PROJECT REPORT

Of

BISCUIT MAKING

PURPOSE OF THE DOCUMENT

This particular pre-feasibility is regarding **Biscuit Making Unit**.

The objective of the pre-feasibility report is primarily to facilitate potential entrepreneurs in project identification for investment and in order to serve his objective; the document covers various aspects of the project concept development, start-up, marketing, finance and management.

[We can modify the project capacity and project cost as per your requirement. We can also prepare project report on any subject as per your requirement.]

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PROCESS OF MANUFACTURE

Biscuit manufacturing consists of four major processes mixing, forming, baking and packing.

Mixing

Mixing is a process where all ingredients are put together in right proportion for dough formation. These ingredients are then fed into Mixers where mixing is done and dough is prepared for molding.

Major ingredients are flour, fat, sugar and others as per the product one would like to have.

Mixing can be done in one stage, two stage or three stages.

One stage or all in One is type of mixing where all ingredients and water are added once .Mixing is allowed till satisfactory dough is prepared .Normally this type of mixing is used for hard Dough.

Two - Stage mixing:

Creaming: All ingredients are added with water and mixed 4-5 minutes except for flour.

2nd stage: Flour with chemicals are then mix with the creaming product to form a consistent dough.

Three stages mixing:

Stage One: fat, sugar with other ingredient like milk, chocolate, malt, honey etc are mixed and cream is prepared with portion of water.

Stage two: Salt, chemical and flavors with colors are mixed with water.

Stage three: Flour with water is then added to the prepared cream and mixed till satisfactory dough is prepared.

Mixing process has following characteristics which have been monitored for better result.

Method.

Mixing time: Normally any mixing could be achieved within 15-25 minutes. Much depends on mixing speed of mixer, flour characteristics or temperatures required for dough.

Dough Temperatures : Very important factor the temperature ranges between 35 deg c - 42 deg c as per biscuit variety .Temperatures are maintained by refrigerant equipments like chillers , direct expansion type chillers .In winter dough temperatures are maintained by heating equipments

Dough consistency: This is done manually by checking dough and stretching the dough it should not break neither should it be so elastic . These methods are mastered by bakers by trial and error method.

For cracker variety dough had additional ingredient yeast and dough are kept for 10- 24 hrs.

Different type of Dough Mixer

DOUGH MIXERS

The mixing stage is of great importance in biscuit-making technology, as a good process starts from the head of the line. In the mixing stage, all ingredients must be uniformly and evenly incorporated in a consistent mass and transformed into a dough which can be processed by the next set of machines. Various mixing machines are available according to the type of dough to be handled.

They include:

Horizontal mixer, suitable for hard sweet and rotary molded biscuit dough.

Vertical mixer, mainly used for cracker production, especially for the sponge and dough process.

Planetary mixer, particularly suitable for soft dough, mainly for wire cut or deposited products; it can also be used for rotary moulded dough.

Spiral mixer, much used in the bread industry, it is also suitable for rotary moulded dough.

Each of these mixing systems has its advantages and disadvantages, so the choice of the mixer type, size and performance must be carefully evaluated by our specialists.

HORIZONTAL MIXERS: Mixing arm is parallel to floor .Popular models are z arm sigma mixers . Tilting arrangement is available with options of dual speed with jackets for cold and water.

VERTICAL MIXERS: Mixing arm is perpendicular to floor

SPIRAL MIXERS: Mixing arm is in spiral shape . Main features are folding mechanism for the dough bowl lid . Options available are fixed bowl type ., removal dough bowl type , Tilt over mixer .

PLANETARY MIXERS: Multiple speed and high speed dough mixing for batter or cream preparation .

Forming

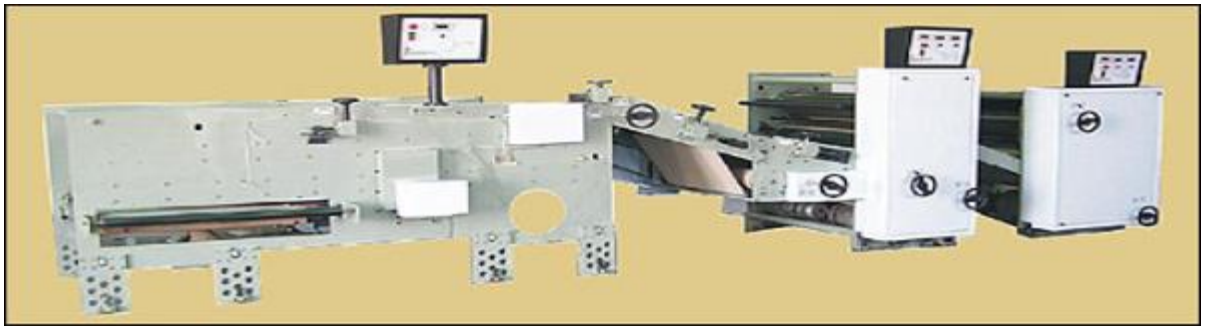
In forming sections the dough is passed through several rolls to form sheets , these sheets are then converted into One uniform sheet of desired thickness it is normally 6-5mm.
Moulders and cutters are used to cut sheet or convert dough into desired shape and size

