

## 1 SPICES CRYO-GRINDING UNIT

### 1.1 Introduction

Spices are most important constituents of Indian food and cuisines, and are used not only for household purpose, but also in hotels, restaurants, eateries and food processing industries. In the regions where spicy food is consumed, Cumin is an important part of most recipes. Cumin is used in whole, grounded form-pure and also forms part of various blended special purpose spices, which are used to add flavors to various dishes through out India and Asia. Turmeric is another important spice largely used in Indian cuisines and it also has several medicinal uses. Turmeric finds application in oleoresin production also. Like Cumin, Turmeric is also used in pure and as a component in blended spices for various Indian dishes. Chilly is a globally popular spice that finds usage in variety of cuisines and dishes. Chilly powder, obtained by the crushing process of dried chillies, finds wider applications in food processing industries as well as a medicinal ingredient. Like Cumin and Turmeric, Chilly is also used in pure or blended form for various dishes in India and Asia.

### 1.2 Objective

The primary objective of the model report is to facilitate the entrepreneurs in understanding the importance of setting up unit of Spices Cryo-grinding unit, 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 and basic technical knowledge for setting up such a facility.

The project envisages setting up of a Spices Cryo-grinding unit for Cumin, Turmeric and Chilly. This is a new concept in spices processing, which results into higher production with better end product quality (aroma and color), than conventional spices grinding unit. This technology uses liquid nitrogen to control the grinding chamber temperature, the result of which is reduction in loss of volatile essential oils in the spices and higher production rate.

### 1.3 Raw Material Availability

Total spice production in the state is 3.15 lakh MT. The area and production with the productivity of different spices are given in the table below:

	Spices	Area (ha)	Production (MT)	Productivity
1	Chillies	47091	43000	0.91
2	Ginger	5233	6000	1.13
3	Turmeric	664	1000	0.96
4	Garlic	42292	178000	4.22
5	Coriander	136388	53000	0.39
6	Other spices	34143	34000	1.00
	<b>Total</b>	<b>265811</b>	<b>315000</b>	

#### 1.4 Market Opportunities

India is the largest producer and exporter of range of raw and processed spices. India leads in Cumin, Chilly and Turmeric production in the world. The exports in 2005-06 have been recorded at a whopping US\$ 500 million (335488 tons). Chilly, seed spices and turmeric contributed 18%, 11% and 7% respectively. The global production of Chilly in the year 2005 has been estimated at around 7 million tons, of which India produced 1.1 million tons. India also has the largest export share (25%), followed by China (24%), Spain (17%), Mexico (8%), Pakistan (7.2%), Morocco (7%), and Turkey (4.5%). The major importers of chilly are countries like United Arab Emirates, European Union, Sri Lanka, Malaysia, Japan and Korea. In India chilly production is concentrated in Andhra Pradesh, having a production share of 49%. Kerala follows with a production share of about 14%. The production of cumin seeds in India is estimated to be around 0.15 million tons annually, followed by countries like Syria, Turkey and Iran, producing around 15000 to 20000 tons. The product has export potential in countries like United States of America, Sri Lanka, United Kingdom, The Netherlands, Japan, Brazil and Singapore, which do not cultivate cumin. In India, large scale production facilities exist in Rajasthan and Gujarat, contributing almost 90% to country's production. Global Turmeric production for the year 2005 was around 0.8 million tons. India dominates the world production by contributing around 75 to 80% of the total world production. Bangladesh, Pakistan, Taiwan, Sri Lanka, Myanmar, Korea, Vietnam, etc are also prominent players. The product holds export possibilities in countries like Japan, Sri Lanka, Iran, United Arab Emirates, United States of America, United Kingdom, and Ethiopia. In India, the southern peninsular area dominates in Turmeric production. Andhra Pradesh is the largest producer, followed by Tamil Nadu.

Spice cryo-grinding is relatively very advanced technology and hence there are very few units operating at present in India. In western India, M/s. Spectra Cryogenic Systems Pvt. Ltd a Rajasthan based unit, with a sales volume of INR 20 million is in the manufacturing of Cryogenically grounded Spices & herbs. Growth Drivers Raw spices, ground spices and blended spices are part of the FMCG products. The trade statistics of sauces, dressings and condiments (raw spices, ground spices and blended spices are part of condiments) was INR

13.92 billion in 2003, anticipated to reach INR 20.75 billion by the year 2009. Processed spices demand is directly linked with its consumption in food processing industry and this is set to grow in India in coming period with growth of population and fast changing food habits as well as increase in spending power of the middle and upper class in India.

