2020

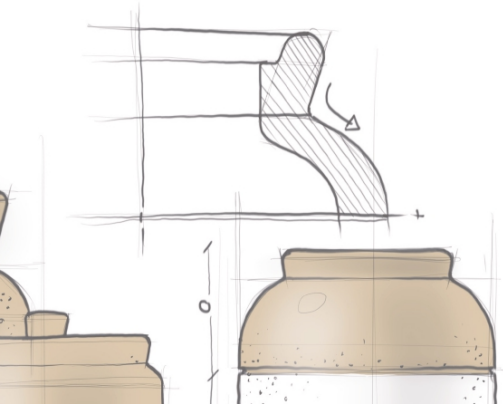
Industrial design project 3

Dosa printer

Cooking appliance Design

Guide. Prof. P. Kumaresan
By. Abhishek Jaiswal 186130006

IDC School of Design
अभिकल्प विद्यालय



Acknowledgment

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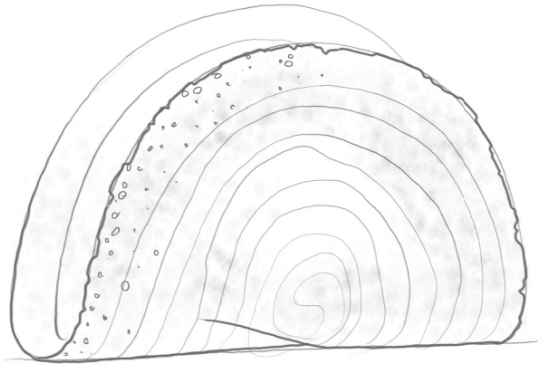
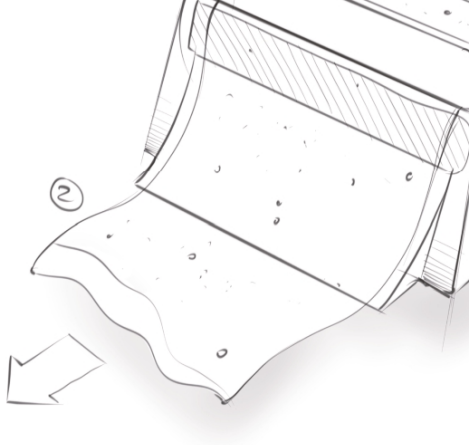
He motivated me to look at the project from a wider perspective at every stage. His pragmatic inputs at each stage were invaluable for the progress and decision.

I would like to thank my classmates and people at IDC for supporting me throughout the project and providing me feedback at every stage.

Abhishek Jaiswal 186130006

Content



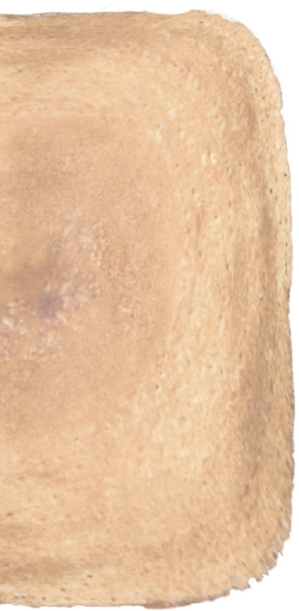


Objective

To design dosa/crepe making appliance for effortless dosa/crepe making.

Design Brief

- Appliance should ease in complex process of dosa/crepe making.
- It should not require any effort other than feeding in raw materials.
- Appliance should be capable of introducing add-ons to the dishes like layering, pattern making using different garnishes and post processing of prepared food sheet.
- Appliance should be fiexible enough to prepare various sheet based dishes.
- Effortless to use along with ease of cleaning, serviceability, lightweight and compact to store.



Research
Market Study

Understanding current market, products and services for dosa making also understanding the identity of dosa in our culture and what will change with our design interventions.

Current market

- Various number of products specific for dosa making are there in market based on multiple working principles. These products are ranging from fully manual to fully automatic functionality. But still there is an gap in this range for a product which reduces efforts of dosa making without being huge in shape.

Market placement/ Key function

Harnessing better of both worlds, a product which is compact in size, lightweight yet capable of preparing dish like dosa/ crepe without any effort. Targeted for upper-middle class consumer market.

Electric dosa tawa

- Compact in size.
- Full manual cooking process

Dosamatic (Mukunda foods)

- Full automatic cooking process.
- Very fast processing time.
- Bulky in Size.

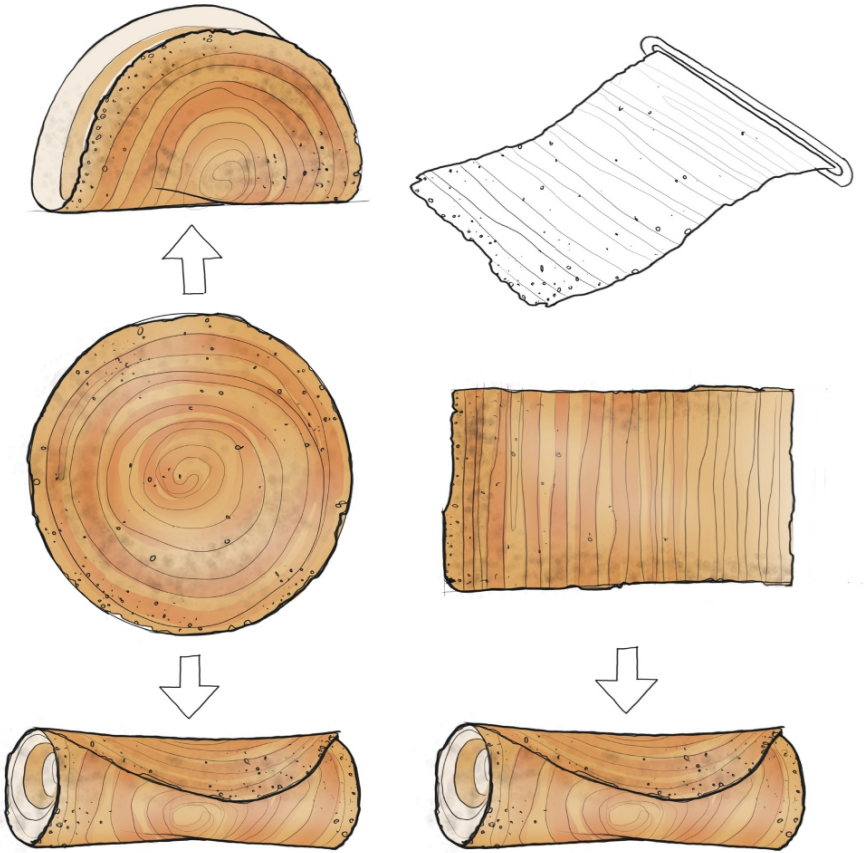
Identity of Dosa

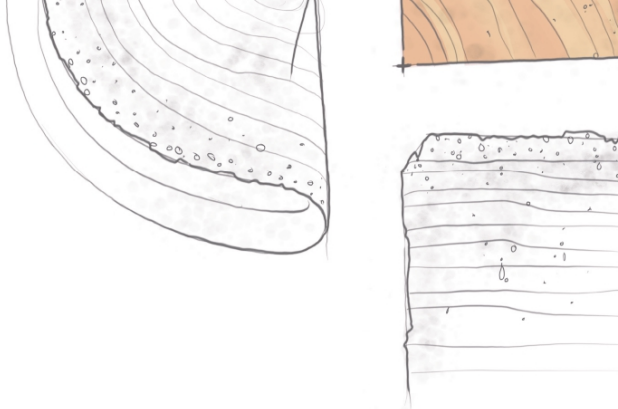
With 22 varieties dosa or dosai or dose is one of the most common staple in south India and is famous across whole Indian subcontinent

Prepared using various proportions of mixture of beaten rice and lentils with varying texture and crispness from mangalorian neer dosa to paper roast Having such diverse palette,dosas at its core have common making process and traditional touch. Apart from being such an traditional dish various other version of it are also arising in this new age where dosa are being infused with various intercontinental materials n methods.

