ENGINEERS INDIA RESEARCH INSTITUTE
We Create Industrialists

DETAILED FEASIBILITY REPORT

(PROJECT FEASIBILITY REPORT)

O N

CORN/MAIZE OIL

INDENTIFICATION & EVALUATION DIVISION FOR HI-TECH PROJECTS

ENGINEERS INDIA RESEARCH INSTITUTE

E I R I C O N S U L T A N T S & E N G I N E E R S

* REGD. OFFICE *
4449, NAI SARAK, MAIN ROAD,
NEAR CHANDNI CHOWK,
DELHI - 11 00 06. (INDIA)
(BETWEEN MARWARI KATRA AND ROSHAN PURA),
PH : 91-11-23918117, 23916431, 45120361, 64727385, 23947058
E-Mail : eiriprojects@gmail.com, eiribooks@yahoo.com
Web: www.eiriindia.org, www.eiribooksandprojectreports.com

CODE : EIRI/DFR/2514
J.C. : 9315

C A U T I O N

This project report has been prepared on the basis of information available with **M/S. ENGINEERS INDIA RESEARCH INSTITUTE.** The intention here is to provide preliminary information to the prospective entrepreneur. Prior to making a firm decision for investment in the project the entrepreneur must verify the various feasibility aspects together along with the addresses for the procurement of plant & machinery and raw materials independently. The information supplied in this report is obtained from the reliable sources but it is not guaranteed and the money once paid will not be refunded back in any case. Claims for incomprehensiveness of the project report will not be entertained and no legal action in this regard would be entertained in any case (Subject to Delhi Jurisdiction only). Any matter relating to our standard points covered in the report may be modified with in 5 days time only from the date of purchase.

ENGINEERS INDIA RESEARCH INSTITUTE, 4449 NAI SARAK,DELHI-110006.

CORN/MAIZE OIL

[EIRI/DFR/2514]J.C: 9315

CONTENTS

APPENDIX – A :

CORN/MAIZE OIL
[EIRI/DFR/2514]J.C: 9315

INTRODUCTION

Maize oil is produced as the big product of the maize product industries. In wet-milling industries starch and its product, corn syrup, dextrose dextrin etc are the principal products, gluten feeds and corn oil are the main by-products. Corn products which mainly consist the endosper without separation of starch from gluten such a cornmeal, homing. In its pearl meal etc are made by dry milling. In the Dry milling corn oil may not be produced as by product depending upon the size of the plant.

In any case the quality of the oil produced in wet milling process some distillers of alcohol used maize as raw material and some dry milling processor to determinate the corn before fermantion and recover the oil.

The fat content of corn has not been changed significantly by the shift from open pollinated varieties to the hybrid varities which now provide practically the whole of the commercial supply of corn for milling. Generally corn contains average 3.9% fat which corresponds with 4.6 percent on moisture free basis. A recent study of 159 samples representing 17 hybrid varities shows the percentage of 5.7% and a minimum of 3.6%. Individual verities averaged as high as 5.2% and low as 3.9%.

The fat of corn kernel concentrated mainly in germ. A study of pollinated corn showed that the grain consist of 81.1% endosperm, 11.5% germ and 7.4% bran which contain 1.15%, 34.8% and 0.80% of either extractable material. The average oil content of respective fractions is 0.8, 34.5 and 1.0% of the whole oil about 84% find in germ and remaining is the endosperm.

Corn oil contains linoleic acid and oleic acid as the main fatty acids, these make up about 85% of the total fatty acids of oil. It also contains the saturated palmitic acid and smaller quantity of stearic acid and nyristic acid. Corn oil having low melting point due to its low content of glycerides containing more than one solid fatty acid permolecule. It is a natural salad oil so it does not need the removal of stearin when allowed to stand at ice box temperature. Maonnaise made of corn oil with stands freezing without breakup the emulsion better than that made with most to other salad oils. Iodine value of corn oil classes it among the semi-drying oils. Its composition makes it suitable for various used in drying oil industries such as the nonyellowing enamels corn oil used for many purposes other than those of a salad and cooking oils.

COMPOSITION OF CORN OIL

Corn oil mainly contains the oleic and lineleic acid as the principal fatty acids of the oil. These acids recovers about 80-85% of the total fatty acids present. Saturated acids as 12 to 16% as in a many other oils. The main acid is palmitic acid associated with a considerably smaller quantity of stearic acid & myristic acid. The presence of minor quantity of hexadecenoic acid seems to be well established.

The composition corn oil result the study of the fatty acid composition of fats obtained from starch & gluten fraction respectively of corn grain. The acids of the fat from the gluten fraction have a composition almost of the same acids as those in corn germ oil but the ratio of saturated acids to unsaturated acids is substantially higher with palmitic acid consisting more than one forth of the total fatty acids.

Composition of Corn Oil Fatty Acids by Weight Percentage of Total Fatty Acids

1. Ioding Value	127.1
2. Hyriatic	0.1%
3. Palmitic	8.1%
4. Stearic	2.5%
5. Total Saturated Acid	15.6%
6. Hexadecenoic	10%
7. Lenolenic	56.3%
8. Oleic	30.1%
9. Acids above C18	1.7%

These compositions are by fractional distillation methyl esters of sat and unsaturated acids.

The arrangement of the fatty acids in the triglycerides of corn oil has been the subject of a recent investigation. The methods of fractioned crystalization from solvent at low temp was found to be capable of separation oils into fractions which different greatly from one another in melting point and composition when the crystalization were made from acetone solutions with were sufficiently dilute. Corn oil is containing the fatty acids whom melting points ranging from 31 to 30^{o}C and ranging the percentage of saturated acids from 57 to 68%. The individual fractions were examined to determine the saponification value.

Unsaponificable portion of corn oil varies from less than 1 to 3%. The important component of unsaponificable fraction is toeopherol which keeps corn oil from oxidizing in spirit of its large content of linolenic esters. Corn oil wax also contributes the unsaponificable portion of crude, corn oil contains the sters of long chain alcohols but its quantity is very small less than 0.5% of the crude oil.

The phospholipides of corn oil like those of soyabean oil and other vegetable oils can be precipitated by dilution of vegetable oil with acetone and by addition of moisture of the oil. A recent investigation of commercial corn "lecithin", the phospholipids of corn consist of a complex moisture containing esters of inositol and sugar in addition to the better types of phospholipides.

CHARACTERISTIC OF CORN OIL

Corn oil having low melting points due to its low content of glycerides containing more than one solid fatty acid per molecule. It is there fore a natural salad oil that is it does not require the removal of stearin as does cotton seed oil to put it into such conditions that it will not become coloured by the separation of stearine when allowed to stand at ice box temperature. Mayonnaize made with corn oil withstand freezing without breaking the emulsion better than that made with most other salad oils.

The iodine value of corn oil classes it among the semi-drying oils. It composition makes it suitable for various used in the drying oil industries such as the preparation of non-yellowing enamels. The quantity of corn oils is used for this purpose other than those of salad & cooking oil is relatively small.

Table : Characteristic of Corn OIl

Genius & Species Common Name	Corn Usual Range	Specimen
Acid Value	2-8	
Saponification Value	187-196	189.5
Iodine Value	109-133	126.5
Thiocynanogen Value	71-77	77
Hyydroxyl Value	8-12	12
R.M. Value	less than 0.5	
Polenske Value	1ess than 0.5	
Unsaponificable (%)	0.8-2.9	1.95
Fatty Acid Field (%)	93-95	93.6
Refractive index (nD40°C)	1.474-1.463	1.46725
Sp. Gravity 25°-25°C	1.470-1.474	
Sp. Gravity 25°-25°C	0.916-0.921	
Melting Point (°C)	-18 to 10°C	
Composition of fatty acids		
wt. of total volatile acids	12-18	15.8
Saturated acids	0.1-1.7	
Mynistic	8-12	
Palmitic	2.4-4.5	
Unsaturated Acids		
Hexadeoenoic	0.2-1.6	
Oleic	19-49	21.9
Limoleic	34-62	61.7
Linolenic	0.0-2.9	0.6

USES AND APPLICATION

It is used for salad purposes and is margaring. some of the better refined qualities reach a high degree of excellence as regard taste small & keeping properties and therefore find use for cake and biscuit making as wall as for greasing of baking pans etc.,

The amount of refined vegetable maize oil produced in the country is limited and the quality does not always reach the excellence of the american product.

Composition of maize cake:-

Moisture	9.47
Oil	12.23
Alleuminoids	20.36
Digestible carbohydrates	46.13
Fibre	9.88
Mineral Water	2.43
	100.00

RAW MATERIALS

Raw material for the corn oil is the maize grains originated in Western hemisphere. Generally it is cultivated in the America, India, Columbus etc. Its name in european countries is corn to distinguish from the cereals.It contains the mainly bran, germ and endosperm. The bran 6% germ 12% and Endosperm 83%. The main composition of the maize is :-

Starch	73%
Sugar	03%
Pentosans	04%
Protein	10%
Oil	4.5%
Fibre	3.5%
Minerals	02%

MARKET SURVEY OF EDIBLE OIL

Macro economic overview

The Indian economy continues to sail in its robust growth tragectory, a journey which began in 2003-04. The country's real GDP grew by 7.5-8.5% between 2003 and 2005: accelerated substantially to 9.0% in 2005-06; and logged a record 9.4% in 2006-07. This makes India one of world's fastest growing significant economies.

We expect the growth momentum to continue in the current fiscal, with real GDP set to clock an impressive growth various factors make us believe that the India growth story will unfold to dazzlethe world for years. The continuation of robust growth in HP in the current fiscal despite higher base, rising consumer demand depicted by sustained growth in earnings of corporate India, good agricultural growth prospects, continued flow of fresh capital investments, despite interest rate hikes, are some contributory factors.

Reflecting changes in the economic environment, the vegetable oil complex, representing a significant part of agribusiness in India has witnessed considerable changes in business conditions in recent years in the wake of economic liberalization.

Overview of Indian vegetable oil economy

The size of the Indian oilseeds based sector is estimated at US$16.5 bn (inclusive of exports and imports). India is the world's fourth largest vegetable oil economy. The industry comprises of 15000 oil mills, 600 solvent extraction units, 250 vanaspati (hydrogenated oil) plants, and over 600 refineries, employing over 1 mn.

