A Presentation to All India Distillers’ Association

ON EVAPORATION & DRYING SYSTEMS FOR ZERO EFFLUENT DISCHARGE (ZELD)
FOOD & BIOTECH ENGINEERS (I) PVT. LTD.
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Joint Technical collaboration with

M/s Crest Biotech Pvt. Ltd.
A 30/B1, Mohan Co-operative Ind. Area
Mathura Road, New Delhi-110044
India
Email: crestbiotech@gmail.com
We serve most industries

- Dairy
- Chemical
- Food and Beverages
- Herbal
- Distillery and Sugar
- Fruits and vegetables
## Food & Biotech in India

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>Invention of Food &amp; Biotech</td>
</tr>
<tr>
<td>1995</td>
<td>Manufacturing facility</td>
</tr>
<tr>
<td>2000</td>
<td>New office</td>
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<tr>
<td>2005</td>
<td>Latest technique and advanced machineries are launched in fabrication unit</td>
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<tr>
<td>2008</td>
<td>Awarded ISO certification</td>
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<tr>
<td>2010</td>
<td>Entered into distillery sector for spent wash concentration</td>
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<tr>
<td>2012</td>
<td>Launched new website</td>
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<tr>
<td>2016</td>
<td>Turnover achieved to 100 crore.</td>
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The Food & Biotech Group

- Food & Biotech Engineers (I) Pvt. Ltd. Unit 1 (Gurukul Industrial Area, Faridabad)
- Food & Biotech Engineers (I) Pvt. Ltd. Unit 2 (Prithla, Palwal)
- Evapodry Manufacturing Company
Food & Biotech Turnover

<table>
<thead>
<tr>
<th>Year</th>
<th>Turnover (Rs. in Crore)</th>
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<tbody>
<tr>
<td>2013-2014</td>
<td>50.76</td>
</tr>
<tr>
<td>2014-2015</td>
<td>63.97</td>
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<tr>
<td>2015-2016</td>
<td>110.31</td>
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</tbody>
</table>
FBE Product range for ZLD
Important factors: Evaporator selection

- Evaporator feed Analysis
- Technology (Falling film/Forced circulation/Combination)
- Steam economy
- Power economy
- Cost of production
TYPES OF EVAPORATOR

- Falling Film Evaporator
- Forced Recirculation Evaporator
- Combination of Falling film and Forced Recirculation Evaporator
- Scrapped Surface Evaporator
Falling Film Evaporator Is Employed In Indian Distilleries For

- Bio methanated Spent wash
- RO reject water concentration
Falling Film Evaporator Working Principle

- **F** = Feed
- **V** = Vapour
- **L** = Liquid
- **LS** = Live Steam
- **SC** = Steam Condensate
PROBLEMS IN BIO METHANATED SPENT WASH

- Problem:
  - Excessive foaming thus contaminated condensate

- Remedy:
  - A new design Gas removing system is incorporated consisting of
    - High heater
    - Gas separator calandria
    - Deaeration vessel
    - Anti foaming mechanism
  - New scroll type Vapor Separator design to suppress the foaming tendency
Five Effects falling film evaporating plant in combination with FF and FR calandria with gas removing system (for biomethanated spent wash)
FORCED RECIRCULATION MEE – SUITABILITY

- HIGH TS AND VISCOUS LIQUIDS
- MOLASSES EFFLUENTS WITH HIGH SALT CONTENTS
- GRAIN LIQUID EFFLUENT
- HIGH CONCENTRATIONS MORE THAN 60% DM ARE REQUIRED IN FINAL MEE PRODUCTS
- CLEAR CONDENSATES ARE REQUIRED FOR RECYCLING IN THE PROCESS.
Forced Recirculation Evaporator Working Principle

\[
\begin{align*}
F &= \text{Feed} \\
V &= \text{Vapour} \\
L &= \text{Liquid} \\
LS &= \text{Live Steam} \\
SC &= \text{Steam Condensate}
\end{align*}
\]
OPERATIONAL ADVANTAGES