Although all dosas are prepared in circular shape mainly and further folded into various forms to fit into a serving plate.

This identity is not getting affected as outcome from dosa printer is in form of a continuous sheet which can also be folded into similar forms.



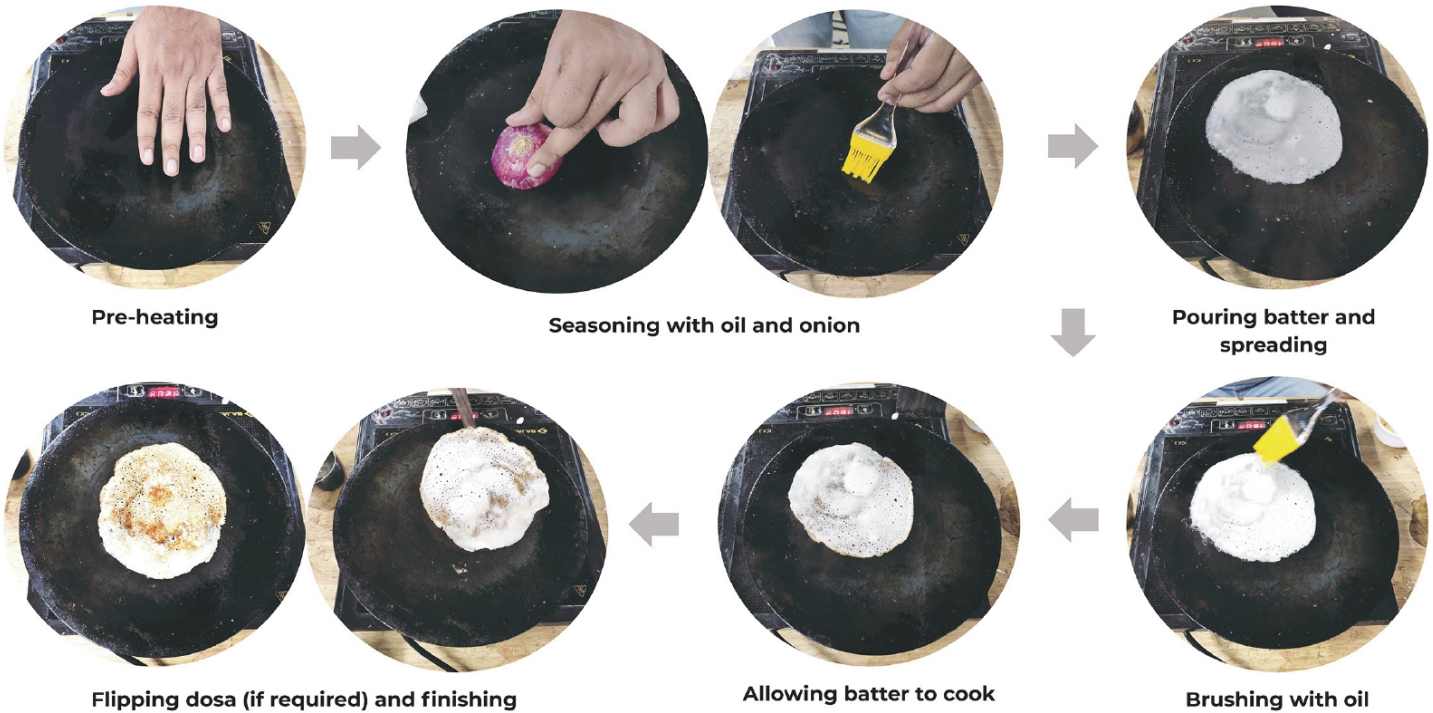


Dosa Making process

Utensils used : Induction cook-top, cast iron tawa, steel scoop (for pouring batter), Wooden spatula, oil brush

Raw material used ID fresh dosa/Idli batter, coconut oil and onion.

- **Preheating**
  Letting cook-top surface reach 160 degree Celsius
- **Seasoning cook top**
  Putting few drops of oil and rubbing a cut onion on heated surface It helps in separating dosa from surface
- **Pouring batter and spreading**
  Quantity of pour decides size of dosa to be made Spreading is done using base of pouring utensil (small steel container)
- **Brushing oil**
  Helps in cooking batter evenly and also releasing it from the cook-top surface.
- **Allowing batter to cook**
  Usually batter started raising from sides within 2.5 mins of cooking at 160 degree Celsius
- **Separating dosa from cook-top**
  Using wooden spatula to slide between dosa and cook-top to release it completely. Well cooked dosa was easy to remove from cook-top.


Pre-heating
Seasoning with oil and onion
Pouring batter and spreading
Brushing with oil
Allowing batter to cook
Flipping dosa (if required) and finishing

