Technology with Innovation

SOYBEAN VALUE ADDED PRODUCTS

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www.dvcprocesstech.com

About Us..

- **DVC Process Technologists** headquartered at Pune is a Technology & Innovation driven company that offers comprehensive processing solution for Edible Oil and Fats, Oleochemicals & Biodiesel industries.
- Serving the industry with dedicated team of technocrats and engineers with vast experience in Oils & Fats and allied industries
- Own **ISO Certified manufacturing facilities** near Pune at Supe & Jejuri with total work area of 40,000 Sqft & 22,000 Sqft respectively.

CE | ASME | TÜV NORD | ISO 9001:2015

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Technology Offered

DVC is a single point solution provider for design, supply, installation & commissioning of process plant & equipment for :

- Vegetable Oil Refineries
- Oil mill Plants
- Fat Modification
- By-Product processing like Gums (Lecithin) Drying & Acid Oil.
- Integrated Biodiesel Production Plants for multiple feedstocks
- Solvent Extraction Plants & Flash Desolventization Plant
- Oleochemical Plants
- Technical Audits & Upgradation
- DVC Proprietary Equipment Designs like SCR® scraped surface heat exchanger, FEVAC® vacuum heater, REGV® regenerative vacuum heater, etc.
- Process & Tank Farm Automation
- Skid mounted plants
- Zero Liquid Discharge Plant (ZLD)

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Ongoing turnkey projects under execution

SL. NO.	LIST OF ONGOING PROJECTS	NAME OF CLIENT
1	40000 Tons Tank farm Fabrication & Automation Turnkey Project	**OLAM INTERNATIONAL** Gabon, Africa
2	Capacity enhancement of Degummed Soy Oil Refinery From 100 TPD to 200 TPD	**Ruyat Oil Limited** Lagos Nigeria
3	50 TPD Soybean & Palm Oil refinery	**OLEOS VEGETABLES** Ecuador
4	100 TPD & 250TPD Vegetable refining Plant	**HUILERIE INDUSTERIAL DE TAMATARE (HITA),** Madagascar
5	100 TPD Soybean oil Refinery	**DARSHANA SOLVANT**, India
6	50 TPD Soybean oil Refinery	**VASUNDHARA**, India
7	500 TPD Soybean Oil Refinery (with dual scrubbing system for tocopherol rich stream)	**GOYAL PROTEINS,** India
8	200 TPD Sunflower Oil Refinery	**SET WAY INDUSTERIES**, Ebene, Mauritius
9	30 TPD Biodiesel Plant	**BLUESTONE ENRGY,** India
10	Chicken Oil Refinery (Pilot scale)	**GROWELL FEEDS PRIVATE LIMITED,** India

Recently delivered projects with capacity enhancement

Sr No	LIST OF PROJECTS	NAME OF CLIENT
1	150 TPD Refinery for Crude Palm & Rice bran Oil	**MANTORA OIL PRODUCTS PVT. LTD** India
2	100 TPD Fish oil refinery	**VINH PHUOC FOOD COMPANY LIMITED,** Dong Thap Province ,Vietnam
3	150TPD Multi-feedstock Biodiesel Plant	**CHEMENERGY BIOFULES**, India
4	200 TPD Palm Oil Refinery	**OLAM NIGERIA LIMITED,** Lagos Nigeria
5	200 TPD Crude Palm & Palm Kernel oil Refinery	**JILNAS NIAGERIA LIMITED,** Nigeria
6	150 TPD Palm Oil Complex	**QATAR FOOD INDUSERIES,** Qatar
7	Up-gradation of Palm Complex from 100 TPD to 150 TPD	**OLAM PALM GABON**, Africa
8	Up-gradation of Palm Complex to 250 TPD	**NILE AGRO INDUSTERIES** Jinja, Uganda
9	Up-gradation of Palm Complex from 60 TPD to 100 TPD	**Olam PALM,** Libreville, Africa
10	Capacity Enhancement 300 TO 600 TPD	**BUDGE BUDGE REFINERY** ,India

Soya Chunks - Introduction

- Soya chunks are made of soy flour, which is a by-product of soy oil extraction.
- Due to its good nutritive values it became popular all over the world.
- It has the similar protein equivalent to meat, and also similar chewy in texture.
- They are also free from cholesterol.
- These nuggets can be used in preparing various food products in households as well as in restaurants and can be important because of its high nutritional value.

