

## 3D-Measurements of Sixteenth-Century Stove-Tiles

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In this paper I will discuss the possibility of using 3D-measurements in investigating the beginning of local manufacture of tile-stoves in Finland. The measurements were tested on a group of sixteenth-century relief-decorated panel-tiles with images connected to the Lutheran Reformation and Renaissance fashion. The measurements were part of a larger project called the Finnish Virtual Archaeology and my own research which investigates the arrival of the ceramic tile-stove in Finland, the beginning of its local production, its effect on the development of living conditions and interior decoration, and its importance as an index of the arrival of Renaissance fashion and support of Lutheran Reformation in Finland.

### **The earliest tile-stoves in Finland**

The early history of tile-stoves goes back to the first century AD and it took place in the German, Swiss and Austrian Alps. The earliest ceramic stove-tiles found during archaeological excavations date, however, from the twelfth century. The oldest stove-tiles looked exactly like ordinary ceramic vessels, but they developed in the course of time into relief-decorated panel-tiles (for example Franz 1969, 12–18, 30; Majantie 2003, 181). In the Nordic countries the first tile-stoves arrived in the fourteenth century (Liebgott 1972, 5), but in Finland they seem to have been adopted only in the second half of the fifteenth century (Majantie 2003, 182–184). The introduction of tile-stoves was connected to the influence of the Hanseatic merchants who traded with and settled in urban centres around the Baltic Sea region, including Finland (Gaimster 2001, 52–54, 59–62). The recruitment of German craftsmen to work in the royal castles of Finland, especially during the rule of King Gustav Vasa (1523–1560) also made it easier for new ideas and fashions to become adopted (Gardberg 1959, 186, 226, 341–342). Building materials, furnishings and everyday objects – like stove-tiles – may well have arrived to Finland also through the travels and acquisitions of the nobility themselves.



Picture 1. Woodcut dating from 1488 showing an interior with a tile-stove.

Tile-stoves remained for a long time a privilege that only the wealthiest members of society could obtain and the old heating systems, like open stoves and fireplaces, continued to be used by their side. The advantage of tile-stoves was that they were smokeless and that they stored heat for a long time. When stove-tiles started to be manufactured with moulds and decorated with images and ornaments, they also became important elements of interior decoration. Like other furnishings and fittings they soon became instruments of showing one's wealth, fashion-consciousness and religious and political loyalties (Gaimster 2001, 61). The earliest stove-tiles in Finland have been found in royal castles and manor houses, but they also appeared in bourgeois homes in the town of Turku (Sw. Åbo) soon after they were introduced in Turku Castle. In fact, the earliest stove-tiles in Finland might well be relief-decorated niche-tiles found during excavations on one of the medieval town quarters of Turku. On the basis of the style and subject of their decoration they date from the second half of the fifteenth century (Majantie 2003, 182–183).

Both vessel-tiles and relief-decorated panel-tiles have been found in Finland. Vessel-tiles date from the end of the fifteenth century to the beginning of the seventeenth century and panel-tiles with Renaissance-style decoration from the second half of the sixteenth century to the beginning of

the seventeenth century. The most typical motifs on Finnish relief-decorated panel-tiles were portraits of German Princes who supported the Reformation in Germany. Especially portraits of Elector Johann Friedrich of Saxony and his consort Sibylle of Cleves were popular on Finnish stove-tiles (Majantie 2003, 186–188).



Picture 2. Stove-tile found in Turku Castle with a portrait of Elector Johann Friedrich of Saxony (TMM18434:1, Turku Provincial Museum). Photo: Kirsi Majantie.

Johann Friedrich was one of the secular supporters of the Lutheran Reformation in Germany and his images were widely distributed around the whole Baltic Sea region (Gaimster 2000, 142–148). Stove-tiles with portraits of Johann Friedrich appeared first in Turku Castle where they can be connected with the support of Lutheran Reformation. Their appearance in Turku is understandable since Turku was the administrative and ecclesiastical centre of the eastern part of the Swedish realm, and Turku Castle was a place where Gustav Vasa's son Johan held his Court as Duke of Finland from 1556 to 1563. Gustav Vasa's interest in the evangelical movement was determined by political and economic reasons. He introduced the Reformation to Sweden and Finland in the beginning of his

reign, but he was careful to not make too notable changes regarding the ecclesiastical organisation or confessional matters during his reign (Grell 1995, 2–5). He however used art to connect himself in a positive way to the Reformation and its leaders (Johannesson 1998, 23). Tile-stoves with portraits of Johann Friedrich could have been part of this program and commissioned for Turku Castle at the end of Gustav Vasa's reign. They could also have been commissioned by Duke Johan himself, since he stayed faithful to his father's convictions regardless of his wife's Catholic background and his favourable attitude towards Catholicism (Grell 1995, 6).

