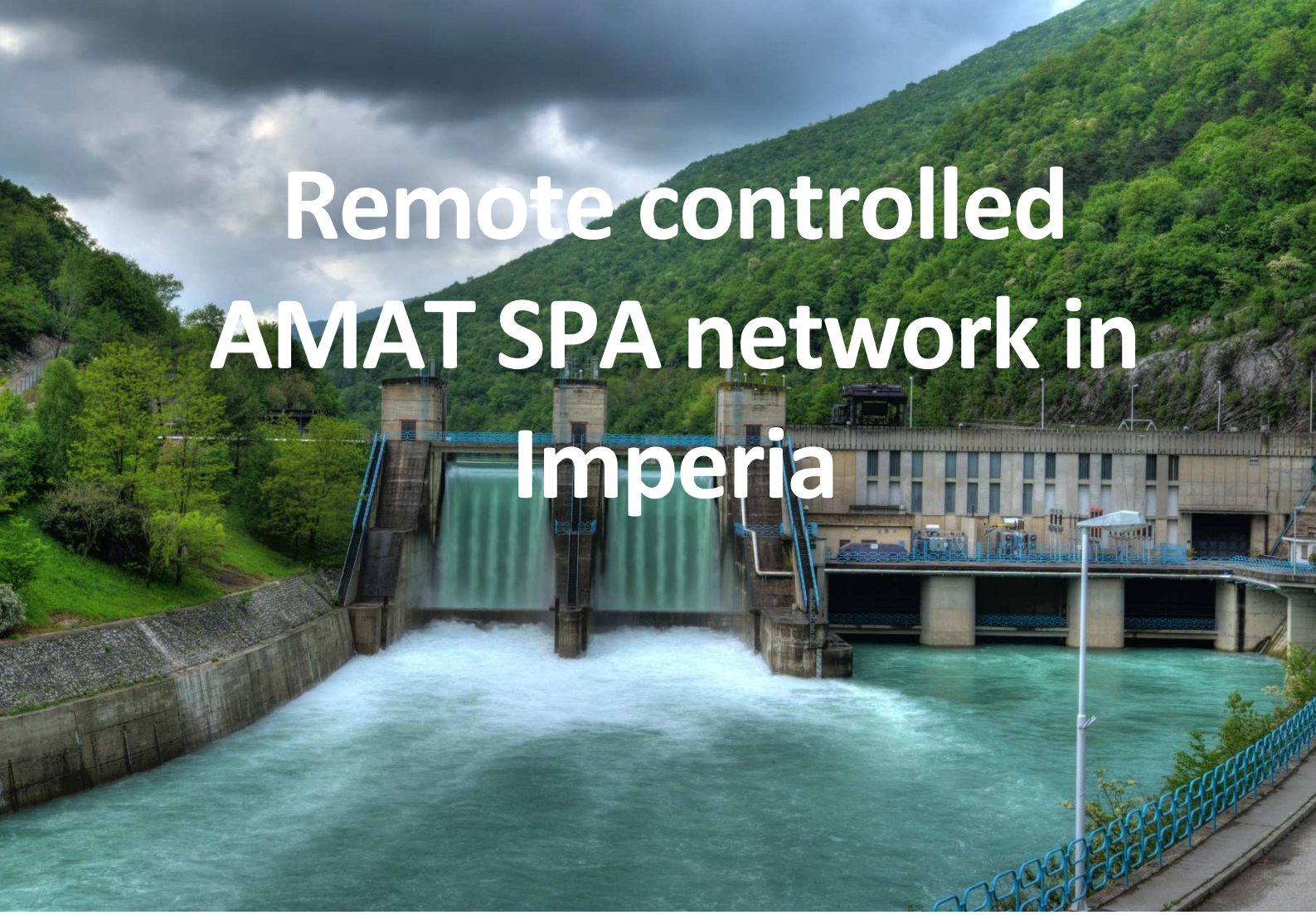
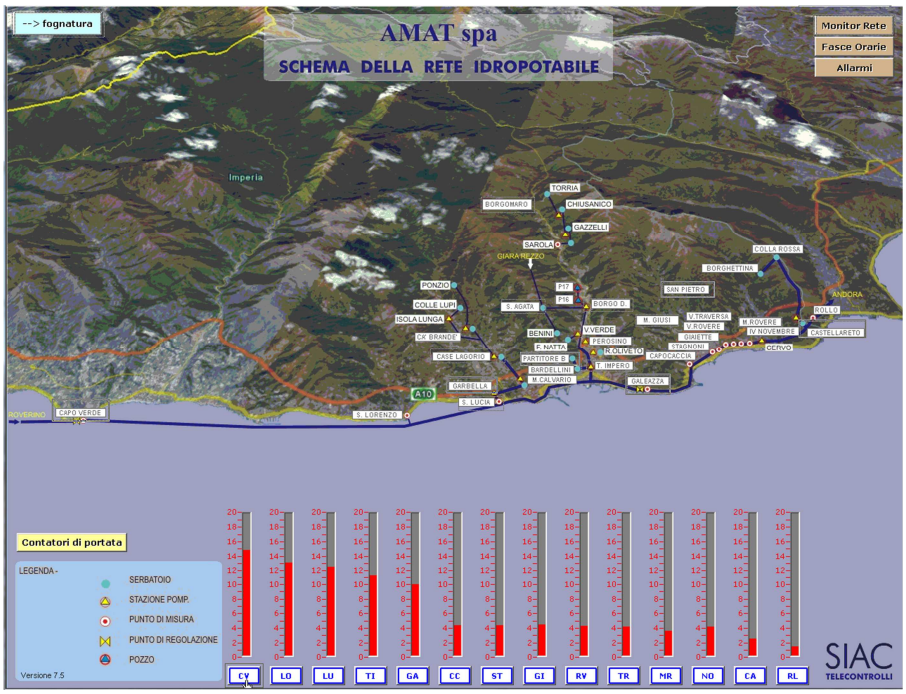


