

3D FOOD PRINTING

A NOVEL WAY OF FOOD CUSTOMISATION

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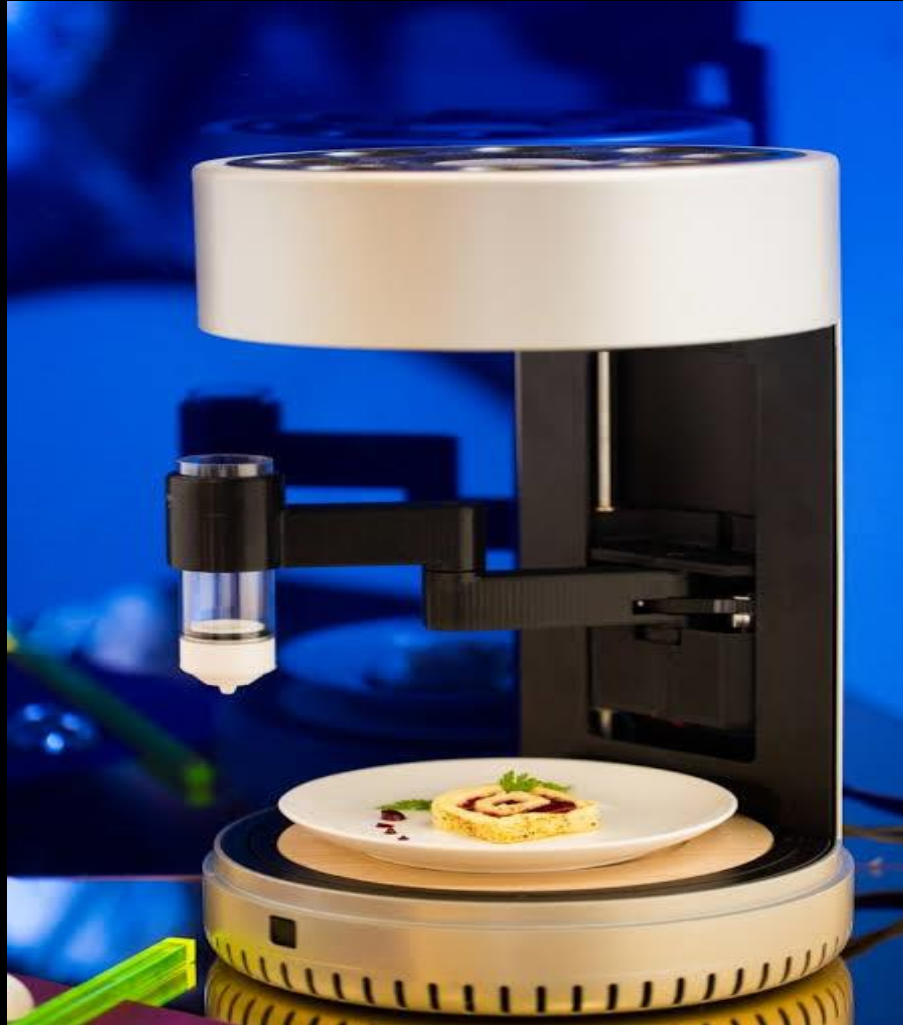
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WHAT IS 3D FOOD PRINTING...

- It is a type of manufacturing process in which the product is produced layer by layer in 3D format.
- Most commonly, food grade syringes hold the printing material, which is then deposited through a food grade nozzle layer By layer.
- The most advanced 3D food printers have pre-loaded recipes on board and also allow the user to remotely design their food on their computers, phones or some IoT device

HOW DOES 3D PRINTER LOOK LIKE

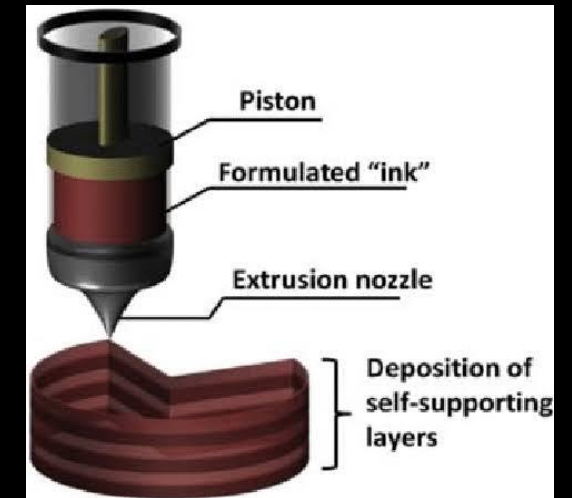


BASIC PRINCIPLE

- The basic principle of 3D printed food is solid free form fabrication i.e The ability of food Material to hold and produce A solid structure without getting deformed.
- The extruder pen places the layer of food ingredients as per the design send from computers.
- The bottom layer is quickly solidify to build more layer on it.
- To complete this a laser guided mechanism is widely used.

PARTS OF 3D FOOD PRINTER

1. Computer
2. Extruder pen or nozzle
3. Ink or food powder or food slurry
4. Platform on which food is printed
5. Laser guided mechanism



TYPES OF 3D FOOD PRINTING

1. Extrusion based printing
2. Selective laser sintering
3. Binder jetting
4. Inkjet printing

EXTRUSION BASED PRINTING

- This extrusion head pushes food materials through a nozzle typically by way of compressed air or squeezing. The nozzles can vary with respect to what type of food is being extruded or the desired printing speed.
- Highly viscous food item such as jelly, cheese, mashed potatoes , puree , chocolates can be used as ink.



