
INNOVATIVE TECHNOLOGICAL METHODS AND TECHNIQUES TO REVIVE THE ANCIENT EGYPTIAN GLASS-MAKING HERITAGE

Nevin Saad Al-Din Abdel Rahman SALEM *

Department of Glass, Faculty of Applied Arts, Helwan University, Egypt

Abstract

The glass industry is considered one of the most important features of the traditional Egyptian handicraft industries, especially what bears the ancient Egyptian heritage, because this heritage has established the foundations and principles of many modern glass technologies such as casting techniques and techniques for reforming glass free, in addition to the aesthetic and heritage values it bears distinctive industries that qualify them for Small heritage. In light of globalization and international agreements and the conquest of Egyptian markets with international glass products that are not commensurate with the Egyptian thought and heritage, there have been no serious scientific attempts to benefit from the ancient Egyptian glass industry, technically and aesthetically, and this is what the research focused on how to revive this heritage, which is distinguished by innovative glass techniques and methods by forming For traditional glass products such as charms, amulets and utensils, which suit the level of small craftsmanship and reach a high level of quality that is competitive in the global market. From here, the research problem arose in the need to revive the ancient Egyptian glass industry heritage with innovative techniques for heritage glass products suitable for small heritage industries, leading to the research goal of creating modern technical methods and methods using glass pastes to form glass products to revive the ancient Egyptian glass industry heritage, and for which research appears in the ancient Egyptian glass industry. With the ancient Egyptian glass industry heritage to compete not only at the local Egyptian level but also at the global level, the research assumes that by studying and analysing the techniques of the ancient Egyptian glass industry and taking advantage of the glass paste forming techniques that were reached in previous research. 2 Technological methods and methods for forming pastes can be devised Glassware carrying the ancient Egyptian glass heritage, such as amulets, medallions and utensils, which are suitable for small traditional crafts industries. The research has reached some results, including: The analysis of the forms and methods of production of ancient Egyptian glass products through historical development can be used in devising technical methods and methods of forming with glass pastes to form amulets, inlays and utensils

Keywords

Innovative, Technological, Techniques, Revive, The Ancient Egyptian, Glass-Making Heritage.

Introduction

The ancient Egyptian excelled in many areas of life, and he was at the forefront in many industries and arts, including the glass industry, as he was the first to lay the foundations for them and invented many techniques for that industry such as casting, forming on the solid mold, forming columns and many others, despite The presence of many ancient Egyptian glass monuments found in Egyptian and international museums, which are a testament to the greatness of the ancient Egyptian and his precedence in this field, to the fact that there is no study that effectively focuses on the ways of its neighborhoods again with innovative technical methods and methods suitable for small heritage industries, as the traditional technical methods It requires a lot of time and effort and in the end it depends mainly on the production of a single piece of art, while small industries need to increase production and save time and effort through

* Corresponding author: appliedarts@a-arts.helwan.edu.eg

modular production, which helps to develop their marketing effectiveness and their ability to compete in global markets.

From here, the idea of research emerged in creating technical methods and techniques using various glass pastes to form glass products bearing the ancient Egyptian glass heritage suitable for small industries production, and thus the research problem arose in the need to revive the ancient Egyptian glass industry heritage with innovative techniques for heritage glass products suitable for small traditional industries. The research is devising modern technical methods and techniques using glass pastes to form glass products to revive the ancient Egyptian glass industry heritage, and the importance of research is to promote the ancient Egyptian glass industry heritage to compete not only at the local Egyptian level but also at the global level. 3) Technical methods and methods of forming pastes for glass products bearing the ancient Egyptian glass heritage, such as amulets, inlays, and utensils, are suitable for the small traditional artisanal industries. Products bearing the ancient Egyptian glass heritage, and that By studying the forms and techniques of ancient Egyptian glass that were produced before the invention of the blow tube in the Roman era, for their suitability with the techniques of manual forming with glass pastes, and thus the research study axes were as follows:

- The historical development of the ancient Egyptian glass industry.
- Forms of ancient Egyptian glass products.
- Innovative methods and methods for producing ancient Egyptian glass using glass paste.

The historical development of the ancient Egyptian glass industry:

The areas of glass industry in pre-Roman times were limited, and were confined to Egypt, Syria, Palestine, Iraq, Greece and Italy. The progression of glassmaking was the beginning of the polishing of ceramic and stone vessels in what is known as glazes. The discovery of glazes came by chance when it was observed over ceramic vessels that were prepared for fires and had a mixture of sand and natron on it, and the discovery of these glazes coincided with the use of calcium salts sand with soda to make Colored glazes on ceramic, and the Phoenician sailors worked to spread this industry along the Mediterranean coast. In ancient Egypt, in the fifth and fourth millennium BC, Egyptian ceramics made of silica, clay or soapy stone were polished with glazes that consisted of a mixture of silica, lime and soda, then they were colored with copper or copper bicarbonate and then this mixture was melted at a high temperature and then The surface of the torque is coated.