India is a leading importer of vegetable oil in the world. As per Oil World magazine, during 2006-07, the European Union 25 was the world's largest importers of 17 oils & fats at 10.0 mt followed by China at 8.6 mt and India in the third place at 5.4 mt.

Each year, India consumes around 12.0 mt to 12.5 mt of various edible oils. Although edible oils are widely consumed, the per capita consumption is around 11 kg a year, considerably lower than in most developed countries. Palm oil (mainly imported) and soybean oil account for almost half of India's total edible oil consumption, followed by mustard oil, groundnut oil, cottonseed oil, rice bran oil and sunflower seed oil.

Domestic vegetable oil production (7.0 mt to 8.0 mt) is not sufficient to meet domestic demand. The trade policy reforms in the mid -90s fuelled increase in edible oil imports, which now meet 40-45% of India's requirement.

India will continue to depend on imports in the future. The composition of the import basket will, however, depend on relative prices of oils. Currently, crude palm oil/palmolein and crude soybean oil are the favorites as they provide the lowest price option. Currently, India accounts for 7.4% of world oil seeds output 6.1% of world oilmeal production 3.9% of world oilmeal export 5.8% of world veg oil production 11.2% of world veg oil import and 9.3% of the world edible oil consumption (Source Oil World).

Table 1
India's GDP Growth Trends

Year	Population (Billion)	GDP Growth Rate (%)	Sectoral Real Growth Rate(%)		
			Agriculture	Industry	Services
2006-07(E)	1.12	9.4	2.7	10.9	11.0
2005-06	1.11	9.0	6.0	9.6	9.8
2004-05	1.09	7.5	0.0	9.8	9.6
2003-04	1.07	8.5	10.0	7.4	8.5
2002-03	1.06	3.8	(-) 7.2	7.1	7.4
2001-02	1.04	5.8	6.3	2.7	7.2
2000-01	1.02	4.4	(-) 0.2	6.4	5.7
1999-00	1.00	6.1	0.3	4.8	10.0
1998-99	0.98	6.5	6.2	3.7	8.4
1997-98	0.96	4.8	(-) 2.4	4.3	9.8
1996-97	0.95	7.8	9.6	7.1	7.2

With steady growth in population and personal incomes. India's per capita consumption of edible oil has been rising steadily. However, oilseeds output and, in turn vegetable oil production, have been trailing consumption growth, necessitating imports to meet supply shortfall.

Oilseed production & availability of vegetable oils

Despite an impressive 25 mn ha (hectares) to 26 mn ha under cultivated oilseeds, production is characterized by low yields. Domestic price support policies favour the production of crops (mainly, rice and wheat) that complete with oilseeds. Oilseeds are grown mainly on marginal and sub-marginal Lands under low input usage. Moreover, less than 25% of the oilseed area is irrigated, rendering cultivation vulnerable to weather related yield risk.

This has resulted in slow growth in oilseed production and continued low yields. At about 970 kg/ha, Indian oilseed yields are about half of the world's average and almost one third of leading producers.

Table 2
Indian Oilseeds production

(Million tons)

Crop	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
Major oilseeds						
Groundnut	7.0	4.1	8.1	6.8	8.0	4.9
Rape/Mustard	5.1	3.9	6.3	7.6	8.1	6.7
Soybean	5.6	4.6	7.8	6.9	8.3	8.7
Other six	3.0	2.2	3.0	3.1	3.5	2.9
Sub total	20.7	14.8	25.2	24.4	27.9	23.2
Others						
Cottonseed	5.1	4.5	5.5	6.8	8.5	9.0
Copra	0.9	0.7	0.7	0.7	0.6	0.6
Grand Total	26.7	20.0	31.4	31.9	37.0	32.8

Table 3
Vegetable oil availability
(Million tons)

Oil Year (Non-Oct)	Domestic availability	Import of vegetable oils				Total availability
		Edible	Vanaspati	Non-edible	Total	
2006-07	7.70	4.75	0.30	0.75	5.80	13.50
2005-06	8.03	4.42	0.30	0.71	5.43	13.46
2004-05	7.59	5.04	0.20	0.40	5.64	13.29
2003-04	7.59	4.39	0.10	0.23	4.72	12.31
2002-03	5.15	5.11	0.10	0.28	5.49	10.64
2001-02	6.72	4.42	0.10	0.39	4.91	11.63
2000-01	5.81	4.83	0.10	0.26	5.19	11.00

Oil production,import & total availability

About 80% of India's domestic oil output comes from the primary source,i.e.nine cultivated oilseeds and two major oil-bearing materials (cottonseed and copra). The secondary source comprises solvent extracted oils, such as rice bran oil as also oils from minor and tree born oilseeds. Oilseeds production for the current oil year ending October 2007 is estimated at 23.2 mt (down 4.7 mt from previous year), equivalent to 7.7 mt of veg-table oils. Total availability of vegetable oils from domestic and import sources is estimated at 13.50 mt during 2006-07.

Where is the Indian veg oil complex headed?

Today, the Indian vegetable oil complex is at the crossroads. It is facing challenges at every point in the supply chain.

Raw material production front

Contrasting with the overall economy, far from showing robust growth, oilseeds output fluctuates alarmingly. Yields continue to be low and farmgate prices are depressed under pressure from low-priced imported oils (barring last one year). Low yields mean high cost of oilseeds production per unit area. In the absence of yield increase, oilseed cultivation is becoming increasingly unremunerative and unattractive. Farmers are once again switching to cereals (mainly, wheat & pulses crops).

Insufficient exploitation of non-traditional sources of oil (rice bran, cotton seed, tree borne oilseeds etc.) is another issue to contend with.

Processing front

Mismatch between (low) raw material production and (high) processing capacity is leading to a situation of too much capacity chasing too less raw materials (oilseeds). Fragmentation of capacities. poor scale economies, large idle capacity, as also high cost of raw material and processing render products oils and meals uncompetitive. They also affect export prospects.

Low priced imported oils eat into the already fragile trade margins on domestic oils. The processing industry, especially oil milling & solvent extraction, suffers from pervasive sickness. However, oil refineries are relatively better off due to lower duty on raw material (crude oils) and rising capacity utilization. Vanaspati industry is under severe stress due to large-scale import of vanaspati at 'Nil' duty from Nepal and Sri Lanka under bilateral Free Trade Agreement.

Marketing and consumption

Per capita consumption of edible oils (11.0 kg) is low, but rising gradually. There is an extreme skew in consumption top 10% consuming over 20 kg per capita and bottom 30% consuming less than 5 kg per capita. This needs correction.

There is strong regional preference for first press oil with natural flavour for example mustard, groundnut, and coconut oils. Inadequate quality control and quality assurance mechanism leads to adulteration. Food laws are antiquated and implementation is poor.

There is low depth and liquidity in the futures market. All these have resulted in erosion of self-reliance in edible oils and rising dependence on imports, currently imports constitute 40-45% of consumption.

Demand drivers

Like in any developing economy, major demand drivers of Indian vegetable oil economy include GDP growth (and importantly, contribution of agricultural GDP) , population growth, possible changes in consumption pattern and of course, Government policies. Each one of them can uniquely impact demand, India's population continues to grow at 1.8% per annum, and average GDP growth of last four years was over 8.0% and last two years was over 9.0%.

The policy makers are aiming at 10.0% GDP growth in the current Eleventh Five Year Plan period. This will further boost the demand for food products, including edible oil.

Recent spurt in vegetable oil prices has slowed or squeezed the natural growth in demand. Indian market is price sensitive and Indian demand price elastic.

Supply side scenario

Given the complexities of the Indian situation, supply estimation is tricky. Supply forecast has to take into account several variables including domestic oil seeds output (which itself is subject to impact of a host of factors), Government policies relating to imports, tariffs and local taxes, health of the domestic processing industry, international prices and exchange rate of the rupee, among others.

India's domestic vegetable oil production is a function, essentially, of domestic oilseeds output. India's oilseeds output shows wide variation from year to year and crop to crop. In 1998-99, production reached at 24.8 mt which touched the lowest of the decade at 14.8 mt in 2002-2003.

However, with good monsoon in 2005-06, the crop output jumped to the record figure of 27.9 mt. However, in the last year it again dipped to 23.8 mt. This year, although the monsoon arrived late by 10 days, rain is normal to excess in most parts of India. We can expect a normal crop of 25 mt to 26 mt.

Can India freeze edible oil imports at current levels

If India does desire to freeze edible oil imports at the current level, an additional indigenous vegetable oil production of 0.5 mt to 0.6 mt per year will have to be ensured. This will translate to production of an additional 1.5 mt to 2.0 mt of oilseeds every year, a prospect not generally perceived as bright, under normal circumstances.

An additional oilseeds output of 1 mt will yield approximately 0.3 mt of oil (assuming unchanged product mix), well below the incremental requirement of 0.5 mt to 0.6 mt . In other words, incremental oilseeds output of 1 mt (possible under normal weather conditions) will meet just about 50% of additional edible oil requirement. This shortfall has necessarily to be met through additional imports.

So, it may be reasonable to expect that under normal conditions. India's domestic consumption requirement will grow by 0.5 mt to 0.6 mt, domestic production will expand by 0.3 mt. leading to import growth of 0.25 mt to 0.30 mt per year over the next 5-10 years time frame (barring exceptionally good years of domestic production) if no serious efforts are made to raise the domestic output.

India will, in the foreseeable future, continue to impact the global vegetable of market because of its increased import requirement and its perceived inability to raise the indigenous productio in the short run.

Edible oil demand projection

The demand for edible oils is expected to increase from the current level of 12.0 mt to 15.6 mt in 2010 and further to 21.3 mt by 2015. The assumes a percapita consumption increase of 4% and a population growth of 1.8%, which translates to an overall growth in demand of 6% per annum.

India will continue her dependence on imports to the extent of about 40% of its consumption requirement. The improvement in yields and the increase in area under cultivation will ensure that the domestic oilseed production is sufficient to meet 60% of consumption requirement.

