CTS Focus

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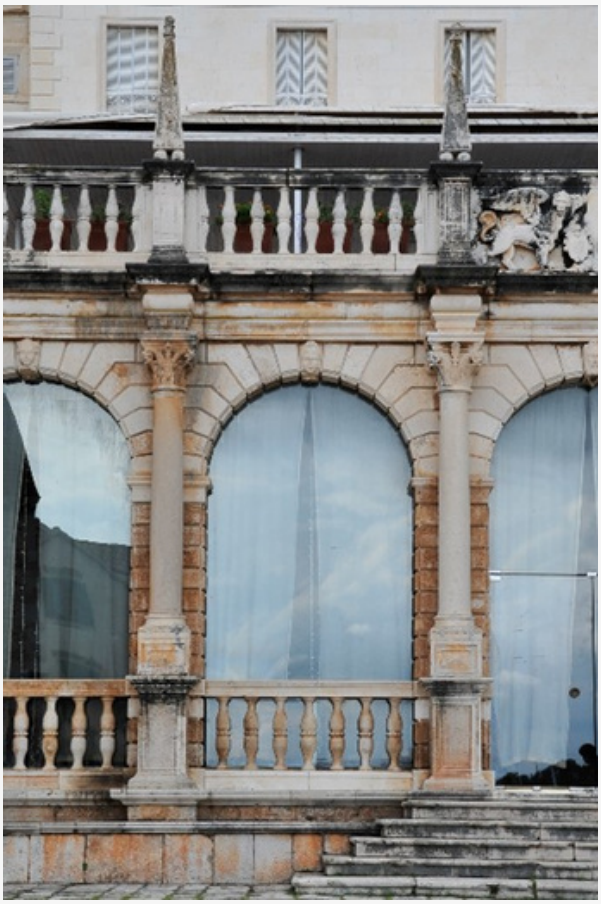
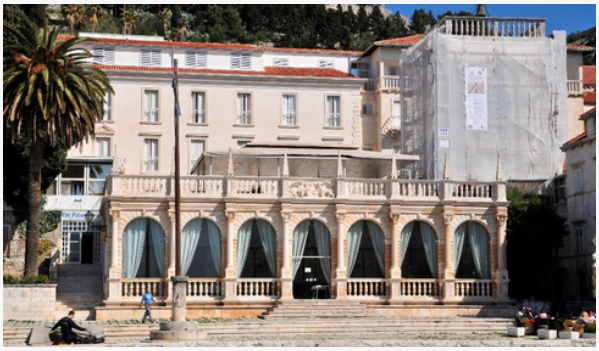
Conservation restoration in Hvar and Kotor

We are bringing into the spotlight a series of interventions that are important not only because of their geographical location (the Adriatic coast, full of monuments dating back to the Serenissima), but also because of the exemplary restoration process and, last but not least, because of the educational and didactic value of the worksite-schools.
Hvar is an island south of Split, while the small town of Kotor, a UNESCO World Heritage Site, belongs to Montenegro. Both of them, under Venetian rule for centuries, have undertaken the preservation of their historical heritage, and what we are going to describe here is another piece that fits happily into this path.



The interventions in Hvar became possible through the interaction between various actors ranging from the Communities of Italians in Hvar and Kotor, to the funding of the Veneto Region and the Municipalities of Hvar and Kotor, as well as the company L.a.i.r.a s.r.l. from Padua, represented by the architects Serena Franceschi and Adelmo Lazzari, that guided, involved and created an important synergy between Italian and local entities. Dr. Francesco Rizzi of CMR s.r.l. and the restorer Barbara D'Incau, the conservation bodies of Croatia and Montenegro, and the Restoration School, Engim Veneto Professioni del Restauro, were involved in the analyses.



◿ Hvar Loggia before and after restoration

Restorations of the façade of the Loggia, then the façade of the Clock Tower, and finally Porta Badoer, one of the five gates of the defensive walls, followed one another over the years. Impressive medieval wall and, although embedded in the stratification of later constructions, still visible and partly well preserved. Both the 15th-century Loggia, remodelled in the 16th century by the military architect Sanmicheli, and the adjacent Clock Tower, also remodelled several times, are the two distinctive elements of the architectural heritage of this little town. Investigations carried out prior to the intervention identified two varieties of calcareous stone material: the first, yellowish, worked with hammer, chisel, stonemason's chisel, also shows traces of orange paint; the second, very tenacious yellowish-white, worked mainly with bush hammer. The tower still retains traces of plaster, suggesting that it was once completely plastered. The type of stone elements, including the bedding mortars, of Porta Badoer is much more varied, because of the numerous interventions over the centuries. They are, however, limestones, mainly grey and reddish.

