This document is for presentation of our range of offerings and is merely for information purpose only. Anything contained herein does not constitute an offer and is non binding.

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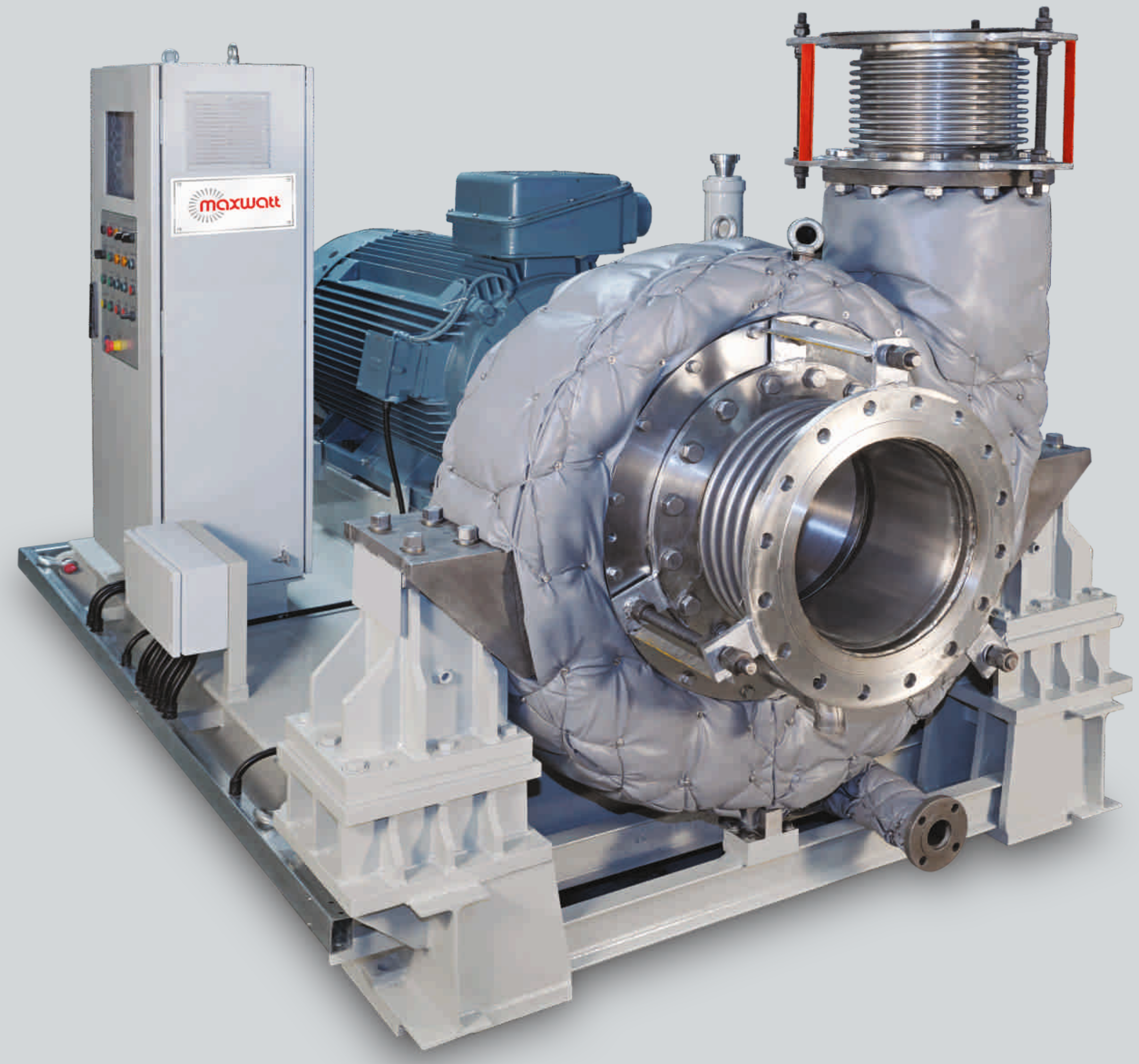
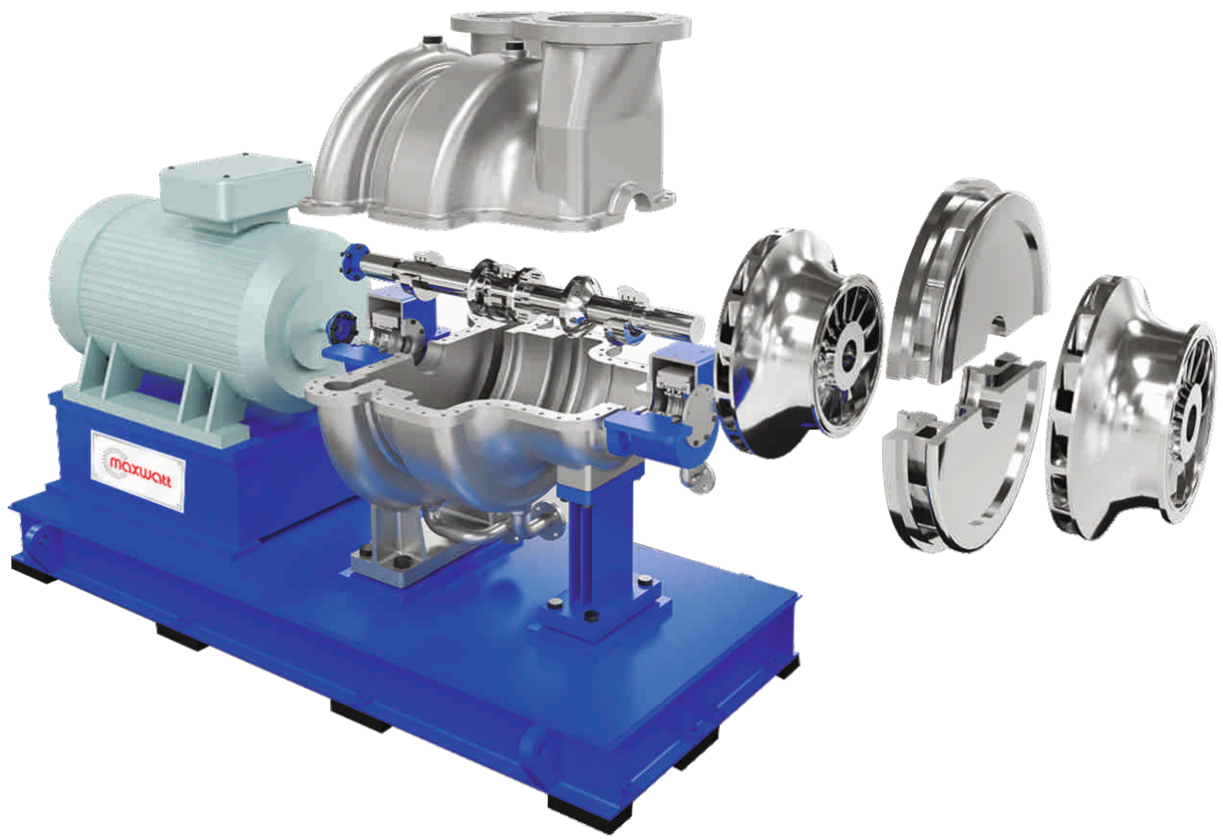
Vapour Fans & Compressors