Stages in forming

laminators : Dough after mixing in tipped into laminators hoppers with some mechanical /pneumatic tilting . There are two type of laminators.

Horizontal type laminators: If space is not the constraint then horizontal type laminators are the best selection as the maintenance and repairs are easily done. The lamination and the controls are visible . Changing webs and rolls are very

easy .Pneumatics and servo motors are used in now modern day laminators for automated speed to be synchronized with rest of the plant .11-14 sheet per batch.



Vertical type laminators : Vertical type of laminators have been there for very long its useful if space is a constraint. Dough is passed through three stage rollers and after lamination of sheet it cut into sheets which are then carried to rollers through inclined webs.

Gauge roll stands . Reduction in sheet is achieved through numerous gauge roll s stand . Popular are three stand gauge rolls or four stand gauge roll . Reduction are achieved in stages as not to create too much stress on the sheet , webs are provided in between for relaxation even an additional web is provided prior to

cutter to release stress from dough sheet. Best results are achieved through four stand gauge rolls . These gauge roll are of different diameter depending upon the plant capacity could be as small as 6" ,8"' , 10" , 12''and 14'' . Speed are set as per plant and cutter rpm . Gauge roll speed has to be increased in every stand so as to maintain the flow of sheets

Dough sheet conditioning: Dough sheet conditioning is done as per the ambient conditions in the plant.

Steam spray - to moist the web surface

Blower : to dry the dough surface.

Flour dusting : to dry the wet surface of the dough .

Above process is mainly for cutting Variety .

Toppings: Toppings are done through mechanical, vibratory or sprays. Means where a hopper is placed above the plant line after the cutter . The toppings could be milk, salt, sugar or cashew, pista bits.

Rotary cutter:

Rotary cutter consists of cups which are a attached to the cutter shell. This shell is then fixed to the shaft and drive mechanism . Two types of rollers are popular One is complete on mould shell where cups are attached in the cavity designed for the cups with dowel pins .

Second concepts is also very popular when shell has several rings fitted over it. This helps in easy removal of damaged part and also very helpful in taking various trials .

Cuter is coupled with rubber roller of shore hardness approx -80-85 . Rubber roller or the pressure roller helps in releasing wet biscuit .

RPM : Rotary cutter speed is set as per plant capacity and baking time , Variety .

Band coverage efficiency : It is ratio of total surface area of cutter -moulder / no biscuit cups

Moulding Roller :It is applied for short dough ,The dough is prepared in lumps these are then fed to die roll through either reciprocating conveyor to The hopper or a rotary conveyor which allows these dough crumbs to spread uniformly on The die roller surface .

These die roller have dies engraved into it . Dough pieces are then released by feed roller which pushes The dough into The dies.

Baking

Wet dough pieces of desired weight and shape are then passed on to oven band through swivel panner web .Ovens are of different types classified into following categories .

a. type of heating b. type of fuel c. type of design d. width of oven band
e. Number of zones .

Heat is transferred to biscuit on band through all the three ways of heat transfer ie conduction , convection , radiation .

Following are the chemical and physical changes which occurs in oven ,When dough piece is passed on to oven .

Physical changes .

1. Formation of crust 2. Melting of fat 3.gas expansion in dough piece due to co2 expansion at higher temperatures . 4. Water converted into steam .
Escape of gases and steam would result in collapse of biscuit structure.

Hence these are passed on to different zones with gradual increase or decrease of temperature .zones are classified as

1. Heating zone
2. Baking zones
3.Coloring zones

Chemical changes

1. Gas formation 2. starch gelatization 3. Protein changes 4. caramelisaion of sugar 5. Dexterisation

COOLING

Cooling process is as important than any other process , When biscuit comes out with oven the temperatures of biscuit are around 70-95deg c, These biscuit can be cooled by letting it travel for distance of 1.5 times of baking time . so if you have a oven of 200 ft then cooling conveyor length would be approx 300 - 350 . In some places forced cooling is also done due to space constrain or for special features .Cooling brings temperatures to room temperature for handling of biscuit for packing.

