ENGINEERS INDIA RESEARCH INSTITUTE
We Create Industrialists

DETAILED FEASIBILITY REPORT

(PROJECT FEASIBILITY REPORT)

O N

STARCH FROM MAIZE

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

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CODE : EIRI/DFR/0411
J.C. : 7991

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.

STARCH FROM MAIZE

[EIRI/DFR/0411] (J.C.:7991)

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APPENDIX - A

STARCH FROM MAIZE

[EIRI/DFR/0411](J.C.7991)

INTRODUCTION

1.0 Starches

Starch is a group of polysacchrides,composed of glucopyranose units joined together by-glucosidric linkages. It conforms to the molecular formula, (C6-H10O5)u, where n varies from a few hundred to over one million. Starch is found as the reserve carbohydrate in various parts of plants and is enzymatically broken down to glucose to other carbohydrates according to the metabollic needs of the plants.

1.1 Natrual Starches

Starch occurs naturally in the plants and its percentage vries with the plant and also in different parts of the same plant. Corn (maize) sorghum grain wheat, rice, potato, tapioca, arrow root and sago are among the important sources of natural starches . The grains of barley, rye, oat, and the millets are also employed in the production of starches.

1.1 Natural Starches

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1.2 Tapioca

The roots of tapioca plant (manihot utillissimax) farms one of the major sources of starch, ranking next to potato in the consumption by starch industry. Tapioca plant, also know as cassava and manioc, thrives in equatorial regions between the Topic of Capricorn. There are as many as seventy five varieties of cassava plant of which two varieties viz., bitter and sweet are widely cultivated; the bitter is usually grown for the purposes of the manufacutre of starch, as it contains a higher content of starch. The starch content of the plant varies between 12 and 33 per cent. The ratio of the percentage of any lase to amylopectin has been found to be 16:84. More than half of the total world area under the cultivation of cassava is confined to the African countries such as Gambia, Ghana, Kenya, Mauritius, Nigeria, Zamibia, Nyssaland, Sierra Leone and Zanzibar and the rest come from the tropical regions of other continents.

1.3 Cereal Starches

The cereal starches ,such as maize wheat, rice and sorghum, are recovered by several processes, of which the wet-milling is by far the most important. Other processes commercially employed in the manufacture of unmodified starches are that alkali, Martin and batter in the order of decreasing importance. Of the material methods earlier used for the production of starch and which have now become obsolete, mention may be made of the Hakka, Alsation and Fescas process. In all the above processes, Starh is recovered in five stages:

a) Softening or steeping of the grains, after thorough washing in water.

b) Tabling or centrifugation of the ground mass.

c) Dewatering and drying of the final products.

d) The recovery of important by products.

1.4 Raw Materials

The principal raw materials, used by the Indian Starch Industry are maize and tapioca.

1.4.1 Maize

Maize is grown in Uttar Pradesh, Bihar, Rajasthan, Punjab, Madhya Pradesh, Himachal Pradesh , Gujarat, Jammu and Kashmir, Andhra Pradesh, Mysore, and Haryana,. The total area under cultivation and the prpduction of maize during 1970-71 were estimated at 5,838,700 hectares and 7,412,900 tonnes respectively.

1.4.6 Chemicals

The important chemicals used by the starch industry are hydrochloric acid, sulphuric acid, soda ash , sulphur and activated carbon and all these are manufactured in the country (chem. Ind. News,1957,1. 283; Agric. Situat. India, 1971-72, 26,376; ibid., 1970-71, 25,1273;

B.I.S.SPECIFICATION

IS : 1005-1976

Edible maize starch (corn flour)
(Second Revision).

IS : 1184-1977

Maize, starch, cotton textile industry
(Second revision)

IS : 4662-1977

Methods for sampling of starches products
(First revision)

For more information contact at:

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Phone: 91 11 23238821, 23233375, 23239402
91 23238821, 23239399 (Fax)
sales@bis.org.intandards Institution

Sr.No.	Sales Outlets Address	Telephone No/Fax/e-mail
01.	**Director (Sales)** Manak Bhawan, 9, Bahadur Shah Zafar Marg New Delhi-110 002	91-11-23238821,23233375,23239402 91-23238821, 23239399(Fax)
02.	**Western Regional Office** Manakalaya, Plot No. E-9, MIDC, Road No. 8, Behind Telephone Exchange, Andheri (East), Mumbai-400 093	Phone 022-28329295 Fax 28374231 Email:saleswro@bis.org.in
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04.	**Northern Regional Office** SCO 335-336, Sector 34-A Chandigarh-160 022	91-0172 2665512 91-0172 2602025 (Fax) 910172-2609285, 2664750,2624136(PBX) nro@bis.org.in
05.	**Southern Regional Office** C.I.T. Campus, IV Cross Road Chennai-600 013	91-044-22542315, 22541584,22541470 91-044-22541087 (Fax) sro@bis.org.in

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MARKET SURVEY

Starch Industry in India

Starch is an abundant carbohydrate distributed worldwide in plants. Starch has been a major ingredient in man's diet over the centuries. In addition it has become a major industrial raw material. Plant seeds, roots and tubers are all sources of industrial starch production. The commercial realities of the starch recovery process limit the industrial sources mainly to wheat, maize and tapioca. Indian starch industry mainly consumes maize as input raw material. Also some industries are tapioca based.

