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International Scientific Conference**COMPLICATED ISSUES OF INCRUSTATION IN THE
TEACHING SYSTEM OF ARTS AND CRAFTS**A. A. Golobokov (a), E. R. Abdurazakova (b)*, D.A. Khvorostov (c)
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**Abstract**

Modern requirements and new benchmarks in the education system involve the need to train specialists in higher education with a broad educational outlook, creative thinkers that are corresponding to highly professional standards. In this regard, the article «Methodical bases of teaching students to the technology of florentine mosaic» is intended to work with students of the Department of Decorative and Applied Art in order to study and further apply the basics of mosaic technology in practice. The main aim is to study the history of mosaic art, the emergence of the method of Florentine mosaics, knowledge of materials, mineralogy, varieties mosaic techniques and schools of mosaics, technological differences of Florentine mosaics during its evolution, a description of the methodological principles of teaching practical development of manufacturing technology of Florentine mosaics, as well as a thorough description of the process of teaching students at universities of an artistic profile, the entire creative heritage of Florentine mosaic from its miniature, easel works to large-scale, large-scale interior and exterior mosaic paintings. Despite all the fashion trends in art that supplant ancient crafts from the life of a modern person, and Florentine mosaic continues to exist, delighting art critics, art and museum experts, appreciators of beauty, collectors lovers of natural semi-precious stones with their unique examples of mosaic craftsmanship.

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Keywords: Florentine mosaic, Pietre Dure, hard stones, Opificio delle Pietre Dure

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1. Introduction

Nowadays contemporary art has gone in a large format, in the grotesque, in the installation, performance, in the computer graphic technologies. Contemporary art is supplanting and, apparently, ideologically, has already supplanted all classical, ancient techniques of fine art from the art market. A certain surge in artistic activity and entrepreneurship in the restructuring and post-restructuring periods created the conditions for micro-renaissance within individual regions of Russia. This period created the preconditions for the activity of artists, including artists of the arts and crafts workshop. Craftsmen of bone carving, wood carving, artists working with metal, jewellers, stone cutters, enamel artists revived. The economic conditions and the art market at that time allowed the revival of the oldest Italian method Pietre Dure in the form of the Russian Florentine mosaic in Russia and specifically in the Far East of Russia. Nowadays Florentine Russian mosaics, variations of the method and mosaic techniques, schools continue to exist. However, they are extremely small in number and continue to decrease, closing forever. The new generation of mosaic specialists almost does not exist. The few masters of mature age do not pass on their experience. The purpose of this article is to record the current situation in this narrow segment of the applied arts. The historical continuity and transformation of the Italian Pietre Dure method into the Russian Florentine mosaic will be analyzed in this article. The technological, technical, mineralogical differences between the schools of the Florentine mosaic will be compared in this work.

2. Problem Statement

Having engaged in mosaics for about thirty years, having gained certain experience, we set several main goals in our creative search. The first one is to reveal to the interested viewer the beauty of stone material, its unique colour and structural capabilities, the properties of the colourful palette, the specificity of stone textures and the optical properties of stone. The second one is to find the ability and show in mosaic works the options for using stones, using their features in a stone panel, which mosaic elements can be assembled from a particular stone. The third one is to present in our works our vision of the world and offer the viewer our own creative concept of the topics that interest us.

The practical principles of the domestic method on the example of the author's school of Florentine mosaic, using of the twenty-years lessons learnt in this field will also be described and consolidated in this article.

3. Research Questions

The main research questions are related to the history of mosaic art, types of mosaic, methods of manufacturing but also to the description and to the process of teaching and learning of Florentine mosaic. Mosaic (French mosaïque, Italian mosaico from Latin (opus) musivum – work that is dedicated to the muses. There are works of decorative and applied art created by arranging, selecting and fixing coloured stones (smalt, ceramic tiles and other materials) on the surface (Grigoriev, 1968). There are several main types of mosaics differentiated by the technique: Roman, Byzantine, Russian and Florentine. By materials,

there are: stone, smalt, glass, mixed. By the manufacturing method, there are - direct, reverse, smooth (evenly polished), not polished.

