

Firing glazed wares in Byzantine kilns: Continuities and changes in the technology of glazed pottery production (11th-15th c.)



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ABSTRACT

The paper examines the continuities and changes in the firing technology applied from the 11th until the 15th century in the Byzantine glazed pottery production during the second firing that was necessary in order the lead-based glaze to be stabilized on the surface of the pre-fired biscuit-wares.

1. Introduction

The first efforts for the introduction of glaze in Byzantine pottery is attested within the late 5th, 6th and the early 7th centuries, as it is evidenced by finds from Philippi (Trivizadaki, 2008), Thasos (Blondé et al., 2003, pp. 773-774; Petridis, 2013, p. 16, 187, n. 2, Fig. 3), Samos (Gerousi, 1992-1993, 258, 266-267, fig. 7, tab. 50α.), Corinth (Hayes 1968, 1992, p. 13; Sanders, 2003a,b), as well as from Eleutherna (Poulou-Papadimitriou, 2001, pp. 239-240, 2004; Yangaki, 2004, 142-143) and Agia Galini in Crete (Vogt, 1991-1993, pp. 68, 72). However, the production of Middle Byzantine glazed wares seems to have its origins in the 7th to 8th century Constantinople and its less known first category of Constantinopolitan Glazed White Wares (Hayes, 1968, 1992, pp. 12-37; about GWW I see: pp. 15-18; Waksman et al., 2007a,b; Armstrong, 2018a, 2018b). These early Glazed White Wares (GWW I) were manufactured in Constantinople and, apart from being merchandized at the markets of the capital, were exported to the provinces of the empire, as indicated by the Glazed White Wares found at the 7th century Yassi Ada shipwreck (Bass, 1982, pp. 165-167, figs. 8-9, 8-11, n. PI-P4.), as well as in several cities of the empire, as Corinth (Sanders, 2003a,b) and Gortyna (Di Vita 1988-1989, 351-355; Belli Pasqua, La Torre, 1994-1995, 173).

From the 7th century the lead-based glazing technique was gradually spread to be probably established in several provincial pottery producing centers of the empire by the end of the 9th or early 10th centuries (Hayes, 1992; Waksman et al., 2007a,b; Papanikola-Bakirtzi, 2012; Papanikola-Bakirtzi, forthcoming). Notwithstanding the

forementioned glazed production—without excluding the earliest examples of glazed architectural tiles (Gerstel and Lauffenburger, 2001; Gerstel, 2001, 2008-2009; Mundell-Mango, 2001)—, when the Byzantine glazed pottery is generally discussed, usually the production of the second millennium glazed tableware comes in mind, and this paper focuses in that period, from the 11th until the mid-15th century.

From the 11th century and its characteristic, elaborate, Sgraffito wares (Papanikola-Bakirtzi, 1999), until the end of the Byzantine era, the Byzantine glazed pottery production is generally distinguished in two periods, with the turning point between them to be traced in the turn the first half of the 13th century, after 1200, and before the middle of the same century (Morgan, 1942; Armstrong et al., 1997; Papanikola-Bakirtzi, 2003; Raptis, 2018).

In the turn of the second millennium—if not earlier in some cases—and mainly during the Komnenian era, the glazed pottery production, which was dominated so far by Constantinopolitan workshops that exported their Glazed White Wares (Hayes, 1992) to the regions of the Byzantine world and beyond, was introduced in the economy of significant provincial centers as well (Papanikola-Bakirtzi, 2003; Papanikola-Bakirtzi, forthcoming), the pottery workshops of which started to manufacture glazed wares in red/reddish fabrics. Apart from Corinth—the Middle Byzantine glazed-pottery production of which, even though in small quantities is rather early, possibly from the late 9th or 10th centuries (Morgan, 1942; Sanders, 1995, 2000, 2003a, 2003b; Papanikola-Bakirtzi, 2003, 2012)—Thessaloniki, Sparta, Thebes and Larissa seem to produce during the eleventh century—or in some cases from the 12th century—their own glazed wares in order to cover

