PROCESSING OF PASTA

INTRODUCTION

Industrial Overview:

➢ Pasta is a food that is widely loved, and is a form of noodle, served in almost every country.

➢ It's mein in China; udon in Japan; pierogi in Poland; spaetzle in Germany.

➢ A dish called pastillum, essentially a ravioli-like pouch filled with meat, was also described by early French authors.

➢ History states that pasta was brought by Marco Polo to Italy from China.

The term "pasta" originally comes from the Italian expression "paste (dough) alimentary (relating to nourishment)."

INTRODUCTION

Product Description:

➤ Pasta refers to the traditional Italian cuisine's staple food that is made using dough, water, eggs, vegetables, and oil.

➤ The dough is kneaded into different kinds, some of which are known as penne, spaghetti, farfalle, barbine, fettuccine, etc.

➤ The pasta type is determined by the size and shape of the holes in the die.

INTRODUCTION

Market Potential:

Spaghetti

➢ The pasta dough is forced through holes between 0.8-0.5 mm in diameter to produce vermicelli and capellini.

➢ Then the cutting machine slices the pasta into 10 inch (250 mm) lengths and coils it into curls.

➢ Spaghetti varies in diameter from 1.5-2.5 mm and is left straight.

Tortellini (Filled Pasta Rings)

➢ On a separate unit, tortellini (filled pasta rings) are made.

➢ From a roll of dough, the computer cuts tiny circles.

➢ On the circle of dough, a bucket of ricotta cheese mixture drops a pre-measured volume of cheese.

➢ The dough is then folded over and a circle is formed by connecting the two ends.

Ravioli (filled pasta squares)

➢ Pre-measured amounts of cheese filling are dropped on a sheet of pasta at pre-measured intervals to produce ravioli (filled pasta squares).

➢ As it passes along a conveyer belt, another sheet of pasta is put over this sheet.

➢ The two layers then move into pre-measured squares under a cutting machine that perforates the pasta.

- ➢ In Penne Pasta, the high carbohydrate content provides the body with glucose that is the key fuel for the brain and muscles.

- ➢ It is low in cholesterol and sodium. The whole grain pasta offers a high nutritional value, which makes it more popular.

- ➢ In addition to this, the form of sauce added will undoubtedly impact the nutritional value of the meal.

- ➢ Pasta processing types includes dry macaroni, noodles, and spaghetti.

➢ 'Indian Pasta Market: Industry Dynamics, Share, Scale, Growth, Potential and Forecast 2018-2023,' India's pasta market reached a sales value of US$ 286.6 million in 2017, showing a CAGR of 17.1% in 2010-2017.

➢ In 2020, revenue in the pasta segment is forecast to hit 11,881 million US dollars.

➢ The market is expected to rise by 3.8 percent annually (CAGR 2020-2025).

➢ The market has been segmented into dry pasta, instant pasta and fresh pasta on the basis of its form.

- ➢ Currently, the Indian pasta industry dominates dry pasta, retaining much of the revenue from the market share.

- ➢ Italy is the country where pasta production, along with the growth of technology and machinery, had and still has its top expression.

- ➢ The artificial drying process allowed pasta to be manufactured at the industrial level from the beginning of 1900 and thus to be distributed first and then internationally to all regions of Italy (including big exportation volumes to USA).

Raw Material Description:

➢ The main raw materials are wheat flour or Maida and starch.

➢ Additionally, one would need sugar, common salt, spices, garlic, ginger, Sodium Bicarbonate, etc. to make a complete dish with veggies.

➢ A combination of water and semolina flour makes pasta.

➢ Semolina is a coarse-ground flour of durum wheat from the middle, or endosperm, amber-colored high protein hard wheat that is primarily grown for pasta production.

- Semolina flour is quickly digested with a lower starch content and a higher protein content than all-purpose flour.

- To produce some pasta, rougher granulations of other high-quality hard wheat, is also used.

- Before being delivered to pasta plants, the semolina and farina flour are fortified with B-vitamins and iron.

Wheat Flour/Maida

➤ Semolina and all types of flour are used to make Noodles or pasta, but soft white wheat flour is also preferred.

➤ The Pasta are elastic and chewy when cooked if solid, high-protein flour is used. Maida is a white flour made of wheat from the Indian subcontinent.

➤ Finely milled, polished and bleached without any bran, it closely resembles cake flour.