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Soya Chunks – Production Process

Storage Before processing

The Soy flour is stored in the vertical silos and in the moisture free environment

Blending & Pre-conditioning

The soy flour passes through the pre-conditioner or mixing equipment where moisture can be added evenly as water or steam in order to maintain the moisture content of 10 to 25%.

Cooking & Extrusion

The cooking of the soy meal is done before extrusion in order to maintain the required moisture and temperature.

The extrusion process forms the soya nuggets of desired size by using the suitable die plate

Drying & Cooling

Dryer used for reducing the moisture content of the final product.

Cooling is done to bring the final product to the ambient temperature

Packaging

The weighing is done and nuggets are packed as per the market demand.

The packaging machine can be automatic, semi-automatic or manual depending upon the requirement.

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Flash Desolventisation System

- In conventional method of de-solventization process, the exposure of the de-oiled meal to direct heat (live steam) then to high temperature jacket heating do coagulate the protein present in de-oiled meal hence downing in the PDI value to 20-40. This low PDI meal is not suitable for the producing different products of Soybean required for the human consumption.
- The alternative process path for the de-oiled material leaving the solvent extraction process is a Flash de-solventising and cooling.
- Superheated solvent vapours are used for the Desolventisation of de-oiled wet meal providing the short contact time with heat. This prevents the reduction of PDI value.
- The meal obtained from FDS has PDI value in the range of **76 - 80** and hence the white flakes, which are produced by this method are raw material for producing the soybean protein concentrate and further downstream products in food industry.

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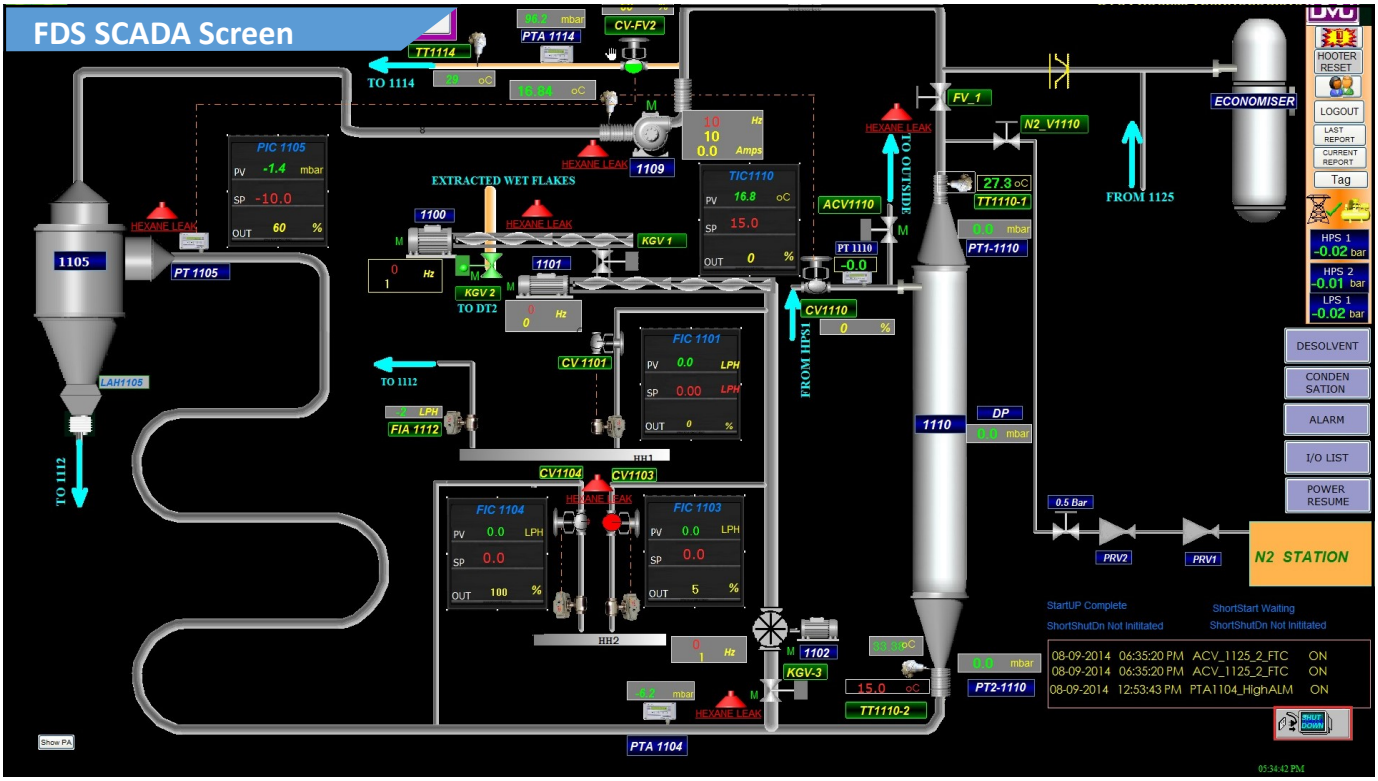