Stove-tiles with portraits of Johann Friedrich have also been found in the town of Turku. Some of them, however, seem to be manufactured fifty years later than the same tiles in the castle. Also a positive-mould with Johann Friedrich's portrait has been found in the town, suggesting that the manufacture of these stove-tiles continued in town even after the original moulds had been broken. The religious message of the stove-tiles might have however changed in the course of time and in addition to being signs of one's religious conviction, their Renaissance decoration may simply have acted as signs of one's fashion-consciousness (Majantie 2003, 186–191).



Picture 3. Positive mould of a stove-tile with a portrait of Elector Johann Friedrich, found in a cellar behind Turku Cathedral (TMM18434:1 Turku Provincial Museum). Photo: Kirsi Majantie.

## Written and archaeological evidence for the manufacture of stove-tiles in Finland

The earliest stove-tiles found in Finland might have been imported from Germany, but since their transportation by boat was risky and their setting up as stoves needed an experienced potter on site, their local manufacture must have begun relatively soon after the first tile-stoves were introduced here. Even though clay was available everywhere in Finland, they were first manufactured by German craftsmen, who brought their workmanship, tools and moulds from their own hometowns in Germany.

The first written documents mentioning the manufacture of stove-tiles in Finland date from the 1540s. They originate from Turku and Häme (Sw. Tavastehus) castles where a German potter called Hans is listed in account books as making stove-tiles. Another early written source of stove-tiles comes from Turku Castle during the years 1560–1563, when a German potter Abraham von Wittenberg is mentioned in account books (Gardberg 1959, 164, 189, 291–292, 339).

Stove-tiles manufactured in Turku and Häme castles in the 1540s were most certainly vessel-shaped stove-tiles. Since they were made on a potter's wheel, their shape does not reveal same kind of details about the nature of their manufacture than stove-tiles that were made with moulds. The shape of vessel-tiles stayed the same for hundreds of years and unless the personal handiwork of individual potters is investigated, it is difficult to assess the duration of their manufacture from their shape alone.

Stove-tiles manufactured in Turku Castle in the 1560s were on the other hand relief-decorated panel-tiles. The images on them depicted portraits of Johann Friedrich of Saxony and Sibylle of Cleves and the potter who made them, most likely brought the clay moulds that he used for their manufacture from his hometown of Wittenberg (Gardberg 1959, 291–294; Majantie 2003, 186–191). Since the images on relief-decorated panel-tiles, which were made with same moulds, were always exactly the same, until the mould became worn or was broken, it is possible to study the nature and duration of the manufacture of these tiles by the size, sharpness and depth of their relief-decoration. The images on panel-tiles were first copied from woodcuts and engravings and to produce relief-decorated stove-tiles the image had to be copied and carved on a wooden panel and then pressed into clay. When these clay panels with negative-images were fired, they could be used as moulds to manufacture stove-tiles with positive-images (Franz 1969, 33, 73).



Since the manufacturing technique to produce new moulds was not available in Finland in the sixteenth century, new tiles had to be made either by using the old worn moulds regardless of the fact that they produced shallow reliefs or they had to be made by copying the image from old stove-tiles from which new moulds were made. If stove-tiles were continued to be made with original worn moulds, the size of the images on them remained the same, and only the sharpness and the depth of the relief-decoration weakened. However, if new moulds were made by copying the images from old stove-tiles, the images on them shrank ten per cent, since clay shrinks that much when fired, and new moulds had to be fired in order to be used. In both cases the sharpness of the image weakened but in the latter case the image also got smaller. Since the layer of glazing on the stove-tiles made the sharp edges of the relief-decoration smoother, copies made of them were not as detailed as the original ones. Since some of the stove-tiles found in Finland have much shallower and weaker relief than other ones with the same image, they either were produced with old worn moulds or the images were copied from old stove-tiles.

In other words, we know that there were moulds to produce stove-tiles in Turku and that they were used in Turku Castle in the 1560s. However, no original moulds have been found, but archaeological evidence suggests that they were used both in Turku Castle and later also in the town of Turku. Stove-tiles found from excavations in the town of Turku also indicate that these moulds were used for a long time or were at some point broken. Some stove-tiles found in the town of Turku and also a positive-mould with Johann Friedrich's portrait might date as late as the beginning of the seventeenth century.

### **The use of 3D-measurements in studying the nature of local production of stove-tiles in Finland**

Before 3D-measurements of the stove-tiles were carried out, I was sure that the shallow reliefs on some of the stove-tiles were caused by copying the images from old stove-tiles. Since the new moulds made by copying the images from old stove-tiles, had to be fired before their use, stove-tiles produced with them had to be smaller than the original ones. To prove this, the images on the stove-tiles had to be measured in detail.

