

# Traditional Dhokra Artifacts Casting Technique

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## Introduction:

India is a country where there is a wonderful harmony of different arts, cultures and religions and all these arts narrate their glorious saga by connecting with history in some form or the other. Dhokra art is also an ancient popular art form among them. It is an ancient exceptional metal craftsmanship practiced in different provinces of the country. Dhokra is a very laborious task as it takes around four to five days to follow 19 step-by-step procedures to make a simple artwork, whereas it takes two-three weeks to prepare a complex one. Dhokra metal artifacts are usually made on the basis of traditional and incomparable folk motifs, but now a large number of innovative creative motifs are also being created keeping in mind the likes and interests of modern society. Indian metal craftsmen were well versed in many techniques of metal crafts from the past. Historical evidence suggests that the metal craft technique was developed in the Chalcolithic period, since then it has been progressively expanded and refined and this technique remains exemplary even today.

The '**Bharewas community**', a sub-tribe of the "**Gond**", still lives in the villages around the **Betul** district headquarters in Madhya Pradesh such as: - **Amla, Tigriya, Barkhed, Chunahazuri** and **Kamleshara**. Those artists are endeavoring to improve and enrich the Dhokra craft and are also transmitting their ancient culture. These artists traditionally create ceremonial objects such as **daggers** for the groom, **skewers**, **peacock-fireplaces** (The people of the tribal community call to this oil lamp "**Morchimney**" in their local colloquial language).

On the occasion of marriage in **Bharewa community**, the bride is gifted **morchimney** and **daggers** (khanjar) and **poniard** (kataar), etc by her parents. The most popular 'ritual' associated with the customs of the tribal society is the setting up of a "**Veer-Kangan**" (bracelet) by the newlywed couple. The newlywed couple install this bracelet in their home for the purpose of seeking blessings from the deities to start a new journey of their life. The entire surface of the periphery of this bracelet is adorned with the images of various adorable deities of the tribal society.



Veer-Kangan

A replica of a similar giant bracelet (Its diameter measures about 18 feet.) for the sake of observation; Preserved in Tribal Museum, Bhopal, Madhya Pradesh. Today, Dhokra artisans have found many innovative ways to craft innovative designs and motifs from simple to complex for make the craft more attractive. Each Dhokra idol seems to be telling its own unique story, usually inspired by nature and tribal beliefs, hence every work of Dhokra craft is priceless, beautiful, captivating and unique itself.

## Origin and Dispersion:

The primitive people developed the art of metal crafts to meet their social, economic and religious needs. Thereafter, knowledge of copper-bronze and ferrous metallurgy developed as a specialized craft, after which people of different ethnic groups mastered the metal-craft and developed their own social, psychological, community customs, rituals and religious curiosity. Started making artifacts accordingly. In the contemporary scenario, traditional metallurgists from different states of India have contributed significantly in preserving this age-old art, which reflects their original skills and special kind of creativity. This type of metal casting technology is being used in India for thousands of years. The famous '**Dancing-Girl**' statue found during archaeological excavations at Mohenjo-Daro is the earliest evidence of a lost wax casting method ever known, indicating a continuation of the archaic metal casting tradition. This technology is still in practical use which is a testament to its relevance.

There is a complete lack of authentic evidence regarding the nomenclature of Dhokra art; if popular legends are taken as the basis, it has its origin from the metal-workers "**Dhokra**" tribe of Bastar in Chhattisgarh. Traditionally, the **Garhwa, Gond** and **Dhurwa** tribes of Kondagaon in the Bastar region of Chhattisgarh have been practicing the art of Dhokra with the "**lost wax**

**technique” or “hollow casting”**. The distant cousins of this tribe migrated to various regions from **Jharkhand** to **West Bengal, Orissa, Rajasthan** and even **Kerala** etc.; Dhokra craft, originally from Chhattisgarh, is now making its presence felt all over India. Today, Dhokra art is world famous for its simplicity, social themes and unique workmanship.

Each fragment of Dhokra craftsmanship has its own unique identity. Usually; Dhokra art was learned as a fine art skill in the tribal community and this technique was passed on from generation to generation and in the state of **Chhattisgarh**, especially in **Bastar**; And apart from **Lalitpur, Raigarh** and **Surguja**, this art continues to exist widely in other provinces like **Madhya Pradesh, Telangana, West Bengal, Orissa**, etc till date. Dhokras Shilp of “**Adilabad**” district of Telangana province has recently got the ‘**GI**’ tag (A geographical indication is a name or sign used on products which corresponds to a specific geographical location or origin).

Dhokra folk craftsmen belong to the “**Nomadic, Primitive Hereditary Metallurgical Group**” in origin and are believed to be native to the dense hilly region of **Dandakaranya**. The existence of Dandakaranya is about 10 thousand years old. This region comes under the newly formed **Chhattisgarh** state after the bifurcation of Madhya Pradesh. The general meaning of the word ‘**Dandakaranya**’ (Dandaka + Aranya = punishment) is “**Dandakaranya**” or “**The Forest of Punishment**”. Despite being brimming with natural beauty, resources and tribal culture, these forests are currently known as **maoist infested** area. In the Bastar region, there are ‘**Abujhmad**’ mountains i.e. strange hills, which are surrounded by forests spread over an area of 3,900 square kilometres.