Table 4
Edible oil demand projection

Parameter	Units	2006	2010	2015
Total demand	Million tons	12.0	15.6	21.3
Total area under oilseeds	Million hectares	26	28	32
Yield	Tons (per hectare)	0.97	1.2	1.4
Production of oil seeds	Million tons	23.2	33.6	44.8
Domestic supply of edible oils	Million tons	8.0	10.1	13.4
Total edible oil imports	Million tons	5.0	5.9	8.3
Imports as share of demand	%	42%	38%	39%

Table-5
Import of edible oils

(Thousand tons)

Oil	2004-05	2005-06	2006-07 (Nov-Jul)	2006-07(E)
Refined palmolein	423	113	80	150
Crude palm oil	2,360	2,373	2,102	2,900
Crude palmolein	187	55	38	50
Soybean oil	2,001	1,703	886	1,350
Sunseed oil	5	101	165	250
Others	65	72	27	50
Total	5,041	4,417	3,298	4,750

Table 6
Landed price of soybean oil & crude palm oil

(US$ per ton)

Month	Soybean Oil Degummed			Crude Palm Oil			SBO
	CIF	Import Duty	Total	CIF	Import Duty	Total	Premium over CPO
July 2007	870	232	1,102	805	207	1,012	+ 90
April2007	734	261	995	705	230	935	+ 60
Jan 2007	705	295	1,000	587	350	937	+ 63
July 2006	552	288	840	448	397	845	- 5
Jan 2006	482	221	703	390	339	729	- 26
July 2005	516	251	767	392	345	737	+ 30
Jan 2005	553	254	807	368	301	669	+138
July 2004	405	334	739	577	283	860	+121

Table 7
Import of Vegetable Oils

(Thousand tons)

Products	2006-07 (Projected)			2005-06 (Actuals)			Defference
	Palm	Soft Oil	Total	Palm	Soft Oil	Total	
Edible oil	3,100	1,650	4,750	2,569	1,848	4,417	+333
Vanaspati	300		300	300		300	Nil
Non-edible (CPS,PFAD & others)	750		750	709		709	+ 41
Total	4,150	1,650	5,800	3,578	1,848	5,426	+374

Current scenario of edible oil import by India

From November 2006 to July, 2007 India imported 3.30 mt. of edible oils, consisting of 2.23 mt of palm products and 1.07 mt of soft oils. The import volume increased by 8% over the same period of the previous year. I expect, during the next three months (Aug-Oct), arrivals would be 0.50 mt to 0.60 mt per month and the total imports would be 4.7 mt to 4.8 mt for the whole year, compared to 4.4 mt in 2005-06. India imports mainly crude oil to utilize its own processing capacity and practically 97-98 per cent of import is in crude form.

Palm oil & soft oil ratio

In 2005-06, the ratio between palm oil and soft oil import was 58.42. However, during the current year, the ratio has tilted in favour of palm oil products whose share has increased to 68 per cent. The ratio of palm to soya depends on landed cost at Indian ports. If soybean oil is expensive by more than US$50-60 a ton, then palm oil is preferred, and vice versa.

Apart from liquid oil, India imports about 0.30 mt a year of vanaspati (hydrogenated fat) manufactured out of palm products from the neighbouring countries like Sri Lanka and Nepal under free trade agreements (FTAs).

The overall imports of vegetable oil by India (edible oil, vanaspati and non-edible oils) during the current year are projected at about 5.8 mt, compared to 5.4 mt last year. The share of palm oil is expected to increase to 4.15 mt, whereas soft oil is likely to decrease to 1.65 mt.

India-a growth market

India will continue to be large importer of vegetable oil for quite some time at least next 10 years-because domestic output growth is unlikely to catch up with demand growth.

Strong GDP growth contributed mainly by manufacturing and service sectors, as also rising population automatically translates to higher demand for a host of food products, including edible oil.

How much of this incremental import demand palm oil will be able to garner would of course depend on relative prices of various oils and tariff structure and landed cost.

It would be in palm oil producers interest to look at India as a large market that is going to be available for a very long term and do all that is required to sustain and service it.

India is currently negotiating a series of FTAs with various countries. Care is being taken by the Indian Government to ensure that such FTAs do not hurt domestic farm interests. Import duty on palm oil has been reduced from 92.5% last year to 45% at present, also the tariff value stays frozen at US$447 (CPO)against the current CPO price of US$821 CIF. This has indirectly reduced the duty further, and currently effective duty on CPO is less than 27%, much less than demanded by Malaysia & Indonesia under ASEAN agreement negotiation.

My advise to the two major palm oil producing and exporting countries, Malaysia and Indonesia, is to have a more broad-based approach to strengthen bilateral trade relationship. That would be mutually beneficial, strengthen the ASEAN Bloc and bring faster development to the entire region.

Source from Chemical Weekly September 11,2007

PROCESS OF CORN MILLING FOR CORN GERM

The corn oil is extracted from the wet milling and dry & milling processes but the recovery of the corn oil is less in dry milling process.

The commerical process for the production of the corn oil needs the following operations . We are using here wet milling process of the corn oil extraction.

First grains are cleaned by series of screens and air separators and then streeped in the water containing 0.2% sulfer dioxide for 48 hours at 130oF temperature.

In addition to sweelling and softening the grain the steeping operation removes most of the water soluble materials including sugars, proteins and minerals. The solubles are recovered by concentrating the steep water and are used for the preparation of the feeds fo mixing with gluten and other products from later stages of the process or as a nutrient in the manufacture of pencilling and streptomycin. An interesting byproduct of steep water is phytin which can be precipitated as calcium phylate by the addition of lime.

Steeped grains passes through degerminators which are mills designed to break up the grain and lossen the germ with out disintegrating it. The ground material drops to the germ separators consisting of through which the germs fleat on the slurry of starch and overflows at one end of the trough. Any starch adhering to the germis washed out through a seriesoof reels adn washed germs is passed through a degerminator and then into a steam heated rotary drier where it is dried to a moisture content of about 2.5 per cent. The dried germ contains about 50% fat, a larger proportion than that found ingerm separated by hand from kernels of unsteeped grains.

The general practice is to press the oil from dried germs on screw presses. Some mills follows this with solvent extraction of the resulting cake in which case the screw passes are operated with more oil left in the cake and a corespondingly higher capacity than when no solvent extraction is used. The recovery of oil in modern mill using solvent extraction is about 3 ibs from per 100 ibs of grain.

