



© Sabiana



A Coating Plant 4.0 for Sabiana, a Manufacturer of Excellence in the Industrial, Commercial, and Residential Air Conditioning Sector

Alessia Venturi **ipcm**[®]

Sabiana is an Italian company that invents, designs, manufactures, and sells equipment to air condition the environments in which people live and work: industries, offices, hotels, hospitals, shopping centres, and homes – all of this by using the world's most natural element: water. It is a major European player in this industry, known throughout the world. Aware of the great importance of coatings for its products' durability and efficiency, Sabiana chose to install a coating system for its radiant strips and panels that incorporates the best of the technology available on the market for powder coating, naturally with an Industry 4.0-oriented approach. Imel contributed to this ambitious project with its plant engineering activity and its digital management modules, Futura Convogliatori Aerei with a power&free conveyor, and Gema Europe with the paint application booth.

Radiant strip heating systems transmit heat mainly by radiation, thanks to particularly high emission coefficients resulting from their large exchange surface areas. Radiant strips are particularly efficient for heating large rooms – especially industrial ones, which are both very large and high – whose architectural characteristics often pose design challenges that can only be overcome thanks to the great flexibility of this type of system. They allow heating in absolute silence, without any air movement, with great efficiency thanks to a limited thermal gradient (on average, the air temperature varies by only 0.1 °C per metre of height), and with maintenance requirements limited only to the heat generator (boiler or heat pump) and the water circulation pump.

Aircraft construction hangars are among the most challenging buildings in terms of design. For example, the halls where the Airbus A380, the air giant, is assembled in Toulouse (France) are heated with Duck Strip radiant strips provided by Sabiana (Corbetta, Milan, Italy), a world leader in air conditioning. Placed

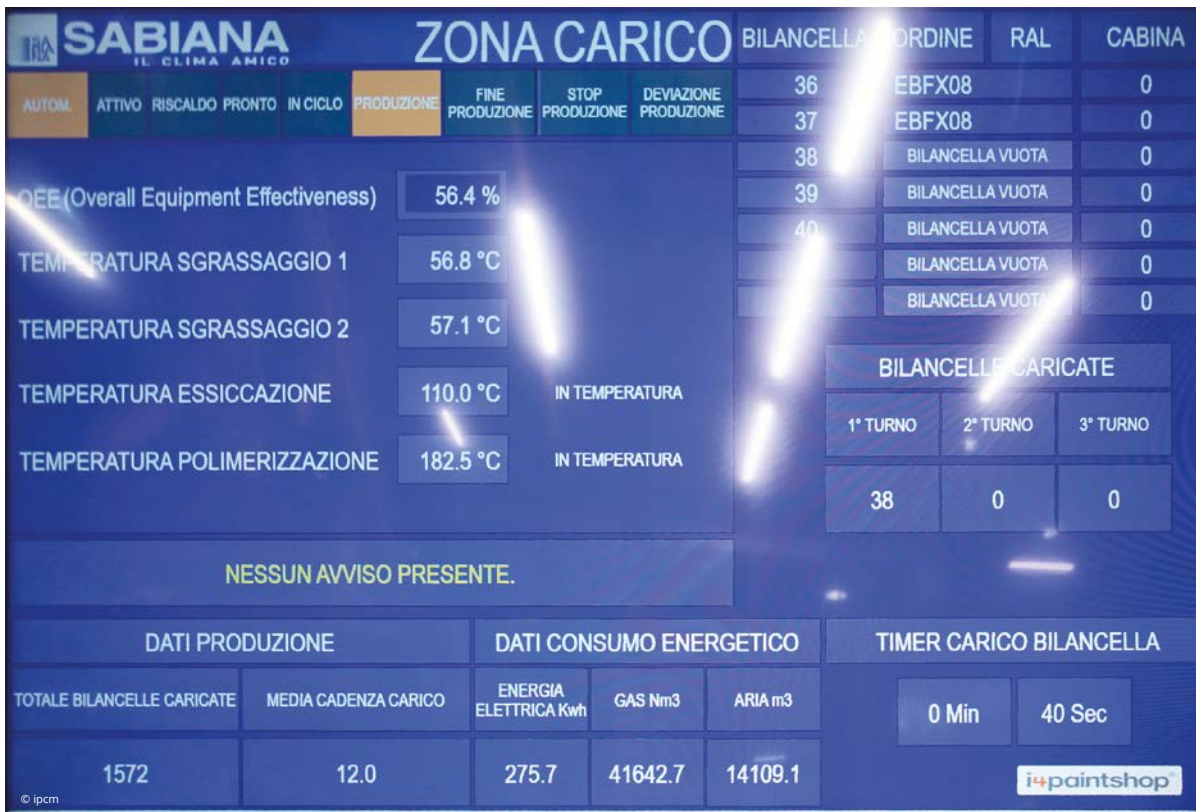
at a height of 42 metres, the Duck Strips radiate heat downwards without causing the slightest air movement. Each of the 18 variants of the new Duck Strip 4.1 product (its name derives from the production technology used) includes 1 to 6 metre-long elements with which it is possible to create radiant strip systems in any length that is a multiple of 1 metre and with different internal circuit solutions. In addition, their wide range of colours allows for interesting architectural solutions in perfect harmony with each building's design.

