Subject: Re:thank you for your offer
Posted by mpeg2 on Fri, 31 Mar 2006 15:43:13 GMT
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Although I now work in the Digital Television field, my background is in materials engineering. I've been following some of these discussions of cryogenically treating components with a sense of amusement - especially, since I've yet to see any discussion by anyone that understands the temperature effect of transformations in metals and semiconductors. If one examines phase diagrams for many of the materials and alloys being discussed, they will quickly note that the phase transitions all take place at elevated temperatures - there are none in the cyrogenic region. This means that there will be no change in crystalline structure of the materials upon cooling to LN2 temps. Other affects - such as removing imperfections (dislocations, point defects) are very temperature sensitive. The kinetics basically say that at these temperatures the defects will be frozen in place - not removed as is being suggested.There are noticeable effects of low temperatures on many materials (for example, the classic liberty ship cracking - or the samauri sword issues in mainland China during winter) - but these are due to a ductile/brittle transition in ferrous metals - impeding dislocation movement. Mechanical properties under stress are affected - not electrical properties that remain after return to room temperature.The notion that the atomic bonds weaken at low temperatures is actually backwards. Annealing of defects will take place at high temps, not low (just look at the kinetics). A good example of this is the quenching process for many materials. High temperature treatment can induce mucleation of new grains. If the material is cooled slowly, then the grains can grow, leading to a softer material. If it is instead quenched at a high cooling rate, then the fine grained structure is frozen in place. Increases in the rate of cooling and decreases in the final temperature increase the fineness of the structure. This is the opposite of what is often claimed.From a materials engineering viewpoint, I'd find it highly suspect that there'd be any changes in tube materials, copper or especially semiconductors from a cryogenic treatment. Rich