Tribal communities like the Gonds live in these forests and many other tribal communities have settled in different regions and villages of India. Due to the nomadic nature of these primitive community people, many tribals migrated from Bastar region not only to other states of India like **Orissa, West Bengal, Jharkhand, Telangana** (erstwhile Andhra Pradesh), **Rajasthan, Kerala**, etc.; Rather, with them their culture, customs and the art of traditional Dhokra metal casting also reached there. As far as their identity is concerned, these primitive metallurgical groups are known by different names according to regional variations, such as Bharewa and Gond in Madhya Pradesh, Ghorua in Chhattisgarh (Bastar region) and Gond Purulia in West Bengal, Dhokras and Dhepos in Birbhum, Bankura, Burdwan and Midnapore districts, Malars in southern Bihar, and locally called Ghantaras and Ghungarghar of Scythria in Orissa.

### **Description of Metal Casting in Ancient Texts:**

The process of **hollow casting**; is described in detail in chapter-2<sup>nd</sup> titled “**Linga Lakshanam**” in the later part of the book “**Shilparatna**” written by **Srikumar** in the 16<sup>th</sup> century. Likewise; several evidences are available in ancient Indian literature related to the lost-wax method, for example; A Gupta period text “**Shilpa Shastra**” mentions about the casting of images in metal. Similarly, the 14<sup>th</sup> chapter of the “**Vishnusamhita**” of the 5<sup>th</sup> century CE describes the modeling method of wax for making metal objects. The 16<sup>th</sup> chapter of the ancient Sanskrit text “**Manasara Shilpa**” mentions the casting of idols in wax under the title ‘**Maduchishta Vidhanam**’, or ‘**Lost Wax Method**’. The method of casting the metal is also described in the text “**Manasolas**”, allegedly written by **King Bhilokamalla Someshvara** of the Chalukya dynasty of Kalyani. All these evidences prove the antiquity of the casting method of Dhokra artifacts.

### **Various Names of Dhokra Artisan Community:**

Primitive metallurgical groups are named with different names according to regional variations, such as ‘**Dhokra**’ and ‘**Dhepos**’ in Purulia, Birbhum, Bankura, Burdwan and Midnapore districts of West Bengal, ‘**Malars**’ in southern Bihar, ‘**Ghorua,**’ ‘**Ghadwa**’ and ‘**Gond**’ in Bastar, Chhattisgarh. Betul is a tribal district of Madhya Pradesh and the metal craftsmen of this region are known as ‘**Gond**’, ‘**Korku**’, ‘**Bhilala**’, ‘**Pardhan**’, ‘**Bharewa**’ and local in Orissa they are called ‘**Ghantaras**’ and ‘**Ghungarghar**’ of Scythria.

### **Significance:**

Dhokra metal artifacts are usually made on the basis of traditional and native folk motifs, but now on a large scale innovative and creative motifs are also being created keeping in mind the likes and interests of the modern society.



*Valedictory function of the workshop*

Collectors and art connoisseurs from around the world; Dhokras crave for artefacts not only because of the **intrinsic rigidity, primitive simplicity**, attractive **folk motifs**, strong **form** and **vitality** of the art form but also because of the **folk customs**, layers of **tradition** and **historical influences** inherent in the artworks. All these features are clearly reflected in the artefacts crafted by the skilled craftsmen of the tribal community.

The Dhokra art process requires a lot of creative thinking, precision and mastery. This technique is still used to craft metal artifacts, accessories, utensils and jewellery. It is unique because of its rustic simplicity, charming folk motifs and distinctive texture effects. The artistic skill of making jewelry out of brass using the craft of Dhokra art was prevalent in the Indus Valley Civilization and Rome as well as Egypt. India is the world's largest brass making country, which has been practicing this art for the past thousands of years.

### **Variety of Dhokra Products:**

Dhokra-craftsmen usually make artifacts from a single metal; but sometimes, as per the need of the customers eight metals (**ashtadhatu**) are mixed in prescribed proportion to create the artifacts. The artisans usually prepare the sculptures of mixed metals by taking advance payment. Among the metal-artifacts that are produced on a regular basis, the following forms are generally important; Such as: - **Lord Buddha, Birds, Designer Diyas** (specialy Morchimni), **Daggers, Veer-Kangan, Statues of Gods and Goddesses**, and various types of **Animals**, reptiles such as **Turtles, Jingles**, and **Wall Hangings, Designer Bowls**, etc. The typical Dhokra artifacts usually cost between INR.300 to 5000, but cast of commissioned artifact is depend on their design & their size.