“Our choice to offer a very wide range of tints and finishes for our strips and radiant ceiling panels has prompted us to invest in powder coating. This is why we have installed a state-of-the-art, fully automatic, highly digitalised, and highly efficient system by integrating all the best solutions that the coating equipment market has to offer,” states Sabiana Plants Manager, Vincenzo Denti. “We opened a tender involving four leading coating engineering companies and Imel's solution impressed us with its cutting



From right to left: Vincenzo Denti, Alessia Venturi, and Carlo Salvadori.

In the previous page: Radiant strips installed in a large industrial environment.



The control panel of Imel painting installation displays all process parameters.

edge plant management software. We gave Imel carte blanche and we appointed it as the prime contractor and works coordinator. This proved to be a correct choice, since they then took on board other leading companies in their sectors, such as Futura Convogliatori Aerei and Gema Europe.”

Sabiana: air design

Two men ahead of their time founded Sabiana in 1929, during America’s Great Crisis. In that year, Franco Binaghi and Benvenuto Anatrella met in Milan and they set their sights on a project to produce systems for heating work and home environments – a utopia in an era when almost no factories were heated. This is precisely why Franco and Benvenuto believed so much in their dream: they understood the importance of improving the working conditions and the quality of life of people. They thus established Sabiana (Società Anonima Binaghi Anatrella).

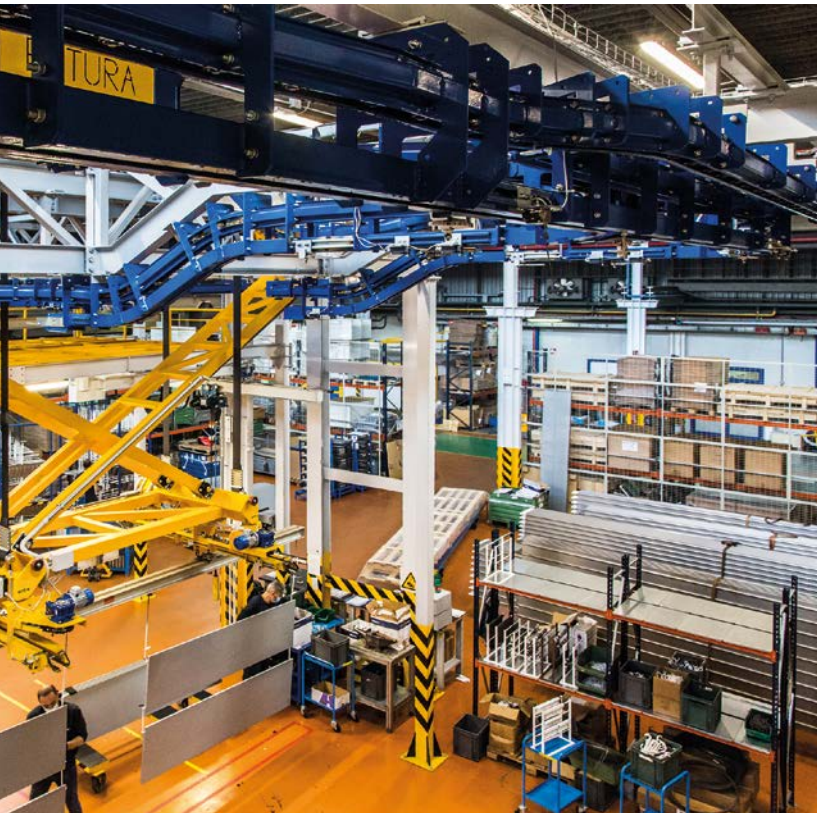
Their idea is now carried on by the third generation of their families, leading an all-Italian company within a large international group. In fact, six years ago, Sabiana became part of the AFG Group (now Arbonia AG) in order to expand even more at the international level.

