BRASS METAL CLUSTER
BALIDEWANGUNJ, HOOGHLY, WEST BENGAL
Design Awareness Programme Report
MSME Design Clinic Scheme, 2012
Supported by Government of West Bengal

With

[Logos: National Institute of Design and MSME]
Acknowledgement

A earnest thanks to all those who has helped in the NAS and preparation of the DAP report. A special thanks to Bali Gram Panchayat Pradhan, Mr. Bhumendra Rai and G.M. District Industrial Officer, Chinsurah Hooghly.

This report would have been incomplete without the critical inputs from Mr. Kirti Parmar and Mr. Shasank Mehta. Also thanks to Sudev Mandal for his honest inputs, Shakti Pada De, Shyma Pada De, Sahadev Shikari, Shishir Das and their families, and to all the artisans of Balidewangunj for cooperating with us in the making of this report.
India is one of the fastest growing economies of the world, but how many are a part of this growth? The fast changing face of technology has driven us towards newer and bigger opportunities, and smaller enterprises hasn’t be able to keep with this pace. This report is a way empower one of such micro industrial cluster to keep up with the development that surrounds them. This exercise was a enlightening insight into the lives of these humble artisans, who toil from dawn to night in pursuit of excellence.

This report can be a reference for the future progress of the 22 units and in extension the artisan community of Balidewangunj, Hooghly, West Bengal, who all are associated with the brass metal casting industry.
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Objective

The primary objective of NAS or Need Assessment Survey is to generate an information base for the allocated cluster as a part of the MSME Design Clinic Scheme, 2012. This information base will contain the following:

Materials and management.
- The work flow pattern
- Raw materials and other resource management
- Special skills and techniques
- Tools and Technology

Manufacturing unit.
- Efficiency of workstations
- Available infrastructure
- Capacity and labour inputs

Product design
- Form and finishing
- Aesthetics
- Market demand and customer needs
- Present competition

Packaging, logistic and storage
Exhibition, display and merchandising

Deliverable

MSME Design Clinic Scheme expects participants to make a thorough report on the selected cluster with special attention to the specific need and problem areas of the respective cluster. A strong involvement is required for creation of an extensive knowledge base of the cluster for any future reference as well as interventions. The designer is required to be understanding and compassionate about the needs of the cluster and their particular set of skills in the appraisal of the cluster. Personal interaction and on-the-ground study will help in making a focused but extensive report.
Methodology

The initial survey started on 27th July’ 2012 and continued till 2nd August’ 2012. Interaction with the artisans, visit to the individual workshops and manufacturing units along with photographic study was a part in this survey. 3rd and 4th August’ 2012 was dedicated to Market study and interaction with the retailers.

Participant

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Duration

The NAS was conducted for Bali Gram Panchayat with special inputs from the G.M, District Industrial Officer, Chinsurah, Hooghly, Mr.. Anindya Das Gupta and with NID and MSME.
INITIAL STUDY
Introduction

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Introduction Balidewangunj brass metal industry:

The Brass Metal Industry at Balidewangunj is a 100 years old industry. However the production processes, tools and techniques involved in this industry can only be compared to a cottage industry. In fact all the production takes place in the workshops which are like a integral component of the households. Most of the household members are involved in the production processes, with a few exceptions. All the workshop setups at Balidewangunj are operational at a very micro level.

The micro scale brass industry at Balidewangunj consists of four villages- Kalagachia, Bali, Radhballavpur and Udairajpur. All of these villages are spread across a 2 kms radius along the Arambag - Balidewangunj road which is the main connectivity of this area. These villages are quite small, with Bali being the biggest of all.

The most striking feature of the brass industry in Balidewangunj is that the whole product range is limited only two utensils- a ‘Ghoti’ or small pot to carry water and ‘Kolshi’ a bigger vessel or urn to store water. The significance of Ghoti is that it is used in several daily activities to fetch and carry water. Is also plays a part in the daily religious ritual of a Bengali household. The Kolshi however has a more social significance as it is gifted on marriages and is a integral part of Bengali marriages.

Another interesting fact about the micro industry at Balidewangunj is that all the workshops use scrap brass metal as their raw material. The scrap brass comes in form of used component of automobiles, gas burner, sprout of the gas cylinder etc. The scrap brass is collected at several places in Kolkata, where the brass is separated from other metals and is collected by the ‘Mahajans’ (mediating agents). The Mahajan then supplies the scrap material to the artisans in Balidewangunj. The Mahajans play a very important role in the running of micro scale brass industry at Balidewangunj, as the Mahajans are not only the suppliers of raw material but also buyer of the finished products from the artisans.

The main market of all the products made at Balidewangunj is Kolkata, specifically Burrabazar, which is the primary market in North of Kolkata for buying Brass utensils. However the artisans here in Balidewangunj do not have much contact with the final market of their products as they sell their products to the Mahajans, and to them the Mahajans are the client.
Arambag is located at 22.88°N 87.78°E. It has an average elevation of 15 meters (118 feet). The town is situated on the link Road (state highway-2) 100 km north-west of Kolkata. It is located on the bank of the Dwarakeswar River. Arambagh subdivision is the subdivision of Hooghly district in the state of West Bengal, India. It consists of Arambag municipalities and six community development blocks: Arambag, Khanakul-I, Khanakul-II, Goghat-I, Goghat-II and Pursurah. The six blocks contain 63 gram panchayats. The subdivision has its headquarters at Arambag.
Arambagh subdivision

Arambag community development block - 15 gram panchayats.
Khanakul-I community development block - 13 gram panchayats.
Khanakul-II community development block - 11 gram panchayats.
Goghat-I community development block - 7 gram panchayats.
Goghat-II community development block - 9 gram panchayats.
Pursurah community development block -8 gram panchayats.

The brass metal cluster od Balidewangunj is located in the subdivision of Goghat-I. It constitutes of four villages- Kalagachia, Bali, Radahballavpur and Udairajpur, which comes under the Goghat-I Gram Panchayat.

Geography

Arambagh is situated on the Eastern banks of Dwarakeswar River, while Balidewangunj is spread along the Western bank of the river. Balidewangunj is surrounded by cultivation land and it sits on a flat topography elevated 15 meters (118 feet) above the sea level. As with most of the Indo-gangetic Plain, the soil and water are predominantly alluvial in origin and very fertile. However owing to the floods of 1970s some of the land near the river is covered with sand which was deposited by the river during the floods.

Rivers

Balidewangunj is located in the Arambagh subdivision of Hooghly district, in the state of West Bengal, named after the Hooghly River. The district of Hooghly has the district of Burdwan on the north, the river Hooghly on the east, the district of Howrah on the south and the districts of Midnapore, Bankura and Burdwan on the west. Hooghly district is mainly the product of its rivers. The three large rivers, the Hooghly, the Damodar and the Dwarkeswar with their extensive and violent oscillations have determined the physiography of the district and have given rise to the smaller streams. Balidewangunj is situated on the banks of the Dwarkeswar and has been blessed with the rich and fertile alluvial soil brought by the river as well as the floods caused by it. In fact a large plot of land is covered by sand in this rural area due the sand deposition by the river during one of its ill fated floods.
Climate

The maximum temperature during summer rises up to 38 °C while minimum temperature during winter comes down to 8°C. Average annual rainfall is 1600 millimeters. Hooghly district has a tropical savanna climate, and this is same in the Balidewangunj rural area. The annual mean temperature is 26.8°C, although monthly mean temperatures range from 16°C to 33°C and maximum temperatures here often exceed 38°C. The main seasonal influence upon the climate is the monsoon. Maximum rainfall occurs during the monsoon in August and the average annual total is above 1,500mm. Moderate northwesterly to northeasterly winds prevails for most of the year with a high frequency of calms. Summer is dominated by strong southwesterly monsoon winds. Winters are comfortable with temperatures lying between 11 to 17°C.

<table>
<thead>
<tr>
<th>Month</th>
<th>Normal</th>
<th>YEAR RAIN FALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>8</td>
<td>2000 1656.1 mm.</td>
</tr>
<tr>
<td>February</td>
<td>16</td>
<td>2001 1164.8 mm.</td>
</tr>
<tr>
<td>March</td>
<td>29</td>
<td>2002 1386.7 mm.</td>
</tr>
<tr>
<td>April</td>
<td>44</td>
<td>2003 1273.8 mm.</td>
</tr>
<tr>
<td>May</td>
<td>118</td>
<td>2004 1234.0 mm.</td>
</tr>
<tr>
<td>June</td>
<td>256</td>
<td>2005 1224.7 mm.</td>
</tr>
<tr>
<td>July</td>
<td>316</td>
<td>2006 1132.6 mm.</td>
</tr>
<tr>
<td>August</td>
<td>278</td>
<td>2007 1625.8 mm.</td>
</tr>
<tr>
<td>September</td>
<td>287</td>
<td>2008 1470.5 mm.</td>
</tr>
<tr>
<td>October</td>
<td>139</td>
<td>2009 1289.5 mm.</td>
</tr>
<tr>
<td>November</td>
<td>28</td>
<td>2010 1078.8 mm.</td>
</tr>
<tr>
<td>December</td>
<td>4</td>
<td>AVERAGE RAINFALL OF LAST 5 (FIVE) YEARS 1374.0 mm</td>
</tr>
<tr>
<td>Total for the year</td>
<td>1523</td>
<td></td>
</tr>
</tbody>
</table>

Average rainfall of last 5 years: 1374.0 mm
Soil and land use pattern

In spite of the fact that this region is one of the most important industrial districts of West Bengal, about 70% of its population depend on agriculture and represents an important and remarkable place in the field of agriculture in West Bengal.

Due to massive population explosion and continuous increase of pressure on land, the farmers of this district are engaged in cultivation of all the major crops utilizing the fullest potentiality of land and natural resources. Though rice is the prime crop of the district the agricultural economy largely depends on potato, jute, vegetables and orchard and the cropping intensity of the district has been escalated to 220%.

Vegetable is a prime crop in the blocks of Haripal, Singur, Chanditala, Polba and Dhaniakhali being grown in a relay system throughout the year. Though potato is cultivated in all the blocks of this district Dhaniakhali, Arambagh, Goghat, Pursurah, Haripal, Polba-Dadpur, Tarakeswar, Pandua and Singur contributed much of its production of this district. Dhaniakhali, Haripal, Pandua, Arambagh and Pursurah have maximum number of cold storages for potato in this district.

Demographics

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Town / Village Name</th>
<th>No of Households</th>
<th>Persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bali</td>
<td>699</td>
<td>3,605</td>
</tr>
<tr>
<td>2</td>
<td>Udayrajpur</td>
<td>276</td>
<td>1,342</td>
</tr>
<tr>
<td>3</td>
<td>Radhaballabhpur</td>
<td>290</td>
<td>1,538</td>
</tr>
<tr>
<td>4</td>
<td>Kalagachhia</td>
<td>159</td>
<td>729</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Literacy rate</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arambagh</td>
<td>81.20%</td>
<td>60.70%</td>
<td>71.00%</td>
</tr>
</tbody>
</table>
Brass Metal Industry

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History of Brass Metal Industry?

The discovery of metal changed the lives of the people in the ancient world. Metal and its alloys made agriculture easier, providing farmers with more efficient tools to work their land. Armies that possessed metal knives, swords, and shields were no match for those that did not. The first two metals and its alloy widely used by humans, copper (and its alloy brass) and gold are still important in people’s lives today.

Man’s first use of the Earth’s natural resources was in the form of grasses, trees, animals and stone. Tools and weapons were made from wood, bone and stone. Stone-Age people knew nothing of metal. Copper is probably the one first used by man. It is found native and in a variety of combinations with other minerals from 4,000 to 6,000 BC was the Calcolithic period which was when copper came into common use. Some ores contain both copper and tin. When smelted, these ores yield an alloy of these two metals, which is known as Bronze. Bronze is significantly harder and stronger than pure copper, and in utilitarian terms at the time, considerably more valuable. The discovery of a copper-tin alloy and its uses led to the Bronze Age. Somewhat later in history, Romans were the first to use brass, as alloy of copper and zinc in Aristotle’s time (330 B.C.).

The story of Indian Brass as is generally known began during the age of the Indus Valley civilization i.e. around 2400 B.C. to 1700 B.C.. As per the literary evidences, indicates that the mining and metallurgy of copper and zinc commenced in 2nd century B.C. (Maurya Sanga time), evidence for the continuity of the activities during Kshatran period of 2nd to 4th century A.D. There is also evidence of copper metallurgy from Pre-Harappan level in Sindh and Punjab. There is greater activity in copper metallurgy as represented by copper Hoard cultures (1100 – 800 B.C.) in Bengal, Sonepur and Chirand (Bihar) and Atranjikhera, Hastinapur, Kausambi and Rajghat(U.P.) Copper is called ‘tamba’ in Hindustani, Zinc ‘jasta’ and tin pewter is ‘ranga’. Brass is made from copper and zinc in varying proportions, usually two of the former to one or one and a half of the latter. Bharat, Kaskut or Kansa are the most constant of alloys of India. On account of its bright color and the polish that it takes this metal is in great demand for ornamental purpose. As regards coins, both brass and bronze were used in ancient India for coinage. The earlier products made out of bronze include the utility items like utensils, statues of Gods and Goddesses besides various other decorative items.
What is Brass Metal industry?

