

## KIP CARA AUGUSTA IZ ARHEOLOŠKOG MUZEJA ZADAR: KONZERVATORSKO-RESTAURATORSKA ISTRAŽIVANJA I RADOVI

U ovom članku opisani su konzervatorsko-restauratorski radovi i istraživanja provedena na rimskoj antičkoj mramornoj skulpturi koja postumno prikazuje cara Augusta. Kip datira u 1. stoljeće i isklesan je s namjerom da se promatra s prednje strane. Pronađen je 1768. godine, tijekom arheoloških istraživanja grada Nina koje je financirao zadarski liječnik i jedan od prvih dalmatinskih kolekcionara, Ante Danielli Tommasoni. Nakon njegove smrti dospio je u sjemenište u Udinama, a potom je prodan Talijanima. Nakon nekoliko godina dopisivanja između talijanskih i jugoslavenskih vlasti, kip cara Augusta donesen je u Zadar 1928. godine, prilikom izložbe u crkvi sv. Donata. Kip je bio postavljen ispred crkve do 1953. kad je premješten u zgradu tadašnjeg Filozofskog fakulteta (danas Sveučilište u Zadru) – Liceja sv. Dimitrija. Godine 1973. premješten je na svoju sadašnju poziciju – u Arheološki muzej Zadar. U predvorju muzeja stajao je od 1991. godine, opasan metalnom cijevnom konstrukcijom (skelom) zbog sumnje u statiku. Demontaža kipa zahtijevala je veliki oprez te razrađen i precizan plan. Po dolasku u radionicu Odsjeka za konzervaciju-restauraciju kamena Umjetničke akademije u Splitu, kada je kip polegnut horizontalno, uočeni su unutar njega mesingani trnovi koji su izazvali (ne)očekivane improvizacije koje su nerijetke u konzervatorsko-restauratorskoj struci. Nakon provedenih istražnih radova statika je osigurana i kip je restauriran po svim visokim pravilima struke. Po završetku radova, izazov je svakako bio postavljanje kipa u novi antički postav na prvom katu Arheološkog muzeja Zadar.

**Ključne riječi:** kip cara Augusta, antika, rimska skulptura, konzervatorsko-restauratorski radovi, mramor, statika

## EMPEROR AUGUSTUS' STATUE FROM ARCHAEOLOGICAL MUSEUM ZADAR: CONSERVATION AND RESTORATION RESEARCH AND WORK

This paper describes the conservation and restoration research and work carried out on a Roman marble sculpture of Emperor Augustus, made posthumously. Dated to the 1<sup>st</sup> century AD, it was intended to be observed frontally. It was found in 1768, during the archaeological excavations of Nin, financed by the Zadar physician Ante Danielli Tommasoni, one of Dalmatia's first collectors. After his death, the statue ended up at the Roman Catholic junior seminary in Udine. Later it was sold to the Italians. After a few years of correspondence between the Italian and Yugoslav authorities, Emperor Augustus' statue was brought to Zadar in 1928 for an exhibition in St Donatus' Church. The statue was installed in front of the church until 1953, when it was moved to the then Faculty of Philosophy (present-day University of Zadar) – the Lyceum of St Demetrius. In 1973 it was moved to its present-day location – Archaeological Museum Zadar. It was in the Museum's vestibule since 1991, girdled with a structure made of metal pipes (a scaffold) because of its delicate statics. Its disassembling required precautions, so an elaborate plan was made. When it was laid down horizontally in the workshop of the Conservation-Restoration Department of the Split Arts Academy, brass wedges were observed in it, forcing (un)expected improvisations – nothing uncommon in the conservation-restoration field. After examination, the statics of the statue was secured and the statue was restored according to the highest professional standards. After the work had been done, installing the statue in the new Roman Antiquities permanent display on the first floor of Archaeological Museum Zadar was a big challenge.

**Key words:** Emperor Augustus' statue, Antiquity, Roman sculpture, conservation and restoration work, marble, statics

Kip cara Augusta u vlasništvu je Arheološkog muzeja Zadar na čiji je zahtjev 2011. godine Odsjek za konzervaciju-restauraciju kamena Umjetničke akademije u Splitu izveo konzervatorsko-restauratorske radove.<sup>1</sup> Iste godine počinje uređenje dugo planiranog novog antičkog postava na prvom katu muzeja gdje kip cara Augusta, s ostale tri ninske carske figure pronađene u isto vrijeme, predstavlja najznačajniji izložbeni spomenik. Naime, zbog opravdane sumnje u njegovu statiku biva opasan metalnom skelom u atriju muzeja od 1991. godine kada su izvedena radiografska snimanja na temelju kojih je zaključeno da kip nije fizički pričvršćen za kameni postament.

## POVIJESNI I PROSTORNI KONTEKST

Prema nekim istraživačima antičkih kipova, ovdje se radi o najljepše isklesanom kipu cara Augusta na svijetu (čija je vladavina ostala zapamćena kao zlatno doba Rima), a ikonografski je identificiran s najvećim rimskim božanstvom – Jupiterom.

Kip iz Nina predstavlja Augusta postumno, prikazan je s golim gornjim djelom tijela što je bilo tipično prikazivanje bogova u to vrijeme, a Rimljani su svoje careve nakon smrti smatrali božanstvima.<sup>2</sup> U čast carskim ličnostima koje su nakon smrti proglašene božanstvima, podizani su hramovi – augusteji. Ninski kapitolijski hram čija je izgradnja datirana (zahvaljujući sačuvanom natpisu na frizu) u doba Flavijevaca, predstavlja najveći od svih u nas dosad poznatih. Ostaci monumentalnog hrama očuvani su u zapadnom dijelu grada, ispod crkve sv. Mihovila.<sup>3</sup> Tlocrtna situacija hrama još je uvijek dobro vidljiva iako je tijekom vremena otpalo nekoliko gornjih slojeva zida jer nalaz nije bio konzerviran. Rimska *Aenona* i njezini arheološki ostaci u današnjem Ninu već su dugi niz godina predmetom domaćih i stranih znanstvenih istraživanja.<sup>4</sup> Nažalost, stručnjaci se još uvijek ne mogu složiti oko dimenzija hrama,<sup>5</sup> pa tako ni oko položaja kipova unutar same *Aenonae*.<sup>6</sup> Ono što možemo zaključiti iz dosadašnjih mnogobrojnih istraživanja i što se može iščitati iz samog preostalog izgleda jest da je *Aenona* bila monumentalni grad koji je poslije, svojim dolaskom zakopala kršćanska zajednica.

Emperor Augustus' statue is owned by Archaeological Museum Zadar, at the request of which the Conservation-Restoration Department of the Split Arts Academy the Conservation-Restoration Department of the Split Arts Academy carried out the conservation and restoration work in 2011.<sup>1</sup> The setting of the long-planned new Roman Antiquities permanent display on the Museum's first floor began the same year. Together with three other imperial statues from Nin, Emperor Augustus' statue is one of the most important exhibits in this display. Due to founded suspicion that its statics had been compromised, the statue was girdled with a metal scaffold in the Museum's atrium in 1991, when radiographic screening showed that the statue was not physically attached to the stone pedestal.

## HISTORICAL AND SPACIAL CONTEXT

According to some researchers of ancient Roman statues, this is the world's most beautifully carved statue of Emperor Augustus (whose reign is remembered as Rome's golden age). Iconographically, he is identified with the most important Roman deity – Jupiter.

The Nin statue is a posthumous depiction of Augustus. The emperor is shown with a naked torso – typical representation of gods in that period. Romans considered their emperors to be divine after death.<sup>2</sup> Temples (*Augustea*) were built to honor the imperial figures that were proclaimed deities after their death. Capitol temple in Nin, dated back to the Flavian period (owing to an inscription on its frieze), is the largest one in our country known so far. The remains of the monumental temple can be seen in Nin's western district, underneath St Michael's Church.<sup>3</sup> The outlines of the temple's ground plan are still very visible, although a few upper layers of its walls had fallen off in the meantime because the remains had not been conserved. Roman *Aenona* and its archaeological remains in the present-day Nin have been the object of national and international scientific research for a long time.<sup>4</sup> Unfortunately, experts still disagree about the temple's dimensions<sup>5</sup> and about the position of the statues within *Aenona*.<sup>6</sup> What we can positively say based on the past research and the preserved remains is that *Aenona* was

1 Voditelj radova: prof. Ivo Donelli; stručni tim: doc. Siniša Bizjak, doc. Marin Barišić, restaurator Frane Oreb, Krešimir Bosnić, studenti Helena Ugrina i Davor Maršić.

2 N. Cambi 2002, 125.

3 Crkva sv. Mihovila bila je podignuta nad hramskom građevinom, ali je dokumentirana i srušena 1912. godine radi istraživanja hrama, vidi A. Durman (ur.) 2006, 178.

4 O domaćim arheološkim istraživanjima Nina vidi Š. Batović, J. Belošević, M. Suić 1968; M. Suić 1969, 1976, 1981, 2003, 2009; D. Maršić, R. Sekso 2012; D. Maršić, M. Dubolnić Glavan 2015. Također, Ćiril Metod Iveković izrađuje s grupom studenata tehničke snimke i idealnu rekonstrukciju. Originalni nacrti i skice nalaze se u Dijecezanskom muzeju Zagrebačke nadbiskupije u Zagrebu. Revizija iskapanja pokazala je da se neki njegovi prijedlozi rekonstrukcije ne mogu prihvatiti.

5 O mogućim dimenzijama hrama vidi D. Maršić, R. Sekso 2012, 28.

6 O mogućim položajima kipova unutar hrama vidi N. Cambi 2002, 64, M. Suić 1968, 48.

1 Team leader: prof. Ivo Donelli; expert team members: Siniša Bizjak, assist. prof., Marin Barišić, assist. prof., restorer Frane Oreb, lecturer Krešimir Bosnić, students Helena Ugrina and Davor Maršić.