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the, limited so far according to the findings, needs of their local and regional markets (Papanikola-Bakirtzi, 2003; Papanikola-Bakirtzi, forthcoming; Vroom, 2011; about Thessaloniki, see also: Konstantinidou and Raptis, 2015, 2016; Konstantinidou, 2018; Paisidou, 2018; Vasilleiadou, 2018; about Sparta, see also: Bakourou et al., 2003; Dimopoulos, 2007, pp. 336, 339; Katsara, 2018; about Larissa, see also: Anastasiadou, 2019). Some workshops of minor significance seem to produce small quantities of glazed wares for local or regional consumption, as that at Argos (Oikonomou-Laniado, 2006; Bakourou et al., 2003; Vasileiou, 2018), while some significant Middle Byzantine glazed-pottery production centers, as that of Chalkis, in Euboea, exported from the 12th century their products in an interregional trade network, since, apart from their regional markets, it seems that they were also covering the consumption needs of distant markets of the Aegean and the coastal Minor Asia (Waksman et al. 2014, pp. 413–414; Kontogiannis and Skartsis, 2018).

Based on findings in Middle-Byzantine contexts in the aforementioned production centers, the majority of the glazed wares produced from the 11th until the late 12th century, were decorated platters and large bowls—with rim diameter varying between 23 and 25 or 25–28 cm. These large refined and decorated tablewares, along with a number of specialized vessels, such as saltzaria or gararia (chafing dishes), indicate the production and the use of these Middle Byzantine glazed tablewares in order to accommodate rather refined, probably “urban” eating habits (Papanikola-Bakirtzi, 2012; Vroom 2003, pp. 313–321; Vroom, 2011; Vionis 2012, pp. 304–310; Raptis 2018). The rendering and the quality of the sophisticated decoration, mainly with Sgraffito techniques applied on a wide variety of iconographical subjects, of these Middle Byzantine glazed tablewares reveal a special care during all the stages of their production as well as the intention for artistic originality by their manufacturers, who consciously produced luxurious artifacts in small quantities, that meant to be consumed by the Byzantine aristocracy (Papanikola-Bakirtzi, 2003, 2012; Raptis, 2018).

Contrariwise, from the 13th century, the production of the Byzantine glazed tableware gains the characteristics of mass—almost industrial—production. The products of the 13th and 14th century workshops throughout the empire are rather smaller than their predecessors (Papanikola-Bakirtzi, 2003, 2012; Sanders 2003a, 2003b; Raptis, 2018). The differences regarding the sizes and the shapes of the dining vessels indicate significant changes to the cooking and the dining habits of the Late Byzantine community (Vroom 2003, pp. 321–333; Vroom, 2011; Vionis 2012, pp. 304–310) and to the glazed pottery production as well. In their majority, they comprise deep bowls with rim diameter that not exceeds the 12–15 cm that were rapidly decorated on the wheel, with more stereotyped decorative themes, as geometrical and stylized vegetal motifs (Papanikola-Bakirtzi, 2003; Vroom 2011; Raptis, 2018). At the same time, archaeological evidence from throughout the Byzantine world reveal the expansion of the glazed-pottery production centers that operated during Late Byzantine period, since new regional production centers that developed their own distinctive morphological and stylistic characteristics were added to those of the previous period. Apart from the previously mentioned Middle Byzantine production centers—namely, Constantinople, Corinth, Thessaloniki, Larissa, Sparta, Thebes and Chalkis—which continue to produce glazed wares, following the new—mass consumed—trends, during the thirteenth century onwards, cities and/or regions as Serres and Mosynopolis in the northern part of the Greek mainland, Pergamon and Nicaea in Asia Minor, Cherson in the Black Sea, as well as the island of Cyprus in the Eastern Mediterranean, are also notable glazed pottery production centers with distinctive production (Papanikola-Bakirtzi, 2003; about Thessaloniki see also: Papanikola-Bakirtzi, 1987, 2012; Papanikola-Bakirtzi and Waksman, 2015; Konstantinidou, 2018; Paisidou, 2018; Vasilleiadou, 2018; about Serres, see also: Papanikola-Bakirtzis, 1992, 2012; about Mosynopolis, see also: Zekos, 2010, Papanikola-Bakirtzi, 2012; about Pergamon, see also: Spieser 1996;

Waksman and Spieser, 1997; Papanikola-Bakirtzi, 2012; about Nicaea, see also: François, 1997; about Cherson, see also: Yakobson 1979, 133–144; about Cyprus, see also: Papanikola-Bakirtzi, 1996; 2014; Ting et al., 2019).