Remote controlled AMAT SPA network in Imperia

Amat Spa unifies and simplifies the remote control of supervisory systems installed in different parts of the plant using a solution based on Movicon 11.

Amat Spa was founded in 1955 and is an automonomous municipal company that manages civil waterworks and urban transport services. In addition to the public transport services (sold in the late 90's) it was also commissioned to manage the Lascinasco waterworks built in the late 800's.
Today Amat is a joint stock company of which 52% is owned by the City of Imperia and 48% owned by the Iren Group which has 50 employees. In addition to the services described above, it also manages the public thermal power plant.
Amat started construction work on the "Rio Oliveto" pumping station and is now in full operation and the new location for the company's offices since 2011. The pumping station has a remote control network system managed by the company.
Following a persistent water crisis the council funded the construction of a 35km (Ø=400 mm) long catchment for the Giara di Rezzo Springs in 1967 which took 3 years to complete. In 1972 a sluice gate was built to regulate the flow of spring water into the Torrente Impero and new wells were drilled to complete the existing aquaduct system together with an underwater pipeline (Ø=800 mm), between Imperia and Capo Verde (Sanremo), to transport excess water of the Roja aquaduct in Ventimiglia to Imperia. The aquaducts of Bardellini, Cascine and Molino of Guisi were built during the 80's and still today form the backbone of the water distribution system. In the same period the Roja underwater pipeline was extended



1. Drinking water network scheme

overland from Santa Lucia in Imperia to Capo Rollo di Andora (SV), for a distance of 33 Km.
A second water crisis saw the need to round off the second Roja aqueduct section by building another pipeline called “Roja bis” between Roverino (Ventimiglia) and Capo Verde (Sanremo), where it connects to the existing pipeline between Capo Verde and Capo Rollo (Sv). This 21 km long pipeline was completed in 2000 and today constitutes the water life line of the entire province of Imperia up to the province of Savona supplying water to the city of Andora as well. The Imperia council appointed Amat Spa the running of the sewage system in 1997.