Packaging.

Bakery packaging has certain specification which are unique for bakery products. Major packaging are Biscuit packaging and bread packaging

BISCUITPACKAGING

Biscuits are fed into packing machines in continuous stacks this is either manual or with help of auto feeders with help of feeding chutes .Biscuits are fed into packing machines in continuous stacks this is achieved through stacker which converts free flowing biscuits into uniform achieved through stacker which converts free flowing biscuits into uniform stacks .These are done through guidelines which could be adjusted as per type of biscuits .

Major function of packaging are

1. Protect from mechanical damage in transit and loading and unloading

2. Protect from loss of moisture and any foreign odour contaminations

3. Protect from Foreign body infestation.

4. Legal compliance for values and ingredients for consumers

5. Advertisement

Biscuit are wrapped with packing machines and wrappers are sealed as long and ends. These are sealed with helps of heaters .Coders are synchronised with machine speed to print details to the packing material .

Packs could be of various size and shape . Popular are pillow pack and family packs with wt ranging from 25 gms to 400gms . These packs are then put into cartons are then taped by passing through carton taping machines .Now biscuits are ready for dispatch .

Various type of packing material is used in biscuit industry.

Primary packaging: Laminate/Wrapper , Wax Paper and Bopp films . These are tailored made for various packs where the cut-off-length and width are decided prior to packing material production .

Basic properties for laminates n corrugated boxes are Bursting strength , GSM and thickness of films measured in microns .Values varies from one product to other.

Selection have to be done on above parameter.

Primary function of packaging are protecting biscuit from foreign body infestation, increasing shelf life , product and manufacturer info and transportation.

Technological innovation has made possible to have various shape , sizes and colours for biscuit packaging .

The important groups of packing material are

- Carton boxes
- Display boxes
- Bopp films(flexible packaging)

Printed clear film

- Wrapper

Pearlised metallised.

- Stickers
- Bopp tapes
- Tear tapes
- Shrink films
- Polypropylene sheets
- Pouches
- Pvc trays

Role of Ingredients.(Raw Material)

Sugar

Primary role of sugar in bread and biscuit is provide sweetness(taste) to the product .Color to the product due to carmalisation .Color of the crust in bread loaves is due to the sugar .Basic role of sugar is to activate the yeast to produce carbon dioxide and alochol during bread manufacturing .

Note: When preparing for mixing yeast is separately being put into ammonium chloride and sugar solution .

Hydrogenated Vegetable Oil -(HVO)Main function of HVO is to retain the moisture inside the dough. Give smoothness to the bite .

Salt

It provides taste to the product. Salt act as controlling agent against wild yeast activity .Thus controlled yeast activity can provide better texture or network .

GMS (Glycerol Mono stearate)-

Its act as emulsifier which binds together the oil and water molecules and it helps bread to hold moisture.

SSL (Sodium Stearoyl lactilate)-

It is also known as Smoother .It is a compound which retains softness in bread and delays staling of bread .

SMP (Skimmed Milk Powder)-

Solution-Main function of Skimmed milk powder is to give flavour to the product and sweetens the product.

Ammonium Chloride-

Ammonium chloride provides Nitrogen which used to activate yeast in presence of water and sugar.

Yeast-It is an unicellular living organism .Its growth is max at higher humidity and temperature 45 deg c .Yeast action on food releases carbon dioxide which gets entrapped in dough and gives puffiness to the product after baking .Yeast are used for sour dough products or Sponge dough products . Sponge are prepared in cracker production yeast is added during mixing are then kept for 18-20 hrs before production.

Commercial yeast are of two types - Compressed yeast and Dry yeast

Compressed yeast - These can be further classified as

Breweries yeast - It acts on malt to give alcohol and carbon dioxide.
Distillers yeast- It acts on molasses to give alcohol and carbon dioxide .
Bakers yeast - It acts on sugar to produce carbon dioxide and alcohol. Carbon dioxide is the main by product.

Other features of compressed yeast

Its available in cake form Its cheaper than dry yeast Moisture content is 80% Life of compressed yeast is 5 days Cell usage is 90-95%.

Dry Yeast

Its costlier than Compressed yeast.Its is available in powder form. Moisture is around 5% Life of dry yeast is more than one year.Cell usage around 60%

Types of Biscuit-(Process Type).

Laminating, sheeting and cutting type.

Here The dough is passed through laminators to produce sheets these multilayer sheets are then fused into single sheet of desired thickness .This sheet is then passed onto cutter of various shape and sizes of cups/dies.