India is the largest brass-making country in the world. This art has been practiced in India for over 5 million years. In the field of brass work a variety of styles are seen in different parts of India. The Northern & North Eastern industries of brass include Moradabad, Aligarh, Hathras and Varanasi in Uttar Pradesh; Mayurbhanga, Dhenkanal, Keojhara and Sundergarh in Orissa; Jaipur and Jodhpur in Rajasthan; Jagadhari and Rewari in Haryana; Udhampur, Sambha and Bhainsali in Jammu & Kashmir; Kurkhihar in Bihar; Hazo and Sarthebari in Assam; Purulia, Bankura, Birbhum, Murshidabad in West Bengal and Delhi etc. The important clusters of the brass in the Southern and Western regions are Pembertha and Hyderabad in Andhra Pradesh; Bidar, Nalgonda, Mysore and Gadag in Karnataka (Bidriwara); Swamimalai, Nachiarcoil, Madurai, Kumbakonam, Tirupur and Tanjore in Tamil Nadu; Ambarnath, Thana, Kalyan and Nasik in Maharashtra; Trichur in Kerala; Jamnagar in Gujarat and Pondicherry, etc.

Moradabad in Uttar Pradesh is world famous for its range of brass items. A wide range of household items like pots, trays, bowls and decorative pieces are made here and are decorated with intricate etching. Electroplated brass and copper items and items made of white metal are also created in Moradabad.
What are the basic products and its uses?

Brass and copper utensils from the staple of the metal works in the Punjab and all large cities great quantities of cooking utensils, lamps etc. are made for local consumption. Bihar and Bengal produce an extensive range of domestic vessels in brass and bell metal especially in the region of Malda, Patna and Gaya. The Ladakh region of Kashmir is known for traditional vessels made out of iron and brass. The craftsmen of Kashmir are also known for richly engraved traditional household items like bowls, samovars, plates and trays. Intricate floral and calligraphic patterns are embossed on copper and silver items. These items are then oxidized, which makes the design to stand out from the background. This work is known as ‘naquashi’. Making of bronze sculptures is common in Palitana in Gujarat. In Rajasthan Jaipur is the main center for brass engraving and lacquering, Items such as photo frames, bowls, plates, boxes etc. Ethnic designs and floral patterns, hunting scenes etc. are hammered or embossed on the surface. Jaipur also known for its bronze sculptures. The art of Koftagari or damascening work is mainly practiced in Alwar and Jaipur, one metal is encrusted into another in the form of wire. Popular articles are swords, daggers and shields. Ornate metal boxes of Bundelkhand, lamps of Sarguja, rice measure bowls and animal figurines of Raigarh, sculptures of Bastar are a few examples of the creativity of crafts persons of Madhya Pradesh. Andhra Pradesh has a rich tradition of metal craft. Sheet metal work using brass is done in Pembarti, on plaques, containers, vases etc. Brassware from Tamil Nadu comprises of decorated traditional lamps, used in religious functions, while Kerala is famous for its polished brass mirrors.

The Dokra metal craft is popular in the tribal belts of Andhra, Orissa and Madhya Pradesh. The uniqueness of this craft form is that no two pieces are alike. These items are mainly made from brass scrap. Unlike any other metal craft the core of the objects is filled with clay.
What are advantages of Brass Metal?

Brass has a combination of strength, corrosion resistance, and formability that will continue to make it a useful material for many applications in the foreseeable future. Brass also has an advantage over other materials in that most products made from brass are recycled or reused, rather than being discarded in a landfill, which will help ensure a continued supply for many years. Due to the capability of brass of being converted into different designs and shapes and its acoustic properties, brass has become one of the preferred item to be used in numerous applications. There are many feature of brass as under:

1. Excellent Machinability: Machined components can be cheaper in brass than in mild steel. All brasses are intrinsically easy to machine.

2. Good Strength: In the softened or annealed condition, the brasses are ductile and strong but when hardened by cold working techniques such as rolling or drawing, their strength increases markedly.

3. Ductility: Some Brass can be extensively deformed at room temperature, and are widely used for the manufacture of complex components by pressing, deep drawing, spinning and other cold forming processes.

4. Conductivity: Brasses have good electrical and thermal conductivities.

5. Easily Joining: Brasses may readily be joined to other copper alloys or to other metals by most of the commercial joining processes such as:
   - Riveting
   - Soft soldering
   - Brazing
   - Friction welding
   - Modern adhesive joining practice

6. Castability: All brasses can be readily cast for a wide variety of end users giving strong, sound castings. End users range from pipeline valves and electrical switch gear components which require high soundness and strength. A long operating life and, in the case of components for mines and the petrochemical industry, spark-resistant characteristics, to noncritical ornamental applications where the requirement is for a good surface finish as well as a long service life.
7. Available Forms and Properties:
Being easily shaped by hot and cold working processes, the brasses are manufactured in a wide variety of forms. Semi fabricated stock is available as rolled plate, sheet, strip and foil and as extruded and drawn bars, shaped sections, hollow rods, tubes and wire. Intermediate products can be obtained as hot stamping, forgings, sand castings, shell moulded castings, gravity and pressure die castings, and investment castings. The availability of these items to specific composition and size specifications may be dependent on quantity requirements. Dimensional tolerances suitable for most general engineering applications are quoted in the relevant British Standards for the wrought products. Any special requirements should be discussed with manufacturers.

8. Recyclable: Brass is recyclable and benefits the high value of any process scrap can be used to reduce production costs significantly.
In India the brass metal industry are located in three states namely Gujarat, Haryana, Orissa, Assam and Uttar Pradesh. But there is a subtle difference between the products manufactured in these three states. The products manufactured in Haryana, Orissa, Assam & Uttar Pradesh are mostly brass metal handicrafts and utility items made out of sheet metal components or single piece casting whereas in Gujarat it is mostly brass machined components. From the point of view of its application or usage pattern, the products manufactured in Uttar Pradesh, Orissa, Assam & Haryana are consumer products and are used as gift, utility or decorative items. Whereas the products manufactured in Gujarat can be classified as industrial product and consumed by industries as a part/ component of their final product. Unlike the above four states, the brass part product in Gujarat requires a lot of machining activities like turning, milling, grinding, drawing, boring, threading etc.
What are advantages of Brass Products?

1. **Non-sparking:** Brasses do not spark when struck and are approved for use in hazardous environments.

2. **Good Corrosion Resistance:** Brasses have excellent resistance to corrosion that makes them a natural, economic first choice for many applications.

3. **Wear Resistant:** The presence of lead in brass has a lubricating effect that gives good low friction and low wear properties utilized in the plates, pinions and gears used in instruments and clocks. Special brasses are available with additions of silicon that make the material ideal for use in heavy duty bearings.

4. **Attractive Color:** Brasses are extensively used for durable decorative applications and for the manufacture of functional items where aesthetic appeal is a requirement and is known as “yellow metal”.

5. **Hygiene:** Brass fittings, free from further protective finishes, should therefore be used in sensitive environments such as hospitals.

6. **Magnetic permeability:** Brasses are essentially non-magnetic, a property which has gained them extensive use in electrical and electronic equipment, as well as instrumentation such as geological and survey equipment.

The point of view of its application or usage pattern, the products manufactured in Uttar Pradesh, Orissa, Assam & Haryana are consumer products and are used as gift, utility or decorative items. Whereas the products manufactured in Gujarat can be classified as industrial product and consumed by industries as a part/ component of their final product. Unlike the above four states, the brass part product in Gujarat requires a lot of machining activities like turning, milling, grinding, drawing, boring, threading etc.
In ancient times the rich man ate off plates of shining gold. In imitation of this, country people all over the world have always used shining copper and brass for saucepans and kettles. Though efforts towards preserving them in a tarnish-free condition are at best, a labour of love and often labour in vain. The domestic utensils industry in India is a major consumer of non-ferrous metals, both indigenous and imported. The most important products are brass wares and aluminium wares. Copper, bell-metal, bronze, nickel-silver and silver wares are also manufactured in minor quantities. The high proportion of imported metals used, the extent to which the choice of materials for domestic vessels in India differs from that made elsewhere, and lack of attention sometimes given to detailed steps in manufacture and in control of materials, considered essential elsewhere, justify serious consideration being given to the rationalization of the industry. Consumption of non-ferrous metals and alloys in India during 1948 for the manufacture of domestic utensils was as shown in the following table:

### DOMESTIC UTENSILS

<table>
<thead>
<tr>
<th>Metal</th>
<th>Tons</th>
<th>Value lakhs (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium</td>
<td>7636</td>
<td>394</td>
</tr>
<tr>
<td>Brass</td>
<td>6325</td>
<td>238</td>
</tr>
<tr>
<td>Copper</td>
<td>134</td>
<td>5.41</td>
</tr>
</tbody>
</table>

The impact of Brass utensils can be seen till the stainless steel utensils and until recently the plastic utensils took over the market. However brass utensils and products are still considered to be a essential part of religious products and auspicious events like marriage and funerals. Also due to the bright shining gold like appearance of brass it has found its place in house hold products and showpieces like vases, candle stands, incense sticks stand and other home accessories.
What is the Cultural Status of Brass Products?

India also has good export trade for aluminium and brass wares and utensils. Aluminium wares and utensils worth Rs. 61 lakhs (978 tons) and Rs. 55 lakhs (878 tons) were exported in 1951 and 1952 respectively mostly to East African, Middle Eastern and South Asian countries. Exports of brass and copper wares and utensils for the same periods have been valued at Rs. 35 lakhs and Rs. 13 lakhs respectively. In the export trade this accounts for 10 per cent of aluminium and 1 per cent of brass wares and utensils production of India.

House hold products:
- Utensils- glass, plates, dishes, woks,
- serving spoons:
- door handles
- Home accessories
- Decorative components

Religious Products
- Idols,
- Worshipping equipment

Medical equipment.

Brass has been replaces by stainless steel in many of the given areas where brass was used extensively earlier. The reason behind are the advantages of os stainless steel’s:

- Stainless steel is in many cases superior to brass in more-aggressive marine environments such as fast-moving currents,
- Stainless steel has excellent resistance to petroleum products and many acids, and it can be passivated in either citric or nitric acid solutions.
- Stainless steel is typically stronger than brass, though actual comparisons depend on grade and alloy.
- Certain grades of austenitic stainless steel are approved for food contact, and are, therefore, a good choice for food and beverage applications.
- Austenitic stainless steel provides a higher service temperature than brass.
However Brass still remains a choice for some specific areas. Religious and auspicious event in India call for brass utensils and products. In fact still now most religious utensils and products are made from brass. This is because of the traditional preference of brass products which has not been changed or influenced by the changing sociocultural scenario in India.

Reason for using brass as a material for household products:
Brass basically refers to a yellowish alloy of copper and zinc, which moreover also comprise a little bit amounts of other metals, but generally 67 percent copper and 33 percent zinc. Brass has been widely used in the manufacturing of ornaments, objects or utensils and so on. As a consequence of aforesaid discussion one can conclude that brass is an only term which is used for the alloys of copper and zinc which may have varied compositions depending upon the availability of materials and function of the product. But the primary reason of the usage of brass is that it replicates gold in its color and shine. Gold as we know has been a precious metal that India is obsessed with till the present day and though in value there might be metals that are expensive that gold, the perceived value of gold is much higher. And as result brass became the immediate choice after gold as it looks alike gold but if much less expensive and more easily available. It is also more strong than gold and can be easily cast in to several shapes.

Brass has a combination of strength, corrosion resistance, and formability that will continue to make it a useful material for many applications in the foreseeable future. Brass also has an advantage over other materials in that most products made from brass are recycled or reused, rather than being discarded in a landfill, which will help ensure a continued supply for many years. Due to the capability of brass of being converted into different designs and shapes and its acoustic properties, brass has become one of the preferred items to be used in numerous applications.

India today is teeming with millions of educated, relatively well-to-do men and women who enthusiastically participate in global networks of science and technology. The Indian economy is betting its fortunes on advanced research in biotechnology and the drug industry, whose very existence is a testament to the naturalistic and disenchanted understanding of the natural world.

But how religious are people in today’s context:

Very Religious - 42%
Some what religious - 45%
Not religious at all - 9%
Rest: No Opinion
Effect on the brass industry due to changing social needs
With the changing lifestyle of urban India, a priority shift has happened which has put religious activities and products related to it on a lesser priority. As a result, industries such as the Balidewangunj brass metal industrial cluster is not thriving as it used to be. After globalization hit India, a lot of lifestyle choices as well as international brands and products has appeared in the Indian market and as a result, traditional products has faced a setback in the urban market. Sub-urban market and rural market however still follows traditional routes and enjoys to buy traditional products. As most brass products, including the ones produced in Balidewangunj belong the a traditional segment its value has reduced in the urban market.