The emergence of pure glass as a separate material in Egypt around 2500 BC, during the dynastic period the glass was in the form of translucent glass beads, and in the ancient, middle and modern countries, glass appeared in the form of jewels, amulets and shapes of small

animals, where the glass beads were made during the reign of King Tutankham Amun 1350 BC, and glass was used as inlays with jewels, gold and precious stones, where the use of glass was mainly as a simulation of precious and semi-precious stones. The first models of glass studs dating back to the era of the First Dynasty were found in Abydos and were in the form of triangular pieces of transparent blue glass with a surface Uneven, studded on a wooden box bearing the name of the King of the First Dynasty (Mina), which is preserved in the Ashmolin Museum.

The glass industry developed to show more used glass products, namely, glassware. The manufacture of these vessels was more difficult than making beads and amulets, as they appeared in Egypt and Mesopotamia in the sixteenth and fifteenth centuries BC, the Egyptians at that time were highly educated. And the glass industry at that time belonged to the people only, beginning with the pharaoh, the priests and the nobles, where the amount was equal to gold, silver, lapis lazuli, and other gems, agate and jewels, so these glass vessels represented many on women's dressing tables as they were used as containers for perfumes, ointments, body oils and eyeliner. That aristocratic life in those ages provided a high value of glassware, as in the tomb of King Thutmose III (1479-1425 BC), glass vessels were found decorated with thermal paints, which are containers for perfumes, kohl, cosmetics, and fragrance oils, as well as large quantities of pots. Glass in the tomb of King Amenhotep III (1390 - 1350 BC) in Melaka, which is the most important site of the glass sites, as well as the Tell el-Amarna area, which was The new capital of Egypt was established by King Amenhotep IV or Akhenaten (1352 - 1336 BC), as Egypt at that period began exporting glass products to Greece while Britain and China were still in the Stone Age.

In the fourteenth century BC, glass makers in Egypt and Mesopotamia produced a variety of glass products, including beads, pendants, jewelry, amulets, and inlays on furniture and sculptural glass pieces, after that a chaos occurred that ended the Bronze Age civilization and did not revitalize again until the ninth century BC. The Egyptian and Assyrian glassmakers were the mainstay of all glassmaking techniques that were used before the invention of the blow tube.

- Forms of ancient Egyptian glass products:

A- Amulets

Ancient Egyptian glass amulets appeared in the form of scarabs, black beetles, seals and statues that were used as funeral deposits kept in the grave with the deceased for use in the afterlife, and at the beginning they were usually light blue and light concentrate with a slightly greenish tinge. The era of the modern state around the sixth and fifteenth centuries B.C. The light blue

color continued, as did the diversity and multiplicity of the colors of the glass, where new colors such as gray, yellow, and white with a yellowish or blue color appeared, and black, brown and orange were rarely used, as amulets continued in the Ptolemaic and Roman eras. That is, from the third century to the first century BC for some amulets dating back to those ages.

B - beads:

Beads in ancient Egypt had a very great value, and this is evidenced by the large numbers that have been found in tombs for various ages, as it was the preferred commodity in trade, and it was used in bartering with primitive peoples, and beads were used in necklaces, necklaces, bras, bracelets, earrings, and the manufacture of clothes by combining beads with each other. Some were weaves, and some pieces of this quality were found in Egyptian cemeteries.

Glass beads were known from the Fifth Dynasty, as it was an evolution of the use of glass as glazes. Among the important archaeological examples is a necklace of beads dating back to the Fifth Dynasty consisting of about 320 small beads of opaque black and blue glass alternately, and twenty-seven small beads were found dating back to the sixth navel. Its color is blue and dark green, and there are many wonderful examples of the modern state, such as large single beads with a blue color that date back to the late Eighteenth and Nineteenth Dynasties.

A group of glass beads was also found in Kom Ushim, dating back to the third and fourth centuries AD.

C- Studs- :

One of the most important purposes of glassmaking in the past was the cheap imitation of gem stones, because gem stones were rare, and for this reason they were very interested in coloring the glass in different colors, so they used purple glass to simulate generous amethyst and green to simulate emerald stone and blue glass to simulate turquoise stone, crystal lapis stone Clear glass to simulate natural alabaster, pale green glass to simulate feldspar, and yellow and red glass to simulate jasper and agate.

Glass inlays were used to decorate gold ornaments, coffins and statues, such as those found in the relics of King Tutankhamun dating back to the Eighteenth Dynasty.

Some individual studs were also found, which are the beginnings of sculptural glass, as they were used with the dead and for burial purposes.

The manufacture of glassware is considered a major technical achievement, and in primitive times it was similar to ceramic pots in use as it is an individual production by artisans and artists. Glassware before the Roman era was rare and stored as treasures and sold at high prices, as it was owned by only the high-class classes of the people.

The glassware industry in Egypt began to spread and expand during the Eighteenth Dynasty

(1567-1320 BC), and technical achievement and artistic creativity continued beyond the Eighteenth Dynasty for many centuries and it was the most famous area in the manufacture of glassware in the era. Al-Qibal, Roman, Tell Al-Amarna, Thebes, Al-Kab, and Ashmonia.

