REPORT

KHAMIR | REHA | IDC

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KHAMIR - Overview

Khamir in Kukma district of Kachch is a platform for the crafts, heritage and cultural ecology of the Kachchh region of Gujarat. Instituted after the earthquake of 2001, it is a space for artisans, resource groups and institutions, buyers, suppliers and craft lovers from around the world to gather under one roof to exchange ideas, collaborate and learn. It works to strengthen and promote the rich artisanal traditions of Kachchh district.

The name Khamir stands for Kachchh Heritage, Art, Music, Information and Resources..Born in 2005, it serves as a platform for the promotion of traditional handicrafts and allied cultural practices, the processes involved in their creation, and the preservation of culture, community and local environments. Their main aim is to shift consumer perspectives and raise the cultural value placed on crafts.

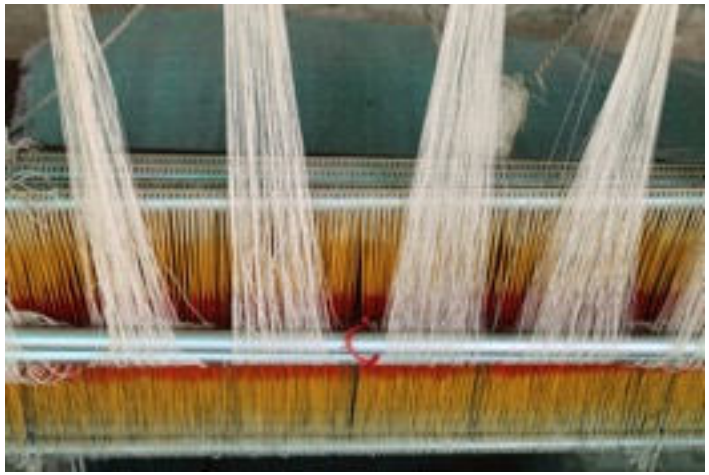
KHAMIR - Activities

ENGAGEMENT
Khamir seeks to inspire curiosity and a deeper understanding of craft, culture and conservation in Kachchh. Through cultural engagement, experiential learning and research, Khamir connects a diverse public with artisans, creating an environment in which creative industries can be recognized as important pillars of society and be recognized as traditional, livelihoods with potential for growth. They organize public workshops, curated exhibitions and festivals to facilitate this engagement.

TRADE FACILITATION
Craft practice in India is linked to a community's livelihood. With the understanding that preservation and growth of the handicraft industry will not be possible without successful production and sales, Khamir connects artisans with markets and facilitates fair trade.

ARTISAN SERVICES
Khamir identifies critical needs within each craft area and works to resolve these needs with a series of intervention.

KHAMIR - Innovation



Kachchhi artisans are constantly testing the boundaries of their craft, ensuring that their work does not stagnate in a market whose whims are ever changing. Khamir, contributes by combining traditional Kachchhi crafts with appropriate technologies and unusual raw materials.
The following are the three major innovation programs.

CAMEL WOOL
Develop and market products made of locally sourced camel wool.

KALA COTTON
Encourages sustainable cotton textile production, and the preservation of agricultural and artisan livelihoods in Kachchh.

RECYCLED PLASTIC WEAVING
Repurposes urban waste materials while supporting traditional weaving skills and methods.

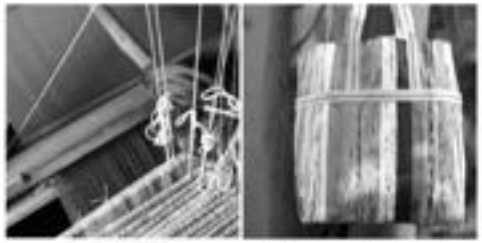
KHAMIR and KACHCH

Ajrakh Block printing | Bank Print | Bela Printing

Bela Printing | Namda | Rogan Painting

Camel wool weaving | Kachchh Weaving | Kala cotton | Khared Weaving

Knife Work | Lacquered Wood | Leather Art | Metal Bells



Mashru Weaving | Recycled plastic weaving

Pottery | Silversmithy | Wood Carving

The rich and diverse creative traditions of Kachchh live at the intersection of cultures and communities. Once a destination by land and sea for people from Africa, the Middle East, and the Swat Valley, Kachchh has a rich tradition of sea trade from Mandvi and a global connection. A river system was shared between Kachchh, Sindh and Rajasthan. As a border state, Kachchh is constantly absorbing cultures from the north, west, and east. Kachchhi motifs can be traced to the ancient Harappan civilization, yet craft is developing and growing with the innovative and entrepreneurial drive of spirited artists.

The arid climate has pushed communities here to evolve an ingenious balance of meeting their needs by converting resources into products for daily living.While embroidery has become a craft synonymous with Kachchh, other textile crafts and hard materials crafts give this land color and identity. Craft is inextricable from the numerous communities, connected by trade, agriculture and pastoralism in Kachchh.

KACHCH

Kachchh, commonly written as "Kutch," is the largest district in India and is located in Gujarat state. It is a mosaic of diverse landscapes, people, and cultures that together create a distinct identity that is unmistakable to those who come here. The district is surrounded by ocean on one side, and the Rann of Kachchh, a vast salt desert, on the other. Once a major trade hub of the Indus Valley delta, Kachchh has long been a melting pot defined by fluid boundaries. It is a meeting point of people, cultures, faiths, languages, and traditions across a diversity of ecosystems and terrains. Kachchh is inhabited by a wide range of communities and cultures. The people of Kachchh belong to a range of different faiths and traditions – most visibly Hinduism, Islam, and Jainism. They speak Kachchhi (a Sindhi dialect that harkens back to the Kachchhi roots of that region), Gujarati, and Hindi. However, these by no means capture the ethnic and tribal sub identities that reflect India's complex social structures. The movement of people across this land has given it a long history of sectarian diversity and peaceful coexistence.

BRIEF

Design and prototype products that would create business opportunities for the artisans of Reha considering the present scenario in accordance with the design philosophy of Khamir. The main intent of the project was to establish a regular work culture between them and also introduce metal crafts featuring Reha at Khamir. The involvement of artisans and their skills was the priority while the choice of product was left open.

UNDERSTANDING THE SCENARIO

1. Overview
Location
Population
Communities and Tribes
Occupation
History

2. Design Exposure
Product Typology
Events and Participation
Target Users

3. Knife making
Process at Reha
Community and People Involved
Trade cycle
Seasons and sales
Various methods of knife making in general
Possibilities and scope for improvement
Khamir and Reha

1 Overview

Reha Nana is a Village in Bhuj Taluka in Kachchh District of Gujarat State, India. It is located 12 KM towards South from District head quarters Bhuj, 350 km from State capital Gandhinagar.

According to the Census of India, 2011, total 271 families reside in Nana Reha. The Reha Nana village has population of 1447 of which 731 are males while 716 are females as per Population Census 2011. In Reha Nana village population of children with age 0-6 is 228 which makes up 15.76 % of total population of village. Average Sex Ratio of Reha Nana village is 979 which is higher than Gujarat state average of 919. Child Sex Ratio for the Reha Nana as per census is 884, lower than Gujarat average of 890. Reha Nana village has lower literacy rate compared to Gujarat. In 2011, literacy rate of Reha Nana village was 71.12 % compared to 78.03 % of Gujarat. In Reha Nana Male literacy stands at 81.64 % while female literacy rate was 60.59 %.
As per constitution of India and Panchyati Raaj Act, Reha Nana village is administrated by Sarpanch (Head of Village) who is elected representative of village.

1 Overview

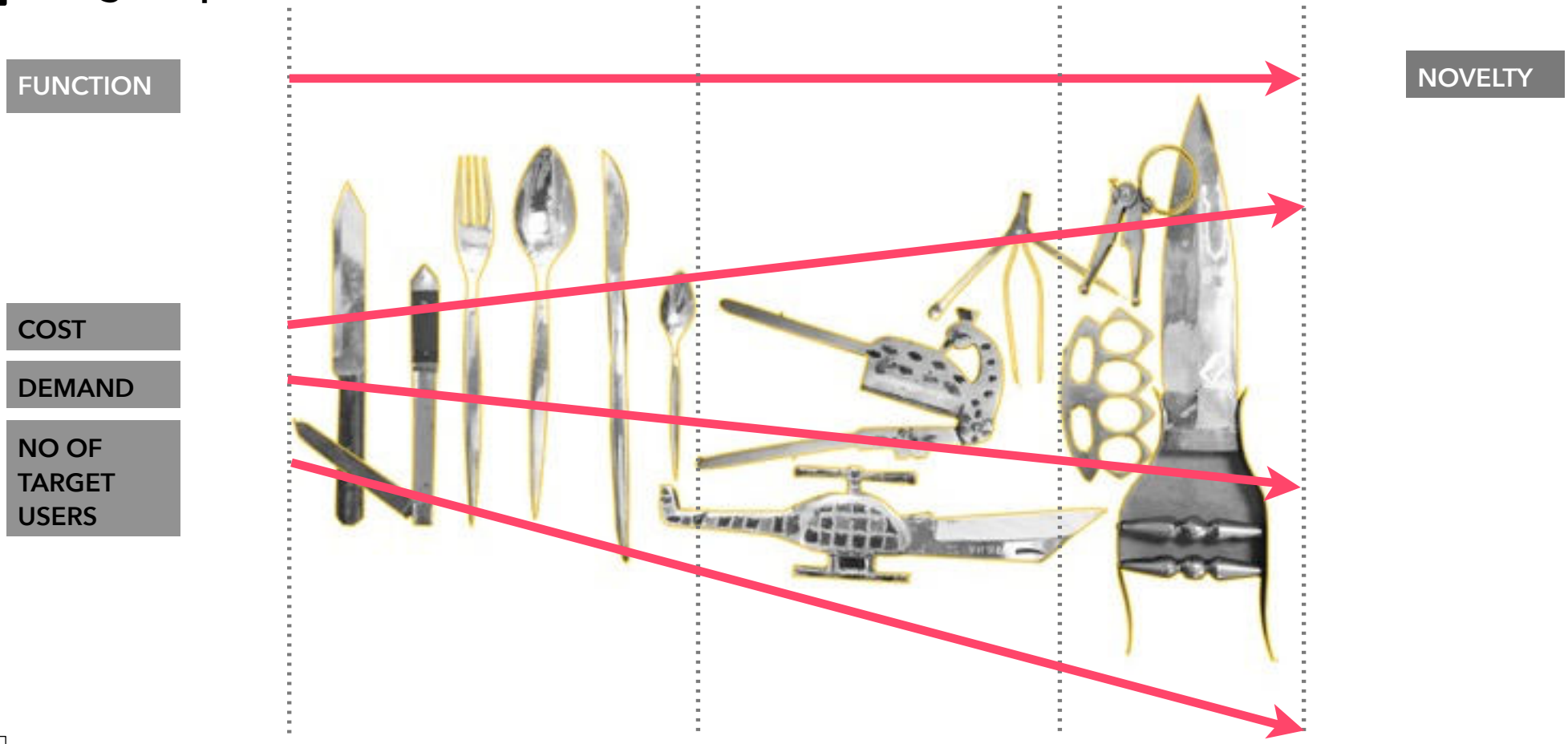
Schedule Caste (SC) constitutes 10.09 % of total population in Reha Nana village. The village Reha Nana currently doesn't have any Schedule Tribe (ST) population. In Reha Nana village out of total population, 474 were engaged in work activities. 85.23 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 14.77 % were involved in Marginal activity providing livelihood for less than 6 months. Of 474 workers engaged in Main Work, 75 were cultivators (owner or co-owner) while 131 were Agricultural laborer, the rest of the workers contribute to the art of Knife making. Some act as traders, with Anjaar as their main market while the others craft and sell their knives to the traders or independently.

1 Overview

Pen Knives, seed crackers, scissors and swords of Kutch are famous in India as well as in all over the world. The exact History of the craft is unknown. The resources say, as agriculture offered them work for about only 6 to 7 months in a year, they allotted themselves in a side industry which could provide them income. According to another description, the industry seems to have been started long time ago by one of the associates of the present craftsmen who exclusively dedicated himself to the job of manufacturing state weapons. Today, there are nearby 100 craftsmen busy in this craft and spread over different places like Bhuj, Mandvi, Anjar, Reha etc.

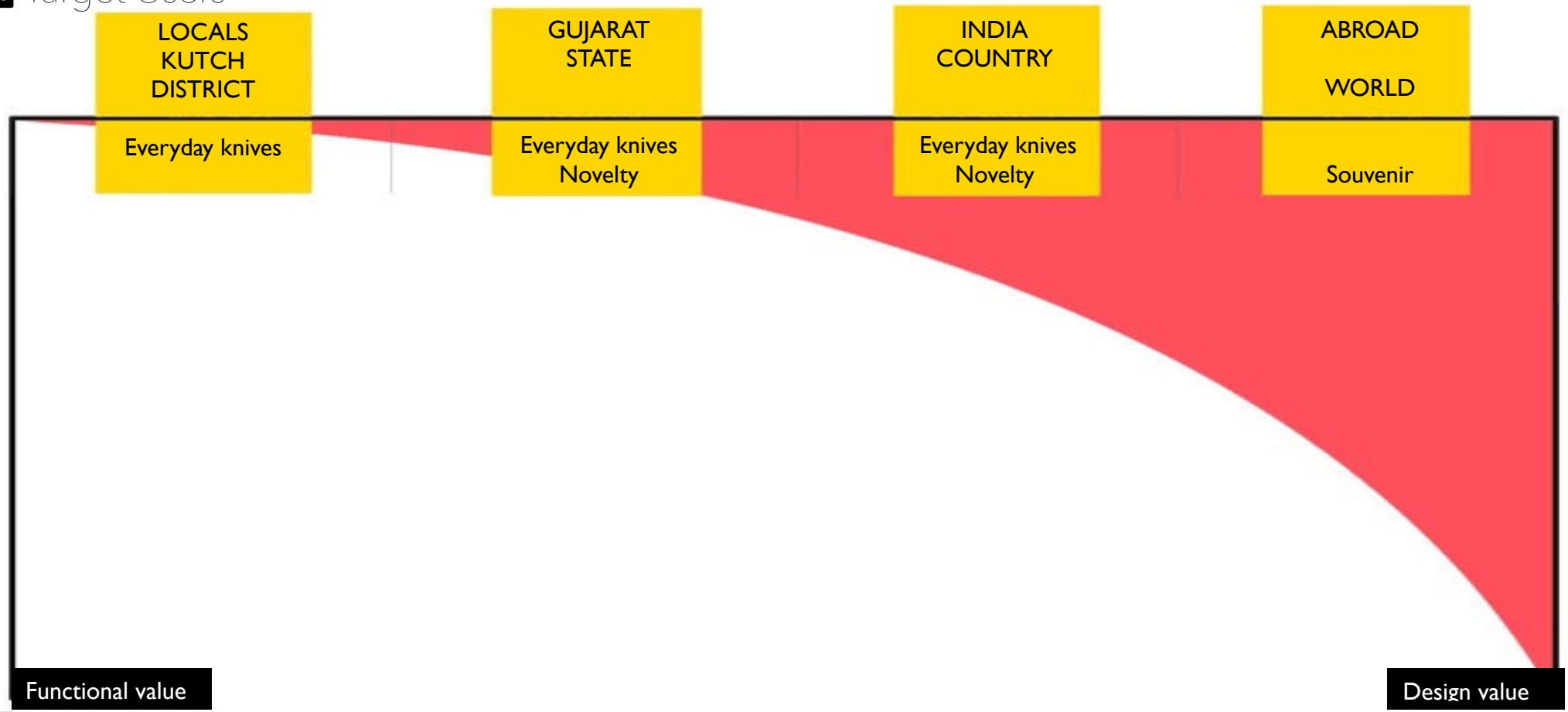
At Anjaar, Knives from China and Germany are imported and sold along with the knives from Reha. These are mostly machine made and mass produced and thereby have better quality and also cost less compared to the handmade Reha products. Reha is not the sole contributor to the knife sector anymore and hence most of the artisans are **shifting from knifework to other occupation** such as carpentry, building works etc due to the reduced quantity of available work. This inturn increases the production time thereby increasing the per piece cost making it difficult for the product to survive the market. This is a major issue faced by the craft today.

2a Design Exposure



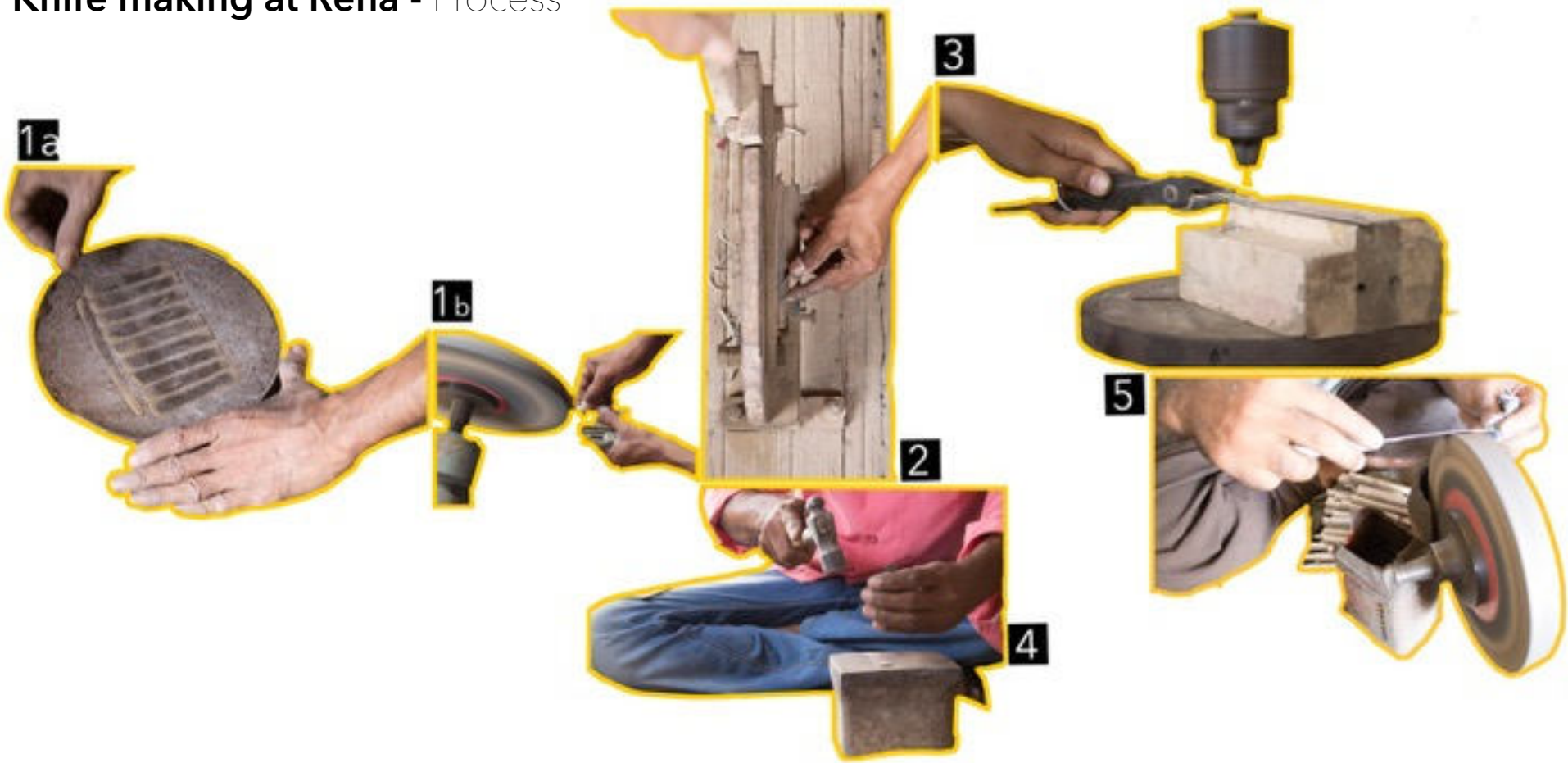
The art of forging and sand casting helps artisans to produce products apart from knives like daggers, nut crackers and cutlery. More trials and experiments in methodology and process can result in alternate typology of products which would in turn provide a varied range of products.
The artisans from the village have been participating in events and exhibitions at national and international level. Recently, internet has also proved to be a great connect for the artisans to market their product through websites and get informed for events and exhibitions.

2b Target Users



The range of products made at Reha vary in the scale of function and cost, thereby catering to different requirements and target users. The functional products are of interest to the local markets while the high novelty products indulges the tourists and visitors.

