Summer Internship (Project 1)

IN2 ON2 Food & Hospitality Pvt. Ltd, Mumbai

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Acknowledgements

Summer Internship is the one chance that we get after a year of learning the foundation courses to go and try our hand in the real world. I am grateful that I could use that time to try and create a product which is unique in terms of its function.

I would really like to thank the entire team of IN2 ON2 Food and Hospitality Pvt. Ltd. For the support that they extended during this period. We were a small team which almost felt like family by the end of that month.

A huge thanks to Mr Ganesh Pawar and Ms Tanya Jha for being a part of that great team and helping me through all the ups and downs which we faced during this period.

Working with start ups is always exciting, as part of a small thing, you become a part of everything which happens, It's a great opportunity to work with a really passionate set of individuals with strong convictions and a really positive outlook towards life.

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Introduction

There has been a spate of ice cream centres blooming in major metro cities in India this year. The most interesting thing about some of these shops is that they use liquid nitrogen to create ice cream almost instantly in front of the customer.

However, all these places, including the ones abroad, directly pour nitrogen in the mix used to prepare ice cream. We wanted to create a product which would do everything that these people do, while using indirect cooling.

This project documents my summer internship with IN2 ON2 Food and Hospitality Pvt. Ltd where we tried to create this innovative product.

Left
The logo for Fresh creams project (Designer: Kavita Dicholkar)

The start-up

Top
The bus transit directions from IDC to the IN2 ON2 premises

IN2 ON2 FOOD & HOSPITALITY PVT. LTD. is a young start-up based in Mumbai built by passionate individuals who believe in bringing about a fresh change in the way food and all is not only consumed but also perceived keeping in mind the minds of our society. Though a daunting challenge, what's life without it.

For Project#1 - FRESHCREAMS; we have built a machine which makes instant ice creams using cryogenic technology.
We like to call the end product Fresh creams and not ice creams to signify the bold change that we are driving on. The machine will make your favourite fruit Fresh creams within 2 minutes unlike any other technology in the world, customizing the kind of ingredients that you wish to include making it fresh and chemical free.

Hence the tagline, EAT HEALTHY, EAT FRESH.

It is currently based at 4B-1003, VERSOVA Skylark Tower, New MHADA colony, Near Lokhandwala circle, Andheri(W), Mumbai

The people

The company was founded by two people, Ganesh Pawar, who is an engineer and Tanya Jha, a lawyer.

Apart from these two, Kavita Dicholkar, (IDC alumnus, VC) takes care of logo and branding along with Darren Pinto who handles mechanical engineering research and development along with fabrication support.

When I joined the internship, I worked closely with Ganesh and Darren in the R&D aspects of the project.

Ganesh Pawar
Co-founder and CEO

Tanya Jha
Co-founder and Legal strategy

Kavita Dicholkar
Logo & branding

Darren Pinto
R & D

Sanket Pai
R & D

Top
The hierarchy and where I fit in

The internship

The internship duration was from 1st May till 31st May 2015.

During the course of this internship, I specifically worked on Fresh creams project. The task was to create the product which would make ice cream quickly using liquid nitrogen indirectly.

The first week was spent in understanding the problem and the users.. Form the second week onwards, we started ideating and prototyping for proof of concepts which continued for two and a half weeks. The last half of the month was spent ideating the product form.

The brief

Since this start-up project was about trying to bring in a healthier method of creating and serving ice cream, Ganesh wanted the product to subtly convey those feelings. He also wanted the look of the machine to be distinctly Indian.

After a lot of deliberation and discussions, the brief given was as follows:

To design a fresh creams machine

Must haves:

- Indian look/appeal
- Hygienic, easy to clean and maintain
- Robust, ergonomic and minimalist design
-

Good to have:

- Unique design
- Customer interaction opportunities

The process

When I started working for the start-up, they had a prototype which was not functioning properly. After a couple of tests, we decided to go back to the drawing board and start looking at multiple ideas to make a product which would serve the intended function.

We tried to use the design process for solving these mechanical engineering issues, which surprisingly worked really well.

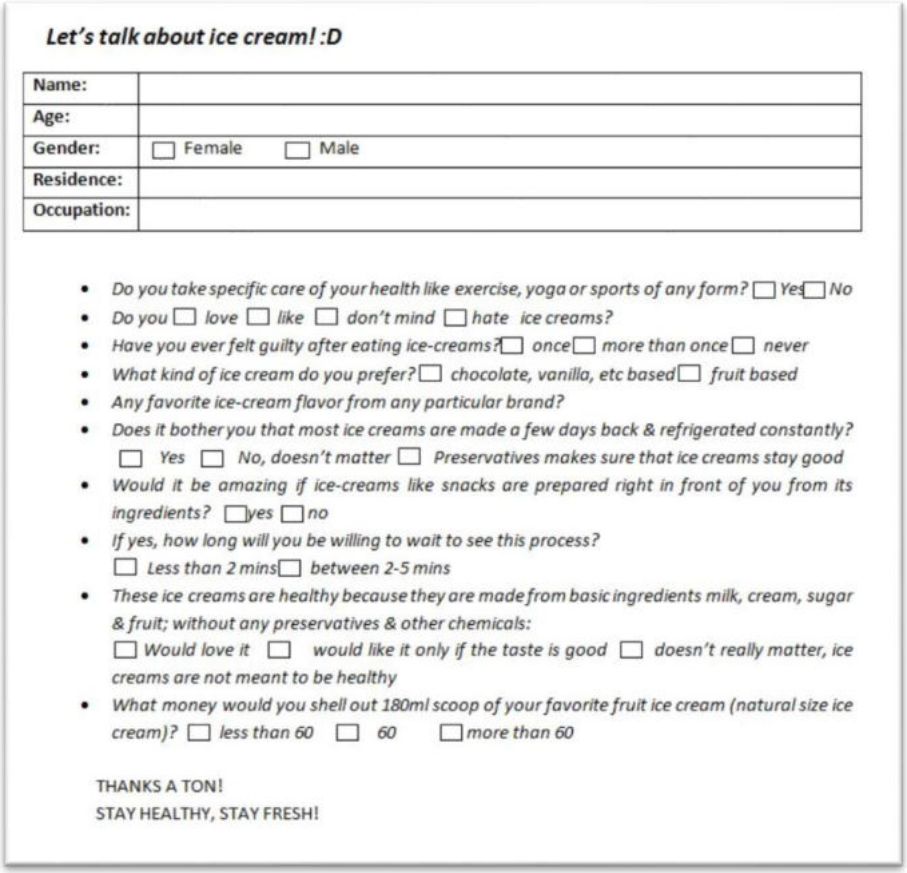
We started with problem identification, brainstorming, mind maps etc. and moved on to iterative processes of ideation, concept generation and prototyping.

The study

After finalising the brief we decided to do an initial user study. Ganesh and Tanya had drafted a user feedback form, which basically asked direct questions to the users about the features that we would be incorporating in the product.

However, one day we met Abbas Mirza, who is a copywriter in BBDO India, an advertising firm. He looked at our form and then explained how our approach could lead to skewed feedback.

We then decided to take his advice and decided to just observe the ice cream places in and around Mumbai. We also looked at other liquid nitrogen ice cream joints in the country. Then we just met people outside these places and spoke to them. Which lead to the creation of user profiles.



Let's talk about ice cream! :D

Name:	
Age:	
Gender:	☐ Female ☐ Male
Residence:	
Occupation:	

- *Do you take specific care of your health like exercise, yoga or sports of any form? ☐ Yes ☐ No*
- *Do you ☐ love ☐ like ☐ don't mind ☐ hate ice creams?*
- *Have you ever felt guilty after eating ice-creams? ☐ once ☐ more than once ☐ never*
- *What kind of ice cream do you prefer? ☐ chocolate, vanilla, etc based ☐ fruit based*
- *Any favorite ice-cream flavor from any particular brand?*
- *Does it bother you that most ice creams are made a few days back & refrigerated constantly?*
  ☐ Yes ☐ No, doesn't matter ☐ Preservatives makes sure that ice creams stay good
- *Would it be amazing if ice-creams like snacks are prepared right in front of you from its ingredients? ☐ yes ☐ no*
- *If yes, how long will you be willing to wait to see this process?*
  ☐ Less than 2 mins ☐ between 2-5 mins
- *These ice creams are healthy because they are made from basic ingredients milk, cream, sugar & fruit; without any preservatives & other chemicals:*
  ☐ Would love it ☐ would like it only if the taste is good ☐ doesn't really matter, ice creams are not meant to be healthy
- *What money would you shell out 180ml scoop of your favorite fruit ice cream (natural size ice cream)? ☐ less than 60 ☐ 60 ☐ more than 60*

THANKS A TON!
STAY HEALTHY, STAY FRESH!