The use of mosaic columns in the manufacture of glassware and gave it a distinct character, mosaic columns are those glass columns whose longitudinal or transverse sectors contain decorative shapes and are combined together to emerge as high-value decorative glass products, so it was the beginning or gesture of the decoration of the mosaic in the glass mosaic. The era of the modern state, when utensils with a veined surface were found in color with the original color in the tombs of the wives of King Thutmose III in the Valley of the Cemeteries of the Monkeys and Thebes al-Gharbiyya, as well as pieces of glass sultans were discovered in the tomb of King Amenhotep II decorated with drawings, some of them resembling chess pieces and others bearing geometric shapes. And the formation of mosaic vessels continued until it spread in the first century BC.

Results:

Thus, from the above, the following results can be reached:

- Creating technical methods and techniques to revive the ancient Egyptian glass industry heritage using glass paste.
- Using compound clay, such as clay clay, a temporary sculptural model can be made in ways, methods and tools that are easy to use and retain its shape and can be modified at any later time, in order to distinguish it with homogeneity and plasticity, which facilitates its formation by deleting and adding with sculpting tools, and through which small, detailed carving models can be made Minutes without cracking.
- Using silicone resin, it is possible to make easy-to-use pattern molds suitable for manual formation, in order to be characterized by high mechanical resistance, high thermal stability and ease of forming into molds that form all the subtle details of the model, no matter how sunken and has an under cut, as well as high flexibility after drying, which makes the pattern easy And finally, because it is easy to reproduce samples without being destroyed for a long period.
- Using ceramic paste, a number of models can be reproduced for the same shape, which facilitates the processes of adjustment and numerical production, because it is one of the strong clays that bear a temperature higher than the clay clay and is characterized by the ease of forming it to take all the details of the silicone mold and keep all these details after its exit, as well. Finishing and modifying the details of the shape by adding small quantities of water, and after that obtaining a permanent model by burning it so that it is possible to make other copies

of the silicone molds after the destruction of the original model or in the event of a desire to do numerical production.

- By using glass paste and gum arabic, sculptural forms can be executed on cold glass and burned in the oven without the use of molds and thus less time for fire, because they are easy to form cold in silicone molds, as well as to keep their shape throughout the fire period, and distinguish them by the purity of the fire, which does not cause the change of the color of the glass Significant change in user or shape.

- By mixing quartz with gypsum, a solid mold can be formed from available and easy-to-form materials in a typical way, due to the failure of the mold size to shrink significantly during the fire and thus break the glass, and this mixture is also characterized by the ease of forming the body of the mold as well as the ease of fragmentation after the fire from inside the glass bowl.

- Using glass paste and flour, the glass can be formed on the solid mold on the cold, to ensure that the glass does not collapse from the surface of the mold during the process of forming and decorating, and because it is easy and soft enough for formation.

- By using glass paste and artificial glue, decorations can be made and formed by cold forming, to distinguish them as elastic, elastic and thus easy to form to take the shapes of spiral columns.

Research Recommendations:

- Establishing a handicraft center to revive the ancient Egyptian glass industry heritage by using glass paste forming techniques, as it has the technical capabilities that are suitable for the manual numerical production of small traditional handicraft workshops.

- Paying attention to innovative scientific research and its development, which supports and develops small industries.

References

1. Alfred Lucas &, Ghanim, T.Z. (5491). Materials and industries among the ancient Egyptians. Cairo: The Egyptian Book House.
2. Nevin Salem. An Analytical Study of Pharaonic Glass Art and its Use in Designing Hand-Made Glass Products. Cairo: MA - Faculty of Applied Arts - Helwan University. (2002).
3. Nevin Salem, An Experimental Study for the Development of a Technology for Thermoforming Glass Powder Using Adhesives, The Fourth International Conference of the Faculty of Applied Arts - February 28-29, 2016.
4. Nevin Salem, New Techniques for Forming with Glass Paste Application on Artistic Models of Islamic Style, The Second International Conference of the Association of Arab Civilization and Islamic Arts “Interactivity between Human Civilizations” Luxor - 26-29 October 2016
- 5- Edward Dillon, M. (1907). Glass. London.

- 6- Goldstein, S. M. (1979). Pre Roman and Early Roman Glass. New York.
- 7- Grose, D. F. (1989). Early Ancient Glass. New York.
- 8- Neuburg, F. (1996). Glass in Antiquity. London.
- 9- Nolte, E. M.–B. (1997). Early Glass of the ancient world. New York.
- 10- Robert J, C.-H. N. (1980). Master pieces of glass. New York.
- 11- Robertson, R. A. (1954). Chats on old Glass. London.
- 12- Zerwick, C. (1987). A short History of Glass. New York.
- 13- Ghada Majid Muhammad JALALI, CULTURAL INDUSTRIES AND THEIR RELATIONSHIPS WITH PRESERVING THE IDENTITY, International Journal of Multidisciplinary Studies in Heritage Research, Vol. 1, No. 1, 2018, pp. 11-14.

Received: July 11, 2018

Accepted: September 30, 2018