

1 INDIVIDUAL QUICK FREEZING

1.1 Introduction

Quick freezing is at present the only process whereby virtually all the properties of most foodstuffs can be preserved. The important feature of this process is ultra-rapid freezing to very low temperatures (-30°C to - 40°C) designed to halt the activities of the microorganisms that cause decay and deteriorate foodstuffs.

Individual Quick Freezing (I.Q.F.) is the latest technology available in freezing and with the advent of the same, it is now possible to preserve and store raw fruit and vegetables in the same farm-fresh condition for more than a year, with the color, flavor and texture of produce remaining as good as fresh from the farm.

In IQF, each piece is frozen individually using technique of fluidization resulting in freezing of fruit and vegetables only in 10 to 12 minutes which otherwise takes at least 3 to 4 hours or even more in the blast freezer. This results into better texture and there is no lump/ block formation and the product is free flowing. One does not have to thaw or defrost the whole packet to take out only a portion, and the rest will remain frozen till required again.

1.2 Objective

The primary objective of the model report is to facilitate the entrepreneurs in understanding IQF fruits and vegetables technology and financial parameters of various components for preparation and submission of project proposal to bank for sanction of long term loan. This model report will serve as guidance to the entrepreneurs on starting up such a new project for setting up such a facility.

1.3 Raw Material Availability

- Major vegetables grown in the state are Potato, Sweet Potato, Tomato, Brinjal, Cabbage, Peas and Onion etc.
- Banana, Orange, Guava, Papaya etc. are the major fruits grown.

The table below shows the production of major fruits and vegetables.

2004-05

Name of crops	Area	Production	Yield
Banana	14941	5.976	40.00
Guava	2763	0.553	20.00
Papaya	684	0.185	27.00
Potato	47602	7.140	15.00
Sweet Potato	4192	0.252	6.00
Onion	35704	5.713	16.00
Tomato	18254	2.738	15.00
Brinjal	13208	1.981	15.00
Cabbage	3349	0.670	20.00
Cauliflower	7665	1.226	16.00
Pea	17278	1.901	11.00

1.4 Market Opportunities

Demand for IQF fruits and vegetables are showing strong growth as the income benefits of economic liberalization measures are fuelling consumption among India's booming middle class. The market for frozen fruits and vegetables is growing both in the domestic and international market. Growth in the fast food sector offers outstanding opportunities for IQF operators to enter into supply agreements with restaurant chains, hotels and airlines, catering businesses etc. Frozen fruits and vegetables have a huge market potential not only in India, but there is an excellent export opportunity to Middle East and neighboring countries as well.

The major market segments for IQF are-

- Retail outlets for direct consumption
- Hotels, restaurants, caterers and eateries
- Food industries which use fruits and vegetables as raw material and want to process during the lean season
- Good export potential

In most of the western countries, the frozen food products dominate the local and export market. There is increasing consciousness towards health and nutrition in India and hence the acceptance and consumption of IQF fruits and vegetables is likely to increase in India and abroad. Particularly in India, a large source for fresh fruits and vegetables, there is a great potential for utilizing such techniques and technology to avoid deterioration of fresh commodities and convert them into value added products.

The trade estimates for the industry project total production between 35,000 –40,000 MT per annum valued at 250-300 crores annually. According to US International Trade Administration, the frozen foods market size in India is US\$ 9 million, which is 0.3% of total

processed foods market. Indian frozen fruits and vegetable market is represented by some of the important products with following market shares such as:

- Green peas : Around 20,000MT
- Mixed vegetables : 5-6000 MT
- Frozen French Fries : 3,000 MT
- Frozen Mango Products (pulp & cubes) : 7000 MT

1.5 Project description

1.5.1 Applications

For extension of shelf life of fresh agro commodities preserving their freshness and nutritional values. The typical shelf life is around twelve month in a well maintained post freezing cold chain.

1.5.2 Capacity of the Project

The rated capacity is 400 Mt per day.