2 N. Cambi 2002, 125.

3 St Michael's Church was built on the site of the temple structure. The church was documented and torn down in 1912, in order to enable the excavations of the temple, see A. Durman (ur.) 2006, 178.

4 For national research of Nin, see Š. Batović, J. Belošević, M. Suić 1968; M. Suić 1969, 1976, 1981, 2003, 2009; D. Maršić, R. Sekso 2012; D. Maršić, M. Dubolnić Glavan 2015. Also, Ćiril Metod Iveković and a group of students made technical recordings and an ideal reconstruction. The original drawings and sketches can be seen in the Diocesan Museum of the Zagreb Diocese in Zagreb. A revision of the excavations showed that some of his reconstruction proposals could not be accepted.

5 For possible dimensions of the temple, see D. Maršić, R. Sekso 2012, 28.

6 For possible positions of the statues within the temple, see N. Cambi 2002, 64, M. Suić 1968, 48.

Krajem srednjeg vijeka, zbog izuzetno povoljnog geografskog položaja, Zadar je poput ostalih dalmatinskih gradova postao prometno, trgovačko, ali i kulturno središte.<sup>7</sup> U to vrijeme raste širi interes za skupljanje, istraživanje i opisivanje antičkih spomenika što rezultira brojnim iskanjima i osnivanjem privatnih zbirki. U isto vrijeme spominju se i prva nestručna arheološka istraživanja koja su vodili brojni sakupljači starina, mletački providuri i knezovi iz Zadra ili Nina.<sup>8</sup> Tada u Zadru djeluju prvi poznati sakupljač umjetnina Juraj Benja i Petar Kršava, opat Samostana sv. Krševana. Poslije njihov rad nastavljaju biskupi, nadbiskupi i plemići. Tako je već sredinom 18. stoljeća zadarski liječnik Ante Danielli Tommasoni posjedovao najveću privatnu zbirku u Dalmaciji. Zadarski bilježnik Ivan Sorrari u rukopisu je ostavio podatke o prvim ambicioznim pokušajima arheoloških istraživanja,<sup>9</sup> a među njima se izdvajaju ona u vrtu Josipa Đurovića.<sup>10</sup> Istraživanja je financirao Danielli koji je i otkupio pronađenu građu o čemu svjedoči i ugovor iz 1768. godine, a nalazi se u Povijesnom arhivu u Zadru.<sup>11</sup> Tom prilikom pronađen je kip cara Augusta kao jedna od četiri kolosalne skulpture. Nedugo nakon otkupa kipove zapaža putopisac Alberto Fortis u svojoj knjizi *Put po Dalmaciji* iz 1792. godine, gdje navodi da se u zbirci Danielli „ističu četiri kolosalna kipa od solnog mramora“.<sup>12</sup> Pred kraj 18. stoljeća iz nepoznatih razloga zbirku nasljeđuje obitelj Pellegrini-Danielli. Zbirka je ponuđena na otkup Narodnom muzeju u Zadru 1832. godine, ali zbog nedostatka ili nemogućnosti procjene otkup se nije dogodio. Zanimljiv osvrt na zbirku Pellegrini dao je njemački putopisac Johann Georg Kohl koji je boravio nekoliko dana u Zadru. Nije upoznao vlasnike, ali se prema njima kritički odnosi smatrajući da „ne pokazuju ni najmanju brigu za te skupocjene predmete, zanemarujući ih gore od svakog najmanjeg malog običnog kramara, koji više čuva svoje lonce, bademe i žigice...“<sup>13</sup>

Cijela je kolekcija prodana plemiću Pietru Cernazaiju 1859. godine u Udine da bi 1882. godine dospjela u vlasništvo sjemeništa, također u Udinama. Sjemenište je zbirku 1901. godine rasprodalo na aukciji po cijeloj Europi. Na zahtjev direktora Arheološkog zavoda u Beču, dio građe otkupljen je za Arheološki muzej Zadar,<sup>14</sup> a tadašnja Kraljevina Italija kupila je četiri rimske carske skulpture za Arheološki muzej u Veneciji.<sup>15</sup> Zbog nedostatka prostora u

a monumental city that ended up buried upon the arrival of the Christian community.

At the end of Middle Ages, Zadar's very favorable geographical position helped it become a traffic, trade and cultural center, just like other Dalmatian cities.<sup>7</sup> It was also the time when considerable interest for collecting, exploring and describing of ancient Roman monuments was aroused, resulting in numerous excavations and private collections. The first amateur archaeological excavations were recorded then, led by numerous collectors of antiquities, Venetian local governors and rectors from Zadar or Nin.<sup>8</sup> Juraj Benja, the first known collector of works of art, and Petar Kršava, abbot of the Monastery of St Chrysogonus, flourished in that period. Their work was later continued by bishops, archbishops and noblemen. In the mid-18<sup>th</sup> century, Zadar-based physician Ante Danielli Tommasoni owned the biggest private collection in Dalmatia. Zadar's notary public Ivan Sorrari left a manuscript with details about the first ambitious attempts of archaeological excavations,<sup>9</sup> particularly those carried out in Josip Đurović's garden.<sup>10</sup> The excavations were financed by Danielli, who also bought the finds (as stated in the 1768 contract kept in Zadar Historical Archives).<sup>11</sup> It was then that Emperor Augustus' statue was found as one of four colossal sculptures. Soon after they were purchased, travel writer Alberto Fortis mentions in his 1792 work *Travels into Dalmatia* the "prominent four colossal statues made from salt marble".<sup>12</sup> At the end of the 18<sup>th</sup> century, for unknown reasons, the Pellegrini-Danielli family inherited the collection. Its purchase was offered to the Zadar National Museum in 1832 but, as it could not be appraised, the collection was not bought. German travel writer Johann Georg Kohl, who spent a few days in Zadar, made an interesting comment on the Pellegrini collection. He never met its owners, but he criticizes them, claiming that they "show not the slightest concern about these precious objects; even the commonest tinker shows more concern about his pots and matches than they do about these objects..."<sup>13</sup>

In 1859, the whole collection was sold to Pietro Cernazai, a noble from Udine. It then became property of Udine's junior seminary. The seminary put the collection to an auction in 1901 and sold it to buyers from all over Europe. At the request of the director of the Archaeological Institute in Vienna, part of the collection was purchased on behalf of Archaeological Museum Zadar.<sup>14</sup> The then Kingdom of Italy

7 Š. Peričić 1987, 494.

8 Š. Batović 1987, 465.

9 H. Morović 1970, 213–231.

10 Prema M. Suiću to je Medovićev vrt.

11 M. Kolega 1990, 5.

12 A. Fortis 1984, 13.

13 M. Despot 1959, 82.

14 Građa je inventarizirana u Muzejski katalog skulpture (inv. br. 19–40) u kojem piše da arheološka građa otkupljena za zadarski muzej sadrži 21 komad rimske kamene plastike, od toga 14 portreta, 1 mramorni ženski kip bez glave, 1 mramorno poprsje žene, 1 torzo Artemide, 1 hermu bradatog Dioniza, 1 glavu satira i 1 reljef, ali se ne spominju 4 carske figure.

15 P. Dragoni, A. Mlikota 2013, 186.

7 Š. Peričić 1987, 494.

8 Š. Batović 1987, 465.

9 H. Morović 1970, 213–231.

10 According to M. Suić, it was the Medović Garden.

11 M. Kolega 1990, 5.

12 A. Fortis 1984, 13.

13 M. Despot 1959, 82.

14 The finds were entered into the Museum's Catalogue of Sculptures (inv. no. 19–40), which specifies that the archaeological finds purchased on behalf of the Zadar museum contain 21 pieces of ancient Roman sculpture (14 portraits, 1 marble headless female statue, 1 marble female bust, 1 torso of Artemis, 1 herm of Dionysius, 1 satire head and 1 relief); however, the 4 imperial figures are not mentioned.



**Slika 1. Skupina carskih kipova ispred Sv. Donata**

Figure 1. Group of imperial statues in front of St Donatus' Church

izvor / source: Dokumentacijski odjel AMZd / Documentation Department of the AMZd

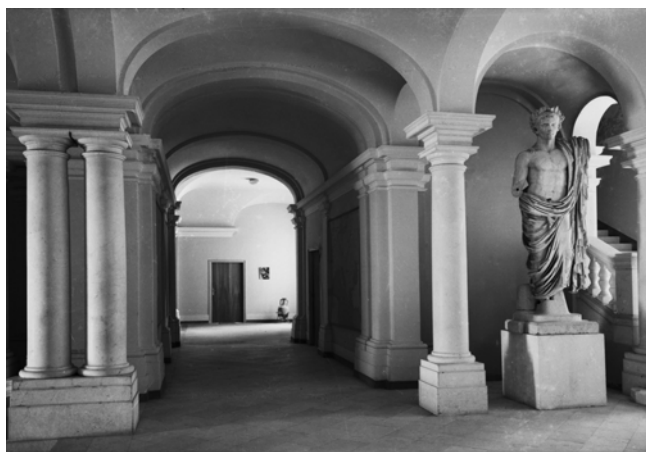
Arheološkom muzeju pohranjene su u podrumu privatne kuće u Veneciji.<sup>16</sup>

Kip cara Augusta s ostalim trima carskim figurama dopremljen je u Zadar 1928. godine, prilikom izložbe u Sv. Donatu.<sup>17</sup> U razdoblju od 1929. do 1931. godine uklonjene su zgrade koje su okruživale Sv. Donat pa je tada otkriven istočni dio pločnika rimskog foruma i temelji crkve. Na oslobođeni prostor oko Svetog Donata postavljeni su kipovi i tako je prezentirana talijanska vlast u Zadru (Sl. 1). Tijekom Drugog svjetskog rata kipovi su vjerojatno bili skladišteni s ostalom građom unutar Sv. Donata ili u podnožju zvonika kako je to i naredio konzervator Luigi Crema koji je najzaslužniji za spašavanje umjetnina u Zadru tijekom rata.<sup>18</sup> Ispred Sv. Donata stajali su sve do 1954. godine kada

bought four Roman imperial sculptures for the Archaeological Museum in Venice.<sup>15</sup> Due to lack of space in the Museum, the sculptures were stored in the basement of a private house in Venice.<sup>16</sup>

The statue of Emperor Augustus and three other imperial statues were brought to Zadar in 1928, for an exhibition in St Donatus' Church.<sup>17</sup> In the period between 1929 and 1931, the buildings around St Donatus' Church were torn down and the eastern part of the Roman forum and the church's foundation were then discovered. The statues were installed in the vacated space by the church in order to represent the Italian rule over Zadar (Fig. 1). During World War II, the statues and other finds were probably stored inside St Donatus Church or underneath its bell tower, as instructed by Luigi Crema, commissioner for antiquities, who deserves credit for saving the works of art in Zadar during the war.<sup>18</sup> They stood in front of St Donatus until 1954, when the Museum's entire archaeological display was moved to the Lyceum of St Demetrius (present-day University of Zadar), where it occupied the basement, ground floor and first floor (Fig. 2).