Maize is doing wonderful things in our everyday life. Maize is present in one form or other in

The Food we eat
The Milk we drink
The Chocolates/Biscuits we take
The Clothes we wear
The Paper we read
The Medicines we take

Maize (Corn) contains about 70% starch, other components being protein, fibers and fat. The basis of the maize milling process is the separation of the maize kernel into its different parts. Maize starch is produced by the wet milling process, which involves grinding of softened maize and separation of corn oil seeds (germs), gluten (proteins), fibers (husk) and finally pure starch.

Byproducts from Maize

The byproducts from maize based industries find various applications:

i. Maize(Corn) Steep Liquor : It contains amino acids, proteins and are used by antibiotics drugs manufacturers. Also it is a large source of biogas, which is being used as fuel for driers, boilers etc.

ii. Maize Gum : Corn Oil is produced by expelling oil from the germs. Corn Oil finds applications in food and other chemical industries. Maize oil cake obtained after expelling oil is used as cattle and poultry feeds.

iii. Maize Gluten : Maize Gluten contains high protein content and it is used as cattle and poultry feeds.

iv. Maize Husk : It contains starch, protein and fat as minor components and mainly consumed as cattle feed.

Concept of Texture

Starch has a multitude of food and industrial applications. Starch plays a leading role in determining the texture of many foods and texture is of vital concern to both the consumers and the manufacturers. Appearance, feel to the touch, softeners and finally mouth feel all contribute to the concept of texture.

Uses of Maize Starch

Maize starch forms viscous, relatively short and opaque paste with cereal flavor. Its paste sets to stiff gels. It is widely used for thickening sauces, gravies, puddings and pie fillings. Maize starch finds numerous uses in the baking industry for the production of cakes, cookies, in ice-cream preparations etc.

In Paper industry a large quantity of starch is consumed as a surface-sizing agent, as a binder, as a paper coating agent etc. In textile industry, starch is used in sizing to strengthen the warpyarn, in finishing and changing the appearance of fabric after it is bleached, dyed or printed, in printing and increase the consistency of printing pastes. Also starch is used as a component in finishing agent to glaze and polish sizing thread.

Starch Derivatives

Starch when cooked forms high viscous gels and this property limits its applications. But by acid and other chemical treatments at varying temperatures the characteristics of the native starch is modified to suit various end users. Following products are made by the chemical / acid and heat treatments of starches.

White Dextrins
Yellow Dextrins
British Gums

These products are partly soluble in water and finds several applications in food industry as

Thickner in Sauces and Soups
Gel Former in Puddings
Suspension Stabilizer
Bodying agent in Baking

Modified Starches such as oxidised starch, pregelatinized starch and cationic starch find wide applications in paper industry, textile industry, Confectionary etc.

Starch Sweetners

Starch based sweeteners are other class of products manufactured in starch industries. A variety of sweeteners for very specific end users are produced by acid/enzyme hydrolysis of starch. Following starch sweeteners are available in the market : Malto dextrin, Liquid glucose, Dextrose monohydrate, High Maltose syrup, Liquid Sorbitol.

These starch based sweeteners find various end users, a few are mentioned below:

Maltodextrin : In syrup and powder form used in food, baby food and medical preparations as a non sweet, nutritive agent.

Liquid Glucose : Widely used in the confectionary bakery, jam, canning and leather industries.

Liquid Dextrose: In fermentation industries for the manufacture of dextrose monohydrates, fructose and Sorbitol syrups.

Dextrose Monohydrates: A crystalline free flowing product used in food and pharmaceutical industries for Glucose-D, Glucose-C manufacture etc.

High Maltose Syrup : As a malt replacement in brewing industry, in confectionary for Candy making.

Sorbitol Syrup: It is hydrogenated dextrose syrup not having any reducing sugars widely used by tooth paste, pharmaceuticals, cosmetics and tobacco industries.