In sociological terms, it seems that the changes that the Byzantine community underwent after the Latin occupation, and mainly the urbanization that characterizes the last two Byzantine centuries, created new social groups willing to consume affordable glazed tableware, even of lower quality (Papanikola-Bakirtzi, 2003, 2012. Raptis, 2018). However, apart from the apparent change of the target group of the glazed pottery workshops, that motivated the new balance between quantity against quality, at the same period there are also significant changes in the technology of the glazed pottery production. The Late Byzantine workshops seem to follow different paths in the procedure of the production, comparing to their Middle Byzantine predecessors. Apart from the style of the decoration, these differences concern to a great extent the final stage of the production, and namely that of the second firing in order the lead-based glaze to be stabilized on the surface of the already decorated and pre-fired biscuit wares (Armstrong et al., 1997; Papanikola-Bakirtzi, 2003; Vroom, 2003, pp. 266–270; Raptis, 2012, 2018).

This paper focuses on the continuities and changes in the technology of the Byzantine glazed pottery production, presenting the Byzantine kilns and the minor firing devices used from the 11th until the early 15th century during the second firing of Byzantine glazed wares.

2. Firing glazed wares in Middle Byzantine kilns (11th–12th c.)

Until recently, it has been generally stated that the Byzantine glazed wares were mainly being fired in two-storey updraft kilns with an *eschara* (i.e. grid) that is the perforated clay floor of the roman type kilns, which did not differ from the kilns used during the same period for plain wares or probably for the first firing of the glazed-wares before the lead-based liquid glaze was applied on their surface (Raptis, 2011, 2012, wherein the preceding bibliography). In this case and with the apparent absence of any kind of device in order the Middle Byzantine luxurious glazed tableware to be stacked on the *eschara* of such kilns, only a few large plates or bowls could be produced successfully during each firing of a moderate-sized kiln.

However, several recent finds—namely clay rods (Fig. 1)—brought to light in Middle Byzantine context at Constantinople (Waksman, 2018), Thessaloniki (Konstantinidou and Raptis, 2015, 2016) and Ierissos, a significant Byzantine town in Chalkidiki near the entrance to mount Athos (Tsanana et al., 2010), combined with similar—though less in quantity—finds from Chalkis (Kontogiannis and Skartsis, 2018), as well as with earlier, underestimated, findings from Corinth (Morgan, 1942, pp. 21–22, Fig. 17j–m), reveal that at least from the 11th century the second firing of the Byzantine glazed wares was accomplished in kilns with clay rods (Fig. 2), which seem to have been introduced in the Byzantine world from the Islamic technological tradition (Konstantinidou and Raptis, 2015, 2016; Hasaki and Raptis, 2016; Raptis, 2018), since their use in 10th century glazed-pottery workshops of the Islamic world is already documented (Nauman, 1971).

Later, after the middle of the 12th and during the 13th century, similar finds evidence the use of kilns with rods for glazed-pottery production in several places: clay rods of a kiln for glazed pottery production have been documented in a rural settlement of the 12th–13th centuries at Nemea in Peloponnese (Athanasopoulos, 2010, 2016; Athanasopoulos and Shelton, 2018), in a 13th century workshop of glazed pottery in urbanized medieval Larissa, in Thessaly (Anastasiadou, forthcoming), in late 13th century workshops in Serres in central Macedonia (Papanikola-Bakirtzis, 1992) and in Mosynopolis in Thrace (Zekos, 2010), as well as within the boundaries of the Studenica monastery in Serbia (Bikić, 2015). Lately, the use of a kiln with clay rods have been also evidenced in medieval Silistra, located on the southern bank of the Danube river in northeastern Bulgaria.



Fig. 1. Clay rods of an 11th century kiln at Thessaloniki.