◿ Before and after the restoration of Porta Badoer in Hvar and a detail of the decay (Hvar), Croatia

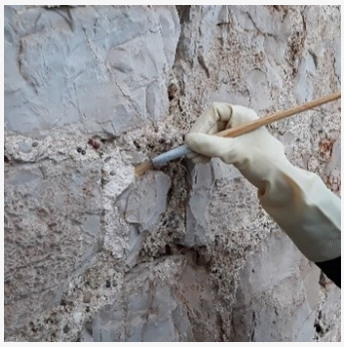
Since the primary cause of degradation was the attack by microorganisms, with alveolisation and degrading pathologies caused by lichenic acids, the first intervention consisted of applying **Biotin T** in 3% water, supported by cellulose pulp, and left in place for the time necessary to soften the microorganisms, and allow their removal with sorghum brushes and low-pressure cleaners.

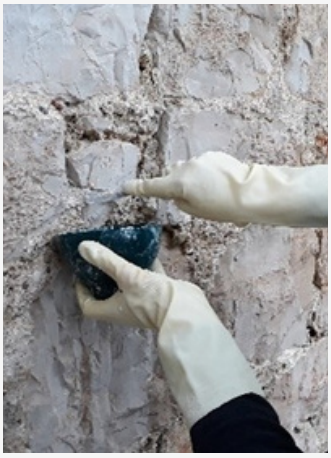
◿ Biological colonisation, Loggia and Porta Badoer in Hvar, Croatia

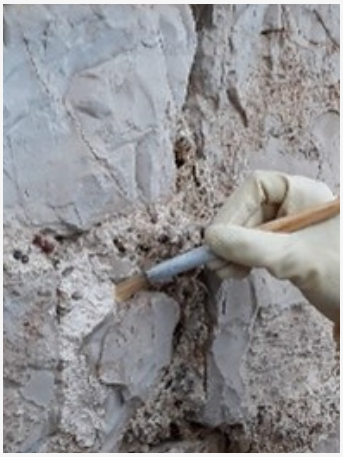
Application of **Biotin T** by spray and/or brush: the application will be repeated several times every few days, in some areas supporting the biocide in a cellulose pulp pack.

Atmospheric particulate deposits and black crusts were removed by means of bicarbonate and ammonium carbonate compresses, where necessary with the addition of chelating agents (**disodium EDTA**), supported by cellulose pulp. In some areas, the removal was completed by compresses with anionic **ion exchange resins** with a desulphating effect.
The phenomenon of erosion of almost all mortar joints in the façade leads to a deposit of rainwater and humidity, with progressive further erosion of the joints themselves.
To consolidate the most deteriorated areas, ethyl silicate (**Estel 1000**) was applied, which allows the deepest areas to be reached, followed by nanocalcium (**Nanorestore**), which leads to a re-aggregation of the surface through the formation of calcium carbonate.

Both products are compatible with limestone, which always contains, in addition to calcium carbonate, a certain percentage of silica that allows the silicate to bond.
This choice made it possible to reduce the use of synthetic resins to bonding only, which was carried out with liquid epoxy (**Epo 150**) and paste epoxy (**Epo 121**).







Micro-cracks and gaps were sealed with the classic **PLM line mortars**, which have been applied for 40 years on major construction sites throughout Europe.

With the same approach, work was carried out in Kotor, on the three gates that are part of the walls of the historic Venetian fortress. For students of the Engim Veneto Professioni del Restauro Restoration School (https://restauro.engimveneto.org) who participated in the Post-Diploma Qualification courses for "Cultural Heritage Restoration Technician", financed by the Veneto Region, it was an opportunity to put into practice what they had learnt in the theoretical lessons, on objects of high historical and artistic value.

The annual inspection, conducted by Dr. D'Incau, was of particular importance, as it attested to the good condition of the surfaces 11 years after the end of the intervention: no microbiological attack was visually perceptible, confirming the good behaviour of Biotin even after a considerable period of time.
To ensure safety, Silo 111 with Biotin R additive was applied by spraying at the end of each intervention.
Monitoring, as part of a scheduled maintenance plan, is the only way to turn a good restoration into an oiled "conservation machine".

BIBLIOGRAPHY:

Public and Defensive Buildings of Venetian Origin in Dalmatia and Montenegro: from Investigations to Conservation Restoration, edited by Serena Franceschi, Adelmo M. Lazzari, Barbara D'Incau. Publisher: Ass. Palinsesti, 2020.