Top
The draft for user study

Market study

Top
Minus 301°F, Mumbai

Middle left
Mimi's Gourmet Gelato, New Delhi

Middle right
Mist and Creams, Hyderabad

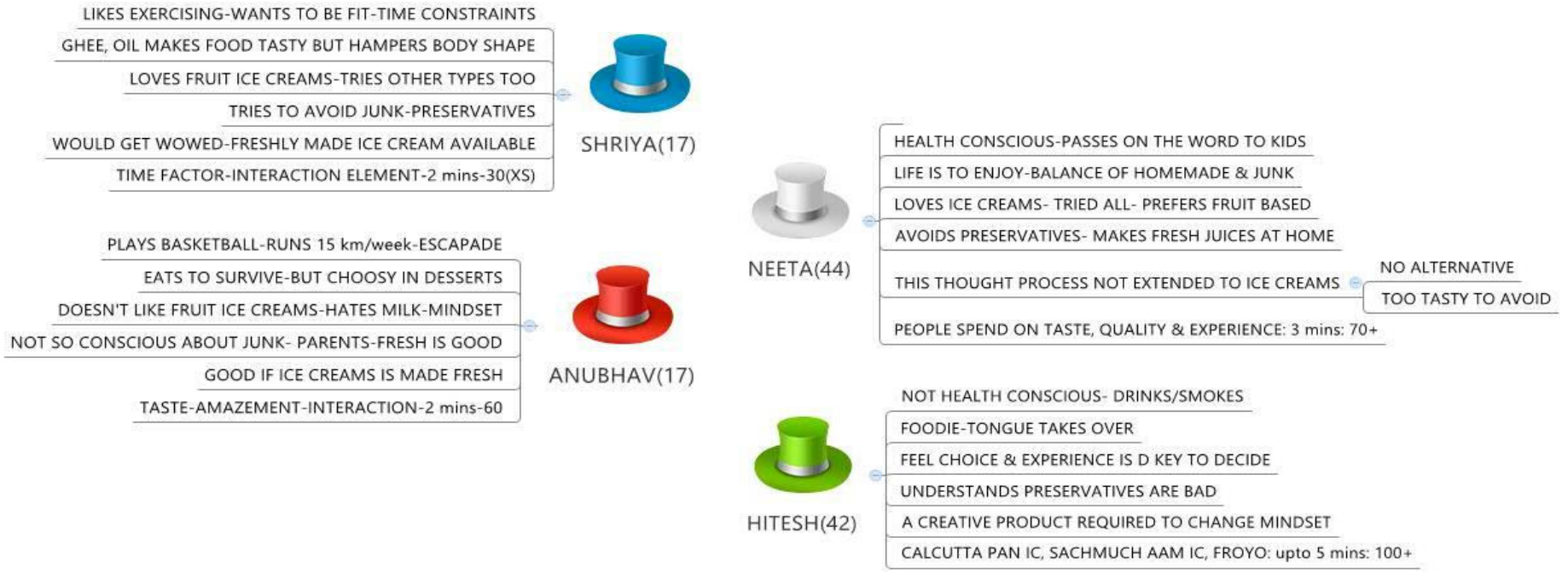
Bottom
Niice cream, New Delhi

We spent some time in Naturals ice cream joints, observing the place and the customers. We also went to Minus **301°F to check out the way they serve the customers.**

What we noticed was that most of the shops used kitchen aid mixers and directly poured liquid nitrogen to create the ice cream.

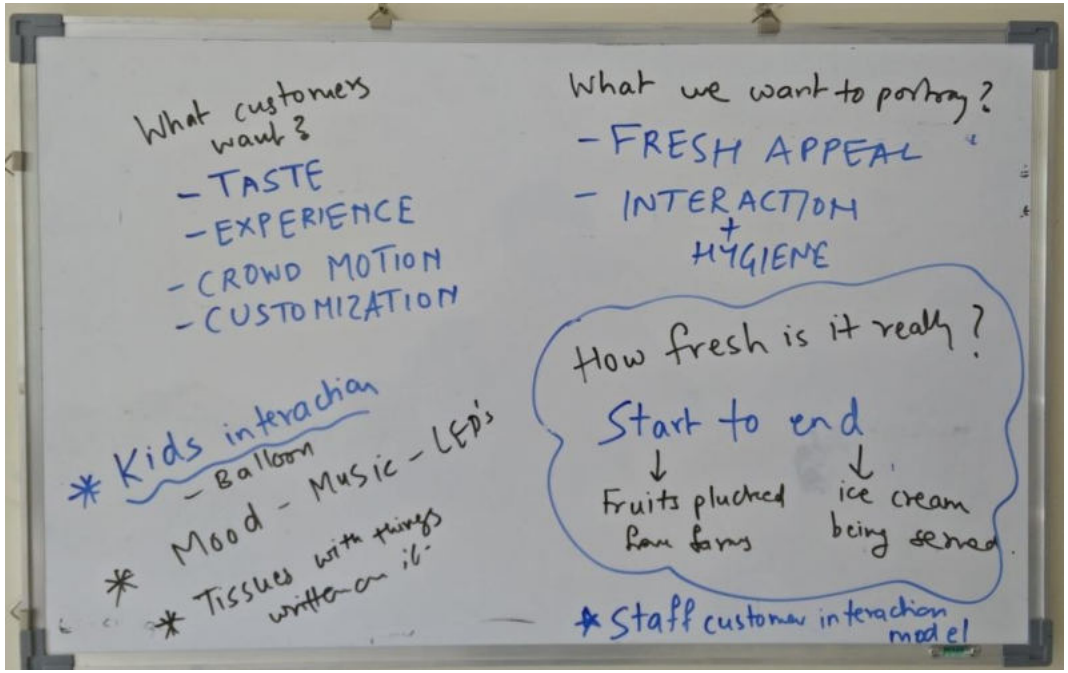
Also liquid nitrogen use was highlighted and that was something that we wanted to avoid.

User study



Top
User profiles

User study

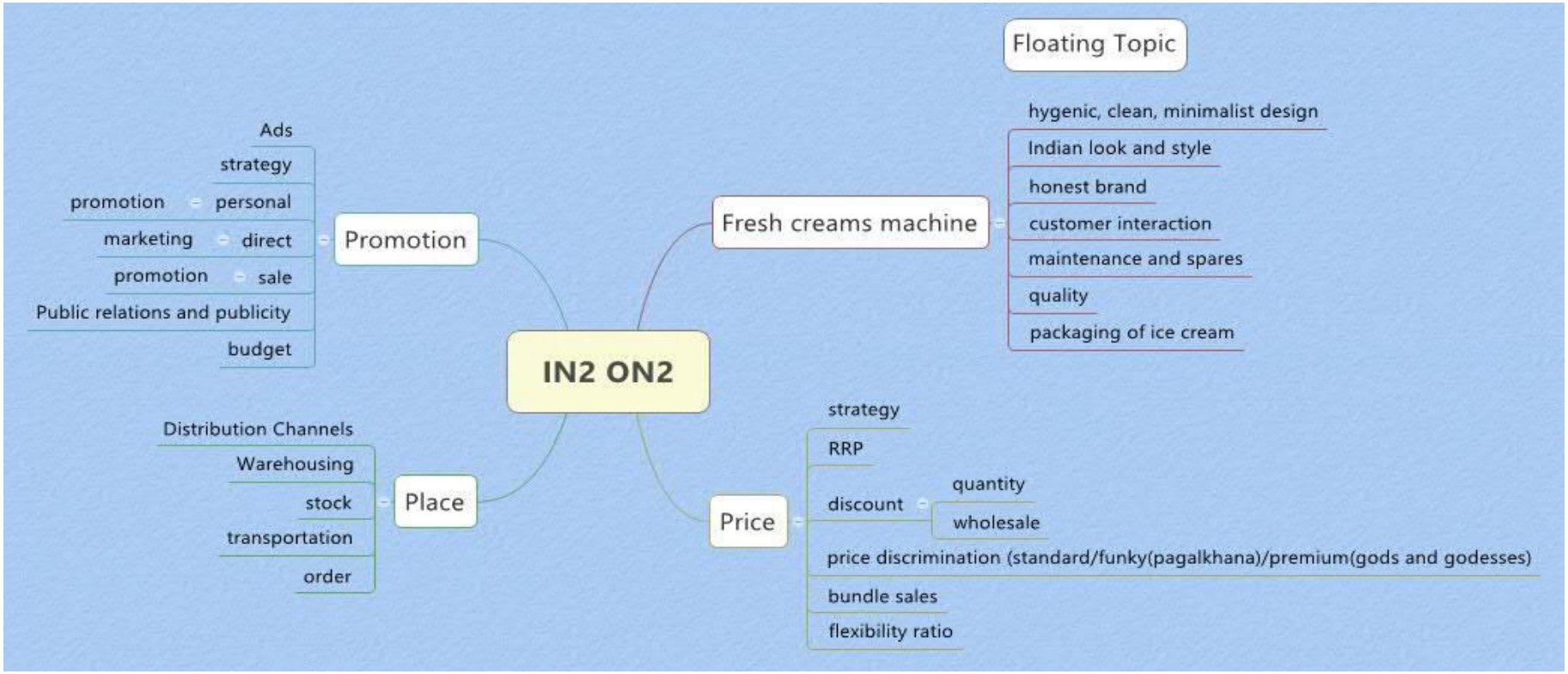


Top
Keywords extracted from user study

We created user profiles by talking to people. The profiles are not imaginary, these were the people that we interviewed and then realised that these would be the people that we would be catering to.

Once the interviews were done we distilled that information in a session were we extracted the keywords.

Mind map

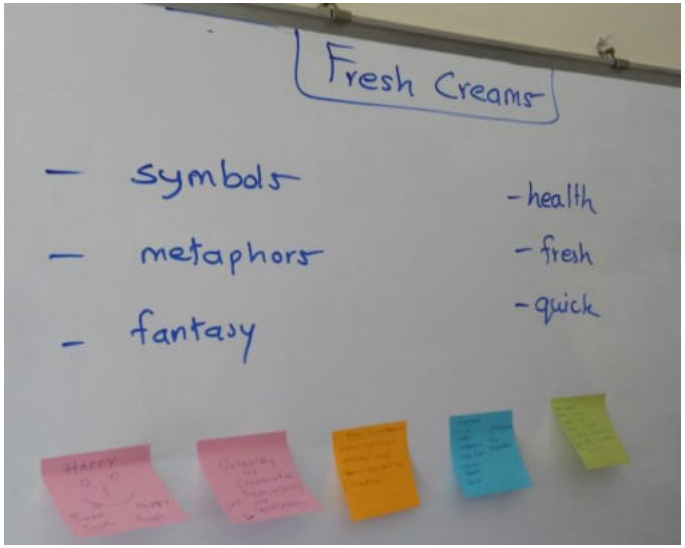


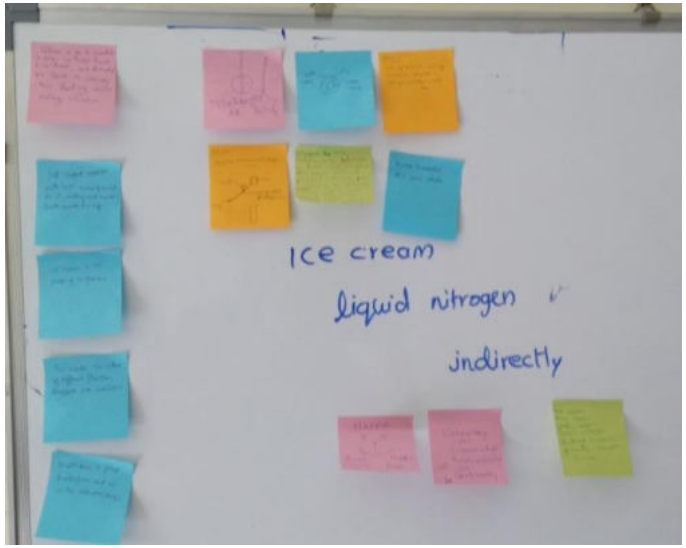
Top
Mind map for direction of IN2 ON2 in general and fresh creams product in particular