Affect on the brass industry due to availability of alternate materials
Stainless steel utensils have been recently introduced in India. These utensils are much favoured, but the deterrent factor in their large usage is the high cost. Moreover, these utensils are at present made only from imported sheets. With larger capacity of steel making in the near future, stainless steel sheets may be in time manufactured in India. Is typically stronger than brass, though actual comparisons depend on grade and alloy. Nickel and chromium required for the manufacture of stainless steel shall have to be imported. However, the initial high cost of stainless steel utensils, in spite of their durability, shall prevent their wide use in Indian homes. Low cost aluminium alloys have not been found suitable for metal dishes, tumblers, bowls, etc., which are used in Indian homes. Stainless steel would possibly be the only alternative to brass and bell-metal. Austenitic stainless steel provides a higher service temperature than brass. It’s important to note that this offers limited benefit because the heat-deflection temperature of the plastic component is usually the limiting factor.

Affect on the brass industry due to contemporary taste of customers.
The Indian culture has never been rigid and that’s why it’s surviving with pride in the modern era. It timely imbibes the qualities of various other cultures and comes out as a contemporary and acceptable tradition. That is what unique about the Indian culture. It moves on with the time. There are certain things about India that are famous worldwide. Brass and bell metal products has been one of those things. While the products that are imported requires some speciality like engraving or surface painting, the products that come out of the workshops do not have any such special features. They are meant for daily usage and gifting on some occasions. Also as the need of the urban crowd has changed they require products that will fit in their present lifestyle. Therefore a new inventory of products range is require to match up to the demand of the customers.
Cluster Information

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Cluster Location Map
Cluster History

The brass metal cluster at Balidewangunj is about 100 years old. It all started when a few artisans took forward the art of casting brass into utensils and built the very foundations of the cluster of brass metal workshops that are exists here. When this cluster was at a very early stage only a few families were involved and most of them worked under several larger units. But with time more people got involved in the craft and the art was passed from generation to generation. Even today the methods and techniques that are followed here at these workshops at Balidewangunj are same as those followed a hundred years back.

As the know-how and the art of casting brass was passed traditionally most workshops and production units become family centric. Almost most of the families were involved here in the process of converting brass into utensils of daily use. Artisans started acquiring the required skills at a very early age while assisting their fathers and it is the same methods that they follow till now. However with increasing members in the family workshops started splitting up. This was also because of the increasing demand in the market. Artisans understood that to meet the demand it is better to split up and own separate workshops. But only the ones with some family capital could build workshops. Others had to work for these families. Even now dearth of capital prevents these artisans from developing.

Presently 200 families are involved in this micro scale brass metal industry at Balidewangunj. They are spread across four villages, Kalagachia, Radahballavpur, Udairajpur and Bali the most populated village in this neighborhood. Most of these families have in this profession for generations while some of them have joined in the recent past. These new comers get trained under the traditional artisans for years. Some have been training for as long as 10 years. After these artisans gain enough experience and confidence they either start their own workshops or sometimes continue working for bigger production units. Earlier more families were a part of the micro scale brass industry in Balidewangunj, but for a number of reasons have been forced to leave this profession and venture elsewhere.

The knowledge of the craft lives with the artisans, there is no written document or any book that they follow in the production process. Most of the processes involving the production, finishing and procurement of materials are similar among the cluster, but certain qualities vary from artisan to artisan. Some of the artisan are more involved in group activities while others are inclined towards the commercial aspect and hence they hire people to work for them. Some of them has developed new shapes that sets their products apart. But over all the cluster in Balidewangunj is a homogeneous cluster that follows similar methods and comes up with similar products, But the skill that they posses is what makes them unique.
The reasons behind development of the Balidewangunj cluster of brass metal industry are:

Proximity to Kolkata: Although Balidewangunj is about 110 Kms from Kolkata it is still within the proximity from where local trading can be continued. The closeness to a major market is one of the contributing factors behind the growth of this craft.

Requirement of basic infrastructure: As most of the workshops can be built on very basic infrastructure it helped these artisans to develop their production units in this locality, completely surrounded by agricultural land far away from any industrial set ups. Most industrial production units are built near other industrial for the definite advantages of location and also because they cause a threat to the environment and its better to confine them to a certain location. But this is not the case with the Balidewangunj brass metal industry. These units are mostly domesticated and require very small space as well as initial investment which makes it possible to built these unite in the houses of the artisans and there is no nee to relocate to any industrial zone as they don’t cause any threat to the neighborhood.

Presence of rivers: As the main material used in the mould making process of the brass metal workshops is clay the presence of the Dwarkeswar river has ushered the growth of this micro scale industry in this region. The clay from the river bed as well as from the banks is not only good for agriculture but also is excellent for making moulds of different consistencies for different phases of the mould making.

Demand of product: The products that are developed in the Balidewangunj cluster are ‘Ghoti’ or small pot to carry water and ‘Kolshi’ a bigger vessel or urn to store water. When this cluster started growing in this region there were not much options of other material than brass to make these utensils and also brass utensils was considered a desirable as well as essential commodities in every households. As a result there was a constant demand of these products and hence the artisans did not require to grow to any other product ranges. The demand of these products have dropped since their inception, but still they are not out od demand.
Non availability of agricultural land: Although the locality of Balidewangunj is surrounded by agricultural land, some of the land was covered with sand after the devastating floods of the Dwarkeswar River in 1970s. Many of the artisans have their land still covered in sand as removal of the sand is expansive process and many of them cannot afford it. Also it requires that the surrounding land to be cleared of sand which is again requires involvement of more money. This lead artisans to take up brass metal casting as permanent profession. Also the artisans who did not own land hat to take up brass casting as it was a popular choice in this region.

Role of Mahajan: The mediating agents or the ‘Mahajan’ as they are know in these parts, played a very important role in the development of this micro scale industry. As procurement of raw material require license, most of the artisans cannot involve in buying of the raw material, which in this case is brass. And the ‘Mahajans’ came in to get the required raw materials to them. Although a mediating agent mostly cuts away a piece of the artisans profit, it is undeniable that without them these artisans cannot survive. And unless the municipal authority or the government steps in to help these artisans, these Mahajans are quite indispensable to the survival of these brass metal workshops in Balidewangunj.
Cluster Products

Interestingly enough the products in Balidewangunj are limited to only two major products:

Ghoti

The Ghoti is a small pot to carry water. It can be used to carry water to the bathroom or for drinking, but as brass products are costlier these days people usually use them for carrying water for religious purposes mostly.

Kolshi

The Kolshi is a large urn used to fetch water from the pond or the well and storing them. Again as the brass Kolshis have become costlier these days they are mostly presented the bride on her marriage as a part of a age old tradition in Bengal.
Infrastructure

- Tools used: 34
- Machines used: 35
- Skills required: 36
- Raw materials: 37
- Workstation Ergonomics: 38
Tools used

1. **Mallet and an anvil** to attach the chuck of the motorized lathe to the product with lacquer before polishing it.
2. **Scraping and shaping tools** made from bamboo, stones and metal plates for the moulds.
3. Pebbles to smoothen the surface of the moulds before drying them.
4. Stone slab to sharpen the shaping tools.
5. Customized **long scissor tongs** to hold the moulds to insert into and retrieve the hot moulds from the furnace.
6. **Mallet and short scissor tongs** to hold and break larger coal pieces
7. **Polishing tools** of different sizes to polish different parts of the product.
8. **Files** to file the products and remove deformities before polishing.
Machines used

1. Motorized lathe to polish the final product.

2. A motorized bellow to blow air in the oven that heats the lacquer that is used to attach the chuck of the motorized lathe to the product before polishing.
Skills required

Moulding making
Making the moulds is a skill intensive process. Care has to be taken at every level the mould has an extremely good finish so the final finishing does not take very long. But as the moulds are made in six pieces in case of the GHOTI and four pieces in case of the KOLSHI, parting line marks are there in all products after casting. The inner mould has to be perfect however and the product cannot be polished from inside.

As the products do not have any decorative feature in them the skill and effort behind the mould making cannot be seen in the final products. Also since the range of products belong the daily use category no special value is added to the products in spite of the skills these artisans possess.

Casting
The processes the is followed by the artisans in Balidewangunj is very labour intensive. It involves a lot of physical labour. The Processes followed and the design of the furnace do not make it easy for the artisans to lift, place and cast the final products in their moulds. In case of the GHOTI the mould size and weight is lesser than that of a KOLSHI, so casting of a KOLSHI is far more laborious work that of a GHOTI. But both processes require physical work and a certain amount of safety that’s is missing.

Finishing
Finishing consists of filing the product and polishing in a motorized lathe. Filing the product is a labour intensive process as the artisans have to apply his strength to remove all the deformities on the surface of the cast product. This process is more of a skill based one. The artisan has to scrape out material in a way the that final finished surface looks seamless and smooth. This finishing is the final finishing of the product and the quality achieved by most artisans is quite commendable.

Recommendations
- The product line should showcase the skills of the artisans.
- Products should highlight the finishing skills of these artisans.
- Products should have simpler moulds and less number of mould components.
- Workstations and furnace should be designed to ease manual labour.
**Raw Materials**

**Local resources:**

**Clay:** Three types of clay is required by the artisans—*Poly Matti* or Riverside clay, *Ettel Matti* or River bed clay and the regular clay from ponds. The clay of bought from several vendors who collect the clay from respective locations. The clay is then stored in the artisans workshop or in the open space available to him. Usually the artisans buy clay that will last him at least 4 - 6 months for mould making.

**Coal:** Coal is another locally available material that the artisans buy from the vendors. Coal is the main fuel used in the furnaces. The coal is bought in chunky form which is then broken down to form small pieces that can be used in the furnace.

**Wood:** Apart from coal wood in form of twigs and smaller branches are also used in the furnace specially in the casting of *KOLSHI*. This reduces the fuel cost as the *KOLSHI* requires more time to be heated because of its volume. The wood is also bought locally from vendors.

**Recycled Materials**

**Brass:** The basic raw material that is used in the casting is scrap brass which is supplied by the Mahajans. *The artisans have to depend on the Mahajans as they don’t have license to buy brass as raw material.* As a result the Mahajans play a key role in the over all demand-production-supply chain of the brass metal products.

The brass the is used by the artisans is recycled which is very socially responsible but the raw material that these artisans get has a lot of impurities which makes it difficult for the artisans to judge the proportions of brass and other metals in the scrap brass,

**Zinc:** The artisans sometimes buy zinc form local dealers to compensate for the weight deficiency due to impurities present in the brass,

**Recommendations**

- Firstly the most important requirement for the artisans is that they form a co-operative and acquire license to buy brass as raw material. This will make them independent from the Mahajans
- Alternative moulds can be developed to reduce the number of raw materials that goes in the process.
Workstation Ergonomics

Mould making

The basic requirements of the moulds making area is:
- Water pot
- Clay
- Work surface
- Tools place

Placement of the working area along with the orientation of light is important as the job requires concentration.

Precision job requires the mould to be held close to the body. Sitting posture do not provide that.

Sitting posture and bending forward for long hours is not recommended

A proper workflow needs to be established to segregate working area from storing area.

Recommendations

- Workstation design is essential to improve working posture.
- Organization of tools and storage of moulds is another issue that needs to be solved.
- Workstation should have natural light to reduce extra electricity cost.
Casting

Furnace height is high which makes it difficult to insert and retrieve the moulds during casting.

No protection and separation in the furnace area making it prone to accidents.

The design of the furnace is such that lot of heat escapes from the top.

The space around the furnace is used for preparation of the furnace but no dedicated space is allocated for this purpose.

The moulds are kept on the floor after being taken out of the furnace. The artisan has to lift the mould fully out and bring to a different level to do this. A platform or tray can help reduce the height difference between the furnace and the floor

Recommendations

- Furnace design is essential to make it more ergonomic so that insertion and retrieval of moulds is easy.
- The furnace should have enough safety to avoid any accidents.
Finishing

- The design of workstation should incorporate all the tools and machines involved.
- It should also take care that less effort is needed by the artisans to finish the products.
- Organization of tools is required.

Very congested workstation in most workshops with not organization of tools, specially as this job requires a number of tools.

Squatting posture and bending forward for long hours in not recommended

Precision job requires the mould to be held close to the body.

A proper segregate is needed in the working to separate it from temporary storing area.

The metal flakes that are wasted can be saved with proper workstation design.

New tools can be designed to minimise time taken in polishing of each product.

Recommendations

- The design of workstation should incorporate all the tools and machines involved.
- It should also take care that less effort is needed by the artisans to finish the products.
- Organization of tools is required.
Processes

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Manufacturing Process

**GHOTI / KOLSHI**

**Order placement** by the Mahajans

**Raw Material Procurement**: Clay, Coal, Wood, Brass, Zinc

**Raw Material Storage**

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**Procurement**

---

**Preparation**

Clay preparation

Mould making

Mould assembly

Preparation of coal for furnace

Furnace preparation

Casting

Cooling and breaking moulds

Preparation Product for final finish

---

**Mould making**

---

**Casting**

Welding two halves of *KOLSHI*

Applicable only for *KOLSHI*

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**Finishing**

Polishing on motorized lathe

---

**Despatching**

Despatching products in sacks

---
Order is placed by the Mahajan

Raw material- scrap brass is supplied by the Mahajan.