### **Types of Lost Wax Casting:**

Apart from India, the lost wax technique has also been used in China, Egypt, Malaysia, Nigeria, Central America and other countries for casting artifacts from various metals, such as copper, brass, etc or mixed metals. Generally, two main methods of lost wax casting are as follows:

1. **Solid Casting:** This method of casting is practised in South India region including **Telangana**. In this method a solid piece of wax is used to make a mould in the casting of dhokra idols.
2. **Hollow Casting:** This method is very popular in central and eastern India, which include **Chhattisgarh, Madhya Pradesh, Jharkhand** and **West Bengal**. This method makes the casting of dhokra idols more traditional and popular, and clay core is used in this.
3. **Mixed Casting:** Based on my in-depth overview of the Dokra casting process, during the Dhokra Metal Casting Workshop, I can say; that the Dhokra casting method uses both the casting methods as described above (solid and hollow casting method). For example, if a Dhokra craftsman is making an elephant statue, the main part of its body (belly and head) is made by hollow casting method while its parts like tail, trunk and ears are made of wax and attached separately due to the structural form of these organs, they have to be applied in solid form. Therefore it would be more appropriate to say that Dhokra artefacts are a mixture of solid and hollow castings.

### **Major Production Centers of Dhokra Artifacts:**

Madhya Pradesh, Chhattisgarh, Odisha, West Bengal, Jharkhand, Telangana, etc. are the major production centers of Dhokra artefacts in India. Apart from India, lost wax techniques for casting copper and alloys were also in vogue in countries like China, Egypt, Malaysia, Nigeria, Central America etc. The unique workmanship of the Dhokra craft of denominator state and the skill of each Dhokra artisan has its own unique characteristics. This ancient craft is world famous for creating unique quality artworks.

### **Types of Motifs:**

Dhokra is an ancient art and the primitive simplicity in motifs is its fundamental hallmark. The Dhokra artisans concerned always pay respect towards the demand and necessity of their customers and prepare different kinds of objects accordingly. However; a lack of '**primitive**' growth can be clearly felt in these motifs mainly due to the incorporation of modernity. Today Signs of modernity are also beginning to appear in the traditional Dhokra art-works. For example; Mention here may be made of the Dhokra artifact which contains an ancient artifact of a dancing girl with that bubbly smile on her face as she stands with her hand on her hip.











Deep knowledge of primitive culture and their pure folk traditions are hidden in Dhokra motifs. On the basis of morphology, requirement and function, these motifs commonly found in Dhokra artefacts are may be categorized under the following three heads, such as:







**1. Ritual Motifs:** Dhokra artifacts of ritualistic models include anthropomorphic figures of different images of gods and goddesses like **Lord Vishnu, Lord Shiva, Crawling Baby Krishna, Lord Ganesh, Mahisamadini Durga, Kali, Saraswati, Laxmi** and some images of other deities like **Nabagrahas** (Nine planets) ets. Very often they prepare animal models like **Elephant, Brishava** (ox), **Horse, Naga** (Serpent) etc. Besides **Ceremonial Lamps with Bird, Lamp in Hands of Anthropomorphic Figurines** are also prepared for religious and ritualistic purposes.

**2. Motifs for Daily Household Artifacts:** These include **Measuring-Pot, Pharua** (small container), **Vermilion-Container, Baksa** (box), **Dipa** (lamp), **Mor-chimni, Dhupadarf** (Agarbatti stick stand), **Decorative Table Stands**, etc.

**3. Motifs for Decoration:** For household decoration they make different kinds of animal and bird figures, such as **Turtle, Monkey, Crocodile, Rabit, Deer, Bull, Hen/Cock, Cat** and **Bagh** with folk-composition and **Pigeon**, etc. Besides they are also preparing different types of Artistic Household Furnishers as per the demand of the costumers.











**Raw Materials:** The details of the raw materials used in the casting process of Dhokra metal artifacts are described in the following table:












Sl. No.	Raw Materials	Description & Related Image
1	Anthills Mud	<p>This is also known by the name of “<b>Valmika Mruttika</b>” (valmika = anthills &amp; ruttika = mud or soil). It is one core element in all required substances for clay formation. Apart from dhokra metal-casting, it is also used in ayurveda and naturopathy.</p> 
2	Water	<p>Water is used in two processes, to knead a mixture of soil, cow dung and rice-husk (chopped pieces of wheat straw or dry grass can be used alternatively); And continue the process of kneading the mixture well until the required consistency is achieved. Apart from this, the wax-liquid is filtered and put in a vessel of water, in which case water is also used to cool the wax.</p> 
3	Binding Substance	<p>In the process of soil preparation, <b>cow dung</b> plays the role of natural binding substance due to its viscous property and <b>wheat straw</b> (rice husk or dry grass cut pieces can be used alternatively in place of wheat straw) is also important ingredients. This element; Strengthens the surface of the core and mould and prevents their surface from cracking.</p> 
4	Beeswax	<p>This is more important natural and eco-friendly basic raw substance, It is used for covering to <b>Gaabha's</b> surface with a thin wax layer and preparing <b>wax thread</b> for formation of <b>motifs</b> and <b>design pattern</b>.</p> 
	Bitumen	<p>This substance is found in both forms, solid or liquid as a petroleum by-product and natural forms. Traditional dhokra metal-casters mix it with beeswax; And sometimes they use it as a substitute for wax. Tribal artisans call it ‘<b>Daamar</b>’ or ‘<b>Koltar</b>’ in their local language. Often traditional tribal dhokra craftsmen add wax as needed while boiling the wax over a stove fire, so that when the molten wax solidifies again, it remains soft; And different types of artifacts can be easily made from the threads made from it.</p> 
	Loban	<p>Its scientific name is ‘<b>Gum Benzoin</b>’. Dhokra artisans Pronounce this substance in their local language by names like <b>Raal, Loban</b> (Frankincense or benzyl), <b>Lobhan</b> (Myrrh) and <b>Shallaki, Sambrani</b> etc and this is act as a “<b>purifier substance</b>”. The artisans are mix it with beeswax during liqudization process for purification and flexibilty of wax-mixture.</p> 
	Mustard Oil	<p>While heating the wax on the stove fire, mustard oil (or any other available cooking oil) is also added to it, because; When wax is heated it becomes liquid and after cooldown it acquires again solid form, so mustard oil provides flexibility to the wax due to its lubricity. Due to which it remains soft after the wax is ready.</p> 
	Wax Threads	<p>These are used to form the initial basic motif of the artwork by wrapping it around the Gabha (core model) according to the prescribed structural-design and adding some motifs separately to the original artifact; Which gives a textural effect to the artwork.</p> 
6	Bean Leaves	<p>These Leaves are crushed very well, and then; its paste is apply over the entailr surface of “<b>Gaabha</b>” (core model), which prevent the soil-surface from sticking to the wax. Usually, the artisans of Tigariya Craft Village, Betul, Madhya pradesh are used leaves of locally available ‘<b>Ballhar</b>’ tree. If these leaves are not available, so that; they use “<b>Chikat-Mitti</b>”, which they collect from the banks of the river.</p> 
5	Koyla	<p>Commonly, It is known as charcoal, coal, etc. It is a black Mineral substance used as a fuel, and obtained in the form of hard black substance taken from underground. Traditional tribal dhokra craftsmen still use this substance in the furnace (Bhatthi) to achieve the required amount of temperature to melt the metal. However, now electric, gas and diesel operated furnaces are also available for this purpose, which are easy and economical to operate, as well as; saves time too.</p> 

7	<b>Brass Scrap</b>	It is also one of the most important substances and is used for casting of dhokra metal products. Typically, artisans; Buy it from utensils shop, automobile workshop, scrap-dealer and other sources in the form of old brass items, old utensils, auto-parts, water taps, nozzles of vehicle tubes etc.	
8	<b>Fule</b>	Both these substances are used as fireing fuel (fire-substance) during the de-waxing process of mould in Ludo furnace and these substances are locally known as <b>kandaa</b> or <b>uplaa</b> (dung cake) and <b>lakdee ke chaila</b> (Small pieces made by tearing dry branches of a tree with an ax) respectively.	
9	<b>Surkhi</b>	Basically; It is the powder-form of broken pieces of terracotta objects or burnt moulds. Dhokra craftsmen prepare it by grinding it on <b>Silbatta</b> , although now it is easily available in the market as well. To make negative mould made from wax, it is mixed in clay as required. <i>(In the picture; Participants of Dhokra workshop are prepareing surkhi power by broken peaces of backed mould.)</i>	
	<b>Sand</b>	It is often found in various rivers. Dhokra artisans add its little quantity as required while making the clay mixture for the mould, as mixing it keeps the surface of the mold hard and also prevents cracking of the mould surface during de-moulding process.	
10	<b>Salt</b>	It is available in the form of powder and crystals. This salt is known as ' <b>Borax</b> ', which in the local colloquial language is called ' <b>Suhaga</b> '. While heating the metal, it is poured into the metal crucible as required. This metal acts as a cleaning substance during the liquefaction process. Borax (hydrated borate of sodium) occurs naturally as evaporative deposits produced by repeated evaporation of periodic lakes. Turkey is the largest producer of it commercially; Boron, California; And it is also produced in Searles Lake, California. In addition, borax has been found in several other locations in the southwestern United States, including the Atacama Desert in Chile, Bolivia and Tibet, and newly discovered deposits in Romania. Borax can also be produced synthetically from other boron compounds.	
11	<b>Iron Nails &amp; Wire</b>	After the surface of the waxed artifact is covered with clay mixture for the second time, after it has dried completely, iron nails of suitable length and thickness are hammered into this mould as required. These iron nails maintain the top surface of the mould and the inner core clay structure (Gaabha) in their original position during de-molding and casting. Iron wire is used to wrap and tie the outer surface of the large size mould. Due to which the mould retains its original form without cracking during de-molding and pouring process.	





### Tools and their Utilization:

For the production of Dhokra craft, artisans use some mechanical tools along with self-made tools. Apart from only a few modern tools, these artisans often use indigenous and traditional tools. Some important tools and equipment are mentioned in the following table for reference.