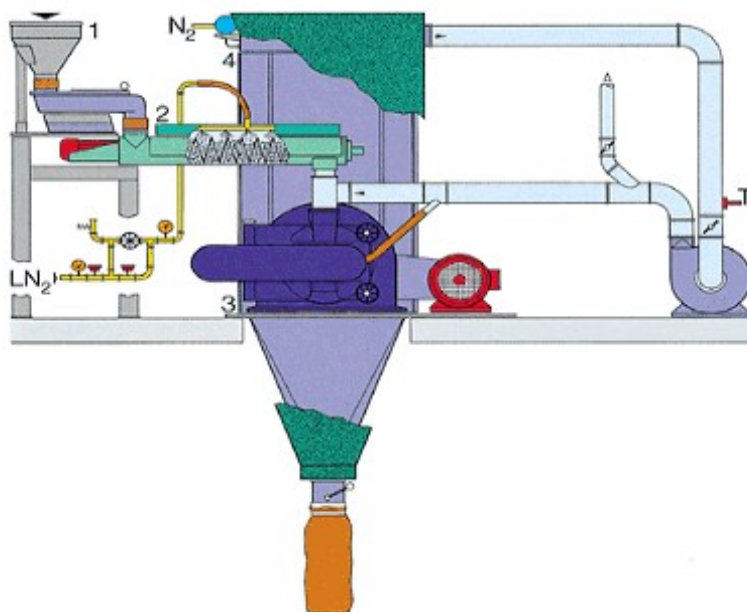
## 1.5 Project description

### 1.5.1 Capacity of the Project

The total capacity of the unit is 1400 MTA.

### 1.5.2 Manufacturing process

As indicated previously-Spices Cryo-grinding technology is new to India, which necessitates import of technology from developed countries like Japan and Germany. Cryogenic grinding reduces the material to particle sizes, which is difficult to attain with ambient temperature grinding in conventional grinding plants. The dry, cold, inert atmosphere, usually generated by a Liquid nitrogen vapor blanket or circulation in the grinder chamber, minimizes thermal reaction with the material and reduces the loss of volatile components from spices during processing.



**Figure 1 Design of a cryogenic grinding system (circuit gas mode)**

The advantages offered by Spices Cryo-grinding technology as against conventional spices grinding technology are as under:

- Cryogenic grinding improves the aroma by minimizing the loss of essential oils (approx. 3-10% loss) which is approx 15-43% in conventional processing. This is important for

Cumin processing. Spices are ground to a thickness of 50 microns, as compared to a size range of 500 – 1000 using conventional grinding processes.

- Spices processed using Cryo-grinding has better natural color, as compared to conventional process, this is very much important for Chilly and Turmeric.
- Finer particle size can be achieved without aroma loss and natural color change.
- Overall grinding capacity can be increased by 2 to 3 times, as process equipments will not have thermal fatigue due to heating up. Fire risks too, are eliminated as temperature during processing is controlled.
- This method of grinding enhances unlocking of natural flavors, aid easy dispersion of the same and control flavor strength.

## 1.6 Project component and cost

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

### 1.7 Land and Building

Particulars	Unit	Qty	Cost/unit	Total
<b>LAND &amp; BUILDING</b>				<b>86.50</b>
Land	SqM	2,000	250.00	5.00
<b>Land Development</b>				
Land Area		2,000	500.00	10.00
<b>Building</b>				
<b>Production Block</b>				
Buildup Area	SqM	1,300	5,000.00	65.00
Contingencies		10%		6.50
<b>PLANT &amp; MACHINERY</b>				<b>120.00</b>
Plant & machinery	LS	1	10,000,000.00	100.00
Contingencies		20%		20.00
<b>MISCELLANEOUS FIXED ASSETS</b>				<b>42.00</b>
Misc Assets	LS	1	3,500,000	35.00
Contingencies		20%		7.00
<b>PRE-OPERATIVE EXPENSES</b>				<b>21.30</b>
Establishment		1	1,670,000	16.70
Professional Charges		1	100,000	1.00
Security Deposits		1	360,000	3.60
<b>TOTAL</b>				<b>269.80</b>

The cost of the various components will depend on the location of the project. Item wise assumptions are as under:

### 1.8 Plant and Machinery

The major machineries required are blower, rotary filter, cooler with liquid nitrogen supply, impact mills, filter etc. The cost of the machinery is Rs. 120 lakhs.

### 1.9 Building

The construction of the building for cryogenic spice processing will cost around Rs. 71.50 lakhs.

### 1.10 Miscellaneous Assets

Other assets like furniture & fixtures, packing tables, plastic tubs, storage racks etc. would cost Rs. 42 lakhs.

### 1.11 Preliminary & Pre-operative Expenses

A provision of Rs. 21.30 lakhs would take care of pre-production expenses like establishment, professional charges, security deposits etc.