The Artisans collect the scrap brass by cycle.

The brass is sorted out of the scrap and weighed to check whether its enough for the order.

Zinc is bought from the local market in Arambagh to compensate for less brass if required.

3 types of clay is brought from vendors. Clay is segregated and stored in the assigned places in the workshop.

Reinforcing material for the preparation of the mould clay is brought from vendors.

**Issues**

- Raw material management is completely in the hands of the Mahajans. As none the artisan possess a licence to purchase raw brass they have to depend on the Mahajans.
- The scrap brass supplied by the Mahajans is most of the times not sufficient to maintain the weight of the products as it contains impurities.
- It is difficult to separate all impurities by hand so while casting other metal impurities are left in the molten brass container as they have different melting point. But it is difficult to judge the proportion of other metal impurities in the scrap brass and have to depend completely on experience.

**Recommendations**

- A local authority should be formed who will possess licence to purchase brass from the market.
- Using scrap brass is a very noble idea but there should be a way to figure out the percentage of brass in them. This could be possible by testing different items once and forming charts of and only buying those items from the market.
- Artisans should have access to raw material for any alternative market other order than the Mahajans.
Clay Preparation

The preparation of clay take a number of steps to achieve the required texture and consistency. The following are the preparation steps for each type of clay.

Outer Mould with *Patt Matti* or Jute clay
1. Jute is cut into very small pieces to add reinforcement to the clay
2. Regular clay from ponds etc. is mixed with the jute pieces
3. The mixture is made into a homogeneous consistency by mixing it with hand
4. Large quantities needed as it mould making material.
5. It is prepared before the mold making process begins

Inner Mould with *Poly Matti* or Riverside clay
1. River side clay containing sand is taken
2. The clay is mixed with little water to make it into a workable consistency
3. The clay is then worked with hands to give it a smooth texture,
4. The inner mould is made with it so large quantities is also needed.
5. Once the outer mould is dry and separated this clay is prepared

Molten Brass container with *Ettel Matti* or River bed clay
1. River bed clay containing sand is taken
2. The clay is mixed with little water to make it into a workable consistency
3. The clay is then worked with hands to give it a smooth texture,
4. Medium quantity needed as molten brass containers are smaller in size.
5. It is prepared before hand and made into small containers to be used once the moulds are dry.

The molten brass container is joined to the mould by *Ghora Matti* or Husk clay
1. Husk is mixed with the river bed clay
2. The mixture is made into a uniform texture
3. Very small quantities are made only in time is casting

Issues
- Sitting Posture for 10 to 20 minutes ergonomically not advised.
- Job requires upper body strength causing back problems.
- No equipment, no storage of prepared clay, no contained area.
- Measuring done by eye estimation so there can be shortage or excess.
Recommendations

- Workstation design should be done for clay preparation studying the work pattern of these artisans.
- Simple manual clay mixing machines can be designed to create the clay without much physical effort as well as saving time.
- Different amount of clay is prepared at different times. Probe should be made if the number types of clay can be reduced.
- Clay once prepared cannot be stored. Alternate material can be tried to achieve the same dexterity.
- Tools to be developed to measure proportions of clay. Guiding charts or formula of composition should be maintained to have uniformity in the process among the artisans.

1. 2. & 3. Artisan preparing different types of clay.
Mould Making

Outer Mould

1. The Mould is made in two parts.
2. The outer Mould is made around the pot (Ghoti/ Kolshi).
3. This is done by covering the pot with the jute clay.
4. While the mould is still wet it is cut into 6 parts using a wooden tool.
5. The body is cut into 4 parts and the rim is cut into 2 parts in case of a Ghoti and two parts in case of a Kolshi.
6. The outer mould is let to dry close to the furnace to quicken the drying process.
7. Once the outer mould dries it is separated into four parts - the bottom of the pot, top part of the pot and the two parts of the rim.
8. The outer mould is marked on the surface beforehand for reference around the edged to help in putting them back.

1. Dried outer mould part of a Ghoti
2. A clean Ghoti and a Ghoti covered with clay with markings that will become the outer mould.
Issues

• Making outer mould takes a lot of time and effort.
• The working position is not ergonomically good.
• Too many number of parts are made for the outer mould.
• Drying time is crucial and it varies from season to season.
• The moulds have to be disassembles and assembled several times.
• Non reusable moulds, specially for the shape of the products.

Recommendations

• Alternate mould making material
• Redesign of the moulds to lessen the no. of parts of the outer mould.
• Use of drying agent to fasten the drying process.
Inner Mould

1. The inner mould is made using the top and bottom and rim components of the pot body as reference.
2. The sandy soil is used to make the inner mould as it is easier to scrape and form it.
3. The top rim is first formed around the top rim outer mould.
4. The outer rim moulds are then removed and the top rim is left to dry.
5. One dry it is scraped to create a uniform gap of about 2mm in between the top rim outer and inner moulds.
6. The rim outer and inner moulds are then joined together.
7. The inner mould for the pot body is then made.
8. First a layer of clay is smeared on the bottom part of the pot body, and then a similar layer is added to the top component.
9. The inner mould is then partly dried.
10. Once dry the inner mould is removed from the outer scraped with a sharp wooden piece.
11. This done till there a uniform gap in between the outer and inner moulds,
12. The inner mould is then again fir into the outer mould to check for the gap.
13. To check the gap uniformity small wooden pieces are inserted in between the moulds.
14. If the gap is not enough the scraping is repeated and if it is more than requires then a thin layer of clay is added to it.
15. The checking is then again repeated till a uniform gap is achieved.

Issues

• Very lengthy and time consuming process.
• Drying of moulds is a big issue as the artisan cannot proceed to the next stage without the previous mould being dry.
• Inner mould has to be specially made very precise as inner polishing of the pots is not possible and they have to me smooth in the mould itself.
• The inner mould is completely destroyed after the casting.
• Achieving the uniform gap in between the inner and outer mould is a matter of great precision and is done completely on eye estimation.
• Tools used are very primitive and again depends on eye precision.
1. Clay daabs used to smoothen the surface of the inner mould  
2. Artisan is smoothening the inner mould with the clay daab to get an un-cracked surface.  
3. Inner mould is smoothened using a pebble stone dipped in water.  
4. Markings being made on the outer mould before separating them  
5. & 6. The inner mould is scraped to remove material to get a uniform gap in between the inner and outer mould.
Recommendations

- The overall mould making process have to be looked at to improve the time engagement.
- Newer technology of mould making needs to be used to improve time consumption. The association of the artisans can have no reusable moulds that could rotate among the artisans.
- The artisans skill is important, but to reduce time involvement tools and jig/ fixtures should be make to quicken the production process.
- Workstation design is essential.
- Drying agent it also essential to quicken the process.

1. The inner mould after being scraped. 2. Artisan checking if the gap between the two moulds is uniform or not. 3. & 4. Outer mould being smoothened with clay daab
Mould Assembly

1. The top rim is attached to the top part of the outer mould first before the inner mould dries fully.
2. The top and the bottom components of the pot body are then put together
3. The outer mould is then separated from the inner mould into four parts leaving the inner mould in one piece.
4. The inner mould is then smoothened with water and little clay and small pebbles.
5. A engraved mark of the initials of the artisan is made in the bottom part of the outer mould
6. A slit for insertion of the molten brass is also made in the outer mould base.
7. The outer mould is then put together using the markings made earlier as references.
8. The outer mould is then sealed using the same Jute clay.
9. The mould assembly is then left to dry close to the furnace to quicken drying.

Issues

- As assembly of clay moulds cannot be seamless, there appear mould mark on the product.
- Too many parts has to be assembled to get the final assembly.
- The drying time again is a big problem.
Recommendations

- Seam lines should be in places that mould mark should not appear on the body of the product.
- While separating the outer mould care to be taken to avoid any breakage which may affect the product body.
- If possible newer technology in mould making to be used.
Molten Brass Container

1. A molten brass container is made with the river bed clay.
2. The molten brass container looks like a glass and is quite crude in form.
3. It is then left to dry.

Final assembly

1. Final assembly of the moulds with the molten brass container is made just before casting.
2. Brass is weighed and put in the molten brass container along with required amount of zinc.
3. The container is then joined to the inverted pot mould using ‘Ghora Matti’ or husk clay. This is a strong bond.
4. The final assembly is dried partly before they are inserted in the furnace.
Wastage

- The major issue with the overall mould making process is the wastage of the moulds. None of the moulds can be reused.
- The molten brass container can be used two to three times but after that they have to be discarded too.
- There is no use for the debris that is created by the process and is not recyclable.

Issues

- Non recyclable mould is the biggest issue here.
- Every process is time consuming and the effort does not show in the final product.
- Use of primitive methods of casting

Recommendations

- Newer technology to be used.
- If the process has to be retained then newer product range have to be made which will showcase the effort put in by the artisan.

1. 2. 3. & 4. Burnt remains of the mould after casting.
Foundry Processes Raw material procurement

- Coal is bought from vendors in large quantities and stored in the workshops.
- The coal is broken into smaller pieces usually the woman in the household.
- The coal pieces is used in the furnace while the coal dust is used for residential cooking.

Furnace Preparation

- Coal is added to the furnace and then lit.
- The coal first smoke up and then goes up in flames.
- All the final assemblies of the pots are added to the inner part of the furnace using tongs in an upright position.
- Pots are taken out after 1 and half hours for the first time. For consecutive casting 1 hour is enough as the furnace is already hot.

1. & 2. Coal stored and broken into smaller pieced before being used
3. Artisan carrying coal to the furnace in a basket.
4. Artisan adding coal to the furnace.
Issues

• The furnace that artisans use are quite primitive in nature. In fact it is quite similar to a regular oven in India. There is a lot of heat loss in it which accounts for more fuel usage and more time consumption,
• All the furnaces are coal fueled which is not very environment friendly. However in case of lack of electricity a furnace with optimal fuel usage can also serve better.
• The insertion of the moulds are from the top which allow the heat to lose from there, also it is not ergonomically very suitable.
• The retrieval of moulds is even more difficult for the artisans as the moulds are fiery hot and they have to maintain a distance form it and at the same time remove them from the top of the furnace. For this they have to stretch themselves in very unsafe postures causing stress.
• The efficiency of the furnaces becomes less as both the mould and the molten brass container has to be heated. In regular processes the brass is only melted and poured which uses the heat to melt the brass only. But in this case as the full mould is heated it takes up more heat.

Recommendations

• One way to improve the efficiency is to redesign the furnace. Furnace design must incorporate the following features.
  - Reduction in the use of fuel.
  - Use of alternative fuel, which is locally available or electricity.
  - Efficiency in terms of heat dissipation
  - Better ergonomics while inserting and retrieving the moulds.
Casting

- The moulds are taken out and kept on the floor using tongs while still keeping them in upright position.
- The moulds are then quickly turned in inverted position with the molten brass container on the top.
- The molten brass then flows into the mould through the slit on the base.
- The moulds is then cooled down.
- The moulds are broken to get the cast pot.
- The molten brass container however can separated form the mould and can be used for two to three times.
1. The final assembly of moulds is inside the furnace. 2. 3. 4. 5. & 6. Artisan taking the mould out of the furnace and keeping it in the inverted position to allow the molten brass to flow in the gap in between the outer and inner mould. 7. Inverted moulds left to cool down before the mould will be broken to get the final product.
Issues

• The lifting the moulds to insert them and remove them from the furnace is a stressful job and not ergonomically suitable.
• The casting of the moulds is blind casting and the artisans don’t know that if the metal is enough to flow into the mould, they have to rely on their experience.
• The breaking of the moulds is not a very clean method and the debris gets spread and requires more space.
• The artisans wear no protection at all while placing the moulds and removing them from the furnace. This may cause accident as the are dealing with very hot moulds.

Recommendations

• The layout of furnace should be a part of a assembly line to ease the processes
• The furnace design should be such that the artisans don’t have problem is inserting and retrieving the moulds
• Safety precautions is a must for all artisans
• Alternative method of casting can be looked at in order avoid wastage.
Filing and joining

- The cast product has a rough surface and blackish in color.
- The product is first filed to remove any lump or irregularity on the surface.
- In case of Kolshi, the two parts of the products are joined with a joining compound made out of zinc and brass dust. The compound is heated and applied to the parts to join them. Once joined the Kolshi is beaten with hammer to get rid of any eruption on the surface.

