**­**[title]Tiberius from Herculaneum:

Methods of Assembling a Monumental Bronze Portrait

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**[A-head]Abstract**

[abstract]

Between 2012 and 2013, the J. Paul Getty Museum collaborated with the Museo Archeologico Nazionale di Napoli to return the bronze portrait of Tiberius from Herculaneum for display. The project provided an opportunity for a full investigation into the statue’s eighteenth-century restorations and its ancient manufacture.

The restoration techniques proved typical of the Royal Foundry at Portici, as documented for other Herculaneum bronzes by Edilberto Formigli and Götz Lahusen. Rather less expected was the discovery that the monumental statue—erected in AD 37—had been assembled from a large number of individually cast pieces. This has valuable implications for our knowledge of Roman bronze-working, and in particular the techniques that were employed to simplify the production of a large, complex statue. The many drapery folds of the toga offered a way of subdividing the larger-than-life-size portrait into numerous smaller parts that could each be cast separately. The multiplicity of cast pieces not only made their molding easier but also allowed for smaller, safer pours of molten bronze, required less lead in the alloy, and demanded fewer chaplets. Once cast, the individual pieces were then joined with simple and economical tack welds, which were able to sustain the great weight of the statue.

**[A-head]Introduction**

[main text]

Building on a collaboration to conserve the bronze Apollo from Pompeii,

[[1]](#endnote-1) the J. Paul Getty Museum partnered with the Museo Archeologico Nazionale di Napoli between 2012 and 2013 to return the larger-than-life-size portrait of Emperor Tiberius (42 BC‒AD 37) from Herculaneum for display (**fig. 7.1**).[[2]](#endnote-2) The statue, which measured 2.4 meters (8 feet) in height, had been off view for some twenty years, owing to weaknesses in the legs and base. The opportunity to resolve these issues, and the generous support of our colleagues in Naples, allowed us to undertake a full study of the statue’s historical restorations and ancient manufacture.

**[A-head]Discovery and Ancient Context**

The portrait was discovered on August 30, 1741; three days later, an inscription believed to belong to it was found nearby.[[3]](#endnote-3) This would date the statue to AD 36 or 37, suggesting that the council dedicated it to Tiberius in the last year of his life or even posthumously. The portrait would then have stood for 42 years until the eruption of Vesuvius in 79.

Early publications indicate that the statue had been found in the Theater at Herculaneum.[[4]](#endnote-4) However, in recent decades, study of archival sources indicates that excavations were *not* underway there when the Tiberius was discovered. Rather, activity was focused on the area of the Porticus (the so-called Basilica), and excavation reports from this time refer to the discovery of two bronze female figures and one male, the latter most likely Tiberius. Tina Najbjerg has fully explored the arguments in favor of the statue’s location in the Porticus,[[5]](#endnote-5) and, proposing that this building was set up in the Claudian period, discusses its adornment with a series of imperial portraits that were added to and moved around during the three decades prior to the eruption of Vesuvius.[[6]](#endnote-6) The statue of Tiberius would thus have been part of a Julio-Claudian family group that was displayed in the niches along the east and west sides of the building. Nevertheless, a chronological puzzle remains, for, as noted, the inscription dates the portrait to 36 or 37, a decade earlier than the building of the Porticus. Najbjerg proposes that the statue could have served initially as a cult image in the nearby Collegio degli’Augustali; when Tiberius died, it would have been moved and set up in the Porticus.[[7]](#endnote-7)

