$$L_{OUT}^{TIR} = \int pdV$$

$$\Delta V = Mc_v\dot{(}T_2 - T_1)$$

$$R = \frac{R*}{M_m}$$

$$C_v = \frac{N_{GDL}}{2} \cdot R$$

$$\Delta S_{GAS} = M\left(c_v \ln\left(\frac{T_2}{T_1}\right) + R\ln\left(\frac{V_2}{V_1}\right)\right)$$

$$= M\left(c_p \ln\left(\frac{T_2}{T_1}\right) - R\ln\left(\frac{P_2}{P_1}\right)\right)$$

$$S_Q^{OUT} = -\frac{Q^{IN}}{T_{SERB}}$$

$$L_{OUT} = L_{DIL} - L_{DISS}$$

$$X = \frac{v - v_{LC}}{v_{VS} - v_{LS}}$$

$$R_{CONV} = \frac{I}{hA}$$

$$R = \left[\frac{K}{W}\right], \quad r = \left[\frac{Km^2}{W}\right]$$

$$\dot{m} = \rho\omega A$$

$$\dot{m} = \rho V$$

$$T_i = T_0 - \dot{Q}\sum_0^i R$$

$$n = \frac{c_X - c_P}{c_X - c_V}$$

$$pv^n = cost$$

$$L_{OUT}^{ISOBARA} = P\Delta V$$

$$H = PVU$$

$$dh = cdt + vdP$$

$$ds = c\frac{dT}{T}$$

$$T(t) = T_\infty + (T_0 - T_\infty)^{e^{-\frac{t}{T}}}$$

$$\tau = \frac{Mc}{hA_{SCAMBIO}} \quad = \frac{\rho V c}{hA}$$

$$t = -\frac{\rho c V}{hA}\ln\left(\frac{T(t) - T_\infty}{T(0) - T_\infty}\right)$$

$$L_c = \frac{V}{A_{SCAMBIO}}$$

1 Costanti

$$M_m^{ARIA} = 28.9 \quad \left[\frac{Kg}{Kmol}\right]$$

$$M_m^{O2} = 32 \quad \left[\frac{Kg}{Kmol}\right]$$

$$M_m^{ELIO} = 4 \quad \left[\frac{Kg}{Kmol}\right]$$

$$M_m^{AZOTO} = 28 \quad \left[\frac{Kg}{Kmol}\right]$$

$$M_m^{ACQUA} = 18 \quad \left[\frac{Kg}{Kmol}\right]$$

$$P_{AMBIENTE} = 10135 \quad Pa$$

$$N_{TUBI} = \left\lceil \frac{\dot{m}}{\rho\overline{w}Sez} \right\rceil$$

2 New section to be retitled

$$Re = \frac{w_\infty \rho L}{\mu} \quad = \frac{w_\infty L}{\nu}$$

$$P_R = \frac{\mu_c}{k}$$

$$B_i = \frac{hL_c}{k_{MATERIALE}} \ll 0.01$$

$$Nu = cRe^m Pr^{\frac{1}{3}}$$

$$Re_{CR} = 5^{10^5} \quad = 50000$$

$$\nu = \frac{M}{\rho}$$

$$L_c = L_g \frac{t}{2}$$

$$m = \sqrt{\frac{hP}{k_s Sez}}$$

3 Liquidi ideali

$$du = CdT$$

$$dh = CdT + vdP$$

$$ds = C \ln \frac{T_2}{T_1}$$

In una trasformazione ISOBARA

$$q_{in} = \Delta h$$

4 Conduzione

Flusso termico

$$\dot{q} = \frac{\dot{Q}}{A}$$

Legge Fourier che descrive flusso termico

$$\dot{q} = -k\frac{dT}{dx}$$

Conducibilitá Termica

$$k = \lambda = \frac{\dot{q}L}{\Delta T}$$

Conservazione dell'energia

$$\frac{d\dot{q}}{dx} = -\rho c \frac{dT}{dt}$$

Equazione generale della Conduzione

$$\frac{\partial}{\partial x}\left(k\frac{\partial T}{\partial x}\right) = \rho c \frac{dT}{dt}$$

$$R_{COND}^{LASTRAP.} = \frac{S}{KA}$$

$$R_{COND}^{CIL} = \frac{\ln\left(\frac{r_e}{r_i}\right)}{2\pi KL}$$

Potenza Termica

$$\dot{Q} = \frac{\Delta T}{R_{TOT}} \quad \text{Potenza Termica}$$

$$\dot{q} = \frac{\Delta T}{r_{TOT}} \quad \text{Flusso Termico}$$

5 Coefficiente globale di scambio termico interno

$$\frac{1}{U_i} = \frac{1}{h_i} + \frac{D_i \ln\left(\frac{D_e}{D_i}\right)}{2k} + \frac{1}{h_c}\frac{D_i}{D_e}$$

6 Differenza media logaritmica

$$\Delta T_{ML} = \frac{\Delta T_{Sn} - \Delta T_{Dx}}{\ln\left(\frac{\Delta T_{Sn}}{\Delta T_{Dx}}\right)}$$