In 2013, in the National Archives in Washington DC, Professor A. Mlikota found a document explaining the condition of the works of art in Zadar in World War II and the circumstances they were in. The document lists the finds taken from Zadar in 1944 and describes the contents of the crates that the then assistant commissioner of the Trieste Institute for the Protection of Cultural Monuments took along from Zadar to Venice.<sup>19</sup> Although it was ordered that the finds be returned to Zadar, it never happened. After lengthy negotiations and attempts to restore the art works, a treaty was signed in 1961, stipulating that Yugoslavia would receive the four imperial statues from Nin as compensation for the works of art taken from Zadar during World War II. Italia had claimed



**Slika 2. Kip cara Augusta u prostoru tadašnjeg Filozofskog fakulteta (danas Sveučilišta u Zadru)**

Figure 2. Emperor Augustus' statue in former Faculty of Philosophy (present-day University of Zadar)

foto / photo: J. Šprajca

16 P. Dragoni, A. Mlikota 2013, 186.

17 Kada su i upisane u knjigu ulaska u muzej – *Registro cronologico generale di entrata*.

18 A. Mlikota 2013, 255.

15 P. Dragoni, A. Mlikota 2013, 186.

16 P. Dragoni, A. Mlikota 2013, 186.

17 This is the time when they were entered into the Museum records – *Registro cronologico generale di entrata*.

18 A. Mlikota 2013, 255.

19 A. Mlikota 2013, 281–309.

se kompletni arheološki postav muzeja seli u zgradu Liceja sv. Dimitrija (danas Sveučilište u Zadru) gdje je zauzela podrum, prizemlje i prvi kat (Sl. 2).

Nadalje, prof. A. Mlikota 2013. godine u Nacionalnom arhivu u Washingtonu pronalazi dokument koji donosi objašnjenja i okolnosti, ali i stanje umjetnina u Zadru tijekom Drugog svjetskog rata. U dokumentu je zabilježena građa odnesena iz Zadra 1944. godine te je dan opis kutija iz zadarskog muzeja koje je tadašnji asistent povjerenika Zavoda za zaštitu spomenika u Trstu odnio iz Zadra u Veneciju.<sup>19</sup> Iako je naređeno vraćanje građe u Zadar, to se nikad nije dogodilo. Nakon brojnih pregovora i pokušaja povratka umjetnina, 1961. godine potpisan je ugovor u kojem Jugoslavija i Italija razmjenjuju četiri kipa rimskih careva iz Nina za umjetnine odnesene iz Zadra tijekom Drugog svjetskog rata. Naime, Italija je tvrdila da su kipovi posuđeni za potrebe izložbe u Sv. Donatu 1928. godine.

Kako se Filozofski fakultet širio, sve se više javljala potreba da se muzej iseli u novi prostor. Prilika se ukazala pri obnovi sklopa samostana i crkve Sv. Marije, pa je dogovoreno da se prostor za novu zgradu muzeja osigura u okviru tog bloka, što je i realizirano tijekom 1971. i 1972. godine. Zgrada Arheološkog muzeja Zadar smatra se najuspješnijim arhitektonskim ostvarenjem poslijeratne gradnje u Zadru.<sup>20</sup> Prilikom postavljanja stalne izložbe srednjeg vijeka u prizemlju i rimskog razdoblja na prvom katu 1973. godine, kip cara Augusta premješten je na svoju današnju poziciju – u Arheološki muzej Zadar.

## OPIS KIPA

Ukupna visina: 265 cm

Najveća širina: 80 cm

Visina glave: 30 cm

Širina lica: 21,5 cm

Tehnika/materijal: klesani mramor

Kip je zbog usklađene ravnoteže (*contrapposto*) oslonjen na desnu nogu, dok je lijeva blago savinuta i zabačena prema natrag. Desno mu je rame u nižoj osi od lijevoga koje se vjerojatno izdiže i zbog uzdignute lijeve ruke u kojoj je držao žezlo. Sačuvana je samo nadlaktica desne ruke koja je malo nagnuta udesno pa se može pretpostaviti da je cijela ruka bila horizontalno ispružena. Na njoj su se nalazili tragovi nekog okruglog predmeta, što su i zabilježili J. Banko i P. Sticotti dok je desna ruka bila čitava.<sup>21</sup>

Sačuvana nadlaktica desne ruke pokazuje da je odlomljeni dio bio pričvršćen metalnom šipkom u laktu. Nedo staje cijela lijeva ruka, koja je vjerojatno bila podignuta, a u

that it had lent the statues only for the 1928 exhibition in St Donatus' Church.

As the Faculty of Philosophy expanded, new premises had to be found for the Museum. When the reconstruction of the complex of the St Mary's Monastery and Church began, it was agreed that the new Museum building be erected as part of that complex. It was built in 1971/1972. The building of Archaeological Museum Zadar is considered the best architectural achievement of the post-war construction in Zadar.<sup>20</sup> In 1973, when the permanent displays of Middle Age in the ground floor and Roman Antiquity on the first floor were set, Emperor Augustus' statue was moved to its present-day place – in Archaeological Museum Zadar.

## DESCRIPTION OF THE STATUE

Total height: 265 cm

Max. width: 80 cm

Head height: 30 cm

Face width: 21.5 cm

Execution/Material: dressed marble

In order to achieve counterpoise (*contrapposto*), the statue rests on its right leg, while the left one is slightly bent backwards. The axis of its right shoulder is lower than the left one; the latter is probably lifted upwards because of the raised left arms which held a scepter. Only the upper part of the right arm has been preserved. It is bent slightly to the right, so we can presume that the entire arm was extended horizontally. Traces of some round object were visible on it, as recorded by J. Banko and P. Sticotti. The right arms was complete.<sup>21</sup>

The preserved upper part of the right arm shows that the broken part was attached to it with a metal rod at the elbow. The whole left arm is missing. It was probably raised. Square-sectioned grooves that used to attach it can be seen at the left shoulder. The head is turned slightly to the right. It wears an imperial attribute – an oak leaf wreath filled with acorns (*corona civica*). The eye is 5 cm long, with no irises and pupils carved within the eye-whites. The hair style is typical of the *Prima Porta* portraits.<sup>22</sup>

The back of the head was executed with a serrated chisel, so there are no traces of combing. The sculptor achieved a perfect contrast of light and shade by executing folds on the toga. The back side is relatively coarsely worked, with no details. This indicates that the statue was intended for frontal observation. It was carved from marble. The visible breaks indicate that it was made from

19 A. Mlikota 2013, 281–309.

20 Zgradu je projektirao akademik Mladen Kauzlaric (siječanj 1896. – rujan 1971.), hrvatski arhitekt.

21 J. Banko, P. Sticotti 1895, 4.

20 The building was designed by Academician Mladen Kauzlaric (January 1896 – September 1971), Croatian architect.

21 J. Banko, P. Sticotti 1895, 4.

22 For more on classification of types and subtypes of Augustus' portraits, see Kolega 2017, 16–18.

lijevom ramenu vide se četvrtasti žljebovi koji su ju pričvršćivali. Glava je malo okrenuta nadesno i na njoj se nalazio još jedan carski atribut – vijenac od hrastova lišća, ispunjen plodovima žirovima (*corona civica*). Dužina oka je 5 cm i unutar bjeloočnica nisu urezane šarenice i zjenice. Frizura je obrađena prema tipu frizure portreta „Prima Porta“.<sup>22</sup>

Stražnji dio glave modeliran je nazubljenim dlijetom, tako da nema tragova češljanja. Kipar je stvorio savršen dojam svjetla i sjene postavljajući kontrastne nabore na togi, dok je stražnja strana relativno grubo obrađena, bez klesanih detalja. Iz toga se vidi da je kip bio namijenjen promatranju sprijeda. Isklesan je u mramoru. Prema vidljivim prijelomima može se zaključiti da je isklesan iz tri dijela. Tijelo je isklesano od jednog većeg mramornog bloka, u jednom komadu, tj. s glavom i desnom rukom do lakta; drugi dio čini desni dio ruke od lakta prema prstima i manji ulomak dodan sa stražnje strane iznad lijevog ramena, dok treći dio čini čitava lijeva ruka koja je posebno klesana i spojena u ramenu (sačuvan je četvrtasti utor). Takav način prikazivanja cara unaprijed je planiran i zadan, rađen po standardnim predlošcima u carskim radionicama. Baza je pak izrađena od kamena vapnenca početkom 20. stoljeća u Italiji.