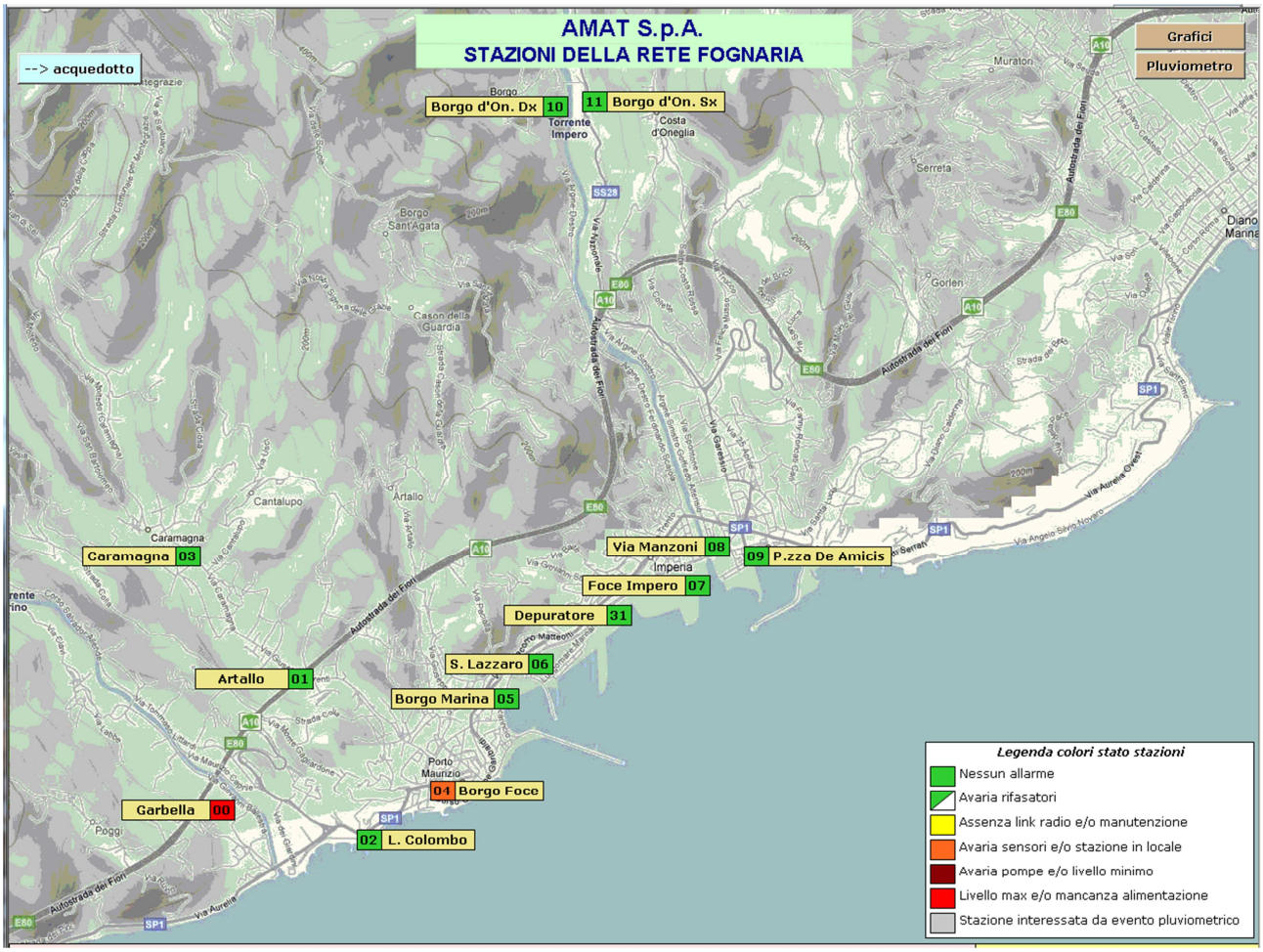
In 1999 Amat spa was ISO 9001 quality certified. In 2002 it was financed to realize the Objective 2 program with the mission to:

- Improve water distribution in the municipal distrists of Cervo, Chiusanico, Diano Castello, Dolcedo and San Bartolomeo al Mare;
- Interconnect the Roja acquaduct with the Giara di Rezzo aquaduct in order to ensure water erogation to Impero Valley district in cases of insufficient water deriving from the Giara Springs;
- Implement safety precautions for the underwater Roja conduit in the vicinity of the new tourist port of the Aregai Marina;
- Realise a new remote control centre in the Rio Oliveto pumping station;
- Adjust the remote control panels to the managerial needs of the wastewater system.

In 2003, Amat Spa participated in a European Consorsium to recieve a grant as part of the Fifth framework Program for the Hydroplan-EU project .
Amat is the only Italian company participant coinvolved in establishing a computerized methodology to be adopted at an European level for the modelling of water and wastewater networks.

System description

The Amat Spa systems are controlled and supervised using Movicon11” and are comprised of:



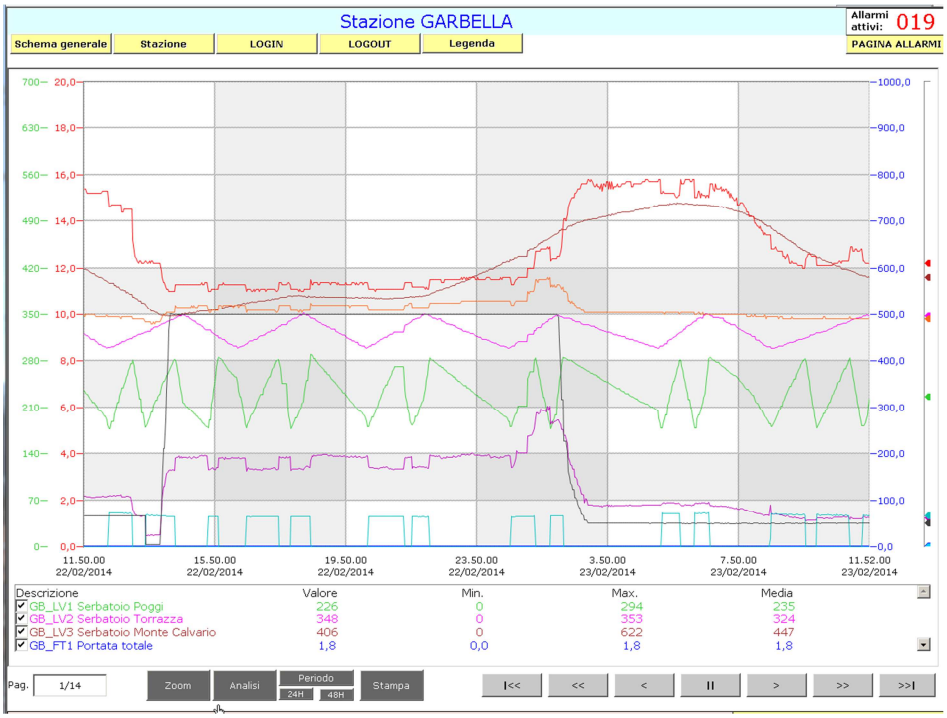
2. *Wastewater network system*

- A water supply netwwork for the towns of Imperia, Diano Arentino; Diano S. Pietro and Pontedassio, totalling around 29,000 clients. In addition, the network is the main water supplier to the towns of Andora, Cervo; Chiusanico; Chiusavecchia; Cipressa; Costarainera; Diano Castello; Diano Marina; Dolcedo; San Bartolomeo al Mare; San Lorenzo al Mare; Vasia and Villa Faraldi for a total of 10,000,000 cubic metres a year.
- On the whole 32 pumping stations containing a total number of with 82 pumps at a total power capacity of 1.500 kW; 118 pressure meters; 15 tank levels and 40 water main meters (the level and pressure meters are twice redundant).
- Local district wastewater network totalling 260 km of pipeline and 26 pumping stations 12 of which are equipped with 33 pumps with a total capacity of over 500 Kw, are already remote controlled with the remaining still in the planning stages.

Field and RTU features:

The controlled "field" is geographically extended over 35 km and is intelligently distributed and managed. There are automation Islands that, in cases of communication failure, activate an emergency program caluculated on site. The control system consists of 60 RTUs equipped with average capacity industrial PLCs which more than half of them can be programmed with five of the **IEC61131-3** standard languages**.** The RTU hardware is standardized while their software, specialized for each individual site, contains the Know How gained over twenty years in operation, constantly evoluted to respond to the increasing demands for running the plant reliably: resource redundancy, quick/easy maintenance and cost effective

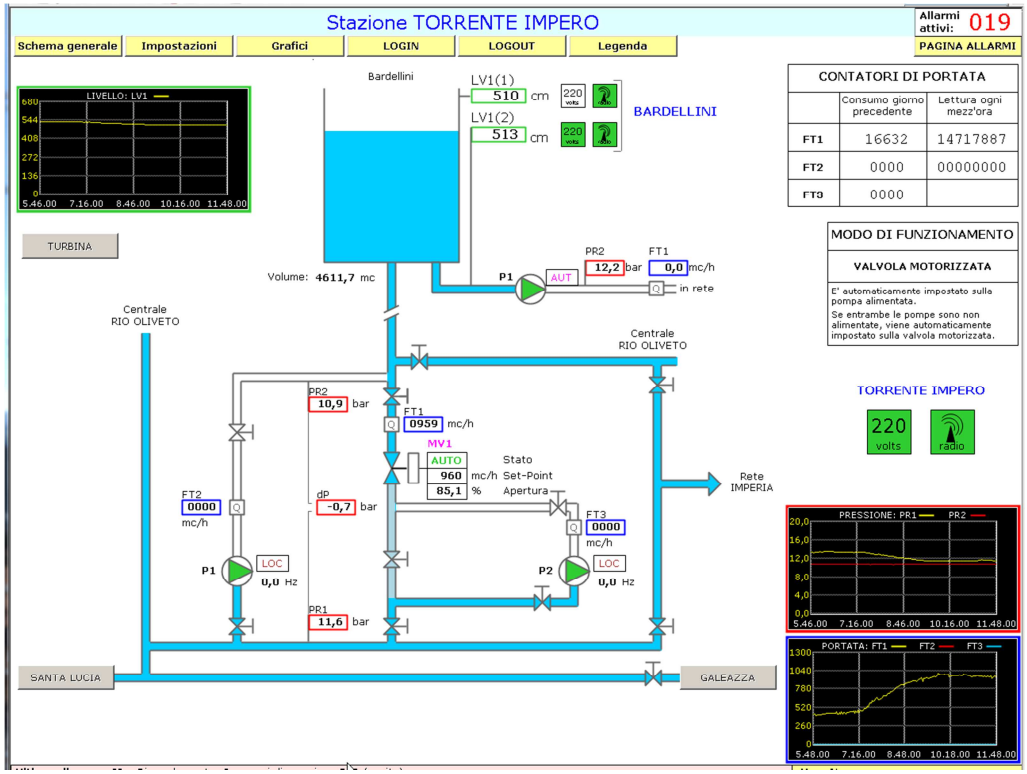
management. To reach the objectives the hydraulic operation control of the various pumping stations different services were integrated (e.g. accumulation and reserve levels) with costs, time ranges and electric energy consumptions.



