

Design Resource

## Metal Casting

Process of Making a Metal Idol

by

Prof. Bibhudutta Baral, Divyadarshan C. S. and

Lija M. G.

NID Campus, Bengaluru

Source:

<http://www.dsource.in/resource/metal-casting>



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## Introduction

Norbulingka institute is located in the terrain and foot hills of Himachal Pradesh that surrounds the Himalayan heights of Tibet and Ladakh. It is an institute which is near Dharamshala in the state of Himachal Pradesh. This institute also helps to retain Tibetan culture and value among the Indo Tibetans who have settled in this place long years ago.

The feel of mini Tibet is obtained in this place, as this institute is maintained with gardens, and water bodies to give the special and colorful feel of the surroundings. With workshops of artisan (craftsmen) working with different crafts (arts) for the preservation of the Tibetan culture.

Copper in 20th century was brought in sheet form for the metal exchange which is mixed with scrap that can be laid by hands on, old wires, faulty castings, spruces from previous image and following. Copper is demand amongst newer sculptors for casting the good quality statues. The soft surface of pure copper is easier to handle than the hard, brittle surface of brass and problems like fire- gilding.

“The native form of Copper generally appears to be found in the malachite and azurite on earth. It is believed to be first found by the Italian Capuchin, Father Orazio della Penna di Billi who had spent about twenty years in Tibet and found the presence of these copper ores in this region. Pure unalloyed copper which is considered valuable for the images of Buddha and Bodhisattva are made of pure copper. Metal craft of Himachal Pradesh is one of the typical antique metal figures which is the main aspect of the temples.

People who follow Buddhism believe their beloved master as Buddha who is remembered as their great master with qualities which inspired many people from generation to generation. Images, statues of Buddha are used as a symbol and object of focus to gain peace of mind, by putting aside the thoughts of strife thinking only of peace, calmness etc. It also helps to recall this great man by devotees to follow his examples and instructions.

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Sand is refined and filled in the mold for casting.



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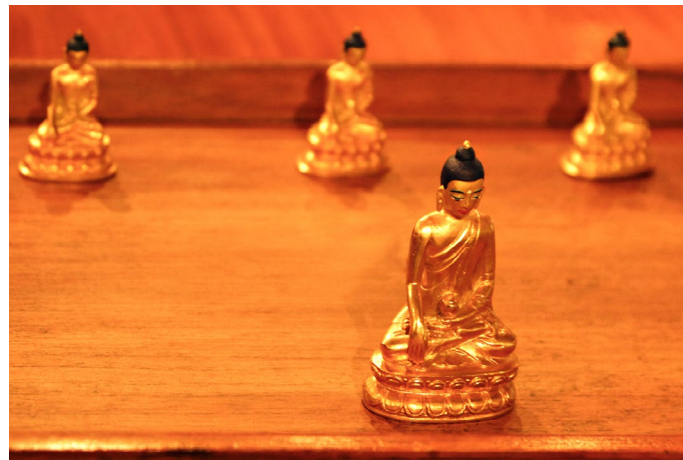
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Furnace used for melting the metal.



Excess casted metal is removed.



Casted idols of Lord Buddha painted with liquid gold.



Molten metal poured in the mold.

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Casted idols made from copper.

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## Tools and Raw Materials

Metal casting is a process of making a metal idol which requires different types of tools and raw materials. Generally charcoal (for heating in furnace) is purchased from Delhi and Ludhiana of Punjab State. The main raw material for making the idol is Copper, purchased from Delhi. The artisan uses about 5kgs crucibles for melting the copper.

- **Copper:** Pure copper is used for making the idol.
- **Brass:** It is added to the copper to increase hardness of the material.
- **Chalk Powder:** It is added on the mold box.
- **Rod:** It is used to set and spread the mud evenly.
- **Charcoal:** Its used as fire base to provide heat.
- **Hammer:** It is used to remove the heated mold.
- **Tongs:** Its used for lifting the crucible.
- **Flask Tongs(Bonzi):** It is used for holding the heated crucible.
- **Chinta (lid):** It is used for closing the mouth of crucible.
- **Crucible:** It is used as a container for melting the copper.
- **Sand Mold Box:** It is used for molding/shaping the product.
- **Mitti (Sand):** Roasted black sand is used as filler material in mold box available near the institute.
- **Sugar Cane Paste:** Sugar Cane Paste is used mix with mitti (sand).
- **Hand Crank Blower:** This is for melting the copper.
- **Small Metal Funnel:** It is used for making hollow on the mold to pour melted copper.
- **Natural Colors:** Colors are used to paint the surface of the idols.
- **Resin:** Its used to fix the color on the surface of the metal cast.

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Chalk powder is used in sand casting to prevent stickiness and helps for easy ejection of the component during the casting process.



Mesh is used to filter the solid and fine particles of sand whereas wood piece is used to crush sand particles.



Sand is used for metal casting as filling material.



Waste sugarcane paste is mixed with the sand to hold the sand particles together.



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Left over parts from copper sheet strip is reused.



20% of brass is added to increase the hardness of copper metal.

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Crucible is used to melt the metals.



Hand blower is used to heat the furnace.



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Tongs and flask tongs are used for holding and lifting the crucible.



High amount of heat is produced through coal and charcoal.

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Bhatti (furnace), which is made in the ground is covered with a concrete lid that is used for melting the metal.



Tools used for breaking the mold on the molten surface.



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Frames in which the sand casting is done.