### ZATEČENO STANJE; DEMONTAŽA KIPA

Kip se nalazio u predvorju Arheološkog muzeja Zadar, opasan zaštitnom cijevnom konstrukcijom i dodatno pričvršćen za pod portland cementom. Naime, nakon potresa 1990. godine i uočene pukotine u predjelu desne noge, a na zahtjev tadašnjeg ravnatelja muzeja Radomira Jurića, sastavljen je tim stručnjaka za radove sanacije kipa koji je tada preventivno bio opasan drvenom konstrukcijom zbog sumnje u statiku.<sup>23</sup> Iz njihova izvještaja vidljivo je da su *in situ* ustanovili statičku ugroženost kipa u području njegova spoja s bazom.<sup>24</sup> U ožujku 1991. godine izvršeno je radiografsko snimanje spoja radioaktivnim izotopom kobalta-60 (<sup>60</sup>Co).<sup>25</sup> Napravljene su četiri snimke spoja pod različitim kutovima i s različitim trajanjem preseljavanja γ-zraka. Na osnovi radiograma zaključeno je da „kip stoji slobodno na podnožju i da nije sidren; da se u centralnom dijelu kipa i njegovog podnožja nalazi okomita praznina dužine cca 300 mm, promjera 50 mm te da postoji još jedna manja okomita praznina koja je vjerojatno bila predviđena za pričvršćenje dijela noge za kip“.<sup>26</sup> Na temelju izvješća o radiografskom snimanju izrađen je prijedlog

three parts. The body was carved from a single large block of marble, including the head and the right arm to the elbow; the second part includes the lower part of the right arm and a small piece added above the left shoulder in the back. The third part is the entire left arm, separately carved and attached at the shoulder (a square-sectioned groove has been preserved). Such way of depicting an emperor was preset and planned in advance, modelled on standard patterns in imperial workshops. The base was made from limestone in Italy, in the early 20<sup>th</sup> century.

### THE STATUE'S INITIAL CONDITION AND ITS DISMANTLING

The statue stood in the vestibule of Archaeological Museum Zadar, girdled with a structure made of metal pipes and additionally fixed to the floor with Portland cement. After the earthquake of 1990, when cracks on the right foot were observed, the then Museum director Radomir Jurić assembled an expert team for repairs of the statue, which had been preventively enclosed in a wooden structure because of its dubious statics.<sup>23</sup> According to their report, the team established that the statue's statics had been threatened at the connection with the base.<sup>24</sup> Radiographic screening of the connection was carried out in March 1991, using radioactive isotope Cobalt-60 (<sup>60</sup>Co).<sup>25</sup> Four screenings were made, from different angles and with different duration of shifting of γ-rays. The radiogram thus obtained indicated “that the statue is standing freely on the base and is not anchored; that there is a vertical hollow approx. 300 mm long and 50 mm wide in the center and bottom of the statue and another vertical hollow that was probably intended for fixing a part of the leg to the statue”.<sup>26</sup> The plan for the conservation and restoration work was proposed on the basis of the radiographic screening report. It was concluded that “the X-ray shows that the existing hollow has been prepared and the wedge has never been embedded. The only connection between the statue and the base was a ‘male-female groove’ (also visible on the X-ray); we believe it is broken”.<sup>27</sup> It is also suggested that wedges be embedded in the hollows and glued with epoxy resin. This is why, based on the drawing and the then team's proposal, a metal-pipe structure in the Museum was built, but wedges were not embedded and glued with epoxy resin – probably due to the outbreak of war in Croatia in 1991.

22 Više o klasifikaciji tipova i varijanti Augustovih portreta vidi Kolega 2017, 16–18.

23 Tim su sačinjavali predstavnici Zavoda za zaštitu spomenika kulture Zadar: prof. Miljenko Domijan i prof. Pavuša Vežić, ing. Davor Uglešić i statičar te stručni voditelj grupe Milivoj Šegan, akademski kipar.

24 M. Šegan 1992.

25 Radiografsko snimanje izvršio je Institut za materijale Ljubljana, Zavod za istraživanje materijala i strukture Ljubljana (ZRMK).

26 M. Šegan 1992.

23 The team consisted of the representatives of the Zadar Institute for the Protection of Cultural Monuments: Prof. Miljenko Domijan and Prof. Pavuša Vežić, Davor Uglešić, B. Sc. and structural engineer and expert team leader Milivoj Šegan, academic sculptor.

24 M. Šegan 1992.

25 The radiographic screening was carried out by the Ljubljana Institute for Materials, Ljubljana Center for Materials and Structures (ZRMK).

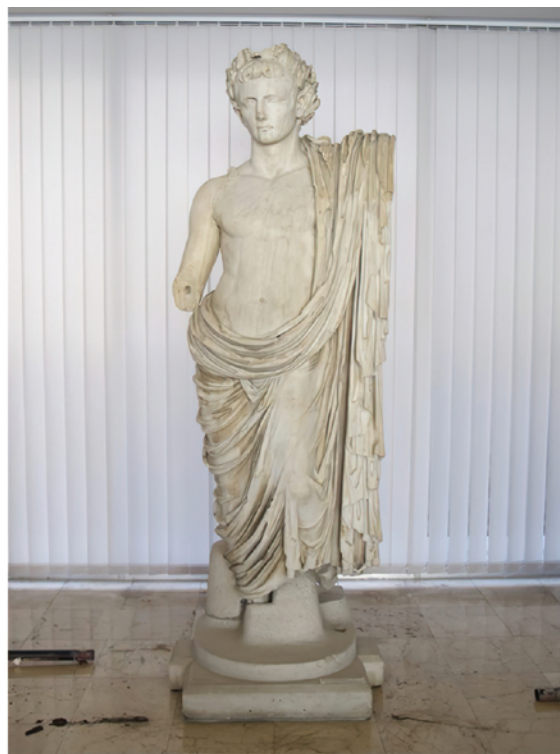
26 M. Šegan 1992.

27 M. Šegan 1992.

**Slika 3. Zatečeno stanje kipa u predvorju muzeja prije i nakon uklanjanja zaštitne skele**

Figure 3. Statue's initial condition in Museum's vestibule, before and after removal of protective scaffold

foto / photo: S. Bizjak



konzervatorsko-restauratorskih radova u kojem je zaključeno da se „na rentgenskom snimku vidi da je priprema postojeće praznine izvršena, a trn nikad nije bio ugrađen. Jedino učvršćivanje kipa za bazu bio je 'muško-ženski utor', također vidljivo na rentgenskom snimku i pretpostavlja se da je on slomljen“.<sup>27</sup> Također, predlaže se ugrađivanje trnova u praznine i lijepljenje epoksidnom smolom. Stoga je prema nacrtu i prijedlogu tadašnjeg tima izrađena metalna cijevna konstrukcija u muzeju, ali ugrađivanje trnova i lijepljenje epoksidnom smolom nije izvedeno – vjerojatno zbog novonastale ratne situacije u zemlji 1991. godine.

Nakon uvida u prijašnju dokumentaciju i procjene stručnog tima s Odsjeka za konzervaciju-restauraciju Umjetničke akademije u Splitu, odlučeno je da će se demontirati zaštitna metalna konstrukcija u muzeju i da će se kip postaviti u horizontalni položaj da bi se detaljno i sa svih strana pregledao. Razrađen je plan i redoslijed skidanja zaštitne skele te postavljanje nove koja bi služila za demontažu samog kipa i njegovo postavljanje u horizontalan položaj kako bi se u tom položaju sigurno transportirao u radionicu u Splitu. Demontaža kipa zahtijevala je veliki oprez jer velika težina i visina ograničavaju mogućnosti manipuliranja kipom. Prije skidanja zaštitne konstrukcije u muzeju, na temelju detaljne analize opterećenja, u radionici Umjetničke akademije u Splitu izrađena je posebna metalno-drvena konstrukcija odgovarajućih dimenzija na koju će kip biti polegnut. Kontroliranim

After earlier documents had been studied and the expert team from the Conservation-Restoration Department of the Split Arts Academy had made its assessment, it was decided that the statue would be laid down horizontally and examined to detail from all sides. The plan and steps of the removal of the protection scaffold and installing a new one were prepared. The new scaffold was intended for dismantling of the statue and placing it into a horizontal position for safe transport to the workshop in Split. The dismantling required particular caution because the statue's massive weight and height hinder its handling. Before the protective structure would be removed in the Museum, a special metal and wooden structure of adequate size (onto which the statue would be laid) was made in the workshop of the Split Arts Academy on the basis of a detailed load analysis. By controlled tightening and slackening of chain hoisting devices, the possibility of the statue's fall was eliminated. The belts of the two hoisting devices were wrapped around the statue's base and pulled up simultaneously and the statue was elevated a few centimeters from the ground (Fig. 3). A pallet and two wooden beams were placed underneath the statue to stabilize it. By repeated simultaneous slackening of the hoisting belts and by using two palettes, the statue was carefully laid in a horizontal position and then transported to the Split workshop (Fig. 4). Soon upon the arrival, three metal wedges, each with a 30mm diameter, were seen sticking out on the bottom side of the limestone base. They were additionally fixed with a concrete matrix that was often used between the two world wars.

27 M. Šegan 1992.



Slika 4. Spuštanje kipa u horizontalni položaj

Figure 4. Laying the statue in a horizontal position

foto / photo: I. Donelli

natezanjem i otpuštanjem lančanih dizalica eliminirana je mogućnost pada skulpture. Remeni dviju dizalica opasali su bazu i istovremenim natezanjem dizalice kip je uzdignut od tla nekoliko centimetara (Sl. 3). Ispod kipa umetnut je paletar i dvije drvene grede kako bi bio stabilan. Ponovnim istovremenim otpuštanjem dizalica i s pomoću dva paletara pažljivo je spušten u vodoravni položaj te naposljetku kamionom prevezen u radionicu u Split (Sl. 4). Po dolasku u radionicu odmah su uočena tri metalna trna promjera 30 mm koja izviruju s donje strane vapnenačke baze. Dodatno su učvršćeni betonskim vezivom, a takvo je vezivo nerijetko korišteno u te svrhe između dva svjetska rata.