3a Knife making at Reha - Process

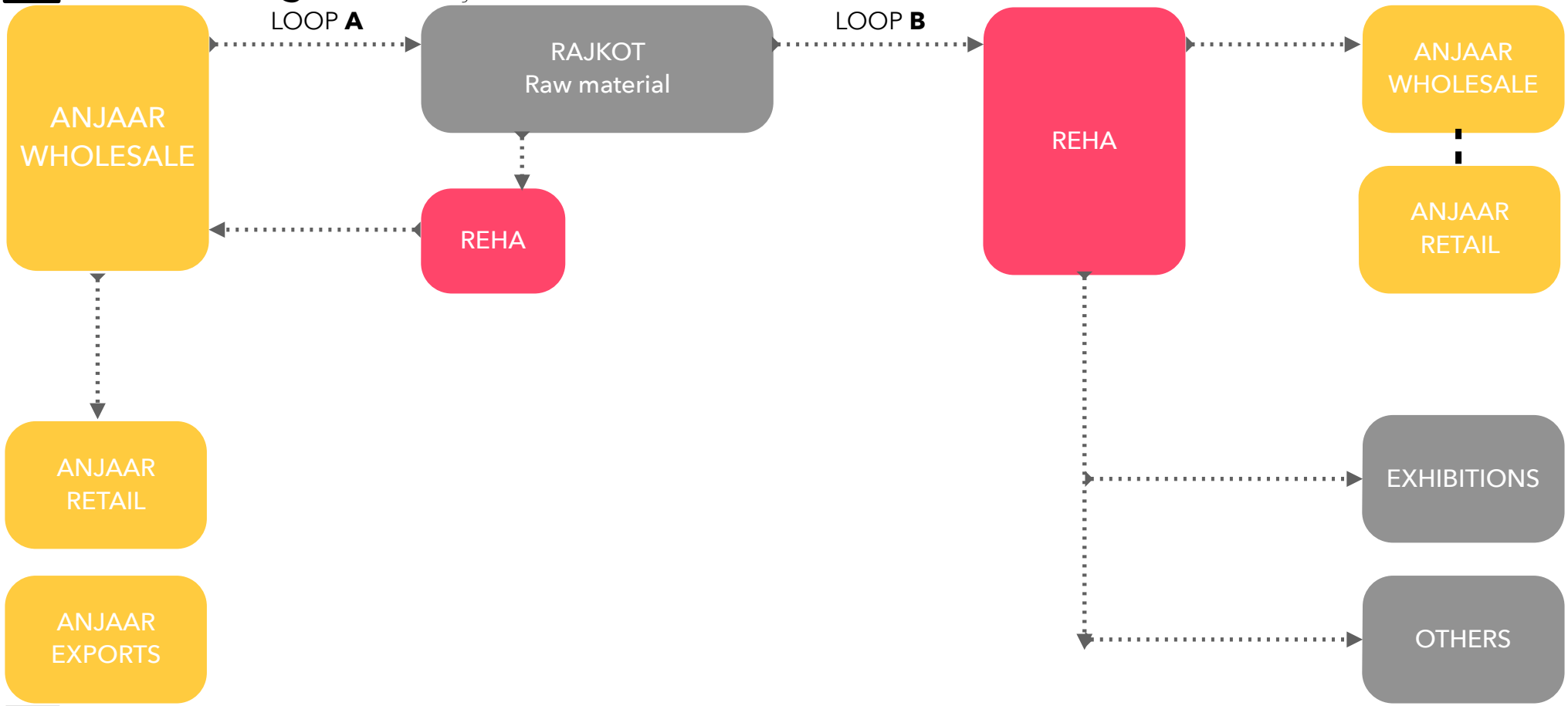


The commonly made knives at Reha are of two parts - the stainless steel blade and brass/wooden handle assembled using rivets. The process of Knife making at Reha is split in three major stages - Sand casting, Forging/Assembly and Finishing. In Sand casting, a mould is made using a format (module) in sand and the melted metal is poured into the mould [1a]. Due to their low melting points, Brass and Aluminum are the preferred metals for the purpose of sand casting. The sand casted pieces are finished to a usable extent in a grinding machine [1b]. Based on the design of the knife, the raw materials such as stainless steel blades are either cut or forged to required form [2]. In case of assembly, holes of required diameter are drilled for rivets [3]. The blade and the handle are then assembled [4] and the final product is buffed to even out the surface and add shine [5]. The blades are later sharpened to provide cutting edges.

3b Knife Making - Community

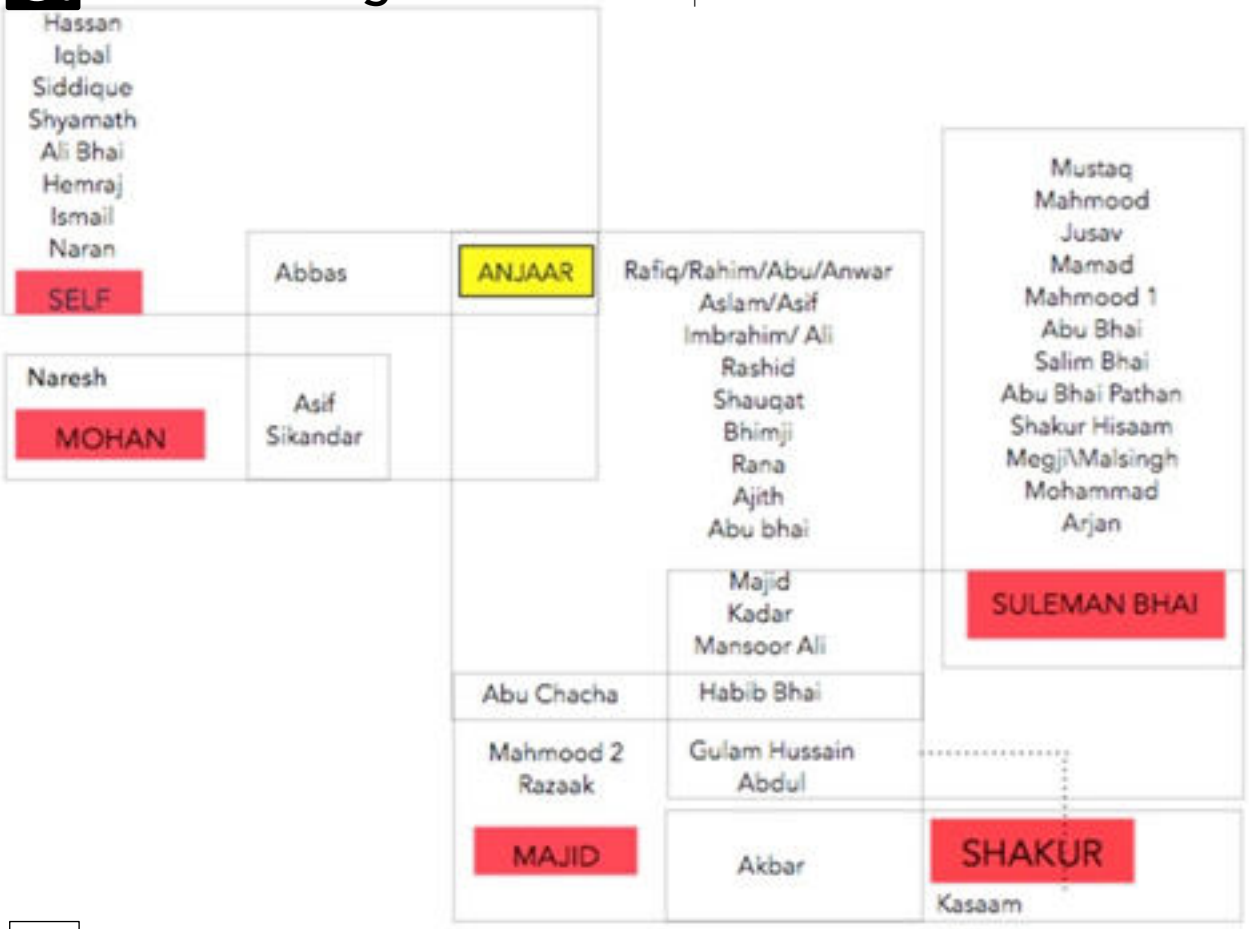
Each of the three stages of knife making requires certain level of expertise and tools. Sand casting requires a furnace with a blower while forging and buffing requires grinding machine and buffing wheels. In order to reduce the initial cost of setup, these are handled by different artisans. A single knife goes through these three process and hence three artisans for its manufacture. This helps in securing the sanctity and relationship within the knife community by making constant collaboration a necessity. Though a few artisans within the village have expertise to practice all, they choose to do so only when there arises a need incase of independent exhibitions and projects.

3c Knife Making - Trade Cycle



Anjaar is the major market for Reha knives. In Anjaar works on two groups of markets - wholesale and retail. The basic Trade cycle consists of two loops. In A, the wholesale markets of Anjaar purchase raw materials and provide orders to the Reha traders who in turn provide work for the Reha artisans. The manufactures knives are sold to the Anjaar wholesale who sell it to the Retails stores for direct customer purchase. In B, the Reha artisans purchase material from Rajkot, manufacture knives and sell it to the Anjaar whole sale who in turn sell it to the retail market. These knives are considered as a design identities of each artisan and are hence used for exhibitions and independent sale and purchase. The traders in Reha facilitate loop A for the Reha artisans.

3d Knife making at Reha - People



SAND CASTING
Gulam Hussain
Abdul Bhai
Ali Bhai
Abu chacha
Mustaq | Mahmood

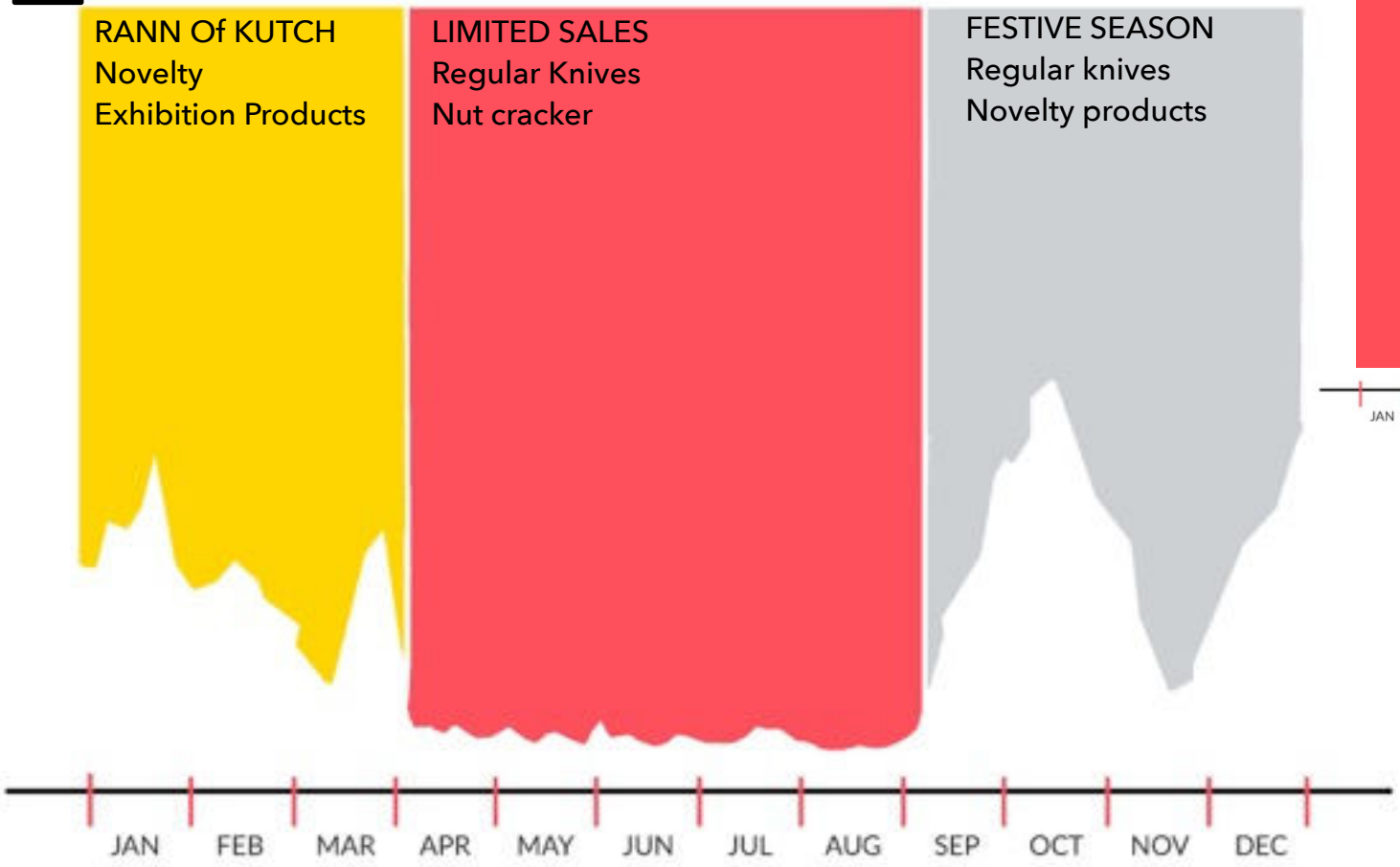
BUFFING
Anwar | Sikandar
Majid Bhai
Asif
Ibrahim Ali
Akbar
Mansoor Ali
Majid Bhai
Akbar
Razak
Mahmood
Abu Bhai
Jusav
Kaadar
Aslam | Asif

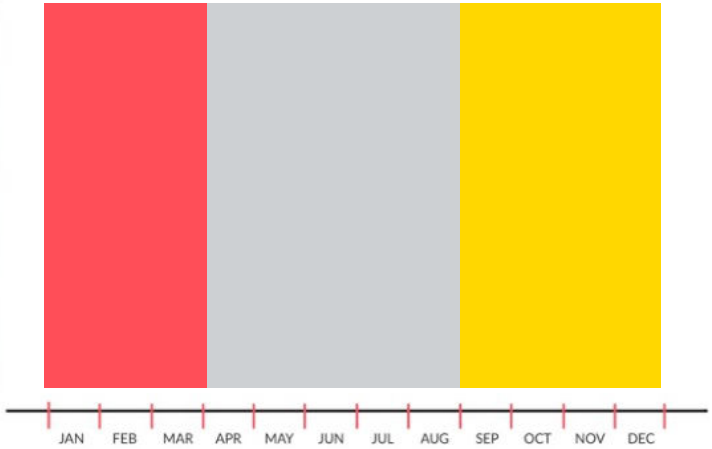
FORGING/ ASSEMBLY
Megji | Malsingh
Mohammad
Arjan Bhai
Hamraj Bhai
Ajith Bhai
Shakur Hisaam
Habib Bhai
Salim Bhai
Abbaas
Abu bhai Patan
Rana
Naresh
Abu Bhai
Bhimji
Kasaam
Rashid
Shauqat
Ismail

Hassan
Rafig
Shyamath
Siddique
Iqbal

According to the survey and sources, there are around 54 artisans in the village who practice this craft - 4 are traders, 5 practice sandcasting, 24 work on forging/assembly and 14 on finishing and buffing. Each trader employs a set of artisans for manufacture and the market. They act as the link to the market for these craftsmen. The above chart categorizes the artsans based on the traders they work for. Suleiman, Shakur, Majid and Mohan are the four main traders. A few artisans like Habib Ali, Gulam Hussain and Abdul work for multiple traders, while artisans, Naran, Hassan, Iqbal, Siddique, Shyamath, Hemraj and Ismail work independently on direct customer project basis. The second chart segregates the artisans according to their category of work - mainly sandcasting , forging/assembly and buffing.

3e Seasons and Sales





Optimum Timeline
of work for the artisan

Based on different seasons, the market for each typology of product varies. During the months of Jan to March, due to the Rann of Kutch festival, the visitors and tourist crowd increases the demand for novelty products and souvenirs such as nutcrackers and keychains. The months from September would be an optimum time for the artisans to work on these kinds of products. The months April to August are non season months, meaning there is a great reduce in the number of tourists. Hence there is reduced sales of novelty products. Within state visitors are the usuals and prefer everyday knives. The Rann of kutch is an exhibition season and may provide sufficient time for the artisans to work on regular knives. September to December , comprises a market for everyday knives and a few novelty products.

3f Various methods of Knife making in general

Forging

Stock removal

is the process of removing material (stock) from a work piece. It includes: Machining, Milling, Turning, Drilling, Grinding, Filling, Broaching, Shaping, Planning ,Sawing.

Forging to shape

Is the art of making knives, swords, daggers and other blades using a forge, hammer, anvil, and other smithing tools

Materials That can be forged commonly include **carbon**, **alloy** and stainless steels, very hard tool
steels, **aluminum**, **titanium**, **brass** and **copper**; and high-temperature alloys which contain cobalt, **nickel** or **molybdenum**

3f Various methods of Knife making in general

Demascus Steel Pattern

welded lamination

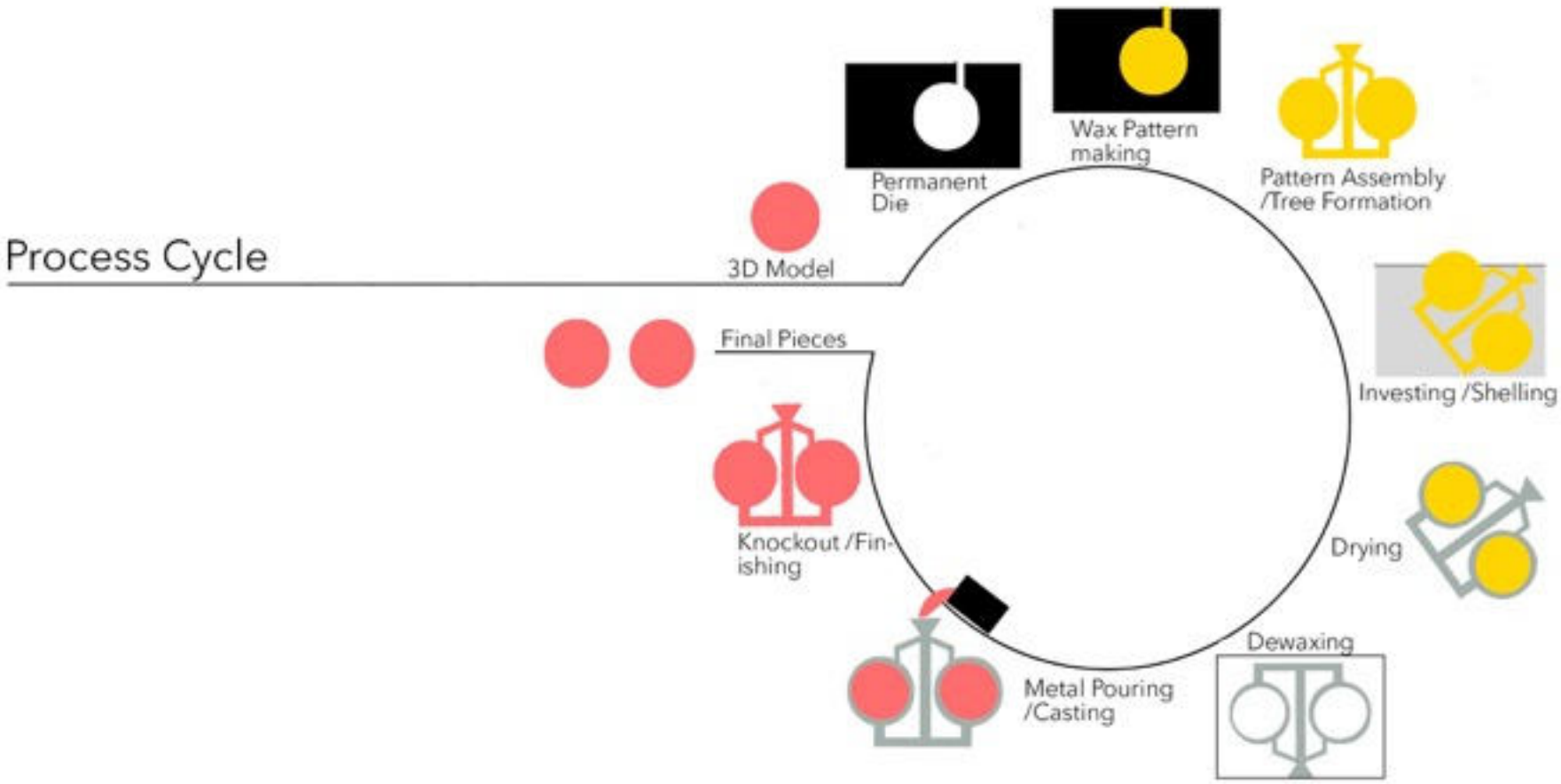
A laminated steel blade or piled steel is a knife, sword, or other tool blade made out of layers of differing types of steel, rather than a single homogeneous alloy

By heating thin iron rods in a carbon-rich forge harder steel cuttingtogether and twisted and manipulated to form a pattern. edges are made. The process is called carburization.