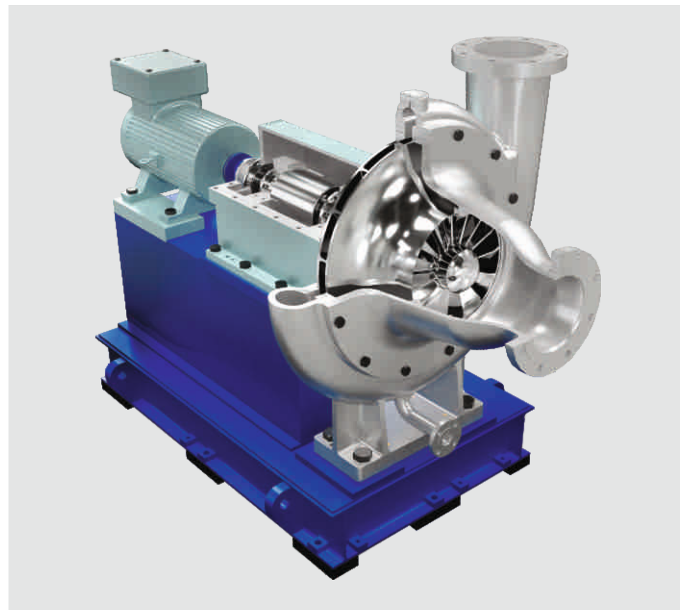
As a company committed to energy efficiency and environmental sustainability, our goal is to provide products and services that address the needs of today's world. As the threat of global warming continues to grow, we understand the importance of solutions that not only improve the environment, but also reduce operating costs for our clients.

