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MEE & MVRE TECHNOLOGY

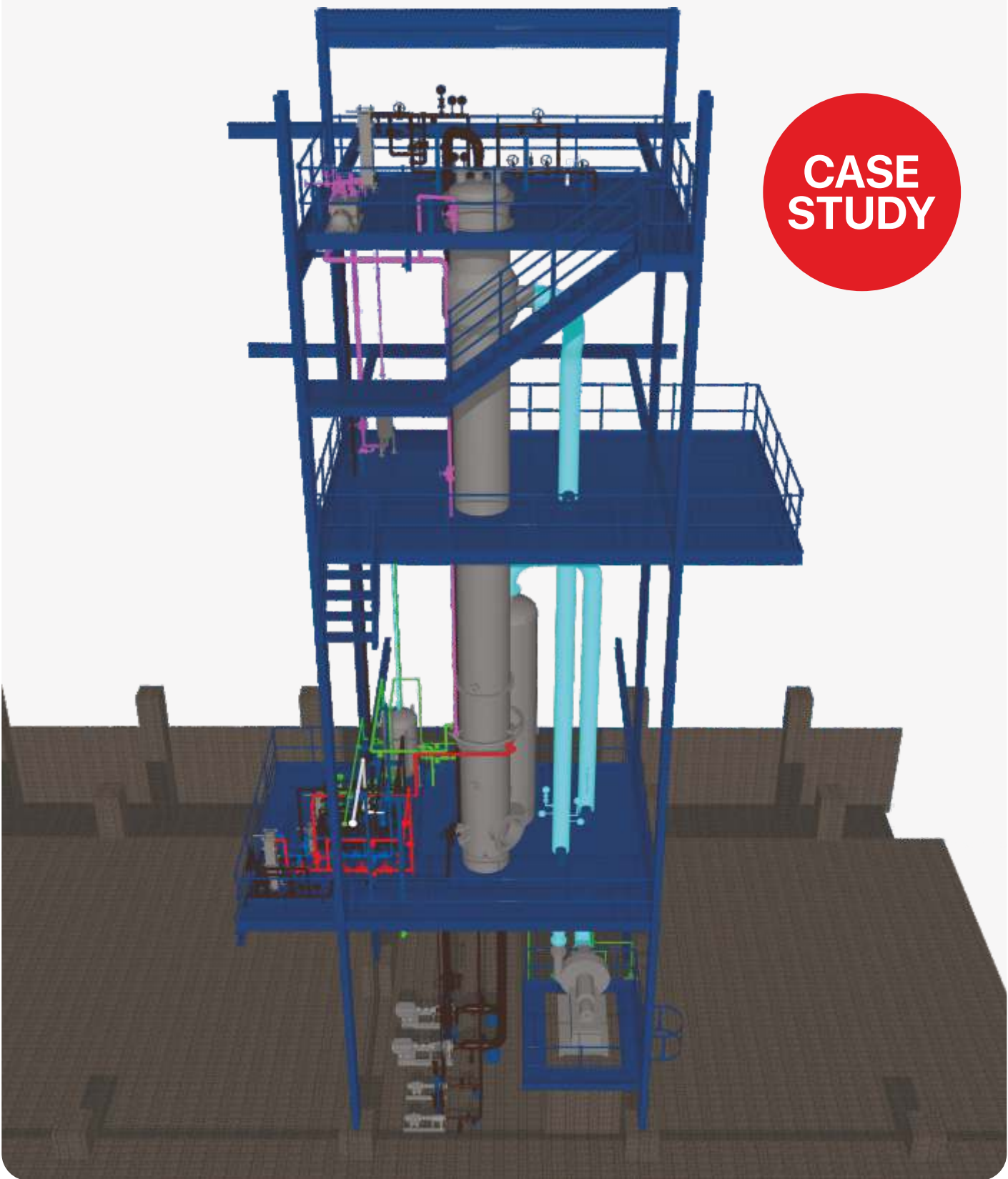
HEATEX INDUSTRIES LTD

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Falling Film Evaporator With MVR Technology For Reactive Dye Liquor For A Leading Chemical Company In Gujarat

CASE STUDY



OBJECTIVE

The following objectives were set during design and engineering phase:
To Reduce the Opex per ton of the Evaporation before feeding to Spray Dryer.
To Increase the Plant Capacity by 50% without investing in Spray Dryer.
Reduction of coal demand by 66% at dryer, a significant step towards carbon neutralization.