Pattern welding

is common in hand-made knives, where the primary goal is to provide a visually striking pattern by forming a blade of several metal pieces of differing composition that are forge-welded

3f Various methods of Knife making in general

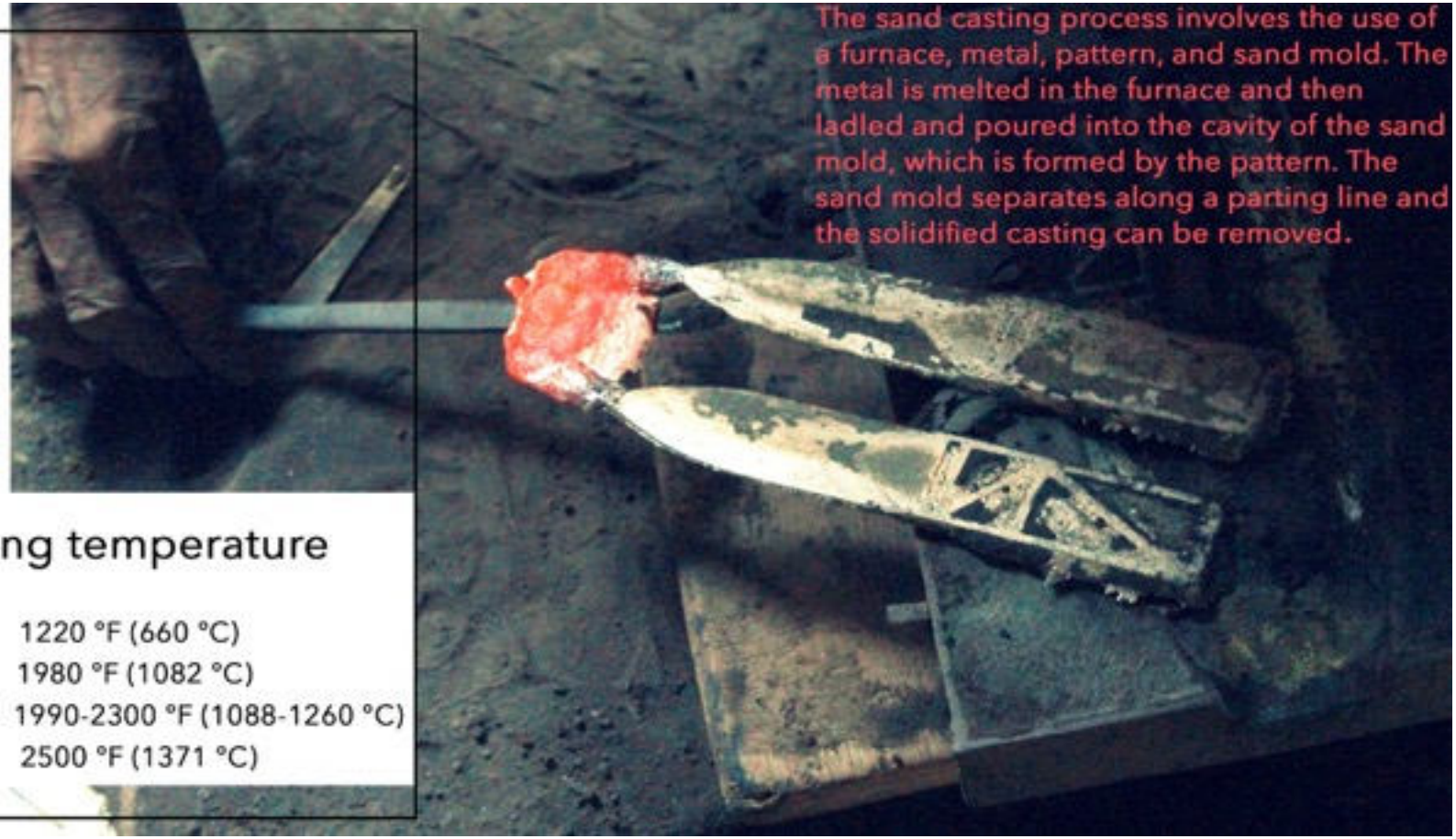


Investment cast.

Investment casting is an industrial process based on and also called lost-wax casting, one of the oldest known metal-forming techniques.

the castings allow the production of components with accuracy, repeatability, versatility and integrity in a variety of metals and high-performance alloys
There are a variety of materials that can be used for the investment casting process, including stainless steel alloys, brass, aluminum, and carbon steel.

3f Various methods of Knife making in general



The sand casting process involves the use of a furnace, metal, pattern, and sand mold. The metal is melted in the furnace and then ladled and poured into the cavity of the sand mold, which is formed by the pattern. The sand mold separates along a parting line and the solidified casting can be removed.

Materials Melting temperature

Aluminum alloys	1220 °F (660 °C)
Brass alloys	1980 °F (1082 °C)
Cast iron	1990-2300 °F (1088-1260 °C)
Cast steel	2500 °F (1371 °C)

SAND CAST(Sand characteristics)

Refractoriness :sand's ability to withstand the temperature of the liquid metal being cast without breaking down.

Chemical inertness :The sand must not react with the metal being cast. This is especially important with highly reactive metals, such as magnesium and titanium and carbon steel.

Permeability: This refers to the sand's ability to exhaust gases.to avoid casting defects, such as blow holes and gas holes, occur in the casting.

Surface finish: The size and shape of the sand particles defines the best surface finish achievable, with finer particles producing a better finish Cohesiveness .

3f Various methods of Knife making in general

COMMON TYPES OF SAND USED:

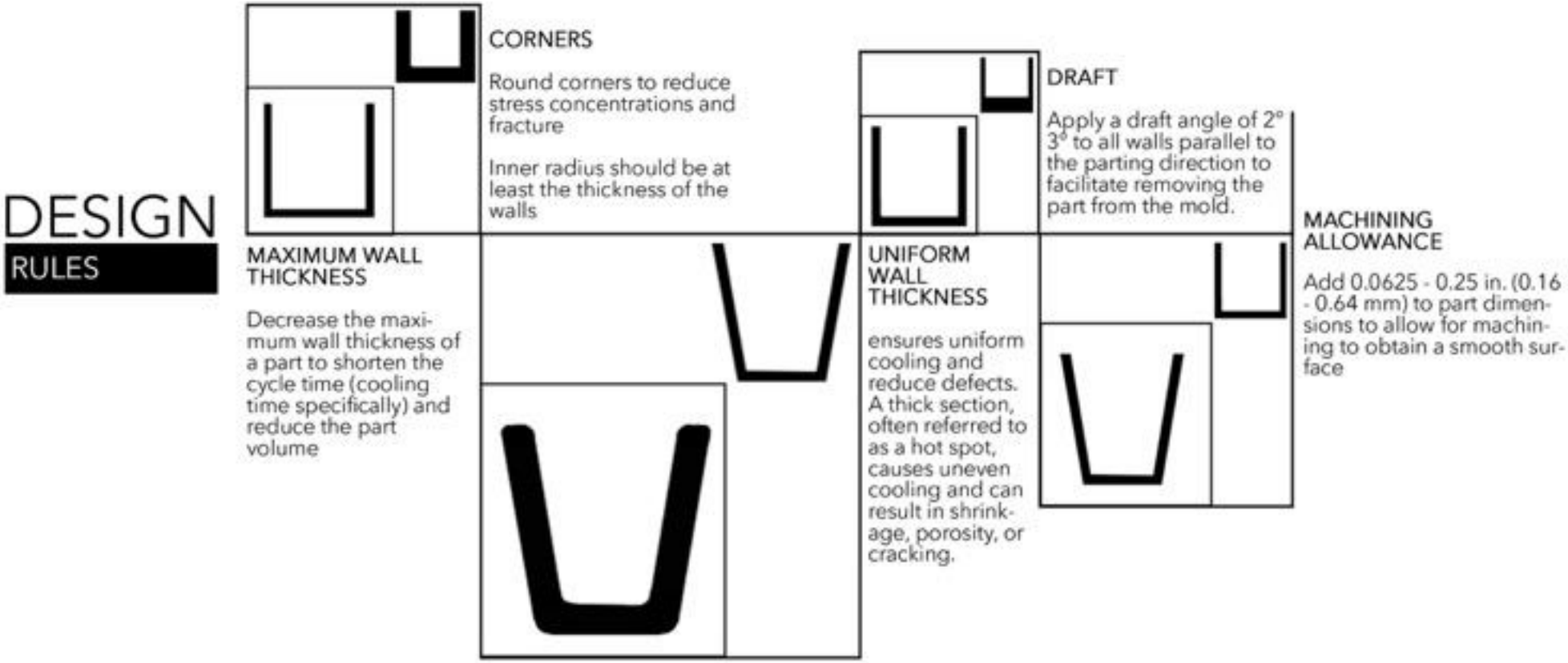
Greensand mold -It uses a mixture of sand, water, and a clay or binder. Typical composition of the mixture is 90% sand, 3% water, and 7% clay or binder. These are least expensive and most widely used.

Skin-dried mold - A skin-dried mold begins like a greensand mold, but additional bonding materials are added and the cavity surface is dried by a torch or heating lamp to increase mold strength. It improves dimensional accuracy and surface finish, but lowers the collapsibility.

Dry sand mold - In a dry sand mold, sometimes called a cold box mold, the sand is mixed only with an organic binder. The mold is strengthened by baking it in an oven. The resulting mold has high dimensional accuracy, but is expensive and results in a lower production rate.

No-bake mold - The sand in a no-bake mold is mixed with a liquid resin and hardens at room temperature

3f Various methods of Knife making in general



Pros & Cons

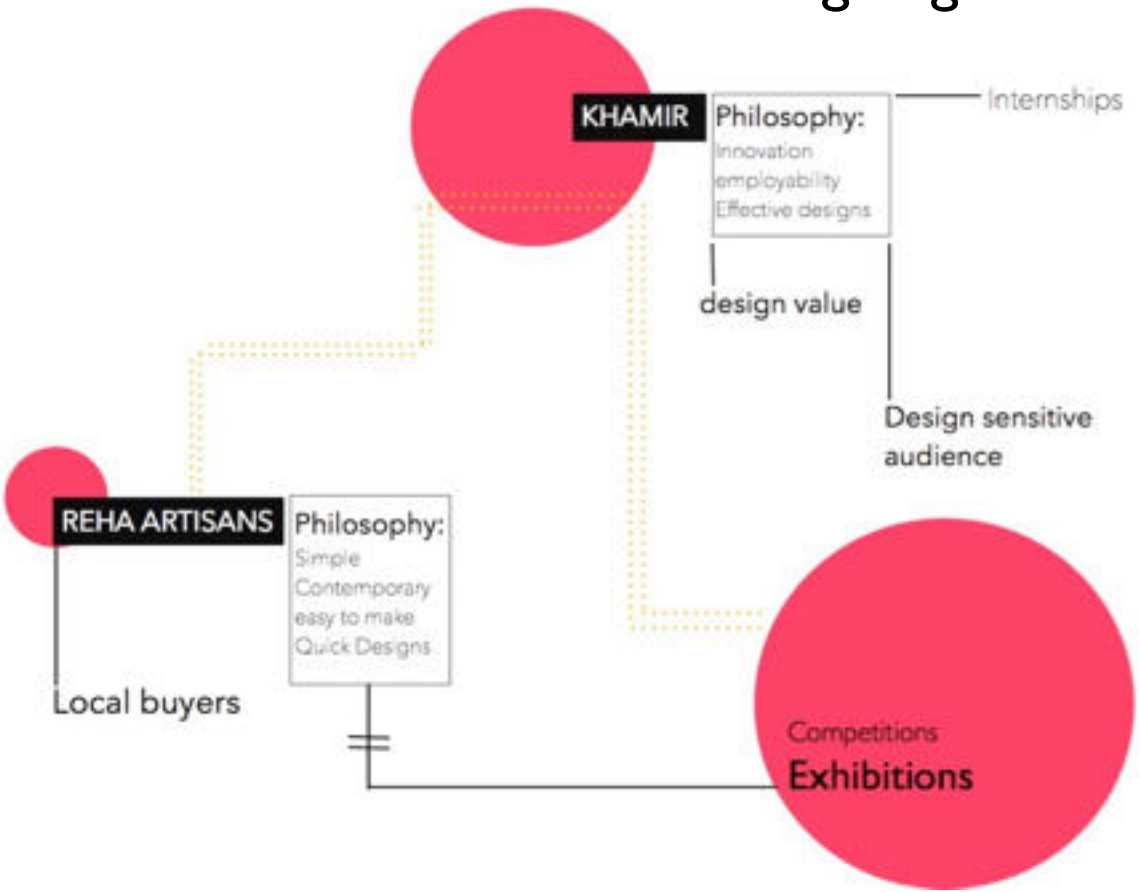
Advantages:

- Can produce very large parts
- Can form complex shapes
- Many material options
- Low tooling and equipment cost
- Scrap can be recycled
- Short lead time possible

Disadvantages:

- Poor material strength
- High porosity possible
- Poor surface finish and tolerance
- Secondary machining required
- Low production rate
- High labor cost

3g Various methods of Knife making in general

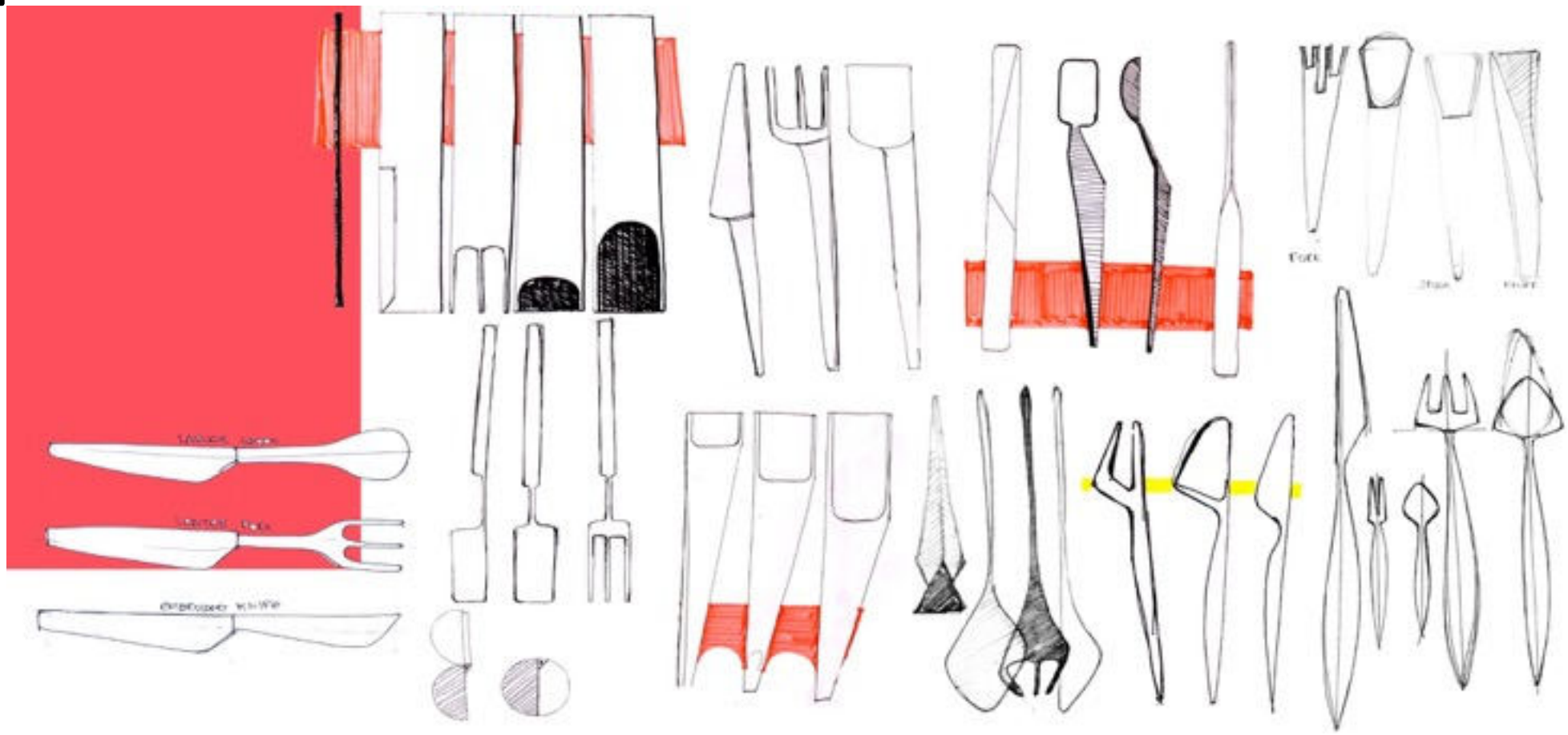


Apart from Occupation shift and competition from imports, the issue surrounding the craft is Limited exploration in terms of design and Khamir's involvement could serve to diminish this issue. Also the design philosophy of the Reha artisans is limited towards simple and quick products and caters to the local buyers only. Khamir caters to design sensitive audience with a wider presence in both national and International market, Its involvement in the field of design for the Reha artisans would help them produce products that would be unique to the land and thereby demarcate a separate market for Reha products.

B IDEATION and DESIGN

Area of work
Ideation
Concept

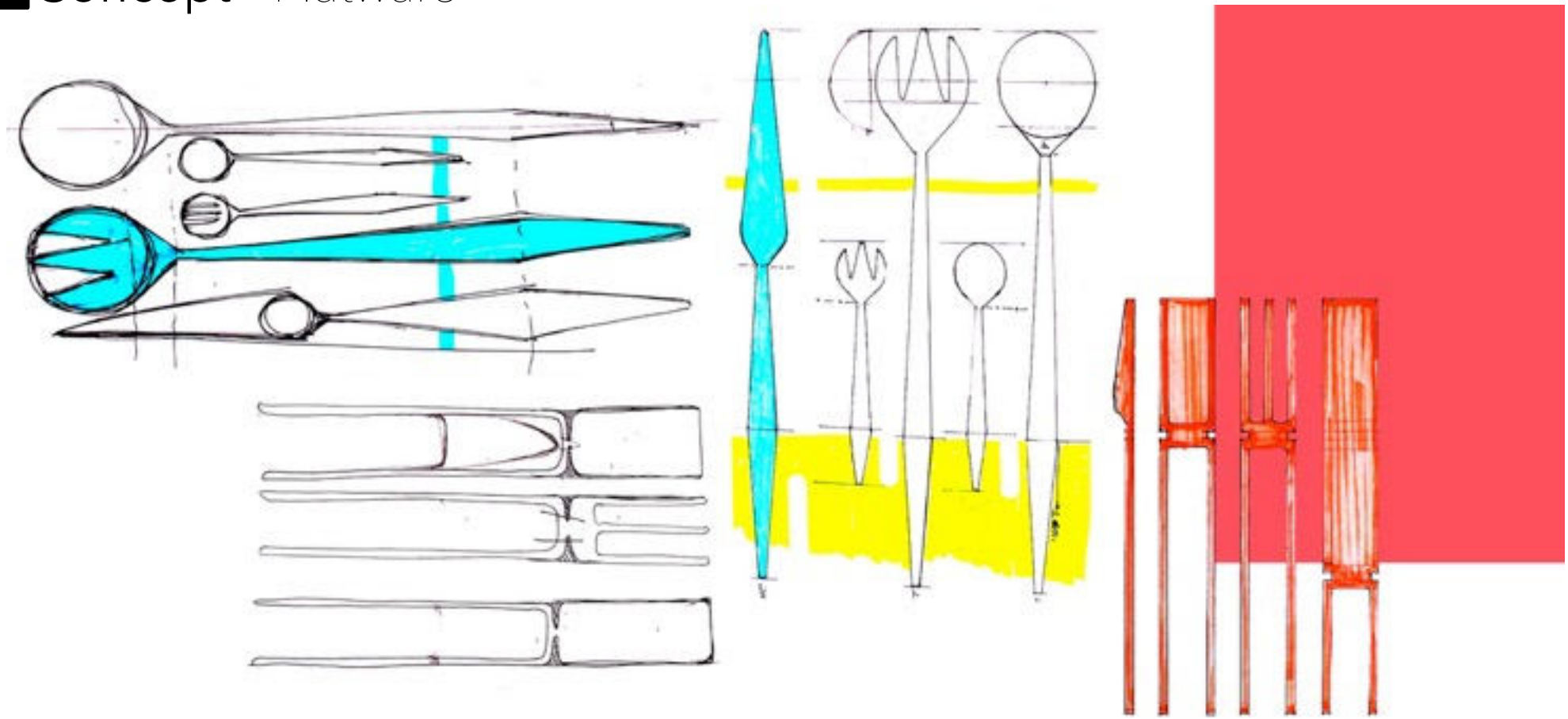
4a Ideation - Flatware



The idea to come up with cutlery designs was to imply the already practiced art of Sand casting /forging and finishing and adding value and paying attention to details together offering a sellable and rich product for the users.