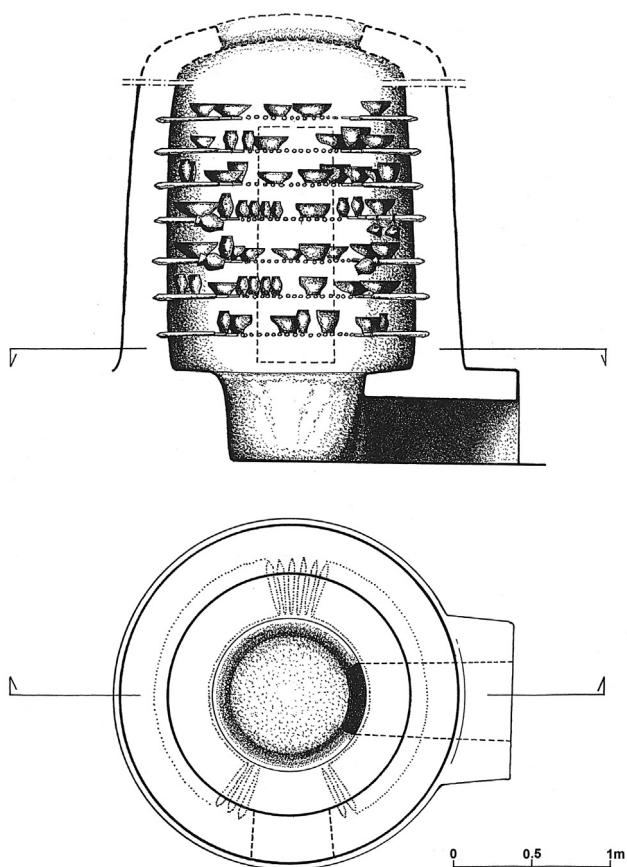


Fig. 2. Kiln with rods; hypothetical reconstruction: section-plan.

Even though architectural remains of kilns with rods have not yet come to light or identified in territories of the Byzantine world, based on the study of their clay rods, the dimensions of which vary—the length of clay rods from different contexts vary from 25 to 40 cm, while

their thickness from 2 to 3.5 cm—these structures should be reconstructed as one-storey, updraft kilns with unified combustion and firing chamber (Fig. 2), like the analogous kilns found, in the Hispan-gaulish, the Levantine and the African shores of the Mediterranean basin (Aubert and Nicolaïdes, 1997; Thiriou 1994, 1997a, 2009a, 2009b).

The hearth, at the lower level of the kiln was probably confined by a rock-cut—or, in some cases, brick-built—bench. At the upper level of the unified chamber of the kiln, the clay rods—projecting from the interior surface of the cylindrical or latency conical upper-structure of the kiln—formed successive series of shelves, where-on the glazed wares were put in order to be fired in order their glaze to be stabilized (Figs. 2 and 3) (Konstantinidou and Raptis, 2015, 2016; Hasaki and Raptis, 2016; Raptis, 2018). It should be noted that, on the basis of the aforementioned description, two Middle Byzantine kilns excavated in Corinth, one at the southeast part of the Agora and the other to the south of the Temple Hill (Morgan, 1942, pp. 14, 17–20), seem to present several morphological and structural characteristics of the type with rods (Konstantinidou and Raptis, 2015).

In these kilns, the glazed wares were placed either on the clay-rod shelves (Fig. 3) (Raptis, 2018), or hanging from them with sigmoid hangers (Figs. 3 and 4) (Konstantinidou and Raptis, 2016; Raptis, 2018), which have been documented almost in all the excavational contexts where clay rods have been also found (Zekos, 2010; Konstantinidou and Raptis, 2015; Bikić, 2015; Konstantinidou, 2018; Raptis, 2018; Athanassopoulos and Shelton, 2018; Waksman, 2018; Anastasiadou, 2019). The hypothetical so far suspension of small scaled glazed wares from the firing rods is evidenced by several minor finds, documented in different glazed pottery workshops: two-partially preserved-sigmoid clay devices were found adhered around one clay rod from Thessaloniki (Fig. 1), while similar adhesion is documented in several examples from Thessaloniki (Konstantinidou and Raptis, 2015); additionally a similar firing device was found adhered around the stem of a glazed goblet, produced in Middle Byzantine Corinth (Morgan, 1942, pp. 21–22, fig. 17), while another sigmoid hanger was found stuck in a suspension hole opened for this purpose on the foot of a bowl produced in the workshop which was operating during the 13th century on Mount Papikion in Thrace (Zekos, 2010).