Soybean Protein Products

Types Based on Protein Content:	Protein % (moisture free basis)
Full Fat Flour	39 - 42
Defatted Flour (white flakes)	50 - 52
Soy protein concentrates	65 - 68
Soy protein isolates	~ 90

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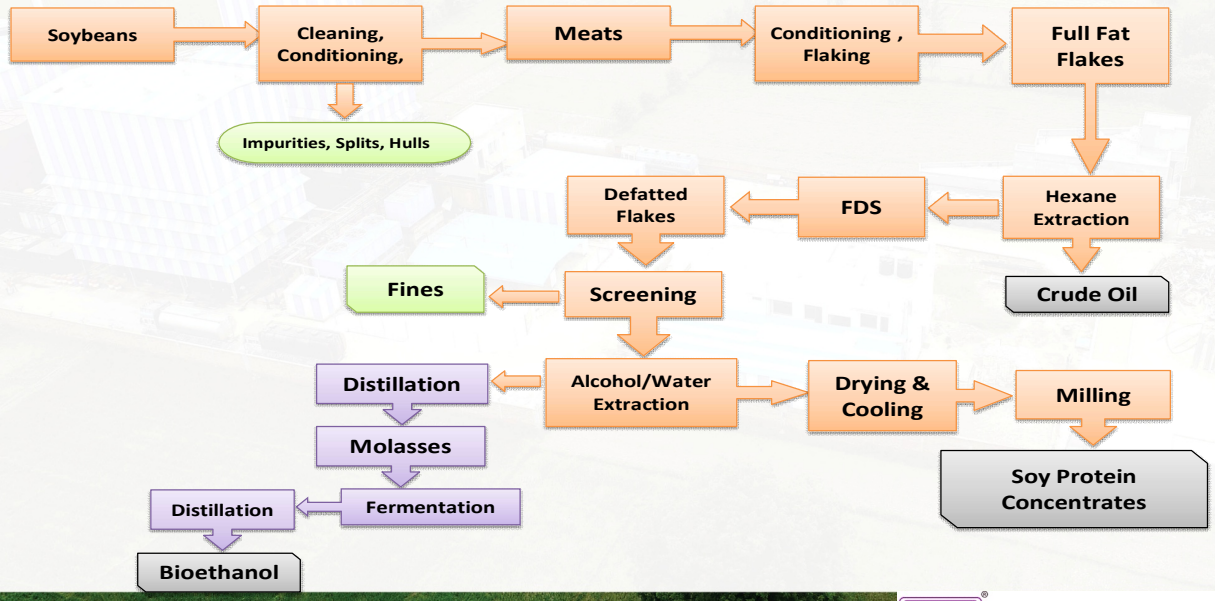
Soy Protein Concentrate Production Process



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Production process for Soy Protein Concentrates

- Good Quality soybeans should be used for the production of Soy Protein Concentrates.

The process is as follows:

Separation of impurities like hulls, sticks, oxidized components → **Preparation of Flakes** → **Extraction of Oil by hexane extraction** → **Desolventisation with the help of FDS loop & stripper** → Meal having NSI 65 - 70

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Production process for Soy Protein Concentrates

- In order to remove the water soluble sugars (carbohydrates), other low molecular weight soluble components and salts second stage extraction is done.
- The solvent used is a mixture of water and alcohol with the specific ratio of concentration. The solvent mixture concentration is adjusted such that the proteins are insoluble but the other products are soluble in the mixture.
- Depending on the extractability of the carbohydrates the ratio of ethanol and water is maintained between 70-30 and 60-40.