### 1.12 Working Capital Requirement

ITEMS	Year 1	Year 3	Year 5
STOCK OF RAW MATERIAL & PACKING MATERIAL	47.33	63.11	63.11
SUNDRY DEBTORS	100.80	134.40	134.40
<b>TOTAL</b>	<b>148.13</b>	<b>197.51</b>	<b>197.51</b>
<b>MARGIN</b>	37.03	49.38	49.38
<b>MPBF</b>	111.10	148.13	148.13
<b>INTEREST ON WC</b>	12.22	16.29	16.29

### 1.13 Means of Finance

<b>EQUITY CAPITAL</b>			43.70%	<b>134.10</b>
<b>MOFPI SUBSIDY</b>	25%	50.00	16.30%	<b>50.00</b>
<b>TERM LOAN</b>				
FINANANCIAL INSTITUTIONS		10.00%	40.00%	<b>122.73</b>
-Payable half yearly Installments	10	12.30		
<b>TOTAL</b>			100%	<b>306.83</b>

### 1.14 Cash flow statement

PARTICULARS	Year 1	Year 3	Year 5	Year 7
<b>SOURCES OF FUNDS</b>				
EQUITY CAPITAL	-	-	-	-
SUBSIDY				
NET PROFIT	26.71	52.05	47.56	43.81
(INTEREST ADDED BACK)				
DEPRECIATION	18.01	18.01	18.01	18.01
PRELIMINARY EXP.W/O	3.04	3.04	3.04	3.04
INCREASE IN TERM LOAN	-	-	-	-
INCREASE IN BANK BORROWINGS-WC	111.10	14.81	-	-
<b>TOTAL</b>	<b>158.87</b>	<b>87.91</b>	<b>68.62</b>	<b>64.87</b>

### 1.15 Projected balance sheet

PARTICULARS	Year 1	Year 3	Year 5	Year 7
<b>LIABILITIES</b>				
EQUITY CAPITAL	134.10	134.10	134.10	134.10
RESERVES & SURPLUS	52.22	96.07	151.80	208.15
TERM LOAN	110.43	61.23	12.03	(0.00)
BANK BORROWINGS-WC	<b>111.10</b>	<b>148.13</b>	<b>148.13</b>	148.13
<b>TOTAL</b>	<b>407.85</b>	<b>439.53</b>	<b>446.06</b>	<b>490.38</b>

### 1.16 Profitability statement

Particulars	Year 1	Year 3	Year 5	Year 7
<b>INCOME</b>	672.00	896.00	896.00	896.00
<b>EXPENDITURE</b>	624.24	822.90	827.38	831.13
<b>VARIABLE</b>	502.46	666.19	666.19	666.19
<b>FIXED</b>	121.78	156.71	161.19	164.94
<b>GROSS PROFIT</b>	47.76	73.10	68.62	64.87
<b>PROFIT BEFORE TAX</b>	2.22	27.78	28.22	27.52
<b>RETAINED PROFIT</b>	2.22	27.78	28.22	27.52

### 1.17 Key Indicators

NET PRESENT VALUE at current Inflation (Rs. in lakhs)	<b>292.43</b>
INTERNAL RATE OF RETURN %	<b>20.55</b>
AVERAGE DSCR	<b>1.67</b>
BREAK EVEN POINT %	<b>88.03</b>
PAY BACK PERIOD ( YEARS)	<b>6.00</b>

### 1.18 Manpower Requirement

PARTICULARS	NO.
<b>SUPERVISORY STAFF</b>	
MANAGERS	1
PRODUCTION SUPERVISORS	3
MARKETING MANAGER	1
ACCOUNTANT	2
<b>WORKERS</b>	
PLANT OPERATORS	3
SKILLED WORKERS	6
HELPERS	10

### 1.19 Assumptions

<b>Project &amp; Financing</b>			
Contingencies on Building			10%
Contingencies on Equipment			20%
Term Loan			40%
Rate of Interest on Term Loan			10%
Subsidy Considered	Subject to ceiling		25%
Expected time of Installation		Months	10
Moratorium		Months	6
<b>CAPACITY</b>			
Rated Capacity Per Annum	80% of Installed capacity	TPA	1400
Number of Operational Days	DAYS		300
Working Hours Per day	Hrs		20
<b>CAPACITY UTILIZATION</b>			
Year I			75%
Year II			90%
Year III			100%
<b>SALES PRICE</b>			
W S Price			64000
<b>OTHER EXPENSE</b>			
Commission			10.0%
Marketing Expenses			2.5%
<b>POWER</b>			
Connected Load	HP		90
<b>DEPRICIATION AS PER COMPANY'S ACT</b>			
BUILDING			3.34%
PLANT & MACHINERY			10.34%
MISC. FIXED ASSETS			7.07%
LAND & SITE DEVELOPMENT			1.63%
<b>MAINTENANCE</b>			
BUILDING			1.00%
PLANT & MACHINERY			3.00%
MISC. FIXED ASSETS			2.00%
LAND & SITE DEVELOPMENT			1.00%

### 1.20 Source of Machinery / Technology

It is important to note here that Spices Cryo-grinding technology is not available in India at present and there will be need to import it from either Japan or Germany.

- Hosokawa Alpine – Germany

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