HRVATSKI RESTAURATORSKI ZAVOD

ACTIVITIES OF THE CROATIAN CONSERVATION INSTITUTE ON THE PROJECT OF THE RESTORATION OF THE FAÇADE OF THE CHURCH OF ST BLAISE AT DUBROVNIK

DJELATNOST HRVATSKOG RESTAURATORSKOG ZAVODA NA PROJEKTU OBNOVE PROČELJA CRKVE SV. VLAHA U DUBROVNIKU

Skupina stručnjaka Hrvatskog restauratorskog zavoda iz Zagreba, na poticaj Zavoda za obnovu Dubrovnika i Društva prijatelja dubrovačke starine, već je prije desetak godina započela s opsežnim konzervatorsko-restauratorskim zahvatom s ciljem zaustavljanja propadanja te detaljne obnove crkve sv. Vlaha. Ovu prvu fazu obilježili su manji konzervatorsko-restauratorski radovi na najugroženijim skulpturalnim i arhitektonskim dijelovima crkve te izrada opsežne dokumentacije kao podloge za daljnju obnovu. Radove je predvodio ili nadzirao Hrvatski restauratorski zavod u suradnji s raznim tvrtkama i stručnjacima. Odjel za kamenu plastiku Hrvatskog restauratorskog zavoda iz Zagreba izvodio je između ožujka i srpnja 2007. godine konzervatorsko-restauratorske radove na sjevernom pročelju crkve sv. Vlaha na temelju elaborata HRZ-a "Crkva sv. Vlaha u Dubrovniku – projekt dovršenja sanacijskih i konzervatorskih radova na svim pročeljima crkve" iz prosinca 2001. godine i troškovnika "Crkva sv. Vlaha u Dubrovniku – troškovnik radova na srednjem dijelu sjevernog pročelja" iz siječnja 2007. godine. Zavod za obnovu Dubrovnika osigurao je stručno-tehničku pripremu radova, a Konzervatorski odjel Ministarstva kulture u Dubrovniku konzervatorski nadzor.

Ten years ago, a group of experts from the Croatian Conservation Institute at Zagreb, encouraged by the Institute for the Restoration of Dubrovnik and the Society of Friends of Dubrovnik Antiquities, started a considerable conservation-restoration intervention with the aim to stop the decay of the church of St Blaise and to undertake a detailed restoration. This first phase included minor conservation-restoration works on the most damaged sculptural and architectural features of the church and the making of a detailed documentation which would serve as the basis for future repairs. The works were carried out or supervised by the Croatian Conservation Institute with the cooperation from various firms and experts. The department for stone sculptures of the Croatian Conservation Institute from Zagreb carried out conservation-restoration works on the north façade of the church of St Blaise from March to July 2007, based on the report of the Croatian Conservation Institute "The Church of St Blaise at Dubrovnik – the project of finishing the repair and conservation works on all church façades" from December 2001 and the cost estimate "The Church of St Blaise at Dubrovnik – the cost estimate of the works on the central section of the north façade" from January 2007. The Institute for the Restoration of Dubrovnik provided the expert and technical preliminaries and the Conservation Office of the Ministry of Culture in Dubrovnik the conservation survey.

HRVATSKI
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DISMANTLING OF THE STATUES OF
ANGELS FROM THE NORTH FAÇADE OF
THE CHURCH OF ST BLAISE

DEMONTAŽA KIPOVA ANĐELA SA SJEVERNOG PROČELJA CRKVE SV. VLAHA

Prvu fazu konzervatorsko-restauratorskih radova na obnovi skulpturalnih dijelova sjevernog pročelja crkve obilježila je demontaža triju skulptura anđela. Kamene skulpture premještene su na radnu platformu radi lakšeg izvođenja konzervatorsko-restauratorskih zahvata. The first phase of the conservation-restoration works on the repair of the carved stones on the north façade of the church was the dismantling of the three statues of angels. The stone statues were transferred onto the working scaffolding in order to facilitate the conservation-restoration works.