Notwithstanding, some among the smaller glazed wares, as jars, goblets, or some bowls with high foot, were probably hanging with

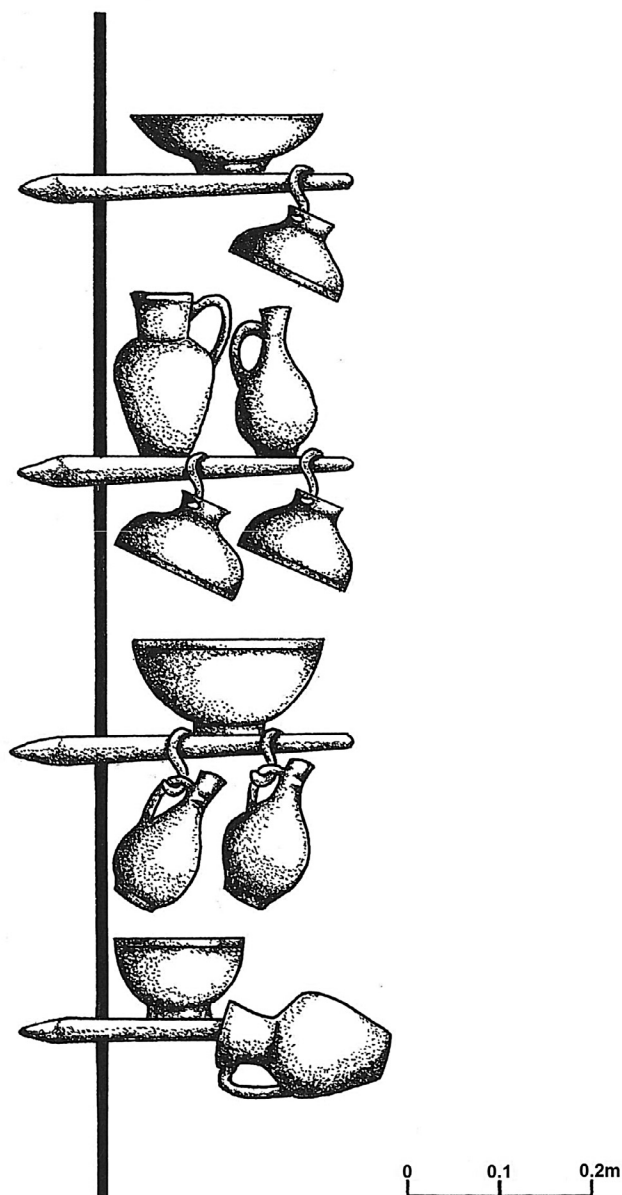


Fig. 3. Glazed wares on clay rods.

these sigmoid hangers from the clay rods, the majority of the Middle Byzantine glazed tablewares, and especially the Sgraffito platters and the large bowls were placed upright on the clay-rod shelves of these kilns (Raptis, 2018).

Even though the Byzantine kilns with clay rods documented so far, are few, it could be stated that the Middle-Byzantine glazed wares were generally fired in kilns of the type in discussion, since—before the introduction of the tripod stilt at the first half and until the middle of the 13th century—it would be difficult or impossible for the Byzantine potters to fire successfully a decent quantity of glazed wares in a regular Byzantine kiln without the interference of any kind of firing device that would prevent the adherence of the production (Raptis, 2018)

3. Firing glazed wares in Late Byzantine kilns (13th-15th c.)

The kiln type with rods remained probably in use until the 13th century, period, during which the type prevailed in the production of glazed wares in the western coasts of the Mediterranean basin. So far—as it has already been mentioned—kilns with rods have been securely documented in four or five 13th century glazed pottery workshops: at Nemea (dated at either late 12th or 13th century, see: Athanassopoulos and Shelton, 2018), at Larissa in Thessaly (Anastasiadou, forthcoming), at Serres in Northern Greece (Papanikola-Bakirtzis, 1992), at Mosynopolis in Thrace (Zekos, 2010), and one—recently documented—at the Studenica monastery in Serbia (Bikić, 2015). However it seems that became a rarity in the Byzantine territory, since during the early probably decades and until the middle of the 13th century, as the Late-Byzantine glazed table-wares gradually became a mass-trend, several changes were made in the operation of the workshops and their kilns, in order their production to be intensified and maximized with a radical change in the balance between quality and quantity (Armstrong et al., 1997; Papanikola-Bakirtzi 2003; Raptis, 2018). At this period a new firing device seems to have been either re-invented, or introduced into the Byzantine world from the China via the medieval ceramic tradition of the Islamic world, that is the well known tripod stilt (Papanikola-Bakirtzi, 1986; Raptis, 2012, 2018). The use of the tripod stilt gave the opportunity large quantities of glazed wares of the same type—mainly moderate or small size bowls—to be stacked in piles within the interior of a regular two storey updraft kiln, morphologically and structurally proportional to those of plain ware production (Fig. 5).