S. No	Its Use & Related Image	
1	peedhaa	<p>A Dhokra shilpi, uses it as a working-platform, when making an artwork out of wax. On which he converts the wax into various formats using his other devices. It is usually a flat rectangular platform made of wood or stone. <i>(In the picture Haata, Kachhni, Kaati &amp; Ptaree are placed on Peedhaa.)</i></p> 
2	Haata	<p>Saddle is modern equipment which is rectangular in shape with a polished flat surface. Muller is also a semi prismatic shaped flat based hard wooden implement used for processing of wax.</p> 
3	Kaati	<p>This typical traditional tool is used in the cutting of wax threads or shaping artifact's parts. In present time, tools such as scissors and paper shredders are being used in its place.</p> 
4	Kachhni	<p>Traditionally, each Dhokra artisan makes these Customized tools himself from strong and smooth wood as per his convenience. These individual vital wooden tools are used for rendering the required design and coil the threads of wax, so that; Beautiful patterns of designs can be created and various parts of the body, such as eyes, hands and toes can be shaped; Clay images are used to adorn the body of ornaments as well as wax molds of humanoid and animal sculptures.</p> 
5	Ptaree	<p>Traditionally, Dhokara artisan's scale was made of bambu flat bar, but in present time; artisans are use steel or plastic scale. This tool; is used in cutting of wax threads and similar other work during wax-coiling, motif-designing and rendring process.</p> 
6	Narja	<p>It is an ancient scale (<i>Taraju</i>), in which a concave plate was tied with three ropes on only one side of the metal rod to weigh the material and vertical marks were marked on the rod of the scale to calculate the weight. The Gond Dhokra artisans used to weigh the metals according to the size of the artwork with similar scales. They call this instrument Narja.</p> 
7	Kdhai	<p>Generally, This is a cooking device (<i>Vessel</i>) made of iron and used in production of dhokara artifacts for preparation of mixture of wax and resin.</p> 
8	Fine Cloth	<p>Mostly; A piece of fine cloth is used as a resin sieve to filter the molten wax mixture into a basin or pot of water by filtering the impurities of the wax mixture.</p> 
9	Pichkaari	<p>This Sieve Syringe (Junt) apparatus has six main parts, namely:- Male-Plank, Female-Plank, Somet (register), Wooden Piston, Perforated Sieve. (Optionally, sieves with different sizes of holes can also be changed in this device to make wax threads of different diameter thicknesses according to the requirement) and Robust Wooden or Iron Rode. The Dhokra handicrafts of Madhya Pradesh call this device "Pitchkari", while; The craftsmen of Orissa call it "Thassa".</p> 
10	Broken Water-Pot	<p>It is the lower half of an earthen pot (handi) containing water used for solidifying the liquidized wax mixture sieved into it. It is also popular as <b>Matki, Matka</b> or <b>Chapei</b>. It is used all over the Indian subcontinent, as a home "<b>water storage cooler</b>". It has been in use since ancient times and can be found in houses of every class. Similarly; Another utensil (<b>Handi</b>) is used to hold a condensed solution of clay (<b>cheekat-mitti</b>). Traditionally this pot was also made of terracotta but now iron or plastic buckets are used. This solution is used in the casting process, when molten metal seeps out during pouring into the mould.</p> 



11	<b>Oil Bowl</b>	In the local colloquial language this oil bowl is referred to as the traditional Dhokra artisan of Orissa and Madhya Pradesh, respectively; ‘ <b>Telmahi</b> ’ and ‘ <b>Ghopkali</b> ’ speak. This pot is used as a container of mustard oil (or available any other oil) and usually, it is made of Terracotta, Metal, Wood or Plastic, etc. This oil is used for lubrication of hand in wax coiling process and also mixed it in to bee-wax during wax melting and purification process on Chuhla’s heat.	
12	<b>Anvil</b>	Traditionally, it is a flat block of stone used for keeping the brass for breaking into small pieces by the hammer. The rock type of the stone anvil varies from dolerite to granite. But, now in the modern phase, Dhokra artisans are using a piece of rail line collected from some source for this purpose. On it, primarily the finished models are placed for filing. Although, Latest modern Verious versions of anvil are also available in the market.	
13	<b>Ludo</b>	Ludo (De-waxing Furnace) is used in baking process of the clay moulds for Demoulding and removing melted wax. Usually, traditional Dhokra artisans make this furnace temporarily with bricks only at the time of need. They call this and the metal smelting furnace “ <b>Bhatthi-Dukaan</b> ” ( <i>kiln-shop</i> ) in their language.	
14	<b>Bhatthi</b>	Each craftsman customizes the furnace ( <i>Bhatthi</i> ) in a variety of sizes, both permanent and temporary, according to his needs and is using a controlled blower to maintain the fire set temperature to melt the metal in it. The traditional Dhokra craftsmen of Madhya Pradesh call “ <b>Bhatthi-Dukaan</b> ” (Kiln-shop), to both furnaces ( <i>De-waxing &amp; Casting furnaces</i> ), in their local language.	
15	<b>Blower</b>	This mechanical equipment is used in the furnace to achieved and maintaining fire set temperature in required way. In the past time artisans used very typical traditional manual blower. In which two parts made of leather were joined together to control the flow of air, it was known as “ <b>Dhaunkni</b> ” (bellows).	
16	<b>Pincher</b>	It is used for gripping the Graphite Crucible ( <i>Ghadiya</i> ) at the time of keeping in and lifting out from the furnace. This is a local made tool sold by the blacksmiths in the market. Dhokra artisans pronounce these typical types of tools with names like <b>Sansi, Samsi, Chimta, pakad</b> etc. but now in present time morden, these tools of casting are known as “ <b>Pinchers</b> ” and according to artisans requirement available in wide range and shapes.	
17	<b>Ghariya</b>	This device ( <i>Graphite Crucible</i> ) is used to melt brass at high temperature in the process of casting Dhokra artifacts. It has also been used since ancient times as a container for melting metals. It is popular among local Dhokra craftsmen by the name of “ <b>Gharia</b> ”.	
18	<b>Ghariya-cap</b>	This deep round shaped Broken metal-pot (Vessel) with a hole in the bottom is used for covering the Graphite Container during of smelting of metal for casting.	
19	<b>Hatudi</b>	This tool (Hammar or Hatudi) with iron head and wooden handle is used for breaking the old metal objects of brass into smaller pieces. It is also used for chiselling any extra metal pieces retained in the finished article before filling them for shiny look.	
20	<b>Chheni</b>	Different size & shap Chheni (chisels) are made of a small iron piece having a broad cutting edge. These are used for cutting the brass into small pieces for melting. Different size chisels are used in creating impressions.	
21	<b>Hacksaw</b>	This is used for cutting out the extra parts of the metal product.	