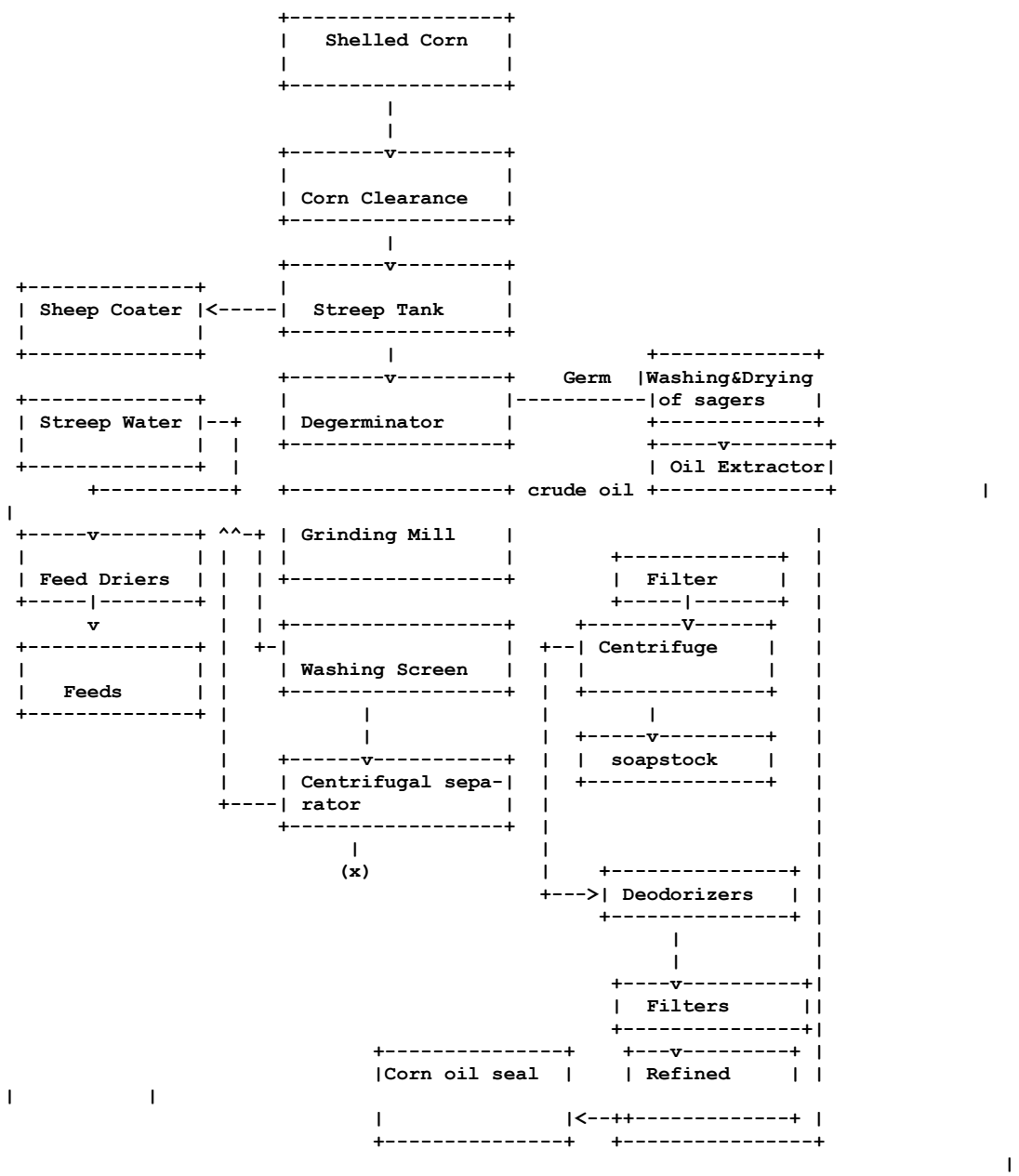
DRY MILLING:-

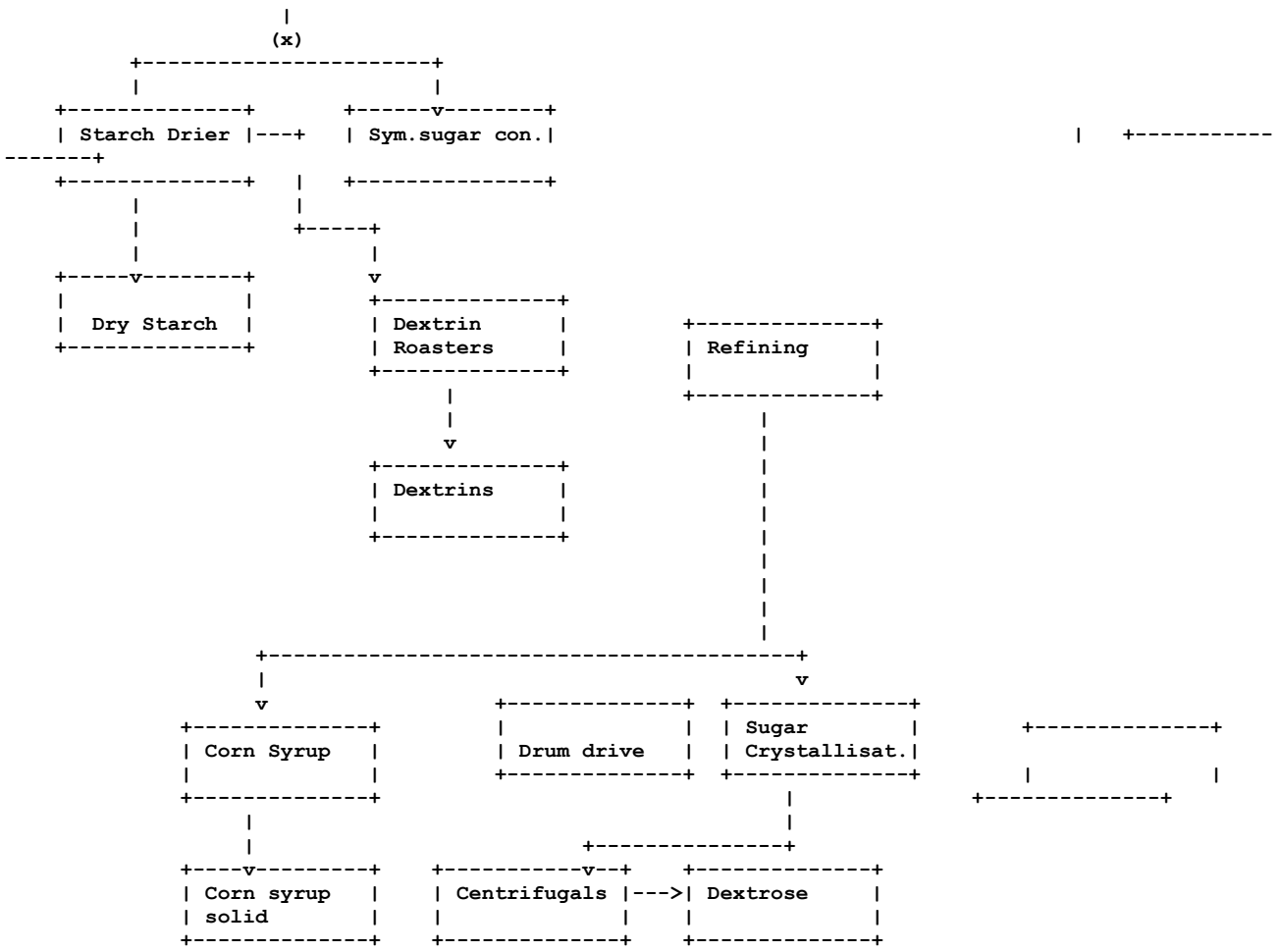
In this process the milling of corn depending upon the principal products produced and upon the size of operation. A considerable quantity of corn ground on burrstone bills to produce corn meal with other no processing except in some cases a sifting to revome part of the bran. More refined corn products are prduced with roller mills which use various arrangements of reels aspirations and shofters for the gradual reduction of size. In most these mills, fractions rich in germ are not used to recover the oil butare utilized in feeds. In the milling process either straight roller mill or mills using degerminator the corn is first cleaned by combination of screens and aspirations then is mixed with warm water to bring it to moisture content of 21-24 per cent. The grains are held is tempering bins for a time usually about one to tow hours before going to degraminator or rolls.

Broken grains are then passes through dryers which remove the part of moisture and through reels to make softers and aspirators. The germ being tougher than the endosperm tends to be flattened rather than ground by the rolls and then scalked off by the shifters i,e. they tend to be retained by the coarser gives in teh sifters. Perfect separation of germs from endosperm is not possible by this methods. The germ produced in this way contains about 20-20% fat. The usual methods of recovering into press the germ in screw presses which reduce the fat content of the cake about 4 to 5 per cent. The average yield of the oil is said to be about 0.6 ib per bushal and miximum yield of this upto 0.8 ib per bushal. Only one third of the total oil is recovered by this process.

In this process ist is examined that crude corn oil contains less than 3% of free fatty acids practically all the oil produced is refined to produce edible oil. Conventional methods of alkali refiningt bleaching and deodorization corn use u`except that a chilling and filtering step is required in the processin to remove at small quantity of wax which if allowed to remain would separate gradually and make the oil cloudy. As in the case of other oils the use of centriguases is replacing kettle refining for the alkali refining step.

MANUFACTURING PROCESS THROUGH WET MILLING




(x)
Starch Drier
Sym.sugar con.
Dry Starch
Dextrin Roasters
Dextrins
Refining
Corn Syrup
Drum drive
Sugar Crystallisat.
Corn syrup solid
Centrifugals
Dextrose

PROCESS OF CORN OIL EXTRACTION FROM CORN GERMS

We take the germ which is separated in the corn milling process either that is dry milling or wet milling. The oil extraction is taken out by the solvent extraction process.

SOLVENT EXTRACTION PROCESS:

The principles of solvent extraction is very simple and comprise the washing out oil from the germ by hot solvents and the subsequent exaporation of the solvent in order to recover the distilled oil, the solvent being used over and over again.

In this process first germ is washedand then dred to remove the sugars. The dried germ is feeded in the oil extraction containers. This used solvent extraction plant is a batch extraction plant. The feed is first heated in the solvent. It is used to reduce the oil from 1 to 2 % per cent in the product. The oilfrom solvent is extruded by the distillation process. Oil is taken out and condensed solvent is again used for the next batch for the extraction of soil from the germ. In the process maximum amount of oil is recovered .It is used for those products in which percentage of oil is very less and can not be extracted by expellers.

COMPLETE PLANT MACHINERY SUPPLIERS OF CRON OIL

Veendeep Oiltek Exports
No. A-67, MIDC, Taloja,
Navi Mumbai, Maharashtra- 410 208, India
Phone: +(91)-(22)-27402073
Mobile: +(91)-9769315466/9769315463
Website: www.veendeep.com/solvent-extraction-plants.html

Tinytech Udyog
Plot No. 2648,
Road H, Kranti Gate,
GIDC-Metoda, Rajkot,
Gujarat - 360 021, India
Phone: +(91)-(2827)-293366
Mobile: +(91)-9227604045/9824221302

PLANT AND MACHINERY SUPPLIERS

SEED CLEANER

MR. INDERJIT SINGH KAILEY
SONI ENTERPRISES
H.NO. 2741/1A,
ST. NO-3, NEW JANTA NAGAR,
A.T.I. ROAD, LUDHIANA-141003, PUNJAB
Phone:911612497849
Email: iskailey@yahoo.co.in

SEPARATOR

ANAND AUTORIDE LTD A MEMBER OF ANAND GROUP
Plot No. 1156/2, Santej
Kalol-382721, Gujarat
Phone:02764-286577
Email: hemexim@wilnetonline.net

G. Surender Reddy, MD
AOF FILTERATION SYSTEMS PVT LTD
8-3-833/282, Phase II, Kamalapuri Colony
Hyderabad-500073, Andhra Pradesh
Phone: +91 40 235 45993,23547627
Email: aof@sify.com

B. L. Sharma, Proprietor
COMPRESSORS & TOOLS COMPANY
154, Chenoy Trade Centre, Park Lane
Secunderabad-500003, Andhra Pradesh
Phone: +91 40 27845377, 27849611
Email: cotolco@compressor.com

FLOWTECH PRODUCTS LTD
19/228-B, Old Rohtak Road,
Basti Sarai Rohilla
New Delhi-110035
Phone: 011-23655616/23653369
Email: flowtech@id.eth.net

BOILER

D. N. Reddy, MD
A P MOTRONIX PVT LTD
3-18-3, Pragathi Nagar,
Ramanthapur, Hyderabad-500013,
Andhra Pradesh
Phone: 040-27038560/27031929
Email: apmotronix@satyam.net.in

Saz Boilers
Plot No. 44, Swami Vivekanand Indl. Estate, Sasane Nagar,
Hadapsar, Pune - 411028, Maharashtra, INDIA
Tel. No. : + 91-20-26970840,
Telefax : + 91-20-26970420
Mobile : + 91 - 98220 36995
Email: response@sazboilers.com, sales@sazboilers.com
Visit Also: www.sazboilers.com, www.sazboilers.in
www.steamboilersindia.com, www.thermalfluidheaters.net
www.sazboilers.co.in, www.hotwater-generators.com

K. C. Rana, MD
A V U ENGINEERS PVT LTD
A-15, A.P.I.E., Balanagar,
Hyderabad-500037, Andhra Pradesh
Phone: +91 40 237 73235, +91 40 237 72343
Email: avuhyderabad@rediffmail.com

Balkrishna Boilers Pvt. Ltd.
Plot No. 78/8, GIDC Vatva, Opp. Abad Bread,
Ahmedabad-382445, Gujarat, India.
Phone: (O) +91- 079 – 25894701, +91- 079 - 25894702
Mobile: +919825024450, +919898011090
Email: info@balkrishn.com, balboilers@yahoo.co.in
Website: www.balkrishn.com

