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**SOME ASPECTS OF THE CERAMICS TECHNOLOGY
IN THE LATE MIDDLE AGES IN BELARUS**

Adding national flavor to agricultural tourist houses is connected with the question of traditional ceramics for national cuisine, which forms an important element of the local colour of the interiors. It's necessary to study the techniques of ceramics production. The technology includes questions of the molding compound composition, molding technique, baking methods and surface decoration. The molding compound of unglazed and glazed utensils of the 16–17th centuries. includes from 25 to 40% of additives: both natural (like sand, sometimes marl) and artificial (gravel or sand, sometimes chamotte). The pottery was formed on hand-operated (before the 16th century) or foot-operated potter's wheel. The items were baked in oxidizing, reducing or uncured oxidizing solution at a temperature between 700 and 900 C. For surface decoration scalding, engobing and glossing were used. In the Eastern region the inner surface was glazed, and the outer surface was covered with a layer of white engobe before glazing. In the Western region engobe was used for painting only. According to the application techniques, the ornament is divided into corrugated, stamped (carving method), moulded, painted, dimpled, notched and fingered ornamentation. Regional features can be noticed in molding compound composition, pottery decoration preferences or ornamentation.

Key words: molding compound, molding technique, baking, surface treatment, ornamentation system.

Introduction. In recent years, a lot of farmsteads have been created as a part of Tourism Development Program in the Republic of Belarus. Being close to nature isn't the only thing tourists seek, they also look for the opportunity to explore some national traditions and therefore farmstead owners try to create such opportunities for them. The easiest way to attract tourists is to get acquainted them with local cuisine. The second logical step can be to revive traditional ceramics technology which forms an important element of the local lifestyle of the interiors.

Tackling these issues requires a revival of not only a variety of forms of utensils but their styles. Therefore, it's necessary to study the techniques of ceramics production. This technology includes the molding compound composition, molding technique, firing methods and surface decoration.

Main part. Molding composition. Its composition is determined on the basis of visual observation of surfaces and fracture of the utensils, as well as petrographic analysis (the transparent section) and mass spectral analysis of the glaze. The composition of the molding material in the 14th – early 16th century was dominated by the addition of gravel. However, compared to the previous centuries, the dough was more thoroughly mixed and crocks on the fracture became more dense. In the 16th century, along with gravel, sand was used as mineral admixtures, which made the dish more dense and reduced its absorption. For example, the mass of the pot from Mir castle (the end of the 15th century) consisted of sand (10–15%) as a natural additives and gravel granite (10%) (potassium feldspar). In general, the ratio of clayey substance and additives in the ceramic items of the 16th and

17th centuries was between 70–75 and 30–25%. Up to 30% of additives was found in glazed utensils. After visual observation of breakings and unglazed surfaces of the ceramic items from the North-West region (Mir and Lida castles, Grodno), a small amount of sand and lime (marl) was noted in the molding composition. The petrographic analysis revealed the presence of natural additives in an amount between 20–25 and 35–40%. In addition, in the fragments from Golshany castle, a small amount (2–3%) of the ceramic material (chamotte) and artificial additives were found. Visual observation of the glazed fragments from Mstislav and Mogilev regions showed the same results. Petrographic analysis of ceramics showed that in the molding mass of utensils a sandy-silt additives as a natural component was presented in the amount of 25–30, but mainly 30–35 and up to 40% (3 fragment). In one case there was the presence of a slight amount (about 7%) of gravel, and in three cases there was chamotte. In the ceramic items from Mstislavl percentage of artificial additives reached 50%, however, equal distribution could be the result of mass compiling from of different types of clay, loam, where sandy loam could act as a non-plastic material. Comparison of the composition of the molding composition of glazed and non-glazed products has shown their extreme closeness. At the end of the 15th century scalding and engobing were implied to improve utilitarian and aesthetic advantages of tableware.

There were some differences in the way of additional surface decoration of glazed products of these regions. In that case, engobes were used. If the potters from the Western region used the engobe mainly for the production of decorative

ceramics (objects for decoration), potters from Mstislavl widely used engobe as a base coat under the glaze and as a surface coating. This refers to the production of glazed pots of the second half of the 17th century. The inner surface was glazed, and the external one was quite often covered with white engobe. The same method of pot production was used in Vitebsk and Minsk regions.

Molding technique. It is necessary to distinguish ceramic products that were formed on hand-operated or foot-operated potter's wheel. The ceramics made on a hand operated potter's wheel were formed in the technique of spiral-circular or circular sticking with the subsequent grinding (smoothing) of the surface or building up (pulling) of the upper part of the utensil.

Products made on the foot-operated potter's wheel were formed in the turning technique (drawing of clay). This method of modeling showed the parallel grooves from the fingerprints on the inner surface of the ceramics and also some marks of cutting from a wheel on the outer surface of the bottom. In Belarus the hand-operated potter's wheel was used in the 10th century, and foot-operated potter's wheel in the 16th century. Judging by the materials from the Western part of Belarus, foot-operated potter's wheel could be used like a hand one only for grinding of ceramics. The success of the mastering of molding techniques depended not only on the knowledge (a new design of a wheel), but also the properties of local raw materials.