The history of mosaic technology began in Mesopotamia and dated back to the second half of the 4th millennium BC. After that mosaic technologies were actively borrowed by ancient Greek masters. The first antique mosaics of the 8th-6th centuries BC were made from simple raw marine pebbles in ancient Greece. At first, such smooth, rounded pebbles were used to pave the floors without using ornamental compositions. Mosaics are transferred from the floor to the walls of buildings with the development of the mosaic method, the attainment of technological innovations, the spread of artistic crafts, the development of fine craftsmanship and storylines. The period of Hellenism (334 BC-30 AD) was accompanied with the blooming of culture and all spheres of life. Palace aesthetics became possible in the decoration of a house or a villa. At this time, mosaic occupies a status and a leading role in the interior. The presence of a mosaic in the villa testifies to the wealth of its owner, who was involved in the world of high Greek culture. During the archaeological excavations in the city of Pella, the capital of the Macedonian kingdom, four floor mosaics of two private houses of the Macedonian elite were discovered. Two mosaics of the so-called «House of Dionysus» covered an area of 3,169 square meters and two mosaics of the «House of Helen's Abduction» with an area of 2,350 square meters. These were mosaics of the highest level of realism, with the use of new technological methods. The mosaic stones were sorted by size, pressed tightly to each other, and here also a colour was used, as well as the volume of the depicted figures that had not been previously. That was achieved by the fact that the master Gnosis, who created those mosaics, guided pictorial counterparts, but not to red-figure vase painting with its two-colour solution and flat image. For the first time in the history of mosaics, Gnosis left his author's autograph «Gnosis made» on its surface. Pella mosaics are the top of pebble mosaic art that will be replaced after a while with natural-coloured stones processed by a certain technological method. For many years, ancient masters had been looking for the improvement of the artistry of mosaics and the achievement of realistic rendering of images. In the process of folding the mosaic, the rounded shape of the gravel did not allow the stones to adhere well to each other. That is why separate pieces of stones for a tighter connection and abutment are begun to chip, removing the rounded side. And with the passage of time four-sided chipped stones appear. And then a cubic mosaic module appears which will be called a tesserae. Tesserae mosaic will reach unprecedented levels in mosaic art due to the possibility of using a cubic module of various sizes and colours. It is this method that made it possible to achieve maximum mosaic detail and brought it closer to the heights of realistic painting. In ancient Rome, as well as in Ancient Greece, the fashion for the luxury of mosaic art continued, that is why the continuity and traditions developed further (Gebhart, 2010).

Roman mosaic built on the achievements of modular mosaic, it was already tesserae, made from small cubes of various types of stones and very dense muted coloured glass - smalt. Roman mosaic became a special type of mosaic, got its own name and was fixed in the history of art by a certain technical methodology. In terms of technique, the Roman mosaic is the most accurate and detailed in the pictorial part, as it consisted of small fragments-pieces of tesserae. The colour tesserae of Roman mosaic were supplemented later by marble, limestone, slate, semi-precious stones and later coloured smalts. Three types of techniques were installed according to the size of the tesserae and the method of laying the tesserae on the mosaic panel. Opus tessellatum- is a mosaic with tesselling dimensions over 4 mm. Opus vermiculatum

– is a mosaic with tesserae size less than 4 mm, this is the most detailed technique with the smallest details. Moreover, stone pieces and smalt in this method are collected one by one along winding lines. *Opus regulatum* is a mosaic with tesserae of the same size and shape, laid in even lines, like brickwork.