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## Making Process

Tibetan metal casting usually is done to cast mostly the various types of Buddha's through the metals that are available. First step of making is the mold where the pattern is placed in the mold and the material is filled to capacity of the hollow cavity around it. The mold has two parts one is the drag (bottom) and the other is cope (top), once the impression is made, the parting line allows the mold to be open and the impressions are made. Sand is mixed with sugarcane juice thoroughly, to soft form and filled in the frame, where chalk powder is sprinkled on the surfaces and held together for the impressions.

In core part where impressions or replicas are designed in such a way that internal geometry cores shrinks to accommodate the size of the core when the metal is poured. As the molten metal hardens the core is broken to remove the mold and cooled for some time. Scrap metal of Copper and brass are collected and adequate amount of the material is measured and taken for melting as per the required quantity of the idols to be made. For melting usually mud or alloy crucibles are preferred. With the help of a blower and coal the scrap copper metal of about 80% is taken for melting to which about 20 % of brass metal is added to make the metal harder, since pure copper is very soft and brittle, therefore adding 20% of brass makes the material harder after setting. The main metal casting skilled craftsmen comes for about two months to this institute as per the orders to cast about minimum eight cast of Buddha a day. It can be sitting, standing Buddha, or a meditating Buddha posture.

After the material is completely dried, the body parts are made separately and sent for brazing the parts together with zinc and brass as filler materials. After brazing, the statues are given the finishing treatment with natural colors mostly used for the thangka painting by thangka artists. In coloring of the statute, golden color is used for the face and blue color for the hair part. Colors are applied on the surface of the statutes with mixing little bit of water and resin. Some Buddha's are heated to obtain some of the parts in black color.



Sand/reusable sand used as filling material in casting is filtered.

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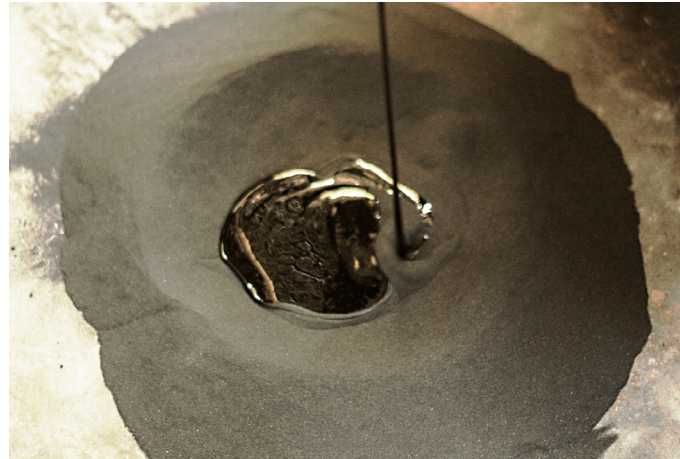
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Sugarcane waste liquid is added to bind the sand particles.



The mixture is mixed well with hand to make the mixture soft.



The mold frame is filled with the sand mixture.



Master casted piece of the idol is used to prepare the mold.

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Mud is filled in the masterpiece idol.



Two halves of the idol are joined.



Joined piece is placed in mold to create the impression of the idol in the mold.



Other side of the mold frame is placed and filled with sand and pressure is applied on it to settle closely.



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A small hole is scooped to pour the molten metal.



Prepared mold is opened and kept.



Masterpiece idol is removed leaving the impression in the mold.



Prepared molds arranged (one above) to pour molten material easily.

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80% copper and 20% bronze is added in the furnace to melt.



Metals are melted at high temperature of around 950 degree Celsius.

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Molten material is poured in the mold box.



Molten material is allowed to settle and cool.



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After cooling, craftsmen separates the filling material from mold box.



Idol is removed by braking hard filling material.



Casted copper idol.



Body parts like hands are attached separately for five inches and above cast parts.

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Completed full idols and body parts are casted separately.

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Casted metal idol of Lord Buddha.



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## Products

Metal casting in India has been practiced from long generations. The idols are made in different sizes like 2inch, 3inch up to 14 feet. The 14 feet huge idols are used in temples for worshipping. Whereas the small and medium sized idols are used as home décor as well as for worship. The artisan (craftsmen) in Norbulingka institute makes at least 8 idols per day. The cost of the products depends on the sizes which start from Rs 150/-. Mostly Buddha in different forms are made more in number, some of the other products are as below;

- 1. Padma Sambhava:** It is also known as Guru Rinpoche who transmitted Vajrayana Buddhism to the Tibet, Bhutan and other neighboring countries.
- 2. Sonam Tsemo:** It is a famous Buddhist scholar and spiritual leader of Tibetans.
- 3. Shakyamuni Buddha:** Popularly known as Gautama Buddha, who founded Buddhism
- 4. Avalokiteshvara:** It is a compassion of all Buddha's which portrays it also refers as Padmapani which hold lotus in the left hand.
- 5. Green Thara:** It is also known as mother of all Buddha's, it is savior from all fears.
- 6. Vajrapani:** It is the deities who also known as a protector of Buddha.
- 7. Mahasiddha Ghanatapa:** They are the type of yogis who has empowerment to act as guru.
- 8. Ushnishavijaya:** It is well known goddesses which symbolizes longevity of Buddha.
- 9. Vajrapani:** It refers to the protector of Buddha.

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Buddha statue painted with golden paint.



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Golden painted statue of Buddha Maitreya.



Casted statue of Nechung Trinley Gyalpo.



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To obtain the shades of black in certain areas, statue is heated using flame torch.



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Finished idol of Lord Ganesh.

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## Contact Details

This documentation was done by Prof. Bibhudutta Baral, Divyadarshan C. S. and Lija M. G. at **NID Campus, Bengaluru**.

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