HRVATSKI
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REPLACING OF THE
METAL PARTS

ZAMJENA
METALNIH DIJELOVA

Brojni metalni dijelovi koji su ugrađeni u kamenu strukturu crkve služili su međusobnom povezivanju blokova, povezivanju dekorativnih elemenata i skulptura sa zidnim plaštem ili su bili umetnuti u dijelove kamene plastike iz statičkih razloga. Djelovanjem korozije na metalne dijelove došlo je do oštećivanja kamenog materijala, što je pak otvorilo mogućnost daljnjeg oštećivanja. Oštećenje je najčešće dovelo do bubrenja korodiranih šipki koje su povećavanjem svoga volumena razarale jezgru kamena. Nusproizvodi kemijske reakcije prenošeni su djelovanjem atmosferilija površinom kamena te su stvorili sloj nečistoća. Stoga je odlučeno da se svi metalni dijelovi zamijene novim dijelovima od nehrđajućeg metala.

Numerous metal parts were built in the masonry of the church in order to connect the blocks, attach decorative elements and sculptures to the wall or were inserted in the carved stones for static reasons. The influence of the corrosion on the metal parts caused damage to the stone and this in turn created the possibility of further damage. In most cases, the damage lead to the expansion of the corroded fixing cramps which increased their volume and destroyed the stone core. By-products of the chemical reaction were transported through the action of the elements onto the stone surface and created a layer of dirt. That is why it was decided to replace all metal parts with the new ones made of non-corrosive metal.

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ZAVOD

REPLACING OF THE
METAL PARTS

ZAMJENA
METALNIH DIJELOVA

Uklanjanje korodiranih metalnih dijelova iz kamenih elemenata i njihova zamjena dijelovima od nehrđajućeg metala (inoks čelika) izvedeni su tako da su sve korodirane spojnice pažljivo demontirane. Na njihovo mjesto postavljeni su dijelovi od nehrđajućeg čelika koji su po mogućnosti dodatno učvršćeni u kameni materijal dvokomponentnim ljepilom za kamen.

Pritom su nove spojnice postavljene na diskretan način kako bi bile što manje vidljive prilikom konačne prezentacije kamene površine zidnog plašta ili arhitektonskih, ornamentalnih ili skulpturalnih dijelova kamene plastike. The removal of the corroded metal parts from the stone elements and their replacement with the non-corrosive ones made of stainless steel included the careful extracting of all the corroded fixing cramps and their replacement with the new stainless steel parts which were in most cases further embedded by using the dual-component glue for stone. The new cramps were placed discreetly so as not to visible on the surface of the stone walls or on the architectural, ornamental and sculpted parts of carved stones.

HRVATSKI RESTAURATORSKI ZAVOD

ČIŠĆENJE KAMENE PLASTIKE

CLEANING OF CARVED STONES

Prilikom čišćenja kamena od naslaga skrame i biološkog materijala primijenjene su razne metode ovisno o stupnju oštećenja materijala i složenosti konzervatorsko-restauratorskog zahvata. Čišćenja vodom pod kontroliranim tlakom i mehanička čišćenja omogućila su bolji uvid u oštećenja na kamenu te preciznije određivanje načina njegove daljnje konzervacije i restauracije. Mehaničko čišćenje izvedeno je na dijelovima kamene plastike na kojima su se i nakon čišćenja vodom pod tlakom zadržale različite nečistoće. Postupak je zahtijevao uporabu raznovrsnog ručnog alata: skalpela, strugalica, dlijeta, četki itd. Ovakav način čišćenja pokazao se posebno učinkovit kod čišćenja sljubnica između kamenih blokova od neadekvatne žbuke. Izvedena su i dodatna čišćenja dubinskih nečistoća kemijskim sredstvom AB-57, tzv. Morovom pastom. Površina jednostavnijih arhitektonskih elemenata na kojima se zadržala nečistoća i skrama dodatno je očišćena metodom mikropjeskarenja, pri čemu se posebnim strojem pomoću komprimiranog zraka raspršuje vrlo sitan silikatni pijesak kroz specijalnu mlaznicu.