Our experienced team of turbomachinery experts and culture of persistent innovation enabled us develop an extensive range of axial & centrifugal compressors & fans for vapour compression. that provide optimal solutions for a variety of industry segments & applications. These axial & centrifugal compressors and fans are designed with advanced technology and high-quality materials to ensure optimal performance, efficiency & reliability.



Maxwatt offers following compression technologies for Mechanical Vapour Recompression (MVR) Applications:

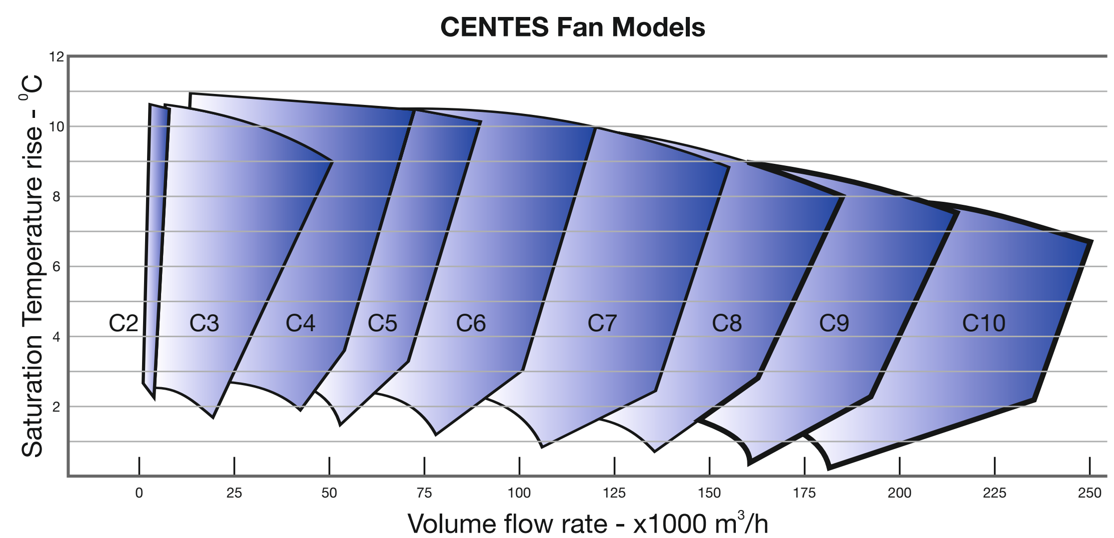
- **Centrifugal Fans, Single Stage Construction - Sat. Temp. Rise 10 Deg. C**
- **Centrifugal Fans, Multi Stage, Single Casing Construction - Sat. Temp. Rise 20 Deg. C**
- **Centrifugal Compressors, Single stage - Sat. Temp. Rise 14 Deg.C**
- **Axial Compressors, Single casing construction - Sat. Temp. Rise 50 Deg.C**



CENTRIFUGAL FANS

Maxwatt proudly presents CENTES range of centrifugal fans tailored for MVR applications, catering to vapor flows of up to 250,000 cubic meters per hour.