Even though the weakening of the reliefs on stove-tiles can be seen with bare eyes and measured manually, 3D-measurements enable a much more

accurate means for comparing the differences between the size and the sharpness of the images on different stove-tiles. Co-operation with the department of Mechanical Engineering in Turku Polytechnic School and its engineers Esa Laine and Mika Seppänen made it possible to use 3D-measurement in studying these changes on stove-tiles and discuss the questions about the nature and beginning of local production of stove-tiles in Finland. At the Polytechnic School they have a portable 3D Coordinate Measuring Machine (CMM) suitable for these kinds of measurements. A selection of stove-tiles, with the same motifs but with different quality of reliefs, was chosen for these measurements. Most of the stove-tiles were from Finland, but some comparative material was chosen from Germany and also one tile from Sweden. This was possible due to an exhibition in the Aboa Vetus museum of Turku, where circa 300 stove-tiles from 25 museums around the Baltic Sea region were on display in 2004 and could be used for these measurements.



Picture 4. 3D Coordinate Measuring Machine (CMM) in the department of Mechanical Engineering of Turku Polytechnic School, with which the measurements of stove-tiles were made.

The principle of the 3D-measuring machine is based on moving a measuring probe which is attached to a robot arm (FAROArm) which is then placed on the surface of the measured object. The machine measures each point in

relation to its own known location and since it gives three coordinates for each point, it enables comparisons between points at different distances from each other but also points at different heights from each other and it also shows the results in 3D form. The measurements are accurate to 0.1 millimetres. Consequently the points chosen for the measurements had to be those which showed the changes in the size of the images and also in the depth of the reliefs. The best points to show these features were the diameter of Johann Friedrich's collar and the highest and lowest points on the panel, which were Johann Friedrich's chin and the background underneath it.



Picture 5. Esa Laine measuring details on a stove-tile with 3D coordinate measuring machine. Photo: Hannele Lehtonen.

Surprisingly, according to the measurements, only the positive-mould with Johann Friedrich's portrait found in Turku had shrunk 10 per cent and the size of the images on the other stove-tiles found in Turku had stayed the same as in the control tile. One small stove-tile from Sweden, which also has a portrait of Johann Friedrich on it, had shrunk 20 per cent. Its' relief is very weak and for example the inscription above Johann Friedrich's head has completely disappeared. All the other images on stove-tiles found in Finland



were approximately the same size as the images on the control tiles from Germany, and only their relief had become weaker. The positive-mould tells for certain that copies of old tiles were made, but the other tiles only tell that the moulds that were used for their manufacture had become worn in the course of time. This means that only some of the stove-tiles with weak relief that have been found in Turku were manufactured with moulds that were made from copying the motifs from old stove-tiles. The rest were most likely made with the same original moulds, but the relief on them was weaker than on the others because the moulds had worn in use.

Both cases however prove that stove-tiles with portraits of Johann Friedrich and Sibylle of Cleves were manufactured in Finland for a long time regardless of the fact that the moulds used in their manufacture had gotten worn or even broken. Both the copying of motifs from old stove-tiles and using the old moulds for so long that they were badly worn suggests that the portraits of Johann Friedrich and his consort Sibylla of Cleves continued to be popular in Finland for a long time, or that after their topicality as Reformation propaganda, they continued to be used because of their Renaissance-style decorations.

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## Literature

Franz, Rosemarie 1969. *Der Kachelofen*. Graz.

Gardberg, Carl Jakob 1959. *Åbo slott under den äldre vasatiden. En byggnadshistorisk undersökning*. Finska Fornminnesföreningens Tidskrift 60. Helsingfors.

Gaimster, D. R. M. 2000. Saints and Sinners: The changing iconography of imported ceramic stove-tiles in Reformation England. In: D. Kicken et al (eds), *Lost and Found: essays on medieval archaeology for H. J. E. van Beuningen*. Rotterdam *Papers* 11. Pp. 142–151.

Gaimster, D. R. M. 2001. Life and lifestyle in the Baltic castle: Patterns in ceramic consumption c. 1200–1600. In: Toim. J. Skaarup et al. (eds), *Castella Maris Baltici V*. AMAF VI. Rudkøbing. Pp. 51-66.

Grell, Ole Peter 1995. Introduction. In: Ole Peter Grell (ed), *The Scandinavian Reformation. From evangelical movement to institutionalisation of reform*. Cambridge. Pp. 1–9.

Johannesson, Kurt 1998. The Portrait of the Prince as a Rhetorical Genre. Iconography, propaganda, legitimation. *The European Science Foundation. The Origins of the Modern State in Europe 13<sup>th</sup>–18<sup>th</sup> centuries*. New York.

Liebrott, Niels-Knud 1972. *Kakler. Hovedtræk af kakkelovnens historie c. 1350–1650*. København: Nationalmuseet.

Majantie, Kirsi 2003. Muotia, mukavuutta ja mielipiteitä – syitä kaakeliuunin käyttöönottoon. In: Liisa Seppänen (ed), *Kaupunkia pintaa syvemmältä. Arkeologisia näkökulmia Turun historiaan*. AMAF IX. Pp. 181–194.