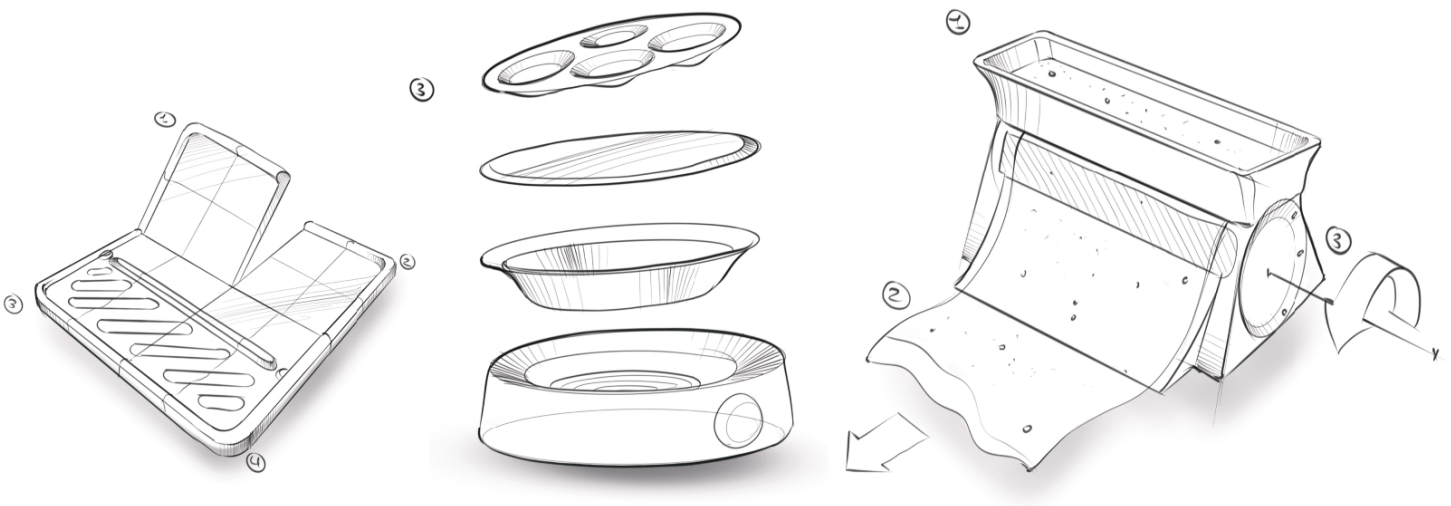
Design exploration

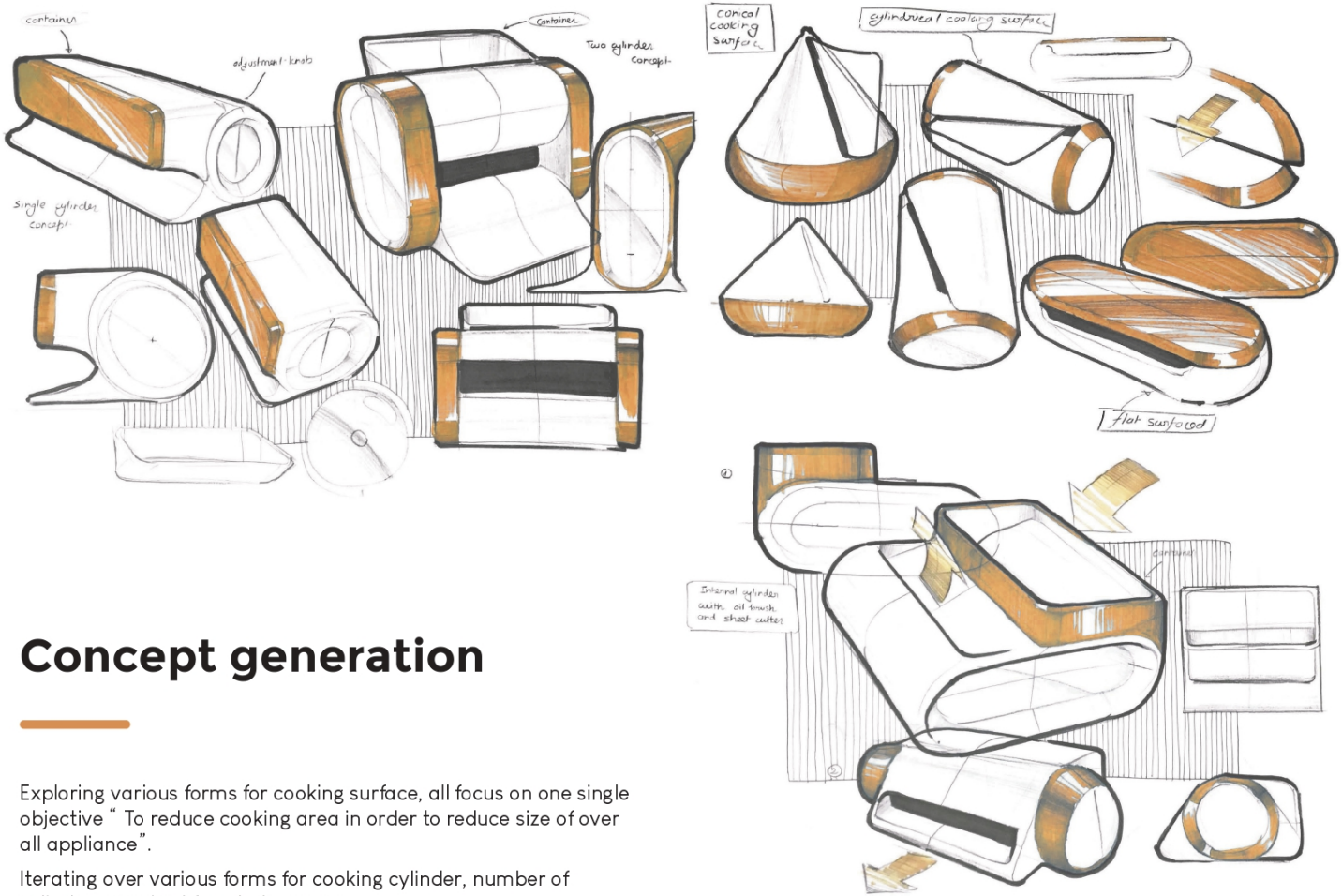
Understanding various design directions and exploring various concepts based on multiple factors.

Design Direction

Crepe printer (reducing contact area/cooking area for compact size).

Inspired from paper printer this concept can make desired length of dishes which are in form of sheet like dosa, crepe etc. Top container is feeder where various batters can be poured and as soon as cooking wheel starts rotating some amount of batter makes contact with heated surface, resulting in continuous sheet of cooked batter.

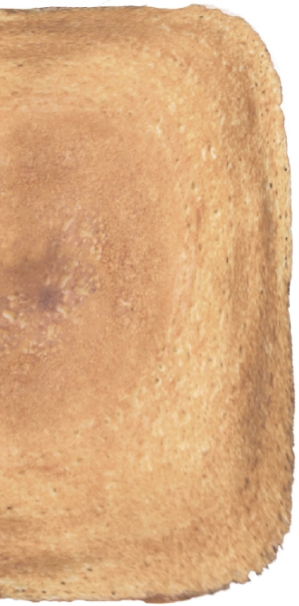




Concept generation

Exploring various forms for cooking surface, all focus on one single objective " To reduce cooking area in order to reduce size of over all appliance".

Iterating over various forms for cooking cylinder, number of cylinders required for whole process.



Working
Rig testing

Detailing out working process of dosa printer along with rig testing to solidify its working.

Dosa printer / Working process

Steps denoted in figure in different numerals indicates various steps taking place during one complete rotation on cylinder.

1. Seasoning area Oiling roller rubs against cylinder surface (45 degree rotation of cylinder).

2. Cooking area Batter from batter container comes in contact with cylinder (cooking of batter takes place during 270 degree rotation of cylinder).

