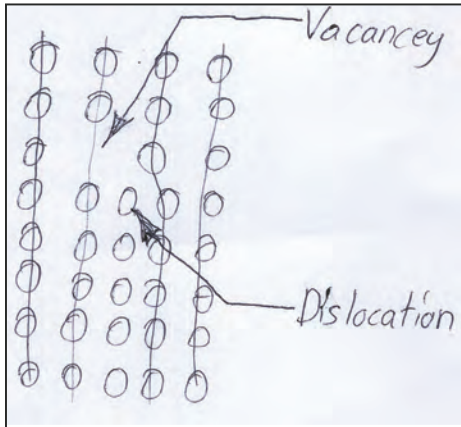


Science of Metals

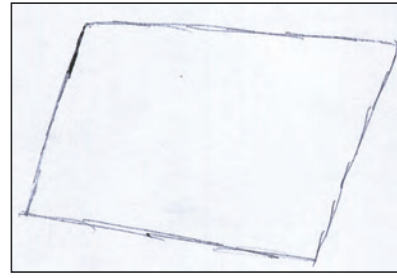
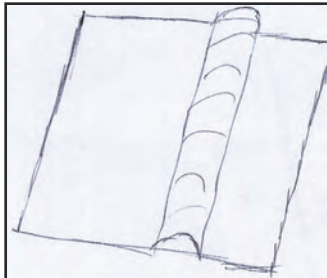
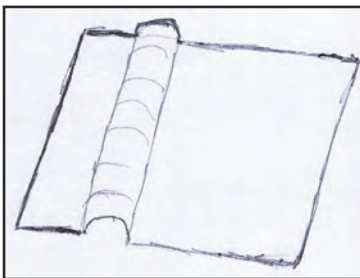
How metals move, strengthen, and fail

Due to the placement of aligned atoms in rows, slip planes or artificial lines of weakness make it possible for movement of atoms. Slip planes have defects that create the possibility of incremental movement. There are two types of defects. Point defects are known as vacancies or missing atoms in the aligned rows.

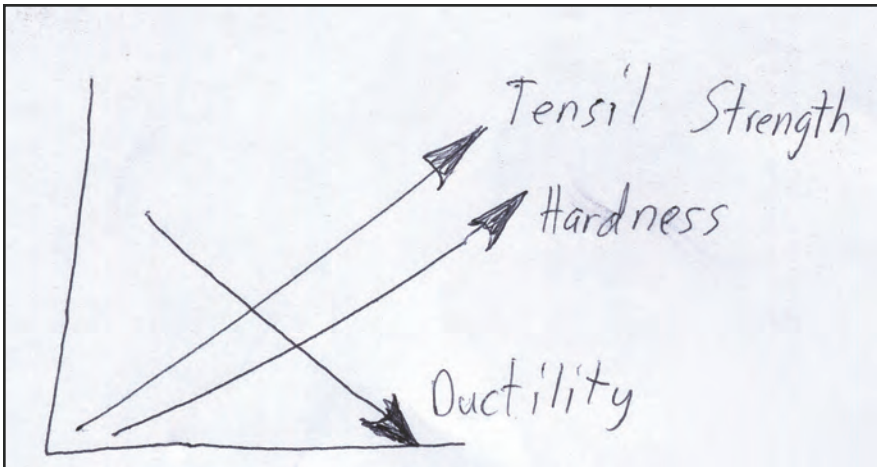


These cause smaller amounts of movement. The second is known as a Line defect. Line defects have dislocated atoms that cause two atoms to move to the same place at once. They create an extra row of atoms. This type causes larger incremental movement. When two atoms intersect an action that is known as a pin occurs.

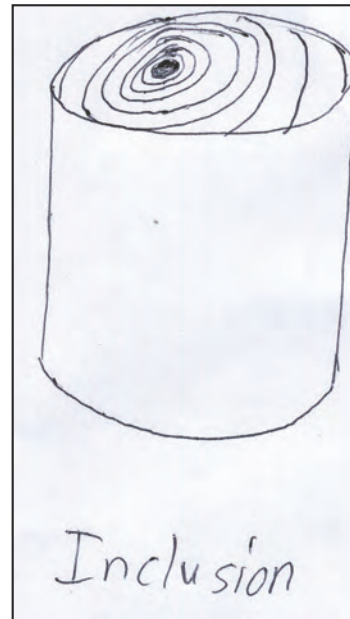
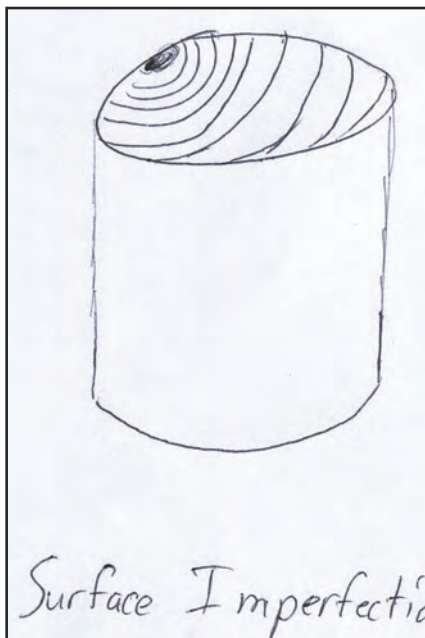
"Carpet analagey"



Cold working metal is used to strengthen metals. Strengthening Mechanisms use up slip systems by pinning them and making the metal stronger. There are tree types of Strengthening Mechanisms: work hardening, strain hardening, and age hardening.



Metals break or fail for two reasons. One way is from surface imperfections. These are notches on a metals surface that causes a point to where they may break.



The other is inclusions inside metals. These failing points are caused by "junk" inside the metals causing a weakness internally. The "junk" could be oxides, molecules, or inter-metallic compounds.