ELEVATORS

Mg. Director
AHURA POWER EQUIPMENTS PVT LTD
2/A `B Block, Goldcoin Complex,
Satellite Road.
Ahmedabad-380015, Gujarat
Phone: 079-25830219
Email: power_engn@hotmail.com

ACE DIEMAKERS
Survey No. 704/1,
*Shantinagar, Bhosari
Pune-411039, Maharashtra
Phone: 020-27129795

ALBRO ENGINEERS PVT LTD
A/2, 206 Konark Park,
Dhole Patil Road.
Pune-411001, Maharashtra
Phone: 020-26119546
Email: albro@maharashtradirectory.com

Amar Jain, MD
ATTAM RATTAN INDUSTRIES
E - 583, Phase VII, Focal Point
Ludhiana-141010, Punjab
Phone: +91 161 674 378

Blany D'costa, Director
CANARA ENGINEERS PVT LTD
203, Hill Green, 149,
Marol Maroshi Road, Andheri (E)
Mumbai-400059, Maharashtra
Phone: +91 22 285 00020,
+91 22 285 93499
Email: canara@bom5.vsnl.net.in
response@canaraindia.com

SOLVENT EXTRACTION PLANTS

DR. S. PREM MATHI MARAN,
MR. PREM MATHI MARAN,
MS. ANITHA GANDHI
AUM CONSULTANCY PVT LTD
89-A, SANTHOME HIGH ROAD, ADYAR,
CHENNAI-600028, TAMILNADU
Phone: 914424643826/24957220
Email: info@aumconsultancy.com,
aumiconmail@yahoo.com

DE SMET CHEMFOOD ENGG PVT LTD
105, CLASSIC CENTRE, 575 M G ROAD
INDORE-452001, MADHYA PRADESH
Phone: 0731-2433013
Email: dschemid@sanaharnet.in

PUNEET DHINGRA, CEO
JAI BHARAT INDUSTRIES
DHURI ROAD, MALERKOTLA-148023, PUNJAB
Phone: +91 1675 253435, 252674
Email: kld_group@satyam.net.in

MR. ADITYA SUDHIR MANAKTALA,
MR. RAJESH JAIPAL UNDRE,
MR. RAJESH J. KUMAR, MR. SUNIL
KUMAR METAL INDUSTRIES
101, KAKAD BHAVAN, 30TH ROAD,
OPP. GAIETY GALAXY CINE,
BANDRA (W), MUMBAI-400050,
MAHARASHTRA
Phone: 912228454373/28455316/
28456561/26441673/264416
Email: adityamanaktala@hotmail.com,
raj_rajathi@hotmail.com

OIL REFINING EQUIPMENTS

MR. SHANKAR, MR ANANTHARAMAN SUBRAMANIAM
BEAM ENGINEERING PVT LTD
12 EAST CLUB ROAD, SHENOY NAGAR,
CHENNAI-600030, TAMILNADU
Phone:914442179351/42179352
Email: beamspr@vsnl.net, beam@vsnl.com

MR. ABDUL RAZAK
G S INDUSTRIES
D-21, INDUSTRIAL AREA,
SECTOR-17, KAVI NAGAR,
GHAZIABAD-201002, UTTAR PRADESH
Phone:911202702282

MR. ADITYA SUDHIR MANAKTALA,
MR. RAJESH JAIPAL UNDRE,
MR. RAJESH J. KUMAR, MR. SUNIL
KUMAR METAL INDUSTRIES
101, KAKAD BHAVAN, 30TH ROAD,
OPP. GAIETY GALAXY CINEMA,
BANDRA (W), MUMBAI-400050,
MAHARASHTRA
Phone:912228454373/28455316/28456561/26441673/264416
Email: adityamanaktala@hotmail.com, raj_rajathi@hotmail.com

MR. S. K. SHUKLA,
MR. MURLI RADHESHYAM LAHOTI
SERVOTECH ENGG IND LTD
203, CHARTERED HOUSE,
NEAR MARINE LINES CHURCH,
MUMBAI-400002, MAHARASHTRA
Phone:912222086368/39549309
Email: servotec@bom3.vsnl.net.in, murlilahoti2000@yahoo.com

MR. S. B. I. KANI, MR. MURUGAN PAL RAJ
SHARP ENGINEERING WORKS
WING B-132, PANNALAL COMP,
1ST FLOOR, NAHAR AND SETH INDL EST,
BHANDUP WEST, MUMBAI-400078, MAHARASHTRA
Phone:912225963173/25968070
Email: sharp@sharpengg.com, mtind@vsnl.com

STORAGE TANKS

D.M. Engg. Co
Unit No. 4, Building No. 5 - A,
Rajprabha Mohan Industrial Estate,
Off W. E. Highway, Naikpada, Vasai,
Maharashtra - 410 208, India
Phone: +(91)-(250)-3217484
Fax: +(91)-(250)-2456877 / 28803259
Mobile: +(91)-9867341077 / 9892946832
Website: www.frpaquatech.com/chemical-process-equipment.html

M/S. Nu-Plast Pipes & Profiles
Plot No. 19, Wazirpur Road, Across Kheri Bridge,
Old Faridabad, Faridabad, Haryana - 121 002, India
Phone: +(91)-(129)-2438446
Fax: +(91)-(129)-6546217
Mobile: +(91)-9873002192
Website: www.nuplast.com/acid-storage-tank.html

OIL PUMPS

MR. A S THAPAR (CHAIRMAN)
MRS. S K THAPAR (DIR)
MR. SABBARWAL (EXP MGR)
ALLENA AUTO INDUSTRIES LTD
B-68, WAZIRPUR, INDL. AREA
DELHI-110052
Phone: 011-27373704, 27121008
Email: alenauto@bol.nt.in;nlchanda@allenaauto.com

MR. Z. M. MOINUDDIN
ALLOYS ENGINEERS PVT LTD
622/4, TRICHY ROAD, SINGANDLM
COIMBATORE, TAMIL NADU
Phone: 0422-2592113
Email: alloys@eth.net

MR. SHIVA KUMAR
ALPUMP LTD
170-172, INDUSTRIAL ESTATE, PERUNGUDI
CHENNAI-600096, TAMIL NADU
Phone: 044-24961142/24961431
Email: alpump@giasmd01.vsnl.net.in

MR. SURESH CHANDRA CHOWDHAR
APEX PUMPS LTD
G-228, RIICO INDUSTRIAL AREA, SITAPURA,
JAIPUR-302022, RAJASTHAN
Phone: 911412770921
Email: apex_pumps@rediffmail.com

MR. SUNIL RAJHANS
APEX TOOLS
4/27, KIRTI NAGAR INDUSTRIAL AREA,
NEW DELHI-110015
Phone: 911125430419/25450237

ROTARY FEEDER

DILIP G. JOSHI, MD
DIGIDALE ENGINEERING PVT LTD
440, RAM NAGAR, ROAD NO. 28,
WAGLE INDUSTRIAL ESTATE
THANE-400601, MAHARASHTRA
Phone:+91 22 258 21417
Email: digidale_engg@hotmail.com;
digidale_conveyors@hotmai

MR DEEPAK VERMA
HI-TECH ENTERPRISES
J-3/191, IIND FLOOR,
RAJOURI GARDEN,
NEW DELHI-110027
Phone:911125432334/25437009
Email: hitech_enterprises@yahoo.com

MASCHINEN FABRIK (I) PVT LTD
11/45, PANDITIA ROAD
KOLKATA-700029, WEST BENGAL
Phone:033-24747761, 24749975
Email: info@mfipl.com

MASCHINEN FABRIK (I) PVT LTD
1 APOLLO INDUSTRIAL ESTATE,
MIDC AREA, ANDHERI)E)
MUMBAI-400093, MAHARASHTRA
Phone:022-26878713
Email: info@mfipl.com

MIXER

S. N. Electrical Industries
Lane No. 3, Plot No. 4,
Shalimar Industrial Area,
New Delhi, Delhi - 110 088, India
Phone: +(91)-(11)-27494499 / 27494411
Fax: +(91)-(11)-27494411
Mobile: +(91)-9911091125
Website: www.snelectricals.com/mixer-grinder.html

Shadows Ltronix System
No. 257 & 258, 1st Floor, 2nd Main Road,
Nehru Nagar, Kottivakkam, Old Mahabalipuram Road,
Chennai, Tamil Nadu - 600 096, India
Phone: +(91)-(44)-42914433
Fax: +(91)-(44)-42914445
Mobile: +(91)-9884490909 / 9176999944
Website: www.shadowsltronix.com/kitchen-appliances.html

Libra Appliances Private Limited
No. 71, Canning Street, Bagree Market, 3rd Floor,
Room No. A-305, Kolkata, West Bengal - 700 001, India
Phone: +(91)-(33)-22159588 / 22353099
Mobile: +(91)-9339861441
Website: www.librahomeappliances.com/mixer-grinder.html

Shakti Global Services
Address: No. 11, 2nd Floor, Akshar Shopping Center,
Near Railway Station, Udhana, Surat,
Gujarat - 394 210, India
Phone: +(91)-(261)-2758073
Fax: +(91)-(261)-2758073
Mobile: +(91)-8980028888
Website: www.shaktimanagers.com/wholesale.html

ROTOMETERS

S. S. KASABE, PROPRIETOR
ALFLOW GLASS EQUIPMENTS
B-9, PHASE I, IDA JEEDIMETLA
HYDERABAD-500055, ANDHRA PRADESH
Phone:+91 40 23095268, 23094494
Email: aglass@tatanova.com

MR. KRISHNA MOORTHY
CRISTAL INSTRUMENTS
224 RAJA INDUSTRIAL ESTATE,
P.K. ROAD, MULUND (WEST),
MUMBAI-400080, MAHARASHTRA
Phone:912225693893
Email: cristal@roltanet.com

MR. PRADIPTA ROY CHOWDHURY
MMP FILTRATION PVT LTD
34-C, SRI AUROBINDO SARANI,
KOLKATA-700005, WEST BENGAL
Phone:913325333171
Email: il: pradipta@mmpfilter.com

