Faience from the Indus Valley Civilization

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The artisans of Egypt, Mesopotamia and the Indus Valley were creating faience and glazes using several different techniques by 2600 B.C. (Vandiver 1982). While many techniques were similar, each cultural region developed its own styles of ornaments and technologies for producing them. Lesser known than those from Egypt and Mesopotamia are the exquisite faience objects produced by the first urban society, the Indus Valley civilization that existed in regions of modern Pakistan and western India between 2600-1900 B.C.

A wide variety of faience ornaments including beads, bangles and jewelry have been retrieved from the major ancient cities of Mohenjo-daro, Harappa and Chanhudaro, located in Pakistan (Marshall, 1931; Mackay 1938, 1943; Vats, 1940; Dales and Kenoyer, 1991). Modern Harappa, built over the mounded remains of an ancient city, is one of the largest sites of the Indus Valley civilization. While faience beads are found in the early levels at Harappa (recent excavations have uncovered a settlement dating to 3300 B.C.), the production of elaborate faience ornaments, figurines and vessels is more prevalent during the urban expansion of the Harappan Period, 2600-1900 B.C. (Dales and Kenoyer, 1991; Kenoyer 1991).

The ancient artisans of the Indus Valley civilization appear to have almost exclusively utilized efflorescence, a technique wherein the color of the glaze and the interior core are identical and the glaze is strongly bonded with the underlying body. Recent studies show that efflorescence itself has variations and can be divided into two processes based on how the quartz is prepared. In one process, the faience paste is made from powdered quartz combined with both flux and colorant. In the second

JONATHAN MARK KENOYER preparing frit for making faience ornaments at his experimental kiln in Harappa.

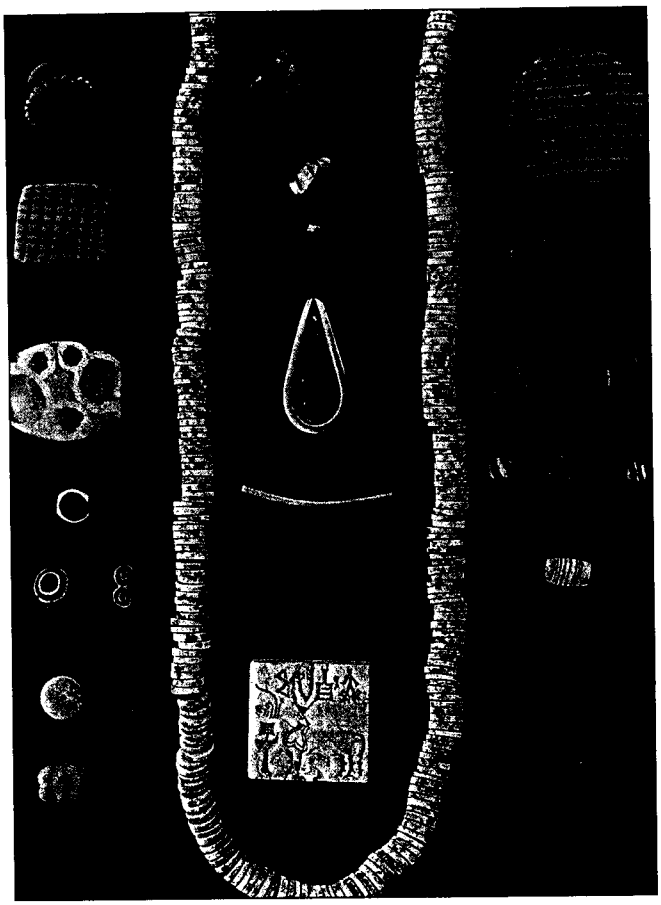
process, powdered quartz is partially melted with a colorant to produce a frit and then reground to a very fine powder. This fine glassy powder, already colored, is mixed with additional flux to prepare faience paste. Adding fine ground quartz increases the volume, but also results in a reduction of color homogeneity.

Faience objects made by the first process tend to have larger quartz grains (50 to 100 microns) and on close examination have a speckled color distribution. Under low magnification (20x) its granular character is discernible in objects where the glaze is eroded or where a broken edge reveals the object's interior core. This paste produced small glazed tokens as well as a wide variety of beads. A similar coarse grained faience was also commonly made in Egypt and Mesopotamia.