Examples :

creamcrackers ,
puff crackers,
marie gold ,
ritz,
tucs
salt n sugar cracker
fifty- fifty
krackjack
monaco.

Moulding type:

The dough is in short crumbs form and is directly fed into rotatory moulder with dies of various shape and size.

Example.
Nice
Good Day
Glucose
Malt n milk type glucose
Choco chips biscuit
bourbon

Extrusion type, rout press & wire cut:

Here soft short dough is passed through holes in extruders and these doughs are then wire cut in pieces which are directly dropped into oven band .We can co - extrude two three types of dough from the die where the central dough could be jelly or jam .These ropes can be cut after or before baking .

Examples.
Butter cookies
Chocolate cookies
Fig rolls
Date rolls

Depositing type:

Here the soft pourable short dough is passed out from extruder and directly laid on baking bands . The depositor may rotate to make swirls and twists on to the products.

Examples.
Cream Treats.

Wafers:
Here pourable batter is placed in baking plates which are then baked into wafer oven these are baked into thin sheets these sheets are then filled by different creams varieties .These sheets are then cut into small fingers of different wt configurations .

Examples

Kitkat Wafers
Wafer chocolates.

Sandwich cream type

Bourbon
milk bikis
pure magic
Chocolate moulding
Chocolate depositing

Following types of recipes are popular in biscuit manufacturing

Glucose - sweet plain biscuit
Salty
Sweet and Salty
Cream biscuits (vanila , straw berry , banana , milk , coconut , chocolate , orange)
Nice : (coconut flavour)
Cho co chips
Bourbon
Digestive
flavored

BISCUIT PLANT LAYOUT

The following plant layout are most suitable for biscuit production line.

Mixing areas has to be double storied as premixing has to be done on the first floor which helps in putting ingredient s to the mixers and in some cases dough to the laminators .Provision for good s elevator has to be kept as ingredients has to be moved to upper floor .Roof has to be provided with natural ventilation so as to reduce the temperatures of baking hall . Packing hall could be on the same floor or could be on the first floor. Basement could be made for raw material storage.

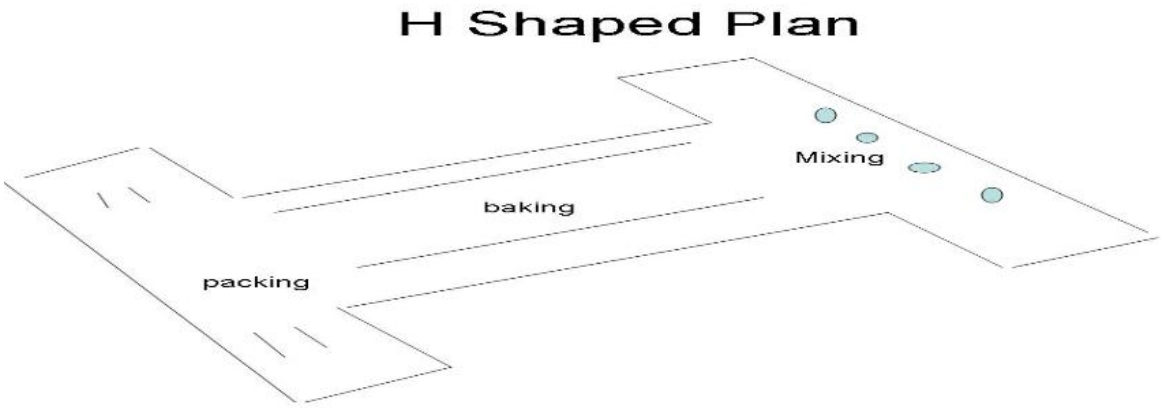
H- Shaped plant layout

The most popular biscuit plant lay out is H shaped or I shaped. The mixing and packaging section occupies the ends are the ovens the main section.

H section is the ideal plant layout where we can have mixing section near to the production line . Packing section is also best placed in H type plant layout

Highlights of H type plants.