Byzantium became the legal successor of the Roman Empire that collapsed in the 4th century and retained the technical methods of Greek and Roman mosaics. With the development of Christianity, the mosaic masters of the Byzantine Empire removed the utilitarian sound of the mosaic and transferred it to the category of cult significance. Byzantine mosaic had passed into the category of monumental, cathedral, temple. Spiritual, religious meanings were incorporated into it, this fact changed the pictorial concept of mosaic works. The mosaics of Byzantium lost their realism; they bore a more generalized character of modeling the spiritual world, where the main characters were not ordinary people, but Christian saints. Byzantine mosaics are monumental canvases that are made on the walls and domes of cathedrals. Technically, they were laid out unevenly, what created additional perception effects. It had a terry velvety and was calculated for a certain distance when it was examined. The types and samples of smalts that were created by Byzantine craftsmen remained unsurpassed for a long time, the secrets of production were strictly kept and not disclosed. When smelting the same amount of smalt ingredients, their equal mass, the same chemical additives, the same temperature regime, the same furnace, a new shade of smalt is inevitably obtained. Smalts were prohibited from being exported outside the Byzantine Empire. Byzantine craftsmen developed the technology of gold and silver smalt. For this, a gold leaf substrate was added to the transparent smalts. These kinds of gold smalts served as a background in mosaic icons, creating a deep golden glow reflecting off the walls where the icons were located.

On the territory of Russia mosaic art arose much later, in the 10th century. In Russia (in Rus), the mosaic appeared with the adoption of Christianity, but it did not gain distribution because of the high cost of the material that was imported from Constantinople. Then the production of glass smalt was established in Kiev. It caused the flourishing of mosaic art.

Later, with regard to the Tatar invasion, contacts with Byzantium were interrupted. The Byzantine Empire fell, and mosaic art was forgotten until the 17th century when M.V. Lomonosov revived that method for Russia.

In Russian history the development of mosaics is associated with the activities of M.V. Lomonosov. He was the first great Russian world-class natural scientist. He is the founder of scientific navigation and physical chemistry. He is a historian, poet, artist, encyclopaedist, chemist, physicist, geologist, astronomer, metallurgist, geographer, a universal person who developed the smalt mosaic technology in Russia and materials for it. M.V. Lomonosov developed his own brewing of the so-called solid glass-smalt, a material of unique beauty that is excellent for artistic purposes (Makarov, 1950). After M.V. Lomonosov's death, the mosaic art in Russia was forgotten for a hundred years, although the entire technological process of brewing smalt, recorded by M.V. Lomonosov, was survived. In the 1840s, the question of transferring paintings and icons of St. Isaac's Cathedral (the largest in Russia) into more reliable material arose. In a wet climate of St. Petersburg, built on a swamp, the frescoes crumbled even before the end of the painting, and where the paint held, the image quickly turned black and dim, the picturesque canvases of Bruni, Nef, Bryullov, Basin began to mold. The Russian government had to send the graduates of the Imperial Academy of Arts V. E. Raev, E. G. Solntsev, I. S. Shapovalov, S. F. Fedorov to Rome in order to study with the

masters of the Vatican Mosaic Studio. On the other hand, glass maker-technologists were invited from Rome to St. Petersburg to organize the production of smalt. In 1851, Russian students returned to their homeland, by the same time the Italians had already organized smalt production for Russians. That year is considered the date of the opening of the Mosaic Workshop of the Imperial Academy of Arts. There are 62 mosaics in St. Isaac's Cathedral. The mosaic work began in 1851 and continued until 1914. It was lasting for 53 years. The icons of the main iconostasis were replaced with mosaic copies. To convey the richness of painterly colors, smalts of more than twelve thousand color shades were applied.

From 1883 to 1907, the Cathedral of the Resurrection of Christ or the Church of the Savior on Spilled Blood was erected in St. Petersburg, in memory of the attempt on life and murder of Emperor Alexander II. The interior of the cathedral is a real mosaic museum, the area of which is 7065 square meters. The mosaic was created in the studio of V.A. Frolov based on sketches by V.M. Vasnetsov, M.V. Nesterov, A.P. Ryabushkin, N.N. Kharlamov. The mosaic exposition of the Savior on Spilled Blood is one of the largest collections in Europe.

Another important definition of a mosaic set is the so-called «Russian mosaic» that appeared in the 19th century, after the fixed technique of joining small plates of stone, for example, malachite, into large planes of walls, columns, bowls, while preserving the natural pattern of the stone, what created the effect of a large cut from the array.