➤ Maida is commonly used to make fast foods- noodles, pasta, baked goods such as pastries, bread, sweets of different varieties, and traditional flatbreads.

Starch

➢ Pastas are made from-

- ▪ Legume starches

- ▪ various tuber or root starches such as potato, sweet potato, cassava, and a number of grain starches such as maize, wheat, sorghum, are made from coarse grain starches.

Salt

➢ In pasta, sodium chloride is a significant component.

➢ In Asian pasta, the addition of sodium chloride at 2-3% level could improve noodle texture by strengthening and tightening the gluten network to increase viscoelasticity.

Oil

➤ Olive oil adds fat and taste, making it more supple and easier to roll out the dough.

➤ The texture of the pasta dough can be corrected with a little added water, rendering the dry dough smoother.

Types of Raw Material:

➢ For pasta-making, the three most widely used kinds of flour are:

- All-purpose flour

- Semolina flour

- "00" flour

➢ Flour contains the gluten needed to give its elasticity and plasticity to pasta dough. It must have the proper degree of elasticity for the dough for easy kneading.

For it to be shaped into all of those wonderful forms, pasta dough also requires some plasticity.

All-purpose flour

➢ The all-purpose flour is made from wheat, but the whole grains are not used.

➢ It is white in color and has been significantly refined to make a very fine powder appropriate for a wide range of types of pastas.

Semolina Flour

➢ Semolina is also known, quite correctly, as wheat pasta or wheat macaroni.

➢ Semolina has less elasticity and much more plasticity than all-purpose-flour.

Flour

➢ Both Semolina and 00 flour are wheat flour, but their texture and flavor vary greatly.

➢ Based on how well they have been grounded, Italians identify various types of flour. "1" flour is a larger particulate wheat flour with a coarse texture, while 00 flour is a much finer powder.

➢ 00 flour is a soft wheat flour which, particularly cakes and crumbly pastries, is perfect for baking.

PROCESS & MACHINERY REQUIREMENT

Raw Material Aspects:

➢ Italian pasta is usually made from durum wheat, including Macaroni and spaghetti.

➢ The basic required raw materials are wheat flour, semolina, starch, vegetable oils, different spices, Sodium Bicarbonate, etc.

➢ Both anatomic components of the grain, including endosperm, bran, and germ, are found in whole-grain wheat flour (WGWF) in the same proportions as intact shape.

➢ The amount of flour sugar (less than 0.5%) is scarcely appropriate for proper yeast fermentation used for proper yeast fermentation.

- Protein chunks (6–18%) serve as concrete containing the endosperm of starch granules.

- The white flour contains other proteins such as amylase, protease, and lipase.

- In human diets, it is the most common carbohydrate in significant quantities in

essential foods such as potatoes, maize (corn), rice, wheat and cascade.

PROCESS & MACHINERY REQUIREMENT

Source of Raw Material:

➢ Uttar Pradesh is the largest producer of wheat in an area with 9.75 million hectares (32%).

➢ Followed by Madhya Pradesh (18.75%), Punjab (11.48%), Rajasthan (9.74%), Haryana (8.36%), and Bihar (6.82%).

➢ As wheat is a major grown crop the availability of wheat grain is easy in the northern states of India.

➢ Various mandis are available in every district for wheat. Raw material can be procured from these mandis, local vendors, or direct from the farm.

Technologies:

- ➢ **Sheeting**

- ▪ Pre-measured amounts of cheese are filled by the machine on a sheet of pasta for the production of ravioli.

- ▪ This plate includes a further layer of pasta while going down the conveyor belt.

- ▪ The two layers then move into pre-measured quadrates under a cutting machine.

➤ **Extrusion technology -** This technology is used to extrude the given raw material through a fixed die in order to force it into required shape.

- *Vermicelli and Capellini*

- The pasta is squeezed into holes in diameter from 0.8-0.5 mm to produce vermicelli and capellini.

- The cutting machine cut pasta into 10-inch (250 mm) lengths and turns it into curls.

- *Tortellini*

- A different machine is used to make Tortellini.

- A small circle of a roll of dough is cut by the machine.

- Bucket of ricotta cheese mixture drops a pre-measured amount of cheese onto the circle of dough.

Manufacturing Process:

➢ **Kneading and Mixing:**

• The first step is the process of wheat flour and water being mixed into the mixing machine.

• The dough is kneaded with water and is then filled with tissue producing elastic properties of the flour at a temperature of 20 to 30 Celsius.