**[A-head]Eighteenth-Century Restoration**

The earliest illustration of the portrait, dating to 1771,[[8]](#endnote-8) shows it fully intact (**fig. 7.2.**). However, discoveries from the Vesuvian sites often underwent extensive intervention before they were put on display, and such work was rarely mentioned in contemporary publications. In the case of the Tiberius, we have archival evidence for its restoration. Camillo Paderni reported on June 14, 1760—almost nineteen years after the portrait had been discovered—that its reassembly had been completed, and all that remained was to provide a patina.[[9]](#endnote-9) A substantial body of research has accumulated regarding the practices of the Royal Foundry at Portici, most substantially by Götz Lahusen and Edilberto Formigli.[[10]](#endnote-10) Their observations regarding the restoration of the Tiberius are, however, relatively brief, since their access to the statue was limited. Nonetheless our findings match with what has been observed for the other large Herculaneum bronzes (**fig. 7.3**).Thus, the Tiberius was aggressively cleaned with rasps, files, and possibly acids. The left hand, which had been separated on discovery, was reattached, and other missing sections were repaired by being cast *in situ* and pinned for added security. The right arm is also a restoration, but does not appear to belong to the ancient statue. The portrait was then given a patina, which was achieved by the application of oxidizing solutions with heat. Finally, small fills were executed using a dark putty containing corrosion products that had been removed from the statue’s surface during cleaning.

**[A-head]Ancient Manufacture**

The aggressive and invasive methods used by the Royal Foundry to clean and restore the Tiberius posed substantial challenges to our attempts to understand its ancient manufacture. Nonetheless, through a combination of close visual observation, technical analysis, and some sampling, we have been able to glean evidence for the ways in which the portrait was conceived and assembled. At the outset, we expected to find that the statue was composed of a number of parts. This was standard practice and has been well-documented for many other large ancient bronzes. Unanticipated, however, was the quantity of individual pieces. In total, we identified 62 separate bronze parts (**fig. 7a‒b**). In order to fully appreciate the reasons for this, we will present a step-by-step reconstruction of the statue’s manufacture, highlighting its division into sections and subsections, and the substantial forethought that went into the early stages of production in order to facilitate the later phases.

**[A-head]Creation and Assembly of the Wax Model**

In order to produce the statue, the sculptors would have fashioned a wax working-model. This was likely achieved with pre-existing molds for a number of the anatomical sections, such as the hands, arms, and the portrait head, which is entirely open in the back where it is covered by the drapery. Residual burial encrustations and the eighteenth-century restorations make it difficult to ascertain how these various wax sections would have been formed. There are no seams to indicate that wax slabs had been applied to the interior of the molds, and given the bronze’s regular thickness and the even modeling between its inner and outer surfaces, we surmise instead that the molds would have been brushed with molten wax. In the case of the head, liquefied wax may have been slurried within the mold, for there is a thickening of the metal at the nose and chin, where pools are likely to have formed.

As for the drapery, the consistent thickness of the metal suggests that molds were used in the production of the wax working-model. However, the complex patterns of the folds could not have been pulled directly from molds. Indeed, their deep undercuts would be impossible to obtain without substantially distorting or even destroying the solidified wax. We propose, therefore, that areas of drapery started out being relatively schematic in the wax-working stage, and that they were then refined to create the arrangement of individual folds. Some of this work might have been done *in situ*, but in other cases wax sections could have been excised, worked up to create high-relief folds, and then reincorporated back into the working model. Some sections could have been subdivided further into pieces, in order to produce the assemblage of naturalistic drapery fold-by-fold. To get a sense of the degree of elaboration that this process allowed, compare the flat and schematic rendering of fabric on the back (see fig. 7.4b)—evidently not substantially manipulated during the wax-working phase—with the complex pattern of folds and creases on the front. In discussing the drapery worn by the bronze portrait of Antonia Minor from Herculaneum, Lahusen and Formigli suggested that actual textile was used in its creation.[[11]](#endnote-11) This is also a possibility for the Tiberius, but cannot be proven. What does seem likely, however, is that some sections of the statue’s drapery were created entirely from scratch—in other words, using the *direct* lost-wax technique. Seen from below, the undercuts between the folds that hang from the left hand are not as thin or uniform in thickness as other sections of the drapery. Furthermore, the spaces between each fold, which should be empty, are partially filled. This contrasts with other areas of drapery on the statue, and the most plausible means of achieving this would have been by shaping this section directly by hand. Therefore, although the production of the Tiberius must have involved numerous molds—what would conventionally be called an *indirect* lost-wax casting—it is better to understand its creation as a composite of indirect and direct techniques, as need required.