1.5.3 Critical success factors

- Maintenance of cold chain at -20oC is essential till the product is delivered to the consumer.
- Selection of plant and machinery plays great role in overall success of the project.
- Maintenance of strict hygiene and sanitary conditions through out processing and handling of finished products is necessary.
- Market assessment or market tie up is necessary
- The plant must be located where availability of key raw materials, electric, power, water, skill manpower and modern communication facilities is not a problem.

1.5.4 Manufacturing process

Table 1 Process description for frozen vegetables/fruits

Procedure (in sequential order)	Description
Grower Storage	Raw materials –Peas/other produce arrives at the plant for processing.
Acceptance sampling	Samples of the unprocessed produce are taken to be graded and for grower payment.

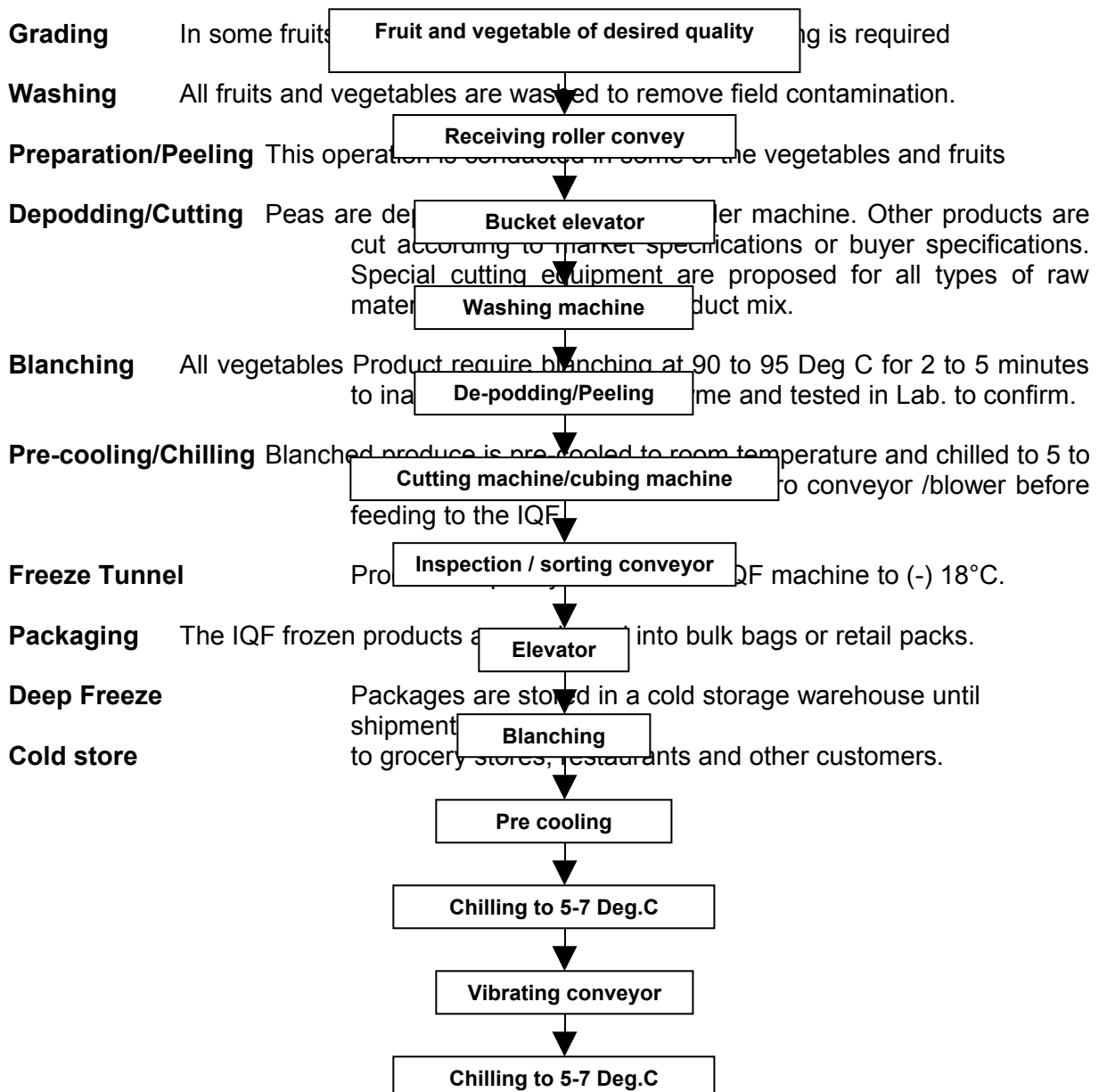
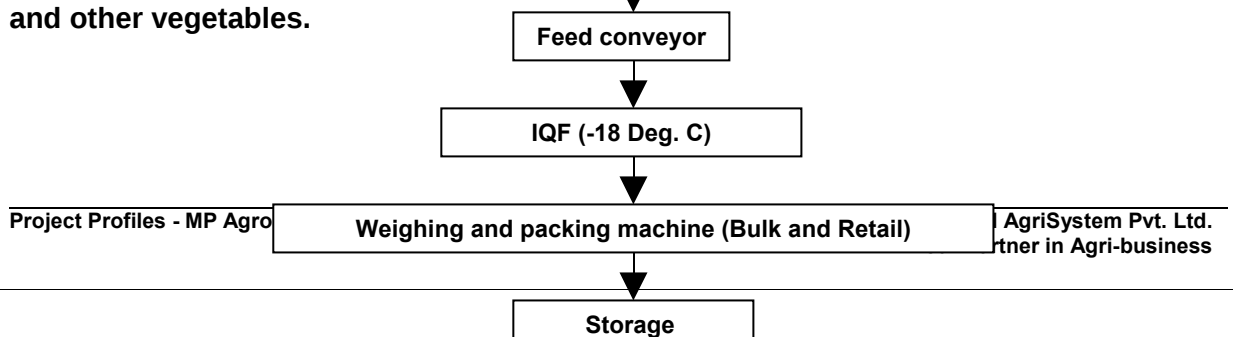