Mood board

Top
Mood board (Keywords: Indian, sweet, dessert)

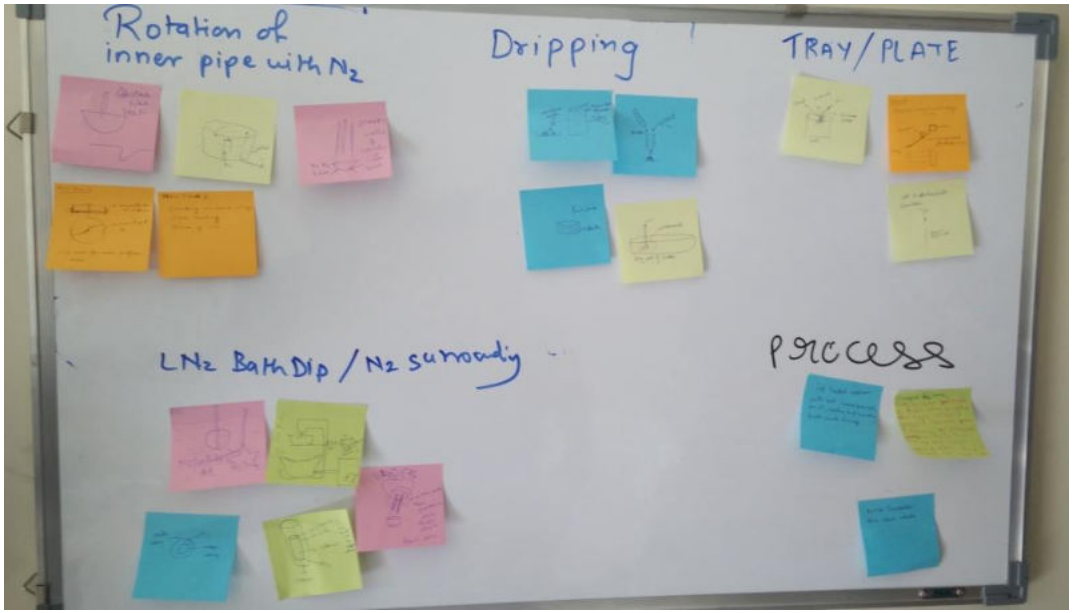
Brainstorming





Top left
The analogies used during the session
Top right
Initial ideas during the session
Bottom. left
Darren explaining one of his ideas
Bottom left
The team deep in thought.

Brainstorming



We met for a brainstorming session to decide the best way to solve issues in existing machine and to come up with new methods of creating ice cream.

Since I was moderating the session, I explained about advantage of using analogies during ideation. We also used the post it method to compile and segregate our ideas.

Top
The final outcome of the session: multiple creative ways of making ice cream.

Ideation




Top left and right
Trying to create a shallow layer of ice cream on a flat surface
Bottom left and right
Trying to create ice cream using pre chilled vessels

Ideation

Top
Trial of existing setup (prototype 1)

We checked the existing set up (prototype 1) and decided to conduct a few trials. The observations were as follows:

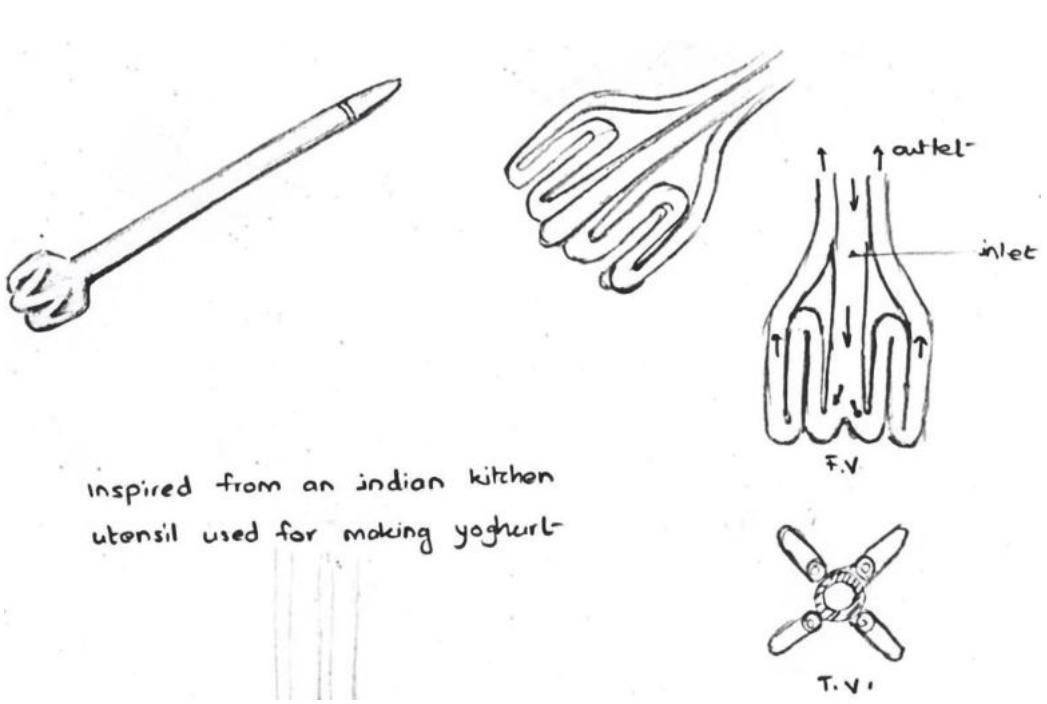
- Freezing of thin layer of mix along the inner surface
- Inefficient liquid nitrogen use
- Non crystallisation of most of the mix leading to wastage

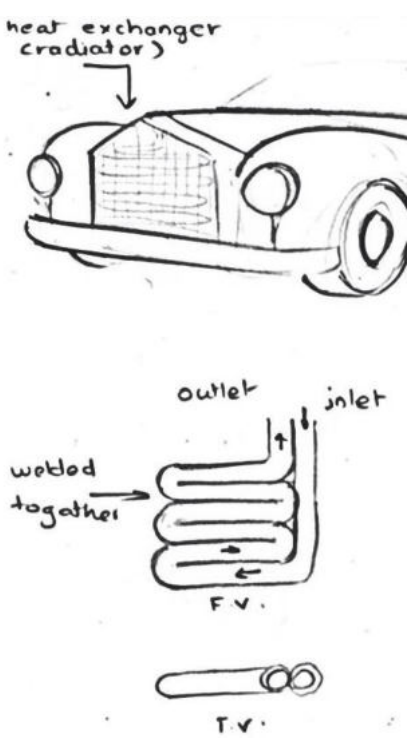
After the trial we tried to make some quick prototypes to check some of the concepts generated during the brainstorming sessions.

Once these trials were over, we started ideating for the freezing mechanism.

Analogies were used to create initial ideation.

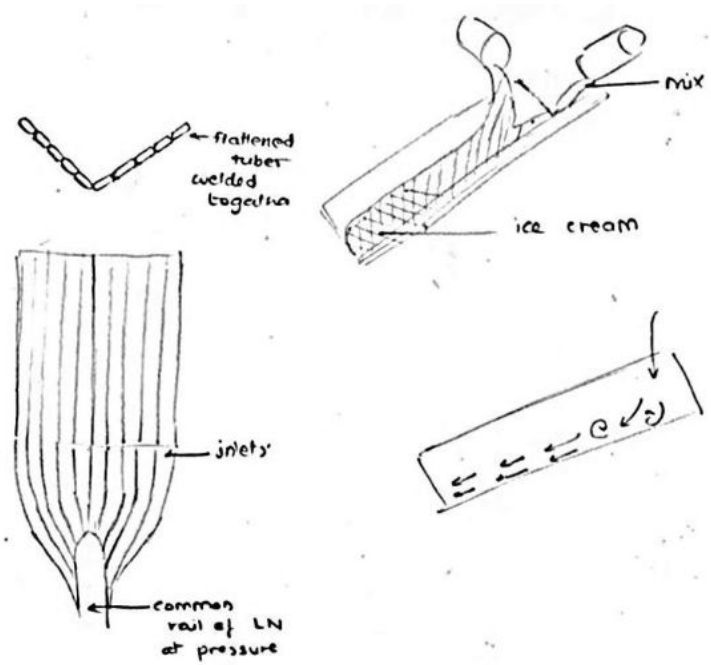
Ideation

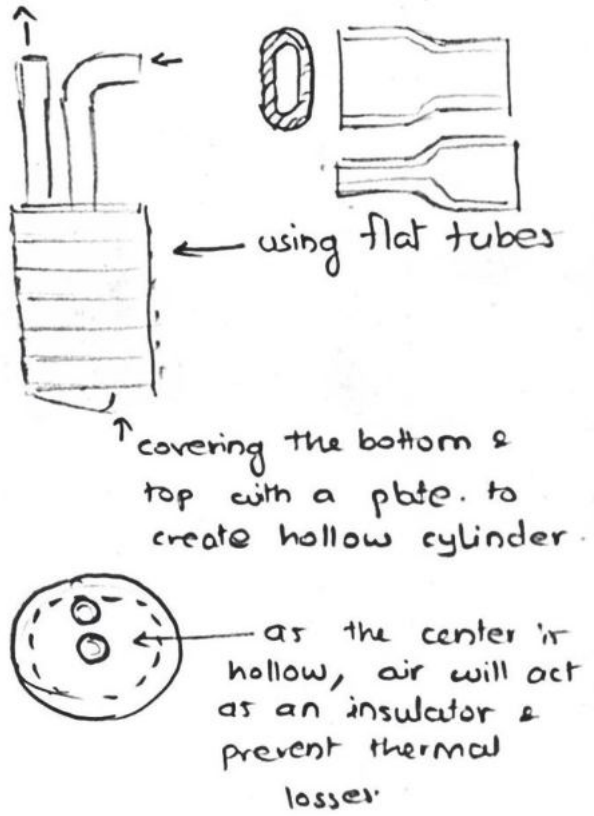




Left
Heat exchanger design inspired from traditional Indian milk churner
Right
Heat exchanger design inspired from a car radiator