- High concentration (60% DM) can be achieved.
- Scale formation is minimal.
- Plant runs continuously for 45 days.
- CIP is required after 45 days.
- Processing cost per lit is lesser than Falling Film Evaporator.
- Do not require extra space for holding the effluent for 4 hrs during CIP.
Problems – Solved by FBE

- Use of Auto feed control and monitoring system
- Use of vacuum monitoring system
- Use of Cooling water temperature monitoring system
- Use of VFD for all pumps
- Use of conductivity transmitter
- Use of continuous pump capacity and head monitoring system
- Use of Stand by calandria with extra valves and manifolds
Five Effects Forced Recirculation Evaporator with Double stage finisher with stand by calandria
Scraped Surface Evaporator
Integrated Evaporator
Salient Features Scrapped surface Evaporator

- Suitable to Preconcentrate the spent wash upto 15-20% TS (depending upon the waste heat available) before feeding to bio-digester.

- Further concentration upto 35% to 55 % TS can be done in Stand alone evaporator
M/S MANAKPUR CHINI MILLS
(FOR RAW SPENT WASH)

- 5 effects forced recirculation evaporator with Double stage finisher with 1 No. stand by calandria
- Feed rate: 66,875 kg/hr from 13% to 60% TS
M/S BAJAJ HINDUSTHAN LIMITED
(FOR BIOMETHANATED SPENT WASH)

- 5 Effects Evaporating plant in combination with three effects falling film and two effects Forced Recirculation calandria and also complete with one stand by falling film calandria and Gas removing system

- Feed rate: 86,625 kg/hr from 12% to 40% TS
M/S DALMIA CHINI MILLS
(For Biomethanated spent wash)

- 5 Effects falling film Evaporating and Gas removing system
- Feed rate: 45,000 kg/hr from 7% to 35% TS
M/S GUJARAT AMBUJA EXPORTS LTD
(For Corn Steep Liquor)

- Three Effects Falling Film Integrated Evaporator with single stage finisher (Heating Media Is Heat Energy Exhausted From Fibre Dryer (Tr 77), Gluten Dryer(Tr 57) And Fibre Dryer Tr 67)

- Feed rate: 20,000 kg/hr from 6.5% to 50% TS
DRYERS

- Suitable and well designed dryers are essentially needed for handling molasses and grain effluent concentrates obtain by employing MEE.

- Dryers are an ultimate solution to achieve ZELD.
Concentrate and Fuel mixing and agitated fluidized bed dryer system
Vibratory Fluidized Bed Dryer

FLEX PLATES
Double screw Mixer/ Conveyor
List of our Valuable Customer

United Nations Industrial Development Organization, Austria.

M/s Oudh Sugar Mills Ltd. (Distillery Division) Hargaon, Sitapur, (U.P.)

M/s UFLEX Ltd. Sector-4, Noida

Double effects evaporator, (Water evap: 500 Kg/hr)

Five effects evaporating plant followed with Single Stage Finisher (W.E: 35,690 kg/hr)

Five effects evaporating plant followed with Single Stage Finisher (W.E: 40,000 kg/hr)
<table>
<thead>
<tr>
<th>Company Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M/s Mankapur Chini Mills ( A unit of BCML) Mankapur</td>
<td>Five Effects Forced Recirculation Evaporating Plant With Double Stage Finisher (W.E: 52,386 kg/hr)</td>
</tr>
<tr>
<td>M/s Superior Industries Ltd</td>
<td>Four Effects falling film Evaporating plant Along With sludge and Gas Removing System for processing biomethanated spent wash (W.E: 9271 kg/hr)</td>
</tr>
<tr>
<td>M/s Bajaj Hindustan Ltd. Gangnauli</td>
<td>Five effects evaporating plant in combination with 3-Effects falling film and 2 effects forced recirculation type calandrias &amp; gas Removing System (W.E capacity: 44,100 kg/hr)</td>
</tr>
<tr>
<td>Company</td>
<td>Description</td>
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<td>-----------------------------------------------------------------------------</td>
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<tr>
<td>M/s Bajaj Hindustan Ltd. Palia U.P</td>
<td>Double Effect falling film evaporating plant, WECap: 150,000 kg/hr</td>
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<tr>
<td>M/s Bajaj Hindustan Ltd. Gola U.P</td>
<td>Double Effect falling film evaporating plant, WE Cap:150,000 kg/hr</td>
</tr>
<tr>
<td>M/s Bajaj Hindustan Ltd. Radaulli</td>
<td>Five effects evaporating plant in combination with 3-Effects falling film and 2 effects forced recirculation type calandrias with one standby calandria &amp; gas Removing System (W.E capacity: 60,637 kg/hr)</td>
</tr>
</tbody>
</table>
List of our Valuable Customer