Figure 1 Process flow diagram for peas, mango cubes, litchi, sweet corn, baby corn and other vegetables.



1.6 Individual quick freezing (IQF)

The technology selected for the proposed unit is Individual Quick Freezing. This system involves the use of a blast of cold air which, when directly on the food products, quickly freezes them. The vegetables are also frozen in air blast tunnel (chamber freeze) in which cold air at –40 degree C is rapidly moved around the product giving it a cryogenic shock and

freezing it instantly. This type of freezing results in the product free rolling and not clotting into lumps.

1.7 Project component and cost

Major components of the projects and their costs are described in the table hereunder:

(Rs in lacs)

PARTICULARS	AMOUNT
LAND	215.00
BUILDING	519.50
PLANT & MACHINERY	1229.50
MISC. FIXED ASSETS/FURNITURE FIXTURES	248.50
CONTINGENCIES	313.85
PRE-OPERATIVE EXPENSES	172.00
MARGIN MONEY FOR WORKING CAPITAL	406.33
	3104.68

1.8 Plant and Machinery

The total cost of the plant and machinery is Rs. 1229.50 Lakhs.

1.9 Building

The main production block will cost around Rs. 519.50 lakhs.

1.10 Miscellaneous Assets

A provision of Rs. 248.50 lakhs would take care of all the requirements.

1.11 Preliminary & Pre-operative Expenses

A provision of Rs. 172 lakhs would take care of pre-production expenses like establishment, professional charges, security deposits etc.

1.12 Working capital assessment

ITEMS	Year I	Year II	Year III
RAW MATERIALS	873.08	964.11	1134.54
LABOUR COST	2.75	3.24	3.89
WORK IN PROGRESS	15.87	17.66	20.64
PACKING MATERIAL	4.81	5.98	7.45
FINISHED GOODS	728.81	812.65	951.25
TOTAL	1625.32	1803.63	2117.76

1.13 Means of finance

Promotors contribution		48.00	1490.24	3.31
(Minimum advisable Seed Capital)	7			
SUBSIDY				
MFPI - Equipment	50.00	1.61	50.00	0.11
TERM LOAN		50.39	1564.43	3.48
FIs				
			3104.68	6.90