3. Scraping and Brushing

A. Scraping of cooked batter sheet from cylinder

B. scrubbing of cylinder surface to eliminate all residual from previous process (45 degree rotation of cylinder).

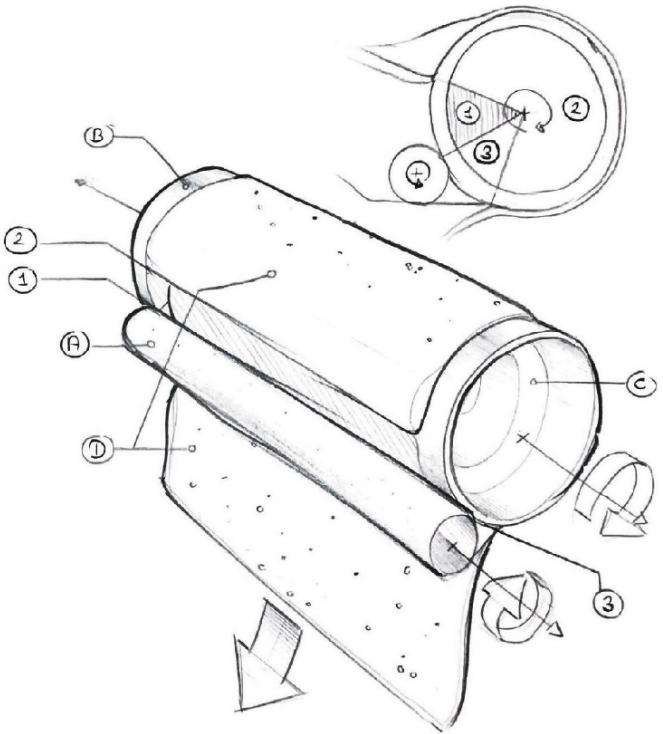
Important parts in illustration

A. Oiling roller

B. Cooking roller

C. Heating element

D. Cooked batter sheet

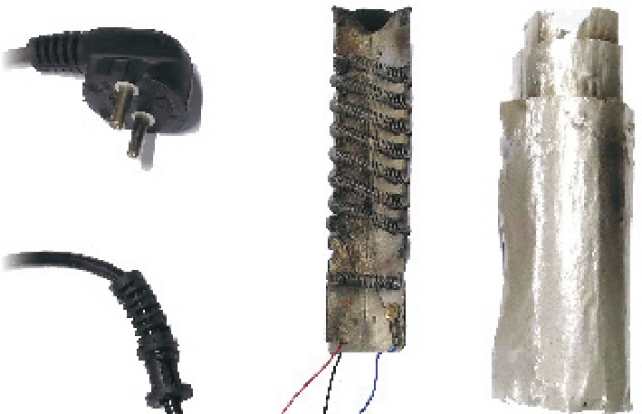


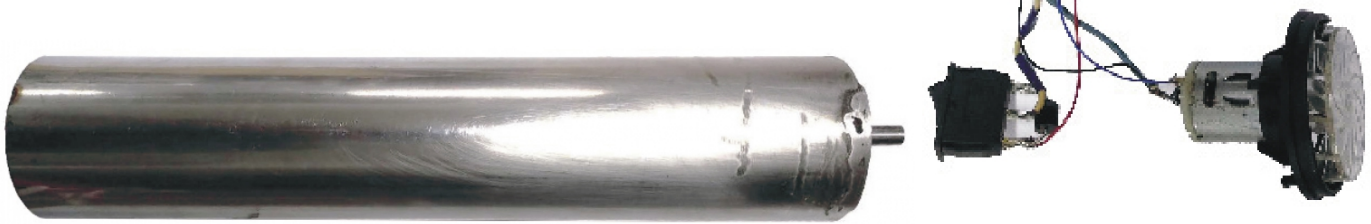
Setup / Rig Testing

For rig testing a simple setup was used which consistent of following components.

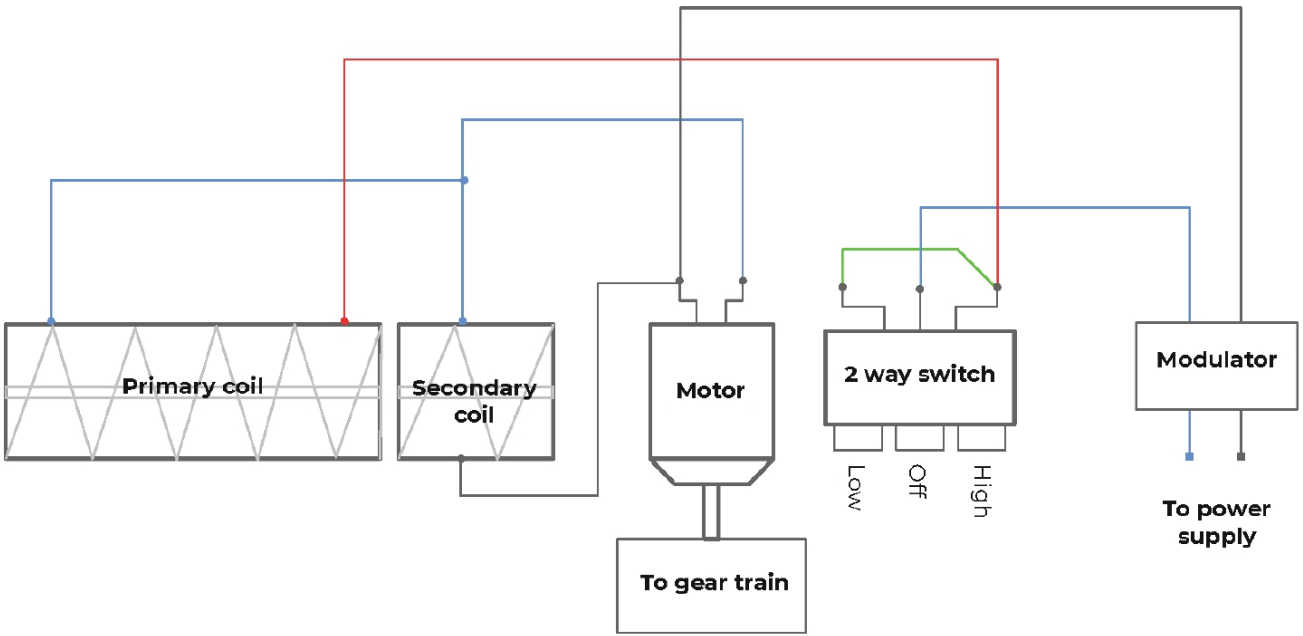
1. Stainless steel cylinder 1.5 mm, 60 X 305 mm with 150 mm effective length and cooking area (188 X 150 mm).
2. Heating element 220-240 V, 1000 W, 120 mm length (Temp. 300-600 C)
3. 2 way switch with Low-Off-high supply configuration
4. Motor to rotate cylinder (not utilized during testing).
5. Mica Sheet for uniform heat distribution.

*This rig was made using parts and complete circuitry from a heat gun. To find out if only it is able to cook batter on top of cooking cylinder in desired time period.





Rig circuitry

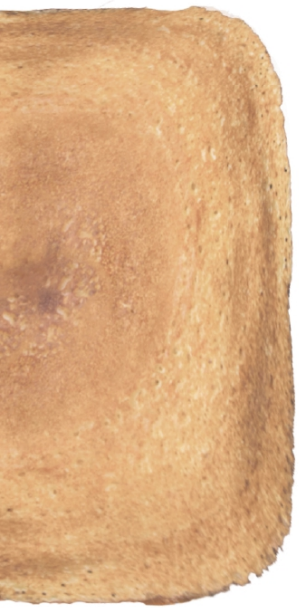


Outcome / Rig Testing

1. In initial test using bare heating element without mica sheet was causing uneven temperature across outer cylinder which caused uneven cooking also.

2. By introducing mica sheet underneath helped in obtaining smaller temperature gradient across effective cylinder length.

As finally this rig was cooking splattered batter within 60 seconds at high heat setting.



