

Production of Moulded Bricks on a Gothic Building Site. The Case of the Thirteenth-Century Abbeys of the Dunes and Boudelo (Belgium)

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ABSTRACT: While the role of the Cistercian abbeys of The Dunes and Boudelo as pioneers of brick production and brick architecture in medieval Flanders remains up for debate, recent research has shed new light on the brick architecture of both abbeys. Since built remains have either disappeared (Boudelo) or lost all authenticity due to reconstruction (The Dunes), the loose moulded bricks collected at both abbey sites are the only reliable material source for the thirteenth-century building campaigns in brick of The Dunes and Boudelo. Numerous profiled bricks from these abbeys show traces of standardized methods of production, similar to practices used on the building sites of contemporary gothic buildings in stone. As such, the moulded bricks from The Dunes and Boudelo reveal these Cistercian abbeys not so much as pioneers of brick building, but as the first to have fully integrated brick in gothic architectural design.

INTRODUCTION

Recent research on archaeological sites and still standing buildings in and outside a Cistercian context confirms the doubt voiced before (Termote 1990, pp. 115-116; Coomans & Van Royen 2008, p. 1) about the supposed role of the Cistercians as re-inventors of brick in the medieval county of Flanders. First of all, the brick wall remains of The Dunes and Boudelo, two Flemish Cistercian abbeys who had their monastic buildings built in brick during the thirteenth century, have either disappeared (Boudelo) or have become virtually useless as a material source due to heavy and undocumented restoration (The Dunes). Also, close reading of the archives of The Dunes and Boudelo with mentions of building campaigns and production of architectural ceramics, does not allow to maintain the pioneering role of the Cistercians. Finally, solid indications have turned up for the use of brick in Bruges which is older than or at least contemporary with the building campaigns in brick of The Dunes and Boudelo. Thanks to tree-ring analysis of its oak truss (1234 ±6), the middle sick ward of St. John's Hospital in Bruges (Fig. 1) is now with certainty the oldest surviving building in Flanders where brick has been used. A renewed look at the wall remains of the first hospital building, built in tufa at the very end of the twelfth century and preserved amongst the thirteenth-century structures, has even brought to light a number of brick courses which cannot be considered as a younger intervention (Wets 2008, p. 152-157).

An often neglected material source for the building campaigns in brick of the abbeys of Boudelo (Asaert et al. 1982, pp. 76-93; De Belie 1997, pp. 180-185; Debonne & Oost 2008) and The Dunes (Termote 1986 & 1990; Van de Voorde 2008) are the numerous loose bricks which were collected throughout the years at both abbey sites. Research of these bricks and the traces of production they bear, now visible since the bricks are no longer part of masonry, does not so much reveal the Cistercians of Boudelo and The Dunes as the re-inventors of brick in medieval Flanders, but rather as the first to make full use of the formal and structural possibilities of the building material in a gothic architectural design.

THE DUNES AND BOUDELO, HISTORICAL OVERVIEW

After having been founded in 1128, the abbey of The Dunes in Koksijde nearby the North Sea coast joined the Cistercian order in 1138 and soon grew into a religious, political and economic heavyweight in the county of Flanders. Building of a new abbey church started in 1214 and the dedication followed in 1262.

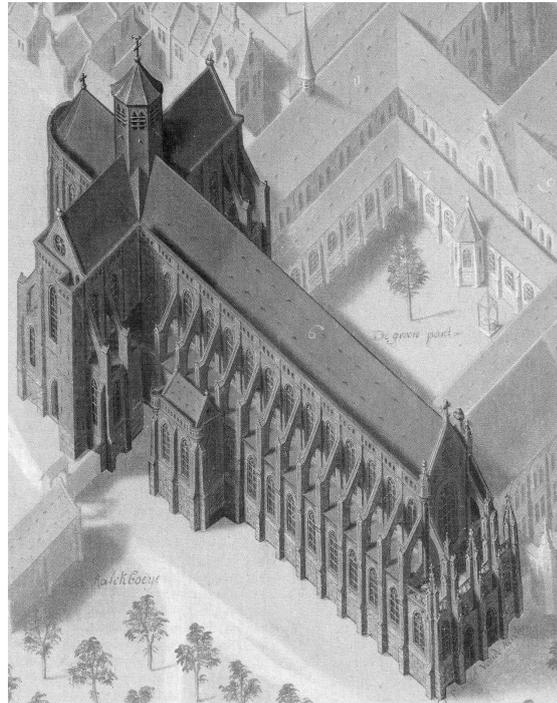


Figure 1 (left): The western gables of the three sick wards of St. John's Hospital in Bruges
 Figure 2 (right): The abbey church of The Dunes, detail of the view of the abbey painted by Pieter Pourbus