- Mixing and packing at the ends
- Production flow is smooth
- Pre -Mixing can be done on the same floor
- No bends hence less maintenance of 90 deg conveyors
- Less wastages



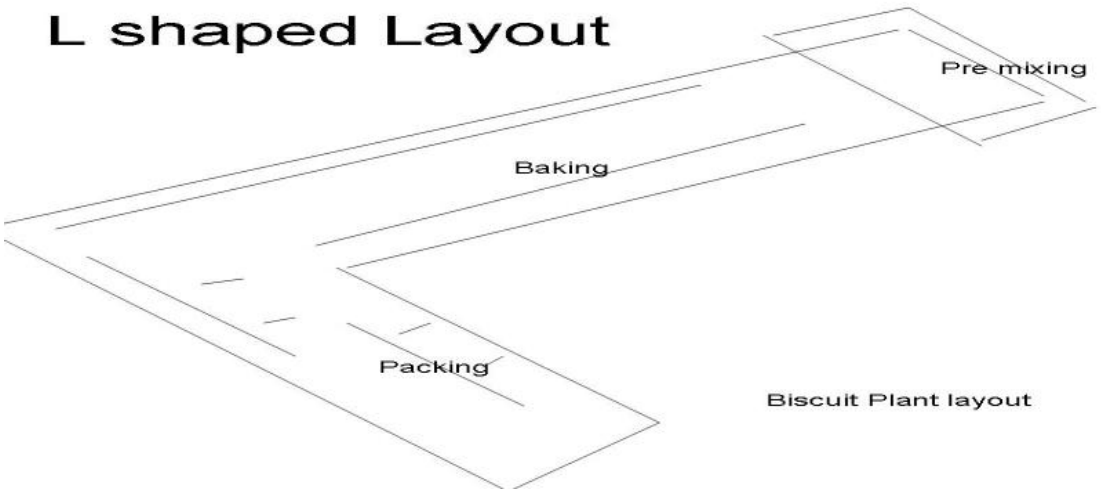
Biscuit Plant layout

L shaped Biscuit

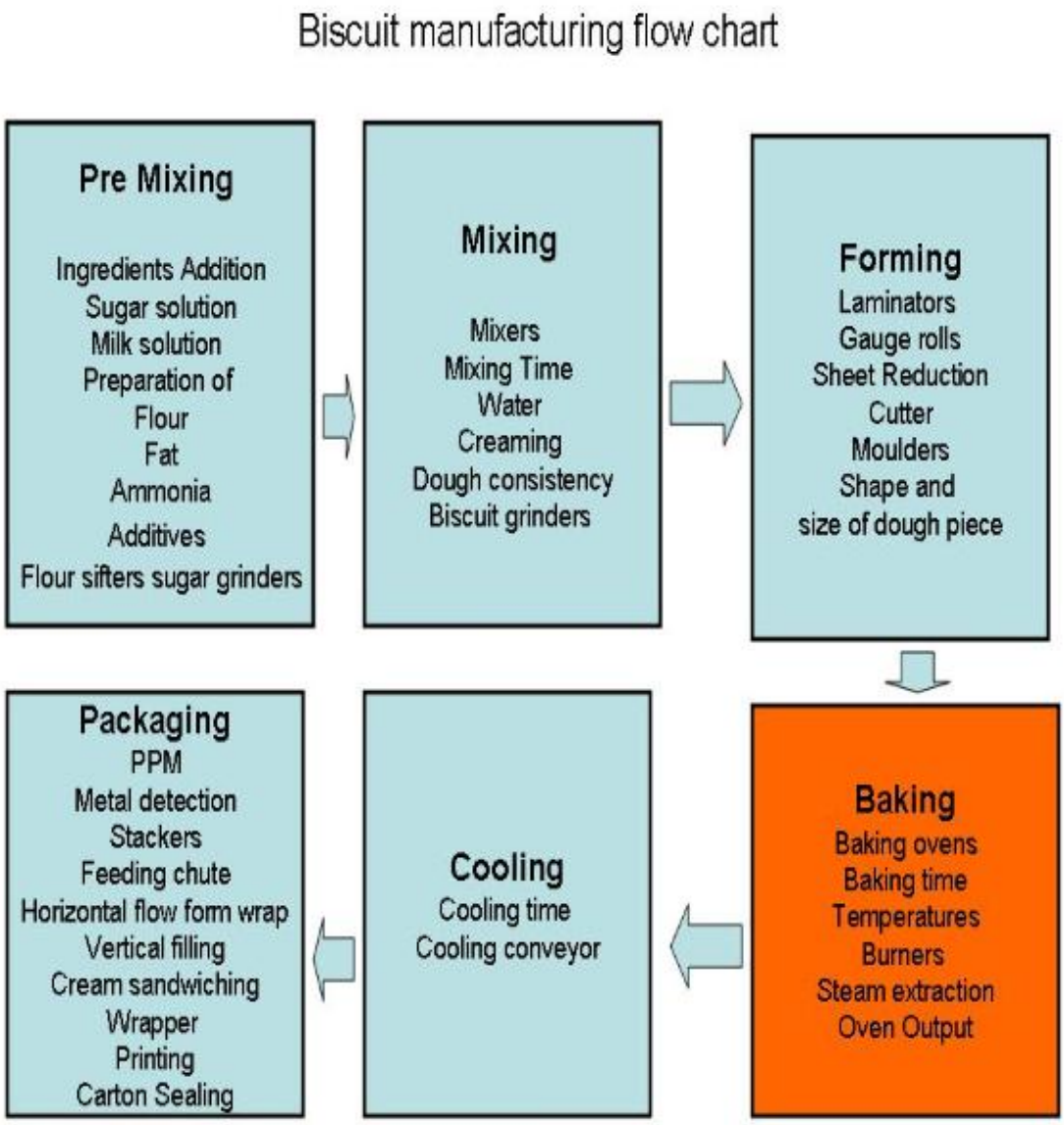
L shaped biscuit plant layout is designed for those factories or plant where we have certain space constrains . A bend or combination bends are provided to change the direction of the flow of the production line hence cutting on the length and utilising width available . Most of L shaped biscuit plants have mixing section on the first floor and feeding to the mixers are done from the top floor .

