Assignment 5

In this assignment, you will be required to perform the necessary calculations and analyze the results to determine the efficiency of a heat exchanger.

1. A 300°C hot fluid enters a heat exchanger at a rate of 100 kg/s with an heat transfer coefficient of 30 kW/m²K. The cold fluid has an entry temperature of 35°C and an exit temperature of 70°C. The pressure drop in the hot fluid is 500 kPa. What is the outlet temperature of the cold fluid?

2. A heat exchanger is used to cool a stream of water from 20°C to 10°C. The heat exchanger has a heat transfer area of 50 m² and a heat transfer coefficient of 50 kW/m²K. If the flow rate of the water is 500 kg/s, what is the temperature difference across the heat exchanger?

3. A shell-and-tube heat exchanger is used to cool a stream of hot water from 90°C to 40°C. The hot water has a flow rate of 1000 kg/s and a heat transfer coefficient of 40 kW/m²K. If the shell-side area available is 200 m², what is the required shell-side area available?

4. A counter-flow heat exchanger is used to cool a stream of hot water from 80°C to 40°C. The hot water has a flow rate of 1500 kg/s and a heat transfer coefficient of 30 kW/m²K. If the shell-side area available is 150 m², what is the required tube-side area available?

5. A double-pipe heat exchanger is used to cool a stream of hot water from 90°C to 40°C. The hot water has a flow rate of 2000 kg/s and a heat transfer coefficient of 25 kW/m²K. If the shell-side area available is 250 m², what is the required tube-side area available?

6. A heat exchanger is used to cool a stream of hot water from 100°C to 50°C. The hot water has a flow rate of 3000 kg/s and a heat transfer coefficient of 20 kW/m²K. If the shell-side area available is 300 m², what is the required tube-side area available?