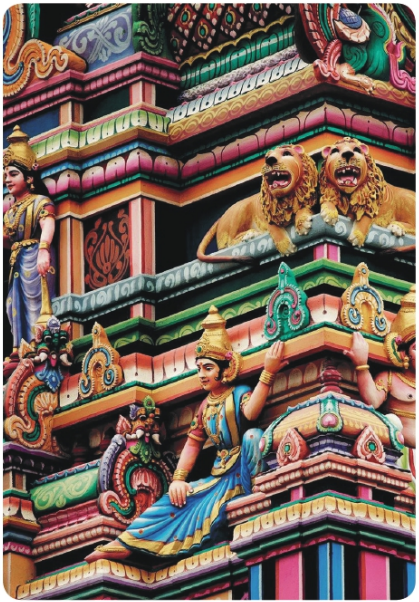
Aesthetic & Details

Harnessing essence of tradition and modern age aesthetics to fuse into one form.







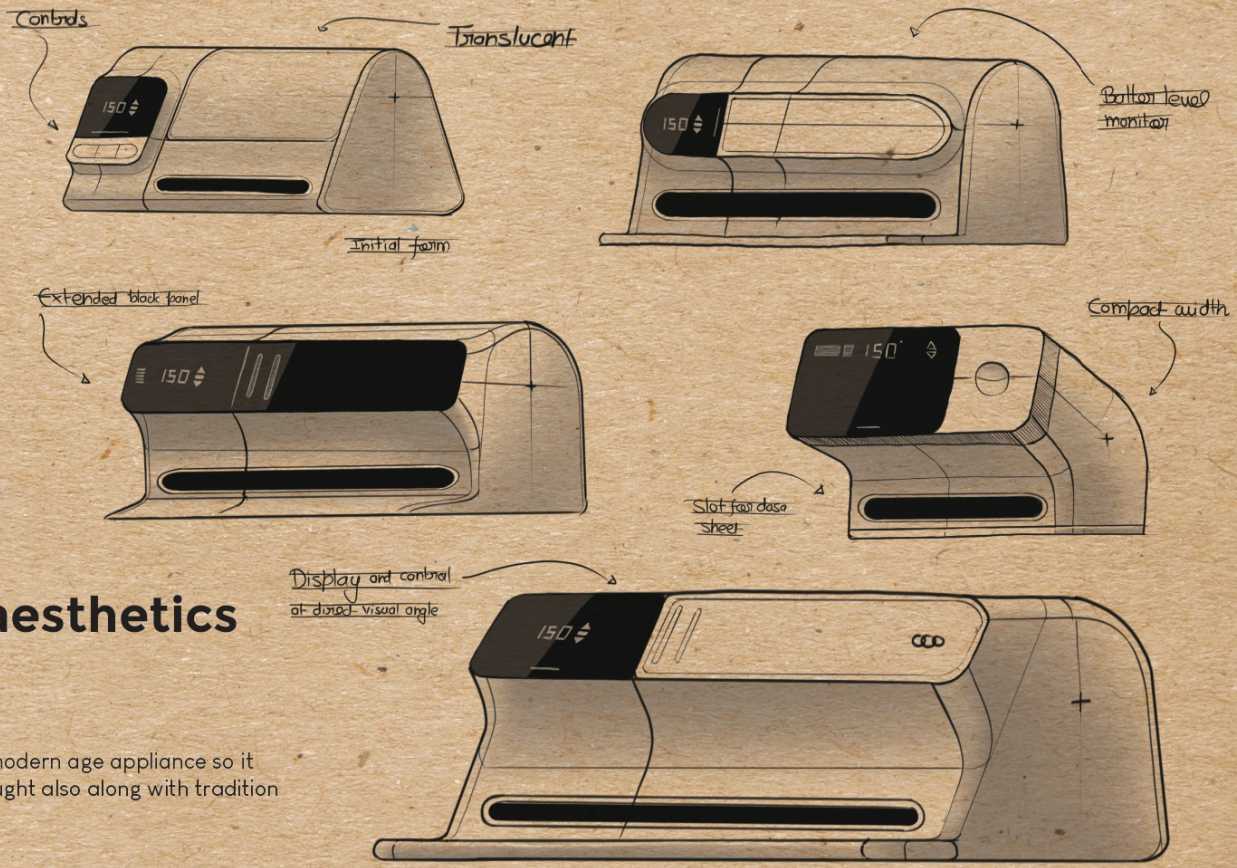
Inspiration

South India is the astounding land recognized for its rich ethnic heritage. It is among the most culturally rich region of India. This region has been carrying forward it's legacy and old age traditions, from lush green lands and mystical monuments to old temples and mouth-watering delicacies. South India has kept its traditionalism intact.

Essence of tradition

In order to blend and compliment dosa printer with other utensils in an Indian kitchen. Various design details of such utensils has been identified in order to be mimicked in dosa printer as per suitability. Their material finishes, color palette, texture, value and emotions connected to them in our memories.

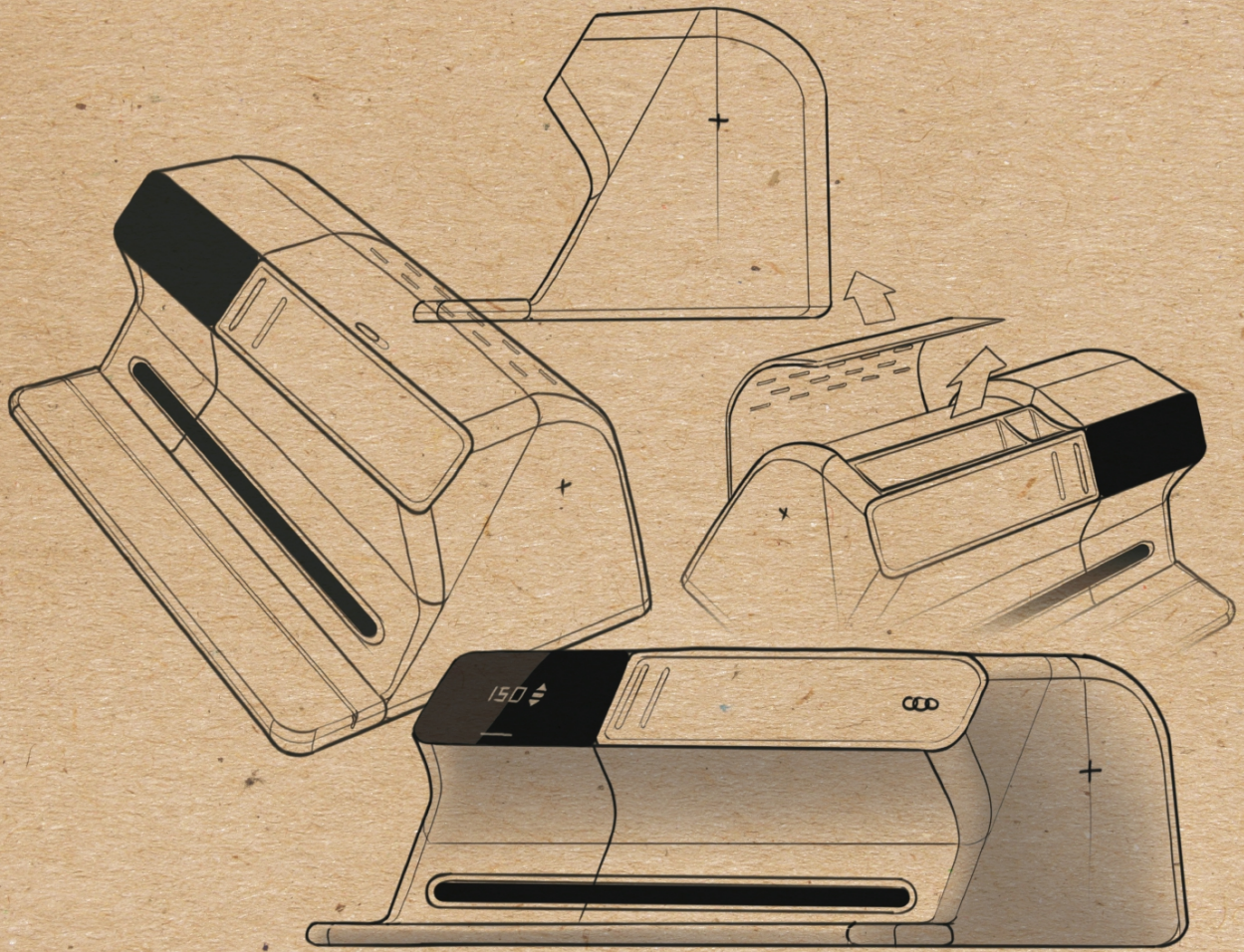
One of the most common object among these is traditional pickle jars (aachar bharani) which has always lived in my memory with that distinct combination of white and brown porcelain finish.