Detaljnim vizualnim pregledom površine mramora uočeno je nekoliko vrsta nečistoća. Crne kore na naborima draperije vjerojatno su nastale za vrijeme izloženosti kipa atmosferilijama.<sup>28</sup> Stražnja strana djelomično je prekrivena okerastim naslagama.<sup>29</sup> Prilično šturo i djelomično obrađena stražnja strana kipa ima pravilni četvrtasti utor koji je vjerojatno sadržavao metalni klin koji je imao ulogu podupiranja, odnosno učvršćenja kipa uza zid (Sl. 5). Nedostaje cijela lijeva ruka i stražnji dio ramena na lijevoj strani, desna ruka od lakta prema dolje i završni dio plašta. Noge su pri dnu koso odlomljene tako da desnoj nedostaje dio od skočnog zgloba do prstiju, a lijeva je koso zasječena po polovici lista. Lijeva je noga odmaknuta, a iznad baze kasnije je slijepljen ulomak noge, tj. dio pete sa zglobovom. Spoj mramora i vapnenca fugiran je portland cementom koji je štetan. Glava ima sitnija oštećenja po desnoj strani lica, nosu, bradi, a dio lijeve usne školjke odlomljen je. Vijenac u listovima oko glave ima cijeli niz nepravilno raspoređenih rupica. Traka kojom

Several kinds of impurities were observed when a detailed visual overview of the marble surface was conducted. The black crusts on the drapery folds are probably a result of exposure to weathering factors.<sup>28</sup> The statue's back side is partly covered with ocher sediments.<sup>29</sup> On the rather coarsely and partially executed back side there is a symmetrical square groove which probably accommodated a wedge that supported the statue or fixed it to a wall (Fig. 5). The whole right arm with the back part of the left shoulder are missing, as well as the right arm from the elbow down and the lower edge of the drape. The legs are canted at the bottom: the right foot from the ankle to the toes is missing and the left leg is canted across the middle of its calf. The left leg is pulled back; its fragment (part of the heel with the ankle) was subsequently glued above the base. The connection of the marble and the limestone was pointed with Portland cement, which is harmful. As for the head, minor damage can be seen on the right side of the face, nose and chin; part of the left concha is missing. The leafed wreath around the head contains numerous irregularly distributed punctures. The strap attaching the wreath to the head is broken above the right shoulder. Minor recent damage can be seen on a number of places; they are probably a result of improper handling of the statue in recent past.

28 Pod pojmom „kora“ generalno se podrazumijeva taloženje materijala na površini. Nastaje kombinacijom egzogenih naslaga i materijala koji je dospio iz kamena. Radi se prvenstveno o gipsu koji djeluje razarajuće na kamen. Crno obojenje kori daje čađa i čestice iz atmosfere koje su zarobljene u gipsu.

29 Riječ je o zemljanim pigmentima koji su se „zalijepili“ još od vremena kada je skulptura bila zakopana.

28 The term “crust” generally means sedimentation of materials on the surface. It is a result of the combination of exogenous sediments and the material originating from the stone. It is primarily gypsum, which has a devastating effect on the stone. The black color of the crust comes from soot and from the particles from the atmosphere which are captured in the gypsum.

29 These are the earth pigments that got “stuck” to the statue while it was still buried underground.





**Slika 5. Zatečeno stanje: crna kora u području draperije i stražnja strana kipa**

Figure 5. Statue's initial condition: black crust on drapery and statue's back side

foto / photo: H. Ugrina

je vezan vijenac oko glave, odlomljena je iznad desne strane ramena. Manja recentna mehanička oštećenja vidljiva su na više mjesta i vjerojatno su posljedica nekoliko nestručnih manipuliranja kipom tijekom nedavne prošlosti.

### UZORKOVANJE MATERIJALA I REZULTATI ISPITIVANJA STATIKE

Nakon analize digitalnim mikroskopom *Dino Capture Dino Lite*, pretpostavlja se da se radi o penteličkom mramoru (Sl. 6).<sup>30</sup> Taj se mramor brao na planini Pentelicus u Attici, 16 kilometara udaljenoj od Atene.<sup>31</sup> Pentelički mramor bijele je boje s bljedozlatnom nijansom pod suncem, a koristili su ga još grčki kipari Fidija i Praksitel za svoje skulpture.<sup>32</sup> S obzirom na uočena tri trna koja izviruju s donje strane baze, uzorkovan je metal od kojih su napravljeni. Na analizu je poslan dio strugotine te je utvrđeno da je riječ o olovnom mesingu izvrsne kvalitete.<sup>33</sup> Najsličniji je današnjim bakrenim legurama naziva C37710, izvrsne otpornosti na koroziju, pogodan za rezanje, kovanje i prešanje te za toplo oblikovanje. Prema interpretaciji rezultata, proizvodi se gnječenjem i sabijanjem, a koristi se za izradu prešanih profila točnih mjera te kao urarska mjed (Sl. 7). Analizirajući dobivene rezultate metala i uspoređujući ih s rezultatima

30 M. Suić je u svojim istraživanjima zapisao da su skulpture izrađene od kararskog mramora (*marmo lunense*) čiji se kamenolom nalazi na sjevernoj granici Toskane i Ligurije (Alpi Apuane).  
31 U antičko vrijeme ovaj je kamenolom bio poznat kao *Vrilissos* ili *Vrilittos*, kako se zvalo i obližnje mjesto. Danas je ovaj kamenolom zaštićen osim što se koristi u konzervatorsko-restauratorske svrhe u cilju obnove akropole.  
32 J. Farndon, S. Parker 2009, 129.  
33 Analizu metala izvršio je Centar za istraživanje metala Istarske županije METRIS, Zagrebačka 30, Pula.

### SAMPLING OF THE MATERIAL AND STATICS TESTING RESULTS

An analysis with a *Dino Capture Dino Lite* digital microscope showed that the material in question was Pentelic marble (Fig. 6).<sup>30</sup> That marble used to be quarried on Mount Pentelicus in Attica, 16 kilometers from Athens.<sup>31</sup> Pentelic marble is white, with a pale-golden hue under sunlight. It was used by such ancient Greek sculptors as Phidias and Praxiteles.<sup>32</sup> The metal the three wedges protruding from the bottom side of the base are made of was sampled. Part of the metal sawdust was analyzed and it was established that the metal in question was leaded brass of excellent quality.<sup>33</sup> It is very similar to modern C37710 alloys, very resistant to corrosion and suitable for cutting, forging, pressing and thermoforming. According to the interpretation of the results, it is obtained by pressing and hammering and is used for the making of precision-made pressed steel sections and as watchmaker's brass (Fig. 7). Based on the obtained results, it was concluded (among other things) that the presence of lead in the brass affected the radiographic examination and the radiograms of two hollows. Gamma rays get slightly diffracted at the connection of two different materials. They can penetrate very dense materials, but the depth of penetration depends on energy and the features of the matter they are passing through until they

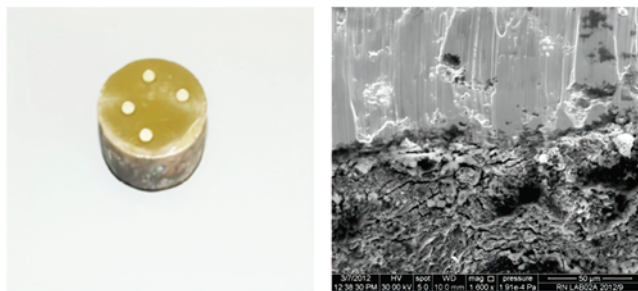


**Slika 6. Mikroskopska snimka mramora pod uvećanjem 1280 × 1024**

Figure 6. Microscopic image of marble under magnification of 1280 × 1024

izradio / made by: I. Donelli

30 M. Suić wrote in his research that the sculptures were made of Carrara marble (*marmo lunense*), quarried in the northwestern area of Tuscany at the borders with and Liguria and Emilia (Alpi Apuane).  
31 In ancient Greece, this quarry was known as *Vrilissos* ili *Vrilittos* (named as a nearby town). Today, this quarry is protected; it is only used for conservation and restoration of the Acropolis.  
32 J. Farndon, S. Parker 2009, 129.  
33 The metal analysis was carried out by the Materials Research Center of Istrian County (METRIS), Zagrebačka 30, Pula.