Sabiana is now one of Arbonia’s many operating divisions worldwide – its branch of excellence for ventilation, cooling, and heating systems. Despite the firm’s international focus, however, its roots are still firmly planted in Italy, as everything is always conceived, designed, and produced between Corbetta and Magenta, in the province of Milan.

The company’s three factories are all located in this area.

Sabiana 1, a plant with a 30,000 m²-wide covered space, deals with the transformation processes of raw materials (typically steel coils or sheets), the laboratory tests, and the production of exhaust pipes. This site is equipped with press-bending machines, robotic welding islands, and automatic deep-drawing systems; around 50% of such production machinery is self-built by Sabiana, drawing on its ninety years of experience. Sabiana 2, with a covered area of 10,000 m², is the plant devoted to product assembly, with 12 assembly and packaging lines. Sabiana 3 is the logistical unit, with a 13,000 m²-wide area for the storage of finished products to be shipped, equipped with 40 loading docks available.

“Despite our huge production and logistical capacity, which enables us to build 1,500 fan coils per day, the demand is such that we also



The loading station with a lowerator, provided by Futura Convogliatori Aerei (Robecco Pavese, Pavia), which facilitates loading operations.

rely on numerous external suppliers. Our future plans include the construction of another 4,000 m² of covered space that will form a connecting area between the units Sabiana 2 and 3, which are adjacent to each other. In September, Sabiana 4, an 8,000 m²-wide facility, will also come into operation: here, we will relocate part of our production and storage activities. We currently employ 330 people, plus a sales network and agents, for a total of a thousand people working directly for Sabiana. With a portfolio of 90 products (under both Sabiana's brand and other brands in the Group), we have a turnover of around 100 million Euros."

**Radiant panels:
a vertically integrated production cycle**

Sabiana's deep-drawing plant for the production of its radiant strips and panels is unique in the world: with a length of 60 m, it is the result of a study carried out to obtain perfect coupling between shells and pipes, with tolerances of just a few tenths of a millimetre, in order to achieve the greatest possible heat exchange. "The process starts with a 6 m-wide metal sheet,



WAVE by **ITF**
MODIFIED ALCOHOL *it's clean!*



High performance modified alcohol cleaning machines

High pressure waterjet deburring and cleaning systems



Complete integrated in-house build automation



DIVISIONS:

CLEANING
ITF
it's clean!

BLASTING
ITF
Sand it!

AUTOMATION
ITF
Automation!





the length of which varies depending on the product we want to obtain,” explains Vincenzo Denti. “The machine takes over the panel and it verifies the sheet’s length, thickness, and diagonal line using laser systems. If the result of the check is positive, the sheet is loaded through Venturi-effect suction cups, bent, and deep-drawn, while the handling frame returns to the beginning of the line to pick up the following metal sheet. After deep-drawing, the panel is placed on a motorised roller conveyor that takes it to the next phase, which consists of inserting tubes by pressing them into the cavities created. The process continues with tack welding and robotic welding and it ends with coating.”

Coating radiant panels has never been easier

Imel designed, built, and installed a powder coating plant for radiant panels, controlled through the i4paintshop automation system and integrated with software developed by Sabiana for managing orders. “A serial number is generated upstream of the process by the order management software and assigned to each individual panel: this enables us to follow the panel’s progress up to the dispatch and installation phases,” explains Vincenzo Denti. “We decided to also include installation among the traceable parameters because, with our new radiant strip processing technology, the hanging cross beams must be positioned with a pitch with tolerances of a few tenths of a millimetre. Through our technical catalogue, we advise the installers to drill the holes according to these pre-set dimensions, so that it is impossible to make a mistake in fixing the hanging chains.”

When the trolleys with the radiant strips arrive at the loading station of the coating plant, they have a 78° inclination assigned to them by the previous machine. This inclination is maintained for all work prior to



The power&free conveyor designed and built by Futura Convogliatori Aerei and the touchscreen of Imel i4paintshop software.