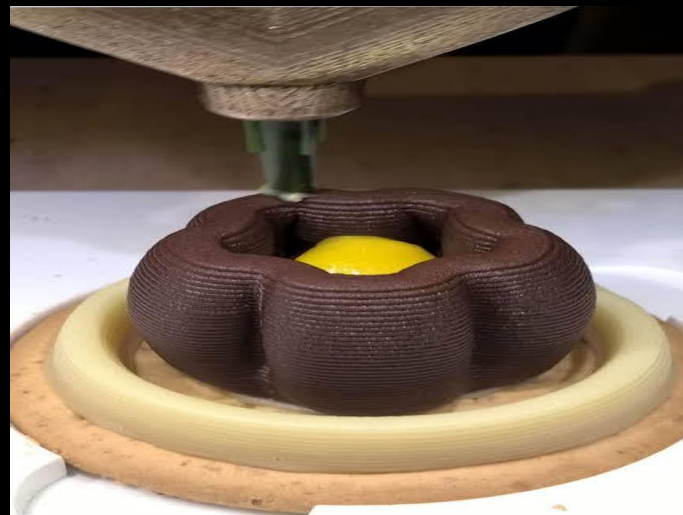
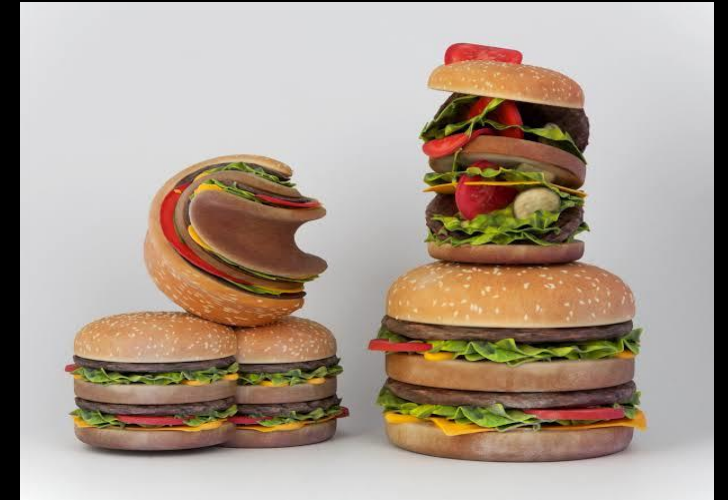
SELECTIVE LASER SINTERING & BINDER JETTING

- In selective laser sintering, powdered food materials are heated by and bonded together forming a solid structure. This process is completed by bonding the powdered material layer by layer with a laser as the heat source.
- Similarly to selective laser sintering, binder jetting uses powdered food materials to create a model layer by layer. Instead of using heat to bond the materials together, a liquid binder is used.
- Ingredients used In powdered form such as sugar powder, chocolates powder and protein powder.

INKJET PRINTING TECHNIQUES

- Inkjet printing is used for surface filling or image decoration.
- By utilizing gravity, edible food ink is dropped onto the surface of the food, typically a cookie, cake, or other candy.
- This is a non-contact method, hence the printhead does not touch the food protecting the food from contamination during image filling.
- Low viscous ingredients is used such as sauce, Coloured food ink.

3D PRINTED FOOD ITEMS

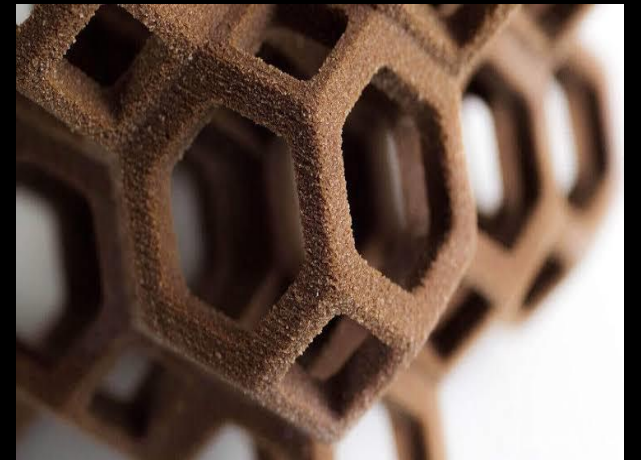


HOW TO MAKE SUGAR BASED PRODUCT

- Sugar and water are whipped and mixed together to form a light mixture called frostings.
- If the mixture is kept for very long period then it will be of very hard texture and can be used as ink for 3D food printers.
- First the fine layer of sugar is spread over the surface then immediately water is sprinkled on it within fraction of second.
- This will help to build up the structure.
- Along with Food grade colour is decorated.
- With some flavours like mint, Vanilla, Strawberry and lemon taste of sugar candy can be made.

HOW TO PRINT 3D CHOCOLATES

- Firstly the chocolate is separated in its basic component such as Cocoa butter , cocoa powder , sugar and milk powder.
- Then layer by layer these materials are printed on a platform the cocoa butter plays a vital role In this product as it gives smoothness to the product.



ROLE OF FOOD TECHNOLOGIST IN 3D FOOD PRINTING

- Formulation of food slurry or food Ink for the printer.
- Customisation of food.
- Development of nutraceutical food.
- Designing of food printer
- Increase the stability of food powder.

APPLICATION OF 3D FOOD PRINTING

- **Space food:** Refrigeration requires a lot of energy in space but generally it is absent in space. So food gets easily spoiled Within 10 days. But 3D food printer can change this scenario by printing food in space station with improved shelf life.
- **In Chocolates and sugar based product industries.**
- **Ready to eat foods.**
- **In producing food supplements.**

CHALLENGES IN 3D PRINTINGS

- Cost
- Limited resources
- Compatibility of materials
- Acceptability of consumer
- Capacity of printers



THANK YOU.....