EXAMPLE: Cold air-standard Otto cycle

A reciprocating device operating at 6000 rpm is modeled as a **cold-air-standard** Otto cycle with a compression ratio of 8.5 and a displacement of 0.005 m^3. Before the adiabatic compression, the air is at 120 kPa and 40°C. After the constant volume heat addition, the air is at 950°C. Use c_v = 0.713 kJ/kg-K and c_p = 1.001 kJ/kg-K.

(a) Sketch the cycle on *P-v* and *T-s* diagrams.
(b) Find the heat transfer and work (per unit mass) for each process in kJ/kg.
(c) Find the net work (per unit mass) and the efficiency of the cycle.
(d) Find the power delivered by the device in kW.