Turning process is available only with plastic molding mixtures, where physical properties of additives allow at high speed to "pull" molding composition. But at the same the utensil must comply with the basic requirement of craft that is functionality (i. e. fire-resistant and water-proof). It is therefore not surprising that firstly these ceramics were not used for cooking in the kiln. This means that the first ceramics were glazed and tare ceramics. It became the experimental group for the development of new technology of glassware molding. Therefore, during the 16th century there were three processes in pottery: mastering of foot potter's wheel; searching for more plastic materials; new forms of tableware developing.

The excavations of the 16th century indicated a gradual development of ceramic technology. There was a parallel coexistence of unglazed ceramic products made on the hand wheel, and glazed products, made in the technique of turning (Polotsk) [2].

Archaic method of foot-operated potter's wheel was preserved in Poneman till the 19th century. Such method was used because of the properties of raw materials. Clay was fatty there and it required a large amount of mineral additives to be refractory.

Firing. Depending on the firing conditions, terracotta or gray ceramic is obtained. The latter is the result of incomplete fuel combustion at the final firing stage. The resin which impregnates the surface of the utensil gives a gray or black color. The resin has the same properties as glaze, it seals the surface of the utensil and enhances its watertightness. In case of insufficient firing temperature 2 or 3 layers of different colors can be seen on a break in the crock. In case of oxygen deficiency, the inner surface of the glazed utensil "closed mold" (e. g., coin jar) gets gray (smoky) color, while the outer surface (especially the unglazed bottoms) has a terracotta color. The archaeological fragments of the above utensils were based on the described characteristics.

According to the results of petrographic analysis, regional features can be noticed in the mode and temperature of fired products. So, the utensils from the North-West region predominantly were fired in an oxidizing medium. Only a fragment of the three-legged pans (16 – early 17th century) from Mirsky castle showed that the first firing was carried out in a reducing medium, and the last firing was in the oxidation medium. The firing temperature of glazed products was quite low (700–800°C).

As for the glazed and unglazed ceramic products from Mstislavl they were predominantly fired at a temperature between 800 and 900°C (only in one case the temperature was below). Among the 12 studied fragments from Mogilev 5 were fired in an oxidizing medium, 3 in a reduction medium and only 4 in an oxidizing one. The firing temperature was between 800–900°C.

The analysis highlighted two methods of firing of glazed utensils: in one and in two stages. During the first stage under a layer of glaze on the products of the first half of the 17th century was a gray layer as glaze prevented oxygen penetration, but it was enough inside the utensil (with the exception of a narrow neck forms). During the second stage the raw material is uniformly oxidized in the firing process and the color of the product was terracotta.

Surface decoration. There are 5 ways to decorate the surface of pottery:

- scalding (the hot utensil was covered with kvass or paste solution by pouring or dipping, followed by firing). As a result spots of different forms and colors (from brown to black) appeared on the surface of the product. Such ceramics are often referred to as "pockmarked";

- engobing (coating the surface with fine clay of contrasting color). This method of decoration has been known since the Iron Age. In Belarus engobe was also used as a primer under glaze and for painting. The latter may be either of a natural color (white, red) or stained by metal oxides;

– polishing (sealing the surface of the vessel and its decoration with a special polishers – bones or pebbles). The vessel was polished after drying before firing. After firing on the surface remained shiny marks. Depending on the firing mode, terracotta and glazed polished products are distinguished;

– glazing (coating the surface with the glassy layer of different colors). If the coating is transparent and the basic color can be clearly seen, we call it the glaze. Otherwise, we deal with enamel covering. The first glazed products were brought to Belarus in 10th century from Byzantium or Kiev. Local products (building materials) were made no earlier than in the middle of 11th century. Glaze color was green (the colorant was copper) or brown (the colorant was iron). The dishes of the 16–17th centuries had glassy and smooth layers. The vessels of the 18th century were covered with a thin layer of glaze (granulated). The color was often brown.

The Late Middle Ages pottery in Belarus was decorated mainly with geometric motifs (parallel ribbons, waves, lozenges, zigzag, sometimes squares) and rarer plant motifs. According to the application techniques, the ornament was divided into corrugated, stamped (carving method), moulded, painted, dimpled, notched and fingered orna-

mentation. Corrugated pattern could be applied with a stick or comb. Stamped pattern was applied with the help of different round stamps or a stamp-wheel (rolling method).

In different historical periods ornament performed different roles. In the late Middle Ages it was applied with the purpose of decoration. With the expansion of the range of ceramics, its ornamental system (ornament localization and application technique) was evolved for each type of vessel. Multi-row ribbons, wave, dimples and moulded rollers were used for unglazed ceramic wares. Carving, paste, panting were used for tableware. After carving method the most common way to decorate gray ceramics became the polishing one.

Conclusion. Thus, the study of the archaeological dishes (Late Middle Ages) showed a variety of artificial additives (gravel, sand or sometimes chamotte) in the molding composition of glazed, gray and terracotta utensils. To decorate ceramics, scalding, engobing, polishing, green or brown glazing methods were applied. The process of mastering foot-operated potter's wheel began in the 16th century. It was primarily used for the production of glazed pottery. Application methods, localization and composition vary depending on the technology and type of wares.

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