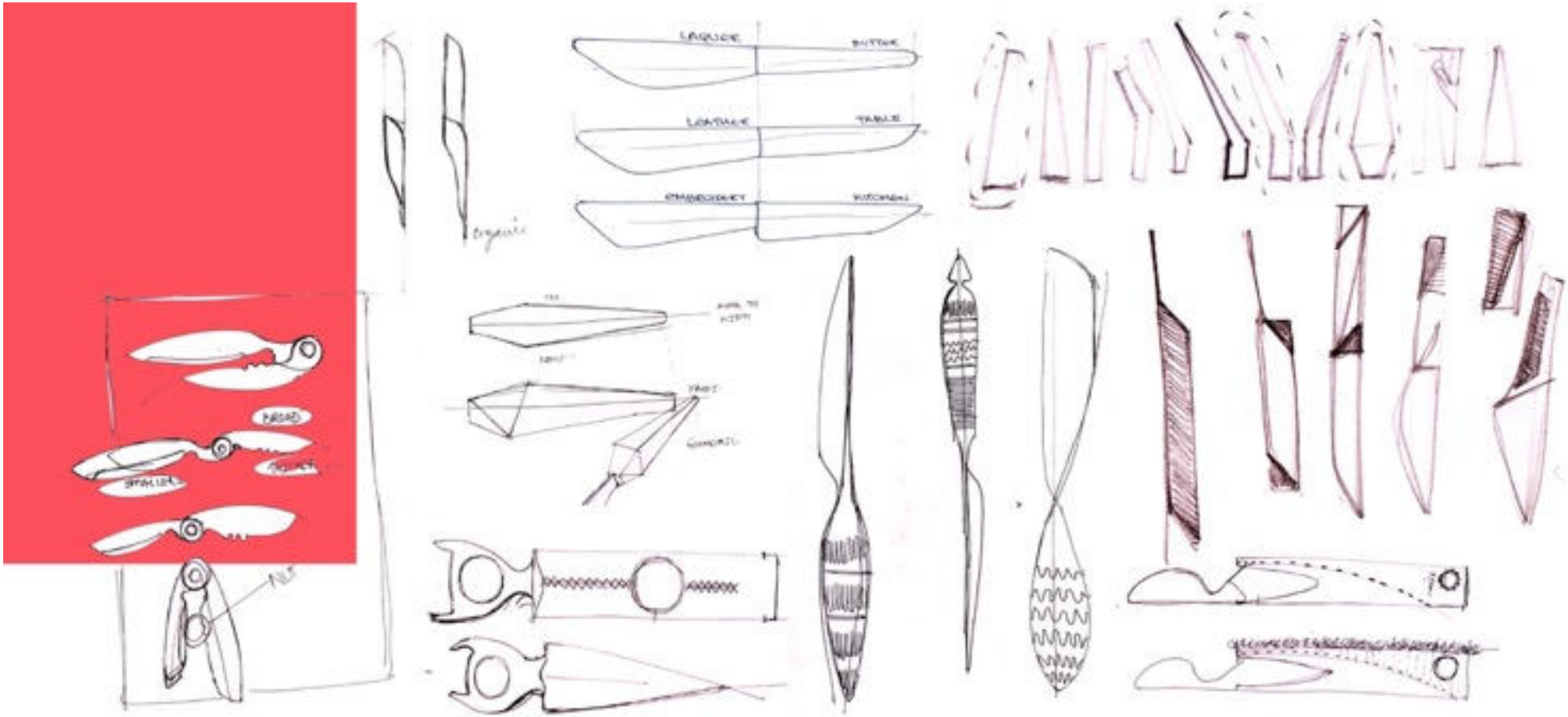
The design ideations varied from designing flat wares with simple flat geometry to try creating designs morphing some organic shapes. In some iterations Keeping the rules of regular Dip in spoons or blade shape and sizes in knife intact while in others playing around these parameters to encounter new possibilities of forms and function. We collectively came up with designs that would space them differently in market either in terms of design or the package they come along (spoon set including serving spoon /rice and the regular dining spoon).

4a Concept - Flatware



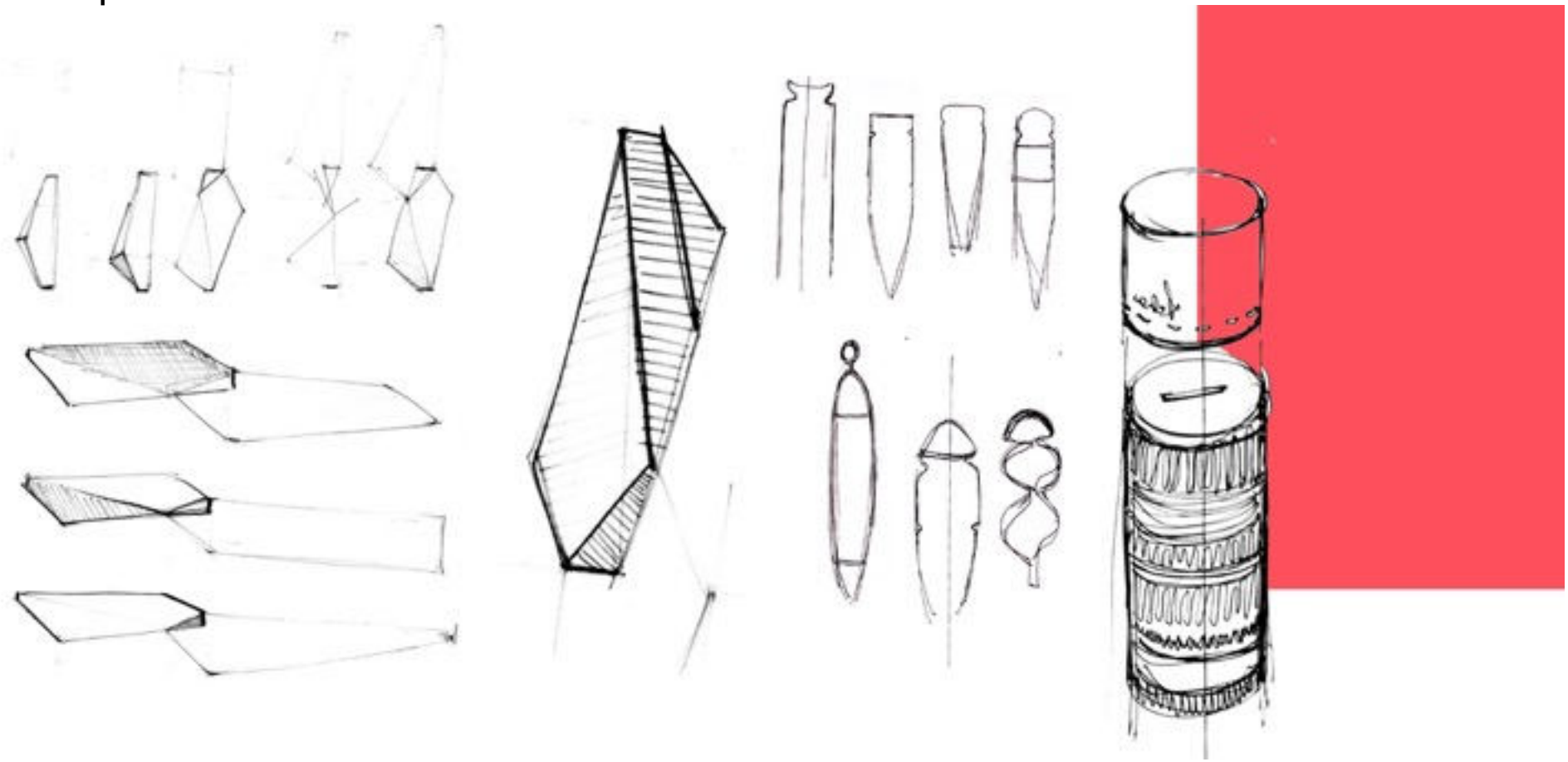
In the direction Of flat wares and cutlery we chose to take forward one design that would restrict itself to flat two dimension measurements with slight depressions radii and curves communicating usage and functionality of product also facilitating quick finishing and production time. The other design that would allow and give the artisan an opportunity to work on details and craft a product that highlights the ability and workmanship that goes in the making of the product. The material choice was restricted to brass to impart richness of the color and shine when in time and adding on to the richness with the oxidized look years after it is put to use. The designs choices were made keeping in mind the details that when changed slightly affects and renders a different product all together allowing artisans to try explorations.

4b Ideation - Knife



The knives made at Reha presently have a peculiar identity and are repetitive in terms of look /function and style. By working on the knives specially Lacquer handle knives our intention was to look into the “how it could be made” part and designing tools and jig’s for the same process allowing quick and finished products and thus to open up an entire new range of lacquer handle knives bringing the two significant arts of Kutch together. The ideation covered solutions of merging a nut cracker with folding pocket knife to knives with different function together or working on the forms of blade/ handles. In brief adding design value to the already existing product in terns of involvement of new art along with it or by slight variation in existing practices.

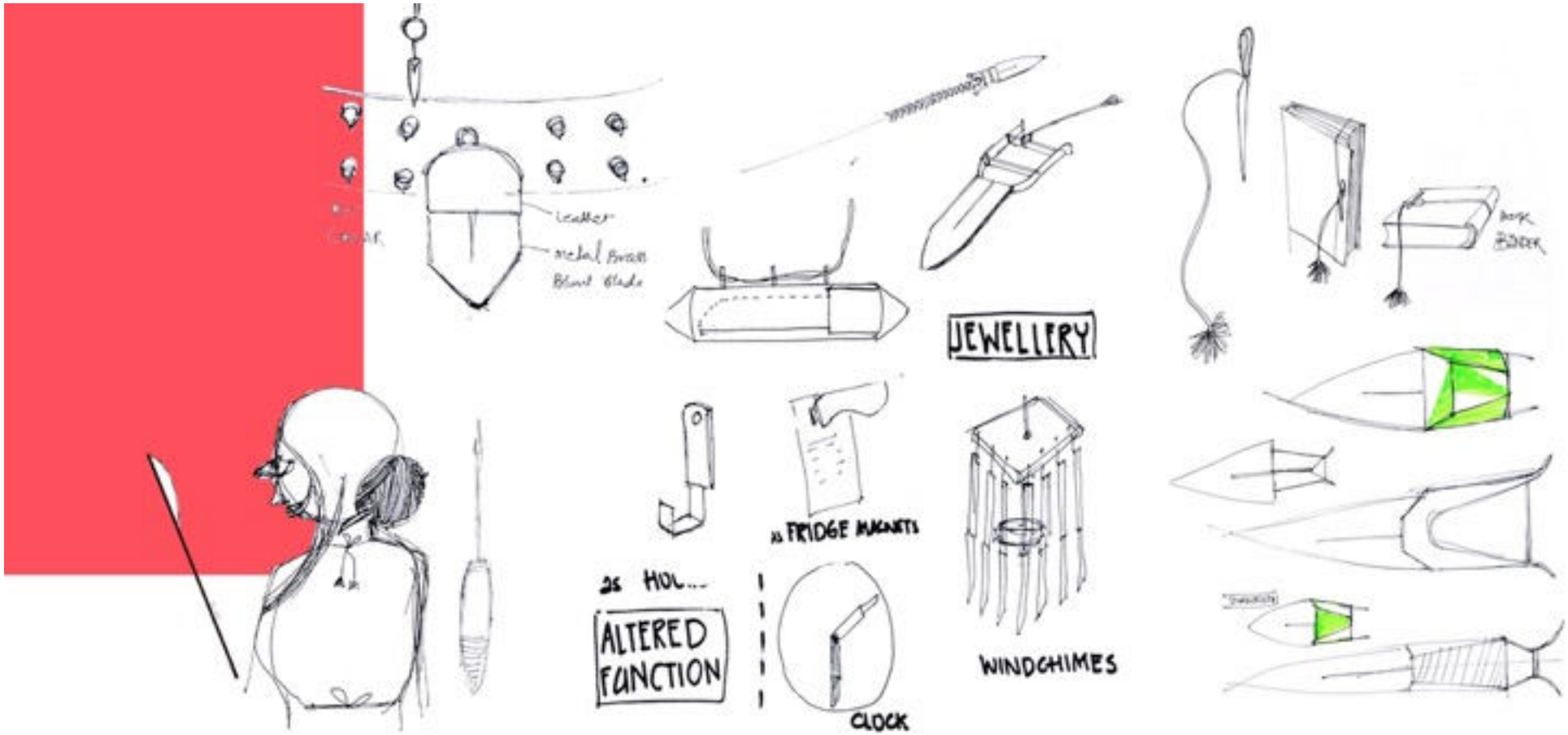
4b Concept - Knife



The final concepts included lacquer knife that included study and understanding the process of lacquering with the limitations and advantages that comes with it. Trying to figure out ways and methods to make the most finished patterns with dyes on the handle. The solution involved fixing the knife blade into a Jig facilitating lacquering of as many knife handles that could also be sold as a separate box on demand.

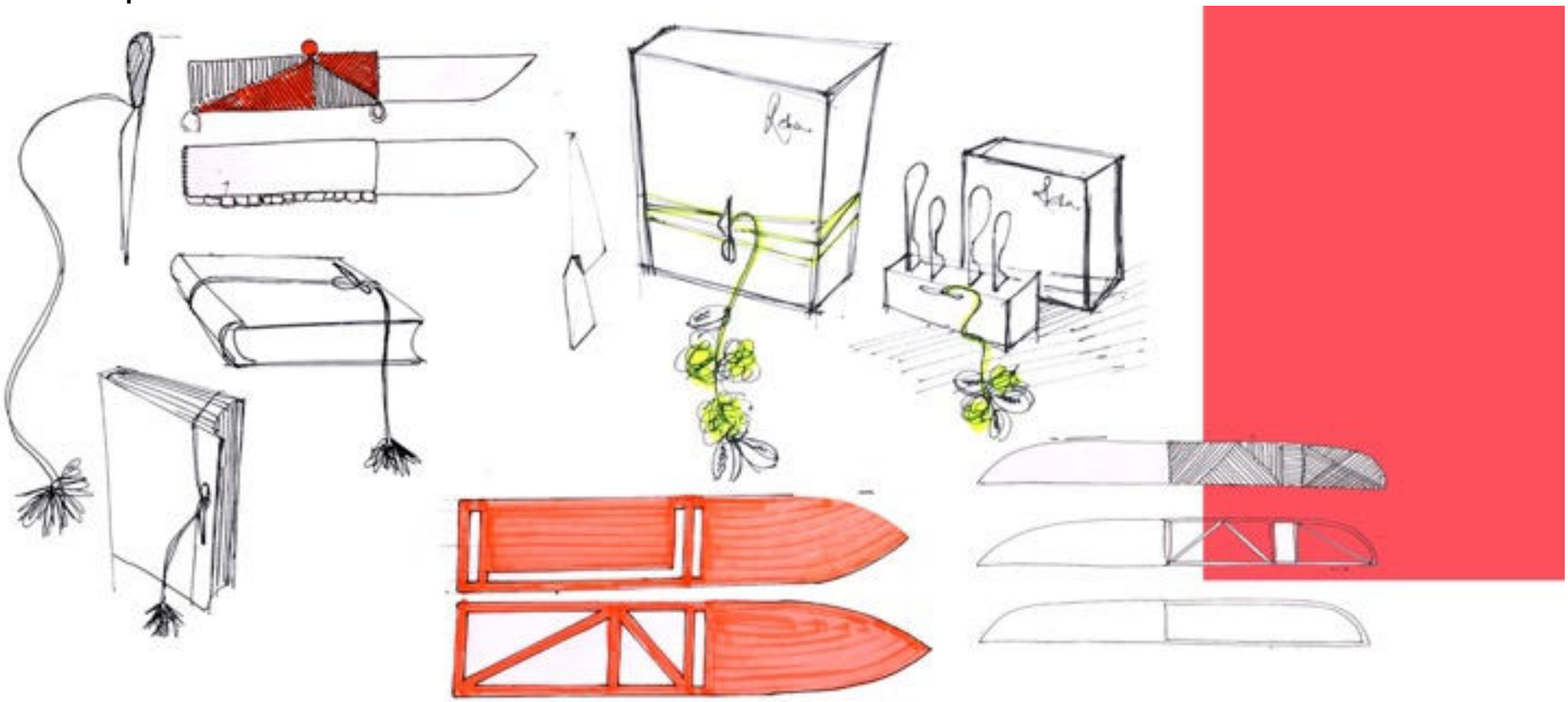
To bring shift In the designs of existing knives we planned to introduce new styles in the finishing of sand casted brass knife handles by adding different face planes in geometry or finishing a few angles more than the others showing both crudeness and elegance of the material in the same piece It show the glimpse of the beauty of the process of making it and with very less an effort and adds to the design value by enhancing the look and overall feel of the product.

4c Ideation - Souvenir



Knife making at Reha is celebrated as an essential art of Kutch . The thought was to Use this identity and come up with alternate products that fit in the semiotics of knife and would again use the same methods of sand casting/forging and/finishing in taking its geometry. This would not only help in creating a strong image of knife as a Reha /Anjar product in the subconscious of people. But also keeps the artisans engaging and excided with new designs ,uses and possibilities. The ideations include product that may or may not have functional value to complete novel items, like knife pendants / hooks / jewelry / wall clock hands/wind chimes /zip hook/fridge magnets /daggers etc.

4c Concept - Souvenir



As a part of final concept we chose to work on variety of novel products using the identity of knife and power associated to come up with ideas. We settled with the concept of a bookmark, redesigning of a dagger and a book binder.

A bookmark blade that marks and separates the “read” and “to be read” pages .When made in brass makes the product very special and personal. A dagger that would incorporate leather and knitting in it and behave as a collective of all art forms of kutch and a memoir of any visit made to the place. The third one as a book binder or say a locking system closely relating the product to the adjectives of safety and security associated with knives.

