



CONDENSATE MANAGEMENT WITH JETOMAT

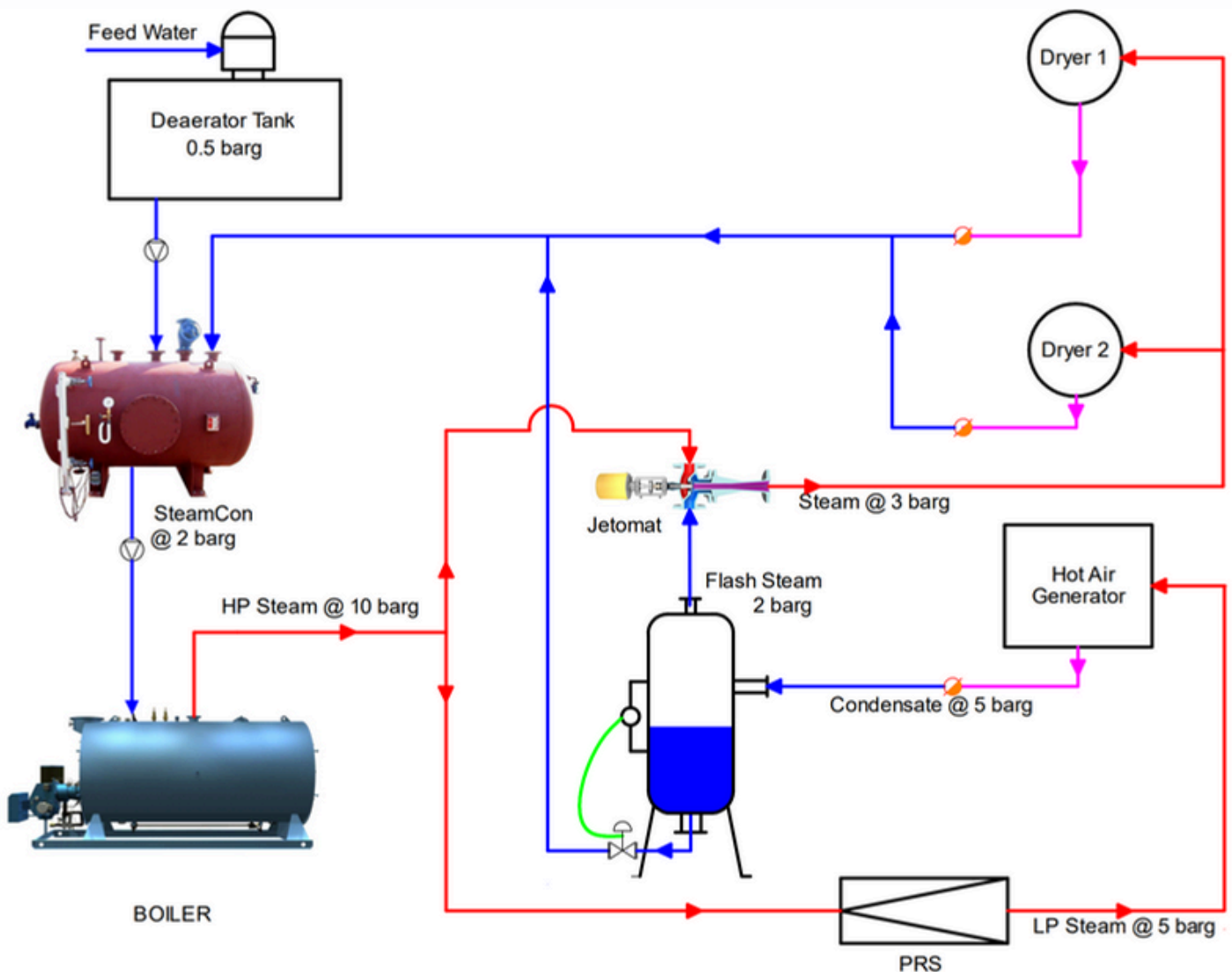
A Trio for Energy Savings: Optimize, Recompress, Recover



The integration of a Variable Nozzle Thermocompressor (Jetomat), Flash Steam Separator, and High Pressure Condensate Recovery System **Closed-Loop** offers a **zero loss steam network operation**.