VACUUM DRIERS

MR. K. R. SHARMA
ATOMIC VACUUM COMPANY (EXPORTS)
BANGLOW C-6, "BANGANGA",
GOVANDI STATION ROAD,
MUMBAI-400088, MAHARASHTRA
Phone: 912227411180/25563525/27412940
Email: atovac@vsnl.com

MR. M. PUGADHANDI
PUGAZH CHEMICAL PLANT & EQUIPMENTS PVT LTD
69, SECOND MAIN ROAD,
INDL. ESTATE, AMBATTUR,
CHENNAI-600058, TAMILNADU
Phone: 914426243718/26251909/26471674 (R)
Email: pugazh@md4.vsnl.net.in

FILTER PRESS

Goyum Screw Press
Plot No. 324/2, Industrial Area- A.
Ludhiana - 141003, Punjab, India
Phone: +(91)-(161)-5084180
Web: www.oilmillmachinery.com

Vihar Engineering
9, Kembros Industrial Estate, Sonapur Lane,
Behind Asian Paints, Bhandup (West)
Mumbai - 400078, Maharashtra, India
Mobile No :+(91)-9820778915 / 9819582526
Tel. No. :+(91)-(22)-25660821 / 25663821
Fax :+(91)-(22)-25663821
E-mail : rabinder_chhabra@yahoo.com,
rabinderchhabra@hotmail.com,
sales@viharengineering.com

Ace Industries
Plot No. 8, Gala No. 2, Shilay Industries,
Goregaon West, Mumbai - 400104,
Maharashtra, India
Phone: +(91)-(22)-28781285
Fax: +(91)-(22)-28781174
Web: www.aceindus.com

The Adarsh Engineering Works
Ghat Road, Near Union Bank
Nagpur - 440018, Maharashtra, India
Mobile: +(91)-9370302490
+(91)-9422102490
Telephone: +(91)-(712)-2725150
Fax: +(91)-(712)-2725150
Email: theadarshrasraj@yahoo.in

HEAT EXCHANGER

Ahlada Industries Private Limited
Sy. No. 66-68, Bahadurpally,
Qutbullapur Mandal, Ranga Reddy District,
Hyderabad - 500043, India
Phone: +(91)-(40)-23094301 / 23194302 / 23094300
Fax: +(91)-(40)-23094300
Website: www.ahladaindustries.net/industrial-machine-equipment.html

Hexamide Agro Tech LLP
At Post Kutari, Near Taloja Gaon,
Near Kharghar Hexcity,
Kharghar, Navi Mumbai - 410 210, India
Phone: +(91)-(22)-64132021
Website: www.usedchemicalreactor.com/used-chemical-equipment.html

Kwality Process Equipments Private Limited
Plot No. 198, Sector - 1, Vasai Taluka,
I. E. Gauraipada, Thane - 401 208, India
Phone: +(91)-(250)-6417968 / 2453438
Website: www.kwalityengineeringcorporation.com/heat-exchangers.html

Metal Gems
No. 920-924, Plaza Panchsheel,
9th Floor, 55 Huges Road, Near Dha,
Mumbai - 400 007, India
Phone: +(91)-(22)-43404040
Fax: +(91)-(22)-43404050
Website: www.mehta-group.com/

WATER COOLING

K D N ENGINEERING
NR. BUNGLOW BUS STAND,
OPP. SATNAM PATEL WEIGH BRIDGE,
NARODA, AHMEDABAD-382325, GUJARAT
Fax:Phone:917922844537/22820412 (R)
Email: kdn.coolingtower@gmail.com

WEIGHING MACHINES

Sansui Electronics Private Limited
Plot No. E-59, Market Yard,
Near Krishi Pannan Mandal,
Gultekdi, Pune - 411 037, India
Phone: +(91)-(20)-24206000 / 24206016
Fax: +(91)-(20)-24206060
Mobile: +(91)-9823089855
Website: www.weighbridge.co.in

Shinde & Sons
No. 40, Narayan Peth,
Pune - 411 030, India
Phone: +(91)-(20)-66015624
Mobile: +(91)-9822046229 / 9822040832

Precision Balance India (Kolkata)
No.6,wood Street,ground Floor,
kolkata-700016, Kolkata - 700016, India
Phone: +(91)-(33)-22404927 / 22874927
Mobile: +(91)-9830204136
Website: www.precisionbalance.net/weighing-scale.html

Milkotronics
No. 1051, Shukarawarpeth, No. 302,
Akshay Centre Tilak Road,
Opposite Pandit Automotive, Pune,
Maharashtra - 411 002
Phone: +(91)-(20)-24484045 / 24482549
Fax: +(91)-(20)-24482549
Mobile: +(91)-9860093884 / 9552524949
Website: www.milkotronicsindia.com/dairy-equipments-softwares.html

Reputed Micro Systems
No. 9, Purvi Apartment,
Opposite Uttara Apartment,
Near Navjivan Press, Income Tax,
Ahmedabad - 380 014, India
Phone: +(91)-(79)-27540018 / 64504501
Fax: +(91)-(92)-27540018
Mobile: +(91)-9825042648 / 9825011656

K 3 G Genxt Marketing Pvt Ltd.
No. 104, Ravi Darshan,
Pune - Solapur Road, Pune - 411 001, India
Phone: +(91)-(20)-26995520 / 26995510
Fax: +(91)-(20)-26993310
Mobile: +(91)-9422314795 / 9422006697

Gravity Instruments Private Limited
No. 8, R. K. Estate, Behind Ekta Hotel,
Sarkhej - Bavla Highway, Sarkhej,
Ahmedabad - 382 210, India
Phone: +(91)-(79)-26890918
Mobile: +(91)-9099921523 / 9825786656

Medi Hera Agencies Private Limited
F - 329/4, Lado Sarai, F - Block,
Ground Floor, Delhi - 110 030, India
Phone: +(91)-(11)-65679410
Mobile: +(91)-9313701466 / 9999506175

ADDRESS FOR RAW MATERIAL SUPPLIERS

GUNNY BAGS

MR. HARISH D. TANNA
DEVAKARAN MULJI(TALPATRIWALA)
1031 NEW, 1073, BHAWANI PETH,
OPP. HAMAL TALIM
PUNE-411042, MAHARASHTRA
Phone:020-26355060/26358188

MR. VIKRAM G SHANKAR
GEE DEE ENTERPRISES
P.B. 2016, P.O.TRIMULGHERRY
HYDERABAD-500015, ANDHRA PRADESH
Phone:040-27963308
Email: vikram@geedee.net

MR. PARVIZ
M E JOHROMI ZADEH EXPORTS
55, AMIN BUILDING,
EBRAHIM RAHIMTULLA ROAD,
MUMBAI-400003, MAHARASHTRA
Phone:912223775797

MR. BISWANATH BAIDYA
TANUSHREE ENTERPRISE
33-A, BANAMALI NASKER ROAD,
KOLKATA-700060, WEST BENGAL
Phone:913324787263/55537818/69525043/24458970
Email: tanusree1008in@yahoo.com

TIN CONTAINER

Mangla Metals Private Limited
No. 49/14, Street No. 15, Samaypur
Delhi - 110 042, India
Mobile: +(91)-9899766655
+(91)-9312215855
Telephone: +(91)-(11)-27836503

GNA Exports
No. 94/3, 2nd Floor, Katriguppe, Near Big Bazaar,
BSK 3rd Stage, Bengaluru - 560085, Karnataka, India
Mobile: +(91)-9535186226
Telephone: +(91)-(80)-26791432
+(91)-(80)-41163061
Fax: +(91)-(80)-26791432
Email: info@gnaexports.com, sales@gnaexports.com

R. K. Machine Tools (India)
Unit No. C-1/ D6, Bachan Singh Compound, Lake Road,
Bhandup West, Mumbai - 400078, Maharashtra, India
Mobile: +(91)-9892007500, +(91)-9833652212
+(91)-7718921975
Telephone: +(91)-(22)-25955287
Email: info@rkmachinetoolsindia.com
canmachines91@gmail.com

Mohammedi Tin Pressing
No. 16, Nawroji Hill Road,
Behind Chinch Bunder Petrol Pump,
Dongri, Mumbai - 400009, Maharashtra, India
Mobile: +(91)-9821340786
Telephone: +(91)-(22)-23774052
Fax: +(91)-(22)-23774052

PLANT AND MACHINERY

1.OIL SEED PREPARATION SECTION

a) Seed cleaner and separator capacity :-
10mt/24hrs. Rs. 1,00,000

b) Elevator
1) Bucket type height 6.00 m
11) Chain type height 6 meters Rs. 80,000

c) Deorticator with sone separator, electrically operated capacity :- 2mt/hr. Rs. 2,00,000

d) Disk mill for subsequent separation of the kernels from the shells by brusing and milling capacity :
1.5 mt/hr Hp: 1.5 HP. Rs. 1,50,000

Total Rs. 5,30,000

2. Solvent extraction plant mainly consisting of carrousel extractor with hydro cyclones , receiving tanks for extractor, three stage silvent vacuum distillation unit using preevaporators and steam heated post evaporators etc.,

Total Rs. 20,00,000

3. Oil refining and bleaching plant consisting of following sections:-

Section 1 :
a) Storage tanks for raw oil capacity 10 mt each 2 Nos.

b) Oil pumps centrifugal type capacity : 100 gpm complete with motor and starter 2 Nos.