Various methods of cleaning the stone from the layers of dirt and biological material, depending on the degree of the damage and complexity of the conservation-restoration intervention, were used. Cleaning with the water-jet spray and mechanical cleaning enabled a better insight into the damaged stone and a more precise designation of the way it should be preserved and restored in the future. Mechanical cleaning was performed on the parts of the carved stones which had dirt residues left even after the cleaning with the water-jet spray. The procedure demanded the use of the various tools: scalpels, scrapers, chisels, brushes etc. This way of cleaning proved to be particularly efficient for the cleaning of the joints between the stone blocks from inadequate mortar. Further cleaning of the deep-rooted dirt with the chemical mean AB-57 was also performed. The surfaces of the simpler architectonic elements which still contained dirt and crust were further cleaned by using sand blasting, a technique where the silica dust is dispersed through a special nozzle of the machine that works with the compressed air.

HRVATSKI
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LASER CLEANING

ČIŠĆENJE LASEROM

Nakon mehaničkog i kemijskog čišćenja te mikropjeskarenja ustanovljeno je da je nužno izvesti dodatne konzervatorsko-restauratorske radove čišćenja složenijih oblika kamene plastike, i to sofisticiranijom opremom. Metoda čišćenja laserom upotrijebljena je za nečistoće koje se nisu smjele ukloniti na drugi način. Laserska zraka razara samo tamne kore, a zaustavlja se na svijetlom vapnencu ili mramoru. After the mechanical and chemical cleaning and sandblasting were carried out, it was established that it was necessary to carry out more conservation-restoration works, namely cleaning of the more complicated parts of the carved stones, using more sophisticated equipment. The laser cleaning method was applied only to the dirt that could not be removed in any other way. The laser beam affects only the dark coating and not the light limestone or marble.

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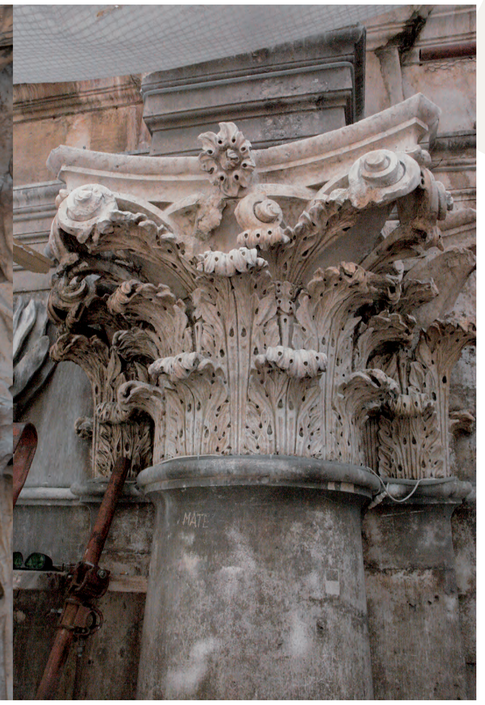
LASER CLEANING

ČIŠĆENJE LASEROM



Kada se čisti laserom, prema strukturi kamenog materijala i vrsti nečistoća regulira se omjer udarne točke, snaga i frekvencija te veličina svjetlosnog snopa. Metoda čišćenja laserom učinkovito se koristi već duže vrijeme u konzervatorsko-restauratorskoj praksi kako u Hrvatskoj tako i svijetu. When using the laser, the stone structure and the type of dirt determine the point of impact, strength and frequency as well as the size of the laser beam. The laser cleaning method has been used efficiently for many years in the conservation-restoration practice in Croatia and in the rest of the world.

HRVATSKI RESTAURATORSKI ZAVOD

LASER CLEANING

ČIŠĆENJE LASEROM

Prije početka čišćenja isključivo laserom napravljeno je nekoliko probnih sondi na zapadnom kapitelu polukružnog pilastra ispod završnog vijenca pročelja. Čišćenje je nakon toga nastavljeno na precizno klesanim vegetabilnim elementima kapitela polukružnih pilastra i pilastra uz portal (akantusovo lišće), dijelovima tijela triju kipova anđela (ekstremiteti, glave, krila itd.) te na glavi anđela nad portalom.

Before the laser cleaning, several test probes were made on the west capital of the engaged column below the cornice of the west façade. The cleaning was then continued on the finely carved vegetal elements of the capitals of the engaged columns and pilasters next to the portal (acanthus leaves), parts of the figures of the three angels (limbs, heads, wings) and on the head of the angel above the portal.

