



Example 4.5

Steam at 1 MPa, 600°C, expands in a turbine to 0.01 MPa. If the process is isentropic, find the final temperature, the final enthalpy of the steam, and the turbine work.

Solution:

mass balance: $\dot{m}_1 = \dot{m}_2 = \dot{m}$

energy balance

$$\dot{E}_{in} = \dot{E}_{out}$$

$$\dot{m}_1 h_1 = \dot{m}_2 h_2 + \dot{W}_{out}$$

$$\dot{W}_{out} = \dot{m} (h_1 - h_2)$$

State 1

$$\left. \begin{array}{l} P_1 = 1 \text{ MPa} \\ T_1 = 600^\circ \text{C} \end{array} \right\} \begin{array}{l} \text{sup erheated} \\ h_1 = 3698.6 \frac{\text{kJ}}{\text{kg}} \\ s_1 = 8.0311 \frac{\text{kJ}}{\text{kg}\cdot\text{K}} \end{array}$$

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JS Bruner



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