Thus, during the stage of the second firing, the glazed wares were stacked upside down on the *eschara* of the kilns, separated between each other by hand-made, mould-made, or wheel-made tripod stilts (Papanikola-Bakirtzi, 1986; for wheel-made tripod-stilts, see also: Zekos, 2003), which prevented the adherence of the production, even though they were leaving a triple mark on the inner surface of the glazed bowls or plates (Papanikola-Bakirtzi, 1986; Raptis, 2018)



Fig. 4. Sigmoid hangers. Thessaloniki, 11th c.



Fig. 5. Mould made tripod stilts and wastes of a Late Byzantine pottery. Thessaloniki, late 13th-14th c (Papanikola-Bakirtzis, 1992).

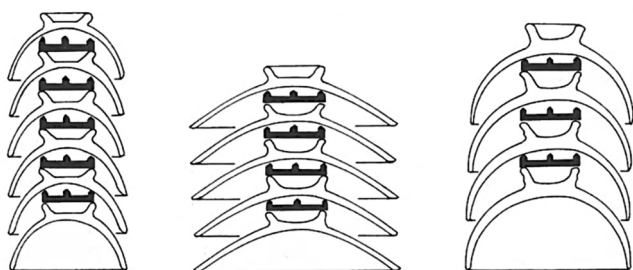


Fig. 6. Late Byzantine bowls and plates stacked upside down with tripod stilts.

(Fig. 6). The latter was probably counted by the potters as an inevitable defect of the systematization and maximization of the production and was probably something that the mass Late Byzantine middle class consumers of glazed pottery wouldn't mind of, as far as they had the opportunity to consume!

Notwithstanding, the combined use of clay rod shelves with tripod stilts is well documented in workshops of the Western Mediterranean, in the wastes of the few 13th century workshops excavated in Greece and Serbia, where the operation of kilns with rods has been evidenced, only the use of sigmoid hangers has been attested so far (Raptis, 2018; see also: Papanikola-Bakirtzis, 1992; Zekos, 2010; Bikić, 2015; Athanassopoulos and Shelton, 2018; Anastasiadou, 2019; Anastasiadou, forthcoming).

However the use of each one of these firing techniques is evidenced by the glazed wares themselves; the triple mark left by the use of tripod-stilt, which usually is preserved on the well maintained bowls or plates evidences without doubt that their second firing occurred in two-storey updraft kilns.

Apart from this evident proof, the way that the semi-liquid lead-based glaze flowed on the interior surface of the ware before it was finally stabilized—something that could be induced even from a medium-sized shred—consists a clear evidence about the position of the wares inside the firing chamber of the kiln during their second firing: if the wares were in upright position they were probably fired in a kiln with rods; otherwise, if they were posted upside down in the kiln, they were most probably fired in a regular updraft kiln with the use of tripod

stilts (Raptis, 2018).

Finally, it must be noted that no evidence of special kilns for the fusion of the lead-based glaze before its application on the decorated ware have been documented in Byzantine context (Raptis, 2012), even though such firing devices have been located and studied in workshops of the Western Mediterranean kilns (Thiriot, 1997b).

4. Conclusions

Based on findings in Middle-Byzantine context, the glazed wares from the 11th until the late 12th or the early decades of the 13th century were produced in small quantities as luxurious products, meant to be consumed by the Byzantine aristocracy. During this period, the second firing of the glazed wares was accomplished in kilns with clay rods, which seem to have been introduced in the Byzantine world from the Islamic technological tradition. These were one-storey, updraft furnaces with unified combustion and firing chamber, where-in the glazed wares were put on successive series of shelves, made with clay rods that were projecting over the hearth. In this kiln type the Byzantine glazed wares were placed upright on the clay-rod shelves, or sometimes were hanging from sigmoid hangers that were applied on the rods.

From the first half of the 13th century onwards, as the Late-Byzantine glazed table-wares became a mass-trend, several changes were made in their production in order their quantity to be maximized. Thus, even though the lead-based glaze remained chemically unalterable, the kilns with rods—that continued to form the main kiln type of the workshops operating in Western Europe—became a rarity in the Byzantine territory, since the Late Byzantine potters used to accomplish the second firing of the glazed wares in regular, two-storey updraft kilns, wherein the glazed wares were stacked upside down inside separated between each other by hand-made, mould-made, or wheel-made tripod stilts, which, even though they were leaving a triple mark on the inner surface of the glazed bowls or plates, prevented the adherence of the production.

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