

Chapter 6 Question #4

Consider a combustor and a compressor. Which types of work occur?

<u>Case</u>	<u>Combustor</u>	<u>Compressor</u>
1)	shaft & flow	shaft & flow
2)	none	shaft & flow
3)	flow	shaft
4)	flow	shaft & flow
5)	none	shaft

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Chapter 6 Question 4 Answer:

(4) The combustor has flow work, the compressor has shaft and flow work

There is no external work in a combustor, but the temperature changes significantly. Since flow work = $p_2v_2 - p_1v_1 = R(T_2 - T_1)$ for an ideal gas, then there must be flow work in the combustor. For a quasi-static, adiabatic compressor there is shaft work and flow work. We know there is shaft work, how do we know there is flow work? Well only if the process ends up at the same temperature as it started would the flow work be zero. For a quasi-static adiabatic compressor, $pv^\gamma = \text{constant}$ so the temperature increases.

Class Response (2003):

