→ For the last few weeks we've discussed power cycles. Systems that utilize heat from a high temperature source to produce useful work. We last discussed the ideal Stirling cycle ⇒ which can run an engine off of the heat of a hand. If this cycle is ideal and if the flows occurred @ constant entropy, this would become the reversible Carnot Cycle. ⇒ What would happen if we reversed the Stirling Engine?

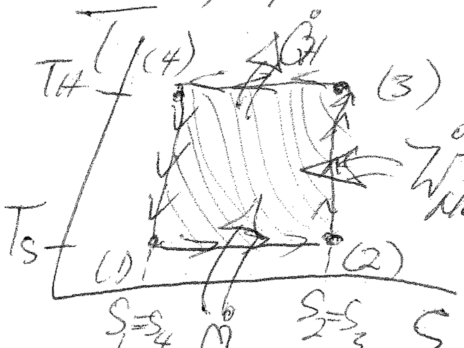
Carnot Cycle in reverse

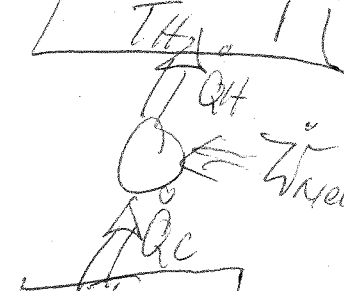
1→2) Reversible, isothermal expansion @ T_C.

2→3) Reversible, adiabatic compression from T_C to T_H

3→4) Reversible, isothermal compression @ T_H

4→1) Reversible, adiabatic expansion from T_H to T_C





Entropy balance from 1→2

$$S_{in} + S_{gen} = S_{out} + \Delta S_{stored}$$

$$\frac{Q_{in}}{T_C} = m(S_2 - S_1)$$

Balance from 3→4: $\underset{0}{S_{in}} + \underset{0}{S_{gen}} = S_{out} + \Delta S_{stored} \Rightarrow 0 = -\frac{Q_{out}}{T_H} + m(S_4 - S_3)$

Really though does this happen???

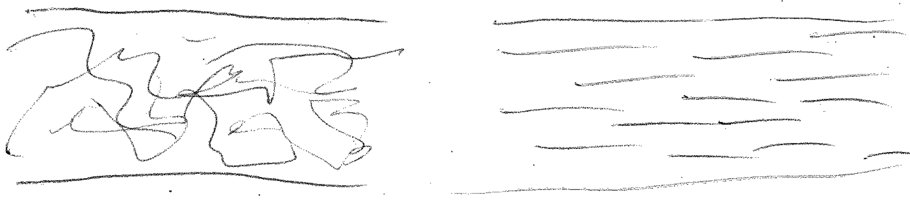
Change in entropy @ constant temperature requires heat transfer!

29.2 ME301 Sp 2011

→ Pass out Rubberbands

which state of the rubberband

relaxed ~~stretched~~



Stretched State has Lower entropy than the relaxed state

So going from relaxed to stretched: $0 = \frac{Q_{out}}{T_H} + m(s_4 - s_3)$

Requires heat rejection @ T constant

Try it with Rubberband

→ Isn't this just friction?

Going from stretched to relaxed: $\frac{Q_{in}}{T_C} = m(s_2 - s_1)$

Requires heat input @ T constant

→ This cannot be explained by friction!!!

→ Could this be used for something useful?

→ Show Picture → Show Movies → Rubberband heat engine

~~But really → more practical cycles~~

→ Basically, ~~[illegible]~~ all you need to create a refrigerator is a change in entropy.

→ Change in phase/state, → Magnetic field, → Chemical concentration