**[A-head]Preparation for Casting**

A further and probably intentional consequence of this approach was to allow for the simplification of the casting process and, thereafter, the reassembly of the different bronze elements. To divide the statue into 62 pieces entailed more than 100 strategic incisions in the wax working-model, mostly along the deep recesses within the drapery folds. Such an operation was not undertaken haphazardly, but rather with substantial planning, and the advantages were multiple.

Having created separate pieces during the elaboration of the wax-working model, the bronze-workers could take advantage of these subdivisions when it came to cutting the model into individual parts for casting. Furthermore, by dividing the figure so extensively, the founders could work with pieces that were manageable in size and thus easy to handle. Working with smaller sections also meant that a smaller firing pit could be employed, permitting an economical use of both materials and fuel. Most importantly, the multiple subdivisions of the wax working-model not only produced smaller shapes, but simpler ones, which reduced the risk of casting flaws. This can be demonstrated with the drapery on the front of the statue. In cross section, the folds of the toga are highly complex three-dimensional forms (**fig. 7.5a**). These undulations and curves would have been troublesome to cast. By subdividing such sections into numerous individual components (**fig. 7.5b)**, the founders could work instead with a series of curved sheets or “half-open” shapes. These would have been easier to prepare for casting, for there was no need to create an interior core of refractive material or an external vestiture. Rather, the open forms could simply be enclosed in refractive material (**fig. 7.5c)**. Though the subdivision of the figure into many pieces and their separate casting might have been more labor-intensive in the short term, it was strategic in the long term, for it increased the likelihood that the cast sections would have been well-made.

A surprising feature of the statue’s production can also be explained in this context. During the study of the Tiberius, we identified just six chaplets. At first, this small number seemed remarkable, especially given the statue’s scale, but it can be understood as an additional benefit of dividing the sculpture into numerous “simple” forms. Typically, chaplets are needed in order to prevent slippage between the interior core and the external vestiture during casting. In the case of the Tiberius, because the simple forms were *encased* in refractive material, the likelihood of any movement was greatly reduced. Thus chaplets were rendered largely superfluous.

The founders not only prepared the wax model for casting with great care; it also appears that they sought to perfect the quality of the bronze that they used. The alloy is very low in lead at 89.97 percent copper, 9.36 percent tin, and just 0.39 percent lead. This seems to have been deliberate. Adding lead to the alloy makes it easier to work, providing increased fluidity that is particularly helpful when casting large pieces of bronze. The fact that lead was *not* added to the alloy used for the Tiberius could be related to the division of the statue into numerous pieces. As noted above, these parts would have been of manageable size and shape, with no need for the addition of lead to guarantee a successful pour.[[12]](#endnote-12)

**[A-head]Assembly of the Bronze Figure**

Most of the sixty-two constituent pieces are for the front of the figure; the rear, which presumably was never intended to be visible and is much more schematically rendered, is made up of just a dozen parts (see figs 7.4a‒b). Once all of the metal pieces were cast, and sprues and vents removed, the final assembly of the statue could begin. All evidence here points to both efficiency and pragmatism: there are numerous open seams, and just a small number of joins.

In its finished state, the Tiberius weighs around 454 kilograms (1000 lbs.), so how and where the joins were made would have been critical for the portrait’s structural stability. Rather than laboriously welding the statue piece-by-piece, the founders joined most of the parts together at just ten “zones” of connection. These are visible (**fig. 7.6**) in the X-radiographs as areas of greater density, the bronze being thicker on account of the fusion welds. Notably, the alloy used for these joins was of a much higher lead content (15.17%) than that used for the parts of the statue. This must have been intentional, as adding lead to the alloy would have allowed for a lower melting point and improved the flow of the molten metal.