These robust centrifugal fans serve as dependable workhorses, ideally suited for an extensive spectrum of MVR applications that demand low pressure ratios. Our design and construction adhere to established features and industry best practices, ensuring a dependable and highly efficient operation.

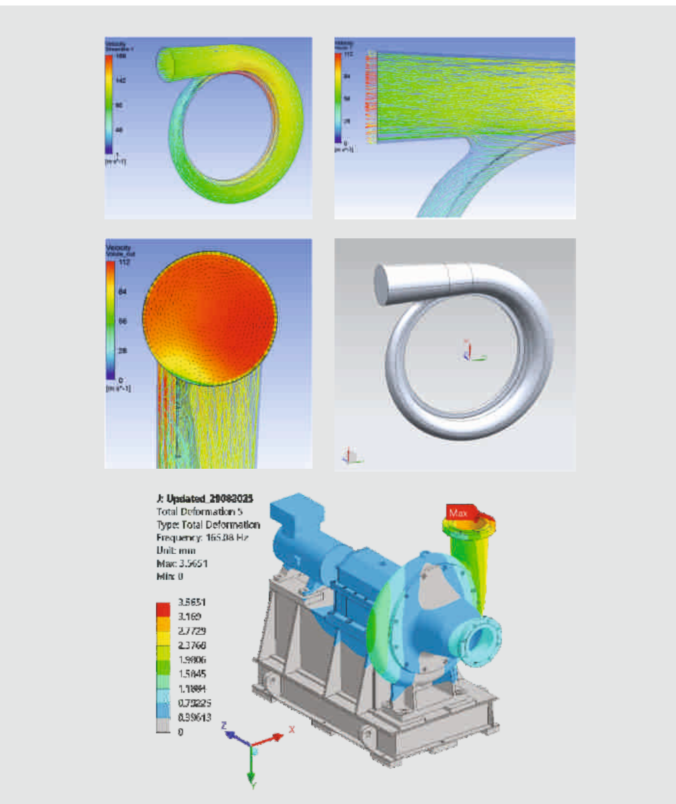


Casing Construction

Fan casings are meticulously engineered to offer exceptional structural stability, capable of withstanding the rigorous forces generated during operation while ensuring zero deformation and fluid leakage. We prioritize ease of assembly, maintenance, and accessibility for effortless inspection and repair in our casing designs.To facilitate the condition assessment of the fan impeller, casings feature a strategically placed borescope hole for easy inspection.

Casing Design Analysis

The design of volute casing plays a pivotal role in achieving efficient pressure recovery and minimizing energy losses. All our casing designs undergo rigorous analysis using established Finite Element Analysis (FEA) tools to guarantee structural integrity, and Computational Fluid Dynamics (CFD) simulations to optimize performance.