Ideation

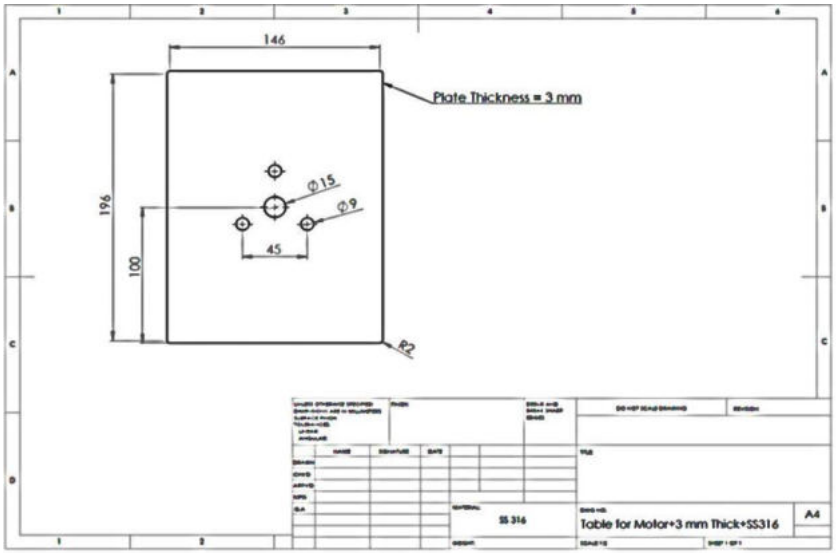


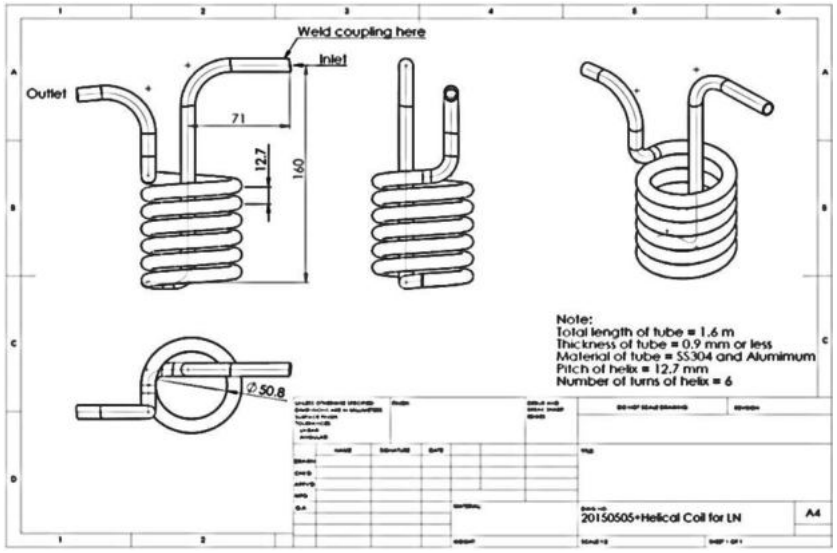


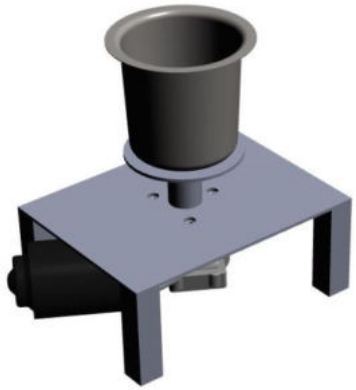
Left
Heat exchanger designed using flat incline surface

Right
Heat exchanger design inspired from an induction water heater

Machine concepts







Top Left
Laser cutting drawing for base plate (proto 2)
Top Right
Drawing for fabricating heat exchanger (proto2)
Bottom
Assembly drawing of the base

Machine concepts

Top
Set up for trial of proto 2

In the next two and a half weeks, we kept designing and fabricating new prototypes.

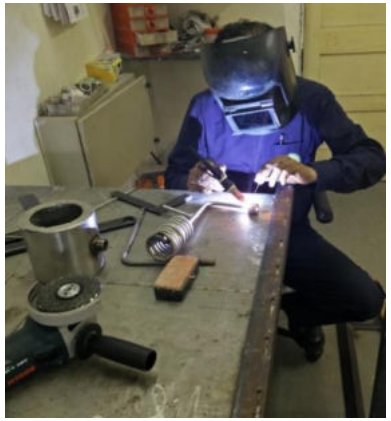
Initially we quickly fabricated Proto 2 to check weather water heater inspired design would work. The major design change was that the vessel would rotate while the whisker/heat exchanger would be stationary.

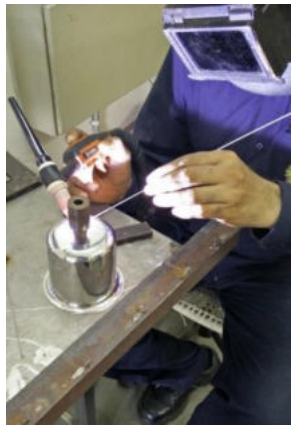
This was the major difference that we decided to incorporate in place of traditional stationary vessel systems.

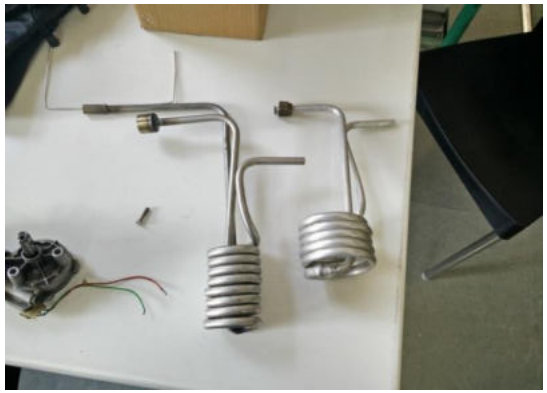
However, we observed the following during the trial of proto 2:

- Ice cream adheres to the helix
- It is difficult to remove ice cream from the machine

Machine concepts






In clockwise direction starting from top left

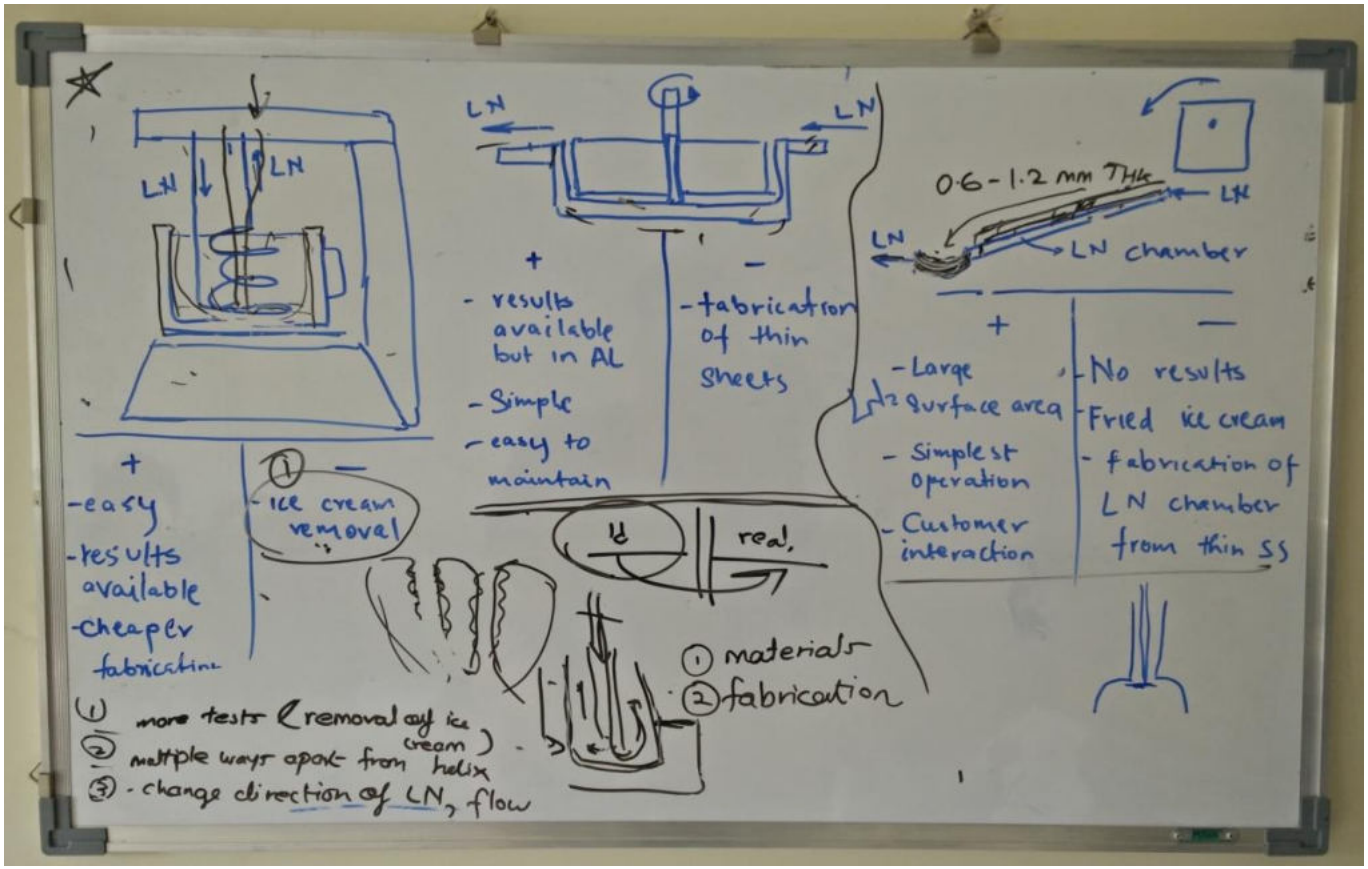
- Material bought after laser cutting
- TIG welding of heat exchanger
- Cutting of base platform legs
- Welding the connector onto the vessel
- Vessel after welding
- Heat exchangers made of SS and Al
- Welding base assembly

Machine concepts

In clockwise direction starting from top left

- Set up for trial of proto 2
- Liquid nitrogen freezing the mix
- Disengaging the vessel and heat exchanger
- Ice cream removal
- Ice cream form after freezing

Machine concepts



Top
Concept evaluation for the first three ideas

Machine concepts

After the trial of proto 2 we again had a discussion about comparing the results of the quick trials for proof of concepts.