Section 2 :

a) Degummer

Working capacity : 5TPD
Conical shape open top material
8 mm Mild steel fitted with 5 HP
starter plus reduction gear spray coils
open steam sparger having coils 1 No.

b) foots Receiver 1 No.
1 m x 0.25 m x 0.25 m material-
Mild steel 6 mm fitted with open steam
coils , inlet and outlets .

c) Oil water Gravity separator 1 No.
Size- 1m x 0.25 m x 0.25 m material-
Mild steel multi compartment type,
Suitable for separation oil from oil
Water layer.

d) Lye , fresh water tank size- 1 No.
1 m x 1 m x 100 m
Capacity : 1000 litres
Material - Mild steel
Rectangular tank, complete with
heating arrangement as and accessories.

e) Lye , preparation tank (phosphoric acid) 1 No.
Capacity : 100 Ltrs.
Size : 0.7 m x 0.7 m x 1 m
Material - FRP Lined MS
Rectangular tank with inlet/outlet etc.

f) Chemical pump (kirloskar) 1 No.
Suitable for transferring lye and brine
Capacity : 100 1 pm
Head - 30 mtrs.
Motor -2 HP TEPC.

g) Degummed / Neutral oil tank
Capacity : 5 Tons
Size - 1 x 1 x 1
Material - Mild steel 5 mm
with inlet/outlet manhole

Section -III :-

CONTINUOUS LAMINAR BLEACHING

a) Pump (feed) 1 No.
Type - Centrifugal
Motor - 1 HP TEFC

b) Day Bind 1 No.
Capacity : 0.5 Tons each
Size: 1 m x 1.5 m x 0.3 m cone
Material - Mild steel with cover

c) Rotary feeder 1 No.
To feed earth at the rate of 1% to 3%
Variable motorised rotary valve / dozer
Size - 50 mm

Drive - Geared Motor 1 HP
920 RPM withgear and
varispeed belt

d) Mixer 1 No.
Liquid cyclone design
Material - Mild steel

e) Rotameter 1 No.
For metering oil into pre-bleaching system
Capacity : 0 to 30 lmp of oil
Fluid - vegetable oil
temp of operation - 40oC max.

f) Pump : (Mixer) 1 No.
Type - centrifugal
Motor - 2 HP TEFC

g) Pre-heating section (25) 1 No.
Made of MS "C"class pipe steam
jacketed to facilitate draining
the heat oil to drying temperature of
70 oC mx.

h) Vaccum Driver 1 NO.
Type - vaccum spray drier with spray
nozzle demister & ejector and accessories
Size : 250 x 450.

1) Material - Mild steel 5 mm
Capacity - 30 lpm oil

i) Buffer (Mixer) 1 NO.
Type - Liquid Cyclone design
Size - 150 x 200
Material - Mild steel 5 mm

j) Pump (Mixer) 1 No.
Type - Centrifugal
Motor - 3 HP TEFC

k) Heater section (4125) 1 No.
Made of SS 304 steam jacketed and fitted
With 3 way cock valve at bottom of each
bend to raise temperature of oil to
bleaching temperature 70 ^{o}C to 110^{o}C

l) Holding section : 1 No.
Made of Ss 304 steam jacketed and narrowed
at each U bend to 50 mm for turbulence and 3
way cocks for during

m) Cooling section 1 No.
Similar to Item (U) but water circulated on jacket

n) Buffer 1 No.
similar to item No. (1)

o) Pump (filter press) 1 No.
Type - centrifugal
Capacity : 10 1pm
Head - 100 meters
Motor - 1 HP TEPC for filtering

p) Thermostat Solenoid for dryer heater and Holding lines in pre-bleacher 3 Nos.

q) Filter Press :
Size : 1 M2
Type - Pressure filter complete with oil gutter, Cock and tightening arrangments.

r) Oil Storage Tanks 1 NO.
Capacity - 5 Tons
Material - Mild Steel
Vessel with settling and draining arrangements
Completre with inlets , outlets , stiffner and accesroies.

SECTION IV
DEIDIRUZER OF DOUBLE DESIGN SECTION

Dearator 1 No.
Size - 200 litres
Type - oil spray type to be gas feed stock
Preheated to 60oC Mx.
Materials Mild Steel 5 mm

Pumps 2 No.

Type - Double machinical seal centrifugal type
Capacity - 30 lpm
Head - 10 meters
HP-1 HP

Deacidifier / deodorizer 1 No.
Working capacity - 5 Tons/24 hours
continuous four tryas
Material -SS 316 wetteed parts in Mild steel sheel double whell cylindrical vesses with dished bottom and downtherm plates. Complete with heating and cooling coils . Open steam inlet and outlets and accessories incorporating following section.

A.Dearator/Preheater Stage

Primary section for heating oil (190oC to Deodorize temp. Using downtherm heatede coils.

B. Pre-stripping stage

To strip the ol PFA content down to 0.1% using steam sparging at deodorizing temp. consisting of 3 Nos downtherm heated trayer.

C. Holding Stage:

To Hold oil at deodorizing temp. to all thermal degradable products to develop.

D. Deodorizing stage :

To remove all odorous constituents of oil incuding those produced in holding section to improve shall life of product.

E. Heat Exchanger Stage :
With heating coils for dearating and drying the feedstock is heated by outgoing product.

F. Oil cooler stage :-
with SS 316 coils , waterr cooled to cool oil to 70°C .

Oil pump self priming type
Suotable for transferring oil under Deodorizer vaccum
Capacity : 10 lpm
Type - Centrifugal double machinal seal
Head - 10 meters
HP - 1 HP
Material -SS 316 working parts.

Fatty acide jet condenser:- 1 No.
Material SS 316 shell cylindrical
Vessel with dished ends with SS internal,
domestic and spray nozzles of SS 316.

Receiver for Fatty acid 1 No.
Cylindrical construction with dieshed ends
Capacity - 20 litres
Material SS 316 with jacket

Fatty acid cooler 1 No.
Capacity - 30 lpm Fatty acid
water cooler area - 1 M2
Material - SS 316.

Fatty acid pump : (selfr priming type SS 316)
Capacity - 10 lpm double mechanical seal
HP- 2 HP

Fatty acid storage 1 No.
Capacity - 100 litres
Type - 10 x 1.0 x 1.0 M
Made - Mild steel 3 mm with FRP lining

Vacuum system: 1 No.
Capacity - To produce 3 mm vacuum Deodorizer
Load - 10 kgs/hr steam + 3 kg air - 3 Kg farry acid
Type - 2 Ejector + 2 Booster

Antioxidant Dozer 1 No.
Type - Metering pump
Capacity - 1 lpm
HP - 1 HP

Polishing Micronic Filter 2 Nos.
Type - Micronic Candle filte3r with improted paper
Capacity - 200 Tons /per set candles

Finished oil storage 1 No.
Capacity - 5 tons
Type - vertical Cylinder
Size - 1 m x 1 m x 1 m

SECTION V
WATER COOLING AND PUNPING ARRANGMENT

Cooling Tower 1 No.
Capacity - 4,000 lpm
Gross flow cooling tower
Guaranteed to cool 3,000 IGPM of water
from 40oC to 30oC with 25o wet bulb temp.
Number of water inlet size - 1 at 6"
Number of fan and fan cell - 2
Pumping Head , feet of water - 9 ft. above

Water circulation pump:
Capacity - 2,000 gallons/hr each
with suitable motor and base plate
Make - KIirloskar
Water piping line from cooling tower to
the extraction with valves and fittings 1 Set
Control panel of the above water pumps 1 Set

Total Rs.18,00,000

---

4) Valves , Mild steel pipes . pipe fittings steam traps and strainers light and high glass etc.	Rs. 2,00,000
5) Boiler (oil fired) Capacity - 3000 kg/hr 1 No of working pressure : 100 psi.	Rs. 3,00,000
6) Wieghing machine (Platform type 1 No.	Rs. 20,000
7) Other Miscellaneous equipments	Rs. 50,000
Sub Total	Rs. 49,00,000
Electrification and Installation Commissioning charges @ 10% of the sub total:-	Rs. 4,90,000
Total	Rs. 53,90,000
SAY	Rs. 54,00,000

PLANT ECONOMICS

Rated Plant capacity	=	5.00 M.T/day
	=	1500.00 M.T/annum

MAIZE/CORN OIL

Basis

No. of working days	=	25 days/month
	=	300 days/annum
No. of shifts	=	3 per day
One shift	=	8 hours

Currency - Rs.

LAND & BUILDING

1.	Land area required 2500 sq. mt. @ Rs.2500/- per sq. mt.	Rs.	62,50,000.00
2.	Factory shed 600 sq. mt. @ Rs. 6000/- per sq. mt.	Rs.	36,00,000.00
3.	Store godown 250 sq. mt. @ Rs.6000/- per sq. mt.	Rs.	15,00,000.00
4.	Workshop in 100 sq. mt. @ Rs. 5000/- per sq. mt.	Rs.	5,00,000.00
5.	Laboratory, 100 sq. mt. @ Rs. 6000/- per sq. mt.	Rs.	6,00,000.00
6.	Time office, 15 Sq. mt. @ Rs.5000/- per sq. mt.	Rs.	75,000.00
7.	Administrative block 50 sq.mt. @ Rs. 6000/- sq.mt.	Rs.	3,00,000.00
8.	Canteen 20 sq.mt. @ Rs. 4800/- per sq. mt.	Rs.	96,000.00
9.	First aid block 10 sq.mt. @ Rs. 5000/- per sq. mt.	Rs.	50,000.00
10.	Cycle Shed 15 sq.mt. @ Rs. 3200/- per sq. mt.	Rs.	48,000.00
	TOTAL	Rs.	1,30,19,000.00

PLANT & MACHINERY

1. Total cost of Plant and Machinery.		Rs.	54,00,000.00
	TOTAL	Rs.	54,00,000.00

OTHER FIXED ASSETS

1.	Office equipment, furniture plus other equipment & accessories	Rs.	2,50,000.00
2.	Laboratory equipments.	Rs.	2,00,000.00
3.	Transportation and charges.	Rs.	2,00,000.00
4.	Pre-operation and Preliminary costs.	Rs.	1,00,000.00
5.	Computer, Laptop, Printer, Internet Connection & Delivery Vehicle	Rs.	6,00,000.00
	TOTAL	Rs.	13,50,000.00

FIXED CAPITAL

1.	LAND & BUILDING	Rs.	1,30,19,000.00
2.	PLANT & MACHINERY	Rs.	54,00,000.00
3.	OTHER FIXED ASSETS	Rs.	13,50,000.00
	TOTAL	Rs.	1,97,69,000.00