1.14 Cash flow statement

PARTICULARS	Year 1	Year 3	Year 5	Year 7
SOURCES OF FUNDS				
INCREASE IN SHARE CAPITAL	-	-	-	-
NET PROFIT	278.55	655.55	644.76	667.28
(INTEREST ADDED BACK)				
DEPRECIATION	179.24	179.24	179.24	179.24
PRELIMINARY EXP.W/O	34.40	34.40	34.40	-
INCREASE IN TERM LOAN	-	-	-	-
INCREASE IN WC	1,218.99	235.60	-	-
	1,711.19	1,104.79	858.41	846.52

1.15 Projected balance sheet

PARTICULARS	Year 1	Year 3	Year 5	Year 7
LIABILITIES				
SHARE CAPITAL	1,490.24	1,490.24	1,490.24	1,490.24
RESERVES & SURPLUSES	(4.87)	610.04	1,484.55	2,475.76
TERM LOAN	1,422.21	853.33	284.44	-
W.C	1,218.99	1,588.32	1,588.32	1,588.32
TOTAL	4,126.58	4,541.93	4,847.56	5,554.33

1.16 Projected profit and loss account

	Year 1	Year 3	Year 5	Year 7
NET SALES REALISATION	4,544.59	6,250.45	6,250.45	6,250.45
TOTAL COSTS	4,052.39	5,381.25	5,392.04	5,403.92
GROSS PROFIT	492.19	869.19	858.41	846.52
DEPRECIATION	179.24	179.24	179.24	179.24
INTEREST	283.42	252.94	196.05	174.72
PRELIMINARY EXP.W/O	34.40	34.40	34.40	-
PROFIT BEFORE TAX	(4.87)	402.61	448.72	492.56
TAXES	-	-	-	-
PROFIT AFTER TAX	(4.87)	402.61	448.72	492.56
RETAINED PROFIT	(4.87)	402.61	448.72	492.56

1.17 Key indicators

NET PROFIT AFTER TAX (Rs. in lakhs)	425.79
INTERNAL RATE OF RETURN %	21.47
DEBT SERVICE COVERAGE RATIO	2.08
BREAK EVEN POINT %	59.45
PAY BACK PERIOD (YEARS)	5.81

1.18 Manpower Requirement

PARTICULARS	NO.
ADMINISTRATIVE STAFF	
Managing Director	1
V.P, Mktg.	1
General Manager, OP	1
Financial Controller	1
Accountant	2

	Security	6
PRODUCTION		
	Food Techno.	1
	Managers	5
	Office / Lab Asst.	4
	Supervisors	6
	Plant Operators	15
	Helpers	10
	Casuals	30

1.19 Assumptions

Project & Financing			
Contingencies on Building			10%
Contingencies on Equipment			20%
Term Loan			50%
Rate of Interest on Term Loan			10%
Subsidy Considered	Subject to ceiling		25%
Expected time of Installation	Year		1
Moratorium	Months		6
CAPACITY			
Rated Capacity Per Annum	80% of Installed capacity	TPD	400
Number of Operational Days	DAYS		200
Working Hours Per day	Hrs		3 shifts
CAPACITY UTILIZATION			
Year I			64%
Year II			83%
Year III			90%
OTHER EXPENSE			
Marketing Expenses			10%
POWER			
Connected Load	HP		1320
DEPRICIATION AS PER COMPANY'S ACT			
BUILDING			3.34%
PLANT & MACHINERY			10.34%
MISC. FIXED ASSETS			7.07%
LAND & SITE DEVELOPMENT			1.63%
MAINTENANCE			
BUILDING			2%
PLANT & MACHINERY			
MISC. FIXED ASSETS			

1.20 Sources of technology

- ❖ **Frigoscandia contracting b**
Box 913, S-25109 Helsingborg,
Rusthallsgatan 21, Sweden,

- ❖ **Paul Kunz GmbH**
Ein unternehmen Der Zimenermann & Jansen Group,

5419, Dottesfeld
Germany

- ❖ **Frick India Ltd**
Jeevan Vihar, 3- Sansad Marg,
New Delhi-110001

The actual cost of projects may deviate on change of any of the assumptions.