

Dhokra Metal Casting Process of Barkai Village, Chattisgarh Artisans

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Abstract

This is an assessment of the Dhokra metal casting techniques, used by the craftsmen's from Barkai village, Bastar, Chattisgarh. Barkai is a small village of tehsil-Makdi, Bastar district in Chhattisgarh state, India. It is a tribal craftsmen's village, especially brass metal work. Those artists are known as Dhokra casters, these craftsmen were renowned for making tribal idols, religious images, and animals like horses, elephant etc. and other objects.

The name 'Dohkra' refers to a collection of metal items, finely formed and adorned brass ware products made using the 'lost wax method' or 'cire perdue' procedure. Dhokra was originally used to refer to a tribe of nomadic craftspeople who lived in Bengal, Orissa, and Madhya Pradesh. Dohkra is known for its strength and shapeliness of design, and it is made by a tribal community. Its themes are usually inspired by folklore. While the elephant is the most well-known of the creatures, there are others. Human heads, kings, manas (miniature replicas of measurements), containers with lids, with or without locking systems, pictures of deities such as Ganesh and Durga, lamps and lamp stands are just a few of the motifs.

The study's aims is to learn about the Dhokra craft production method in present times, for which documentation of metal craft making process is done from beginning till the end.

Keywords: Dhokra metal casting, Cire perdue, Indian lost wax process, tribal art, Chattisgarh Artisans.

1. Introduction

This study looks at how a craft is linked to craftsmen and how craftsmen are linked to a craft. Metal is a typical craft tool used by Indian cultures. Dhokra metal castings, an important traditional skill. The metal utilised is brass, which is cast using the lost wax process to create magnificent items. Dhokra is not just found in Orissa. Bengal, Bihar, and Madhya Pradesh are also home to this species. Dhokra refers to a collection of metal objects created using the 'cireperdue' or lost wax process. Because of its importance in regular people's lives, the metal casting technology has survived for millennia. The Dhokra metal craft is slowly losing away as modernisation takes hold and people's lifestyles change.

Dokra art - Each masterpiece is developed from the ground up and is one-of-a-kind in the globe. Because of the inherent nature of the Dhokra art process, the colour, size, and shape of the sculpture varies. These non-ferrous metal casting objects are entirely handcrafted by tribals in India's interior. The ancient Harappa and Mohenjodaro civilizations employed the 4,000-year-old "lost wax casting" method in their art. Every artefact is cast individually in this method, and the item is destroyed in the process. As a result, each masterpiece must be constructed from the ground up and is one-of-a-kind in the globe. For the craftsmen and their families, art is a source of income.

2. Aims & methodology

The study's goals and objectives are to comprehend an old art that provides a look into our society's ancient metallurgy. To have a better understanding of the Dokra craft production method and the materials used in the process. To comprehend the role of artisans in society. The focus of this paper is to study the traditional process metal casting especially like which wax they use and why, their modelling process, furnace, crucible, casting and finishing techniques etc. Here researcher followed methods like visiting the metal casting workshops and did documentation of metal casting process from the beginning to the end, means from wax model making to metal casting, till finishing. Also interviewed senior traditional craftsmen at their workshops, to see their previous work and techniques used by them.

3. Process of metal casting of Barkai village, Chattisgarh Artisans

Lost-wax casting is used by the Dhokras to create hollow brass sculptures and pictures. Lost wax is a method of making a metal object by first creating a wax model of the item and then melting the wax to produce a mould hole that is filled with molten metal. The methods of Dokra metal casting traditionally used is known as cire-perdue or Lostwax method process. Following are the tools and material required in the Dhokra metal casting process:-

1. AariMitti/ChiktiMitti (Black Soil)
2. Bhoosa (Rice Husk)
3. Rui Mitti (Riverside Soil)
4. Gobar (Cow-dung)
5. Lal Mitti (Red Soil)
6. Sem Patta (Bean Leaves)
7. Mome (Wax)
8. Jalawan (Fire Wood)
9. Koyla (Wood Coal)
10. Bhatti (Furnace)
11. Kenduakathi (Blower machine)
12. Nihan (Small chisel)
13. Batani (Big chisel)
14. Hathora (Hammer)
15. Kui (Crucible)
16. Chimta (Toung)

Solid casting and hollow casting are the two basic lost-wax casting procedures. The former is more widespread in central and eastern India, whereas the latter is more common in southern India. The steps are as follows: -

3.1. Preparation of wax

Dhokra craftsmen's use natural bees wax for their metal casting process from the ages. For fashioning the wax models, thin wax stings are prepared first. For that wax is melted to add wax colour is it (Figure.1) and when that wax starts to sets while colling down, a piece of soft wax from that is used to create strings with the help of a press mould (Figure.2). The wax is likewise shaped into a wire structure used for minute details and fitted around the core model in this case.

3.2. Making of core body

Local clay was used to make the cores. After drying, the clay was sieved through sacking and combined

with uncrushed sand. This sand-rich clay was combined with water to the desired consistency and used to create appropriate core-figures. A clay model core is created, slightly smaller than the artefact's final intended size (Figure.3) and the surface of that core is smoothened by rubbing leaves (sempatta). The core can be toughened by burning or drying in the sun. Fine clay is always used for the core model. Over three or four days, the cores were carefully sun-dried.

3.3. Model making

Around the core, a thin layer of melted wax is applied (Figure.4) so that further wax can be applied easily which are wax wires/strings, with that a wax model is created up to the thickness of metal needed in the completed product (Figure.5). In fashioning the wax model, parts of the image such as the head, body, legs, etc. are made separately by hand (Figure.6). These are then refined by warming them and shaping them using a knife and scraper. Finally, the different finished parts of image are jointed together (Figure.7) using heated iron tools. In the case of making a small metal image, the pedestal is shaped as part of the wax model itself, but in case of large models, the pedestal must be made separately.