Polishing

- Bottom of the product is then heated on a coal oven to which air is blown using a hand blower machine.
- When the bottom of the product is hot enough a piece of lacquer is stuck to it which glues the product to the chuck of the motorized spinning machine.
- When the product is spinning the is first made straight by hitting a few times.
- The pot is then polished with sharp tools.
- The polishing is done in the following parts:
  - First the lower part of the body of the pot using a sharper tool.
  - Then the upper part of the body of the pot using a slightly blunt tool.
  - Third the outer rim with a similar blunt tool.
  - The inner rim using a sharper tool.
  - The inner rim is only polished till the neck and it cannot be reached further.
  - Finally the base is polished.
- The product is the smoothened with oil and ash dust to give it a uniform shine.
- The oiled product is then cleaned with cloth before transporting them to the Mahajan.
Issues

- The posture of the artisans is not ergonomic as they sit on the floor. Also they have to put too much pressure on their hands to scrape out the material to polish the pots.
- There is a lot of wastage in scraping out material. Although it is recycled, this means that the pots have too much deformities and hence the mould need to be bettered.
- The use of lacquer to grip the pot to the chuck is quite redundant, it requires more simpler gripping techniques

Recommendations

- Workstation design id required with integrated lethe to allow the artisans a more ergonomically preferred posture. Also it should help the artisans to polish the pots without putting too much physical effort.
- Better machine design to grip the pots easily.
- In case of any new product development, the products range has to be such that they can be finished in similar ways as the artisans are familiar with it.

1. Lacquer is placed on the chuck which will hold the Ghoti temporarily
2. Ghoti is attached to the chuck of the lathe
3. The chuck is aligned straight to the ground
4. & 5. Polishing
1. 2. & 3. Polishing of a Ghoti using different tools.  4. Hot coal is added to the Ghoti to remelt the lacquer and release the Ghoti.  5. Ghoti being separated from the chuck of the lathe.  6. Polishing of the Kolshi done in similar process except the chuck of the motorized lathe is bigger in diameter.
There is no packaging for the products before sending them to the Mahajans. They are usually placed in a gunny sack without any other wrapping. However, when some of the artisans sell these products in Melas and fairs, they wrap them in old newspaper.

The products are placed inside gunny sack and placed in the back of the cycle and taken to the Mahajans usually the artisans. Most Mahajans come to Arambagh to collect the products so the artisans have to travel about 12 Kms to deliver the products.

**Issues**

- The lustre of the products looses due to no packaging, as a result many times the products have to be repolished by the Mahajans.

**Recommendations**

- Basic packaging is requires, with bubble wrap or even newspaper will work.
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Business Model

ARTISANS

Raw Material

MAHAJAN
Mediating agents

RECYCLED WASTE

RETAIL
Mainly Kolkata

CONSUMER

MELA/ FAIRS
Rural festivals and fairs

ARTISANS

Finished product

MAHAJAN
Mediating agents

RECYCLED WASTE

RETAIL
Mainly Kolkata

CONSUMER

MELA/ FAIRS
Rural festivals and fairs
Branding & display

Branding
- Every product has embossed initials at their base but these embossing are very crude in nature and not easily visible.
- No signature style or decoration is present in the products as a result in the market these products do not stand out. Also the novelty of these products is low as they do not offer anything special.

Display
- There is no display of products in the workshop of the artisans or their houses. Most products are lined up and stored before despatch.
- Although the products have a basic attraction value because of their shining finish, they do not have anything beyond that to offer.

Recommendations
- A signature design style is required to set these artisans apart from the mass manufactured products as these products are manufactured with a lot of effort and care.
- Value added products can make these products more lucrative and desirable as compared to just daily use products.
- Attraction value of these products needs to be increased.

1. Embossing of the initials of the artisan on the base of the GHOTI, 2. & 3. Polished products lined up before being despatched to the Mahajan’s place.
Product value

- Product segment these products belong is daily used products and this do not enhance the desirability of the products.
- Effort and skillful labour behind the product is not evident from the product range. The finish is what stands out but that too is not exceptional as most brass products have similar finishes.
- Value the product is not very high as they are not sold for their craftsmanship but mere functional value.

Recommendations

- Considering the effort and skill of these artisans a separate products segment like lifestyle or home accessories should be looked at. Hence product segment needs to be revised.
- Products should display the skills of the artisans and the effort of craftsmanship spent behind them.
- Design can add value to the product. Some examples are pic 1, 2 & 3.

1., 2. & 3. Contemporary brass products which are valued because of their design and finish.
Market Scene

- Demand of brass daily use products have reduced over the time. Brass products are mostly used only in occasions these days.
- Newer materials like plastic and steel has replaced brass in many segments because they are manufacture friendly and less expensive.
- Young families have different lifestyle now and this has created a demand in lifestyle products and home accessories. Also the aesthetics of this user group has altered due to international influence and exposure to a vast array of choices.

Recommendations

- Newer product range should be created to cater the growing market needs.
- New networking is required to take the product to the suitable market.
- NGOs and co-operative can bridge this gap and bring the products to the users through proper retailing or exhibitions.

1., 2. & 3. Kolkata’s Burrabazar where all the products from Balidewangunj is sold along with brass products from other parts of the state.
Unit Study

Unit informations 1 to 7  66 - 80

TYPE 01

Workshop units producing GHOTI (small pot to carry water)
Unit- 01

Unit Owner: Shakti Pada De
Establishment [Year]: 1990-92
Age: 46 years
Education: Upto 4th Std.
Address: C/o Shakti Pada De, Kalagachia, P.O.- Balidewangunj, District- Hooghly, Police Stn- Goghat- I,
Phone: Office: (03211) 220 53 Mobile: (0) 97322 95572
Work Experience: 20 Years

ARTISANS
No. of Artisans involved: 4
- Shakti Pada De (owner)
- Gurupada De (32), Employed, Involved in casting
- Sudarshan Bhuiaya (42), Employed, Involved in finishing (filing)
- Subhadra De (40), Family, General Assistance
No. of furnaces: 1

PRODUCT
Name of products: Ghoti (small pot to carry water)
Sizes: 400gms, 550 gms, 700gms, 900gms, 1.2 Kgs
(fast moving: 550gms and 900gms)
Production capacity: 45 units/ week (June- October)
90 units/week (November-May)
Possibility to increase production:
Yes, with improvement of labor availability.
New products: None.
**LOGISTICS**

Packaging: None

Market: Mahajan (mediating agents)

Price fixing: Mahajan (mediating agents)

Labour: Rs.5/ Unit

Overhead: Rs.100-150/ day

**STRATEGIC**

Manufacturing Issues:

- All traditional process, no technological up gradation
- Labour intensive mould making
- Non-reusability of the moulds

Labour Issues: Trained or skilled labour less available.

Material Issues: None

Other Issues:

- Revision of rates.
- Dependency on Mahajans.
- Long hours of work and subsequent affect on health
- Not ergonomically designed workstations

---

**Layout**

Of the workshop.

Type of construction: Semi-permanent

Materials: Brick walls, clay floors, tile roof, clay furnace, boundaries and minor structures made from bamboo.
Unit: 02

Unit Owner: Madan Mohan Mandal  
Establishment (Year): 1990-92  
Age: 42 years  
Education: Upto 6th Std.  
Address: C/o Madan Mohan Mandal, Kalagachia, P.O.- Balidewangunj, District- Hooghly, Police Stn- Goghat- I,  
Phone: -  Mobile: (0) -  
Work Experience: 20 Years

ARTISANS
No. of Artisans involved: 4  
Madan Mohan Mandal (owner)  
Phulora Mandal (35), Family, General Assistance  
Surojit Mandal (20), Family, Involved in finishing (filing)  
Ganesh Alu (42), Employed, Involved in finishing (filing)  
No. of furnaces: 1

PRODUCT
Name of products: Ghoti (small pot to carry water)  
Sizes: 700gms, 900gms, 1.2 Kgs, 1.5 Kgs  
(fast moving: 900gms and 1.2Kgs)  
Production capacity: 45 units/ week (June- October)  
90 units/week ( November-May)  
Possibility to increase production: Yes, with reusable moulds.  
New products: None.
**LOGISTICS**
Packaging: None
Market: Mahajan (mediating agents)
Price fixing: Mahajan (mediating agents) / Unit Owner
Labour: Rs.5/ Unit
Overhead: Rs.100- 150/ day
Transportation: Cycle (self arranged)

**STRATEGIC**
Manufacturing Issues:
- Labour intensive mould making
- Non-reusability of the moulds
Labour Issues: None
Material Issues: None
Other Issues:
- Long hours of work and subsequent affect on health
- Not ergonomically designed workstations
- Dependency on Mahajans

---

**Layout**
Of the workshop.

Type of construction: Semi-permanent
Materials: Brick walls, clay floors, tile roof, clay furnace, boundaries and minor structures made from bamboo.
Unit- 03

Unit Owner: Jitendra Alu  
Establishment [Year]: 1993-94  
Age: 40 years  
Education: Upto 9th Std.  
Address: C/o Jitendra Alu, Kalagachia, P.O.- Balidewangunj, District- Hooghly, Police Stn - Goghat- I,  
Phone: - Mobile: [0] - 9775760511  
Work Experience: 7 Years

ARTISANS  
No. of Artisans involved: 3  
  Jitendra Alu (owner)  
  Tara Rai (70), Employed, Involved in mould making  
  Surdarshan Bhuiya (40), Employed, Involved in filing (finishing)  
No. of furnaces: 1

PRODUCT  
Name of products: Ghoti (small pot to carry water)  
Sizes: 700gms, 900gms, 1.2 Kgs,  
(fast moving: 900gms and 700gms)  
Production capacity: 50 -70 units/ week (June- October)  
100 - 120 units/week (November-May)  
Possibility to increase production: No  
New products: None.
LOGISTICS

Packaging: None
Market: Mahajan (mediating agents)
Price fixing: Mahajan (mediating agents)
Labour: Rs.120 -180/ day
Overhead: Rs.100- 150/ day
Transportation: Cycle (self arranged)/ Assistant (Rs.50 / trip)

STRATEGIC

Manufacturing Issues: Completely dependent on labours
Labour Issues: None
Material Issues: None
Other Issues: Layout and organization of workshop

Layout
Of the workshop.
Unit- 04

Unit Owner: Chandan Alu
Establishment (Year): 1995-96
Age: 41 years
Education: Just Literate
Address: C/o Chandan Alu, Kalagachia, P.O.- Balidewangunj, District- Hooghly, Police Stn- Goghat- I,
Phone: - Mobile: (0) - 9732129721
Work Experience: 30 Years

ARTISANS
No. of Artisans involved: 4
  Chandan Alu (owner)
  Hima Alu (32), Family, General Assistance and mould making
  Samar Kali (26), Employed, Involved in polishing
  Tapan Ghosh (48), Employed, Involved in filing (finishing)
No. of furnaces: 1

PRODUCT
Name of products: Ghoti (small pot to carry water)
Sizes: 250gms, 700gms, 850 gms, 900gms, 1.5 Kgs,
Production capacity: 35 -40 units/ week
Possibility to increase production: With availability of more labour
New products: Yes, Bowl (Made to order)
LOGISTICS
Packaging: None
Market: Mahajan (mediating agents)
Price fixing: Peer group discussion
Labour: Polishing - Rs.200 - 250/day
Filing Rs.150 - 200/day
Overhead: Rs.100 - 150/day
Transportation: Cycle (self arranged)

STRATEGIC
Manufacturing Issues:
Time consuming process
Labour Issues: Skilled labour not much available
Material Issues: The percentage of zinc added to brass depends on experience as there is no way to check the composition of the raw material.
Other Issues: -

Layout
Of the workshop.
Unit Owner: Naba Kumar Alu
Establishment [Year]: 2002
Age: 46 years
Education: Just Literate
Address: C/o Naba Kumar Alu, Kalagachia, P.O.- Balidewangunj, District- Hooghly, Police Stn- Goghat- I,
Phone: Mobile: (0) - 9932113508
Work Experience: 23 Years

ARTISANS
No. of Artisans involved: 3
   Naba Kumar Alu (owner)
   Bijoli Alu (35), Family, General Assistance
   Ganesh Alu (42), Employed, Involved in filing (finishing)
No. of furnaces: 1

PRODUCT
Name of products: Ghoti (small pot to carry water)
Sizes: 700gms, 900gms,
Production capacity: 60 units/ week (depending on capital)
Possibility to increase production:
With availability of more labour
New products: Yes, can develop mould is product is given.
LOGISTICS
Package: None
Market: Mahajan (mediating agents)
Price fixing: Yearly peer group discussion
Labour: Filing Rs.100/day X 2 days in a week
Overhead: Rs.100-150/day
Transportation: Assistant (Rs. 70 for 35-70 pieces)

STRATEGIC
Manufacturing issues:
Time consuming process
Labour issues: No.
Material issues: No.
Other issues: Physical problems- Knee, lower back

Layout
Of the workshop.
Unit- 06

Unit Owner: Arup Kali  
Establishment [Year]: 1935-40  
Age: 52 years  
Education: Upto 8th Std.  
Address: C/o Arup Kali, Kalagachia, P.O.- Balidewangunj,  
District- Hooghly, Police Stn- Goghat- I,  
Phone: -  
Mobile: (O) - 9093316822  
Work Experience: 42 Years

ARTISANS

No. of Artisans involved: 4  
Arup Kali (owner)  
Paddabati Kali (46), Family, General Assistance  
Rajkumar Kali (28), Family, General Assistance  
Ganesh Alu (42), Employed, Involved in filing (finishing)