Special conditions for the development of Florentine mosaics were formed back in Catherine's times, when the St. Petersburg Academy of Arts established close cooperation with Italian masters. Students-stone-cutters were sent to Italy to learn the secrets of mosaic art. Since that time, the term «Florentine mosaic» has been consolidated in the cultural field of Russia and has become an indispensable part of Russian applied art.

Florentine mosaic Pietra Dura is translated from Italian as a «hard or solid stone». Pietre Dure is the plural meaning of «hard, solid stones», that is why both found terms are correct in the technical literature. In the field of English language, it sounds like «hardstones». In the Italian language, this terminology covers all the peaks of stone-cutting art - stone mosaics, engraving and ornamental artistic stone carving, in the form of three-dimensional objects. In modern life, the frequently occurring English, Russian and international term «Florentine mosaic» was developed and applied to the tourism industry, but it has come everywhere into life as the name of the mosaic process. In the Italian language, there is a word «Commessò», which is closer to the Florentine method, translated as a mosaic made of marble (stone) (Giusti, 2007). The term «Commessò» implied Pietre Dure mosaics (marble and other hard stones) and meant the required hardness and durability of the materials used in that work. It also implied the technique of creating pictures from docked together thin plates of brightly colored semi-precious and ornamental stones (Vipper, 1953).

The Florentine Pietre Dure mosaic originated in the late Renaissance at the end of the 16th century. The first copy Pietre Dure was described in the end of the 14th century in Florence. It was ordered by Duke Francesco Medici I, who hired several famous Italian Mannerist painters to design and execute commesso mosaics. After that, Pietre Dure and commesso were widely produced. In 1588, Francesco's successor, Grand Duke Ferdinando de 'Medici I, established (Opificio delle Pietre Dure) a permanent workshop for the production of hard stone mosaics. The first group of artists, that was hired by Duke, improved the

method and included its technical foundations. The efforts in the workshop were initially directed towards making stone decorations for the family funerary chapel, that was begun by the Medici in the church of San Lorenzo in 1605. Nowadays the work of the Florentine mosaicists, who worked from the 16th century to the 19th century, is highly valued and is in great demand in the art markets of the world. This is confirmed by sales results from leading auction houses such as Christie's and Sotheby's. This method was developed in Florence in the period of the late Renaissance at the end of the 16th century, and therefore received the broader trade name - Florentine mosaic. The first stone details for inlaid furniture, and then separate independent stone paintings, were made of marble, a soft material that was easy to work with and had a rich palette of shades. Subsequently, the most common stones for mosaics were agates, quartz, chalcedony, jasper, granite, porphyry, petrified wood, lapis lazuli and marble. All these stones have a wide range of colours, and they provided an almost limitless range of colours in colour transitions together. The stones listed above, with the exception of marble and lapis lazuli, are «hard stones» or stones that are between feldspar and diamond according to the hardness scale. At the beginning of the 19th century the hardness scale was developed and officially approved by the mineralogist Friedrich Moos. Apparently, in the 16th, 17th, 18th centuries Florentine craftsmen classified all stone structures as «solid» or «hard», in comparison with the properties of softer materials, for example, wood, because sea shells were also actively used in mosaics, corals, amber, which are not fully hard materials and are not stones. Comesso mosaics were mainly used for countertops, small wall panels or trim pieces for expensive furniture. Plots on them varied from symbolic and floral still lives to landscapes. A lot of them were executed with such painstaking care and such sensitivity to the picturesque possibilities of colour and shades of stones that they began to compete with picturesque paintings in their detailed realism. Pietre Dure, in essence, was created as a stone marquetry, with a carefully elaborated unique technology for cutting stones and subsequently creating a stone cutting industry closely linked to the techniques of jewellery technique. It also came to be considered as a sculpture, as its three-dimensionality was achieved with the help of carved bas-relief and convex figures (Efimova, 1997). The traditions of Pietre Dure originate in the mosaic technologies of Ancient Greece, and then of Ancient Rome. This can be seen in surviving examples in architecture, where mosaics were used on the floors and walls of the buildings.

