The produce market in Bolzaneto, Genoa (Italy).

FOCUS ON TECHNOLOGY

Maintenance of Genoa's Food Logistics Centre and Produce Market with High Performance, Surface Tolerant, Water-based Paints

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SPIM Spa, the company entrusted with the protection of real estate assets of the Municipality of Genoa (Italy), and SGM, Genoa's wholesale market management company, chose Ti.Pi.Ci. – Technology in Protective Coatings for the maintenance of the external metalwork structures of Genoa's Food Logistic Centre and Produce Market, with a total area of 13,600 m².

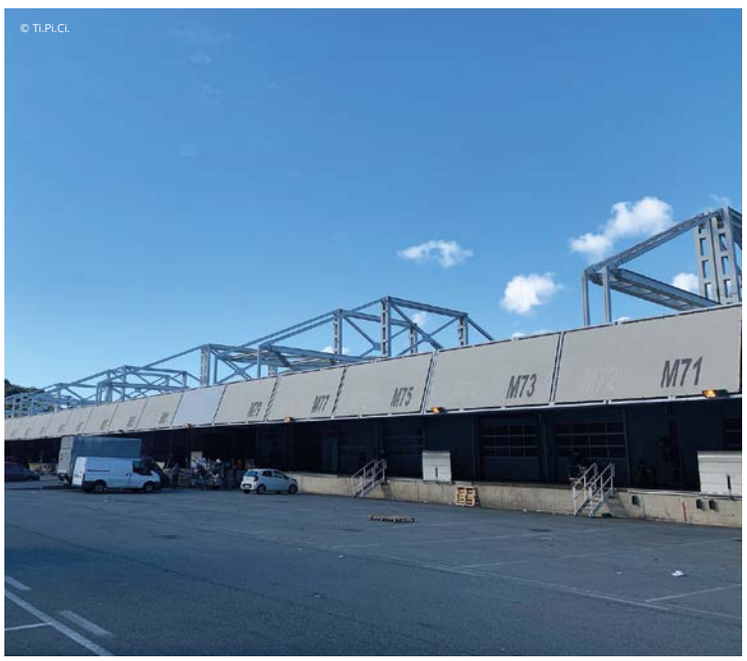
Genoa's Produce Market covers an area of 82,000 m², including 32,000 m² of indoor space. The 23,150 m²-wide produce pavilion is the core of the facility, featuring 56 modules for wholesalers and 188 loading and unloading bays. The interior of the market consists of a huge rectangular gallery lined with dealer stands. Its glass and steel roof, designed by Massimo Majowiecki, has a steel frame with braces that discharge the weight of the structure towards the sides. It also features a skylight in the centre to let in plenty of light and fresh air while leaving the centre of the market free, as it does not require supporting pillars (**Figs. 1 and 2**). West of the market, there is a logistics platform covering over 9,000 m². The ground floor is almost entirely occupied by refrigerated storage units, forming a large loading and storage area where logistics, processing, and storage operations can take place.

SPIM Spa and SGM have always paid particular attention and constantly invested in improving these buildings through the adoption of innovative technologies and environmentally friendly maintenance systems, aimed at safeguarding the health of people and the environment and in line with the highest safety standards. A very

effective solution in terms of corrosion protection for the maintenance of carbon steel structures was the adoption of water-based, high-build, long-lasting, recoatable paint products, which are easy to be over-coated over time.
In addition to their high corrosion protection properties when applied on steel substrates exposed in marine and industrial environments, they are non-flammable, which is a decisive element in terms of the operational aspects of areas like this one.
The application of water-based coatings developed specifically for use in the protective sector is now widespread for both new construction and maintenance works. The coatings developed and perfected by Ti.Pi.Ci. - Technology in Protective Coatings over the last few decades, in particular, have been successfully applied in numerous projects, certainly including Genoa's Food Logistic Centre.

Sixteen years of class C4 corrosion

The facility is located in Bolzaneto, an industrial area on the outskirts of Genoa a few kilometres from the sea. This can be classified as a class C4 (high corrosion) environment according to standard ISO 12944-2:2017. The construction, painting, and assembly of the metal structures at the Bolzaneto site were carried out in 2005, whereas maintenance was performed in the spring of 2021, that is, sixteen years later. The original coating system applied on such metal elements was composed by solvent-based paints as shown in **Table 1**.