SOLUTION

After extensive research and applied engineering, we determined that the optimal approach to raise the liquor DS% from 25% to 50%, significantly reducing the heat load to only 67% of its previous operating value, was to implement an FFE with MVR installation.

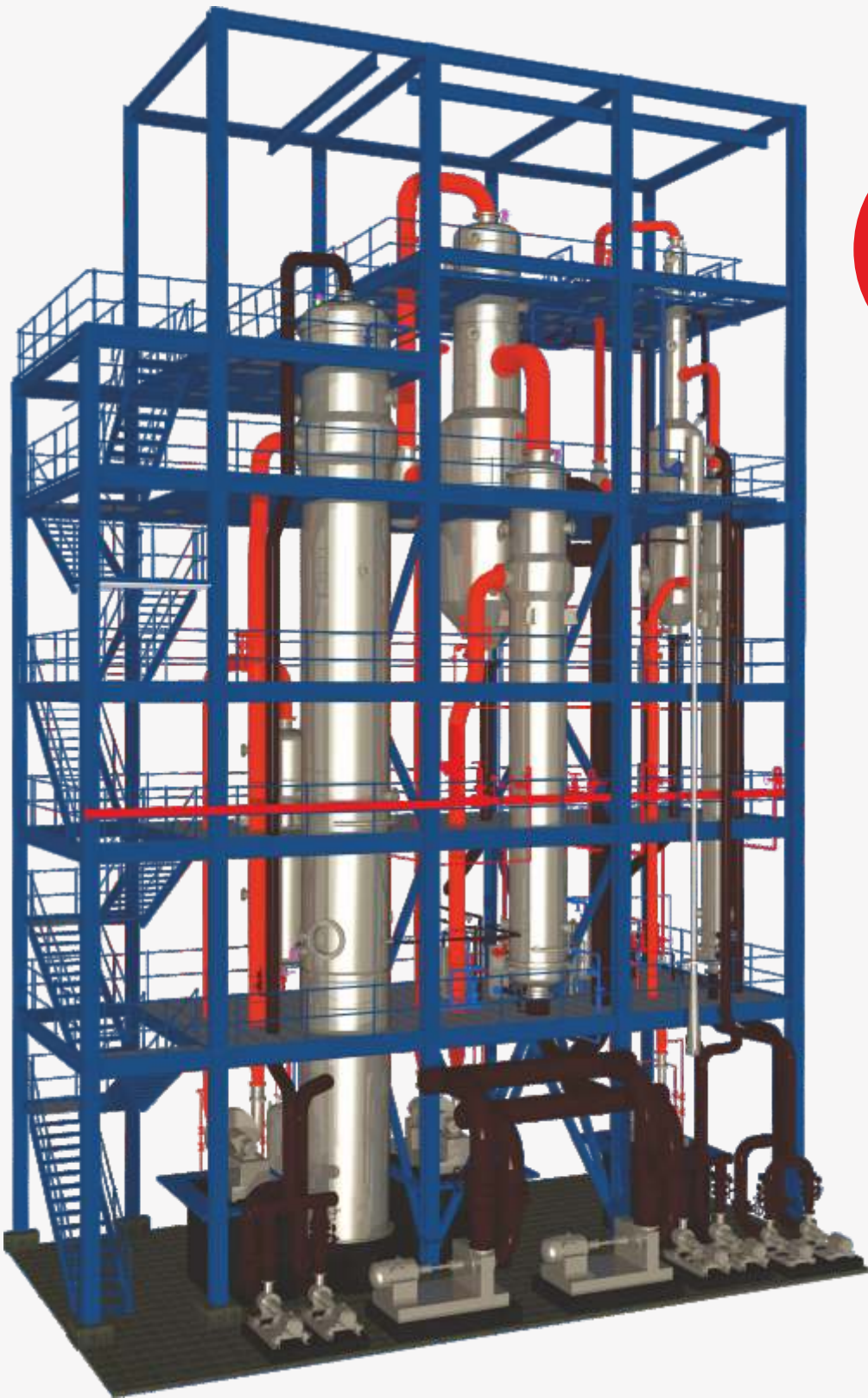
COMPARISON OF PRE-PROJECT AND POST-PROJECT PARAMETERS

