Welcome to a brief introduction on Miscella Refining Section

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BRIEF HISTORY ON COTTON SEED

- **Cotton belongs to a family Gossypium**
- **Fruits which are hard before maturity opens up automatically when it matures**
- **Each seed capsules are put for drying**
- **Ginning Machine separates the fiber from the seed**
- **Fibers are pressed and packed in bales**

BRIEF HISTORY ON COTTON SEED

- **Seed without long fiber is still covered by short fiber called Lints**

SEED COMPOSITION

Lints	:	8 TO 10%
Oil	:	18 TO 22%
Meat	:	35 TO 38%
Hulls	:	30 TO 32%

FFA in seed at 2% in begining of the season can increase to 4.5% during off season, if the seeds are not properly stored FFA can increase above 7%

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METHOD OF PREPARATION

METHOD : 1

- DELINTING
- DECORTICATING
- CRACKING
- FLAKING
- COOKING
- PRE-PRESSING AND COOLING

Cotton Seed processing through Pre-Pressing route is not recommended due to increase in FFA by 2.5% results in more oil losses during Refining stage.

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METHOD OF PREPARATION

METHOD : 2

- DELINTING
- DECORTICATION
- CRAKING
- COOKING
- FLAKING
- EXPANDING AND COOLING

Seed Prepared by Expanding route is most widely used due to its better oil recovery due to lower FFA

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WHY COLOUR OF OIL IS DARK IN COTTON

- Like most oil seeds, cotton seed also contain Pigments such as Carotenoids and Chlorophylls
- Most important pigment is Yellow solid called Gossypol
- Because of toxic properties (linked to infertility in Humans),removal of Gossypol is important in Cotton Seed
- Pigments are located through the Tissue of the meats in glands

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- If gland wall can be ruptured, the Gossypol can be converted to nontoxic form called “Bound” Gossypol
- In contrast the “Unbound” or “Toxic Gossypol” is called “Free Gossypol”
- Mechanical Operations will not rupture entire cells, because of their small size
- When Gossypol is not “Bound” in the Preparation Stage, it will be extracted along with oil during Extraction.
- Crude Cotton Oil has dark colour due to the presence of Gossypol

ADVANTAGES OF MISCELLA REFINING

- Neutralizing stage requires excess addition of caustic soda
  - Re-Refining step required to eliminate Colour
  - Result – Oil losses by Saponification
- If Neutralization is done when the oil is in Miscella Phase
  - Clearer Oil can be obtained with Higher Yield.
  - Neutralized oil can directly be sent to bleacher and De-odorizer.
  - Avoid the re-refining and water washing step
- The continuous demand for the light oil has motivated Cotton Seed Processors to incorporate Miscella Refining Process.

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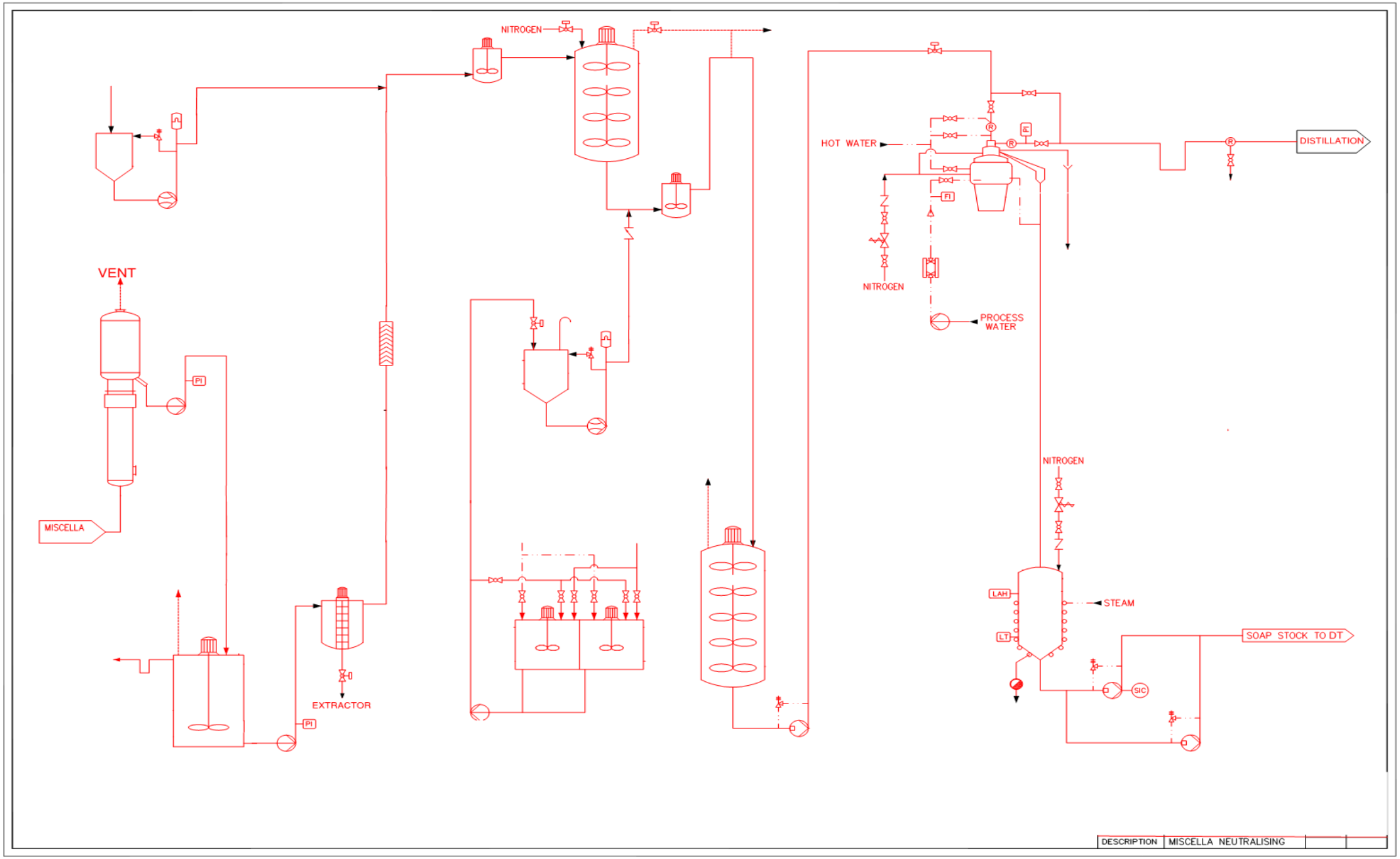
FLOW SHEET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DESCRIPTION
MISCELLA NEUTRALISING

