Fractography Solutions - All images from ASM Vol 12, 9th edition

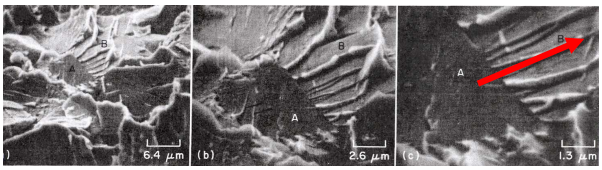

Figure 1 – (ASM p175) AISI 1040 steel should be ductile, but this is a brittle fracture. River patterns indicate direction of crack propagation. Brittle fracture likely occurred due to cold temperature during failure. (Notched test specimen tested at -196C)

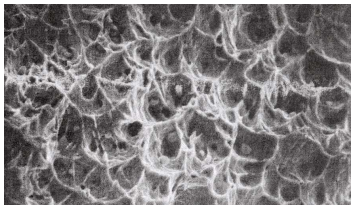

Fig 2 – (ASM p173) Ductile fracture of copper. The equiaxed dimples are consistent with tensile load.

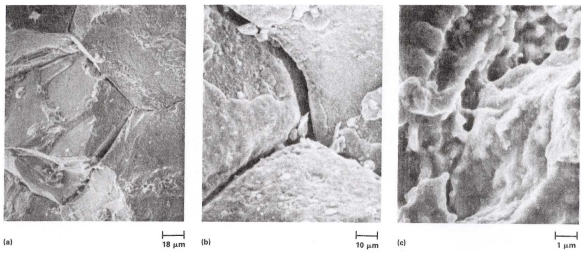

Fig 3 – (ASM p26) Intergranular cracking is consistent with many types of failure mechanisms. These happen to be creep fractures of Inconel 625, Incoloy 800, PE-16-grain boundary cavitation.

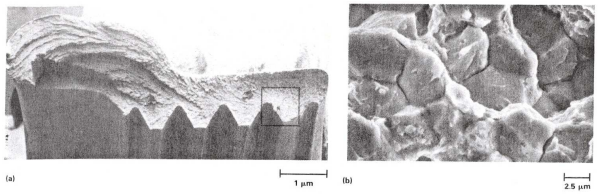

Fig 4 – (ASM p24) AISI 8740 is a high strength steel (>150ksi, 40RHC) and is therefore highly susceptible to hydrogen embrittlement. Intergranular cracking is consistent with hydrogen embrittlement. Likely cause was inadequate baking after cad plating.

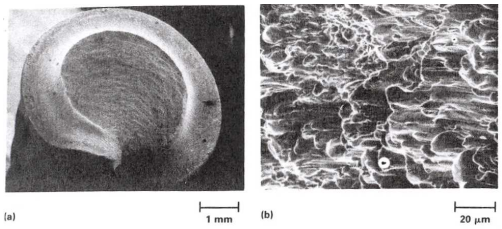

Fig 5 – (ASM p6) elongated dimples indicate shear failure. It appears the screw failed due to shearing and not tensile overload.

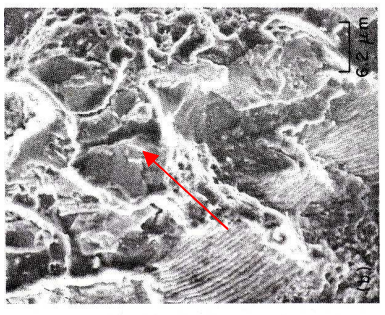

Fig 6 – (ASM p177) Intermingled ductile dimples and fatigue striations indicate fatigue loading followed by larger overload. Based on striation spacing, the growth rate was about $7X10^{-7}$ m/cycle. Crack direction is indicated by the arrow (most likely the ductile failure was preceded by the fatigue cracking).