In studying the X-ray images and the locations of these points of connection, we conclude that the sixty-two pieces of the statue were largely assembled in sections (marked here in yellow)(**fig. 7.7**), as many of the joins occur at points where the drapery folds meet. Thus, individual pieces would have been placed side-by-side and then fusion-welded only where they converge. There was no need to close each and every seam, and many were instead left open (**fig. 7.8**). Because of the careful preparation of the wax working-model, these open seams are all but invisible today, lying deep within the folds of the drapery. This economical method of joining was employed not only for the complex folds of drapery, but also for the body parts. Thus the head is attached at just four points: two where the neck contacts the tunic, and at another two where the mantle meets the crown.

**[A-head]Surface Treatment**

Once the statue was fully assembled, any defects on the surface could be rectified. A number of post-casting repairs, such as cold patches, are visible, but they are relatively few, indicating that the casting was successful. As a final step, the surface of the statue may also have been treated, although the eighteenth-century cleaning severely compromises our understanding of the bronze’s ancient appearance. In studying one of the deepest recesses of drapery, however, we did encounter a smooth black surface. Under high magnification, this showed very fine parallel lines that are shallower and more numerous than those created by the tools used to clean the statue in the eighteenth century. These lines could indicate that a pumice or another fine abrasive application was used to finish the bronze in antiquity. The black color provides evidence for copper sulfides, potentially chalcocite (Cu2S). It may be the result of natural corrosion phenomena typical in the volcanic soil of the Bay of Naples, or it may indicate the application of sulfuric vapors or liquids to color the surface. If so, the portrait would have been a lustrous dark gray or black.[[13]](#endnote-13)

**[A-head]Conclusion**

The techniques used to produce the portrait of Tiberius, from its conception in wax to its translation and reassembly in bronze, highlight the Roman bronze-workers’ ingenuity and pragmatism in achieving a naturalistic sculptural composition, while at the same time increasing the probability of a successful casting. Most significant in this regard is the discovery that the statue was composed of such a large number of parts. Comparison with other large bronzes—most obviously those from Herculaneum—suggest that the Tiberius is exceptional. By comparison, Lahusen and Formigli distinguished 22 parts for the Livia, 19 for the Antonia Minor, and 15 for one of the Agrippina Minor statues.[[14]](#endnote-14) Other large-scale, heavily draped bronzes are scarce, but around 26 separate parts have been documented for the Victoria of Brescia,[[15]](#endnote-15) and at least 29 for the Marcus Aurelius in Cleveland.[[16]](#endnote-16) In sum, therefore, the 62 parts used to create the Tiberius are roughly double what might be expected. The counts for the other statues just mentioned could prove to be underestimates. How else might we explain the quantity of pieces?

Even though many of the other large Herculaneum bronzes are imperial portraits, Najbjerg has proposed that the Tiberius was initially conceived of in isolation.[[17]](#endnote-17) This could account for its complexity: the status of the commission may have warranted a more advanced level of production. More superficially, the richness of the drapery could be the reason for the quantity of pieces; simply put, the portrait of Tiberius is a more elaborate composition than the other large bronzes cited above. Or perhaps equating sixty-two parts with “complexity” is to miss the point. For though it involved substantial forethought and labor, separating the wax working-model into so many pieces increased the likelihood that the finished product would have been a success. Firstly, casting the pieces would have been easier, as they would have been smaller and simpler to handle, and the risk of flaws reduced. Secondly, because the subdivisions of the wax working-model had been carefully planned, the bronze-workers could assemble the cast pieces in sections, using just a few focused points for fusion welding. Finally, because many of the divisions between the parts run along recesses of the drapery folds, their open seams could be hidden. So while sixty-two parts may at first betoken a complex production process, this is better understood as a means of guaranteeing a successful outcome: multiplicity translates into simplicity. In this light, our Tiberius of many parts offers a valuable lesson in Roman risk-reduction.