ADDRESS OF MANUFACTURERS/SUPPLIERS OF STARCH

Anil Starch Products Ltd.
Anil Road, P.O.Box 10009
Ahmedabad - 380025
Ph:. 2123222
Fax: 2110731

Geeta Trading Company,
2105, Khari Baoli,
New Delhi - 110 006
Tel : 2513852

Ganga Bishan & Sons
142, Gadodia Market
Kari Baoli, Delhi - 110006
Ph:. 2943682

Md. Nasimuddin, I.A.S
Sagoserve, Salem - 636302
Ph:. 447673, 448046
Fax: 0427-445028

National Starch & Chemical Co.
10, Finderne Avenue
P.O.Box 6500
Bridgewater, New Jersey - 08807 90500
908 685 5000
Website : www.nationalstarch.com

Punjab Maize Products Ltd.
Uppli Road,
Sangroor,
Punjab - 148 001
Tel : 34209
Fax : 30615

Punjab Maize Products Ltd.
A-8, DLF Indl. Area - 1,
Faridabad - 121 003 (Hr.)
Tel : 2765 50
Fax : 2768 84

MANUFACTURE OF STARCH

Starch form maize is obtained by the wet milling process. The process involves cleaning of grains, steeping, milling, speration of husk, germ and gluten, and drying the product. The grains received at the mills and magnetic separators to completely eliminate the extraneous mater present. The cleaned grain is stored in concrete silos.

The grain is transported to steeping vat by elevators and conveyors through a weighing machine. Warm matter containing a small amount of sulphur dioxide is circulated through the vats to loosen the husk and soften the gluten. During the steeping, a part of the soluble salts and proteins of the traisin get dissolved and when the solid matter content of the water reaches percen at 6-10 ie it is replaced by fresh steep water. The washed water is concentrated by evaporation and is used as cattle feed.

After steeping the softened granins are passed over vibrating screens to remove any adhering foreign matter and then ground in attrition mills consisting of two plates with protuding teeth. The ground mass is passed in to wooden, V shaped, germs from the rest of the mass. The floating germs are skimmed over by sweep paddles, washed on screens dried and sent to the oil extraction plant. The mixture of starch gluten, husks add fibre recovered at the bottom and sent to vibrating screens to eliminate excess water and soluble substances. IT is then throughly milled in fine grindes to fine slurry know as starch milk. The grinders may be either Buhror stone mills or preferably vertical mill make of stainless steel. The starch milk is processed in entrifuges to remove husk and fibre which are washed free of adhering starch in the counter current system and washing fed back to the main starch stream.

The resulting slurry is passed through high speed continuous centriguges where the lighter gluten is separated form the heavier starch. In the first stage, the heavy starch layer is taped in such a way that least possible amount of starch goes in which the overflow of gluten, thus maintaining gluten purity. In the latter stages the process is reversed to ensure the purity of the starch. The gluten from the first stage is concentrated and pressed into cake. The glutenous starch from the latter stages is fed back to the main stream at the husk sepration stage. The deglutenized starch milk is dewatered in a perforated bucket centrifugal machine to a moisture content of about 30-36 percent. It is flash-dried and packed or passed on to other division for the manufacture of starch derivaties.

PROCESS OF DESCRIPTION

Wet milling or the classical milling process is the only process for the manufacture of starch which is universally in commercial use. Starch manufactured by this process can be used by textiles, paper and food industries. Starch may be dry milled using screening and air - classification of particle size, but this process does not completely separate oil, starch, and hull and can only be used by food industry. Better separation is obtained by wet - milling.

To better understand the milling process, it is necessary to examine the structure of the corn kernal. The principal parts of the kernel are the tip cap, the main entry for water absorption by the kernel which consists of 0.8% of the kernel the pericarp or hull (5%) the germ or embryo (11%) and the endosperm (82%). The tip cap and pericarp comprise the fibre fraction in wet -milling or the bran fraction is dry milling. The germ is composed mainly of protein and lipids, where as the endosperm consists of starch granules embedded in proteinaceous cell walls. An average composition of corn grain on a dry basis is 71.3% starcch, 9.91% protein and 4.45% fat (29-30). The normal water content is 10 - 15%.

Cleaning & Soaking :-

The maize received at the site is weighed, cleaned by grain cleaners and stored in silos. When required it is cleaned by screening to remove colour, sand, and other foreign material, and then by aspiration to remove the lighter dust and chaff. This operation is known as dry cleaning of maize, which removes dust, broken grain and foreign matters. This reject from the grain is mixed with cattle feed. After cleaning the grains is once again weighed for steeping.

Steeping :-

In steeping process steep acid or sulphurous acid is produced by turning sulphur in a rotary burner. Generated sulphur di-oxide is cooled and absorbed in an absorption tower. The sulphurous acid formed is then pumped to steep tank.

The weighed grain is already been added in the steep tank when sulphurous acid is pumped. The grain is soaked for 48 hours in warm steep acid the temperature being maintained at 50-55oC. Steeping requires careful control of water flow temperature (50 - 55 oC), sulphur dioxide concentration, 0 % and PH at 3- 4. Corn introduced to teh steeps at a moisture content of 15% attains a moisture concentration of 45% at the end of 30 - 40 h. This water absorption rate is accelerated by the sulphur dioxide in the steep water ad results in a 55 - 65 % increase in kernel volume.