➢ **Extrusion:**

• Once the wheat flour, semolina with water, has been uniformly mixed, a stiff dough has formed that pass through die under high pressure.

• A wide variety of pasta can be produced by adjusting the shape of the die.

➢ **Drying:**

• The drying time will be important because when the pasta is too dried, it will break down and the risk of spoilage will rise if it is dried too slowly.

➢ **Packaging:**

• Fresh pasta is folded into transparent plastic containers in pre-measured quantities.

• As the containers pass along a transport belt, each container is covered by a plastic sheet and hot-pressed.
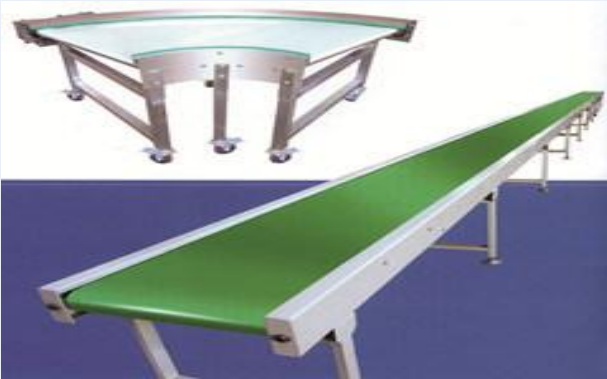
PROCESS & MACHINERY REQUIREMENT

Flow Chart:

Machine Name	Description	Machine Image.
Powder Blender	This machine is used for mixing the ingredients required to make Pasta.	
Dough mixer blade type	With a rotating bowl in a Spiral mixer the spinning motion imitates hand kneading and rolling motions and gently mixes Noodles dough	

Machine Name	Description	Machine Image.
Extruder	An extruder for pasta is a machine to make various types of pasta by squeezing pasta dough through dies. By modifying the pasta die, various pasta types are obtained.	
Dryer Machine	The Dryer machine is used for remove the execs water from the steamed Pasta.	

Machine Name	Description	Machine Image.
Pasta packaging machine	Used for packaging the noodles for marketing in various packages.	

Additional Machine & Equipment:

Machine and Equipment	Uses	Pictures
Material handling Equipments	These Equipment's are used for material handling.	
Food Grade Conveyor	These are conveyors with food grade belt to maintain food safety standards set by monitoring authorities.	

Process & Machinery Requirement

General Failures & Remedies:

General Failures	Remedies
Ball bearing failure of various machine	1. Proper periodic lubrication of all bearings in various machines.
Power Drive Overload	1. Ensure proper weighing & metering specially in case of semi-automatic plant.
Mechanical Key Failure	1. Ensure that mechanical keys are replaced as per there pre-defined operational life. 2. Prevent Overloading.
Loss of Interface	1. Provide proper physical shielding for the connections.

Nutritional Information: (100 gram)

Name	Pasta (Gram)
Calories	131
Major Nutrients	➢ Total Fat- 1.1 g ➢ Saturated fat- 0.2 g ➢ Polyunsaturated fat- 0.4 g ➢ Monounsaturated fat- 0.1 g ➢ Cholesterol- 33 mg ➢ Sodium- 6 mg ➢ Potassium- 24 mg ➢ Total carbohydrates- 25 g ➢ Protein- 5g
Health Benefits	Refined pasta is often enriched, which means that it contains nutrients such as B and iron. Sometimes the minerals are added back to enrich the flour.

PROCESS & MACHINERY REQUIREMENT

Export Potential & Sales Aspect:

- India is the major food and grain producer country in the world, but only less than 10% is processed.

- Analysis of corporate data shows that the value-added factor has increased dramatically for food processors.

- The driving factors for pasta market growth in India include increased urbanization, changes in lifestyles, and growing demand for ready-to-eat products.

- Health-conscious customers are now seeking healthy food products that have increased demand for pasta made from wheat.

- Market growth in 2020-2025 is expected to be high.

PM-FME Scheme

➢ Support for capital investment for up-gradation and formalization with registration for GST, FSSAI hygiene standards and Udyog Aadhar;

➢ Capacity building through skill training, imparting technical knowledge on food safety, standards & hygiene and quality improvement;

➢ Hand holding support for preparation of DPR, availing bank loan and up-gradation;

➢ Support to Farmer Producer Organizations (FPOs), Self Help Groups (SHGs), producers cooperatives for capital investment, common infrastructure and support branding and marketing.

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