

Sector	Agro and Food Processing
Sub - sector	Food Processing
Project No.	AF-17
Project Title	Spices Cryo-grinding unit - Cumin, Turmeric, Chilly

Project Description

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.

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.

Product Applications

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.

Market and Growth Drivers

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.

Why Gujarat?

Gujarat is the second largest producer of Cumin in India and 10 districts in Gujarat produce cumin, 14 districts produce chilly and 7 districts produce Turmeric, thus raw material will be readily available for

the proposed unit. The production of spices is likely to increase in the coming years, with irrigation facilities made available through Narmada Canal System, in spices growing area of Central and North Gujarat.

Gujarat is having ready availability of technical and commercial manpower as there are several spices processing units already operating.

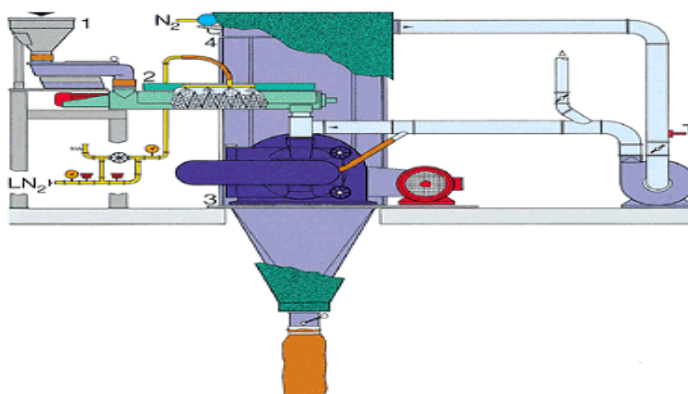
Entrepreneurs in Gujarat are readily adopting newer technologies and processes, used in food process industry in general and spices processing in particular, as a part of their continuous efforts to expand their business in domestic and export markets.

Technology / 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.

Design of a cryogenic grinding system (circuit gas mode)



Source: Hosokawa Alpine

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.

Technology Suppliers

1. Hosokawa Alpine – Germany

Raw materials

Gujarat is one of the leading states in spices production and processing in India. Spices Area and production trend in Gujarat is summarized in following table:

Area and Production – Chilly, Cumin and Turmeric

Particulars	Year	Area ('00 Hectares)	Production ('00 MT)
Chilly			
1	2000-01	139	105
2	2001-02	204.55	398.66
3	2002-03	121.05	104.68
4	2003-04	271.10	245.780
5	2004-05	246.36	265.16
6	2005-06	316.45	378.40
Cumin			
1	2000-01	1074	436
2	2001-02	1757.90	859.62
3	2002-03	2000.49	642.75
4	2003-04	2030.11	819.99
5	2004-05	2081.41	1069.75
6	2005-06	2679.20	1476.15
Turmeric			
1	2000-01	N.A.	N.A.
2	2001-02	6.885	122.43
3	2002-03	8.43	146.88
4	2003-04	9.49	111.83
5	2004-05	10.17	141.16
6	2005-06	13.95	165.075

Source: Department of Agriculture Statistics, Gandhinagar, Government of Gujarat

The total requirement of spices for the proposed project will be 1575 MT/annum, considering 5% operating loss.

Suggested Plant Capacity and Project Cost

Estimated project cost for Spices Cryo-grinding unit of 1500 Tons per annum plant capacity is INR 60 Million (i.e. US \$ 1.33 Million)

Estimated Cost of Project and Means of Finance

Sr. No.	Cost of project	INR in million
1	Land and Land development	2.40
2	Building & Civil works	4.50
3	Plant & Machinery	25.00

Sr. No.	Cost of project	INR in million
4	Misc. Fixed Assets	8.00
5	Preliminary & Pre-operative	7.50
6	Provision for contingencies	7.50
	Total Fixed Assets	54.90
7	Margin Money for working capital	5.10
	Total	60.0
	Means of Finance	
8	Promoters contribution	17.10
9	Term loan	42.90
	Total	60.00

