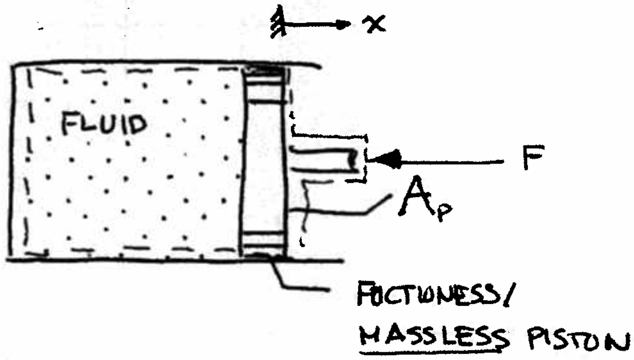
CAMPAD 22-141 50 SHEETS 22-142 100 SHEETS 22-144 200 SHEETS

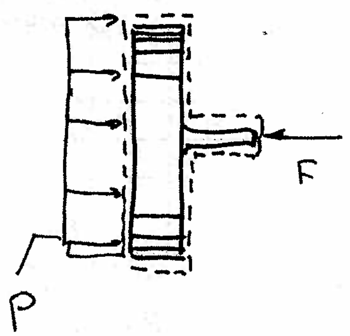
COMPRESSION/EXPANSION WORK



$$W_{IN,1-2} = \int_{\bar{s}_1}^{\bar{s}_2} \vec{F} \cdot d\bar{s}$$

$$= -\int_{x_1}^{x_2} F \, dx$$

MAKE PISTON SYSTEM



OR SAY V=0 ALWAYS

CoLM x-DIR

$$\frac{d}{dt}\left(\mathbb{P}_{SYS,x}\right) = \sum F_x + 0 - 0$$

$$\frac{d}{dt}(0!) = PA_p - F$$

$$F = PA_p$$

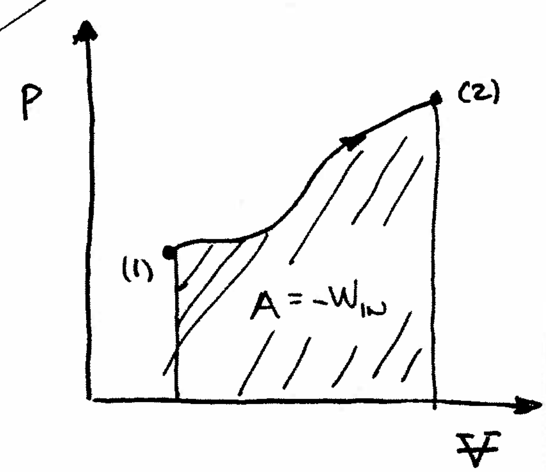
QUASIEQUILIBRIUM

THUS

$$W_{IN,1-2} = \int_{x_1}^{x_2} -(P A_p) \, dx$$

$A_p \, dx \Rightarrow d\forall$

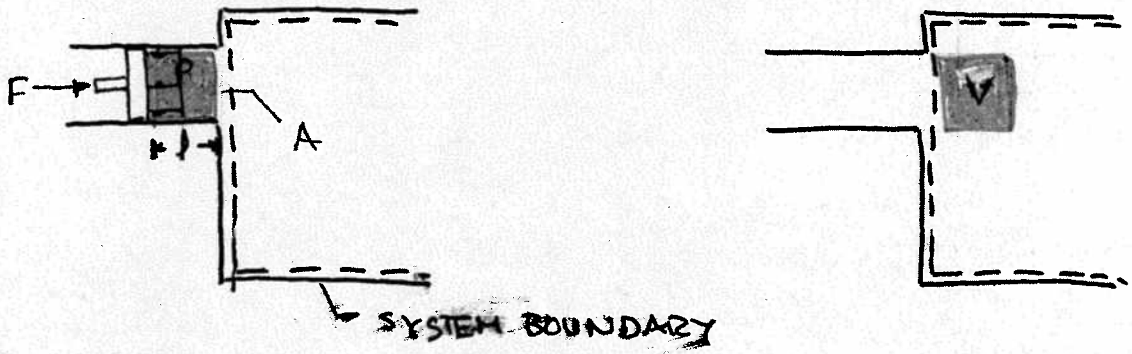
$$= -\int_{\forall_1}^{\forall_2} P \, d\forall$$



- COMP/EXP. WORK
- IN TERMS of *System properties only*!

Flow Work & Enthalpy

• WORK REQUIRED TO PUSH MASS INTO (OUT of) SYSTEM:



$F = PA$

$W_{FLOW} = FL = PA\ell = P\forall$

$$\frac{W_{FLOW}}{m} = P\,v$$

SPECIFIC VOLUME $v = \frac{\forall}{m}$

$$\frac{d}{dt}(E_{sys}) = \dot{Q}_{IN,NET} + \dot{W}_{IN,NET} + \sum_{IN} \dot{m}\left(u + \frac{V^2}{2} + gz\right) - \sum \dot{m}\left(u + \frac{V^2}{2} + gz\right)$$

$\dot{W}_{IN,NET} = \dot{W}_{IN,NON\text{-}FLOW} + \dot{W}_{IN,FLOW}$

$\dot{W}_{IN,FLOW} = \dot{m}(pv)$ ← HEY! → $u + pv \equiv h$

SPECIFIC ENTHALPY

$$\frac{d}{dt}(E_{sys}) = \dot{Q}_{IN,NET} + \dot{W}_{IN,NET,\ NON\text{-}FLOW} + \sum_{IN} \dot{m}\left(h + \frac{V^2}{2} + gz\right) - \sum_{OUT} \dot{m}\left(h + \frac{V^2}{2} + gz\right)$$

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