High lights of L-shaped layout

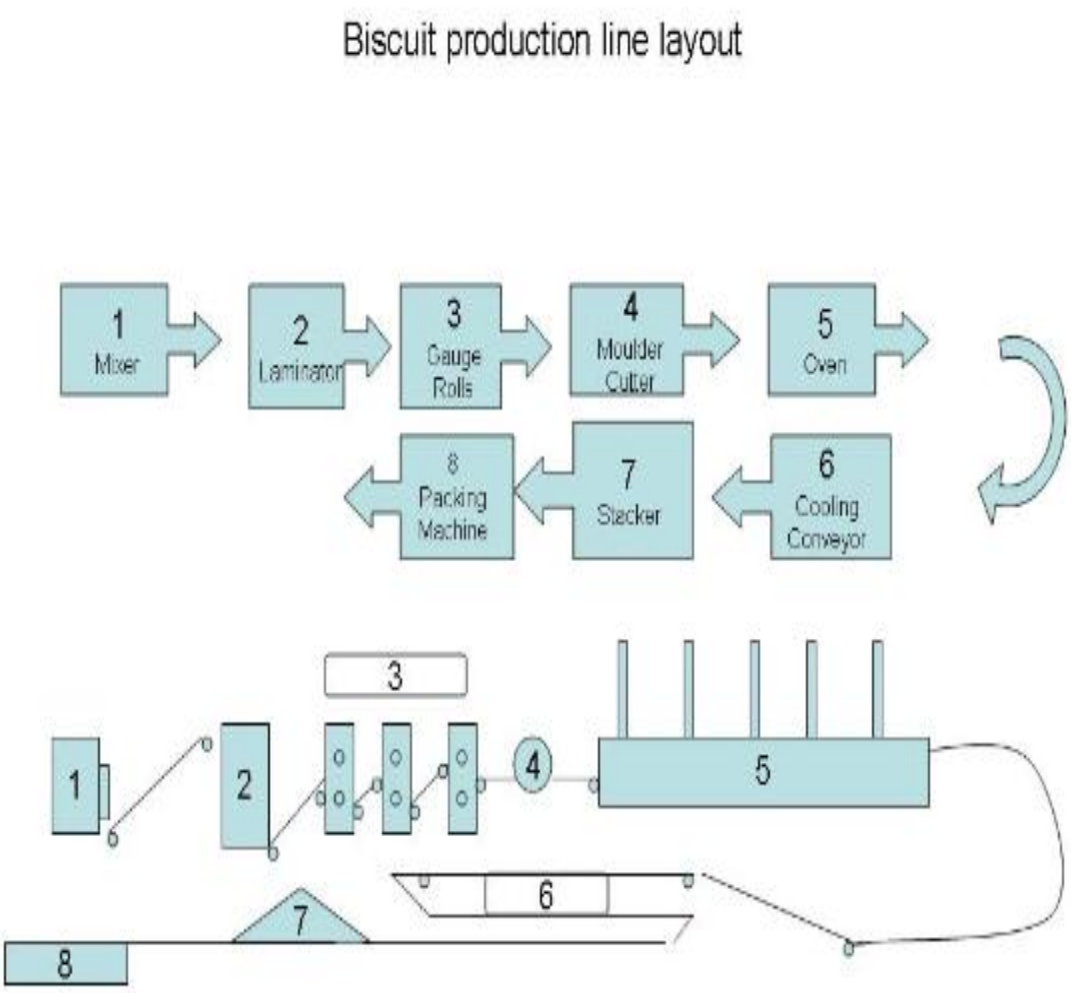
- Bends and combination bends required
- Pre - Mixing to be located on the first floor
- Maintenance cost a bit
- Best suited for area with Less space length wise


L shaped Layout
Pre mixing
Baking
Packing
Biscuit Plant layout

Biscuit Manufacturing Flow Chart.