In the Middle Ages, Pietra Dura was used on floors, small plaques and columns in compositions of memorial altars and tombstones. Insertions of different colors and types of stones in geometric or floral patterns were used. In the Italian late Renaissance, this technique was used to create images in the interiors of buildings and was lifted from floor to walls, and then transferred into a separate small mosaic panel. The Florentine masters most fully designed the form of Pietre Dure and began to consider it as an example of «painting in stone». So, Domenico Ghirlandaio chose the most accurate definition for this method, as «Pittura l'Eternita» - the meaning is «an eternal picture» or «a picture for eternity» (Perlmutter, 2016).

The main material of the Florentine Mosaic is natural stone, therefore, to understand this method, it is necessary to get acquainted with some of the physical properties of natural stones. It is important for a stone mosaic master to know the hardness of the processed minerals, because the hardness of the stone primarily depends on the complexity of its processing (how much time and efforts will be spent on processing the mineral, what tool will be needed, how is better to «open» to grind and polish the stone). And, hardness is also very important for precious stones because it is the hardness that determines the

durability of the gem. Moreover, the durability of the polishing of the stone depends on the hardness (in such cases, it is said that the stone «holds well and keeps polishing for a long time») and its shine.

After getting acquainted with the history of mosaic art, students should master the knowledge of the phased work, get acquainted with the equipment for the manufacture of Florentine mosaic, as well as the technology of its manufacture.

EQUIPMENT AND WORK STAGES

1. A large sawing machine (diamond disc with a diamond content in the bronze edge 200x160, diameter 400mm, 500mm). Industrial oil I-76 or organic oils are used as a coolant, with the addition of diesel fuel in a ratio of 1/2, 1/3, one to three, depending on the viscosity of the oil. This machine is designed for rough sawing any stones, with a hardness of up to 9 units on the Mohs scale. A stone or stone block with dimensions 120x150x200 mm is fixed in the vice of the machine, and then plates of a certain thickness are sawn from the stones. For mosaic, the preferred plate thickness is 3mm. It will also be needed an eraser and sketch paper.

2. A scoring machine. It is designed for trimming plates and cutting curved mosaic parts. It works on water with the usage of a 200-250 mm diamond blade.

3. An Adjusting machine (diamond plan-washer with a diameter of 200 mm, with a diamond edge-field 20 mm wide and a diamond content in the bronze edge 200x160, or abrasive wheels of different grain size).

4. A surface grinding machine with cast iron faceplate for grinding mosaic and its details. There used a loose abrasive powder with water. Coarse grinding is carried out with abrasive micro powder No. 9.10. Grinding is carried out with medium abrasive powders No. 40, 28.

5. A drill machine (dental, jewellery or technical machine) with a straight tip, for high-precision processing of small mosaic details and their fine fit (adjustment) to each other. There used diamond or abrasive burs' tips, milling cutters of various profiles, as well as diamond micro saw blades. It is an efficient tool that develops a high speed of the cutter or bur, with a regulating foot pedal.

6. A grinding manual machine for finishing and polishing mosaics. Preliminary finishing of the mosaic is done with diamond-containing flexible rubber discs. With a diamond content of 200, 400, 800 units. Polishing is carried out with rubber discs with a diamond content of 1500, 3000 units. Lapping and polishing are carried out when the mosaic surface is sufficiently wetted with water and at speeds from 3000 to 5000 rpm.

4. Purpose of the Study

The first aim of the work is to record the current situation in this narrow segment of applied art. The second aim is to analyze the historical continuity and transformation of the Italian Pietre Dure method into the Russian Florentine mosaic. The third aim is to compare the technological, technical, mineralogical differences between the schools of the Florentine mosaic. The fourth aim is to describe and consolidate the foundations of the domestic method on the example of the personal school of Florentine mosaic, using the gained experience in this area.

5. Research Methods

As a basic methodological principle of the research, a combination of historical, problem-logical, typological-systemic and comparative methods was chosen. Art criticism methods are used: formal, stylistic, semiotic-hermeneutic. They are used as fundamental - the iconological method of interpretation.