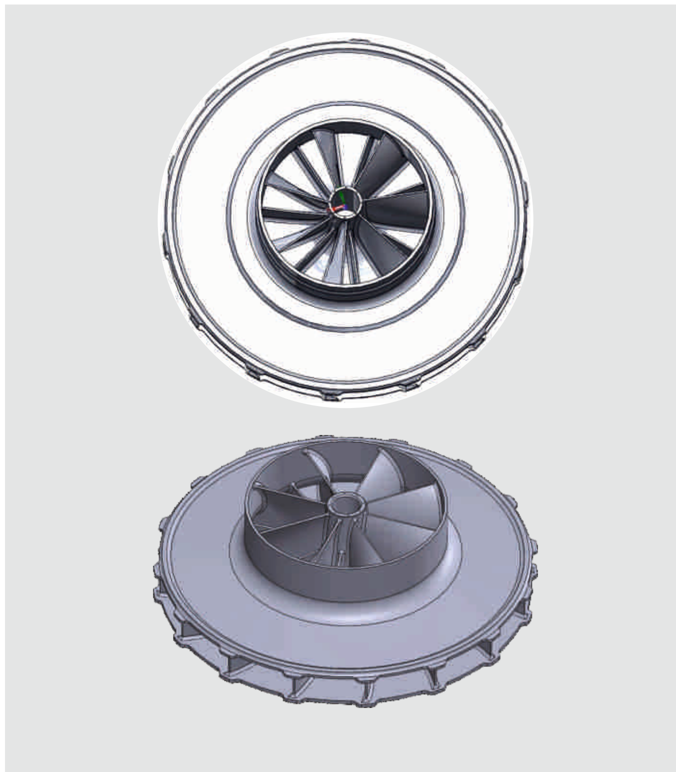


Material Selection

We carefully select the construction material based on specific application requirements. Among the commonly used materials are Carbon Steel, SS 304, SS 316L, SS 316Ti, Duplex, and Super Duplex steel. Each material undergoes thorough laboratory testing to ensure that its chemical and physical properties align with the specified composition.

Fan Impeller

Impellers are manufactured using advanced techniques tailored to the flow rating. Smaller flow-rated impellers are typically 3D metal printed, while larger flow-rated ones are fabricated. The blade profiles also vary, with larger impellers featuring 2D profiles and smaller sizes employing 3D profiles. The design of the blades, including their shape, curvature, number, and angles, is meticulously chosen to optimize compression efficiency. Our focus on aerodynamic efficiency minimizes losses arising from turbulence and flow separation. Comprehensive Computational Fluid Dynamics (CFD) simulations are conducted to analyze flow patterns and fine-tune impeller designs, resulting in enhanced compressor performance and energy efficiency.

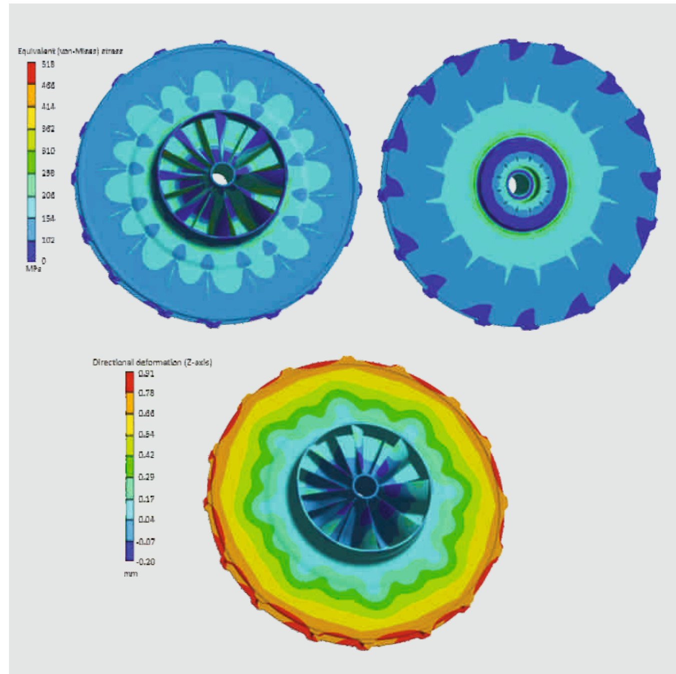


Material Selection

Material selection is driven by specific application requirements, with an emphasis on excellent mechanical properties. Commonly used materials include SS 304, SS 316L, SS 316Ti, 17-4 PH steel, Duplex, Super Duplex steel, and Titanium. Rigorous material inspections are conducted during manufacturing to ensure the absence of defects or flaws that might compromise the impeller's integrity. Quality control measures, such as non-destructive testing (NDT) techniques like ultrasonic testing and dye penetrant inspection, are employed to verify the structural soundness of the impellers.

Stress Analysis

Finite Element Analysis (FEA) is a standard practice to evaluate the stress distribution and deformation of impellers under various operating conditions. This analysis helps identify potential stress concentrations and fatigue-prone areas. By optimizing the impeller's design based on stress analysis results, we enhance its reliability and safety.