PRODUCT DESIGN
and Development

FLATWARES
Cutlery 1
Cutlery 2

KNIVES
Lacquer
Brass Plane

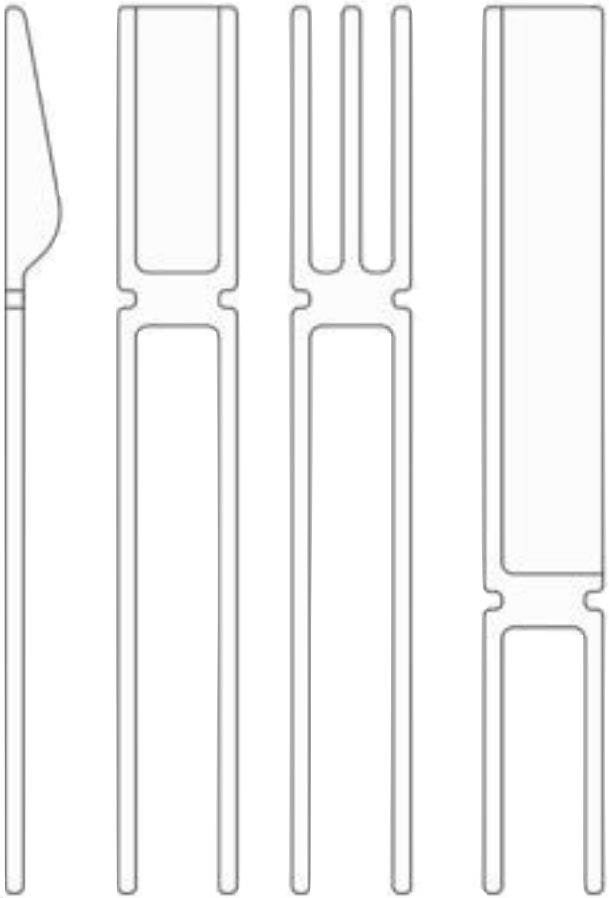
SOUVENIR
Dagger
Bookmark
Binder

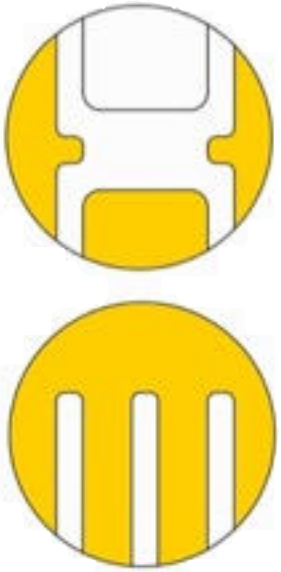
5a

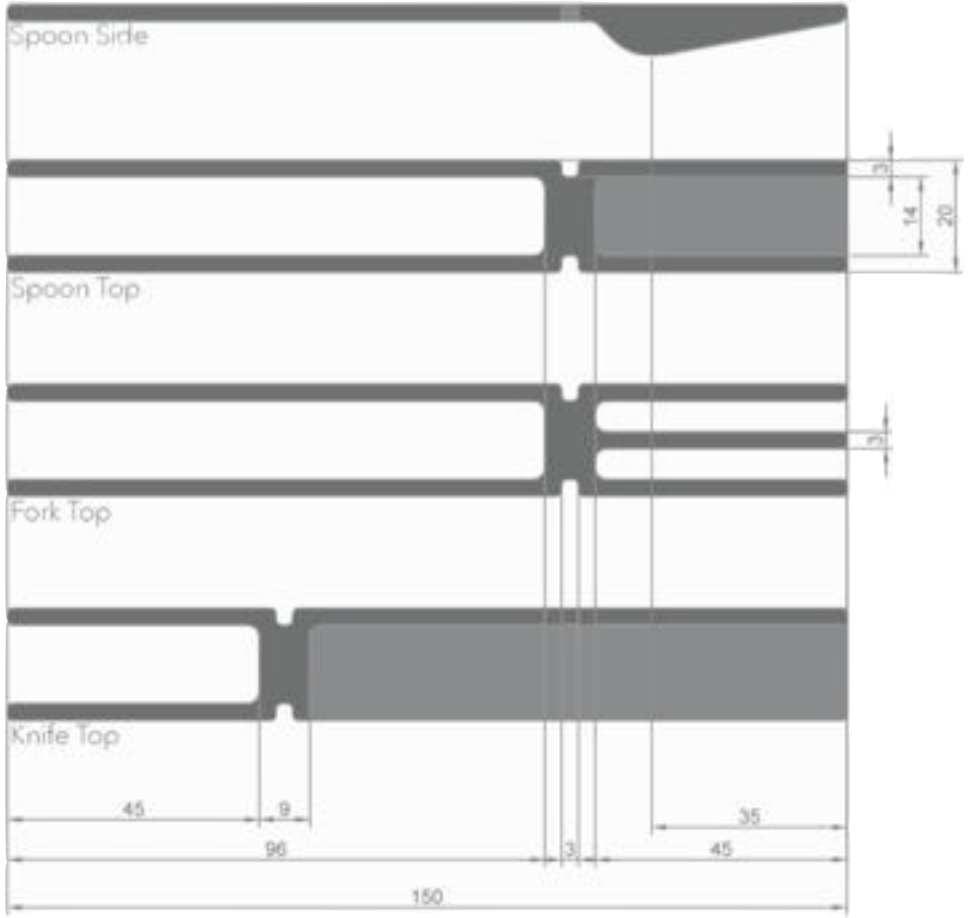
FLATWARES

SET 1

5a Sample design and Dimensions

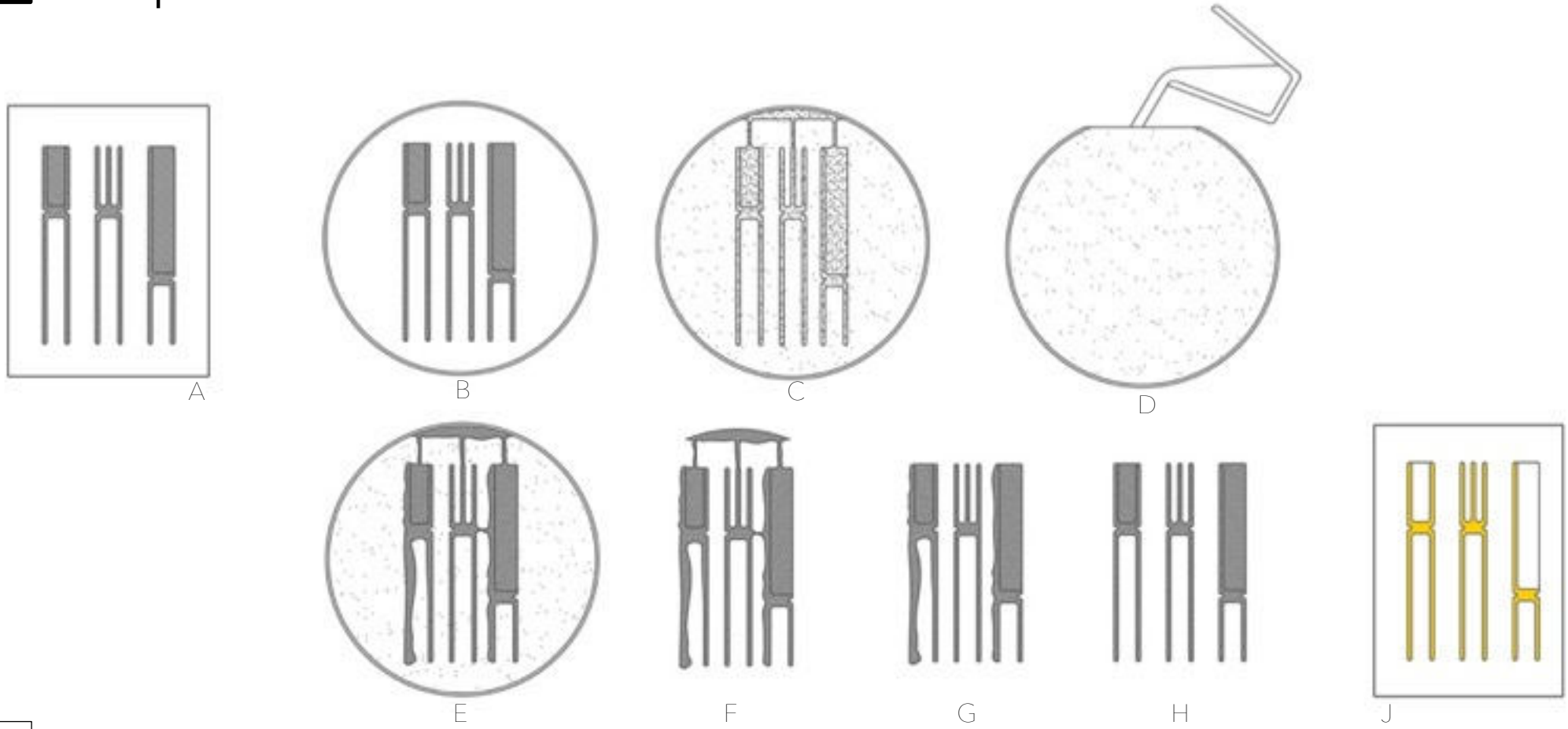




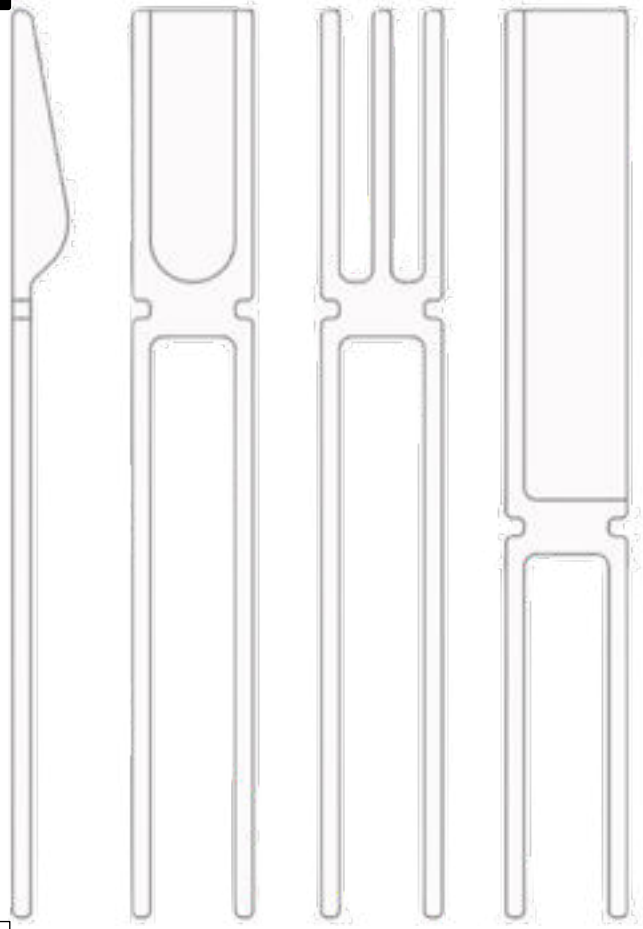


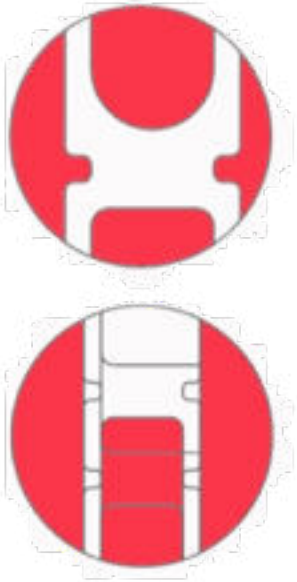
The set consisted of a spoon, fork and a knife. While the fork and knife maintained the flatness, a soft dip was given in the spoon to serve its purpose . Each piece was maintained to a even 3mm thickness to provide stiffness to the product along the axis of the cutlery, a major requirement for ergonomic comfort. Bright gold like appearance and germicidal properties of brass makes it a suitable product as a tableware. The downside was its weight, hence the pieces are designed to provide stability with minimum material. The dips on the sides cut out the monotony of the rectangle and shift one's concentration to the long legs. The interface of the spoon and fork are kept to as minimum as possible while the knife was in accordance with the standard. The minimum radii and fillets on the corners provide a safer surface finish.

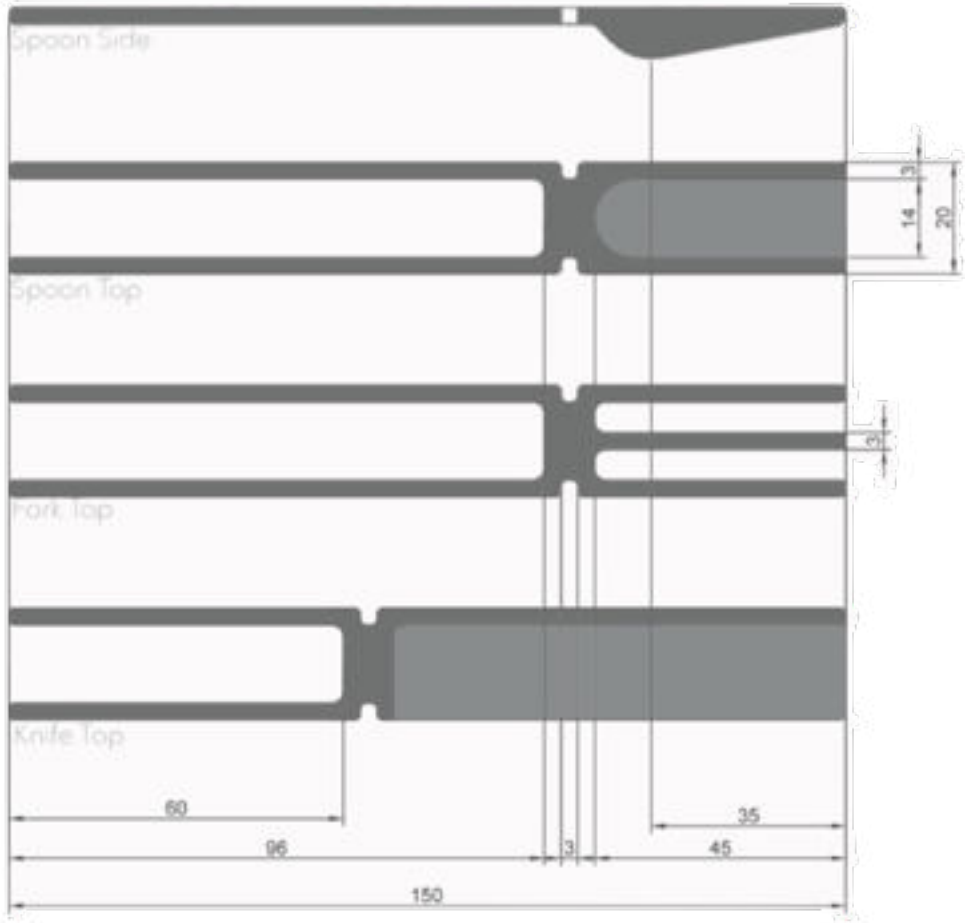
5a Sample Process



The sand casting process includes samples made in wood ceramic plastic or any other material (A: sample in wood0).The mold samples are cast between sand held between metal frames (B) later runner space (C) is created by removing sand (C) for allowing molten metal to let in(D) and settle in cavities(E) .When let to cool down and removing extra metal the pieces gets ready to be finished (J).
The major issues in casting were observed in spreading of metal all along the cavity also at times cooling down of material before spreading evenly ,resulting in shorter lengths.





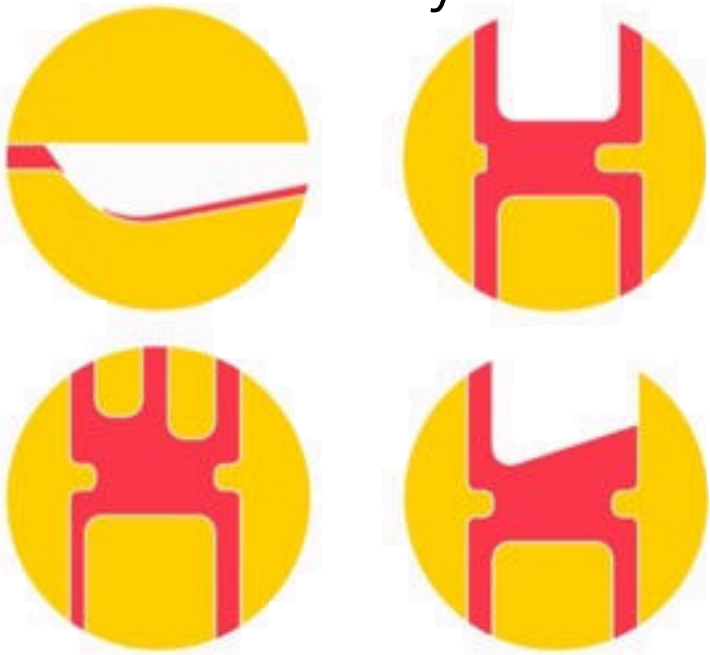


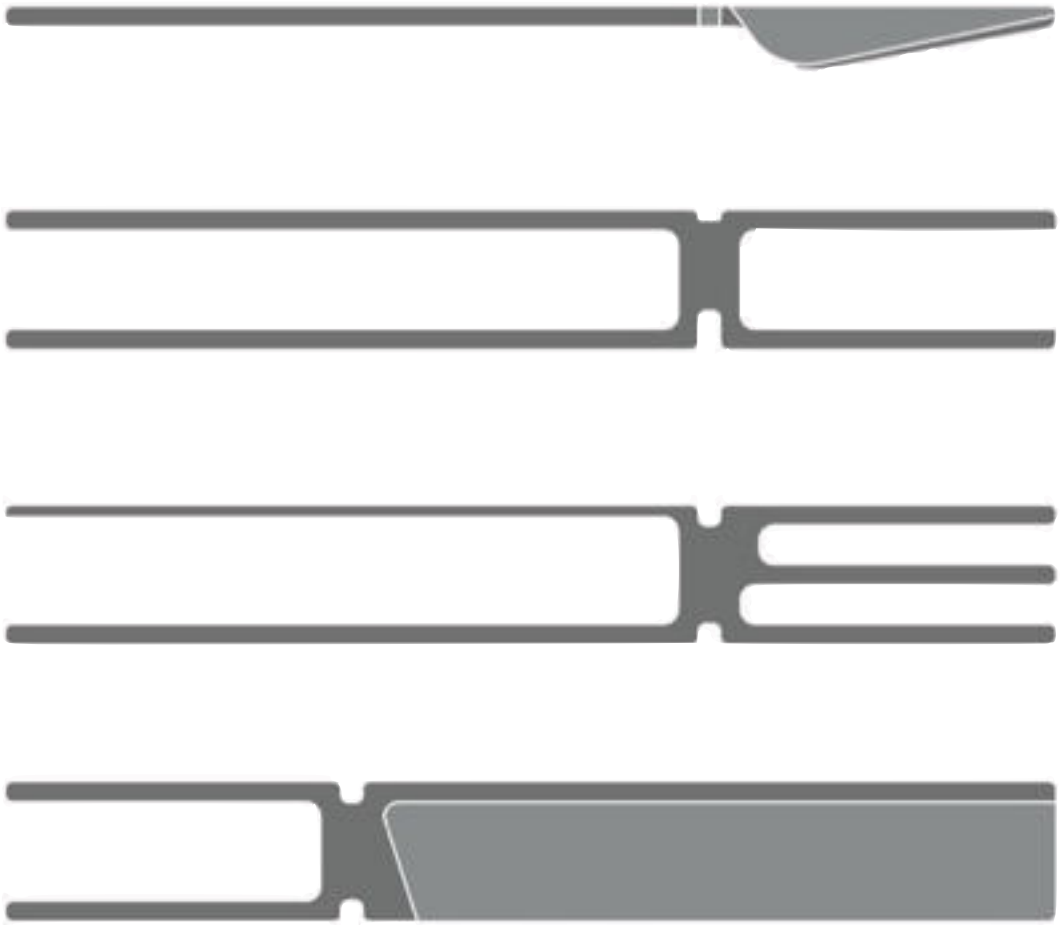
The dimensions and details of the design were so kept to reduce the overall weight of the cutlery and also deriving the required strength to the frame

With the first sample set there were many specifications in design that we reconsidered ,like the slits separating the neck with the rest of the body can have a fillet radii allowing easy machining. The knife blade could be reduced in length all0owing easy grip etc. .

The design could have been the same but demanded attention and also such precise details were not permitted by the tools the artisans used and so these changes were incorporated into the design and taken further.

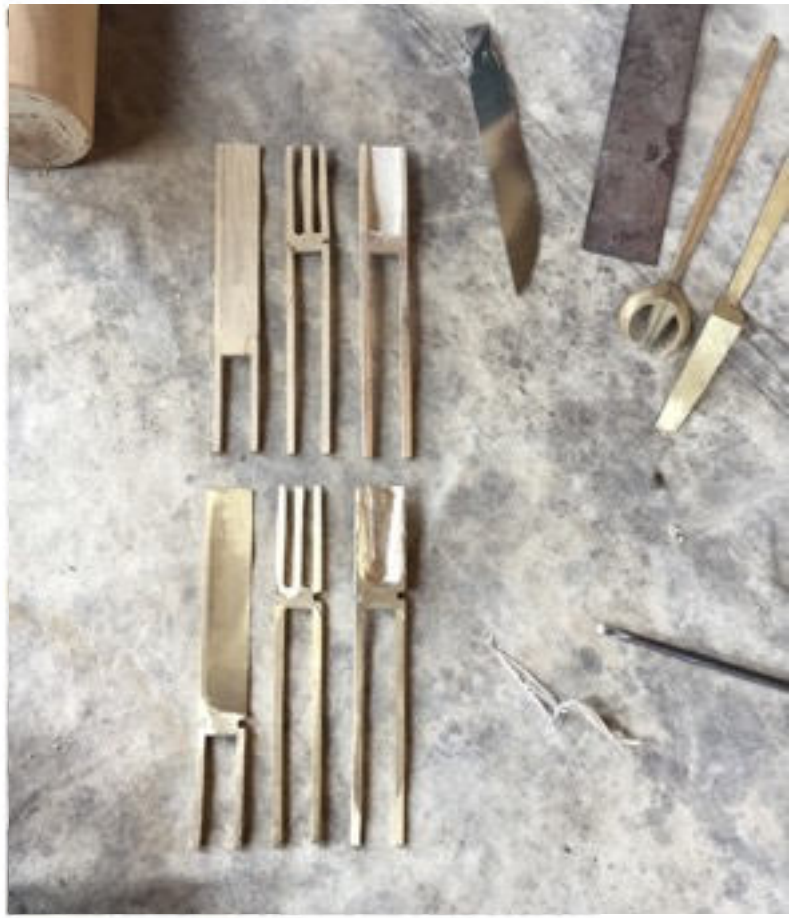
5a Points of accuracy





When put to production and with the making of the multiple pieces of the same design we observed the details that were overlooked in repetitive finishing of product and so we came up with certain points that had to be taken care of while processing .These included the depth of slits in the neck of the piece .The curves between tines of the fork and the detail marking the beginning of blade in the butter knife. These together defines the language of the product and so should be added or removed with conscious decisions being made for balancing and justifying the overall aesthetics.