Sulphur dioxide was first added to corn steep water to prevent the growth of putrefactive micro organisms, but it is indispensible in maximising starch yield. It acts on the nitrogen - containing components of corn which consist of 10% albumin and non-protein nitrogen, 10% globulin, 38% zein and 42% glutelin. Sulphur di-oxide effects softening of the glutelin matrix, followed by dispersion. This action allows maximum starch release and recovery especially from the horny endosperm . Although sulphur dioxide inhibits the growth of micro organisms after several hours its concentration decreases and lactic acid bacteria start to grow.

Steep Liquor Concentration :-

During the steeping period, solubles are leached out of the maize grain and the steeped liquor is drawn off from the steeping tanks. It is concentrated to about 50% solids in three stages. Vapours coming out of the evaporators are condensed and the hot water from condenser is used for making steep acid again.

Crude Gem Oil Recovery :-

The grain after steeping is dewatered in a DSM dewatering screen. The softened corn kernels are degenerated between two studded steel plates, one rotating and one stationary, which tear the kernels apart and extricate the corn germs without crushing them. An attritcon null is used for this purpose and mill gap is so adjusted to maximize the amount of germ freed, but minimize rupture of germ, which would cause loss of oil and present problems in the purification step. The germs together with the slurry are sent to a hydroclone ie a cyclone separator, when the particles separate by density, the endosperm and fibre leaving in the hydroclone underflow and germ from the centre.

The germ fraction is then pumped onto screens, wahsed several times to remove residual starch, dewatered to 50-55% water content, and go for expelling and oil recovery.

Primary grinding is a difficult seperation process since maize has to be partially broken to remove the outer fibrous layer (pericarp) remove the germ from endosperm by partially breaking it without damaging the germs.

Fibre Separation :-

The cyclone underflow is milled a second time for complete release of the starch granules. Some mills use a Bauer mill, which is a combination of attrition impact mill, some favour use of Entoleter mill, which is an impact mill only. Following the second milling, the kernel suspension contains starch, gluten and fibre. The fibre is removed by flowing the slurry over fixed concave screens. The fibre is retained on the screen while the starch and gluten pass through. Collected fibre is slurred and screened to remove residual starch and protein. The fibre is later consumed with 21% gluten for feed use.

Gluten Separation & Concentration :-

The starch - gluten suspension, commonly known as mill starch is concentrated by centrifugation to reduce soluble material. The low density of gluten, compared to starch, permits easy separation by centrifugation. Protein contant is thus reduced to 1 - 2%. The starch suspension from the centrifugal separator is diluted and subjected to 8 - 14 stages of hydroclone washing. The concentrated starch underflow from this process is once again diluted and passed through a final battery of hydroclones to wash the starch and remove the last traces of protein.

