

# LIMPID<sup>TM</sup> ENGINEERING

Limpid Engineering Private Limited is an engineering and consulting company, offering services to the energy, chemical, pharma, power, sugar & food and process industries along with industrial automation solutions as add-on.

**LIMPID**  
ENGINEERING PVT.  
LTD.

## MVR EVAPORATOR

Water

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# MVR EVAPORATOR

Vapor recompression is being used in many industrial applications as an alternative to direct steam utilization generated by burning fuel in boiler. Dairy, saline, pharma, other food and distillery industries are among that is using Mechanical vapor recompression, in particular, in industrial evaporators for concentration of solids. Waste heat from a spent vapor stream is upgraded to a higher pressure and then re-using it to capture its useful energy by simultaneously condensation and evaporation. The vapor generated from evaporator is compressed to increase pressure and corresponding temperature. As the pressure rises, the saturation temperature also increases along with some degree of superheat is added to compressed vapors.

This process is very energy-efficient and offers many unique advantages. Limpid Engineering's MVR based plate or tubular forced type evaporator is available in various MOCs to suite the liquid to handle to concentrate the liquid stream or to recover the solvent i.e., water in most of the cases.



The increase in saturated temperature generates a temperature difference between the exhaust vapor and the working fluid. The temperature difference then enables heat transfer between the two fluid streams using a heat exchanger element. This arrangement usually employs a compressor to increase the pressure of the vapor stream carrying waste heat. Since energy of latent heat is always reused, the energy input needed for such a process is simply the energy supplied to compress the fluid.

This method helps in recovering the water from effluent to recycle back to process to achieve ZLD thereby reducing water intake significantly. Ultimately, it minimize the volume of liquid/solid waste that requires treatment or to be disposed of, while also producing a clean stream suitable for use elsewhere in the plant processes, thereby saving money and being beneficial to the environment. Evaporators and crystallizers along with vapor compressor is used to evaporate & simultaneous condensed water.

## “ New Development

This is our new development towards the sustainability.

## ADVANTAGE & Benefits



### No need of heat source and sink

There is no need to put heat source i.e. boiler and heat sink system i.e. cooling tower. Great reduction on CAPEX and footprint.



### Suitable for any process industry

This method is equally suitable for any process industry. Only additional equipment that vary is the stripping column for COD removal.



### Energy efficient & sustainable solution

Depend upon the characteristic of the effluent the operating expenses is just ₹0. 20-0.30 per liter, which is much less than any other conventional water treatment process.



### Customizable for any capacity

System can be designed to suit the desire capacity of any size from i.e. ranging from 24KLD to 1.0MLD single unit.



### Compact and minimal footprint area

Since it eliminates the conventional bigger settling and aeration operations along with heat source and heat sink equipment, footprint is too less.