5a Specifications



WEIGHT

Spoon - 100gm
Fork - 80 gm
Knife - 80 gm

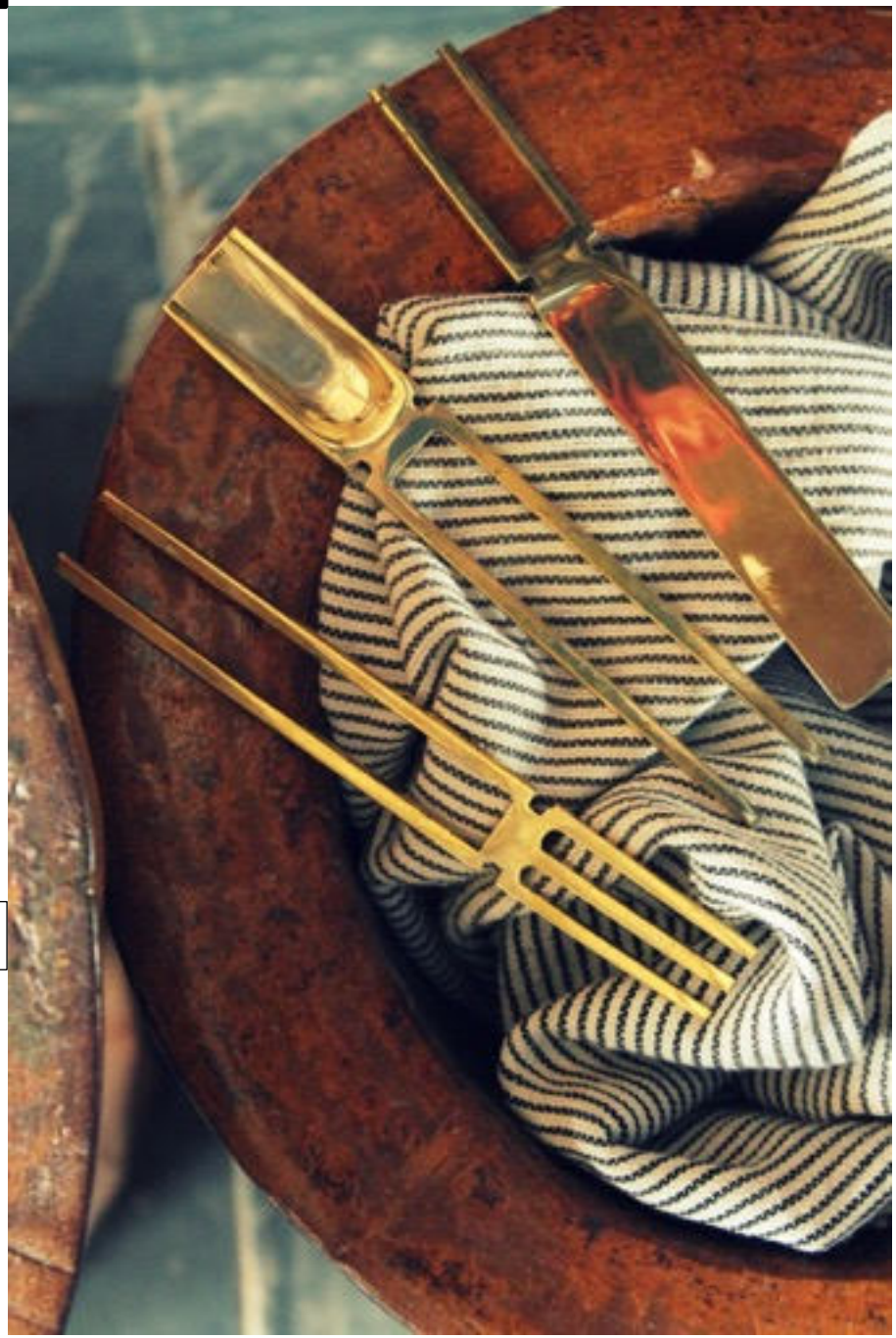
COST

Format Cost : Rs 500
Sample Sandcasting Cost per set : Rs 150
Finishing Cost per set : 1000

Batch Production cost : 2100
Estimated sets production per day : 3
Estimated production cost per piece : 500

ARTISANS

Format : Naran Bhai
Sandcasting : Mustaq Bhai
Finishing : Naranbhai



KUTCH

A Land in Transition

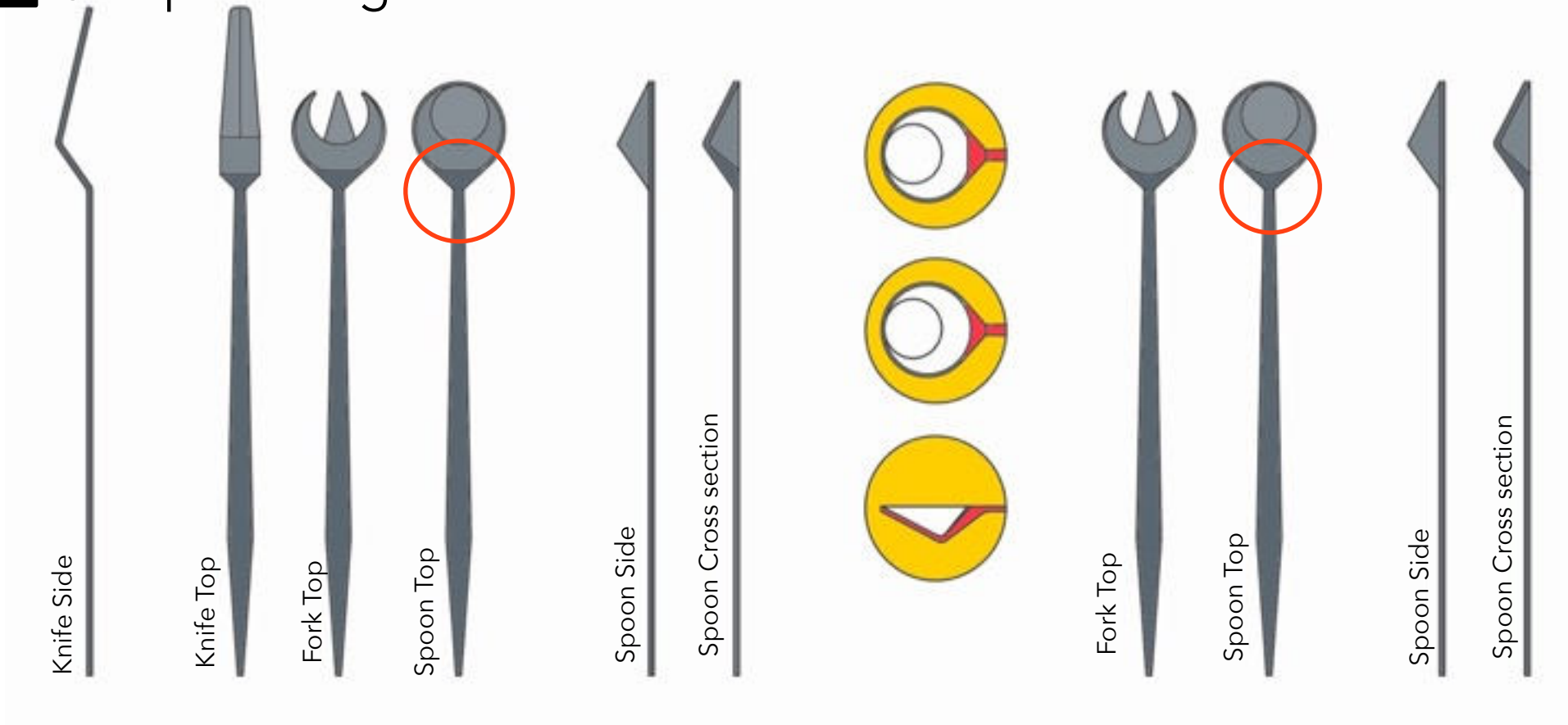
Archana Shah

5b

FLATWARES

SET 2

5b Sample Design and alteration



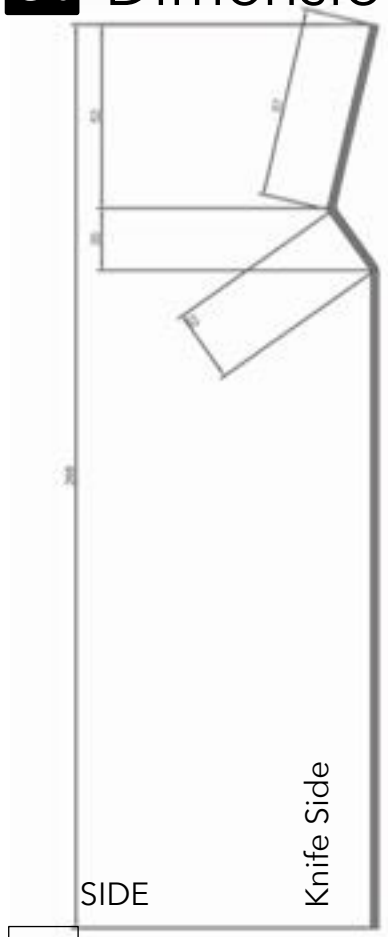
SAMPLE DESIGN

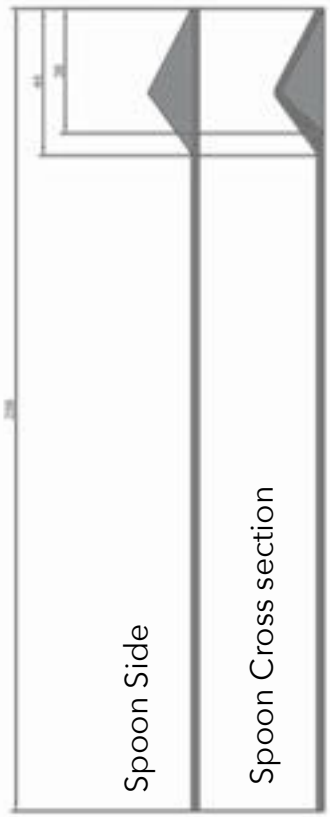
ALTERATION

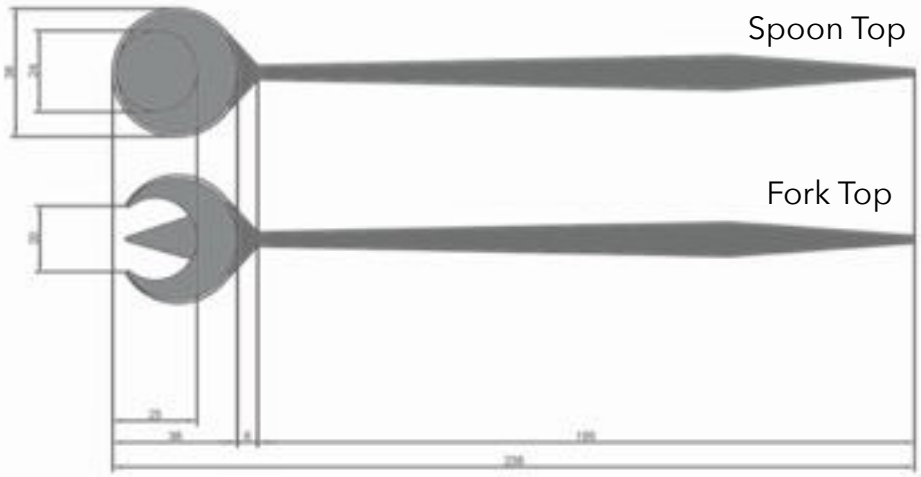
DESIGN FOR PRODUCTION

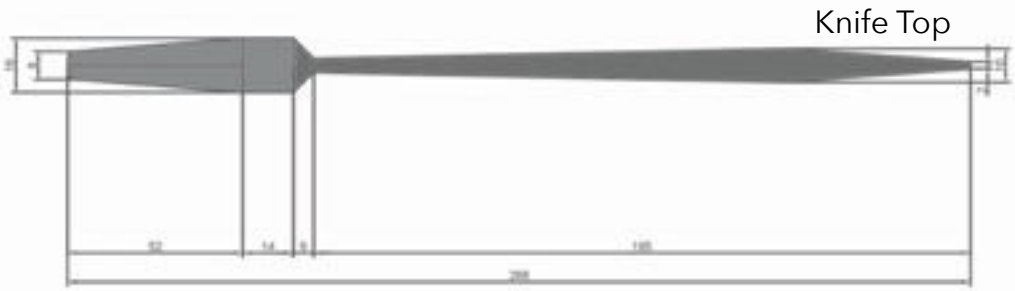
The set consisted of a spoon, fork and a knife. The design geometricized the organic shapes into long slender handles with small hemispherical interfaces. The interface consisted of two circle in intersection planes with the point of intersection being the front of the spoon. The knife mimicked this double planar dip thereby providing a more ergonomically comfortable angle for cutting the food on the plate. Further, the knife was sharpened at both sides to work for both right and left handed people thereby increasing the user base. The intersection of the handle and the interface were kept straight flat to relate the handle and a feeling of suction of the hemisphere to the handle. This was later changed into an arc as the finishing inside the spoon and fork were required to be done on the drill and the previous detail thereby was not possible when it came to mass production.

5b Dimensions



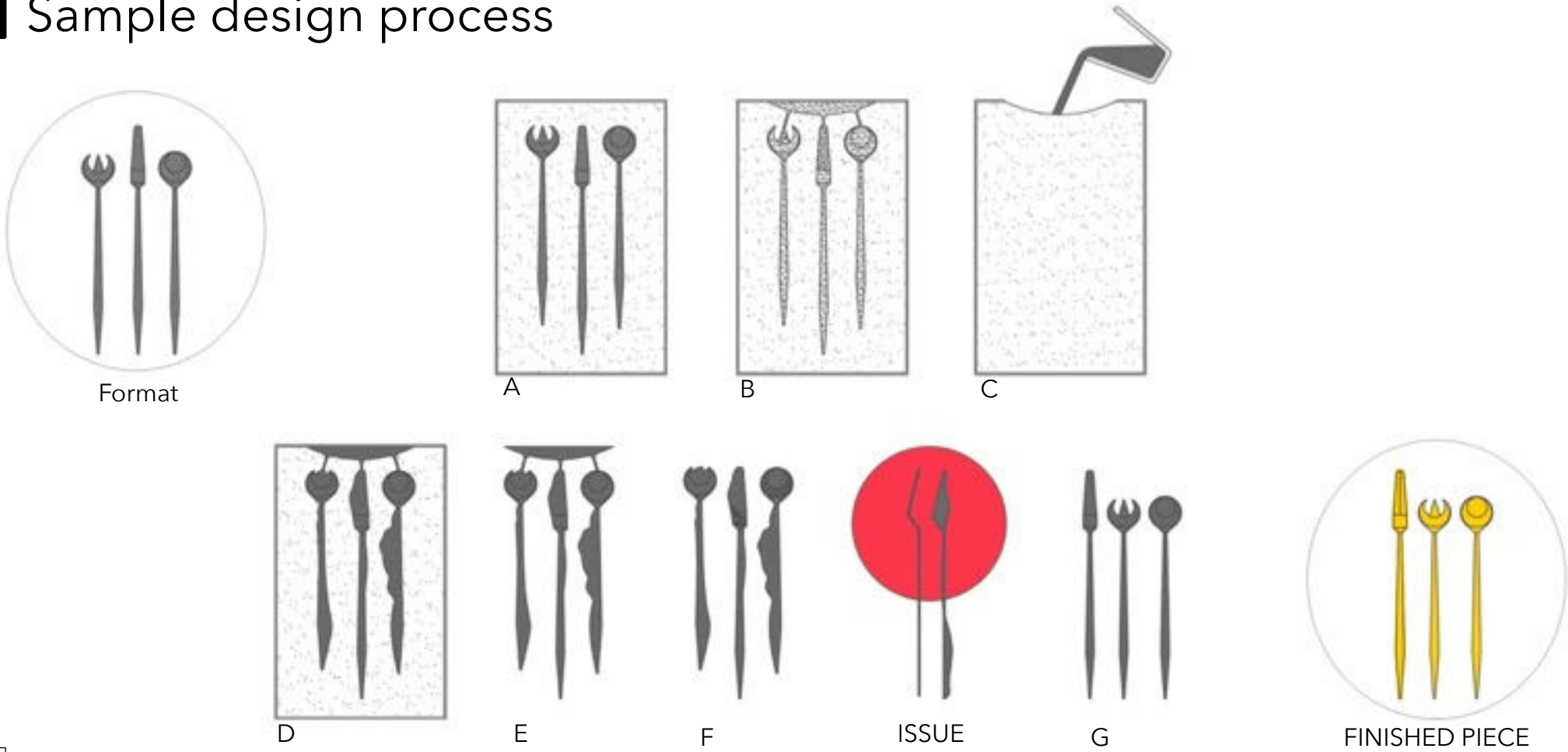






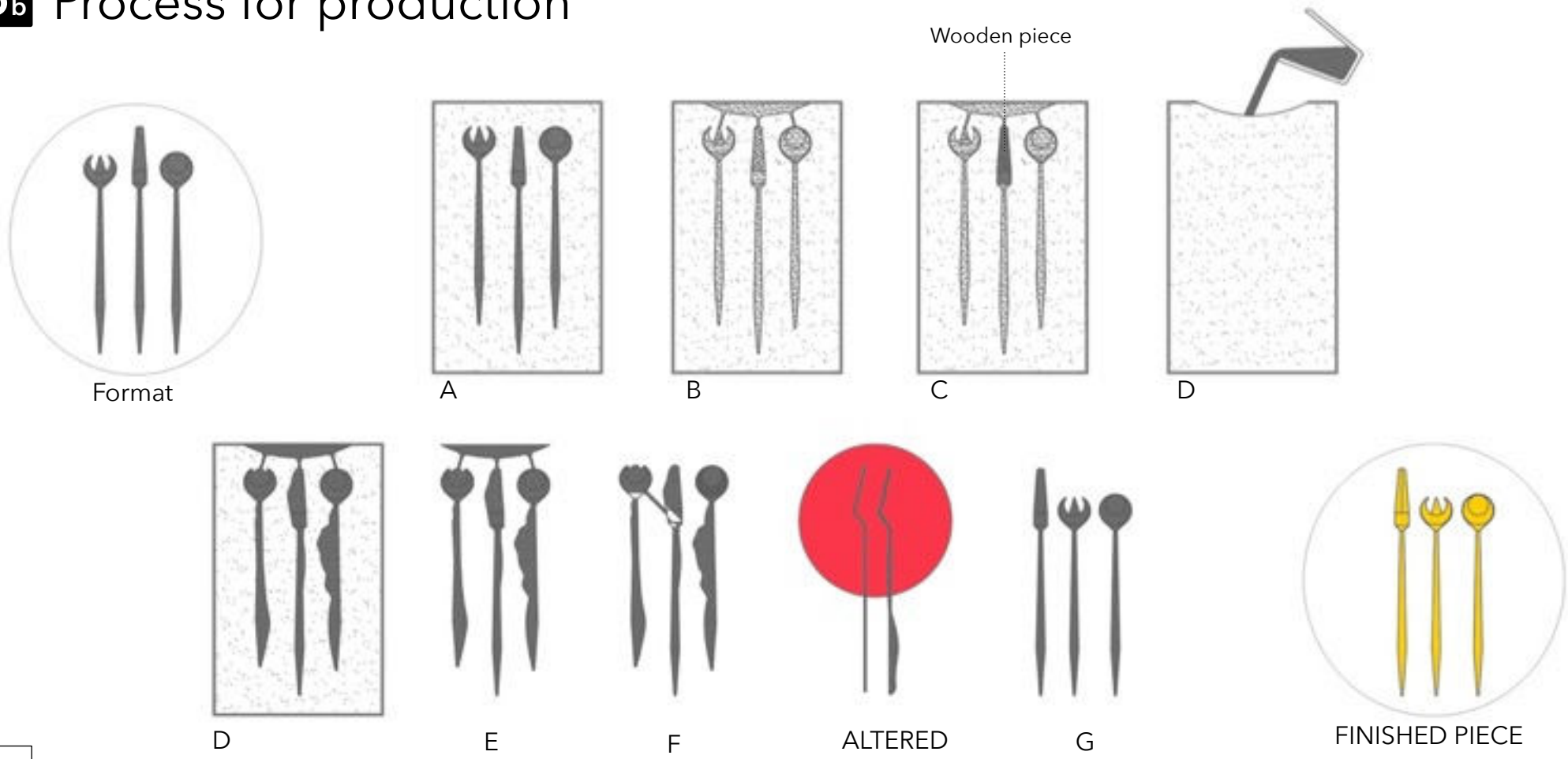
Brass due to its color and weight brings in an elegant expression of expensiveness and the designs and the dimensions were made keeping that in the mind. The interfaces of spoon and fork encase a minimum volume for small quantity intake which is main attribute of fine dining. The long slender handles are deliberately over proportioned to emphasize the contrast between the hemisphere and the handle. The height of the cutting edge in the knife are made lesser than the standard because of its usage as a fine dining piece. The dimensions of the knife are altered from that of the spoon, to cater to its purpose and also stay as family with the rest of the pieces.