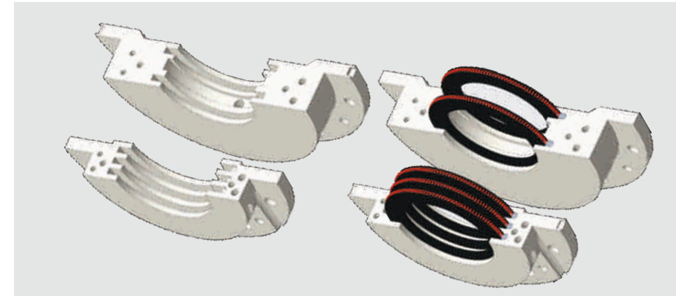


Balancing and Rotodynamic Analysis

Each impeller undergoes dynamic balancing post-fabrication and inspection to mitigate unbalanced forces and vibrations, ensuring smooth operation. Additionally, a rotating train analysis is conducted using rotodynamics to determine the critical speeds of the impeller and the entire rotating train. This analysis ensures that these critical speeds do not intersect with the normal operating speed range, guaranteeing safe and efficient operation.

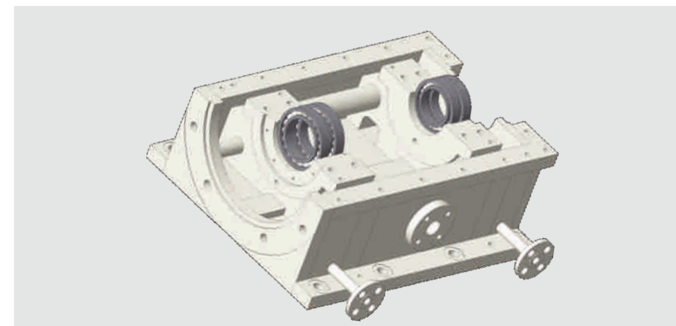
Gland Seals

Gland seals feature an innovative floating seal design, incorporating precision-engineered carbon rings arranged within the seal housing. A Buffer gas connection, strategically located within the gland seal housing, positioned between the carbon rings, enables . This buffer gas connection typically utilizes low-pressure steam or treated water to further enhance the sealing performance. The buffer gas sealing ensures the pressure inside the casing as per the design and improves efficiency of the gland seals.



Bearings

The Bearings are, predominantly of the anti-friction type, with choice of pneumatic oil lubrication or pressurized oil lubrication. To ensure precise and reliable lubrication, each package is equipped with a self-contained lubrication system. The design features a configuration where two sets of bearings are positioned on one side of the rotor shaft within a sturdy pedestal and the fan impeller is expertly mounted on the opposite side of the shaft.



Vibration Monitoring

Each package comes equipped with a vibration monitoring system. This system includes a vibration sensor paired with a transmitter that seamlessly communicates with the control system. The purpose of this system is to continuously and diligently monitor the unit's vibration levels and provide protection against any potential problems stemming from excessive vibration. Thereby it ensures smooth and reliable operation of equipment.

Electric Motor

The packages typically feature a direct-drive configuration, with the motor directly powering the fan. However, in specific project scenarios, we offer the flexibility of incorporating a speed step-up gearbox between the fan and the electric motor. This choice is made to align with the project's unique requirements. Additionally, electric motor's parameters, such as voltage and frequency, are selected based on the specific conditions at your site.