[A-head] Acknowledgments

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1. See most recently Risser and Saunders 2015. [↑](#endnote-ref-1)
2. Museo Archeologico Nazionale di Napoli, inv. 5615; Lahusen and Formigli 2007, 40–42 with bibliography, to which add Boschung 2002, 120, no. 42.8 and Najbjerg 1997, 235–36 (S13). For more on the project, see the blog posts: <http://blogs.getty.edu/iris/a-roman-emperor-sojourns-at-the-getty-villa/> ;<http://blogs.getty.edu/iris/rediscovering-tiberius/>; <http://blogs.getty.edu/iris/has-history-got-roman-emperor-tiberius-all-wrong/> [↑](#endnote-ref-2)
3. *CIL* X 1414. Bardet’s excavation report (quoted in Panutti 1983, 210) testifies to the association, but the authors of *Antichità* 1771 rejected any connection between the portrait and the inscription (312, n. 6). Given the inscription’s substantial width, Boschung 2002, 123, n. 691, has also sought to disassociate the two. [↑](#endnote-ref-3)
4. *Antichità* 1771, 311–13. In rejecting the sculpture’s connection with the inscription, the authors declared the portrait to be that of Claudius Drusus Nero. When it was first unearthed, it was initially identified as that of a woman (Pannuti 1983, 210). [↑](#endnote-ref-4)
5. Najbjerg 1997, 158–63. Allroggen-Bedel 1974, 107 n. 87, and Guadagno 1981, 138, were the first to publish doubts that the Tiberius was found in the Theater. Lahusen and Formigli 2007, 142–51 discuss these concerns, but ultimately remain in favor of the Theater as the findspot. Parslow 1995, 39; Pagano 1996, 242; and Boschung 2002, 120, accept the Porticus as the findspot. [↑](#endnote-ref-5)
6. See also Najbjerg 2002. [↑](#endnote-ref-6)
7. Najbjerg 1997, 201–203. [↑](#endnote-ref-7)
8. *Antichità* 1771, pl. 80. [↑](#endnote-ref-8)
9. “. . . Intorno alli ristauri delli antichi metalli in tutto oggi deve essere compita la statua dell’omo velato, non rimarra altro nella settimana ventura di dargli la patena, cioè al novo, et accordarla intiera.te, qual fatica sara di un omo, e li altri daranno principio a quella della Donna, la quale e in moltissmi pezzi…” (quoted in Scatozza Höricht 1982, 524–25). [↑](#endnote-ref-9)
10. Lahusen and Formigli 2001; see also Mattusch and Lie 2005, 335–37; Represa Fernandez 1988, 21–25; Scatozza Höricht 1982; Caianiello 1998; and Prisco 2008. [↑](#endnote-ref-10)
11. Lahusen and Formigli 2007, 43. [↑](#endnote-ref-11)
12. Lahusen and Formigli 2007, 167, provide comparable compositions for a number of other figures, such as the Augustus (MANN inv. 5595) and the Antonia Minor (MANN inv. 5599). These too are composed of numerous pieces—albeit not as many as the Tiberius—and we may justifiably see in their low lead content a sign of the bronze-workers’ expertise and familiarity with their medium. [↑](#endnote-ref-12)
13. It is plausible that the low lead content of the alloy could have facilitated the process of mercury gilding. However, due in large part to the statue’s treatment after discovery, there is no chemical or physical evidence for this. [↑](#endnote-ref-13)
14. MANN inv. 5589, 5599, 5609; Lahusen and Formigli 2007, 28, 43–44, and 53. [↑](#endnote-ref-14)
15. Brescia, Santa Giulia–Museo dell Città, inv. MR 369; Salcuni and Formigli 2011, 14. [↑](#endnote-ref-15)
16. Cleveland Museum of Art, inv. 1986.5; Christman 1987, 106. [↑](#endnote-ref-16)
17. Above, n. 7. [↑](#endnote-ref-17)