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Food & Feed Lines Production Process

Cleaning & Grading

Grade 1 Soybeans

Unloading, Pre-cleaning, storage

Weighing

Cleaning

Grade 2 Soybeans

Unloading, Pre-cleaning, storage

Weighing

Cleaning

Preparation- I

Preparation- II

Extractor -I

Extractor -II

DTDC

Miscella

FDS

Feed Meal

Crude Oil

White Flour

FEED LINE

FOOD LINE

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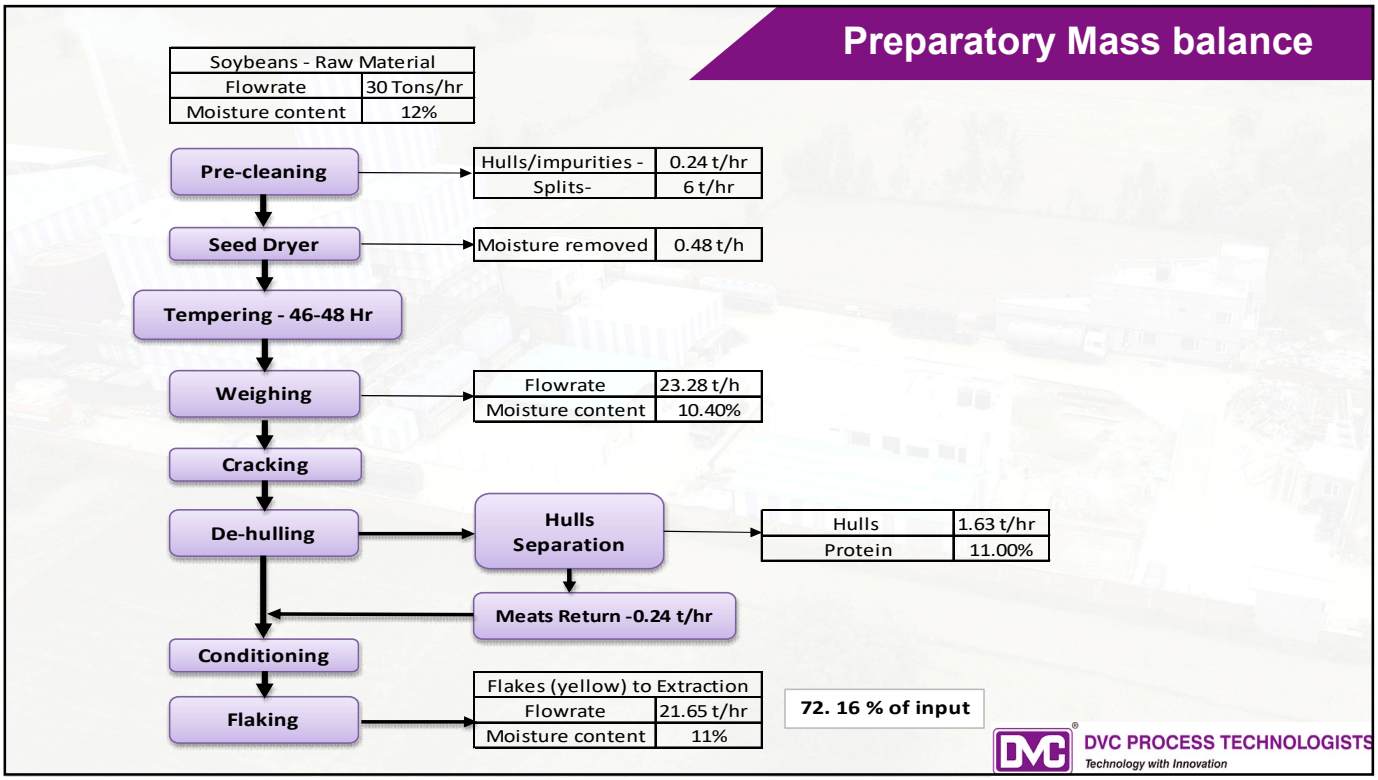
Preparatory Mass balance