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RESTORATION OF THE
DAMAGED CARVED STONES

RESTAURIRANJE OŠTEĆENIH DIJELOVA KAMENE PLASTIKE




Armatura od nehrđajućeg metala postavljena je tako da se olakša modeliranje formi koje nedostaju i zapunjavanje oštećenja masom umjetnog kamena. Umjetnim kamenom na bazi nekoliko vrsta kamenog brašna, akrilata, gašenog vapna i bijelog cementa domodelirane su forme kamenih arhitektonskih i skulpturalnih elemenata koje nedostaju te su dodatno obrađene finim klesarskim alatom. Obradom i tonskim ujednačavanjem izjednačeni su sa strukturom originalne površine kamena. Stainless steel scaffolding was set in order to facilitate the modelling of the parts that were missing and the filling of the damaged surface with the artificial stone paste. Artificial stone made from several sorts of stone dust, acrylate, slaked lime and white cement was used for the restoration of the missing carved stones of the architectural and sculptural decoration, which were then finished off with the fine carving tools. The treatment and the tonal equalization were made to match the structure of the original stone surface.

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REPLACEMENT OF
STONE BLOCKS

TAŠELIRANJE KAMENIH BLOKOVA

Na mjestima velikih oštećenja strukture zidnog plašta gdje se pojavilo ljuskanje i odlamanje kamenih blokova, odnosno ispadanje cijelog bloka kamena, ugrađeni su novi blokovi od istovrsnog kamena. Blokovi, prethodno pripremljeni grubom klesarskom obradom, tašelirani su u jezgru zidnog plašta. Sljubnice između njih zapunjene su vapnenom žbukom pojačanom bijelim cementom. Ukoliko je bilo nužno sidriti kameni umetak, šipka je bila od nehrđajućeg čelika s navojem, a vezivo je bilo istovrsno masi kojom se zapunjavaju sljubnice. Na izravnim spojevima originalnih i tašeliranih dijelova upotrijebljeno je dvokomponentno ljepilo za kamen. Površinska obrada zamjenskih elemenata kamene plastike također je prilagođena obradi originalnih blokova.

In the places where the masonry structure was severely damaged and where the crumbling and splitting of stone blocks appeared causing some of them to break off and fall, new blocks of the same stone had to be inserted. These blocks, which had been previously treated with the rough carving technique, were fixed into the bedding plane of the masonry. The joints between them were filled with lime mortar mixed with cement mortar. When it was necessary to embed the stone implant, the rod that was used was made of stainless steel and provided with a screw, while the mortar was the same as the one used for the joints. Where the original and the inserted blocks were joined directly, the dual-component glue for stone was applied. The surface of the replacement carved stones was also treated to match the workmanship of the original blocks.

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REATTACHING OF THE
STATUES OF ANGELS

MONTAŽA KIPOVA ANĐELA

Nakon završetka konzervatorsko-restauratorskih radova na pročelju u zoni kipova pristupilo se montaži anđela na njihovo prvobitno mjesto iznad portala crkve. Umjesto prijašnjih željeznih veza sa zidnom masom, prema uputama statičara projektanta, upotrijebljene su nove šipke od nehrđajućeg čelika. After the completion of the conservation-restoration works on the statue zone of the façade, the next step was to reattach the angels to the original position above the church portal. Following the recommendations of the static analyst, new stainless steel rods were used to replace old fixing cramps made of iron.