22	<b>Files</b>	Files of various size and shapes are used in removing unnecessary extra bits of metal casting, as well as to give the surface of the artwork a shiny appearance. These are available in different shape, like rectangular cross-section, Square, Knife-Edge, round, semi-round, Triangular, etc.	
23	<b>Pedestal Grinder</b>	Both buffing and polishing work is done with help of this mechanical machine. After the casting of Dhokra artifacts, their rough surface is made flat and polished by making its surface shiny. In this way a beautiful Dhokra artwork acquires its original form by passing through various stages sequentially.	
24	<b>Cleaning Tools</b>	This is used for rubbing the surface of casted artifact.	
25	<b>Cutter</b>	This equipment is used in the finishing-process of Dhokra artifact's cylindrical and flat surfaces and also used to remove unwanted metal parts from the surface.	



### Creation & Casting Process of Dhokra Artifacts:

The creation of artifacts begins with preparing a mixture of **chikane mittie** (*smooth soil*) or **anthill soil**, **cow dung** and **wheat straw** (*rice husk or chopped dry grass can be used alternatively*). After that, a “**Gaabha**” (*basic internal structural model*) is made from the prepared soil mixture. The mixture is thoroughly kneaded, adding water as needed until the desired consistency is achieved; and then a “**Gabha**” (*core model*) is made using this soil mixture. These initial processes are followed by a series of **24 technological processes** step-by-step using **12 basic materials** with the help of **25 specialized conventional tools and mechanical equipment**, resulting in a prized “**Dhokra artwork**”. A step-by-step description of all these processes is given in the following table:

Process	Step	Discreption of Sequential Process & Concerned Image
Gaabha Formation	1 <sup>st</sup> Step	<p><b>Clay Formation:</b> In this process; Soil, rice husk (or wheat straw) are mixed with water as required and kneaded well. After that a <b>gaabha</b> (core) is made from the prepared clay-mixture.</p> 
	2 <sup>nd</sup> Step	<p><b>Gaabha Formation:</b> The creation of Gaabha by an artisan with clay mixture (which was as prepared in step 1st) is called Gabha-formation. The traditional tribal Dhokra artisans of Madhya Pradesh, in their local colloquial language, refer to the 'core-structure' (the external structure of predetermined images-layout) of the Dhokra artifact as the "<b>Gabha</b>". Which in local terminology is also called '<b>Kor</b>', '<b>Sanchal</b>' or '<b>Chhacha</b>' is referred to as.</p> 
	3 <sup>rd</sup> Step	<p><b>Drying Process of Gaabha:</b> Prepared Gaabha is dried by placing it in the sun, near smoldering dung cakes or wood fire for 3 to 4 hours and de-humidified. Here it is important to make sure that the core model is completely dry. This clay model (core) forms the basis of the final cast of the artifact to be produced.</p>  
	4 <sup>th</sup> Step	<p><b>Rubing Process:</b> When the Gabha is thoroughly dried, the artisans level and smooth the surface by carefully rubbing it with sandpaper.</p> 
	5 <sup>th</sup> Step	<p><b>Coating Process:</b> In this step the craftsman makes a viscous solution of green bean leaves (colloquially known as bean) and applies it to the entire surface of the Gaabha.</p> 
Wax Preparation & Its Use	6 <sup>th</sup> Step	<p><b>Wax Threads Formation:</b> Following the preparation of the wax mixture and fitting of Jant, the next step is the preparation of wax-wire by a '<b>Pichkaari</b>' (sieve syring/junt). After cooking and filtering, the finished wax mixture is filled into a cylinder of a wok strategically placed on a platform and by painstakingly impulsive pressing the piston of that appliance, threads are created as shown in the picture.</p> 
	7 <sup>th</sup> Step	<p><b>Wax Liquid Coating:</b> In this process, traditional dhokra craftsmen of Madhya Pradesh usually use native tools made by wrapping an old soft cotton cloth around one edge of any wooden stick available at the workplace; In the previous process the entire surface of the gabha covered with bean leaf paste is coated with a thin layer of wax-liquid. This layer of wax protects the design pattern created with the wax thread in the next step from sticking to the clay surface of the gabha and the original artwork retains its original appearance after casting.</p> 
	8 <sup>th</sup> Step	<p><b>Wax-Threads Formation:</b> In this stage of the process, the resin bundle (the cooked wax mixture is called '<b>resin</b>') by Dhokra craftsmen of Madhya Pradesh called it '<b>pichkari</b>', While the artisans of Odish call it '<b>thasa</b>') by filling in the <b>Junt equipment</b>, threads of different thicknesses are prepared according to the requirement. By using these wax threads (usually; as thin as about 1 mm in diameter) the artist creates the wax artwork according to his creativity on the clay model created in the first step. This is the most important step in making the dhokra art as it requires constant practice to perfect the art of pulling the wax into thin strings and wrapping it around cleverly.</p>  <p><i>Participants concerned with the preparation of wax liquid under guidance of resource person</i></p>