Mixed Feed Processing :-

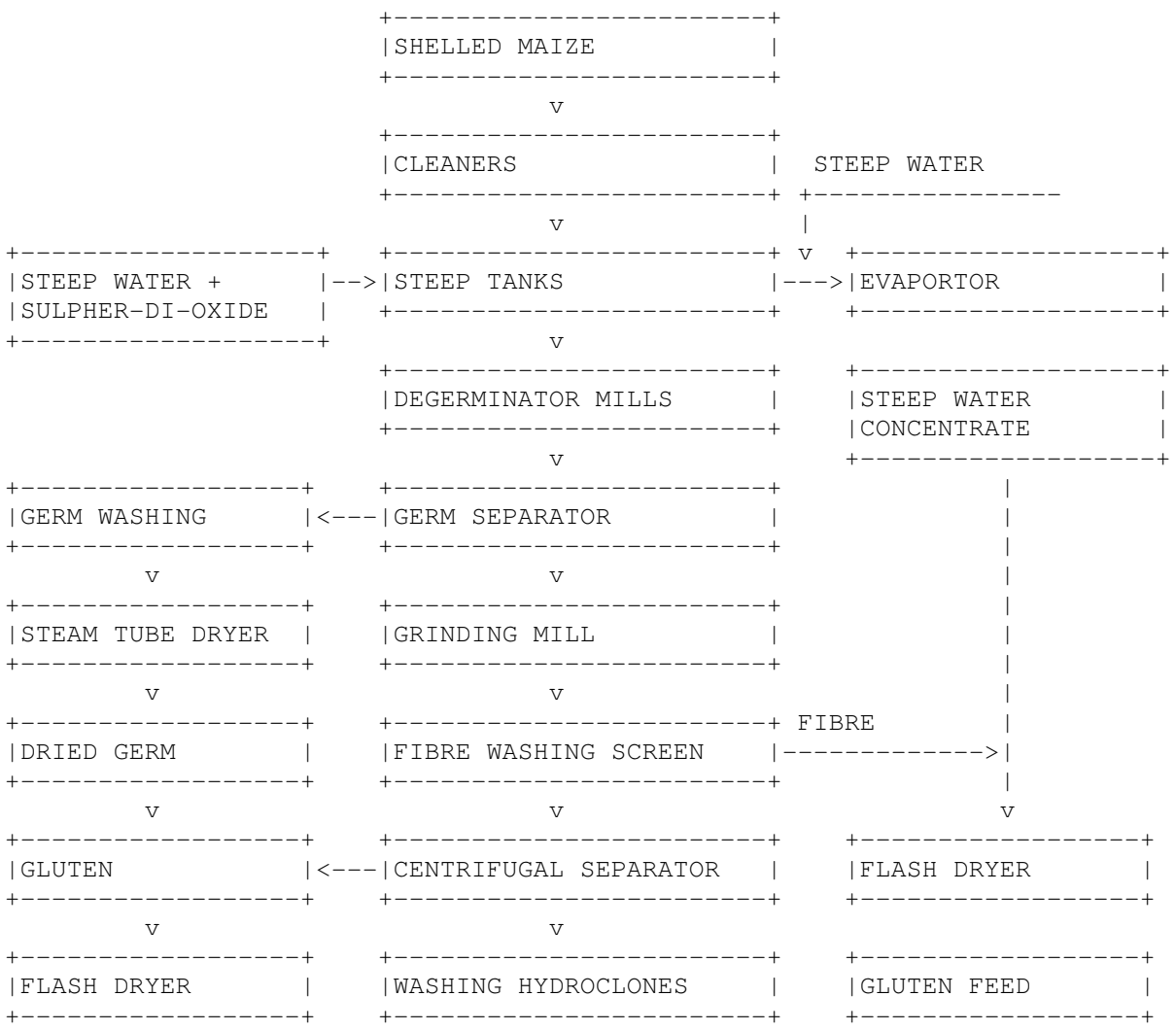
Washed and filtered fibres, from step 4 corn rejects from step 1, concentrated liquor from step 2 adn gluten from the previous step are mixed in the required proportions to the desired protein content, suitable for making cattle feed. The mixed feed is dried in flash drier and nulled to the required size.

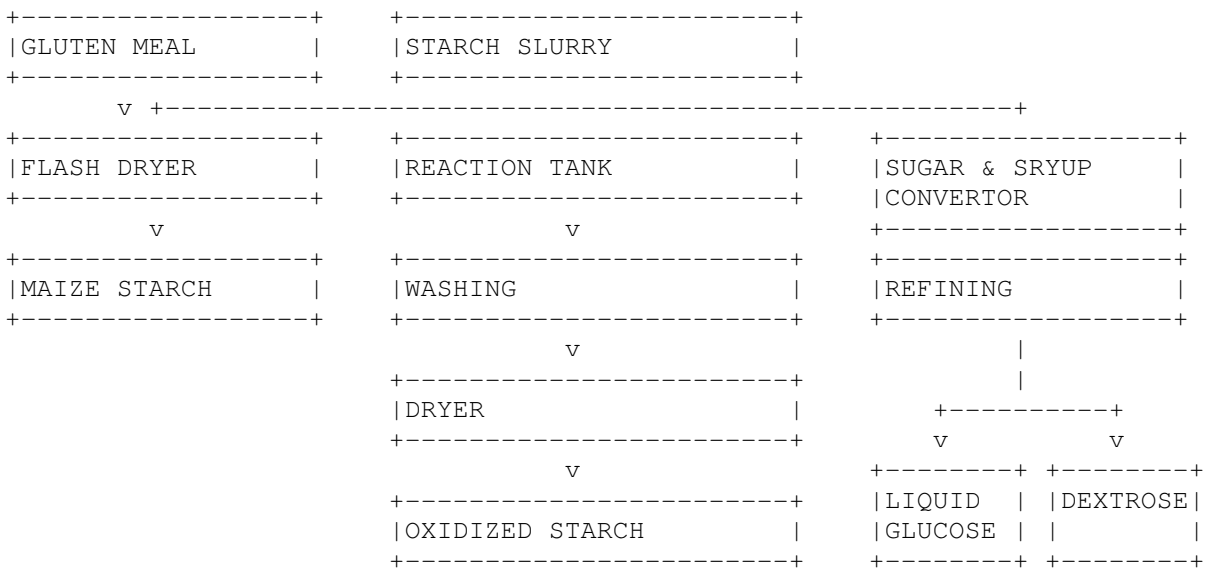
Starch Washsing, Dewatering and Drying :-

The starch suspension may be processed dry and marketed as unmodified corn starch, modified by chemical or physical means, gelatinized and dried, or hydrolyzed to corn syrup. The wet milling process requires Ca 0.2 m3 water/100 kg. Corn or (20 gal/100 gal). This water must be removed before marketing. The corn is usually dewatered by centrifugation, followed by injection into a column of hot air (200 - 260oC) The starch granules dry very rapidly and are collected in cyclones. A large amount of energy is consumed in evaporating and drying starch making the wet milling process the second most energy intensive food industry.