5b Sample design process



The formats were first made in wood. The formats were used to sand cast the brass piece. The formats are placed in a appropriately sized iron enclosure base and are filled with the bed of sand. The sand is then stabilized [A]. The formats are pressed again to demarcate a clear boundary and the formats are removed out of the enclosure. Links are created for the metal flow from the open point [B]. The melted metal, brass, is poured into the enclosure and allowed to settle [C]. The pieces gets hardened within a span of 2 minutes [D]. The hardened piece is removed out of the casting enclosure [E]. The pieces are separated out [F] and finished with a taper and light buff [G]. The issue during this process was with the knife where its deep form was hindering an even casting. As a result, the knife casted was bulky which increased the per piece cost of the knife and also consumed greater time for finishing.

5b Process for production



In the previous process, after removing the format out of the sand cast enclosure, a wooden piece cut to fill the volume of the knife is placed with the sand [C]. The metal is poured in and it fills the allowed volume only and does not overflow or creep out. The wooden piece is removed along with the hardened metal and reused for the next set of casting process. The knife piece becomes sleek and its weight reduces in turn reducing its cost. The finish also becomes quick due to the absence of excess metal.

5b Specifications

WEIGHT

Spoon - 100 gm
Fork - 80 gm
Knife - 250 gm

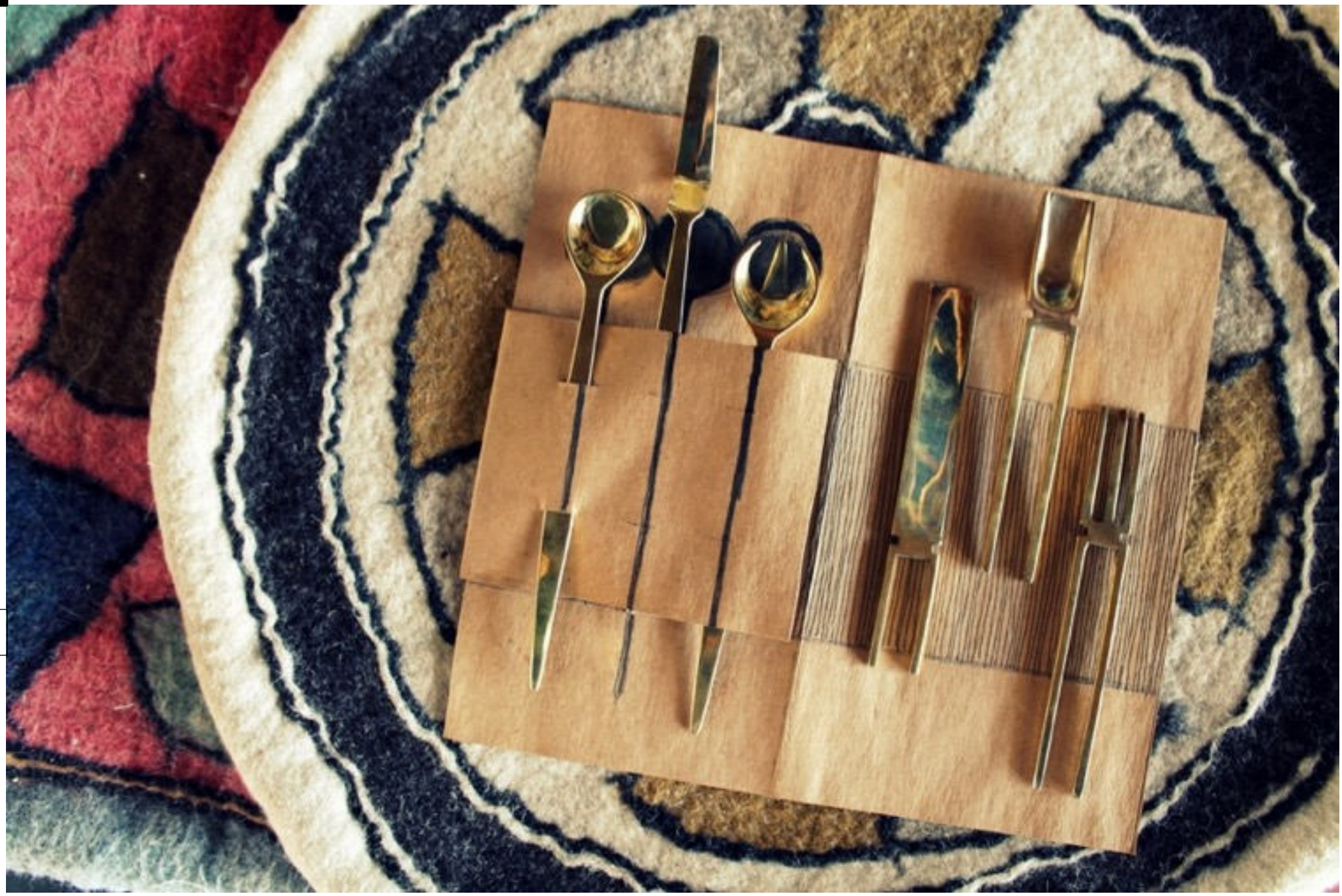
COST

Format Cost : Rs 1000
Sample Sandcasting Cost per set : Rs 260
Finishing Cost per set : 1000

Batch Production cost : Rs 2360
Estimated sets production per day : 2
Estimated production cost per piece : 660

ARTISANS

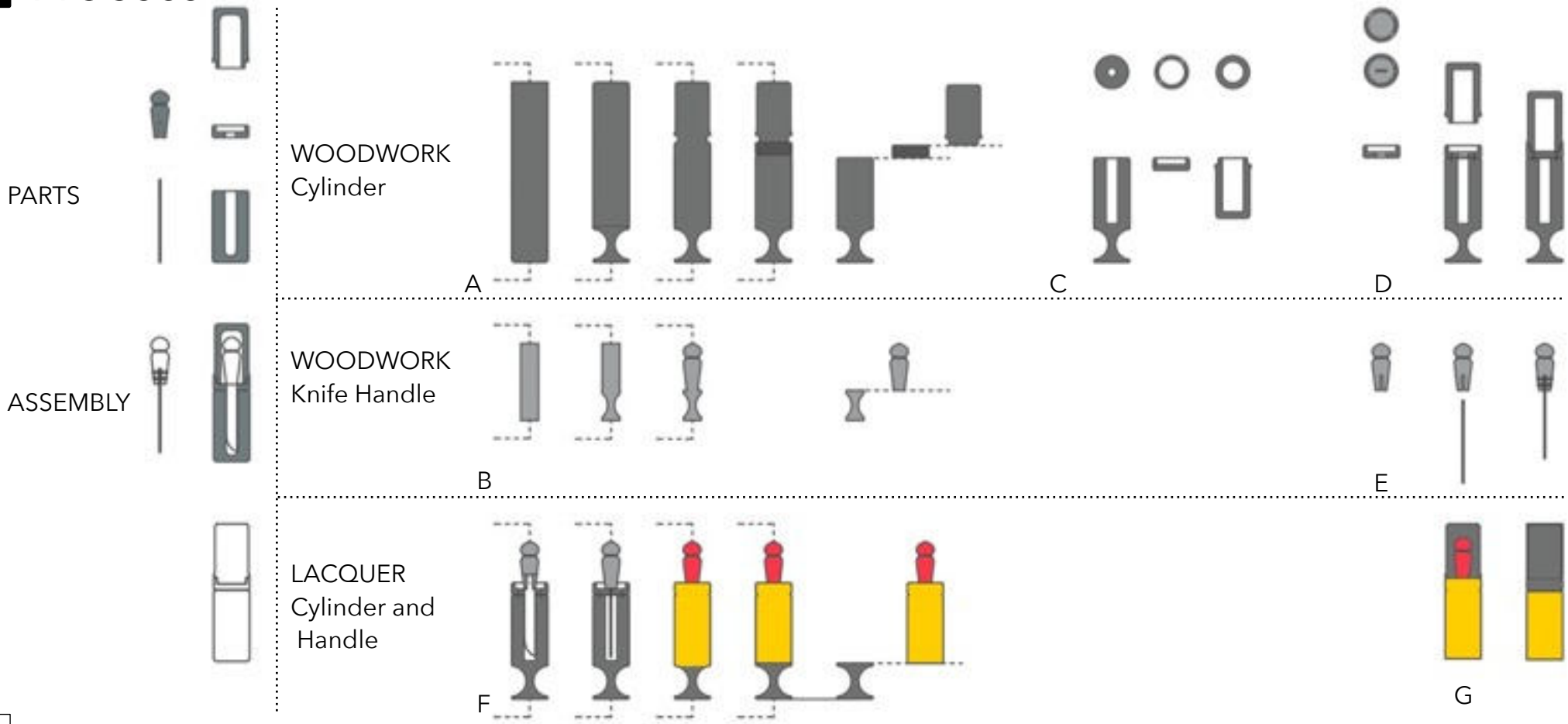
Format : Naran Bhai
Sandcasting : Abu Chacha
Finishing : Naranbhai



Lacquer

The brief was to incorporate the characteristic lacquer work of Nirona village in Kutch.

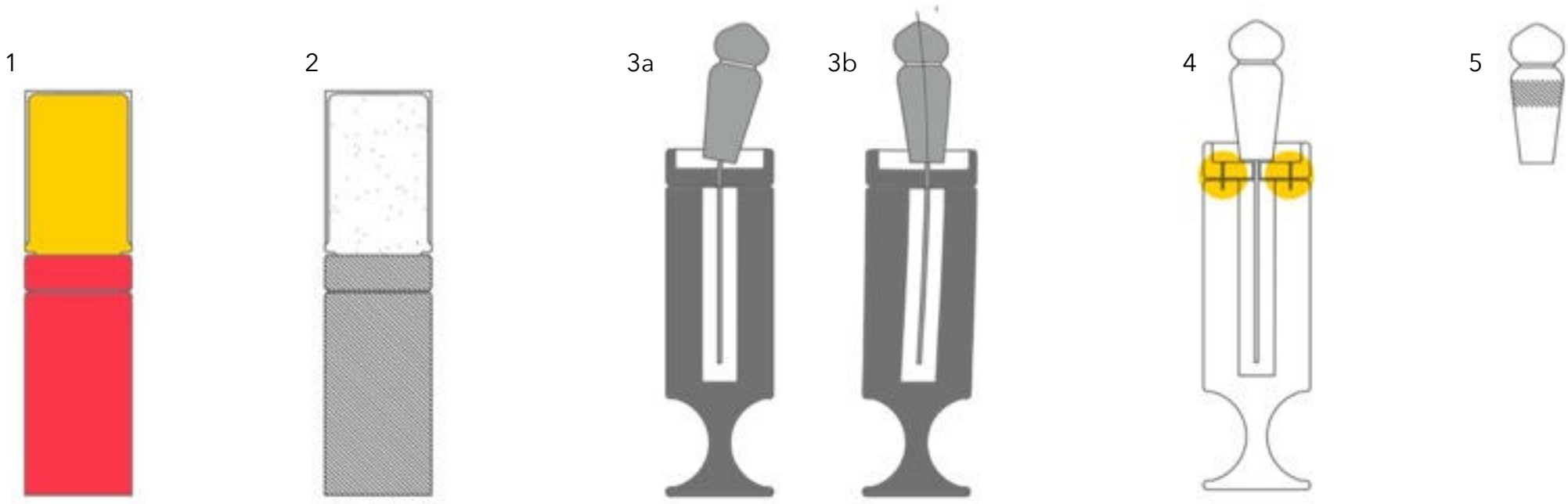
5c Process



It consists of 5 parts - knife blade, knife handle, cylinder base, holding disc and the cap. The disc is nailed to the cylindrical base and they form the holder for the knife.

The process for manufacture of the sample is split into three parts - woodwork for the cylinder, woodwork for the knife and lacquer. The process also takes place as three major steps with the first and third step requires a Nirona Lacquer artisan and the second intermediate step requires a Reha artisan. An appropriate size of wood is taken and is lathed out for an even finish. The Nirona artisan then lathes out depression for the thread movement. He then carves out the other depressions for the cap to fit within the cylinder. Similar process takes place with the knife handle. The piece is later cut into three parts - cap, disc and cylinder. The stand in the cylinder is retained for the purpose of lacquer. Holes of appropriate radii are drilled in the three pieces. At Reha, the handle is sawed for a slit to hold the stainless steel blade. The disc is then slit to hold tight the blade of the knife handle. The knife and the cylinder are then lacquered together and the cylinder is cut out from the stand.

5c Issues



The process was not entirely successful and the following issues were faced during the process.

1. The cap the cylinder was lengthened to enclose the knife handle but the proportion between the cap and the base seem misfit.

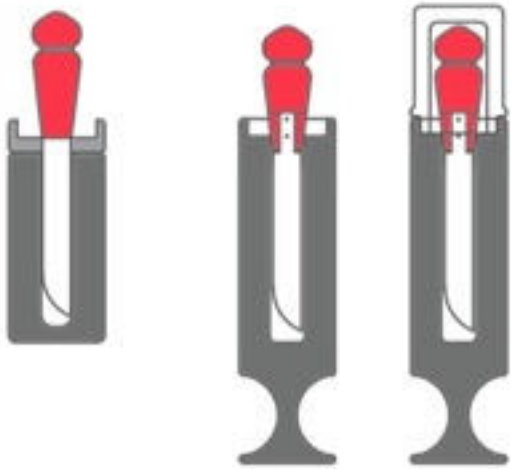
2. The base was intended to be lacquer and the cap leather. Appropriate color of leather and patterns needed to be designed for the two crafts to blend together as a single piece.

3. The force from the two needle points for the lathe was considered but not the pressure applied from the side for the lacquer. The slit in the disc held the blade that could bend easily. This pressure pushed the knife blade off axis and made it impossible to lacquer with lathe.

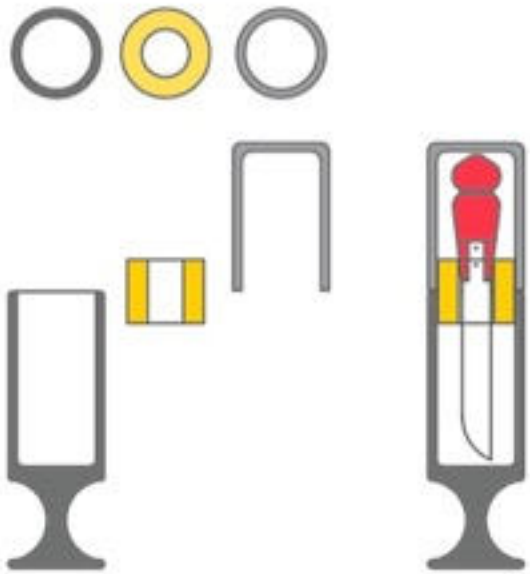
4. The disc was nailed to the base and rendered to base from any other use apart from the use as a holder.

5. The width of the handle was not ergonomically comfortable.

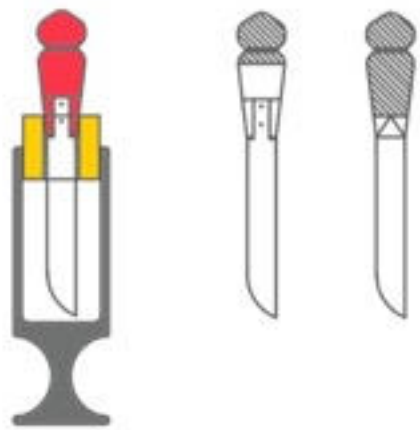
5c Alternate Design



OPTION 1



OPTION 2



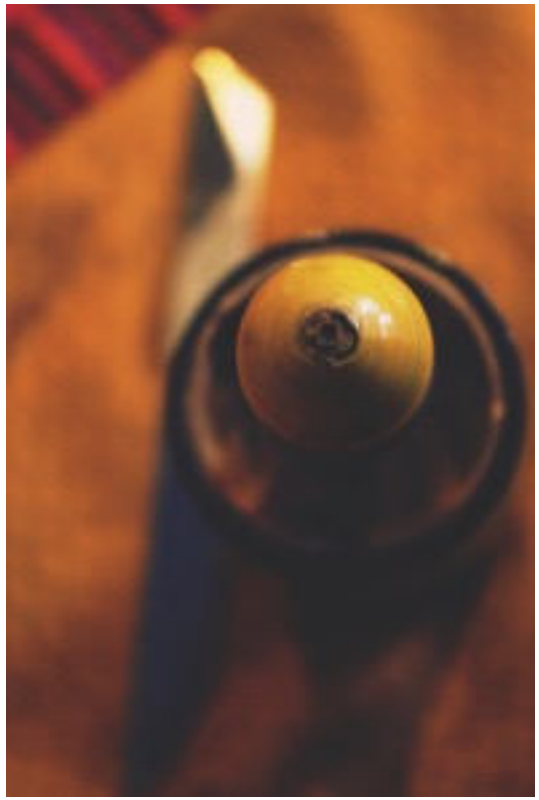
AREAS OF CONCERN

There are two solutions for the issues mentioned previously. In the first option, the length of the cylinder could be increased and a hole of appropriate size could be drilled that would hold the lacquer by the wooden piece which would make the piece stay in axis for the lacquer. The issue with this option is that the cylinder base would be used as just an holder. This issue is catered in option 2, where a intermediate cylinder is used which fixes itself between the cylinder and the knife handle. Since this piece is removable, it entire set can be used as a holder and as a storage set when the intermediate cylinder is removed. The areas of concern and scope for design intervention in this process is the area that goes inside the cylinder which cannot be lacquered. This area needs to be designed out to celebrate the raw wood in that area to give a more finished look or the handle must be designed for two finishes - varnish and lacquer.

5c Specifications

COSTING
Sample Cost
Wood work and Lacquer : Rs 2000
Assembly and metal work : Rs 300
Leather work : Rs 350

ARTISAN
Woodwork : Popat (Nirona), Metal work and assembly : Naran Bhai (Reha) , Lacquer : Popat (Nirona)