**Slika 7. Uzorak mesinga i SEM fotografija uzorka pri uvećanju P = 800 ×**

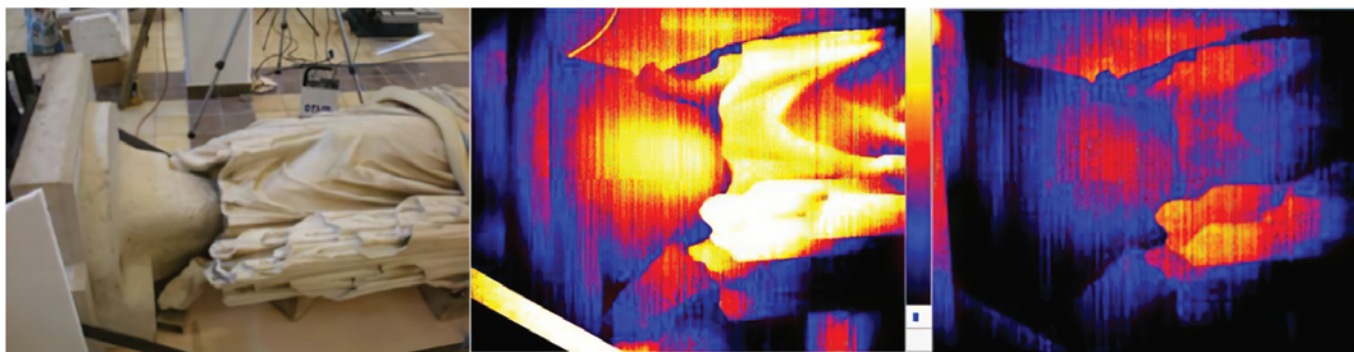
Figure 7. Brass sample and SEM photograph of sample under 800× magnification

izradio/ made by: Metris, Centar za istraživanje metala Istarske županije / Materials Research Center of Istrian County – METRIS

izvještaja radiograma ZRKM-a iz 1991. godine, može se zaključiti da je (između ostalog) i prisutnost olova u mesingu utjecala na radiografsko ispitivanje te na dobiveni prikaz dviju praznina. Naime, gama-zrake podliježu malom stupnju difrakcije na spoju dvaju različitih materijala i prolaze kroz vrlo guste materijale, ali im dubina penetracije ovisi o energiji i svojstvima materije kroz koju prolaze dok ne naiđu na atomsku česticu.<sup>34</sup> Drugim riječima, metali s velikom gustoćom poput olova (11,35 g/cm<sup>3</sup>) mogu zaustaviti, tj. apsorbirati gama-zrake. Rezultat se prikazuje radiogramom na kojem se slika formira s pomoću raznih sivih tonova. Stupanj zacrnjenja filma ovisi o gustoći materije u određenoj točki pa će tako područja s manjom gustoćom biti tamnija, a područja s većom gustoćom ili u kojima nema materijala (šupljine, pukotine) bit će potpuno crna. Također, radiografsko snimanje izvršeno je iz nekoliko kutova, ali ne i s nekoliko visina. Dimenzije filma

reach an atomic particle.<sup>34</sup> In other words, high-density metals such as lead (11.35 g/cm<sup>3</sup>) can stop (absorb) gamma rays. The result can be seen on a radiogram formed by a range of gray shades. The level of opacity of the film depends on the density of the matter at a certain point; for example, the areas of a lower density will be darker and the ones with a higher density (or the ones with no material, such as hollows and cracks) will be totally black. Also, radiographic screening was made from several angles but not from several heights. As the size of the radiography film used was 40×30 cm, this is the “height” of the recorded hollow. All things considered, radiography would again be the first choice if the height of the metal were to be detected. However, limitations such as the sculpture’s size and weight and its complicated transport prevented this method of examination.<sup>35</sup>

After considering all the available non-destructive methods, thermography was selected. It has a long history of use in conservation and restoration research and work. Thermography is best defined as a technique that registers IC radiation, which is different for every object with a temperature above absolute zero. Today, thermography is more than just registering temperature; it is a technique using sophisticated equipment and software for diagnosing the condition of objects based on their IC radiation. Hoping that this non-destructive method of measuring temperature and its distribution across an object’s surface would locate the depth of the brass wedges, we had to heat them up. As metal heats up much faster than stone, the thermographic camera would record different temperatures.<sup>36</sup> We first heated them with an electric drier and then with a propane-butane burner. However, as they are deeply inserted in the stone, the metal wedges could not be located with thermography and a medium-wave cooled thermographic camera (with thermal sensitivity 0.02 °C) (Fig. 8).<sup>37</sup>



**Slika 8. Snimke termografske kamere prije i nakon petominutnog grijanja propan-butane plamenikom**

Figure 8. Thermographic images before and after 5-minute heating with propane-butane burner

izradio/ made by: L. Krstulović Opara

34 Upravo zbog svojstva da na spoju dva različita materijala imaju mali stupanj difrakcije (a to se odnosi i na slučaj kad je spoj od istog materijala), ova je metoda veoma pogodna za ispitivanje višedijelnih komponenti.

34 It is this feature of a slight diffraction at the connection of two different materials (and also at the connection of two pieces of the same material) that makes this method very suitable for testing of multipart components.

35 Today, the world’s best radiation methods for cultural monuments are used in Laboratoire ARC-Nuclear, CEA, Grenoble (France) and Museum of Central Bohemia in Roztoky (Czech Republic).

36 On thermographic images they are designated with different colors.

37 The thermographic measurements were carried out by PhD Lovre Krstulović Opara from the Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture of the University of Split.



Slika 9. Sondiranje mesinganih trnova bušenjem

Figure 9. Probing brass wedges by drilling

foto / photo: H. Ugrina

korištenog za radiografski zapis su  $40 \times 30$  cm, pa je tolika „visina praznine“ i na radiografskom zapisu. Uzimajući sve u obzir, ponovno bi radiografija bila prvi izbor za detekciju visine metala, međutim ograničenja poput dimenzija i težine kipa te kompliciran transport spriječila su taj način ispitivanja.<sup>35</sup>

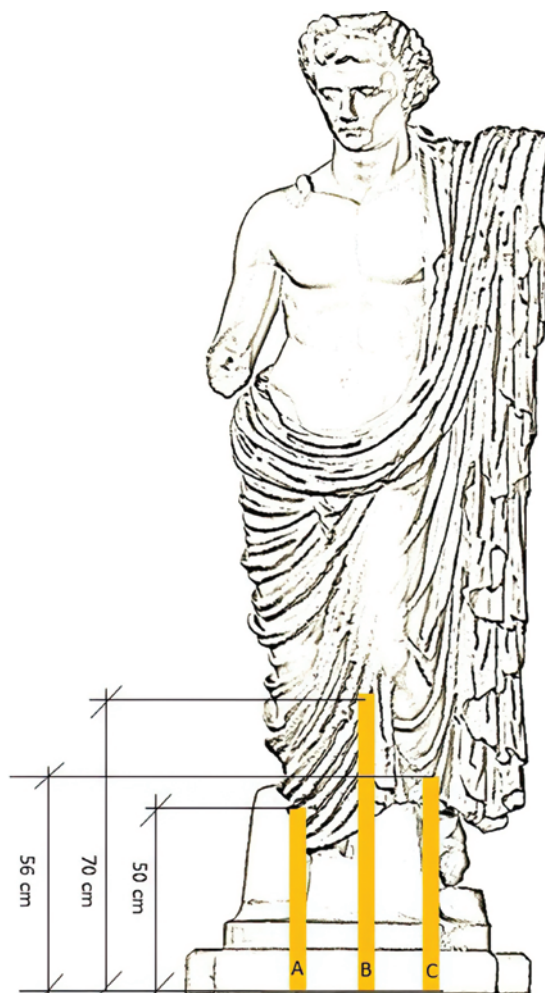
Nakon pretraživanja dostupnih nedestruktivnih metoda izabrana je termografija koja se odnedavno primjenjuje u konzervatorsko-restauratorskim istražnim radovima. Termografija bi se najjednostavnije mogla definirati kao tehnika s pomoću koje se registrira IC zračenje, koje je karakteristično za svaki objekt, čija je temperatura iznad apsolutne nule. Danas termografija nije samo registriranje temperature, to je tehnika koja koristi sofisticiranu opremu i softver za dijagnostiku stanja objekata na bazi njihova IC zračenja. U nadi da će ta nedestruktivna metoda mjerenja temperature i njezine raspodjele po površini objekta locirati dubinu mesinganih trnova, morali smo ih zagrijati. Metal se mnogo brže zagrijava od kamena pa bi tako termografska kamera snimila različite temperature.<sup>36</sup> Prvo su grijani električnom sušilicom, a potom propan-butan plamenikom. Međutim, termografijom i srednjovalnom hladjenom termografskom kamerom osjetljivosti  $0,02$  °C nije bilo moguće locirati metalne trnove koji se nalaze duboko u kamenu (Sl. 8).<sup>37</sup>

Nažalost, termografske snimke nisu polučile zadovoljavajuće rezultate pa je jedini preostali način da se utvrdi dubina mesinganih trnova bilo sondiranje, tj. njihovo bušenje kroz centar, po dužini, prateći dubinu endoskopskom kamerom (Sl. 9). Bušilo se svrdlom promjera 8 mm, što je minimalan promjer za endoskopsku kameru. Ta „improvizirajuća“ metoda zahtijevala je izrazitu preciznost jer je cilj

35 Danas najbolje svjetske radijacijske metode za kulturnu baštinu ima Laboratoire ARC-Nucléart, CEA, Grenoble, Francuska i Muzej Središnje Češke, Roztoky.

36 Na termografskim snimkama one su označene različitim bojama.

37 Termografsko mjerenje izvršio je dr. sc. Lovre Krstulović Opara s Fakulteta elektrotehnike, strojarstva i brodogradnje Sveučilišta u Splitu.



