Turn in today! Hu. Quiz on Friday.

Given: RPM, V_0, p, g, h_3

Diesel

\[ M_{\text{in}} = W_{2c} = \text{Diesel fuel} \]

\[ M_{\text{amb}} = \frac{W_2 + W_t}{\text{Air}} \]

\[ W_t = M_1 W_1 T_3 \rightarrow \text{Watch out!} \]

Given: h_3, h_2, C_p(T_3 - T_0)

\[ T_2 = T_1 \cdot \frac{k_i}{k_i - 1} \]

\[ V_c = \frac{V_3}{V_2} \cdot \frac{T_3}{T_2} \]

Since \( P_3 = P_2 \)

\[ W = \left( \frac{\text{RPM}}{60} \right) \frac{7}{2} \cdot \frac{P V}{RT_i} \]

\[ V_3 = V_i \cdot (1 - \frac{1}{k_i}) \]

2-3: in general

\[ Q_{2-3} = h_{2-3} = h_3 - h_2 \]

2-3: constant P

\[ Q_{2-3} = P (h_{2-3} - h_2) \]

\[ P_{2-3} = P_{2-0_3} = P_2 U_2 - P_{0_3} U_2 \]

\[ W = \text{cut} P_0 \]

So: for a const P process: \( Q_{2-3} = h_{2-3} = h_2 \)

Gas turbine: Non-ideal compressor + turbine

Compressor: 1-2S: Isothermal process to \( P_2 \)

1-2A: Real (irreversible) process to \( P_2 \)

Will always involve working two problems.

1. Ideal process
2. Actual process

\[ \text{ideal (assure IG, const } p) \]

\[ T_{2S} = T_1 \cdot \left( \frac{P_2}{P_1} \right)^{\frac{k_i}{k_i - 1}} \]

\[ W_{c,2s} = C_p (T_2 - T_{2s}) \]

\[ \text{actual: } M_c = \frac{Q_{2s}}{W_{c,2s}} \Rightarrow W_{c,2s} = \frac{Q_{2s}}{M_c} \]

\[ W_{c,2s} = C_p (T_2 - T_{2s}) \]

\[ \frac{Q_{\text{in}}}{h_3 - h_2} = C_p (T_3 - T_{2s}) \]

Recall: compare irreversible process between two sides to a reversible process between same two sides. Think of always have \( W_{\text{rev}} > W_{\text{irrev}} \) in deciding how magnitudes compare.