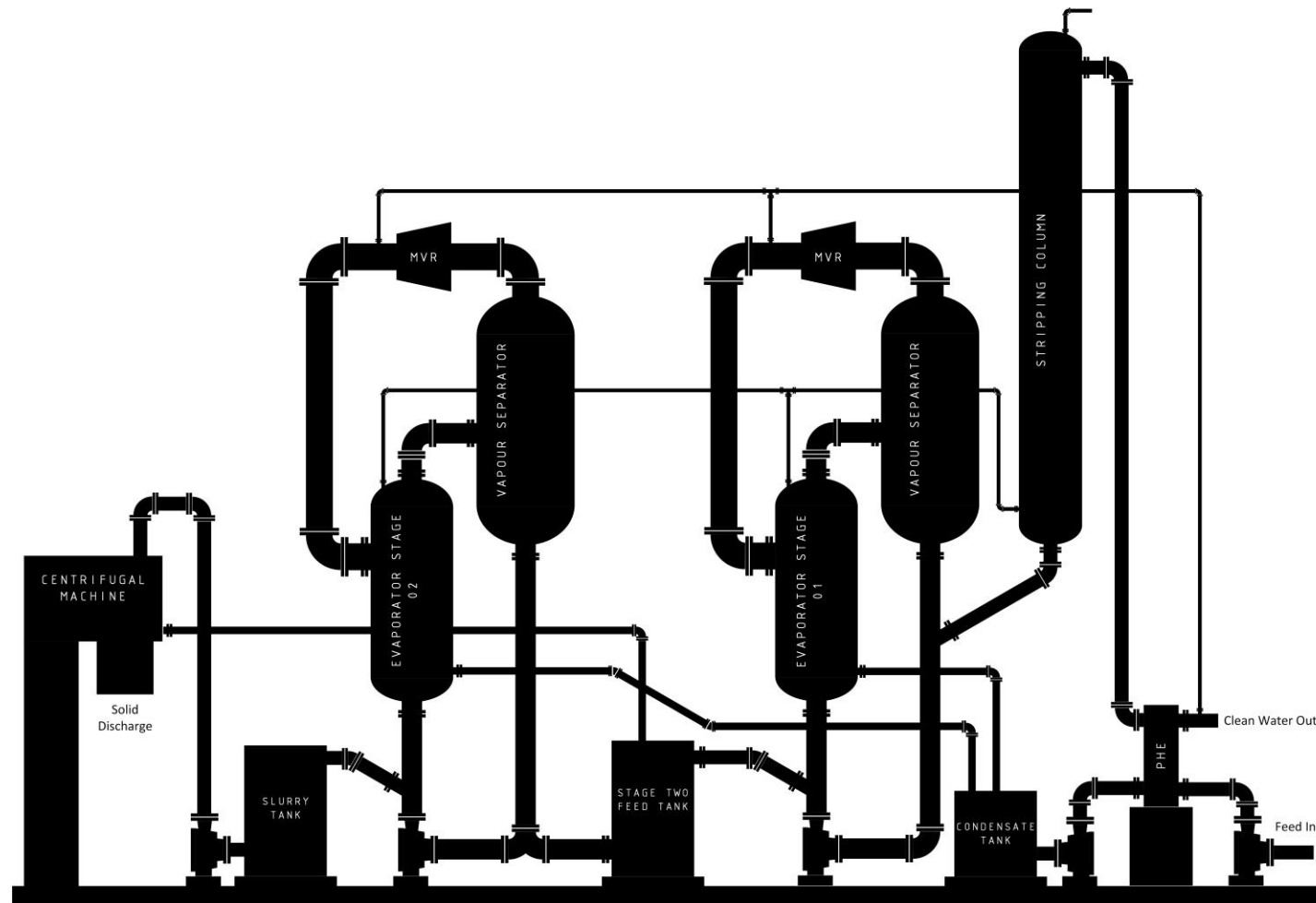


### Integration with Stripper

This system can be well integrated with stripping column for COD removal. Thermal integration of the two required still not required any cooling tower. Make steam is required to strip off solvents.

# PROCESS FLOW

Typical Process flow diagram for a Pharma Industries.



## Conventional Equipment Eliminated

1. Thermal Energy Source i.e. Boiler for Steam generation including all ancillaries. (Fuel Handling, Ash handling, DM Water plant, and land requirement.)
2. Heat Sink i.e. Cooling Tower. (Loss of water to environment, Direct or Indirect Condensers including water pumps, and land.)

## Ultra Sonic CIP System (LE-CIP™)

Patented LECIP eliminates the mechanical or chemical cleaning. Conventional cleaning procedure calls for schedules shutdown of the system for cleaning. Our ultrasonic CIP system support non-stop operations.

# APPLICATIONS

MVR Evaporator improves the quality of water to make it appropriate for a specific end-use. The end use may be drinking, industrial water recycling, irrigation, water recreation or many other uses, including being safely returned to the environment.



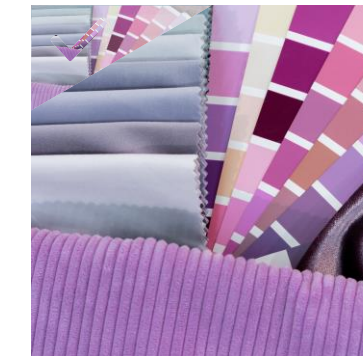
## Chemical & Pharma Industry

Chemical & Pharma industries including companies that produce industrial chemicals and medicines & drugs.



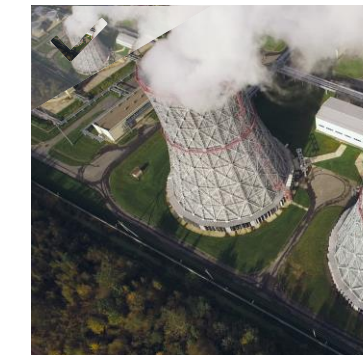
## Desalination & Distillation

Process that takes away mineral components from saline water to produce water suitable for human consumption.



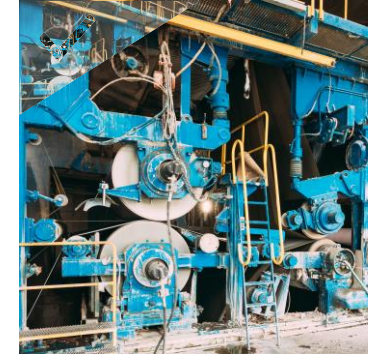
## Textile & Dyeing Industry

The textile industry is primarily concerned with the design, production and distribution of yarn, cloth and clothing.