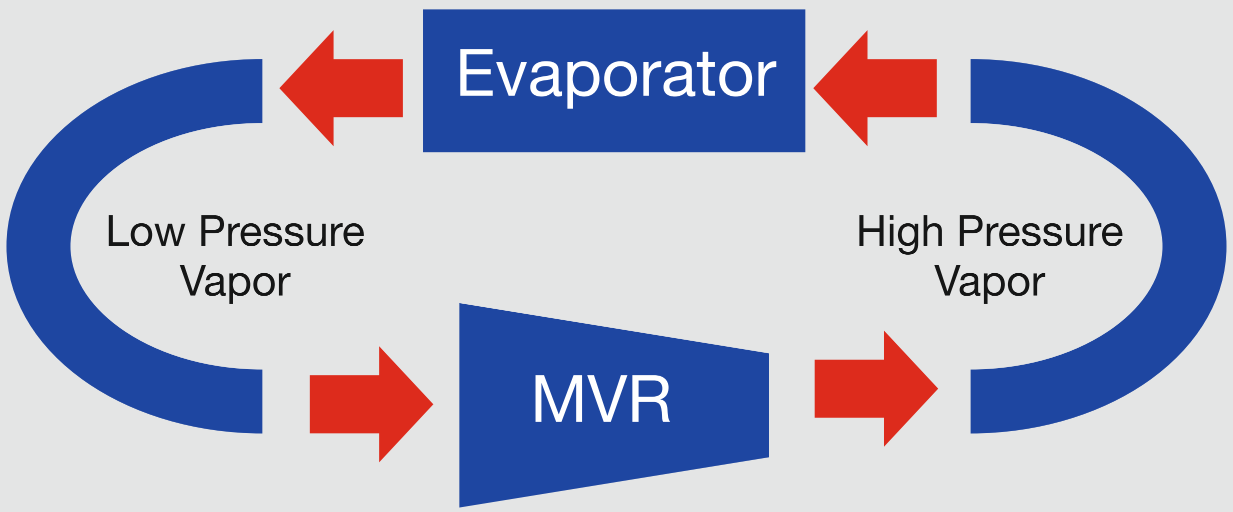
Mechanical Vapour Compression (MVR) technologies, have gained increased attention, especially with the growing emphasis on Environmental, Social & Governance (ESG) factors in corporate settings. As the importance of energy efficiency takes center stage among various technologies, steam remains a prevalent medium for heat transfer in numerous industries. However, many heat transfer applications result in the release of steam vapours, dissipating energy into the environment through cooling towers.

The Mechanical Vapour Recompression Process addresses this challenge by re-compressing the vapours produced during evaporation back to their original state, effectively recycling latent heat. These re-compressed vapours are then reintroduced into the evaporation cycle as the motive heat source. In traditional steam generation processes, a substantial amount of energy is consumed during the phase change of water to steam (Latent Heat – 540 Kcals/Kg). The MVR process optimizes this by recycling the latent heat of steam, offering a two-fold advantage:

1. Elimination of fossil fuel consumption for steam generation in evaporation.
2. Significant reduction in total energy costs, resulting in a rapid payback period and a compelling return on investment when integrated with a heat transfer process.

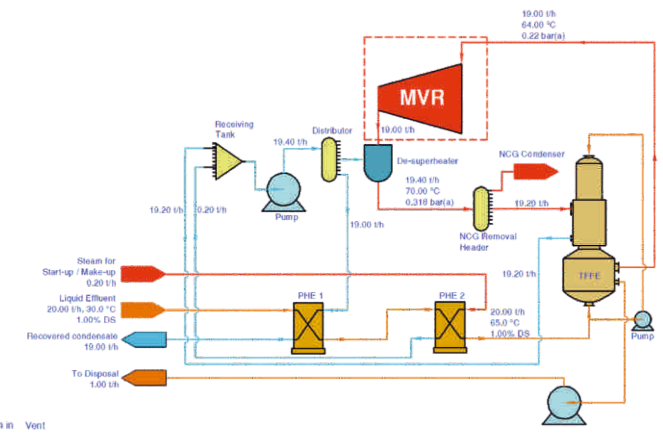
Explore a range of industrial applications where our Fans & Compressors prove highly effective in conserving water, Energy, preventing environmental degradation and facilitating resource cycling !

