

Engineering: dislocation and deformation analysis



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Consider edge dislocations of opposite sign and having slip planes that are separated by several atomic distances. Briefly describe the defect that results when these two dislocations become aligned with each other. When the two edge dislocations become aligned, a planar region of vacancies will exist between the dislocations.

7. 12 Consider a metal single crystal oriented such that normal to the slip plane and the slip direction are at angles 60° and 35° with the tensile axis.

If the critical resolved shear stress is 6 MPa will an applied stress of 12 MPa cause the single crystal to yield? If not, what stress will be necessary? Since the resolved shear stress is less than the critical resolved shear stress, the single crystal will not yield.

7. 19 List the four major differences between deformation by twinning and deformation by slip relative to mechanism, conditions of occurrence, and final result.) With slip deformation there is no crystallographic reorientation, whereas with twinning there is a reorientation

2) For slip, the atomic displacements occur in atomic spacing multiples, whereas for twinning, these displacements may be other than by atomic spacing multiples

3) Slip occurs in metals having many slip systems, whereas twinning occurs in metals having relatively few slip systems

4) Normally slip results in relatively large deformations, whereas only small deformations result for twinning.

7. 39 An undeformed specimen of some alloy has an average grain diameter of 0.050 mm .