6. Findings

In the process of the research the following conclusions were made: natural selection and survival conditions in the wild forced a person to use the natural materials around him that are suitable for performing simple and complex everyday tasks. The first objects used by man were sticks and stones. There were stones for processing various tools of labour, everyday life and weapons. For example, spearheads and arrowheads were made of sharp volcanic glass, processed with river silicon and silica sand. Household tools, human housing was improved, religious buildings were erected. There also came a necessity for the creation of ritual amulets and home decoration. Mystical amulets, totems were the first jewellery, for which rarer, valuable materials were used, including transparent, translucent, coloured, striped natural gemstones. People paved the floors in their homes and decorated the walls with larger coloured stones, for instance, river pebbles. These were the origins of the appearance of jewellery and the simplest mosaics that are still accompanying humanity to these days and evolving with our development. At first people learnt how to process soft stones, if the strength and abrasion resistance of the processed stone was lower than simple sand. They also used sea and river sand, as well as natural emery containing corundum grains. Large, workable, not hard stones were sawn into blocks for the construction of temples and dwellings using the most common material in nature - quartz sand. Small beautiful transparent gemstones were treated with natural emery, both with abrasive and polished quartz sand. For example, the masters of antiquity created beautiful carved gems with portraits of their contemporaries from the river striped carnelian, consisting of milky white and brown stripes (Belitskaya, 2016). As the original rough cutter, the craftsmen used diamond. As a grinding abrasive, the craftsmen used crushed corundum-emery and ordinary quartz sand. While polishing, craftsmen used natural horsetail, containing an excess of silica. Since ancient times people have used semi-precious stones, protecting themselves with amulets, decorating themselves, expressing their individuality, asserting their social status. The same reasons formed the basis for decorating their houses, giving them distinctive elements of interior and exterior decor using stone, both building and decorating material. Human religiosity formed the basis for the creation of religious buildings to worship gods, assert their significance for humans and glorify their exclusivity. All these elements were the preconditions for the creation and development for this kind of an art form as mosaic. In addition, this article describes the part the method of working with natural gems, which has been developed and improved for 25 years in the studio of the Florentine mosaic by Anatoly Golobokov. The development of a conceptual design is taking the available stone color palette into account. An individual sketch is made with watercolors or other paints. The prepared sketch can be enlarged or reduced with the help of duplicating techniques. If a group of masters is working on the project, multiple copies will be prepared. The sketch can be laminated with transparent sheeting for preservation while interacting with the stone details of the mosaic. The project must be divided into its component mosaic parts. With the help of pencil tracing paper or dacron (lavsan) matte

