

Technological Interventions in Low Temperature Heating and Cooling



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Low Temperature Heating

- Industrial Applications (Engineering, Automobile Sector)
 - Degreasing/Washing lines in Paint Shop (40 to 60 Deg C)
 - Ovens (80 to 250 Deg C)
- Commercial Building Applications (Hotels & Hospitals)
 - Hot water (45 to 60 Deg C)

Low Temperature Heating

- Issues:
 - Indirect heating (from 2400 Deg C flame temp to 200 to 50 Deg C)
 - In m.cp. ΔT terms it may look like that we still have same amount of heat.
 - However energy source is now quite degraded. Source temp is almost brought close to sink.

Low Temperature Heating

- Sources of inefficiency
 - Indirect heating
 - Recirculation rate
 - Generation is continuous while consumption is in batches
- Solutions
 - Generation at source (Ex: tubular burners for tank water heating instead of hot water recirculation)
 - Regulating recirculation (Ex: Flow control based on loading on TFH)

Points for Discussion

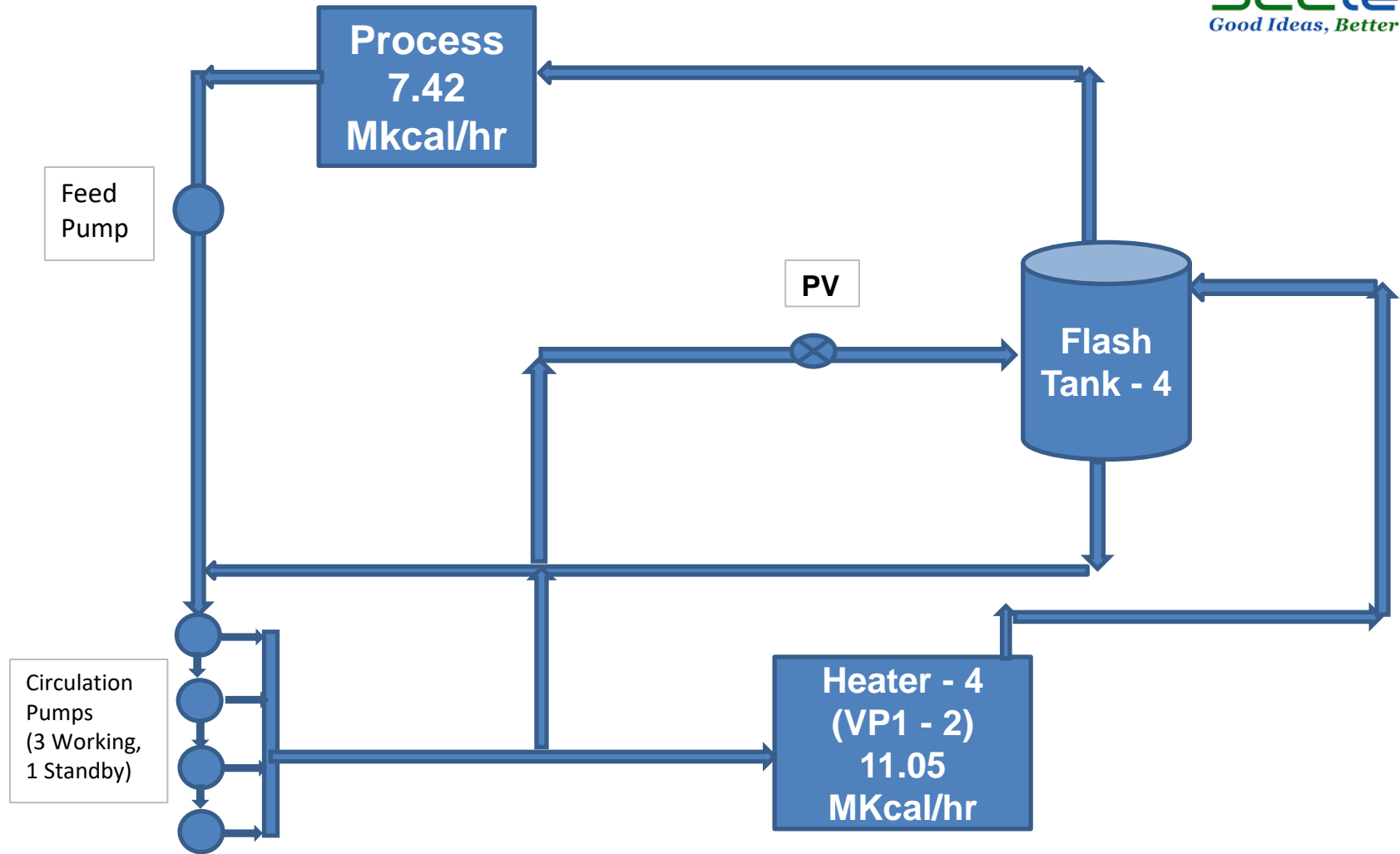
- Lets revisit how we interpret basic laws of thermodynamics & Heat Transfer
 - *Energy can not be created and can not be destroyed. It can be converted from one form to another.*
 - *Heat loss from pipelines is a surface phenomenon (convection & radiation) to be controlled by insulation.*

Points for Discussion



- First one limits us to equipment efficiency.
- Second one limits us to insulation.
- On both fronts there has been lot of work and great achievement.
- However scope for savings is still unaddressed. Probably more than what has been achieved by equipment efficiency.

Case: Heat Loss in Pipeline



Line Losses = 3.63 Mkcal/hr

Case: Heat Loss in Pipeline

Sr. No.	Particulars	Values	Unit
1	Heat Supplied by TFH	11.05	Mkcal/hr
2	Heat Utilized in Process	7.42	Mkcal/hr
3	Total Heat Loss	3.63	Mkcal/hr
4	Heat Loss in Pipeline from Heater Outlet to Flash Tank + Flash Tank	2.20	Mkcal/hr
5	Heat Loss in Pipeline from Flash Tank Outlet to Process Inlet	0.92	Mkcal/hr
6	Heat Loss in Return Pipeline + Recirculation of TF from Flash Tank to Circulation Pump	0.51	Mkcal/hr

Revisiting Interpretation to foster Energy Saving Efforts

- *Energy can not be created and can not be destroyed. It can be converted from one form to another.*
 - *It looks like that in low temperature heating application, **In conversion of energy, it may finally get lost...***
- *Heat loss from pipelines is a surface phenomenon (convection & radiation) to be controlled by insulation.*
 - *Apart from insulation, It looks like that **Heat loss in a pipe is directly proportional to the flow rate...***