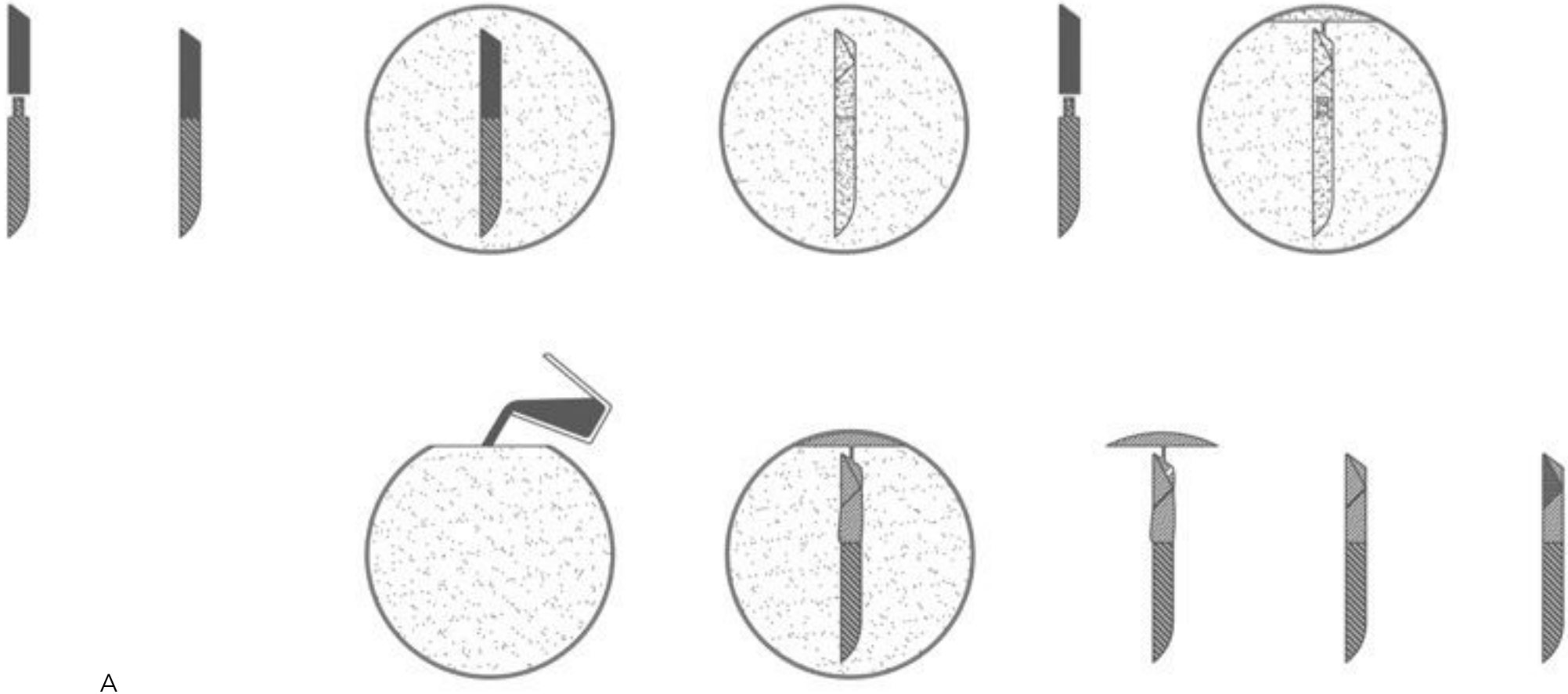


5d

KNIVES

Brass Plane

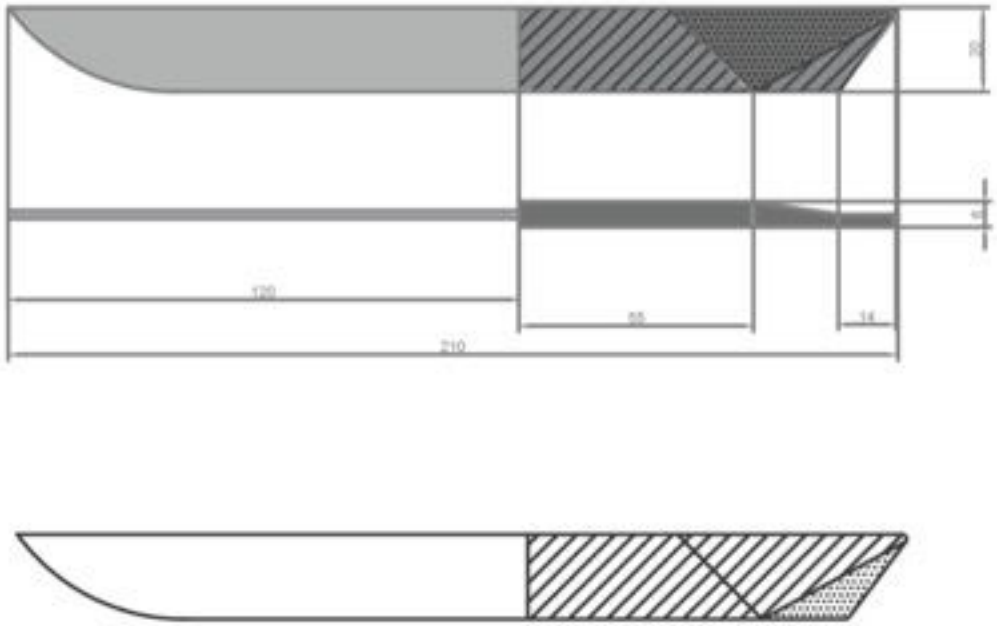
5d Process

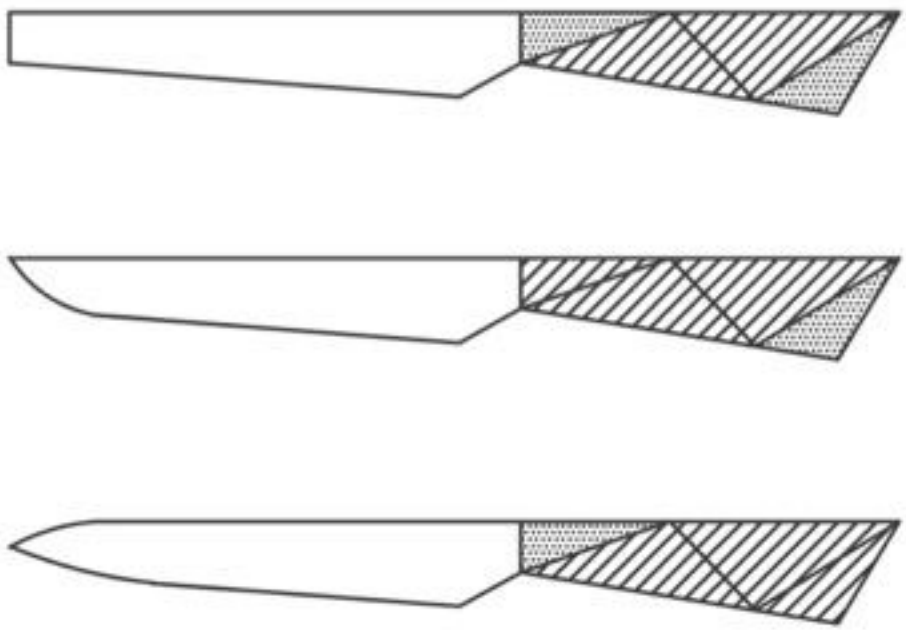


A

The most commonly made knives at Reha uses assembly of blade with the handle usually made in wood or brass or plastic. Such handles though splits the entire cycle in many steps do not score good grades on aesthetics scale. With these knives we casted the stainless steel blades in brass and aluminum metals to avoid exposed rivets and blade joinery giving it an even finish throughout. It follows the same method of casting the handle just that, when handle is being casted we already place the blade in cavity .The molten metal pours down and settles and grips the blade fixing both in axis and holding it tight in position.

5d Dimension and Design





Alternate Design

Because the regular knives attracts the maximum customers. The supply has to be kept high and so the production has to be quick and should give the artisan the freedom to alter and play with the aesthetics in years to come .
Here because there is a little alterations in the finishing part the method offers an entirely different product in the scale of aesthetics with so less an effort. It exposes the artisans to the different possibilities the material and the method has to offer and adds to the design value
It turned out to be an exercise to better understand the behavior and nature of brass for both us and the artisans.

SAMPLE PIECE

WEIGHT
300 gms each

SAMPLE COST

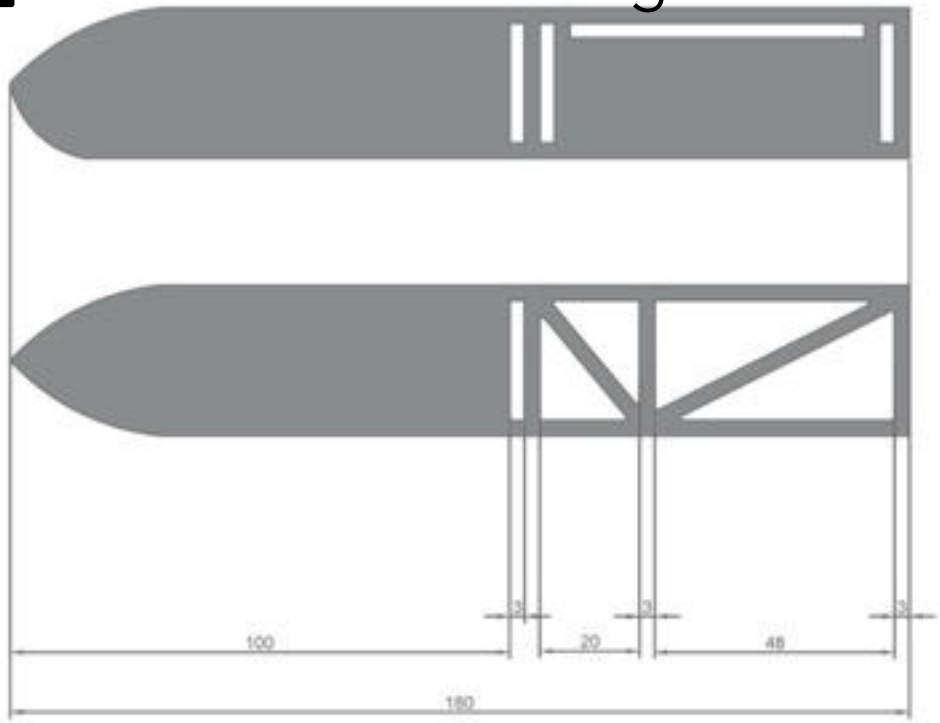
Format : Rs 300
Sand casting : Rs 180
Finishing : Rs 300
Total cost per piece : Rs 780

5e

SOUVENIR

Dagger

5d Dimension and Design



SAMPLE DESIGN - Metal - Dimensions

SAMPLE DESIGN - Leather

DESIGN FOR PRODUCTION - Metal

DESIGN FOR PRODUCTION - Leather

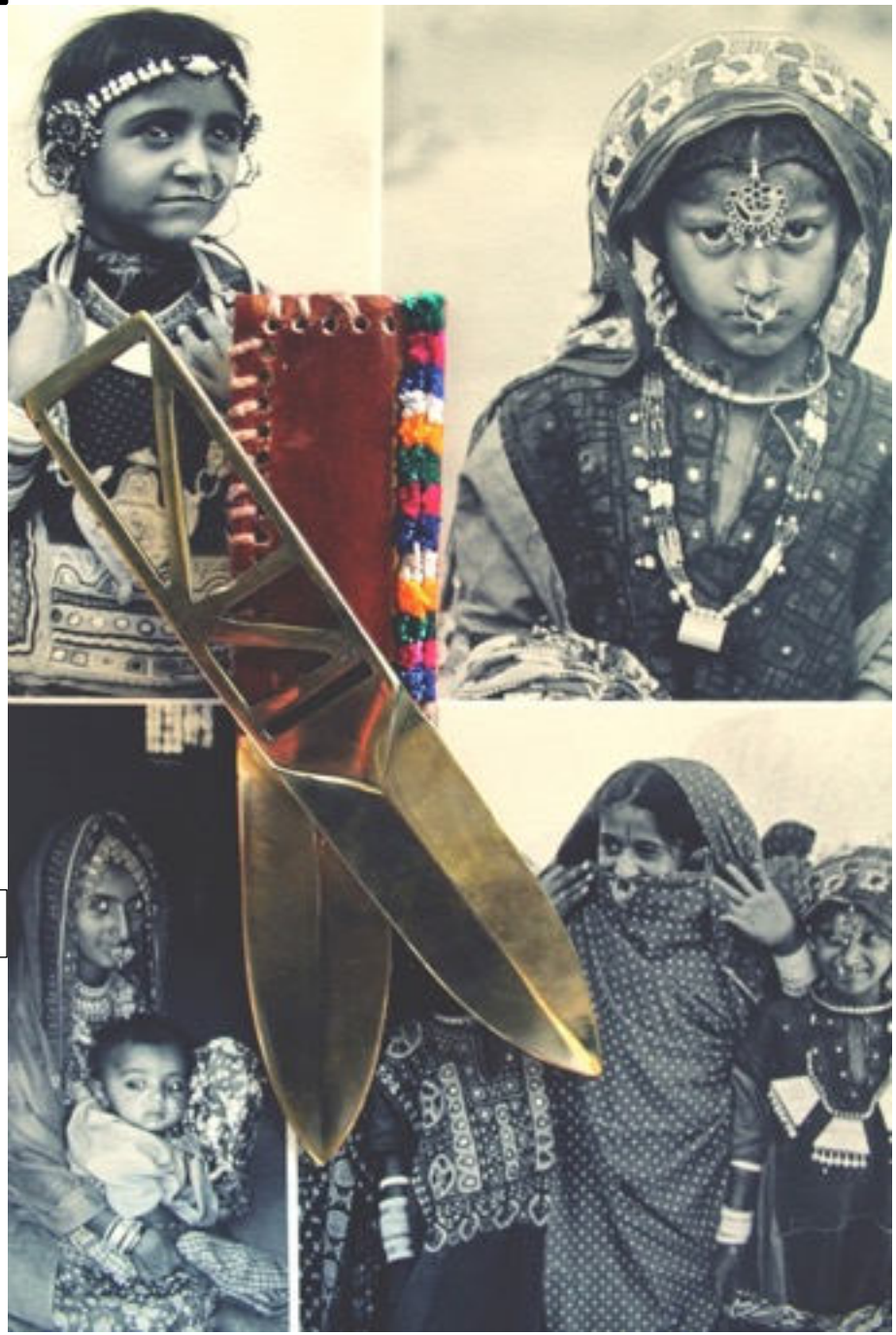
The daggers are designed for a brass handle or with a leather handle integrating another popular craft of Kutch along with. Provisions are therefore provided in the sand casted metal piece for the needle work. The slits and cuts in the sample proved to be time consuming. They could be made faster by using a laser instead of a hacksaw. For the piece to be handmade, the slits for the needlework is converted into drilled holes and depressions to reduce material and thereby cost per piece. The leather is knitted along with the metal handle.

SAMPLE PIECE

WEIGHT
200 gms each

SAMPLE COST

Sandasting : Rs 240
Finishing : Rs 1000
Leather work : Rs 150



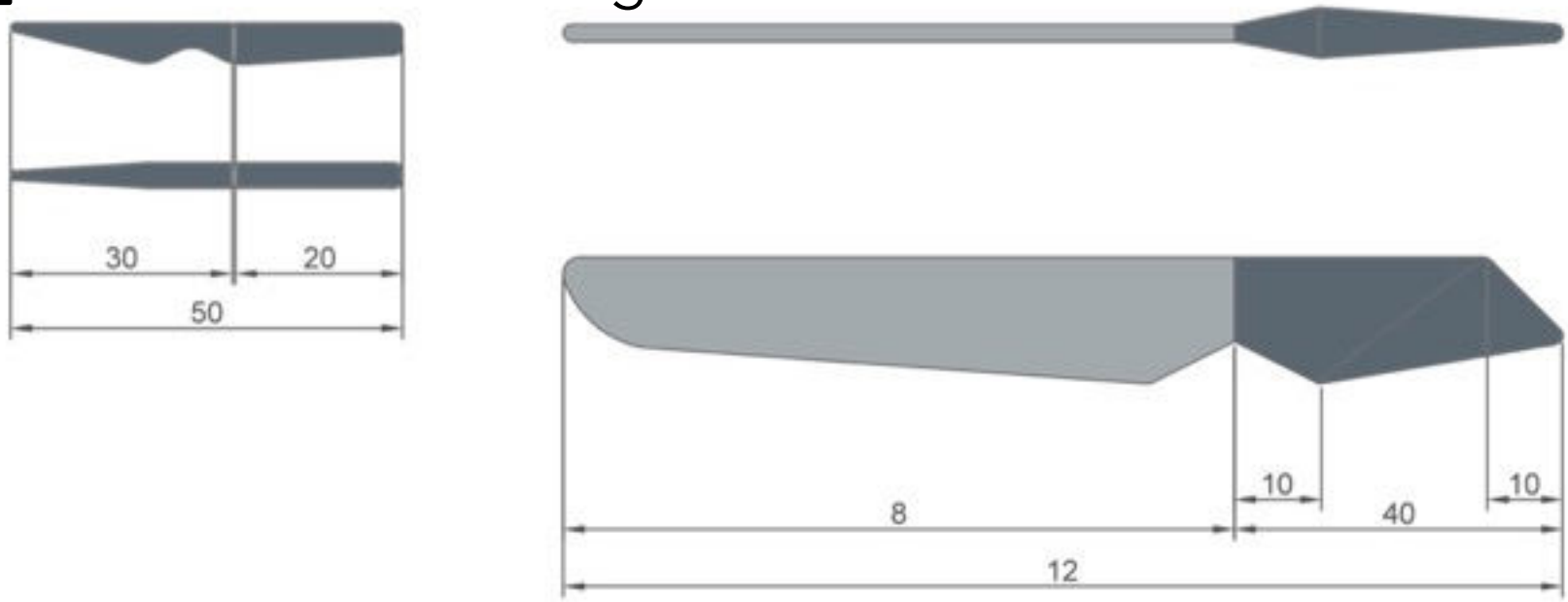
JADEJA RULERS

5f

SOUVENIR

Bookmark
Binder

5d Dimension and Design



The aesthetics of both the book binder and bookmark knife were kept very symbolic of the structure of conventional knife. Also because the bookmark had to be made in brass the proportion of blade to handle were decided allowing easy sliding of blade between the pages . The chamfers in the handles help reduce the overall weight of the product which otherwise was too heavy to suit as a bookmark. Other than the forms and the sand casting methods in coming up with these two we also considered sheet folding wire bending frames as an alternative and quick techniques to make knife figures and putting it to similar functions.

SAMPLE PIECE

BOOKMARK
Weight : 80 gm

COST

Sandasting : Rs 50
Finishing : Rs 100
Batch production cost : Rs 700
Estimated cost per piece : Rs 150

SHIFTING SANDS
Kutch: A Land in Transition

6 COSTING

SANDCASTING

Sample Set: Rs 620
Batch Production : Rs 2100

FORMAT

Cost Per day Rs 1000
3 days of Formatting
Total cost of Formats : Rs 3000

FINISHING

(Sample set, 3 nos)

Cost per day : Rs 1000
No of days : 7
Total cost for finishing : Rs 7000

TOTAL PROJECT COST
(as paid by Khamir)

Rs 12100

6 ANNEXURE

6 LEARNINGS

DOING FROM WHAT WE LEARNT

The teachings at IDC be it sketching and renders on paper as taught in media investigation to modelling and aesthetics in PD1 helped in structuring the entire chain with Ideation, understanding of material, learning its potentials and fails looking up for opportunity areas at one end to Understanding the target users, positioning the product in market ,considering the limitations and work permits of artisans involved on the other end.
All the theoretical knowledge of Elements of design ,ergonomics, system design, user cantered design along with various tools of brainstorming or concept finalisation comes handy when practicing with material and making. It all together constructs a balanced design.

LEARNING FROM WHAT WE DID

It is very important for the designer and the artisans to have faith in each others skills and capabilities making the entire process a contribution from both ends, with the intent to try out new possibilities and not fear failures.
When crafting a product the design evolves as we proceed .It need not be the exact replica of the ideations on paper rather it should be the right balance of the aesthetics retaining the language of product at the same time allowing for human errors or process limitations.
In craft sector we see the final product comes up as an output of some finite steps. It is good to understand this cycle of product transforming from raw material to its final shape and derive relation on each step of how the value addition at each step is related to the final output .This gives a better understanding of business cycle
For the upliftment of craft in the region it gets important to involve the artisans and show them the various possibilities in the craft they practice .Its good if the designs are chosen that would leave the artisan to try and come up with various other iterations with slight variation to keep them engaged and not ending up with the project being a one time experiment.

6a Project Calender

SUN	MON	TUE	WED	THU	FRI	SAT
				7MAY REHA Study and Analysis INTRO	8 REHA Study and Analysis PROCESS	9 REHA Study and Analysis PEOPLE
10	11 ANJAAR Market Analysis	12 REHA Study and Analysis TYPOLOGY	13 Presentation 1 **ANALYSIS**	14 DESIGN CONCEPT KHAMIR	15 REHA ARTISANS	16 DESIGN CONCEPT KHAMIR
17	18 DESIGN KHAMIR + REHA	19 DESIGN DWG KHAMIR	20 PROTOTYPE FORMAT REHA	21 PROTOTYPE FORMAT REHA	22 STUDY OTHER CRAFTS BHUJODI	23 PROTOTYPE FORMAT REHA
24	30 PROTOTYPING REHA	26 PROTOTYPING REHA	27 PROTOTYPING NIRONA	28 PROTOTYPING REHA	29 PROTOTYPING REHA	30 PROTOTYPING NIRONA
31	1 PROTOTYPING REHA	2 PRODUCT EXPERIENCE KHAMIR	3 Report	4 Report	6JUNE Presentation PRODUCT	

6b Product Calender

SUN	MON	TUE	WED	THU	FRI	SAT
17	18 DESIGN KHAMIR + REHA	19 DESIGN DWG KHAMIR	20 Format - Dagger Format - Spoon 1	21 Format - Spoon 1	22 STUDY OTHER CRAFTS	23 Format - Spoon 2 Format - Bookmark
24	25 SANDCASTING Spoon 1 Spoon 2 Daggers Bookmark	26 SANDCASTING Spoon 1 Spoon 2 Daggers Bookmark FINISHING Spoon 1 Spoon 2 Daggers Bookmark	27 LACQUER Woodwork	28 FINISHING Spoon 1 Spoon 2 Daggers Bookmark FORMAT Knife set	29 SANDCASTING Knifeset FINISHING Knife set	30 **Batch Production** SANDCASTING Spoon 1 Spoon 2 Bookmark FINISHING Spoon 1 Spoon 2 Bookmark
31	1 **Batch Production** FINISHING Spoon 1 Spoon 2 Bookmark	2 **Batch Production** FINISHING Spoon 1 Spoon 2 Bookmark	3 Report and Presentation	4 Report and Presentation	5 Report and Presentation	6JUNE Presentation 4 **PRODUCT**

6 REFERENCES

Khamir.org,. 'Who We Are | Khamir'. N.p., 2015. Web. 1 July 2015.

Khamir.org,. 'Who We Are | Khamir'. N.p., 2015. Web. 1 July 2015.

Khamir.org,. 'Who We Are | Khamir'. N.p., 2015. Web. 1 July 2015.

Gujarattourism.com,. 'Tourism Hubs Details'. N.p., 2015. Web. 1 July 2015.