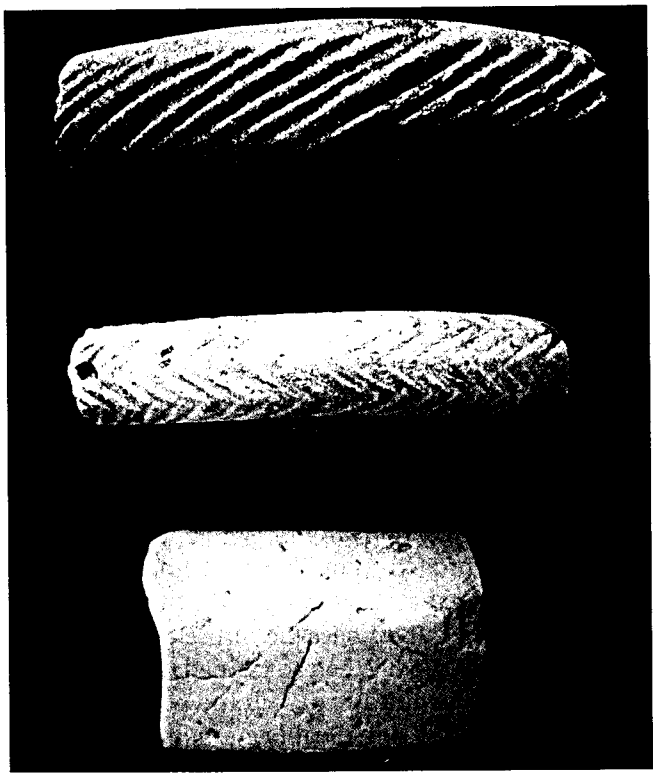
Most faience objects—bangles, tiny beads, miniature vessels and animal figurines—were produced using the second process, resulting in a homogeneous, compact structure with a high percentage of glassy matrix. No other region of the ancient world is known to have produced this type of glassy faience. Called compact faience (McCarthy and Vandiver 1990), it is made from a paste of extremely fine, evenly colored glassy powder that has a high percentage of colored glass and fine grains of unmelted quartz, with grain sizes of less than thirty microns (very few had particles larger than fifty microns). When quartz is ground to this size, the texture resembles talcum powder.

The discovery of white rock quartz and quartzite fragments at Harappa suggests it may have been a major source for silica powder used in making faience objects. Other minerals found in Harappan faience include alumina, sodium and potassium, and since these are not found in large quantities in natural quartzite, they must derive from the adhesive, flux or colorants that were mixed with the silica (McCarthy and Vandiver 1990).

The sodium and potassium probably came from two types of flux that are still used for glazing and glass production in South Asia. In traditional glazed tile technology and glass production of South Asia, the primary flux for melting silica is an alkaline ash derived from the burning of desert plants, generally referred to as camel-thorn [Urdu-*sajji* or *khar*; *Haloxylon recurvum, H. multiflorum, Sal-sola foetida, Suaeda fructicosa* (Rye and Evans 1976)]. Another type of flux used in glazing is a naturally occurring sodium carbonate/ bicarbonate, commonly referred to as natron (Urdu-*reh*). Traces of calcium in some Harappan faience may be due to calcinated bone or calcium phosphate, also a flux and probably a component of white faience, since *sajji* or *khar* creates a greenish-gray glaze.



HARAPPAN ORNAMENTS Turquoise colored faience ornaments and ear plugs were worn with agate and carnelian beads, deep blue lapis lazuli, gold and white fired steatite. *Photographs are courtesy of the author.*



HARAPPAN BANGLE FRAGMENTS Blue-green, yellow and white glazed bangles. Diagonal lines, chevrons or zig zag motifs are incised either while the paste is still pliable (blue-green bangle) or when it becomes firm (yellow bangle).

BROWN AND WHITE spiral banded faience bead with a poorly sintered glaze.

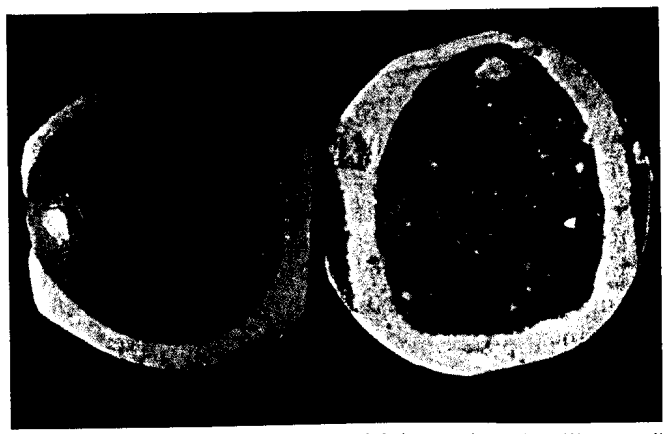
Copper, iron or manganese are also found in minute traces in Harappan faience and although they help to lower the fusion point of silica, their primary function appears to have been for color. Most faience of the ancient world, including the Indus cities, was colored with copper minerals to produce blue to blue-green glazes. However, the Harappans developed special techniques to produce glazes of pure white (from calcium), deep azure (from copper minerals), black (from manganese), yellow, brown and red-brown (from iron minerals) and brilliant red (colorant unknown). These glazes were usually used with one or more colors and reflect an intimate knowledge of the temperatures needed to melt silica as well as the atmosphere (oxidizing or reducing) for obtaining specific colors.

One important question about faience technology is the type of adhesive used to hold the ground quartz together during the forming process. In recent experiments by the author, numerous adhesives were tried, including honey, mustard oil, clay, gum of the *shisham* tree (*Dalbergia latifolia*) and gum tragacanth. *Shisham* gum proved to be one of the best adhesives since it did not shrink. It is possible the Harappans used no adhesive at all because of the extremely fine powder that was used. When combined with water and the soapy alkaline mixture of *sajji* and natron, the fine powdered quartz was malleable enough to form delicate shapes. Even in drying, the paste remained quite strong and it was possible to scrape and incise the surface with intricate designs.

