T-S Diagram of Rankine Cycle

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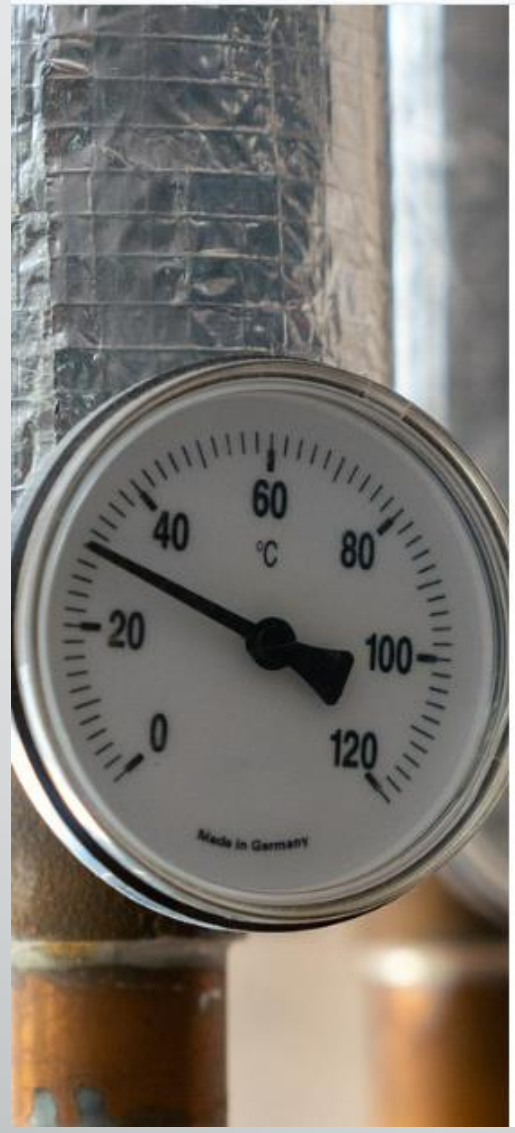


Understanding the T-S Diagram

Introduction to T-S Diagram

The T-S diagram, also known as the Temperature-Entropy diagram, is a graphical representation of the thermodynamic cycle of a system.

Role in Rankine Cycle

In the Rankine Cycle, the T-S diagram helps visualize the heat transfer and work done during each stage of the cycle.

Axes Representation

The horizontal axis represents entropy (S) while the vertical axis represents temperature (T).

Processes in T-S Diagram

The T-S diagram for the Rankine Cycle typically consists of four main processes: compression, heat addition, expansion, and heat rejection.

Importance of T-S Diagram

The area enclosed by the cycle on the T-S diagram represents the net work output of the cycle.

Understanding the T-S diagram is crucial for analyzing the efficiency and performance of the Rankine Cycle.

Key Components of Rankine Cycle

01

Boiler

Heats the working fluid (typically water) to its boiling point

Generates high-pressure, high-temperature steam

02

Turbine

Receives high-pressure, high-temperature steam from the boiler

Converts thermal energy into mechanical energy by expanding the steam

03

Condenser

Cools and condenses the exhaust steam from the turbine into liquid form

Transfers heat to a cooling medium (usually water or air)

04

Pump

Pressurizes the condensed liquid (condensate) to the boiler pressure

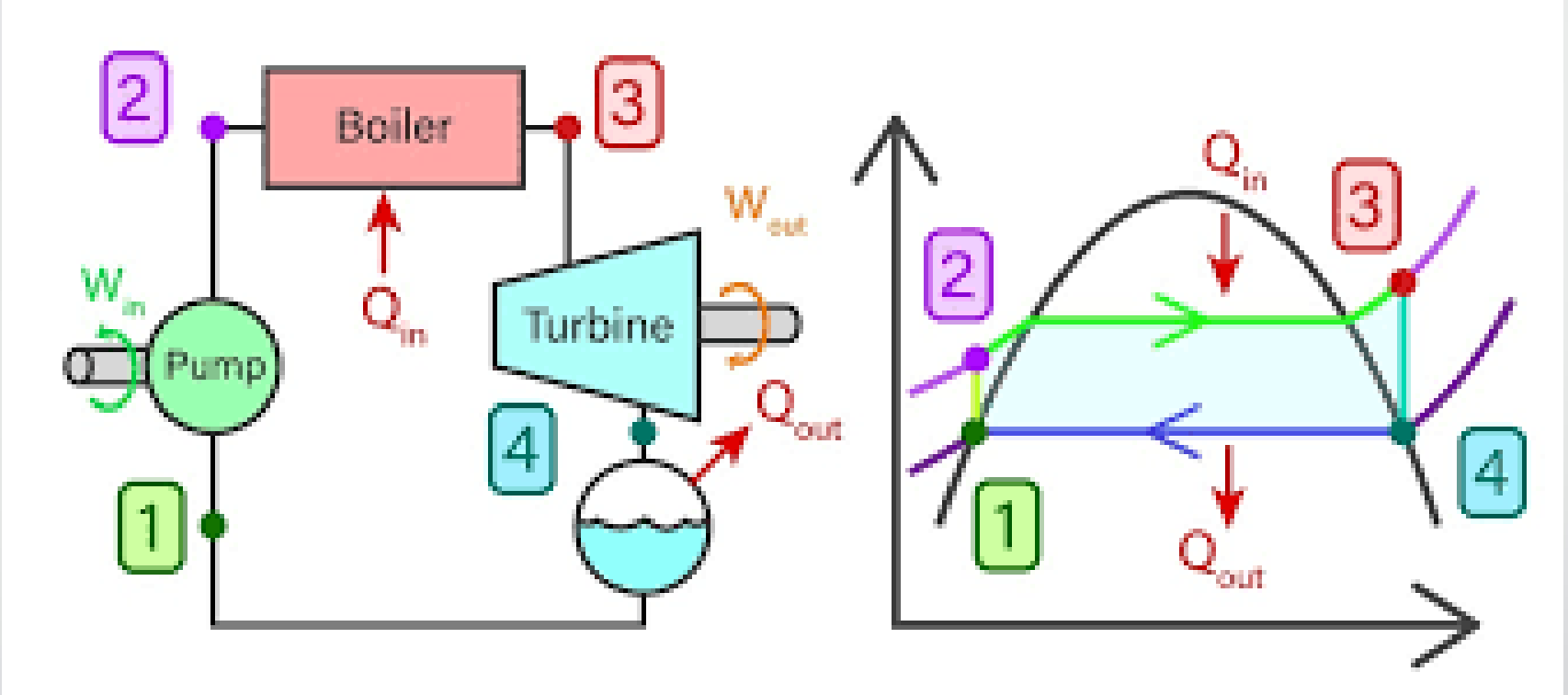
Feeds the pressurized liquid back into the boiler to complete the cycle

05

Heat Exchanger

Improves overall efficiency of the cycle

Preheats the feedwater using the heat from the condensed steam before it enters the boiler


2
Boiler
3
W_out
W_in
Q_in
Turbine
Pump
4
Q_out
1
Q_in
3
2
4
1
Q_out