The principle product of milling unmodified starch is a white powder with a pale yellow tint. Absolute whiteness requires bleaching. The final product, usually has a water content of 11% and may contain 1% protein, ash, lipids, and fibre.

PROCESS FLOW DIAGRAM FOR THE MFG. OF STARCH




GLUTEN MEAL
STARCH SLURRY
FLASH DRYER
REACTION TANK
SUGAR & SRYUP CONVERTOR
MAIZE STARCH
WASHING
REFINING
DRYER
OXIDIZED STARCH
LIQUID GLUCOSE
DEXTROSE

SUPPLIERS OF RAW MATERIALS

SULPHUR

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ADHESWARA CHEMICALS PVT LTD
26, Royapettah High Road
Chennai-600014,
Tamil Nadu
Fax:Phone:+91 44 281 30019
Emaicmail@adheswaragroup.com

Mg. Director
ALLIED ELECTROMECH COPRN
404, Vyapar Bghavan,
4th Floor, 49,
P.D, Mello Road
Mumbai-400009,
Maharashtra
Fax:Phone:022-23774964
Emaiallied1@bol.net.in

COMPLETE PLANT SUPPLIERS

UNIVERSAL PROCESS ENGINEERS
A-1 / 10 , IDA NACHARAM,
HYDERABAD - 500076
Phone+ 91-040-27172573
Fax: + 91-040- 27179701
Description
MANUFACTURERS & EXPORTERS OF "CHEMICAL EQUIPMENTS"
STARCH, STARCH MAKING MACHINERY, GLUCOSE, PLANTS & MACHINERY.
E-mail: info@a2zstarch.com
Website http://www.a2zstarch.com

S. S. Starch Consultancy
Providing starch plant turnkey project services.
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Kukatpally, Hyderabad, Andhra Pradesh - 500 072, India
Phone: +(91)-(40)-55202241 Fax: +(91)-(40)-55202241

PLANT AND MACHINERY

Starch Plant

Upto 60% of the equipment can be fabricated indegenously whereas 40% will have to be imported.

Floowing is the list of major equipments with the information on whether the equipment should be imported or indegenous.

S.No.	Equipment	Qty.	Indegenous	Imported
1.	Steep tanks	6	x	
2.	Recirculating Pumps	6	x	
3.	Heaters	6	x	
4.	Steep acid tank	1	x	
5.	Dorr clone	4		x
6.	DSM Screens	4		x
7.	Filtrate tank	1	x	
8.	Steep liquor Evaporator	1		x
9.	Grind Mill	2		x
10.	Fine Mills	1		x
11.	Expellen Press	2		x
12.	Merco rotary	1		x
13.	Merco B-30	1		x
14.	Merco Strainer	1		x
15.	Gulten thickner	1		x
16.	Drum filter	1	x	
17.	Dorrclone Starch	1		x
18.	Clarification system	1		x

S.No.	Equipment	Qty.	Indegenous	Imported
19.	Starch Milk tank	1	x	
20.	Starch filter	1	x	
21.	Emergency tank	1	x	
22.	Sulphur Burner	1	x	
23.	Absorption tower	1	x	
24.	Dryers	3		x
25.	Seperating cyclones	1		x
26.	Flash Dryer (Starch)	1		x

In addition to this list of equipment, storage, vessels, pumps, heat exchangers, agitators, conveyons, strainers, packing systems, etc. will be required.

About 40% of the equipment has to be imported Both indigenous and imported equipment can be purchased through Messers Dorr Oliver who has developed a lot of special equipment such as Dorrclones, DSM screens, merco centifuges etc.