The initial system, designed for a 4 t/h feed rate, included a spray dryer that received Reactive Dye Liquor with a 25% DS content from the reactors in the dye manufacturing unit. The dryer is operated with hot air at 250°C. A coal-fueled hot air generator was employed.

| Parameters | Pre-Project | Pre-Project |
|---|---------------------------|--------------------------|
| Operating Feed Rate | 4 t/h | 4 t/h |
| Evaporation Rate | 3 t/h | 3 t/h |
| DS in Reactive Dye Liquor | 25% | 50% |
| Coal Consumption (A) | | |
| Total Coal Consumption | 0.45 t/h | 0.15 t/h |
| Coal Price | ₹9,000/ton | ₹9,000/ton |
| Steam Opex | ₹4050 per hour | ₹1350 per hour |
| Power Consumption (B) | | |
| Additional Power Consumption for MVR System | -- | 44 kW-h |
| Power Price | -- | ₹8/kW-h |
| Power Opex | -- | ₹325 per hour |
| | | |
| Total Opex Cost (A+B) | ₹4050 per hour | ₹1702 per hour |
| Total Opex on Evaporation Rate | ₹1350 per ton Evaporation | ₹567 per ton Evaporation |
| Reduction of Opex | -- | 58% |



ZLD Project For CPC Plant Effluent Having 10% Ammonium Sulfate With 100% Recovery Using Evaporation With MVR Technology For A Leading Chemical Company In Gujarat



CASE STUDY

OBJECTIVE

The following objectives were set during design and engineering phase:
To reduce the operation cost per ton of the effluent feed rate
To increase the Ammonium Sulfate recovery from 40% to 80%

SOLUTION

Redesign the Evaporation Station with MVR technology to minimize the use to live steam for the evaporation process.

COMPARISON OF PRE-PROJECT AND POST-PROJECT PARAMETERS

The client was using 5 Effect Forced Circulation MEE train along with Agitated Film Dryer to achieve the ZLD for the CPC plant. The RO plant was actively operational to decrease the DS in the condensate from 2000 ppm to 300 ppm, which was sourced from the Multiple Effect Evaporator (MEE) station for reuse in the process. The plant's operational capacity was designed with 5 t/h feed rate.

| Parameters | Pre-Project | Post-Project |
|---------------------------------|---------------------|--------------------|
| Configuration | MEE | MVR-E 2 Effects |
| Operating Feed Rate | 4 t/h | 5 t/h |
| Ammonium Sulphate Salt Recovery | 10% | 100% |
| | 160 k/h | 500 kg/h |
| Steam Consumption (A) | | |
| Total Steam Consumption | 1.7 t/h | 0.6 t/h |
| Steam Price | ₹ 3000/ton | ₹ 3000/ton |
| Steam Opex | ₹ 5100 per hour | ₹ 1800 per hour |
| Power Consumption (B) | | |
| Power Consumption | 214.67 kW-h | 182.50 kW-h |
| Power Price | ₹ 8/kW-h | ₹ 8/kW-h |
| Power Opex | ₹ 1717 per hour | ₹ 1460 per hour |
| RO Unit for Condensate (C) | | |
| OPEX at RO unit for condensate | ₹ 100/t condensate | Nil |
| Opex Cost @ 3.2 tons condensate | ₹ 320 per hour | Nil |
| | | |
| Total Opex Cost (A+B+C) | ₹ 7137 per hour | ₹ 3260 per hour |
| Total Opex on Feed Rate | ₹ 1784 per ton feed | ₹ 652 per ton feed |
| Reduction of Opex | -- | 63.45% |



MVR BASED EVAPORATION TECHNOLOGY

The system constitutes an integrated module with a Falling Film Evaporators, PHEs, Vacuum System, and Mechanical Vapor Re-compressor (MVR). The evaporation technology is designed to cater to small to large-scale applications across industrial and domestic applications, with a primary objective to achieve to reduce the steam demand to nearly nil for any product evaporation requirement with 100% heat recycling technology. The system offers up to 95% (+) water recovery, 100% salt (solids) recovery, also ensuring Zero Liquid Discharge (ZLD) - significantly contributing to sustainable water management.