This abbey church was mostly built in brick, made from clay that was available in large quantities in the polder area around the abbey. However, the oldest known written mentions of production of architectural ceramics in The Dunes only date from the abbacy of Theodorik (1253-1265) (Termote 1990, p. 111). The abbey already suffered from stagnancy when in 1578, the local Calvinist government started to dismantle the monastic buildings; however the definitive move of the monastic community from The Dunes to Bruges only took place in 1624. What remained of the buildings in Koksijde was buried under the advancing dune sand and rising water level. Since the first excavations in the early twentieth century the brick wall remains of over half of the monastic buildings have been uncovered (Dewilde & Demeulemeester 2005). Unfortunately, undocumented restoration and thoughtless reconstruction have made these wall remains a non-authentic and therefore useless material source. As a result, the view on the abbey of The Dunes (Fig. 2) painted by the Bruges master Pieter Pourbus in 1580 remains an exceptionally valuable iconographic source of the medieval abbey. On this view, the church appears as a large gothic Cistercian abbey church: a long nave, a transept with side-aisles and a short, polygonal choir without ambulatory. Also, the presence of a supportive system of flying buttresses, intended to carry cross rib vaulting, shows a logical use of gothic skeleton building.

The origins of the abbey of Boudelo near Stekene (halfway between Ghent and Antwerp) go back to 1215, when a hermit's community founded in 1197 was reorganized into a Cistercian abbey. During the thirteenth century the monastic buildings were erected with brick, as in The Dunes made from locally available clay. For this purpose, the countess of Flanders had donated lands to the abbey in 1223 'to make bricks' (*ad conficiendas lateres*), although the first explicit written mentions of production of architectural ceramics by Boudelo date from 1261-1263. The devastating sack of the abbey by the Calvinist troops of Ghent in 1578 forced the monastic community to move to their refuge house in Ghent. The underground remains of the abbey were excavated between 1971 and 1986, before they disappeared for good to make way for new constructions (Asaert et al. 1982; De Belie 1997). Scarce iconographic sources depict the abbey before its destruction in 1578, but contrary to the view of The Dunes by Pourbus these are rather schematic, merely permitting the reconstruction of the general lay-out of the abbey.

MOULDED BRICKS FROM THE DUNES AND BOUDELO

Apart from the common rectangular bricks, numerous profiled bricks were found at both sites, about 260 different forms in The Dunes and 61 in Boudelo. Several forms of bricks exist in different sizes, bringing the total number of brick forms, different sizes included, to over 500 in The Dunes and 138 in Boudelo. Besides simple forms such as bricks with chamfered and rounded sides for the offsets of buttresses and windows, bricks with more complex mouldings in a gothic design were collected as well. These are elements for constructive use,

such as elements for archivolts, shafts and ribs of vaults (Figs. 3-4, 10). Bricks for more decorative use were found as well, mostly in The Dunes and to a lesser degree in Boudelo: fragments of tracery, parts of blank arched corbel courses, bases of piers and foliage capitals, which are a precise version in brick of similar capitals in stone (Fig. 5). These profiled bricks were always moulded before firing; traces of carving of the moulding after the brick had been fired are nowhere to be found. The smooth surface of the edges of the bricks indicates a moulding with a wooden frame or a thread in soft metal, possibly after the basic form of the brick had already been made with a moulding frame. Some bricks have sides with more or less parallel strokes, traces of cutting the unfired brick with a knife (Fig. 6).



Figure 3 (left): Moulded brick with incised halfway line and impressed Greek cross from Boudelo abbey
 Figure 4 (right): Moulded brick with incised St. Andrew's cross from The Dunes abbey

Several moulded bricks have softly incised lines on their upper surfaces, applied before firing to facilitate a precise execution of the moulding. On a moulded brick part of a shaft from Boudelo, an incised line runs across the middle of the upper surface (Fig. 3). Similar lines can also be found on bricks from The Dunes. On the upper surface of a brick with an annulet, one can remark two diagonally crossing lines (Fig. 7).