Bangles were made from shell, copper and bronze, gold, silver, terracotta, stoneware and faience. Shell bangles adorning the left arms of women have been found in Harappan burials and terracotta figurines display bangles on both arms and are worn by men as well as women (Kenoyer, 1992). Only shell bangles were discovered in burials indicating that bangles made from other materials were either removed or broken at death, a custom still followed in parts of India and Pakistan.

Faience bangles, manufactured from compact faience, are much stronger than other types. Since many technical aspects of metallurgy and ceramics evolved from the need to make specific objects for ritual and ornamentation, it is possible that the compact faience technique resulted from experiments to make strong, well bonded faience bangles. Most likely made by preparing a coil of paste that was wound around a tapered mandrel, they were joined and then removed for drying. After partly drying, they were trimmed on the interior and incised with repeated diagonal or chevron designs on the edge. The final phase of drying, probably on a wooden rod, allowed the flux to effloresce on the outermost surfaces. As there are rarely any firing marks on the edges of bangles, it is probable that they were placed on a layer of powdered bone or powdered limestone (calcium phosphate) during firing. The technique for making compact faience bangles continued after the Indus Valley civilization ended and undoubtedly set the foundation for the development of the glass bangle technology of the later Early Historical Period (circa 600 B.C.).

After fired steatite and terracotta, faience beads are the third most abundant bead type at Harappa. Faience was used to make relatively small beads and thus required many for a single necklace. Faience beads, as well as fired steatite and terracotta, also replaced small beads made from natural materials during preceding periods. During the Neolithic Period (6500-5500 B.C.) at the site of Mehrgarh, Pakistan (Jarrige 1985), tiny beads were



BROWN AND WHITE spiral banded faience beads with a well sintered glaze.

made from turquoise, lapis lazuli and shell, but such beads are extremely rare during the Harappan Period. This is not because these materials were unavailable, but because it was easier to make steatite and faience beads. The change to faience beads during the Harappan Period is similar to the introduction of glass seed beads in North America or other regions of the world, where they rapidly replaced beads made painstakingly from natural materials.

Faience beads are usually blue and blue-green, although yellow and white glazed beads, possibly to imitate polished bronze or white shell, are relatively common. Tiny cylindrical beads, short barrel and oblate shapes as well as spherical beads are perhaps most common. Blue-green faience beads are often combined with gold to make minute pendants.

In addition to monochrome, grooved and notched beads, flat discs with serrated edges and incised designs and bichrome beads began to appear as faience artisans experimented. Bichrome beads appear to imitate banded agate beads, which were extremely important in Harappan aesthetics and probably also for ritual purposes. Faience imitations were generally made as spiraling bands of contrasting color; white with red-brown, brown or black. Natural agate eye beads were also copied in white and brown or black faience.

SQUIRREL molded and carved faience from Harappa. Very compact blue-green faience, but the glaze is weathered to a matte surface. *Photograph by Richard H. Meadow.*

Bichrome beads were made by preparing two colors of frit and paste separately. Because the minerals used to color faience red-brown, brown or black also affect the melting temperature of silica, artisans mixed appropriate amounts of flux in the white and colored faience so both glazed at the same temperature. Many examples of only one or the other glazed color indicate that not all artisans were skilled in this procedure.

The most exquisite example of Harappan faience technology is a red and white faience eye bead in which both colors are evenly glazed without any flaws. This unique bead appears to imitate the famous bleached carnelian eye beads, often called etched carnelian, from the Harappan cities.

Another unique ornament is a gold brooch or pendant inlaid with tiny faience beads or rods. Two contrasting swirls of color, one blue-green and the other a dark, almost black azure, the faience inlay is set in a black mastic, probably made from bitumen. This form of inlay, not common in other parts of the ancient world, reflects the individual style of Harappan artisans. Glazed inlay on gold may have been the predecessor to enamel working on gold, a technology that developed significantly later in South Asia.

Figurines appear to have been made in two piece molds, then trimmed and incised with details before the final drying phase. Made from compact faience, they were completely glazed with a homogeneous color throughout the core. Seated ram figurines perforated to wear as beads were made from pure white glaze faience. Parakeets, monkeys and squirrels were usually of blue or blue-green faience. These later figurines were not perforated as beads, but usually had a hole in the base to mount as an ornament, possibly on furniture or as part of an elaborate costume.

Faience technology of the Indus Valley civilization is the beginning of a long trajectory of glazing and glass developments in South Asia that merits investigation by artists and scholars who are intimately aware of the subtle connections between raw materials, technique and design. Continuing research includes documenting the complex transition from Harappan compact faience production to the development of glass bangles and beads of the Early Historical Period. For example, the famous *meena-kari,* enamel on gold and silver, which is still practiced throughout South Asia, may also have roots in early experiments with glazed faience inlay in gold.

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Acknowledgments

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