

HOMEWORK PROBLEM: Flow Exergy HW#1

Given: A superheat power cycle with states as indicated on the diagram below. The environment is at $T_0 = 300$ K and $P_0 = 100$ kPa. Cooling water is used to remove heat from the condenser.

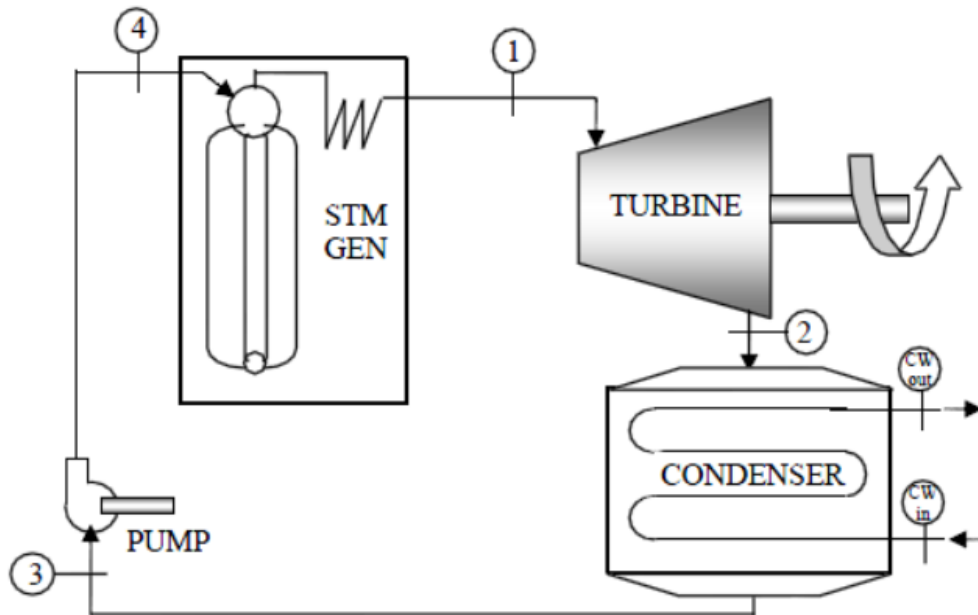


Figure 1: Cycle components

Determine: the intensive flow exergy a_f for each of the states below. If you cannot calculate the value, state why it is not possible.

You can summarize the answers in the table below, but you must show your calculations on a separate page as in a standard homework solution.

Solution: Standard assumptions can be applied. Each component is steady-state and changes in kinetic and potential energies can be neglected. Turbomachinery can be assumed adiabatic; and pressure drops in the heat exchangers can be neglected.

Table 1: Properties at various states

State	P [bar]	T [°C]	h [kJ/kg]	s [kJ/kg-K]	a_f [kJ/kg]	Notes
0	1	27				
1	80	480	3348.4	6.6586		
2s	0.08		2082.9	6.6586		
2	0.08		2272.7			
3	0.08		173.88			
4s	80		181.94			
4	80		185.39			$T \sim T_{sat} @ h; s \sim s_f @ T$
CW in		15	62.99			$s \sim s_f @ T$
CW out		35	146.68			$s \sim s_f @ T$