The Flash Steam Separator generates dry, **high-quality flash steam from hot condensate**, while the Jetomat recompresses it with high-pressure motive steam, boosting it for **reuse and reducing the need for live steam generation**. The SteamCon system further enhances efficiency by **recovering hot condensate upto 110 - 145 DegC** (Custom Design for Higher Temp) and returning it to the boiler feedwater tank, eliminating vent steam losses and offering Maximum Fuel and Economical Savings.

WHY CHOOSE INTEGRATED CONDENSATE RECOVERY?



HIGHEST ENERGY SAVING:

The integrated system of Jetomat, Flash Separator, and High Pressure Condensate Recovery, **maximizes steam reuse and reduces the need for fresh steam** generation, leading to significant energy savings and lower operational costs.



CLEAN PLANT AREA:

By efficiently managing steam and condensate in a closed-loop system, the solution minimizes steam leaks and excess moisture, helping **maintain a cleaner and safer plant environment, reducing corrosion risks** and improving equipment longevity.



EASE OF OPERATION AND MAINTENANCE :

Designed with minimal moving parts and automated controls, the system offers simple operation and low maintenance requirements, ensuring **reliable performance with reduced downtime** and minimal operator intervention.

HOW IT WORKS

Flash Separator, Jetomat and SteamCon Condensate Recovery Pump provides an efficient closed-loop solution for steam recovery and condensate management, maximizing energy efficiency in industrial processes.

FLASH SEPARATOR

FLASH STEAM IS AS GOOD AS LIVE STEAM.

Separates Flash Steam from Condensate: The Flash Separator effectively separates flash steam from Dual Phase High Pressure Condensate when Pressure is Reduced.

Larger Diameter for Dryer Steam: The steam-condensate mixture Velocity is reduced allowing dry flash steam to rise above.

Condensate Settling: The reduced velocity allows the heavier condensate to settle at the bottom of the vessel.

Condensate Drainage: The settled condensate is drained through a control valve or steam trap from bottom of the separator.

Flash Steam Rises: The lighter flash steam rises to the top of the separator, providing dry, high-quality steam.

Ideal for Low-Pressure Applications: The dry steam is suitable for supply to Thermocompressor or low-pressure applications directly, such as preheating boiler feedwater or other low-pressure steam processes.



JETOMAT

**SUCTION STAGE**

Low-pressure steam is drawn into the Jetomat by the high-velocity jet of motive steam.

MIXING STAGE

The low-pressure steam mixes with the high-pressure steam within the diffuser, where the kinetic energy is transferred.

COMPRESSION STAGE

The mixed steam is compressed, resulting in higher pressure and temperature, suitable for reuse.

VARIABLE NOZZLE

The variable nozzle design adjusts the steam flow rate and pressure dynamically, ensuring performance and efficiency under varying process conditions.

STEAMCON - CONDENSATE RECOVERY PUMP



MOTIVE FORCE: SteamCon uses **Steam or Compressed Air or Electric Pump** as a motive force to pump condensate. Selection of Motive Force is based on site condition and Operation Cost.

The pump **fills with condensate by gravity** until it is full, sensed by Level Switch. **Steam is introduced** to pressurize the vessel when it is full by Controller. The pressurized vessel **pumps the condensate out** & Motive Steam is released back to Flash Vessel to be reused in process.

This cycle **repeats continuously** with minimal steam/electricity consumption.

BENEFITS OF INTEGRATED SYSTEM

The **Closed-Loop Integrated Condensate and Flash Steam Recovery System** has a Flash Separator, Jetomat, and SteamCon to provide a highly efficient steam management solution with **zero energy loss**. Here are the key benefits:



MAXIMUM ENERGY RECOVERY:

Recovers flash steam and recompresses it for reuse, minimizing the need for fresh steam generation and **reducing energy consumption by up to 30%**.