Soybeans - Raw Material
Flowrate 30 Tons/hr
Moisture content 12%
Pre-cleaning
Hulls/impurities - 0.24 t/hr
Splits- 6 t/hr
Seed Dryer
Moisture removed 0.48 t/h
Tempering - 46-48 Hr
Weighing
Flowrate 23.28 t/h
Moisture content 10.40%
Cracking
De-hulling
Hulls Separation
Hulls 1.63 t/hr
Protein 11.00%
Meats Return -0.24 t/hr
Conditioning
Flaking
Flakes (yellow) to Extraction
Flowrate 21.65 t/hr
Moisture content 11%
72. 16 % of input
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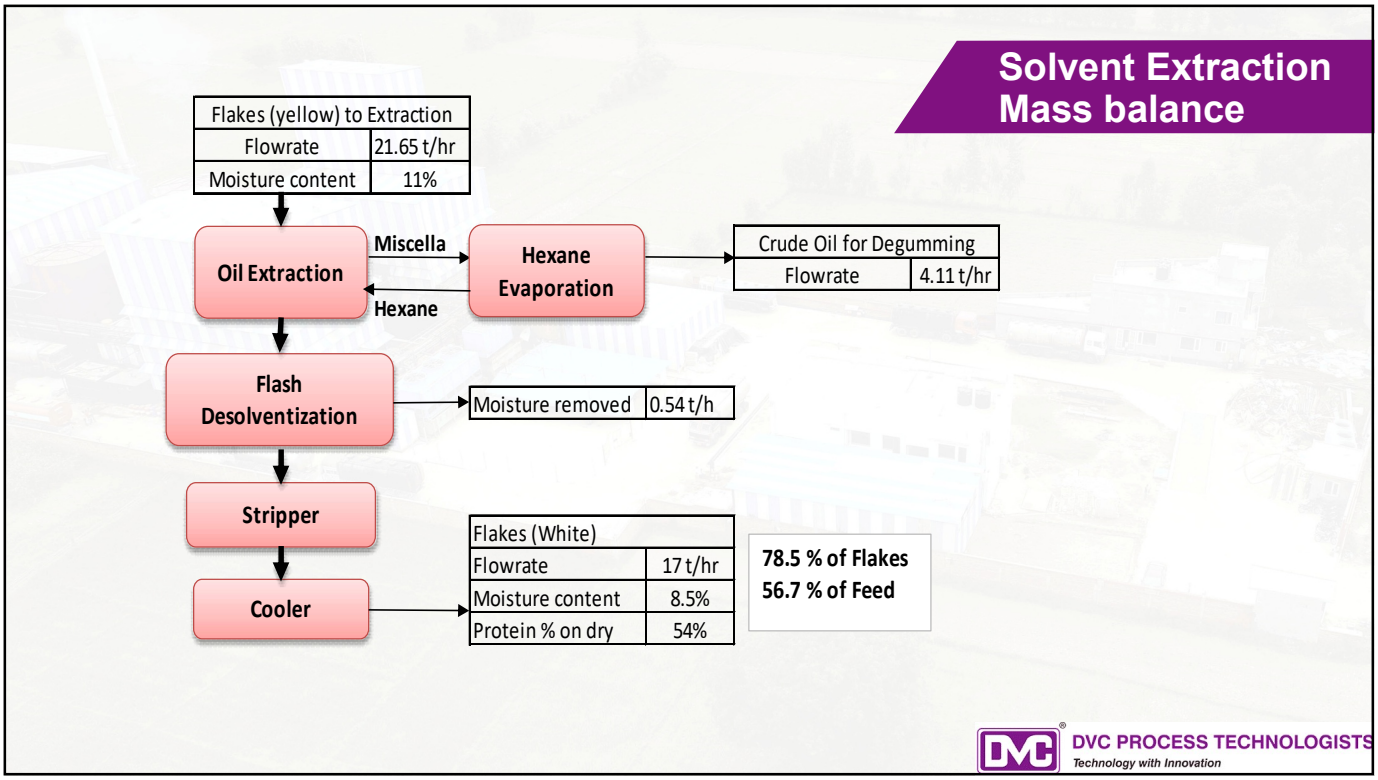