Figures 1 and 2 – **The market's central area is a free space, as there are no supporting pillars.**

Table 1 - **Original solvent-based paint system applied on metal in 2005.**

SURFACE PREPARATION	PRIMER	DFT	MID-COAT	DFT	TOP-COAT	DFT	TOTAL DFT
Solvent cleaning and metallic grit blasting (Sa 2.5)	Solvent-based zinc rich epoxy product	60 m	Solvent-based vinyl epoxy product	70 m	Polyurethane product	40 m	170 m

Figures 3 and 4 (above) – **Visual inspections on site.**

Figures 5 and 6 - **All water-soluble salts and contaminants were removed with a high-pressure water cleaning operation.**

Sixteen years later, the surfaces showed traces of rust and detachments between the zinc-rich primer and the mid coat, but also between the latter and the top coat.

The maintenance operations carried out by Ti.Pi.Ci.

A visual inspection on site before the start of the maintenance works enabled to classify the degree of rusting as Ri4 (according to ISO 4628-3) and the degree of flaking as 3(S4) according to ISO 4628-5 (**Figs. 3 and 4)**.

The surface preparation and coating activities were carried out on site by Covesa Coating (Breno, Brescia, Italy), a company specialising in the painting and sandblasting of metal structures, as well as in structural reinforcement and waterproofing of tanks, roofs, and channels.

Surface preparation started with a high-pressure water cleaning step in order to remove all water-soluble salts and contaminants (**Figs. 5 and 6**), but also the flakes that had formed in the original solvent-based paint. The second step was a mechanical cleaning operation aimed at removing rust as much as possible. In the most degraded surface areas, where steel was exposed, the rust grade was D, according to standard ISO 8501-1. After power tool cleaning, the surface preparation degree was PSt2 as per standard ISO 8501-2 (**Figs. 7 and 8**).

While selecting the coating system to be applied, SPIM Spa and SGM took into consideration the fact that this maintenance operation was to be carried out in a building where food is handled and that the site's safety had to be carefully safeguarded, given the presence of numerous operators involved in the market's daily activity. All these requirements could only fulfilled with the application of a high-performance, surface-tolerant, water-based paint system.

The new protective coating system

The water-based system (**Table 2**) was chosen in order to meet all the requests imposed by SPIM Spa and SGM regarding the on-site paint application intervention:

Figures 7 and 8 – **Rust was removed by power tool cleaning.**

• low VOC content to safeguard the environment and the health of applicators;
• non-flammability to avoid fire risk;
• surface-tolerant properties;
• extremely high-level protection and adhesion features;
• coating applicable on external surfaces also at low temperatures;
• coating applicable by roller and brush.

Ti.Pi.Ci. selected HYDROGUARD® HB in order to guarantee high adhesion, high solids by volume (74%), and excellent steel protection. HYDROTHANE® DTM Semi-gloss was also chosen because of its high solid residue by volume (61%), as this allows reducing paint consumption. All water-based paints were applied by brush and roller. The application work started in March 2021 (**Fig. 9**) and ended in June 2021.

Table 2 - **Water-based protective system applied on external surface.**

TYPE OF COATING	SOLIDS	DFT	VOC LEVEL	PRODUCT
Water Based "Surface Tolerant" High Build Epoxy Mastic	74%	1x70m	<65 g/l	HYDROGUARD® HB Off White
Water Based Polyurethane Semigloss Topcoat	61%	2x50m	<120 g/l	HYDROTHANE® DTM Semigloss Ral 9010

At the end of this maintenance intervention, all the parties involved (SPIM Spa, SGM, and Covesa Coating, the paint applicator), were pleasantly surprised by the performance degree shown by the water-based system used. They were also extremely satisfied with the final appearance of the structures treated, thanks to the excellent aesthetic characteristics of the HYDROTHANE® DTM Semi-gloss top coat **(Fig. 10**).

Conclusions

Ti.Pi.Ci., which collaborated with Covesa Coating in this project, has been studying the possible applications of green anti-corrosion coatings in various sectors, such as infrastructure, buildings, oil & gas, etc. for more than twenty years now. However, although fortunately more and more rarely, it is still mistakenly believed that structures can only be adequately protected with solvent-based products, thus further polluting the environment as, unfortunately, has been done for too long.

A final, thought-provoking consideration regards Ti.Pi.Ci., which takes great pride in having been able (after too many attempts and rejections) to apply its technology and experience, gained in over twenty years of activity worldwide, on a structure located in Genoa, the city where this company was founded and where it still has its headquarters.

Figure 9 - **All water-based paints were applied by brush and roller.**

Figure 10 - **The aesthetic results of the HYDROTHANE® DTM semi-gloss top coat's application.**