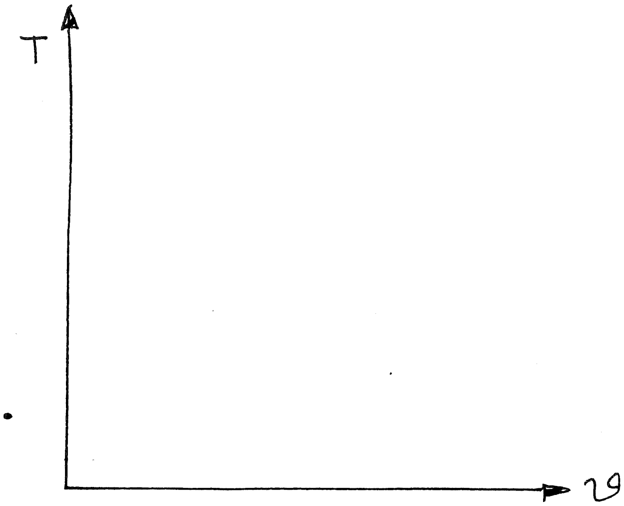


- NOW REPLACE _____ WITH _____.

¡ALL THE TRENDS ARE THE SAME!

¿ But why do we care ?

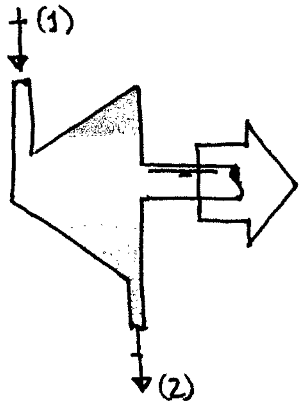
ENTROPY ACCOUNTING

$$\frac{d}{dt}(S_{sys}) = \sum \frac{\dot{Q}_{in}}{T_b} + \sum_{in} \dot{m} s - \sum \dot{m}_{out} s + \dot{S}_{gen}$$

CLOSED SYS., FINITE TIME + INTERNALLY REVERSIBLE	OPEN, S-S SYS, 1 INLET & 1 EXIT + INTERNALLY REVERSIBLE
PICK SYSTEM SO THAT $T_b = T_{sys}$	PICK SYSTEM SO THAT $T_b = T_{sys}$

* BE SURE TO LABEL THE PHASES & SHOW LINES of CONST. P.

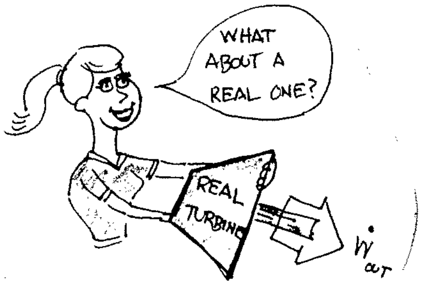
LET'S RE-EXAMINE THE TURBINE IN THE LAST EXAMPLE.



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

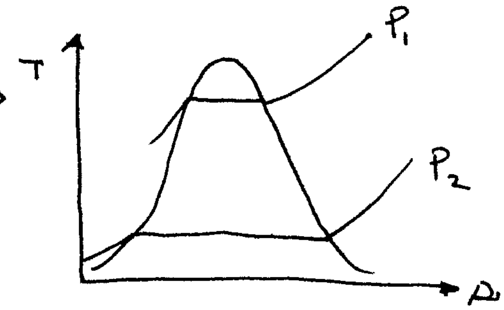
CoE w/
•
•

SINCE *Adiabatic, reversible* $\Rightarrow$ ________



BEST CASE

____



WRITE S-Acct'ing FOR A *REAL* (i.e., ADIABATIC BUT IRREVERSIBLE) TURBINE

$$\frac{dS_{sys}}{dt} = \sum \frac{\dot{Q}}{T_b} + \sum_{IN} \dot{m}s - \sum_{OUT} \dot{m}s + \dot{S}_{GEN}$$