## Blow down & Rejects

Heat rejection device that rejects waste heat to the atmosphere usually a water stream to a lower temperature and blow down.



## Paper & Pulp Industry

Companies that use wood as raw material and produce pulp, paper, paperboard and other cellulose-based products.



## Distilleries & Beverage

Consists broadly of two parts, one potable liquor and the industrial alcohol including anhydrous ethanol for blending with petrol.

# FEATURES

For raw water or wastewater, in particular, the configuration of an industrial water treatment system depend on the application and characteristics of the water in relation to the required level of purity.



More than 95% clean and reusable distilled water reclamation using MVR Evaporator with significantly reduced energy consumption.

This system comes with fully integrated complete monitoring system for various operating parameters like flow, temperature, pressure, power consumption, vibration, feedback from field along with controlling of compressor & vacuum pump RPM through integrated variable frequency drives.

## Custom made

1- MOC: SS 304/316/316L, Duplex Steel or Ti.

2- Capacity: As per customer need from minimum size of 24 KLD to any bigger size.

3- Option for Stripper Column and inline pre-filtration integration.

4- Ultrasonic CIP system.

5- Tubular or plate type

### MVR Evaporator OPEX

Typical operating cost of the water treatment using MVR Evaporator is \$0.0027-0.0060 per liter of effluent treated. (₹0.20-0.45 per liter)

₹0.15 per liter (Textile)	₹0.25 per liter (Pharma)	₹0.65 per liter (NaOH)
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Typical Outlet water Quality

<100ppm TDS	<300ppm COD	<200ppm BOD
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# COST BENIFITS

Efficient low cost system that mainly required electric consumption as utility. Significantly reduced CAPEX i.e. cost of land because of low footprint and reduced utilities station. Opex is comparatively lower than other conventional method being used in the industries.

## MVR Evaporator OPEX

**\$0.0027**

Typical operating cost of water treatment using MVR Evaporator is \$0.0027-0.0060 per liter.



**\$6.500**

About \$6.50 saving per kilo-liter of water as compared to conventional methods.



OPEX 25-40%



SAVINGS >150%

**\$0.3500**

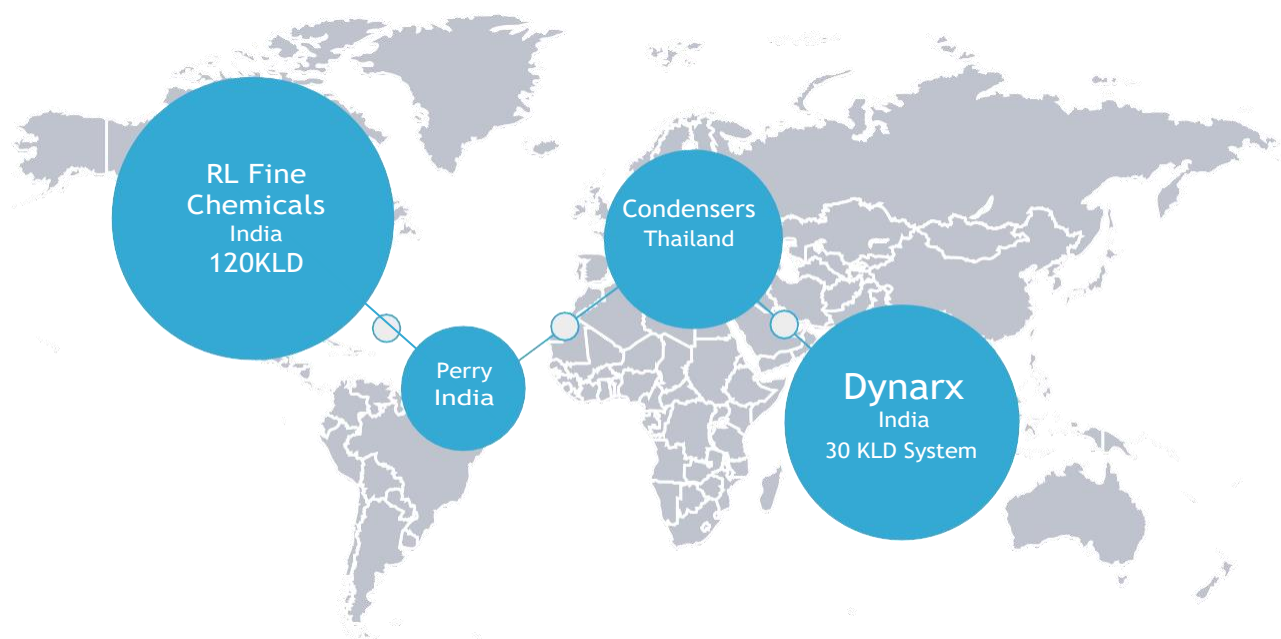
Cost of mechanical/chemical cleaning and down time is a major head of the maintenance. Our system has almost negligible cleaning cost, equivalent saving is about \$0.35 per kilo-liter.