Once all three concepts were analysed, we decided to go ahead with helix tube concept.

Which led to fabrication of Proto 3.

Proto 3 was based on a helix in helix. We had thought that this would lead to better results but we were sorely disappointed.

The observations were:

- Length of the pipe increases due to two helices, leading to heat transfer losses
- It was still difficult to remove ice cream from the machine

Machine concepts

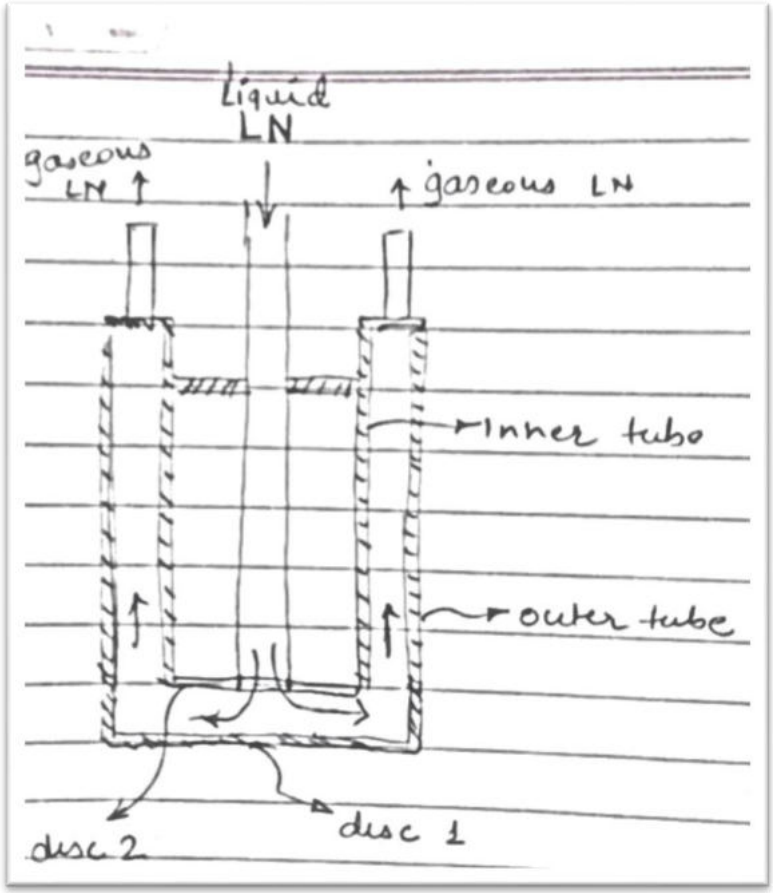





In clockwise direction starting from top left

- Fabrication of helix in helix heat exchanger
- Set up for trial of proto 3
- Freezing in progress
- Freezing in progress
- Ice cream formation on heat exchanger
- Final ice cream form

Machine concepts



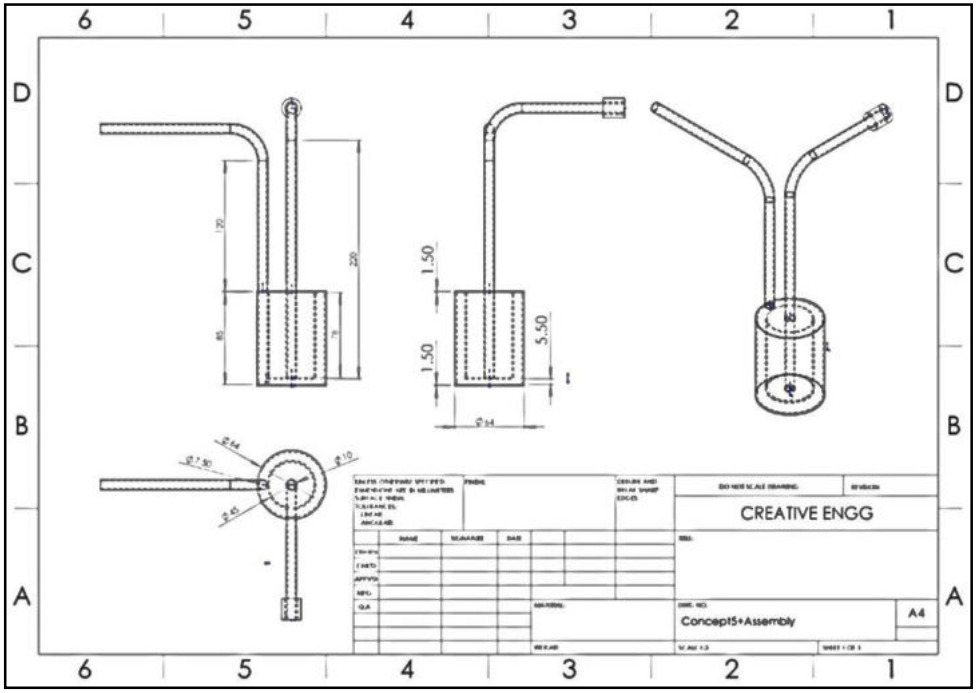
Top
Quick sketch of the cylinder concept

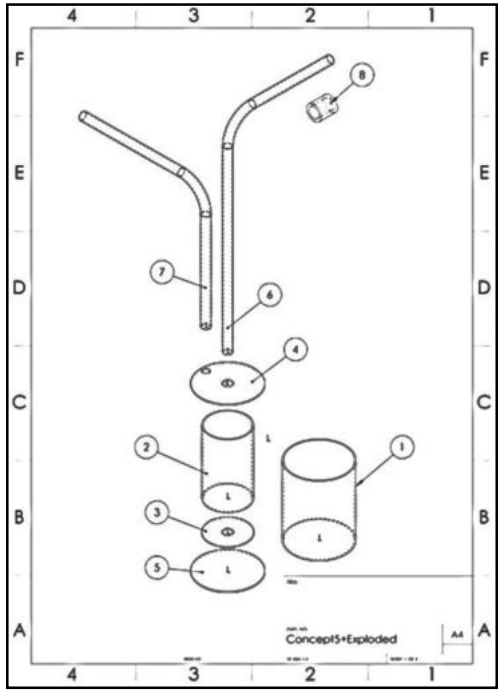
After the results of proto 3, we thought it would be wonderful if we could create ice cream in the form of a bowl. The idea was to serve the customers fresh fruit pieces in the container made of ice cream.

Hence we decided to convert the helix in to a concentric cylinder assembly which is enclosed at the bottom.

We had our first major success with this concept and then we worked on optimising the ice cream removal aspect.

Machine concepts





Top left
Manufacturing drawing of cylinder assembly
Top right
Parts required for cylinder assembly

Machine concepts






In clockwise direction starting from top left

- Cutting the tubes to required length
- The pieces required for assembly
- Assembling the inner cylinder before welding
- TIG welding the inner cylinder
- TIG welding the outer cylinder
- Buffing the piece after welding`

Machine concepts





In clockwise direction starting from top left

- Set up for trial
- Trial in progress
- Form attained by ice cream after trial
- Removal of ice cream
- Ice cream ready to eat

Machine concepts

Top
Bowl shaped ice cream form which was attained during the final trial

During the trial of proto 4 we observed the following:

- easier to remove ice cream from the machine compared to previous photos
- Air heater to be used in piping circuit to facilitate removal

To improve the ice cream removal we decided to include an air heater in the system, this would thaw the first layer of ice cream which adheres to cylinder.

We tried this and managed to get a bowl shaped ice cream form.

The next step would be to conduct trials for optimisation of the recipe, time taken, nitrogen flow and ice cream removal.

Product form concepts

Once the machine hard points were finalised, we did some ideation regarding the final look of the product.

The main considerations were:

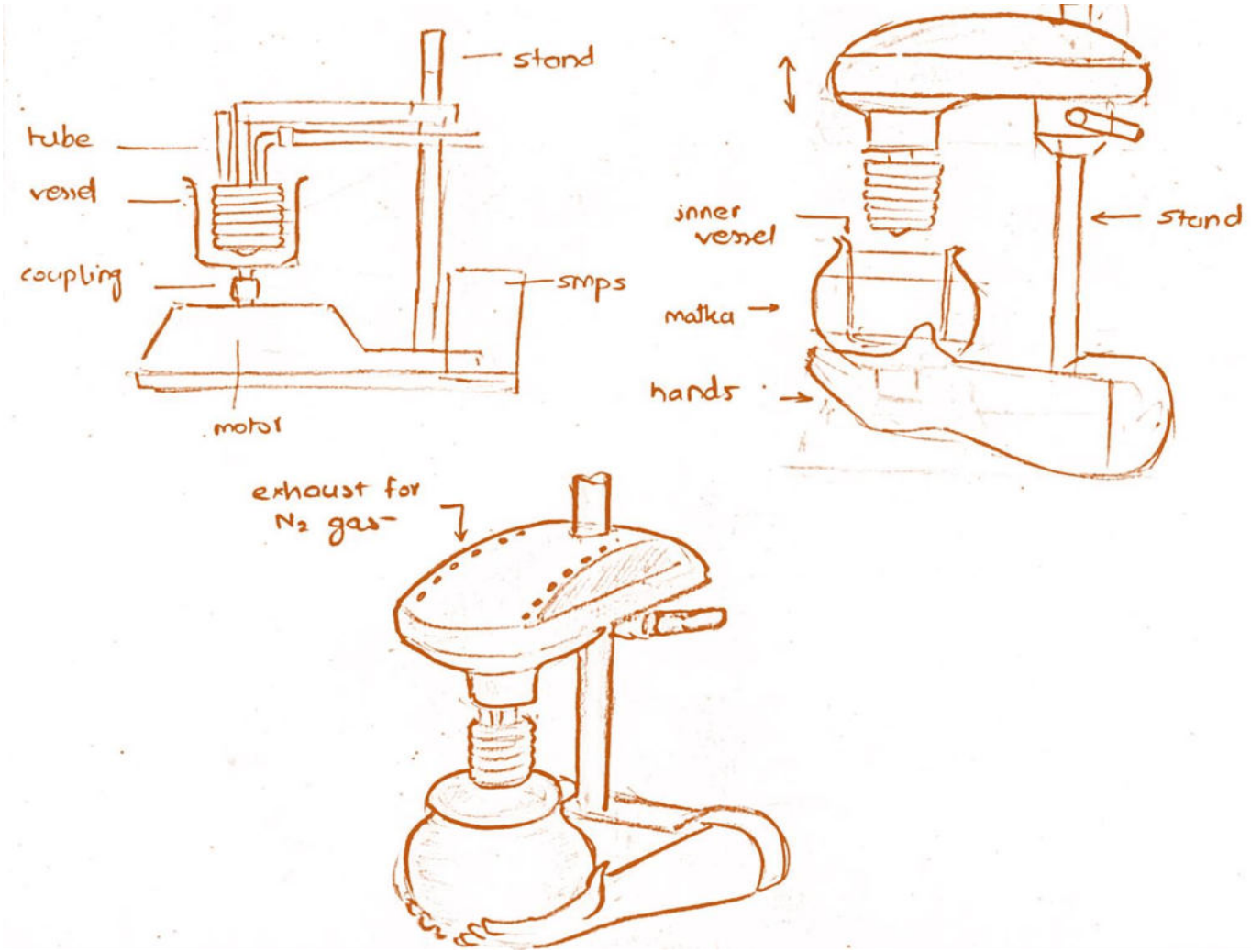
- It should look distinctly Indian
- It should take care of functional requirements of robustness and food grade product
- It should convey the feeling of fresh and celebration

I started with initial ideation considering the hard points of the machine as the framework.

Out of the initial concepts, Ganesh really liked the one which had Waarli art (concept #5).

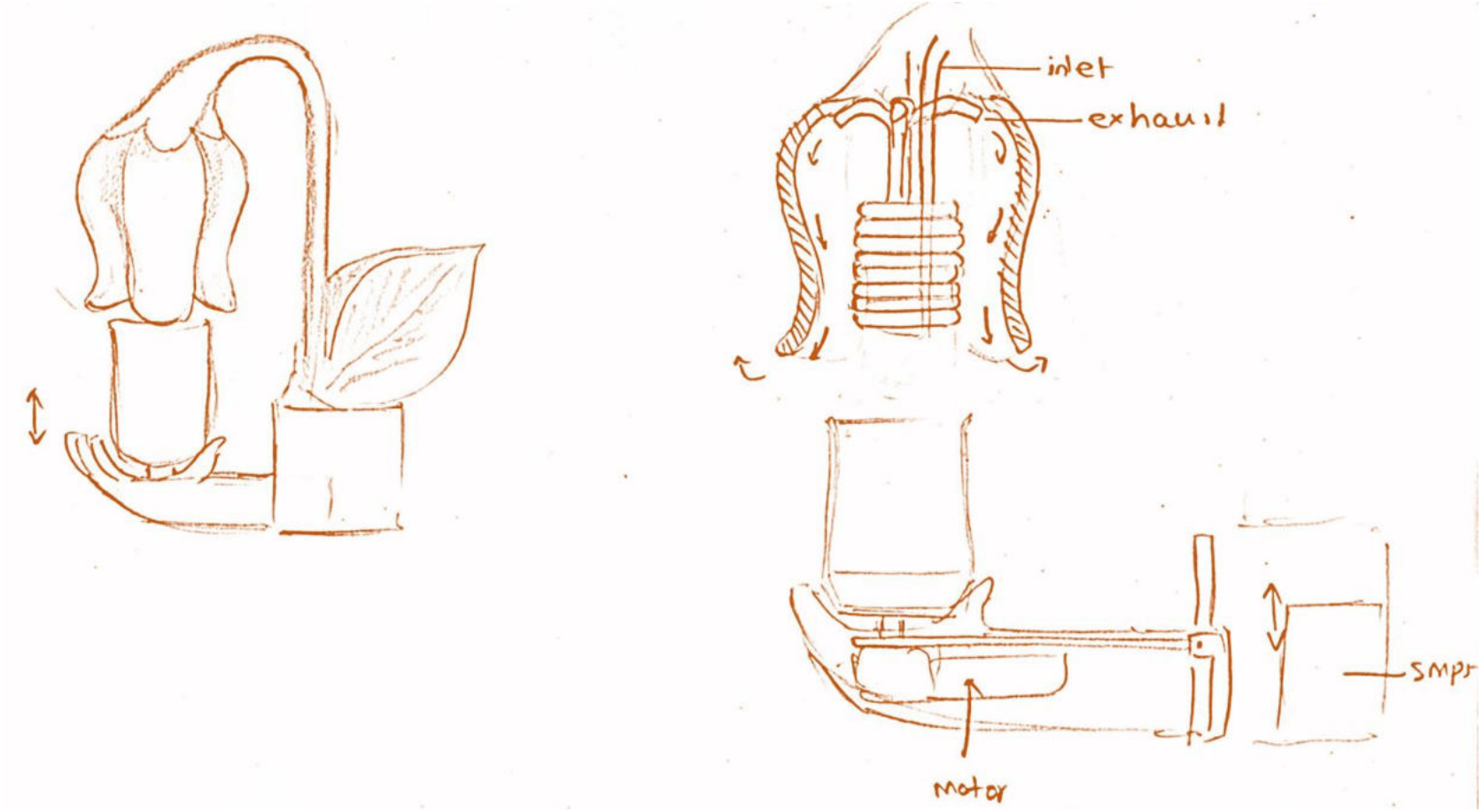
More forms were explored for concept # 5, and final 2 designs were selected for further detailing.

Product form concepts



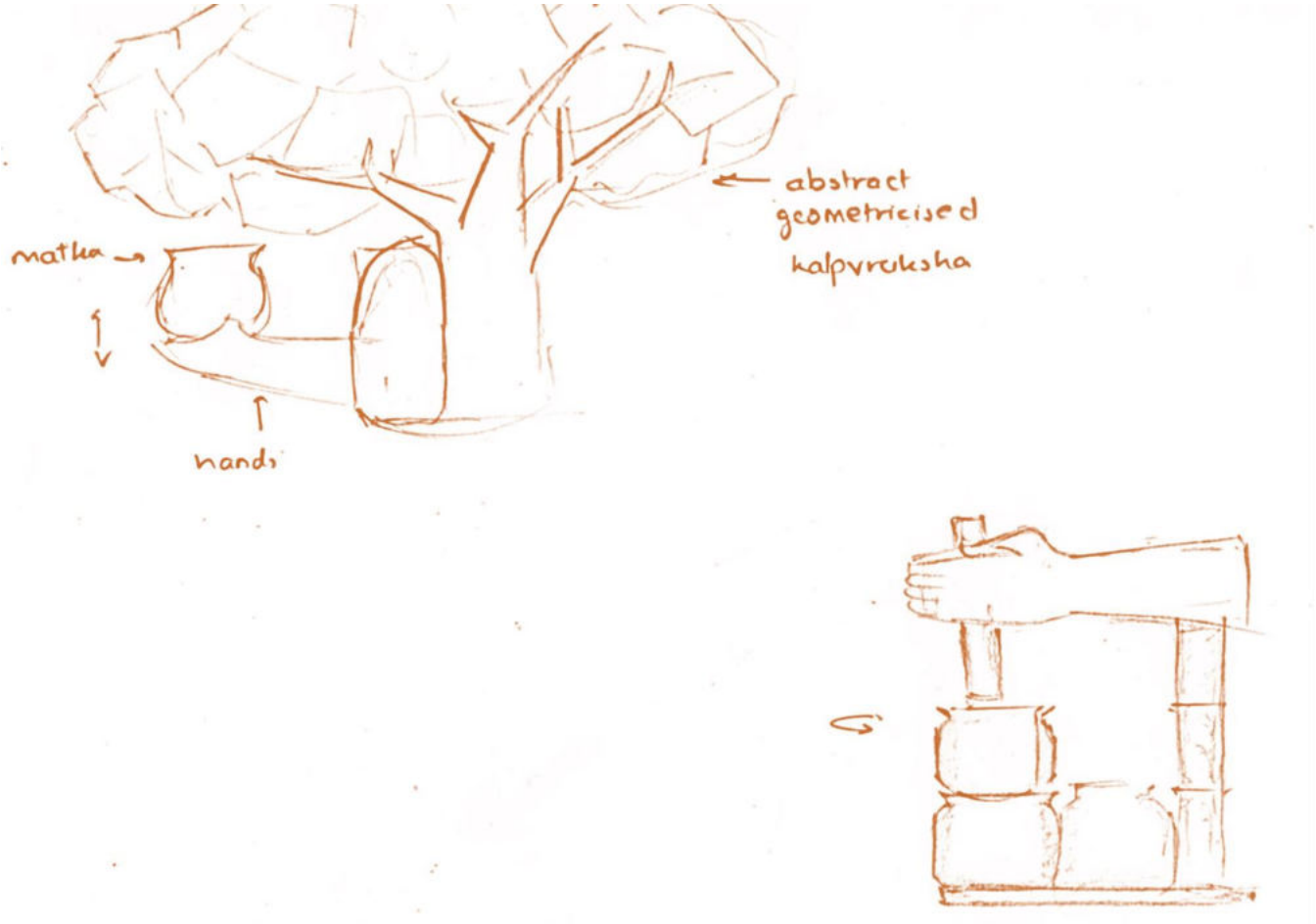
Left
Concept #1:

Product form concepts



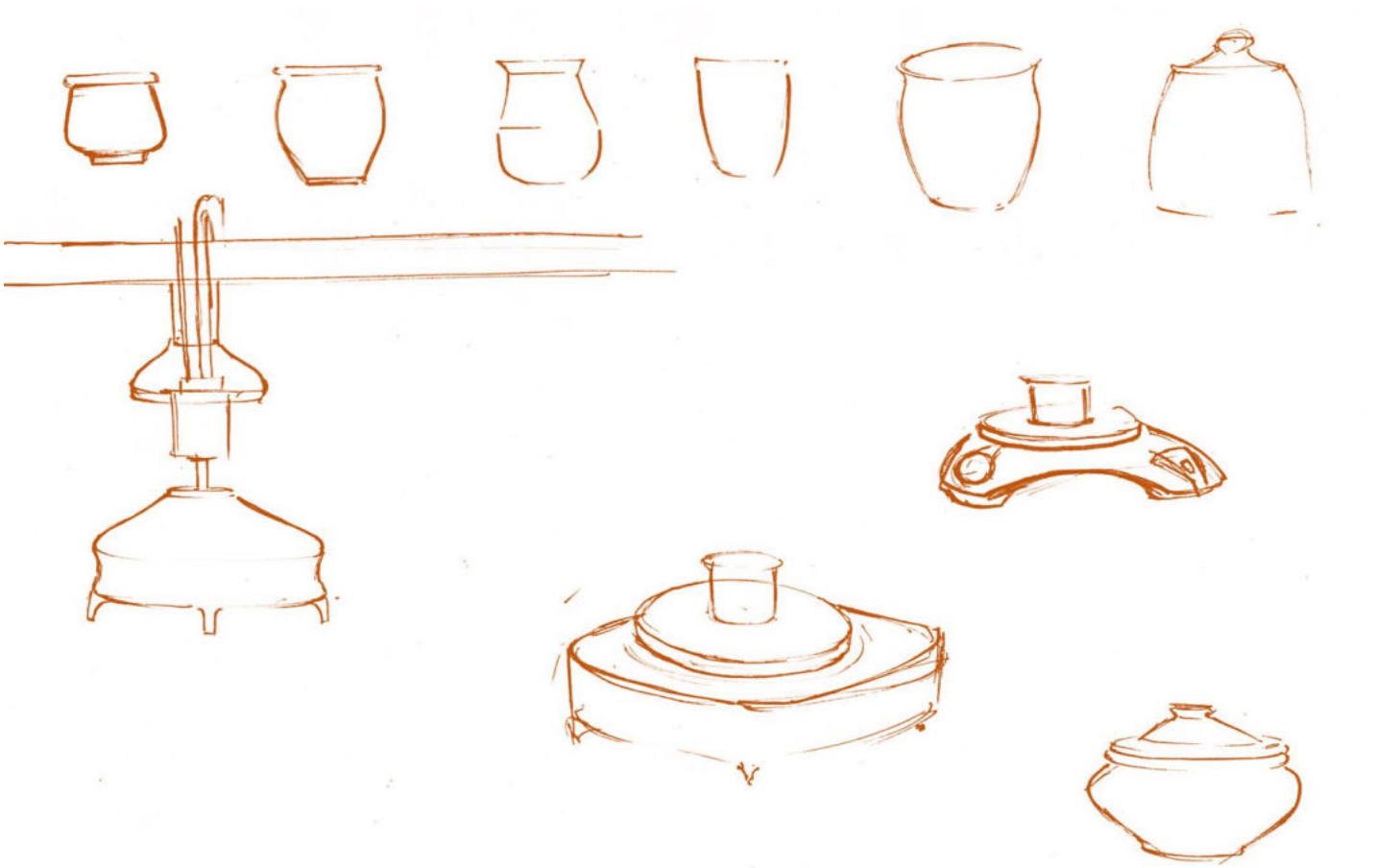
Right
Concept #2

Product form concepts



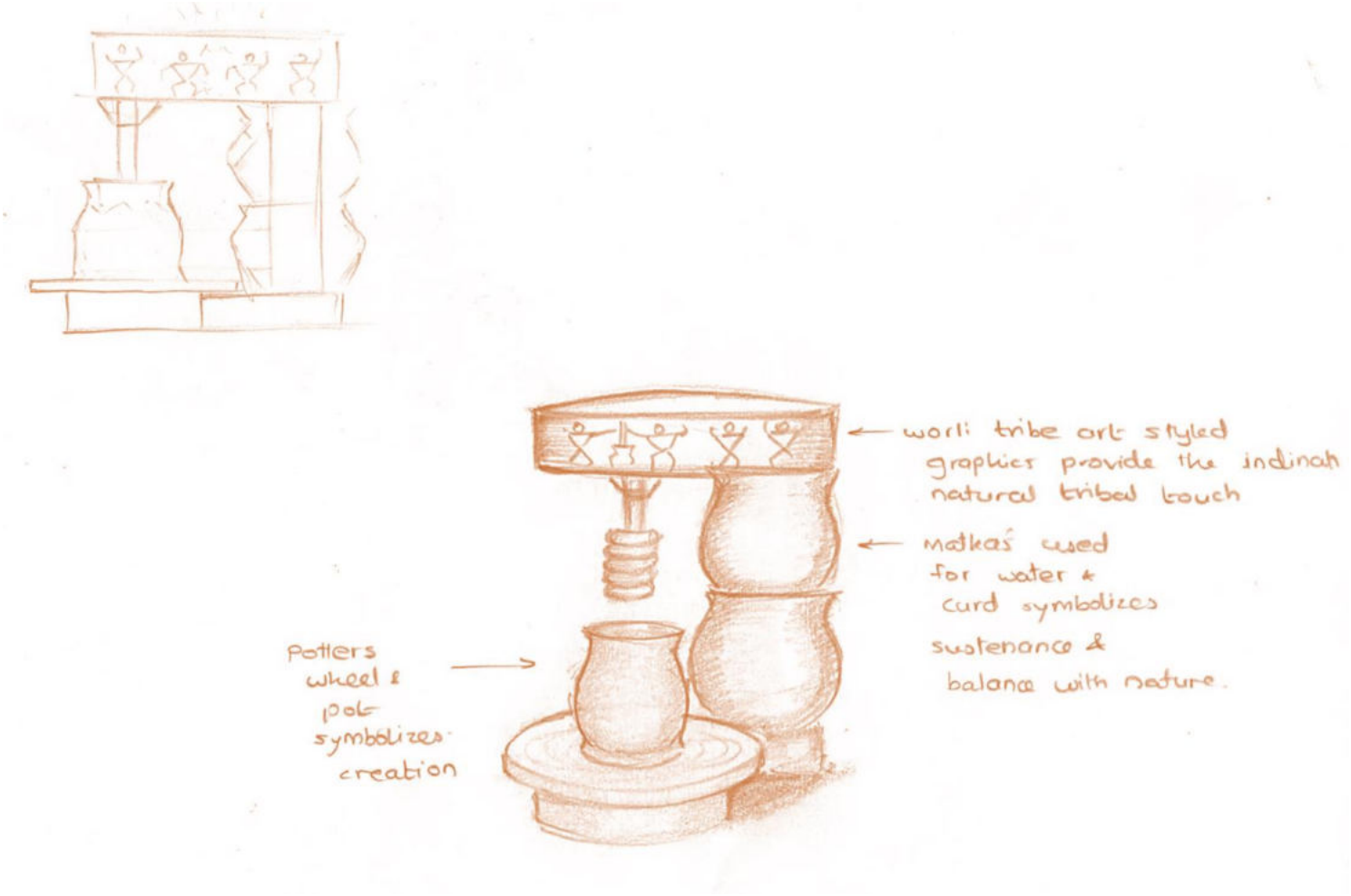
Top Left
Concept #3:
Bottom right
Concept #4

Product form concepts



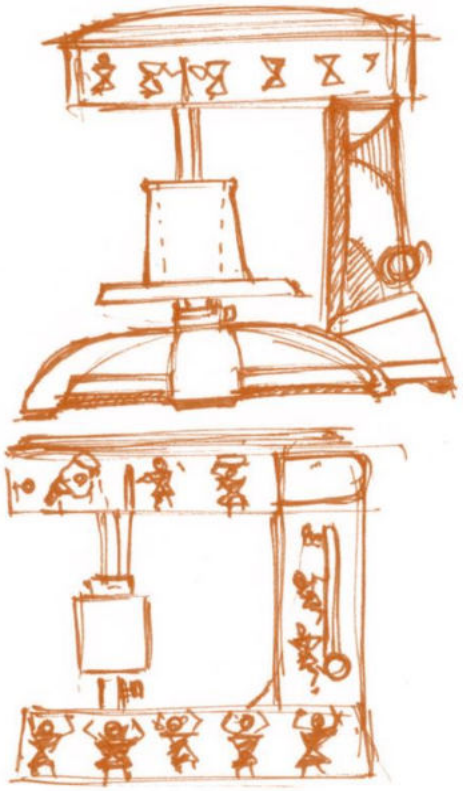
Right
Quick ideation for various vessel shapes

