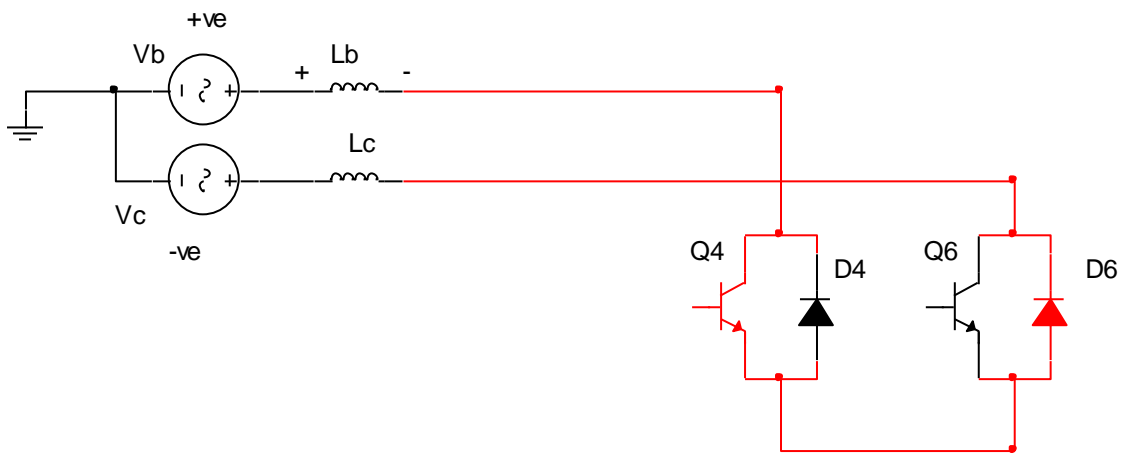
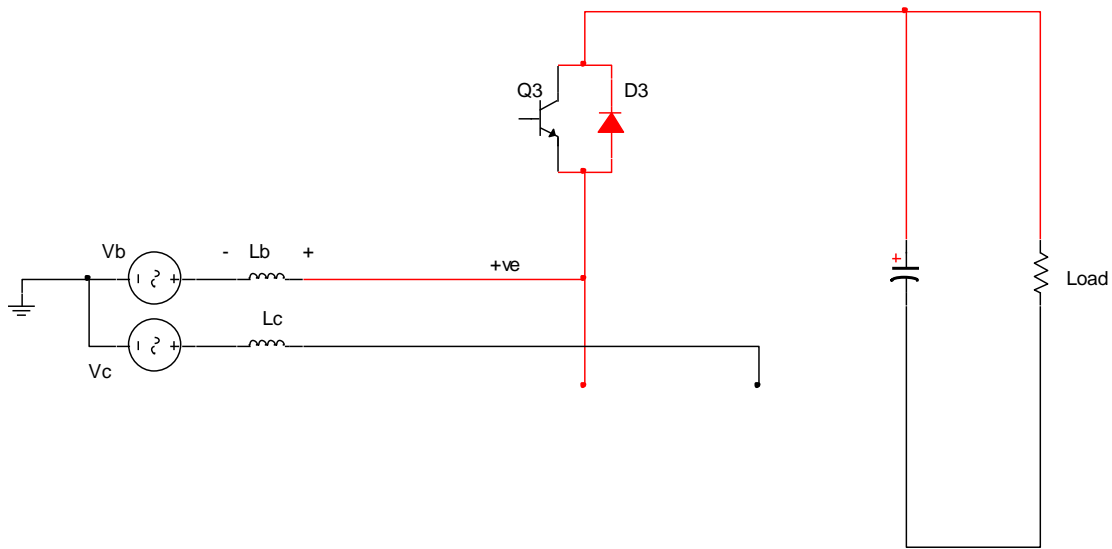


The basic circuit of an IGBT (OK I used a standard NPN transistor – sue me) active rectifier.

This is going to be a fairly simple – hand waving explanation. Looking at the above diagram it can be seen that if the DC voltage is not higher than the peak Line – Line voltage of the upstream voltage, then the rectifier would operate as a standard 6 pulse rectifier, with the diodes turning on and the IGBTs not doing much. If the DC voltage is higher than the Line – Line voltage then the diodes are reversed biased. It works just like a boost circuit, energy is stored and released in the inductors.



The firing – stage 1. $V_b - V_c$ is positive. The IGBT Q4 is turned on. Current flows from Vb, through Lb, Q4, D6 (which is forward biased), Lc and back to Vc. As this current is flowing. Whilst this is happening a voltage is being built up across the inductors opposing the current – Lenz’s law. So in stage 1 of the firing energy is being stored in the inductors.



Stage 2. The IGBT $Q4$ has turned off. The energy in L_b then transfers via $D3$ to the DC link.