OIL LOSSES IN BATCH NEUTRALIZING AND REFINING

Conventional process

		Season	Off season
Batch neutralising			
Crude oil			
FFA		2%	4.50%
Color 1/4 inch cell	Y		
	R		
	Y+10R	150	
Caustic Be		20	
Caustic consumed	kg flakes/ton	2.5	4
Neutral Oil			
Neutral Oil color			
Color 1/4 inch cell	Y		
	R		
	Y+10R	35 to 40	
Losses		**6%**	**8%**
Rerefining and washing			
Caustic Be		12 to 14	
Caustic consumed	kg flakes/ton	2	4
Washed oil			
Color 1 inch cell	Y		
	R		
	Y+10R	42 to 45	45 to 50
Losses		**1.5%**	**2.25%**
Bleaching			
Earth local	kg/ton	10	
Bleached oil.			
Color 1 inch cell	Y		
	R		
	Y+10R	18 to 20	
Losses		**0.30%**	**0.30%**
Deodorisation			
Deodorised oil			
Color 1 inch cell	Y		
	R		
	Y+10R	3 to 4	
Losses		**0.10%**	**0.10%**
Total losses		**7.40%**	**11.00%**

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OIL LOSSES IN MISCELLA REFINING

Losses in Miscellla refining.

Feed oil	Season	Feed oil	Off season
FFA:	2	FFA:	4.5
Impurities	0.1	Impurities	0.1
Gossipol	0.4	Gossipol	0.4
Phosphatides	0.5	Phosphatides	0.5
Volatiles	0.3	Volatiles	0.3
Total	3.3	Total	5.8
WL	3.6	WL	6.1
Refining factor	**1.14**		**1.14**
Loss in miscella refining	**4.104**		**6.954**
Bleaching	**0.5**		**0.5**
Deo	**0.1**		**0.1**
Total loss	**4.7**		**7.55**

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OIL LOSSES IN MISCELLA REFINING

PAYBACK CLACULATION

		Season	Off season	
Loss in conventional process	%	7.40%	11.00%	
Loss in miscella refining	%	4.70%	7.55%	
Savings in loss	%	2.70%	3.45%	
Capacity	TPD	100	100	
Oil saved	TPD	2.696	3.446	
Oil cost	Rs/ton	90000	90000	
Savings	Rs/day	2,42,640	3,10,140	
Operation/year	**days**	**90**	**90**	
Savings per year		**2,18,37,600**	**2,79,12,600**	**4,97,50,200**
Pay back		**0.75 to 1**	**year**	

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EFFECT OF GOSSIPOL ON MEAL

- Cotton Seed Meal usage in animal feed is curtailed due to toxic nature of Gossypol.
- **BROILERS** Dietary free Gossypol upto 150 ppm (0.015)do not affect the broiler performance, levels upto 400 ppm (0.04%) is to be fed if Ferrous Sulphate is added at 1:1 Iron to free Gossypol weight ratio.
- **SWINE** Performance of Growing-Finishing swine is not affected by feeding upto 100 ppm Free Gossypol. A 1:1 weight Iron to free Gossypol may be used to inactivate free Gossypol in excess of 100 ppm
- **CATTLE** Cotton Seed meal is used as a protein source and does not generally makeup to 15% of the diet. However it should not be fed to the young calves under 4 months of age.

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REFERENCE PROJECTS

- 150 TPD Cotton Seed Extraction Plant – Turkmenistan supplied with Miscella Refining Process- Cake from Pre-Pressing route - Year 2010
- 230 TPD Cotton Seed Extraction Plant – Benin supplied with Miscella Refining Process- from Expander-Year 2022

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ACCESSIBILITY

Our global network of offices ensures a close and reliable partner for project execution and ongoing plant operation. Our team understands the importance of close relationships with our customers to provide the best service prior, during and after the project execution.

CUSTOMER SERVICE

- Deliver project fast and at the full scope
- Reactivity and prompt availability of our team
- Local presence in most markets globally
- Engineering support to improve performance

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