On folios 21 and 32 in the sketchbook of Villard de Honnecourt (ca. 1235) building parts and templates (*molles*) for profiled elements in stone of Reims cathedral are shown with lines similar to those on the bricks of The Dunes and Boudelo (Fig. 9). In the sketchbook of Villard these lines are 'axe de reference, indispensable à la taille' (Bechmann 1993, p. 189). Apparently, a technique used to carve mouldings in stone was also used on the building sites of Boudelo and The Dunes to apply mouldings on clay forms. In the case of the brick part of a shaft from Boudelo (Fig. 3), the actual moulding might have been done as follows: a line was incised on an unfired rectangular clay form, which served as the halfway line along which a plank was mirrored with half of the moulding cut out. On the brick with the annulet from The Dunes (Fig. 7), the line running across the width of the block served as base to project the diagonal line, which in turn indicates the position of the annulet in relation to the block behind. The use of this technique enabled the precise reproduction of different forms of bricks, which implies an architectural design made up in advance wherein the various brick forms were already established. The profusion of moulded bricks constitutes an aspect in which the brick architecture of The Dunes and Boudelo distinguishes itself from the middle sick ward of the St. John's Hospital in Bruges, where apart from rectangular bricks only bricks with a bullnose moulding were used.

Besides lines to aid the precise reproduction of various mouldings in clay, some bricks from The Dunes and Boudelo have other signs, mostly incised or impressed on the upper surface, sometimes on the underside. Again, these signs were applied before firing the clay form. All the conserved brick parts of shafts from Boudelo have a Greek cross impressed on the upper surface (Fig. 3). Moulded bricks from The Dunes show softly incised St. Andrew's crosses (Figs. 4, 10) and, on the mentioned brick with the annulet, a Roman numeral 2 (Fig. 7). Since they were found on a monastic site, the crosses on the bricks from Boudelo have



Figure 5 (left): Brick foliage capital from The Dunes abbey
 Figure 6 (right): Brick from The Dunes abbey with cutting traces on the chamfered side

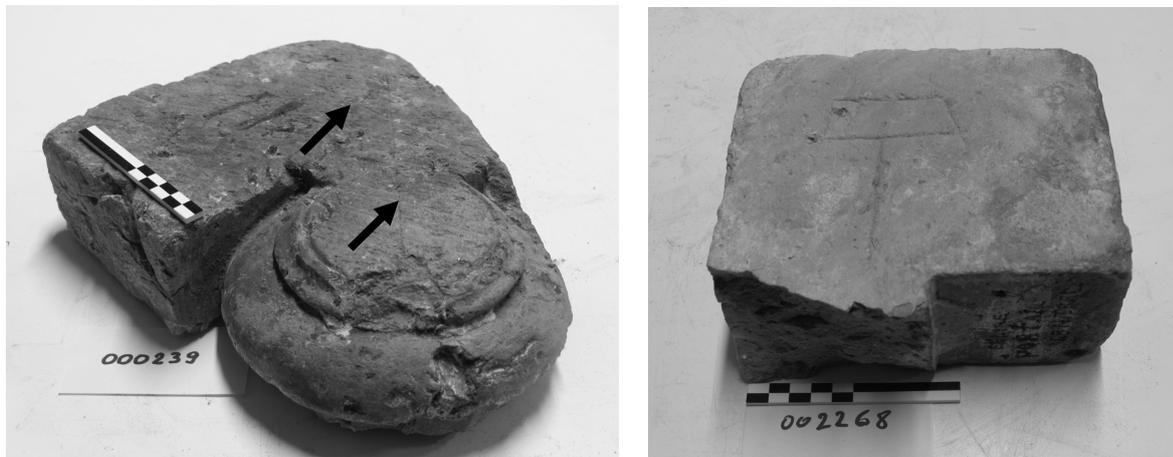


Figure 7 (left): Brick with annulet from The Dunes abbey (the arrows indicate the incised lines)
 Figure 8 (right): Brick with brickmaker's tool from The Dunes abbey