No. of furnaces: 1

PRODUCT

Name of products: Ghoti (small pot to carry water)  
Sizes: 450gms, 550gms, 700gms, 900gms, 1.2kgs  
Production capacity: 60 units/ week (depending on assistance)  
Possibility to increase production: With availability of more labour  
New products: Yes, have done a few other products on order.
LOGISTICS
Packaging: None
Market: Mahajan (mediating agents)
Price fixing: Peer group discussion
Labour: Rs. 5/ piece
Overhead: Rs. 100/ day
Transportation: Cycle (self arranged)

STRATEGIC
Manufacturing Issues:
  - Labour intensive mould making
  - Non-reusability of the moulds
Labour Issues: No.
Material Issues: Raw material contains less brass many times and zinc has to be added to maintain weight, and this zinc has to be bought by the artisan themselves.
Other Issues: Physical problems- Knee, lower back

Layout
Of the workshop.
Unit Owner: **Shyma Prasad De**  
Establishment [Year]: 1977  
Age: 66 years  
Education: Upto 7th Std.  
Address: C/o Shyma Prasad De, Kalagachia, P.O.- Balidewangunj, District- Hooghly, Police Stn- Goghat- I,  
Phone: - Mobile: (0) - 9800356057  
Work Experience: 40 Years

**ARTISANS**  
No. of Artisans involved: 2  
- Shyma Prasad De (owner)  
- Pushparani De (48), Family, General Assistance  
No. of furnaces: 1

**PRODUCT**  
Name of products: **Ghoti** (small pot to carry water)  
Sizes: 450gms, 550gms, 700gms, 900gms, 1.2kgs  
Production capacity: 60 units/ week  
Possibility to increase production: **With more capital**  
New products: Yes, **Dabur** (beetle leaf box).
LOGISTICS
Packaging: None
Market: Mahajan (mediating agents)
Price fixing: Peer group discussion
Labour: Rs. 5/ piece
Overhead: Rs.100/ day
Transportation: Cycle (self arranged)

STRATEGIC
Manufacturing Issues:
- Labour intensive mould making
- Non-reusability of the moulds
Labour Issues: No.
Material Issues: No.
Other Issues: Physical problems

Layout
Of the workshop.
Unit Study
Unit informations 8 to 17

**TYPE 02**

*Workshop units producing KOLSHI* (large urn used to fetch and store water)
Unit- 08

Unit Owner: Tapash Das  
Establishment [Year]: 1972  
Age: 35 years  
Education: Upto 8th Std.  
Address: C/o Tapash Das, Kalagachia, P.O.- Balidewangunj, District- Hooghly, Police Stn- Goghat- I,  
Phone: -  Mobile: (O) - 9609502895  
Work Experience: 15 Years

ARTISANS

No. of Artisans involved: 5  
Tapash Das (owner)  
Putul Das (28), Family, General Assistance  
Sefali Das (55), Family, General Assistance  
Tapan Das (32), Family, Involved in Polishing  
Balaram Kali (38), Employed, Involved in mould making

No. of furnaces: 1

PRODUCT

Name of products: Kolshi (large urn used to fetch and store water)  
Sizes: 4kgs, 5kgs  
Production capacity: 20 -25 units/ week  
Possibility to increase production: With more capital  
New products: No.
LOGISTICS
Packaging: None
Market: Mahajan (mediating agents)
Price fixing: Peer group discussion
Labour: Rs. 200/day X 5 days
Overhead: Rs. 100/day
Transportation: Cycle (self arranged)

STRATEGIC
Manufacturing Issues:
- Labour intensive mould making
- Non-reusability of the moulds
Labour Issues: Unavailability of skilled labour
Material Issues: No.
Other Issues: No.

Layout
Of the workshop.
Unit- 09

Artisan 1

Artisan: Sahadev Shikari
EMPLOYED in establishment of Mahadev Rauth

Age: 37 years
Education: Upto 8th Std.
Address: C/o Mahadev Rauth, Bali, P.O.- Balidewangunj, District- Hooghly, Police Stn- Goghat- I.
Phone: - Mobile: (0) -
Work Experience: 18 Years

ARTISANS
Sahadev Shikari works for Mahadev Rauth, and has two co-worker. All the employees do all jobs, from mould making to casting.

Bapan Kamiya (35), Co-worker
Ram Ratan Rauth (37), Co-worker

No. of furnaces: 9 (3 each for each artisan)

PRODUCT
Name of products: Kolshi (large urn used to fetch and store water)
Sizes: 4kgs
Production capacity: 20 -24 units/ week
Possibility to increase production: N/A
New products: No.
Artisan: Bapan Kamilya
EMPLOYED in establishment of Mahadev Rauth

Age: 35 years
Education: Upto 6th Std.
Address: C/o Mahadev Rauth, Bali, P.O.- Balidewangunj, District- Hooghly, Police Strn- Goghat- I.
Phone: - Mobile: (O) -
Work Experience: 15 Years

ARTISANS
Bapan Kamilya works for Mahadev Rauth, and has two co-worker. All the employees do all jobs, from mould making to casting.

Sahadev Shikari (37), Co-worker
Ram Ratan Rauth (37), Co-worker

No. of furnaces: 9 (3 each for each artisan)

PRODUCT
Name of products: Kolshi  (large urn used to fetch and store water)
Sizes: 4kgs
Production capacity: 20 -24 units/ week
Possibility to increase production: N/A
New products: No.
LOGISTICS
Packaging: None
Price fixing: Mahadev Rauth Employer
Labour: Rs. 53 X 4/ days
(4= no. of pieces made)

STRATEGIC
Manufacturing Issues:
Labour intensive mould making
Non-reusability of the moulds
Material Issues: No.
Other Issues: No.

Layout
Of the workshop.

9 FURNACES
3 FURNACES BELONG TO EACH ARTISAN WORKING HERE
MOULD MAKING ZONE
Unit- 10

Unit Owner: Debi Ram Rauth  
Establishment (Year): 1982  
Age: 37 years  
Education: Just literate  
Address: C/o Debi Ram Rauth, Bali, P.O.- Balidewangunj, District- Hooghly, Police Stn- Goghat- I,  
Phone: - Mobile: (O) - 8016273313  
Work Experience: 20 Years

ARTISANS
No. of Artisans involved: 1  
   Debi Ram Rauth (owner)

Debi Ram Rauth does only welding the two parts of Kolshi and Ghoti and polishing of the final product.

PRODUCT
Name of products: Kolshi (large urn used to fetch and store water)  
Sizes: All sizes  
Production capacity: 6 Kolshi / day or 60 - 70 Ghoti / day  
Possibility to increase production: With more labour  
New products: No.
LOGISTICS
Packaging: None
Market: Other unit owners
Price fixing: Local peer group
Labour: Rs. 40/ Kolshi
Rs. 5/ Ghoti
Overhead: Rs.100/ day
Transportation: Cycle (self arranged)

STRATEGIC
Manufacturing Issues: No.
Labour Issues: No.
Material Issues: No.
Other Issues: Physical problems- knee, chest pains and lower back pain

Layout
Of the workshop.
Unit- 11

Unit Owner: Sanjay Das
Establishment [Year]: 1930-40
Age: 38 years
Education: Upto 4th Std.
Address: C/o Sanjay Das, Bali, P.O.- Balidewangunj, District- Hooghly, Police Stn- Goghat- I,
Phone: - Mobile: (0) -
Work Experience: 23 Years

ARTISANS
No. of Artisans involved: 2
Sanjay Das (owner)
Gauranga Das (28), Family, all jobs

No. of furnaces: 4 is running, but total 6

PRODUCT
Name of products: Kolshi  (large urn used to fetch and store water)
Sizes: 4kgs, 5kgs
Production capacity: 20 -25 units/ week
Possibility to increase production:
With more capital
New products: No.
LOGISTICS
Packaging: None
Market: Mahajan (mediating agents)
Price fixing: Peer group discussion
Labour: Rs. 50/ piece
Overhead: Rs. 100/ day
Transportation: Cycle (self arranged)

STRATEGIC
Manufacturing Issues: Labour intensive mould making
Labour Issues: Unavailability of skilled labour
Material Issues: No.
Other Issues: No.

Layout
Of the workshop.
Unit-12

Artisan

Artisan: Sanjit Shikari
EMPLOYED in establishment of Swapan Das

Age: 32 years
Education: Upto 8th Std.
Address: C/o Swapan Das, Bali, P.O.- Balidewangunj,
District- Hooghly, Police Stn- Goghat- I,
Phone: - Mobile: (O) -
Work Experience: 10 Years

ARTISANS
Sahadev Shikari works for Mahadev Rauth, and has two co-worker. All the employees do all jobs, from mould making to casting.

Bapan Kamilya (35), Co-worker
Ram Ratan Rauth (37), Co-worker

No. of furnaces: 9 (3 each for each artisan)

PRODUCT
Name of products: Kolshi (large urn used to fetch and store water)
Sizes: 4kgs
Production capacity: 20 -24 units/ week
Possibility to increase production: N/A
New products: No.
LOGISTICS
Packaging: None
Market: Mahajan (mediating agents)
Price fixing: Peer group discussion
Labour: Rs. 200/ day X 5 days
Overhead: Rs. 100/ day
Transportation: Cycle (self arranged)

STRATEGIC
Manufacturing Issues:
- Labour intensive mould making
- Non-reusability of the moulds
Labour Issues:
- Unavailability of skilled labour
Material Issues: No.
Other Issues: No.

Layout
Of the workshop.

ENTRANCE

6 FURNACES
MOULD MAKING ZONE
Unit- 13

Unit Owner: Shishir Das  
Establishment [Year]: 1977  
Age: 33 years  
Education: Upto 8th Std.  
Address: C/o Shishir Das, Bali, P.O.- Balidewangunj, District- Hooghly, Police Stn- Goghat- I,  
Phone: - Mobile: (O) - 97344780522  
Work Experience: 18 Years

ARTISANS  
No. of Artisans involved: 5  
Tapash Das (owner)  
Putul Das (28), Family, General Assistance  
Sefali Das (55), Family, General Assistance  
Tapan Das (32), Family, Involved in Polishing  
Balaram Kali (38), Employed, Involved in mould making  
No. of furnaces: 1

PRODUCT  
Name of products: Kolshi (large urn used to fetch and store water)  
Sizes: 4kgs, 5kgs  
Production capacity: 20 -25 units/ week  
Possibility to increase production: With more capital  
New products: No.
LOGISTICS
Packaging: None
Market: Mahajan (mediating agents)
Price fixing: Peer group discussion
Labour: Rs. 200/ day X 5 days
Overhead: Rs. 100/ day
Transportation: Cycle (self arranged)

STRATEGIC
Manufacturing Issues:
- Labour intensive mould making
- Non-reusability of the moulds
Labour Issues:
- Unavailability of skilled labour
Material Issues: No.
Other Issues: No.

Layout
Of the workshop.
Unit- 14

Unit Owner: Uttam Shikari  
Establishment (Year): 1982  
Age: 43 years  
Education: Upto 6th Std.  
Address: C/o Uttam Shikari, Bali, P.O.- Balidewangunj,  
District- Hooghly, Police Stn- Goghat- I,  
Phone: -  Mobile: (0) - 9609502895  
Work Experience: 23 Years

ARTISANS
No. of Artisans involved: 1
  Debi Ram Rauth (owner)

Debi Ram Rauth does only welding the two parts of Kolshi and Ghoti and polishing of the final product.

PRODUCT
Name of products: Kolshi (large urn used to fetch and store water)  
Sizes: All sizes  
Production capacity: 6 Kolshi /day or 60 -70 Ghoti /day  
Possibility to increase production: With more labour  
New products: No.
LOGISTICS
Packaging: None
Market: Other unit owners
Price fixing: Local peer group
Labour: Rs. 40/ Kolshi
Rs. 5/ Ghoti
Overhead: Rs. 100/ day
Transportation: Cycle (self arranged)

STRATEGIC
Manufacturing Issues: No.
Labour Issues: No.
Material Issues: No.
Other Issues: Physical problems- knee, chest pains and lower back pain

Layout
Of the workshop.
Unit-15

Unit Owner: Srimanta Digar  
Establishment [Year]: 2000  
Age: 26 years  
Education: Upto 3rd Std.  
Address: C/o Srimanta Digar, Bali, P.O.- Balidewangunj,  
District- Hooghly, Police Stn- Goghat- I,  
Phone: -  Mobile: (O) - 9734466343  
Work Experience: 10 Years

ARTISANS
No. of Artisans involved: 5  
Tapash Das (owner)  
Putul Das (28), Family, General Assistance  
Sefali Das (55), Family, General Assistance  
Tapan Das (32), Family, Involved in Polishing  
Balaram Kali (38), Employed, Involved in mould making

No. of furnaces: 1

PRODUCT
Name of products: Kolshi (large urn used to fetch and store water)  
Sizes: 4kgs, 5kgs  
Production capacity: 20 -25 units/ week  
Possibility to increase production: With more capital  
New products: No.
LOGISTICS
Packaging: None
Market: Mahajan (mediating agents)
Price fixing: Peer group discussion
Labour: Rs. 200/day X 5 days
Overhead: Rs.100/day
Transportation: Cycle (self arranged)

STRATEGIC
Manufacturing issues:
- Labour intensive mould making
- Non-reusability of the moulds
Labour issues:
- Unavailability of skilled labour
Material issues:
- No.
Other issues:
- No.