	9 <sup>th</sup> Step	<p><b>Wax-Coiling, Design Formation &amp; Rendering:</b> This step, following the previous procedures, involves covering the surface of the thoroughly polished and dried gabha of the mold by creating creative patterns with wax strands to give the artwork the proper shape to be cast. Therefore, the strings of wax are then coiled around the Gabha mold one after the other until the entire artwork has taken the shape it wants to form the artwork, basically the Dhokra artisans use this winding or wax. -Start up the wire or from the head. An artisan usually adds some aesthetic look to the Dhokra item according to his creativity and his artistic skill. Sometimes the head, arms, legs and other important parts of a specimen or any decorative design required in an object which is not possible on wax-wire are usually carved separately by soft wax and attached to the original structure. Kachni, pain, and hata are mainly used to make these parts. In addition, artisans do a variety of design and decoration works through strings made from wax. At this stage the artwork can be seen moving towards perfection according to the predetermined size. Each craftsman uses his own personal tools made of wood (spatials of various shapes and sizes) to smooth out any rough surfaces on the mold.</p>  <p><i>Participants concerned with creating design &amp; patterns with wax threads</i></p>
Mould Formation for Metal Casting	10 <sup>th</sup> Step	<p><b>Waxed-Model Covering with Clay &amp; Channel Formation:</b> In this process; By mixing ant bambi soil (<i>alternatively sandy soil can also be used in its place</i>), surkhi powder (<i>can also be substituted with charcoal powder</i>) adding water as required, to the prepared mixture the entire surface of the prepared predetermined sculpture-structure (<i>negative-mould</i>) is carefully covered by wrapping wax threads. Meanwhile, during de-moulding, two tubes (<i>runners</i>) are also attached to the ludo-furnace (<i>kiln</i>) to melt the wax out of the mold during heating and to pour the molten metal over the cavity left by the wax.</p> 
	11 <sup>th</sup> Step	<p><b>Clay Mould Drying Process:</b> The mold is again dried thoroughly by placing it in the sun light, near dung cakes or a wooden bonfire and after totally drying it a second layer of soil is applied. When this layer too is completely dry, After that; The last layer of soil-mix is applied according next 3<sup>rd</sup> step.</p> 
	12 <sup>th</sup> Step	<p><b>Final Mould Formation with Clay-Surkhi Mourter:</b> In this stage; By mixing <b>ant's bambi clay, surkhi powder and charcoal's friable powder</b> with water as required, this 2<sup>nd</sup> layer of prepared mixture carefully apply the entire surface of the mould. After that the finished mould is again completely dried according to the procedure described earlier.</p> 
	13 <sup>th</sup> Step	<p><b>Iron Nails Pinching Process:</b> As in the previous step, before de-moulding the entire surface of the completely dried mold, iron nails of suitable length and thickness are hammered as required. By doing so, during de-moulding, when; As the wax melts out, a cavity is formed between the internal structural mold (gabha) and the external mold. In this position, the iron nails keep the inner and outer molds in their respective places.</p>
	14 <sup>th</sup> Step	<p><b>Iron Wire Binding Process:</b> After the previous step, just before placing the mold in the Ludo Bhatthi for de-moulding, a thin slurry of clay is applied over its entire surface and the surface of the mold to avoid cracking or cracking during heating of the mold in the bhathi is tightly wrapped around it with an iron wire of the required thickness.</p>
Metal Casting Process	15 <sup>th</sup> Step	<p><b>Process of De-moulding,</b> in this process; The completely dried mold is baked in a Ludo furnace by gradually raising the temperature to about 800°C (1472°F). By which the wax inside the mold is melted out and a fine cavity is created in the mold for the molten metal to be molded between the cavity (<i>the inner structure of the artwork</i>) and the outer surface of the mold. During de-moulding, the mold is always placed upside down in the furnace so that the mouth of the channel faces down for the wax to melt out.</p> 