Biscuit production line layout



Energy Conservation*:*

The following steps may be taken for the conservation of energy.

1. Machinery & Equipment's parts, which are revolving and reciprocating should be properly, lubricated from time to time with suitable lubricant oil.

2. Lay out of the unit should be in such a way in that no back tracking of material is there.

3. All electric switches may be kept off, when not required.

4. The entire transmission belt will be tightened before starting the work is wherever applicable.

5. Fluorescent tube with electronic Chokes may be used for energy saving. Further recently developed compact fluorescent tubes called (CFT) of 10,15, watts Philips/Glaux made may be used for energy saving and decoration. These self ballasted fluorescent lamps are high efficiency replacements for ordinary bulbs. For same light output, CFLEBs consume about one-fifth the power consumed by ordinary bulbs, thereby saving a lot of energy. The savings get further multiplied when CLEBs are used in air conditioned areas, since the saving of energy by using CLEBs also corresponds to less heat dissipation reducing load on air conditioners. The life of CFLEBs is about 8000/10000 hours i.e. about 10 times that of ordinary bulb.

The typical payback period in terms of savings of energy bills and cost

of ordinary lamps is about 6 months operation. Unlike ordinary bulbs, these CFLEBs provide choice of three colours designated A, B & C, to suit individual requirements.

Electronic Ballast, with protection against high voltage spikes, along with high quality CFLs make these composite CFLEBs (or self ballasted CFLs) Slim, lightweight, efficient and reliable units.

6. As far as possible Solar Energy and day light will be used keeping all the other lights off.

7. As far as possible inductive load of motor will be reduced and high power factor will be used with the aid of capacitors of appropriate sizes.

8. It is desirable for an oven to have a higher production capacity , a short come-uptime, a higher reliability and energy efficiency (with least thermal radiation) and less maintenance requirement.

Pollution Control:

1. This industry may be involves pollution to some extent for which State Pollution Control Board has to be approached.

2. Minimum height of shed will be maintained with exhaust fans should be installed for removing decongestion proper ventilation, removal of cokes fumes etc.

Financial Aspects

Basis & Presumption:

1. The Project Profile has been prepared on the basis of Single Shift of 8-hrs. a day and 25-working days in a month at 75% efficiency.

2. The rates quoted in respect of salaries and wages for skilled worker and others are on the basis of minimum rates in the relevant State.

4. Interest rate for the fixed and working capital has been taken @ 13% on an average whether financed by the Bankers or Financial Institutional.

5. The rate quoted in respect of machinery, equipment and raw materials are those prevailing at the time of preparation of the Project Profile and are likely to vary from place to place and suppliers to suppliers. When a tailor made project profile is prepared, necessary changes are to be made.

6. The gestation period in implementation of the project may be to the tune of 6 to 9 months which includes making all arrangements, completion of all formalities, market surveys and tie-ups etc..

Production (Target & Value):

1.Production of Nutritious Biscuits: 108 MT

2.Value of Nutritious Biscuits : Rs. 90,72,000/-

Power Requirement: **25 K.W**

Cost of Project

S.NO.	PARTICULARS	AMOUNT
1	Land & Building	Rented
2	Plant and Machinery	22.50
3	Furniture & Fixture	2.50
5	Margin for Working Capital	5.15
6	Preoperative exp	2.50
	Total	32.65

Means of Finance

S.NO.	PARTICULARS	AMOUNT
1	Own Contribution	10.77
2	Term Loan	20.00
3	Unsecured Loan	1.88
	Total	32.65

Fixed Assets.

Land and building			Amount(In Rs.)
Rented : 5000 Sq ft Building			Rented.
(At Rs 90 per square feet)			