As indicated above the proposed project will require approx. 3000 Sq.mt of land and proposed built up area for proposed unit will be approx. 1125 Sq.mt. The unit will have annual installed capacity of 1500 Tons per annum. Total estimated fixed cost of the project is INR 54.90 million and INR 5.10 million will be as working capital margin, which adds up to make the capital cost of INR 60 million. Since, the proposed unit is a EOU, a Debt: Equity ratio of 2.5:1.0 is suggested and accordingly the estimated term loan amount of INR 42.90 million is arrived and promoter's equity margin will be INR 17.10 million.

Plant and Machinery

The major plant and machinery required for the project are listed below:

List of Plant and machinery

Sr. No.	Particulars	Quantity	Supplier
1	Blower	1	Hosokawa Alpine, Germany
2	Rotary valve	Lot	Neela India Pvt. Ltd, Mumbai
3	Eddy-current screw cooler with liquid N ₂ supply	1	Hosokawa Alpine, Germany
4	Impact mills	2	Hosokawa Alpine, Germany
5	Filter	1	Parksan Filters Pvt. Ltd., Mumbai
6	Temperature sensors- Hosokawa	Lot	Hosokawa Alpine, Germany
7	Screw feeder	1	Geetha Food Engineering, Mumbai
8	Product container – Storage Tank	2	Kisan Equipments (I) Pvt. Ltd
9	Tank for liquid nitrogen storage with circulation insulated piping for nitrogen and pumps etc;	1	INOX India Ltd, Mumbai

Utilities

The proposed unit will necessitate 60 HP power (44.742 KW), liquid nitrogen 0.76 kg/kg of spices on a per day basis.

Manpower required

The proposed project will have total manpower requirement of 20 persons, out of which 3 managers, 3 plant supervisors and 6 plant operators will be technical manpower. There will be 1 accountant and 7 helpers (labors) in this project.

Suggested Location

Suggested locations for the proposed project are Mehsana, Banaskantha, Ahmedabad and Surat districts.

Project Time Line

The proposed project will have project timeline of 6 to 8 months for various clearances and a project implementation period of 12 to 14 months.

Financial Indicators

Based on the profitability projections worked out for the proposed project, key financial indicators are as summarized below:

Key financial indicators

Sr.No	Financial Ratios	1 st year	2 nd year	3 rd year
A	Break-Even Point in % capacity	39.37	35.60	31.97
B	Debt-service Coverage Ratio	1.83	2.22	2.68
C	Average DSCR	2.24		
D	Return on Investment (ROI) in %	25.93	30.22	34.54
E	IRR	49%		

The proposed EOU project will have an indicative IRR of approx 49% considering initial 10 years operation. Proposed project being an Export oriented unit the Debt equity ratio is 2.5:1.

Clearances Required

Filing of Industrial Entrepreneur's Memorandum (IEM) with the Secretariat of Industrial Approvals (SIA), Department of Industrial Development, Ministry of Industry, and New Delhi.

The unit will require registration of their product with Food and Drugs Administration (FDA) in exporting countries, apart from registration with Indian and state food administration. It is obligatory to meet provisions under the PFA act for all products and quality aspects for marketing product in Indian market.

The unit will get EOU registration from RBI, DGFT and with APEDA / Spices Board of India as a registered manufacturer exporter to avail export incentives.

Critical Aspects

The most critical aspect of this product will be meeting quality standards as per FDA regulations in consuming countries and Codex standards being followed by them.

Being an EOU the unit will have to follow strict quality standards as accepted in the countries where export is to be done.

Another critical aspect of these products will be its shelf life for export consumers and hence it would need imported technology / process meeting FDA regulations in importing countries and Codex standards followed by them.

Agencies to be contacted

Industrial Extension Bureau

Mott MacDonald India

Gujarat Agro Industries Corporation Ltd.