Slika 10. Prikaz visina mesinganih trnova

Figure 10. Heights of brass wedges

izradila / made by: H. Ugrina

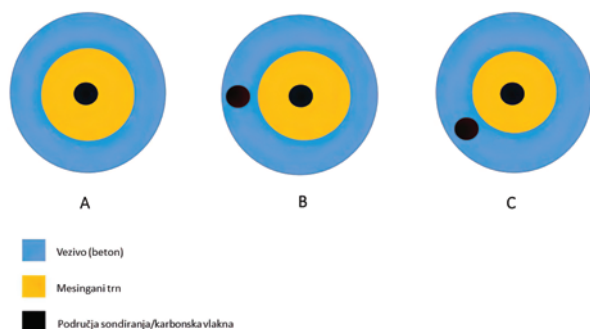
Unfortunately, as the thermographic images failed to yield satisfactory results, the only way of establishing the depth of the brass wedges was to probe them by drilling them along their length, through their central section, and determine the depth with an endoscopic camera (Fig. 9). An 8 mm drill was used, which is a minimum diameter for an endoscopic camera. This “improvised” method required extreme precision because the brass wedge had to be drilled along its length without going off course into the marble. A guide for the drill was designed to prevent it from deviating from its course. At first, drills available in the market were used, but then longer drills were made in a workshop by welding an additional length to the commercially available drills. It was the only solution because no metal dills of such length are available in the market. The depth measured for the first wedge (probe A) was 50 cm. The endoscopic camera showed the depth of 70 cm for the second wedge (probe B) and 56 cm for the third wedge (probe C) (Fig. 10). After these results, a structural analysis confirmed that these three brass wedges were more than enough to ensure the statue’s unsupported standing – in



Slika 11. Postavljanje šipki od karbonskih vlakana

Figure 11. Inserting carbon-fiber rods

izradila / made by: H. Ugrina



A

B

C

■ Veživo (beton)

■ Mesingani trn

■ Područja sondiranja/karbonska vlakna

Slika 12. Presjek mesinganih trnova (sondi) A, B i C

Figure 12. Cross-sections of brass wedges (probes) A, B and C

foto / photo: H. Ugrina

bio bušiti ravno do kraja mesinganog trna i ne skrenuti s pravca u mramor. Konstruirana je vodilica za bušilicu kako ne bi došlo do skretanja s pravca zbog devijacija svrdla. U početku su korištena svrdla proizvođača, a potom su u radionici izrađena duža, navarivanjem na tvorničko svrdlo. To je bilo jedino rješenje jer na tržištu ne postoje tako duga svrdla za metal. Kod prvog trna (sonda A) izmjerena dubina iznosila je 50 cm. Endoskopska kamera kod drugog trna (sonda B) pokazala je dubinu od 70 cm, a kod trećeg (sonda C) 56 cm (Sl. 10). Nakon dobivenih rezultata statički proračun potvrdio je da su ta tri mesingana trna i više nego dovoljna da bi kip stajao samostalno u prostoru, odnosno da je veza između kamene baze dodane u prethodnoj restauraciji i mramornog kipa čvrsta.<sup>38</sup> U kanale koji su nastali sondiranjem unutar mesinganih trnova postavljene su šipke od karbonskih vlakana<sup>39</sup> (promjera 8 mm), dodatno učvršćene dvokomponentnim epoksidnim ljepilom trgovačkog naziva *Novapox UV* (Sl. 11–12).

other words, that the connection between the stone base added as part of an earlier restoration and the marble statue was firm enough.<sup>38</sup> Carbon-fiber rods were inserted into the 8mm-diameter channels created by probing the brass wedges.<sup>39</sup> These rods were additionally fixed using the two-component epoxy glue of the brand name *Novapox UV* (Figs. 11–12).

## CONSERVATION AND RESTORATION WORK

After the structural analysis had been confirmed and after the carbon-fiber rods had been inserted, the statue was erected with a chain hoisting device and cleaning of the layers of dirt from its surface began. It should be noted that the cleaning began only after a detailed overview of the sculpture that revealed no traces of original polychromy.<sup>40</sup> Marble is a porous material, so cleaning it with tap water and sponges or similar tools would be inadequate, because water would penetrate the marble through its pores, stay there and damage it after a while. However, pressurized water vapor has turned out to be very efficient for this purpose. This method is practical because it allows a number of combinations: for example, pressure, water flow and water temperature values can be changed to achieve different combinations. By increasing water temperature, the efficiency of dissolving the surface dirt is increased. The pressure will depend on the diameter of

38 Statički proračun izradio je dipl. ing. Boženko Jelić iz tvrtke „Jelić inženjering“.

39 Općenito su za ugljična vlakna karakteristična sljedeća svojstva: velika čvrstoća, elastičnost, izvrsna otpornost na toplinu, veoma slaba gorivost, kemijska inertnost, nekoroziivnost, otpornost na kiseline, lužine i organska otapala, dobra toplinska i električna vodljivost, nemagnetičnost, vrlo mala apsorpcija rendgenskih zraka, neupijanje vlage i izvrsna biokompatibilnost.

38 The structural analysis was carried out by Boženko Jelić, B. Sc., from Jelić engineering company.

39 Generally, carbon fibers have the following features: high strength, elasticity, excellent high-temperature resistance, very low combustibility, chemical inertness, non-corrosiveness, resistance to acids, bases and organic solvents, good thermal and electrical conductivity, non-magnetism, very low absorption of X-rays, non-absorption of moisture and excellent biocompatibility.

40 It is known today that the statues were once painted. However, since they were found more than 250 years ago and were repeatedly moved and left in the open for years – and probably inadequately cleaned – it is not very likely that the paint would remain on the marble's surface. P. Liverani 2004, 235–242.



**Slika 13. Čišćenje vodenom parom pod pritiskom**

Figure 13. Cleaning with pressurized water vapor

foto / photo: H. Ugrina

### KONZERVATORSKO-RESTAURATORSKI RADOVI

Nakon potvrđenog statičkog proračuna i postavljanja šipki od karbonskih vlakana, kip je s pomoću lančane dizalice uspravljen i započelo je čišćenje površinskih naslaga nečistoća. Ovdje napominjemo da je čišćenje započeto tek nakon detaljnog pregleda skulpture tijekom kojeg nisu ustanovljeni ostatci izvorne polikromije.<sup>40</sup> Mramor je porozan materijal, stoga čišćenje vodovodnom vodom spužvama ili sličnim alatom ne bi bilo odgovarajuće jer će se voda upiti u pore, zadržati tamo i sigurno s vremenom napraviti štetu. Čišćenje kamenih površina vodenom parom pod tlakom dosad se pokazalo vrlo uspješnim. Ta metoda ima mnoge mogućnosti kombiniranja, npr. kombiniranje vrijednosti tlaka, protoka vode i njezine temperature. Povišenjem temperature vode pospješuje se otapanje površinske nečistoće, a

the nozzle being used. As for the water as a medium, the so-called soft water is recommended because of its lower scale content.<sup>41</sup> In this case, distilled water and a low-pressure procedure (2–4 bars) were used (Fig. 13). Portland cement was mechanically removed from the connections with the base. Laser was used for the parts of the drapery covered with black crust.<sup>42</sup> Laser is otherwise used for removal of black deposits from stone in such way that the black crust on the stone absorbs the beam of light rays, thus creating on the surface mechanical microresonance that separates the black crust without heating the stone. The advantages of laser cleaning are: lack of contact, direct and very accurate control, selectivity and self-restriction, local action, environmentally-friendly procedure and complementarity.<sup>43</sup> Just like in the case of vapor cleaner, the use of laser also enables combinations, as required, like beam frequency and intensity, depending on the type and thickness of the crust on the stone. Spraying water over the stone surface facilitates cleaning because it creates a bigger contrast between the shades of colors, thus making it easier for the laser to recognize the dirt (Fig. 14).<sup>44</sup>

The thicker calcite deposits on the lower part of the drapery were removed by using jets of an abrasive agent. When cleaning cultural monuments by using abrasive agents, the basic requirement is that the abrasive agent be inert, so that it only has physical effects. The dry abrasive cleaning device and 50 µm marble powder were used. The minor reconstructions, such as the circular recess on the limestone base and the crack on the left foot, were carried out using artificial stone – the commercial acrylic-emulsion mixture with the brand name *MarGrip*. After drying, the surface was dressed using carving tools and its hew was harmonized with the original (Figs. 15–16).



**Slika 14. Čišćenje laserom**

Figure 14.

Laser cleaning

foto / photo: D. Maršić

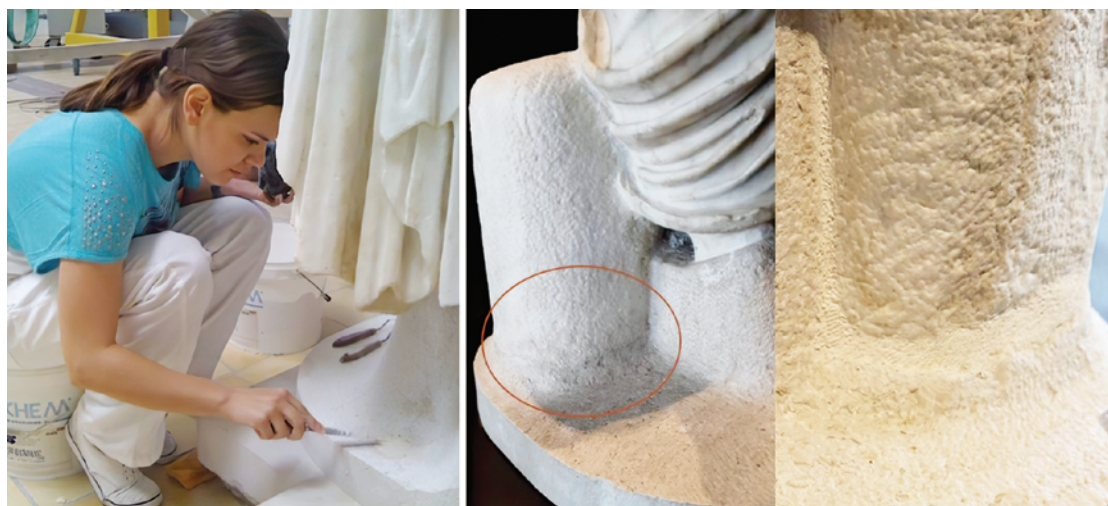
40 Iako danas znamo da su kipovi bili bojeni, s obzirom na to da su pronađeni prije više od 250 godina, nekoliko puta premješteni i ostavljani godinama na otvorenom prostoru izloženi atmosferilijama, a uz to vjerojatno i neadekvatno čišćeni, teško da bi se boja uspjela zadržati na površini mramora. P. Liverani 2004, 235–242.

41 Demineralized water is the best for the purpose because it does not leave scale deposits inside the condensation boiler of the device.

42 It was the commercial laser with the brand name *Michelangelo* (made by Italian manufacturer Quanta system), type Nd:YAG with 1,064 nm wavelength.