	16 <sup>th</sup> Step	<p>In the Casting Process, at which time; The mould is being de-moulded in the Ludo furnace, at the same time another Furnace (the traditional tribal craftsmen of Madhya Pradesh call it “<i>Bhatti-Dukan</i>” in their local colloquial language) to the desired shape (known in the local language as “<i>Gharia</i>”) the graphite container is set up in to furnace and pieces of old brass are filled in it; and the metals are melted by gradually raising the furnace temperature to about 1100°C (2012°F); And in the meantime, to remove the waste material from the metal-liqueur, the desired <b>Suhaga</b> (Borex Salt) is poured into it (Although;The traditional craftsmen usually remove a piece of burning coal from the furnace in place of the suhaga and pulse it to purify the brass-liquid and sometimes the liqueur or In place of coal embers, a little aluminum is added) and the metal is purified. After this, following the moulding process, the molten metal-liquid is carefully filled into the hot mould itself by taking out the de-molded moulds one by one in the Ludo furnace, and then the mould that has been cast is kept to cool down. Casting is nothing but the process of obtaining an exact replica or reproduction of a wax-artwork actually sculpted by the creator according to a predetermined structure. Unlike wax preparation and mold coverings, casting is also an important task that requires very careful supervision by an experienced person.</p>	
	17 <sup>th</sup> Step	<p><b>Mould Cooling Process:</b> The mould is then left to cool down for at least two to three hours. Regular spraying of water helps hastens the cooling process. It also makes the mould softer and easier to break for unfolding the artifact.</p>	
	18 <sup>th</sup> Step	<p><b>Casted Artifact Releasing Process:</b> After the mold has cooled, it is broken with a hammer and then its finishing is done. The artist uses a variety of tools to brush, file, and buff the finished product to enhance her beauty.</p>	
Buffing & Polishing	19 <sup>th</sup> Step	<p><b>Extra Substance Removing Process:</b> In this process, the cutouts of the channel(s) and the rough bits formed during casting are carefully removed using various tools and mechanical equipment as per the requirement.</p>	
	20 <sup>th</sup> Step	<p><b>Brass Welding &amp; Brazing Process:</b> Sometimes after casting, some parts of some artifacts remain weak or the molten metal does not reach some parts and the artifacts remain incomplete. In such a condition, earlier the traditional Dhokra craftsmen used to break the incomplete artifacts and use its metal during the next casting. Sometimes some craftsmen; By cutting different finished parts of some incomplete artifacts of the same kind and welding them together, they create a new artwork.</p>	
	21 <sup>st</sup> Step	<p><b>Filing Process:</b> In this stage, the surface of the artwork is leveled and its various parts are shaped according to the structural design by filing them with files of different sizes, shapes and types. But now such imperfect parts of artworks are repaired by welding brass with gas welding machine.</p>	
	22 <sup>nd</sup> Step	<p><b>Buffing Process:</b> The buffing process is related to the surface finishing and polishing method of Dhokra metal artifacts. In this process, the excess surface of the dhokra artwork is leveled by mechanical buffing machine to fiend smooth and shiny appearance or. Mechanical buffing machines in the buffing process typically use wheels with metal bristles to remove loose abrasives such as cutting compounds. The process is usually a coordinated process of grinding dhokra artworks with a brass Brussels wheel and buffing pad wheel, focusing on giving the original artwork a lustrous appearance by breaking the mould. This wheel is used to grind the artwork to remove the impurities deposited on its surface and to give a shiny appearance to the surface.</p>	

	23 <sup>rd</sup> Step	<b>Polishing Process:</b> Process of Buffing with Buffing Pad Wheel: Fine-grained abrasive materials are attached to the polishing wheel. When the surface of the Dhokra metal artifact collides with the surface of the polishing wheel, the surface of the metal-artifact begins to be rubbed and polished and the impurities deposited on them are removed. As a result, the surface of the Dhokra craft becomes brighter. In this process, very little of the material is removed from the metal surface by grinding the metal. In the final stage of this process, the Dhokra artisan rubs the surface of the artwork thoroughly by applying wax abrasive material (such as wax pole polish or any other similar polishing compound) on the polishing wheel to obtain a high-quality glossy surface.	
	24 <sup>th</sup> Step	<b>Finishing of Artifact:</b> Dhokra artwork takes almost the final shape in the 24th step according to its predetermined structure. But if required so, sometimes the traditional Dhokra craftsmen rub the artwork thoroughly with sand to polish and give it a lustrous appearance.	
Final Dhokra Artifacts	On the last day of the workshop, the superb final product is now ready and the creative works created by the participants were displayed during the valedictory ceremony.		

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### Conclusion:

Dhokra art is the ancient traditional indigenous folk-art technique of casting of metal artifacts; which continued to progress from generation to generation, without being affected by industrialization, but today; the clouds of crisis are hovering over its existence. It's no matter how many adverse circumstances; Art finds a path and a medium to communicate itself, whether or not it has its supporters, mentors and assistive technologies. Being a strong supporter of this traditional art form, I can say that today's new generation; Not only keen to connect with the past, understand the importance of its rich and glorious ancient culture, customs and traditional folk-arts, but also; it is also very conscious and alert to protect and promote it. In the current changing modern environment; undoubtedly, like other art forms, "**Dhokra art**" will continue to evolve and expand in a refined manner, incorporating new techniques as needed.