ROTOVER

The new frontier for the mass painting

New
2021



Luca Floreanini designer

The perfect solution

For painting and/or coating automatically and quickly small parts (**metals and not**) in batch, for example: buttons, bolts, screws, springs, O-rings and much more.

The new process

An automatic **control of air and paint flow** allows you to obtain a perfect wettability of the pieces in any cycle phase.

New temperature control

Reliable, accurate, **economic**.

The Data Management

The new control SW stores all process data, for a precise **consumption and production costs control**, and supports you proposing a plan of **preventive maintenance** operations.

4.0 Rotover MES

Easy and interactive production planning system for one or more machines.

A data-base of working cycles accessible from every machine and easy to be updated: **4.0 interconnection**.

Multifunctionality

Interchangeable drums of various shapes, sizes and geometries, designed for different possible types of items and for different materials.

Customer Service

Send a test batch and Imel will prepare for you the optimized cycle for your production.

All machines are **connected to Imel Service Center** for a real time support

On the side of the operator

Easy and immediate control software.

New design

Ergonomic, user friendly with no exposed cables and pipes.



Find out more, Scan the QR code to add the contact of our **product manager** to your device.





The large pre-treatment tunnel.

coating (such as welding the collectors), which require it. The coating line has a production pitch of 2 minutes and 70 seconds, with a cycle time of around 40 minutes and a production capacity of 36 m² per rack. "During the coating cycle, the parts are handled automatically by the power&free overhead conveyor designed by Futura. Assisted by two synchronised hoists, the operators lift the radiant strips and hook them up to form a set, for a total coating capacity of 6,000 mm in length, 3,200 mm in height, and 500 mm in width," indicates Vincenzo Denti. "After loading, the parts pass through the pre-treatment tunnel, where surface preparation takes place. The components are treated in a 5-stage cycle. It starts with two hot degreasing stages to remove any residue from their surfaces, followed by a cleaning operation with mains water to eliminate any alkaline residues left by the degreasing stages and one with demineralised water to reduce the amount of soluble salts remaining. The workpieces are then subjected to nanotechnology conversion



Radiant plates entering the pre-treatment tunnel.

and a final rinse with demineralised water. "After pre-treatment, the parts continue to the drying oven and then to a natural cooling zone at room temperature. Afterwards, they reach the powder application booth for the automatic one-coat application of hybrid epoxy-polyester products, followed by a manual touch-up phase if necessary. Cross-linking takes place in the curing oven, where the workpieces remain for 20 minutes at 190 °C. From here, they continue through the natural cooling zone to the unloading station, where they are automatically transferred from the overhead conveyor to the unloading lowerator." "We can apply the full range of RAL colours to our radiant strips," adds Vincenzo Denti, "as they are fully customisable in terms of finishing. Actually, 90% of our production is coated in two or three tints. However, despite this, we asked Imel and Futura to set up a system and conveyor to accommodate a second coating booth in future, which will enable us to apply two colours at the same time



After passing through the drying oven and the cooling area, the parts move on to the powder application booth.

and increase our production capacity, in anticipation of increased demand for our innovative radiant heating strips. After coating, the large radiant panels are packed and shipped directly from Sabiana 1, without passing through the warehouse. They are mostly manufactured to order, so we cannot build up a stock."

Mechatronics, automation, digitalisation: a cutting edge coating plant

"The overhead conveyor we designed for Sabiana's plant has a maximum capacity of 500 kg + rack and a line speed of 2.5 m/min.," explains Stefano Gerletti, sales manager at Futura Convogliatori Aerei (Robecco Pavese, Pavia, Italy). "The most interesting, as well as impressive aspect of this conveyor is the technology applied to its special parallel lowerators with a pantograph movement (QR code <https://we.tl/t-f19wo87j1B>) that give complete mobility to the operators, who are free to move around the workpiece-holding rack

without any encumbrance. In addition, Imel's synchronised hoists mounted directly on the lowerators further assist the operators in loading and unloading the radiant strips. This combination produces an easy and ergonomic loading and unloading movement for the operators, who can carry out their job in total safety. For the rest, it is a traditional power&free conveyor, with numerous storage buffers along the way and with one branch already prepared to accommodate a second coating booth in future."