Modern aesthetics

As dosa printer is an modern age appliance so it should refiect that thought also along with tradition and indiginiuty.

Minimal, monolithic and futuristic are the attributes to mimic in its form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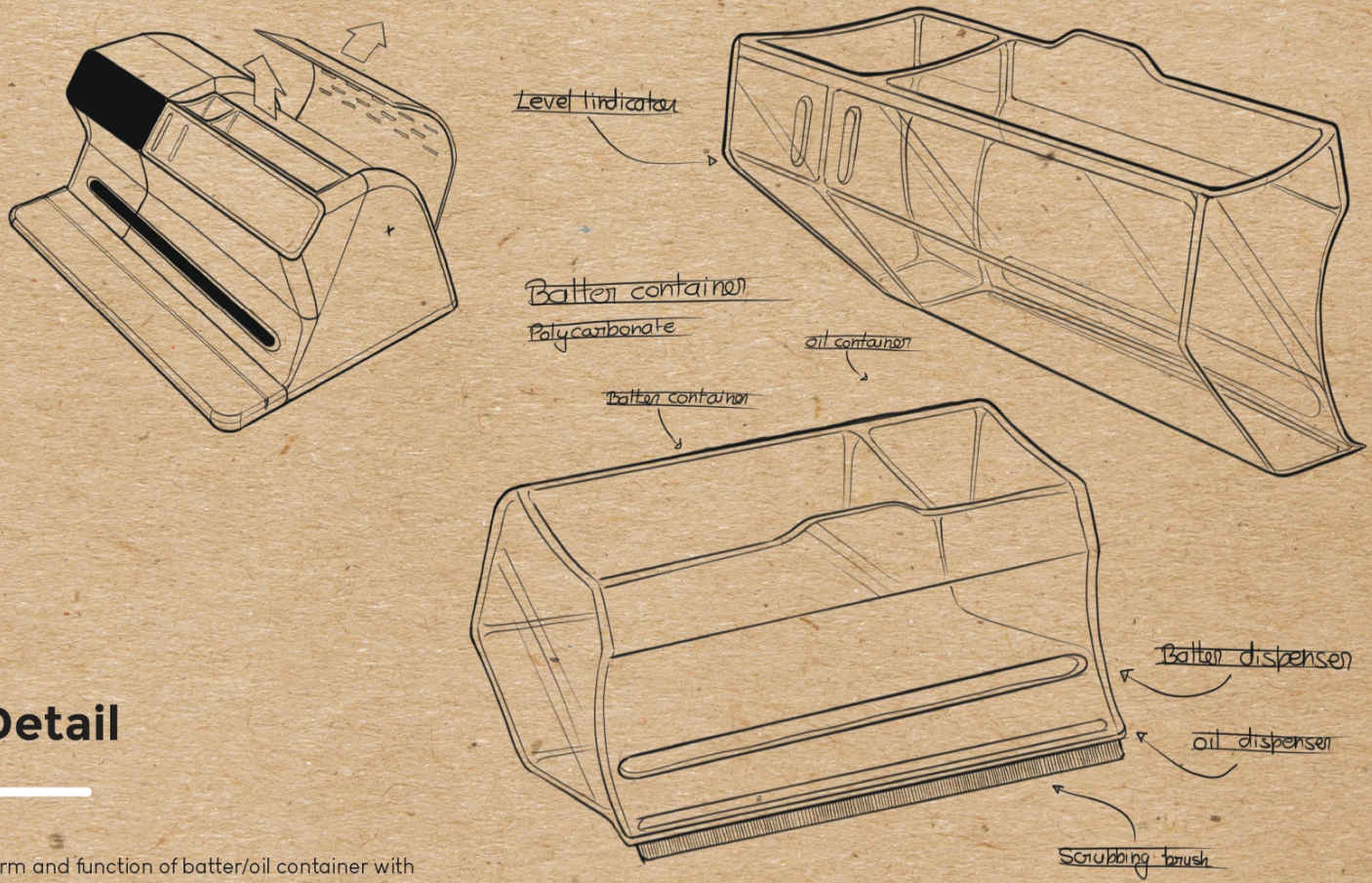


Detail

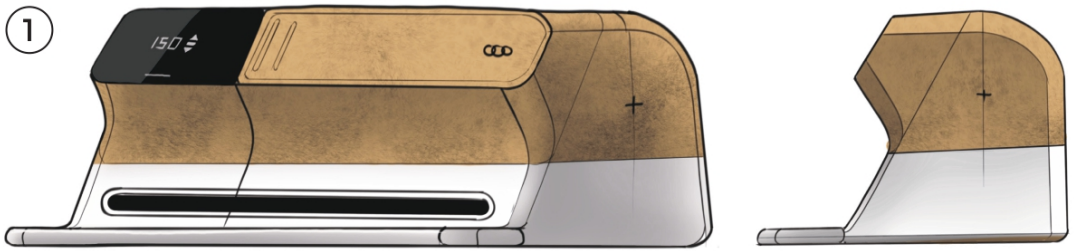
Form and function of batter/oil container with illustrations detailing about its removal from dosa printer.