Solvent Extraction Mass balance
Flakes (yellow) to Extraction
Flowrate 21.65 t/hr
Moisture content 11%
Oil Extraction
Miscella
Hexane
Hexane Evaporation
Crude Oil for Degumming
Flowrate 4.11 t/hr
Flash Desolventization
Moisture removed 0.54 t/h
Stripper
Cooler
Flakes (White)
Flowrate 17 t/hr
Moisture content 8.5%
Protein % on dry 54%
78.5 % of Flakes
56.7 % of Feed
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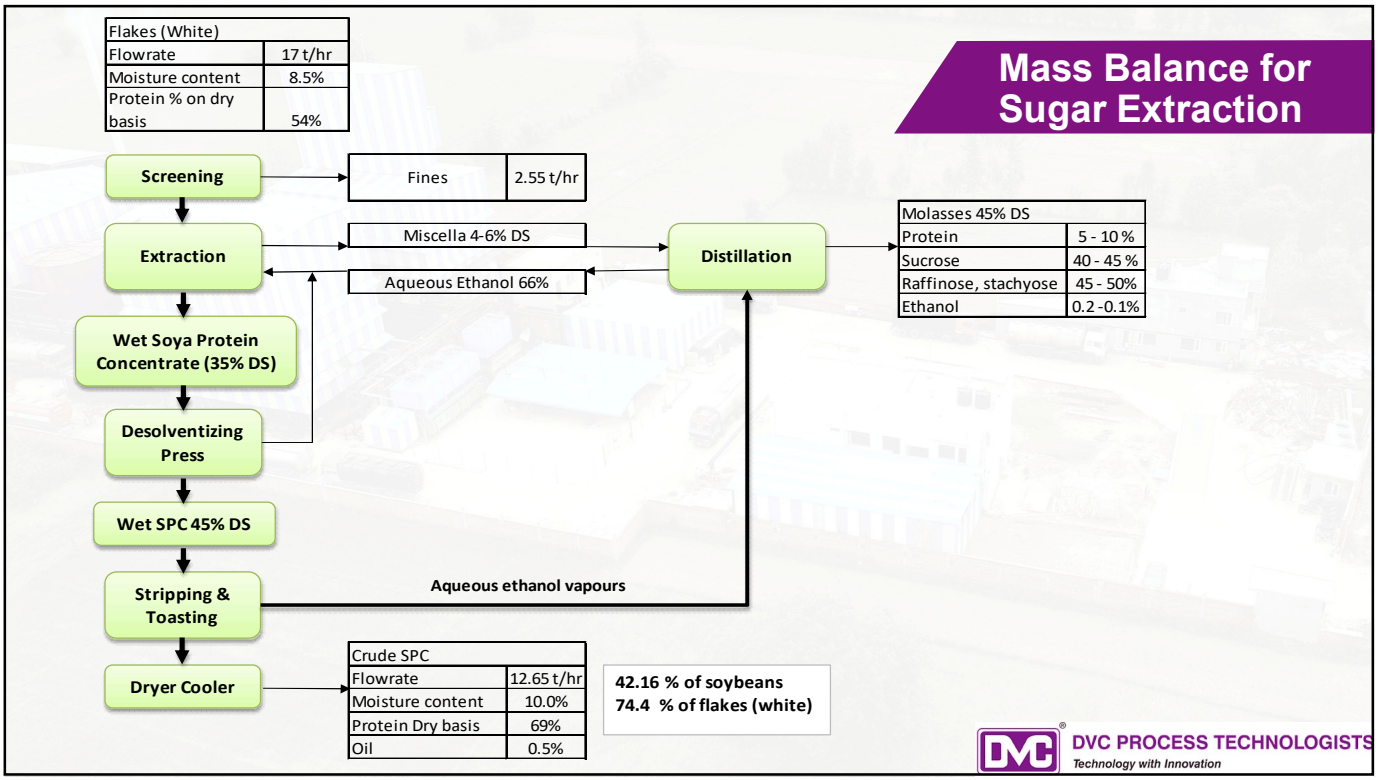
Mass Balance for Sugar Extraction