been explained as religious symbols (explanation cited in Debonne & Oost 2008, p. 286). Following this view, the crosses could then be identified as consecration crosses. However, consecration crosses on bricks of early thirteenth-century churches in Northern Germany are to be found on the sides of the bricks which remain visible in the masonry (Perlich 2007, p. 141), thus excluding a religious meaning of the crosses on the bricks from Boudelo. Neither do these crosses seem intended to reinforce the adhesion of the mortar between two bricks (Van de Voorde 2008, p. 308), considering their limited size and depth. In Northern-Germany and in the former lands of the Teutonic Order, moulded bricks with impressed and incised marks, among which Greek crosses and St. Andrew's crosses are known from the period 1280-1310 (Kutzner 2001, cited in Perlich 2007, pp. 84-85). These are explained as *Zieglerzeichen*, marks left by the brickmaker comparable to the stonecutter's marks on elements in stone. Greek crosses and St. Andrew's crosses are among the stonecutter's marks on thirteenth-century elements in Tournai limestone in the St. Nicholas' church in Ghent, built simultaneously with the abbeys of The Dunes and Boudelo (De Smidt 1974, pp. 16-18, 23, 33). Stonecutter's marks are probably depicted in the sketchbook of Villard de Honnecourt as well, not on the stone elements themselves but strangely enough, according to the caption, on the templates (*molles*) used for carving the profiles in stone (Fig. 9). The crosses on the bricks from The Dunes and Boudelo could then well be marks left by brickmakers, similar to the marks of identity and quality left by stonecutters on the stone elements they carved. On a brick fragment from The Dunes, the brickmaker has probably drawn one of his tools, a scraper used to level the unfired brick when still in its moulding frame, just like stonecutters traced their hammers and chisels as marks (Fig. 8). On the other hand, the Roman numeral 2 on the brick with annulet from The Dunes (Fig. 7) can rather be identified as a mark for positioning and not as the mark of a brickmaker. Again, the sketchbook of Villard offers a comparison: the second *molle* from the left on the second row on folio 32 has an X and a Roman numeral 2. It is unlikely to find two different stonecutter's marks on one piece; therefore, the Roman numeral 2 should rather be considered as a mark for positioning and the X as a stonecutter's mark.

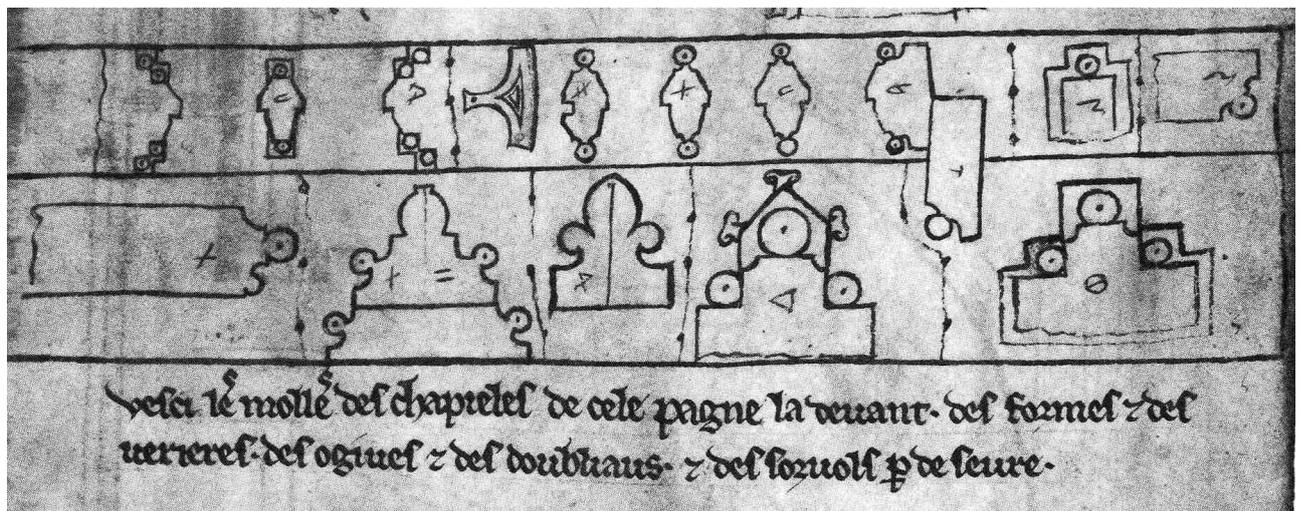


Figure 9: Scantlings of profiled pieces from the radial chapels of Reims cathedral, f° 32 in the sketchbook of Villard de Honnecourt (Erlande-Brandenburg et al. 1986, pl. 63). The caption below reads: Vesci les molles des chapeies de cele pagne la devant des formes et des verieres des ogives et des doubiaus, et des sorvolz par de seure