$s_{2,ACTUAL} =$

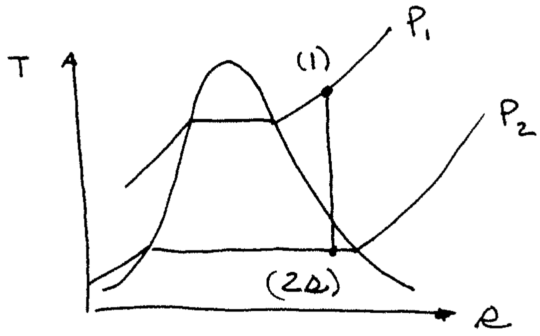
$>, <, = s_{2,IDEAL}$

$\therefore \quad h_{2,ACTUAL} = h(P_2, s_{2,ACTUAL} \quad s_{2,IDEAL})$

$>, <, = h_{2,IDEAL}$

$\therefore \quad \dot{W}_{OUT,ACT} = \dot{m}(h_1 - h_{2,ACTUAL})$

$>, <, = \dot{W}_{OUT,IDEAL}$



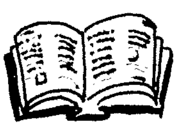
ACTUAL TURBINE

(2s) SIGNIFIES ____________ (IDEAL) TURBINE

(2) " ____________ "

------ WHY THE DASHED LINE FOR THE ACTUAL TURBINE?

ANS:

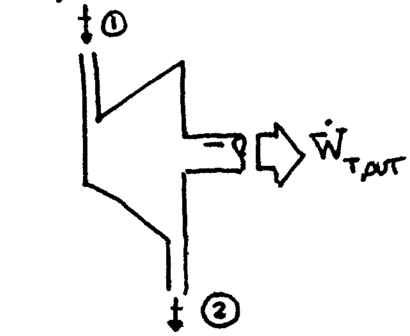


LET US DEFINE, THEN

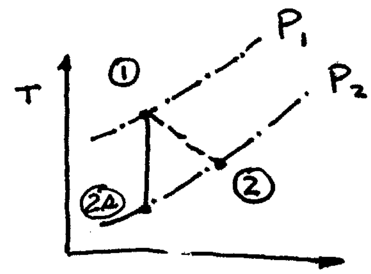
$\eta_T \equiv$ ____________

ISENTROPIC (A.K.A ADIABATIC) EFFICIENCIES

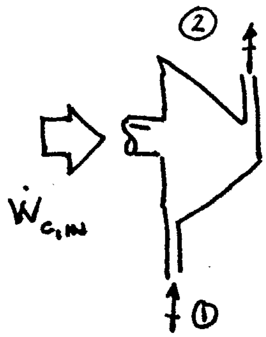
TURBINE



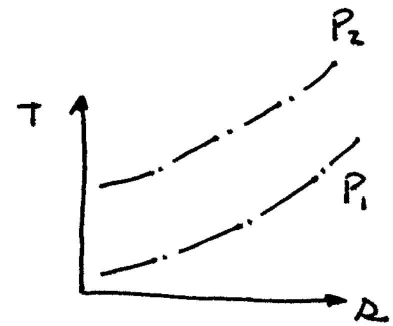
$$\eta_T \equiv \frac{\dot W_{out}}{\dot W_{out,s}} = \frac{\dot m (h_1 - h_2)}{\dot m (h_1 - h_{2s})}$$



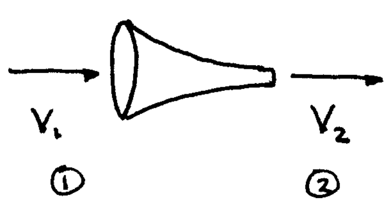
COMPRESSOR



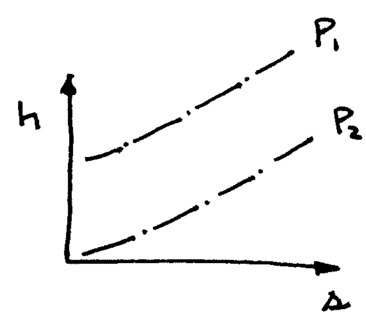
$$\eta_C \equiv \frac{\dot W}{\dot W} = \underline{\qquad\qquad\qquad}$$



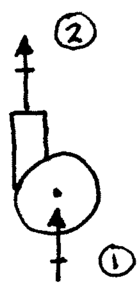
NOZZLE



$$\eta_N \equiv \frac{\Delta KE}{\Delta KE_s} = \underline{\qquad\qquad\qquad}$$



PUMP



$$\eta_P \equiv \underline{\qquad\qquad} = \underline{\qquad\qquad\qquad}$$