sheeting, masks are made along the contours of these parts. The cutting of the stone plate is made taking the cracks in the stone, rationality and economy into account. It is best to connect the mosaic parts along a curved or conjugate line. Straight lines of connection in a mosaic are always visible, sometimes they are eye-catching, what reduces the aesthetic perception of the work. The selection of a stone occurs in the search for effects, volumes of the desired detail. It is achieved by selecting a good stone-colored material with a color stretch in the stone plate, the so-called color transition. The most expressive material for this is jasper. Ural jasper stones contain various combinations of colors and color transitions from one to another. These properties of the stone are used by experienced mosaic craftsmen. Sawing of parts is carried out with the help of a scoring machine. Then the two parts are fitted to each other using a trimming machine and a diamond washer. The final fine fit (adjustment) is completed using a drill or hand-tipped machine with diamond or abrasive burs of various profiles. The joined parts are hot glued with epoxy resin. For this, the gluing of the mosaic parts is carried out on a hot electric plate. A stone, preferably granite platform slab 400x400mm, 30-40mm thick, is installed on the tile for equal temperature distribution from the heating centre to the periphery. With the help of epoxy resin, the use of special glossy paper on a wax or plastic base allows you to successfully and quickly connect the mosaic parts to each other on a hot plate. Gluing of mosaic pieces is carried out on the front side, holding the pieces on plastic paper and with a little pressure from above. The result is a fast (within 15-20 seconds) perfect connection of parts. Smooth seams that are well spilled with epoxy resin and connecting parts, allow you to firmly hold dozens of parts and process them. If it is necessary, you can increase the mosaic area. The preparation of epoxy resin is carried out in the required quantities (in accordance with the need) at different stages of work. The approximate proportion is one part of hardener to three parts of resin. For a more inconspicuous connection of parts and dissolution of the connecting seams, the resin is tinted with coloring pigments. Conventional oil paints are used successfully. The color pigment is separately prepared, the exact color is carefully selected. Pigment is added to the resin only after the resin has been combined with the hardener and the quality of the resin has been checked. The pigment is added in minimal amounts so that the oil paint does not weaken the properties of the resin. Then the parts of the mosaic are enlarged and connected to each other, until the final completion of the mosaic set in according to the sketch. The prepared top layer of the mosaic work must be grinded (co-grinded) with coarse, medium and fine abrasive powders on the cast iron washer of a large grinding machine. Grinding (co-grinding) is carried out in order to remove unevenness between mosaic details, remove traces of epoxy and create a perfect smooth and even surface. After that it is necessary to prepare the top layer of the mosaic for connection with the mosaic base. Ordinary 4 mm thick glass panes are perfect for the mosaic base. Glass has a coefficient of expansion that is equal to stone samples. Therefore, in the future, the mosaic does not undergo any deformations, is resistant to aggressive environments, retains its qualities for many years, and is almost eternal. After grinding, abrasive powders, stone plates and mosaic details always have a dull, matte, «grey» tone because the stone surface is abraded during abrasive grinding and, it looks as if it is «dried». It becomes necessary to constantly wet the surface of the polished mosaic to return the stone its' true colour in order to correctly navigate selection of stones in the further. An effective way to improve this process is the use of ordinary everyday baby cream. Thanks to the oils that are in its structure, baby cream allows a stone to return to its true colourful properties. The stone is soaked with the greasy base of the cream, its colour structure is restored and the stone becomes as

if it is polished. There are grinded (co-grinded) mosaic and prepared glass. The back reverse side of the mosaic with glass is the basis for the successful connection of the mosaic with glass. Smooth glass is polished with coarse abrasives until a rough and matte surface is obtained. The epoxy resin is prepared in a one third of a ratio, one part of hardener and three parts of resin. You can add a small amount of colouring powder to the resin. This non-transparent resin will hide the back of the mosaic and will look more aesthetically pleasing. The resin is applied to the matt glass base and to the mosaic stone part, then it is left for a while. After the resin has acquired a viscosity, both halves of the mosaic are connected, removing excess from the edges. The mosaic that is glued to the base is ready for final fine grinding and polishing. Special attention should be paid to the tight connection of the mosaic with the glass base. There should be no space between them. After polishing, the baguette (molding) is selected according to the stone aesthetics of the mosaic work. The past centuries have not influenced the Florentine method of the Pietre Dure natural stone plate mosaic. Fundamentally, neither the technical equipment nor the technology for creating stone panels in Italy has changed over the past years. The founders of the method firmly adhere to their previous positions of manufacturing parts without using electrical energy. These principles of technology allow Florentine craftsmen to combine mosaic elements just as accurately, quickly and efficiently. The Russian changes in technology, using electricity, have not fundamentally changed the method, have not accelerated and have not increased the productivity in the manufacture of parts (Giusti, 2006). Nevertheless, we can notice that the technology of connecting the elements to epoxy resin, instead of rosin-wax mastic, shows in general greater reliability and durability of mosaics. There are several basic ways to install mosaics. The direct method is when the cut parts are laid on the basis of the mosaic, for example, on glass. In this case, after the end of the installation, the parts along with the base are spilled and fastened with epoxy resin. The thickness of the used stone plates is different, that is why with the direct method the front surface of the mosaic often comes out with differences in height. Sometimes these differences are quite large. Coarse grinding (co-grinding) of such a surface takes more time and effort. This kind of grinding rather intensively removes the upper mosaic layer. And in this case the nuances of the transitions of the stone are lost. It is difficult to follow this process. Therefore, workers try to prepare stone plates of the same thickness as much as possible. There is a reverse way of laying the mosaic pieces, it is face down. A flat front side is obtained in this method. However, it is very unprofitable to work with this method, since the master does not see the full-fledged process of the development of the work, connecting the details blindly. This method is most suitable for abstract, large-detailed mosaics. The direct method has several advantages. It is relatively fast, it provides the ability to work across the entire mosaic canvas, in different places, what allows you to always adhere accurately to the sketch and the entire project. However, the direct method has limitations during the process of making very fine mosaic details. For example, it is practically impossible to prepare a piece of stone less than a millimetre thick with a complex curved shape (Popova & Sarabyanov, 2017). Therefore, a free method of joining (connecting) parts and building up a mosaic was developed with practical skills. This free method is based on joining stone pieces outside the base, on which mosaics are usually laid and fixed. These pieces are permanently fixed with epoxy resin with the special gluing and are in the hands of the mosaicist. Fixing (gluing) is done on a hot stone slab as it was described above. The nodes (knots) and details of the mosaic are built up, fastened together in accordance with the sketch, levelled with light grinding, and then laid out on the front side and finally connected (Gebhart, 2015). The result is a rather