We come up with effluent treatment method without use of steam & heat rejection units and ancillaries.

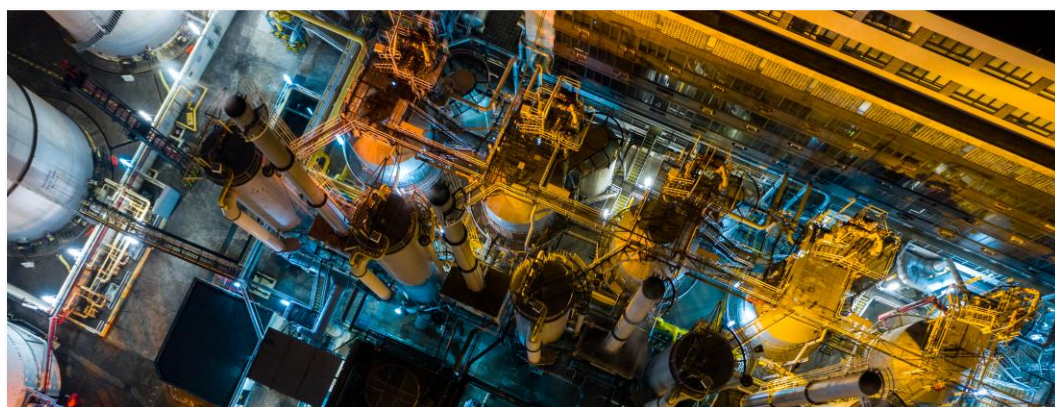
An operating expense is an ongoing cost for water treatment. We have developed & design system and its components to minimizing utilities and consumable parts. This make our MVR Evaporator system better than other available in the market.

# PORTFOLIO

## GLOBAL AND REGIONAL INSTALLATIONS



Our accumulated skill, experience in process design, engineering & automation, made us equally competitive.



# 60

% Reduction in Power,  
At Eastern Sugar Company, Thailand

# 213

Million INR Saving scope  
Computed & reported to Parry Sugar

# 55

kW/Liter with Stripper  
R L Fine chemicals Pvt. Ltd.

# 80

kW/Liter with Stripper  
Dynarx Technology India Limited

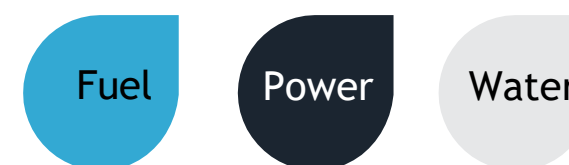
# PROJECTS

Considering objective of enhancing our customer's returns, we focused on energy efficiency and designed/redesigned & re-engineered process and equipment along with automation. More than 5 years of exposure of evaporation and MVR. Following is our recent installations.

## RECENT PROJECTS

In past few years, we have executed/being executed multiple technology oriented installations in food & pharma at domestic and as well as international locations.

PROJECTS	YEAR	TYPE	CAPACITY	WATER		FOOD	
				02	03		
R L Fine Chemicals Pvt. Ltd.	2021	Effluent	120KLD				
Dynarx Technology India Limited	2021	Effluent	30KLD				
Parry Sugars Refinery India Pvt. Ltd.	2021 & 2020	Process Design & Sugar Drying	3000TPD				
Eastern Sugar Company, Thailand (Unit-1 & Unit-2)	2019 & 2020	Jet Condensers	26000TCD				



For Eastern Sugar Company, Thailand we bring down the power required for pumping by 60% of the original by installing new water jet condensers. New system not only bring the OPEX down but also smoothed their crystallization by creating consistent vacuum in crystallizers. Same equipment was implemented in one of their other unit.

Parry Sugars Refinery India Pvt. Ltd. invited us for energy audit and re-engineering of their process to optimize the fuel consumption. In another case study we redesigned their sugar drying unit to overcome high moisture in product.

# LIMPID ENGINEERING

## MVR EVAPORATOR

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