PLANT ECONOMICS

Rated Plant capacity	=	20.00 MT/day
	=	6000.00 MT/annum
		STARCH FROM MAIZE

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 2.5 acres. = 2617.5 sq.m @ Rs.1000/- per sq.mt.	Rs.	26,17,500.00
2.	Development Charges for 2.5 acre @ Rs.15000/- per acre.	Rs.	37,500.00
3.	Corn receiving godown 250 sq.mts. @ Rs. 4000/- per sq.mt.	Rs.	10,00,000.00
4.	Corn silos 500 sq.mt. @ Rs. 4000/- per sq.mt	Rs.	20,00,000.00
5.	Steep house 250 sq.mts. @ Rs. 3600/- per sq.mt.	Rs.	9,00,000.00
6.	Wet milling section 1000 sq.mts. @ Rs. 4000/- per sq.mt.	Rs.	40,00,000.00
7.	Office space 50 sq.mts. @ Rs. 4500/- per sq.mt.	Rs.	2,25,000.00
8.	Security & Firstaid 50 sq.mts. @ Rs. 3500/- per sq.mt.	Rs.	1,75,000.00
9.	Canteen 200 sq.mts. @ Rs. 3000/- per sq.mt.	Rs.	6,00,000.00
10.	Laboratory & work shop 100 sq. mts. @ Rs. 4500/- per sq.mt.	Rs.	4,50,000.00
11.	Loading and scaling area 500 sq.mts @ Rs.1500/- per sq.mt.	Rs.	7,50,000.00
	TOTAL	Rs.	1,27,55,000.00

PLANT & MACHINERY

1.	Weighing machine 1 nos. Capacity 2T. @ Rs.115,000/-	1 No.	Rs.	1,15,000.00
2.	Silos 20 nos. Capacity 1 MT each. @ Rs. 9000/-	20 No.	Rs.	1,80,000.00
3.	Screening machine. 2 nos. @ Rs. 60,000/- per piece.	2 No.	Rs.	1,20,000.00
4.	Rotary burner 1 nos. @ Rs.160,000/-	1 No.	Rs.	1,60,000.00
5.	Steep tanks. 6 nos.	6 No.	Rs.	3,30,000.00
6.	Recirculating pumps 6 nos. @ Rs. 40,000/-	6 No.	Rs.	2,40,000.00
7.	Acid tank storage 1 nos. Capacity 3 ton with special antico- rrosive lining. @ Rs. 95,000/-	1 No.	Rs.	95,000.00
8.	Evaporator; Capacity 2 ton. @ Rs. 4,00,000/- 1 nos.	1 No.	Rs.	4,00,000.00
9.	Condensor. 1 nos. @ Rs. 50,000/-	1 No.	Rs.	50,000.00
10.	Attrition mills 2 nos. @ Rs. 7,00,000/-	2 No.	Rs.	14,00,000.00
11.	Hydroclones Cylones. 3 nos. @ Rs.	3 No.	Rs.	1,80,000.00
12.	Fine mill (pulveriser) 1 nos.	1 No.	Rs.	1,50,000.00
13.	Centrifuge 1 nos.	1 No.	Rs.	2,00,000.00
14.	Storage tanks. 5 nos. Capacity 1 MT each.	5 No.	Rs.	2,50,000.00
15.	Elevator 1 nos.	1 No.	Rs.	95,000.00

16.	Tray dryer 2 nos. Capacity 2 MT	2 No.	Rs.	2,50,000.00
17.	Flash dryer 1 nos.	1 No.	Rs.	75,000.00
18.	Miscellaneous.		Rs.	3,00,000.00
		TOTAL	Rs.	45,90,000.00

OTHER FIXED ASSETS

1.	Office equipment, furniture plus other equipment & accessories	Rs.	4,50,000.00
2.	Water electricity connection.	Rs.	50,000.00
3.	Site fabrication work.	Rs.	1,50,000.00
4.	Erection & commision.	Rs.	2,00,000.00
5.	Preliminary & pre-operative expenses.	Rs.	1,60,000.00
6.	Miscellaneous.	Rs.	1,00,000.00
7.	Office Cars	Rs.	6,00,000.00
	TOTAL	Rs.	17,10,000.00

FIXED CAPITAL

1.	LAND & BUILDING	Rs.	1,27,55,000.00
2.	PLANT & MACHINERY	Rs.	45,90,000.00
3.	OTHER FIXED ASSETS	Rs.	17,10,000.00
	TOTAL	Rs.	1,90,55,000.00

WORKING CAPITAL REQUIREMENT/MONTH

RAW MATERIALS

1.	Maize 875MT. @ Rs.10000/- per MT.	Rs.	87,50,000.00
2.	Sulphur 4.175 MT. @ Rs. 25,000/- per MT.	Rs.	1,04,250.00
3.	Fuel oil for 2.5 ton steam/hour for drying in 0.25 ton fuel/hour for sulphur burning. .....cont.... .....cont..... Total fuel oil = 150MT. @ Rs.12/- kg.	Rs.	18,00,000.00
4-	Lubricating oil 75kg. @ Rs. 60/- per kg.	Rs.	4,500.00
	TOTAL	Rs.	1,06,58,750.00