(ii)	Machinery and Equipment			
S.no.	**Description**	**Qty. nos.**	**Price/ unit**	**Amount (In Rs.)**
1	Automatic continuous Roller cutting machine with Oven size 48" fitted with two heavy duty reduction gearbox ,automatic wastage returning system with Elec. Motors with starters complete machinery	**1**		**950000**
2	Flour Shifter automatic screw type vibrator system With automatic lifting system with motor & starters	**1**		**60000**
3	Sugar Grinding Machine (30-50 Kg./Hrs. , 2KW	**1**		**35000**
4	Roll Sheeter size 24" fitted with reduction gear box Variable speed, with motor & starters	**1**		**230000**
5	Double action horizontal mixing machine cap. 300 Kg. Per batch , automatic tilting with elec. Motor	**1**		**160000**
6	Cooling conveyor size 24" working length 100' total length35' with motor & starters	**1**		**250000**
7	Oil spraying machine for salted biscuit belt size 24" With elec. Motor & starters	**1**		**65000**
8	Turn table working between oven and conveyor Fitted with motor and starters	**1**		**120000**
9	Extra Brass roller for rotary cutting machine & Roller cutting machine	**1**		**10000**
10	Syrup Machine with one motor &starters SS	1		**85000**
11	Biscuit Grinder with motor 5 HP starters	1		**25000**
12	Working table with S.S./Aluminum top	2		**5000**
13	Weighing Balance platform type	1		**5000**
14	Aluminium vessels, Mats, cups, Mugs, ladle, spoons, gloves,etc. and misc.equipment			**10000**
15	Electrification & Installation Charges @ 10%			**200000**

16	Cost of Office Equipment and other production equipment etc.			**40000**
	Total Cost of Machinery & Equipment			**2250000**
	Furniture & Fixture			**250000**
	Total (Rs In Lacs)			**2500000**

TOTAL WORKING CAPITAL				**Rs.**
Salary and Wages		(i)		15.00
Raw Material		(ii)		55.20
Utilities		(iii)		2.85
Other Contingent Expenses		(iv)		9.32
Total				82.37
Working Capital for 3 months				20.59

Staff and Labor

Designation	**No.**	**Salary(Rs.)**		**Total(In. Rs.)**
Production Manager	1	20,000.00		20,000.00
Supervisor/Store Keeper	1	18,000.00		18,000.00
Accountant	1	15,000.00		15,000.00
Salesman	1	15,000.00		15,000.00
Skilled workers	2	12,000.00		24,000.00
Semi-Skilled Worker	2	10,000.00		20,000.00
Peon/Watchmen	1	8,000.00		8,000.00
Sweeper	1	5,000.00		5,000.00
		Total		125,000.00
		Total Annual Salary(In Lacs)		**15.00**

Raw Materials

Particulars	Rate(Rs)	Quantity(Kgs)		Total(In. Rs.)
Wheat Flour (Maida)	15	6000(Per Month)	kgs	90,000.00
Maida Starch, Vegetable Fat,salt,soy flour,soda,colours,preservatives		3000(Per Month)	kgs	245000.00
Packaging Material				125000.00
Total (Annual In Lacs)				55.20

Utilities.

CALCULATION OF POWER EXPENSE			
Total Power Load Required		25	KW
No of Days		300	
No of Hours		8	
Total Power Expense		44760	KWH
(i) Power Supply from UPPCL	100%	44760	
COST OF POWER			
(I) Cost of power from UPPCL		259,608.00	
(@7/- per Unit)			
Add : Fixed Cost		25,000.00	
Add : Lubricants		-	
Total Annual Power Expense(In Lacs)		**2.85**	

Other Contingent Expenses

Particulars			Amount(In.Rs)
Rent			45000.00
Postage and Stationery			700.00
Advertisement			3500.00
Telephone			4500.00
Repair & Maintenance			5500.00
Insurance			1000.00
Sales Expenses			8000.00
Consumable Expenses			2000.00
Miscellaneous Expenses			7500.00
Total		Total In One Month	77700.00
		Annual In Lacs	9.32

Cost Of Production

Particulars	In. Rs.	
Total Recurring Expenditure		82.37
Depreciation on Plant and Machinery @ 15%		3.38
Depreciation of Furniture/Fixture & Office Equipment @ 10 %		3.75
Interest On Term Loan		2.60
Interest on Working Capital Loan		2.01
TOTAL COST OF PRODUCTION	In Lacs	92.10

Turnover

Particulars			Production (MT)	Qty(Nos.)	Rs	In. (Rs. Lacs)
Biscuit			**108 MT**		**Rs 100 Per Kg**	**108.00**
TOTAL TURNOVER						**108.00**

Profit					**15.90**
Percentage profit on sales					14.73%

Rate of Return on Total Capital Investment

= Net Operating Profit/ Invested Capital
= 35%

Return on Assets

= Sales/Average total Assets
= 4.32

Return on Equity

= Sales/ Stockholder's Equity
= 1.48

Debt to Equity Ratio

= Total Term Liabilities/Total Shareholder's Equity
1.86

Interest Coverage Ratio

= Earning before Interest & Tax/ Interest Expense
= 4.02

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