fragile stone part of the mosaic without a base. The basis for the mosaic is being prepared at the same time. Usually it is glass of 4 mm thickness. For mosaics with an area of about 50 square decimetres, that is up to half a square meter, a glass of 4 mm thickness is optimal. Thicker glass increases the weight of the mosaic. It is not recommended to use glass less than 4 mm, as it almost always cracks. As it was mentioned earlier, glass has a coefficient of expansion that is equal to stone specimens and that is why glass is an ideal mosaic base. The glass must be processed, grinded with a coarse abrasive. The gloss must be removed and the pores of the surface must be opened too. In this case the epoxy resin, that connects the two parts of the mosaic, glass and stone, penetrates into the pores of glass and stone, reliably joining them into a single inseparable whole. This mosaic method makes it possible to process stone mosaic parts that are bonded with epoxy resin. These kinds of parts can be trimmed, sharpened to any minimum thickness and curvature. Mosaic masters often combine the straightforward and free way of making mosaic panels, using the advantages of both methods (Massinelli, 2015).

7. Conclusion

To sum up, it should be noted that the past centuries have not influenced on the Florentine method of the Pietre Dure natural stone plate mosaic. Fundamentally, neither the technical equipment nor the technology for creating stone panels in Italy has changed over the past years. The founders of the method firmly adhere to their previous positions of manufacturing parts without using electrical energy. These principles of technology allow Florentine craftsmen to combine mosaic elements just as accurately, rather quickly and efficiently. Russian changes in technology, using electricity, have not fundamentally changed the method, have not accelerated it and have not increased the productivity in the manufacture of parts. Nevertheless, it can be noted that instead of rosin-wax mastic, the technology of connecting the elements to epoxy resin shows greater reliability and longevity of mosaics in general. Questions about the search for themes and the development of author's solutions when designing mosaic plots still remain. This problem is common for the Italian and Russian masters of the Florentine mosaic. It is necessary to note that small mosaic workers do not have these kinds of problems. These masters work freely, widely, brightly, revealing their creative artistic potential, creating modern contemporary compositions, applying and using volumetric plastic forms and the whole arsenal of modern creative means. Possible reasons for the current situation are in the absence of art education among Florentine mosaic specialists, conservatism in the choice of themes and approaches to design. People can and must fight with the reasons for the present decline in the creative development of the Florentine mosaic. First and foremost, it can be realized by widely promoting this unique method, by organizing special competitions, regional, national and international exhibitions. A detailed, qualitative study of the artistic profile of the entire creative heritage of Florentine mosaic from its miniature easel works to large-scale interior and exterior mosaic canvases is appropriate. The preservation of the domestic method of Florentine mosaic has great moral importance, as it seems to be significant element of the Russian cultural heritage. The very fact that the mosaic Florentine style, that was originated in the late Renaissance, reached through the centuries both the middle zone and the outskirts of Russia in the Far East. And nowadays, despite all the fashion trends in art, Florentine mosaic continues to exist, delighting art critics, experts, connoisseurs of beauty, collectors and lovers of natural semi-precious stones with their unique examples of mosaic craftsmanship.

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