ZERO ENERGY LOSS:

Reuses both flash steam and high pressure condensate, ensuring **no energy is wasted throughout the steam system**.



FAIL SAFE OPERATION:

All Critical Operation Components are with redundancy, with **One Working and One Standby** with Smark Auto Switch Controllers.



HIGH RELIABILITY & UPTIME:

German-made sensors* Their precision craftsmanship results in greater reliability and uptime, minimizing the chances of unexpected failures and ensuring smooth operation

*In Selected Models



ENVIRONMENTAL FRIENDLY:

Lowers carbon emissions and supports sustainability goals by **minimizing steam waste** and **optimizing resource use**.



ELECTRICAL VS. STEAM-POWERED PUMP

CRITERIA	ELECTRICALLY OPERATED	STEAM-POWERED
Energy Source	Electric Pumps are pumping Condensate	Steam is Used for Pumping
Operational Efficiency	High efficiency, especially with variable speed control	Potentially less control with pulsating pumping action
Capital Expenditure	Typically Lower as Smaller Dia Cond Piping Pipes	Higher , requires steam piping and Larger Dia Cond Piping
Operation Expenditure	OpEx Cost 1.1 Lacs/Yr Pumping 5 TPH, 9 Rs/kW	OpEx Cost 3.0 Lacs/Yr Pumping 5 TPH, 2 Rs/Kg
Maintenance	Easier to maintain with despread serviceability for electrical components	May require specialized knowledge for steam equipment, with more moving parts to manage
Temperature Handling	Special Pumps Needed for High Temp Condensate Pumping	Handles high temperature condensate
Efficiency in Low Load	Less efficient with low loads	Constant Efficient with low loads
Environmental Impact	Can be powered by renewable electricity , reducing carbon footprint	Steam Waste leading to increased fuel consumption , Higher Carbon footprint

SAVINGS EXAMPLE

Flash Steam and Pressurized Cond Recovery

Integrated recovery of **1 TPH** condensate at **3.5 barg**

Flash at 0.5 bar g, & recompressed to a usable pressure.

Savings in Lacs/Yr

Flash Steam Savings : 8.47

Condensate Recovery Savings : 12.27

Additional Pr Condensate Savings : 2.06

Total Savings: Over Rs. 22.8 lacs/year



SAVINGS CALCULATIONS BREAKUP

FLASH STEAM GENERATION CALCULATION:

The percentage of flash steam generated when hot condensate is released to a lower pressure can be calculated using the formula:

$$\% \text{ Flash Steam Generated} = \frac{(hf1 - hf2) \times 100}{hfg2}$$

hf1 = Enthalpy of water at the higher pressure (kcal/kg)

hf2 = Enthalpy of water at the flashing pressure (kcal/kg)

hfg2 = Enthalpy of evaporation at the flashing pressure (kcal/kg)

Flash Steam Generated at 0.5 Barg : 6.94% of 1000 kg/hr = ~ 69 kg/hr

FLASH STEAM SAVINGS CALCULATION:

Savings from utilizing flash steam can be calculated using:

Coal Cost: Rs. 12 per kg

Operating Hours: 8000 Hrs/ Yr

$$\text{Savings (Rs./hr)} = \frac{\text{Flash Steam Quantity} \times \text{Heat Content} \times \text{Fuel Cost}}{\text{GCV of Fuel} \times \text{Boiler Efficiency} \times \text{Sp Gravity}}$$

$$\begin{aligned} \text{Savings} &= 69 \times (643 - 35) \times 12 / (5,500 \times 0.85 \times 1) \\ &= 107 \text{ Rs/Hr} \\ &= 107 \times 24 \times 330 \end{aligned}$$

$$\text{Annual Savings} = 8.47 \text{ lacs/year}$$

CONDENSATE RECOVERY SAVINGS CALCULATIONS:

Savings for conventional Condensate Recovery can be calculated using:

$$\begin{aligned} \text{Savings} &= (1000 - 69) \times (100 - 35) \times 12 / (5,500 \times 0.85 \times 1) \\ &= 155 \text{ Rs/Hr} \\ &= 155 \times 24 \times 330 \end{aligned}$$

$$\text{Annual Savings} = 12.27 \text{ lacs/year}$$

PRESSURIZED CONDENSATE RECOVERY, ADDITIONAL SAVINGS

Pressurised Condensate Recovery at 0.5 Barg can be calculated using:

$$\begin{aligned} \text{Savings} &= (1000 - 69) \times (111 - 100) \times 12 / (5,500 \times 0.85 \times 1) \\ &= 26 \text{ Rs/Hr} \end{aligned}$$

$$\begin{aligned} \text{Annual Savings} &= 26 \times 24 \times 330 \\ &= 2.06 \text{ lakhs/year} \end{aligned}$$

$$\text{TOTAL SAVINGS} = 22.8 \text{ Lacs/Yr}$$

TECHNICAL DETAILS

	Flash Separator	Jetomat	SteamCon Pump
Size	150 - 400 mm	15 - 300 NB	1000 to 15000 Lit/Hr
Material	Stainless Steel, Carbon Steel	GJS-400-18- LT, Stainless Steel	Stainless Steel Carbon Steel
Pressure Range	0 to 70 bar g	PN 16 to 160	0.5 to 10 barg
Temperature Range	Up to 200°C	-10°C to 350°C	95°C to above 150°C in closed loops
Control System	Automatic, Level Based	Baelz PID/PLC Controller	Automatic, TDS/Level Based



M A D E I N G E R M A N Y



Transmitter



Switch

FLASH SEPARATOR SELECTION

Condensate (kg/hr)	Flash Steam (kg/hr)				
	50	100	200	500	1000
10000	FS350	FS350	FS350	FS350	FS350
5000	FS300	FS300	FS350	FS350	FS350
2500	FS250	FS250	FS300	FS300	
2000	FS250	FS250	FS300	FS300	
1500	FS200	FS250	FS250	FS300	
1000	FS200	FS200	FS250		
500	FS150	FS150			
250	FS150				

STEAMCON SELECTION

		SteamCon (Lit/Hr)								
Motive Barg	Back Pr Barg	15	25	40	50	80	90	100	120	150
3.5	1.5	550	1000	1600	2500	4300	6000	12000	13500	15000
	2.5	471	850	1400	2100	3600	5100	9900	11000	12500
5	1.5	600	1100	1800	2700	4500	6300	12500	14000	15000
	2.5	600	1100	1700	2500	4200	6000	9700	10800	12100

INDUSTRIES WE SERVE



BREWERY



CHEMICAL



CORRUGATOR



DAIRY



F & B



OIL & GAS



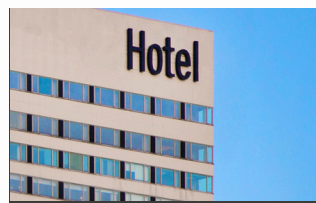
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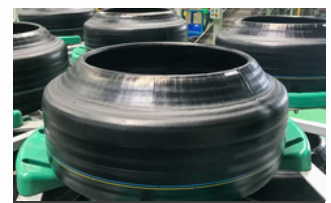
PLYWOOD



HOTEL



TEXTILE



TYRE





Baelz is a **family-owned enterprise** with a long tradition. Based in Heilbronn in south-west Germany, its products, made in Germany, are known for their quality. For **over 125 years** Baelz inventiveness has produced new patents & new developments. Baelz technologies are inspired by the laws of nature & harness the power of innovation to **achieve economical use of energy & resources**.

Due to Baelz's policy of continuous development, the company's **components & products for control, heat & cold engineering** have been installed all over the world.



MORE RESOURCES



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