Product form concepts



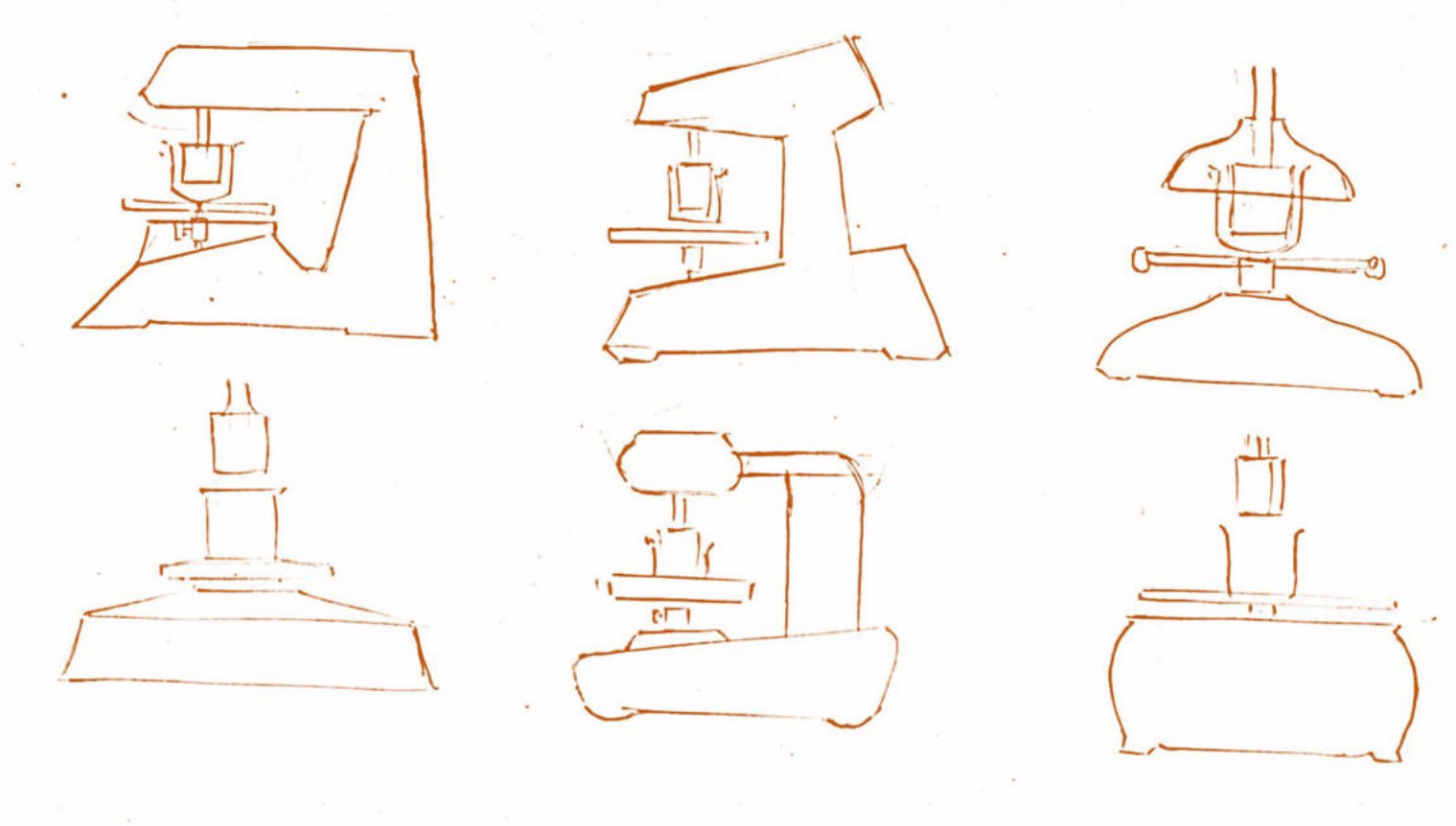
Left
Concept #5:

Product form concepts



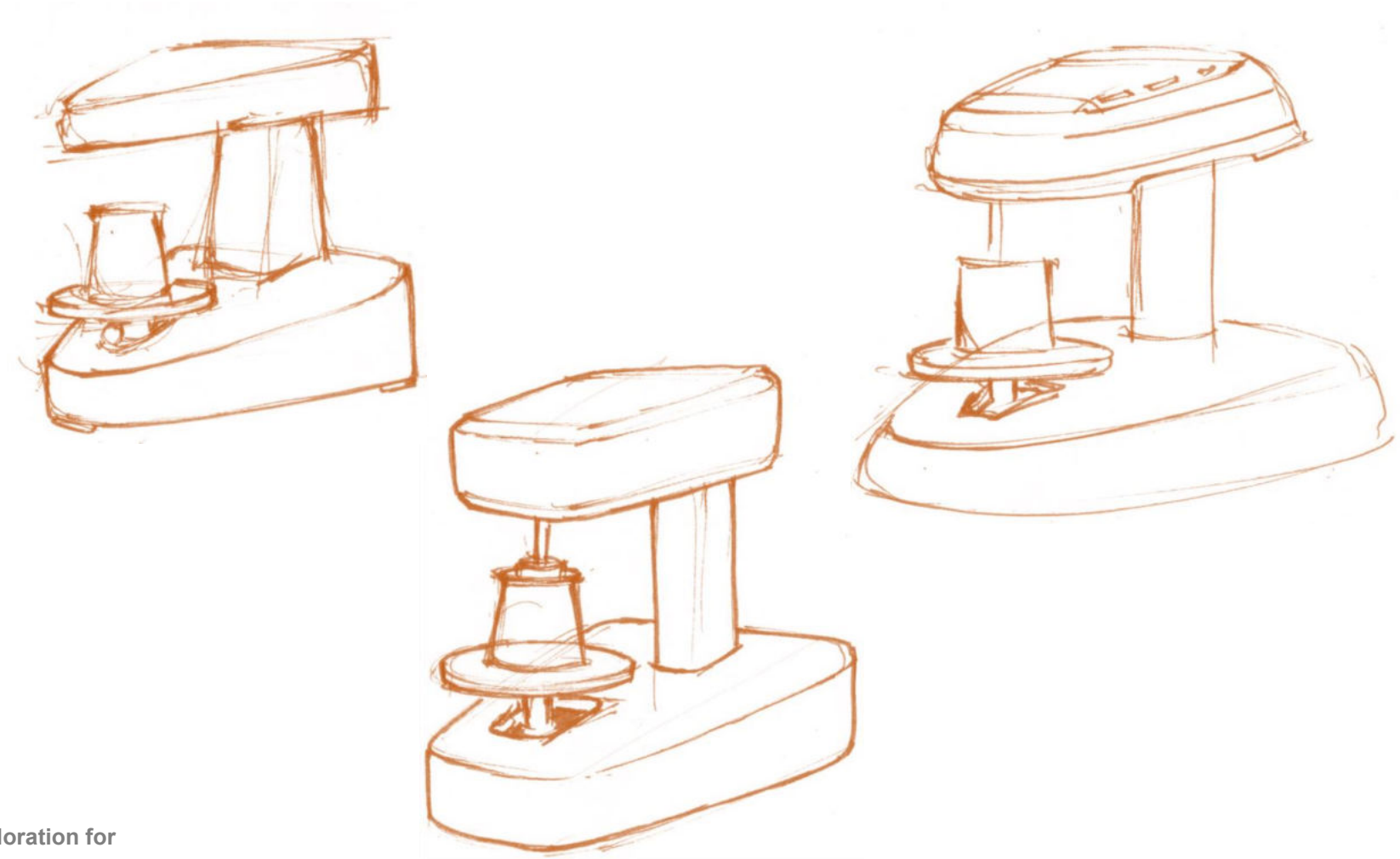
Top
Further exploration for concept#5:

Product form concepts



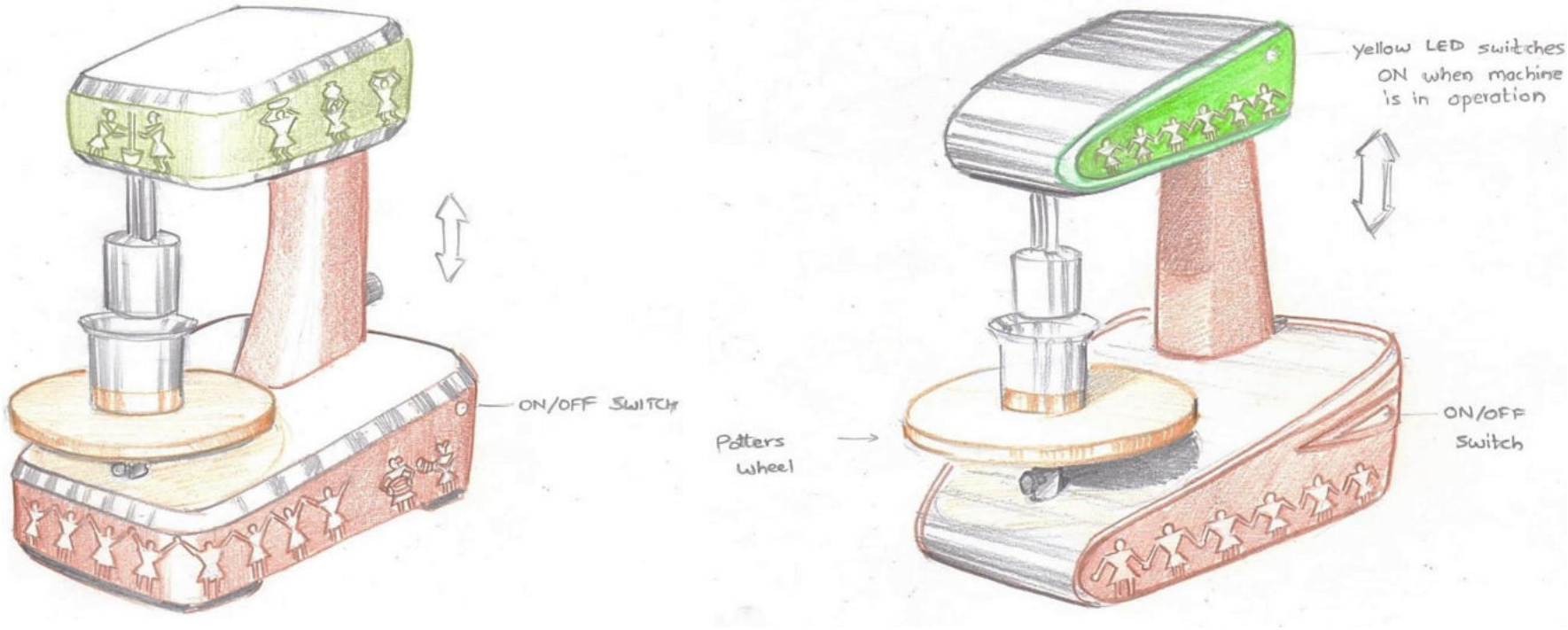
Left
Further exploration using silhouettes for concept # 5

Product form concepts



Right
Further exploration for concept#5

Product form concepts



Left
Final selected forms 1 and 2

Major Challenges

The most daunting challenge in this internship was to convince a group of engineers that creative thinking methods can be used to solve technical problems too.

The brainstorming method used managed to give some decent outputs which really worked in my favour during these discussions.

The second challenge was to try and come up with a method of making ice cream which no one else has managed to achieve successfully.

Thank you