3.5. Mould making

A thin coating of extremely fine clay is applied to the wax model, creating an imprint of every aspect of the model (Figure.8). After the thin layer has dried and hardened, further layers of clay are added to the mould (Figure.9), as well as one or more pouring channels through which molten metal can flow to fill the mould. A split bamboo stick was traditionally used to drill through the dry first layer. A big casting may need the use of two or more channels. For molten metal to flow within the mould, a clay funnel is inserted (Figure.10). Also, in this case core pins are applied (Figure.11), and binding wire is used by wrapping up around the clay mould with iron rods to reinforce the clay mould and then a last layer of clay is applied on the moulds (Figure.12). After that a last layer of clay slip is applied on the mould to fill the gaps between the mould and the wire wrapped (Figure.13). Then the moulds are placed under the sun for initial dry process (Figure.14). After the mould is sundry, handle is created with galvanised wire on large size moulds only (Figure.15)

3.5. De-waxing the mould

For De-waxing process the moulds are placed inside a local kiln (Figure.16) made up with terracotta bricks and fired with wood to be baked (Figure.17), for that iron tongs are used to add woods gently around the moulds (Figure.18), so that moulds will not damage. The wax melts and is lost (thus the term lost-wax method), leaving a hollow mould behind. This creates a hollow that is precisely the same size, shape, and surface characteristics as the intended object. Because of the closed system of dewaxing firing, it was difficult to reclaim the wax, which was either vaporized and burned or absorbed into the mould's clay.

The loss of the modelling medium may not have been an issue for forest-dwelling nomads who would have obtained natural resources for themselves on their journeys, but it became a significant cost inefficiency after the dhokra people settled down.

3.6. Casting

A primitive furnace was constructed using loose bricks in a handy open place (Figure.19). Cow dung and purchased charcoal were used to build the fire in that furnace and a crucible is placed with brass metal in it. When the mould was deemed ready, tongs or a pair of green sticks were used to take it from the fire. The metal cup was placed at the top, allowing molten brass to flow down into the mould cavity (Figure.20). The molten metal then solidifies between the mould's core and inner surface, forming a

negative imprint of the wax model in all its details. The hardened metal's outside surface so mimics the shape and features of the original wax sculpture, while the core creates a hollow interior.

3.7. Taking cast out from the mould and finishing stage

The sculptor carefully removes burnt clay (mould) after the cast gets cool down to extract the object (Figure.21). Iron rods and wires are removed, and the sculptor removes all unwanted mould remains with iron chisel (Figure.22). Then the extra metal, runners and core pins are removed from the brass cast (Figure.23,24) with the help of different tools like hammer chisel and now days with angle grinder. The image now is exactly that seen in the wax model. Details of the dress and ornaments as well as other final touches are essential to make the icon perfect in all the aspects and surface flaws and imperfections are corrected.

4. Conclusion

India, a country of unity and variety with numerous traditions and customs, has a very promising state in the form of Chhattisgarh, which is rich in tribal handicraft. The Bastar area in Chhattisgarh is one of India's most popular tourist attractions. Bastar's traditional handicrafts are quite popular among tourists. These Dokra casters from India's eastern states share not just shared roots and modifications, but also a distinctive lost wax casting method and aesthetic. The wax model that is melted out of a mould, leaving a hollow area to be filled with molten metal, is known as Cire Perdue (lost wax) casting.

Because of its traditional indigenously developed technology in producing traditional types of brass metals products, the Indian brass metal industry, which is one of the most important components of the metal craft, is facing stiff competition in the emerging manufacturing scenario. As a result, artisans are seeking alternative employment in order to survive, and brass and bell metal artisan skills continue to decline and appear to be on the verge of extinction in some clusters/areas, necessitating product diversification, design development, technological advancement, and proper market exploitation, among other things.

By promoting Bastar handicraft, we are not only exposing the craftsmen's secret abilities to the world, but also enhancing Indian culture by elevating it in the global context.

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12. Figures



Figure 1. Melting bees wax with red wax colour.



Figure 2. Creating Wax strings of soft bee's wax from a press mould.



Figure 3. Creating core body with clay.



Figure 4. Wax layer is applied on sundried clay core body.



Figure 5. Modelling with wax strings on core body.



Figure 6.The wax model is kept on piece of cloth, to assemble the parts



Figure 7. Wax model is ready for mould making process. Figure



8. First layer of fine clay is applied for mould making process.



Figure 9. Further layers of clay are added to the mould



Figure 10. Clay funnel is attached with wax runner on the mould



Figure 11. Iron nails are added as core pins



.Figure 12. Galvanised wire and binding wire are used to reinforce the mould



Figure 13. Last layer of clay is added on the mould Figure



14. Moulds are placed under the sun for initial dry process



Figure 15. Handle is created with galvanised wire on large size moulds



Figure 16. Local kilns are prepared with bricks



Figure 17. Dewaxing process of moulds in local kiln



Figure 18. Iron tongs are used to add woods gently around the moulds



Figure 19. Traditional furnace with coal firing



Figure 20. Pouring molten metal into the moulds



Figure 21. The mould is removed from the cast with a hammer.



Figure 22. Chisels are used to remove the mould remains.



Figure 23. Nails are removed from the cast with chisel



Figure 24. Unwanted metal flashes are chiselled carefully