"Like all the plants built by Imel, the pre-treatment tunnel and ovens manufactured for Sabiana's plant are made of steel and then covered with sandwich panels to guarantee exceptional thermal and, above all, acoustic insulation," says Carlo Salvadori, founding member of Imel. "The plant has a step-by-step movement and it features a curing oven with a staged feeding process. The most special feature of this system is its interconnection with the line's logistics. A terminal equipped with a barcode reader registers the racks entering the



The powder centre provided by Gema Europe.

coating plant and all the components associated with them. The data is saved on Sabiana's server, which creates a record in the "Oven" table of the SQL Database containing information on everything that has been hung onto each registered rack, including the loading date and time. The Imel PLC and Sabiana's server exchange information by writing and reading data in a SQL table that is visible to both systems. The information contained in the SQL table "Oven" and recorded during loading is written on the PLC: in this way, the Visual Management system can display the batches currently being coated plus other useful information on the monitor.

"The tracking system maintains the information associated with each rack during the whole treatment cycle, while enriching it with further process data. After coating, in the same table, the Imel PLC adds (by means of software installed on the Sabiana server) all production and quality data to the rack's record, so that Sabiana's company system can easily read them. This production master data is enriched with process data from the line PLC and saved on the i4paintshop platform.

"We supplied Sabiana with a complete booth from our MagicCylinder EquiFlow series," states Mario Ferro, the Managing Director of Gema Europe Srl. "This is equipped as follows:

- OptiCenter OC03 powder management unit with OptiSpray AP01.1 pumps featuring the SIT Smart Inline Technology (dense phase)
- OptiFlex AS06 automatic application unit with 21 OptiGun GA03-PA guns (20 on reciprocators + 1 manual gun)
- MagicControl 4.0 master control module for managing the booth and application system
- Reciprocators with a horizontal handling system controlled by photocell bars for automatic workpiece recognition
- 3D Laser system.

"The latter is one of Gema's flagships as it allows the guns to deliver the maximum powder amount only when a workpiece is in front of them. Combined with the dense phase feeding technology, the 3D Laser system provides our customers with maximum coating efficiency and consistent optimisation of their powder coating consumption."



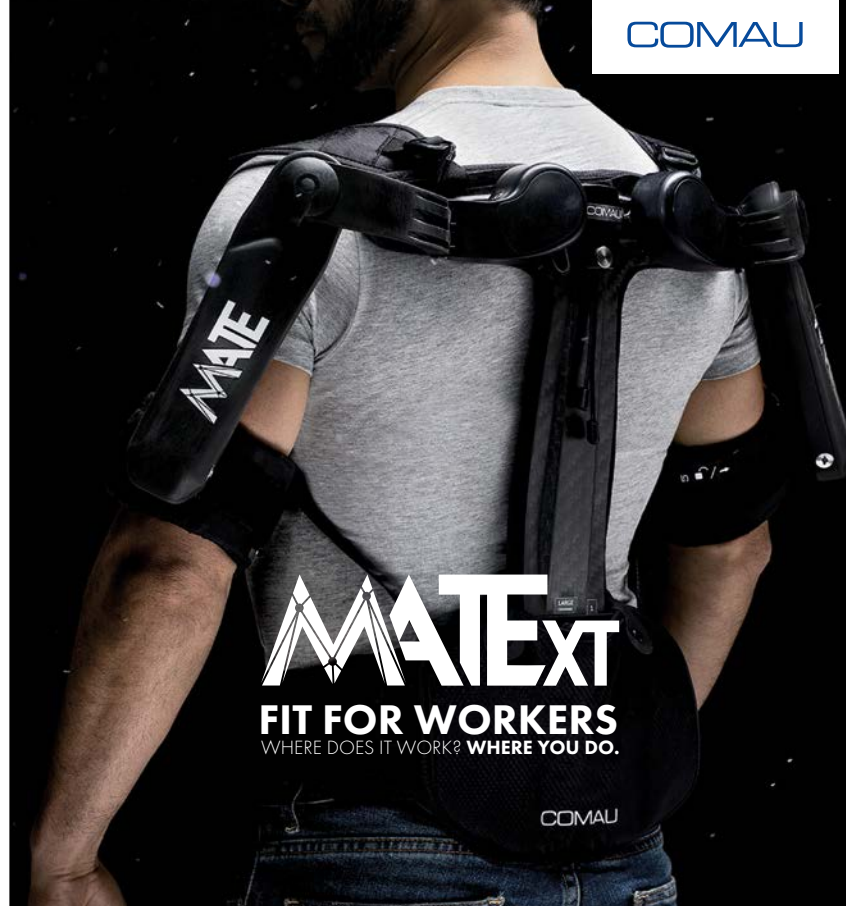
Powder coating application with dense phase technology.

