Process Design of a Shell and Tube Heat Exchanger

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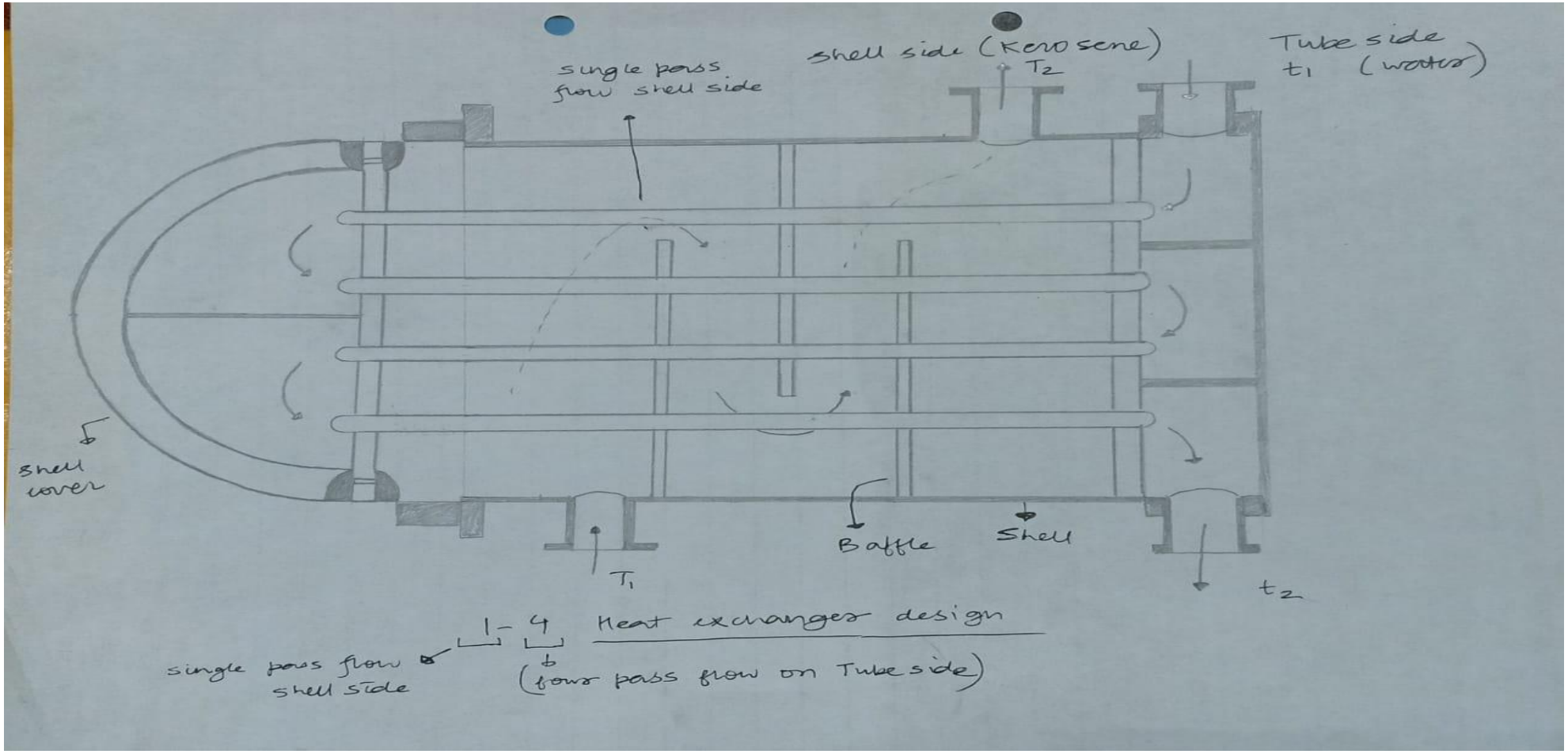
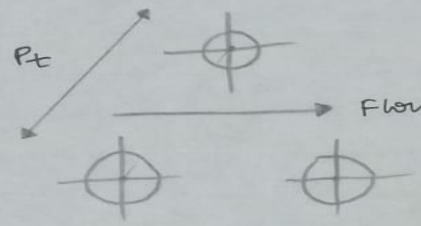
Problem Statement:

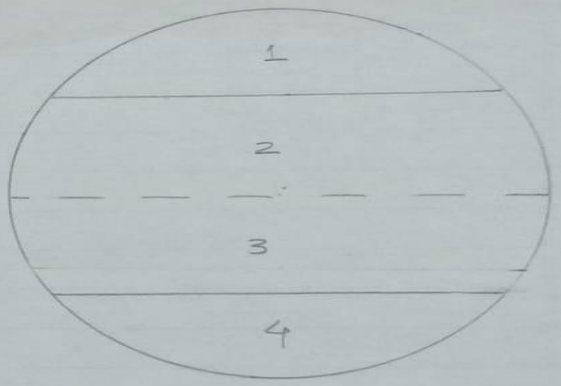
- Kerosene (42º API) is required to be cooled from 110°C to 40°C by supplying cooling water (10º API) stream from 33 °C to 45 °C.
- The maximum pressure drop of 0.7 kg/cm^2 for both streams is permissible.
- Design for a 1-2 shell and tube heat exchanger for this service.
- Flow rate of kerosene: - $\frac{75000}{Z}$+(500×Z) kg/h where Z is our group number.
- Considering 1’’ OD tubes on 1.25’’ triangular pitch, 16 ft length.

Schematics:

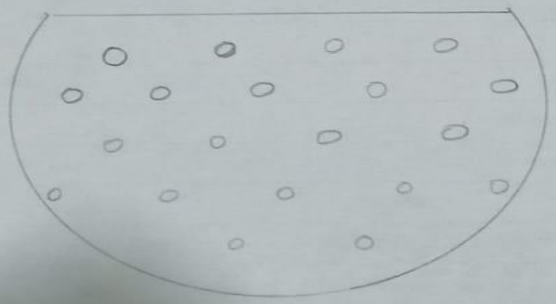

single pass flow shell side
shell side (Kerosene)
T_2
Tube side
t_1 (water)
shell cover
Baffle
Shell
T_1
t_2
1 - 4 Heat exchanger design
single pass flow shell side
(four pass flow on Tube side)



(Tube pattern (Triangular))



(Four pass)



(25% baffle cut)

{ Reference :
Coulson and Richardson

Design Calculations to Follow from the Next Page….