Layout
Of the workshop.
Unit Name: Rana Brass Metal  
Unit Owner: Tarak Chandra Rana  
Establishment (Year): 1935-40  
Age: 43 years  
Education: Upto 10th Std.  
Address: C/o Tarak Chandra Rana, Bali, P.O.- Balidewangunj, District- Hooghly, Police Stn- Goghat- I,  
Phone: - Mobile: (O) - 8001684219  
Work Experience: 24 Years  

ARTISANS  
No. of Artisans involved: 5  
Tapash Das (owner)  
Putul Das (28), Family, General Assistance  
Sefali Das (55), Family, General Assistance  
Tapan Das (32), Family, Involved in Polishing  
Balaram Kali (38), Employed, Involved in mould making  

No. of furnaces: 1  

PRODUCT  
Name of products: Kolshi (large urn used to fetch and store water)  
Sizes: 4kgs, 5kgs  
Production capacity: 20-25 units/ week  
Possibility to increase production: With more capital  
New products: No.
**LOGISTICS**

Packaging: None
Market: Mahajan (mediating agents)
Price fixing: Peer group discussion
Labour: Rs. 200/day X 5 days
Overhead: Rs. 100/day
Transportation: Cycle (self arranged)

**STRATEGIC**

Manufacturing Issues:
- Labour intensive mould making
- Non-reusability of the moulds
Labour Issues: Unavailability of skilled labour
Material Issues: No.
Other Issues: No.

**Layout**

Of the workshop.
Unit- 17

Unit Owner: Bharat Bairagi
Establishment (Year): 1972
Age: 54 years
Education: Upto 6th Std.
Address: C/o Bharat Bairagi, Radahballavpur, P.O.- Balidewangunj,
District- Hooghly, Police Stn- Goghat- I,
Phone:  -  Mobile: (O) - 76026667774
Work Experience: 25 Years

ARTISANS
No. of Artisans involved: 5
Tapash Das (owner)
Putul Das (28), Family, General Assistance
Sefali Das (55), Family, General Assistance
Tapan Das (32), Family, Involved in Polishing
Balaram Kali (38), Employed, Involved in mould making

No. of furnaces: 1

PRODUCT
Name of products: Kolshi  (large urn used to fetch and store water)
Sizes: 4kgs, 5kgs
Production capacity: 20 -25 units/ week
Possibility to increase production:
With more capital
New products: No.
**LOGISTICS**

Packaging: **None**

Market: **Mahajan (mediating agents)**

Price fixing: **Peer group discussion**

Labour: **Rs. 200/ day X 5days**

Overhead: **Rs.100/ day**

Transportation: **Cycle (self arranged)**

---

**STRATEGIC**

Manufacturing Issues:

- Labour intensive mould making
- Non-reusability of the moulds

Labour Issues: **Unavailability of skilled labour**

Material Issues: **No.**

Other Issues: **No.**

---

**Layout**

Of the workshop.

---

FURNACES

ENTRANCE

MOULD MAKING ZONE

- 4 FURNACES

---

BRASS METAL CLUSTER  BALIDEWANGUNJ  HOOGHLY  WEST BENGAL

ANINDYA DAS GUPTA  INDUSTRIAL DESIGNER  2012
Unit Study

Exception
Tarak Chandra Rana is the owner of Rana Brass Metal. He has a experience of 24 years and has been making KOLSHI. However that sets him apart that he has developed moulds for other small artifacts on request from different institutions. Not only did Tarak Chandra rana showed skill to develop artifacts that are aesthetic and artful, he also used the clay to its full potential as a mould making materials.

Clay is very adoptive and as these artisans are making their own moulds it easy for them to develop moulds for any form. But this requires certain skill to visualize and understand the 3-D form of the products. Tarak Rana showed his talent in the moulds that he made. Also these moulds are reusable and some of the examples can be seen the pictures 1, 2 & 3.
## Unit Details

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<th>Sl. No.</th>
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<th>Product</th>
<th>Employment</th>
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<td>Shakti Pada De</td>
<td>GHOTI</td>
<td>Unit Owner</td>
<td>04</td>
<td>C/o Shakti Pada De, Kalagachia, P.O.- Balidewangunj, District- Hooghly, Police Stn- Goghat- I, Mobile: (0) 97322 95572</td>
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<td>02</td>
<td>Madan Mohan Mandal</td>
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<td>03</td>
<td>Jitendra Alu</td>
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<td>06</td>
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<td>C/o Arup Kali, Kalagachia, P.O.- Balidewangunj, District- Hooghly, Police Stn- Goghat- I, Mobile: (0) 9093316822</td>
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<td>Sahadev Shikari</td>
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<td>17</td>
<td>Tarak Chandra Rana</td>
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<td>Bharat Bairagi</td>
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SWOT Analysis

**Strength**

- Extremely skilled artisans with clay mould making
- Locally available raw materials for mould making
- Proximity of Balidewangunj to Kolkata, which is a big market in the whole of eastern India
- Eco-friendly approach to manufacturing using scrap brass
- State Government initiatives to improve the production processes
- Initiative of local Panchayat to help the artisans
- Vast potential of using clay as a mould material, as any mould can be developed in a very cost-effective way.
- Path-breakers among the artisans group who can influence the whole community
- Production of really good quality products, in terms of material and finish.

**Weakness**

- Lack of capital is weakening the growth prospects
- Although the artisans have the skills to make refined clay moulds, most of them cannot make moulds of any other products without guidance
- The artisans don’t have a licence to buy raw material for industrial purpose. This makes them dependent on the Mahajans for raw material.
- The whole trade is too much dependent on the Mahajans. The artisans are completely unaware of the present market and its demands. There is no alternative way to reach the market for these artisans
- The artisans are also unaware of modern technology as well as the need of organized and ergonomically sound workshops.
Opportunities

• The state government of West Bengal is proactive in the development of this particular artisan community. If the artisan can use this opportunity then it will help them in the long term.
• The proximity to Kolkata is a great advantage for the artisans of Balidewangunj. Not only Kolkata is a large market for all their products, there are many NGOs and organizations that can help these artisans to bring their products to the market.
• NGOs need to be roped in to bridge the gap between the artisans and the market.
• Workshops need to be taken to educate to develop moulds on their own of new products.
• There is high need for a community facility centre that would be like an interface for the artisan to the outer market and protect their interests.
• The artisans should be educated in personal health, organizational skills and how to improve and make production faster.

Threat

• The artisans have very less unity when it comes to taking important decision for their community.
• Many artisans are opting out of this trade because the high stress level, lower returns and labour intensive processes which affect their health and personal life.
• As more and more artisans are opting out there is a shortage of labour and this unavailability of labour is growing fast.
• The market is updating very frequently, but these artisans are stuck with age old products and processes.
## Concerning Issues

### Unit
- Dependency on Mahajans
- No strategic control over trade and products
- No licence to buy raw material
- Complicated mould design
- Non reusability of moulds
- Wastage of moulds
- Limited product range
- No signature design
- Long hours of intensive effort
- Health problems
- Workstation ergonomics
- Quality of raw material
- Dependency on non-eco-friendly fuel.
- Less knowledge to develop newer moulds.
- Use of age old techniques and processes.

### Cluster
- Unavailability of skilled labour.
- More and more artisans are opting out
- Artisans peer group is not a strong body to exercise their rights.
- There is requirement os a body to control and help the artisans.
- All artisans have only two types of products which creates less distinction.
- No division of labour among the cluster hence all artisans are involved in all the processes.
- Unavailability of any common facility that can guide and help them in product development.
- Less unity among the artisans.

### National
- Products from Moradabad is a threat to the artisans.
- Artisans are unaware of newer trends in the market.
- There is a major shift in the lifestyle of urban Indian people with globalization.
- The artisans are not properly licensed and hence not capable of getting loans.
- There is not technical support available from institutions.
- State government is proactive to develop these artisans.

### Global
- The artisans use scrap brass which is very green and eco-friendly.
- The artisans are capable of developing export quality products but there is a lack of focus in design of products.
- The shortage of organic fuel will affect the artisans as they depend on coal.
- Casting technology has gone ahead by leaps.
**Product Design**

The product line should showcase the skills of the artisans, specially the finishing skills of these artisans. If the process has to be retained then newer product range had to be made. In case of any new product development, the products range has to be such that they can be finished in similar ways as the artisans are familiar with it. A signature design style is required to set these artisans apart from the mass manufactured products as these products are manufactured with a lot of effort and care. Value added products can make these products more lucrative and desirable as compared to just daily use products. Attraction value of these products needs to be increased. Considering the effort and skill of these artisans a separate products segment like lifestyle or home accessories should be looked at. Hence product segment needs to be revised.

**Co-operative Body**

Firstly the most important requirement for the artisans is that they form a co-operative and acquire license to buy brass as raw material to make them independent from the Mahajans. A local authority should be formed who will possess license to purchase brass from the market. Artisans should have access to raw material for any alternative market.

**Mould Design**

Products should have simpler moulds and less number of mould components. Alternative moulds can be developed to reduce the number of raw materials that goes in the process. Overall mould making process should be looked at to improve the time engagement. Newer technology of mould making needs to be used to improve time consumption. The association of the artisans can have no. Reusable moulds that could rotate among the artisans.

**Workstation Design**

Workstations and furnace should be designed to ease manual labor and to improve working posture. Workstation should have natural light to reduce extra electricity cost. The design of workstation should incorporate all the tools and machines involved. Workstation design should be done for clay preparation studying the work pattern of these artisans. It should also take care that less effort is needed by the artisans to finish the products. Workstation design id required with integrated lathe to allow the artisans a more ergonomically preferred posture. Also it should help the artisans to polish the pots without putting too much physical effort. Better machine design to grip the pots easily.
Workplace Organization
Organization of tools and storage of moulds is another issue that needs to be solved. The artisans’ skill is important, but to reduce time involvement tools and jig/fixtures should be made to quicken the production process. Tools to be developed to measure proportions of clay. Guiding charts or formula of composition should be maintained to have uniformity in the process among the artisans. The layout of furnace should be a part of an assembly line to ease the processes.

Furnace Design
Furnace design is essential to make it more ergonomic so that insertion and retrieval of moulds is easy. The furnace should have enough safety to avoid any accidents. Reduction in the use of fuel and use of alternative fuel, which is locally available or electricity. Efficiency in terms of heat dissipation. The furnace design should be such that the artisans don’t have any problem in inserting and retrieving the moulds. Safety precautions are a must for all artisans.

Material Testing
Using scrap brass is a very noble idea but there should be a way to figure out the percentage of brass in them. This could be possible by testing different items once and forming charts of and only buying those items from the market.

Clay Processing
Simple manual clay mixing machines can be designed to create the clay without much physical effort as well as saving time. Probe should be made if the number types of clay can be reduced. Clay once prepared cannot be stored. Alternate material can be tried to achieve the same dexterity. Use of drying agent to fasten the drying process.

Net-Working
New networking is required to take the product to the suitable market. NGOs and co-operative can bridge this gap and bring the products to the users through proper retailing or exhibitions.

Packaging
Basic packaging is required.
Proposed Business Model

ARTISANS

Common Facility Centre

NGOs/Non-Profit Organizations

Consumer

Recycled Waste

Rural festivals and fairs

Artisans Body

Strategic control

Raw Material

Finished product
Proposed Product Range

Brass Products Range Available (Developed by Small Scale Industries)

RESIDENTIAL

DAILY USE PRODUCTS
- Kitchen utensil
  - Plate
  - Bowl/ Serving bowl
  - Spoons/ forks
  - Glass
  - Pots/ urns
  - Cooking utensils

HOME ACCESSORIES
- Decorative
  - Wall hangings
  - Mural
  - Relief sculpture
  - Wind chimes
  - Mirror Frames
  - Decorative boxes

Usable
- Vases
- Lamp base
- Candle stand
- Wall hooks
- Incense stick holder

RELIGIOUS

WORSHIP ITEMS
- Oil lamp
- Idols
- Bells
- Misc. products

OFFICE/ INSTITUTIONAL

DESKTOP ACCESSORIES
- Book ends
- Pen stand
- Paper weight
- Card holder

Proposed Products guidelines
- Two component mould
- More solid products than hollow ones.
- Finishing can be done by Lathe or grinding
- Smaller products with a added value.

Products presently developed
Proposed product range
Designer Products

All these designer products follow the guidelines set for products proposed to be developed by the artisans.