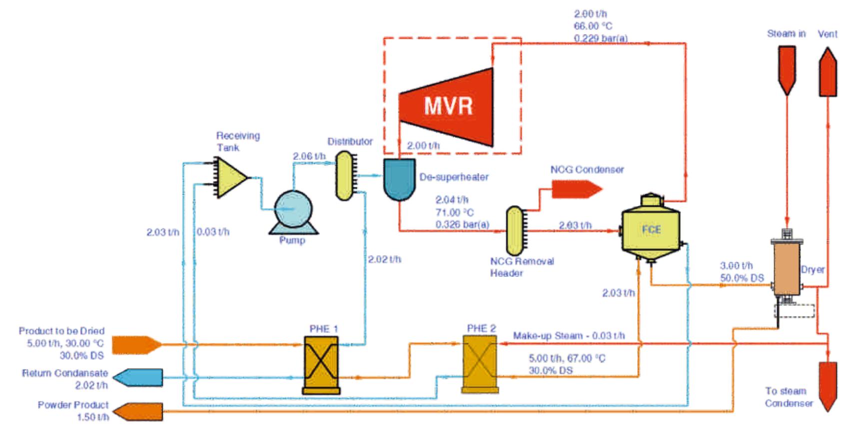
MVR evaporator



EFFLUENT TREATMENT

- Zero Liquid Discharge (ZLD) for Industrial waste water treatment.
- Cooling tower blow down.
- RO reject.



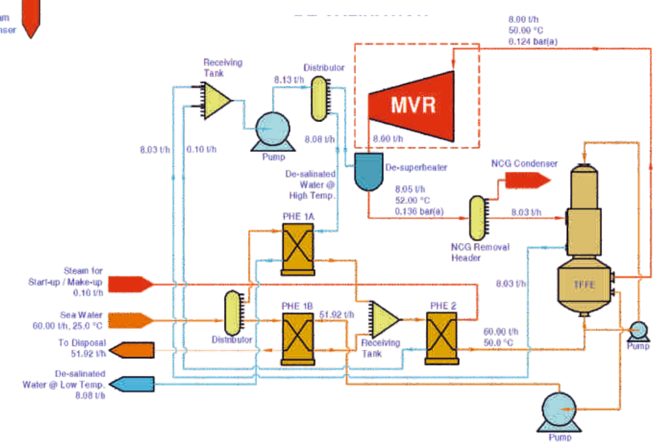


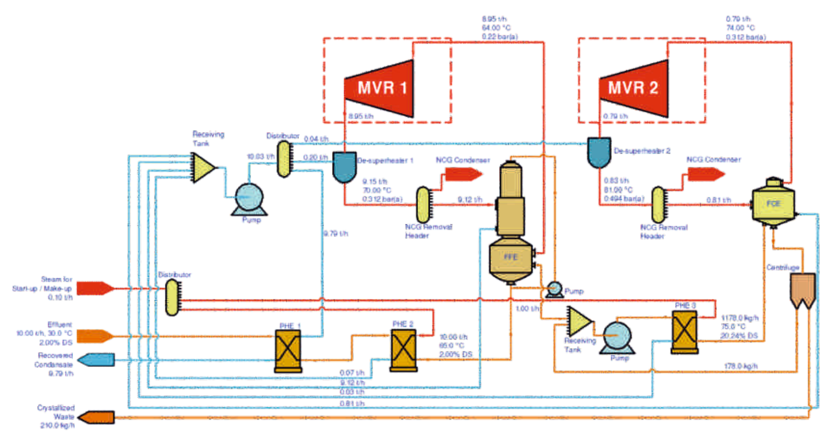
PRODUCT CONCENTRATION FOR DRYER APPLICATION

- Chemical & Pharma.
- Food & Beverage.
- Ethanol / Distilleries.

DE-SALINATION

- Fresh water production from Sea water, for Industrial & household purpose.





EVAPORATION WITH CRYSTALLIZATION

- Chemical & Pharma.
- Cane / Beet sugar.

PRODUCT CONCENTRATION

- Chemical & Pharma
- Food & Beverag (Milk, Soy Protein, etc.).
- Distilleries / Ethanol.
- Cane / Beet sugar.