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ARCHITECTURAL PARTS OF CARVED
STONES - BEFORE AND AFTER THE WORKS

ARHITEKTONSKI DIJELOVI KAMENE PLASTIKE - PRIJE I POSLIJE RADOVA

PRIJE I POSLIJE
BEFORE & AFTER

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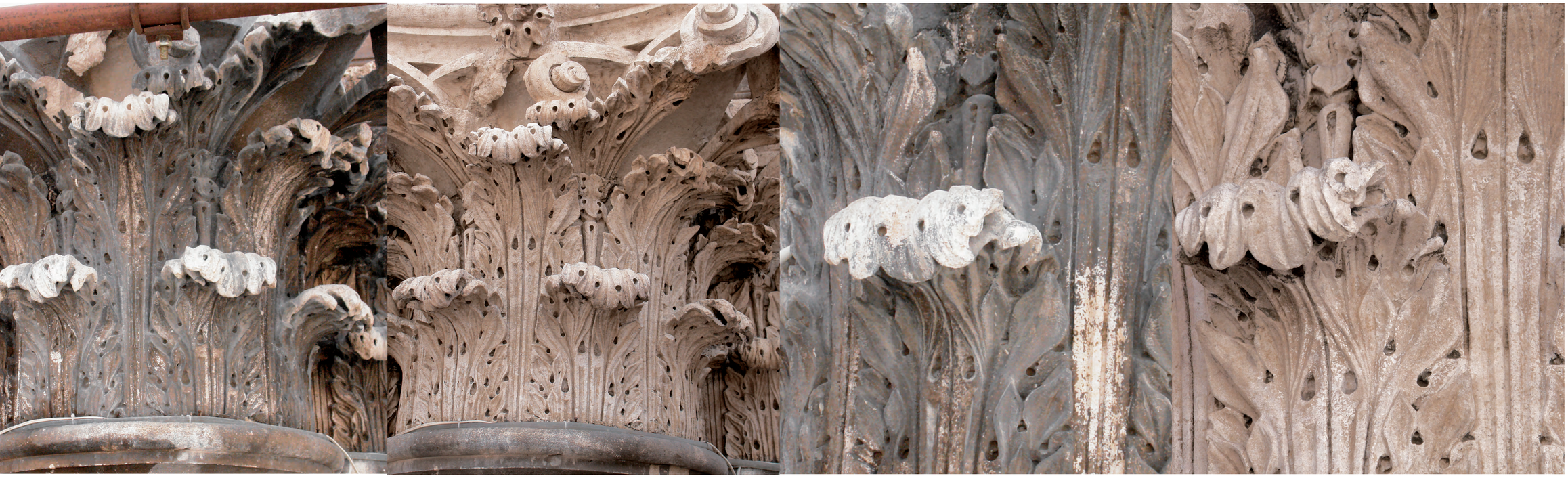
CAPITALS OF THE PILASTER BELOW THE
CORNICE - BEFORE AND AFTER THE WORKS

KAPITELI PILASTRA ISPOD ZAVRŠNOG VIJENCA - PRIJE I POSLIJE RADOVA



PRIJE I POSLIJE
BEFORE & AFTER

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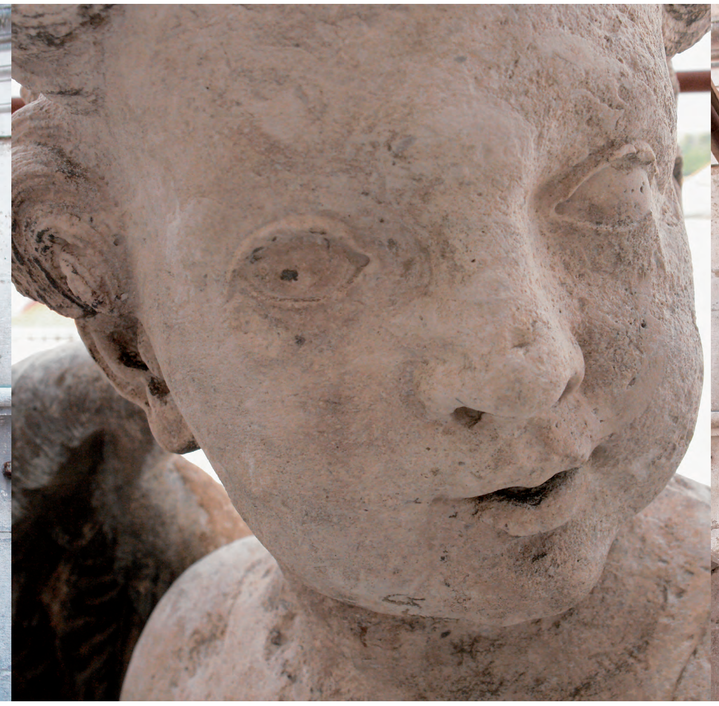
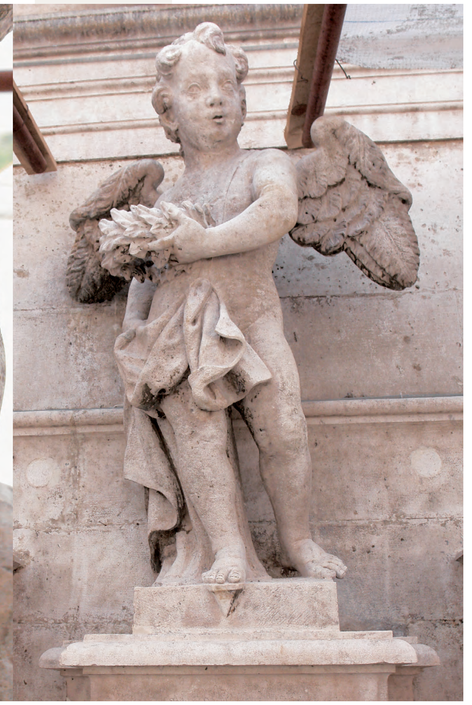
STATUES OF ANGELS - BEFORE
AND AFTER THE WORKS