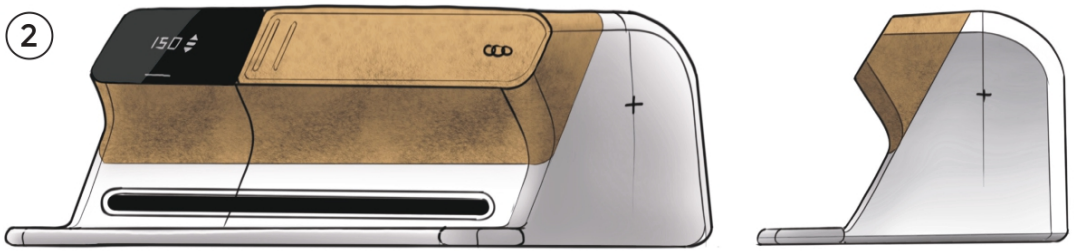
CMF

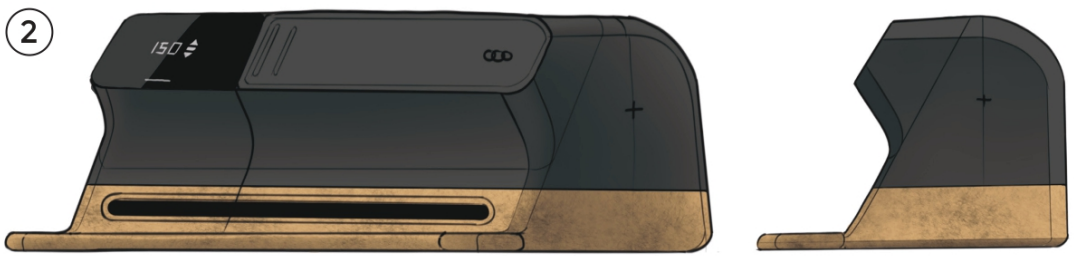
3 variants of dosa printer based on different combinations of finishes bringing different values in it.

First two are directly inspired from visual appearance of traditional pickle jars (achar bharni) with slight change in ratio of white and brown texture.

Third one is inspired from combinations of visual appearance from cast iron tawa and clay chulha.

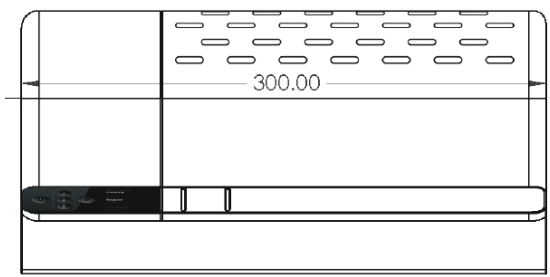


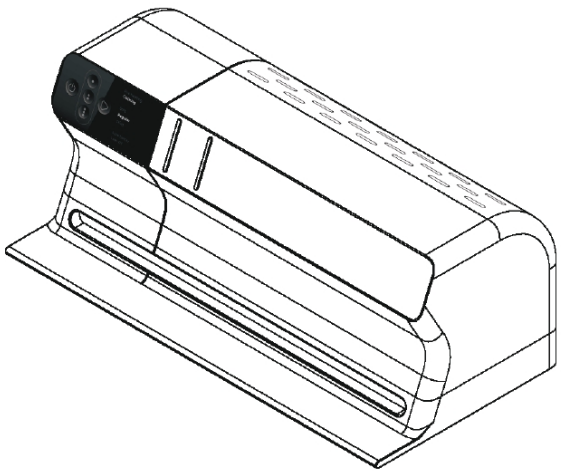


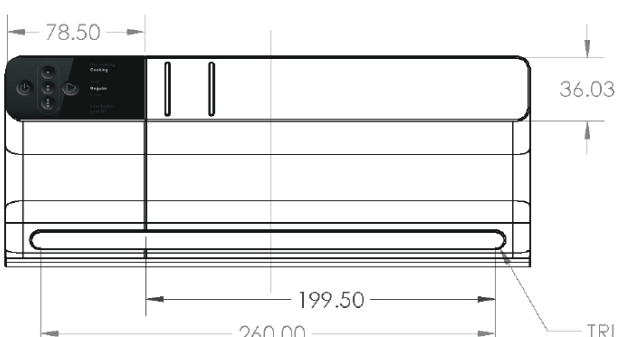


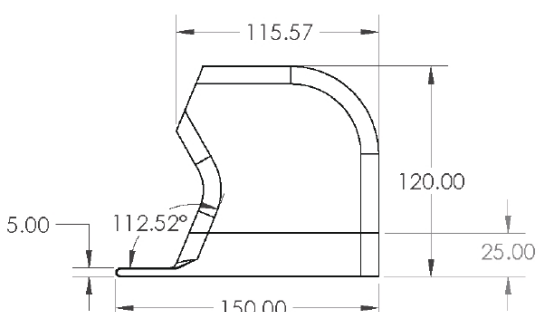
Body dimensions

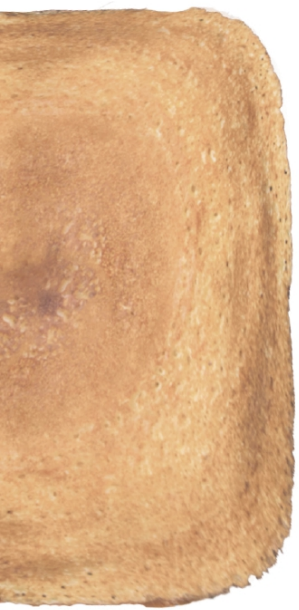
*All dimensions given below are in millimeter (mm)











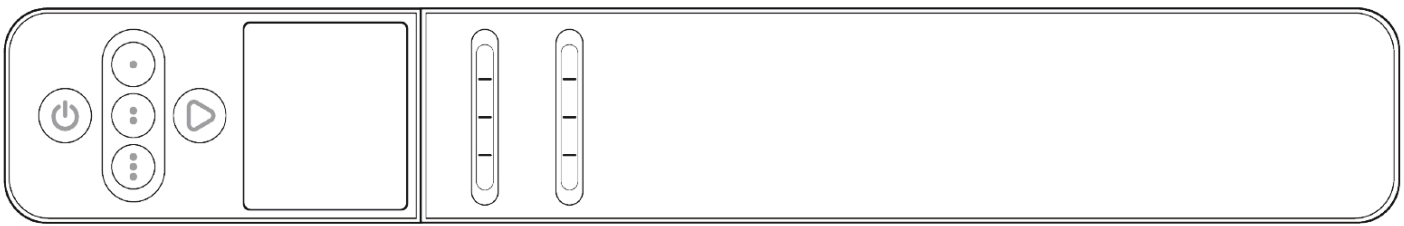
Interface

Exploring input and output elements of dosa printer to enhance its usability.

Controls

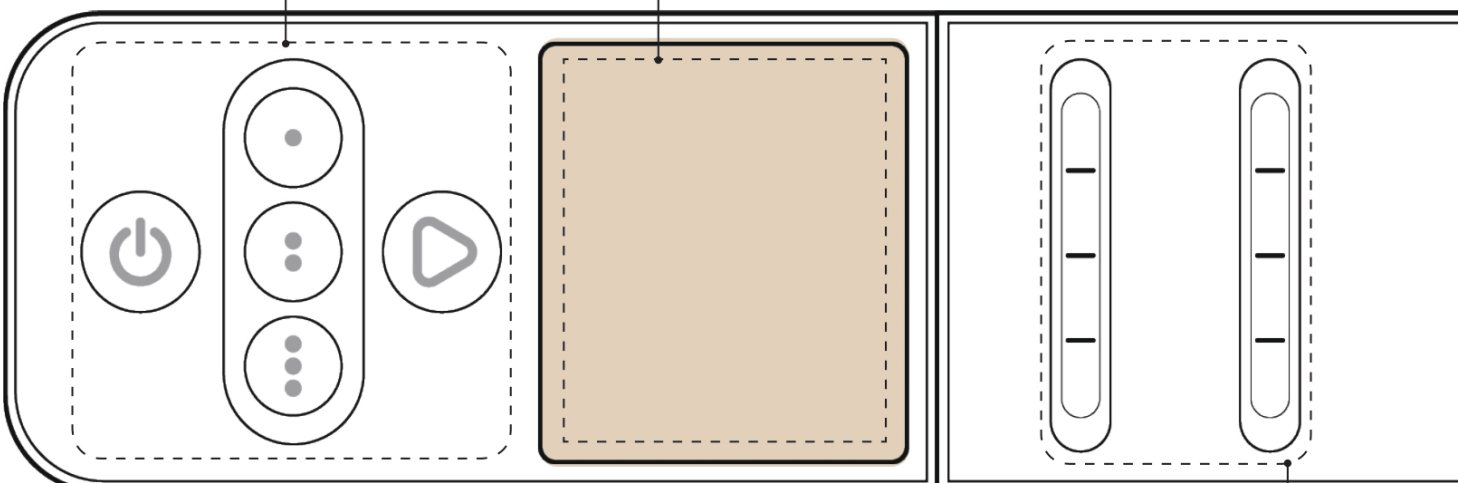
A control panel situated at face of dosa printer in 80 x 36 mm area, with step by step buttons and a feedback display.