1. Brass Lamp by Babette Holland Val
2. Brass Candle Stand by Littala - Nappula
3. Reversible Marilyn Candle holder
4. Incense Burner
5. Pendant Lamp by Lisa Johansson-Pape
6. Liberty hardware - Franklin Brass hook
7. Paperweight by Oji Masanori
8. Paperweight by Carl Aubock
9. Vienna Bookends by Dwell Studio
Future Vision

Initial Phase
0-1 Years

- **NID MSME Design Clinic**
  - Aid in strategic planning

- **Personal development**
  - Workshops
  - Training to develop new design

- **Better Life**
  - For the artisans

Intermediate Phase
1-3 Years

- **Capital Investment**
  - Loans / MSME Schemes

- **Cluster level investment**
  - Common facility centre
  - Newer technology of casting

- **Better Productivity**
  - Increase in production
  - Ease of production
  - Increase in profitability

Final Phase
3-5 Years

- **Quality Control**
  - Quality check of all raw materials
  - Quality check on products

- **Better Trade**
  - Organized production
  - Reaching newer market
  - Export quality products

- **Sustained Trade**
  - Self supported growth
  - Upgrading production

- **NGOs / Non profit organizations**
  - Bring the products to the suitable market

- **Designer Intervention**
  - Aid in Physical design and application

- **New design**
  - Design of new products
  - Design of workstations and furnace
Phase-wise Development

Initial Phase

Training Programme/ Workshops
Workshops and training programmes need to be conducted to make the artisans aware of better process and techniques. Training is also required to help the artisans develop new moulds and organise better.

Tool/Equipment/ Workstation design
Design of workstations is a big opportunity area here. Work flow needs to be understood and accordingly ergonomically better workstations need to be designed. Furnace design is another area that needs attention. For the finishing of products special lathe can be designed to minimise effort and time taken by the artisans.

Awareness Schemes
The artisans should attend various awareness programmes to update themselves according to the demands of the market, newer technologies and better working methods.

New products design
As the range of the products developed here is just two, the range should be expanded to showcase the skills and expertise of the artisans and also to meet the latest market demands and upcoming trends.

Intermediate Phase

Infrastructure Improvement
The artisans work with very basic infrastructure. In order to improve their lifestyle and thereby the products that are developing the infrastructure of the workshops need to be improved. Proper space, storage, lighting, workstations etc. can help improve the infrastructure.

Artisans Co-operative body
The artisans need to come together and create a co-operative body that will take care of the artisans interest. Also this body can procure license to buy raw materials and sell the products developed. This body will have control over the pricing, loans etc. for the artisans.

Common Facility Centre
The co-operative body need to form a common facility centre that can house equipment and moulds that can be used by the artisans. The common facility centre can also display the prod-
ucts. The government need to invest in these facility centres to make them sustainable in the initial phase. Trainings and workshops will form the regular activities of the facility centre thereby improving the skills and knowledge of the artisans.

**Control over Quality**
The common facility centre should also have testing facility to test the quality of the raw material as well as the finished products.

**Research and development**
There are many areas of research that can be taken further. Development of alternative of clay for mould making, quick-setting clay, optimal use of materials can be some of the areas of research.

**Up gradation of technology and production**
The artisans need to embrace the new techniques and production processes. Research and development will help them to get technology specific to their need.

**Involvement of NGOs/ Non Profit Organizations**
NGOs and non profit organizations need to be roped in to boost sale the products. The artisans can reach many new markets through them.

**Export of products**
With help of NGOs the artisans can also export their products to overseas market. The artisans need to expand their product range for this and maintain high quality all through.

**Final Phase**

**Sustainable Growth**
The future vision for the artisans of the brass cluster of Balidewangunj is that they achieve a sustainable model of business that helps them maintain quality and increase profitability. The main aim of this development is to improve the life of the artisan financially and in health to make them stay in this profession and keep producing quality products.
DESIGN CLINIC WORKSHOP
# Design Clinic Schedule

## Day 1
30.03.2013

### Orientation
- What do you expect from MSME?
- How can you improve?
- What do you need for it?
- What MSME offers you?

### NAS Report Discussion

### Unit discussion

### Ghoti / Kolshi / Polishing

### Discussion on strength and weakness

## Day 2
31.03.2013

### Presentation on workstation design and need of ergonomically better environment.

### Presentation on prototypes to be developed during the workshop.

### Discussion of parallel works of Tarak Chandra Rana

### Short films on Mould design using different softwares.

### Short films on CNC prototyping.

## Day 3
01.04.2013

### Presentation on Design intervention in different fields and their implications.

### Presentation on New designs in brass.

### Discussion on how to develop two piece moulds of simple products.

### Short films on Brass casting in different factories

## Day 4
02.04.2013

### Discussion on prototypes

### Discussion on benefits and objectives of MSME Design Clinic by Sudev Mandal

### Presentation and discussion in the future vision for the cluster

### Short films on Metal Casting at Home Part 2 Backyard Foundry

### Short films on New designs in brass

## Day 5
03.04.2013

### NAS Report Closure

### Presentation of Prototypes

### Presentation of other works by the artisans

### Presentation on Platina by Mr. Mahendra Pal

### Q & A Session about the workshop with the artisans.

### Photography session.
The Workshop started with introduction by the Panchayat Pradhan Mr. Bhumen Rai, BDO, Mr. Prabhat Chakraborty.

NAS Report Discussion
Objective
The Workshop was started with the discussion on the NAS Report as it clarified all the questions the artisans had regarding the workshop and what to expect from it.

Presentations mode
Presentation was done by projecting the NAS Report and each section was explained in detail.

Feedback
There was a confusion among the artisans about what will be the outcome of the workshop. After the discussion on the NAS report there was more clarity among the artisans.
Presentation on workstation design and need of ergonomically better environment.  
A short presentation was made showing the problematic postures of working of the artisans  
and how to create a workspace with better ergonomics.

Presentation on prototypes to be developed during the workshop.  
A presentation on the prototypes that will be developed and discussion on why these designs  
are suitable for this cluster. Discussion on a basic guidelines on how to develop the moulds for  
these prototypes.

Discussion of parallel works of Tarak Chandra Rana  
A discussion was arranged with Tarak Chandra Rana as he has worked outside the cluster and  
has developed products other than the regular ones

Short films on Mould design using different soft wares.  
Short films on CNC prototyping.
Day 03 01st April 2013

Presentation on Design intervention in different fields and their implications.
Presentation to show the design interventions in different fields by designers that has altered the way people do things. The presentation is to demonstrate the effect design can have on the lives of people.

Presentation on New designs in brass
An exposure to the world of new designs in brass that will help the artisans to enhance their knowledge.

Discussion on how to develop two piece moulds of simple products
The new designs that were presented were taken up to discuss how to develop moulds and demonstrate which of these products will be suitable for the artisans to develop henceforth.

Short films on Brass casting in different factories
Day 04 02nd April 2013

Discussion on prototypes
The prototypes that were handed to the artisans before were taken up for discussion to be cast and about any problems faced by the artisans in developing their moulds.

Discussion on benefits and objectives of MSME Design Clinic by Sudev Mandal
A thorough discussion was made on the benefits and objectives of MSME Design Clinic by Sudev Mandal. Discussions were also made on the future directions that can be taken up by the cluster.

Presentation and discussion in the future vision for the cluster

Short films on Metal Casting at Home Part 2 Backyard Foundry
Short films on New designs in brass

1. Mr. Sudev Mandal discussing on the benefits and objectives of MSME Design Clinic and 2. Mr. Anindya Das Gupta discussing on the prototypes.
Day 05 03rd April 2013

**NAS Report Closure**
Final day feedbacks on the prototype developed by the artisans and how this cluster can move into a better profitable business.

**Presentation of Prototypes**
Presentation of other works by the artisans

**Presentation on Platina by**
A short demonstration and presentation was made by Mr. Mahendra Pal on Platina on metals.

**Q & A Session about the workshop with the artisans.**
The Question and Answer session was conducted by Sudev Mandal regarding the workshop.
Workshop - 30th March to 3rd April 2013

The workshop was arranged in a small primary school hall.
Short Films Shown

31.03.2013

Bottle mold design- www.solidsolutions.co.uk
SolidWorks mould tool design- www.solidsolutions.co.uk
CNC cutting vase prototype
Fadal CNC Mill Machining Brass multi axis- - www.fmmservices.com

01.04.2013

A Brass Casting Demonstration
Manufacture of brass taps- Avilion Foundry- Wolverhampton
Polishing Brass with a bench grinder- www.polish-up.com.au
Brass engravings Uttar Pradesh- www.indiavideo.org
Indian Handicraft, Brass Handicrafts, Decorative Home Items- www.exoticindiaproducts.com
Solid Brass Desk Accessories - product overview- www.deskaccessories.co.uk

02.04.2013

Metal Casting at Home Part 1 Backyard Foundry
Metal Casting at Home Part 2 Backyard Foundry
Metal Casting at Home Part 3. Backyard Foundry
Metal Casting at Home Part 4 Backyard Foundry
Metal Casting at Home Part 5 Backyard Foundry Core Making
Metal Casting at Home Part 6 Preparing the Moulding Sand
Metal Casting at Home Part 7 Oddside Mould Making
Metal Casting at Home Part 9 The Furnace
Metal Casting at Home Part 10 Another Day in my Home Foundry
Metal Casting at Home Part 17. Ten Castings with a Snap Flask
Metal Casting at Home Part 27 Core Box making with Plaster of Paris
Metal Casting at Home Part 32 Making Moulding Flasks
- Directed by Myfordboy
Farefax Engines 2008
Prototyping

Objective
Prototyping was introduced in the workshop to create a hands-on experience for the artisans. This was also necessary as the artisans can understand the true potential of using clay moulds and to be able to develop any new mould in very less development time.

Designs
The designs for prototyping was mainly from the househol's accessory range. This was done so that the artisans are exposed to a newer product area as well as they can create some modern yet easily doable designs.

Feedback
Most of the artisans were able to understand how to develop the mould of the designs and some of them even casted the products during the workshop.
Design for Prototype

The prototypes designed for the workshop were:

1. Candle holder
2. Incense stick holder
3. Ash tray &
4. Pin holder
**CNC Prototyping**

All the prototypes were CNC machined using aluminium as base material. These prototypes will help the artisans to create moulds with more precision and also understand the products better.
Prototype 01 Ash Tray

**Design Style**
Modern ash tray to match contemporary home decor.

**Specs:**
- Material: Cast Brass
- Size: 75mm DiaX8.5mm [H]
- Weight: 100-120 gms.

**Production cost:** Rs. 35 to Rs. 40
**Market price:** Rs. 80/- to 100/-
**Profit:** 100% to 250%
**Prototyped by:** Shakti Pada De

**Observations**
- Prototype done by single mould which accounted for more waste
- Some tools needs to be developed to get better finish from inner side.
Prototype 02 Candle Stand

**Design Style**
Modern and minimalist Candle stand.

**Specs:**
Material used for prototype: Cast Tin  
Original material to be used: cast Brass  
Size: 75mm DiaX9mm (H)  
Weight: 100-120 gms.

**Production cost:** Rs. 35 to Rs. 40  
**Market price:** Rs. 80/- to 100/-  
**Profit:** 100% to 250%.  
**Prototyped by:** Vikash Chakraborty

**Observations**
- Prototype done by single mould.
- Finishing needed more time as the base material was hard.
- Sharper edged was achieved with this design as the tools matched the artisans existing tools.
Prototype 03 Incense stick Holder

**Design Style**
Incense stick Holder with a small tray to collect all the ash.

**Specs:**
Material: Cast Brass  
Size: 75mm DiaX18mm (H)  
Weight: 100-120 gms.

**Production cost:** Rs. 35 to Rs. 40  
**Market price:** Rs. 80/- to 100/-  
**Profit:** 100% to 250%.  
**Prototyped by:** not completed
Prototype 04 Pin Holder

**Design Style**
Minimalist pin holder for modern offices.

**Specs:**
Material: Cast Brass  
Size: 75mm DiaX8mm (H)  
Weight: 100-120 gms.

**Production cost:** Rs. 35 to Rs. 40  
**Market price:** Rs. 80/- to 100/-  
**Profit:** 100% to 250%.

**Prototyped by:** Arup Maity

**Observations**
- Prototype done by single mould but without much wastage.  
- The product was mirror polished to get better results.
Mould Design

The prototypes were designed with the following considerations:

- The mould should be in two pieces.
- The moulds can be made into multiple casting moulds later.
- The products can be polished with the existing tools that the artisans have.

Ash tray Mould

Incense Stick holder Mould

Candle Stand Mould

Pin Holder Mould
Conclusion

The survey and workshop conducted on the Brass Metal Cluster in Balidewangunj was a part of the initiative taken by NID MSME Design Clinic Scheme and Government of West Bengal. The programme focused on the design issues of the cluster and what are the possible solutions for it. The recommendations made were keeping in mind the present situation of the artisans and the potential they displayed in their work.

This cluster is one of the rare clusters which have been included in MSME Design Clinic Scheme in spite of not having a co-operative of their own. However the artisans are on their way to form a body of their own to operate on co-operative basis. In the workshop it was focused that how a co-operative can help these artisans to develop in their future and form common facility centres.

The importance of ergonomically safe workstations and healthy working environments were also focused in the workshop. And finally the artisans were introduced to newer designs that they can diversify into later without much effort. Overall the survey and the workshop was an effort to portray the potential the artisans possessed and that should nurture it for a financially safe and healthy future.