WORKING CAPITAL REQUIREMENT/MONTH

RAW MATERIALS

1.	Germ Required per month (12Ton per day) i.e.total per month @ Rs. 10,000/- Mt.	Rs.	30,00,000.00
2.	Petroleum either required per month 8.75 ton. @ Rs 40/- kgs.	Rs.	3,50,000.00
3.	Gunny bags @ Rs. 10/- each (2775) bags.	Rs.	27,750.00
4.	Tin container 5000(25 kgs) @ Rs. 40/- each container/.	Rs.	2,00,000.00
5.	Other chemicals for testing.	Rs.	15,000.00
	TOTAL	Rs.	35,92,750.00

CORN OIL [EIRI/EDPR/0704] (J.C :9315)
J.C. 9315 Page A- 7

SALARY & WAGES / MONTH

1.	Manager	1 No.	Rs.	25,000.00
2.	Oil Technologist	1 No.	Rs.	20,000.00
3.	Production Supervisor	3 No.	Rs.	45,000.00
4.	Laboratory Chemist	1 No.	Rs.	10,000.00
5.	Laboratory Assistant	1 No.	Rs.	8,000.00
6.	Plant operator	6 No.	Rs.	48,000.00
7.	Electrician	1 No.	Rs.	8,000.00
8.	Maintenance representative	1 No.	Rs.	7,000.00
9.	Semi skilled workers	6 No.	Rs.	39,000.00
10.	Unskilled worker	10 No.	Rs.	60,000.00
11.	Accountant-cum-cashier	1 No.	Rs.	10,000.00
12.	Sales Officer	1 No.	Rs.	10,000.00
13.	Sales Representative	1 No.	Rs.	8,000.00
14.	Clerk-cum-cashier	1 No.	Rs.	7,000.00
15.	Store keeper	1 No.	Rs.	7,500.00
16.	Peon/Chowkider	3 No.	Rs.	18,000.00
		TOTAL	Rs.	3,30,500.00
	Plus perks @ 33% p.a.		Rs.	1,09,065.00
		TOTAL	Rs.	4,39,565.00

UTILITIES AND OVERHEADS

1.	Power Consumption of 13000 Kwatt hrs @ Rs. 6.00 per Kwatt hr.	Rs.	78,000.00
2.	Water Consumption of 200 KLs @ Rs. 4.00 per KL	Rs.	800.00
3.	Fuel oil.	Rs.	20,000.00
4.	Postage and stationery.	Rs.	15,000.00
5.	Consumable stores.	Rs.	20,000.00
6.	Repair and Maintenance.	Rs.	20,000.00
7.	Transportation charges.	Rs.	1,00,000.00
8.	Advertisements and publicity.	Rs.	1,00,000.00
9.	Sales Promotion.	Rs.	1,50,000.00
10.	Other miscellaneous.	Rs.	50,000.00
	TOTAL	Rs.	5,53,800.00

Total load is 24 Kwatts

TOTAL WORKING CAPITAL/MONTH

1.	RAW MATERIAL	Rs.	35,92,750.00
2.	SALARY & WAGES	Rs.	4,39,565.00
3.	UTILITIES & OVERHEADS	Rs.	5,53,800.00
	TOTAL	Rs.	45,86,115.00

1.	WORKING CAPITAL FOR 3 MONTHS	Rs.	1,37,58,345.00
2.	MARGIN MONEY FOR W/C LOAN	Rs.	34,39,586.25

COST OF PROJECT

TOTAL FIXED CAPITAL	Rs.	1,97,69,000.00
MARGIN MONEY	Rs.	34,39,586.25
TOTAL	Rs.	2,32,08,586.25

TOTAL CAPITAL INVESTMENT

TOTAL FIXED CAPITAL	Rs. 1,97,69,000.00
TOTAL WORKING CAPITAL FOR 3 MONTHS	Rs. 1,37,58,345.00
TOTAL	Rs. 3,35,27,345.00

COST OF PRODUCTION/ANNUM

1.	Working Capital for 1 year	Rs. 5,50,33,380.00
2.	Interest @ 13.50% on T.C.I	Rs. 45,26,191.58
3.	Depreciation @ 10.00% on buildings	Rs. 6,76,900.00
4.	Depreciation @ 20.00% on Plant and Machinery	Rs. 10,80,000.00
5.	Depreciation @ 20.00% on office equipment & furnitures	Rs. 50,000.00
	TOTAL	Rs. 6,13,66,471.58

TURN OVER/ANNUM

1.	Receipt by sale of 1500 MT. of Corn/Maize Oil @ Rs. 48,000/- per MT.	Rs. 7,20,00,000.00
	TOTAL	Rs. 7,20,00,000.00

PROFIT = RECEIPTS - COST OF PRODUCTION

= 7,20,00,000.00 - 6,13,66,471.58

= 1,06,33,528.43

PROFIT SALES RATIO = Profit / Sales x 100

$$= \frac{1,06,33,528.43}{7,20,00,000.00} \times 100$$

= 14.77 %

RATE OF RETURN = Operating profit / T.C.I x 100

$$= \frac{1,06,33,528.43}{3,35,27,345.00} \times 100$$

= 31.72 %

BREAK EVEN POINT (B.E.P)

Fixed Costs of the plant are as under -

1.	Interests	Rs.	45,26,191.58
2.	Depreciation	Rs.	18,06,900.00
3.	40.00% of salaries	Rs.	21,09,912.00
4.	40.00% of overheads	Rs.	26,58,240.00
	TOTAL	Rs.	1,11,01,243.58

$$B.E.P. = \frac{\text{FIXED COSTS}}{\text{FIXED COSTS + PROFIT}} \times 100$$

$$= \frac{1,11,01,243.58}{1,11,01,243.58 + 1,06,33,528.43} \times 100$$

$$= 51.08\ \%$$

LAND MAN RATIO = Total land / Manpower

2500 : 39 :: 64 : 1

RESOURCES FOR FINANCE

1. Term loans from Financial institutions (65.00 % of fixed capital) at @13.50% p.a rate of interest	Rs.	1,28,49,850.00
2. Bank loans for 3 months (65.00 % of working capital) at @ 13.50% p.a rate of interest	Rs.	89,42,924.25
3. Self raised capital from even funds & loans from close ones to meet the margin money needs at a @ 13.50% p.a rate of interest	Rs.	1,17,34,570.75
TOTAL	Rs.	3,35,27,345.00

We hope **Detailed Feasibility Report** in your possession at the time, must have conveyed you the elementary idea on process data, market and economics. We feel you must have now taken a decision to finalize your project plan for ultimate implementation in a successful manner. Before you go ahead, we suggest you to take our ***MARKET SURVEY CUM DETAILED TECHNO ECONOMIC FEASIBILITY REPORT.***

"**EIRI"** offer you **MARKET SURVEY CUM DETAILED TECHNO ECONOMIC FEASIBILITY REPORT** on this project.

Brief contents of MARKET SURVEY CUM DETAILED TECHNO ECONOMIC FEASIBILITY REPORT are as under :

- Introduction
- Properties
- BIS (Bureau of Indian Standard) Specifications & Requirements
- Uses & Applications
- Present Indian Market Position
- Expected Future Demand
- Export & Import Statistics Data
- Names and Addresses of Existing Units (Present Manufactures)
- List of Plant & Machineries
- Miscellaneous Items and Accessories
- Instruments, Laboratory Equipments and Accessories
- Electrification, Electric Load and Water
- Maintenance, Suppliers/Manufacturers of Plant and Machineries
- Process of Manufacture with formulae if applicable
- Flow Sheet Diagram
- List of Raw Materials
- Availability of Raw Materials
- Requirement of Staff & Labour
- Personnel Management
- Skilled & Unskilled Labour
- Requirement of Land Area
- Built up Area
- Plant Layout.

along with financial details as under:

Summary of Capital Cost of Project
Land & Side Development Exp.
Buildings
Plant & Machineries
Misc. Fixed Assets
Technical Know how Fees & Exp.
Preliminary Expenses
Pre-operative Expenses
Provision for Contingencies

below mentioned financial statements (Annexure) will be for 5 to 10 Years

Annexure :: Cost of Project and Means of Finance
Annexure :: Output, Profitability and Cash Flow Chart
Annexure :: Assessment of Working Capital requirements

Annexure :: Sources of Finance
Annexure :: Balance Sheets
Annexure :: Break-Even Analysis and profitability analysis.
Annexure :: Quantitative Details-Output/Sales/Stocks
Annexure :: Sales Realisation
Annexure :: Raw Material Cost
Annexure :: Other Raw Material Cost
Annexure :: Packing Material Cost
Annexure :: Consumables, Store etc.,
Annexure :: Employees Expenses
Annexure :: Fuel Expenses
Annexure :: Power/Electricity Expenses
Annexure :: Repairs & Maintenance Exp.
Annexure :: Other Mfg. Expenses
Annexure :: Administration Expenses
Annexure :: Selling Expenses
Annexure :: Depreciation Charges - Profitability
Annexure :: Depreciation Charges
Annexure :: Interest and Repayment - Term Loans
Annexure :: Tax on Profit
Annexure :: Assumptions for Profitability workings
Annexure :: Assessment of Working Capital

Engineers India Research Institute (EIRI) is a renowned name in the industrial world for offering technical and financial consultancy services.

EIRI services are:

Detailed Feasibility Reports
New Project Identification
Project Feasibility and Market Study
Identification of Lucrative Industrial Project Opportunities
Preparation of Project Profiles / Pre-Investment and Detailed Feasibility Studies,
Market Surveys / Studies, Market Survey Cum Detailed Techno-Economic Feasibility Reports
Project Reports in CD Roms
Identification of Plant /Process/Machinery and Equipment, Industrial General Guidance for setting up new industrial projects.

Price Rs. 20,000/- (Rs. Twenty Thousand only) or US$ 400/- (US Dollars Four Hundred Only) for MARKET SURVEY CUM DETAILED TECHNO ECONOMIC FEASIBILITY REPORT.

PLEASE SEND YOUR CONFIRMED ORDER AT:

ENGINEERS INDIA RESEARCH INSTITUTE
4449, Nai Sarak, Main Road, Delhi-110 006 (India)
Ph: 91-11-23916431, 23918117, 45120361, 64727385, 23947058
E-Mail: eiribooks@yahoo.com**, eiriprojects@gmail.com**
Website:www.eiriindia.org, www.eiribooksandprojectreports.com
Mob: 9811437895, 9811151047