All buttons on control panel are clustered in steps to ease in its usability.



Control buttons to control various functions and factors in dosa printer these control buttons are further divide into 3 parts explained further in next page.

Display for feedback from various processes in dosa printer also to indicate selected options for cooking.



Batter/oil level indicator to keep track of content. These indicators and simple protrusion of clear plastic from batter/oil container visible through slots on face of dosa printer.

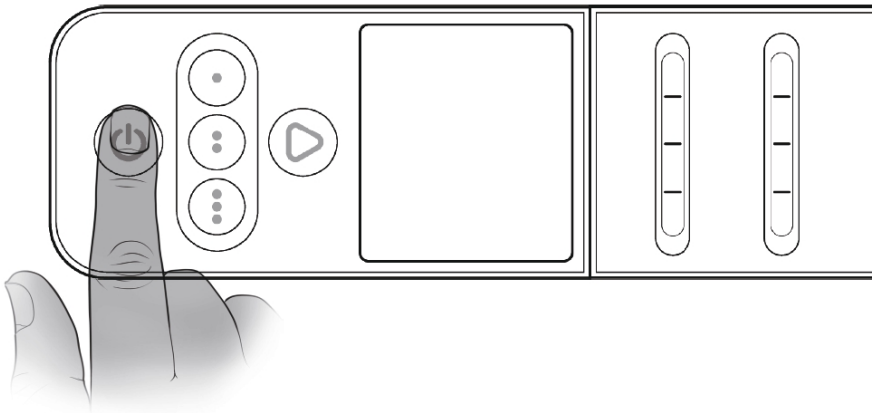
Input/output layout

Various elements of face panel are intended for their own specific functions and are divided into 3 different parts explained further.

Power ON/OFF

First button in control panel which allows to switch ON and OFF dosa printer.

Once user turns it on, a preheating cycle starts to prepare cooking cylinder inside in least possible time.

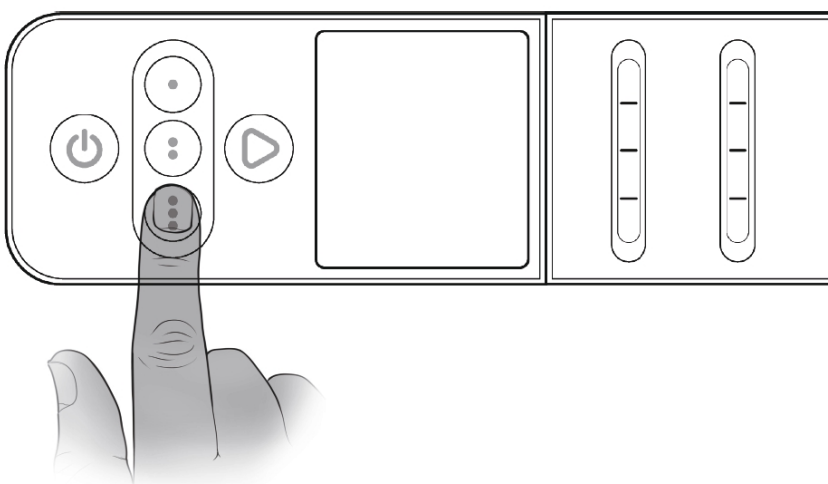


Temperature levels

3 buttons aligned with each other next to power button are temperature level controls which allows user to control crispiness of cooked dosa by selecting three different cooking temperature presets.

Once user selects temperature level, cooking cylinder starts to adjust accordingly with in that temperature preset.

During this, selected preset continuously blinks on display. Once cooking cylinder reaches desired temperature, blinking temperature preset stops and becomes solid with a buzz sound to indicate that set up ready to print dosa.



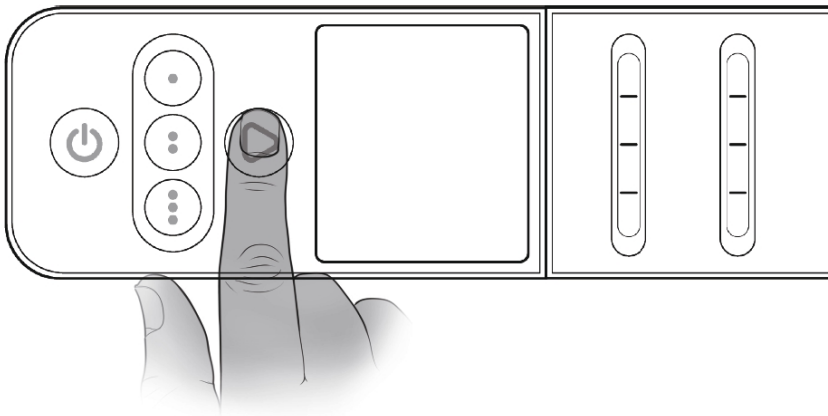
Start/stop printing

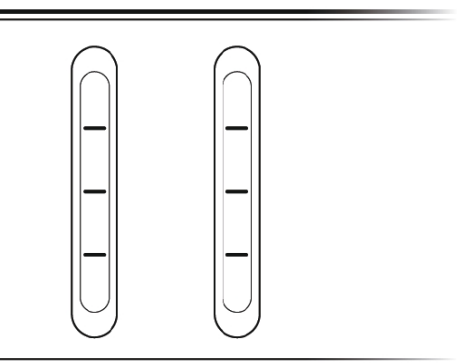
Last button in control panel to start and stop printing dosa.

Once user starts printing cooking cylinder comes in contact with batter/oil container and starts making dosa sheets.

Pressed again this button disengages batter/ oil container from cooking cylinder and cooking cylinder makes one complete rotation after that to get rid off all the batter on its surface.

User has to check/fill both batter and oil containers completely before commencing this step.





Power off

Once user presses power button again, a cleaning cycle starts in to clean all residual materials on cooking cylinder, while this cycle heating element is off.

This cylinder cleaning cycle will happen every time in case of sudden power cut or disengagement of any component in dosa printer to reduce risk of cooking surface damage.


Dosa
printer


Dosa
printer
Pre-heating
Cooking
Soft
Regular
Crispy
Low batter
Low Oil

Reference

Classification of Indian cuisines
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