In short, stonecutter's marks and marks for positioning which were commonly used for stone pieces, were likewise applied by brickmakers in Boudelo and The Dunes. It is important to note that also stone was used on the building sites of The Dunes and Boudelo, which opens the possibility of some degree of technical exchange between stonecutters and brickmakers. The preserved elements in Tournai limestone from Boudelo are limited in number and rather fragmentary, whereas at the site of The Dunes numerous well preserved elements in Tournai limestone and Northern French, possibly Artois limestone have been collected. Some of these moulded pieces are the stone counterparts of the same forms in brick, with similar halfway lines and crosses on the upper surfaces (Figs. 10-11). Certainly for The Dunes, it is clear that both brick and stone were integrated in a complete standardization of the building parts in order to realise a gothic architectural design.

CONCLUSION

Whereas the role of the Cistercians as pioneers of brick in the medieval county of Flanders remains uncertain, the moulded bricks from Boudelo and The Dunes show that in the thirteenth century these Cistercian abbeys have integrated the production of brick building parts in their gothic building campaigns. Techniques used for stone elements at the gothic building sites of that time, such as the incision of lines to facilitate the carving of mouldings, stonecutter's marks and marks for positioning, were applied on brick in both Flemish Cistercian abbeys. The lines to facilitate the moulding of specific brick forms and the marks left by brickmakers indicate a standardized mass production of brick building parts. The presence of marks for positioning on some of the bricks from The Dunes shows that the placement of these elements was foreseen during manufacture, which implies an already drawn up architectural design.

The painting of the abbey of The Dunes by Pieter Pourbus (Fig. 2) leaves no doubt about the gothic character of the abbey church. The choice for a church built according to the modular principle of gothic skeleton building demanded a detailed architectural design drawn up in advance, which in turn required a rationalisation of the building site with mass production of building elements in brick and stone. As such, the use of brick at the abbeys of The Dunes and Boudelo clearly differs from the use of brick in the middle sick ward of the St. John's Hospital in Bruges. Typologically and as a consequence aesthetically, this building is of a different kind than the abbey church of The Dunes. In the monastic environment of The Dunes, an outspoken gothic design was chosen for the new abbey church, with all implications explained above. In the urban environment of Bruges, the main priority was to cover a large space that could accommodate the sick (Coomans 2007, p. 190-192). There, the application of gothic skeleton building was of no consideration, which explains a use of brick of a considerably different kind than in The Dunes and Boudelo.

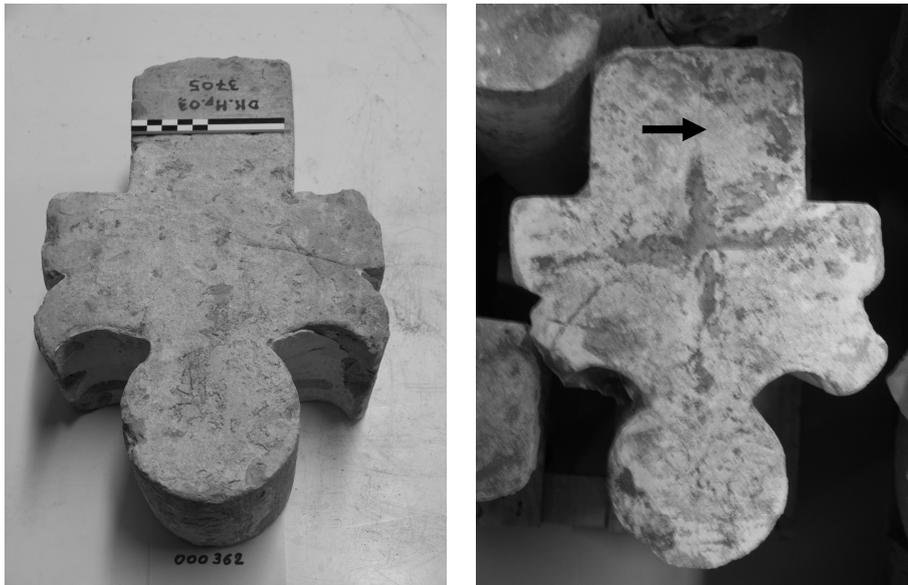


Figure 10 (left): Brick part of a ribvault with incised cross from The Dunes
 Figure 11 (right): Limestone part of a ribvault with incised halfway line and cross from The Dunes

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