01. No Heat Generation and Rejection:

Our system operates without generating any heat, thus eliminate the need for boiler, and similarly no need for heat rejection systems means no condensers and cooling tower that leads to minimizing energy consumption.

02. Least Carbon Footprint:

By employing a sustainable evaporation process, we significantly reduce carbon emissions, contributing to a greener future. Complete green process can be achieved using solar power which can be easily integrated with the system.

03. Least Manpower Required:

Our fully automated system ensures minimal manpower requirements, enhancing operational efficiency and reducing labor costs.

04. No Blowdown from Cooling Tower Reduces Load on Effluent Plant:

With our technology, the need for a cooling tower and subsequent blowdown is eliminated, lightening the load on your effluent treatment plant.

05. No Reverse Osmosis (RO) System Required:

Our advanced evaporation process eliminates the need for an RO system, saving on capital and operational costs.

06. Operates on Low AT in the Range of 1-3°C:

Our system operates efficiently within a narrow temperature range, optimizing energy consumption and ensuring superior performance.

07. Very Low Power Consumption in Evaporation:

We prioritize energy efficiency, resulting in significantly reduced power consumption during the evaporation process.

08. Most Effective System with the Lowest Condensate and Solid Recovery Cost:

Our innovative design ensures highly effective condensate and solid recovery, minimizing associated costs.

09. Recovery of Energy in the form of Bioenergy or Fuel for Boilers:

Our technology facilitates the recovery of energy, which can be utilized as bioenergy or fuel for boilers, further enhancing resource efficiency.

10. Recovery of Nutrients for use as Fertilizers in Fields:

We enable the recovery of valuable nutrients from effluent, which can be repurposed as fertilizers, promoting sustainable agriculture practices.

11. 90-95% Water Recovery from Effluent:

Our system achieves an exceptional water recovery rate from effluent, reducing water consumption and enhancing water conservation efforts.

12. No Chemical Treatment in the Process:

Our technology eliminates the need for chemical treatment, ensuring a cleaner and more environmentally friendly process.

13. Integration with Zero Liquid Discharge (ZLD) Projects:

Our system seamlessly integrates with ZLD projects, using crystallization or dryer, enabling comprehensive water recovery and reuse.

14. Decentralized Water Recovery System for Different Effluent Streams:

Our adaptable system can be tailored to suit various effluent streams, providing decentralized water recovery solutions.

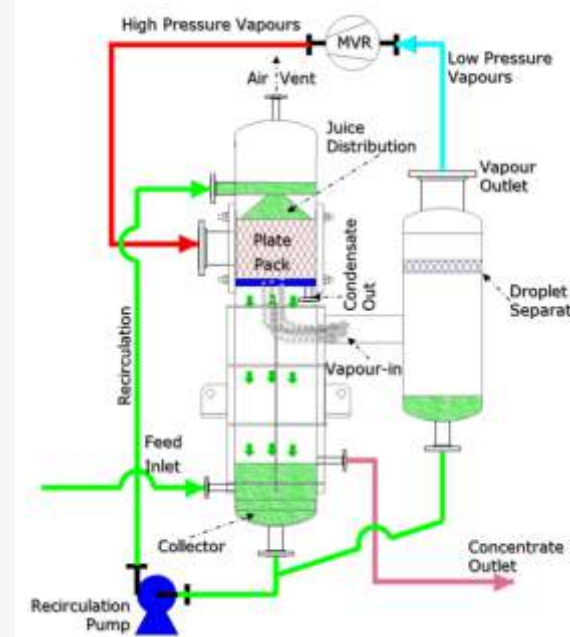
15. Low Footprint Design Ensures High Evaporation Efficiency and Reduced Civil Cost:

Our compact design maximizes evaporation efficiency while minimizing civil construction costs, optimizing your investment.

16. Reliable and Completely Automated System:

Our fully automated system guarantees reliability and precision, reducing the risk of human error and ensuring uninterrupted

Process Flow Diagram



ENGINEERING SERVICES

Heatex specializes in developing customized and sustainable solutions with comprehensive process engineering planning for the processing of the products. We pay meticulous attention to every detail to ensure that the project is most efficient and is tailored to perfection.