3. *A graph showing the Garbella Station's tank levels and total capacity*

Telecommunication network

Communication between RTUs and the Movicon SCADA Server is established through a propriety Amat Spa communication network which was design engineered and realized by SIAC srl. The structure of this totally radio communication network with more than 70 digipeater radiomodem apparatus is formed of two "star" mains: one for the waterduct network and One for the wastewater network. "Sub-Stars" have been connected to some of the two main network vertices which constitute the "automation islands" with local coordinated operation.



4. *A details layout of the Torrente Impero pumping station system*

The network hardware is built of only two types of apparatus that require simple maintenance and whose overall UP-Time factor has been mantained at a steady rate of nearly 100 % over the years. The RTU and communication network are supplied power by means of: "Enel" the local

power company network, solar panels, and also hydraulic microturbines.

The Supervision System

The actual situation is the final result of a unification and standardization process using Movicon 11 the unique supervision system which has replaced different superivision products installed in different areas of the plant over the years.

The application runs on Windows 2003 server with a second backup server which is updated every hour. A third server is kept in cold reserve for disaster recoveries. The choice of a SCADA for control system unification was based on 25 years of experience in the sector in order of the following evaluations:

1) the possibility to operate with multi-vendors offering the chance to expand whenever needed; 2) Integration with the world of Microsoft; 3) autonomous and easy integration of funtions; safe remote access; 5) quality customer help services offered by software product company.

The integration flexibility obtained has enabled, for example, autonomous and simple management of the properiety communication network with cost effectiveness using purpose tools provided to control its funtionality: communications are monitored on a Movicon screen page showing statistics of lost packets and a relating alarm management.

The option for operators, shift workers and on-call duty staff to use the remote access feature based on the WebClient technology frees them being physically present to operate the main control terminal at the pumping station's head offices.

The "Movicon 11" application currently controls almost 6000 variables throughout the water and wastewater networks. The field network is soon to be expanded with another 10 stations.

In addition to the normal control functions, the technical help service collaborated to improve performances to become a more 'expert' system by implementing new PLCs, new protocols and new alarm technology.

The drinking water supply network has been implemented with a management system that controls the daily volumns of incoming water and outgoing water flows of the various routes by monitoring losses and flow meters accurately.

In order to monitor the wastewater network system the supervisor also dialogs with a pluviometer or rain gauge, to establish station by station the average flow in dry weather periods in ratio to the increase in flow due to rainfalls: to ascertain how each day progresses after the event of weather changes.

SIAC System Integrators

The design engineering of the entire system was assigned to SIAC, a company established in 1988 as transformation of the Idorsist company (from 1980 partners of Hydorplan Compess A.G.).

SIAC are experts in design engineering water supply and distribution networks and wastewater systems combined with developing specialized software in this typology integrated with aided engineer designing of complex and mesh networks.

Today SIAC is a System Integrator, with a strong connotation of security, that operates in the field of industrial automation, TLC networks and process control particularly specializing in expanded and distributed remote field control systems. Their expertise has been proven with certification: ISO UNI 9001 in 2002; the BS7799 certificate in 2004 and the UNI ISO 27001 (Information Security Management System) certificate in 2008.

Ing. Gabriele Guasco
Siac Srl