43 G. Nikšić 2004, 44.

44 I. Donelli 2005, 3.



Slika 15. Izrada  
rekonstrukcija u  
umjetnom kamenu  
Figure 15.  
Reconstructions with  
artificial stone

foto / photo: S. Bizjak, H.  
Ugrina

i tlak će ovisiti o promjeru sapnice koja se koristi. Što se tiče vode kao medija, poželjna je tzv. meka voda, odnosno voda s manjim sadržajem kamenca.<sup>41</sup> U ovom slučaju korištena je destilirana voda i niskotlačni postupak u vrijednostima 2 – 4 bara (Sl. 13). Na spojevima s bazom mehanički je uklonjen portland cement. Na dijelovima draperije onečišćenim crnom korom korišten je laser.<sup>42</sup> Inače, laser se upotrebljava kod uklanjanja crnih naslaga s kamena snopom svjetlosnih zraka koje crna kora kamena apsorbira i pritom na površini kamena stvara mehaničku mikrozonanciju koja odvaja crnu koru, a da se kamen ne zagrijava. Prednosti čišćenja laserom su: beskontaktnost, izravna i precizna kontrola, selektivnost-samoograničenje, lokalnost, ekološki čist postupak te komplementarnost.<sup>43</sup> Kao i kod parnog čistača, i na laseru se mogu kombinirati mogućnosti ovisno o potrebi, i to frekvencija i jačina snopa, a ovisno o vrsti i debljini kore na kamenu. Čišćenje se pospješuje raspršivanjem vode na kamenu površinu jer se tako stvara veći kontrast između to-nova boja pa laser lakše prepoznaje nečistoću (Sl. 14).<sup>44</sup>

Deblje kalcitne naslage na nižim dijelovima draperije uklonjene su mlaznim čišćenjem abrazivnim sredstvom. Osnovni je zahtjev kod upotrebe abrazivnog čišćenja kulturne baštine da abraziv bude od inertnog materijala kako bi njegovo djelovanje bilo isključivo fizikalne naravi. Korišten je uređaj za suho abrazivno čišćenje te mramorni prah finoće 50 µm. Manje rekonstrukcije poput udubine pravilnog okruglog oblika u vapnenačkoj bazi i pukotine u predjelu lijeve noge izvedene su umjetnim kamenom, tj. akrilno-emulzijskom smjesom trgovačkog naziva *MarGrip*. Nakon sušenja površina je obrađena klesarskim alatima te tonski usklađena imitirajući originalnu (Sl. 15–16).

## ERECTING THE STATUE IN THE NEW ROMAN ANTIQUITY DISPLAY OF ARCHAEOLOGICAL MUSEUM ZADAR

After the conservation and restoration work, the statue had to be returned to the Museum's new Roman Antiquity display and erected there.<sup>45</sup> The Roman Antiquity collection found its new home on the Museum's first floor. Steel-structure partition walls divide this floor into numerous compartments, thus making the most of the low-ceiling space. Bringing in through the main entrance and up the stairs a statue weighing almost two tons was not possible. Exhibiting such large statues in the museum is a major physical challenge for the museum's spatial and structural integrity. The only possible solution was to lift the sculpture inside in a horizontal position through a widened first-floor window by means of a crane (Figs. 17–18).<sup>46</sup> Unfortunately, the group of imperial statues is not presented in an adequate context because the largest statue, whose head has not been preserved, is missing. Thus, the imperial statues of Tiberius, Augustus and an unknown emperor occupy most of the space, as a culmination of the Roman Antiquity collection. The statues can be observed from all sides (Fig. 19).

## CONCLUSION

Generally, the Roman province of Dalmatia abounded in varied sculptures. Then, just like today, the society of the antiquity cannot be imagined without decorative and figurative architecture, statues and reliefs. They reflected the grandeur of the empire and carried its civilizational, political and religious messages. In the centuries that followed, the fate of the Roman monuments in these parts depended on the peoples and cultures that kept arriving here. Thus, in Middle Ages, the Emperor Augustus' statue and the temple ended up buried together.

41 Najbolje je rabiti demineraliziranu vodu koja ne stvara kalcitne naslage unutar kondenzacijskog kotla uređaja.

42 Korišten je laser trgovačkog naziva *Michelangelo* (talijanske tvrtke Quanta system) tip Nd:YAG 1064 nm valne duljine.

43 G. Nikšić 2004, 44.

44 I. Donelli 2005, 3.

45 The author of the display is the museum advisor PhD Kornelija Appio Giunio. The architectural design is by architects Ivo Pedišić and Iva Letilović.

46 This and other sculptures from the Roman Antiquity collection were very skillfully lifted by crane operator Ante Boban.



**Slika 16. Unošenje kipa kroz demontirani prozor na prvi kat Arheološkog muzeja Zadar**

Figure 16. Lifting sculpture onto first floor of Archaeological Museum Zadar through widened window

izvor / source: Dokumentacijski odjel AMZd / Documentation Department of the AMZd; foto / photo: I. Čondić

## MONTAŽA U NOVI ANTIČKI POSTAV ARHEOLOŠKOG MUZEJA ZADAR

Završetak konzervatorsko-restauratorskih radova i vraćanje kipa podrazumijevalo je montažu u novi antički postav muzeja.<sup>45</sup> Novi prostor antičke zbirke smješten je na prvom katu, podijeljen je mnogobrojnim metalnim pregradama čelične strukture na manje cjeline i tako je zadani prostor niskog stropa maksimalno iskorišten. Stoga unošenje gotovo dvije tone teškog kipa kroz glavna vrata i uz stepenice nije bilo moguće. Izlaganje tako velikih kipova unutar muzeja predstavlja veliki fizički izazov za prostorni strukturni integritet. Jedino moguće rješenje bilo je unošenje skulpture u ležećem položaju s pomoću kranske dizalice kroz demontirani prozor na prvom katu (Sl. 17–18).<sup>46</sup> Nažalost, skupina carskih kipova nije prezentirana u kontekstu jer nedostaje najveći kip, čija glava nije sačuvana. Tako antički postav Arheološkog muzeja Zadar kulminira prezentacijom carskih kipova Tiberija, Augusta i nepoznatog cara koji zauzimaju većinu prostora i koji se mogu promatrati sa svih strana (Sl. 19).

## ZAKLJUČAK

Općenito je rimska provincija Dalmacija bila puna raznovrsne skulpture. Onda, a i danas, antičko društvo ne možemo zamisliti bez dekorativno-figurativne arhitekture, kipova i reljefa. Ona je opisivala veličinu carstva i nosila civilizacijsku, političku i religioznu poruku. Tijekom kasnijih stoljeća sudbina rimskih spomenika na našim prostorima ovisila je

45 Autorica postava muzejska je savjetnica dr. sc. Kornelija Appio Junio, arhitektonsko rješenje dali su arhitekti Ivo Pedišić i Iva Letilović.

46 Podizanje ove i ostalih iz skulptura iz postava kranskom dizalicom s izrazitom preciznošću odradio je Ante Boban.



**Slika 17. Postavljanje kipa u novi antički postav**

Figure 17. Erecting the statue in new Roman Antiquity display

izvor / source: Dokumentacijski odjel AMZd / Documentation Department of the AMZd; foto / photo: I. Čondić



**Slika 18. Kip cara Augusta nakon izvedenih konzervatorsko-restauratorskih radova**

Figure 18. Emperor Augustus' statue after conservation and restoration work

izvor / source: Dokumentacijski odjel AMZd / Documentation Department of the AMZd; foto / photo: I. Čondić



**Slika 19. Kip cara Augusta unutar novog antičkog postava Arheološkog muzeja Zadar nakon izvedenih konzervatorsko-restauratorskih radova**

**Figure 19. Emperor Augustus' statue in new Roman Antiquity display of Archaeological Museum Zadar after conservation and restoration work**

foto / photo: H. Ugrina

o kulturama koje su nadolazile s novodoseljenim narodima pa su tako kip cara Augusta i hram u srednjem vijeku zatrpani zajedno.

Njegovo otkriće nekoliko stoljeća nakon toga izazvalo je ponovno divljenje i isticanje moći te borbu za vlasništvo nad samom skulpturom pa se još uvijek na njoj mogu uočiti posljedice nestručnog rukovanja i transporta tijekom prošlosti. Kvaliteta mesinganih trnova i vapnenačke baze, postavljenih u Italiji početkom 20. stoljeća, dokaz su da su za obnovu kipa korišteni tada najbolji poznati materijali. Stručna valorizacija tog kulturnog dobra uočena je i u odlukama tima zaduženog za sanaciju 1992. godine. Međutim, tadašnji nezreli odnos i nedostatak interdisciplinarnosti na relaciji radiografija – restauracija rezultirali su donošenjem zaključka prije vizualnog pregleda kipa sa svih strana, tj. odozdo. S obzirom na tadašnju ratnu situaciju radovi nisu izvedeni pa kip biva nepravедno opasan zaštitnom skelom u Muzeju 20 godina.

Tijekom ovih konzervatorsko-restauratorskih radova i istraživanja kip cara Augusta analiziran je u okviru vremena u kojem je nastao, kulturnih sredina koje su ga okruživale i u kontekstu povijesnih događaja koji su ga nepravедno degradirali.

The statue's discovery several centuries later triggered admiration for it and the desire to manifest power by owning it. The consequences of unskilled handling and transport in the past can still be seen on it. The quality of the brass wedges and limestone base, installed in Italy in the early 20<sup>th</sup> century, indicates that the best materials known at the time were used for the statue's reconstruction. The expert valorization of this cultural monument can also be seen in the decisions of the rehabilitation team in 1992. However, as a result of the lack of a professional approach and an interdisciplinary approach that would bring together radiography and restoration, conclusions were made at the time without visually inspecting the statue from all sides, including the bottom side. As it was during the wartime, the stabilization work was not carried out and the statue was unnecessarily girdled with a protective metal scaffold in the Museum for the next 20 years.

During this conservation and restoration research and work, the Emperor Augustus' statue was analyzed in the context of the period in which it had been made, the cultural environments that surrounded it and the historical events that unjustly degraded it.



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