KIPOVI ANĐELA -
PRIJE I POSLIJE RADOVA



OBNOVA PROČELJA CRKVE SV. VLAHA U DUBROVNIKU / RESTORATION OF THE FAÇADE OF THE CHURCH OF ST BLAISE AT DUBROVNIK

Izvoditelj projekta / Project manager:
HRVATSKI RESTAURATORSKI ZAVOD / CROATIAN CONSERVATION INSTITUTE
Ferdinand Meder, ravnatelj / director

Voditelj radova / Supervisor in charge:
Mate Roščić, konz. rest. / conservator-restorer
Konzervatorsko-restauratorska istraživanja i izrada dokumentacije Conservation-restoration research and documentation:
Ivan Jengić, konz. pov. umj. / conservator-art historian
Kamenko Klofutar, konz. savjetnik / conservation adviser
Vinko Pešorda, konz. rest. / conservator-restorer
Mate Roščić, konz. rest. / conservator-restorer
Josip Velnić, konz. savjetnik / conservation adviser

Podizvođači / Subcontractors:
Građevinar – Quelin d.o.o., Dubrovnik
Lokošek projekt d.o.o., Zagreb

Investitori / Investors:
Zavod za obnovu Dubrovnika / Institute for the Restoration of Dubrovnik
Društvo prijatelja dubrovačke starine / Society of Friends of Dubrovnik Antiquities

Donatori / Sponsors:
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Nadzor / Supervisors:
mr. sc. Ivanka Jemo, d.i.a. / (MA), architect ,
Zavod za obnovu Dubrovnika / Institute for the Restoration of Dubrovnik
Sanja Radović, d.i.a., / architect, Konzervatorski odjel u Dubrovniku Ministarstva kulture RH / Conservation Office of the Ministry of Culture in Dubrovnik

HRVATSKI RESTAURATORSKI ZAVOD

PARTS OF CARVED STONES FROM THE MAIN PORTAL - BEFORE AND AFTER THE WORKS

DIJELOVI KAMENE PLASTIKE GLAVNOG PORTALA - PRIJE I POSLIJE RADOVA

IMPRESUM IZLOŽBE / ACKNOWLEDGEMENTS

Izložba je nastala na inicijativu Zavoda za obnovu Dubrovnika, Društva prijatelja dubrovačke starine i Hrvatskog restauratorskog zavoda na temelju konzervatorsko-restauratorskih radova na crkvi sv. Vlaha Dubrovniku provedenih tijekom 2007. godine.

The exhibition was organized thanks to the Institute for the Restoration of Dubrovnik, Society of Friends of Dubrovnik Antiquities and the Croatian Conservation Institute and focuses on the conservation-restoration works on the church of St Blaise at Dubrovnik carried out in 2007.

Izložbu realizirali / Exhibition organized by:
Hrvatski restauratorski zavod / Croatian Conservation Institute
Ferdinand Meder, ravnatelj / director
Zavoda za obnovu Dubrovnika / The Institute for the Restoration of Dubrovnik
Autori izložbe / Exhibition organizers:
Ivanka Jemo, Ivan Jengić, Mate Roščić
Stručni suradnici / Expert assistants:
Dijana Požar, Edita Šurina
Grafičko oblikovanje / Typeset: Mateo Matijašević

Tisak / Print: O_TISAK
Lektura / Language advisor:
Ivana Vrtić
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Magdalena Skoblar
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