



**Mixer:** ensure the raw materials, water/liquid chemical additives are fully mixed.

**Screw conveyor** The raw materials are conveyed in the stainless steel roller to the feed machine of extruder .

**Twin-screw extruder:** is made of the feeding system, extruding system, cutting system, heating system, transmission system and controlling system .

**Air conveyor :**conveys the food relying on the wind-force from the blower

**Three-layer roasting oven :** is heated by electricity and is used to bake and dry food.

**Oil sprayer :**heat liquid oil or solid fat, before spraying the food surface using the oil pump.

**Hoister:** used to convey the food from the oven to the cooking machine

**Roller :**sprays the oil from the feeding end of the roller then sprays the flavoring on the surface and separate the oil from the material .

**Cooling conveyer :** food drying and flavoring, conveyor can select the different sizes of finished food.

### Summary

The production line uses rice and rice flour as their raw materials to produce value added products such as rice based baby food, rice cereal and rice snack. The production line is modern and require little labour 4-5 persons. The FOB costs of the two lines are shown in the table below.

Production Line	Cost USD	Cost GYD
Snack Food	\$28,600	\$5,883,019



## GUYANA RICE DEVELOPMENT BOARD POSTHARVEST DEPARTMENT

### Conclusion

Rice product produced by extrusion has the potential to diversify Guyana's economy. Key to the success of the products produced would be the marketing and distribution. Considerable emphasis would need to be focused on marketing since similar products already exists and are manufactured by well established international companies such as Nestle, Kellogs, and Quaker etc. These companies have well established and accepted products with extensive distribution networks, international advertising etc. For the venture to be successful, the product produced must be competitive in terms of quality, variety, price, branding/ packaging and marketing to draw potential consumers away from their imported counterparts.



## Extruded Rice Products



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## Introduction

The rice product market is one that has been consistently expanding over the years with the US and UK taking the lead role. Extrusion processing equipment has become the touchstone operating equipment in most snack food companies throughout the world. Food extrusion is a process in which a food material is forced to flow, under one or more conditions of mixing, heating, shear and through a die, which is designed to form and/or puff-dry the ingredients.



## Possible Products

### 1. Rice as Baby Food

Baby food is most often made with rice. It can be made of white or brown rice, mixed with other foods, and made hot or cold. Rice cereal is fed to most children raised in the United States soon after formula or breast feed. Fortified with grains, vitamins, and iron, rice cereal is often used as the first semi-solid food in a baby's diet. It is made of precooked and processed rice, often combined with milk or water into a pureed consistency.

### Production of Baby food

The rice or broken is first milled into flour which is used as the raw material. This is then discharged into the mixer where additional ingredients are added and thoroughly mixed. The conveyor takes it to the extruder to be processed then to the oven where moisture is removed. The product is cooled as it passes through the cooling conveyor and goes back to the milling system. At the milling system the product is converted once more to flour/powdered form of the desired particle size depending on the age of infant for which the product is intended.

### Baby Food Market

Baby food is a \$1.25 billion a year industry in the USA with three companies--Gerber, Beech-Nut and Heinz--controlling over 95% of the market. Gerber is the industry leader, with a 70% share of the market. These companies dominance in the baby food industry is reflected in local supermarkets where their products are prominently displayed along with another popular brand; Nestle.

## 2. Breakfast Cereal

A breakfast cereal is a food made from processed grains that is often eaten with the first meal of the day. It is often eaten cold, usually mixed with milk juice, water, or yogurt, and sometimes fruit, but may be eaten dry. Cereals may be fortified with vitamins. Some cereals are made with high sugar content. The breakfast cereal industry has gross profit margins of 40-45%, and steady and continued growth throughout its history.



### Production of Cereal

Grains or flour are mixed with flavoring agents, vitamins, minerals, sweeteners, salt, and water in a large rotating pressure cooker.

If flour is used instead of grains, it is cooked in a cooking extruder. This device consists of a long screw within a heated housing. The motion of the screw mixes the flour with water, flavorings, salt, sweeteners, vitamins, minerals, and sometimes food coloring. The screw moves this mixture through the extruder, cooking it as it moves along. At the end of the extruder, the cooked dough emerges as a ribbon. A rotating knife cuts the ribbon into pellets. These pellets are then processed in much the same way as cooked grains.

### The Cereal Market

The world breakfast cereal industry was worth \$28 billion in 2010, having recorded close to 4% yearly growth for the four preceding years. Ready-to-eat cereals represented the leading market segment, generating almost \$24.5 billion in 2010 to account for more than 87% of the overall market in terms of value. Growth in the global breakfast cereal market is being fueled by changing lifestyles, consumer awareness regarding the importance of healthy eating habits and evolving food consumption patterns.

The global breakfast cereal market is led by the US, the UK, France, Spain, Italy and Russia, with these countries both producing and consuming the largest volume of cereals. Around 35% of the global population buys cereal products, mostly in the US and the EU.

## 3. Snack Food

The demand for rice snacks has increased considerably in the last years with increasingly health conscious consumers choosing a snack alternative that contains less fat to go with a drink. This has caused consumers to turn to rice snacks rather than other alternatives such as corn or wheat.

The snack food production uses extrusion technology to make puffed rice snacks. Extrusion technology provides the opportunity to process a variety of food products by just changing a minor ingredient and processing condition on the same machine. Several different shapes, texture, color, and appearances can be processed by minor changing in the hardware and processing conditions.



## The Production Line

### Components of the Line

Mixer → Screw conveyor → Twin screw extruder → Air conveyor → Three layer dryer → Hoister → Oil sprayer → Flavoring roller → Cooling conveyor



**Milling Machine;** The milling machine is used to mill the raw material into flour and also used in the baby food production.