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Salient points for Sugar Extraction Process

- Temperature during Extraction : 65 – 70^{O}C
- Pre – soaking time : 20 minutes
- Extraction time : ~ 2.25 hours
- Bed Height : less than or equal to 1 meter.
- Ratio of Solvent to white flakes : 4.5 – 5.5 liters per Kg
- Ethanol & water Ratio : ~ 65 – 35

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Desolventisation - Sugar Extraction Process

- The evaporation of Ethanol up to 80% is achieved through indirect heating.
- For pre-Desolventisation, horizontal disc type dryer is used.
- The outlet product temperature is maintained at 85 – 90^{O} C
- Final Desolventisation is done in the Vertical Stripper or Scrapped Surface Evaporators.
- Heat Recovery from vapours is achieved in the distillation Section
- The product is dried and cooled to the ambient temperature through air.

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Milling & Distillation - Sugar Extraction Process

- Cleaner separates the hulls, impurities, stems, sticks
- Depending on the final application in the market the milling is done from 65 - 100 µ.
- In order to ensure prevention of bacteriological growth in the final product the moisture content is maintained below 8 %.
- Full miscella : 4 to 6 % dry solids (dissolved sugars & proteins)
- Optimized miscella concentration is around 5% for efficient extraction to maintain the Balance of SPC protein concentration & energy consumption.

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Distillation - Sugar Extraction Process

- After fourth evaporator molasses content is 45 – 48 %
- The concentration goes greater than 48 % by using effective distillation column.
- To control the DM (brix), the on-line refractometer is used .
- The ethanol content is below 1% can be assured by the molasses having at lest 45-48 brix.
- There is a risk of generation of foam in the distillation section hence the anti foaming agent is used for eliminating this problem.
- The risk of fouling is prevented by the Cleaning in Place system (CIP)

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Applications of Soy Protein Concentrates

The production of Meat substitute products by the extrusion process

Preparation of food products which requires high protein contents

The Soy protein Concentrates can be used as fish meal as it has nearly same protein

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Soy Protein Isolates

- Soya Protein Isolates are the highest concentrated form of Proteins having more than 90% protein content on dry basis.
- Protein isolates are produced from soy flakes (obtained from FDS) by dilute alkaline extraction and subsequent acidification of the protein extract to the isoelectric point, approximately pH 4.5.
- The precipitated protein curd is recovered by centrifugation, washed, slurried in water, and usually neutralized prior to being spray dried.

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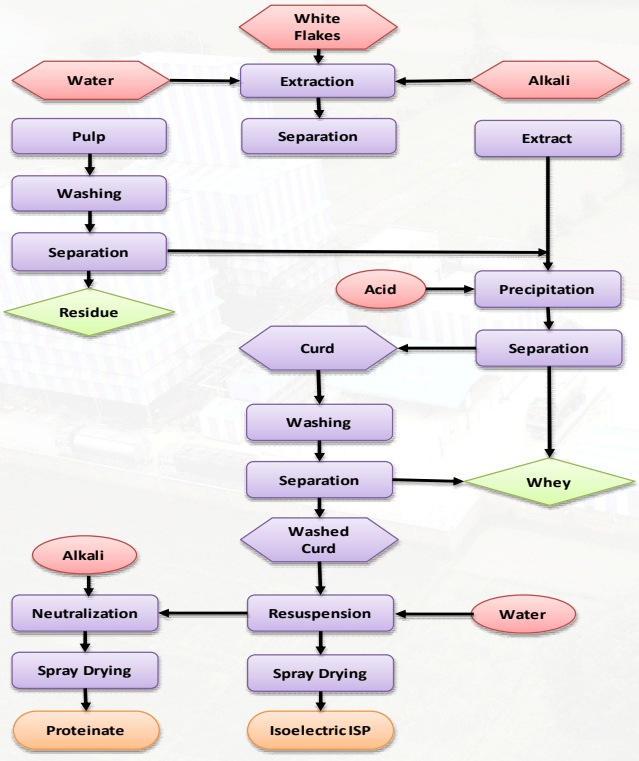
Soya Protein Isolates Production Process



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OUR KEY CLIENTS

Cargill
KAMANI Healthy Oils
GOYAL GROUP
bol
SANJAY GHODAWAT GROUP
EDIBLE GROUP
SITA SHREE FOOD PRODUCTS LTD.
VIPPY
Dufil
ADM
tirumalla™ Edible Oils & Foods
Scanola
BAJRANG
Olam
NILE AGRO INDUSTRIES
AV GROUP
Ruchi Soya Industries
GUJARAT AMBUJA EXPORTS LIMITED NURTURING BRANDS
الشركة القطرية للصناعات الغذائية QATAR FOODS INDUSTRIES

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THANK YOU!

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