M/s Gujrat Ambuja Exports Lt. Gujrat

- Three Effects Forced Recirculation evaporator for Effluent, Feed Rate: 5,000 kg/hr

- Five Effects Forced Recirculation evaporator for Effluent, Feed Rate: 11,000 kg/hr

M/s Gujrat Ambuja Exports Lt. Gujrat

Three Effects Falling Film Integrated Evaporator With Single Stage Finisher For Corn Steep Liquor Feed Rate: 20,000 Kg/Hr

M/s Gujrat Ambuja Exports Lt. Gujrat

Three Effects Falling Film Integrated Evaporator With Single Stage Finisher For Corn Steep Liquor Feed Rate: 10,000 Kg/Hr
<table>
<thead>
<tr>
<th>Company Name</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>M/s Sentini Bioproducts Pvt. Ltd.</td>
<td>Five Effects Forced Recirculation Evaporating Plant With Single Stage Finisher, W.E Capacity: 27,734 kg/hr</td>
</tr>
<tr>
<td>Hyderabad</td>
<td></td>
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<tr>
<td>M/s Gulshan Polyols Ltd</td>
<td>Five effects falling film evaporator with Single stage forced recirculation finisher for RO reject water, W.E:5,893 lit/hr</td>
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<tr>
<td>Delhi</td>
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<tr>
<td>M/s Seksaria Biswan sugar factory Ltd. P.O.:Biswan</td>
<td>Four Effects Evaporating Plant In Combination With Falling Film And Forced Recirculation Calandria (W.E: 16,000 Kg/Hr)</td>
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</tr>
<tr>
<td>M/s Sona Sati Pvt.Ltd</td>
<td>Five Effects Forced Recirculation Evaporating Plant With Single Stage Finisher, W.E Capacity: 21,000 kg/hr</td>
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<tr>
<td>Bihar</td>
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<tr>
<td>Customer</td>
<td>Description</td>
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</tr>
<tr>
<td>M/s Dashmesh Medicare Pvt.Ltd. Chandigarh</td>
<td>Three Effects Evaporating Plant In Combination With Falling Film And Forced Recirculation Calandria (W.E: 2,700 Kg/Hr)</td>
</tr>
<tr>
<td>M/s Parabolic Drug Chandigarh</td>
<td>Three effects evaporating plant in combination with falling film and forced recirculation type calandrias (W.E capacity: 3,600 kg/hr)</td>
</tr>
<tr>
<td>M/s Dalmia Sugars Ltd. Sitapur</td>
<td>Five effects evaporating plant in combination of falling film and forced recirculation type calandrias (W.E Capacity : 21,000 kg/hr)</td>
</tr>
</tbody>
</table>
List of our Valuable Customers

M/s Dharni Sugars & Chemicals Ltd
Tamilnadu
Five Effects Forced Recirculation Evaporating Plant With Single Stage Finisher, W.E Capacity: 47,620 kg/hr

M/s Kothari Fermentation & Biochem Ltd.
Sikandrabad, Bulandshahr
Five effects evaporating plant followed with Single Stage Finisher (W.E: 14,000 kg/hr)

M/S Simbhaoli Sugar Mills Ltd., New Delhi
Five Effects Forced Recirculation Evaporating Plant With Single Stage Finisher, W.E Capacity: 25,300 kg/hr
Thanking You