SALARY & WAGES / MONTH

1.	Manager 1 nos.	1 No.	Rs.	15,000.00
2.	Secretary 1 nos.	1 No.	Rs.	10,000.00
3.	Accountants 2 nos.	2 No.	Rs.	12,000.00
4.	Process Engineer 1 nos.	1 No.	Rs.	8,000.00
5.	Production & maintenance superintendent. 1 nos.	1 No.	Rs.	6,500.00
6.	Sales & Marketing officer 1 nos.	1 No.	Rs.	5,000.00
7.	Skilled labour 5 nos.	5 No.	Rs.	22,500.00
8.	Unskilled labour 5 nos.	5 No.	Rs.	20,000.00
9.	Peons & office attendants 2 nos.	2 No.	Rs.	7,000.00
10.	Stenographer/typist 1 nos.	1 No.	Rs.	4,200.00
11.	Driver 2 nos.	2 No.	Rs.	8,400.00
		TOTAL	Rs.	1,18,600.00
	Plus perks @ 33% p.a.		Rs.	39,529.38
		TOTAL	Rs.	1,58,129.38

UTILITIES AND OVERHEADS

1.	Power Consumption of 15000 Kwatt hrs @ Rs. 5.00 per Kwatt hr.	Rs.	75,000.00
2.	Water Consumption of 700 KLs @ Rs. 4.00 per KL	Rs.	2,800.00
3.	Sales promotion & advertising.	Rs.	1,00,000.00
4.	Transportation.	Rs.	2,00,000.00
5.	Packaging & containers costs.	Rs.	1,50,000.00
6.	Miscellaneous.	Rs.	1,00,000.00
	TOTAL	Rs.	6,27,800.00

Total load is 28 Kwatts

TOTAL WORKING CAPITAL/MONTH

1.	RAW MATERIAL	Rs.	1,06,58,750.00
2.	SALARY & WAGES	Rs.	1,58,129.38
3.	UTILITIES & OVERHEADS	Rs.	6,27,800.00
	TOTAL	Rs.	1,14,44,679.39

1.	WORKING CAPITAL FOR 3 MONTHS	Rs.	3,43,34,038.17
2.	MARGIN MONEY FOR W/C LOAN	Rs.	85,83,509.54

COST OF PROJECT

TOTAL FIXED CAPITAL	Rs.	1,90,55,000.00
MARGIN MONEY	Rs.	85,83,509.54
TOTAL	Rs.	2,76,38,509.54

TOTAL CAPITAL INVESTMENT

TOTAL FIXED CAPITAL	Rs. 1,90,55,000.00
TOTAL WORKING CAPITAL FOR 3 MONTHS	Rs. 3,43,34,038.17
TOTAL	Rs. 5,33,89,038.17

COST OF PRODUCTION/ANNUM

1.	Working Capital for 1 year	Rs.13,73,36,152.68
2.	Interest @ 12.00% on T.C.I	Rs. 64,06,684.58
3.	Depreciation @ 10.00% on buildings	Rs. 10,13,750.00
4.	Depreciation @ 20.00% on Plant and Machinery	Rs. 9,18,000.00
5.	Depreciation @ 20.00% on office equipment & furnitures	Rs. 90,000.00
	TOTAL	Rs.14,57,64,587.26

TURN OVER/ANNUM

1.	Sale of 6000 MT of starch. @ Rs.27500/- per MT.	Rs.16,50,00,000.00
	TOTAL	Rs.16,50,00,000.00

PROFIT = RECEIPTS - COST OF PRODUCTION

= 16,50,00,000.00 - 14,57,64,587.26

= 1,92,35,412.74

PROFIT SALES RATIO = Profit / Sales x 100

$$= \frac{1,92,35,412.74}{16,50,00,000.00} \times 100$$

= 11.66 %

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

$$= \frac{1,92,35,412.74}{5,33,89,038.17} \times 100$$

= 36.03 %

BREAK EVEN POINT (B.E.P)

Fixed Costs of the plant are as under -

1. Interests	Rs.	64,06,684.58
2. Depreciation	Rs.	20,21,750.00
3. 40.00% of salaries	Rs.	7,59,021.02
4. 40.00% of overheads	Rs.	30,13,440.00
TOTAL	Rs.	1,22,00,895.60

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

$$= \frac{1,22,00,895.60}{1,22,00,895.60 + 1,92,35,412.74} \times 100$$

$$= 38.81\ \%$$

LAND MAN RATIO = Total land / Manpower

2618 : 22 :: 119 : 1

RESOURCES FOR FINANCE

1. Term loans from Financial institutions (80.00 % of fixed capital) at @12.00% p.a rate of interest	Rs.	1,52,44,000.00
2. Bank loans for 3 months (75.00 % of working capital) at @ 12.00% p.a rate of interest	Rs.	2,57,50,528.63
3. Self raised capital from even funds & loans from close ones to meet the margin money needs at a @ 12.00% p.a rate of interest	Rs.	1,23,94,509.54
TOTAL	Rs.	5,33,89,038.17

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

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