"Because of the geometrically complex shape of our products, we had several powder penetration issues especially at the deep-drawing bends. Here, a Faraday cage was created that prevented the application of consistent thicknesses and uniform finishes," confirms Vincenzo Denti. "With our new guns and the dense phase powder management unit, we are now able to achieve perfect coverage by applying a constant average thickness of 80 microns over the whole surfaces of parts."

i4paintshop: Imel's management system 4.0

The management system 4.0 installed on Sabiana's plant is made up of a series of digital modules that not only guarantee complete traceability of parts and the processing of consumption data, but also act as a "brain" capable of guiding the operators in the management and maintenance of the plant, foreseeing even the smallest intervention and preventing almost all possible accidents.

- i4environment: extraction and processing of global consumption data for gas, water, electricity, and compressed air



MATEXT
FIT FOR WORKERS
 WHERE DOES IT WORK? WHERE YOU DO.



MATE-XT is the exoskeleton that brings the qualities of MATE to an eXTreme level.

The new **MATE-XT** is the latest version of the Comau exoskeleton that has been vastly improved, taking its benefits to the next level and adding important new features.

Resistant to water, dust, UV rays and high temperatures, it is ideal for applications in difficult environments..

MATE-XT is easy to put on, easy to adjust and easy to use, ensuring the worker:

- Reduction of muscle fatigue
- Improved posture and comfort
- Reduction of risk from biomechanical overload certified with EAWS methodology
- Better quality of work

MATE-XT works when, where and how you do.

Come and find out at comau.com/mate



The curing oven.



The unloading station with a lowerator.

- i4production: extraction and processing of production time data (detailed history of the plant's times: start-up, production, machine stops, end of cycle, etc.), traceability of batches and their actual process data (for each individual rack associated with them), and alarm list related to all the treated racks
- i4efficiency: OEE measurement, including all its elements (availability, quality, and performance), as follows:
 - productivity (loaded/unloaded parts, rejected parts)
 - plant availability
 - alarm list for every production day
- i4maintenance: self-learning, smart calendar for managing preventive maintenance based on the operating hours of the plant components, extraction of routine maintenance schedules on a daily/weekly/monthly basis
- i4smartdoc: digital management of plant documentation, i.e. it gives access to every component's documentation via a QR code located on the parts themselves using a browser or smartphone app
- i4service: direct access system to the Service-Imel structure, organised in reservation order according to various priority levels and enabling the customers to check in real time their requests' status and their assigned managers.
- i4visual: for visual management in the loading/unloading stations connected to the factory planning system. ○

We are
pow^der
ful

advanced
solutions for
metal surfaces
treatment



Europolveri offers a wide range of **Powder Coatings** that are available in several different finishings and gloss level. A stock of approximately 1000 different colors, always available, supported by specific products formulated to guarantee architects and designers the highest quality, both in terms of performance and aesthetic value, for the finishing of architectural structures and objects of furniture and design.

Besides the wide offer of Qualicoat products and thanks to the great experience in the architectural sector, Europolveri is a reliable partner in developing and producing tailor-made solutions requiring Sublimation and Powder on Powder products. Furthermore, Europolveri ensures the development of specific colors and finishings in Qualicoat Class 2.

ARCHI
TEC PLUS
TURAL

ARCHI
TEC FLEX
TURAL

ARCHI
TEC LIGNUM
TURAL

anti
microbial

anti
GRAFFITI

anti
CORROSION



EUROPOLVERI S.p.A. - Sandrigo (VI) Italy - Ph. +39.0444.750643 - Fax +39.0444.750653
FILIALI/Branch Office: Cernusco sul Naviglio (MI) Ph.+39.02.92148001 - Erbusco (BS) Ph.+39.030.7704158
DEPOSITO/Depot: Iori Colori, Reggio Emilia Ph.+39.0522.327248



info@europolveri.it - www.europolveri.it